

**BASIC DESIGN STUDY REPORT  
ON  
THE IMPROVEMENT PROJECT  
FOR  
THE TECHNICAL SCHOOL IN KARIMA  
THE DEMOCRATIC REPUBLIC OF THE SUDAN**

**NOVEMBER 1984**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

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## PREFACE

In response to the request of the Government of the Democratic Republic of the Sudan, the Government of Japan decided to conduct a basic design study on Technical School Improvement Project and entrusted the survey to the Japan International Cooperation Agency. The JICA sent to the Sudan a study team headed by Mr. Izumi Tokunaga, Grant Aid Div., Economic Cooperation Bureau, Ministry of Foreign Affairs from 10th September to 28th September, 1984.

The team had discussions with the officials concerned of the Government of the Sudan and conducted a field survey in Karima. After the team returned to Japan, further studies were made and the present report has been prepared.

I wish to express my deep appreciation to the officials concerned of the Government of the Democratic Republic of the Sudan for their close cooperation extended to the team.

November, 1984



Takaharu Kazama

Executive Director

Japan International Cooperation Agency



**S U M M A R Y**





## SUMMARY

The Democratic Republic of The Sudan presently has a shortage of skilled labor in the fields of agriculture, industry, construction and commerce. The absence of skilled labor poses a serious threat to the development of these sectors. Therefore the Sudanese Government has formulated a plan to improve the condition of twenty-nine higher technical schools including education and training in practical and applied technics in an attempt to resolve the problem. The plan also intends to remedy the imbalance of the distribution of education services between local areas and Khartoum.

In 1978, the Government of the Republic of Ireland conducted an investigation into the feasibility of improving five existing higher technical schools. The schools, located in Torit, Tonj, Gedaref, Karima and Ed Duem were among fifteen other industrial higher technical schools considered for improvement. The report concluded that improvement was feasible in only four of the five schools and that action towards improvement should be implemented promptly. The school not selected was Ed Duem, the reasons being that the site had particular problems with soil conditions. Based upon the recommendation made by the Government of Ireland, grant aid money was made available through the European Community for the improvement of three schools Torit, Tonj and Gedaref. Under these circumstances, the Government of Japan decided to conduct a Basic Design Study for the improvement of the Karima school by entrusting to the Japan International Cooperation Agency (JICA) to execute the study.

A Basic Design Study Team, headed by Mr. Izumi Tokunaga, Grant Aid Div., Economic Cooperation Bureau, Ministry of Foreign Affairs was sent to the Sudan for 18 days from September 10 to 27, 1984 to exchange views with the Sudanese authorities concerned and make field studies of the Karima area and the Karima technical school. It was found that the Karima Technical School was established in 1963 with all new facilities, equipment and teaching staff. Since that time the buildings have



deteriorated to a point requiring immediate improvement and the curriculum sacrificed greatly due to the shortage of qualified teachers.

Further studies were made into the feasibility of implementing the project and the Team found following substantial problems for the execution of the project.

1. Karima is located about 500 km north of Khartoum, from which no definite roads exist, Karima is thought to be like an oasis surrounded by vast desert terrain where even the most common route connecting the two cities is virtually an indistinct trail running through the Nubian Desert. A four-wheel drive vehicle can take up to 10-12 hours to travel the distance.

2. Due to the requirements of any proposed project in this region, transportation of large amounts of construction materials via this route and the safety of the workers and materials can not be ensured. Temperatures along the route may reach 50°C in summer and sandstorms being common throughout the year, may delay passage.

3. In Karima, utilities are in short supply and rationed equitably to only the central section of town. Electricity is supplied for four hours per day and tap water limited to 90 tons per day. The remaining sections of the city have no electrical or water facilities existing.

4. There are no building contractors established in Karima. Labor is again the problem with few unskilled workers available and skilled workers even fewer. Building materials are virtually non-existent with only small quantities of low-grade, unglazed bricks available, and sand.

5. Public communication connecting Karima with other cities including Khartoum and Port Sudan is unavailable.

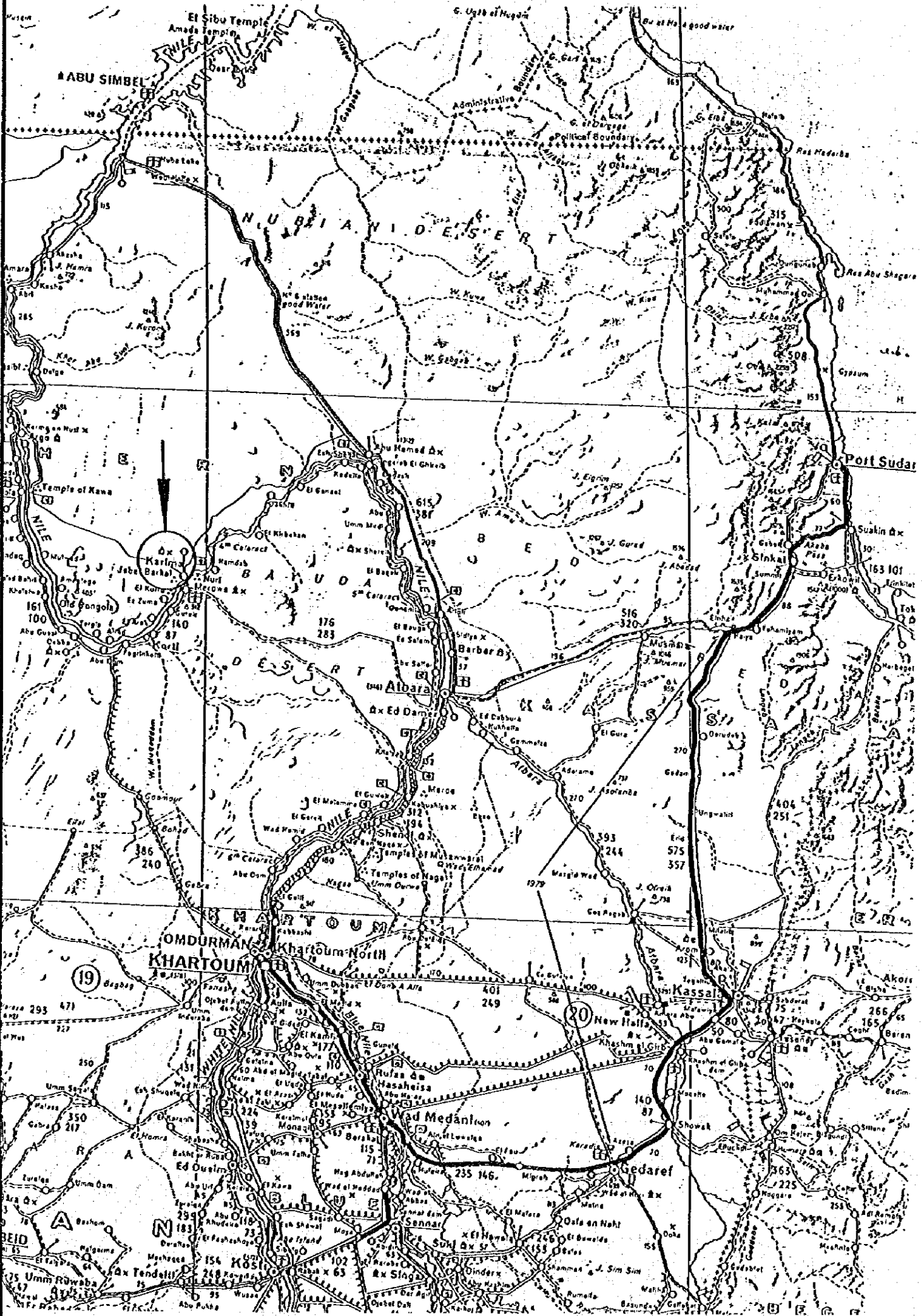
The Basic Design Study Team considered these facts and concluded that the implementation of the proposed project is not possible within the framework of Japanese grant aid cooperation in terms of the facts that construction work must be contracted to Japanese Companies and completed in a specified time period.



After reporting the results of the investigation to Sudanese agencies concerned, the Study Team discontinued their survey work and returned to Japan ahead of schedule.

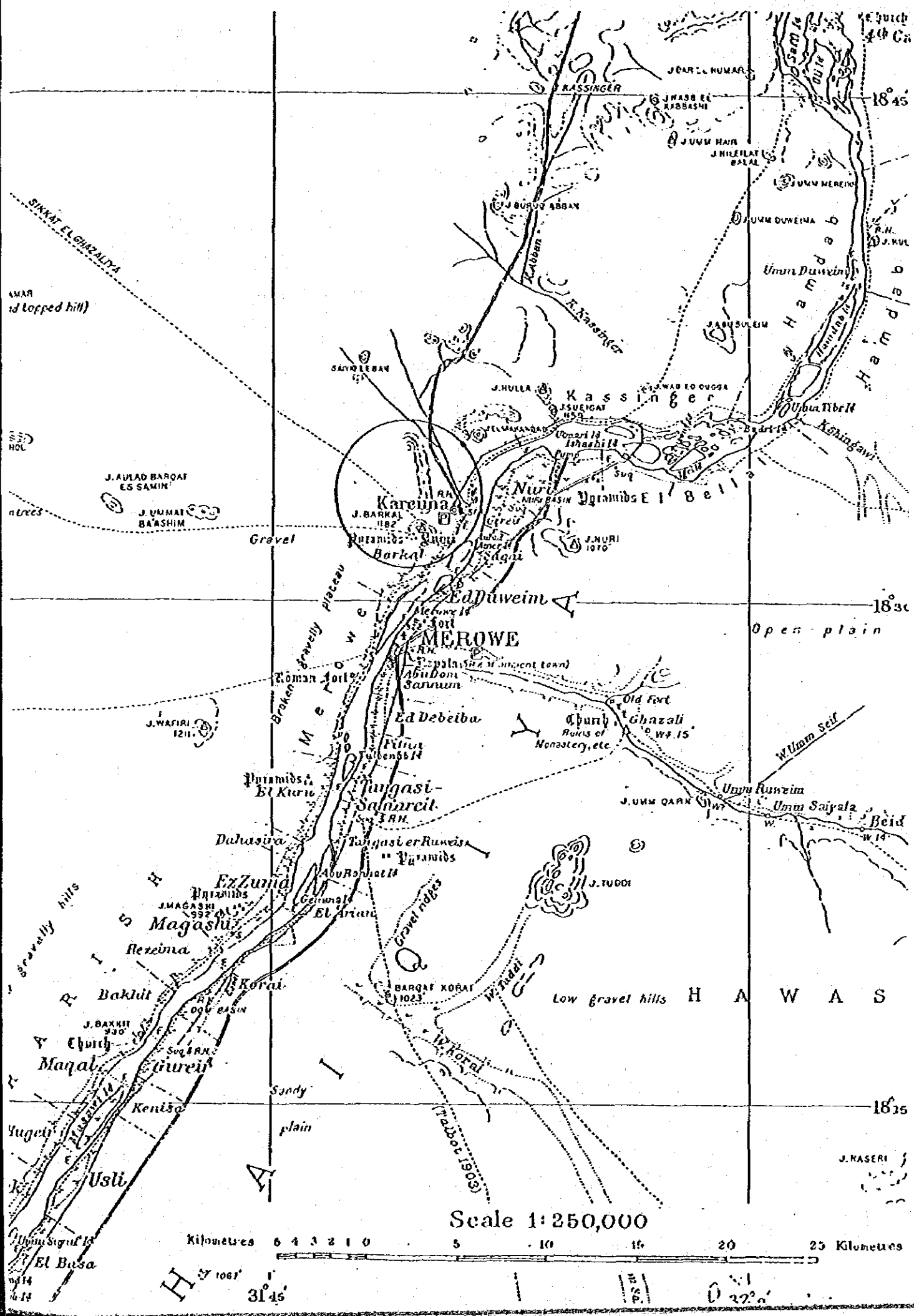
The Sudanese Ministry of Education and Guidance, which is the executing agency for the proposed improvement Project, accepted the Study Team Report and requested consideration for other projects in the education field in the future.













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## CHAPTER 1 INTRODUCTION



## CHAPTER 1 INTRODUCTION

In the past, education in the Sudan has laid emphasis on theoretical aspects of learning and has somewhat neglected the practical side. However, the need for manpower equipped with basic technical know-how, mainly in practical aspects, is rapidly increasing in order to adapt to the present industrialized society. The Sudan itself is intensely carrying out a policy for training such manpower.

In 1978, the Government of the Republic of Ireland conducted an investigation into the feasibility of improving five existing higher technical schools.

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The report concluded that improvement was feasible in only four of the five schools and that action towards improvement should be implemented promptly.

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This Report was compiled based on the results of the field survey. The organization of the Study Team and memorandum are shown on Appendix.





## **CHAPTER 2 BACKGROUND OF THE PROJECT**



## CHAPTER 2 BACKGROUND OF THE PROJECT

### 2-1 Outline of Education in the Sudan

Three hundred years ago, school flourished in many Sudanese towns. These schools concentrated on the teaching of the Arabic language and the Islamic religion. After the Turco-Egyptian armies and the forces of the Mahdi of 19th century interrupted education. At the beginning of the 20th century that the Anglo-Egyptian administration was able to take a first step towards planned education with the establishment of the Gordon Memorial College in 1902. Primary and secondary schools were established, with the aim of producing educated personnel for the administration.

In 1924 with the beginnings of the Nationalist movement, they set up their own schools for education. At the time of Independence in 1956, disparities in the educational system existed. Only an estimated 12% of the children of primary age were in school and some 86% of the population was illiterate.

The first priority of the independent government was to initiate rapid and massive expansion in an effort to bring modern education within reach of the whole population. Table 2-1-1 shows statistical changes in the education in the Sudan from 1970 to 1978.

This table shows rapid growth of primary enrolment from 38% in 1970 to 47% in 1975 after the reorganisation of the educational system in 1972, while secondary enrolment doubled from 7% to 14% in the same period.

Table 2-1-1

SUDAN	1970	1975	1977	1978
1. TOTAL POPULATION (000)	14 090	16 015	16 914	17 382
2. POPULATION 6-17 (000)	4 145	4 707	4 967	5 100
% FEMALE	49	49	49	49
3. ENROLMENT, ALL LEVELS	972 554	1 472 460	1 552 399	1 736 013
% FEMALE	36	34	39	39
FIRST LEVEL	825 620	1 169 219	1 302 040	1 358 193
% FEMALE	38	36	41	41
SECOND LEVEL	132 626	281 839	326 250	351 984
% FEMALE	28	31	33	34
THIRD LEVEL	14 308	21 342	24 109	25 835
% FEMALE	23	16	21	24
4. TEACHERS, ALL LEVELS	26 899	46 281	...	...
% FEMALE	...	...	...	...
FIRST LEVEL	17 740	31 695	34 989	38 887
% FEMALE	39	32	31	32
SECOND LEVEL	8 006	13 166	14 882	18 437
% FEMALE	18	...	...	20
THIRD LEVEL	1 153	1 420	...	...
% FEMALE	...	7	...	...
5. PUBLIC EXPENDITURE ON EDUC.	27 102	...	...	...
TOTAL (000) POUND	2.9	...	...	...
AS % OF GNP	...	...	...	...
6. % ENROLMENT (MF) BY LEVEL	100	100	100	100
FIRST LEVEL	85	79	79	78
SECOND LEVEL	14	19	20	20
THIRD LEVEL	1	1	1	1
% ENROLMENT (F) BY LEVEL	100	100	100	100
FIRST LEVEL	89	82	82	82
SECOND LEVEL	11	17	17	18
THIRD LEVEL	1	1	1	1
7. ENTRANCE AGE: FIRST LEVEL	7	7	7	7
SECOND LEVEL	13	13	13	13
DURATION: FIRST LEVEL	6	6	6	6
SECOND LEVEL GEN.	6	6	6	6
8. GROSS ENROLMENT RATIOS (MF)				
FIRST LEVEL	38	47	49	50
SECOND LEVEL	7	14	15	16
THIRD LEVEL	1.16	1.52	1.63	1.70
GROSS ENROLMENT RATIOS (F)				
FIRST LEVEL	29	34	42	42
SECOND LEVEL	4	9	10	11
THIRD LEVEL	0.31	0.49	0.70	0.82

Source: International Year Book of Education UNESCO 1981.

The educational objectives of the First 6-Year Economic and Social Development Plan (1977/78 - 1982/83) were --

- \* to attain more equitable enrolment of boys and girls on a nationwide basis.
- \* to reach a more equitable distribution of educational services between urban and rural areas;

- \* to develop technical skills relevant to the labor market requirements by putting more emphasis on agricultural, industrial and economic training on a non-university level; and
- \* to increase educational effects by combining theoretical study with practical training.

The 6-Year Development Plan was completed in 1983, but due to net foreign debts the review of the Plan was initiated in 1980 and the Sudanese Government is now making a 3-year plan for national development in which the above educational objectives are incorporated.

So far theory-oriented academic education has been predominant in the Sudan, neglecting the aspects of technical training based on practice. In order to remedy this situation, improvement in the technical education has been increasing.

As seen from Table 2-1-2 which shows the education system in the Sudan, the primary level starts at the age of 7 but is not compulsory. The former 4+4+4 system was converted to the present 6+3+3 system when the educational system was reorganized in 1972.

At present, however, technical training on the latter half of secondary level is operated by 4-year system and most of the students who finish school are engaged in business, while only few proceed to higher education.

Table 2-1-2

Structure of the education system in the Sudan

Age	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26		
Level					I				II				III				IV									
Stage					1				2		3															
	Kindergartens		Koran schools		AB schooling non-compulsory										General secondary		Higher secondary									
									Voc. centres				Technical		Commercial		Agricultural		Home economics							
													National craft centres													
																									Teacher training	
																									Technical and professional institutes	
																									Universities	

Source:  
International Guide to Education Systems  
UNESCO 1979

The students who attend higher schools including universities are qualified for an admission examination by the Sudan School Certificate which is granted only after successful examination and after the completion of higher Secondary School of 3 or 4 years duration. Duration of studies and qualifications to be granted on a higher level are shown in Table 2-1-3 "Profile of Higher Studies".

PROFILE OF HIGHER STUDIES Table 2-1-3

Duration of Studies  
(Previous education: 12 years, Sudan higher-secondary-school certificate)

	years	1	2	3	4	5	6	7	8	9	10
Education		GDE	IC	TD	B						
Physical education					Di						
Arts					B	BH		M			PhD
Fine arts, applied arts				Di							
Architecture						B		M			PhD
Law				B*	B†		M			PhD	
Social sciences, economics				Di		B			M		PhD
Commercial sciences				Cer		B		M			PhD
Exact and natural sciences					B	BH		M			PhD
Engineering, technology				Cer	Di	B		M			PhD
Medical sciences											
medicine							B			M/D	
pharmacy							B		M		PhD
veterinary medicine							B		M		PhD
Agriculture				Cer	Di	B		M			PhD

- B bachelor's degree
- BH bachelor's degree (honours)
- Cer certificate
- D doctor's degree
- Di diploma
- GDE general diploma of education
- M master's degree
- PhD doctor of philosophy
- IC teacher's certificate (primary school)
- TD teacher's diploma (secondary school)

- \* civil law
- † Sharia (Islamic law)

Source: International Year Book of Education UNESCO 1981.

For Primary Schools, Table 2-1-4 shows changes in the number of schools, pupils and teachers for a six year period. The curricula include reading and writing, arithmetic, religion, sanitation and brief history and geography and community affairs incorporated for respective regions.

Primary schools Table 2-1-4

	Unit	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
Schools							
Male and co-educational	No	3,276	3,324	4,054	4,226	4,316	4,362
Female	"	1,553	1,640	1,395	1,431	5,786	1,578
Total	"	4,829	4,964	5,450	5,657	5,786	5,940
Pupils							
Male and co-educational	No	761,932	800,658	807,270	842,230	849,873	892,816
Female	"	445,729	483,855	547,231	410,407	422,312	439,199
Total	"	1,207,661	1,284,513	1,349,501	1,252,637	1,272,185	1,332,015
Teachers							
Male and co-educational	No	23,219	24,055	26,276	n.a	n.a	n.a
Female	"	10,499	10,933	12,605	n.a	n.a	n.a
Total	"	33,718	34,988	38,881	14,579	42,620	45,604
Staff: pupil ratio		1:35	1:36	1:35	1:33	1:33	1:33

Source: Ministry of Education *SUDAN YEARBOOK 1983*

The first half of the secondary education is carried on at Intermediate Schools (see Table 2-1-5). In 1982, about 4% of the Schools were coeducational and 42% of the total students were girls. The ratio of girls to boys is still increasing. Intake from primary level is as low as about 19%. The curricula include religion, geography, history, arts, science, mathematics, English and Arabic, with particular attention being paid to mathematics and language.

Intermediate schools Table 2-1-5

	Unit	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
Schools							
Male	No.	546	576	769	673	827	853
Female	No.	231	274	425	354	521	553
Total	No.	777	850	1,243	1,024	1,342	1,406
Pupils							
Male	No.	104,947	116,095	163,880	131,346	150,171	157,555
Female	No.	42,480	52,629	84,929	11,284	92,888	109,788
Total	No.	147,427	168,724	248,812	202,630	243,059	267,343
Teachers							
Male	No.	n.a	n.a	10,411	n.a	8,580	8,785
Female	No.	n.a	n.a	2,967	n.a	3,749	3,891
Total	No.	9,254	10,460	13,378	11,584	12,323	12,676
Staff to pupil ratio	Average	1:15	1:16	1:19	1:20	1:20	1:20

Source: Ministry of Education

*SUDAN YEARBOOK 1983*

Approximately 40% of the students who leave Intermediate Schools proceed to the second half of secondary education which is diversified into Secondary School and Technical Secondary School. The ratio of their students was 83% (boys) to 17% (girls) in 1982 (see Tables 2-1-6 and 2-1-7).

Duration of studies is 3 or 4 years at either school, then the students are granted qualifications to take an examination for a Sudan School Certificate. Many Schools provide dormitories to accommodate students from remote areas.

The curricula of Secondary Schools for the first year include religion, history, geography, physics, chemistry, biology, sports, arts, mathematics and language (English, Arabic and French). In the second and third years, the selected studies of students are the arts or sciences and their related subjects.

Secondary schools

Table 2-1-6

	Unit	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
Schools							
Male	No	57	68	104	110	110	113
Female	"	23	34	66	66	73	73
Total	"	80	102	170	176	183	300
Pupils							
Male	No	33,087	37,238	52,015	64,653	52,636	56,665
Female	"	10,856	14,975	26,257	20,829	30,681	31,977
Total	"	43,943	52,213	78,272	75,482	83,317	88,642
Teachers							
Male	No	2,781	2,896	3,199	--	3,835	3,828
Female	"	477	496	495	--	608	601
Total	"	3,258	3,392	3,694	3,906	4,443	4,429
Staff: pupil ratio		1:13	1:15	1:21	1:20	1:20	1:20

Source: Ministry of Education

SUDAN YEARBOOK 1983

Technical Secondary Schools are diversified into four branches -- Industrial, Commercial, Agricultural and Home Economics -- as shown in Table 2-1-7, of these one Home Economics School and a few Commercial Schools are reserved solely for girls.

Curricula include general and specialized teaching subjects for each branch. Upon completion, students can obtain qualifications to take an examination for a Sudan School Certificate.



Technical secondary schools

Table 2-1-7

	Unit	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
<b>Schools</b>							
Industrial	No.	15	15	15	15	15	15
Commercial	No.	8	9	17	21	31	36
Agricultural	No.	3	3	3	3	3	3
Home economics	No.	3	3	1	1	1	1
<b>Total</b>	<b>No.</b>	<b>29</b>	<b>30</b>	<b>36</b>	<b>40</b>	<b>50</b>	<b>55</b>
<b>Classes</b>							
Industrial	No.	71	82	97	101	108	117
Commercial	No.	41	47	86	110	151	172
Agricultural	No.	24	25	28	27	28	32
Home economics	No.	14	17	4	4	4	12
<b>Total</b>	<b>No.</b>	<b>150</b>	<b>171</b>	<b>215</b>	<b>242</b>	<b>291</b>	<b>333</b>
<b>Students</b>							
Industrial	No.	3,470	4,189	4,955	4,944	5,320	5,670
Commercial	No.	1,902	2,229	4,908	5,999	8,175	9,265
Agricultural	No.	1,308	1,442	1,597	1,495	1,573	2,210
Home economics	No.	717	949	256	252	234	590
<b>Total</b>	<b>No.</b>	<b>7,397</b>	<b>8,809</b>	<b>11,716</b>	<b>12,690</b>	<b>15,302</b>	<b>17,735</b>
<b>Teachers</b>							
Industrial	No.	na	na	na	na	na	373
Commercial	No.	na	na	na	na	na	129
Agricultural	No.	na	na	na	na	na	43
Home economics	No.	na	na	na	na	na	12
<b>Total</b>	<b>No.</b>	<b>585</b>	<b>535</b>	<b>648</b>	<b>678</b>	<b>684</b>	<b>846</b>
Staff to Student Ratio	average	1:14	1:16	1:18	1:20	1:20	1:20

Source: Ministry of Education

SUDAN YEARBOOK 1983

Table 2-1-7 shows that, in 1981/82, the number of students was 17,735, an increase of 2,433 or 16% over the preceding year, while that of teachers was 846, an increase of 162 or 24% over the preceding year, showing a higher rate than the former and also yearly changes show a rapid increase in 1981/82.

## 2-2 Karima Technical High School

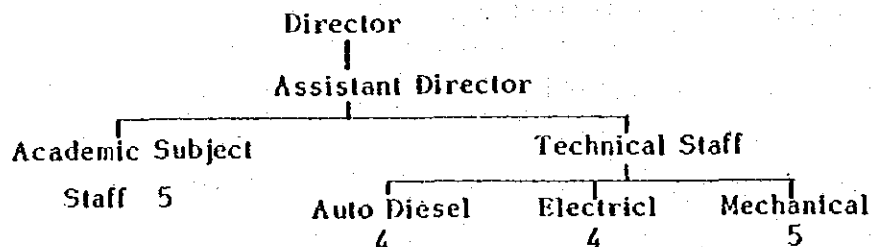
The school was constructed in 1963 as part of an American Aid Programme. The campus is surrounded by 20 m wide roads (unpaved and of sandy soil) on three sides, with its site area totaling about 34,400 sq.m., excluding Staff Housing area. The campus is built on flat land and its outer boundary is fenced by brick walls.

The existing buildings consist of masonry and brick walls, one-storey, with corrugated iron sheeting on timber roof trusses. The existing Campus Plan is shown on Appendix V. The plan consists of a class room block, dormitory block, staff houses block as well as Mosque and generator room, with the floor area totaling about 2,700 sq.m., excluding Staff Houses.

The foundation of soil is such that the top 70 cm comprise of sand layers, followed by laterite layers, with no "black cotton soil". Results of the standard penetration test have shown that the existing soil bearing capacity of more than 20 tons/sq.m is available, while the neighbouring stratum is more or less a firm consistency, as evidenced an excavated trench.

Student enrollment, as of September 1984, amounted to 300 students in day-time courses and an additional 300 students in evening courses.

In regard to teaching staff, there are a total of 20 staff-members, including Director and Assistant Director: five academic subjects staff and 13 technical subjects staff (4 for auto & auto-diesel, 4 for electrical and 5 for mechanical).



In addition, there are 32 auxiliary staff-members, including accountants, clerks, cooks, drivers, machinery maintenance crew, and labourers.

The courses are of four-year terms. In the Northern Province where Karima is located, the academic year begins in early July and ends in April, with two terms and a short holiday in between.

Classes are open a total of 200 days per year, or 34 weeks; a six-day week with Friday being a holiday. Academic subjects comprise of the Arabic Language, English Language, Religion, Mathematics and Science, while Technical subjects consist of Machining, Welding, Auto & Auto-Diesel, Electrical, and Technical Drawing etc.

The workshops consist of a Machine & Fitting Shop, Auto and Diesel Shop, Welding Shop, and Electrical Shop. Their present situation is as follows :

#### MACHINE AND FITTING WORKSHOP

The machine and fitting workshops contain an adequate range of equipment, most of which is maintained in good order, although some of the equipment is found to be outdated or broken down. The working table with vice is found in still serviceable condition considering its heavy wear and tear.

However, raw materials for purpose of teaching are virtually unavailable. Serviceable major equipment is described later.

#### AUTO AND DIESEL WORKSHOP

Most of the existing equipment in the auto and diesel workshop is found to be outdated and broken down. The current teaching materials, including a cut-away engine model, and gear and clutch assemblies, are in poor condition, while the working bench, jacks, and presses, that are vital for functioning the workshop, is unavailable. The Auto & Auto-Diesel workshop practice now is being restricted to the a basic level.

## WELDING SHOP

It is noticed that the only serviceable equipment in the welding shop is an outdated and small size welding machine. It does not function well in the work shop. Raw materials in the form of teaching materials is unavailable. Pipe flange welding operations are seen under way as part of the workshop practice.

## ELECTRICAL WORK SHOP

A model of electrical wiring is the only teaching material the electrical workshop contains. There is virtually no basic teaching equipment, such as measuring instruments for different kinds of data or for inspection and maintenance of electrical work. The functions of the workshop at present is restricted to an elementary level due to lack of equipment, materials, etc.

## MAJOR SERVICEABLE EQUIPMENT

. Machine and Fitting Shop	
. Lathe machine	4
. Shaping machine	1
. Milling machine	3
. Grinding machine	1
. Drilling machine	2
. Drilling machine (without motor)	1
. Auto and Diesel Shop	
. Fuel pump test start	1
. Diesel single cylinder engine	1
. Petrol engine on bench	1
. Welding Shop	
. Welding machine	1
. Electrical Work Shop	
. Ammeter/Voltmeter	1

## Infrastructure

### Electric Power

The existing 35 KVA 3-phase and 12.5 KVA single-phase generators are operate from 10 AM to 1 PM, and from 6 to 10 PM.

The two diesel engines were built one in 1960 and the other in 1975 and are maintained by the maintenance staff.

One class room is provided with only 3 sets of ceiling mounted fluorescent lights and therefore lighting intensity for evening classes is insufficient.

### Telephone Service

A telephone line is available at the Director's office only.

### Water Supply System

A water supply main (200 mm dia) runs on the road to the north of the site and water is supplied and stored near the campus gate in an elevated tank (L x D x H: 3.6 x 2.4 x 1.4 m, with the head at 4 m), then distributed to the Kitchen, one drinking place and several ablutions. The Kitchen has 9 washing facilities, but there is no water supply equipment worth mentioning. Latrines are fitted with washbowls ( 3 sets). There is one drinking place with water stored in bottles and supplied by pitchers.

### Drainage and Sewerage Treatment

Latrine waste water is treated by a seepage type septic tank (about 10 m deep) installed almost directly below the latrines. Meanwhile, waste water from the latrine near the playing field is directed into a septic tank provided in the quadrangle.

The septic tanks are in extremely unsanitary condition, with renovation technically difficult to implement considering existing latrine structures. The latrines as a whole may have to be reconstructed.

### Current administration of the school

In addition to 20 Teaching Staff, there are 32 auxiliary staff, such as accountants, clerks, cooks, drivers, generator maintenance staff, and labourers, for running the school.

All expenses involved are met by the government; in 1983 annual cost ran to about LS 164,000.- (US\$ 128,000.- at an exchange rate of US\$ = LS 1.28), with the following break-down:

<u>Item</u>	<u>Annual amount in LS</u>
Food for 250 students	90,000
Teaching material expenses	4,500
Fuel for workshop practice	400
Fuel for power generator	9,000
Personnel expenses, for 20 teaching staff + 32 auxiliary staff @ LS 4,500/month x 12 months	54,000
Transportation expenses (including students to and from their homes)	1,500
Facility maintenance expenses	4,700
<hr/> Total	<hr/> LS 164,100.-

### **CHAPTER 3 PURPOSE AND CONTENTS OF THE PROJECT**





## CHAPTER 3 PURPOSE AND CONTENTS OF THE PROJECT

### 3-1 Irish Report

The Irish Report refers to the study prepared in June 1978 by GBWA International Architect and Consultants of Ireland under the title of "Technical Schools Project for the Ministry of Education of the Democratic Republic of the Sudan".

The Report called for renovation of the four existing technical schools - Torit and Tonj (both in Southern Province), Gedaref (Central), and Karima (Northern Province) - in order to help produce middle level manpower in Sudan.

The project targeted the four technical schools and funding was available through the European Development Fund. However, Karima Technical School was dropped from its implementation scheme due to the fact that the Sudanese Government placed its policy priority on the Southern Province at that time. According to the European Community's Khartoum office, the Torit and Tonj schools were renovated in 1983, and the Gedaref school scheduled for completion of renovation by November 1984.

The Karima Technical School Renovation Project Plan, prepared in 1978 by the Irish consultant, consist of the following three categories:

- a) New Construction  
Workshops, dining/assembly hall, dormitories, bachelor's quarters, toilet and Mosque etc., with a total floor area of 2,081 sq.m.
- b) Refurbishing Work  
Partial alteration of partitions and also general overall repairs of the buildings.
- c) Equipment  
Supply of equipment for the workshops.

The estimated cost for the above items (as of 1978) are as follows:

New Construction	647,520.- ECU
Refurbishing Work	163,532.- "
Equipment	190,808.- "
<hr/>	
Total	1,001,860.- " * ECU=US\$1.08517 (as of 1981)

### 3-2 Planning Codes in Technical Education & Training of the Ministry of Education

In 1980 the Ministry of Education, the Democratic Republic of Sudan, issued planning codes for technical education and training as a guide in strengthening and developing the technical schools.

The planning codes were aimed at achieving the following three objectives:

- (a) To meet the critical & urgent need of the industrial & development plans of the Sudan.
- (b) To enhance and improve the Technical Ability in the country.
- (c) To prepare students in such a way as to enable them to find chances in Higher Institute & Universities.

Requirements for curricula, yearly study programme, staffing and major facilities are outlined below:

- Curricula

The core curricula include:

- |                           |                           |
|---------------------------|---------------------------|
| 1. Religion               | 7. Physics                |
| 2. Arabic Language        | 8. Additional Mathematics |
| 3. English Language       | 9. Technical Drawing      |
| 4. Elementary Mathematics | 10. Workshop Technology   |
| 5. General Sciences       | 11. Workshop Practice     |
| 6. Chemistry              |                           |

- Subject Study Programme

The current 4-year term of study is expected to change in the future to 3 years based on 200 working day-year.

The number of lessons is scheduled for 42 periods a week.

Details shown in Table 3-2-1

Table 3-2-1

Subjects	1st year	2nd year	3rd year	Total
Religion	3	3	3	9
Arabic Language	6	6	8	20
English Language	6	6	7	19
Technical Drawing	4	4	4	12
Work Shop Practic	8	8	5	21
Chemistry/Physics	4	4	4	12
Elementary Mathematics	6	6	7	19
Additional Mathematics	-	-	4	4
Work Shop Technology	4	4	4	12
Civic	1	1	-	2
<b>Total</b>	<b>42</b>	<b>42</b>	<b>42</b>	<b>126</b>

• Administration & Teaching Staff (Mechanical School):-

a) Administrative Staff:

Director	1
Assistant Director	1
Registrar	1
Bursar	1
<b>Total</b>	<b>4</b>

b) **Technical Subjects Staff:**

Machining	2 (with 1 assistant)
Fitting	2
Welding	1
Electrical	3 (with 1 assistant)
Auto	2 (with 1 assistant)
Auto-Diesel	1
Technical Drawing	2
<hr/>	
<b>Total</b>	<b>13</b>

c) **Academic Subjects Staff:**

Religion & Arabic Language	4
Mathematics	3
Chemistry/Physics	3
English Language	2
<hr/>	
<b>Total</b>	<b>12</b>

• **Building Requirements:**

a) **Administration block**

- (1) director's office, with conference area, and secretarial space.
- (2) assistant director's office.
- (3) bursar's office.
- (4) registrars office.
- (5) printing & business machine room.
- (6) store room.

b) **Class rooms & teacher's offices**

c) **Drawing rooms**

d) **Sciences laboratories**

e) **Workshops**

f) **Library**

g) **Central store**

h) **Dormitories**

i) **Dining room, kitchen & canteen**

j) **Staff houses**

**CHAPTER 4** CONDITIONS OF PROJECT AREA



## CHAPTER 4 CONDITIONS OF PROJECT AREA

### 4-1 Present Situation of Karima City

Karima City is located in the Bayuda Desert of Northern Sudan, about 350 km North of Khartoum.

The city faces the Nile River, and is situated 18.50 degrees North latitude and 32 degrees East longitude. On its west side are the ruins of an ancient Egyptian dynasty, which are occasionally visited by tourists, especially during the mild-climate seasons. The railway station is in the East of the city, adjacent to the main market which is used by the citizens for daily shopping. In terms of an administrative zone, the city belongs to the Northern Province with its administrative organ located in Dongola.

Across the Nile lies Merowe City, which has an air field and a ferry terminal. Ferry service connects the two cities, which have a combined population of about 12,000 people. The centre of Karima is inhabited by some 5,000 people, mostly Arabs. The dominant religion is Muslim (Sunni Sect), and prayers are diffused by means of loud-speakers throughout the city at regular intervals.

The official language of The Sudan is Arabic, and in Karima only a small percentage of the people speak English. The salaried class consists of government employees only, and business hours are generally between 7:00 AM and 2:00 PM for most workers. In the afternoon there is very little traffic or activity on the streets and the crime rate is at a minimum.

Most houses in Karima are single storey built of earthen-block walls with corrugated iron-sheathed roofs. There is a two-storey bank building which is the only two-storey building in the city. There is one hospital and seven schools. The latter consist of three Elementary Schools (two for boys and one for girls), three Secondary Academic Schools (one for boys and two for girls) and one Secondary Technical School (for boys).

#### 4-2 Natural Conditions

The Nile River runs along on the east of Karima City, its banks lined by a succession of date-trees.

The climate is that of a typical desert. While the day-time temperature may exceeds 40°C, it becomes comfortably cool in the late evening until morning.

According to the Director of Karima Technical School, there has been no rainfall in the past four years.

In the summer season (April - October), as the buildings suffer from radiant heat, residents are obliged to take their beds from their rooms and sleep outdoors, running a risk of exposure to sand-storms. According to 30 year climatological data, the number of days with more than 10 mm rainfall is 0.7 days per year, with total yearly rainfall averaging 31 mm.

#### 4-3 Infrastructure

##### 4-3-1 Electric Power

Electric power is supplied at a low voltage (3-phase 4W 400/230V 50 Hz) by regionally-installed generators. The supply time is about four hours per day (two hours each in the morning and afternoon). Canning factories and wireless stations have their own captive generators. The power supply is far from dependable, as voltage fluctuation and power failures occur frequently. A 5,200-KVA thermal power generating plant, is currently under construction on the west of the city with German aid, and is scheduled for completion in February 1985. Keeping pace with generating plant erection, the distribution work is under way for connection with villages along the Nile including Karima City where the power supply is to commence in June 1985.

##### 4-3-2 Telephone Service

Local telephone lines are available in villages along the Nile, and there is good telephone service within Karima City, though new installations appear difficult because of a shortage of circuits.



Communication with Khartoum is possible only by wireless telephone, and is generally not for use by private people.

#### 4-3-3 Television

The city of Karima is equipped with a parabola type antennae system, so one-channel TV broadcasting is available to the public.

#### 4-3-4 Service Water Supply System

Service water is supplied by the water authority making use of water from the Nile. The water treatment facility is equipped with a settling filtration plant with a disinfection chamber. The current output of 90 cu m/hour is expected to be increased to 150 cu m/hour in the future. While the water pressure is about 2 kg/sq cm (overhead tank height = 20 m), the pressure is estimated to decrease to 1 kg/sq cm at the distribution terminals. In the project area, a water supply main of 200 mm dia. runs along its northern road. Though service water is found slightly cloudy in appearance, it is considered to be at an acceptable drinking quality. (The mission has confirmed this at the water-supply outlet of the campus.)

#### 4-3-5 Sewerage

There is no public sewerage system. Household waste water is treated by deep well type filter tank (10 - 20 m deep), while rain-water is drained away unchecked.

#### 4-3-6 Fuel oil

It is vital to ensure a secure supply of fuel oil for running power generators. In the face of nation-wide fuel shortage, this situation does not look optimistic. Karima Technical School is allocated by the government a ration of 3,000 gallons per year for running generators.

#### 4-4 Transport

To reach Karima from Khartoum, there are four different modes of transport:

##### 4-4-1 By air

The 40-seat Fockler aircraft makes three flights weekly between Khartoum and Merowe (flight time of about  $1\frac{1}{2}$  hours). However, due to fuel shortage, this flight service is irregular and therefore undependable.

##### 4-4-2 By rail

Every week a train runs from Khartoum to Karima. One way trip takes 38 - 48 hours and service is often irregular. Passenger carriages consist of 1st, 2nd and 3rd class, all of them considerably outdated; train fares are LS 33.2, LS 22.64 and LS 13.7 for a single ticket respectively.

##### 4-4-3 Regular bus

There are three bus services every week, taking more than 20 hours per trip. The bus is always crowded with some passengers riding aboard the roof-top.

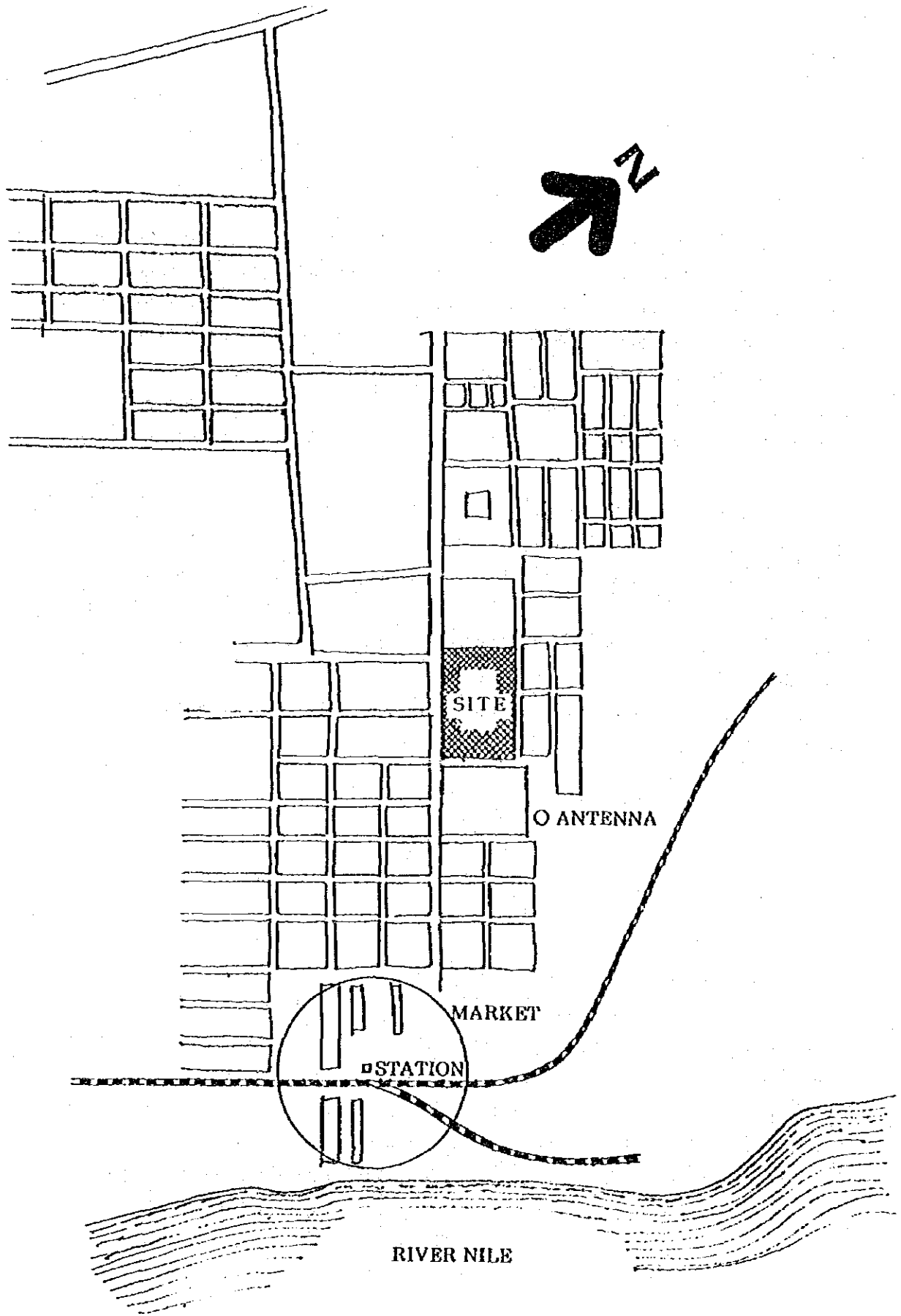
##### 4-4-4 By rental car

The most dependable form of transportation is 4-wheel drive utility vehicles across the desert. It takes 10 - 12 hours to travel a distance of about 430 km (one-way). Daily rental, including fuel cost, costs about LS 400 - 500. Between Khartoum and Merowe, there is actually no constructed road. Usage and direction is accomplished by tracing the wheel tracks. The condition of the road resembles an endurance test course for humans and machinery. In addition, the ferry-boat serving Merowe - Karima can accommodate only two 1-ton vehicles at the maximum and can not under any circumstances accommodate larger loads.

#### 4-5 Others

There is no accommodation available for Japanese staff to reside for long periods. Further, the Japanese staff would be required to bring in food-stuff in sufficient quantities and to cook themselves. Tapped water will become potable by use of a filter tank. In the aforementioned thermal power generating plant project, expatriate staff houses, about 40 units with air-conditioning equipment, and dining rooms etc., were brought in to the site in the form of container shipments.

The project staff has its own power generating plant, chartered aircraft and three Landcruisers (special model with wireless telephone unit) for communications and transport purposes. Rail transport of supplies is available, but it sometimes takes as long as 11 months to reach the site from Port Sudan, due to delays caused by customs clearance and transshipment. In the project area, there are no construction companies or skilled workers available, with the exception of bricklayers.



MAP OF KARIMA

METEOROLOGICAL DATA OF KARIMA

ELEMENT	MONTH											
	1	2	3	4	5	6	7	8	9	10	11	12
AIR TEMPERATURE	DAIRY MINIMUM	122	144	174	216	251	269	272	270	241	186	138
	DAILY MAXIMUM	284	310	319	388	421	432	415	410	392	334	292
	MEAN DAY TEMP. MAX. + MIN. 2	203	225	247	302	336	351	342	341	344	317	260
BRIGHT SUNSHINE DURATION	%	92	92	86	86	85	82	78	79	78	88	93
	HRS	102	106	105	108	110	105	103	101	95	103	103
RELATIVE HUMIDITY	%	29	23	18	16	16	17	25	31	23	29	32
RAINFALL	mm/MONTH	0	0	0	0	TR	TR	10	17	4	TR	0
WIND	PREVAILING DIRECTION	N	N	N	N	N	NNW	NNW	N	N	N	N
	MEAN SPEED M P H	11	11	12	11	11	10	9	9	9	12	11

SOURCE: SUDAN METEOROLOGICAL DEPARTMENT.

\* TR: TRACE



## CHAPTER 5 CONCLUSION





## CHAPTER 5 CONCLUSION

The Basic Design Study Team has concluded that the proposed Karima Technical School Improvement Project does not fall within the framework of Japanese grant assistance.

The following reasons are cited as a result of examining the prospects of the project in detail.

- 1) The construction term is basically a maximum of two years including time required for detail design and is not sufficient for the implementation of the project.
- 2) The construction site in Karima is located about 500 km north of Khartoum across desert terrain including crossing the Nile River. The trip can take up to 12 hours and loads are limited due to carrying capacity of the ferry.
- 3) Severe climatic and endemic conditions require a secure communication means, which there is none.
- 4) Building materials are not available locally with the exception of sand, aggregate and low-grade brick units so most building materials must be imported from other areas or countries.
- 5) There are no building contractors established in Karima and skilled and unskilled labor is very scarce so virtually all labor must be drawn from other areas of Sudan and provisions provided for their stay.

To summarize, the geographic, climatic and endemic conditions in and around Karima indicate that the proposed project is extremely difficult to accomplish. Transportation, communications and materials are all lacking, therefore the construction period cannot be ensured. Though these conditions could be overcome, the cost required to do so in order to execute the works would amount to far more than ordinary costs of building works and the allocated budget for this project.



APPENDICES



Appendix I Memorandum

MEMORANDUM

The Government of Japan has sent, through the Japan International Cooperation Agency (JICA) which is an implementing agency of technical cooperation of the Government of Japan, a team to carry out the Basic Design Study on the Improvement Project of Technical School at Karima which is the only one technical school in Northern Province for 18 days from 10th to 27th September 1984.

The team has had a series of discussions and changed views with the staff members of the Ministry of Education and Guidance, the Government of the Democratic Republic of the Sudan has conducted the field survey at Karima.

The team has understood the necessity and the importance of the Project which aims to strengthen the training of middle level technicians in the field of welding, mechanics, fittings, auto engineering and electrical installation as well as to remedy local imbalance of the distribution of education services between local areas and Khartoum.

However, the team has found substantial difficulty on executing the Project within the framework of Japan's grant assistance because of remote location and infrastructure problem of Karima.

Further, the team has pointed out the necessity of filling up of management and teaching staff of the school for strengthening the function of the school.

The result of the study will be compiled into the report and will be submitted to the Sudanese side.

23rd September 1984

**Appendix II      Organization of Study Team**

<b>Team Leader</b>	<b>Mr. Izumi Tokunaga</b>	<b>Ministry of Foreign Affairs</b>
<b>Coordinator</b>	<b>Mr. Norio Shimomura</b>	<b>Japan International Cooperation Agency</b>
<b>Project Architect</b>	<b>Mr. Toshiro Kawada</b>	<b>Ishimoto Architectural &amp; Engineering Firm, Inc.</b>
<b>Architect</b>	<b>Mr. Akira Nakazawa</b>	<b>Ishimoto Architectural &amp; Engineering Firm, Inc.</b>
<b>Electrical Engineer</b>	<b>Mr. Seiichi Nishikubo</b>	<b>Ishimoto Architectural &amp; Engineering Firm, Inc.</b>
<b>Equipment, Mechanical Engineer</b>	<b>Mr. Akira Hiwasa</b>	<b>Ishimoto Architectural &amp; Engineering Firm, Inc.</b>

**Appendix III List of Counterparts**

**Mr. MOHI EL-DIN WAHBI**

**Ministry of Education and Guidance  
under Secretary**

**Mr. AHMED KABOSH**

**Ministry of Education  
Deputy under Secretary**

**Mr. AHMED DAFALLA EL FIL**

**Director of Technical Education**

**Mr. YOUSIF ABDEL SALAM**

**Head of Civil Section**

**Mr. ALI SALIH EL HAG**

**Head of Mechanical Section in Technical Secondary Schools**

**Mr. MOHMED EL HASSAN SULLIMAN**

**Head Master of Karima Technical Secondary School**

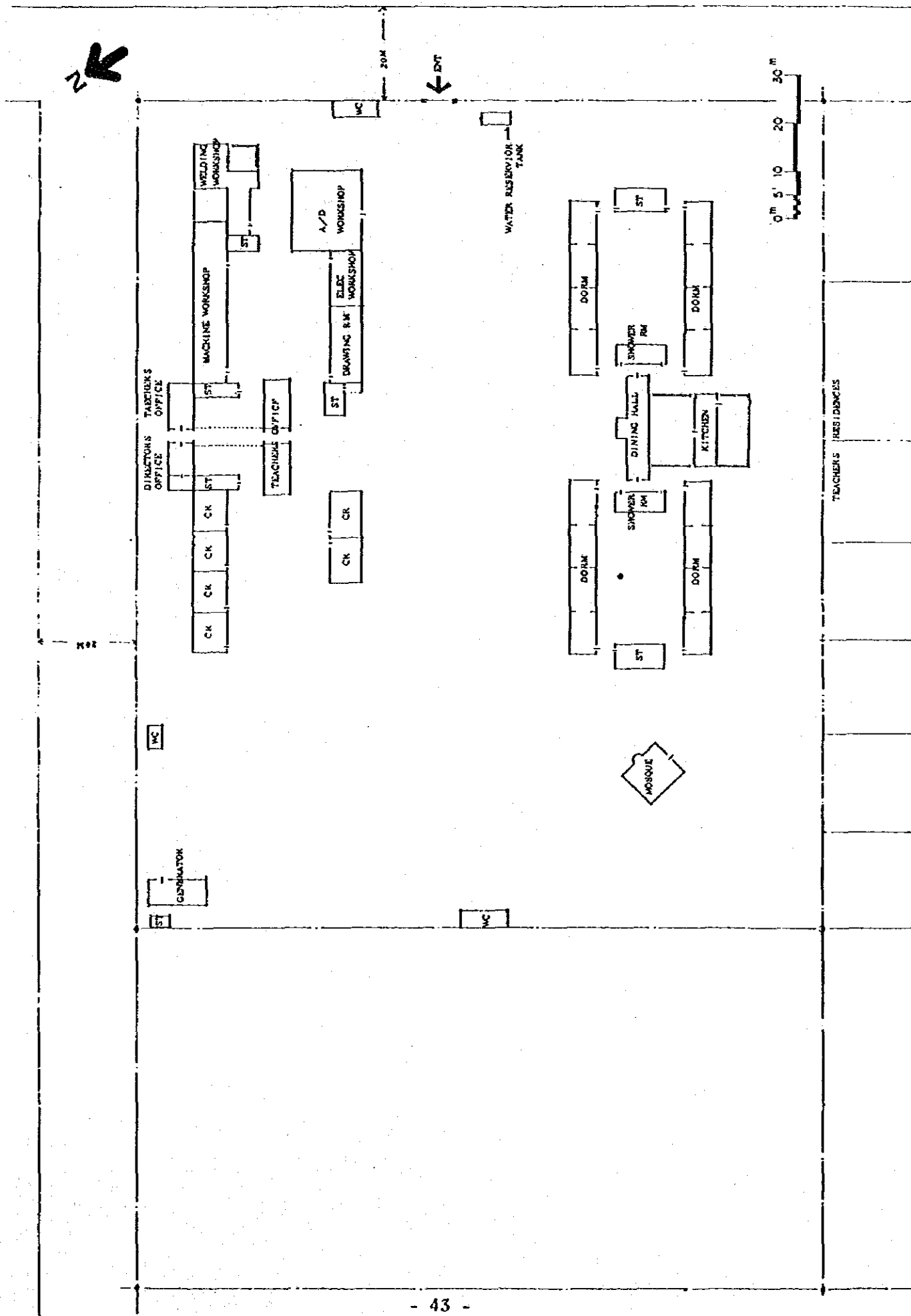
Appendix IV Diary of the Basic Design Survey Team.

DIARY OF THE BASIC DESIGN SURVEY TEAM DISPATCHED  
FROM 10TH SEPTEMBER TO 27TH SEPTEMBER, 1984

Date	Day	Description
Sep. 10	Mon.	Tokyo $\begin{array}{l} \nearrow \\ \searrow \end{array}$
11	Tue.	$\begin{array}{l} \nearrow \\ \searrow \end{array}$ Amsterdam
12	Wed.	Amsterdam $\longrightarrow$ Khartoum
13	Thu.	Visit and briefing at the Japanese Embassy Courtesy call to Ministry of Education and Guidance (MEG)
14	Fri.	Preparation of survey schedule for Karima. Mr. Tokunaga (team leader) arrived in Khartoum.
15	Sat.	Visit to MEG and meeting was held with officials of MEG. Investigation of existing technical school by Belgian grant aid.
16	Sun.	Khartoum $\longrightarrow$ Karima by vehicle.
17	Mon.	Investigation of existing educational facilities of Karima Technical School. Visit to Water Supply Department and Canning Factory.
18	Tue.	Investigation of existing educational facilities of Karima Technical School. Collection of technical information of local building construction methods, materials and prices. Returned to Khartoum by vehicle (Mr. N. Shimomura and Mr. T. Kawada)
19	Wed.	Visit and briefing at the Japanese Embassy Visit to MEG and meeting was held with MEG officials. Returned to Khartoum by vehicle (Mr. A. Nakazawa, Mr. E. Nishikubo, and Mr. A. Hiwasa)
20	Thu.	Visit to MEG and meeting was held with Under Secretary of MEG and officials.
21	Fri.	Meeting among team members. Preparation of summary document of the Survey.
22	Sat.	Collection of materials and data at Ministry of Construction and public Works and Survey Department.
23	Sun.	Visit to MEG and submission of Memorandum. Collection of data at Meteorological Department, Central Station and construction site of Khartoum Training Hospital.
24	Mon.	Preparation of summary document of the Survey.
25	Tue.	Return flight Khartoum $\longrightarrow$ Amsterdam Visit to European Community of Brussels (Mr. I. Tokunaga and Mr. T. Kawada)
26	Wed.	Amsterdam $\begin{array}{l} \longrightarrow \\ \nearrow \\ \searrow \end{array}$
27	Thu.	$\begin{array}{l} \longrightarrow \\ \nearrow \\ \searrow \end{array}$ Tokyo



Appendix V Layout plan of the existing building.







JICA