CHAPTER 4 BASIC DESIGN

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4-1 BASIC DESIGN OF FACILITY

(1) Policy for Basic Design

1) The basic design will be performed such that this facility is constructed based on the construction project of the National Learning Resource Center for Teacher Training in Science and Mathematics Education of the Republic of the Philippines so as to create functional and rational facilities to sufficiently fulfill the expected sales for programs of training and equipment and materials.

2) Since the facility will be constructed adjacent to the existing ISMED facility, harmony with the existing facility will be thoroughly taken into account. Particular consideration will be given to harmony with the environment in the periphery of the site as it is to be constructed within the campus of the University of the Philippines.

3) Thoroughly grasping the climate, natural features and construction situation in and around Manila, a facility that is energy saving (natural lighting, natural ventilation, etc.) and economical for operation and maintenance will be planned.

4) In the construction of the facility, local materials and familiar methods of construction will be used as much as possible, and the finishing work, etc. will be done by local tradesmen, aiming at saving construction costs and reducing the construction period.

5) The roof is planned to be a flat deck convenient for use driving astronomical observation.

In consideration of the above items, the design (configuration and color) of the facility will be planned based on the following items:

(2) Study of Design Conditions

1) Natural conditions

① Measures against rainfall

The floor height of the 1st floor will be 300 mm from the ground to prevent flooding in the rainy season. The depth of the eaves will be made deeper (2.0 m) providing a balcony at each floor to prevent rainwater from flowing into the rooms.

② Measure for solar radiation

The roof will be made a reinforced concrete floor with heat insulation and water proofing work and covering concrete will be placed.

The depth of the eaves on the roof will be made deeper (2.0 m) providing a balcony at each floor to prevent the direct rays of the sun from coming into the rooms.

③ Measures for ventilation and lighting

Putting greenery in the courtyard is the prevailing method in low-rise buildings. Therefore, in the training building an open courtyard is provided in the upper part so as to have a serene expanse in the inner space. This courtyard also serves as an opening for natural ventilation and lighting which will save the amount of electric power needed for cooling and illumination.

2) Environment of proposed side for construction

① The proposed site is a wooded area with three sides enclosed by roads with ISMED nearby. This environment will be dealt with by the following measures:

As the training building is interconnected functionally and organizationally with the existing buildings of ISMED, it will be planned so that either may be reached through connecting corridors.

The dormitory building will be planned to have a high floor construction partly as it is located on a slope with a difference in level of about 1.0 m on the south side of the existing packing lot.

② The removal of trees and plants on the proposed site for construction will be held to the minimum required in the portion where buildings and storage areas for materials are to be constructed, etc. so as to maintain the park's function as an outdoor experiment field for biology.

3) Building schedule and building materials

① The design will be made such that the general building program in the Republic of the Philippines may be used.

The building will be a reinforced concrete rigid frame structure and a large span frame structure auditorium will be a post-tensioned prestressed concrete structure.

The wall will be of concrete black construction with mortar coating backing.

The earth under the concrete floor and around the buildings will be treated against termites.

The supports will be made a direct support foundation on the adobe layer.

2 The building materials of the Republic of the Philippines will be used as much as possible.

Materials for which maintenance and the purchases of spare parts are easy will be adopted.

The materials used will be determined after studying performance and durability thoroughly.

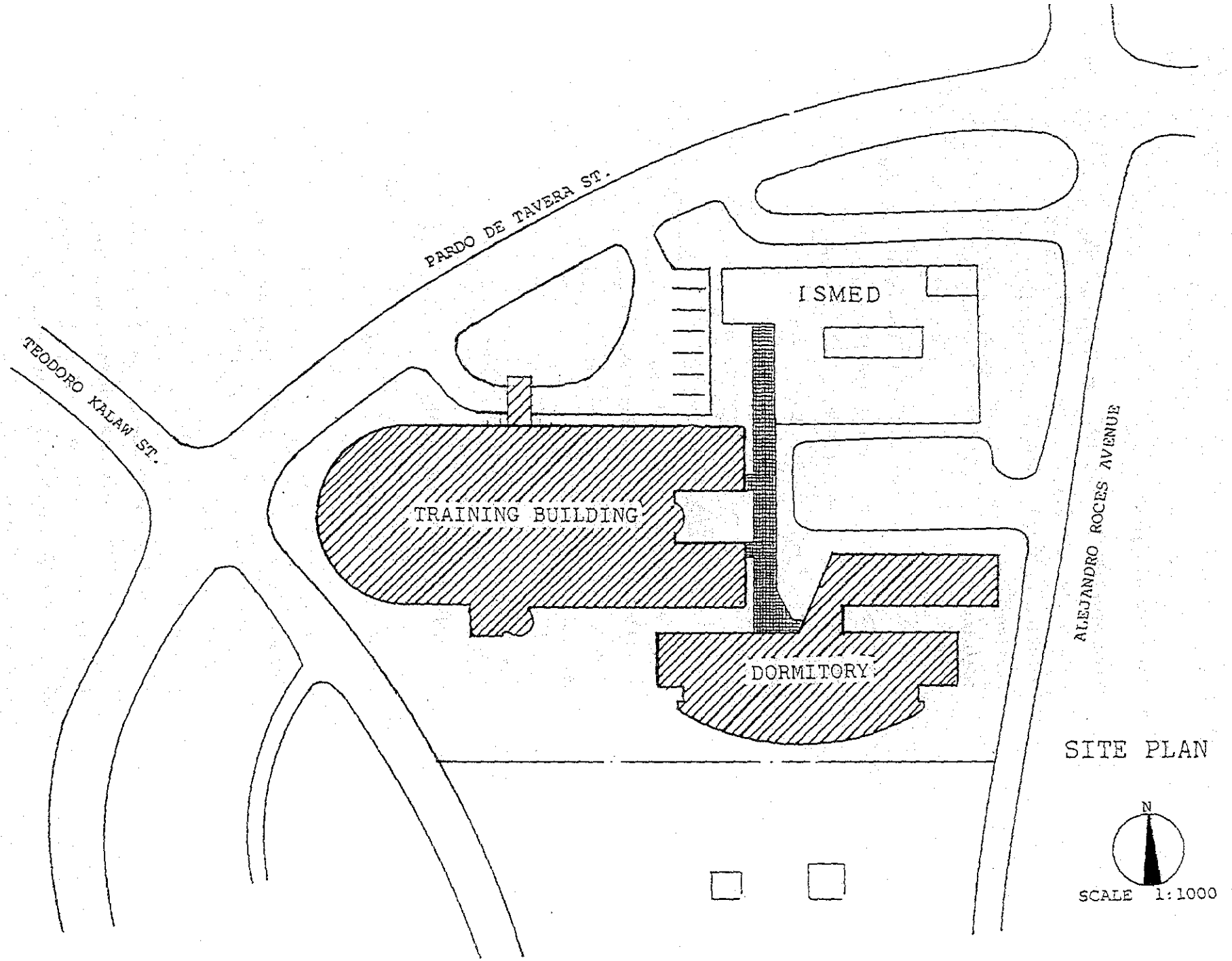
(3) Basic Plan of Building

1) Layout plan

After studying the acquired area of the site, elevation thereof and the position of existing ISMED buildings and parking, the training building will be located to the west of the existing ISMED buildings where the site is relatively flat so as to allow interchange with the existing ISMED buildings through connecting corridors on the first floor. An access road from the road on the north side of the site - Pardo de Tavera St. and a parking lot for visitors will be provided.

The dormitory building will be located to the south of the existing parking that faces Alejandro Roces Avenue - the road on the east of the site and the approach to the building will be made separate from that of the "training building".

Layout plan is shown in next page.


PARDO DE TAVERA ST.
TEODORO KALAW ST.
ALEJANDRO ROCES AVENUE
ISMED
TRAINING BUILDING
DORMITORY
N
SCALE 1:1000

SITE PLAN

2) Architectural Plan

① Training building

Laboratories for training and lectures, the auditorium, library, workshop for fabrication, painting room and administration office will be incorporated in one building so as to conduct training more effectively.

An atrium with a courtyard is in the center of the building to provide natural ventilation and lighting as well as a place of relation for trainees.

· Planning

One the lst floor the workshop, printing room, library, display room, and seminar room will be arranged so as to facilitate the movement of books, equipment for fabrication of teaching materials, etc.

The 2nd floor will have the chemistry, physics, primary science, elementary and secondary mathematics labs, the audio-visual classroom, the respective preparatory rooms, staff room and storage room for laboratory apparatus.

On the 3rd floor will be the auditorium, the biology, physical geography, information science cabs, the preparatory room, staff room and specimen room.

Balconies will be provided on the 2nd and 3rd floors to prevent strong sunshine from coming directly into the rooms as well as to be places for simple experiments and observation.

The rooms will be connected via open corridors facing the courtyard on the respective floor.

An audio-visual room and a dome to house the astronomical telescope will be on the roof, which will also be used for outdoor observation.

The basic column spacing will be 4.0 m x 8.5 m taking into account the layout of experiment tables and shelves in the laboratory.

- Section plan

As well as making the ceiling height of each room 3.0 m, jalousie windows will be provided above the doors facing the open corridor to enable natural lighting and ventilation.

The floor height of the 1st floor will be raised 300 mm from the ground to prevent the rooms from flooding in the raining season.

The auditorium will be laid out on the 3rd floor with an atrium up to the rooftop so as to create a high ceiling and on the upper part a transom window and a ventilation window will be provided for natural lighting and ventilation. During projection, the room may be darkened using a movable louver.

- Elevation plan

Reinforced concrete eaves will project 2.0 m and the 2nd and 3rd floors will have balconies to prevent direct sunshine and rainwater from entering the rooms.

The outside appearance is to have a symbolic aspect as a national center and at the same time

the specifications for finishing the exterior walls will employ common local materials, such as adobe chipping and pea gravel exposed by washing, etc.

② Dormitory building

This facility will be used as a sleeping facility for trainees who are to be dispatched from 13 regions of the Philippines to receive training for one month and for lecturers who are to be dispatched from each region or university.

· Planning

The dormitory building will have 3 storeys with the 2nd and 3rd floors for trainees and rooms for lecturers and common rooms on the 1st floor.

A central corridor will be provided on the 2nd and 3rd floors. Each floor will have 45 rooms in total and each room will be used by two people for a total capacity of 90.

In consideration of the fact that about 90% of the trainees will be women, each room will be provided with a shower unit and wash basin. On each floor a linen closet, washing room and common toilet will be provided.

On the 1st floor, 4 bedrooms for lecturers, each with a bath and toilet unit, a cafeteria, a lounge, and living quarters for a janitor will be provided. The cafeteria will be used not only by the trainees but also by the staff of the Center.

- Section plan

  The ceiling height of each room will be 3.0 m with a large window so as to allow natural ventilation.

  Since the dormitory will be on the south side of the existing parking lot, which is about 1.0 m lower than the lot, the level of the 1st floor level will be raised.

- Elevation plan

  Reinforced concrete eaves will be project 2.0 m and a balcony will be provided on each floor to keep out direct sunshine and rainwater.

3) Structural plan

Since the buildings of the facility are 3-story (partially 4-story) training building and 3-story dormitory, their frame work must have sufficient resistance against all external forces and be able to transmit them to the ground simply and efficiently. The structural plan therefore takes into account the above items as well as economic viability.

① Method of framing

Both the training building and dormitory building will employ reinforced concrete rigid frames. The large framing functionally necessary for the training building will use prestressed concrete beams i.e. the post-tensioned method.

② Design criteria

The structural design method will be in accordance with the National Structural Code (NSCP) that is generally used in the Philippines at present.

These criteria are based on the ACI standards in the U.S.A.

ACI 318-77 (ultimate strength design) was adapted for the design of the facility.

③ Load

Live load

Live load shall be established as follows in accordance with the provisions of NACP.

Room	Dead weight kg/m^2
Laboratory	500
Office	300
Corridor, lobby	500
Toilet	300

. Earthquake force

The earthquake force applied to the buildings may be calculated using the following equation based on the rules of the NSCP:

V = ZKCW

V : Base shear

Z : Coefficient that is determined by the region and foundation of the building

Z = 1.4 (refer to Fig. 9)

K : Coefficient that is determined by the type of structure

K = 1.0

C : Coefficient that is determined by the natural period (T) of the building

C = 0.05/3 T

W : Total weight of the building

Here an approximate calculation

$T = 0.05\ hr/\ D$

Where hn : Height of the building

D : The length of the building in the direction of an earthquake force

(Refer to Fig. 9, Earthquake Coefficient "Z")

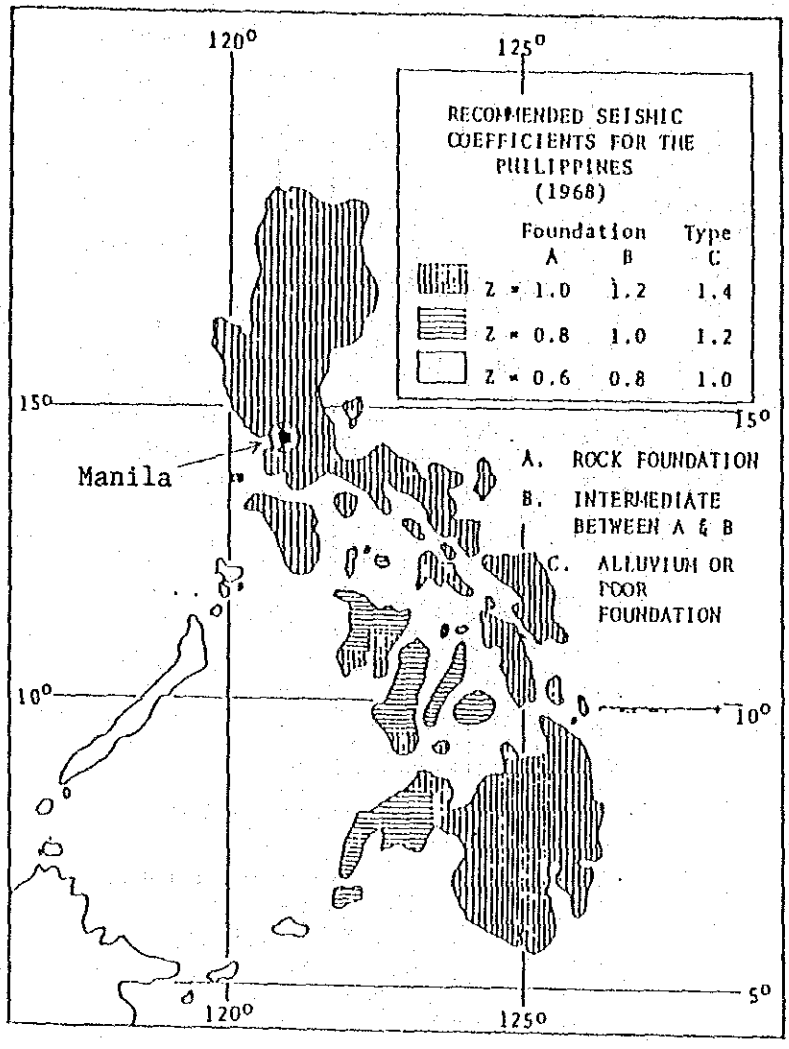
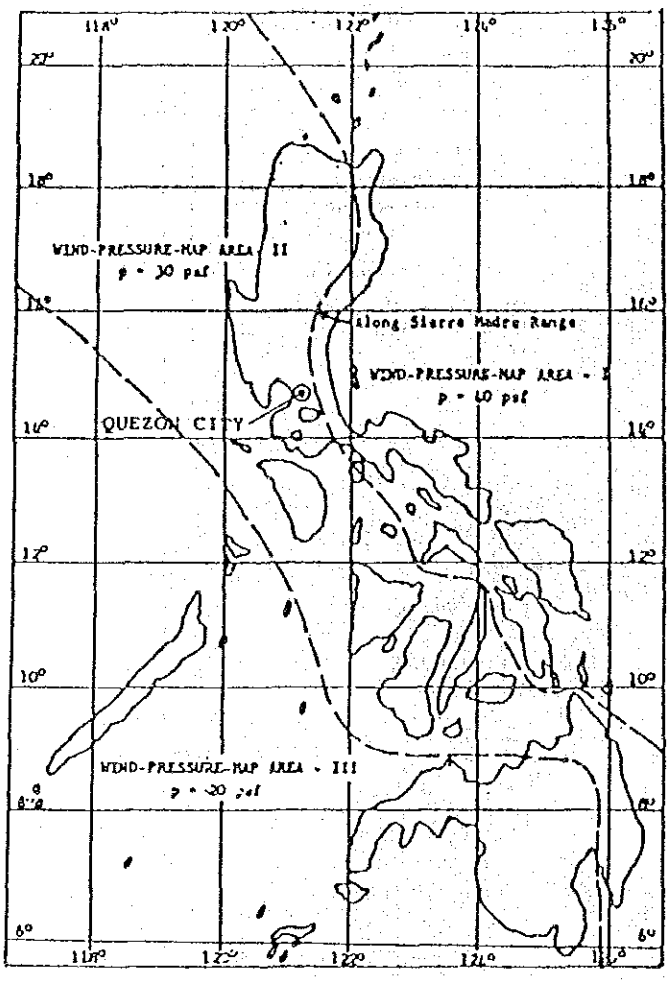


Fig. 9 Earthquake Coefficient "Z"

· Wind load

The wind load acting on the building will be determined based on the NSCP. (refer to Fig. 10, Table 12)

According to the drawing, Manila belongs to Area II. Therefore, the wind pressure coefficient will be in accordance with Area II of Table 12.



WIND-PRESSURE-MAP AREAS FOR THE PHILIPPINES

Fig. 10 Wind Pressure Area Map

Wind-pressure-map areas for the Philippines

Table 11 Table of Wind Pressure Coefficients

Basic wind pressures for different heights zones above ground following uniform building code height zones and pressure variations (Author's recommendation)

Height zone in feet	Wind-pressure-map area		
	Area - I	Area - II	Area - III
Less than 30	30 psf	20 psf	10 psf
30 to 50	40 psf	30 psf	20 psf
50 to 100	50 psf	35 psf	25 psf
100 to 500	60 psf	40 psf	30 psf
500 to 1200	70 psf	45 psf	35 psf
over 1200	80 psf	50 psf	40 psf

④ Foundation method

The foundation will employ the spread foundation method in which both the training and the dormitory building are to be supported directly by the bearing ground.

⑤ Main structural materials

The structural materials shall be in conformity with JIS standards and their the allowable stress intensity shall be as follows:

. Concrete

Design strength

FC = 210 kg/cm^2 (3,000 psi)

FC = 280 kg/cm^2 (4,000 psi)

where prestressed concrete is used

Slump 15 cm (≒ 6 inch)

. Reinforcing bars

Standard design strength

Ordinary round bar

Long-term	1,600 kg/cm^2	
Short-term	2,400 kg/cm^2	(SR 24)

Deformed round bar

Long-term	2,000 kg/cm^2	
Short-term	3,000 kg/cm^2	(SD 30)
Long-term	2,000 kg/cm^2	
Short-term	3,500 kg/cm^2	(SD 35)

4) Electrical system plan

① Receiving and transforming system

Electric power will be supplied from the pole transformer to be installed by MERALCO (Manila Electric Power Company) at 3ø, 3W, 220V, 60 Hz.

② Trunk line system

Power will be lead-in through the external wall of the training building through overhead piping, and will be received at the switch-board from where power will be supplied to the distribution board, the motor boards at locations on each floor of the training dormitory buildings through piping.

③ Motor system

Motor control boards will be provided at several locations to supply power and operate the water supply system, ventilation and cooling system, etc., and power circuit piping and wiring work will be performed.

④ Lighting, convenient outlet system

The lighting system mainly uses fluorescent lamp along with some incandescent lamps. The blocks of switches for lighting fixtures are broken into groups to allow control by area, which will reduce power costs.

⑤ Telephone system

A lead-in terminal board will be provided for the lead-in of telephone circuits from the telephone company and piping and telephone set outlets for installing telephone sets in each room through the telephone terminal board will be provided on each floor.

⑥ Broadcasting system

Broadcasting equipment, such as amplifiers, speakers, clocks, chimes, etc. will be provided in the training and dormitory buildings so that the time, on-the-premises announcements, etc. can be broadcast.

In the auditorium, a public address system with a microphone, an amplifier, and a speaker will be provided for use during meetings.

⑦ Interphone system

For contact between the office and the storage room of each section a wall type interphone system will be provided.

⑧ Automatic fire alarm system

Heat detectors or smoke detectors will be used depending on the location and the receiving boards are to be provided in training and dormitory building, respectively, to detect fires early.

⑨ Lightning arrester system

The system will consist of lightning rods and conductors.

5) Water supply, drainage and plumbing system

① Water supply system

Piping will be branched from the lead-in piping (3"-75ø) coming from the water main currently used by FSMED and water will be stored in the outdoor storage tank and supplied to the training and dormitory buildings by gravity.

② Drainage system

Sewage will pass through a simplified septic tank, where it will be combined with miscellaneous waste water and then be discharged into the sewer main.

The waster discharged from the biology and chemistry laboratories and the darkroom will be treated in the simplified pH adjustment tank and then be combined with the miscellaneous wastewater system.

Kitchen waste will pass through the grease trap to remove grease and then be combined with the miscellaneous wastewater system.

The rainwater drainage system will be made independent of the other systems so as to drain off rainwater quickly.

③ Fire extinguishing system

Indoor fire hydrants will be provided at each stair-case in both the training and dormitory buildings. The riser will be made an independent

system and will have a Siamese connection for each system.

④ LPG gas system

Propane gas will be used for the kitchen and laboratories. An outdoor LPG storage cylinder will be provided for the supply of LPG gas to various locations.

6) Cooling, ventilation system

① Cooling system

Only rooms in the training building will have cooling, viz., office, library, director's room on the 1st floor, auditorium and each staff room on the 2nd and 3rd floors, the information science room, studio and control room on the 3rd floor. In the dormitory, the trainer's rooms on the 1st floor alone will be cooled.

② Ventilation system

For the rooms other than the above in the training building, a ceiling fan will be provided. For the kitchen, toilet and shower room, either a ventilation fan or exhaust fan will be provided.

7) Finishing plan

① Exterior finishing

. Roof

Both the training and dormitory buildings will have a deck roof (flat roof), with heat insulation over asphalt waterproofing, and jointing covering concrete will be placed in the form of direct covering finish.

. Exterior walls

Both the training and dormitory buildings will be finished with adobe chipping, exposed pea gravel on the concrete and concrete masonry unit backing.

. Floor

The balcony floor in the training building will be of waterproof mortar with a trowel finish and that in the dormitory building an exposed pea gravel finish.

. Ceiling

For both the training and dormitory buildings, the ceilings of the eaves and the balconies will have an acrylic resin spray finish.

. Openings

Windows will be transparent glass in locally-made steel sashes with a coating finish. Doors will be steel flush doors with a coating finish.

② Interior finish

. Floor

[Training Building]

Oil stained wax finish on parquet floor:

Each laboratory, display room, auditorium

P tile:

Library, office, seminar room, staff room

Carpet:

Audio-visual room, information science room, micro-teaching room

Mortar trowel finish:

Workshop, printing room, storage room

Porcelain mosaic tile:
Toilet

Jointing exposed pea gravel finish:
Entrance hall, corridor

Locally produced marble:
Main stairs

Exposed pea gravel finish with brass non-slip moulding
Auxiliary stairs

[Dormitory Building]

Oil stained was finish on a parquet floor:
Sleeping room, cafeteria, lounge

Jointing exposed pea gravel finish:
Entrance hall, corridors

Porcelain mosaic tile:
Toilet, kitchen

Exposed pea gravel finish with brass non-slip moulding:
Stairs

. Wall
[Training Building]

Acrylic emulsion paint finish on cement mortar:
General rooms including laboratories

Acoustic board finish:
Audio-visual room

Veneer plywood with oil stained clear lacquer finish
Auditorium

100 square semi-porcelain tile finish
Toilet

[Dormitory Building]

Acrylic emulsion paint finish on cement mortar:
General rooms including sleeping rooms

Veneer plywood with oil stained clear lacquer:
Cafeteria, lounge

100-square semi-porcelain tile finish:
Toilet, kitchen

. Ceiling

[Training Building]

Calcium silicate board with acrylic emulsion paint finish
Each laboratory, workshop, printing room, staff room, warehouse, toilet

Rockwool acoustic board
Library, office, seminar room, display room, auditorium, audio-visual room, information science room, microfilm teaching room

Oil stained clear lacquer on deck plate
Entrance hall, corridor

. Dormitory

Acryl emulsion paint of calcium silicate board
General room including accommodation, corridor

Vinyl paint on calcium silicate
Toilet, kitchen

Rockwool acoustic board
Cafeteria, lounge, entrance hall

(4) Outline of Facilities

Facilities to be constructed in the project are as follows

1) Training building

No. of floors	3, with a partial rooftop
Structure:	Reinforced concrete, rigid structure
Building area:	2,527 m^2
Total floor area:	6,221 m^2

The administration office, library, seminar room, display room, micro-teaching room, workshop, and printing room shall be located on the 1st floor.

The physics, chemistry, biology, and elementary science laboratories, the audio-visual room and auditorium shall be located on the 2nd floor. A plan shall be made so that the auditorium will be also accessible from the 2nd floor.

The earth science, biology and information science laboratories, and the room for lecturers shall be located on the 3rd floor.

On the rooftop, an audio-visual room and a room in which a telescope for astronomical observation will be installed shall be built, and the rooftop shall be used as an observation deck.

The exterior wall shall be finished by chipping after coating concrete blocks with adobe, whereas the inner wall shall be finished with acryl-emulsion paint on mortar. The inner wall however shall partially be finished with oil stain clear lacquer on veneer placed on wood structures.

As for the floor, the laboratories shall have parquet floors, and the common-used portions shall be finished with washed pea gravel and P-tiles as a basic rule.

2) Dormitory

No. of floors:	3
Structure:	Reinforced concrete, rigid frame
Building area:	934 m^2
Total floor area	2,129 m^2

The cafeteria, lounge, and superintendent's room will be on the 1st floor, and sleeping accommodations and bathroom with washing room will be on the 2nd, 3rd, and 4th floors.

A balcony shall be provided on each floor.

The exterior wall shall be finished with chipping after coating concrete blocks with adobe, while the inner wall shall be finished with acryl emulsion paint on mortar.

The floors of the common-used sections shall be finished with washed pea gravel, and the floors of the classrooms shall be parquet floors as a basic rule.

3) The training building and dormitory including ISMED shall be planned so that each building is connected by corridors.

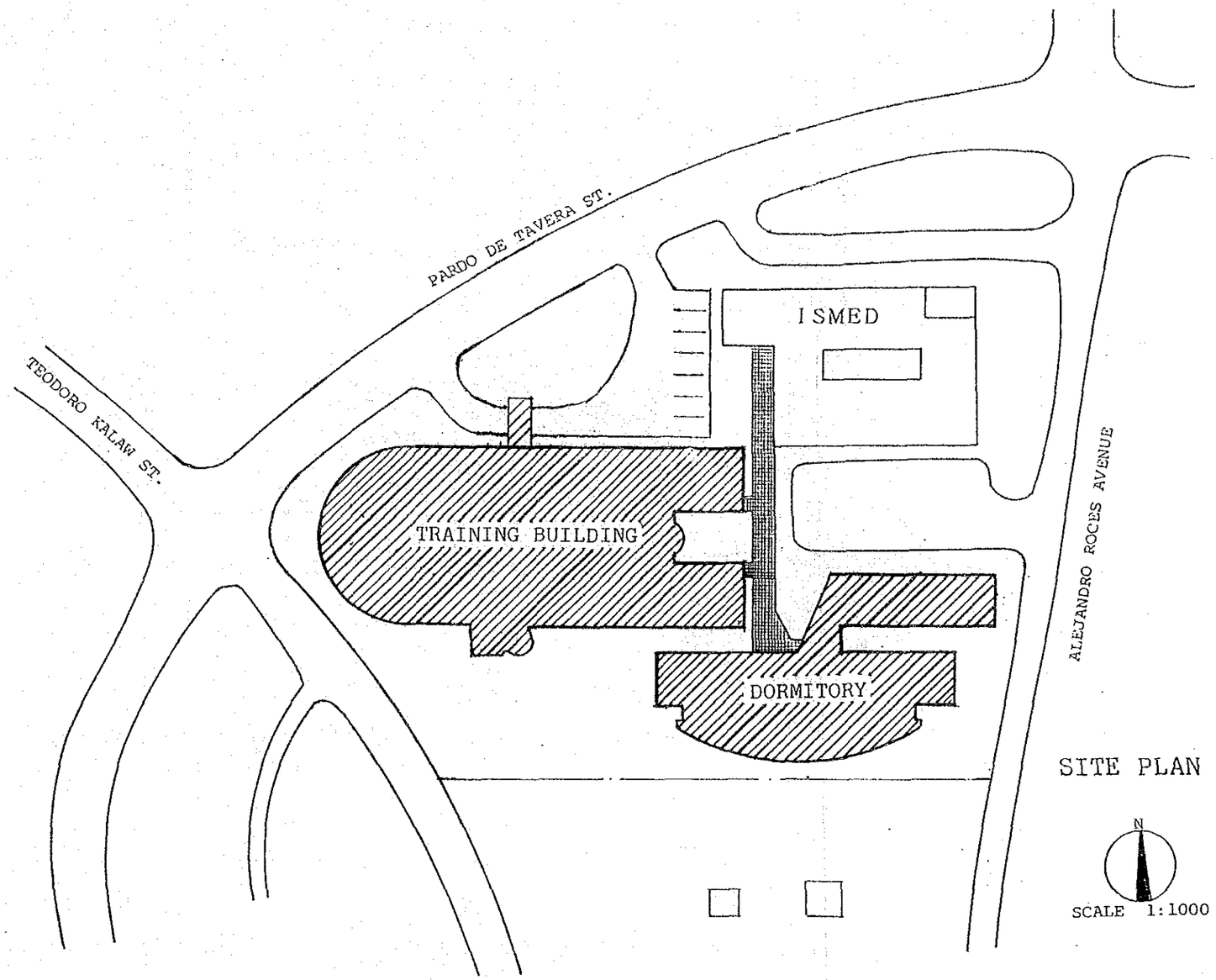
(5) Basic Design Drawing

1) Training building

① Site plan
② Ground floor plan
③ First floor plan
④ Second floor plan
⑤ Third floor plan
⑥ Roof floor plan
⑦ A-A Section
⑧ B-B Section
⑨ North elevation
⑩ South elevation
⑪ West elevation
⑫ East elevation

2) Dormitory building

① Ground floor plan
② First floor plan
③ Second floor plan
④ Roof floor plan
⑤ Section
⑥ Elevation
⑦ Elevation


PARDO DE TAVERA ST.
TEODORO KALAW ST.
ISMED
TRAINING BUILDING
DORMITORY
ALEJANDRO ROCES AVENUE
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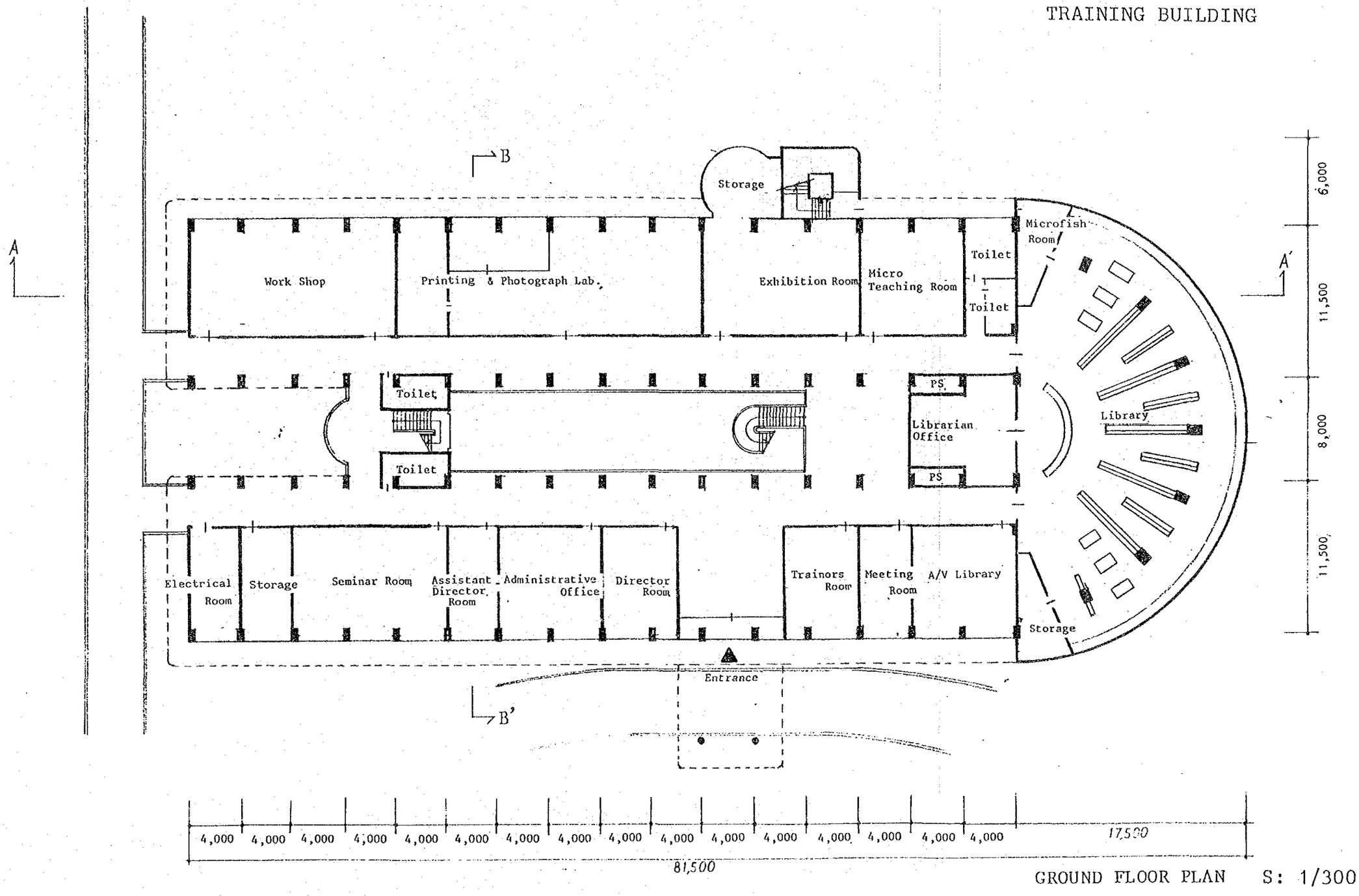
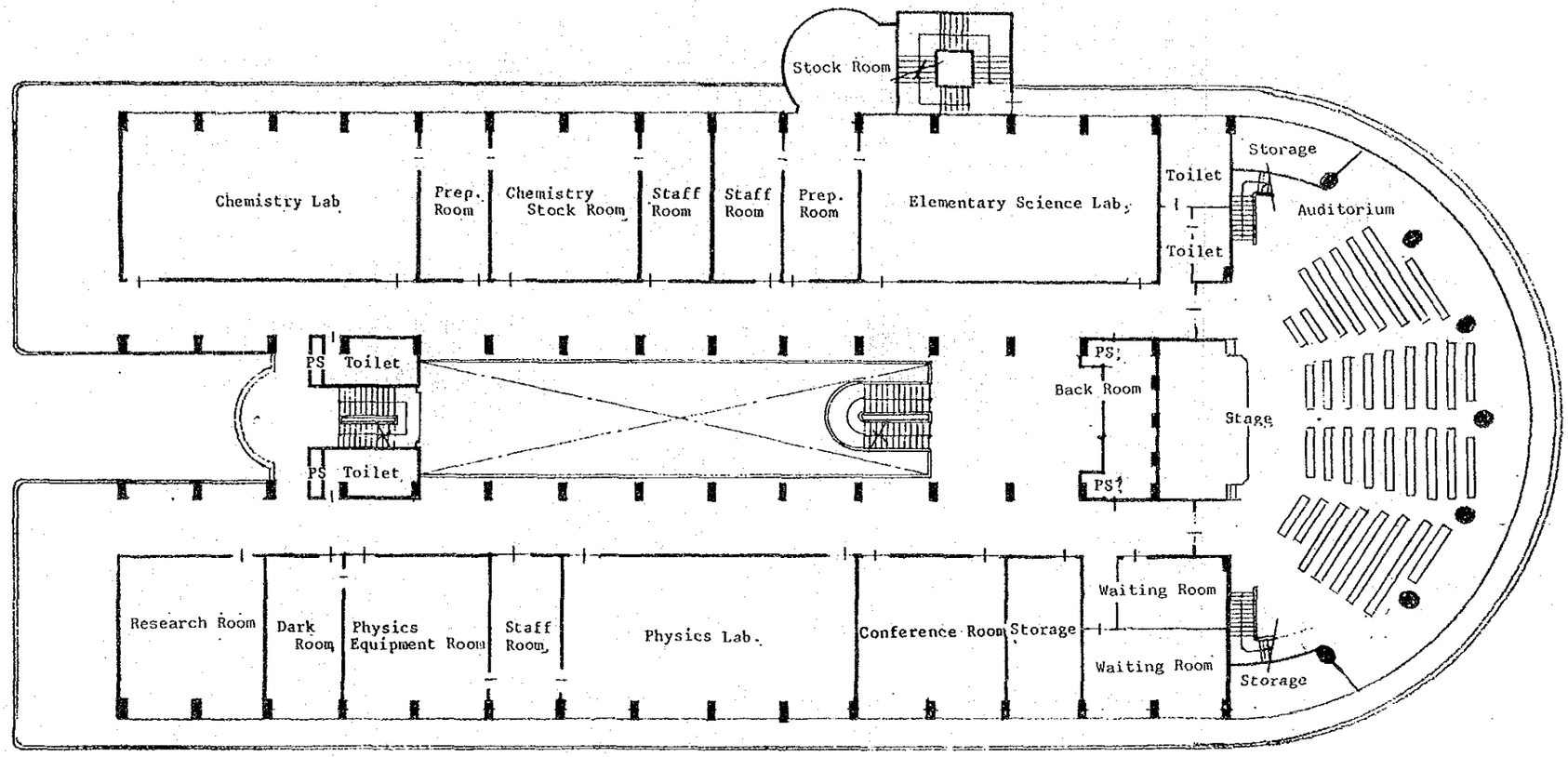
SITE PLAN

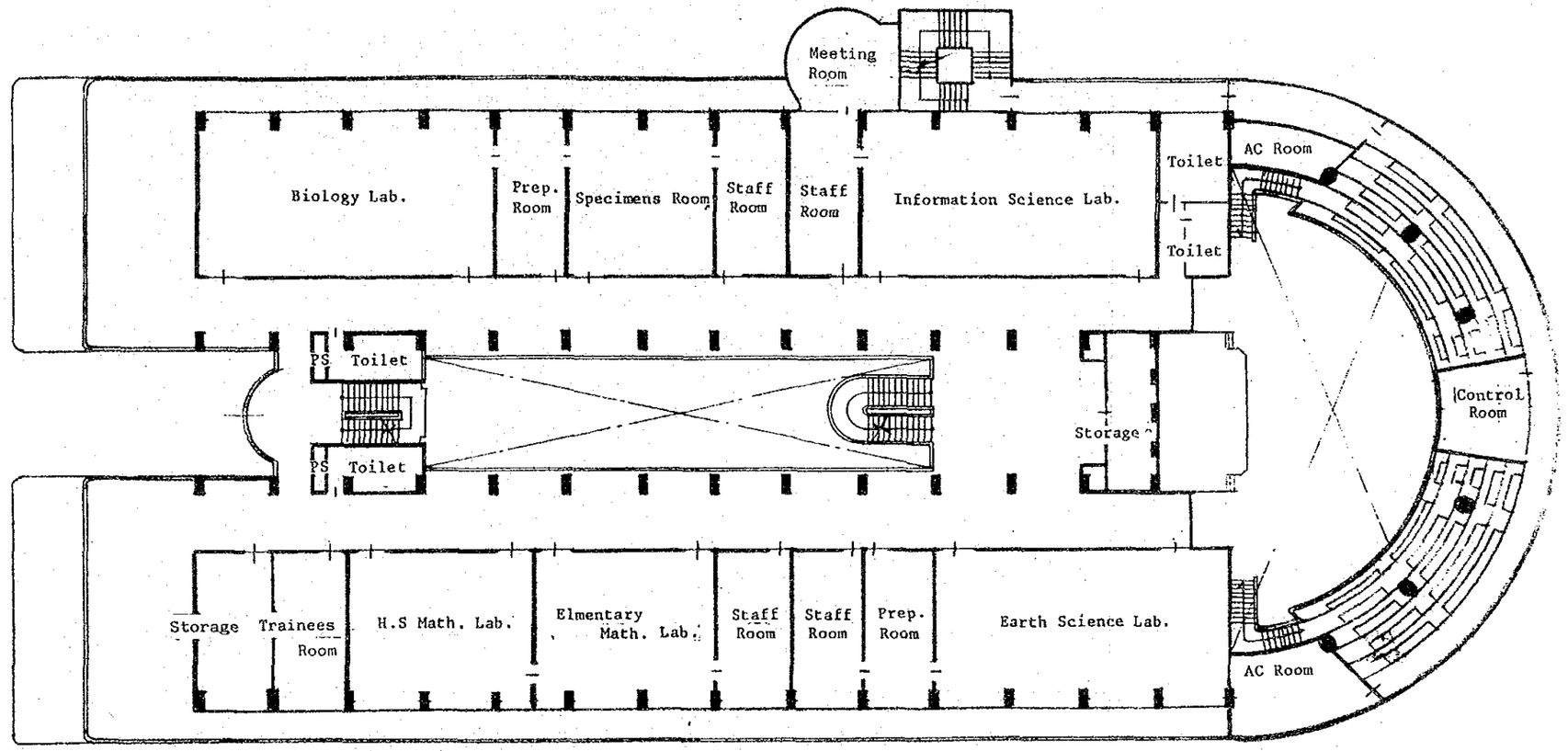
TRAINING BUILDING



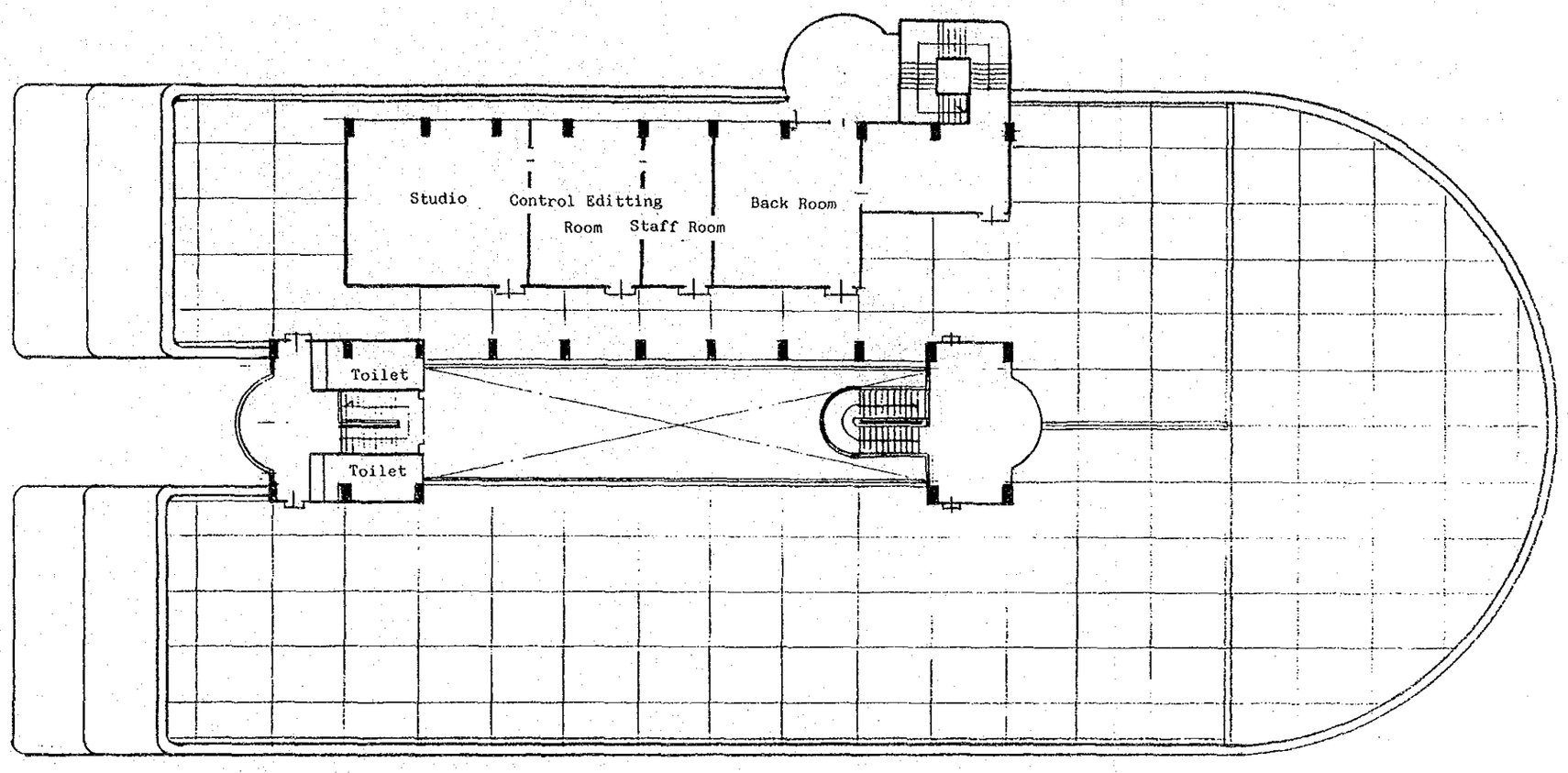
GROUND FLOOR PLAN S: 1/300



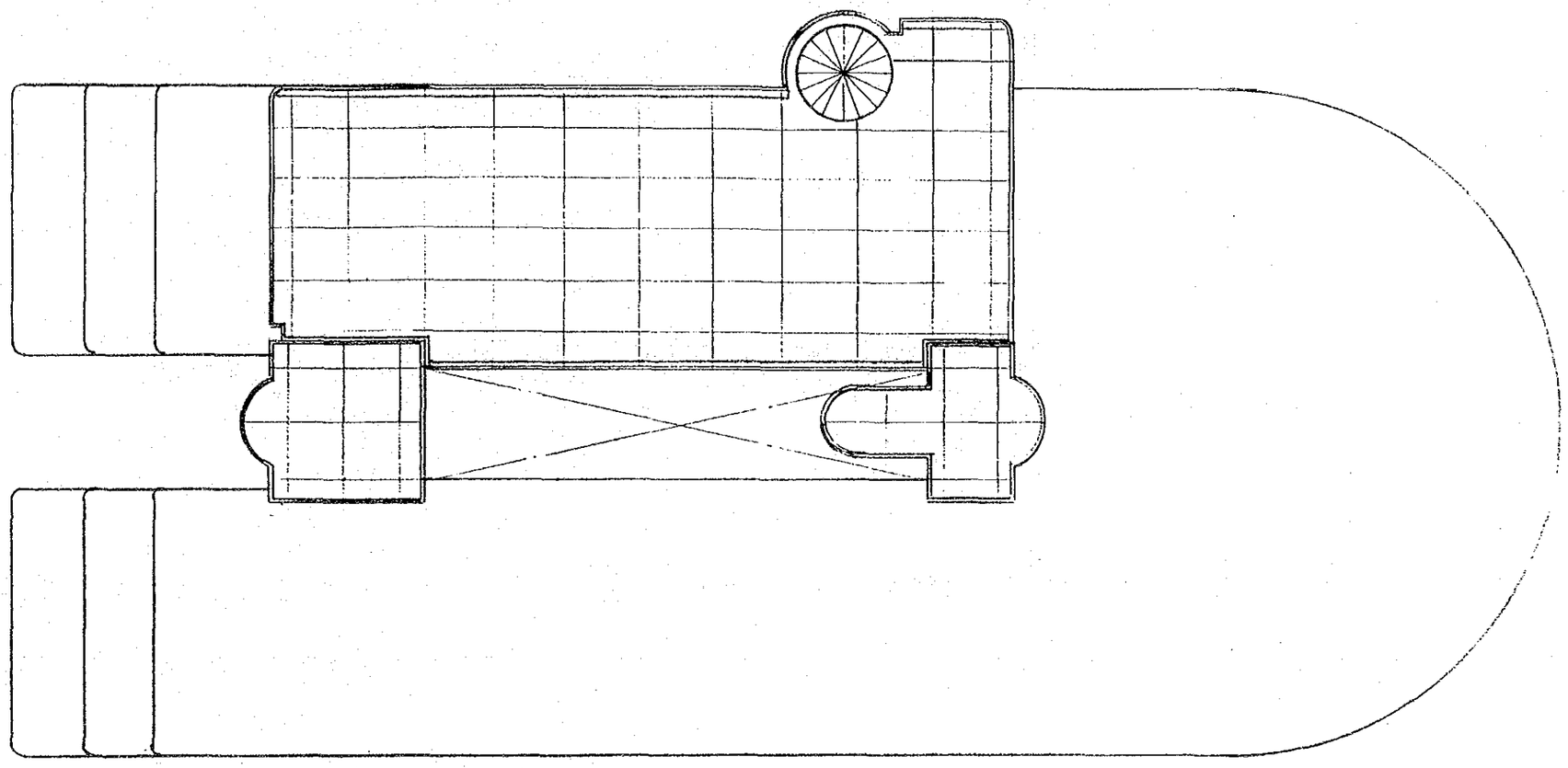
FIRST FLOOR PLAN S: 1/300



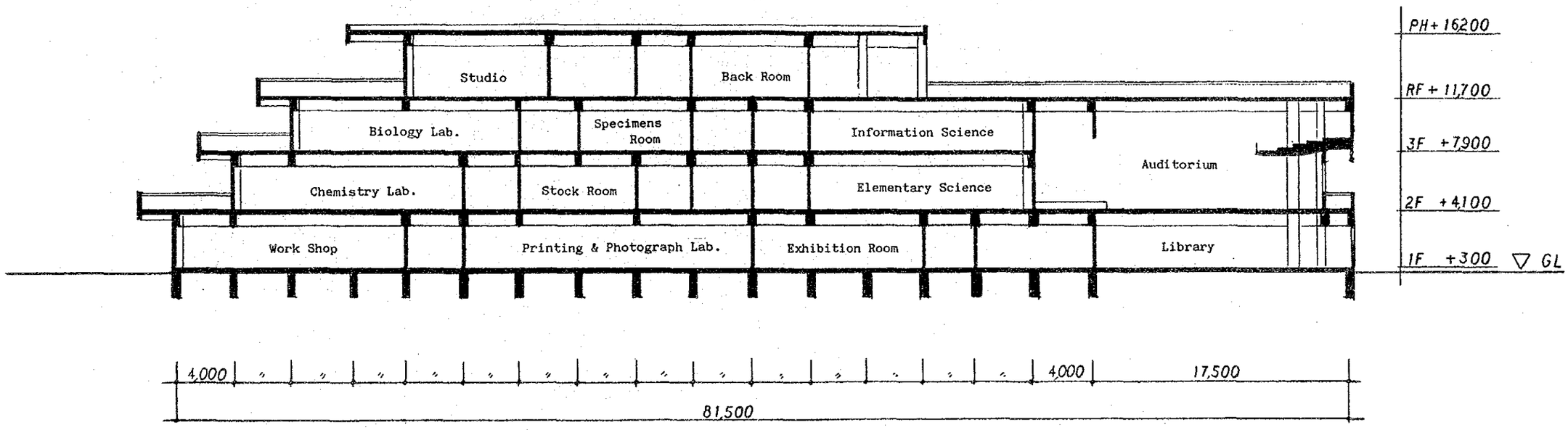
SECOND FLOOR PLAN S: 1/300



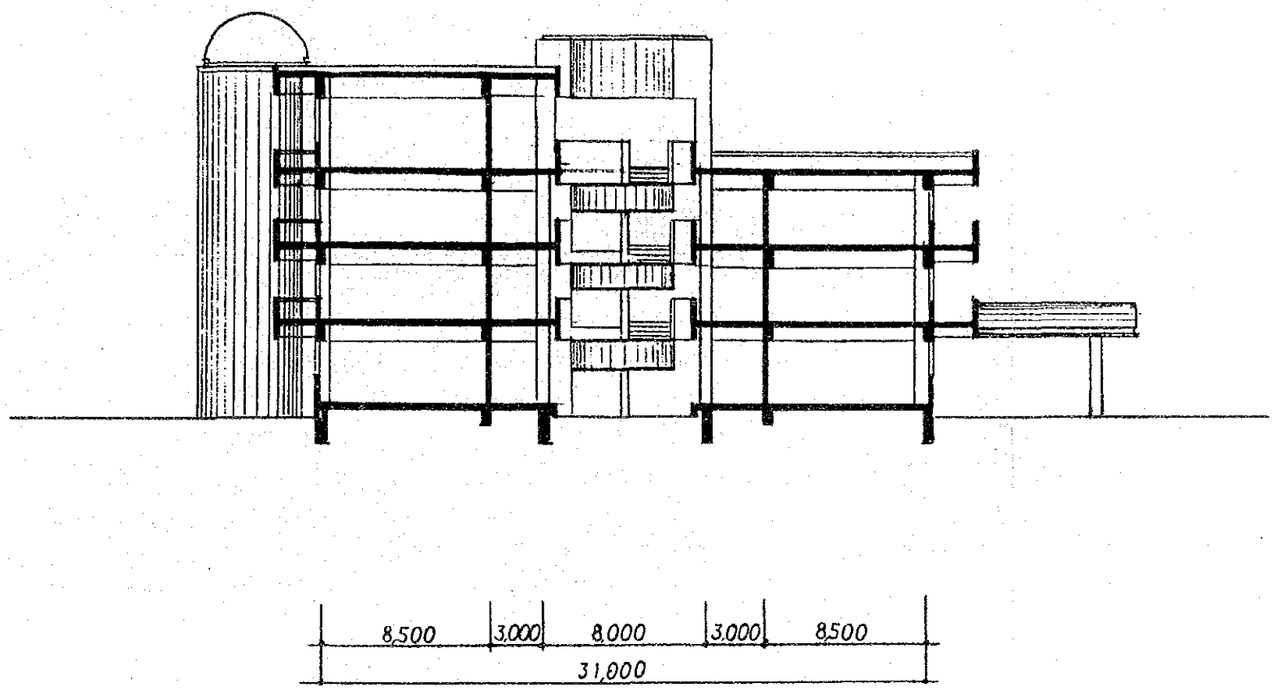
THIRD FLOOR PLAN S: 1/300



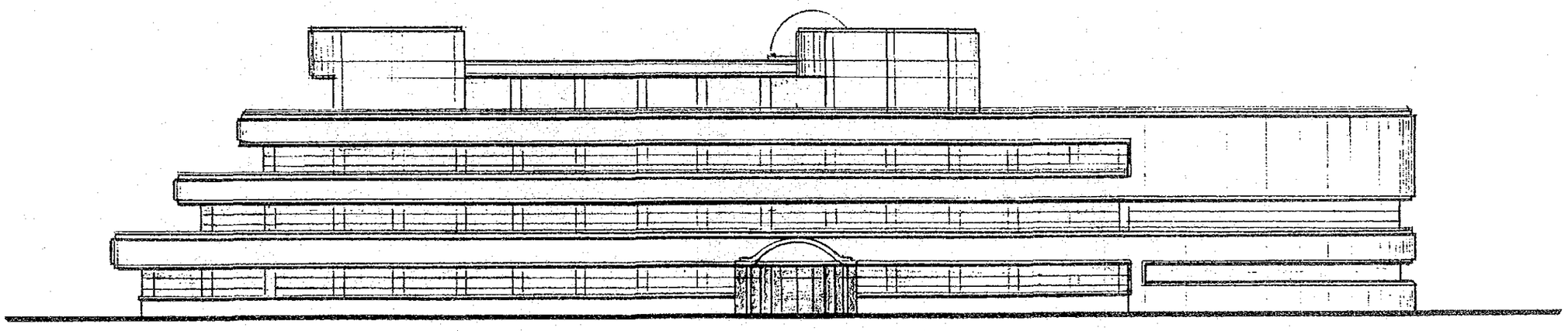
ROOF FLOOR PLAN S: 1/300



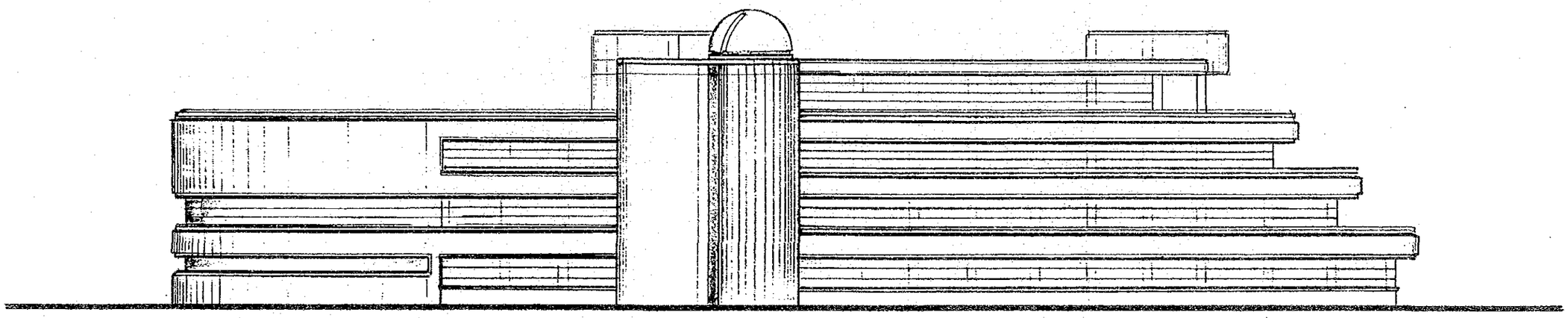
A-A SECTION S: 1/300



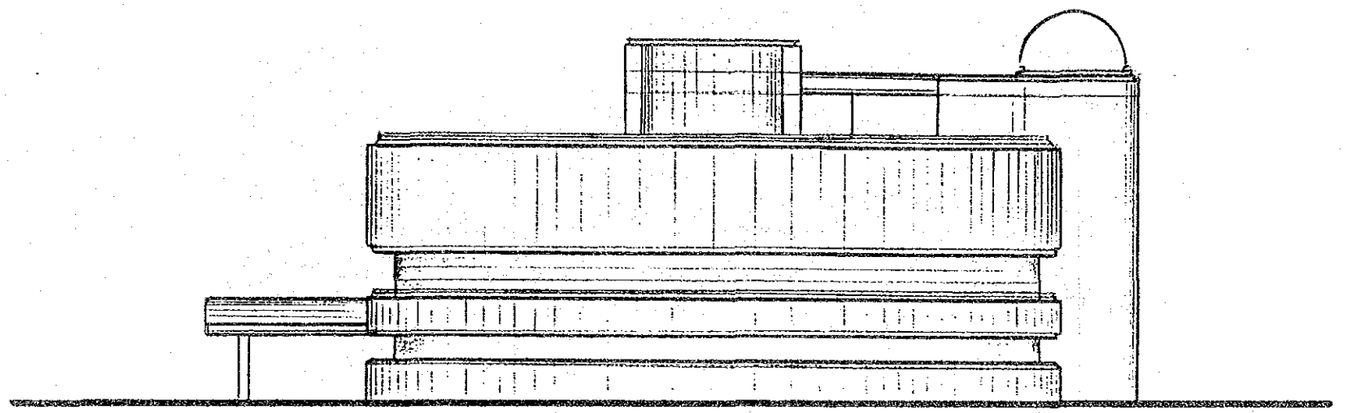
B-B' SECTION S: 1/300



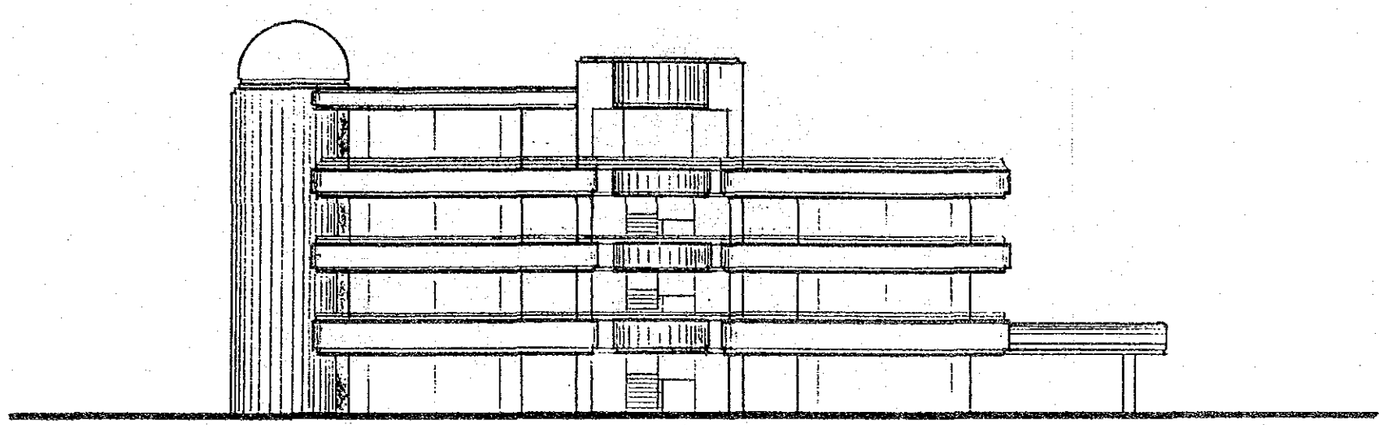
NORTH ELEVATION S: 1/300



SOUTH ELEVATION S: 1/300

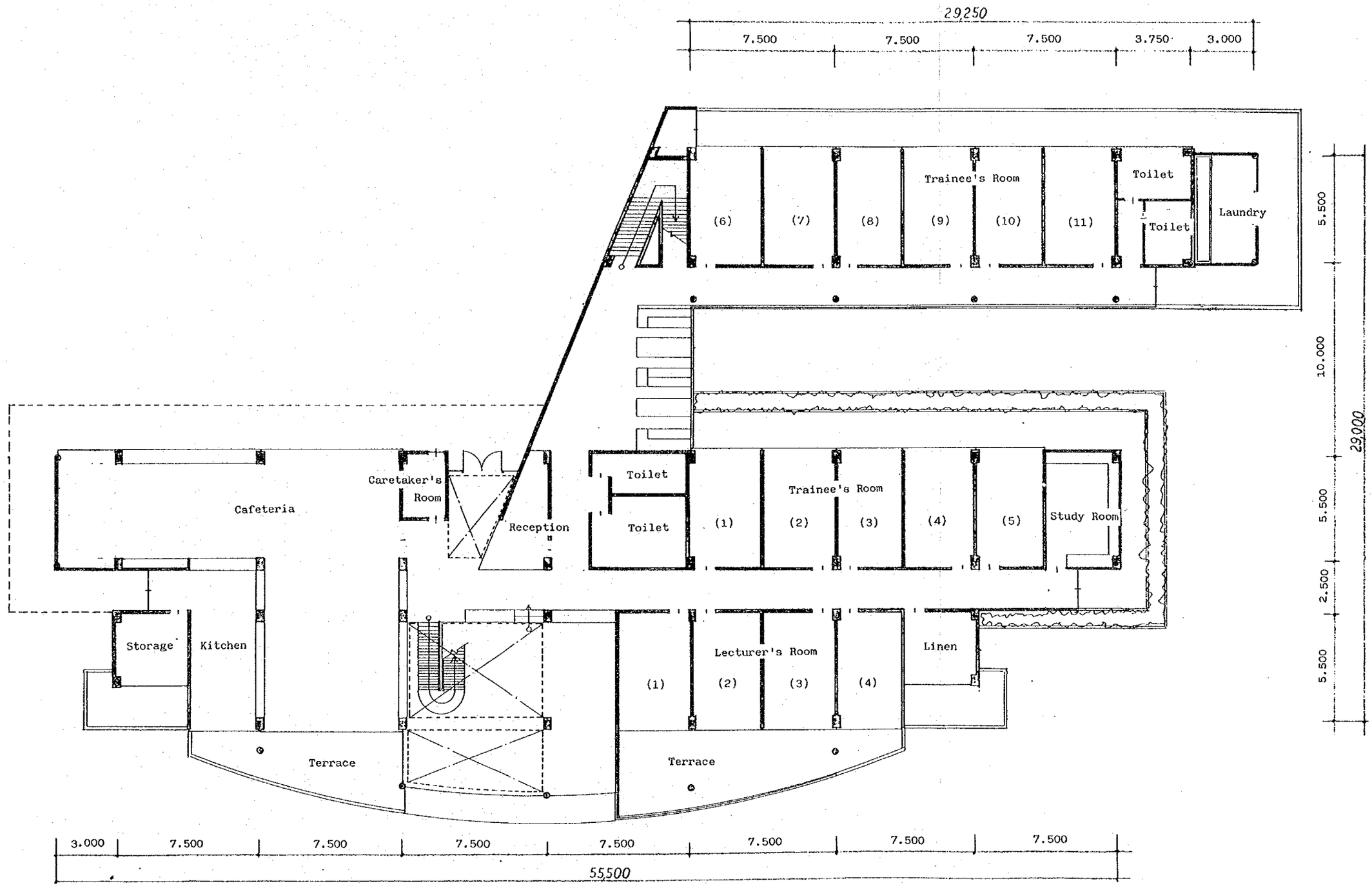


WEST ELEVATION S: 1/300

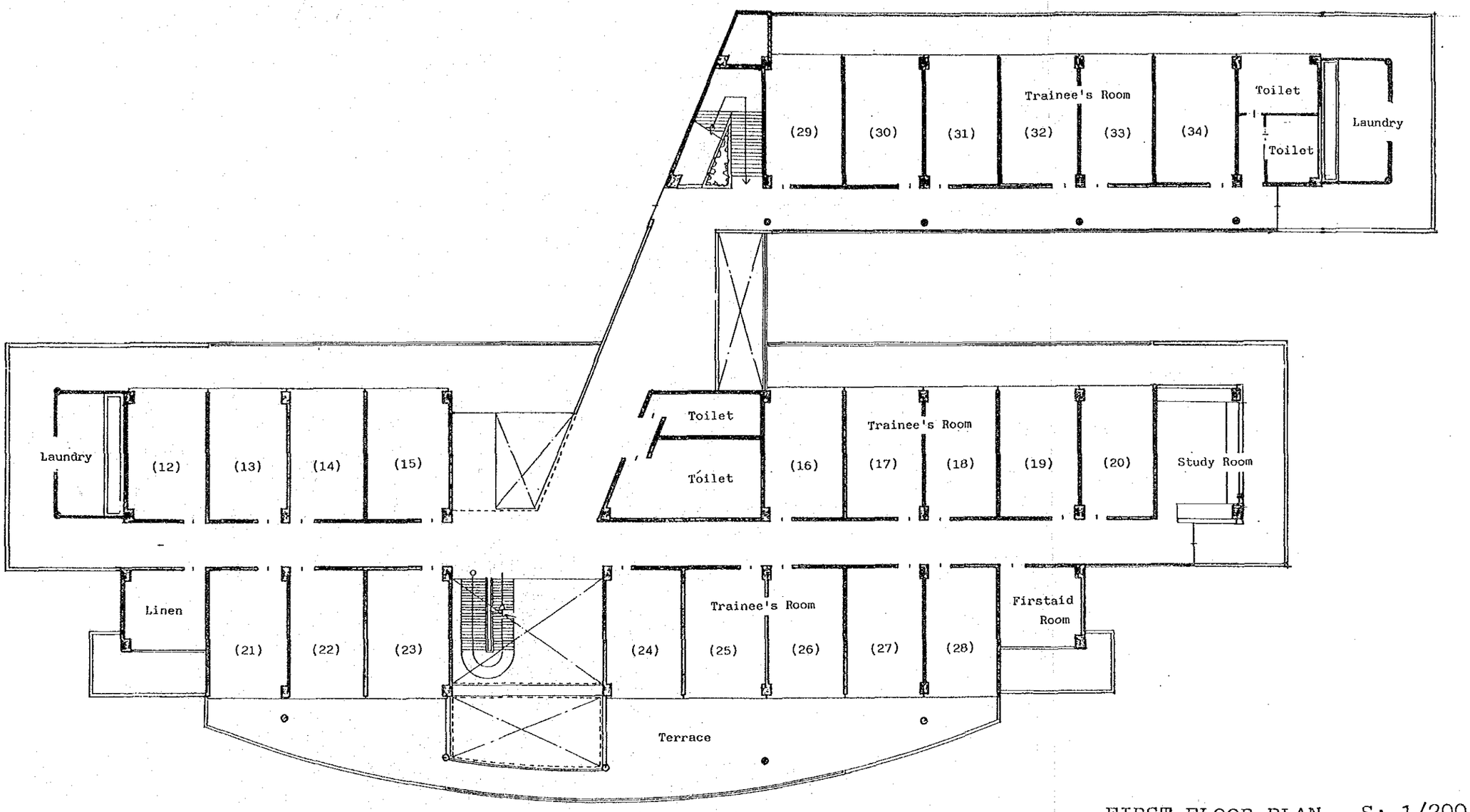


EAST ELEVATION S: 1/300

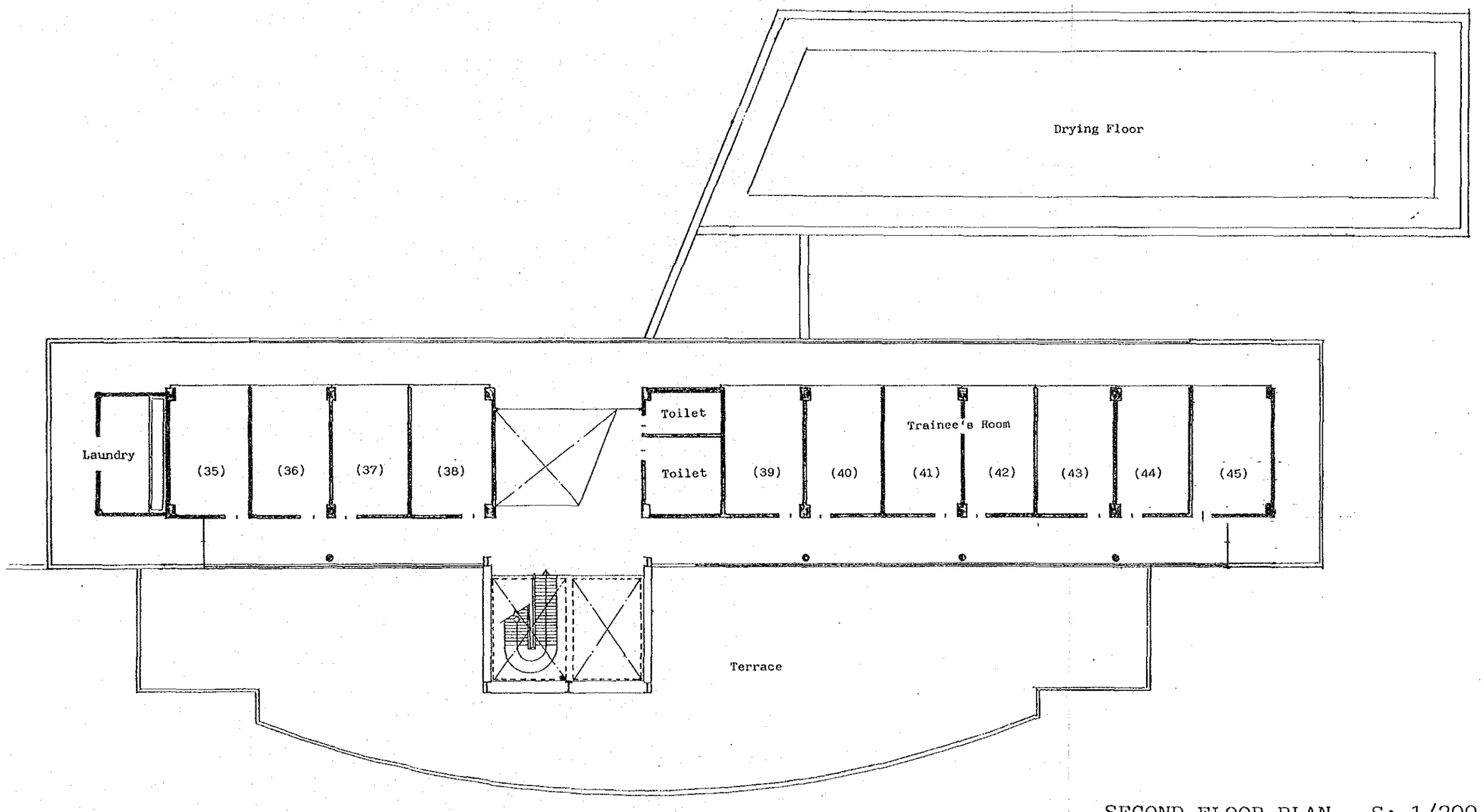
DORMITORY



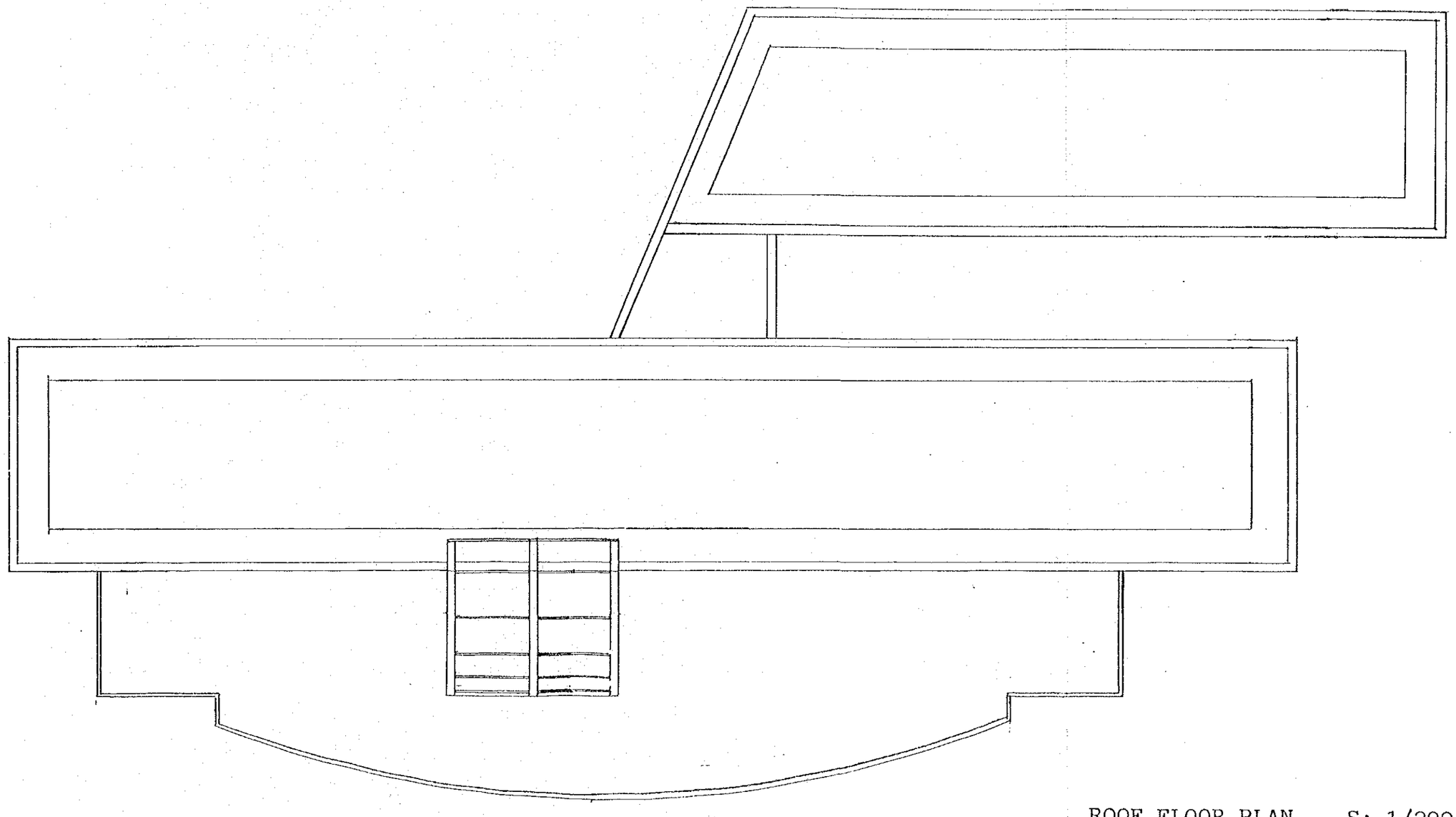
GROUND FLOOR PLAN S: 1/200



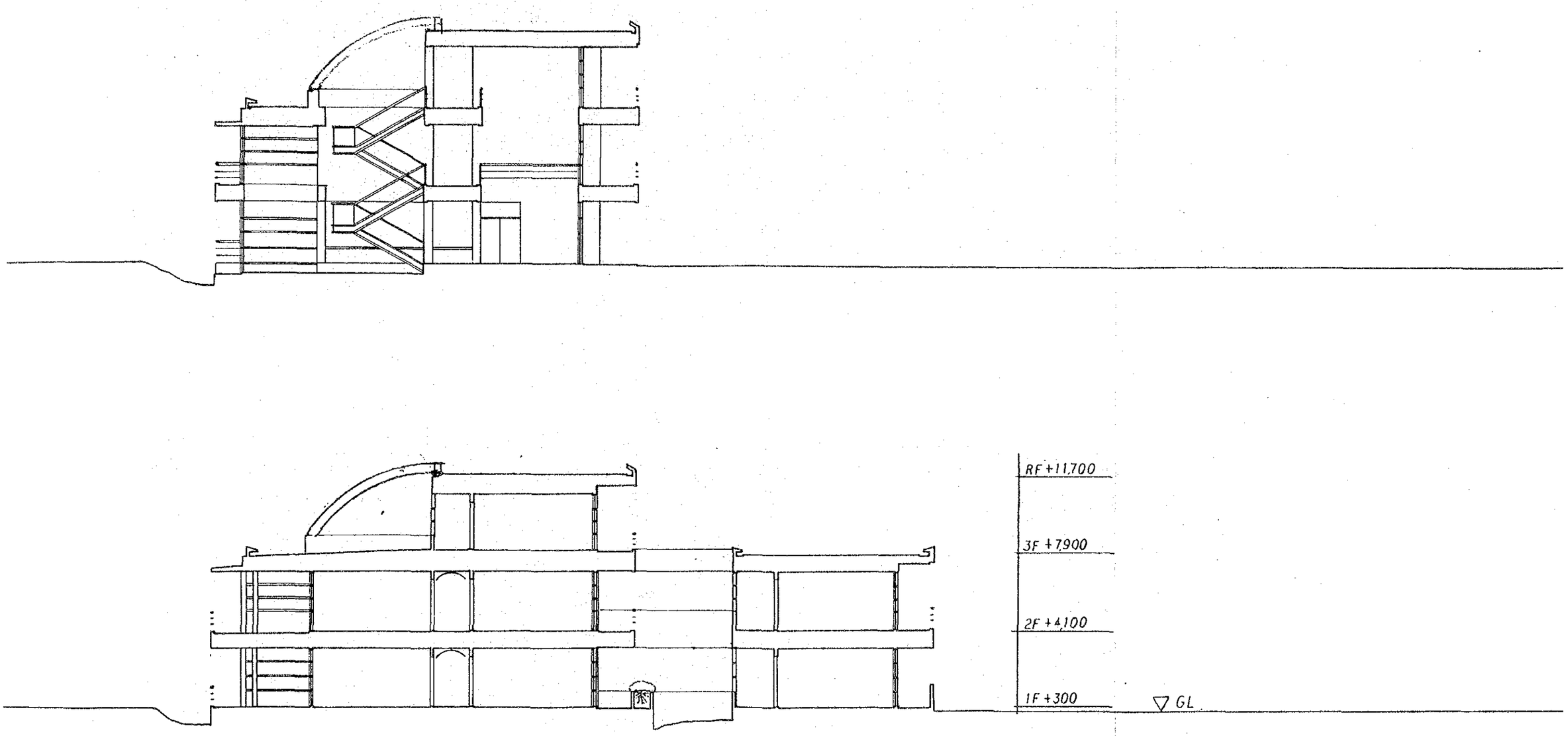
FIRST FLOOR PLAN S: 1/200



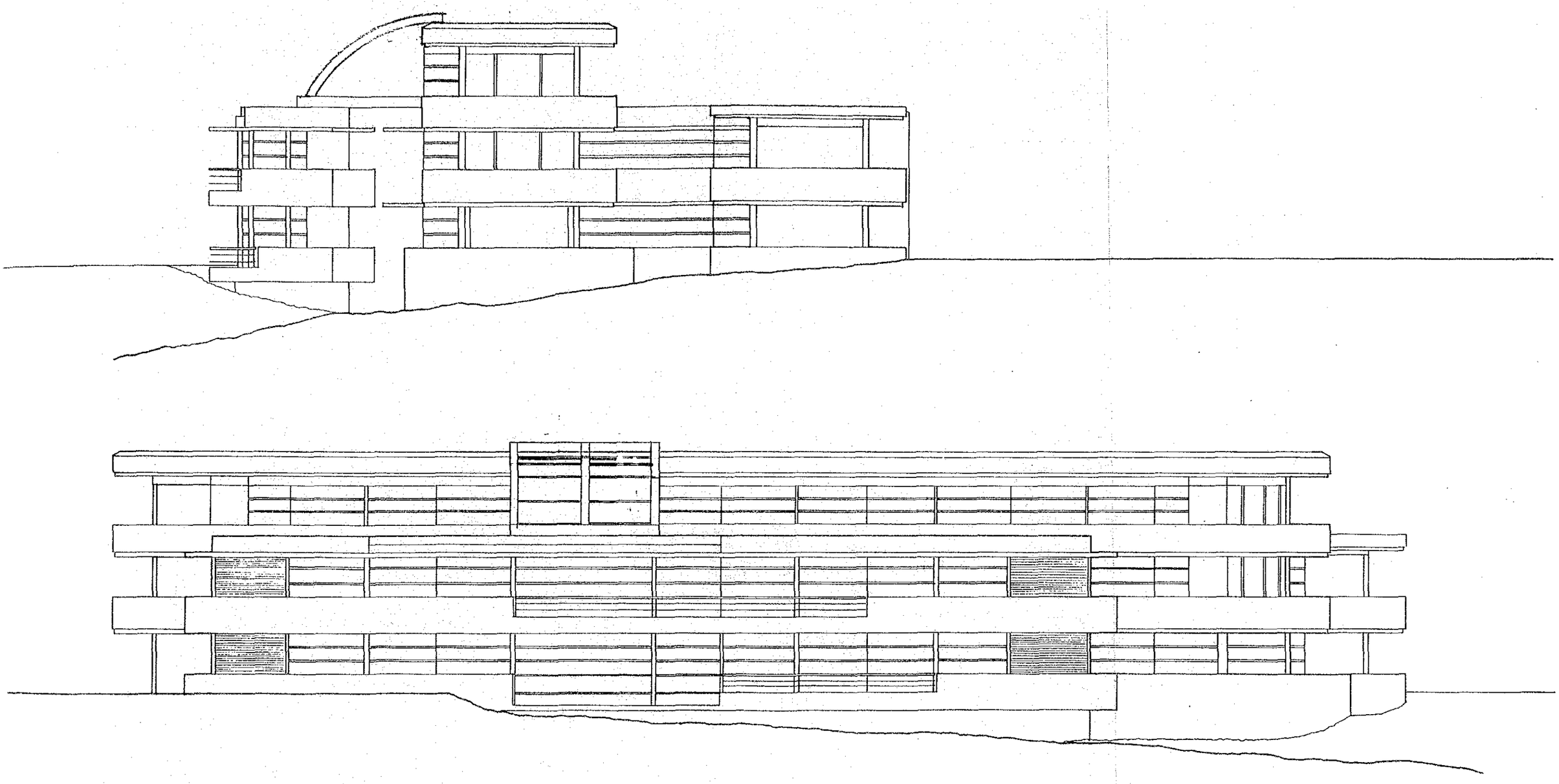
SECOND FLOOR PLAN S: 1/200



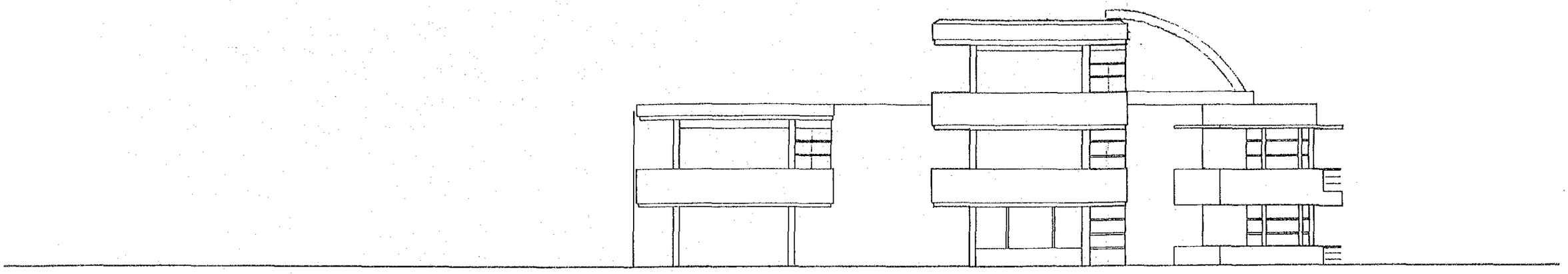
ROOF FLOOR PLAN S: 1/200

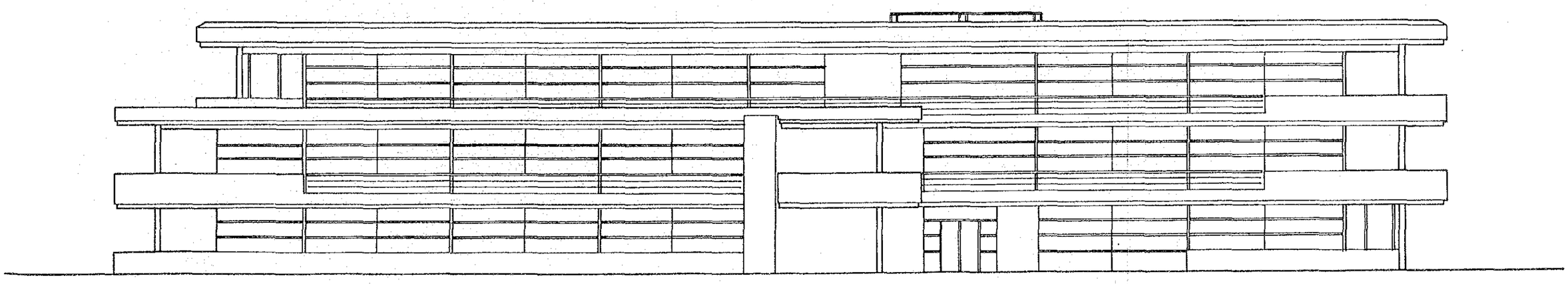


SECTION S: 1/200



ELEVATION S: 1/200





ELEVATION S: 1/200

4-2 BASIC PLAN FOR EQUIPMENT AND MATERIALS

(1) Basic Design Policy

The National Learning Resource Center for Teacher Training in Science and Mathematics Education is to be positioned as the head of all 12 regional training centers in science and mathematics education and play an important role in the development of science and mathematics education in the future.

Based on the situation the Philippines as above, equipment and materials must be considered for the Center on the Basis of their ability to offer satisfactory education and reliable training for science and mathematics teachers throughout the country.

On the other hand, there is a large disparity in the level of education, equipment and materials between urban areas and rural area, making if necessary to carefully consider that the majority of trainees are to be dispatched from rural regions. Thus equipment and materials which can be used freely without reluctance by the trainees and which are compatible with the training curriculum must be selected.

The selection will be made along the following guidelines:

1) Durable mechanisms which are easy to maintain.
2) Handling is simple so that no long period training is required.
3) The running costs i.e. cost of water, electricity and consumables, etc. after introduction are low.
4) Equipment can be used widely and effectively.
5) The purpose for the equipment is adequately high in light of the objectives, functions and future plans of the facility.

6) Measures can be taken for fluctuation of voltage.

7) No incidental work of a large scale for introduction is required.

8) Equipment can be used widely for various purposes.

9) A maintenance structure is well established for procurement of expendables, spare parts, etc.

10) Equipment and materials can cope with the development of contents of training in the future.

(2) Basic Plan for Equipment and Materials

1) Biology laboratory

The biology laboratory is for instruction in the laws, mechanisms and forms of natural phenomena through the observation of visible and microscopic natural phenomena. For this purpose, equipment and materials are to be selected which allow training in the basic handling of the microscope and carrying out experiments covering the development of cells, ecology, heredity, evolution, light composition, respiration, micro organisms, fermentation, etc. Particularly, as the microscope plays an important role in fundamental experiments, each trainee is required to learn how to handle it directly.

Equipment and materials for outdoor observation and for collecting materials for biological experiments and well as conducting "learning by experience" through observing familiar natural phenomena will be selected.

2) Chemistry laboratory

Equipment and materials which are required to conduct experiments in the construction and composition of molecules and atoms, theory of the periodic table of

elements, solutions and colloids, various chemical reactions, bonds, electrochemistry, energy, organic chemistry, petroleum, nucleic acids, proteins, enzyme, etc.

As each trainee must take part in actual experiments, equipment and materials are to be selected with an emphasis of fundamental studies, such as accurate quantity measurement, temperature, application of heat, etc. that are particularly important items.

3) Physics laboratory

Equipment and materials that will allow trainees to perform a wide range of experiments included in the curriculum, such as dynamics, measurement of physical quantity, properties, electricity, batteries, electrolysis, magnetism, optics, wave motion, molecular movement, atomic nuclei, nuclear reaction, nuclear power generation, etc.

With regard to the study of dynamics, there is a wide range of subjects on which experiments are to be conducted in each curriculum, i.e. from plane dynamics during elementary education, pulleys, and springs as far as universal gravitation for which diversified laboratory equipment and materials are to be introduced.

4) Physical geography laboratory

Equipment, materials and models to be introduced include those required for learning about various forms and phenomena on Earth, such as topography, geology, rocks, soil, volcanoes, climate, weather maps, atmospheric circulation, clouds, meteorological observation, typhoons, etc. and also those required for

learning about the universe through astronomical observation, pollution problems, such as the pollution of air, water, soil, the circulation of substances, energy consumption, food chains, etc.

Particularly, with regard to celestial bodies, a dome-type reflecting telescope will be installed on the rooftop for night study in order to make possible the observation of various celestial bodies of the solar system, nebulae, etc. that could not have been actually experienced before.

5) Mathematics classroom

Two classrooms will be provided, one for arithmetic for elementary education and one for mathematics for secondary school in which equipment and materials for instruction in numbers, shapes, addition, subtraction, multiplication and division, rations, graphs, angles, area, volume to plane geometry, solids, logarithms, quadratic equations, probability, differentials, integral calculus, etc. will be introduced.

As the training in arithmetic will evolve with the teaching method using arithmetic sets as a center, teaching materials of this type may be fabricated and used on the actual site of teaching.

For high school mathematics, the use of computer software development by the information science department is planned. Therefore, equipment and materials to fulfill the plan will be considered.

6) Elementary science laboratory

The primary science lab includes instruction in the human body, growth, food, nutrition, etc. which are

subjects taught in health and physical training in Japan and will also include subjects such as air, water, force, machinery, meteorology, rocks, the solar system, etc. which are fundamental subjects of science.

This field also requires the digestion of a wide range of curriculum and consequently the number of items of equipment and materials is considerable. However, as it strictly deals with primary science, selection will mainly center around equipment and materials that can easily be operated by elementary school children themselves excluding those which are higher in level and equipment and materials for demonstration.

7) Information science laboratory

The main equipment to be introduced will be personal computers to be used for mathematics data processing, chemistry, biology, etc., demonstration and improvement of guidance for students who have low scholastic achievement, etc. Software in English and software for application will be introduced aiming at improving efficiency in the preparation of software. Since the voltage of the power source is unstable, the introduction of voltage stabilizing equipment must also be considered.

8) Equipment and materials for fabrication of teaching materials for practical exercises

Although materials for teaching materials for practical exercises may be considered to include metals, wood, glass, paper, plastics, etc. at the center, fabrication will center around metals and wood in consideration of the supply condition of local materials. The equipment and materials will be such that the trainees and the teachers of the subjects can use them easily and

large-scale equipment such as used in manufacturing plants will not be introduced.

A paper cutter will be jointly used by the printing room and photograph laboratory.

Glasswork will be restricted to that which can be processed using a burner and as materials shaping and glass blowing are difficult to obtain locally, such equipment therefore will not be considered.

9) Photography and printing equipment and materials

In light of the plan to distribute printed matter, a printing machine that can print 4 A-4 size sheets simultaneously and a cutter and folding machine will be introduced. The grade of photographic equipment is also required to match that of the above printing machine to allow production of negative plates.

For printing simple documents that are to be distributed at the time of the training, a small offset printing machine will be provided.

Cameras will also be used commonly for microscope photography.

10) Audio-visual equipment and materials

The main purpose of introducing the audio-video equipment is to produce video teaching materials on the process and results, etc. of the experiments conducted at the Center which trainees can take home with them for follow-up after training. Other video tapes on the biological process and results (germination and fertilization), etc. for which experiment results cannot possibly be obtained in a short time, animated

videos on molecular movement in chemistry and video teaching materials introducing hydro-electric power generation and nuclear power plants, etc., for which the opportunities to visit are scarce, will also be produced.

The planned equipment and materials include, those for video production, a small scale studio, editing room and those for the A/V library.

In the A/V library a portable type projector and overhead projector will be provided, with the stipulation that they can be carried into each laboratory when needed.

Each laboratory will be provided with a TV monitor for showing teaching videos.

11) Equipment and materials for administration and management

To improve the efficiency of maintenance and management, a personal computer will be provided for this center. In addition, widely used equipment such as a copying machine, typewriter, etc. will also be introduced.

12) Equipment and materials for library

To house the planned number of 12,300 books and 5,600 magazines, open book shelves, cabinets for magazines, reading tables and studying desks, etc. will be provided.

To improve the efficiency of management thereof the library will also have a personal computer.

13) Vehicles

Two microbuses with a capacity for 30 passengers and one light van for transport of equipment and materials will be used for outdoor observation and fabrication of teaching materials.

(3) Outline of Equipment and Materials

Field	Purpose	Major Equipment
Biology laboratory	Observation and experiments cells, generation, genetic inheritance, photosynthesis, and fermentation	Microscope Stereo-microscope Automatic balance pH meter Refrigerator Incubator Models of human body sections Centrifugal separator Grinder Water Purification apparatus
Chemistry laboratory	Observation and experiments on the structure and composition of molecules and atom, dissolution, colloids, various chemical reactions, organic chemistry, electrochemistry, energy, nucleic acids, and proteins	Spectro-photometer pH meter Dissolved oxygen meter Water quality analysis set Galvanometer/voltmeter Water purification apparatus Chromatograph Ozonator Fat extractor Ultrasonic washer Personal computer Soil analysis kit Automatic Balance

Field	Purpose	Major Equipment
Physics laboratory	Observation and experiments on mechanics, electric, electronics, optical, waves, molecular movement, and atomic nuclei	Mechanical dolly Universal gravitation experiment device Three major laws of motion experiment device Acceleration, centrifugal, and centripetal force experiment device Static current generator Experimental device for voltage, current, and resistance Logic trainer Micro processor Oscilloscope Electric wave experiment device Energy receiving and converting experiment device Circuit checker Job energy experiment device Michelson's experiment device Optical fiber experiment device Laser Luminosity meter Polarization experiment device Geiger counter

Field	Purpose	Major Equipment
Earth science laboratory	Observation and experiments or geography, soil, rocks, climate, celestial bodies, contamination of air, water and soil	40 cm Cassegrain Telescope
		Direct vision spectroscope
		Portable polarizing microscope
		Astronomical telescope (small)
		Astronomical telescope (large)
		Topographic model
		Hardness meter
		Rock cutter/grinder
		Instrument shelter
		Chromatographer
		Solar battery experiment device
		Precision scale
		Water heat microtome
		Portable microtome
		Micrometer
		Constant temperature dryer

Field	Purpose	Major Equipment
Mathematics laboratory	Learning and actual practice on figures, shapes, addition, subtraction, multiplication and division, ratios, graphs, angles, area, volume, plain geometry, solids, logarithms, quadratic equations, probability, differentials, and integers	Mathematics teaching tool set Board for shape explanation Rotary range finder Protractor Compass Function demonstrator Expansive three dimensional model Circular graph demonstration board Elliptical, linear, and hyperbolic scales Probability teaching materials Binominal distribution explanation device Rotary graphic explanation device T-shape scale Pantograph Random number device Calculator (portable, science) Calculator (program)

Field	Purpose	Major Equipment
Elementary science laboratory	Study and experiments on the body and the growth of human beings, food, nutrition, air, water, force, machinery, meteorology, and the solar system	Blender Water tank Pressure vessel Constant temperature dryer Stereo-microscope Microscope Dissecting device Human body model Convex mirror Concave mirror Planetarium Rock specimens Magnets Spectrometer pH meter Topographical model
Information science laboratory	Study and experiments on mathematics, chemistry, biology data, research on new software, development of teaching methods for below average students using personal computers, and improvement of existing software	Personal computer Display Printer Video projector White board

Field	Purpose	Major Equipment
Equipment for preparation of materials	Equipment and tools for machining and the fabrication of metal and wood learning materials	Metal lathe Drill press Grinder Cutting machine Welding machine (gas, electric) Compressor Tool set Milling machine Power saw Molding machine
Equipment for photography and printing	Equipment for the preparation of instruction manuals, text books, and pamphlets for educational training	35 mm camera Film printer Process camera Film developer Darkroom equipment Laminating machine Drafting machine Lighting table Paper collector Binder Direct processor Offset printer Folding machine Cutter

Field	Purpose	Major Equipment
Audio-visual equipment	Equipment for the preparation of video teaching materials, equipment for the AV library, auditorium speakers, and projection equipment	Video color camera Special effect system Wave home monitor Vector scope Monitor TV Voice mixer Amplifier Cassette deck Picture processing machine Time base corrector Duplicator VTR VTR system for microscope Lighting system Portable VTR system Micro-teaching camera 16 mm projector Slide projector OHP Speaker system VTR 7 TV sets Stereo system

Field	Purpose	Major Equipment
Equipment office administration	Equipment for office administration and conferences	Personal computer for administration Typewriter Copy machine
Library equipment	Equipment for book control, rent, and perusal	Personal computer for control Copy machine Typewriter Micro reader Book shelves Perusal and study desks
Vehicles	Outdoor observation and transportation of outdoor photographing equipment	Micro bus Light van

(4) List of Equipment and Materials

(1)-a BIOLOGY

	NAME	SPEC	QTY
1	Biological Microscope	Trinocular Tube, 20 x 1500 x 20W	20
2	Stereo Microscope	W/Auxiliary Objective VM-A12X	20
3	Photomicrographic	Manual 35mm Camera	9
4	Universal Illuminator	Condenser Lens W/Metal Stand	35
5	Dissecting Set	Scissor, Scalpel, Needle Etc.	35
6	Electric Incubator	90 Liters, 5 -- 60C, 0.3A	1
7	Environmental Chamber	100 Liters, 5 -- 45C	2
8	Autoclave	1.5 Kg/cm, 232 x 460mm	1
9	Hot Air Sterilizer	50 -- 250C, 72 Liters	1
10	Refrigerator	170 Liters, Freezing Room:43 Liters	1
11	Constant Temperature Water Bath	5 -- 80C	9
12	Electric Drying Oven	90 Liters, 40 -- 250C	1
13	Automatic Table Balance	Capacity:160g, Sensitivity:0.1g	4
14	Aquarium and Air Pump	750 x 450 x 450mm, 45W	1
15	Spotting Scope	15X, Length of Draw Tube:365mm	35
16	Alcohol Lamp	Capacity: Approx.100 ml	20
17	Iron Tripod	Diameter: 80Mm, Height: 210mm	35
18	Test Tube Stand	For 12 Pcs. of Test Tubes	25
19	Pipette Stand	Vinyl-Chloride Made	20
20	Gas Teclu Burner	For LPG with Cock	25
21	Gas Blast Burner	For LPG	2
22	pH Meter	Measuring Range: 0.00 -- 14.00pH	2
23	Magnifier	10X	35
24	pH Indicator Paper	pH Range:0 -- 14, Size:60 x 800mm	3

	NAME	SPEC	QTY
25	Chemical Test Paper	Blue and Red: 50, Yellow: 100	3
26	Ultrasonic Water	42KHz, 100W	1
27	Automatic Water Distillator	1 -- 1.2 Liter/Hour	1
28	Thermometer	Mercury:-5 -- 105C, 0 -- 360C	1
29	Electric Centrifuge	0 -- 4000rpm	1
30	Willey's Pulverizer	5 Kg/H, Crushing Size: 0.5mm	1
31	Insect Cage	Wooden Made, 260 x 260 x 360mm	1
32	Electric Hot Plate	400C, 300 x 250mm	1
33	Homogenizer	1800rpm, 100W, 5 -- 30ml	1
34	Measuring Spoon Measuring Cup	Steel Made	1
35	Laboratory Glassware	Test Tube, Beaker, Flask	1
36	Plankton Net	Diameter: 205 mm	1
37	Human Anatomical Model	Human Male Figure, Eye, Ear	1
38	Bacteria Model, etc.		1
39	Personal Computer	Full Set W/Software	1
40	Centrifuge Hand Operate	For 2 Tubes	9
41	Balance Direct Reading	100g	1
42	Microtome 1	150mm Knife	1
43	Microtome 2	Cut Scale 0.01mm	1
44	Hand Tally Counter	4-digits	17
45	Calculator	8-digits	17
46	Microscope Slide Making Kit		1
47	Lecture Table	3,600 x 900 x 850	1
48	Students Table	3,600 x 600 x 800	8

	NAME	SPEC	QTY
49	Cabinet	1,760 x 400 x 1,760	15
50	Sink Unit 1	1,800 x 750 x 800	1
51	Side Table 1	3,000 x 750 x 800	4
52	Side Table 2	600 x 750 x 800	1
53	Side Table 3	1,000 x 750 x 800	4
54	Side Table 4	500 x 750 x 800	7
55	Sink Unit 2	1,200 x 800 x 800	3
56	Side Table 5	900 x 750 x 800	6
57	Work Bench 1	2,400 x 900 x 750	1
58	Chair For Teacher	530 x 460	1
59	Stool	410 x 450 x 750	32
60	Desk	1,400 x 700 x 700	2
61	Chair	530 x 570 x 760	2
62	Work Bench 2	1,800 x 750 x 750	2
63	Assembling Shelf	1,800 x 450 x 2,402	18
64	Table for Computer	1,600 x 500 x 650	1
65	Table for Computer	600 x 700 x 650	1
66	Chair		1
67	Black Board	3,600 x 92 x 1,200	1
68	Balance Table	1,500 x 750 x 800	1
69	Labo Cart	450 x 710 x 840	2
70	Microscope Cabinet	1,800 x 500 x 1,800	3
71	Color Video Monitor	20-Inch 4-System, W/Hangers	2
72	Beta System VTR	4-System, W/Console	1

(1)-b CHEMISTRY

	NAME	SPEC	QTY
1	UV/VIS Spectrophotometer	190 - 900mm, 0.15mm	1
2	Infrared Spectrophotometer	Wavenumber Range: 40,000 - 4,000mm	1
3	Gas Chromatograph	Column Oven, Sample Injection Port	1
4	ph Meter	Measuring Range: 0.00 - 14.00pH, -1,999 -- 1,999mV	5
5	ph Tritest	Measuring Range: pH 1 - 11, 11 Steps	3
6	ph/Ion Meter & Electrode Set	Measuring Range: pH -2.00 -- 16.00	1
7	Portable NOx Analyzer	Measuring Range: 0-50/100/250/500/1000ppm, NOx	1
8	Dissolved Oxygen Meter	Measuring Range:0-5/10/20ppm, 3ranges	1
9	Water Analyzer	For Heavy Metal Test	1
10	Personal Computer	8 Bit, W/Software	1
11	Water Purification Apparatus	Capacity: Approx.1.8 Liter/hour	1
12	Direct Reading Analytical Balance	Capacity: 160g, Sensitivity: 0.1mg, Digital Reading	2
13	Table Balance	Capacity: 100g, Sensitivity: 0.1g	17
14	Electronic Balance	Capacity: 330g, Sensitivity: 1mg, Digital Reading	9
15	Laurent System Polari-Sacchari Meter	Polarization Graduation: -130 -- 130	1
16	Electric Drying Oven	Temperature Range:40-250C, Capacity:9 Capacity: 90 Litter	2
17	Crystal Structure Model	2 Modules a Set	1
18	Crystal Model Kit	Beads:169pcs., Bonds:286pcs.	1
19	Galvanometer	Sensitivity: 2 x 10(-4)V, 3.5 x 10(-6)A	2

	NAME	SPEC	QTY
20	Funnel Stand	For 2 Funnels, Made of Metal	9
21	Buretle Stand	For 2 Burette, Made of Metal	9
22	Pipette Stand	Made of Vinyl Chloride	9
23	Vacuum Pump	Ultimate Vacuum:10(-3)Torr, Pumping Speed: 50 Liter/min.	1
24	Magnetic Mini-Stirrer	Stirring Capacity: 10-1000ml, Revolution: 200 - 2000rpm	9
25	Ultrasonic Washer	Ascillating Cycle: 42KHz, Output Capacity: 100W	1
26	Constant Temperature Water Bath	Temperature Range:Room Temp.5 - 80 C	1
27	Thermometer 1	Mercury:-5 -- 105 C	20
28	Thermometer 2	Alchol, -5 -- 105 C	20
29	Thermometer 3	Alcohol, -30 -- 50 C	15
30	Thermometer 4	Mercury, 0 - 360 C	10
31	Paper Chromatograph Jar	Displacement Vessel:Dia.80 x H360mm	3
32	Heumann'S Ozonizer	Double Glass Tube and Foil Type	1
33	Gas Blast Burner with Compressor	For LP Gas	2
34	Gas Burner	For LP Gas	30
35	Electric Heating Mantle	Capacity:1000ml, Power Selectable: 125/250/500W	1
36	Portable Light	Battery Type, Small Bar Type Light	10
37	Electric Hot Plate	Heating Temperature: Max.400 C	5
38	Digital Circuit Tester	Accuracy: 0.5-2%	2
39	Electric Voltmeter	Measuring Range:15/50/150/500MV, 1.5/5/15/50/150/500V, 10 ranges	1
40	Soxhlet'S Tat Extracter	Soxhlet'S Fat Extractor, 4pcs.	1

	NAME	SPEC	QTY
41	Constant Temperature Water Bath	Mini Cooler; Temperature Range:0-40 C	1
42	Cork Borer 1	Desk Type, Dia.of Wheel: 160mm, Cutter: 6pcs. a Set	2
43	Cork Borer 2	Set of 6 Cutters	5
44	Magnetic Stirrer	Stirring Capacity: 100-3000ml, Revolution: 200-1,500rpm	1
45	Hot Water Tunnel	Dia.100mm	2
46	Air Polution Analyzer		1
47	Hand-Operated Vacuum Pump	Attainable Vacuum: Apprx.600mmHg	1
48	Electric Drill	Each 2 Drills for Wood Working & Metal Working	1
49	Test Tube Stand	Rotary Type, for 14Pcs. of Test Tube	17
50	Macro Pipette	Dispencing Capa.: 2-10ml, Min. Graduation: 0.5ml	1
51	Vinyl Apron, Labo-Glow Guggles	Various kinds	40
52	Laboratory Glassware	All kinds of Glasswares for Chemical Experiment	1
53	Reagent & Chemicals	Various kinds	1
54	Water Inspecting Kit	For Many kinds of Testing	2
55	Soil Tester	Complete Set	2
56	Meter Portable	pH 0-14, 0 - 50 C, 31/2digits	1
57	DC Volt Meter	-1 -- 3V, -5 -- 15V, -100 -- 300V	9
58	Magnetic Stirrer	200 - 2,500rpm, Auto-Switch	9
59	Refrigerator	258 Liters (Freezer 60)	1
60	Calculator	10 digits	17
61	UV-Ray Source	3,660A	1
62	Regulated DC Power Supply	Output: DC 1-15/0-5A	9

	NAME	SPEC	QTY
63	Center Table	3,600 x 1,500 x 800H W/Shelf, Sink	1
64	Piezo Electric Device		9
65	Lecturer Table	3,600 x 900 x 850	1
66	Table For Student	3,600 x 600 x 800	8
67	Cabinet	1,760 x 400 x 1,760	15
68	Sink Unit 1	1,800 x 750 x 800	1
69	Side Table 1	3,000 x 750 x 800	4
70	Side Table 2	600 x 750 x 800	1
71	Side Table 3	1,000 x 750 x 800	4
72	Side Table 4	500 x 750 x 800	7
73	Sink Unit 2	1,200 x 800 x 800	3
74	Side Table 5	900 x 750 x 800	6
75	Work Bench	2,400 x 900 x 750	1
76	Chair For Teacher	530 x 460	1
77	Stool		32
78	Desk	1,400 x 700 x 700	2
79	Chair	530 x 570 x 760	2
80	Work Bench	1,800 x 750 x 750	2
81	Assembling Shelve	1,800 x 450 x 2,402	18
82	Table For Computer	1,600 x 500 x 650	1
83	Table For Computer	600 x 700 x 650	1
84	Chair	530 x 460	1
85	Black Board	3,600 x 92 x 1,200	1
86	Stool		4
87	Center Table 6	3,600 x 1,500 x 800	1
88	Side Table 7	600 x 750 x 800	1

	NAME	SPEC	QTY
89	Corner Unit	950 x 950 x 800	2
90	Side Table 8	2,400 x 750 x 800	2
91	Sink Unit 3	1,800 x 750 x 800	1
92	Side Table 9	1,800 x 750 x 800	1
93	Side Table 10	1,000 x 750 x 800	2
94	Fume Hood	1,500 x 750 x 2.350	1
95	Balance Table	1,500 x 750 x 800	1
96	Color Video Monitor	20-Inch, 4-System, W/Hangers	2
97	Beta System VTR	4-System W/Console	1

(1)-c PHYSICS

	NAME	SPEC	QTY
1	Pesonal Computor	8 Bit W/Software	1
2	Tape Measure of Steel	50m in Case, mm Graduations	2
3	Vernier Calipers	Scale Range:0-150mm, Min. Reading: 0.05mm	17
4	Micrometer Screw Gauge	Measuring Range: 0-25mm, Accurate to 0.01mm W/Case	17
5	Spherometer	Measuring Range: -20 -- 25mm, Graduated in 0.01mm	9
6	Table Balance 1	Capacity: 500g, Sensitivity: 0.5g	9
7	Table Balance 2	Capacity: 100g, Sensitivity: 0.1g	9
8	Spring Balance 1	Capacity: 200g, Sensitivity: 2g	17
9	Spring Balance 2	Tension: 1Kg, Pressure: 1Kg	9
10	Experimental Kit for Statics	Levers,Balance,Pendulum,Pulley,Wheel, etc.	9
11	Electronic Stop-Watch	Measuring Range: 59'59	20
12	Weight Set	Weight Receiver(1Kg):1 pc., Weight(1Kg): 5pcs.	9
13	Pair of Dynamics Carts and Board	Mass of a Cart: Approx.1Kg	5
14	Comparable Apparatus With Work	Horizontal Uses, Variable Function	9
15	Helical Steel Springs	3 kinds a Set, W/3 indicators	9
16	Table Clump Pulley	Limit Pressure: 17Kgf	9
17	Apparatus for Gravitation	Accuracy of G: 10%	1
18	Spring Balancer for Dynamic Cart	Capacity: 25g	9
19	Gas Bearing Runway for Dynamics	Sliding Board:2m Long With 1.9m	1
20	Recording Device Kit	Recording Slider: 2pcs.	2

	NAME	SPEC	QTY
21	Air Table for Dynamics	Effective Space: 520 x 680mm	1
22	Collision Apparatus	Wooden Board Length: 1100mm	2
23	Demonstration of Newtonian Mechanics	Newton'S 1St,2Nd,3Rd Laws of Motion	2
24	Rotational Inertia Apparatus	W/Axis of Rotation, a Guide & AC Recording Timer	9
25	Angular Momentum Kit	Experiments on Angular Momentum & on Moment of Inertia	9
26	Falling-Ball Experimental Kit	Steel Ball: 2pcs.	1
27	Two Kinds Free-Fall Balls	Device for Simultaneous Dropping W/Two Plastic Balls	1
28	Collision Balls	Suspended Type, 8 Balls	1
29	Meter Stick,	White Plastic Made	17
30	Meter Stick Balance Set	Arm Length: 1m	1
31	Support Stand With Lever Knife Edge	Metal Stand: 180mm High	10
32	Lever Knife-Edge Clamp for Meter		20
33	Force Board, Basic Form	A Metal Disc, 400mm in Dia.	5
34	Force Table, Kennon Design		1
35	Crame Boom Set, Simple Form		1
36	Pulleys 1	Single Sheave	9
37	Pulleys 2	Double Sheave	9
38	Lever Experimental	Arm: 600mm W/10 x 20g Weights	2
39	Wheel & Axle	Metal Made, Wheel: 120,60,30mm Dia.	2
40	Inclind Plane	Plane:L500 x W100mm of Metal	9
41	Led Timer	Switching Period: 7.5-22Hz Variable	2
42	Newton's Ring Apparatus	Dia.85mm	9

	NAME	SPEC	QTY
43	Pulleys 3	Triple Sheave	9
44	Energy To Work Apparatus		9
45	Ballistic Car		1
46	Acceleration Apparatus and Graph Paper	12 Sheets of Graph Paper, 2 Sheets of Carbon Paper	10
47	Accelerometer	A Plastic Cell W/Graduated Grid	10
48	Centrifugal Force Apparatus	Shaft: 5/16 inch	1
49	Centripetal Force Apparatus		1
50	Collision in Two Dimentions	Two a Set	9
51	Electric Rotating Platform	Dia. 50mm, Revolutional Number: 5-60rpm	1
52	Electrostatic Generator	Motor Driven Variable Speed	1
53	Electrostatic Generator Wimshurst	Two Plastic Plates, Dia.30.5mm	1
54	Insulating Platform	Hardwood Platform: Approx.305 x 305	1
55	Loyden Jar,Seperable	Dimensions:H12.7 x Dia.79mm	2
56	Discharger, Fixed Type		2
57	Insulating Stand for Electrostatic	Height: 140mm	2
58	Insulating Stand, High Voltage	Height: 400mm	2
59	Bell Chimes, Electrostatic	Three Bells:3pcs., Metal Balls: 2pcs.	1
60	Lighting Plate & Holder	Plate:102 x 203mm, Holder Length: 121mm	1
61	Resistance Coil, Mounted	Set of 5	10
62	Rheostats	Current Cap.: 0.30A, Ressistance: Approx.5500 ohm	10

	NAME	SPEC	QTY
63	Oersted'S Law Apparatus, Simple		2
64	Ampere'S Rule Apparatus		5
65	Magnetic Balance	Dimensions: 330 x 102 mm	5
66	Magnetic Field Balance		5
67	Current Balance, Simple Form		5
68	Multimeter, Demonstration	DC Voltmeter: 0-5/50/500V, AC Voltmeter: 0-5/50/250V	2
69	Logic Pulser Probe	Continuous 5Hz Pulse, One Shot Pulse	2
70	Transistor Characteristic Apparatus	Measuring And Comparing The Voltage/Current	5
71	Breadboard Systems	Sockets:2, Bus Strips:4, IC Cap:10	12
72	Logic Trainers	LCD Indicator W/Manual	5
73	Logic Trainer Board	D/A A/D Conversion	2
74	Electronic Logic Set	To Investigate The Fundamentals of Computer Logic	5
75	Micro-Processor		9
76	Braun Tube Oscilloscope	Frequency Band:DC 0-5Hz-3dB, AC: 2Hz-5MHz-3dB	5
77	Dual Trace Synchroscope	Frequency Band: DC 0-20MHz-3dB, AC: 10Hz-20MHz-3dB	2
78	Electronic Digital Counter	Frequency:0.001-999.9KHz, Period: 0.001-999.9ms	1
79	Gauss Meter	Seven Ranges: 0-3.0Wb/M2	2
80	Static Monitor	Measuring Range: DC & AC, Max.30KV	2
81	Millikan'S Elementary Charge Apparatus	Voltage Between Electrods: 100 - 500V	2
82	Electron Diffraction Demonstrator	Distance Between Gold Leaf & Fluorescent Surface: 150mm	1
83	Diffusion Cloud Chamber	Heater:Approx.100W, Dia. of Observation: 100mm	2

	NAME	SPEC	QTY
84	Radio Wave Experiment Apparatus	Oscillating Wavelength: Approx.250mm	4
85	Plank'S Constant Apparatus	Accuracy of Experiment: Order of 10(-34)<J.S.>	1
86	Power Source for Electronic Tube	High Voltage Output:AC,DC 0-500V, '100mA	2
87	Gs Alkali Storage Battery	Capacity: 6V, 7.5Ah	2
88	Regulated DC Power Supply	DC Output:0-18V, 5.5A, Lipple: 500(m)Vrms	9
89	Transparent Board for Moment of Force	Experimental Board, Variable Lever, Flucrum Axis	2
90	Electrical Resistance	Ressistance: 15ohm;2pcs, 30ohm;1Pc, Lead Wire: 7pcs.	2
91	Lenses & Prism Kit	Convex, Prism, Tnapezoidal Glass etc.	1
92	AC Recording Timer	For 60Hz Frequency, Interval of Dotting:1/60sec.	2
93	Coulomb'S Law, Magnetic, for OHP	Graduation: 100mm	2
94	Electrician'S Tool Set	20 Tools in a Case	1
95	Metal Working Tool Set	30 Tools in a Case	1
96	U-Shaped Magnet, Strong	Made of Al-Ni-Co Steel	9
97	Magnetic Field Creator	Two in a Set	5
98	Coil for Magnetizing	Dia. of Wire: 0.5mm	2
99	Magnetic Needle	Length of Needle: 100mm	9
100	Hamilton'S Electric Whirl	Experiments on Electrostatic Point Discharge	2
101	Parallel Plates Condenser demonstrator	Aluminum Plate, Glass Plate And Vinyl Chloride	1
102	Dissectible Transformer	Coils: 400 turns,40 turns, 4 turns	1
103	High Voltage Supply	Input:DC4-6V,1-2A, Output:Approx.10KV	1
104	Auto-Transformer	Safety Current: 5A	2

	NAME	SPEC	QTY
105	Self Induction Current Demonstrator	Lamp: Neon Lamp	2
106	Measurement of Magnetic Field	Air Core Solenoid: 500 turns, Current Balance	5
107	Electromagnetic Force Demonstrator	Max. Current:DC 5A, Min. Sensitivity: 5mgf	2
108	Demonstrator for Conversion Energy	High Quality DC Motor W/Decelerator, Weights	2
109	Ohm'S Law Demonstration Apparatus	Fixed Resister:10ohm x 10pcs., Variable Resister: 1000ohm x 1pc.	2
110	Spectrum Tube Stand	Tripod Stand W/Two Terminals	5
111	E/M Measuring Apparatus	Herm Holts Coil:130 turns Current Adjusting Resister	2
112	Induction Spheres	2 Spheres a Set, 76mm Dia.	2
113	Capacitor, Large	2 Aluminium Plate 200mm Dia.	2
114	Hollow Cylinder	Metal Cylinder: 51mm Dia.	2
115	Hollow Conducting Sphere	Metal Sphere: 102mm Dia.	2
116	Black Box for Electric Circuit	Six Terminals Box, Tester W/Rods, Read Wire	17
117	Circuit Tester	Accuracy: 4% of Max. Graduation	2
118	Universal Power House	Output:AC 0-20V,5A, DC 0-20V,5A	9
119	Thermometer	Mercury: -5C -- 105C	17
120	Demonstration Galvanometer	Circular Scale: 250mm	1
121	Demonstration Universal Meter	Circular Scale: 240mm for DC	1
122	DC Voltmeter	Measuring Range: DC 3/15/300V	17
123	DC Ammeter	Measuring Range: DC 50/500Ma/5A	17
124	Meters for Projection	Circular Scale: 83mm	2
125	Micro-Ammeter	Measuring Range: DC 100(M)A	17
126	Galvanometer	Sensitivity: 2 x 10(-4)V x 3.5 x 10(-6)A	17

	NAME	SPEC	QTY
127	Digital Circuit Tester	Display:3.5 digit LCD, Accuracy: 0.5-2%	9
128	Resistance Box	Resistance Valves:	9
129	Test Oscillator	1000/100/10/1/0.1ohm	2
130	Law Frequency Oscillator	Frequency Range:10Hz-1MHz, Sine/Square Wave	2
131	Integrating Watt Meter	Rating : AC 100V, 20A	1
132	Generator Model for AC & DC	Magnetic Pole Indicator	2
133	Vacuum Discharge Tube	Length: 400mm W/Cock	3
134	Electromagnetic Induction Apparatus	Free-Fall Length: 300mm, Detecting Coil: 1T/2T/3T	3
135	Circuit Tester	Taut-Band Type, Accuracy: 4%	2
136	Thermister Probe	W/Prote Ting Cap	2
137	Electronic Stop Clock	Measuring Range:0.001-9999S, Accuracy: 0.5 digit	1
138	Electric Miselaneous	IC etc.	1
139	Optical Slit	Stainless Steel	9
140	Michelson'S Interferential Apparatus	Surface Mirror:2pcs, Half Mirror:1pc., Vacuum Vessel: 1pc.	1
141	Polarization Discs	Dia.100 mm	2
142	Direct Vision Pocket Spectroscope	Slit Edge Length: 4mm W/Comparison Prism	17
143	Laser Optical Bench	Adjusting Stand W/Other Accessories	9
144	Light Source	From Diffusion to Conversing Beams	9
145	Light Source	Strong Parallel,Diffusion and Conversing Rays	9
146	Plane Mirror	400 x 300mm W/Metal Stand	9
147	Convex Mirror	Dia.90mm, Focal Length: Approx.125mm	9
148	Concave Mirror	Dia.90mm, Focal Length: 150mm	9

	NAME	SPEC	QTY
149	Convex Lense	Dia.75mm, F: 200mm,250mm,300mm	9
150	Optical Bench	Graduation Length: 1500mm	2
151	Fiber Optics Demonstrator	Flexible Light Guide: 3mm Dia.	2
152	Fiber Optics Kit	W/5M Fiber Cable	9
153	Laser,He/Ne,Modulated	Beam Dia.:0.53mm, Beam Divergence: 1.5m Red	3
154	Laser,He/Ne	Beam Dia.:0.68mm, Beam Divergence: 1.2m Red	3
155	Student Taser Experiment Kit	W/3 Mounted Lens And Others	9
156	Stroboscope,Digital	Frequency Range: 5-100Hz, Digital Display	2
157	Lenses for Laser Beam Diffusion	Objective Lens Ach 10X	9
158	Safety Goggles		35
159	Speed of Light/Laser Video kit	W/Beam Splitter, Two Lenses, etc.	2
160	Spatial Filter	Beam Divergence: 50mm Red	9
161	Spatial Filter /Telescope	W/6X Beam Shaping Telescope	1
162	Photometer	W/Photocell And Meter	2
163	Holography Kit	W/Optional Accessories,Film,Chemicals etc.	9
164	Hologram Demonstration Set		9
165	Hologram Assortment	35mm 4 kinds Halogram	9
166	Demonstration Hologram	Large Transmission Halogram: 200 x 250mm	2
167	Polaroid Film	Square, Large Size:152 x 152mm	2
168	Polarization of Light		2
169	Spectrum Chart		1

	NAME	SPEC	QTY
170	Replica Diffraction Gratings	3 Kinds : Groves 600/mm,300/mm,300/mm	9
171	Grating Spectrometer	Width: 219mm, Grating: 600 Groves/mm	1
172	Spectrometer	Base Dia.: 222mm	1
173	Polarization Kit for OHP	Polarizing Plate, Aperture Test Piece: 4pcs.	1
174	Optical Slit	Bulb, Filter, Receptacle etc.	2
175	Photo Electric Tube	Vacuum Type, Max. Voltage:DC 250V	1
176	Photo Electric Effect Demonstrator	Photo Electric Tube, Transmitter, Receiver	1
177	Ripple Tank	Dimension: 550 x 550 x 40 mm	5
178	Flat Wire Coil,Wave Demonstrator	Plain Wire Nelical Spring 75mm Coiled 170turns	2
179	Doppler'S Principle Apparatus	Tube Length: 350mm	1
180	Adjustable Phase Wave Generator	Motor, Two Circular Waves Produced	5
181	Illuminant for Ripple Tank	Lamp Electric Consumption: 150W	5
182	Ripple Tank for Ohp	Water Flow And Depth: 250 x 250 x 40mm	1
183	String Vibrator	Vibration Range: 50Hz - 200Hz	1
184	Linear Expansion Tester	Copper,Iron,Brass W/Triplex Sprit Lamp	9
185	Water Calori Meter	Copper Vessel Capacity: 200ml	9
186	Specific Heat Specimens	Iron, Aluminium, Copper	9
187	Mechanical Equivalent of Heat Apparatus	Spring Balance, Thermometer	9
188	Iron Tripod	Dia.80mm, Height: 210mm	9
189	GS Teclu Burner	For LPG W/Cock	9
190	Digital Temperature and Heat Flow Meter		1

	NAME	SPEC	QTY
191	Torricelli'S Law Experimental Kit	Glass Tube Length:1,000mm, Hg: Approx.200g	1
192	Portable Thermo-Hydrometer	Measuring Range: 0-100 %	1
193	Radiation Detector	GM Tube:for Beta-Ray,Gamma-Ray, Range: 1000/5000/10000/50000	1
194	Geiger-Mueller Probe Stand	Sample Case, Shelues, Sample Stand etc.	1
195	Crookes Tube	W/Cross Aluminium	1
196	Semi-Conductor Sample Set	Thermister, Germanium Diode etc.	1
197	Frank-Herts Apparatus	Accelerating Voltage:Ne,He,Ar DC 0-80V, Hg DC 0-30V	1
198	Atomic Structure Demonstration board	Black Board Wall Type, Electron Balls	1
199	Photoelectric Experimenter	Photoemissive, Photo Conductive, Photovoltaic	2
200	Scattering Apparatus	Dia.651mm, Depth: 102mm	1
201	E/M Apparatus	E/M Tube: 200mm in Diameter, Helmholty Coil: 600mm	1
202	Molecular Motion Demonstrator		1
203	Balance, Spring	50Kg	1
204	Balance, Spring	10Kg	2
205	Soft X-Ray App.	0-25KVP, 0-5MA	1
206	AC Meter Voltmeter	-1 -- 5V	17
207	AC Meter Ammeter	0-1A, 0-10A	17
208	Protractor Large	600mm Dia., Plastic Model	2
209	Lecturer Table	3,600 x 900 x 800	1
210	Table for Student	3,600 x 600 x 800	8
211	Chair for Teacher	530 x 460	1
212	Stool		32

	NAME	SPEC	QTY
213	Black Board	3,600 x 92 x 1,200	1
214	Cabinet	1,760 x 400 x 1,850	11
215	Side Table 1	3,000 x 750 x 800	6
216	Side Table 2	600 x 750 x 800	1
217	Sink Unit 1	1,500 x 750 x 800	1
218	Side Table 3	1,000 x 750 x 800	4
219	Side Table 4	500 x 750 x 800	7
220	Desk	1,400 x 700 x 700	2
221	Chair	530 x 570 x 760	2
222	Table for Computor 1	1,600 x 500 x 650	1
223	Table for Computer 2	600 x 700 x 650	1
224	Chair		1
225	Work Bench	2,400 x 900 x 750	3
226	Center Table	3,000 x 1,200 x 800	2
227	Side Table 5	3,000 x 750 x 800	1
228	Side Table 6	2,400 x 750 x 800	1
229	Corner Unit	1,500 x 750 x 800	1
230	Side Table 7	1,500 x 750 x 800	1
231	Labo Cart		2
232	Sink Unit 2	1,200 x 750 x 800	1
233	Side Table 8	900 x 750 x 800	2
234	Color Video Monitor	20-Inch 4-System W/Hangers	2
235	BETA System VTR	4-System W/Console	1

(1)-d EARTH SCIENCE

	NAME	SPEC	QTY
1	40cm Cassegrain Telescope	With 5m Doom	1
2	Transparent Hemispnere	Inner Dia 633mm, Inner Thickness 5mm with Angle Measure	3
3	Transparent Celestial Globe	Diameter 350mm with Horizon, Meridian, Time Board, Moon, sun, Earth and Plan	3
4	Celestial Globe	Diameter 210mm, Celestial Map	10
5	Earth Experiment App.	Section Plate of the Earth with Slit of Light Source	9
6	Astronomical Direct Vision Spectroscope	A set of Three Eyepieces for the Prism with Case	30
7	Direct Vision Pocket Spectroscope	Tube Length 90mm, Edge Length 4mm, with Comparison Prism	9
8	Sun Spectrum Observer	Total Length about 500mm, Fraunhofer Lines about 100	1
9	Portable Seismograph	With Vibration Stage, Pendulum Weight 1.8Kg, Damper: MK Steel Magnet Type	2
10	Radiation Detector	Counting Ratemeter: : 1,000/5,000/10,000,50,000rpm With GM Tube and Stand	1
11	Dip Needle	Declination Plate: Diameter 72mm 5dig. Scale, Leveling Screws, Disc Diameter 100mm 1dig. scale	3
12	Electric Centrifuge for Multitubes	Max 4000rpm, Rotor: Swing Type, Quadruple Support, 15ml x32, 50ml x4	1
13	Polarizing Microscope	80X-320X	17
14	Rock & Mineral Micro-slide	15 Slides, Granite, Diorite, Hornblend etc.	6
15	Volcano Model	3 Models	1
16	Models of Land to Demonstrate Cycle	3-Stages Young, Mature, Old	2
17	Features Model	190 x 630 x 200mm	1

	NAME	SPEC	QTY
18	Fossil Model	20 Models	1
19	Crystal Models	25 Models	1
20	Steel Mortar	Diameter: 150mm With Pestle	5
21	Mixer	Inner Volume: 12ml, Material: Heat-proof Glass	2
22	Vernier Calipers	Stainless Steel, Scale Range: 0-150mm	9
23	Micrometer Screw Gauge	Measureing Range:2-25mm, Accurate to 0.01mm	9
24	Soil Hardness Tester	Strength of Spring:8.0Kg, Total Length: 200mm	9
25	Sieves Set	Six Kinds Depth:45mm, Diameter:150mm	9
26	Electric Drying Oven	Temperature Range: 40 - 250 C, Capacity: 90 Liter	1
27	Clinometer	Wooden Frame with Case	30
28	General Hammer	About 500g, Oak Handle, about 500mm Long	30
29	Rock Cutter	2-Step Gear Change, Diamond Blade	1
30	Simple Thermohelio Meter	Radiation Receiver:80mm in Dia, about 70ml with Tripod	9
31	Direct Sunshine	Detector:Copper Palte Thermometer 0 -- 50 C, Equatorial Type	1
32	Torricelli'S Law Experimental Kit	Glass Tube: 1000mm Length	2
33	Thermometer Screen	Inner Size: 750 x 750 x 780mm, Overall Height:2135mm, Single Screen	1
34	Anemometer	With Three Wind Cups, Measuring Range: 1 -- 60 m/sec. Diameter of Wind Cups: 100mm	2
35	Stereo Microscope		9
36	Anemoscope	Length of Vane: 740mm, Direction Disc: 390mm, with 4m of Sliding Pole	2
37	Rain Gauge	Copper, Diameter of Receiver:200mm	2

	NAME	SPEC	QTY
38	Evavoration Guage	Copper, Diameter: 200 x 100mm	1
39	Diffusion Cloud Chamber	Diffusion Type,Ionization Chamber: Diameter 90 x 45mm	1
40	Thoma Blood Counter	A Pair of Glass Plate in Case	1
41	Paper Chromatograph	Displacement Vessel: Dia.80 x 360mm, Four Pieces of Filter Paper can be hung	9
42	Electronic Digital Counter	Count: 1 -- 9999, Frequency: 0.001 -- 999.9 KHz	1
43	Set of Pulleys	Operation for more than Three Minutes	1
44	Solar Battery and Experimental Kit	Solar Battery Elements: 10pcs. in Series Open Voltage: 5.7V Operating Voltage: 4.5V,	1
45	Funnel Stand	With Holder for Two Funnels	9
46	Iron Stand	Supporting Rod: Dia.12 x 600mm	30
47	Pipette Stand	Hold Two Pipettes Clip Type	15
48	Set of Pulleys	4 Plastic Pulleys, Consisting of Movable and Fixed Single and Double Pulleys with Metal Frame	9
49	Wheel and Axle	Diameter 30, 60, 120mm	9
50	Inclined Plane	Inclined Plane: 500 x 100mm	9
51	Electronic Stop Watch	Measuring Range: 59'99	9
52	Rotating Platform Experiencing Prece	500mm in Diameter, Metal, with Wheel and Rope	1
53	Water Bath Controller and Water Bath	Temparature Range: Room Temperature 80 C, 24 Liter	1
54	Cylinder Microtome	Sectional Graduation: 10 micron, Stage Dia.: 75mm	1
55	Thermister Thermometer	Measuring Range:-25 - 60/60 - 150 C, Accuracy: 1.0%	1
56	Table Balance 1	Capacity:500g, Sensitivity: 0.5g with Set of Weight	9

	NAME	SPEC	QTY
57	Table Balance 2	Capacity: 1,000g, Sensitivity: 1g, with Set of Weight	9
58	Baume'S Hydrometers	Light and Heavy	9
59	Thermometer 1	-5 -- 105 C	25
60	Thermometer, 2	0 -- 360C, Mercury	10
61	Hand Generator	Abs Body, Hand Driven Motor	9
62	Aquarium and Air Pump		1
63	U-Shaped Magnet Strong	Distance Between Arms: Inside 50mm, Al-Ni-Co Magnet Steel	9
64	Electromagnet	Total Resistance: 5ohms	9
65	Polarization Discs	Diameter: 100mm, Two to the Set	9
66	8Cm Refractor Telescope	Supper Poralice 80m	17
67	Universal Power House	Output:AC 0-20V,5A DC 0-20V,5A	9
68	Tape Measure	Copper, 50m in Case, MM Graduation	9
69	Circuit Tester	DC-V, AC-V, DC-A, Ohm	9
70	Water Calorimeter	Used in the Compasion of Heating Action Ofrectric Current	9
71	Spring Balance	Capacity: 200g, Sensitivity: 2g	9
72	Automatic Table Balance	Capacity: 80g, Sensitivity: 0.05g	2
73	Electronic Balance	Capasity: 330g, Min. Reading: 1mg	1
74	Single Pan Balance	Two Beam Dial Type, Capacity: 310g, Sensitivity: 10mg	9
75	Topography Relief Model	For Philippines Sea	1
76	Thermometer	Mercury 0 -- 100 C	16
77	Microscope Metallurgical		1

	NAME	SPEC	QTY
78	Weather Chart	For Philippines	1
79	Balloon	For Weather Set	1
80	Throdlite	For Weather Set	2
81	Disc, Circulation Weather	For Weather Set	1
82	Center Table	3,600 x 600 x 800	8
83	Lecturer Table	3,600 x 900 x 800	1
84	Stool	315 x 475 x 615	32
85	Chair For Teacher	530 x 460	1
86	Black Board	3,600 x 92 x 1,200	1
87	Cabinet	1,760 x 400 x 1,760	12
88	Side Table 1	3,000 x 750 x 800	3
89	Side Table 2	1,000 x 750 x 800	3
90	Side Table 3	500 x 750 x 800	5
91	Sink Unit 1	1,800 x 750 x 800	1
92	Side Table 4	600 x 750 x 800	1
93	Work Bench	2,400 x 900 x 750	1
94	Desk	1,400 x 700 x 700	2
95	Chair	530 x 570 x 760	2
96	Assembling Shelf	1,800 x 450 x 2,402	7
97	Sink Unit 2	1,200 x 750 x 800	2
98	Side Table 5	900 x 750 x 800	4
99	Color Video Monitor	20-Inch 4-System, W/Hangers	2
100	Beta System VTR	4-System W/Console	1

(1)-e MATHEMATICS

	NAME	SPEC	QTY
1	Multitle Times Trial Experimenting Tool	1 Set of Dice, Chip, Coin	15
2	Five-Color Counting Bars	5 Colors, 200 pcs/Color	10
3	Magnet Type Numbers	Blackboard Type	10
4	Number Quantity Figure Magnetic Demonstrator	1 Set of Blackboard, Number, Card	1
5	Rotary Numbers Arranging Board	Number 1 - 100, W/Frame	1
6	Figure Position Explanation Board	Blackoard, Card Type: 10,000 1,000 100 10 1	1
7	Fraction Demonstrator	Board 1/1, 1/2, 1/3, 1/4, 1/5 Block	1
8	Exercise Board For Calculation	Number 1-20, W/Board	1
9	Rotary Distance Measuring Tools	330mm, Rotary-Type	2
10	Transparent Two-Color Protractor	600mm, Protractor	2
11	Transparent 360 Degree Whole Circle	450mm, 360 C	2
12	Circle Area Demonstrator	Wooden Type	1
13	Laying Type Colored Tieces	1 Set of Triangle, Fan Type, Square (Magnet Type)	9
14	Liter Cases 1	Cup For 1l, 5dl, 1dl, Measure For 1l	10
15	Liter Cases 2	10, 20, 50, 100, 200, 1,000ml	10
16	Capacity Experimenting Tool	10 Liter Container, 300ml Container x 5	10
17	Volume And Capacity Experimenting Tool	1 Liter Case, 1cc x 1,000 Cube	1
18	1M3 Large Visually Retresenting Cube	Plastic Type	1

	NAME	SPEC	QTY
19	Basic Volume Demonstrator	8, 4, 2, 1cm a Cube	1
20	Dial Scale	8Kg	10
21	Chronometer	Second and Minutes Indicator	10
22	Triangle	Two kinds of Triangle W/Handle 600mm	9
23	Metal Made Large Compass	Length: 540mm, Metal Made	9
24	Tarallelogram Demonstrator	300mm, Metal Made	1
25	Magniffication And Reduction Demonstrator	W/Board, Compus, Magnet Board	1
26	Three Dimensional Models	Trigonal, Square Circle Prism, etc.	9
27	Collapsible Three Dimensional Model	Tetrahedron, Trigonal, Circle Pyramid etc.	9
28	Space Coordinates Demonstrator	3 Side Board, 3-Metal Stick for 5cm Section Graph	1
29	Circle Graph Teaching Blackboard	860 X 860mm	1
30	Magnet Type 1 Meter Straight Edge Ruler	Magnet Type, Wooden Type	15
31	Similar Cylinder and Cone Volume		10
32	Pythagoras Theorem Experimenting Demonstrator	Square Plastic Board, Magnet Block	1
33	Ellipse Straight Line and Hyperhola curve Tool	Length: 300mm, Aluminium Made	9
34	Probability Experimenting Tool		15
35	Random Number Die	Red, Blue, Yellow Each 8pcs	9
36	Binonminal Distribution Demonstrator	Transparency Board	2

	NAME	SPEC	QTY
37	Parallel Plane Demonstrator	Plane 285 x 285mm: 3pcs., Straight Stick: 12pcs.	1
38	Angle Demonstrator	Stainless Steel Made	1
39	Revolving Figure Explanation Experimenting Tool	Handle Type, Metal Made	1
40	T-Square	Length: 1,050mm	2
41	Proportional Compass	Length: 600mm	1
42	Graph Chart Blackboard	900 x 900mm, Steel Made	1
43	Sum of Interior Angles Demonstrator	Length: 250mm, Wooden Made	1
44	Pantagraph	Length: 590mm, Wooden Made, W/Magnet	1
45	Cord Magnet	Dia.4mm X 1m, Dia.2mm X 1m, Each 7 Colors	9
46	Color Magnets	Dia.40mm, 7 Colors, Each 27pcs.	10
47	Magnet Numbers Arranging Board	Blackboard: 900 x 1,000mm, Steel Magnet Numbers: 1 -- 100	1
48	Rotary Type Multiplication Exercise Board	Frame Size: 610 x 600mm, Plastic	1
49	Set Square	18cm	30
50	Calculator	10 Figures	30
51	Function Calculator		30
52	Programe		5
53	Tape Measure	50m, Vynile Made	10
54	Small Globe	W/Wooden Stand	10
55	Large Globe	Metal Made, 28,000,000:1	1
56	Paper Cutter	Cutting Size: 338mm, Table Size 302 x 408mm	2
57	Tool Set	Scissors, Stapler, Cutter, Tape Compass, 30cm Scale	10

	NAME	SPEC	QTY
58	Electronic Balance	Weighting Capa.: 6,000g Readability: 1g	1
59	Automatic Table Scale	1Kg	4
60	Spring Scale	1Kg	10
61	Wrold Map		10
62	Stand		10
63	Personal Computer	16Bit W/Display, Stand	1
64	Rotary Numbers Arranging Board	Frame: 610 x 600mm, Stand Type	1
65	Magnet Type Multiplication Exercise Board	Blackboard: 900 x 900 x 15mm, Steel	1
66	Moving-Up and Moving-Down Calaulation Board		1
67	Multiplication Fact Set	Character Board: 81pcs. White Board: 9pcs.	1
68	1 CM3 Piece Set	5,000pcs. (Red; 2,500pcs, Yellow: 2,500pcs.)	2
69	Lecturer Table	1,600 x 700 x 700	2
70	Chair for Teacher	560 x 495 x 765	2
71	Table for Student	1,400 x 600 x 700	30
72	Chair For Students	430 x 495 x 765	60
73	Side Table 1	1,800 x 750 x 800	6
74	Side Table 2	1,500 x 750 x 800	2
75	Desk	1,400 x 700 x 700	2
76	Chair	530 x 570 x 760	2
77	Cabinet	1,760 x 400 x 1,850	3
78	Table For Computor 1	1,600 x 500 x 800	1
79	Table For Computor 2	600 x 700 x 800	1

	NAME	SPEC	QTY
80	Chair		1
81	Black Board	3,600 x 92 x 1,200	1
82	Sink Unit	1,200 x 750 x 800	1
83	Side Table 3	900 x 750 x 800	2
84	Side Table 4	500 x 750 x 800	2
85	Labo Cart	450 x 710 x 840	2
86	Steps	532 x 748 x 663	2
87	Color Video Monitor	20-Inch 4-System W/Hangers	4
88	Beta System VTR	4-System W/Console	2

(1)-f INFORMATION SCIENCE

	NAME	SPEC	QTY
1	Whiteboard	1,195 x 92 x 905mm	6
2	Movable Whiteboard	1,945 x 575 x 1,780mm	2
3	Instructor Desk W/Chair	3,000 x 800 x 650mm	1
4	Student Desk	2,400 x 700 x 700mm	8
5	Student Chair	Pipe Made	32
6	Cabinet	Glass,Steel,Base 1,850 x 1,500 x 500mm	8
7	Desk	1,200 x 800 x 700mm	6
8	Chair	460 x 550 x 499mm	6
9	Coakboard	900 x 1,000	15
10	Personal Computer for Lecturer	16 Bit, 640KB RAM, Display, 50MB Hard-Disk, Printer, W/Communication System	1
11	Personal Computer	16 Bit, 640KB RAM, Display, 20MB Hard-Disk, Printer, W/Communication System	2
12	Personal Computer	16 Bit 640KB RAM, Display Printer, W/Communication System	14
13	Software For Personal Computer		1
14	100 inch Video Projector	4-System	1
15	100 inch Screen	Flat Screen, Spring Type	1
16	Beta System VTR	4-System	1
17	Stereo Power Amplifier	51W + 51W	1
18	Speaker	Digital Component	2

(1)-g ELEMENTARY SCIENCE

	NAME	SPEC	QTY
1	Biological Microscope	50X-150X,with Stage, Monocular	1
2	Water Bath	Inside: 300 x 330 x 180mm with Cover, Themostat	1
3	Autoclave	Inner Size: Dia.232 x D460mm	1
4	Electric Balance 1	Capacity: 330g, Sensitivity: 1mg, Digital Reading	1
5	Electric Balance 2	Capasity: 3,120g Sensitivity: 100 mg	1
6	Electric Drying Oven	Temperature Range: 40-250 C, Copacity: 15 Litter	1
7	Stereo Microscope	With Standard Accessory	9
8	Biological Microscope	With Standard Accessory	9
9	Dissecting Set	Scissors, Sealpel, Forceps, Teasing Needle, Magnifier	17
10	Chemical Balance		9
11	Fossil Specimens 1	Zoological, Set of 10 Collection	1
12	Fossil Specimens 2	Botanical, Set of 10 Collection	1
13	Digital pH Meter	Measuring Range:0-14.00pH Indication: -1999mV -- 1999mV	1
14	Thermometer 1	-5 -- 105 C	20
15	Thermometer 2	0-360 C	10
16	Thermometer 3	-30 -- 50 C	20
17	Garden Tools	Set of 13Tools, Shovel, Water Pot, Hoe, etc.	17
18	Iron Mortar	Diameter:150mm, Made of Iron with Pestle	17
19	Petri Dish	Plastic, Diameter:47mm 100pcs In Case	1
20	Terrarium	Wood, 320 x 450 x 335 mm	1

	NAME	SPEC	QTY
21	Breathing Fitness Kit	Studying the Efficiency and Importance of Human Breathin	1
22	Lung Function Model	190 x 190 x 550mm	1
23	Human Vision Biokit	For 30 Students	1
24	Optical Illusions Poster Set	32 Posters Demonstrates the Eccentricities of Human Observation	1
25	Musical Illusions Study Set	Long-Play Stereophonics Recording Explores Visions Aspects	1
26	Poster Analysis Grid	Accurately And Graphically Shows	1
27	Optical Kit	Meets All Requirements for PSSC 3rd, 4th and 5th Edition Labo	1
28	Lux Meter	Led Digital Display Measuring Range: 0-990 lux, Min.1 lux	1
29	Beach Collection Set	3pcs. a Set	9
30	Insect Killing Jar	Dia.90 x H120mm	1
31	Human Male Figure	Dissectible Into 100parts, Plastic	1
32	Human Models	Female Organs, Heart Model, Kidney Model, Teeth Model, Brain	1
33	Microscopic Slide	Botanical: 20 Slides, Zoological: 20 Slides	1
34	Funnel Stand	Made of Metal, for 2 Funnels	9
35	Burette Stand	Metal, for 2 Burette	9
36	Pipette Stand	Made of Vinyle Chloride	9
37	Gas Burner	For LP Gas with Cock	17
38	Cork Burner	Set of 6 Cutters	9
39	Burrets	Mohr Type,Plane 10ml,50ml,100ml	10
40	Laboratory Glassware	Beaker,Flask, Measuring Cylinder, Filttering Bottle, etc.	1
41	Demonstrator of Newton's Laws	Runway: Wood 1430mm Length	1

	NAME	SPEC	QTY
42	Sympathetic Tuning Forks	Steel, Consist of a pair of Tuning Forks, Box, Rubber Hamm	1
43	Young'S Modules Apparatus	Distance Between Fixed Edges: 400mm, Copper, Steel, Brass	1
44	Prism Set	8 Quilateral Prism, Length 75mm, Right Angle Prism, Length 4	1
45	Set of Pulleys	Plastic, 4 Pulleys, Movable, Fixed, Single, Double	9
46	Weel and Axle	Metal,Stepped Wheel, Mounted on a Stand, Dia.30,60,120mm	9
47	Inclined Plane	Metal, Total Length 500 x W100mm	9
48	Electronic Stopwatch	Measuring Range: 59min. 59.99sec.	17
49	Spring Balance	Capacity:200g, Sensitivity:2g	30
50	Plane Mirror	200 x 140mm with Protection Plate	17
51	Convex Mirror	Diameter: 90mm, Focal Length: 125mm with Stand	1
52	Concave Mirror	Diameter: 90mm, Focal Length: 150mm with Stand	1
53	Lens and Prism Kit	Convex Lens, Large And Small, Prism, Cylindrical Lens	17
54	Bar Magnets	Set of 2 Magnet	17
55	U-Shaped Magnet	Arms Inside: 50mm	17
56	Transparent Celestial Globe	Diameter: 350mm, Movement of Sun, Moon, Planet, Artifical Satellite	3
57	Doube Hemisphere Set	Transparent Hemisphere,2pcs Dia.200mm	17
58	Celestial Globe	Dia.320mm, with Stand	9
59	Planetarium	Pinhole Type, Dome 3m Dia.	1
60	Rock and Mineral Specimen	Rocks: 50kinds, Mineral: 50kinds	1
61	Magnetic Compass	Diameter:45mm, Round Metal Case	2
62	Rain Gauge	Copper, 200Mmdiameter with Mesure	1

	NAME	SPEC	QTY
63	Astronomical Direct Vision Spectroscope	For Abservation of Star Spectra	9
64	Volcano Model	Set of 3 Models	1
65	Models Cycle of Land Erotion	Set of 3 Models	1
66	Refrigerator	Capacity:170L, Freezing Room:43 Liter	1
67	Laboratory Wagon	750 x 450 x 750, 2Floors, with Caster	3
68	Wood Working Tool Set	Set of 25 Tools	1
69	Chemical		9
70	Scale Platform	10Kg and 100Kg each 1	1
71	Hot Plate	400C, 300 x 250mm	1
72	Chart Stand	Three Grips	1
73	Alcohl Lamp	Glass	17
74	Measuring Rod	2000mm	1
75	Weight Scale	100Kg	1
76	Splygmomanameter	Aneroid	1
77	Water Bath	Approx.400 x 200 x 200mm, Polipropilene	1
78	Three Globes Set	S/M/E	1
79	Lecturer Table	3,600 x 900 x 800	1
80	Table for Student	3,600 x 900 x 800	8
81	Cabinet	1,760 x 400 x 1,850	12
82	Chair for Teacher	530 x 460	1
83	Stool		32
84	Work Bench	2,400 x 900 x 750	1
85	Desk	1,400 x 700 x 700	2
86	Chair	530 x 570 x 760	2

	NAME	SPEC	QTY
87	Black Board	3,600 x 92 x 1,200	1
88	Side Table 1	600 x 750 x 800	1
89	Sink Unit 1	1,800 x 750 x 800	1
90	Side Table 2	1,000 x 750 x 800	1
91	Side Table 3	3,000 x 750 x 800	1
92	Side Table 4	900 x 750 x 800	1
93	Side Table 5	500 x 750 x 800	2
94	Sink Unit 2	1,200 x 800 x 800	1
95	Display Cabinet	1,500 x 600 x 900	4
96	Filling Cabinet	455 x 620 x 1,400	3
97	Microscope	120V Biological Metallurgical	1
98	Color Camera	NTSC DC12V 1 Chip CCU	1
99	Camera Adaptor	120V	1
100	Color Video Monitor	13-Inch 4-System	1
101	Video Cassette Recorder	NTSC	2
102	Color Video Monitor	20-Inch 4-System W/Hangers	2
103	Beta System VTR	4-System W/Console	1

(2)-a WORKSHOP

	NAME	SPEC	QTY
1	Working Bench	1,800 x 900 x 800mm, Hard Plywood	4
2	Working Chair	3,000 x 550mm	15
3	Tool Cabinet	Steel, 880 x 515 x 1,790mm	6
4	Sink	900 x 750 x 800mm	2
5	Precision Lathe Machine	Swing Over Bed 360mm, Distance between centers: 550mm	1
6	Tapping & Drilling Machine	Swing Capacity 360mm, Drilling Capacity: 13mm in Steel	1
7	Pedestal Grinder	Wheel External Dia.205mm Grinder Current 1.9A	1
8	Dia Cut Machine	Cutting Capacity 240 x 360mm Motor 0.4Kw	1
9	Glass Blowing Burners	Tabl-Top Gas Burner,Hand Hold Burner, Adaptor	3
10	Universal Wood Working Machine	Automatic Planing 310 x 5mm	1
11	Moulding Machine	Capacity 1/2 Inch, Power Input 1300W	2
12	Electric Arc Welding Transformer	Secondary Current 300A, Range 50-300A	2
13	Oxy-Acetylene Gas Welding and Cutting	Welding 0.5-25.0mm, Cutting 3-150mm	2
14	Portable Air Compressor with Accessories	Pressuref 8.0-9.9Kgf/cm2, Air Tank 60 Litter	1
15	Portable Electric Drill	Drilling Capacity 13mm in Steel Motor Power 700W	2
16	Portable Electric Grinder	Depressed Center Wheel 100mm Power Input 590W	2
17	Hand Tools & Measuring Tool Set	Anvil, Hammer, Screw Driver, Angle Wrench, etc.	3
18	Working Bench	1,200 x 600 x 740mm, Plywood W/Cabinet	2

	NAME	SPEC	QTY
19	Vertical & Horizontal Compound Mill	Table 500 x 500mm, Motor 0.75W	1
20	Hack Sawing Machine	Cutting Capacity 180mm in Round Bar Motor 0.4Kw	1
21	Shaping Machine	Max Stroke 420mm, Motor 1.5Kw	1
22	Logic Analyzer	DCV 200M, 2, 20, 200, 1,000/ACV 200M	2
23	Circuit Tester	DCV 0.25, 10, 50, 250, 1KV/ACV 10, 5	2
24	Electrician Tool	Cutting Plier Nose Plierm Drive etc.	5

(2)-b PHOTOGRAPHING AND PRINTING EQUIPMENT

	NAME	SPEC	QTY
1	Phototypesetting Machine	Processor 32Bit, Ram/Mb, Rom 256Kb, Keyboard: 9	3
2	Phototype Printer	Printing Speed 8 Pages/Min.	1
3	Drafter Set	W/Stand, Board: 750 x 1,050mm, Chair, Light	2
4	Layout Table W/Chair	Effective Area: 895 x 790mm, Gradient: 0-50 deg.	2
5	Typewriter W/Table & Chair	96 Characters, Speed:23Cps, Max.432mm, Correction Memory: 1000	1
6	Business Desk W/ Chair	1,000 x 700 x 700mm, W/Side Drawer, W/Chair	1
7	Filling Cabinet	456 x 620 x 700mm, 2-Drawers W/drawer Frame & Hanging Folder	2
8	Locker	880 x 400 x 1,790mm, Upper Case: Glass Door Lower Case: Steel Door	2
9	35mm Camera	W/Zoom Lens 35-70mm, F3.3-4.5	6
10	4 x 6 Camera	W/Lens E40mm F4, E50mm F3.5, E25mm F5.6, Tele Converter	1
11	Water Proof Camera	Perfect Water Proof	1
12	Camera Accessories (A)	Various Type Lenses	3
13	Camera Accessories (B)	Tripod, Flash Light, Motor Drive	1
14	Photo Enlarger	Negative Size 6x7, 6x6 6x4.5, 35mm, Harf35mm, 110mm	1
15	Processor & Accessories	Film Processor, Graphic Film Processor, Dark Room Tool	1
16	Graphic Film & Chemicals	8" x 10", 5" x 7", 356 x 432mm Graphic Paper & Various Film	1
17	Graphic Chemicals	Color & Mono Color Film Developer and Stabilizer	1

	NAME	SPEC	QTY
18	Photograph Tools	Slide Vuewer, Film Cutter Cutting Mat, Magnifier, Stapler	1
19	Work Desk	1,200 x 600 x 700mm	3
20	Work Chair	450 x 520 x 497	5
21	Refrigerator	Inside Temperature 2-14 C, 290 Liter	1
22	Sink	1,000 x 850 x 800mm	1
23	Locker	880 x 515 x 1,790	2
24	Shelving for Chemicals	1,500 x 500 x 1,850	1
25	Process Camera	Image Size Reflection 510 x 610mm, Copy Reflection Size: 350 x 730mm	1
26	Auto Film Printer	Printing Size: 650 x 530mm	1
27	Auto Film Processor	Max.Film Size: 66 Min.Film Size: 102 x 127mm Capacity: 97 Sheets/Hr	1
28	Film Cabinet	1.375 x 989 x 414mm	2
29	B/W Densitmeter	Range: 0.00-4.00, Dot: 0-100%, Accuracy: +0.02	1
30	Color Densitmeter	Range: 0.00-4.00, Dot: 0-100%, Accuracy: +0.02	1
31	Contact-Screen	510 x 610mm, 85/100/120/133/200 Line	1
32	Gradation Master & Screen Tint	Use for Various Screen Work	1
33	Layout Table W/Chair	Effective Area: 895 x 590mm, Gradient: 0-50 Dig.	1
34	Process Film	Vo-Type: 138 x 180mm, 252 x 303mm, Lo-Type: 252 x 303mm, 354 x 430mm	1
35	Process Chemical	Developer, Rep;Enisher & Stabilizer	1
36	Vacuum Printer	Printinng Size 1,110 x 860mm Vacuum Pump 70 Liter/Min.	1
37	Auto Plate Processor	Plate Size: Max.Width 860mm Operating Speed: 820 mm/Min.	1

	NAME	SPEC	QTY
38	Direct Plate Maker	Plate Size: Max.310 x 480mm Reduction Range: 100 To 60%	1
39	Open Shelves	1,850 x 600 x 2,100mm	1
40	Printing Plate & Chemicals	Ps-Printing Plate, Direct Master Developer, Fountain Solution	1
41	Offset Press	Max Printing Speed 11,000Spm, Max.Sheet Size: 480 x 660mm	1
42	Small Offset Press	Sheet Size: Max.315 x 440mm, Min.90 x 120mm, Speed Range: 3,000-12,000Iph	1
43	Printing Materials	Offset Ink, Printing Paper, Washing Liquid, Cleaning Cloth	1
44	Auto Collator	Number Of Paer Bins 16, Pile Height in the Bin: 30mm	1
45	Paper Filding Machine	Max. Folding Size: 630 x 450mm, Folding Speed: 15,000 Sheets/Hour	1
46	Adhesive Bookbinding Machine	Max: 320 x 320mm, Min.: 75 x 75mm	1
47	Wire Bookbinding Machine	Capacity: Max.25mm, Stetching Speed: 9000 Ditetches/Hour	1
48	Plastic Ring Bookbinding Machine	Capacity: 20 Sheets at a time, 16,000 Sheets/Hour	1
49	Laminate Machine	Max. Width: 320mm, Min. Width: 60mm Operating Speed: 0.5-2.3m/min.	1
50	Guillotine Cutter	Cutting Width:1,020mm, Capacity:155mm	1
51	Work Table	1,500 x 750 x 700mm	2
52	Open Shelves	1,850 x 600 x 2,100mm	2
53	Binding Materials	Hot-Melt Paste, Steel Wire, Plastic Ring, Book Cover	1
54	Engineering Copier	Max.Width: 950mm, Speed: 30-500m/hour	1
55	PPC Copier	A3-A6, Magnification Rate: 65-141% Zoom, Speed: 40 Copies/min.	1
56	Hand Cart	Loading Capacity: 500Kg	4

	NAME	SPEC	QTY
57	Step	690 x 345 x 830mm	2
58	Folding Chair	410 x 410 x 420mm	12
59	Spare Parts		1

(2)-c AUDIO VISUAL EQUIPMENT

	NAME	SPEC	QTY
1	Color Camera	1 Chip CCD DC24V NTSC	2
2	Zoom Lens	Motorized E-E	1
3	Motorized Pan	Tilt Head, Indoor Light Duty	2
4	Wall Mount Bracket	For Motorized Pan	2
5	Pan/Tilt Head And Lens Contriller		1
6	AC Adaptor	For Zoom Lens	2
7	Cables		1
8	Color Video Monitor	20-Inch 4-System	2
9	Beta System VTR	4-System	2
10	Rack		2
11	U-Matic Video Cassette Recorder	PAL/SECAM/NTSC	1
12	VHS VTR		1
13	Beta System VTR	4-System	1
14	Color Video Monitor	20-Inch 4-System	3
15	Stereo Set		1
16	3-Tube Color Video Camera	MF Saticon Tube, NTSC	2
17	Servo Zoom Control Unit		2
18	Tripod With Dolly	Fuid Head & Two Pan Rods	2
19	Intercomm. Headset		3
20	Dynamic Microphone	Omni-Directional	3
21	Electret Condenser Microphone	Lavalier Type, Silver	1
22	Microphone Boom Stand	U-5/16, PF-1/2	2

	NAME	SPEC	QTY
23	Table Microphone Stand	PF-1/2	1
24	Cradle Suspension	5/8-Inch	2
25	Color Video Monitor	20-Inch 4-System	1
26	Monitor Stand		1
27	Compact Monitor Speaker	With Leakage Flux Canceller	2
28	Connecting Panel		1
29	Mic. Extension Cable	10m	3
30	Ceiling Light System		1
31	AC Power Adaptor		3
32	Camera Control Unit	NTSC	3
33	Special Effect Generator	With E-File	1
34	Universal Chroma Keyer		1
35	Remote Control		1
36	Monochrome Video Monitor	9-Inch EIA	3
37	Color Video Monitor	13-Inch 4-System	2
38	NTSC Waveform Monitor		1
39	NTSC Vector		1
40	Rack Mount Metal		1
41	Video/Audio Distributor	5-Output	1
42	Professional Audio Mixer	8-Channel	1
43	For-Digital Integrated Amplifier		2
44	Cassette Tape Deck	3-Head, 2 Motor	1
45	Compact Monitor Speaker	With Leakage Flux Canceller	2

	NAME	SPEC	QTY
46	System Console		1
47	Colour Video Monitor		1
48	U-Matic Video Cassette Recorder		1
49	Cables		1
50	Racks		1
51	Genlocker	NTSC System	1
52	Dual Micro-Floppydisk Unit		1
53	NTSC Superimposer		1
54	NTSC Videotizer		1
55	Delay Line		1
56	Video Titler	English, NTSC	1
57	Graphics Editor	NTSC	1
58	CP/M Ver 2.2		1
59	Disk Basic	NTSC	1
60	Q-Manager	NTSC	1
61	Quick Titler		1
62	3.5" Micro-Floppydisk	10pcs/pack	10
63	Video/Audio Switcher	6-Input	1
64	System Table		1
65	A/V Cables		1
66	Telecine Multiplexer		1
67	16mm Film Projector	24-Frame/NTSC 115V/60Hz	1
68	35mm Slide Projector		1
69	3-Tube Color Video Camera	MF Saticon Tube (NTSC)	1
70	Color Video Monitor	13-Inch 4-System	1

	NAME	SPEC	QTY
71	U-Matic Video Cassette Recorder	NTSC	1
72	System Table		1
73	A/V Cables		1
74	Camera Adaptor		2
75	Automatic Editing Control Unit	NTSC/PAL	1
76	Video/Audio Switcher		1
77	9-Pin Interface Board	Built-In 2-VTR Connector	2
78	Parallel Switcher	Interface Board	1
79	RGB Display Monitor		1
80	Remote Control Cable	5m	1
81	Remote Control Cable	5m	3
82	Connecting Cable	25P/30m	1
83	Color Video Monitor	13-Inch 4-System	2
84	High Quality Editing VTR		2
85	High Quality Editing VTR		1
86	Time Base Corrector	NTSC	2
87	System Table		1
88	A/V Cables		1
89	U-Matic Vido Cassette Recorder	NTSC	1
90	Beta System VTR	NTSC 120V	5
91	Multi Remote Controller		1
92	Multiple VTR Selector		1
93	Potable Video Projector W/Screen		1

	NAME	SPEC	QTY
94	Video/Audio Distributor	5-Output	1
95	Video/Audio Switcher	6-Input	1
96	Color Video Monitor	13-Inch 4-System	1
97	System Rack		1
98	A/V Cables		1
99	VHS VTR		1
100	3-Tube Color Video Camera	MF Saticon Tube (NTSC)	1
101	Condenser Microphone	Super Uni-Directional	1
102	Portable VTR	NTSC	1
103	AC Power Adaptor		1
104	Camera Extension Cable	10m 14P-14P	1
105	Color Video Monitor	8-Inch NTSC Portable	1
106	Lamp	24V 200W 10pcs/pack	1
107	Portable Battery Light		1
108	Rechargeable Batery Pack	Ni-Cad	20
109	Battery Charger	Upto Four Batteries	2
110	Battery for Microphone		20
111	Tripod With Dolly		1
112	Dynamic Microphone	Uni-Directional	1
113	Mic. Extension Cable	10m	1
114	Mic.Extension Cable	50cm	1
115	U-Matic Video Cassette Tape		50
116	U-Matic Video Cassette Tape		100

	NAME	SPEC	QTY
117	U-Matic Video Cassette Tape	60Min.	100
118	Video Cassette Tape	BETA System VTR	50
119	Audio Cassette Tape	60Min.	100
120	Auto Transformer	Max.300VA 50/60Hz	15
121	Cassette for Slide		1
122	16mm Projector	for Auditorium	1
123	Slide Projector	for Auditorium	1
124	Projection Table	for Auditorium	2
125	Screen (Motor)	for Auditorium	1
126	Over Head Projector		7
127	Slide Projector		5
128	Screen (Tripod)		10
129	Screen (Tripod)		2
130	16mm Projector		1
131	Slide Projector		1
132	Tape Recorder		1
133	Screen (Spring)		2
134	Projection Table		3
135	Head Phone		6
136	Film Cabinet (16mm)		2
137	Film Cabinet (Slide)		3
138	Portable Amp. Set		5
139	Megaphones		3
140	Sound System Rack	Cabinet,Cassette Deck,Wireless Mic.	4
141	Desk	1,400 X 700 X 700	2
142	Chair	530 X 570 X 760	2

	NAME	SPEC	QTY
143	Table for Computer	1,600 X 500 X 650	1
144	Table for Computer	600 X 700 X 650	1
145	Chair	530 X 460	1
146	Cabinet	1,760 X 400 X 1,760	3
147	Lecturer Table	1,800 X 900 X 800	1
148	Lecturer Table	1,800 X 900 X 800	1
149	Table for Students	1,400 X 600 X 700	5
150	Chair for Students	430 X 495 X 765	10
151	Lecturer Table	560 X 495 X 765	1

(3)-a ADMINISTRATION OFFICE

	NAME	SPEC	QTY
1	Book Shelves	Glass Pane Door,Steel Door,Base 1,500 x 400 x 880	2
2	Filing Cabinet	456 x 620 x 1,335	8
3	Copier	Paper Size: Postcard - A3, Speed:21 Copies(A4)/min.	1
4	Personal Computer	16 Bit, W/Printer, Display, Computer Table and Chair	2
5	Electric Typewriter	544 x 500 x 174, Paper Size:432mm	2

(3)-b LIBRARY EQUIPMENT

	NAME	SPEC	QTY
1	Charging Desk W/Chair	1,800 x 603 x 850, W/Chair	4
2	Card-Catalog Cabinet	1,058 x 430 x 1,400	3
3	Reading Table	2,400 x 1,100 x 680	6
4	Reading Chair	560 x 460 x 750	36
5	Steel Book-Shelving	944 x 644 x 2,160	55
6	Atlas Stand	800 x 420 x 1,000	1
7	Map & Picture Cabinet	990 x 700 x 497, Steel	1
8	Low Shelving	1,800 x 500 x 1,115, Steel W/Wooden Panel	6
9	Periodical Cabinet	1,000 x 410 x 1,162	2
10	Stool		10
11	Book Truck	800 x 350 x 1,120	3
12	Step		3
13	Bulletin Board	1,200 x 900	1
14	Librarian Desk W/Chair	1,800 x 800 x 700	1
15	Ass. Librarian Desk W/Chair	1,200 x 800 x 700	1
16	Filing Cabinet	458 x 620 x 1,400, 4 Drawer	3
17	Locker	455 x 515 x 1,790	2
18	Work-Table for Book-Mending	1,200 x 750 x 700	2
19	Open Shelves	900 x 300 x 1,500	5
20	PPC Copier	Copy Paper Size Postcard-A3 Speed 21 Copies(A4)/min.	1
21	Typewriter	544 x 500 x 174, English	1
22	Personal Computor	16 Bit, ROM64KB, Display, Printer	1
23	Book Cards & Charging Cards	Catalogue Card, Index Card Card Pocket, Charging Card	1

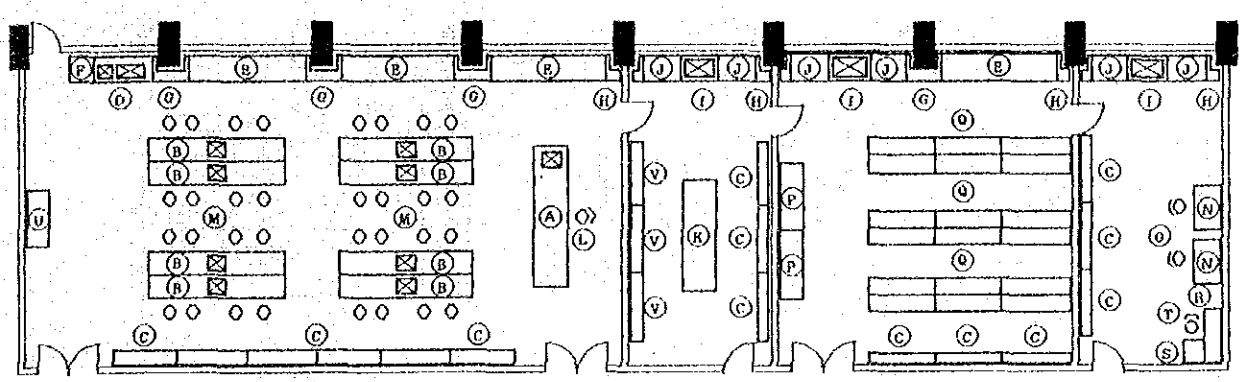
	NAME	SPEC	QTY
24	Microfiche Organize System	Microfiche Camera, Auto-Processor Inserter Reader, Ficher	1
25	Microfiche Reader-Printer	Screen: 300 x 300mm, Print Size A4/Letter	1
26	Microfiche Reader	Screen Size: 285 x 360Mm, Max.48X	1
27	Microfiche Cabinet	413 x 620 x 700	3

(4) VEHICLES

	NAME	SPEC	QTY
1	Micro Bus	26-Persons, 3400cc, Diesel, Airconditioning	2
2	Wind Van	6-Persons, 2300cc, Diesel, Airconditioning	1

(5) Laboratory Table Layout Drawings

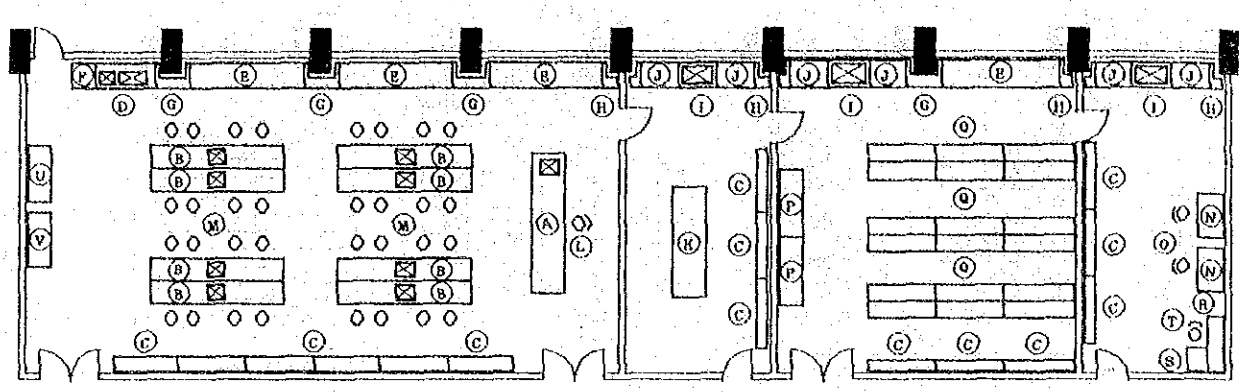
(1) - a BIOLOGY



LABORATRY PREP. ROOM SPECIMENS ROOM STAFF ROOM

A	:LECTURER TABLE W/SINK	3,600 x	900 x	800H x	1set
B	:STUDENTS TABLE W/SINK	3,600 x	600 x	800H x	8sets
C	:CABINET	1,760 x	400 x	1,760H x	15sets
D	:SINK UNIT 1	1,800 x	750 x	800H x	1set
E	:SIDE TABLE 1	3,000 x	750 x	800H x	4sets
F	:SIDE TABLE 2	600 x	750 x	800H x	1set
G	:SIDE TABLE 3	1,000 x	750 x	800H x	4sets
H	:SIDE TABLE 4	500 x	750 x	800H x	7sets
I	:SINK UNIT 2	1,200 x	750 x	800H x	3sets
J	:SIDE TABLE 5	900 x	750 x	800H x	6sets
K	:WORK BENCH 1	2.400 x	900 x	750H x	1set
L	:CHAIR FOR TEACHER	530 x	460	x	1set
M	:STOOL			x	32sets
N	:DESK	1,400 x	700 x	700H x	2sets
O	:CHAIR	530 x	570 x	760H x	2sets
P	:WORK BENCH 2	1,800 x	750 x	750H x	2sets
Q	:ASSEMBLING SHELF	1,800 x	450 x	2,402H x	18sets
R	:TABLE FOR COMPUTER 1	1,600 x	500 x	650H x	1set
S	:TABLE FOR COMPUTER 2	600 x	700 x	650H x	1set
T	:CHAIR			x	1set
U	:BALANCE TABLE	1,500 x	750 x	800H x	1set
V	:MICROSCOPE CABINET	1,800 x	500 x	1,800H x	3sets

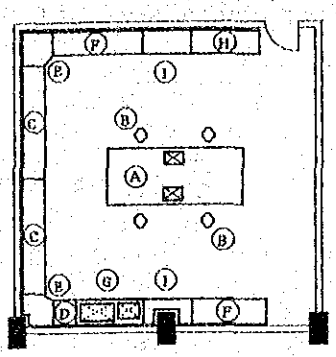
(1) - b CHEMISTRY



LABORATRY PREP. ROOM STOCK ROOM STAFF ROOM

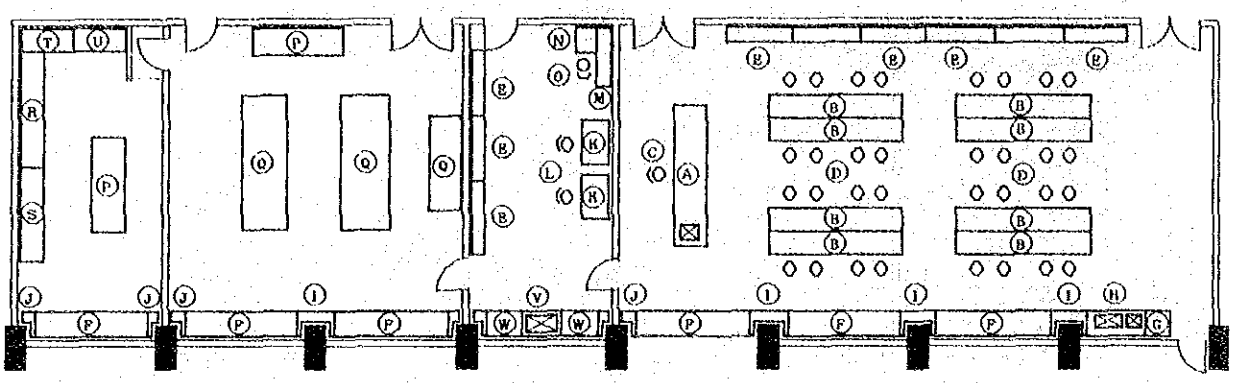
A	:LECTURER TABLE W/SINK	3,600 x	900 x	800H x	1set
B	:STUDENTS TABLE W/SINK	3,600 x	600 x	800H x	8sets
C	:CABINET	1,760 x	400 x	1,760H x	15sets
D	:SINK UNIT 1	1,800 x	750 x	800H x	1set
E	:SIDE TABLE 1	3,000 x	750 x	800H x	4sets
F	:SIDE TABLE 2	600 x	750 x	800H x	1set
G	:SIDE TABLE 3	1,000 x	750 x	800H x	4sets
H	:SIDE TABLE 4	500 x	750 x	800H x	7sets
I	:SINK UNIT 2	1,200 x	750 x	800H x	3sets
J	:SIDE TABLE 5	900 x	750 x	800H x	6sets
K	:WORK BENCH 1	2,400 x	900 x	750H x	1set
L	:CHAIR FOR TEACHER	530 x	460	x	1set
M	:STOOL			x	32sets
N	:DESK	1,400 x	700 x	700H x	2sets
O	:CHAIR	530 x	570 x	760H x	2sets
P	:WORK BENCH 2	1,800 x	750 x	750H x	2sets
Q	:ASSEMBLING SHELF	1,800 x	450 x	2,402H x	18sets
R	:TABLE FOR COMPUTER 1	1,600 x	500 x	650H x	1set
S	:TABLE FOR COMPUTER 2	600 x	700 x	650H x	1set
T	:CHAIR			x	1set
U	:BALANCE TABLE	1,500 x	750 x	800H x	1set
V	:FUME HOOD	1,500 x	750 x	2,350H x	1set

(1) - b CHEMISTRY (RESERCH ROOM)



A	:CENTER TABLE W/SINK	3,600	x 1,500	x 800H	x	1set
B	:STOOL				x	4sets
C	:SIDE TABLE 6	3,000	x 750	x 800H	x	2sets
D	:SIDE TABLE 7	600	x 750	x 800H	x	1set
E	:CORNER UNIT	950	x 950	x 800H	x	2sets
F	:SIDE TABLE 8	2,400	x 750	x 800H	x	2sets
G	:SINK UNIT 3	1,800	x 750	x 800H	x	1set
H	:SIDE TABLE 9	1,800	x 750	x 800H	x	1set
I	:SIDE TABLE 10	1,000	x 750	x 800H	x	2sets

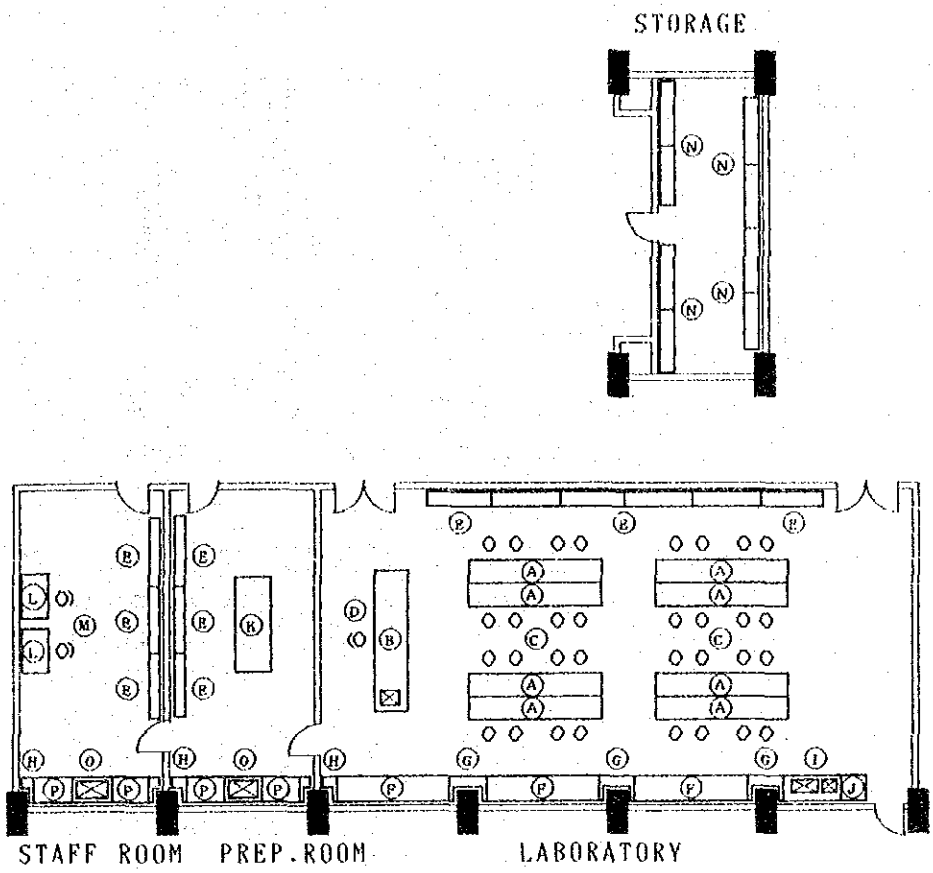
(1) - c PHYSICS



DARK ROOM EQUIPMENT ROOM STAFF ROOM LABORATORY

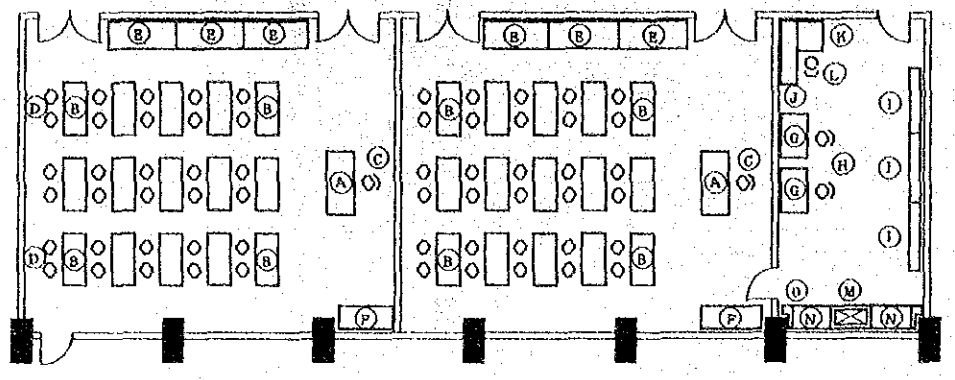
A	:LECTURER TABLE W/SINK	3,600	x	900	x	800H	x 1set
B	:STUDENTS TABLE W/SINK	3,600	x	600	x	800H	x 8sets
C	:CHAIR FOR TEACHER	530	x	460			x 1set
D	:STOOL						x 32sets
E	:CABINET	1,760	x	400	x	1,850H	x 11sets
F	:SIDE TABLE 1	3,000	x	750	x	800H	x 6sets
G	:SIDE TABLE 2	600	x	750	x	800H	x 1set
H	:SINK UNIT 1	1,800	x	750	x	800H	x 1set
I	:SIDE TABLE 3	1,000	x	750	x	800H	x 4sets
J	:SIDE TABLE 4	500	x	750	x	800H	x 7sets
K	:DESK	1,400	x	700	x	700H	x 2sets
L	:CHAIR						x 2sets
M	:TABLE FOR COMPUTER 1	1,600	x	500	x	650H	x 1set
N	:TABLE FOR COMPUTER 2	600	x	700	x	650H	x 1set
O	:CHAIR						x 1set
P	:WORK BENCH	2,400	x	900	x	750H	x 3sets
Q	:CENTER TABLE	3,000	x	1,200	x	800H	x 2sets
R	:SIDE TABLE 5	3,000	x	750	x	800H	x 1set
S	:SIDE TABLE 6	2,400	x	750	x	800H	x 1set
T	:CORNER UNIT	1,500	x	750	x	800H	x 1set
U	:SIDE TABLE 7	1,500	x	750	x	800H	x 1set
V	:SINK UNIT 2	1,200	x	750	x	800H	x 1set
W	:SIDE TABLE 8	900	x	750	x	800H	x 2sets

(1) - d EARTH SCIENCE



A :CENTER TABLE	3,600 x	600 x	800H x	8sets
B :LECURER TABLE W/SINK	3,600 x	900 x	800H x	1set
C :STOOL	315 x	475 x	615H x	32sets
D :CHAIR FOR TEACHER	530 x	460	x	1set
E :CABINET	1,760 x	400 x	1,760H x	12sets
F :SIDE TABLE 1	3,000 x	750 x	800H x	3sets
G :SIDE TABLE 2	1,000 x	750 x	800H x	3sets
H :SIDE TABLE 3	500 x	750 x	800H x	5sets
I :SINK UNIT 1	1,200 x	750 x	800H x	1set
J :SIDE TABLE 4	600 x	750 x	800H x	1set
K :WORK BENCH	2,400 x	900 x	750H x	1set
L :DESK	1,400 x	700 x	700H x	2sets
M :CHAIR	530 x	570 x	760H x	2sets
N :ASSEMBLING SHELF	1,800 x	450 x	2,402H x	7sets
O :SINK UNIT 2	1,200 x	750 x	800H x	2sets
P :SIDE TABLE 5	900 x	750 x	800H x	4sets

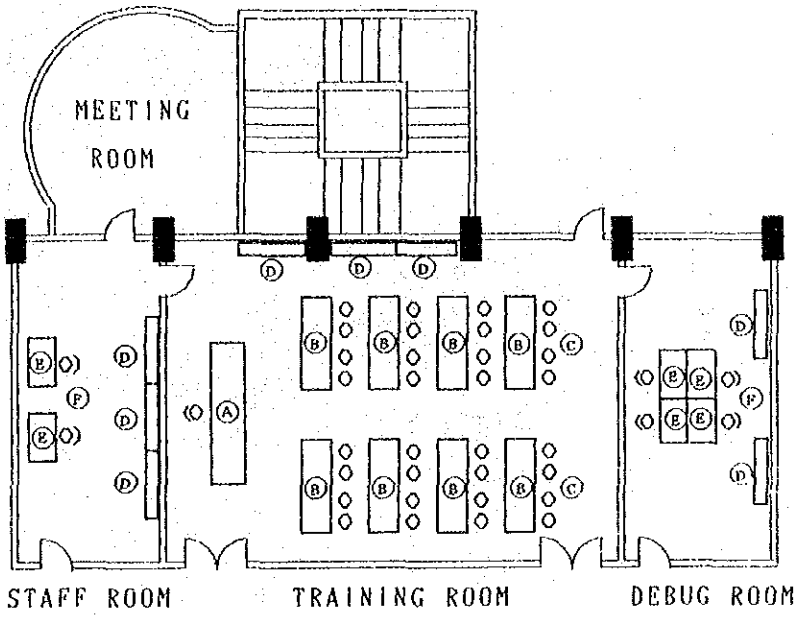
(1)－e MATHEMATICS



HIGH SCHOOOL MATH.　ELEMETARY SCH. MATH.　STAFF ROOM

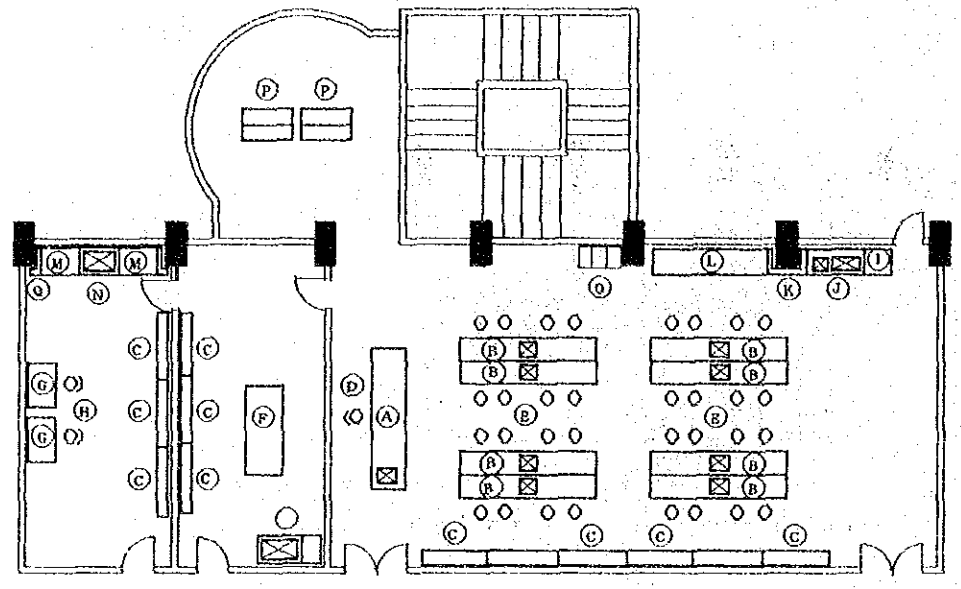
A :LECTURER TABLE	1,600 x 700 x	700H x	2sets
B :STUENTS TABLE	1,400 x 600 x	700H x	30sets
C :CHAIR FOR TEACHER	560 x 495 x	765H x	2sets
D :CHAIR FOR STUDENT	430 x 495 x	765H x	60sets
E :SIDE TABLE 1	1,800 x 750 x	800H x	6sets
F :SIDE TABLE 2	1,500 x 750 x	800H x	2sets
G :DESK	1,400 x 700 x	700H x	2sets
H :CHAIR	530 x 570 x	760H x	2sets
I :CABNET	1,760 x 400 x	1,850H x	3sets
J :TABLE FOR COMPUTER 1	1,600 x 500 x	650H x	1set
K :TABLE FOR COMPUTER 2	600 x 700 x	650H x	1set
L :CHAIR		x	1set
M :SINK UNIT	1,200 x 750 x	800H x	1set
N :SIDE TABLE 3	900 x 750 x	800H x	2sets
O :SIDE TABLE 4	500 x 750 x	800H x	2sets

(1) - f INFORMATION SCIENCE



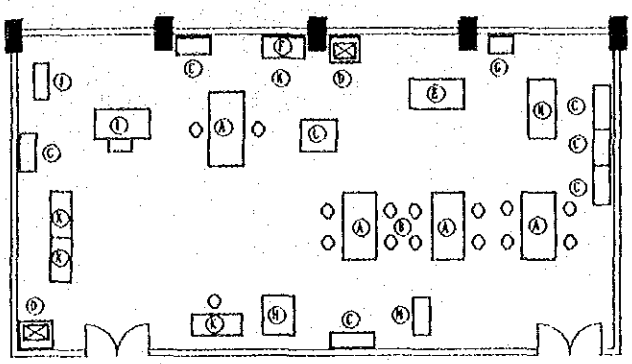
A :INSTRUCTOR DESK	3,000 x	800 x	650H x	1set
B :STUDENT DESK	2,400 x	700 x	700H x	8sets
C :STUDENTS CHAIR				x 32sets
D :CABINET	1,850 x	1,500 x	500H x	8sets
E :DESK	1,200 x	800 x	700H x	6sets
F :CHAIR	460 x	550 x	499H x	6sets

(1) - g ELEMENTARY SCIENCE



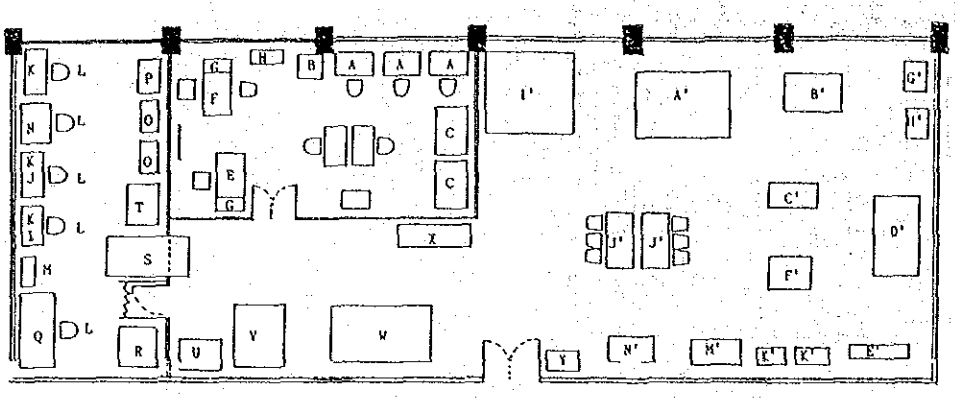
A	:LECTURER TABLE W/SINK	3,600	x 900	x 800H	x	1set
B	:STUDENTS TABLE W/SINK	3,600	x 600	x 800H	x	8sets
C	:CABINET	1,760	x 400	x 1,850H	x	12sets
D	:CHAIR FOR TEACHER	530	x 460		x	1set
E	:STOOL				x	32sets
F	:WORK BENCH	2,400	x 900	x 800H	x	1set
G	:DESK	1,400	x 700	x 700H	x	2sets
H	:CHAIR	530	x 570	x 760H	x	2sets
I	:SIDE TABLE 1	600	x 750	x 800H	x	1set
J	:SINK UNIT 1	1,800	x 750	x 800H	x	1set
K	:SIDE TABLE 2	1,000	x 750	x 800H	x	1set
L	:SIDE TABLE 3	3,000	x 750	x 800H	x	1set
M	:SIDE TABLE 4	900	x 750	x 800H	x	1set
N	:SINK UNIT 2	1,200	x 750	x 800H	x	1set
O	:DISLAY CABINET	1,500	x 600	x 900H	x	4sets
P	:FILLING CABINET	455	x 620	x 1,400H	x	3sets
Q	:SIDE TABLE 5	500	x 750	x 800H	x	2sets

WORKSHOP



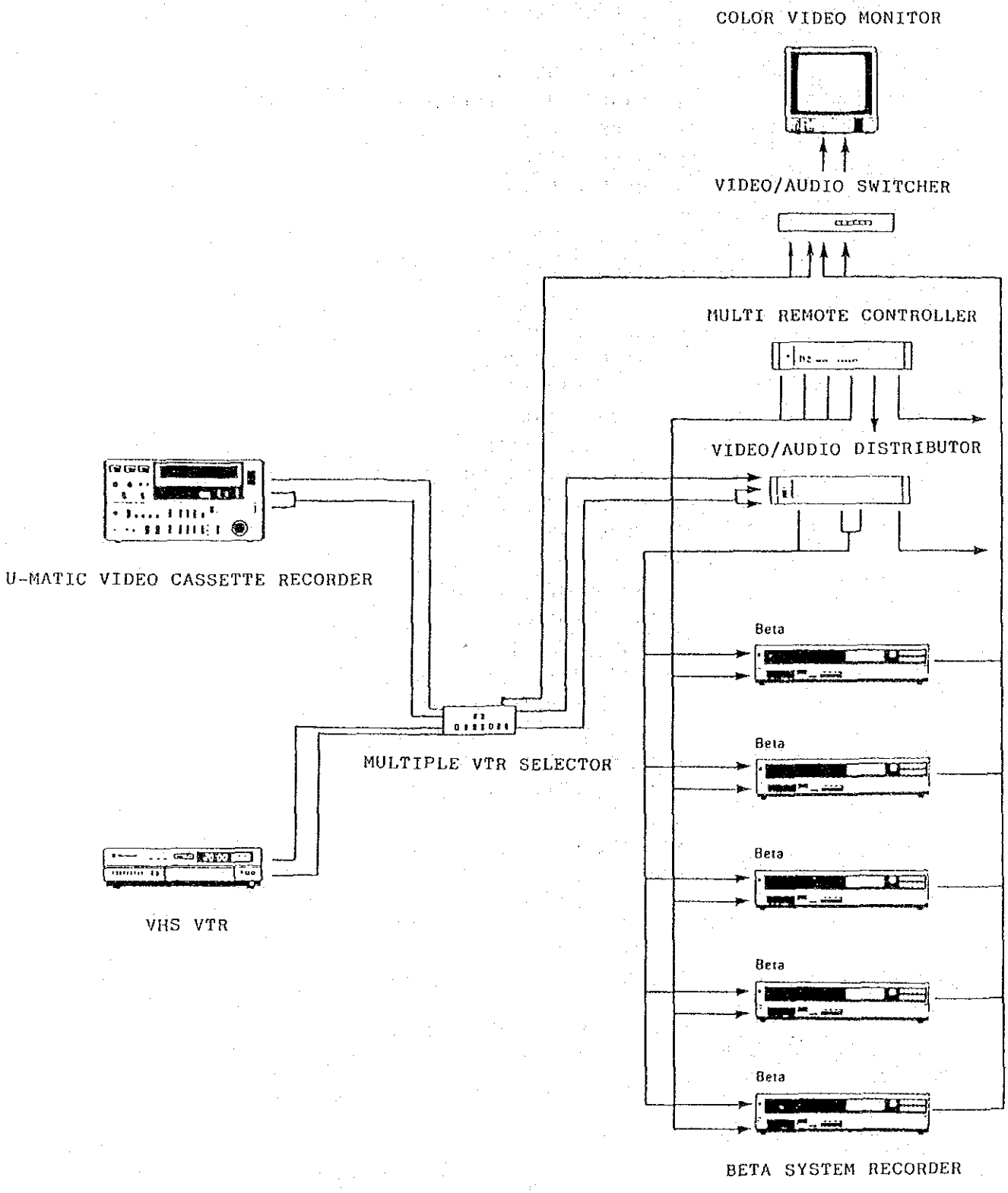
A	:WORKING TABLE	1,800 x	900 x	800H x	4sets
B	:CHAIR			x	15sets
C	:TOOL CABINET			x	6sets
D	:SINK			x	2sets
E	:PRECISION LATHE MACHINE			x	1set
F	:TAPPING & DRILLING MACHINE			x	1set
G	:PEDESTAL GRINDER			x	1set
H	:DIA CUT MACHINE			x	1set
I	:UNIVERSAL WOOD WORKING MACHINE			x	1set
J	:PORTABLE AIRCOMPRESSOR			x	1set
K	:WORKING BENCH W/CABINET			x	2sets
L	:VERTICAL & HOLIZONTAL COMPOUND MILLING MACHINE			x	1set
M	:HACK SAWING MACHINE			x	1set
N	:SHAPING MACHINE			x	1set

PRINTING ROOM

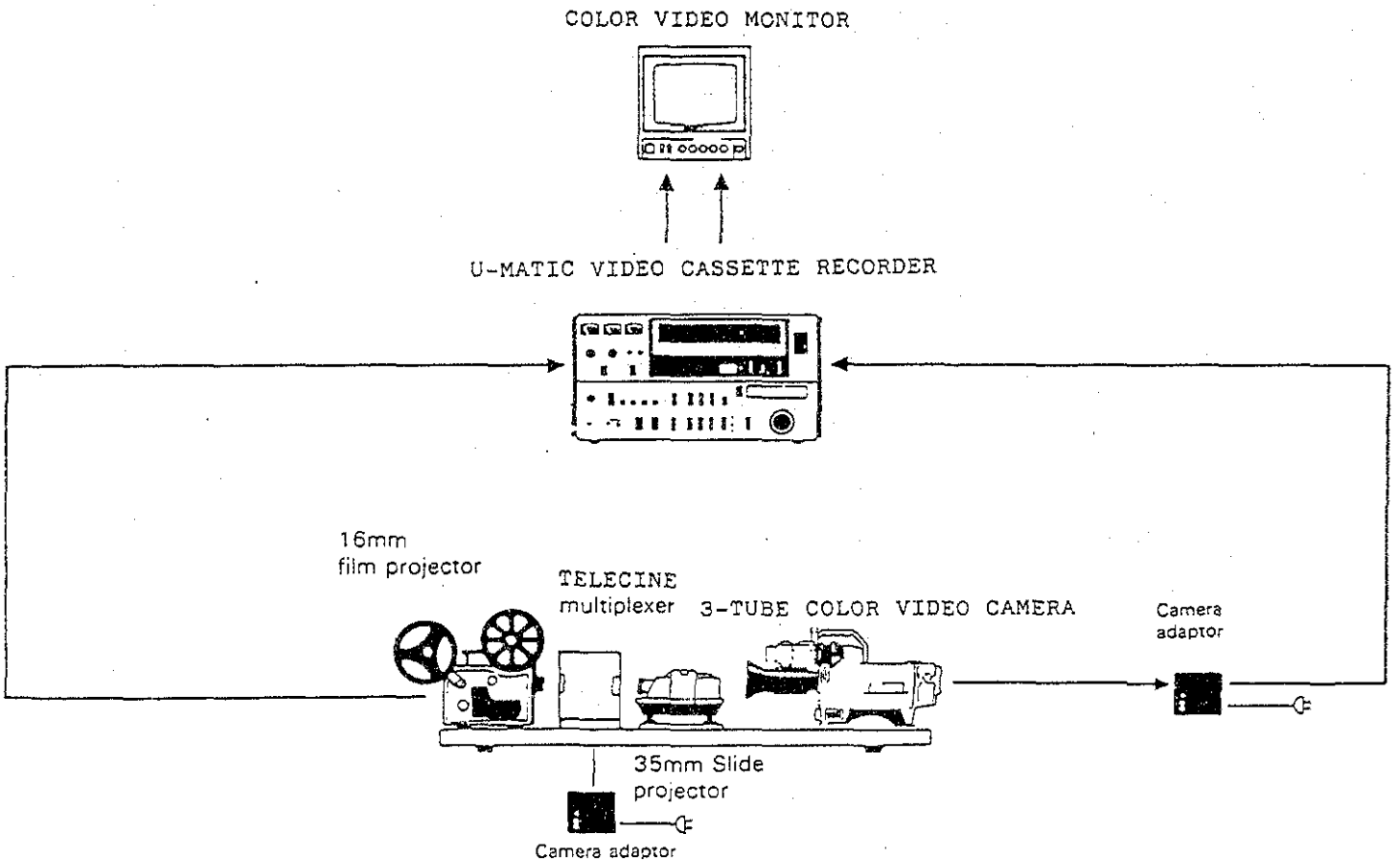


A :PHOTOTYPESETTING MACHINE
B :PHOTOTYPE PRINTER
C :DRAFTER
D :LAYOUT TABLE W/CHAIR
E :TYPEWRITER W/DESK
F :BUSINESS DESK
G :FILING CABINET
H :LOCKER
I :PHOTO ENLARGER
J :PROCESSOR W/ACCESORIES
K :WORK TABLE
L :WORK CHAIR
M :REFRIGERATOR
N :SINK
O :LOCKER
P :SHELVING
Q :PROCESS CAMERA
R :AUTO FILM PRINTER
S :AUTO FILM PROCESSOR
T :FILM CABINET
U :LAYOUT TABLE
V :VACUME PRINTER
W :AUTO PLATE PROCESSOR
X :DIRECT PLATE MAKER
Y :OPEN SHELVES
A':OFFSET PRESS
B':SMALL OFFSET PRESS
C':AUTO COLLATOR
D':PAPER FOLDING MACHINE
E':ADHESIVE BINDING MACHINE
F':WIRE BINDING MACHINE
G':PLASTIC BINDING MACHINE
H':LAMINATE MACHINE
I':GUILLOTINE CUTTER
J':WORK TABLE
K':OPEN SHELVES
M':ENGINEERING COPIER
N':PPC COPIER

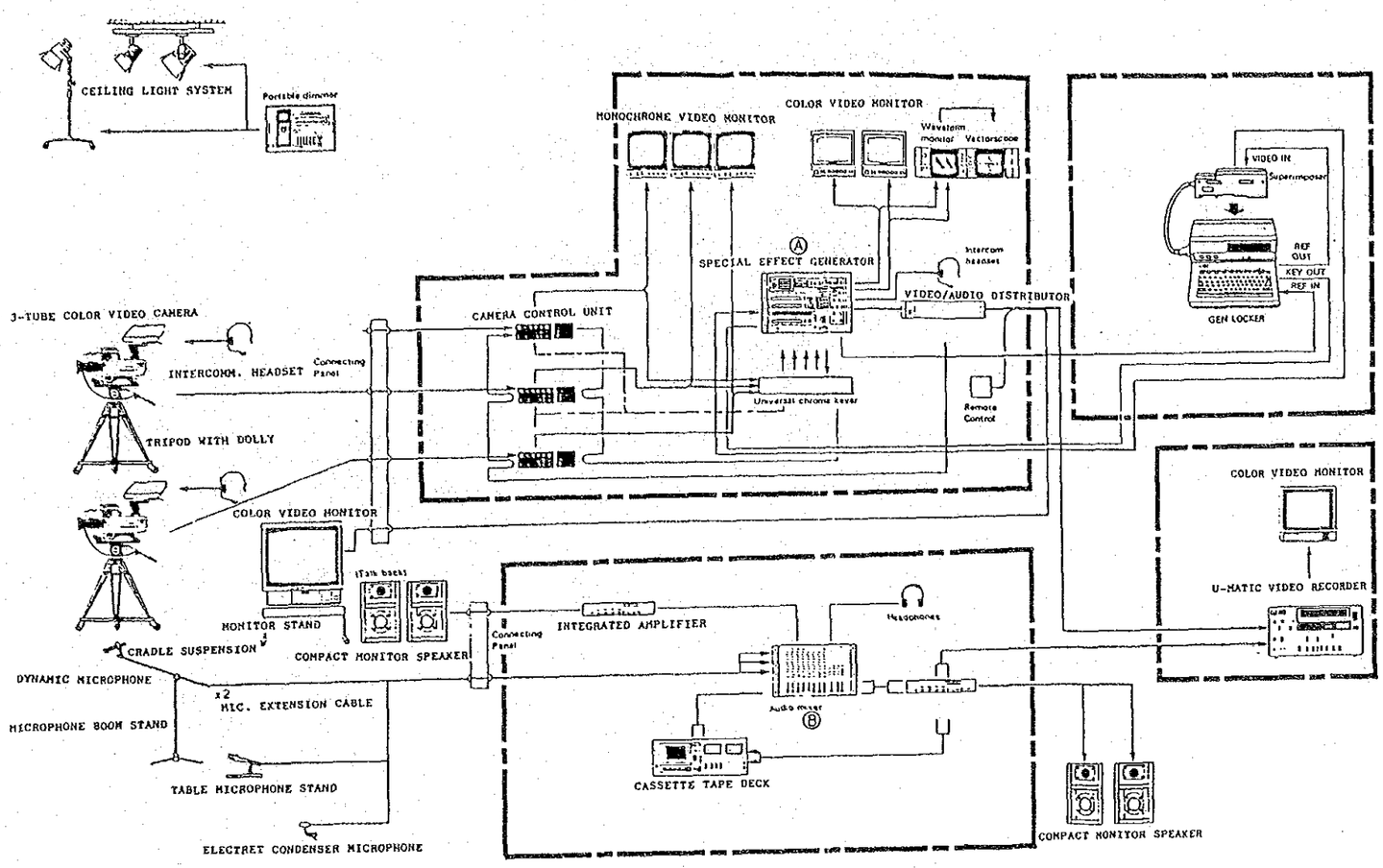
Duplicating System



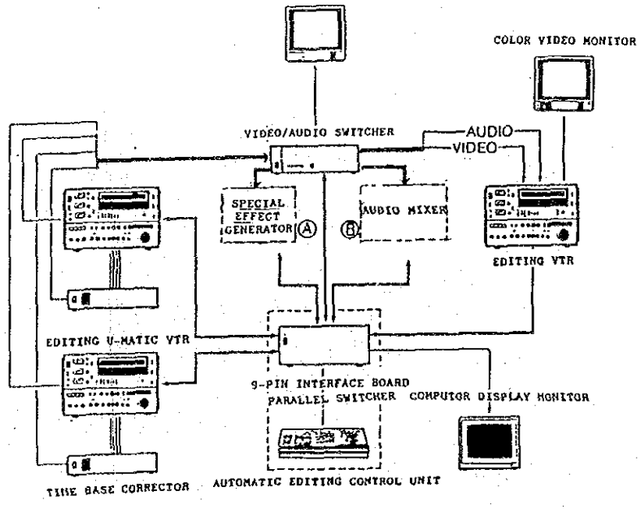
Film-Chain System



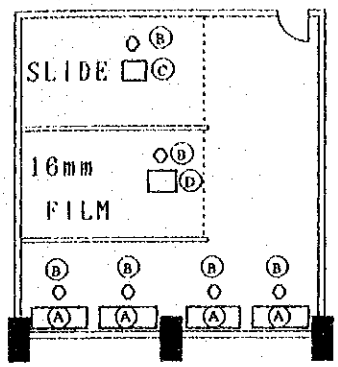
Studio System



Editing System

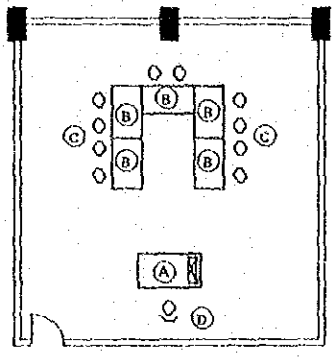


A／V　LIBRARY



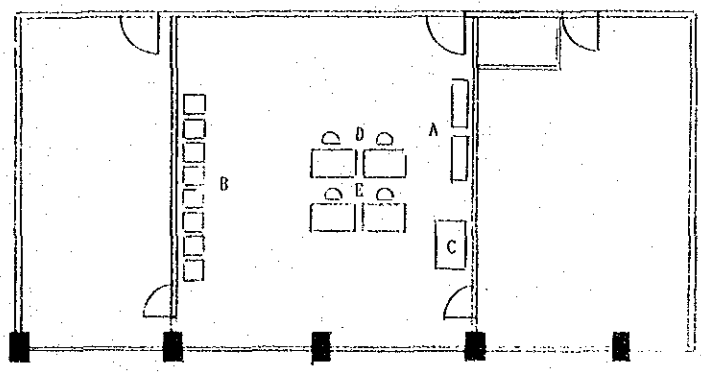
A	:A/V TABLE	1,500 x	600 x	800H x	4sets
B	:CHAIR			x	6sets
C	:SLIDE PROJECTOR TABLE	900 x	500 x	800H x	1set
D	:16MM FILM PROJECTOR TABLE	900 x	500 x	800H x	1set

MICRO TEACHING



A :LECTURER TABLE W/SINK	1,800	x	900	x 800H	x 1set
B :STUDENT TABLE	1,400	x	600	x 800H	x 5sets
C :CHAIR					x 10sets
D :LECTURER CHAIR					x 1set

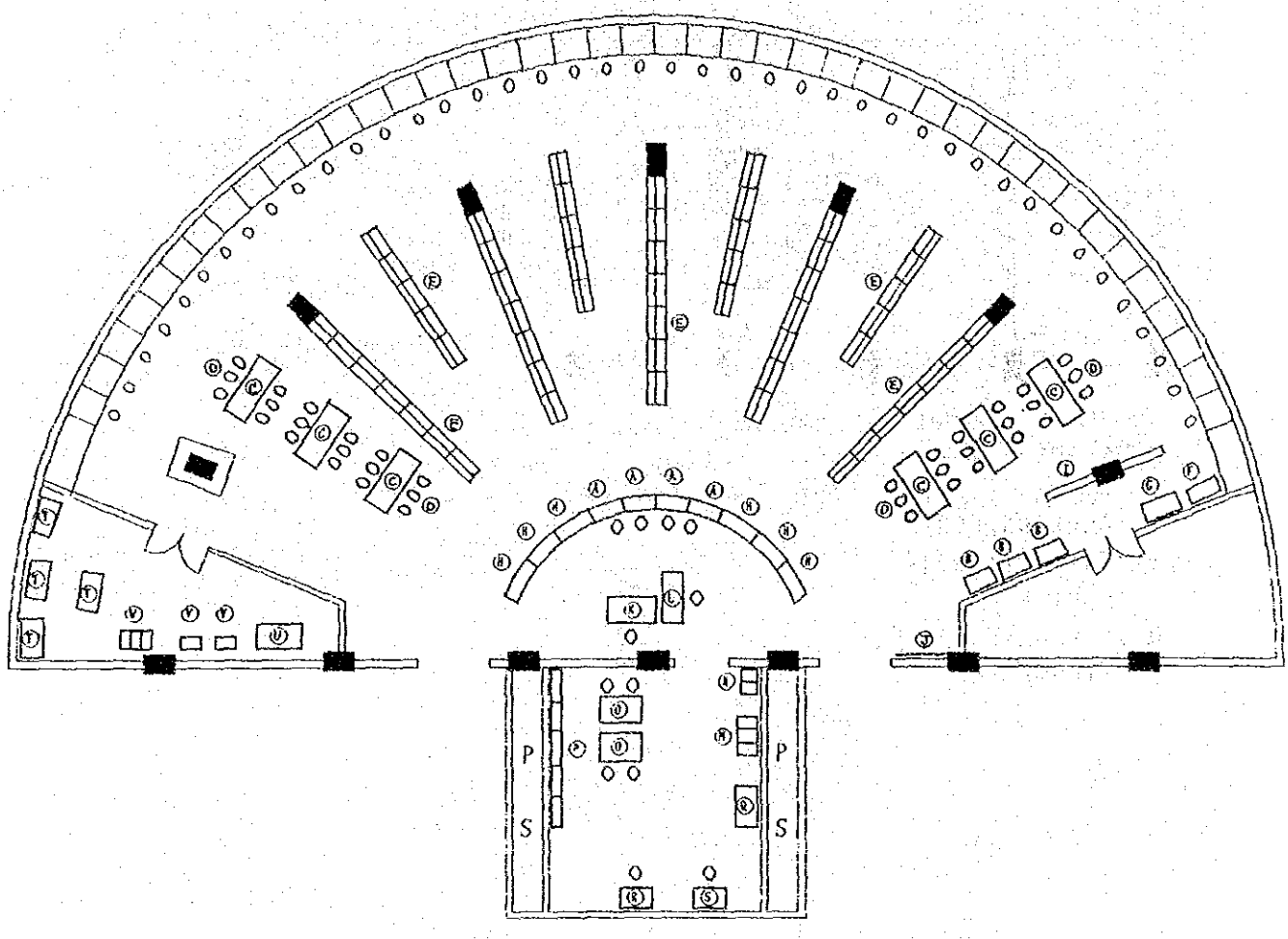
ADMINISTRATIVE OFFICE



ASSIT. DIRECTOR　　ADMINISTRATIVE OFFICE　　DIRECTOR

A :BOOK SHELVES
B :FILE CABINET
C :COPIER
D :PERSONAL COMPUTER
E :TYPEWRITER

LIBRARY



A :CHARGING DESK W/CHAIR
B :CARD CATALOGUE CABINET
C :READING TABLE
D :READING CHAIR
E :STEEL BOOK SHELVING
F :ATLAS STAND
G :MAP & PICTURE CABINET
H :LOW SHELVING
I :PERIODICAL CABINET
J :BULLETIN BOARD
K :LIBRARIAN DESK W/CHAIR
L :ASSISTANT LIBRARIAN DESK W/CHAIR
M :FILING CABINET
N :LOCKER
O :WORK TABLE FOR BOOK MENDING
P :OPEN SHELVING
Q :PPC COPIER
R :TYPEWRITER W/ACCESSORIES
S :PERSONAL COMPUTER W/ACCESSORIES
T :MICROFICHE ORGANIZE SYSTEM
U :MICROFICHE READER-PRINTER
V :MICROFICHE READER
W :MICROFICHE CABINET