

**Preliminary Design  
for  
The Jomo · Kenyatta College  
of  
Agriculture and Technology**

September 1978

Japan International Cooperation Agency

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78-27

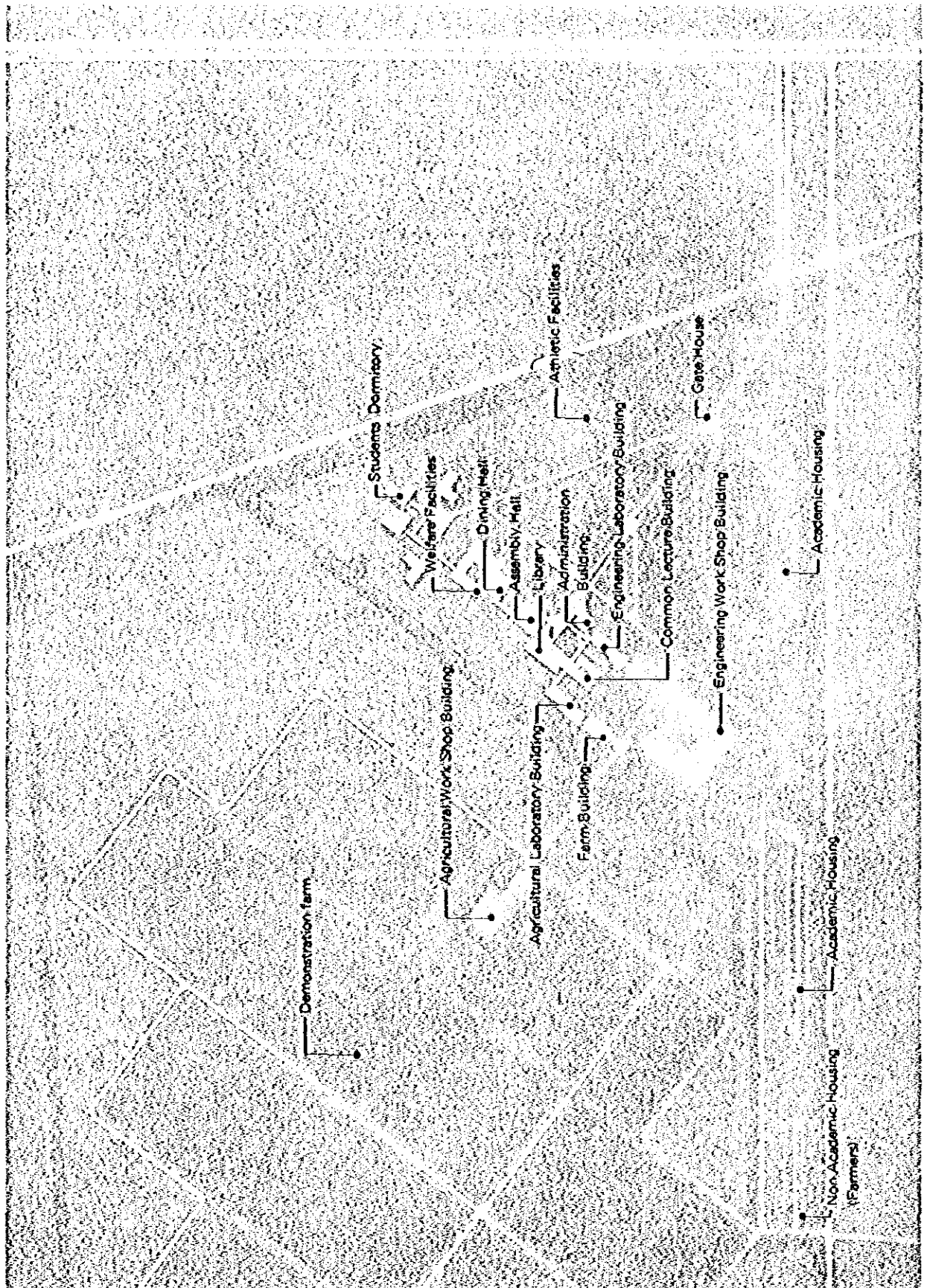


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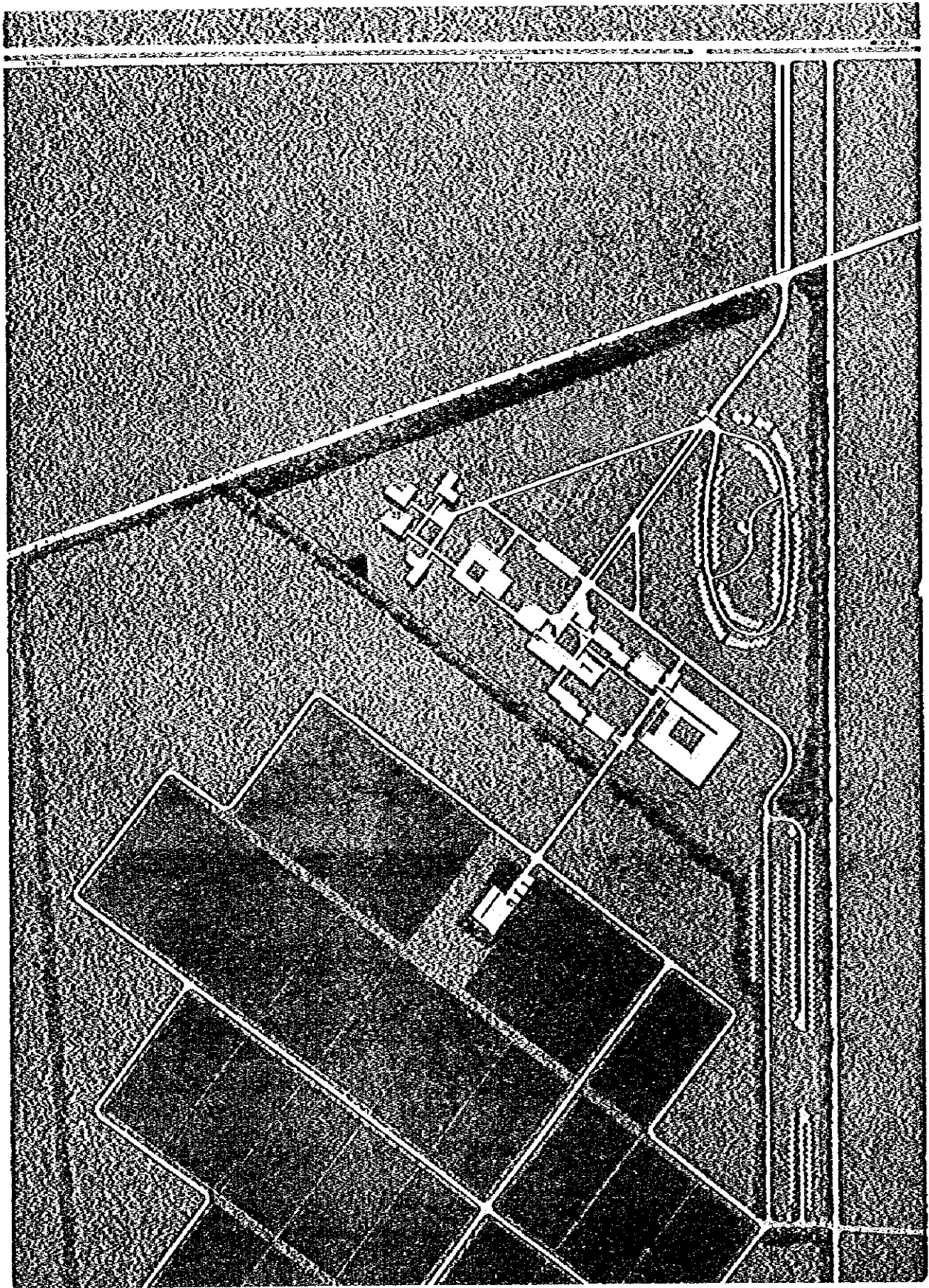
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MODEL OF PROPOSED COLLEGE





MODEL OF PROPOSED COLLEGE





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 to death, 10 invasion of Southern Lebanon  
 litary included. See also — Back Page.

# Mzee donates project site

**PRESIDENT** Kenyatta has donated a site for the Sh. 200 million Kenyatta Agricultural Institute.

The land is at Juja in Gatundu. Construction of the institute is expected to start next January.

This was disclosed yesterday by the Chairman of the project Mr. Ngugi Muigai, when he conducted a nine-

man Japanese mission around the site yesterday afternoon. The purpose of the mission is to prepare a master plan for the project. It is a follow-up mission to the one which called on Mzee in December.

Mr. Muigai said the Institute would be built in two phases, the first admitting 120 students. The project is being financed by the Japanese government. The mission is led by Prof. C. Uenosono of the Faculty of Engineering, Kyoto University. It includes Prof. Fukuda and Prof. Iwasa of the Okayama University, Faculty of Agriculture and five architects. Also present were senior officials from Kenya's Ministry of Education and the Survey of Kenya, who have already mapped the site.

## S SUSPECT

of allegedly stealing \$88,000 from a Nairobi court to award extradition. Magistrate Mr. Robinson Abdou an authenticated warrant from Mr. — a Ugandan citizen. After by objection to the demand, King said. There were two of 11. KTV vps

President Donates a site for the project.

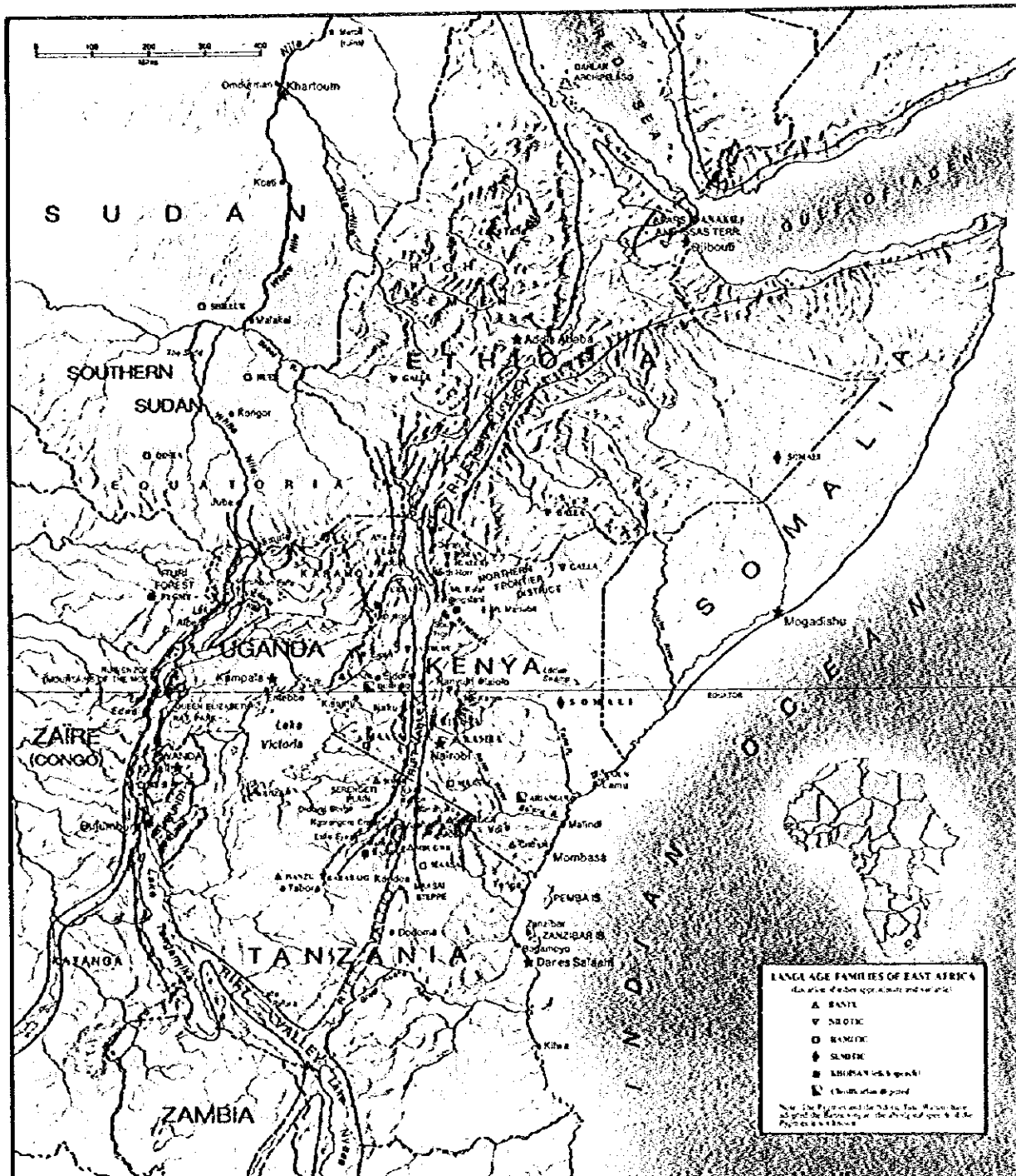


Signing the Minutes at the Conference Room in the Ministry of Education on March 18, 1978.



Signed by Mr. Uenosono, Leader of the Japanese Survey Team and Mr. Wairagu, Chairman, Deputy Secretary Ministry of Education





MAP OF KENYA



## PREFACE

In compliance with the request from the government of the Republic of Kenya, the government of Japan decided to take up a preliminary survey necessary for the designing of the project to construct the Jomo Kenyatta College of Agriculture and Technology, and the Japan International Cooperation Agency (JICA) has conducted the survey.

JICA dispatched a survey team to Kenya for the period from the 9th to 21st of March 1978.

The survey was conducted satisfactorily, thanks to the full cooperation extended by the Kenyan government. After returning to Japan, the team has compiled a report based on the findings of the survey and the discussions with the officials concerned of Kenya.

I hope the report now being submitted will contribute to the progress of the promotion of friendly relationship between Kenya and Japan. I express my deep appreciation to the officials concerned of the Kenyan Government for their full cooperation extended to the survey team.

September 1978



Shinsaku Hogen – President

JAPAN INTERNATIONAL COOPERATION AGENCY



## CONTENTS

MODEL OF PROPOSED COLLEGE

AGREEMENT, SIGNATURE

MAP OF KENYA

PREFACE

CONTENTS

<b>CHAPTER 1. DISPATCH OF THE SURVEY TEAM</b> .....	<b>1</b>
1-1 Purpose of the Survey Team .....	1
1-2 Member of Japanese Preliminary Design Survey Team .....	2
1-3 Representatives of the Republic of Kenya .....	3
1-4 Minutes .....	5
<b>CHAPTER 2. OUTLINE OF THE PROJECT</b> .....	<b>11</b>
2-1 Organization for this Project .....	11
2-2 Educational Objectives of the College .....	12
2-3 Student Enrollment and Duration in Years .....	13
2-4 Organization of Teaching Staff .....	14
2-5 College organization of Staff Allocation .....	16
2-6 Outline of Educational Program .....	18
<b>CHAPTER 3. MASTER PLAN</b> .....	<b>21</b>
3-1 Site Surroundings .....	21
3-2 Zoning .....	21
3-3 Master Plan .....	22
<b>CHAPTER 4. PLANNING OF FACILITIES</b> .....	<b>25</b>
4-1 Outline of the Facilities .....	25
4-2 Fundamental Work Plan .....	26
4-3 Contents of Facilities .....	27
4-4 Architectural Planning .....	29
4-5 Materials Plan .....	31
4-6 Structural Planning .....	33
4-7 Air Conditioning and Ventilation System Planning .....	33
4-8 Plumbing System Plan .....	34
4-9 Electrical System Plan .....	36
4-10 Environmental Improvement .....	38
4-11 Demonstration Farm Planning .....	39
<b>CHAPTER 5. PRELIMINARY DESIGN</b> .....	<b>43</b>
<b>CHAPTER 6. TEACHING EQUIPMENTS</b> .....	<b>68</b>
<b>CHAPTER 7. DEMARCATION OF CONSTRUCTION</b> .....	<b>69</b>
<b>CHAPTER 8. DESIGN AND CONSTRUCTION SCHEDULE</b> .....	<b>71</b>





## CHAPTER 1. DISPATCH OF THE SURVEY TEAM

### 1-1 Purpose of the Survey Team

In reply to a request from the Government of Kenya of establishment of Jomo Kenyatta College of Agriculture and Technology for assistance, and as a result of the preliminary survey visited the Republic of Kenya in the middle of November 1977, Japan International Cooperation Agency dispatched a preliminary Design Survey Team to execute this project.

The purpose of the survey had two major objectives, one concerned with the academic planning for curriculum, teaching training, and the other with physical planning for master plan and educational facilities.

In addition to the large task of establishing a new college, this project was considered especially complex in view of the fact that both the Ministry of Education and Ministry of Agriculture will take control the new educational programs under the education system of Kenya.

This college therefore, would be figured out something entirely new in Kenya's educational experience. In the survey then, stress was placed on the curriculum and other college educational programs rather than on actual physical considerations such as construction. At the same time, a study was also carried out of the college administration and management organizations.

The results of the survey are summarized in Chapter 2 and it will be found that they are considerably different from the preliminary survey.

In the survey for the preliminary design of the college buildings, it should go without saying that the academic planning were the vital factors in the physical planning. According to the requests of the preliminary survey team, the project site was examined in detail and this site investigation was analyzed carefully.

In addition, data necessary to estimate construction costs were also collected. Furthermore, the level of workmanship available in local was considered and a study was made of the construction period, according to the survey programs elaborated in advance by the survey team.

## 1-2 Member of Japanese Preliminary Design Survey Team

- Dr. Chikasa Uenosono . . . . . Team Leader  
Professor of Faculty of Engineering  
Kyoto University
- Dr. Minoru Fukuda . . . . . Education of Agriculture  
Professor of Faculty of Agriculture  
Okayama University
- Dr. Junkichi Iwasa . . . . . Education of Food Processing  
Professor of Faculty of Agriculture  
Okayama University
- Mr. Hiroshi Kai . . . . . Coordination  
Social Development Cooperation Department  
Japan International Cooperation Agency (JICA)
- Mr. Ken-ichi Yoshida . . . . . Design Management  
Director  
Architectural Design Department  
Kume Architects – Engineers
- Mr. Takeshi Ono . . . . . Architectural Design  
Architect  
Architectural Design Department  
Kume Architects – Engineers
- Mr. Hidefumi Inoue . . . . . Quantity Survey  
Architect  
International Department  
Kume Architects – Engineers
- Mr. Sadakazu Ogawa . . . . . Mechanical Engineering  
Architect  
International Department  
Kume Architects – Engineers
- Mr. Masao Iida . . . . . Structural Engineering  
Engineer  
International Department  
Kume Architects – Engineers

### 1-3 Representatives of the Republic of Kenya

Following representatives of the Republic of Kenya are designated to work with the Japanese survey team.

#### 1. Ministry of Education:

Mr. P. J. Gachathi . . . . .	Permanent Secretary
Mr. J. H. Wairagu . . . . .	Deputy Secretary
Mr. P. W. Muthoka . . . . .	Under Secretary
Mr. E. A. Wangai . . . . .	Senior Education Officer Technical Education
Mr. S. Ndirangu . . . . .	Education Officer Planning Unit
Mr. E. A. A. Luchemo . . . . .	Education Officer Facilities Unit
Mr. Mbiyu Kariuki . . . . .	Education Officer Technical Assistance Unit
Mr. D. B. Shah . . . . .	Head of Electrical Engineering Department Kenya Polytechnic
Mr. W. Kirkwood . . . . .	Head of Mechanical Engineering Department Kenya Polytechnic
Mr. M. M. Nganga . . . . .	Head of Building & Civil Engineering Department Kenya Polytechnic
Miss M. W. Mundara . . . . .	Head of Institutional Management Kenya Polytechnic
Prof. Karue . . . . .	Dean of Agriculture Nairobi University

#### 2. Jomo Kenyatta College of Agriculture and Technology Implementation Committee (referred to below as the College Implementation Committee)

Mr. Ngengi Muigai . . . . .	Chairman The College Implementation Committee
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**3. Ministry of Agriculture**

- Mr. P. K. Gota ..... Director of Agriculture
- Mr. G. O. Ogola ..... Manpower Development Officer
- Dr. P. T. Obwaka ..... Principal  
Egerton College
- Mr. C. R. J. Miaga ..... Soil Conservation Engineer
- Mr. B. W. A. Odhiambo ..... Horticulture Lecturer  
Egerton College
- Mr. P. A. M. Misiko ..... Head of Engineering Department  
Egerton College
- Mr. M. N. Maina ..... Head of Land & Farm Management Division

**4. Ministry of Works:**

- Mr. Hindo ..... Deputy Chief Architect
- Mr. P. E. Kauyue ..... Architect Educational Group

**5. Ministry of Finance Planning:**

- Mr. G. M. Ndotto ..... Assistant Secretary  
External Aid Division

#### 1-4 Minutes

The following are the details on the agreed minutes.

- (1) The survey team requested The Government of Kenya had organized a College Implementation Committee as stated in minute (1) to facilitate the construction of the College.
- (2) Regarding the college site described in minute (2), the Government of Kenya informed the survey team of a change in the college site during the second meeting on March 11 (Sat.). The survey team made strong representations against this change, ascertaining that the change of site would result in alteration of the preliminary design. Undersecretary of the Ministry of Education and Mr. N. Muigai visited the survey team to give greetings prior to the fourth meeting on March 16 (Thur.). The Undersecretary promised that there would be no site changes and apologized about the site change problem. Mr. N. Muigai also offered some further explanation of this matter. The representatives of the College Construction Implementation Committee and the survey team visited the site at 15:40 on March 17 (Fri.) for the site inspection under the guidance of N. Muigai. On March 23 (Thur.), the survey team and the committee came to an agreement on the zoning of the site after the discussion between the two parties.
- (3) Of the organs within the framework of the college which are specified in minute (4), the survey team merely accepted an administrative (management) organ as proposed by the Kenyan side. Those different, in connection with faculty, from the previously agreed minutes are (a) the introduction of a department/course system and (b) the change of courses in the Agriculture Department. So far (b), the survey team proposed the horticulture, agricultural engineering, and food processing courses, as well as a demonstration farm commonly for these courses in reply to the request by the Ministry of Agriculture. In addition, both parties agreed to further deliberate the courses and the curriculums of the Agriculture Department.
- (4) On the occasions of the second meeting on March 11 (Sat.) and the third meeting on March 13 (Mon.), both parties agreed that the education period would be three years with the horticulture course and the agricultural engineering course and also that, to verify the graduation from this college, a diploma would be presented to individual graduates. As regards the education period and production verification, there was no change with the food processing course.
- (5) With regard to the training of instructors in minutes (9), the Government of Kenya made a strong proposal at the third meeting on March 13 (Mon.) and the fourth meeting on March 16 (Thur.). The Undersecretary also proposed, prior to the opening of the fourth meeting, that training be provided for the instructors.

**AGREED MINUTES OF DISCUSSION**  
**ON THE JOMO KENYATTA COLLEGE OF AGRICULTURE AND TECHNOLOGY**  
**BETWEEN THE GOVERNMENT OF KENYA WORKING GROUP AND THE**  
**PRELIMINARY SURVEY TEAM DISPATCHED TO KENYA BY THE**  
**GOVERNMENT OF JAPAN**

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The preliminary Survey Team on the Jomo Kenyatta College of Agriculture and Technology was dispatched to Kenya from 10th to 18th March, 1978 by the Government of Japan with a view to discussing the various points related to the construction of the said College with the representatives of the Government of Kenya. The Japanese Team was headed by Prof. C. Uenosono, Kyoto University, whereas the Kenyan team was headed by Mr. J.H. Wairagu, Deputy Secretary, Ministry of Education. Having completed a series of meetings and site visits, both sides agreed on the following points:

1. In order to facilitate the construction of the College, the Government of Kenya has established the Kenyatta College Implementation Committee. The Committee will be responsible for the co-ordination of actions of the organs within the Government of Kenya as well as liaison on behalf of the Government of Kenya, with the Government of Japan, through the Embassy of Japan in Kenya. The Committee will be composed of:
  1. Mr. J.H. Wairagu ..... Chairman, Deputy Secretary Ministry of Education
  2. Mr. P.W. Muthoka ..... Under Secretary, Ministry of Education
  3. Mr. E.A. Wangai ..... Senior Education Officer, Technical Education, Ministry of Education (Alternate Vice-Chairman)
  4. Mr. S. Ndirangu ..... Education Officer Planning Unit, Ministry of Education
  5. Mr. E.A.A. Luchemo ..... Education Officer, Facilities Unit, Ministry of Education
  6. Mr. Mbiyu Kariuki ..... Education Officer, Technical Assistance Unit, Ministry of Education
  7. Mr. G.M. Ndotto ..... Assistant Secretary, External Aid Division, Ministry of Finance and Planning
  8. Mr. P. Kanyue ..... Head of Education Group, Ministry of Works
  9. Mr. G.O. Ogola ..... Manpower Development Officer, Ministry of Agriculture
  10. Dr. P.T. Obwaka ..... Principal, Egerton College

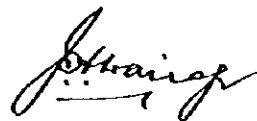
11. Mr. D.B. Shah ..... Head of Electrical Engineering Department, Kenya Polytechnic
12. Mr. W. Kirkwood ..... Head of Mechanical Engineering Department, Kenya Polytechnic
13. Mr. M.M. Nganga ..... Head of Building & Civil Engineering Department, Kenya Polytechnic
14. Miss M.W. Mundara ..... Head of Institutional Management, Kenya Polytechnic
15. Interested Parties

2. The Government of Kenya will take necessary measures to enable the Government of Japan to initiate steps to construct the College. The College site has already been opened by H.E. Mzee Jomo Kenyatta, the President of the Republic of Kenya for the sole use of the College. The site has an area of about 200 hectares, and is located at Juja in Gatundu area. The Government of Kenya will ensure the free access to the site by the people concerned with this project from March, 1978. The Government of Kenya will complete and provide the results of the topographical survey and site investigation\* to the Government of Japan by the end of June, 1978. The necessary levelling and clearing of the site should be completed by November, 1978 so that the construction works can be started from December, 1978.
3. The Government of Japan will consider the Master Plan of the College and financing the construction and equipment of such parts of the plan as will be agreed between the two governments.
4. The organization of the College will be as shown in Appendix A.
5. The Government of Kenya will consider sponsorship system(s) for the students of the College in a forward looking manner so that the maximum use of the College facilities as well as its teaching staff may be attained.
6. The education period and certificate level of specific courses of the College will be as shown in Appendix B.
7. The number of students, teachers and staff in terms of courses and Departments of the College will be as shown in Appendix C.
8. The utilization plan of the site will be as attached hereto.

9. As a matter of principle, training of lecturers and staff is crucial to the whole project and in this connection prompt measures should be considered by both Governments.

上之園親佐

C. UENOSONO,  
PROFESSOR OF ELECTRICAL ENGINEERING,  
KYOTO UNIVERSITY,  
LEADER OF SURVEY TEAM  
OF THE GOVERNMENT OF JAPAN



J.H. WAIRAGU,  
DEPUTY SECRETARY,  
MINISTRY OF EDUCATION,  
LEADER OF KENYAN TEAM  
FOR THE GOVERNMENT OF KENYA

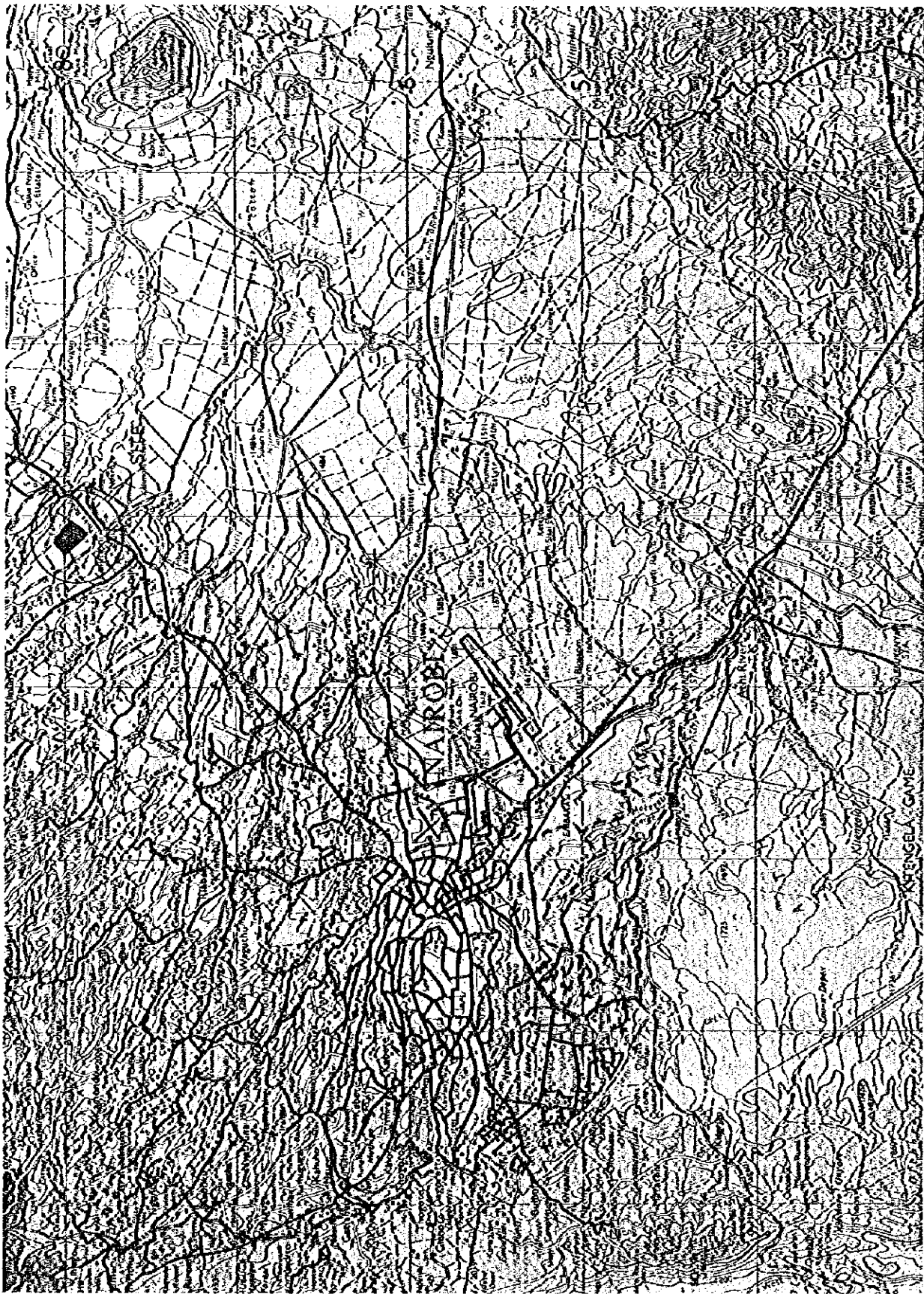
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FOOT NOTE

1. \*Site investigation includes soil tests surveying of physical features of the site, available services, related existing infrastructure and the environmental conditions.
2. †Master plan implies both academic and physical development plan.

18th March, 1978





LOCATION OF SITE



## CHAPTER 2. OUTLINE OF THE PROJECT

### 2-1 Organization for this Project

As in the initial Project Brief presented by the Government of Kenya, this project was elaborated by the Ministry of Education. However, both the Ministry of Education and the Ministry of Agriculture are responsible for the college educational program. Therefore, to coordinate the educational program, the Government of Kenya newly organized the College Implementation Committee composed of the staff of the both ministries.

This committee is reinforced further with the representatives of the Ministry of Works and the Ministry of Finance and Planning to promote the coordination inside of the Government of Kenya with regard to the construction program of the college, the procurement of the necessary funds, etc.

The Ministry of Education steers the Committee, but it is desired that a project director, the central figure of this project, will be appointed for careful coordination to proceed this project.

At present, the Heads of the Departments of Engineering of Nairobi Polytechnic are taking charge of programming of the curriculums for the Faculty of Engineering of this college.

Meanwhile, the Principal of Egerton College has been assigned for the handling of the curriculums for the Faculty of Agriculture.

For an overall adjustment in this handling of the curriculums for both faculties, it is necessary to unify the education system after the principal is appointed.

As for construction, both Nairobi Polytechnic and Egerton College are responsible for setting up design requirements. The Ministry of Works takes charge of the site survey, as well as of the execution of each construction work carried out by the Government of Kenya and the Ministry of Finance and Planning ensures the budgetary arrangement of these works.

Because that the Ministry of Finance and Planning is the acceptance channel for Assurances from foreign countries, this project will also be executed in the same way. The project director mentioned above, appointed by the Government of Kenya will be responsible for collecting all the data necessary for the construction of this college and will also take charge of the request and advice to the Committee for the procedures to complete the project. It is, therefore, vitally essential to appoint a competent person for this post, who will be expected to contribute his promotion of this project.

## 2-2 Educational Objectives of the College

Currently in Kenya, there are the Faculty of Engineering of Nairobi University, Kenya Polytechnic and Mombasa Polytechnic which are available for the higher technical education under the jurisdiction of the Ministry of Education. On the other hand, for the advanced agricultural education, Egerton College is available which the Ministry of Agriculture controls. The Government of Kenya has now set up the educational objectives, as enumerated below, of the Jomo Kenyatta College of Agriculture and Technology, which the Ministry of Education is about to establish.

- (1) To nurture and educate engineers and specialists who have a technical capability
- (2) To nurture and educate person enable to engage in productive professions or to run their own shops, stores or factories, especially in local districts
- (3) To cultivate persons with a technical background who can develop technical knowledge among the laborers, in order to assure a rapid growth of the national economy
- (4) To cultivate the students' concerns to handicraft manufactures

The educational objectives cited above were struck out and then set up in the period from 1974 to 1978 as the Kenya Development Project. Referring to these educational objectives, it is clear that, for the Kenya Development Project, the priority is given to the vocational education and training under the current education system of Kenya. This is based on the polytechnic education program in reply to one of the recommendations by the Education Administrative Council of Kenya for practical vocational education and training.

Summarizing the educational objectives, the Jomo Kenyatta College of Agriculture and Technology has its aim to contribute to the development of local districts.

Therefore, the educational program features that the college will have the Faculty of Agriculture and the Faculty of Engineering, though emphasis is placed on the agricultural education, in order to develop local districts mainly through the agricultural education.

The level of the education will be higher than that for raft technicians and will be to cultivate diplomaed technicians. But in the near future, the educational level is scheduled to bring up the technicians with higher diploma. To be more concrete, the Jomo Kenyatta College of Agriculture and Technology, will be similar to Kenya Polytechnic and Egerton College and will be capable of cultivating the technicians with Part II certificate and those with Part III certificate, as well as the technicians with regular diploma and those with higher diploma.

### 2-3 Student Enrollment and Duration in Years

The departments of each faculty, estimated number of students and duration in years are as specified in the Table 1 shown below.

Table 1

	Department/Course	No. of student/ year	Duration in years	No. of student/ Duration	Certificate/ Diploma
Faculty of Agriculture	A. Department of Horticulture	30	3	90	Diploma
	B. Department of Agricultural Engineering	36	3	108	Diploma in Agricultural
	C. Department of Food Processing	20	4	80	Diploma in Food Processing
Faculty of Engineering	A. Mechanical Engineering Dept.				
	i) Agricultural Machinery Engineering	12	4	48	} Technician Part II, Part III E.A.E.C
	ii) Motor Vehicle Engineering	14	4	52	
	iii) Construction Plant	12	4	48	
	B. Building & Civil Engineering Dept.				
	i) Irrigation Engineering	16	4	64	} Technician Part II, Part III E.A.E.C
	ii) Construction Technician	16	4	64	
	iii) Architectural Technician	12	4	48	
	C. Electrical Engineering Department				
i) Electrical Engineering	15	4 <sup>1</sup> / <sub>2</sub>	60	} Technician Part II, Part III E.A.E.C	
ii) Electronic Engineering	15	4 <sup>1</sup> / <sub>2</sub>	60		

The requirements for admission to this college are as follows:

- A) Those who have at least acquired the East African Certificate of Education (hereinafter referred to as E.A.C.E.) in the final school grade of Secondary Technical Schools or Secondary Academic Schools
- B) Those who have completed the courses for two years and have acquired the East African Advanced Certificate of Education (hereinafter referred to as E.A.A.C.E.) at Advanced Secondary School (Form V and Form VI) after the acquisition of the E.A.C.E. at Secondary Academic Schools
- C) Those who have acquired E.A.A.C.E. at Advanced Secondary School having the courses for Form V and Form VI at Mombasa Polytechnic after the acquisition of E.A.C.E.

For the details regarding the education system of the Republic of Kenya, refer to the preliminary survey report on the Jomo Kenyatta College of Agriculture and Technology Construction Project by the Japan International Cooperation Agency in January 1978.

## 2-4 Organization of Teaching Staff

(1) Teaching staff of each faculty is composed as the Table 2 shown below.

Table 2

Name of Faculty	Department/course	Lecturers	Technicians	
Agriculture 1°	A. Dept. of Horticulture	8+1*	5	
	B. Dept. of Agricultural	9+1*	7	
	C. Dept. of Food Processing	9+1*	6	
Engineering 1°	A. Dept. of Mechanical Eng.	18+1*	9	
	i) Agriculture Machinery Eng.	6	3	
	ii) Motor Vehicle Eng.	6	3	
	iii) Construction Plant	6	3	
	B. Dept of Building & Civil Eng.	24+1*	6	
	i) Irrigation Eng.	8	3	
	ii) Construction Technician	8	2	
	iii) Agricultural Technician	8	1	
	C. Dept. of Electrical Eng.	15+1*	5	
	i) Electrical Eng.	8	3	
ii) Electrical Eng.	7	2		
2°		83+6*	38	129

**Notes:**

1. ° means Dean of Faculty.
2. \* means Head of Department.
3. In addition to the above, 4 demonstrators and 30 farmers will be allocated to the demonstration farm.

The teaching staff in the above table are directly responsible for education and training and signify the lecturers, senior lecturers, assistant lecturers and demonstrators (the organization of the teaching staff is not a final one). The technicians in the above table take charge of maintenance of the facilities, including equipment or devices to be installed in each workshops.

The qualification of the lecturers is that they must have some experience in practical teaching after the acquisition of Bachelor of Science or Higher Diploma.

As for the technicians, they must have Part III certificate vested from the Faculty of Engineering, complete the course of pedagogy in advance and also have some experience in factory.

The qualification of the technicians for the Faculty of Agriculture is almost the same as that of those for the Faculty of Engineering.

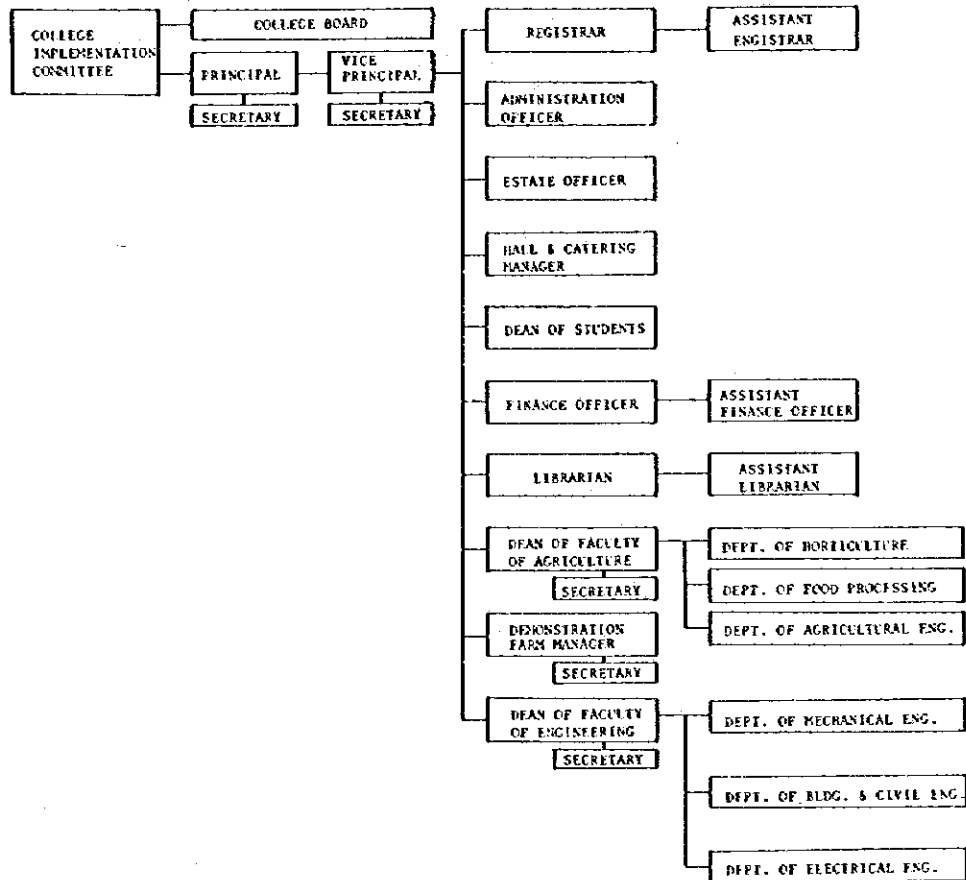
With regard to the departments such as the Departments of Irrigation Engineering, Food Processing, etc. which are to be newly provided, it will be difficult to secure lecturers, for there are no lecturers specializing in these fields.

**(2) Managerial and Clerical Staff**

i) Principal	1
ii) Vice Principal	1
iii) Registrar	2
iv) Senior Officers	22
v) Secretaries	2
vi) Clerical Officers	15
vii) Copy Typists	8
viii) Cooks	10
ix) Drivers	4
x) Artisans	9
xi) Messengers	6
xii) Securities	12
xiv) Cleaners	20

## 2-5 College organization of Staff Allocation

### (1) College Organization



The administrative and managing organizations for the Jomo Kenyatta College are currently under studying by the Ministry of Education. Particularly, the Ministry of Education is now engaged in examining the overall college education system in keeping pace with planning the development project in Kenya. With reference to the minutes, records of discussions and the current college education system, the college is expected to be administered and managed by the following organization.

Namely, the Board of Governors will be established as a supreme voting organ for the administration and management of the College. It is supposed that the Board of Governors should be composed of the representatives of the Ministry of Education, the related ministries and bureaus, private association and the principal of the college concerned. Before the opening of the college, the College Implementation Committee (The Chairman of it is Mr. J. H. Mairagu, Deputy Secretary, Ministry of Education) will act for the Board of Governors to decide the followings.



- (i) Appointment of the project director
- (ii) Deliberation and preparation of the particulars regarding technical assistances for the teaching staff training program
- (iii) Appointment of the principal, vice principal and departmental heads
- (iv) Recruitment of the teaching staff and training programs for them
- (v) Establishment of scholarship system
- (vi) Advertisement for students
- (vii) Agreement on the provisions related to the budget for school year

**(2) Staff Allocation**

The College Implementation Committee has defined the teaching staff, college administrative and managing staff and the staff allocation as described in paragraph 2-4. It is also described in paragraph 1-5 of the agreed minutes.

In addition to the above, the following personnel is allocated for both the Faculty of Agriculture and the Faculty of Engineering.

	Faculty of Agriculture	Faculty of Engineering	
Senior Officer		1	
Secretaries		11	
Subordinate Staff	4		9
Drivers	2		
Sub-total	6	12	9
Total		27	

Hence, the grand total number of personnel for the new college is 297; 116 staffs are for the college administration and management; 154 persons are the teaching staff (34 persons of them are for the demonstration farm); 27 persons for the Faculty staff.

## 2-6 Outline of Educational Program

In the Republic of Kenya, the educational program depends on the qualifications which the students desire to obtain. Thus, the Ministry of Education has the education on the basis of the educational programs by the East Africa Examination Council and the qualifications to be offered to the individuals by this educational program.

In this regard, the same is both Kenya Polytechnic and Mombasa Polytechnic. Namely, the qualifications to be acquired are in compliance to the educational programs.

Meanwhile, in the case of Egerton College which is under the jurisdiction of the Ministry of Agriculture, the East Africa Examination Council has no direct control for this college. For the result of it, Egerton College has an unique education system and its qualifications are equivalent to the educational program.

It will be required for much time to make adjustments as the different education systems are combined into the new college.

Therefore, a plan to program the curriculums for electrical and mechanical engineering departments has been already clarified, but for other departments, a curriculum programming plan is under elaboration.

Up to date, no adjustment for educational programs has made among the Department of Agricultural Engineering in the Faculty of Agriculture, the Department of Irrigation and the Department of Agricultural Machinery Engineering in the Faculty of Engineering.

As described in paragraph 2-2, the Government of Kenya has been now in progress to renovate the overall education system in line with the Kenya Development Project. Under such a situation, the universities and the colleges in this country will be slated to be renovated in 1979.

It is expected that, as a link in the chain of this renovation, the educational program for the new college should be made clear. Though it is unclear at the present stage as to the educational program of this college, the followings are confirmed.

- (i) The curriculums of the Faculty of Agriculture of the new college are equivalent to or more than those of Egerton College.
- (ii) The curriculums of the Faculty of Engineering are equivalent to or more than those of Kenya Polytechnic.

Therefore, excluding the departments of Mechanical Engineering, Electrical Engineering, and the course of Irrigation Engineering in the Department of Building & Civil Engineering, it is possible to presume the curriculums of this new college from those of Egerton College.

As the course of Irrigation Engineering is to be provided for the first time in this College, it is necessary to work out the required curriculums for this course.

It will be useful to refer to the curriculums selected to the course of Water Engineering of Kenya Polytechnic.

In addition, each department in the Faculty of Agriculture is to be set up newly, thus it is required their curriculums. It will be helpful to see and look into the curriculums of the departments corresponding to those of Egerton College. It should be taken note that in this new College, the recruitment of the teaching staff for the new departments is important problem.

It may be said that the curriculums for the departments planned to be set up newly depend on the teaching staff.

Now a description will be given of the outline of the educational program prepared for the Faculty of Agriculture.

### 1. Educational Objectives

Agriculture is one of key industries in the Republic of Kenya and produces a large output. Blessed with the climate and natural conditions, there is a good potential in this country that a great variety of crops may be grown and furthermore that many kinds of livestock may also be raised.

Especially, the small scale-based agricultural production by Kenyan peoples has since the independence been getting popular and some efforts have been exercised to further increase the production output.

However, at the present stage, the education and training level of the farmers stay at low level. Kenya has not educated man-power enough to develop the agriculture with such a good potential. Egerton College is available to nurture and educate the intermediate level agricultural experts, and there is reportedly a project to expand this agricultural college. But even with this project, it cannot be said that the experts are enough in number to make up for the lack of farmers' agricultural knowledge.

The Faculty of Agriculture of Jomo Kenyatta College is aimed to provide the education and training at the same level as in Egerton College and is intended to have the curriculums as those of Egerton, so as to be cooperative with one another, thereby enabling to compensate for something devoid on the either side. It is planned that, under such circumstances, the Agriculture Faculty of this College is about to proceed with nurturing the intermediate level agricultural experts.

### 2. Outline of Agricultural Education

Egerton College locating on the north plateau of Rift Valley, 2,000m above the sea level provides with the students the college education designed for running a large-sized farm and stock farm of the north European type. On the other hand, Jomo Kenyatta College is proposed to be located in the suburbs of Nairobi. The height of the site is slightly lower than the site of Egerton College.

Accordingly, the site is more suitable to produce the tropical crops, and is expected to be developed into a horticultural zone of the concentrative operation type. With these taken into account, Jomo Kenyatta College will have the department of horticulture, to give priority to the horticulture and the production and management of tropical crops upon which Egerton College has not placed much stress, as well as the department of food processing make study of use-development and processing for the tropical crops. In addition, this new college will also be characterized with the department of agricultural engineering having the speciality in the pedological maintenance, as well as in the irrigation and drainage required for the management of agriculture concentrative operation type consisting mainly of small-scale farms. Along with these educational objectives, demonstration farm is planned.

As briefed above, with these three departments and the demonstration farm, Jomo Kenyatta College will have its existence made significant.

Furthermore, this college has the Faculty of Engineering for the purpose of providing the agricultural students with chances for technical and engineering education. With no doubt, Jomo Kenyatta College will be highly appraised for these characters.

### 3. Educational Programs

#### (1) Department of Horticulture

In this department, education of general agricultural engineering will be given with importance placed on the study of tropical fruits, vegetables, and petals. Therefore, the curriculums will cover the greatly varied items in general agriculture, and they will be arranged, centering around the plantation.

Each of the curriculums will consist of a lecture, experiment, and practices (in the demonstration farm). With this department, the practices at the demonstration farm is one of the key elements in the horticultural education. It is hence essential to prepare the farm facilities in advance.

#### (2) Department of Agricultural Engineering

The curriculums of this department will cover the entire field ranging from agricultural engineering to civil engineering. Especially with this department, the curriculums will be arranged to provide the education and training designed for such a part of civil engineering which includes the pedological maintenance, soil utilization, farm land preparation and improvement, irrigation, and drainage, as well as for the agricultural facilities and various agricultural machinery.

In this way, the Department of Agricultural Engineering is intended to bring up men of ability who can contribute to popularize the agricultural techniques among general farmers. This department will have a close relation with the Faculty of Engineering with regard to the agricultural engineering education. Considering this, the Faculty of Engineering should offer as many chances to the Department of Agricultural Engineering as possible so that this department may fully utilize the facilities of the Engineering Faculty.

In providing the curriculum mainly for the machines other than the agricultural machinery, the Department of Mechanical Engineering should be cooperative.

#### (3) Department of Food Processing

This department will provide the education and training regarding the food processing of crops. However, importance will be given to the curriculums worked out for cultivating vegetables to bring up food processing engineers who can take charge of material control, process control and product control, as well as familiarizing themselves with the methods of processing for various products. For this department, it is particularly necessary to furnish various well-equipped laboratories and workshop.

## CHAPTER 3. MASTER PLAN

The master plan for this project will be prepared within mind the surroundings and the terrain of the site, location of the approach road from the Thika road and undulation of the site.

### 3-1 Site Surroundings

The site is located about 40 km northeast away from Nairobi and in Juja town along the Thika road. The site is 500m north from the Thika road.

The terrain of the site is almost rectangular having the northeast line and the southeast apse line. The site area is 1,900m long and 1,000m wide and measures approximately 200 ha. The surroundings of this site are as shown in the map.

The site has some water flowing grade from north to south and there is a damp ground at the central part.

It is accordingly necessary to reclamate considering rain water drainage of the site. The Thika road side of the site is state-owned; the area on the west of the site and other areas are privately owned.

Within the state-owned land along the Thika road, there are the dwellings temporarily for the nomadic tribes. These dwellings are slated to be removed by the Kenya Government. For the approach to the site, there is presently an approach road with a width of 4 ~ 5m which is branched from the Thika road. The Kenya Government is planning to expand the road width in the future.

### 3-2 Zoning

With regard to the zoning, the survey team agreed with the Kenyan authorities on site utilization basically through the discussion with them. It has reached a conclusion that the Kenya Government proceed with preparation for water supply, drainage and electric power supply according to this zoning plan.

The followings are the details on the basic zoning plan.

- (1) The Kenya Government will be responsible to prepare an approach road (which is to be provided exclusively for the college) from the Thika road to the site. This will be the main approach road to the site.
- (2) The main approach road will be provided near the south corner of the site and another approach road to the demonstration farm will be planned so as to approach to the farm directly from the road running on the west of the site.
- (3) Area of approximately 40 acre near the main approach road will be appropriated for the campus.
- (4) The demonstration farm will be situated on the north of the site, and non-teaching staff housing (for farmers) for this demonstration farm will be constructed near the farm gate. The survey team came to a conclusion to proceed planning with flexibilities according to the basic zoning plan mentioned above. This is because some adjustments are expected to be necessary, depending on the results, the further survey of site condition by the Kenyan authorities, as well as for studies of water supply, drainage and electric power supply.

### 3-3 Master Plan

The following were taken into account as the basic elements for the master plan.

The common facilities for the Faculties of Agriculture and Engineering will be provided at the end of the approach road extending from the main gate. The academic facilities of both faculties and student dormitories will be arranged at the left and right wings, respectively, centering these common facilities.

Stated to be arranged at the center of the above common facilities is the Administration Building. This is in order that this building may be easily identified by the visitors, and it will be used frequently both by the students and teaching staff. Hence, it will be located in front of the end of the approach road from the main gate.

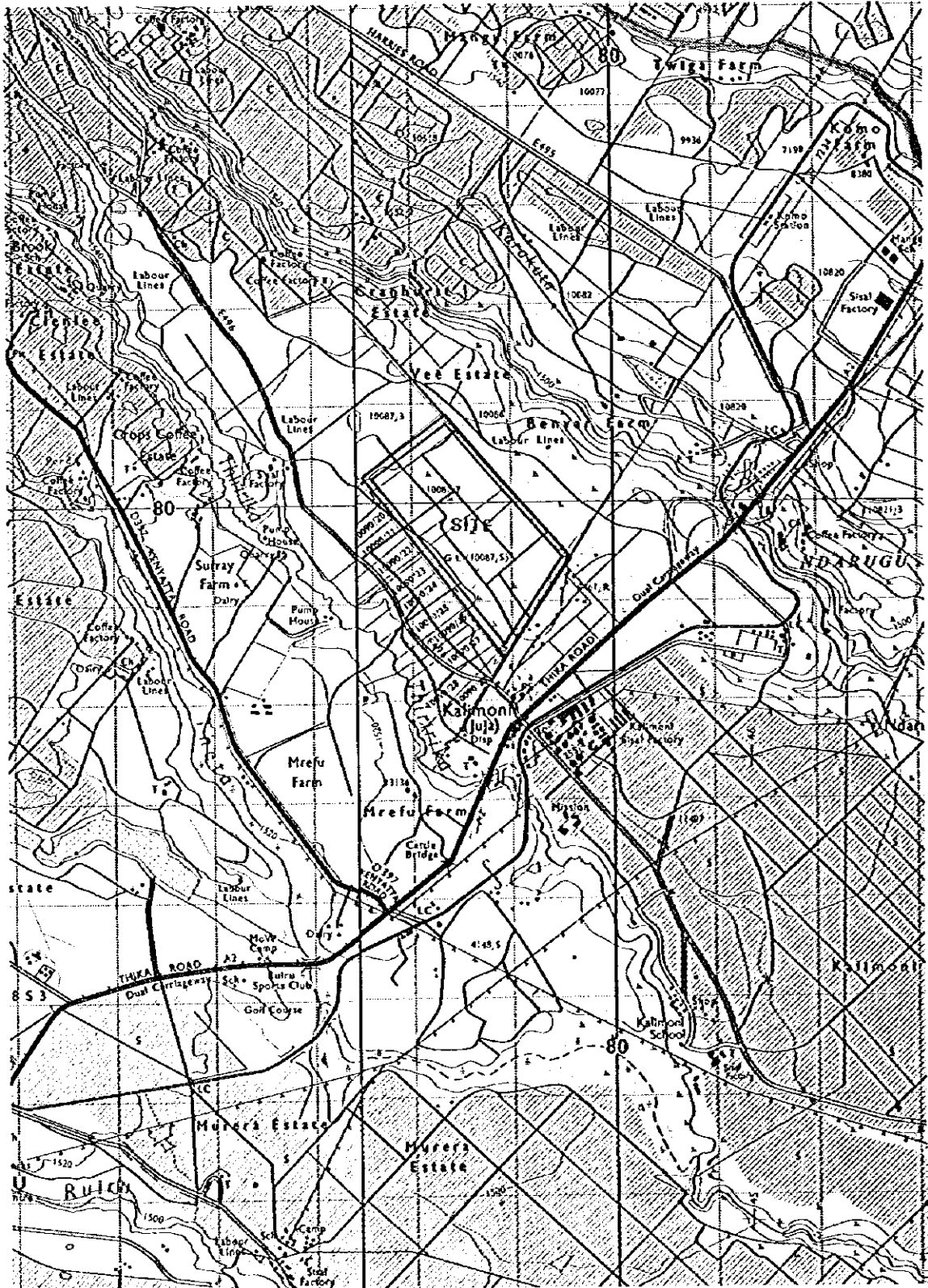
The students welfare facilities and the dining hall will be provided for both wings of the Academic Facilities and student dormitories. But they are the more closely associated with the dormitories. Thus, they will be arranged close to the dormitories.

In academic facilities zone, the Faculty of Agriculture is arranged near to Farm and the Faculty of Engineering near to Workshop Building, centering common class room building including a drawing room and the Library Building.

The Workshop Building for Faculty of Engineering is provided also for the department of agricultural engineering (Faculty of Agriculture), but, considering the noises and for the convenience of supply of the teaching equipments, this building will be arranged away from the research laboratories.

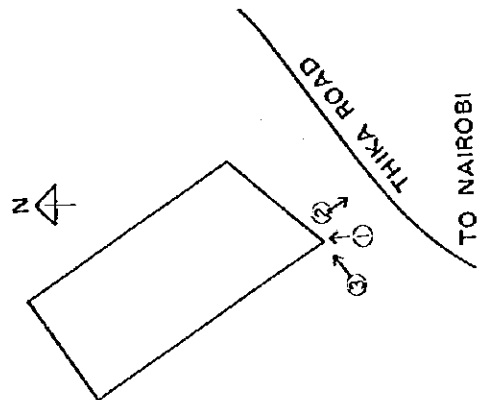
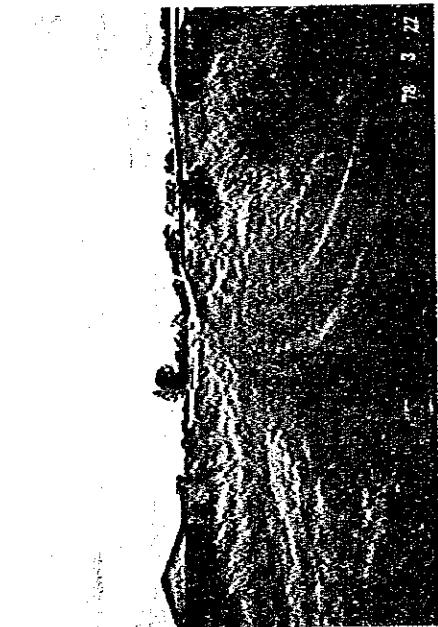
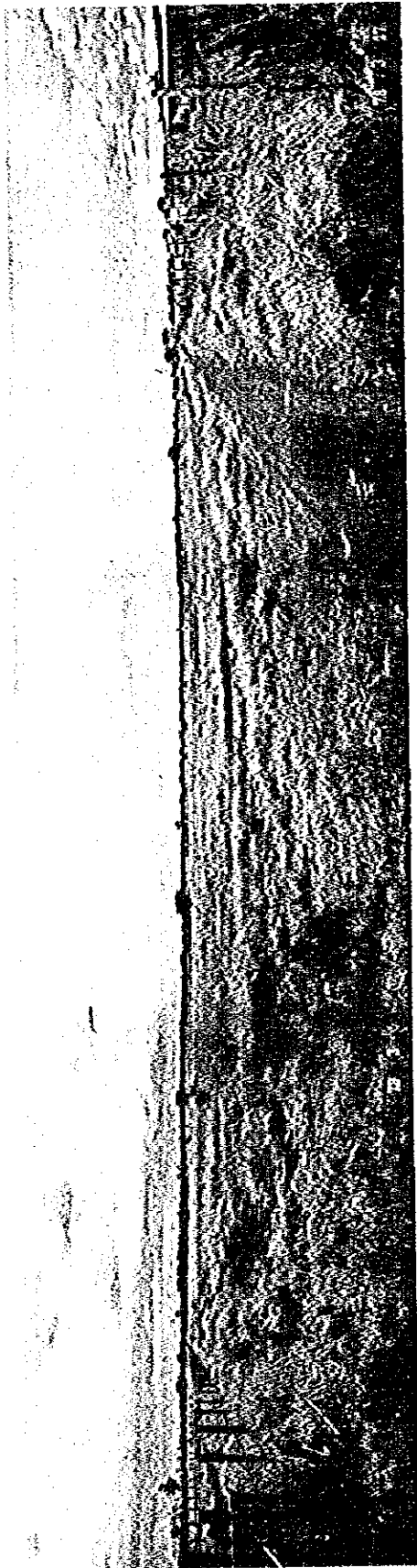
The housing for the teaching staff will be arranged on the west side of the approach road so that campus traffics may be checked from the Gate House.

On the other hand, the non-teaching staff housing will be arranged along the west-side boundary of the site. In addition, the housing for non-teaching staff housing (the farmers) of the demonstration farm will be arranged at a point near the entrance of the demonstration farm.



1 km

SITE





## CHAPTER 4. PLANNING OF FACILITIES

### 4-1 Outline of the Facilities

Adjustment was made on facilities organization of this college after the considerations by the Japanese experts based on the following items.

- (1) Class rooms, laboratories and workshops are provided as required for each department in the Faculty of Agriculture and the Faculty of Engineering, as recorded in the minutes of the meetings conducted between the Ministry of Education of Kenya and the Survey Team.
- (2) The size of each lecture room, laboratory and workshop is decided to suit the number of students in each department.
- (3) The common facilities for the students are planned for the total student number of 720.
- (4) Administration building and the rooms in the common facilities for the teaching staff are planned to accommodate the number of personnel requested by Kenyan authorities.
- (5) For the purpose of effective use, the facilities are put together to be used commonly by the Faculty of Agriculture and the Faculty of Engineering. Mainly, the ordinary lecture rooms and drawing rooms are arranged in a common lecture building in the center of both faculties. Further, for the character of the laboratories, their lay out was considered with those set up for common use in the Faculty of Agriculture and in the Faculty of Engineering separately.
- (6) With regards to the whole facilities organization, a proposal is made by the survey team to satisfy the facilities organization as requested by the Ministry of Education of Kenya, after considering the opinions of the Japanese experts.

However, it is considered necessary to make adjustments with respect to the above conditions at the stage of detailed design after considering the actual education methods and the school management in Kenya.

The facilities organization is shown below.

Name of Building	Stories	Floor Area (m <sup>2</sup> )	
		Stage I	Stage II
1. Administration Building	2	882	
2. Assembly Hall	1	828	
3. Library	2	1,260	
4. Common Lecture Building	2	1,980	
5. Communal Accommodation Building	1	1,998	
6. Dormitories (2 Buildings)	3	3,144	
7. Dormitories (2 Buildings)	3		3,144
8. Agricultural Laboratory Building	2	2,192	
9. Agricultural Workshop	1		758
10. Farm Building	1		1,674
11. Engineering Laboratory Building	2		2,703
12. Engineering Workshop	1		4,005
Sub-Total		12,284	12,282
Total Floor Area		24,666	

#### 4-2 Fundamental Work Plan

Since a part of the proposed site for the construction of this college is only used as a grazing land, it will be necessary to carry out large scale site reclamation for this project.

Considering that it is required to provide Demonstration Farm in addition to the academic facilities in the Faculty of Engineering and the Faculty of Agriculture, it is necessary to provide them completely with emphasis laid on the environment as a college, not only on the functions of the buildings.

While it is considered a condition that almost all of the undermentioned fundamental works will be implemented by the Kenya Government, it is expected that sufficient considerations will be given by the Kenya authority on the following points in planning.

(1) Approach Road to the Site

Approach Road will be newly constructed from Thika Road to the site.

(2) Reclamation of the Site

At present, about 30% of the site is used as a flat grazing land although no land preparation is done for the remaining part.

This remaining part is equivalent to the almost area of the demonstration farm.

(3) Domestic Water Supply and Agriculture and Irrigation Water Supply

It is assumed that wells should be dug in the site for the supply of domestic water and it is necessary to plan to distribute water supply to teaching staff zone, academic facilities, farm facilities and the zone of the farm workers considering the future plans. It is also necessary to make sufficient considerations on the location of the wells.

As Thiririka River flows on the west side of the site about 1 km away and Ndarugu River flows on the east side about 1 km away, water for the agriculture and the irrigation will be tapped probably from one of these rivers. It is necessary to consider on the location of intake, waterways to the site and the canals in the site.

(4) Sewage Treatment Facilities and Rainwater Drainage

It is necessary to plan the sewage treatment facilities for the whole campus and the drainage system after the sewage treatment.

Also with regards to the drainage of rainwater, it is necessary to plan for the whole site including the drainage for demonstration farms.

(5) Electric Power Supply and Telephone

It is confirmed that a high-tension power line is installed along Thika Road, but it is necessary to study on the incoming power line to the site from this mains and on the distribution system in the site.

Also with regards to the telephone lines, it is necessary to study on the supply to the site from Thika Road.

### **4-3 Contents of Facilities**

The buildings are planned in three groups, namely, common facilities, academic facilities and living quarters. The administration building, assembly hall and the communal accommodation building are included in the common facilities. The library, common lecture rooms, agricultural laboratory building, agricultural workshop, farm building, engineering laboratory building and engineering workshop are included in the academic facilities. The living quarters include the two sub-groups, the dormitories for male students and for female students and the quarters for the teaching staff.

#### **1) Administration Building**

The administration building is planned as a two storied reinforced concrete structure. In the ground floor of the building, two entrances are provided with one for the visitors and the other for the students. Facilities such as the general administration office, accountants section, students section, duplicating room and PABX room, which have a close relationship to the students, are arranged in the ground floor.

The Principal room, conference room, vice-principal room and the staff lounge, etc. are planned in the first floor.

#### **2) Assembly Hall**

The assembly hall is planned to accommodate about 750 persons and facilities are provided mainly for lectures. The seats in the central part of the assembly hall are movable, making this part possible to use for multi-purposes such as indoor sports, parties, etc. Project rooms are planned to facilitate 16 mm movie and slide projection.

#### **3) Communal Accommodation Building**

Students' canteen, staff's canteen, meeting room for the students, club rooms, conversation room, health clinic, book store, laundry and the rooms for maintenance section are planned as the facilities included in the Communal Accommodation Building.

#### **4) Library**

Library is planned to store 25,000 volumes, and as a full-dormitory type college, the number of seats for the readers is to be somewhat larger and about 130 seats are provided which is about 20% of the number of students enrolled. A resource center is provided affiliated to this library for the preparation of materials for the audio-visual classroom. Further, it is planned to include the printing facilities for the whole college in this library.

#### **5) Common Lecture Building**

As the lecture rooms are commonly used by both the Faculties of Agriculture and Engineering, the lecture rooms are planned with flexibility. The layout of the lecture rooms is composed of 6 rooms for 18 students, 4 rooms for 30 students, 1 room for 50 students and 1 room for 80 students.

Further, 4 drawing rooms capable of accommodating 20 students are planned in this building for the common use of all the departments.

## **6) Agricultural Laboratory Building**

The following laboratories are planned in the Agricultural Laboratory building, and in addition to them, the rooms for the Dean of the Faculty of Agriculture, Heads of the each department and the teaching staff are also provided in this building. Plant Physiology, Agricultural Irrigation, Soil Physics, Soil Mechanics, Plant Pathology, Technologic and Micro-biology.

## **7) Food Processing Workshop**

Workshops for bread baking, fruits and vegetables processing and use of agricultural products are provided together with the deep freezers, boiler rooms, control room and storage attached to these workshops.

## **8) Engineering Laboratory Building**

Laboratories for three departments, namely the Department of Electrical Engineering, the Department of Mechanical Engineering and the Department of Building and Civil Engineering are provided in the engineering laboratory building. Laboratories in each department are given below.

Laboratories for the Department of Electrical Engineering:

Elementary Electric Electricity, Electric Machine, Electric Installation, Electronics.

Laboratories for the Department of Mechanical Engineering:

Mechanical Science, Elementary Fluids & Thermodynamic

Laboratories for the Department of Building and Civil Engineering:

Concrete, Building Science, Soil Mechanics, Hydraulic Survey.

## **9) Engineering Workshop**

Workshop facilities for the Faculty of Engineering and the Faculty of Agriculture are provided in the Engineering Workshop together with the hard standing for agricultural machinery and motor vehicles.

As the workshop facilities, workshops for agricultural machinery, machines, internal combustion engines, motor vehicle, welding, plumbing and wood work are provided.

## **10) Farm Building**

Farm Building included Farm Manager room in the Demonstration Farm is planned with the storage of products and the Hard Standing of agricultural machinery and implements store.

## **11) Staff Housing**

With regards to staff housing, their types are determined by the Kenya Government Code, according to the status of staff. These types are shown in Appendix.

Next, with regards to the number of housing required for the staff, the Kenyan Authorities has prepared a list shown in Appendix.

#### **4--4 Architectural Planning**

In the design of buildings, planning is done, considering the following points.

##### **Natural Conditions:**

It is natural to plan buildings to suit the climate of the region, and as Nairobi has very favourable climatic conditions, their characteristics are positively utilized in the design.

Since a very comfortable indoor climate could be obtained during the day time by positively allowing the outside air to flow in, the layout of rooms and the position of their openings are considered to provide planned cross ventilation.

Considering the location with respect to the latitude, the layout of buildings is planned on East-West axis to provide ample sunlight.

For the long rainy period from March to May and the short rainy period in November, connections of the buildings are planned to enable passing between them even during the rains.

##### **Construction Term:**

In order to complete the construction in a short period, buildings are planned with mainly one or two stories. Further, buildings which could be divided according to their functions are positively separated and planned in the construction schedule.

##### **Future Plan:**

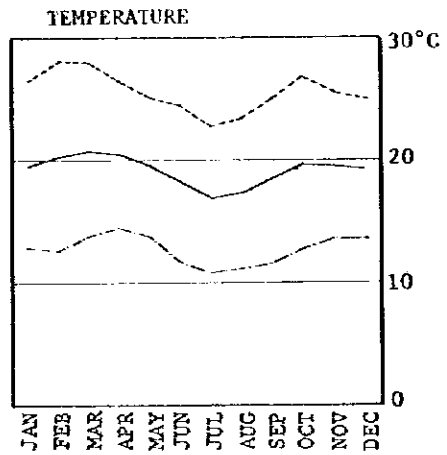
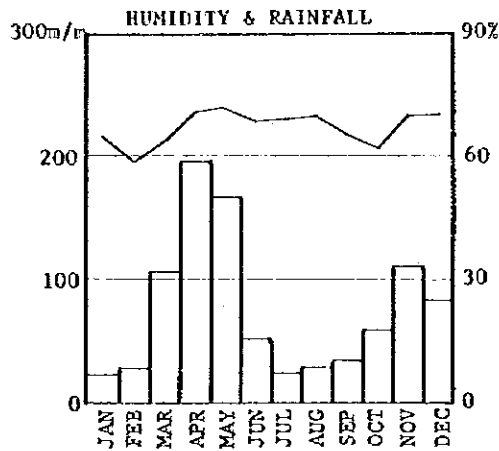
Considering the expansion of the facilities of the Faculty of Agriculture and the Faculty of Engineering, planning is done not to hinder the functions after expansion.

##### **Construction Technology:**

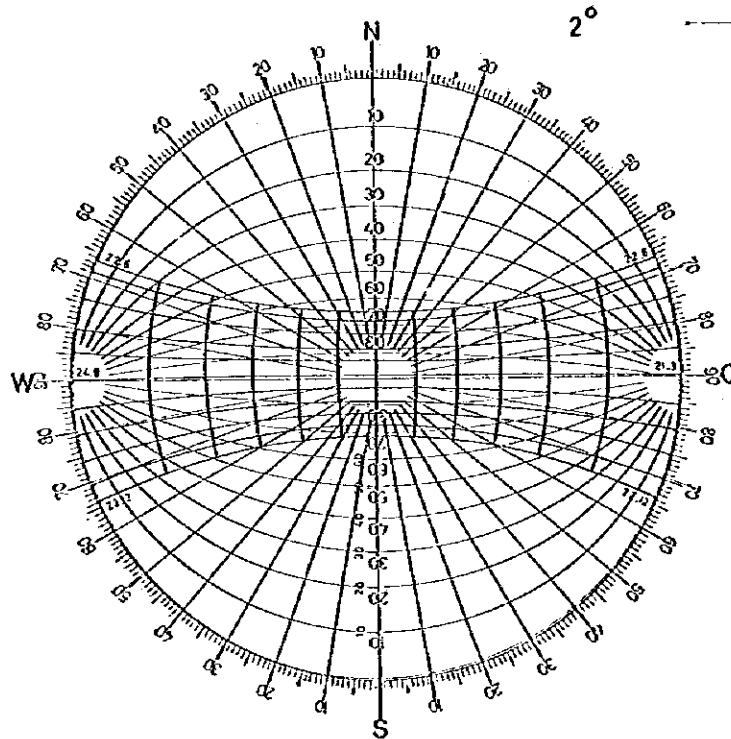
Considering the maintenance of the buildings after their completion, the construction is planned utilizing mainly the materials and equipment available locally. Structures are centered on the reinforced concrete rigid frame structures and block walls widely experienced locally. Since problems relevant to water proof of roofs could be anticipated, flat roofs are avoided and the roofs are planned as sloped roofs.

CLIMATIC DATA  
CLIMATIC DATA.

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
TEMPERATURE °C	Max	26.4	28.1	27.9	26.3	25.0	24.5	22.7	23.3	25.1	26.5	25.3	25.0
	Min	12.9	12.7	13.8	14.5	13.9	11.7	10.9	11.2	11.5	12.8	13.7	13.5
	Average	19.7	20.4	20.9	20.4	19.5	18.1	16.8	17.3	18.3	19.7	19.5	19.3
HUMIDITY %		64.5	58.5	63.5	70.0	71.5	68.5	69.5	70.0	65.5	62.0	70.0	70.5
RAINFALL mm		46.0	51.7	114.4	230.6	167.2	51.3	23.7	27.0	32.1	67.1	109.8	82.6



SUNPATH DIAGRAM



#### **4-5 Materials Plan**

The main building materials are selected as far as possible to purchase in local.

##### **Structural Materials**

Structures are mainly reinforced concrete structures with concrete block walls and steel framed structures are used in some parts of the workshops and the assembly hall.

Cement, aggregates, sand, blocks, reinforcement bars and steel frames are produced locally. As reinforcement bars and steel frames are processed locally with imported materials, import from Japan may be considered in some cases.

##### **Exterior Finishing Materials**

Roofs are planned as pitch-roofs covered with cement tiles.

Sashes are assembled with ready-made aluminium parts imported from Japan.

The exterior walls are planned to be made by maintenance free materials such as stucco.

##### **Interior Finishing Materials**

Interior finishing materials are planned according to the utilization of the room.

As the standard flooring materials planned, PVC tiles are used in the ordinary lecture rooms, terrazzo finishing for corridors and mortar hardener finishing for workshops. Some of the office rooms, conference rooms, etc. are furnished with carpets.

Walls are finished with painting on the mortar trowelled. Some of the interior partitions are planned as movable partition for future alterations. Walls of the workshops are finished by painting directly on the blocks.

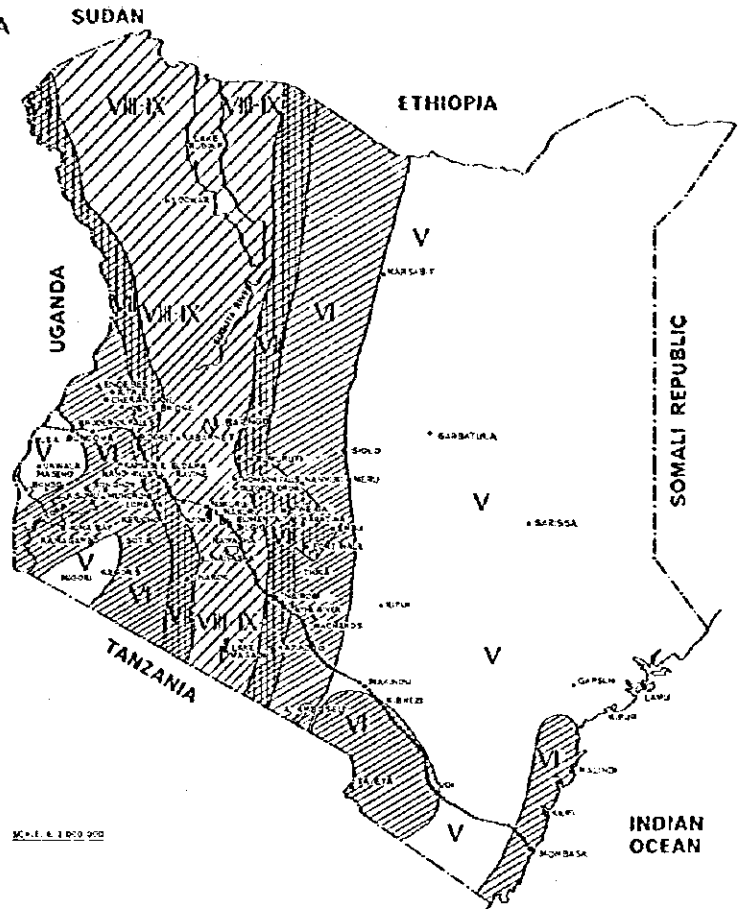
Ceiling finish is mainly done with sound absorbing materials and the finishing of workshops, etc. is done by spraying sound absorbing materials.

##### **Materials for service piping and the other service facilities**

Concrete pipes, PVC pipes, galvanized iron pipes, etc. are produced locally and utilized.

Although sanitary fixture are also produced locally, metal parts, valves, pumps, etc. are to be imported from Japan.

**SEISMIC ZONING MAP OF KENYA  
AFTER I. S. LOUPEKINE**



**TABLE I TABLE RELATING SEISMIC DESIGN TO TYPES & USAGES OF BUILDINGS**

TYPE OF STRUCTURE & USAGE CLASS.		ZONE V		ZONE VI		ZONE VII		ZONE VIII - IX	
		SEISMIC DESIGN REQUIRED	LIMITING STOREYS OR HEIGHT.	SEISMIC DESIGN REQUIRED	LIMITING STOREYS OR HEIGHT.	SEISMIC DESIGN REQUIRED	LIMITING STOREYS OR HEIGHT.	SEISMIC DESIGN REQUIRED	LIMITING STOREYS OR HEIGHT.
R.C., Steel, etc.	Class A	No	No limit	No Unless 17 storeys or over	No limit	No Unless 6 storeys or over	No limit	Yes	No limit, but special precautions
	Class B	No	3 storeys for offices, hotels etc. 4 storeys for flats	No	3 storeys for offices, hotels etc. 4 storeys for flats	No	3 storeys for offices, hotels etc. 4 storeys for flats	Yes IF 3-4 storeys	3 storeys for offices, hotels etc. 4 storeys for flats
Framed Structures (flexible or rigid)	Class C	No	No limit	No	No limit	Depends on use and importance and level of damage acceptable. At Engineer's discretion.			
	Class D	No	2 storeys	No	2 storeys	No	2 storeys	No	2 storeys
Load Bearing	Class A	No	No limit	Yes	Not more than four storeys	Yes	Not more than three storeys	Yes	Not more than two storeys
	Class B	No	3 storeys for offices, hotels etc. 4 storeys for flats	Yes	3 storeys for offices, hotels etc. 4 storeys for flats	Yes	3 storeys for offices, hotels etc. 4 storeys for flats	Yes	Not more than 3 storeys in in all cases
Walls	Class C	No	Not over 3 storeys	No	Not over 3 storeys	Load bearing walls for installations not recommended over 2 storeys. At Engineer's discretion.			
	Class D	No	3 storeys	No	3 storeys	Yes	3 storeys	Yes	2 storeys
	Class E	No control of domestic buildings in Rural areas is envisaged, but buildings over 3 storeys should be discouraged, because of likely poor design and construction.							

Note: Where "Seismic Design" is referred to this means:  
 In case of Framed Buildings - Engineering Computation of effect of forces on frame as recommended in this Code.  
 Load Bearing - Compliance with particular Recommendations in this Code.



#### **4-6 Structural Planning**

##### **Ground and Foundations**

The ground in the site consists of Black Cotton Soil and Murran, which are clay not suitable for foundation ground for buildings, to a depth of about 2 meters from the ground surface. The weathered tuff below is considered sufficient as a bearing layer required for the buildings to be constructed.

Foundations are planned as independent footings with the footings embedded into this bearing layer of tuff.

The design bearing capacity is estimated at  $f_b = 30 \text{ t/m}^2$  (long term).

##### **Horizontal Force**

Horizontal forces are not considered for the structural design in this project site. However, with regards to wind resistant design, calculations are done based on the design standards.

##### **Main Structures**

The main structures are planned as reinforced concrete structures. Some of the workshops are planned as steel framed structures and the partition walls are planned as concrete block work. The structure of the assembly hall is planned as a steel framed truss.

#### **4-7 Air Conditioning and Ventilation System Planning**

The proposed site of the college is favoured with good climatic condition. Generally, it is possible to maintain a comfortable indoor temperature by positive supply of open air in high temperature time-zone of daytime. Taking into consideration building maintenance cost the proper plan is to place emphasis on the arrangement of buildings, while avoiding mechanical system much as possible.

##### **4-7-1 Planning of Ventilation System**

Ventilation of all buildings shall be natural ventilation, except for the rooms described below where mechanical ventilation will be applied.

###### **1) Common facilities**

Kitchen, Laundry, Laboratories, and Assembly Hall

2) For Workshop such as Welding, Internal Combustion Engine, joinery and painting, mechanical ventilation will be applied if required.

##### **4-7-2 Planning of Special Air Conditioning System**

An independent air conditioning system is planned for rooms, such as laboratories and storage where constant or low temperature are required in Faculty of Agriculture.

Suitable system is to be furnished for each room requiring special conditions, such as concrete curing, soil testing in Faculty of Engineering.

##### **4-7-3 Boiler**

This will be so planned that steam will be supplied to all equipment in the kitchen and laundry.

## **4-8 Plumbing System Plan**

### **4-8-1 Water Supply System**

The daily consumption of water within the site is anticipated to be 150 cubic meters (33,000 U.K. Gal).

The proposed water supply system to distribute water to all buildings is to be made by pumping well water to the water reservoir and then to the elevated water tank. The water supply main to each buildings is to be loop-piping outdoors in order to meet sufficiently the demand of each building at its respective peak hour.

Capacity of the water reservoir is to be 75 cubic meters which is equivalent to half of the daily consumption; the tank will be installed outdoors.

The elevated water tank is capable of storing 20 cubic meter (4,400 U.K. Gal), or the maximum consumption of water in the academic facilities, and the pumping equipment is to be satisfactory to meet the normal maximum capacity of water supply. The head should be met the necessary pressure of a fire hydrant.

Two units of water pumping equipments are provided, and each of them should be automatically operated one after the other. Steel water pipes should be lined with vinyl chloride.

### **4-8-2 Planning of Bored Well Facility**

Two wells with 200 cu. m./day are to be bored. Well water pumped from the bored well by submerged pump is to be stored in reservoir after sedimental treatment of sand has been completed. The Kenya Government is responsible to carry out wells, pumps and piping to reservoirs.

### **4-8-3 Planning of Drainage System**

Four drainage systems is planned, that is, sewage, miscellaneous drainage, rainwater and drainage devised through experiments.

#### **1) Sewage System**

Sewage from the toilets in each building is led to the drain in each zone by the gravity force, and then to be transferred by a pump to a oxidization pond, which is constructed in the site.

#### **2) Miscellaneous Drainage System**

Miscellaneous drains from buildings are to be discharged through the same route as the sewages.

#### **3) Rainwater Drainage System**

Drainage of rainwater from roofs of all buildings, road and on the surface is to be effected by single-line piping and discharged to the open ditch surrounding the buildings.

#### **4) Laboratories Drainage System**

Drainage containing acid and alkali from laboratories in the Faculty of Agriculture will be led to the neutralization tank first and discharged through connecting to miscellaneous drainage. The interior piping will be of cast iron pipes, steel pipes will be used for sewage and vinyl chloride pipes for miscellaneous drainage. For the outside piping, concrete pipes and vinyl chloride pipes will be utilized.

#### 4-8-4 Planning of Fire-Extinguishing System

Interior and exterior fire hydrants (with two 20-meter hoses) are installed in all the wings. The water for initial fire extinguishing will be obtained from the elevated-water tank in case of a fire in the buildings.

#### 4-8-5 Planning of Gas Supply System

L.P.G. gas is used for kitchens and laboratories. Gas cylinders will collectively placed at zones assigned to respective blocks including piping extensions for gas supply.

#### 4-8-6 Planning of Sanitary Fixtures

Sanitary fixtures are to be installed in toilets and other lavatories in buildings. Experiment equipment and apparatus will be provided in the laboratories.

#### 4-8-7 Sewage Disposal Facilities

Sewage and miscellaneous drainage are a joint pipe and through the sewage reservoir and pump station located on east side in the site, conducted to the oxidation pond.

After natural disposal treatment, the drainages finally are discharged to out of site utilizing of the land reclamation.

Primary oxidation pond will be required 7,550 m<sup>2</sup> surface drainage area, 1.75 m depth, secondary pond required 766 m<sup>2</sup> surface are, 1.75 m depth. Under consideration of maximum drainage, 2 sets of pump will be installed and operated automatically are after another and parallelly. External main drainage pipe should be concrete pipe.

#### 4-9 Electrical System Plan

##### 4-9-1 Service Wire of Power

Incoming power line will be connected to a substation of the college. By the reason of the esthetic viewpoint, the incoming power line is desirable through underground cable, but in the results of the discussion with E.A.P. and Lighting Company considering the cost involved, an aerial cable should be distributed until the near of the substation, and an underground cable should be mounted around the substation area to connect into it.

The connecting into the substation, mounting of a incoming main oil circuit breaker, and of a transformer should be carried out by E.A.P. and Lighting Company. Also the connecting into the teachers' houses should be carried out by E.A.P. and Lighting Company.

We have agreed on the discussion that the electric power supply is available before the construction, if the temporary work for the power supply is offered in its early stages.

##### 4-9-2 Telephone Lines

It was agreed that the Kenya Government would perform linking of telephone lines to the Main Distribution Frame (MDF) at PABX room in Administration Building. Five (5) lines are expected to be linked.

##### 4-9-3 Substation Facility

The 11-KV high voltage power is incoming and is transferred by a transformer to middle voltage of 3-phase, 4-wire 415/240V. The middle voltage power is supplied to every building through breakers in a switch-board. The projected capacity of substation facility is approximately 750 KVA.

##### 4-9-4 Main-power Line

Electric power supply from the substations are distributed by 3-phase, 4-wire 415/240V for power and light lines reaching the distribution boards in each building. Main line systems are to be allocated on the basis of the buildings as well as taking into consideration the convenience users. Power equipment such as fans and pumps are to be operate and controlled by means of power control panels. The power control will incorporate motor breaker, magnetic conductor, ON-OFF push button switch, ampere-meter if necessary. As for power line for practical training exercise rooms, an emergency push-button switch should be mounted for the operator's safety and Earth Leakage Breakers to detect leak and shut off breaker, are to be installed where much humidity exists along the circuit for the safety of operators.

##### 4-9-5 Lighting System

Supply to load for lighting, outlet, and for workshops and laboratories is to be made through MCB (Molded Circuit Breaker) fixed at branch circuit of distribution board, and also this protects the circuit.

Method of wiring is to be interior type colored vinyl sheath wire to be contained in metal conduits. Distribution boards will be installed for laboratories and workshops, or in each work section, and they will be installed at appropriate location to facilitate the operation and control.

On the distribution boards for special purposes, pilot lamps will be provided to indicate on and off of Main M.C.B.

Outlets in rooms for laboratories and workshops will be installed in accordance with the number of instruments and equipment projected. For those instruments and equipment which require respective grounding, terminal boards will be installed for the purpose.

Lighting switches and receptacles in British standard should be mounted.

#### 4-9-6 Lighting Fixture

Light source is chiefly obtained from fluorescent lamps, and incandescent lamps are to be used in accordance with purposes of the respective building. Local switches will be planned to light small areas for a more economical consumption of electricity. All lighting fixtures are to be grounded. Illumination of main rooms are planned as follows:

Drawing Room and Library	400 LX
Class Room, Office and Conference Room	300 LX
Hall and Corridors	100 ~ 150 LX
Covered way	50 ~ 100 LX
Workshop	300 ~ 400 LX

#### 4-9-7 Telephone Line Piping System

Telephone line is to be installed from Main Distribution Frame (MDF) in the PABX room to telephone outlets of main rooms through telephone terminal panels in every building. Piping work will be made by using metal conduits and telephone outlets will be provided wall-mounted type. In connection with the piping, installation of arrestor for city line and grounding for PABX are to be performed.

#### 4-9-8 PABX Facility

Cabinet type cross-bar PABX with capacity of 100p is to be installed in the administration building.

#### 4-9-9 Public Address System

In the auditorium, a sound system will be installed for exclusive use of the hall. This system is to be composed of operation and adjustment table, amplifier, speaker, tape recorder, record player, microphone, cordless microphone and receiver to be used for lectures, entertainment, and other purposes.

#### 4-9-10 TV Community Receiving System

Outlets for television will be provided in the lounge of the welfare facility and workshop for electrical training. Master antennae are to be fixed to respective building for wiring from the antennae to outlets; coaxial cable will be used with metal conduct.

#### 4-9-11 Inter-Phone System

An inter-phone system is to be installed for communication among rooms related to operation of the auditorium and also among substations for security and control purposes.

#### 4-9-12 Fire Alarm System

A fire alarm with bell and push-button will be installed in order to convey speedy information, evacuation, and countermeasures in case of outbreak of or other emergencies. Range of bell alarm is limited only in the building where a fire breaks out and bells of other building will not ring according to this system. An indicating panel in the administration building can indicate where a fire breaks out.

#### 4-9-13 Lightning Arrestor

Lightning arrester is installed on the elevated water tank to protect from damages due to lightning. Lightning rod and conductor will be installed and a grounding copper plate will be underground.

#### 4-9-14 External Lighting

External lighting will be installed around buildings for security purposes at night. Wiring is planned underground. Turning on and off of the lights will be operated automatically and manually.

### 4-10 Environmental Improvement

When a college is newly constructed, extremely large funds is necessary, and a major part of these funds are spent on the buildings, teaching equipments, staff housing, etc. for their construction, and it is very difficult to attend on to the environmental improvement. Environmental improvement has a large influence on the mental aspects of the students and the atmosphere as a college including the visual points. Therefore long term planning is done with regards to environmental improvement which is implemented by degrees.

In the first stage, improvement is done with respect to the items functionally minimum required. Both sides of the approach road to the site of the college from Thika Road and the campus roads to the entrance of the buildings are to be provided with turfs and trees. Since the temporary huts presently built for the nomadic tribes close to the approach road from Thika Road give an extremely unpleasant impression to the entrance of the college, it is hoped that the Kenya government would take some measures to improve this situation.

Turf and tree planting is planned around the buildings and the covered way, in the courtyard, etc.

Outdoor sports facilities are important as well as the buildings as a part of education, and therefore, running track, football pitch, volley ball pitches and tennis courts are also planned.

Tree planting along the boundary of the site and around the staff housing, and the landscaping between the entrance of the college and the buildings are planned to be adjusted gradually after the opening of the college.

#### 4--11 Demonstration Farm Planning

##### Purpose

A demonstration farm is established with the aim of providing training to the students of the faculty of agriculture to acquire necessary technology, and a place for the agricultural production.

##### Necessity

It is necessary that the students of the Faculty of Agriculture should possess knowledge and understanding with regards to farm management through practical experience in agricultural production. In order to accomplish this, it is necessary to have a demonstration farm which could continuously supplement the purpose of education with agricultural production and its management.

Specially, the students of the department of horticulture should follow an education system which combines the three phases of lectures, experiments and farm practices in coordination, and to achieve this, it is necessary to have an appropriately managed farm for horticultural production.

Since principles and application relevant to agricultural machinery, preservation of farm land, irrigation and drainage are very important subjects for the students of the department of agricultural engineering, a farm is the place for their practical education. Further, with regards to the students of the department of food processing, a farm is necessary since their course of education embraces general education of agriculture, production procedure of farm products and their processing, and the effect of a farm on these students is not secondly to that on the students of the above-mentioned two departments.

For these reasons, it is necessary to have the farm ready for immediate use as a place for education at the time of beginning the education in the Faculty of Agriculture, like the workshops and processing facilities.

##### Area

Total area of about 150 ha is planned as the training farm.

##### Classification of Farm Area for Utilization

1. Management Area	5 ha
2. Fruits Farm	20 ha
3. Vegetable Farm	8 ha
4. Floral Farm	2 ha
5. Special Products (Special products include coffee, tea, pyrethrum, peppermint, pepper, sisal, etc.)	15 ha
6. Paddy Fields	5 ha
7. Manure products	
1) Peas	20 ha
2) Grass	10 ha
8. Others	65 ha

Note: In the beginning, it will be necessary to secure a farm of 10 ha., at least, which has been well prepared for fruit trees, vegetables, flowers, etc., after the demonstration farm is put into use.

## Land Reclamation

Irrigation and drainage of the farm is most important in the land preparation for the farm. The annual rainfall of this area is about 850 mm and is concentrated in the rainy season. Therefore, although the cultivation is possible during this period, that of herbaceous plants, specially yearly crops become difficult during the dry season. Moreover, since the annual evaporation is over 1850 mm, showing that a balance of water is not at all remained, provision of irrigation facilities is essential in the establishment of the farm. Further, since the drainage of the farm is necessarily not good, it is considered that water will stagnate during the rainy season causing hindrance to the healthy growth of crops and also to the management of farm. Therefore, drainage ditches are necessary for surface drainage. The following are the points that require careful attention in the land preparation for the farm.

- 1) By maintaining water resource for irrigation water, irrigation facilities must be provided. For the whole crop area, it is desirable to lay main pipelines to supply irrigation water. Irrigation facilities using sprinklers are very essential for the vegetable farm and the floral farm, and those also for fruits farm must be considered.
- 2) Drainage ditches shall be provided around the college. Moreover, across all the roads in the farm, drainage ditches shall be provided and they shall be connected to the drainage ditches cut around the college.
- 3) Farm area where the arable soil is not thick enough, shall not be prepared as arable land and will be used as forests and grass fields. In this plan, the arable land is limited to about 80 ha.
- 4) Around the boundary of the college, a forest belt of width 100m shall be necessary. Since the soil in the area around the boundary of college is not so good, this area is not suitable for farm land. Therefore, it is better to use this area for a forest belt to cover the campus, and the protection given to the farm products from winds is considered remarkable.
- 5) The arable soil in the farm area is shallow and not fertile. Therefore, the land has to be prepared by deep plowing and it is necessary to increase the fertility of soil by cultivating green manure crops.
- 6) The classification of land for utilization is as follows:

Fruits Farm	20 ha
Vegetables and Floral Farms	10 ha
Special Products	15 ha
Paddy	5 ha
Manure Crops	20 ha
Grass Fields	10 ha
Total	80 ha



## **Irrigation and Drainage**

First of all, irrigation is indispensable in the cultivation of crops, especially the horticultural crops. Irrigation water is tapped from the rivers such as Ndarugu River, which flows on the northern side of the farm, and Thiririka River, on the southern side of the farm by constructing dams, intake and pumping facilities as may be required, and is transported to the farm by pipelines.

Although the irrigated area in the farm is 80 ha according to the demonstration farm plan, 10 ha are required to be irrigated at the initial stage. Irrigation is done by installing farm ponds and pressure pumps in the farm and by providing fixed pipelines for the main routes. Sprinklers are used to irrigate the horticultural crops and rain guns are used to sprinkle water to the manure crops. With regards to the latter, sprinkling of a mixture of animal manure, urea should be considered in future.

As other drainage plans, a ditch is provided right around the boundary of the campus, which also helps to prevent the inflow of water from outside the campus, and open ditches are provided at regular intervals in the farm to provide surface drainage. Since the ground water level is low, drainage by underdrains may not be necessary for the time being depending on the soil conditions.

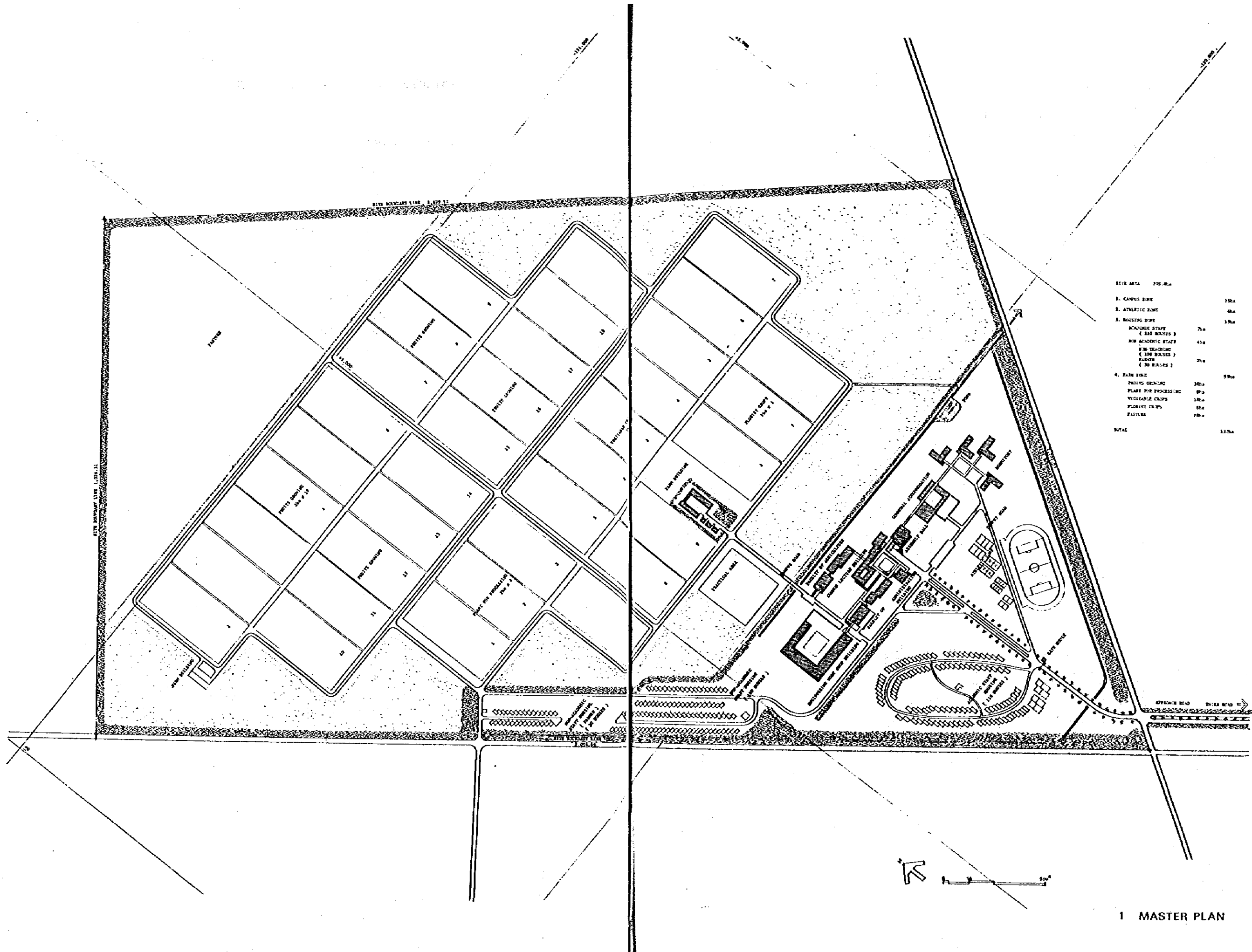
Moreover, in order to dispose this water into the drainage canals outside, it is necessary to provide facilities such as drainage canals and pumping station if necessary.



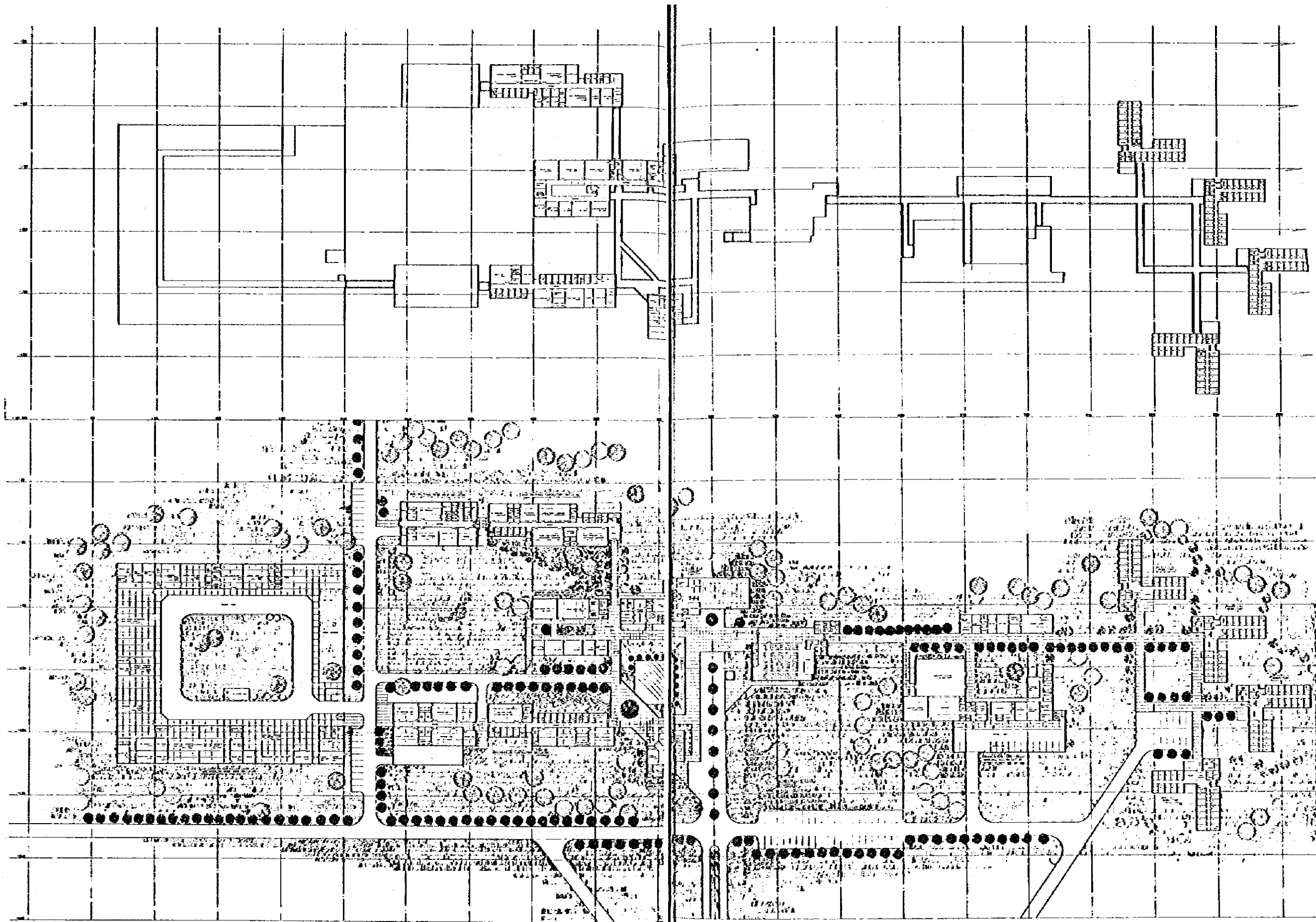
## **CHAPTER 5. PRELIMINARY DESIGN**

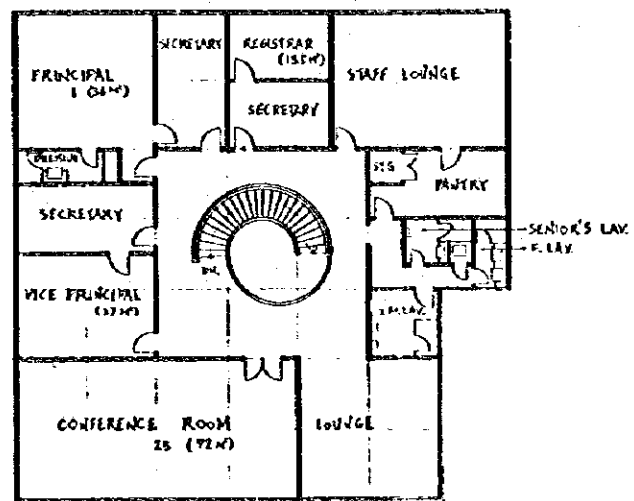
### **List of Drawings**

<b>No.</b>	<b>Title of Drawing</b>
1.	MASTER PLAN
2.	BLOCK PLAN
3.	ADMIN. ASSEMBLY HALL
4.	LIBRARY & COMMON LECTURE BUILDING
5.	COMMUNAL ACCOMMODATION BUILDING
6.	DORMITORY & GATE HOUSE
7.	AGRICULTURAL LABORATORY BUILDING
8.	AGRICULTURAL WORKSHOP
9.	ENGINEERING LABORATORY BUILDING
10.	FARM BUILDING
11.	WORKSHOP BUILDING

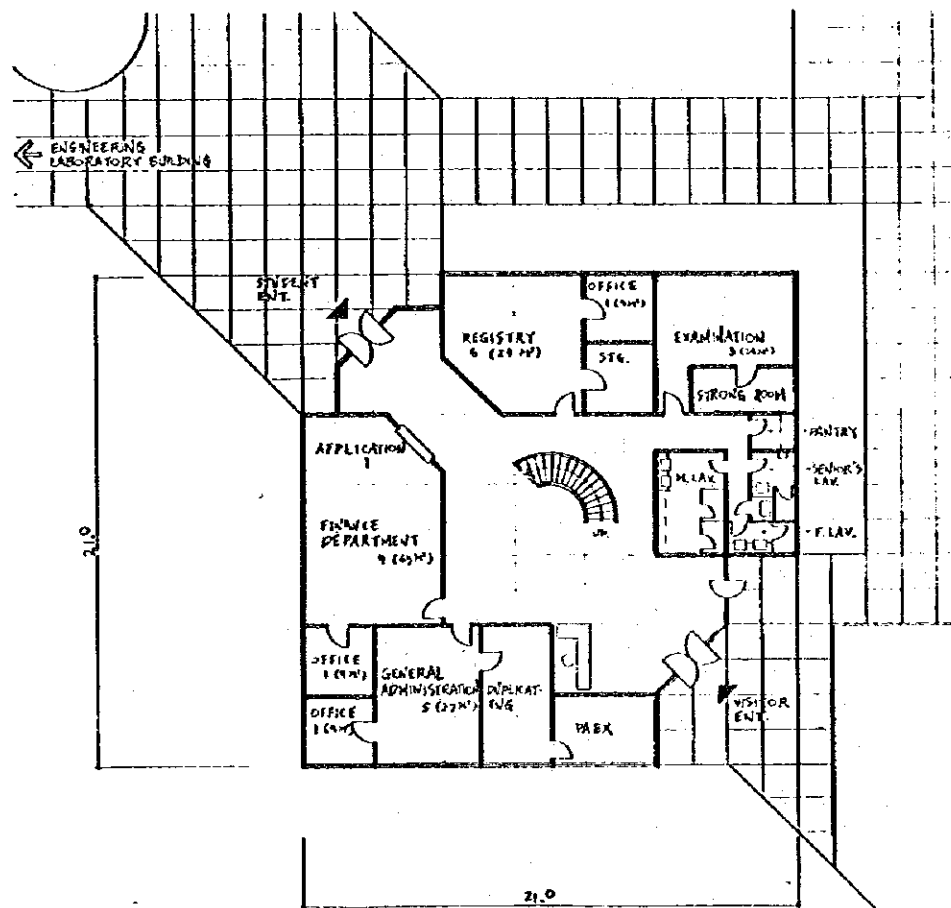


SITE AREA 725.00a	
1. CAMPUS BURE	100a
2. ATHLETIC ZONE	40a
3. RESIDING ZONE	330a
ACADEMIC STAFF	70a
( 110 BUSES )	
NON ACADEMIC STAFF	40a
( 100 BUSES )	
FACULTY	20a
( 30 BUSES )	
4. FARM ZONE	50a
FRUIT GARDENS	30a
PLANTS FOR PROCESSING	10a
VEGETABLE CROPS	10a
FLORIST CROPS	5a
PASTURE	5a
TOTAL	1125a

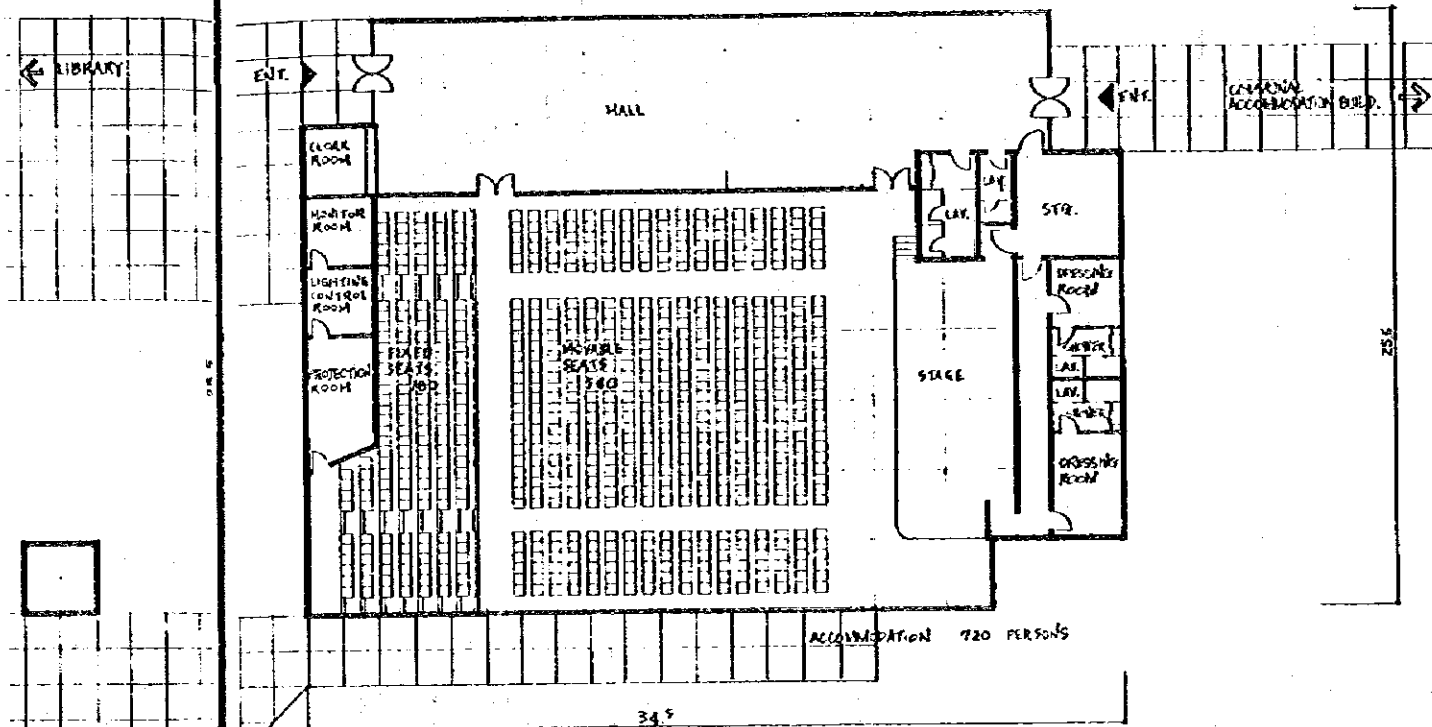




FIRST FLOOR PLAN

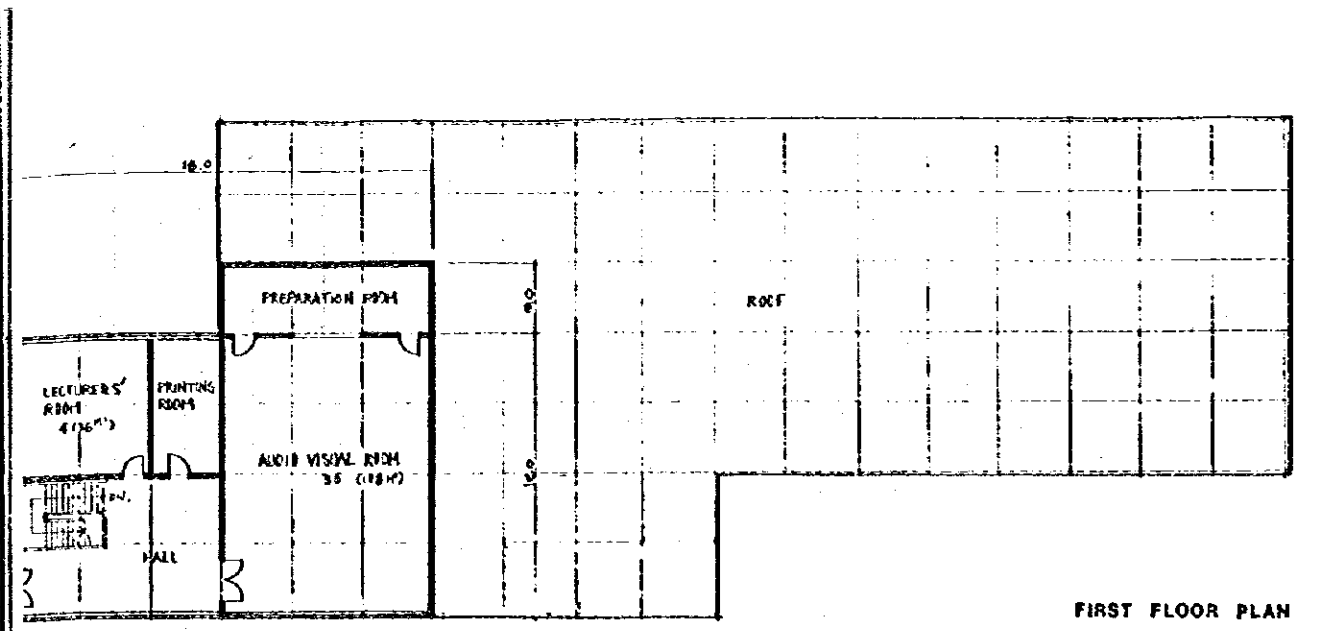
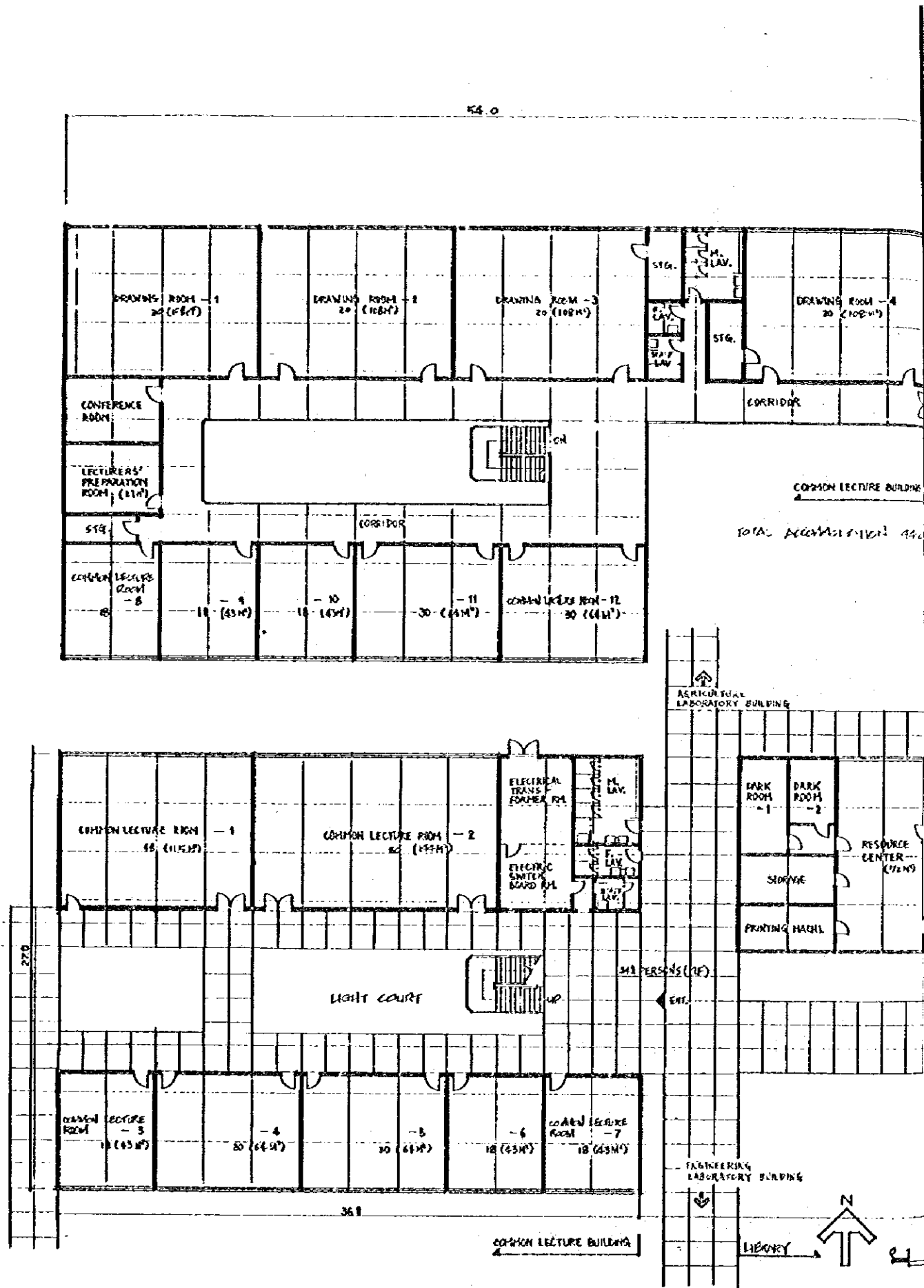


GROUND FLOOR PLAN

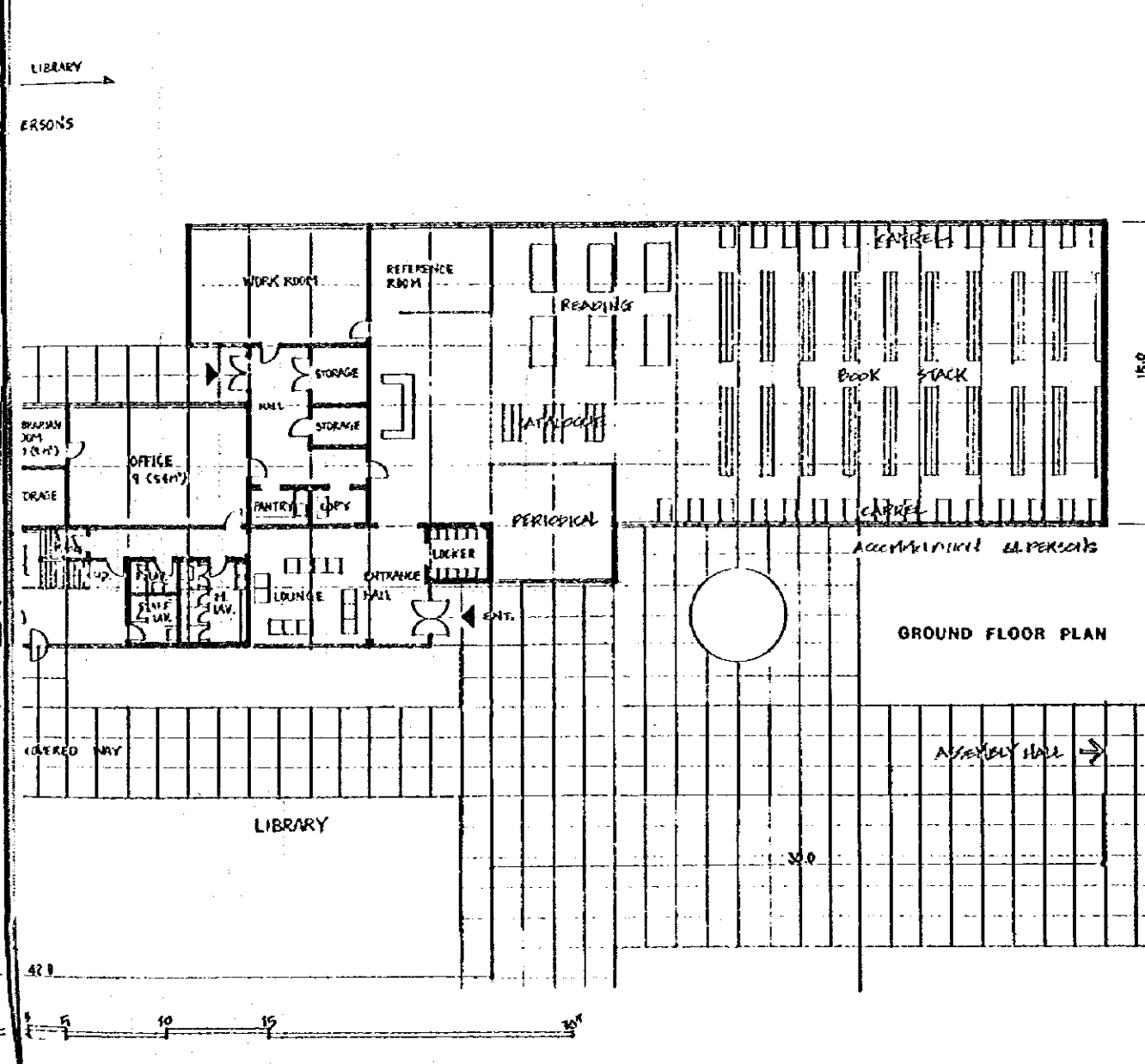


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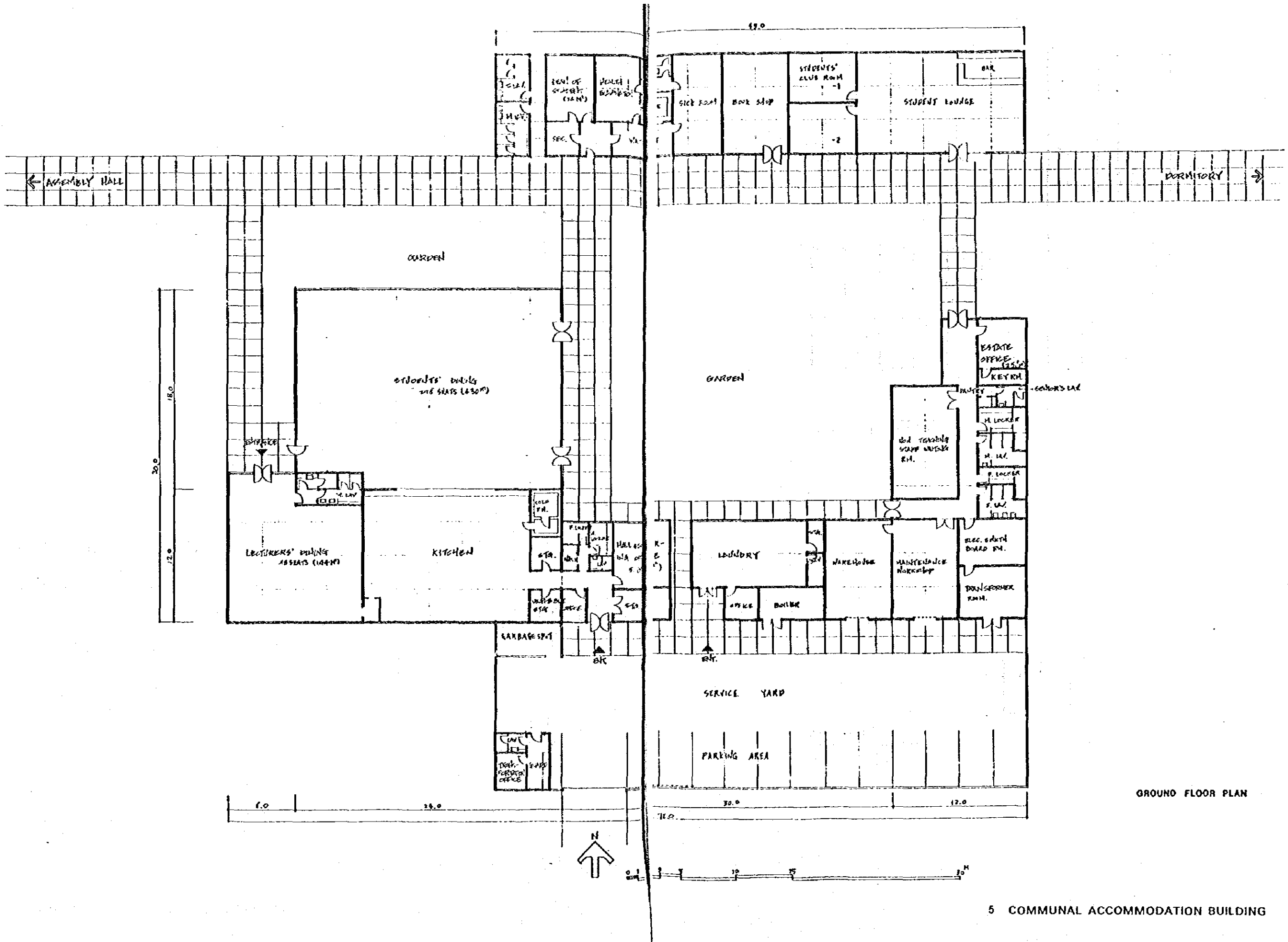




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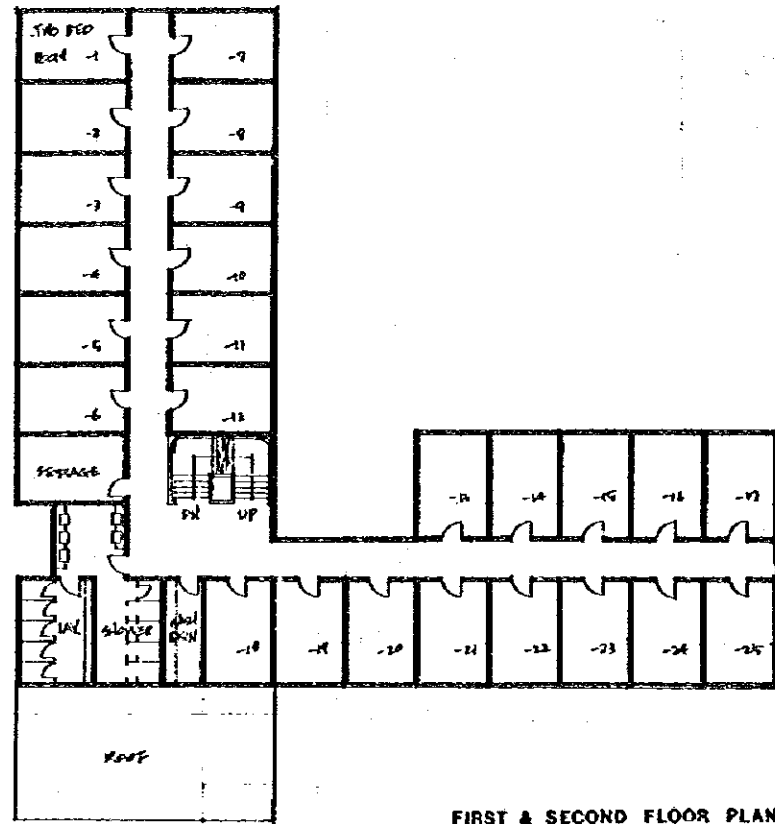


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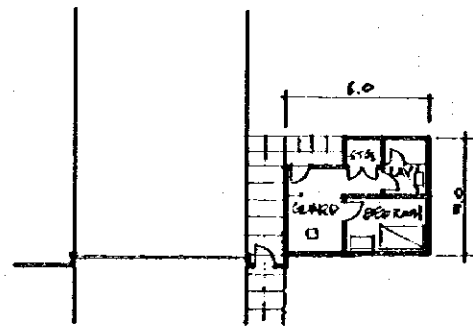


GROUND FLOOR PLAN

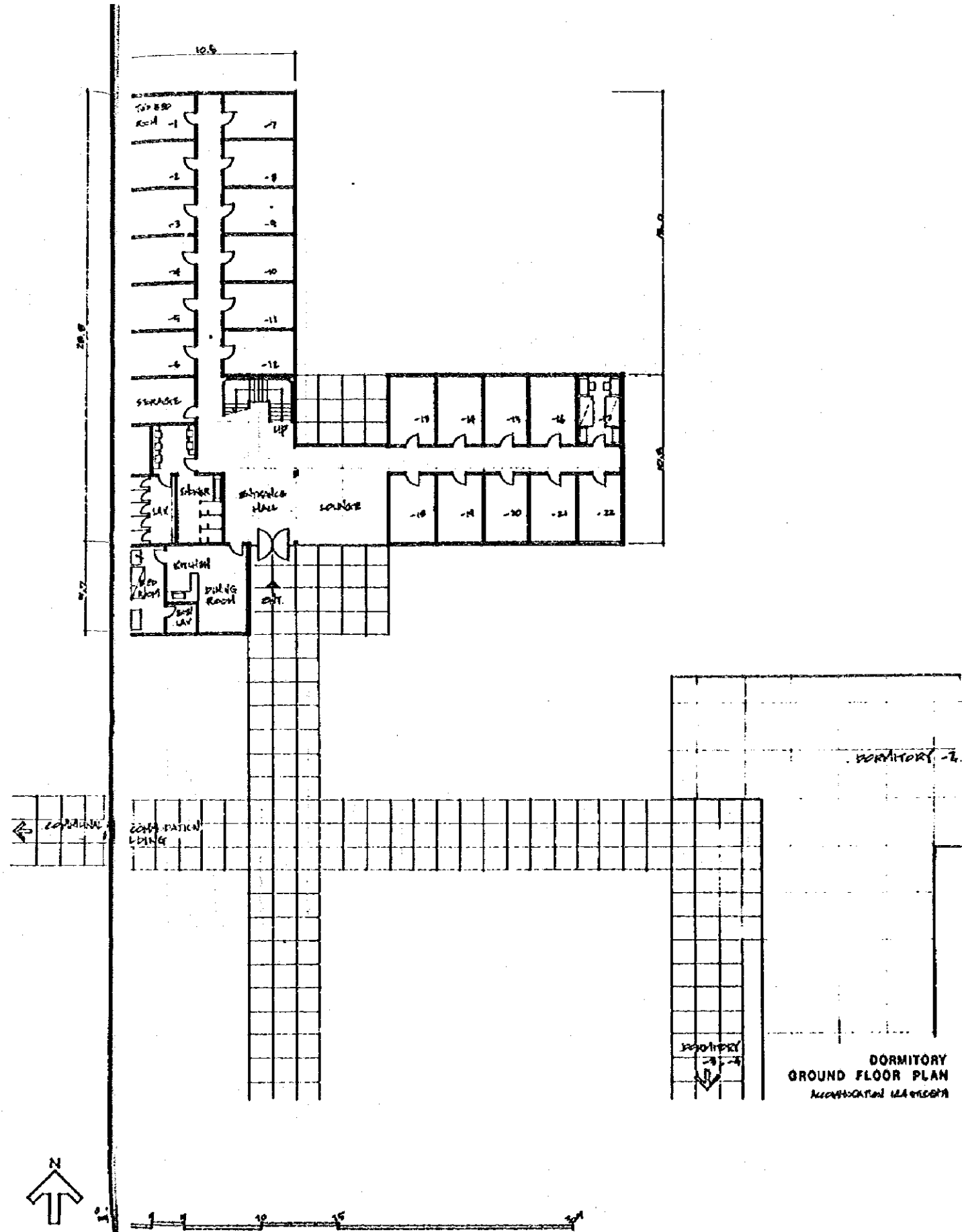




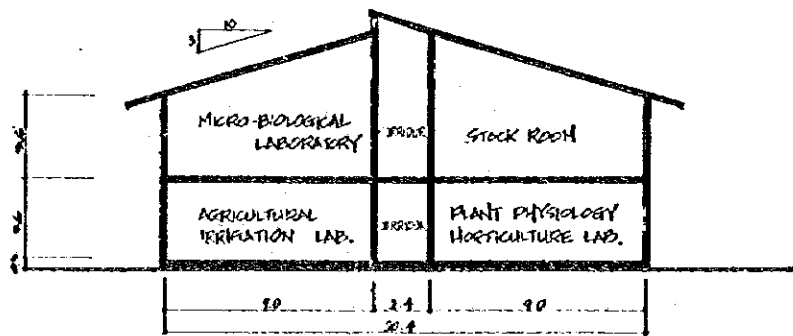
FIRST & SECOND FLOOR PLAN



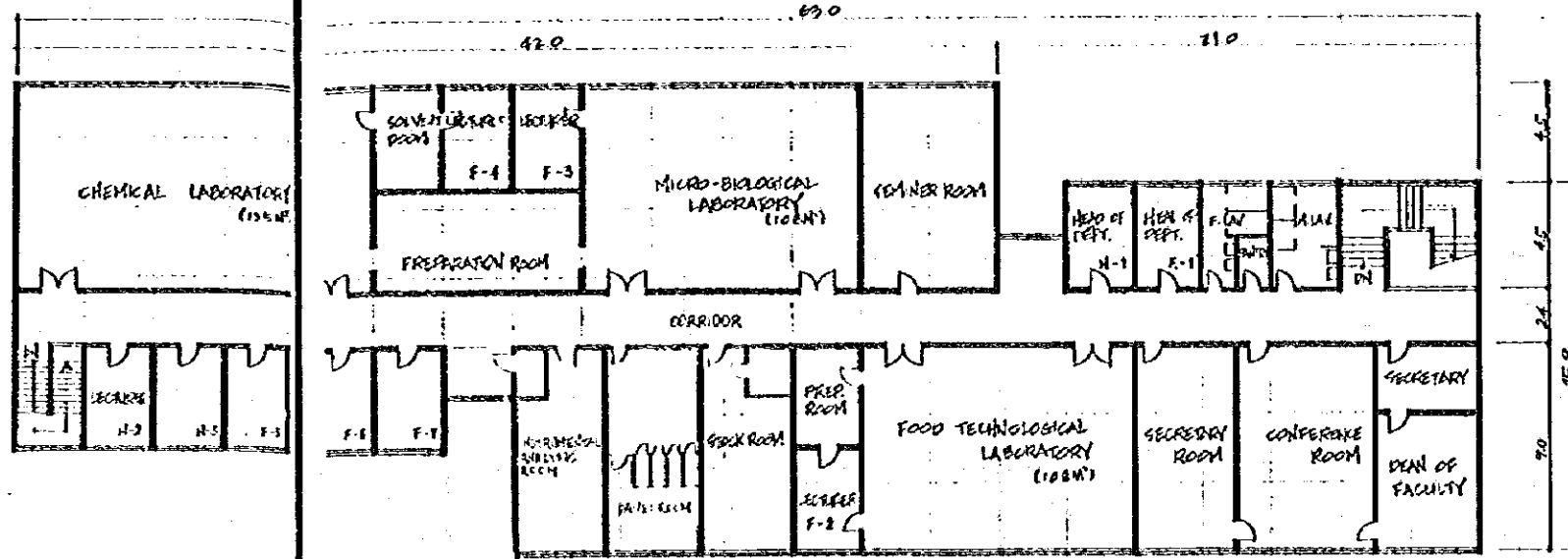
GATE HOUSE  
GROUND FLOOR PLAN  
(EXTERIOR WORK)



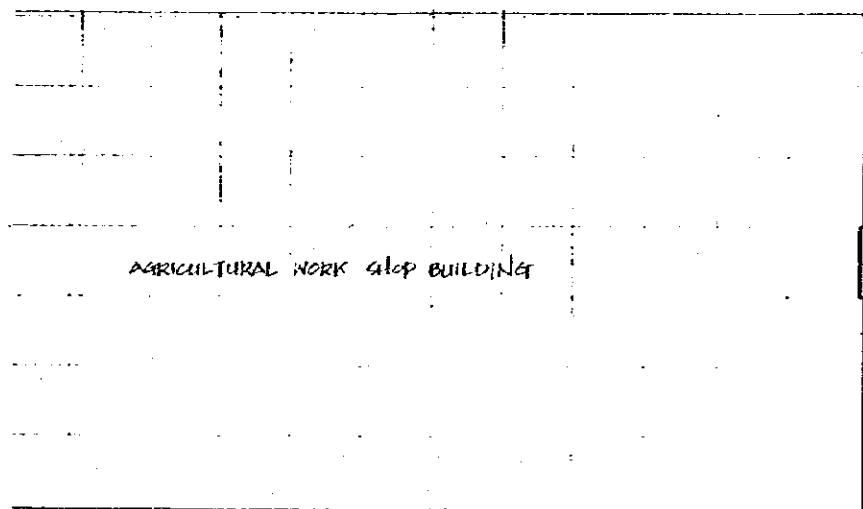
DORMITORY  
GROUND FLOOR PLAN  
ACCENTUATED INTERIOR



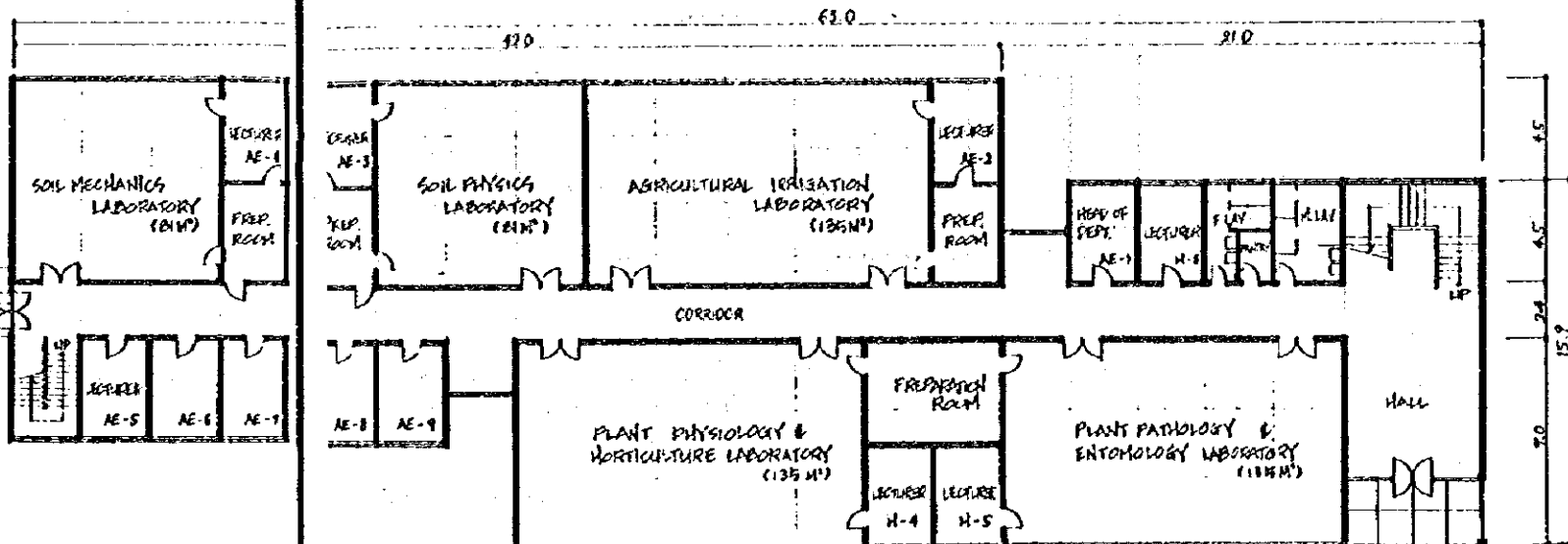
SECTION



FIRST FLOOR PLAN

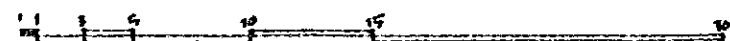


AGRICULTURAL WORK SHOP BUILDING



GROUND FLOOR PLAN

AE : Agricultural Engineering  
 H : Horticulture  
 F : Food Processing

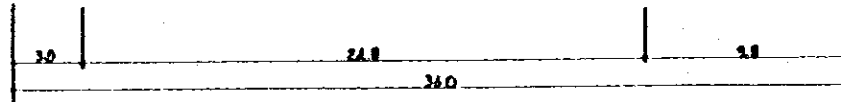
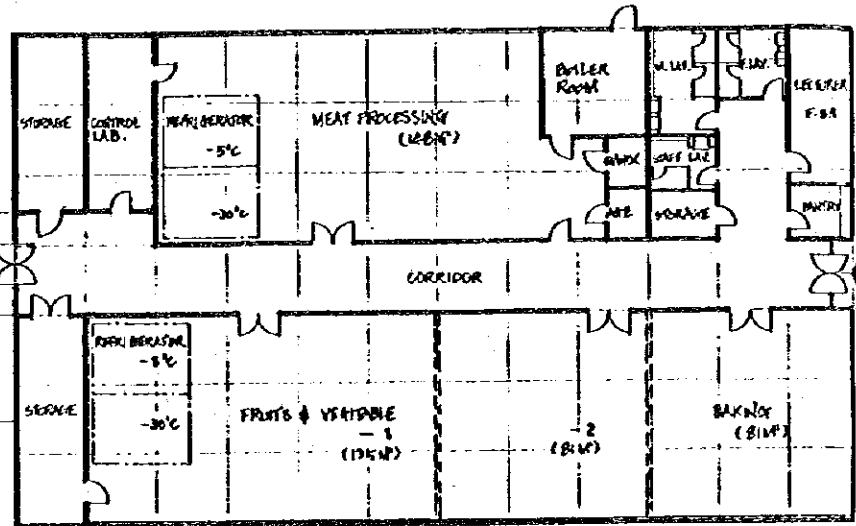


FARM BUILD.



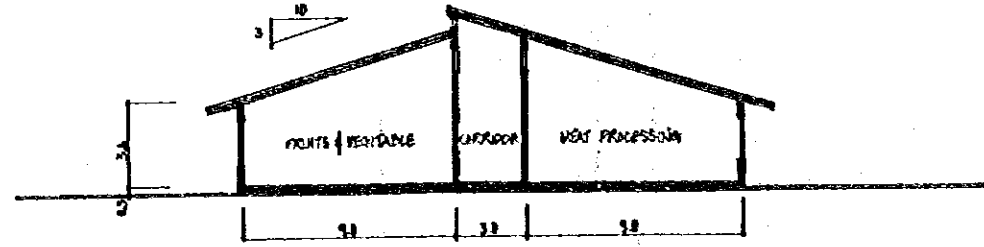
PARKING AREA

CAMPUS ROAD

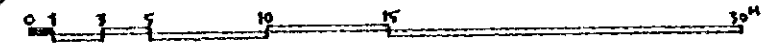
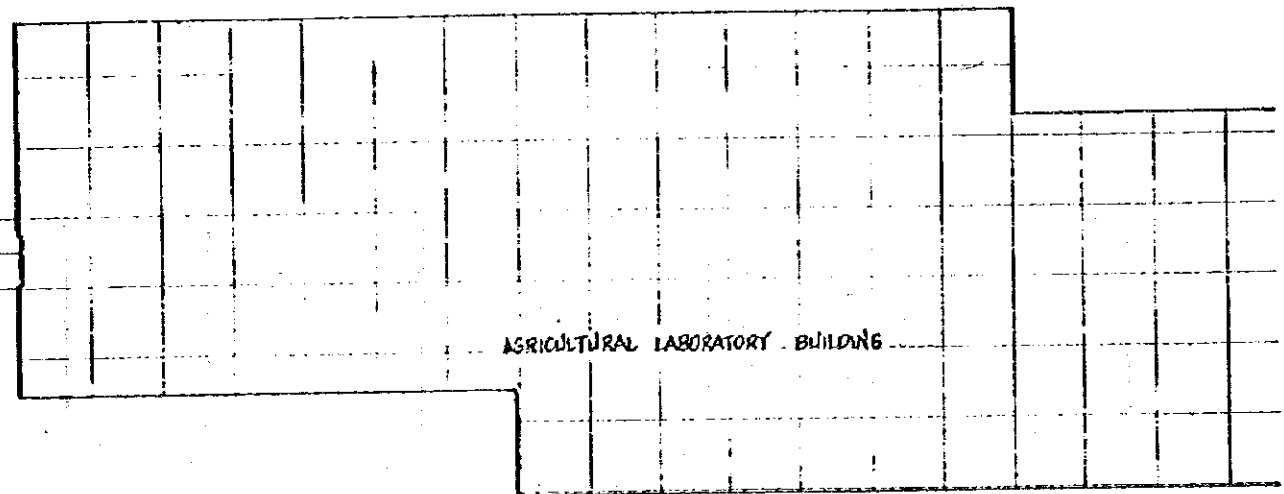


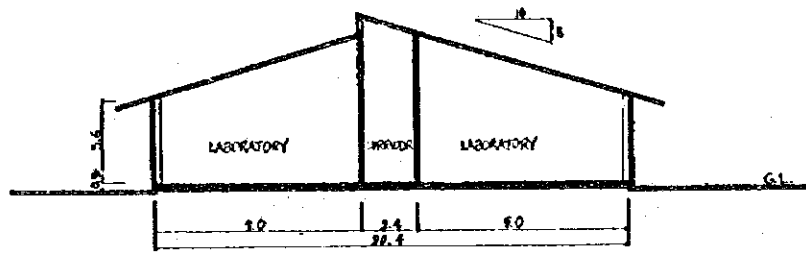
GROUND FLOOR PLAN

F: Food Processing

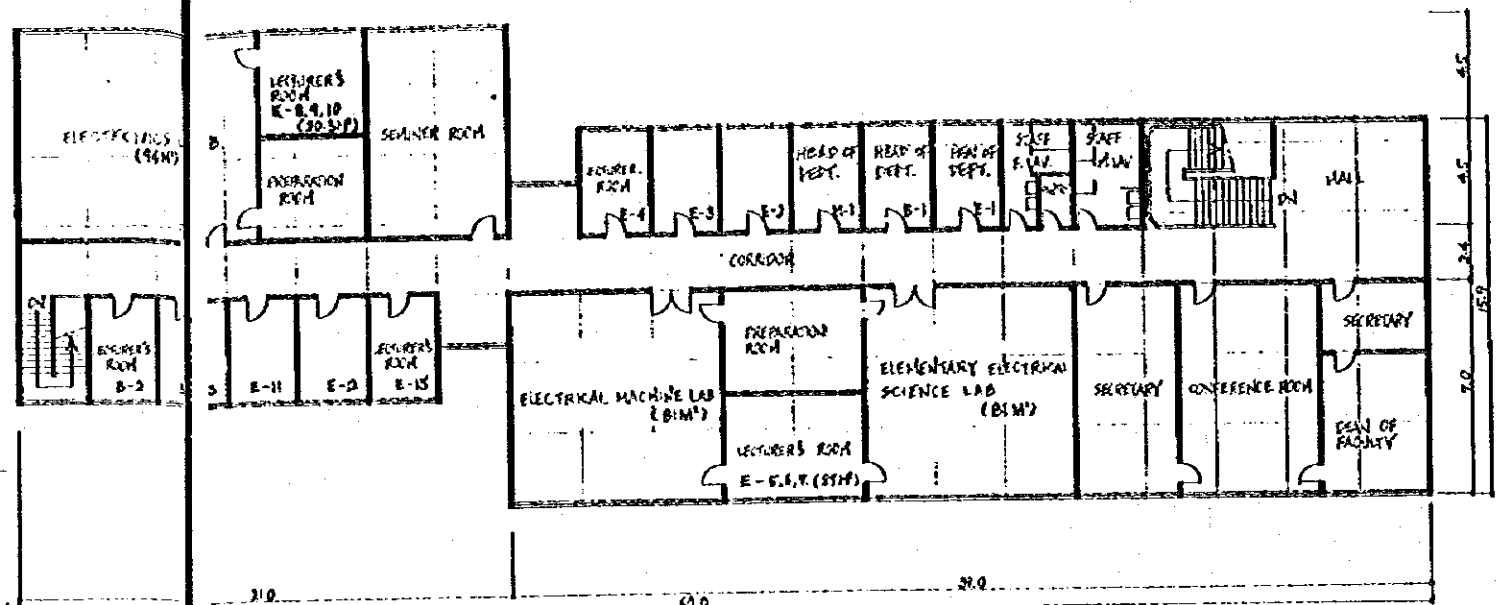


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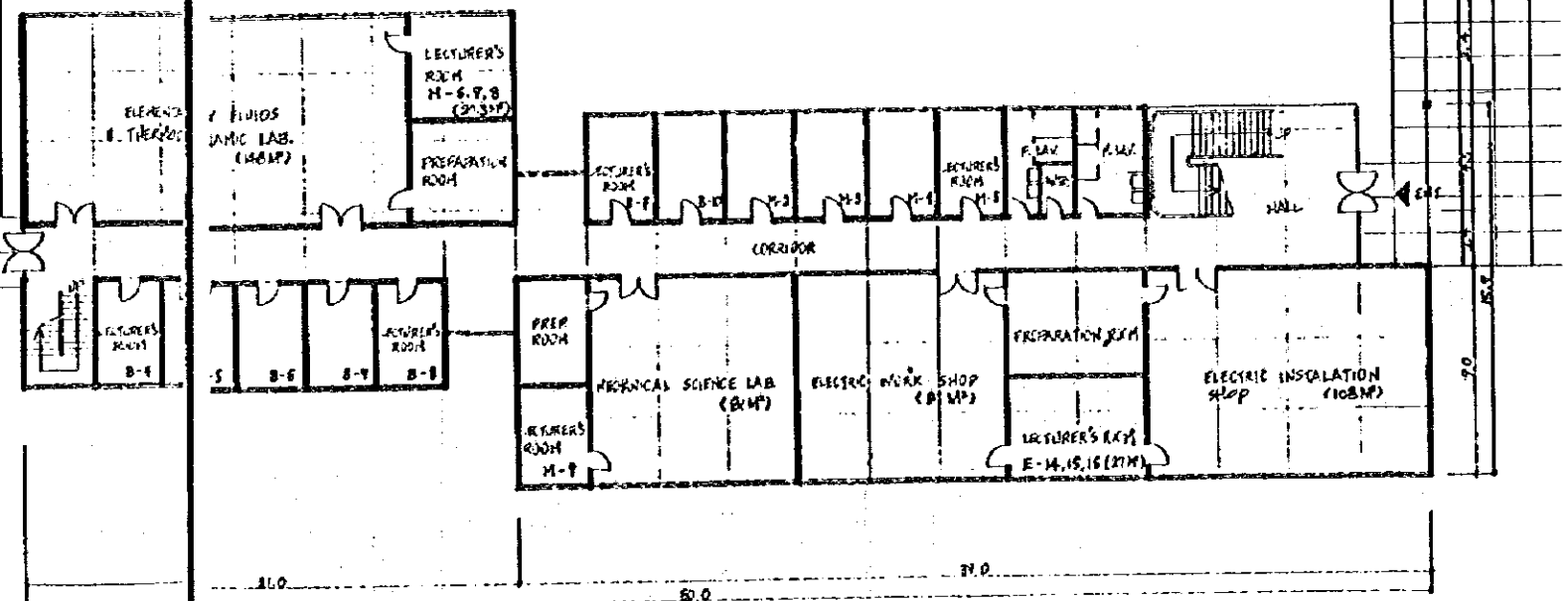
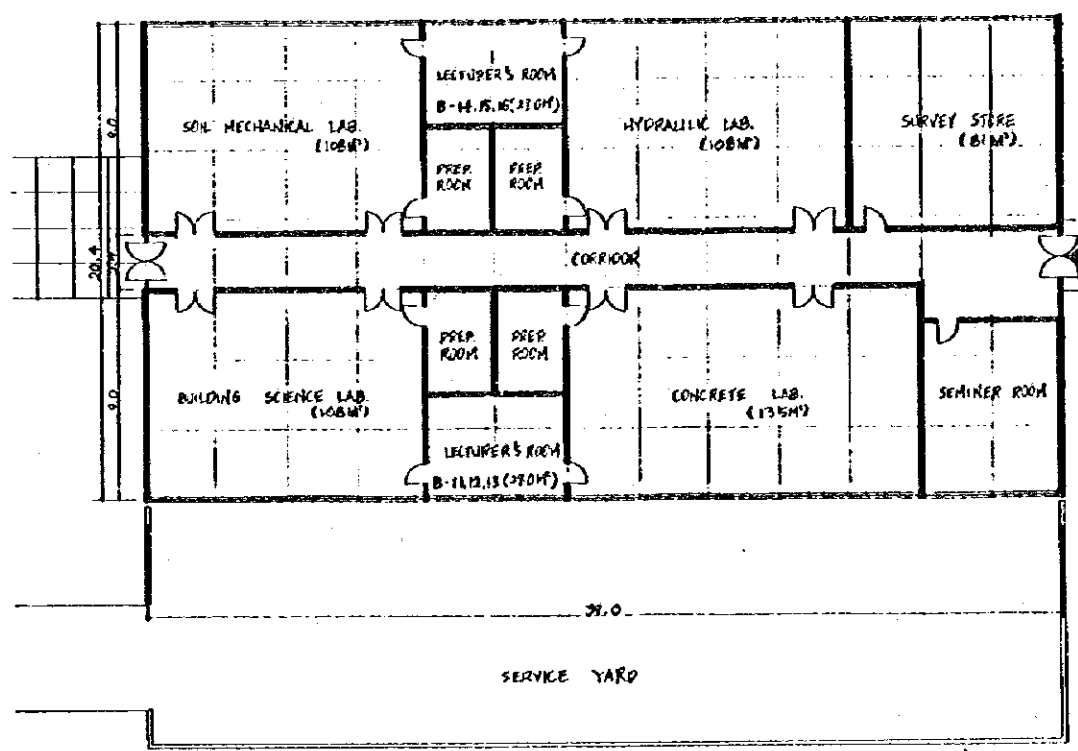




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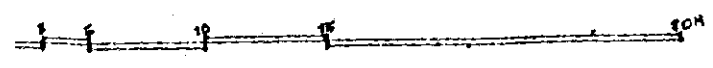


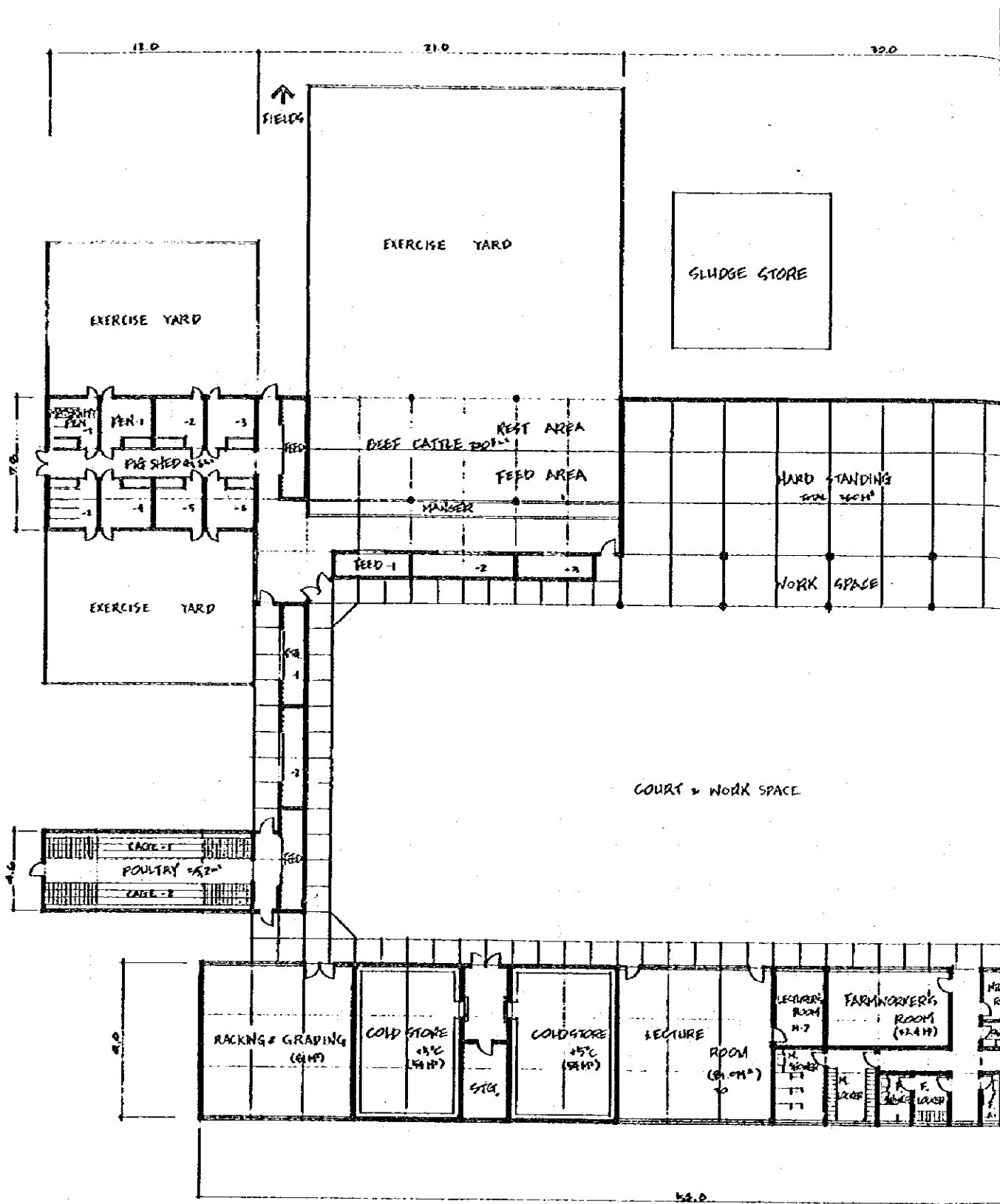
FIRST FLOOR PLAN



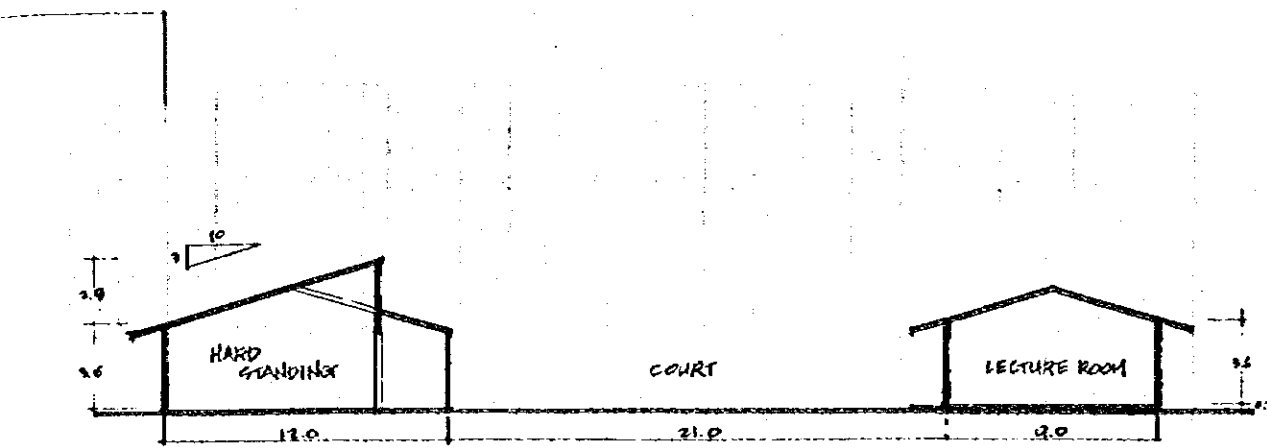
GROUND FLOOR PLAN

E : Electrical Engineering  
 M : Mechanical Engineering  
 B : Building Engineering

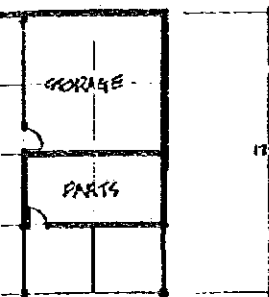




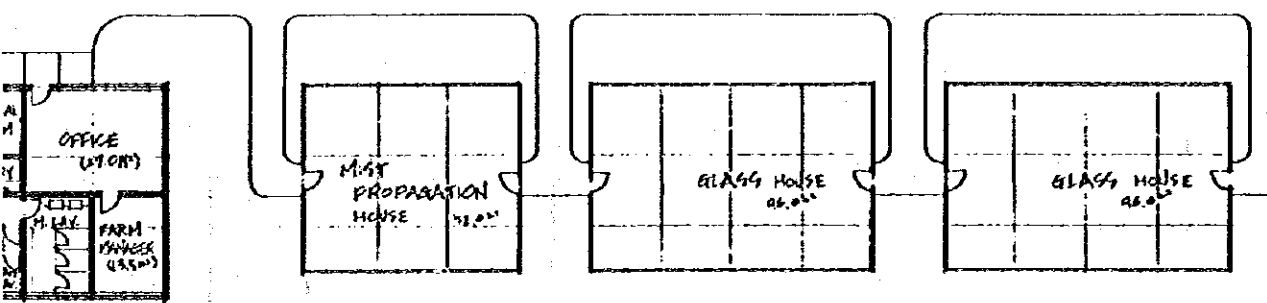
H: Horticulture



SECTION



CAMPUS →



GROUND FLOOR PLAN