SCHOOL OF ENGINEERING FEDERAL POLYTECHNIC - OFFA
(Towards an Effective integration of Facilities in Schools of Engineering)

By

ROTIMI KAYODE JOSEPH
B.Sc. (Hons) Architecture

A Thesis submitted to the Postgraduate School, Ahmadu Bello University, Zaria, Nigeria in partial fulfilment of the Requirements for the Award of the degree of Master of Science in Architecture (M.Sc. Architecture).

DEPARTMENT OF ARCHITECTURE
FACULTY OF ENVIRONMENTAL DESIGN
AHMADU BELLO UNIVERSITY
ZARIA - NIGERIA.

NOVEMBER, 1992.

DECLARATION

I hereby declare that this thesis has been composed by myself and that it is a record of my own research work under the supervision of my mentor Dr. O.O. Ogunsete of the Department of Architecture, Ahmadu Bello University, Zaria. It has not been accepted in any previous application for a higher degree. All quotations are distinguished by quotation marks and sources of information are specifically acknowledged by means of references.

ROTIMI KAYODE JOSEPH

NOVEMBER, 1992.

CERTIFICATION

This thesis entitled "School of Engineering, Federal Polytechnic Offa (Towards an Effective integration of Facilities in School of Engineering") meets the regulations governing the award of the degree of Masters of Science in Architecture (M.Sc. Architecture) of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentations.

Chairman Supervisory Committee	Date 25/1/93
Member, Supervisory Committee	Date 24/6/93
Member, Supervisory Committee	Date 24/6/93
Head of Department	Date
Dean, Postgraduate School	Date

DEDICATION

This thesis is whole heartedly dedicated to:

- Almighty God, the creator and maker of the entire Universe and everything therein, the author and finisher of our faith.
- Members of my family for the love and support.

ACKNOWLEDGEMENT

Success it is said; is achieved through hardwork and in the course of it, there must have been obstacles and encouraging hearts, and at success one is bound to recall same. Both, in one way or the other, have been catalyst to its realisation for they inspire ambition and create a peaceful atmosphere for its pursuance respectively.

In realising this work; it has not been a solitary effort all the way through. It was a conglomeration of efforts accompanied by sad and merry moments. I therefore want to express my profound gratitude to the following people from different quarters of the country for their various contributions toward the success of this programme.

First, I am indebted to my supervisor Dr. O.O. Ogunsete for his thorough supervision of this work. I must as well express my immense gratitude to the head of departmet, Dr. O. Solanke, Arc. W.B. Qurie, Arc. Yelorah, Arc. Madusolumon and the entire staff of the department of architecture, that I have been opportuned to meet and work under, they made me realise that the frontiers of architecture knows no limit.

Special mention should be made of certain individual who had at one time of the other made considerable efforts towards the success of this project, they include: Mr. J.S. Adeniyi and his wife (my sister), Mrs. Y. Adeniyi, Mr. R.A. Adunmo, Mr. Sunday Towoju and Mr. J.O. Omotosho. Your efforts are highly appreciated.

I also wish to extend my gratitude to friends like Kunle Ajetomobi, Tunde Arowona, Akeem Abidemi, Jide Johnson Jones Onuga, Yomi Omotosho, Ladi Amos, Bode Osatuyi and all my classmates whose suggestions and criticism were contributary factors to the success of this thesis. It's been nice learning together under the same roof for five years. All my numerous friends all over the world are as well acknowldeged for their friendship.

I am of course, grateful to my parents, Mr. J.A. Rotimi and Mrs. V.A. Rotimi; my brothers and sisters for all they have been able to give. Your love and affection had always been overwhelming.

Finally, I acknowledge the driving force of that darling friend to come from the blues. You have indeed been a source of yearning for accomplishment.

I am thankful to GOD for giving me life abundantly.

QUOTABLE QUOTES

"Dispersal is antoganistic to life, density is not an avoidable evil we have to contend with, it is the only morphology that can guarantee a meaningful existence.

PAOLO SOLERI -ARCHITECT

"Totality is made up of diversity as is unity. The quality of unity is its power to absorb diversity in a total sum of meaning".

YAACOU AGAM - ARTIST.

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ABSTRACT

Training is a systematic process by which individuals knowledge, behaviour, attitude and skills are developed towards executing specific functions or jobs. Thus training is a developmental learning process. Training centre as an educational institution should thus provide an environment such as would be conducive for learning process.

The first instinct of an architect when he is to design a building is to enquire into its purpose. In designing buildings concerned with complicated manufacturing machines, such as school of engineering where the aim is to educate and train people not for one factory, but many, the purpose of the building is an extremely complex one. No other educational building possibly, no other type of building has the same degree of complexity. The architect therefore, needs to become sufficiently acquainted with what is going on in these schools to enable him provide suitable spaces and conditions for the people who are to use them.

This thesis is an attempt by the author towards achieving effective integration of physical facilities needed for the training of practically oriented, innovative and immaginative engineers in one of our new Polytechnics. The thesis is also an architectural contribution on the part of the author, to indigenous technological advancement in Nigeria.

CHAPTER ONE

CHAPTER ONE

GENERAL INTRODUCTION

1.1 INTRODUCTION

The Planning and design of higher education facilities covers a wide range of activities from the drawing up of a policy to its implementation. Between these two extremes lie problems, such as detailed long range planning for individuals institutions, and the drawing up of instructions or briefs to Architects for translating abstract ideas into three dimensional forms.

Education as a systematic pocess of training and instructions, requires certain spaces and equipment to carry out its functions effectively. Architecture evolves, methods of arranging such spaces and equipment for proper learning conditions. Education curriculum is dynamic and not static. Due to changes in school's curricula or students enrolment, school buildings have always been subjected to changes not only within the envolop but also in the form of additions and annexes. Unfortunately, because these changes have not been planned for in the begining, hapharzard layout of buildings which are not only expensive, but also unsatisfactory results. These changes also mar the beauty of the school. These are of courses, matters of concern to educational planners and Architects.

In view of future changing demands, the main consideration in the planning of educational buildings must therefore be the

provision for flexible and adaptable spaces, properly integrated. "Flexible and adaptable space is valuable in giving the school curriculum a chance to grow in response to changing students population". (Yoloye, A.E. 1990).

This thesis is therefore, aimed at designing a school of Engineering where maximum integration and flexibility with minimum dislocation and cost for subsequent alterations and addition will be achieved, so as to be able to accommodate the constantly changing demands of a dynamic system of education.

1.2 STATEMENT OF PROBLEM

A survey of some polytechnics in the country has shown that some schools of Engineering do not have their various departments integrated. They are either scattered within the same campus or located in different campuses. Even in some schools where the departments are integrated, effective integration is lacking due to effects of one function on another (e.g activities of a workshop located close to a library).

Reasons for these could be:-

i. Lack of provision for possible changes which may arise due to changes in the school's curricula;

ii. Non-availability of land for future expansions;

iii. Nature of the departments involved;

iv. Rigidity in design, etc.

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Various problems emerge out of discentralization of buildings. These include, hapharzard layout of buildings duplication of facilities which could be commonly shared, reduced interaction between students and staff of the various departments etc.

1.3 MOTIVATION

In educational institution, the students population is not static, neither are the courses run. When such a situation occurs the result is that there are corresponding changes in the accommodation spaces. This may result in the dis-unification of such an institution. Examples could be taken from the following institutions:-

i. The faculty of Environmental Design, Obafemi Awolowo University, Ile-Ife; where the Department of Architecture was moved to the formal central cafetaria due to lack of space.

ii. Faculty of Technology annexe, University of Ibadan, which is situated within a block of flats meant for residential purposes since there is no space in the main faculty building, as provision for expansion was not taken into consideration during the design stage.

iii. The school of Engineering, Kaduna Polytechnic which is also not left out of this problem. The various departments are scattered all over the campus.

Federal Polytechnic, Offa was established by the Federal Government of Nigeria in November, 1990.

The institution, especially its school of Engineering where heavy and complicated machines are involved, may not be left out of these problems if not properly planned. Faculties or schools are supposed to have their various departments unified and not separated.

The drive behind this thesis is therefore the desire to see a school of Engineering where the facilities are effectively integrated.

1.4 AIM AND OBJECTIVES

The aim of this thesis is to provide an effectively integrated academic environment for the purpose of achieving good and conducive atmosphere for learning, both for now as well as for the future population. To achieve this aim, the following objectives have been set out:-

i. To find out reasons why we have discentralization in some schools of Engineering;

ii. To study the problems of discentralization in some Schools of Engineering;

iii. To investigate the degree of effectiveness in places where there is integration, (i.e. to know the problems arising from improper integration).

iv. Allow for future expansion interms of flexibility and land availability;

v. To provide a functional relationship between the various departments and within each departments constituting the school;

vi. To make appropriate recommendations based on the findings.

1.5 SCOPE AND LIMITATIONS

It is necessary to define the scope of work to make the boundaries of the work very clear. Ideally, the researcher has developed a manageable problem within the limit of time and other resources, rather than one which will be vague wide, and too complex.

The scope of this work is thus organised as follows:-

(i) Analytical Study:-

This deals with general data collection and analysis of the existing situation of some schools of Engineering, to aid better understanding of the thesis problem with the view to proposing a better design as this is an important element in the design solution. This study will be concluded by recommendations and general suggestions on how these problems could be resolved with particular reference to the Federal Polytechnic, Offa.

(ii) Design Proposal:-

At the end of the recommendations, a design proposal will be evolved following the general findings and proposals for solving discentralization . problems in schools of Engineering. The structure and content of the design proposals largely depends on the general findings. The layout will include four (4) departments: Mechanical Engineering, Civil Engineering, Electrical Engineering and Agric. Engineering departments;

However, programmes of the Polytechnic have not been fully developed. Certain constraints would therefore be experienced

with respect to the design proposal. These include the land use regulation governing Offa, geological settings of the site, and the climatic conditions of the site. (These must be successfully tackled in the proposed design).

1.6 RESEARCH METHODOLOGY

For any finding in any research work to be accepted, scientific methods must be employed in carrying out such a work. In order to successfully realise the aim and objectives outlined in this thesis the procedure for conducting the research follows the figure suggested bwlow:-

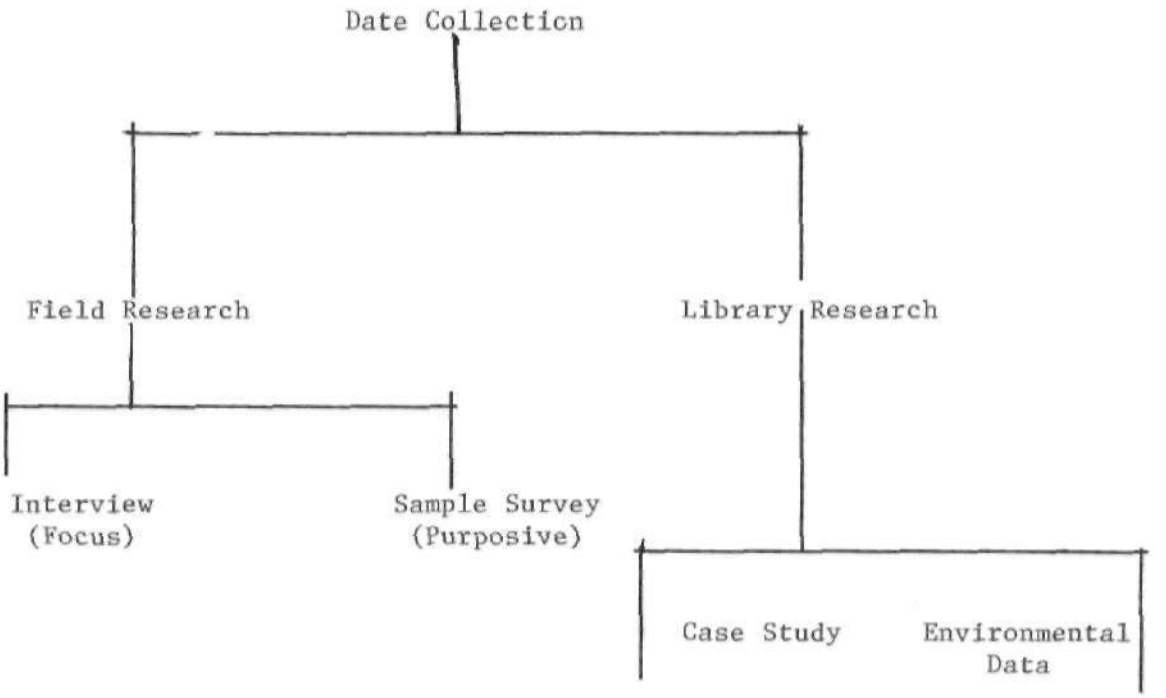


FIG. 1-1 RESEARCH METHODOLOGY

Thus, the data collection will follow these two sources; field research and library research. In case of library research books, papers, past thesis works and journals have been analysed with motive of comprehending the ideas and views regarding the design principles. Case studies, personal observations and environmental data will cap the research.

Field research on the other hand, will depend on purposive sample surveys and focus interviews deductions from personal observations in field and research findings as well as responses during interviews are analysed to assess peoples view with regards to critical design issues.

Finally, assessment by environmental data which enhances the analysis of prevailing environmental conditions, both in micro and macro levels of the site, for the proposal, as well as physical features around the site are analysed with the aim to adopting the proposal to these ever enduring forces.

1.7 ARCHITECTURAL SIGNIFICANCE

Studies on the problems of discentralization of facilities in our schools of Engineering seem not to have been dealt with, despite the associated effects. This study is therefore significant because:-

i. It will bring to light, reasons for discentralization in some schools of Engineering.

ii. It will reveal problems associated with discentralisation of facilities in schools of Engineering;

iii. It will suggest means through which these problems could be solved through design solutions.

This will enhance better academic performance as well as accreditation by the National Board for Technical Education (N.B.T.E) based on the provision of adequate facilities.

Findings from this study could also be useful to a future researchers.

1.8 USERS/CLIENT

The users will mainly be students and staff of the Polytechnic and Federal Polytechnic Offa, Government, the Client.

CHAPTER TWO

CHAPTER TWO

THE NIGERIAN EDUCATION SYSTEM

2.1 HISTORICAL BACKGROUND

The origin of western Education in Nigeria has been traced by Fafunwa (1971), Fajona (1979) and Yarwa (1981) to the pioneering work of the early Christian Missionaries. The oldest institution are just over a hundred years old. They came into existence primarily to promote Christian Evangelism. Later they began to supply the manpower needs of the metripolitan power in administration and trade.

In the course of time new needs have arisen. Children have been sent o primary school in order to join the mainstream of modernization. In the secondary schools, which numbered fewer than 200 thirty years ago, expansion has been so rapid that today there are more than 2,000 in number. But the substance of instruction has not charged significantly.

The war years of 1939 to 1945 and the immediate pre-independence and post-independence periods, have combined to open our eyes to slark realities of the international scene. Nigeria must be united as a nation and grow out of her tribal and regional divisions. An ever rapidly growing population must be fed in spite of the rural migration to urban areas, food product diminishes, necessitating importation, houses must also be built, requiring the services of architects and draftman, civil engineers and technicians, decorators and estate managers.

More hospitals are needed which have to be staffed with physicians surgeons, pharmacists, midwives, nurses and various paramedical personnel.

All these demand and many others of the past twenty to thirty years have made the old pattern of education anachranistic. New policies have to be formulated, new structures adopted, new contents developed, new teachers trained, new books written, new management techniques adopted to meet the heavy demands of development. By the year 2000, the more advanced countries will have developed much more, increasing the gap between their level of attainment and that of our own. Not to recognize the necessity for a developmental ideology is to fail to read the writing on the wall.

The challenges today is, self-reliance and self-substanance for the nation as a whole in a scientific and technological age. It is within this historical and developmental context that a new educational policy and system has been embarked upon.

2.2 HISTORY OF THE POLICY

The history of the new policy dates back to the National Curriculum Conference held in September, 1969 during which Nigerians from all works of life were invited to present their views on what kind of education they wanted for Nigeria.

Four years later, in 1973 a national seminar was held to prepare the draft of a national policy on education based on the recommendations of the 1969 Curriculum Conference.

Based on the report of the seminar, the Federal Government finally brought out the document "Federal Republic of Nigeria National Policy on Education" in 1977. In the same year, an implementation committee was set up to prepare a blueprint for the implementation of the policy. The committee submitted its report in 1978, and the Federal Governments reactions were published the following year. In 1981 the policy was revised and though there has been a number of modifications in the policy, the essential spirit of it has remained.

2.3 PHILOSOPHY OF NIGERIAN EDUCATION

Nigeria's philosophy of education is based on the integration of the individual into a sound and effective citizen and equal educational opportunities for all citizens of the nation at the primary, secondary and tertiary levels, both inside and outside the formal school system.

In consequence, the quality of instruction at all levels has to be oriented towards inculculating the following values;

- request for the worth and dignity of the individual;
- faith in man's ability to make national decisions;
- moral and spiritual values in interpersonal and human relations;
- shared responsibility for the common good of society;
- respect for the dignity of labour; promotion of the emotional, physical and psychological health of all children.

For the philosophy to be in harmony with Nigeria's national objectives which were stated in the Second National Development Plan and include the following:

- a free and democratic society;
- a just and egalitarian society;
- a united, strong and self-reliant nation;
- a great and dynamic economy;
- a land of bright and full opportunities for all citizens.

It has to be geared towards self realisation, better human relationship, individual and national efficiency, effective citizenship, national consciousness, national unity as well as towards social, cultural, economic, political, scientific and technological progress.

2.4 AIMS AND OBJECTIVES OF THE NATIONAL EDUCATIONAL POLICY

The national education aims and objective to which the philosophy is linked are therefore:

- the inculcation of national consciousness and national unity;
- the inculcation of the right type of values and attitudes for the survival of the individual and the Nigerian society;
- the training of the mind in the understanding of the world around; and
- the acquisition of appropriate skills, abilities and competence both mental and physical as equipment for the individual to live in and contribute to the development of the society.

KASHIM IBRA...

- the desire that Nigeria should be a free, just and democratic society a land full of opportunities for all its citizens, able to generate a great and dynamic economy, and growing into a united, strong and self-reliant nation cannot be over emphasised. In order to realise fully the potentials of the contributions of education to the achievement of the objectives, all other agencies will operate in concert with education to that end. Furthermore, to foster the much needed unity of Nigeria, imbalances in inter-state and intra-state development has to be corrected. Not only is education the greatest force that can be used to bring about resource, it is also the greatest investment that the nation can make for the quick development of its economic, political, sociological and human resources.

2.5 SCOPE OF THE POLICY

The national policy document deals with eleven aspects of education in the country. These are:

Philosophy of Education

Pre-primary education

Primary education

Secondary education

Higher education

Technical education

Adult and Non-formal education

Special Education

Teacher education

Educational services

Education planning, organisation and financing

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2.6 ENGINEERING EDUCATION IN NIGERIA

Historians of Nigerian education agree that the establishment of the Yaba Higher College in 1932 marked the begining of higher education in Nigeria. Paradoxically, they disagree on whether the education provided in the college could be in fact regarded as higher education. Courses offered at the early stage of the institution include:- Agriculture forestry, medical studies, survey, veterinary, science and Teacher Training. Courses in Engineering were not initially included until the later stage.

With time, a recommendation was made on the establishment of a Nigeria College of Arts, Science and Technology which was to be a Federal Institution with Branches at Enugu, Ibadan and Zaria. This was considered and work commenced at the Ibadan branch in 1950, Zaria in 1952 and Enugu in 1954.

However, certain features of the Nigerian Colleges of Arts, Science and Technology deserve special mention.

i. Throughout its short life the Nigerian Colleges remained the major feature-institutions for Nigeria only University at Ibadan.

ii. At least two of the colleges proved very useful nuclei of two new Nigerian Universities. The college of Ibadan remained the temporary home of the Ife University for five years, and its centre for studies in Pharmacy and Public Administration until 1973 when all the movement to Ife was completed and campus reconverted into a Polytechnic owned by the state

TYPICAL EDUCATIONAL PATTERN FOR ENGINEERS AND TECHNICIANS IN NIGERIA

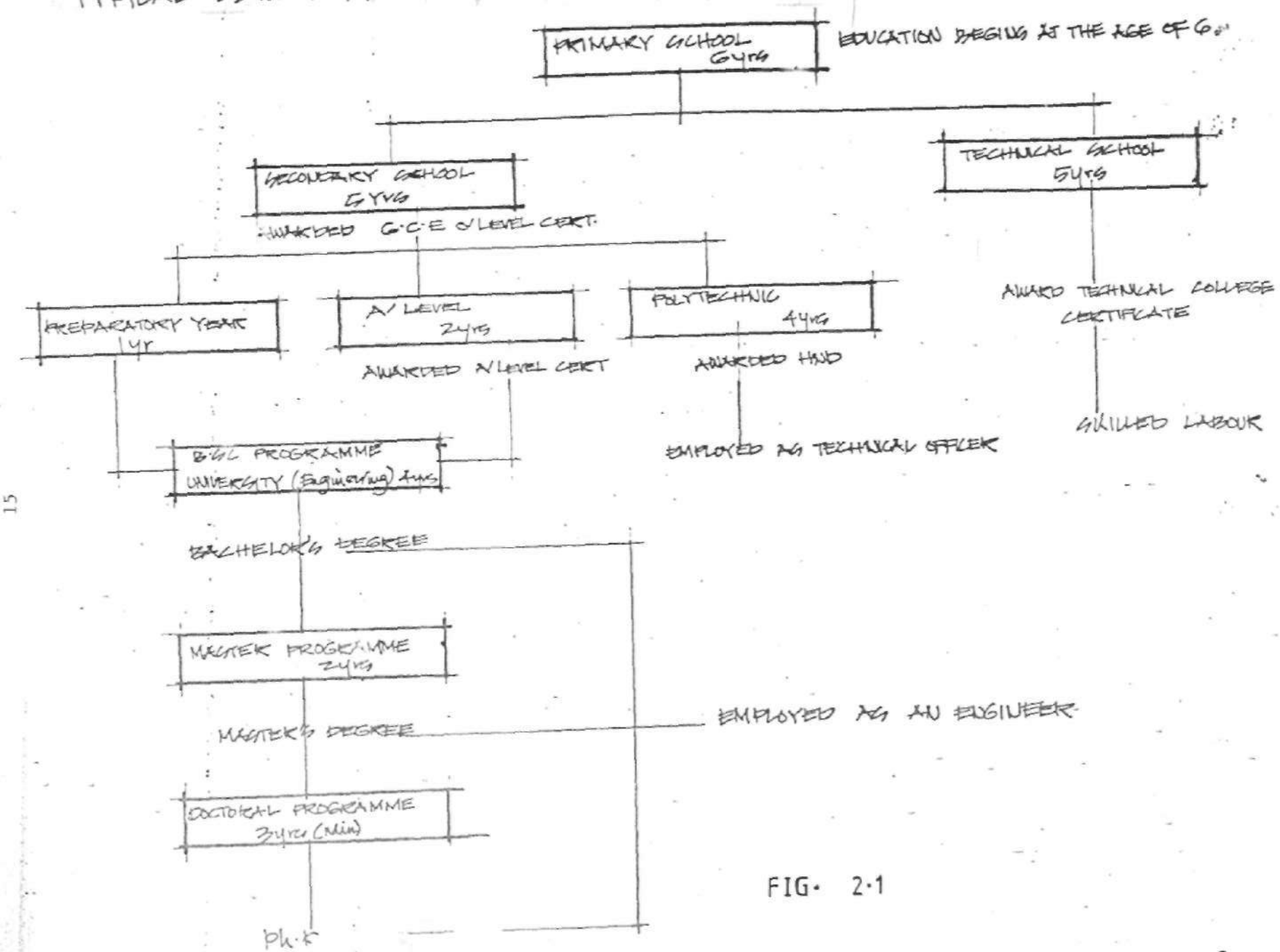


FIG. 2·1

Government.

The Zaria branch was converted into a wing of the Nigeria University.

iii. The Colleges administered a fairly comprehensive curriculum with each branch specialising in certain area of study. At Ibadan, for example, the obvious attractions were the courses in Pharmacy Secretaryship and Accountancy. Enugu emphasized Land Surveying and Estate Management, while Zaria was centre for Architecture. Education and Engineering.

The first school to graduate engineers therefore was the former Nigeria College of Arts Science and Technology, Zaria through the University College of Ibadan, which prepared students for the external degrees of the University of London. The first student graduated from Zaria in 1960, from a curriculum that was a copy of that of the University of London, and of those colleges with a special relationship with London, such as the University of the West Indians.

The Zaria College of Arts Science and Technology became the autonomous Ahmadu Bello University in 1962, but the engineering structure and curriculum remained largely patterned on that of the University of London.

2.7 BACKGROUND OF NIGERIAN ENGINEERING STUDENTS

The needs of developing countries are quite different from those of developed countries. Most Nigerian engineering students lack a background which would facilitate entry into an engineering career.

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For example, mechanical toys and objects are not present in their houses, hence they are deprived of the acquaintance and knowledge possessed by students in technological advanced nations. The student's lack of familliarity often makes it difficult for him to relate mathematical analysis to the realities which they describe, or even visualize and draw simple mechanical objects. Moreover, the family structure into which they are born discourage initiative and they receive little encouragement to be inquisitive. Only after their arrival at a University do these students make their first acquaintance with drawing instruments and for the first time, learned a technical vocabulary.

The secondary schools have not so far provided suitable background for the study of engineering. Few schools offer engineering drawings and engineering related subjects. Even in such schools, the emphasis is on developing the students power of analysis and abstraction, with education devoted almost exclusively to the study of books. The average Nigerian child, not unexpectedly, grow up with a poor background in mechanical skill and knowledge. He may never have visited a factory or workshop, though there are many construction sites and factories in the country. He will therefore have no strong reasons for choosing engineering as a profession nor will he have very much knowledge about what an engineer does

or what the course of study entails. His acquantance with science and technology will have been gained primarily from reading rather than through simple experience in his home surrounding.

These factors affect not only the type of facilities that must be provided for an engineering school but also the students attitude and motivation towards engineering in life.

2.8 ENGINEERING MANPOWER NEEDS IN NIGERIA

Developing countries wish to make rapid economic advances so that they can obtain many of the goods and services available in the more developed nations. To do so, each of these countries like Nigeria will have to train the large number of engineers and technicians necessary to bring the country through the various stages of technological development.

In Nigeria, majority of the engineers employed in the industries are mainly responsible for installations, repair and maintenance of manufactured equipment and for its operation to provide the required services. With the exception of civil engineering, engineers in general are not concerned with design or manufacture.

In Nigeria fourth National Development Plan, the Federal and the State Government together plan to spend about 45% of their proposed total expenditure in the public sector during the plans period on activities that are essentially

engineering. Most of the other project such as education/ resettlement, rehabilitation etc. have an engineering content and it is possible that with over 50 percent of the total development plan expenditure will be spent on engineering and constructions project. This represents a formidable challenge to the engineering manpower in Nigeria.

Engineering embraces 3 categories of persons: The Craftman or skilled worker, the technicians and the professional engineers. It appears that higher institutions in Nigeria that teach engineering are graduating a sufficient number of engineers to meet the needs called for in the plan. The major problem in the country appears to be on the quality of these engineers. There is a widespread belief in the country that the type of education an engineer receives is inadequate. Industry maintains that most of the newly graduated engineer are inexperienced and not immediately suitable for employment and that further training is expensive and reduces the procutivity of experienced staff who must be assigned to supervision duties.

Nigerian Education has never been completely adequate for the creation of the professional engineer. There is always a need for training before professional status is attained. Although the practising engineer will be engaged in a life long process of learning, he must demonstrate a minimum level of competence before the responsibility of the profession can be entrusted to him. He needs practical and realistic experience in design and construction, and must carry increasing degrees of

responsibility for these functions. It is customary to expect that competence and the confidence which goes with it will be acquired by the young graduate engineer after a period of employment. However, this has not been possible as Nigerian because the industrial community has not demonstrated a satisfactory commitment to providing the orientation, training and the degree of responsibility which the young engineer needs to develop his confidence and abilities.

The attitude of the graduate engineer towards practical work is not a result of his engineering training, but is more of the result of the prevailing attitude in the country. The fact that the engineer is engaged in work of a practical nature brings any shortcomings clearly to the point.

It may therefore be necessary for the universities to become involved in some aspect of practical training. Co-operative programmes with industries could provide a practical orientation and correct these aspects of the students' psychological attitudes towards work which constitute a bar to high productivity and efficiency. Practical training is of paramount importance, particularly in a developing country such as Nigeria. Such training, even if it is only during the vacation, provided opportunities for students to gain an idea of what engineering is about. It provides an opportunity to relate the theoritical knowledge obtained in lecture to real engineering problems.

CHAPTER THREE

CHAPTER THREE

POLYTECHNIC EDUCATION AND TECHNOLOGY DEVELOPMENT IN NIGERIA

3.1 INTRODUCTION

The economic status of any nation can be measured on the ability of that nation to aupply its own needs, that it, the extent to which the nation is self-reliant.

The achievement of self-reliance depends to some measure on technology and availability of trained skilled labour force.

Of recent, many Nigerians are begining to recognise the importance of technology on their lifes. Increased development in technology means that existing and emerging industries would need well trained skilled personal. At the moment, tremendous and perhaps revolutionary changes are taking place in Nigeria and in the world, politically, economically and industrially. Most of these changes have been due to rapid advances in science and technology. Therefore, educators are giving increasing emphasis on the level of intelligence, understanding and good judgement of workers. Also, the need is now greater for workers who possess the ability to make decisions and who are resourceful, analytical and dependable.

Thus any educational policy designed to serve the needs of present day Nigerians; must aim at increasing proficiency in all trades, services and strata of work, from the professional level to that of unskilled labour.

3.2 RATIONALE FOR POLYTECHNIC EDUCATION IN NIGERIA

Polytechnics are unique institution of higher learning where technological knowledge and skills are acquired for direct application to the solutions of the problem of society (Ibrahim, 1984:3).

These unique institutions of higher learning are so regarded because they educate their clienteless for a unique purpose. Consequently the approach in these institutions is also unique. Polytechnic education is essentially the training in a system of techniques essential for the production of goods and services which the society wants (Awokoya, 1982).

This satisfaction of social needs is all that it takes for the society to be self-reliant. Polytechnic education had to be introduced when it became glaring that the existing system of education (as inherited from the colonial era) was not satisfying the needs of the society.

The guest for self-reliance must have been one of the reasons for the establishment of Polytechnics in the country. The apparent failure of the institutions must have led to the widespread criticism of the relevance of the Polytechnics curricula sequel to which the National Board for Technical Education (NBTE) was mandated (In July, 1980) by the then Minister of Education, to review the format and structure of the Technical Education in the country. This task, they were given with the following terms of reference among others:

i. to examine the present format, structure, involvement and output of formal, vocational, technical and technological education at all levels in the country in details.

ii. to consider how far the present format and structure is suited to satisfying the present and future manpower requirements, and if necessary, make recommendation for improving it.

iii. to examine the courses run at each level and consider how the course structure, content and methods of certification are relevant and consider how to make them more result oriented.

iv. to consider the present and future demand for technical teachers and their qualifications and to make a comprehensive proposed programme and

v. to consider ways of improving informal and apprenticeship training qualitatively so that it can play a more effective part in producing the right kind of manpower and so on.

After attending to the assignment, the NBTE (1985:12) outlined the main objectives for establishing Polytechnics and colleges of technology as including;

1) to provide full time and part time courses and training in technology, applied science, commerce, management, National and Agricultural production and distribution:

2) to provide appropriate opportunities for research and development in technology and Applied science so that existing technology may be improved or new inventions made; and

3) to undertake production of goods and services to generate for the country, the capacity for technological self-reliance.

The polytechnics in the light of the essence of their establishment are charged with the task of making the nation self-reliant technologically. This task, they are expected to accomplish through the type of education they provide their clienteless.

Education for technological self-reliance may therefore be considered a challenge to Nigerian Polytechnics. This is so because the rationale for polytechnic education may be summarized in technological self-reliance.

3.3 EDUCATING FOR TECHNOLOGICAL SELF-RELIANCE: A CHALLENGE TO NIGERIA POLYTECHNIC

A nation's claim to independence would be a shame if she has to import all her machines and perenially recruit expatriates to design and establish her industries, repair the machines and construct her roads and bridges (Okafor, 1984).

If we (Nigerian citizens) perceive Nigeria as an independent nation, then we are faced with the task of making the independence meaningful.

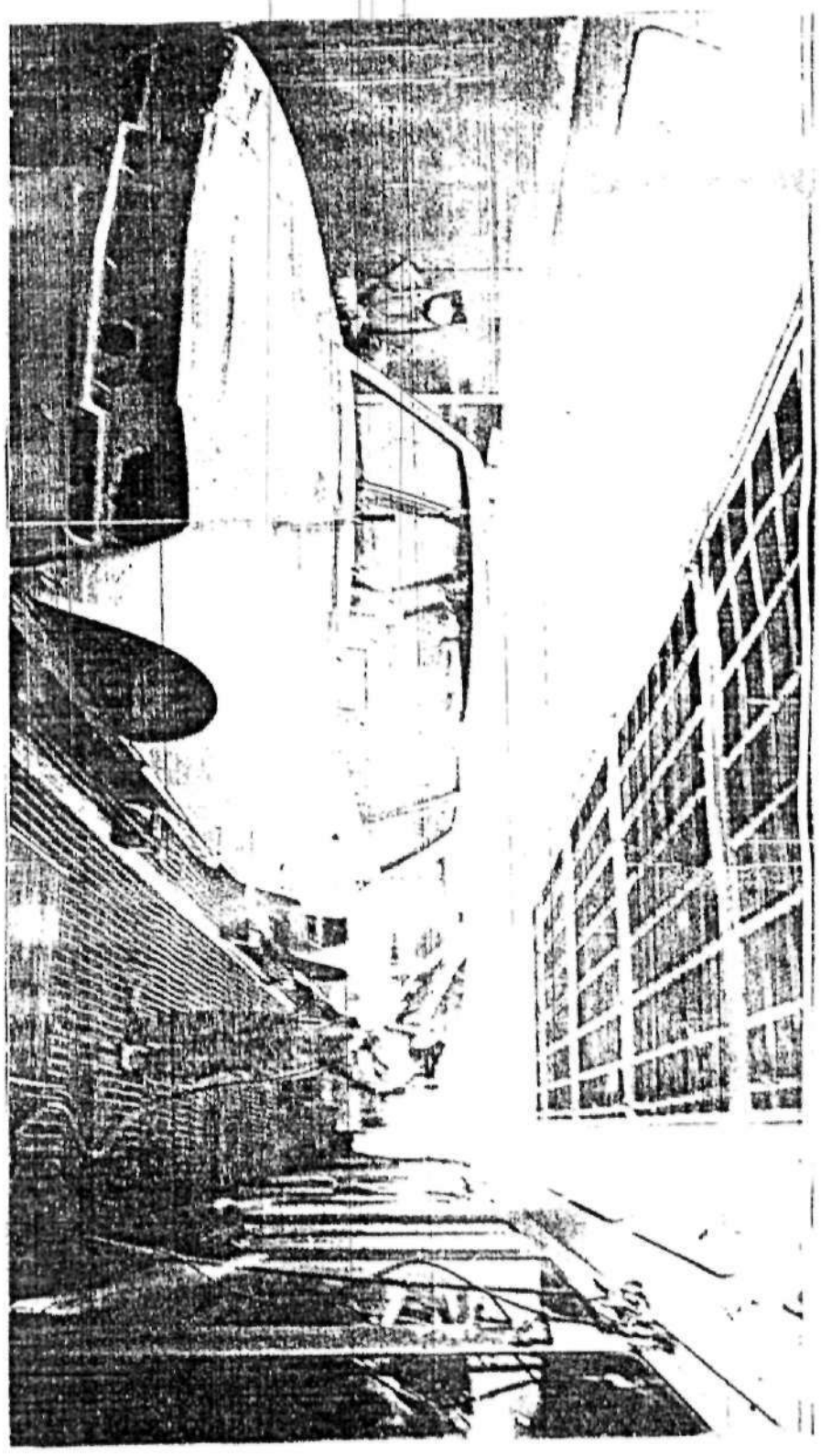


PLATE 1 ASSEMBLYING STATION

To make independence meaningful, we must be able not only to fly our own aeroplanes, man our own ships, drive our own cars ... as we do now, we must also learn to manufacture many of these things ourselves so that those from whom we now import these essentials of our modern technological world can never hold us to ransom (Brigg; 1983).

The authenticity of these views in the Nigerian context and that of other developing nations is implicit in the famous Arusha Declaration in which Dr. Nyerere states:

"In order to maintain our independence and our people's freedom, we ought to be self-reliant in every possible way and avoid depending upon other countries for assistance .... (Nyerere, 1968:34).

An objective appraisal of our nations claim to independence, the extent to which this independence is meaningful and the status to maintenance of our independence based on these references, would leave no one in doubt that we are yet on the drawing board.

In the light of the nation's plight in self-reliance as a result of the orientation of her citizen, the need to evolve a solution becomes paramount. In order to achieve this much desired self-reliance especially in the area of technology, Nigerian citizens need to be 'born again' and this rebirth is mainly possible though education. Such education designed for the attainment of technological as well as other forms of self-reliance is to be found in the polytechnics. The

situation in our country is such that myraids of technological problems abound despite the existence of numerous polytechnics and other technically and technologically based educational institutions.

3.4 GENERAL DEVELOPMENT TASKS IN NIGERIA

Nigeria as a relatively rich country once affected by war is seriously going through the ages of rapid development. This could be readily seen in the amount of money voted for the last three development plans.

Our independence has sparked of massive development of the economy and social services, Universities in Nigeria now face serious responsibilities to offer comprehensive range of professional training and new courses as local development needs may suggest.

A review of the development task in Nigeria reveal that Nigeriansurge for self-sufficiency and total independence cannot be reconciled with the existing parity of indigenous manpower in Nigeria. To meet the need for qualified manpower required for the development and public services, the universities in the country must be prepared to accept a wider range of professional training courses.

It thus become expedient to review the scope of the developmental task in Nigeria (See pages). In all the spheres of the developmental task, there is an equivocal demand for technologists to take care of our industrial

productions which contribue to a greater length to stabilise any country's economy. Consequently, the demand for technologist particularly the engineers that contributes much to the products designs becomes equally imperative in Nigeria's attempt at the development of her citizens. If Nigeria has to be the self-renewing society she is aspiring to be, then the task is for her to evolve a rapid and effective development of her educational systems and produce men and women capable of replacing the bulk of the existing expatriate personnel as a matter of principle and economic expendiency.

3.5 CONSTRAINTS ON THE PATH OF SELF-RELIANCE

A number of factors obviously militate against the attainment of technological self-reliance.

Generally Nigeria's technology development which could be termed as just taking off is concentrated in the hands of expatriate experts. Foreign industrial and mechanical know how dominate the actual handling while Nigerians are either administrative heads assistant technicians labourers or messengers. Despite the continuous acquaintance of this assistan t technicians with the processing engine and almost all the aspects of production, recognision is still not given to them as they are lacking the certificates of qualification which is either going through related course in the university or technology school.

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Most of the higher institutions we have are not well equiped to accomplish the tasks for which they were established. It would be recalled that the Federal Ministry of Education admitted in Guardian Editorial Comment that all of the nation's polytechnics are "disastrously ill-equiped to carry out the task for which they were established particularly in the engineering and technologically base courses". The comment further hinted that in its nation-wide accreditation exercise in 1986, the NBTE found less than 10% of the engineering and technology programmes deserving of accreditation. The comment consequently ended with the conclusion that we are confronted once again with unpleasant contradiction between our professional priorities on the one hand and the neglent of the specific actions needed to realise them on the other".

Also, the teaching method emphasize training rather than education and this process of learning without integration breeds satiety and discontent among Nigeria students who are constantly haunted by the fair of failure. Educational institutions in Nigeria should identify themselves with the societies they serve and actively contribute to the solution of their problems; but the students are so isolated from the society that the isolation seems to be sacrosanct. The extensive amount of equipment that can be gained from industry and through student works and interest and in conjunction with the local profession that might make use of the facilities have been unexploited in Nigeria..

No profession is capable of growth if research into its problems is neglected, and this neglect exists.

Another problem Nigeria still encountered today which could be dangerous to technology development is dedication to work. Nigerian citizens are lacking this dedication and all their end products are always failure. This could either be attributed to lack of National identity or the end monetary gain is more important than the pride of production.

Much could not have been said if we forget about the problems created by the government. The setting of our development priority towards technology development has been on reduction since ages, military recognision has taken over. Less contribution is being made to technology education of the younger ones Science has failed to germinate properly and technology has received much lip services but little priority attention in national and state budgets.

With these symptons of technological deficiency, one can diagnose the status of the nation's disability in respect of technological self-reliance. With impoverished environment prevailing in most Nigeria polytechnics, their chances of rising to the changes of technological self-reliance appear rather slim and therefore calls for rescue by the government and citizens of this nation.

3.6 PRESENT ENCOURAGEMENT

For a long time, technical education at the tertiary level remained unpopular with the generality of people in Nigeria and was treated as somewhat inferior to other tertiary levels of education with which it nrmally should share equal standing in its own right.

Government has fortunately recognised this unfair assessment of products of technical education and has taken necessary steps to remove the disparity in the reward pattern which has previously treated both staff and graduates of polytechnics, for example, as somehow less valued than the staff and graduate of universities. The salary scale for both sub-sections is now the same.

Also encouragement from the government for these future Nigerian technical experts could be said to have been increasing especially over few past years under the technical students exchange programme with countrties like U.S.A., Russia and Poland. But the question still continues to arise that while this could be going on, is it not possible to be thinking of establishing this sort of schools around?

For long the answer to this question could be staffing which is one of the major problems existing in Nigeria technology developments now. This staffing problem is felt in the establishment of new universities in the country which are forced to centre around producing administrative graduates.

CHAPTER FOUR

CHAPTER FOUR

FEDERAL POLYTECHNIC OFFA: A Synopsis of the Facts.

4.1 ITS ESTABLISHMENT

The Federal Polytechnic Offa, was established by the Governemnt of the Federal Republic of Ngieria in 1990. Its establishment followed the request by the people of Offa during the official visit of President Ibrahim Babangida to Kwara state in November 1990, to establish a Federal Polytechnic in the town before the expiration of his administration.

Offa deserved such an institution, being the first community to establish a community high school (Offa Grammer School) in the Northern Nigeria in 1943, such institution will reduce the burden of admission of students into higher institutions.

4.2 OBJECTIVES OF ITS ESTABLISHMENT

The objectives of the establishment of the Polytechnic are:-

i) To encourage the advancement of learning and to hold out to all persons without distinctions of tribe, creed, sex or political conviction the opportunity of acquiring a higher and liberal education.

ii) To develop and offer academic courees and other facilities for the pursuit of learning in all its branches and to make those facilities available on proper terms to such persons as are equiped to benefit from them.

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President Babangida shaking hands with Miss Patatu Kilani after presenting him with a bouquet of flowers. Watching (in white agbada) are the Managing Director of NISUCO, Alhaji Suleiman Abdullahi and other dignitaries.

FEDERAL POLY FOR OFFA

From Latif Summonu/ Tom Odi, Offa

PRESIDENT Ibrahim Badamasi Babangida acceded, yesterday to the request of the people of Offa to establish a Federal Polytechnic in the town before the expiration of his administration.

The President declared amidst thunderous ovation during a courtesy call on the Olofa of Offa, Oba Mustapha Olawore Olampekun Aniwajove in his palace, "I do solemnly pledge that I will definitely establish the institution in Offa because you have been a source of inspiration to us."

President Babangida said that Offa deserved such an institution, being the first community to establish a community high school in the Northern Nigeria in 1943. The President said he had had long and close association with the sons and daughters of Offa from youth and "as an old man I continue to work" both privately and publicly with them.'

"Therefore my visit to Offa to me is home coming."

He then thanked the people for the wonderful reception accorded him and his entourage.

Welcoming the President to Offa, Oba Olawore thanked the federal government for the establishment of a polytechnic in the town.

He said already the Olalomi Comprehensive High School which has all the necessary infrastructure for the take-off of the institution would serve a temporary site of the polytechnic.

He said Offa, a pacesetter in education, should now be regarded with the entire Oyun Local Government and the state as a whole as educationally disadvantaged.

Oba Olawore assured the

Continued on P21

iii) To relate its activities to the social, cultural and economic, scientific and technological needs of the people of Nigeria and to provide innovative educational programmes of high standard regardless of the nature of the degree being pursued as long as this has importance and relevance for national development.

iv) To encourage and promote scholarship and conduct sound research in all fields of learning and human endeavour, particularly the most relevant to a balanced National Development.

v) To provide education for self reliance.

iv) To undertake any other activities appropriate for a polytechnic of the highest standard.

4.3 SITE LOCATION

Presently the polytechnic has its temporary site at Olalomi Comprehensive High School, Offa, along Offa-Erin-Ile road. The proposed permanent site is situated along Offa-Ojoku road. The land has been surveyed for this purpose.

Meanwhile, the local government has reminded interested members of the public whose land may fall within an area of 1,507 hectares situated on the left hand side between Kere-Aje,



Plate . 2 ; Temporary site



Plate 3; Access to permanent site

Ilota-Ogbondoroko to Igboidun LGEA primary school extending to Ikotun road between Gbosun to Lamin village along Ikotun road to make written representation to the council chairman within 21 days.

4.4 ACCESS TO THE SITE

Presently, the proposed permanent site for the polytechnic is not highly accessible owing to the fact that the main access to the site (Offa-Ojoku road) is an untaired road. This would be developed with time as the Polytechnic fully takes off. However, the temporary site is highly accessible owing to its proximity to the main road that links Offa to Erin-Ile and Oshogbo.

4.5 ACADEMIC PROGRAMMES

The Polytechnic is to officially take off in June and October this year for the 1991/92 session. Already, the process for the admission of students into the polytechnic had started. Many student applicants have started obtaining admission forms at the temporary site of the polytechnic (Olalomi comprehensive High school Offa).

Nine courses have been stipulated for the first quinquennium, three of which are for Pre-National Diploma (Pre-ND) programme and six National Diploma (ND) Programme. The courses at Pre-Nd level include.

i) Laboratory science.

ii) Computer science

iii) Electrical/Electronics ENgineering

At the ND level, we have:

i) Laboratory science

ii) Computer science

iii) Electrical/Electronics Engineering.

iv) Banking and FInance

v) Secretarial studies

vi) Business Administration

Eventually, more courses would be introduced when the polytechnic takes off fully.

4.6 ORGANISATION OF ADMINISTRATIVE AND ACADEMIC UNITS

The administrative and academic units of the polytechnic are organised along the same line as other conventional polytechnics. The organisational chart is as follows:

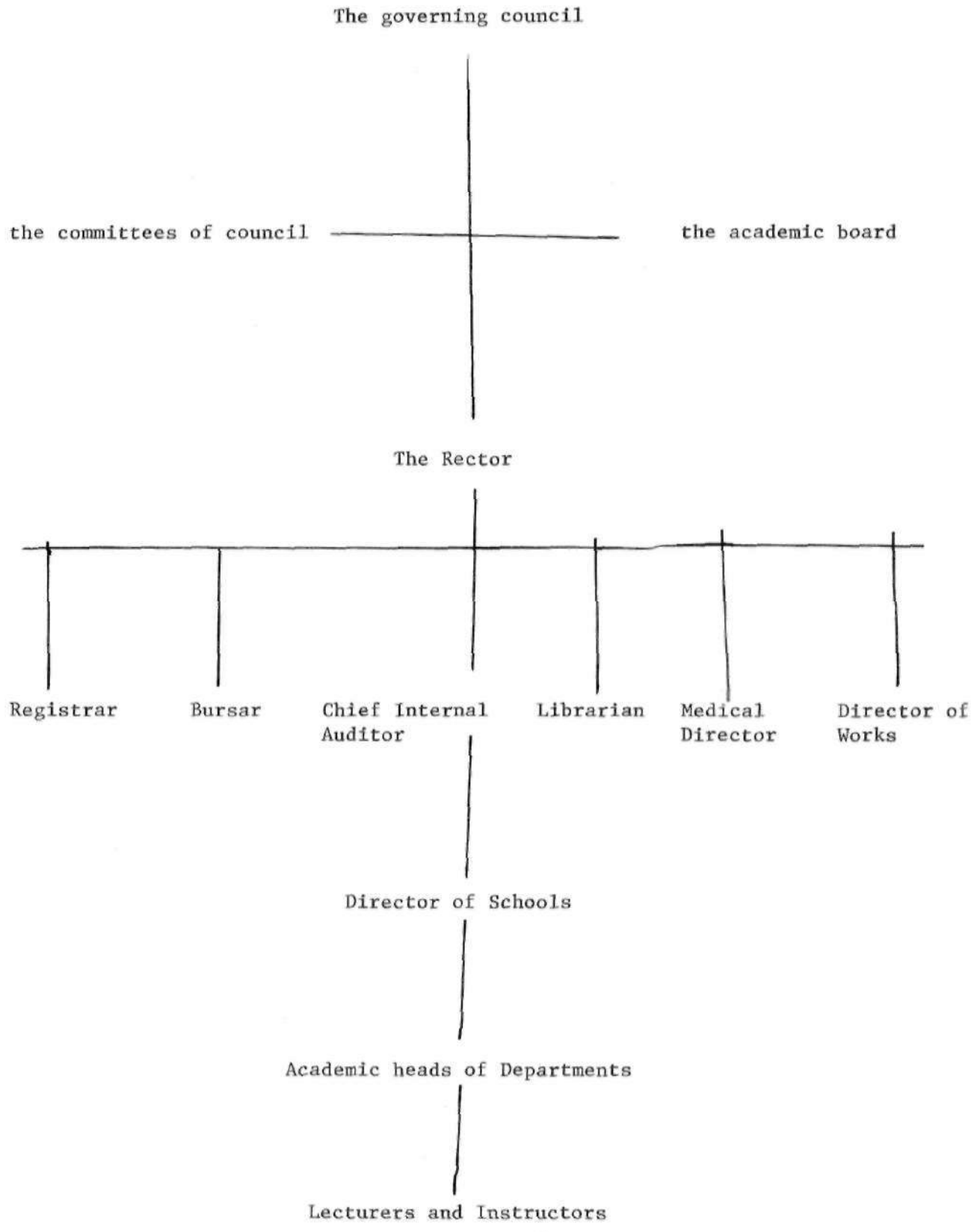


Fig. 4-2 : Organisation chart

4.6.1 The Governing Council

The Polytechnic Council, headed by the Chairman of council is the supreme governing body of the polytechnic. The council is responsible for the non-academic management and general financial policy of the polytechnic. it has power to manage all matters not otherwise provided for by law of the polytechnic. The council also makes appointments of some principal officers.

Under the governing Council, we have:

i) The committees of council

These committees of council comprise of:-

- Finance and general purpose committee
- Senior establishment committee
- Junior establishment committee
- Tender Board committee
- Disciplinary committee.

ii) The Academic Board

The academic board, chaired by the Rector is responsible for all academic matters of the polytechnic. Membership of this board include, the deputy rector, director of schools, head of departments and elected members. The registrar, who is also a member, is the secretary of the board.

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4.6.2 The School Boards

Each school/faculty in the polytechnic is governed by a school or faculty board - School boards broadly control the academic programme of the schools subject to the academic board approval. The boards discuss curriculum, examinations and other academic issues. Statutorily, the rector and the deputy rector are members of each school board and the director of school is chairman.

4.7 ACCREDITATION REQUIREMENTS

The National Board for Technical Education (N.B.T.E) is responsible for accrediting all DIploma programmes in the Polytechnics and colleges of technology in Nigeria. The accreditation requirements are as follows:

4.7.1 Goals and Objectives

There shall be evidence that all the programmes to be accredited have defined goals and objectives.

4.7.2 Curriculum

The curriculum of the programme to be accredited should be adequate to prepare practitioners at an appropriate level in the particular field.

4.7.3 Teaching staff (Quality and Number)

They determine the adequacy of the programme, as instructional goals and objectives are achieved, only to the level of competence and vision of teaching staff.

4.7.4 Admission, Retention and Graduation of Students

The institution should have policies on the admission, retention, withdrawals, expulsion and graduation of students spelt out in one of its publications.

4.7.5 Standard of Diploma Examination

Standards of examinations leading to the award of a diploma shall be appropriate for the level of the programme (i.e., Diploma Final Examinations, Past Questions, Home work problems, course work, projects and External Examiners Reports for two years preceeding the visit, and report on students supervised industrial training schemes).

4.7.6 Financial Report

There should be adequate financial support to the institution and to the department where the programme to be accredited is offered, as a measure of dedication to the goals and objectives of the programme.

4.7.7 Physical Facilities

There shall be adequate physical facilities i.e. classrooms, studios, workshops, and tools, laboratories, instruments, machines for up-dating the physical facilities and for expandable supplies to give students proper learning experiences essential to achieving their own goals and objectives.

4.7.8 Administration of Department

Administrators must perform their leadership role with mutual concern with policies that affect teaching and support staff and students of the Department. The Head of Department must be a professional in that field.

4.7.9 Employers' Rating of Diplomates

This is required to accertain that there is a rating of satisfactory performance of the diplomates in their chosen fields. For the purpose of this thesis, only the criteria relating to physical facilities and the number of teaching staff are taken into consideration. The remaining criteria have to do with administrative matters.

The space standards obtained from the National Board for Technical Education (N.B.T.E.) were calculated and compiled by the Planning Division of the National Board for Technical Education (N.B.T.E.).

The rationalization of the time-tables is an administrative matter. The main purpose of this task is to ensure that the facilities provided are used effectively. The final time-table is drawn up after a careful study of the course out-line.

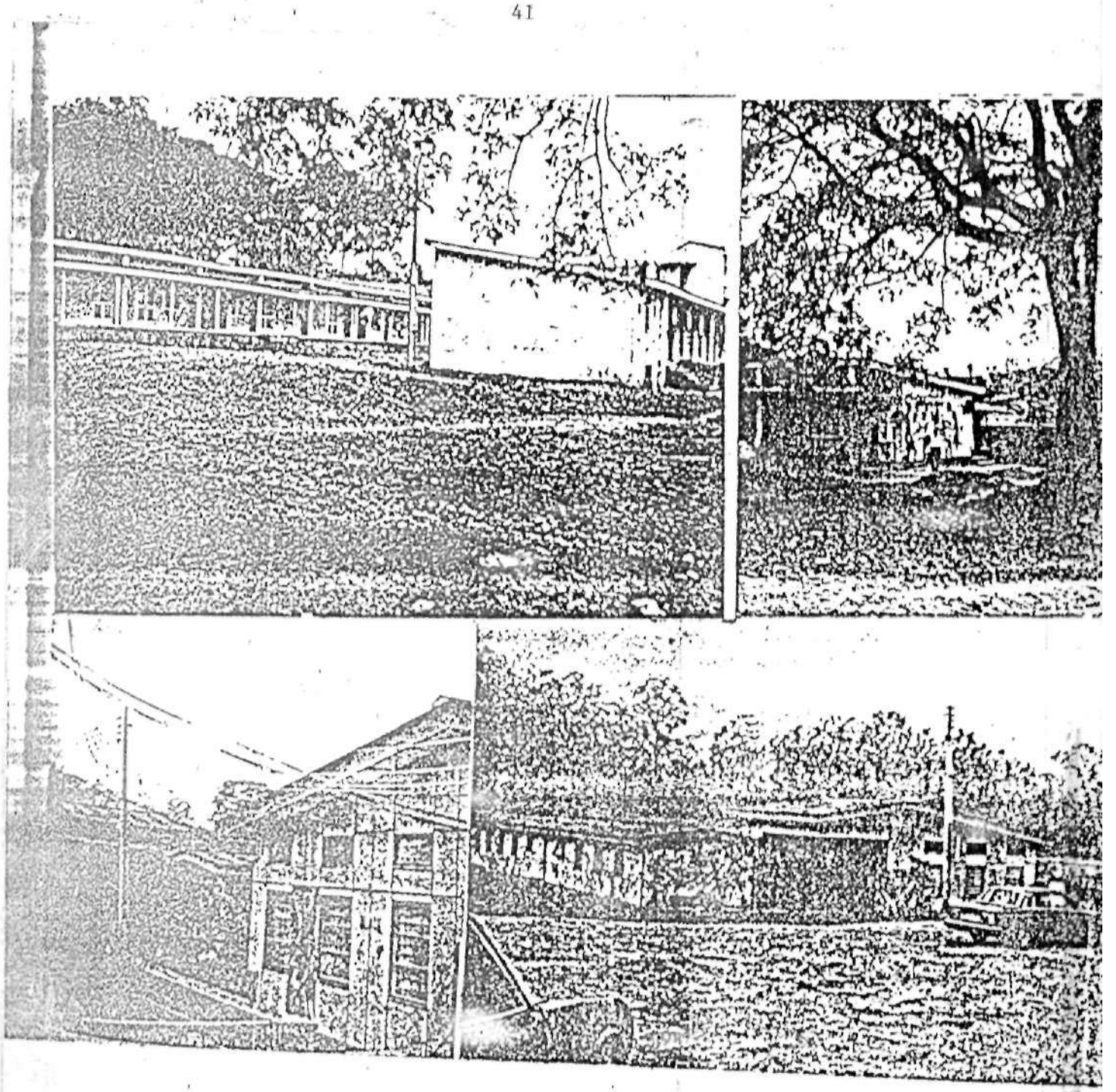


Plate 4 : Temporary site

4.8 DEVELOPMENT PLANS FOR THE POLYTECHNIC

The development plans for the polytechnic can be seen under two headings, namely; temporary and permanent development plans. Presently, the polytechnic is concerned with its temporary development plan. Renovation work has began on the seven classroom blocks at Olalomi Comprehensive High School Offa, the temporary site of the compus, while additional ones are being constructed.

Besides the fact that a piece of land of about 1,507 hectares has been surveyed and a master plan drawn for the permanent site, no other development has been done on the site.

CHAPTER FIVE

CHAPTER FIVE

EFFECTIVE INTEGRATION OF FACILITIES IN SCHOOLS OF ENGINEERING

5.1 INTRODUCTION

Broadly speaking, integration simply means the combination of parts into a whole (i.e. the putting together of the various parts into a single unifying whole. This meaning does not differ when applied to buildings. The need to integrate people especially in learning institutions obviously called for the need to integrate buildings.

5.2 INTEGRATION OF FACILITIES IN SCHOOLS OF ENGINEERING

Generally, there is that need for faculties to have their various departments integrated and not seperated. Although the degree at which this integration is needed varies from faculty to faculty. The highest degree is found in school of engineering owing to the heavy, complicated and expensive machines that are involved. This therefore explains why the emphasis is on school of engineering.

5.3 NECESSITIES FOR INTEGRATION

In learning institutions, certain conditions are necessary for fastering the teaching and learning process. Among these are:-

i. A school environment conducive to good emotional and academic growth;

ii. Curriculum content (Subject matter) and teaching methods congruent with the needs of students and successive stages

of development.

iii. Good student - teacher relationship

iv. Provision of research facilities

v. Provision of other educational facilities

Anything done to improve the classroom environment improves of course, the social and academic climate in the school.

From these,it could be deduced that it is no exaggeration to say that the school atmosphere that is conducive to teaching and learning is one that is friendly, free of hostility and tension as well as that where the facilities are properly integrated.

Besides, other necessities of integration of facilities include:-

i. High degree of interaction between the staff and students through integration of facilities;

ii. Administrative and academic convinience in having it all "happen in one place"

iii. Complete weather protection. Users do not have to leave one building to another especially when raining;

iv. Considerable economy in services, especially in electrical, mechanical as well as circulation net work,is achieved through integration of facilities.

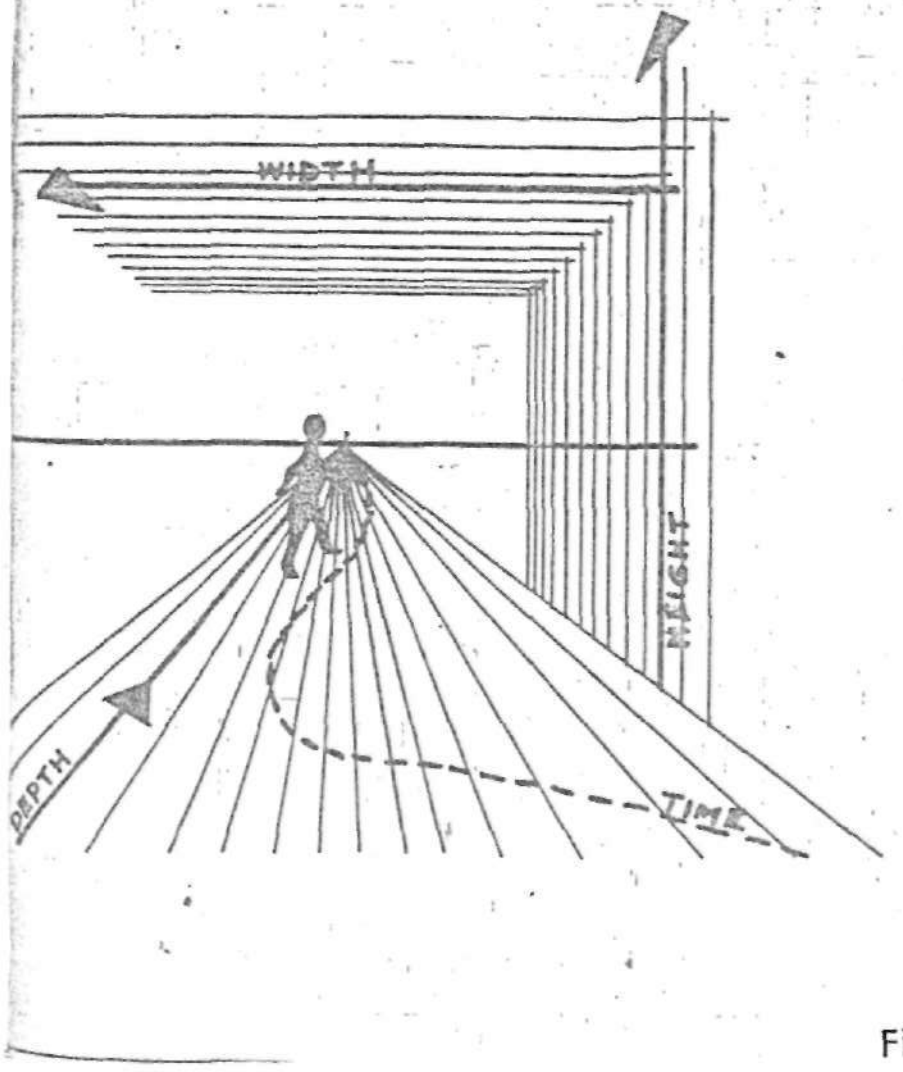
v. Avoidance of duplication of facilities that could be commonly shared between two or more departments;

vi. Little or no less of time in transit between functions;

5.4 DEFECTS OF INTEGRATION OF FACILITIES

Integration of facilities despite its advantages, is not without certain objects. These are:-

CHARACTER AND SIGNIFICANCE OF SPATIAL FORMS



THE FOUR DIMENSIONS OF SPACE —— WIDTH, DEPTH, HEIGHT AND TIME MUST BE CONSIDERED FOR A TRUE EXPERIENCE OF SPACE FROM DIFFERENT POINTS AND DIFFERENT LEVELS.

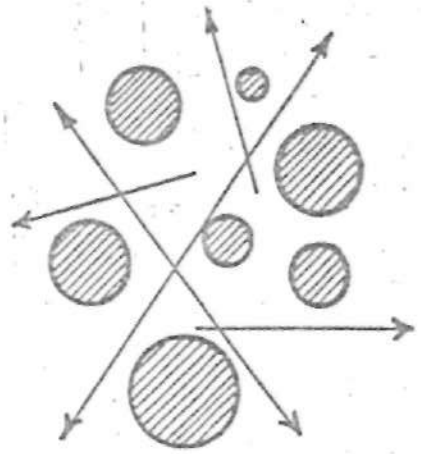
SIGNIFICANCE

SPACES WITH MINUTE DETAILS TO BE EXPERIENCED AND APPRECIATED SHOULD BE MOVED THROUGH SLOWLY, AND VICE VERSA.

Fig. 5·1

ENVIRONMENT FOR EDUCATION

CHARACTER AND SIGNIFICANCE OF SPATIAL FORMS



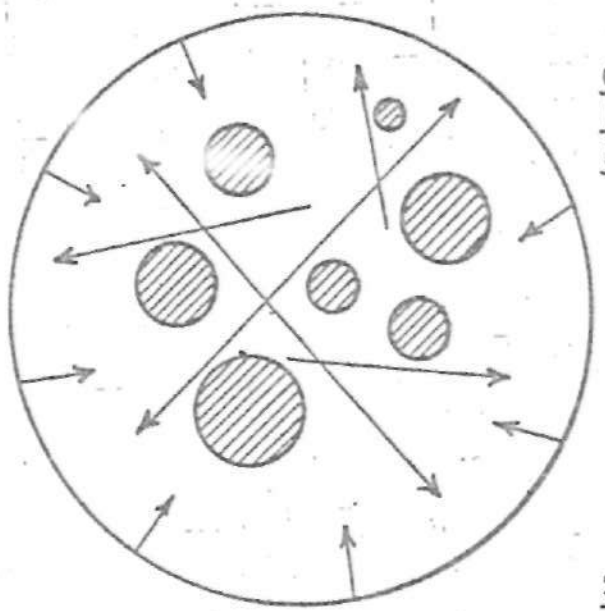
NEGATIVE SPACE

SPACE LEFT OVER,
VISUAL FIELD IS UNLIMITED;
LACKS CENTRE FOCUSS;
IT IS DYNAMIC.

SIGNIFICANCE

FOSTERS FREE AND RELAXED GATHERING.

COULD BE OUT-DOOR MOCK-UP SPACE OR CIRCULATION ROUTE.



COMBINATION OF NEGATIVE AND POSITIVE SPACE

LACKS CENTRE FOCUS THOUGH FOCUS IS ON FREE INNER GROUPING.

VISUAL FIELD EXTENDED BUT LIMITED.

SPACE WITHIN IS DYNIMIC.

SIGNIFICANCE

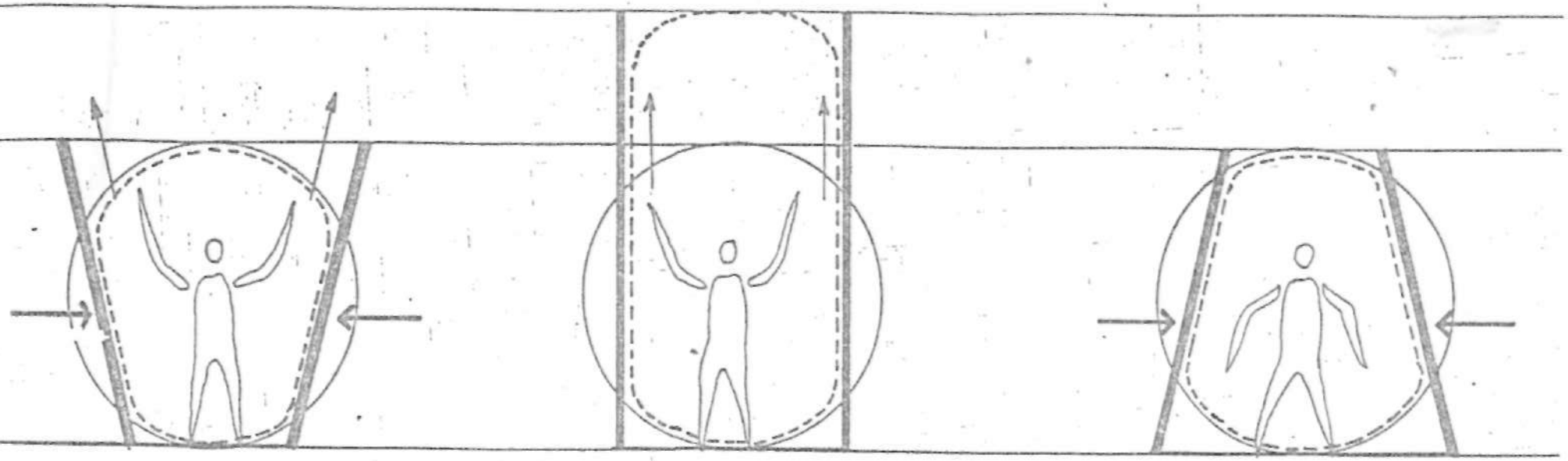
FOSTERS COMMUNITY OF INTEREST.

A PLACE TO BE.

COULD BE LIFE-STYLE OF THE STUDIO.

Fig. 5.2

CHARACTER AND SIGNIFICANCE OF SPATIAL FORMS



PLANES INCLINED THUS GIVE SENSE OF UPLIFT OR DEPRESSION. DEPRESSIVE FEELING CAN BE REMOVED BY APPRIATE LIGHTING AND COLOUR.

THE PLANES CAN BE VERTICAL AND TOWERING INSTEAD.

PLANES INCLINED THUS CAN IMPEL THE BODY FORWARD OR IMPLY RESTRAINT TO MOVEMENT.

SIGNIFICANCE:—

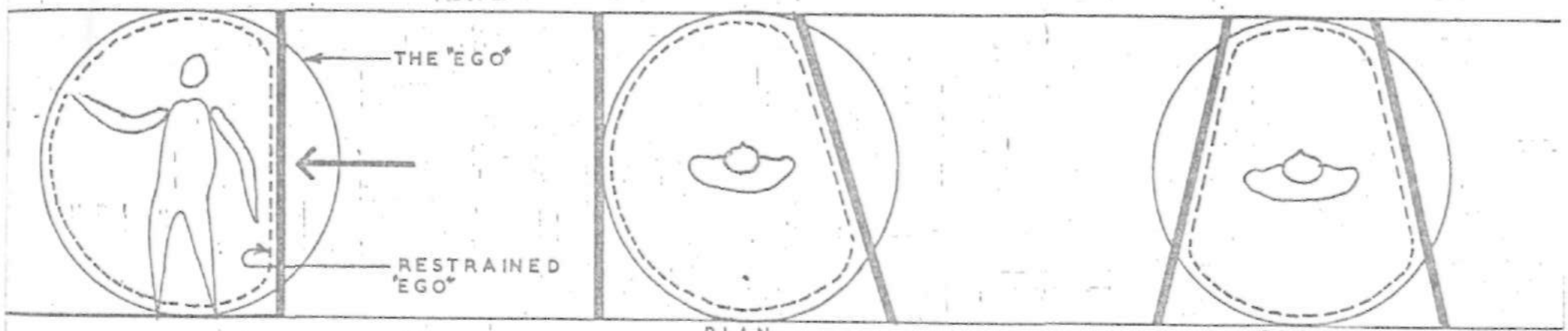
FOSTERS INSPIRATION AND SENSE OF UPLIFT.

THIS COULD HAVE AN APPEAL IN THE DESIGN STUDIO.

Fig. 5.3

ENVIRONMENT FOR EDUCATION

CHARACTER AND SIGNIFICANCE OF SPATIAL FORMS



SURFACES THAT COME CLOSE TO THE BODY

SIGNIFICANCE:—

AN IMPLIED RESTRICTION TO MOVEMENT, AN INDUCTION OF "TENSION",

COULD BE EMPLOYED TO GIVE DIRECTION OF MOVEMENT ESPECIALLY TO QUIETER ZONE.

"TENSION" MEANS AROUSAL REACTION.

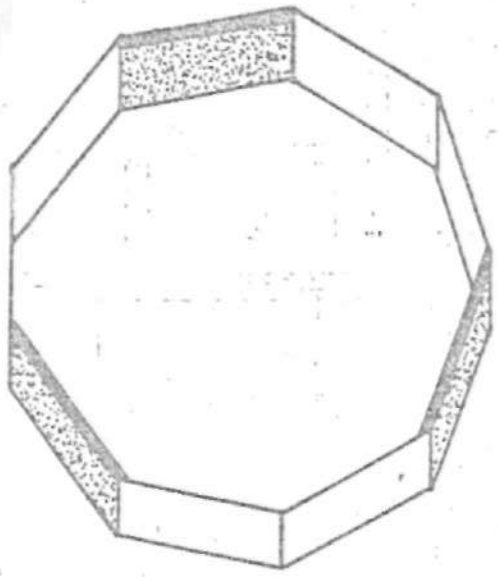
THE "EGO" MEANS PROJECTION OF "PERSONAL SPHERE", USUALLY IN SPHERICAL OR CIRCULAR SPACE.

Fig. 5.1.

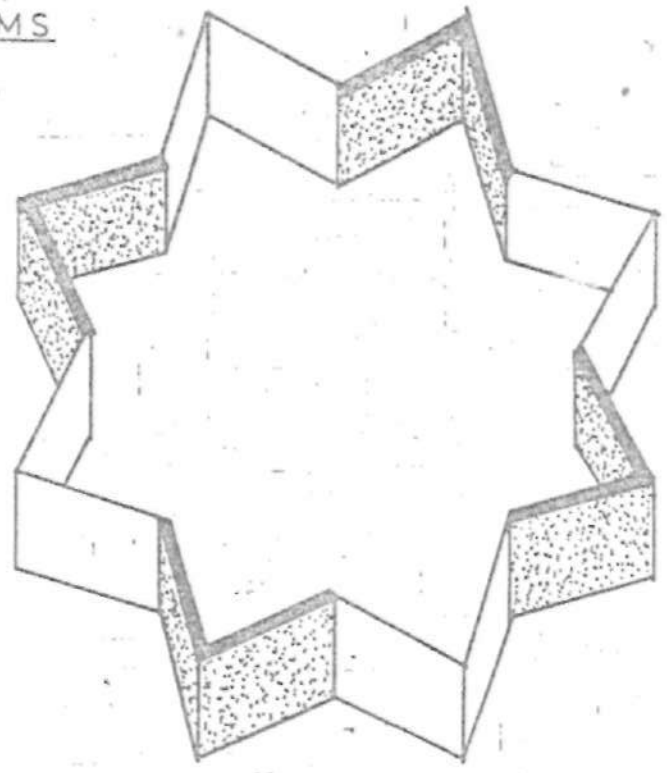
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ENVIRONMENT FOR EDUCATION

CHARACTER AND SIGNIFICANCE OF SPATIAL FORMS



URE AND DIAGONAL SPACES FUSED
GETHER IN MANY WAYS



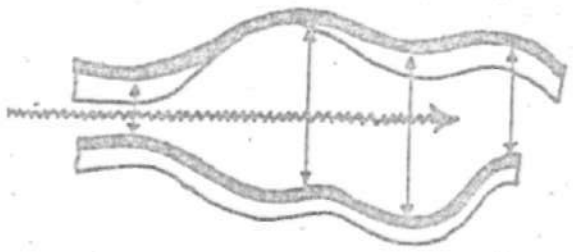
GNIFICANCE:—

ORIENTATION WITHIN SUCH A SPACE WILL ALWAYS BE AMBIGUOS, BECAUSE IT EVOKES DIFFERENT RESPONSES FROM DIFFERENT PEOPLE AT DIFFERENT TIMES AND IN DIFFERENT DEGREES OF STIMULUS.

THIS FORM WILL HAVE AN APPEAL FOR SUCH PLACES AS THE STUDENTS' COMMON ROOM, THE SYMPOSIUM AND THE SEMINAR ROOMS, BECAUSE THE NEED FOR VARYING SENSORY INPUT IS AFFORDED BY HESE SPATIAL FORMS.

ENVIRONMENT FOR EDUCATION

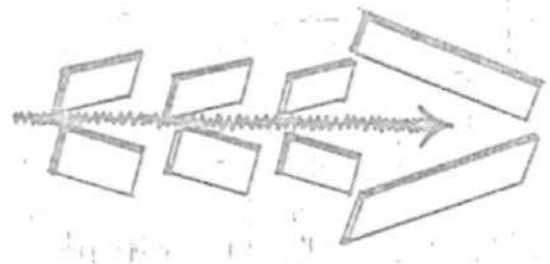
CHARACTER AND SIGNIFICANCE OF SPATIAL FORMS



ASTICITY OF SPACE

GNIFICANCE:—

EACH MOVEMENT THROUGH THE SPACE IS MARKED BY HESITANCY AS THE INDIVIDUAL ATTEMPTS TO MAINTAIN EQUILIBRIUM WITH THE FLEXIBLE AND DECORATIVE VALUES OF THE FORM.



RYTHMIC SEQUENCE OF SPACE

SIGNIFICANCE:—

THE BODY AND MIND VIBRATE IN AFFINITY TO THE UNWRITTEN MUSIC.

COULD SYMBOLISE WINDOW OR COLUMN SPACING ALONG A WALKWAY.

Fig. 5·6

i. High fire risk factor due to continuous structure;

ii. Human desire to go out of ones immediate environment once in a while is highly stigmatized by such conglomeration of facilities in one place;

However, these little defects can be taken care of to certain degree through design solution by provision of fire fighting equipment, use of fire resistant materials for construction, creation of interesting scenic features etc;

5.5 CAUSES OF DISCENTRALISATION

For one to be able to have an effective integration of facilities there is that need to have an understanding of some of the causes of discentralisation of facilities. The causes include:-

i. Changes in the school curriculum

ii. Further expansion

iii. Nature of the department involves

iv. Lack of flexibility needed for growth.

5.6 PROBLEMS OF DISCENTRALISATION

There are a lot of problems arising from discentralisation or improper integration of facilities in learning institutions These are:-

i. Hapharzard layout of building which mar the beauty of the school;

ii. Duplication of commual facilities which could have been commonly shared;

iii. Reduced interaction between students and staff

iv. Administrative and academic inconveniences.

5.7 TOWARDS EFFECTIVE INTEGRATION OF FACILITIES

The following are some of the factors to be considered to help in achieving effective integrations of facilities:-

i. Site Selection

Decision to site an institution in a particular place usually lies outside the interest of the architect although both the architects and the planners may be involves in the feasibility studies. The result of such decisions usually leads to the selection of a suitable site.

It has been noted that one of the causes of discentralisation is non-avoidability of land for further expansion. It is therefore necessary to select a site that will give room for future expansion so that the proposed could be integrated with the existing.

ii. Case Studies

The issue of case studying is to see how certain problems have been solved and how certain relationships have been achieved in an existing situation. This is needed for a better design.

iii. Course Analysis

A Careful analysis of the course, would help in determining the facilities required by the department. By the time the architect is through with a thorough analysis, he would be able to develop an initial brief that would enhance effective integration of the facilities.

iv. Zoning

Having derived the final functional requirements, they have to be sorted out into zones. From here a functional flow pattern could be derived.

In a school of Engineering for example, the noisy laboratories and workshops need to be seperated from the classrooms and library. This will obviously enhance effective integration.

v. Flexibility

This could simply be put to mean the ability of a space to be contracted or expanded as functions, conditions or circumstances demand. Buildings could tend to be obsolete if they are unifunctional As such and in order to achieve flexibility in buildings there is need to take it into consideration at the outset of the design so that careful analysis is done on how best to achieve it. Flexibility is needed for the proposed to be effectively integrated with the existing.

The flexible character ought to be incorporated into the architecture of modern day especially in this area of dynamic life style. But attaining total flexibility in a building is presently impossible as natural space must be physically defined and the defining elements:- the roof, wall and floor confine the activities and arrangement that are possible in the space. Also other defining elements serve important purpose such as creating privacy and security.

5.8 CONCLUSION

This chapter has briefly discussed effective integration of facilities in which all factors affecting it comes into play. Understanding these ideals and applying them will go a long way in creating an environment which is conducive for its users and respond to all the conditions.

CHAPTER SIX

CHAPTER SIX

CASE STUDIES

6.1 INTRODUCTION

Case study serves as an important instrument for systematic research procedure. To avoid repeating architectural problems, especially that due to discentralisation of facilities in schools of Engineering, it is important to make some comprehensive case studies of some of the existing schools. This will aid better understanding of the problems with the view to proposing a better design as this is an important element in the design solution.

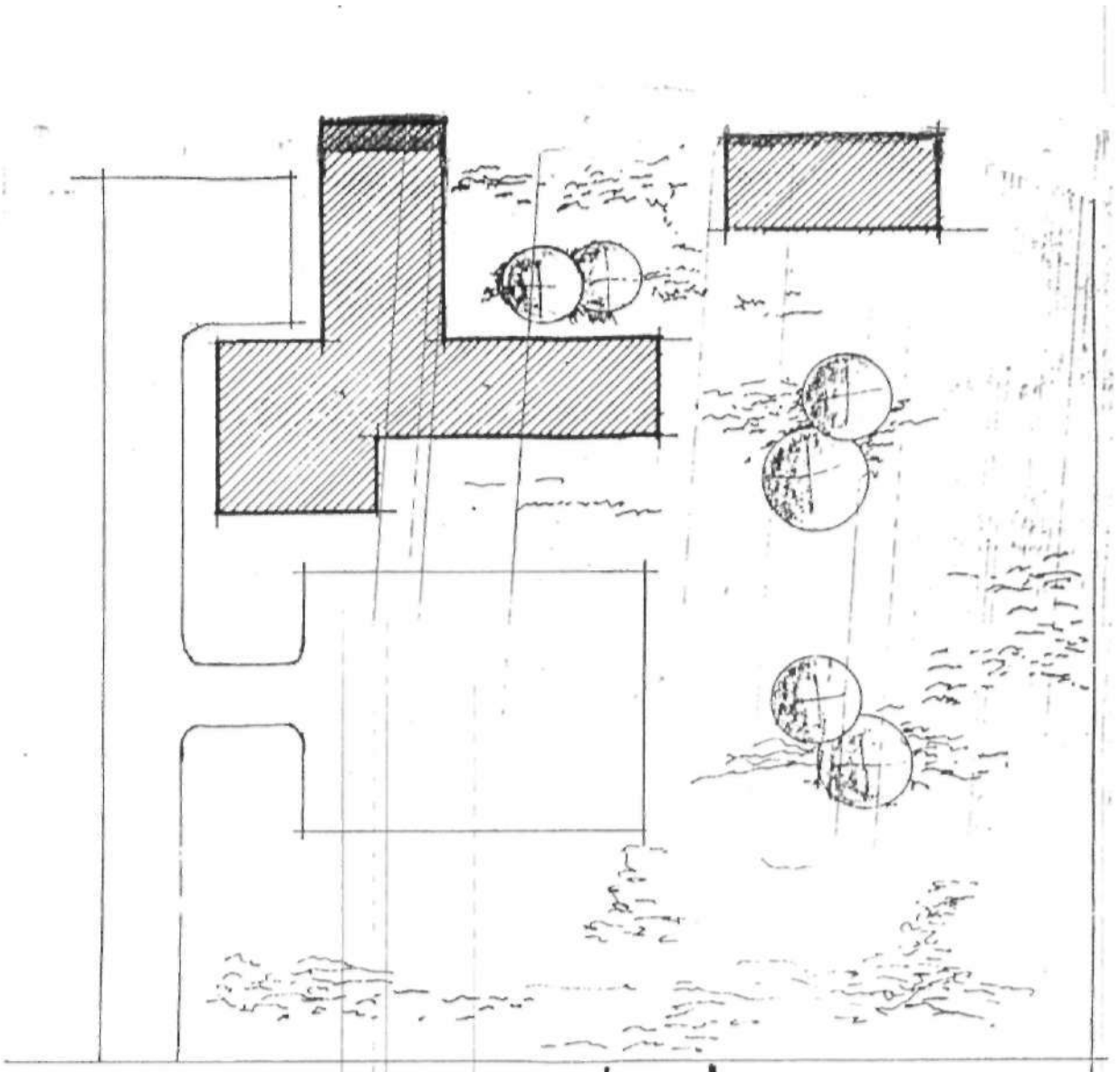
For the purposes of this thesis case studies of some schools were done in the following order:-

i. School of Engineering Fed. Poly. Bida
ii. School of Engineering, Kwara State, Poly. Ilorin.
iii. School of Engineering. Fed. Poly, Ado-Ekiti
iv. School of Tech. National Engineering University, Lima Peru)

All the relevant information were collected through (focus) intension with the personnel concerned, verbal discussions with individual or group directly or indirectly affected by each of the building under consideration as well as the author's personal observations at various locations of the building.

6.2 SCHOOL OF ENGINEERING FED. POLY, BIDA

Information relating to this project is as described below:-



SITE PLAN.

KASHIM IBRAHIM LIBRA

Fig. 6.1

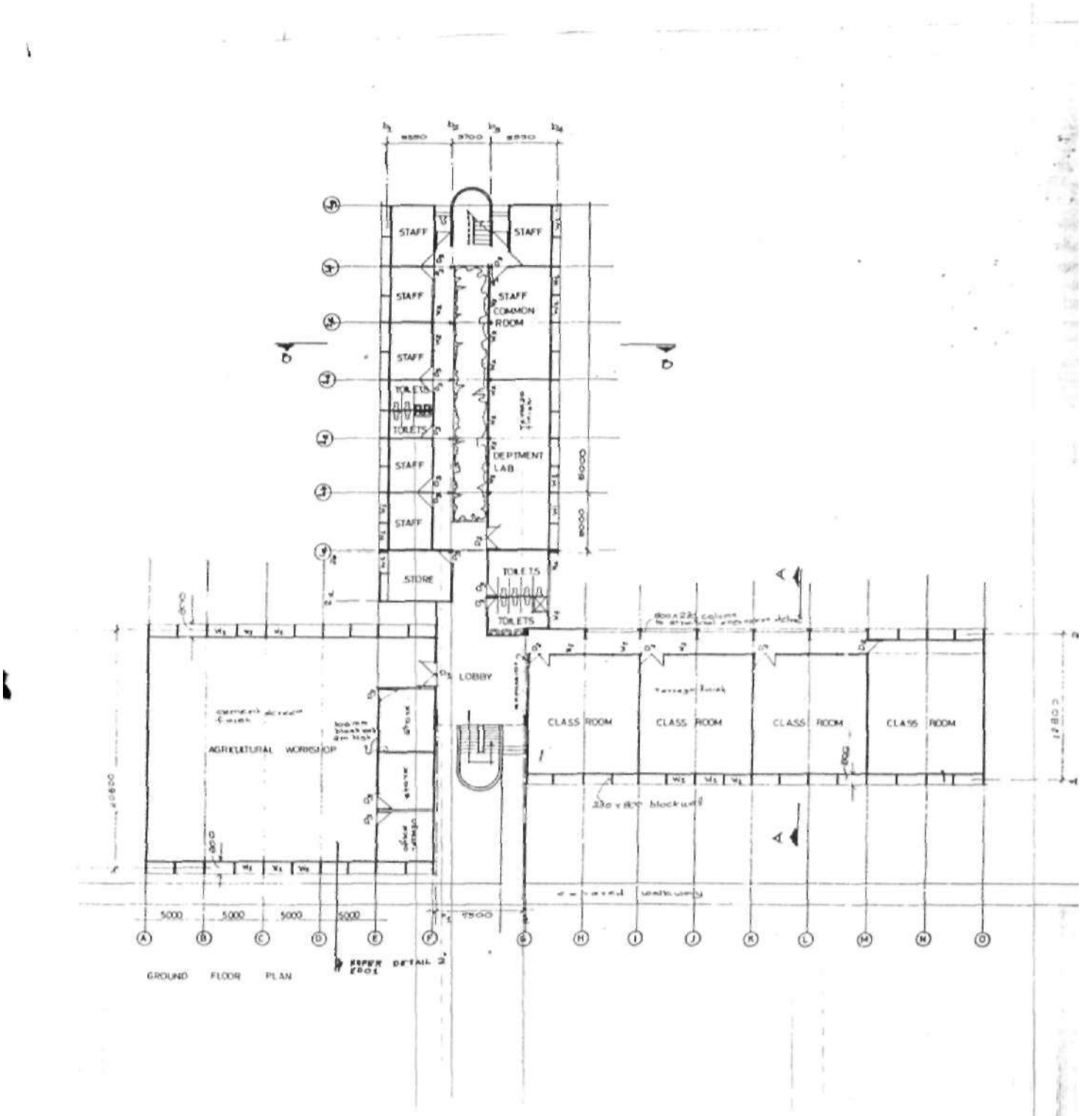

STAFF
STAFF
STAFF
STAFF COMMON ROOM
STAFF
TOILETS
TOILETS
STAFF
DEPTMENT LAB
STAFF
STAFF
STORE
TOILETS
TOILETS
LOBBY
AGRICULTURAL WORKSHOP
CLASS ROOM
CLASS ROOM
CLASS ROOM
CLASS ROOM
230 x 800 blockwall
5000
5000
5000
5000
7500
GROUND FLOOR PLAN

Fig. 6.2

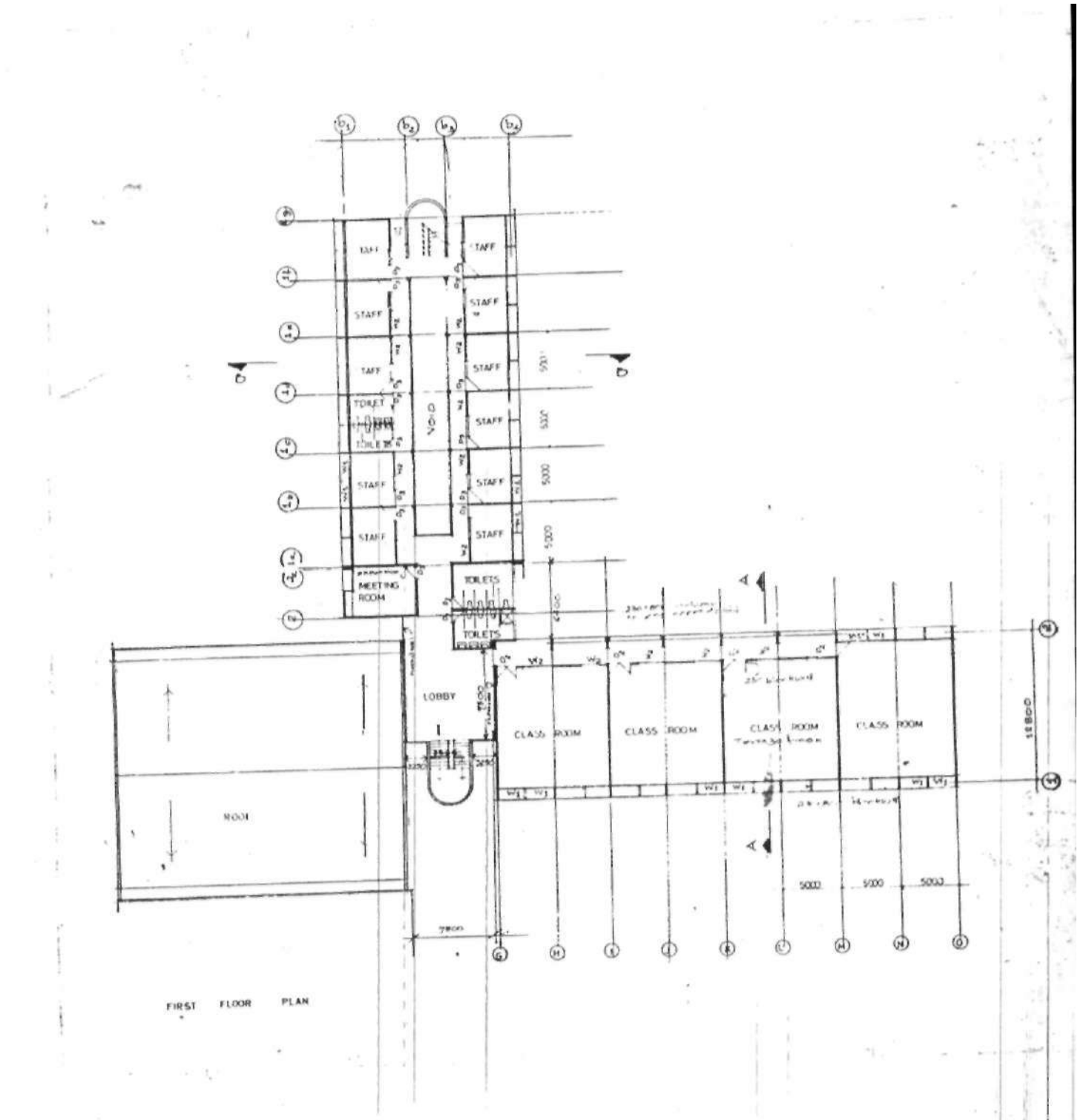
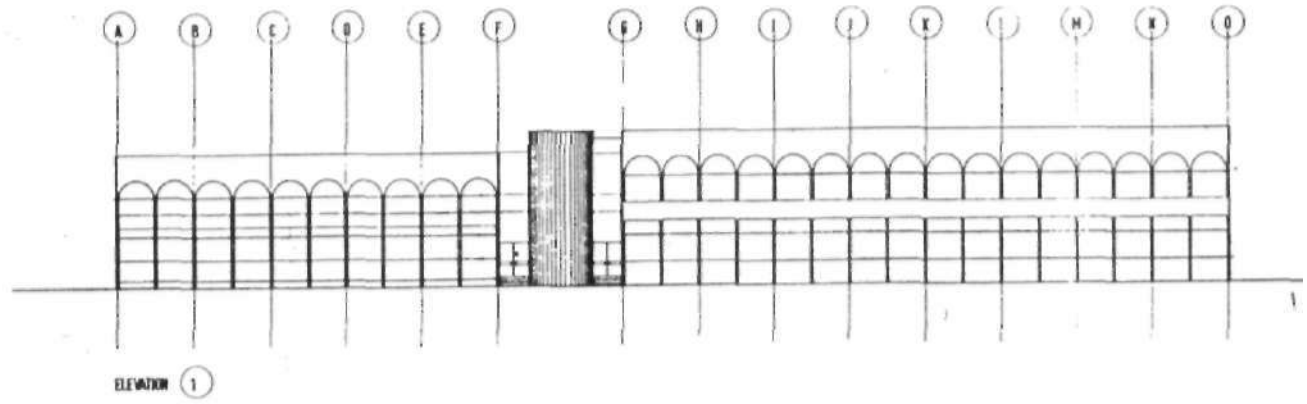
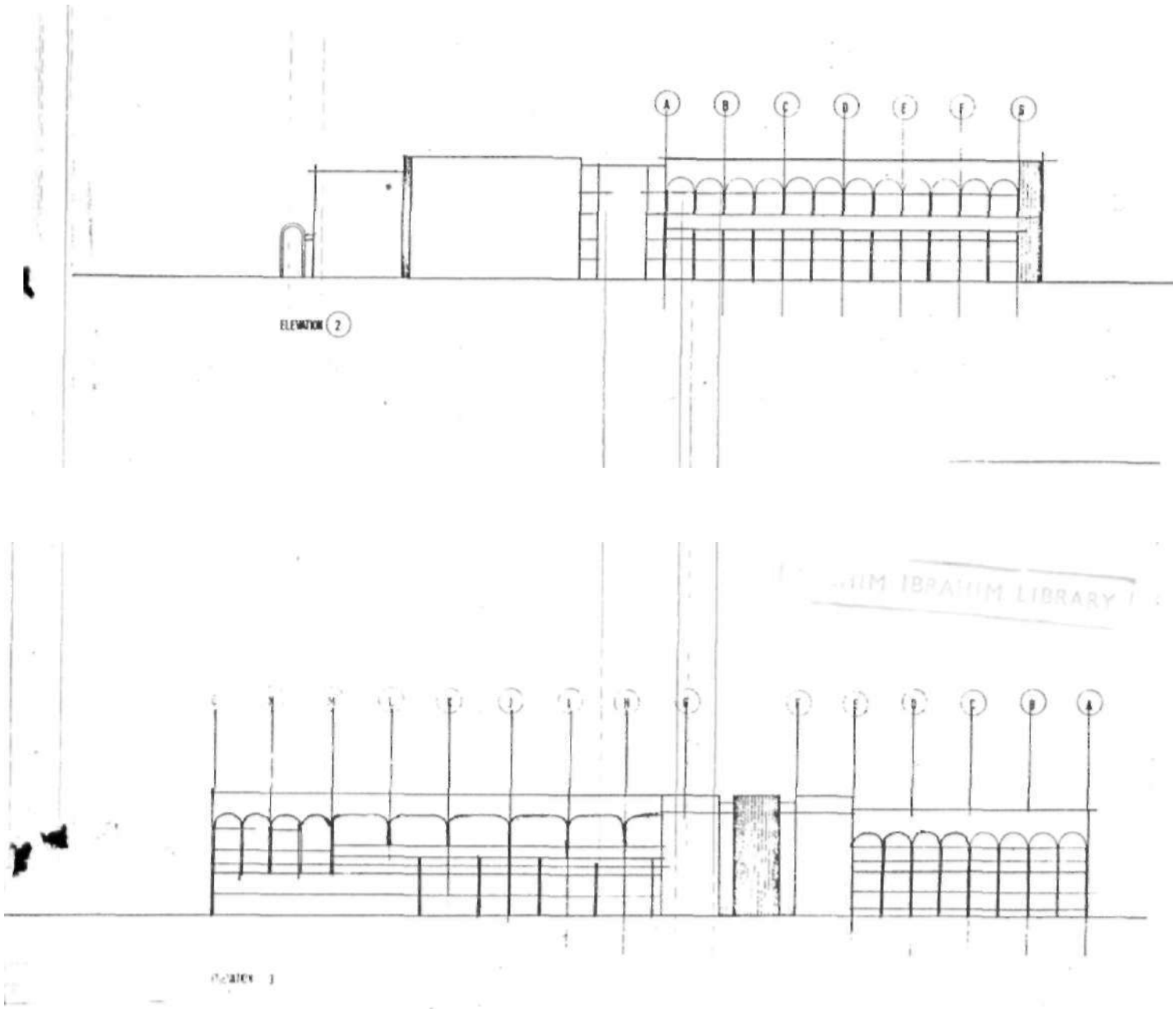

STAFF
TOILET
VOID
MEETING ROOM
TOILETS
LOBBY
CLASS ROOM
ROOM
5000
9100
FIRST FLOOR PLAN

Fig. 6·3





...IIM IBRAHIM LIBRARY

Fig. 6.4



Plate 5 : Bida polytechnic

6.2.1 Site:-

The site is a large expance of slightly undulated and sparesely forested arable land.

6.2.2 Architect:- Ella Waziri Associates Consultant-Architect and Planners.

6.2.3 Client:- Federal Polytechnic Bida

6.2.4 Users:- Staff and Students of Fed. Poly. Bida

6.2.5 Facilities

Facilities available in the scholl includes:-

i. Staff Offices

ii. Class rooms

iii. Laborators

iv. Workshops

v. Staff common rooms

vi. Toilet facilities

vii. Drainage facilities

viii Parking spaces.

6.2.6 General Description

The permanent site for the school is yet to be fully developed and so case study concerning the whole school could not be done. The case study here is therefore restricted to the department of Agricultural Engineering.

The building has two floors; the ground and the first floor.

The ground floor houses functions like the workshops, classrooms laboratory, common rooms, staff office, and stores. The first floor takes care of functions like classrooms and offices mainly Each of the two floor has toilet facilities to cater for their respective users.

The structure is simple. The roof is constructed of steel trusses and alluminium roofing sheets. The walls of sand/cement block work and the floor of reinforced concrete.

6.2.7 Merits

i. The structure is simple thus easy to maintain
ii. The building is easily accessible
iii. The drainage system is well planned
iv. Fairly planned with good lighting.
v. Fairly planned with good circulation
vi. There is effective ventilation
vii. There is availability of land for future expansion
viii. Toilets and other vital facilities are adequate.

6.2.8 Demerits

i. The parking spaces are not well defined thus haphazard parking
ii. There is no proper landscaping
iii. The drainage gutters are exposed and some are even blocked
iv. Lack of fire fighting equipment in the workshop
v. Lack of first aid facilities.

6.3 SCHOOL OF ENGINEERING: KWARA STATE POLY. ILORIN

Information relating to this is as described below:-

6.3.1 The Site

The site of this school is situated within the temporary site of the polytechnic which is within the location of the temporary site of University of Ilorin.

6.3.2 Architect:- Allied Architects

6.3.3 Client:- Kwara State Polytechnic Ilorin

6.3.4 Users:- Staff and Students of Kwara State Poly. Ilorin

6.3.5 Facilities

The facilities available in the school include:-

i. Staff office
ii. Class room
iii. Assembly Hall
iv. Laboratories
v. Workshops
vi. Large central Store
vii. Drawing rooms
viii. Drainage facilities
ix. Toilet facilites
x. Parking spaces.

6.3.6 General description

The existing school of Engineering for Kwara State Polytechnic is situated in the temporary site of the polytechnic. The site was originally used by government Technical Training College, (G.T.T.C) Ilorin and later Kwara State College of Technology in 1973.

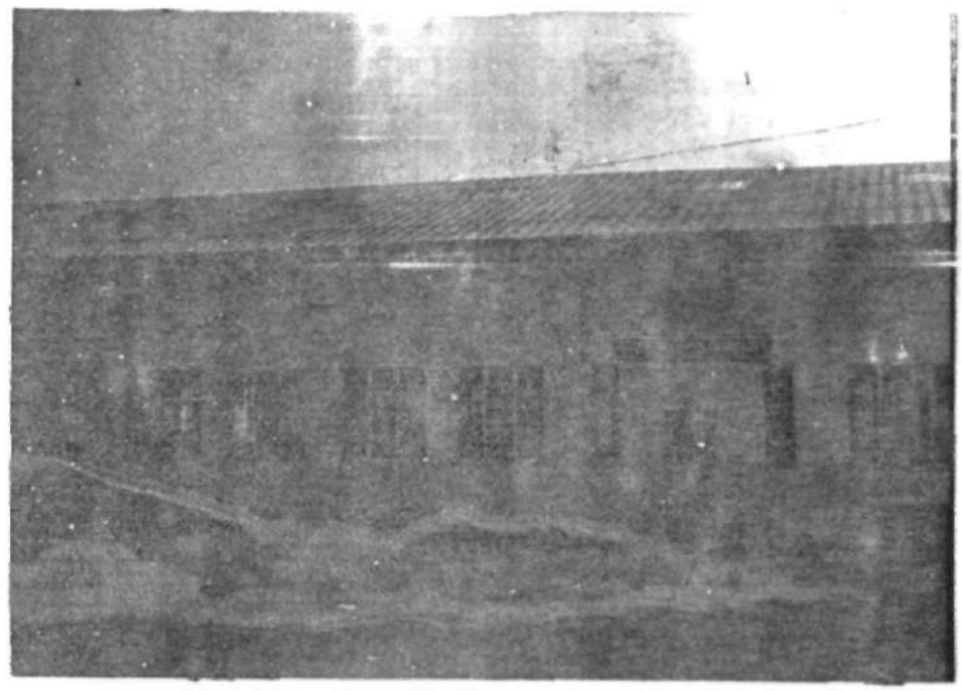


Plate 6 : Kwara polytechnic

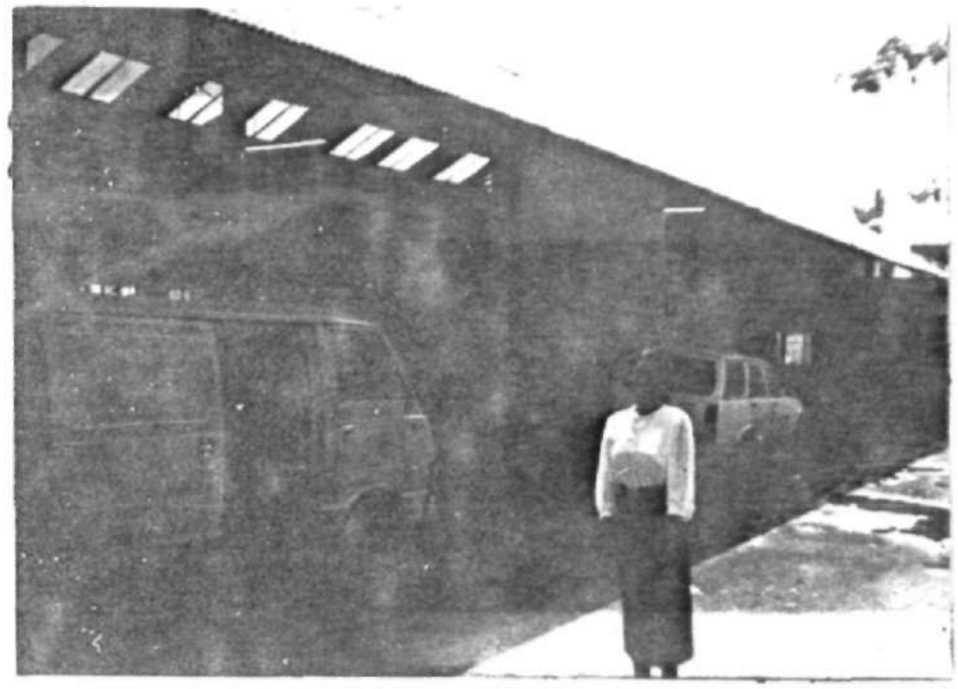


Plate 7 : Kwara polytechnic



Plate 8 : Kwara polytechnic

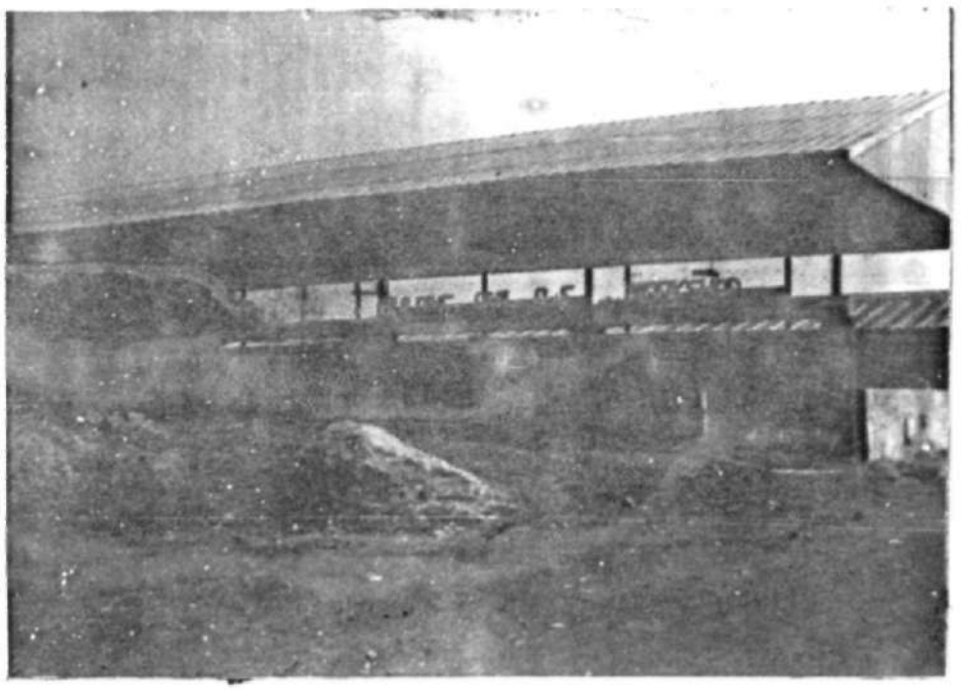


Plate 9 : Kwara polytechnic

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Plate 10 : Kwara polytechnic

With the exception of the workshops which are linearly arranged, other buildings are hapharzard arranged on the site. The buildings are all bungalows, there are no storey buildings.

6.3.7 Merits

i. The structures are simple thus easy to maintain

ii. The drainage system is well planned

iii. There is effective ventilation

iv. There is good lighting

v. Availability of a large central store

vi. Provision of security by fence and night guards

6.3.8 Demerits

i. There are no adequate toiles

ii. Non-availability of land for expansions

iii. The buildings are haphazardly arranged

iv. No proper landscaping.

v. The drainage gutters are exposed and some are even blocked

vi. No proper parking spaces

vii. Non-availability of first aid facilities

6.4 SCHOOL OF ENGINEERING FED. POLY. ADO-EKITI

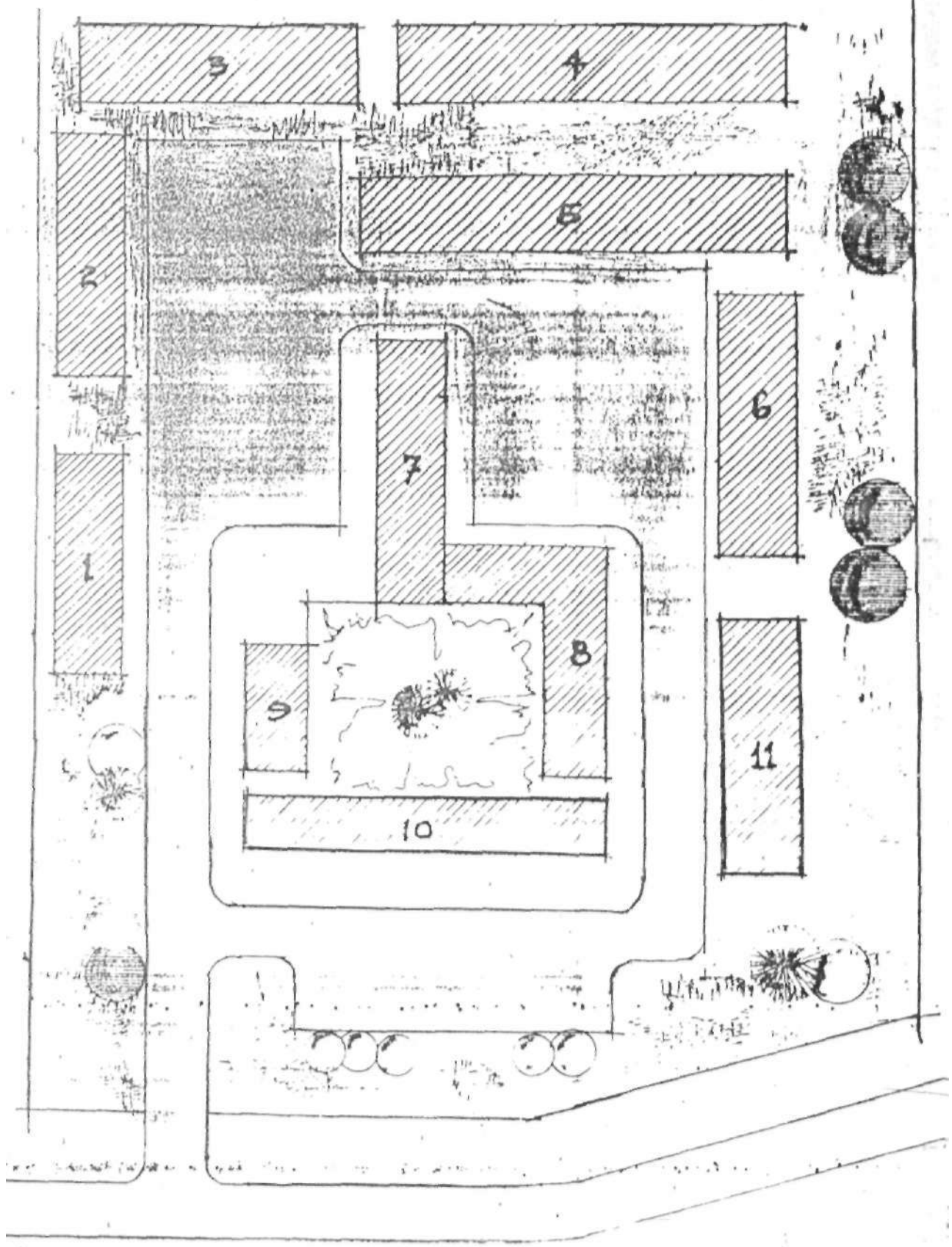
The information relating to their school is as described below:-

6.4.1 Site:- The site is a large expanse of slightly undulated forested arable land with a background of wooded and bare hills.

6.4.2 Architect:- Archon Nigeria Architects

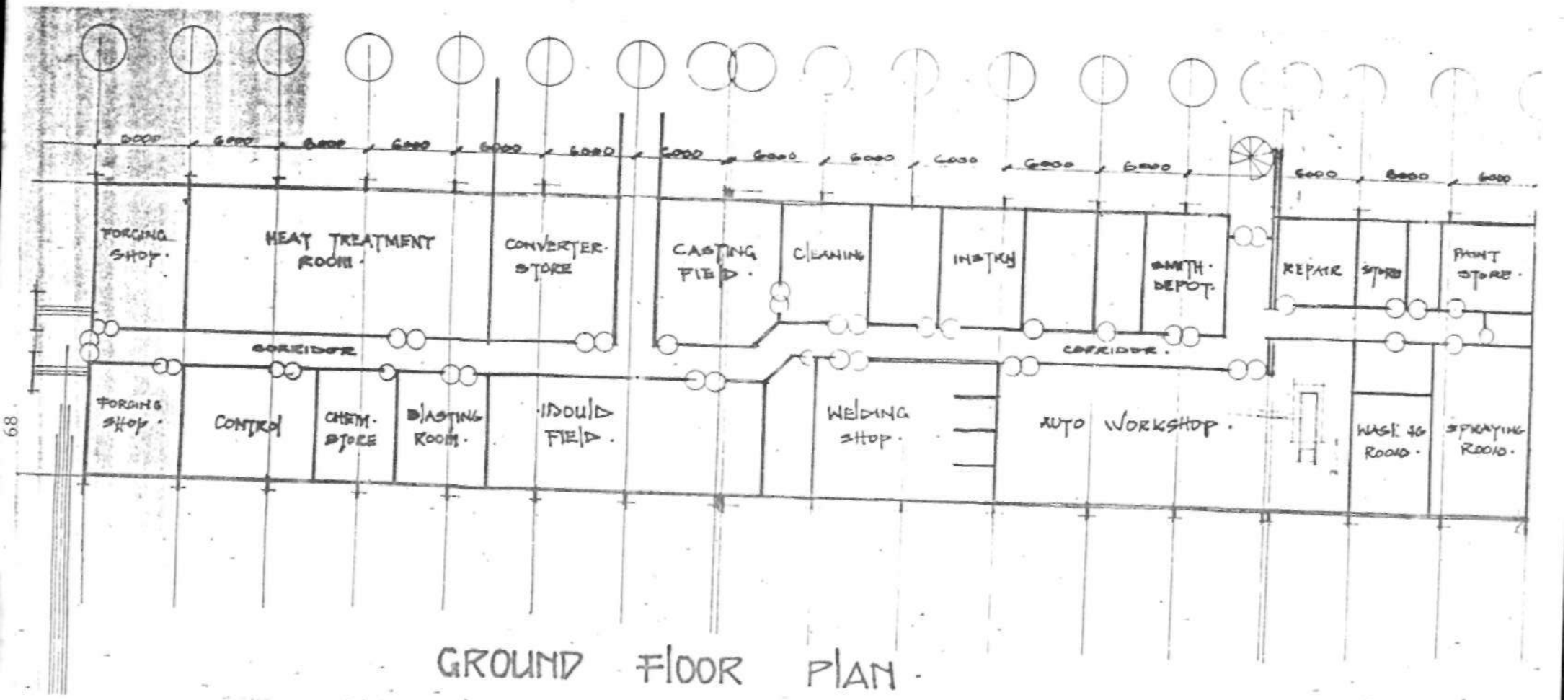
6.4.3 Client:- Fed. Poly. Ado-Ekiti

6.4.4 Users:- Staff and Students of Fed. Polytechnic Ado-Ekiti.



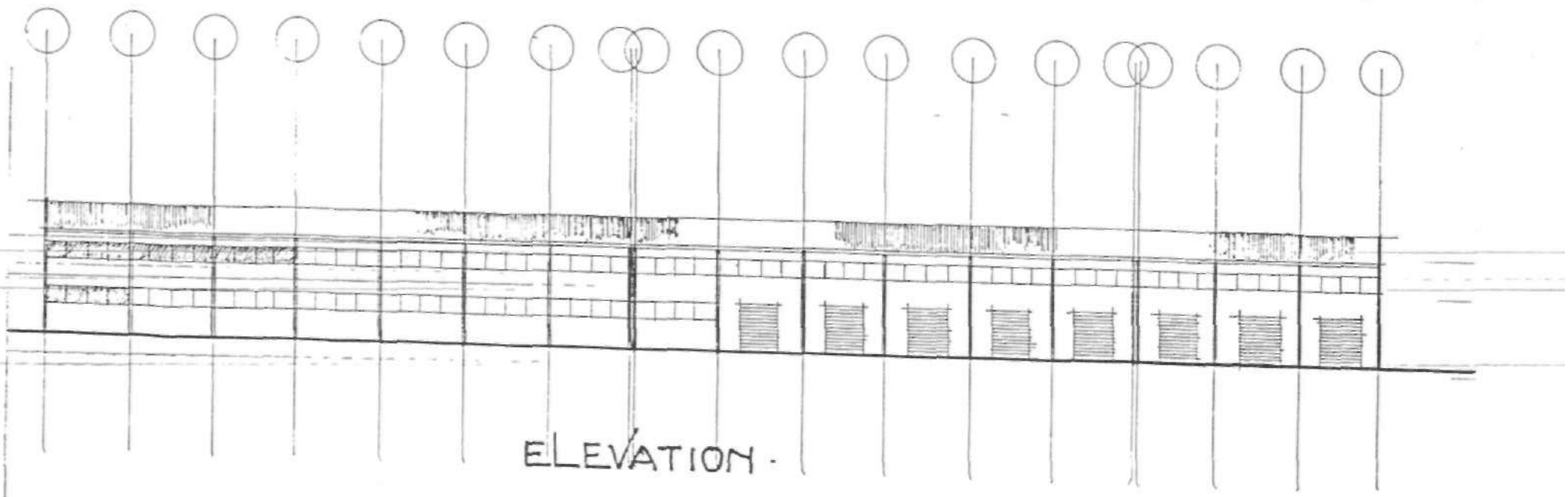
SITE PLAN.

Fig. 6-5



GROUND FLOOR PLAN.

Fig. 6.6



ELEVATION.

Fig. 6.7

6.4.5 Facilities

Facilities available in the school include:-

i. Classrooms

ii. Staff offices

iii. Laborators

iv. Workshops

v. Drawing rooms

vi. Toilets

vii. Parking spaces

viii Drainage system

6.4.6 General Description

Presently some departments of the school are yet to move from the old temporary site to the new permanent site, with which this case study is on. Although construction has started on the permanent site long ago, the old site is still in use by some departments.

As could be seen on the site plan, the classroom, laboratories, the workshops etc, provided are not integrated. The roofs are much of steel trusses and alluminium roofing sheets, the walls of sand/cement block work and the floor of reinforeced concrete.

6.4.7 Merits

i. The structure is simple and thus easy to maintain

ii. The drainage syste is well planned

iii. There is effective ventilation

iv. The classrooms are large enough to take large number of students

v. The workshops are fairly planned with good lighting.

6.4.8 Demerits

i. Non-availability of land for future expansion

ii. The building spaces are not well defined and thus hapharzard parking;

iii. No well defined pedestrian movement

iv. No proper landscaping

6.5 SCHOOL OF TECH. NATIONAL ENGINEERING UNIVERSITY LIMA

6.5.1 The Site:- The site is situated within the University premises and bounded by the students dormiteries, sports arena etc. and university on the adjoining site to the right.

6.5.2 Client:- National Engineering University, Lima (PERU)

6.5.3 Users:- Staff and students of school of tech. National Engineering University, Lima (Peru)

6.5.4 General Appraisal

As could be seen from the Plate, a general view of the school shows that it shares many communal facilities such as dormetories, sports arena etc, with the university on the adjoining site.

The engineering machine shop is well laid and with good natural lighting and overhead electrical conduits to allow for re-arrangement of machines. The electronic laboratory is also with natural lighting and mobile equipment on wheeled bases.

Generally, the various units of the school are carefully and linked up with covered walk ways

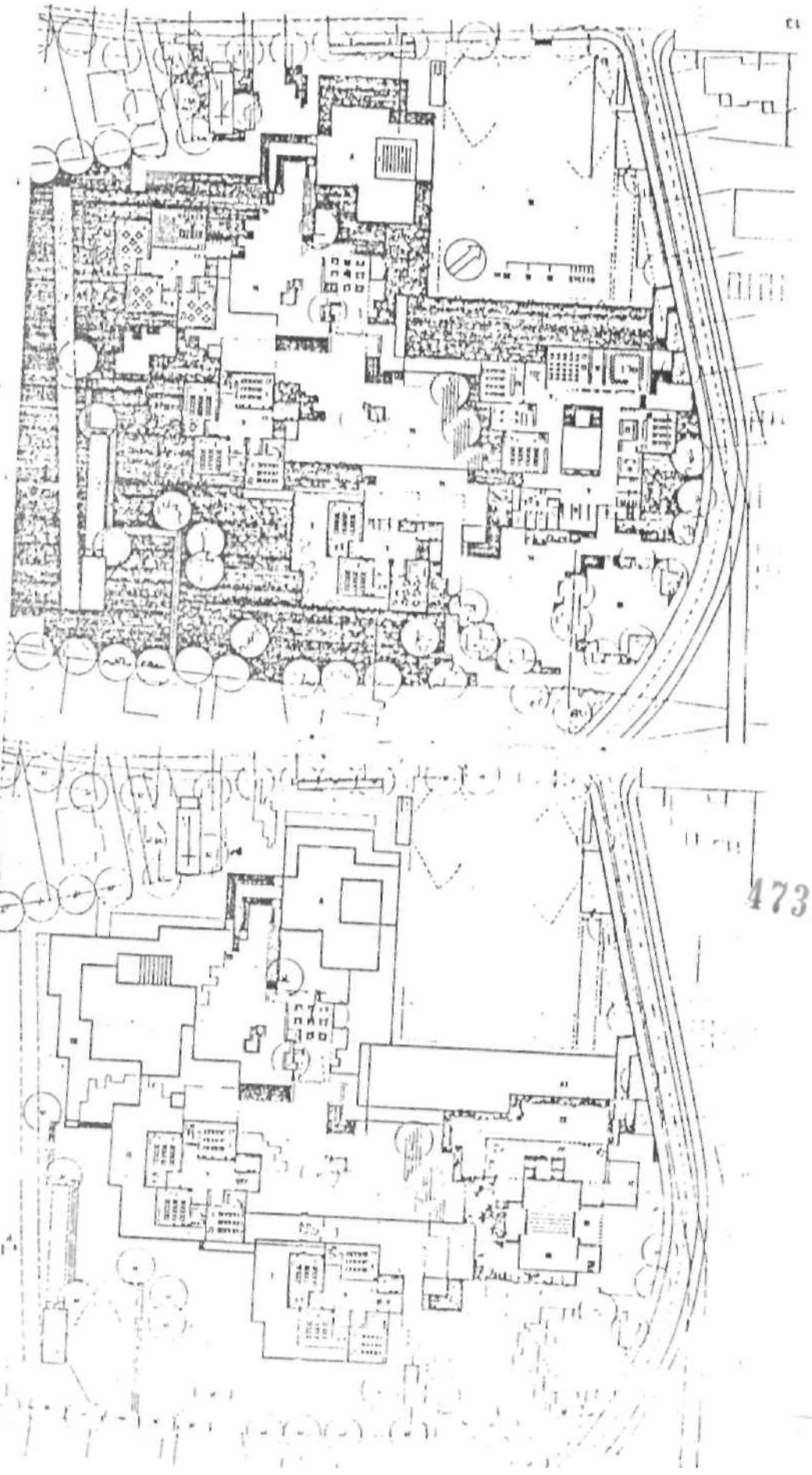


Fig. 6.8 : Floor plans

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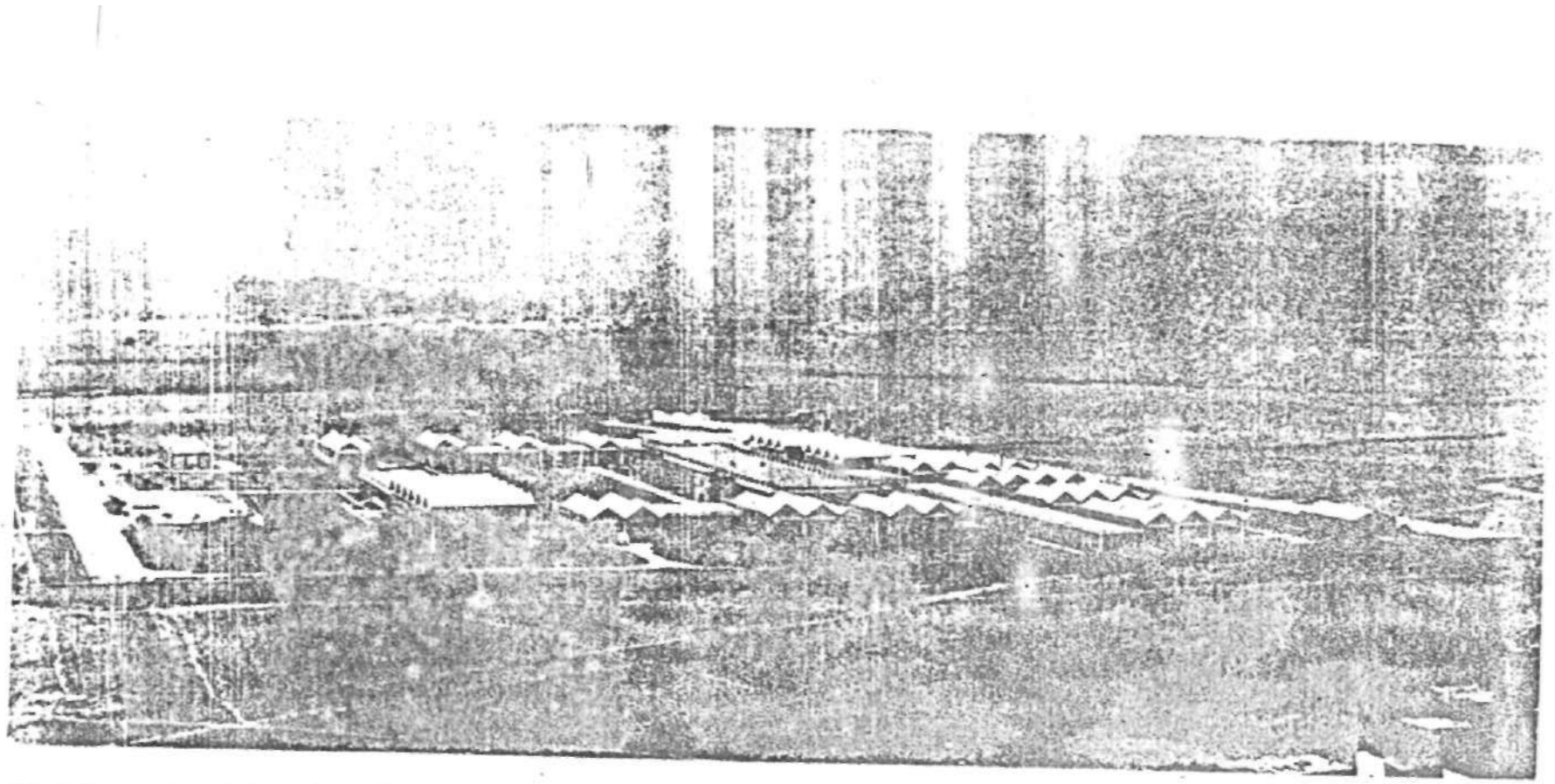


Plate 11 A general view of the School of Technology, National Engineering University, Lima (Peru). The school shares many communal facilities such as dormitories, sports arena, etc., with the university on the adjoining site to the right of the picture.

Plate 11: National Engineering University; Lima

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6.6 CONCLUSION ON CASE STUDIES

This study has served to familiarise the researcher with the problems in some of the existing schools of engineerings. It is observed that apart from the administrative aspects, schools of engineering generally have teaching rooms as well as the specialist rooms. Specialist rooms refer to laboratories and workshops which are the most noisy area of the school. For an effective integration of these with the administrative and the teaching rooms, there should be a careful seperation between them.

CHAPTER SEVEN

CHAPTER SEVEN

OFFA - THE STUDY AREA

7.1 HISTORICAL BACKGROUND

The name offa was derived from the Yoruba word "Bow" and the traditional title of its ruler "OLofa" means the "Owner of the bow". This title handed down from one ruler to another; most probably came from the fact that the past leader of Offa was a hunter and archer. There is however, no information regarding the age of the town; but it is believed to be about three (3) centuries old. It is commonly believed that the original settlers were the Yoruba's from Ile-Ife - the spiritual centre of Yoruba land or Oyo. Either is possible considering the proximity of Offa to these two towns.

7.2 NATURAL CHARACTERISTICS

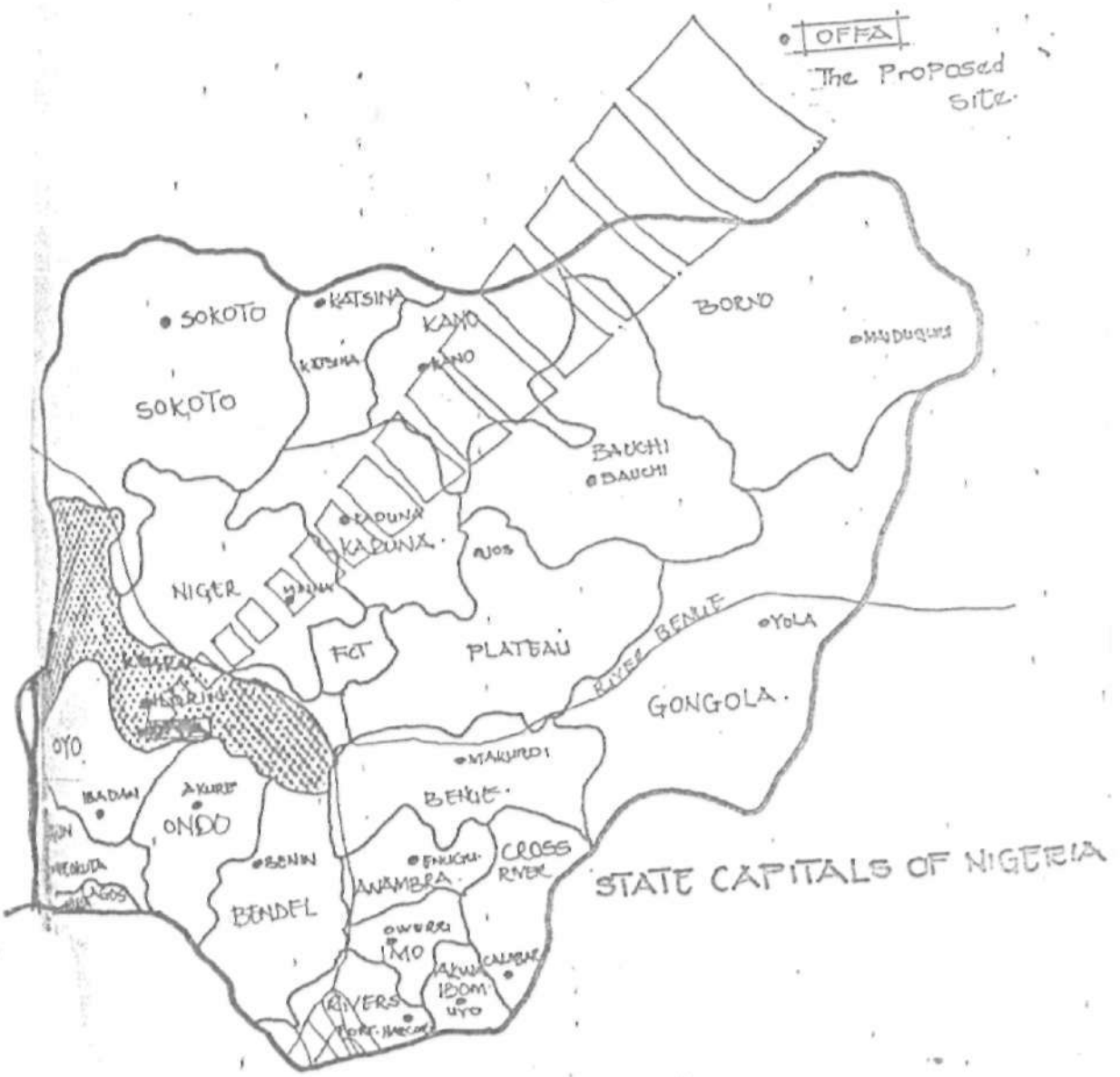
7.2.1 Location:

The town is located on the western high lands of Nigeria at an attitude of 425 meters above sea level on the water shed of the southern boundaries of Kwara State (See Map)

7.2.2 Soil and Vegetation

The common vegetation found in Offa belongs to the guinea savannah region of Nigeria. The arable soils are good for agricultural cultivation as well as for various construction purpose. The vegetation is very dense due to the abundant ground water supplies.

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MAP OF NIGERIA SHOWING LOCATION OF OFFA

Fig. 7.1



Fig. 7.2

Vegetations along the lower part of the near by streams are left to grow, while those on the upper part have been cleared and turned over to agricultural use.

Generally, numerous streams facilitate natural drainage in the area. An embarkment four kilometres north-east of Offa, on the river Oyun, form a small and shallow reservoir covering an area of about 35 hectares.

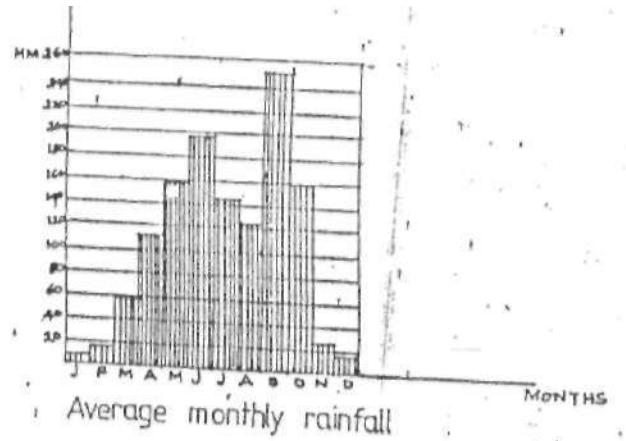
7.2.3 Geology

The area displays simple geological characteristics with no major strucutural disturbances and no identifiable geological formations. The area is probably underlain by the pre-cambrian basement complex consisting of granites, schists and gneisses.

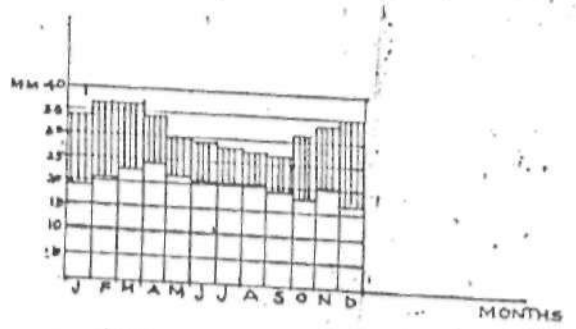
Generally, the topography is even with gentle slopes, and drainage is well developed.

7.2.4 Climate

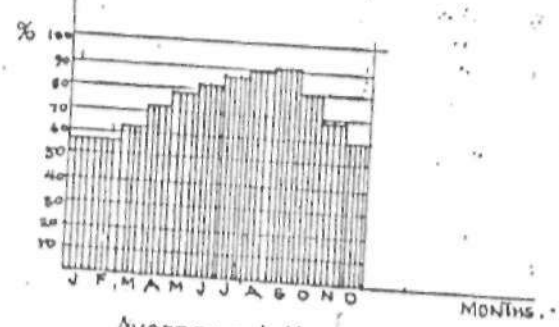
Offa is characterised by two dominant seasons. The wet season and the dry season. The wet season is from April to October. It is characterised by the warm and humid south west winds. This blows across the atlantic carrying moist during the rainy season. The dry season is from November to April. It is characterised by the north-east or harmattan wind. This is a dust laden wind usually cold and dry and blows across the desert The dry season with temperature reaching up to $38^{o}C$ brings drought conditions.



Average monthly rainfall

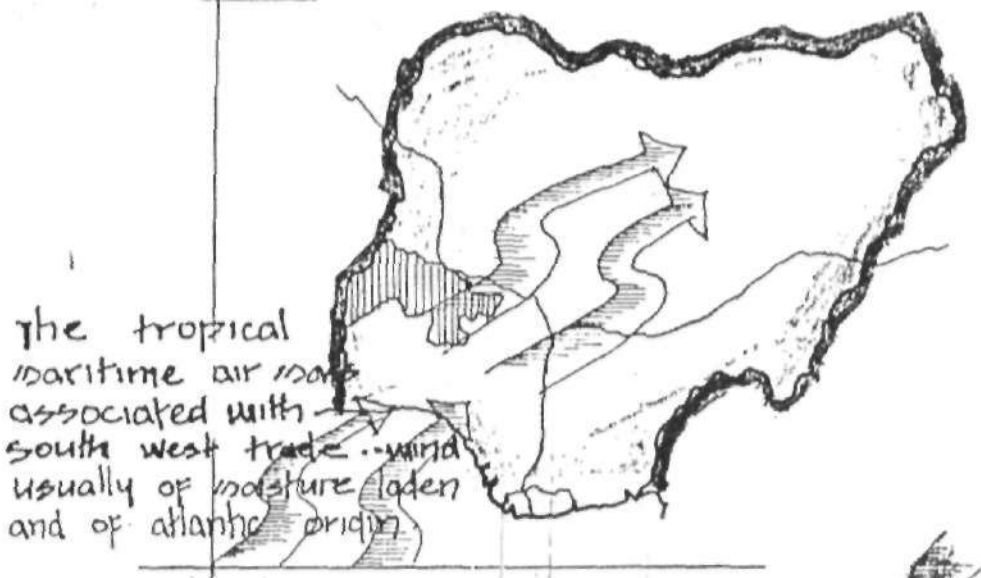


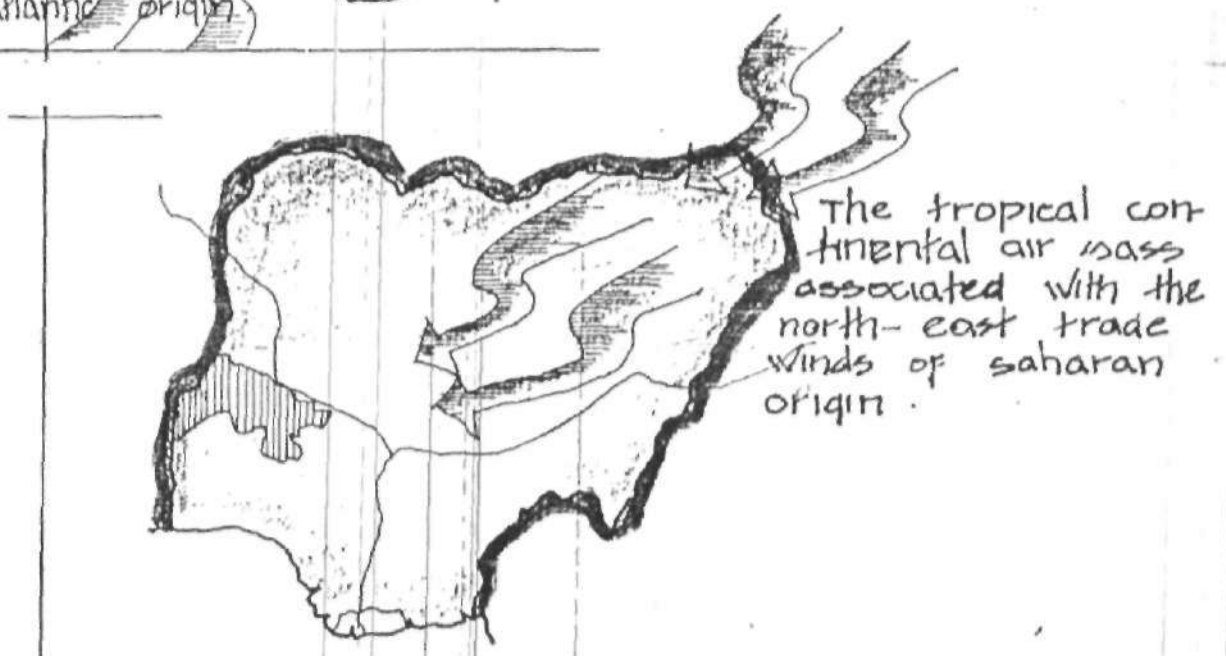
Average max & min temperature



Average relative humidity

FIG 7.3 CLIMATIC FACTORS IN OFFA





PREVAILING WINDS IN DRY AND WET SEASONS

DESIGN IMPLICATIONS

The marihme winds blowing in a south westernly direction are cooler and generally more desirable than the harmattan winds(north easternly direction).

Building orientation should therefore be such as would take advantage of the maritime winds while the harmattan winds could be screened off by the use of barriers, or by proper orientation.

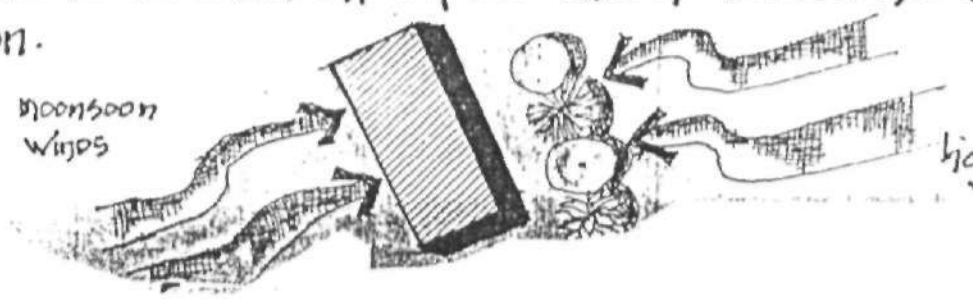


Fig. 7.4.

The main annual rainfall is about 45 - 55" (i.e. between 1200 and 1400mm). The temperature condition remain virtically unchanged throughout the year. The relative humidity is about 80 percent at 9.00 a.m. in the wet season. In the dry season the harmattan winds help reduce the relative humidity from a level of 80 percent to about 65 percent.

It can be observed that there is no case of extreme climatic conditions. For the purpose of design, moderate climate conditions can therefore, be assumed.

7.3 SOCIO-ECONOMIC BASE

The main occupation of the people can be grouped into four categories:-

i. Agriculture - farming, lumbering, livestock etc;

ii. Manufacturing - industry, crafts, professionals etc;

iii. Tertiary - trade, services, government, teaching etc:

iv. Construction.

These made the town the focal point of economic growth in the former Oyun local government Area of Kwara State.

A survey was carried out in 1974 to study the structure of the labour force and make future possible projections. This is necessary to determine what organisations are needed for the management and development of manpower. The result implies that the percentage of labour force in Agriculture was 44% in 1974 and it is likely going to drop to 22% in the year 2005. Manufacturing will increase from 12% to 18%.

Tertirary will increase from 44% to 50% and construction

will also increase from 3% to 10%.

The industrial sector of the town composed of large and small scale industries. The small scale industries however consists of sawmills, structural metal firm, printing, Block industries and bakeries. Each employ between 15 - 60 people The large scale industrial sector consists of a biscuit factory, Foam inudstry, Carpet factory, and the brewery. They employ between 400 - 1000 people. However, the location of the town on the main railway has helped the growth of these industries, giving them easy access to the Nigerian markets and ports.

What can be observed here is typical of any urban community where agriculture gradually losses its value. However, other occupational groups which may become more popular, could serve as revenue generating sources for the local authority of the town. It is very likely that the total labour force will grow at a higher rate than the population if there is massive in-migration of labour or if the 15 - 49 age group will grow.

7.4 DEMOGRAPHIC CHARACTERISTICS

This aspect deals with information gathered on the population structure of the town, the occupation of the people, religion and employment structures.

7.4.1 Population Distribution

According to the 1963 population census, Offa had a population of 71,600 and by 1974 it has risen to 94,500. It is estimated that the town grew at a natural growth rate of 2,55% per annum.

However, projecting from this population, the population in 1990 would be 139, 300. For the purpose of this study a population size of 206,000 for Offa in the year 2005 was projected. It is very unlikely that Offa will grow faster than the rate of natural increase, if the growth strategy for it, is properly moderated in all aspects of development; which include both government and private capital investment, industrial locations, growth of educational institutions as well as various expansion/location of commercial centres (See the table below:-)

Projected Population Table

Year	1980	1985	1990	1995	2005
Assumed Annual grow rate	2.55	2.55	2.55	2.55	2.55
Projected Population by end of phase	109,900	124,600	139,300	160,300	206.15(

Source: Offa Master Plan by Daral - Handasal Consultant 1974-200

7.4.2 Population Profile

The 1974 population survey of Offa shows that population based on age and sex of the people, consist of two main categories.

(i) The dependent population: This class consists of the much younger and the much older groups. They depend mainly on others for survival.

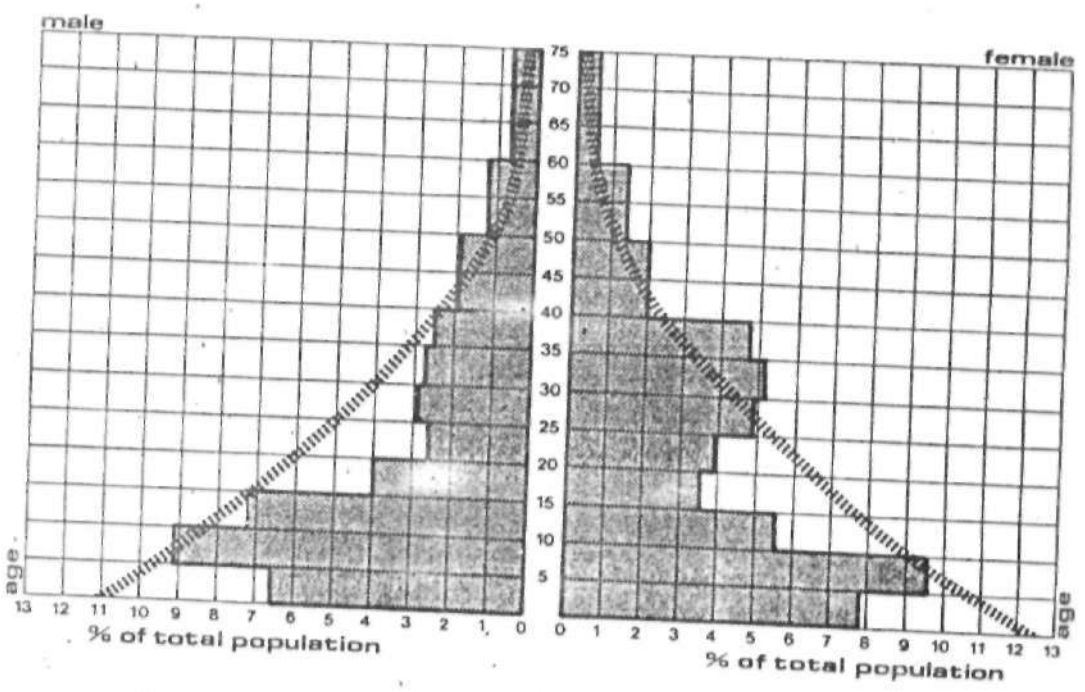
(ii) The working age population: This class consists of those who are engaged in one way or the other in a gainful pursuit.

KASHIM IBRAHIM LIB

KASHIM IBRAHIM LIBRARY

age group	% of total population	
	male	female
0-4	6·6	7·8
5-9	9·2	9·5
10-14	7·3	5·5
15-19	4·0	3·6
20-24	2·6	3·9
25-29	2·9	4·9
30-34	2·8	5·1
35-39	2·5	4·8
40-49	3·9	4·0
50-59	2·6	2·7
60+	2·0	1·8
	46·4	53·6

Table : 7·2



adjusted average of 14 designated settlements in kwara state

Fig· 7·5

source: field sample survey by the consultants 1974

However, the population profile shows that for independent population, 45% are under 15 years and 3.8% are over 60 years. While for working age population, from 15 - 19 years, account for 50.3% of the population. If however, the working age population is divided into two Age Groups of 15 - 34 years and 35 - 39 years then the younger age group accounts for about 60% of the working age population and the older group accounts for the other 40% of the working age population (See the Table below)

Population Profile for Offa: 1974

Age Group (Years)	Male	Female	% of Total Population	Category
0 - 15	23.1	22.8	45.9	Dependent Population
16 - 59	21.3	29.0	50.3	Working Age
60 - Above	2.0	1.8	3.8	Dependent
Total	46.4	53.6	100.0	

Source: Offa Master Plan.

In the working age population category, there are more females than males. This is because naturally the female population is more than the male population. Another reason is due to the fact that men die younger thus in the market largest population of people participating in trading are female.

7.4.3 Ethnic And Religious Composition

The Yorubas, who represent the majority of the town's population own most of the land and control the ruling of the community.

The 1974 survey of Offa shows that 92% of the heads of households were Yorubas.

The Hausas and the Nupes in Offa engage mainly in the trading of Agricultural products and foods stuffs. This is due to the fact that majority of them own land at the Suburb of Offa, where they farm various agricultural products. They account for about 4% of the population.

The Ibos and the Edos are largely employed on the railway while most of the Igbira are farm labourers. They account for the remaining 4% of the population. Source: Offa Master Plan.

7.4.4 Religious Composition

The population composition shows that 79% of the inhabitants are muslims, 19% christian, while the remaining 2% belong to the other religious. The Offa people generally have various traditional festivals that they celebrates yearly. The most popular of all these festival is the Moremi Festival. However, with the emergence of education the modern religion (i.e. Islam and Christanity), all the various traditional festivals have all been neglected (Source: Offa Master Plan.)

7.4.5 Occupational Structure

Offa is generally characterised by plain arrable land, which is suitable for agriculture. This however, influenced the occupational structure of the people, where by about 70% of the population were engaged in agriculture. However, in the recent past, due to the emergence of specialization,mechanization and urbanisation within the town, only 18% of the working population now engaged in agriculture.

55% of the labour force engaged in the tertiary sector (i.e commercial activities such as marketing, trading, banking, Insurance e.t.c.). 20% engaged in manufacturing while about 7% of the labour force engage in various types of construction and casual works. Source: Offa Master Plan.

7.4.6 Employment Structure

In the early sixties it was estimated that about 80% of Offa inhabitants 18 years and above engaged in some form of income producing activities, majorly agriculture. 85% of this labour force engaged on a full time basis, while 15% engaged on a casual or part time basis.

In the recent past, the high rate of labour force has gone down seriously due to seeking knowledge outside the town. Presently, due to the serious improvement in school attendance there is high unemployment and this led to increase in self employed sector, thus leading people to specialise in various areas. Source: Offa Master Plan.

7.5 TYPES OF BUILDING IN OFFA

Out of the total area of land developed, 65% can been classified as residential including private and public housing areas. Educational institutions represent 10% while commercial areas and religious area represent the remaining 25%.

According to the residential survey carried out in 1974, 2 main types of dwellings were identified.

a) Multi House hold building

b) Single House hold building

72% of the house hold building surveyed came under the Multi - House hold building, with 2 or more families sharing a single unit. Over one-third of the residential buildings had courtyards. While about 61% were compact and rectangular.

Dwellings are not usually allocated according to definite plots. They all exist in close proximity without specific boundaries, and the land between houses are regarded as common land for every cluster.

The various types of building existing in Offa include:

i) Commercial buildings - This include hotels, market structure, Film house, Banks etc.

ii) Religius buildings:- These are various religious structure scattered all over the towns such as Churches, Mosques, and shrines

iii) Residential Building

iv) Educational Building

Two-third of the building structures are less than 20 years old. Majority of the structure are single storey building.

About 60% of the structure are now constructed of cement blocks while the other 40% use mud as the building material for walls.

Roof construction is predominantly of metal sheets, and occasionally of concrete and asbestor sheets.

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CHAPTER EIGHT

CHAPTER EIGHT

DESIGN BRIEF

8.1 INTRODUCTION

The proposed school of Engineering is one of the first schools to be developed at the permanent site of the polytechnic. It is, without doubt, going to be one of the largest schools at the new site, considering the vast area of land allocated to it in the proposed master plan. It is also evident that the development of the school will be in phases considering the dynamic nature of education curriculum or student enrolment as well as the scope of the development. Based on the current academic programme of the polytechnic at both the Pre-National Diplomal (Pre-ND) and the National Diplomal (ND) level, the emphasis is laid on four departments (Civil, Mechanical, Electrical and Agric. Engineering departments) for the first phase of this development with which this thesis is concerned.

This document sets out the school's objectives for this development at the permanent site of the Polytechnic. Consultants are therefore to translate these requirements into physical space provision.

8.2 DESIGN POPULATION

It is quite difficult for one to predict with much degree of certainty the kind of the number of students who may attend

any particular school in future years, but with much experience and knowledge of the changes in student population for a certain number of years one should be able to make a fairly shrewd guess of what the population will be at a particular time in future.

The proposed student strength shall be about 640 with a staff/student ratio of 1:10. This brings the total design population to about 700. The breakdown of the student population shall be as follows:

Department	Pre-ND	NDI	NDII	HNDI	HNDII
Civil Engineering	20	40	40	30	30
Mechanical Engineering	20	40	40	30	30
Electrical Engineering	20	40	40	30	30
Agric Engineering	20	40	40	30	30
Total	80	160	160	120	120

Total = 80 + 160 + 160 + 120 + 120 = 640.

A good study of this as well as the types and grades of both the teaching and the non teaching staff to be attached to each department is required so that sufficient facilities can be provided for both the student and the staff.

8.3 FACILITIES

The facilities to be provided are as follows:

- Vehicular parking spaces
- Service bays/service entrance
- Ancillary facilities - kitchen, lounge, student common rooms etc.
- Services - stairs, walkways, toilets, stores etc.
- Classrooms
- Drawing studios
- Lecture theatres
- Laboratories/workshops
- Faculty library
- Faculty offices
- Departmental offices

8.4 BRIEF DESCRIPTION

Schools of Engineering are large and complex buildings comprising of many facilities. The design should be flexible enough to accomodate unforseen uses and expansion. It should also take cognizance not only of the initial cost but also the cost-in-use of the building.

The brief description for the various components of the design is as follows:

8.4.1 Vehicular Parking

There shall be parking lots to serve the staff and students of the school as well as visitors from outside. This should accomodate a maximum of about 50 cars and should be laid out to differentiate between transient users (visitors) and members of the school in order to minimise noise and disturbance and for proper definition of vehicular traffic pattern. The layout should also have adequate consideration to convinient access from the parking lots to the building complex and proper landscaping to minimise the possible micro-climate effects of large parved areas.

8.4.2 Service Bays

These are needed to serve the workshops, the laboratories and the ancillary areas e.g. kitchen. They should have enough space for full manoeuvring of vehicles and trucks for delivery services.

8.4.3 Ancillary

This is made up of facilities which are public orientated and have to do with the welfare of the workers. It is made up of functions like staff canteen, lounge, kitchen etc.

Students' common rooms for example are for relaxation. Some students are happy to sit and read, others to sit and talk and others creat some amusements which may be quite or noisy.

KA[illegible]

8.4.4 Services

These are made up of facilities like the stairs, walkways, stores, male toilets, female toilets etc. Other facilities e.g. airconditioning, water supply, air cooling, electrical distribution and equipment, telecommunication and transmission security would depend on engineering services for the building.

8.4.5 Faculty Library

A faculty library with facilities for refrence, reading and borrowing books need be provided for both the students and the staff. Other operational areas like the librarians office, entrance and control, periodicals and other ancillary spaces are also to be provided. Two of the most important requirements considered in the planning of the library is flexibility and freedom to expand. There should therefore be no permanent structures within the library, partitions as well as shelves must be movable.

It is important to note that the library must be situated in the quite zone of the planning.

8.4.6 Teaching Rooms

Two main types of teaching room exist in engineering school. These are:

i) Specialist rooms

Rooms planned and equiped for the teaching of a particular subject or group of subjects such as workshops and laboratories.

UNESCO : HIGHER EDUCATION
PREPARED BY Yekta Chahrou
TITLE Appendix 3--E
SOURCE CLASP/JDP Building Bulleti
INSTITUTION Department of Educ on and Science, U.K.
SUBJECT Laboratory Types. Equipment.
DATE Jan 19
PAGE 63
DATE 1970

(200)

LABORATORY TYPES

● MAJOR OCCURRENCE
○ MINOR OCCURRENCE

TYPES	LABORATORY TYPES: Wet – Bench	Wet – Machine	Dry – Bench	Dry – Machine	Electrical – Bench	Electrical – Machine
Testing machines			○	●		
Machine tools			○	●		
Engines			○	●	○	●
Compressors				●		
Turbines	○	●	○	●		
Pumps	○	●				
Centrifuges	○	●	○	●		
Hydraulics, tanks and piping	○	●				
Boilers		●				
Generators				●		●
Electro-magnets						●
Furnaces	○	●	○	●		
Ovens	●	○	●	○		
Wind tunnels				●		
Refrigeration equipment	○	○	○	○		
Computers and data processing	○	○	○	○	○	○
Instrumentation	●	○	●	○	●	○
Experimental glassware	●	○				
Fume cupboards	○					
Gas bottles	○	○	○	○		
Gantries, cranes, etc.		●		●		●
Anti vibration blocks			●			
Strong floors				○		
Test rigs - structural			○	●		
- engines			○	●		
- electronics	○		○		●	○
- electrical					○	●
- hydraulics	○	●				
- chemical engineering	○	●				
- vibrations/dynamics			○	●	○	

Table · 3-2

UNESCO : HIGHER EDUC

PREPARED BY Yekta Chal

TITLE Appendix

SOURCE CLASP/JDP
Building Bu

INSTITUTION Department ion and Science, U.K.

SUBJECT Service Needs. quipment.

DATE Jan 1975

PAGE 62

DATE 1970

ROOM TYPE : (200)

SERVICE NEEDS

● MAJOR NEED
◑ MEDIUM NEED
○ MINOR NEED

TYPES	HOT WATER	COLD WATER	COLD WATER - CONSTANT HEAD	DRAINAGE	ELECTRICITY 230v.	ELECTRICITY 415v.	ELECTRICITY D/C	COMPRESSED AIR	VACUUM	TOWN GAS	OTHER INERT GASES	STEAM (LOW PRESSURE)	DISTILLED WATER	OIL, PETROL
Testing machines					○	●								
Machine tools					○	●		○						
Engines	◑		◑			●	◑					◑		◑
Compressors														◑
Turbines	◑		◑									◑		
Pumps				◑	◑			○						
Centrifuges				◑	◑									
Hydraulics, tanks and piping	●	◑	●											
Boilers										●				◑
Generators										◑		◑		
Electro-magnets					●									
Furnaces					◑					◑				
Ovens				◑	○									
Wind tunnels							●							
Refrigeration equipment				◑						◑				
Computers and data processing				●										
Instrumentation				●	◑	◑								
Experimental glassware	○	◑		◑	◑			◑	○	◑	○		○	
Fume cupboards	◑	◑		◑	◑			◑	○	◑	○		○	
Gas bottles											●			
Gantries, cranes, etc.					◑									
Anti vibration blocks														
Strong floors														
Test rigs - structural		○		○	◑	◑	○	◑						
- engines		◑		◑	◑	●		○						●
- electronics					●	◑	◑							
- electrical					◑	●	◑							
- hydraulics		●	◑	●	○	○								
- chemical engineering	◑	●	○	●	◑	○	○	○	◑		○	◑	○	
- vibrations/dynamics					●	○								

Table 8-3

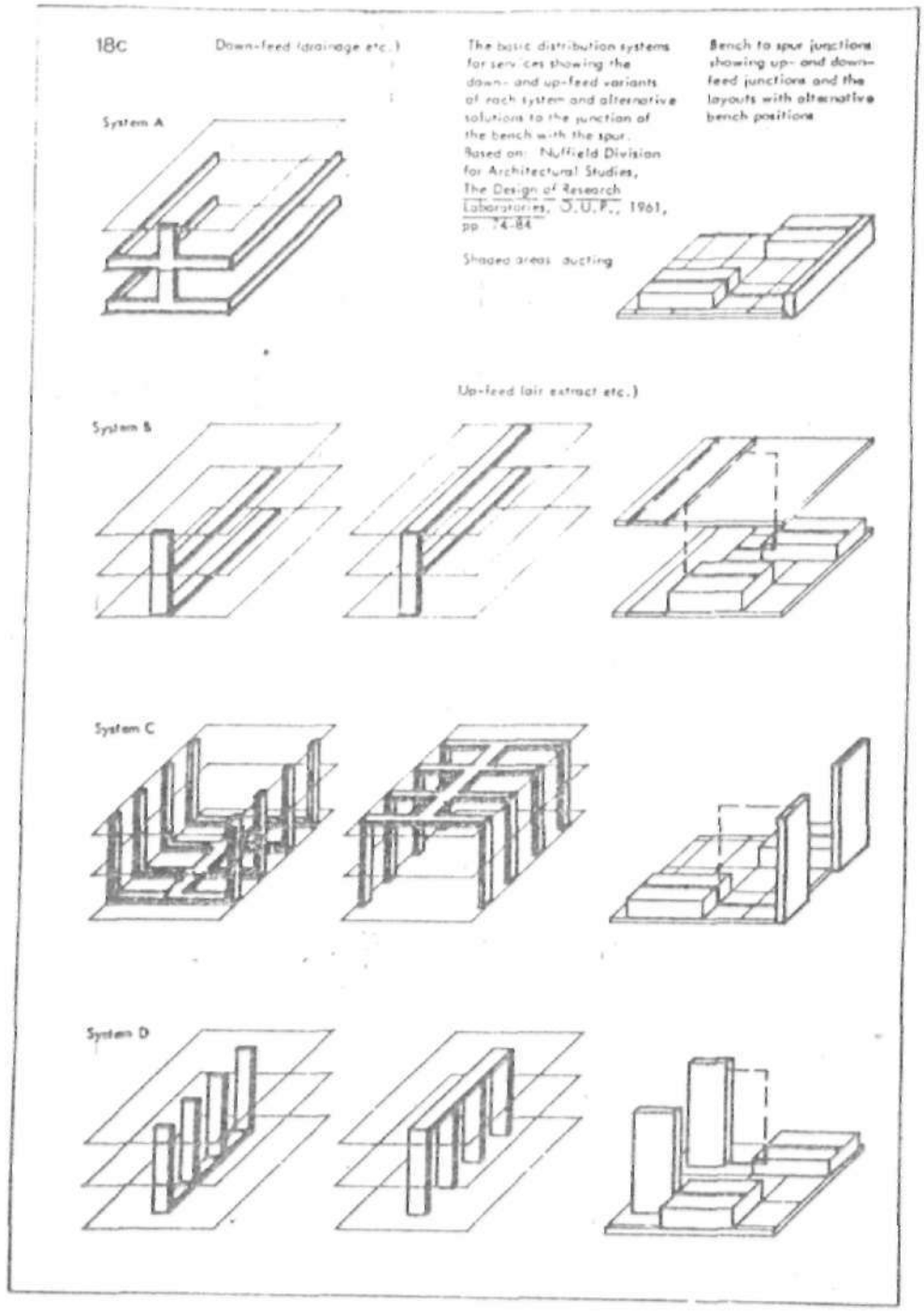


Fig. 8.1

KASHIM IBRAHIM LIBRARY

ii) General Teaching Rooms:

Rooms with few specialised requirement such as classroom, demonstration room and drawing offices. Most of the subjects taught involve practical work and therefore need specialist rooms. Some subjects require only one specialist room while some require more than one. However part of the instruction in every subject is theoritical and this usually takes place in a general teaching room such as classroom or lecture room. For every subject taught one or more specialist rooms and some general teaching rooms are required.

In planning the teaching accomodation, the architect should not only take into account the fundamentally changing nature of the syllabus of work, but he should also bear in mind that in any particular school, the type of course offered are likely to alter for a variety of reasons as the year pass by. With this in mind, in the final design, those teaching rooms which are not likely to be changed or rearranged in the event of changes in sylabuses of work in future such as lectures theatre, domonstration classrooms and some laboratories may be attached to the administrative centre of the department. Teaching rooms that house heavy and noisy equipment should be separated from those that need quietness. Rooms for subjects common to two or more departments must be placed as links between them e.g. strength of material laboratory between mechanical engineering and civil engineering departments.

It is important to note that every department, especially those with heavy workshops and laboratories should be equiped with simple easily accessible first aid appliances for the immediate treatment of cuts, burns, soffocation, shock etc.

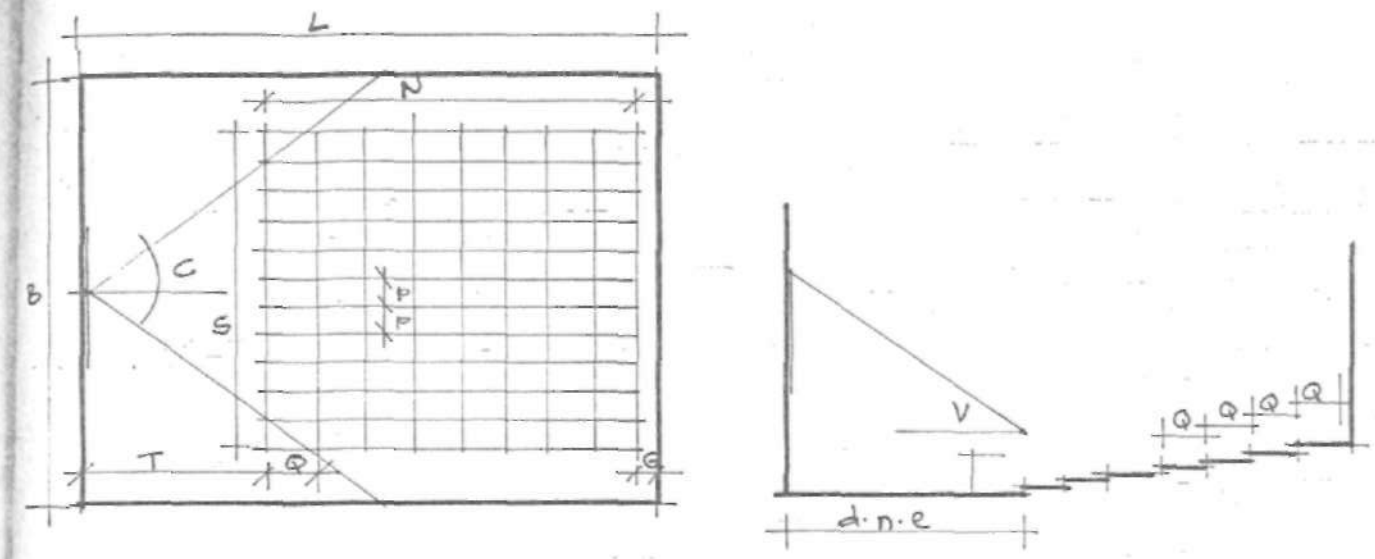
8.4.7 Lecture Theatres

Two lecture theatres. each of which will held on audience of 120 people are to be provided in the school. They are intended as demonstration theatres for lectures on a wide range of subjects. The lecture threatres should be used to enhance interaction between students. Special attention should be paid to the access and escape routes. They should be adequately dimensioned and accessible to handicapped people.

8.4.8 Faculty Offices

The major part of the administrative work of the school is carried out in the general office and in the diractor's Office. These rooms are usually grouped in some central position near the entrance or the main circulation space. The general office must be big enough for the great deal of clerical work that is done here in the way of typing, keeping records, accounts, duplicating of examination papers, notices and reports etc. Also, every member of the Faculty (students and staff) is likely to have occasion to visit the general office to seek information, enough space is therefore required for large number of students who may congragate there, particularly on enrolment days at the beginning of a year session.

CTURE THEATRE : CALCULATION OF W (SCREEN IMAGE)



LEGEND	
L	ROOM LENGHT
B	ROOM WIDTH
N	NUMBER OF ROWS
C	HORIZONTAL CENTRE IMAGE ANGLE
P	SEAT WIDTH
V	VERTICAL ANGLE FROM NEAREST EYE TO TOP OF SCREEN
S	SEATS PER ROW
T	SPACE FRONT WALL TO FRONT ROW
W	IMAGE SIZE
d·n·e	DISTANCE TO NEAREST EYE
Q	ROW SPACING
G	TOLERANCE B/W LAST ROW AND BACK WALL

IF NEAREST EYE IS 2W AWAY AND CENTRE IMAGE ANGLE (C) = 45°

THEN FOR A STRAIGHT FRONT ROW LENGTH APPROX. = 4W

∴ AT .50 M., SEAT WIDTHS PLACES PER ROW = 4W/.50 (S)

NUMBER OF ROWS AT .80 M. SPACING TO FARTHEST 6W−2W/.80 (N)

BUT N×S = CAPACITY IN PLACE

$$\therefore \text{CAPACITY} = 6W-2W/0.80 \times 4W/0.5 = 16W^2/0.40$$

$$C = 16W^2/0.40 \Rightarrow W = \sqrt{0.40C}/16$$

$$\text{OR } W = \tfrac{1}{4}\sqrt{0.40C}$$

∴ FOR A GIVEN CAPACITY THE REQUIRED SCREEN IMAGE (W) IS $\frac{1}{4}\sqrt{0.40C}$

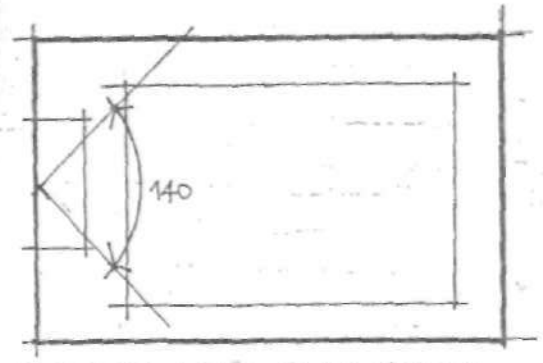
FOR 300 CAPACITY $W = \frac{1}{4}\sqrt{0.4 \times 300} = 2.7\text{M}$

FOR 200 CAPACITY $W = \frac{1}{4}\sqrt{0.4 \times 200} = 2.2\text{M}$

Fig · 8·2

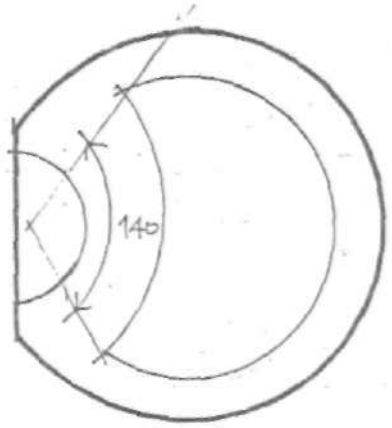
LECTURE THEATRE : DESIGN REQUIREMENTS

BASIC SHAPES FOR LECTURE THEATRE



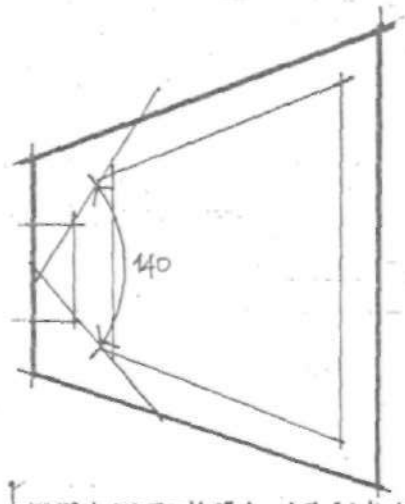
RECTANGULAR PLAN FORM

SATISFACTORY FOR SMALL CAPACITY. WITH CAPACITY OF OVER 150 REFLECTING FROM CEILING AND WALLS WILL BE REQUIRED OR SOUND AMPLIFICATION WILL BE LIKELY TO BE NEEDED. THUS IT IS NOT ECONOMICAL WITH LARGE CAPACITY



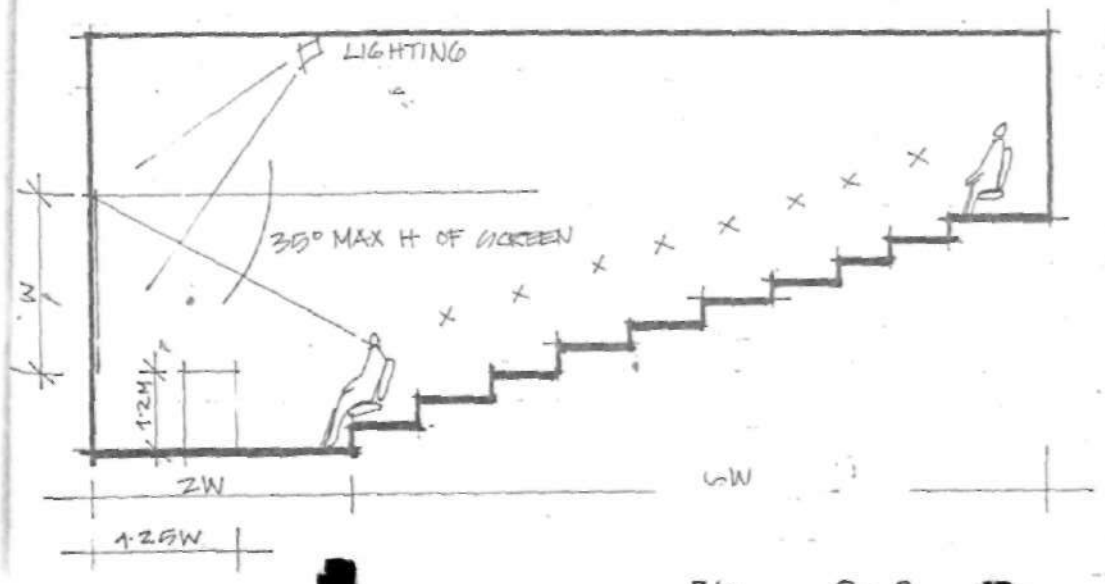
FAN SHAPE

USE FOR LARGE CAPACITY, SOUND FROM SPEAKERS AREA ARE DISTRIBUTED UNIFORMLY THROUGHOUT THE ROOM. USED MOSTLY IN AUDITORIUM DESIGN



TRAPEZOIDAL PLAN FORM

PREFERRED FOR MEDIUM CAPACITY OF UP TO 450. IT DOES NOT NECESSARY REQUIRE SOUND AMPLIFICATION FOR THIS CAPACITY. USED MOSTLY FOR SCHOOL LECTURE THEATRE OF MEDIUM CAPACITY. IT IS VERY ECONOMICAL



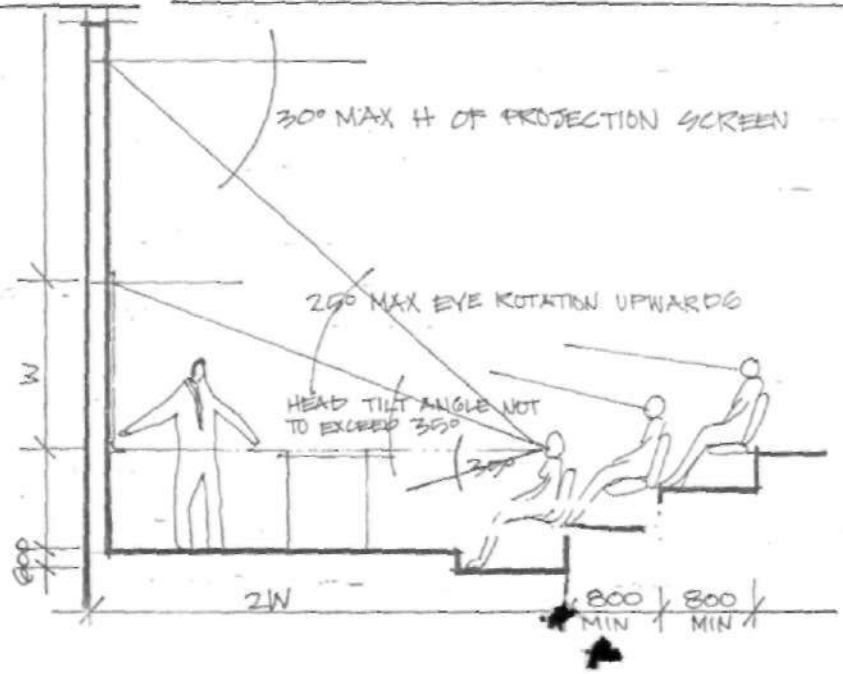


Fig - 8-3

Other facilities like faculty board room, secretary's office, faculty officer's, ancillary rooms etc. should also be provided.

8.4.9 Departmental Offices

These include offices for heads of department, secretary, teaching staff, departmental offices, lecture rooms, stores and other ancillary facilities. These are to be dispersed and placed near their related departments.

8.5 BRIEF ANALYSIS

The brief analysis looks into a breakdown of the accommodation requirements for the various spaces required by the design scheme. These spaces are derived from space standards set out in N.B.T.E and other architectural standards. From this analysis, a comprehensive schedule of accommmodation could be drawn. The analysis is as follows unit by unit.

8.5.1 Vehicular parking

It is assumed that most, if not all staff, will have cars, thus parking for about 60 cars need be provided for the staff. In the case of students parking, a car/student ratio of 1:20 is assumed, thus parking for about 32 cars need to made for the students - A total of about 92 cars is therefore projected.

8.5.2 Teaching rooms

Teaching rooms are of two types; the specialist teaching rooms and the general teaching rooms. Analysis on these can be seen in two perspectives;- number of teaching rooms as well as areas of the teaching rooms.

i) Number of teaching rooms

A large number of general teaching room particularly clasrooms and demonstration rooms are needed in engineering schools. The number required depends on the number of subject groups being taught at any one time and the type of course they are following. An assessment of the number of each type of general teaching room requires can be made from a study of the probable time table of course units in a school. The proportion of a student's time spent in general teaching room as compared with specialist rooms varies very much from one course to another. Knowledge gained from related studies (case studies) made and some background discussion with lecturers in engineering departments shows that the requirements of teaching rooms for a school of engineering are as follows.

Department	Specialist rooms	General Teaching room
Mechanical Eng.	Foundry, Automobile w/shop, thermodynamics lab., strength of material lab., machine lab, metal w/shop, Heat engines, fluid mech., Refrence and ac laboratory.	Classrooms 6No., Lect. Theatre 2No. (for the whole school) Seminar rooms 1No. (min).
Civil Eng.	Hydraulics lab; struc. lab., conc. lab., soil mech. lab., wood w/shop, Highway/Trans. lab., Water treatment lab., Mech. w/shop, Elect. w/shop, Building science lab.	"
Electrical Eng.	Elect. lab., Electronic lab., Telecom. lab., Electro-Mech. lab., Mech. w/shop., elect. install. lab.	"
Agric. Eng.	Thermodynamics lab., Strength of material lab., Agric. Eng. w/shop. Fluid mech.	"

ii) Space Area of Teaching Rooms

For this purpose, teaching rooms can be classified according to the following:

a) Those in which the piece of equipment are so large that their dimensions determine the area, irrespective of the number of students who may be instructed in the room at any one time.

b) Those in which the equipment and the fittings are comparatively small and the area required is directly related to the number of students that are likely to work in the rooms.

Category (a) consists mainly of the engineering workshops and laboratories, which houses very large equipments, for instance, a foundry and hydraulics laboratories. For their workshops, the area required clearly will depend on the number and size of the pieces of equipment the school intends to install.

Category (b) includes all the other kinds of specialist rooms and all the general teaching rooms.

For laboratories and workshops, there are international stnadards for area per student provided by United Nation Scientific and cultural organisation (UNESCO).

8.5.3 Faculty Library

The library will comprise of periodicals capable of seating 30 readers, reference section with study carrels and capacity for 30 readers and a study area with reading table for 100 readers. Space areas for these can be obtained from architectural standards.

8.5.4 Administrative accommodation

The administrative accommodation can be classified into two:

i) Those under the faculty; which include;

- Director's office
- Secretary's office
- General office
- School board room
- School officer's office
- Ancillary rooms

ii) Those under the departments, which include:

- Head of department's office
- Staff offices
- Staff common room
- Secretary's office
- General office

The space areas for all these can be obtained by reference to architectural standards.

8.6 SCHEDULE OF ACCOMMODATION

Schools of Engineering are large and complex buildings to design, and nowhere is this more forcibly demonstrated than in the

length of the schedule of accommodation which the architect has to prepare. This is, of course, an output of the brief analysis. A comprehensive schedule of accommodation for this project is as given in the appendix for summary of total space requirement.

CHAPTER NINE

CHAPTER NINE

DESIGN REPORT

9.1 SITE ZONING

In the site zoning, the first objective is to group the specialist teaching area on one hand and the general room including the faculty office on the other. The accommodations required to be orientated to achieve the best indoor environment and arranged to suite the functional requirements. The quite areas of the faculty was zoned away from the noisy spaces.

The zoning also gave allowance to future expansion and *access to all parts of the faculty considered.*

The following diagrams shows some of the zoning principles that could be used.

Diagram I;

The teaching spaces here are grouped together and separated from the noisy area by a buffer zone. The centre of the zones is regarded as a focus to provide a link between the various groups of spaces. Access to various zones are shown.

Diagrams 2, 3 and 4

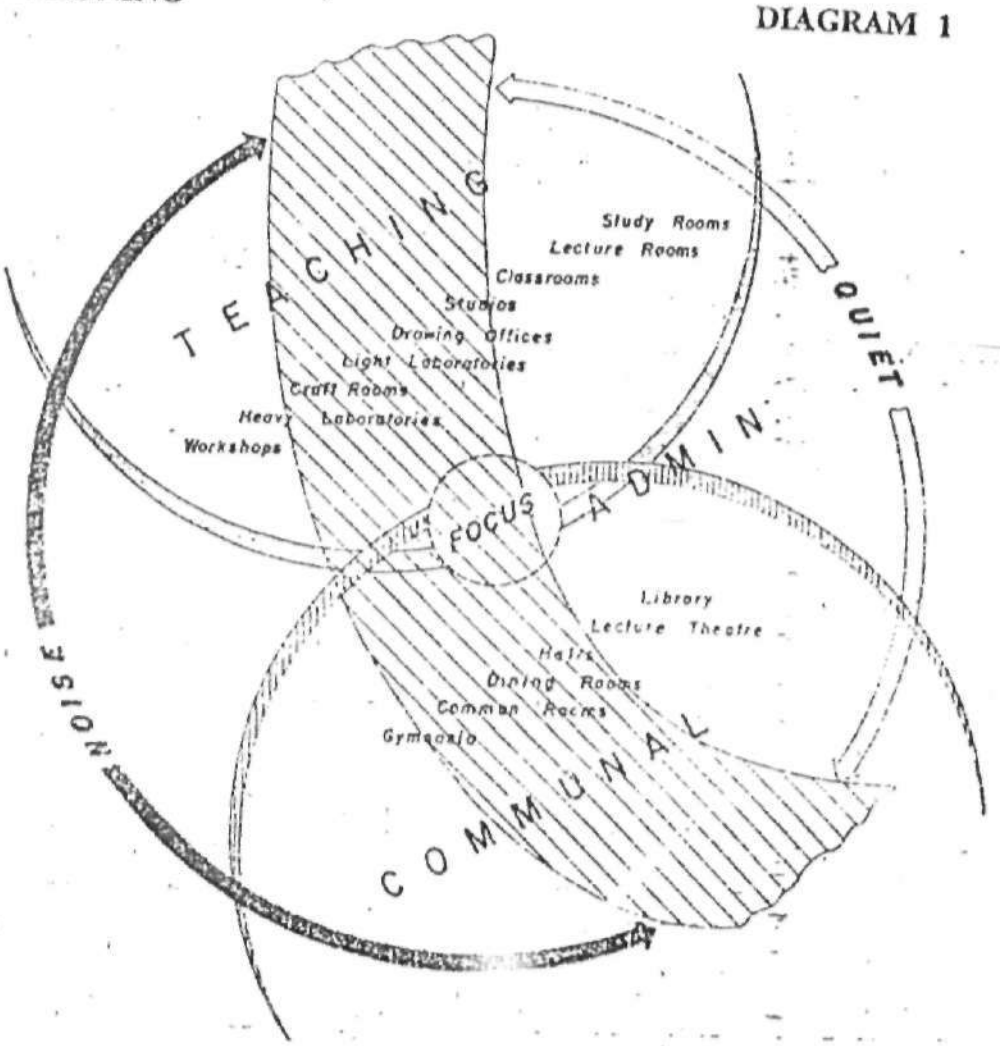
These illustrate a further stage in the zoning. The basic zone are maintained and internal links provided to different parts of the school.

The classrooms required to be linked to the workshop. Near the classrooms and easily accessible should be the library, the offices of the heads of departments and staff rooms.

Ministry of Education Building Bulletin No. 5

ZONING

DIAGRAM 1



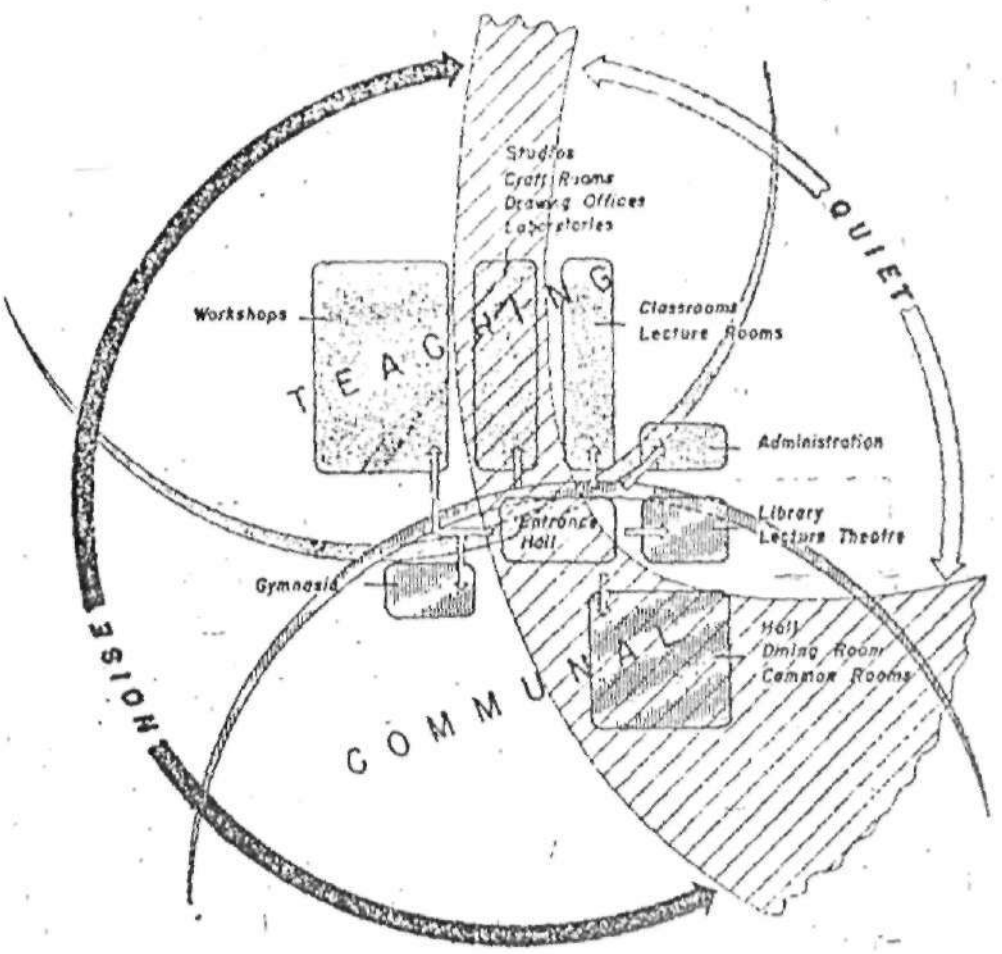
NOTE: 1. Zoning of rooms by function ; teaching, communal and administration.
2. Focus around which functional zones are grouped.
3. Zoning of rooms for conditions

Fig. 9·1

DIAGRAM 2

ZONING BY GROUPS OF ACCOMMODATION

GOOD EXAMPLE



NOTE :
1. Rooms zoned by function around the entrance hall as a focus.
2. Workshops and gymnasia in a noisy zone, separated by a "buffer" zone from the classrooms, lecture rooms, library and administration in a quiet zone.
3. Simple circulation between teaching rooms without passing through the communal or administration areas.

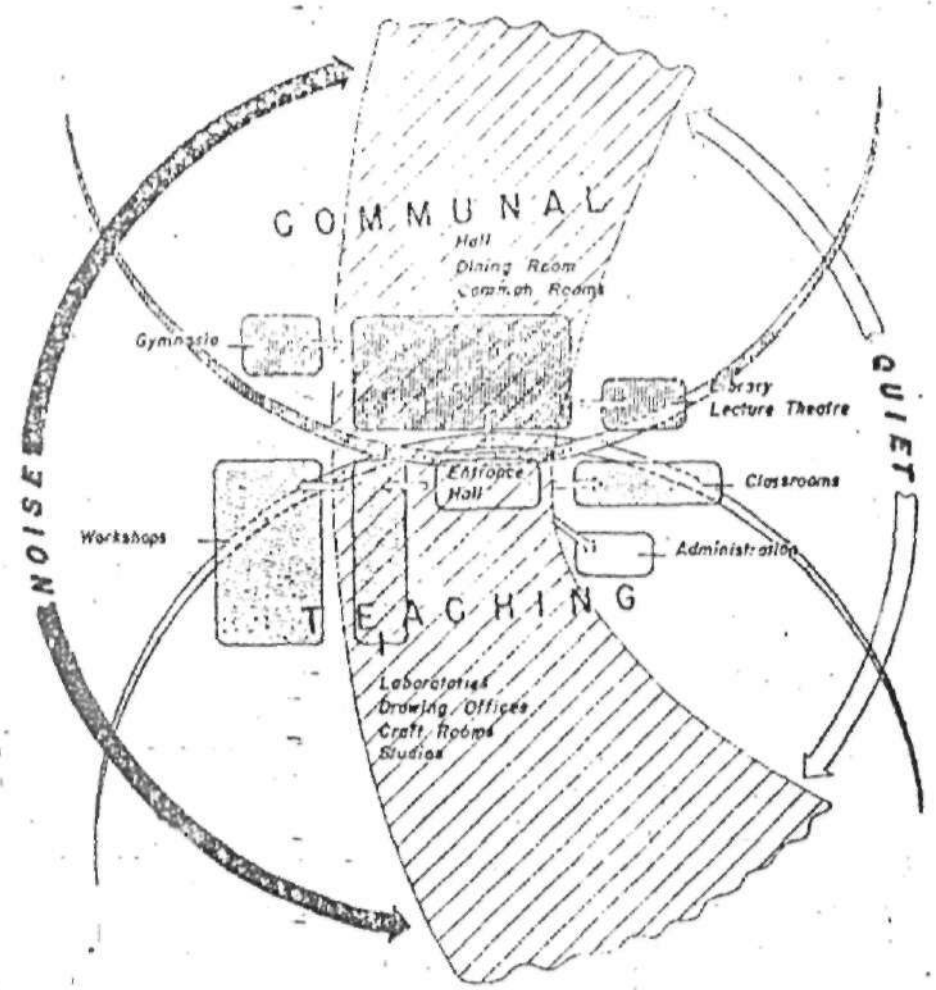
Fig. 9·2

Ministry of Education Building Bulletin No. 5

DIAGRAM 3

ZONING BY GROUPS OF ACCOMMODATION

GOOD EXAMPLE



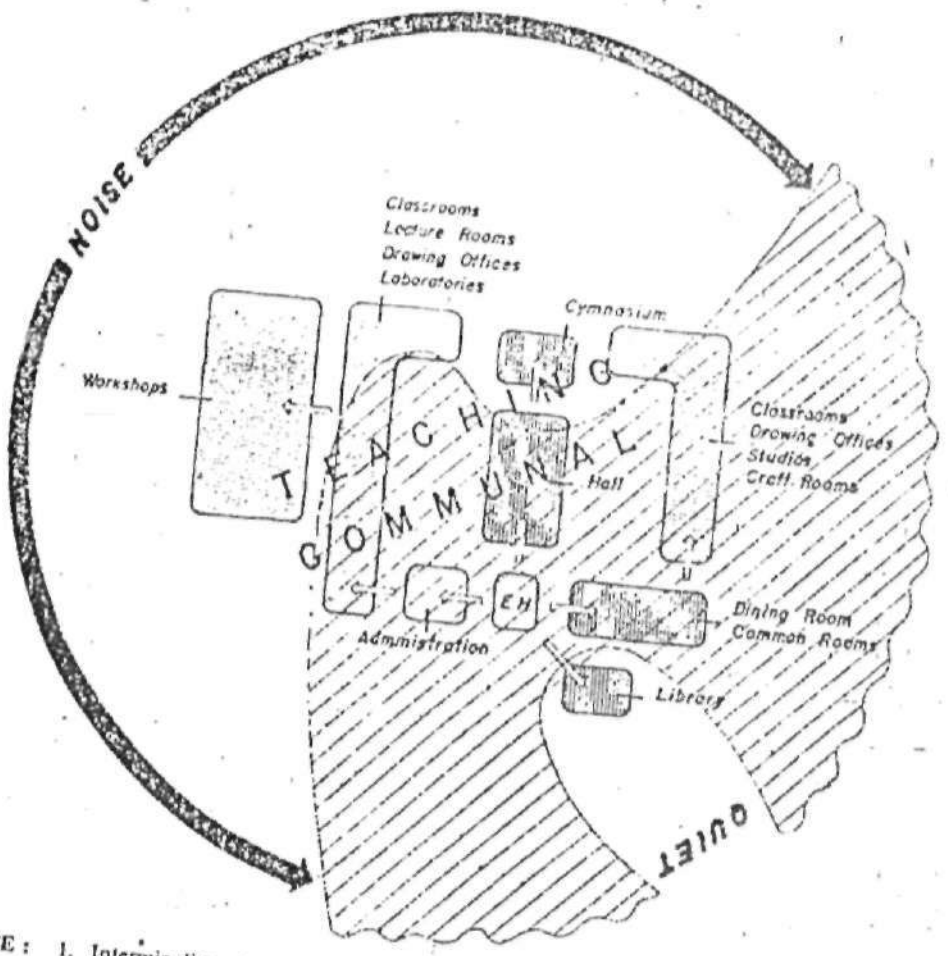
NOTE :
1. Rooms zoned by function around the entrance hall as a focus.
2. Workshops and gymnasia in a noisy zone, separated by a " buffer " zone from the classrooms, lecture rooms, library and administration in a quiet zone.
3. Simple circulation between teaching rooms without passing through the communal or administration areas.

Fig : 9·3

NEW COLLEGE OF FURTHER EDUCATION *September 1959*

ZONING BY GROUPS OF ACCOMMODATION DIAGRAM 4

BAD EXAMPLE



NOTE :
1. Intermingling of teaching and communal areas.
2. Classrooms and lecture rooms mixed with "buffer" zone rooms, instead of being placed separately in a quiet zone.
3. Long distances between teaching rooms passing through communal and administration areas.

Fig. 9·4

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Access to various zone are clearly defined. At this stage the movement of students, staff, visitors and materials, within the school building is considered. The students, from the approach roads either pass through the entrance hall into the classrooms or pass straight into workshops. The internal circulation is between the workshops and the classrooms, laboratories and the drawing offices. The staff arrive at the administrative wing and proceed to the teaching rooms,the same internal circulation as the students visitors to the school approach and enter the administrative block through the main entrance hall.

Deliveries to the central store is by a services road direct from the road on North. Vehicular access to workshops which require occasional delivery of heavy materials is provided.

Before selecting a final zoning concept for the site. Three alternatives were looked into. In all the three alternatives, the author tried to create a common link between the public area and the various departments. One of the design parametres in institutional and public buildings is that there should be as much as possible a separation of public services and pedestrian routes.

9.2 THE PLANNING CONCEPT

The planning is such that the department are planned in a series of separated units and linked up by covered walkways The main approach to the complex is from the south western end of the site.

The main entrance hall was to be a large exhibition concourse. This is through the administrative block. Also in this main administrative block are staff centre, office and the faculty library.

Following the dictation from the linear nature of the site the department are arranged linearly and linked together with covered walkways. The workshops are orientated such that the prevailing winds can direct fumes and noise from the workshops away from the teaching blocks.

Space is reserved at the north eastern as well as the north western sides of the site for future expansions.

Finally, the layout seeks to create a related, free atmosphere among students and staff by its provision of green lawn, flowers, paved courtyards and walkways.

9.3 PLANNING AND DESIGN FACTORS

The planning was influenced by four main factors. These are related function, noise level, servicing and the site.

9.3.1 Related Functions

Early in the conceptual stage, it was acknowledged that even in unity, there still exists diversity. Even though all the departments in this school are related some are closer related than others. For this reason the courses were carefully grouped so that the strongly related ones are physically linked to increase cross-course interest and participation. Departments could be related either by raw materials or by technique.

This grouping encourages communication and sharing of ideals. The entire building becomes a building where people see each other and become aware of the activities.

All in all, the spatial organisation becomes one in which the students in electrical Engineering department for instance gain from these in mechanical engineering.

9.3.2 Noise Level

Another factor that influenced the planning is the noise levels. Various activities generate different noise. For this purpose, the composition had to be carefully zoned to ensure that those sections which require quiteness are properly treated by withdrawing them from the source of the noise, or where constraints arise, are properly resolved using buffer zones or sound reflecting barriers.

The functions were zoned into noisy, moderately noisy, and quite zones as given below:

i. Noisy zone - workshops

ii. Moderately noisy zone - laboratories

iii. Quite zone lecture rooms and offices.

Though most workshops invariably produce a certain degree of noise, some are obviously more tolerable than others. For example, the metal works and founding workshops produce much noise that what is obtained in the electrical workshop.

9.3.3 Servicing

Serviceability also influenced to a large extent the spatial organisation though more noticeable on the microscope level of each section. During the site planning stage when service access were being conceptually situated, the functions

which require proximity to this access were noted. So in plan , the workshops whose raw materials are bulky and cannot be easily moved are located close to this access.

9.3.4 The Site

This is another important factor that influenced the planning. The site being the linear type, dictated the linear arrangement of the building on the site.

9.4 CIRCULATION

Circulation within and outside the building is well articulated and rather interesting. Routes are unmistakingly defined with a minimum of collision points. The pedestrian as well as the vehiclar movements have been clearly defined around the building. Covered walkways are used to link up all the various units of the school. Staircases are strategically provided for vertical circulation.

9.5 ORIENTATION

The prevailing winds are the NE trade winds and the SW monson winds. Considering this and the sun- path, the buildings are orientated in a way that good indoor environment is achieved. The workshops are orientated such that fumes, dust and noise generated are directed away from other parts of the building.

However, with this sort of orientation, the administrative, lecture rooms and the lecture theatres enjoy abundance of ventilation, and good air change.

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The West and East elevations of the building are adequately treated against insolation.

9.6 SECURITY

The architectural design of the school though geared towards smooth circulation, took into consideration, the security of life and property in the complex. The entrance to the complex are provided with security posts. Most entrances are lockable and some occasionally used.

9.7 LANDSCAPE

The landscape system can be divided into:

i) natural landscape

ii) built-up landscape.

The landscape control pedestrian movement. Trees and shrubs are used to further shade the building as well as act as a dust buffer to the harmattan winds. The courtyards are paved and landscaped with trees and flowers as well as provided with sit-outs for relaxation.

9.8 FINISHES

9.8.1 Walls

Light coloured sandtex wall finishes are recommended for the exterior wall finishes to enhance the sculptural look. Classrooms will be painted in light pastel colours to create a psychologically cool atmosphere. Discussion rooms will have certain accents to induce excitment and participation. The walls of the exhibition area,

the laboratories and the workshops will be bright coloured (preferably white) to create the necessary contracting background.

9.8.2 Floors

The floors of the classrooms and the offices shall be finished with sandscreed while the workshops and laboratories will be finished in hardwearing material. Acoustic treatment need be given to the lecture theatres to reduce noise.

9.9 MATERIALS USAGE AND CONSTRUCTION METHODOLOGY

The chief material to be employed in the construction are reinforced concrete, sandcrete blocks and glass.

Construction method is by cast-in-situ for structural elements like columns and beams. Floors are also of cast-in-situ.

Steel lattice trusses are used for roofs with asbestors and alumium roofing sheets. Brick facing are also employed as external finish to serve parts of the building.

9.10 FIRE PREVENTION.

Fire out-break within the school has been carefully looked into. In planning, the discontinuity between the zones will help in suppressing total spread.

However, to prevent this occurent, fire deflection and suppression equipment are to be installed in the various areas especially workshops and laboratories. The workshops have been designed in such a way as to provide for the easy and rapid evacuation of students and staff in case of any fire accident.

CHAPTER TEN

CHAPTER TEN

SUMMARY AND CONCLUSION

10.1 SUMMARY

This thesis begins with a general introduction as well as some literature review on Polytechnic and Engineering education as well as their relevance to technological development in Nigeria. After this, the design problem itself was discussed.

Next, a general study of some selected schools of Engineering was carried out. This was done to aid better understanding of the problems with the view to proposing a better design. While chapter seven discussed the study area, chapter eight delt with the design briefing and users requirements.

Finally, the site for the proposed project was analysed and studied taking into consideration natural elements climate and environment, and a design was proposed to suit the functional and site demands of the project.

10.2 CONCLUSION

It is deemed necessary after a thorough and detailed study and application of findings such as these, to embark on a concluding note making general statements on the just completed study.

This thesis has been an attempt at synthesisting the tasks of the architect and that of the planner in the creation of an integrated academic environment whose components relate to each other as products of a super-organising idea thereby providing a solid basis for the development of Federal Polytechnic, Offa.

It has systematically demonstrated problem of discentralisation of facilities in schools of Engineering as well as shown with empirical evidence that an effective integration of facilities is needed for a conducive academic environment.

The thesis does not pretend to have absolutely solved all the problems. However, problems unsolved in this thesis due to whatever reason are left for the on coming researchers.

I finally conclude by quoting an assertion stated by a British Architect during the Milan International school Building congress. He said "the problem is for us architects to make architecture out of a school, not for teachers as otherwise happens to try to make a school out of architecture."

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APPENDIX

SUMMARY OF SCHEDULE OF ACCOMMODATION

FACULTY OFFICE

ACCOMMODATION	NO. OF Pers.	AREA PER Pers.(m^2)	TOTAL AREA (m^2)
Director's Office	1	-	38.00
Secretary	1	-	20.00
General Office	4	-	45.00
Board Room	20	2.50	50.00
Faculty Officer's Office	1	-	25.00
Library	160	1.50	240.00
MECHANICAL ENGINEERING DEPARTMENT			
Head of Dept.	1	-	95.00
Secretary	1	-	18/00
Gen. Office	2	-	38.00
Board Room	20	2.50	50.00
Staff Offices	20	16.00	320.00
Common room	15	-	70.00
Seminar rooms	30	2.40	72.00
2 Drawing offices	40	1.50	120.00
4 Class rooms	40	1.20	192.00
Computer room	4	-	45.00
Faundry/W/Shop	20	-	150.00
Metal W/Shop	20	-	150.00
Auto W/Shop	20	-	150.00
Machine W/Shop	20	-	90.00

Thermp. Lab.	10	-	90.00
Applied Mech. Lab.	20	-	90.00
Strenght of Material Lab.	20	-	90.00
CIVIL ENGINEERING DEPARTMENT			
Head of Dept.	1	-	35.00
Gen. Office	1	-	18.00
Board Room	2	-	38.00
Staff room	20	2.50	50.00
Secretary	1	-	18.00
Common room	15	-	320.00
Seminar room	30	-	70.00
2 Drawing Office	40	1.50	120.00
4 Classrooms	40	1.20	192.00
Computer room	4	-	45.00
Concrete Lab.	20		150.00
Hydrualic Lab.	20		150.00
Highway Lab.	20		90.00
Soil Mech. Lab.	20		90.00
Constr. W/Shop	20		150.00
Wood W/Shop	20		150.00
ELECTRICAL ENGINEERING DEPARTMENT			
Head of Dept.	1	-	38.00
Secretary	1	-	18.00
Gen. Office	2	2.50	38.00
Board room	20	16.00	50.00
Staff Offices	20	-	320.00

Common room	15	-	70.00
2 Drawing Offices	40	1.50	120.00
4 Classrooms	40	1.20	192.00
Computer rooms	4	-	45.00
Seminar room	30	2.40	72.00
Electrical W/Shop	20	-	150.00
Elect/Telecom. Lab.	20	-	90.00
High. Volt. Lab.			90.00
Mech. Lab.	20	-	150.00
AGRIC. ENGINEERING DEPARTMENT			
Head of Dept.	1	-	35.00
Secretary	1	-	18.00
Gen. Office	2	-	38.00
Board room	20	2.50	50.00
Staff Offices	20	16.00	320.00
Common room	15	-	70.00
Seminar room	30	2.40	72.00
2 Drawing room	40	1.50	120.00
4 Class room	40	1.20	192.00
Computer room	4	-	45.00
Crop. Lab.	20	-	60.00
Soil Lab.	20	-	60.00

625

EXISTING TREES
As much as possible, all existing trees should be retained.

615

SOUTH-WEST MONSOON WINDS
cool and moisture laden. Prevailing from April to October. Desirable within the built environment.

620

NORTH

SUN-RISE
averagely at 6:00a.m. daily.

MEAN SOLAR PATH

JUNE 22

DECEMBER 21

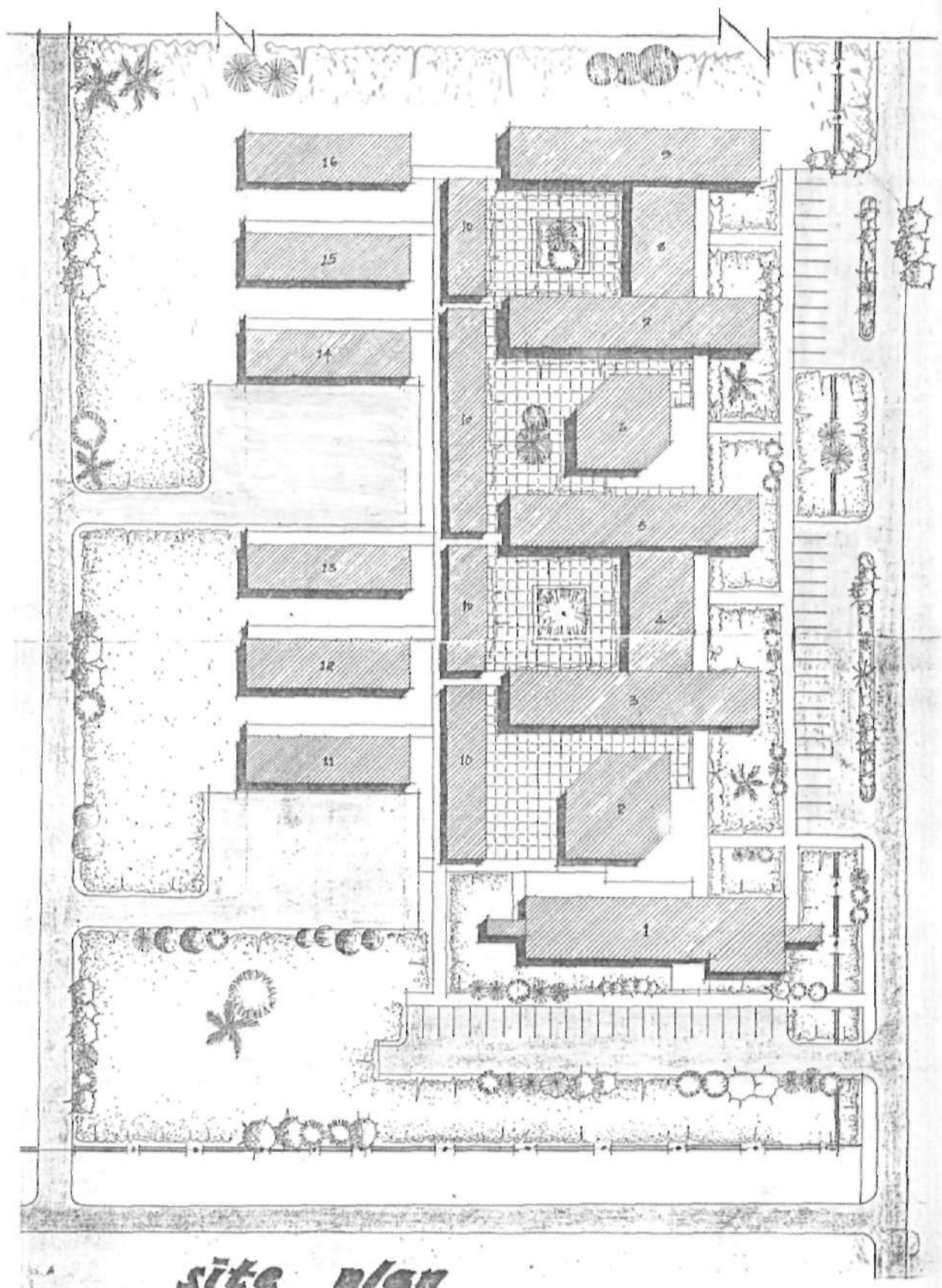
SUN-SET
averagely at 6:20p.m. daily.

SOUTH

NOISE LEVELS
generated mainly from vehicles on the road. Could be buffered by using trees.

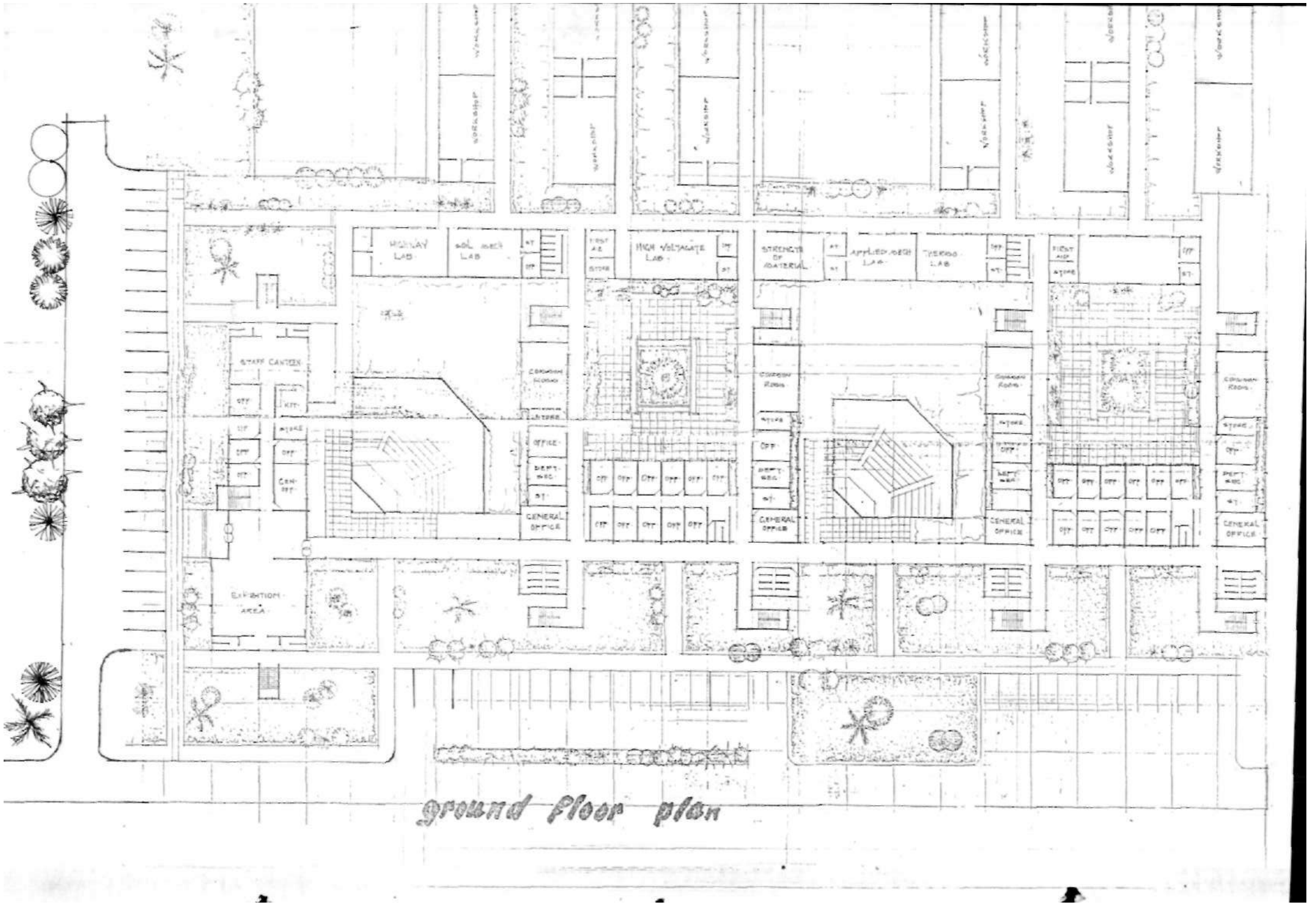
POSSIBLE POINT OF INGRESS/EGRESS

610

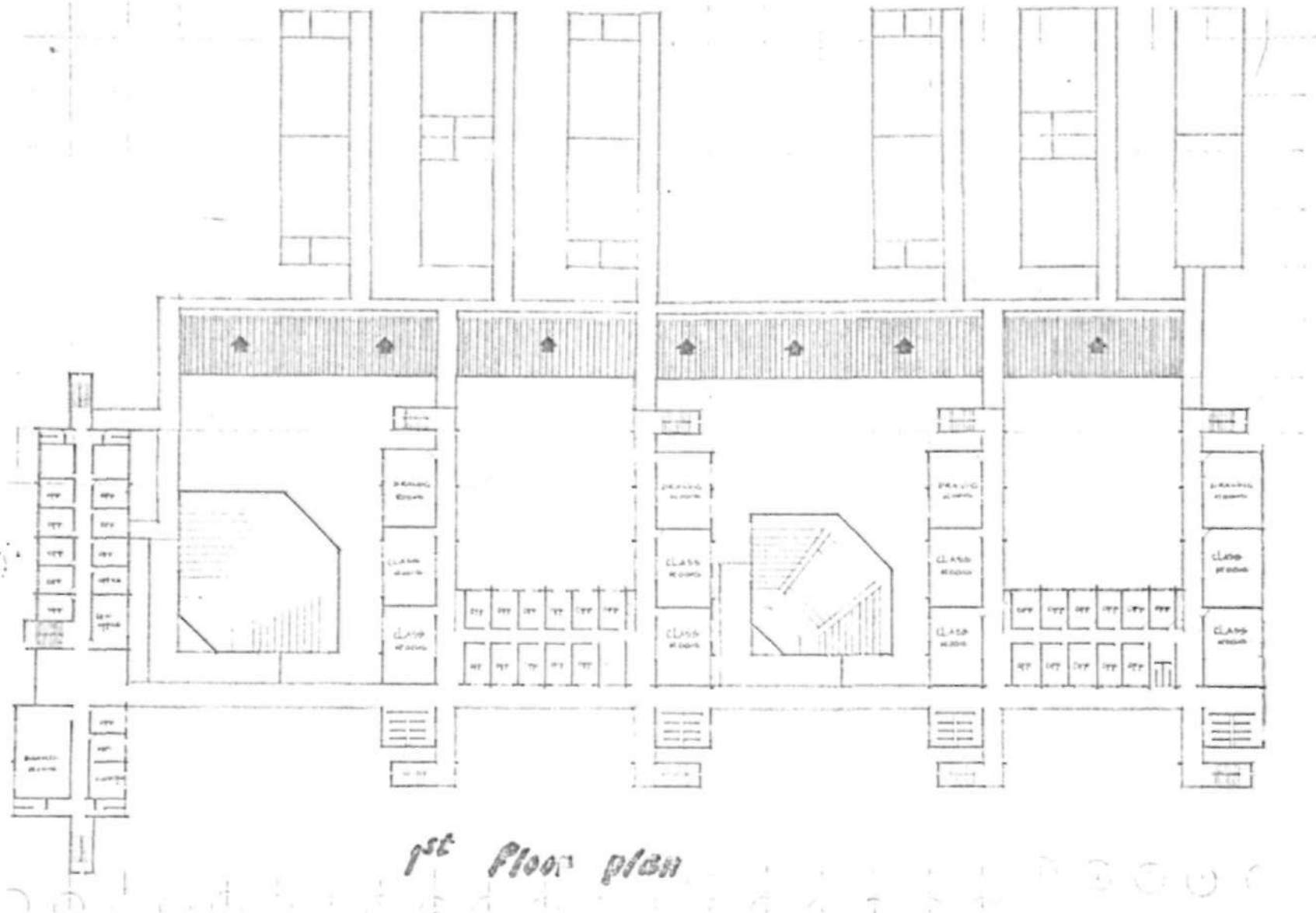


site plan

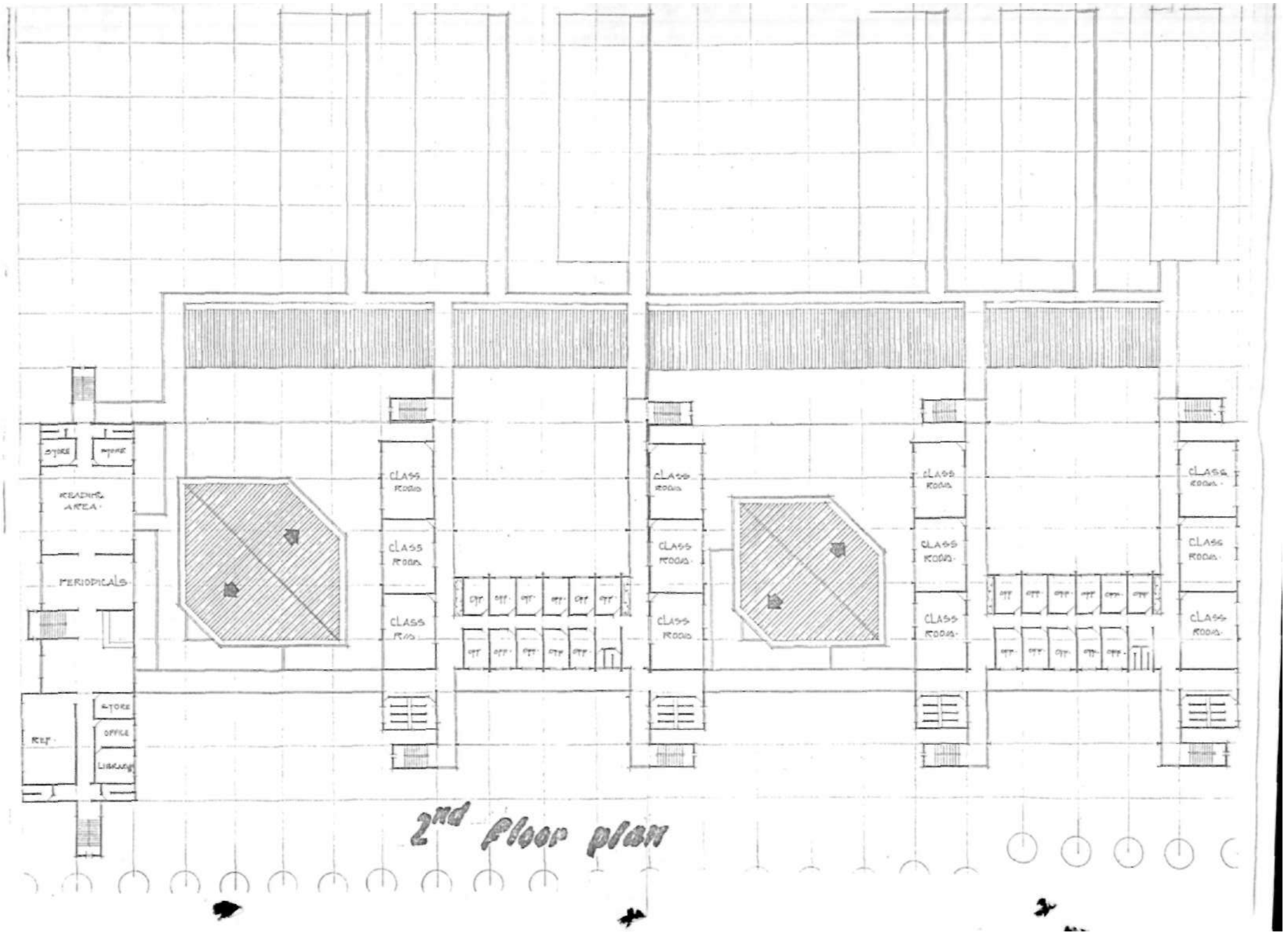
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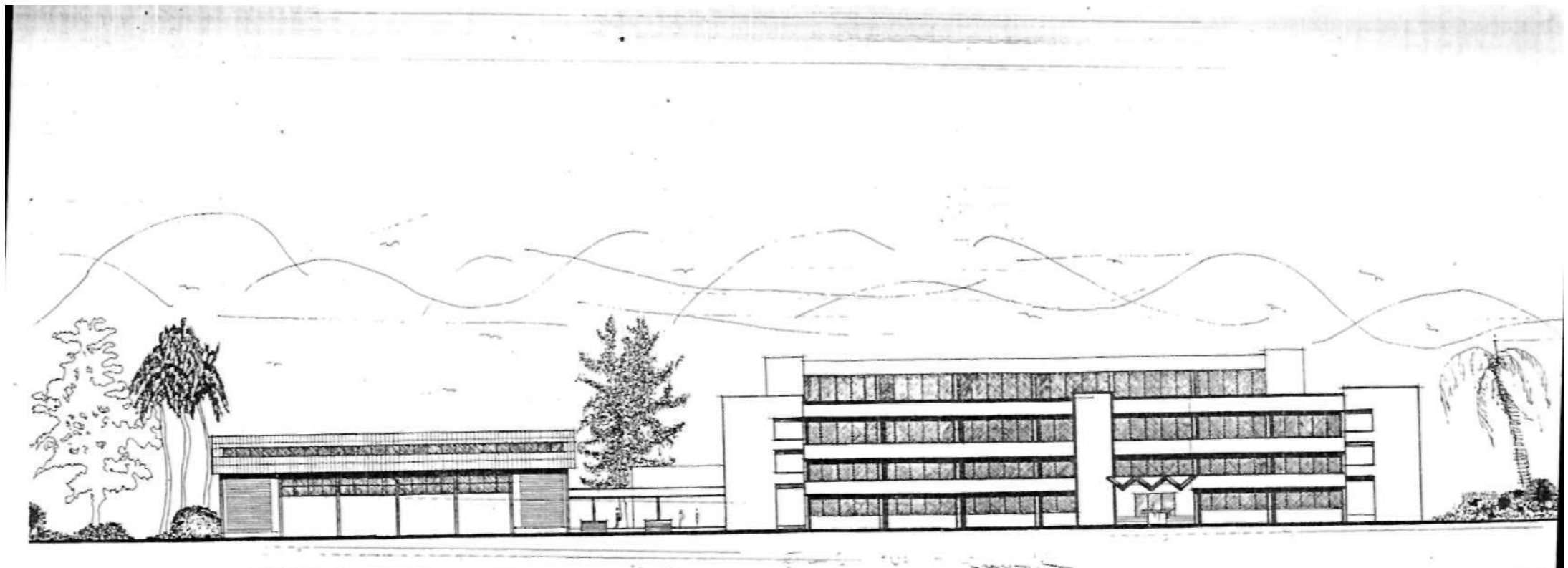
ground floor plan



1st floor plan

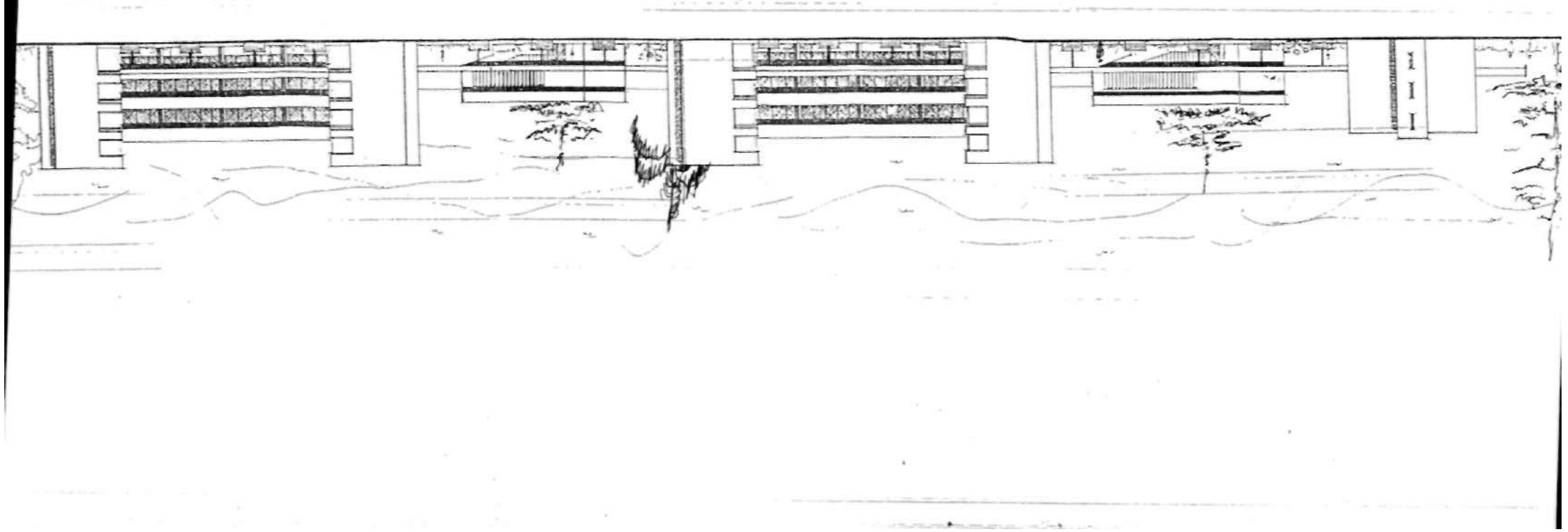


2nd Floor plan



south west elevation

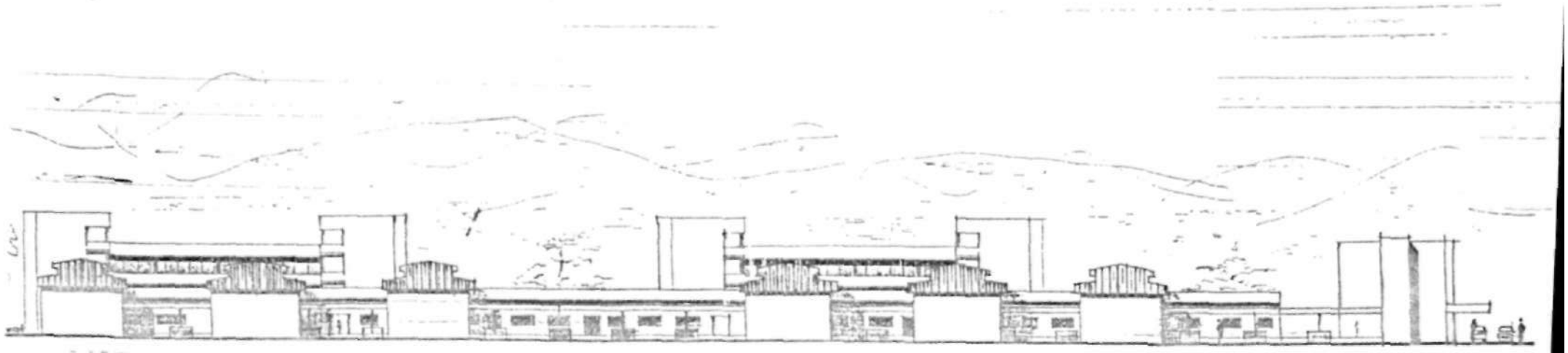
South east elevation



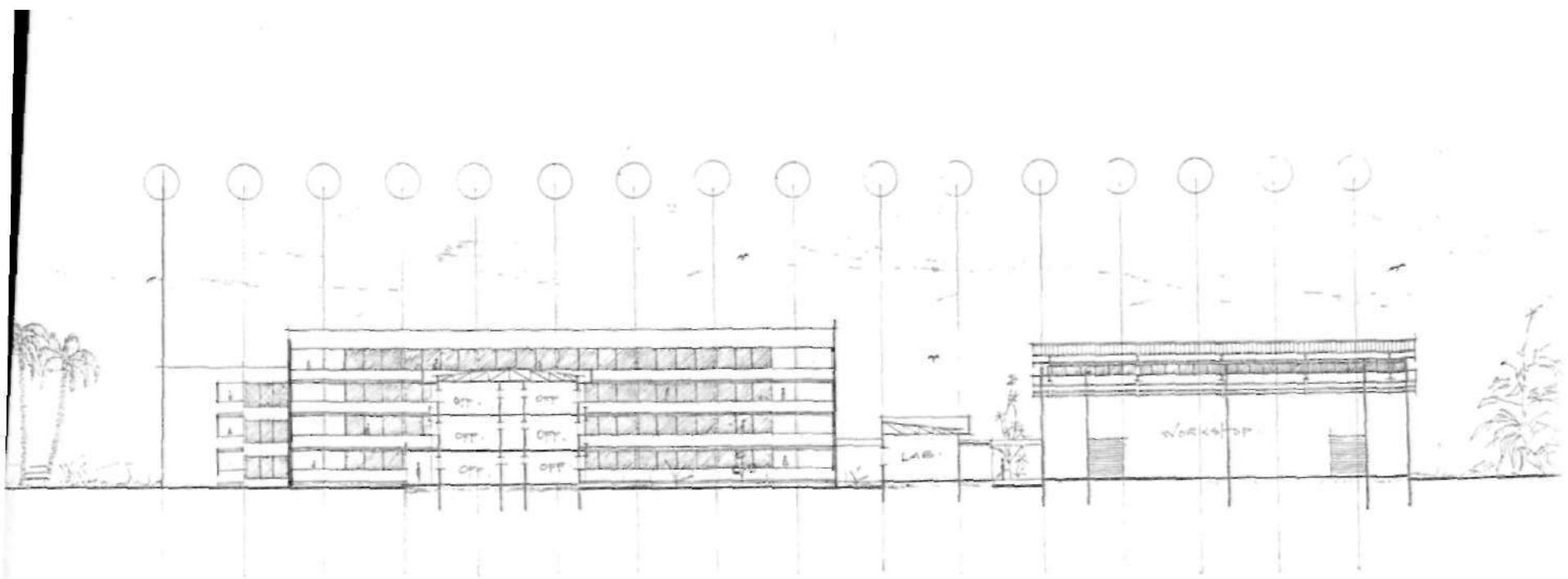


north east elevation

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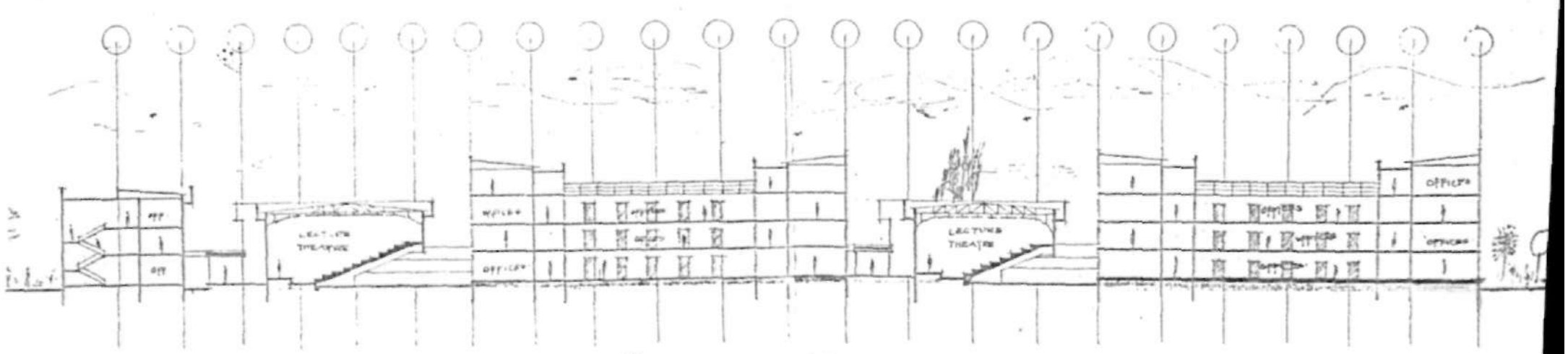


north west elevation

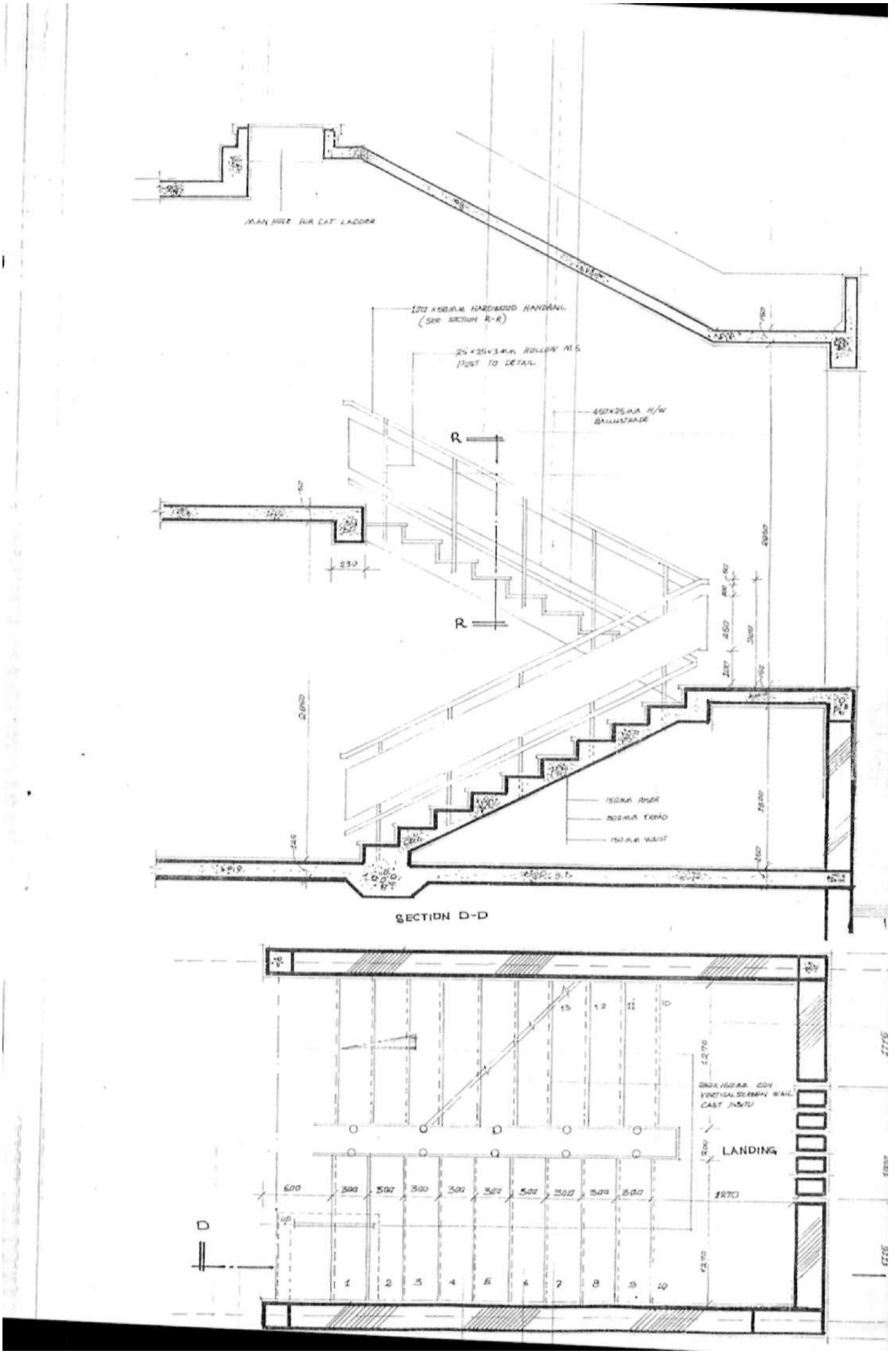


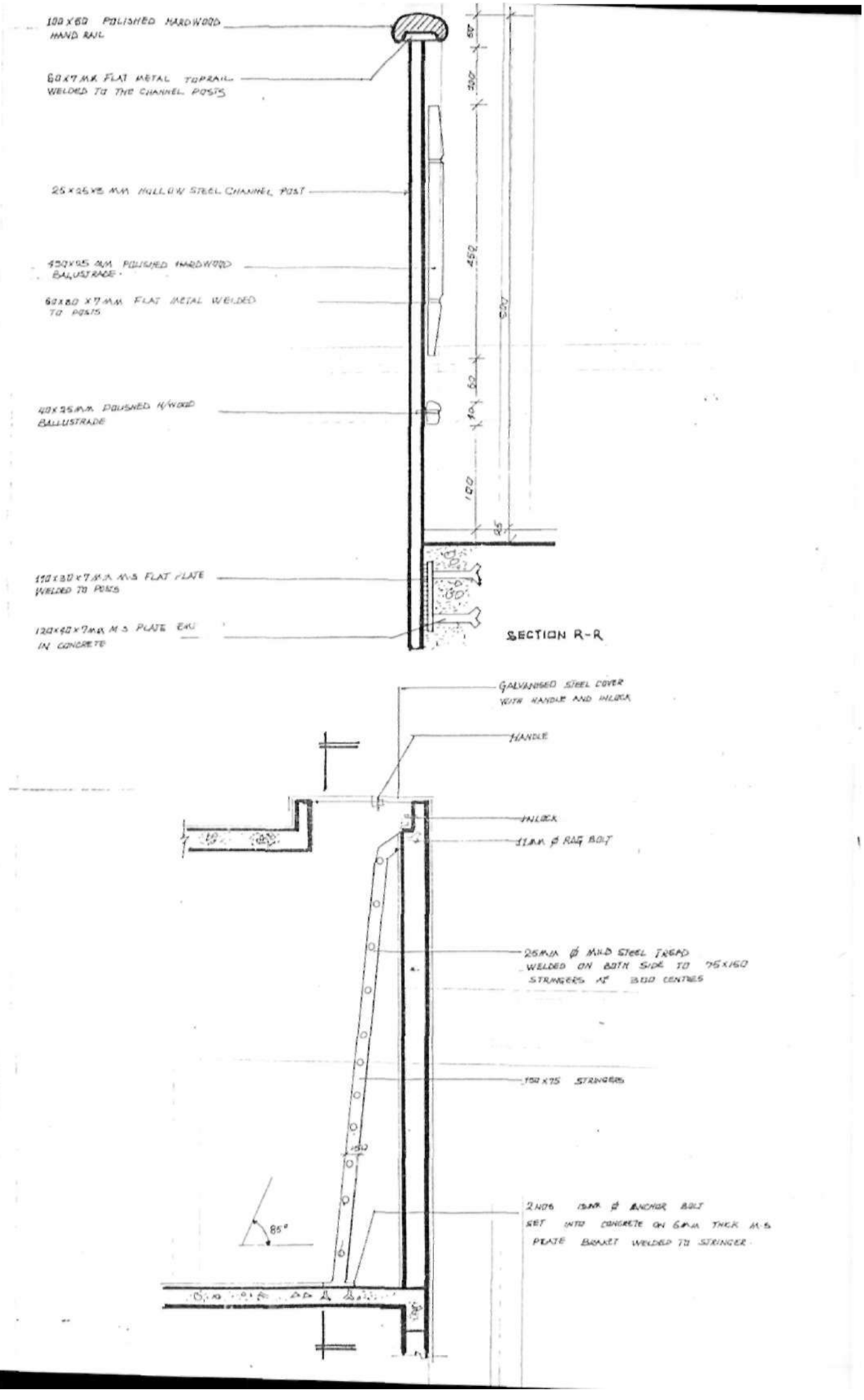
section 4-4

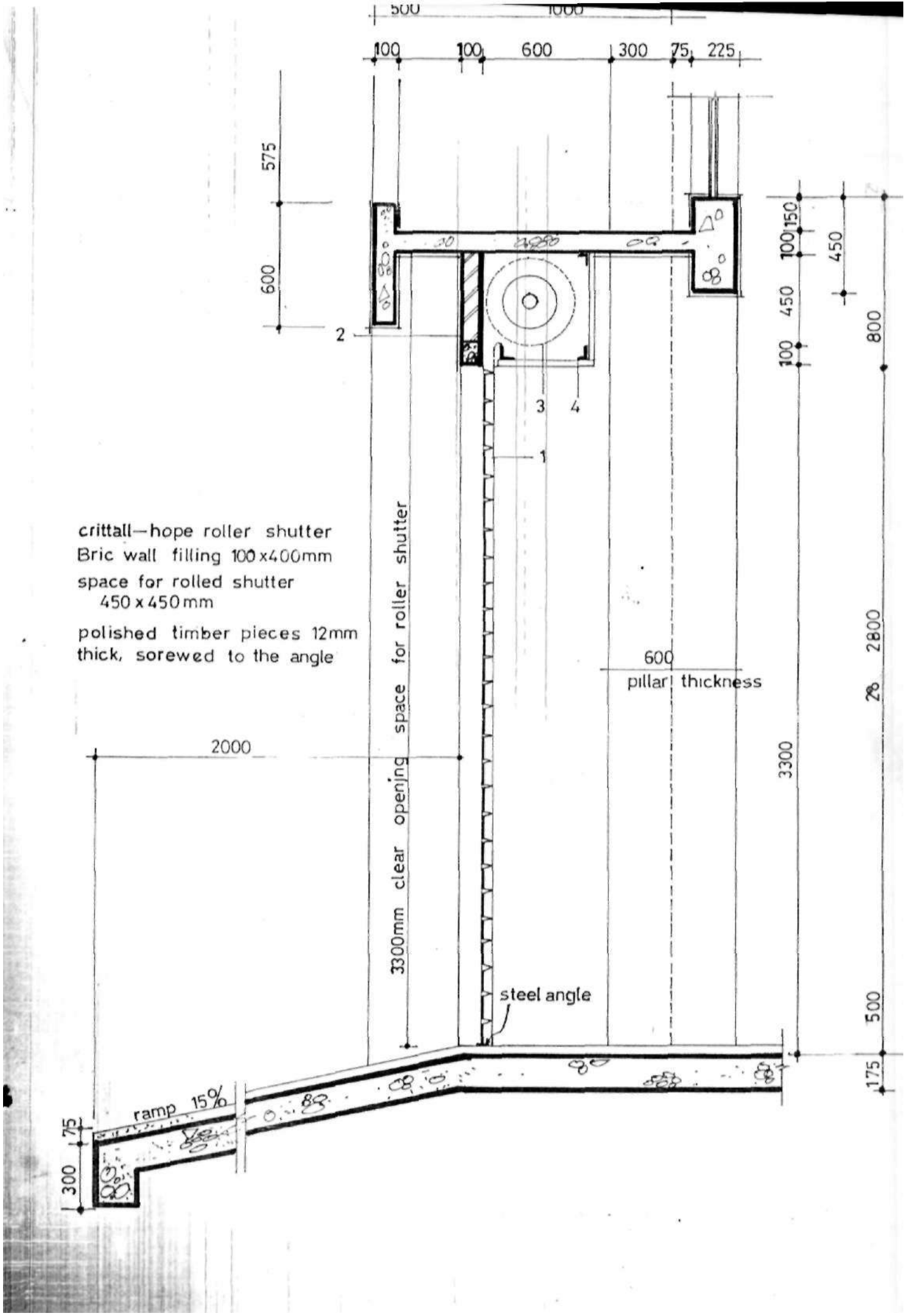
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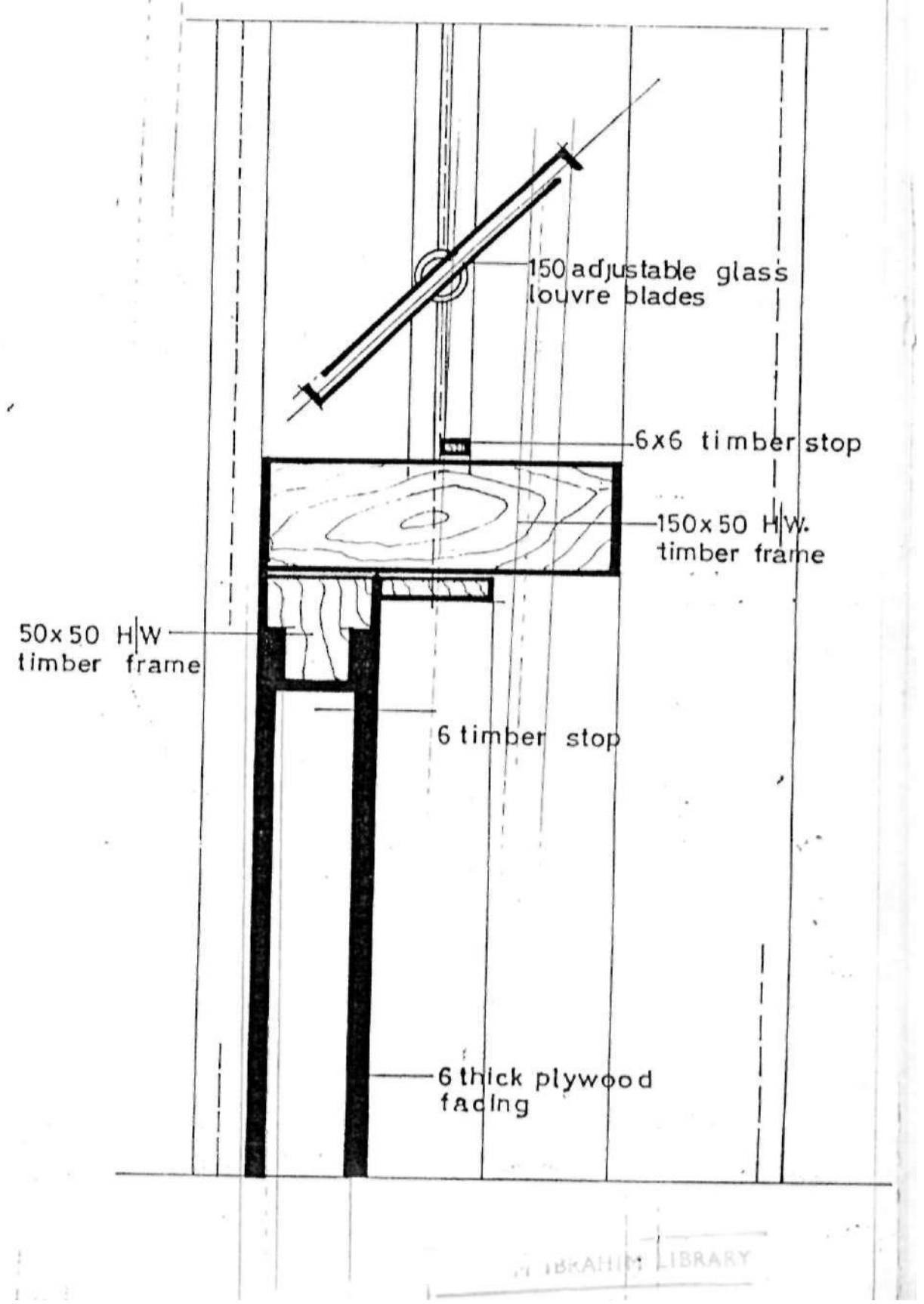


section X - X

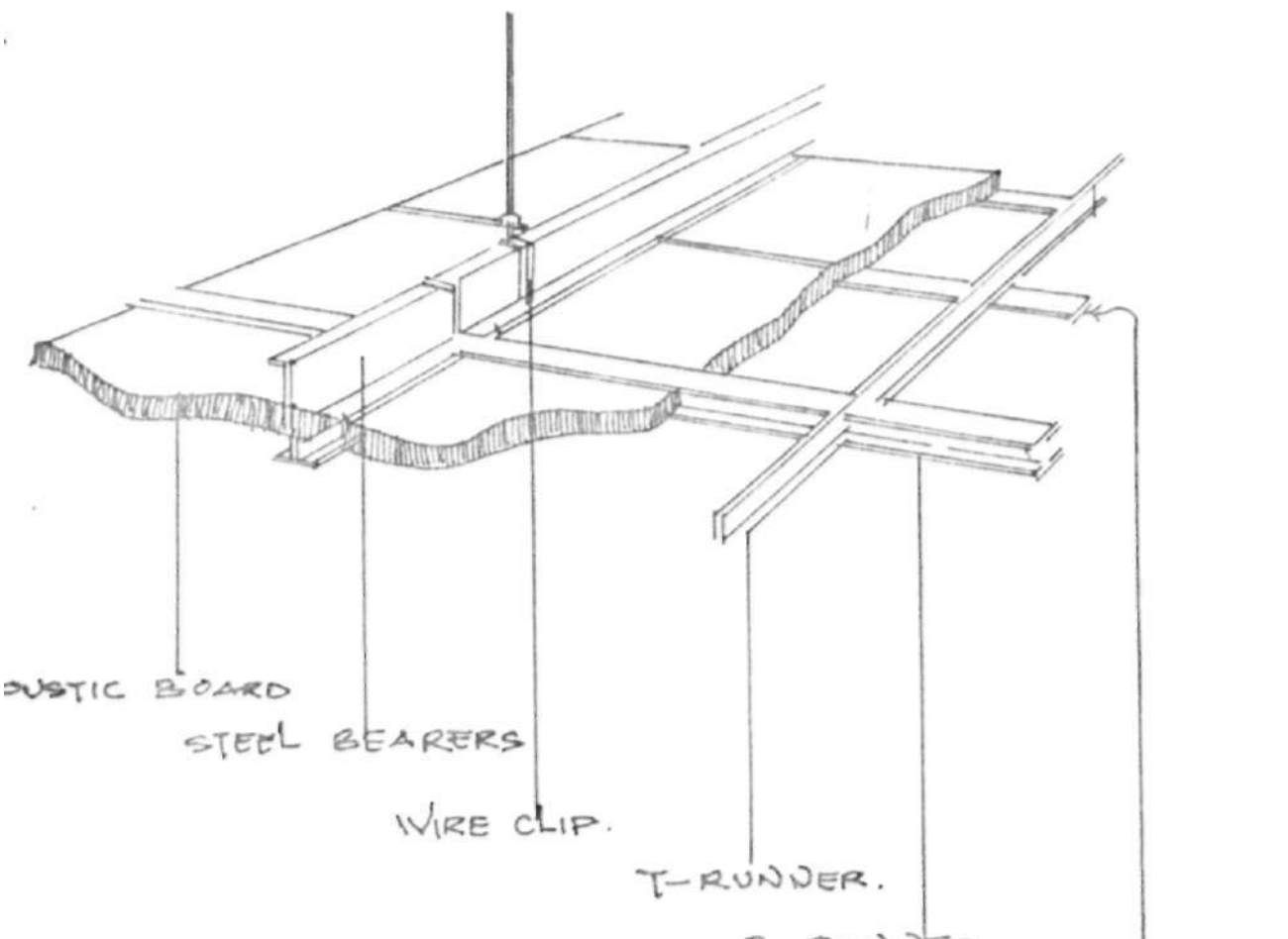

MAN HOLE FOR CAT LADDER
1200 x 50 M.M. HARDWOOD HANDRAIL (see section R-R)
25 x 25 x 3 M.M. ROLLOW M.S POST TO DETAIL
450 x 25 M.M. M/W BALUSTRADE
R
R
230
2880
4860
150
300
450
150 M.M. RISER
300 M.M. TREAD
150 M.M. WAIST
SECTION D-D
D
D
600
300
1270
LANDING
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15


100 X 60 POLISHED HARDWOOD HAND RAIL
60 X 7 M.M. FLAT METAL TOPRAIL WELDED TO THE CHANNEL POSTS
25 X 25 X 3 M.M. HOLLOW STEEL CHANNEL POST
450 X 95 M.M. POLISHED HARDWOOD BALUSTRADE
60 X 80 X 7 M.M. FLAT METAL WELDED TO POSTS
40 X 25 M.M. POLISHED H/WOOD BALUSTRADE
110 X 80 X 7 M.M. M.S. FLAT PLATE WELDED TO POSTS
120 X 40 X 7 M.M. M.S. PLATE EMB IN CONCRETE
50
300
450
600
60
100
45
SECTION R-R
GALVANISED STEEL COVER WITH HANDLE AND HILOCK
HANDLE
HILOCK
12 M.M. Ø RAG BOLT
25 M.M. Ø M.S. STEEL TREAD WELDED ON BOTH SIDE TO 75 X 150 STRINGERS AT 300 CENTRES
150 X 75 STRINGERS
2 NOS 12 M.M. Ø ANCHOR BOLT SET INTO CONCRETE ON 6 M.M. THICK M.S. PLATE BRACKET WELDED TO STRINGER
85°


500
1000
100
100
600
300
75
225
575
600
2
3
4
1
150
100
450
100
450
800
crittall—hope roller shutter
Bric wall filling 100x400mm
space for rolled shutter
450 x 450 mm
polished timber pieces 12mm
thick, sorewed to the angle
600
pillar thickness
2800
2000
3300mm clear opening space for roller shutter
3300
steel angle
500
175
ramp 15%
75
300

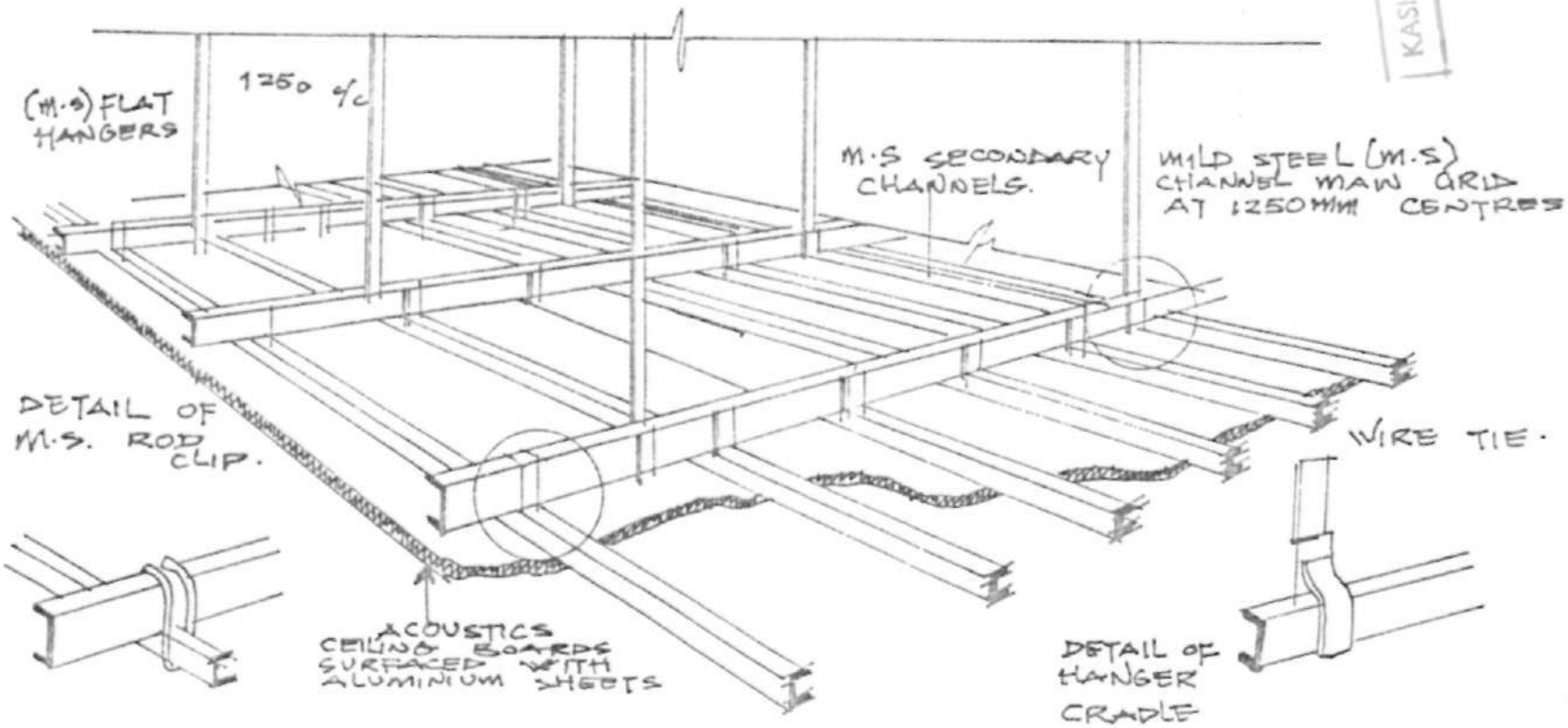


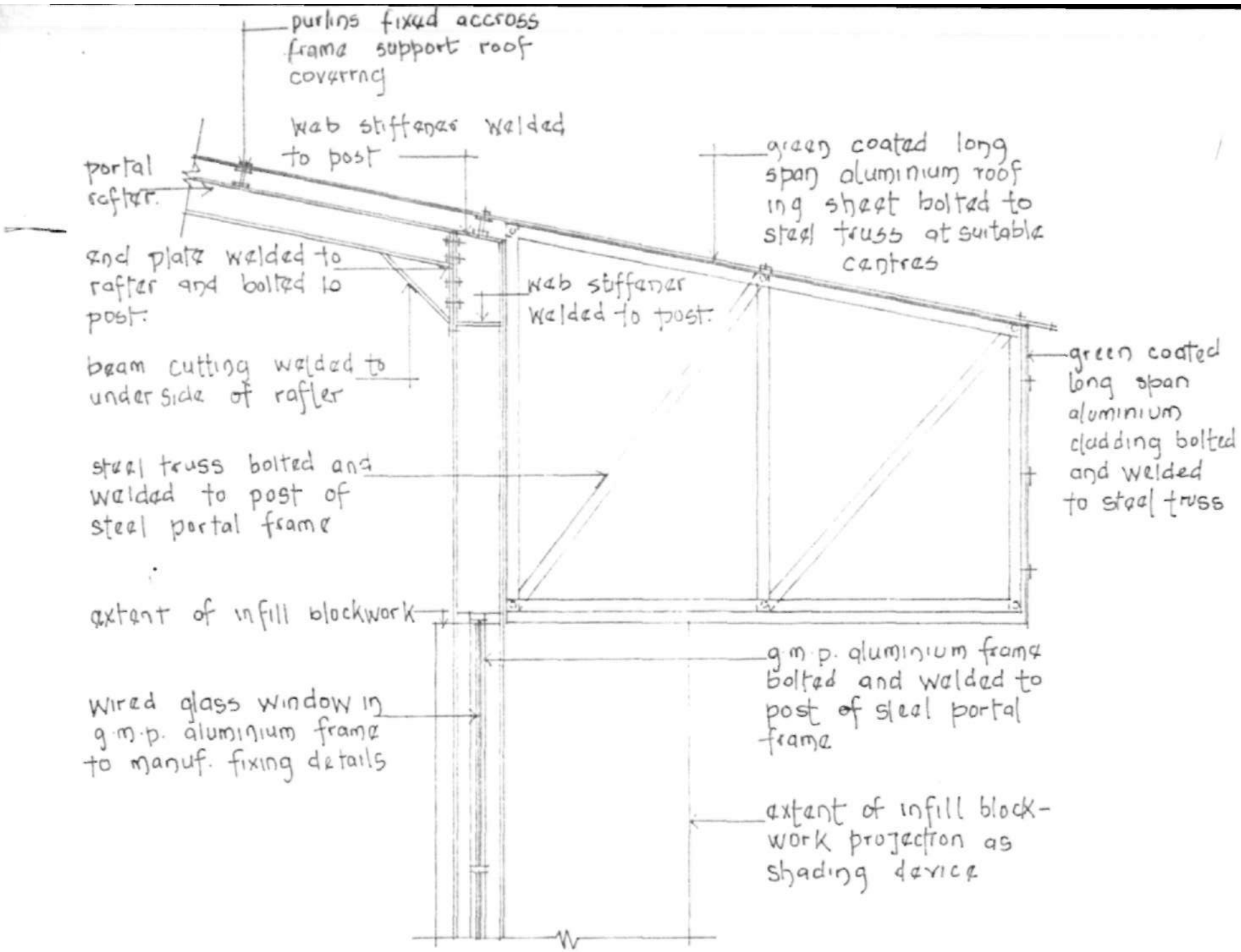
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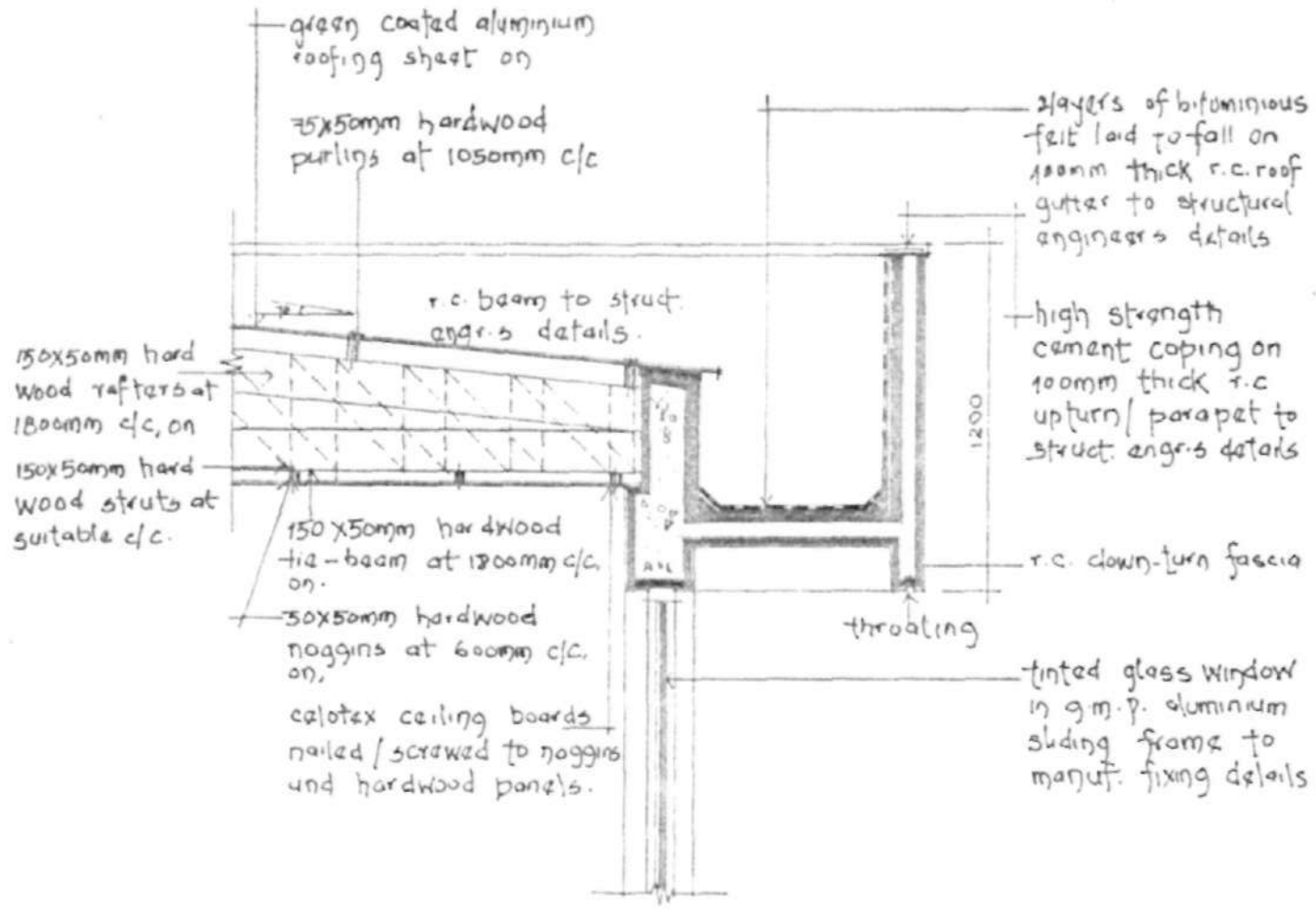


SUSPENDED CEILING DETAILS

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purlins fixed accross frame support roof covering
web stiffener welded to post
portal rafter
green coated long span aluminium roof ing sheet bolted to steel truss at suitable centres
end plate welded to rafter and bolted to post:
web stiffener welded to post:
beam cutting welded to underside of rafler
green coated long span aluminium cladding bolted and welded to steel truss
steel truss bolted and welded to post of steel portal frame
extent of infill blockwork
g.m.p. aluminium frame bolted and welded to post of steel portal frame
Wired glass window in g.m.p. aluminium frame to manuf. fixing details
extent of infill block-work projection as shading device


green coated aluminium roofing sheet on
75x50mm hardwood purlins at 1050mm c/c
2layers of bituminious felt laid to fall on
100mm thick r.c. roof gutter to structural engineers details
r.c. beam to struct. engr.s details.
150x50mm hard wood rafters at 1800mm c/c, on
high strength cement coping on 100mm thick r.c upturn/ parapet to struct. engr.s details
1200
150x50mm hard wood struts at suitable c/c.
150 x50mm hardwood tie-beam at 1800mm c/c. on.
r.c. down-turn fascia
50x50mm hardwood noggins at 600mm c/c. on,
throating
tinted glass window in g.m.p. aluminium sliding frame to manuf. fixing details
celotex ceiling boards nailed / screwed to noggins and hardwood panels.

