

and the appointment of full-time lecturers, have already been implemented.

The FFS intends to become independent from the NIOMR as a technical school directly controlled by the Federal Ministry of Science and Technology and believes the appointment of full-time staff and organizational reform under the Project to be the process to achieve independence.

The FFS currently receives various assistance from the NIOMR which cannot be provided by other institutions, including the training of lecturers at the NIOMR, the application of the NIOMR's research and development efforts to the educational activities of the FFS and access to the NIOMR's facilities and equipment. As effective educational activities may be difficult to maintain without this assistance, the FFS must carefully work out the necessary arrangements to secure similar assistance from the NIOMR and the Federal Ministry of Science and Technology in the implementation of the independence process.

### 3.2.2 Evaluation of Facilities and Equipment

#### (1) Construction of New Facilities

As described in Section 2.5, the scope of the request covers the full range of new facilities required for a boarding school, including a main school building with classrooms, laboratories, library, assembly hall and offices, a workshop, dormitory building and canteen building.

The existing school buildings show signs of general deterioration, including that of the building service facilities, and their extended use in the future appears inappropriate. Since they also have structural faults, they should be withdrawn from use in the near future from the point of view of safety point of view. In principle, therefore, the idea that the use of the existing facilities is not considered and that new facilities will be constructed under the Project is appropriate.

However, the building housing the mock bridge and two classrooms which

was constructed in fiscal 1986 with Japanese grant aid cooperation is still in good condition and, therefore, they should continue to be used in an efficient manner.

Consequently, the facilities to be constructed under the Project will include common classrooms, special rooms, laboratories and a workshop in accordance with the curricula of the courses.

In addition to the above facilities, the provision of a number of facilities essential for the school is planned, including a principal's office, lecturers' rooms, offices, medical treatment room and meeting room, etc.

There are currently two dormitory buildings with 28 rooms each which are also fairly deteriorated. As these buildings have no structural faults, however, their future use can be secured by improving various building services and the exterior finish. Each of the existing rooms has an area of 20 m<sup>2</sup> and is used to accommodate 4 students with 2 bunk beds. 50 rooms of the total 56 rooms will be used to accommodate 200 students. The remaining 6 rooms will be used as washing and linen rooms, etc. Consequently, a new dormitory building capable of accommodating 300 of the school's total 500 students will be constructed.

The request also included the construction of a school guest house. In view of the hotel and transportation conditions in the vicinity of the school, the provision of minimum accommodation facilities for visiting lecturers and others is deemed necessary and it will be appropriate to include this type of accommodation in the dormitory building.

## (2) Provision of Equipment

The proper provision of educational equipment is essential for the FFS to be certified by the NBTE as a technical school. However, the only notable equipment currently owned by the FFS are the navigational instruments in the mock bridge, a marine diesel engine model in the workshop for the Marine Engineering Course and 3 - 4 machine tools, all

of which were provided on the basis of a request made by JICA experts to the Government of Japan. The provision of laboratory equipment is also poor, partly because of the access by FFS students to the laboratories, workshops, fish plant and fish culture ponds of the other divisions of the NIOMR.

The FFS requires various equipment to consolidate its educational activities and to achieve good results by raising the morale of the students. Existing equipment which is in good condition will be transferred to the new facilities to be constructed under the Project, and the provision of the following equipment is planned.

1) Practical Training Equipment for Marine Engineering Course

Although the existing marine diesel engine model and several machine tools (some of which require repair) can be used, a large amount of equipment is still required. The minimum machine tools, tools, various model units and work tables, etc., necessary for the practical training of the Marine Engineering Course students will be provided.

2) Laboratory Equipment

Equipment and apparatus necessary for the chemistry, biology, physics and applied science laboratories will be provided. The applied science laboratory will be used for experiments relating to aquaculture methods and fish processing and for the chemical analyses of the ingredients of foodstuffs and fish meat to be conducted mainly by students of the HND General Fisheries Course. As chemical analyses will also be conducted in the chemistry laboratory, the relevant equipment and apparatus will also be provided for the chemistry laboratory. In addition to tests in specific fields, general tests will be conducted in the chemistry, biology and physics laboratories by all students of the FFS, including those of the PND Course.

3) Teaching Equipment and Apparatus for Nautical Science and Fishing Course

Since the navigational instruments and other equipment in the existing mock bridge are in good condition, not much new equipment is required. However, a gyrocompass and satellite navigator will be provided for the mock bridge and the latter will be a simple type without such peripheral units as a plotter and path printer.

#### 4) Drawing Equipment and Apparatus

Drawing equipment, tools, boards and desks, etc. to be mainly used by students of the Marine Engineering Course will be provided.

#### 5) Audio-Visual Equipment

A number of items in the field of fisheries are difficult to comprehend without visual presentation. These items include the conditions of coastal, brackish water and inland water fisheries and aquaculture work. Better results can be achieved through the use of video tapes and slides. Audio-visual equipment is already in use by the NIOMR, including the FFS, for the presentation of research results and for seminars using materials prepared by researchers. The FFS should be capable of preparing its own audio-visual teaching materials if the necessary equipment is provided. As it is believed that audio-visual education will have a positive effect on the educational activities of the FFS, such audio-visual equipment as a VTR set and slide projector will be provided.

#### 6) Personal Computers

The use of small computers is becoming increasingly popular in Nigeria by not only governmental research institutions but also by private companies for data accumulation, analysis, storage, accounting and other purposes. As a result, graduates of the FFS are now required to have some knowledge and experience of computer operation. To meet this requirement, personal computers, together with power units, will be provided to train students in data accumulation and analysis and the compilation of fisheries statistics using general-purpose software available in the market.

### 7) Microbuses

Microbuses will be provided to transport students for practical training off campus, visits to factories and for other off campus activities.

### 8) Boats with Outboard Engine

Small boats with outboard engines will be provided for practical training on fishing methods such as gillnetting and longlining, in addition to fishing gear for small-scale brackish and inland water fisheries.

## 3.3 Outline of the Project

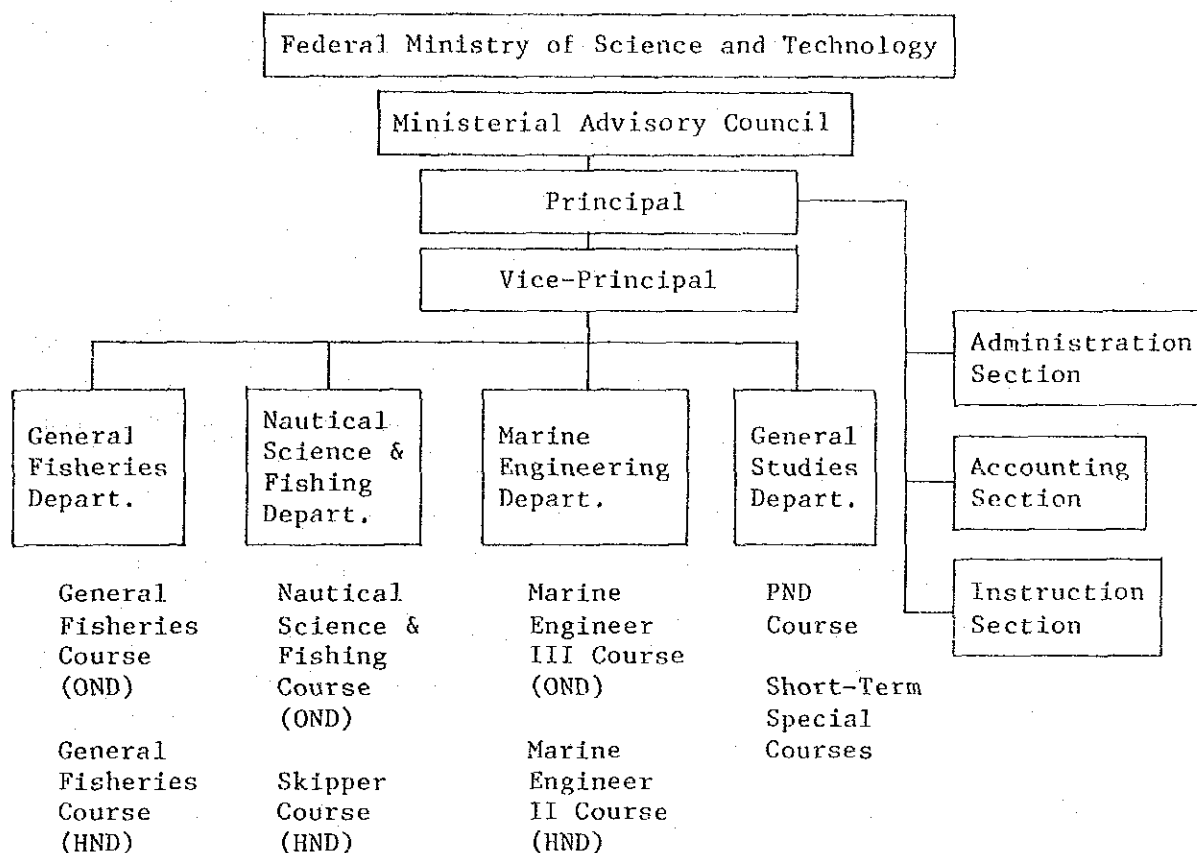
### 3.3.1 Project Implementation Agency and Administrative System of FFS

The project implementation agency is the NIOMR and the Project will be implemented with the cooperation and the supervision of the Federal Ministry of Science and Technology.

With the implementation of the Project as an intermediate step, the FFS will have an independent administrative system from the NIOMR as shown below and will be a technical school directly controlled by the Federal Ministry of Science and Technology. The FFS Management Council will be established to supervise the operation of the school while General Fisheries, Nautical Science and Fishing, Marine Engineering and General Studies Departments and Administration, Accounting and Instruction Sections will be established under the control of the Principal. The educational courses provided by the FFS will be expanded by adding two new courses (Skipper Course and Marine Engineer II Course) to the existing courses.

All the staff members will be full-time employees of the FFS to strengthen both the teaching and administration functions of the FFS, and some of these full-time employees have already been appointed. The number of staff as of October 1989 and the planned increase up to 1992 are given in Section 3.2.3.

### Planned Organization of the FFS



### 3.3.2 Activity Plan

#### (1) Consolidation of Educational Courses

With the introduction of the new Skipper Course and Marine Engineer II Course to meet the demand for captains and chief engineers for large fishing boats, the FFS will provide students with the necessary education and training to sit the national examinations for Skipper and Marine Engineer II after one year's actual experience onboard a fishing boat.

The courses will last for one year and a total of 40 students will be accepted for each course. The necessary qualifications for these courses will be graduation from either the Nautical Science and Fishing Course (OND) or the Marine Engineering Course (OND) of the FFS as well

as one year's experience onboard a fishing boat or equivalent qualifications.

The FFS is currently preparing the syllabus for each course, the main subjects of which are those required to sit the national examinations, and the planned subjects include the following:

**Skipper Course:**

Fishing Boat Operation, Nautical Science, Maritime Law, Navigational Instruments, Land and Sea Meteorology, Ship Safety and Management, Fishing Methods and Fishing Gear, Ship Construction, Maritime Signals, Electrical Science and English

**Marine Engineer II Course:**

Marine Diesel Engines, Generators, Refrigeration, Electrical Engineering, Thermodynamics, Ship Engineering, Mathematics, Physics, Engine Repair Technology and English

With the above new courses, the FFS will have the following courses and number of students in the future.

Course	Duration	Capacity	No. of Students
(First Year + Second Year = Total)			
OND			
1. General Fisheries	2 years	40	(40 + 40 = 80)
2. Nautical Science & Fishing	2 years	40	(40 + 40 = 80)
3. Marine Engineering	2 years	40	(40 + 40 = 80)
HND			
4. General Fisheries	2 years	40	(40 + 40 = 80)
5. Skipper	1 year	40	(40)
6. Marine Engineer II	1 year	40	(40)
Others			
7. Pre-National Diploma	1 year	60	(60)
8. Coxswain	6 months	40	(40)
(Total No. of Students: 500)			

## (2) Improvement of Educational Content

With the construction of the new facilities and the provision of educational equipment, various educational activities, including practical training and laboratory work, which have so far been impossible due to the lack of both facilities and equipment will be implemented.

### 1) Laboratory Work

With the consolidation of the laboratory equipment, general laboratory work in the fields of biology, chemistry and physics will be conducted by students of the OND, HND and PND courses. Students of the HND General Fisheries Course will be able to conduct laboratory work and practical studies using applied science.

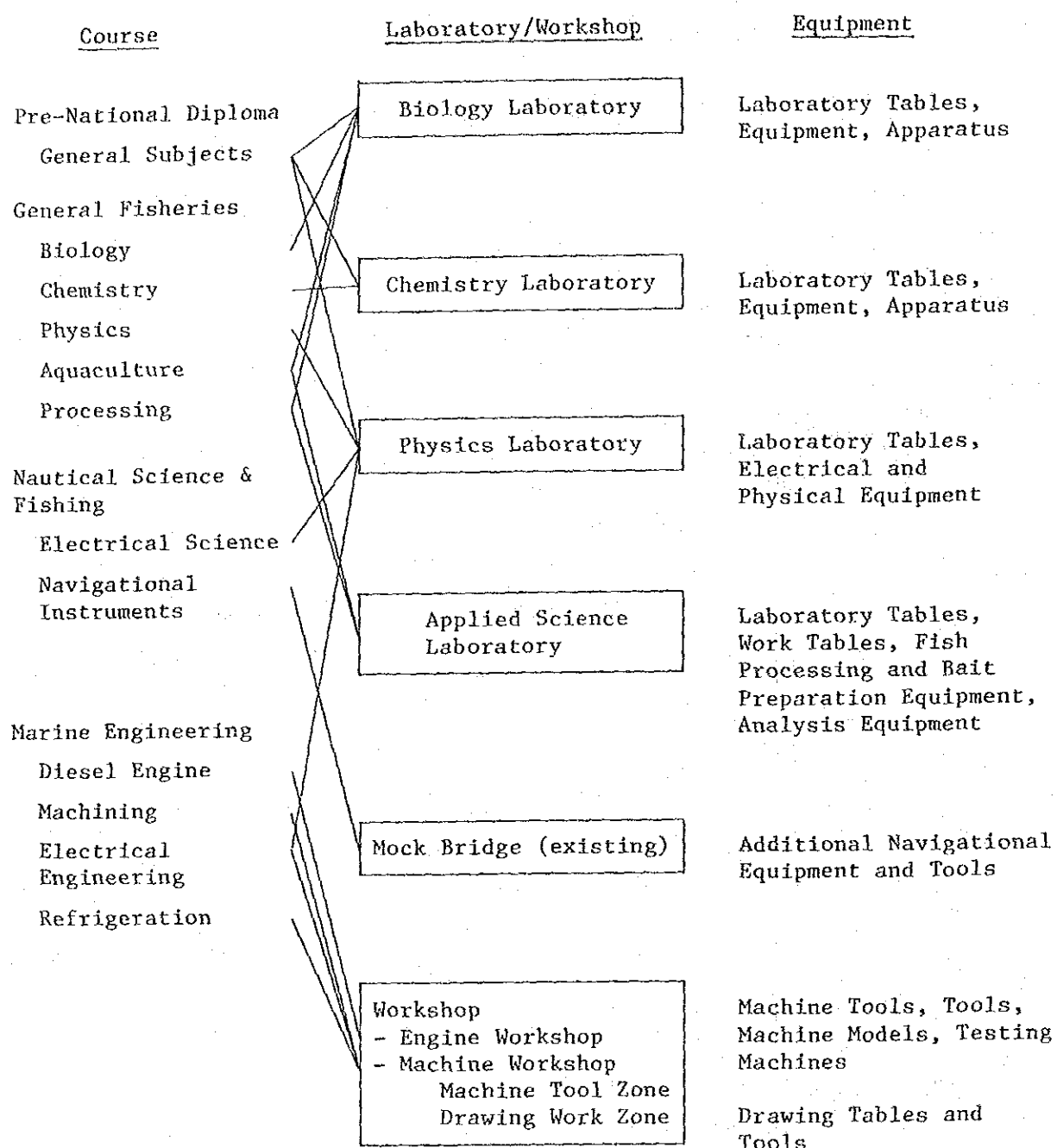
### 2) Workshop

Various types of practical training will be conducted for students of the Marine Engineering Department, including that in drawing, engines, machine tools, welding and sheet metal processing, forging, material testing and electrical appliances.

### 3) Audio-Visual Education

Various types of audio-visual equipment will be used for lectures and practical training to assist in the proper understanding by students of such subjects as the operational conditions of fisheries, fishing boat operation, aquaculture technologies and various types of work which generally require the students to be on site to obtain a proper understanding.





#### 4) Computer Education

Personal computers and ready-made general-purpose software will be introduced to assist students in acquiring knowledge of and experience in computer (small computer) operation through fisheries data accumulation and analysis work.

### 3.3.3 Outline of Facilities and Equipment

The facilities and equipment which are considered necessary under the Project based on the above examination are outlined below.

#### (1) Outline of Facilities

##### 1) Classroom Building

###### - Drawing Room

A drawing room will be required for the drawing classes of the Marine Engineering Department. As the use of an ordinary classroom would be troublesome as it would necessitate the moving of drawing tables and drawing boards, etc., likely resulting in damage to the equipment, and as the use of a drawing room as an ordinary classroom would also be difficult in view of the provision of drawing tables and drawing boards, the provision of a separate drawing room is believed appropriate.

###### - Audio-Visual Room

The use of audio-visual equipment for lectures and practical training should prove extremely effective in terms of assisting in the students' comprehension of such subjects as various fishing methods, fishing boat operation, aquaculture technologies and various other subjects and also to show the activities of the FFS to visitors and to provide advice to artisanal fishermen on efficient fishing methods and fishing gear, etc. The provision of an audio-visual room is, therefore, essential. In view of the necessity to provide an adjoining projector room and fixed equipment, this room should be used for audio-visual purposes only.

###### - Equipment Storage Room

Computers have already been introduced by government research institutions and private companies in Nigeria for data processing, data storage and other purposes and graduates of the FFS are now required to possess basic knowledge of and experience with

computers. The introduction of personal computers for student training is, therefore, necessary to meet this requirement. As computer training will be provided by moving the computers from one classroom to another as required (if appropriate power outlets are provided), only a small equipment storage room for use by lecturers will be required under the Project.

#### - Classrooms

Based on the above examination of special rooms, the provision of 9 classrooms with 40 seats each and 1 classroom with 60 seats is planned. As the building span will be decided in accordance with the distribution of the laboratory tables, etc., in the laboratories which will be discussed later, the sizes of the classrooms will be basically determined by the resulting span. Since many rooms are required, the sizes should be kept to a minimum by the careful arrangement of desks and chairs.

#### - Library

A library is an essential part of any school. According to the NBTE recommendation, the library should be large enough to accommodate 30% of the total number of students, i.e., 150. In reality, however, it is unlikely that 150 students will simultaneously use the library and a library with some 50 seats should prove adequate.

#### - Biology, Chemistry and Physics Laboratories

These laboratories are essential for the practical training of students of all courses as well as being indispensable facilities of any technical school. The floor area of each laboratory will be carefully determined taking the likely distribution of laboratory tables and other equipment into consideration.

#### - Applied Science Laboratory

An applied science laboratory will be required for practical training in various technologies in the fields of aquaculture and fish processing, etc. This practical training has been conducted

at the fish processing plant of the NIOMR up until now but the separation of the FFS from the NIOMR will end the continued use of this plant and will, therefore, necessitate the provision of this laboratory.

- Preparation Rooms

Each laboratory will require an adjoining preparation room to store laboratory equipment and apparatus, to prepare agents and to provide a resting place for the laboratory technicians and assistants.

2) Administration Building

- Principal's Office

As there will be many visitors to the school, a reception area will be required in addition to appropriate office space. An adjoining secretary's office and a waiting room will also be necessary.

- Offices for Instruction, Accounting and Administration Sections

Separate offices will be required for the Instruction Section dealing with student registration and academic records, etc., the Accounting Section dealing with school accounts and salaries and the Administration Section dealing with all administrative aspects of the school's management in view of the different types of work.

- Medical Treatment Room

As included in the NBTE recommendation, a medical treatment room is essential for a school with 500 boarding students. The employment of one full-time nurse is planned in the staff plan of the FFS up to 1992.

- Lecturers' Rooms

Exclusive space for the Vice-Principal and 25 full-time lecturers (currently 19) will be required. The FFS hopes to have individual rooms for lecturers as is the common practice in the U.S. and

Europe. Since the existing lecturers' rooms and rooms for the NIOMR's senior staff are all individual rooms, the provision of individual rooms is planned in principle. However, in view of the column spans and available space, some rooms will be used by more than one lecturer. As lecturers are expected to use these rooms fairly often to interview students and to provide guidance, as much space as possible should be provided.

- Meeting Room

A meeting room large enough to accommodate the Principal, Vice-Principal, 25 lecturers, 3 main office staff members and clerk will be required for staff meetings.

3) Dormitory Building

- Bedrooms

The interior of each bedroom should be rationally designed to minimize the size in order to cope with the large number of boarding students. While individual rooms are preferable, rooms accommodating 4 students each are more appropriate in view of the actual circumstances. The dormitory building will have a total of 75 bedrooms for 300 students.

- Guest Rooms

Guest rooms will be required to accommodate visiting lecturers, etc. As there are some hotels in the vicinity of the FFS, the minimum number of rooms will be planned.

- Dormitory Office

A dormitory office will be necessary to receive visitors and to ensure the security of the dormitory building.

4) Workshop Building

The provision of a workshop is required for the practical training of students of the Marine Engineering Department and the size of

the workshop will be determined in accordance with the layout of the machinery and work tables, etc. The workshop will house a machine tool practice area, engine practice area, welding and sheet metal processing area, storage areas and instructors' rooms.

#### 5) Power Building

Given the local power supply conditions, the provision of a power generator will be required. In view of the installation of the generator adjacent to the classroom and dormitory buildings, it will be necessary to construct a power building to block the noise. Electrical boards will be housed in this building.

### (2) Outline of Equipment

The main equipment, the provision of which is planned under the Project, is as follows.

#### 1) Equipment for Workshop

Machines, tools and teaching equipment for practical training in the Marine Engineering Department. The machines and tools will be similar to the existing equipment with which the lecturers and assistants have operational experience. The teaching equipment, including pumps and motors, etc., will have basic structures and functions. The main equipment planned is as follows:

- machines, including a lathe, milling machines and a shaper for practical training on machines
- gas and electric welders for practical training on gas and electric welding
- tools sets and work tables for practical training on metal work and machine repair
- various equipment models for practical training on engines and electrical equipment

## 2) Equipment for Applied Science Laboratory

Equipment to be used by students of the HND General Fisheries Course, especially those specializing in aquaculture, fish processing or food analysis, under the supervision of lecturers for research on aquaculture and fish processing and for the analysis of food and feed.

Up to the present, the facilities and equipment of the NIOMR have been used for these purposes. The planned equipment will enable students to conduct laboratory-scale practical training and research. The analysis equipment will be similar to that with which the lecturers are already familiar. Since the main purpose is to teach analysis methods and procedures using this equipment, small size and easy operation should be given priority over precision.

The techniques, equipment operation and data processing experience gained through the above training will subsequently be utilized in such work places as governmental research institutes, culture ponds and food processing companies, etc. by the graduates of the FFS. The main equipment planned is as follows.

- fish tank for experiments on various technologies relating to breeding and aquaculture
- pH meters, DO meters and salinometers for the measurement of basic environmental elements in water
- pyrostat for culture under constant temperatures
- pure water manufacture unit for the manufacture of pure water to prepare various agents
- muffle furnace for the measurement of organic matters contained in water or mud using the incandescent reduction method
- nitrogen decomposition and distillation unit for the decomposition and distillation of samples, including fish meat (for the measurement of coarse protein)
- fat extraction unit for the extraction of the fat content from

samples, including fish meat

- spectrophotometer for the measurement of chlorophyllin and iron by colourmetric analysis
- gas chromatograph for the analysis of amino acids and fatty acids, etc.
- precision balance for the precise measurement of weight
- portable mincer to process or mince fish meat
- portable meat mixing machine for the uniform mixing of minced fish meat, etc.
- refrigerators to store samples and processed materials
- work tables for fish processing work
- laboratory tables for various chemical and physical analyses

### 3) Equipment for Biology Laboratory

Equipment to be used for the observation of morphological and anatomical characteristics and for the identification of fry and plankton. The main equipment planned is as follows:

- fish dissecting sets for the dissection of fish
- scales for the measurement of various fish organs, including the ovaries and stomach contents
- microscope for the observation of tissues, etc.
- refrigerator to store samples, etc.
- laboratory tables, etc., for biological laboratory work

### 4) Equipment for Chemical Laboratory

Equipment required for a wide range of laboratory work, ranging from basic experiments in inorganic chemistry to the chemical treatment of samples for chemical analysis using applied technologies.



At present, it is difficult to conduct these experiments and analyses due to the shortage of equipment. As the number of teaching staff is sufficient, however, education and training in the chemistry laboratory will be smoothly conducted with the provision of new equipment. The main equipment planned is as follows:

- laboratory tables for chemical laboratory work
- draft chamber for the extraction of harmful gases
- various glass apparatus, etc.

5) Equipment for Physics Laboratory

Equipment required for a wide range of laboratory work, ranging from general experiments in dynamics and electricity, etc., for pre-diploma course students to practical training on electric circuits for OND course students. As the number of teaching staff is sufficient, no difficulties are anticipated in the teaching and training of students in the physics laboratory. The main equipment planned is as follows:

- laboratory tables for physical laboratory work
- various equipment relating to dynamics, electrical science and optical science for the study of basic theories

6) Equipment for Nautical Science and Fishing Department

Equipment to be used by the students of the Nautical Science and Fishing Department is to be installed at the existing mock bridge or in classrooms for the relevant courses. The main equipment planned is as follows:

- gyrocompass and repeater set for the study of their mechanisms and maintenance
- satellite navigator set for operation purposes (this type of

navigator has been used by Nigerian fishing boats in recent years)

- life-saving devices for display purposes and for practical training on their application

7) Drawing Equipment

Drawing tables, tools sets and desks for the drawing practice of students of the Marine Engineering Department.

8) Audio-Visual Equipment

Equipment to be used for audio-visual education and to serve a single class at a time. The FFS staff are capable of preparing their own teaching materials. The main equipment planned is as follows

- slide projector to show slides on a wide range of subjects
- VTR set to show those subjects, such as fishing methods and aquaculture technologies, which particularly require the visual presentation of techniques to be properly understood

9) Personal Computers

Small personal computers with a basic processing capacity for the practical training of students (for which a large capacity computer is not required).

10) School Buses

For the transportation of students and lecturers for activities off the school campus, including practical training at factories and factory visits. The interior of the buses will be very simple but will satisfy the basic requirements of a school bus.

#### 11) Boats with Outboard Engines

For practical training on various small-scale fishing methods and boat operation. The boats will be small enough to be driven by an outboard engine.

#### 3.3.4 Proposed Construction Sites

The proposed construction sites are part of the NIOMR premises which are located in the southwestern corner of Victoria Island in Lagos State. The area surrounding the NIOMR is relatively quiet with naval facilities, government offices and private offices mixed with private residences. The Atlantic Ocean lies to the south of the NIOMR premises (Gulf of Guinea).

As described earlier, the area belongs to the tropical zone and is consequently characterized by high temperatures, relative humidity and rainfall. The rainy season is between April and October while the dry season is between November and March and a cold wind called the harmattan blows from the north at the end of the latter bringing sand and dust. No earthquake has ever been recorded in Lagos State.

The existing NIOMR facilities are in fact scattered in three different areas which are not far away from each other and the proposed sites of the Project consist of 1.2 ha in Site A (where the Administration Building, Fishing Technology Laboratory, Technical Service Division Building and staff flats, etc., are located) and some 0.6 ha in Site B (where the present FFS is located).

While the removal of the deteriorated existing buildings of the FFS in Site B and the construction of a multi-story building were originally planned, this plan has been withdrawn by the FFS as the cost of the removal and of constructing temporary facilities could not be met under the present Japanese grant aid cooperation system, resulting in a heavy financial burden on the FFS. As a result, it has been decided to construct all the new facilities except the Workshop in the southeastern part of Site A while the Workshop will be constructed in the entrance area of Site B (present carpark site).

(1) Site A

The subject site for the Administration Building, Classroom Building, Dormitory Building and Machine Building will be the southeastern part of Site A, from the existing dormitories to the southern and eastern perimeter fences. An access road will be provided using the 8 m road which branches out from Ahmadu Bello Way passing between the western side of the premises of the Federal Department of Fisheries and the NIOMR's Administration Building.

1) Power Supply

A 3-phase, 3-wire high voltage power transmission cable (11,000 V) of the Nigerian Electric Power Authority (NEPA) currently runs beneath the above 8 m road and a 500 kVA transformer is located on the NIOMR premises to reduce the voltage to 400 V and to supply power to all NIOMR facilities in addition to a stand-by power generator with a capacity of 300 kVA in the case of blackouts during the peak power consumption period. Since both this transformer and power generator appear to have no surplus capacity, however, a new transformer will be required to receive power from the high voltage power transmission cable and to supply power to the new FFS facilities, and a new stand-by power generator will also be provided. In addition, an automatic voltage regulator (AVR) will also be necessary to maintain the constant voltage of the power supplied to sensitive equipment.

2) Water Supply

Water is supplied to all NIOMR facilities from a Lagos State water main buried beneath the front road. In addition, a water main of the Federal Government also connects to the NIOMR premises from Ahmadu Bello Way while a deep well (100 m in depth) located to the south of the Technical Service Division Building is another source of water. This well has a spring water volume of 114 tons/day and the water is pumped by a submerged water pump with a pumping capacity of 136 tons/day, treated at a filtration pond (capacity:

80 m<sup>3</sup>) and stored in a 4 m<sup>3</sup> water tank. This water is pumped only to the Fishing Technology Laboratory.

The water supply from the public water mains is extremely poor and all divisions of the NIOMR rely on the deep well to fetch the necessary water. Since the volume of spring water, the capacity of the submerged water pump and the capacity of the filtration pond are all adequate, this deep well will be used as the water source for the Project while constructing additional water treatment equipment and a water tank which will be connected to the existing filtration pond.

### 3) Drainage

Rainwater is currently drained to the drainage pipes under the road via gutters and drainage pipes. Sewage is infiltrated to the ground through an infiltration tank after first being treated at the septic tank. Miscellaneous waste water is directly drained to the infiltration tank.

### 4) Telephones

The NIOMR does not have any extra lines at present and the introduction of new lines appears difficult. The existing telephone exchange equipment is old and all the available lines are utilized by the existing facilities. Therefore, the installation of new telephone exchange equipment for the new FFS facilities will be required under the Project.

### 5) Gas

No city gas supply is currently available and propane gas in cylinders is generally used.

### 6) Ground Conditions

As part of the present study, a local specialist company was

commissioned to conduct a geological survey in three places. According to the final report submitted by this company, the surface soil extends to 1 m below the surface and is followed by a sand layer with an N value of 20 to GL -20.0 m. As a result, a ground bearing strength of some 15 tons/m<sup>2</sup> can be expected for the direct foundation method assuming a supporting layer depth of GL -1.5 m - -2.0 m.

(2) Site B

The proposed site for the Workshop Building will be the current site of the carpark between the front entrance of the site and the existing Mock Bridge Building.

1) Power Supply

As in the case of Site A, power is currently supplied from the high voltage power transmission cable which runs beneath the adjoining road. A 300 kVA transformer is located on the site to reduce the voltage and to supply power to the FFS and other facilities. The new Workshop Building will also be supplied power by this transformer.

2) Water Supply

Water is currently supplied to the site from the Lagos State water main which is buried beneath the adjoining road. Although the water supply conditions are poor, the water supply for the Workshop Building will be secured by storing water in a tank overnight as the building is not expected to use much water in view of its functions.

3) Drainage

The present drainage system is the same as that for Site A.

4) Telephones

The existing facilities have trunk lines using the same exchange equipment as Site A. Trunk lines will be provided for the new Workshop Building using the new exchange equipment to be installed on Site A under the Project.

5) Gas

Propane gas is currently used as in the case of Site A.

6) Ground Conditions

The standard penetration test conducted at the site showed a similar ground bearing strength to Site A.

**CHAPTER 4**  
**BASIC DESIGN**





## CHAPTER 4      BASIC DESIGN

### 4.1    Basic Principles

The following principles were adopted in the design of the new facilities for the FFS based on the planned contents of the Project.

- (1) The functions of the facilities shall be decided in accordance with the fact that the FFS will have administrative independence from the NIOMR.
- (2) The appropriate floor area for each facility shall be decided taking the sizes of the existing facilities, the planned use of the facilities and the number of staff involved into consideration.
- (3) The layouts of the administration, educational and accommodation facilities shall be decided in view of coordinating the rooms in these facilities.
- (4) Particular attention shall be paid to not disrupting the ongoing activities of the FFS and NIOMR in the preparation of the layout, structural and building services plans.
- (5) As the proposed construction site is located near the sea, measures to prevent damage by salt in the air shall be introduced.
- (6) Attention shall be paid to the maximum use of local materials and construction methods.
- (7) All facilities shall be easy to maintain so as to minimize the maintenance cost.

## 4.2 Examination of Design Conditions

### (1) Natural Conditions

In view of the site shape, prevailing wind direction and strong afternoon sunshine, the new buildings will in principle have an east-west axis with their openings facing north and south. Heat insulation measures at the upper side of the roof slabs will be introduced to provide effective insulation vis-a-vis solar radiation.

### (2) Locational Conditions

Of the various existing building services, the power supply facility has no surplus capacity vis-a-vis the power demand of the new buildings and, therefore, a new power supply system is planned. Care will be taken in the layout of the new buildings not to disrupt the existing building service networks, including those under existing roads.

### (3) Use Purposes

As the Administration Building will have visitors, it should be separated from the Classroom Building to avoid disturbance while At the same time it is necessary to minimize the length of the path line between the lecturers' rooms and classrooms.

### (4) Construction Plan

The first priority of the construction plan is not to disturb the ongoing activities of the FFS and NIOMR during the construction period. As a result, careful consideration has been given to the planning of construction equipment and materials delivery and transportation on the premises. The temporary buildings will be an adequate distance from the existing buildings in view of possible noise and dust and security requirements.

## (5) Building Design

As the existing Mock Bridge Building and Fishing Technology Laboratory Building of the NIOMR were constructed with Japanese grant aid cooperation, the new buildings to be constructed under the Project should have design uniformity with these buildings. The selection of construction materials was based on the review of the advantages and disadvantages of the existing buildings.

### 4.3 Basic Plan

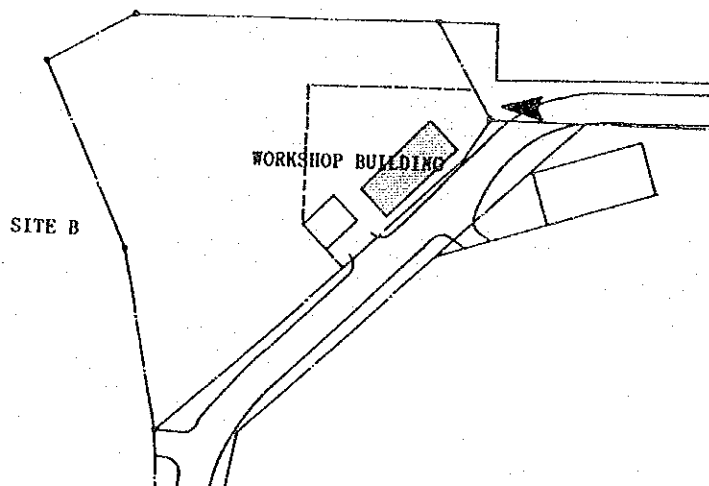
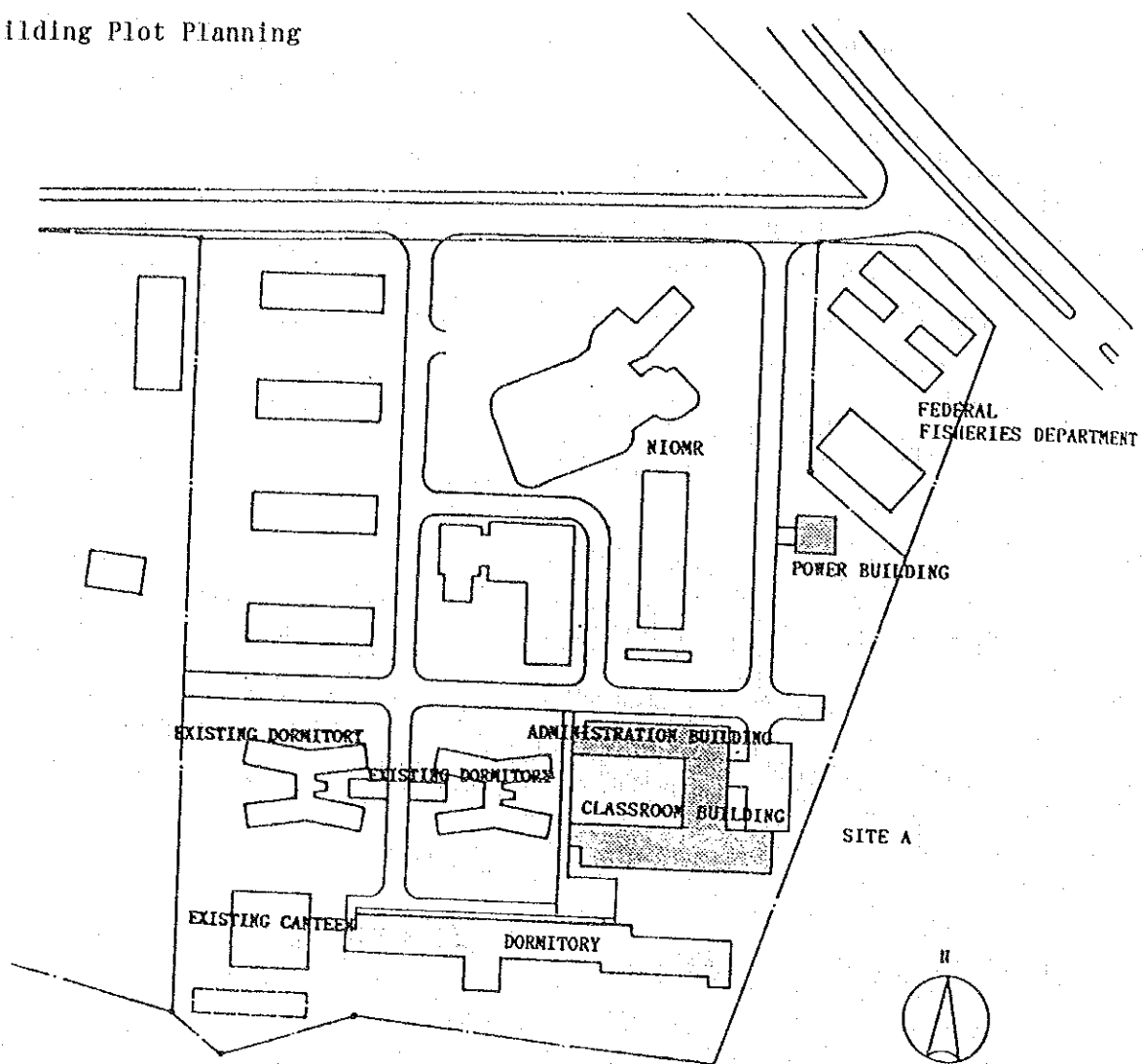
#### 4.3.1 Layout Plan

The following principles were adopted in the preparation of the layout plan.

- a building axis to avoid the strong afternoon sunshine as much as possible
- a building axis to maximize natural ventilation taking the prevailing wind direction into consideration
- locationing of the Administration Building where many visitors are expected near the access road from the main road to maintain a quiet environment for the Classroom Building and Dormitory Building
- appropriate path lines connecting the lecturers' rooms and classrooms which have a close functional relationship
- appropriate locationing of the new Dormitory Building and existing Dormitory Buildings
- efficient and economical layout to make the building service lines as short as possible

The resulting layout plan based on the above principles is given in the following figure.

# Building Plot Planning



#### 4.3.2 Building Plan

##### (1) Floor Plan

The Project intends the creation of a building complex consisting of administration and classroom areas, dormitory, etc. which are required to constitute a full boarding technical school specializing in the field of fisheries with the functions of each building planned to suit the actual conditions in Nigeria.

The required floor area of each building was calculated as follows while referring to the Neufert Building Design Standards widely used in Europe and taking the sizes of the existing buildings into consideration.

- 1 determination of the floor areas of the main rooms
- 2 totalization of the above floor areas
- 3 initial calculation of the floor area of each building by adding the areas of such common spaces as stairs and corridors to 2 above
- 4 modification of the initial calculation results in view of the contents of the structural plan, etc.
- 5 calculation of the total floor area by adding the required floor area of each building

##### 1) Classroom Building

The Classroom Building will have the following rooms.

Classrooms (40 students x 9 rooms, 60 students x 1 room),  
Biology Laboratory, Chemistry Laboratory, Physics Laboratory,  
Applied Science Laboratory, Drawing Room, Audio-Visual Room,  
Equipment Storage Room and Library.

### Floor Area Calculation Standards

Classroom	B 2.0 m <sup>2</sup> /person
Laboratory	B 80.0 m <sup>2</sup>
Preparation Room	B 30.0 m <sup>2</sup>
Library	B 25.0 m <sup>2</sup>

The resulting number of occupants of each room and respective floor areas are as follows:

Room Name	Number of Occupants	Desirable Floor Area	Adopted Floor Area
Classroom	40	B 80.0m <sup>2</sup>	61.83m <sup>2</sup>
Classroom	60	B 120.0m <sup>2</sup>	90.20m <sup>2</sup>
Laboratory	40	B 80.0m <sup>2</sup>	93.07m <sup>2</sup>
Preparation Room		B 30.0m <sup>2</sup>	31.57m <sup>2</sup>
Library		B 25.0m <sup>2</sup>	93.07m <sup>2</sup>

The floor area of the Classroom Building calculated on the basis of the above results is given below.

#### Ground Floor

Biology Laboratory	93.07 m <sup>2</sup>
Preparation Room	30.75 m <sup>2</sup>
Chemistry Laboratory	93.07 m <sup>2</sup>
Preparation Room	30.75 m <sup>2</sup>
Applied Science Laboratory	93.07 m <sup>2</sup>
Preparation Room	31.57 m <sup>2</sup>
Audio-Visual Room	70.52 m <sup>2</sup>
Projector Room	20.50 m <sup>2</sup>
Toilets and Pantry	41.88 m <sup>2</sup>
Corridor and Stairs	274.78 m <sup>2</sup>
Balcony	90.02 m <sup>2</sup>
Sub-Total	869.98 m <sup>2</sup>

### First Floor

Physics Laboratory	93.07 m <sup>2</sup>
Preparation Room	31.75 m <sup>2</sup>
Classrooms (40) (61.83 m <sup>2</sup> x 5)	309.14 m <sup>2</sup>
Classroom (60)	90.20 m <sup>2</sup>
Toilets and Pantry	41.88 m <sup>2</sup>
Corridor and Stairs	214.92 m <sup>2</sup>
Balcony	100.24 m <sup>2</sup>
Sub-Total	881.02 m <sup>2</sup>

### Second Floor

Classrooms (40) (61.71 m <sup>2</sup> x 4)	246.82 m <sup>2</sup>
Drawing Room (40)	123.82 m <sup>2</sup>
Equipment Storage Room	28.70 m <sup>2</sup>
Library	93.07 m <sup>2</sup>
Librarian's Room	31.57 m <sup>2</sup>
Toilets	41.88 m <sup>2</sup>
Corridor and Stairs	214.92 m <sup>2</sup>
Balcony	100.24 m <sup>2</sup>
Sub-Total	881.02 m <sup>2</sup>

### R-Floor

Stairs and Water Tank Room	67.24 m <sup>2</sup>
Sub-Total	67.24 m <sup>2</sup>

Classroom Building Total 2,699.26 m<sup>2</sup>

## 2) Administration Building

The Administration Building will have the following rooms and offices.

Principal's Office, Lecturers' Rooms, Administration Section Office, Accounting Section Office, Instruction Section Office, Meeting Room and Medical Treatment Room



### Floor Area Calculation Standards

Principal's Office	25.0 ~ 30.0 m <sup>2</sup> /person
Lecturer's Room	15.0 ~ 25.0 m <sup>2</sup> /person
Senior Officer's Room	6.0 ~ 9.0 m <sup>2</sup> /person
Office (for more than 1 person)	4.0 ~ 6.0 m <sup>2</sup> /person
Meeting Room	2.5 m <sup>2</sup> /person

The resulting number of occupants of each room and respective floor areas are as follows:

Room Name	Number of Occupants	Desirable Floor Area	Adopted Floor Area
Principal's Office	1	25.0 - 30.0 m <sup>2</sup>	23.25 m <sup>2</sup>
Lecturer's Room	1	15.0 - 25.0 m <sup>2</sup>	15.55 m <sup>2</sup>
Instruction Office	4 (Chief: 1) (Officers: 3)	18.0 - 27.0 m <sup>2</sup> 6.0 - 9.0 m <sup>2</sup> 12.0 - 18.0 m <sup>2</sup> L(4.0 - 6.0) m <sup>2</sup> x 31	23.25 m <sup>2</sup>
Accounting Office	4 (Chief: 1) (Officers: 3)	18.0 - 27.0 m <sup>2</sup> 6.0 - 9.0 m <sup>2</sup> 12.0 - 18.0 m <sup>2</sup> L(4.0 - 6.0) m <sup>2</sup> x 31	23.25 m <sup>2</sup>
Administration Office	6 (Chief: 1) (Officers: 5)	26.0 - 39.0 m <sup>2</sup> 6.0 - 9.0 m <sup>2</sup> 20.0 - 30.0 m <sup>2</sup> L(4.0 - 6.0) m <sup>2</sup> x 51	46.50 m <sup>2</sup>
Meeting Room	30	75.0 m <sup>2</sup> (2.5 m <sup>2</sup> x 30)	69.75 m <sup>2</sup>

The floor area of the Administration Building calculated on the basis of the above results is given below.

#### Ground Floor

Administration Office (6)	46.50 m <sup>2</sup>
Instruction Office (4)	23.25 m <sup>2</sup>
Accounting Office (4)	23.25 m <sup>2</sup>
Medical Treatment Room	23.25 m <sup>2</sup>

Meeting Room (30)	69.75 m <sup>2</sup>
Toilets and Pantry	41.31 m <sup>2</sup>
Corridor and Stairs	104.81 m <sup>2</sup>
Balcony	66.92 m <sup>2</sup>
Sub-Total	399.66 m <sup>2</sup>

#### First Floor

Principal's Office	23.25 m <sup>2</sup>
Secretary's Office and Waiting Room	23.25 m <sup>2</sup>
Lecturers' Rooms (15.57 m <sup>2</sup> x 9)	140.12 m <sup>2</sup>
Toilets and Pantry	41.31 m <sup>2</sup>
Corridor and Stairs	104.00 m <sup>2</sup>
Balcony	66.92 m <sup>2</sup>
Sub-Total	398.85 m <sup>2</sup>

#### Second Floor

Lecturers' Rooms (15.55 m <sup>2</sup> x 12)	186.62 m <sup>2</sup>
Toilets	41.32 m <sup>2</sup>
Corridor and Stairs	104.00 m <sup>2</sup>
Balcony	66.92 m <sup>2</sup>
Sub-Total	398.85 m <sup>2</sup>

Administration Building Total	1,197.36 m <sup>2</sup>
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### 3) Dormitory Building

The Dormitory Building will have the following rooms.

Bedrooms for Male Students (4 Students x 57 Rooms), Bedrooms for Female Students (4 Students x 18 Rooms), Guest Rooms (2) and Dormitory Office

### Floor Area Calculation Standards

Bedrooms (4 Occupants)	18.0 - 36.0 m <sup>2</sup>
Required No. of Showers	1/10 - 15 persons
Required No. of Toilet Bowls	1/10 - 15 persons
Required No. of Urinals	1/10 persons

The resulting floor area and number of required items are as follows:

	Number of Occupants/Users	Required Floor Area/Number	Adopted Floor Area/Number
Bedrooms	4	18.0 - 36.0 m <sup>2</sup>	21.10 m <sup>2</sup>
Showers	228 (male)	15.0 - 22.8	21
Showers	72 (female)	4.8 - 7.2	8
Toilet Bowls	228 (male)	15.2 - 22.8	24
Toilet Bowls	72 (female)	9.6 - 14.4	10
Urinals	228 (male)	22.8	24

The floor area of the Dormitory Building calculated on the basis of the above conditions is given below.

#### Ground Floor

Guest Rooms (1) (21.30 m <sup>2</sup> x 2)	42.60 m <sup>2</sup>
Bedrooms for Male Students (4) (21.00 m <sup>2</sup> x 17)	357.00 m <sup>2</sup>
Bedrooms for Female Students (4) (21.10 m <sup>2</sup> x 6)	126.60 m <sup>2</sup>
Dormitory Office	21.60 m <sup>2</sup>
Toilets and Shower Rooms	144.25 m <sup>2</sup>
Corridors and Stairs	326.15 m <sup>2</sup>
Balconies	147.60 m <sup>2</sup>
Sub-Total	1,165.80 m <sup>2</sup>

#### First Floor

Bedrooms for Female Students (4) (21.10 m <sup>2</sup> x 6)	126.60 m <sup>2</sup>
Bedrooms for Male Students (4) (21.06 m <sup>2</sup> x 20)	421.20 m <sup>2</sup>

Toilets and Shower Rooms	144.25 m <sup>2</sup>
Corridors and Stairs	326.15 m <sup>2</sup>
Balconies	147.60 m <sup>2</sup>
Sub-Total	1,165.80 m <sup>2</sup>

#### Second Floor

Bedrooms for Female Students (4) (21.10 m <sup>2</sup> x 6)	126.60 m <sup>2</sup>
Bedrooms for Male Students (4) (21.06 m <sup>2</sup> x 20)	421.20 m <sup>2</sup>
Toilets and Shower Rooms	144.25 m <sup>2</sup>
Corridors and Stairs	326.15 m <sup>2</sup>
Balconies	147.60 m <sup>2</sup>
Sub-Total	1,165.80 m <sup>2</sup>

Dormitory Building Total 3,497.40 m<sup>2</sup>

#### 4) Workshop Building

The floor area of the Workshop Building calculated on the basis of the machinery and work table layout plan is as follows:

#### Ground Floor

Workshop	251.08 m <sup>2</sup>
Attendant's Room	8.06 m <sup>2</sup>
Storage Room	9.30 m <sup>2</sup>
Corridor and Stairs	9.00 m <sup>2</sup>
Sub-Total	277.44 m <sup>2</sup>

#### First Floor

Workshop	251.08 m <sup>2</sup>
Attendant's Room	8.06 m <sup>2</sup>
Storage Room	9.30 m <sup>2</sup>
Corridor and Stairs	9.00 m <sup>2</sup>
Sub-Total	277.44 m <sup>2</sup>

Workshop Building Total 554.88 m<sup>2</sup>

### 5) Power Building

The total floor area of the Power Building calculated on the basis of the generator and panelboard sizes, etc., is 100.00 m<sup>2</sup>.

The total floor area of the new buildings based on items 1) - 5) above is as follows:

Classroom Building	2,699.26 m <sup>2</sup>
Administration Building	1,197.36 m <sup>2</sup>
Dormitory Building	3,497.40 m <sup>2</sup>
Workshop Building	554.88 m <sup>2</sup>
Power Building	100.00 m <sup>2</sup>
<hr/>	
Total	8,048.90 m <sup>2</sup>

### (2) Vertical Plan

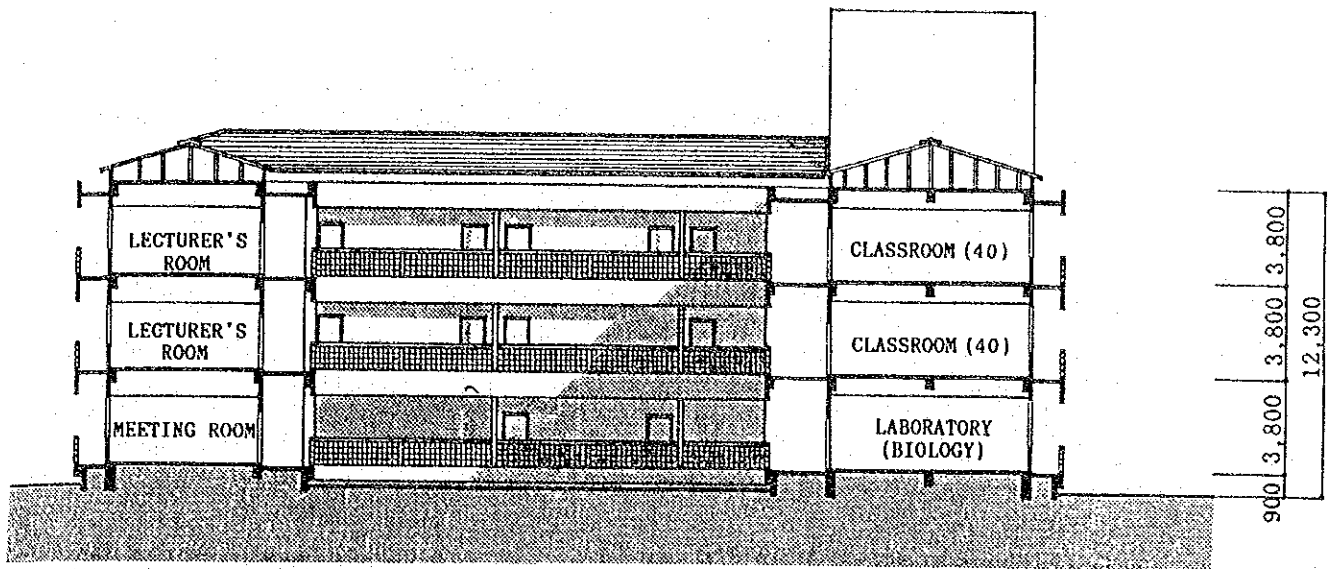
The main consideration in the case of the vertical plan is for all the buildings distributed on the site in accordance with the layout plan to conform to each other.

- 1) application of the same specifications for the exterior wall finishing and colour
- 2) use of aluminium window frames instead of steel frames to avoid damage by salt due to the site's location near the sea
- 3) provision of eaves for each floor to stress the horizontal lines of the buildings
- 4) provision of wide openings on exterior walls to promote natural ventilation for those rooms for which air-conditioning is not provided.

### (3) Sectional Plan

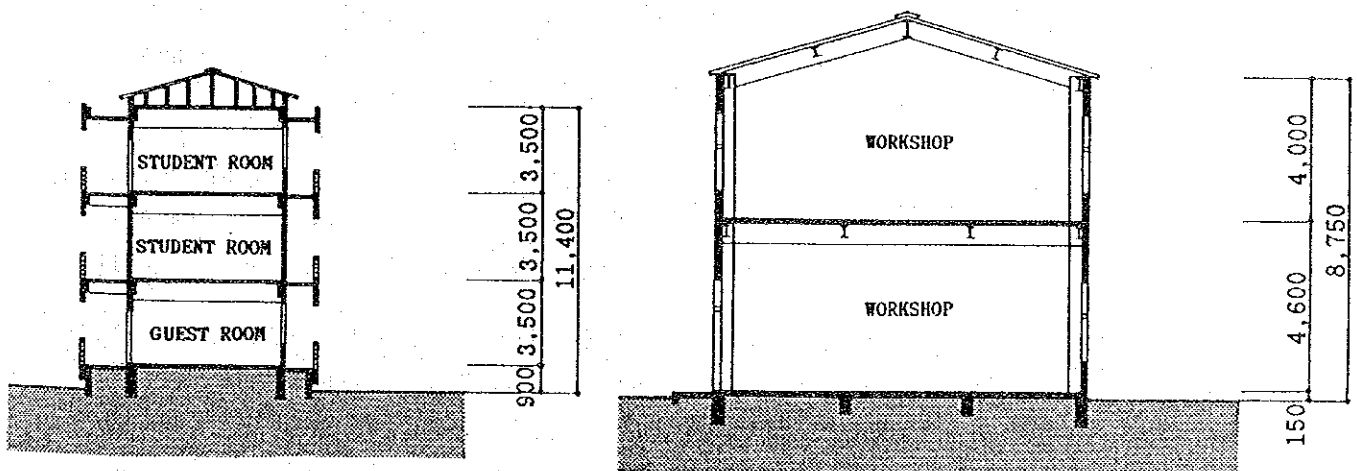
The basic floor heights will be 3.80 m for the Classroom Building and Administration Building and 3.50 m for the Dormitory Building in view

# Section Planning



ADMINISTRATION BUILDING

CLASSROOM BUILDING



DORMITORY BUILDING

WORKSHOP BUILDING

of the planned large spaces for the laboratories, drawing room and classrooms, etc. requiring easy ventilation. Moreover, eaves will be provided for all floors to shut out direct sunshine and to prevent rain from entering the rooms. A double roof structure consisting of concrete slabs with a wooden roof truss above them will be adopted in view of heat insulation and waterproofing. In the case of the workshop, however, only steel frames will be used in view of the large spans. The standard sections are shown below.

#### (4) Material Plan

It is now almost two years since the construction of the existing Fishing Technology Laboratory Building and the Mock Bridge Building and the materials used for these buildings have been evaluated. Those materials for which the evaluation results are positive will be used for the new buildings to achieve harmony with the existing buildings while those for which the evaluation results are negative will be replaced by other local materials.

##### 1) Exterior Finish

Structures:	reinforced concrete
Exterior Walls:	acrylic spray tile to ensure waterproofing and harmony with existing buildings
Roofs:	concrete slabs with wooden roof truss covered by corrugated coloured slates to ensure heat insulation and waterproofing during heavy rain. Concrete slabs will not be used for the Workshop Building
Doors and Window Frames:	aluminium finish window frames and steel doors

##### 2) Interior Finish

Partitions:	concrete block partitions will in principle be used in view of future
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flexibility, sound insulation, prevention of termite damage and easy plumbing while simple partitions will be wood with termite control treatment

Floors:

terrazzo polished on site will in principle be used in view of abrasion-resistance and easy maintenance. In the case of workshops, mortar hardener finish will be employed to improve the durability

Walls:

mortar with emulsion paint finish for hygiene and easy maintenance

Ceilings:

materials with high sound absorption will be used in view of the extensive use of hard flooring. Highly water resistant materials will be used in those places using water

#### 4.3.3 Structural Plan

In view of the proximity of the proposed construction sites to the sea, the main structural materials will all be highly salt resistant. The structural system has been selected in view of ensuring smooth work on site, durability and easy maintenance. The reinforced concrete structure, which is the most common structure in Nigeria for the types of buildings planned, will be adopted for pillars, beams and floors while concrete blocks or bricks will be used for walls. The shape of the buildings will be kept as simple as possible.

Nigeria is located far from the earthquake zone in the central Atlantic and no large earthquake has been recorded in the last 100 years. With regard to wind pressure, the largest wind velocity observed at Ikeja, which is not far from the proposed construction sites, in the last ten years was some 60 miles/hour. As a result, the types of load considered in the structural design are the dead load and imposed load which are the constant load plus the wind pressure as the horizontal load.



Victoria Island is situated at the meeting point of the Lagos Lagoon and the Gulf of Guinea and has uniform ground formed by the sedimentation of sand over a long period of time. The results of the prospecting survey conducted at three places at the sites indicate that a ground bearing strength of some 15 tons/m<sup>2</sup> can be expected and, therefore, direct foundations are planned for the single to three-story buildings.

The Nigerian structural standards are based on the relevant British Standards and were followed for the present design purposes. The following types of load vis-a-vis the buildings are considered.

- 1) Dead Load: calculation of the real load of the building components, including structural materials and finishing materials
- 2) Imposed Load: calculation of the imposed load for the offices and classrooms, etc., is based on BS CP3 Chapter V. The value of the special load is separately calculated
- 3) Wind Pressure: the basic wind velocity is some 70 miles/hour (30 m/sec)
- 4) Seismic Force: not considered

#### 4.3.4 Plumbing Work Plan

##### (1) Water Supply

There is one deep well (100 m in depth) on the NIOMR premises with a spring water volume of 114 tons/day which is equipped with a submerged water pump capable of pumping 136 tons/day. A filtration pond (capacity: 80 m<sup>3</sup>) is located next to the well. The pumped water is currently stored in a 4 m<sup>3</sup> water tank via the filtration point and water treatment equipment and is then supplied to the Fishing Technology Laboratory only.

The present daily water consumption volume of the Fishing Technology

Laboratory is approximately one ton. The monthly change of water in the flume tank requires 30 tons. As the estimated daily water consumption volume of the new buildings is some 80 tons, i.e. 75 tons for the dormitory building (500 x 150 r/day) and 4.5 tons for other buildings (90 x 50 r/day), the present water supply system using the well water can be shared by all the new buildings (except the Workshop Building) considering the satisfactory spring water volume, capacity of the submerged water pump and capacity of the filtration pond, with the exception of the present water treatment equipment and water tank.

Since the water supply from the federal and state water mains is extremely poor, the planned water supply system for the new buildings will include a new water treatment equipment and water tank to be connected to the existing filtration pond. Water will be pumped from this tank to an elevated water tank on top of the Classroom Building and will then be supplied to all the new buildings by the gravity method.

In the case of the Workshop Building, as the expected water consumption volume is small, extension from the state water main running under the adjacent road is planned so that water can be stored in a water tank during the night.

## (2) Drainage

Drainage will be conducted in the following three ways.

- rainwater will be drained to drainage pipes under the road via gutters and drainage pipes
- sewage will be infiltrated to the ground through an infiltration tank after first being treated at a septic tank
- miscellaneous waste water will be directly drained to the infiltration tank

(3) Gas Supply

A gas supply system using LPG, which is popularly used in Nigeria and easily obtainable if cylinders are available, will be provided for the laboratories and kitchen. LPG cylinders will be provided where required.

(4) Sanitary Ware

Western style toilet bowls with flush levers and urinals will be provided.

(5) Fire Extinguishing System

The provision of fire hydrants, and fire extinguishers as stipulated by the Nigerian Fire Service Act Nigeria is planned.

4.3.5 Air-Conditioning and Ventilation Plan

The air-conditioning cost generally accounts for a large proportion of the maintenance cost due to the high temperature and humidity in Lagos State. The present plan intends the maximum use of natural ventilation and the provision of mechanical air-conditioning for special rooms. Air-conditioners will be procured locally in view of easy maintenance.

(1) Air-Conditioning

Either air cooling window-type or air cooling separate-type air-conditioners which are most commonly used in Nigeria will be provided. A central air-conditioning system has not been adopted the sake of energy saving and because of the different uses of the rooms. Those rooms where independent air-conditioners will be provided are as follows, while those rooms without such equipment will be ventilated by ceiling fans.

- Classroom Building

audio-visual room, library and preparation rooms

- Administration Building

principal's office, lecturers' rooms, administration office, accounting office, instruction office, medical treatment room, meeting room,

- Dormitory Building

guest rooms and dormitory office

- Workshop Building

instructors' rooms

(2) Ventilation

A mechanical ventilation system will be provided for those places where overwhelming heat and bad odour may be generated, i.e., toilets and the Power Building.

#### 4.3.6 Power Supply Plan

All electrical equipment and apparatus have been selected on the basis of reliability and durability while the system has been selected on the basis of operational safety and easy maintenance.

(1) Power Supply

The present transformer (500 kVA) of the NIOMR cannot meet the additional power requirement and, therefore, a new transformer will be provided to supply power to the new buildings. This transformer will receive power from the high voltage power transmission cable (3-phase, 3-wire, 11,000V) of the NEPA buried under the adjoining road and power (3-phase, 3-wire, 400 V, 50 Hz) will be supplied to the Power Building from the secondary side of the transformer.

(2) Power Distribution

Power will be supplied to the trunk power lines from the Power

Building. For those places where low voltage power is required for special equipment, an AVR (automatic voltage regulator) will be connected to the power line to supply power of the required voltage to these places. In the case of the new Workshop Building, the existing transformer can be rearranged to supply power to the new building.

(3) Generator

A standby generator will be provided to supply emergency power to laboratory equipment and special equipment as well as for fire extinguishing and security purposes during blackouts.

(4) Lighting and Power Outlets

In general, fluorescent lamps will be used inside the buildings. Appropriate power outlets will be provided in view of the uses of the rooms. The standard luminous intensities which are judged appropriate for the different types of rooms are as follows:

rooms in administrative offices	300 lux
meeting room	300 lux
classrooms	300 lux
laboratories	500 lux
bedrooms	200 lux
toilets and corridors	100 lux

(5) Telephones

The NIOMR currently has no telephone lines available and it will be difficult to obtain new trunk lines for the FFS buildings. The existing exchange equipment capable of handling 6 external lines and 50 extensions is deteriorated and the provision of additional extensions is impossible. Therefore, new exchange equipment capable of handling the current 6 external lines and the number of extensions required to meet the telephone requirements of both the existing and new buildings will be provided.

(6) Public Address System

A public address system will be provided for the Administration and Classroom Building to page lecturers and students and for emergency broadcasting. Wall-type and ceiling-type speakers will be installed.

(7) TV Antenna

A common TV antenna will be erected on the campus and the television outlets will be provided in necessary places such as audio-visual room.

(8) Lightning Rod

A lightning rod will be erected at the elevated water tank on the roof of the Classroom Building.

(9) Fire Alarm System

A fire alarm system which automatically detects fires and issues an alarm will be installed for the early detection of fires and the prevention of serious damage pursuant to the Nigerian Fire Service Act.

4.3.7 Equipment Plan

The main equipment, the provision of which is planned, is as follows:

(1) Equipment for Marine Engineering Workshop

Machine Tools and Others

1) Lathe	1
2) Vertical Milling Machine	1
3) Horizontal Milling Machine	1
4) Shaper	1
5) Drills	2
6) Grinders	4

7) Power Metal Cutter	1
8) Sheet Metal Cutter	1
9) General Tools	40 sets
10) Measuring Instruments	10 sets
11) Vices	25
12) Electric Welders	2
13) Gas Welders	2
14) Forging Tools	1 set
15) Work Tables	15
16) Apparatus Shelves	6
17) Tool Shelves	10

#### Machines for Teaching Use

18) Volute Pump	1
19) Motor Models	2
20) Transformers	2
21) Variable Resistors	2
22) Generator Model	1
23) Electrical Circuit Models	2

#### (2) Equipment for Drawing Rooms

1) Machine Drawing Set (for Instructor)	1
2) Machine Drawing Sets and Tables	40

#### (3) Equipment for Equipment Storage Rooms

1) Personal Computers	4 sets
system units, keyboards, display units, printers, various software	

2) Power Units	4 sets
(4) Audio-Visual Equipment	
1) Screen	1
2) Slide Projector	1
3) Tape Recorder	1
4) 16 mm Projector	1
5) VTR	1
6) Overhead Projector	1
(5) Equipment for Teaching Material Preparation	
1) Copier	1
(6) Equipment for Nautical Science and Fishing Department	
1) Gyrocompass (with 1 repeater compass)	1
2) Satellite Navigator	1
3) Inflatable Life Raft	1
4) Life Jackets	4
5) Rescue Signals	2 sets
6) International Signal Flags	1 set
7) Barometer	1
8) Anemoscope and Wind Meter	1 set
(7) Equipment for Applied Science Laboratory	
1) Indoor Fish Culture Tanks	2
2) Aquariums	4
3) pH Meters	2
4) DO Meters	2



5) Salinometers	2
6) Autoclave	1
7) Feed Grinder	1
8) Water Analyzers	2
9) Pyrostat	1
10) Oven	1
11) Muffle Furnace	1
12) Hot Plate	1
13) Kjeldahl Protein Analyzer	1
14) Spectrophotometer	1
15) Gas Chromatograph	1
16) Table Type Agitator	1
17) Fat Extractor	1
18) Precision Balance	1
19) Homogenizer	1
20) Centrifuge	1
21) Portable Mincer	1
22) Portable Meat Cutting and Mixing Machine	1
23) Pure Water Manufacturing Unit	1
24) Freezer/Refrigerators	2
25) Laboratory Tables	2
26) Work Tables	5
27) Equipment Shelf	1

(8) Equipment for Chemistry Laboratory

1) Laboratory Tables	6
2) Draft Chamber	1
3) Glass Apparatus and Auxiliary Equipment	

4) Equipment Shelves	5
(9) Equipment for Biology Laboratory	
1) Laboratory Tables	6
2) Pyrostat	1
3) Fish Dissection Sets	20
4) Scales	10
5) Refrigerator	1
6) Microscopes	20
7) Stereomicroscopes	20
8) Equipment Shelves	5
(10) Equipment for Physics Laboratory	
1) Work Tables	10
2) Equipment Shelves	10
3) Various Equipment relating to Dynamics, Electricity, Light and Sound	
(11) Vehicles	
1) Microbuses for the transportation of students	2
(12) Boats	
1) Small Boats with Outboard Engines	2
(13) Fishing Gear	
Nets, Net Materials, Ropes and Floats, etc.	

#### 4.3.8 Existing Canteen Building Renovation Plan

There is already a canteen building on the NIOMR premises. While this building has no problems of a structural nature, there are such problems as water leakage from the roof due to the deterioration of the asphalt waterproofing, damage to both the interior and exterior mortar walls, corrosion of the metal fittings, wear of flooring materials and the deterioration of the furniture. In addition, the corrosion of the buried pipes has almost put the water, power and sewerage services out of operation. While the power supply is still maintained, there is a danger of short-circuiting.

As this will be the only canteen facility when the buildings planned under the Project are completed and as it will not be capable of fully serving a large number of boarding students, there is serious concern regarding healthy and stable student life on the campus. It is, therefore, planned to improve the existing canteen building and it is preferable that the relevant work be conducted between July and September, i.e., the vacation period at the end of the school year. The basic principles for the improvement work are as follows:

##### (1) Building Work

- In principle, the structure of the building will not be altered.
- The asphalt waterproofing on the roof will be entirely renewed and covered by gravel.
- The interior, exterior and floor finishing will be of the same standard as that of the new buildings.

##### (2) Building Services

###### 1) Electrical Work

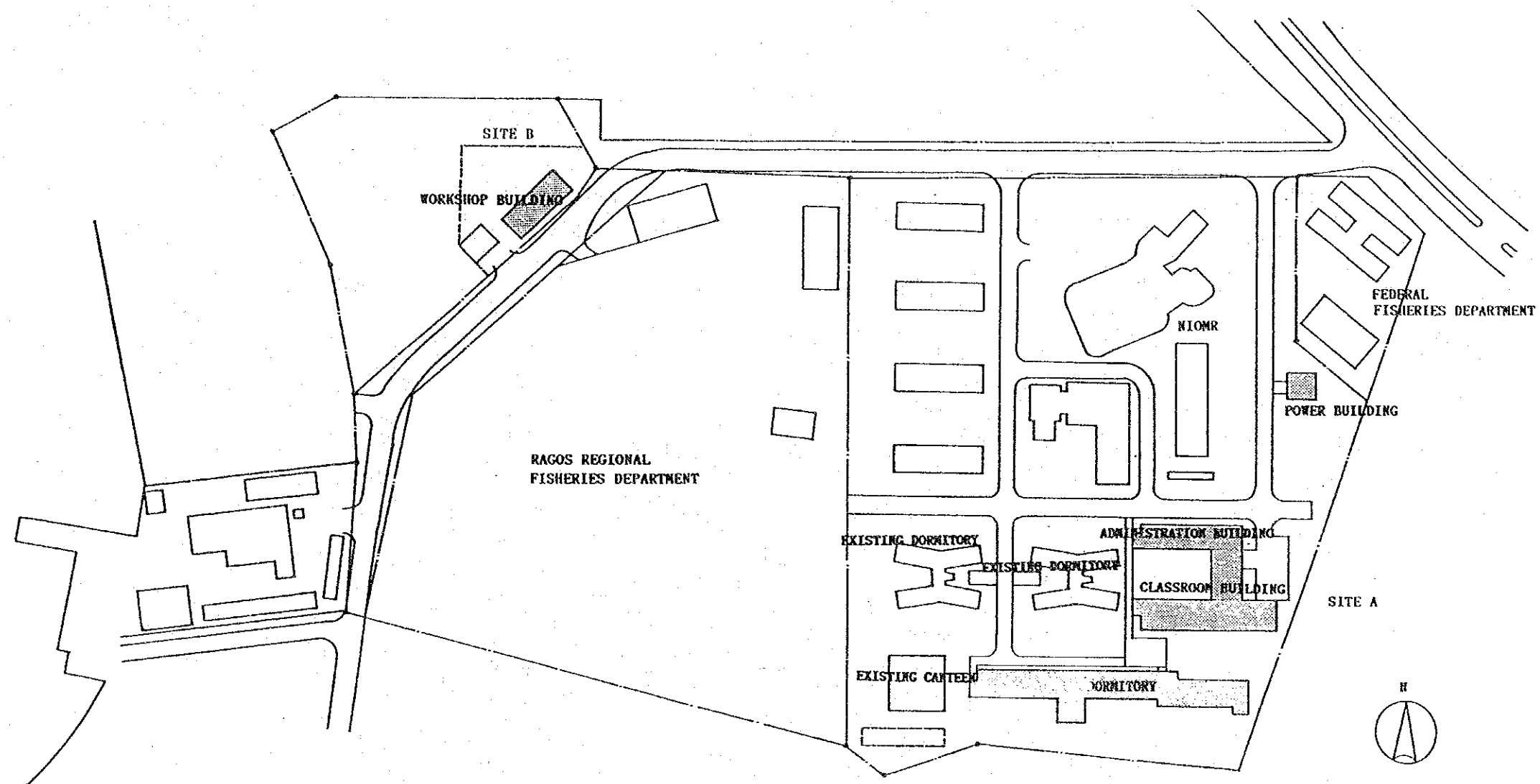
- A new power distribution board will be installed to receive power from the new power building. All pipes will be exposed.

- Lights and power outlets will be entirely renewed using the same items as for the new buildings.
- Ceiling fans will be installed.

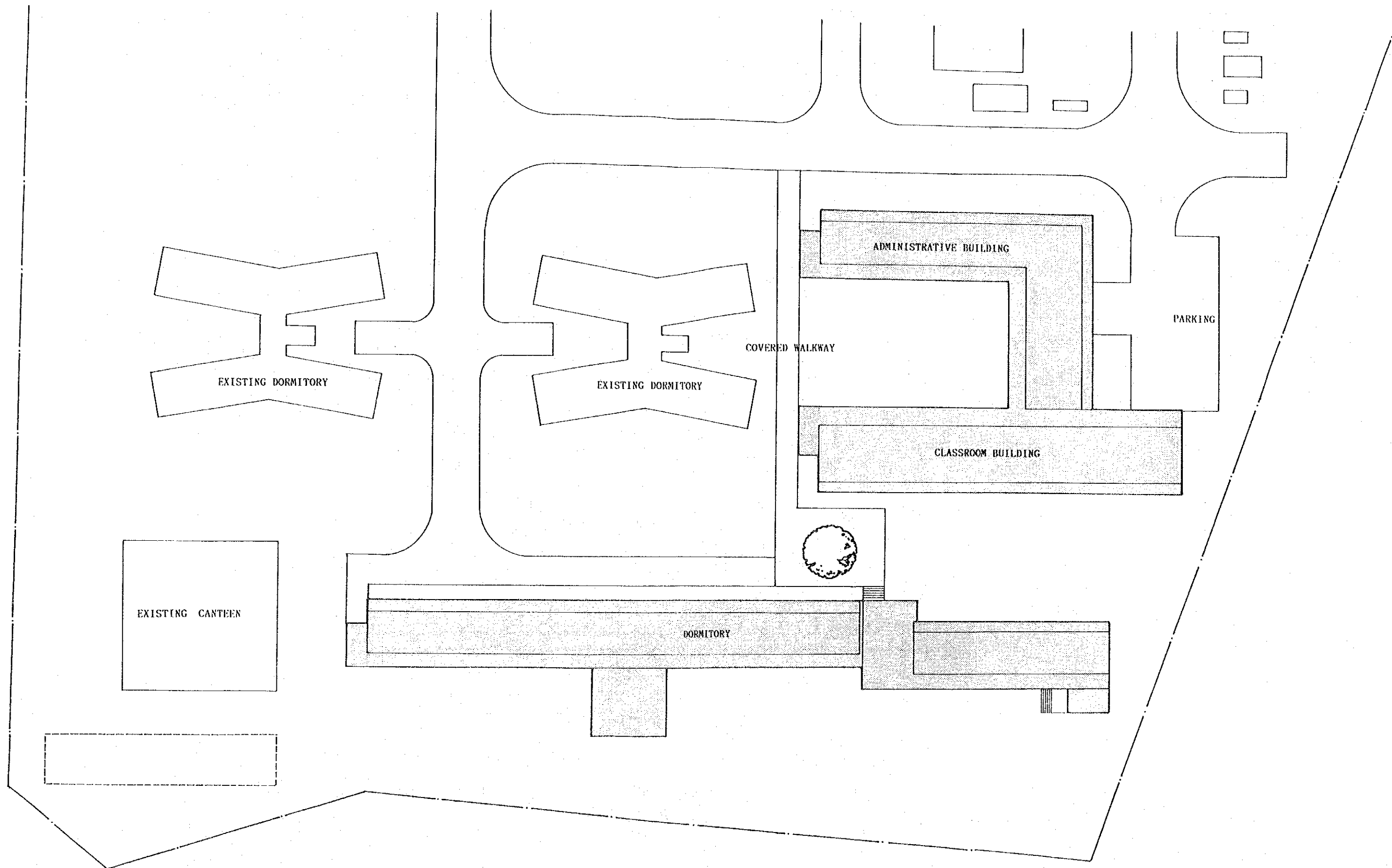
## 2) Plumbing Work

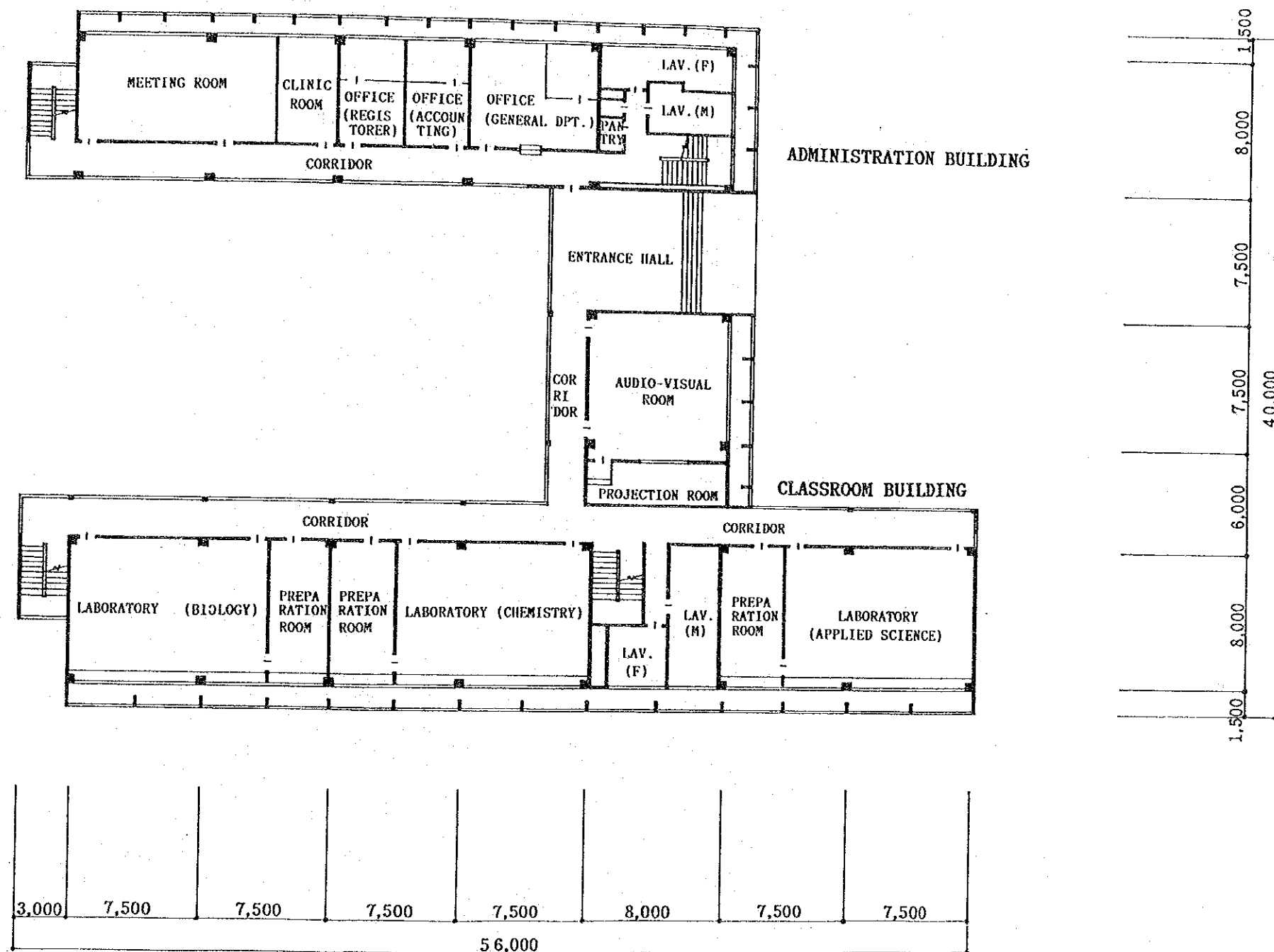
- The water supply will be directly provided from the elevated water tank on the Classroom Building and all pipes will be exposed.
- Drainage pipes will be exposed where possible and will be properly tilted. The existing drainage pipes will be improved in those places where exposed pipes cannot be used.
- All toilets will be renewed.
- The existing infiltration tank will be improved for continued use.

## 4.4 Basic Design Drawings

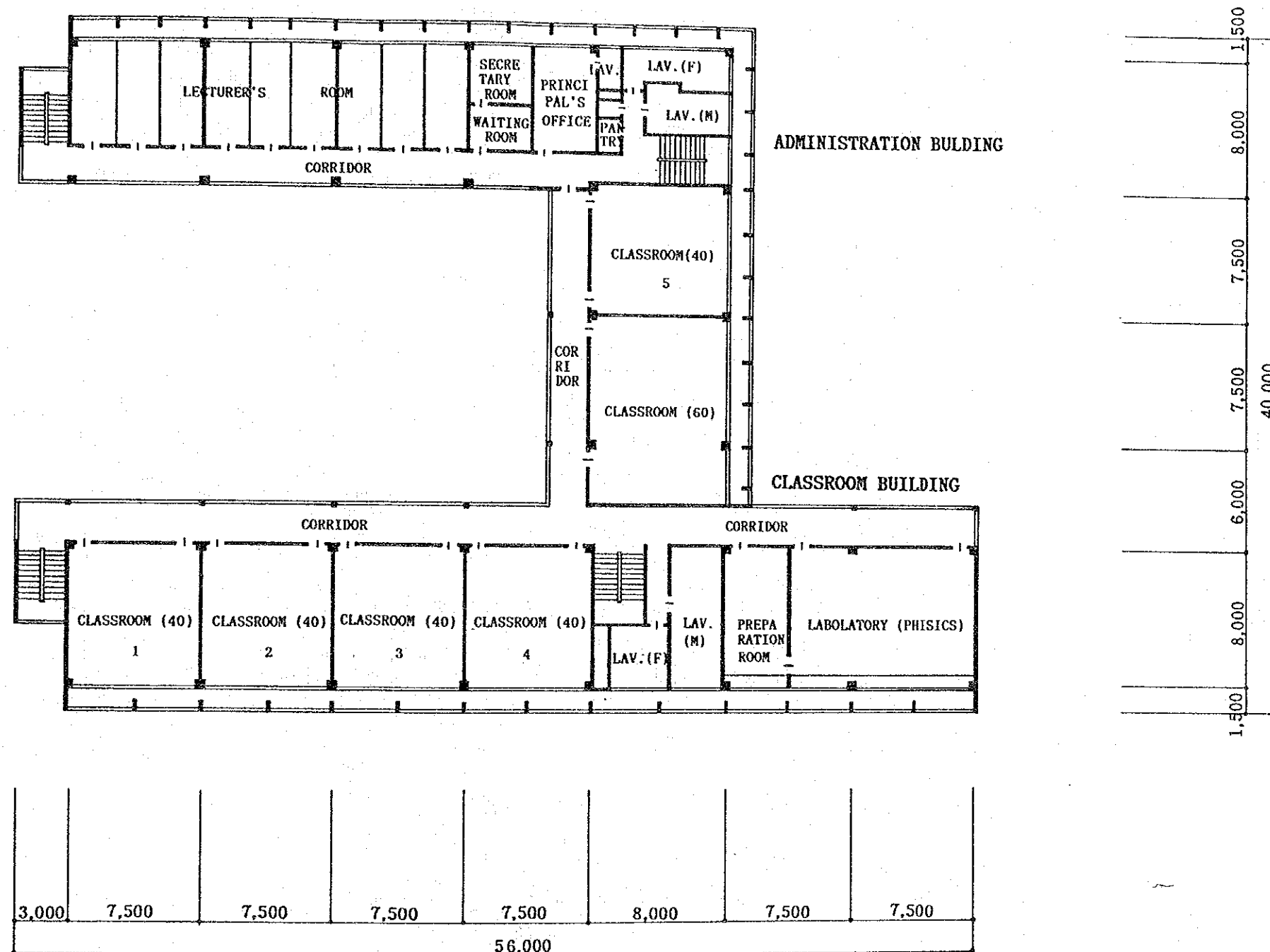


PLOT PLAN 1:2,000



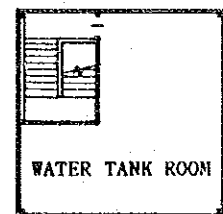


ADMINISTRATION BUILDING AND CLASSROOM BUILDING GROUND FLOOR PLAN 1:300

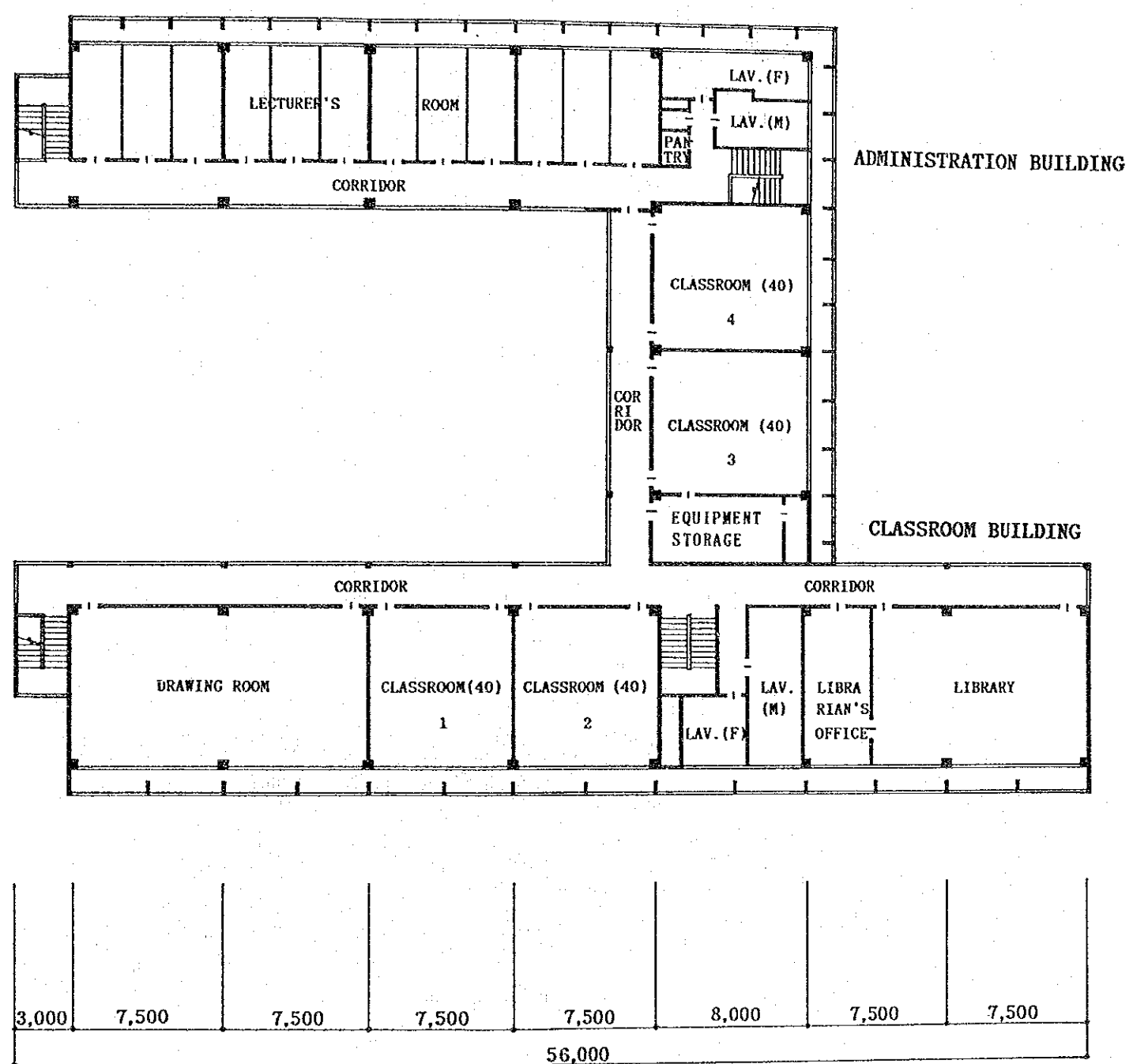


ADMINISTRATION BUILDING AND CLASSROOM BUILDING FIRST FLOOR PLAN 1:300

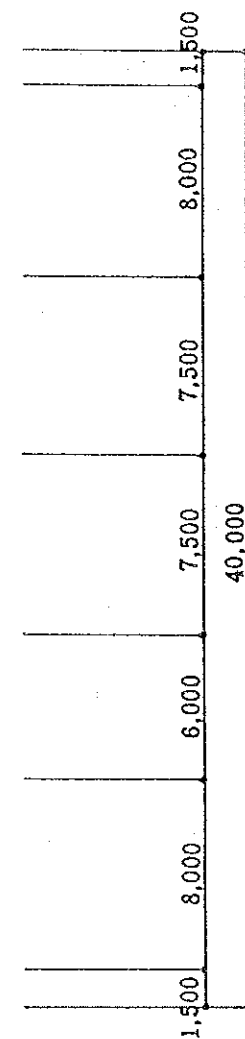


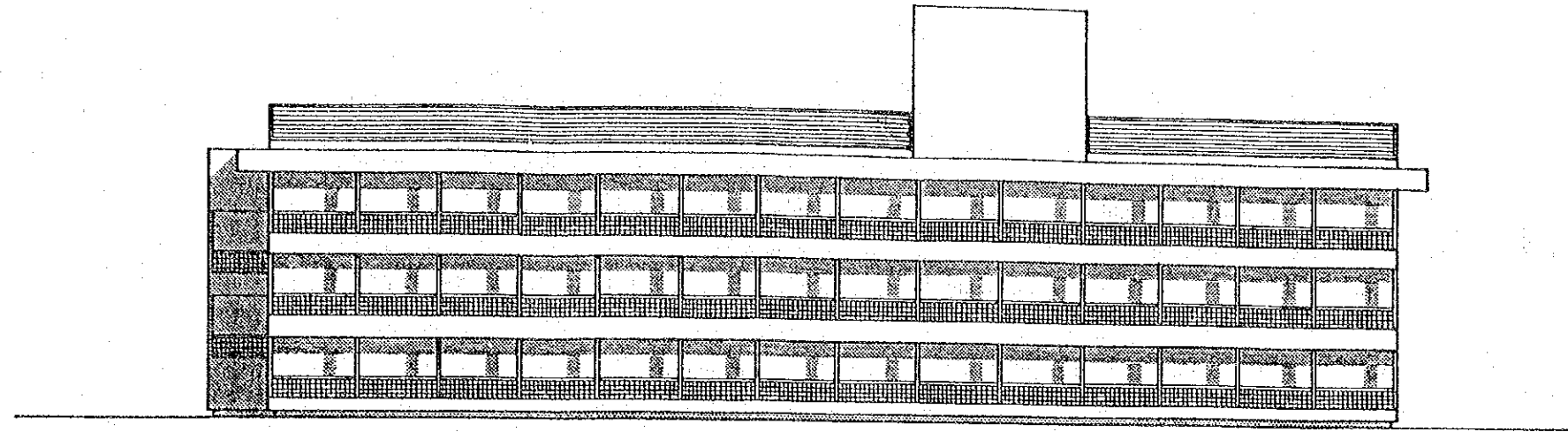


PENTHOUSE PLAN

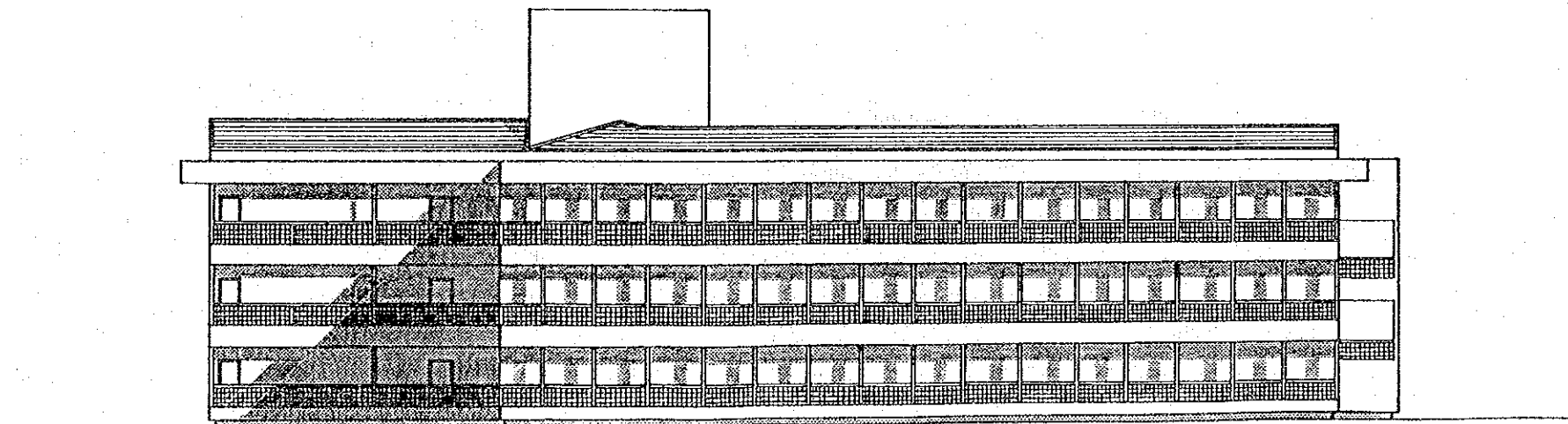


SECOND FLOOR PLAN

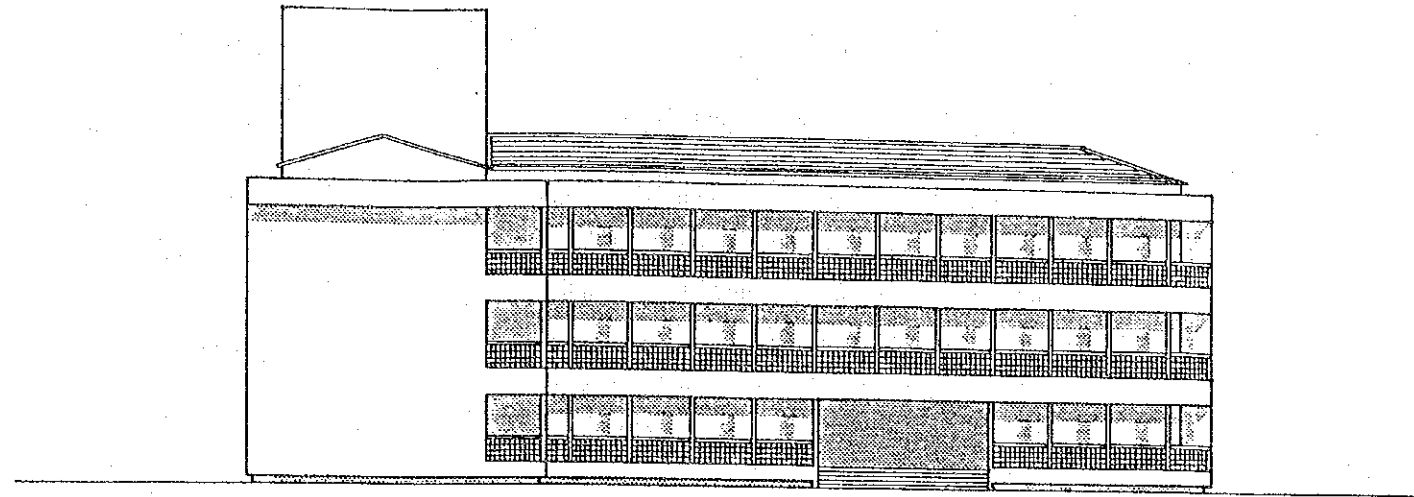




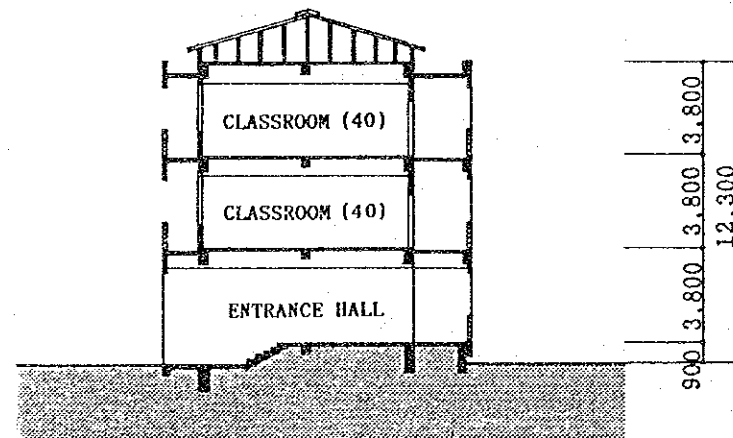
SOUTH ELEVATION



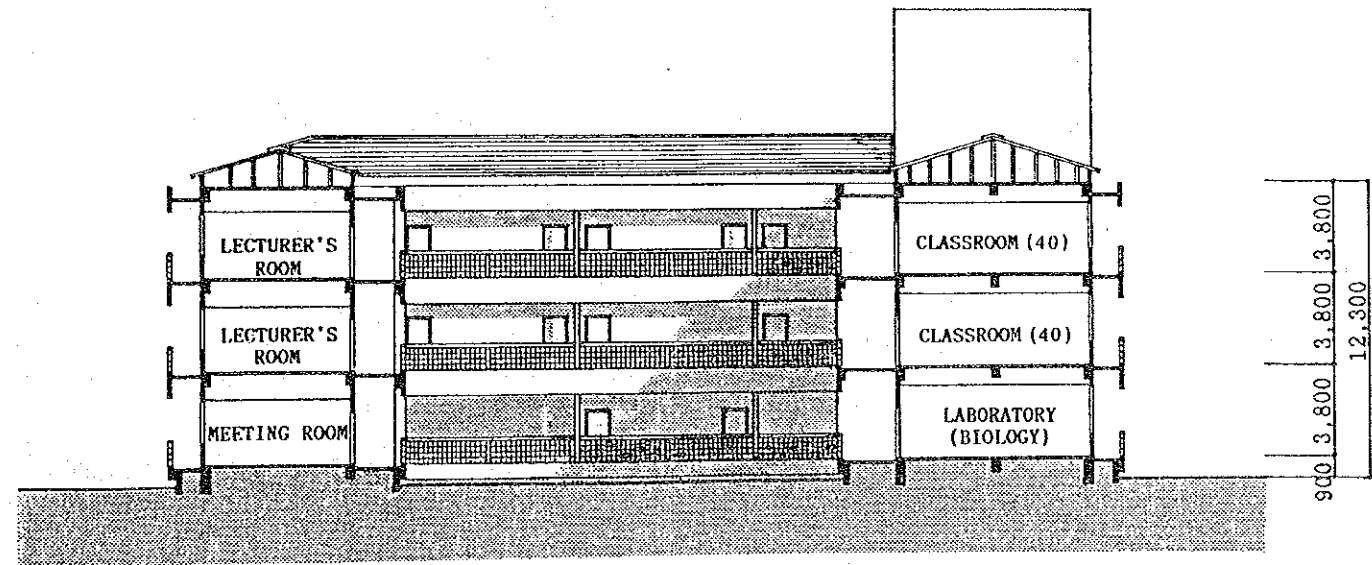
NORTH ELEVATION



EAST ELEVATION

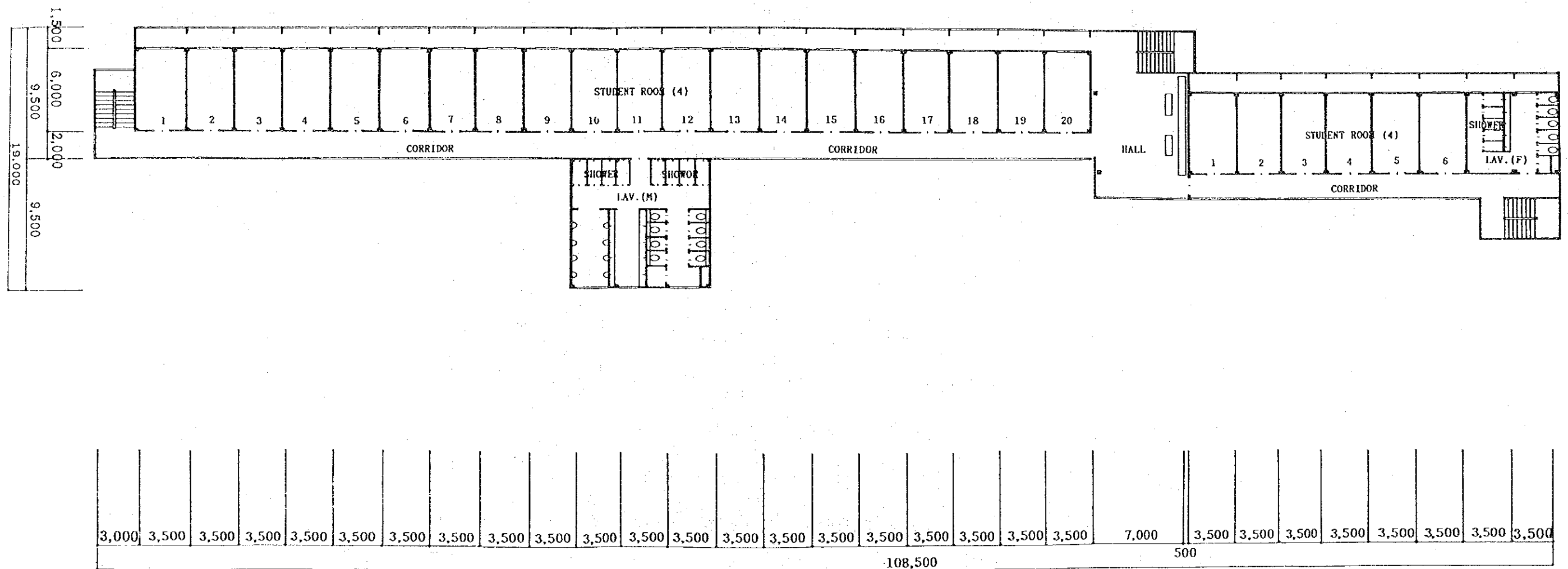


SECTION

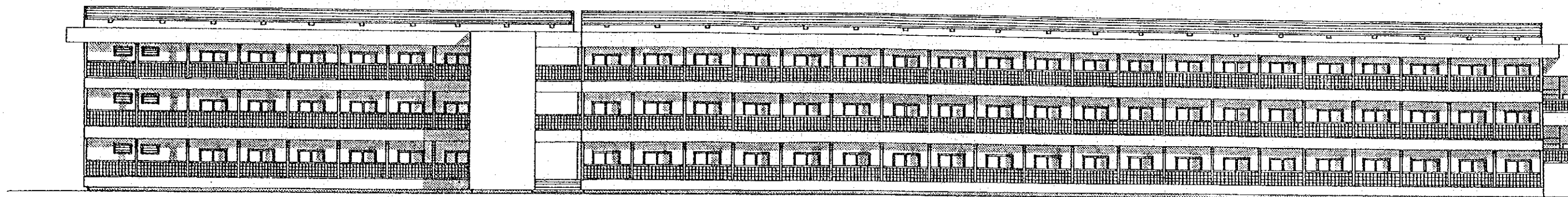


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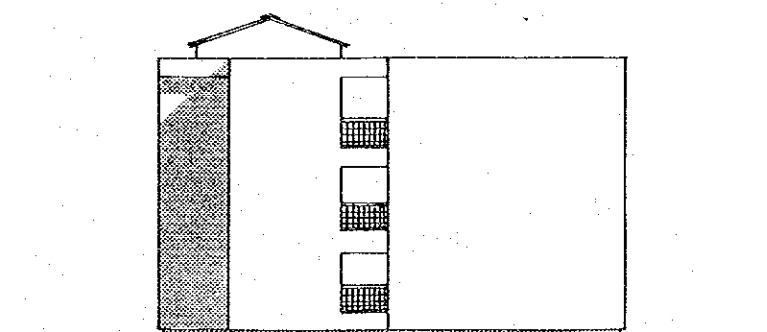




DORMITORY FIRST FLOOR - SECOND FLOOR PLAN 1:300



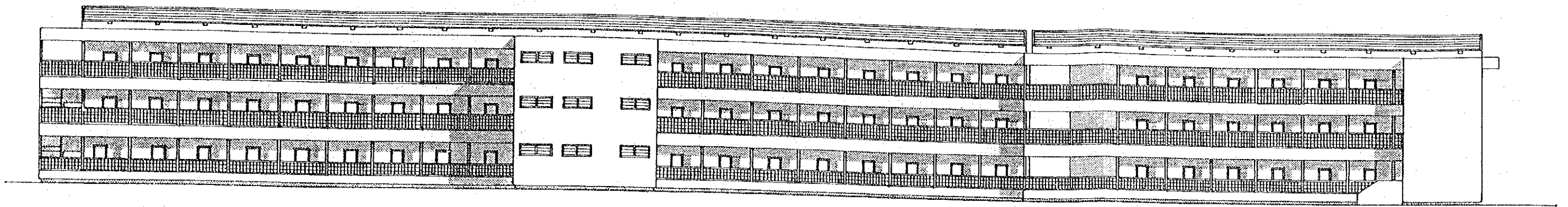
NORTH ELEVATION



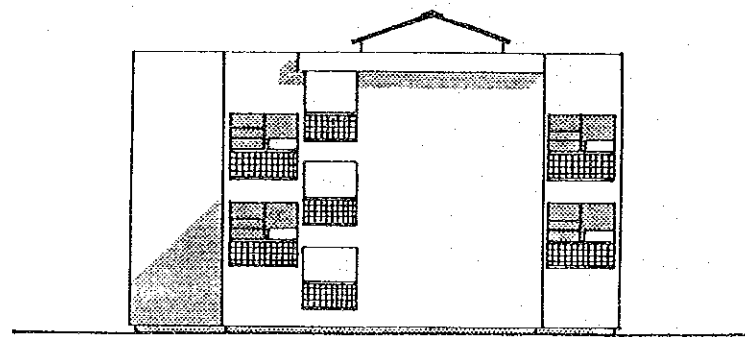
WEST ELEVATION

DORMITORY ELEVATION 1:300

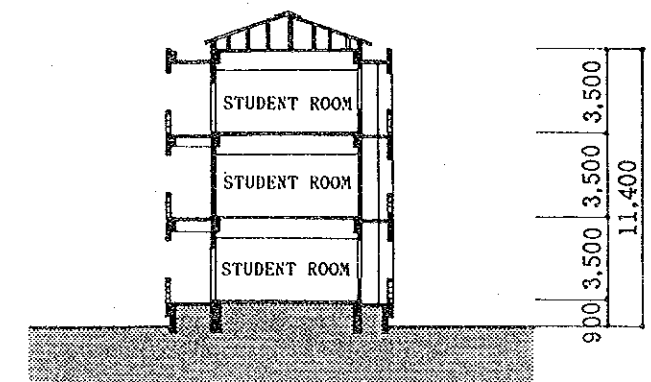
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SOUTH ELEVATION



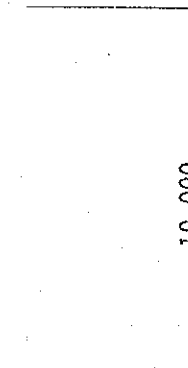
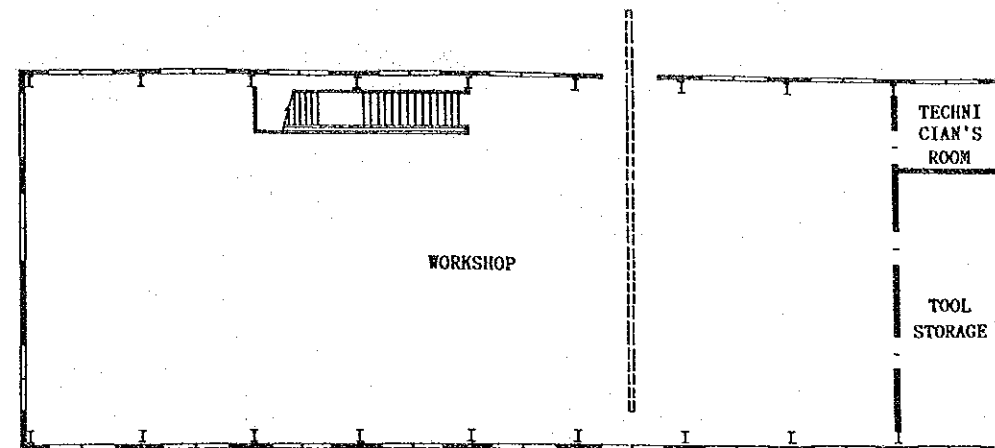
EAST ELEVATION



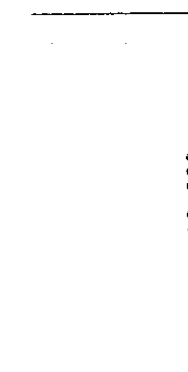
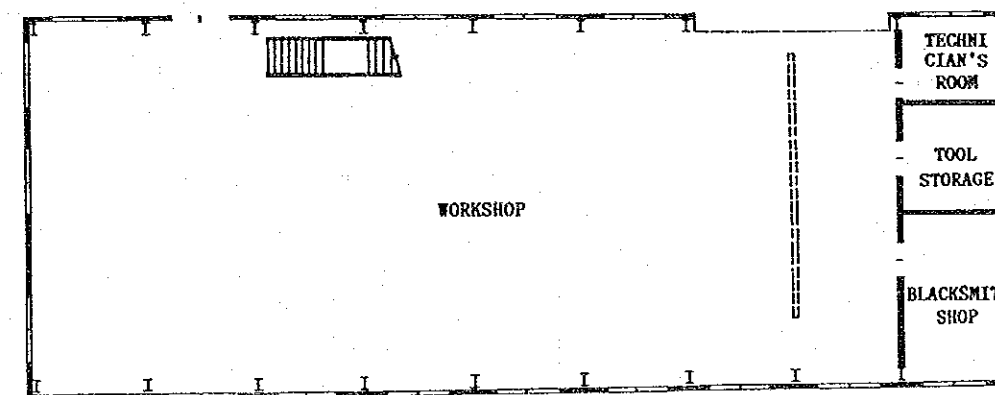
SECTION

DORMITORY ELEVATION • SECTION 1:300

- 1 1 4 -



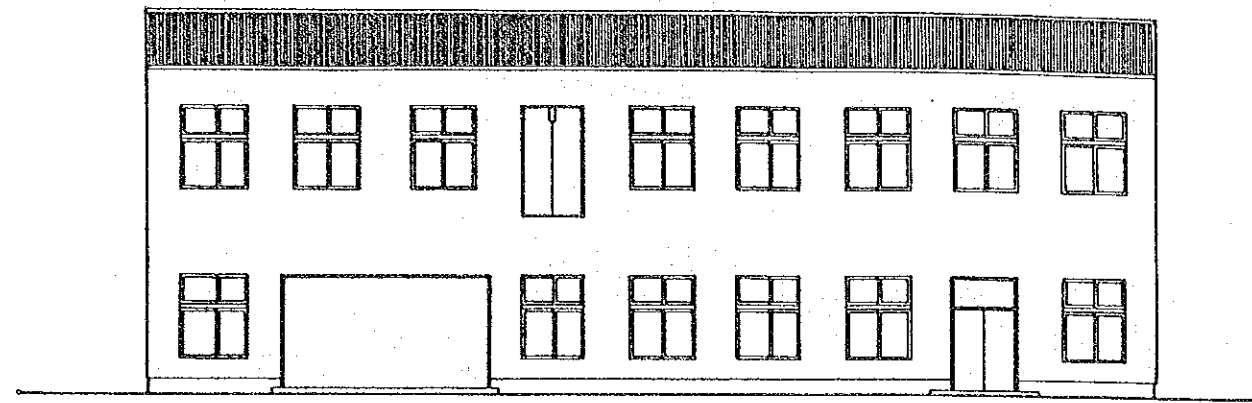
FIRSTFLOOR PLAN



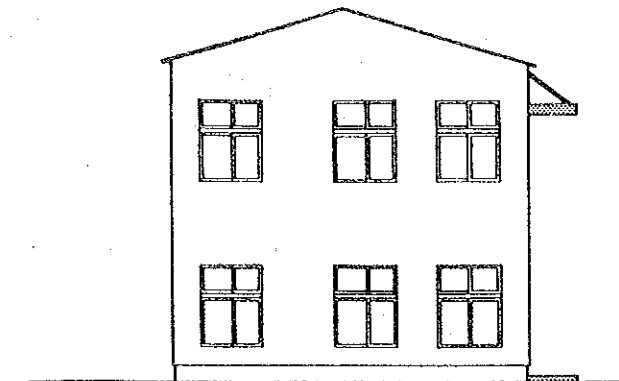
3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
27,000								

GROUND FLOOR PLAN

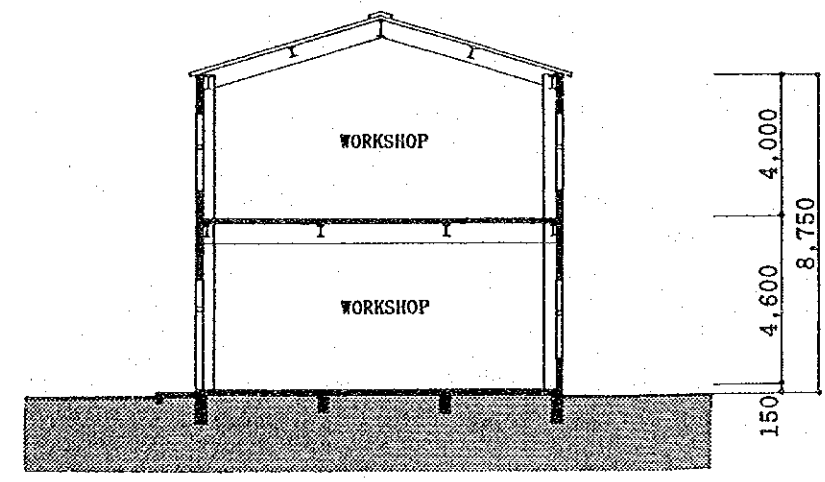




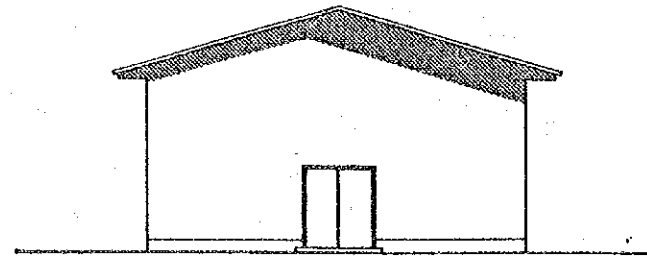
WEST ELEVATION



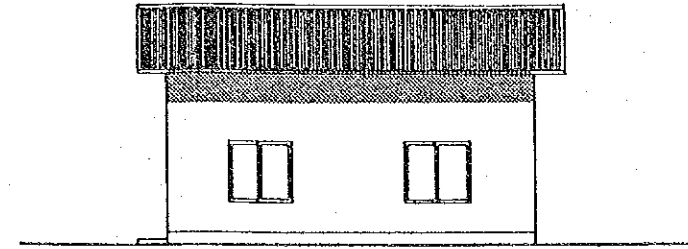
NORTH ELEVATION



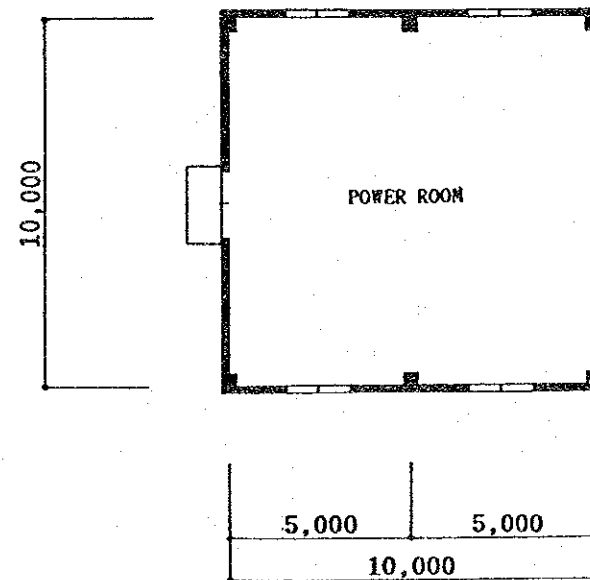
SECTION



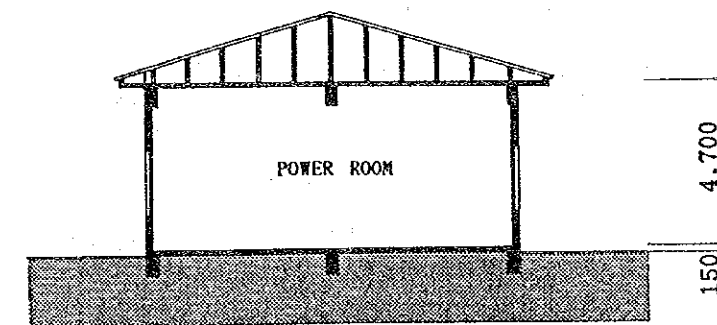
WEST ELEVATION



SOUTH ELEVATION



PLAN



SECTION



## **CHAPTER 5**

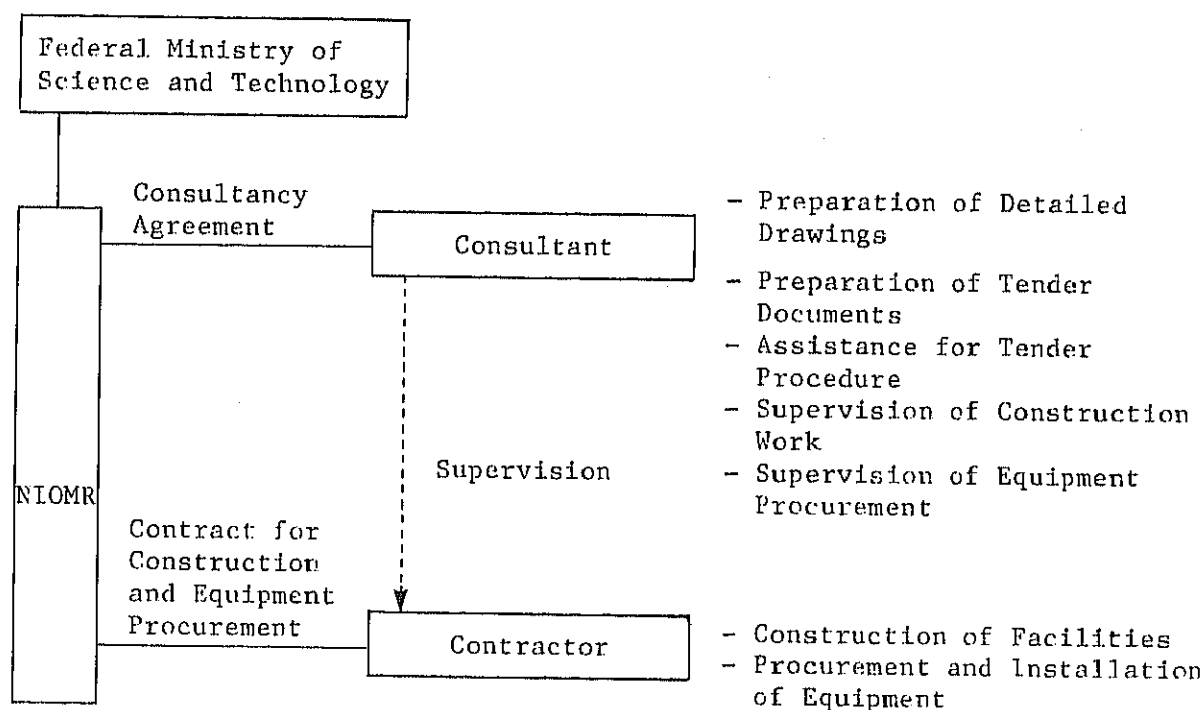
### **PROJECT IMPLEMENTATION PLAN**



## CHAPTER 5 PROJECT IMPLEMENTATION PLAN

### 5.1 Project Implementation System

The project implementation agency for the Project is the NIOMR which will conclude agreements with a Japanese consultant and with contractors and will commission them to implement the Project.



- (1) Upon concluding an agreement with the NIOMR, the consultant will prepare the detailed design and tender documents, will provide assistance for the tender procedure and will supervise both the construction work and the equipment procurement.
- (2) Upon concluding an agreement with the NIOMR after selection through the tender procedure, the contractor will construct the facilities under the supervision of the consultant in collaboration with a Nigerian consultant.

## 5.2 Project Responsibilities

The scopes of the construction work and equipment provision, etc., for which the Japanese and Nigerian sides are responsible to complete the Project are as follows:

### (1) Undertakings by Japanese Side

#### A. Buildings

- a) classroom building
- b) administration building
- c) workshop building
- d) dormitory building
- e) others (guard house and power building)
- f) renovation of existing canteen building

#### B. Building Services

- a) elevated water tank
- b) water treatment system
- c) water tank
- d) septic tank
- e) infiltration tank
- f) telephone exchange equipment
- g) generator

#### C. External Work

- a) site roads and carpark
- b) drainage on premises

#### D. Equipment

- a) equipment for workshop (Marine Engineering Department)
- b) equipment for Nautical Science and Fishing Department
- c) equipment for applied science laboratory

- d) equipment for chemistry laboratory
- e) equipment for biology laboratory
- f) equipment for physics laboratory
- g) equipment for drawing room
- h) equipment for computer room
- i) equipment for audio-visual room
- j) equipment for administration section
- k) equipment for practical training off campus
- l) fishing gear

(2) Undertakings by Nigerian Side

A. Construction Work

- a) To secure the site for the Project
- b) To clear, level and reclaim the site prior to the commencement of the construction (including the removal of the existing mosque and carpark on the proposed sites)
- c) To undertake incidental out-door work such as gardening, fencing, gates and exterior lighting in and around the site
- d) To provide on electricity distributing line to the site
- e) To provide general furniture such as carpets, curtains, tables, chairs and others
- f) To renovate the existing two dormitories
- g) To dismantle the existing unserviceable structures

B. Services and Expenditures Loads

a) General Expenditures

- To bear commissions to the Japanese foreign exchange bank for the banking services based upon the banking arrangement
- To bear expenses for providing on electricity distributing line and telephone trunk line to the required places



- To bear all the expenses for tax exemption and customs clearance of the materials and equipment brought in for the Project at the port of disembarkation
- b) To maintain and use properly and effectively those facilities constructed and equipment purchased under the grant.
- c) To take necessary measures for prompt unloading, tax exemption and customs clearance of the materials and equipment brought in for the project at the port of disembarkation.
- d) To exempt Japanese nationals from custom duties, internal taxes and other fiscal levies which may be imposed in the Federal Republic of Nigeria.
- e) To accord Japanese nationals whose services may be required in connection with the supply of products and the services under the verified contracts such facilities as may be necessary for their entry into Nigeria and their stay there for the performance of their work.
- f) To bear all the expenses, other than those to be borne by the grant, necessary for the construction of the facilities as well as for the transportation and the installation of the equipment.
- g) Placement of staff members necessary for the administration, operation and maintenance of the Project.

## 5.3 Construction Plan

### 5.3.1 Construction Policies

With the conclusion of the Exchange of Notes relating to the Project, the Government of Nigeria will conclude a consultant agreement with the selected Japanese consultant to proceed to the preparation of the detailed design drawings and documents. The consultant will discuss with and explain to the FFS the detailed design, contractor selection method, tender procedure, subcontracting agreements and construction procedure, etc. in accordance with the basic policies determined by the Basic Design.

As various types of preparation work indicated in Section 5.2 (Project Responsibilities), including land preparation, must be completed prior to the commencement of the construction of the buildings so as not to delay the construction work, the Japanese consultant and the FFS should carefully discuss and establish an appropriate implementation schedule, including the time of commencement of site preparation, the provision of building services to the sites to be conducted by the Nigerian side and the presence of Nigerian engineers at the test operation of the building services and equipment.

With regard to the construction plan, the following items should be carefully noted.

- (1) Proper arrangement of the construction schedule during the rainy season (April - October) as this largely determines the prospect of completing the Project on time.
- (2) Proper consideration of the drying process, including water curing, at the time of concrete placing and plaster work during the dry season (November - March).
- (3) Prevention of the theft of materials and equipment, etc. and maintenance of order on the construction sites during the construction period.

- (4) Proper cooperation with local subcontractors for the successful completion of the work by the establishment of an appropriate project management system taking the different assignments of the contractor and local subcontractors and the required manpower to conduct the assignments into consideration.
- (5) Formulation of an appropriate work implementation plan taking the work efficiency of Nigerian workers into consideration.
- (6) In principle, local procurement of construction materials and equipment. However, some materials may have to be imported from Japan in view of quality, quantity and delivery date. As the local construction engineers may not be accustomed to these materials, it may be necessary for the contractor to dispatch engineers to provide advice. The expertise of the local construction engineers should, therefore, be studied and a plan to dispatch engineers prepared if necessary.

#### 5.3.2 Work Supervision Plan

The consultant will provide full-time on-site supervisors with appropriate technical expertise during the work supervision stage to conduct quality control, work progress control and safety control. The consultant will also provide technical engineers for short periods (one week - one month) in accordance with the work progress to inspect and advise on the construction work.

##### (1) Supervision Principles

- To hold frequent consultation meetings with the related Nigerian and Japanese organizations to promote the smooth progress of the construction work.
- To provide appropriate instructions and advice to the contractors.

- To try to utilize traditional Nigerian technologies suitable for the Nigerian climate in the construction plan with a view to promoting technical exchange between the two countries.
- To provide appropriate instructions and advice on the maintenance of the buildings and equipment by the Nigerian side following the completion of the Project.

(2) Scope of Supervisory Work

The scope of the required supervisory work includes the following.

1) Assistance for Construction Contract

Provision of advice on the selection of contractors and contract conditions, explanation of the construction cost estimate, examination of cost estimates, preparation of draft agreements and attendance at the signing of agreements.

2) Advice for Contractors

Examination of and the provision of advice on the work implementation plan.

3) Examination and Approval of Drawings

Examination and approval of drawings, materials, finishing samples and equipment.

4) Reporting on Work Progress

Reporting on the progress of the work to the FFS.

5) Inspections

Regular inspection of the buildings and equipment and inspection following the completion of the related work.

#### 6) Attendance at Delivery

Attendance at the delivery of the buildings, equipment and work completion documents to the Nigerian side.

#### 7) Assistance for Payment Approval Procedure

Examination of the documents relating to the payment of the construction cost based on the agreements and the provision of assistance for the approval procedure for these documents.

### 5.3.3 Equipment and Materials Procurement Plan

In principle, those construction materials which are available in Nigeria will be used taking the local construction technologies (construction machinery, work capability and work efficiency) into consideration. However, procurement from Japan or a third country will be made for the building service equipment and the laboratory equipment, etc. With regard to the labour supply, although a relatively good labour force is available around Lagos, careful attention must be paid to securing skilled workers and technicians. It will be necessary to dispatch Japanese engineers in relation to work involving special equipment using advanced technologies.

The planned supply sources for the equipment and construction materials, etc., are as follows:

Item	Nigeria	Japan	Third Country
o Reinforcing Bars and Steel Frames	o		
o Cement	o		
o Aggregates (Sand, Gravel)	o		
o Concrete Products (Slates, Blocks)	o		
o Wood Materials, Plywood	o		
o Doors and Windows (Steel, Aluminium)	o		
o Doors and Windows (Wood)	o		
o Glass	o		
o Paint	o		
o Interior Materials (for Ceilings, Walls and Floors)	o		
o Heavy Construction Machinery	o		
o Surveying Apparatus	o		
o Materials for Temporary Structures	o		
o Pipes		o	
o Air-Conditioning Equipment		o	o
o Ventilation Equipment		o	o
o Telephones and Switchboard		o	o
o Pumps		o	o
o Power Generator		o	o
o Sanitary Fixture		o	
o Electric Wires		o	
o Lighting Fixture		o	
o Panelboards		o	
o Power Outlets and Switches		o	o

Those materials or equipment required from Japan will in principle be transported by sea with a transportation period of some 56 days, i.e. 45 days for sea transportation from Yokohama Port to Port Lagos, 10 days for customs clearance and 1 day for inland transportation from Port Lagos to the sites.

The crucial point in procurement will be the selection of equipment which can be easily maintained and for which fast after-services are provided. That equipment manufactured and sold in Nigeria does not present any problems from the maintenance aspect. Selection priority in the case of imported equipment should be given to equipment for which there are local agents providing after-services. As a lot of precision equipment is involved in the Project, the delivery and installation of this equipment should be properly coordinated with the planned schedule for installation, adjustment and handing over to the Nigerian side so that the installed equipment is not left idle for a long period of time.

#### 5.4 Work Plan for Nigerian Side

The work to be carried out by the Nigerian side must be implemented in accordance with the work progress of the Japanese side.

- (1) The land preparation of the construction sites must be completed prior to the commencement of the building construction work. The wooden mosque and carpark currently located on the sites must be removed before the start of the construction work and it is estimated that some 10 days will be required for their removal.
- (2) The extension of the power line and renovation of the existing dormitories must be conducted during the building construction work. Power should be connected to the new buildings approximately one month before the completion of the buildings. As the work for the new substation to extend the power supply from the high voltage power transmission cable buried beneath the adjoining road will be conducted by the NEPA, advance consultations with the NEPA will be required to confirm the delivery date, transformer capacity and transformer availability, etc.

With regard to the renovation of the existing dormitories, the refurbishing and renovation of each bedroom must be completed by the completion of the Project to make the standard of these dormitories equal to that of the new dormitory. Therefore, it is preferable that the

renovation work be conducted during the end of the year vacation (July - September) in 1991.

- (3) Landscaping, the erection of fences and the provision of furniture will be conducted after the completion of the buildings. While landscaping is desirable to provide a pleasant environment and to prevent dust, the erection of fences to separate the FFS facilities from the NIOMR facilities is not urgently required in view of the existence of perimeter fences for security purposes.

## 5.5 Project Implementation Schedule

While the estimated period required to complete the construction of the new buildings is months, this schedule may not be kept in view of the following.

### (a) Required Construction of 5 Buildings

As the construction of 5 buildings, i.e. Administration Building, Classroom Building, Workshop Building, Dormitory Building and Power Building, is planned, a carefully decided plan vis-a-vis the vertical or horizontal use of materials and the distribution of workers, etc., must be prepared in order to complete the entire Project within the planned period.

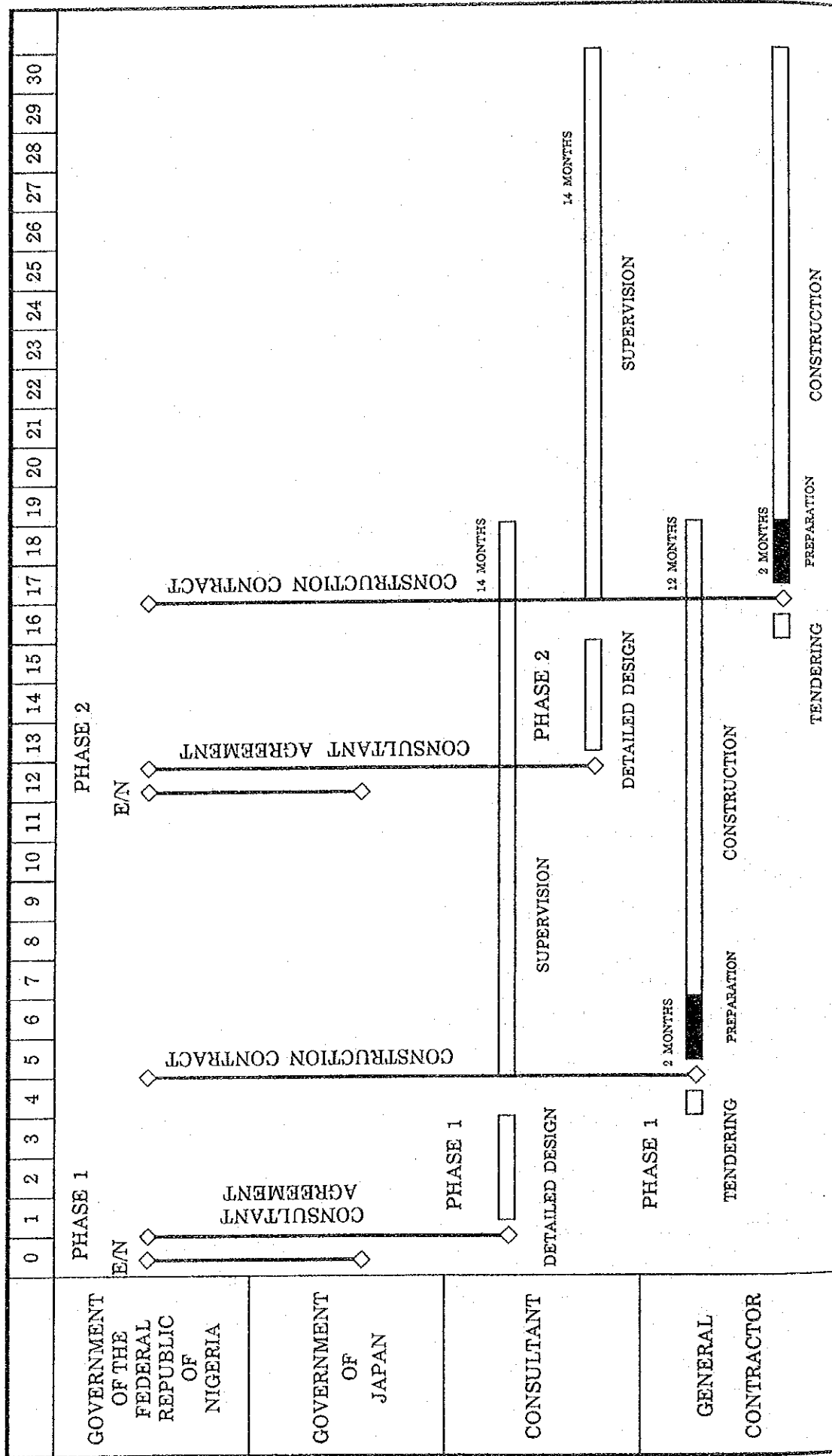
### (b) Low Work Efficiency in Rainy Season

The rainy season in Nigeria stretches from April to October during which the work efficiency declines to 60% - 70% of that in the dry season.

The tentative Project implementation schedule is given as follows:



# IMPLEMENTATION SCHEDULE



(1) Detailed Design and Tender

Immediately after the Exchange of Notes, the NIOMR will conclude the consultant agreement with a Japanese consultancy company. The consultant will then prepare the detailed design drawings and tender documents based on the Basic Design Report. Following the approval of these documents by the NIOMR, the consultant will commence the tender procedure. The agreements on the construction work and equipment procurement will be subsequently concluded with the successful tenderers following the public announcement of tender, tender explanation, opening of tenders and assessment of bids. The preparation of the detailed design is expected to take approximately 3 months, including the time required to obtain FFS approval, while approximately 1 month will be required for the tender procedure.

(2) Construction Work

Construction work will commence immediately after the signing of the construction agreement. The Project will be implemented in two phases and each phase will take 18 months to complete after the respective Exchange of Notes. The first phase will consist of the construction of the Classroom Building, while the second phase will consist of the construction of the Administration Building, Dormitory Building, Workshop Building and Power Building, the improvement of the existing Canteen Building and the equipment installation work. The delivery and installation of the equipment will be coordinated with the progress of the construction work. As no equipment requires a long installation period, equipment delivery some 2 months before the completion of the construction work is planned.

## 5.6 Project Cost Estimate

Cost to be Borne by Government of Nigeria

The project cost to be borne by the Nigerian side is estimated to be 4,189,000 naira, the breakdown of which is given below.

Power Extension	101,500 naira
Erection of Fences	202,200 naira
Mosque and Carpark Removal	1,100 naira
Furniture	24,200 naira
Renovation of Existing Dormitories	3,860,000 naira

In addition to the above-mentioned cost, some expenses will be incurred for demolition of unserviceable structures.

## 5.7 Management and Maintenance

### 5.7.1 Management Plan

#### (1) Organization of FFS

A practical management system will be established for the FFS to effectively promote various activities as already described in 3.3.2.

The FFS is currently in the transitional period of becoming independent from the NIOMR in terms of its organization and budget in order to follow the NBTE recommendation. The FFS is expected to be an independent institution by the time of the Project's completion.

## (2) Maintenance Plan

### 1) Buildings

The life of a building is largely determined by the frequency of maintenance and cleaning work. Daily maintenance ensures a good environment for the building users and minimizes the repair cost due to the early detection of damage and breakdowns. The implementation of the following regular checks is desirable.

#### (Exterior)

- repair and/or repainting of the exterior and inspection of cracks caused by neutralized concrete .... every 5 years
- check and repair of roof .... check: yearly  
repair: every 5 years
- check and repair of roof waterproofing .... check: yearly  
repair: as required
- cleaning of gutters and drains .... monthly
- check and repair of exterior doors and window sealings .... yearly
- repainting of exterior doors and window frames .... every 5 years
- check and cleaning of side gutters and manholes, etc. .... monthly
- landscaping and gardening .... as required

#### (Interior)

- redecorating .... as required
- repair and repainting of interior walls .... as required
- replacement of ceiling materials .... as required

- readjustment of doors and windows .... yearly
- replacement of hardware .... as required

With regard to security, 24 hour patrols and checking of people entering and leaving the premises will be required in view of preventing the theft of equipment and other items.

## 2) Building Service Equipment

A proper understanding of the functions and operation of building service equipment is essential for effective maintenance. In addition to daily control and regular checks, the repair of building service equipment should be promptly conducted to ensure proper operation and to prevent breakdowns or accidents affecting building activities. In regard to expendable parts, regular overhauls and replacement are required and regular checks must be conducted for each piece of equipment. The service lives of building service equipment are generally considered to be as follows, at the end of which replacement is required.

### (Electrical)

- power generators 15 - 20 years
- panelboards 20 - 30 years
- fluorescent lamps 5,000 - 10,000 hours
- incandescent lamps 1,000 - 1,500 hours
- telephone exchange equipment 40 years
- internal broadcasting equipment 10 - 20 years

### (Plumbing)

- pumps 10 - 15 years
- tanks 15 - 20 years
- pipes and valves 10 - 15 years
- toilet fixtures 25 years

- fire fighting equipment                      20 years
- gas apparatus                                      6 years
- waste water treatment machines              7 years

(Air-Conditioning)

- pipes    10 - 15 years
- fans    10 - 15 years
- air-conditioners                                10 - 15 years

### 3) Teaching and Laboratory Equipment

An appropriate control system should be established for each item of equipment by assigning a person to be in charge of the equipment. In addition, the use of a record book or similar means should be introduced to record the names of users, duration and purpose of use, operation conditions and maintenance results, etc. It may be inevitable for the equipment used for practical training or laboratory work to have a higher breakdown rate than other types of equipment due to mishandling in view of direct use by many students, but teachers and laboratory assistants should have a thorough knowledge of the function and operation of equipment to prevent breakdowns and accidents as much as possible. Students must also be taught proper handling methods and their use of the equipment must be supervised by a teacher or assistant.

Those responsible for equipment maintenance must conduct regular checks on the equipment, parts and accessories and must submit requests for the procurement of spare parts or expendable items to the Administration Section well in advance so that the equipment is not left idle while waiting for the delivery of spare parts or expendables. In the case of that equipment for which there are local agents, maintenance agreements should be made to cope with sudden breakdowns.

### 5.7.2 Personnel Plan

The FFS currently has 4 academic departments and 3 sections, i.e., General Fisheries Department, Nautical Science and Fishing Department, Marine Engineering Department, General Studies Department, Administration Section, Accounting Section and Teaching Section, and has a total of 44 staff members.

The number of possible students will increase from the present 420 by 80 to 500 with the completion of the Project and the current organization of the FFS should be able to cope with this increase without any major change. The FFS has been increasing the number of teaching staff in response to the NBTE recommendation and the increased size of the accommodation facilities, the increased number of laboratories and the introduction of such special rooms as computer and audio-visual rooms will result in an increase of 43 staff as shown on the next page by the time of the Project's completion.

	Grade (USS)	Current Number (1990)	Planned Number (1992)	Annual Salary (naira)	Personnel Cost Increase (naira)
Principal	14	1	1	19,790	-
Vice Principal	13	1	1	17,030	-
Asst. Chief Fisheries Officer	12	1	1	15,370	-
Principal Fisheries Officer	11	1	1	13,990	13,990
Principal Instructor (Marine)	11	1	1		
Principal Instructor (Nautical)	11	-	1		
Senior Fisheries Officer	09	2	2	10,670	10,670
Principal Instr. Grade II (Marine)	09	1	1		
Principal Instr. Grade II (Nautical)	09	-	1		
Senior Asst. Secretary	09	1	1		
Fisheries Officer Grade I	08	4	4	9,170	27,510
Senior Instructor (Marine)	08	-	2		(9,170 x 3)
Senior Instructor (Nautical)	08	2	2		
Asst. Secretary Grade I	08	1	1		
SEO Accountant	08	1	1		
Audio-Visual Engineer	08	-	1		
Higher Lab. Technologist	07	-	4	7,540	52,790
Fisheries Officer Grade II	07	4	6		(7,540 x 7)
Instructor Grade I (Marine)	07	2	2		
Instructor Grade II (Nautical)	07	1	1		
HEO Accountant	07	1	1		
Confidential Secretary	07	1	1		
Staff Nurse	07	-	1		
Senior Typist	06	2	2	5,980	5,980
Library Officer	06	-	1		
Asst. Marine Engineer	05	-	2	4,510	9,020 (4,510 x 2)
Senior Clerk	04	1	2	3,640	7,280
Craftsman	04	-	1		(3,640 x 2)
Typist	03	1	1	2,930	8,790
Library Assistant	03	1	1		(2,930 x 3)
Coxswain	03	-	2		
Motor Driver and Mechanic	03	2	2		
Clerical Asst. (Admin./Account.)	02	2	2	2,480	24,800
Workshop Attendant	02	-	2		(2,480 x 10)
Machine Operator	02	-	1		
Electrician	02	-	1		
Plumber	02	-	1		
Carpenter	02	-	1		
Laboratory Assistant	02	1	4		
Messenger	02	1	2		
Laboratory Attendant	01	1	4	2,280	29,640
Cleaner	01	3	6		(2,280 x 13)
Gateman	01	3	5		
Porter (Guardman)	01	-	3		
Cook/Steward	01	-	2		
Total		44	87		190,460 (43 persons)



### 5.7.3 Management Cost

The management cost of the FFS for fiscal 1988/89 is given below.

Item	Amount (naira)
Personnel Expenses	448,000
Maintenance and Operation Cost	240,000
Total	688,000

The breakdown of the personnel expenses is as follows:

Item	Amount (naira)
Salaries	317,000
Benefits	131,000
Total	448,000

The breakdown of the maintenance and operation cost is as follows:

Item	Amount (naira)
Transport	3,500
Teaching Materials/Office Expendables	42,000
Building Maintenance	59,000
Wages for Part-Time Lecturers	13,700
Equipment Maintenance	39,000
Books/Printing	4,000
Boat and Car Maintenance	18,000
Fishing Gear	6,500
Equipment Procurement	41,000
Research Materials/Fish Pond Maintenance	4,000
Lighting, Heating and Telephone	8,000
Miscellaneous	1,300
Total	240,000

The large costs for building maintenance, equipment maintenance and equipment procurement in the maintenance and operation cost can be explained by the efforts to rapidly improve the facilities in fiscal 1988/89 in response to the NBTE recommendation in October 1988.

As the FFS did not have separate meters for lighting, heating and telephone usage, the relevant facilities of which belong to the NIOMR, the FFS appears to have paid estimated lighting, heating and telephone costs under the single billing to the NIOMR.

The annual management cost following the completion of the Project was divided as follows and the cost for each item at the time of writing (November 1988) was estimated.

Annual Management Cost Items

- Personnel Expenses
- Operation Cost
- Building Maintenance Cost
- Educational Equipment Maintenance Cost

(1) Personnel Expenses

The staff of the FFS to be increased following the completion of the Project are shown below together with the resulting personnel expenses increase.

Grade	Annual Salary (naira)	Increase	Personnel Expenses Increase (naira)
11	13,990	1	13,990
9	10,670	1	10,670
8	9,170	3	27,510
7	7,540	7	51,780
6	5,980	1	5,980
5	4,510	2	9,020
4	3,640	2	7,280
3	2,930	3	8,790
2	2,480	10	24,800
1	2,280	13	29,640
Total		43	190,460

The aggregate amount of various benefits for the total salary increase shown above, i.e., 190,460 naira, is estimated to be approximately 78,700 naira. Therefore, the personnel expenses will increase by 269,160 naira. The total personnel expenses after the completion of the Project will be 717,160 nairas/year (447,000 + 269,160 naira/year).

## (2) Operation Cost

The annual operation cost was estimated based on the estimated electricity, LPG and fuel oil consumption volumes. As the new buildings will use well water, the water cost is included in the electricity charge because of the pumping operation.

### a) Electricity

#### Lighting and Power Outlets

Classroom Bldg.	35 x 1,800 hrs x 0.12 naira/kWh =	7,560
Admin. Bldg.	31 x 8 hrs/day x 365 x 5/7 x 0.12 naira/kWh =	7,759
Dormitory Bldg.	32 x 8 hrs/day x 365 x 0.12 naira/kWh =	11,213
Workshop Bldg.	16 x 4 hrs/day x 365 x 2/7 x 0.12 naira/kWh =	801

#### Air-Conditioning and Ventilation

Classroom Bldg.	$45 \times 1,800 \text{ hrs} \times 0.12 \text{ naira/kWh} =$	9,720
Admin. Bldg.	$61 \times 8 \text{ hrs/day} \times 365 \times 5/7 \times 0.12 \text{ naira/kWh} =$	15,267
Dormitory Bldg.	$22 \times 8 \text{ hrs/day} \times 365 \times 0.12 \text{ naira/kWh} =$	7,709
Workshop Bldg.	$2 \times 4 \text{ hrs/day} \times 365 \times 2/7 \times 0.12 \text{ naira/kWh} =$	100
Educational Equip.	$60 \times 4 \text{ hrs/day} \times 365 \times 2/7 \times 0.12 \text{ naira/kWh} =$	3,003
Drainage Facility	$0.2 \times 3 \text{ hrs/day} \times 365 \times 0.12 \text{ naira/kWh} =$	26
Water Supply Facility	$11.2 \times 3 \text{ hrs/day} \times 365 \times 0.12 \text{ naira/kWh} =$	1,472

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Total 64,630

#### b) LPG

$$18 \text{ cylinders} \times 300 \text{ kcal/hr} \times 4 \text{ hrs/day} \div 11,000 \text{ kcal/kg} \times 365 \times 2/7 \\ \times 2 \text{ naira/kg} = 410 \text{ naira/year}$$

#### c) Fuel Oil

##### Power Generator

$$12 \text{ hrs/month} \times 12 \text{ months/year} \times 200 \text{ kVA} \times 0.8 \times 0.35 \text{ £/kWh} \times \\ 0.5 \text{ naira/£} = 4,032 \text{ naira/year}$$

##### Buses

$$50 \text{ km/day} \times 365 \text{ days} \times 2/7 \times 0.2 \text{ £/km} \times 0.5 \text{ naira/£} \times 2 \text{ buses} \\ = 1,043 \text{ naira/year}$$

##### Small Boats

$$10 \text{ £/hr} \times 4 \text{ hrs/day} \times 80 \text{ days/year} \times 0.7 \text{ naira/£} \times 2 \\ = 4,480 \text{ naira/year}$$

The total fuel cost is 9,555 naira/year.

The total operation cost is as follows.

Electricity	64,630 naira/year
LPG	410 "
Fuel Oil	9,555 "
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	74,595 naira/year

### (3) Building Maintenance Cost

The building maintenance and repair cost generally increases with time but is usually negligible in the first 5 years.

With regard to building services, the FFS plans the recruitment of maintenance staff and their personnel expenses have already been accounted for.

The annual cost for parts exchange, overhaul and the replacement of equipment is estimated to be 0.5 - 1.0% of the initial procurement and installation cost of the building service equipment.

$$18,186,000 \times 0.75\% = 136,395 \text{ naira/year}$$

### (4) Educational Equipment Maintenance Cost

#### a) Expendables Cost

Machine Tool Related	Sundries	9,000 naira/year
	Gas & Welding Bars, etc.	7,500 naira/year
	Materials	2,700 naira/year
Laboratory Work Related	Glass Apparatus, Gas & Parts, etc.	10,000 naira/year

#### b) Maintenance Cost

Equipment Parts & Repair	37,000 naira/year
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Total	66,200 naira/year

Based on the above estimate, the maintenance cost increase will be as follows:

Building Operation Cost	74,595 naira/year
Building Maintenance & Repair Cost	136,395 naira/year
Equipment Maintenance Cost	66,200 naira/year
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Total	277,190 naira/year

Of the 1988/89 maintenance cost of 240,000 naira, the costs of the following items will not be required following the completion of the Project.

Building Maintenance Cost	59,000 naira
Equipment Maintenance Cost	39,000 naira
Equipment Procurement Cost	41,000 naira
Part of Building Services and Telephone Costs	5,000 naira
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Total	144,000 naira

The total remaining 96,000 naira of the above 240,000 naira and the estimated maintenance cost of 277,190 naira for the renewed FFS will be 373,190 naira. These figures are summarized in the following table.

(Unit: naira/year)				
	Cost for 1988/89(a)	Cost for New FFS	Increment Portion(b)	(b)/(a)x100 (%)
Personnel Cost	448,000	717,160	269,160	60.1
Maintenance Cost	240,000	373,190	133,190	55.5
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Total	688,000	1,090,350	402,350	58.5

The new personnel expenses will be an increase of some 60%. The planned staff increase, however, will not take place immediately following the handing over of the completed buildings but will be gradually achieved over the 3 year period between 1990 and 1992 in accordance with the NBTE recommendation. The allocation of the money required for the increased personnel expenses will not prove very difficult if the actual increase of the staff is carefully coordinated with the budgetary appropriation.

The estimated maintenance cost of 1,090,350 naira/year will not be a formidable amount as the actual NIOMR budget for 1988/89 of 6,388,700 naira for 363 staff members implies the possible allocation of some 1,500,000 naira/year for the FFS for 87 staff members given the fact that both organizations are under the control of the Ministry of Science and Technology.

**CHAPTER 6**  
**PROJECT EVALUATION**





## CHAPTER 6 PROJECT EVALUATION

Together with the development of agriculture, the development of fisheries is an extremely important task for Nigeria to establish a self-sufficient food supply by promoting primary industries which is one of the main targets of Nigeria's national development efforts. As in the case of all economic sectors, the fostering of capable manpower is an essential requirement for the development of fisheries and, therefore, the strengthening of fisheries education and manpower development are given priority in the fisheries development strategy.

The FFS, which is the subject of the Project, is the only technical school in Nigeria specializing in fisheries and the education of seamen. While the importance of manpower development has been increasing in view of promoting fisheries, the existing facilities of the FFS have deteriorated to the extent that its educational activities are limited and the establishment of new courses is hampered.

The Project intends to improve the present poor conditions of the FFS to enable it to fully perform its responsibility in fisheries education and training. With the implementation of the Project, the FFS will be upgraded in terms of not only its organization and educational system (increase of full-time teaching staff and introduction of new courses, etc.) but also in terms of its facilities and educational equipment. The upgraded educational activities of the FFS will certainly contribute to the promotion of manpower development in the fisheries field, thus making a substantial contribution to the promotion of the fisheries industry and increased fish production in Nigeria.

The implementation of the Project and the subsequent smooth management of the new facilities will achieve the following.

- (1) The construction of a number of new school facilities and the provision of the necessary teaching equipment and apparatus will, together with the consolidation of the teaching staff, enable new educational

activities, including laboratory work and practical training, which have so far proved difficult or impossible for the FFS, further improving the standard of education provided by the FFS.

- (2) For the first time, Nigeria will have domestically educated candidates for fishing boat skippers and chief engineers with the introduction of the new Skipper and Marine Engineer II Courses, the graduates of which are entitled to sit the national examinations for Skipper and Marine Engineer II. Together with the existing Nautical Science and Fishing and Marine Engineering Courses, the indigenization of senior fishing boat crews will become a reality in terms of the educational system.
- (3) The Government of Nigeria has been promoting a policy of strengthening technical education and all domestic technical colleges and schools, including the FFS, now require certification by the NBTE. The FFS, however, has so far failed to be certified by the NBTE because of the shortage of the necessary facilities and equipment and also because of its inappropriate organization and management systems. The NBTE has, in fact, issued an improvement recommendation to the FFS.

The improvement of the facilities and equipment, increase of the school's staff and consolidation of the school's management through the Project will enable the FFS to be certified by the NBTE as a higher educational institution (technical school) providing OND and HND courses. The higher status of the FFS will enable the FFS to attract capable students and will raise the morale of the students, thus contributing to manpower development in the fisheries field.

The smooth implementation of the Project is expected to achieve the above results and, therefore, the Project will make a substantial contribution to fisheries development in Nigeria as part of the national efforts to establish a self-sufficient food supply.