

## APPENDIX V. COUNTRY DATA



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### I. Basic Indices

#### (1) The United Republic of Tanzania

Capital : Dar es Salaam (population: 1,300,000,  
as of 1983)

#### (2) Land Area and Population

Land Area : 945,050 km<sup>2</sup>  
Population : 22,100,000, as of 1986  
Population Density : 23.4 persons/km<sup>2</sup>  
Overall Average  
Population Growth Rate : 3.8% (1977 - 1985)  
Average Span of Life : 51 years

#### (3) Political System

President : Ali Hassan Mwinyi was inaugurated in  
1985

(4) Religions : Islam, Christianity

(5) Languages : Swahili, English

(6) Ethnic Composition : Bantu, Indian

#### (7) Education

Functional Literacy Rate: 62% (Males above 20 years old, as of  
1981)

**(8) Currency and Exchange Rate**

Tanzanian shilling : 32.7 = US\$1 (average as of 1986)

**(9) Climate**

The United Republic of Tanzania has a tropical climate on the coast and a semitemperate climate inland. Much of the country has low and erratic rainfall. In the most fertile north and southwest there are short rains in November-December and long rains in March-May.

**(10) Geography**

The country consists of a mainland area and Zanzibar island with various small islands. The mainland area is mostly above 300 m from sea level except around the coastal area.

**(11) Longitude and Latitude**

Long. 29°40' E - Long. 40°27' E

Lat. 10° S - Lat. 11°44' S

**II. Socio-Economic Indices**

**(1) Gross Domestic Product (1984)**

GDP : TSh 69,500 million

GDP per capita : TSh 3,390

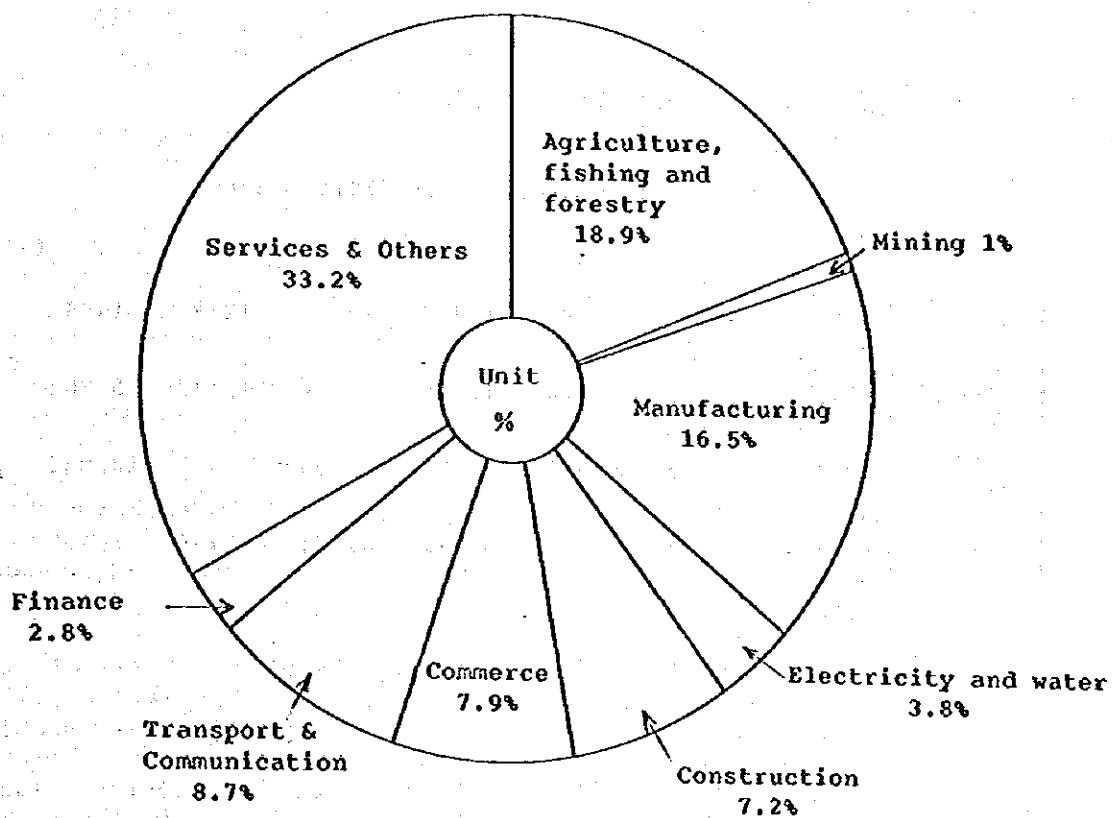
**(2) Gross National Product (estimated in 1984)**

GNP : TSh 75,485 million

GNP per employed person: TSh 8,200

**(3) Industrial Structure**

**Structure of total employment by industrial sectors (1981)**



**(4) Employed population as of 1986**

**9,500,000 persons**

(5) Inflation rate

Consumers' price rate

Year	1985	1986	1987
1980=100	346.0	457.3	598.3

(6) International balance of payments

Trend of External Trade (1978 - 1985)

(TSh mn)

Year	1978	1979	1980	1981	1982	1983	1984	1985
Exports, FOB	3,669	4,096	4,192	4,706	4,144	4,132	5,761	4,960
Imports CIF	8,798	9,073	10,308	9,739	10,499	8,877	12,956	17,962
Balance	-5,129	-4,977	-6,116	-5,033	-6,355	-4,739	-7,195	-13,002

Major Exports (1980 - 1985)

(TSh mn)

	1980	1981	1982	1983	1984	1985
Coffee	1,165	1,185	1,239	1,449	2,216	1,993
Cotton	399	642	523	689	713	414
Sisal	251	270	224	145	146	94
Tea	182	164	172	243	330	
Cloves	568	417	395	44	136	
Tobacco	106	151	178	127	110	
Cashewnuts	60	286	92	72	439	
Diamonds	18	13	10	7	16	

(Source: Country Profile Tanzania 1987 - 1988 EIU)

(7) Trade with Japan

(US\$ mn)

Year	1985	1986
Imports from Japan	97.1	110.2
Exports to Japan	10.7	21.0

(8) Treasury balance of the Government of Tanzania

(TSh mn)

Year	1983	1984	1985
<b>Revenue</b>	<b>15,234</b>	<b>14,538</b>	<b>18,031</b>
Tax revenue	13,462	12,749	16,186
Non tax revenue	1,772	1,789	1,845
<b>Expenditure</b>	<b>18,180</b>	<b>19,908</b>	
Public administration	2,559	4,669	
Foreign affairs	171	321	
Defence and security	3,810	3,685	
Education	2,890	2,009	
Health	1,131	977	
Community services	665	709	
Economic services:			
General administration and research	703	1,524	
Agriculture, forestry, fishing and hunting	2,273	2,295	
Mining, manufacturing and construction	1,406	1,595	
Electricity and water	1,003	564	
Roads and bridges	1,050	910	
Others	468	641	
<b>Balance of annual revenue deficits</b>	<b>2,946</b>	<b>5,370</b>	

(Source: Government Printer, Economic Survey 1984)

### III. Main Index of Each Factor

#### (1) Agriculture

Agriculture is the principal source of income, accounting for 35-46% of GDP according to government estimates, while World Bank estimates put it as high as 50%.

Only 6.2 mn ha (about 8% of the country) is estimated to be under cultivation, and only 3% of this area is irrigated. Much of the country has low and erratic rainfall. In the most fertile north and southwest there were considerable shortage problems in the area around Lake Victoria in 1983-84, but the rains were good in 1985 and late 1986. As in most of Africa, programmes to combat soil erosion and deforestation are urgently needed but are limited by a lack of resources.

Subsistence crops include maize, wheat, sorghum, rice and millet. Total production of these were 3,620,000 tons in 1985. And the relative proportions of these are as follows.

Maize	:	58%
Rice	:	12%
Wheat	:	2%
Millet	:	8%
Sorghum	:	20% (as of 1985)

Export crops include coffee, cotton, sisal, tea, tobacco, pyrethrum and cashewnuts. Total production of these were 226,000 tons in 1985. And the relative proportions of these are as follows.



Coffee	:	24%	
Cotton	:	23%	
Sisal	:	18%	
Tea	:	8%	
Tobacco	:	7%	
Pyrethrum	:	1%	
Cashewnuts	:	19%	(as of 1985)

(2) Mining

Diamonds, mined at the Williamson mine near Lake Victoria, remain Tanzania's most important non-agricultural export, although production had fallen to an estimated 272,049 carats by 1984 from a peak of 988,000 carats in 1967. In 1983, the mine earned TSh 207.6 mn (\$18.6 mn) in foreign exchange. Gold output has risen since 1980 and new investments are planned. Commercially viable reserves of gold are put at 4.35 mn tons of ore.

Iron ore is mined at Chunya and deposits are estimated to be capable of producing 250,000 tons a year, while Liganga in Njombe district could produce 500,000 tons a year. Phosphate deposits at Minjingu in the Arusha region have been exploited. Production capacity of phosphate is 100,000 tons a year. Salt and lime are also mined and are potential export items.

The mining sector is hampered by a lack of government resources for the large investments required to exploit new deposits.

### (3) Manufacturing

In the 1970s a range of industrial projects was established and resulted in a 0.5% a year growth of manufacturing production between 1970 and 1982. The contribution of manufacturing to GDP has dropped, however, in the 1980s, from 8.7% in 1980 to 4.7% in 1984, with a 15.4% decline from 1983 to 1984 due to very low capacity utilization. Industrial output fell by 6.4% in 1985. For example, the textiles sector averaged only 30% capacity utilization, thereby contributing to high unit costs. The decline in industrial output resulted from high import dependency which led to shortfalls in raw materials and essential spare parts as foreign exchange constraints grew worse.

### (4) Tourism

Tourism is an important potential growth sector for which Tanzania has considerable natural resources on its Indian Ocean coastline and the great game parks and reserves of the north (Serengeti, Manyara, Ngorongoro) and the south (Ruaha, Mikumi), which account for nearly a third of the country. The government's Tanzania Tourist Corporation (TTC) is responsible for investment in tourism. Hotel investment is usually undertaken in partnership with foreign private enterprise. TTC owns about 80% of the capacity.

178,000 tourists visited Tanzania in 1974, the peak year, more than double the number in 1970. Tanzania has the capacity to attract 400,000 visitors per year according to TTC estimates.

(5) Economically active population

	Males	Females	Total
Agriculture, forestry and fishing	3,787	4,353	8,140
Industry	353	78	431
Services	630	308	938
Total labour force	4,769	4,739	9,508

(ILO estimates, 1000 persons, as of 1980)

Production of Selected Industries

(tons unless otherwise stated)

	1980	1981	1982	1983 <sup>a</sup>	1984 <sup>a</sup>
Cement ('000 tons)	286	393	334	380	390
Textiles (mn m <sup>2</sup> )	93,123	96,133	86,275	59,656	62,750
Cigarettes (mn tons)	4,735	3,865	4,693	3,841	5,786
Beer ('000 litres)	63.8	64.3	64.2	69.0	70.0
Canned meat (tons)	1,078.0	736.0	333.0	176.3	412.0
Petroleum products (tons)	617,349	521,325	502,125	573,100	595,121
Iron sheets (tons)	17,322	10,105	16,044	16,044	16,500
Rolled steel (tons)	18,144	16,473	12,104	12,104	12,670
Fertiliser (tons)	50,852	69,029	13,662	31,211	32,715
Sisal products (tons)	31,616	13,246	20,595	17,320	17,800
Aluminium products (tons)	4,460	3,132	3,031	3,031	3,496
Paints ('000 litres)	1,364	1,474	1,139	713	892
Wood products (mn m <sup>2</sup> )	874	712	770	432	576
Radios ('000)	223	155	110	48	62
Batteries (dry, '000)	79,248	78,006	73,227	47,385	60,476

a: Estimates

Source: Bank of Tanzania, 1987

Amount of Production in Each Sector (1976 fixed price)

(TSh mn)

	1976	1980	1981	1982	1983	1984	1985
Agriculture, fishing and forestry	9,046	9,418	9,511	9,639	9,597	9,849	9,689
Mining	214	189	193	193	174	188	175
Manufacturing	2,811	2,683	2,382	2,304	2,215	2,187	2,047
Electricity and water	220	400	417	420	413	439	462
Construction	884	932	890	930	549	660	654
Commerce	2,839	2,839	2,725	2,668	2,640	2,697	2,527
Transport and communication	1,685	1,818	1,652	1,694	1,473	1,697	1,707
Finance	2,036	2,483	2,529	2,702	2,817	2,894	2,874
Service	2,342	3,657	3,916	4,221	4,450	4,508	5,548
Others	424	531	549	667	716	754	767
Total (GDP)	21,653	23,888	23,666	24,104	23,612	24,365	24,916

Ministry of Planning and Economic Affairs, Hali ya Uchumi wa Taifa katika Mwaka 1985, (Government Printer, Dar es Salaam, 1986) p.6, Jedwali A.



**APPENDIX VI. METEOROLOGICAL DATA**





APPENDIX VI. METEOROLOGICAL DATA

1) STATION: MOSHI (1/3)

Year	Month	Temp. 3PM		Relative Humidity 3PM		WIND MI/DAY	Rainfall		Days with Thunder	Days with Hail
		Max °C	Min °C	Max %	Min %		mm/Day Max.	mm/Month		
1982	1	36.3	15.8	49	26	165.43	11.9	13.5	8	0
	2	36.4	16.0	50	23	248.98	16.0	19.0	9	0
	3	35.9	16.0	68	16	342.58	51.1	113.9	12	0
	4	32.1	17.3	90	31	256.19	34.6	90.7	8	0
	5	30.2	17.0	82	51	116.85	48.3	216.6	0	0
	6	28.2	13.9	71	44	069.49	32.0	83.7	0	0
	7	27.4	13.4	95	40	060.17	23.6	44.7	0	0
	8	28.2	12.4	70	41	154.32	11.1	14.2	0	0
	9	29.0	15.8	61	31	193.46	12.6	23.3	0	0
	10	31.5	15.0	94	34	170.53	14.8	51.5	2	0
	11	33.2	16.4	83	30	162.02	43.4	263.6	8	0
	12	33.7	16.0	69	34	072.11	87.8	111.8	5	0
1983	1	35.6	19.9	69	29	119.46	10.9	11.6	4	0
	2	36.2	16.2	84	22	178.62	22.3	31.9	8	0
	3	36.3	18.1	67	26	188.29	38.6	54.1	5	0
	4	33.2	18.5	77	33	168.99	110.9	217.4	5	0
5	31.3	17.4	91	51	106.15	43.7	217.3	0	0	
6	28.2	16.3	82	48	071.92	13.9	34.6	0	0	
7	28.3	19.3	64	43	087.53	17.6	26.9	0	0	
8	29.5	23.0	64	31	081.22	0.7	0.7	0	0	
9	31.7	13.9	58	28	211.64	3.2	3.3	0	0	
10	34.2	14.1	51	23	213.84	7.6	8.8	0	0	
11	36.6	16.0	70	29	197.04	30.7	35.2	9	0	
12	33.5	16.2	76	29	127.00	17.7	67.7	16	0	
1984	1	34.8	16.0	75	29	135.02	18.0	38.7	16	0
	2	36.5	16.7	46	20	134.93	1.6	1.9	10	0
	3	36.2	17.0	46	16	217.39	7.9	13.7	5	0
	4	33.0	18.5	95	31	103.80	282.0	553.5	6	0
	5	28.8	16.4	82	40	083.93	16.0	58.9	0	0
	6	27.1	14.6	81	39	050.96	36.6	72.2	0	0

2) STATION: MOSHI (2/3)

Year	Month	Temp. 3PM		Relative Humidity 3PM		WIND MI/DAY	Rainfall		Days with Thunder	Days with Hail	
		Max °C	Min °C	Max %	Min %		mm/Day	Max. mm/Month			
1984	7	26.2	14.0	66	47	044.13	59.4	46.9	0	0	
	8	28.0	13.9	64	42	073.20	0.6	0.6	0	0	
	9	30.4	10.5	61	24	203.37	3.1	4.2	0	0	
	10	33.6	14.1	59	25	255.84	28.2	31.0	0	0	
	11	31.8	17.0	67	35	235.82	31.3	95.2	0	0	
	12	32.7	15.0	95	32	145.82	15.1	57.6	11	0	
	1985	1	35.4	15.5	83	23	168.75	13.6	14.3	4	0
		2	35.0	17.9	80	29	179.92	27.3	99.2	9	0
		3	35.7	15.2	63	27	265.55	38.8	146.5	4	0
		4	30.4	16.5	88	46	156.77	86.1	200.7	4	0
		5	29.4	16.0	87	53	162.18	48.7	173.2	0	0
		6	-	-	-	-	-	-	-	-	-
7		-	-	-	-	-	-	-	-	-	-
8		-	-	-	-	-	-	-	-	-	-
9		-	-	-	-	-	-	-	-	-	-
10		32.2	14.0	61	27	270.50	20.8	40.0	0	0	
11		32.3	15.3	82	29	252.89	62.4	116.2	8	0	
12		33.0	17.2	88	36	297.8	16.1	63.7	9	0	
1986	1	34.4	17.0	61	35	187.90	24.8	87.6	14	0	
	2	-	-	-	-	-	-	-	-	-	
	3	34.3	17.0	78	25	195.66	43.6	164.5	11	0	
	4	30.7	18.0	79	48	156.04	174.7	392.6	12	0	
	5	29.4	17.3	81	53	128.21	34.6	198.6	6	0	
	6	27.5	12.4	79	40	077.87	18.0	29.5	0	0	
	7	29.4	11.1	70	38	087.06	1.2	2.2	0	0	
	8	38.7	11.8	64	36	180.37	3.7	7.0	0	0	
	9	31.2	12.4	69	29	224.20	0.9	1.4	0	0	
	10	34.1	14.2	64	25	252.80	35.8	43.8	6	0	
	11	32.6	16.8	55	27	262.91	19.0	58.7	5	0	
	12	33.0	16.9	83	40	093.71	41.2	89.2	13	0	

3) STATION: MOSHI (3/3)

Year	Month	Temp. 3PM		Relative Humidity 3PM		WIND MI/DAY	Rainfall		Days with Thunder	Days with Hail	
		Max °C	Min °C	Max %	Min %		mm/Day	Max. mm/Month			
1987	1	35.5	16.0	88	28	154.72	18.2	39.8	16	0	
	2	36.4	16.9	76	29	216.60	10.4	25.0	14	0	
	3	35.2	16.3	87	25	168.06	4.9	8.8	5	0	
	4	35.7	16.8	89	34	147.23	38.3	116.0	12	0	
	5	29.8	16.4	89	48	076.67	48.3	91.1	2	0	
	6	28.2	13.2	80	40	103.85	0.3	0.3	0	0	
	7	-	-	-	-	-	-	-	-	-	-
	8	28.6	13.8	95	35	106.07	32.3	60.8	0	0	
	9	31.8	14.6	63	29	218.49	1.6	4.1	0	0	
	10	33.8	15.6	52	24	257.09	0.6	0.6	0	0	
	11	34.1	17.0	58	28	437.28	12.5	13.4	5	0	
	12	36.7	17.2	60	20	467.31	8.4	14.6	8	0	
1988	1	38.7	18.4	90	30	425.59	29.4	60.8	9	0	
	2	35.6	17.6	88	26	411.84	6.5	8.6	4	0	
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4) STATION: SAME

Year	Month	Temp. 3PM		Relative Humidity 3PM		WIND MI/DAY	Rainfall		Days with Thunder	Days with Hail
		Max °C	Min °C	Max %	Min %		mm/Day	Max. mm/Month		
1986	1	37	18	100	52	355.65	33.4	80.3	-	-
	2	38	19	92	71	378.80	-	-	-	-
	3	37	20	100	78	332.68	17.5	74.0	-	-
	4	34	20	100	84	341.25	17.5	74.6	-	-
	5	34	20	100	84	385.73	11.5	62.1	-	-
	6	31	10	92	74	336.68	5.7	12.6	-	-
	7	31	10	92	59	402.41	-	-	-	-
	8	31	14	92	76	381.25	-	-	-	-
	9	34	14	100	70	353.50	-	-	-	-
	10	39	17	92	78	293.40	8.8	9.9	-	-
	11	35	18	100	84	387.29	27.2	55.3	-	-
	12	36	20	100	79	337.54	23.4	79.7	-	-
1987	1	37	20	100	86	331.00	11.6	16.2	-	-
	2	37	18	92	78	357.99	24.3	36.6	-	-
	3	38	20	100	85	250.79	15.0	42.1	-	-
	4	37	19	92	72	358.46	20.5	74.0	-	-
	5	34	16	100	72	336.20	20.6	70.6	-	-
	6	31	14	92	70	331.00	4.6	4.6	-	-
	7	30	14	93	73	400.38	-	-	-	-
	8	30	17	100	68	401.87	3.3	10.6	-	-
	9	34	15	-	-	-	-	-	-	-
	10	35	17	100	78	404.60	-	-	-	-
	11	37	20	100	79	327.56	8.0	23.5	-	-
	12	38	21	92	79	324.69	-	-	-	-
1988	1	38	20	92	67	416.84	12.3	18.6	-	-
	2	37	20	100	66	348.99	9.3	17.8	-	-
-	-	-	-	-	-	-	-	-	-	-
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**APPENDIX VII. HYDROGEOLOGICAL INVESTIGATIONS**  
**REPORT FOR BOREHOLES, SAME**



HYDROGEOLOGICAL AND GEO-ELECTRIC INVESTIGATIONS FOR  
SELECTION OF BOREHOLE SITES AT SAME TOWN KILIMANJARO REGION

ABSTRACT

Hydrogeological and geoelectrical surveys were carried out at Same Town in an effort to explore drilling sites for the proposed Same Stadium.

By studying the geomorphological, the present water sources, and the geological set up, 9 sites were probed in various areas as follows:

Mathandari Village	1 Site
K.I.D.C. Ceramic Factory	1 Site
Same Town	3 Sites
Proposed Stadium	4 Sites

Three out of the nine sites were selected for exploratory cum production drilling. Targeted depth and diameter of the boreholes are 350' - 400' and 10" - 12" diameter respectively. The area is a lowland situated within the Usagaran rock system and the outcrops like uarzites and gneisses can be observed in the uplifted areas.

INTRODUCTION

Responding to the request made by the D.W.N of Same, the Hydrogeology team of Kilimanjaro carried out the hydrogeological surveys from 7/8/86 to 14/8/86.

The request arised from the fact that the District Council has planned to build District Stadium at Same Town and Town Water Supply is insufficient for this additional demand lot alone its daily consumption.

LOCATION

Same is located about 110 km from Moshi Town along Moshi - Dar es Salaam road. The area is bounded by

Longitude 37°41's - 37°45'E  
Latitude 4°00's - 4°05's

and falls on Topo Sheet No. 89/1 (1:50,000)

PRESENT WATER SOURCE

Same Town is supplied with water by a spring from the Pare Mountain ranges and three boreholes whose data is attached to this report (Appendix I).

GEOMORPHOLOGY

The surveyed area is in the southern extremity of North Pare Mountains and the greater part of the Southern Pare Mountains. These mountains rise to a maximum height of 8080 ft. These mountains being highly folded and faulted are bounded on all sides by steep scarps which are actually retreated fault scarps.

The actual faults being obscured by superficial younger deposits. Three quarters of the surveyed areas is a lowland originating from the coalescing of mountain slopes. This lowland which is seasonally water-logged has folded Mbuga. The geologic set-up of the area indicate favourable precipitation and storage area for groundwater.

#### HYDROGEOLOGY

The area is fed by boreholes and a spring. The presence of water source have depicted the availability and potentiality of groundwater. The ground is seasonally water-saturated.

Most of the recharge of this area is done by direct precipitation of rainfall and numerous small perennial streams from the South Pare Mountain ranges which rarely flow far after reaching the foot of the mountains. The recharge is taking place directly within the catchment area and indirectly at the edge and slopes of mountain ranges.

The vegetation is scattered trees and scrubs indicating the low amount of rainfall.

#### GEOLOGY

Geologically the area is lying within the Usagaran rock system. Being old basement rocks of more than 650 million years age are highly folded, faulted and intruded by younger formations. These basement rocks include Quartzites and Gnaisses. The older rocks are covered by the younger deposits such as red loamy clay, black cotton soil and silt. The fractured and faulted, slopes of the mountains ranges are highly permeable and these are trending to the mbuga area where they are obscured. During drilling the fractures may be intercepted. The mbugas also have good storage capability of groundwater.

#### RESISTIVITY SOUNDING

The 4 - Electrode Schlumberger's configuration method was applied in carrying out the probes to the depth of 200 m by using the Geophysical Instruments i.e. ABEM AG Terrameter set. The results after interpretation of the field curves are as shown below (Appendix II).

Out of 9 sites probed, 3 sites have been chosen for exploratory cum production drilling.

Site No. 1 Mathandari Village is located to the Western side of Same Town 4km from Moshi - DSM road.

Site No. 2 for same Township is located to the Eastern side of same where the abandoned borehole exist.

Site No. 3 for same proposed stadium is located about 50m on the basin which lies to the western side of same township and near to the Moshi - DSM highway.



APPENDIX I

B/H No.	LOCALITY	WATER STRUCK METERS	WATER LEVEL IN METER	DROWING DOWN METER	S.W.I. IN METER	YIELD LPH	DEPTH IN METER
KL.52/76	Same	39.62	-	-	-	9	153.92
KL.10076	Same	108.28	65.53	-	65.53	13640	150.87
KL.61/77	Same	93.57	44.99	-	-	20461	103.63

APPENDIX II

PLACE	STATION	RESISTIVITY IN OHM - METERS	THICKNESS IN METERS
K.I.D.G. Factory	1	2.7, 3.4, 87	1, 25
Mathandari Village	1	100, 21,	1, 15
Same Township	1	34, 3.5,	1.2, 18
	2	12.5, 5, 31	2.2, 33
	3	4.3, 8.5, 210	2.7, 40.5
Same Township Proposed Stadium	1	23, 4.5, 115	1.5, 37.5
	2	35, 3.6,	1.7, 25.5
	3	9, 3.7,	1.9, 28.5
	4	42, 4.2	1, 25

CONCLUSION AND RECOMMENDATION:

1. The quality of water is anticipated to be good and suitable for domestic and Industrial uses.
2. The depth and diameter of the boreholes should be 350' - 400' and 10" - 12" respectively.
3. Sites of VES stations recommended for exploratory cum production borehole drilling are as shown in Appendix II.

APPENDIX III

PLACE	SIZES 1st Choice	CHOSEN 2nd Choice
K.I.D.C. Ceramics Factory	-	-
Mathandari Village	1	-
Same Township	3	2
Same Proposed Stadium	1	4

4. During drilling works the hydrogeologist or a Senior Technician should be attached with the drilling crew to give technical advise wherever required.

Written by

Approved by

(M. Kinyaiya)  
TECHNICIAN IV

(E.A.S. Mwende)  
REGIONAL HYDROGEOLOGIST

HYDROGEOLOGICAL AND GEO-ELECTRIC INVESTIGATIONS FOR  
SELECTION OF BOREHOLE SITES AT SAMA TOWN KILIMANJARO REGION

ABSTRACT

Hydrogeological and geoelectrical surveys were carried out at Sama Town in an effort to explore drilling sites for the proposed Sama Stadium. By studying the geomorphological, the present water sources, and the geological set up, 9 sites were probed in various areas as follows:

Kathandari Village	-	1 site
K. I. D. C. Ceramics Factory		1 Site
Sama Town		3 sites
Proposed Stadium		4 Sites

Three out of the nine sites were selected for exploratory and production drilling. Targeted depth and diameter of the boreholes are 350' - 400' and 10" - 12" diameter respectively. The area is a lowland situated within the Usagari rock system and the outcrops like quartzites and gneisses can be observed in the uplifted areas.

INTRODUCTION

Responding to the request made by the D.V.L. of Sama, the Hydrogeology team of Kilimanjaro carried out the hydrogeological surveys from 7/8/66 to 14/8/66. The request arises from the fact that the District Council has planned to build District Stadium at Sama Town and the Town Water Supply is insufficient for this additional demand let alone its daily consumption.

LOCATION

Sama is located about 110 kilometers from Moshi Town along Moshi - Dar es Salaam road. The area is bounded by longitude  $37^{\circ} 41' E$  -  $37^{\circ} 45' E$   
Latitude  $4^{\circ} 00' S$  -  $4^{\circ} 05' S$   
and falls on topo sheet No. 89/1 (1: 50,000)

PRESENT WATER SOURCE

Sama Town is supplied with water by a spring from the Pare Mountain ranges and two boreholes whose data is attached to this report (Appendix I).

GEOMORPHOLOGY

GEOLOGY

The surveyed area is in the southern extremity of the North Pare Mountains and the greater part of the Southern Pare Mountains. These mountains rise to a maximum height of 8000ft. These mountains being highly folded and faulted are bounded on all sides by steep escarpments which are actually retreated fault escarpments.

The actual faults being obscured by superficial younger deposits. Three features of the surveyed area is a lowland originating from the coalescing of mountain slopes. This lowland which is seasonally water-logged has a high illuqa. The geologic set-up of the area indicates favourable precipitation and storage area for groundwater.

HYDROGEOLOGY

The area is fed by boreholes and a spring. The presence of water sources have depicted the availability and potentiality of groundwater. The ground is seasonally water saturated.

Most of the recharge of this area is done by direct precipitation of rainfall and numerous small perennial streams from the South Pare Mountain ranges which rarely flow far after reaching the foot of the mountains. The recharge is taking place directly within the catchment area and indirectly at the edge and slopes of mountain ranges.

The vegetation is scattered trees and shrubs indicating the low amount of rainfall.

GEOLOGY

Geologically the area is lying within the Uvegaron rock system. Being old basement rocks of more than 650 million years ago are highly folded, faulted and intruded by younger formations. These basement rocks include Quartzites and Gneisses. The older rocks are covered by the younger deposits such as red loamy clay, black cotton soil and silt. The fractured and faulted slopes of the mountains ranges are highly permeable and these are trending to the mbaga area where they are occurred. During drilling the fractures may be intercepted. The mbagas also have good storage capability of groundwater.

RESISTIVITY SOUNDING

The 4 - Electrode Schlumberger gamma configuration method was applied in carrying out the probes to the depth of 200m by using the Geophysical Instruments i.e. ABEM AG Terrameter set. The result after interpretation of the field curves are as shown below (Appendix II).

Out of 9 sites probed, 3 sites have been chosen for exploratory cum production drilling.

Site No. 1 - Mathandari Village is located to the western side of Same Township, 4km. from Mochi - DSM road.

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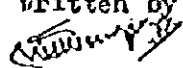
CONCLUSION AND RECOMMENDATION:

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2. The depth and diameter of the boreholes should be 350' - 400' and 10" - 12" respectively.
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PLACE	SIZES CHOSEN	
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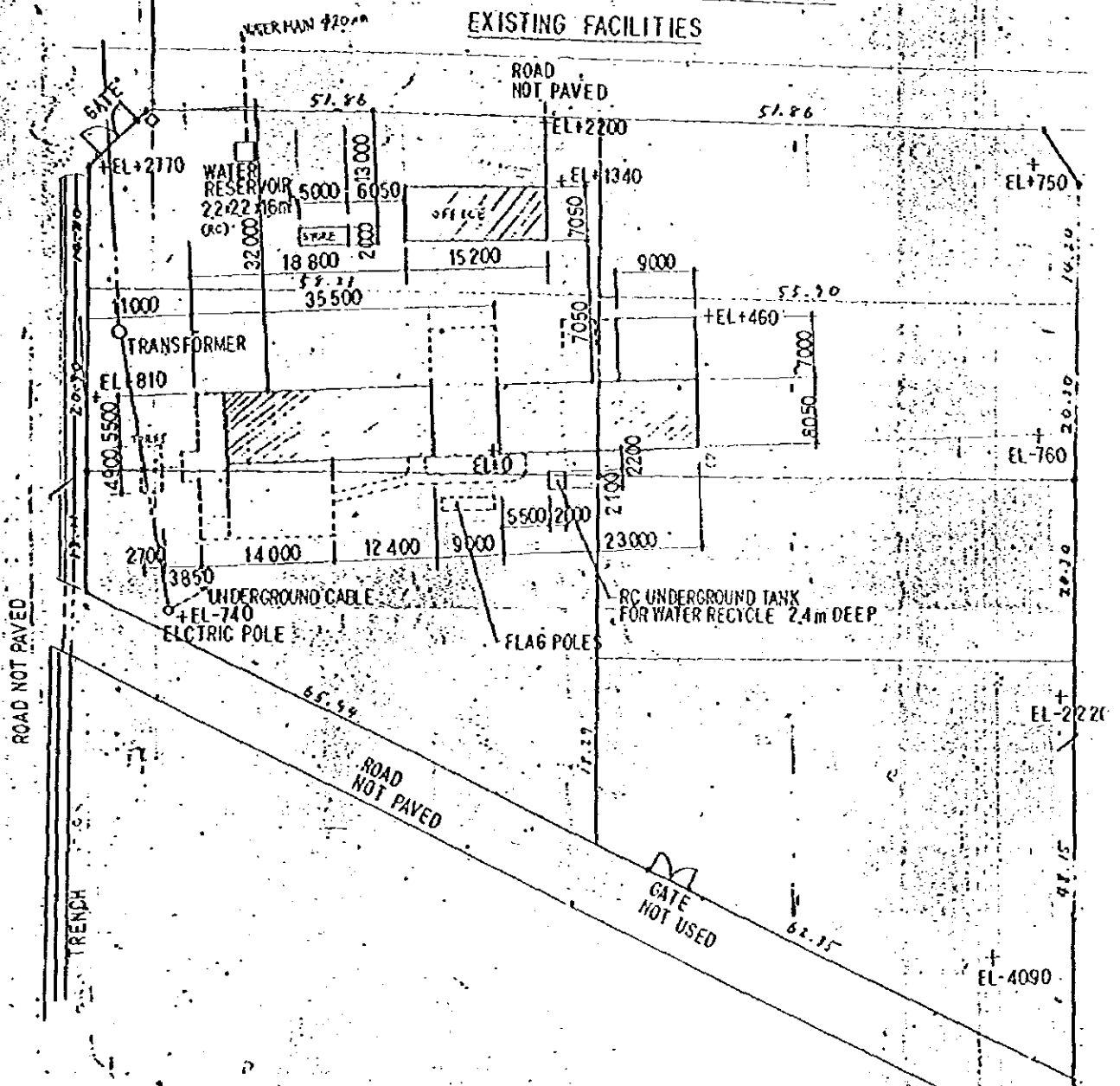


**APPENDIX VIII. PLOT PLAN OF EXISTING SAME CENTRE**



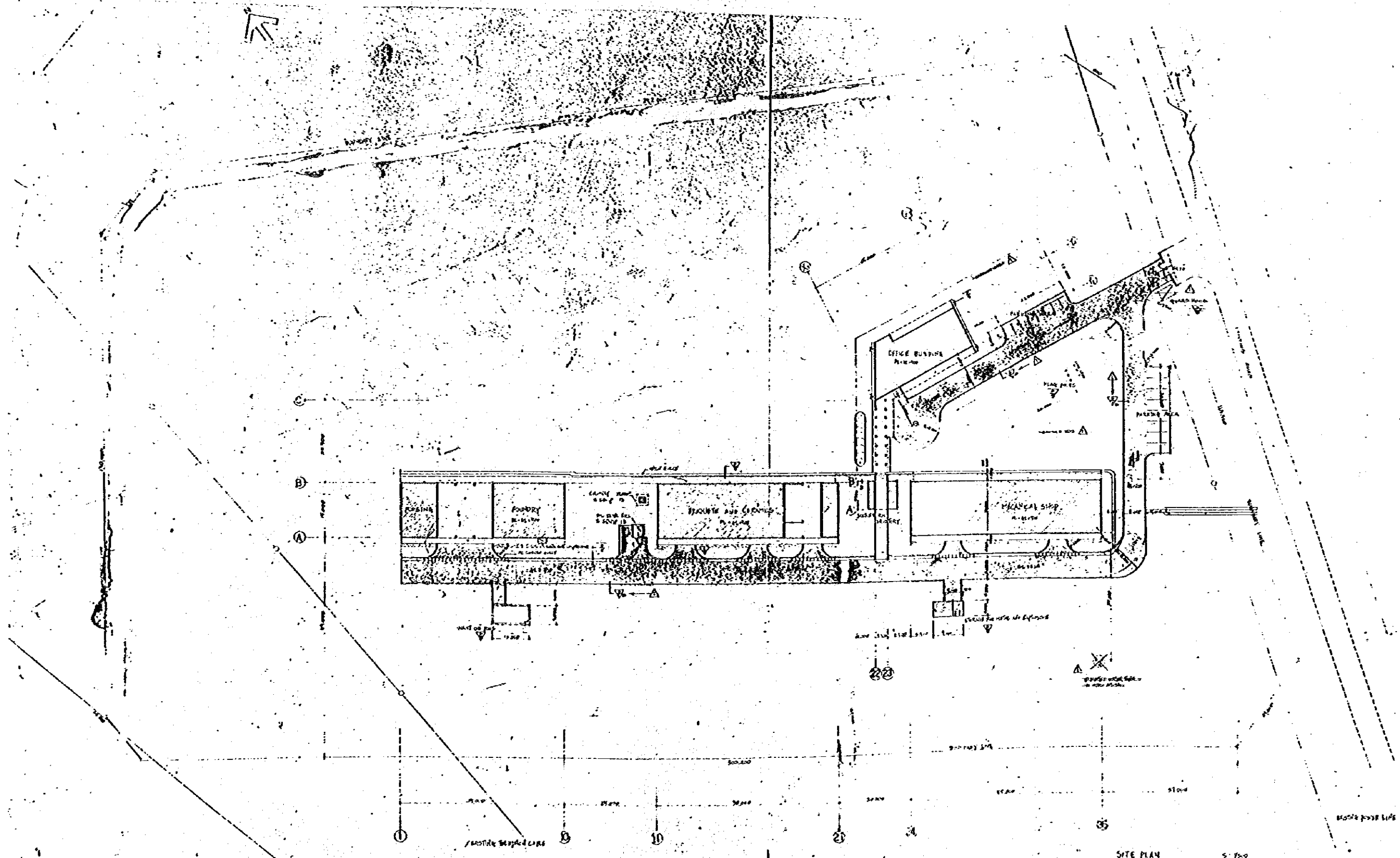


Site Plan of SAME CRDC. (scale 1/800)





**APPENDIX IX. PLOT PLAN OF EXISTING MOSHI CENTRE**



SITE PLAN S. 750



**APPENDIX X. RESULTS OF INSULATOR  
WATER PENETRATION TEST**



**APPENDIX X. RESULTS OF INSULATOR WATER PENETRATION TEST**

Products No.

Lot No. 5th APRIL, 1988

1. Applied standard                      JIS-C-3801
  
2. Date                                      19th April, 1988
  
3. condition of test liquid
  - Density                                      1 %
  - Test pressure                                100 kg/cm<sup>2</sup>
  - Duration of applied pressure    4 hours
  
4. Location of test lab.                  Niwa Shyoudenki Ceramics, Ltd.
  
5. Number of test pieces                one each
  
6. Test results

Test piece No.	Degree of penetration	Judgement
Sample piece of KIDC	No penetration	OK
Sample insulator of KIDC	Penetration observed	not applicable

Notes





**APPENDIX XI. JIS C3845 LOW VOLTAGE SHACKLE  
TYPE INSULATORS**



# JIS

UDC 621.315.625

JAPANESE INDUSTRIAL STANDARD

Low-Voltage Shackle  
Type Insulators

JIS C 3845-1975

Translated and Published

by

Japanese Standards Association

XI-1

Printed in Japan

48

## JAPANESE INDUSTRIAL STANDARD

JIS

## Low-Voltage Shackle Type Insulators

C 3845-1975  
(Reaffirmed: 1983)1. Scope

This Japanese Industrial Standard specifies low-voltage shackle type insulators made of porcelain, hereinafter referred to as the "insulators".

2. Performances

The performances shall be as given in Table 1, when tested in accordance with the methods specified in 6.

Table 1

Item	Performance
Power-frequency voltage	No abnormality is found on each part of insulator at 15 kV.
Tensile withstand load	1000 kgf (9800 N) *
Thermal shock	No abnormality is found on each part of insulator when subjected such immersion that the temperature difference is 70°C { K } * or more, cold water temperature is 0 to 20°C, and immersion time is 10 min each.
Porosity	No liquid penetrates into porcelain.

Note \* In these items, the numerical values and units in { } are based on the International System of Units (SI) and are appended for reference.

3. Material

The material given in Table 2 shall be used.

Table 2

Name of part	Material
Porcelain	Porcelain whose all surfaces except the exposed part indicated by chain line in Attached Figure are uniformly glazed. White in colour unless the colour is specified.

4. Shapes and Dimensions

The shapes and dimensions shall be as given in Attached Figure.

Applicable Standard:

JIS C 3801-Testing Method for Insulators

5. Appearance

The appearance shall show no defects detrimental to practical use.

6. Test Methods

6.1 Construction The construction test shall follow 4. of JIS C 3801.

6.2 Appearance The appearance test shall follow 5. of JIS C 3801.

6.3 Tensile Withstand Load The tensile withstand load test shall follow 7.1.1 of JIS C 3801.

6.4 Thermal Shock The thermal shock test shall follow 9. of JIS C 3801.

6.5 Porosity The porosity test shall follow 10. of JIS C 3801.

6.6 Power-Frequency Voltage The power-frequency voltage test shall follow 6.5 of JIS C 3801.

7. Inspection

The type inspection and acceptance inspection prescribed below shall be carried out in accordance with the test methods of 6.

- (1) Type Inspection The type inspection shall be carried out on all the items shown in Table 3, and the specimens shall comply with the provisions of 2. to 5. Number of specimens to be inspected shall be 3 pieces.
- (2) Acceptance Inspection The acceptance inspection shall consist of 2 kinds of inspection i.e. sampling inspection and 100 % inspection.
  - (a) Sampling Inspection The sampling inspection shall be carried out on the items of 1. to 5. given in Table 3, and the specimens shall comply with the provisions of 2. to 4. The sampling plan for this inspection is subjected to the agreement between the parties concerned with the acceptance.
  - (b) 100 % Inspection The 100 % inspection shall be carried out on the item 6. given in Table 3 and the products shall comply with the provision of 5.

Table 3

Inspection item
1. Construction
2. Power-frequency voltage
3. Tensile withstand load
4. Thermal shock
5. Porosity
6. Appearance

8. Designation of Product

The product shall be designated by the name.

Example: Low-voltage shackle type insulator

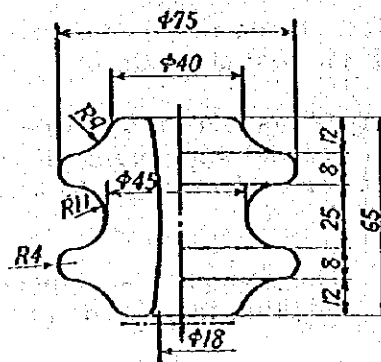
9. Marking

The items prescribed below shall be marked on the porcelain part of insulator in an indelible way.

- (1) Manufacturer's name or abbreviation
- (2) Years of manufacture (may be the last two numerals when expressed in the Christian Era)

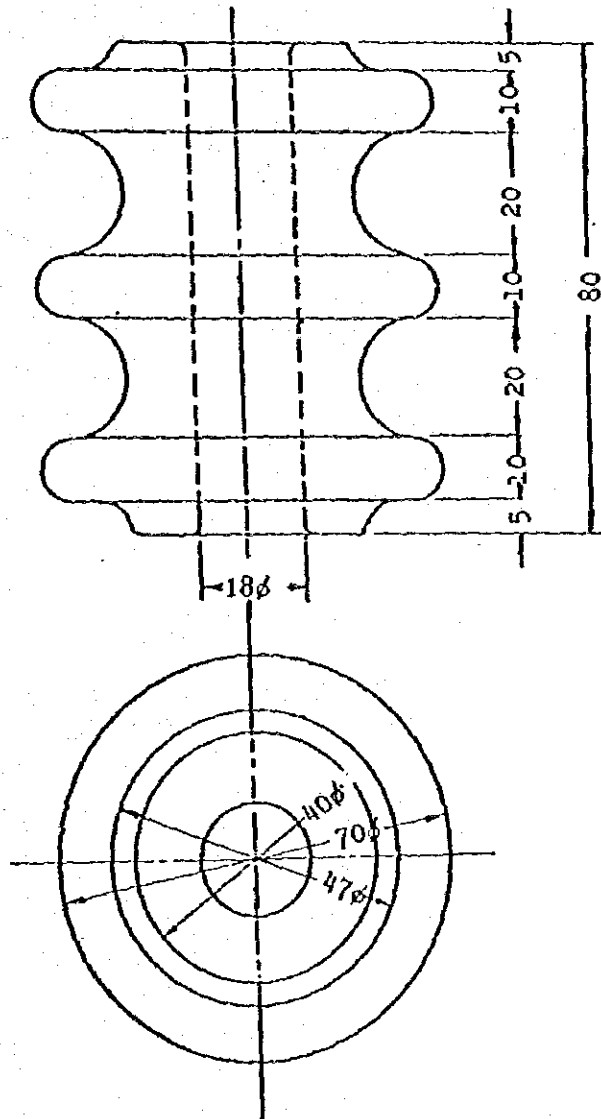
Attached Figure

Unit: mm



Remark: The numerical values indicate basic sizes.

DRG. NO.



XI-5





**APPENDIX XII. BREAKDOWN OF COSTS TO BE BORNE  
BY THE GOVERNMENT OF TANZANIA**



APPENDIX XII. BREAKDOWN OF PROJECT COSTS TO BE  
BORNE BY THE GOVERNMENT OF TANZANIA

(1) Major items

- Same Centre : 11 kV electrical supply line  
up to transformer
- Moshi Centre : 11 kV electrical supply line  
up to transformer

(2) Conditions for estimate

- Construction work and method : under the direct control of  
the Kilimanjaro Regional  
Government
- Date of estimation : May, 1988
- Depreciation of  
construction machinery : Nil
- Labour cost : as per local unit price
- Locally procured equipment  
and materials : Nil
- Land acquisition cost : Nil
- Exchange rate : 1 TSh = ¥1.409

(3) Project cost estimation

Description	Unit	Q'ty (man-day)	Unit price (TSh/man-day)	Amount (TSh)
11 kV electrical supply line up to transformer for the Moshi Centre				
Electrician	man-day	38.85 x 3	250	29,137
Worker	man-day	2.5 x 3	100	750
11 kV electrical supply line up to transformer for the Same Centre				
Electrician	man-day	24.98 x 3	250	18,735
Worker	man-day	6.066 x 3	100	1,819
<b>TOTAL</b>				Approx. 50,000



**APPENDIX XIII. REFERENCES**



APPENDIX XIII. REFERENCES

- Maps
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  - ( " ) o UGWENO-USANGI ( EAST AFRICA 1:50,000 TANZANIA )
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  - ( " ) o PARE DISTRICT ( SCALE 1:250,000 )
  - ( " ) o MAPENDEKEZO YA MPAKA MPYA WA MJI WA MOSHI 1978
  - ( " ) o TANZANIA ( SCALE 1:200,000 )  
- Printed by Surveys and Mapping Division, Ministry of Lands,  
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  - ( " ) o SAME-Proposed Township Boundary Ministry of Lands, Water,  
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- o Site Plan of Same C.R.D.C.
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- o Pamphlet for THE TANZANIA ENGINEERING AND MANUFACTURING DESIGN  
ORGANIZATION



JICA