


BASIC DESIGN STUDY REPORT
ON
THE CONSTRUCTION PROJECT
FOR
THE SCHOOL OF VETERINARY MEDICINE UNIVERSITY OF ZAMBIA
REPUBLIC OF ZAMBIA

JUNE, 1983

JAPAN INTERNATIONAL COOPERATION AGENCY

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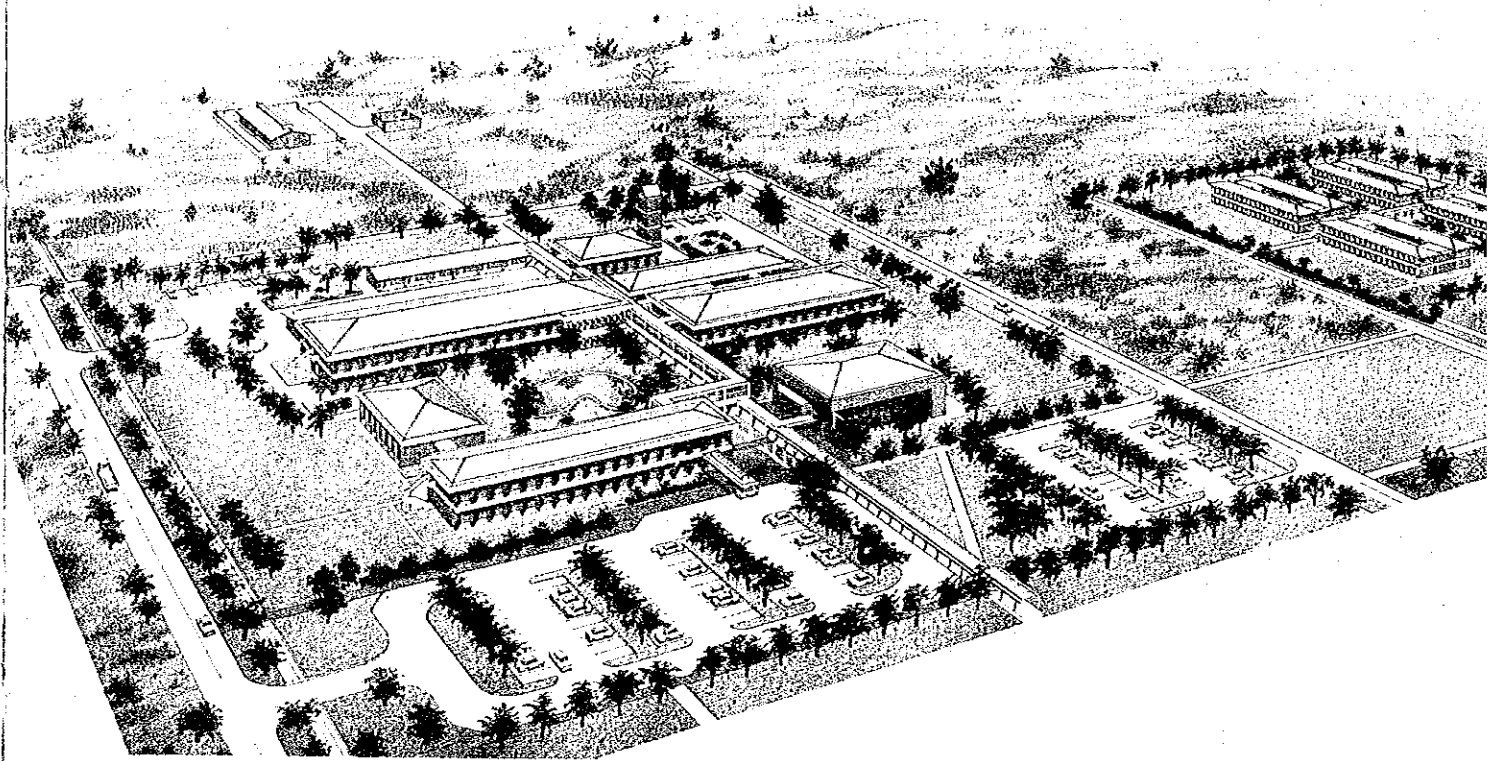
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SCHOOL OF VETERINARY MEDICINE UNIVERSITY OF ZAMBIA

PREFACE

In response to the request of the Government of the Republic of Zambia, the Government of Japan decided to conduct a survey on the Construction Project for the School of Veterinary Medicine, University of Zambia and entrusted the survey to the Japan International Cooperation Agency (JICA). The JICA sent to Zambia a survey team headed by Dr. Nobuo Hashimoto, Professor, The school of Veterinary Medicine University of Hokkaido from Feb.8 to Mar.1, 1983.

The team had discussions with the officials concerned of the Government of Zambia and conducted a field survey. 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.

June, 1983



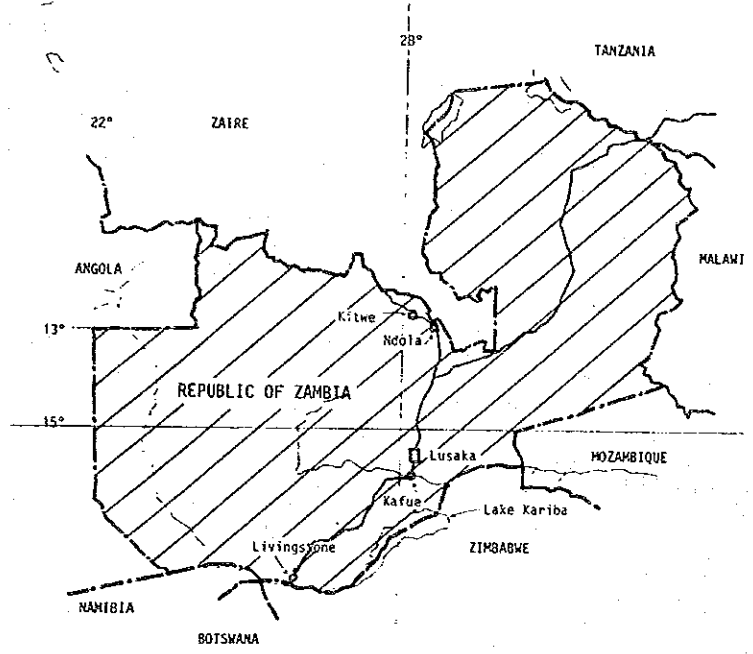
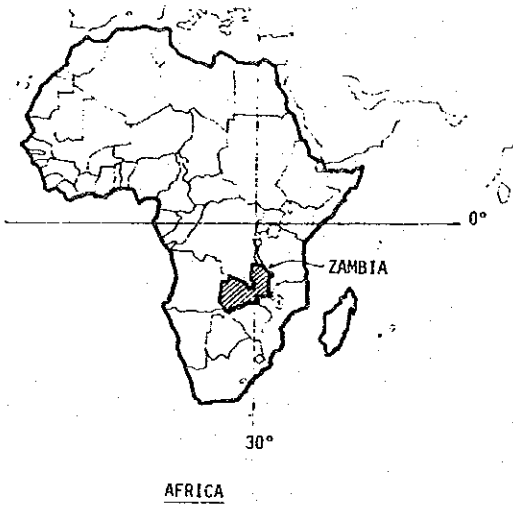
Keisuke Arita

President

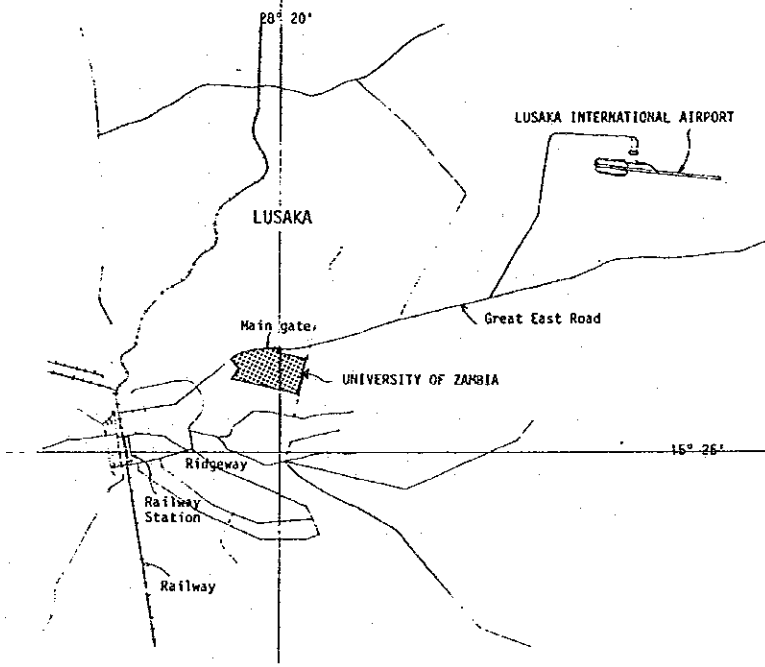
Japan International cooperation Agency

LOCATION MAPS

MAPS OF ZAMBIA, LUSAKA AND SITE



MAP OF ZAMBIA



MAP OF LUSAKA

CONTENTS

	<u>Page</u>
SUMMARY - - - - -	1
CHAPTER 1: INTRODUCTION - - - - -	7
CHAPTER 2: BACKGROUND OF THE PROJECT	
2-1 Outline of the Economic Situation in Zambia - -	11
2-2 Present State of Animal Husbandry in Zambia - -	13
2-3 History of Veterinary School Plans - - - - -	17
CHAPTER 3: SITE CONDITIONS	
3-1 Site Description and Surroundings - - - - -	19
3-2 Natural Conditions - - - - -	23
3-3 Utilities - - - - -	26
Chapter 4: THE SCHOOL OF VETERINARY MEDICINE PROJECT	
4-1 Objectives and Concept - - - - -	29
4-2 Basic Design of School Facilities - - - - -	39
4-3 Basic Design Drawings - - - - -	83
CHAPTER 5: PROJECT IMPLEMENTATION	
5-1 Executing Agency - - - - -	129
5-2 Construction Planning - - - - -	131
5-3 Scope of Work - - - - -	136
5-4 Tentative Overall Schedule - - - - -	138
5-5 Operation and Maintenance - - - - -	139
CHAPTER 6: PROJECT APPRAISAL - - - - -	141
CHAPTER 7: CONCLUSIONS AND SUGGESTIONS - - - - -	143
APPENDICES	

SUMMARY

Zambia has been exerting great efforts in implementing the Government's policy of developing the agriculture and fishery industry as one of her main industries, and in endeavouring to abandon the monoeconomical structure of the country in favour of a more stable, balanced economic basis. Seventy-five percent of all labour in Zambia is reported to be engaged in agriculture. Most of these farmers are running small-scale traditional livestock operations. Only two percent of the total agricultural labour force is working outside the traditional farming sector. The personnel of the Agriculture and Water Department are guiding these traditional farmers towards the concentration of their activities, improvement of their efficiency and rationalisation of their methods in order to increase their profits.

Since Zambia has a domestic animal population of about two million, and in view of her climate, geographical features and natural heritage, the future development of her animal husbandry clearly has unlimited potential. However, there are hindrances to such development, the shortage of veterinarians being the most serious problem of all. In 1982, there were only one-seventh of the normal ratio of veterinarians to animal population that other countries have. Moreover, the number of Zambian nationals among these veterinarians was only about 10% of the total.

The Government of Zambia has accordingly requested the Grant Aid assistance of the Government of Japan so as to establish a School of Veterinary Medicine at the University of Zambia. A Basic Design Study was undertaken from February to March 1983 in response to this request, in order to study the effects and appropriateness of Grant Aid from the Government of Japan, and to prepare the Basic Design according to need and on the most suitable scale. The following details agreed by both parties are summarized and were signed by the representatives of both parties in the form of the Minutes of Discussions.

According to the desires of the Zambian Government, the School was to have comprised of five departments. As a result of a study of comparable facilities in Zambia and of discussions between the parties, and taking into consideration international trends and Japan's experience in such fields, a revised concept plan having four departments has been agreed on. The new departments are: the Department of Bio-Medical Sciences, the Department of Pathology, Microbiology, and Parasitology, the Department of Disease Control and the Department of Clinical Studies.

In accordance with the reorganization and renaming of the Departments, the academic subjects to be covered by them were radically reorganised. Because of the level of the secondary school graduates in Zambia, both parties agreed, firstly, that six years, composed of two years for pre-veterinary training and four years for veterinary studies, are necessary; and, secondly, that even after the pre-veterinary training of two years, it will be necessary to include in the curriculum a certain amount of fundamental or general lectures during the initial stages of the veterinary courses, and thereafter the students will gradually receive more and more lectures that are more specialized in content and application. Consideration of the nature, functions and range of each of the various courses led to the decision to conduct the bio-medical courses and those of pathology, microbiology and parasitology in the same building, the Veterinary Sciences Building, and similarly, the clinical studies and disease control courses will be housed together in the Disease Control and Clinical Studies Building.

The final overall design was for fifteen buildings: the two just mentioned, the Administration Building (with teaching rooms), the Veterinary Library, the Lecture Theatre, the Dissecting & Post-mortem Building, the Large Animal Accommodation, the Experimental Animal Quarters, the Central Supply and Service Building, the Covered Way, the Animal Quarantine Building and the Student Hostel (in four buildings).

As for the Student Hostel, it is assumed that the proportion of students from regions other than Lusaka in the School of Veterinary Medicine will be about 90%. The existing hostels in the University are already occupied and have no reserve space: A hostel for the students of the School of Veterinary Medicine must therefore without fail be established, but it would be extremely difficult for the Government of Zambia to bear the cost of construction of such buildings. These students are unlikely to find any suitable accommodation except in facilities provided for them by the University, because of the lack of any such accommodation (due to absence of need) in Lusaka, and this problem is compounded by the poor quality of transportation services in the area.

In consequence of this situation, the Government of Zambia strongly requested the mission to include the Student Hostel in the Grant Aid coverage for the School of Veterinary Medicine. The mission accepted the request, and included the Hostel in the Basic Design of the School.

From late May to early June 1983, the Basic Design Confirmation Survey Mission visited the site in order to confirm, with the Zambian officials concerned the contents of the Report, and to confirm the preparatory arrangements made by the Zambian side.

Implementation of this Construction Project under the Grant Aid Programme in accordance with the procedure set out by the Government of Japan is under consideration. Certain items of the work must be carried out by the Zambia side in parallel with the work to be performed under Grant Aid in such a way that these two aspects of the work can be smoothly coordinated and combined.

The Government of Zambia will be responsible for site preparation, provision of the necessary infrastructure, and the arrangements necessary for the efficient implementation of the Project. The construction period for this Project is estimated at approximately 21 months. Both the construction and the operation and maintenance of the

completed facilities will be the responsibility of the University of Zambia. The Government of Zambia has already designed an organisation plan and the necessary financial commitments have been made for this purpose. The National Commission for Development Planning (NCDP) is the agency of the Government of Zambia that is responsible for the conclusion of the Exchange of Notes for the Japanese Grant Aid Programme.

This project will aid the Government of Zambia in implementing its policy of abandoning the monocultural structure of the country. The veterinarians trained in the new school will be equipped not only with the expertise related directly to animal diseases but also with general competence in matters of animal care and development, and will also contribute considerably to the establishment of an administrative system for animal husbandry.

In Zambia, for many years, plans have been studied for the establishment of the nation's own school of veterinary medicine, but these have been postponed for a variety of reasons. The differences in education system between Zambia and those countries that employ the British system of education have raised much difficulty in relation to the dispatch of students from Zambia to these countries. However, the establishment of the School will enable such problems to be easily overcome, and furthermore, will make it possible to accept trainees from countries adjacent to Zambia. This will also serve to establish between Zambia and these countries an international animal disease prevention system that may contribute to the prosperity and stability of the entire region.

As stated before, a very high priority has been attached by the Government of Zambia to this project and the necessary arrangements, such as financial commitments and the allocation of staff, have already been made. The School will raise the level of education, and will lead to the systematisation of the administration of animal husbandry in Zambia. It will also be extremely useful for the country in raising the

level of public hygiene. Furthermore, it will offer to Zambia the benefits not only of nurturing her livestock industry but also of improving life and living standards.

Japan has already played a part in the veterinary field in Zambia by dispatching experts from Japan Overseas Cooperation Volunteers (JOCV). If it should further be possible for experts to be sent from Japan for technical cooperation and assistance in the veterinary and animal husbandry field, such an action will significantly raise the contribution of Japan to the region, and also help to promote further the cordial relations that exist between the two nations.

CHAPTER 1 : INTRODUCTION

CHAPTER 1: INTRODUCTION

1-1 OBJECTIVE AND BACKGROUND

Zambia has relied greatly on the copper industry in her economic activities. The Government of Zambia framed the Third National Development Plan, initiated in 1979, partly in order to diversify her main industries to include the agricultural industry, because the international price of copper has exhibited a tendency to decline since the 1970's. Moreover, it is feared that the copper resources themselves may be exhausted in the early part of the 21st century.

Seventy-five percent of all labour in Zambia is reported to be engaged in agriculture. Most of these farmers are running small-scale traditional livestock operations. Only two percent of the total agricultural labour force is working outside the traditional farming sector. The personnel of the Agriculture and Water Department are guiding these traditional farmers towards the concentration of their activities, improvement of their efficiency and rationalisation of their methods in order to increase their profits.

The domestic animal population of Zambia is high (over 1 : 3) compared with its human population. Considering the climate, and the natural and geographical features of the country, the future development of her animal husbandry clearly has unlimited potential. However, in Zambia's present situation, it must be admitted that animal husbandry now remains at an undeveloped stage. Owing to endemic diseases like Trypanosomiasis (Sleeping Sickness), which is carried by Tsetse flies, and a variety of other diseases, the mortality of domestic animals is rather high and reproductivity is low. The Government of Zambia, to cope with these problems, has endeavoured to promote animal husbandry by, for instance, strengthening the administrative system and improving Zambia's disease-prevention technology and techniques, treatment procedures, breeding methods, and also animal reproductivity. However, the shortage of

veterinarians is the most serious problem of all. In 1982, there were some 70 veterinarians serving in the entire country, of whom only 8 were Zambian nationals. In such a situation, it can hardly be said that either this profession or animal husbandry itself has been established on a solid foundation in this country.

The Government of Zambia, in the light of above situation, has requested the Grant Aid assistance of the Government of Japan so as to establish a School of Veterinary Medicine at the University of Zambia (UNZA).

1-2 BASIC DESIGN SURVEY MISSION

In compliance with this request, the Government of Japan, through the Japan International Cooperation Agency (JICA), dispatched a study mission headed by Nobuo Hashimoto, Professor of the School of Veterinary Medicine, Hokkaido University, from February 6th to March 1st, 1983.

The study mission conducted the various investigations necessary for the basic design, conferring with the Zambian officials concerned.

The investigations and discussions conducted included the following:

- (1) Discussions to clarify the requirements of the Government of Zambia.
 - 1) Confirmation of the purpose of this project;
 - 2) Agreement on the basic concept of the project;
 - 3) Study and inspection of the animal husbandry situation in Zambia in confirmation of the rationale behind the basic concept of the project, including the inspection of similar facilities existing in Zambia;
- (2) Field investigations to ascertain site conditions.
- (3) Discussions on the planning and equipment necessary for the school.

- (4) Discussions on the function and intended purpose of each of the facilities and items of equipment.
- (5) Explanation of the typical procedure of Japanese Grant Aid.
- (6) Discussions on the scope of the work to be conducted by each of the two Governments, including the budgetary provisions to be made by the Government of Zambia and the maintenance requirement for buildings, facilities and equipment.
- (7) Study of the situation and conditions related to construction work

The findings and results of the discussions held between the study mission and Zambian Government officials were summarized and signed by the representatives of both parties in the form of the Minutes of Discussions on the Construction Project for the School of Veterinary Medicine, University of Zambia, Republic of Zambia, signed on February 18th, 1983. Based on these Minutes, further technical discussions were conducted by the study mission.

A document listing the members of basic design study mission, and copies of the diary of the study and of the Minutes are attached to this report.

1-3 BASIC DESIGN CONFIRMATION SURVEY MISSION

After working out the basic design on the basis of the study results and compiling the Basic Design Study Report, the Government of Japan, conducted a basic design confirmation survey in Zambia through the Japan International Cooperation Agency, from May 24 to 31, 1983. The survey mission, headed by Professor Nobuo Hashimoto, submitted the above Report to the Zambian Government officials concerned, giving explanations where necessary, and conducted the further investigations that were required for

finalizing the basic design. The discussion and investigations carried out included the following:

- 1) Confirmation of the contents of the Report
- 2) Confirmation of the preparatory arrangements made by the
Zambian side
- 3) The survey mission and the Zambian Government officials concerned agreed in principle to all matters described in the Report and exchanged the Minutes of Discussions on 30th May, 1983.

CHAPTER 2: BACKGROUND OF THE PROJECT

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2-1. OUTLINE OF THE ECONOMIC SITUATION IN ZAMBIA.

The economic structure of Zambia is shown in Fig. 2.1. It can be seen that agriculture-forestry-fishery, mining, and manufacturing are the main three industries in Zambia. The proportion accounted for by the mining industry, which involves mainly copper production, exceeded 40% at the time of her independence in 1964, but later, especially after 1970, the share was forced down because of price instability on the international market.

The Government of Zambia, since independence, has implemented several National Plans. Following the Emergency Plan (1964-1965) and the Transition Plan (1965-1966), the First National Development Plan (1966-1970) and the Second National Development Plan (1972-1976) have been implemented.

These plans were not sufficiently successful in bringing about either the hoped-for diversification of the economic structure to satisfactorily reduce the dependence on copper, or the elimination of income differences between regional groups.

The next such plan was the Third National Development Plan (1979-1983), which was initially scheduled to start from 1977, but because of the recession and the aggravation of the balance of international payments, the start of the plan was delayed until 1979.

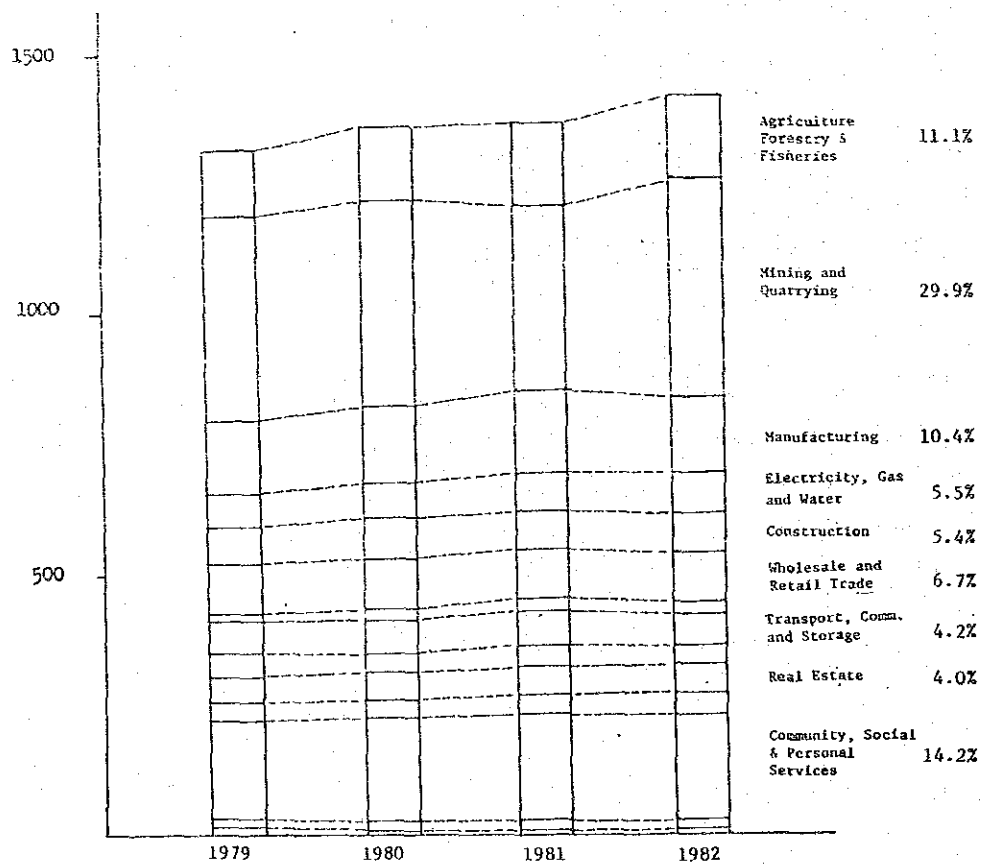
The main targets of the Third National Development Plan are:

- 1) Diversification of the economic structure to reduce the heavy dependence on copper;
- 2) Expansion of education and training facilities to provide the necessary manpower;
- 3) Encouragement of rural economic development etc.

The target GNP growth rate at the end of the final year of this plan is 6% in real terms.

FIG. 2.1 Gross Domestic Product by kind of Economic Activity in Producer's Values at Constant (1970) Prices

GDP (Mil. Kwacha)



2-2 PRESENT STATE OF ANIMAL HUSBANDRY IN ZAMBIA

Zambia, in her 752,614 km² area, has a human population of approximately 6.5 million and a domestic animal population of approximately 2.15 million. The majority of the animal population consists of cattle, which number about 1.73 million.

Notwithstanding the great size of the animal population, its contribution to the food needs of the country remains small. This is due to the local animal husbandry practices and to the poor health of the animals themselves.

In Zambia, the sectors of animal husbandry are classified in the following three categories:

1) Traditional Sector

The cattle are bred on common land in herds of less than 40 head (on the average 5-6 head). Approximately 85% of the cattle belong in this sector. The reproduction ratio is very low (about 3% per year).

2) Commercial Sector

The cattle are reared on private land (held on a 99-year lease system) on a large scale -- herds of about 4,000-5,000 head. The reproduction ratio is relatively high (approximately 30% per year).

3) Government Sector

This sector is composed of a few model farms of various scales managed experimentally.

In the traditional local culture, animals -- especially the larger ones -- are often kept as a form of capital. They play an important role in certain social transactions and on ceremonial occasions, and in certain places they are used seasonally as draught animals. However, the systematic

exploitation of such animals and the intensive development of their use for food and for economic purposes has occurred only in certain highly developed areas, and hardly at all in the traditional sector. As a result, the production of milk, meat, milk products and meat products in Zambia is insufficient for the needs of her population, and this situation is aggravated by the fact that her rate of population growth is a relatively high 3.2 per cent per year.

The second factor that has hampered the development of domestic livestock in Zambia is the high incidence of various diseases, including endemics.

The prevailing diseases in Zambia are as follows:

<u>Order of frequency</u>	<u>Name of Disease</u>	<u>Notes</u>
1	Tick-borne disease	Also known as theileriosis or East Coast disease Mortality: 95%
2	Trypanosomiasis	Also known as sleeping sickness
3	Bacterial diseases	Such as: Anthrax, contagious pleuro-pneumonia, streptococcal haemorrhagic septicaemia, bovine tuberculosis, etc.
4	Venereal diseases	Such as: Brucellosis, vibrio fetus (Campilobacter fetus), trichomonas
5	Foot-and-mouth disease	
6	African swine fever	

In its determination to boost the production of foodstuffs, Zambia embarked in 1981 on what is called "Operation Food Production", a long-term programme which requires that the

highest priority be given to all ventures connected with the development of the food-producing potential of the country.

The achievement of this aim in the livestock industry will require an increase in the amount of livestock, the provision of adequate animal health services, the control of disease, an increase in the reproductivity of the animals and an improvement in the methods of their management. But this in turn can be accomplished only if there are sufficient veterinarians equipped with an overall knowledge and wide experience of animals in health and disease. They need to have been trained to apply that knowledge in the diagnosis, treatment, prevention and control of animal diseases, the improvement of animal reproduction, the enhancement of animal welfare and the protection of human health.

In Zambia, however, there is a great shortage of veterinarians. In 1982, there were some 70 veterinarians serving, of whom only 8 were Zambian nationals. By the international standard of one veterinarian for every four thousand livestock units Zambia would need about 500 veterinarians to cater for the present population of domestic animals. To this number should be added the personnel necessitated by the problems arising from the size and variety of the wild animal population. It is clear that although the services of experts from abroad are highly valued, it is Zambia's responsibility to ensure that her own nationals are trained as veterinarians in the numbers required and in accordance with all the circumstances that are relevant to animals and animal welfare and that are peculiar to the country. Suitable training facilities that would be able to meet the country's needs in the numbers required do not exist in or near Zambia. Hence the Government of Zambia has

expressed its wish to establish a national School of
Veterinary Medicine and has requested the assistance of the
Japanese Government to enable it to do so.

2-3 HISTORY OF VETERINARY SCHOOL PLANS

In Zambia, a plan for the establishment of veterinarian training facilities has been under consideration since as far back as the founding of the University of Zambia in July 1966. But after a study of the priorities of the other possible schools in the University, this project was postponed and since that year, the task of supplying the necessary training has been committed to foreign universities.

However, the United Kingdom, Kenya and Zimbabwe, which are the main possible countries to which Zambia may dispatch her students, applicants are required to have completed a total of 13 years of primary and secondary school education, whereas, in Zambia, the corresponding school education period is 12 years.

This difference in the education system has raised much difficulty in relation to the dispatch of students from Zambia to these countries.

In 1977, the Zambian Government requested the FAO to cooperate in the planning of the construction of facilities to train veterinarians. In response, the FAO conducted research on countries in southern Africa and recommended the establishment of a veterinarian school in Zambia for the countries that are members of the Southern African Development Coordination Conference (SADCC). Then in 1980, on gaining independence, Zimbabwe hoped to set up a veterinary school of her own. After friendly discussions between the two principals, it was decided that the school would be set up in Zimbabwe. In line with this decision, the SADCC countries agreed in May 1982 on the establishment in Zimbabwe, but this plan was on a relatively small scale (with about 30 students graduating each year). The number of places available for Zambian enrolments was very small, and anyway, the enrolment problem mentioned above had yet to be resolved, and so Zambia's requirements could not possibly be satisfied there.

In view of these circumstances, the Government of Zambia finally decided to establish the country's own veterinarian school. This decision was supported by the constituent countries of the SADCC.

CHAPTER 3: SITE CONDITIONS

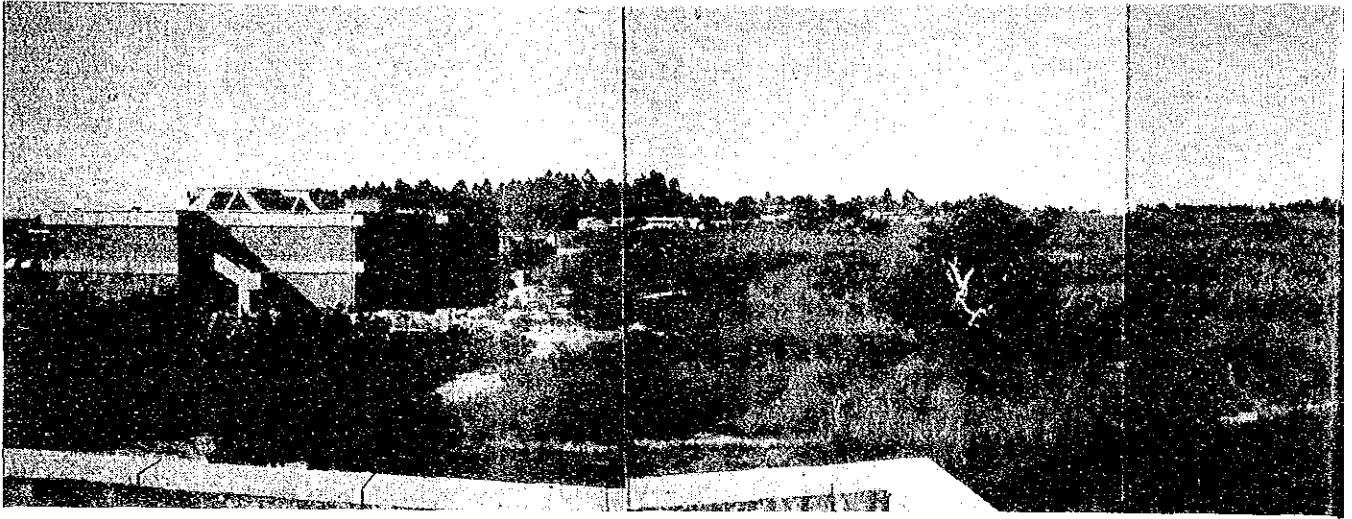
CHAPTER 3: SITE CONDITIONS

3-1 SITE DESCRIPTION AND SURROUNDINGS

The proposed School of Veterinary Medicine will be constructed on the east side of the main campus of the University of Zambia (UNZA), which lies partly along the south side of the Great East Road, approximately 6 kilometers in a north-easterly direction from the centre of Lusaka, the capital city of the Republic of Zambia, and approximately one-third of the way from the city centre to Lusaka International Airport. The city of Lusaka is situated in Lusaka Province in the south-central area of the country, at latitude 15°25'S and longitude 28°17'E.

The principal axis of the main campus of UNZA extends a maximum of 2.6 km from approximately north-west (where it is bordered by about 1.5 km of the Great East Road) to south-east. It has a maximum width at right-angles to this axis of approximately 1.5 km. (Other dimensions: N-S axis, 1.4 km; E-W axis 2.2 km; area, 2,657,285 m² or 656.6 acres). The entire site has already been acquired by UNZA. The location of the proposed School is towards the south-east corner of the site, just south-east of the planned School of Agriculture, on which construction is due to commence in September, 1983. The nearest buildings currently in existence are: the temporary School of Agriculture, about 200 m to the north; the School of Mines, about 200 m to the west-north-west; and the dining hall, about 300 m to the west.

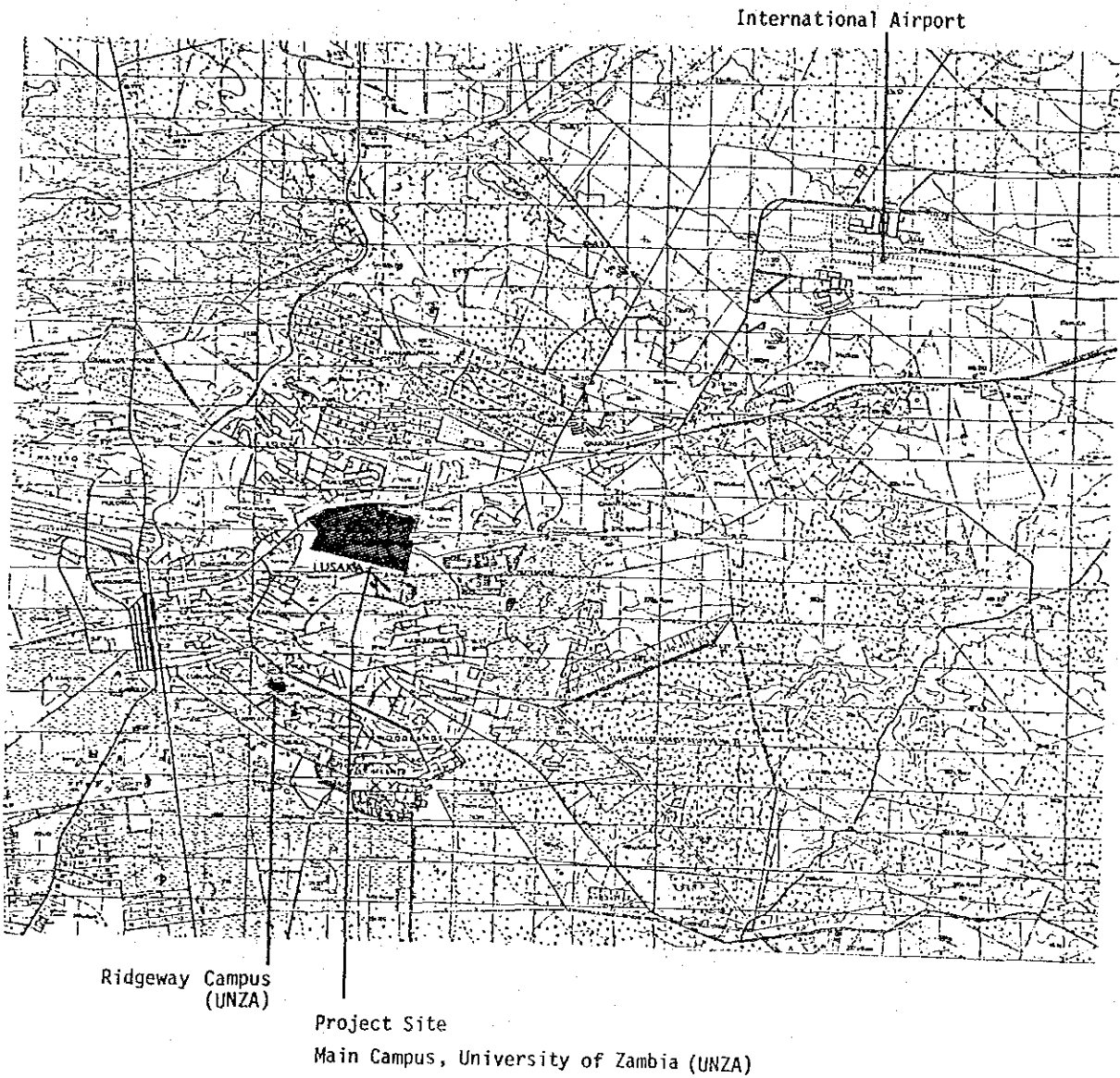
FIG. 3.1



PROJECT SITE

FIG. 3.2

CITY OF LUSAKA





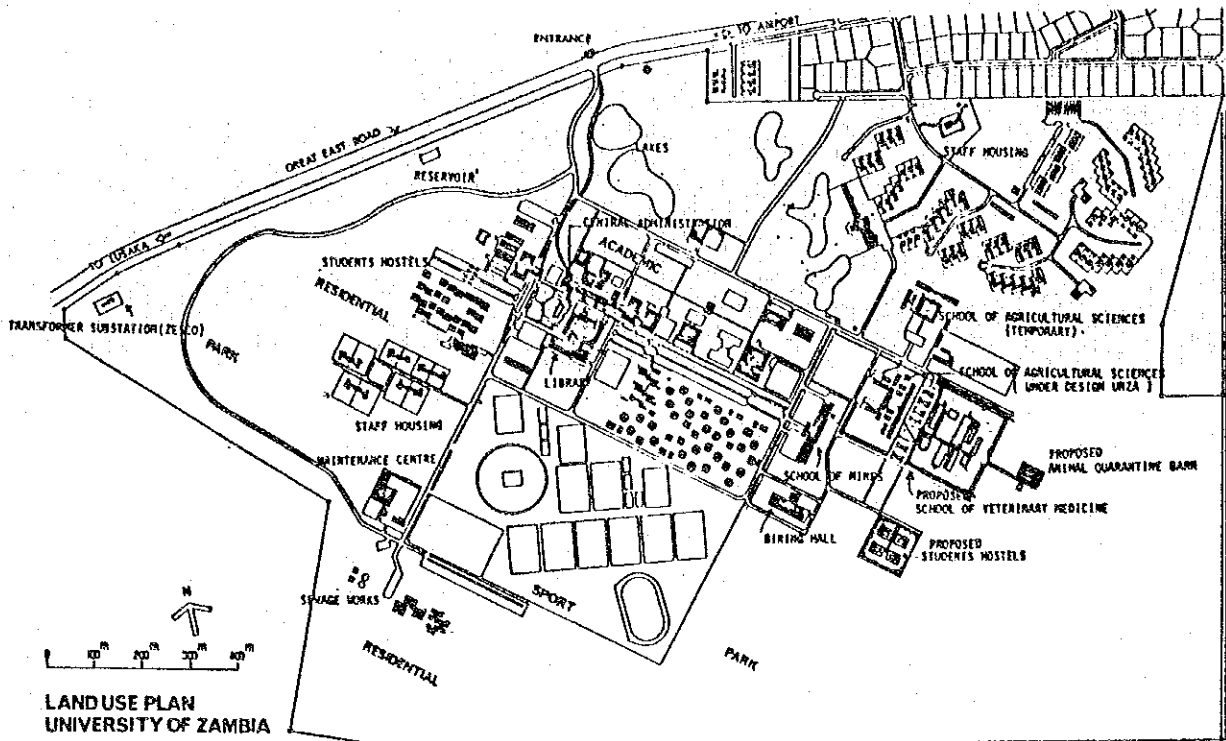
A site for the proposed student hostel has been selected about 100m away from, and to the south-west of, the proposed School of Veterinary Medicine.

The site of the proposed school and its hostel accommodation is at present open field covered with grass and bushes. It is virtually flat, showing a gentle undulation of less than 2 meters overall, but a certain amount of site preparation -- land filling and grading -- will be necessary.

Between the proposed site and the south-east corner of the campus is a large area of unused land which may serve for the construction of any further facilities that may be required for future expansion of the school.

The campus is served by the Great East Road, along which a bus service runs, with a stop at the entrance gate to the University.

FIG. 3.3



3-2 NATURAL CONDITIONS

3-2-1 Climatic Conditions

The Republic of Zambia is located in the south-eastern part of the African continent and occupies about twice the land area of Japan. Being in the Tropical Zone at altitudes from 1,000 to 1,300 meters above sea level, it has a genial climate, with the year divided sharply into a dry season and a wet season. From May to July the weather is cool and dry, from August to October, hot; and the rainy season stretches from November to March, followed by a short post-rainy season until the end of April. It is important that these conditions should be considered in the design and construction of buildings in Zambia.

The climatic conditions in the Lusaka area are as follows:

- Mean annual temperature: 19.7°C
- Annual range of temperatures: (approx.) 4 - 38.5°C
- Mean annual humidity: 64.6%
- Mean annual rainfall: 836 mm
- Average number of rainy days per year (1 mm or more): 71 days

FIG. 3.4

RECORD VALUES

Element	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Maximum Monthly Rainfall (mm)	37.3	8.4	2.3	6.1	14.5	137.7	209.9	422.4	547.4	530.4	268.4	65.0
Minimum Monthly Rainfall (mm)	Nil	Nil	Nil	Nil	Nil	Nil	1.0	60.2	19.3	44.2	4.8	Nil
Absolute Maximum Temperature (°c)	29.4	28.3	28.3	33.9	35.0	37.8	38.3	33.9	35.0	31.1	32.8	31.7
Absolute Minimum Temperature (°c)	-7.2	3.9	4.4	3.9	6.7	10.6	11.7	12.8	13.7	11.7	11.7	8.9

Rainfall 1916-1970=54 years. Temperature 1938-1966=28 years.

The mean high temperature of the cool, dry season is 22.8°C and its mean low temperature is 9.9°C. In the hot season, the corresponding figures are 26.1°C and 16.6°C, respectively. Between September and March the mean monthly temperature is above the mean annual temperature, and between December and June the mean monthly humidity is higher than the mean annual humidity.

The prevailing winds in the months from April to September are easterly or south-easterly. For much of this period, the speed of these winds may exceed 10 meters per second. Between October and March, the wind direction is westerly or north westerly. Wind speeds of up to 30 meters per second during this period must be considered in the design of buildings.

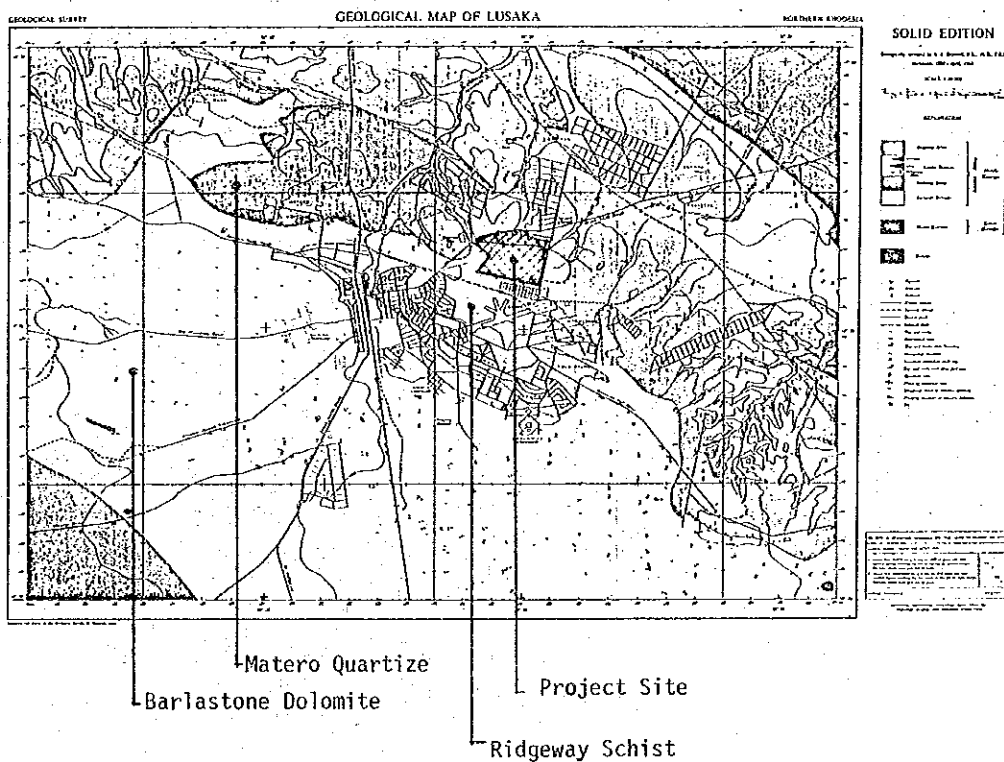
A day's rainfall or a thunderstorm in the rainy season is often so excessive that drainage systems cease to be able to handle the volume of water. No work on the soil should be attempted during these months, and careful consideration should be given to adequate drainage.

Lightning strikes are common and cause much damage. Ample precautions should therefore be made. However, since Zambia is outside the earthquake zone and has no earthquakes on record, no special consideration is required in this respect.

3-2-2 Geological Conditions

According to geological maps of Lusaka compiled and drawn in the Geological Survey Department, Northern Rhodesia (now Zambia), in 1959 and 1962, the campus of UNZA stands mainly on Lusaka Dolomite (crystalline dolomite, dolomitic limestone and limestone; ferruginous slate), which is overlaid with brick earth and quartz gravel; although part of it is on quartz-muscovite-biotite (-garnet) schist and flaggy quartz-muscovite schist with the same type of superficial layer as the main part, above. However, soil tests are at present under way, and will be complete by the end of June. The detailed results will be supplied in the near future by UNZA.

FIG. 3.5



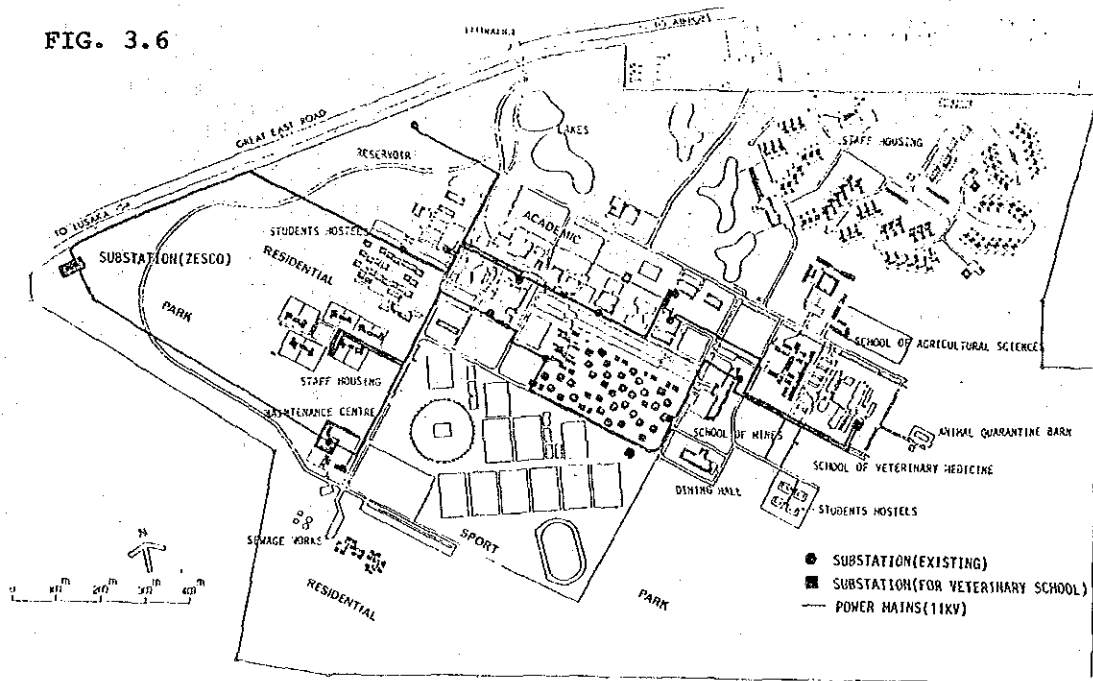
3-3 UTILITIES

3-3-1 Power Supply

From the ZESCO (Zambia Electricity Supply Corporation) electric power substation at the north-western end of the UNZA campus, runs an 11 kV double line loop circuit with 13 substations supplying power through loop lines. The ZESCO substation receives a double line carrying 33 KV, and important facilities such as the President's official residence and the airport are supplied by the same distribution system. The power intake capacity is 7,500 KVA x 2, but since the demand is only 1,800 KVA, this is more than enough.

The power supply for the School will come along a branch line from the nearest substation to the site, that of the School of Mines, to the Central Service Building's own substation. The installation of this subsystem is the responsibility of the University. The equipment beyond this point -- circuitbreakers, transformers, etc. -- will be provided and installed by Japan at the points on the site where required.

FIG. 3.6



3-3-2 Telephone System

A telephone exchange exists to serve the entire University, but since it is already working at full capacity, the installation of an independent system for the School of Veterinary Medicine is necessary. The required telephone lines will be prepared and led into the Administration Building by the University.

3-3-3 Water Supply

Water is drawn into an underground reservoir from Lusaka City Council's supply main, and then pumped to each building on the campus. The supply for the School of Veterinary Medicine will be taken from a main 150 mm pipe buried under the road in front of the School of Mines. This pipe will be extended by the University as far as the reservoir tank (which is part of the present project) just outside the Central Service Building.

3-3-4 Rainwater

The University will be responsible for the construction of storm drains 3 meters in width running along both north and south sides of the roads on the School's site. The site's rainwater drainage will feed into them.

3-3-5 Household Drainage

The household drainage system on the campus includes an aeration-type sewage disposal plant which processes the sewage before it is fed into the Lusaka City Council's main drain. After that, final processing is performed by the city's disposal plant and then the water is returned to the river. There is no standard of quality prescribed by the city for the waste water leaving the University's disposal plant. The drainage from the School of Veterinary Medicine will be connected, at the University's expense, to an extension of the existing drain near the School of Mines.

3-3-6 Laboratory Drainage

Since the waste water from the laboratories of the School of Veterinary Medicine is to be fed into the same disposal plant as the University's household sewage, equipment must be installed at an intermediate point in order to carry out neutralization and other processes.

3-3-7 Gas Supply

There is no city gas supply system in Lusaka,, and therefore gas for heating must be supplied, wherever it is needed, from LPG cylinders.

3-3-8 Special Gases

At present, in those parts of other faculties where special gases are used, the supply is obtained from cylinders kept indoors, and these are purchased from Zambia Oxygen Limited. The special gases that are available are: oxygen, carbon dioxide, hydrogen, chlorine, argon, ammonia, freon, sulphur dioxide, acetylene, compressed air and ethyl chloride.

**CHAPTER 4 : THE SCHOOL OF VETERINARY
MEDICINE PROJECT**

CHAPTER 4: THE SCHOOL OF VETERINARY MEDICINE PROJECT

4-1 OBJECTIVES AND CONCEPT

4-1-1 Objectives

- (1) When it has reached its planned capacity, the school will graduate 30 veterinarians each year, as well as approximately 12 persons trained at postgraduate level in veterinary sciences. This output will ensure the filling of veterinarian posts in accordance with the plan to cope more and more effectively each year with the problems of animal diseases and disease control, among others. Because the training programme will include instruction in general and related fields, including social studies, in livestock production and in animal management, the veterinarians will be equipped not only with expertise related directly to animal diseases but also with general competence in matters of animal production and their improvement and with the skills for communicating this knowledge to the ordinary farmer undertaking animal husbandry. The proper deployment of the veterinary personnel trained in this way will therefore lead to a decline in certain animal diseases, to the eradication of some and to the control of all. It will also lead to an improvement in livestock management practices, especially in the traditional sector, and subsequently to an improvement in animal health and reproduction.

- (2) The development of the livestock industry with an increased number of locally trained veterinarians will also lead to a significant improvement in the overall standards of human health and well-being because of: (a) better control of the endemic diseases of livestock animals; (b) improvement in the health of animals and in their reproductivity; (c) the greater availability of milk, meat and other animal products; (d) the

reduced transmission of diseases from animals to humans; (e) the contributions made by the veterinarians to public health services such as food hygiene, environmental hygiene, and public awareness of them; and (f) the promotion of public awareness of how pets and wild animals should be handled.

- (3) Through its postgraduate and research programmes, the school will serve as a centre for dealing with a number of the animal health problems that are endemic in Zambia and neighbouring countries. The School of Veterinary Medicine will also collaborate with other research centres such as CVRI Balmoral.

The need for a greatly increased number of veterinarians is felt also by the countries adjacent to Zambia. It is not likely that any of these countries will wish to establish their own national veterinary schools, but in time, some of their nationals could be admitted to the School in Zambia as students. Since Zambia is enclosed by seven other countries and since the transmission of animal diseases cannot be stemmed by national boundaries (especially where there is a large wild animal population) it is clearly in Zambia's interest to assist in some way in providing veterinary training for these countries. This would also serve to establish links between these countries that will contribute to the prosperity and stability of the entire region.

4-1-2 Basic Concept of the School of Veterinary Medicine

(1) Background, purpose and organization

After the study of the original concept (called the Preliminary Sketch) of the school projected by the University of Zambia, the mission has proposed plans and obtained the agreement of the Zambian officials responsible on a new basic concept of the school. The mission's proposal was based upon (a) its judgement of needs and of what would be the most appropriate feature to incorporate in order to fulfil these, after discussion with the Zambian officials concerned and (b) its study of the situation of the livestock industry and of the administration system in the country.

According to the original requirement of the Zambian Government, the length of time required for completion of the course was six years in total, divided into one year of pre-veterinary and five years of undergraduate studies. Considering the level of the graduates of the secondary schools in Zambia, the mission and the Zambian officials have revised the original plan to a total of six years consisting of a two-year pre-veterinary course and a four-year undergraduate course.

The following points were agreed by the two parties:

1) The purpose of the School

For the development of the livestock industry in Zambia, a powerful administration system in the field of prevention and control of animal diseases and improvement of the breeding and reproductivity of cattle are necessary. The purpose of this school is to train such experts to engage in the above fields.

2) Departments

According to the original idea, the School was to be composed of five departments, namely, those of Anatomy, Physiology and Biochemistry; Pathology, Parasitology and Microbiology; Medicine and Pharmacology; Surgery and Reproduction; and Preventive Medicine and Food Hygiene.

As a result of (a) the discussions between the parties, (b) the abovementioned study of the livestock industry and administration system, and (c) consideration of both international trends and the experience of Japan, a revised concept plan having four departments has been agreed on. The new departments are: the Department of Bio-Medical Sciences, the Department of Pathology, Microbiology and Parasitology, the Department of Disease Control, and the Department of Clinical Studies. In accordance with the reorganisation and renaming of the Departments, the subjects to be covered by them was radically reconsidered. No special department will be required for animal sciences, since these subjects can be adequately provided at the School of Agricultural Sciences (already in existence in temporary facilities).

The subjects taught by each of the new departments are as follows:

i) Department of Bio-Medical Sciences

- Anatomy
- Physiology
- Biochemistry
- Pharmacology

ii) Department of Pathology, Microbiology and Parasitology

- Pathology
- Microbiology
- Parasitology

iii) Department of Disease Control

Epizootiology

Preventive Medicine or Public Health

Food Hygiene

Environmental Science or Wild Life Disease

iv) Department of Clinical Studies

Animal Reproduction and Veterinary Obstetrics

Artificial Insemination and Animal Breeding

Medicine

Surgery and X-Ray Radiation

3) Programmes

The following Table shows the courses to be conducted at the proposed School. For each course, the number of years of study required, the student capacity and the purpose are indicated.

Courses	Years required	Number of students		Purpose
			Total	
Pre-veterinary	2	40	80	Preparation for veterinary course
Veterinary	4	30	120	Veterinary training
Master	2	8	16	Training of teachers and researchers
Doctorate	3	4	12	Training of teachers and researchers
Total			<u>228</u>	

At first, the mission thought that a total of five years (one year's pre-veterinary course and four years of undergraduate course) would be enough for training veterinarians in the four departments. However, in view of the level of secondary school graduates in Zambia, both parties agreed that six years were necessary. These would be made up of two years for pre-veterinary training and four years for veterinary studies.

4) Curriculum

Also because of the level of secondary school graduates, both parties have agreed that even after the pre-veterinary training of two years it is necessary to provide the students with a curriculum including a certain amount of fundamental or general lectures during the initial stages of the veterinary course, and thereafter the students will gradually receive more and more lectures that are more specialized in content and application. Furthermore, the parties agreed on the addition of the following lectures to the original plan.

- * Genetics and Biometrics in the 2nd year
- * Animal Nutrition and Dietetics in the 3rd year
- * Livestock Production in the 5th year

The curricula agreed upon are as follows:

<u>Year at University</u>	<u>Curriculum</u>
1st	<u>Pre-Veterinary I</u> Biology Chemistry Physics Mathematics

2nd	<u>Pre-Veterinary II</u> Biochemistry and Organic Chemistry Genetics and Biometrics Introduction to Anatomy and Physiology Sociology
3rd	<u>1st Professional Year</u> Comparative Anatomy/Histology/Embryology Animal Physiology Pharmacology and Toxicology Animal Nutrition and Dietetics Animal Breeding
4th	<u>2nd Professional Year</u> Comparative Pathology, Histopathology and Clinical Pathology Microbiology (Bacteriology and Virology) Immunology Parasitology and Entomology
5th	<u>3rd Professional Year</u> Epizootiology and Animal Hygiene Public Health and Food Hygiene Environmental Science or Wild Life Disease Introduction to Clinical Studies Livestock Production
6th	<u>4th Professional Year</u> Animal Reproduction and Obstetrics Artificial Insemination Medicine Surgery and X-Ray Radiation The Veterinarian in Society

5) Number of Staff

The Government of Zambia has expressed its desire for the staffing of the School (under the new concept) as follows:

i) Number of staff

<u>Position</u>	<u>Number of staff</u>	<u>Position</u>	<u>Number of staff</u>
Dean	1	Senior technicians	10
Professors	4	Technicians	15
Assistant Professors	11	Secretaries	9
Lecturers	15	Administrative Officers	2
Chief Technicians	4	Miscellaneous	36
Pharmacist	1		
Radiologist	1		
TOTAL:			109

ii) Allocation of Principal Staff

<u>Department</u>	<u>Dean</u>	<u>Prof.</u>	<u>Asso.Prof.</u>	<u>Lect.</u>	<u>Chief Tech.</u>	<u>Total</u>
Bio-Medical Science	(1)	1	3	4	1	10
Pathology, Microbiology, and Parasitology		1	2	3	1	7
Disease Control		1	3	4	1	9
Clinical Studies		1	3	4	1	9
TOTAL:	1	4	11	15	4	35

6) Building facilities

A preliminary sketch project on the School of Veterinary Medicine which also included the School of the Agricultural Sciences, incorporating the two schools into one complex, had been prepared by Erhard Lorenz Associates, Architects, one of the local architectural firms, before the dispatch of the mission.

The mission's proposal was for an alternative layout plan, and was put forward after consideration of the basic concept of the school and of the nature, relationship and functions of the departments, and also the relationship between the staff and students. This was agreed by the Zambian officials after some discussion. The details of the layout agreed are described later in this Chapter.

(2) Student hostel

The University of Zambia is the only university in this country, and therefore receives applications from students throughout the land. The country's secondary schools, however, are distributed in proportion to the sizes of the local populations that they serve. Only about 10% of the students at the University come from Lusaka and the rest come from various parts of Zambia and must live in hostels on the university campus. The University is thus a 90% residential university.

It is assumed the ratio of the students of the School of Veterinary Medicine from regions other than Lusaka will be in approximately the same ratio as in the above distribution. However, unlike cities with long-established universities, there is in Lusaka no system of approved residences or hostels for university students to find lodgings during the academic year. In fact, apart from the hotels, there is nowhere at all available for the accommodation of non-residents of Lusaka. In view of this situation, it is likely that these students will find -- to say the least -- great difficulty in obtaining accommodation, except in facilities that are provided for them by the University. Moreover, the existing hostels in the University are already fully occupied and have no reserve space (capacity: 2,700). Consequently, a hostel for the students of the School of Veterinary Medicine must without fail be established.

Previous major developments at the University that have been supported by agencies outside Zambia have been accompanied by a provision for the required hostel accommodation, notably the Schools of Mines, Engineering (Phase II) and Education (Phase II). In each case, both academic and hostel facilities -- and, at the School of Mines, staff housing as well -- were provided by the supporting agency. The Government of Zambia, in consequence of all of the foregoing, strongly requested the mission to include the hostel in the Grant Aid coverage for the School of Veterinary Medicine. The study mission explained to the Government of Zambia on the difficulties of furnishing such facilities under the Grant Aid System. However, since it would be extremely difficult for the Government of Zambia to bear the cost of construction of such buildings, the study mission agreed to include such a student hostel in the basic design, respecting the request of the Government of Zambia.

As for catering facilities, no extra provision will be required for the School of Veterinary Medicine. The ample facilities of the University's dining hall and kitchen can accommodate several hundred more students than they do at present.

4-2 BASIC DESIGN OF SCHOOL FACILITIES

4-2-1 Design Principles

The execution of the basic design has been governed by the following design principles. These have been selected as criteria in response to the request of the Government of Zambia, which sees the urgent need to train veterinarians for service in Zambia, and also to the wish to give the future students of the School a pleasant environment conducive to study.

- (1) Facilities should be such that the requirements of the users are fully reflected in their design.
- (2) Environmental conditions, both natural and man-made, should be fully considered in the design.
- (3) In order to be compatible with local conditions, the buildings should be easy to use and maintain and should involve as little maintenance cost as possible.
- (4) The design should enable construction to be performed at a minimum cost while ensuring a high degree of durability in the buildings. To achieve this end, due consideration should be given to utilization of local construction techniques, materials and practices.
- (5) The design should be flexible, allowing possible variations in function, as well as possible expansion of the facilities in the future.
- (6) The design will conform to the relevant laws, regulations and standards now in force in Zambia.

- (7) Conformity with the conditions of siting and land use incorporated in the Master Plan of the Campus drawn up by the University of Zambia.
- (8) Coordination and harmonisation with the concepts and plans of the planned School of Agricultural Sciences due to be constructed on the adjacent site.

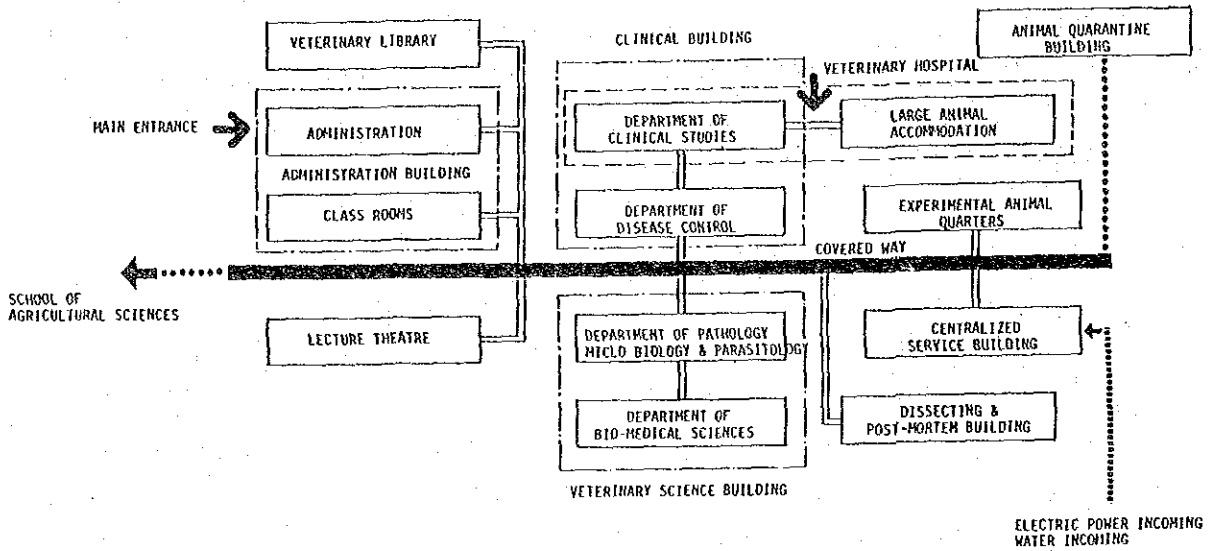
4-2-2 Basic Plan

All aspects of basic planning of the Project, including the organizational aspects such as the nature of the courses, curriculum, length of full undergraduate course, number of students, etc., agreed upon -- as stated above -- by the Japanese mission and the Zambian officials in charge, have already been completed.

(1) Building Plan

- 1) After taking into consideration the nature, functions and range of each of the various courses, it was decided to conduct the bio-medical courses and those of pathology, microbiology and parasitology under the same roof -- in the building known as the Veterinary Science Building -- and, similarly, clinical studies and disease control courses will be housed together in the Disease Control and Clinical Studies Building. This is shown more graphically in the diagraph on the next page.
- 2) The construction methods to be followed will be those which are customarily employed in Zambia. In accordance with their respective functions as facilities of the School of Veterinary Medicine, the buildings will be either of a single storey or of two storeys. Sufficient space will be left between buildings in order to ensure a free passage of breeze.
- 3) The various facilities will be laid out so as to reflect the curriculum for each year of study. According to the above guidelines, the 11 buildings of the School, and the 4 buildings of the Student Hostel will be constructed and laid out as shown in the drawing on the next page.

FIG. 4.1



This diagram shows the organisation of the School into Departments, etc., or independent single-story buildings (boxes), two-storey buildings (dotted broken lines), and the veterinary hospital (broken line), arranged about the axis of the main section of the Covered Way (broad line).

In accordance with the aforementioned aim, the buildings are integrated to the following twelve parts.

Identification

letter of building

Name of building

A	Administration Building
B	Veterinary Library
C	Lecture Theatre
D	Veterinary Science Building For two departments: Bio-medical Sciences and Pathology, Microbiology and Parasitology
E	Dissection & Post-mortem Building
F	Disease Control and Clinical Studies Building For two departments: Disease Control and Clinical Studies
G	Large Animal Accommodation
H	Experimental Animal Quarters
I	Central Supply and Service Building
J	Covered Way
K	Animal Quarantine Building
L - O	Student Hostel

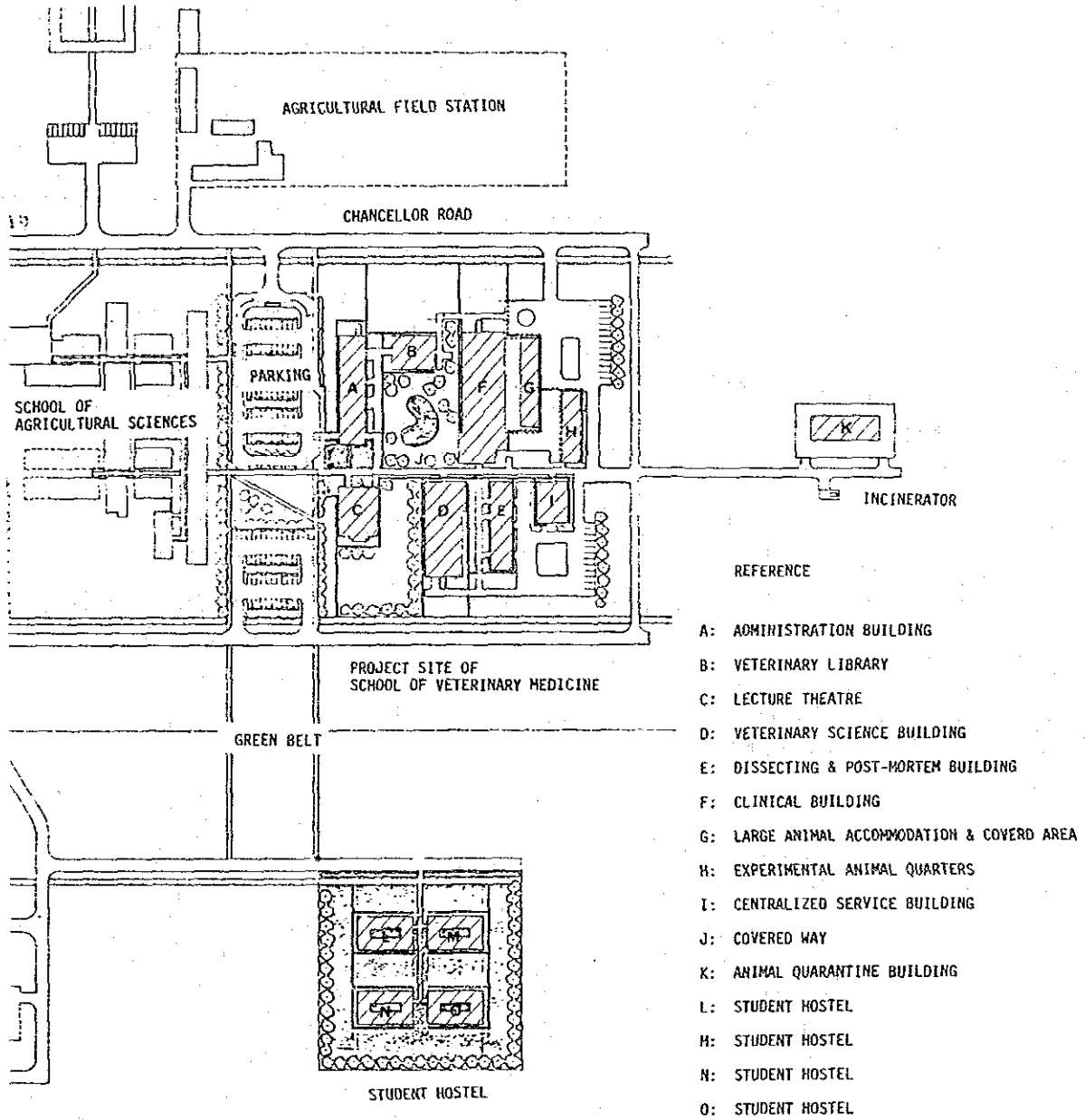
(2) Block Layout

The layout and composition of the facilities have been established in the manner as described below.

- 1) The main road of the site, Chancellor Drive, runs along the north-east side of the university campus. The main approach way from this road to the School of Veterinary Medicine is located beside the School of Agricultural Sciences. There is a direct entrance from Chancellor Drive to the Clinical Building. A new entrance road will be constructed to the Central Supply and Service Building at the south-east side of the site.
- 2) The Administration Building (Building A) is located directly opposite the main building of the School of Agricultural Sciences, on the other side of the Car Park.
- 3) The Covered Way of the School of Agricultural Sciences is directly connected to the Covered Way which is the main axis of the School of Veterinary Medicine. The Veterinary Science Building (Building D) is located on the south side of this Covered Way, and the Clinical Building (Building F) is on the north side.
- 4) The Veterinary Library (Building B) is located to the east of the Administration Building (Building A), and the two are connected by the Covered Way. These buildings, together with the Clinical Building (Building F) and the main axis of the Covered Way, enclose a courtyard.
- 5) The Lecture Theatre (Building C) is located to the south-west of the Administration Building (Building A) combiniante to the School of Agricultural Sciences, and satisfies the requirement for a Lecture Theatre to be used in common with the School of Agricultural Sciences.

- 6) The Central Supply and Service Building (Building I) is located at the east end of the Covered Way on its south side.

FIG. 4.2



(3) Architectural Planning

In this section, the expression "rooms common to all departments" covers: a teaching laboratory, a preparation and store room, a professor's room, three associate professors' rooms, a chief technician's room, a seminar room, research laboratories (the number of which varies according to the department), and a storage room, for each department.

A. Administration Building

On the ground floor, there is an entrance hall, reception area and 4 classrooms; and on the first floor, the Administration Office, the Dean's and the Associate Dean's Office the Committee Room and other rooms for administrative purposes.

The class rooms comprise: one room with a capacity of 40 students and three rooms for 30 students each. Each classroom will be furnished with a blackboard, a notice board, a screen, set of blackout curtains, and desks and chairs for lecturers and students.

FIG. 4.3

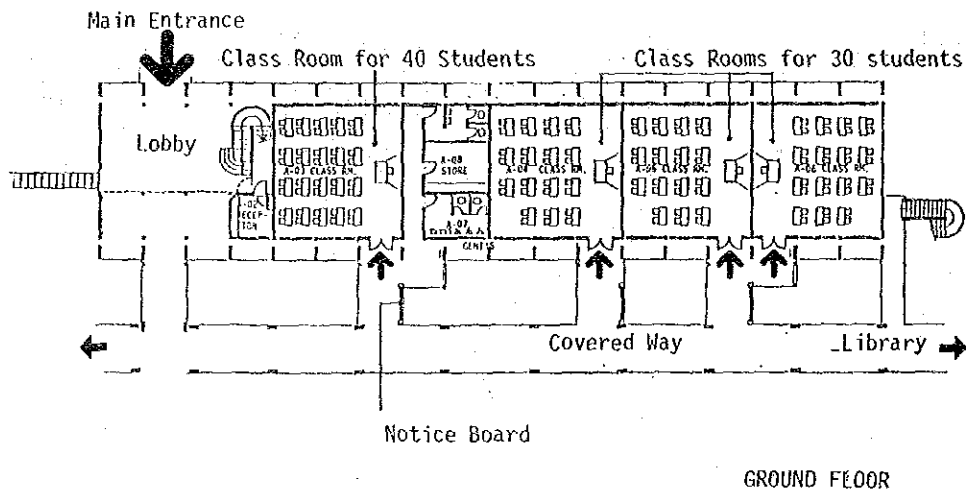
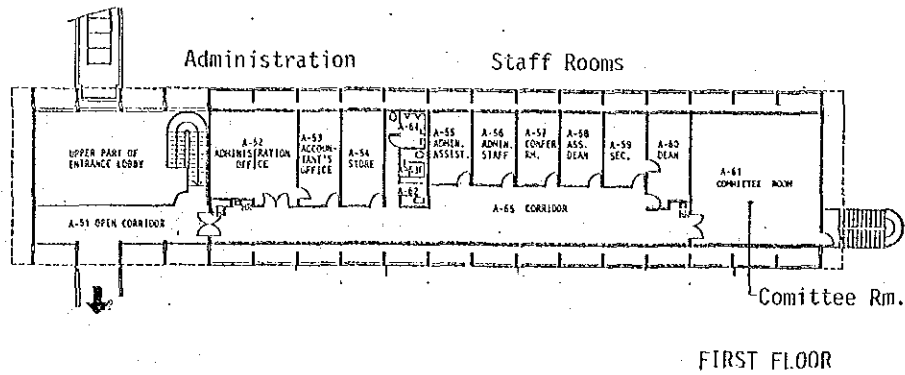


FIG. 4.4



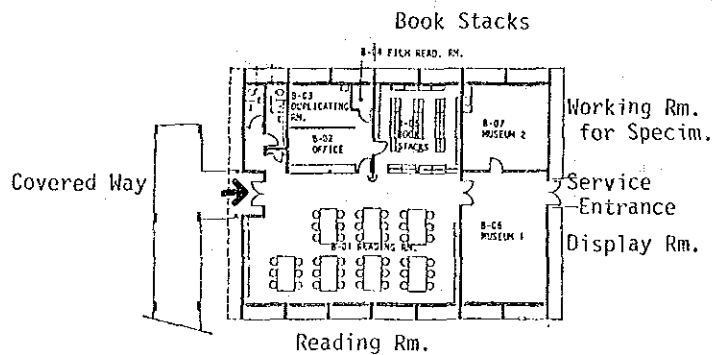
B. Veterinary Library

At its Lusaka campus, the University of Zambia has a Central Library (established in 1969) having 1,600 seats and about 300,000 books. This library functions as the information centre of the entire university. However, because of the member of specialized books on veterinary subjects that are required, and also because of the distance of the proposed School from the Central Library, the establishment of a Veterinary Library at the School is considered to be necessary.

A reading room, a stack room, an office and two specimen rooms have been included in the plan. The reading room has space for reading and study for more than 40 people.

The stack room is designed to accommodate 10,000 books, magazines and journals, which will be furnished by Japan as a part of the Grant Aid. One of the specimen rooms will be used for displays of skeletons, and the other for other types of specimens for study.

FIG. 4.5

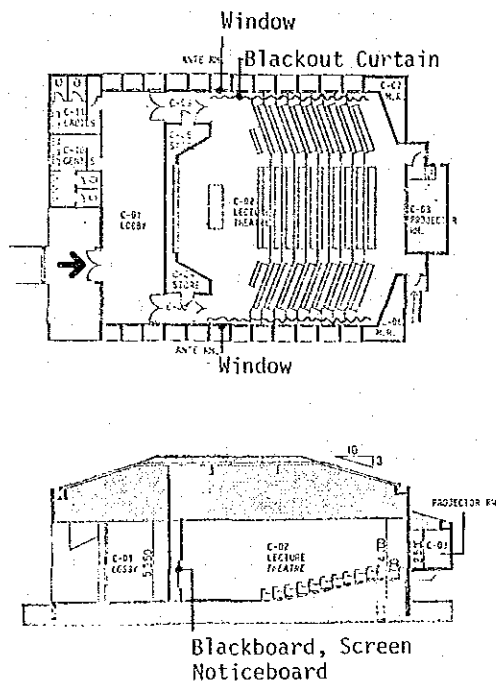


C. Lecture Theatre Building

Since it is to be used in common by both the School of Veterinary Medicine and the School of Agricultural Sciences, the Lecture Theatre Building has been located near the latter, to the south of the Administration Building. The capacity of the Theatre will be 214 persons, who will be seated on the benches with movable tables. A projection room for 16 mm films has also been planned.

A notice board, an up-and-down type blackboard, overhead projector, a screen, a sound system, etc. will be installed.

FIG. 4.6



D. Veterinary Science Building

The Bio-Medical Department is situated on the ground floor, and the first floor houses the Pathology, Microbiology and Parasitology Department. As well as the rooms common to all departments, present on both floors a postgraduate room is also included in the plan of the 1st floor, for use by the two departments housed in this building.

Each teaching laboratory has six island-type benches. Each bench has seats for six students working simultaneously. A teaching bench as well as a cabinet to hold microscopes, etc., is installed. A preparation room adjoins the teaching laboratory to increase working efficiency. The numbers of research laboratories are five for the Bio-Medical Department, three for Pathology, Microbiology and Parasitology. Each of these rooms has a central island-type bench and a bench under the windows. The seminar room and the postgraduate room are equipped with a view to their possible future use as experimental laboratories.

FIG. 4.7

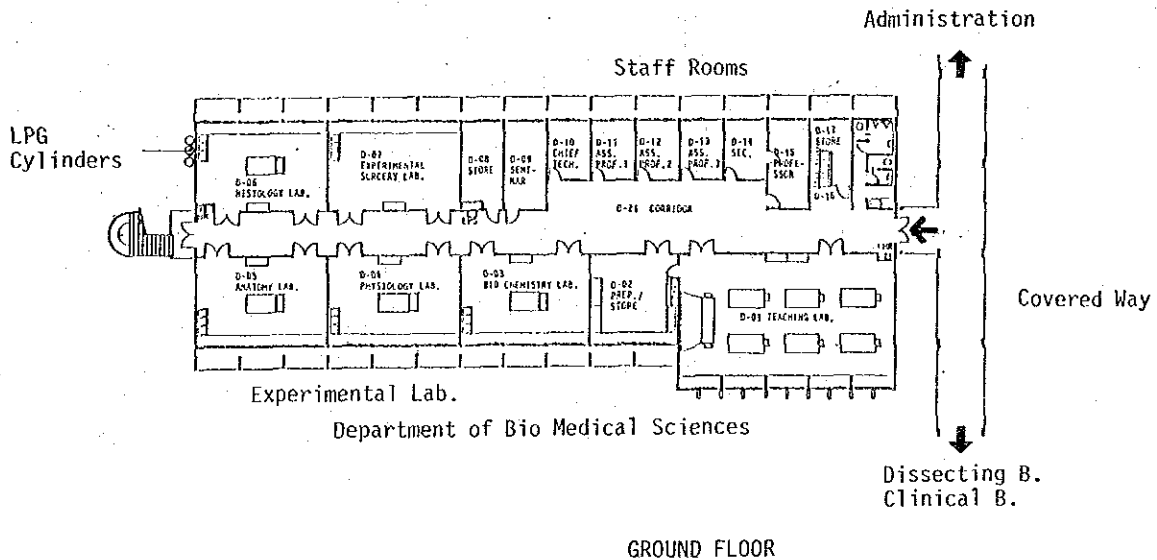


FIG. 4.8

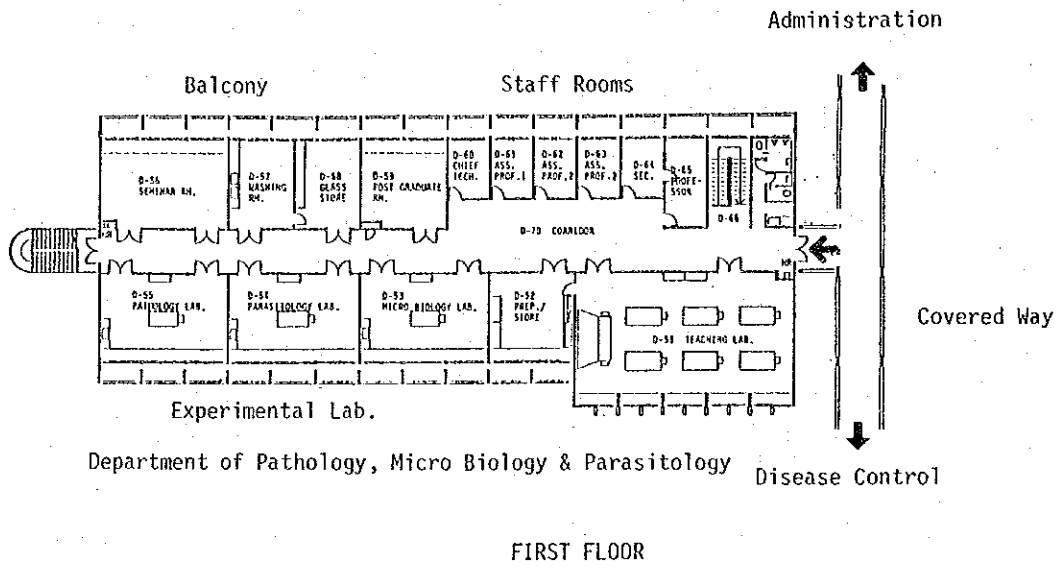
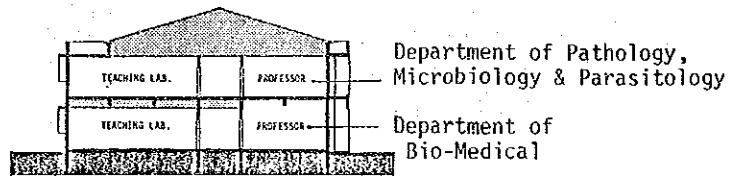


FIG. 4.9



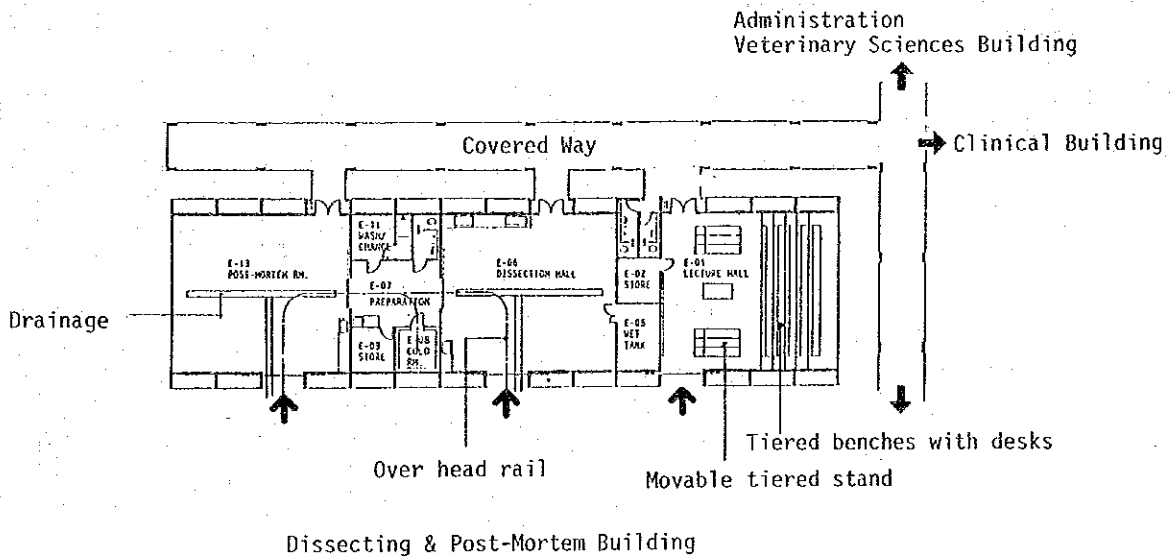
E. Dissection & Post-mortem Building.

Located next to the Veterinary Science Building, this building has a lecture theatre, a dissection hall, a post mortem room and an area for preparation.

The dissection hall is for the students' practical anatomy studies, and has a storage room for specimens kept in formalin. The post-mortem room is for dissection for ascertaining an animal's cause of death. Connecting these two rooms is a preparation room (with an adjoining cold room) through which runs a ceiling-suspended crane for convenient transportation of large animals. The floors of these rooms are inclined and have a drainage system to facilitate washing.

The lecture room, is fitted with tiers of desks and benches and with two mobile tiered stands for viewing purposes.

FIG. 4.10

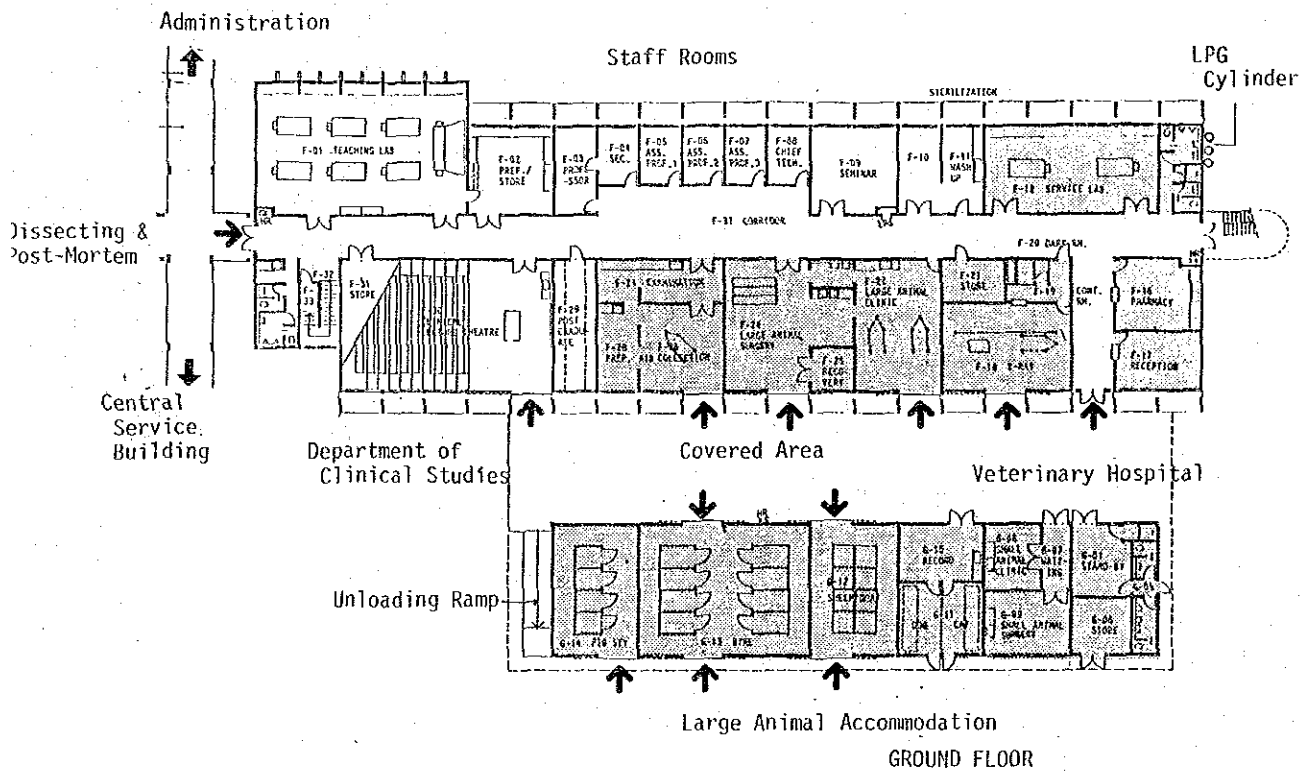


F. Disease Control and Clinical Studies Building

This building houses the Department of Clinical Studies on the ground floor and the Department of Disease Control on the 1st floor. On the ground floor, apart from the rooms common to all departments, there is a lecture theatre and a veterinary hospital containing a large-animal clinic, a surgical treatment room, an X-ray room a clinical examination room, a pharmacy, and an artificial insemination and collection room.

The lecture theatre has about 100 seats arranged in tiers. The size of the door and the finish of the floor of this room have been designed so as to allow animals to be brought into the room directly from outdoors.

FIG. 4.11



On the 1st floor, there are the rooms common to all departments, two bio-hazard rooms, six research laboratories, a wash-up room, a sterilization room, and also a seminar room and an information room designed for possible future conversion into laboratories.

FIG. 4.12

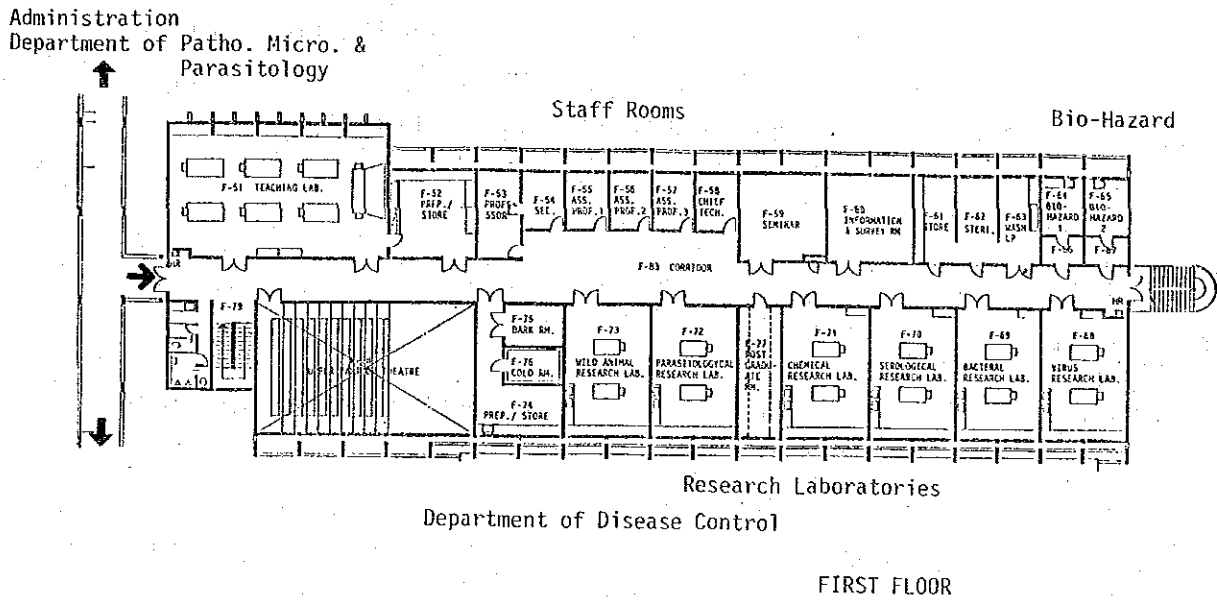
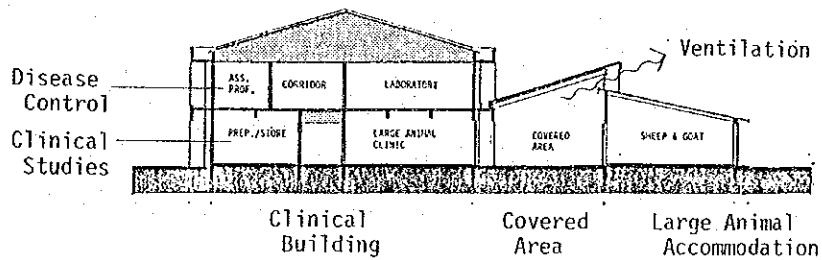


FIG. 4.13



G. Large Animal Accommodation (Building-G) and Covered Area.

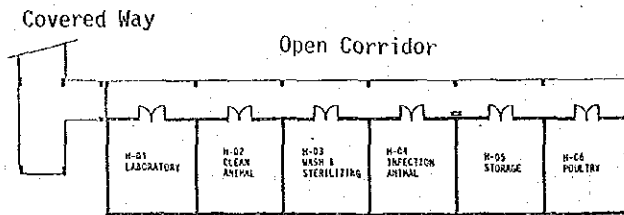
The Large Animal Accommodation acts as the the sickrooms of the veterinary hospital, and is joined to the Disease Control and Clinical Studies Building by a Covered Area.

When animals arrive, they are first observed and weighed outside, for preliminary diagnosis in this building. The large animal accommodation contains a small-animal clinic, sickrooms for pigs, cattle, sheep, goats, dogs and cats, and a room for the staff, who look after these animals.

H. Experimental Animal Quarters

It is in these quarters that the small experimental animals mainly used in the Department of Disease Control and Clinical Studies are kept. They contain a laboratory, an infected animal room, a washing and sterilising room, a bacteria-free-animal room, a poultry room and a storage room.

FIG. 4.14



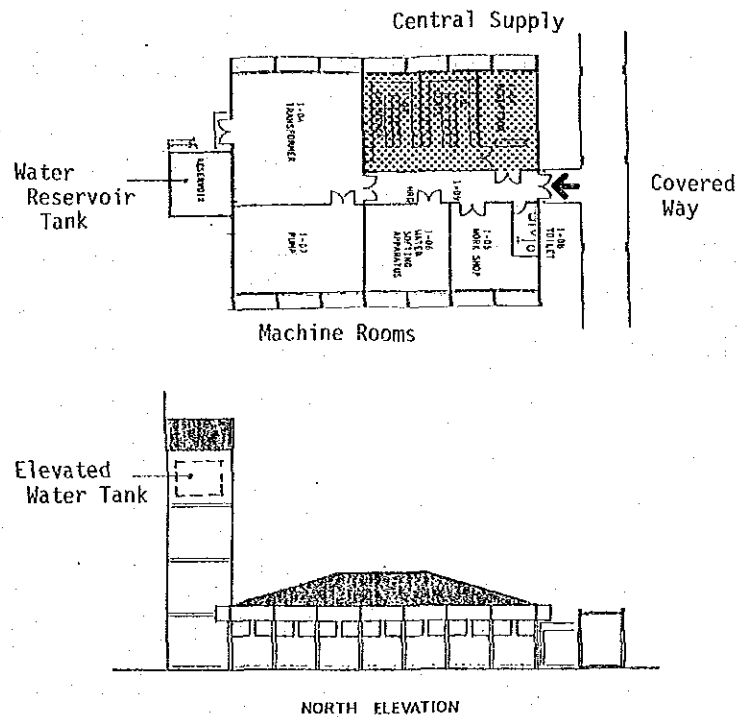
Experimental Animal Quarters

I. Central Supply and Service Building

The centralisation of the purchasing and control of laboratory glassware and of chemicals is at present being put into practice at some of the schools in the University of Zambia.

A glass equipment room and a chemicals room are incorporated in this Building, as well as a transformer room, a workshop, a water softening plant room, a pump room, etc.

FIG. 4.15



J. Covered Way

The Covered Way is a walkway connecting the nine buildings A to I. It is partly single-storeyed, and partly double-storeyed. As well as acting as a passage or walkway for people, it also carries plumbing and conduits for electrical cables and wiring in the ceilings of the lower storey.

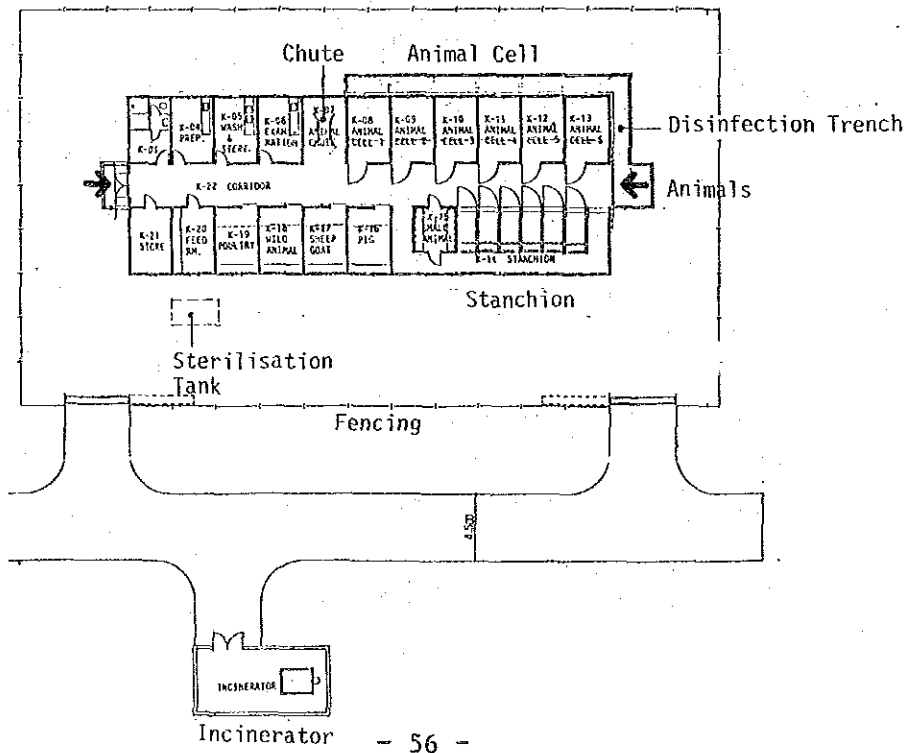
K. Animal Quarantine Building

This building is composed of rooms where newly purchased animals can be kept while their physical condition is observed so that their suitability for experimentation can be judged; where sick animals are kept temporarily while awaiting diagnosis; and where experiments with infectious diseases are performed using ticks and flies.

In order to prevent the entrance of ticks and flies from the outside, insect-proof screens will be installed on both windows and doors, and trenches containing antiseptic solution will be prepared in front of the doors.

The animal cells, K-08 to K-13, where the animals under observation will be kept, will be physically isolated from the rest of the rooms and the corridor of this building, having common walls but no communicating doors, windows, vents or drains. The doors, windows, vents and drains of these cells will open directly to the exterior of the building.

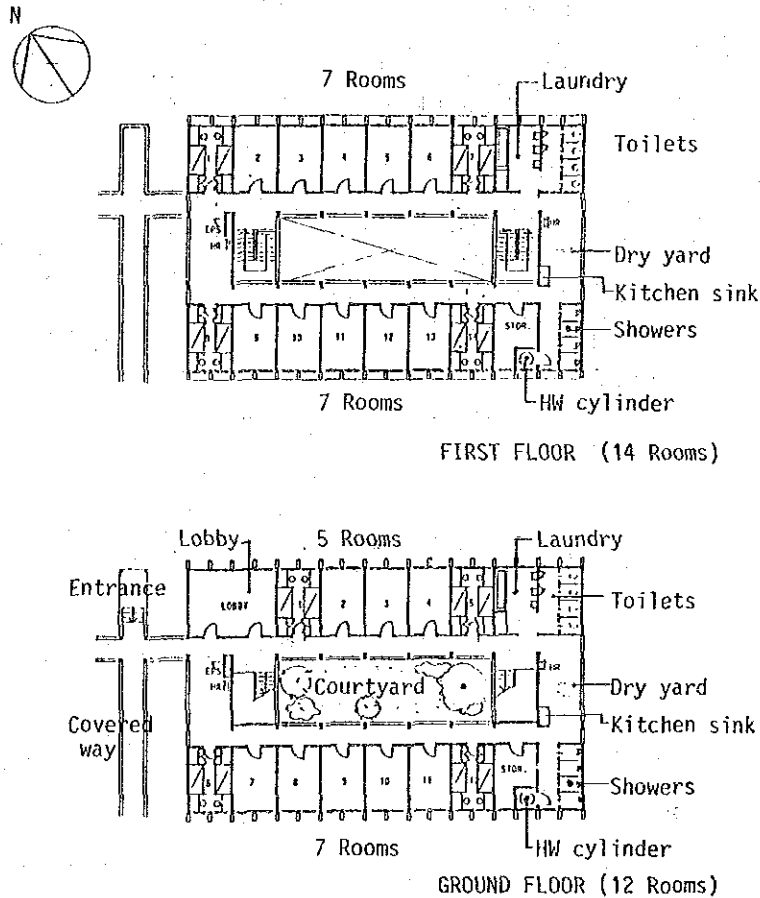
FIG. 4.16



L. Student Hostel

This hostel will be able to accommodate 208 students, representing about 90% of the total number (228). It has been designed as four two-storey buildings, each with the same capacity, connected with each other by a covered way. Each is built around a courtyard which has the students' rooms along its north and south sides, and the toilets, shower rooms and drying area are at the east or the west end of each building. Each room is shared by 2 students, with a bed, a desk and storage space for each. There are in total twenty-six rooms -- twelve rooms on the ground floor and fourteen on the 1st floor -- so that the full complement of students for one hostel building is 52. The other facilities include a lounge and public telephones on the ground floor.

FIG. 4.17



(4) Planning of Construction Materials

Construction materials will be purchased as much as possible in Zambia. However, since the materials that can be purchased with certainty in Zambia are limited to cement, sand and gravel aggregate, concrete products, bricks, asbestos sheeting, etc., the rest of the materials will be imported from other countries.

i) Structural materials

The materials of the main structures are: reinforced concrete for two-story buildings and masonry (brick or concrete block) for single-storey buildings. The local structural techniques are preferred.

ii) Outside Finish Materials

Asbestos sheeting will be used as the roofing material, and brick or (only for the Animal Quarantine Building) concrete block, as the facing material.

The standard types of steel sash will be used.

iii) Inner Finish Materials

In principle, polished terrazzo or vinyl asbestos tiles will be used for flooring; the walls will have a paint finish on mortar; and the ceilings will be of asbestos sheets (local asbestos chipboard). However, the suspended ceilings will be kept down to a minimum except on the 1st floor.

(5) Structural Plan

a. Basic Plan

- 1) The natural features, and the scale, form and purpose of the buildings will be considered in order to find the most appropriate structural design.
- 2) The local conditions of supply of materials, their quality, and local construction techniques will all be taken carefully into consideration in the structural design. As long as they raise no problems, local structural materials and construction techniques will be employed.
- 3) Structural design will be carried out with consideration for the economic factor, for the structural durability of the buildings and for their maintenance.

b. Structural design principles

- 1) The Republic of Zambia Standards (RZS) and/or British Standards (BS) will be used for structural design. Also, Japanese Industrial Standards (JIS) will be referred to partially where necessary.
- 2) Masonrywork will be the main element of the structural system, and for two-storey or long-span buildings, reinforcement will be achieved by the use of columns and/or beams.
- 3) The footing of the building has been designed as a "spread foundation", since the site stands on solid laterite, which is expected to offer ample support.

Though the bearing capacity will be confirmed by boring tests, it is anticipated to be approximately 7.5 t/m².

c. Structural materials

1) Reinforcing bar

Deformed bar of hot-rolled high tension steel ($f_y = 410$ N/mm²) and round steel bar of hot rolled steel ($f_y = 250$ N/mm²) will be used.

2) Concrete

An ordinary type of concrete having $F_c = 20$ N/mm² (Strength after four weeks).

3) Cement

Ordinary Portland cement will be used.

4) Steel materials

Hot-rolled steel ($f_y = 430$ N/mm²) will be used.

5) Bricks

Bricks satisfying RZS and/or BS will be used.

d. Design Load

1) Dead load

Reinforced concrete 2.4t/m³

Structural steel 7.85t/m³

Brick 1.9t/m³

2) Live loads

Classrooms 306 kg/m²

Committee Room (fixed seats) 408

Committee Room (free seats) 510

Corridors, hallways 408

Offices 255

3) Earthquake load

No earthquakes have been recorded in the area in the past, and none are expected in the future.

It is not necessary to take earthquake load into consideration in structural design because Zambia and the surrounding countries are stable from a seismic point of view.

4) Wind load

The average wind velocity is 17m/sec. It can be ignored in the design of buildings such as these, which are no more than two storeys high and are made of brick masonry, stonemasonry or concrete.

(6) Utility Design

1) Design Principles

- (1) Simple operation, easy maintenance and economical running should be the primary considerations in the design of the electrical and mechanical systems of this school, so as to suit not only the local climatic conditions but also the living habits and customs of Zambia.
- (2) The design of electrical and mechanical systems will be performed in accordance with the codes and regulations of the Government of the Republic of Zambia. Where these are not available, the British Standard and/or the Japan Industrial Standard will be referred to.
- (3) Whenever possible, for the convenience of future replacement, the equipment to be selected will be limited to that which can easily be purchased locally or in neighbouring countries.

2) Electric System

Facilities for the School of Veterinary Medicine

(a) Power receiving and transforming system

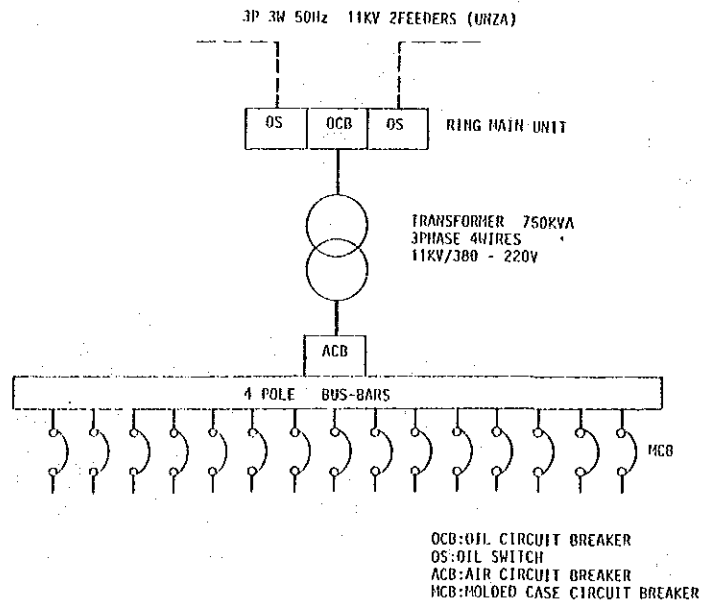
Power will come in at the high voltage intake panel to be provided by UNZA in the Central Supply and Service Building. The supply voltage will be 3-phase, 50 Hz, 11 KV.

The estimated system design loads are as follows, totalling 750 KVA.

Lighting, service outlets	180 KVA
Equipment in experimental and and research rooms	320 KVA
Air conditioning, ventilation and pumps	250 KVA

Power receiving and transforming, one-line diagram (ring circuit diagram to be provided by UNZA)

FIG. 4.18



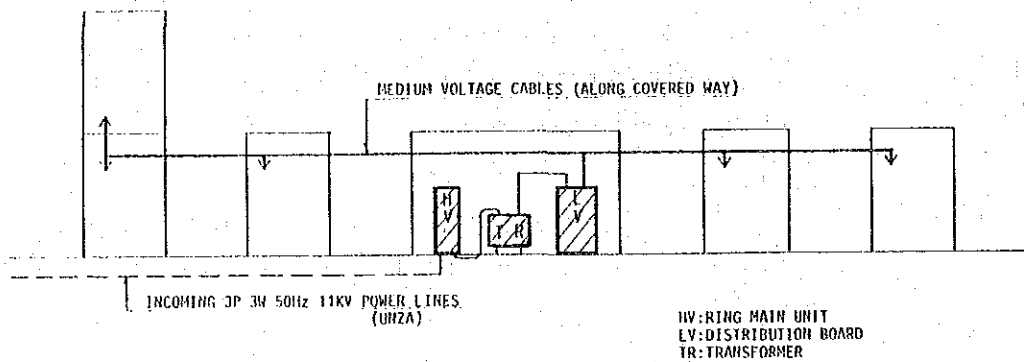
(b) Power Mains

The power mains will be installed from the distribution panels in the Central Supply and Service Building as far as the power control panels and panel boards. Wiring will generally be installed in metal ducts, racks, metal conduits, etc., for the medium-voltage power mains.

Power Supply, Line Diagram

Medium-voltage main route (along ceiling of Covered Way)

FIG. 4.19



(c) Wiring and Conduiting to Motors

Wiring and conduiting from power control panels will be provided to supply power to air-conditioning units, ventilating fans, water discharge pumps, fire fighting pumps, etc. The supply voltage will in general be single-phase 220V for small motors and 3-phase, 3-lines, 380V for other motors.

(d) Lighting and Service Outlets

i) Lighting system

Fluorescent fixtures will be employed, in view of their high efficiency. The average intensities of illumination in the main rooms will be as follows:

Dean's Room and Lecturers' Rooms	300 (Lux)
Experiment and research rooms	300
Teaching and lecture rooms	300
Lecture Theatre	300
Veterinary Library	300
Animal rooms	100
Electricity and pump rooms	150
Toilets and corridors	100

ii) Service Outlets

Service outlets of single-phase 220V with 3-pin plugs with switches are installed at appropriate locations in each room.

iii) Power supply equipment for experimental and research equipment

Large capacity equipment	3-phase, 380V	with circuit breakers
General equipment	single-phase	with service outlets

(e) Telephone system

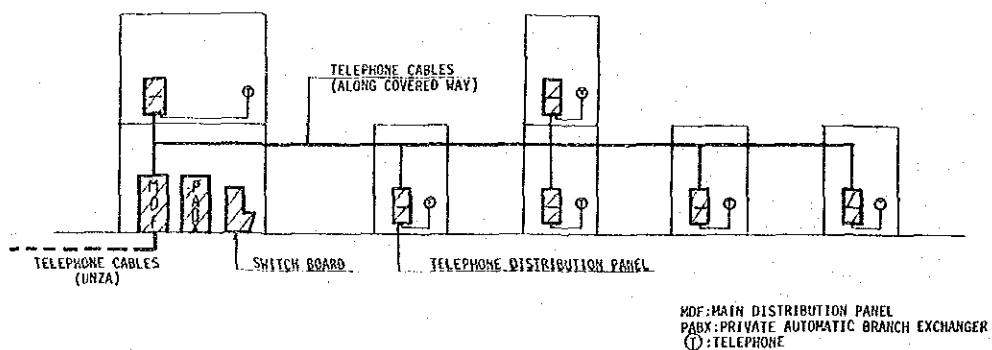
Main lines reach UNZA from the outside at the main terminal board in the University's Central Administration Building. Cables will be laid underground from exchange switchboard to be installed in the School's Administration Building. The School's other buildings will be served with extension lines. Outlets for public booths will be placed in the lobby of the 1st floor of the Administration Building and at a location near the entrance of Veterinary Library.

Plans are being considered by UNZA for changes in the university's telephone system.

- Telephone exchange (Cross-bar type, 100 lines) Installed in the Reception Room of the Administration Building
- Relay panel ditto
- Telephones 80 sets

Telephone system diagram

FIG. 4.20

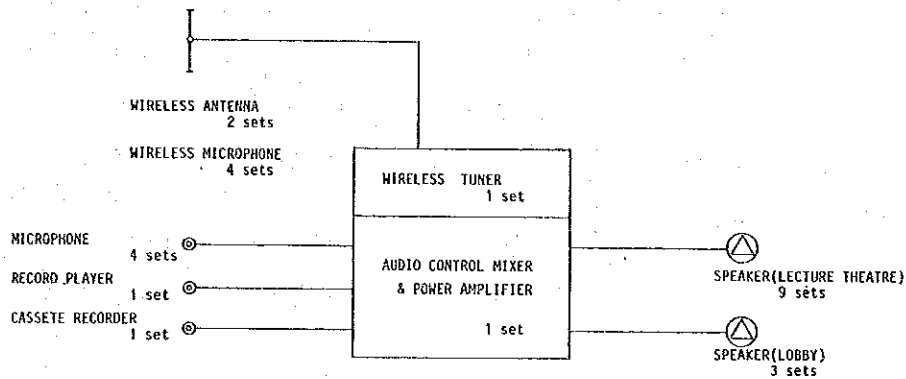


The main input line will be provided by UNZA.

(f) Public Address System

- i) One amplifier set with a microphone and loud speakers, will be installed in the Lecture Theatre.

FIG. 4.21



(g) Electric Clocks

Alternating current clocks will be installed at the following locations.

- i) Lobby and administration office of Administration Building
ii) Reading room of Veterinary Library
iii) Theatre and Lobby of Lecture Theatre

(h) Fire Alarm System

Push-button-type fire alarm switches and alarm bells will be provided at a location near every fireplug in every building.

(i) Lighting Facilities

The roof of each building is equipped with a conductor.

Student Hostel

A three-phase 4-line 380/220V power supply reaches UNZA at the receiving panel of the student hostel. From this panel, the power is supplied to the various buildings of the School through distribution and power regulation panels.

3) Ventilation and Air Conditioning System

School of Veterinary Medicine

(a) Ventilation

Natural ventilation is obtained mainly through the design and arrangement of the buildings. For those rooms requiring inductive ventilation because natural ventilation is difficult or for some other reason, ventilation fans will be provided.

The rooms for which provision of inductive ventilation is planned are shown in the following Detailed Description of Facilities, School of Veterinary Medicine.

(b) Air Conditioning Equipment

i) Remote-type air conditioners are provided in the following rooms:

Administration Building: Committee Room

Veterinary Library: Reading room and specimen display room

The locations of the air conditioners are shown on the attached drawings.

ii) A packaged-type air conditioner is installed in the Lecture Theatre for air-conditioning and ventilation.

The location and installation method are shown on the attached plan.

iii) The indoor temperature is designed to be between 26°C and 27°C when the outdoor temperature is 31.2°C — 31.2°C being the average temperature in October, which is the month with the highest daily temperature in the year.

(c) Cold Storage System

Cold storage equipment will be installed to keep the internal temperature of the cold rooms between 5 — 6°C in the Dissecting & Post-mortem Building and the Disease Control and Clinical Studies Building. Its location is shown on the attached plan.

(d) Steam Boiler

An electric high-pressure steam boiler will be provided to supply high-pressure steam to the autoclave unit in the Sterilisation Room of the Veterinary Hospital.

Student Hostel

(a) Ventilation Equipment

A ventilation system will be provided in the toilets and shower rooms.

4) Sanitary Equipment Plan

School of Veterinary Medicine

(a) Water Intake System

i) From the existing water supply pipe on the University site, piping work to the reservoir tank will be undertaken by UNZA. From the reservoir tank, water is pumped up through water softening equipment to the elevated water tank for distribution by gravity.

The detailed layout of equipment is planned as shown on the attached Water Supply and Drainage System plan.

iii) The estimated amount of water consumed in the School is as follows:

	(persons)	(m ³ /person-day)		
Staff	61	x 0.12	=	7.32 m ³ /day
Administrative Officers	4	x 0.12	=	5.76
Students	238	x 0.08	=	19.04
Experimental and research equipment				55.88

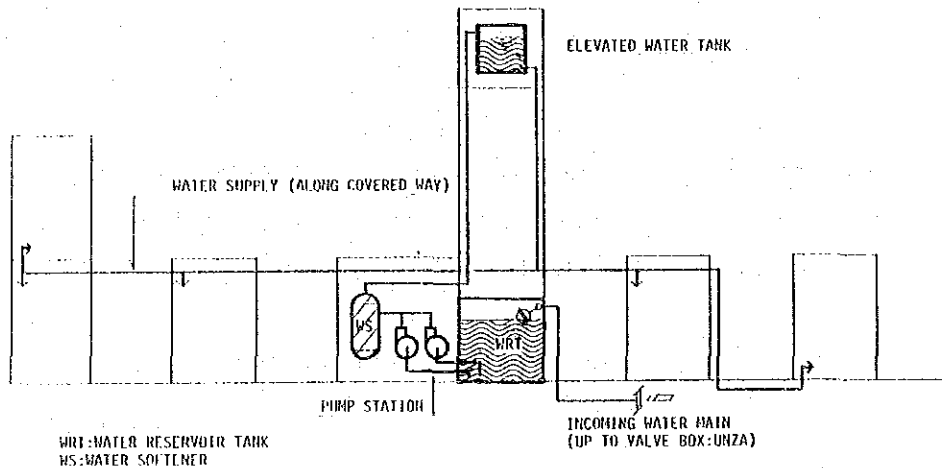
88.00 m³/day

iii) The planned capacity of the water reservoir tank and the elevated water tank are as follows.

Reservoir tank	40 m ³
Elevated tank	15 m ³

Water supply system diagram

FIG. 4.22



(b) Hot Water System

At the necessary locations in the experimental rooms, shower rooms, hot water supply rooms, etc., electric hot water equipment will be installed to provide a hot water supply locally.

The rooms for which local hot water supply is planned are shown on the attached Detailed Description of Facilities, School of Veterinary Medicine.

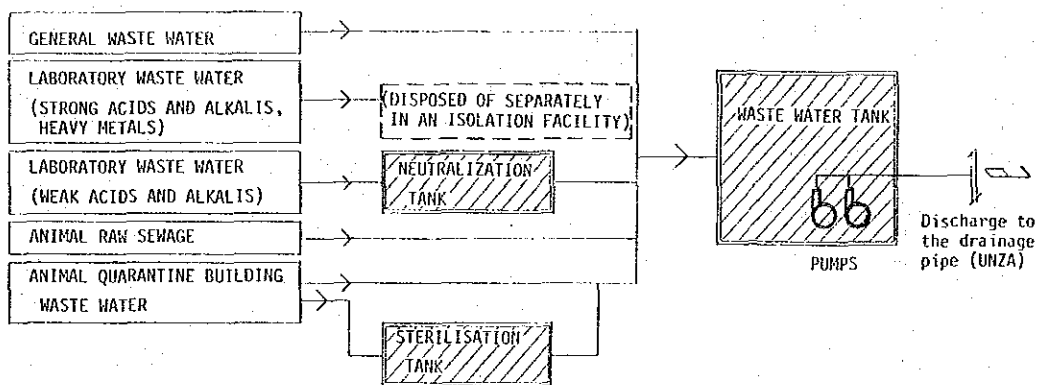
(c) Drainage System

The waste water from the building will be drained through three main lines, viz., sanitary sewerage line, the domestic waste line, and the experimental waste line. These three will be joined at an appropriate point outdoors to carry all the waste together to the drainage pump room on the Site, from where it is then pumped into the drainage pipe provided by UNZA.

For the treatment of water from the Animal Quarantine Building, a sterilizing tank will be installed. The weak acidic or alkaline drain water from the experimental rooms will be treated chemically in a neutralizing tank. The hazardous substances such as radioactive substances, heavy metals, strong acids or alkalis, organic solutions, etc., from the various experimental rooms must be kept separate from the other waste matter from these rooms, and must not be discharged into the above drainage system. The layout is shown on Water Supply and Drainage System plan, attached to this Report.

Drainage system

FIG. 4.23



(d) Sanitary Equipment

The following will be installed:

Toilets: WCs, urinals and washstands
Shower room: Shower heads

(e) Gas Equipment

LP Gas will be supplied as necessary to the experimental rooms, etc. Each building is equipped with gas cylinders. The rooms for which a gas supply is planned are shown in the Detailed Description of Rooms.

(f) Fire-fighting Equipment

Fire-fighting pumps are provided in all buildings and will be connected to the interior fire-fighting plugs installed in every building on each floor.

The locations of the fire-fighting plugs are shown on the attached layout plan.

(g) Incinerator

An outdoor exposure-type oil-fired incinerator will be installed.

Student Hostel

(a) Water Supply System

Water will be supplied to the necessary places through a pipe line connected directly to the water supply pipe installed by the University on the Site.

The layout plan is shown on the attached Water Supply and Drainage System Plan.

The amount of water consumed is estimated to be as follows.

$$208 \text{ residents and personnel} \times 0.1\text{m}^3/\text{person-day} \\ = 20.8\text{m}^3/\text{day}$$

(b) Hot Water Supply System

In the shower and laundry rooms, a partial hot water supply provided by electric hot water equipment is planned.

(c) Drainage System

The waste water from the Hostel buildings will be drained in two lines, viz., a sanitary sewage and a domestic waste line. These will be joined at an appropriate point outdoors, and will discharge into a drainage pipe to be provided by UNZA.

The layout plan is shown on the attached Sanitary Equipment Layout Plan.

(d) Sanitary Equipment

The following sanitary facilities will be installed in the buildings:

Toilets: WCs, urinals and washstands

Shower room: Shower heads

(e) Fire-fighting Equipment

Fire-fighting plugs are installed on each floor of all buildings. Their water supply will be piped from the ordinary water supply equipment pipes. The layout of the fire-fighting equipment is shown on the attached layout plan.

(7) Veterinary equipment

Veterinary equipment for use in the School of Veterinary Medicine must be selected giving due consideration to the present situation of animal health and welfare and veterinary services in Zambia, and to the educational policies, systems, curricula and standards established by the University of Zambia. The standard veterinary equipment (of which a list is given below) has been planned according to the following priorities:

- a. Priority has been given to those items of equipment for activities described in Section 4-1-2, above, that can, according to the educational curriculum, be utilised immediately after the completion of the project.
- b. Consideration for the common use has also been given to the equipment that can be jointly used for the work of more than one field or Department.
- c. The selection of equipment is based on the availability of spare parts and on the degree of ease of operation and maintenance.

The following is a list of types of equipment selected as described above:

1) DEPARTMENT OF BIO-MEDICAL SCIENCES

- a. Dissecting Equipment (various types)
(For anatomical study and research)
- b. Autopsy Equipment
(For post-mortem examination and diagnosis)
- c. Histological Laboratory Equipment
(For micro-anatomy)
- d. Experimental Physiology Equipment
- e. Equipment for Use of Students
- f. Anatomy Equipment
(For small-animal operations)
- g. Embryology and Comparative Anatomy Equipment
- h. Experimental Equipment for Biochemistry
(For chemical analysis)

2) DEPARTMENT OF PATHOLOGY, MICROBIOLOGY AND PARASITOLOGY

- a. Experimental Equipment for Pathology
- b. Comparative Pathology and Histopathology Equipment
- c. Parasitology Equipment (various types)
(For examination, diagnosis and treatment)

- d. Microbiology Equipment
- e. Microbiological Culture Equipment
- f. Equipment for Identification of Bacteria and Viruses
- g. Microbiology and Parasitology Equipment for Use of Students
- h. Washing and Sterilization Equipment

3) DEPARTMENT OF CLINICAL STUDIES

- a. Animal Clinical Equipment
(For large-animal diagnosis and treatment)
- b. Large-animal Surgery Equipment
(For surgical X-ray diagnosis)
- c. Small-animal Clinical Equipment
(For surgical and O.B. use)
- d. A.I. Collection Equipment
- e. Preparation Equipment
(For Large-animal Clinic)
- f. Cattle Equipment
(For cattle experiments, diagnosis and treatment)
- g. Clinical Examination Equipment
(For blood, urine and other body fluid examination and analysis)
- h. X-ray Diagnosis Equipment

- i. Equipment for Use of Students
(For clinical studies)
- j. Equipment for Pigs
(For pig experiments, diagnosis and treatment)
- k. Restraining Stalls (various types)
- l. Consumable Materials Used in Diagnosis and Treatment

4) DEPARTMENT OF DISEASE CONTROL

- a. Diagnosis Equipment for Food Poisoning & Toxic Diseases
(For chemical analysis)
- b. Sero-diagnosis Equipment
(Parasitic, bacterial, rickettsial & viral)
- c. Sero-epidemiological Equipment
- d. Parasitic Disease Diagnosis Equipment
- e. Wild Animal Disease Survey Equipment
- f. Bacterial Disease Diagnosis Equipment
- g. Virus Disease Diagnosis Equipment
- h. Research Laboratory Equipment
(For bio-hazards, dark rooms, sterilization)
- i. Equipment for Students
(For research study)

5) TRANSPORTATION VEHICLES

a. Animal Transport Vehicle (1)

b. Land Rovers (2)

c. Mobile Clinic (1)

6) EDUCATIONAL MATERIALS AND EQUIPMENT

a. Reference Books, Veterinary Literature, Periodicals, etc;
Specimens, Skeletons, etc.

b. Audio-visual equipment

7) FURNITURE FOR LABORATORIES, EXAMINATION ROOMS, CLINICS, ETC.

a. Tables, Cabinets, Sinks, etc., Used in Experiments and Other
Practical Studies and Procedures

FLOOR AREA OF BUILDINGS

In square meters

Buildings	Building foot print m ²	Floor area m ²			Remarks
		Ground Floor	1st Floor	Total	
A Administration Building	666	486	486	972	
B Veterinary Library	315	315	-	315	
C Lecture Theatre	465	397	-	397	
D Veterinary Science Building	905	765	765	1,530	
E Dissection & Post-mortem Building	563	475	-	475	
F Disease Control & Clinical Building	1,400	1,215	1,215	2,430	
G Large Animal Accommodation	378	378	-	378	
G' Covered Area	372	372	-	372	
H Experimental Animal Quarters	324	324	-	324	
I Central Supply and Service Building	377	335	-	335	
J Covered Way	914	914	301	1,215	
K Animal Quarantine	396	396	-	396	
Sub-total	7,075	6,372	2,767	9,139	
L,M,N & O Student Hostel	378x4 1,512	378x4 1,512	1,512	3,024	
Covered Way	91	91	-	91	
Sub-total	1,603	1,603	1,512	3,115	
TOTAL	8,678	7,975	4,279	12,254	