DECLARATION

This Thesis is my original work and has not been presented for a degree in any other University.

NAME OF AUTHOR

MICHAEL GACHIE

This Thesis is submitted as part of the University Examination for the Degree of Master of Architecture.

CHAIRMAN OF DEPARTMENT OF ARCHITECTURE

UNIVERSITY OF NAIROBI.

TABLE OF CONTENTS

ABSTRACT

My thesis is on Agricultural Institute to be presented as part of my final design presentation for the Degree of Master of Architecture.

This report details the development of Nyahururu Institute of Agriculture as a refinement of the study I made at Egerton College, Njoro. It deals with the facilities developed for the training of skilled middle level manpower in Agriculture.

The Institute will function as a self-governing institution or para-statal organisation responsible for initiating, co-ordinating and directing its own programmes. This broad mandate includes the provision of research opportunities, facilities and professional guidance for the study of Agriculture.

This project has served as a useful exercise in dealing with overall, integrated planning, taking into consideration all the design parameters to produce a coherent relationship.

ACKNOWLEDGEMENTS

For his skill, patience and understanding during the design development acknowledgement is gratefully made to Mr. Ehsani, my tutor; for his interest in coherent highly rationalized approach to Architecture and Mr. Bruce Creager from whom I have learned a lot.

Gratitude is also due to Professor Wood for his encouragement and participation in the crits; and to Mr. Stewart Brecher and Mr. James Archer for their crucial appreciation and criticisms when I really needed them.

To the Principal and the staff of the Egerton College, Thanks are also due for permission to make a case study there and especially so to Mr. P.M.M. Kiriro for his kind assistance.

Last but not least I would like to thank the staff of the Nyahururu County Council for the kind assistance with the maps.

INTRODUCTION

Since independence the Government has introduced an ambitious land settlement programme to ensure a more equitable distribution of private farmland by bringing it more into citizen ownership.

Private farming has always been the heart of domestic agriculture. State owned farms are confined to those that provide essential inputs to private farms, such as hybrid maize and improved strains of livestock. Private agriculture takes on virtually all forms of organization, including Co-operatives, Companies, Partnerships and individual farms.

High priority is gone into promoting welfare in the country-side in order to accelerate development and this has seen rise in marketed production of small holdings from K.£12.4 million in 1963 to K.£54.8 million in 1972, raising the share of small farmers in total marketed output from 25 to 52 percent over the decade. This has been achieved partly by the transfer of land from large farmers but equally important the success is intimately related to a modernization process aimed at transforming low productivity subsistence agriculture to high productivity commercially orientated farming.

The principal constraints in agriculture are knowledge, technology and credit. For the purpose of this scheme, knowledge and technology are the issues concerned. Various experimental approaches to agriculture development continue through the Special Rural Development Programme (SRDP) which begun in 1971 and has been testing integrated development. This includes agriculture improvement, credit, extension services, roads, water supplies, health and education. Increased output expected from agriculture can only be produced if more farmers intensify production; plant new crops; use improve seeds, fertilizers and insecticide; imploy better methods of cultivation; adopt improved veterinary practises etc. Very high priority is, therefore, given to the training and extension programmes which are aimed at helping the farming community to take up these better methods.

It is therefore recognized that there is a need to train extention workers and advisory staff to fill suitable posts within the Ministry of Agriculture. Training here is meant to embrace both the long training programmes aimed at providing the trainees with professional and technical skills, as well as, Short-refresher Courses aimed at helping keep the trainees abreast of new ideas, research discoveries and new development of techniques in their field.

The Nyahururu Institute of Agriculture shall therefore have such facilities as are necessary for the development of training of skilled middle level manpower and a vocational school.

The vocational school shall operate as follows:-

(a) The primary role is to induce change and attitude of mind receptive to new ideas among practising farmers and to encourage adoption of better farming systems. To this end , short residential courses averaging one week's duration will be offered.

(b) An inservice training programme# for Junior Agricultural Assistants. The objective is to up-grade the qualifications and capability of the lower level technical staff who are the extension staff most frequently in contact with farmers.

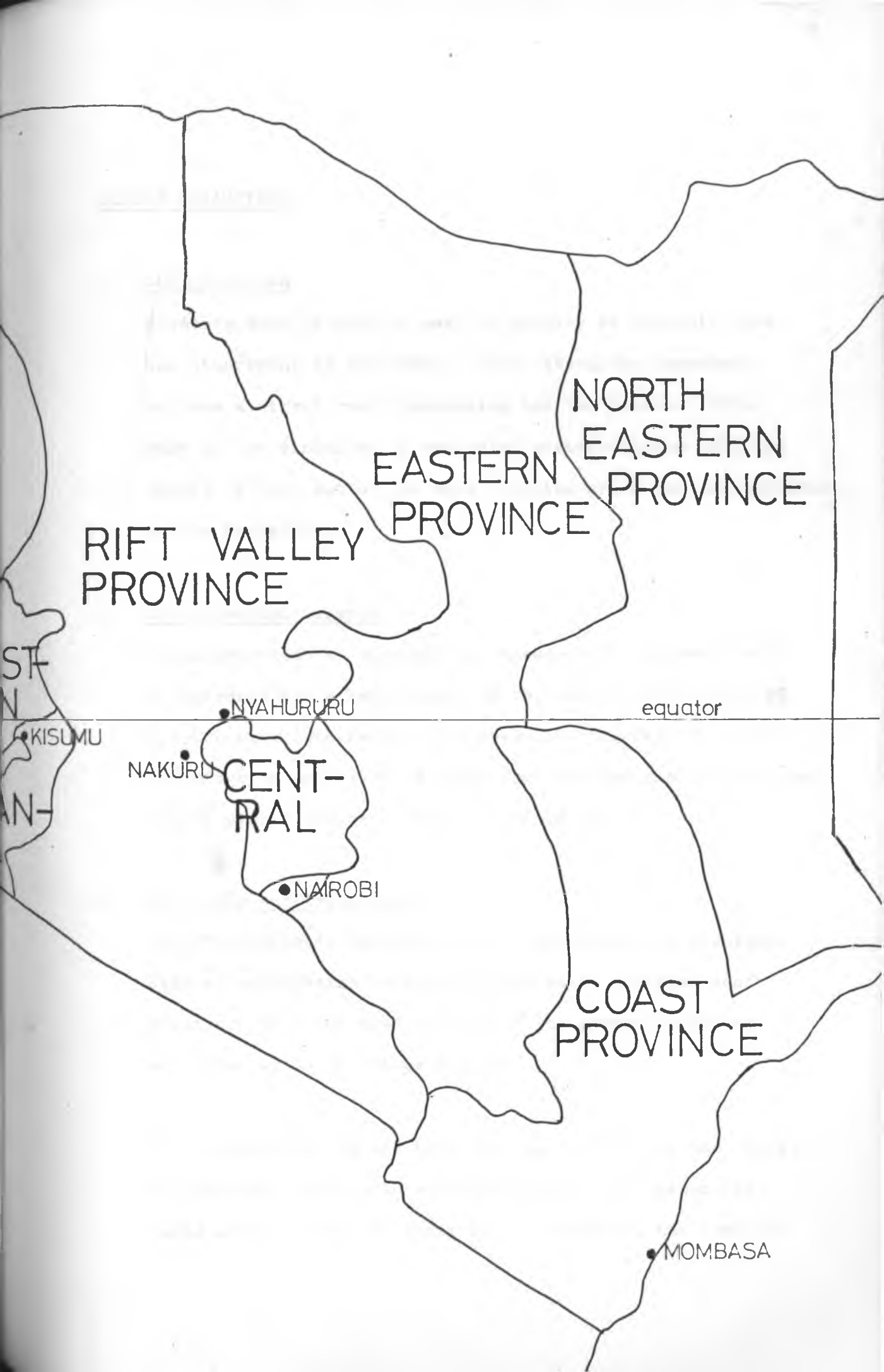
SITE ANALYSIS (Location and General Facilities)

The Institute is to be built in Nyahururu (formerly Thomson's Falls) which is about 130 miles from Nairobi. The town for many years served the farmers in the district as a service centre with a railway station, K.F.A. building, post office, K.C.C. and Government district headquarters. With introduction of settlement schemes, the town is growing rapidly with three Secondary Schools, three Primary Schools and a pencil factory. It is also a tourist attraction centre with a good hotel overlooking the Falls. It has however, remained a major communication centre for both the district of Nyandarua and Laikipia, being the adminstration and government headquarters of the former. The township is situated on the fertile highlands of Kenya (attitude 7747ft. above sea level). In this area the main agricultural occupation is that of diary, mixed farming and ranching although poultry, horticulture and other farming activities are possible.

The site for the Institute is an old golf course that is no longer used. This is on the periphery of the town and has a suburban atmosphere. There could be no difficulty in providing such services as water, electricity and sewer. The relation of the site and its surrounds is good with a church and a Seconary school on each extreme end and residential area on one side.

The site vegetation is grass with trees along the main road.

The land has a gentle slope so drainage is made easy.


NORTH EASTERN PROVINCE
EASTERN PROVINCE
RIFT VALLEY PROVINCE
NYAHURURU
equator
KISUMU
NAKURU
CENT-RAL
NAIROBI
COAST PROVINCE
MOMBASA

DESIGN PARAMETERS

1. Communication

Students must be able to move as quickly as possible from one department to the other. It is therefore important to have a direct route connecting the two places. This must not be disturbed by vehicular movement hence vehicles should be kept out of the main teaching areas and concentrated on the periphery.

2. Environmental Aspects

It is important to sunshade the spaces where students will be gathered for a long time. By the nature of the type of construction (see below) a north-south orientation of the buildings is necessary in order that the sun shading devices (stone piers) may be kept at a minimum size.

3. Materials and Technology

Locally available materials to be used as far as possible. Simple construction technique to be used. Pitched roof construction to be used to reflect the general character of the existing buildings around.

The construction of the buildings is dictated by the choice of materials to be used - stone masonary and timber (see table of materials, Appendix I). To minimize the cost of

construction it is necessary to use the locally available materials as far as possible. I have therefore decided to use mainly load bearingwalls as the main structural parameter and masonary piers to stablize the structure. The piers shall also act as horizontal sun breakers. Reinforced concrete columns are to be used where obsolutely necessary. Vertical sun protection is to be done by means of overhang. The idea is to produce cheap acceptable design which requires minimum maintenance and semi-skilled labour to construct.

4. Social Aspects

This deals with the social aspects of the students only since it is not possible to include the general population in an Institution of this nature expect when they are invited to watch a play in the multi-purpose hall. The social aspects for the students will generally be in form of open outdoor spaces and cafeteria where students can meet and have discussions while waiting to move to the next place.

5. Planning

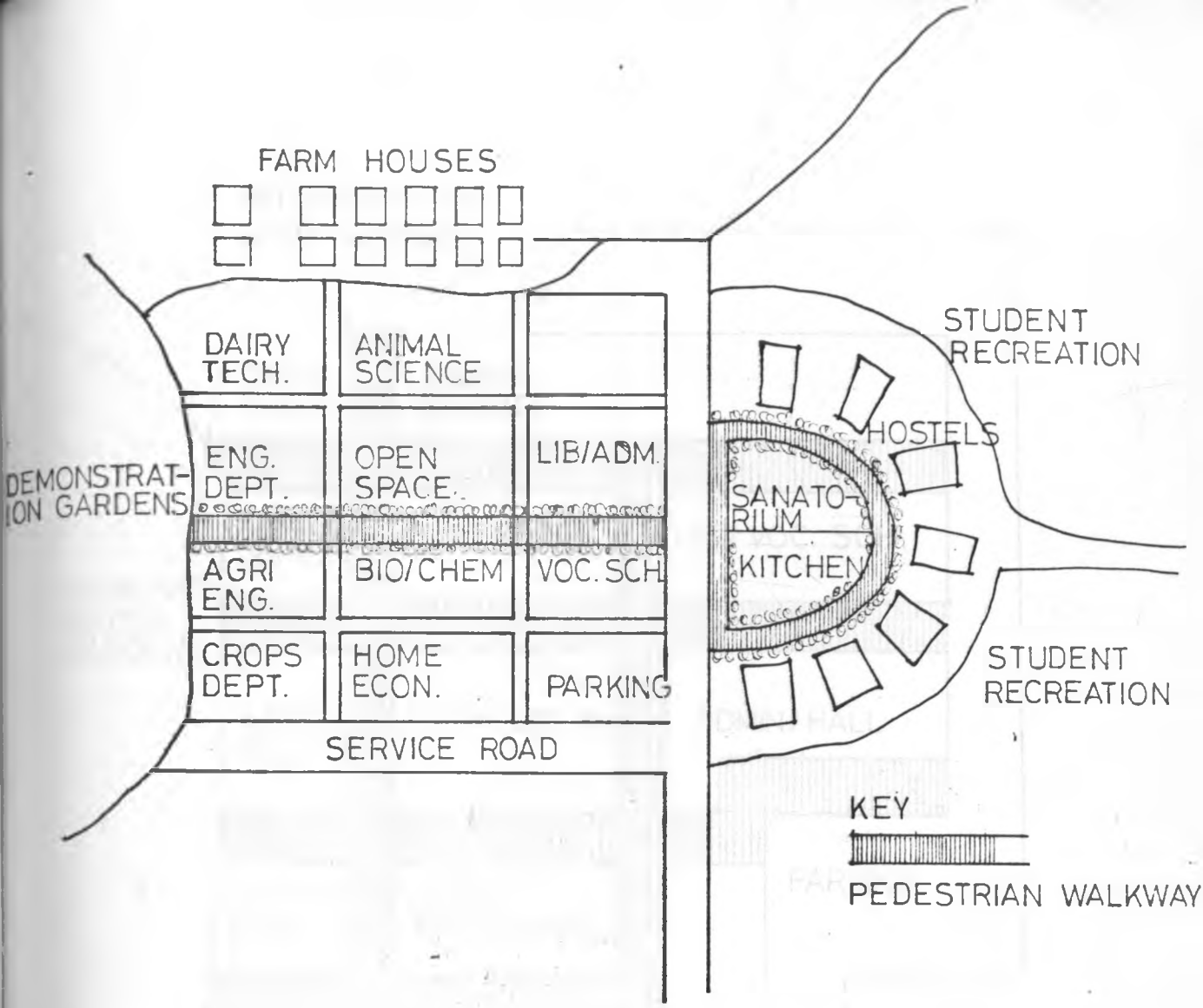
Functions which can tolerate a higher noise level can be placed near the major walkway while those that require quite be placed farther away. Great care must be taken in planning because also the most important functions require to be near the major walkways. As I have said earlier in the section of

communication direct routes from one place to the other are necessary and therefore the spaces about them should be directional ie. tending to flow into the next space. One major aspect of an institution of this kind is that the institution buildings must be well placed in relation to the demonstration gardens which are very vital to the teaching of Agriculture.

DESIGN CONCEPT

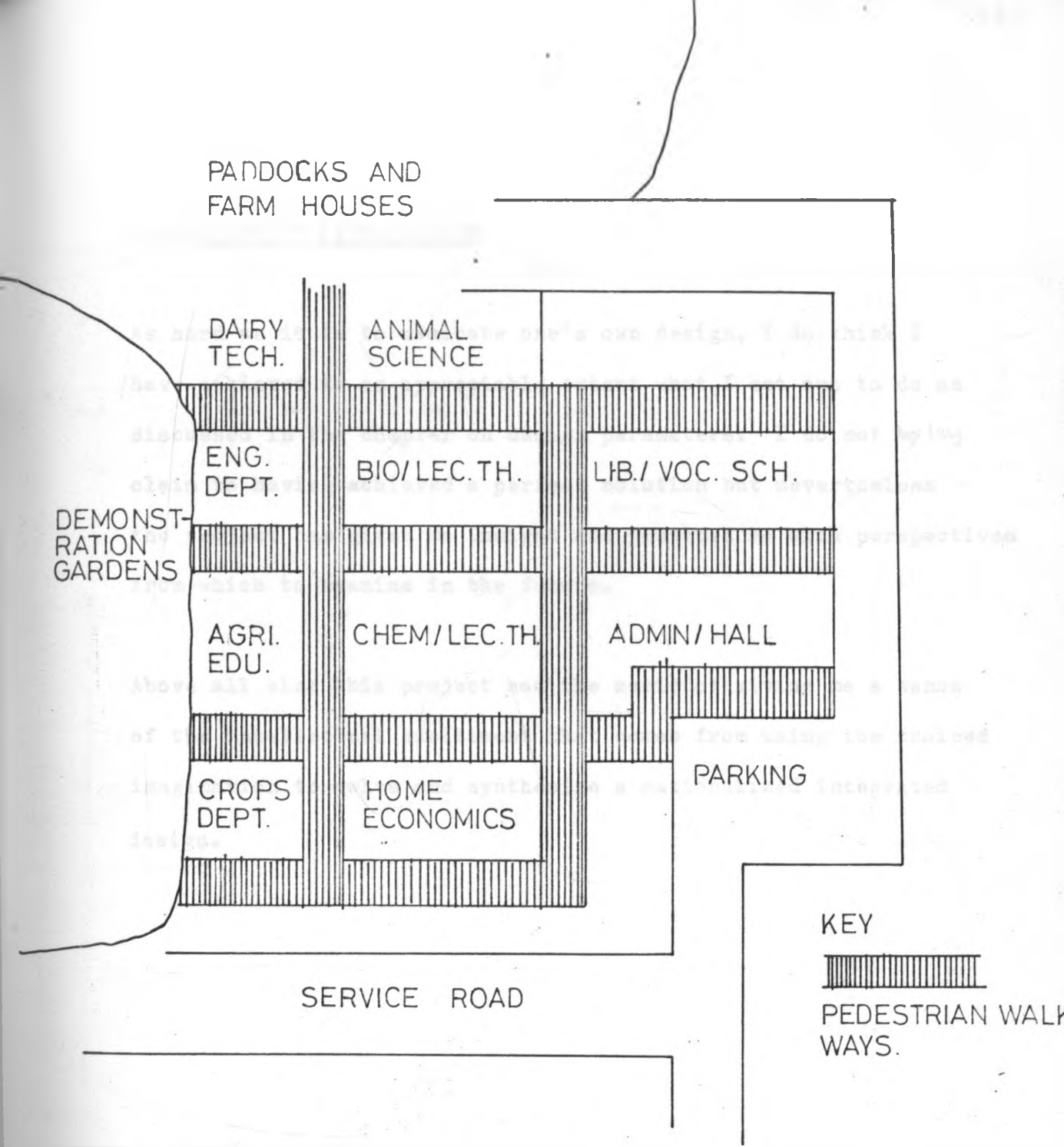
The design shall be primarily based on function and well related to the site. In addition it shall be well restrained and simple using the local materials available (namely natural stone blocks and timber) as much as possible. The emphasis shall lie not in the isolated building but in that building and its relationship to the space and nature about it. The overall impression shall lie not so much in individual greatness as in collective excellence aiming at achieving the ultimate union of architecture, planning and landscaping each working for the fullest impression of the esthetic and recreational values of the natural environment.

It is important to retain the general impression of the rural areas so that the buildings must be isolated physically from each other but the spaces about them must be integrated in such a way that they give an overall cO-ordinated design which works as one. (see next page)



One major pedestrian walkway to be provided passing through the major activities of the Institute. The less important activities to be located behind the major ones.

The departments of Agriculture Engineering, Crops and Agriculture Education to be located next to the demonstration gardens . The departments of Dairy Technology and Animal Science to be located near the farm houses and dairy. (See performance specification)



Direct system of circulation necessary to save time in moving from one place to the other. Vehicular circulation concentrated on the periphery.

EVALUATION OF FINAL DESIGN

As hard as it is to evaluate one's own design, I do think I have achieved to an appreciable extent what I set out to do as discussed in the chapter on design parameters. I do not ~~lay~~ lay claim to having achieved a perfect solution but nevertheless the project has given me insight and provided me with perspectives from which to examine in the future.

Above all else this project had the merit of giving me a sense of the intellectual excitement that comes from using the trained imagination to solve and synthesize a rationalized integrated design.

APPENDIX I

TABLE OF MATERIALS

BUILDING COMPONENT	MATERIALS	AVAILABILITY	APPLIED CONSTRUCTION	MAINTENANCE	DURABILITY
FOUNDATIONS	Stone Masonary	Abundant	Easily Constructed	None	Good
FLOORS	Concrete	Abundant	Easily Constructed	None	Good
FLOOR Finishes	Cement Screed	Abundant	Easy	Little	Good
WALLS	Masonary	Abundant	Easily Constructed	None	Very good
OPENINGS (WINDOWS)	Steel Framed glass	Available	Semi Skilled labour	Low	Very good
(DOORS)	Timber	Abundant	Semi Skilled labour	Paiting required	Good
ROOF STRUCTURE	Timber	Abundant	Semi Skilled labour	None	Good
ROOF COVERING	Claytiles	Readily available	Semi Skilled labour	Little	Good

APPENDIX II

PERFORMANCE SPECIFICATION (Special Consideration)

1. Vehicle Access and Parking

Vehicles to be kept out of the main teaching area and concentrated on the periphery. This will ensure a save free pedestrian flow. Ample parking space near the administration and multi-purpose hall for staff and visitors.

2. Pedestrian Circulation and Site Treatment

Direct routes for pedestrian flow necessary to save time when moving from one point to another. They pass trhough a series of transitional spaces hence different visual and physical treatment for such spaces to give a variety. The spaces must not have a feel of confinement so that one must be able to see the other space.

3. Storage and Security

Storage spaces to be provided in each department. Special care must be taken in designing storage spaces which are particularly important e.g. drug store, stationary store etc. such that they cannot be broken into easily.

4. Administration and Library

These have a close co-operation for reasons of administration.

The library must be well situated to serve both the students, teaching staff and non-teaching staff. The library comprises of:-

reading space and book shelves
left clook
catalogue area
counter
process room where books can be sorted out
librarian and secretary offices and store.

The administration comprises of:-

staff-room with kitchen and store
conference room ample waiting space and reception
offices for the principal
deputy principal and their secretaries
offices for the executive officers
games officer
registrar and secretary
dean of students and secretary
finance officer and secretary
accountants office
cashier's office
audit and salaries offices plus appropriate - store spaces.

Total area 1200 sq. m.

5. Multi-purpose Hall

Its functions shall be assembly, indoor games, plays and social gathering. It shall be clearly visible to visitors such that they would not have to ask where to go when invited to attend a play or social gathering.

Total area 500 sq. m.

6. Vacational School.

Shall comprise of the following:-

display space for pin-ups
pictures and farm models
lecture room
seminar room
work room
offices for the head of school and his secretary
staff room.

The school shall be situated near the administration block for conviniency of the visitors and the teaching staff.

Total area 380 sq. m.

7. Animal Science Department

Shall have the following facilities:-

Animal areas for treatment and exhibition of animals
laboratory
preparation room, storage for animal feed
equipment and drugs
staff room
offices for head, deputy and secretary.

Since these are the people concerned with animals, the department shall be located near the farm houses and the paddocks.

Total area 480 sq. m.

8. Agriculture Engineering Department

Shall have a good access to the demonstration gardens.

It comprises of the following:-

staff room
offices for head, deputy and secretary
demonstrator's office
water conservation classroom with equipment
two drawing classrooms
electrical and physics laboratory
survey equipment store
general stores for steel and wood
welding workshop
wood workshop
tractor repair workshop and cutting workshop
compressor room
tools store.

Total area 900 sq. m.

9. Home Economics Department

Shall have spaces for the following:-

project rooms
classroom
tie and dye
cooking space for 10 students
storage for materials
microscopes and needles.

The course taught is related to the diploma in Agriculture hence close relationship with Crop Department.

Total area 960 sq. m.

10. Crops Department

Shall be situated near the demonstration gardens for ease of operation. Also related to the department of Home

Economics and Agricultural Education. It shall have staff room, offices for head, deputy and secretary and two classrooms and a store.

Total area 290 sq. m.

11. Agriculture Education Department

Related to the crops department, shall have two classrooms, staff room, offices for head, deputy and secretary including store.

Total area 290 sq. m.

12. Dairy Technology Department

Shall be well connected to the dairy for easy transportation of milk. It shall have the following facilities:-

machine room where the work is done
classroom
research hall
refrigeration room
boiler house
cheese room
butter cold room
urgridient store and cheese store
staff room
head and secretary's office
demonstrator's office.

Total area 500 sq. m.

13. Chemistry Department

This is a central facility to be used by all students hence situated in a central position. It shall have two laboratories for teaching nutrition and two for soil science, gas plant to be used also for Biology department, fume and furnace cupboards, preparation rooms, glass and chemical store balance room, staff room and offices for head, deputy and secretary.

Total area 1200 sq. m.

14. Biology Department

This is also a central facility for all students. It shall have laboratories for the following subjects:-

Botany
Zoology
Microbiology Entomology & Parasitology.
Store for microscopes, glass and chemicals,
Staff room and offices for deputy and secretary

Total area 1200 sq. m.

15. Lecture Theatres

These too are central facilities and shall be integrated with the Chemistry and Biology Departments.

APPENDIX III

SCHEDULE OF ACCOMMODATION (General Consideration)

1. Student Anemities

The Institute is designed for 400 students with a projection of up to 600 students. There is ample space for more buildings to be put up with an outward expansion. Outdoor reaction spaces and games facilities are provided.

2. Medical Services

A sanatorium to be build with two doctors and nursing staff. Ward facilities to be provided.

3. Staff needs

To have a Staff Common Room in the administration block and staff rooms in each departmental building. The staff shall be housed in the residential area near the Institute.

4. Administration and General Services

This includes the administration block, library and multi-purpose hall. These shall cater for the non-teaching staff, teaching staff and students.

5. Facilities

These include:-

(a) Modern and well equipped laboratories for the teaching of Agricultural Science - Botany, Zoology, Microbiology, Entomology, Parasitology, Soil Science and Nutrition.

(b) A wide range of agricultural machinery and equipment for effective training in agricultural mechanisation, farm building design and soil and water conservation.

(c) A comprehensive stock of modern audio-visual aids for use in training students to become good teachers and extension workers in the field of agriculture.

5. Farms and Finance

Two farms shall be developed, one being the demonstration Unit where the Institute buildings are situated and the other as the Commercial Farm. The Demonstration Unit will serve as the main teaching and experimental farm with many crops and animal enterprises including wheat, barley, oats, maize, potatoes, sunflower, dairy cattle, sheep, goats, poultry, pigs, rabbits, and bees. Many enterprises are included to ensure that students gain the necessary knowledge of the different types of farming available today. A large portion of practical skills training and investigation techniques for the students will be carried out within the Demonstration Unit.

The Commercial Farm will be kept strictly on commercial lines and serves the purpose of generating revenue for the Institution. Students will also use the facilities for practical training by special arrangement between the teachers and the Farm Manager.

APPENDIX IV

DIPLOMA PROGRAMMES

Each diploma programme represents a specialization within the agricultural industry, and a three year course is designed to produce a middle level personnel capable of handling extension and advisory work in a district.

The courses are integrated in such a way that the amout of agricultural science, crop production, animal production, agricultural engineering, agricultural economics and agricultural education covered depends on the type of specialisation and work of the diplomate in industry. The following three-year diploma programmes will be offered:-

(a) Diploma in Agriculture

Prepares students for service in general aspects of agriculture with a marked bias on crop production under East Africa conditions.

(b) Diploma in Agriculture and Home Economics

This is a programme designed for preparing qualified women extension workers for rural areas. The content of the course is approximately 60% general agriculture and 40% Home Economics.

In home economics the areas covered include, nutrition, family life, education, house management, clothing, housing and home improvement.

(c) Diploma in Agriculture Education

Aspecialized programme for preparing teachers of agriculture in schools, institutions and Farmers Training centres. It embraces all aspects of Agriculture as well as teaching methods. During their training, the students will spend at least three months in supervised teaching practice in Secondary Schools.

(d) Diploma in Agriculture Engineering

Prepares for a career in Agricultural Mechanisation and soild and water conservation services. It is a very specialized programme covering all aspects of agricultural Engineering.

(e) Diploma in Animal Husbandry

A specialized programme for preparing extension workers in all aspects of animal production and disease control.

(f) Diploma in Diary Technology

The diplomates from this programme are trained specifically for managerial posts in dairy plants and factories.

Their training covers all aspects of plant management, accounts, engineering, and quality control of all dairy products. The course is highly specialized and has very little in terms of general agricultural extension.

(g) Diploma in Farm Management

This programme has a lot in common with the Diploma in Agriculture but with emphasis given to Agricultural economics, Farm management and Agri-business.

APPENDIX V

REFERENCES AND BIBLIOGRAPHY

1. Statistics and agricultural policy - Kenya Development Plan 1971 - 1974.

2. General Agricultural problems related to education:-

   (a) The Work Performance of Junior Agricultural Extension Staff in Western Province I.D.S. Division Pages No. 109

   (b) Organizational Structure for Productivity in Kenya Agricultural Extension I.D.S. Division Pages No. 154.

3. I.D.S. Publications

   J.W. Harbeson - Land Resettlement and Development Strategy in Kenya.

   J.W. Harbeson - Land Resettlement and the Politics of Rural Development.

   B.F. Smith - Farm Management in Present Agriculture

   L.D. Smith - Some Possible Policy Issues for Kenya Agriculture.

4. Research - Done in Egerton College, Njoro

5. Diploma programmes and requirements
   - Egerton College Catalogue.