BASIC DESIGN STUDY REPORT
ON
THE CONSTRUCTION PROJECT OF
A JUNIOR SECONDARY SCHOOL
AT MEHEBA REFUGEE SETTLEMENT
(ICARA II)
IN
THE REPUBLIC OF ZAMBIA

JANUARY, 1986

JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

In response to the request of the Government of the Republic of Zambia, the Government of Japan decided to conduct a Basic Design Study on the Construction Project of a Junior Secondary School at Meheba Settlement and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to Zambia a study team headed by Mr. Momoki TANEICHI, Grant Aid Division, Ministry of Foreign Affairs, from September 17 to October 12, 1985.

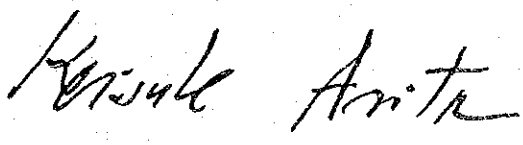
The team had discussions on the Project with the officials concerned of the Government of Zambia and conducted a field survey in the Meheba Refugee Settlement.

After the team returned to Japan, further studies were made and the present Report has been prepared.

I hope that this report will serve for the development of the Project and contribute to the promotion of friendly relations between our two countries.

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

January 1986



Keisuke ARITA
President
Japan International Cooperation Agency

PHOTOGRAPHS OF PROJECT SITE

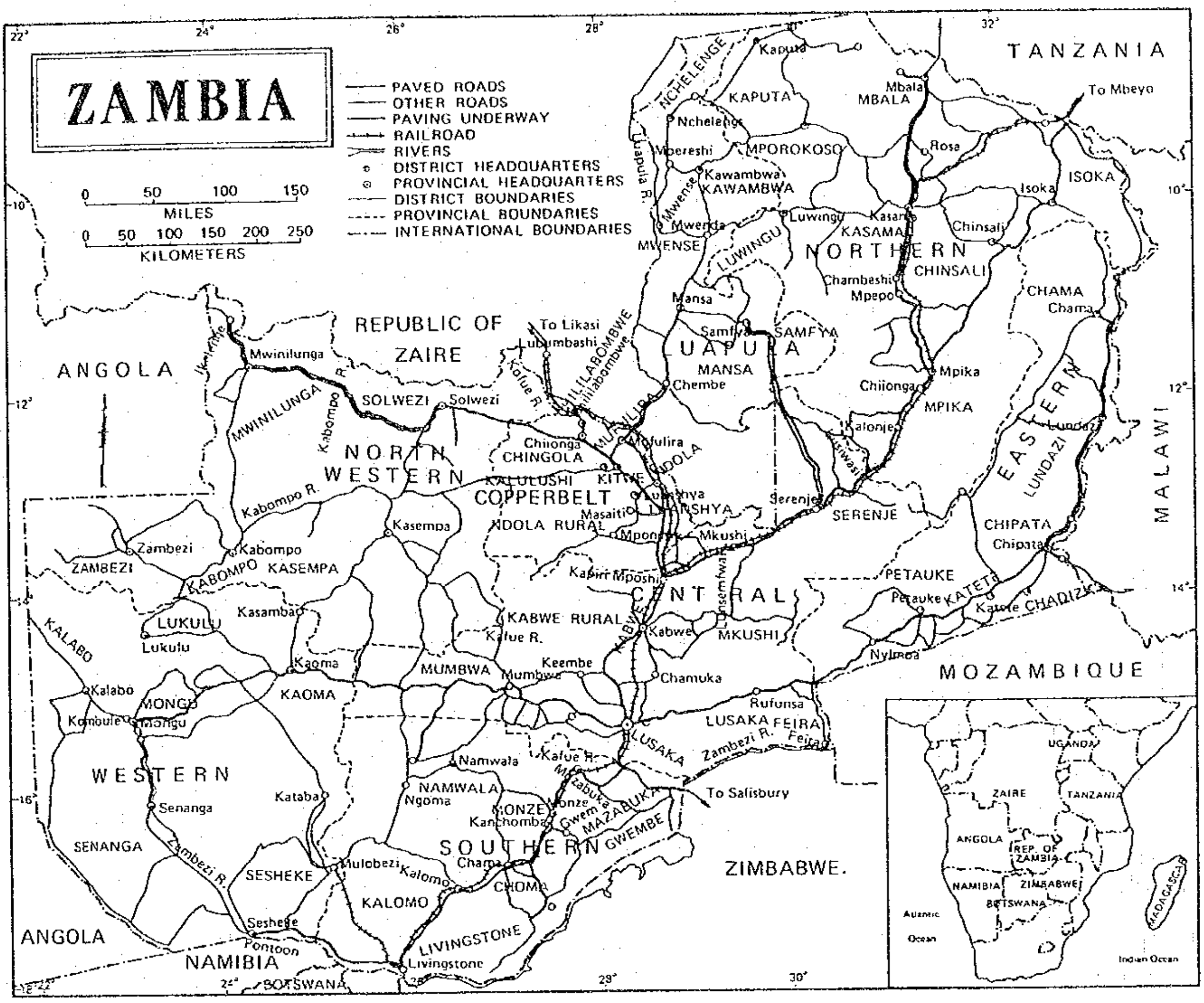
Main Road

Project Site for Staff Houses

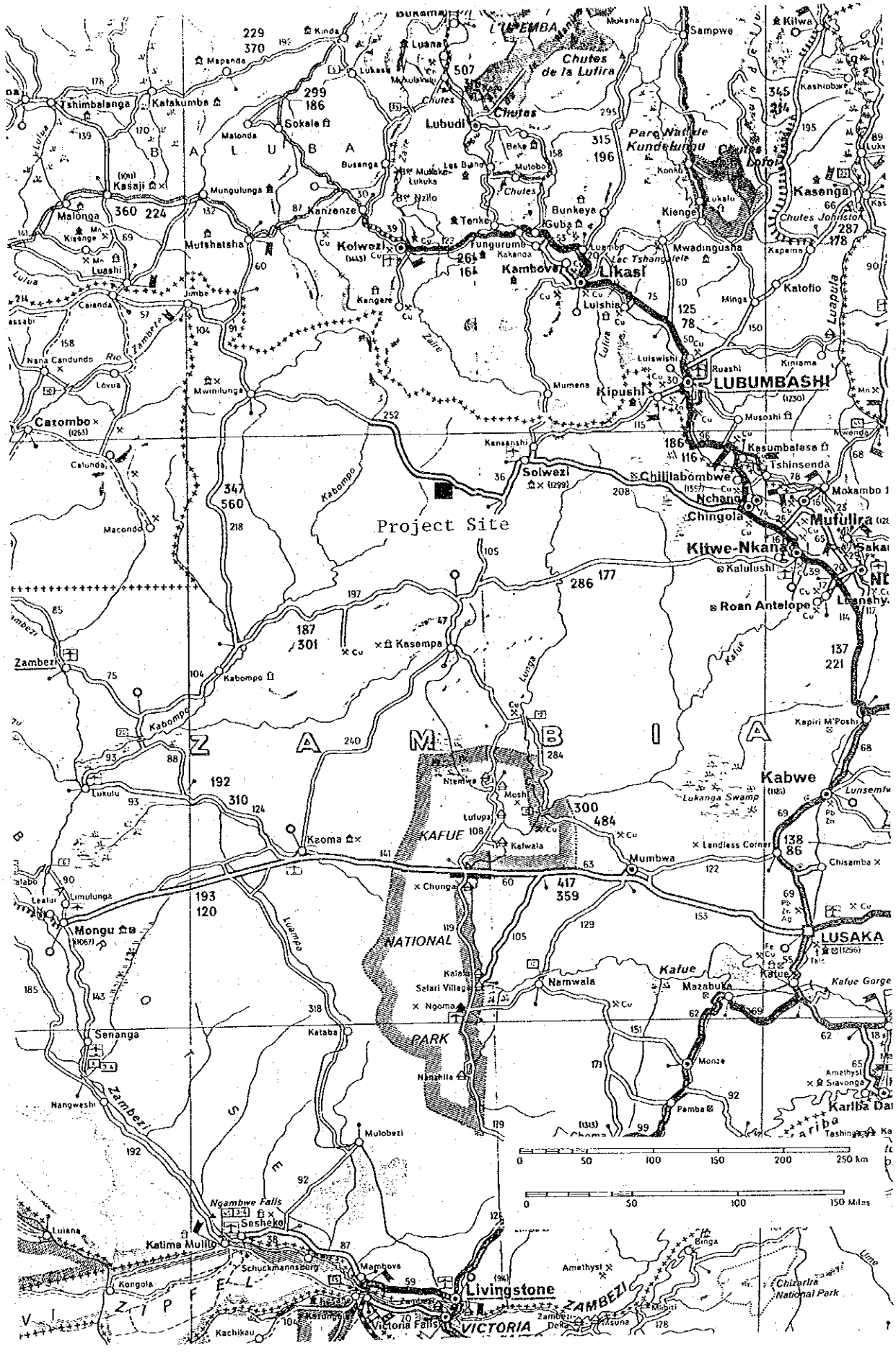
Road No. 6

Project Site for Junior Secondary School

MAP OF ZAMBIA



LOCATION MAP OF THE PROJECT SITE



SUMMARY

African countries have traditionally been lenient in accepting people who have been forced to flee from neighboring countries. Most of the host countries, however, belong in the category of latest developing countries, in which the presence of a large number of refugees has exacerbated their already frail economy and constituted one of the causes of retarding their own national development.

In July 1984, in response to the request of the Secretary-General of the United Nations, the Second International Conference on Assistance to Refugees in Africa (called ICARA II) was held in Geneva with the cooperation of UNDP, UNHCR and OAU. This conference was held with the objective of alleviating the burden on the African countries. Despite depressed economy, the African countries have continued to accept the inflow of refugees and have provided them with, or improved their social and economic infrastructure while, on the other hand, continuing to offer them direct assistance as heretofore. In response to this request, altogether 128 development project proposals were submitted by 14 African countries, including five projects by Zambia. The "Construction Project of a Junior Secondary School at Meheba Refugee Settlement", which was considered to have the first priority among the five, was at this time requested to the Government of Japan for assistance in the form of Grant Aid.

As of 1984, there were some 103,000 refugees in the Republic of Zambia. 91,879 refugees (90% of the total) are concentrated in the North-Western and the Western Province bordering Zaire and Angola. The Meheba Refugee Settlement in the North-Western Province, where 11,360 refugees, mainly Angolans, are settled, is the largest refugee settlement in Zambia, with a 14-year history, having been opened by UNHCR in 1971. As far as education of the refugee children is concerned, there are only three primary schools that were constructed by non-government volunteer groups. There is no secondary school, and it is with the assistance of UNHCR and other international agencies that only a handful of the primary school graduates are able to enter secondary schools in other cities.

The secondary school situation in Zambia is such that less than 20 per cent of Zambia's own primary school graduates are able to enter junior secondary schools, because of the shortage of schools. In view of this situation, a junior secondary school construction program to build 11 schools is being implemented by the Ministry of General Education and Culture by using loans from the World Bank and the African Development Bank. At this stage, it is difficult for the Zambian Government to construct a secondary school for refugees from its own funds.

It is against such a background that this project has been developed. It aims to offer the refugee children in Meheba Settlement as well as in other parts of the North-Western Province of Zambia, the same opportunity to acquire a junior secondary education as Zambian childrenand, at the same time, to ease the difficulty of entering secondary schools for Zambian children around the settlement by accepting them for enrollment in the new secondary school.

The site proposed for construction of this junior secondary school is located within the Meheba Settlement, which is 70 km west of Solwezi about 650 km northwest of the Zambian capital city, Lusaka. The site, which comprises flat land of 25 ha., lies adjacent to the primary school located in the core area of the settlement where the Office of the Refugee Commissioner of the Ministry of Home Affairs, a warehouse, a market, a clinic, etc. are located.

Education in this junior secondary school will follow the curriculum prepared in accordance with Zambia's educational system and will offer the final two years (grades 8-9) of the nine years of basic education (grades 1 through 9). It will accommodate 240 students, of which 160 will be boarded in the dormitories.

Facilities of the secondary school will consist of the school block comprising of the administration building, classrooms, dormitories, a kitchen and a canteen, and an ablution facility and a staff housing block, for a headmaster's, teachers', and supporting staff housing, a sports ground and an agricultural training farm. Equipment and miscellaneous materials necessary for the school are for teaching, administration, a canteen, workshop practice, and agricultural

activities. The facilities will be designed in accordance with the guidelines adopted for the secondary schools now under construction by the Ministry of General Education and Culture. All of the major buildings will be of one-story block wall structure with asbestos cement roofs on steel bar trusses. This is an economical structure as it uses locally available materials. The total floor area will be 3,814 square meters excluding the exterior corridors. The construction period is estimated to be 14 months following the signing of the Exchange of Notes between the two governments.

The competent authority of the Government of the Republic of Zmbia responsible for the execution of this project is the Ministry of Home Affairs. Coordination of planning on the construction program and operation after project completion will be handled by the Ministry of General Education and Culture. This secondary school will be operated and maintained by the teaching and administrative staff of 41 people headed by the headmaster dispatched by the Ministry of General Education and Culture. Recurrent cost and salary for staff expenses necessary to operate the school are estimated at approximately 182,000 kwacha per year.

The Construction Project of a Junior Secondary School at Meheba Refugee Settlement (hereinafter refered to as "the Project") aims to offer to as many refugee children and the local Zambian children as possible the opportunity to acquire a junior secondary education in order to develop manpower with sufficient knowledge and skill to participate in productive activities in the future. The significance of this project using Japan's Grant Aid is therefore quite high.

For the smooth operation of the school, it is necessary that the Government of the Republiec of Zambia will allocate an adequate budget in consideration of the facts that the school will be located 70 km away from Solwezi, the closest town where government offices are located. Also it will be necessary to maintain a local water and an electricity supply systems, which entail more expense than a regular school.

It is also hoped that the teaching and administrative staff, particulary the teachers of science and mathematics, who are to be the mainstay of the school, will be secured and that, at the same time, the refugee children will be given a better educational environment through the granting of scholarships and other means of assistance.

CONTENTS

CHAPTER 1

INTRODUCTION

CHAPTER 1 INTRODUCTION

Majority of African governments base their refugee policy on tenets and objectives of international and regional instruments relating to refugees, which hold that voluntary repatriation is the ideal solution to the problems of Africa's refugees, whose number is estimated at nearly three million. Many refugees have left their homes due to the complex situation created by the process of decolonization, tribal contention and religious struggle, making it difficult to aim for voluntary repatriation. Assistance to refugees has been provided by UNHCR and many other organizations; this assistance has been concentrated on activities that help refugees overcome the initial problems arising from their sudden flight. To help them achieve a level of subsistence comparable to that of neighboring nationals and to assist them for quite a long term until conditions allow them to return to their home country, the host country has to allocate scarce resources to support the refugees.

All of the African countries that host an increasing number of refugees are at a stage of development where they have great difficulty meeting basic needs, including infrastructural services, for their nation. Providing for an additional group, particularly when the number is significant, constitutes a severe drain on national resources and makes it more difficult for the country to maintain its development plan.

In recognition of the above situation, the International Conference on Assistance to Refugees in Africa (ICARA II) was held in July 1984 to help African governments find the resolution to strengthen their social and economic infrastructure (roads, bridges, hospitals, schools,etc.) to cope with the burden imposed by the refugees.

At the request of the Secretary-General of the United Nations, 14 of the African countries facing refugee problems submitted 128 project proposals, which related to the following categories.

1. To develop human resources through basic education, skill training, and provision of health and sanitation facilities,

2. To strengthen the physical and technical base for improving agriculture and the related fields in order to increase productivity.
3. To improve the transport infrastructure.

The Government of the Republic of Zambia, which hosts about 103,000 refugees, requested five projects, as listed below.

1. Construction of a junior secondary school, at Meheba Refugee Settlement
2. Strengthening of health and other facilities in areas with refugees, including Meheba Settlement
3. Construction of three primary schools
4. Agricultural development in the North-Western Province
5. Refugee access roads in the North-Western Province

In order to realize the construction of a junior secondary school, which was listed as the first priority among the projects, the Government of the Republic of Zambia requested the cooperation of the Government of Japanese in the form of Grant Aid.

At the request, the Government of Japan decided to conduct a basic design study of the Project, and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent a basic design study team headed by Mr. Momoki Taneichi, Grant Aid Division, Ministry of Foreign Affairs from September 17 to October 12, 1985. The team held a series of discussions with the officials of the Ministry of Home Affairs and the Ministry of General Education and Culture of the Republic of Zambia to examine the riability of the Project, and carried out a field survey and investigation concerning the basic design for the Project. The Minutes of discussions on the Project was signed as attached in annex together with other information on the Project.

This basic design study report includes the background and the purpose of the Project, the detail of the basic design, and a project evaluation, and was prepared on the basis of discussion with the personnel in charge from the Government of the Republic of Zambia and an analysis of materials obtained from the field survey.

CHAPTER 2

BACKGROUND OF THE PROJECT

CHAPTER 2 BACKGROUND OF THE PROJECT

2-1 Economic and Social Conditions

Zambia, in Central Africa, has an area of 752,614 square kilometers, about twice the size of Japan. It is land-locked, being bounded on the north by Zaire and Tanzania, on the east by Malawi and Mozambique, on the south by Zimbabwe, Botswana and Namibia, and on the west by Angola. Except for a number of valleys, the country lies between 900 and 1500 meters above sea level, which ensures a largely temperate climate. The population is 6.42 million and is growing at the very rapid rate of 3.1 percent a year. About 43 percent of the population lives in Lusaka, the Copperbelt or other urban areas, making Zambia the most urbanized country in Africa.

The flow of people from the rural areas to the urban areas is increasing every year and the rapid expansion of the population in the urban areas creates the problems of high unemployment, shortage of housing, and the shortage of adequate teaching and medical facilities. On the other hand, the shortage of manpower in agricultural production is disturbing the development plan for the rural areas. The population is 99 percent African, comprising some 73 tribes, with about 50,000 Europeans and 10,000 Asians and other races.

Zambia depends heavily on the copper accounts, which occupy over 95 per cent of export earnings. Therefore, copper price fluctuations have had a major destabilizing effect on the entire economy. The sharp fall in copper prices since 1975, accompanied by the dramatic rise in petroleum prices and the significant increase in the price of imported equipment and raw materials, produced financial difficulties for Zambia, affecting both external and internal accounts.

The utilization of existing infrastructure for productive purposes has been severely constrained in recent years by the prevailing financial crisis, which inhibits the funding of recurring costs,

Fig. 2-1 Real Copper Price 1970-1982

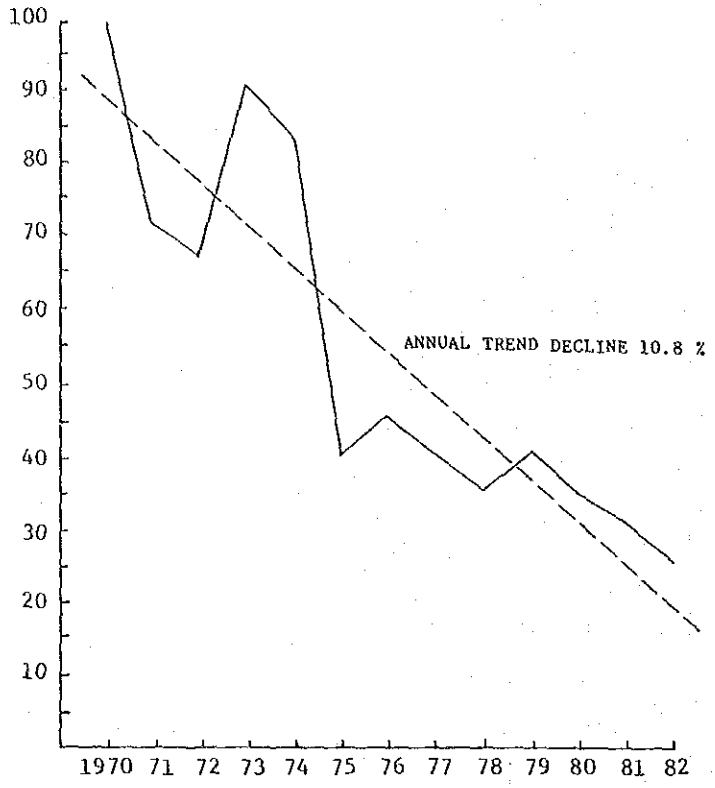
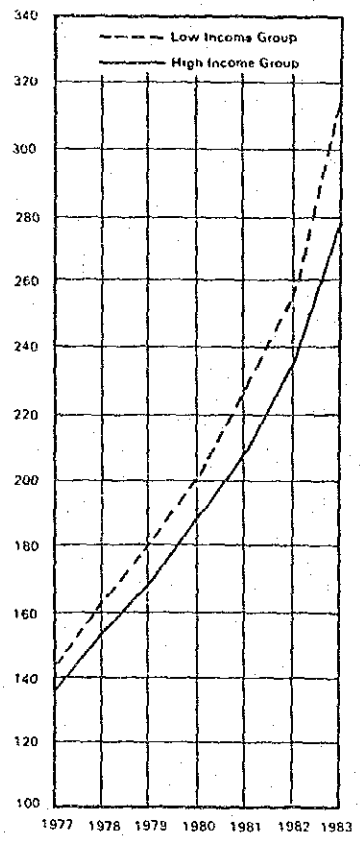


Fig. 2-2 Consumer Price Index
(1975 = 100)



prevents adequate utilization of industrial capacity because of the shortages of raw materials and spare parts, and causes a downward trend in employment in the formal sector. On the other hand, the effort to improve agricultural performance has been disappointing overall due to the delays in rural development and declining agricultural production caused by the outflow of white laborers from the country.

Due to the drought in 1979, maize production fell far short of Zambia's needs, requiring the importation of substantial amounts of maize, thus making the economic situation worse. Under these conditions, the Third Five-Year Development Plan 1979-1984 was executed three years behind schedule. It targets the rural sector for development, with emphasis on agricultural production.
The plan is expected to be introduced:

1. the use of planning as an instrument for attaining socialism
2. the generation of more and fuller employment as a major objective of development
3. the diversification of the economic structure in order to reduce the dependence on copper
4. assignment of the highest priority to rural development
5. the promotion of industrial production based on local raw materials.
6. the promotion of the exploitation of non-copper mineral resource.
7. the reduction of the disparities in the level of income between the rural and the urban sectors
8. speeding up the process of Zambianization
9. the expansion of educational and training facilities
10. the progressive attainment of a target growth rate of 6 percent of GDP under conditions of reasonable price stability

The Government policy toward the improvement of economic conditions has been basically unchanged since the First National Development Plan. This indicates consistency of the policy on one hand, and, on the other hand, that the problems facing the country since the independence, have not yet been resolved.

Fig. 2-3 Refugees in Africa

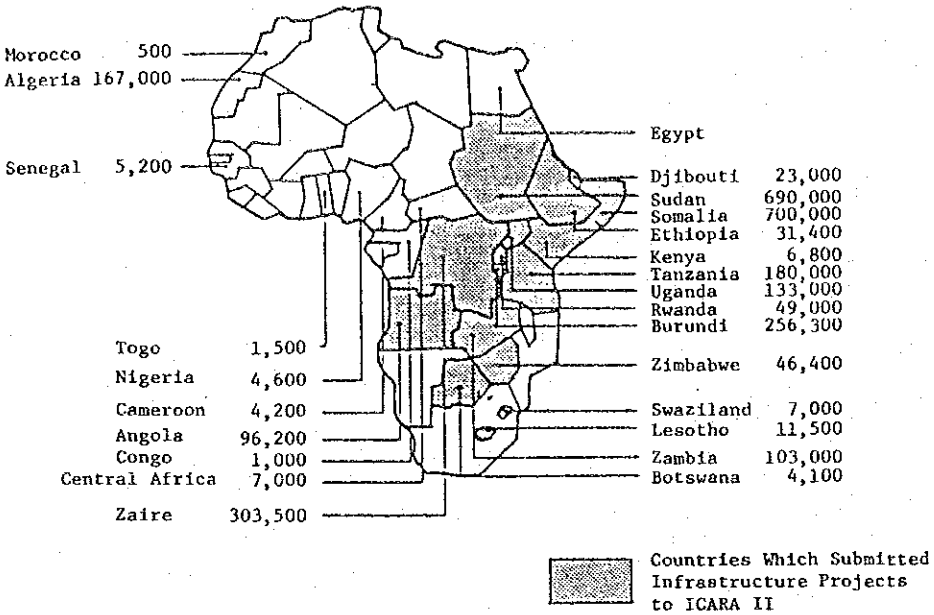
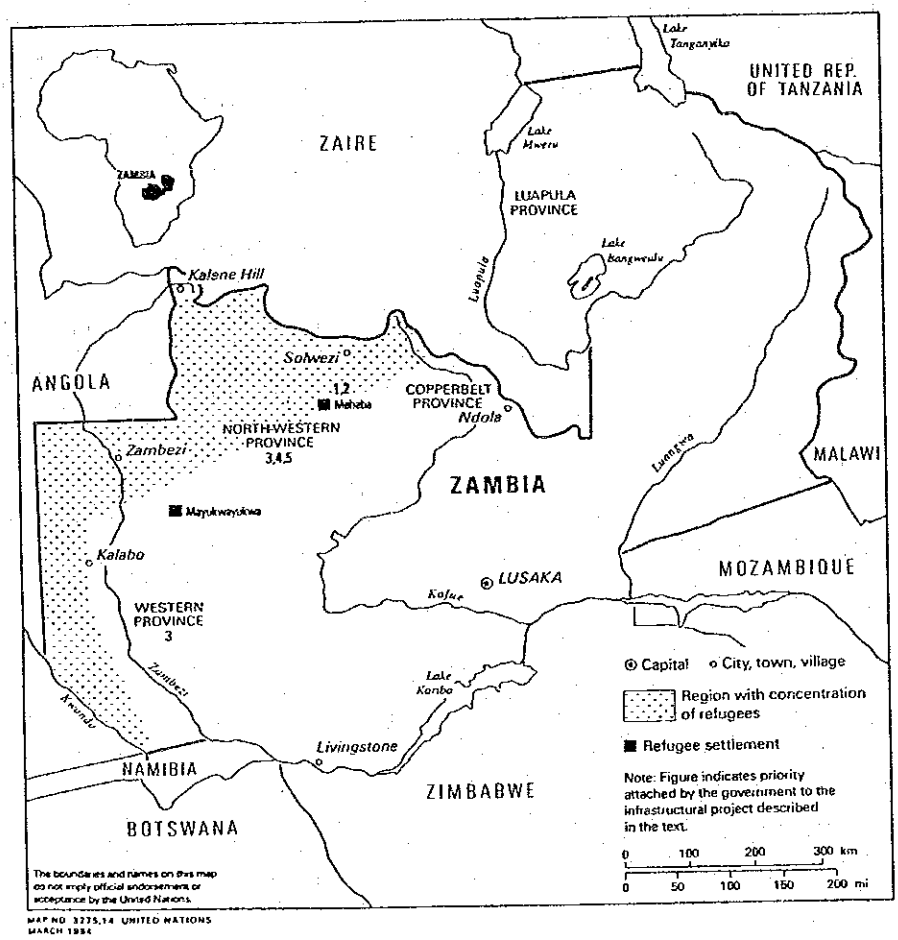


Fig. 2-4 Refugees in Zambia



2-2 Refugees

2-2-1 Refugees in Zambia

The major causes which triggered the inflow of refugees from neighboring countries into Zambia are the internal strife that broke out in the years before and after Congo's independence in 1960, particularly Katanga Province's (currently Zaire's Shaba Province) independence movement, the internal wars fought among the three major Angolan liberation oganizations, the MPLA, FNLA, and UNITA, which continued even after Angola became independent in 1975, and, more recently, Rhodesia's struggle for independence in 1980. Of the refugees who escaped to Zambia, most of those from Rhodesia (which is now Zimbabwe) have returned to their home country since its independence. Most of the refugees currently settled in Zambia are, therefore, from Zaire and Angola.

In 1984, there were some 103,000 refugees in Zambia, including 83,104 Angolans, 10,446 Zairians, 4,882 Namibians, 2,944 South Africans and a number of other nationalities. These refugees are spontaneously settled among the national population and most of them are concentrated in the Western and the North-Western Provinces.

Even though Zambia faces financial difficulties, refugees are readily accepted into the country in most case because of the official government policy of humanism and traditional African hospitality. In an effort to promote the safety and security of refugees, the Government of Zambia has tried to settle refugees at a reasonable distance from the frontiers of their respective countries of origin. However, in situations, such as those obtaining in the Western and the North-Western Provinces, where refugees have been unwilling to move from border areas,, for reasons of cultural affinity and social compatibility, the Government has preferred to extend assistance to refugees where they have spontaneously settled and has endeavored to ensure their safety and security under occasional difficult conditions.

In Zambia, as in the other African host countries, the burden of the refugee presence has been significant, but has been well managed by the Government with the help of UNHCR and other international donors.

The international community has provided limited assistance to meet some basic needs. Such assistance in the North-Western Province has included training of clinical assistants and agricultural extension workers. In the Western Province, aid has been limited to provision of health services, some basic food commodities, seed for farming, agricultural tools and clothing.

In addition to above assistance for refugees, two organized settlements have been completed with international assistance and handed over to the Government. The first such settlement, Mayukwayukwa in the Western Province, is the home of some 1,400 refugees, while the Meheba settlement in the North-Western Province is inhabited by some 11,360 refugees. Mayukwayukwa was transfered over to the Government for administration in 1973, and the Meheba transfer took place in 1982. Assistance at both settlements prior to the transfer included construction of village roads, health and educational facilities, water and sanitation systems, and agricultural extension services.

Two other areas receiving assistance from the international community are the ANC farm for 2,500 South Africans and the SWAPO Nyango Health and Education Center for 4,500 Namibians. Activities at the ANC farm focused on promotion of self-sufficiency, which was deemed to have been achieved by 1982. At the Nyango Center, international assistance is being provided for construction of educational and health facilities and improvement of the water-supply system. Some 350 refugee students are receiving scholarships from various international agencies.

The administrative framework for implementing the Government's policy of providing assistance to the refugees has been established in the Office of the Refugee Commissioner in the Ministry of Home Affairs. The Ministry's total budget in 1983 of

1,041,201 kwacha includes a grant of 157,000 kwacha to maintain refugees at the Meheba and the Mayukwayukwa settlements. The grant is for such elements as food, fuel, road maintenance, housing, medical supplies, and wages for casual labor. Support for refugees at settlements and spontaneously settled areas is also provided in the budgets of several other Ministries. Some 200 Zambian government officials are concerned with the administration of refugee activities.

The Government indicates that the policy is to provide each refugee with either land or a job. The allocation of land at the Meheba settlement is 580 square kilometers; at the Mayukwayukwa settlement, the area is 90 square kilometers. In spontaneously settled areas, refugees are allocated land in the same way as for nationals. The usual size of land is 5 hectares.

Despite the unemployment situation in Zambia, the Government stated that its policy and practice was to help qualified refugees find gainful employment. Substantial numbers of them are serving as doctors in hospitals, lecturers at the University, teachers in secondary schools, and officials in parastatal organizations. Although refugees are assisted in obtaining identity cards to enhance their mobility, the unskilled majority are encouraged to engage in agricultural activities. The Zambian government allows refugees to stay in the country as a policy as long as they wish.

2-2-2 Meheba Settlement

As stated previously, the Meheba refugee settlement is the largest of such refugee settlements in Zambia. It was established by UNHCR in 1971 in the woodlands 70 km west of Solwezi in the North-Western Province for the purpose of protecting the refugees coming into Zambia and also for developing and improving the region for accepting those refugees. In 1982, ten years after its establishment, the administration of the settlement was transferred from UNHCR to the Ministry of Home Affairs because the refugees were considered to have settled and the initial purpose of the project had, therefore, been achieved. Today, about 600 Zambians,

including the soldiers and the personnel of the Office of the Refugee Commissioner of the Ministry of Home Affairs, are residing in this settlement.

The population of the settlement as of November 1984, is 11,360, consisting of 10,667 Angolans, 553 Zairians, 138 Namibians, 1 Portuguese and 1 Mozambican. English, Portuguese, and such tribal languages as Kaonde, Luvale, Lunda, etc. are spoken, but the number of refugees who speak English is limited.

Table 2-1 Population Summary of Meheba Settlement
February 1985

	Males	Females	Boys (under 17 years)	Girls (under 17 years)	Total
Angolans	2,490	2,536	2,869	2,772	10,667
Zaireans	174	89	127	163	553
Namibians	32	37	31	38	138
Portuguese	1	-	-	-	1
Mozambican	1	-	-	-	1
Total	2,698	2,662	3,027	2,973	11,360
	5,360		6,000		

"Meheba" means "a place where people are wary of going for water because of the lions that prowl the areas" and, just as its name implies, it abounds in water. The total area of the settlement is 580 square kilometers. It is about 14 km wide in east-west direction and 40 km wide in north-south direction. Branch roads spread out at intervals of one kilometer on both sides of the main road, which runs toward south from a main gate through the settlement. At present, the main road has been extended as far as

17-18 km from the gate. The settlement is broadly divided into Zone A, Zone B, and Zone C. A primary school, facilities for supplying water to public installations, a meeting place, a cooperative union, clinic, etc., which were constructed under assistance given since 1972, are located in the core part of each of these zones. The Refugee Office is located in the center of Zone A.

Refugees have made satisfactory use of the land. The basic practice at the settlements is to provide refugees with food rations for two years, by which time they are expected to become self-sufficient. At the Meheba settlement in 1984, 1,376 refugees received rations, while the others were producing their own subsistence plus a small surplus. In 1984, sales from Meheba settlement to the North-Western Co-operative Union included 3,200 bags (288 ton) of maize, 2,100 bags (105 ton) of sunflowers and other items.

The settlement has three flour mills where the refugees have their maize milled for their own consumption. Sunflowers are transported by the co-operative union to Ndola in the Copperbelt Province and sold to an oil refining company there. Rice, soybeans, cabbage, tomatoes, etc. are also being cultivated, in addition to maize and sunflowers.

(1) Major Facilities in Meheba Refugee Settlement

1) Educational Facilities

There are three primary schools but no junior secondary school in Meheba. Primary school A was built in 1972, and primary school B in 1974, both by a non-government voluntary organization called the L.W.F (Lutheran World Federation). Primary school C was built in 1983 by AFRICARE. At present, all the three are operated under the control of the Ministry of General Education and Culture. Each school can only handle day students and teaches students in grades 1 to 7 (ages between 7 and 13) according to Zambia's educational system. The scale of each school as of 1985 is as follows:

Fig. 2-5 Meheba Settlement

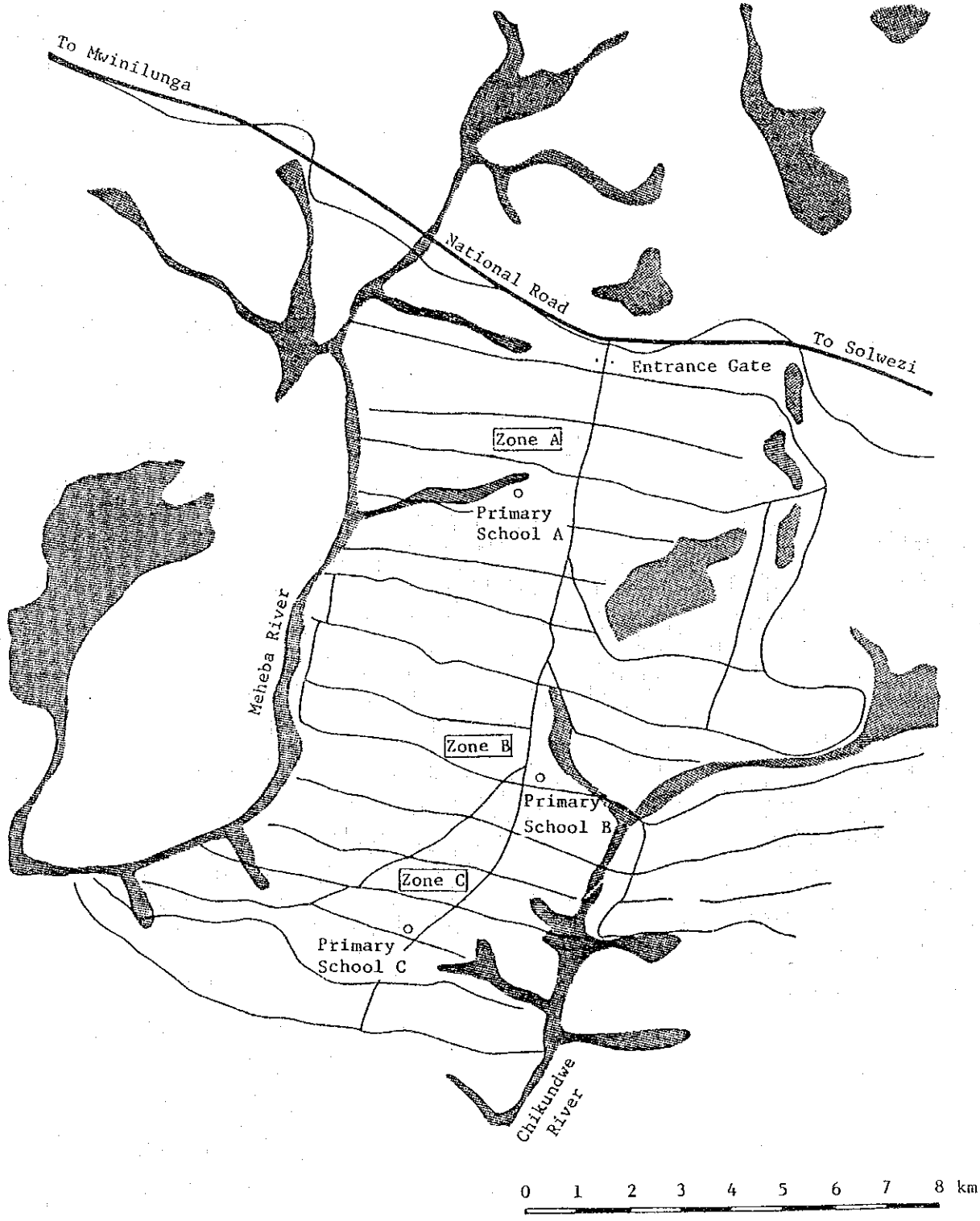


Table 2-2 Primary School in Meheba

	Number of Students	Number of Teachers
School A	1,128	28
B	821	24
C	514	-
Total	2,463	(352 student per grade)

The number of refugees under the age of 17 within the settlement is 6,000 and when some 400 children of Zambians working in the settlement under the age of 17 are added, the average number of children at each age is 376. The combined total of students enrolled at the three primary schools (grades 1-7) within the settlement is 2,464, from which it is assumed that there is an average of 352 for each grade. The percentage of school attendance is estimated to be around 93 percent.

Primary school A is located about 2 km from the main entrance gate, which is more or less in the center of Zone A of the settlement. As it has 25 classes whereas there are only 13 classrooms, it adopts the double shift system of dividing the classes into mornings and afternoons. Primary school B is located about 10 km from the gate and has a large playground. Ever since the roofs of its four classrooms and three teachers' rooms were blown away by the winds in December, 1984, it has been compelled to crowd its students into the remaining classrooms. Also, the principal is obliged to take two of his teachers into his own residence because of shortage of teachers' house. Teachers at the three primary schools in Meheba include eight Angolans as well as Zambians. The Angolans had, settled in Meheba as refugees, returned to their alma mater after graduating from secondary school in the town and obtaining a teacher's qualification .

2) Medical facilities

The clinic in Zone A is staffed with about 20 persons, of which eight are members of the Red Cross Society. However, only three are health extension workers with formal medical training. There is no one with a doctor's license in the settlement. There are beds for hospitalized patients and simple medical instruments in the clinic, but patients who require intensive treatment are sent to hospitals in Solwezi 70 km away from the settlement. As babies are most often delivered at home, the clinic handles only a few deliveries a month.

The clinic in Zone B has a staff of three, a nurse, a health assistant and a male caretaker, but it has no beds for inpatients.

The clinic in Zone C, although its construction has been completed, is not staffed yet.

3) Market

The market in Meheba is open from Monday through Saturday, but it is inactive because the vegetables and other produce are grown mainly for shipment to Solwezi and are not placed on the market in Meheba. There are grocery stocks, but daily necessities are difficult to come by. Eggs, chicken, rice, postage stamps, etc. are available at the co-operative union's store.

4) Workshop

The workshop has an automotive department and a woodworking department where refugee mechanics and artisans work. The automotive department performs repair and maintenance of vehicles. It also repairs all machinery in the settlement. Due to the short supply of parts, however, the mechanics are unable to repair as much as they would like to, with the result that immobile vehicles and tractors are left untouched.

The woodworking department purchases wood from the neighborhood and makes such furniture as tables, chairs, beds, and cupboards for sale to refugees and to customers in Solwezi.

5) Power generating and water supply facilities

As no power supply by trunk line is available, Zone A has a full time operator operating a 25-KVA generator for about four hours (18:00 to 22:00) a day, which consumes 20 liters of fuel oil a day. However, due to the short supply of fuel oil, power supply is often suspended.

Water is pumped by diesel pump from a nearby water well into a tank. This process consumes about 20 liters of fuel oil every three days. The water level in the tank is regulated by the laborers in the workshop.

Electricity and water are supplied to the medical facilities, schools, the Refugee Commissioner's Office, and some of the staff residences, and not to the refugee huts. The generator is in operation only in Zone A. The one in Zone B is out of operation because the parts for repair are unavailable.

6) Transportation

A large truck, which depart from the front of the Refugee Commissioner's Office in morning for the provincial capital of Solwezi and returns in the evening, is giving ride for anyone who wishes to go town. This truck is also used for transport of surplus agricultural produce and craftwork. Also, a walk to the national road allows one to use the bus service which runs several times a day. Moving within the settlement is mainly on foot.

7) Housing

Refugees' huts are composed of sun-dried bricks and straw-thatched roofs. A hut is about 3 to 5 square meters, and each family builds several of these to live in. Water is taken from a shallow well, which is usually dug jointly by a group of a few families. Trees felled in clearing land are used as fuel.

2-2-3 Problems

In 1984, the refugee community of 103,000 constituted 1.5 percent of the total Zambian population of 6,240,000, sufficient to exert significant pressure on the country's limited financial resources and infrastructure. The demand for government services is particularly great in areas of refugee concentration, such as the Western and the North-Western Provinces, where refugees account for about 12 percent and some 7 percent, respectively, of the provincial population. UNHCR has recognized that additional assistance is necessary to promote the further integration of refugees in the Western and the North-Western Provinces. The burden on local services and basic infrastructure is heaviest in these two provinces.

In view of this situation, UNHCR considers assistance for the promotion of further integration of refugees in the Western and the North-Western Provinces to be of vital importance. The Meheba settlement, in particular, 14 years since its establishment, is not only capable of supporting itself but also of contributing to the Zambian economy in agricultural production. It is quite possible that the Meheba refugees will be able to assume their part in the nation's agriculture development, which the Third National Development Plan lists as the first priority target. To this end, it is necessary to improve the infrastructure within the settlement. However, as it is difficult for the Zambian Government to secure financial resources of its own, it must seek assistance from the international community.

2-3 Education

2-3-1 Educational System

The Republic of Zambia has so far been compelled to depend on foreigners for senior engineers and managers in every industrial sector due to a shortage of qualified Zambian personnel. In view of this situation, the Zambian Government, in an attempt to develop manpower resources by enriching its educational system under the First National Development Plan, which aims for the "Zambianization of industry", has allocated 5.1 percent of its GNP, or 10.0 percent of the ordinary budget of the Government, to the educational sector. All education from the primary school level to the university level is carried out at the expense of the Government. In the Third National Development Plan (1981-1984), the policy of "developing manpower resources by the expansion and improvement of educational and training facilities" was again taken up as one of the first priority policy, and in order to implement a drastic educational reform and to execute the new policy more powerfully, the former Ministry of Education and Culture was reorganized into two ministries, namely, the Ministry of General Education and Culture (in charge of elementary and secondary education) and the Ministry of Higher Education (in charge of professional and technical education, university education, and the training of teachers.)

Primary and secondary education will undergo the largest change as a result of the educational reform. Under the system before 1983, primary education consisted of seven years (compulsory education), junior secondary education, three years, and senior secondary education, two years; under the final system that the Ministry aims to establish, education will last 12 years, consisting of nine years of compulsory basic education and three years of secondary education.

This reform is based on the judgment that it is impossible for anyone to assume fully productive activities with only seven years of compulsory schooling and that at least nine years of education

Fig. 2-6 Educational System in Zambia

Before 1983

Primary Education	Grade 1-7 (7-13 Age)	
Secondary Education	Junior	Grade 8-10 (14-16 Age)
	Senior	Grade 11-12 (17-18 Age)

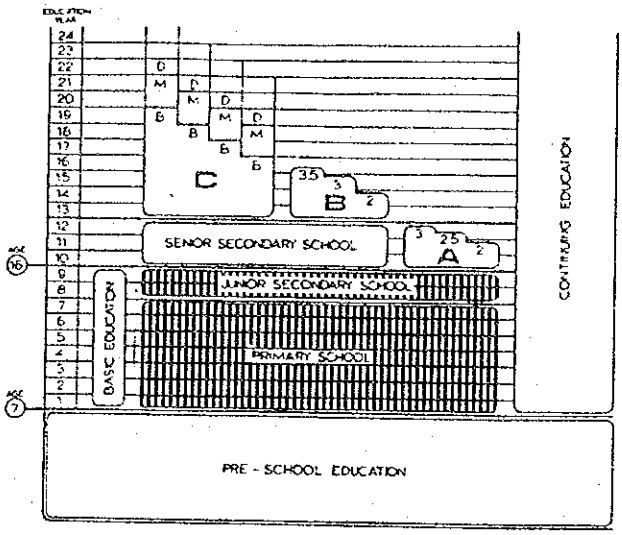
Interim structure of education

Primary Education	Grade 1-7 (7-13 Age)	
Secondary Education	Junior	Grade 8-9 (14-15 Age)
	Senior	Grade 10-12 (16-18 Age)

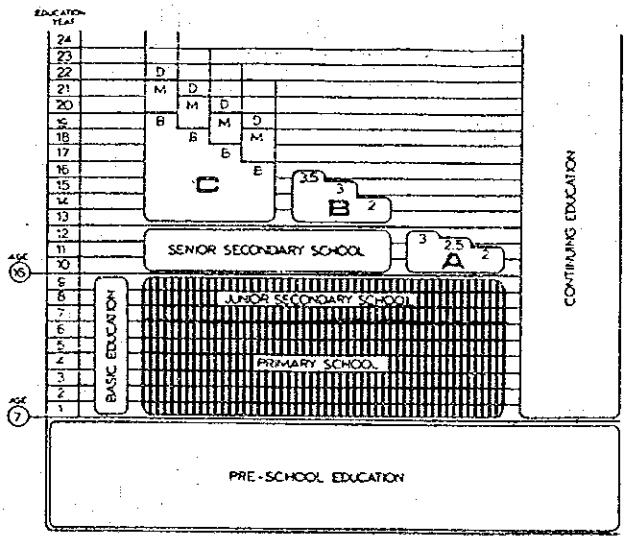
Final structure of education

Basic Education	Grade 1-9 (7-15 Age)
Secondary Education	Grade 10-12 (16-18 Age)

Interim structure of education



Final structure of education



NOTES

A Various vocational programmes, e.g., Trades, Nursing, Teacher Training, etc., leading to a certificate.

B Various programmes, e.g., Agriculture, Technology, Commerce, Nursing, etc., leading usually to a diploma.

C University degree:
D = Doctorate.
M = Master.
B = Bachelor: 4 years – Ordinary.
5 years – Engineering, Agriculture, etc.
6 years – Veterinary Science.
7 years – Medicine.

N8
In A and B there are also some courses which take less than 2 years.
From primary to senior secondary an education year represents a grade.

is necessary for this. However, as the burden created by the expansion of facilities would be too heavy if the existing seven-year primary school system were to be immediately shifted to the final nine-year educational system, the Ministry of Education has established a provisional system to provide a bridge between the old and the new. In this transitional system, primary education will consist of seven years (grades 1 to 7), junior secondary education, two years (grades 8 to 9) and senior secondary education, three years (grades 10 to 12).

The junior secondary education (grades 8 to 9) will eventually be integrated with the first seven years (grades 1 to 7) of primary education to comprise the final, integrated, basic educational system (grades 1 to 9), but for the time being, the provisional system is likely to prevail.

The provisional and the educational system of Zambia are summarized in Fig.2-6.

2-3-2 Secondary School

During the Second National Development Plan (1972-1976), primary education was expanded at a very fast pace; as a result, the number of school children, which was 936,817 in 1977, increased to 980,406 by 1979. The junior secondary schools (grades 8 to 10), however, were not expanded enough to accept the many qualified primary school graduates. One of the major reasons for this was that the construction of junior secondary schools scheduled in the Second National Development Plan was discontinued due to deliberations about the "proposed educational reform," which was subsequently placed on the agenda. The Third National Development Plan, however, makes provisions for the Fifth Educational Project for Expanding Educational Facilities, which is currently under the leadership of the Ministry of General Education and Culture with the financial cooperation of the IBRD and the African Development Bank. The "Project Implementation Unit" (abbreviated as P.I.U) has been created as the project executing agency by which 11 junior secondary schools are under construction. When these are completed they will be able to accommodate 4,320 new students.

Fig. 2-7 Location of Secondary School

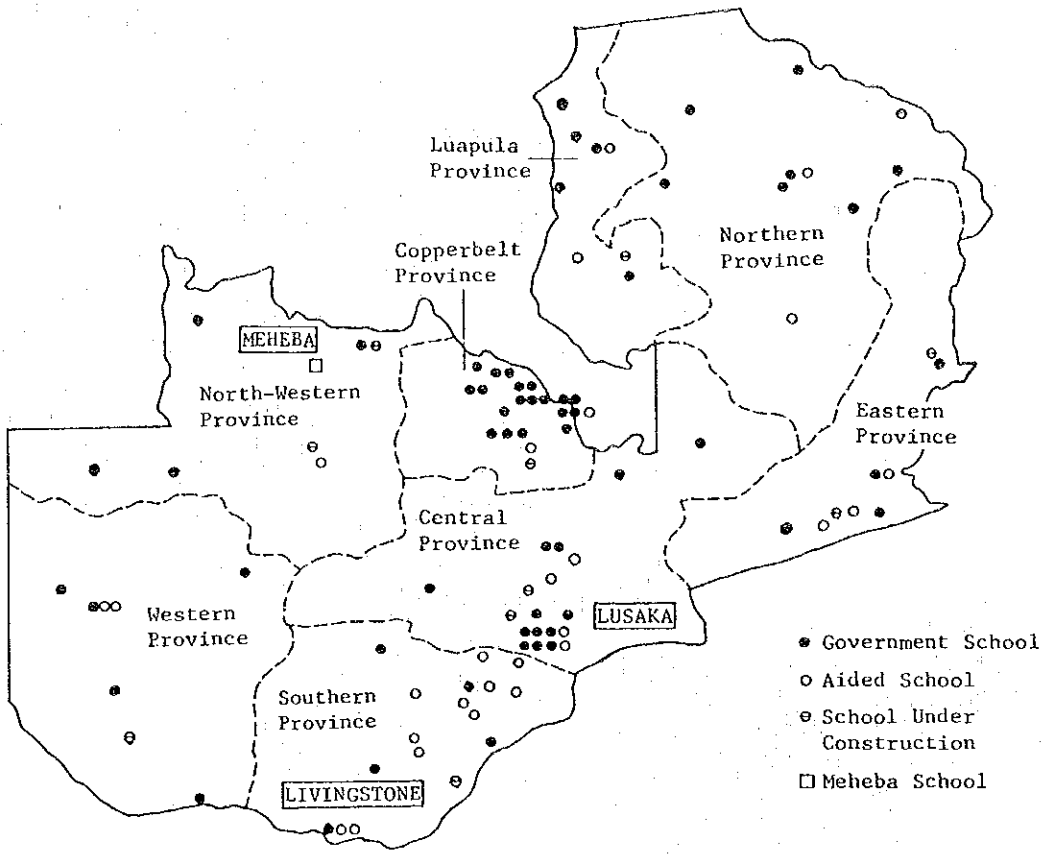
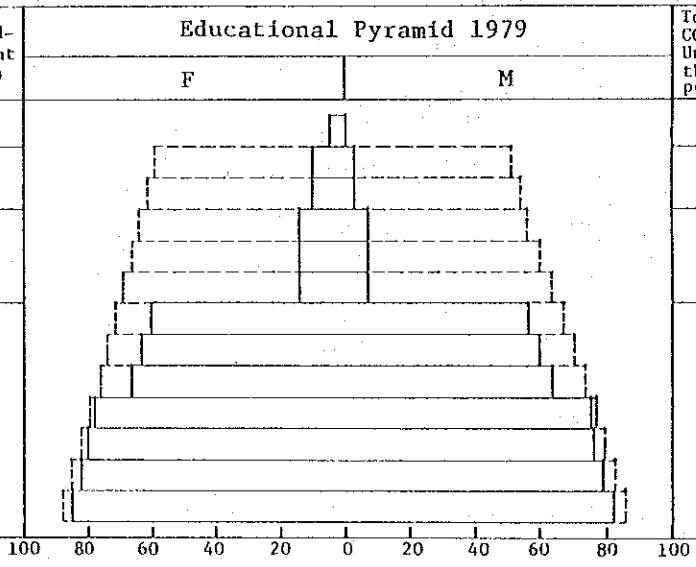


Fig. 2-8 School Enrollment

	Age	Edn. Attainment (Grade)	Total COH(A) Unit: thousand persons	Actual(B) Unit: thousand persons	B/A (%)
University	18+		–	4.0	–
Senior Secondary School	18	XII	111.0	10.4	9
	17	XI	115.0	11.0	10
Junior Secondary School	16	X	119.0	23.4	20
	15	IX	124.0	23.6	19
	14	VIII	128.0	23.3	18
Primary School	13	VII	132.0	117.3	89
	12	VI	137.0	117.1	85
	11	V	142.0	125.3	87
	10	IV	152.0	150.5	99
	9	III	159.0	156.6	98
	8	II	162.0	159.4	98
	7	I	170.0	161.4	95



(1) Percentage of Proceeding to Secondary School

As of 1980, about 90 percent of children eligible for compulsory primary education were enrolled in primary schools. It is possible for any primary school graduate (grade 7) to go on to a secondary school (grades 8 to 12) as long as he passes the state examination, which he must take at the time of graduation, with good marks. The students who can be admitted are determined simply by the results of the examination; starting at the top of the list counting down, and drawing the line where the number matches the capacity of all secondary schools. In 1983, 29,987 or 18.5 percent of the 162,126 students who took the grade 7 final examination were judged eligible to advance to grade 8. The number of those who become eligible for senior secondary education by passing the final examination of the junior secondary school (grade 9) normally drops to half the number of those who have completed the junior secondary courses.

As above, the percentage ratio of the enrollment in elementary schools is relatively high because it is the required basic education in Zambia, but the ratio of enrollment in secondary schools is remarkably low compared to the ratio of the enrollment in primary schools. In terms of the absolute number, however, the number of students that the primary schools and secondary schools can accommodate is increasing by around 6 percent a year; in 1983, it was 1,194,070 and 115,088, respectively.

(2) Teachers

Those aspiring to become teachers in primary schools must have graduated from junior secondary school to become eligible for training at one of the ten colleges for the training of teachers for elementary education; those aspiring to become teachers in secondary schools must have graduated from senior secondary school to become eligible for training at one of the five colleges for the training of teachers for secondary education. Teachers, however, are in short supply, and as of 1980, the number of students per teacher in secondary schools was 22-23, which

compares poorly with the level of advanced countries, which is 15-17 students per teacher. Also, the number of secondary schools as of 1980 was 4,297. Zambian teachers in these schools numbered 2,496, or only 58 percent of the total. In view of this, the education of teachers, particularly Zambian teachers, is considered important to carry out the education program smoothly. The combined number of students who hope to become primary or secondary school teachers enrolled in colleges throughout the country however, has remained level at around 4,400 since 1979.

(3) Boarding System

Almost all of the secondary schools in Zambia maintain dormitories. In urban districts such as Lusaka, the boarding system is liable to be discontinued because of the fact that the number of students who can be day students is on the rise due to concentration of population and also because discontinuation will decrease expenses for operation and maintenance. However, almost all of the secondary schools in the rural district, whose absolute number is small, still adopt the boarding system. At secondary schools in the North-Western Province, boarding students account for as much as 95 percent of the total number of students.

2-3-3 Problems

The illiteracy rate of adults in Zambia today is as much as 56 percent. Accordingly, the primary objective of educational administration in Zambia is to build as many school facilities as possible, to train teachers, and to offer as many people as possible the opportunity to acquire an education.

The educational reform also aims to extend basic education to nine years so that a large labor force with adequate fundamental knowledge and technical skill may be sent out into the society to participate in productive activities. Junior secondary education (grades 8 to 9) is important to achieve this objective. However, the construction of secondary schools is not progressing as scheduled due to the stagnation of Zambian economy, and the low

ratio of the enrollment in secondary schools is attributable to the absolute shortage of secondary schools. (The number of elementary schools in 1980 was 2,813 and the number of secondary schools 128.)

The shortage of schools varies greatly by region; for instance, in the urban districts of Lusaka and the Copperbelt, the ratio of the enrollment in secondary schools is 22 percent whereas in the North-Western Province it is only 16.6 percent. The lag in secondary education is leading to a lag in higher education, which, in turn, is constituting an obstacle to the training of teachers.

2-4 Circumstance and Contents of Request

As stated in the introduction, Zambia has some 103,000 refugees as of January 1984, and as they can hardly be expected to return to their home countries out of their own free will, the country, like many of the other host countries of refugees , is obliged to formulate a development program that urges the settlement and integration of the refugees.

However, the actual situation is that severe economic conditions continue to prevail in Zambia, and the country is in need of assistance to strengthen its social and economic infrastructure (road, bridge, hospital, school. etc.) to cope with the refugee problem.

The Meheba settlement is the home of some 11,360 refugees which account for about 10 percent of all refugees with Zambia. Education for the refugees of the settlement, however, is quite inadequate, for although there are three primary schools within the settlement, there is no secondary school at all.

The situation calls for an urgent expansion of educational facilities, but as we have mentioned previously, for a country which has enough difficulties trying to improve the educational system for its own people, the task of providing a budget for the expansion of educational facilities at Meheba is beyond the means of the Zambian Government alone.

It is against such background that the Zambian Government has requested a Grant Aid for the Project to the Government of Japan. The responsible ministry of the Zambian Government in charge of this Project is the Ministry of Home Affairs, and the contents of facilities which have been requested for the junior secondary school in the Meheba settlement are as follows:

1. Classrooms (for 360 students)
2. Laboratories
3. Workshop
4. Furniture and equipment
5. Dormitories (to accommodate 250 students)
6. Staff houses
7. Power generator and water supply facilities
8. Sports ground
9. Farm (3-5 acres)

CHAPTER 3

BASIC SCHEME FOR THE PROJECT

CHAPTER 3 BASIC SCHEME FOR THE PROJECT

3-1 Objectives of the Project

The objectives of this Project are to offer the refugee children in the North-Western Province of Zambia, and especially in the Meheba settlement, an opportunity comparable to that of Zambian children to enroll in secondary schools and, at the same time, in the light of the shortage of secondary schools in Zambia, to expand the possibility for Zambians living near the settlement to enroll in the school in the settlement and thereby contribute to the improvement of the social infrastructure of Zambia, the host country of the refugees.

3-2 Discription of the Project

3-2-1 Executing Body and Operational Agency

The ministry responsible for the implementation of this Project is the Ministry of Home Affairs, which supervise and administers the refugee settlement. The Ministry will be responsible for the construction of the buildings and for rendering assistance to refugee children after construction. Operation of the secondary school will be the responsibility of the Ministry of General Education and Culture (hereinafter abbreviated as "Ministry of Education") which supervises and administers primary education.

In accordance with that, the Ministry of Home Affairs will be responsible for the provision of conveniences in procedural formalities concerning construction work and in granting exemptions from duties on materials and equipment imported. The Ministry of Education will be responsible for coordinating the design standards for the buildings and the installation standards for equipment, etc. and for providing budgetary measures for the operation and maintenance of the secondary school after its

Fig. 3-1 Ministry of Home Affairs Organization

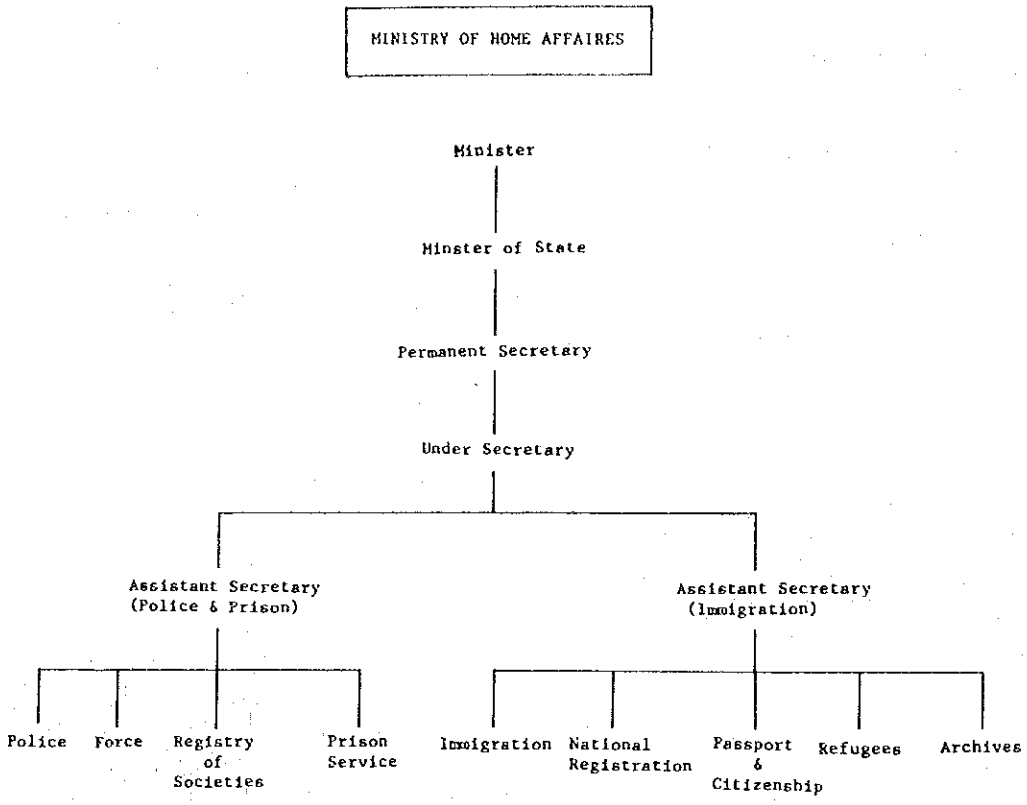
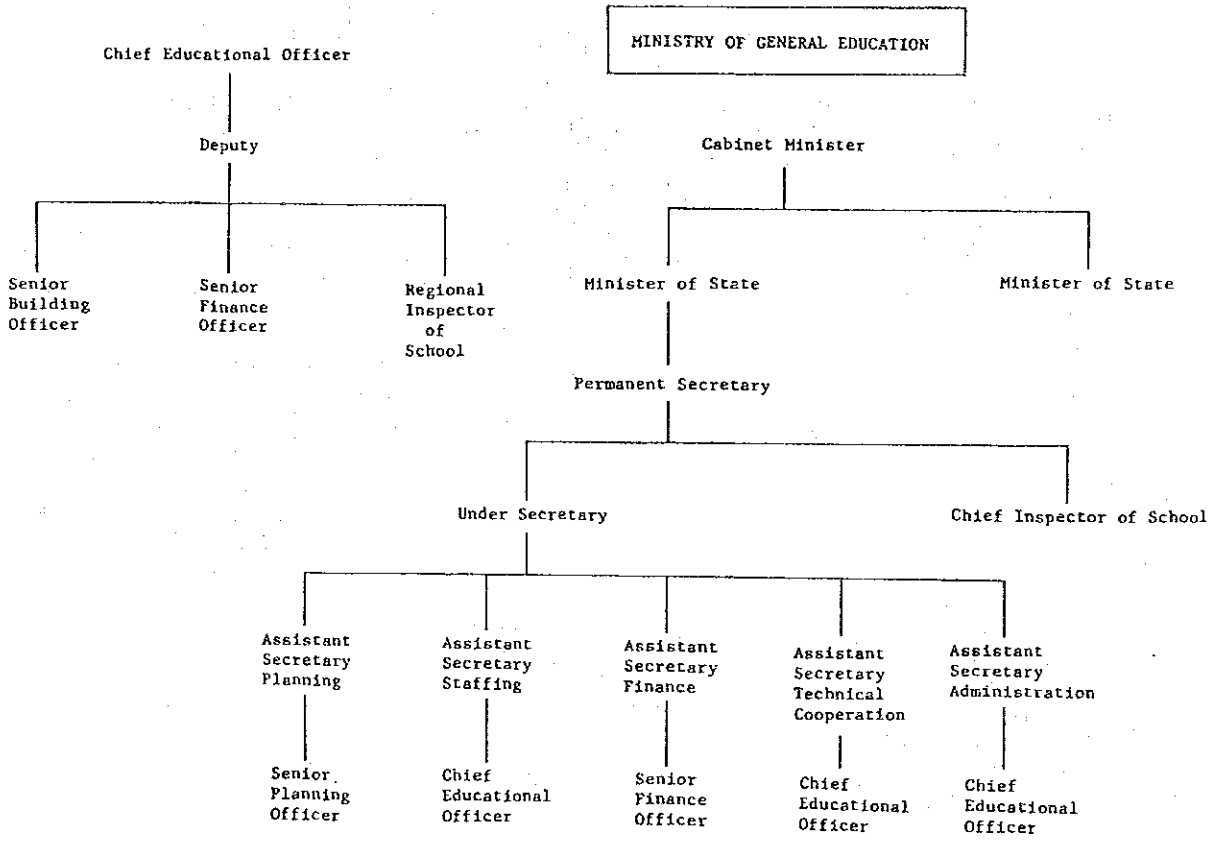


Fig. 3-2 Ministry of General Education and Culture Organization



completion. With respect to construction, the Ministry of Works and Supply will work for the guidance of the jurisdiction concerning on approval of public structures.

3-2-2 Design Guideline

As stated in chapter 2-3-2, Zambia provided the Fifth Educational Project for Expanding Educational Facilities and many secondary schools are now under construction. For the construction of the facilities, the Ministry provided "Architectural Brief and Schedule of Accommodation" as a guideline for the design of the schools. This guideline is produced based on the curriculum of the school, the number of students and teachers, necessary equipment and etc.,and sets the standard of the size of the rooms and the grade of the buildings. This guideline is taken as the base of the design of the Project.

3-2-3 Basic Plan

(1) Teaching Curriculum

Although this secondary school is intended mainly for the refugees, it will not offer a special curriculum for the benefit of the refugees only. Its curriculum will be what any ordinary junior secondary school in Zambia (grades 8 and 9) will teach pursuant to the country's educational system, and it will cover the final two years of the nine-year compulsory education established under the country's new educational system. 40 students in each class will study mainly in English. Students study average 38-week per year which is divided into three terms. Study period of a week is 40 to 45.

Subjects in the week are as follows.

Subject	No. of Periods
1) Core Subject	
English	7
Mathematics	6
General Science	6
Political Education	2
Social Studies	4
Physical Education	2
Spiritual and Moral Education	2
Zambian Languages	2
Production Unit	2
2) Optional Subject	
(Choose from below)	
Culture/Creative Language	4
Arts and Crafts, Music	
3) Practical Subject	
Industrial Arts	6
Agricultural Science	
Commercial Subject	
Home Economics	
Total	43

(2) Number of Students Admitted

Students eligible for admission are the graduates of primary schools within the Meheba settlement, the refugee children of other settlements, and Zambian graduates of primary schools in the neighborhood. The combined total of students enrolled in the three primary schools (grades 1 to 7) within the settlement is 2,464, from which it is assumed that there is an average of 352 for each grade. The percentage of school attendance is estimated to be around 93 percent. To enable 20 percent of the 352 seventh grade students of the settlement to move up to the next grade, about 70 seats would have to be prepared for each grade of the junior

secondary school. Since the standard number of students per class under the educational system of Zambia is 40, it means that at least two classrooms will be necessary to seat 70 students.

Table 3-1 Number of Students in Meheba

Primary School	Male Student	Female Student	Total Students	Students per Grade	Estimated Number to Secondary
A	558	570	1,128	161	32
B	477	344	821	117	23
C	370	144	514	73	15
Total	1,405	1,058	2,463	352	70
Proportion	57%	43%	100%		

Furthermore, if we are to consider the possibility of admitting refugee children of other settlements and also Zambian children in the neighborhood and making even a modicum of contribution to alleviating the shortage of secondary schools in Zambia, it would be necessary to have each grade of 120 students divided into three classrooms of 40 students each. This means that the total number of students for the two grades would be 120 per grade times 2 or 240 students.

(3) Number of boarding students

All secondary schools in Zambia, with the exception of some in the urban areas, have dormitories. Particularly in local areas where a secondary school covers an extensive area, the provision of a dormitory for students coming from distant places is a must. At the secondary school in the North-Western Province, boarding students account for as much as 95 percent of the total enrolled.

The 240 seat capacity of this secondary school is expected to be filled with 140 children of the settlement and with some 100 children from outside of the settlement. The 100 from outside of the settlement are not in a position to commute daily as even the nearest primary school in the neighborhood is 24 km away from the Project site, while the other settlements are also located at quite a distance. Also, households within the settlement are located in a range of 20 km in the North-South direction and about 12-13 km in the East-West direction so that it would be difficult for those in some parts of Zone C and Zone B to commute. Therefore, the dormitory is necessary even if only to enhance the percentage of school attendance of students within the settlement. For these two major reasons a dormitory has to be planned for this secondary school, and a plan should be made as to the number of students it should accommodate.

Table 3-2 Number of Boarding Students

	Number of Students		Number of Boarding Students	
	per grade	per school	per grade	per school
Within Settlement:				
Zone A	32	64	0	0
Zone B	23	46	15	30
Zone C	15	30	15	30
Sub-total	70	140	30	60
Outside Settlement:	50	100	50	100
Total	120	240	80	160

When the number of children advancing to secondary schools is estimated for each zone of the settlement, it is 32 in Zone A, 23 in Zone B and 15 in Zone C. Some of the children in Zone A and Zone B live within the commutable range of 8 km, and assuming that there are about 40 of such students per grade, it means that boarding facilities must be planned for around 30 students out of the 70 students per grade who are expected to attend this school from within the settlement.

From the foregoing, the number of students who are expected to use the dormitory is estimated to be around 160, including those from both within and outside the settlement. The male and female ratio in all secondary schools throughout the country and in the primary school in Meheba as well is 1:1, and, since the standards for establishment of secondary schools in Zambia stipulate that dormitories for male and female students must be separated, it is necessary to plan two dormitories wings with accommodation for 80 in each wing.

(4) Teaching and Non-teaching Staff

The teaching and non-teaching staff required for the school is as follows:

1) Teaching Staff

Table 3-3 Teaching Staff

Subject	3-Stream School		4-Stream School
English Language	3	*(3)	3
Zambian Language	1	*	1
Mathematics	2	2	3
Religion	1	*	1
Civics	1	*	1
History	1	*(2)	2
Geography	1	*	1
Science	2	(1)	3
Agricultural science	1	1	1
Homecraft	1	*(1)	1
Commerce	1	*	1
Art/Craft/Music	1	1	1
Physical Education	1	1	1
Woodwork	1	*	1
Metalwork	1	*(1)	1
Technical Drawing	-		1
Total	19	(13)	24

According to the guideline for the staff allocation set by the Ministry of General Education and Culture, a three-stream school requires 19 teachers. At the same time the guideline permits the teachers to take several subjects if they are qualified so that the figure in the *( ) shows the subjects which can be taken by other teachers. The maximum teaching load per teacher is set as 30 periods so that 13 teachers are necessary for the new school.

2) Non-teaching Staff

The non-teaching staff required for the school is as follows. The figures are taken from the standard allocation of non-teaching staff for three-stream boarding schools set by the Ministry.

Table 3-4 Non-Teaching Staff

Staff	Number per School	
	Day School	Boarding School
Bursar	1	1
Boarding Master	1	1
Caretaker	1	1
Matron	-	1
Clerks	2	2
Orderlies	2	2
Cooks	-	4
Kitchen hands	-	6
Watchmen	2	2
Driver	2	2
Artisans	2	2
Laboratory assistants	1	4
Laborers	4	4
Total	18	29

One of the teachers takes the position of the boarding master. Specialists such as a bursar, a caretaker, a matron, clerks, cooks and laboratory assistants will be seconded from the Ministry of General Education and Culture and the others will be employed locally.

3-2-4 Location of the Site

To reach Solwezi, the provincial capital of the North-Western Province, from Lusaka, the capital of Zambia, one must go through Kitwe and Chingola in the Copperbelt Province. Meheba is situated

along the national road farther west of Solwezi, toward Mwinilunga. The distance between Lusaka and Solwezi is 584 km and between Solwezi and Meheba, about 70 km. The roads are paved for the most part and it is about a 6-hour ride by car to travel the whole distance. Solwezi has a population of about 10,000. It has an airport, which at one time was used for regular flight services, but today, it is only used for irregular services.

A main road that runs south toward the settlement almost perpendicular to the national road from Solwezi cuts across the settlement roughly at the center, and branch roads spread out from it in an east-west direction at intervals of about 1 km, in paralleling the national road. The branch roads on the right of the national road are numbered with even numbers and those on the left, with odd numbers. The refugee settlement covers a total area of 580 square kilometers.

The refugees are given a plot of 5 ha., 100 meters in frontage and 500 meters in depth. Their huts, built on the roadside, have mud walls and grass thatched roofs. The farms behind them are cleared by burning for planting of cassava, maize, beans, etc.

The settlement is divided into three zones and they are called Zone A, Zone B, and Zone C in the order of their proximity to the national road. Major facilities in each area are as follows.

Zone A : Refugee Office, Workshop, Clinic, Market,Refugee office staff house, Storage, Community center, Primary school A, Teaching staff housing, Generator Room, Elevated water tank.

Zone B: Clinic, Primary School B, Teaching staff housing, Generator Room

Zone C: Primary school C, Clinic.

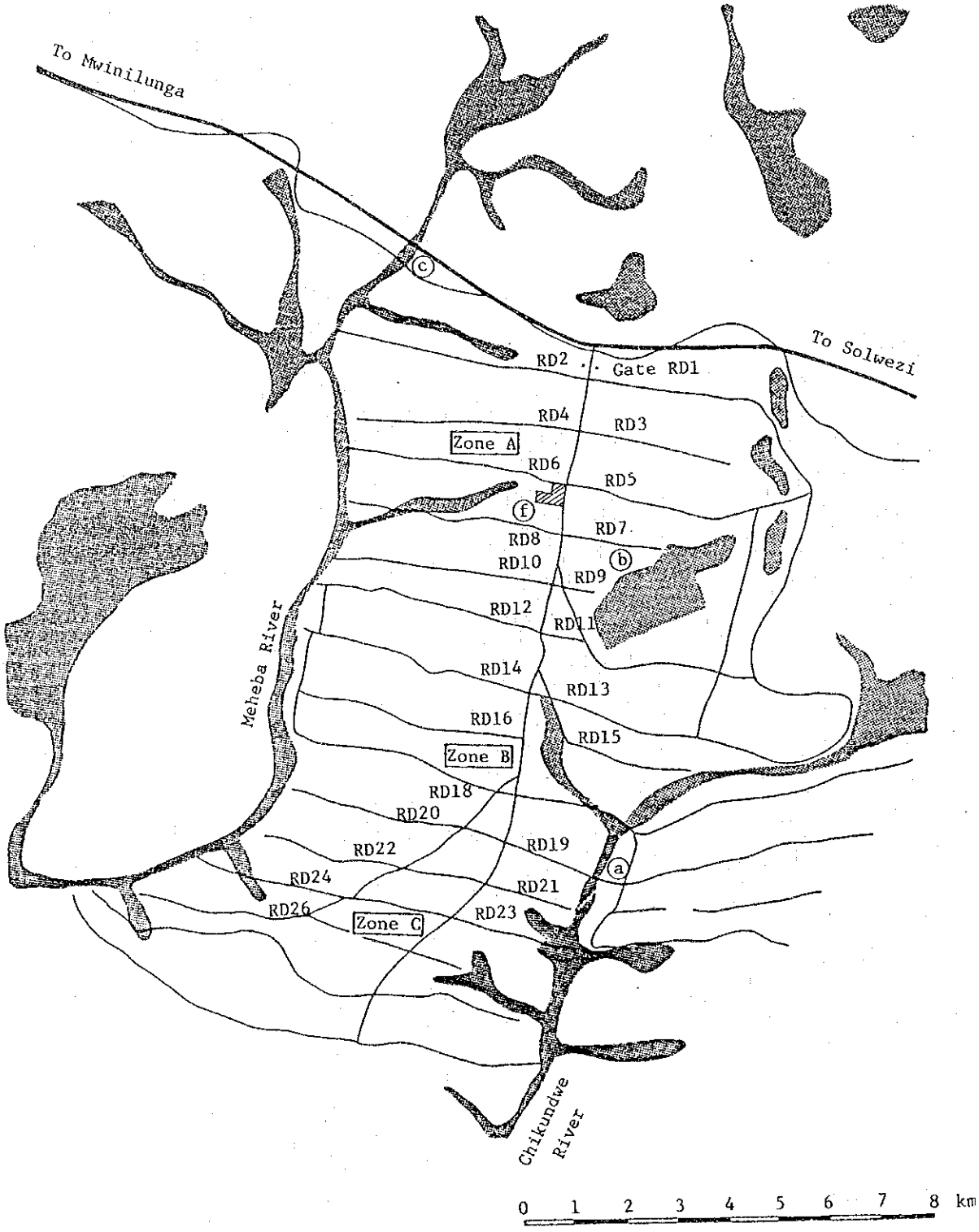
(1) Proposed Site

Outline of the three proposed sites is as follows:

Table 3-5 Description of Porposed Sites

Location	Description
Location:	
Site A	The farthest from the national road. Located in Zone B along road No.19. About 12 kilometers from the main gate.
Site B	Located in Zone A along road No.9. Facing south pond.
Site C	Located in the northwest corner of the settlement. Nearest to the national road but far from the settlement center.
Access Road:	
Site A	About 4.5 km east from the main road of the settlement. Difficult for heavy vehicles to access in the rainy season. Necessary to reinforce the existing bridge for the vehicles. The road also has to be repaired.
Site B	About 1 km east of the main road. Conditions are quite similar to site A.
Site C	A new access road has to be constructed from the national road. A walkway from the settlement also has to be constructed for the school children.
Site Condition:	
Site A	Part of the site is cultivated and some is natural forest. Gentle slope toward the river. Site reclamation work is necessary.
Site B	Very gentle slope toward the pond. Good ventilation by the wind. An open area is not enough for the school due to the water level of the pond.
Site C	Natural forest and no open space. Lots of site work has to be done.

Fig. 3-3 Location of Proposed Sites



Water Source:

Site A	Shikundwe river is located 1 km west of the site. Level difference is about 20 meters. Water level differs in the dry and rainy seasons.
Site B	About 1 km to the pond. Quality of water is not adequate for drinking unless treated. Water level also changes according to the season.
Site C	About 0.5 km to the Meheba river, located to the west. Condition of water is similar to the site B.

Existing Facilities:

Site A	Refugee huts are around the site. Primary school B is located across the river.
Site B	Relatively close to zone A facilities. Refugee huts are around the site.
Site C	No existing facilities.

Problems:

Site A	Too far from the national road. Difficult to transport the construction materials. Too far for the day student to attend school. Difficult to find the supporting staff in the area. Difficult to procure food and daily material. Too far from a clinic. Lack of means of communication. Condition is the worst of the three sites.
Site B	Site area is too small. The access problem is the same as site A. Relatively better conditions compared to the other two sites. A mosquito problem might arise due to location of pond.
Site C	The location of the site is too far from the existing refugee huts and other facilities. Preparation of the access road and site preparation requires a lot of work prior to the construction. Other conditions are quite similar to site A.

The conditions attached to the site selection are that the site be within the Meheba Settlement and that selection be done within the framework of the Japanese Government Grant Aid system.

1) Preparation Stage

a) Easy to carry out site clearing and survey.

b) Easy to construct temporary facilities, such as the laborer's camp

c) Easy to obtain the water for daily and construction use

d) Easy to obtain services such as the purchase of food, communications and medical care.

e) Good security.

f) Construction of the temporary facilities to be achieved in a short time.

2) Construction Stage

a) Easy access to the site and good security.

b) Adequate labor supply

c) Good medical facilities.

3) Operation stage

a) Good living conditions for the teaching and non-teaching staff

b) Easy communication to Solwezi

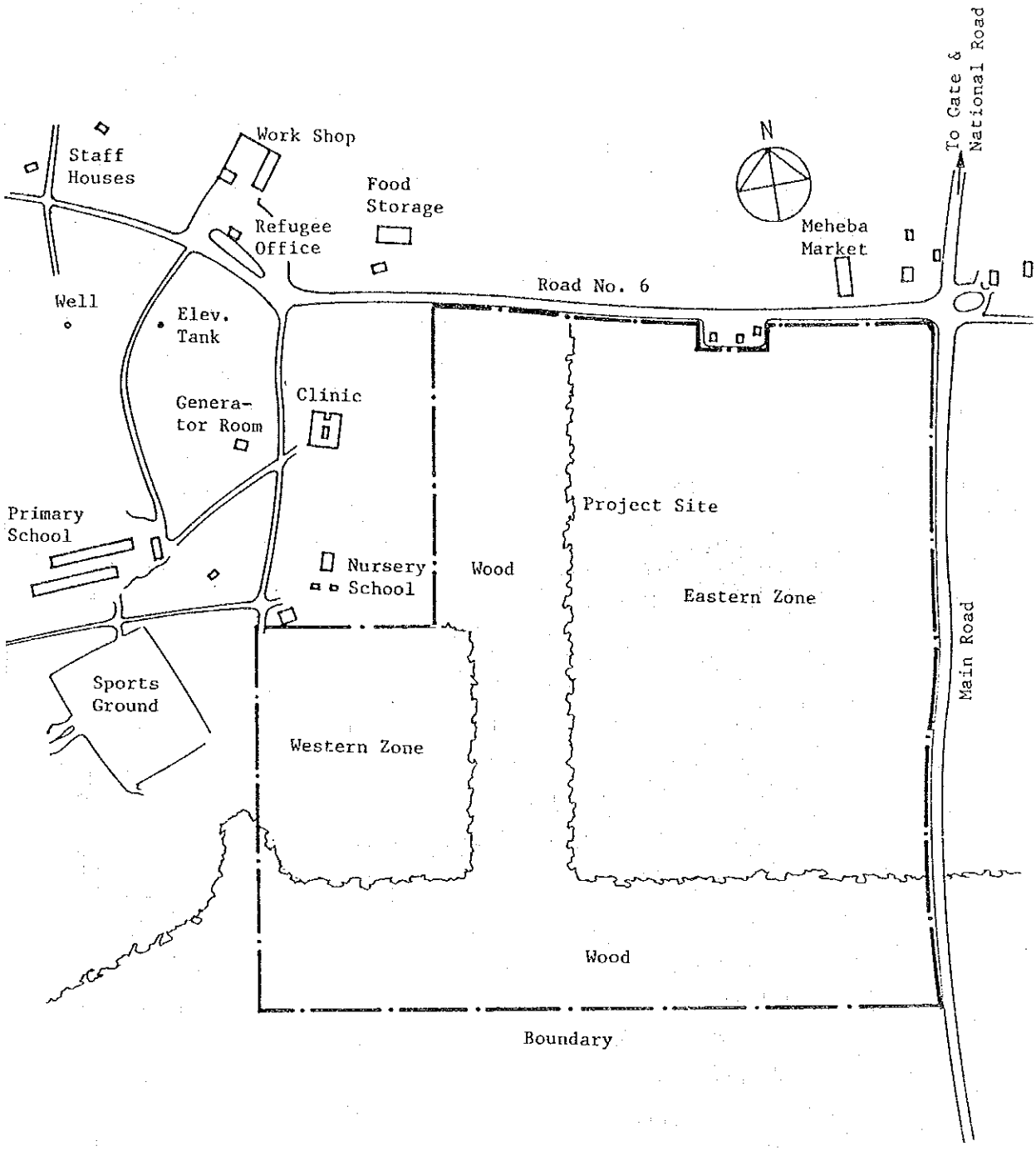
c) Good location for the day students

d) Easy to employ local supporting staff

e) Easy means of transport for boarding students to attend school.

In view of these conditions, all three proposed sites can hardly be considered suitable for construction as they are likely to pose considerable difficulties for the construction work. It was thus considered best to secure the site in the neighborhood of the Refugee Commissioner's Office in Zone A of the settlement. The final proposed site is at point (F), as proposed by the Ministry of Home Affairs. The conditions here are more favorable than in the other proposed sites. With dwellings of Zambian government officials and refugees densely distributed in the surrounding area, it is considered the most suitable of the construction sites within the Meheba settlement.

Fig. 3-4 Site for Proposed Project



The officer in charge from the Ministry of General Education who accompanied the survey team pointed out that the site was adjacent to primary school A and that he favored the selection of this site because the proximity of the primary school to the new secondary school is conducive to the achievement of the Ministry of General Education's aim to shift from the system of 7-year compulsory education to the 9-year educational system. This site, as a result, was selected as the site to be proposed for the construction of the secondary school.

(2) Selected Site

The site is located at a point about 3 km inside of the national road on a corner formed by the meeting of the main road and the No.6 branch road. It is in the shape of a reversed 'L' and covers an area of about 25 ha. The major facilities of the settlement, such as the market, a warehouse, Refugee Commissioner's Office, a workshop, and staff housing face the No.6 branch road.

To the north of the site are the clinic, primary school A and the nursery school, and approximately at the center of all these is an elevated water tank from which water is supplied to the major facilities. The water in the tank is well water, from 15 meters below ground level, taken up from the suction pit located about 500 meters west of the elevated tank and conveyed by pump to the tank.

Approximately at the center of where the elevated water tank, the clinic, and primary school A are located, is a generator room wherein a 25-KVA diesel generator is installed to supply power to the major facilities, primarily for lighting between 6 pm and 10 pm, but the capacity is too small to meet the power demand.

The site gently inclines at a gradient of one percent from the main road toward the west, and coppices still remain on its southern border and at the location indicated on the map. On the

crop fields, which are cleared by burning, are many ant hills and stumps of miscellaneous small trees. Considerable levelling work is therefore necessary before the construction of the buildings and playground can be started.

(3) Natural Condition

Zambia is located on the border of Central Africa and Southern Africa between 9 and 18 degrees south latitude and 23 and 34 east degrees longitude and belongs to the tropical zone, but it is not uncomfortably hot as the altitude ranges between 900 and 1,500 meters above sea level. The climate is divided into three distinct seasons, namely, the cool and dry season between May and August, the warm and dry season between September and October, and the rainy season between November and April. The mean temperature during the cool and dry season, or winter, is 16 degrees centigrade. The temperature difference between morning and evening is large in both summer and winter.

The neighborhood of Meheba, where the construction site is located, has a large amount of rainfall, for Zambia . Here, it rains 110 days in a year and averages 1,339 mm rainfall per year. The roads within the settlement are unpaved. As the soil is lateritic, the road becomes muddy during the rainy season which makes a vehicle difficult to move.

Fig. 3-6 Climatic Data

SOLWEZI LAT. 12° 10' LONG. 26° 22' ALT. 1,386 m

	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Year
Mean Pressure (m b)	866.9	865.5	864.5	863.3	863.5	863.0	862.8	862.6	863.3	863.9	865.5	866.8	864.3
Mean Temperature (℃)	15.3	17.8	20.4	22.2	20.1	20.4	20.5	20.6	20.8	19.9	17.3	15.1	19.2
Mean Max Temperature (℃)	25.2	27.4	30.3	30.8	27.7	26.1	26.4	26.5	26.7	26.9	26.2	24.8	27.1
Mean Min Temperature (℃)	4.8	7.4	10.6	13.9	15.6	16.0	16.0	15.9	15.6	13.3	8.7	5.1	11.8
Mean Rel. Humidity (%)	55	45	46	50	73	78	73	78	78	72	63	55	64
Mean Sunshine Hours/day (h)	10.0	10.0	9.6	7.8	5.9	5.4	4.2	4.8	4.2	6.6	8.3	9.9	6.9
Mean Windspeed (K t)	2.6	2.7	2.6	2.4	2.1	2.0	1.8	1.9	1.8	2.0	2.0	2.2	2.2
Mean Monthly Rainfall (mm)	0	0	4	46	185	271	281	228	246	71	7	0	1339
Raindays (mm≧1)	0	0	0	4	15	22	22	19	19	7	0	0	107

(4) Condition of infrastructure

Solwezi, the provincial capital, is the only place in the North-Western Province where the power grid of the Zambia Electric Power Supply Corporation is installed. Other than that, in the province diesel power plants are located at Mwinilunga, Kasempa, Kabompo and Zambezi. Areas like Meheba that are far from the urban center, usually have only a diesel generator to supply a small area. Most of the dwellings in such areas are therefore without electricity.

Waterworks and sewage are not provided except in cities, and water from wells or streams is used for drinking. Drainage is in the form of natural seepage.

In Zone A underground stream water is pumped up and supplied to major facilities. Water quality is hard but suitable for drinking according to the water quality standards of WHO.

Since no telephone is available, the wireless telegraph of the army stationed at the settlement is the only communication facilities available. It is used only for urgent communication.

The settlement is contiguous to the paved national road which connects Solwezi and Mwinilunga, but the main road and branch roads within the settlement are unpaved.

3-2-5 Necessary Facilities

The guidelines for required facilities of the standard junior secondary school have been prepared by the Ministry of General Education and Culture based on the curriculum of the school. This school also follows the guidelines. The list of necessary facilities is as follows.

Table 3-7 Facilities

Facility	No. of bldg	Function and Rooms
Administration	1	Administration and operation of the school. Office for headmaster, deputy headmaster, bursar; office, sick bay, and toilet
Classroom	2	Teaching general subjects. 3 classrooms and storeroom per building.
Laboratory (Science and Library)	1	Laboratory experiments for physics, biology, chemistry. Reading and storeroom in Library
Workshop	1	Woodwork and metalwork practice. Workshop and preparation room.
Homecraft (Cookery and Needlework)	1	Cooking and needlework practice. Practice room and preparation room.
Kitchen and Canteen	1	Serving meals for 160 boarding students. Serve as multipurpose function room. Kitchen, tuck shop, canteen for 80 students.
Dormitory	2	Male and female, 80 students each. Possibility of conversion to classrooms in the future. Three rooms for 24 students and one room for 8 students, per building.
Ablution	2	Buildings for males and females. Toilet, shower, washing rooms.
Garage and Store	1	Space for three vehicles. Storage for agricultural tools
Headmaster's House	1	
Teaching Staff's House	12	
Staff House	7	
Generator Room	1	For two 30 KVA generators.

There is no government staff house available for the new school staff in the settlement and it is quite difficult to commute every day from Solwezi, which is 70 kilometers away from the settlement.

It is, therefore, essential to provide staff housing. Housing for one headmaster, twelve teaching staff and seven supporting staff is necessary for the Project.

The electrical power supply in the settlement depends on a 25-KVA generator, since there is no main in the area. Water is also taken from a natural well using a water pump with a diesel generator and a pump up to the elevated water tank there after supplied by gravity. The capacity of both facilities is not enough to cover for the Project so new power supply and water supply systems have to be provided.

3-2-6 Organization and Staff Distribution at the School

This school will be operated and maintained by the Ministry of General Education and Culture. The following is an outline of the allocation of the staff.

(1) Staff Allocation

The teaching and non-teaching staff required for the school is as follows:

Teaching Staff	Number
Headmaster	1
Deputy headmaster	1
Teachers	11
Total	13

Non-Teaching Staff	Number
Bursar	1
Boarding Master	1
Caretaker	1
Matron	1
Clerks	2
Orderlies	2
Cooks	4
Kitchen hands	6
Watchmen	2
Driver	2
Artisans	2
Laboratory assistants	4
Laborers	4
Total	29

One of the teachers takes the position of the boarding master. Specialists such as a bursar, a caretaker, a matron, clerks, cooks, and laboratory assistants will be seconded from the Ministry of General Education and Culture and the others will be employed locally.

CHAPTER 4

BASIC DESIGN

CHAPTER 4 BASIC DESIGN

4-1 Policy of the Basic Design

The following are adopted as policies for the design of this Project.

(1) This junior secondary school should be the same as the ordinary Zambian junior secondary school and should be designed in accordance with the standard set by the Ministry of General Education and Culture.

(2) Since the school is to be built in the refugee settlement particular consideration should be taken to a design that fits in with surrounding conditions.

(3) The design is to show full consideration to the climate, the local life style, and other factors peculiar to Zambia.

(4) The operating and maintenance costs will be minimized by fully utilizing natural ventilation and lighting, and by using durable materials.

(5) The design is to be economical and easy to construct, with due consideration to the technology, materials, and labor available in Zambia.

(6) The construction materials are to be selected from materials available in Zambia in order to facilitate easy repair and maintenance work after completion.

(7) Standards for the design will comply with applicable laws and regulations in Zambia. Where no applicable standards are available, the facilities shall be designed in accordance with the applicable laws and regulations in Japan.

(8) In equipment and material plans, standards set by the Ministry of General Education and Culture are to be adopted, taking into consideration the location of the school (in the refugee settlement quite far from town) and the need for the easy maintenance.

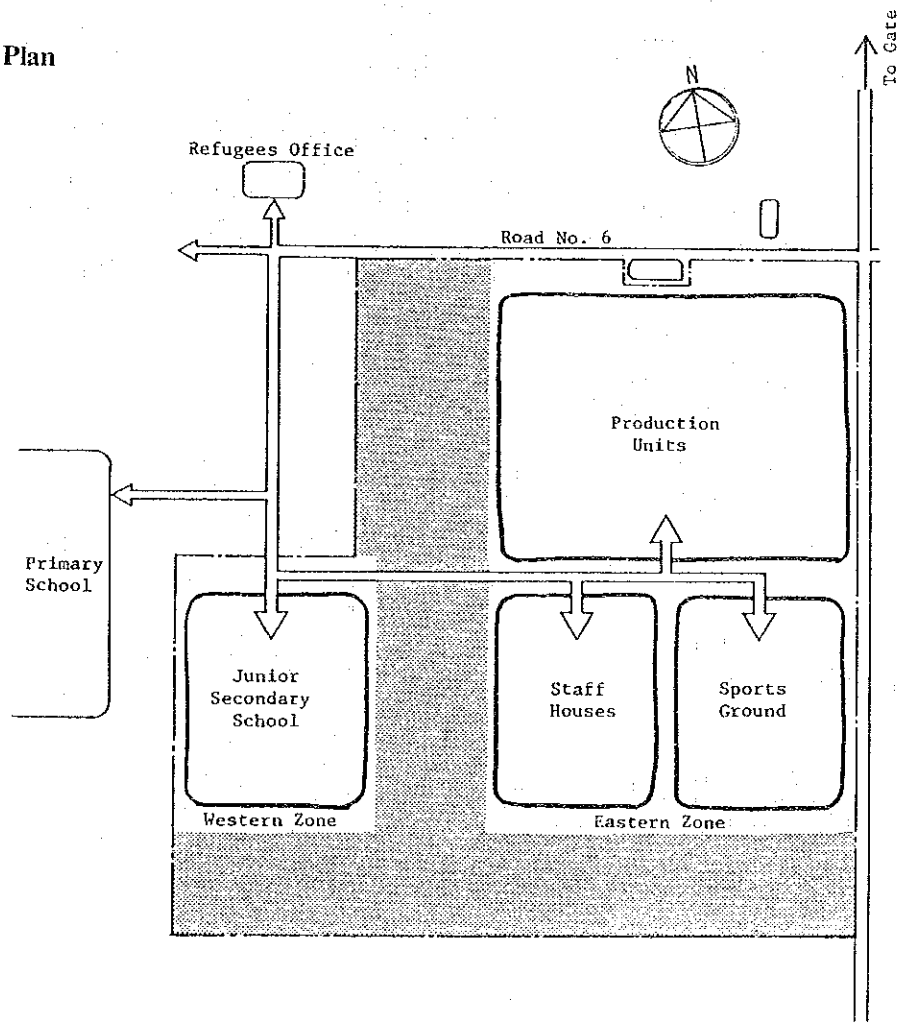
4-2 Basic Design

4-2-1 Site Plan

Two thirds of the "L" shaped site is cultivated farm area. on the south side of the site there is an original forest and a strip of the forest continues to the north at the corner of the "L" shape. The height of the trees is about 20 meters.

The site plan preserves as many trees as possible in order to keep down the costs for the site clearance and to protect the forest. At present, cultivated area totals 4 ha. in the west zone and 18 ha. in the east zone. The area fronting on road No.6 is occupied by the buildings; locating the school block here will be avoided. The school block will be located in the west zone, which is adjacent to the primary school A. Housing, sports facilities, and an exercise farm are planned in the east zone.

Fig. 4-1 Site Plan

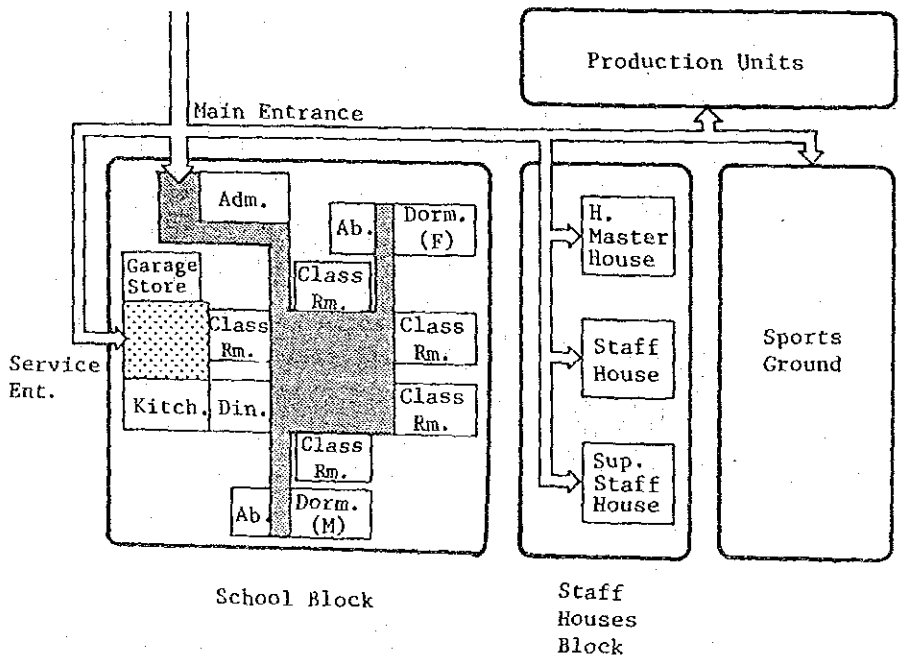


4-2-2 Layout Plan

In the layout plan, the proposed facilities are indicated as "School block", "Staff house block", "Sports ground", and "Training farm" in accordance with their functions. The school block consists of an administration building, classroom buildings, a workshop, dormitories, a canteen and a kitchen, and ablution buildings.

The functional relations of the above facilities can be summarized in the following diagram:

Fig. 4-2 Functional Diagram



Taking into consideration the above factors, the facilities layout is planned as follows:

(1) School block

The school block is planned in the west zone of the site, adjacent to primary school A. The location was decided with the consideration of the following factors:

a. in the final Zambian educational system, grades 1 to 9 are to be continuous.
b. the efficient utilization of the existing facilities ,such as the sports ground, etc.
c. locating the new facilities close to the existing water source

The layout of the buildings of the School block is as follows.

1) Administration Building
This building is located as close as possible to the existing primary school because of the possibility of the future expansion of the school and the desire to provide easy access to visitors.

2) Classroom building and other teaching rooms
Next to the administration building and located around the center court.

3) Workshop
Because of the noise created by workshop activities the building will be located in such a place where lectures will not be disturbed. Easy access for the transport of materials will also be provided.

4) Canteen and Kitchen
Close to the dormitory, classrooms and administration building, and in the center of the School block. Easy access for food and materials supply will be provided.

5) Dormitory
Male and female blocks should be located separately. Location of the buildings are opposite each other to the classroom. Future conversion into the classrooms also has to be considered.

6) Ablution block

Located close to the dormitory building but keep adequate distance to prevent the smell by ventilation.

(2) Staff Housing Block

Located on the southwest side of the east zone near to the School block. Headmaster's housing, teaching staff housing (12 units), and supporting staff housing (7 units) are located separately.

(3) Sports Ground

Sports field and soccer ground are planned in the area along the Meheba main road on the southeast side of the east zone.

(4) Training Farm

The existing farming area in the east zone is to be used as it is.

4-2-3 Architectural Design

(1) Classrooms

Classrooms will be for 40 students each. All the classrooms should be designed in blocks of 1x3 each with a storeroom attached. There must be good natural daylight and ample cross ventilation. The storeroom is to have daylight and shelves on the walls.

(2) General Science Laboratory

The laboratory is to handle physics, chemistry and biology classes of 40 students each. Along three walls will be a continuous workbench of concrete with SUS sink units (acid, alkalis and oxidation resistant). Gas points are provided for ordinary schools but this school will be provided with Bunsen Burners. Such things as shelves, blackboards, pinup boards and ample shelving in the storeroom will be provided.

(3) Domestic Science

Domestic science (homecraft) comprises two basically different activities; cookery and needlework. The subjects will be taught in groups of 20 students each. Because of the nature of the different activities, they should be physically separated. Each room should have a storeroom which is also used as the preparation room, to keep the teaching equipment and other materials. Other facilities to be provided are;

1) Cookery : Shelves, workbench, sink
2) Needlework : Workbench and chair
Along the walls there should be a continuous workbench

(4) Workshop

The workshop will mainly cater to woodwork and metalwork classes of 20 students. Woodwork shall be done in the enclosed room and metalwork and blacksmithing shall be done in the covered shed because of the noise created by the work. The basic tools for students in the workshop will be hand tools. In addition, simple electrical tools will be introduced.

(5) Library

The library shall provide reading space for 20 students. Storage of books will be in lockable, large, steel cupboards placed in secure positions.

(6) Administration

The administration block should include the following functional areas:

Headmaster's room
Deputy headmaster's room
Bursar/Registry room
Secretary and reception office
Staff room for teaching staff
Storage
Toilet
Sick bay (examination room and bedroom for males, females)
Flag pole (to be provided in front of the administration office.)

(7) Kitchen and Canteen

The canteen is planned not only for taking meals but also for multipurpose functions such as combined classes, seminars, student assemblies or night student activities. Space is adequate for 80 students dining at one time or a gathering of 240 students. Food is prepared on wood ranges. A tuck-shop to sell daily goods and stationery and an office are also planned.

Canteen	: 80 seats with tables, 240 seats for gatherings.
Kitchen	: Range, sink, cooking tables.
Office	: Records and accounting
Yard	: Storage of fire wood
Storage	: Food storage
Toilet	: For cooking staff

(8) Ablution

In general, there should be separate toilet facilities for daily use by students and for boarders. However, it is designed to accommodate the two functions into one combined area. Facilities for male and female ablution are separately provided between the classroom and the dormitory. The number of sanitary fixtures must satisfy the minimum requirement set by the Ministry of Health and consideration is also made of future changes in the size of the school. Standard ablution size for a 360 student school will be adopted.

(9) Dormitory

The dormitories are to be designed on the same model as the classrooms. This is for easy conversion into teaching space in future. Each unit is to be 63 square meters and accommodate 24 students each. The total of boarding students per building is 80. Each bedroom is separated by a 2-meter-high block wall which also supports the bunk beds.

(10) Staff Housing

The standard of the staff houses shall follow the government standard. Composition of the standard house and floor area is as follows.

1) Headmaster	112 square meter	1 unit
2) Teachers' houses	84	12
3) Supporting staff	63	7

A toilet, a shower and a kitchen sink are to be provided.

Coparison of Facilities

Study has been done to compare the secondary school facilties of Zambia and that of Japan. Since the educational system of Zambia and that of Japan are different, the size of space should not be judged by this space requirement.

Table 4-1

	ZAMBIA by Min.of Education			JAPAN by Min. of Education		
	No	area/rm	total area	No	area/rm	total area
Schoolrooms						
Classrooms	6	63.0	378.0	6	65.0	390.0
Storage	2	21.0	42.0	-	-	-
Science labo.	1	100.0	100.0	1	100.0	100.0
Preparation	1	25.0	25.0	1	65.0	65.0
Workshop	1	150.0	150.0	1	201.0	201.0
Prep.& storage	1	25.0	25.0	1	33.0	33.0
Homecraft			126.0	1	117.0	117.0
Cookery	1	63.0				
Needlework	1	63.0				
Preparation	2	11.0	22.0	1	26.0	26.0
Materials rm	-	-	-	1	32.0	32.0
Library	1	50.0	50.0	1	52.0	52.0
sub-total			918.0			1,016.0
Administration						
Head master rm	1	25.0	25.0	1	26.0	26.0
Deputy H.M.rm	1	20.0	20.0	-	-	-
Secretary	1	22.0	22.0			
Bursar's rm	1	16.0	16.0	1	65.0	65.0
Staff room	1	80.0	80.0	1		
Sick bay	1	55.0	55.0	1	32.0	32.0
Night duty rm	-	-	-	1	23.0	23.0
Storage	1	16.0	16.0	1	32.0	32.0
Ablution	1	23.0	23.0	1	46.0	46.0
sub-total			257.0			224.0
total			1,189.0			1,279.0

4-2-4 Structural Design

(1) Design Policy

The structural system shall conform to the standard set by the Ministry of General Education and Culture. An economical and durable structural system is designed with due consideration of the quality of materials and the skill of laborers.

1) The structural design principles

All the buildings are standarized simple one story buildings. The foundation is set directly on the laterite soil. The walls are concrete blocks set on the ground floor slab, which is laid on the hard core. Asbestos roofing material is set on the steel bar roof truss.

2) Structural materials

Reinforcing steel	:	Deformed bar SD30(JIS standard) or its equivalent
Concrete	:	Fc=20 N/sqmm (4 weeks strength)
Cement	:	Ordinary Portland cement
Concrete Block	:	RZS or BS standard

3) Design Load

The design load is set in accordance with the laws and regulations in Zambia.

a) Dead Load (t/cum)

Reinforced Concrete	2.4
Concrete, block, brick	1.9

b) Live Load (kg/sqm)

Roof	50
Office, classroom	250

c) Earthquake Load

Since no major earthquake has occurred in Zambia and there is no code on structural consideration of seismic force, it will not be considered in designing the buildings.

d) Wind Load (kg/sqm)

Wind speed in the area is only 16 meters per second so this force is not considered in the design of the one story buildings.

4-2-5 Plumbing and Electrical Design

(1) Design Policy

The design of the mechanical and plumbing systems shall conform to the local standard and aim at durability, easy maintenance, and low operation costs. Since the location of the school is in the refugee settlement, the surrounding conditions have been considered to determine the grade of the facilities, together with the standard set by the Ministry.

(2) Mechanical and Plumbing design

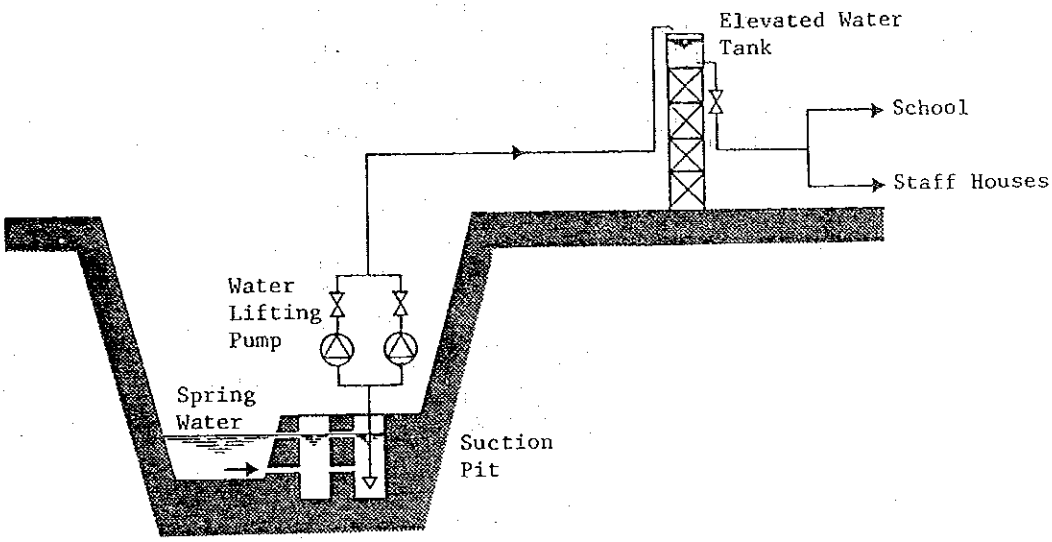
1) Water Supply System

The water supply system for the refugee office and primary school A does not have sufficient capacity for the Project. To cope with the situation, a new intake pit will be installed adjacent to the existing water intake pit near the site and water will be pumped up to new elevated water storage tanks which are to be provided in the school, from which it will be supplied to various places by gravity. The quality of water is analized at the National Council for Science Reserch and found as drinkable. The amount of water consumption necessary for the school is estimated as below.

	Number of person	Amount per Head t/day	Total Amount
Teaching staff	15	0.12	1.8
Staff	20	0.12	2.4
Student	240	0.08	19.2

Since the facilities need a water supply of about 10 cubic meters per hour, the capacity of the water storage tank is designed to be 20 cubic meters which is the average consumption of 2 hours. This storage amount is determined with the consideration of the operation period of a generator which is not be continuously operated during daytime. The ready made elevated tank is installed 10 meters above ground, supported by a steel frame tower.

Fig. 4-3 Water Supply System



2) Hot Water Supply

To save on energy to heat up water, simple domestic types of solar heater panels are to be installed in the kitchen and the headmaster's house. Hot water supply in the kitchen is limited to the washing area and the cooking area.

3) Drainage System

As a whole, the drainage system is divided into three systems; sewage, general waste water and rainwater.

a) Sewage

Sewage from the toilet is led to septic tanks installed outside each building for treatment, and then to the penetration pit. Cast iron pipes are used in the interior piping and cement asbestos pipes in the exterior portions.

b) General Waste Water

General waste water is led to a penetration pit. Kitchen discharge will be filtered by the grease trap pit going to the penetration pit. Polyvinyl chloride pipes are used for the interior piping and cement asbestos pipes for the exterior portions.

c) Rainwater

Rainwater from buildings is discharged into an open ditch installed around each building. Thereafter, it is discharged to the lower area around the site.

d) Sanitary Ware

Sanitary fixtures are installed in the toilet and shower rooms.

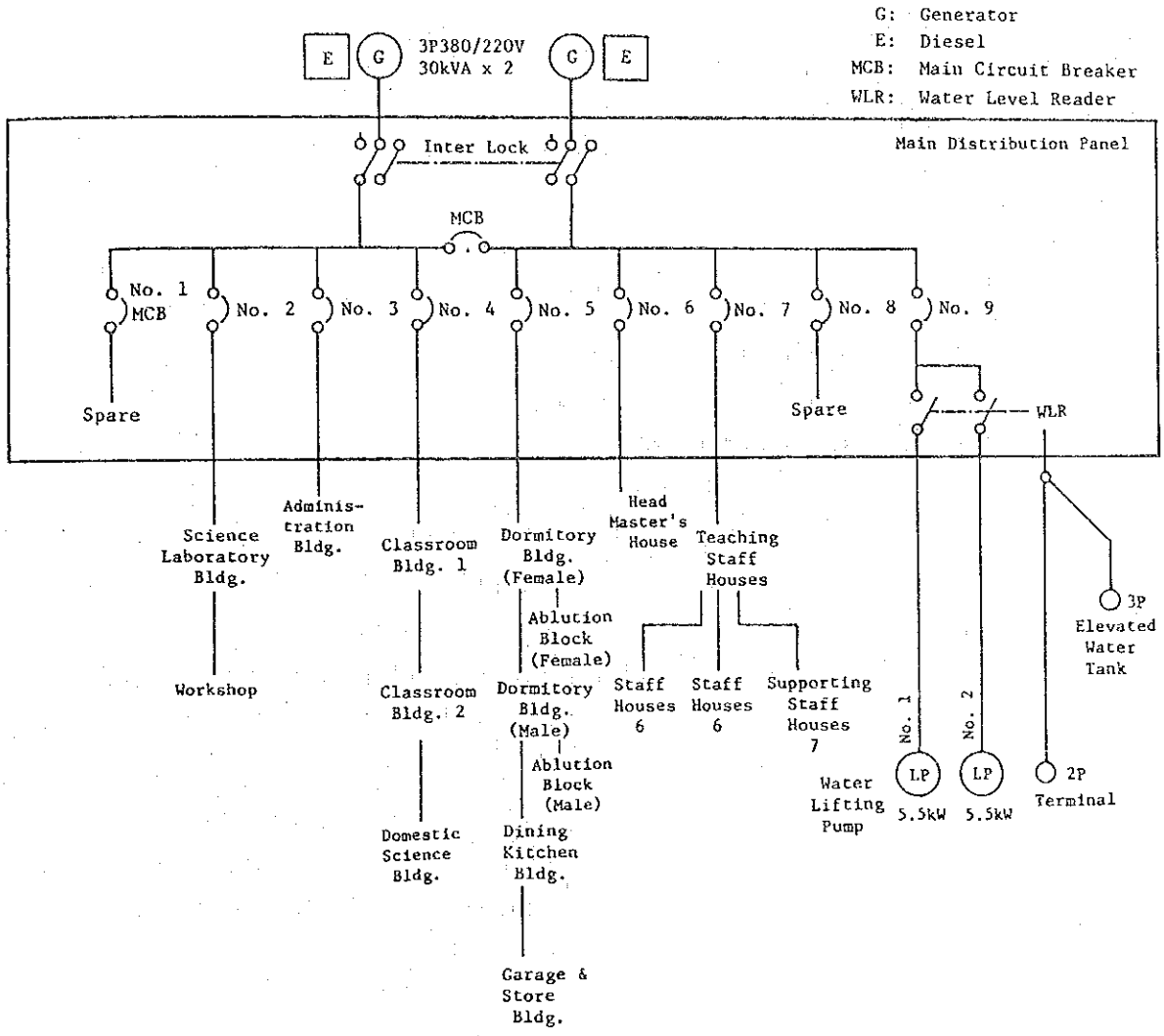
Toilet : Western style WC, urinals, lavatories.

Shower room : Shower head.

e) Kitchen Equipment

The kitchen will be equipped with a wood range, refrigerators, sinks, and service counters.

Fig. 4-4 Power Distribution Diagram



(3) Electrical Design

1) Power Generating System

There is no existing power supply line around the area, so the generator has to be provided. The capacity of the generator is determined by calculation of the total power consumed by the water supply system and the lighting for the dormitory, the staff house, and the receptacle circuit.

Two sets of 30-KVA generators are installed in parallel so that it is easy to match the flexible power consumption and also able to cope with the load needed at the time of the maximum demand for power. One can also provide the back-up in case of the failure of the other generator. In this way, low operation costs, which is essential for this school, can be maintained. The power supply is 3 phase 4 lines 380 V/220 V.

2) Trunk Line System

Trunk lines are installed from the main distribution board to panels in each building and to the power distribution panel in the water pumphouse by underground cable.

3) Power Supply System

Piping and wiring are provided to supply power to the water supply pump and the workshop training equipment.

4) Lighting and Receptacles

a) Lighting

Main lighting is provided by incandescent lamps, in consideration of voltage stability. The luminous intensity in the rooms is planned to be the minimum because of the running cost of the generator, and lighting is provided only where necessary at nighttime for safety.

b) Receptacles

Receptacles are of the ordinary 220v 3P type and installed in the laboratory, classrooms, offices, and other places.

5) Lightning Conductor

A lightning conductor is installed in the upper part of the elevated tank.

4-2-6 Main Building Materials Plan

Materials to be adopted for the school are selected from standard materials in accordance with the guidelines set by the Ministry of General Education and Culture. The standards are based on local availability, aiming at easy maintenance and also at saving on construction costs.

Exterior Finish

Exterior Walls: Spraypaint finishing on the concrete block
Roof : Asbestos corrugated sheet (Trafford Tile)
Sash : Steel sash oilpaint finish

Interior Finish

Floor : Cement screed finish
Interior Wall : Cement mortar rendered paint finish on block
Ceiling : No ceiling (exposed to roof)

Ceramic tiles are used as wainscots for the kitchen, the toilet, and the shower room.

4-2-7 Educational Equipment

Major equipment required for the Project is as follows:

Equipment

Teaching	:	Audio-visual, laboratory, homecraft, workshop.
Kitchen	:	Food preparation, canteen utensils
Office	:	Stationery, maintenance

Miscellaneous items

Furniture	:	Classroom, dormitory, canteen and office
Motor vehicle	:	Truck(4t), pick up truck and four-wheel drive vehicle.

The location of the projected school is quite far from the township and much equipment is quite difficult to purchase in the country due to the importation problems. This equipment should be provided in the scope of the Project. Equipment and materials which will be selected are essential items for starting and operating the school.