

#### 4-6 SERVICE PLANNING (Electrical and Mechanical System)

##### 1. Basic Design Policy

In consideration of the climate conditions prevailing at Mahasarakham and the living habits and customs in Thailand the electrical and mechanical systems chosen must be suitable for simple operation and ease of maintenance. Wherever possible standardized equipment and fixtures should be specified in the systems to facilitate replacement in case of trouble.

The design of electrical and mechanical systems, is in accordance with codes and regulations available in Thailand in principle, but where these are unavailable in Thailand suitable Japanese standards shall be followed. Equipment and materials which will be imported from Japan shall comply with JIS (Japanese Industrial Standard) and those which will be purchased in Thailand shall generally comply with TIS (Thai Industrial Standard).

## 2. Electrical System

### 1) Power Supply

Power will be supplied as far to the power fuses near the transformer which will be installed in the Site by the Provincial Electrical Authority (P.E.A.) in Mahasarakham. The power is to be transformed from 22 KV to 3 phase 380 volts and single phase 220 volts. The low voltage distribution panels are installed in the distribution room, and through them necessary power is distributed to power control panels and lighting panels.

Estimated system design loads are as follows, totaling approximately 600 KVA

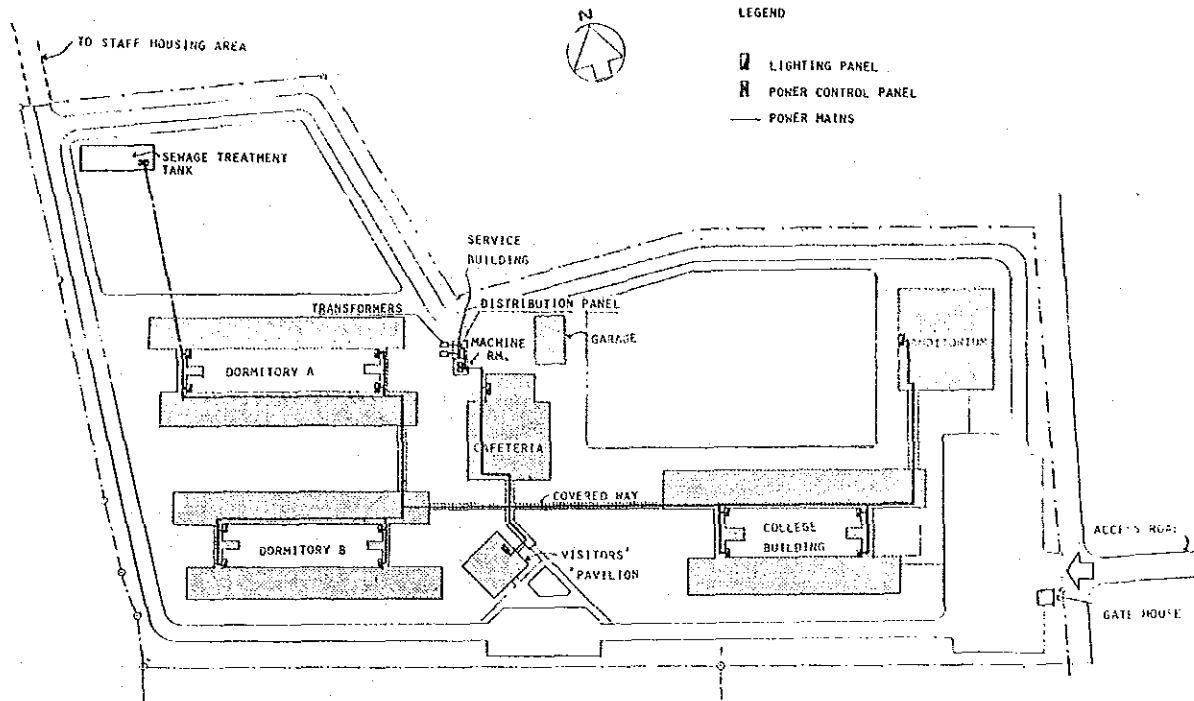
i. Lighting and outlets	350 KVA
ii. Cooling and ventilating load	150 KVA
iii. Plumbing load	70 KVA
iv. Miscellaneous	30 KVA

As there is rarely any interruption of electric service in the city of Mahasarakham, no stand-by generator will be necessary.

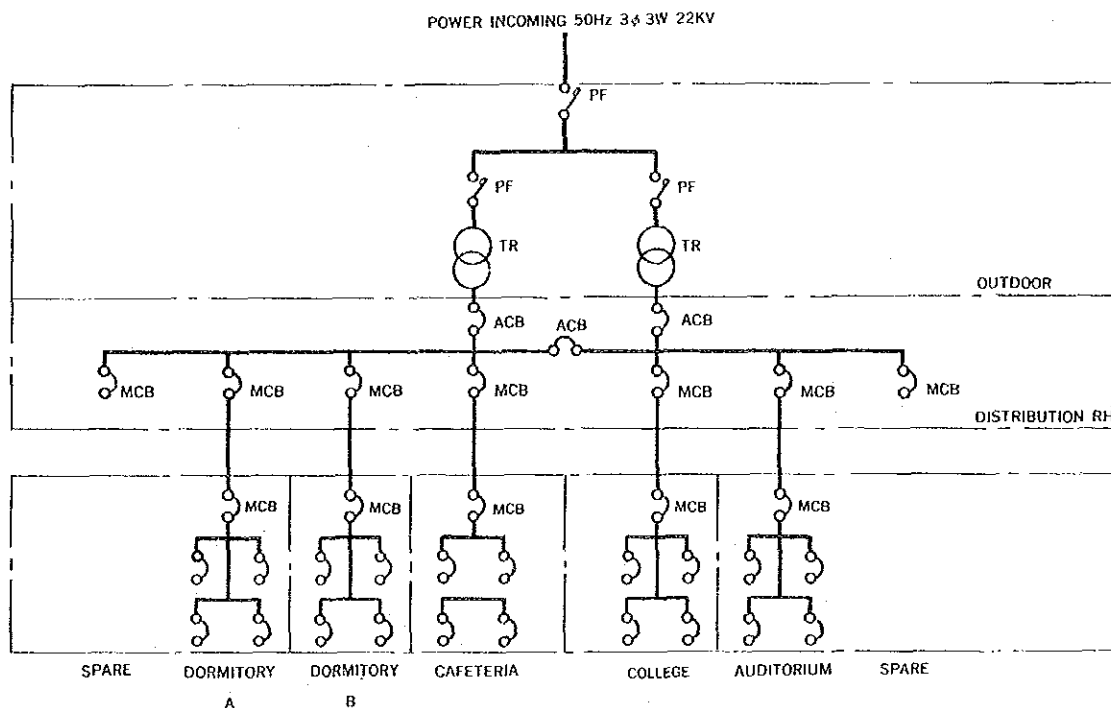
Emergency lighting and guide lamps should be supplied with batteries.

### 2) Power Mains

3 phase 380 volt and single phase 220 volt power mains will be installed through the distribution panels in the distribution room as far as the power control panels and lighting panels. Wiring will generally be installed in metal ducts and racks in the ceiling void and sometimes in vertical conduit pipes.



ELECTRICAL POWER DISTRIBUTION SYSTEM



POWER SUPPLY ONE LINE DIAGRAM

3) Lighting and service outlets

Administration, conference room, lecture rooms, bed rooms etc. will mainly be provided with fluorescent fixtures and locally with incandescent fixtures. The intensities of illumination allowed for in the main rooms is as follows.

Administration	300 lux
Director's room	300 "
Staff room	300 "
Library	300 "
Auditorium	300 "
Cafeteria	250 "
Laboratories	300 "
Toilets and corridors	100 "

Services outlets will include general outlets, kitchen and laundry outlets, audio-visual equipment power supply outlets and laboratory equipment power supply outlets. Most outlets will be of single phase 220 volts.

4) Power for motors

Conduit and wiring will be installed to distribute power from control panels to air coolers, ventilating fans, and feed water pumps. Conduiting from the power control panels will generally be exposed.

5) Telephone

It is considered necessary to provide at least 5 trunk lines and about 20 extension lines. The push-button telephone system will be adopted.

6) Public Address System

Public address system will be provided in college building, cafeteria, auditorium, dormitory A, dormitory B and visitors' pavilion.

Independent loudspeaker system will be provided in lecture rooms, conference room, auditorium and audio-visual room. Amplifiers will be installed in a cabinet with casters.

7) TV and Radio System

TV and radio antenna and other necessary broadcast receivers will be provided to permit instructors and students to receive TV and radio programs in the cafeteria, recreation area in the students dormitories and audio-visual room.

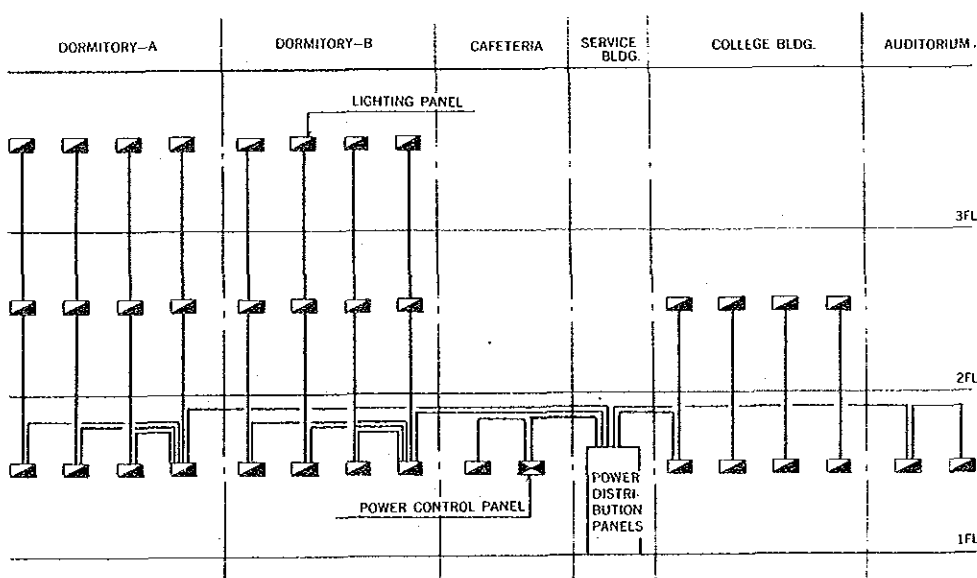
8) Fire Alarm System

A fire alarm system will be provided. Generally thermal sensors will be installed in the rooms and corridors. Indication panels will be located at the administration or matron's room and in the dormitories.

Alarms will be given by bells, located adjacent to fire hydrant cabinets.

9) Lightning Protection System

A lightning protection system will be provided on the buildings of college and dormitories.



POWER RISER DIAGRAM

### 3. Ventilating and Cooling System

#### 1) Ventilating System

Basically natural ventilation has been provided for in the design of these buildings to allow the free flow of fresh air into the rooms and to remove stale air from the rooms. Ventilating equipment such as ceiling fans supply fans or extract fans will be installed in the Administration Director's Room, Conference Room, Staff Room, Library, Lecture Rooms, Laboratories, Auditorium, Visitor's Pavilion, Cafeteria, Laundry, Shower Room, Toilet etc. Hoods or fume cupboards will be installed in Chemistry and Biology Laboratories.

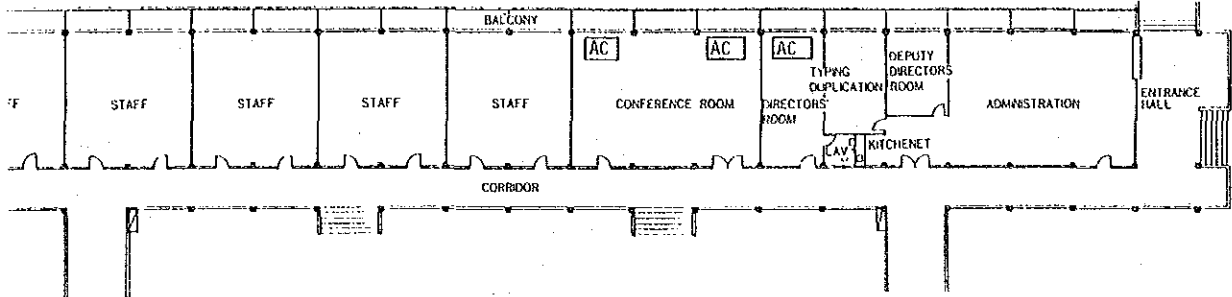
#### 2) Cooling System

Cooling equipment will be of air-cooled split-type room air conditioners and air-cooled packaged-type air conditioners. The temperature conditions will be 27 - 29°C DB indoor air temp. and 35°C DB outdoor air temp. Director's Room, Conference Room, Library, Audio Visual Room and Control Room will be equipped with air-cooled split-type room air conditioners. The Auditorium will be equipped with an air-cooled packaged-type air conditioner.

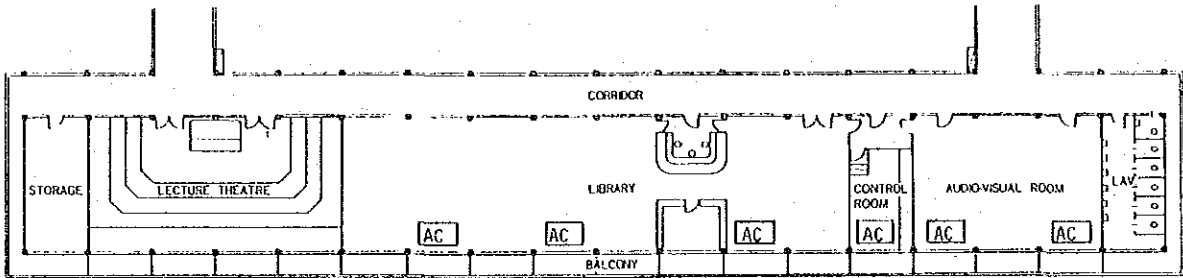
### 4. Water Supply System

City water lead in from the city main will be stored in the water reservoir, from where it will be pumped to the elevated tank. The water will then be distributed to draw-off points by gravity. The water reservoir and the elevated water tank have partitions to enable half of their capacity to be drained for cleaning and maintenance without disrupting the supply to taps and facilities.

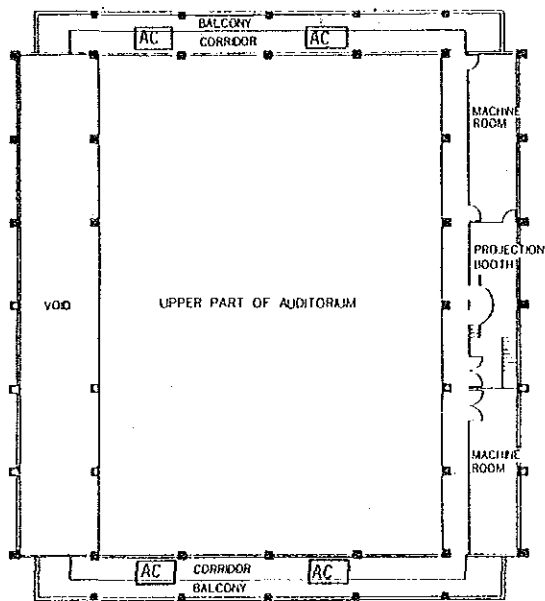
SPACE PROVIDED WITH COOLING SYSTEM



COLLEGE BUILDING 1ST FLOOR



COLLEGE BUILDING 2ND FLOOR



AUDITORIUM

Water consumption is estimated as follows.

1. College Building

Student	600 c x 0.070 m <sup>3</sup> /d.c. = 42	} ----- 65 m <sup>3</sup> /d
Staff	100 c x 0.080 m <sup>3</sup> /d.c. = 8	
Laboratory	150 c x 0.100 m <sup>3</sup> /d.c. = 15	

2. Cafeteria

Student	600 c x 0.020 m <sup>3</sup> /c.n. x 3 n/d = 36	} ----- 42 m <sup>3</sup> /d
Staff	100 c x 0.020 m <sup>3</sup> /c.n. x 3 n/d = 6	

3. Dormitory

Student	600 c x 0.120 m <sup>3</sup> /c.d. = 72	} ----- 84 m <sup>3</sup> /d
Staff	100 c x 0.120 m <sup>3</sup> /c.d. = 12	

4. Miscellaneous

Water sprinkling	-----	10 m <sup>3</sup> /d
Car Washing, etc.		

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Total	201 m <sup>3</sup> /d
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The capacity of the water reservoir and the elevated tank will be approximately as follows.

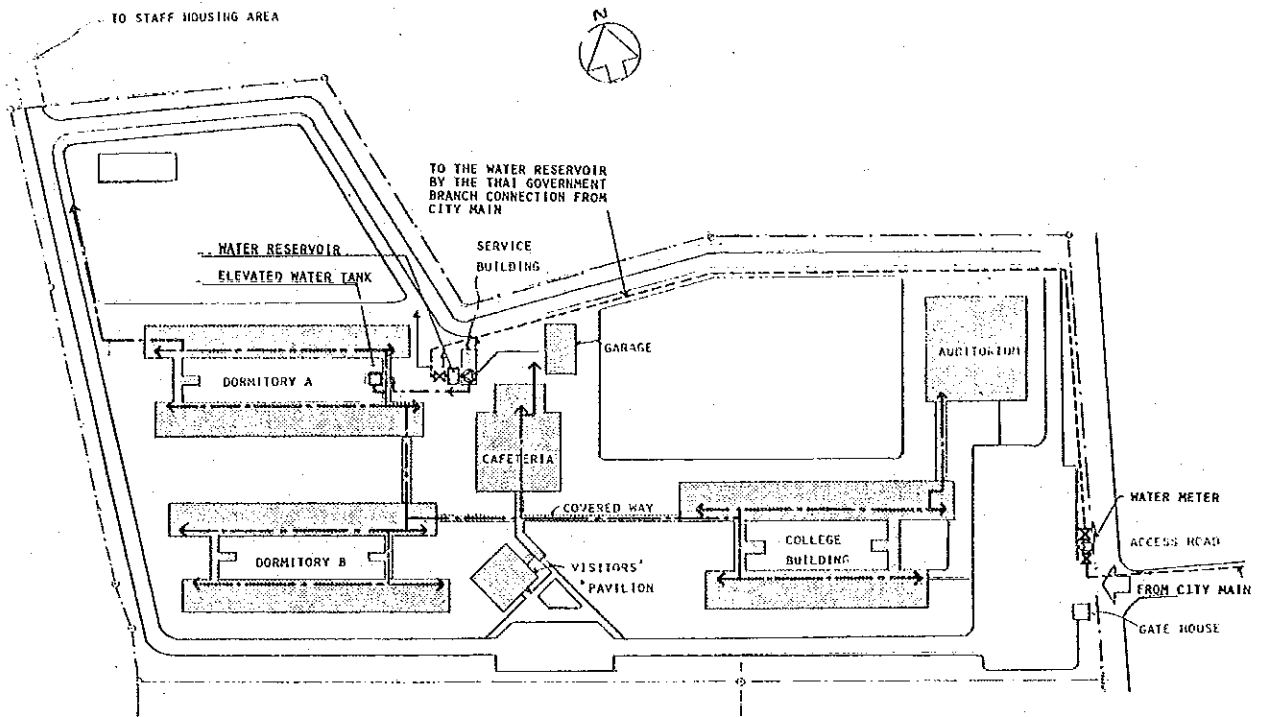
The water reservoir	100 m <sup>3</sup>
The elevated water tank	50 m <sup>3</sup>

5. Sewage, Drainage and Storm drain system

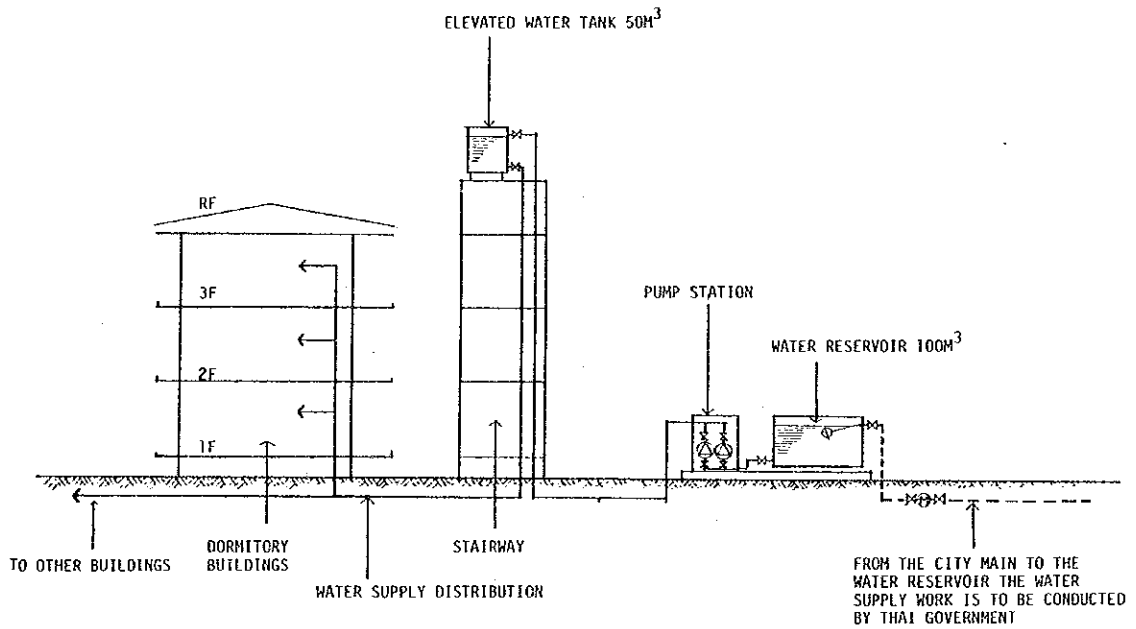
There will be a separate Sewage system, soil water drainage system and storm water drainage system.

Effluent water will be discharged to the canal after receiving necessary treatment, primary treatment, secondary treatment or neutralization.



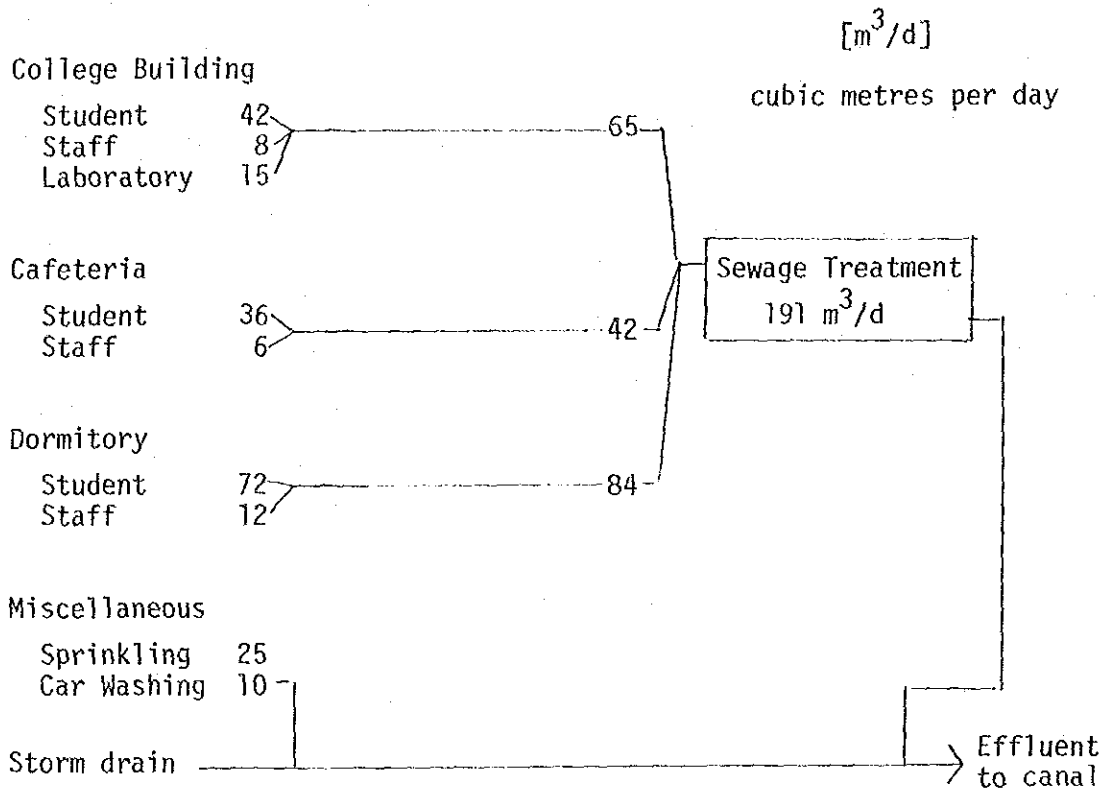


WATER SUPPLY DISTRIBUTION SYSTEM



WATER SUPPLY SYSTEM

Toxic substances, radioactive substances, strong acid, strong base and solvent should not be discharged to these systems. They should be recovered. The flow rates of discharged water will be as follows.



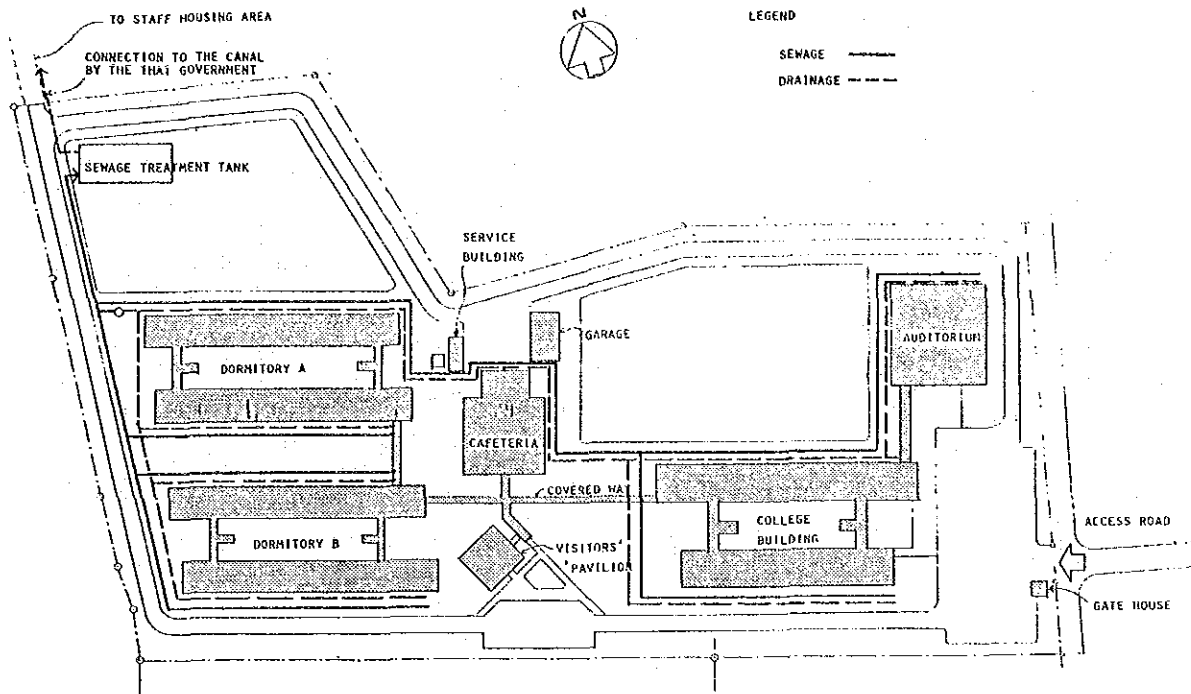
#### 6. Kitchenette equipment

Hot water for drinking use will be served with storage-type electric water boilers. And for cooking, electric hot plate will be equipped.

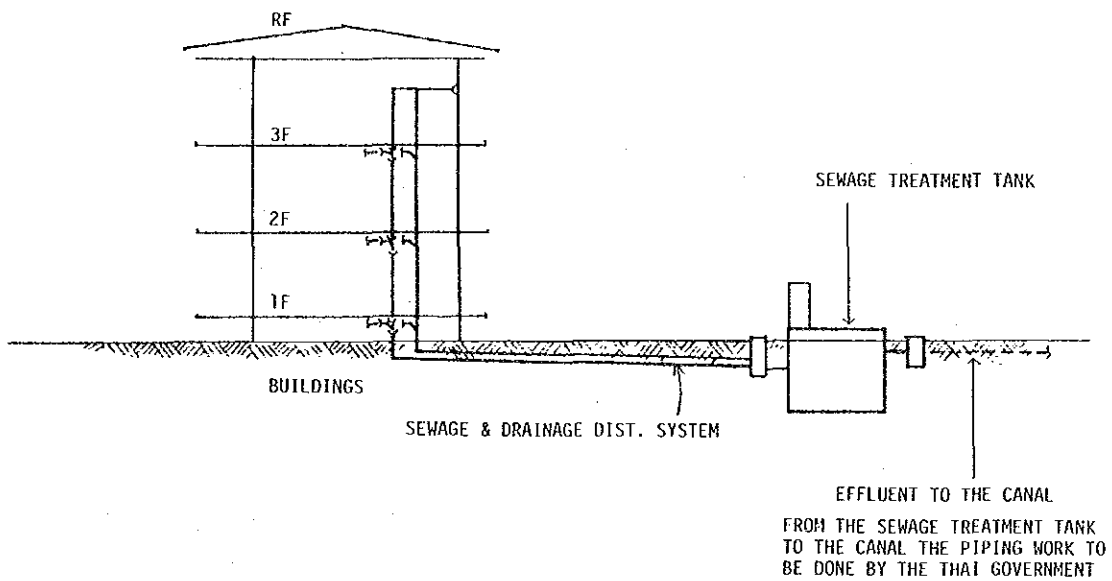
#### 7. Kitchen equipment

Kitchen equipment to prepare meals for students and staff will be as follows.

walk-in freezer, walk-in cooler, reach-in refrigerator/freezer, gas range, rice cookers, fish broiler, gas fryer, 2 com't sinks, pan sink, etc.



SEWAGE & DRAINAGE DISTRIBUTION SYSTEM



SEWAGE & DRAINAGE SYSTEM

8. Plumbing fixtures

Plumbing fixtures for Toilets, Shower room, Sick room and Laundry will be as follows:

Toilet for staff	Western type closet, urinal, lavatory, mirror, soap holder, cleaner's sink
Toilet for students	Local type closet, lavatory, mirror, cleaner's sink
Shower Room	Faucet, Showerhead
Sick Room	Lavatory Faucet

9. Fire-fighting system

Dry chemical-type hand extinguishers will be installed in accordance with the requirement for installation of fire extinguishers in the Japanese fire code.

10. Gas supply system

LPG will be supplied to the cafeteria kitchen and the laboratory. For the other rooms where heat is required for hot water service, cooking, etc., electricity will be utilized.

Gas cylinders will be installed in each building as required.

11. Sewage treatment

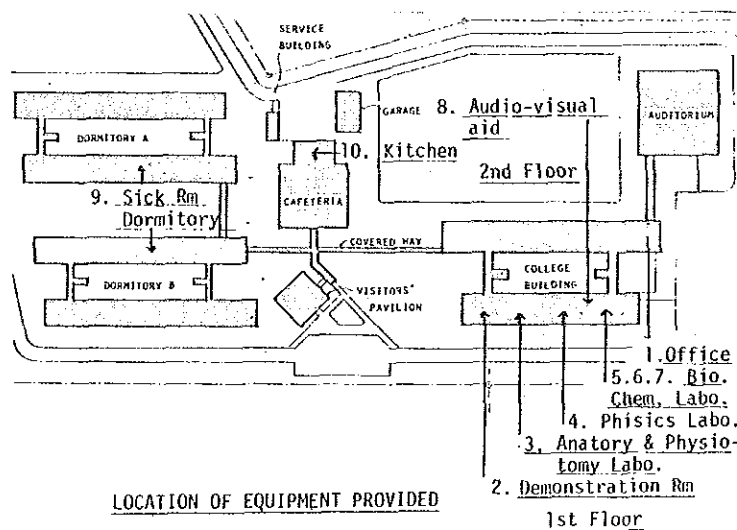
The sewage treatment system will be basically in accordance with the rules and regulations in Thailand taking those in Japan and the local conditions of the site into consideration.

The capacity of sewage treatment is estimated approximately at 200 m<sup>3</sup>/d.

#### 4-7 EDUCATIONAL EQUIPMENT

The educational equipment necessary for nursing education should be selected and decided in accordance with the present situation of nursing education, in Thailand, especially the educational policies, systems, curriculums etc. for nursing of the Nursing College Division, Ministry of Public Health. As a two block system will be adopted under the nursing education policies of the Ministry of Public Health, there will be 75 students in each block. Educational equipment suitable for the curriculums and their rotation system should be selected. The Thai nursing education system has its own history of development different from the Japanese one. Furthermore the Ministry of Public Health has an independent plan for future nursing education.

Taking into consideration the above mentioned situation and policies, and the items of educational equipment which were requested at the time of the basic design survey by the Thai Government, educational equipment for Mahasarakham College of Nursing will be finally decided under the agreement between the Thai Government and the Japanese Government. The educational equipment necessary for various purposes in their respective rooms are generally expected to be as shown on the following List of Educational Equipment.



LIST OF MAIN EDUCATIONAL EQUIPMENT

1. Office
  - 1) Typewriter
  - 2) Electric typewriter
  - 3) Electric calculator
  - 4) Plain paper copier
  - 5) Stencil machine
  - 6) Stencil scanner
2. Demonstration room
  - 1) Fowler's bed
  - 2) Bedside table
  - 3) Bedside chair
  - 4) Sterilizer
  - 5) Stretcher
  - 6) Sphygmomanometer
  - 7) Stethoscope
  - 8) Oxygen tent
  - 9) S.S.E. set
  - 10) Speculum
  - 11) Douch set
  - 12) Undine
  - 13) Doll for bathing, adult
  - 14) Doll for bathing, infant.
  - 15) Pediatric bed
  - 16) Overtable
  - 17) Simon's bed
  - 18) Obstetric manikin
3. Anatomy and Physiology Laboratory
  - 1) CLA Training dummy
  - 2) Anatomical chart in color
  - 3) Sculptured skeleton
  - 4) Muscular attachments
  - 5) Skull with removable vertex etc.
  - 6) Left section of head
  - 7) Human ear, eye, arm, leg
  - 8) Brain section
  - 9) Flexible heart
  - 10) Respiratory organ
  - 11) Foetal doll
  - 12) Human development set
  - 13) Individual vertebra
  - 14) Human pregnancy set
4. Physics Laboratory
  - 1) High-form triple beam balance
  - 2) Vernier calipers
  - 3) Standard pressure gauge
  - 4) Spectrometer prism
5. Biology Laboratory
  - 1) Binocular microscope
  - 2) Compound microscope with 4 objectives
  - 3) Microscope projector
6. Micro Parasitology Laboratory
  - 1) Hot air oven
  - 2) Autoclave
7. Chemistry Laboratory
  - 1) Chemical chart
  - 2) Triple beam balance
  - 3) Centrifuge
  - 4) PH meter
  - 5) Periodic table
  - 6) Thermometer
8. Audio-Visual Aids Room
  - 1) Color video taperecorder
  - 2) 20" color monitor TV
  - 3) 50-2V coaxial cable 40m x 10
  - 4) 35mm slide projector
  - 5) Synchronization cassette recorder
  - 6) 8mm sound movie projector
  - 7) 16mm optical magnetic sound projector
  - 8) Sound filmstrip projector
  - 9) Screen, 70" x 70" stand type
  - 10) Overhead projector
  - 11) Amplifier
  - 12) Speaker
  - 13) Microphone
9. Dormitory
  - 1) Sterilizer
  - 2) Sphygmomanometer
  - 3) Stethoscope
  - 4) Wash basin
  - 5) Refrigerator
10. Kitchen
  - 1) Cabinet
  - 2) Freezing box
  - 3) Refrigerator
  - 4) Stove
  - 5) Electric kettle

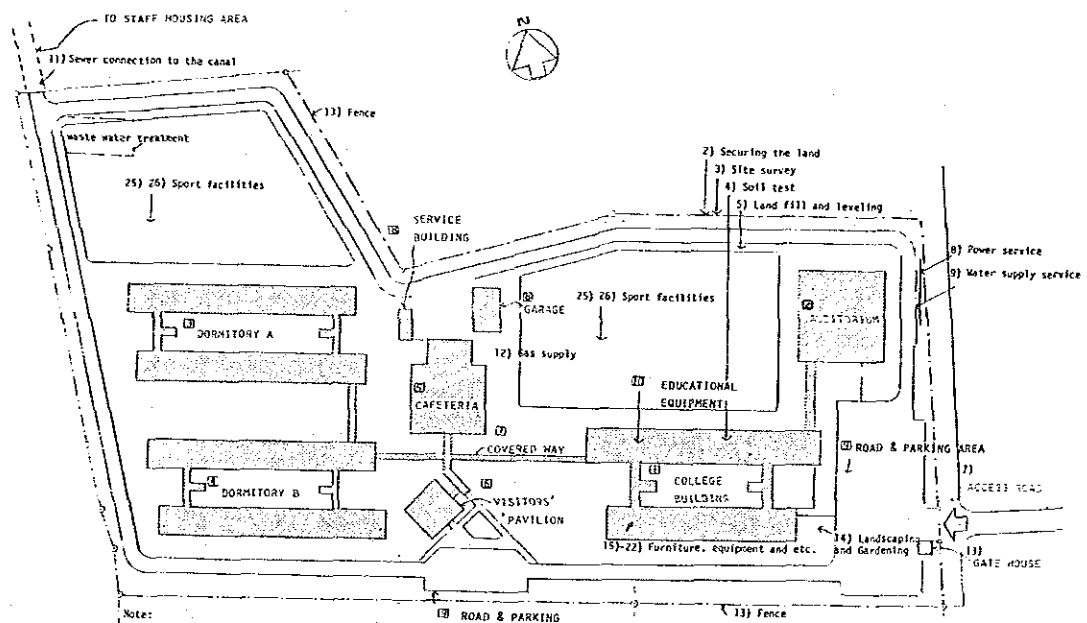
#### 4-8 SCOPE OF THE WORKS

The scope of the works to be undertaken by each party are indicated as follows under the terms and conditions of the "Exchange of Notes".

##### 1. Work to be undertaken by the Japanese Government

- 1) Detailed design and construction supervision.
- 2) Construction of the college and supply of equipment as follows.

- ① College building
- ② Auditorium
- ③ Dormitories
- ④ " "
- ⑤ Cafeteria
- ⑥ Visitors' pavilion
- ⑦ Covered way
- ⑧ Service building
- ⑨ Road and Parking area
- ⑩ Educational equipment



Note:  
This drawing show the ites of the works of the both governments by indicating respectively marked with ① nos. for the Japanese government and ① nos. for the Thai government

PLAN SHOWING THE SCOPE OF THE WORKS

## 2. Works to be undertaken by the Thai Government

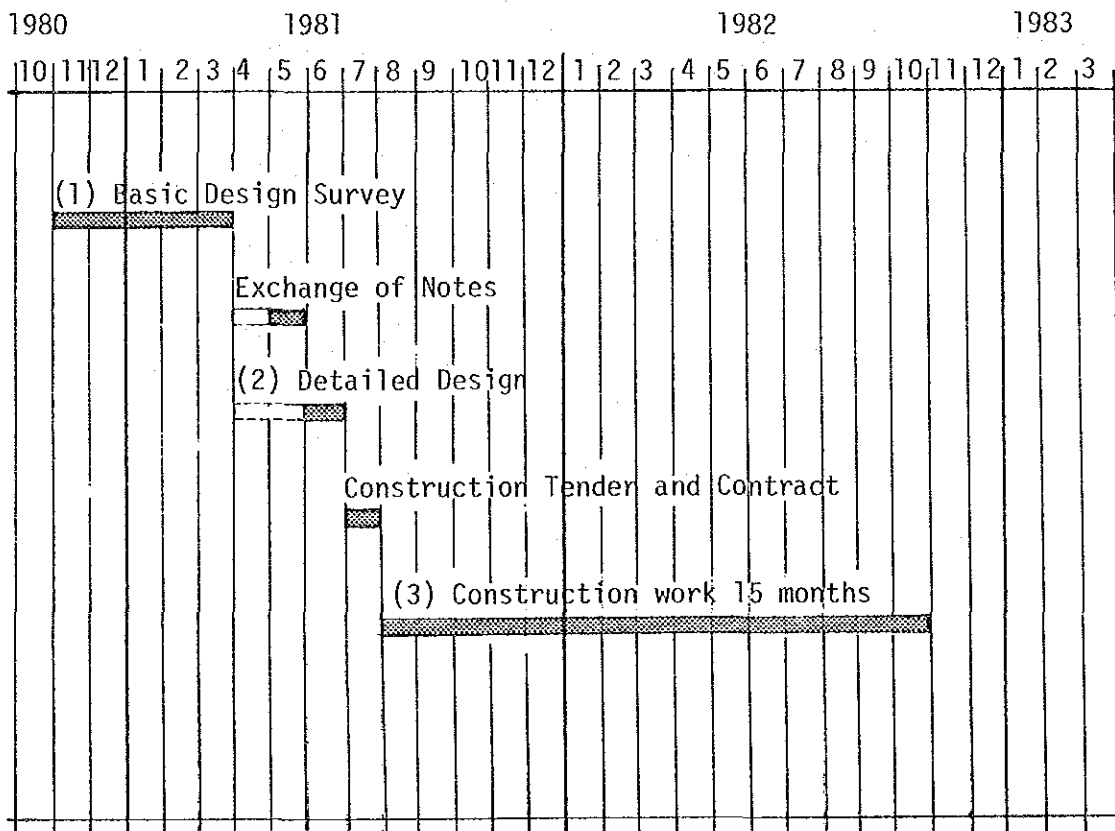
- 1) Custom duties, internal taxes and fiscal levies for the imported materials and equipment and the Japanese nationals involved in this Project shall be exempted or be borne by the Government of Thailand.
- 2) Securing plot of land
- 3) Site survey
- 4) Soil test and any other geological tests
- 5) Land Fill and levelling
- 6) Demolition and removal of obstacles on the Site including underground obstacles
- 7) Construction of Access Road
- 8) Main power cable to the distribution board in the building
- 9) Water supply to the water tank(s) in the building
- 10) Drainage connection to the public drain
- 11) Sewer connection to the canal from the waste water treatment tank
- 12) Gas supply
- 13) Gate(s) and fence
- 14) Landscaping and gardening
- 15) Office equipment
- 16) Food service utensils
- 17) Carpets and curtains
- 18) Bedding materials
- 19) Linen
- 20) Drugs and reagent
- 21) Furniture
- 22) Education equipment not included in Japanese work
- 23) Operation and maintenance expenses
- 24) Telephone line to the main distribution frame in the building
- 25) Basketball court
- 26) Tennis courts



4-9 OVERALL PROJECT SCHEDULE (Tentative)

Since the project is to be implemented under the Grant Aid programme by the Japanese Government, the schedule is proposed as shown below. The schedule is divided into:

- (1) Basic Design Survey undertaken as part of the Japanese Technical Cooperation programme and
- (2) Detailed Design and (3) Construction work by the Grant Aid scheme.

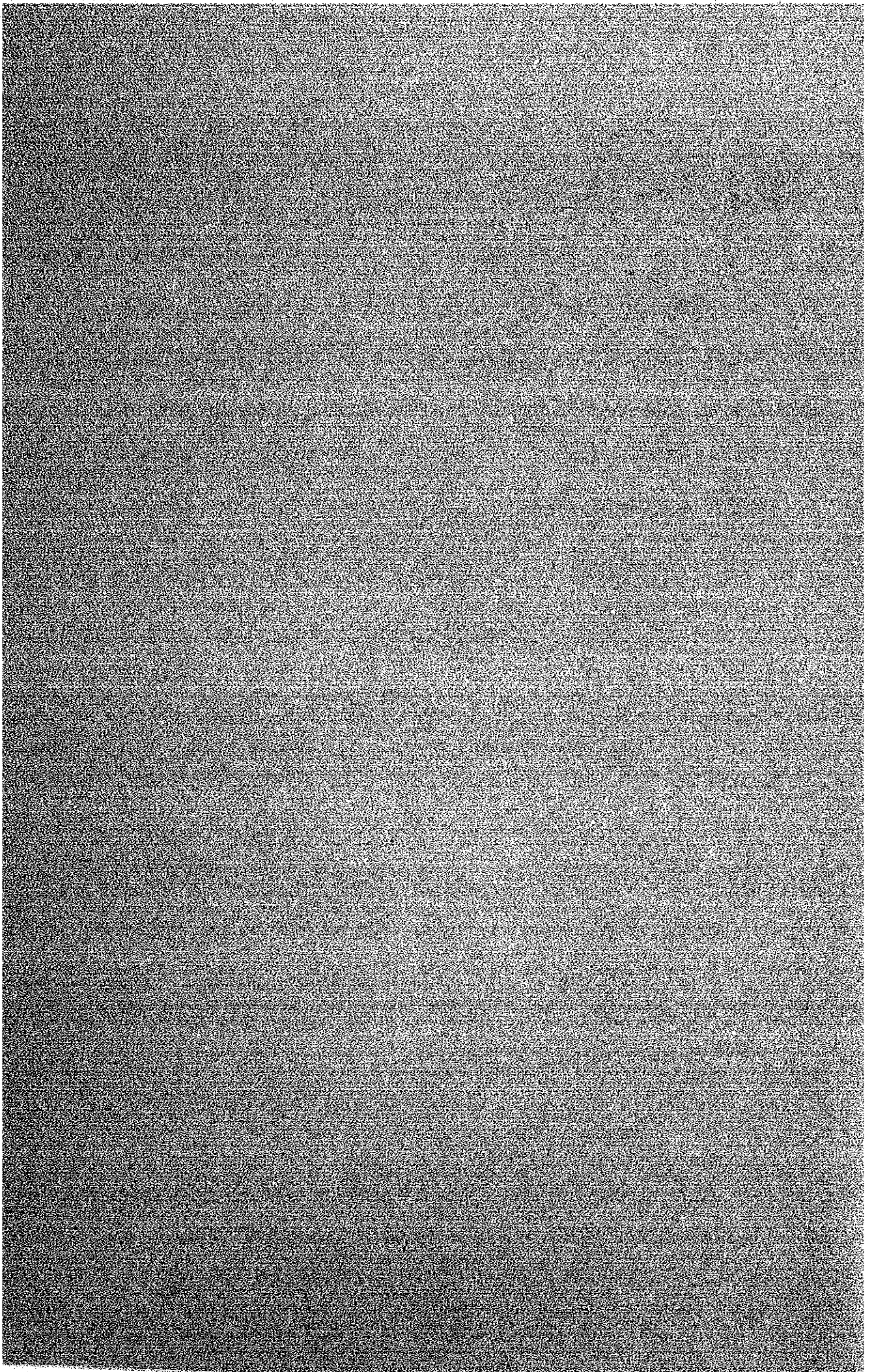


Note in the above schedule

- 1. Exchange of Notes is assumed to be concluded by May 1981
- 2. Detailed Design work consequently carried out up to June
- 3. Construction Tender and Contract undertaken in July 1981
- 4. Construction schedule conducted for a fifteen months period from August 1981 to October 1982

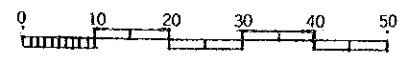
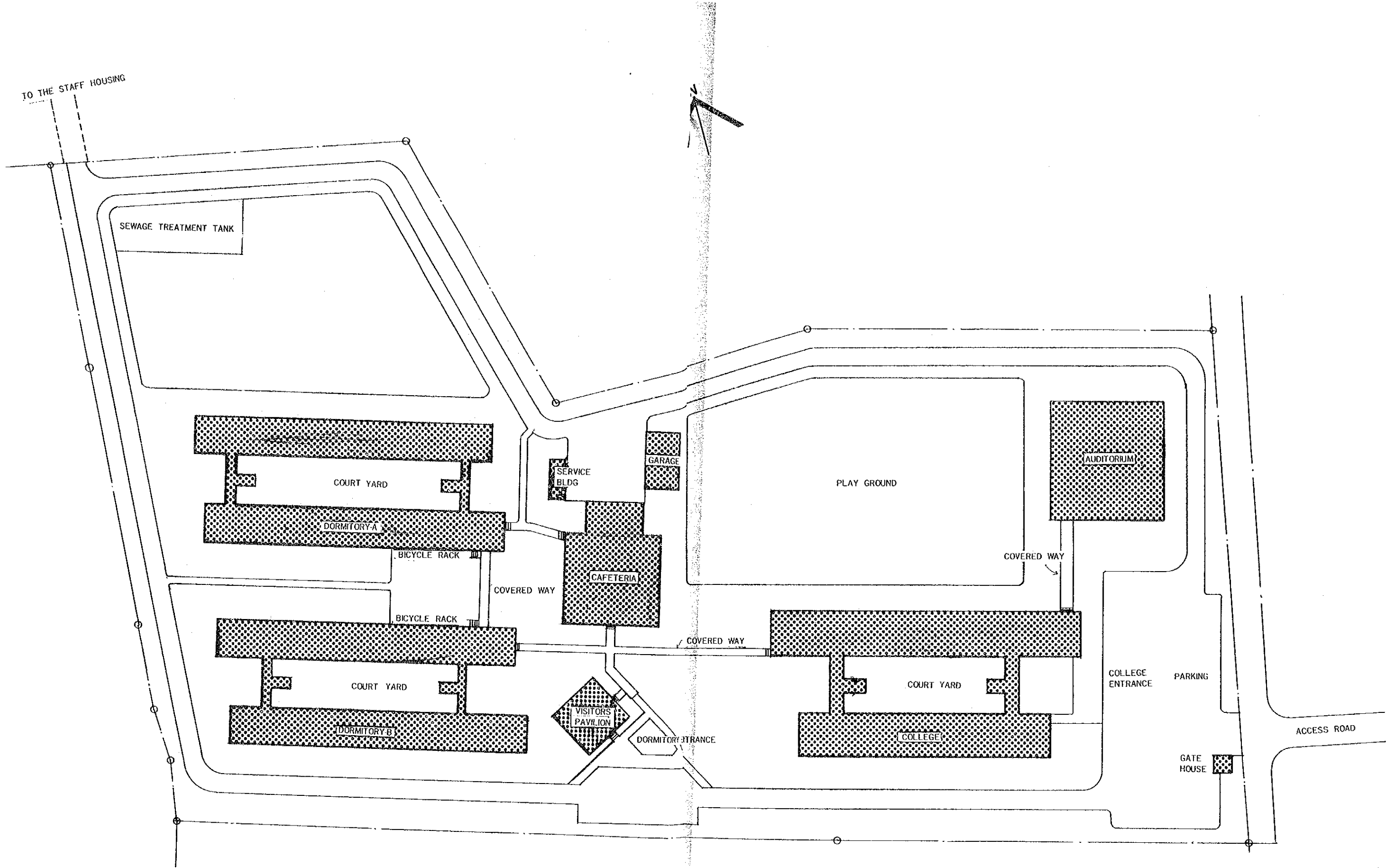


CHAPTER 5 DRAWINGS OF THE BASIC DESIGN

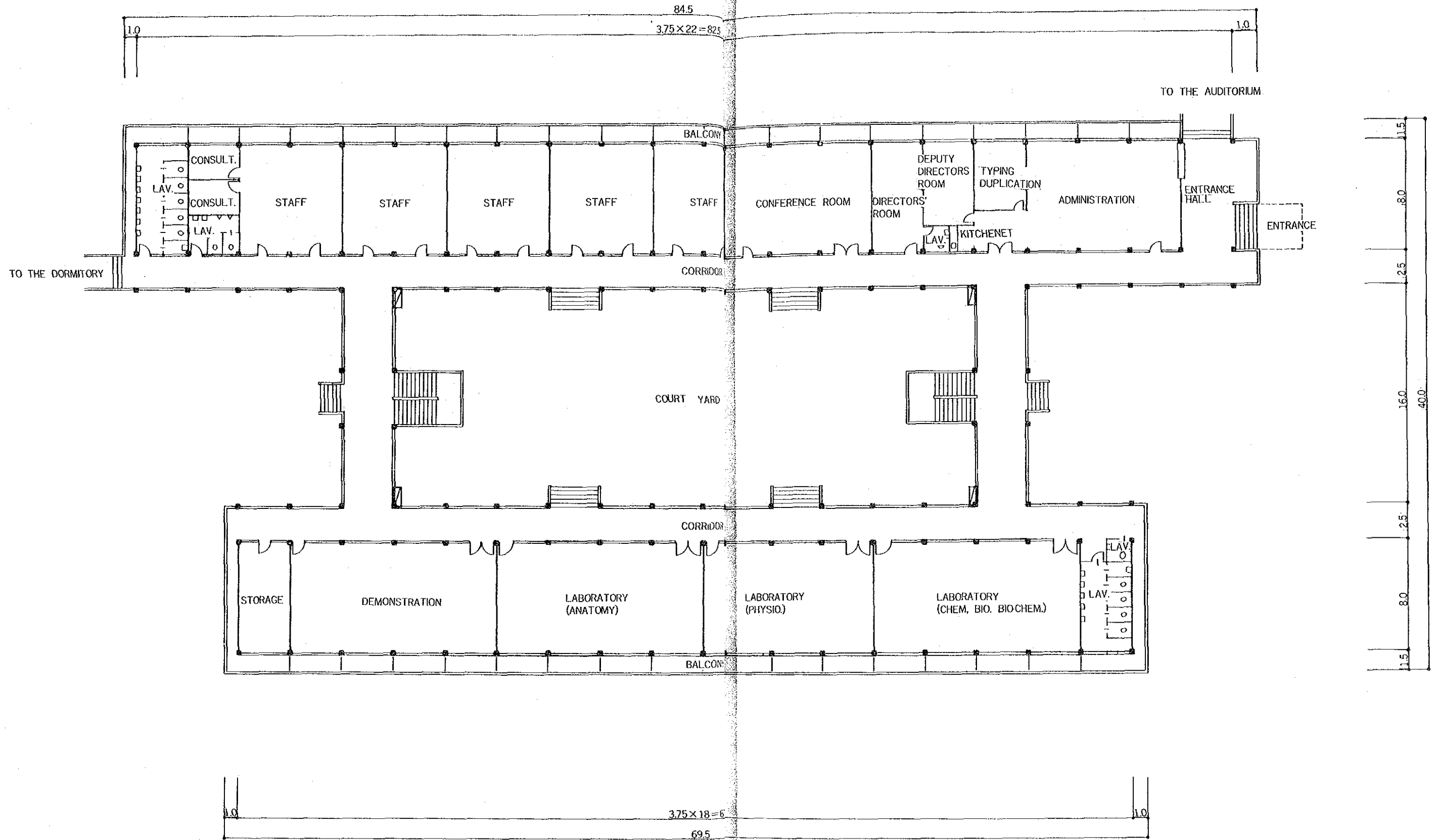


LIST OF DRAWINGS  
BASIC DESIGN  
MAHASARAKHAM NURSING COLLEGE

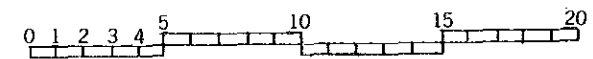
- |     |                                            |                       |
|-----|--------------------------------------------|-----------------------|
| 1.  | PLOT PLAN                                  |                       |
| 2.  | COLLEGE                                    | 1st FLOOR PLAN        |
| 3.  | COLLEGE                                    | 2nd FLOOR PLAN        |
| 4.  | DORMITORY-A                                | 1st FLOOR PLAN        |
| 5.  | DORMITORY-A                                | 2nd & 3rd FLOOR PLAN  |
| 6.  | DORMITORY-B                                | 1st FLOOR PLAN        |
| 7.  | DORMITORY-B                                | 2nd & 3rd FLOOR PLAN  |
| 8.  | CAFETERIA & VISITORS' PAVILION             | PLANS                 |
| 9.  | AUDITORIUM                                 | PLANS                 |
| 10. | COLLEGE & DORMITORY-B                      | ELEVATIONS & SECTIONS |
| 11. | AUDITORIUM, CAFETERIA & VISITORS' PAVILION | ELEVATIONS & SECTIONS |

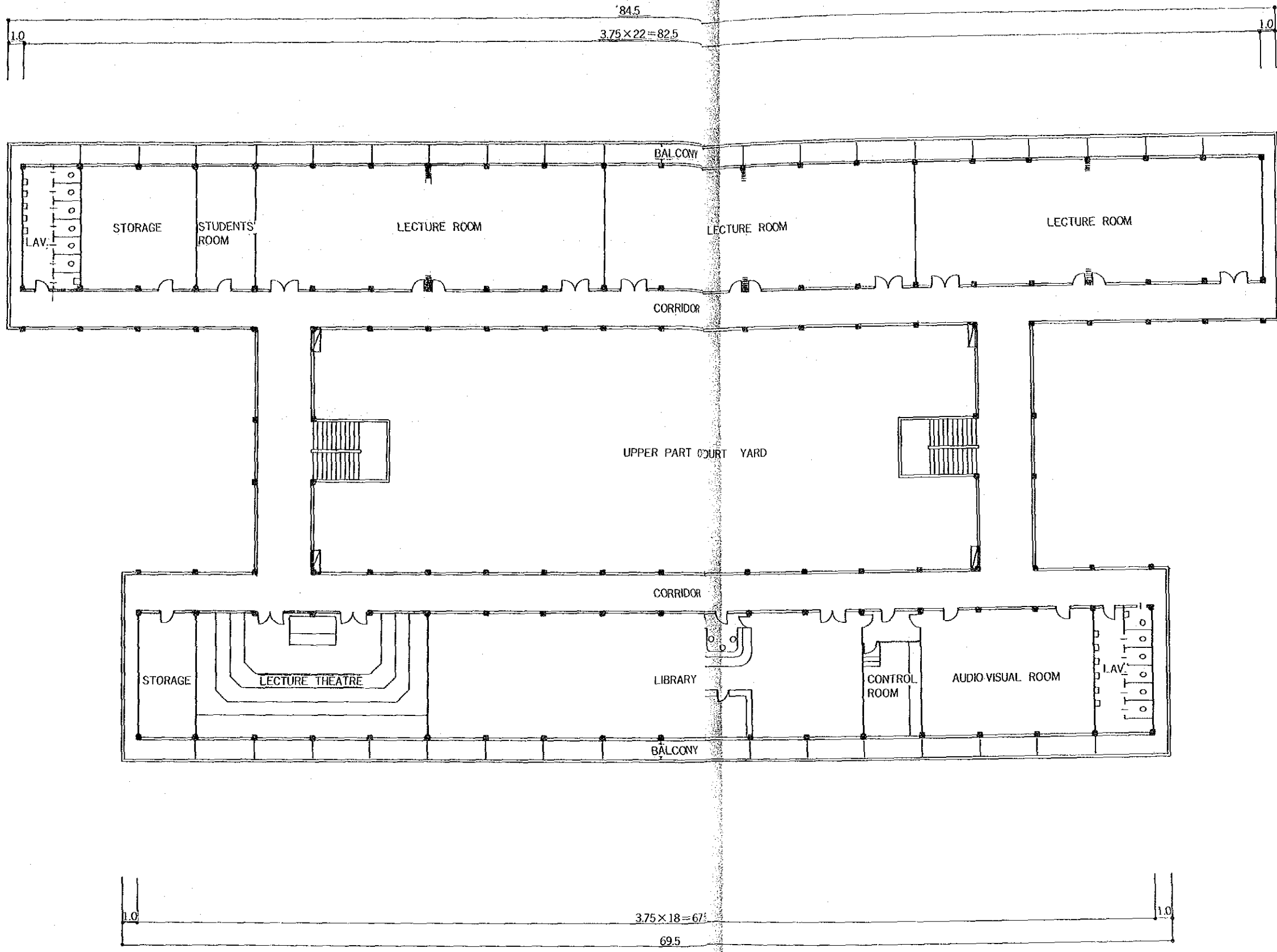


PLOT PLAN  
 MAHASARAKHAM NURSING COLLEGE

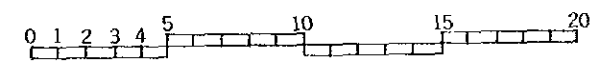


1 ST FLOOR PLAN

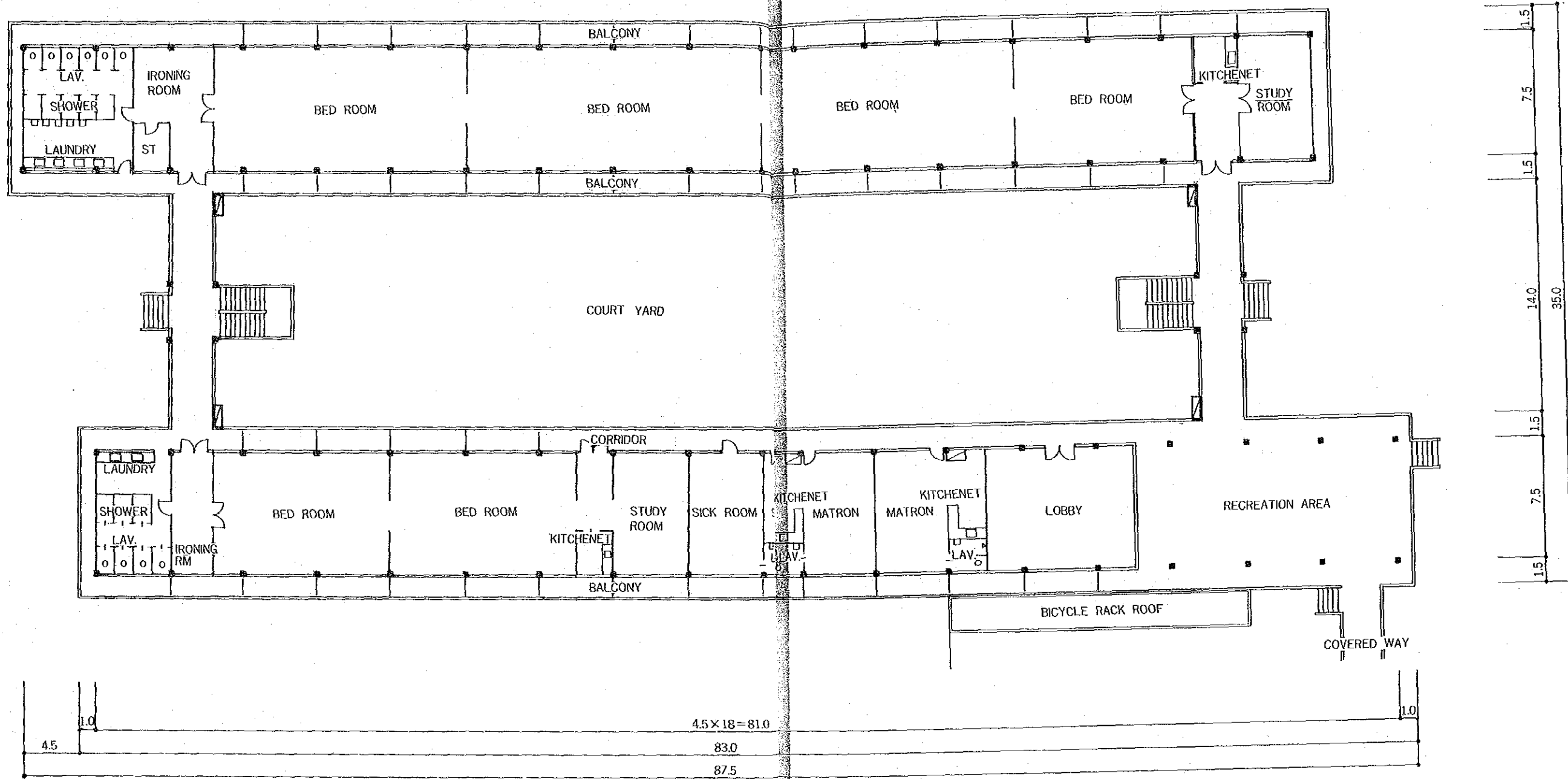




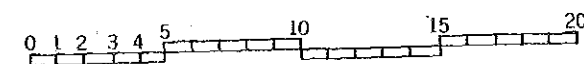
2<sup>ND</sup> FLOOR PLAN

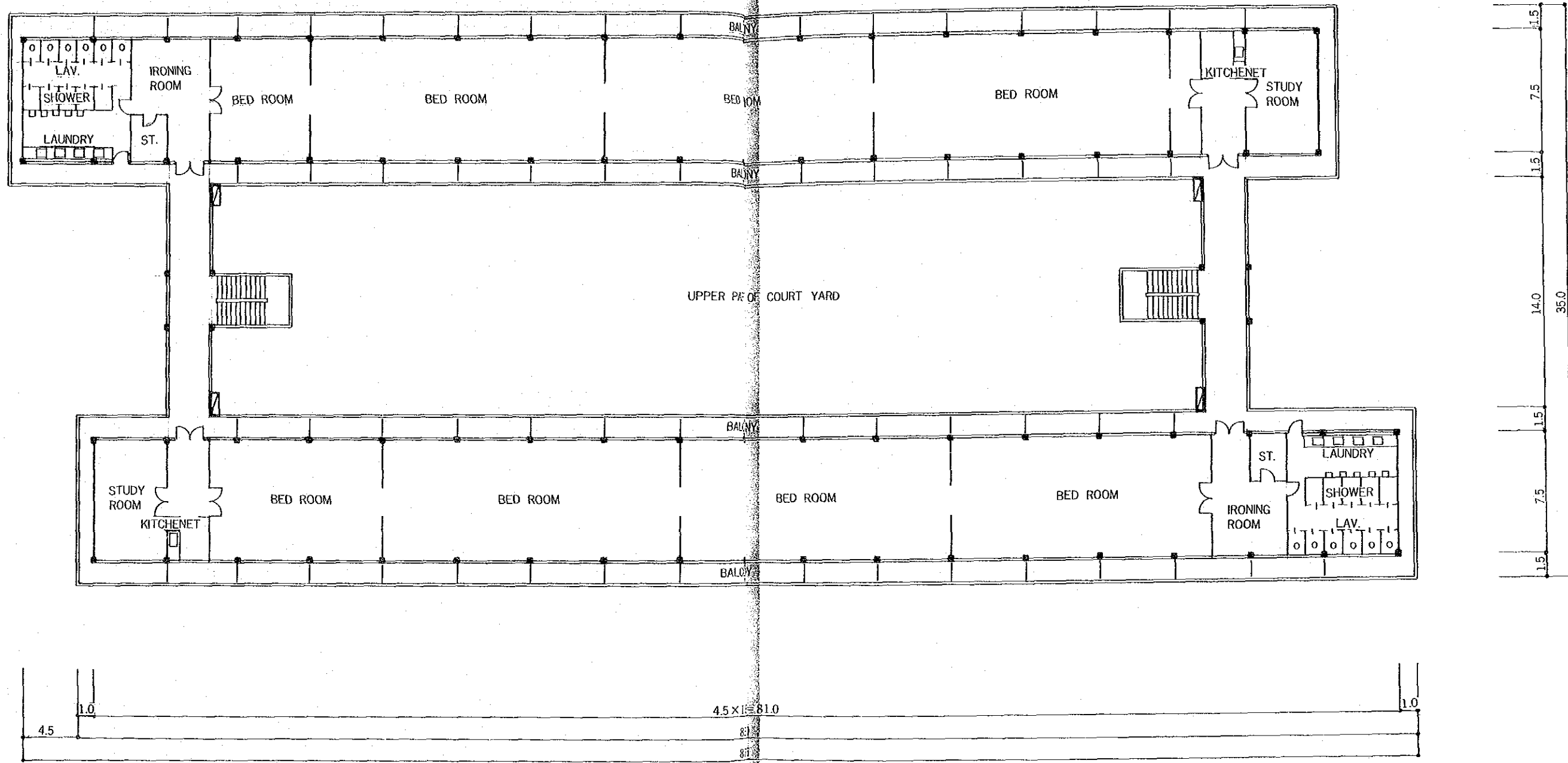




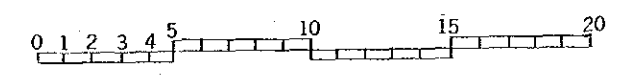


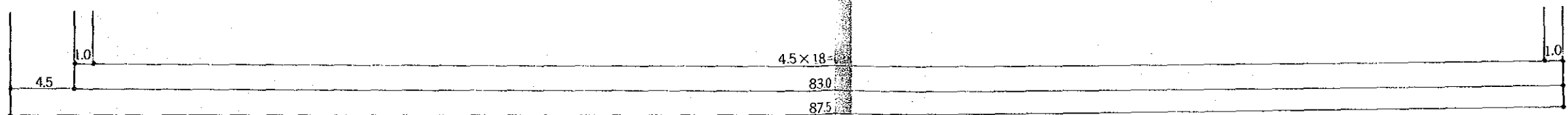
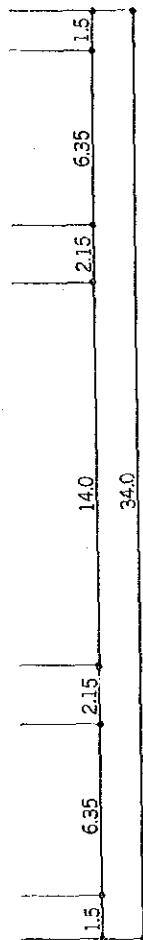
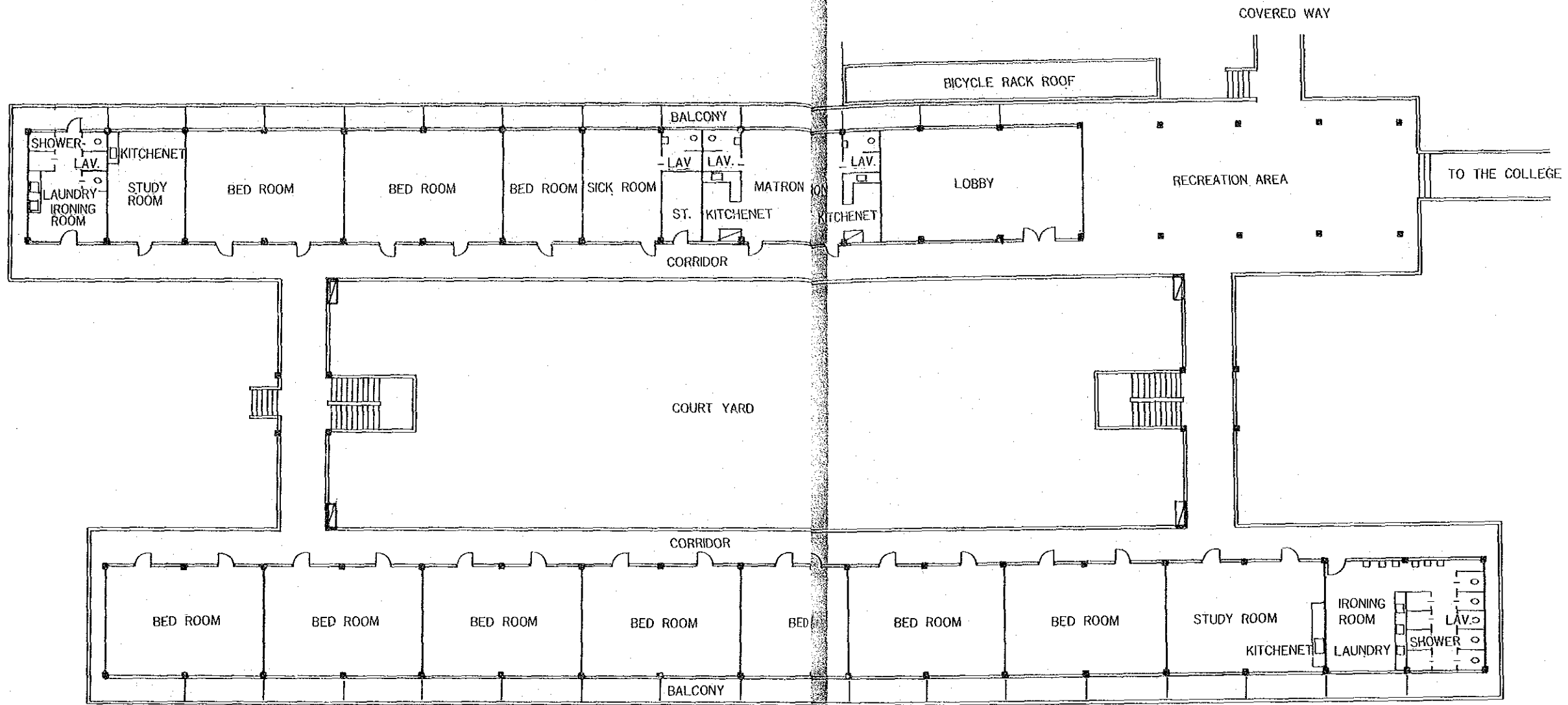
1st FLOOR PLAN



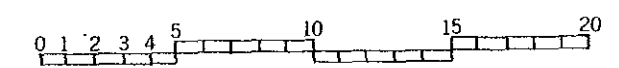


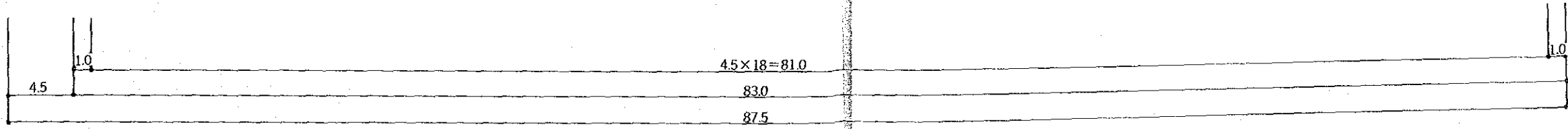
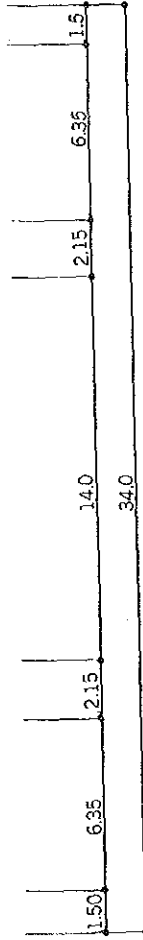
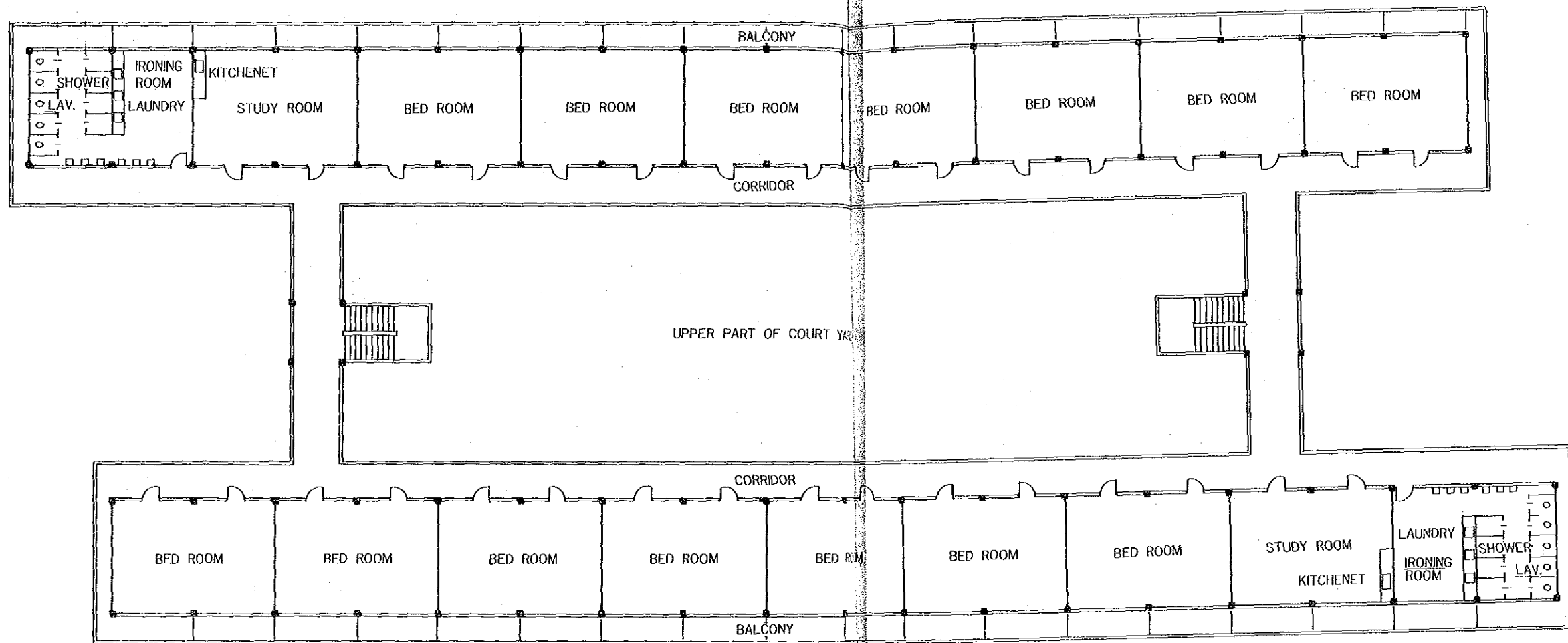
2ND & 3RD FLOOR PLAN



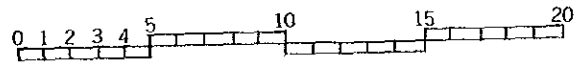


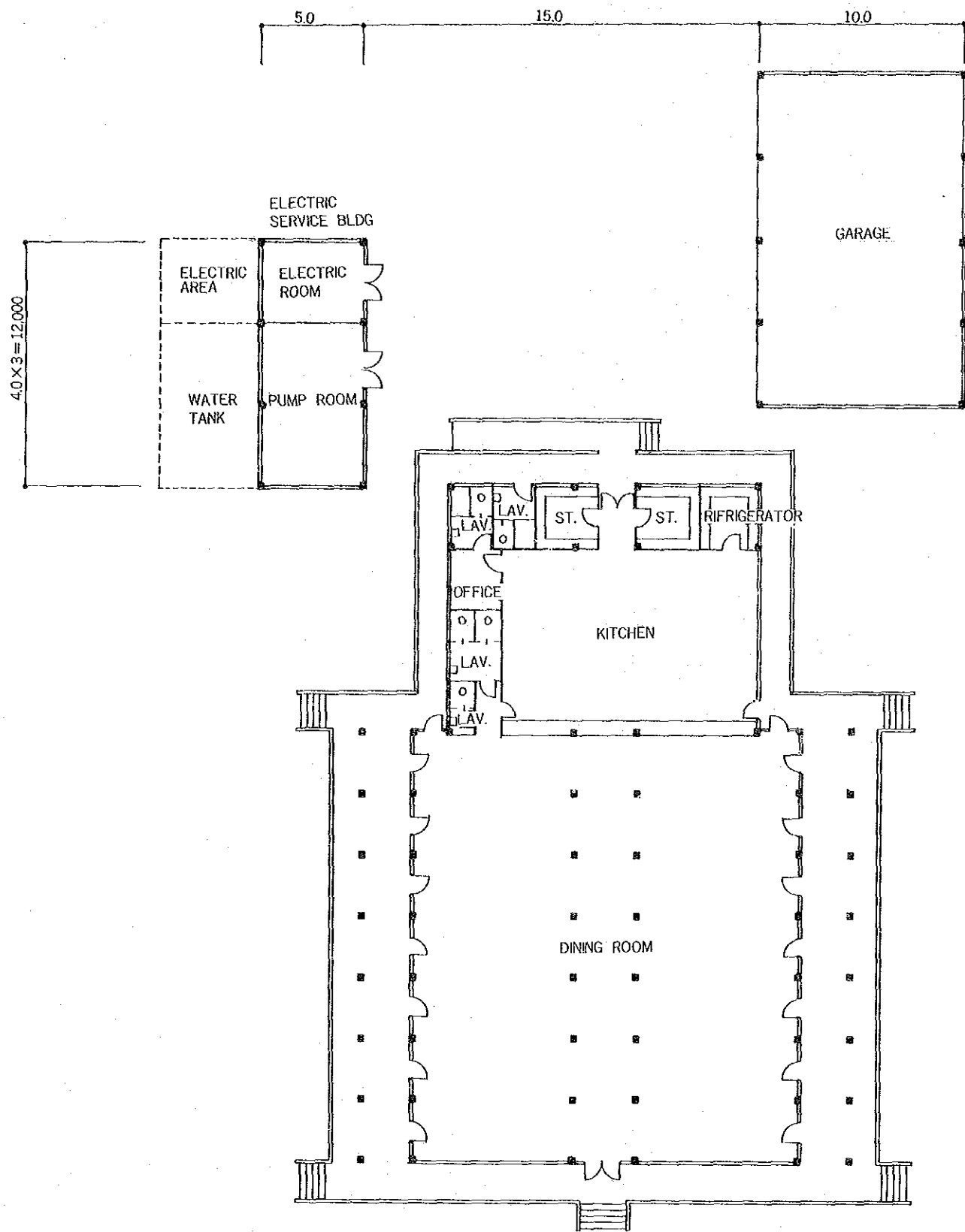
1ST FLOOR PLAN



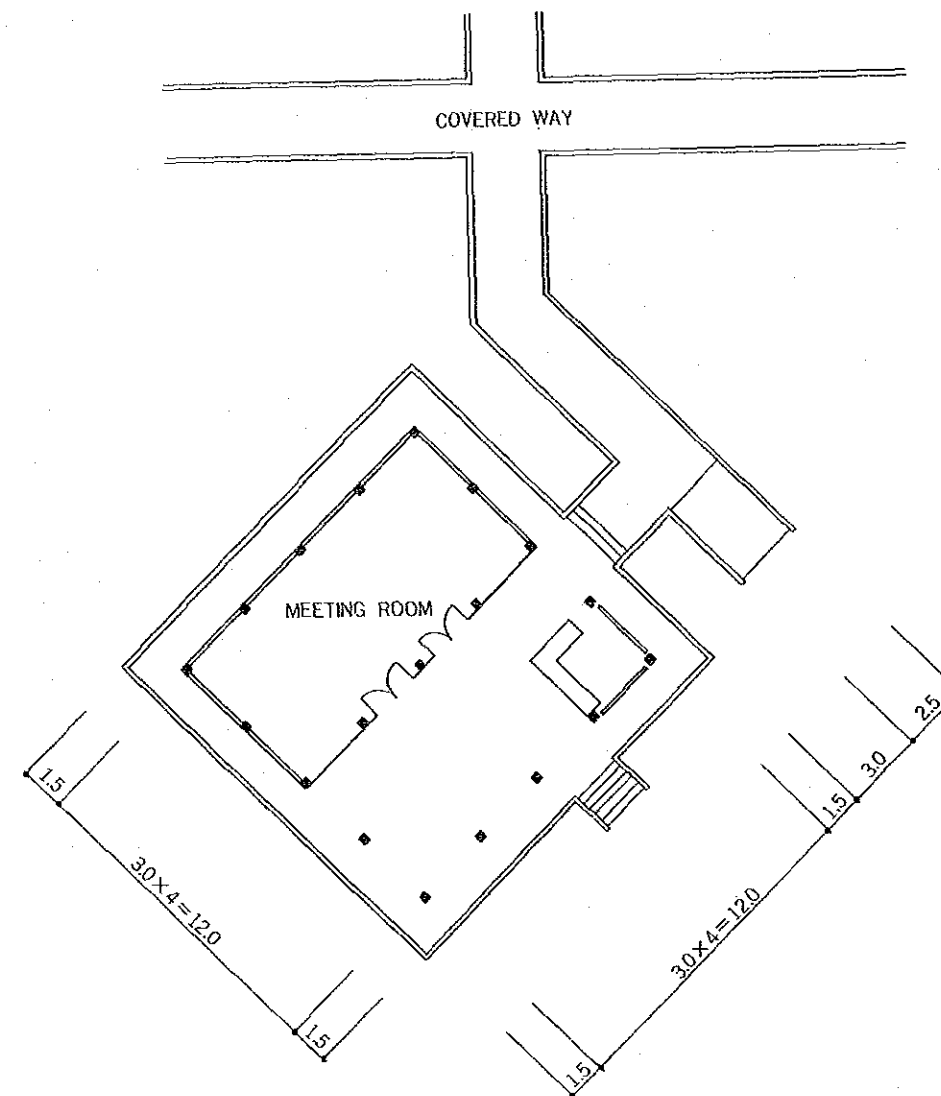


2ND & 3RD FLOOR PLAN

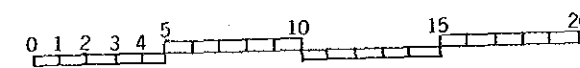




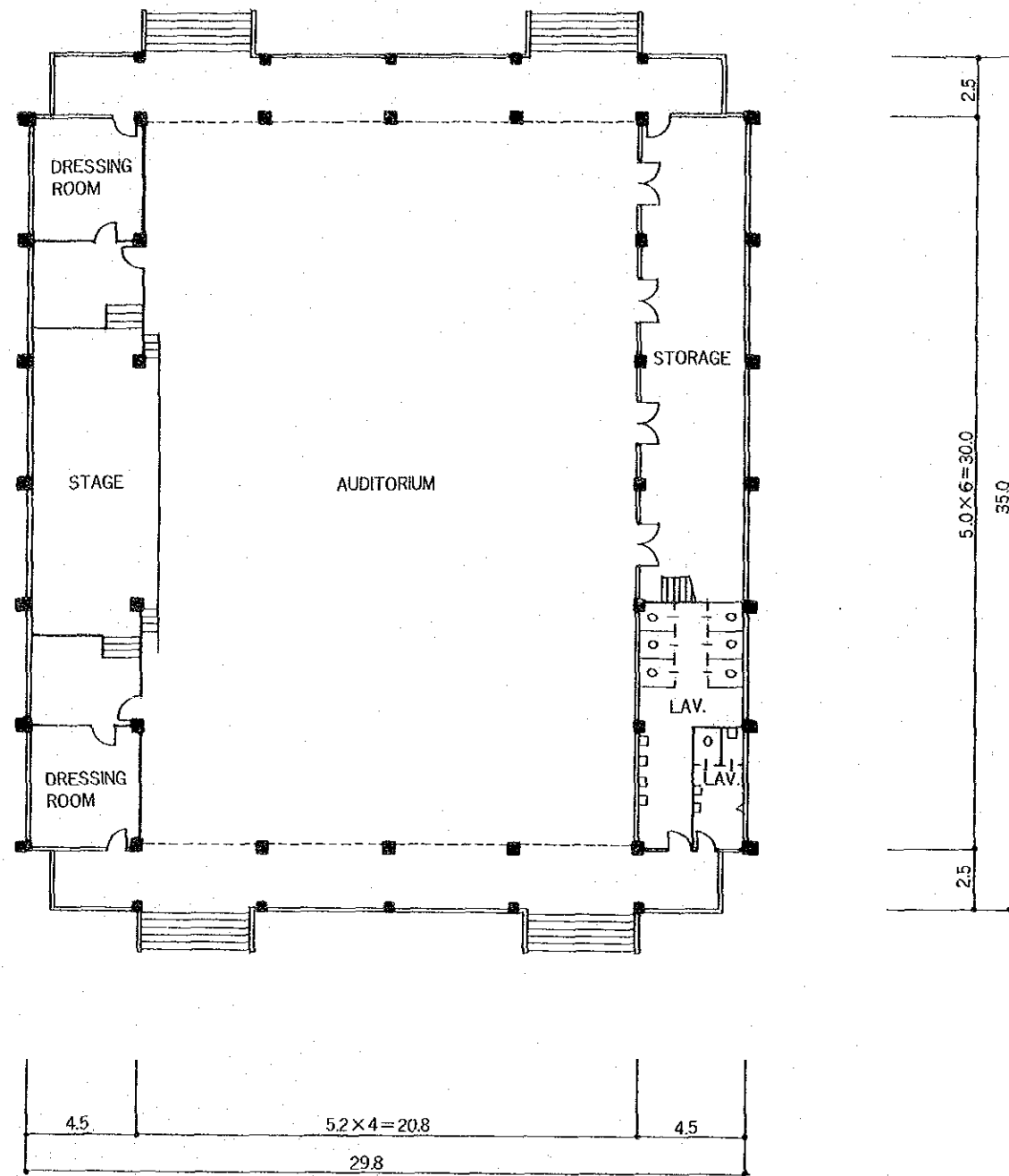
CAFETERIA PLAN



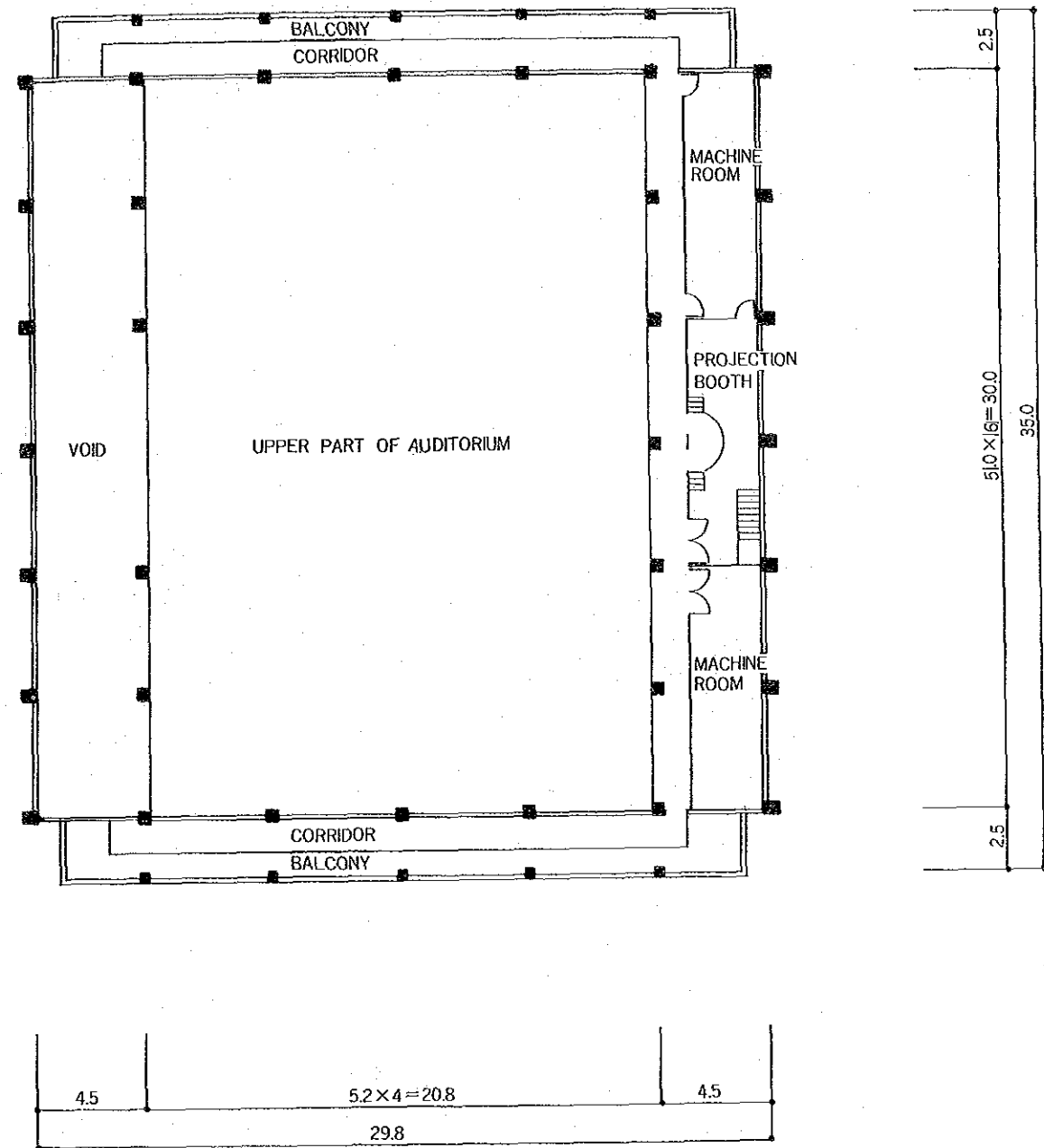
VISITORS' PAVILION PLAN



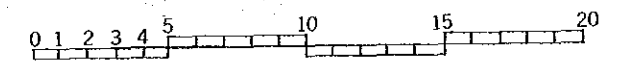
CAFETERIA & VISITORS' PAVILION  
MAHASARAKHAM NURSING COLLEGE



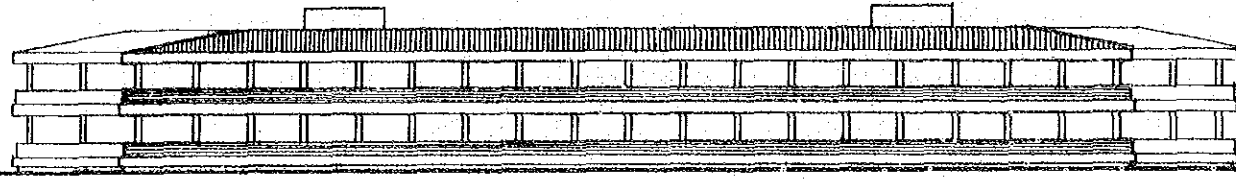
1ST FLOOR PLAN



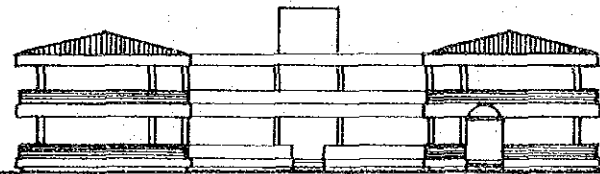
2ND FLOOR PLAN



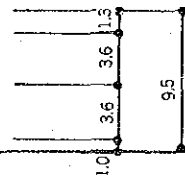
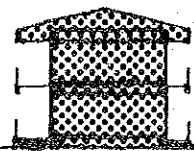
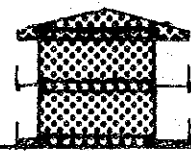
COLLEGE



SOUTH ELEVATION

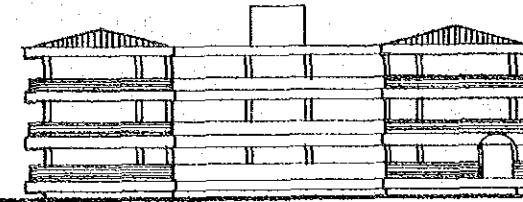


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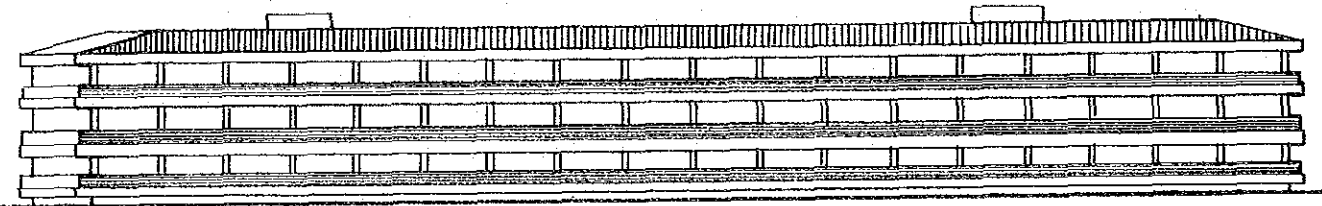


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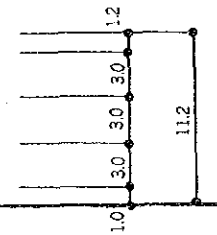
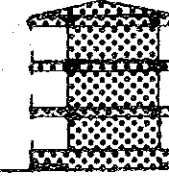
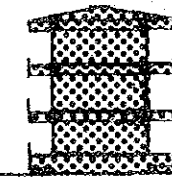
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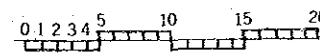
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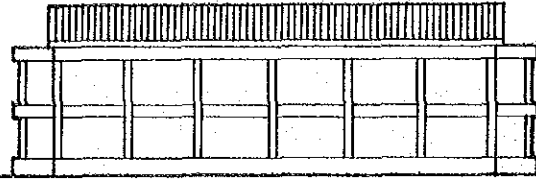
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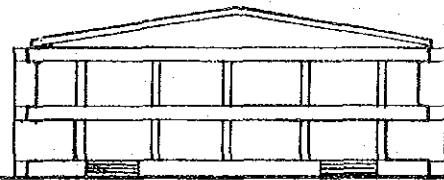
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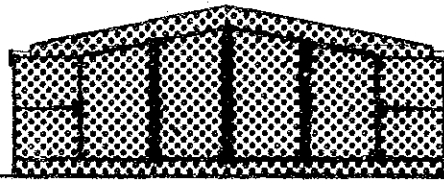
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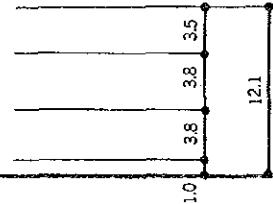
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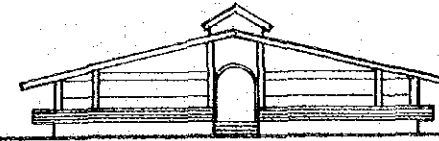
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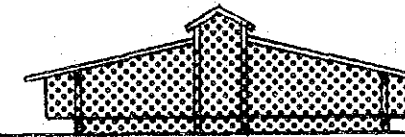
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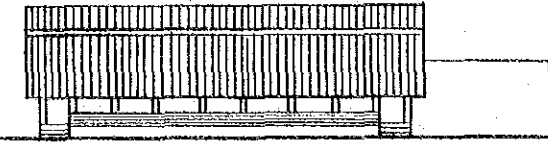
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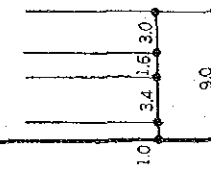
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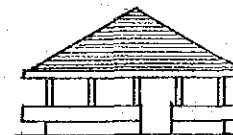
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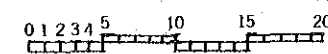
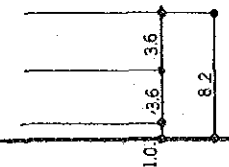
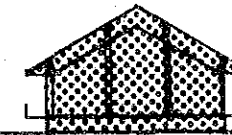
EAST ELEVATION



VISITORS' PAVILION



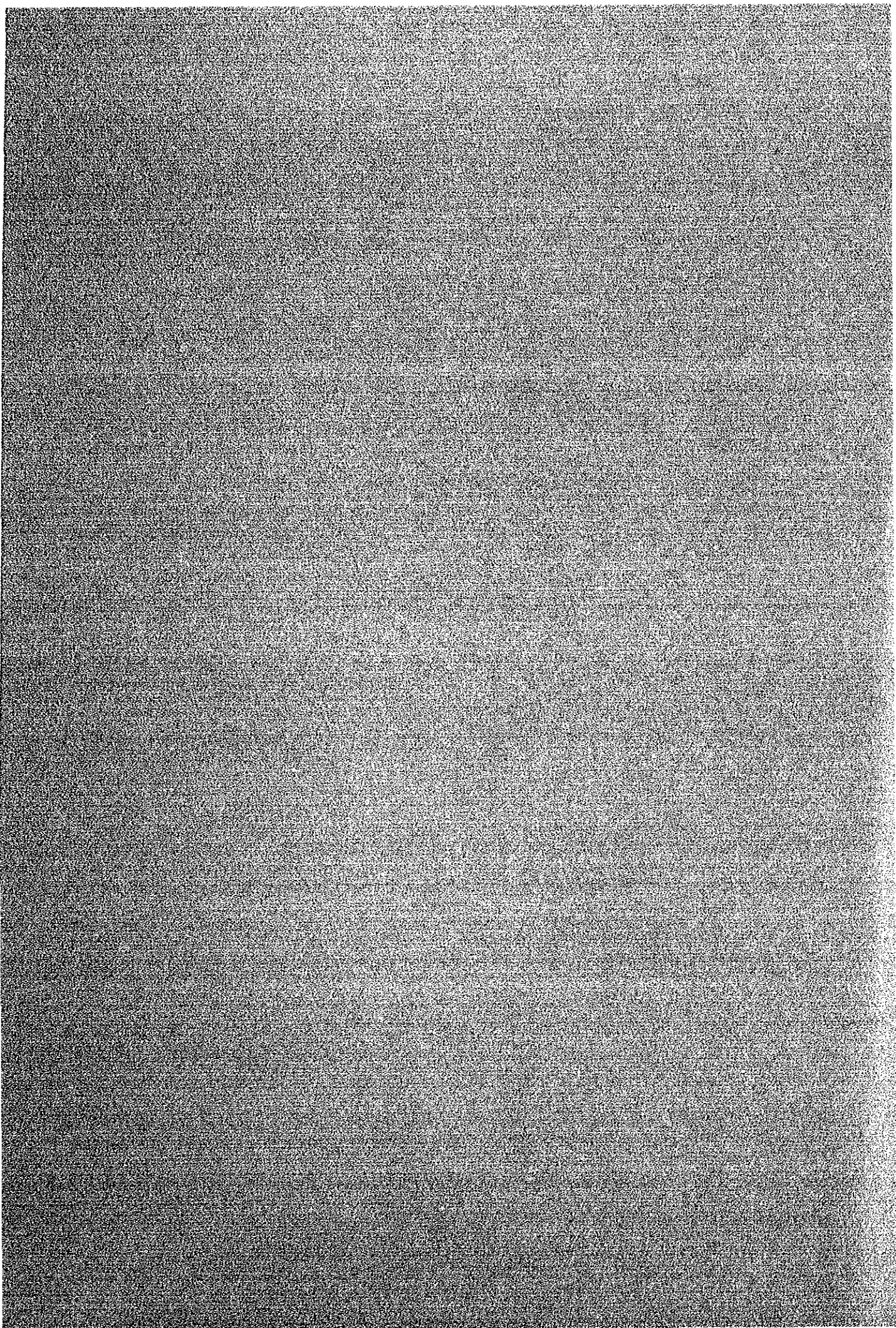
EAST ELEVATION







CHAPTER 6 CONSIDERATIONS AND SUGGESTIONS



## CHAPTER 6 CONSIDERATIONS AND SUGGESTIONS

### 1. Significance

The significance of this college is recognized as follows:

- 1) As a measure to meet the shortage of nurses.
- 2) To educate student nurses who will work in rural communities and to promote medical care and nursing care in such communities. There are 15 province in the Mahasarakham area, however the medical care and nursing care level is rather low.
  - a. Therefore, the Mahasarakham College of Nursing should be the central nursing school to promote the primary health care for people in rural communities.
  - b. Nurses should have the ability and knowledge to consider the problem solving process, by studying fundamental problems, understanding various subjects, in order to pinpoint the cause of patients' problems and finally to resolve them.
  - c. Nurses not only undertake the duties of medical treatment but also take a responsibility in promoting health, preventing diseases, and maintaining medical care and hygienic conditions for the people.
- 3) To improve and expand the services of medical care in the North-Eastern area.

The North-Eastern area close to other countries has a majority of the population, and it is rather under-developed compared with other areas of Thailand. Therefore, it is important to improve and expand the services of medical care, as health problems have an effect upon various other aspects of society; economy, education, politics, culture, etc. in this area.

The Construction of the Mahasarakham College of Nursing will contribute to the development and promotion of national public health and prevention of diseases as well as improving medical care facilities and preventative medicine for the people of Thailand.

## 2. Effect

- 1) The length of the nurse education course for Registered Nurses in Thailand has now increased to 4 years. This is sufficient time to provide the necessary amount of nursing practice. A 4 years (B.S. and Diploma) and 2 years (Diploma) system of nursing education (even using a mass production system) is better than producing numbers of practical nurses. For this reason, the foundation of the Mahasarakham College of Nursing is very significant.
- 2) However, there is a shortage of nurses in Thailand, and especially in the North-Eastern area. This has already been described above.

The shortage of nurses manifests itself in three ways:

- a. Shortage of absolute number
- b. Shortage of graduates from 4 years course
- c. Shortage of nurses who work at communities

To resolve this problem, the Ministry of Public Health made the National Development Plan, for Public Health Development which has already started. The 2nd phase of those plans will continue until 1986.

To accomplish the National Plan for producing more nurses, a method of increasing the number of students in each class was studied. The result was the 2 block enrollment system now being operated at some nursing colleges. There is no other way to increase the numbers of nurses, since the number of colleges is limited and it is very difficult to establish new colleges due to the difficulty of obtaining sufficient funds. Thus, the establishment of the Mahasarakham College of Nursing is very important for Thailand.

- 3) The conditions and facilities of existing training hospitals in the Mahasarakham area are inadequate for training students.

Larger and more efficient hospitals are required to handle the presence of so many students. Furthermore, improvements to the Mahasarakham Provincial Hospital must be carried out before it can be considered suitable for education purposes.

However, judging from experience elsewhere, the improvement of those other medical colleges can be expected following foundation of the Mahasarakham College of Nursing. Furthermore, the medical care and educational level of the community will be improved. As there is a large population in the North-Eastern area, and it is located near the border the improvement and promotion of nursing education are especially important.

There can be no doubt that the contribution of Japanese-Grant-Aid to this program of National Development will be extremely effective and play an important part for the development of Nurse Education.

### 3. Conclusion and Suggestion

From a purely educational viewpoint, the teaching method which is described on this project is not wholly suitable for ideal nursing education.

However, taking into consideration the present medical situation in Thailand, it can be appreciated that the establishment of the Mahasarakham College of Nursing is very significant, even if the mass production system of education must be adopted. The urgent need for great numbers of nurses to work in communities in the North-Eastern area led us to conclude that 150 students enrolled each year for the four years course in a building which can accommodate 600 students altogether would be reasonable.

The Ministry of Public Health in Thailand also strongly requested a total capacity of 600 students. Therefore it has been suggested to the Japanese government that for the present a budget adequate to support a total of 600 student nurses be approved. It is earnestly hoped that the teaching system at the Mahasarakham College of Nursing should be improved in the future to allow more attention to be paid to developing the personality and quality of nurses.

