9.2 Recommendation

In order to realize a smooth implementation of the Project and to ensure adequate operation and maintenance of the project facilities, it is recommended to strengthen the organization staff for operation and maintenance of the godowns, especially in the field of grain quality control with fumigation. Presently, no well trained staff for this purpose is available in IMUCU and NJOLUMA. Staff should be trained at institution such as NMC.

ANNEX

ANNEX 1-1

MEMBERS OF STUDY TEAM

The Study Team

Name	Position
Kazuyuki ISHII	Team Leader Food Agency, Ministry of Agriculture, Forestry and Fisheries
Osamu KOSEGAWA	Project Coordinator First Basic Design Study Division, Grant Aid Planning and Survey Department, JICA
Hajime ENDO	Planning Architect Nippon Koei Co., Ltd.
Hitoshi TANAKA	Structural Design Architect Nippon Koei Co., Ltd.
Akio MAEDA	Grain Market System Planner Nippon Koei Co., Ltd.
Takeshi NOMURA	Road Planner Nippon Koei Co., Ltd.

Counterpart

Name	Position
J. KINYUNYU	Grain Market System Expert Regional Planning Officer
A. N. MERRO	Grain Market System Expert Regional Agricultural Development Officer
J. J. CHOMBO	Road/Bridge Expert Assistant Executive Engineer
M. J. MBENA	Road/Bridge Expert Executive Engineer
F. TEMBA	Building Engineer Assistant Executive Engineer
J. MZENA	Surveyor Executive Survey

ANNEX 1-2

ITINERARY OF STUDY TEAM

(From March 31st to May 4th, 1988)

No.	Date	Place of Night Stay	Action
	MARCH		
1.	31 (Thr.)	Travel	Departure Tokyo for Amsterdam
	APRIL		
2.	1 (Fri.)	Amsterdam	Arrival in Amsterdam
3.	2 (Sat.)	Travel	Departure Amsterdam for Dar es Salaam
4.	3 (Sun.)	Dar es Salaam	Arrival in Dar es Salaam
5.	4 (Mon.)	Dar es Salaam	Internal meeting on field survey and data collection
6.	5 (Tue.)	Mikumi	Courtesy call on Embassy of Japan, Ministry of Agriculture, Ministry of Finance and JICA Tanzania Office. Move to Mikumi.
7.	6 (Wed.)	Iringa	Move to Iringa. Courtesy call to R.C. and discussion with RDD and his team about the inception report and field survey.
8.	7 (Thr.)	Mafinga	Courtesy call to D.C. of Iringa. Move to Kilolo and field survey in Kilolo site. Move to Mafinga, courtesy call to D.C. of Mufindi. Move to Ifwagi, field survey in Ifwagi site. Move to Mafinga.
9.	8 (Fri.)	Soliwaya	Move to Njombe and courtesy call D.C. of Njombe. Move to Matembwe, field survey in Matembwe site. Move to in Soliwaya.

No.	Date	Place of Night Stay	Action
10.	9 (Sat.)	Iringa	Move to Iringa. Discussion with RDD and his team based on the survey results. Preparation and signing of the Minutes of Discussion.
11.	10 (Sun.)	Iringa	Data collection and internal Meeting on anticipated work schedule. Mr. ISHII (Team Leader), Mr. KOSEGAWA (Project Coordinator) and Mr. ENDO move to Mikumi.
12.	11 (Mon.)	Iringa	M/S ISHII, KOSEGAWA, ENDO move to Dar es Salaam. M/S MAEDA, TANAKA, and NOMURA detailed discussion with RDD and his team on the field survey.
13.	12 (Tue.)	Dar es Salaam	M/S ISHII, KOSEGAWA and ENDO cal to Ministry of Finance, countersigning of Minutes of Discussion, visit to Ministry of Agriculture, Office of Prime Minister and First Vice President. Report to Embassy of Japan and JICA Tanzania Office. M/S MAEDA, TANAKA and NOMURA move to Njombwe.
14.	13 (Wed.)	Itundu	M/S ISHII and KOSEGAWA; leave Dar es Salaam for Tokyo. Mr. ENDO, data collection from concerned agencies in Dar es Salaam. M/S MAEDA, TANAKA and NOMURA move to Itundu, field survey in Itundu site.
15.	14 (Thr.)	Vwawa	Mr. ENDO, data collection from concerned agencies in Dar es Salaam. M/S MAEDA, TANAKA and NOMURA move to and Vwawa, inspection on existing warehouses.
16.	15 (Fri.)	Iringa	M/S ENDO, MAEDA, TANAKA and NOMURA move to Iringa.
17.	16 (Sat.)	Iringa	Data Collection at RDD's office and concerned agencies.
18.	17 (Sun.)	Iringa	

No.	Date	Place of Night Stay	Action
19.	18 (Mon.)	Iringa	
20.	19 (Tue.)	Iringa	Survey on local constructors, data collection, Analysis of collected data.
21.	20 (Wed.)	Iringa	
22.	21 (Thr.)	Iringa	
23.	22 (Fri.)	iringa	
24.	23 (Sat.)	Iringa	Preparation of field note, field survey, Analysis of collected data
25.	24 (Sun.)	Iringa	
26.	25 (Mon.)	Iringa	Discussion with RDD
27.	26 (Tue.)	Iringa	Analysis of collected data
	(National Holiday)		
28.	27 (Wed.)	Iringa	Report to RDD, Data Collection
29.	28 (Thr.)	Dar es Salaam	Move to Dar es Salaam
30.	29 (Fri.)	Dar es Salaam	Visit to Ministry of Agriculture, Ministry of Finance, Embassy of Japan and JICA Tanzania Office to report the result of field survey.
31.	30 (Sat.)	Dar es Salaam	Data Colection from concerned agencies
	MAY		
32.	1 (Sun.)	Travel	Departure Dar es Salaam for Amsterdam
33.	2 (Mon.)	Amsterdam	Arrival in Amsterdam
34.	3 (Tue.)	Travel	Departure Amsterdam for Tokyo
35.	4 (Wed.)		Arrival in Tokyo

ANNEX 1-3

LIST OF PERSONNEL CONTACTED

(1) Office of the Prime Minister and First Vice President

Mr. P.A.M. Chikira	:	Senior Planing and Control Officer

(2) Ministry of Finance, Economic Affairs and Planning

Mr. R. Mhagama	:	Deputy Principal Secretary
Mr. P.J. Mbena	:	Finance Management Officer

(3) Ministry of Agriculture and Livestock Development

Mr. V. Mrisho	:	Assistant Commissioner of Planning and Marketing
Mr. B. Katani	:	Senior Agricultural Oficer Planning Department

(4) Regional Commissioner's Office, Iringa

Mr. J. Malecera	:	Regional Commissioner

(5) Regional Development Director's Office, Iringa

Mr. E. N. Mudogo	:	Regional Development Director
Mr. A. Mwakibolwa	:	Regional Cooperatives Officer
Mrs. C. N. Mtalo	:	Planning and Control Officer
Mr. H.O.L. Ngohelo	:	Regional Landuse Planner
Mr. L.M.J. Mbena	:	Regional Engineer

(6) Iringa District

Mr. L.P. Mbawala	:	District Commissioner
Mr. M.O. Mgongolwa	:	District Executive Director
Mr. B.S. Lawa	:	District Agricultural Development Officer

(7) Mufindi District

Mr. E.A. Mahawa	:	District Commissioner
Mr. A.S. Komba	:	District Agricultural Development Officer

(8) Njombe District

Mr. M.C. Ndode	:	District Commissioner
Mr. J.M. Gamaah	:	District Executive Director

(9) Ludewa District

Mr. T. Nyombo	:	Assistant Planning and Control Officer
Mr. G.F.T. Ndola	:	District Cooperative Officer

(10) TRM Resident Engineer's Office, Iringa

Mr. W.M. Mwamyalla	:	TRM Resident Engineer, Iringa

(11) N.M.C. Iringa Branch

Mr. B.J. Maliya	:	Operations Manager
Mr. M. Saleh	:	Makambako Depot Manager

(12) IMUCU

Mr. B.L. Duma	:	Marketing Manager
Mr. M. Kigula	:	Mufindi Branch Manager
Mr. S. Uguluma	:	Iringa Branch Manager

(13) NJOLUMA

Mr. Nduru	:	Acting General Manager
Mr. L. Ngelime	:	Ludewa Branch Manager

(14) Embassy of Japan

Mr. Saburo Tanaka	:	A Charge d'Affaires ad interim
Mr. Syougo Takeuchi	:	First Secretary
Mr. Kazumasa Shibuta	:	Special Investigator

(15) JICA Office

Mr. Nobuo Toida	:	Resident Representative
Mr. Hiroshi Murakami	:	Assistant Resident Representative

ANNEX 1-4

MINUTES OF DISCUSSION

MINUTES OF DISCUSSION
ON
THE PROJECT FOR IMPROVEMENT
OF
AGRICULTURAL STORAGE AND TRANSPORTATION
SYSTEM
IN
IRINGA REGION
IN
THE UNITED REPUBLIC OF TANZANIA

In response to the request of the Government of the United Republic of Tanzania, the Government of Japan decided to conduct a basic design study on the Project for Improvement of Agricultural Storage and Transportation System in Iringa Region (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA") which is an official agency implementing the technical cooperation of the Government of Japan. JICA sent to the United Republic of Tanzania the study team headed by Mr. Kazuyuki ISHII, Senior Officer for Storage Technique, Food Agency, Ministry of Agriculture, Forestry, and Fisheries for 35 days from 31st March to 4th May, 1988.

The team had a series of discussions and exchanged views with the authorities concerned of the Government of the United Republic of Tanzania.

As a result of the study and discussions, 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.

9th April, 1988
Iringa, Tanzania

Mr. Kazuyuki I S H I I
Team Leader
JICA Study Team

Mr. E.N. MUDOGO
Regional Development Director
Iringa Region

REGIONAL DEVELOPMENT DIRECTOR
IRINGA REGION

ENDORSED BY

MR. E.N. Mbuya
COMMISSIONER FOR SECTORAL PLANNING
MINISTRY OF FINANCE, ECONOMIC AFFAIRS AND PLANNING

ATTACHMENT

1. Objective

The objective of the Project is to improve grain marketing facilities including transit godowns and related feeder roads in Iringa Region.

2. Project Sites

The sites for the transit godowns are located in Kilolo, Ifwagi, Matembwe and Itundu.

Feeder roads to be improved are part of: (1) Iringa to Kilolo, (2) Mafinga to Ifwagi, (3) Kibena to Matembwe and (4) Mkiu to Itundu

(Site map is attached as ANNEX - I)

3. Executing Agency

Regional Development Director's office, Iringa Region is responsible for the execution of the Project.

4. Understanding of the Government of Japan

The Team will convey to the Government of Japan the request of the Government of Tanzania that the former takes necessary measures to cooperate by implementing the Project within the scope of Japanese Grant Aid Program.

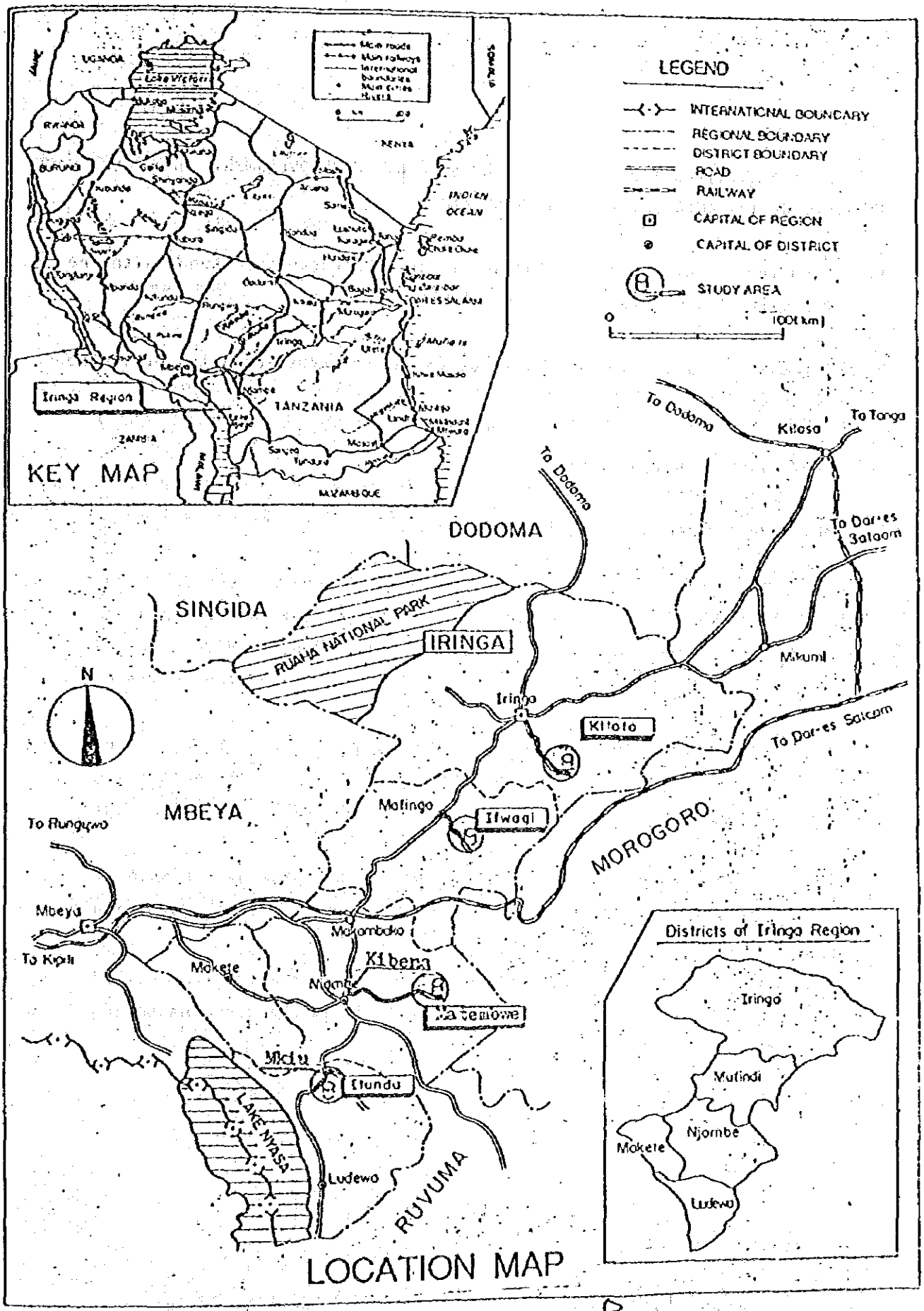
(List of main facilities and equipment requested by the Government of the United Republic of Tanzania for Japan's Grant Aid is attached as ANNEX II)

5. Understanding of Japan's Grant Aid System

The Tanzania side has understood Japan's Grant Aid System explained by the Team.

6. Undertaking of the Government of Tanzania.

The Government of Tanzania will take the necessary measures listed in ANNEX III on condition that the Grant Aid would be extended to the Project.


KEY MAP
Iringa Region
TANZANIA
LEGEND
INTERNATIONAL BOUNDARY
REGIONAL BOUNDARY
DISTRICT BOUNDARY
ROAD
RAILWAY
CAPITAL OF REGION
CAPITAL OF DISTRICT
STUDY AREA
100 km
DODOMA
SINGIDA
RUAHA NATIONAL PARK
IRINGA
MBEYA
MOROGORO
RUVUMA
LAKE NYASA
To Dodoma
To Tanga
To Dar-es Salaam
Kilosa
Mikumi
Iringo
Kilolo
Mafingo
Ifwagi
To Rungwe
Mbeya
To Kipili
Makete
Njombe
Kibena
Mdandu
Ludewo
Districts of Iringa Region
Iringo
Mufindi
Njombe
Makete
Ludewo
LOCATION MAP

ANNEX II

MAIN FACILITIES AND EQUIPMENT REQUESTED BY THE GOVERNMENT OF THE UNITED REPUBLIC OF TANZANIA FOR JAPAN'S GRANT AID

1. Construction of godowns in Kilolo, Ifwagi, Matembwe and Itundu with the capacity of 2,000 tons each.

2. Improvement of related feeder roads to the construction sites of the above -mentioned godowns.

3. Provisions of cargo trucks

4. Provisions of road maintenance equipement

ANNEX III

MEASURES TO BE UNDERTAKEN BY THE GOVERNMENT OF THE UNITED REPUBLIC OF TANZANIA

1. To secure the site for the Project.

2. To clear and reclaim the site prior to the commencement of construction work.

3. To provide facilities for distribution of electricity, water supply, telephone, drainage and other incidental works leading and up to the site.

4. To ensure prompt unloading, tax exemption and custom clearance of the project goods at the port of disembarkation.

5. To exempt Japanese nationals concerned from custom duties, internal taxes and other fiscal levies which may be imposed in the United Republic of Tanzania with respect to the supply of products and services under the verified contracts.

6. To provide and accord Japanese national concerned with necessary permission, licences and other authorization required for the implementation of the Project.

7. To bear all the expenses other than those to be borne by the grant aid necessary for the execution of the Project.

8. To maintain and use properly the facilities constructed and equipment purchased under the grant aid.

ANNEX 2-1

PRODUCTION OF MAIN CROPS IN IRINGA REGION

Croo name	1983/84		1984/85		1985/86		1986/87		1987/88 #1	
	Planted Area (ha)	Production (ton)	Planted Area (ha)	Production (ton)	Planted Area (ha)	Production (ton)	Planted Area (ha)	Production (ton)	Planted Area (ha)	Production (ton)
Maize	301,700	611,800	301,600	574,700	220,800	371,700	266,000	425,100	236,100	424,400
Beans	44,300	27,000	48,800	37,800	43,500	20,800	39,300	35,700	31,900	21,100
Wheat	18,000	26,900	17,500	15,300	17,600	14,300	14,500	13,000	18,100	23,400
Sorgum	11,900	17,300	26,700	25,900	13,000	11,700	17,000	19,000	16,400	17,000
Paddy			2,200	2,900	3,900	3,900	4,400	4,500	2,200	2,100
Cassava	300		4,000	6,700	3,800	3,800	4,200	6,400	1,400	3,500
Irish potato	12,400	84,600	20,200	173,700	13,600	92,500	6,900	88,700	15,400	171,000
Peas					4,200	2,700	2,400	2,000	4,300	1,300
Sun flower	3,300		7,400	4,700	5,500	4,000	6,200	3,900	15,300	8,130
Pyrethrum	2,200	110	7,600	900	7,200	300	2,300	800	1,900	900
Sweet potato							5,500	11,500	5,500	26,200
Tobacco	3,000	1,500	2,000	1,300	2,000	1,400	2,200	1,400	1,600	1,100
Tea	7,600	7,800	5,000	7,500	5,100	7,100	5,100	6,300	5,300	7,900
Coffee	200	100	700	100	500	100	700	100	700	200
Groundnuts							900	300	7,100	2,200
Cowpeas							1,000	100		
Coconuts										
Fingermillet							1,000	800		

#1 : Forecasted
Source : Regional Agricultural Development Office

ANNEX 2-2

EXISTING AGRICULTURAL GODOWNS IN OBJECTIVE AREA

Village Cooperataive Society	Wards	Villages	Storage Capacity (ton)
A: Kilolo Area			
1. Ukumbi	Ukumbi	Ukumbi	400
2. Lulanzi		Lulanzi	400
3. Lukanin		Lukani	400
4. Kitowo		Kitowo	400
5. Pomerin		Ngurube	400
		Kihesa Mgagao	-
6. Kilolo		Kilolo	-
7. Bomalangombe	Bomalangombe	Bomalangombe	-
		Mwatasi	-
		Masisiwena Ideganda	-
		Ngingula	-
8. Dabaga	Dabaga	Kidagabe	-
		Ngangande	100
		Ilamba	-
9. Ukimi	Ukwege	Ipalama	150
		Ukwega	150
		Kisinga	-
		Mkalanga	150
10. Idete	Idete	Idete	150
		Madege	150
		Itonya	150
		Ilutiya	150
		Uluti	150
		Mhanga	150
Sub-total			3,450

Village Cooperataive Society	Wards	Villages	Storage Capacity (ton)
B. Ifwagi Area			
1. Imini	Ikonongo	Itlavanu	-
		Mirili	300
		Ikonongo	-
		Ifwagi	-
		Nundwe	300
3. Miliko	Ikonongo	Kidete/Kibengu	250
		Mdabulo	-
		Ludilo	300
		Ifupila	250
		Idangaa	-
3. Mtwango	Mtwango	Swala	250
		Lufunda	300
		Kitilu	250
4. Ilimi	Mtwango	Lugoda	-
		Ikaningmbe	-
		Ihegela	-
		Luhunga	300
		Mkange	-
Sub-total			2,500
C: Matembwe Area			
1. Matembwe	Lupembe	Matembwe	600
2. Isoliwaya	Lupembe	Isoliwaya	600
3. Lupembe	Lupembe	Lupembe	-
		Igombora	-
	Idamba	Mfriga	-
4. Kidegembwe	Kidegembwe	Kidegembwe	500
		Image	500
Sub-total			2,300

Village Cooperataive Society	Wards	Villages	Storage Capacity (ton)
D: Itundu Area			
1. Nangali	Mlangali	Itundu	-
2. Lufumbu		Lufumbu	300
3. Kiyombo		Kiyombo	300
4. Nasinbwe		Nasinbwe	300
5. Igumbilo		Igumbilo	300
6. Imalu		Luwyo	-
7. Ludewa	Ludewa	Ludewa	300
8. Luand	Luand	Mbwila	300
		Luand	300
9. Mawengi	Mawengi	Mawengi	450
10. Nadunda		Nadunda	600
11. Lupande		Lupande	300
Sub-total			3,400

ANNEX 2-3 ESTIMATION OF PROPOSED GODOWN CAPACITY

A. Estimation of Proposed Godown Capacity

	Item		Kilolo	Ifwagi	Matembwe	Itundu
1)	Harvested area:					
	Nos. of household		11,400	2,700	3,400	4,700
	Area (2 ha/household)	(ha)	22,800	5,400	6,800	9,400
2)	Production (1.8 tons/ha)	(tons)	41,000	9,700	12,200	16,900
3)	Consumption	(tons)	16,300	3,900	4,900	6,700
	Self-consumption		11,400	2,700	3,400	4,700
	Gift		2,900	700	900	1,200
	Loss		2,000	500	600	800
4)	Surplus 2) - 3)	(tons)	24,700	5,800	7,300	10,200
5)	Grain handled by cooperatives	(%)	30	80	80	80
		(tons)	7,400	4,600	5,800	8,200
6)	Largest amount of collected grain on monthly base 5) x 32%	(tons)	2,400	1,500	1,900	2,600
7)	Supply (100 kg/ha)	(tons)	2,300	600	700	900
8)	Fertilizer handled by cooperatives	(%)	30	100	100	100
		(tons)	700	600	700	900
9)	Largest amount of handled fertilizer on monthly base 8) x 1/3		≒250	200	≒250	300
10)	Required capacity	(tons)	≒2,700	1,700	≒2,200	2,900
	6) Grain		2,400	1,500	1,900	2,600
	9) Fertilizer		250	200	250	300
11)	Present capacity	(tons)	0	0	0	700
12)	Proposed capacity 10) - 11)	(tons)	2,700	1,700	2,200	2,200

Note:
- Production : (Nos. of household in the area) x (2 ha/household) x (1.8 tons/ha)
- Consumption : Based on the estimated value, self-consumption of 1 ton/household/year, gift of 250 kg/household/year, loss of 5% of production
- Grain handled by cooperatives : Estimated at 30%, 80%, 80% and 80% of whole surplus in Kilolo, Ifwagi, Matembwe and Itundu respectively
- Largest amount of collected grain on monthly base : 32% of total handled grain (see Table 3 for detail)
- Fertilizer supply : Estimated at 100 kg/ha
- Fertilizer handled by cooperative : Estimated at 30% in Kilolo, 100% in other areas
- Present capacity : Capacity of godowns owned by branch offices of cooperative unions and located in the project area

B. Maize Handled by Cooperatives

Cooperative	July	Aug.	Sept.	Oct.	Nov.	Dec.
Kilolo						
1986/87	5	7	12	130	40	-
Imini-Ruaha						
1985/86	-	110	170	110	20	10
1986/87	-	110	200	120	90	40
Matembwe						
1984/85	-	100	270	480	100	50
1985/86	-	110	260	410	210	-
1986/87	-	120	330	340	370	-
Mufangati						
1984/85	30	50	100	60	30	-
1985/86	80	200	310	200	70	-
1986/87	100	180	300	210	160	-
Total	215	987	1,952	2,060	1,090	100
(%)	(3)	(15)	(30)	(32)	(17)	(2)

ANNEX 2-4

ESTIMATION OF MAXIMUM LOAD VOLUME AT GODOWNS

(Unit: ton)

Item	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.
Kilolo Godown							
1. Grain							
Monthly carry in	220	1,110	2,220	2,400	1,300	150	-
Monthly send out	-	220	1,110	2,220	2,400	1,300	-
Daily carry in	9	46	93	100	54	6	-
Daily send out	-	9	46	93	100	54	-
2. Fertilizer							
Monthly carry in	250	250	250	-	-	-	-
Monthly send out	-	250	250	250	-	-	-
Daily carry in	10	10	10	-	-	-	-
Daily send out	-	10	10	10	-	-	-
3. Daily handling amount							
Grain	9	55	139	193	154	60	-
Fertilizers	10	20	20	10	-	-	-
Total	19	75	159	203	-	-	-
4. Hourly handling amount :	The maximum daily handling amount is about 203 tons in October.						
Ifwagi Godown							
1. Grain							
Monthly carry in	140	700	1,400	1,500	800	100	-
Monthly send out	-	140	700	1,400	1,500	800	100
Daily carry in	6	39	58	63	33	3	-
Daily send out	-	6	29	58	58	33	4
2. Fertilizer							
Monthly carry in	200	200	200	-	-	-	-
Monthly send out	-	200	200	200	-	-	-
Daily carry in	8	8	8	-	-	-	-
Daily send out	-	8	8	8	-	-	-
3. Daily handling amount							
Grain	6	35	87	121	91	37	4
Fertilizers	8	16	16	8	-	-	-
Total	14	51	103	129	91	37	4
4. Hourly handling amount :	The maximum daily handling amount is about 130 tons in October.						

(Unit: ton)

Item	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.
Matembwe Godown							
1. Grain							
Monthly carry in	180	900	1,800	1,900	1,000	120	-
Monthly send out	-	180	900	1,800	1,900	1,000	120
Daily carry in	8	38	75	79	42	5	-
Daily send out	-	8	38	75	79	42	5
2. Fertilizer							
Monthly carry in	250	250	250	-	-	-	-
Monthly send out	-	250	250	250	-	-	-
Daily carry in	10	10	10	-	-	-	-
Daily send out	-	10	10	10	-	-	-
3. Daily handling amount							
Grain	8	46	113	154	121	47	5
Fertilizers	10	20	20	10	-	-	-
Total	18	66	133	164	121	47	5
4. Hourly handling amount :	The maximum daily handling amount is about 164 tons in October.						
Itundu Godown							
1. Grain							
Monthly carry in	230	1,130	2,300	2,400	1,300	150	-
Monthly send out	-	230	1,130	2,300	2,400	1,300	150
Daily carry in	10	47	96	100	54	6	-
Daily send out	-	10	47	96	100	54	6
2. Fertilizer							
Monthly carry in	300	300	300	-	-	-	-
Monthly send out	-	300	300	300	-	-	-
Daily carry in	13	13	13	-	-	-	-
Daily send out	-	13	13	13	-	-	-
3. Daily handling amount							
Grain	10	57	143	196	154	60	6
Fertilizers	13	26	26	13	-	-	-
Total	23	83	169	209	154	60	6
4. Hourly handling amount :	The maximum daily handling amount is about 210 tons in October.						

ANNEX 2-5 TRANSPORTATION AND LABOR REQUIREMENT AT GODOWNS

Proposed Godowns/Items			July	August	September	October	November	December	Total
Kilolo	Labour	(man/month)	161	772	1,528	1,608	852	80	5,001
	Round trip	(no./month)	15	69	137	144	77	8	450
	Running distance/1	(km/month)	480	2,208	4,384	4,608	2,464	256	14,400
Ifwagi	Labour	(man/month)	122	588	1,163	1,224	649	61	3,807
	Round trip	(no./month)	20	93	183	192	102	10	60
	Runnig distance/1	(km/month)	180	837	1,647	1,728	918	90	5,400
Matembwe	Labour	(man/month)	146	703	1,391	1,464	776	73	4,553
	Round trip	(no./month)	17	81	160	168	89	9	524
	Runnig distance/1	(km/month)	289	1,377	2,720	2,856	1,513	153	8,908
Itundu	Labour	(man/month)	161	772	1,528	1,608	852	80	5,001
	Round trip	(no./month)	12	58	114	120	64	6	374
	Runnig distance/1	(km/month)	204	986	1,938	2,040	1,088	102	6,358
Total	Labour	(man/month)	590	2,835	5,610	5,904	3,129	294	18,362
	Runnig distance/1	(km/month)	1,153	5,408	10,689	11,232	5,983	601	35,066

Note : /1 : Round trip number x mean distance trip

Mean distance/trip : Kilolo : 32 km
Ifuwagi : 9 km
Matembwe : 17 km
Itrundu : 17 km

ANNEX 2-6 ESTIMATION OF CASUAL LABORERS REQUIREMENT

Work Item	Power/Equipment	Labour Requirement (man/day)	Proposed Godown							
			Kilolo		Ifwagi		Matembwe		Itundu	
			Equipment (unit)	Labor (man/day)	Equipment (unit)	Labor (man/day)	Equipment (unit)	Labor (man/day)	Equipment (unit)	Labor (man/day)
Carry in:										
Unloading	Manpower	2	-	2	-	2	-	2	-	2
Weighing	Manpower + Platform scale	2/unit	5	10	3	6	4	8	5	10
Moisture content check	Manpower + Moisture meter	1/unit	1	1	1	1	1	1	1	1
Carriage in godown	Manpower + Cart	2/unit	8	16	5	10	7	14	8	16
Lift up to stack	Manpower + Slat conveyor	4/unit	1	4	1	4	1	4	1	4
Stacking	Manpower	6	-	6	-	6	-	6	-	6
Send out:										
Unsacking	Manpower + Sleat conveyor	4/unit	1	4	1	4	1	4	1	4
Unloading from conveyor	Manpower	2/unit	1	2	1	2	1	2	1	2
Crriage in godown	Manpower + Cart	2/unit	8	16	5	10	7	14	8	16
Loading up to truck	Manpower	6	-	6	-	6	-	6	-	6
Total	-	-	-	67	-	51	-	61	-	67

ANNEX 2-7

OPERATION AND MAINTENANCE COST FOR TRANSIT GODOWNS

A. O&M Cost for Godowns

Cost Item	Godowns			
	Kilolo	Ifwagi	Matembwe	Itundu
1. Personnel Expense (Tsh/year) (Ref. B)	160,800	160,800	160,800	160,800
2. Wages for Casual Labor (Man.day/year)	5,000	3,800	4,600	5,000
(Tsh/year)	275,000	209,000	253,000	275,000
3. Fuel for Slat Conveyor (Tsh/year) (Ref. C)	23,300	14,40	18,800	23,300
4. Office Stationery, Others (5% of 1)	8,000	8,000	8,000	8,000
Total	472,100	396,000	445,200	472,100

B. Personnel Expense for O&M of Godowns

Staff	Class	Number	Unit (Tsh/month)	Monthly Amount (Tsh/month)	Yearly Amount (Tsh/year)
Store keeper	MSU4	1	25,00	2,500	30,000
Assistant store keper	MSU 3	1	1,800	1,800	21,600
Accountant	MSU3	1	1,800	1,800	21,600
Incharge handling/1	*	1	1,200	1,200	14,400
Incharge handling/2	*	1	1,200	1,200	14,400
Incharge handling/2	*	1	1,200	1,200	14,400
Logistic	*	1	1,200	1,200	14,400
Gaurd	*	2	1,200	1,200	14,400
Clerk	*	1	1,300	1,300	15,600
Total		10	-	13,400	160,800

Note: /1 : Handling incharge (Send in)
/2 : Handling incharge (Send out)
/3 : Handling incharge (Agricultural inputs)
* : Permanent labour

C. Operation Cost of Slat Conveyor

Item	Proposed Godowns			
	Kilolo	Ifwagi	Matembwe	Itundu
Yearly Handling Amount (ton)	8,300	5,200	6,700	8,400
Capacity of Conveyor (65 ton/hr x 2 units)	130	130	130	130
Operation Hour (hr/yar) (effeciency = 0.4)	160	100	130	160
Fuel (lit/year) (0.45 lit/ps x 6 ps x 0.6) x 2 units	520	320	420	520
Fuel Cost (Tsh/year) (including lubricants) (Tsh 39/lit x 1.15)	23,300	14,400	18,800	23,300

Note: Depreciation & spareparts are not included.

D. Cost for Fumigation of Grain

Cost Item	Project Area			
	Kilolo	Ifwagi	Matembwe	Itundu
1. Personnel expense (No. of person)	4	4	4	4
Tsh/year (Tsh. 1,200/man.month)	57,600	57,600	57,600	57,600
2. Consumable expense Grain handling amount (ton/yar)	7,400	4,600	5,800	8,100
- Phostoxine Requirement (Tablets) (5 tab./ton)	37,000	23,000	29,000	41,000
- Tsh/yar (Tsh. 0.7/tab.)	25,900	16,100	20,300	28,700
- Gass detecting tube No. of times of fumigation (times/year)	30	20	25	35
- Requirement of tube (No.) (4 Nos./time)	120	80	100	140
Tsh/year (Tsh. 98/tube)	11,800	7,800	9,800	13,700
- Gass absorption canister (can) (2 cans/team/time)	60	40	50	70
Stand by	6 ÷ 70	4 ÷ 50	5 ÷ 60	7 ÷ 80
- Tsh/year (Tsh. 3,030/can)	212,100	151,500	181,800	242,400
Total (Tsh/year)	307,400	233,000	269,500	342,400

E. Transportation Cost (Increased Amount of Grain)

Cost Item	Project Area			
	Kilolo	Ifwagi	Matembwe	Itundu
1. Personnel expense				
Drivers (person)	3	2	2	2
(Tsh. 1,430/month)				
(Tsh./yar)	51,500	34,300	34,300	34,300
Assistant	3	2	2	2
(Tsh. 1,200/month)				
(Tsh/year)	43,200	28,800	28,800	28,800
Sub-total	94,700	63,10	63,100	63,100
2. Fuel (light oil)				
Truck (7 ton class, 200 ps)	3	2	2	2
Total running distance/1 (km)	14,400	5,400	8,900	6,400
Total running time (hr)	480	180	300	210
(30 km/hr)				
Fuel cost (lit)	17,050	6,390	10,660	7,460
(0.24/ps/hr x 200 ps x 0.74)				
(Tsh/year)	431,400	161,700	269,700	188,700
(Tsh. 22/lit x 1.15 including lubricants)				
Total (Tsh/year)	526,100	224,80	332,800	251,800

Note: /1 : Ref. to Annex 2-2

Depreciation and spareparts cost are not included.

ANNEX 2-8

OPERATION AND MAINTENANCE COST FOR FEEDER ROADS

Consumption Volume of Fuel for O&M Equipment

(Replenishment volume of gravel = 50 m^3/km/year x 72 km = 3,600 m^3/year)

O&M Equipment	Comsumption Volume of Fuel (lit/year)
Backhoe (digging and loading) (30 m^3/hr, 9 lit/hr)	1,080
Dump truck (Hauling) (6 m^3/hr, 30 lit/hr)	18,000
Motor grader (Spreading) (300 m^3/hr, 12 lit/hr)	140
Bulldozer (Compacting) (30 m^3/hr, 15 lit/hr)	1,800
Total	21,020

Consumption Volume of Fuel for O&M Equipment

(Unit: Tsh/year)

Item	Amount
Operation cost of O&M equipment (Tsh. 39/lit x 21,020 lit x 1.5) (Oils : 15% of fuel)	942,750
Maintenance cost of O&M equipment (20% of the above)	188,550
Wages of hired labour (temporary laboures) (Tsh. 55/persons day x 25 day x 5 persons x 6 months)	41,250
Materials & others (5% of the above total)	58,880
Total	1,231,430

ANNEX 3-1 COUNTRY DATA

I. BASIC INDICATORS

1.	Name of Country	:	United Republic of Tanzania
2.	Capital	:	Dar es Salaam
3.	Date of Independence	:	February 9, 1961 (Tanganyika) December 10, 1963 (Zanzibar)
4.	Area of Territory	:	945,100 km^2
5.	Population	:	121.4 million persons (estimate in 1986)
6.	Population Density	:	23.4 person/km^2 (in 1986)
7.	Population Growth Rate	:	3.8% per annum
8.	Life Expectancy	:	51 years old (in 1983)
9.	Political Conditions		
	(1) Form of government	:	Constitutional Republican Form
	(2) Form of national assembly	:	The Single-Chamber System of National Council
	(3) Political party	:	Only one party is recognized, namely, Chama Cha Mapinduzi; CCM (which means the revolutionary party)
	(4) Sovereign (President)	:	Al Hassan Mwinyi (took the position on Nov. 5, 1985)
10.	Religious Conditions	:	Traditional Animism, Christianity and Moslem are accepted. Proportion of the believers of each religion to total population is 40, 30%, respectively.
11.	Languages	:	Swahili is the official language. English is also prevalent.
12.	Racial Conditions	:	African Negro takes 98% of total population, and others are Indian, Arab and a few White. African Negros are predominantly of two groups, namely, Bantu and Nilotic, 95% of the total population is Bantu.

13. Education

(1) Education System : Divided into primary school (6 years), secondary school (4 years of 1st curriculum and 2 years of 2nd curriculum), university (3 years) and various professional training schools. Number of schools, teachers and pupils by each system in 1983 are as shown below.

Kinds of School	No. of Schools	No. of Teachers	No. of Pupils
Primary School	10,044	85,476	3,552,923
Secondary School	70	2,213	71,219
University	1	752	3,877
Professional Training School	40	967	10,568

Source: Ministry of Education, Tanzania

(2) Primary school enrollment : 90% (the proportion of the population of the age-group of 7 to 13 years old)

(3) Adult literacy : 70% (in 1980)

14. Geographical Conditions

Tanzania is composed of a continental part (Tanganyika) and two islands on the Indian Ocean, namely Zanzibar and Pemba, and located between latitude 1°S and 11°45'S and between longitude 29°29'E and 4°38'E. The geography of the country is characterized as follows; eastern lowlands, central highlands and western mountainous area. Climatic conditions are largely divided in to tropical oceanic climate in the eastern coastal area and both Zanzibar and Penba islands, savanna climate in the central highlands, temperate constant-spring climate in north Mt. Kilimanjaro area, and tropical forest climate on the western lake-shore area of Tanganyika.

Annual rainfall varies by region. In the western lake shore region, for example, annual rainfall is expected to be 750 mm at the minimum. On the other hand, in the central highland region, rainfall varies year. In the coast region of the Indian Ocean and both islands, about 500 mm of annual rainfall is expected. The rainy season is divided into the great one (April to May) and the small one (November to February).

II. SOCIO-ECONOMIC INDICATORS

1. Trend of Gross Domestic Product (GDP)

Item	1982	1983	1984	1985	1986
GDP at market price (Million Tsh)	52,546	61,008	76,264	99,330	131,346
GDP at constant (1976) (Milion Tsh)	24,104	23,472	23,930	24,561	25,486
Real increase (%)	3.1	-2.6	2.0	2.6	3.8
GDP per capita					
GDP at market price (Tsh)	2,737	3,081	3,720	4,685	5,998
At constant (1976) (Tsh)	1,255	1,185	1,167	1,159	1,164
Real increase (%)	-	-5.6	-1.5	0.7	0.4
Population (Million)	19.2	19.8	20.5	21.2	21.9
Exchange Rate to US$1.00 (Tsh)	9.28	11.14	15.29	17.47	32.70

source: Economic Survey 1986

2. Gross Domestic Product by Industrial Origin (at market price)

(Unit: Tsh million)

Item	1984		1986		1987	
Agriculture	41,295	(54)%	56,235	(57%)	77,385	(59)%
Mining & Quarrying	337	(0)	251	(0)	474	(0)
Manufacturing	5,861	(8)	6,861	(7)	8,164	(6)
Electricity & Water	551	(1)	1,071	(1)	2,060	(2)
Construction	1,661	(2)	1,977	(2)	2,241	(2)
Commerce	10,476	(14)	13,599	(14)	18.141	(14)
Transport	4,826	(6)	7,061	(7)	8,550	(7)
Finance	6,140	(8)	6,790	(7)	8,192	(6)
Public Administration & Defence Bank Charge	-1,511	(-2)	-1,799	(-2)	-2,148	(-2)
Total	76,264	(100)%	99,330	(100)%	131,346	(100)%

Source: Economic Survey 1986

3. Currency Unit, Trend of Exchange Rate to U.S. Dollar

(1) Currency Unit : (Tanzania Shilling Tsh)

(2) Trend of Exchange Rate to U.S. Dollar

(Unit: Tsh)

Item	1982	1983	1984	1985	1986
Exchange Rate to US$1.00	9.28	11.14	15.29	17.47	32.70

Source: IMF International Financial Statistics

4. Increase of Consumer Price Index

(Unit: %)

Item	1982	1983	1984	1985	1986
Annual Inflation Rate	28.9	27.1	36.0	33.3	32.5

Source: Economic Survey 1986

5. Trade Structure

(1) Trend of Foreign Trade

(Unit: Million Tsh)

Item	1982	1983	1984	1985	1986
Export (f.o.b.)	3,767	4,573	5,125	4,994	11,391
Import (c.i.f.)	10,239	10,478	12,960	17,470	34,329
Balance	-6,472	-5,905	-7,856	-12,476	-22,938

Source: Economic Survey 1986

(2) Main Commodities Traded (1984)

1) Exports

Item	Amount (Tsh.Mn.)	Ratio (%)
Coffee	2,216	39.1
Cotton	713	12.6
Cashewnuts	439	7.8
Tea	330	5.8
Sisal	146	2.6
Cloves	136	2.4
Diamonds	71	1.3
Others	1,500	26.5
Total	5,661	100.0

2) Imports

Item	Amount (Tsh.Mn.)	Ratio (%)
Machinery & equipment	3,843	32.1
Mineral fuel	2,404	20.1
Manufactured goods	2,115	17.7
Chemicals	1,561	13.1
Food	1,111	9.3
Others	919	7.7
Total	11,953	100.0

Source: Ministry of Planning and Economics, Tanzania

(3) Main Trading Partners

1) Exports to:

(Unit: %)

Item	% of Total Value	
	1984	1985
West Germany	21.9	23.5
UK	14.3	16.8
Indonesia		6.9
Singapore	2.1	6.4
Netherlands	5.7	6.1
Finland	3.3	4.9
Italy	6.4	4.7
Japan	4.6	3.8
Belgium	1.4	2.4
USA	3.1	1.8

2) Imports from:

(Unit: %)

Item	% of Total Value	
	1984	1985
UK	11.8	13.2
Japan	10.0	9.9
Italy	8.0	9.4
West Germany	10.8	9.3
Iran	8.6	7.3
Netherlands	4.8	3.6
USA	3.7	3.5
Sweden	3.4	3.4
Saudi Arabia	0.7	3.4
Belgium	4.2	3.1

Source: IMF Direction of Trade Statistic

6. Economically Active Population, Wage Employment, Wage Earnings

(1) Economically Active Population: Economically active population by sex and age group in 1978 is shown below.

(Unit: Persons)

Age Group	Total			Males			Females		
	(1) Total Population	(2) Active Population	(2)/(1) (%)	(1) Total Population	(2) Active Population	(2)/(1) (%)	(1) Total Population	(2) Active Population	(2)/(1) (%)
0 - 9	5,981,924	1,239	-	2,949,200	824	-	3,032,724	415	-
10 - 14	2,101,447	67,298	3.2	1,066,645	21,361	2.0	1,034,802	45,937	4.4
15 - 19	1,719,280	744,465	43.3	841,340	275,735	32.8	877,940	468,730	53.4
20 - 24	1,329,098	1,134,703	85.4	588,580	496,337	84.6	742,518	638,366	86.0
25 - 29	1,329,098	1,134,703	85.4	586,580	496,337	84.6	742,518	638,366	86.0
30 - 34	962,335	916,609	95.2	457,537	446,882	97.7	504,798	469,727	93.1
35 - 39	886,152	853,919	96.4	439,515	433,176	98.6	446,637	420,743	94.2
40 - 44	670,194	647,943	96.7	321,487	317,107	98.8	348,707	330,836	94.9
45 - 49	632,342	612,781	96.9	320,391	316,894	98.9	311,951	295,887	94.9
50 - 54	470,663	449,938	95.8	233,611	229,418	98.2	237,052	220,520	93.0
55 - 59	380,433	360,304	94.7	205,252	201,271	98.1	175,181	159,033	90.8
60 - 64	347,771	312,668	89.9	172,414	165,309	95.9	175,357	147,359	84.0
65 - 69	240,865	204,580	84.9	124,810	116,335	93.2	116,055	88,254	76.0
70 - 74	194,131	148,941	76.7	103,046	90,884	88.2	91,085	58,057	63.7
75 -	282,102	169,183	60.0	154,933	112,577	72.7	127,169	56,606	44.5
Total	17,512,611	7,845,105	44.8	8,587,086	3,809,135	44.4	8,925,525	4,035,970	45.2

(2) Wage Employment by Sector

(Unit: 1,000 persons)

Sector	1983	1984	1985	1986	% of Share 1986	% of Change 1983/86
Agriculture	131.9	134.8	136.5	127.0	18.3	3.9
Mining & quarrying	7.6	8.3	8.6	8.9	1.2	17.1
Manufacturing	115.4	121.7	134.6	128.7	17.2	10.9
Utilities	26.1	26.6	26.6	27.5	3.7	5.4
Construction	50.1	52.7	30.2	26.4	3.5	-47.3
Commerce	44.0	45.3	48.1	49.2	6.6	11.8
Transport & communication	61.1	62.1	71.4	72.9	9.7	19.3
Finance	19.2	22.3	25.1	28.0	3.7	45.8
Public services	231.5	258.6	266.6	270.3	36.1	16.8
Total	686.9	732.2	747.7	748.9	100.0	39.5

(3) Wage Earnings

(Unit: Tsh/month)

Item	1980	1981	1982	1983	1984
Minimum monthly wage	480	600	600	600	810
Average monthly wage	768	827	691	1,275	1,500
Sector					
Agriculture	422	456	491	529	622
Manufacturing	&92	850	916	984	1,158
Construction	579	615	662	703	827
Transport	1,113	1,289	1,389	1,529	1,661
Commerce	920	1,023	1,182	1,231	1,448
Government	740	799	663	932	1,035

Source: Bureau of Statistics, Government of Tanzania

7. Balance of Payment

(Unit: US$ Mn.)

Item	1980	1981	1982	1983	1984	1985
Export (f.o.b.)	505.4	563.4	413.0	378.8	366.7	340.9
Import (c.i.f.)	1,219.9	1,173.6	1,094.8	818.8	839.3	972.0
Trade balance	-714.5	-610.2	-681.6	-440.0	-472.6	-631.1
Services (net)	19.1	70.0	38.9	23.2	12.5	21.0
(receipts)	(178.9)	(195.8)	(117.3)	(108.1)	(107.4)	(129.0)
(payments)	(159.8)	(125.8)	(78.4)	(84.9)	(94.8)	(108.0)
Official transfers (net)	106.9	107.5	93.7	84.4	96.5	104.5
Private transfers (net)	21.8	22.5	25.4	18.9	62.1	130.0
Current account balance	-566.7	-410.2	-523.6	-313.5	-301.5	-375.6
Long-term capital (net)	166.3	179.9	240.5	134.0	123.7	96.0
Short-term capital (net)	60.5	100.7	57.8	101.8	109.8	-32.0
Capital account balance	226.8	280.6	298.1	235.8	238.5	64.0
Errors & omissions	48.6	34.8	-48.9	-171.3	-182.5	-115.5
Counterpart items	7.0	6.0	-	-	-	-
Exceptional financing	110.1	111.9	91.7	60.6	49.0	100.0
Overall balance	-174.2	23.1	-182.7	-188.4	-201.5	-327.1
Net foreign assets	22.0	18.5	18.5	-26.3	-19.0	-
Payment arrear	152.2	4.6	164.2	214.7	220.5	-

Source: Bank of Tanzania, Government of Tanzania

8. Public External Debt

(Unit: US$ Mn.)

Item	1980	1981	1982	1983	1984
Total including undisbursed	2,982.0	3,133.9	3,234.5	3,380.9	3,1856.4
Disbursed only	2,010.7	2,188.6	2,390.6	2,584.2	2,593.7
Official creditors:	1,576.8	1,734.5	1,890.7	2,096.8	2,132.1
- Multilateral	562.5	681.8	795.6	885.0	997.1
- Bilateral	1,014.4	1,052.7	1,211.8	1,211.8	1,135.1
Private creditors:	433.8	454.1	487.5	487.5	461.5
- Suppliers	210.7	203.3	189.8	189.8	171.4
- Financial markets	223.1	250.8	297.7	297.7	290.2
Debt service:	75.7	73.8	65.4	65.4	71.3
- Principal	38.8	40.2	29.8	29.8	41.0
- Interest	37.0	33.6	35.6	35.6	30.3
Debt service ratio (%)	10.7	8.1	11.2	14.1	-
Disbursed debt/GNP (%)	41.1	40.5	46.9	58.9	68.0

Source: Bank of Tanzania, Government of Tanzania

9. Public Finance

(Unit: Tsh. Mn.)

Item	1981/82	1982/83	1983/84	1984/85	1985/86
Revenue	10,101	11,819	13,995	18,855	20,160
Tax revenue	9,078	11,252	13,407	18,231	19,300
Non-tax revenue	1,023	567	588	624	860
Expenditure	19,182	18,442	20,894	25,699	27,403
Recurrent expenditure	13,980	14,062	16,174	20,376	21,782
Development exenditure	5,196	4,359	4,733	5,308	5,606
Lending	6	-21	-21	15	15
Overall deficit	-9,081	-6,623	-6,891	-6,844	-7,243
Fund procurement					
Grant	1,656	1,593	1,234	1,892	1,685
Net foreign borrowing	1,204	970	230	608	-9
Net domestic borrowing	5,008	4,472	5,581	4,260	5,567
Adjustment	1,213	-412	-154	84	-

Source: IMF Data

10. Expenditure by Purpose

(Unit: Tsh. Mn.)

Item	1981/82	1982/83	1983/84	1984/85
Public debt	3,300.1	4,337.3	3,012.5	4,556.2
General services	3,168.2	3,198.1	3,919.2	6,297.7
Social services of which:	6,299.8	5,736.0	7,413.2	6,131.5
(% of education)	(39)	(44)	(39)	(33)
(% of health)	(16)	(18)	(15)	(16)
Economic services of which:	6,101.6	5,341.8	6,912.6	7,539.2
(% of agriculture)	(23)	(28)	(33)	(30)
(% of infrastructure)	(44)	(39)	(36)	(28)
Others	485.1	4,415.8	2,072.5	3,677.8
Total	19,354.8	23,029.0	23,330.0	28,202.4

Source: Bank of Tanzania, Government of Tanzania

11. Trade with Japan

(1) Trend of Trade

(Unit: US$ Mn.)

Item	1979	1980	1981	1982	1983
Exports to Japan	28.6	23.2	18.6	18.0	18.4
Imports from Japan	71.9	113.3	93.4	90.6	75.2
Balance	-43.3	-90.1	-74.8	-72.6	-56.8

Source: Statistics of Japanese Custom

(2) Main Commodities Traded (1983)

(Unit: US$ 10^3)

Exports to Japan		Imports from Japan	
Item	Amount	Item	Amount
Coffee	13,325	Rice*	12,558
Cord and nets	1,881	Steel coil	12,383
Cloves	690	Automobiles	7,615
Shrimps	616	Steel plates	4,501
Sisal	600	Communication equipment	1,360

Note : * Deferred payments based on official assistance
Source : Statistics of Japanese Custom

12. Gross Official Foreign Reserves

(Unit: US$ Mn.)

Item	1981	1982	1983	1984	1985
Foreign Reserves	52.8	39.1	62.5	38.3	38.8

Source: IMF Data

III. NATIONAL DEVELOPMENT

1. National Development Plan

(1) Past National Development Plans

- First 3-year Plan	(1961-1963)
- First 5-year Plan	(1964-1968)
- Second 5-year Plan	(1969-1973)
- Third 5-year Plan	(1974-1980)
- Fourth 5-year Plan	(1981-1986)
- National Economic Survival Program (NESP)	(1981/81)
- Structural Adjustment Program (SAP)	(1982-1985)

Although the Government of Tanzania had implemented the First, Second and Third 5-year Plan since the middle of 1960's, the Fourth 5-year Plan was suspended and introduced the National Economic Survival Program (NESP) in 1981 as an urgent countermeasure, to cope with the rapid economical decline towards the end of 1970's. The Government further took the Structural Adjustment Program (SAP) for the rehabilitation of national economy. However, the anticipated result was not realized sufficiently, because of the extreme lack of foreign exchange.

(2) Current National Development Plan

The Economic Recovery Program (ERP) was launched in 1986 for the period 1986-1990. In the ERP, the target annual growth rate of GDP was set at 4.5% on an average to be attained by the following manner:

- Achievement of food self-sufficiency through increased agricultural production.
- Gaining of foreign exchange by the means of export promotion,
- Rehabilitation of major social infrastructure,
- Amelioration of the rate of operation in existing factories, and
- Improvement of the condition of revenue and expenditure of the national finance.

Increase of agricultural production both for food crops and export crops was given first priority in the program. In order to attain the target, a development fund of US$143 million was projected to be invested mainly in; i) strengthening of extension services and research works, ii) stabilization of farm inputs supply, iii) acceleration of irrigation development, iv) promotion of estate development and v) rehabilitation of foundation for production of export crops.

2. National Budget

The national budget in 1986/87 is as shown below:

Expenditure:		Revenue:	(Tsh. million)
Total	55,596	Recurrent	33,620
Recurrent (increase by 82% of 1985/86)	39,736	Grants & loans for foreign donors	17,333
Development (increase by 183% of 1985/86)	15,860	Non-bank borrowing	2,143

Source: Daily News, 20 June, 1986

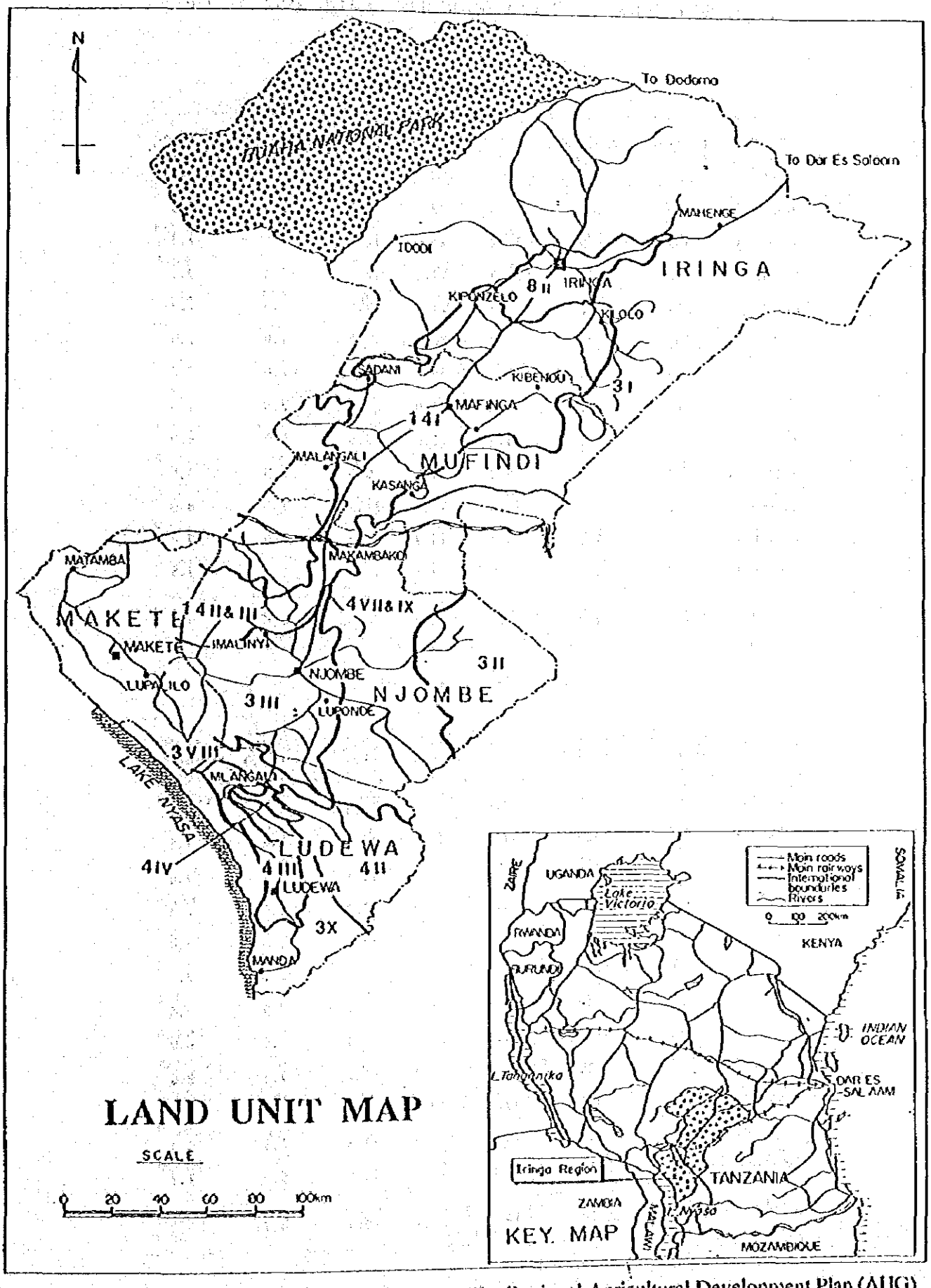
This budget was constructed as the first year's national budget for the period of ERP, and was set to increase by about 100% over that of Tsh. 27,403 million in 1985/86. The large budget increase reflects the devaluation in April 1986 recommended by IMF. The amount of Tsh. 17,333 million, which is larger than the estimated development expenditure, was requested in grants and loans from foreign donors.

Such countries as Sweden, West Germany, Holland, Norway and Japan are the donor countries, together with international organizations like IDA.

Agriculture takes the largest share of the development budget with 28.2%, followed by economic services (24.1%) and social services (19.3%), while industry is accorded a low priority at 8%.

ANNEX 3-2

METEOROLOGICAL DATA FOR LAND UNITS



REF. : Regional Agricultural Development Plan (AHG)

MONTHLY CLIMATIC DATA FOR THE LAND UNITS (1/6)

Land Unit 31

Month	Precipitation mm	Evapotranspiration mm	Temperatures 0900 hrs Mean °C	Max. °C	Min. °C	Sunshine duration hrs	Average radiation mj/day
January	200	100	17.3	22.0	12.5	5.0	7.5
February	250	90	18.4	24.0	12.8	5.5	7.8
March	290	110	17.2	21.8	12.6	5.4	7.5
April	205	96	16.5	21.5	12.5	5.5	7.0
May	80	90	15.3	20.0	10.5	6.0	7.0
June	40	70	13.7	19.5	8.0	7.0	7.2
July	10	80	13.2	19.0	7.5	7.5	7.5
August	5	90	14.3	20.0	8.5	8.0	8.0
Septeaber	10	115	15.7	22.5	9.0	8.5	8.5
October	30	130	17.5	23.5	11.5	7.5	8.0
November	100	120	18.4	24.2	12.5	7.0	7.8
December	180	110	17.6	22.5	12.8	6.0	7.5
Annual	1,400	1,200	16.3	21.7	10.85	6.6	7.6

Land Unit 311

Month	Precipitation mm	Evapotranspiration mm	Temperatures 0900 hrs Mean °C	Max. °C	Min. °C	Sunshine duration hrs	Average radiation mj/day
January	400	110	17.4	22.3	12.5	5.5	7.5
February	170	120	17.8	23.1	12.6	5.8	7.6
March	320	140	17.3	22.3	12.4	5.9	7.6
April	290	130	16.7	21.3	12.2	6.0	7.1
May	40	80	15.3	20.3	10.3	6.8	7.0
June	0	65	13.6	19.5	7.8	7.6	7.3
July	0	60	12.9	19.0	6.9	7.9	7.6
August	10	75	13.7	20.0	7.5	7.8	8.0
September	20	110	15.4	22.1	8.7	7.5	8.6
October	40	120	17.2	23.8	10.6	7.2	8.5
November	100	110	18.1	24.3	11.8	6.9	8.3
December	210	130	17.8	23.1	12.5	6.0	7.7
Annual	1,600	1,250	16.1	21.7	10.5	6.75	7.7

MONTHLY CLIMATIC DATA FOR THE LAND UNITS (2/6)

Land Unit 3III

Month	Precipitation mm	Evapotranspiration mm	Temperatures 0900 hrs Mean °C	Max. °C	Min. °C	Sunshine duration hrs	Average radiation mm/day
January	240	85	17.6	22.8	12.4	6.0	7.8
February	200	80	17.5	22.5	12.5	5.9	7.7
March	250	90	17.4	22.7	12.2	6.3	7.9
April	160	80	16.8	21.5	12.2	6.1	7.2
May	50	85	15.3	20.5	10.2	7.0	7.1
June	10	75	13.5	19.5	7.5	7.7	7.1
July	5	85	12.5	19.2	6.5	7.7	7.8
August	5	100	13.5	20.2	6.9	8.1	7.5
September	10	110	15.2	22.0	8.4	7.2	8.2
October	30	120	16.9	23.8	10.0	7.0	8.5
November	60	100	18.0	24.5	11.5	6.9	8.4
December	180	90	17.8	23.5	12.2	5.9	7.7
Annual	1,200	1,100	16.0	21.9	10.2	6.8	7.7

Land Units 3VIII and 3IX

Month	Precipitation mm	Evapotranspiration mm	Temperatures 0900 hrs Mean °C	Max. °C	Min. °C	Sunshine duration hrs	Average radiation mm/day
January	180	100	17.7	21.0	14.4	5.5	7.5
February	260	95	17.2	20.5	13.9	6.0	7.0
March	300	60	16.8	20.0	13.6	5.5	8.0
April	220	70	16.7	20.0	13.5	6.0	7.0
May	90	55	16.0	18.5	13.5	7.0	6.8
June	10	70	13.0	18.0	8.0	7.5	6.5
July	0	75	11.2	17.5	5.0	8.0	7.0
August	0	75	12.5	19.0	6.0	8.5	8.0
September	30	100	16.0	22.0	10.0	8.0	8.5
October	90	120	18.0	23.5	12.5	7.5	8.8
November	120	110	18.5	24.0	13.0	6.0	8.0
December	200	70	17.2	22.0	12.5	5.5	7.5
Annual	1,500	1,000	15.9	20.5	11.3	6.75	7.55

MONTHLY CLIMATIC DATA FOR THE LAND UNITS (3/6)

Land Units 3X and 3XI

Month	Precipitation mm	Evapotranspiration mm	Temperatures 0900 hrs Mean °C	Max. °C	Min. °C	Sunshine duration hrs	Average radiation mm/day
January	250	90	15.5	20.0	11.0	4.0	6.6
February	200	80	15.0	19.5	10.5	5.0	7.0
March	300	90	15.0	20.0	10.0	5.5	6.9
April	290	80	14.5	19.5	9.5	6.0	6.6
May	60	85	13.8	18.5	9.0	7.0	6.9
June	15	70	11.2	17.5	5.0	7.5	7.5
July	10	85	10.5	17.0	4.0	8.0	7.5
August	5	100	11.5	18.0	5.0	8.5	7.9
September	5	110	13.2	20.0	6.5	8.0	8.1
October	10	120	15.0	21.0	9.0	7.5	8.2
November	65	100	14.7	20.0	9.5	6.0	7.2
December	190	90	14.5	19.0	10.0	4.5	6.5
Annual	1,400	1,100	13.7	19.2	8.3	6.45	7.20

Land Unit 4II

Month	Precipitation mm	Evapotranspiration mm	Temperatures 0900 hrs Mean °C	Max. °C	Min. °C	Sunshine duration hrs	Average radiation mm/day
January	200	110	15.2	19.5	11.0	5.9	5.6
February	180	100	15.5	19.5	11.5	6.0	5.8
March	240	110	15.0	19.0	11.0	6.5	5.9
April	180	100	14.0	17.5	10.5	6.0	5.8
May	50	70	12.2	16.0	8.5	7.0	6.1
June	0	50	11.0	15.5	6.5	8.0	6.5
July	0	90	10.5	15.0	6.0	8.0	6.4
August	0	110	11.5	16.0	7.0	7.0	6.7
September	0	130	13.0	18.0	8.0	7.0	7.7
October	10	150	14.7	20.0	9.5	6.5	8.4
November	60	160	15.5	20.5	10.5	6.2	7.6
December	180	120	15.5	19.5	11.5	6.0	5.8
Annual	1,100	1,300	13.6	18.0	9.3	6.7	6.5

MONTHLY CLIMATIC DATA FOR THE LAND UNITS (4/6)

Land Unit 4III

Month	Precipitation mm	Evapotranspiration mm	Temperatures 0900 hrs Mean °C	Max. °C	Min. °C	Sunshine duration hrs	Average radiation mm/day
January	200	100	18.0	22.5	13.6	6.0	6.0
February	300	90	17.6	22.5	12.8	6.5	7.0
March	220	100	17.5	22.9	12.1	6.5	6.5
April	190	90	16.9	22.3	11.6	6.0	6.9
May	70	60	16.2	21.5	11.0	6.0	7.0
June	0	40	14.3	202.	8.4	7.5	7.5
July	0	90	13.4	19.7	7.1	8.0	7.8
August	0	100	14.6	21.0	8.3	8.5	8.0
September	0	110	16.4	23.0	9.8	8.0	8.5
October	10	140	18.3	24.0	12.7	7.5	8.2
November	130	160	18.5	23.2	13.8	7.0	7.0
December	180	120	17.5	21.7	13.3	6.0	6.5
Annual	1,300	1,200	16.6	22.0	11.2	7.0	7.2

Land Units 14II, III and IV

Month	Precipitation mm	Evapotranspiration mm	Temperatures 0900 hrs Mean °C	Max. °C	Min. °C	Sunshine duration hrs	Average radiation mm/day
January	170	110	20.8	25.6	15.6	5.5	8.5
February	180	100	20.4	25.4	15.3	6.4	8.5
March	190	110	20.5	25.9	14.8	6.2	8.8
April	60	100	20.2	25.3	14.7	7.5	8.4
May	10	90	19.2	25.2	13.0	8.1	9.0
June	0	80	17.6	24.0	10.6	8.8	8.4
July	0	85	17.2	23.7	10.3	8.9	8.5
August	0	110	18.0	24.6	10.9	8.9	8.9
September	0	130	19.4	26.6	12.6	8.6	9.5
October	20	140	20.9	27.9	14.1	8.4	9.9
November	100	125	22.2	28.4	15.4	7.6	9.3
December	170	120	21.1	26.5	15.9	6.4	8.7
Annual	900	1,300	19.8	25.8	13.6	7.6	8.2

MONTHLY CLIMATIC DATA FOR THE LAND UNITS (5/6)

Land Units 4IV and 4V

Month	Precipitation mm	Evapotranspiration mm	Temperatures 0900 hrs Mean °C	Max. °C	Min. °C	Sunshine duration hrs	Average radiation mm/day
January	190	100	15.8	19.5	12.0	5.0	5.0
February	290	90	15.0	19.0	11.0	6.5	5.5
March	240	100	15.0	20.0	10.0	6.0	6.0
April	190	90	14.2	19.0	9.5	6.5	6.0
May	80	60	13.5	18.0	9.0	5.5	6.2
June	0	40	12.0	17.0	7.0	6.0	6.5
July	0	90	10.7	16.5	5.0	7.5	6.5
August	0	100	12.0	17.5	6.5	8.0	7.0
September	0	110	13.2	19.5	7.0	8.5	7.5
October	10	140	15.0	21.0	9.0	9.0	8.5
November	120	160	15.0	20.0	10.0	7.0	7.5
December	180	120	14.5	18.5	10.5	6.5	6.0
Annual	1,200	1,200	13.8	18.8	8.9	6.8	6.5

Land Units 4VII and 4IX

Month	Precipitation mm	Evapotranspiration mm	Temperatures 0900 hrs Mean °C	Max. °C	Min. °C	Sunshine duration hrs	Average radiation mm/day
January	260	110	16.1	20.9	11.2	6.0	5.5
February	240	100	16.3	21.4	11.3	5.9	5.8
March	250	120	15.6	20.1	11.1	6.5	6.0
April	200	90	15.1	19.2	11.0	6.0	5.8
May	60	70	13.8	18.3	9.3	5.5	6.1
June	5	50	12.2	17.5	7.0	6.0	6.5
July	5	90	11.6	17.0	6.2	8.0	6.4
August	5	110	12.3	18.0	6.7	8.5	6.7
September	10	130	13.8	19.9	7.8	9.0	7.7
October	15	150	15.4	21.4	9.5	7.0	8.0
November	60	160	16.2	21.9	10.6	6.5	7.6
December	190	120	16.0	20.8	11.3	6.0	5.8
Annual	1,300	1,300	14.5	19.7	9.4	6.7	6.5

MONTHLY CLIMATIC DATA FOR THE LAND UNITS (6/6)

Land Unit 81I

Month	Precipitation mm	Evapotranspiration mm	Temperatures 0900 hrs Mean °C	Max. °C	Min. °C	Sunshine duration hrs	Average radiation my/day
January	150	120	19.7	24.7	14.7	6.5	7.6
February	120	100	19.8	24.9	14.7	6.8	7.3
March	150	120	19.7	24.8	14.7	6.9	8.1
April	90	110	19.5	24.1	14.9	7.1	8.1
May	20	100	18.6	23.5	13.8	8.0	8.6
June	5	110	17.4	22.8	11.9	9.1	8.6
July	0	120	16.7	22.4	11.1	9.6	7.9
August	0	130	17.3	23.2	11.4	9.3	8.8
September	0	140	18.8	25.3	12.3	9.4	9.8
October	5	150	20.3	27.0	13.5	9.0	10.0
November	40	130	21.1	27.7	14.6	8.1	9.5
December	140	120	20.3	25.9	14.8	7.1	8.6
Annual	720	1,450	19.1	24.7	13.5	8.1	8.6

Land Unit 14I

Month	Precipitation mm	Evapotranspication mm	Temperatures 0900 hrs Mean °C	Max. °C	Min. °C	Sunshine duration hrs	Average radiation my/day
January	200	110	17.4	21.9	12.9	5.3	7.3
February	175	100	18.3	23.8	12.8	5.7	7.6
March	220	110	17.3	21.9	12.7	5.5	7.3
April	75	100	16.7	21.1	12.2	5.8	7.1
May	15	90	15.3	20.2	10.4	6.6	7.0
June	10	80	13.8	19.5	8.0	7.6	7.2
July	5	85	13.1	18.8	7.4	7.8	7.5
August	0	110	14.0	19.9	8.2	8.0	8.2
September	0	130	15.7	22.3	9.1	8.4	9.0
October	5	140	17.5	23.8	11.2	7.2	8.5
November	65	125	18.2	24.2	12.2	6.9	8.3
December	180	120	17.8	22.8	12.8	6.1	7.8
Annual	950	1,300	16.2	21.7	10.8	6.7	7.7

ANNEX 3-3

RESULTS OF SURVEY ON BEARING CAPACITY

Design bearing capacity of the construction site should be determined by synthetic examination based upon the results of fiels survey.

1.Results of survey using cone penetrometer

Equipment used; cone penetrometer,section area of top cone 3.23 sq.cm

Survy site ; 2 points within the construction site, 2 times of survey were carried out at each site

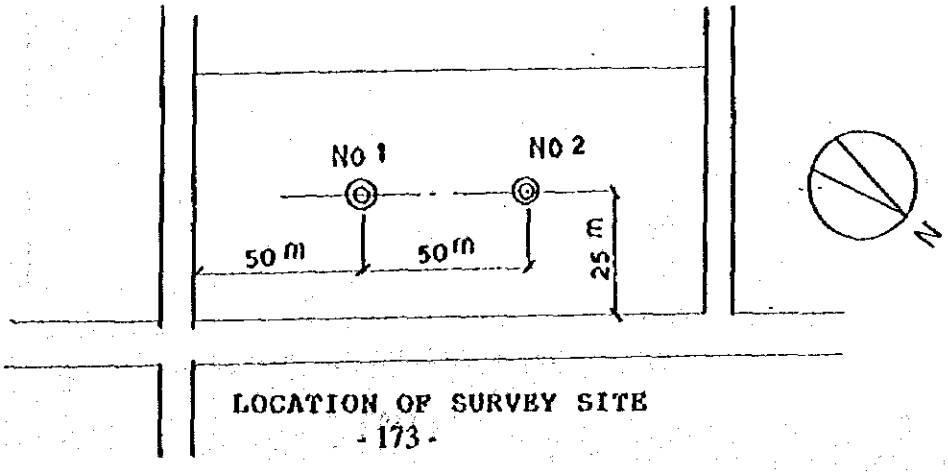
Results of survey

1.Kilolo Site

Depth from GL (cm)	Survey Site No.1					
	1st Time			2nd Time		
	Gauge	Q	qa(t/m2	Gauge	Q	qa(t/m2
10	-	-	-	-	-	-
20	-	-	-	-	-	-
30	97	43	20.2	92	40	18.6
40	104	46	21.4	86	38	17.7
50	119	52	24.2	90	40	18.6
60	143	63	29.3	105	46	21.4
70	100	44	20.5	83	37	17.2
80	113	50	23.3	93	41	19.1
90	81	36	16.7	67	29	13.5
100	82	36	16.7	73	32	14.9
110	95	42	19.5	65	29	13.5
120	81	36	16.7	57	25	11.6
130	101	44	20.5	71	31	14.4
140	102	45	20.9	87	38	17.7
150	94	41	19.1	84	37	17.2
160	150	66	30.7	70	31	14.4
170	189	83	38.6	60	26	12.9
180	not measurable			65	29	13.5

190		140	62	28.8
200		130	57	26.5

Depth from GL (cm)	Survey Site No.2					
	1st Time			2nd Time		
	Gauge	Q	qa(t/m2	Gauge	Q	qa(t/m2
10	–	–	–	–	–	–
20	–	–	–	–	–	–
30	130	57	26.5	168	74	34.5
40	124	55	25.6	155	68	31.6
50	135	59	27.4	135	59	27.4
60	113	50	23.3	136	60	27.9
70	116	51	23.7	146	64	29.8
80	206	91	42.3	134	59	27.4
90	212	93	43.2	115	51	23.7
100	not measurable			114	50	23.3
110				125	55	25.6
120				180	79	36.7
130				not measurable		
140						
150						
160						
170						
180						
190						
200						

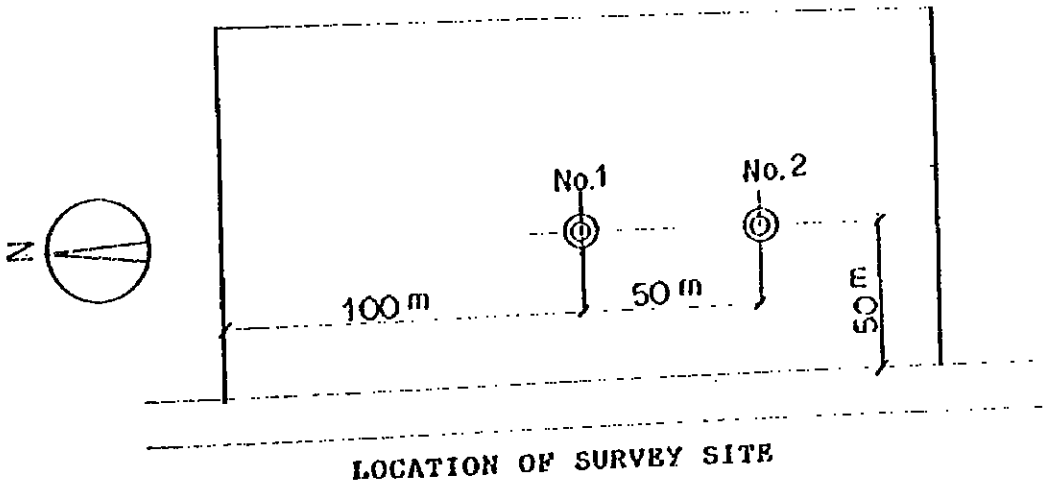


LOCATION OF SURVEY SITE

2.Ifwagi Site

Depth from GL (cm)	Survey Site No.1					
	1st Time			2nd Time		
	Gauge	Q	qa(t/m2	Gauge	Q	qa(t/m2
10	-	-	-	-	-	-
20	-	-	-	-	-	-
30	132	58	27.0	188	83	38.6
40	104	46	21.4	186	82	38.1
50	74	33	15.3	118	52	24.2
60	80	35	16.3	103	45	20.9
70	88	39	18.1	76	33	15.3
80	86	38	17.7	70	31	14.4
90	70	31	14.4	68	30	14.0
100	73	32	14.9	52	23	10.7
110	63	28	13.0	70	31	14.4
120	56	25	11.6	78	34	15.8
130	55	24	11.2	82	36	16.7
140	72	32	14.9	51	22	10.2
150	71	31	14.4	48	21	9.8
160	52	23	10.7	53	23	10.7
170	52	23	10.7	72	32	14.9
180	67	29	13.5	148	65	30.2
190	123	54	25.1	123	54	25.1
200	124	55	25.6	185	81	37.7

Depth from GL (cm)	Survey Site No.2					
	1st Time			2nd Time		
	Gauge	Q	qa(t/m2	Gauge	Q	qa(t/m2
10	–	–	–	–	–	–
20	–	–	–	–	–	–
30	42	18	8.4	120	53	24.7
40	55	24	11.2	144	63	29.3
50	172	76	35.3	100	44	20.5
60	165	73	34.0	66	29	13.5
70	105	46	21.4	66	29	13.5
80	105	46	21.4	85	37	17.2
90	100	44	20.5	68	30	14.0
100	198	87	40.5	105	46	21.4
110	190	84	39.1	79	35	16.3
120	78	34	15.8	82	36	16.7
130	82	36	16.7	87	38	17.7
140	103	45	20.9	64	28	13.0
150	131	58	27.0	50	22	10.2
160	60	26	12.1	36	16	7.4
170	81	36	16.7	58	26	12.1
180	66	29	13.5	95	42	19.5
190	44	19	8.8	160	70	32.6
200	38	17	7.9	185	192	39.1

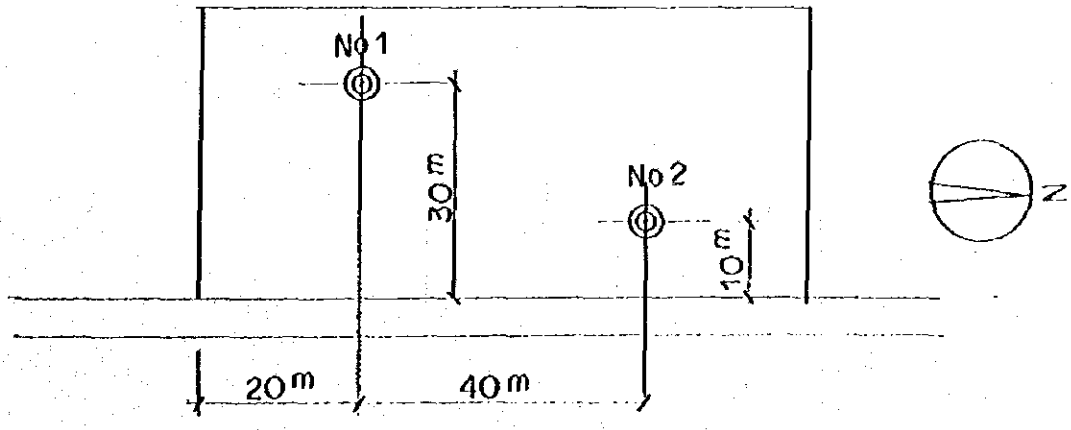


LOCATION OF SURVEY SITE

(3)Matembwe Site

Depth from GL (cm)	Survey Site No.1					
	1st Time			2nd Time		
	Gauge	Q	qa(t/m2	Gauge	Q	qa(t/m2
10	-	-	-	-	-	-
20	-	-	-	-	-	-
30	82	36	16.7	111	49	22.8
40	113	50	23.3	132	58	27.0
50	100	44	20.5	144	63	29.3
60	52	23	10.7	71	31	14.4
70	56	25	11.6	50	22	10.2
80	82	36	16.7	54	24	11.2
90	128	56	26.0	46	20	9.3
100	74	33	15.3	52	23	10.7
110	57	25	11.6	46	20	9.3
120	52	23	10.7	67	29	13.5
130	46	20	9.3	56	25	11.6
140	52	23	10.7	70	31	14.4
150	51	22	10.2	88	39	18.1
160	66	29	13.5	98	43	20.0
170	83	37	17.2	92	40	18.6
180	123	54	25.1	128	56	26.0
190	174	77	35.8	137	60	27.9
200	168	74	34.4	162	71	33.0

Depth from GL (cm)	Survey Site No.2					
	1st Time			2nd Time		
	Gauge	Q	qa(t/m2	Gauge	Q	qa(t/m2
10	–	–	–	–	–	–
20	–	–	–	–	–	–
30	130	57	26.5	135	59	27.4
40	138	61	28.4	138	61	28.4
50	137	60	27.9	97	43	20.0
60	142	62	28.8	114	50	23.3
70	100	44	20.5	83	37	17.2
80	84	37	17.2	63	28	13.0
90	67	29	13.5	55	24	11.2
100	52	23	10.7	42	18	8.4
110	74	33	15.3	48	21	9.8
120	75	33	15.3	52	23	10.7
130	100	44	20.5	40	18	8.4
140	64	28	13.0	48	21	9.8
150	65	29	13.5	50	22	10.2
160	73	32	14.9	58	26	12.1
170	86	38	17.7	84	37	17.2
180	94	41	19.1	103	45	20.9
190	102	45	20.9	160	67	31.2
200	174	77	35.8	123	54	25.1

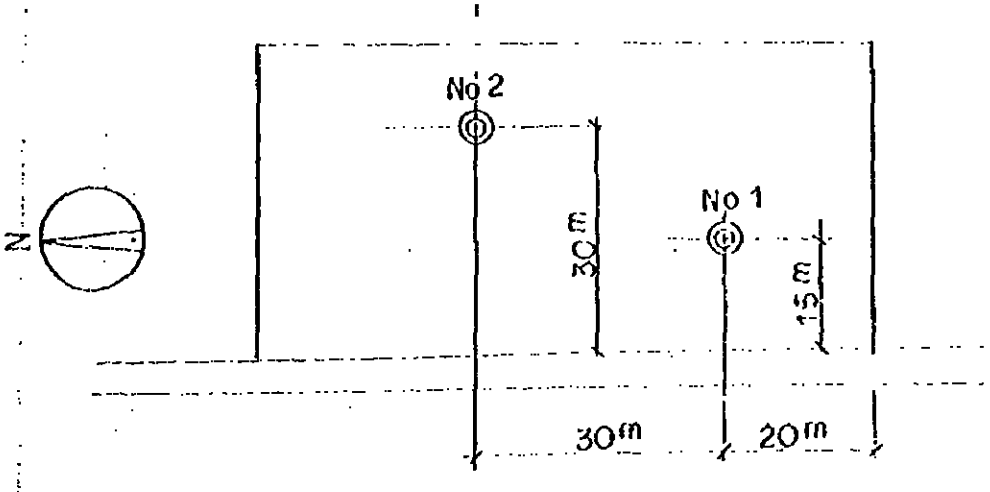


LOCATION OF SURVEY SITE

(4)Itundu Site

Depth from GL (cm)	Survey Site No.1					
	1st Time			2nd Time		
	Gauge	Q	qa(t/m2	Gauge	Q	qa(t/m2
10	-	-	-	-	-	-
20	-	-	-	-	-	-
30	150	66	30.7	135	59	27.4
40	146	64	29.8	155	68	31.6
50	120	53	24.7	130	57	26.5
60	188	83	38.6	180	79	36.7
70	255	112	52.1	115	51	23.7
80	280	123	57.2	108	48	22.3
90	274	121	56.3	58	26	12.1
100	246	108	50.2	66	29	13.5
110	223	98	45.6	65	29	13.5
120	69	74	34.4	51	22	10.2
130	54	68	31.6	52	23	10.7
140	54	68	31.6	57	25	11.6
150	61	27	12.6	46	20	9.3
160	57	25	11.6	56	25	11.6
170	52	23	10.7	64	28	13.0
180	52	23	10.7	64	28	13.0
190	51	22	10.2	60	26	12.1
200	42	18	8.4	47	21	9.8

Depth from GL (cm)	Survey Site No.2					
	1st Time			2nd Time		
	Gauge	Q	qa(t/m2	Gauge	Q	qa(t/m2
10	–	–	–	–	–	–
20	–	–	–	–	–	–
30	120	53	24.7	103	45	20.9
40	118	52	24.2	63	28	13.0
50	103	45	20.9	70	31	14.4
60	120	53	24.7	56	26	12.1
70	72	32	14.9	55	24	11.2
80	98	43	20.0	49	22	10.2
90	68	30	14.0	51	22	10.2
100	74	33	15.3	49	22	10.2
110	75	33	15.3	47	21	9.8
120	153	67	31.2	50	22	10.2
130	50	22	10.2	54	24	11.2
140	125	55	25.6	54	24	11.2
150	81	36	16.7	57	25	11.6
160	90	40	18.6	53	23	10.7
170	90	40	18.6	60	26	12.1
180	70	31	14.4	70	31	14.4
190	105	46	21.4	105	46	21.4
200	90	40	18.6	115	51	23.7



LOCATION OF SURVEY SITE

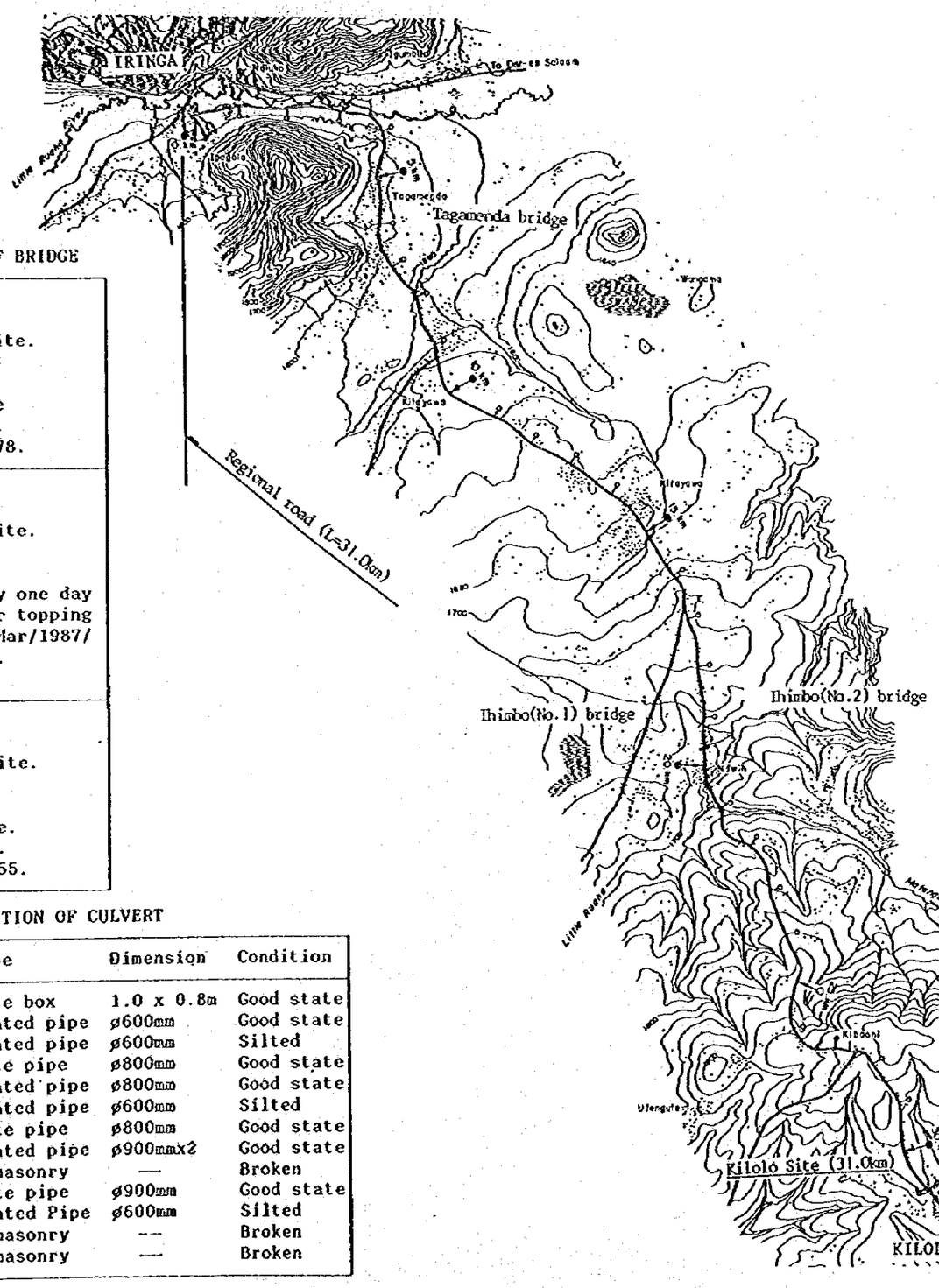
Where $qa = a \times \frac{Q}{A}$

qa : Equivalent Allowable Bearing Capacity kg/cm² (Safety factor 3)
Q : Maximum Penetrating Resistence of Corn, (Number on gauge x 0.44)
A : Area of Cross Section of Corn
a : Conversion factor for Allowable Bearring Capacity, 0.15-0.20 (in this case, 0.15 is applied)

2 Pit Survey

Geological condditions were observed to a depth of 2 mat each site. Each site has simmiler geological conditions as shown below.

Depth	Geological Conditions
0 - 30 cm	Brackish gray or reddish brown sandy loam
30 - 200 cm	Reddish brown loam



PRESENT CONDITION OF BRIDGE

Tagamenda bridge
Location:7.9km
Type:RCC & SB composite.
Width:3.9m
Spam length:9.0m
Records of flood;None
Condition:Good state.
Const.year:Before 1978.

Ihimbo(No.1)bridge
Location:20.5km
Type:RCC & SB composite.
Width:3.5m
Spam length:12.0m
Records of flood;Only one day over topping in Mar/1987/
Condition:Good state.
Const.year:1986

Ihimbo(No.2)bridge
Location:21.0km
Type:RCC & SB composite.
Width:6.4m
Spam length:7.2m
Records of flood;None.
Condition:Good state.
Const.year:Before 1955.

PRESENT CONDITION OF CULVERT

No.	Location	Type	Dimension	Condition
1	0.2km	Concrete box	1.0 x 0.8m	Good state
2	1.0km	Corrugated pipe	ø600mm	Good state
3	2.7km	Corrugated pipe	ø600mm	Silted
4	3.3km	Concrete pipe	ø800mm	Good state
5	4.2km	Corrugated pipe	ø800mm	Good state
6	5.8km	Corrugated pipe	ø600mm	Silted
7	13.7km	Concrete pipe	ø800mm	Good state
8	15.2km	Corrugated pipe	ø900mmx2	Good state
9	19.2km	Stone masonry	—	Broken
10	19.6km	Concrete pipe	ø900mm	Good state
11	22.0km	Corrugated Pipe	ø600mm	Silted
12	22.5km	Stone masonry	—	Broken
13	22.9km	Stone masonry	—	Broken

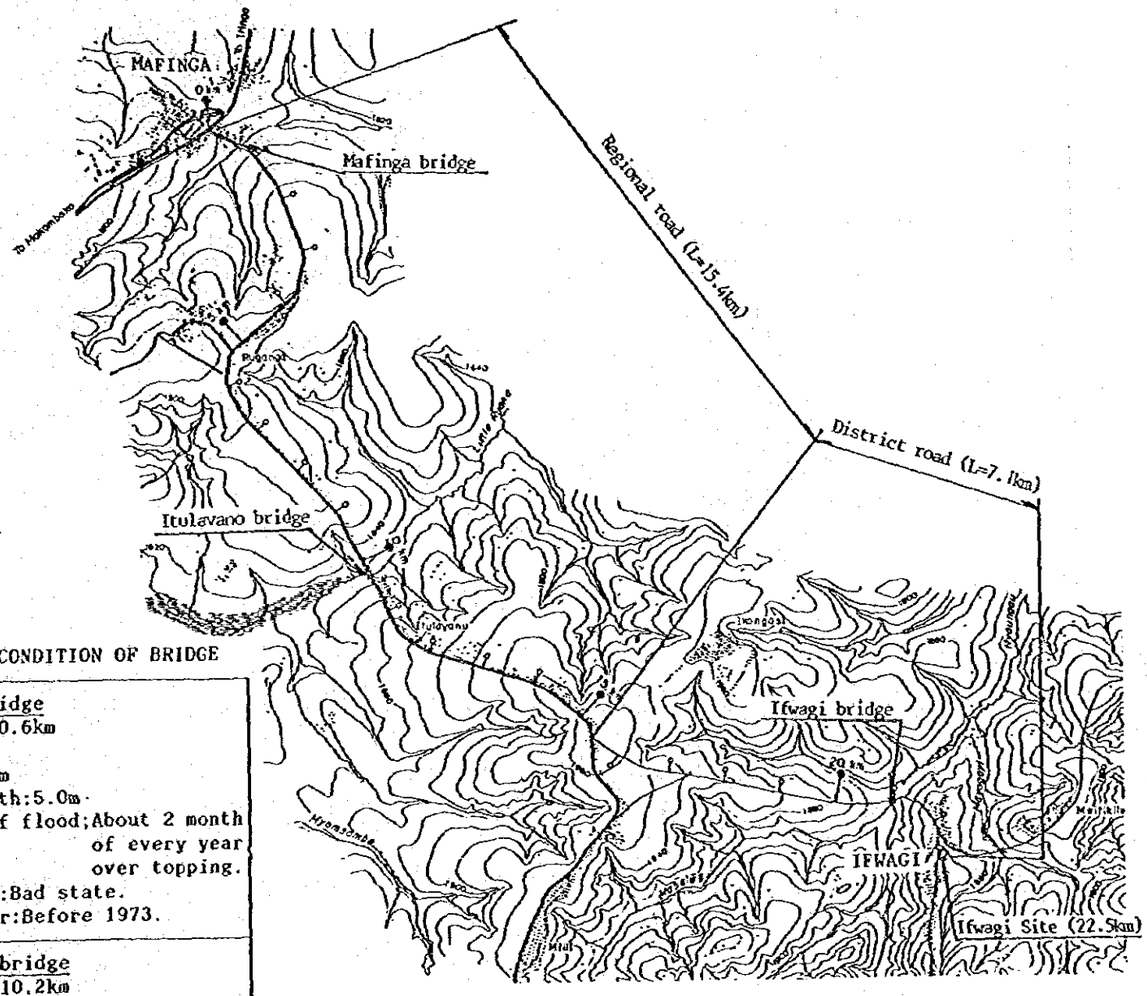
PRESENT ROAD CONDITION
(Iringa to Kilolo Agricultural Storage Site)

LOCATION	PRESENT CONDITION
0.0km (Iringa) | 7.9km	Road class :Regional road(7.9km) Terrain :Hilly Subgrade :Red sandy loam Road width :4.5-6.0m Road surface:No pavement,Fair camber Condition :Bad state.Impassable in heavy rains due to poor drainage facilites.Slippery and maddy in rainy season. Calvert :6 nos.
7.9km | 19.1km	Road class :Regional road(11.2km) Terrain :Hilly Subgrade :Red sandy loam Road width :4.5-6.0m Road surface:Fair camber .Same parts are gravel pavement or spread gravel. Condition ::Passable in all seasons. Culvert :2 nos. Bridge :1 no.
19.1km (Ihimbo) | 31.0km (Site)	Road class :Regional road(11.9km) Terrain :Hilly Subgrade :Red sandy loam Road width :3.5-4.5m Road surface:No pavement,Nor camber. Condition :Bad state.Impassable in heavy rains due to poor drainage facilites,Slippery and maddy. in rainy season. Calvert :5 nos. Bridge :2 nos.

IRINGA-KILOLO

PRESENT ROAD CONDITION
(Mafinga to Ifwagi Agricultural Storage Site)

LOCATION	PRESENT CONDITION
0.0km (Mafinga)	Road class :Regional road(2.7km) Terrain :Hilly Subgrade :Red sandy loam Road width :5.0-6.0m Road surface:No pavement,Slight camber. Many potholes,ruts and corrugations. Condition :Bad state.Impassable in heavy rains due to poor drainage facilites. Calvert :None Bridge :1 no.
2.7km 9.2km	Road class :Regional road(6.5km) Terrain :Hilly Subgrade :Red sandy loam Road width :5.5-6.0m Road surface:No pavement.Fair camber Partly corrugations. Condition :Passable in all seasons. Culvert :None. Bridge :None.
9.2km 11.2km	Road class :Regional road(2.0km) Terrain :Hilly/Mountainous Subgrade :Loam Road width :4.5-5.0m Road surface:No pavement,No camber Many potholes. Condition :Bad state.Impassable in heavy rains due to poor drainage facilites Very slippery in rainy season. Calvert :None. Bridge :1 no.
11.2km 14.4km	Road class :Regional road(3.2km) Terrain :Hilly Subgrade :Red loam Road width :4.5-5.5m Road surface:No pavement.Fair camber. .Partly poteholes. Condition :Passable in all seasons. Culvert :None. Bridge :None.
14.4km 22.5km (Site)	Road class :Regional road(1.0km) and District road(7.1km) Terrain :Hilly Subgrade :Red loam Road width :3.5-4.5m Road surface:No pavement,No camber. Many potholes. Condition :Bad state.Impassable in heavy rains due to poor drainage facilites. Very slippery in rainy season. Narrow width. Calvert :None. Bridge :1 no.



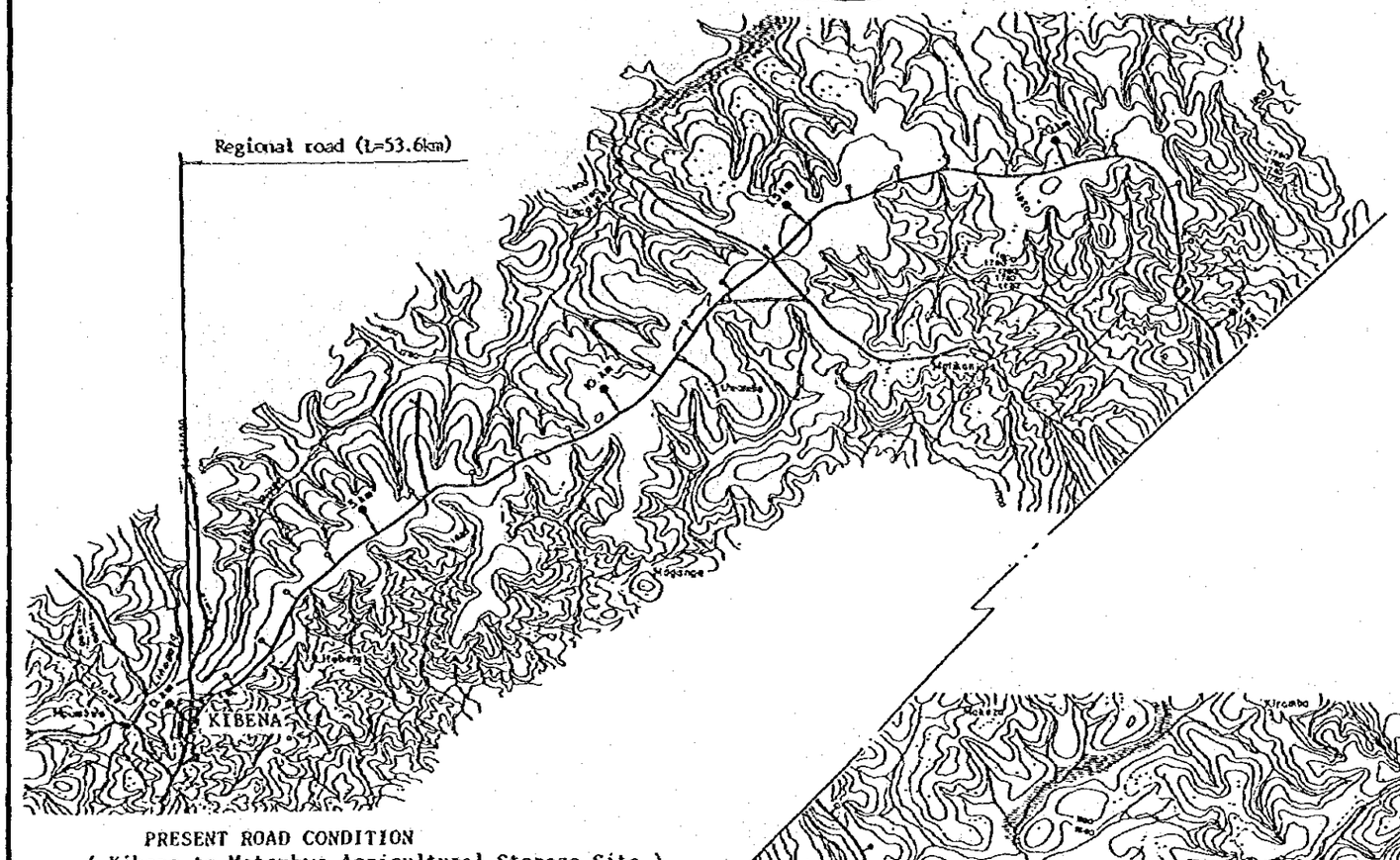
PRESENT CONDITION OF BRIDGE

Mafinga bridge
Location:0.6km
Type:RCC.
Width:3.6m
Spam length:5.0m
Records of flood;About 2 month of every year over topping.
Condition:Bad state.
Const.year:Before 1973.

Itulavana bridge
Location:10.2km
Type:RCC & SB composite.
Width:3.6m
Spam length:10.0m
Records of flood;Only 3 days over topping per 3-5 years
Condition:Good state.
Const.year:Before 1973.

Ifwagi Bridge
Location:20.5km
Type:Timber slab, stone masonry abutment.
Width:3.6m
Spam length:4.7m
Records of flood;None.
Condition:Bad state.
Const.year:Before 1978.

MAFINGA-IFWAGI

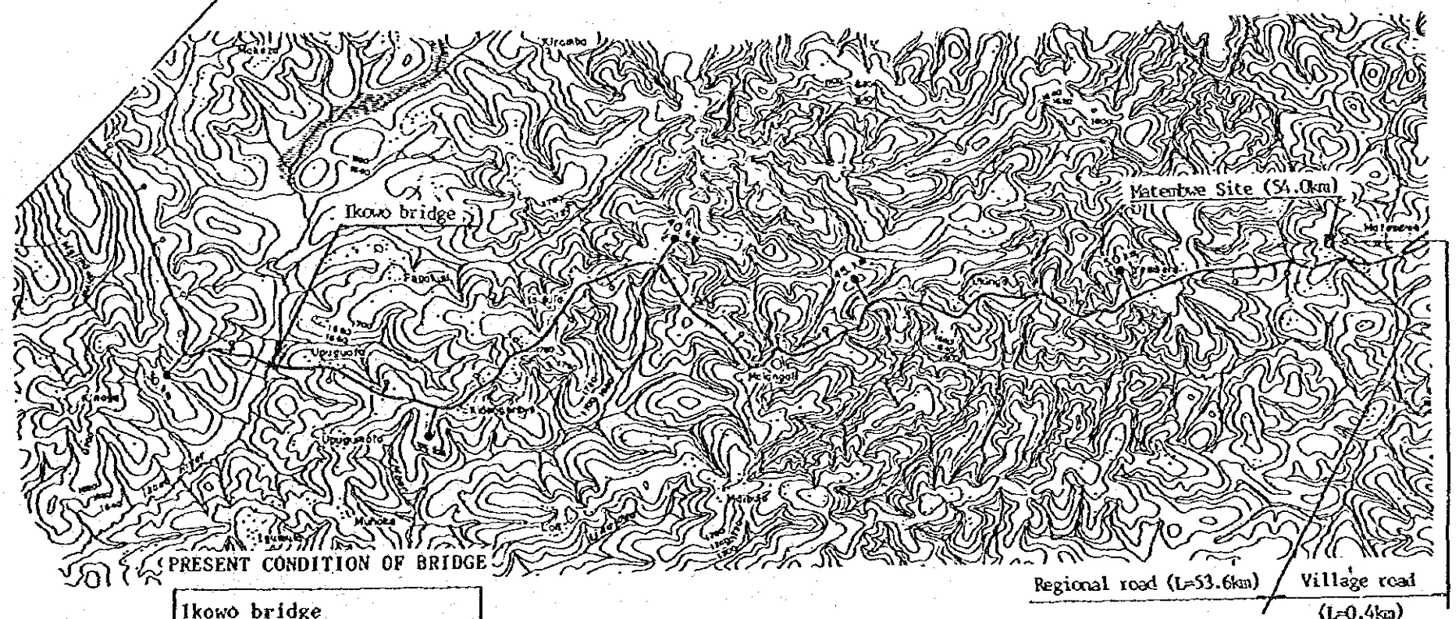


PRESENT ROAD CONDITION
(Kibena to Matembwe Agricultural Storage Site)

LOCATION	PRESENT CONDITION
0.0km (Kibena) | 23.7km	Road class :Regional road(23.7km) Terrain :Hilly Subgrade :Red loam Road width :5.5-6.0m Road surface:No pavement.Fair camber .Partly potholes. Conditionson:Passable in all seasons. Culvert :None. Bridge :None.
23.7km | 26.5km	Road class :Regional road(2.8km) Terrain :Hilly/Mountainous Subgrade :Red loam Road width :3.5-5.0m Road surface:No pavement,No camber. Many potholes,ruts & eroded. Conditionson:Bad state.Impassable in heavy rains due to poor drainage. facilites.Very,slippery in rainy season. Culvert :None. Bridge :None.

PRESENT ROAD CONDITION
(Kibena to Matembwe Agricultural Storage Site)

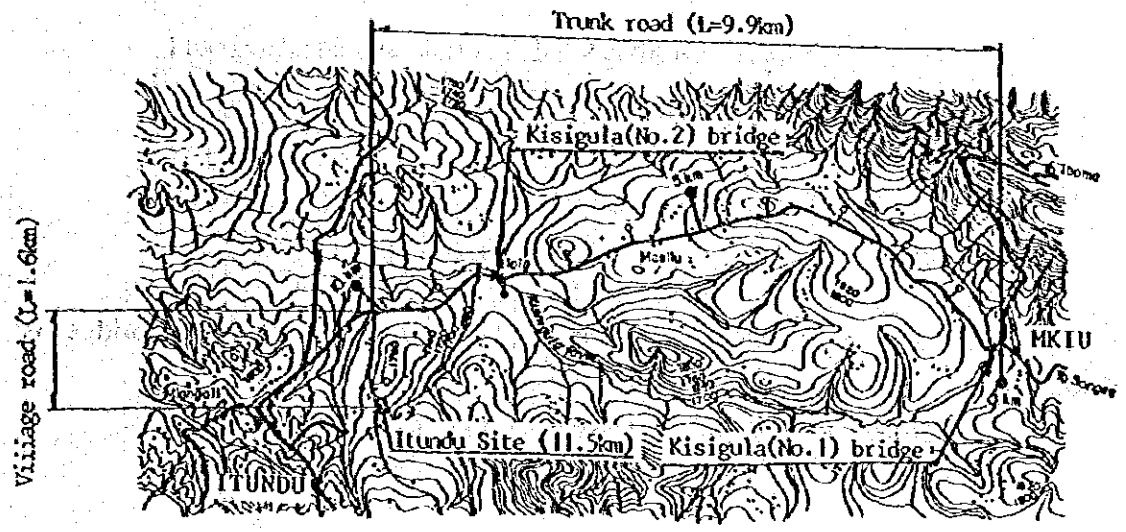
LOCATION	PRESENT CONDITION
26.5km | 29.2km	Road class :Regional road(2.7km) Terrain :Hilly Subgrade :Red loam Road width :4.5-5.5m Road surface:No pavement.Fair camber. Condition :Passable in all seasons. Culvert :None. Bridge :None.
29.2km | 54.0km (Site)	Road class :Regional road (24.4km) and Village road(0.4km) Terrain :Hilly/Mountainous Subgrade :Red loam Road width :3.5-4.5m Road surface:No pavement,No camber. Condition :Bad state.Impassable in heavy rains due to poor drainage. facilites.Very slippery in rainy season.Narrow width. Culvert :None. Bridge :1 no. bridge



PRESENT CONDITION OF BRIDGE

Ikowo bridge
Location:31.8km
Type:Timber slab, stone masonry abutment.
Width:3.8m
Spam length:5.5m
Records of flood;None.
Condition:Bad state.
Const.year:Before 1978.

KIBENA-MATEMBWE



PRESENT ROAD CONDITION

(Mkiu to Itundu Agricultural Storage Site)

LOCATION	PRESENT CONDITION
0.0km (Mkiu)	Road class :Trunk road (9.9km) and Village road(1.6km)
|	Terrain :Hilly/Mountainous
11.5km (Site)	Subgrade :Red loam
	Road width :4.0-4.5m
	Road surface:No pavement,No camber. Many potholes,ruts & eroded.
	Condition :Bad state.Impassable in heavy rains due to poor drainage. facilites.Very,slippery in rainy season.
	Calvert :3 nos.
	Bridge :2 nos.

PRESENT CONDITION OF BRIDGE

Kisigula (No.1) bridge
Location:0.3km
Type:Timber slab, stone masonry abutment.
Width:3.8m
Spam length:5.0m
Records of flood;None.
Condition:Bad state.
Const.year:Before 1978.

Kisigula (No.2) bridge
Location:8.1km
Type:Timber slab, stone masonry abutment.
Width:3.8m
Spam length:3.6m
Records of flood;None.
Condition:Bad state.
Const.year:Before 1978.

PRESENT CONDITION OF CULVERT

No.	Location	Type	Dimension	Condition
1	6.2km	Concrete pipe	ø600mmx2	Good state
2	8.0km	Corrugated pipe	ø1,200mm	Good state
3	8.4km	Corrugated pipe	ø1,200mm	Good state

MKIU-ITUNDU

ANNEX 3-5

FLOOD ANALYSIS

(1) Flood discharge

Flood discharge is estimated as following 5 places where replacement of bridges is required.

Road	Place	River
Mafinga-Ifwagi	Mafinga bridge	Branch of Little Ruaha river
"	Ifwagi bridge	"
Kibena-Matembe	Ikowo bridge	Ikowo river
Mkiu-Itundu	Kishigula (No.1) bridge	Kishigula river
"	Kishigula (No.2) bridge	"

Flood discharge of each river is estimated applying the following procedure and the data collected during the basic design study.

- Peak flood discharge is estimated using the Rational formula as shown below:

$$Qp = 1/3.6 \times re \times A \quad \ldots\ldots\ldots\ldots \quad 1$$

where, Qp : peak flood discharge (m^3/sec)
re : effective rainfall intensity for the duration equal to the flood concentration (mm/hr)
A : catchment area (km^2)

Mafinga bridge	:	16.5 km^2
Ifwagi bridge	:	80.8 km^2
Ikowo bridge	:	106.3 km^2
Kishigula (No.1) bridge	:	27.5 km^2
Kishigula (No.2) bridge	:	56.2 km^2

- Flood concentration time of the Yongoma river is given by the following equation:

$$Tp = n \times re^{-c} \times A^{d} \quad \ldots\ldots\ldots\ldots \quad 2$$

where, Tp : flood concentration time (min)
n : coefficient (= 240)
c : coefficient (= 0.433)
d : coefficient (= 0.22)

- Rainfall intensity can be calculated by using the following equation:

$$rt = R_{24}/t \times (t/24)^{k} \quad \ldots\ldots\ldots\ldots \quad 3$$

where, rt : rainfall intensity during t hours (mm/hr)
R_{24} : daily rainfall (mm/day)
t : time in hours (hr) (= Tp)
k : coefficient (= 1/3)

- Probable basin rainfall is calculated by applying the Iwai Method, using the annual maximum daily rainfall in each year observed at Iringa meteorological station. Maximum daily rainfall record and these results are shown below.

Annual Maximum Daily Rainfall at Iringa Meteorological Station

Date	Rainfall (mm/day)	Date	Rainfall (mm/day)	Date	Rainfall (mm/day)
1957. 1. 7	61.0	1968. 12. 12	54.4	1979. 12. 29	52.6
1958. 3. 4	51.8	1969. 4. 13	37.7	1980. 1. 18	88.5
1959. 3. 25	34.5	1970. 1. 14	55.2	1981. 1. 1	57.5
1960. 1. 21	34.3	1971. 3. 8	39.0	1982. 12. 25	47.3
1961. 2. 13	45.7	1972. 2. 8	40.8	1983. 12. 13	80.2
1962. 3. 7	55.1	1973. 1. 5	59.2	1984. 4. 13	36.0
1963. 12. 25	43.7	1974. 3. 25	38.2	1985. 3. 1	28.6
1964. 11. 8	34.8	1975. 1. 12	52.9	1986. 1. 22	40.7
1965. 12. 4	47.2	1976. 12. 20	41.9	1987. 3. 10	65.2
1966. 11. 21	58.4	1977. 12. 24	30.7		
1967. 4. 20	67.3	1978. 1. 20	41.3		

Probable Daily Rainfall

Return Period in Year	Probable Rainfall (mm/day)
2	46.7
5	59.3
10	67.6
20	75.6
30	80.2
50	85.9
100	93.8
200	101.6

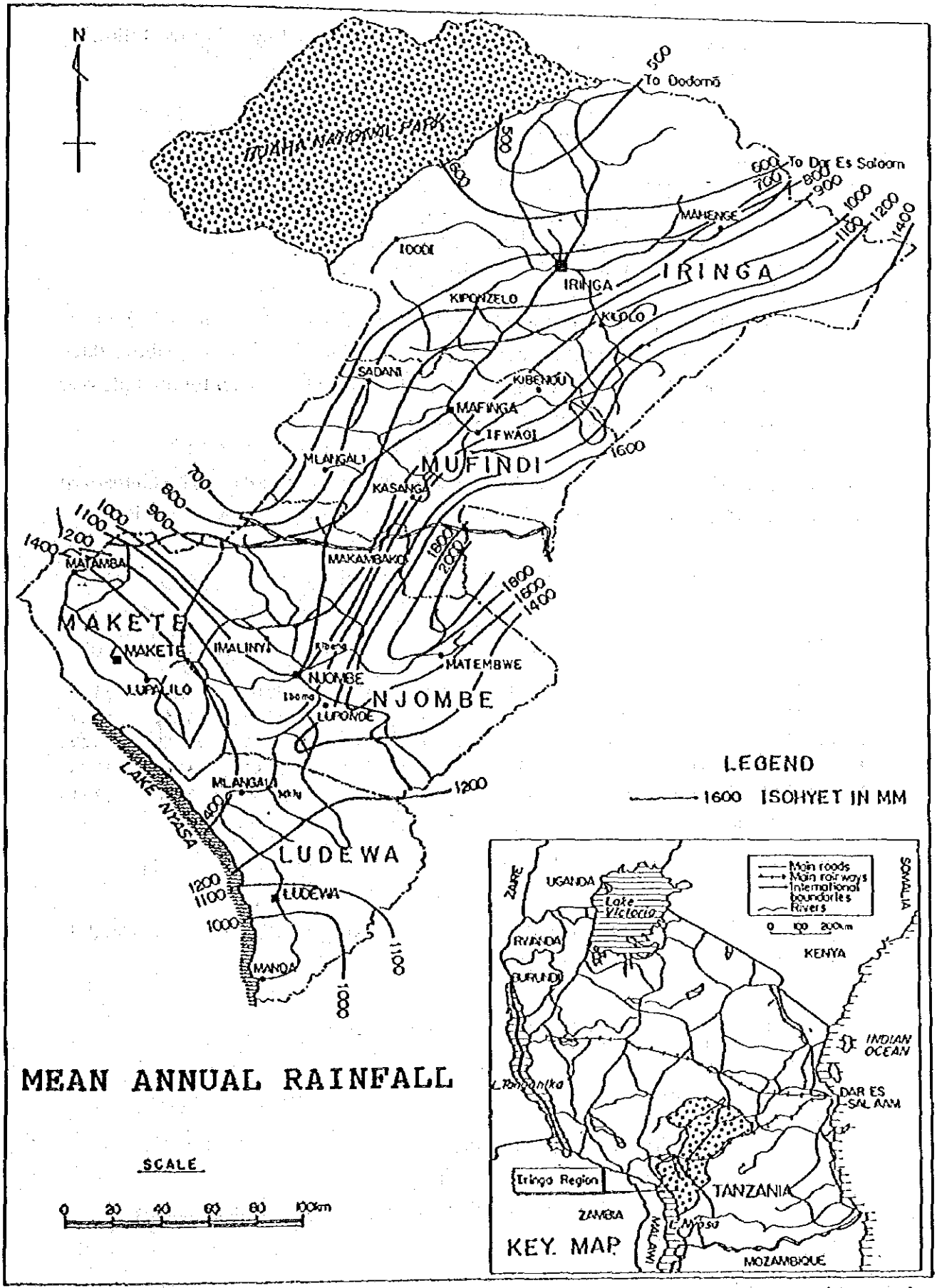
- Probable basin rainfall at each point is calculated using probable basin rainfall at Iringa station by applying the isohyetal analysis method (Isohyetal Map is shown on the next page. The calculated results areshown below.

Probable Basin Rainfall

Position	Annual Rainfall (mm) (Share of Area) (%)			Basin Area (km^2)
Mafinga bridge	950 (100)			16.5
Ifwagi bridge	1,050 (44)	1,150 (56)		80.8
Ikowo bridge	1,500 (10)	1,700 (83)	1,900 (7)	106.3
Kishigula (No.1) bridge	1,300 (100)			27.5
Kishigula (No.2) bridge	1,300 (100)			56.2

Probable Daily Rainfall (mm/day)

Position	Return Period in Year						
	2	5	10	20	50	100	200
Mafinga bridge	59.15	75.11	85.63	95.76	108.81	118.81	128.69
Ifwagi bridge	68.87	87.45	99.69	111.48	126.67	138.32	149.83
Ikowo bridge	105.8	133.94	152.69	170.76	194.02	211.86	229.48
Kishigula bridge (No.1)	80.95	102.79	117.17	131.04	148.89	162.59	176.11
Kishigula bridge (No.2)	80.95	102.79	117.17	131.04	148.89	162.59	176.11



REF : Water Master Plans for Iringa Ruvuma and Mbeya Regions (DANIDA)

- Effective rainfall intensity during t hours is calculated by using the following equation:

$$re = r \times rt \quad \ldots\ldots\ldots\ldots \quad 4$$

where, re : effective rainfall intensity during t hours (mm/hr)
r : peak runoff coefficient (= 0.20)
rt : rainfall intensity during t hours
(obtained by using the equation-3)

- The flood concentration time (Tp) and the effective rainfall intensity (re) for the duration equal to the flood concentration time are calculated using above three equations (2, 3, and 4). Then, peak flood discharge of each river for multiple year return periods are calculated using equation- 1 .

Peak flood discharge estimated in accordance with the above procedure is summarized as below for each return period.

Peak Flood Discharge (m^3/s)

Position	Return Period in Year						
	2	5	10	20	50	100	200
Mafinga bridge	5.10	7.14	8.58	10.04	12.01	13.59	15.21
Ifwagi bridge	2.29	31.18	37.49	43.87	52.50	59.41	66.47
Ikowo bridge	0.46	70.59	84.87	99.32	118.86	134.50	150.49
Kishigula bridge (No.1)	1.89	16.63	20.00	23.40	28.01	31.69	35.46
Kishigula bridge (No.2)	0.97	29.34	35.27	41.27	49.39	55.90	62.54

(2) Surface Runoff

The surface runoff, on which the capacity of a drainage facility will be decided, is calculated through the following procedure.

- Surface runoff is calculated using the Rational formula.

$$Q = \frac{1}{3.6 \times 10^6} C \cdot I \cdot a$$

where, Q : Surface runoff (m^3/s)
C : Runoff coefficient (= 0.7)
I : Rainfall intensity within the time of concentration (mm/hr)
a : Drainage area (m^2)

$$a = W \cdot L$$

where, W : Drainage width (= 50 m)
L : Length of drainage ditch (m)

- In order to estimate the intensity within the time of concentration, the probable rainfall intensity formula by specific coefficient method is used.

$$I = R \cdot \beta(t)$$

where, R : 1-hr rainfall intensity (mm/hr)
$\beta(t)$: Specific conversion coefficient

As for the actual application of this figure, the same coefficient to 10 minutes. duration is adopted in case of the time of concentration of less than 10 minutes., in consideration of the economic aspect and precision on estimation of concentration time of runoff.

- The rainfall intensity of 1-hr duration is estimated by the following formula on the basis of the daily rainfall.

$$R = \frac{rday}{t} \cdot \left(\frac{t}{24}\right)^{1/3}$$

where, rday : Daily rainfall (mm/day)
t : Specific time concerned (= 1 hr)

- It is generally acceptable that the design probable recurrence of a heavy rainfall of 2 years is used for designing drainage facilities of roads. The design rainfall for each road is estimated applying the isohyetal analysis method as well as the calculation of flood discharge of rivers. These results are as follows:

Daily and Hourly Rainfall at 2 Years Probable Recurrence

Road	Iringa-Kilolo	Mafinga-Ifwagi	Kibena-Matembwe	Itundu-Mkiu
Daily Rainfall (mm/day)	49.8	62.3	99.6	80.9
Hourly Rainfall (mm/hr)	17.3	21.6	34.5	28.1

- The time of concentration of runoff from the drainage area is computed by dividing the length of drainage ditch by flow velocity. In the design of drainage facilities, Manning's formula is used for calculation of the velocity.

$$t = \frac{L}{V \times 60}$$

where, t: Time of concentration (min.)
L: Length of drainage ditch (m)
V: Velocity (m/sec)

- Calculation of the interval of drainage canal is proceed as follows. After presuming the length of the side ditch (= the interval of drainage canal), runoff at that length is calculated using above equations. By comparing the calculated runoff with allowable runoff, the presumed length of the side ditch is revised. After repeating these procedure, the maximum length of side ditch is calculated. The results of these procedure for each road are shown as follows:

Side Ditch Interval and Drainage Discharge

Road/Gradient (%)	3	4	5	6	7
Iringa-Kilolo	361	234	168	127	101 (m)
Mafinga-Ifwagi	288	187	134	102	81
Kibena-Matembwe	180	117	84	64	51
Mkiu-Itundu	222	144	103	78	62
Allowable runoff	121	79	56	43	34 (lit/sec)