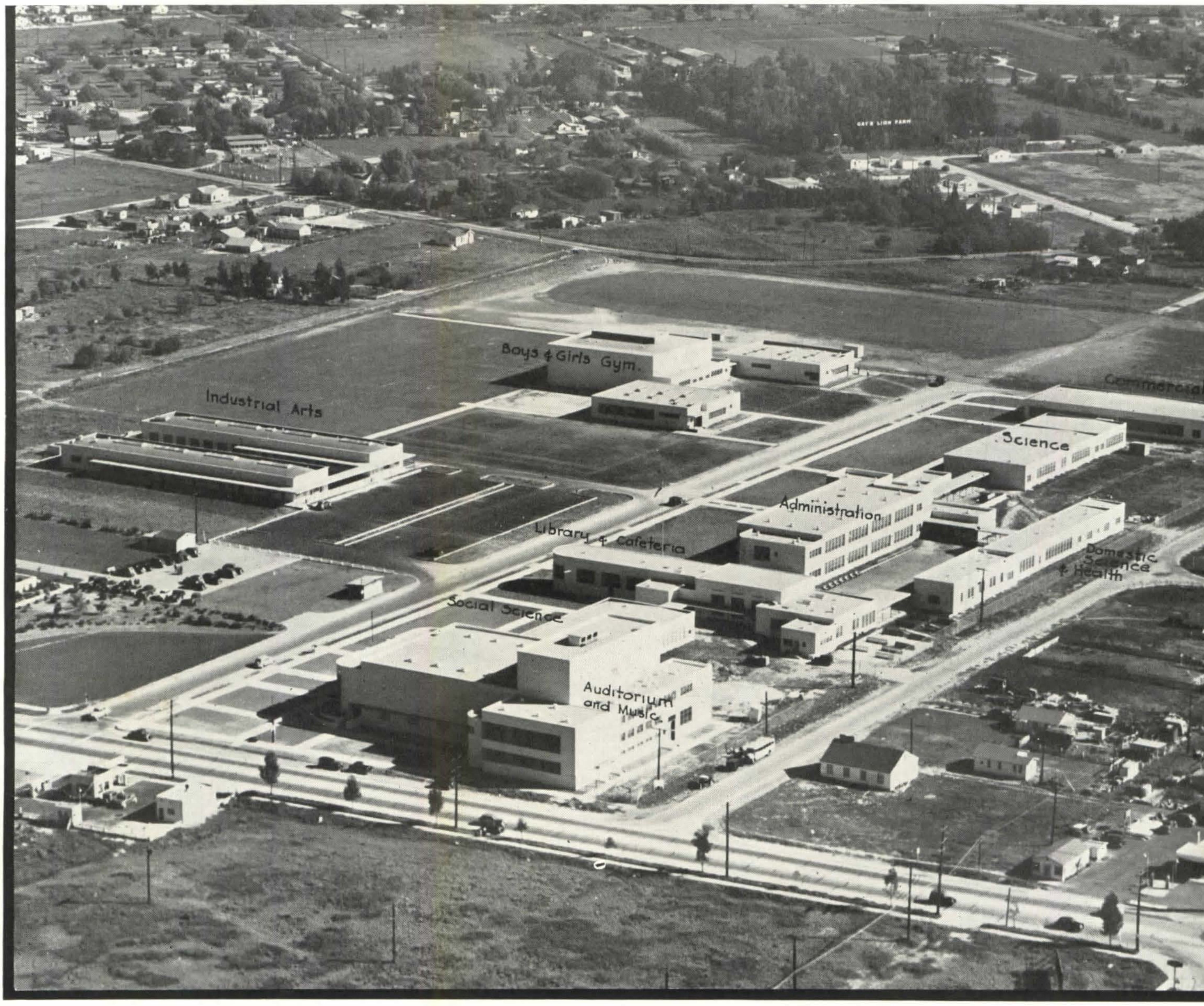
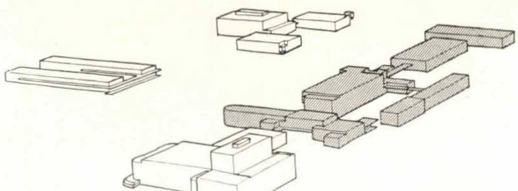


HIGH SCHOOL, EL MONTE, CALIFORNIA

MARSH, SMITH & POWELL, Architects

DURING THE PERIOD in which this new school plant was being constructed in a rapidly growing suburb of Los Angeles, student enrollment increased more than 25 per cent—from 1,750 to 2,200. Planning for future expansion was, therefore, of paramount importance. The present buildings are so arranged on the site that space is reserved for additional building in almost every department. Two factors determined the choice of the open plan, with departments housed in separate structures: the local soil-bearing value was very low; the buildings had to be designed to resist earthquake stresses. The two larger units—the Administration Building and the Auditorium—are of reinforced concrete construction, erected on piling. The balance of the buildings are one story in height, framed in wood and built up from concrete slabs. Exterior finish is of metal-reinforced cement plaster, applied on diagonal 1-in. sheathing. Built under a PWA program in 1938-1939, the school cost $610,000, including site improvement and professional fees, but excluding equipment and landscaping.

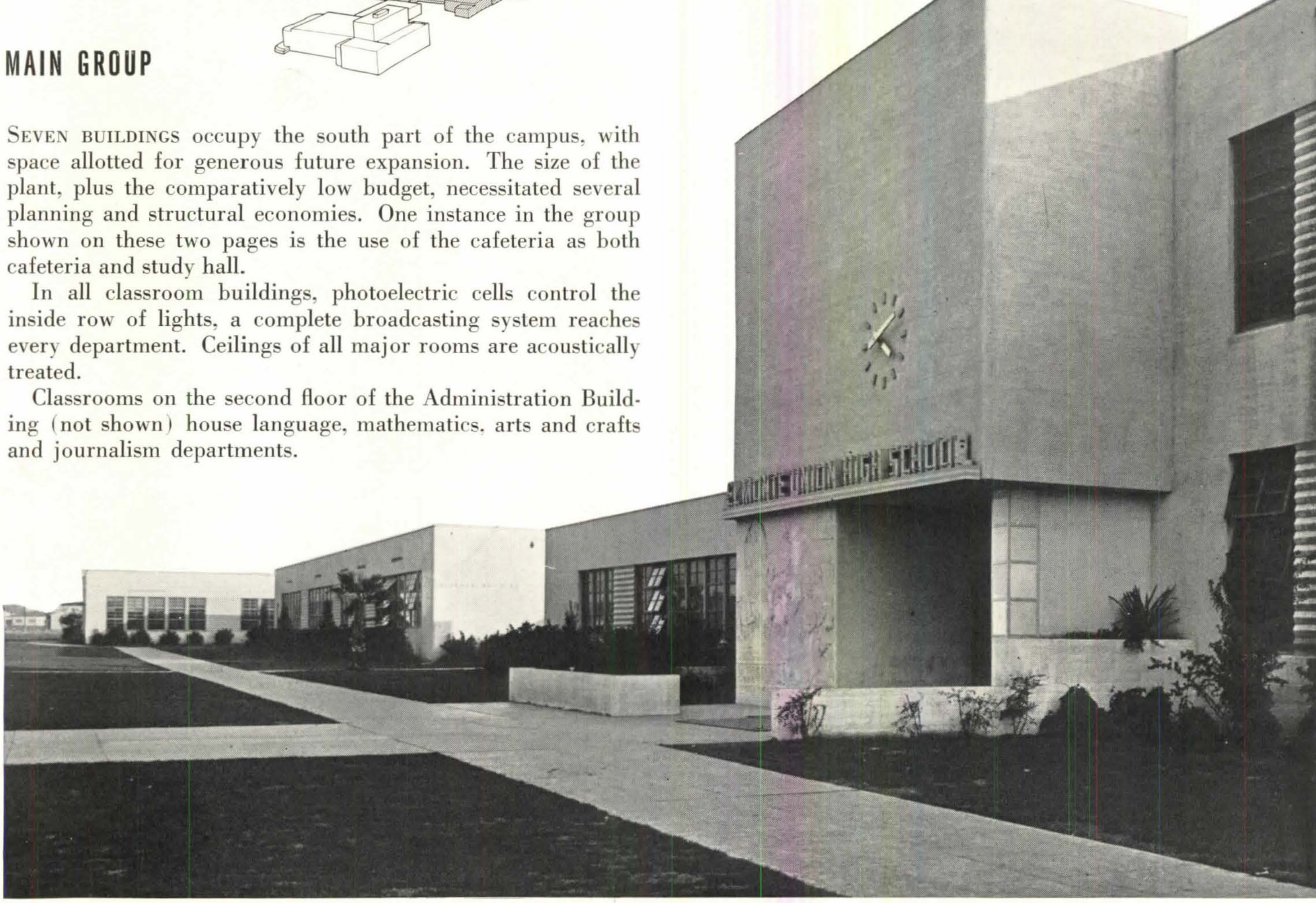


MAIN GROUP

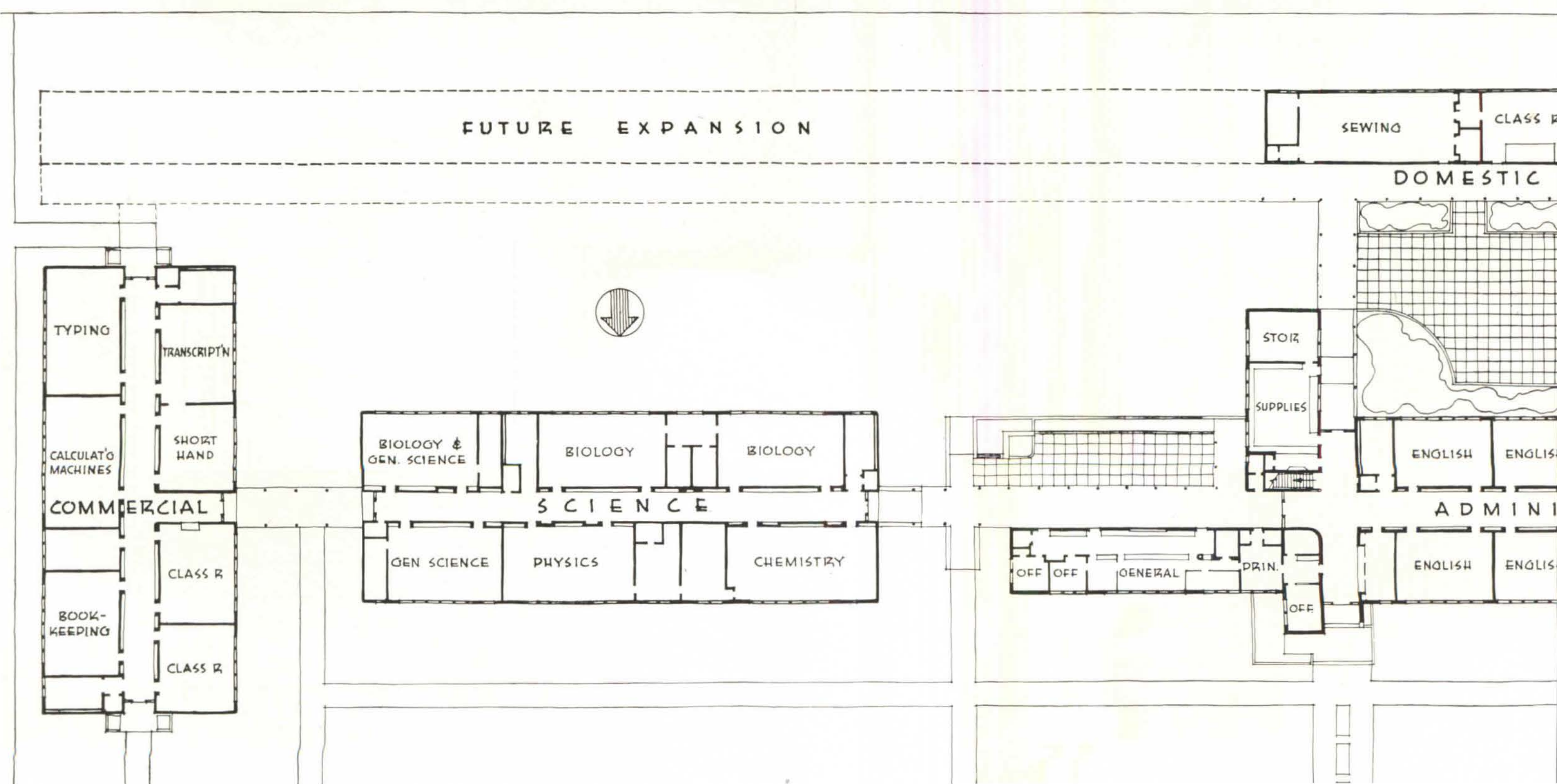
SEVEN BUILDINGS occupy the south part of the campus, with space allotted for generous future expansion. The size of the plant, plus the comparatively low budget, necessitated several planning and structural economies. One instance in the group shown on these two pages is the use of the cafeteria as both cafeteria and study hall.

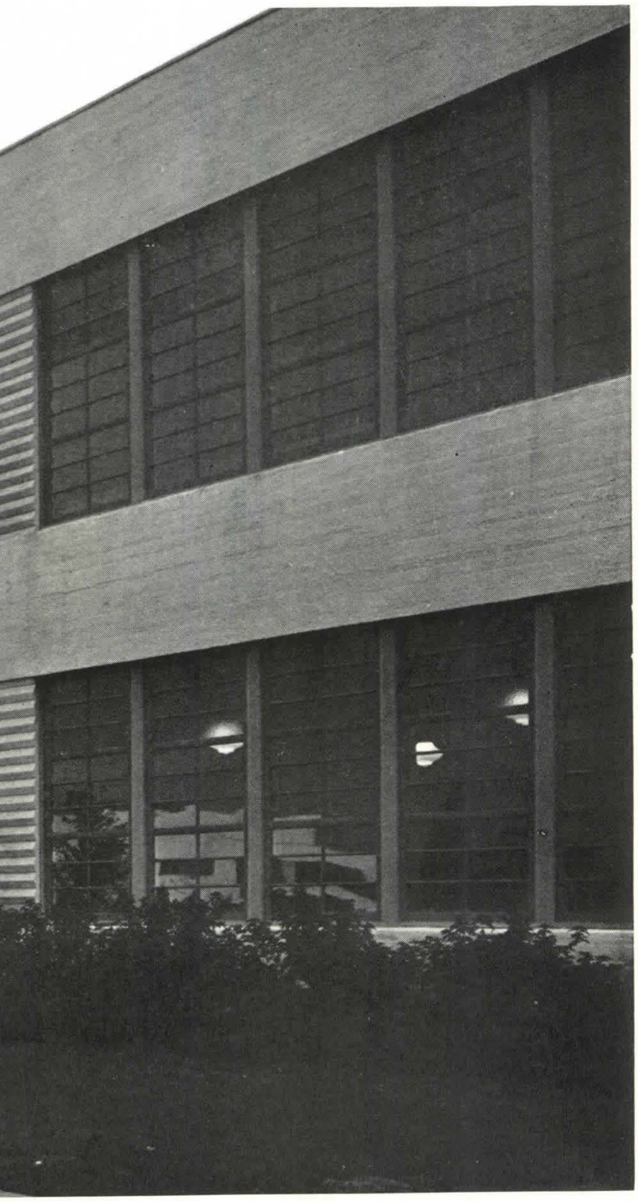
In all classroom buildings, photoelectric cells control the inside row of lights, a complete broadcasting system reaches every department. Ceilings of all major rooms are acoustically treated.

Classrooms on the second floor of the Administration Building (not shown) house language, mathematics, arts and crafts and journalism departments.



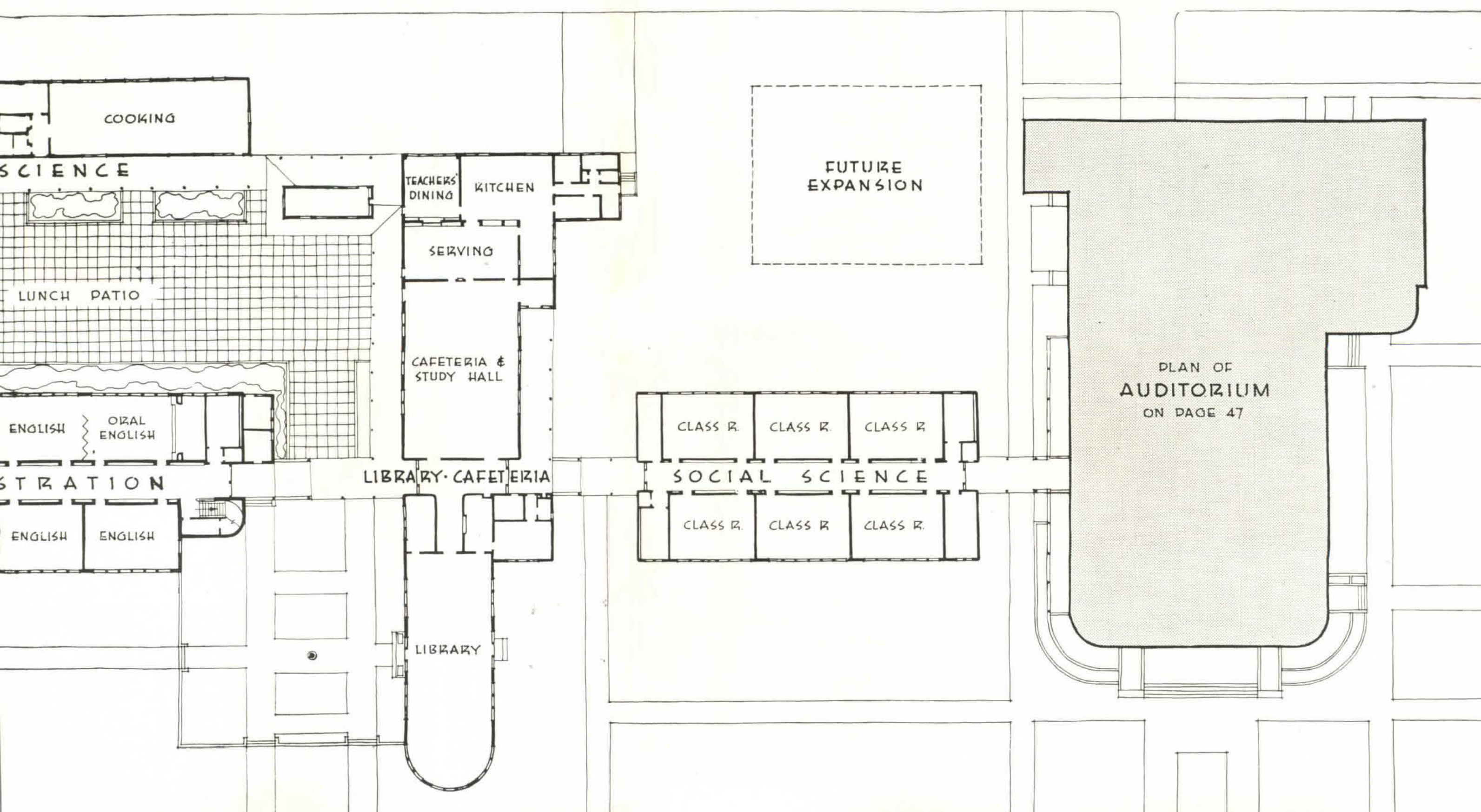
Photos by Eaton

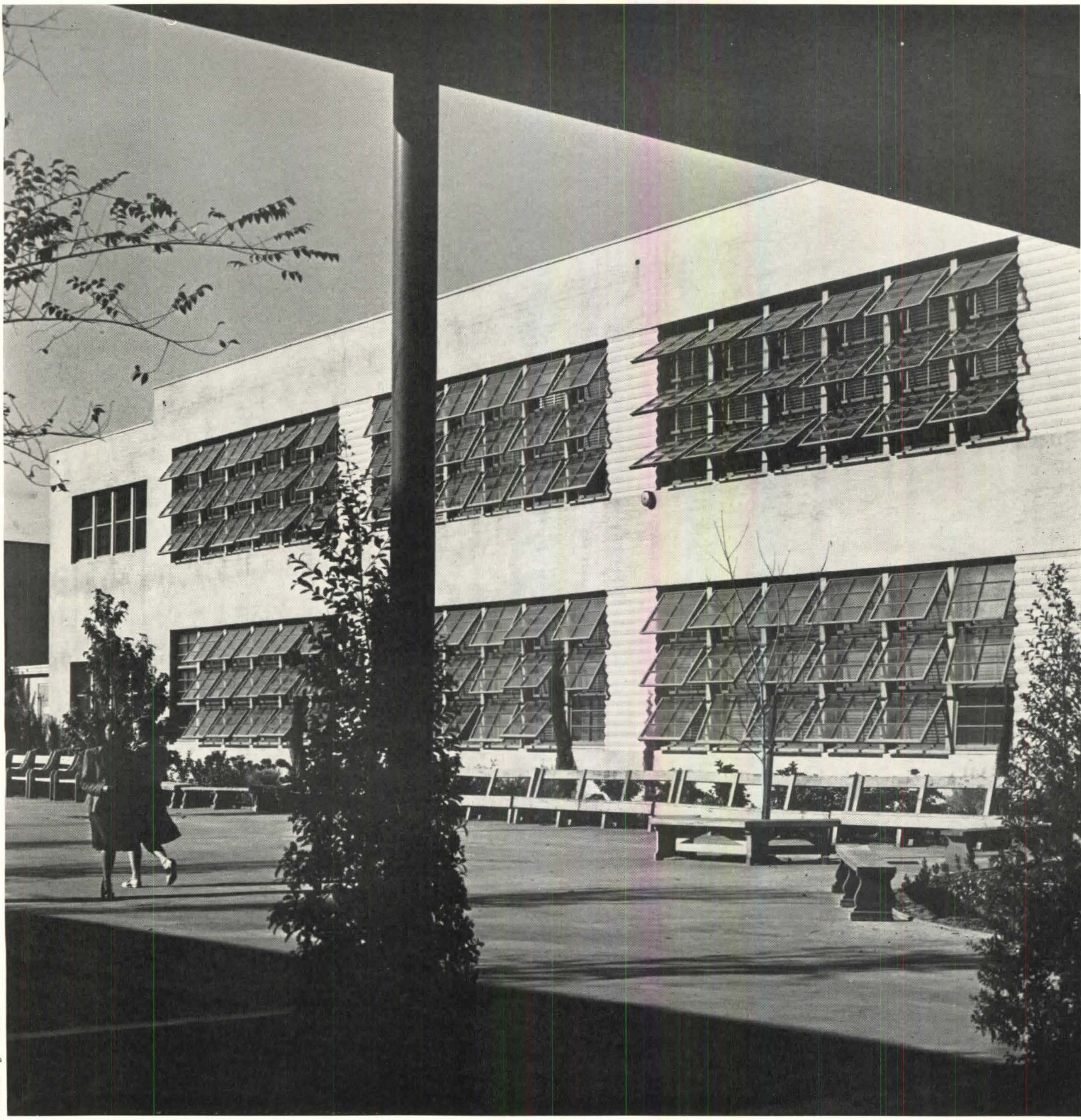




TYPICAL CLASS ROOM

LIBRARY



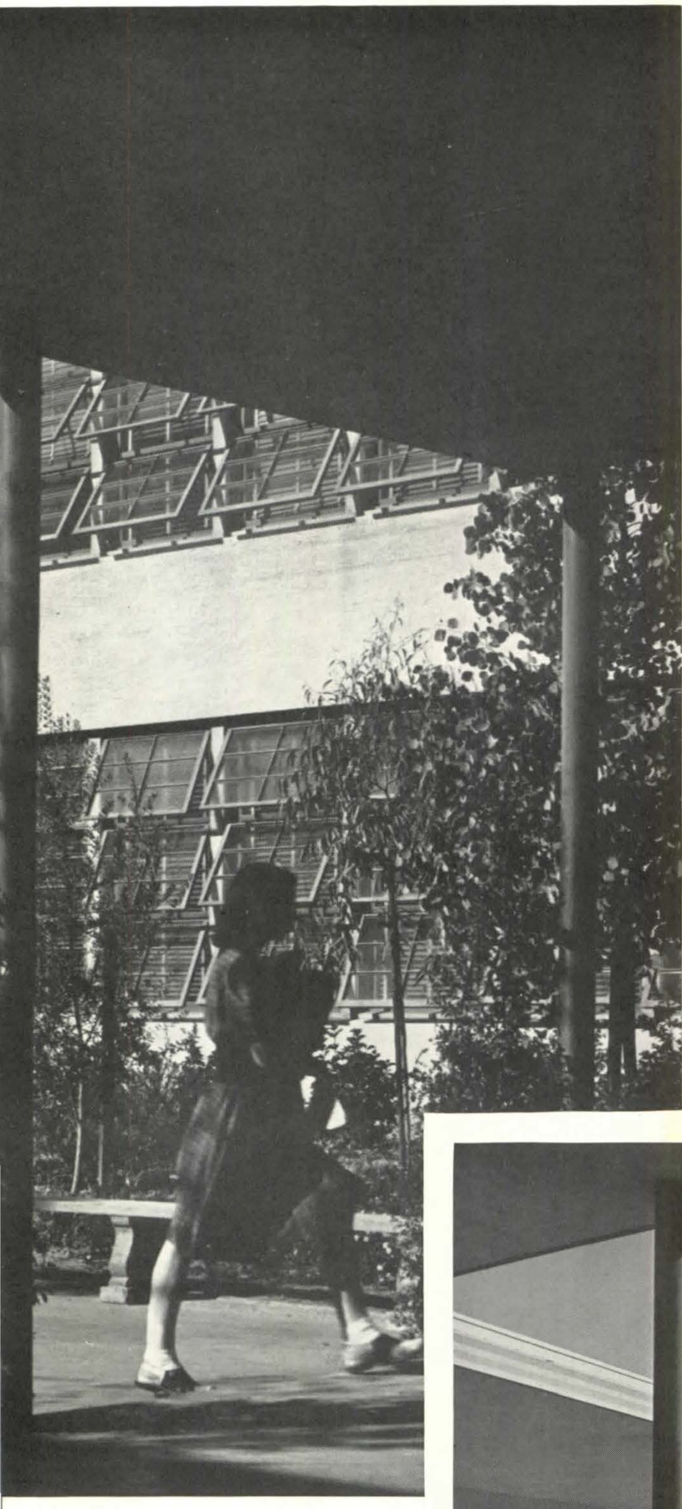


Photos by Eaton

CIRCULATION

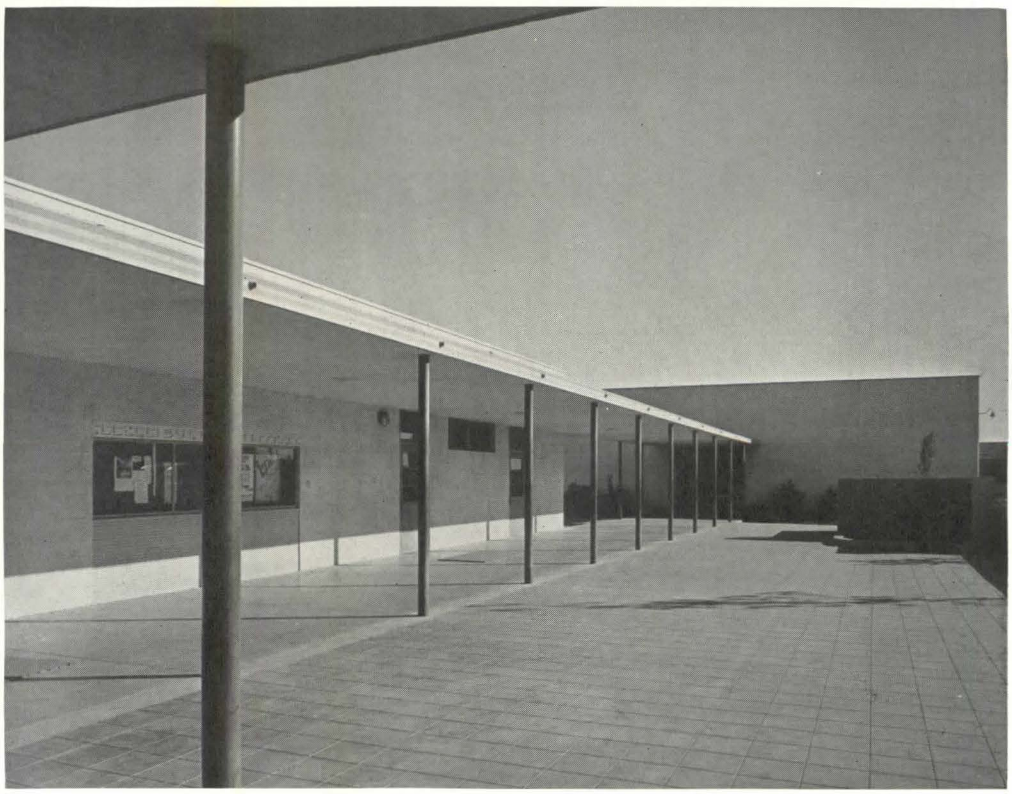
COVERED WALKS connect all seven of the buildings on the south half of the site. In conjunction with adjacent walls, these passageways form various courtyards and patios. The large one in back of the Administration Building (above) adjoins the cafeteria and is used for outdoor lunch-eating. The two units of the Industrial Arts group are also connected with a sheltered walk, which forms an inner courtyard between them.

Due to the high water level in this area in winter, no basements were included in any of the buildings. Janitors' work rooms and storage spaces were provided above ground. The heating system consists of a gas furnace and fan system in the auditorium and unit heaters in the main rooms of the other buildings.



ENTRANCE TO AUDITORIUM (See next page)

COLONNADE TO SCIENCE BUILDING



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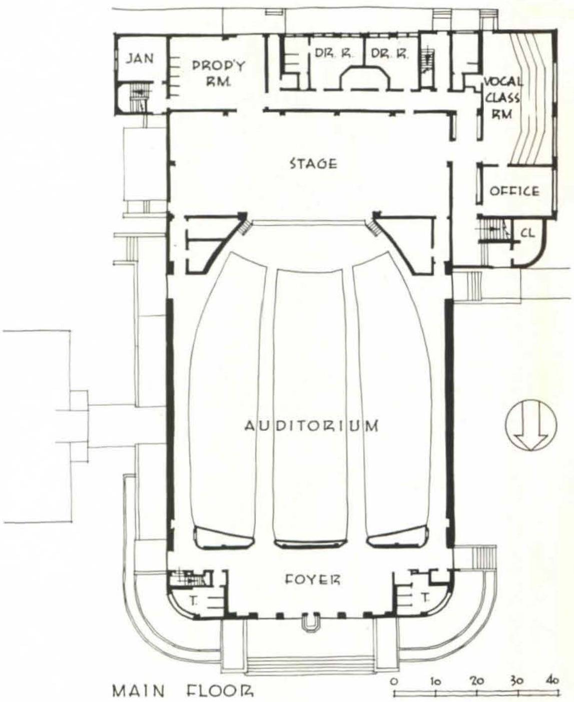
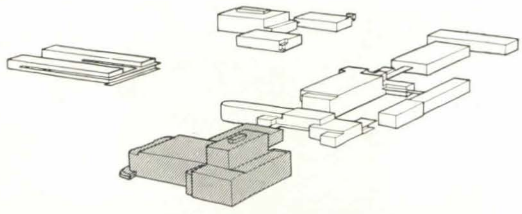
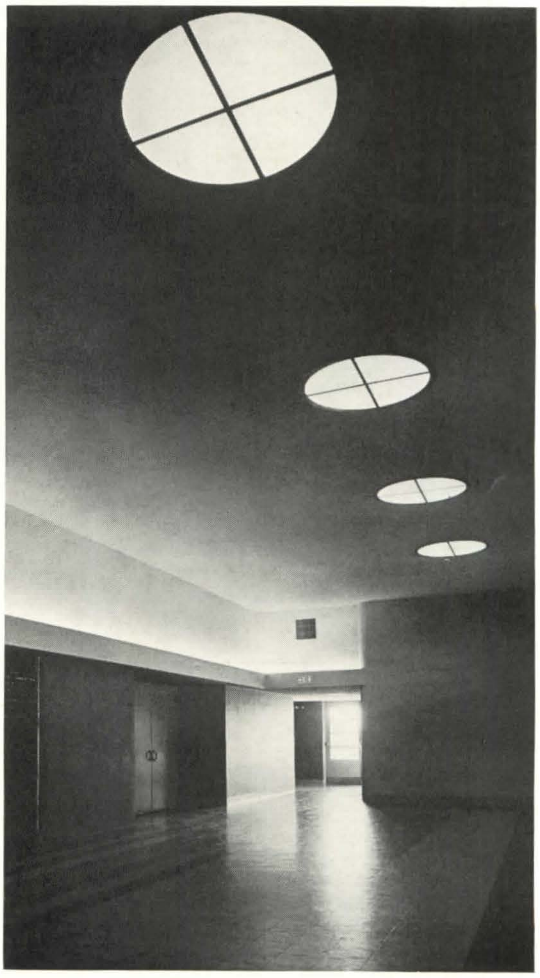


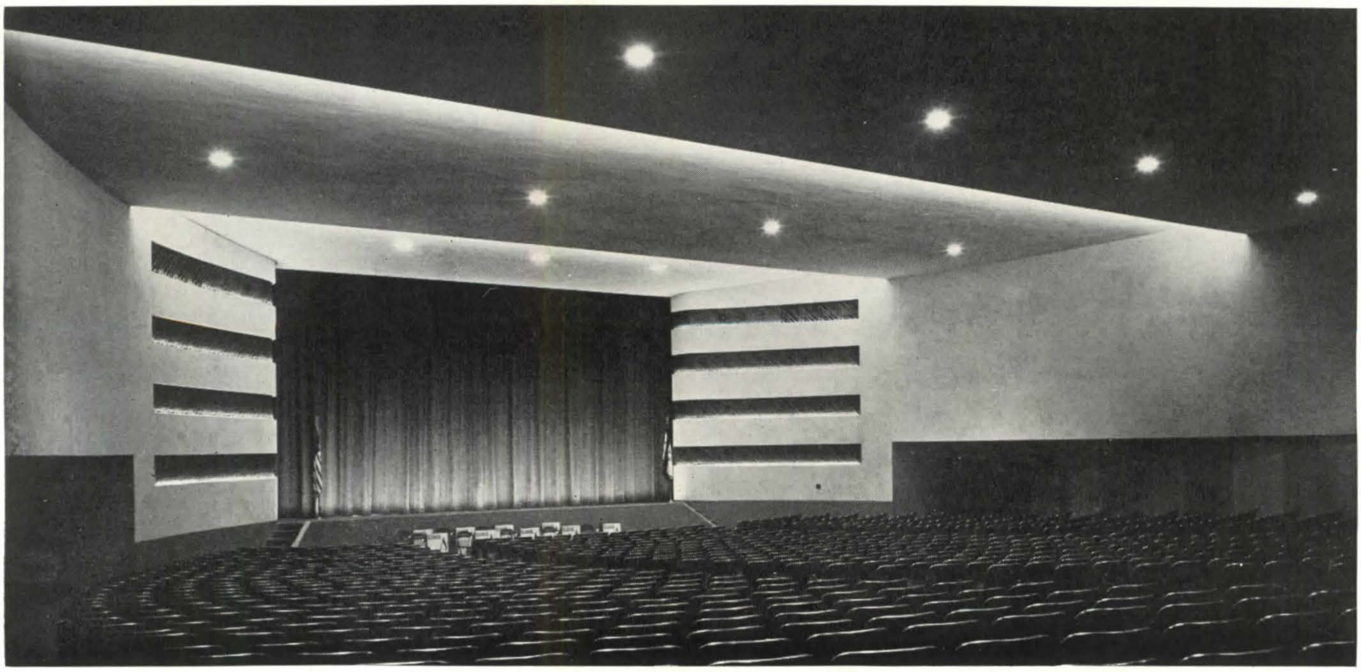


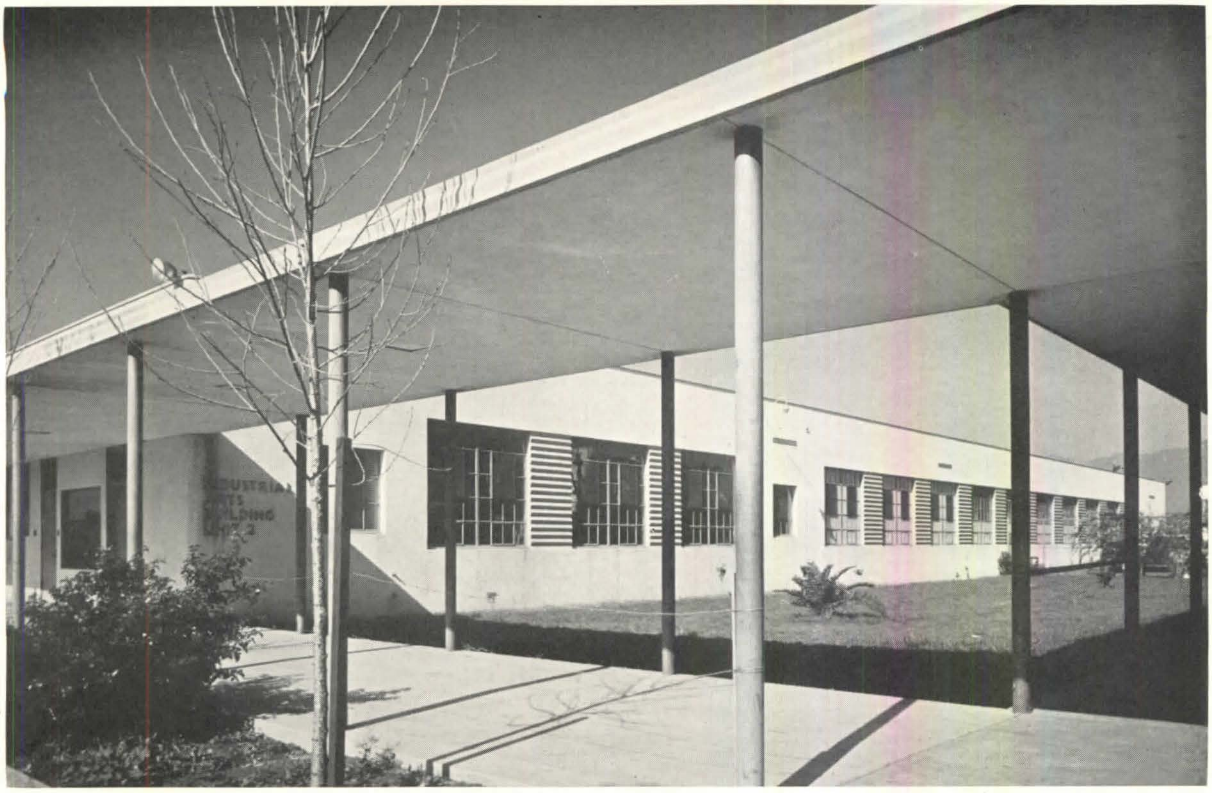


AUDITORIUM

ONE OF THE LARGER BUILDINGS on the campus is the reinforced concrete Auditorium Building. On the ground floor, besides the foyer, auditorium (seating 1,178) and the full-width stage, there are property, dressing and make-up rooms, and classrooms for singing and music appreciation. A specially noteworthy plan feature is the placement of the property room, which opens directly onto the stage and out to a delivery platform at the rear of the building.

An L-shaped plan borders the stage loft throughout three floors of its height. On the second floor there is a large Band Room and store rooms for costumes and instruments. In back of the stage gridiron, at the third-floor level, are a music-teaching studio and eleven practice rooms.





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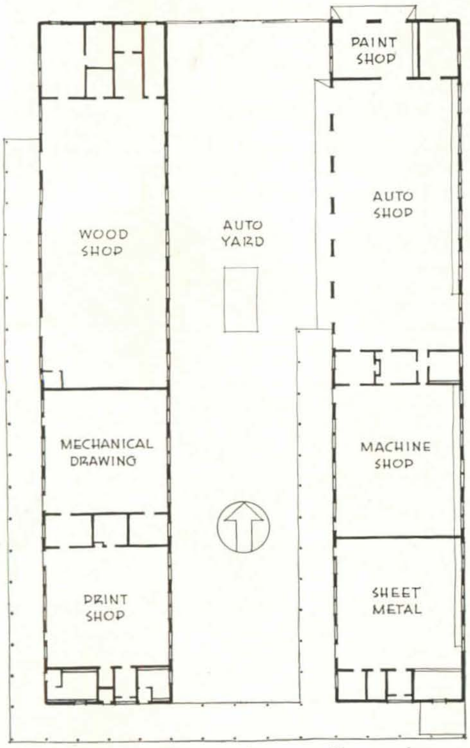
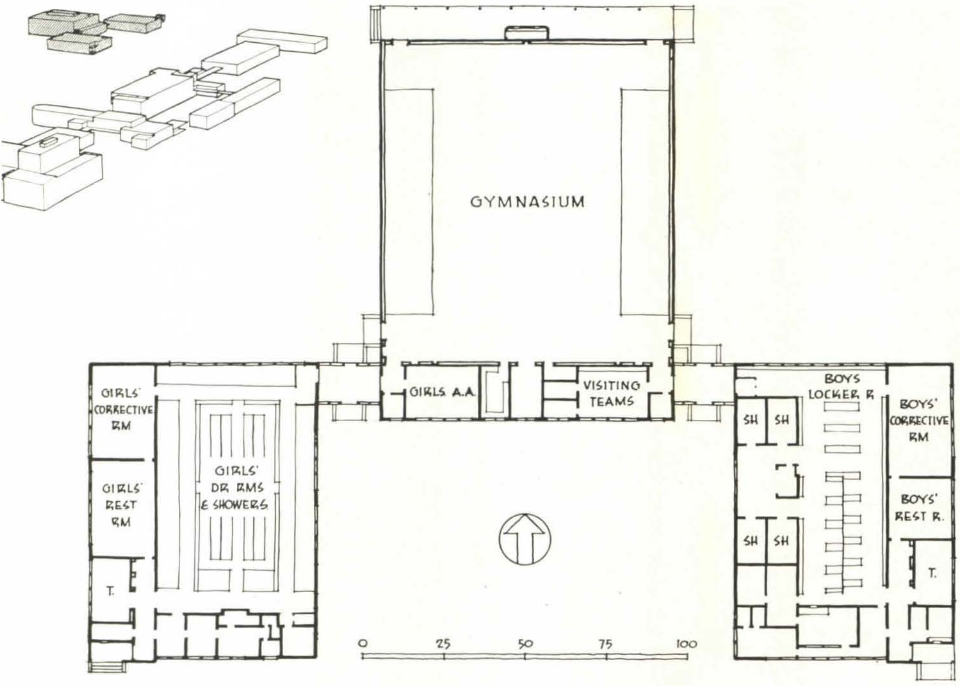
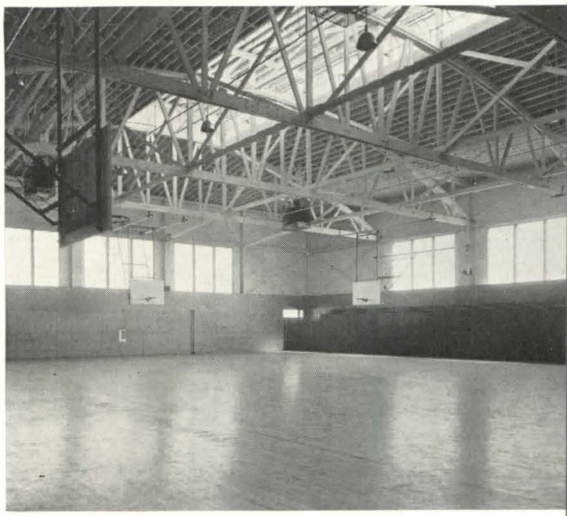


INDUSTRIAL SHOPS

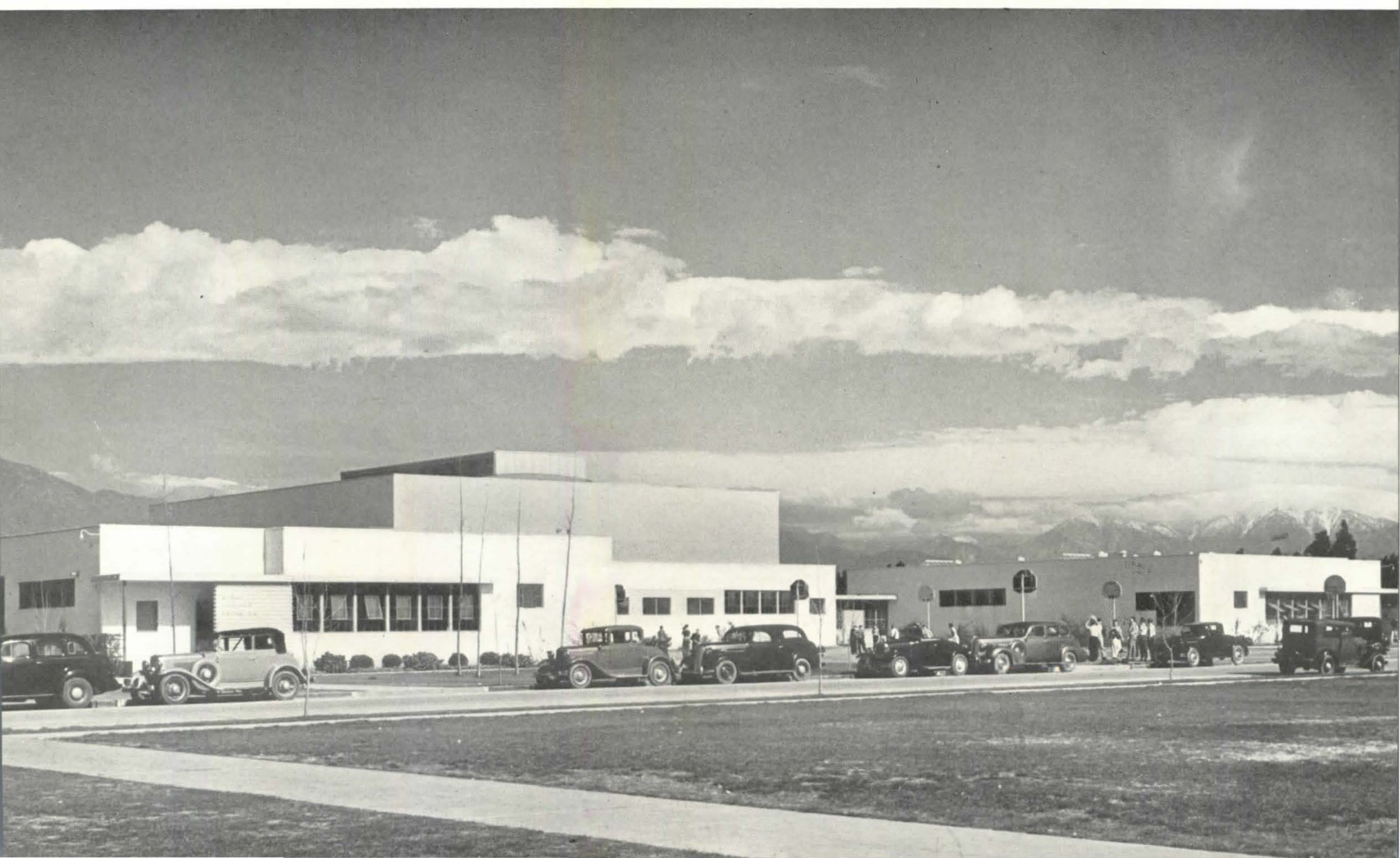
THE TWO BUILDINGS for the school's Industrial Arts Department are located on the north side of the plot directly *across* from the Administration Building. Special requirements of the educational program dictated the provision of unusually large units. Each is 40 by 428 ft. in area. The buildings are daylighted by both wall windows and skylights. In the east building are auto, machine and sheet metal shops. A print shop, a wood shop and a mechanical drawing room occupy the building on the west. Space on the plot is reserved for proposed future additions—an additional shop building, an Agriculture Building, and a bus garage.

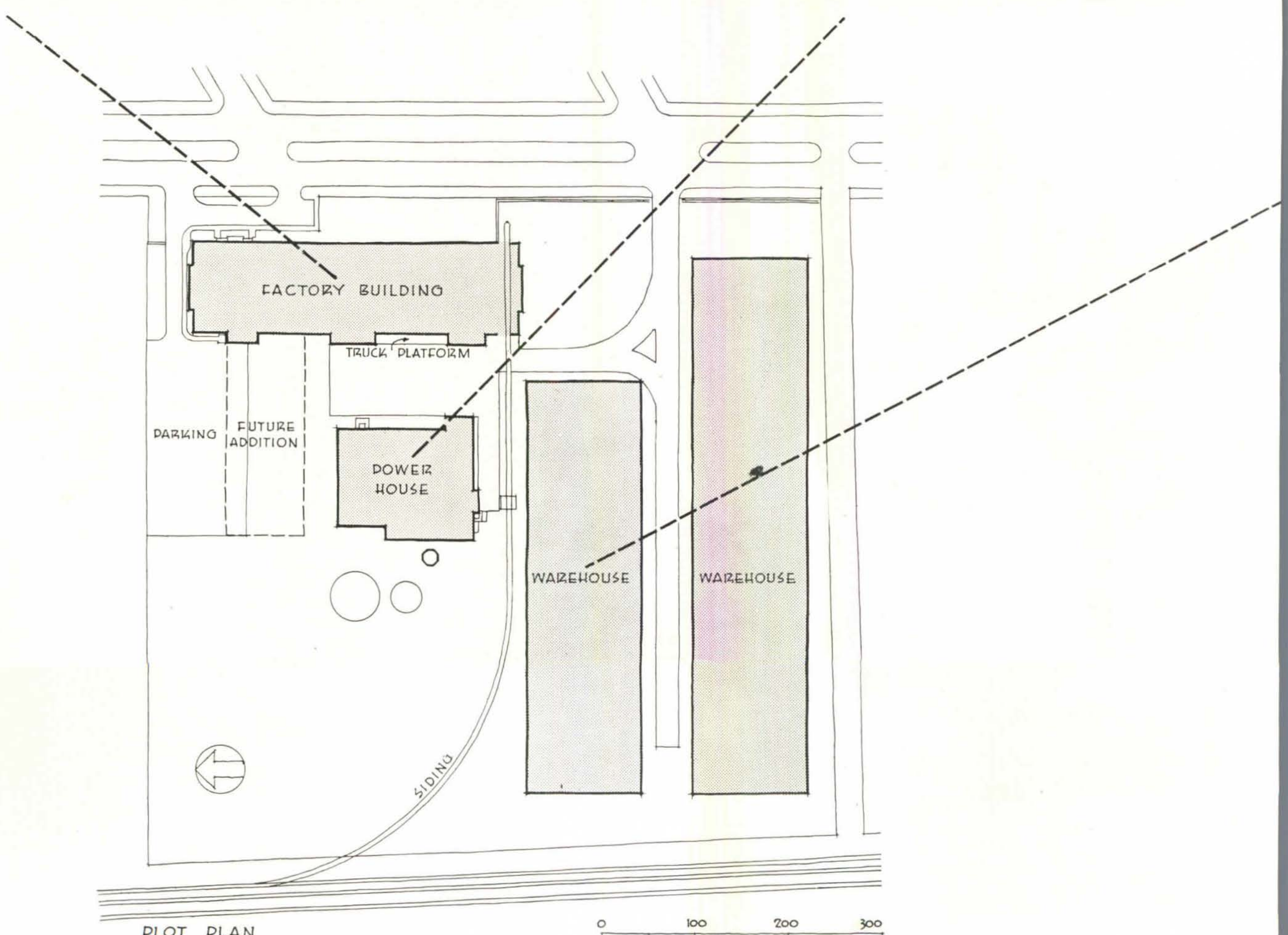




GYMNASIUM

ANOTHER INSTANCE of economical planning to come within the budget is the Gymnasium building, located on the north side of the site. A single large gymnasium floor serves both boys and girls. Locker and shower buildings flank the gymnasium at either side; special dressing-room facilities are provided for visiting teams. Between the gymnasium and the shop buildings (see facing page) is space for six tennis courts. Behind each of the locker-room units is a volley ball court. A track field and baseball diamond occupy the entire eastern end of the school plot.




FACTORY BUILDING
TRUCK PLATFORM
PARKING
FUTURE ADDITION
POWER HOUSE
WAREHOUSE
WAREHOUSE
SIDING
PLOT PLAN
0
100
200
300

Photos by St. Thoma

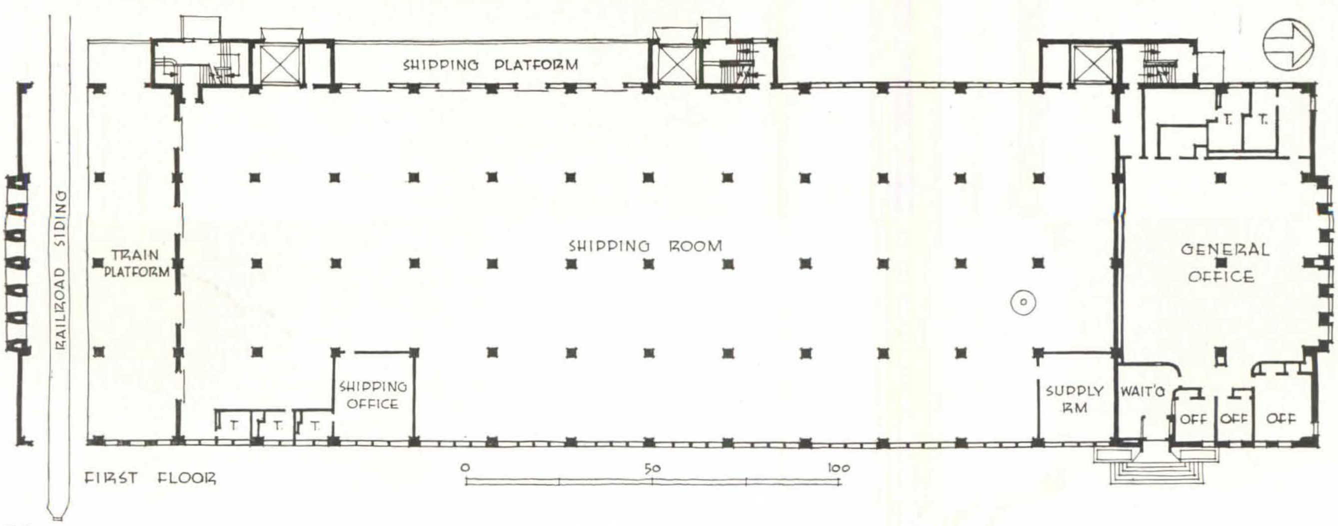
TOBACCO FACTORY, RICHMOND, VIRGINIA

SCHMIDT, GARDEN & ERIKSON, Architects

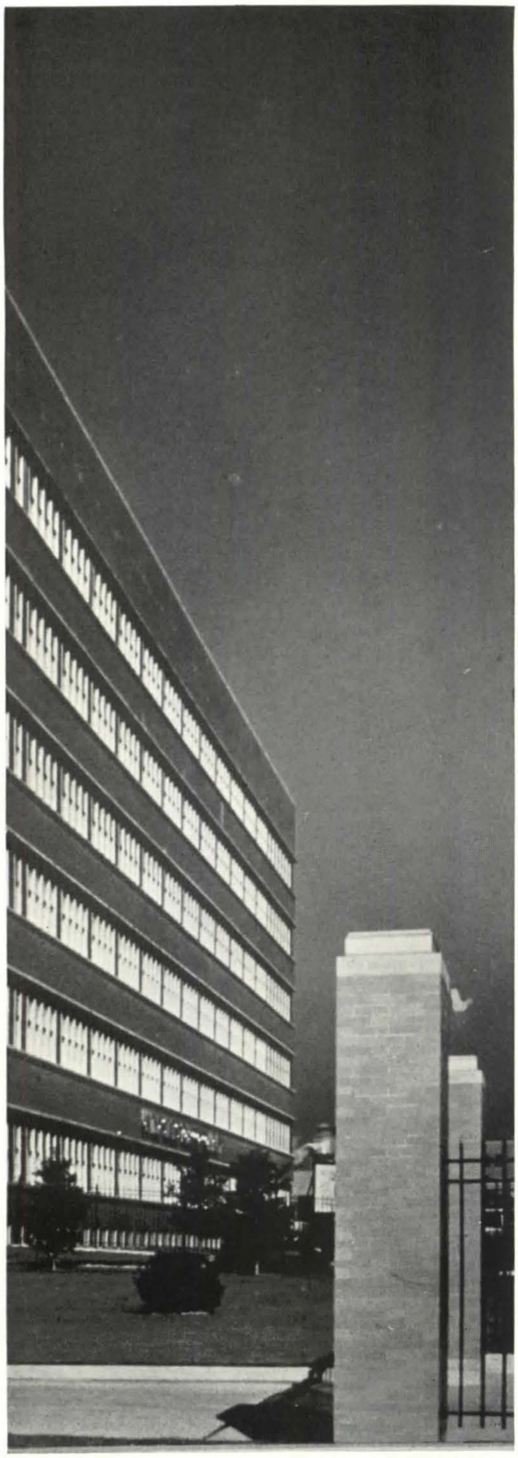
THIS ENTIRE NEW PLANT for the United States Tobacco Co., just outside Richmond's city limits, replaces the old factory which was in the heart of the city. Two advantages determined the choice of the new and detached site: the buildings could be designed and located for optimum production efficiency; a large enough site was afforded to provide for future expansion of facilities. Location of the site is such that the plant is visible from most parts of Richmond as well as from a considerable distance along the main north-south arterial highway which it adjoins. Hence the group was designed not alone as an efficient factory but also to attract public attention and to advertise the company's product. To the latter end, the entire north and south façades of the factory building proper serve, in effect, as supports for giant, stainless-steel sky signs (detail on page 54).

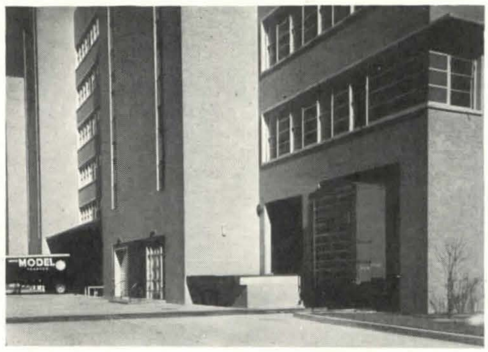
The plant layout comprises three main elements—the six-story factory building, a power house and the tobacco warehouses. Trucking lanes and a railroad siding reach each of the three units. The basic production process follows a simple pattern. From the warehouses, cured tobacco is taken to the factory building and hoisted to the top floor. Steps in manufacture follow gravity back to the ground floor, where the packaged tobacco is loaded either on freight cars, which actually enter the building at its southern end, or on trucks.

Photos by St. Thomas



FIRST FLOOR





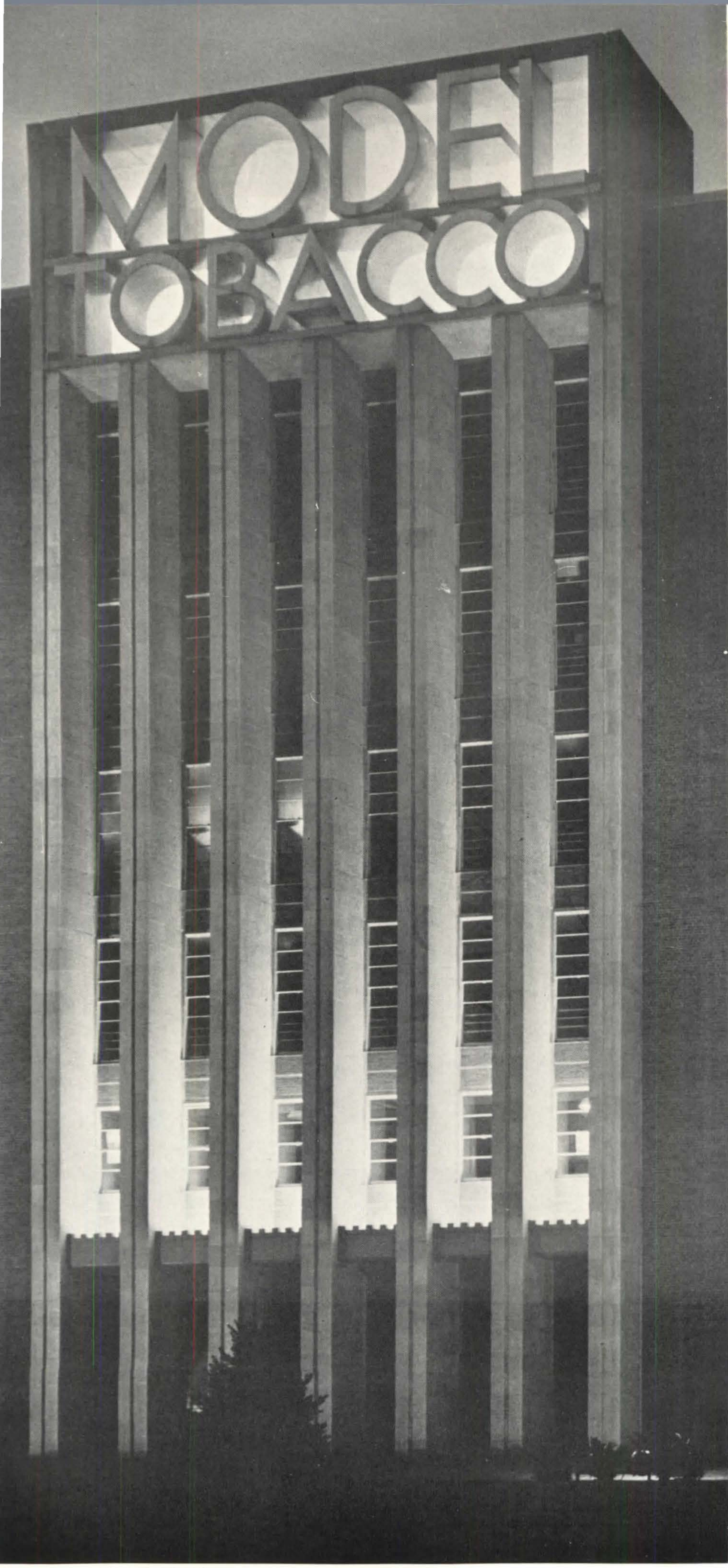
SHIPPING AREA

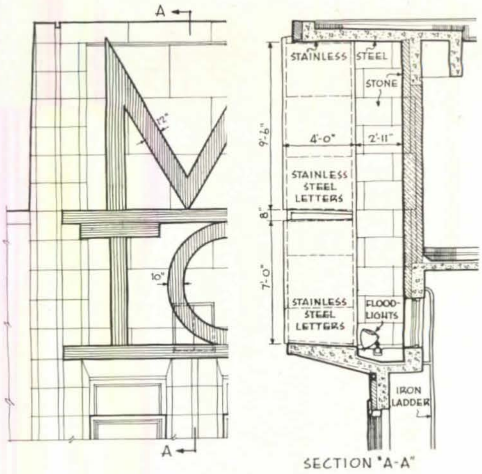
FACTORY BUILDING

DOMINATING THE GROUP is the main factory building. Of reinforced concrete structural frame, the building is surfaced in red face brick and cut-stone trim. Each of the floor areas (100 by 350 ft.) is divided into three parts—the large central portion given over to the manufacturing process, the two ends variously assigned to railroad siding and office space (see first floor plan), dining-rooms, service, locker and wash-rooms (on other floors). Throughout the six floors fireproof walls with fire doors separate the three areas. The stainless steel signs, which are mounted in cut-stone frames, are supported by vertical piers springing from the ground. On the east long wall of the building are unbroken horizontal bands of windows. Wood sash are used in air-conditioned areas; hollow metal elsewhere. The warehouses are framed in wood and surfaced with sheets of corrugated metal, which are set at an angle to facilitate circulation of air.

CONSTRUCTION SHOT

TRUCKING LANE (warehouse at left)

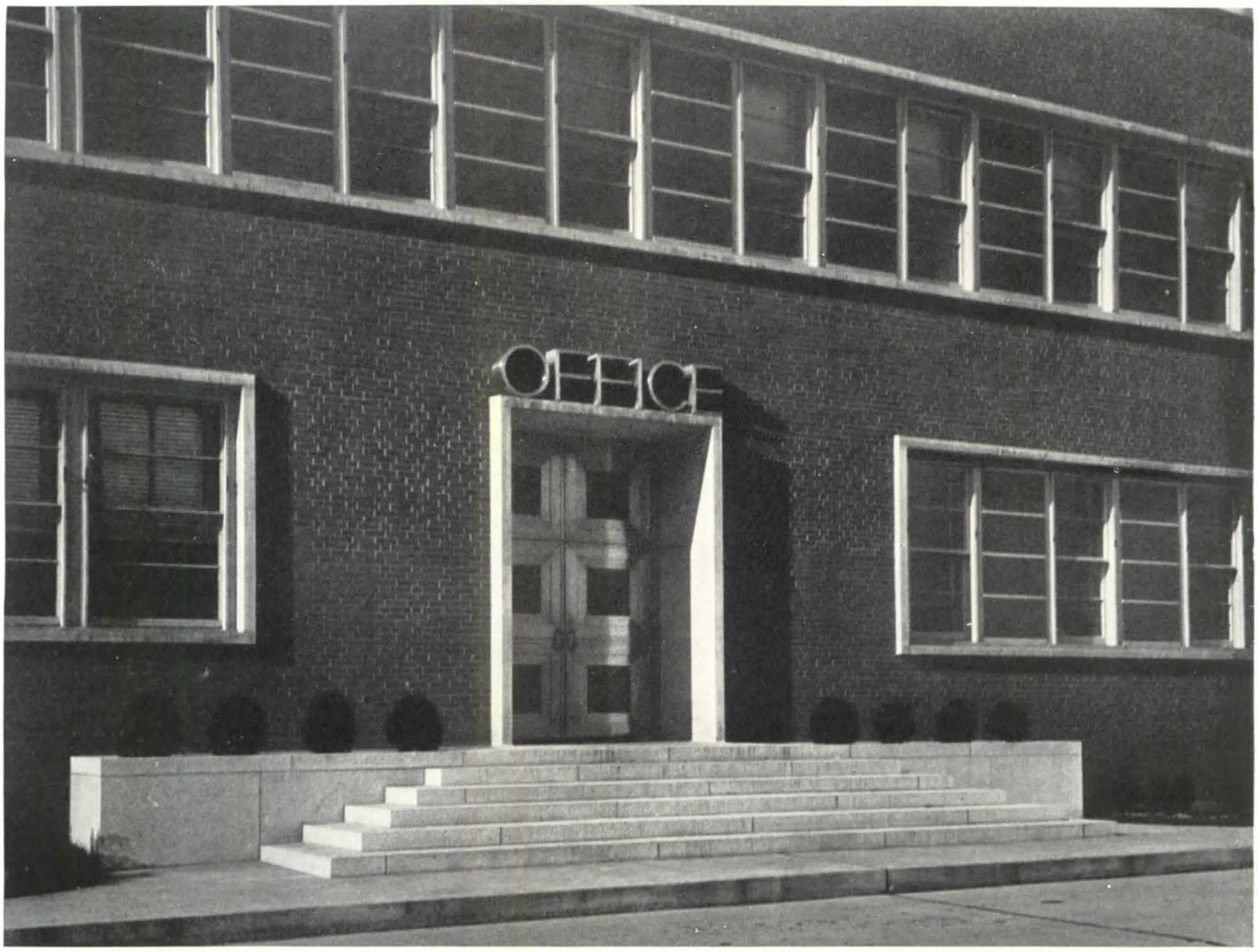




SKY SIGN: The monumental sign letters, of stainless steel, are silhouetted at night against the floodlighted stone background. The area between the piers (see left) is also night-lighted.

PRIVATE OFFICE

Photos by St. Thomas

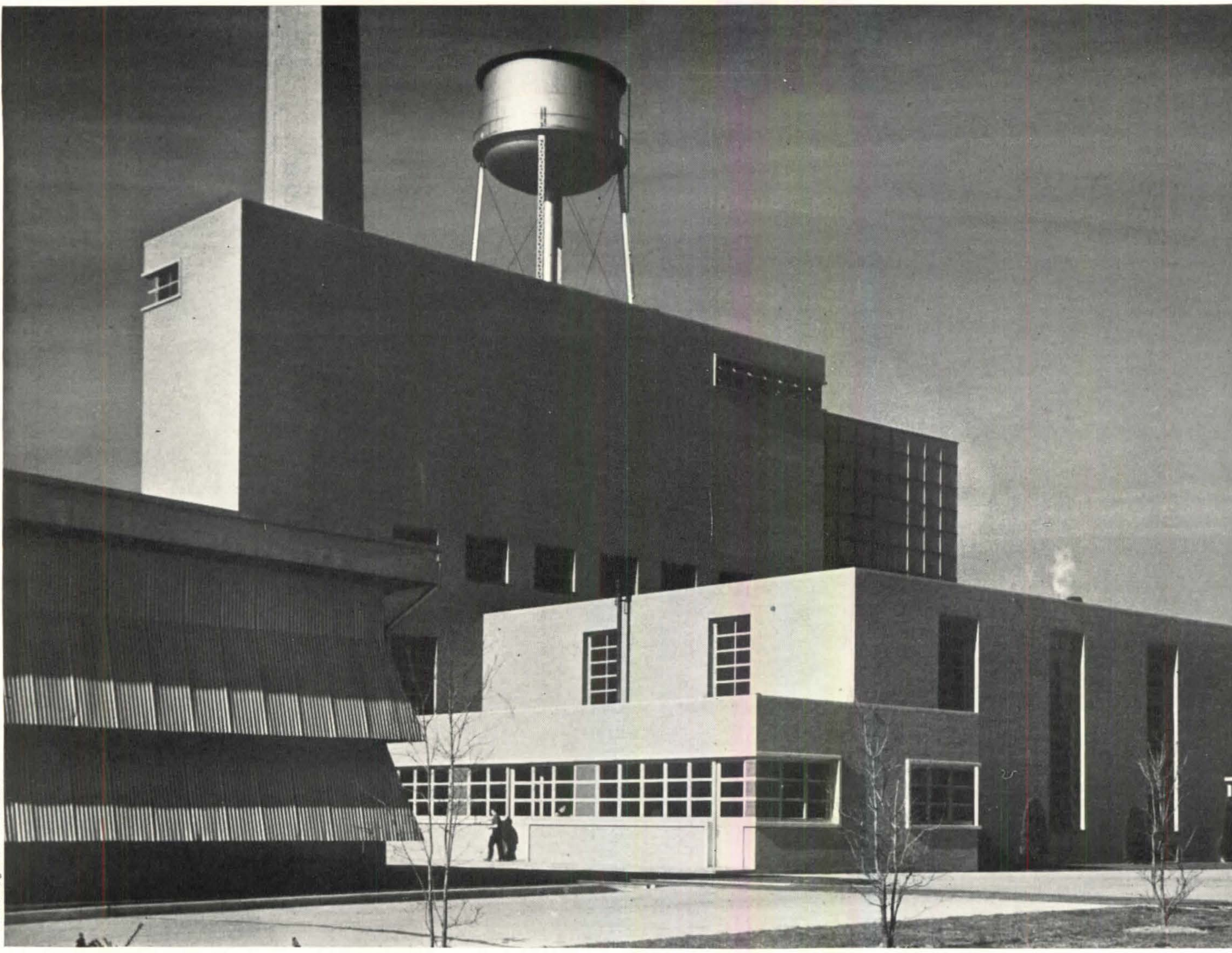


ENTRANCE TO OFFICE AREA

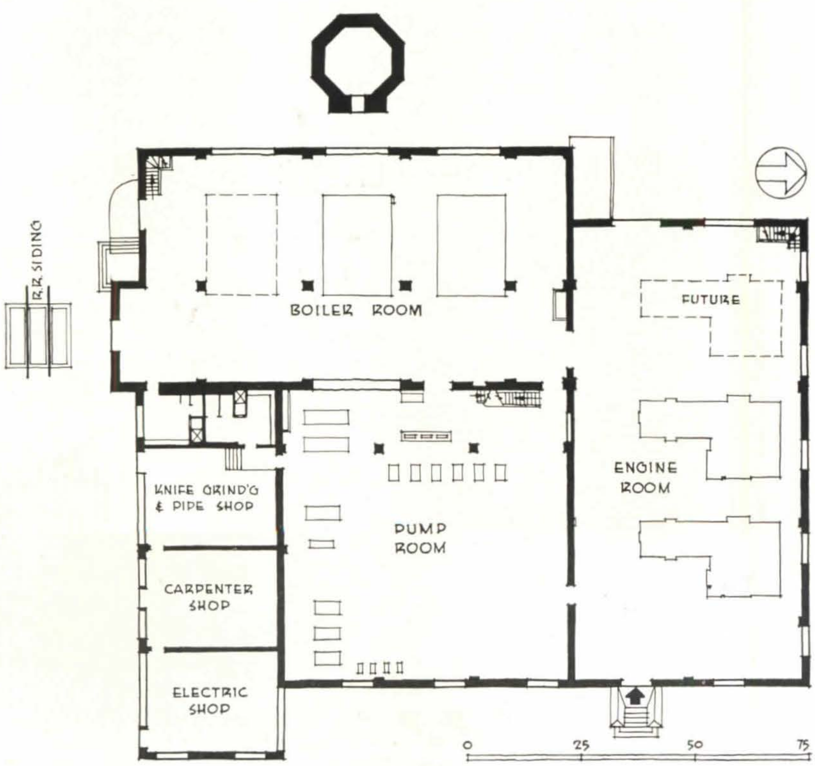
GENERAL OFFICE SPACE

OFFICES

SINCE THE BUILDING is not open to the public, the entrance to the office area, at the north end of the east elevation, is handled simply—a pair of stainless steel doors set in a stone frame. Reception room, private offices and general office work area occupy this entire end of the ground floor. Ceilings are acoustically treated and the floors are of rubber tile. Elsewhere on this floor, asphalt plank floors are used; on the second floor, iron-bound, edge-grain maple. Throughout the rest of the building, the concrete slabs are surfaced with a 1-in.-thick *industrial cement finish.*

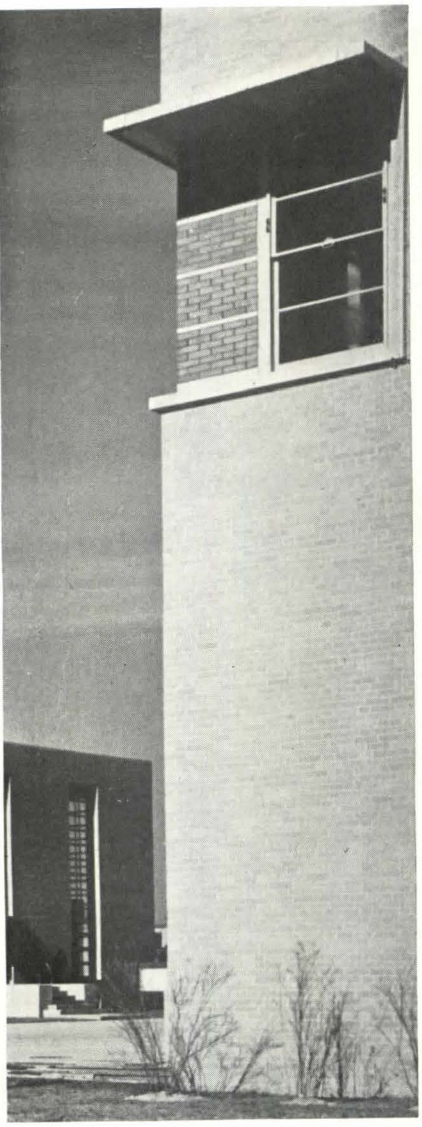


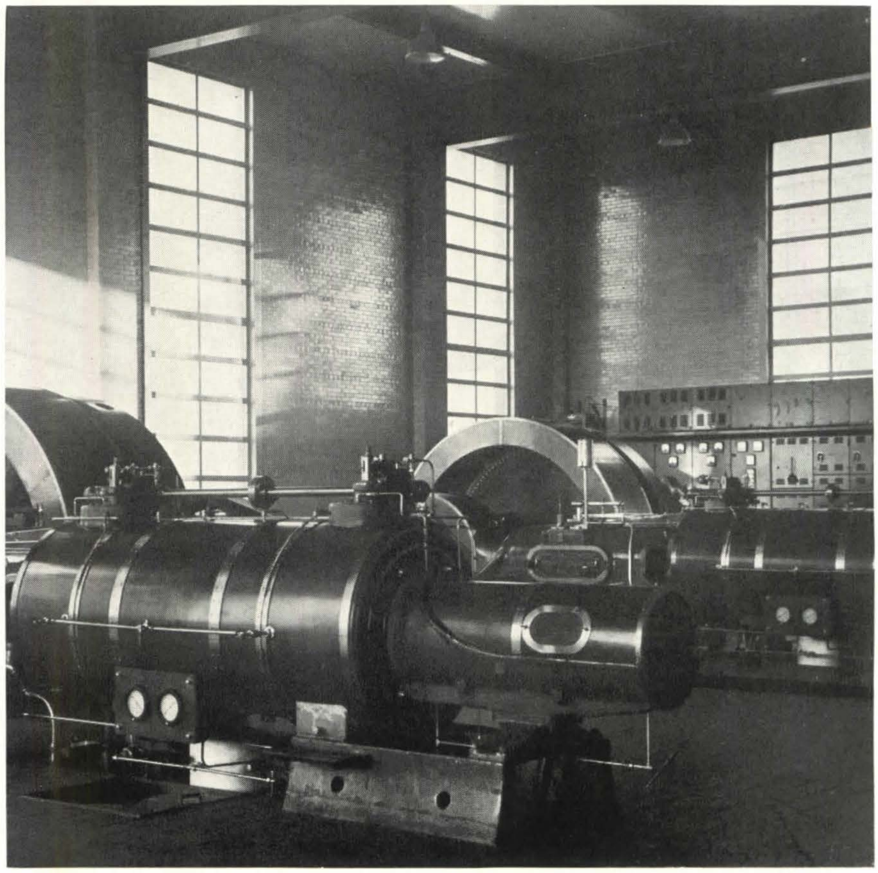
Photos by St. Thomas



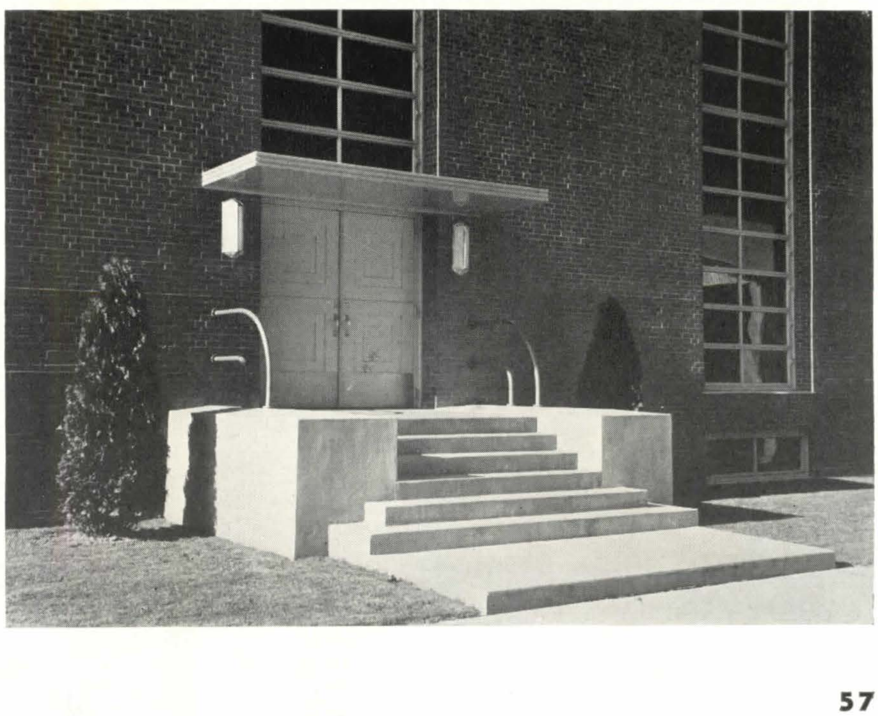
POWER HOUSE

A COMPLETELY SEPARATE UNIT of the plant is the power house with its 204-foot chimney. Surfaced, like the factory building, in brick with stone trim, the power house is framed in steel. A boiler room, pump room, engine room and work shops are the main plan elements. Interior walls are of buff glazed brick. Flooring in the shops is of wood block; elsewhere, of quarry tile. The steel sash are of the projective type with mechanical operators. The power plant consists of two boilers, two engine generators, two refrigerating units, complete with pumps, conveyors and other equipment for automatic operation.





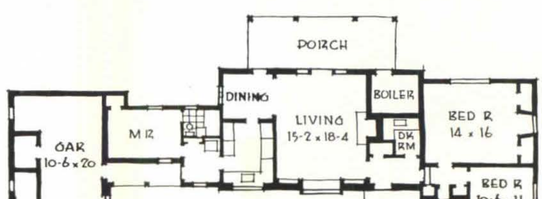
ENGINE ROOM



POWER HOUSE ENTRANCE

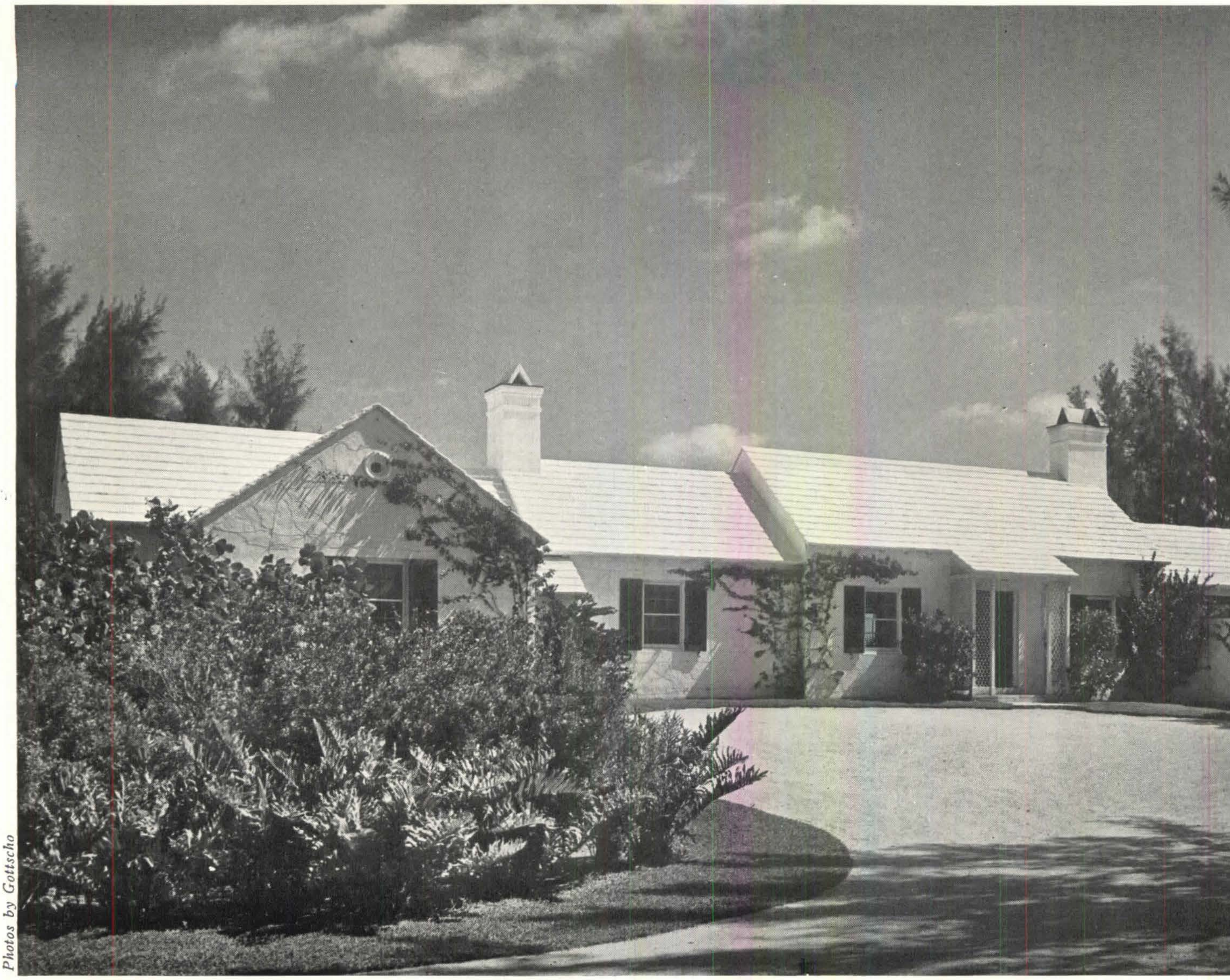
HOUSES

Photos by John Gass, Rudolph E. Leppert Jr.



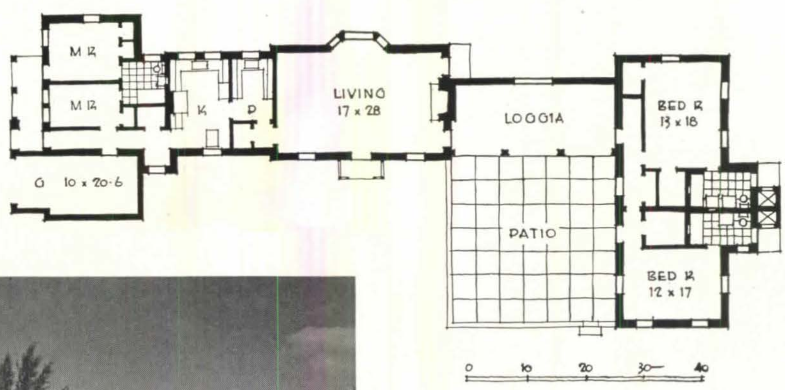
BENSON ESCHENBACH, Architect

SITUATED NEAR SCARSDALE, N. Y., this residence for Mr. and Mrs. William M. S. Strong is a simple and dignified adaptation of early Pennsylvania domestic architecture. The exterior is a straightforward expression of the plan. With all services (except the boiler room) located at one end, bedrooms at the other, and the living area between, the plan offers a noteworthy solution to the zoning problem. The rear of the house is more open than the front, as the owners wanted quiet and privacy. Exterior walls are of whitewashed stone, hand-split shakes and rough-sawn boards.

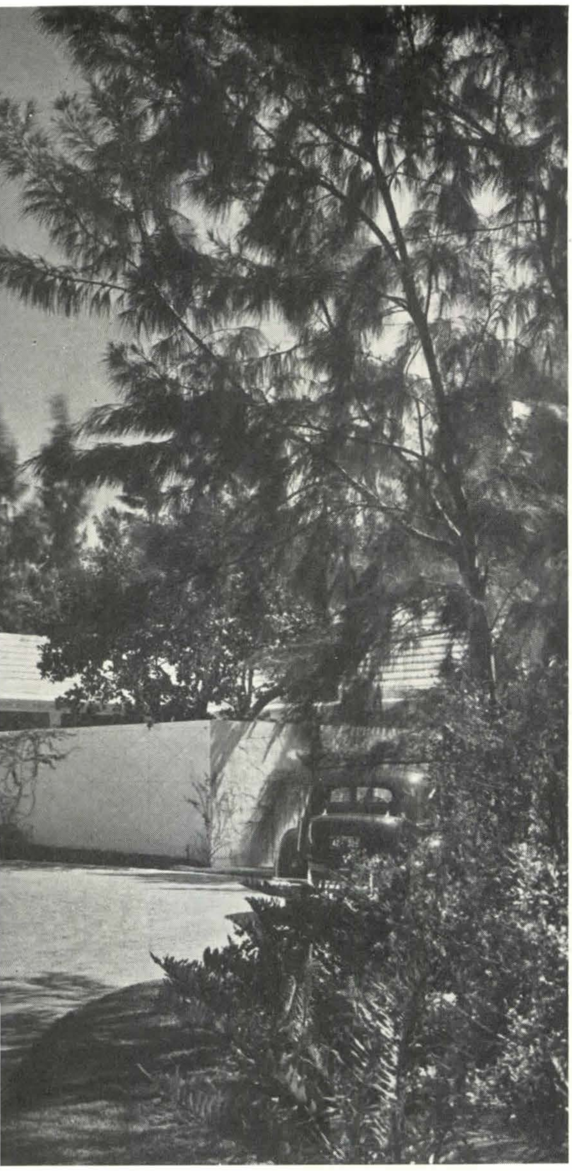


Photos by Gottscho

MOTOR COURT and ENTRANCE



REAR ELEVATION
and View toward Sound



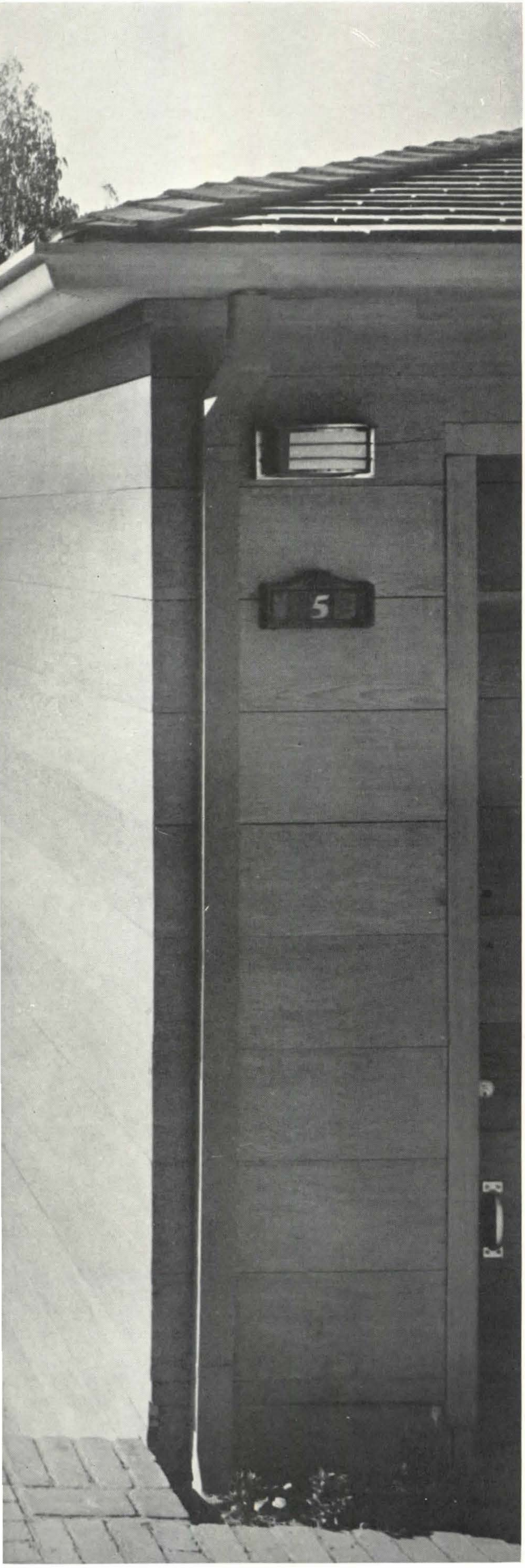
PHELPS BARNUM, Architect

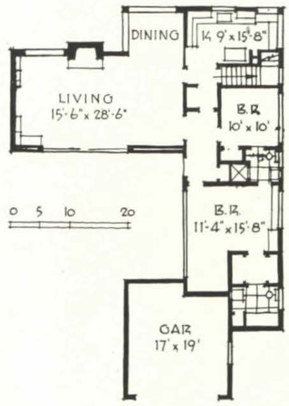
FOR THEIR HOBE SOUND, FLA. home, Mr. and Mrs. Martin J. Quinn, Jr. wanted a small house in which the sense of privacy would be equal to that usually obtained in much larger houses. This was accomplished by placing a pantry between the living and service areas, and a loggia and patio between living and sleeping areas. At the bedroom end of the house, two shower baths are provided which can be directly entered from outside for the convenience of swimmers. The house is of concrete block and reinforced concrete construction, finished in smooth-troweled stucco painted white; interior walls are of plaster, and of wood panelling. Exterior exposed woodwork is cypress, glazed with a white pigment for a weathered effect.

PATIO: view from loggia toward bedroom wing

LOGGIA separates living and sleeping areas

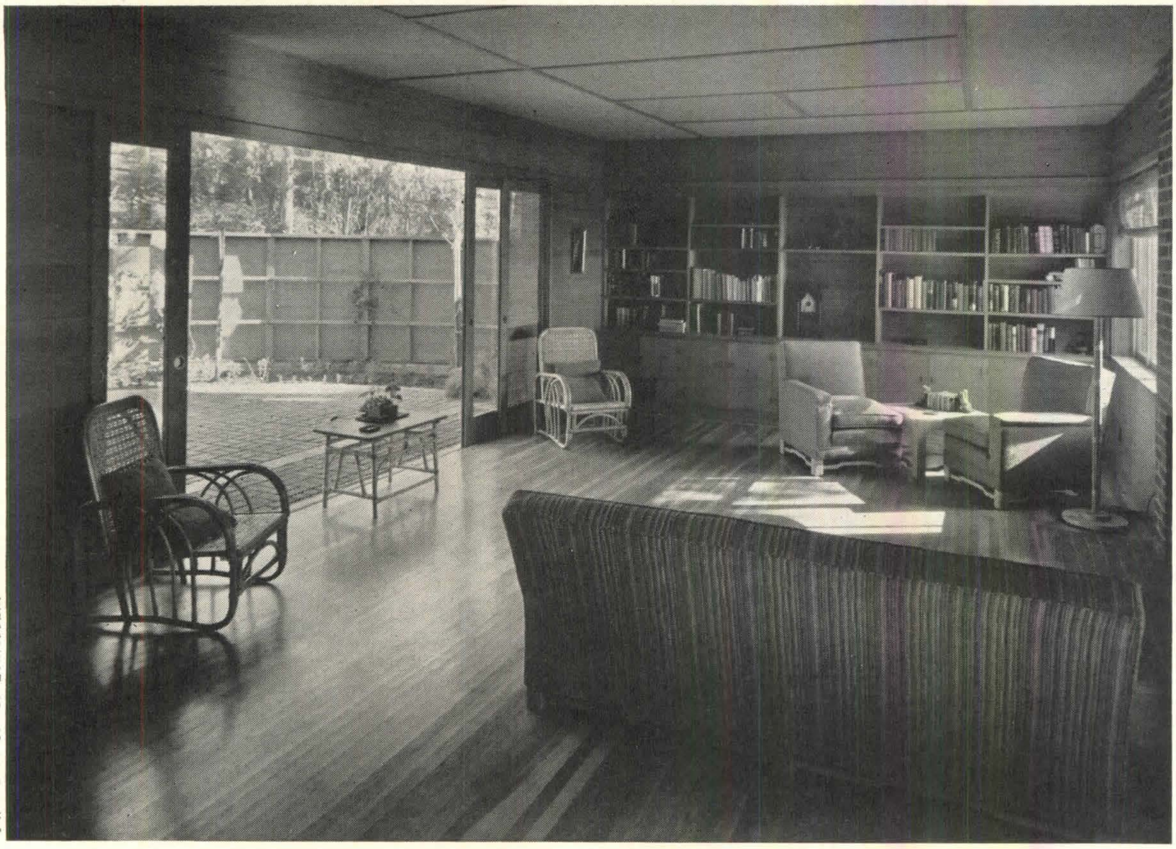
Photos by Roger Sturtevant





CLARENCE W. W. MAYHEW, Architect

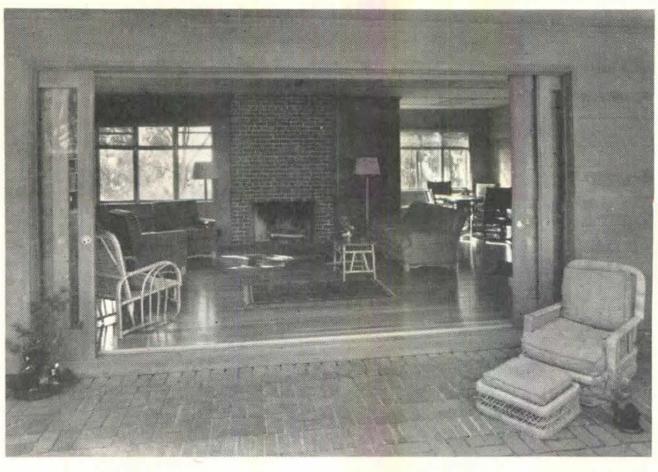
THE SITE OF THIS BERKELEY, CALIF. house for Mr. and Mrs. James K. Sebree, is a steep hill, which slopes toward San Francisco Bay. The house takes advantage of the unusual shape of the lot—25 ft. wide at the street, 70 ft. wide at the opposite end—to place the garage at the narrow, or street end, and the main living rooms along the wide side. These rooms all have a view across the bay. The patio, however, faces the opposite direction and is protected from wind by the house. Sliding doors between patio and living room make it possible to unite indoor and outdoor living areas. Exterior is of flush lapped redwood, left to weather in natural color.



Photos by Roger Sturtevant

LIVING ROOM, looking toward patio

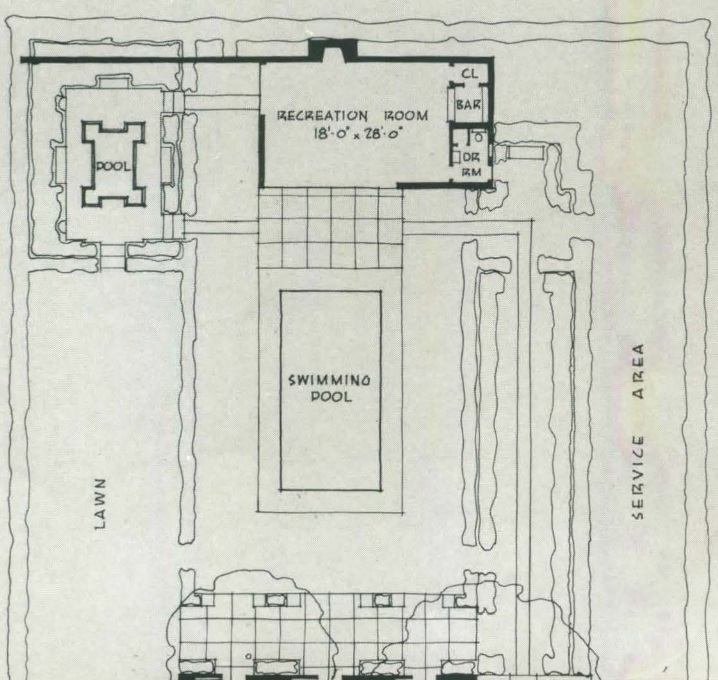
SLIDING DOORS panelled in woven reeds prevent glare without cutting off the air



LIVING ROOM from patio; dining alcove is at the right

RESIDENTIAL DETAILS—RECREATIONAL

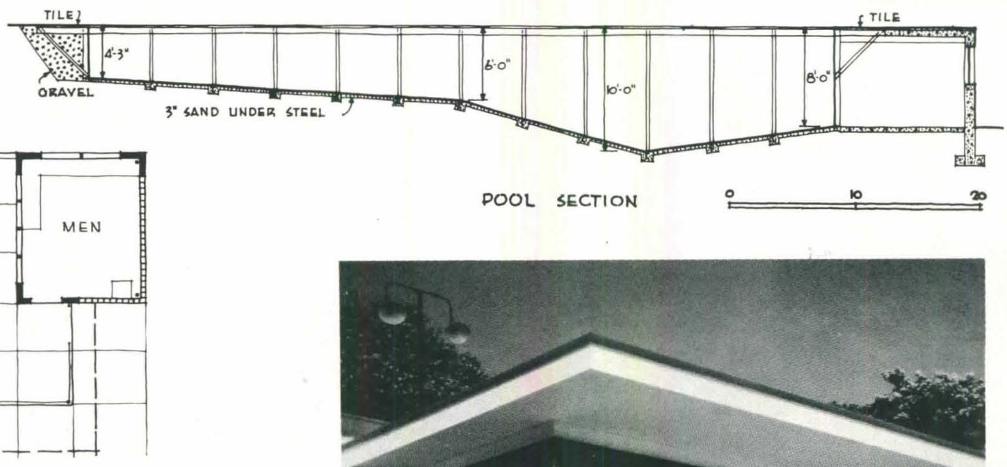
Photos by Elwood M. Payne



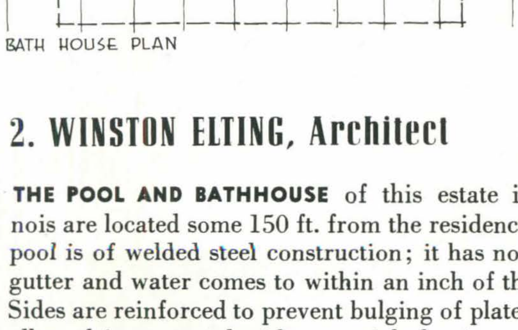
1. JOHN F. STAUB, Architect

THIS RECREATION PAVILION IN HOUSTON, TEXAS, is at the rear of a garden, and is separated from the house by a swimming pool. Because of its eastern exposure, a locally desirable feature, the pavilion is used as an outdoor living area, especially in the afternoons, when the western outlook of the living room is objectionable.

Photos by Hedrich-Blessing



POOL SECTION

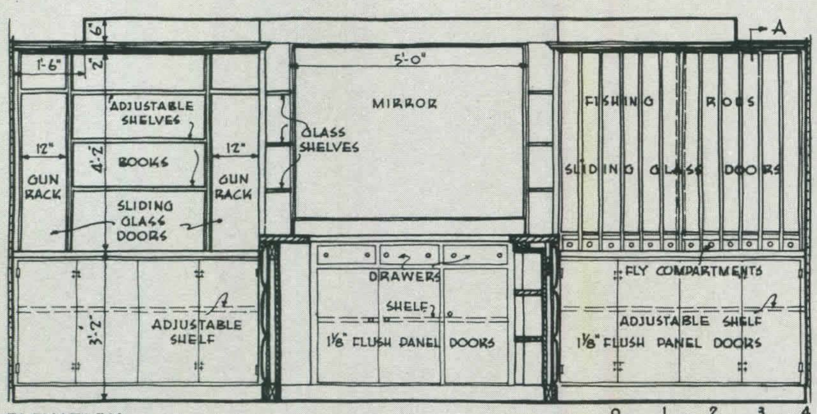


BATH HOUSE PLAN

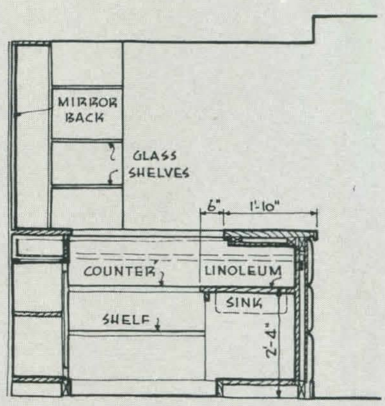
2. WINSTON ELTING, Architect

THE POOL AND BATHHOUSE of this estate in Illinois are located some 150 ft. from the residence. The pool is of welded steel construction; it has no scum gutter and water comes to within an inch of the top. Sides are reinforced to prevent bulging of plates, and all steel is protected with a special aluminum paint and lacquer. The bath house has a steel and frame structure; its screened-in central area is for games. Screens are stretched at top and bottom from steel members of small section and are fastened at sides directly to lally columns.

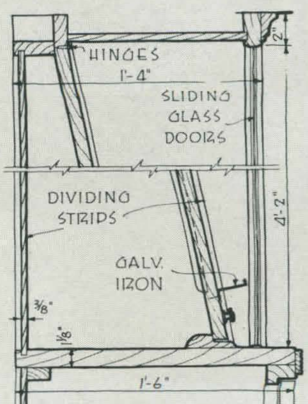
Rudolph Edward Leppert Jr.



ELEVATION



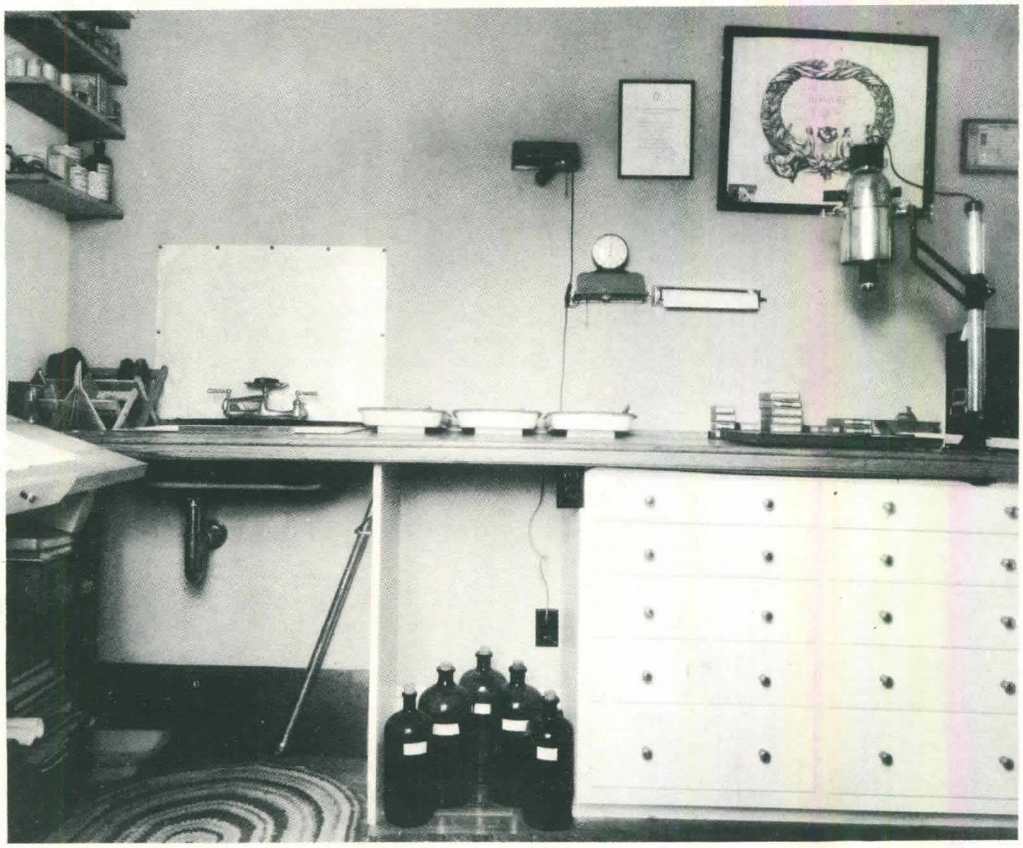
SECTION THROUGH BAR

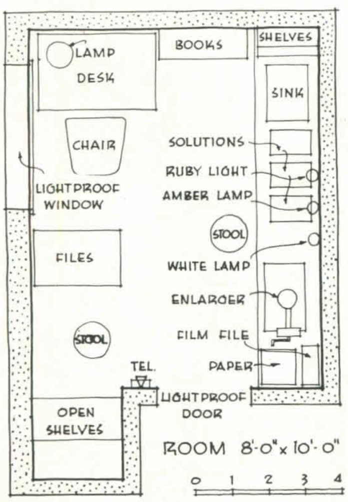


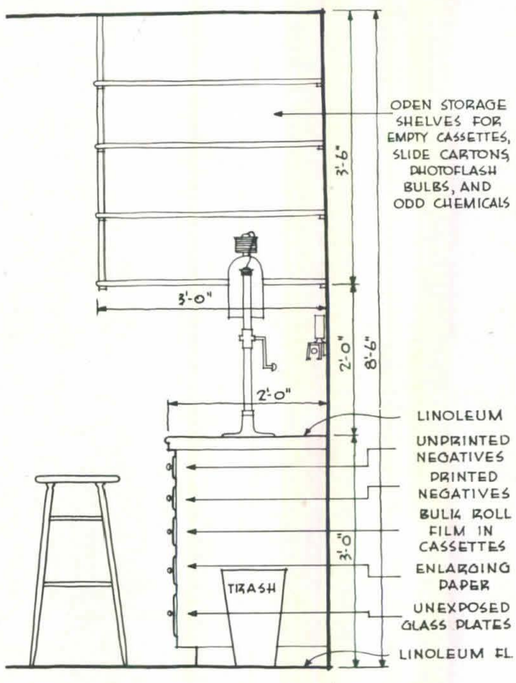
SECTION "A"

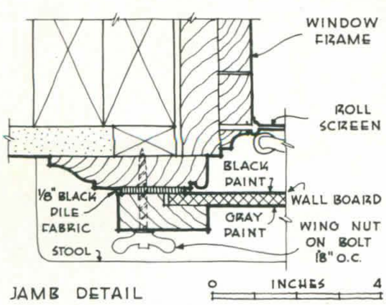
3. G. DEWEY SWAN, Architect

PROVISION FOR STORAGE of hunting and fishing equipment was made in this recreation room in a Connecticut residence. These two racks are protected by sliding plate glass doors. Under the fishing rod rack are drawers for tackle. In addition, there is a completely equipped bar, with a counter surfaced in polished plastic material. The room is large enough to accommodate tables for bridge.







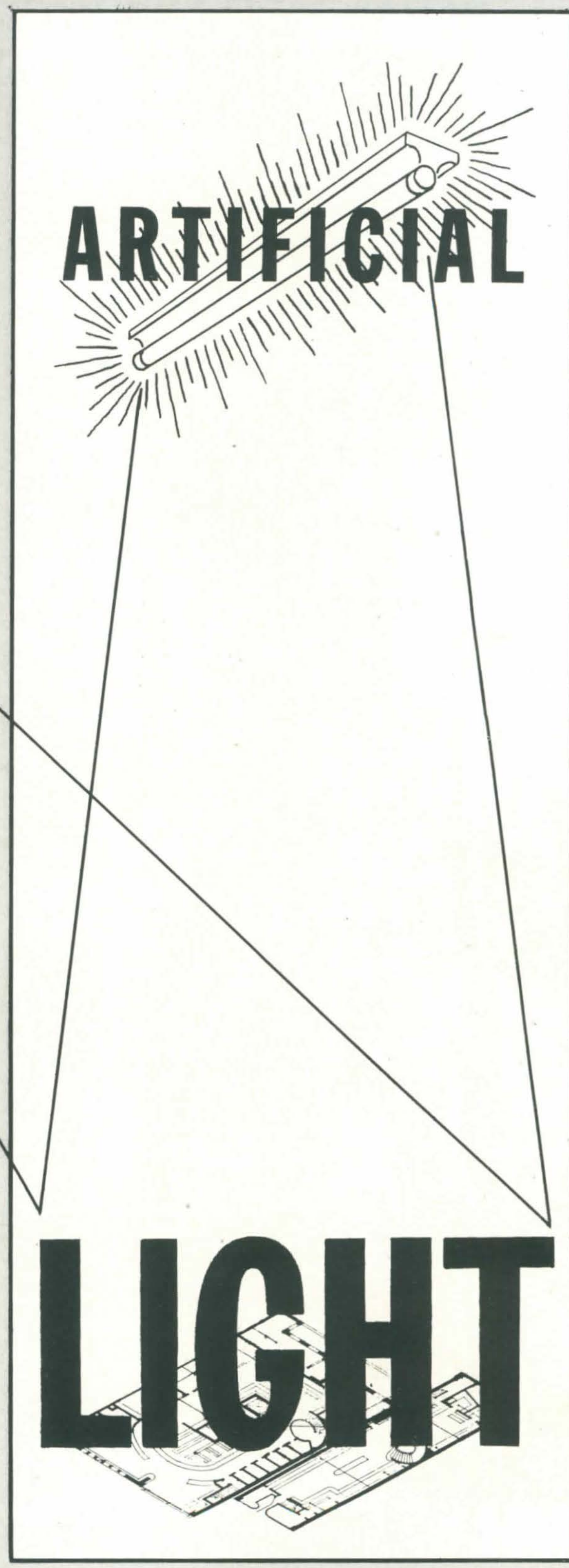


JAMB DETAIL

4. SYDNEY WAHL LITTLE, Architect

THIS DARK ROOM provides ample storage, shelf, and counter space. Automatic weather-strip at threshold and velvet-faced stops make door lightproof. Wallboard panel edged with black velvet can be quickly attached to lightproof window. Equipment includes telephone.

The Integration of NATURAL AND ARTIFICIAL LIGHT



PART II

Only the architect, in the last analysis, can achieve the correct integration of natural and artificial light — and the further integration of both with all other environmental factors — which modern building demands. In this issue MR. HANS BLUMENFELD presents the second of two papers on the subject.*

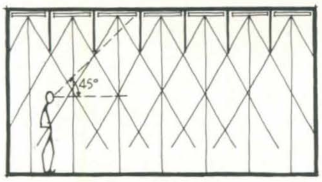
EQUALIZATION of surface brightnesses is the best way to avoid possible glare in general lighting; as no one surface is much brighter than any other, fixation of none is disturbed by glare from brighter neighboring surfaces. Another way, much advertised and widely used, is removal of the sources of light to the ceiling, above the normal zone of vision, resulting in vertical lighting (fig. 1). This method is never quite satisfactory. Either the angle with the horizontal is small and the brightness of the ceiling will be disturbing, when objects of lower brightness are viewed, or the rays within the field of vision are entirely "cut off," and only "down-lighting" remains. However, as the normal line of vision is horizontal, the vertical surfaces should receive the main light (fig. 2). Downlighting reverses this relation in favor of horizontal planes; in addition, it eliminates practically all visible own shadows, while casting hard shadows on the floor. Yet, downlighting is frequently used even in cases where attention should be concentrated on vertical surfaces, such as shelves in self-service stores, or pictures in galleries (fig. 3). In many cases, notably in reading lamps, vertical illumination enforces the adoption of an unnatural bent position (fig. 4).

The legitimate place for downlighting is in the illumination of horizontal surfaces, such as horizontal show cases, or tables; it should however be kept in mind that it is not the table that is to be seen, but the object placed on it, which may have predominantly vertical surfaces, as in most industrial work.

In any such case the vertical light is primarily intended for local lighting, and should be compared with the alternative of separating local and general lighting at the source.

For most objects, light incident at an angle of 15 to 45 degrees above the horizontal affords the most satisfactory illumination. This arrangement is possible where the function of the room normally causes all persons to look in one direction only, as in churches or in some types of workrooms; otherwise, if a person looks around, the light will be in his eyes.

*A/R, pp. 49-56, 12/40



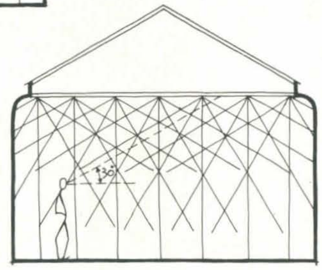
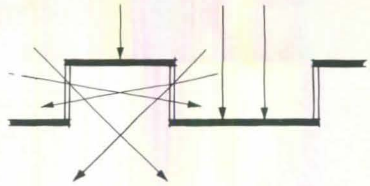
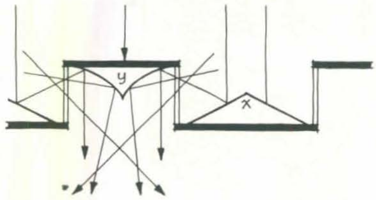


Fig. 1 VERTICAL ILLUMINATION. An unshielded lighted ceiling is glaring (right); glare is avoided by "downlighting" (above) but vertical surfaces are apt to receive too little light



Most of the light of the sky never enters the room; some of the light entering the room goes out again through the opposite window



A bright roof surface (x) at a correct angle will throw part of this light into the room; another reflecting surface (y) directs it down

Fig.5 MONITOR ROOFS

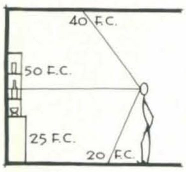


Fig. 2 DESIRABLE DISTRIBUTION OF BRIGHTNESS. Greatest brightness on vertical surfaces in zone of vision; zone below horizon should be half as bright because eyes are more sensitive to light from below

Roger Sturtevant

Fig. 6 CLERISTORY WINDOWS throw high side light on the object without throwing it into the eyes of the spectator. Same result is achieved at night by appropriate arrangement of artificial light

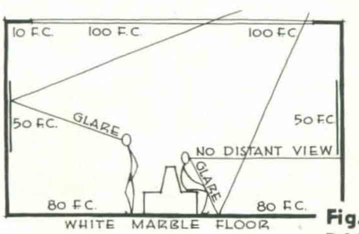


Fig. 3 UNDESIRABLE DISTRIBUTION OF BRIGHTNESS. The average museum room succeeds in coordinating all elements necessary for the prevention of seeing

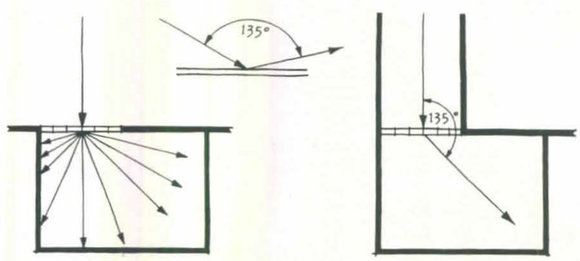


Fig. 7 SKYLIGHTS. Prismatic glass blocks can be used to redirect vertical light into depth of room (left). However, light rays incident at flat angles are redirected to the sky by prismatic blocks (center); hence—for skylights under an open sky—diffusing blocks are preferable

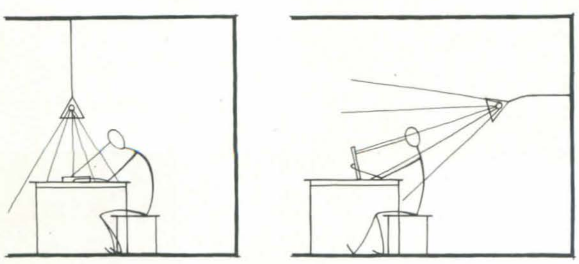


Fig. 4 VERTICAL LIGHTING (left) too often forces an unnatural position. HORIZONTAL LIGHTING (right) permits a natural position

Courtesy Holophane

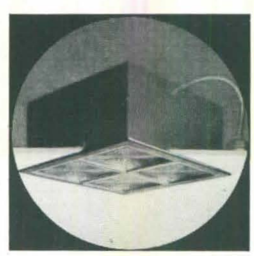


Fig. 8 LIGHT REDIRECTED DOWNWARDS by prismatic glass . . .

Pittsburgh Reflector Corp.

Fig. 9 . . . or by parbolic reflectors

High sidelight

The need for a more horizontal light, and the difficulty of keeping horizontal skylights clean, has in many cases led to their replacement by high sidelights, such as sheds, monitors, cleristories, or lanterns. This inevitably means a loss of light, some of which may be retrieved by reflection from bright roof surfaces, especially if these are inclined towards the windows (fig. 5). However, in this case it will be the roof that accumulates the dust.

Cleristory or lantern light to some extent solves the problem of throwing horizontal light on the objects, without throwing it into the eyes of the subjects (fig. 6).

Redirecting prismatic glass blocks are also used to achieve a more nearly horizontal illumination, notably in pavement lights. However, they lose any light which is incident from a horizontal direction, and which they redirect upwards. Therefore redirecting blocks of this type are only appropriate for skylights at the bottom of shafts or narrow courts; under an open sky diffusing blocks are preferable (fig. 7).

Similar prismatic glasses are also used in many fixtures for artificial lighting, usually in connection with diffusing and reflecting elements, with the purpose of partial downlighting (fig. 8).

Downlighting

Where downlighting is desired, all light rays are to be redirected vertically downwards. This is most easily achieved by using a parabolic reflector with a point source (fig. 9). Such fixtures may be suspended or recessed into the ceiling. With a narrow beam they are used for spotlighting.

The elements of a parabolic reflector may also be broken up and made part of the ceiling, as in reflecting ridge metal panels, which provide parallel downlighting throughout a room (fig. 10).

In most cases of downlighting, however, the light from the source, whether natural or artificial, primary or secondary, is cut off by vertical surfaces, which may absorb it entirely or reflect it partially. In the "louverglass" these surfaces are of miniature size inside the sheet and vertical to its surface, which, for this purpose, is used horizontally. In all other cases they are larger, and have the advantage not to accumulate dust.

The vertical surfaces may be an essential part of the architecture, such as ceiling beams or coffers, or may consist of built-in metal fins, or of movable louvers; or they may be part of a lighting fixture, arranged in parallel rings or in the form of an "egg-crate." In many fixtures the light reflected by these vertical surfaces is glaring. This can only be avoided by making the surfaces darker, with a corresponding loss in efficiency, or by making them larger, with a corresponding increase in the size of the fixture.

Where the source is a parabolic reflector, this difficulty is avoided, but the ceiling is too dark. Both these defects indicate that downlighting is essentially a method of directed local lighting, and should be supplemented by some other system of general lighting.

Natural and artificial vertical illumination

Skylights and high sidelights are out of reach and hard to curtain. At night their surfaces appear as black holes, contrasting unpleasantly with the balance of the room and allowing a great amount of light to escape towards the sky, where it is worthless even for advertising purposes.

This loss can be substantially diminished if the artificial light is not thrown against the ceiling, but flows parallel to the flux of the natural light. Sometimes this is attempted by arranging downlighting fixtures under the skylight openings or at their edges. If small, these sources are glaring; if large, they obstruct the daylight. The logical solution is to put the artificial sources into the same relation to the room as the natural source, and to arrange them above the opening. Their light must then be diffused by translucent materials in the skylight opening, which will serve in daytime to equalize the light of the sky. In this way perfect blending of the light from natural and artificial sources is possible, and a smooth and unnoticeable transition can be made from day to night illumination. The transition can be automatically controlled by a photo-electric cell, or by a spectroradiometric photometer.

However, increased distance of the source, loss of light through absorption by the diffusing glass, and in some cases exposure of the lighting fixture to the weather will increase the cost.

Considering the difficulty of protecting skylights from the sun's heat, and also from accumulation of dust, we may well raise the question if the same goal might not be achieved more economically by relying altogether on artificial light, using reflected light from the walls and ceiling. As the number of kilowatt-hours per dollar increases, and as the number of lumens per watt goes up the economic advantage of daylight disappears more and more. Where natural ventilation is replaced by air conditioning, the other great reason for the outside opening disappears, and the open space on the other side of the wall or ceiling becomes merely an enemy to be guarded against by thermal and acoustic insulation, and terribly restricting the freedom of plan.

We might do well to discard our traditional methods, ossified in street patterns and building codes, which call for a bit of outside light and air everywhere, and not enough anywhere; and might accept a clear distinction between two different types of rooms: one without a view, relying entirely on artificial illumination and ventilation, and the other with an outside view, and making the most of it.

Horizontal lighting

In a room with a view, the outside world seen through the window is normally the brightest part of the entire luminous environment, and its relation to the brightness inside the room is of paramount importance. Where dramatization of the view is sought, it may be effectively framed by a darker interior (fig. 11). Livability of a room is better assured by a gradual transition of brightness (fig. 12). The view is disturbed by distracting glare from a bright floor (fig. 13).

With light from one side only, brightness distribution in the room will always be very uneven; less so, however, if the window goes up to the ceiling. With modern methods of construction there is no excuse for cutting out the best part of the light by a heavy window head, which is an atavistic hangover from the stone lintel or arch.

"Double lighting" greatly improves distribution of light in the lower room, and combined with bright reflecting walls and ceilings achieves very satisfactory results (fig. 14).

While vertical illumination makes rooms indefinite and objects flat, horizontal lighting achieves brightness distribution in harmony with the axis of vision: walls first, ceiling second, floor third. This emphasizes the shape of the room and the plasticity of the objects (fig. 15).

With two-sided illumination these advantages are partially sacrificed for a more even distribution, essential for most workrooms. This system works well in shallow or high rooms. In the middle of a narrow and low room, however, there will be confusing shadows and glare from the windows on either end; in rooms facing east and west, twilight effects may be experienced, especially around sunrise and sunset.

Sometimes sufficient equalization can be achieved with one-sided illumination by reflection from the opposite wall and the ceiling, or by light from two or three adjoining sides. The results are usually more satisfactory than with illumination from two opposite sides (fig. 16).

It is well worth-while to match the pleasant effects of natural window lighting by artificial illumination. This can be achieved by luminous architecture, or by indirect lighting of walls or of white window curtains. By these means one or more walls may be made the main source of light within a room. There is no sound basis for the dogma saying that the ceiling should always be twice as bright as the walls.

Control of sunlight

The sources of natural illumination, skylight and sunlight, are ever changing. The radiant heat, the abundant light, and the ultraviolet rays of the sun are generally desirable, but excessive quantities of both heat and light may become intolerable, and have to be kept out, without impeding the normal access of sunshine.

No problem exists with a northern exposure. On a south wall a projecting hood, cornice, or balcony will keep out the high summer sun, while admitting the low winter sun, and at the same time will serve to equalize the light (fig. 17). On east and west walls, with the hot summer sun almost opposite the window, a vertical screen is needed for temporary use. Nature furnishes such a summer screen in the shape of the leaves of a tree. They must however be supplemented by man-made means, such as awnings, shutters, blinds.

All of these are far more efficient if applied on the outside. The interval between the protecting screen and the window should be large enough to allow for circulation of air. However, all movable screens are more difficult to handle if located outside the window. They are exposed to the weather and therefore are higher in first and maintenance cost, and they accumulate more dust—though dust may be less objectionable there than it would be in the room.

With protective means on the inside, such as venetian blinds or shades, the absorbed heat is re-radiated or convected into the room. This is especially true of dark surfaces. Only specular reflecting surfaces will not only absorb radiant heat, but will reflect a considerable amount of hot red and infra-red rays. Polished gold is the ideal material; for the time being aluminum or kindred materials will have to do the trick, as in aluminum venetian blinds.

Republic Steel

Fig. 10 WITH CORRUGATED METAL PANS of high reflectivity, the entire ceiling may act as a parabolic reflector, redirecting light downwards

Charles Lorenz

Fig. 11 VIEW DRAMATICALLY FRAMED by dark surfaces in room . . .

Fred R. Dapprich

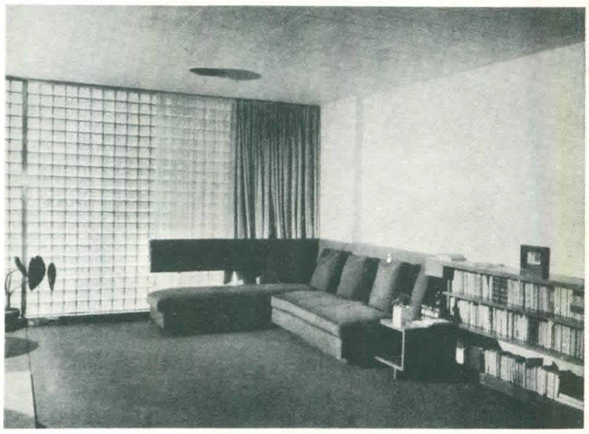
Fig. 12 . . . but equalization of brightness between interior and view enhances livability of room

Julius Shulman

Fig. 13 A BRIGHT FLOOR may detract from view

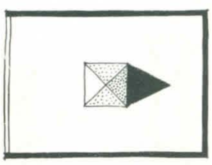
Courtesy "Glass in Architecture and Decoration"

Fig. 14 **LARGE WINDOW with diffusing curtain achieves excellent brightness distribution aided by reflected light from white walls and ceiling**

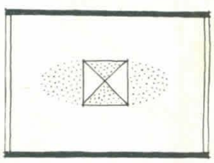


Courtesy "Glass in Architecture and Decoration"

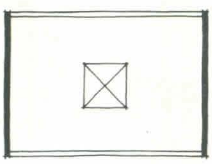
Fig. 15 **GOOD DISTRIBUTION OF BRIGHTNESS—wall, first; ceiling, second; floor, third. Proportion of room and shape of objects is brought out by horizontal light**



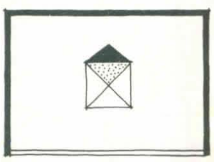
POOR: heavy cast shadow and own shadow



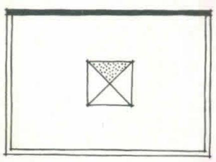
POOR: confusing own shadows and cast shadows



FAIR: no cast shadow, no own shadow



GOOD: slight cast shadow, slight own shadow



EXCELLENT: no cast shadow, light own shadow

Fig. 16 **PLASTICITY with various types of horizontal light (reflecting walls and ceilings are assumed, with double lines indicating light source)**

Awnings, shades, and curtains are always made out of transmitting diffusing materials; venetian blinds of translucent plastics are also available. Besides keeping part of the sun's heat out of the room, they are also helpful in equalizing brightness inside the room. If used intelligently, they will diffuse part of the light towards the walls and ceiling, which will reflect it into the back of the room. They should diffuse the light entering the lower and middle part of the window, without obstructing the upper part, which throws the light directly into the back of the room. The traditional shade reverses this process and makes matters worse (fig. 18).

Venetian blinds not only diffuse the light, but redirect it towards the ceiling and the back of the room. Directional glass blocks do the same work, with a much smaller loss of light. In order to avoid glare, their use should be restricted to the part of the window above the sight line, the lower part being made with diffusing blocks, or of clear glass (fig. 19).

As glass reflects or absorbs a considerable part of all light incident at angles of less than 30 degrees, a vertical window loses an appreciable portion of the available light, especially where the lower part of the sky is obstructed by dark objects. Use of directional glass blocks on an inclined plane might catch this valuable light and direct it to the back of the room (fig. 20). At the same time the view seen through the clear glass of the lower half would decrease in brightness, because part of the sky would be out of the picture. An objection to such an arrangement may be the difficulty of keeping the inclined surface clean.

While with southern exposure sunshine must be controlled by horizontal elements—hoods, awnings, venetian blinds, or horizontal prisms in glass blocks—on northeastern and northwestern walls the rays of the low-standing sun can be better controlled by vertical units. In the Washington, D. C. office of the Pittsburgh Plate Glass Company this has been done by a horizontal sawtooth window (fig. 21), which may be regarded as a monumental vertical louver. Shutters and venetian blinds, turning on a vertical axis, might as well be constructed on the same principle. While they would fail to redirect the light towards the ceiling, they would be easier to clean than horizontal blinds (fig. 22).

In the "louverglass" the small reflecting surfaces inside the pane are immovable, but according to the setting of the pane they may be used either as horizontal or as vertical louvers, or diagonally.

Horizontal and vertical surfaces have been combined into a kind of monumental "egg crate" in the Brazilian Pavilion at the N. Y. World's Fair (fig. 23). The familiar stone grilles of Spanish architecture are based on the same principle. The sun is kept out, except when it stands directly opposite the windows, and the light is reflected into the room by the white surfaces of the crate—provided they are kept white.

It is much easier to keep these surfaces clean if one big box is used instead of many small boxes. Such a big reflecting box is an enclosed balcony or a "loggia" with bright ceiling and walls; besides being a highly efficient means for sun protection and light distribution in the room behind, it is a very valuable room in itself.

Selective filters

In order to exclude radiant heat, while admitting light, selective filters have been developed. Special glasses are available which absorb the infra-red and red rays, while transmitting the cooler part of the spectrum. Only light of bluish color and decreased brightness is transmitted, while about half of the absorbed heat is re-radiated into the room, and half to the outside. However, if the glazed surface is extended sufficiently to compensate for the loss of light, the total amount of heat will be almost the same, and in some cases greater than it would be if clear glass had been used.

If the filtering glass is used in double glazing, together with clear glass, the result is slightly better; but the necessity to clean four large surfaces instead of two may prove prohibitive except with sealed double glazing.

One of the best selective filters is water. Half an inch will absorb practically all infra-red rays, without noticeably diminishing the light. Water might well be used for protection against radiant heat, notably on horizontal skylights. Condensation on the bottom of the glass would be a problem. It may be less serious in uses outside a building, as on hoods.

Water would have the further advantage not to accumulate dust. Extension of translucent surfaces may defeat its purpose, if it leads to neglect of cleaning. In vertical windows often half of the light is absorbed by dirt, and in skylights as much as 80 per cent.

Screens also absorb a considerable amount of light. A screen, built on the principle of miniature venetian blinds, reflects some light towards the ceiling; it will, however, lose its efficiency with the accumulation of dust on the miniature horizontal metal fins.

Artificial illumination in rooms with windows

With glass blocks or well-diffusing sheet glass it is possible, though expensive, to effect a gradual transition from daylight to night illumination by locating the artificial source outside the window; both natural and artificial light will be filtered through the same diffusing medium. With transparent materials this cannot be done, because a small source would be glaring and a large source would obstruct daylight and view. Either continuity of direction has to be sacrificed, by introducing an additional source (fig. 24a), or continuity of illumination must be interrupted by lowering a white curtain over the window opening (fig. 24b); after this interruption light comes in from the same direction as before; at night it is received by reflection from the curtain, and in daytime by transmission through the window. This solution is necessary in particular cases, as in art studios, and is desirable in many other rooms, where furniture has been arranged for use in daylight. In such rooms the sources of light, preferably fluorescent tubes, are often hidden by window valances. These lighting valances, if close to the wall, are inefficient; if strongly projecting, they may obstruct the room. In most cases it will be better to throw the light on the curtain from a cove or fixture placed on the ceiling.

Where translucent walls are not lighted from the outside, they should also be covered at night by reflecting screens. It is often claimed that no curtains are needed with walls of glass blocks. This is only true for semi-opaque translucent materials, which reflect about as much light as they transmit. Such materials may be used with daylight from the outside and artificial light from the inside. They will be less than 50 per cent efficient in either case.

Most glass blocks have a much higher efficiency for light transmission. They accomplish the functions normally allotted to the light window curtain: they diffuse the light and obscure the view from the outside. They cannot, however, do the work of the heavy shade or the venetian blind, to wit: throw the sun's heat back out of the room in daytime, and throw articial light back into the room at night.

At night brilliant translucent glass walls may have some advertising value in business buildings; however, as always, you cannot eat your pie and have it. The light that goes after the customer in the street is lost to the worker in the shop. This loss not only decreases the total brightness of the room, but makes the brightness distribution less equal than it would be with a reflecting surface.

In most cases it will be preferable to separate the functions: reflect the light back into the room, and entrust the advertising to luminous signs alone. Usually translucent walls do not harmonize too well with such signs.

Automatic control of transition from daylight to artificial illumination is also possible with window lighting. However, because of the use of shades, blinds, etc., there is some risk that the brightness at the "electric eye" will not correspond to the brightness at the working surface.

Translucent walls, affording neither a view nor natural ventilation, should really not be compared to transparent walls or windows. As with skylights, the alternative is the reflecting surface. It is merely a question of cost whether a wall should be built of glass blocks or of a solid material painted white; sources of light in both are substantially equal. This should also be considered in using glass blocks for interior partitions. The low reflection factor of a glass partition makes it a negative factor of the luminous environment, if it is not lighted from behind, just as a black wall is a negative factor.

Local lighting

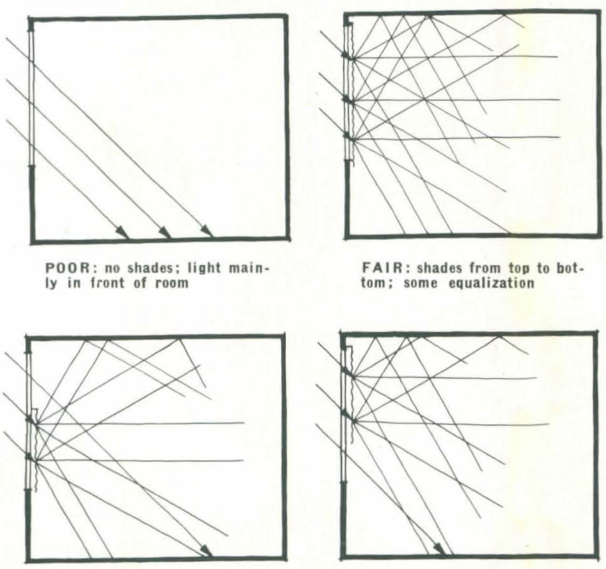
Where concentration on a seeing task is required, local light is helpful by making the task brighter than the balance of the visual field. It is hardly ever achieved by redirection of daylight, but almost exclusively by artificial illumination, which makes it easy to shield the source from the eye. A point source produces harsh shadows and often causes secondary glare. This is avoided by using an extended source, such as fluorescent tubes, or translucent or reflecting diffusers. Where a very high brightness—over 100 f. c.—is required, fluorescent tubes are the only solution because incandescent lamps produce too much heat.

The location of the source must be adapted to the specific task. A source above the head produces downlighting effects, which are not always *desirable;* a source between the eye and the object is necessarily limited in extension. A source behind the person is the best solution for subjects with normal vision, but will produce glare in spectacles, if less than 30 degrees above or 15 degrees aside the line of vision.

Flexibility is the most important point in local lighting. Floor and table lamps may often be in the way. A better solution is suspended lamps and long wall brackets,

Hedrich-Blessing

Fig. 17 **HOOD OVER WINDOW** designed to admit winter sun, exclude summer sun, and equalize the light inside the room



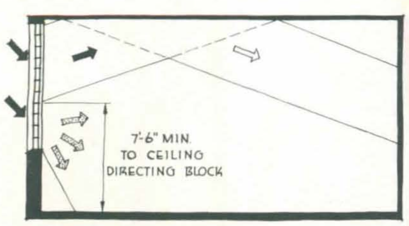
POOR: no shades; light mainly in front of room

FAIR: shades from top to bottom; some equalization

GOOD: shade only in lower half; direct light in back of room plus diffused light throughout

BAD: shade only in upper half; direct light in front of room, no light in back

Fig. 18 EQUALIZATION OF LIGHT BY USE OF SHADES



Owens-Illinois Glass Co.

Fig. 19 EQUALIZATION OF LIGHT BY USE OF GLASS BLOCKS. Here diffusing blocks are used above eye height and directing blocks above to light back of room

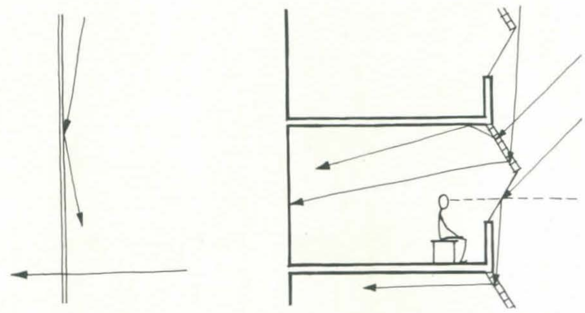
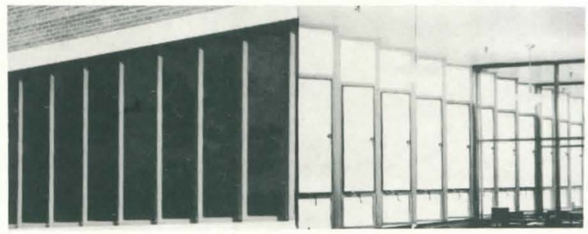


Fig. 20 SINCE CLEAR GLASS TRANSMITS light at large angles but reflects it at small ones (left), an arrangement of directional glass blocks and clear glass (right) might be useful in many locations. Here directional glass blocks catch sky light and redirect it to back of room while view through clear glass is protected against glare from sky



Joseph W. Molitor

Fig. 21 WITH NORTHEASTERN OR NORTHWESTERN EXPOSURE, the sun may be kept out by vertical — rather than horizontal — louvers. Here, alternating panes of clear and opaque glass form a monumental vertical "venetian blind"

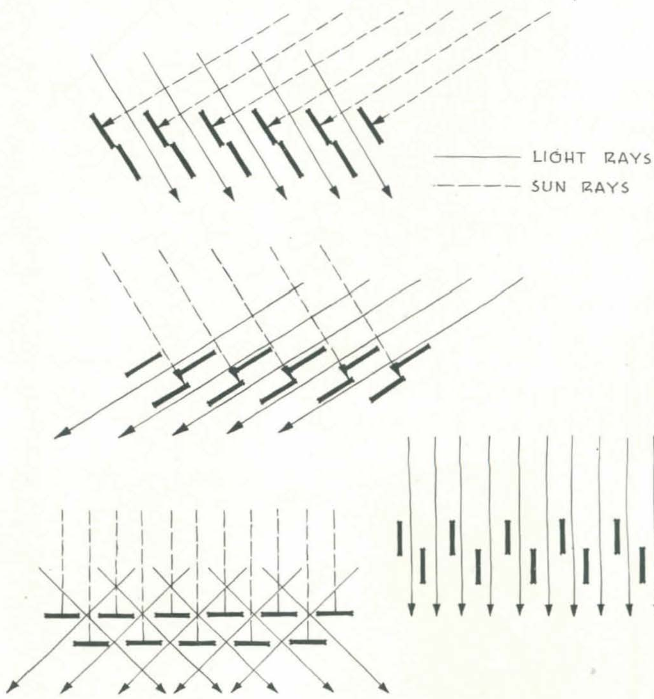
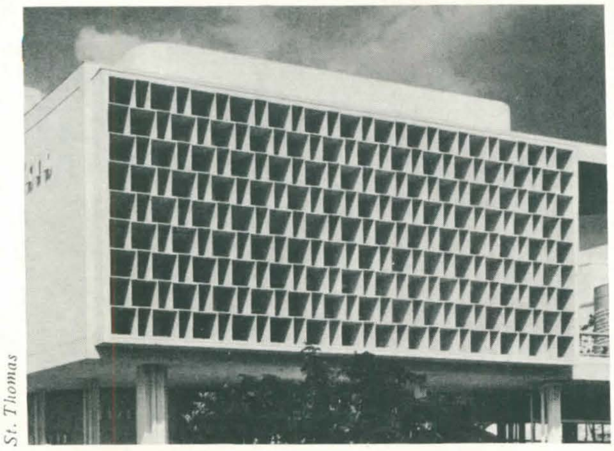
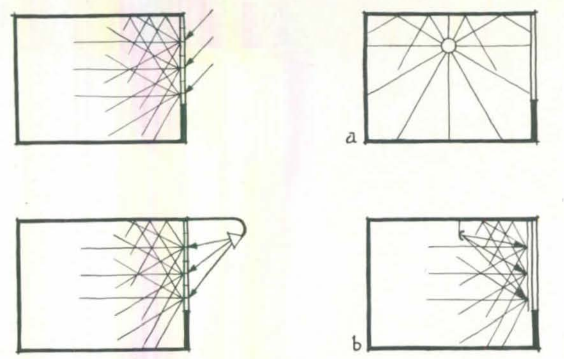


Fig. 22 VERTICAL, MOVABLE LOUVERS admit light, exclude sun



St. Thomas

Fig. 23 MONUMENTAL EGG-CRATE BAFFLE reduces glare, excludes sun, admits light — part direct and part reflected



With a translucent (diffusing) wall, light from a point source on the outside may gradually and unnoticeably replace daylight

With transparent glass either equality of direction has to be sacrificed (a) or continuity of lighting must be given up, the window being covered by a reflecting curtain

Fig. 24 TRANSITION FROM DAYLIGHT TO ARTIFICIAL ILLUMINATION

so arranged that they can be freely moved and twisted in any direction, or be pushed back to the ceiling or wall if not used.

Many fixtures now on the market unnecessarily obstruct the line of vision in daytime; most force the person using them into a certain fixed position, often an unhealthy one, instead of being adaptable to the needs of the user.

Combination of general and local lighting in one fixture is often attempted, but seldom fully successful. Such fixtures make it impossible to adapt the brightness contrast to individual needs. Normally brightness contrast between the locally lighted object and its surroundings should be between 2:1 and 5:1. This relation should in no case be exceeded within the central part of the visual field, within an angle of 30 degrees. As for the balance of the room, there is some reason for the general assumption that dark surroundings are restful for the eyes. In small rooms, where distance adaptation is impossible, looking into the dark is the only means to relieve the strain of constant near vision. In large rooms some relaxation is provided, if the general brightness is well equalized, and is not less than 1/5 to 1/10 of the highest local brightness.

Where dramatic effects are desired, the aim is not equality of brightness, but contrast. Window displays need a special type of lighting, which should be brighter than the street outside; this attracts attention and eliminates glare of the window glass. Artificial lighting alone can achieve this, and is therefore rapidly replacing daylight in the illumination of show cases and show windows. This fact should lead to a renaissance of the arcaded shopping street, with the shadow of the arcade in turn increasing the brightness contrast in favor of the display.

Thermal and acoustic insulation

Convection of noise and heat through the window glass can be overcome to a considerable extent by using two panes with a dehydrated and partly evacuated hollow space between them. This is done in glass blocks; the same principle is used for sealed double and triple clear plate glass, known as thermopane.

Insulation against radiant heat is more difficult; it can probably never be achieved by the use of transmittent filters alone, but can be arrived at by the use of reflecting screens, both fixed and movable. Removable screens allow for radiant heat in winter, as do also hoods over windows facing south.

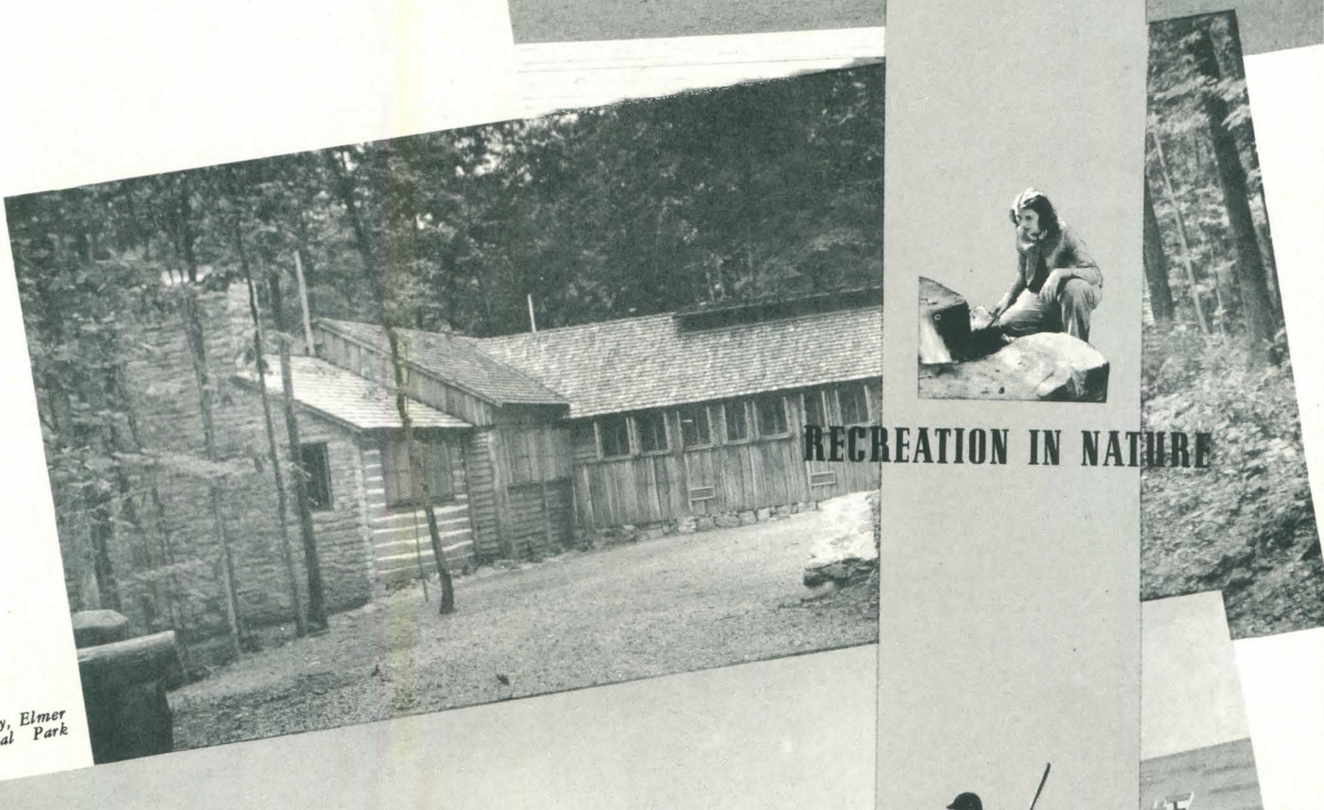
The most serious objection against wide expanses of glass is the excessive reflection of sound, often complicated by vibration of the pane. Possibly some translucent plastics may prove more satisfactory in this respect. Any surface treatment diffusing light will also help to diffuse sound, but such surface is more difficult to clean. This is least objectionable where the surface is broken only along vertical lines, as in ribbed or fluted glass.

Air conditioning, by eliminating dust, may incidentally make it easier to solve the acoustic problems of glass. On the other hand, it makes protection against radiant heat more urgent than ever.

Thus illumination is affected by many other elements of design, and in turn affects them. With the rapid increase of scientific knowledge and technical means the advice of the illuminating engineer becomes as indispensable to the architect as consultation by the structural engineer became long ago. However, the lighting specialist's demands must be integrated with all other factors of human environment. This is the architect's job, and control of light is part and parcel of it.

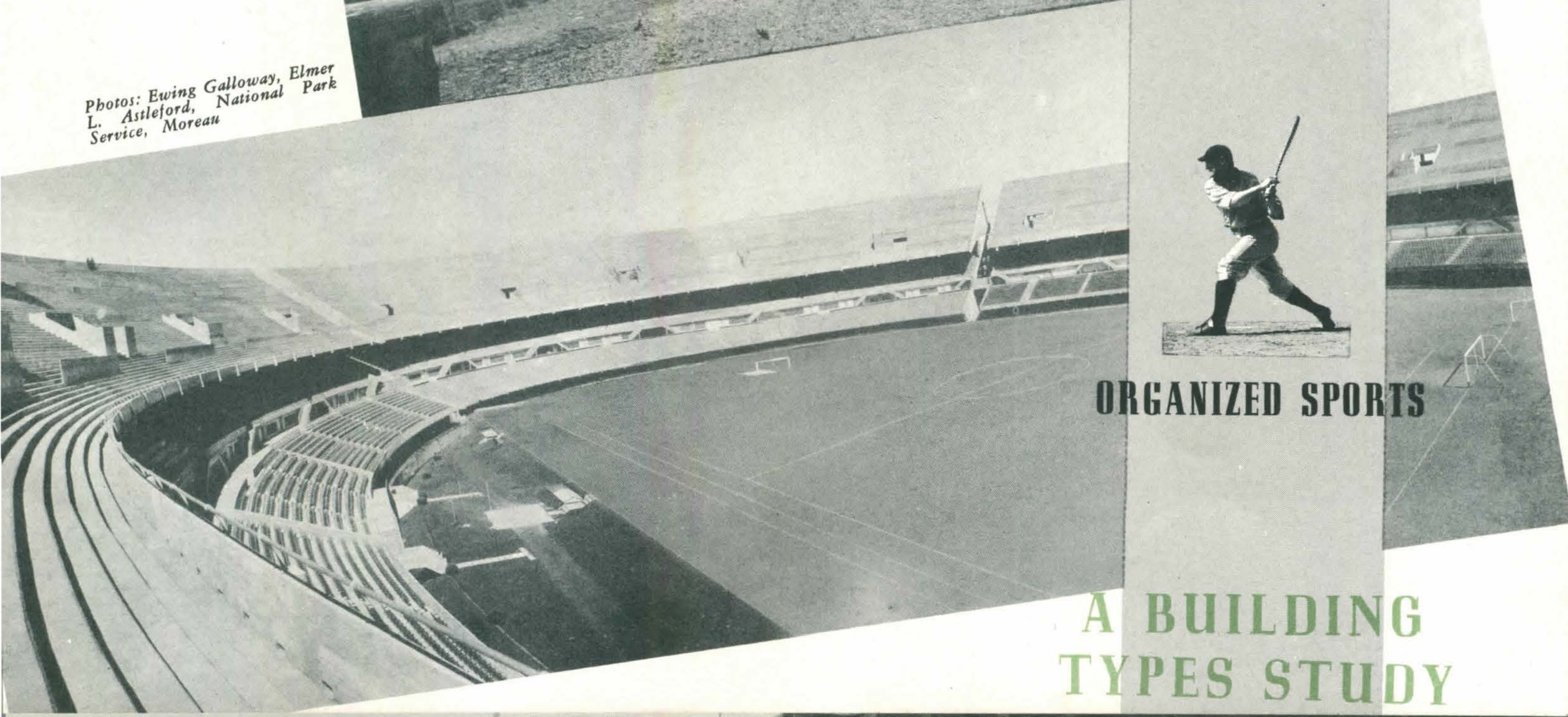
RECREATION STRUCTURES

CULTURAL FACILITIES



RECREATION IN NATURE

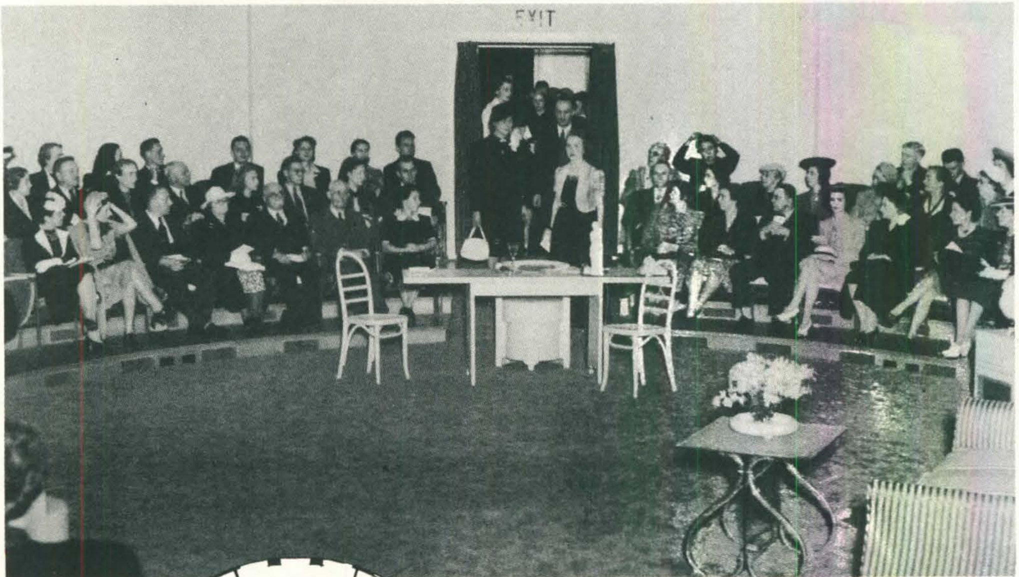
Photos: Ewing Galloway, Elmer L. Astleford, National Park Service, Moreau



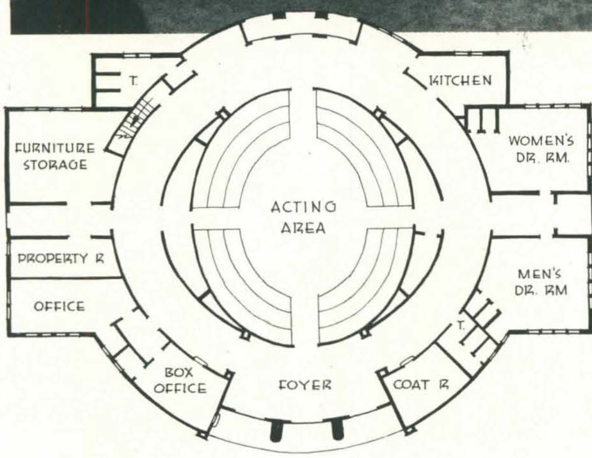
ORGANIZED SPORTS

A BUILDING TYPES STUDY

THEATERS



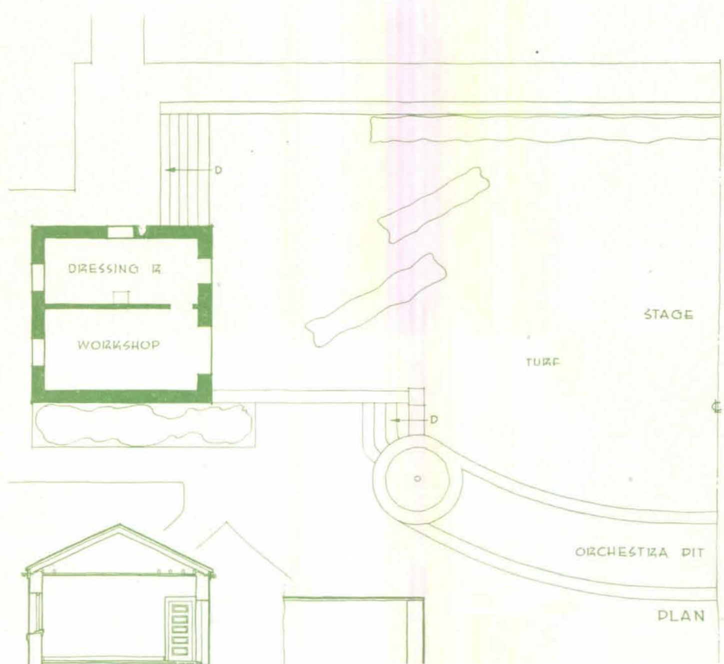
Charles Bell



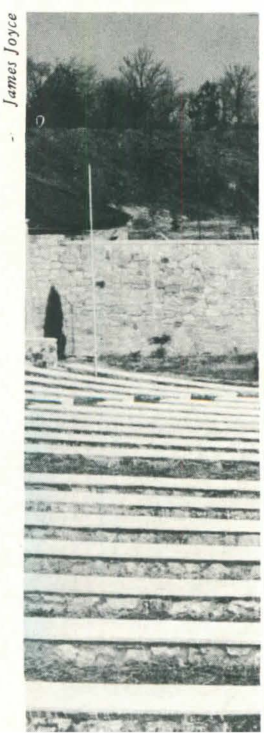
PENTHOUSE THEATER, UNIV. OF WASHINGTON, SEATTLE, WASH. is planned for intimate productions, in which the audience, limited to 170, become almost participants. Opened in May, 1940, this theater is of a type which evolved after successful years of experimenting by Glenn Hughes, Director of Washington University's Drama Division. Structure is of plywood.

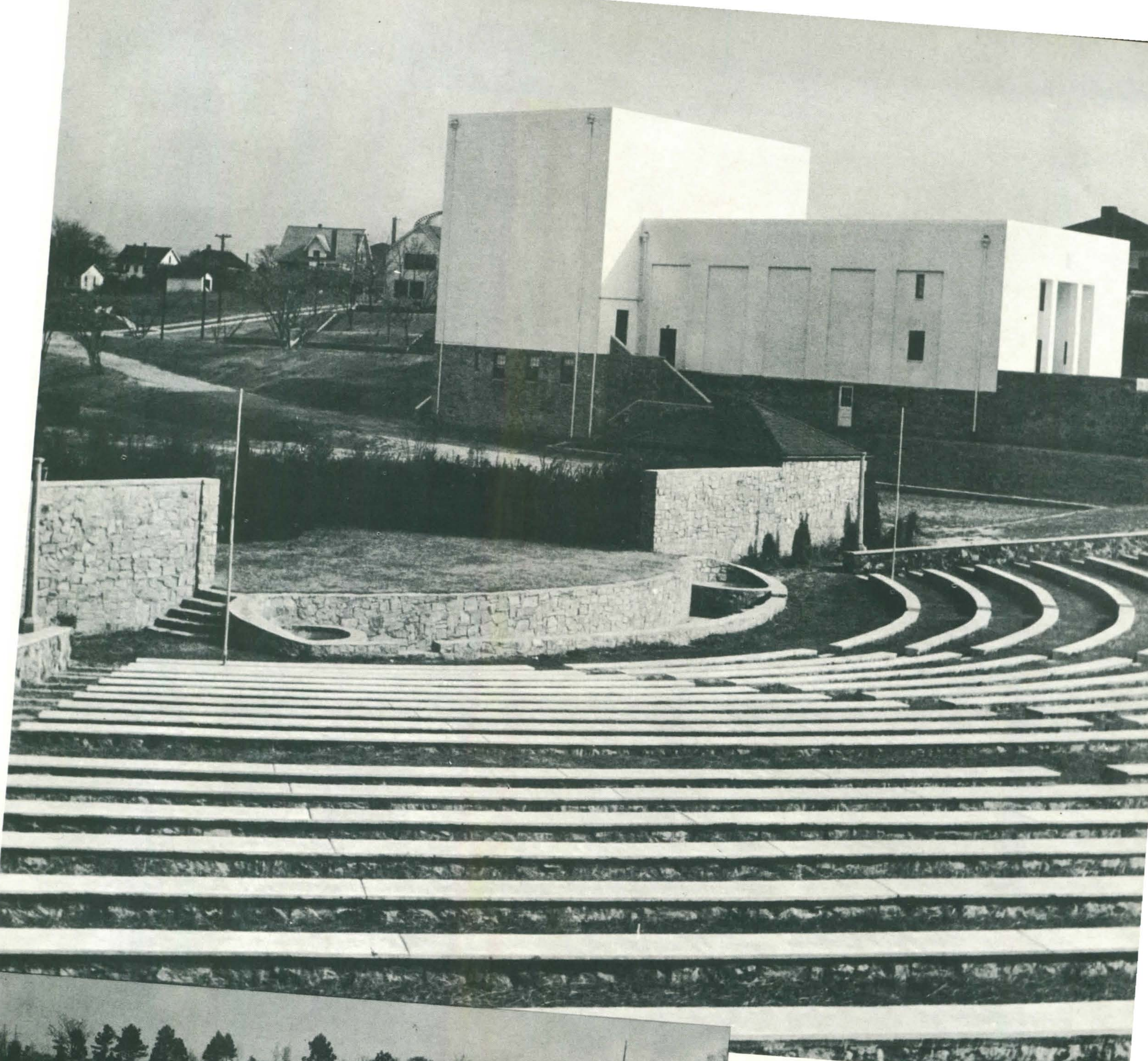
LITTLE THEATER, RALEIGH, N. C.: THADDEUS B. HURD, ARCHITECT. The amphitheater, designed by R. J. Pearse, which is an integral part of this little theater project, makes use of ticket booths, etc., in the lobby area of the theater building.

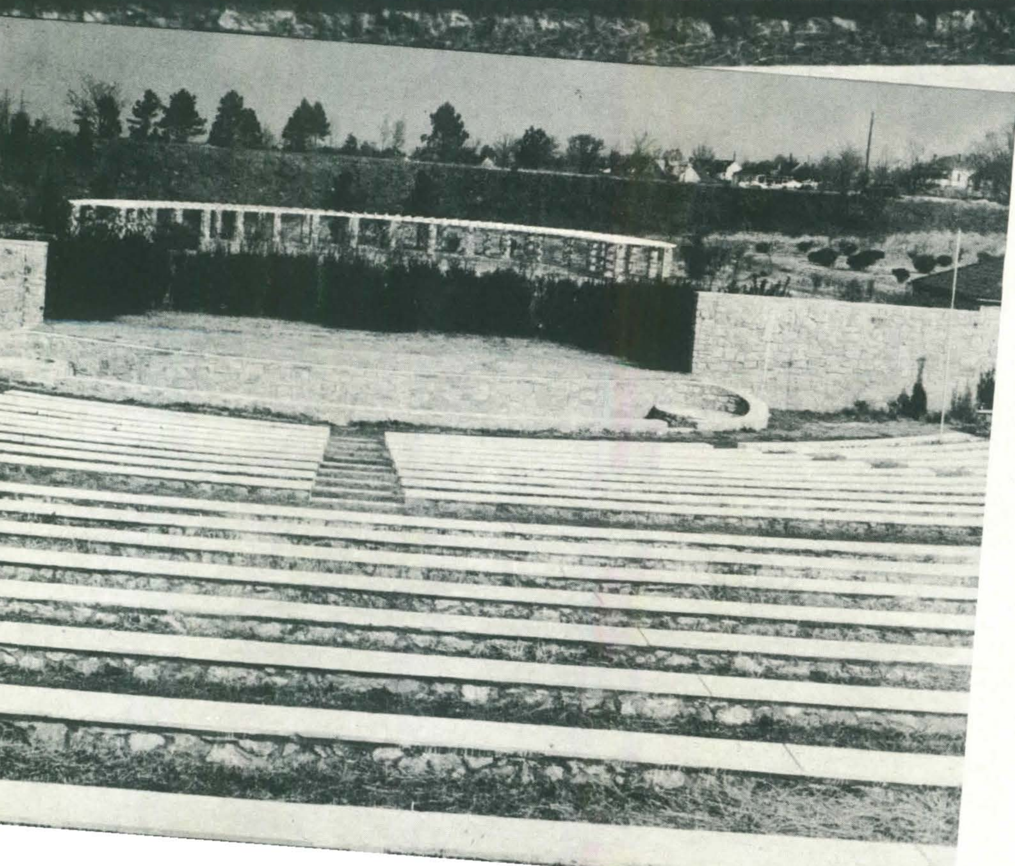
Design of outdoor theater seating space differs slightly in principle from design for band shell or stadium audiences. In the case of concerts, while it is desirable that every member of the audience see the performers, it is not absolutely essential; satisfactory hearing is most important. Also, the band shell stage is often below or level with the lowest row of seats. In theaters, both indoors and out, satisfactory vision is at least as important as hearing. The stadium has a large "stage" before it, with action dispersed over every part of the field; the theater audience views a small

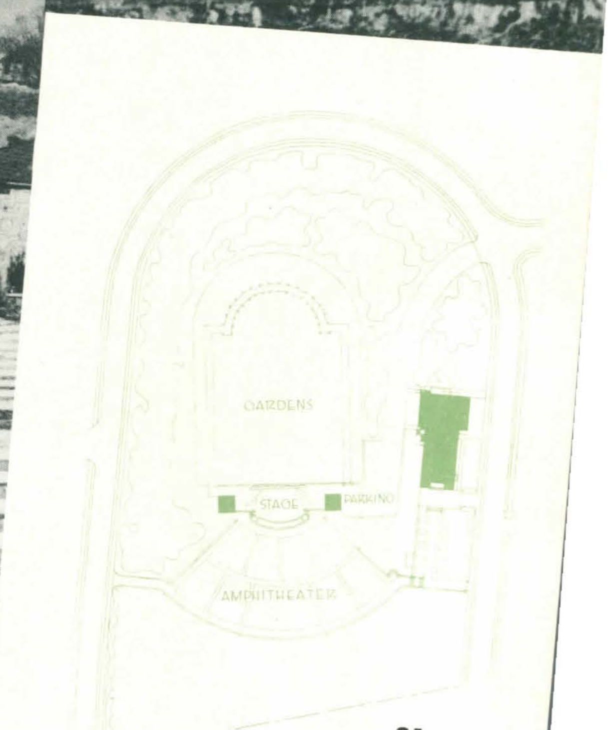


James Joyce







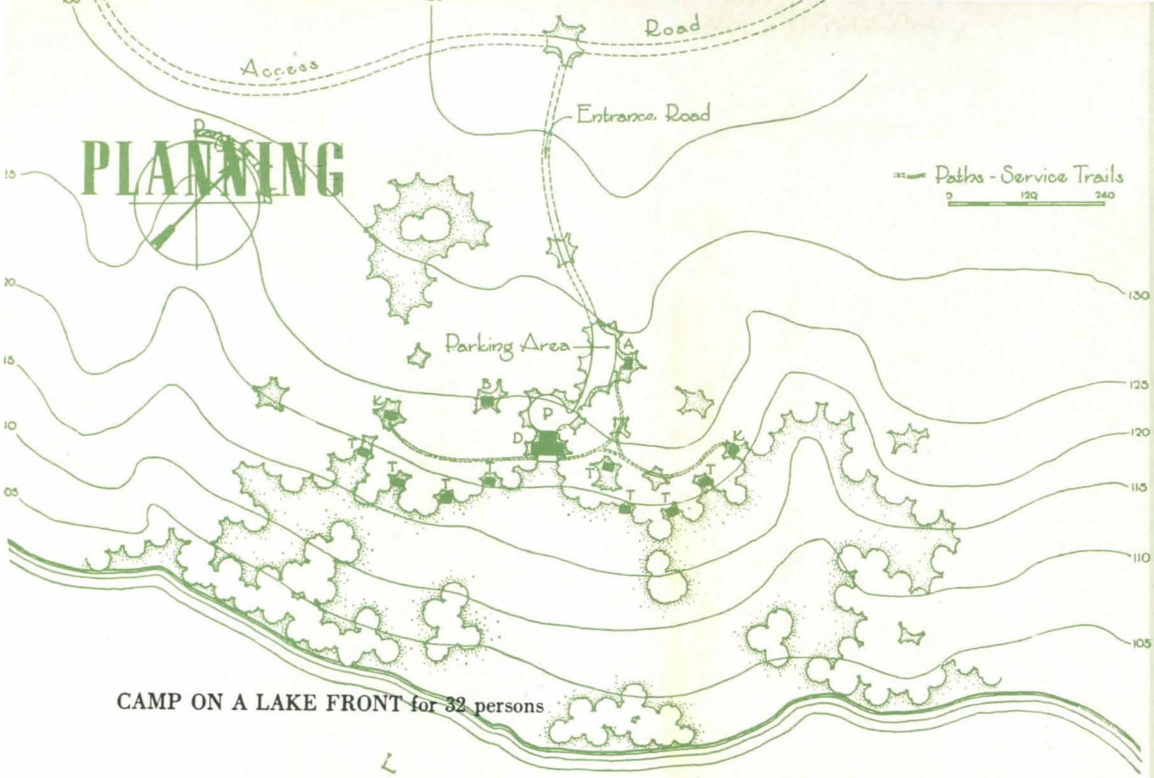

GARDENS
STAGE
PARKING
AMPHITHEATER

RECREATION IN NATURE BENEFITS FROM

THE EXISTENCE OF PARK COMMISSIONS, many of which have achieved enviable reputations, is justification enough—if any were needed—for the statement that enjoyment of nature increases when sound planning principles are applied. Under supervision of park departments efforts of landscape and regional planners, of building designers, and of experts in the field of recreation, are coordinated. Such simple structures as the entrance pylon and sign below, and the bridge and bridle path, have to be related to one another, and designed to fulfill their several functions.

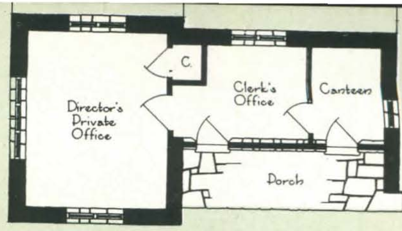
Photos: National Park Service, Ewing Galloway

PLANNING

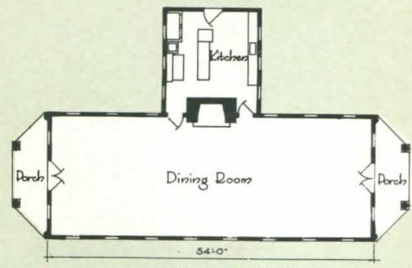


CAMP ON A LAKE FRONT for 32 persons

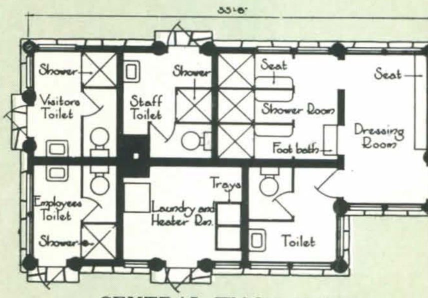
CAMP ON A DAMMED STREAM for 72 to 96 persons



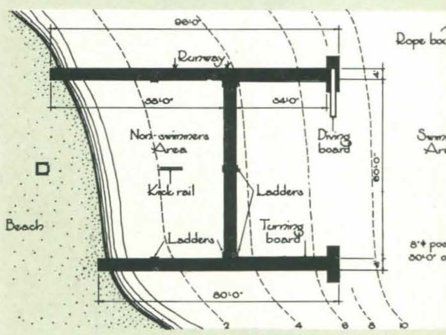
ADMINISTRATION BUILDING



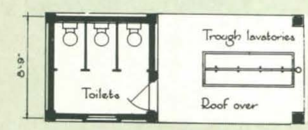
DINING LODGE



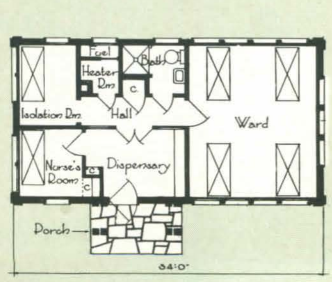
CENTRAL WASH HOUSE



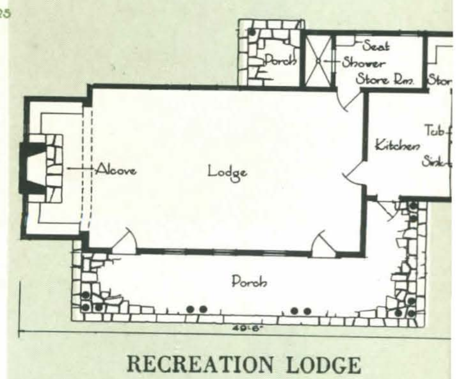
SWIMMING AREA



LATRINE



INFIRMARY



RECREATION LODGE

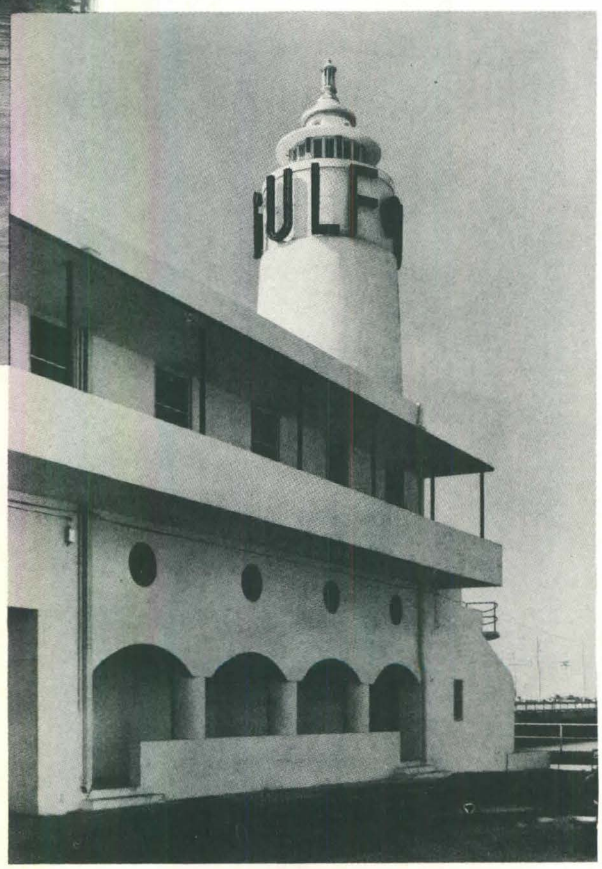
THE ORGANIZED CAMP shows application of planning principles reported by the United States National Park Service. The average capacity ranges from 25 to 125 campers; smaller and larger numbers may be justified by special conditions, but are considered uneconomical. It is now common to group a camp of more than 32 persons in units of 16, 24 or 32 (max.). Central facilities are provided for administration, dining, medical care, and mass recreational and cultural activities. Outlying units, each a short walking distance from this "administrative" central area, are colonies of sleeping cabins or tents. Each unit centers around its unit lodge, and has a unit wash-house and latrine. This organization allows groups having common interests to congregate, and facilitates health supervision, particularly in children's camps. The accompanying plans are chosen from typical examples published in "Organized Camp Facilities" (Nat'l Park Service, Washington, D. C.).

TO ENJOY NATURE

From the ubiquitous hotdog stand, which mars so many scenic highways, to such luxurious establishments as Sun Valley, business has found ways to serve the American in search of recreation. Indeed, recreation has become a major industry; and good design, commercial as well as aesthetic, benefits both the pleasure-seeker and the merchant.

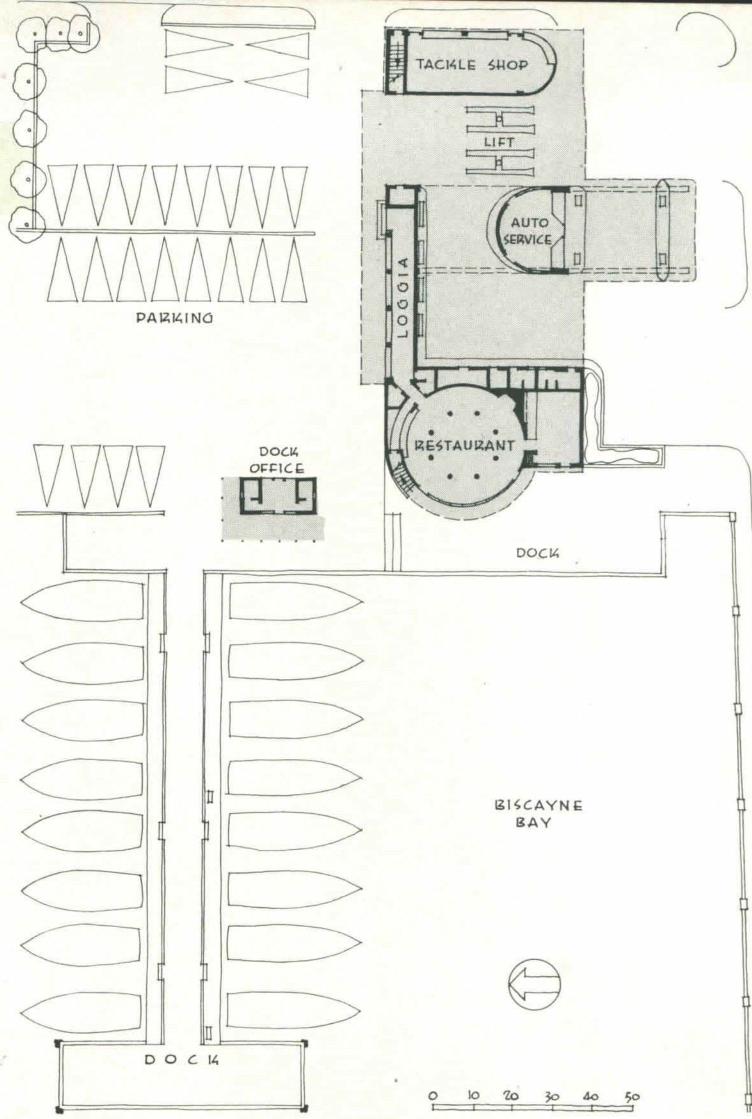
Photos by Gottscho

NIGHT VIEW from land side shows concession

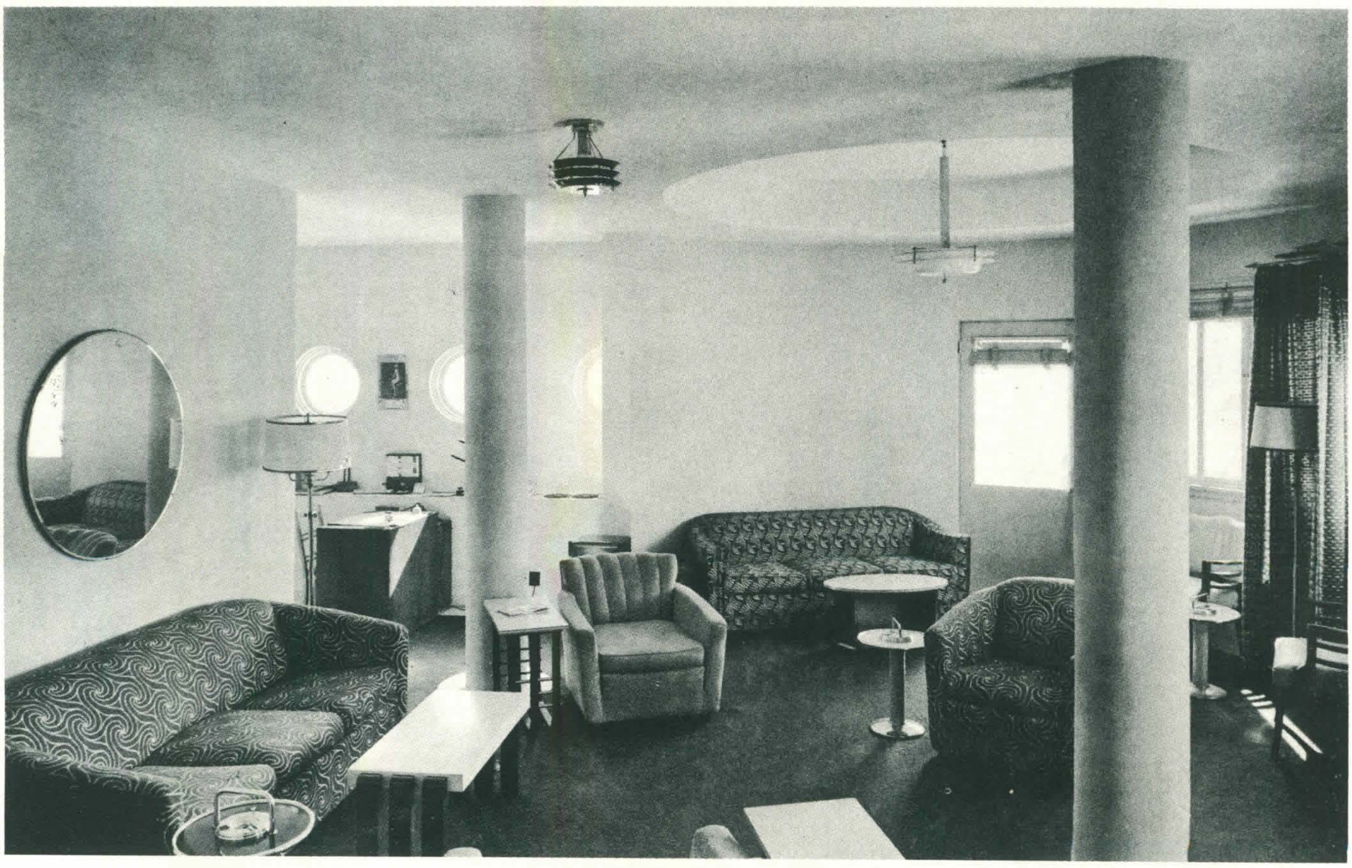


HOTEL ROOMS overlook bay

WE NEED COMMERCE



SERVICE STATION AND HOTEL, GULF CORP., MIAMI BEACH, FLA.: POLEVITZKY AND RUSSELL, ARCHITECTS. Here in one development are service station, hotel, parking space, fishing-tackle concession, restaurant, and radio station. The building stands at the entrance to Miami Beach, and is therefor more imposing than a service station would normally be. The service station accommodates both automobile traffic over Miami's Municipal Causeway and fishing boats at the Floridian Pier and Gulf Dock. The tower houses the fishing fleet's radio room; its sign is both a beacon and an advertisement. Hotel (on second floor) provides cheap quarters for attendants. Third floor contains a one-bedroom apartment for the building's manager. Structure has reinforced concrete skeleton built on concrete-capped piles; tower is poured concrete.



HOTEL LOBBY is small, and has dumb-waiter to restaurant below. Future extension of building may occupy north half of lot

SPECTATOR ACCOMMODATIONS FOR ORGANIZED

NEED FOR ACCOMMODATING SPECTATORS has brought business into the field of organized sports. Size of stadium, grandstand or bleachers depends on type of sponsoring educational institution and municipality; number of students, faculty, alumni, townspeople; athletic relations with and proximity to other municipalities. Surveys of high school grandstands indicate that for small communities — up to 5000—stands have seating capacity equal to 25% of population. For larger towns —up to 50,000—a 10% ratio is more common.

SHAPE OF STAND depends on sport for which it is designed. Straight or slightly curved stands are suitable for football, track, and general entertainments, curved or angled stands for baseball. Shallow curves have been used for dual-purpose stands; or baseball field is laid out with first-base line paralleling a straight stand. Orientation of stand, and so of playing field, should be such that sun does not shine in players' eyes. This means that, for center of each time zone in United States, short axis of football field should run about 50° east of true north; line from first to third base of baseball field, about 72° east of true north. Maximum variation due to changing location within time zone is about 80°.

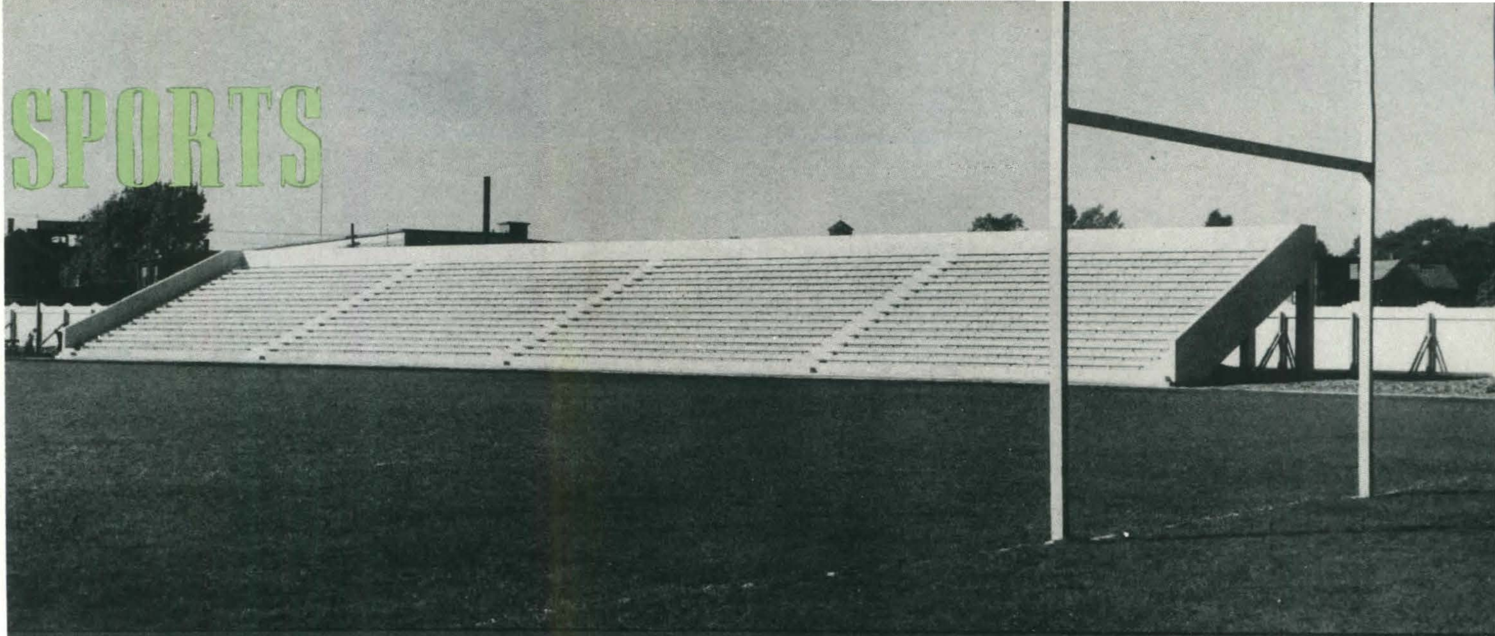
STADIA

Arthur Bauer

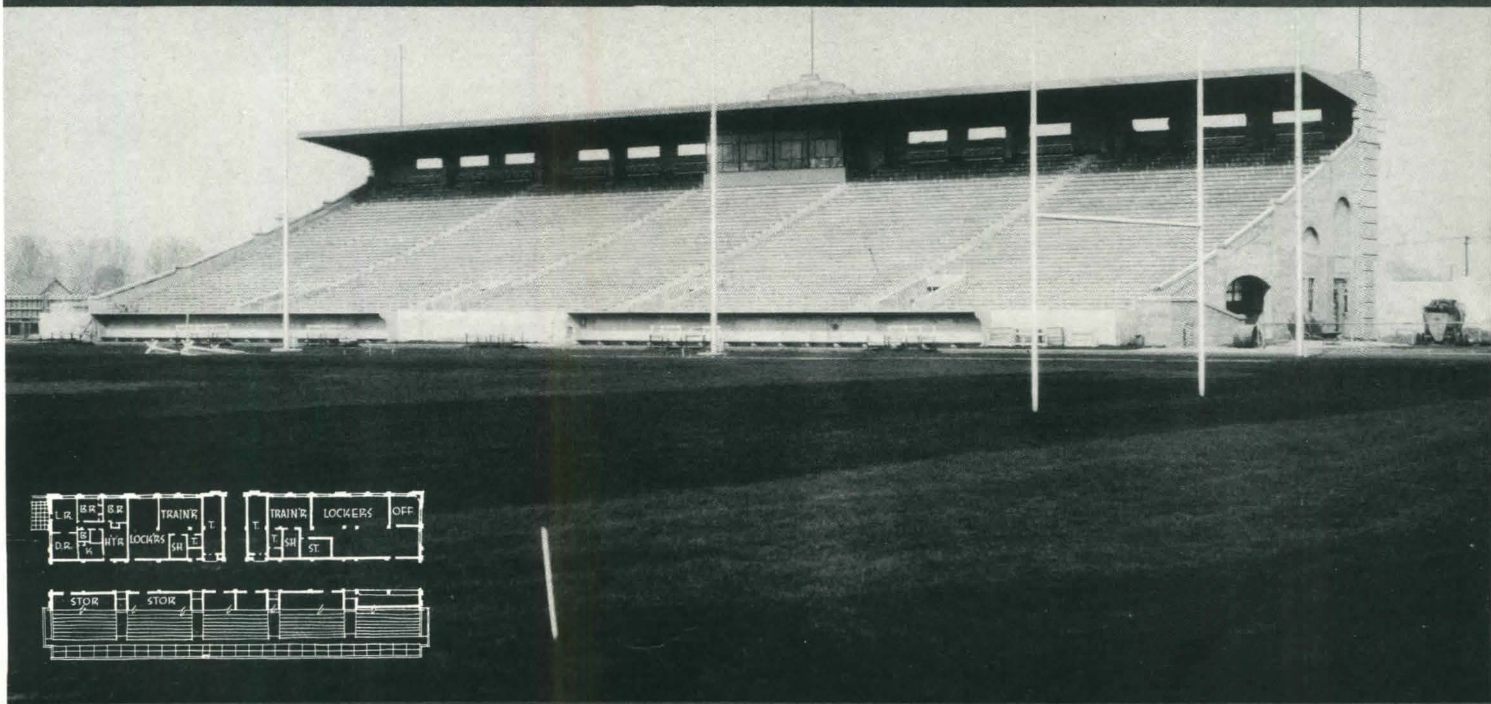
CIRCULAR STADIUM; RIVER PLATE CLUB, BUENOS AIRES, ARGENTINA: JOSE ASLAN, HECTOR EZCURRA, ARCHITECTS

SPORTS

Photos courtesy Portland Cement Assn.

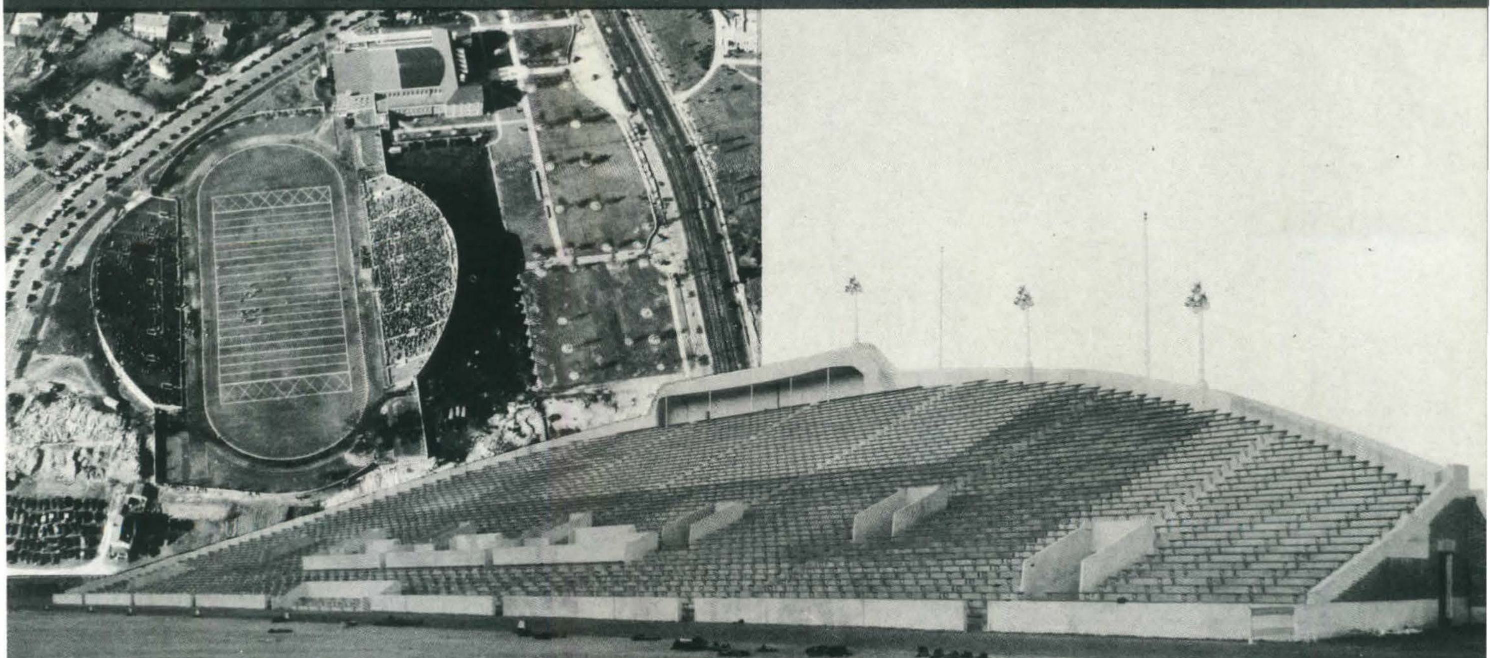


SIMPLE CONCRETE BLEACHERS: CHELSEA, MASS.: FEER AND EISENBERG, ARCHITECTS

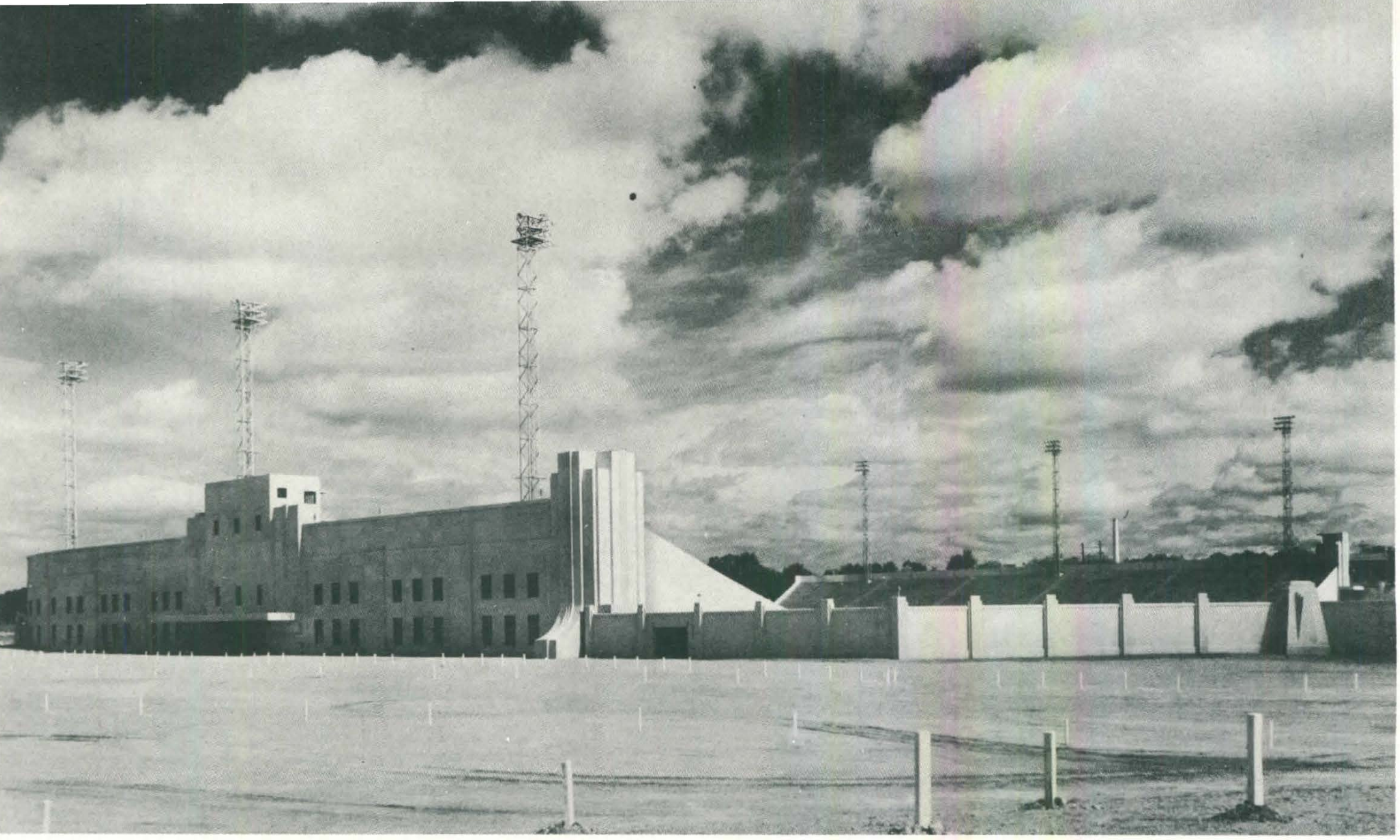


STRAIGHT GRANDSTAND WITH SPECIAL FACILITIES; STROBEL FIELD STADIUM, SANDUSKY, O.: HAROLD PARKER, AIA, ARCHITECT

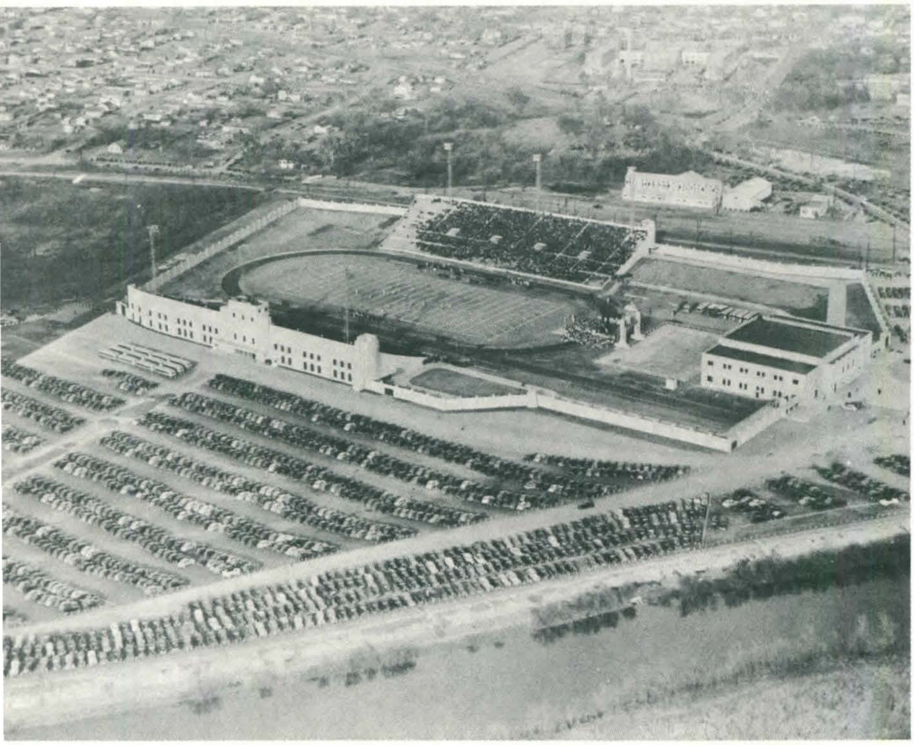
Norfolk Ad. Bd.

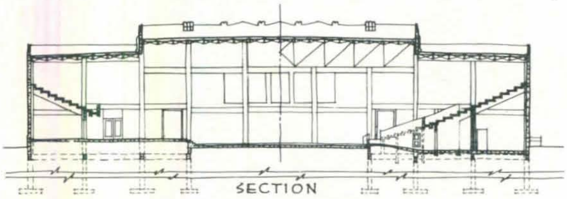


SEATS CONCENTRATED AT CENTER; WILLIAM AND MARY STADIUM, NORFOLK, VA.: C. A. NEFF, AIA, ARCHITECT

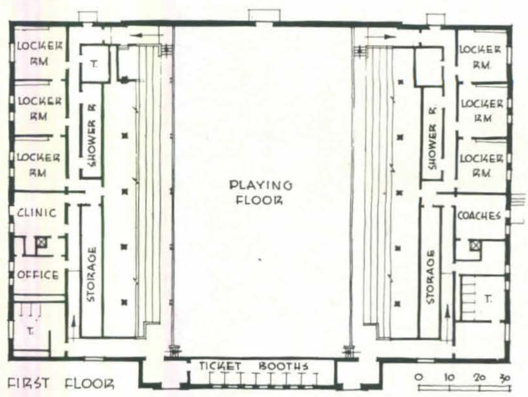


Photos by Wm. Langley, Denny Hayes





SECTION



FIRST FLOOR

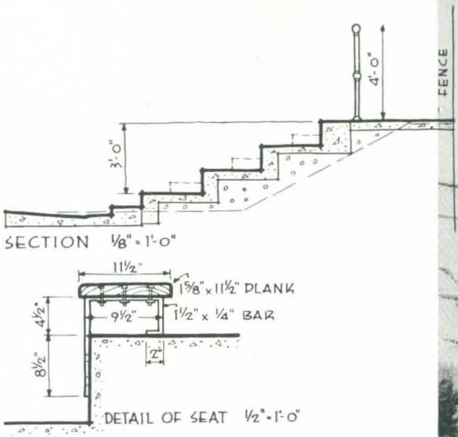
ONE OF THE LARGEST in the country, this athletic plant has two principal units: Stadium, consisting at present of two grandstands designed for future expansion into a horseshoe shape; and field house. Grandstands, 135 by 390 ft., seat 23,457 spectators (horseshoe will seat 40,000) who can exit in 10 minutes through ramped vomitories. Space under stands accommodates entire audience in case of rain. Playing field design conforms to AAU requirements. Fieldhouse, 125 by 165 ft., seats 3,000, has provisions for basketball, volley ball, tennis, wrestling, boxing. Structures are concrete, and cost approximately $765,000.

COMPLETE ATHLETIC PLANT FOR DALLAS, TEXAS, HIGH SCHOOLS: HOKE SMITH, ARCHITECT

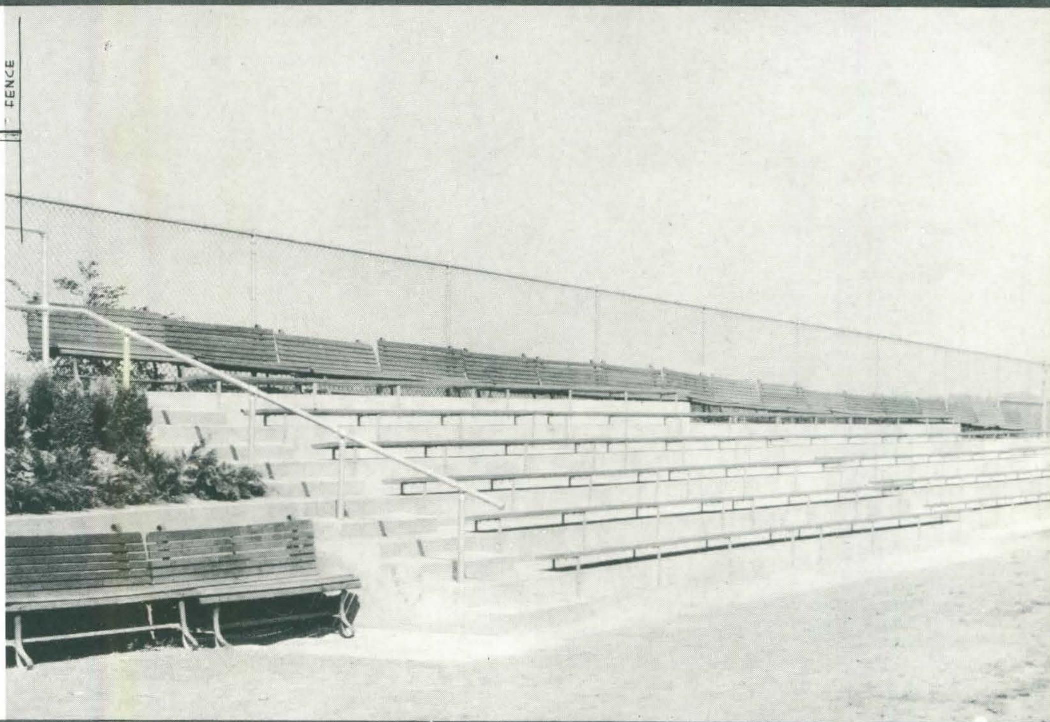
BLEACHERS

Usefulness, and hence popularity, of community playgrounds is increased when bleachers are provided; and small school fields also benefit. Here, on a level site, precast riser bents are supported by cast-in-place framing.

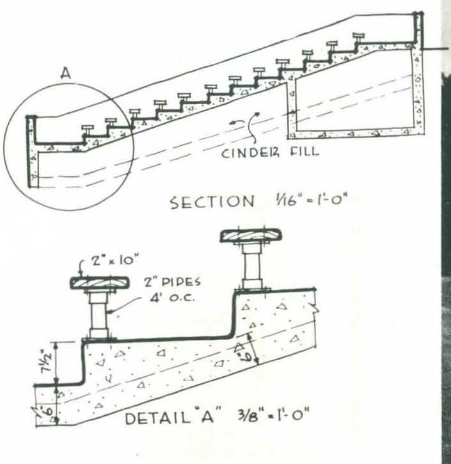
MORGAN PARK, NEW LONDON, CONN.: G. A. WATERS AND K. H. HOLMES, ENGINEERS



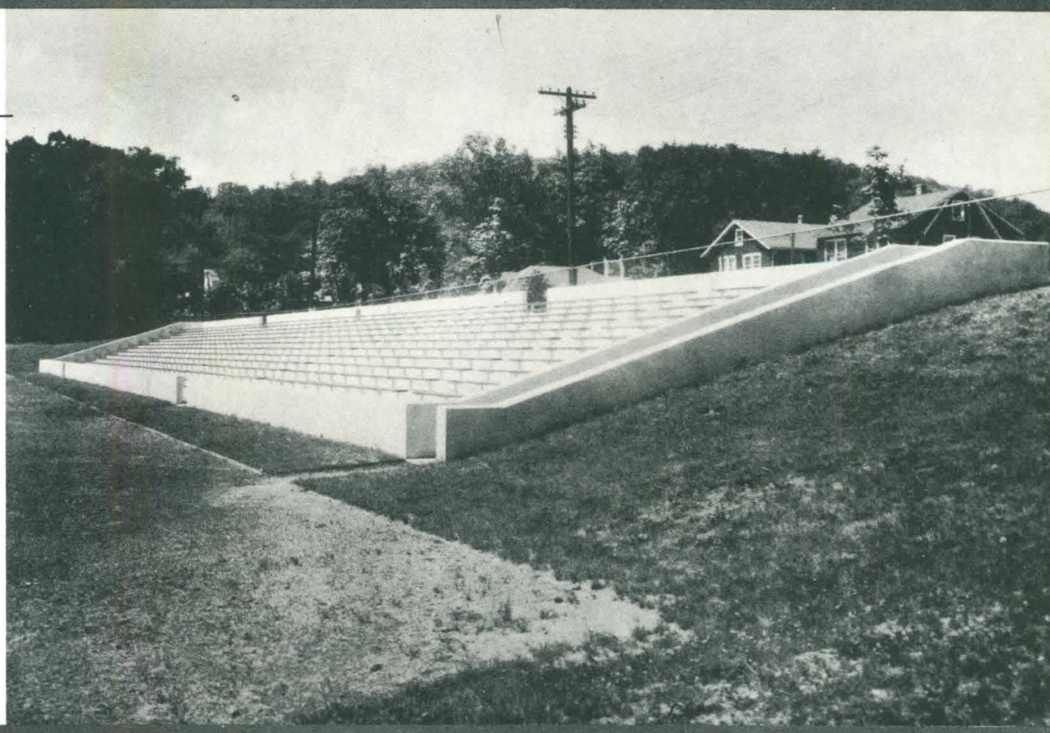
These baseball bleachers take advantage of grades and concentrate largest number of seats near home plate. When built of concrete, slab may be cast on embankment surface which is shaped either to step form or as a plane.



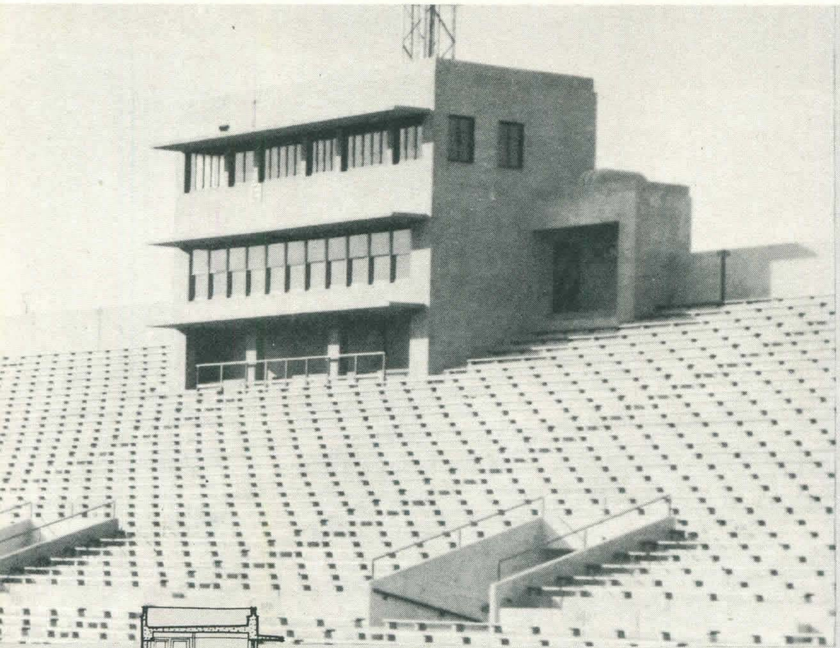
HAMPDEN ST. PLAYGROUND, HOLYOKE, MASS.: P. S. HOWES, ARCHITECT; P. E. BOND, ENGINEER



Also built to take advantage of natural slope, this structure has its principal spectators' entrance at top. Passage at right leads to dressing room beneath stand.



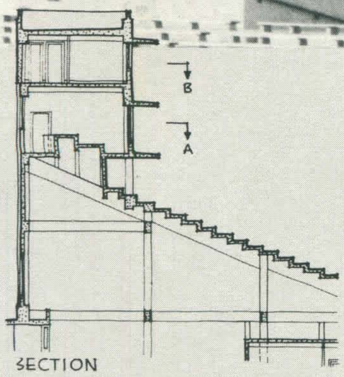
NYACK, NEW YORK: H. G. EMERY AND G. N. SCHOFIELD, ARCHITECTS; HARVEY POLHEMUS, ENGINEER



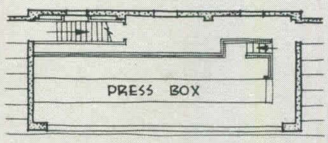
PRESSBOXES

DALLAS, TEXAS, HIGH SCHOOLS STADIUM: HOKE SMITH, ARCHITECT. This press and radio box accommodates 100 reporters and observers, has three broadcasting booths above, and the roof forms a platform for cameramen.

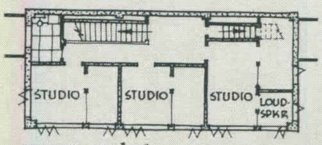
For football, these facilities should be centered on the 50-yd. line; for baseball, location near home plate is desirable. An elevation, such that reporters' view cannot be obstructed by a standing crowd, is required. Minimum facilities consist of a continuous desk, 1 ft. 6 in. wide, with an allowance of 2 linear ft. per man. If wire reports are to be sent out, each reporter (plus telegrapher) needs 4 linear ft. of desk. Telephone connections to scoreboard and players' bench, outside telephones, adequate artificial light, and some form of heating, are desirable. To prevent interference, cables for radio, telephone and power lines should be in separate conduits. Broadcasting booths 10 by 8 ft. (minimum) will accommodate technicians and equipment for large broadcasting systems. Small local stations may have fewer personnel and use smaller booths. Public address systems may be controlled from the pressbox or broadcasting booth.



SECTION

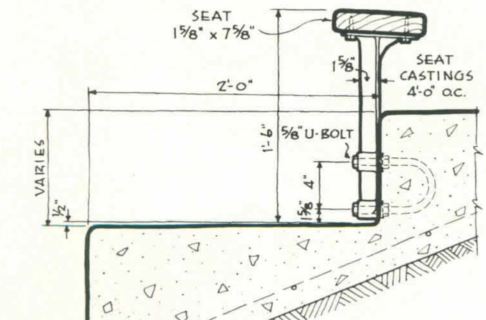


PLAN AT "A"



PLAN AT "B"

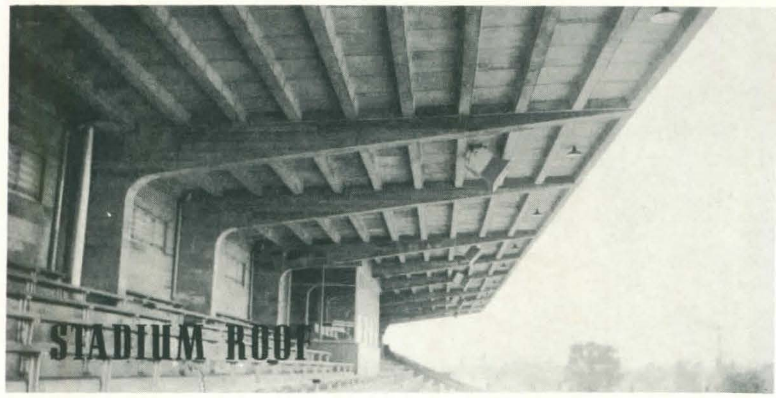
STADIUM SEATS



SECTION • SHOWING SEAT DETAIL • ¾" = 1'-0"

MITCHELL FIELD, HOLYOKE, MASS.: P. E. BOND, ENGINEER. Like most stadium seats, these are wood, supported on iron brackets. Woods most commonly used are Douglas fir, redwood, cypress, etc.; choice should be based on resistance to deterioration. Preservatives are desirable, as is painting, provided care is taken to prevent staining spectators' clothing. Seats made up of two or three pieces, preferably pitched to the back for comfort and drainage, have least tendency to warp.

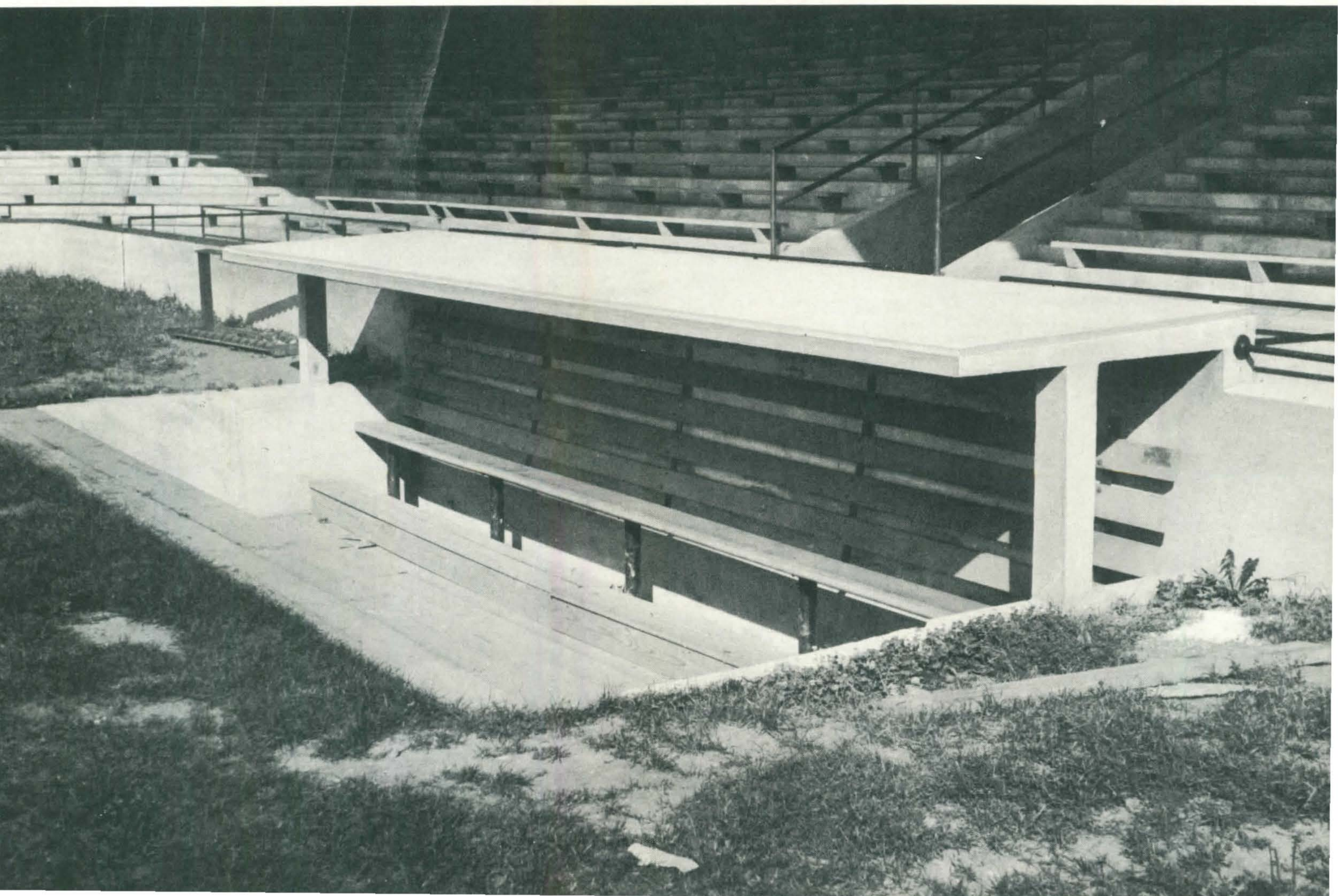
Preferable minimum depth of seat is 10 in., nominal thickness, usually 2 in. Supports are ordinarily 4 ft. on centers. Seats should not be continuous over expansion joints in the stand structure, unless the extension is not more than 4 ft., and unless the plank is not rigidly anchored to the end support.



STROBEL FIELD STADIUM, SANDUSKY, O.: HAROLD PARKER, ARCHITECT, R. C. REESE, ENGINEER. This type of cantilevered concrete roof offers protection to spectators and the press. In some cases, the pressbox is suspended from the front edge of the roof.

PLAYER'S DUGOUT

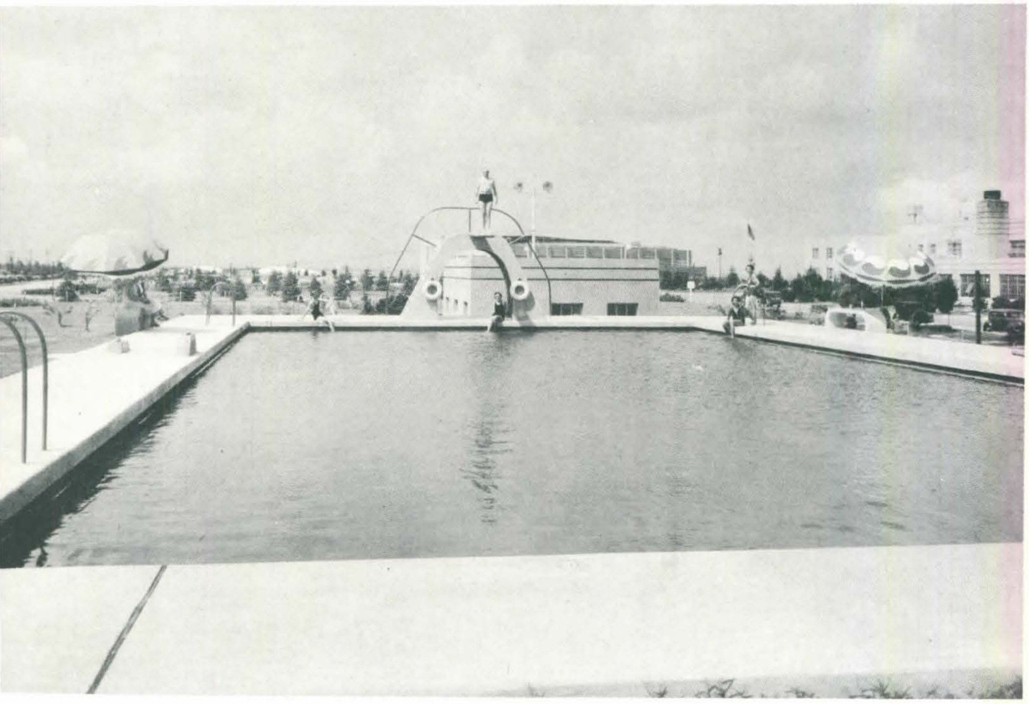
DUGOUT, MICHIGAN STATE NORMAL COLLEGE GRANDSTAND, YPSILANTI, MICH.: GIFFELS AND VALLET, INC., ARCHITECTS. Placing floor of dugout below grade reduces interference with spectators' view, and protects players from cold. Depth is determined by sightlines from grandstand, and by drainage problems. Besides seats, a drinking fountain (permanent or portable) and telephones to pressbox and scoreboard, are desirable.



SWIMMING POOLS

PRIVATE

POOL dimensions are commonly smaller than formerly; this 60-ft. example on a Connecticut estate has an adjoining wading pool.*



PUBLIC

SHUSHAN AIRPORT SWIMMING POOL, NEW ORLEANS, LA.: E. E. ELAM, ENGINEER. This pool was designed primarily as a reservoir for the fire-protection system; as a swimming pool, it has value for revenue and as an advertising medium.

COMMERCIAL

WASHINGTON PARK POOLS, CHICAGO, ILL.: CHICAGO PARK DISTRICT, DESIGNERS. Designed for both recreation and competition, this grandstand-equipped pool has diving and racing pools in the foreground. Barely visible under trees is segregated wading pool.

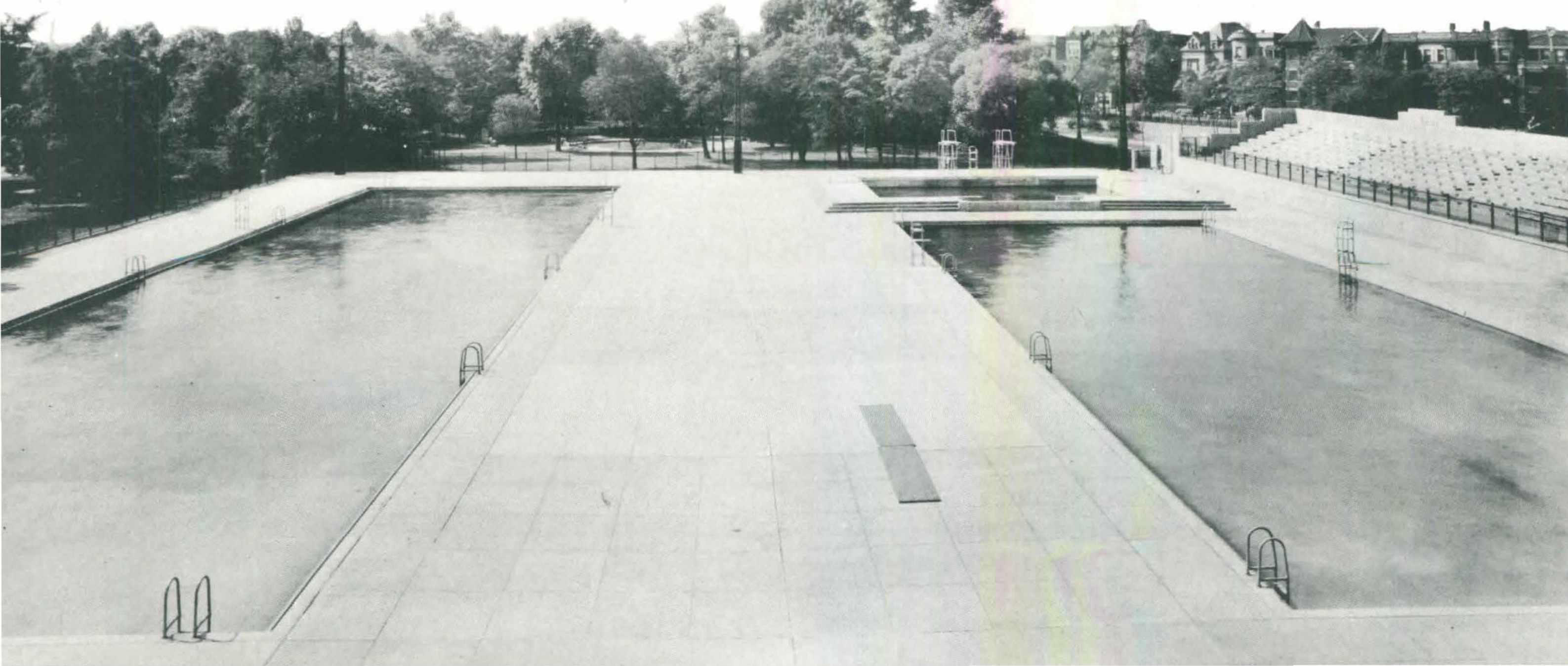


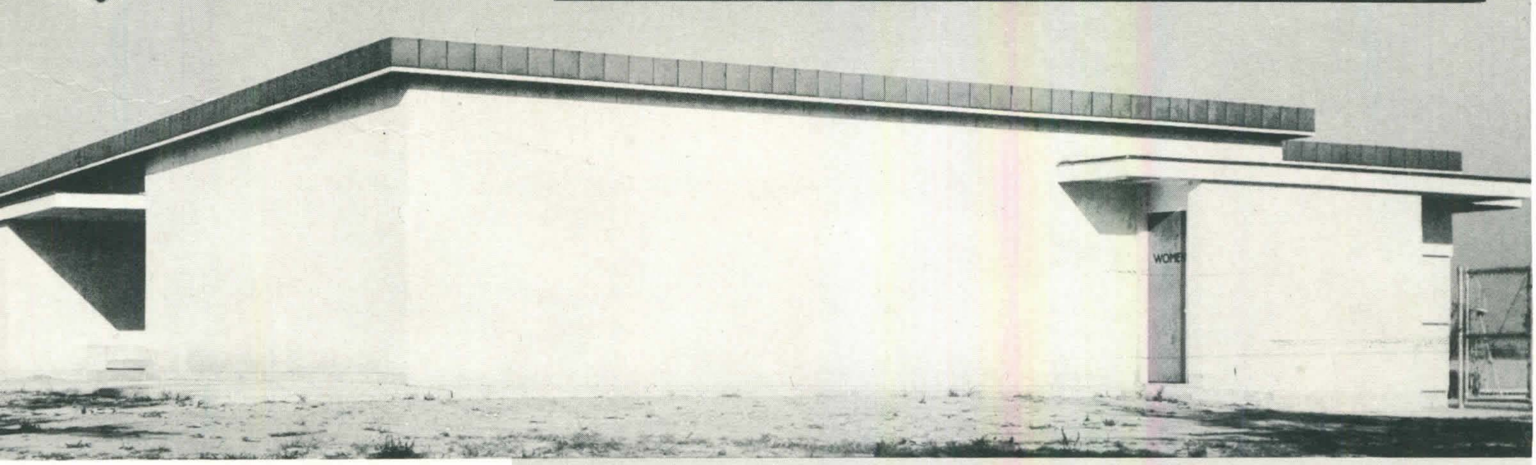
Photo courtesy Swimming Pool Constr. Co.

CLUB A 75-ft. pool is the usual accommodation today. Typical provisions include a bathhouse (see accompanying Time-Saver Standards) and lounges, terraces, etc.).

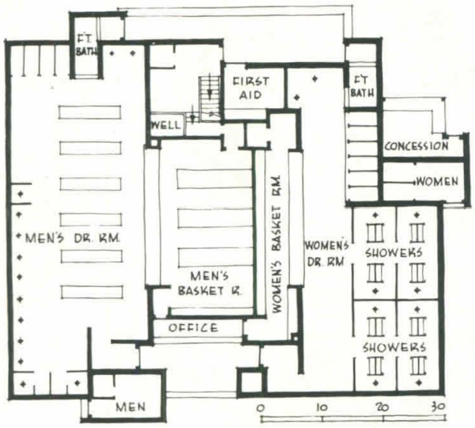
COMPLETE FACILITIES for swimming pools vary somewhat with the type of pool. For public pools, diving area, wading pool, bathhouse, spectator facilities and play area are desirable. Wading pools are considered necessary wherever small children are admitted. Bathhouses are discussed on the two following pages and in the accompanying Time-Saver Standards. Play areas and space for sun bathing increase a pool's popularity and can, in effect, increase a pool's capacity by keeping people busy out of the water.

Size of pool may be predicated upon estimated attendance. For private and club pools this is relatively simple; for public pools, criteria are difficult to set up. Studies by Iowa State College indicate that for cities under 30,000 population, max. daily attendance is from 5 to 10%. Another rule estimates average daily attendance at from 2 to 3%; with maximum daily attendance about 2 to 6 times the average; and maximum attendance at any one time, about 1/3 total daily attendance. Pool capacity allowances are based on the assumption that water 5 ft. or more deep is "swimming" area; less depth is used for "bathing"; for swimming, allow 27 sq. ft. per person; for bathing, 10 sq. ft. Another method of computing areas allows each bather 20 sq. ft. including pool, walks, and play area. Local and state health regulations should be consulted.

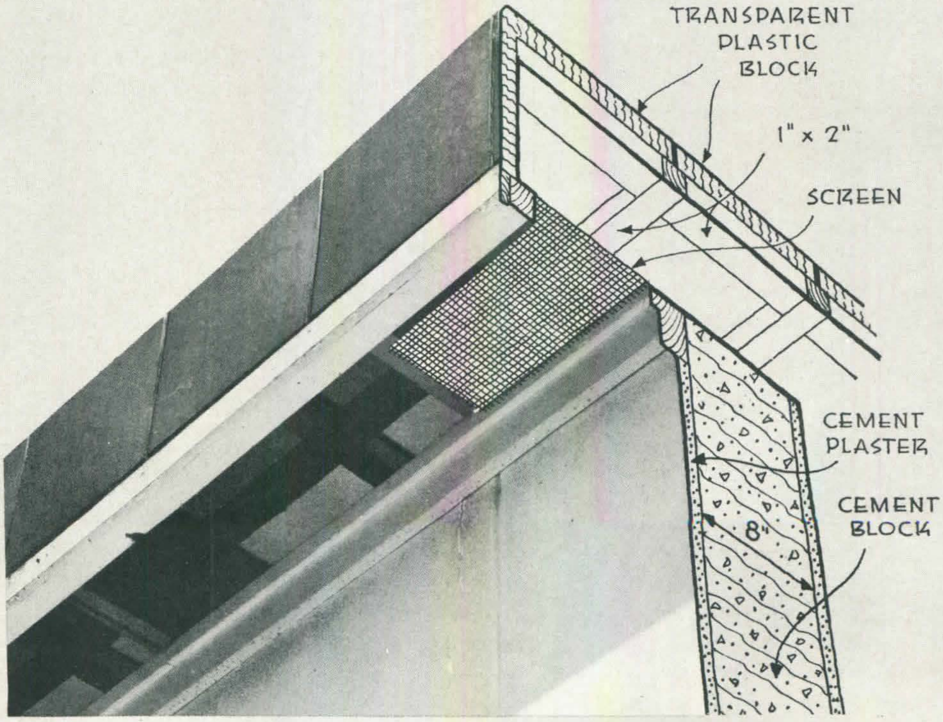
DIVING TOWER, ASTORIA SWIMMING POOL, NEW YORK CITY: *DEPARTMENT OF PARKS*, DESIGNERS. This structure, in reinforced concrete, an example of design for function.

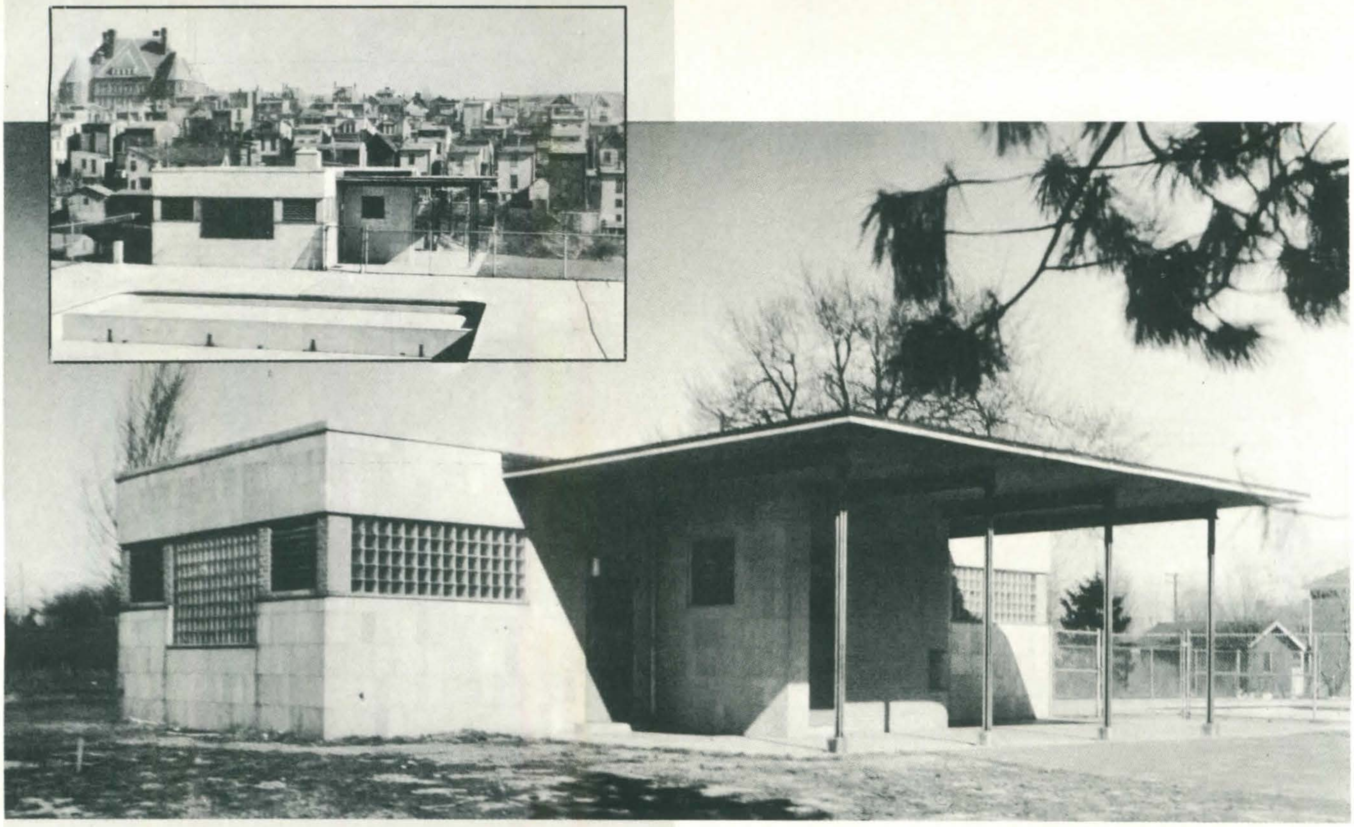


Photos by Elmer L. Astleford



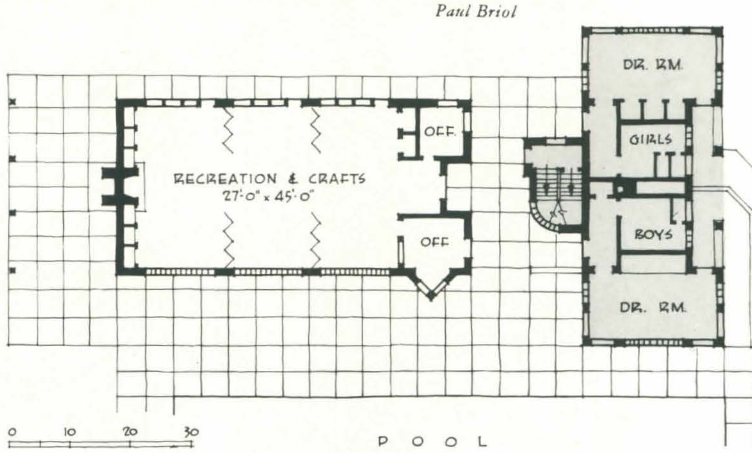
MUNICIPAL BATHHOUSE, MIDLAND, MICH.: ALDEN B. DOW, ARCHITECT. Chief problem in this type of structure is maintenance of privacy without reducing necessarily high standards of sanitation. Also important are segregation of bathers by sex, separation of "wet" bathers from "dry," efficient yet unobtrusive supervision of dressing rooms, and provision for controlling incoming and outgoing patrons. Here the architect provided ample interior light by means of translucent plastic eaves-coverings, and permitted adequate ventilation by leaving open the eaves-soffit. Bathhouse also contains sterilizing equipment for pool; this is located in a half-basement. The resulting raised floor of the checking area aids supervision of dressing space. In pool photo, note deep-water area in center, protected by a low rail. Diving tower with elevated seat for lifeguard is located so all patrons and spectators can see and be seen.

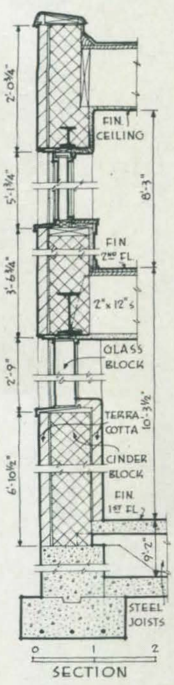




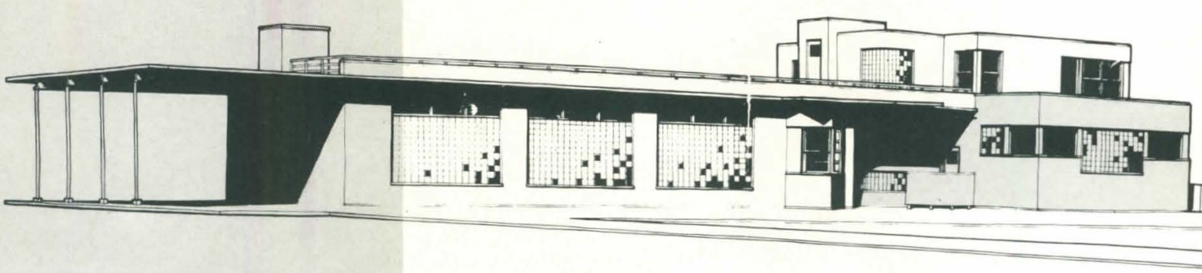
Paul Briol

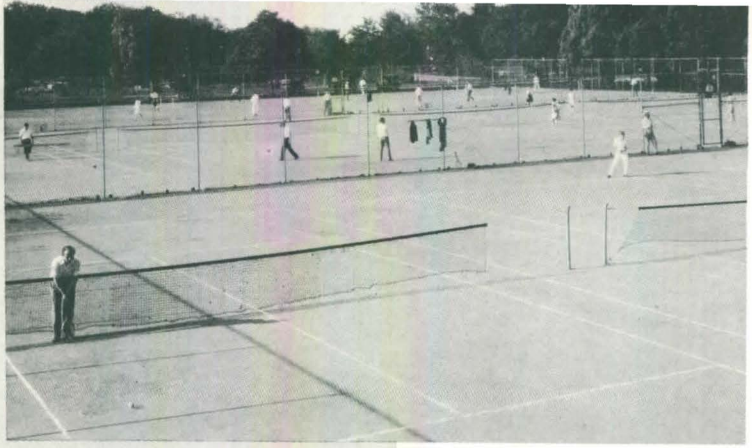
SHELTER HOUSES, CINCINNATI, O.: GARRIOTT AND BECKER, ARCHITECTS. Ten identical structures have been constructed for Cincinnati's Recreation Commission. Each center will ultimately contain a large recreation room; indoor and outdoor fireplaces; space for dancing; and caretaker's apartment. Each present bathhouse unit contains toilets for completed unit. Light is admitted through glass blocks, air through louvers. This kind of building is subject to ruthless vandalism, particularly in "tough" neighborhoods. So breakable materials and equipment are omitted or replaced with unbreakable; surfaces of walls are ceramic glazed to discourage scribblers; "dirt-catchers" are eliminated.





EACH OF THE TEN shelter houses adjoins a city-maintained pool. One problem lay in devising a single plan suitable for all ten locations.





Ewing Galloway

AN AMERICAN DEVELOPMENT: RECREATION CENTERS

IN THE CITY, or wherever large audiences are available, commercialized sports have their definite place. There remain, as typically urban problems, the need for outdoor play areas, particularly for children; the need for passive forms of outdoor recreation in which people can participate—such as parks—and the need for buildings to house games, hobbies, and social gatherings.

In rural districts, the first two needs—space for outdoor play and passive outdoor recreation — may be filled by nature. But the community of interest which develops around organized team play, and from pursuit of avocations, social functions, etc., demands formal facilities like those needed in cities. The importance of these activities is attested to by the great number of community facilities provided by schools, churches, and municipalities.

OUTDOOR AREAS. The report of a special committee of the National Recreation Association* on standards of outdoor recreation areas in housing developments follows substantially recommendations previously published in Architectural Record.† Three types of spaces, for varying age-groups, are considered desirable: *Playlots*, small in size, for preschool children; *playgrounds*, larger in area, for older children; and *playfields* for young people and adults, with accommodations for organized games.

ULINE SKATING RINK, Washington, D. C.: J. H. Lapish, Architect

RECREATION BUILDINGS. Requirements naturally vary according to local needs. The following are considered desirable features in a community recreation building:**

- ★ **Gymnasium with locker, shower, and dressing room facilities**
- ★ **Auditorium with stage**
- ★ **Rooms for games, club activities, arts and crafts**
- ★ **Kitchen**
- ★ **Lobby, lounge and office**
- ★ **Toilets, checking and heating facilities, fuel and storage rooms, janitors' or caretaker's facilities.**

Gymnasium space 50 by 90 ft., with minimum ceiling height of 20 ft., is desirable. Lockers, dressing rooms, etc., need not be planned for full capacity use, as in schools, but rather in proportion to the approximate average use.

Auditorium, if used for a variety of purposes including dancing, should have a level floor; sloping floors are suitable only when permanent theater seating is to be installed. Stage should be permanent and elevated. Depending on community interest in dramatics, expensive equipment such as fly galleries and elaborate lighting facilities may be held to a minimum. Experiments in semi-portable stage construction, with the front portion of the stage consisting of uniform removable sections which can be regrouped (as runways for fashion shows, etc.), are now in progress.

At least two rooms, usually more, are devoted to arts and crafts (similar to school industrial art provisions), to club meeting rooms, exhibitions, etc.

Skating rinks are sometimes included, outdoors or indoors; often swimming pools are designed for winter conversion for skating. Recreation centers such as those in Cincinnati, illustrated in this issue, are adaptable to this purpose.

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* "*Play Space in New Neighborhoods*"; 25¢, National Recreation Assn., 315 4th Ave., N. Y. C.

† "*Low-Rent Housing*"; A Building Types Study, Arch. Record, March, 1939.

** "*Planning a Community Recreation Building*," by F. Ellwood Allen, consultant; 20¢, National Recreation Assn. See also "*Community Theaters*"; A Building Types Study, Arch. Record, October, 1939.

BATH HOUSE DESIGN

Information on this sheet was prepared by Ronald Allwork from data assembled by the Portland Cement Association; Joint Committee on Bathing Places, American Public Health Ass'n.; Conference of State Sanitary Engineers.

General. Capacity and operation of the bathhouse must be such as to avoid overcrowding at times of maximum demand; however, it is better to have an overcrowded condition a few times a year rather than to have facilities so large as to be uneconomical.

Location of bathhouse depends partly on size of pool and space available. When possible, bathhouse should be placed so as to protect pool from prevailing winds. A location at one side of the pool, or better still, at the shallow end, will reduce the danger of poor swimmers and children falling or jumping into deep water.

Size of bathhouse and selection of equipment, in relation to pool size, depend on such factors as the need for: lockers, or central checking system; individual dressing rooms, or the "dormitory" system; private or group showers; and extra facilities. If patrons are permitted to use their own suits, some will come ready to swim, and dressing and check rooms may be small. But since all bathers should be required to take a cleansing shower, the number of showers needed will remain the same.

Area of bathhouse is usually 1/3 of pool area; area of dressing room approximates 1/5 pool area. It is recommended that bathhouse facilities, based on the number of bathers present at any one time (2/3 of whom may be assumed to be men), be provided as follows:

1 shower for each 40 bathers
1 lavatory for each 60 bathers
1 toilet for each 40 women
1 toilet for each 60 men
1 urinal for each 60 men

For rough estimate of maximum number of persons within a pool enclosure (pool and walks) assume one person for every 12 sq. ft. of pool area. Hence for a pool 30 x 75 ft., assume 190 persons.

Elements of a bathhouse vary with local requirements, but usually include: entrance lobby, ticket or cashier's booth, concessions, manager's office, public telephones, checking room, suit and towel room, dressing rooms, toilets, showers, first aid room, guard's or attendant's room, mechanical equipment, storage space, etc.

Dressing rooms. Method of checking clothes must be decided before the layout can be determined, as the method chosen affects the entire arrangement. Both individual lockers and central check rooms have been used successfully. Choice depends mainly on local conditions. A combination of the two systems may become the most desirable, since obviously requirements for a well-dressed adult and for a boy in play clothes are not the same. Lockers should be placed on a raised platform to keep them dry and to simplify floor cleaning. Lockers require most space, but tend to keep clothes in better condition. Individual dressing rooms must usually be provided for women and girls, whereas men and boys ordinarily dress in aisles between rows of lockers. A few individual dressing rooms are sometimes provided in men's dressing rooms.

Regardless of the system adopted, dressing and locker rooms should be arranged to admit a maximum of sunlight and air in order to maintain clean, sanitary conditions. Satisfactory results have been obtained from the "open-court" type, in which the roof is omitted over part of the dressing room area.

Toilets of the wall-hung type are recommended.

Showers may be either individual or group-controlled; some type of control, which eliminates any possibility of bathers being scalded, is essential.

There are many types of bathhouse equipment on the market which add to the convenience of the patrons and increase the popularity of the pool. Hair driers, comb-vending machines, exercisers and scales are frequently installed.

Planning of bathhouse elements should be such as to permit operation with minimum of personnel, particularly during slack periods.

Circulation. Arrange all facilities so patrons can pass through quickly, without confusion. The only route from dressing room to pool should be past toilets and shower rooms. Each bather should be required to take a thorough cleansing shower with soap before putting on bathing suit. By requiring each bather to pass through a group of showers before entering the pool a superficial bath will be obtained, but this must not be considered as replacing the required shower in the nude.

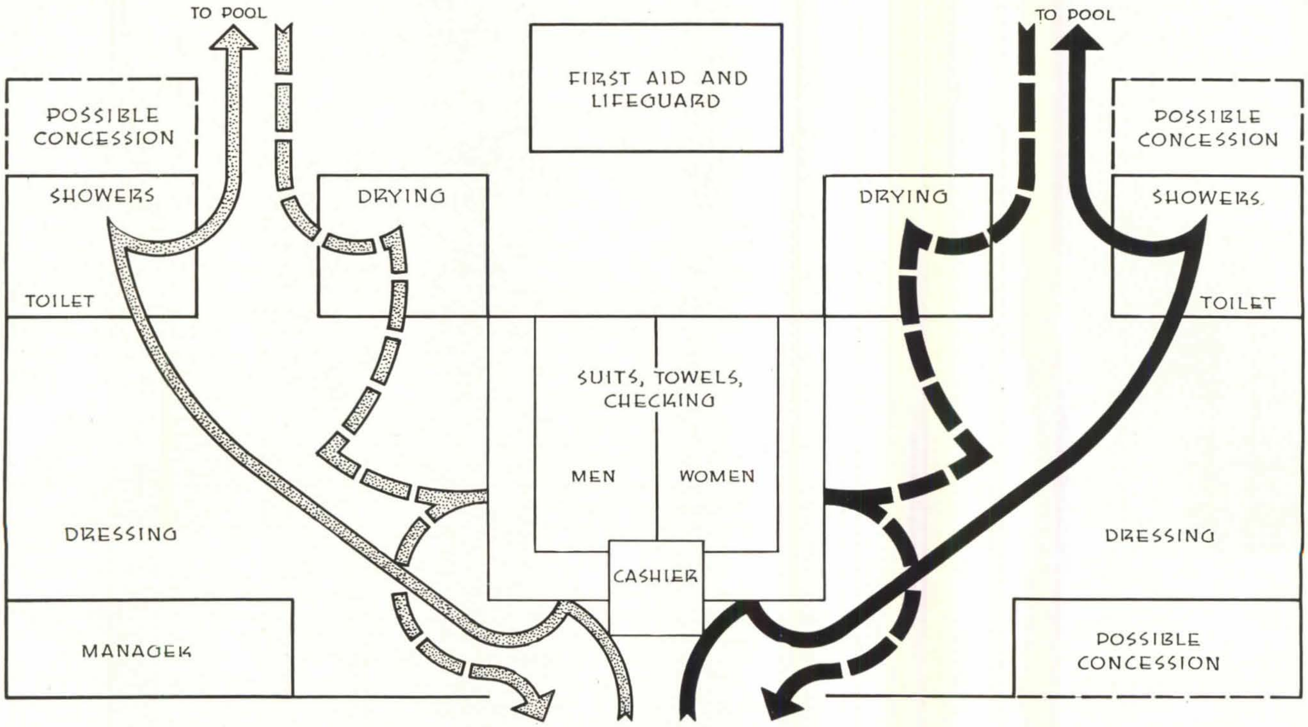
Toilets should be accessible directly from both dressing room and pool. Separate ones for "wet" and "dry" bathers are desirable. Disinfecting foot baths should be placed between pool and toilet.

Bathers returning from the pool should preferably pass through a separate drying room to the dressing room, and the "wet" and "dry" bathers should be separated as much as practical. Exit from bathhouse to street should be so arranged that an attendant may collect all keys, checks, suits or other supplies belonging to the establishment.

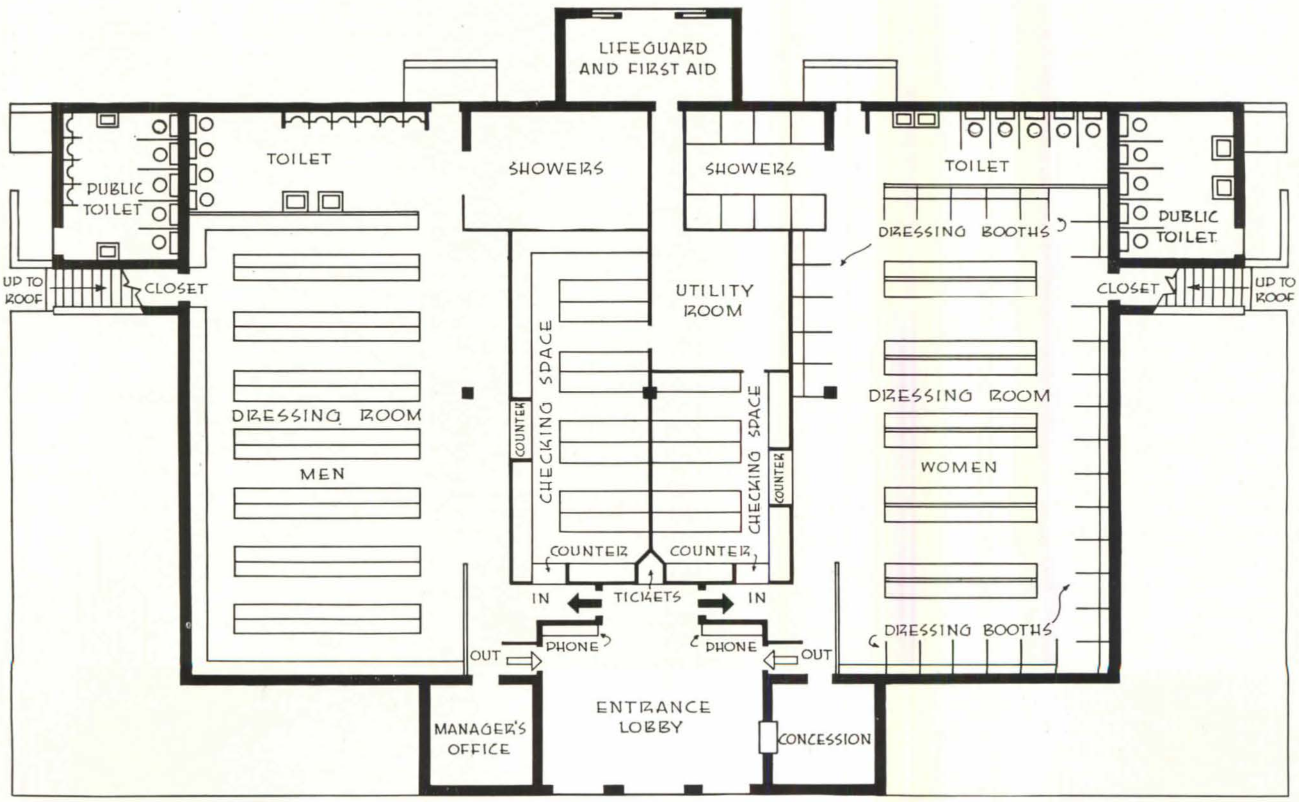
Construction. Resistance to deterioration and fire is especially important. The constant dampness which usually prevails is harmful to many materials and causes rapid deterioration. Therefore materials which are entirely satisfactory in ordinary buildings may not be desirable for bathhouses. Fire hazard must also be considered in selection of materials, particularly since the building is generally in an isolated location and without attendants a good portion of the year.

Bathhouses must be kept scrupulously clean by frequent washing. Construction should be such that washing with high pressure hose will not damage the building. Floors of bathhouses should be pitched 1/4" per ft. to frequent outlets to assure rapid drainage. Provide an ample number of hose connections to make cleaning easy. Connection should be not less than 1 in. to insure adequate water volume and pressure.

BATH HOUSE DESIGN



BATHHOUSE CIRCULATION



SCALE 1/16" = 1'-0" PLAN OF TYPICAL BATHHOUSE FOR 750 PERSON POOL

STADIA: SEATING DESIGN — 1

Information on this sheet was prepared by Ronald Allwork from data assembled by the Portland Cement Ass'n.; Gavin Hadden; A. B. Randall; E. S. Crawley. It is intended to furnish a basis for designing outdoor seating for grandstands, arenas, bowls, theatres, bleachers, etc.

General. The purpose of a grandstand is to provide an audience with a good view of a performance under comfortable circumstances. The view is affected by both the distance to the action and obstructions in the line of sight. Shape and relation of grandstand to action is generally determined by type of performance.

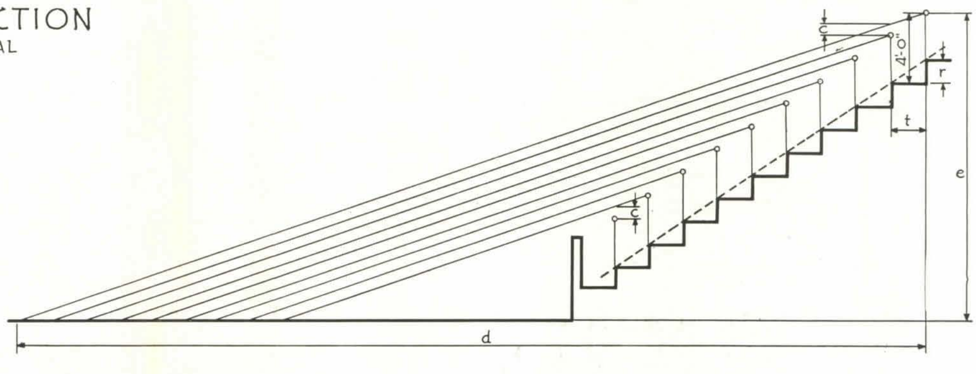
Sight lines. Best view is obtained when the sight line to any part of the field of action clears the heads of the spectators in front. Since this is not always practicable, only sight lines normal to the grandstand are ordinarily considered; oblique lines to different parts of the field are neglected. However, compensation is sometimes made (particularly in bowls) by curving the stands so normal lines approach the center of action.

The focal point—intersection of sight line with playing field—varies according to the type of action. For football, it may be the nearest line of the playing field; for track, at about chest height of the runner in the nearest lane; for baseball, the catcher.

The approximate eye level of a seated spectator is assumed to be 4 ft. above the floor and 6 in. below the top of his hat. Referring to diagrams below, it will be observed that, with focal point and elevation for first row of seats established, required elevation for higher seats is materially affected by the assumed value of *c*. With a value of 6 in. given to *c*, an unobstructed view may be assumed, but except for small grandstands, this dimension often results in excessively high rear seats. It is therefore common practice to assign a smaller value to *c*, especially in large grandstands. It is assumed that spectators will have a satisfactory view if they can see over the heads of those in the second row ahead of them. This requires a value of 3 in. for *c*.

Diagrams below illustrate two types of sections; the second shows a curved seat section with a common focal point, and the first, a straight seat section with a different focal point for each seat. In the straight section, lower seats have better visibility, and upper seats poorer visibility, than in the curved section, but the average is the same.

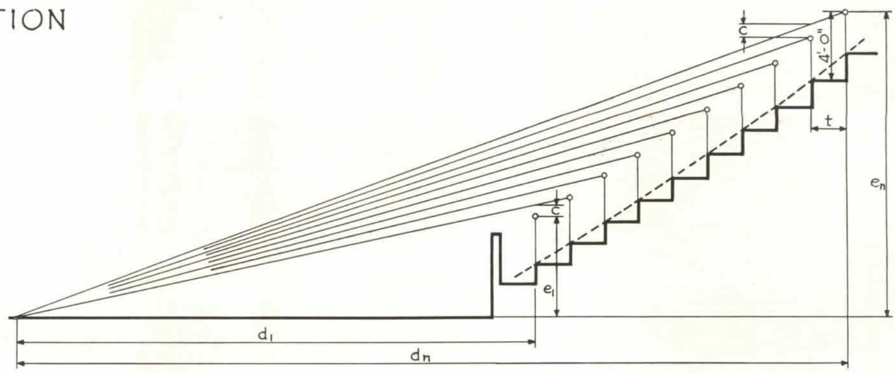
STRAIGHT SEAT SECTION
PROVIDES A DIFFERENT FOCAL POINT FOR EACH SEAT



NOTE — SINCE ALL RISERS ARE EQUAL IN HEIGHT, THEIR TOP EDGES FORM A STRAIGHT LINE

NOTE — THE ELEVATION OF FRONT AND REAR SEATS, AND THE SIGHT LINE CLEARANCE, ARE THE SAME FOR BOTH DIAGRAMS. NEITHER DIAGRAM IS DRAWN TO SCALE.

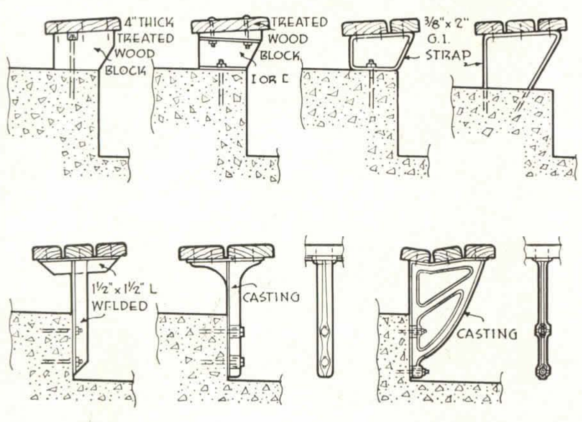
CURVED SEAT SECTION
PROVIDES A COMMON FOCAL POINT FOR EACH SEAT.



NOTE — SINCE EACH RISER IS GREATER THAN THE ONE BELOW IT, THEIR TOP EDGES FORM A CURVED LINE.

STADIA: SEATING DESIGN – 1

$\frac{d}{t}$	S	$\frac{d}{t}$	S	$\frac{d}{t}$	S
1	0.0000	36	4.1468	71	4.8328
2	1.0000	37	4.1746	72	4.8469
3	1.5000	38	4.2016	73	4.8608
4	1.8333	39	4.2279	74	4.8745
5	2.0833	40	4.2535	75	4.8880
6	2.2833	41	4.2785	76	4.9014
7	2.4500	42	4.3029	77	4.9145
8	2.5929	43	4.3267	78	4.9275
9	2.7179	44	4.3500	79	4.9403
10	2.8290	45	4.3727	80	4.9530
11	2.9290	46	4.3949	81	4.9655
12	3.0199	47	4.4167	82	4.9778
13	3.1032	48	4.4380	83	4.9900
14	3.1801	49	4.4588	84	5.0021
15	3.2516	50	4.4792	85	5.0140
16	3.3182	51	4.4992	86	5.0257
17	3.3807	52	4.5188	87	5.0374
18	3.4396	53	4.5380	88	5.0489
19	3.4951	54	4.5569	89	5.0602
20	3.5477	55	4.5754	90	5.0715
21	3.5977	56	4.5936	91	5.0826
22	3.6454	57	4.6115	92	5.0936
23	3.6908	58	4.6290	93	5.1044
24	3.7343	59	4.6463	94	5.1152
25	3.7760	60	4.6632	95	5.1258
26	3.8160	61	4.6799	96	5.1363
27	3.8544	62	4.6963	97	5.1468
28	3.8915	63	4.7124	98	5.1571
29	3.9272	64	4.7283	99	5.1673
30	3.9617	65	4.7439	100	5.1774
31	3.9950	66	4.7593	101	5.1874
32	4.0272	67	4.7744	102	5.1973
33	4.0585	68	4.7894	103	5.2071
34	4.0888	69	4.8041	104	5.2168
35	4.1182	70	4.8186	105	5.2264



TYPICAL SEATS AND SEAT SUPPORTS

SCALE ½"=1'-0"

NOTE – DETAILS SHOWN ABOVE ARE IN COMMON USE BUT MANY OTHER DESIGNS ARE EQUALLY AS ACCEPTABLE. THE FIRST TWO UPPER LEFT DETAILS ARE APPLICABLE ONLY TO RELATIVELY HIGH RISERS

Straight section need be checked for sight lines from top seats only, as these have the poorest view. In this case, the relation between horizontal distance from seat to focal point d, height of eye above focal point e, width of tread t, height of riser r, and clearance c is represented by the formula:

$$\frac{d}{c} = \frac{t}{r - c}$$

Curved section. Relation of the various factors is represented by the formula:

$$e_n = d_n \left[\frac{e_1}{d_1} + \frac{c}{t} (S_n - S_1) \right]$$

in which e_n = *elevation above focal point of eye of spectator in row n.*

e_1 = *elevation above focal point of eye of spectator in row 1.*

d_n = *distance from focal point to row n.*

c = *clearance between successive sight lines.*

t = *width of tread.*

S_1 and S_n = *values from table corresponding to* $\frac{d_1}{t}$ *and* $\frac{d_n}{t}$.

For simplicity the value of d_1 should be an exact multiple of t. As an example of the use of this formula, assume that it is desired to design a grandstand with a common focal point. Assume the factors:

$$e_1 = 6 \text{ ft.},\ d_1 = 32 \text{ ft.},\ c = 0.25 \text{ ft.},\ t = 2 \text{ ft.}$$

Then the formula becomes

$$e_n = d_n \left[\frac{6}{32} + \frac{0.25}{2} (S_n - 3.3182) \right]$$

which can be simplified to

$$e_n = d_n\,(0.125 S_n - 0.2273)$$

for these specific conditions. For the last row

$$d_n = 78;\ \frac{d_n}{t} = 39;$$

from the table,

$$S_n = 4.2279;$$

and the formula gives

$$e_n = 23.494$$

which is the distance above the focal point of eye of spectator in the last row. Elevation of tread for this spectator is thus 23.49 — 4.0 = 19.49 ft. The elevation of each row is obtained similarly. To provide this curved seating section requires that each riser be slightly higher than the preceding one. Few grandstands have been built to the theoretical curve but a number have been constructed with a series of straight sections which approximate the theoretical curve. This is obtained by increasing the height of riser for succeeding groups of 5 to 10 rows rather than for each row. This greatly reduces the construction difficulties involved in the use of variable riser heights. Such a plan is recommended for structures containing more than about 25 rows of seats and may be used in smaller structures.

Treads and risers for grandstand seats should be as small as possible for economy but sufficient for comfort and good view. Width of treads may be from 24 to 30 in. Width of 26 in. provides reasonable comfort and is probably satisfactory for average cases. When seats with fixed backs are used, tread should be at least 30 in. Where there is much movement of spectators during the program, as at race tracks, wider treads are required than when spectators remain in their seats. First tread should be wide enough to provide 18 in. between front edge of seat and wall or rail. Distance between back of last seat and rear wall need not be more than 6 in. unless a transverse aisle is provided here. Riser heights may vary from 6 to 18 in. Risers in small stands usually are from 9 to 14 in.

Seats. Space allowed for each seat, lengthwise in the row, is generally between 17 and 18½ in. Width of seats may be varied slightly to provide for varying lengths of rows caused by entrance-ways, aisles, etc. Height of seat from floor should be approximately 18 in.