# O S U
# PRE SCHOOL
# PROGRAM

SPRING SEMESTER 1978

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May I devote everything I have done to my one year old son who is waiting for me in Thailand, my home country. He makes me think back to my childhood so I still have time to be grateful to my parents who gave me my pre-school education in their own school which belongs to our family. And because of them sending me here, I have a chance to start my pre-school again but in English with my advisor, my'Professor Salmon' and my'Mrs. Salmon', other instructors and also some of my American friends. I am going back home but I still see and hear all of them in my mind forever, so I would like them to see and hear me too everytime they open this book. I will still be close to you, Mrs. Jones who helped me a lot in correcting my English grammar and finding books for my research. I would like to thank both Mrs. Jones and Donald Browder, my friend, whom I will remember as my English teachers in my pre-school time here. The most helpful person to my program who gave me a lot of time and the most useful imformation is Miss Leone List, my client. I wish to honor her and would like to bring her writing which shows the opportunity each child could get from being in the O S U pre-school program, making me realize what I and every parent in the world would want his child to have from a pre-school program:

1. To grow in feeling that he is a worthwhile individual capable of achieving success, initiating ideas, and acting with increasing independence.
2. To build his strength, muscular coordination, physical skills.
3. To develop sound habits of eating, resting, elimination, and play.
4. To establish a foundation for good health and safety habits.
5. To learn to respond comfortably and happily to people... his peers and adults other than his own parents.
6. To grow in his ability to express his emotions constructively.
7. To appreciate his rich heritage of music, art, literature.
8. To develop his imagination and express his ideas, feelings, and needs creatively through music, movement, dramatic play, art, and language.
9. To grow in understanding of his natural and social environment, of spatial and number relationships.
10. To build sound concepts; develop good in tellectual habits such as the ability to solve problems; persist in the face of difficulty, concentrate, become absorbed, think creatively.

Even though I come to study my Master Degree in Architecture, I have the same opportunity as a child going to pre-school program. My Professor Salmon gave me a broad mind to go on studying in the world; form the books, from people, from myself and certainly from him. I must, without a doubt, pay high respect to somebody who gives me the same things I have from my parents. I could not have finished all this work without his advice. May I apologise if there might be something incomplete or wrong in this book and I will be happy if it can be useful to some one.

CONTENTS

Oklahoma State University now has a fine pre-school program which the facilities need to be improved. There are three separate locations for small groups and the classrooms are in bad condition. A new building is needed that can combine all scattered facilities into one good location. The size of the pre-school should be big enough to serve Stillwater needs. Since O.S.U. employs the most people in town, I believe the O.S.U. campus would be a good site for this project. Although I cannot suggest the best site yet.

Why should it be on the campus? Dr. Mary C. Rainey, (Dir. Family. Sdy. Cen.), and I discussed this and found these reasons : the University can assist this project with a demonstration school for the goal of resident instruction of college studies ( through a PH.D program ) ; volunteer students are another factor which can help with the running of the program. Another goal of the University would be the use of Extension for Parent education, which would help both students and staff. Still another goal would be a research program which would involve observation and controlled experiments, which is, after all, one of the reasons for family study centers and often for pre-schools everywhere in the States as well as in my country, Thailand. Some details we talked about are : the characteristics of the families the children come from,

- how many hours they need to be in attendance, perhaps they could be dropped off and picked up by their parents who come to work on the campus,
- the kind of transportation that would be needed,
- the income of different families would have to be considered; how much they can afford for tuition,
- how this program can be useful for training volunteer teachers who can later help the low income groups by going back to their hometowns and starting pre-school programs.

I have obtained ideas from a book SCHOOLS FOR EARLY CHILDHOOD by the Educational Facilities Laboratories (E.F.L) program. They developed some surplus buildings into housing for pre-school programs. The authors gave new ideas and concepts of what the needs of this kind of program are.
For example: a grocery store was remodeled into a pre-school with the idea that people who walked by could see activies

inside the glass windows and begin to notice what was being done inside.

Concerning the existing program on Oklahoma State University campus, I have access to a lot of records and data on the size of the school from Miss Leone List, my client ( extension 5059 , Home Economic West room 226 ). My mother has a girls' school in Thailand and our family has worked with this school for more than fifty years. She will be able to give me some ideas about the needs in my own country. I can use my own past experience, because I went to the demonstration school of Chulalongkorn University for eight years, I can remember the activities they created in this school to allow the children to show their capabilities, their needs and their feelings toward something they enjoy or that which bores them. It is Dr.Rainey's idea that childrens' activities will create the spaces they need and will shape the form of the buildings. The climate is another influrence on the form of the buildings. In the summertime the weather here is close to Thailands' and fall is comparable to winter in Thailand. I hope to take back the knowledge I gain here to use in my own country.

Questions I am interested in asking my client:

- the present purpose of O.S.U. demontration child development laboratories.
- site, possibly close to the administrative office.
- populations of children, teachers, volunteer training students, observers.
- technical instruments used in teaching.
- emphasis to be placed on the library, play ground and other areas
- which people would assist in this program at O.S.U.
- area from which the children come.
- interest of international students.
- facilities in town which relate to the pre-school program, such as hospital, health center, food procurment, laundry facility, etc.

The Purpose.

The main goal of the Oklahoma State University campus' pre-school program is for the students in the Department of Family Relations and Child Development to be familiar with the child activities they are studying in both the laboratory and research programs. There are a lot of children on the waiting list because the existing program now does not have enough space for all Stillwater applicants. Children between three and five can apply to this program, some disabled children can be accepted into the program along with normal children. At present there are some disabled children in attendance, who are able to both learn and enjoy the program, but the department does not provide any special facilities for them. The primary purpose of the facilities is to serve the needs of university students in studying pre-school children, rather than the pre-school child, himself. This is a different concept than could normally be found in a private pre-school facility. In this case of the O S U program, it is not intended to serve the total community but rather to provide enough children and a broad enough program of activities to serve as a training and observation center for the students in Family Relations and Child Development Department, the faculties and also for the students in other disciplines.

The program tries to help the children learn in many ways; family activities, self-control, understanding and expression, or creating their individual balance education which seems to be one of the main activities children need and which I intend to put into my thesis as the most basic needs for children's bodies, minds and health. The program now tries to include comprehensive education program, both indoor and outdoor, but for children only three to five years of age, it sometimes difficult to learn the rules of sports and games.

A swimming pool is another necessity if the program is to provide for all children. Some of them learn how to swim or play outside during the summer. In regard to technical instruments used in the program, I learned that there are a great number of them used both by groups, teacher or other individuals. There are A.V. resources, tape recorder, filmstrips, listening stations with earphones for individual needs (which will not disturb others). There are also musical instruments for the children to learn to play, which have colored key boards for easy recognition.

Sometimes musicians, invited by the department, put on performances for the children to enjoy.

In the program, there are now about eighty children, divided into one full day, four half day groups of sixteen children. There are six head teachers and six assistants required. The department plans to have one more half day group for younger than three years old children which will require four more teachers. Observers come from Home-Economic majors, as the program can provide the space.
If the program is expanded one of the most important needs is observation areas for the students who major in Special -Education, Psychology, Speech, etc. The one way mirror with a sound system is now in use, Perhaps closed circuit T.V. can also be provided.

Besides other areas for teaching and exercising, the kitchen and laundry are important areas which would need to be designed. There are full-time cook-housekeepers in the program. Specialists in the department will be the teachers and the nutrition advisers. This is the main reason they want the pre-school close to the Home-Economic building: so the staff can have easy access and do not need offices in the pre-school building.

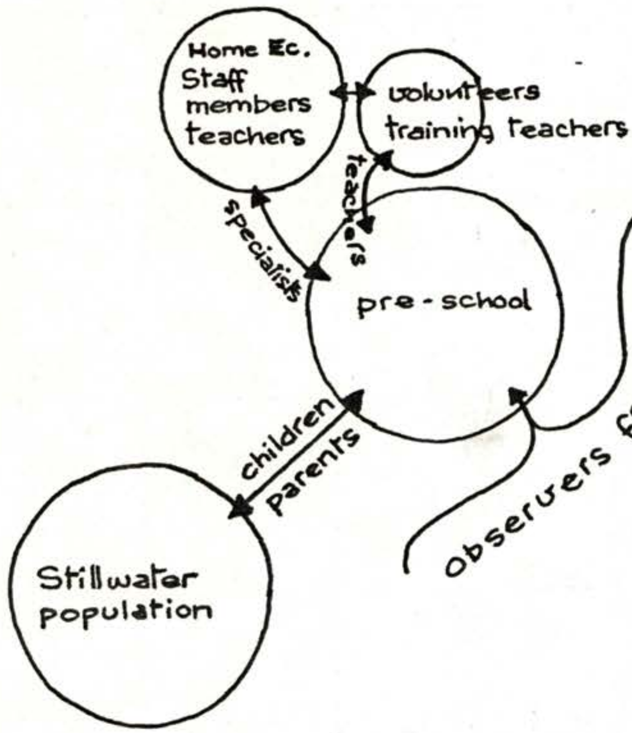
It would be good if the site could be in the center of the campus so that the observers could come from any part of the campus, and not spend too much time in travelling. They could use their time between class schedules to go there. Now my client still has not made the actual site decision although tentatively the old greenhouse and old playground with the old buildings of the pre-school adjacent to the Home-Economic building has been mentioned. They speak of combining the pre-school ( on the ground floor ) with some more Home-Econonmic offices ( above it ).

THE LIST OF THE BUILDING-USERS :

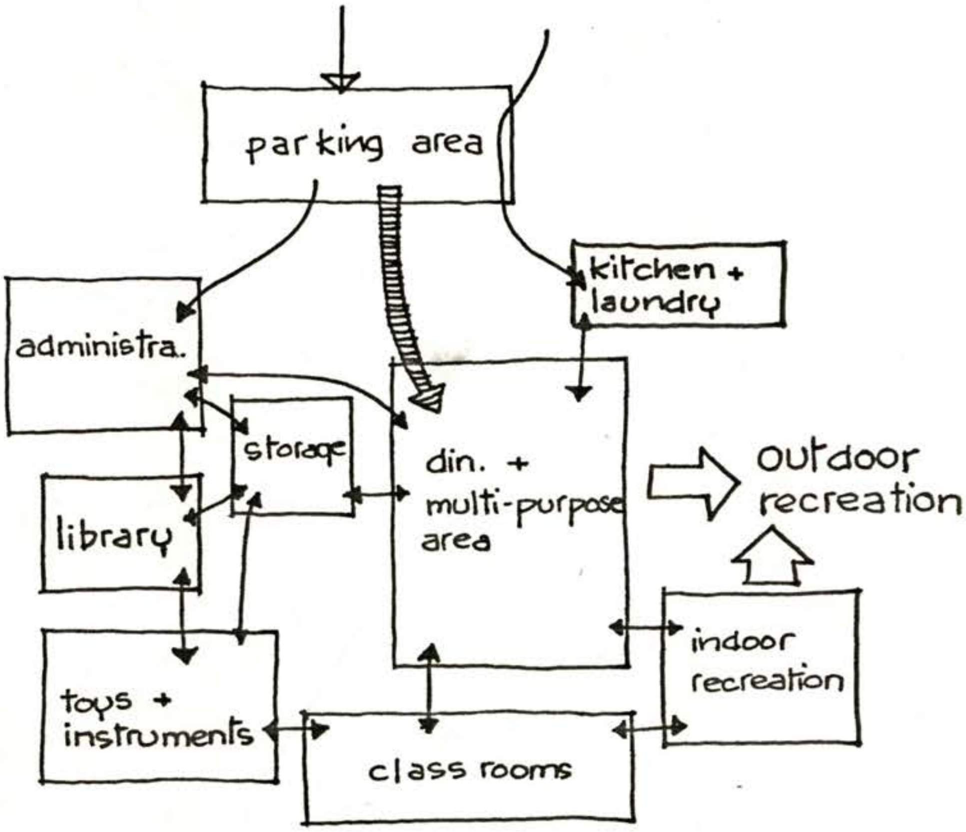
1. pupils 80 children age three to five years
2. teachers 6 head teachers and 6 assistants
3. observers
4. staff members of the department; food specialists
   education specialists
5. cook, laundress, housekeeper
6. student teachers, research people

THE LIST OF AREAS :

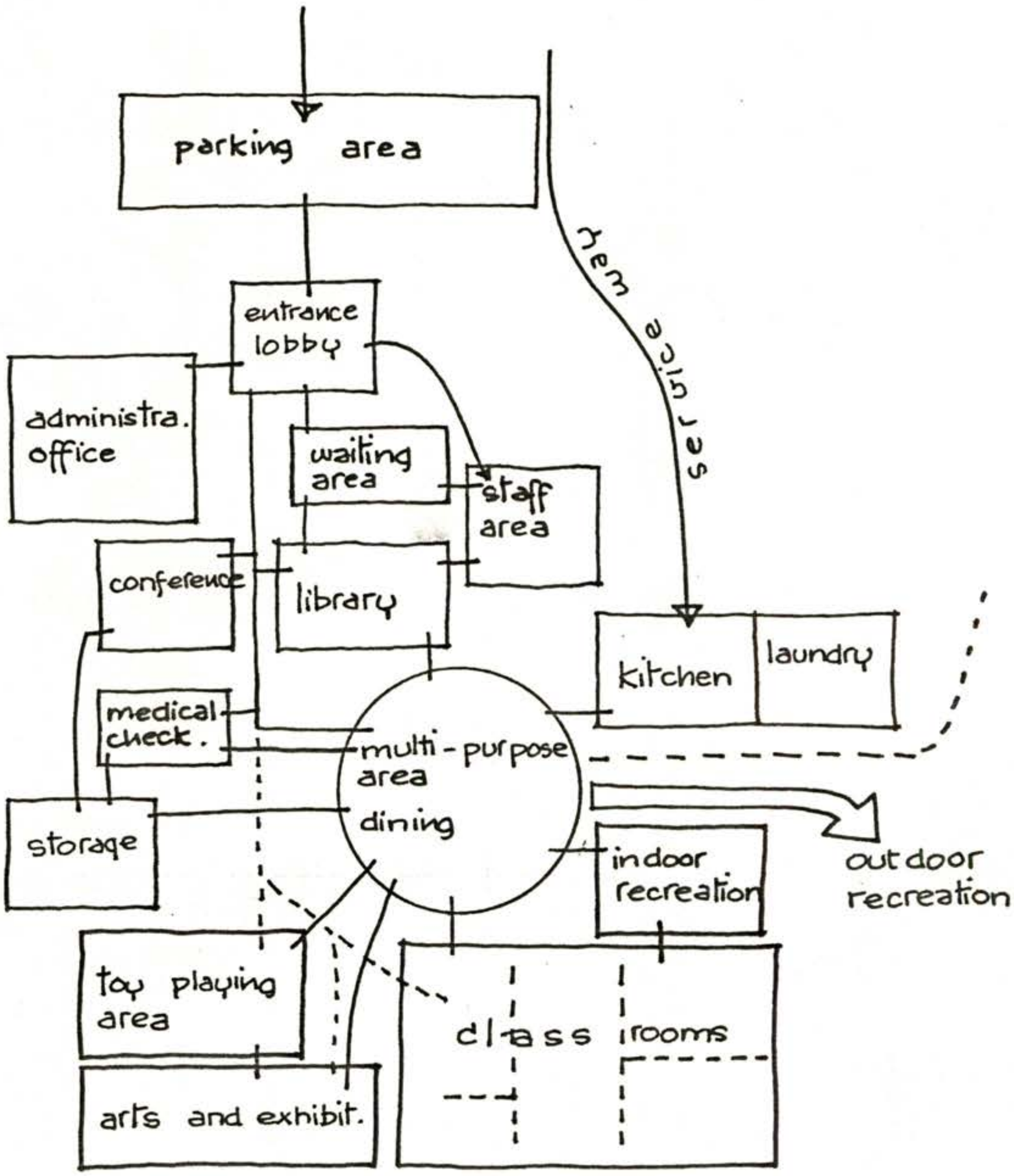
1. classrooms
2. indoor recreation
3. outdoor recreation + playground
4. pool
5. dining area
6. kitchen + laundry
7. staff area
8. storage
9. lavatories
10. library
11. arts + playing area
12. toy room
13. lobby + exhibition area
14. entrance + waiting area
15. observation areas
16. conference room (with projection capabilities)
17. medical checking area
18. rest area (napping)
19. administration + general office
20. parking area




The Site Decision in the center of O.S.U. campus.




Grouping of Activities




Functional diagram of spaces.

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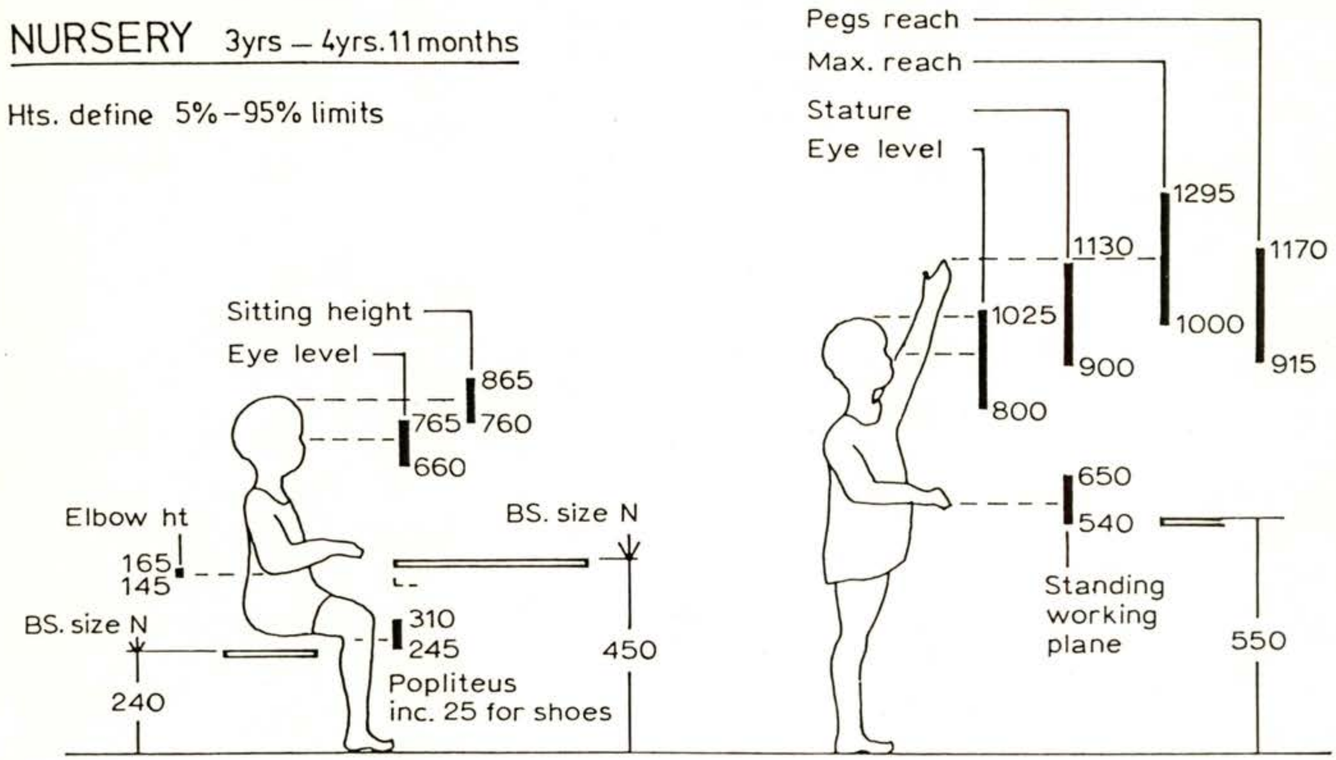



*Fig. 1.9 Relevant body dimensions. Nursery. 3 yrs–4 yrs 11 months*

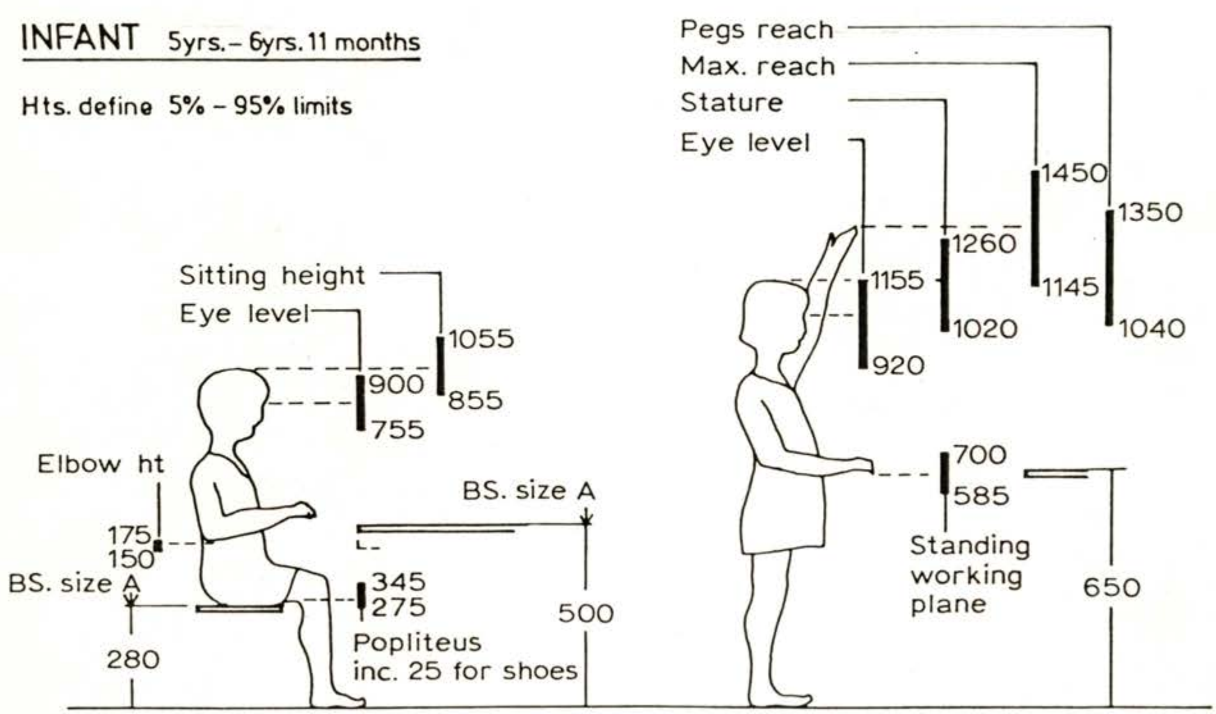



*Fig. 1.10 Relevant body dimensions. Infant. 5 yrs–6 yrs 11 months*

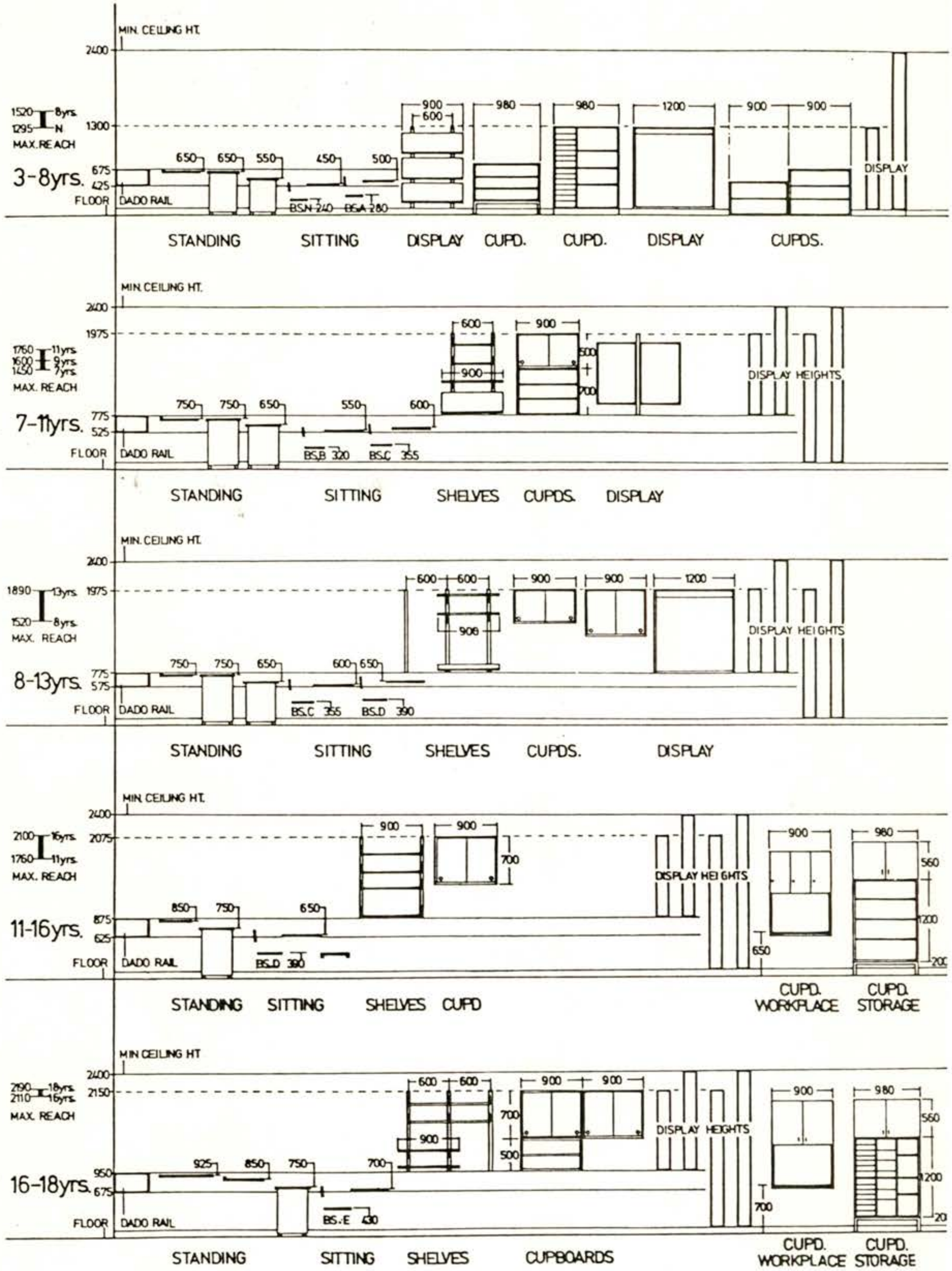



*Fig. 1.19 Recommended positioning of wall mounted furniture and equipment*

# SCHOOLS—PRIMARY

MARY MEDD, O.B.E., R.I.B.A.

## INTRODUCTION

Compulsory state education begins at 5 years, but permissive legislation allows Local Education Authorities to build also for children of 3–5 years, either in separate buildings or in nursery groups attached to primary schools.

Until recently primary schools were divided into the following types:

| | *Children aged* |
|---|---|
| (a) Infants' schools | 5–7 years |
| (b) Junior schools | 7–11 years |
| (c) J.M.I. schools (Junior mixed and infants) | 5–11 years |

Since the Plowden Report (1967) other types of school have been added, which include:

| | *Children aged* |
|---|---|
| (d) First schools | 5–8 years |
| (e) First schools | 5–9 years |

From these 'first schools' children can proceed to Middle schools, for the age ranges of 8–12, 9–13, or occasionally 10–13 years. Middle schools therefore cross over the legal boundary between primary and secondary education. Most Nursery and Primary schools are for both boys and girls.

## SITING

*Reference:* The Standards for School Premises Regulations 1972, H.M.S.O.

Notes on Procedures for the Approval of School Building Projects in England, HMSO.

There are statutory requirements which relate to:

(i) The ground covered by the buildings, their immediate surrounds and the paved areas for play. (A paved area is defined as one having a hard, impervious surface constructed of materials such as tarmacadam or concrete).

(ii) Playing fields.

*For a nursery school* the minimum site area is based on the number of pupils, and this must include a garden playing space – again a minimum area is given – some of which is to be paved.

*For a nursery class* designed in conjunction with a primary school, a minimum area, based on the number of pupils in the nursery, must be added to the site area of the primary school. This must include a minimum area of garden playing space and paved area.

*For a primary school* there must be a minimum site area, including, as above, a paved area, to be laid on suitable foundations and properly graded and drained. In addition, every primary school except those for infants only, must have a minimum area of playing field, with certain modifications if provision for physical education and recreation is available either indoors or elsewhere.

The scale of provision for car-parking facilities is given in 'Notes on Procedures for the Approval of School Building Projects in England', Appendix 13.

There are, of course, many other factors to be taken into account, e.g. safety and ease of access, service approaches, treatment of boundaries, natural features and wild areas, sheltered gardens and courts, planting, contours and levels (see Fig. 1.1), seating etc. For these there are recommendations, but not statutory requirements.

## PLANNING

In any discussion of planning trends, educational principles must always be the starting point. While a classroom/corridor basis of design, with formal rows of desks, may well have satisfied the educational needs of the past, it has lost its relevance today.

The richness and variety of primary education—variety in the activities, in the materials and equipment used, in the sizes of working groups—call for richness and variety. This also applies in the design of space and furniture, and the furniture is as important as the space. For most of the time the children work in small groups and individually, each taking his own time to find his own way, and becoming involved in many sources of information. Preconceived subject categories and a fixed timetable are largely irrelevant.

The problem is to provide space and equipment for such frequently changing patterns of work and materials and how to achieve a balance between small scale privacy for young children, and large scale exploration.

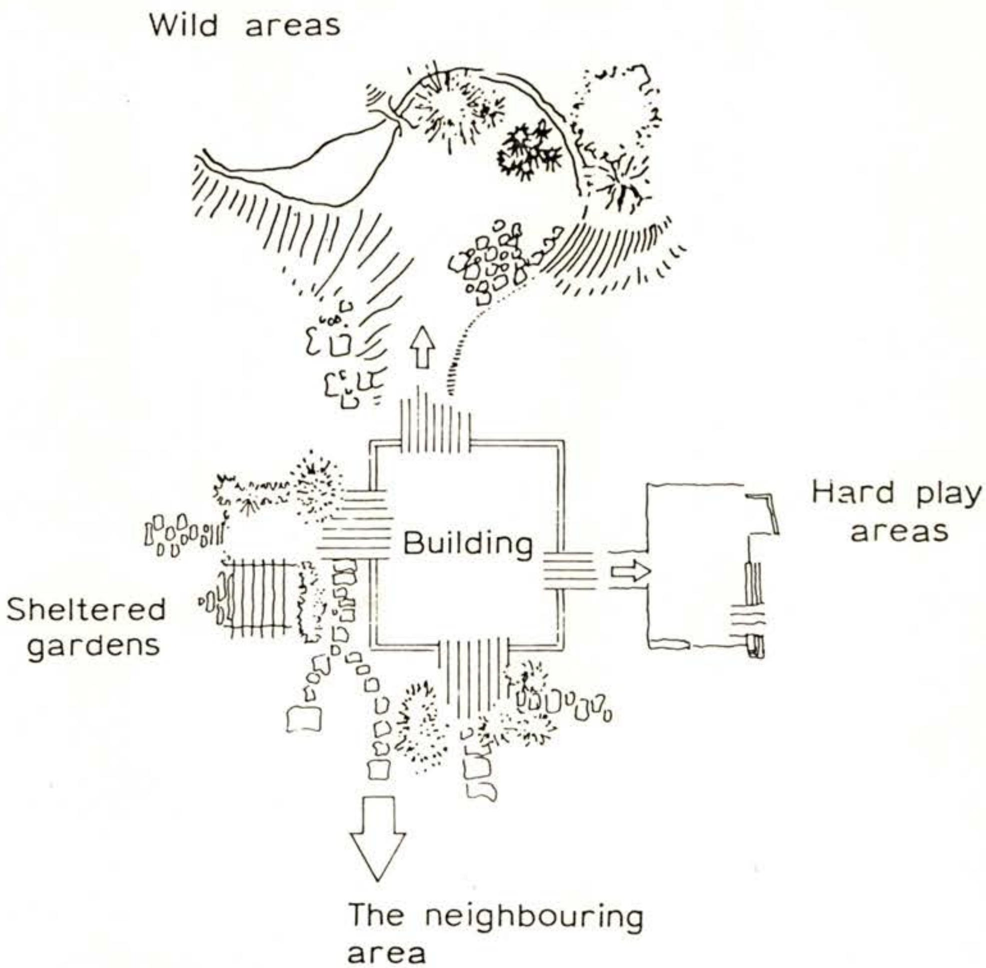



*Fig. 1.1 Some ingredients of planning. Outside*

There are some fairly straightforward needs to be met for all children:

(i) A welcoming entrance, with somewhere to hang a coat and put one's things;

(ii) A place and a person to turn to easily for a sense of security;

(iii) A more general kind of studio-workshop area in which experiments, testing, painting, construction can be undertaken, with small bays or locations where this first hand experience can be used for recording, writing, calculating, discussing;

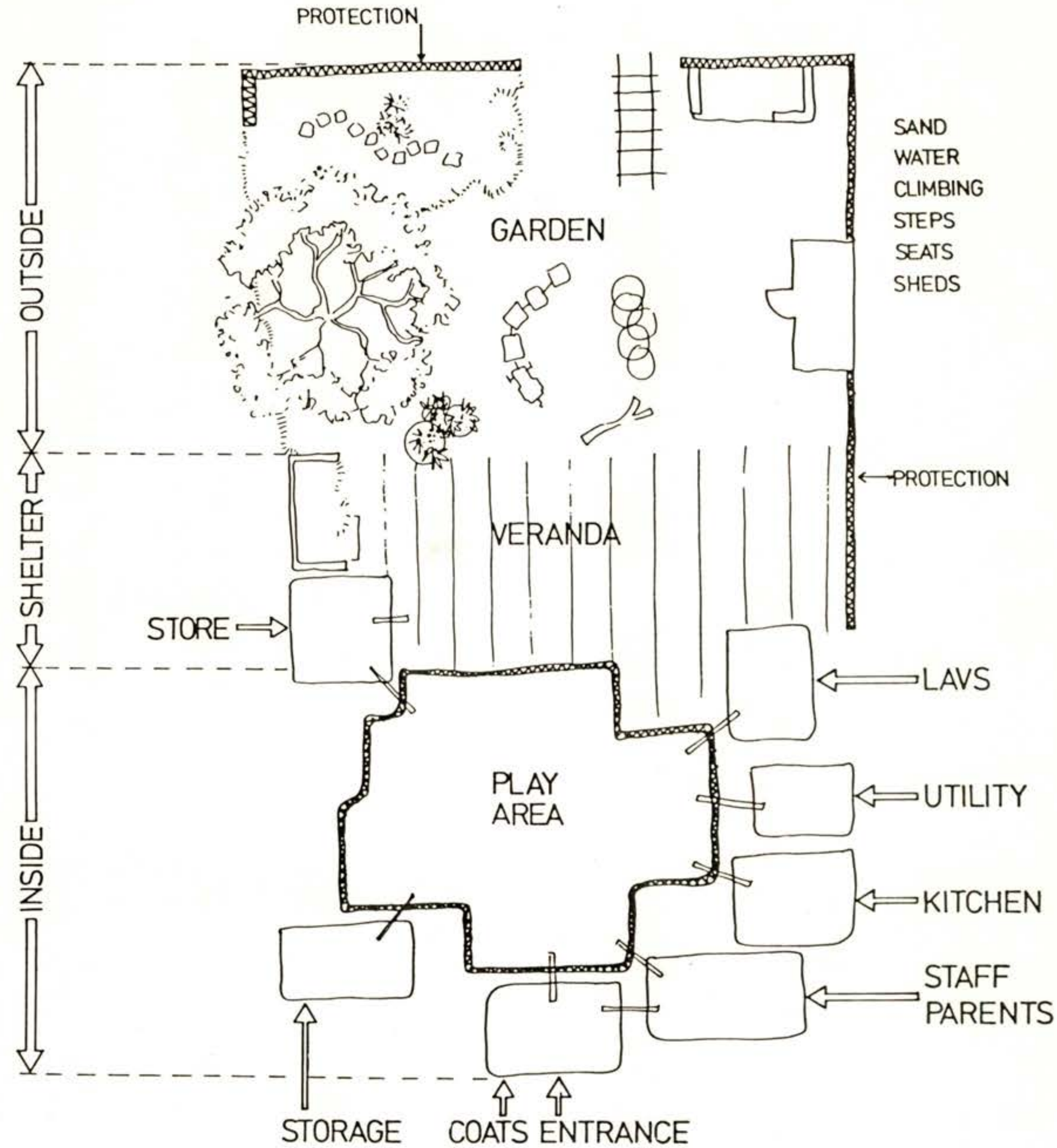
(iv) A small enclosed room, or rooms, where really quiet work can be done without disturbance, or where noisy work can go on without causing disturbance;

(v) A covered work area leading to a sheltered garden court where bigger apparatus can be handled, animals and plants cared for and studied.

Such planning ingredients as these are likely to be or ised into centres in which two or more teachers can tog be responsible for groups of children—perhaps 2-tea centres for younger ones and 3- or 4-teacher centres for ones. (Lavatories and coats areas are likely to be dispers small units in each centre.) See Fig. 1.2.

Other parts of the school, shared by all, e.g. a h central books area (in addition to local provision), spac meals etc., are also likely to be more informally designed in the past.

For very young children (under 5 years) the princ governing planning trends are fundamentally similar. changing patterns are likely to be more extemporary, ever, with variety achieved largely by means of furn rather than by architectural definition. Parents may pla important part in the life of nursery schools, and this affect the planning.




Many primary schools include a nursery group of under fives, either incorporated in the main school, or built as a separate ur

There are three places for work and play:
(a) Inside
(b) Sheltered transition between inside and outside.
(c) Outside.

*Fig. 1.3 Under fives. Main ingredients*

Small rural schools are likely to have very small groups of under fives. These should always have a comfortable play area of statutory size to which they can all withdraw with those who are responsible for them. It will not be large enough for the full range of nursery activities, but will perhaps be more appropriate for the quieter and less energetic ones.

The under and over fives may or may not share sink, lavatory and coat areas, which must always however be very convenient for the youngest children. Movement between spaces for under and over fives must always be easy, to encourage sharing. The furnishing should provide for adults.

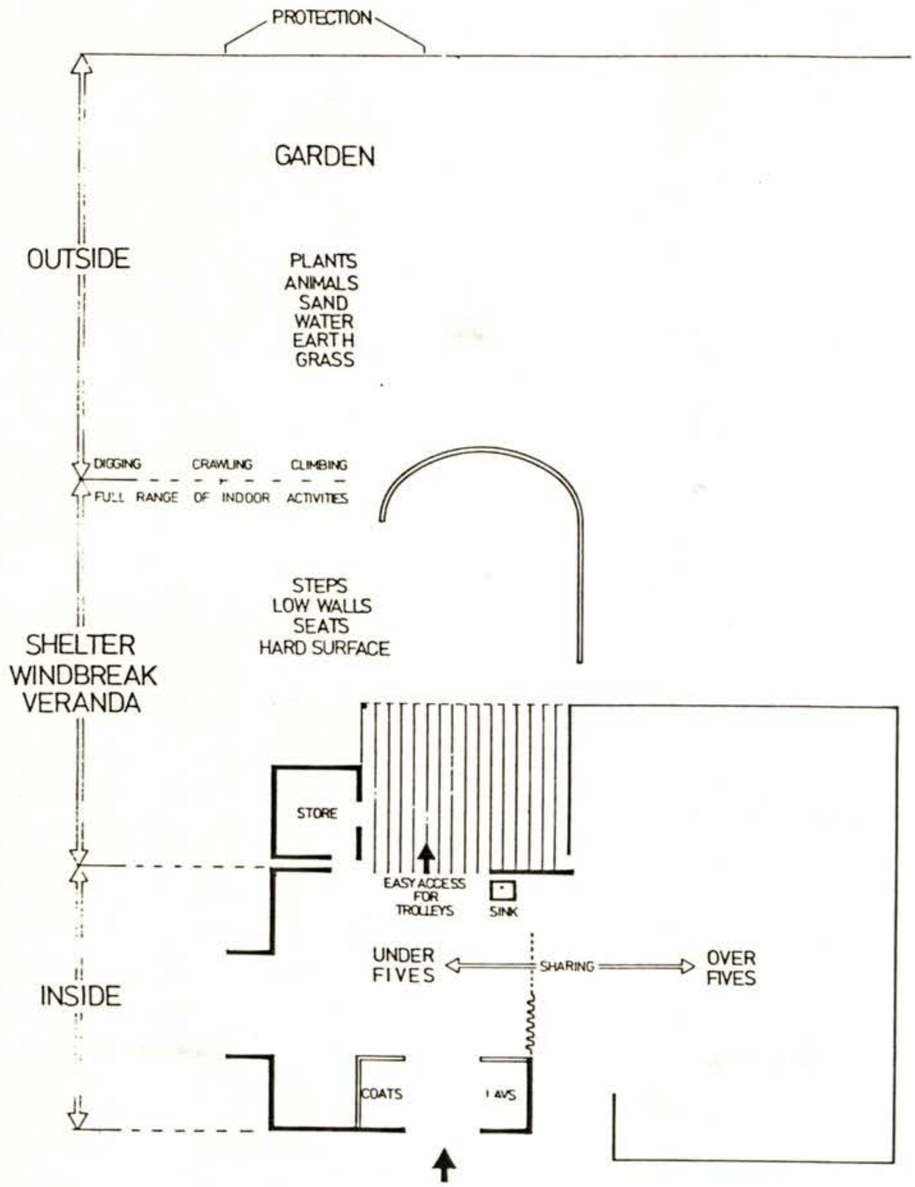
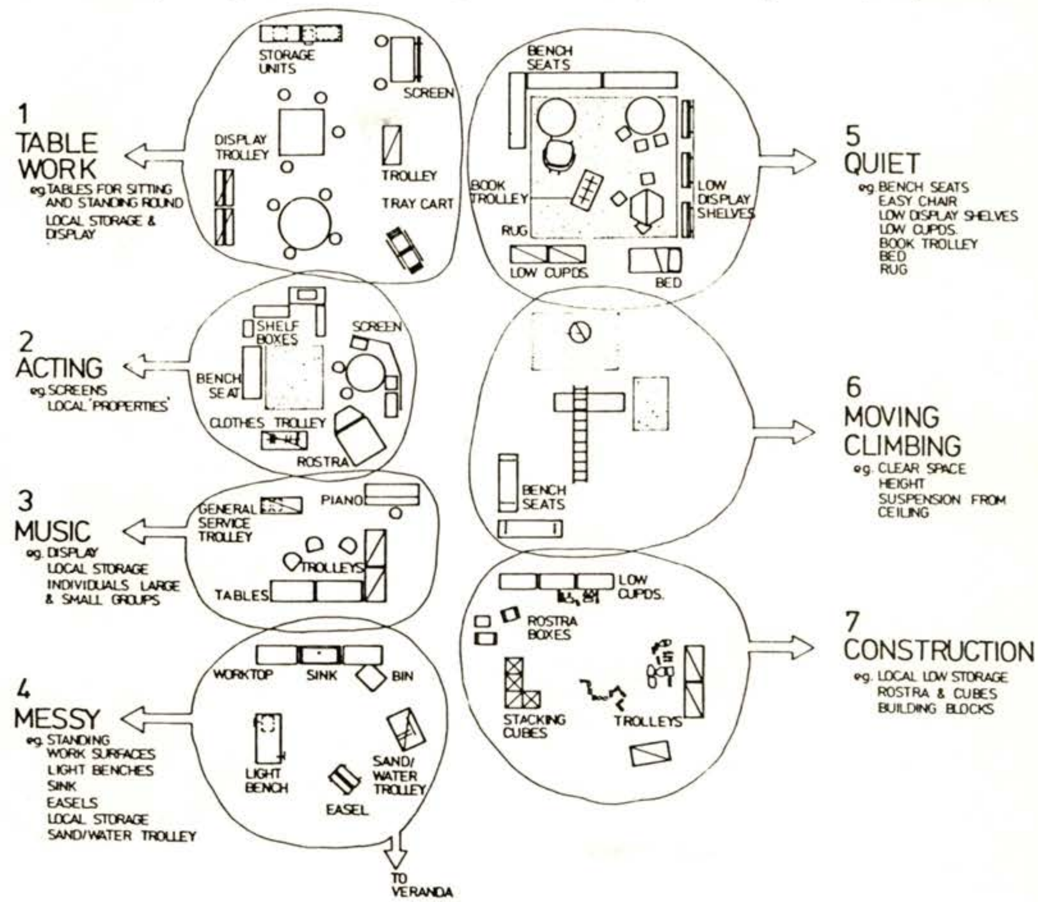


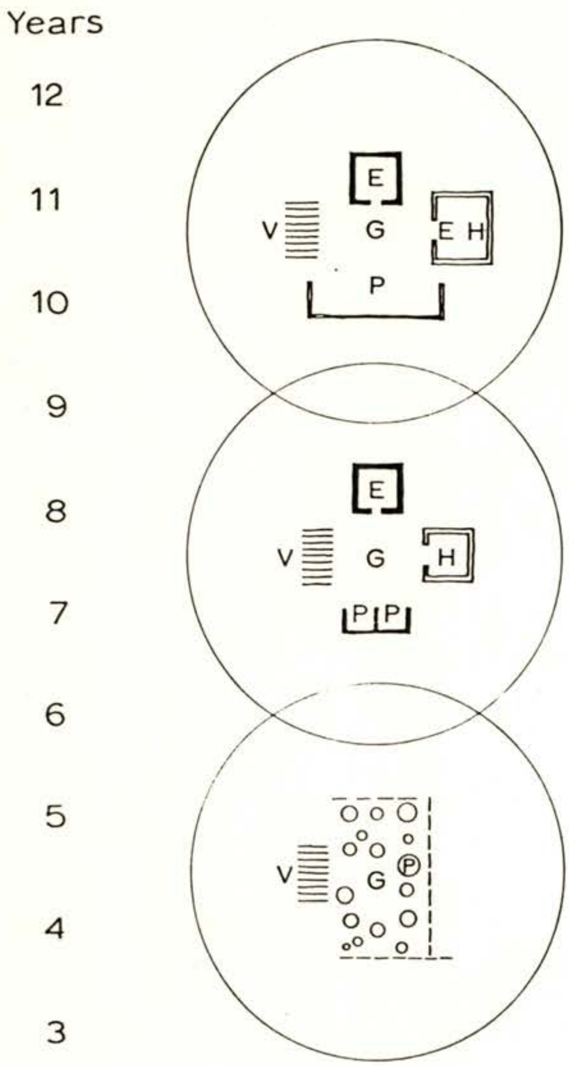

*Fig. 1.4 Relationship between spaces for Under Fives and Over Fives*

| | |
|---|---|
| 1<br>TABLE WORK | eg. using materials & objects - not making much mess - small scale. |
| 2<br>ACTING | eg. home play - camping - shops - hospitals. |
| 3<br>MUSIC | eg. exploring sounds individually, singing & dancing together. |
| 4<br>MESSY | eg. using clay water sand etc. |
| 5<br>QUIET WORK | eg. looking at books, writing, resting, story telling. |
| 6<br>MOVING | eg. climbing, swinging, jumping, rolling. |
| 7<br>CONSTRUCTION | eg. building with blocks, small & large scale, undertakings such as engines, buses, boats, houses, etc. |




The activities outlined above are likely to be pursued by children both under and over five, and the degree of shari is likely to be greater with smaller numbers.

*Fig. 1.5 Main zones of activity—younger children*




- Work still in small groups
  Greater range and depth of interests
  Developing provision for particular skills in general context

- Work in small groups
  More definition of different zones by planning as well as by furniture
  Less space available
  Fewer teachers

- Children working individually
  Many extemporary situations
  Changing patterns
  More variety through furniture: less through architectural definition
  Many adults

This diagram shows how the arrangement of planning ingredients is likely to vary as the children progress from 3 to 11 years.

*Fig. 1.6 Continuity—transitions. Some ingredients of planning for local work areas.*
*H. Home bases. E. Enclosed rooms. G. General work areas. P. Particular bays or zones. V. Covered areas.*

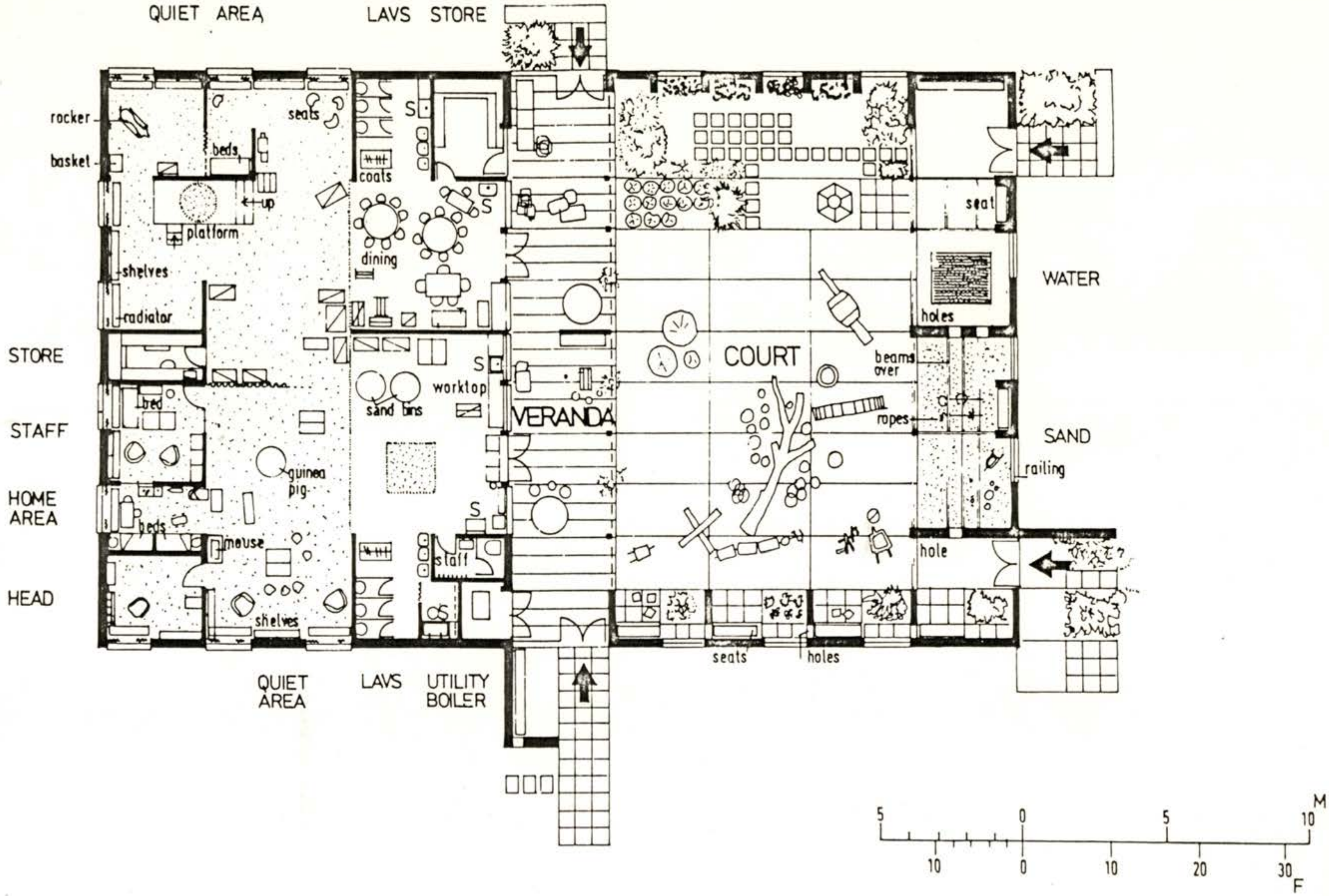



*Fig. 1.20 Tilbury Nursery Centre, Essex. Designed for 60 places, 3–5 years*

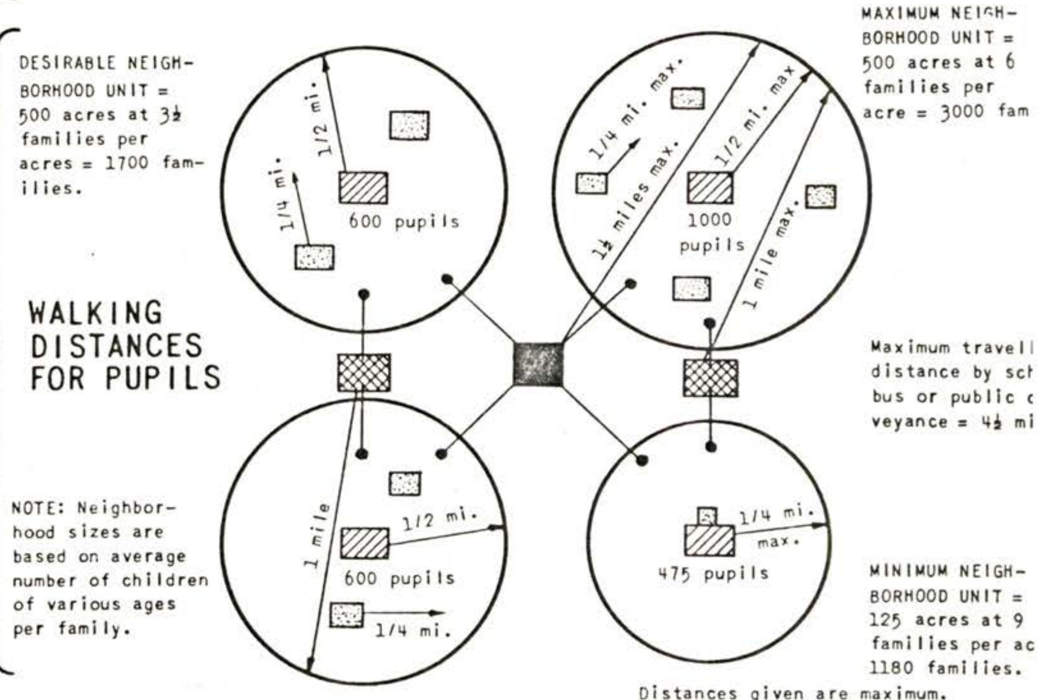
B

The selection of a school site involves many factors. Consideration should be given to the following:

**UTILIZATION OF SITE FOR EDUCATION, RECREATION AND COMMUNITY ACTIVITIES**

Determined by nature and scope of educational program. Consider possible location of sc site adjacent to existing park, recreation areas or library.
Educational uses: Nature study, art, dramatics, construction, woodcrafts, gardening, out classrooms, physical education.
Recreational uses: During school hours, after school hours, weekends and holidays.
Community uses: By adults for gardening, playing games, picnicking, hiking. Used by neigh hood teenagers where other facilities are limited. Automobile parking.

**PROXIMITY OF HOME AND SCHOOL**




**SIZE OF SITE**

| Type of school | Minimum size of site |
|---|---|
| Pre-schools | ½ acre per playroom |
| Elementary schools (Grades 1-6) | 5 acres plus an additional acre for each 100 pupils of predict ultimate maximum enrollment. (Thus 200 pupils = 7 acres) |
| Middle schools (Grades 7-10) | 10 acres plus an additional acre for each 100 pupils of predict ultimate maximum enrollment. |
| Upper school and junior college (Grades 11-14) | 30 acres plus an additional acre for each 100 pupils of predict ultimate maximum enrollment. For specialized educational programs (agricultural, aeronautic physical education, etc.) additional area will be required. |

**TOPOGRAPHY AND SOIL CONDITIONS**

Subsoil should provide good drainage and proper base for economical and substantial foun tions for building. Good topsoil to support vegetation where desired and to permit draina Elevation of site should be above surrounding water table and should not be at foot of hills mountains. In hilly districts, children should not be expected to climb mountains or steep h sides to get to school. Hazardous cliffs, pits, gullies. Conditions such as marshes, stagn water and dumps should be avoided.

**ZONING**

School will serve residential areas. Commercial and industrial districts should be avoid School buildings should enhance city plan and fit into zoning program.

**HIGHWAYS AND TRAFFIC**

School district should relate to existing and future highways to avoid hazard and noise. Wit community, reduce to a minimum the number of crossings necessary for children to reach scho Public service lines should be convenient to school but located at least one block away avoid noise. In cities or suburbs, avoid through streets, select park areas, short or dead e streets. In rural areas, consider convenient bus routing from all parts of district.

**EXPANSION OF COMMUNITY**

Determine potential number of pupils in area to be served. Study development of new housi for prediction of future potential. Allow 20 to 30% of site for unforseen future needs.

**COST OF SITE**

Cost of site is a relatively small part of overall cost. An expensive site may reduce the over cost as grading or utilities may cost less. Purchase vacant land in advance of need with a lo range program if possible; land will be more expensive if divided into lots. In urban areas, av the purchase of homes.

## WALKS, DRIVES AND PARKING

ıvenience and safety, access for pedestrians should st consideration, vehicles second, servicing third. The pes of traffic should be separated.

should be direct to discourage shortcuts across lawns, ɐ radius at changes of direction and intersections. instead of steps should be used where grade does not 12 to 15%.
ı width of walks – 5' 6".

AND TURNAROUNDS should not circle building or ı building from playfield. Drives should follow the most outes, provide for clear vision, have no steep slopes, od drainage.
hould be a limited number of entry points to the school facilitate traffic control.
8 ft. for 2-lane drives and 80 to 90 ft. diameter for bus nd.

IG on site is necessary for schools providing pupil tation; loading should not be directly from a main street. Pupils should not be required to cross driveway to board bus. Loading platforms should be sheltered in northern climates.

PARKING should not be permitted on streets bounding school where there is heavy vehicular traffic, near pedestrian entrances to school site, near roadways entering school grounds or at loading areas.
On-site parking should not be allowed to crowd or eliminate recreational areas.
School bus parking need not be on school site.
Space for automobile parking – 250 sq. ft. per car.
For bicycle parking – 1 sq. ft. each.

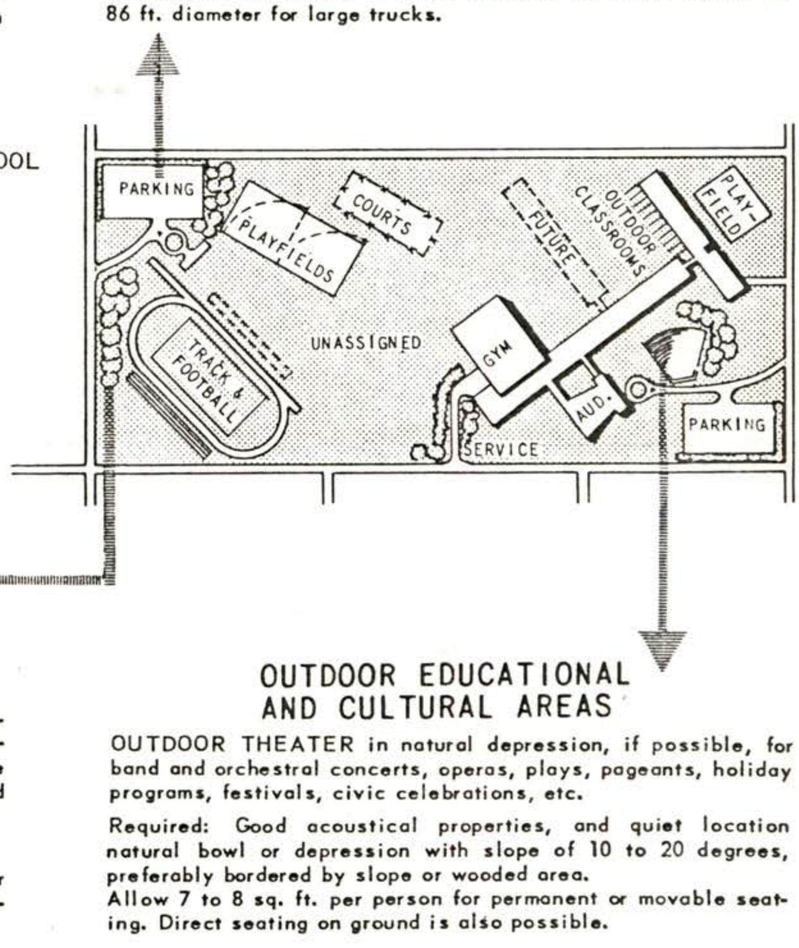
SERVICE AREAS. Portions of building to be serviced should be located near a side street in order to minimize loss of campus space for driveways.
Service and delivery areas may be segregated from play and other areas by planting or shrubbery.
Turnaround for trucks – 38 ft. diamater for small trucks to 86 ft. diameter for large trucks.

AMATIC SKETCH OF 1200 PUPIL HIGH SCHOOL
functional relationships of school elements,
e areas and orientations.

rea of site = 36 acres
g area = 4 acres
lds and recreation areas = 18 acres

RE

7 ft.


## TOPOGRAPHY AND PLANTING

inage, building should be located at high point of conlay areas should be developed as slightly convex survith ground sloping to periphery. Contours should be in such a manner that if one drain becomes clogged ill flow to another level.

etaining walls at change in grades is hazardous.

reas for young children should not be located near r streams. Lakes should be illuminated at night, fencther protection should be employed.

ȷ trees, streams, lakes should be protected during :tion.

voods with underbrush should be separated from school reaks.

ıtive trees; avoid thorny trees or those bearing fruits, berries.

unsightly places or poorly developed adjacent proptrees or thick growth.

shrubs at least 20 ft. from building when windows beıround level.

ennial flowers only in well protected beds.

esirable, use trees as a device for light and sound

## OUTDOOR EDUCATIONAL AND CULTURAL AREAS

OUTDOOR THEATER in natural depression, if possible, for band and orchestral concerts, operas, plays, pageants, holiday programs, festivals, civic celebrations, etc.

Required: Good acoustical properties, and quiet location natural bowl or depression with slope of 10 to 20 degrees, preferably bordered by slope or wooded area.
Allow 7 to 8 sq. ft. per person for permanent or movable seating. Direct seating on ground is also possible.

CHILDRENS' GARDENS for experimentation, plant study and productive activity.
Allow approximately 150 sq. ft. per pupil.

OUTDOOR CLASSROOMS for construction projects, art, dramatics, etc. should have partially paved surface, protection from prevailing winds, ample sunlight but protection from extremely bright sunlight, direct communication to classroom, sound control between adjoining outdoor classrooms.

Allow 60 to 70 sq. ft. per pupil.

WOODED AREA for nature study, scoutcraft, picnics, hiking, etc. Provision for and size of such an area is dependent on the educational program and selection of site.

## BUILDING ORIENTATION

Southeast or east light should be secured for as many classrooms as possible. South light is satisfactory if east or southeast light cannot be obtained. North light is considered desirable for southern climates.

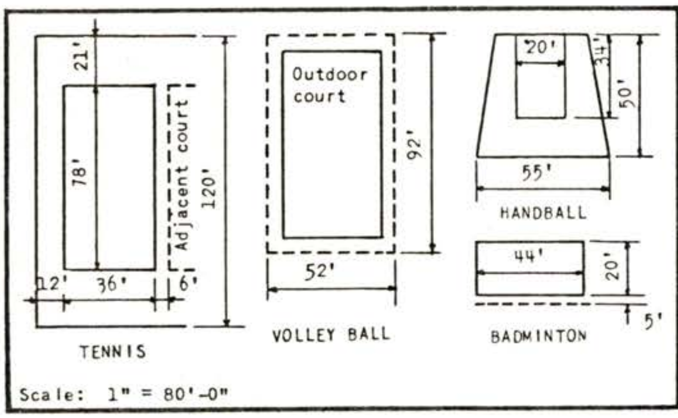
Building should be set back from street approximately 100 ft.

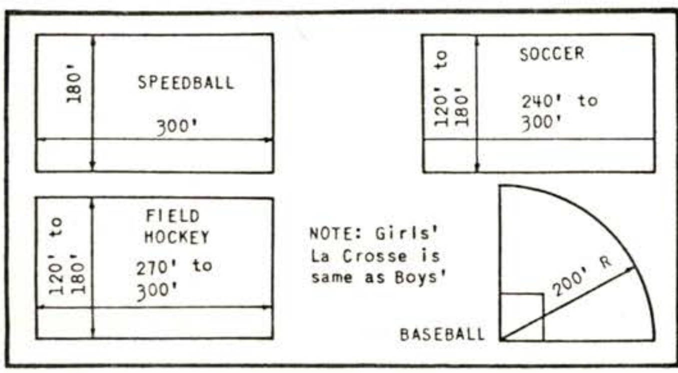
Use of hard ground surface around buildings is desirable for easy maintenance.

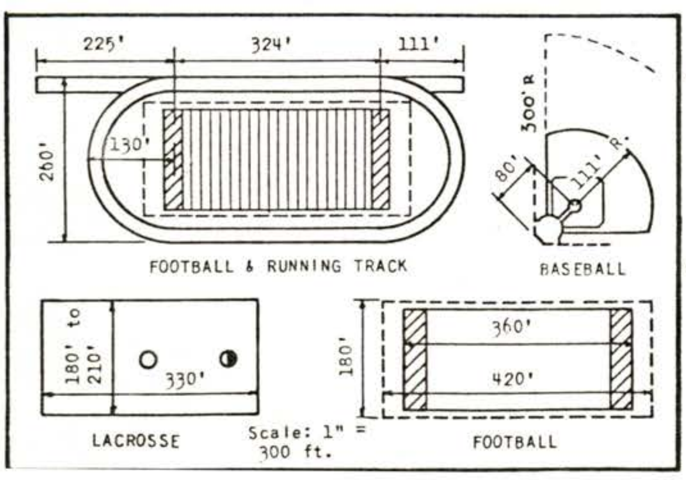
Open areas will be required near building for children not actually in play.

Provision for future extension of building should be considered.

For information on areas required for building, refer to pages on space requirements for Pre-Schools, Elementary Schools and High Schools.




## PLAY AND RECREATION AREAS

Areas are listed in order of desirable proximity to bui
Play and recreation areas should not be located near
rooms.

NURSERY AND KINDERGARTEN. Approximately 300 s
per child. Activities: Climbing, running, jumping (indivi
or in groups), group and singing games, digging, use of
toys.

Required: Shelter from prevailing winds.
- Sunny exposure (but shade from extremely sunlight).
- Slightly sloped ground.
- Permeable, non-abrasive, dust-free ground surf
- Adequate resilient-paved space for pedal toy play apparatus.
- Direct communication to indoor and semi-she areas.
- Safety from vehicles and older children.

ELEMENTARY SCHOOL. Approximately 3 acres for 300
plus ½ acre for each additional 100 pupils.
Activities: Running, climbing, group games (informa
organized).

Required: Turf area for informal activities and ball (softball, fieldball and modified soccer).
- Apparatus area with resilient paving.
- Shaded area for small group games and story-t
- Natural features such as rocks, trees and rough rain should not be disturbed as they lend them to elementary childrens' activities.
- Separation of younger and older children.

COURTS AREA – (See drawing for space requirements)
NOTE: Approximately one acre is required for 4 tenn
handball, 3 badminton and 2 volleyball courts).
Courts should be easily accessible to gym and p
facilities.
They should have rapid and efficient drainage.
They may be flexible for use as skating areas during
Fencing, sidewalls or partial sidewalls may be required
cially for handball courts.

HIGH SCHOOL GIRLS' AREA – (See drawing for space r
ments).
NOTE: An area 320 ft. by 280 ft. (approximately 2 acre
accommodate physical education classes, one full-size
ficial field for softball, field hockey, soccer, speedba
Lacrosse).

Playfields should be accessible to shower and dr
facilities and have turfed, slightly sloped ground.

HIGH SCHOOL BOYS' INTRAMURAL AREA – (See draw
space requirements.
NOTE: An area 380 ft. by 350 ft. (approximately 3 acres
accommodate physical education and intramural recreati
tivities – Lacrosse, soccer, football, softball, spe
touch football. This space allows for one full-sized o
field or 2 minimum-sized official playing areas for any
the above named activities.

If a quarter-mile oval track cannot be provided, a 3
20' straight away may be used.

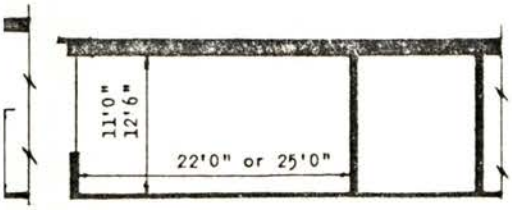
Spectator accommodation and illumination for night us
be desired.

INTERSCHOOL ATHLETIC AREA –
requirements).

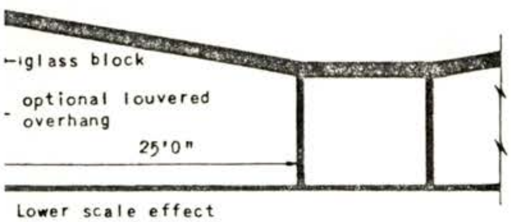
Allowance for track and football – abo
about 3 acres; field for football or soc
broad and high-jumping pits and pole
(2 softball fields may be located in this

For stadium seating, allow 3 sq. ft. per
Install lights for night use.

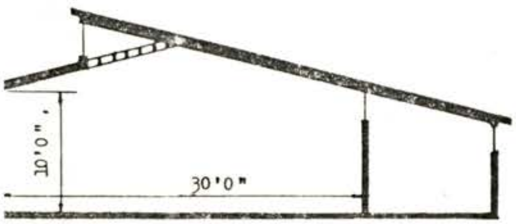
Scale: 1/16" = 1'-0"



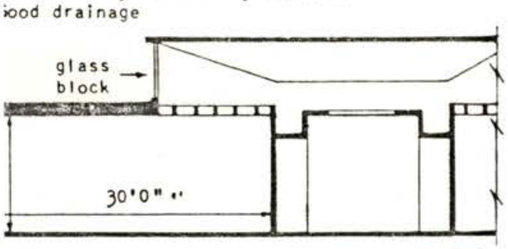

tructurally economic
lternate - glass block diffuses and directs
ight to ceiling




Lower scale effect

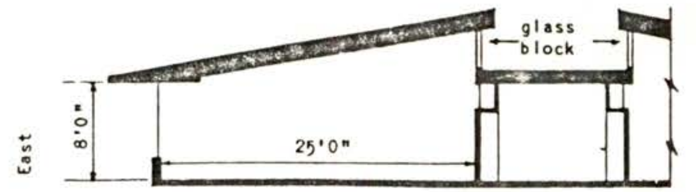



coustically excellent
Toplight protected from weather
tructurally relatively economic
ood drainage

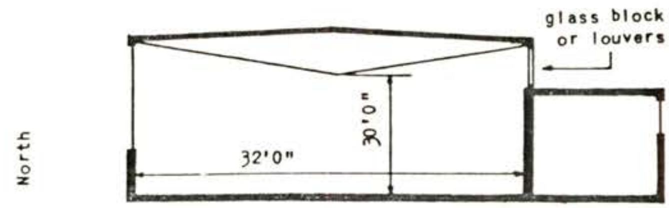



Eastern version of #4 permits double-loaded corridor

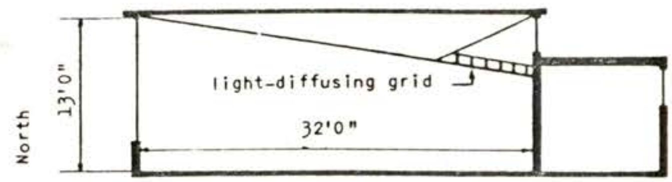
## UNILATERAL DAYLIGHTING




#5 Thermal gains and losses better balanced than #4
Allows bilateral lighting with economy of double loaded corridor



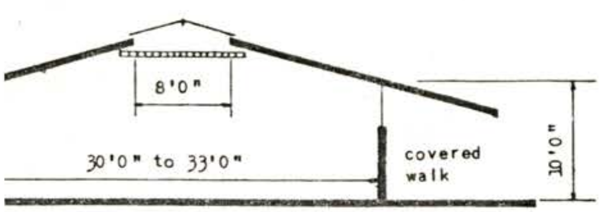

#6 As compared with #5 - wider span by truss
Effect of lower scale
Permits single or double-loaded corridor



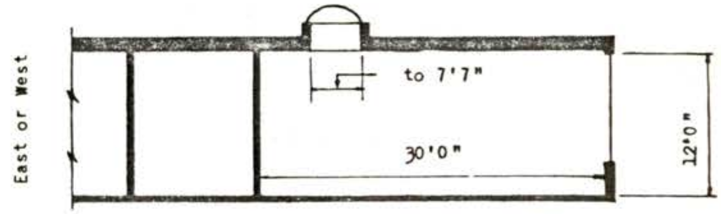

#7 Wide span by truss
Unbroken ceiling
Permits single or double-loaded corridor


#8 High ratio of glass to floor area

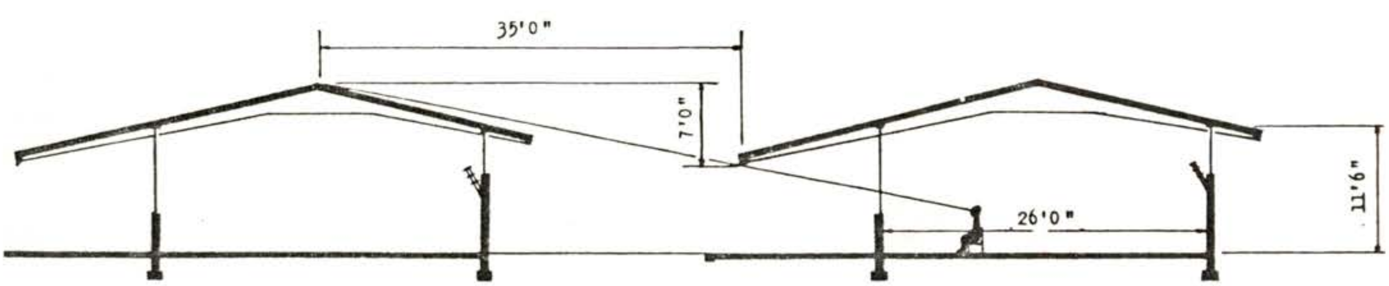
## BILATERAL DAYLIGHTING



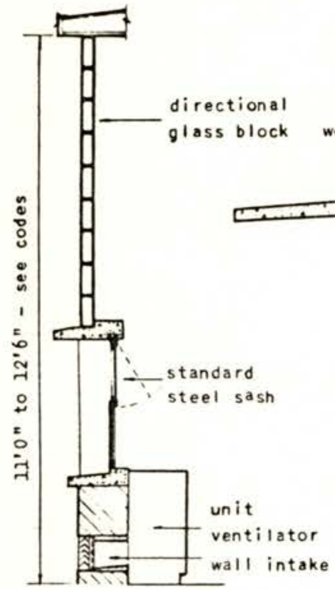

CENTRAL SKYLIGHT

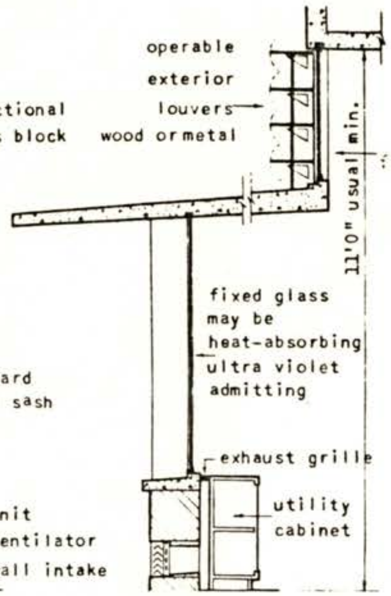



SUPPLEMENTARY DOME SKYLIGHT

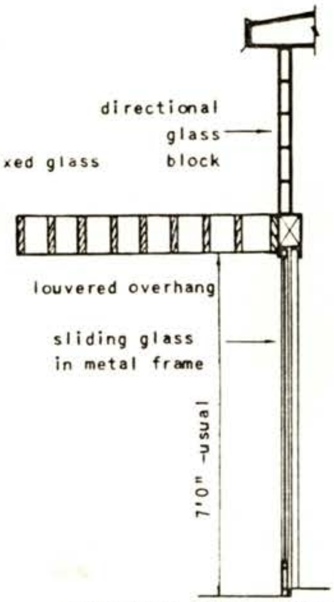



USE OF NEIGHBORING SCHOOL WING AS SKY CUT-OFF

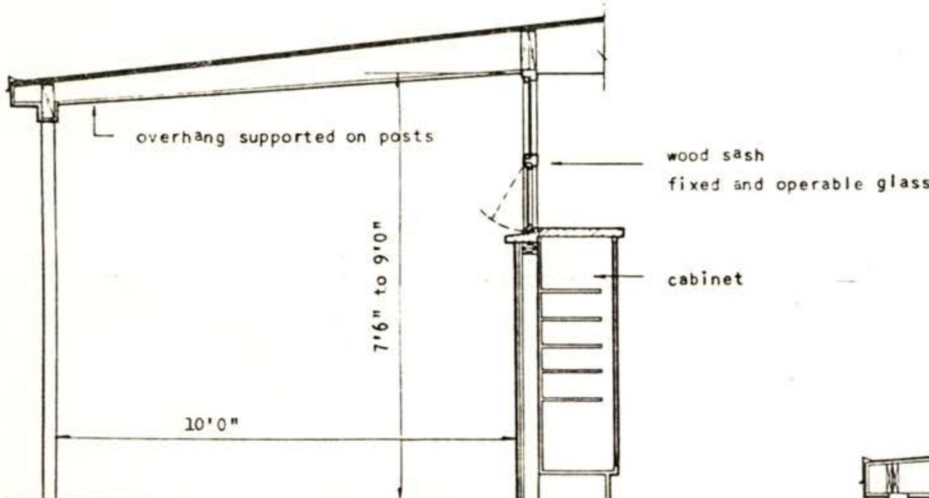


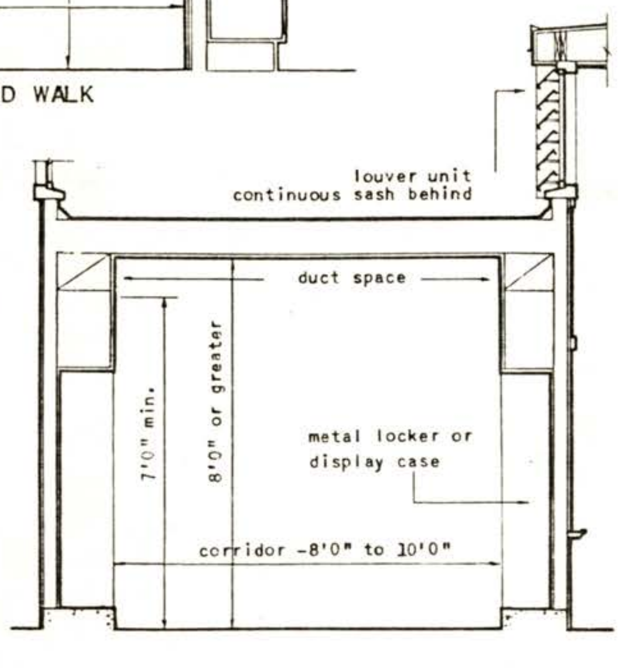

GLASS BLOCK CLERESTORY
SHOWN WITH VENTILATING & STORAGE UNITS




SLIDING GLASS WALL

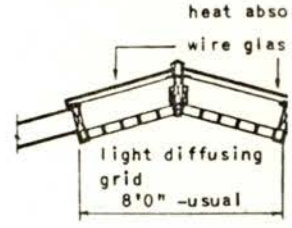



COVERED WALK

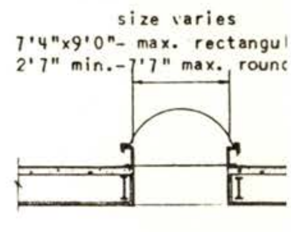



## WALL SECTIONS
SCALE: 1/4" = 1'0"

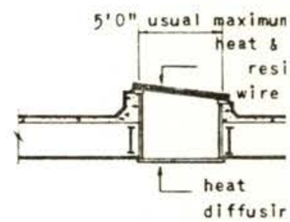
DOUBLE-LOADED CORRIDOR WITH CLERESTORY



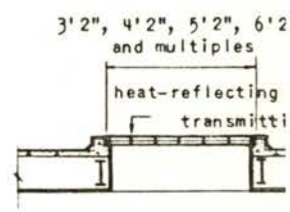

CENTRAL SKYLIGH



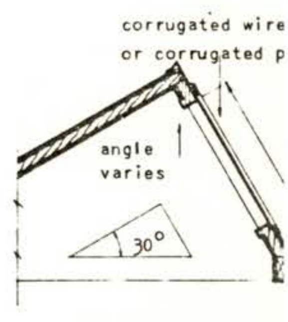

PLASTIC DOME SKYL
ROUND TYPE




STRIP SKYLIGHT

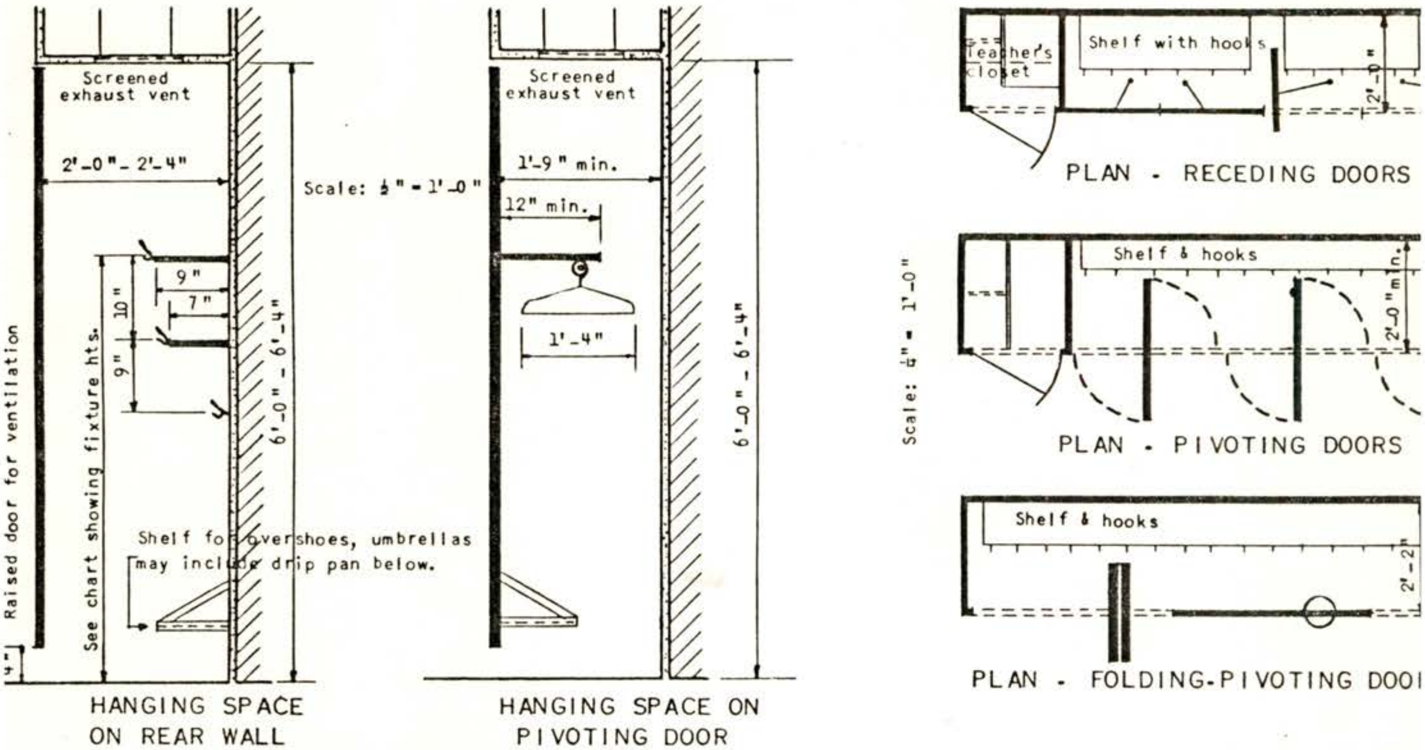



GLASS BLOCK SKYL

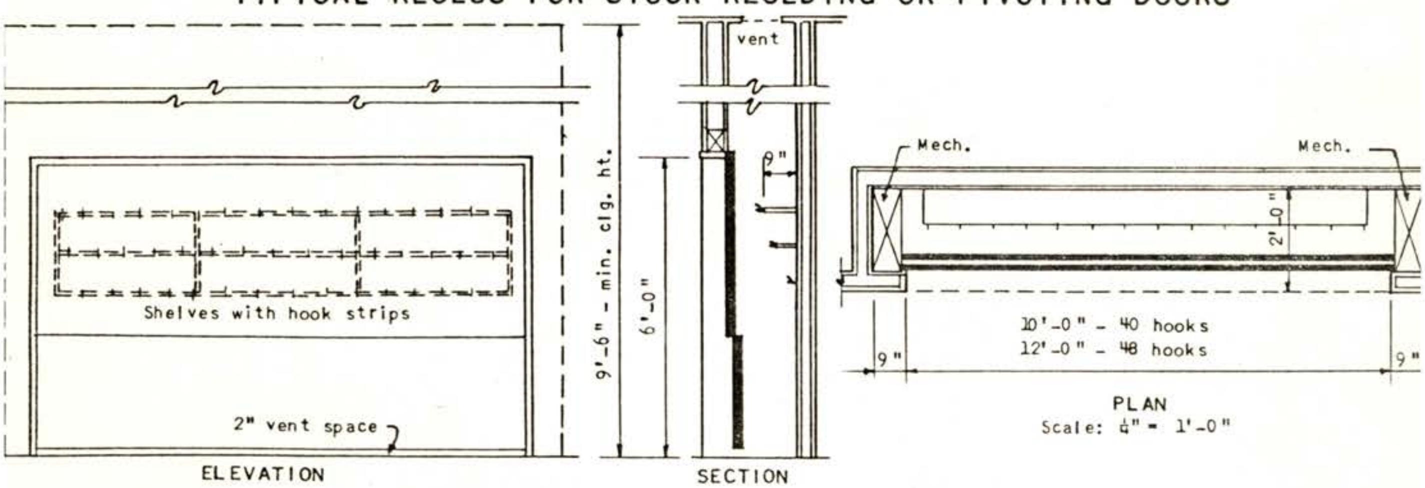



SAWTOOTH SKYLIG

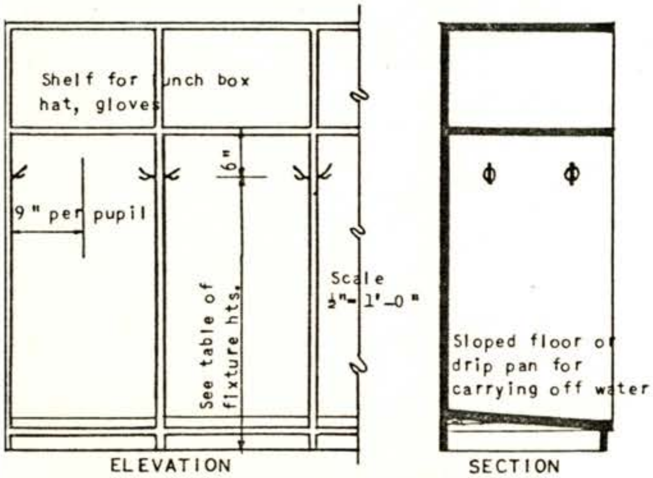
## SKYLIGHTS
SCALE: 1/8"=1'0"



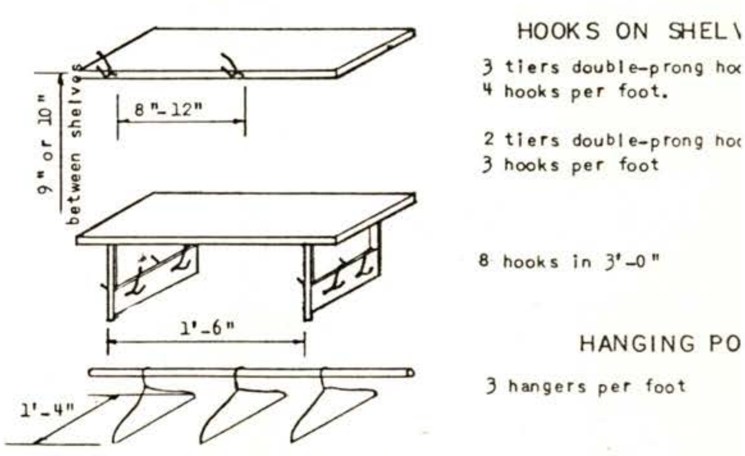

## TYPICAL RECESS FOR STOCK RECEDING OR PIVOTING DOORS



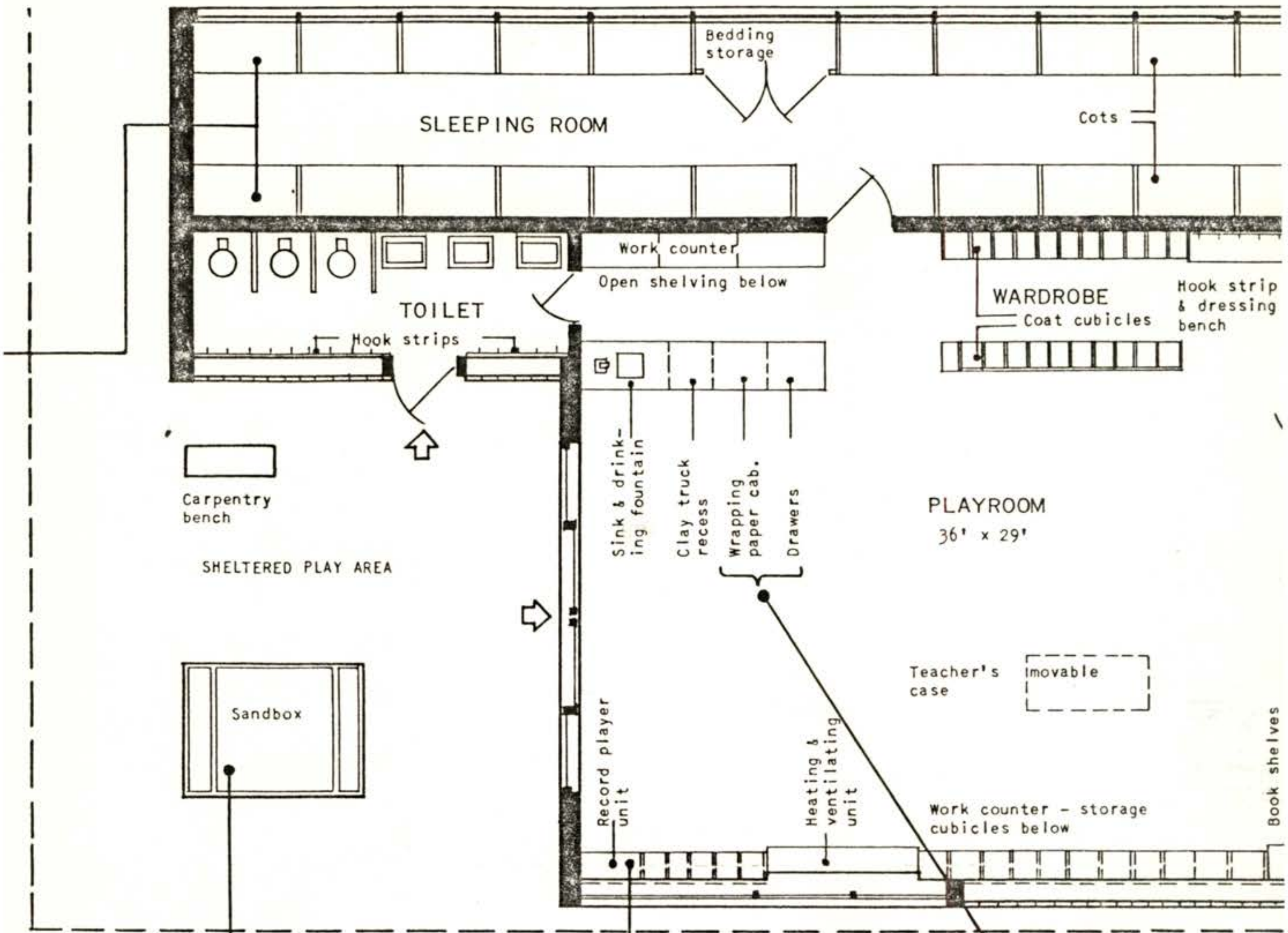

## VERTICAL-SLIDING WARDROBE DOOR




OPEN CUBICLE WARDROBE

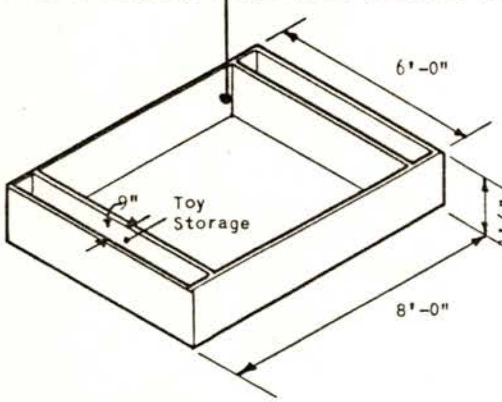



HANGING DEVICES

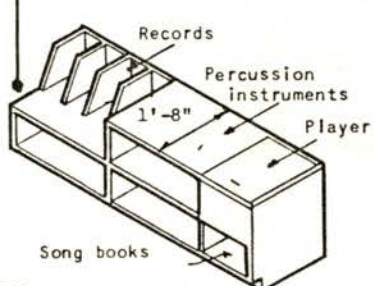



**PRE-SCHOOL PLAYROOM WITH SEPARATE SLEEPING ROOM**

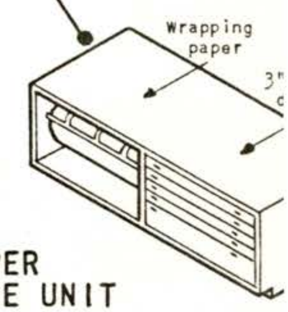
Scale: 1/8" = 1'-0"



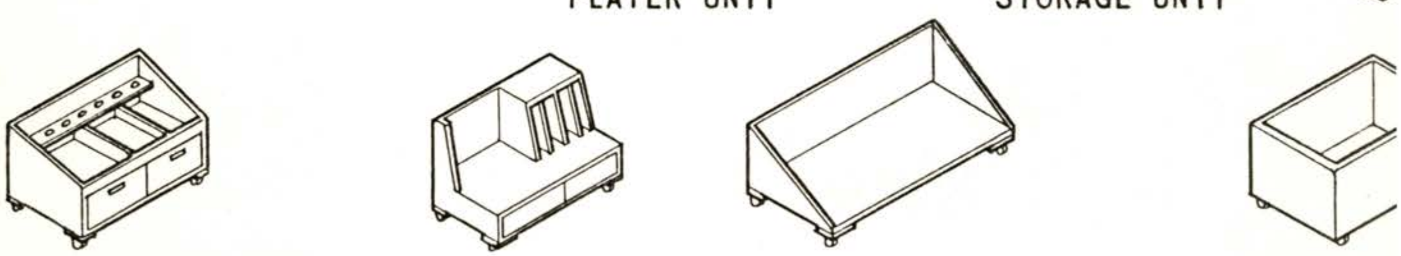

**SANDBOX**




**RECORD PLAYER UNIT**



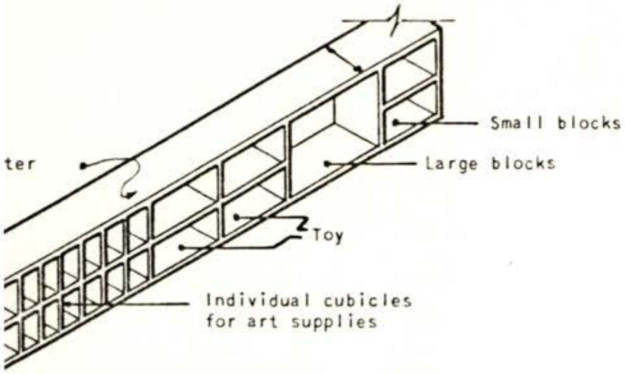

**PAPER STORAGE UNIT**



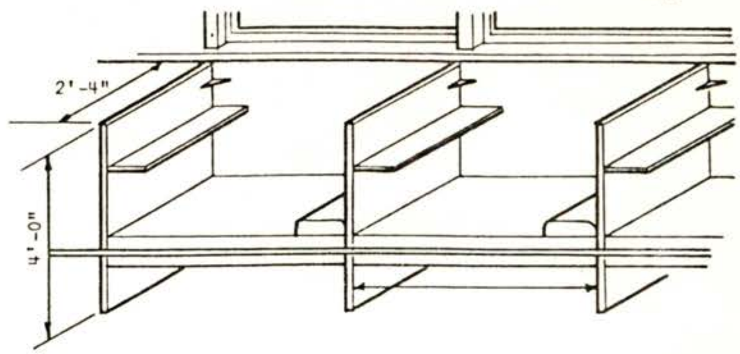
CARPENTRY TOOL CART MUSIC CART REST MAT CART BLOCK CART

**MOVABLE STORAGE CARTS**

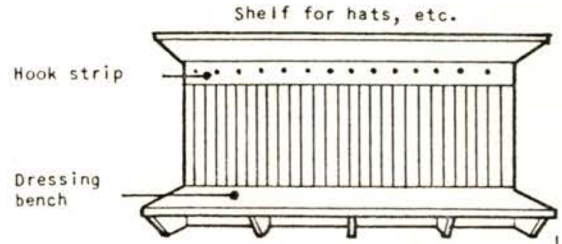
Scale: 1/4" = 1'-0"



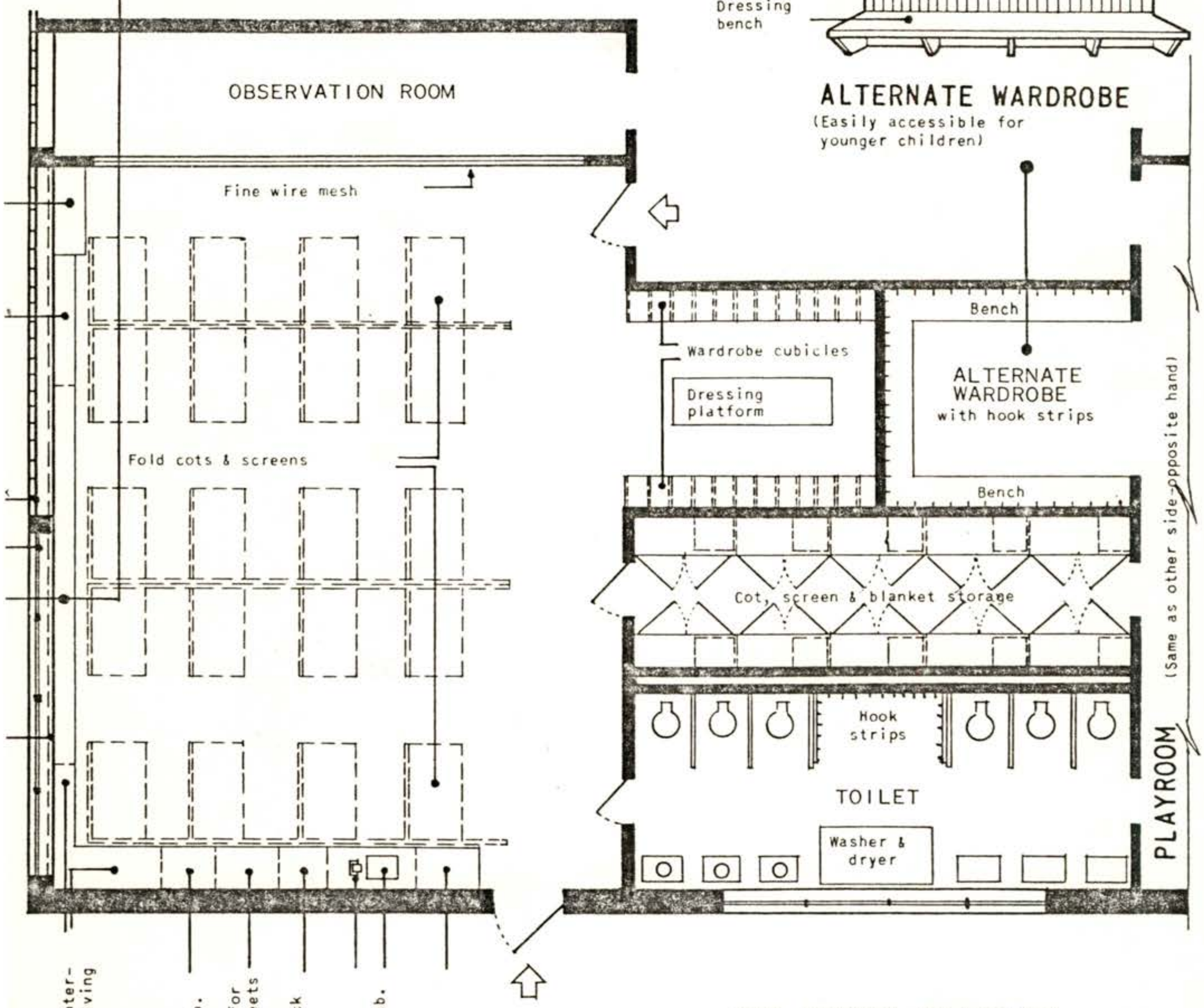

STORAGE CUBICLES




COTS




ALTERNATE WARDROBE
(Easily accessible for younger children)



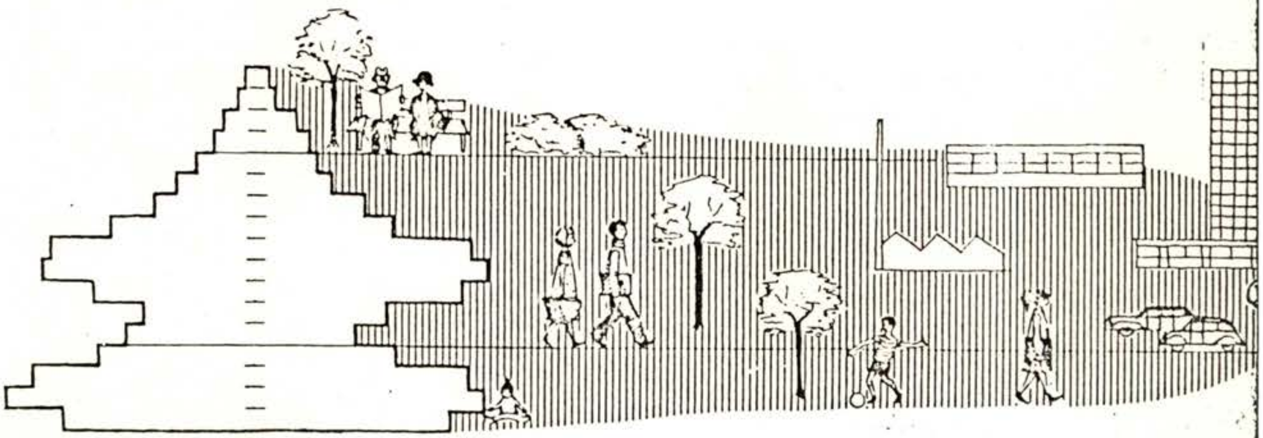

PRE-SCHOOL PLAYROOM
(ALSO USED AS SLEEPING AREA)

Scale: 1/8" = 1'-0"

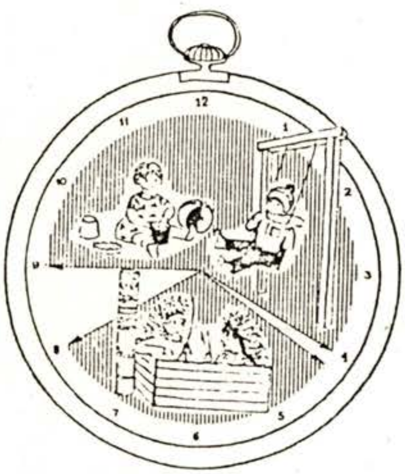
C

PLAYGROUND AREAS

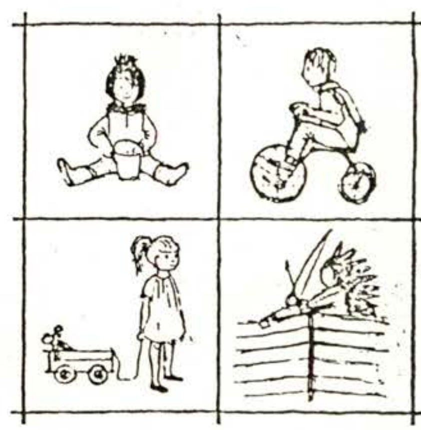
## When planning play areas remember



THAT people's radius of action depends on their age
The mobility of each age group and its need for social centres and other common grounds should be the deciding factor in planning
Children's radius of action is short so their social centre, the playground, must be near their homes



THAT small children below school age use the playground in the morning and afternoon; schoolchildren are there after 4 p.m. During the holidays and week-ends all ages use it

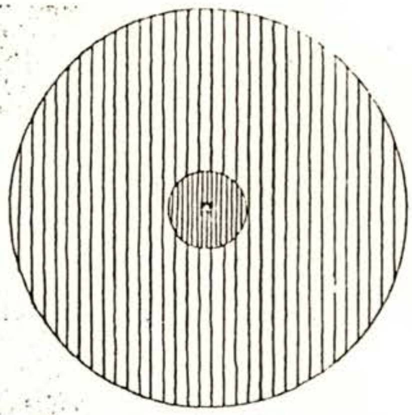


THAT there must be a certain minimum space for each child in the area. The size of this space will depend on the average play-time per day and also on the number of daily hours the playground is open

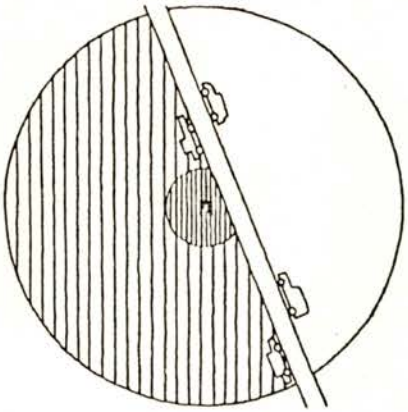
THE FOLLOWING POINTS MUST BE CONSIDERED AT THE DESIGN STAGE

AESTHETICS
Sympathetic landscaping can prevent dreariness

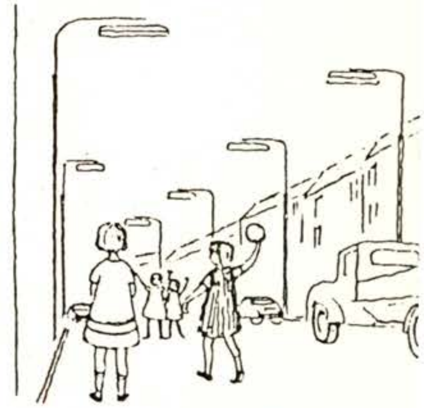
ECONOMY
A playground that is not attractive to children is a waste of land and money



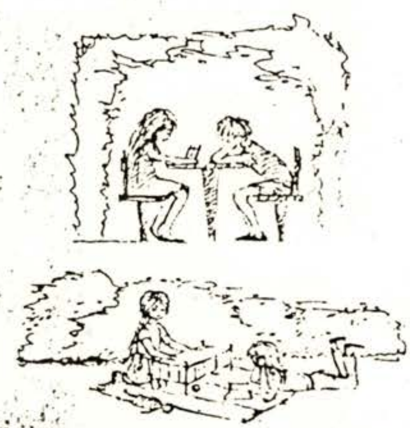
THAT small children prefer to play close to their homes. Older children do not mind walking 300 to 400 yards



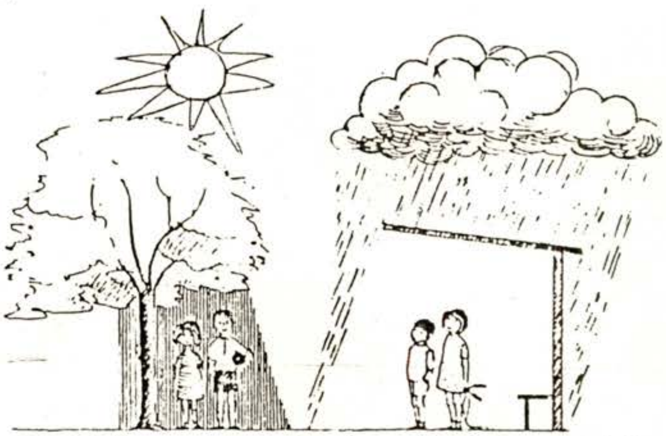
THAT traffic in the streets may cut off the children's access to playgrounds



THAT children prefer to play on the street if the playgrounds are not attractive to them



THAT all play areas should have facilities for rest and calm occupations



THAT shelter against wind and rain should be provided

Purposes

Playgrounds must be designed:

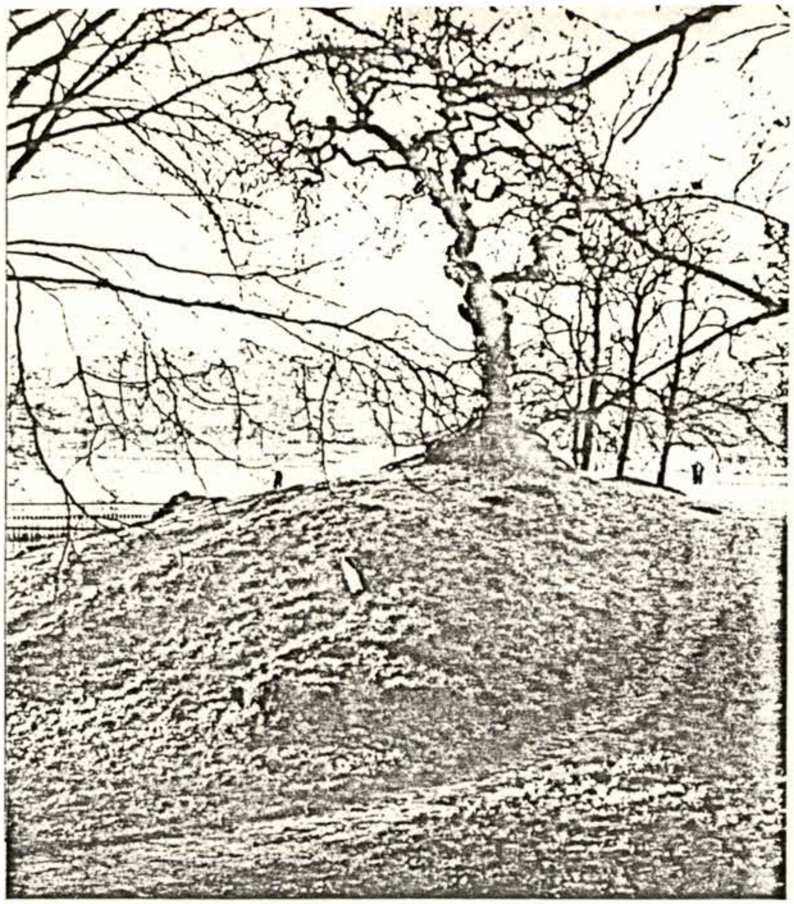
- TO avoid dark and sunless positions
- TO ensure children can reach them in safety
- TO avoid nuisance to residents by noise and broken windows
- TO make them visually part of the total environment

Facilities

Playgrounds are social centres for children, so they must have:

- Sitting places and tables
- Shelter from draughts and whistling winds
- Protection from rain
- Plenty of variety and choice of things to do
- Easy access to lavatories

*Architects: Max Siegumfeldt and Søren Stenz Designer: Ane Marcussen*



A much-used artificial hill in Battersea Park, London

A playground in Birmingham, England

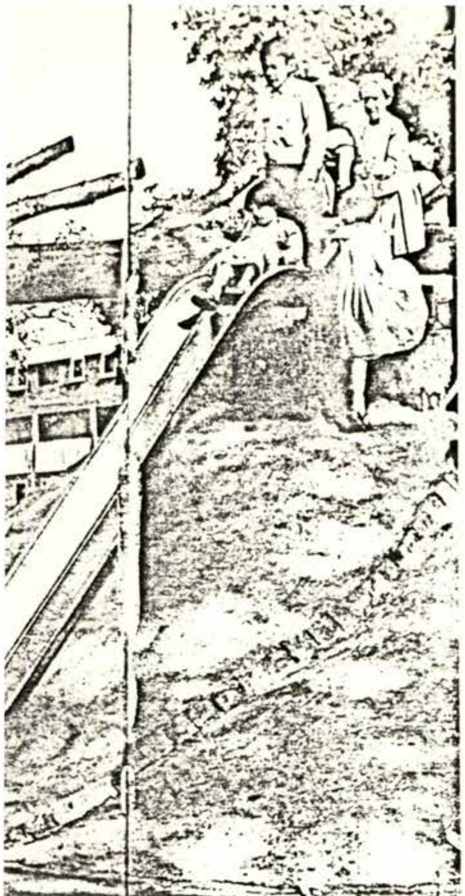
## Ground-shaping

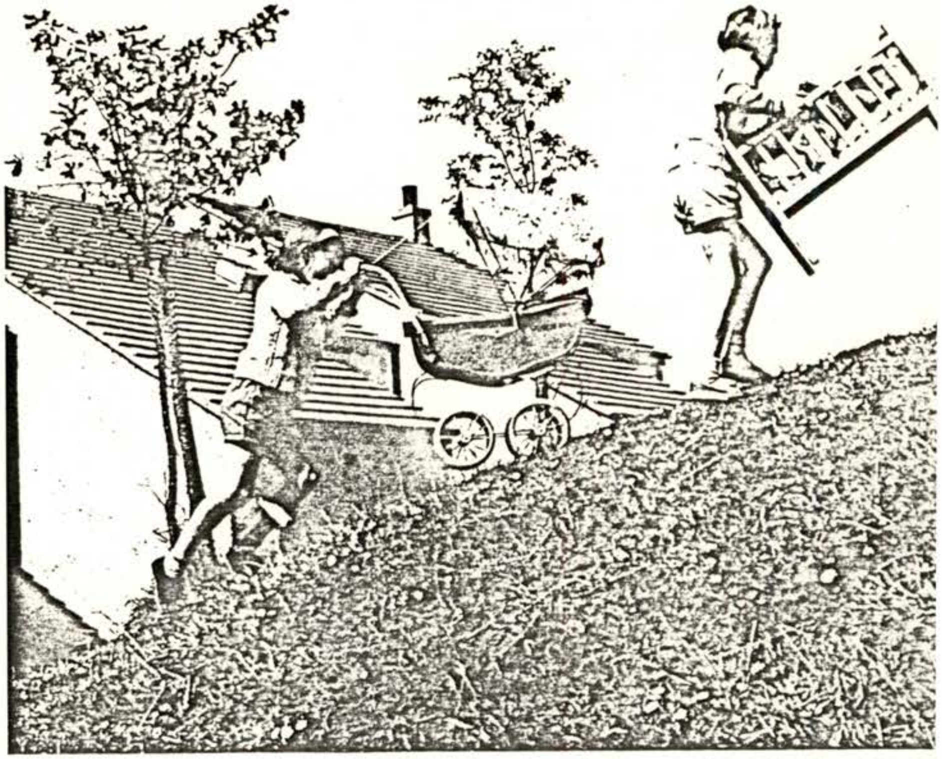
Children adore climbing, clambering and sliding; hence full advantage should be taken of any differences of level. Ground-shaping and artificial contoured mounds make good wind shields and barriers, serve as banks for rolling down on their shallower side, and, if laid with granite setts, can be slid down and climbed up. Steps can also be worked into these undulations, and ideal pockets are left at the bottom in which to put a sand-pit or a pool.

The creation of these hills and hollows, a simple matter with modern machinery, is an excellent way of disposing of rubbish and the excavated soil from building works, roads, paths, etc. Incidentally, it saves the cost of transporting waste soil or rubble to tips outside the site. Ground-shaping presupposes co-operation from the beginning between the landscape architect, the architect and the road engineer. The final shaping must be done on the site, for this work is indeed a form of sculpture.

When grass is used on the side of the hills, the gradient should be easy, to prevent wear – not more than 35 degrees. Any sharper slope should have a hard surface. The turf on the bank should be pegged in position with 5-inch wooden pegs, one for each turf. The pegs should be flush with the surface, so as not to impede scything or mowing.

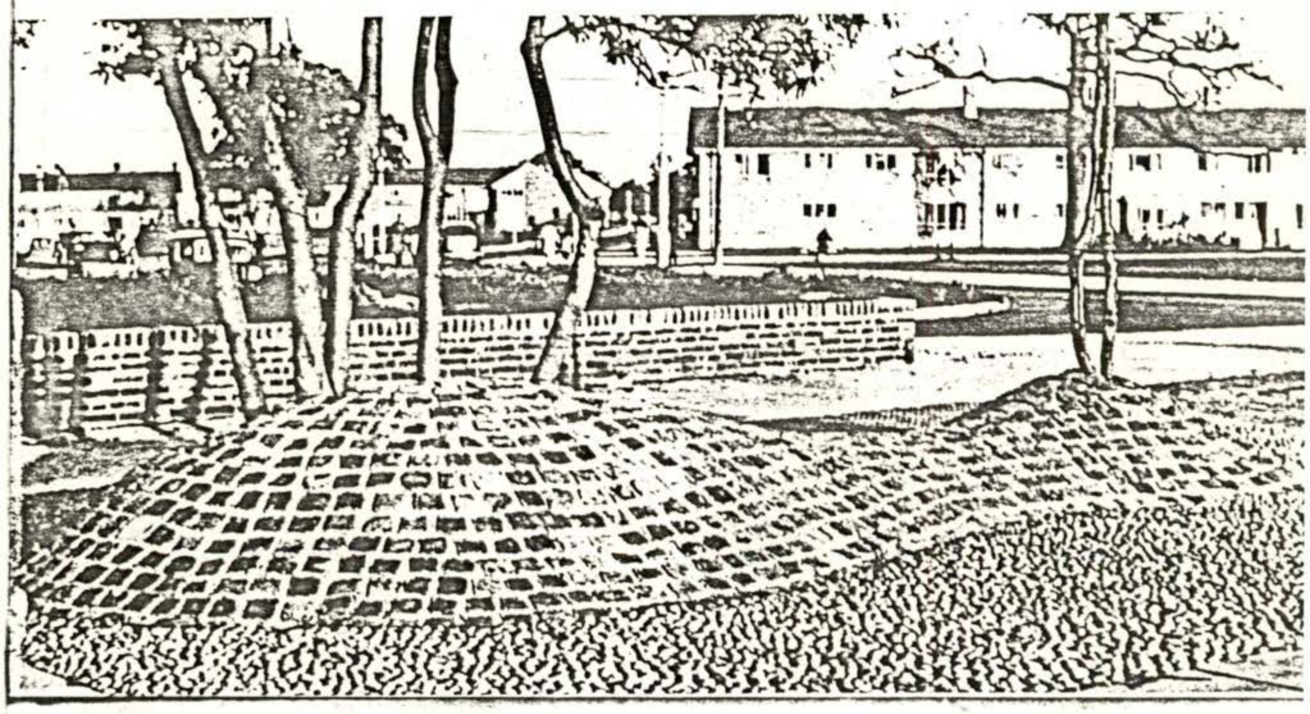
On the steeper slopes, granite setts placed on 2 inches of concrete should start at the bottom and follow the natural lines of the bank. To make climbing easier for the children, larger setts that protrude 4 inches can be inserted at intervals, or toe-holes made by omitting setts.

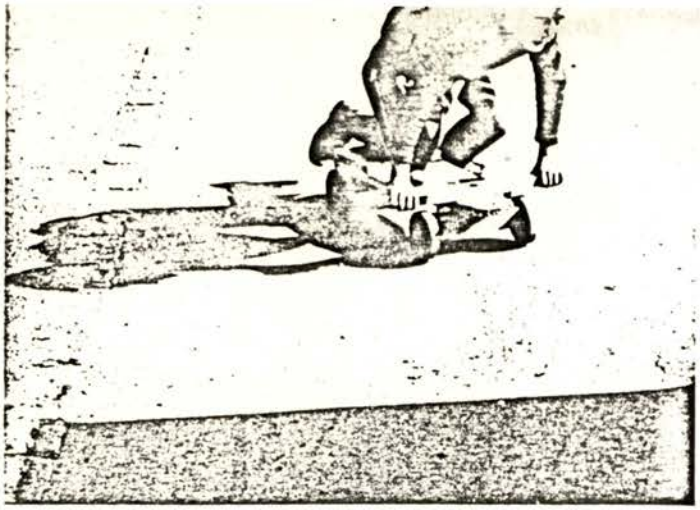




*A man-made grassy slope in Cumbernauld New Town*

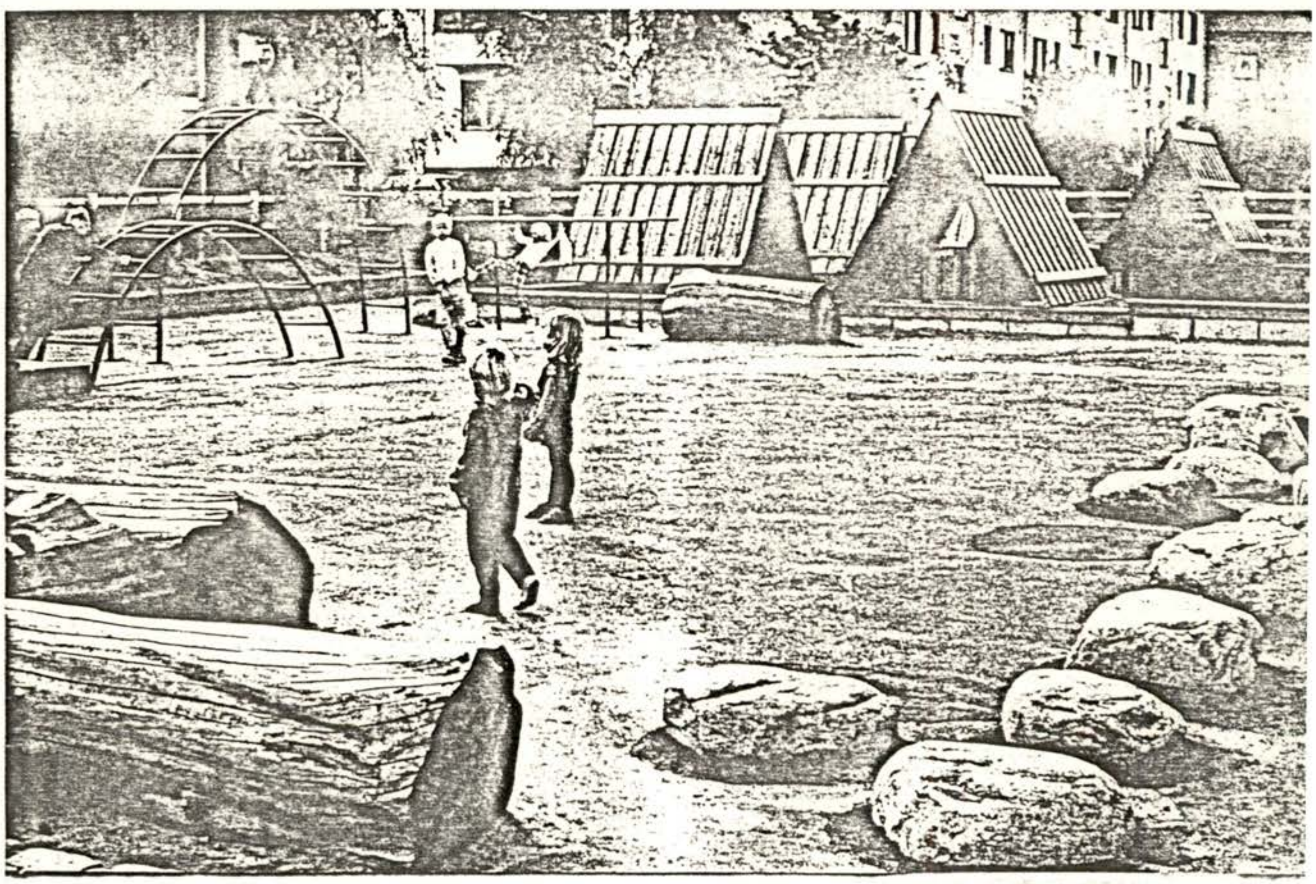
*Banks round trees surfaced with granite setts and pebbles in the shopping area, Crawley New Town*



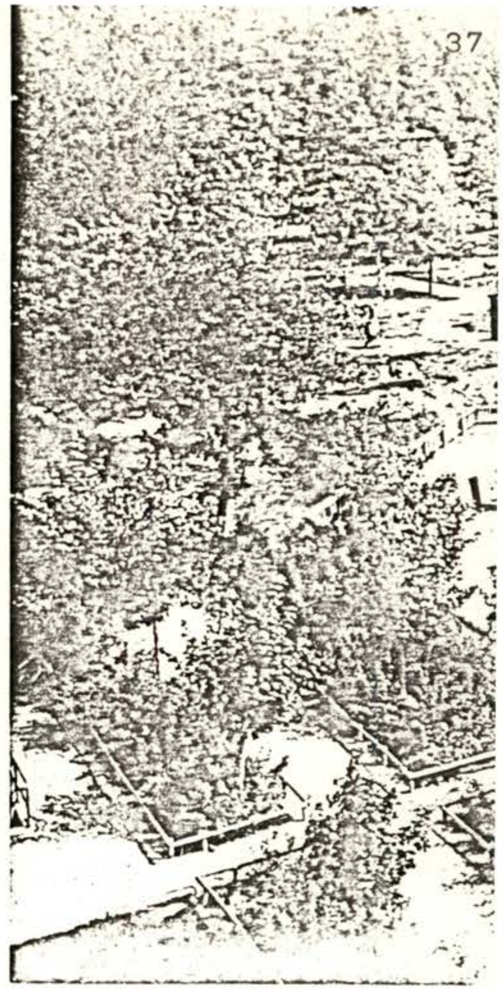


*Länsmansgarden, Gothenburg, Sweden. A comprehensive playground serving a neighbourhood with a population of 5,000*

*View of the playground showing the tunnel under the road for safe passage, high banks planted with shrubs. Fixed ping-pong tables. Architect: Arvid Bengtsson*



*General view of a play park in Stockholm showing different areas divided by rich planting and low fencing*



*A quiet story with the play leader*

CHILDREN'S GARDENS

In each play park, a small plot is set aside as a children's garden, which is dug and planted by them, and is surrounded by a low, green wooden fence. When the annuals are in blossom, the children pick small bunches to take home or to give to a sick friend. These small gardens are decorative and gay, and give the children much joy. A park superintendent sees that good soil is available, and the gardens are always placed in sunny positions.

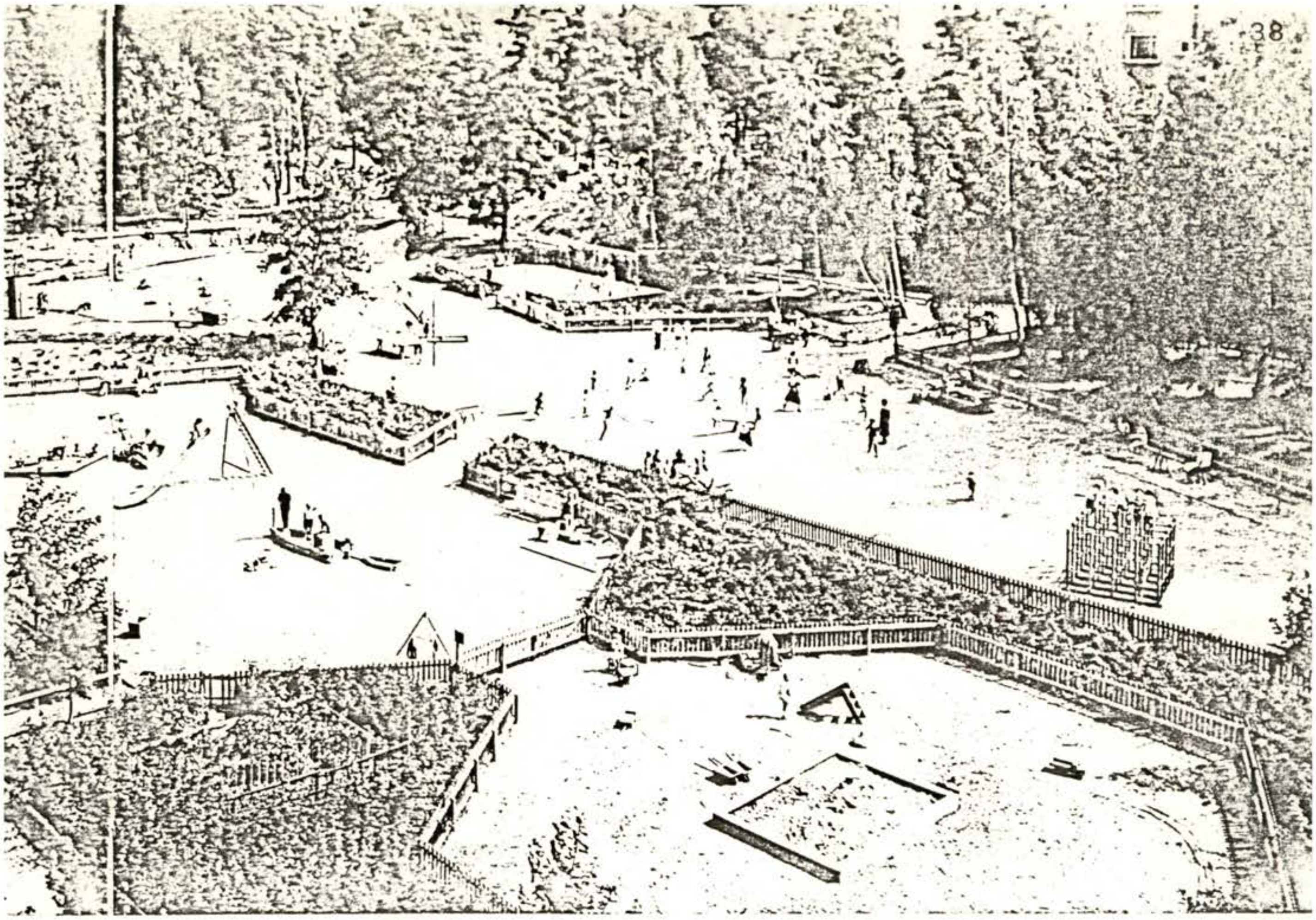
SHELTER

Wherever possible, some form of shelter is provided; this may be a disused building, the rooms of a ground-floor flat, or a building specially erected for the purpose. The facilities include a lavatory, a room for the play-leader, and storage for the movable equipment. Many play parks have, in addition, a shelter from sun and rain, and space for indoor play in winter and bad weather.

SPECIAL EVENTS

Each play park has a special exhibition every year on a Saturday afternoon, when parents are shown the games that are played, the tools that are used, and the general activities. Selection contests are arranged every summer for ball games, throwing the lasso, stilt-walking, table tennis, chess, and other activities. At the end of the season the winning teams from each play park meet for the finals in a central park; this is a gala day to which parents and friends are invited. The highest score is rewarded with the cherished Iron Crown, which the children erect in their own play park until the next year.

The Stockholm Children's Theatre tour the play parks in the summer; there are travelling Punch



and Judy shows; and the Magic Man appears at the various parks in a decorated car. A marionette theatre has recently been added to these attractions. Specialists in dramatics, puppetry, sports and carpentry visit the play parks from time to time to help the play-leaders.

#### THE UNDER-FIVES

An innovation of great help to mothers is the play enclosures for children between the ages of two and five. Grass areas are surrounded by a low fence, which can easily be moved to a fresh place from time to time. Mothers can leave their children for one or two hours, while they go shopping or are otherwise occupied. The enclosures are closed during the lunch period to ensure that children are not left too long. These play-pens are under the general supervision of the play-leader, but students watch after the children. Placed on the grass are small benches and tables, movable blocks, a sand-tray on a wooden base, and other nursery school play materials. Names, addresses and telephone numbers of the parents are known, and a note made of the times when the child is brought and collected.

#### INSURANCE

None of the Stockholm play parks is enclosed with wire fencing or in any other way. They are free for the children to use at any time, all through the year. They are always open, but a notice at the entrance tells what hours the play-leader will be there – usually 9 a.m. to 5 p.m. Each child takes home to its parents an illustrated leaflet which includes a plan of Stockholm, the situation of each play park, the facilities available, the dates of special events, and details of supervision. Each supervised play park has a sunflower sign at the entrance, saying when the movable equipment is available, when the play-leader is there, and that all children up to fifteen years are welcome.

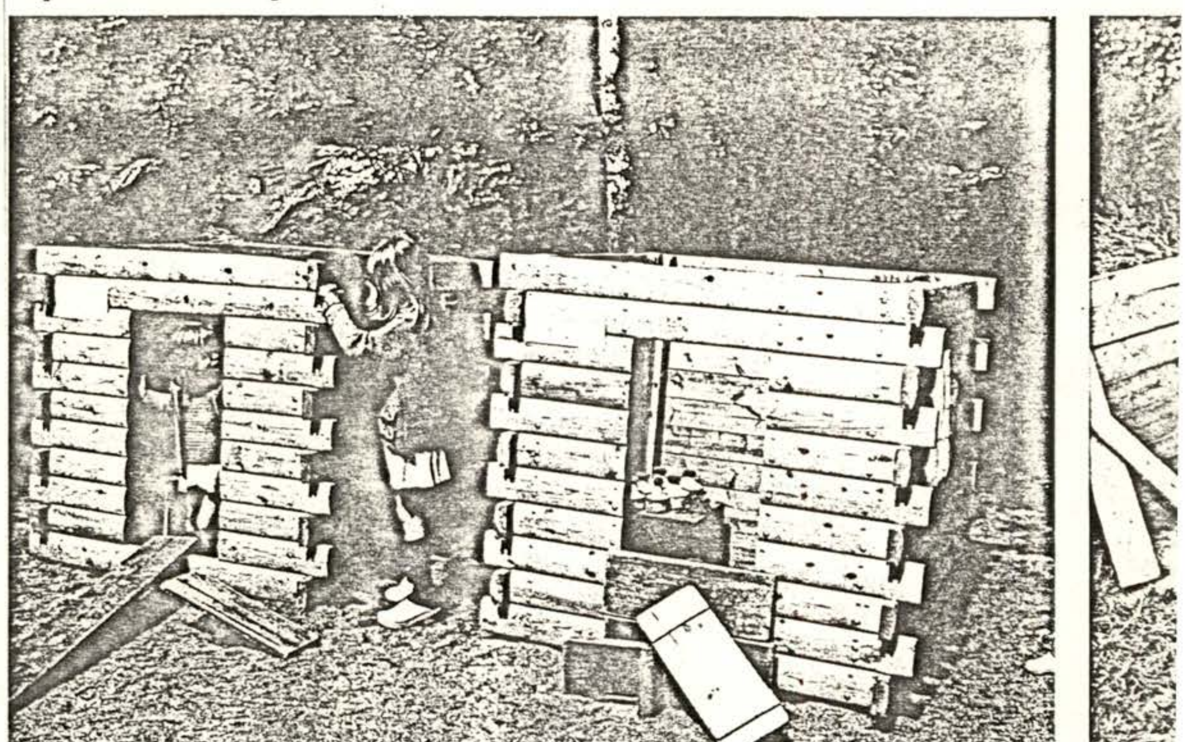
On the sign are the words: 'The play material is for the children, who use it at their own risk.' The parents fully understand that there may be accidents in the play park, just as there may be in their own homes or in the streets. Insurance has not created any problem. Most Swedish school children and many of pre-school age are insured by their parents against accidents out of school, for the small sum of 8*s*. a year. A private contractor tours the play parks during the summer to carry out minor repairs, and all the movable equipment is taken to a central workshop for renovation during the winter.

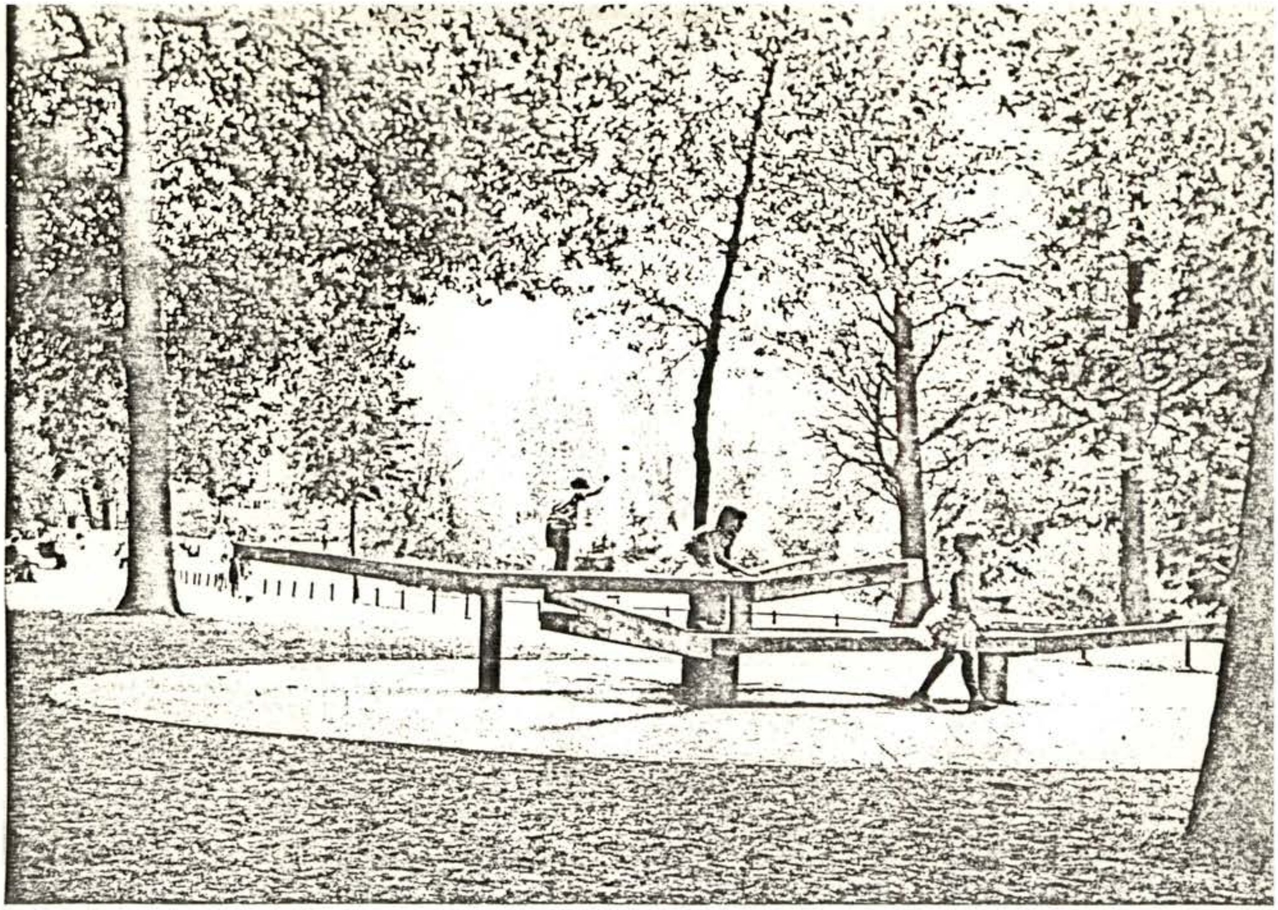
COSTS

The development of play parks in Stockholm has been gradual. Beginning in 1937, the target was one play park for every 10,000 inhabitants, that is to say, about 2,000 children aged one to fifteen. At present the goal is one play park for every 5,000 inhabitants (1,000 children). In addition to these larger play parks, there are hundreds of smaller ones. It has been found, as in other countries, that children are not eager to go a long way to find a place to play. Little children need to play in safety out-of-doors very close to their homes, and the five-to-tens seem reluctant to go more than 400 yards from home.

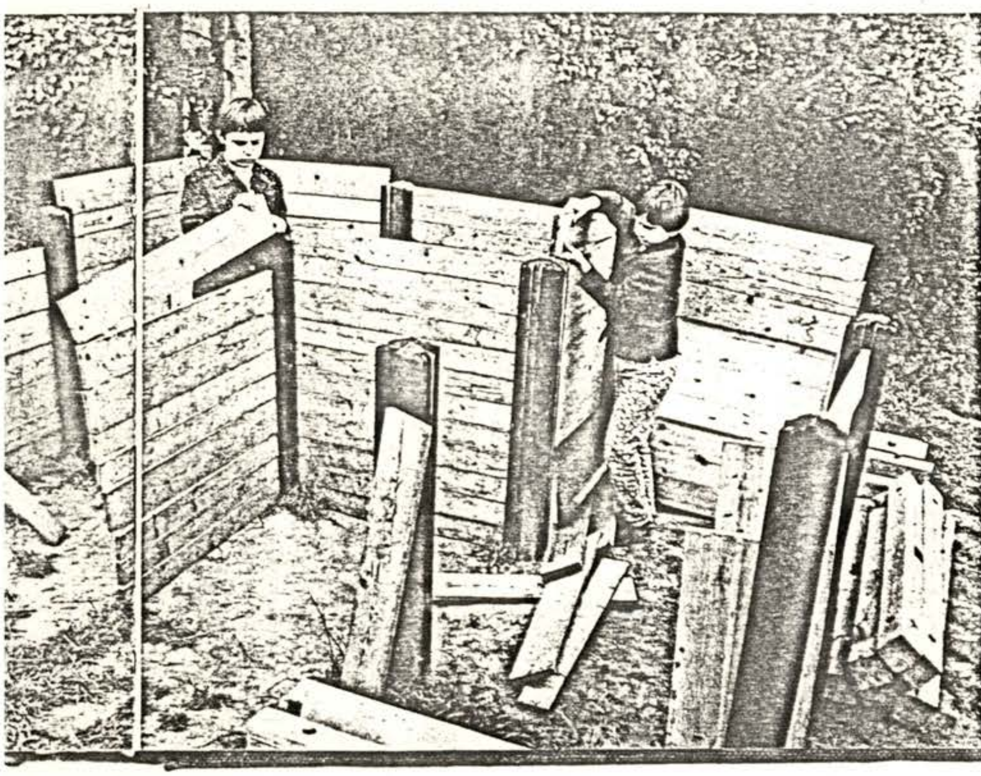
The layout costs of a large typical play park of just over 2 acres serving 1,000 children bear favourable comparison with the asphalt playgrounds fitted with expensive fixed equipment and fences. The cost of a Stockholm play park will include all the play surfaces (grass and ball game areas), paddling-pool, soccer half-court, buildings for indoor play with a room for the leader, lavatories and storage, all the play equipment, the planting, hedges and fences. At a roughly equivalent cost, the all too familiar asphalt playground will have no variety of play-space, no indoor playroom, no movable equipment, and little or no planting. The annual maintenance cost of play parks includes the salaries of two play-leaders throughout the year plus the care and renewal of all the items mentioned above. It is estimated that 100,000 visits are paid by the children each year to such a play park, making a total cost per visiting child of approximately 6*d*.

*Playhouses in a Swedish park*

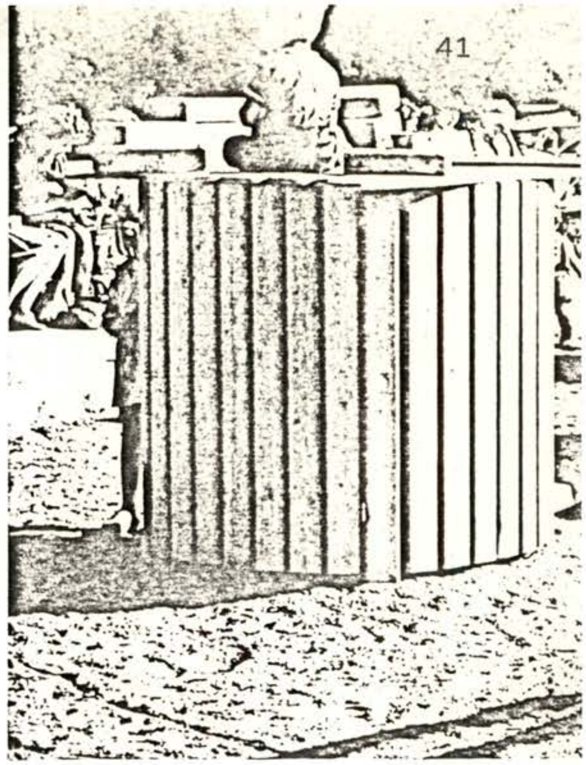




*Incidental play in Sarphati Park, Amsterdam*



*Building material used on a playground designed by Lars Hokmberg and Eva S. Paulsson, Sweden*



## Surfacing and texture

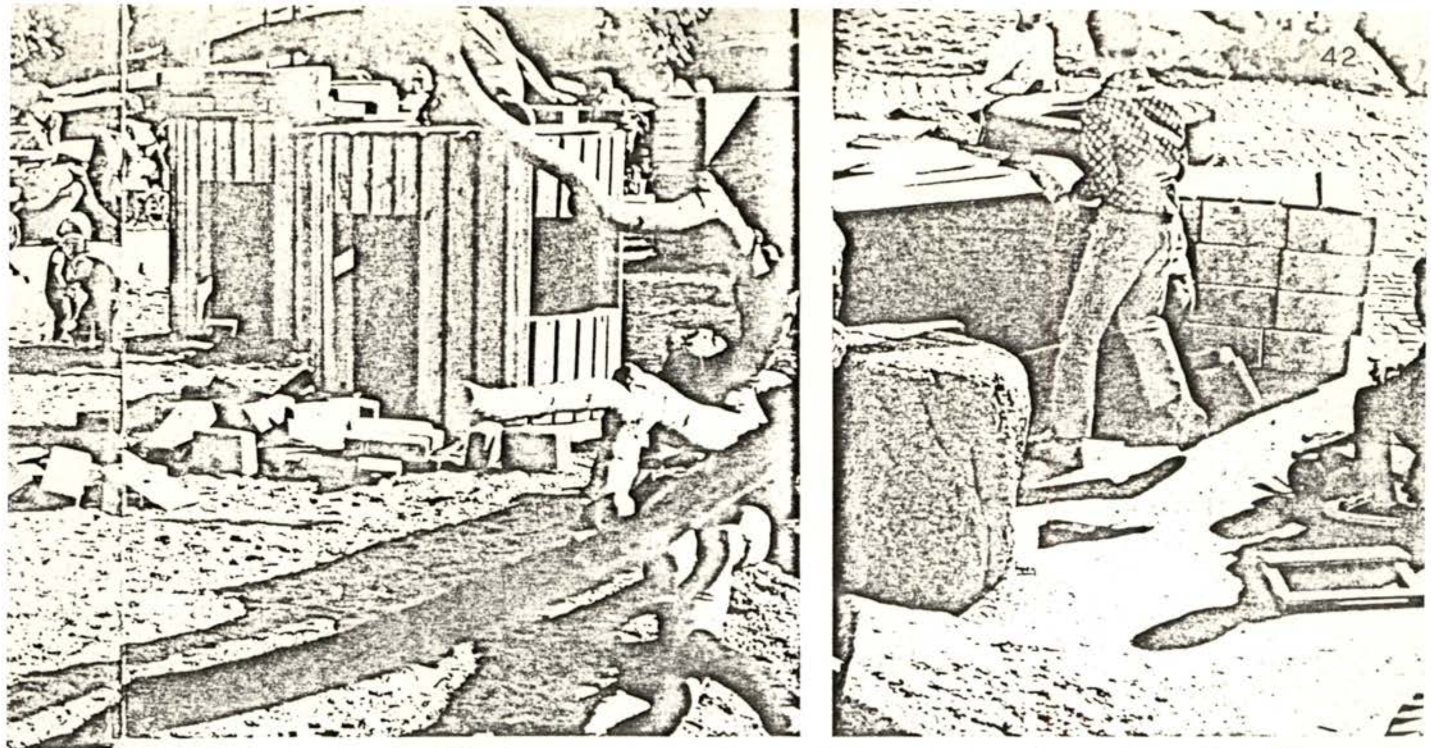
No one has yet discovered the ideal surfacing, although a mixture of grass and paving would seem the obvious compromise. The most pleasant surface is, of course, grass, but unless the area is large this will soon be reduced to mud – pleasant perhaps for the children but less so for their mothers. When grass is used as the surface material, some wear and tear will inevitably occur; there should be a sum of money allocated for re-laying and renewal. If the grass is scythed once or twice a year, the children will take pleasure in playing with the dried grass.

A playing surface that has proved satisfactory in a number of countries is one composed of steam-cleaned cinders (very fine) and peat moss. When mixed mechanically and rammed into place, this combination becomes a resilient surface of an attractive brown colour, the cinders acting as a binder for the organic material.

Plain earth should not be overlooked as a surfacing material. When mixed in the proper proportions of clay, sand and silt, it makes a surface more resilient than asphalt. No doubt there will be complaints that children soil their clothes when they play on an earth surfacing, but after all, if children are to play, they must be expected to get dirty sometimes. Country children play in fields and ditches, and get dirty – why not town children?

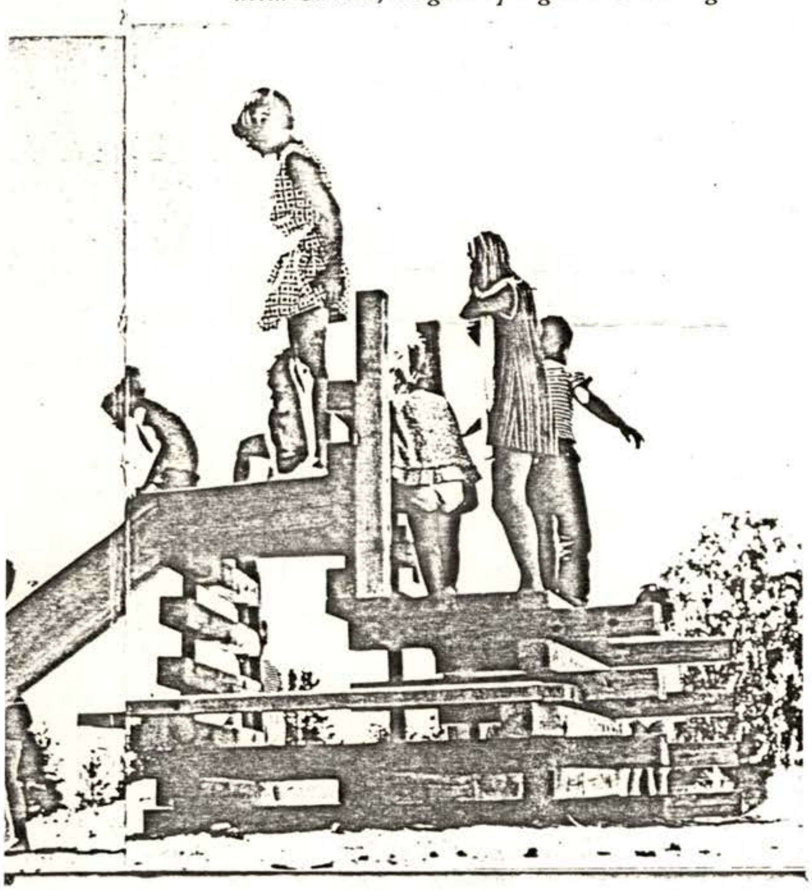
Where clean sea sand, free from oil, is easily and cheaply available, it provides an excellent floor. In certain parts of Sweden, whole playgrounds are surfaced this way. The disadvantage is that it tends to dry out and blow about to everyone's discomfort, unless it is sprayed in dry weather.

Probably the best surface is paving, in as many differing patterns and textures as possible within the overall design; this gives variety and interest, and helps to break up what could become a barren stretch of uninviting concrete.[13] When paving is used, there must be provision for good drainage in order to allow the surface to dry out as quickly as possible. Any puddles should be designed ones. To counteract the dullness of raw concrete, it is possible to paint it, as well as asphalt, with a liquid plastic dressing. This not only adds a pleasant colour but seals off the dust.[14] A plastic surface, which does not soil clothes, is used on artificial hills in Berlin.



*A housing estate playground in Gothenburg, Sweden, with sand floor and movable materials*

*north Sweden, designed by Ingemar Callenberg*



## Sand and water

Sand play is indispensable for the youngest children; it is a perfect medium and gives endless pleasure. Certain prejudices, however, must be faced. Sand play is thought by some to be a danger to health, even though no scientific evidence is available to prove this. If precautions are taken there is no danger. As sand is purified when it is exposed to rain, sun and wind, the sand-pits should not be boxed in when they are not being used, and they should always be in the sunniest part of the playground. The use of disinfection has been generally discontinued. If cats are found to foul the sand, it may be necessary to place on top an open wire frame with the largest possible mesh, to exclude their entrance, but this is by no means always necessary. Tarpaulins and wooden covers are no longer used, since wire-mesh provides ventilation and is lighter to handle. The danger of broken bottles in sand-pits must be guarded against by raking the surface each morning.

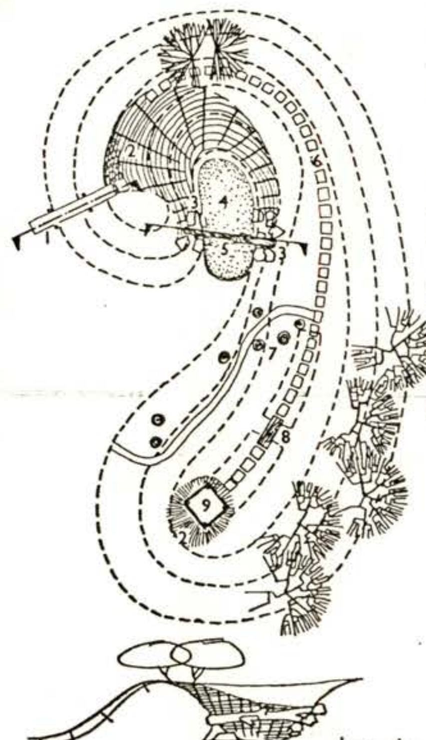
*Recesses for intimate play made from 3-foot high fencing, free from draughts and perfectly in scale* (below)

## Seclusion and scale

It is not easy to design a satisfactory layout combining the many ingredients of a playground for young children into a pleasant and harmonious whole. The designer should never forget that, though he is designing for children's use, the playspace must be considered as a visual extension of the surrounding houses.

The needs of the youngest children should be considered from the very beginning. The site of their playground should be selected with the greatest care, and they should not be left with a totally unsuitable piece of ground after other claims have been met.

The shape of the site is irrelevant. The basis of play for this age group is informality and the design should also be informal. Hard corners force an unnecessary restriction on children running, using tricycles and wheeled toys. Free or curved shapes also involve easier maintenance.

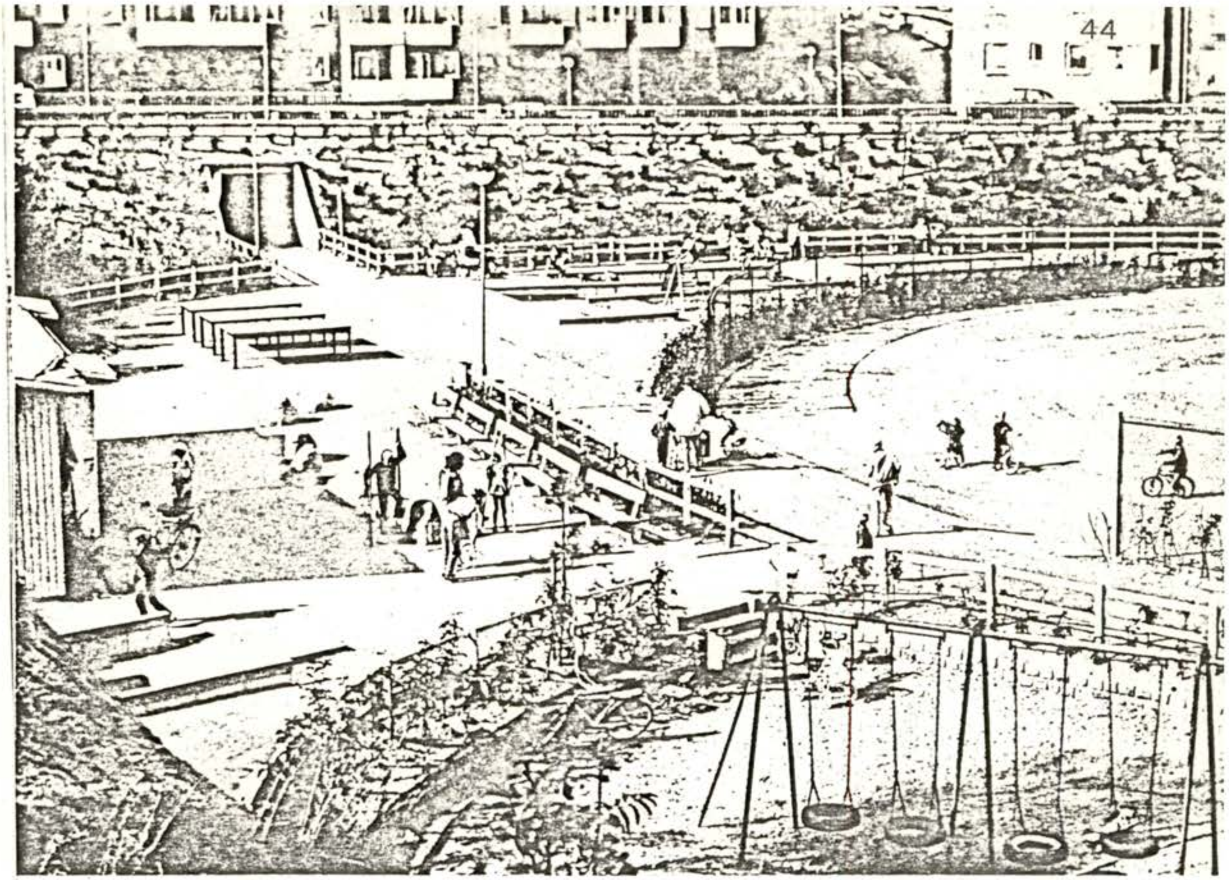


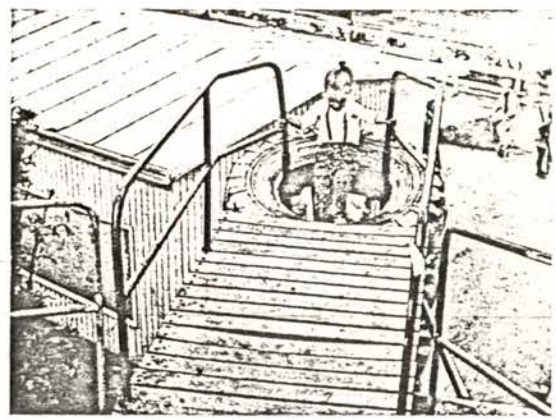

KEY

1 slide following side of hill
2 granite setts on steep slope for sliding down and climbing up
3 rocks set in bank
4 sand-pit
5 dead tree climbing bridge
6 stepping-stones
7 thicket of dead tree trunks for climbing
8 bridge
9 wooden look-out hut

A HILL PLAYGROUND FOR SMALL CHILDREN

*Designer: John Brookes*





## Playgrounds without leaders

Local authorities are often most unwilling to pay the salary of a play leader. Architects and planners are, therefore, searching for a good way to design playgrounds which are satisfying to the children and yet do not rely only on mechanical equipment or a play leader. This poses a very difficult problem and too little attention has been paid to its solution, for the unsupervised playground is the one most frequently to be found.

Many housing estates in Sweden have faced up to this dilemma. Arvid Bengtsson, the Parks Superintendent of Gothenburg, has created many playgrounds which, although without a leader, make use of heavy materials (such as large tyres and wooden blocks) that can be moved around by the children.

D

PRESTRESSED CONCRETE SYSTEM

*People shape their buildings;*
*thereafter the buildings shape the people.*
—Winston Churchill

SECTION II

# Designing the school

The problem: Design educational facilities to serve an estimated 63.3 million U.S. students by 1975, providing optimum flexibility of interior space, and meeting strict requirements for the financial budget, construction schedule, fire resistance, maintenance and aesthetics.

The solution: Through use of prestressed components, maximum flexibility of educational space readily may be obtained. Programmed building schedules can be met by using quality-controlled structural members, and the inherent fire resistance of such members meets rigid code requirements. The virtual elimination of maintenance is an added benefit, as is the attractiveness offered through a variety of shapes and surface textures in the exposed structural elements.

### Flexibility is essential

Flexibility of space is the prime design requisite for today's schools which must serve tomorrow's expanded enrollments and ever-changing educational requirements. Moreover, because of the variety of public functions the school building often serves, "flexibility" has become the key word in many building specifications to permit the changing of space not only for next semester's educational needs but for next week's service club luncheon or tonight's student dance.

Such flexibility of design space is readily achievable through long-span prestressed concrete beams, permitting the elimination of interior columns and the use of removable partitions to create multi-purpose areas. Today, dramatic examples of columnless spans of more than 100 ft. are commonplace through prestressing. Indeed, precast concrete beams have been designed in the 150-ft. range, and through use of the post-tensioning technique, even greater spans are obtainable. The men's gymnasium at Indiana State Teachers' College in Terre Haute has a prestressed folded plate roof that extends 155 ft. between columns.

### Long spans provided

In school construction, prestressed concrete has been of particular significance for the long-span requirements of gymnasiums, cafeterias, auditoriums and stadiums. Without the use of prestressing many concrete shell roof designs would not be practical. Shell roof design includes barrel arches, domes, folded plates, hyperbolic paraboloids, and many combinations and free-form variations.

In some areas, large-cored members are being manufactured which span up to 100 ft. The members are prestressed both longitudinally and transversely. The large cores serve as convenient space for electrical conduit or as air ducts for heating and air-conditioning. The members also are used vertically as wall panels.

### Versatility noted

Through prestressing techniques, the imaginative school design team also has the opportunity of economically building vertically when land restrictions obviate horizontal construction. In one Western school a prestressed concrete structure has been built straddling the existing older facility, which was later connected to the newer building.

Upon occasion architects have chosen to design schools with the first floor raised about 10 ft. above the ground, supported on precast columns. The obvious advantage is the sheltered play area afforded students during inclement weather, and parking areas for the school's instructional staff.

The increasing cost and scarcity of city sites has resulted in unique school designs. New York City has built one school over the Hutchinson River Parkway and others in apartment buildings. A school in Beverly Hills, Calif., tops three parking decks for cars. "For an estimated $900,000, we can provide about two acres of parking," says its architect. "When you consider that land here goes for about $1 million an acre, you can see we're saving some money."

Other large cities, plagued with high real estate costs, also have been forced to use ingenuity for developing new schools. One technique developed by school planners is the joint occupancy concept, in which school plants are built into private or public housing projects or even into commercial office buildings. In effect, the joint occupancy scheme provides free sites for public schools.

In Chicago, branches of eight elementary schools have been established in two South Side public housing projects by altering space originally designed as apartments. New York City has planned two similar projects where lower floors of apartment buildings will be designed as school space and attached low-rise buildings will house auditoriums and cafeterias.

### Air rights utilized

The principle of buildings on air rights is also being utilized. The campus of New York's Bronx Community College straddles a subway train yard; in Chicago, plans are underway for a junior college to be built over railroad tracks. The new United Nations schools are built on a renovated pier in the East River, close to U.N. headquarters.

Further innovations in space utilization are seen in the conversion of renovated buildings into schools. In Chicago, a candy factory was transformed into a vocational high school with modern shop facilities. Also in Chicago, a number of abandoned telephone exchange buildings were donated to the Board of Education and converted into educational and vocational guidance centers to teach crafts to overaged elementary school pupils.

Still another answer has been the creation of educational parks: The construction of schools of all levels from elementary through high school or community college on a single, park-like site. East Orange, N.J. is abandoning its existing school system and recreating it in an educational park. New York City has planned several educational parks.

### The Pittsburgh Plan

A different interpretation of the educational park has been developed in Pittsburgh. Rather than creating school complexes in which all levels of education occur on one site, Pittsburgh envisions the educational park as part of an overall redevelopment scheme for entire neighborhoods.

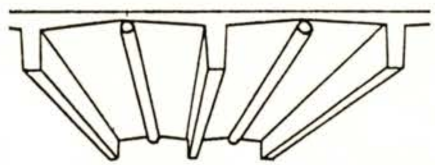
## School Construction Systems Development

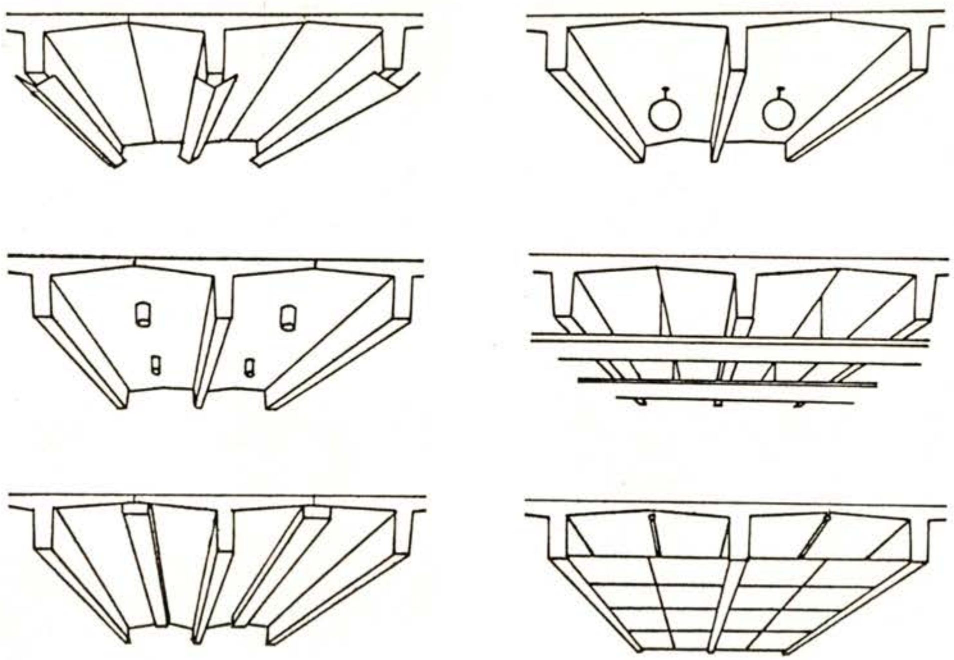
The demand for flexibility of educational space is the fundamental basis for the School Construction Systems Development program discussed in the preceding Section on school planning. SCSD requires the development and utilization of structural components, amenable to mass production, that are compatible with and incorporate into the roof structures such factors as the lighting and ceiling system, heating, ventilating, and air-conditioning equipment, with provisions for acoustics and interior partitions.

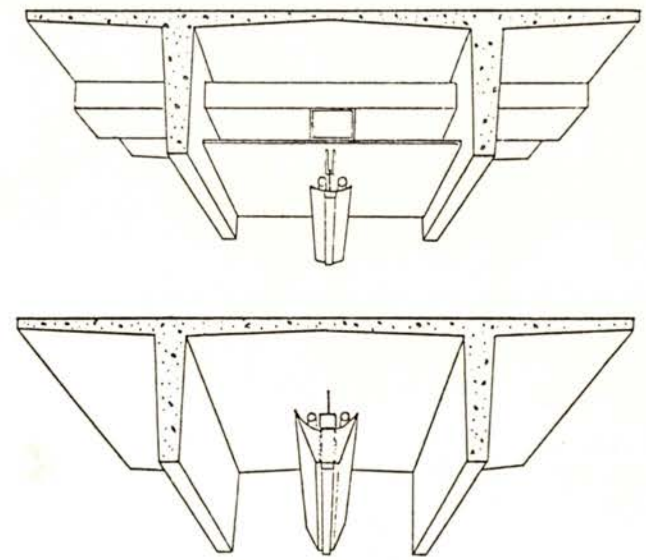
Precast, prestressed concrete components are ideally suited to such building programs, in that the areas between the stems of single-tees, double-tees or channel units or the cores of hollow units capably serve as area-ways for mechanical equipment.

The accompanying illustrations demonstrate how two California producers of prestressed concrete components met the SCSD specifications. The SCSD program required that the total depth of the ceiling "service sandwich" (formed by the prestressed members and the mechanical equipment) must not exceed 3 ft. from the top of the roof component to the bottom of the mechanical equipment. This requirement was ably met in the prefabricators' proposals, with the equipment located either parallel to the stems or perpendicular to the structural components, in which case openings were designed through the stems to allow passage of the pipes and conduits.

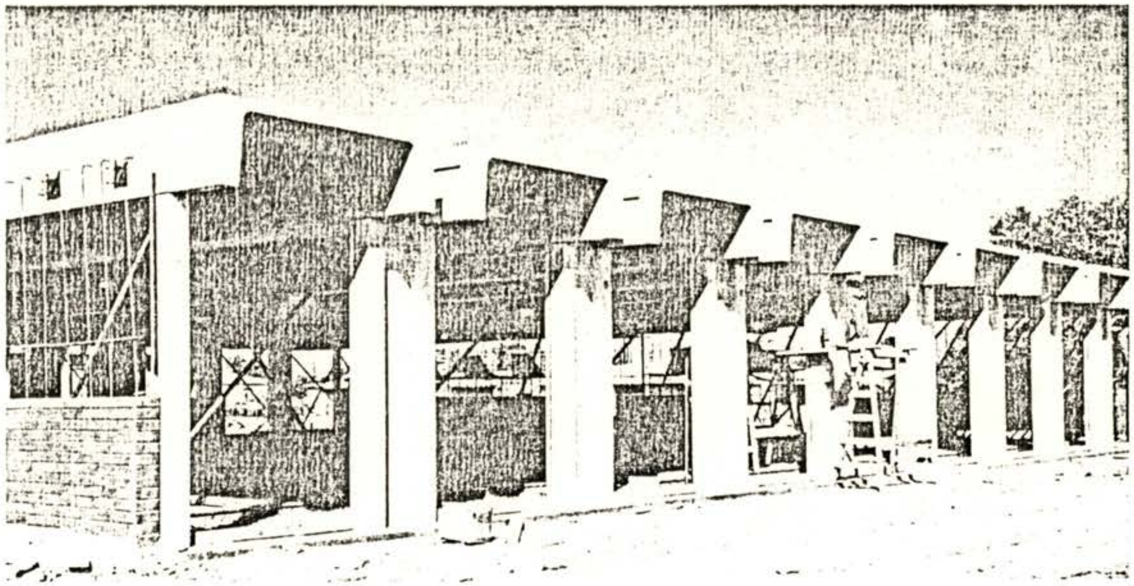
Examples of cove lighting, surface-mounted directional lights, diffused lighting, hung fixtures and luminous ceiling arrangements. These are only a sampling of the lighting techniques possible with prestressed stemmed members.

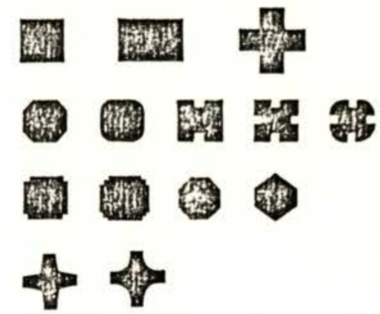


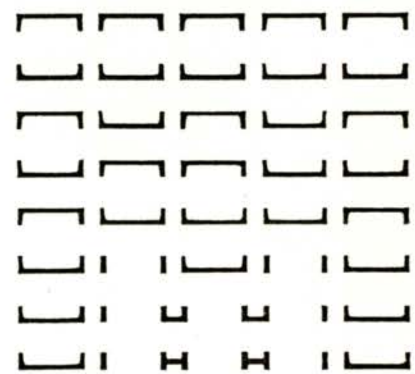


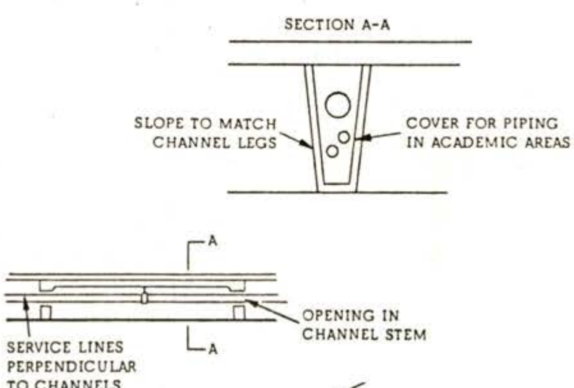


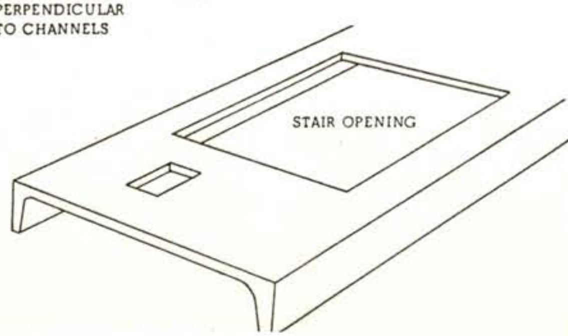
Sketches prepared by firm of Ben C. Gerwick, Inc., illustrate typical compatibility of prestressed components with mechanical and lighting systems. Transverse distribution services are accommodated by either round or rectangular holes formed through the stems of the tees. Thus, a minimum depth of the overall integrated structural-mechanical system is achieved.










Versatility of prestressed components is well demonstrated in Ferguson Elementary School at Hawaiian Gardens, California. The architect, Duffy & Dreher of Long Beach, utilized channel members 105 ft. long, 8.4 ft. wide and 30 in. deep in the three-building complex; the units provide a 5-ft. cantilever. This Concrete Modular Duct (CMD) system is compatible with service components, thus providing total environmental control on a flexible modular basis. The CMD system consists of three main elements: Prestressed channel sections, girders and columns. The system was developed through Interpace (formerly Wailes Precast Concrete Corp.). The illustrations demonstrate column shapes, including those specified for California's SCSD program and other possibilities; various possible arrangements of channels when used vertically as wall panels; architectural treatment of the channel overhangs; and provisions for openings and passage of services.

## Concrete Modular Duct System

The precast prestressed concrete modular system proposed for SCSD by INTERPACE of Pomona, Calif. (formerly Wailes Prestressed Concrete Corp.), has since resulted in the construction of Ferguson Elementary School, located in the community of Hawaiian Gardens, near Long Beach. The INTERPACE system is compatible with other building and service components to provide the school with total environmental control on a flexible modular basis. The building system has been termed CMD (concrete modular duct).

The CMD system consists of three main elements: prestressed channel sections, girders and columns. The channels serve as the key link in the "service sandwich" and carry the duct work for air distribution from the primary source to the terminal distribution system. The length, depth and width of the stem of the channels can vary, depending on application and structural design.

### Advantages of CMD

The CMD school structure offers several apparent advantages, in common with all precast, prestressed concrete construction:

• Channels precast in steel forms give a finished surface with low maintenance characteristics.

• Erection time is fast because comparatively few pieces are involved (two days per building at the Ferguson School project).

• Fireproofing is integral with the structure, thus meeting code requirements without added cost.

• From a civil defense standpoint, CMD has advantages in that some radiation protection is provided.

In addition, a variety of cantilevered end configurations are available, and the cantilever soffits can have an architectural finish of almost any color and texture. Short sections of the roof channels can be used as exterior bearing walls in a variety of ways for visual consistency with the structure. Natural lighting can be achieved by utilizing the space between the precast units in the overhang. Parapets in different configurations may be used to provide a distinctive appearance and for screening roof-mounted mechanical equipment. Column shapes also can vary to express different architectural designs.

Since the initial SCSD specifications were drafted, technological advances in prestressed concrete fabrication permit even greater freedom of integration of mechanical equipment and prestressed components.

### Merrimac Elementary School

One of the first all-concrete schools in the nation to employ a modular component design approach is Merrimac Elementary School in Merrimac, Mass. The structure was designed by Architects Lord and Den Hartog of Boston, who had earlier developed a precast, prestressed building shell system called Precreate.

Based on Precreate ideas, Merrimac School is designed to permit expansion in any direction without disturbing existing operations. The basic structure is a 52,000-sq. ft. block of five classrooms, completely self-sufficient with required services. Each module can be arranged in a variety of ways, horizontally or vertically. Construction of the building shell calls for standard precast, prestressed concrete components, resulting in clear spans of 72 ft.

## Integration of mechanical equipment with the structure

One of the important advantages of prestressed concrete is that it can be left exposed. This is possible because of its fire resistance and the relatively smooth, durable surface of the precast products.

By confining the service lines and ducts within the profile of the structural members, such as between the stems of tee members or inside cored members, the story height—and therefore, the over-all building height—can be reduced. In addition, cleaning and maintenance expenses are lowered.

The space between the stems of the members provides, in effect, a natural lighting fixture or troffer. This area can be coated with a highly reflective paint, and high-output fluorescent lamps can be installed in a continuous strip. Thus, by proper spacing of the lighting channels a high level of illumination can be maintained at substantial savings. By using recently developed paints these prestressed concrete lighting channels can be made almost twice as efficient as conventional fluorescent fixtures. In special areas, troffers can be completely enclosed with diffuser panels fastened directly to the bottom of the tee flanges, to produce a completely flush ceiling.

Because of the high load-carrying capacity of prestressed members it is possible to locate high-voltage substations, with heavy transformers, near the areas of consumption with little or no additional expense. Safety of personnel is also benefited, since the distribution feeds can be run within the channels created by the stems and a closure piece attached to the bottom of the stems, instead of being exposed to maintenance forces.

### Use of stemmed members

Similarly, distribution ducts for heating, air conditioning, or exhaust systems can be provided by this same space in stemmed members or inside cored members, at substantial savings. In stemmed members there can be up to 70 per cent reduction in metal duct work alone, since three sides of the duct are readily provided by the bottom of the flange and the sides of the stems. The fourth side of the duct is merely a metal panel attached to the bottom of the tees in the same fashion as the lighting diffusers. The attachment can be made with threaded inserts, reglets, or other commercially available inserts either cast into the tees or by drilling and plugging.

If high-velocity air movement is required the enclosed space becomes, in effect, a long plenum chamber with uniform pressure throughout its length. Air diffusers are merely installed in the sheet metal bottom panels. Branch runs, if required, can be made with standard ducts at the column lines. Branch ducts also can be accommodated by providing holes in the stems of the tees, as illustrated.

### Cored members

In a cored member virtually all duct work is eliminated. These members can have oval, round or rectangular voids of varying size and provide excellent ducts and raceways for the various systems. With these ready-made passages, holes can be punched to provide access and distribution. The cores are merely lined up and connected to provide continuity of the system. Holes compatible with structural design can be provided in intermediate supporting beams, such as inverted tees, to insure continuity.

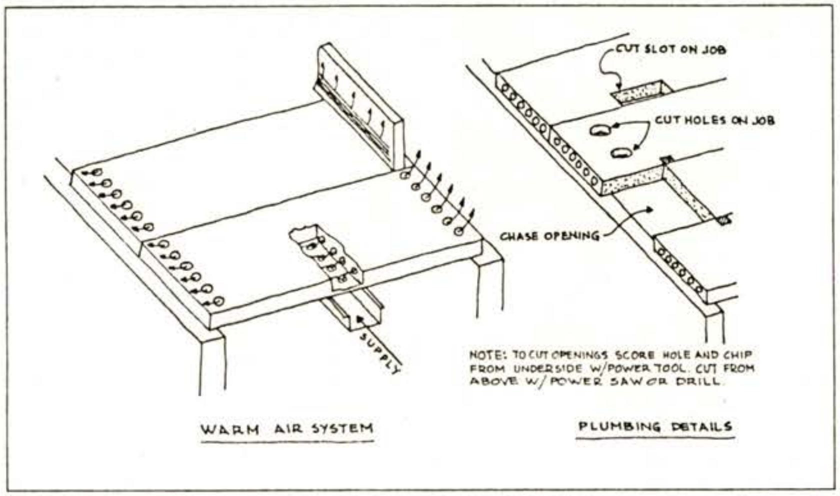
The accompanying drawings illustrate various methods devised to coordinate mechanical systems with precast, prestressed concrete components.

### Electrical requirements

The increasing use of business machines, television and telephones in schools stresses the need for adequate and flexible means of supplying electrical outlets. A concrete fill, usually placed on prestressed members, provides an excellent section in which to carry conduit runs and floor outlets. With the shallow-height electrical systems now available, a comprehensive system can be provided for in a reasonably thin slab. The height of tubes for these electrical systems is as little as 1⅜-in.; most systems easily can be included in a 3-in. topping. When the electrical system is placed in a composite topping considered part of the structural slab, the location of ducts and conduits must be coordinated with the reinforcing steel.

### Special components

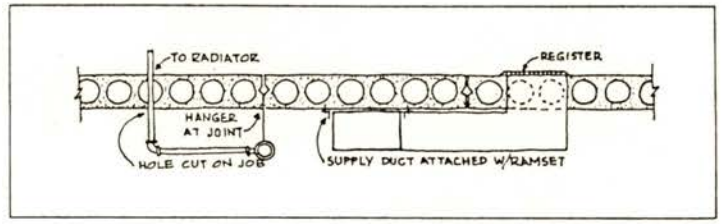
A few prefabricators of prestressed concrete products may also manufacture a component which resembles a pair of double-tees joined side-by-side, so that four stems appear in section. These multi-stemmed units are usually installed "upside-down," thus presenting a finished ceiling on the underside. At the job site, a composite slab is placed on top of the stems, thereby creating a structural member quite similar to a hollow-core slab, with flat top and bottom surfaces, but with some additional advantages. By initially leaving the top slab off, the electrical and mechanical systems can be installed in the field with generous tolerances, because it is relatively easy to carry such systems either across or within the stems. The systems are then covered when the top slab is placed. In addition, openings can be provided with ease in the stems and bottom flanges for ducts or pipes running across or through the member, by forming openings at the plant or by drilling them at the job site.

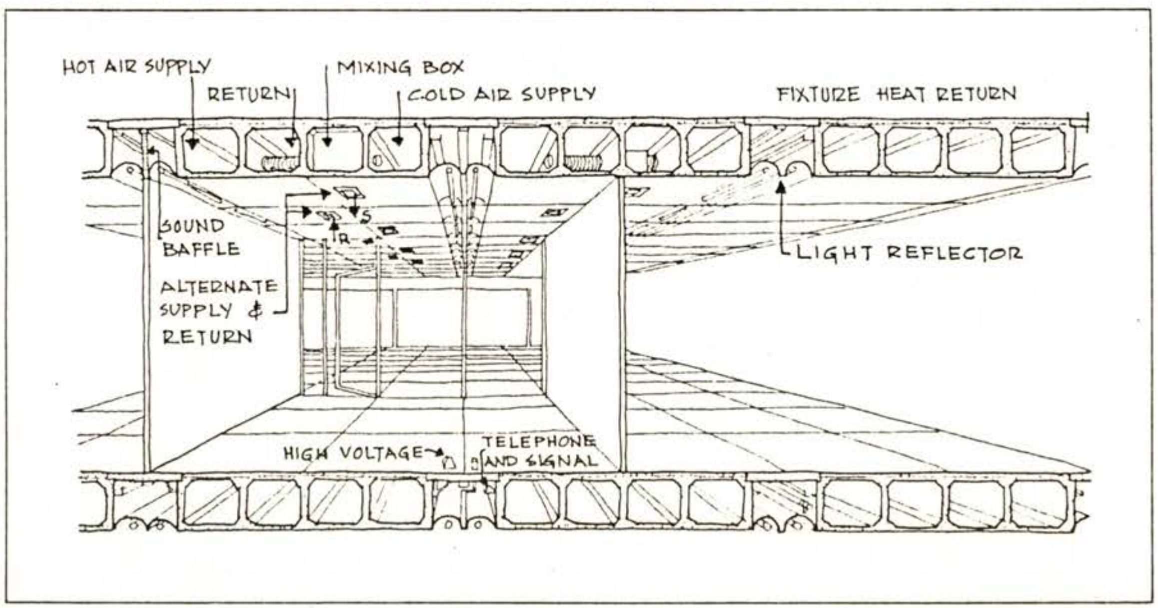



Sketch of warm air system and plumbing details that take full advantage of the voids in hollow-core slabs.

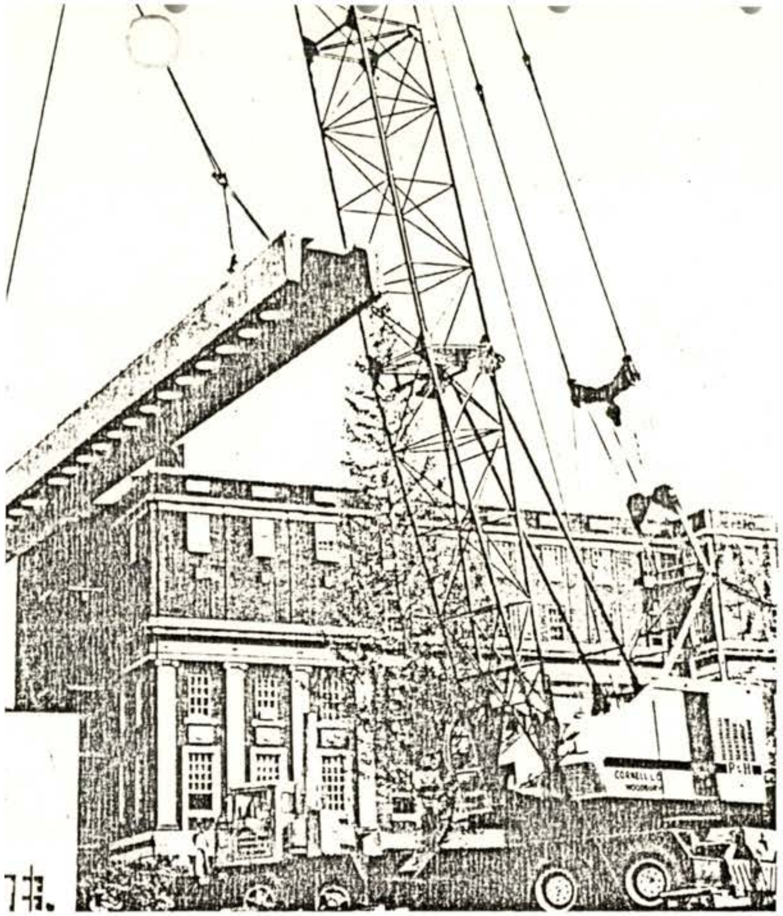
Installation of heating systems in hollow-core slabs. An example of a wet heating installation is shown on the left and circulating air on the right.

Courtesy of Utah Prestressed Concrete Co.




Lighting, wiring and a dual-duct air-conditioning system can all be filled within the overall depth of this type of large hollow-core slabs. Access holes are arranged so that mixing boxes, baffles, and diffusers for air supply as well as wiring and lighting can be easily installed after the beams have been set in place in the structure. This system has the advantages of providing a flat ceiling and enclosing all of the mechanical systems within its structural depth.



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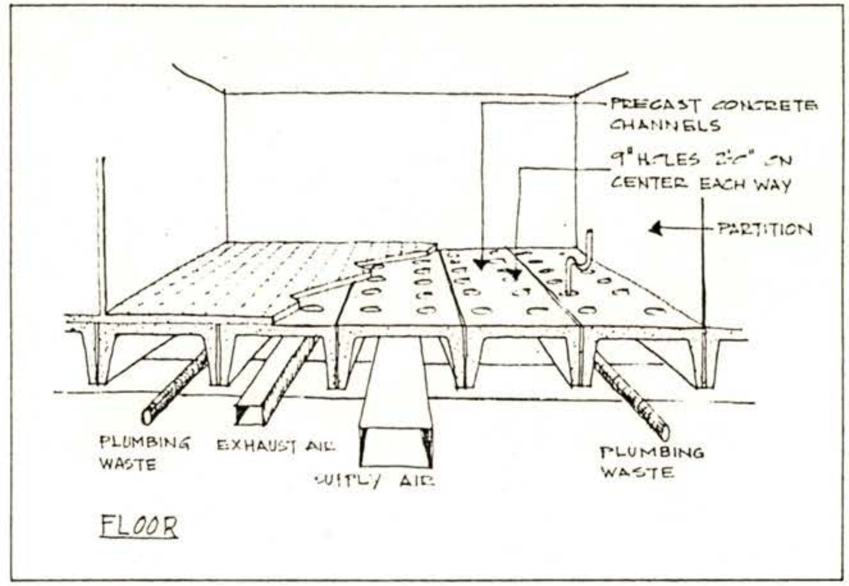
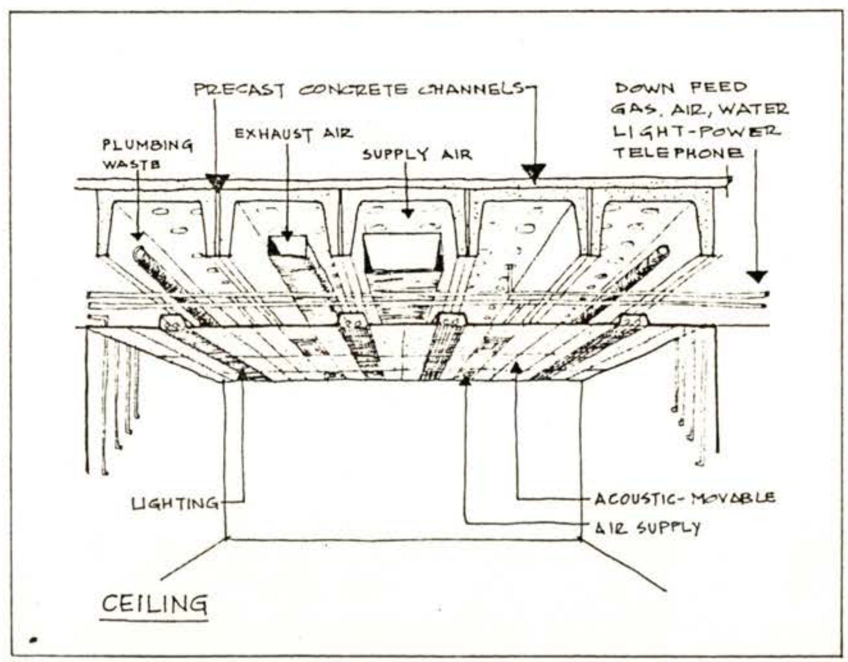
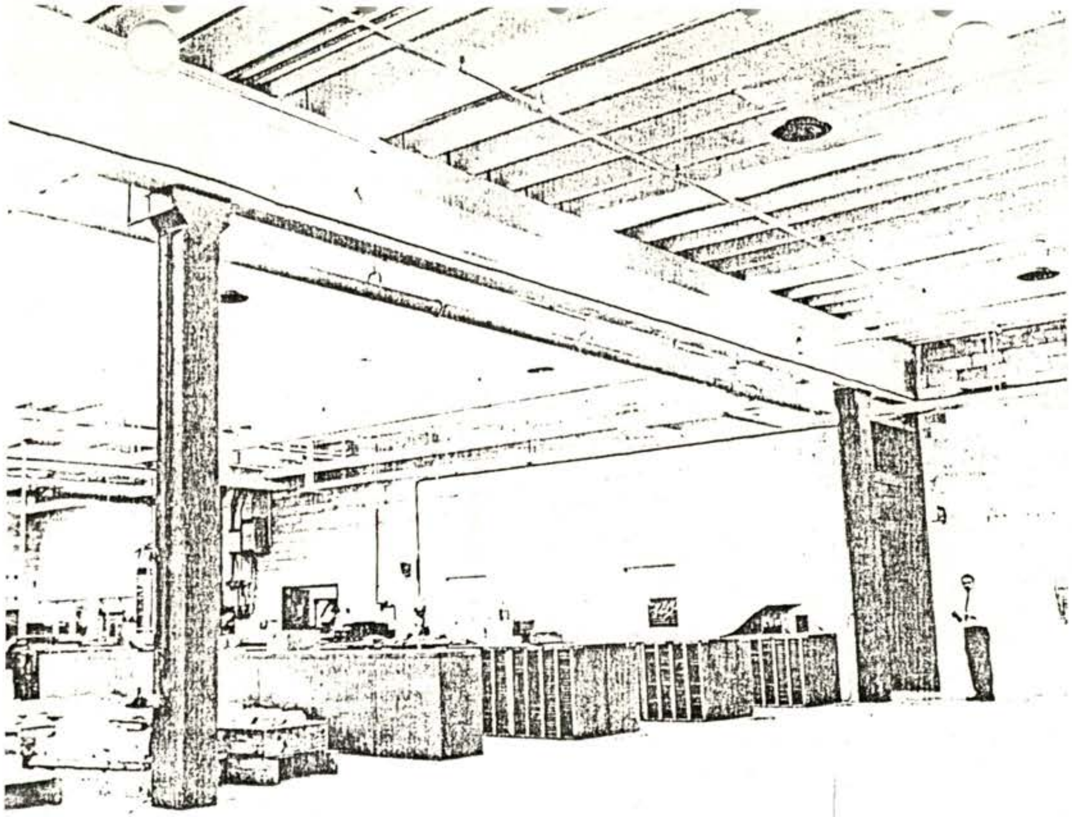
ct: Nolen and Swinburne

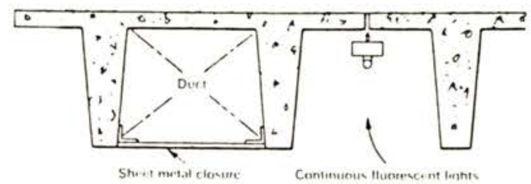


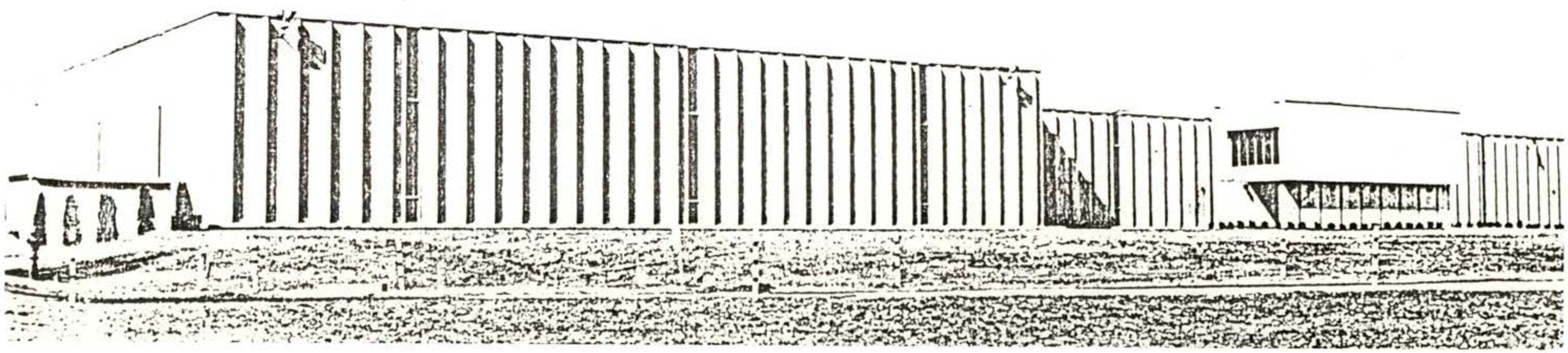



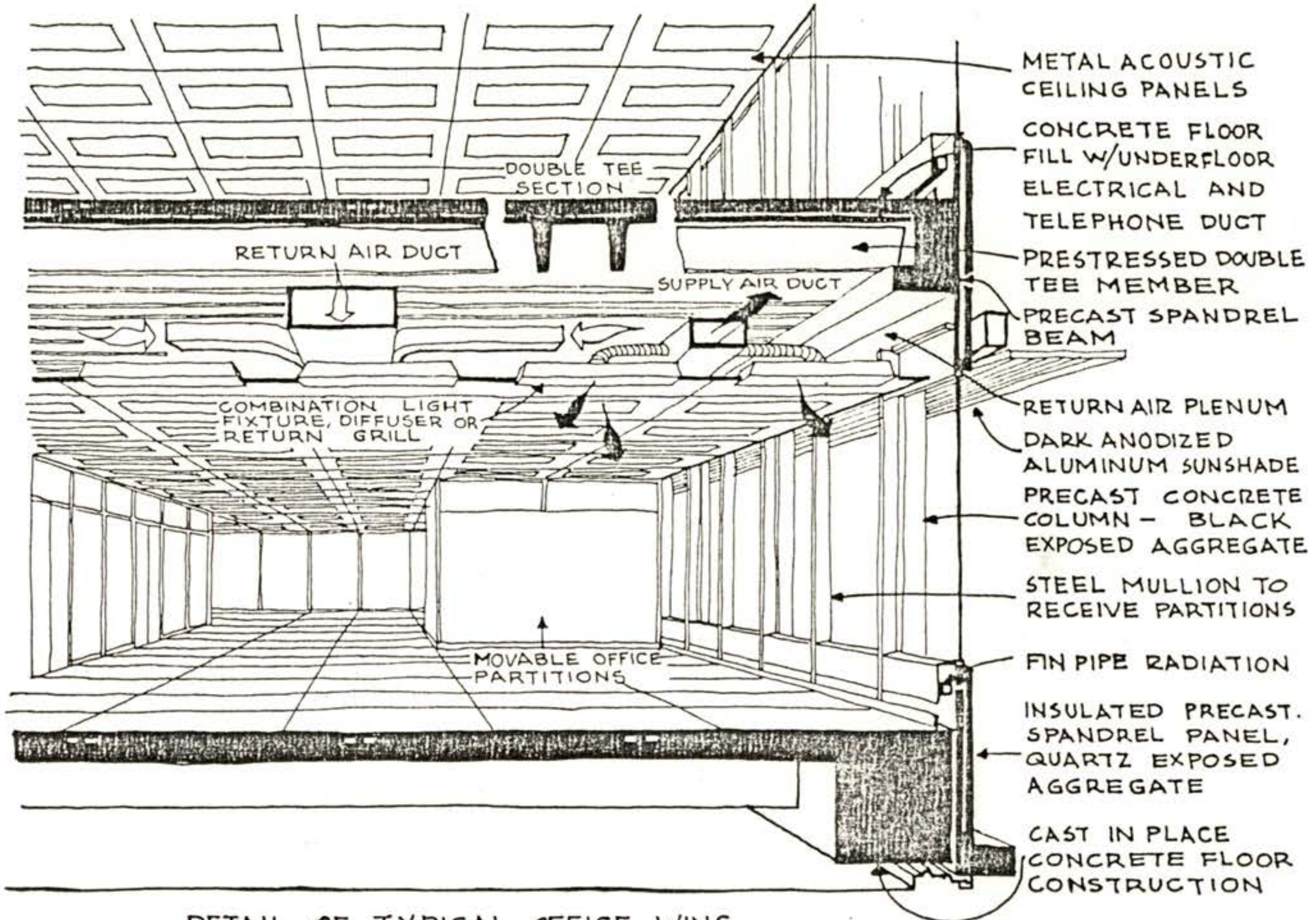

Maximum flexibility is created with the integration of utilities as shown in these sketches. All services—gas, water, vacuum, pressure, waste, air conditioning, lighting and power—are placed within prestressed concrete channel members. The photo shows one of the channels being set into position in a structure. The unit has 9-in.-diameter holes formed at the plant to accommodate a 4 ft. x 4 ft. modular plan. The holes were placed in the members to provide access to the electrical and mechanical distribution systems.



Electrical conduits, air-conditioning ducts, fluorescent tubes and all mechanical piping are supported and integrated into the structural system of the Henry A. Loughlin Building which houses the printing division of Princeton University Press in Princeton, N.J. The space between the tee stems was used as ducts, with sheet metal enclosures attached to the stems. Columns, girders and tees were painted to reflect the bare fluorescent tubes, with a resultant 25 per cent reduction in electrical costs. The roof deck of the 64,000-sq. ft. plant consists of 50-ft. double-tee slabs. The structure is framed with 14-in.-sq. precast columns and 36-in.-deep prestressed girders. The exterior is clad with 8-ft.-wide prestressed panels, sprayed at the site with thermal and acoustical insulation.






DETAIL OF TYPICAL OFFICE WING

Sketch showing how composite lighting, acoustic and air-conditioning systems can be combined in a double-tee roof system providing complete space flexibility as well as environmental control.

Raceways of prestressed hollow-core units forming floors and ceilings are utilized to carry closed-circuit educational television and other utility lines to all classrooms in the Fred J. Heyne Building at the University of Houston, Texas. The building houses the College of Pharmacy and the College of Business Administration, where a great number of electrical outlets were especially required for business machines. The wiring system provides for extreme flexibility for future needs and will permit easy relocation of floor outlets and ceiling lighting during the life of the building. The duct work permits students in any classroom to receive television programs originating in studios on the first floor of the building.

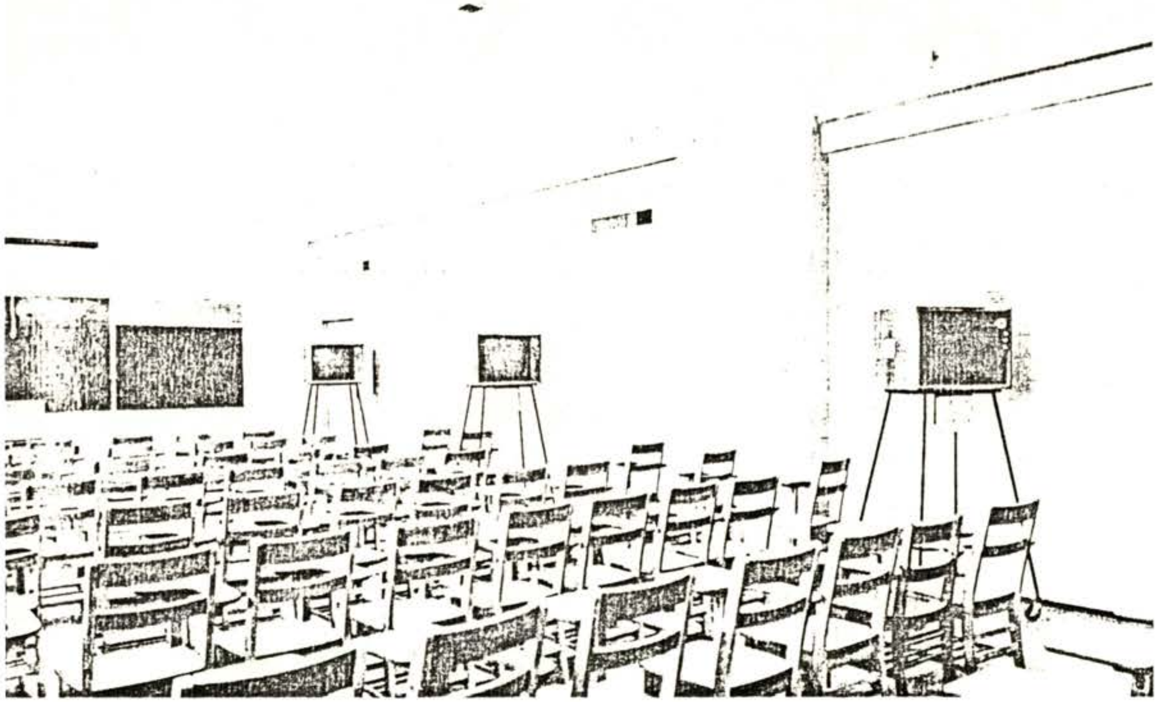
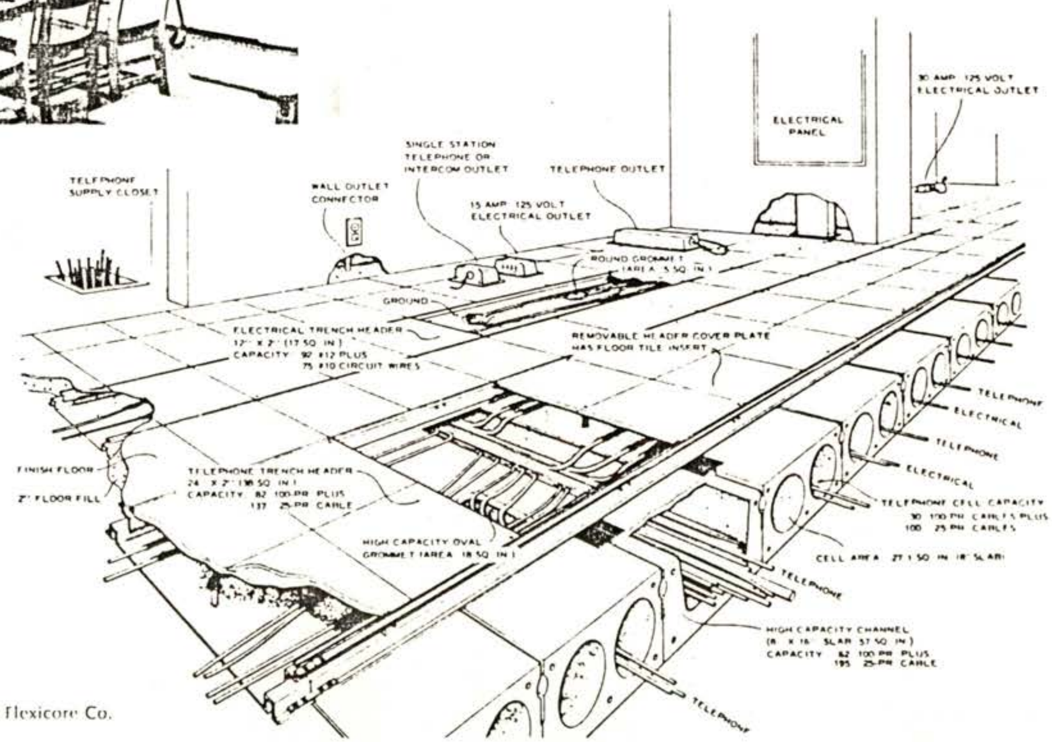


Photo courtesy of Flexicore of Texas, Inc.




Cutaway drawing illustrates one system of underfloor telephone and electrical distribution utilizing precast, prestressed hollow-core components. Many variations of this illustrated system are possible. All fittings are listed by Underwriters' Laboratories, Inc.

Courtesy of the Flexicore Co.

# Fire resistance of prestressed concrete

Provisions for fire safety in educational buildings have progressed far from the days when a bucket of water was kept handy in the early schoolhouse, in case the wood-burning stove became overheated. Perhaps the first advance in fire safety was the provision for a pond near the rural schoolhouse, to serve as a reservoir from which water could be pumped or carried by bucket brigade. A more sophisticated design treatment of the pond principle is seen today in the air conditioning system areation reservoir, which may serve as reflecting pools set amid landscaped plazas. In many outlying school districts, however, the modern areation pond also serves as an emergency supply of water to fight fire.

## Fire safety essential

The addition of overhead sprinkler systems in existing classrooms has been in wide use since the tragic deaths of 92 students and three nuns on December 1, 1958 in a Chicago elementary school. Three-fourths of today's schools are more than 10 years old, emphasizing the need for modern, safe classrooms.

Because of its intrinsic resistance to fire, prestressed concrete is an especially advantageous construction material. Insurance firms commonly offer lower premiums for buildings of such design, a cost factor which should be studied thoroughly by the design team. Quite frequently a structure initially designed in another building material is re-designed in prestressed concrete when the matter of insurance costs is considered. The resultant savings in insurance premiums thus permit more of the budgeted funds to be spent directly for the structure itself or for needed educational equipment.

## Underwriters' Laboratories

Two-, three- and four-hour label service is available from Underwriters' Laboratories, Inc., for prestressed concrete building materials. The various fire reports by Underwriters' Laboratories listed in Appendix C provide detailed information on fire resistance ratings of some prestressed concrete components. Copies of the reports are available from the Institute.

Underwriters' Laboratories, Inc.'s File R4123-13, *"Roof and Ceiling Construction Consisting of Prestressed Pretensioned Concrete Double-Stemmed Units and Various Insulation Materials,"* is especially important to architects and engineers. The test was designed to close a gap in the knowledge of fire resistance of insulated concrete roof slabs. The manufacturers of 11 different types of insulation material cooperated with the Institute to determine performance of insulating board and insulating concrete or mastic types of insulation. The universality and importance of the tests to the building industry is apparent.

## Building codes

Today, school design and construction are guided by municipal, state and—in Canada—federal building codes pertaining to structural safety. The codes include such factors as wind and load limits, the use of new building materials, illumination, acoustics, ventilation, the number and location of exits and stairways, and fire resistance ratings of structural materials.

Comprehensive building code requirements for precast and prestressed concrete construction (including post-tensioning techniques) are contained in the American Concrete Institute's publication, *"ACI Standard Building Code Requirements for Reinforced Concrete (ACI-318-63)."* The chapter on prestressed concrete was developed by a joint ASCE-ACI committee, with generous assistance from PCI technical committees.

## Other specifications

Additional specifications for architectural and precast concrete are listed in Chapter 13, and for prestressed concrete in Chapter 15, of the publication, *"Specifications for Structural Concrete for Buildings (ACI 301-66)."* The former specification covers such conditions as concrete proportioning, forms, placing of concrete, finishes (both textured and aggregate transfer), patching and curing. The latter chapter deals with materials in post-tensioned prestressed concrete (including admixtures and grout), and ducts, anchorages and splices, formwork, placement and protection of tendons and accessories, application of prestressing force, grouting and shop drawings.

Copies of the publications may be obtained from PCI, ACI, or the Portland Cement Association.

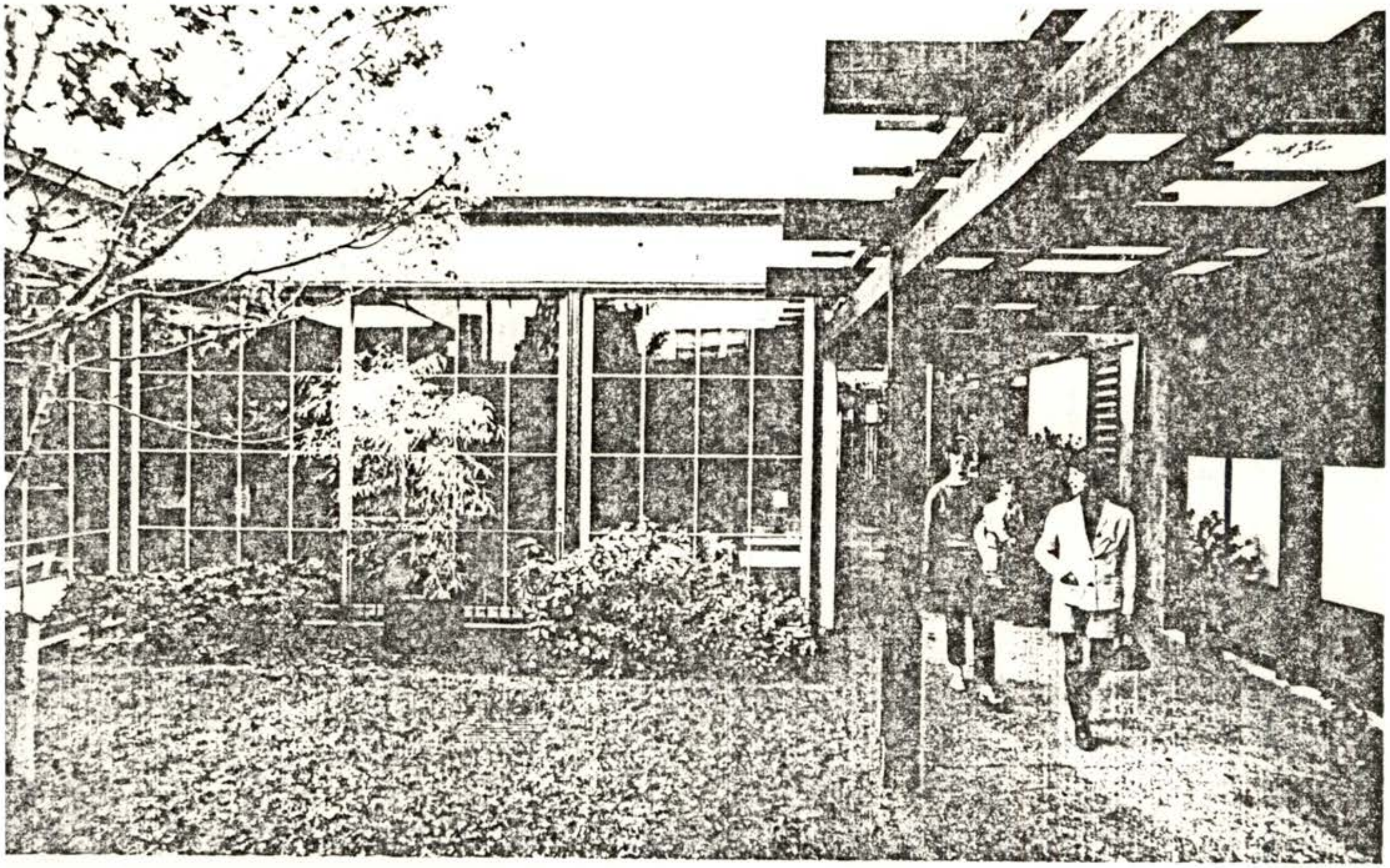
E

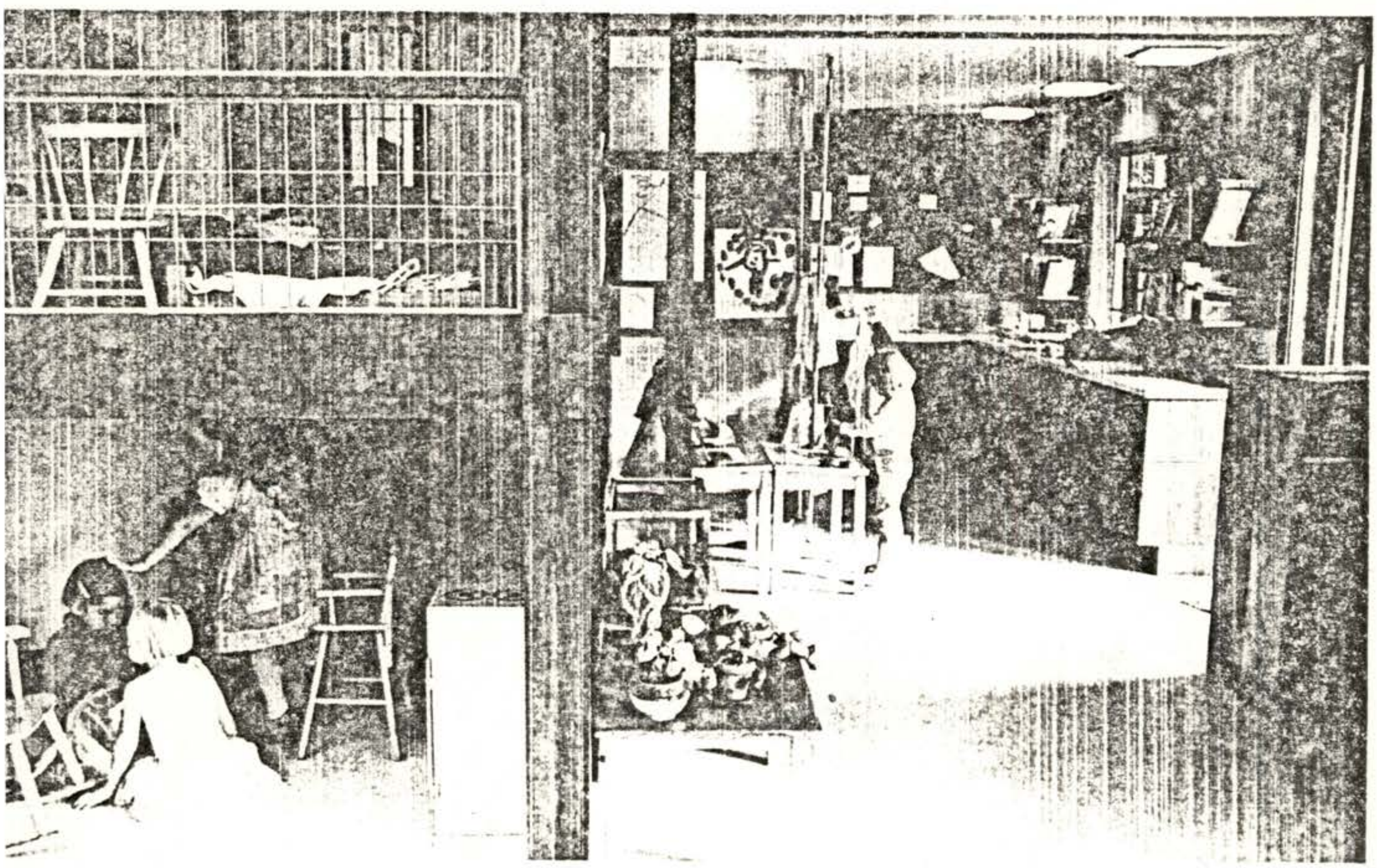
EXAMPLES OF THIS TYPE OF BUILDING :

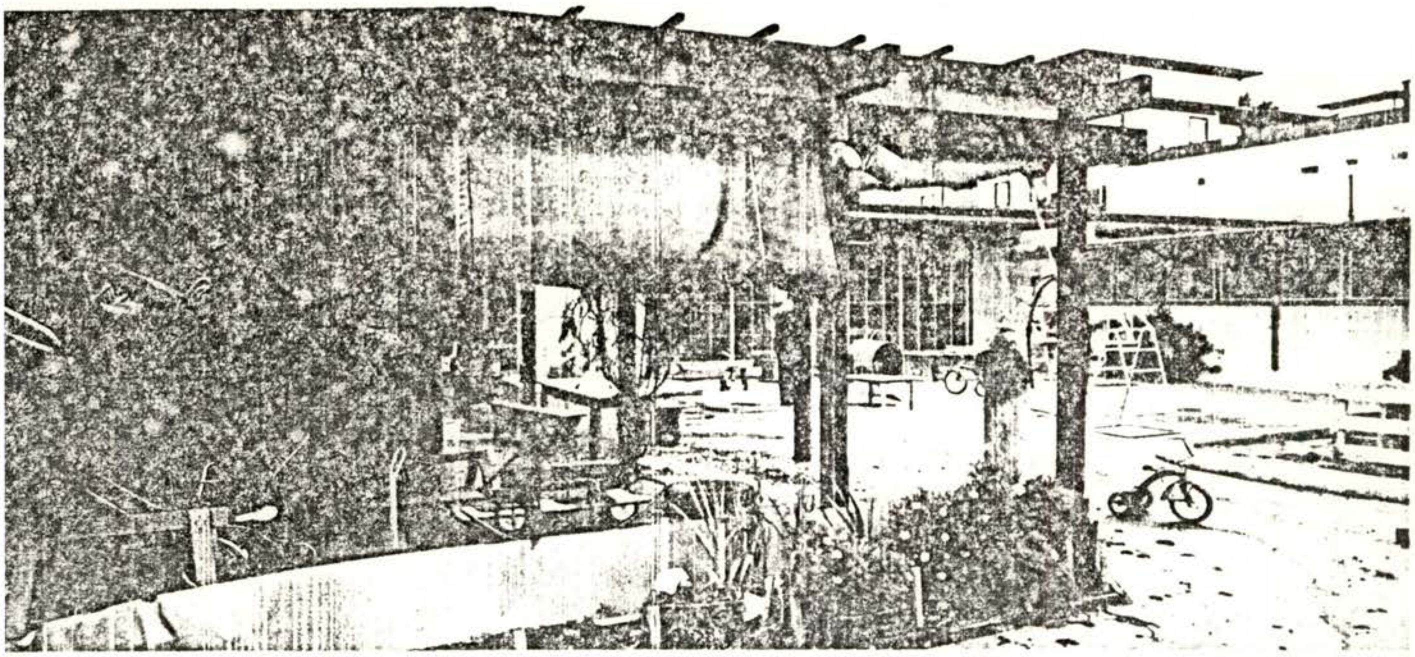
HAROLD E. JONE EARLY EDUCATION CENTER

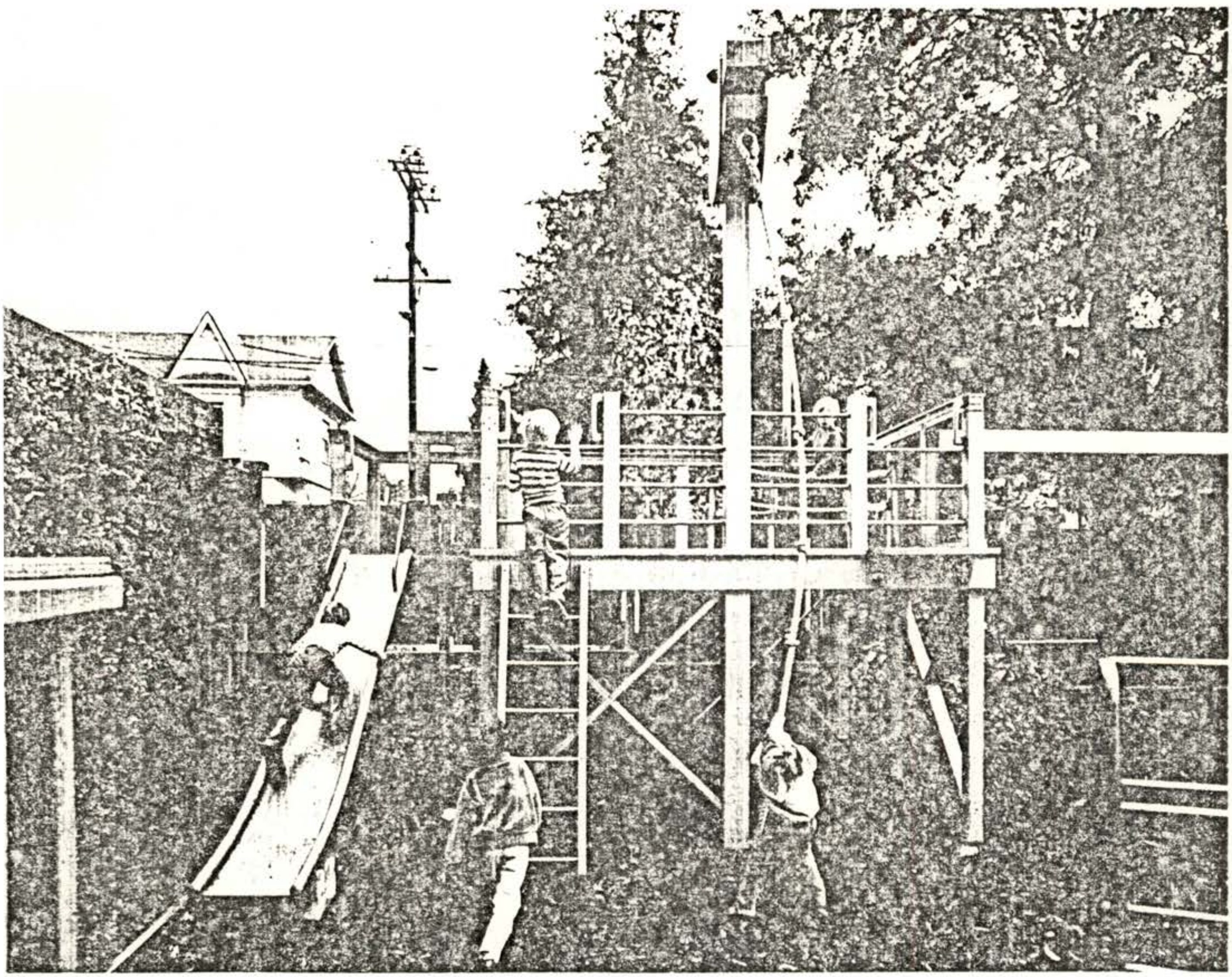
Two groups of children attend school at different periods of time. The children enjoy playing in the play yard independently or in group and feel free to go in to read books.

**Harold E. Jones Early Education Center**

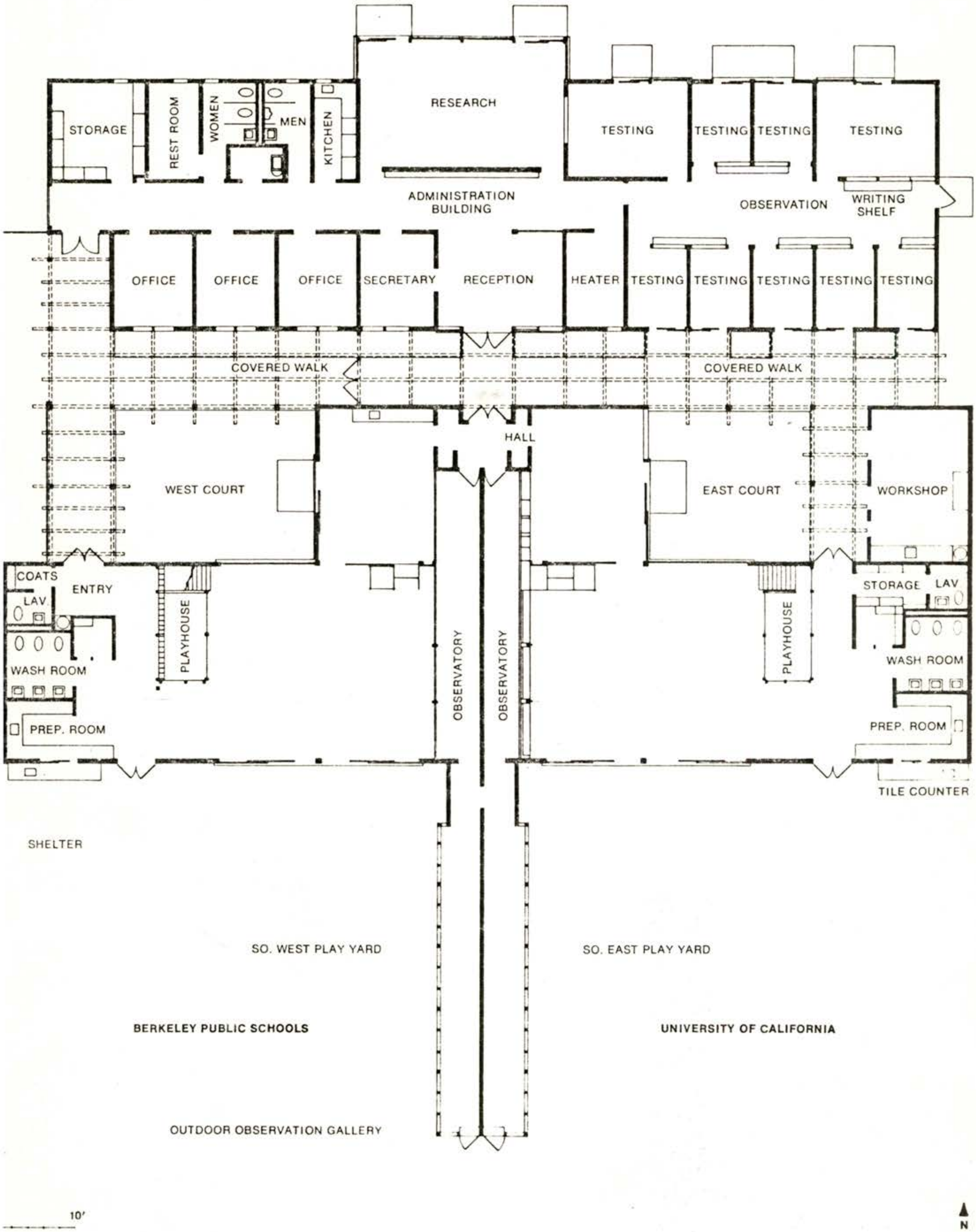






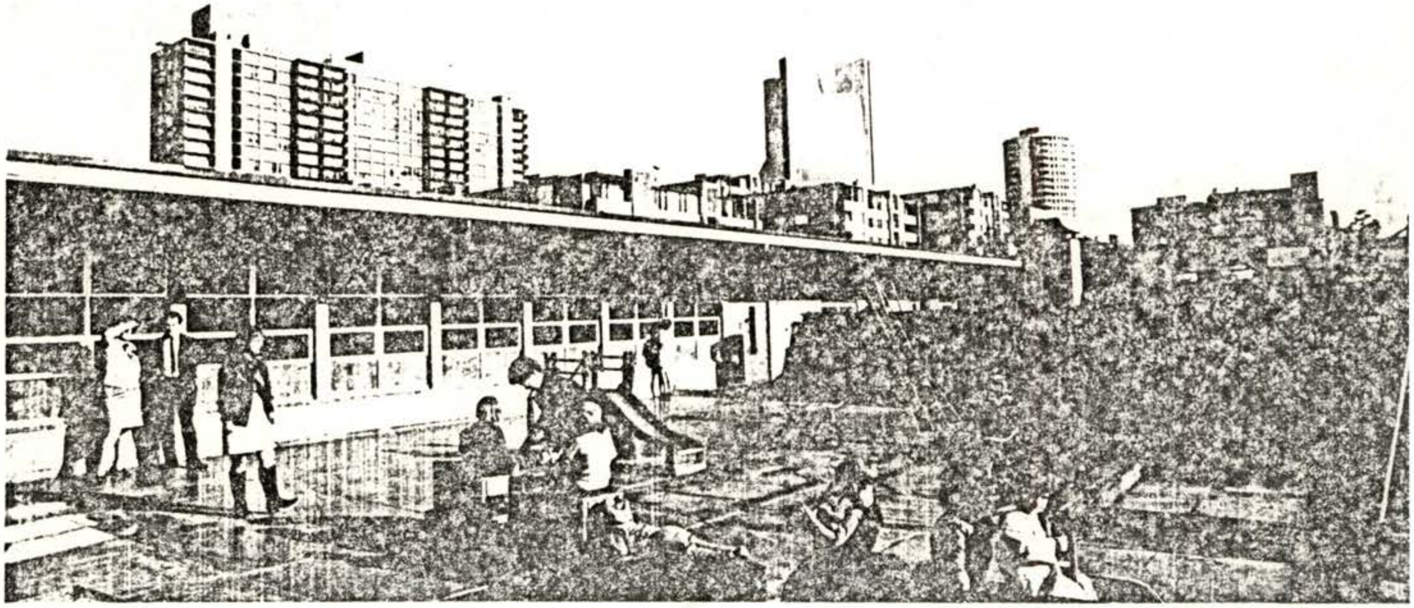


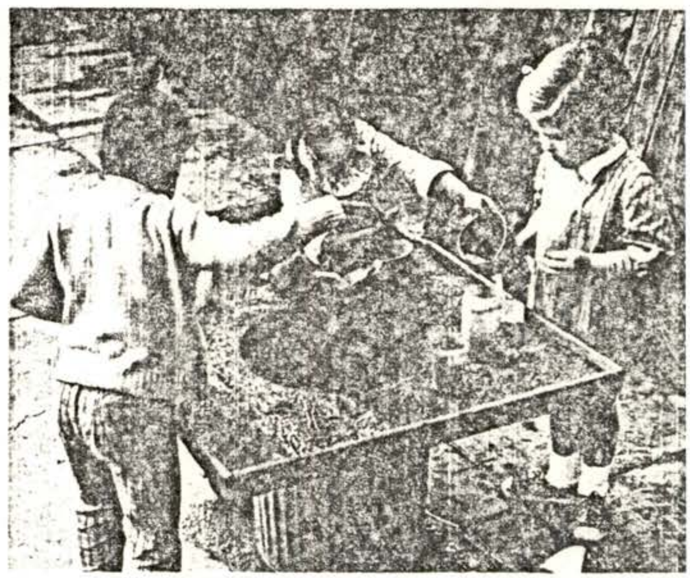
## Harold E. Jones Early Education Center

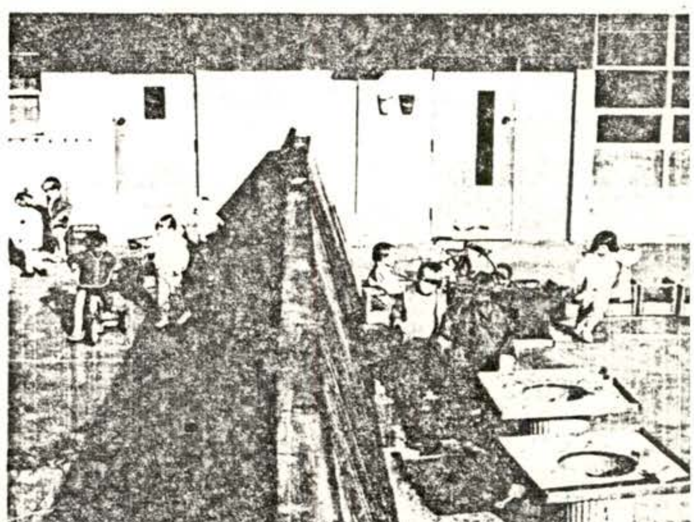


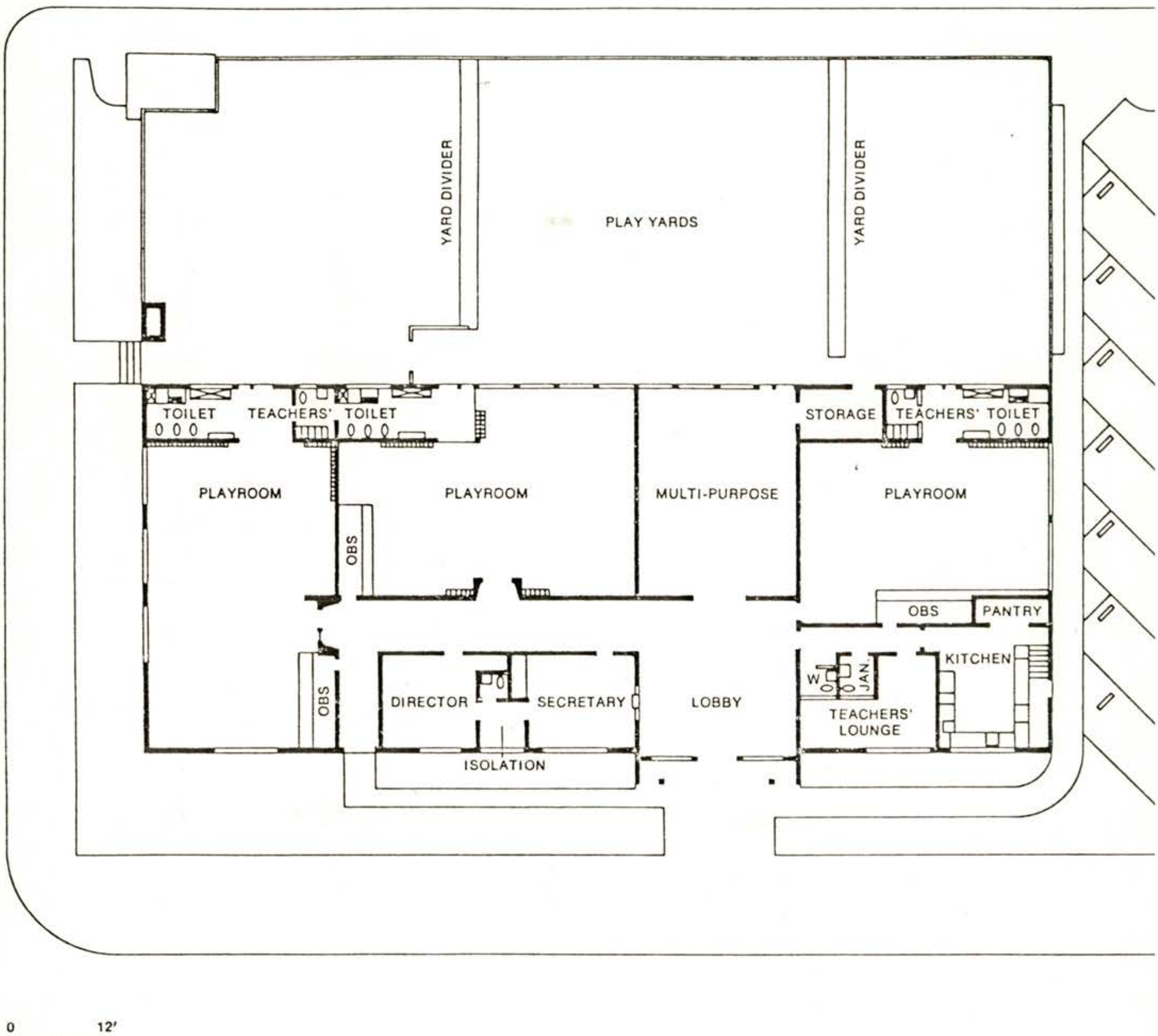
PHOEBE HEARST PRESCHOOL LEARNING CENTER

Children start learning here by using their own hands to create things ( toys they want to play with ).



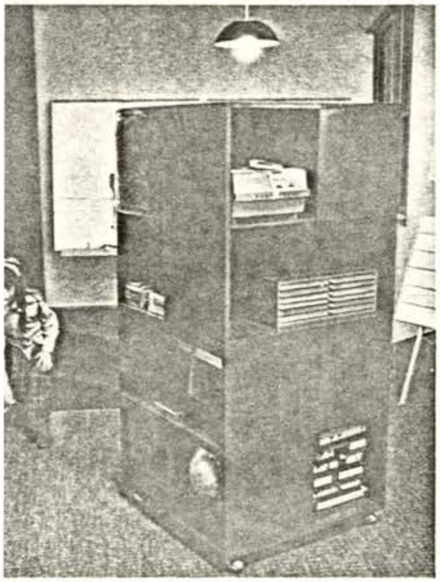


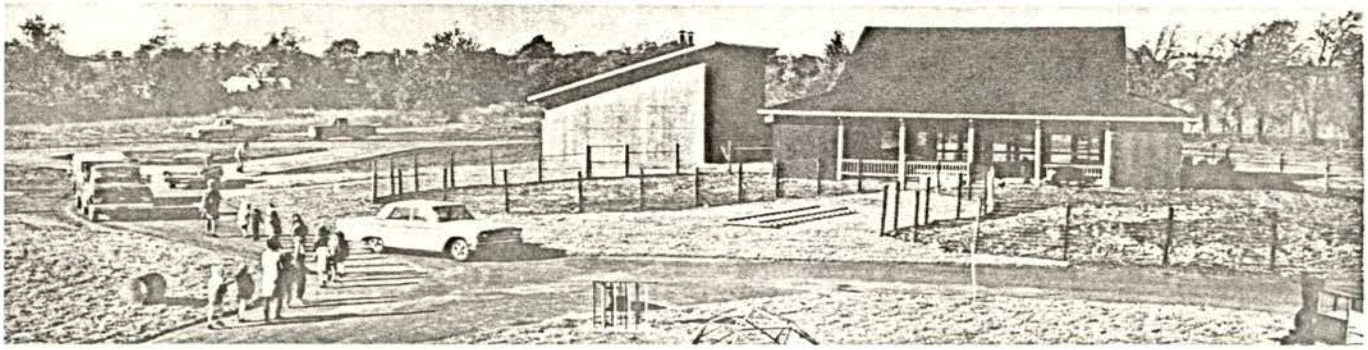


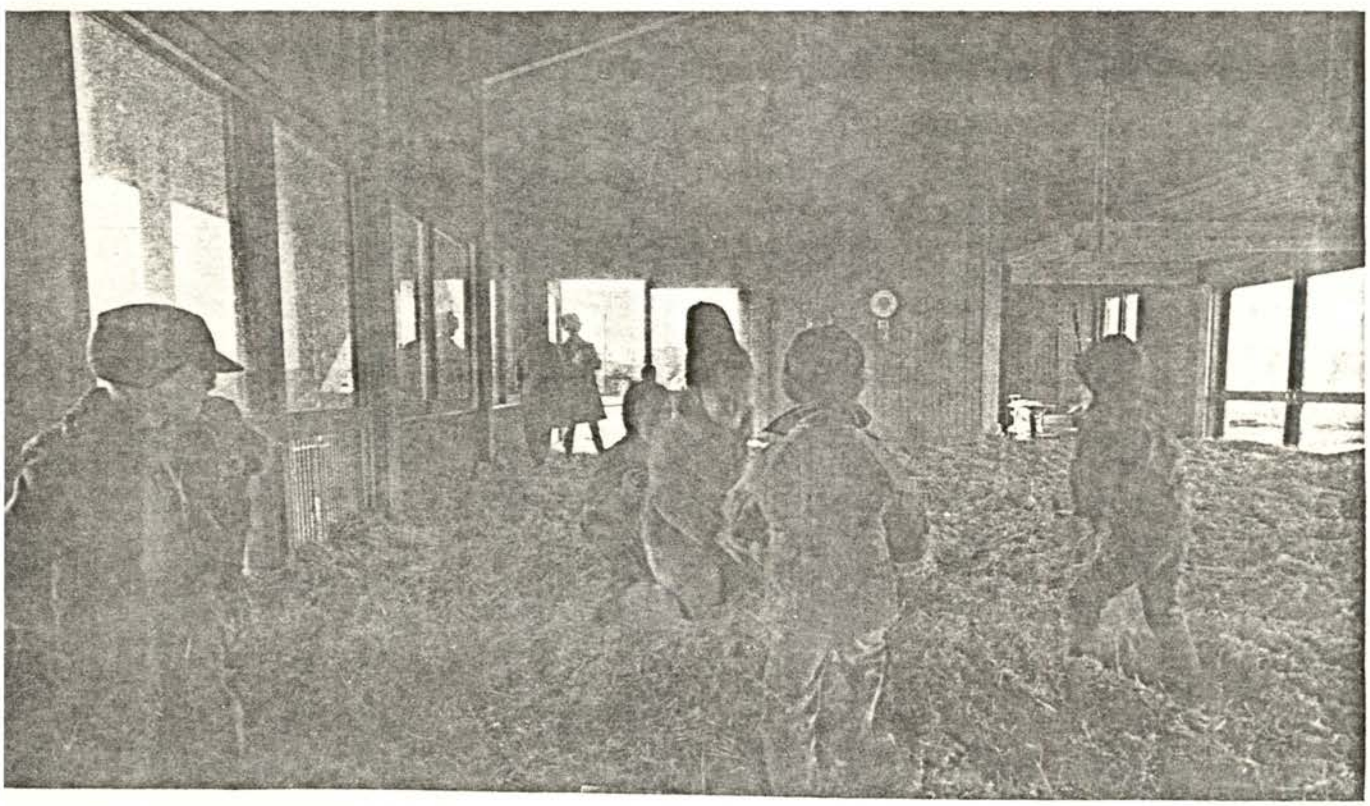

YARD DIVIDER
PLAY YARDS
YARD DIVIDER
TOILET
TEACHERS'
TOILET
STORAGE
TEACHERS'
TOILET
PLAYROOM
PLAYROOM
MULTI-PURPOSE
PLAYROOM
OBS
OBS
PANTRY
KITCHEN
W
JAN.
OBS
DIRECTOR
SECRETARY
LOBBY
TEACHERS' LOUNGE
ISOLATION
0
12'

LAMPLIGHTER SCHOOL

Parents come to observe their children. French is taugh there Each classroom has its own space " dug down " for children to sit inside. There is a barn with a hayloft, farm animals, a mine and hills to investigate.







# Huge building for an intimate program



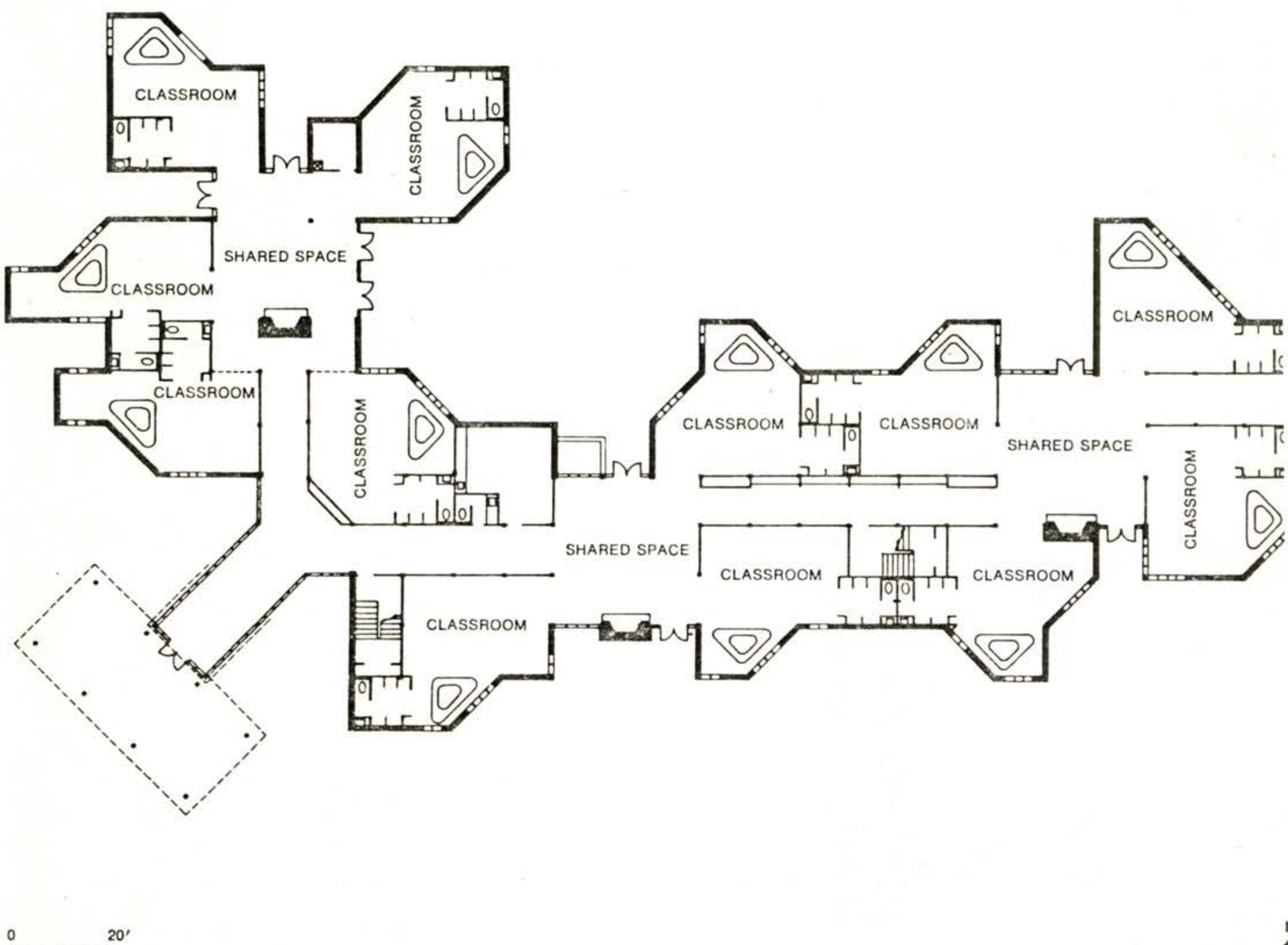
Dallas' Lamplighter School opened its present facilities in 1969, but its history began in 1953 when its two co-directors started a kindergarten-first grade school for 23 children in an old house on a spacious piece of land.

The school and its reputation grew so quickly that, by 1967, 350 children were enrolled in nursery school through fourth grade, and twice that number were on a waiting list.

During those 14 years, the former residence housing the school was redesigned, redeployed, revamped, and reworked in an effort to find room for the influx of children. Additions were added and buildings were built, until it became obvious that the structure had reached the point that it was impeding the school program.

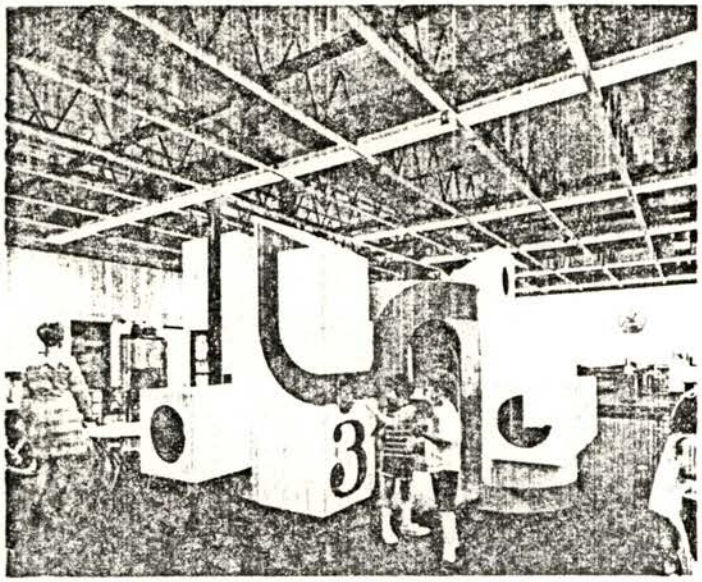
At that time co-directors Natalie Murray ai Marieta (Sandy) Swain approached EFL for a pla ning grant that would make it possible to try o some new ideas in classroom design and furr ture. "We wanted furniture, particularly for tl younger children, that would fit both children ar teachers, be movable, take up little space, and n be cumbersome," says Mrs. Murray. "We didr want traditional tables or chairs. As a matter fact, we were pretty sure that the furniture w wanted might not be considered furniture at all

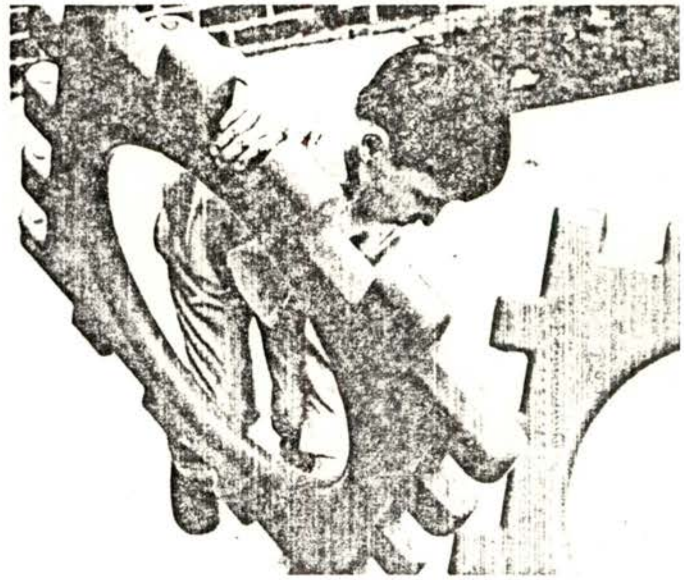
The Lamplighter School offers children fro the age of three through nine a program th Sandy Swain describes as "a learning situatic in which the emphasis is put on success in ac demic and nonacademic areas, on feeling goc about oneself."

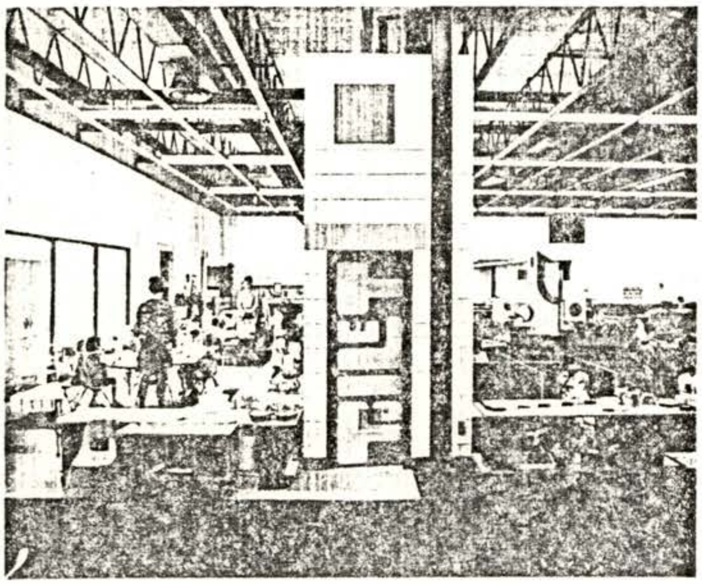


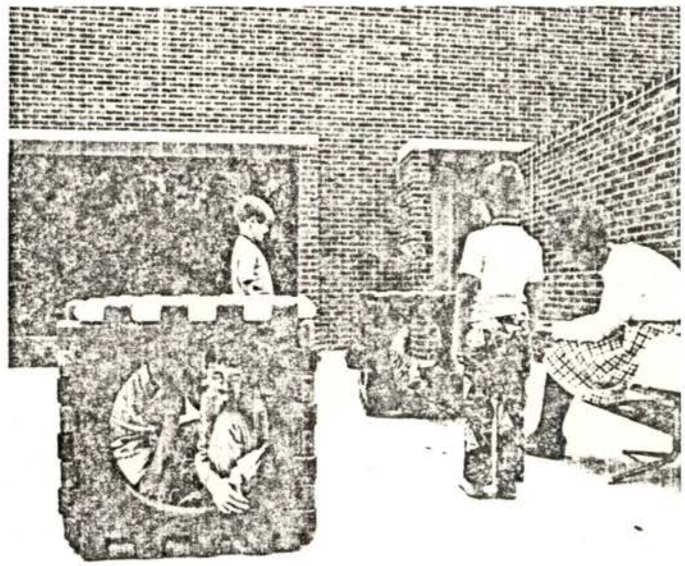
CASADY SCHOOL

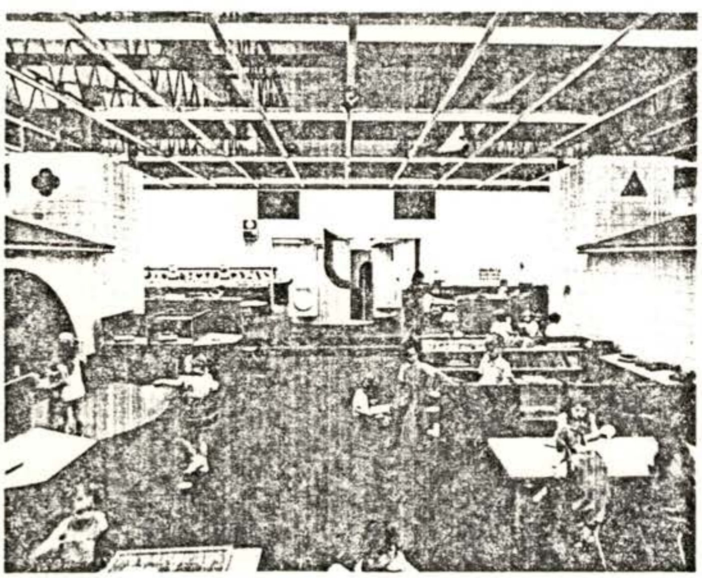
Children have their own modular toys for creative purposes. It is an open space floor plan, but children learn how to lower their voices.

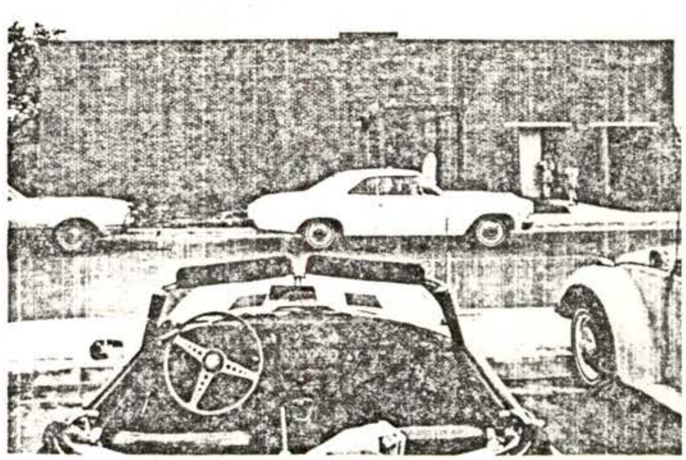




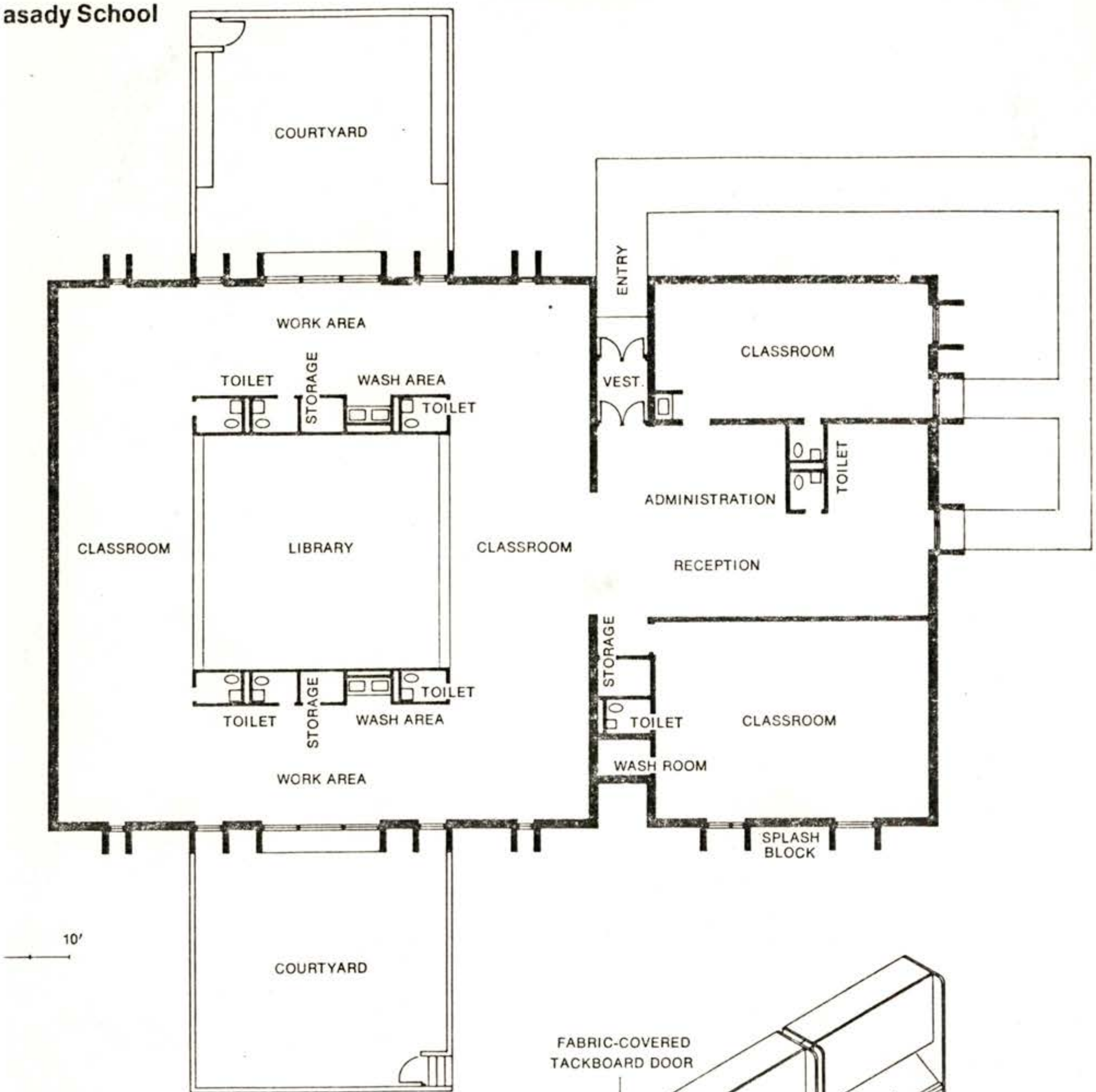


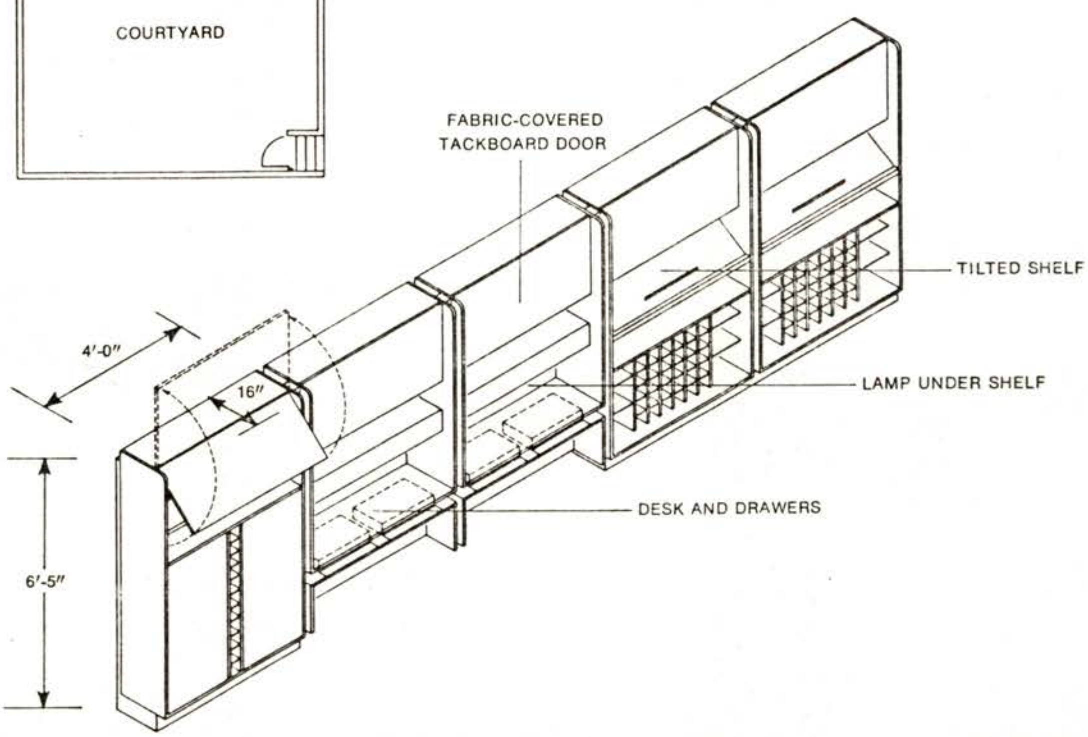






**asady School**



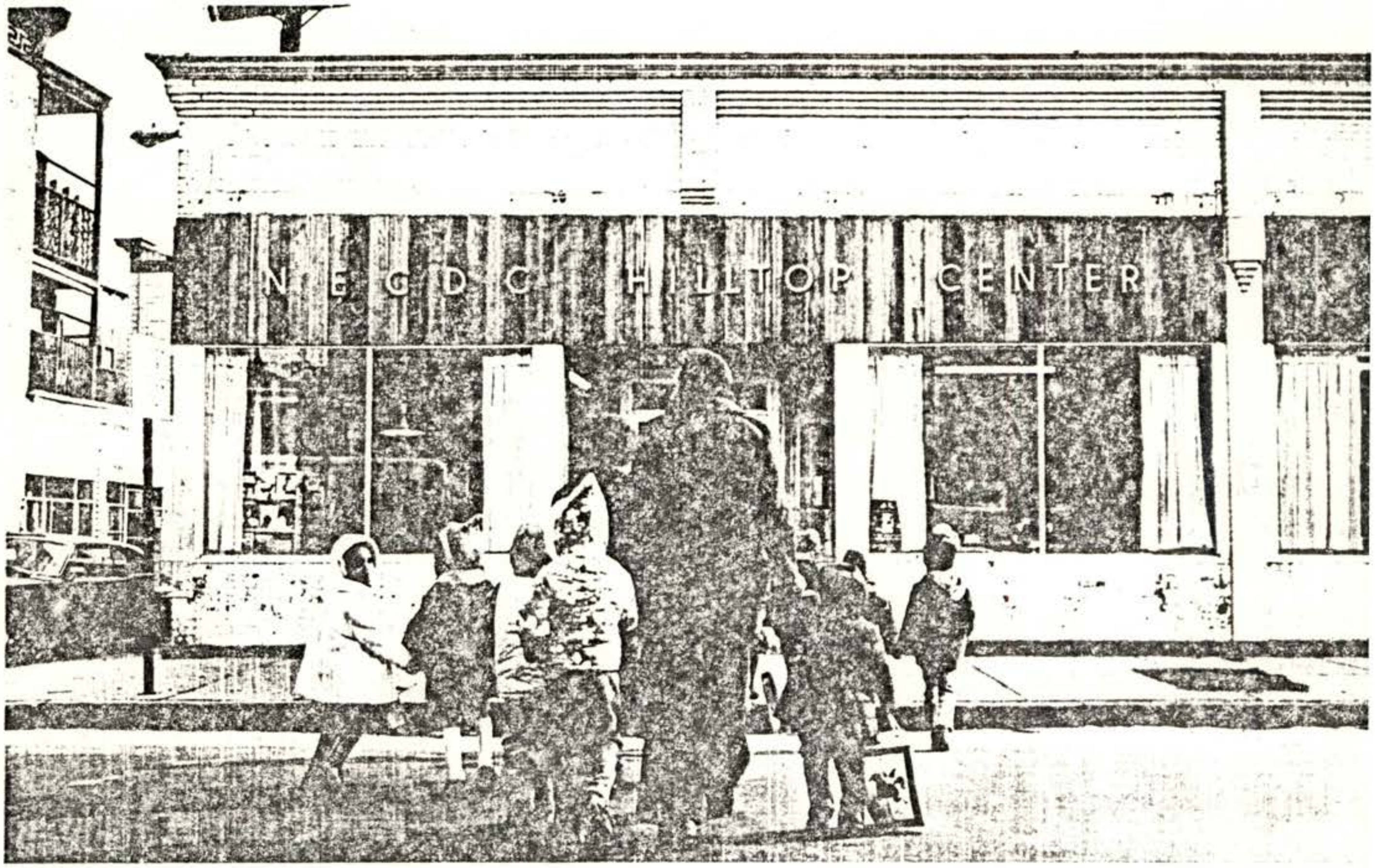



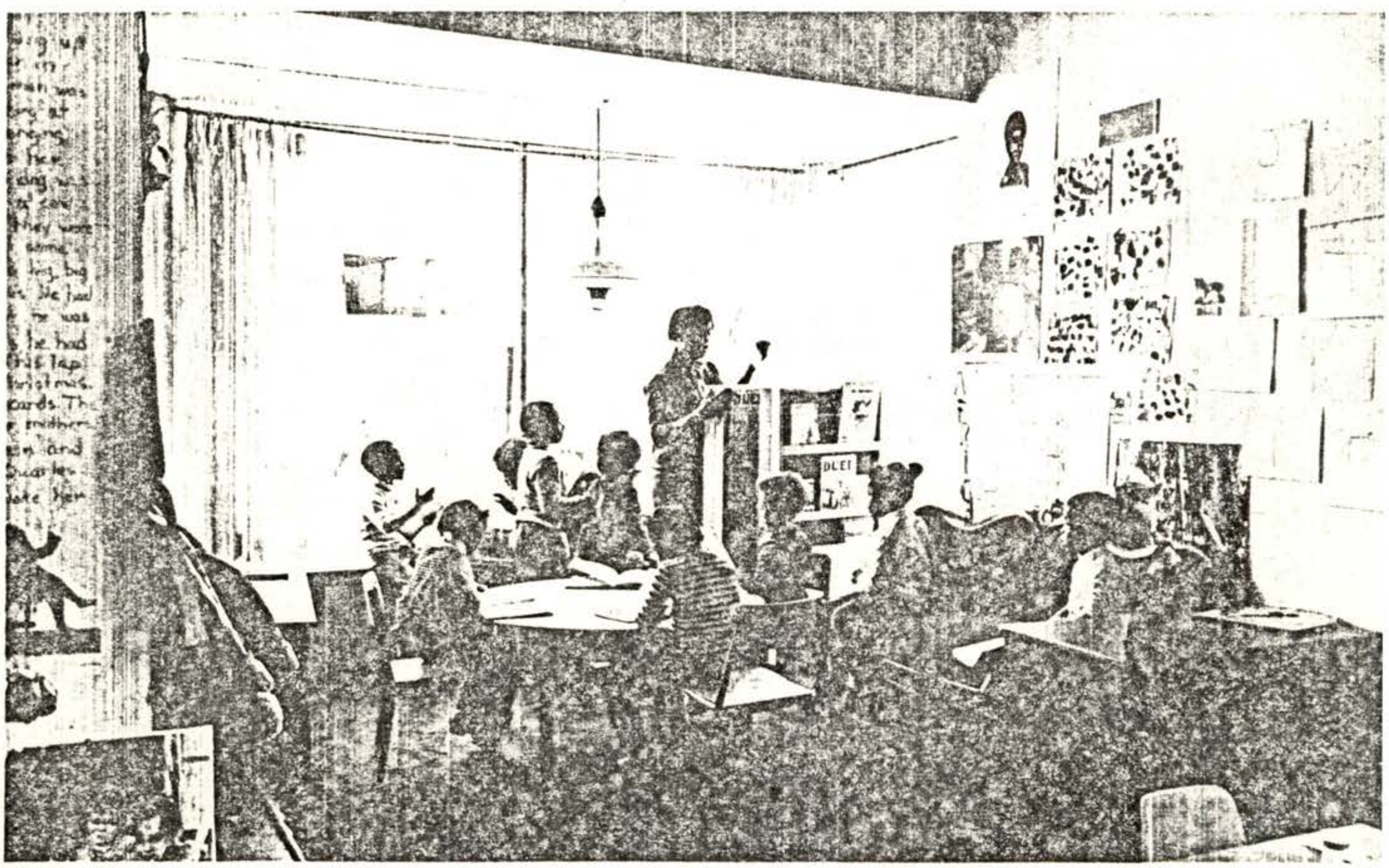

en types of storage units, display and work surfaces for children are available in the wall units.

Top cupboards, which are out of children's reach, also serve as display boards.

HILLTOP CENTER

This school developed from a grocery store ( mentioned above ). Most of children are black and from low-income families. The school teaches than how to borrow books from the library, since they do not have libraries in their home as some people do.

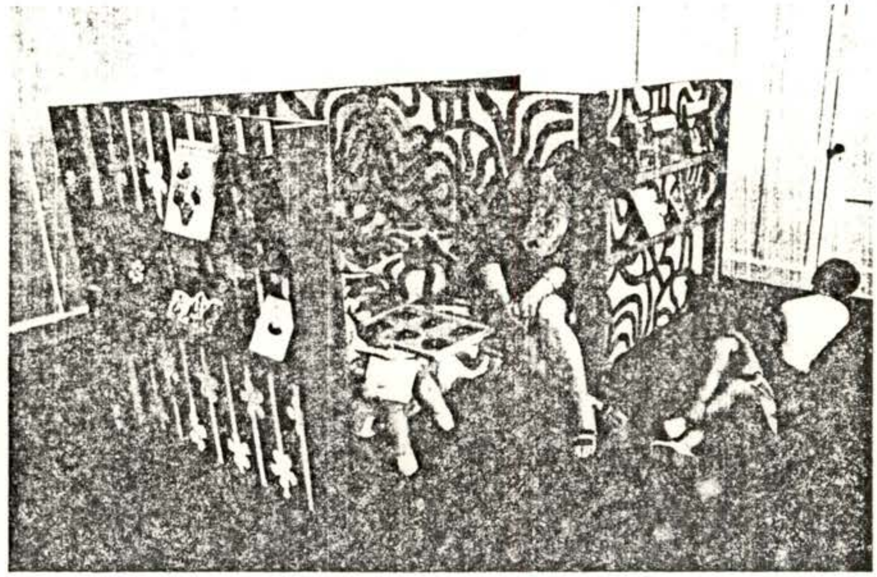

N E G D C HILLTOP CENTER



CHILD MINDERS SCHOOL

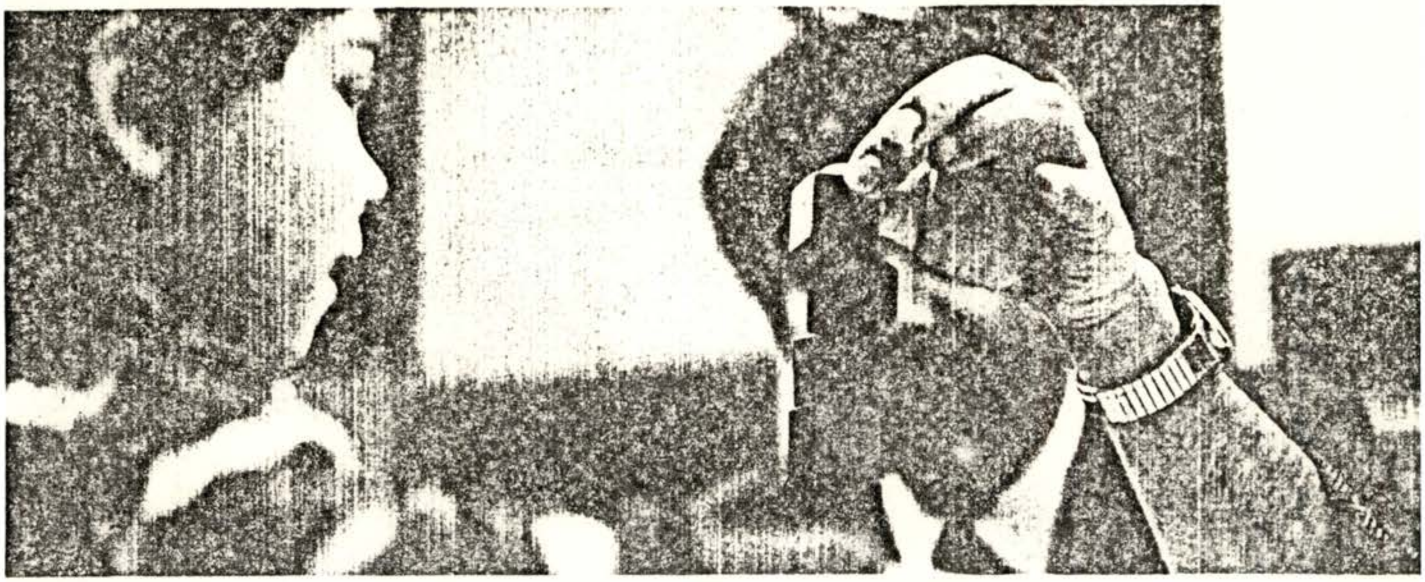
Children have their small spaces to build things and tear them down. Nature is brought into their daily lives. They learn about the real world with work and play in wet and dry areas by using clay, paints, etc.

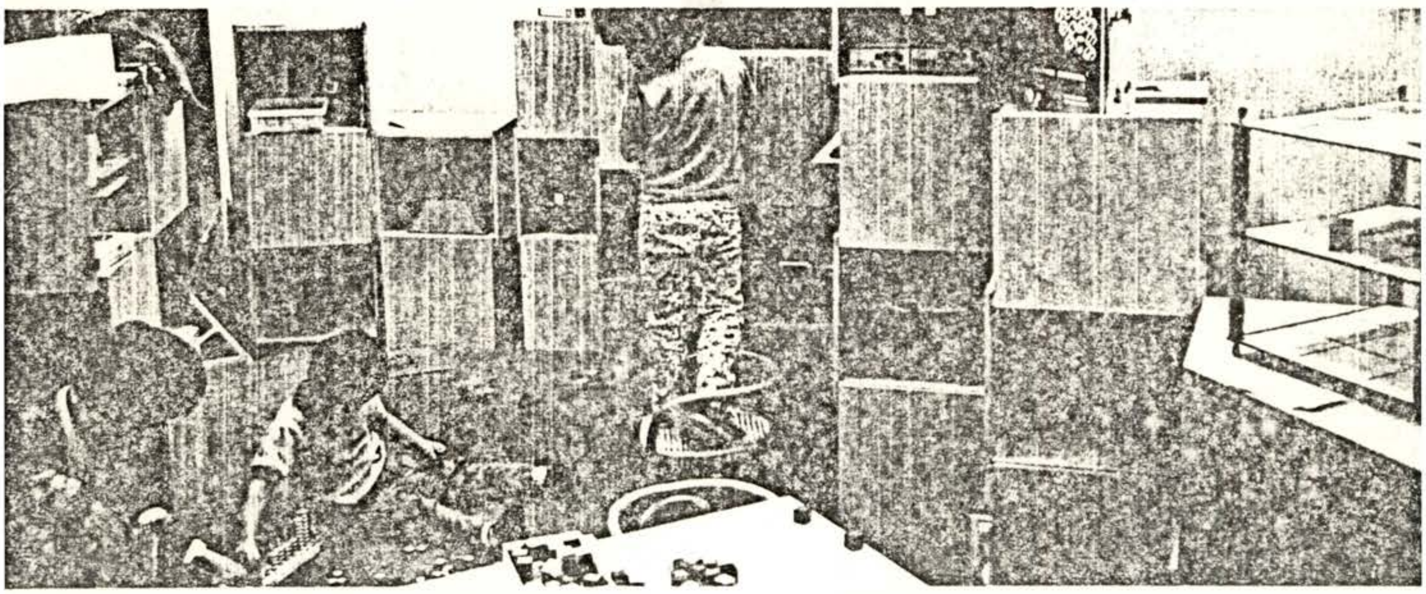
## Child Minders School

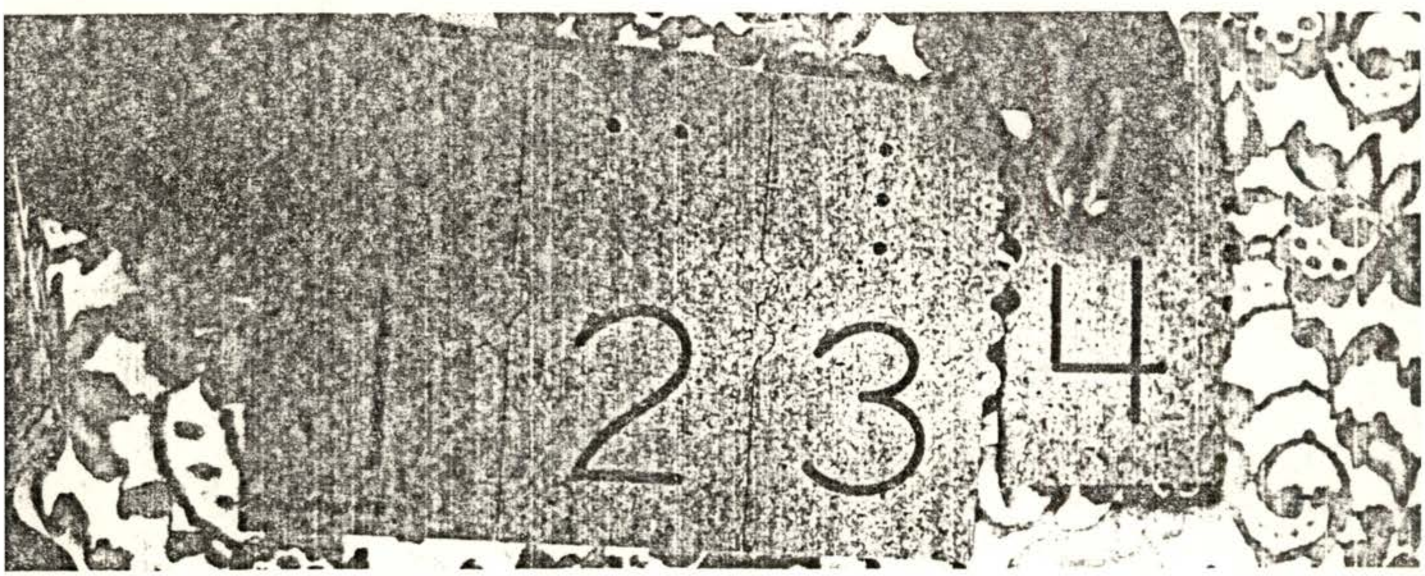


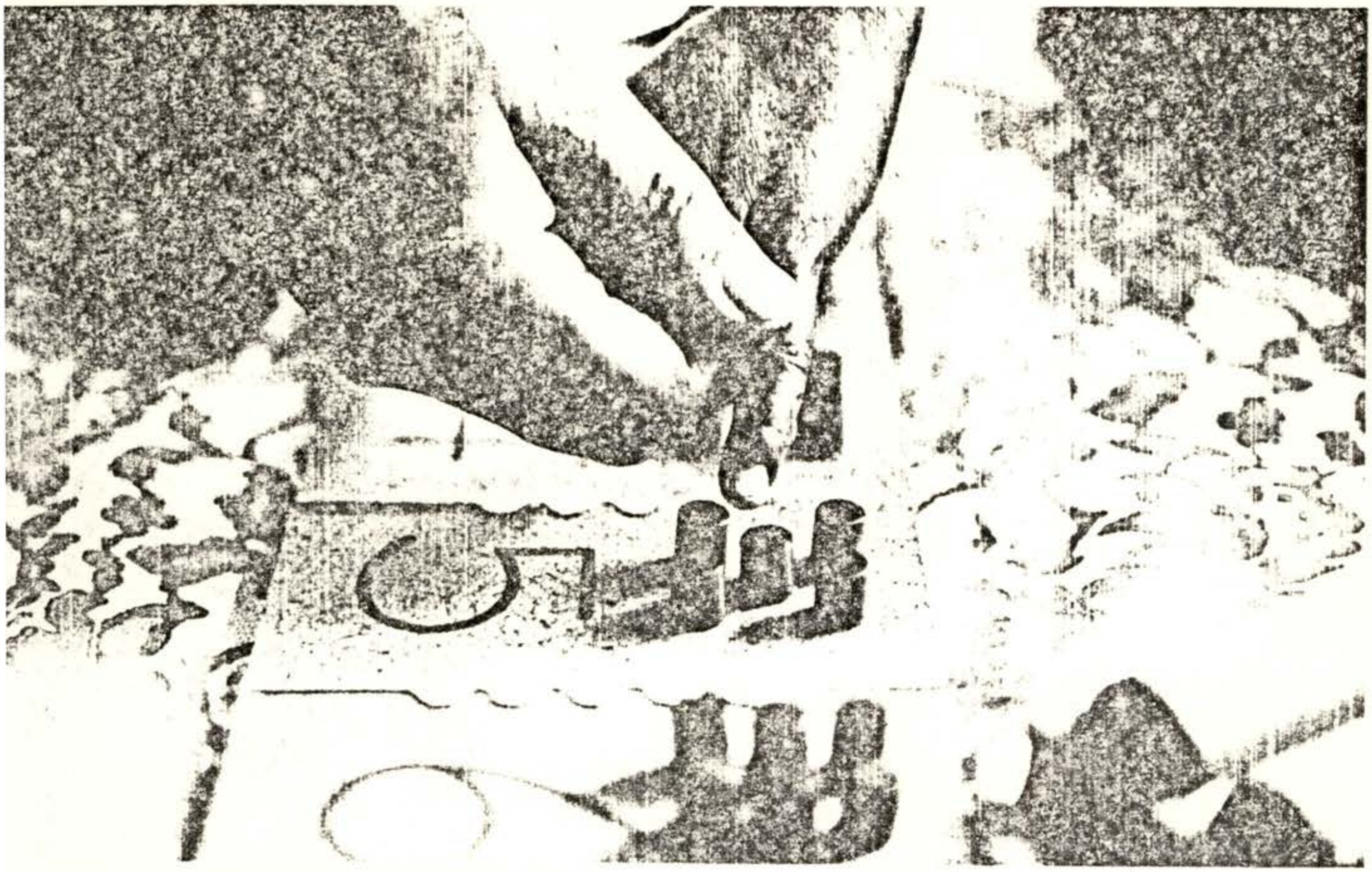
THE TOY LIBRARY

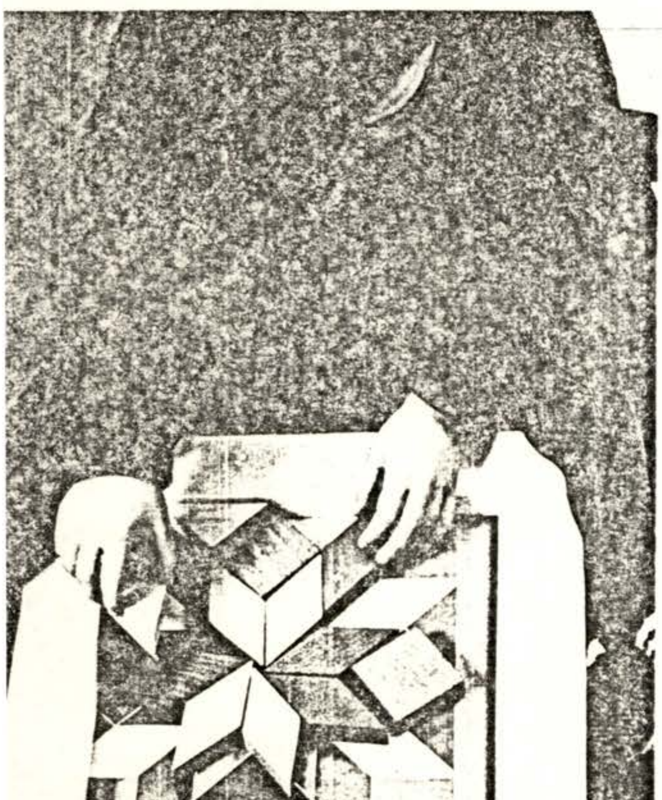
The concept of setting up a library with childrens' books and toys to help educate children who do not have a chance to attend school. The parents can borrow toys and books but cannot force the children to play with them until they are ready.









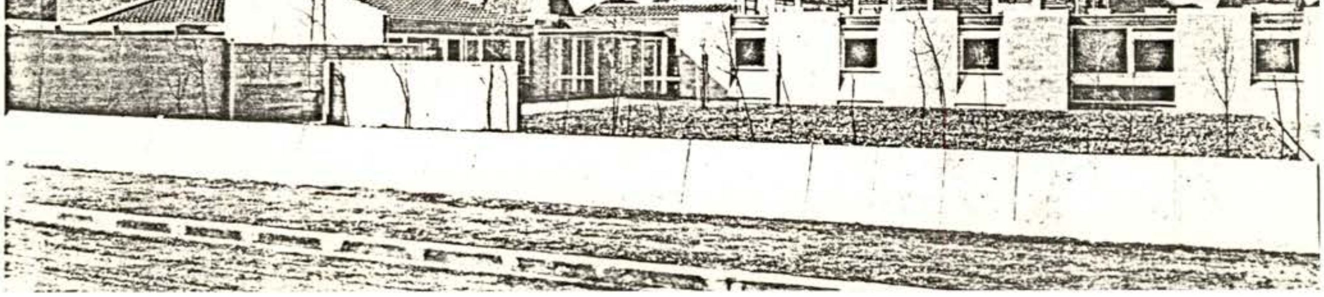


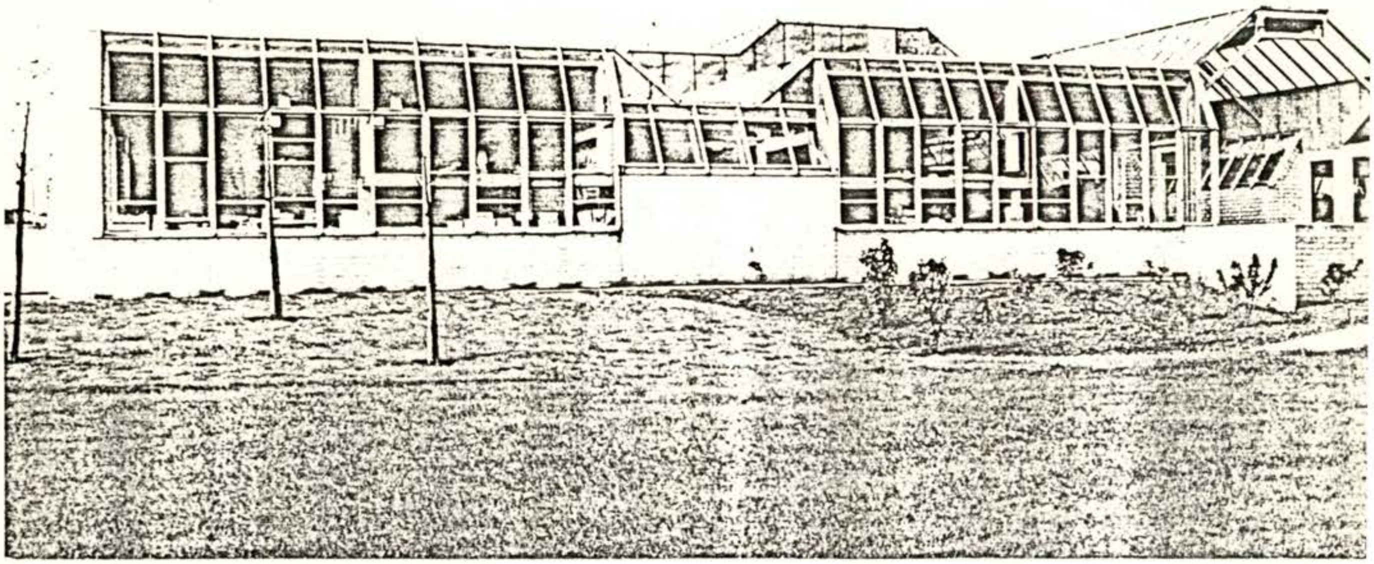
F

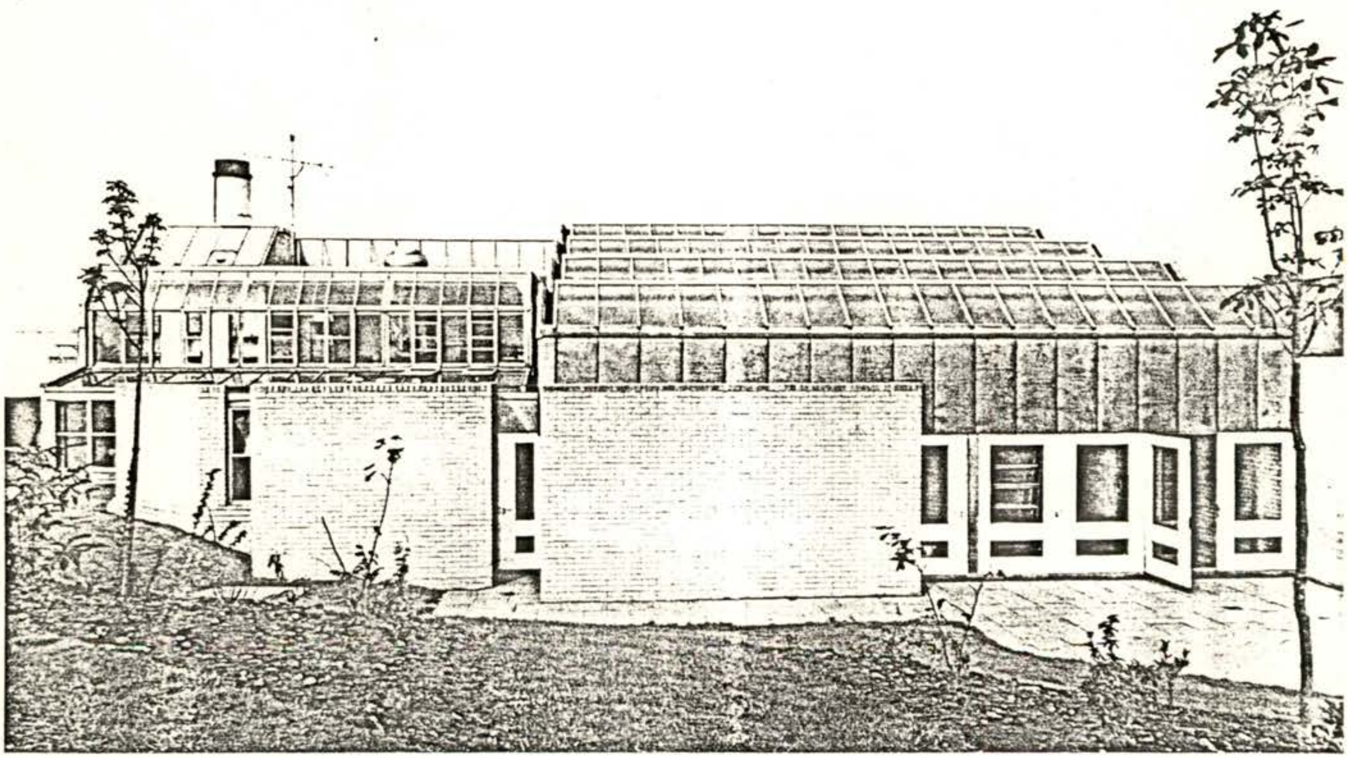
# Infant school at Hampton, Middlesex

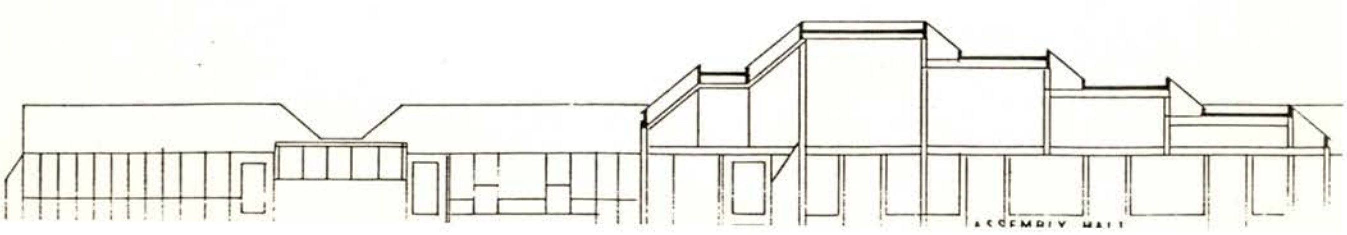
| | |
|---|---|
| at | Ripley Road, Hampton |
| designed by | Manning Clamp & Partners in association with H. S. Gardiner, borough architect, Richmond on Thames |
| staff | |
| partner in charge | Tony Dick |
| architects | John Rowland<br>Graham Hatt |
| quantity surveyor | Norman Waumsley |
| consultant structural engineers | Jenkins & Potter |

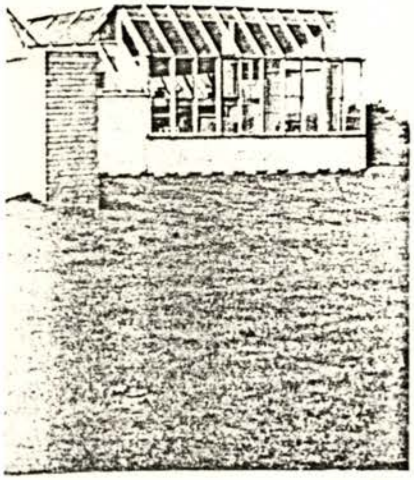
*Hampton Station Infants' School, for 360 children between the ages of five and seven, is one of the first to incorporate and develop mai of the principles recommende in the Plowden Report on education. Starting with the ideas initiated by the* DES *at Finmere, Oxfordshire, it develops still further the principles embodied in the later* DES *project for the Inne London Education Authorit at the Eveline Lowe School, Rolls Road, Southwark*

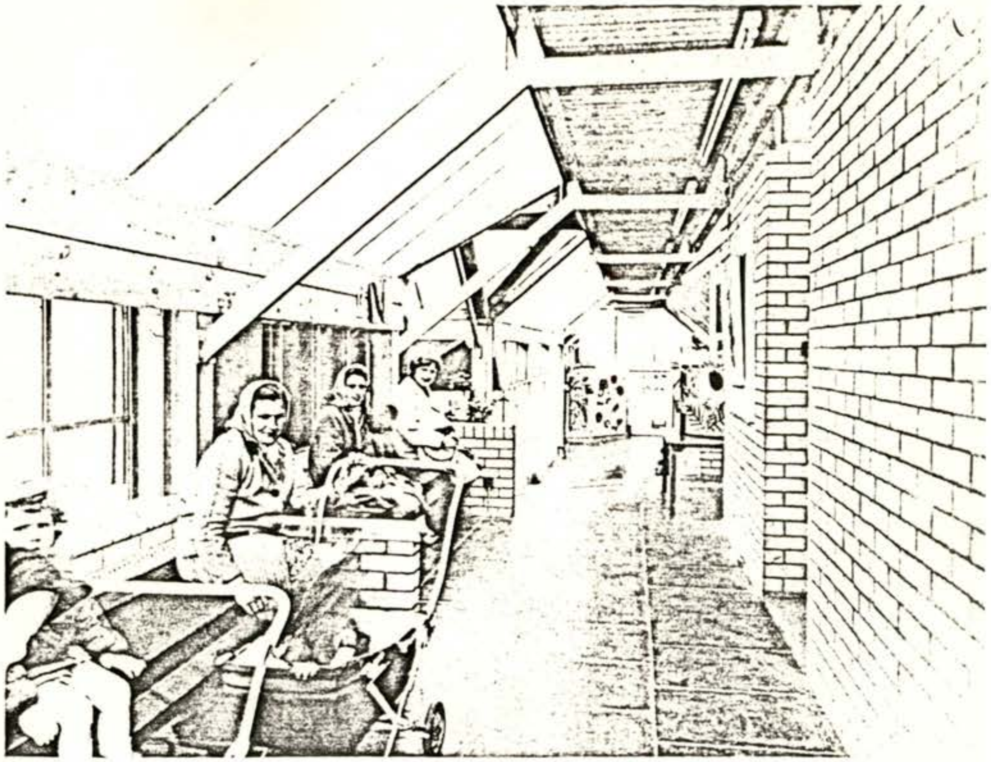












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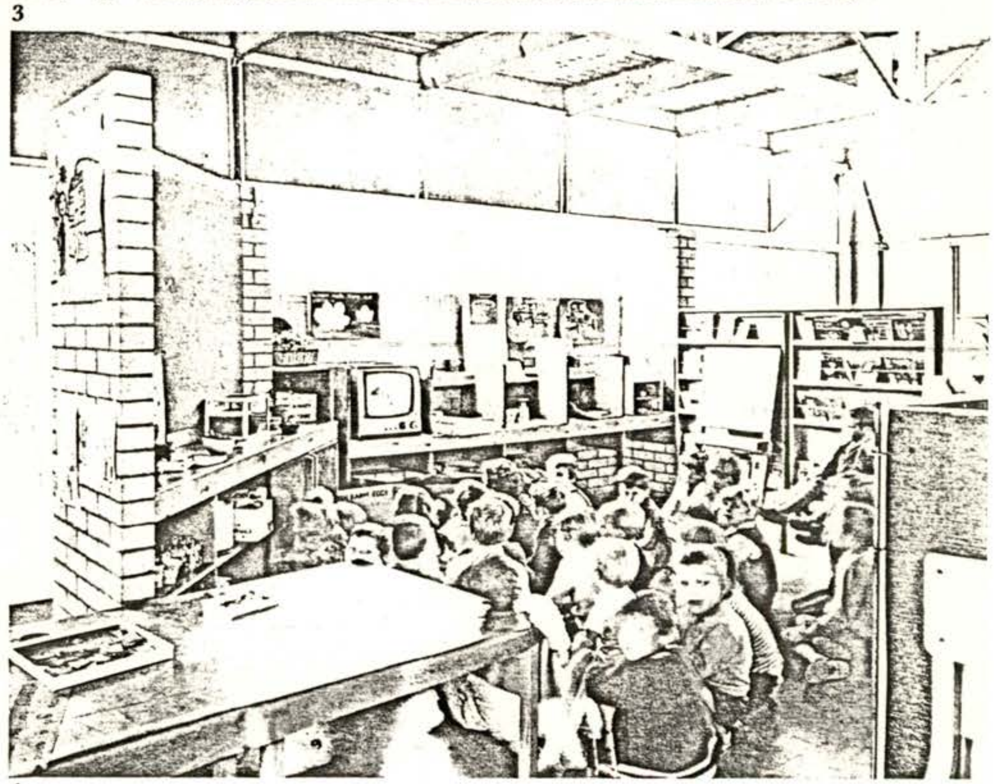
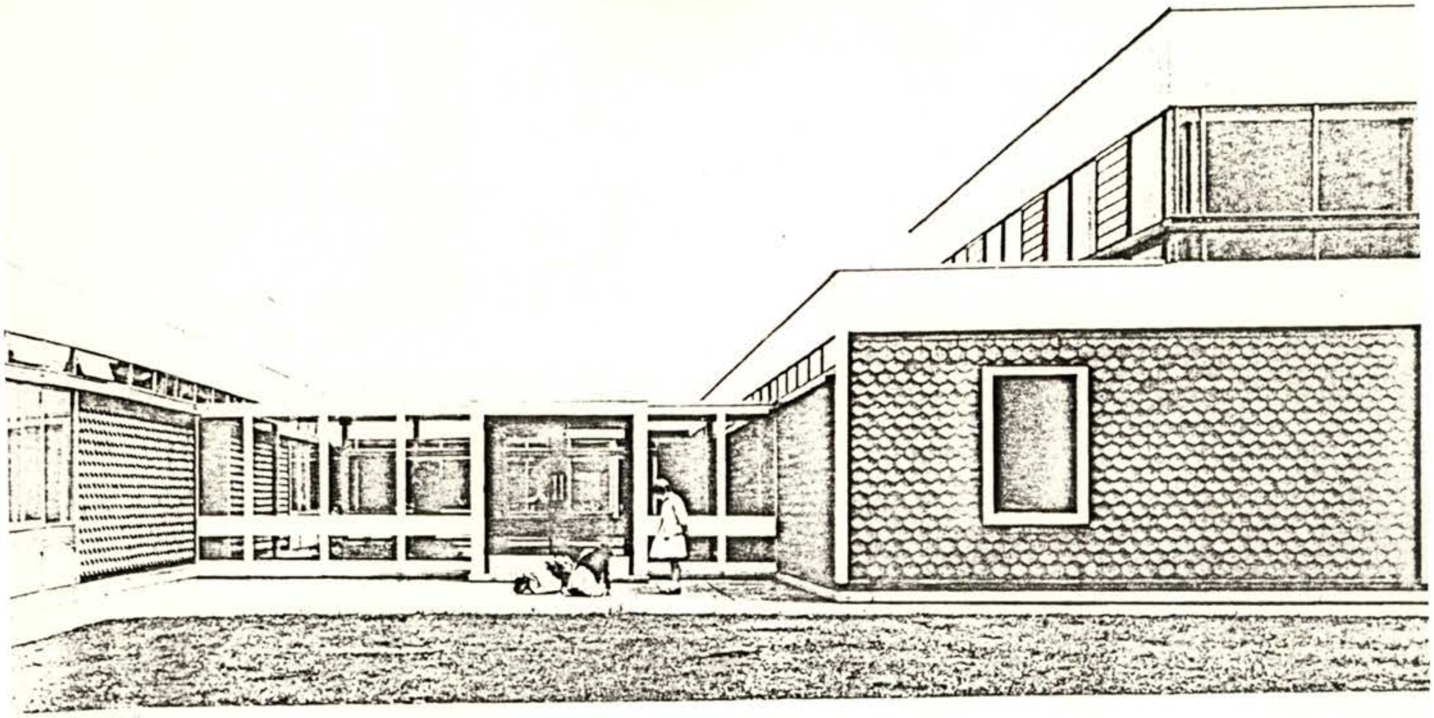
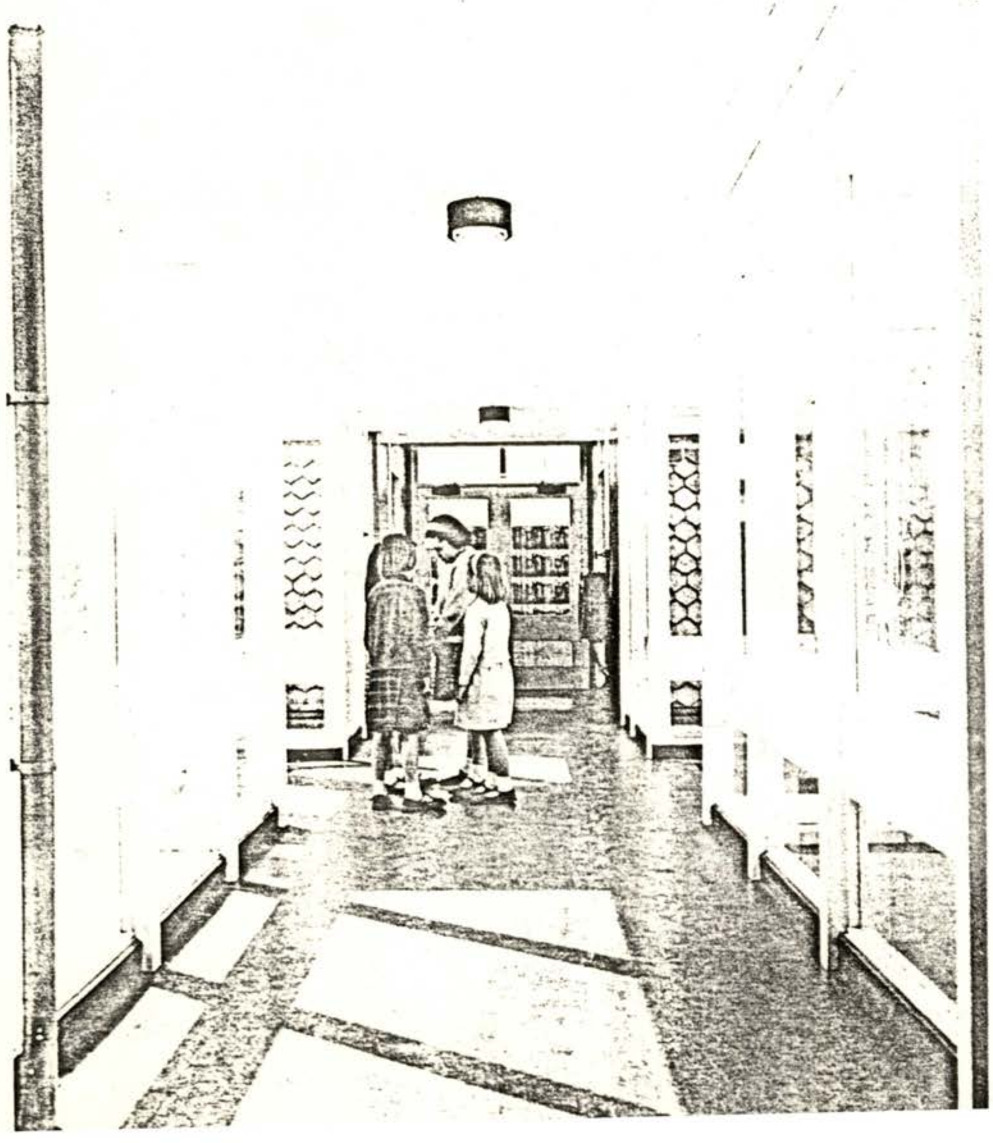
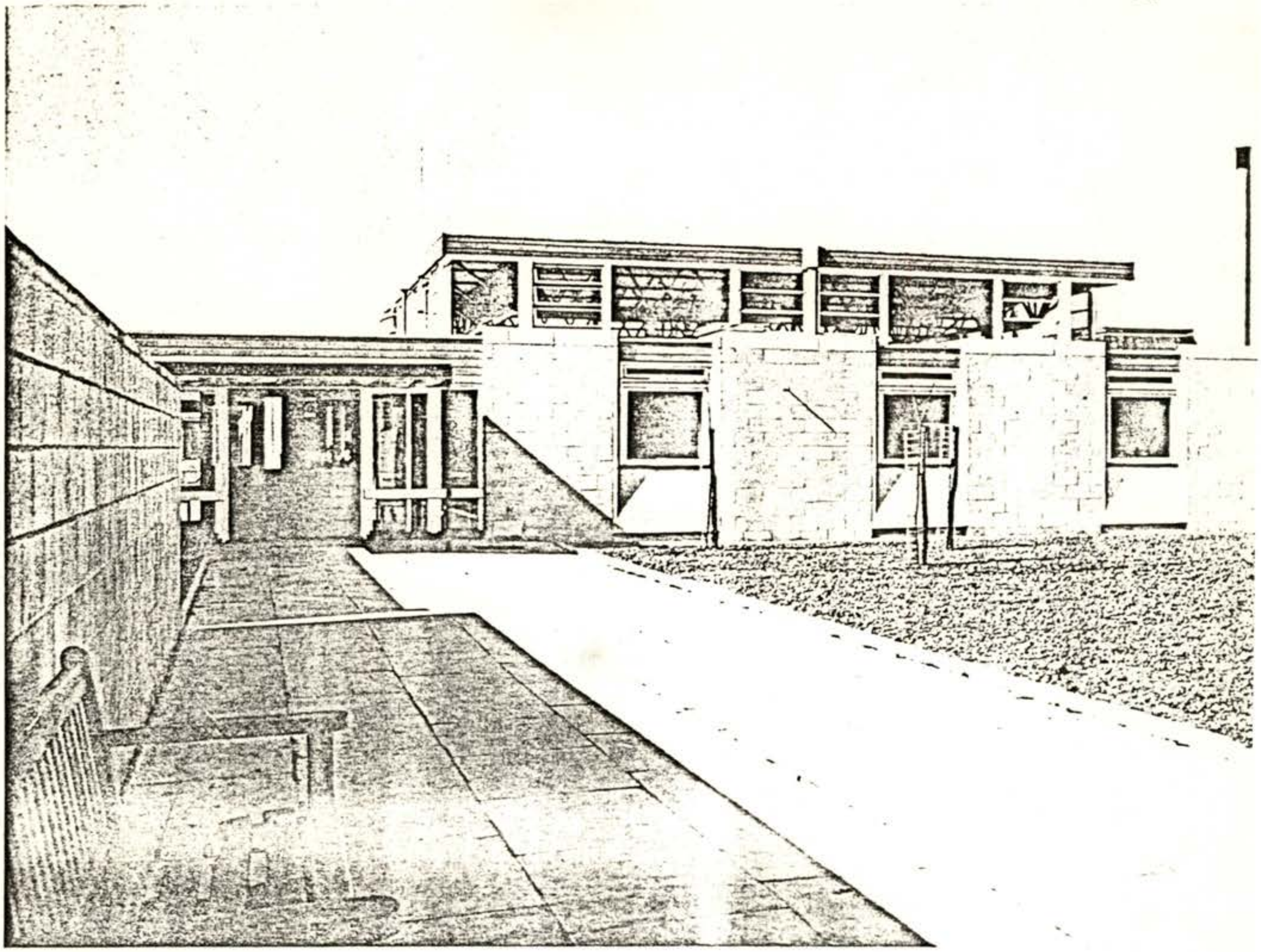


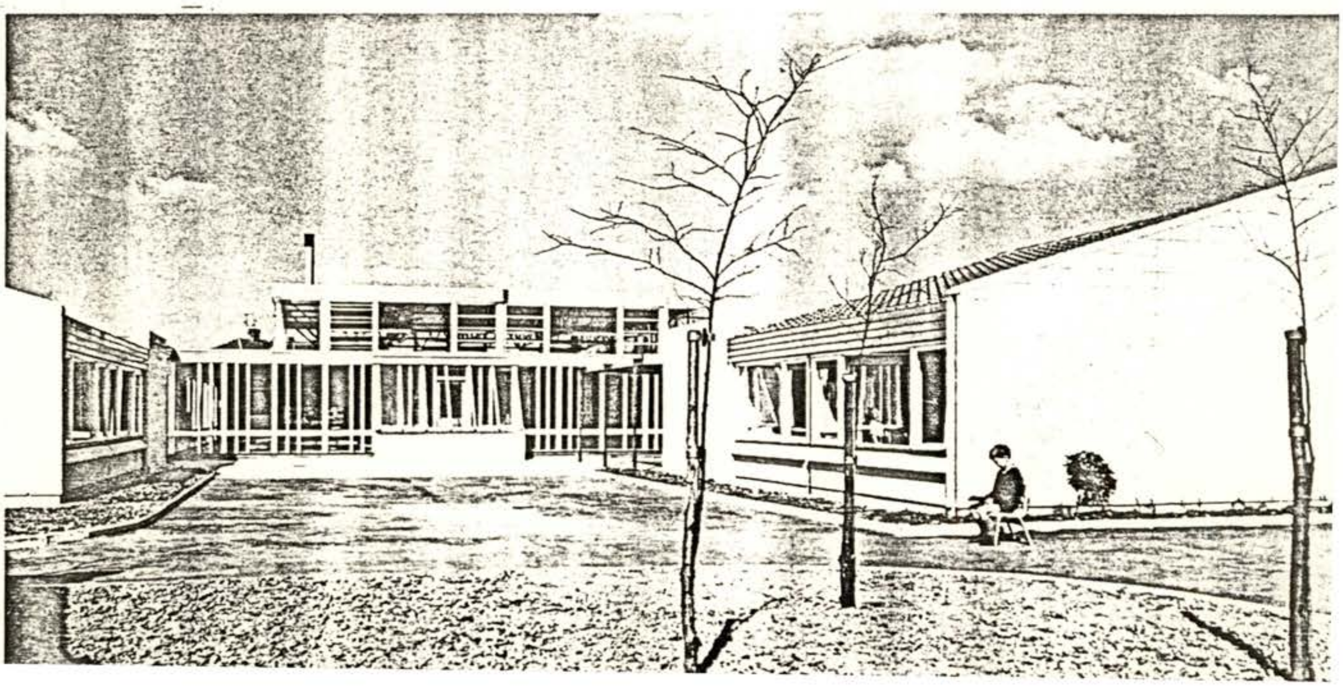
4

**3** *Mothers wait in the entrance hall for their children at the end of the day. Shutters on left open onto library*
**4** *Typical class space showing teacher's corner, left, and display screens to subdivide the teaching area*









The Program.

THE OKLAHOMA STATE UNIVERSITY PRE-SCHOOL PROGRAM

The University has a fine program for preschool children, but the physical facilities need to be improved. The main goal of the Oklahoma State University campus pre-school program now is for the students in the Department of Family Relations and Child Development to be familiar with the activities and problems of these children which they are studying in both their laboratory and research programs. Currently these children comprise three seperate groups housed in buildings which are quite old. A new building is required to gather these groups in to one central location. The site selected for this new building is the program's old laboratory close to the Home Economic West building. It will be convenient for the instructors and specialists from HEW as well as to the observing students on the campus who will be able to reach the new building with ease and greater frequency. The list of building users are:

pupils - age 3 to 5
- 1 group all day period (16-20)
- 2 groups in the morning period (32-40)

- 2 groups in the afternoon period (32-40)

each period has a meal at the school, only the all day period has two meals at the school.

teachers
- each group of pupils requires one head teacher and one assistant.
- some specialist from HEW will help teacher and cook periodically
- about 8 - 10 teachers are present at the same time.
- offices are not required

observers
- most are students in the Family Relations and Child Development Department.
- some are from other departments
- There are many visiting observing groups

cook, laundress, house keeper
- to prepare meals, do laundry and clean the areas
- volunteers and specialists help occasionally.

The list of areas:

1. class room area
   - 3 groups at the same time approximately 16-20 children per group

- open space for class activities
- books, toys, storages around

2. resting
   - stage & movie shows
   - napping for the all day group

3. outdoor recreation & play ground
   - individual play area
   - group play area
   - outdoor storage
   - wading pool

4. kitchen & laundry

5. staff area
   - for relaxing: acup of coffee
   - comfort seats
   - flexible conference area
   - unformal library

6. storage
   - for kitchen facilities
   - for teaching equiptment and aids

7. lavatories
   - convenient for children and staff

8. entrance & waiting area

9. administration & medical checking area

   - every morning

10. observation area

    - to observe children's activities.

11. parking area

The Design Solutions.

The main area of the building is the classroom area which would incloud everything for the children 3 to 5 years of age. There are two kinds of children who come to this building, first is the all-daygroup-children and second is the half day groups, that is: two groups in the morning period and two groups in the afternoon period. Each group of 16 to 20 children will have their own spaces, indoor and outdoor playground even the toilets close to their classrooms, watched over closely by the teachers at least one head teacher and one assistant per each group all the time. Some features to be noted in the design are as follows:

a) Because of the small piece of land, the playground could not be devided into three-individual group-playing areas or even have as much play equipment as it should. Thinking of the bad weather that might prevent the children from playing outside, the building could have the sheltered playing area for them. Between the classrooms and the playgrounds, the patio or the trellis has been provided for the semi-outdoor activities with the moveable plastic and canvas awning roofs.

b) The upper floor or the observing balcony has been provided for observing groups which come from the

Department of Family Relations and Child Development mainly, and other Departments on the campus. Without interfering in class activities, the observers can look down into classrooms from the one-way mirrors and turn on the microphones when they want to hear the sound in the classrooms.

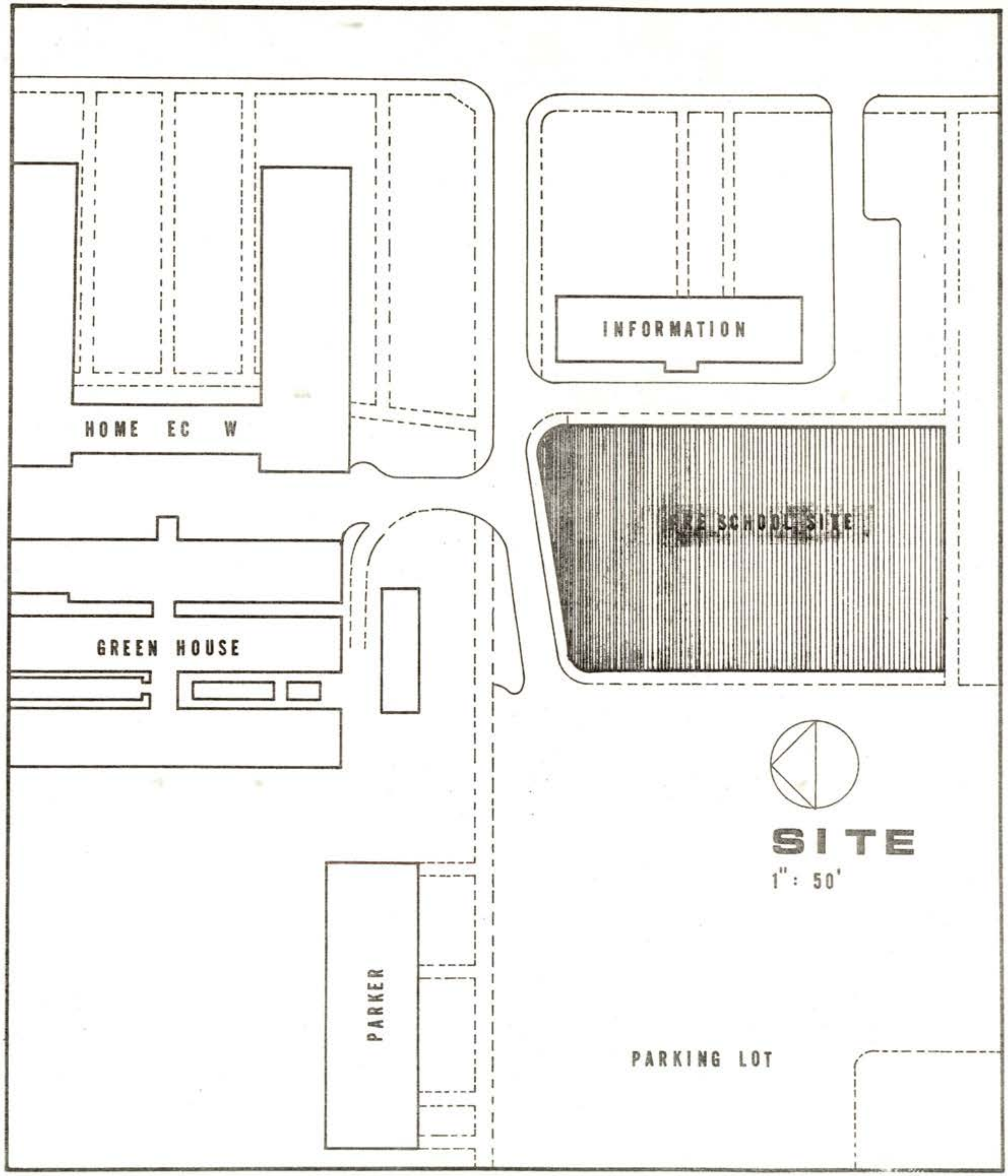
c) Offices are not required in this program, because most of the teachers and the specialists have their own offices in the Home Economics West Building. The staff area is the place where the teachers take a short break, read books or set up meetings.

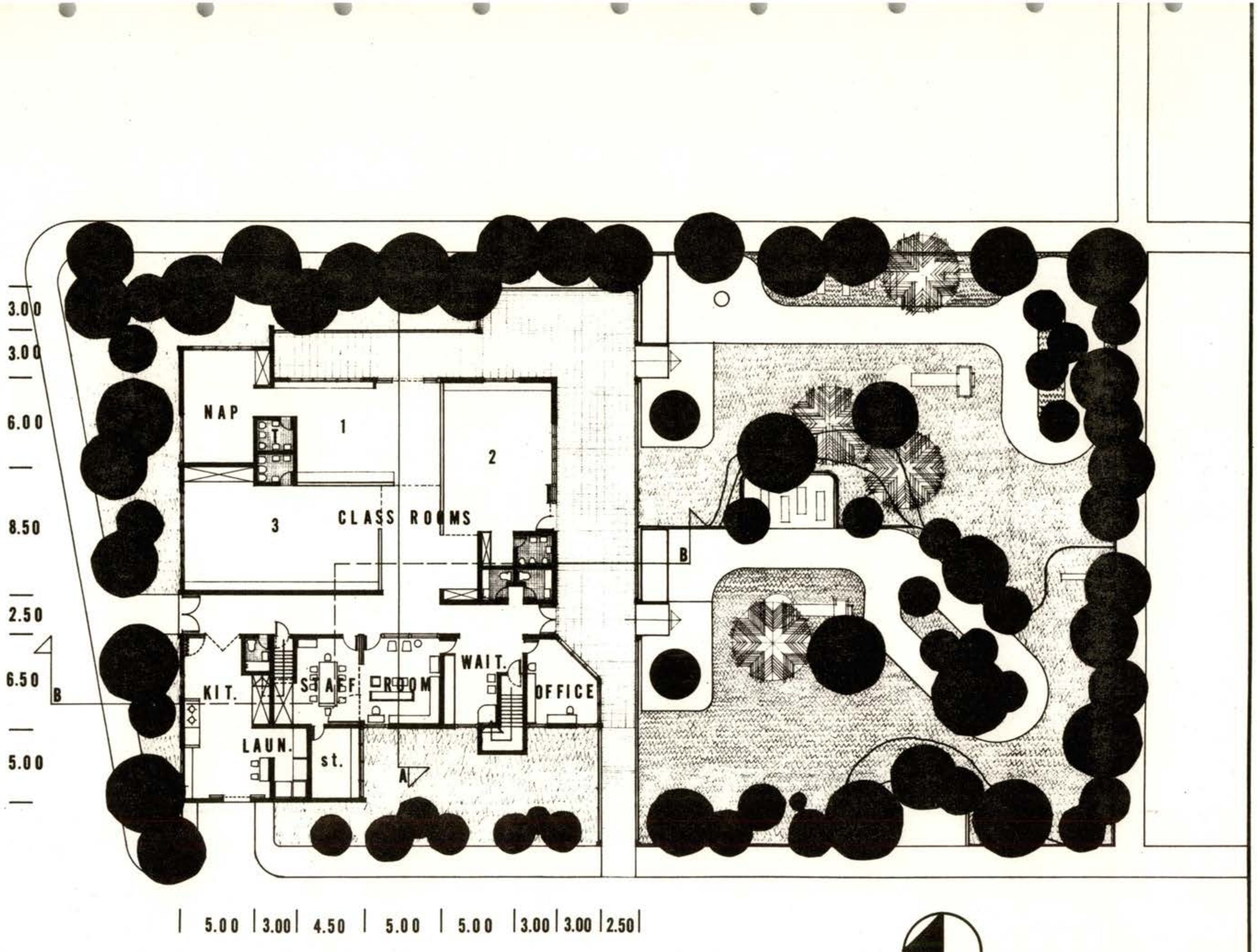
d) The kitchen and laundry should be big enough for a small group of volunteers and specialists who help the program occasionally.

e) The quietest area close to other buildings would be the napping room for the all day group and sometimes the room could be adjusted for showing movies or so children could act in plays.

f) The building should present the domestic atmosphere for both young children and the teachers or other people who come in. Another influence on the building's characteristics is the existing buildings surround that area which seems to repeat the rythmn of the pitched green roofs and the red brick walls. To make the building harmonize with the surroundings, domestic atmosphere should not be forgotten. And the most important thing in the design is the scale which comforts the users of the building, the children. Lower fences, lower and small scale openings, lower ceilings and ramps have been considerd for use. The landscape and the orientation could help create a nice atmosphere for both indoor and outdoor spaces.

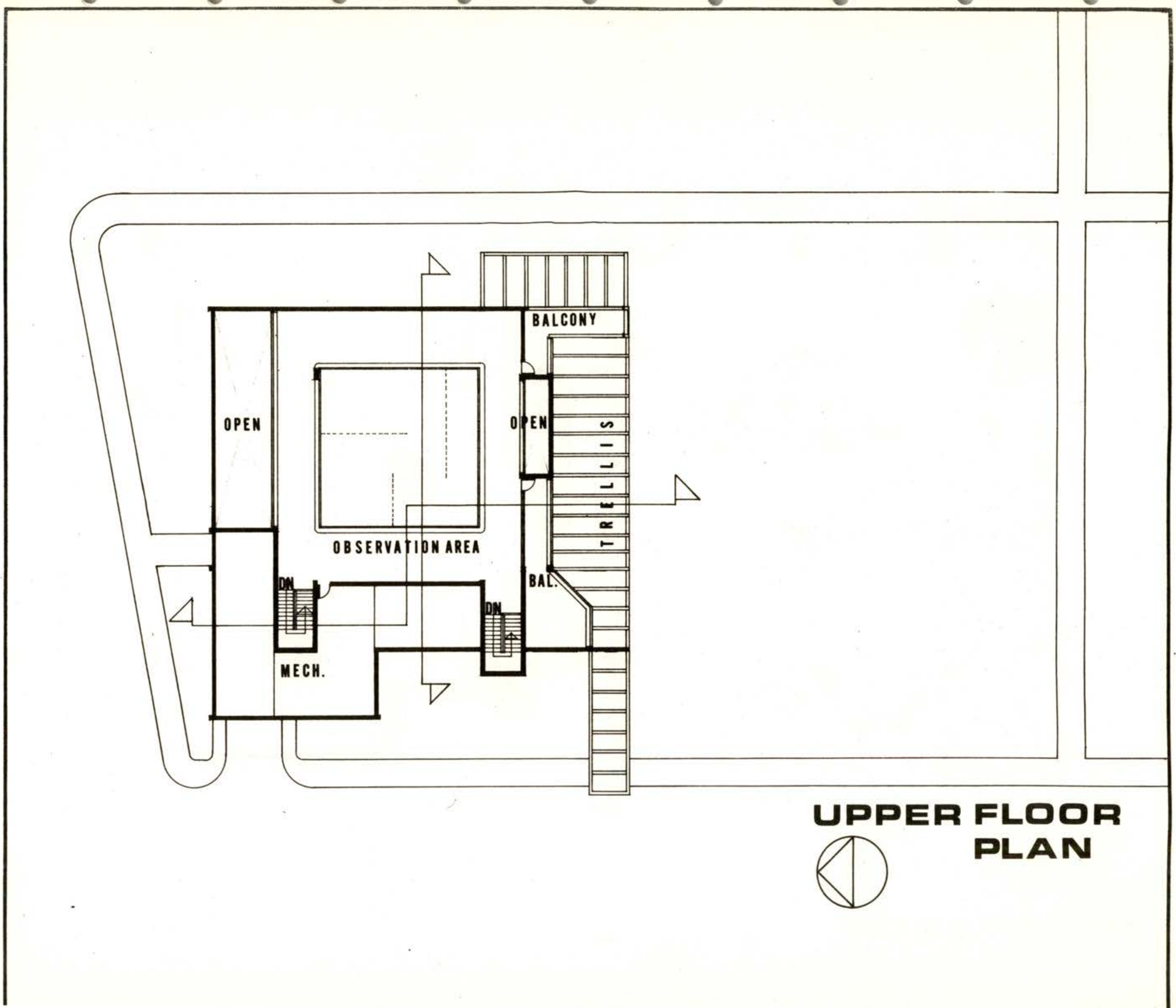
Drawings  Site Model


INFORMATION
HOME EC W
SCHOOL SITE
GREEN HOUSE
PARKER
SITE
1" : 50'
PARKING LOT

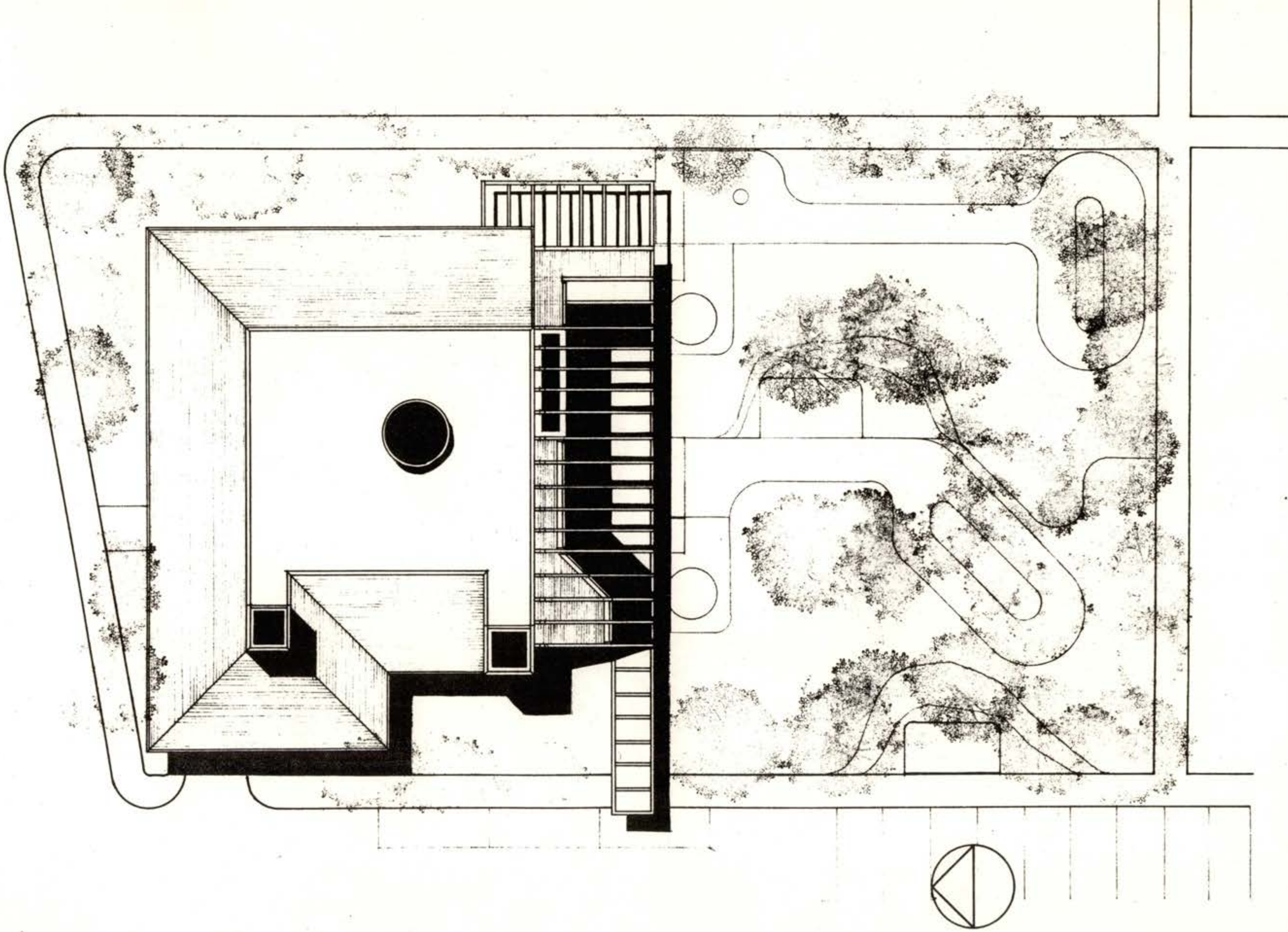



# GROUND FLOOR PLAN

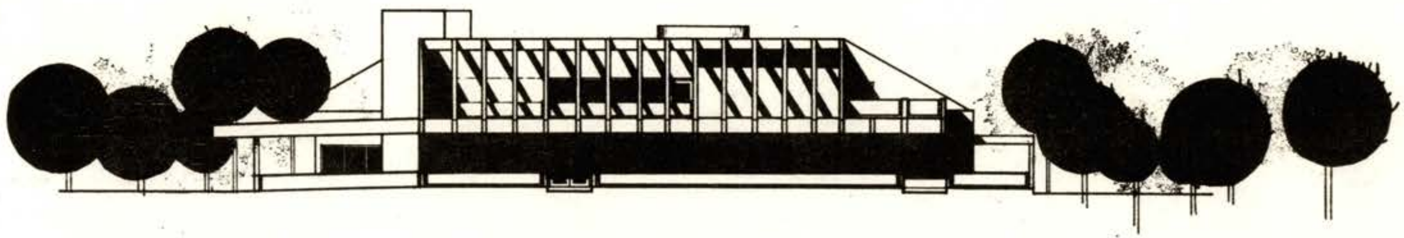
1 : 200




# UPPER FLOOR PLAN



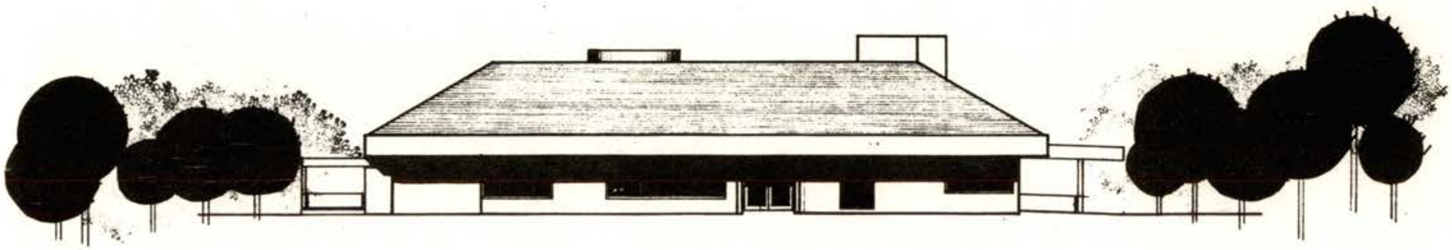
# ROOF PLAN

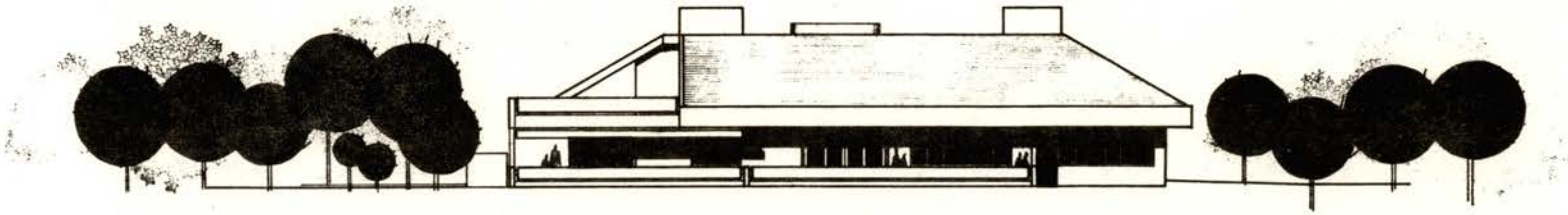


SOUTH

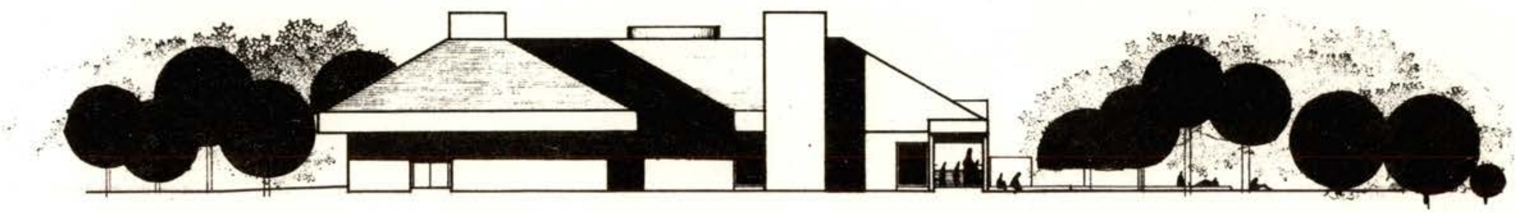
ELEVATION

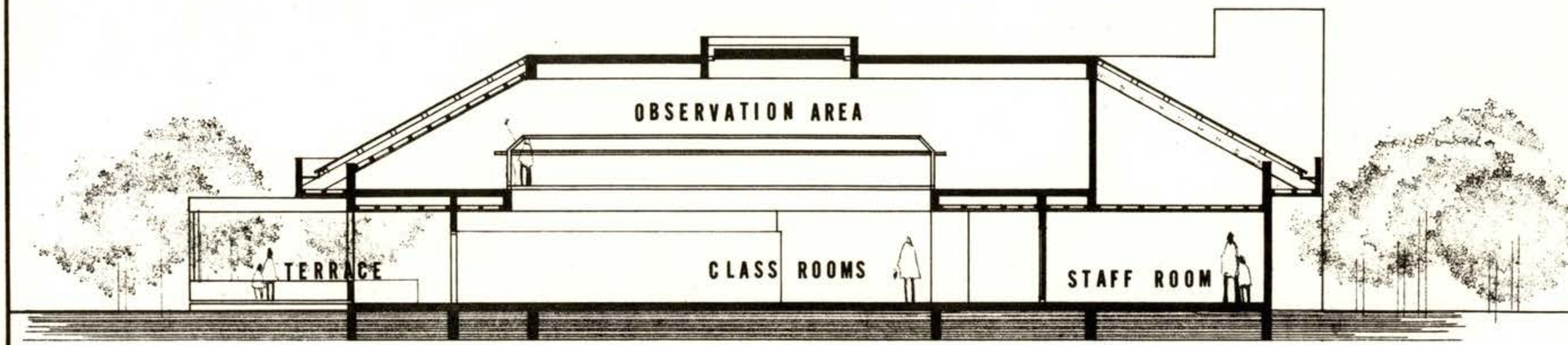
NORTH





EAST
ELEVATION
WEST






A
SECTION 1:100
B