PROGRESSIVE ARCHITECTURE

PENCIL POINTS

RAILROAD DORMITORIES

HOUSES

DAYLIGHTING

FEBRUARY 1946

Jenkins PRACTICAL PIPING LAYOUTS 7

How to Plan FUEL OIL PREHEATER AND PUMP CONNECTIONS

Another in the series of basic Piping Layouts prepared by Jenkins Bros.

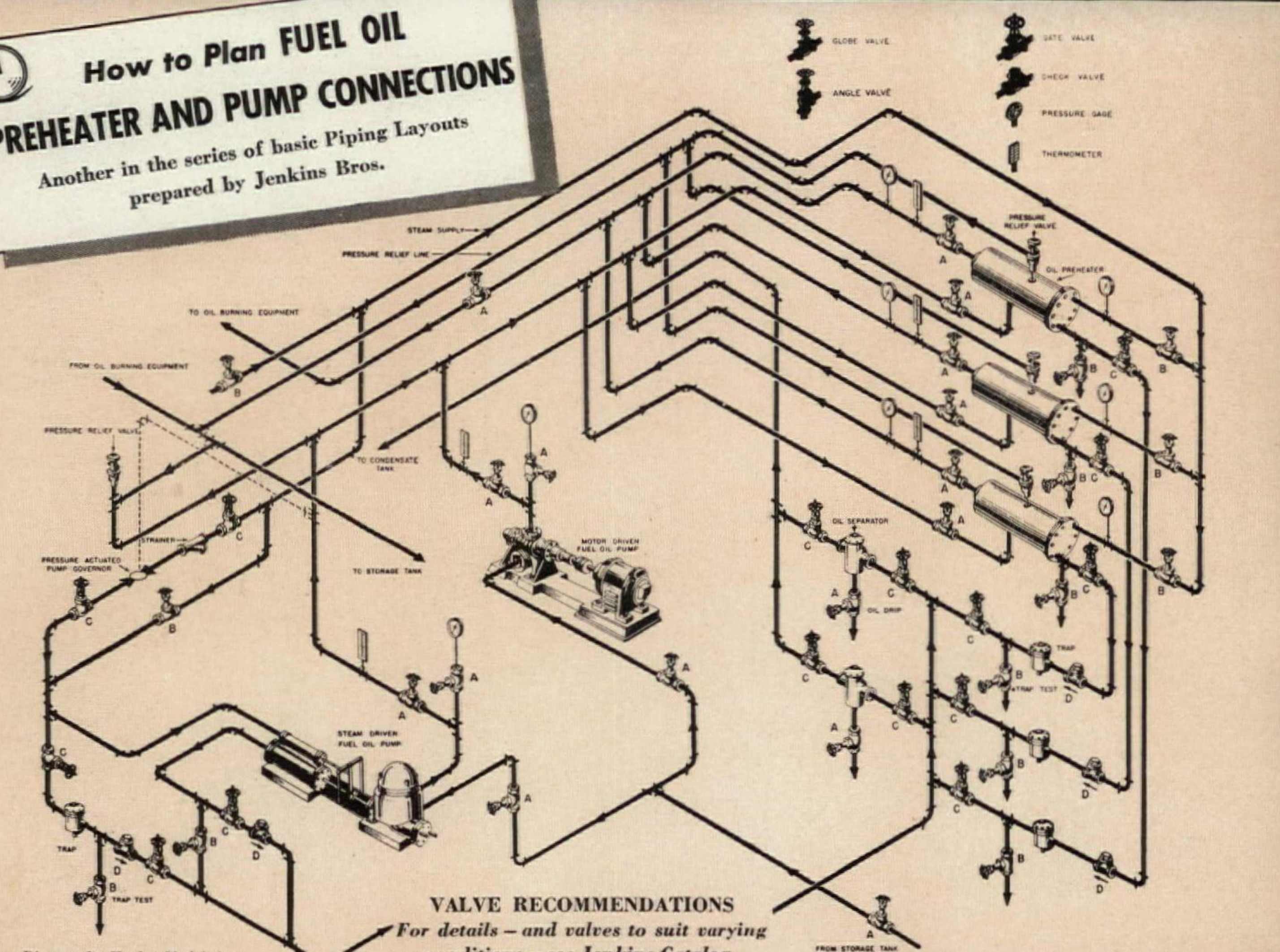

Diagram by Huxley Madeheim, Consulting Engineer

VALVE RECOMMENDATIONS

For details – and valves to suit varying conditions – see Jenkins Catalog.

Code	Quan.	Jenkins Valves	Service
A	16	Fig. 970 Regrind-Renew Br. Globe	Oil Lines
B	13	Fig. 950 Regrinding Br. Globe	Steam Lines
C	15	Fig. 275 O.S.&Y. Br. Gate	Steam Lines
D	5	Fig. 92 Bronze Swing Check	Steam Lines

Preheaters and Pumps are necessary for conditioning fuel oil for furnaces used for heating or power.

Continuous Circulation to and from the burners is provided in this layout showing preheaters and pumps in lines originating at, and returning to the storage tanks.

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Any Two Preheaters of the three provided have sufficient capacity to heat the maximum demand of fuel oil, thus allowing the shut down of one for repairs.

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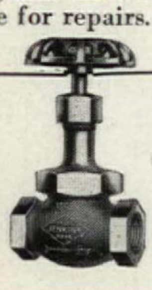

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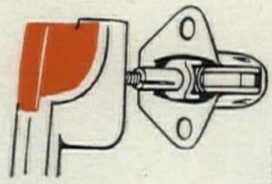

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PROGRESSIVE
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PENCIL POINTS

WE'RE BETTING ON THE

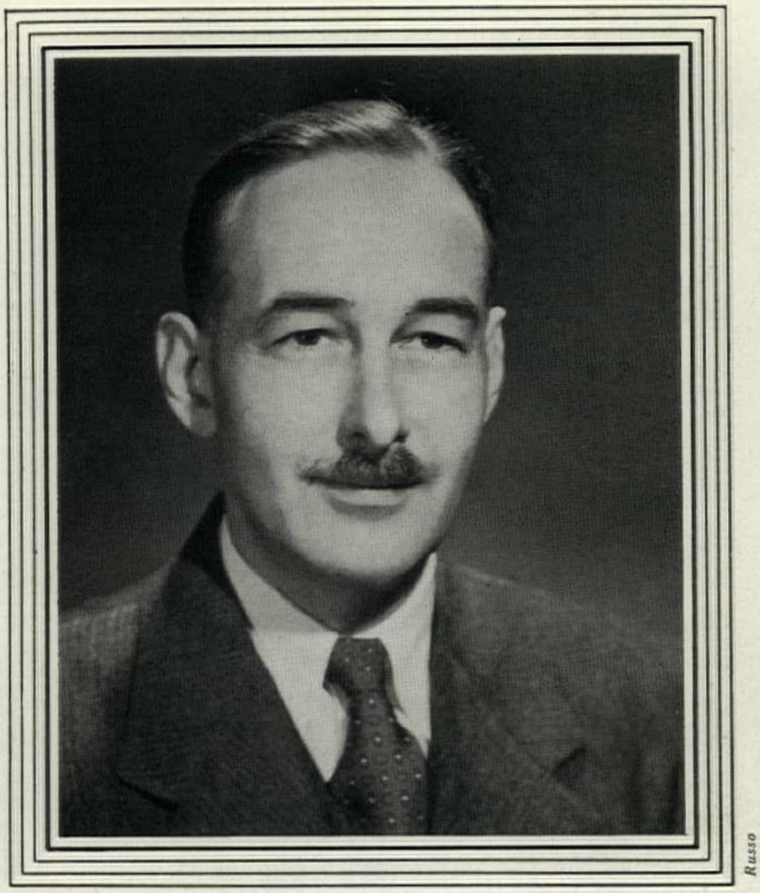
It is impossible for any thoughtful person to survey the world, or our own country, or even our own profession, at the turn of this year and get from his observations any great feeling of satisfaction. Things look pretty bad.

In our own field—that of architecture and building—there are several serious situations. High prices, material shortages, strikes and the threat of strikes, black market operations, and scarcities of specialized manufacturing and building labor are holding up the actual execution of many projects that are otherwise ready to go ahead. The army demobilization policy (which might have been intelligently integrated with the needs of the national economy, but was not) has been allowed to bog down, with the result that a lot of men badly needed in special civilian pursuits like architecture are being held in uniform while others are prematurely let loose into a civilian life that is not yet ready to absorb them. The acute housing shortage, which was foreseen by many architects and planners four or five years ago and should have been provided against then, is now embarrassing many cities and causing a wild search for emergency expedients to relieve it. Surely there is trouble both here and ahead.

Yet we have enough confidence in the underlying common sense and organizing ability of the American people and their leaders to make us believe that the difficulties will be straightened out without an unbearable amount of dislocation and suffering. It won't be altogether an easy process: there are no "snap" solutions to these problems. They will require the patient, persistent efforts of men of good will to pull things together and counteract the disruptive forces that V-J Day set loose.

This magazine has often iterated its faith in the future and in the destiny of the professions entrusted with the planning of tomorrow's human en-

FUTURE!



Russo

THOMAS H. CREIGHTON

Born Philadelphia, Pennsylvania, 1904. Education: public schools, Albany Academy, Harvard College, Beaux-Arts Institute of Design. Employed, after schooling, in several well known offices in various states as designer, project manager. Had own office for a time which was given up to become assistant senior architect, Department of Hospitals, New York City. Lately an associate in the firm of Alfred Hopkins and Associates. Registered architect, New York State, associate member American Hospital Association, member American Institute of Architects. Author of numerous magazine articles and book, "Planning to Build."

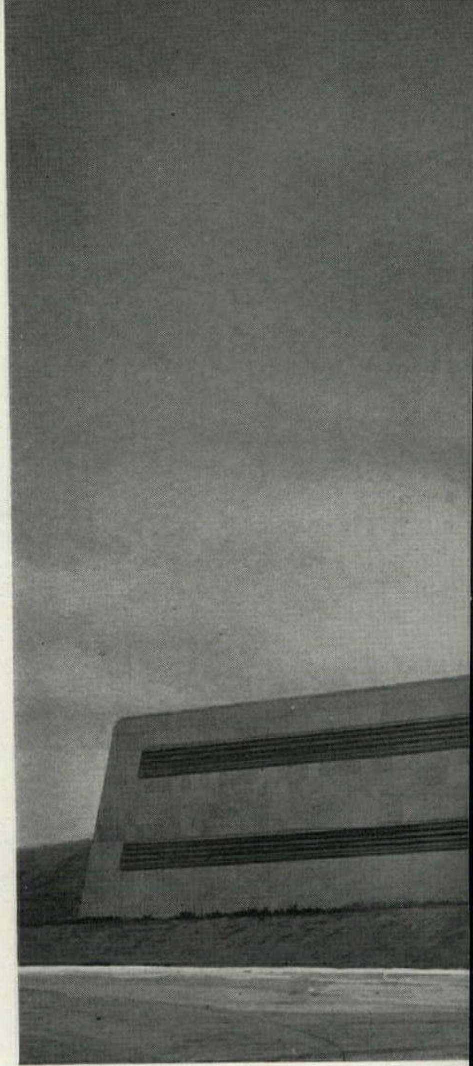
ironment. We shall continue to serve to the limit of our ability the men esponsible for the design of the better building and physical arrangeents that an expanding society requires. We shall continue to look orward and to encourage the growth of progressive architectural design. fore specifically, we shall undertake to provide our readers with an icreasing flow of timely, accurate, and reliable architectural and techical data, designed to keep them informed of significant developments the art and craft of building.

line with this policy, we announce with pleasure and pride the addion to our already energetic and able editorial staff of a new member ho brings us fresh strength, enthusiasm, and mature understanding of e practical problems of the architectural world. He is Thomas H. reighton, A.I.A., who is already known to many of our readers through ritings that have appeared in these pages and elsewhere. We have ersuaded him that the opportunity to serve the field of architecture rough this magazine will in the years to come be in many ways a ewarding one. Since he firmly believes in the philosophies of design which we have dedicated ourselves, he has been willing to leave a accessful and potentially lucrative career in architectural practice to in forces with us. He will act as Executive Editor and will undertake e administrative responsibilities of the editorial department. We expect at he will add substantially to our ability to serve this field and we elcome him as friend and associate.

Kenneth Reid

2 DORMITORIES FOR RAILROAD MEN

One of the most satisfying things about progressive architecture is the flexibility it has demonstrated time and again in finding design solutions for new human problems or ones for which only the most makeshift answers have heretofore been offered. In the dormitories presented here, built during the war for the Pennsylvania Railroad, we find not only a new answer to an old problem, but a new building type that reflects the intention of at least one important company to further its employer-employee relations. Not the least encouraging aspect of these buildings is the indication they give of numberless other human needs that await only the recognition of the problem by those in charge and the progressive designer's diagnosis.



Photographs by Robert Damora

MURPHY, QUIGLEY & CO., General Contractors
PETER STROBLE, Consulting Engineer
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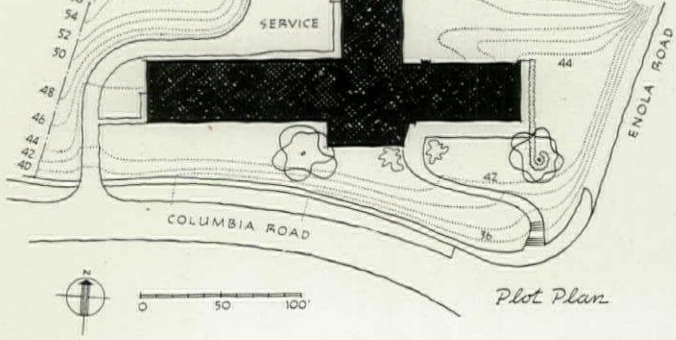
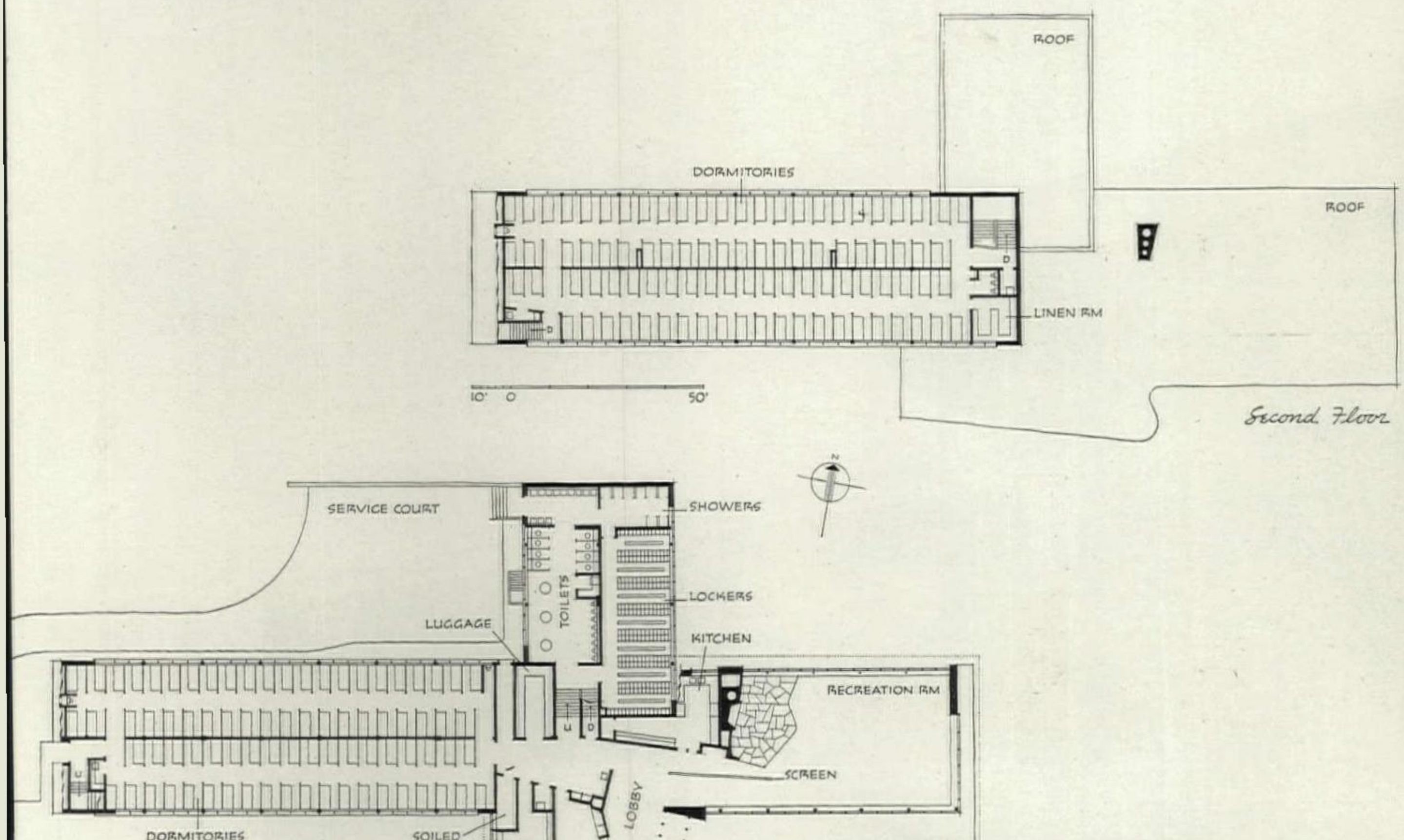
1 ... DORMITORY AT ENOLA, PA.

LESTER C. TICHY, Architect



Plot Plan

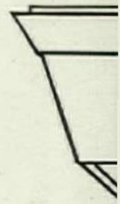
The dormitory at Enola (like the one at Reily St., Harrisburg; see page 54) was designed and built to provide neat, quiet, comfortable sleeping accommodations and a lounge for railroad men who find themselves after a day's work at the end of a run many miles from home. Heretofore, the only available accommodations have been local rooming houses or casual provisions in railroad shop buildings. The Enola dormitory, with space for 169, is for the use of men who work on freight trains. In plan, the sleeping accommodations, recreation area, and sanitary conveniences are clearly defined.

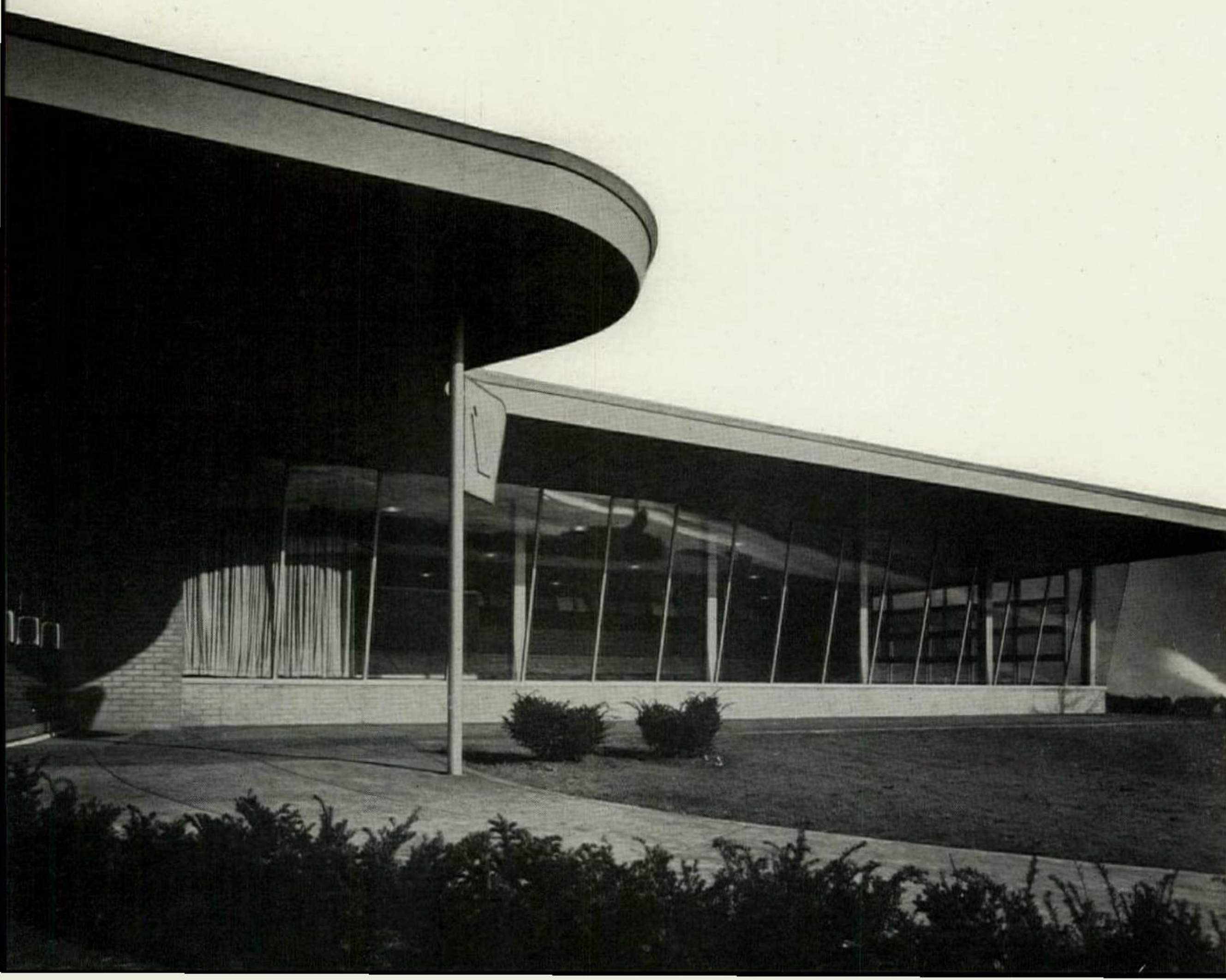

ROOF
DORMITORIES
ROOF
LINEN RM
10' 0 50'
Second Floor
SERVICE COURT
SHOWERS
LOCKERS
TOILETS
LUGGAGE
KITCHEN
RECREATION RM
SCREEN
LOBBY
DORMITORIES
SOILED LINEN
LINEN
OFFICE
Ground Floor

1 . . . DORMITORY AT ENOLA

LESTER C. TICHY, Architect

The outsloping wall of the lounge at Enola reflects the fact that the building is on a hilltop with a wide-spread view to the southwest. A guiding principle in the selection of materials—and, hence, a considerable factor in the character of the finished design—was that the building be able to stand hard wear. In general character, the wish was to provide an atmosphere that, while comfortable, should be sufficiently austere so that it would prompt the users to respect the property and keep it orderly. Selection of hard, permanent materials is the result, and there is a rather Spartan simplicity to the design that discourages a feet-on-the-table approach to life. That the buildings were built at all during the war is a tribute to the war work that the railroads handled; a Government priority placed the jobs in the essential class. Even so, the architect tells us, "the trials and tribulations in obtaining adequate materials were at times almost insurmountable."

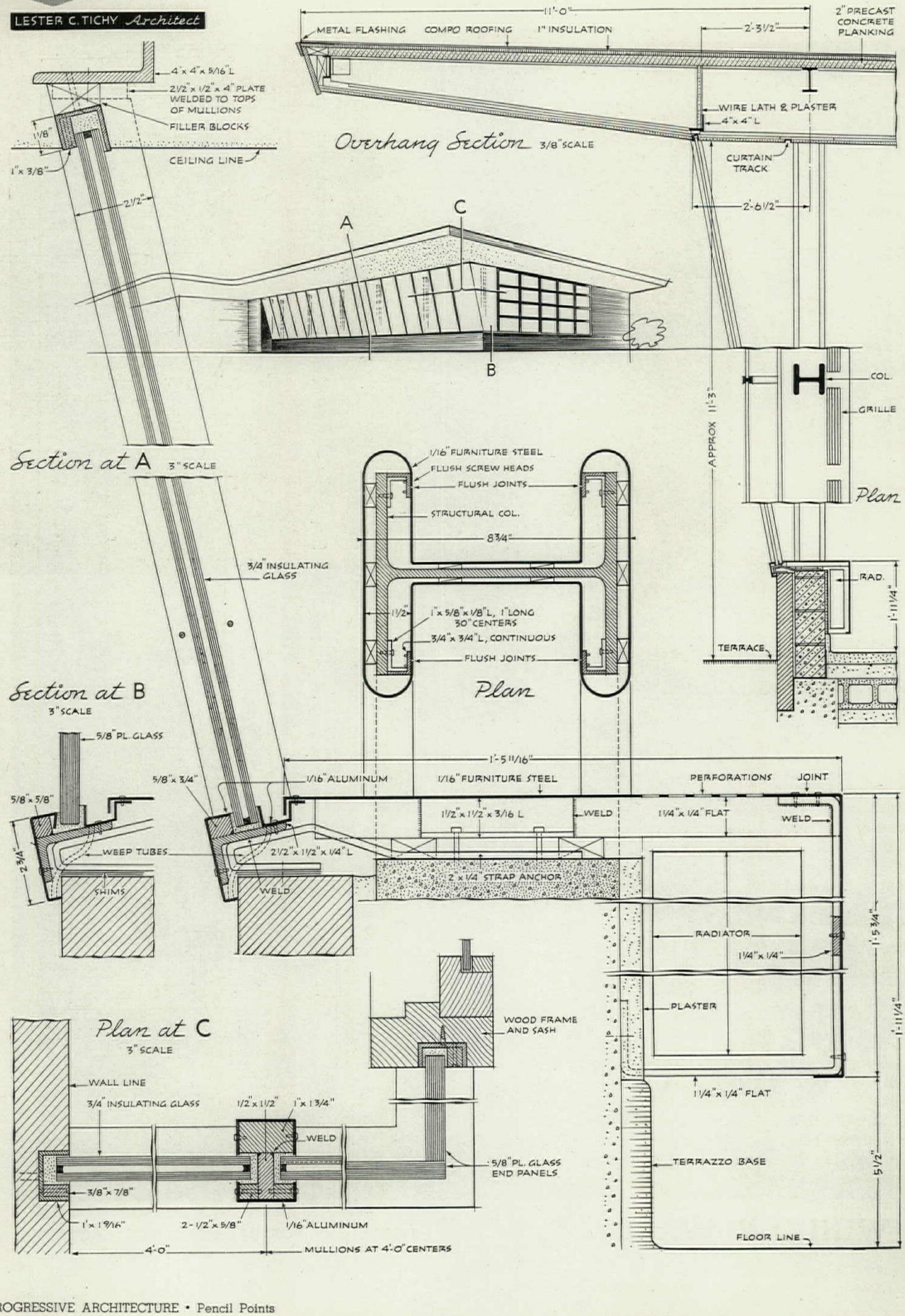


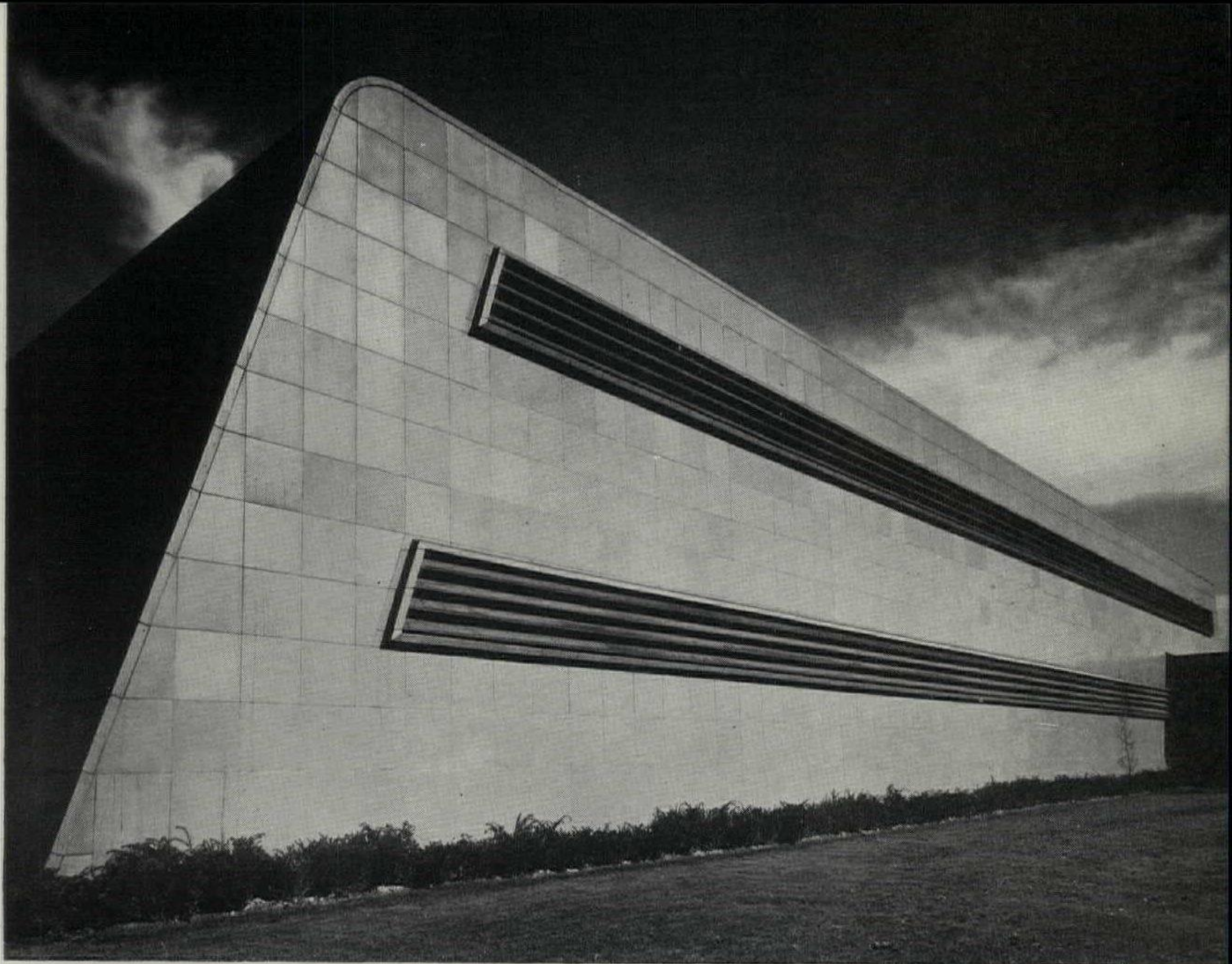


WINDOW WALL

DORMITORY FOR RAILROAD MEN, ENOLA, PA.

LESTER C. TICHY *Architect*





CONTINUOUS LOUVERS shield the window areas of the dormitory block.

1 . . . DORMITORY AT ENOLA

LESTER C. TICHY, Architect

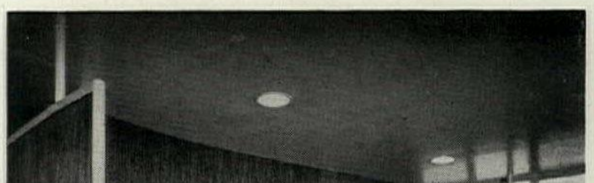
Since train schedules require that the buildings be used at any time of the day or night, the dormitories had to be contrived so that even at midday they would be dimly lighted yet airy—a design problem that resulted in a wall section wherein the window and ventilating bands are shielded on the outside by continuous, light-obscuring louvers.

The slope of the site was put to use by placing the locker-and-washroom wing a half story above the first floor. Thus, these rooms serve both sleeping floors, and sizable economies were gained by the fact that the facilities did not have to be duplicated. Framed in steel, the building is finished on the outside with salmon-red brick (around the lounge area and washroom wing) and neutral green-blue terra cotta (on the dormitory mass). The sloping end wall of the latter is a design element that the architect introduced because he felt it looked better that way. On studying the plan facilities within this wall, there seems to be no functional reason for this device.

The building is heated by a coal-fired hot-water system, and natural ventilation is assisted by forced air recirculation.

THE WASHROOM WING (left) occurs halfway between main floor levels.

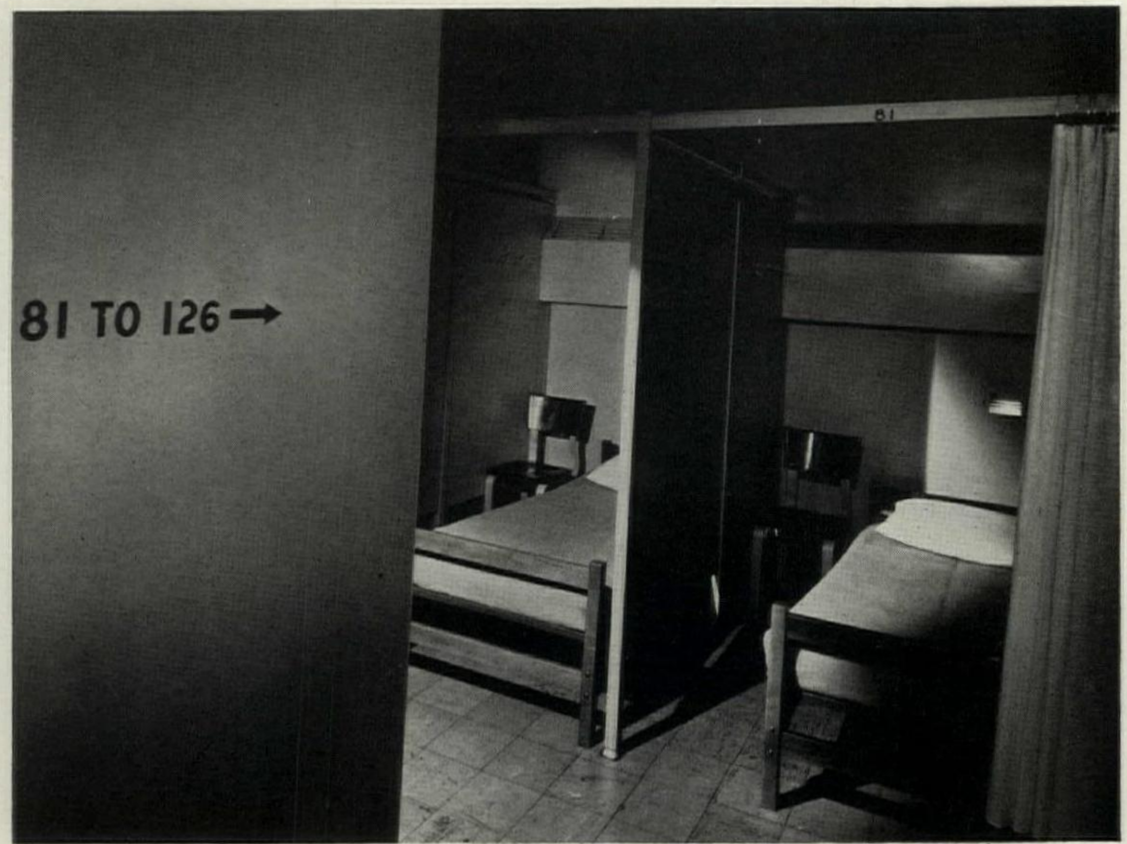
The lounge itself is purposely kept as simple as possible; no movable objects such as bric-a-brac or plug-in lamps are used; breakage is thus avoided, and maintenance enhanced. The floors are a cream-toned terrazzo with flagstone in front of the fireplace; red brick and a yellow-painted ceiling add color interest, and the dark Bubingia wood veneer on the screen and around the fireplace provides a degree of texture and warmth to the scheme. The lounge chairs are upholstered in red and green leather. A kitchen, equipped with refrigerator storage space, allows the men to prepare short-order meals for themselves. The railroad supplies silver, china, and glassware.



THE FIREPLACE CORNER.

1 . . . DORMITORY AT ENOLA

LESTER C. TICHY, Architect

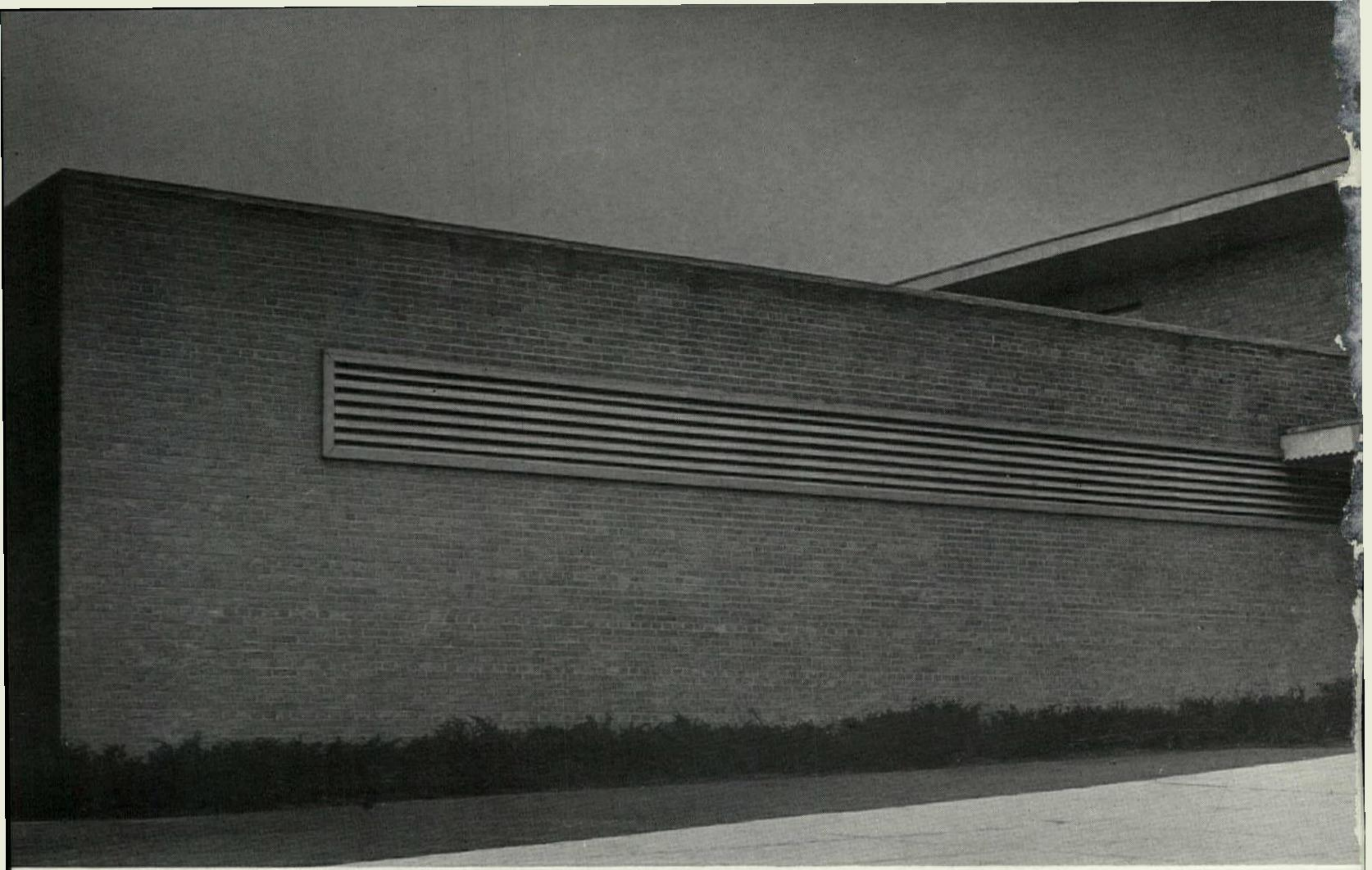


TYPICAL DORMITORY SPACE—metal partitions, asphalt tile floors, plaster walls and ceiling.

The usual use-routine is for a man to come to the dormitory, deposit 25 cents for a locker key (returned on leaving), be assigned a cubicle, undress, wash, and let the attendant know the hour he wishes to be called. The lounge is used between times or by men who have just a brief stopover.

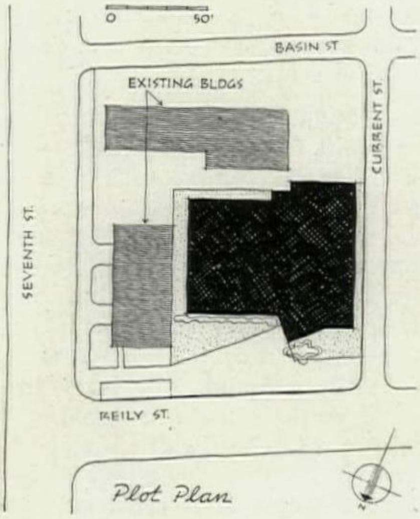
In the design of the sleeping rooms, important factors were permanence and ease of maintenance—resulting, again, in selection of comparatively hard materials—metal partitions, asphalt tile floors, plaster walls and ceilings. The problem of quiet is one that more or less solves itself, however. In plan, the dormitory is separated from the rest of the building by a row of service rooms and pairs of doors; in addition, lighting in the rooms is a subdued blue which suggests quiet, and finally—though not least important—the men who come here are tired. A louvered reading light occurs in the wall above each bed. An attendant removes the used linen and makes up the bed fresh before the cubicle is reissued.

WASHROOM DETAIL.



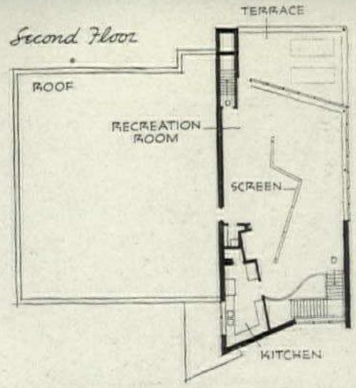
2 DORMITORIES FOR RAILROAD MEN

2 . . . DORMITORY AT REILY STREET, HARRISBURG, PA

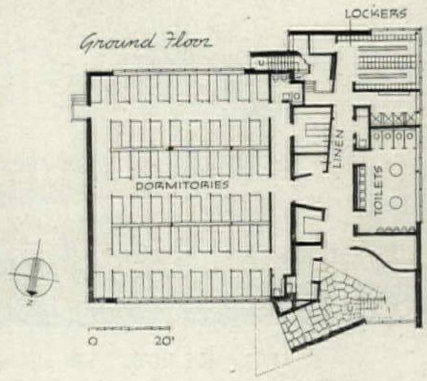


In the design of the Reily Street Dormitory, the basic problem was very similar to that presented at Enola—away-from-home sleeping quarters and recreation space for Pennsylvania Railroad workers. In detail, however, there are several differences. The site at Reily Street is a crowded in-town lot instead of an open hilltop, and, while the Enola dormitory is for freight-train crews, the Reily Street building is for passenger-train employees—conductors, brakemen, etc. Furthermore, the building is much smaller than that at Enola. Accommodations were needed here for only 50.

A study of the plans across page shows the same careful separation between the three major areas that maintains in the larger building—the dormitory room set apart from the public space by a passageway and a series of service and storage rooms, and the locker and washrooms related to yet distinct from both of these. Site limitations required a two-story scheme, and the lounge is located on the upper level.



THE SLOPE OF THE GLASS WALL of the second-story lounge makes it face due south.

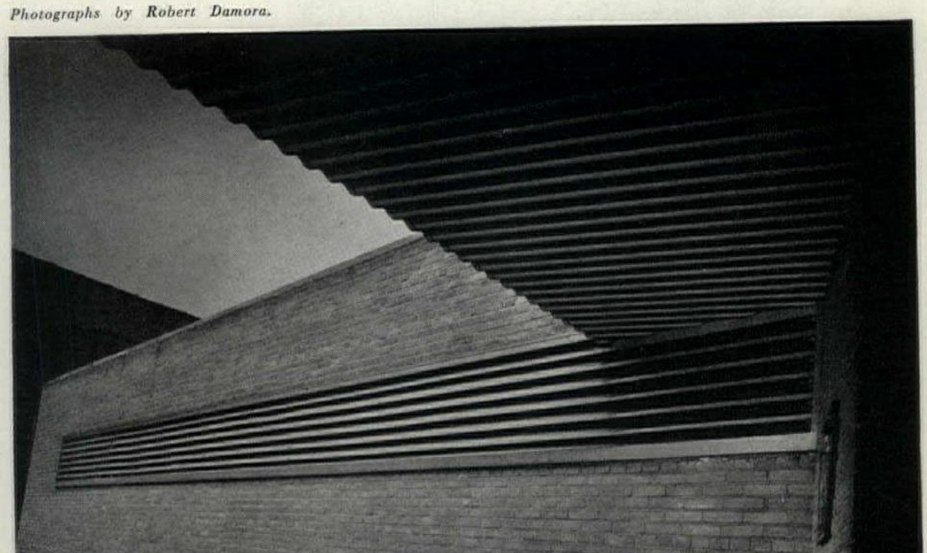


ON THE FIRST FLOOR, the entrance hall, a row of service rooms, and a passage hall separate the dormitory from the rest of the building.

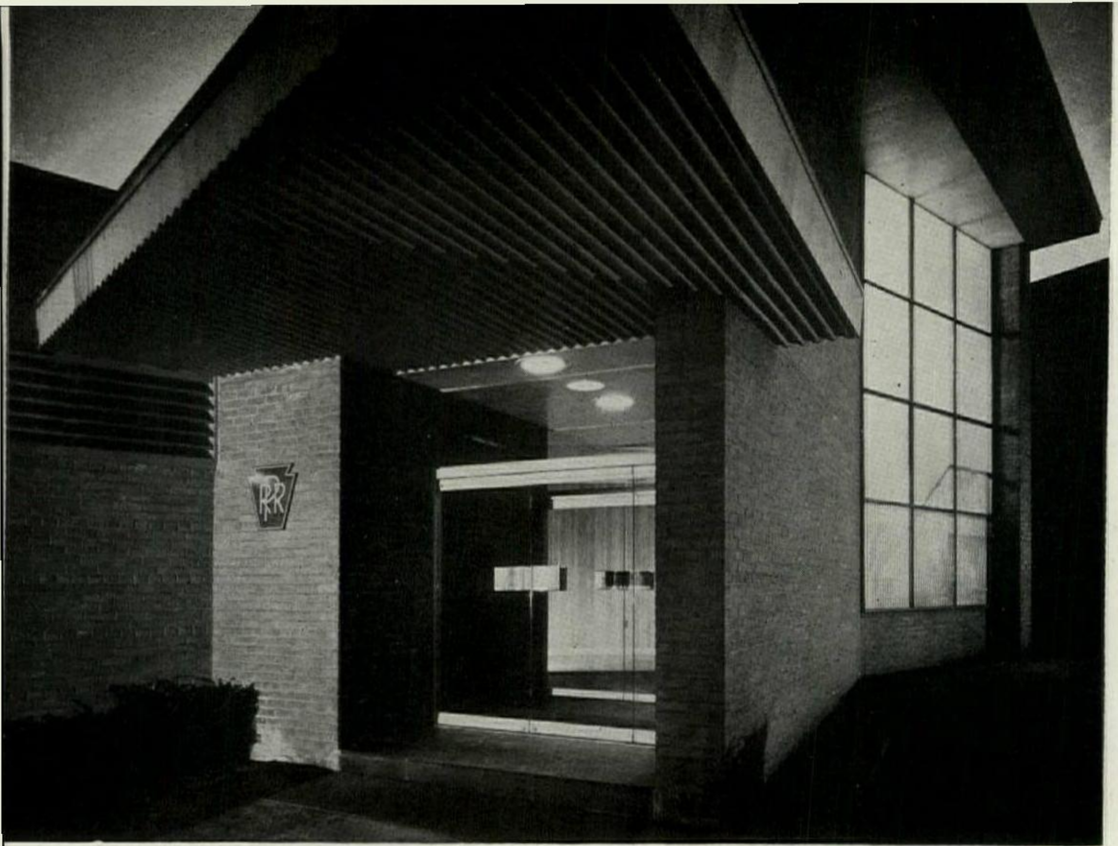
Photographs by Robert Damora.

ESTER C. TICHY, Architect

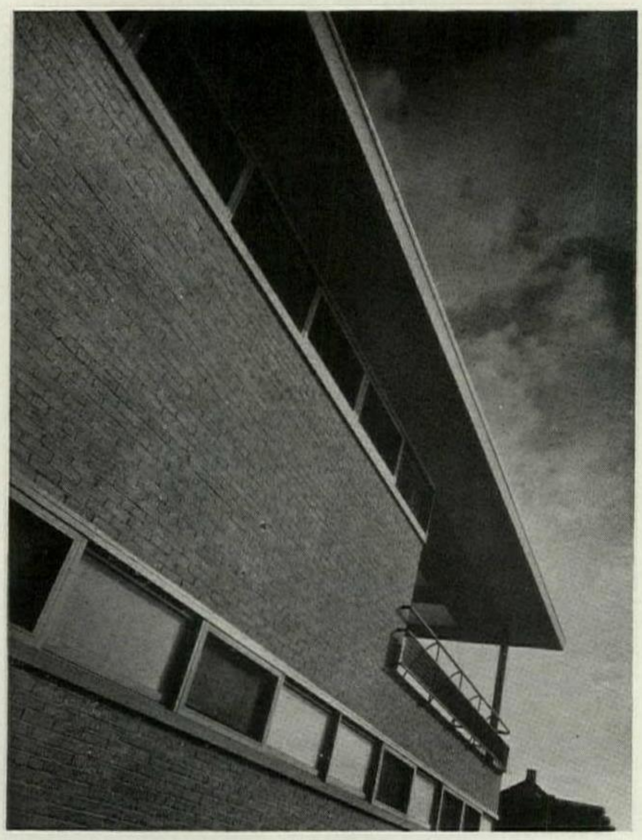
URPHY, QUIGLEY & CO., General Contractors
ETER STROBLE, Consulting Engineer
OHLPART & HART, Mechanical Engineers



A CONTINUOUS LOUVER outside the dormitory is both a light baffle and a ventilating device.



ENTRANCE DOORS, with dormitory wing at left and tall stair-hall window at right.



DETAIL SHOT looking up toward the second-story porch. See selected detail (page 62) of the porch railing.

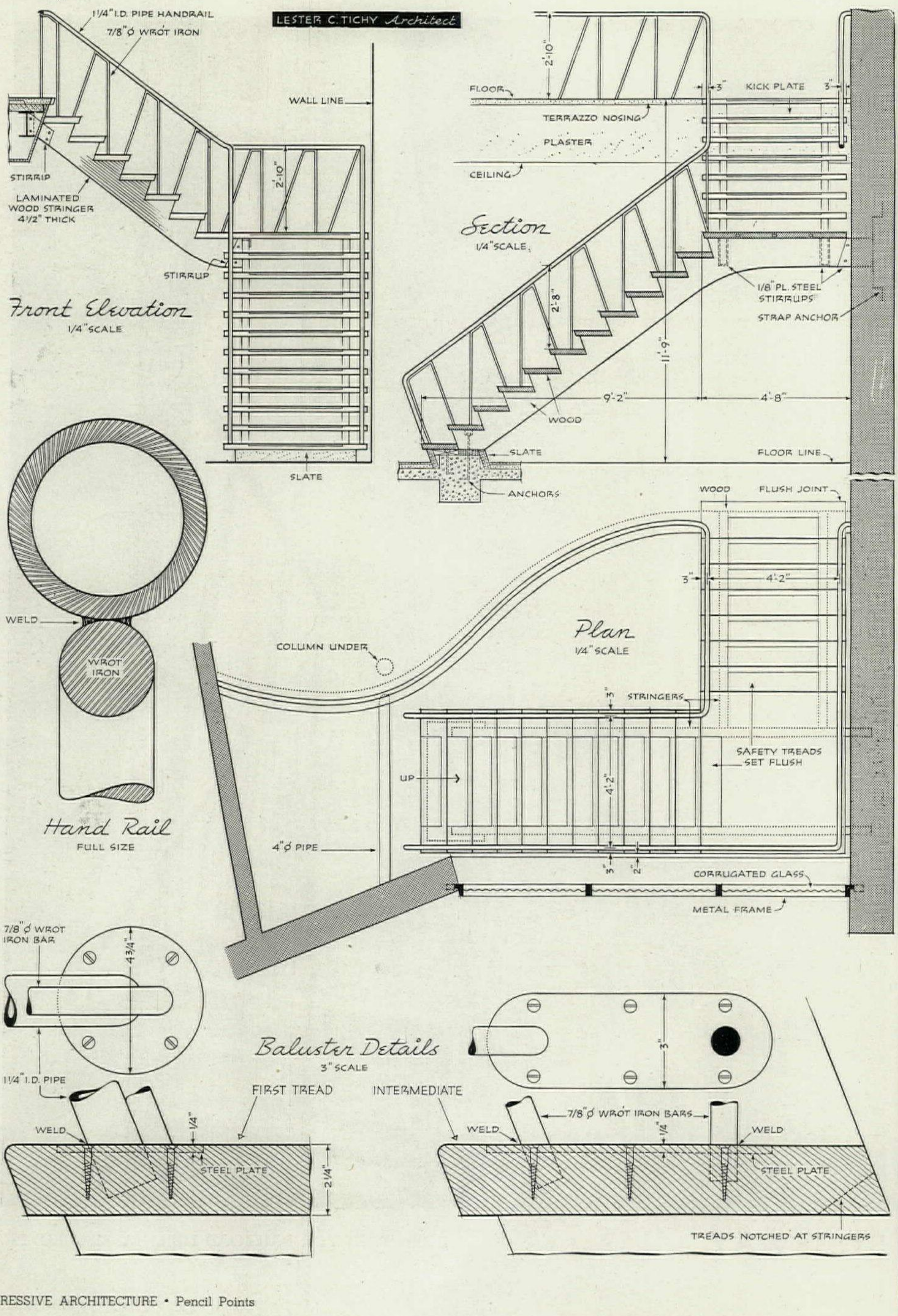
2 . . . DORMITORY AT HARRISBURG

LESTER C. TICHY, Architect

The tempered-glass entrance doors to the building are arranged at an angle to face the usual path of approach. Both of the dormitories are so located that they are but a few minutes' walk from the place where the men leave their trains. The underside of the marquee is surfaced with corrugated asbestos, recalling the horizontal lines of the louvers outside the dormitory windows. Construction is a combination of a light, structural steel system and masonry. Exterior walls are of brick with terra cotta tile backup. Both inside and out, materials were chosen for their durability and for the simplest possible maintenance.

STAIRWAY

DORMITORY FOR RAILROAD MEN, HARRISBURG, PA.


LESTER C. TICHY Architect
1 1/4" I.D. PIPE HANDRAIL
7/8" ø WROT IRON
WALL LINE
2'-10"
STIRRIP
LAMINATED WOOD STRINGER 4 1/2" THICK
STIRRUP
Front Elevation
1/4" SCALE
SLATE
FLOOR
2'-10"
3"
KICK PLATE
3"
TERRAZZO NOSING
PLASTER
CEILING
Section
1/4" SCALE
2'-8"
1/8" PL. STEEL STIRRUPS
STRAP ANCHOR
11'-9"
9'-2"
4'-8"
WOOD
SLATE
FLOOR LINE
ANCHORS
WELD
WROT IRON
Hand Rail
FULL SIZE
WOOD
FLUSH JOINT
3"
4'-2"
Plan
1/4" SCALE
COLUMN UNDER
3"
STRINGERS
SAFETY TREADS SET FLUSH
UP
4'-2"
4" ø PIPE
3"
2"
CORRUGATED GLASS
METAL FRAME
7/8" ø WROT IRON BAR
4 3/4
1 1/4" I.D. PIPE
Baluster Details
3" SCALE
3"
FIRST TREAD
INTERMEDIATE
WELD
1/4"
STEEL PLATE
2 1/4"
7/8" ø WROT IRON BARS
WELD
1/4"
WELD
STEEL PLATE
TREADS NOTCHED AT STRINGERS

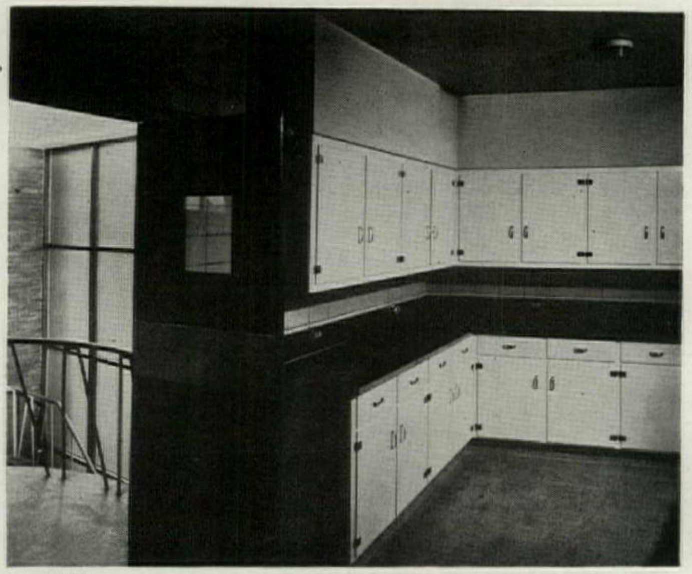
2 . . . DORMITORY AT HARRISBURG

LESTER C. TICHY, Architect

The big, full-height, corrugated-glass window adjoining the stairway floodlights the entrance lobby, the stairs, and the upstairs lounge—the stair landing being also a balcony at the end of the lounge. Along the side of the building, the outlook is hardly prepossessing, and the fenestration in this area consists simply of a series of single-light sash (some hinged and in-opening) at ceiling height. Toward the sitting porch, the wall of the lounge is largely of glass, and good daylight is admitted through two sizable rectangular openings in the porch roof.

LOOKING DOWN TOWARD THE ENTRANCE from the stairway landing. The lobby floor is partly flagstone and partly terrazzo. The ceiling, as in all of the public space, is painted a soft yellow.

LOUNGE looking toward stair landing.

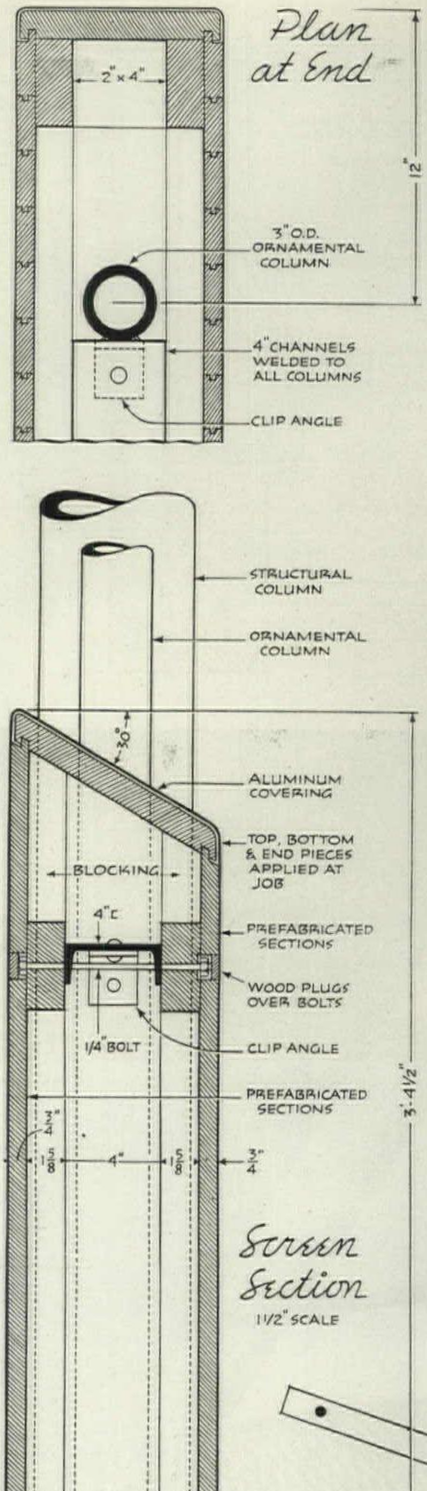


KITCHEN.

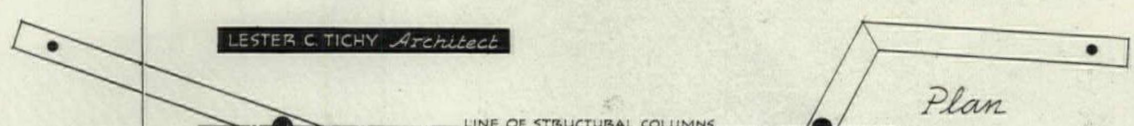
2 . . . DORMITORY AT HARRISBURG

LESTER C. TICHY, Architect

The lounge is subdivided by a low partition (see selected detail) into sitting and eating space. The top of the partition is sloped to keep it from being used as a seat. Adjoining the eating space is the kitchen, equipped with a refrigerator and storage lockers where the men may bring and check food supplies. As at Enola, the lounge is furnished with leather-upholstered lounging chairs, and the comparative severity of the permanent interior finishes is relieved by introduction of areas surfaced with wood veneer.

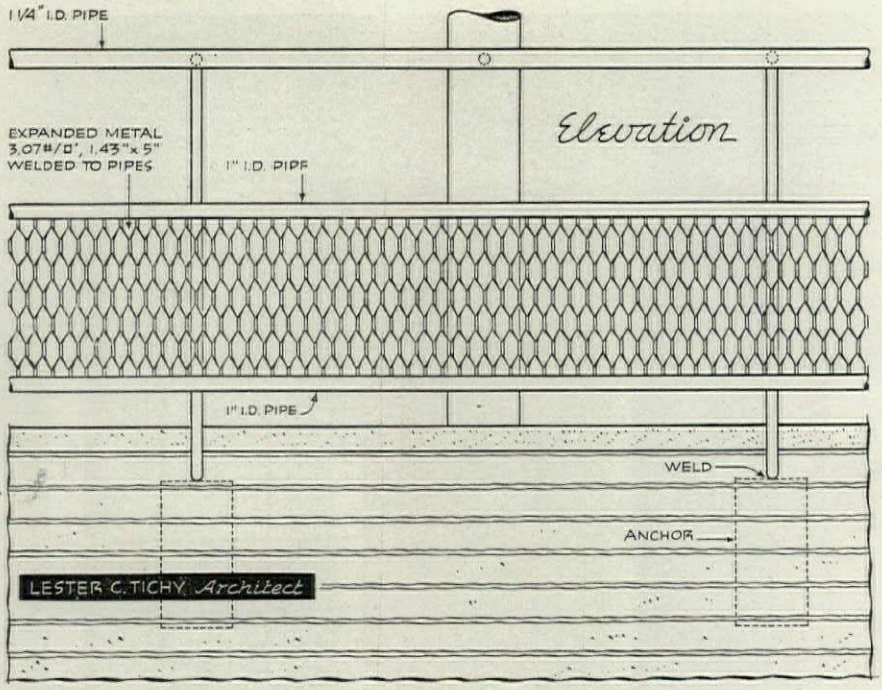


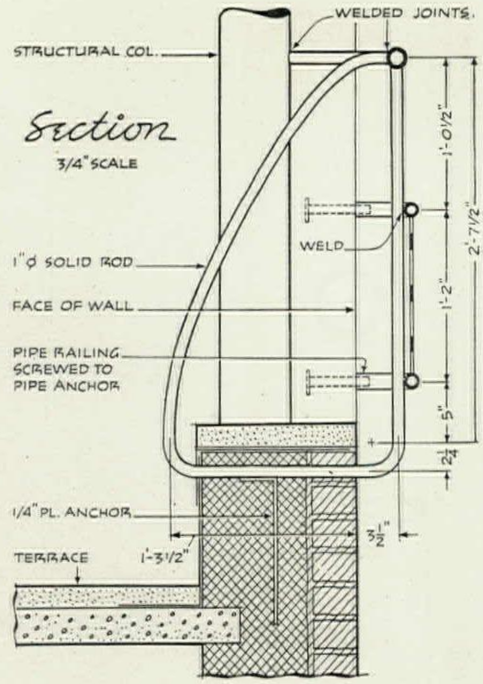
LESTER C. TICHY *Architect*



LOW PARTITION

DORMITORY FOR RAILROAD MEN, HARRISBURG, PA.





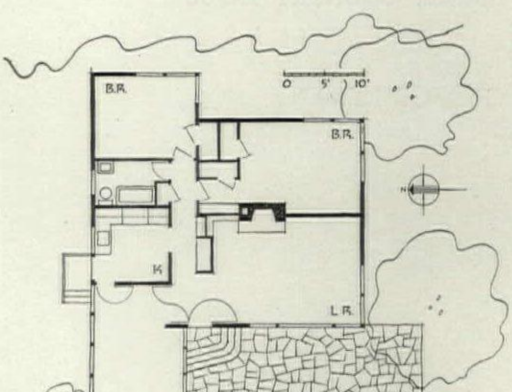
PORCH RAILING

DORMITORY FOR RAILROAD MEN, HARRISBURG, PA.

Ezra Stoller

SMALL COUNTRY HOUSE, ALPINE WOODS, N. Y.

GEORGE NEMENY, Architect



This house was built before the war, and the architect freely admits that compromises were made to gain certain mandatory appearances of tradition. In its basic planning, however, the approach is wholly of today. In addition, it achieves within a small area surprising flexibility and sense of space. Plan elements that contribute to this increased livability are the pair of "reverse swing" doors between porch and living room; the less-than-full-height storage partition separating living room from bedroom hall, and the big view window flanked by casements. A small basement occurs underneath the bathroom and the smaller of the bedrooms.

LIVING ROOM.

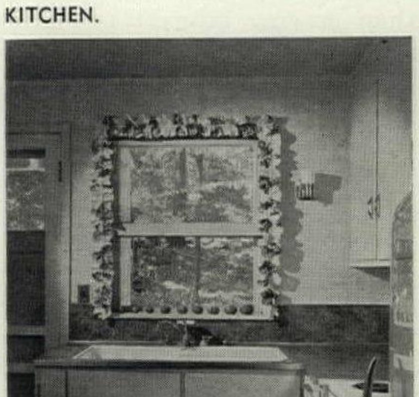
FIREPLACE. Partition wall at left.

SMALL COUNTRY HOUSE

GEORGE NEMENY, Architect

LIVING PORCH.

KITCHEN.



The doors between the living room and porch open to form one large living space; the 6-foot-high partition screening the bedroom passage makes the living room appear larger than its actual dimensions, and the long bank of windows extending around the corner includes the pleasant wooded outlook as part of the living space. All of the main rooms are cross ventilated southeast and southwest; the kitchen and bath face north. The porch opens to the south and west and is screened against the weather by windows on the north wall. Knotty pine was used for interior wall finishes to satisfy a requirement that the house should "not look too modern." It is interesting, we think, to note how the sound basic contemporary thinking shines through these incidental bows to tradition.

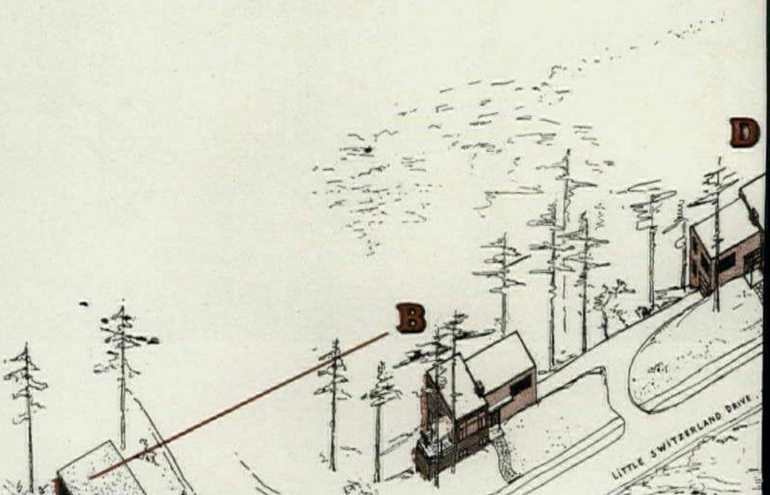
DEVELOPMENT RESTRICTED TO

LITTLE SWITZERLAND,

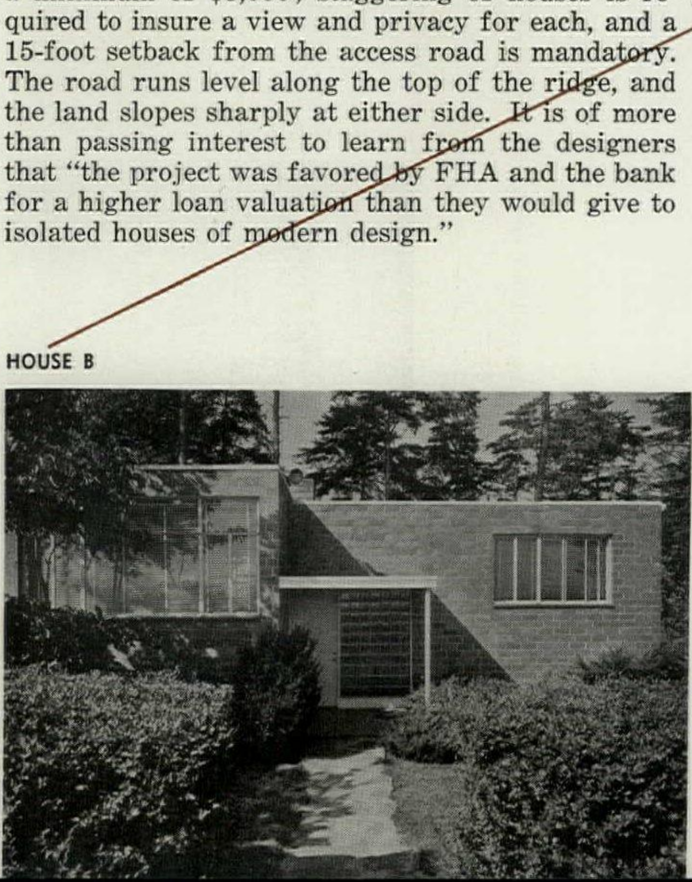
DESIGNED BY ALFRED

For most families, we believe, a good house for today is one that makes living as pleasant and free from drudgery and costly upkeep demands as possible. In our opinion, the residential designer who sincerely strives toward these goals is working in a progressive, contemporary vein. Instances of the resultant houses frequently appear in these pages. Infrequently, however, is it our fortune to find and publish an entire development designed with this approach—particularly one promoted by real estate interests wherein a restriction required that all houses should be of contemporary design. On these next several pages we present just such an exception.

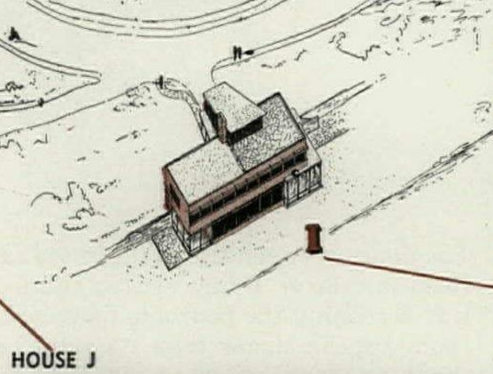
Located at the end of a high ridge of Brown's Mountain, six miles from Knoxville, this project of contemporary houses is a separate subdivision of a real estate development rather ambitiously called "Little Switzerland." It started with a group of congenial families who wished to build cooperatively and persuaded the designers to join in the venture. The latter prevailed on the realtor to make this portion of the ridge a separate unit and to establish the "contemporary design" restriction. In all, there are twenty 120′ x 240′ lots; to date, ten houses are either built or designed—all by Alfred and Jane West Clauss. Owners are assured permanent protection by clauses in the property deeds; houses must cost a minimum of \$5,000; staggering of houses is required to insure a view and privacy for each, and a 15-foot setback from the access road is mandatory. The road runs level along the top of the ridge, and the land slopes sharply at either side. It is of more than passing interest to learn from the designers that "the project was favored by FHA and the bank for a higher loan valuation than they would give to isolated houses of modern design."



HOUSE B



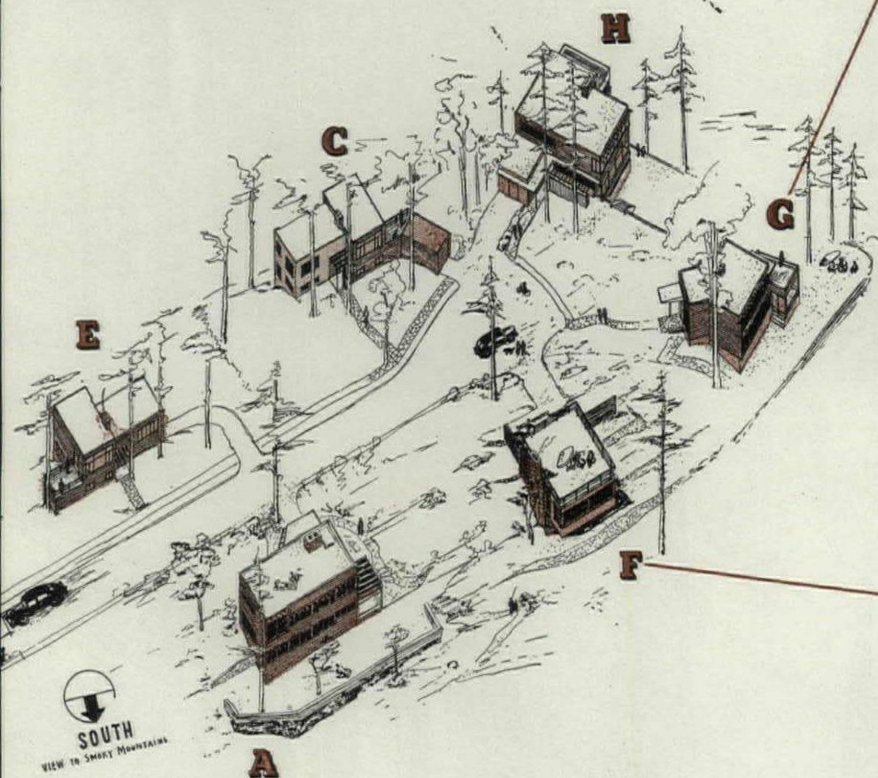
HOUSE J



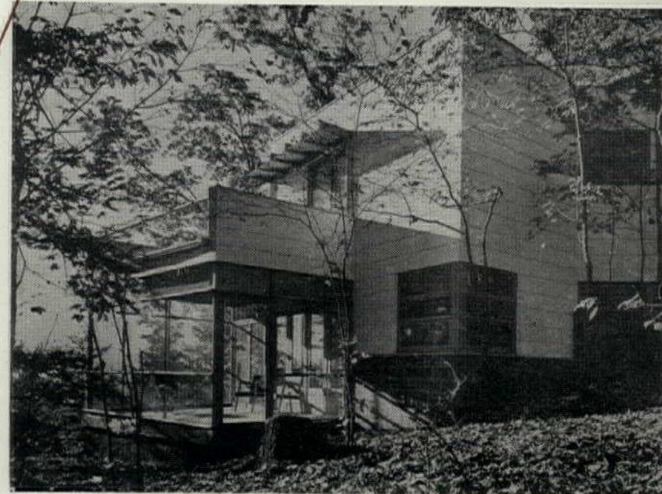
HOUSES OF CONTEMPORARY DESIGN

KNOXVILLE, TENNESSEE

and JANE WEST CLAUSS



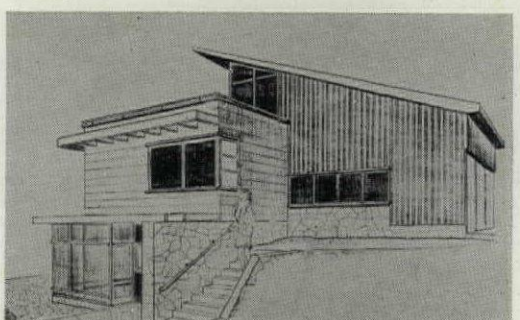
HOUSE G



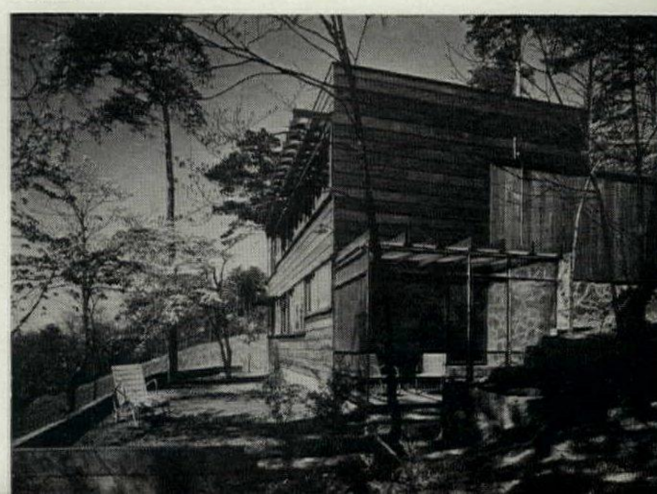
Photographs by Billy M. Glenn

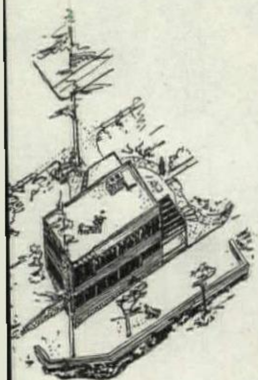
HOUSE F

HOUSE I



HOUSE A

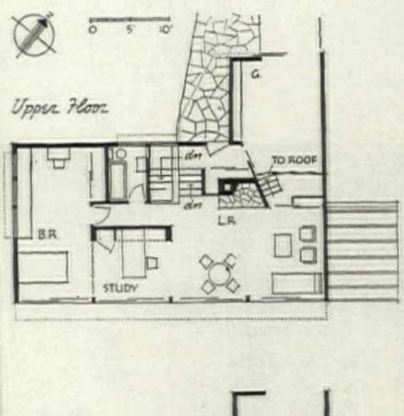


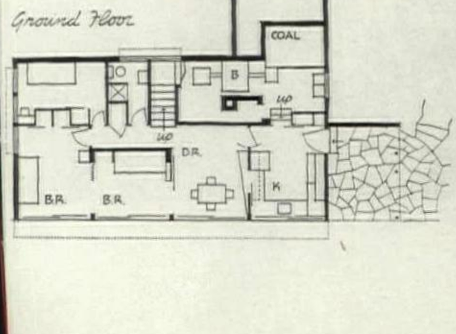


HOUSE A

LITTLE SWITZERLAND

ALFRED and JANE WEST CLAUSS

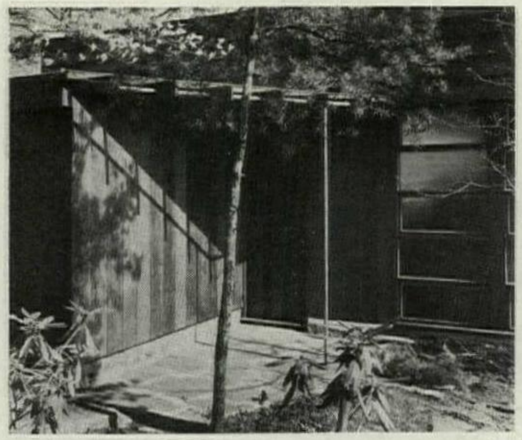




One of the most recent units of the group, this redwood house, the designers' own home, represents a culmination and refinement of planning theories and details introduced in the houses previously built (namely, B, C, D, E, and F). The living room is placed on the second floor; the kitchen and dining room are on the ground floor, and the entrance door occurs at an intermediate level. This basic scheme, an intelligent design reflection of the sloping site, also separates living activities and provides desired privacy. Sleeping space and a bathroom also occur on each level—for the same reasons.

To suit the owners' particular preferences, however, the plan of House A is considerably more open and flexible than those of the other houses at Little Switzerland. Separation between several of the rooms or use areas is accomplished by curtaining instead of partitions, and sliding panels and removable, full-height closets anticipate the probability that alternate floor arrangements may be desired in future.

The recreation deck above the garage is reached by a stair behind a sliding panel in the living room; the kitchen porch opens onto the walled terrace on the view side at ground level. The garage and workshop, planned as part of the house, are connected directly with the entrance hall. Placement of the house on the lot made an entrance drive unnecessary.



ENTRANCE DOOR.

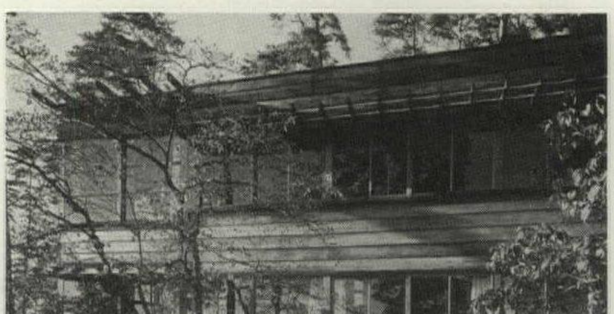
HOUSE A

LITTLE SWITZERLAND

ALFRED and JANE WEST CLAUSS

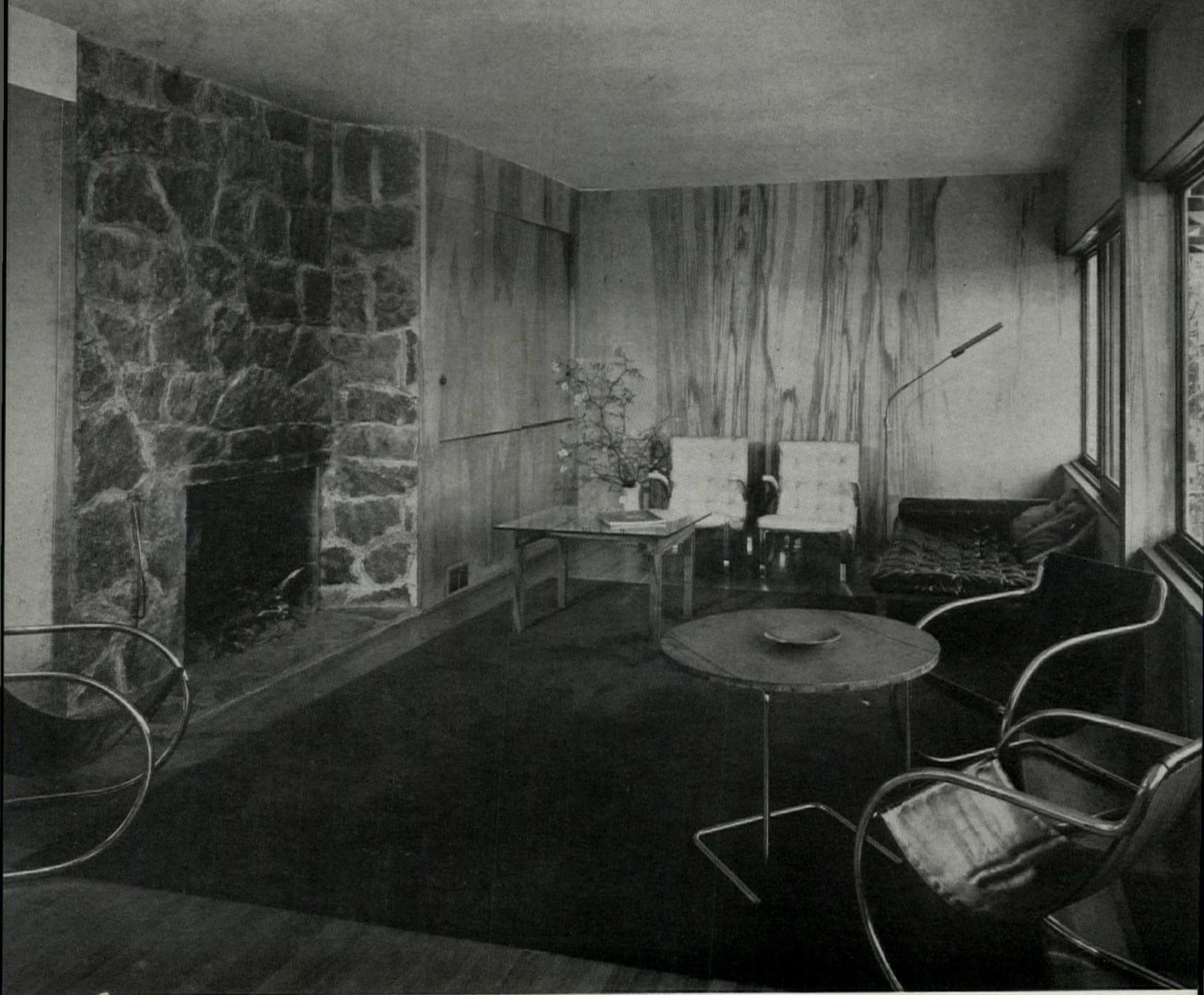
An important aspect of the organization of the house is the relative barrier to view and distraction it offers on the approach side and the continuous large-scale fenestration that occurs toward the south and the commanding view of the Smoky Mountains. A highly rationalized scheme, it provides both intermediate post supports that allow subdivision of the area into several sizes of desirable room shapes and the advantages to be gained from use of solar heat in winter. For evidence of the latter, witness the designers' report: "Only three tons of coal are used per year." They admit, however, that some of this economy is attributable to the central location of the heater room and chimney. To shade the sun in summer, the outriggers above the window bands are fitted with removable asbestos panels which slide into grooves provided in the framework. "These provide better air circulation than a solid overhang," according to the designers.

STREET SIDE of house.



DAY.

NIGHT.



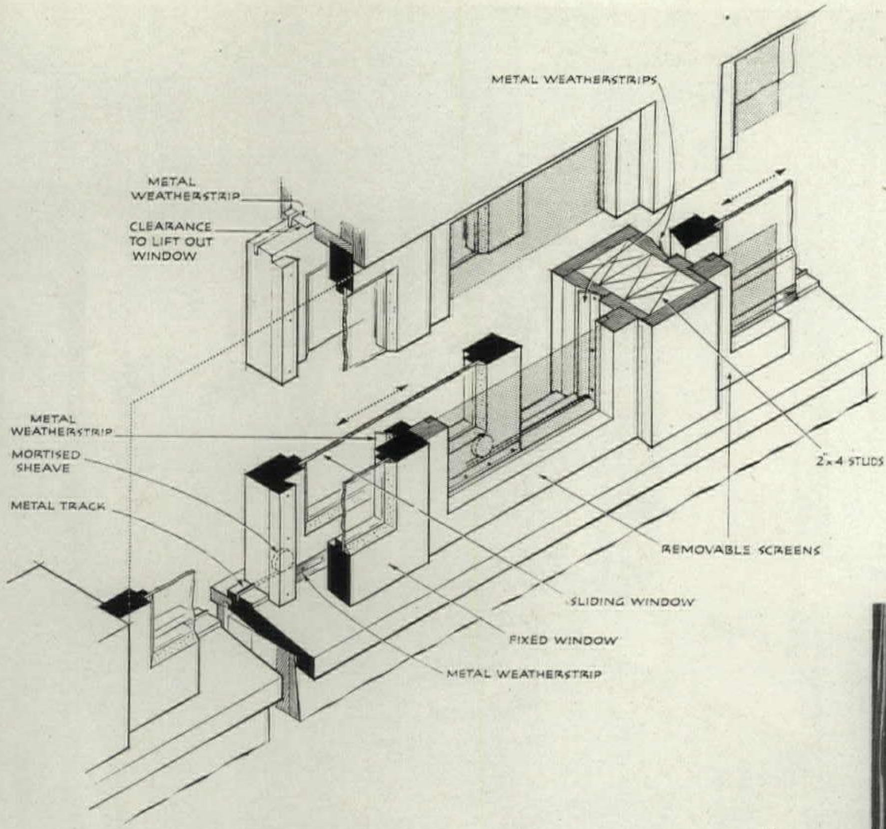
HOUSE A

LITTLE SWITZERLAND

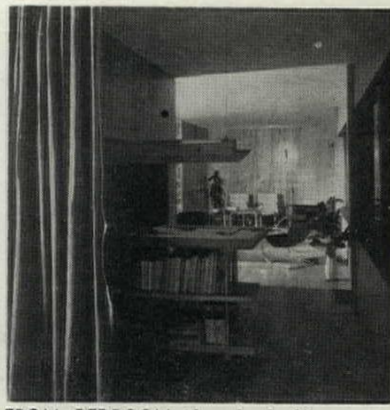
ALFRED and JANE WEST CLAUSS

The entire house was built by Mr. Clauss with the help of one local man! Foundation walls below grade are of poured concrete; above grade, native stone is used, the same stone from which the fireplace and chimney are built. Wood framing is covered with wood sheathing and roofing paper and finished with redwood siding. Interior walls are of gumwood plywood; ceilings are plaster over gypsum lath; and finished floors are oak. Both walls and roof contain a layer of mineral-wool insulation.

The sliding windows are a development of the ones the designers used in the first house built in the development—House F, the log-cabin minimum house shown on Page 78. The dining-room photograph over page is particularly effective in showing how amply these invite the superb view. In summer time, the sliding device permits extreme openness or a variety of placements of the sash to lure the breeze. Indirect light panels are used to illuminate the living room and hall.



DETAIL of sliding windows

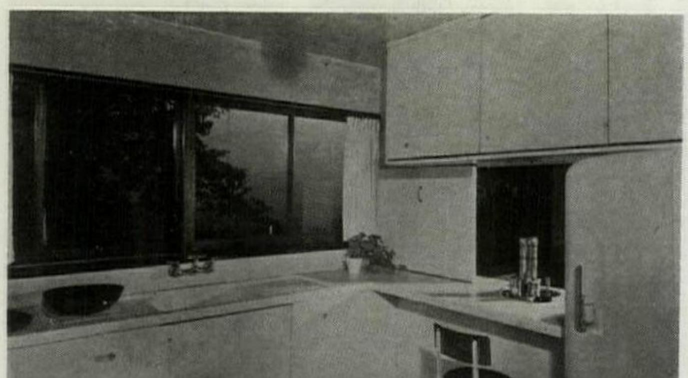


FROM BEDROOM though drafting room area to living room.

LOOKING TOWARD the drafting room.

DINING ROOM.

KITCHEN.



HOUSE A

LITTLE SWITZERLAND

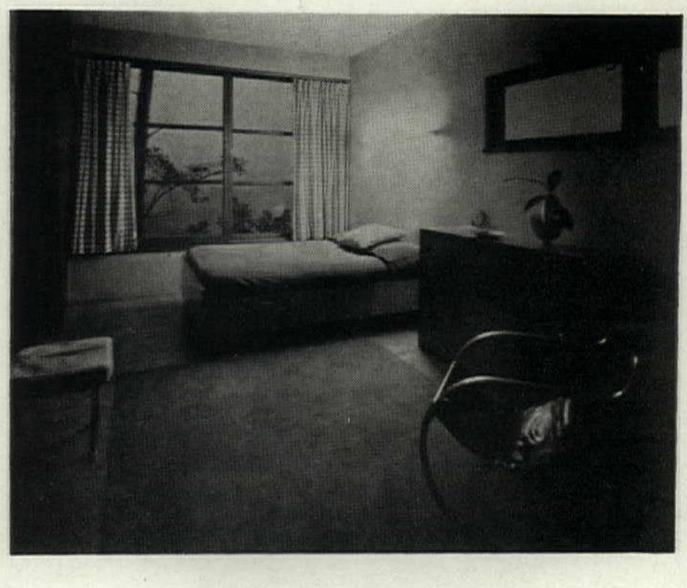
ALFRED and JANE WEST CLAUSS

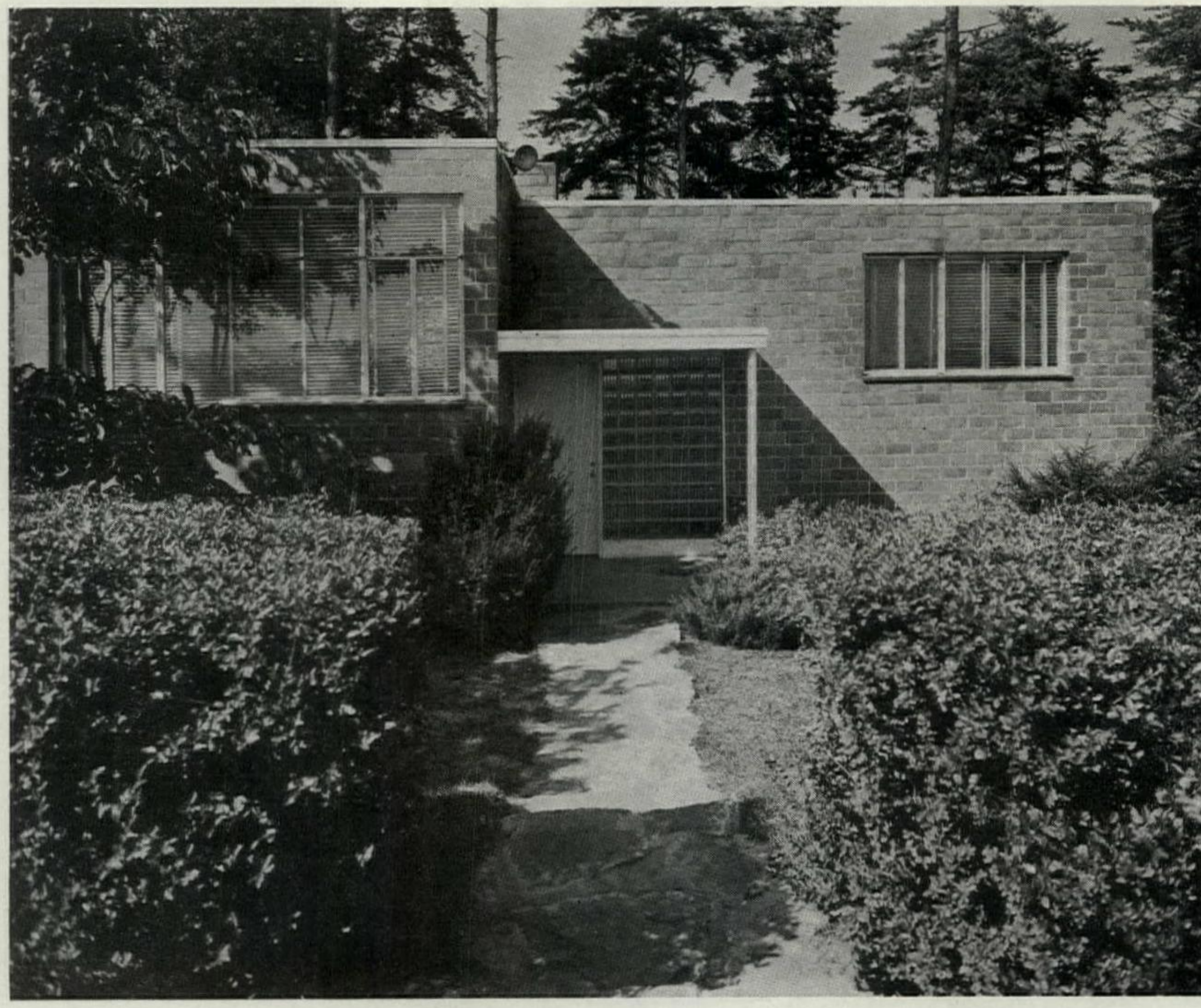
A study of the photographs on these two pages reveals the exceptional consideration that the designers gave to storage problems, step-saving devices, and provisions to simplify housekeeping. Between the dining room and kitchen a large central panel slides back to facilitate meal serving. Underneath the counter of this pass window, on the dining-room side, is storage space for dining-table items. On the kitchen side, the counter can be used either as a work top

A COMMODIOUS BUILT-IN STORAGE CABINET supplements regular closet space in the master bedroom.

for food preparation or as a sit-up eating place for quick, informal meals. Use of sliding doors on all storage units saves much floor space and helps keep the rooms neat in appearance. The master bedroom is equipped with a long, low built-in storage cabinet along the side wall in addition to an unusually large full-height closet. This generous provision of well located built-in elements greatly simplifies furnishing. Only a minimum of movable pieces is required.

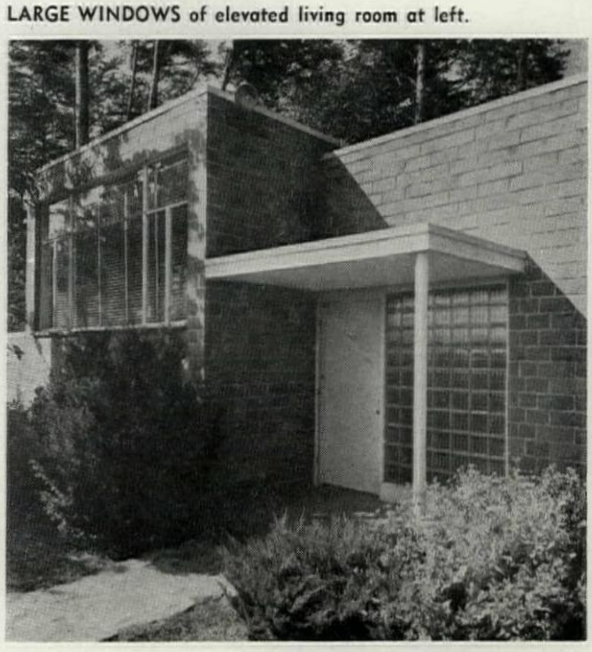
THE UPSTAIRS BEDROOM.





HOUSE B

LARGE WINDOWS of elevated living room at left.

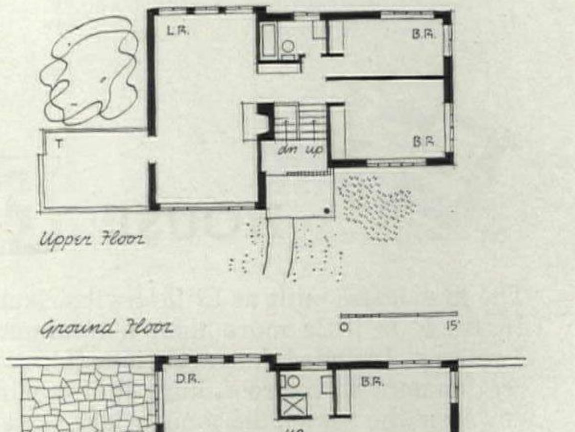


LITTLE SWITZERLAND

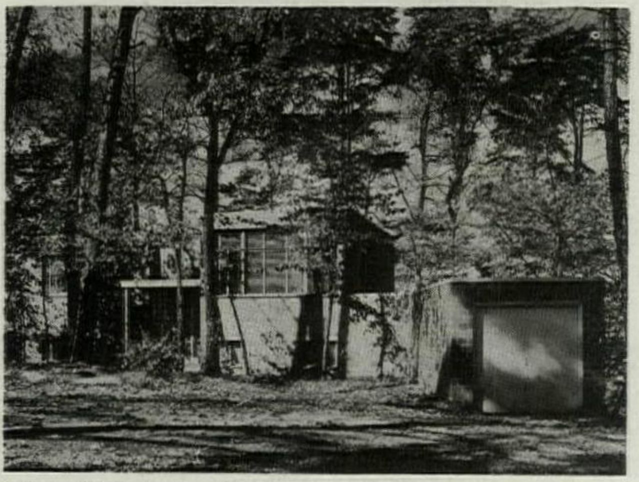
ALFRED and JANE WEST CLAUSS

Among the first of the houses planned for the development, House B is one of a group along the north side of the access drive that have similar (or exactly in reverse) plans. It was in this group that the designers first experimented with the upstairs living room, the downstairs kitchen and dining room and the front door halfway between floors. To keep maintenance costs low, hollow tile (of a warm, sandy-earth color) is used for wall construction; the casements are steel; and interior surfaces are plastered.

LIVING ROOM.



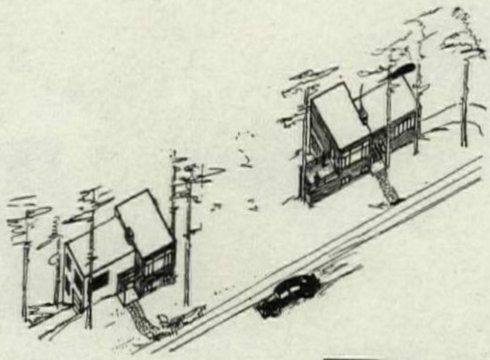
STAIR HALL.



TWO VIEWS of house C.

HOUSE C

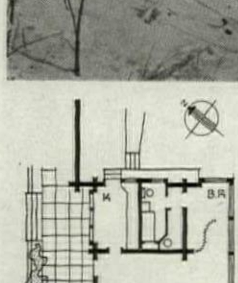
House C (photos at left) has almost the exact reverse of the plan of House B, except the slope of the site made a garage wing, with roof terrace above, desirable. Space occupied by the garage in House B is here given to a second bedroom.



HOUSES D AND E

Houses D and E are very similar, also of hollow tile construction, and are spaced along the north side of the drive so that each has an uninterrupted view to the mountains. E is yet to be built.

HOUSE F.



HOUSE F

The first house built at Little Switzerland, House F is little more than a minimum dwelling. Included, however, is a full recreation deck on the roof, huge sliding windows on the view side, and a large open fireplace. Construction is of hand hewn logs and local stone, resting on six concrete piers. The building is cantilevered out from the piers toward the view.

HOUSE G

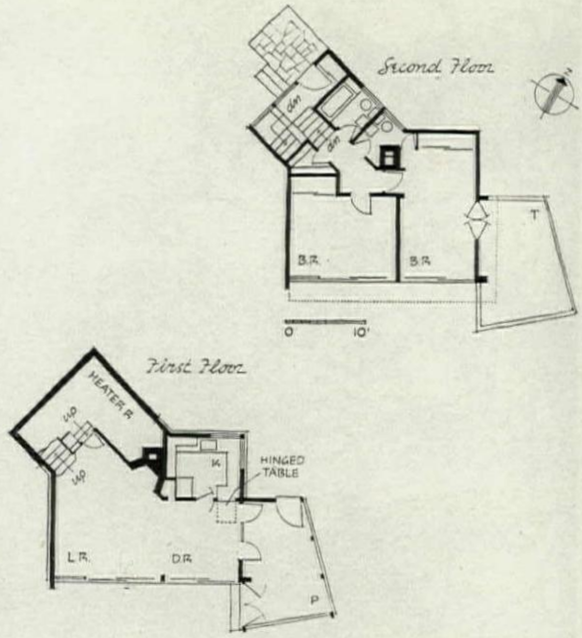
LITTLE SWITZERLAND

ALFRED and JANE WEST CLAUSS

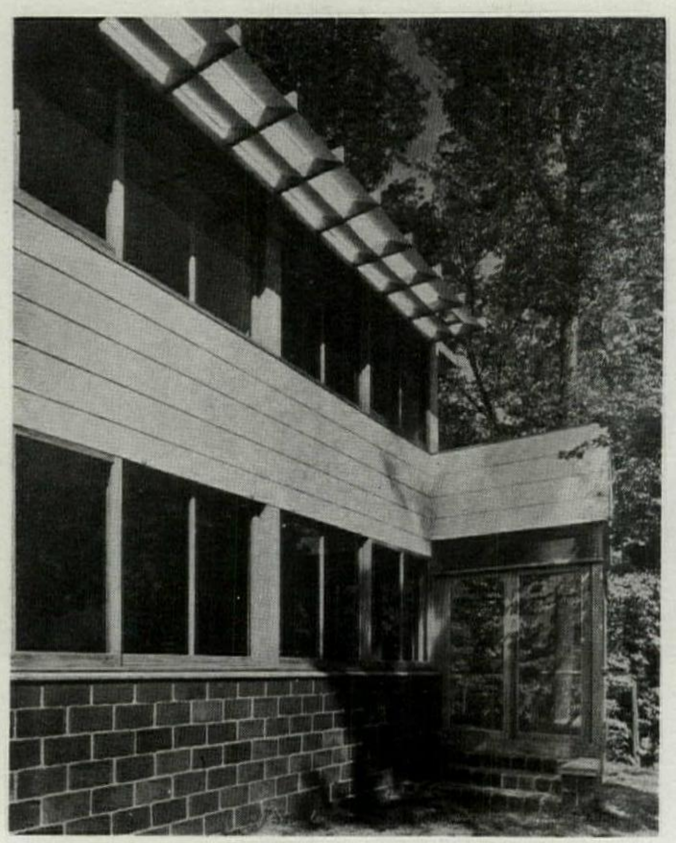
This house, the most recent one completed at the development, was built during the war. Mr. Clauss did all of the work himself, with whatever materials were on hand or could be locally produced. Footings are concrete; foundation walls are of tile and insulated block; the wood framing was made from trees on the site, which were sawn into rough lumber at a nearby mill and dried on site. To conserve lumber for floors, gypsum roof planking was used for the roof and second floor; roofing is built-up gravel. The first floor is built of prefabricated 30″ x 30″ concrete panels which were laid over concrete joists, red smooth finished and waxed. Exterior walls are of asbestos shingles over insulation board.

HOUSE G

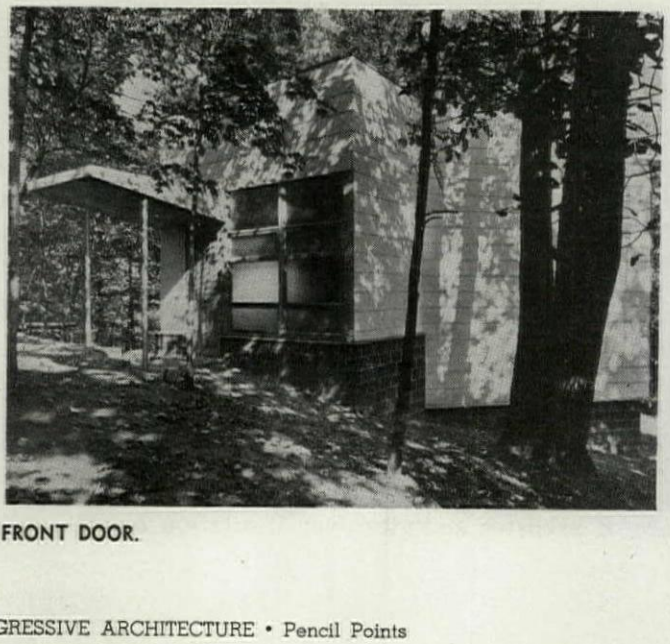
LITTLE SWITZERLAND
ALFRED and JANE WEST CLAUSS



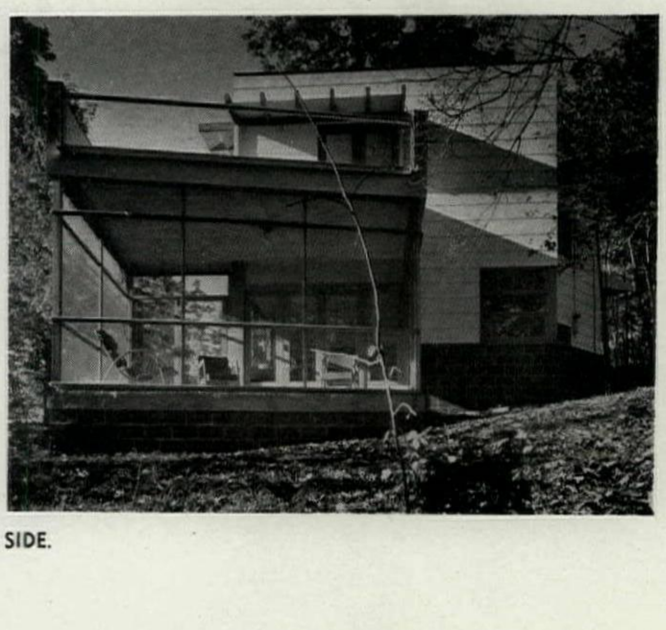
In plan, House G is a departure from what appears to be the Little Switzerland "standard." The entrance at the intermediate level is used, but living room, dining room, and kitchen are more conventionally arranged, all on the lower floor. All closet doors are sliding, the large heater and storage room is reached directly from the living room, and the chimney is centrally placed for economy in heating. As with the other houses on the southern slope, continuous window bands are used for optimum daylighting and use of sun in winter. An angled porch with terrace above captures the ridge-end view in three directions.



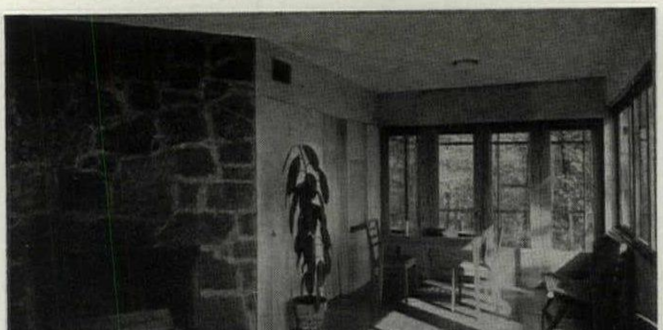
SOUTHERN WALL.



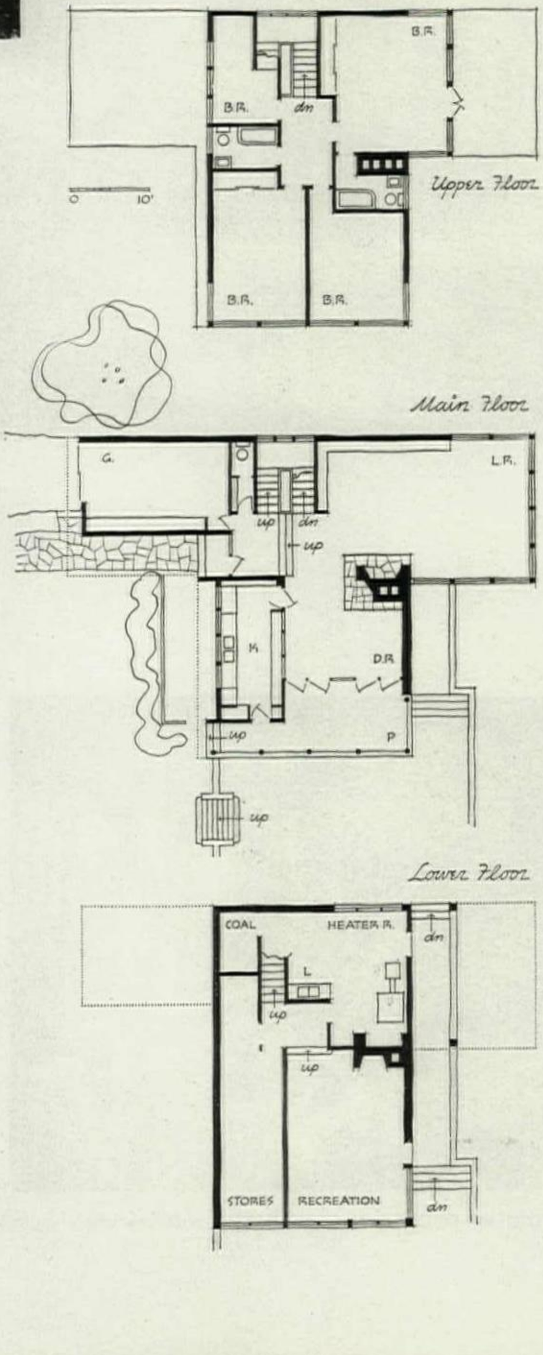
FRONT DOOR.



SIDE.



THE LIVING-DINING ROOM is 24 feet in length, with the whole south wall lined with windows. Wall surfaces are native stone or gumwood plywood.

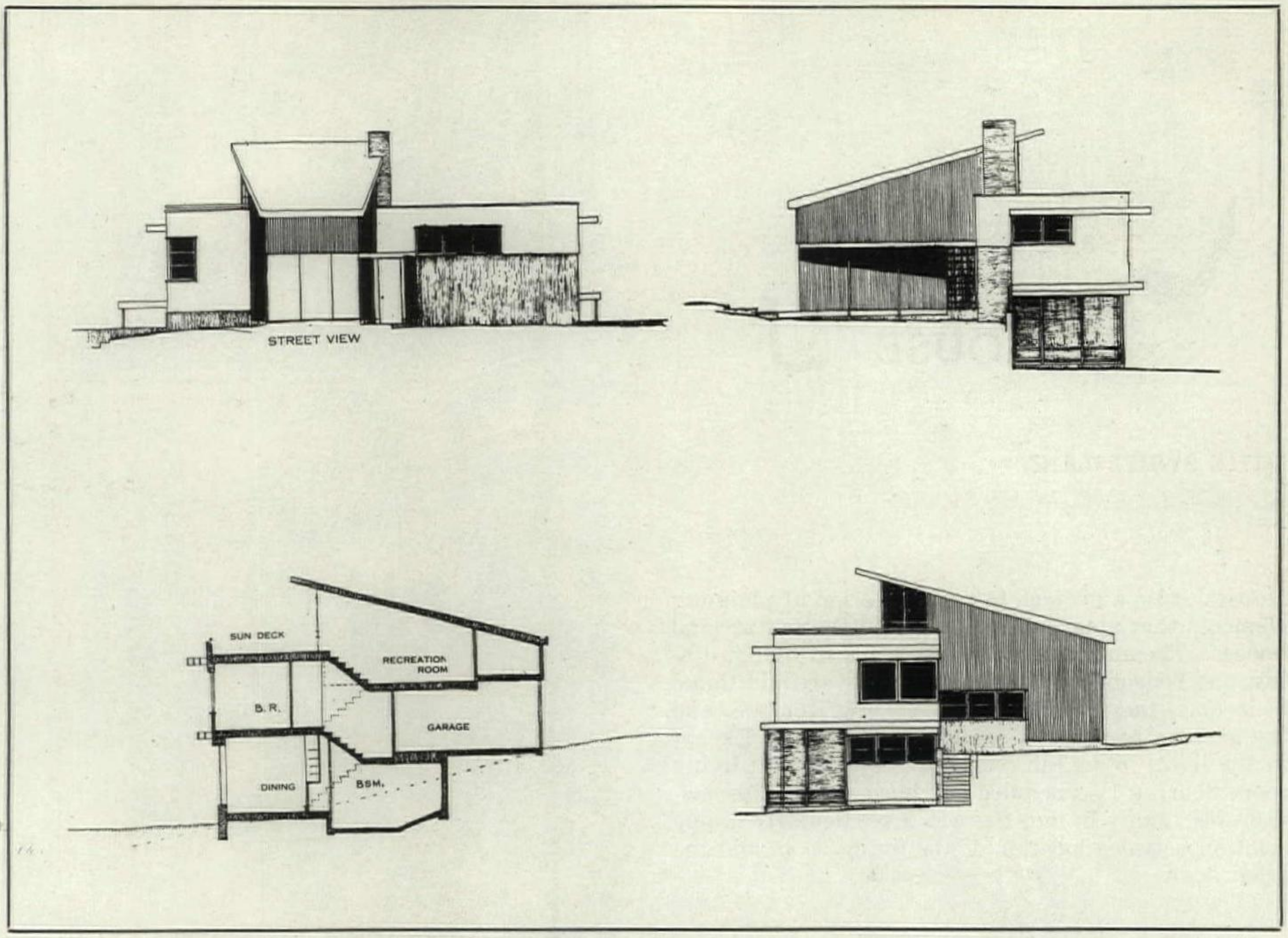


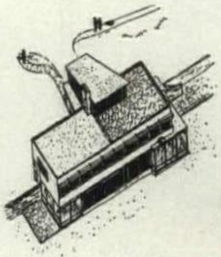
HOUSE H

LITTLE SWITZERLAND

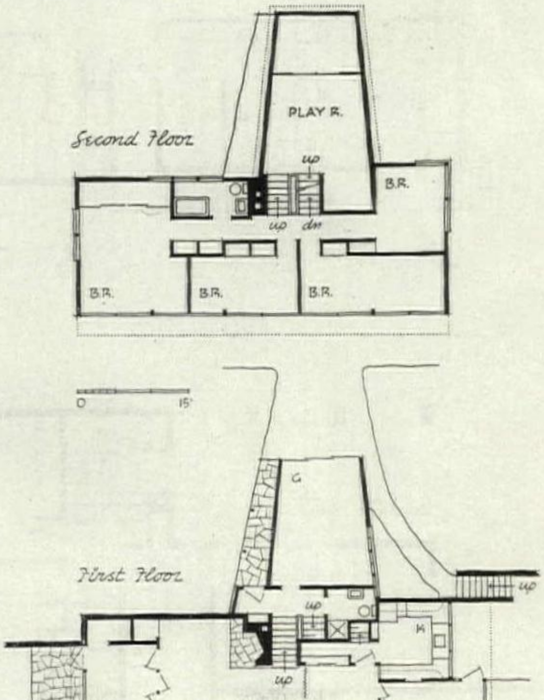
ALFRED and JANE WEST CLAUSS

Yet to be built, House H is arranged as a three-story scheme, with an above-grade recreation room planned on the lower floor along with heater room, laundry, and storage space. Centralization of garage entrance, front door, and service court is an important plan item. The entire end of the living room, cantilevered out over the lower floor, is glazed to encompass the broad outlook. Both the kitchen and the dining room open onto the living porch which facilitates serving of outdoor meals in summer.

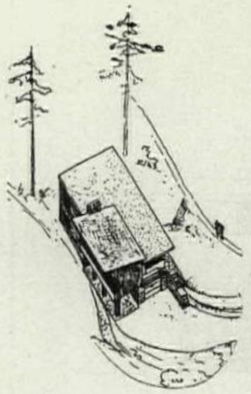




HOUSE I



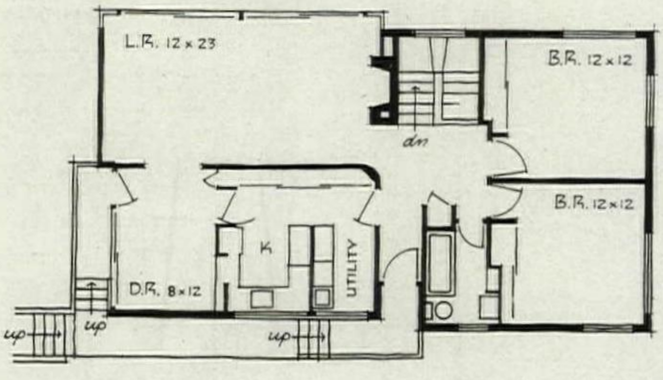
This house, now under construction, departs in plan from all of the other houses. On the first floor, while it utilizes the extreme openness that is found in House A, it is quite dissimilar in that the living room, dining space, and kitchen all occur on this level. The particular site suggested the extension of the garage-workshop toward the street for easy access. This, in turn, gave rise to the upper level recreation room with its broad roof deck extending the full width of the house. The bands of sliding windows on the southern, view side are practically a Clauss "standard"—used repeatedly, as the designers tell us, "because they work so well."



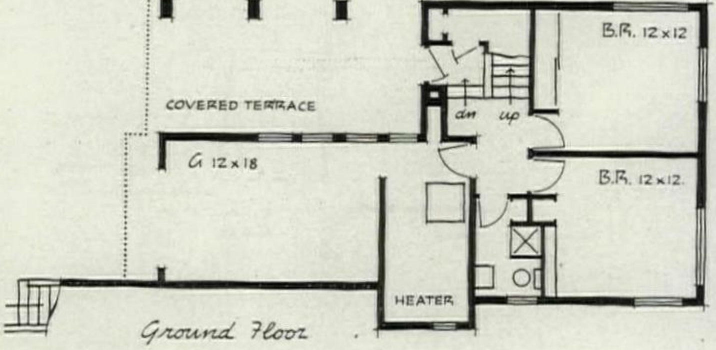
HOUSE J

LITTLE SWITZERLAND
ALFRED and JANE WEST CLAUSS

House J, also a project, is a combination of planning elements that appear in the other Little Switzerland houses. The entrance, at grade, leads to living, dining, and bedrooms. On the floor below are additional bedrooms, the heater room, a covered terrace, and the garage, reached by an access driveway. Except in the living room, all floors are of concrete; living room flooring is scheduled for hard wood. For privacy for family living, there is a particularly happy relation between location of the living room and the front door.



Upper Floor



Ground Floor

STEEL, PORCELAIN ENAMEL, and CONCRETE

Combined in a Structural System

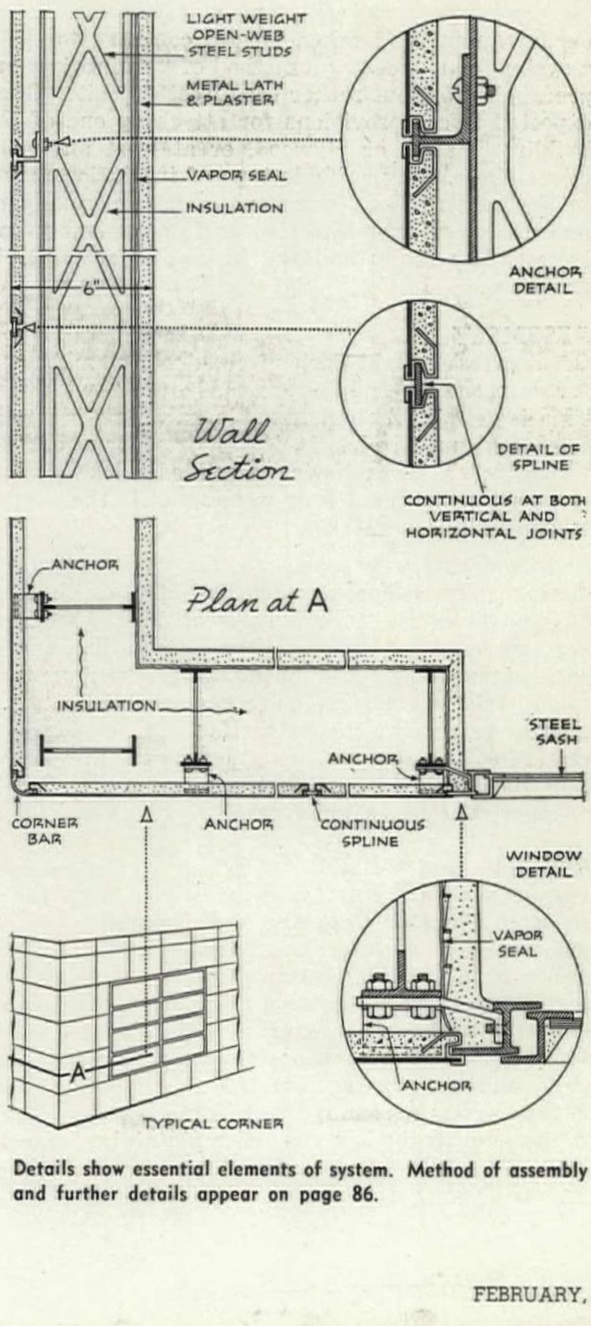
The Journal of the Royal Architectural Institute of Canada presented, in its July 1945 issue, an article* by James A. Murray proposing a new technique for combining lightweight stock steel structural shapes with an exterior surface of porcelain-enameled steel pans backed with mesh-reinforced concrete. The system, intended for use in many types of buildings, and its potential advantages are described in the following report.

The chief difference between this system and conventional practice in the U. S. A. lies in the use of unfamiliar materials: lightweight steel members instead of conventional wood or masonry; porcelain-surfaced pans instead of the usual shingle, clapboard, brick, tile, terra-cotta, or stone exteriors. It is probable that the system could be greatly refined; it has certain clumsy elements which further study might eliminate. But it achieves much, and the familiar in it may help to hasten acceptance of the principles which underlie it. The advantages are tangible:

1. Permanence, incombustibility.
2. Simple mechanical assembly methods as opposed to mortar joints or to cutting, fitting, and nailing, all of which consume expensive time.
3. Airtightness (see later discussion).
4. High insulating value, obtainable by installing any type of insulation desired.
5. Substantial reduction of condensation.
6. Possibility of using color extensively on building exteriors.
7. Extremely light total weight: 15 lb. per sq. ft.
8. Low maintenance costs.

STRUCTURE

The permanence of the finish is undoubted. The steel members are of course incombustible, although, lacking fire-resistant covering, they would be easily destroyed by fires originating in interior woodwork, furnishings, etc. In many ways the structural system does not approach the coldly logical maximum of efficiency, which might increase such advantageous factors as lightness, rigidity, etc. Adoption of such a simple device as pre-assembling structural panels, perhaps with wall framing members in a grid or diamond pattern, would surely have eliminated many small parts and thus reduced the necessary materials and labor. The construction is apparently amply strong for most ordinary purposes, and stress analyses of every part can be made easily by routine engineering procedures to determine suitable sizes, loadings, and factors of safety. It is essentially a braced box in which wind loads, according to the author, are transmitted by the steel studs to the floor beams and interior columns. For multi-story buildings in particular, the author suggests, the lightness of the total wall construction facilitates placing columns back from the building line, and cantilevering continuous floor beams to carry the walls. This would permit complete freedom of treatment of the exterior.



Details show essential elements of system. Method of assembly and further details appear on page 86.

* *"Prefabricated Exterior Walls, Air-Sealed Buildings and Color Treatment," by James A. Murray.*

Almost as an afterthought, Mr. Murray declares: "For house construction, 2" x 4" wood studs may be used instead of steel studs to reduce cost." Which leads one to believe that he is interested chiefly in the wall surfacing!

EXTERIOR SURFACING

Outer surfaces consist of porcelain-enameled steel pans, backed with concrete reinforced with wire mesh. The panels can be made any shape or size, up to 20 sq. ft. in area. For ease of erection, they have been limited to 6 or 7 sq. ft.; they are ½" thick. Each panel is secured to the structural frame at four points with anchors that fit into continuous slots on the panel edges. A unit of this area, so supported, reportedly will withstand a load of 80 lb. per sq. ft. without appreciable distortion. Panels are slip-jointed together vertically and horizontally between anchors with flat splines, which provide for contraction and expansion and exclude the elements. Panel edges consist of separate strips formed to the necessary shape; this would produce a narrow "border" around each panel. If the steel sheet which constitutes the panel base could be shaped to form the desired edge, another item of material and some pre-assembly time—and a feature possibly disadvantageous to the designer—might be eliminated.

INTERIOR SURFACING; INSULATION

For inside surfaces, the designer proposes placing a vapor barrier over the structural frame, applying metal lath and plaster to form the wall surface. This, like the conventional organization of framing, is also contrary to the expected in a system announced as a method of "prefabrication." It is *not* prefabrication, but rather the direct opposite. One would have expected to see provisions for attaching one of the numerous building boards, or plywood, or at least an insulating-board plaster-base. Any suitable type of insulation may be installed in the construction; since the wall is virtually airtight and moisture-proof, condensation could conceivably be held to extremely low limits and the insulating material is thus well protected.

ASSEMBLY

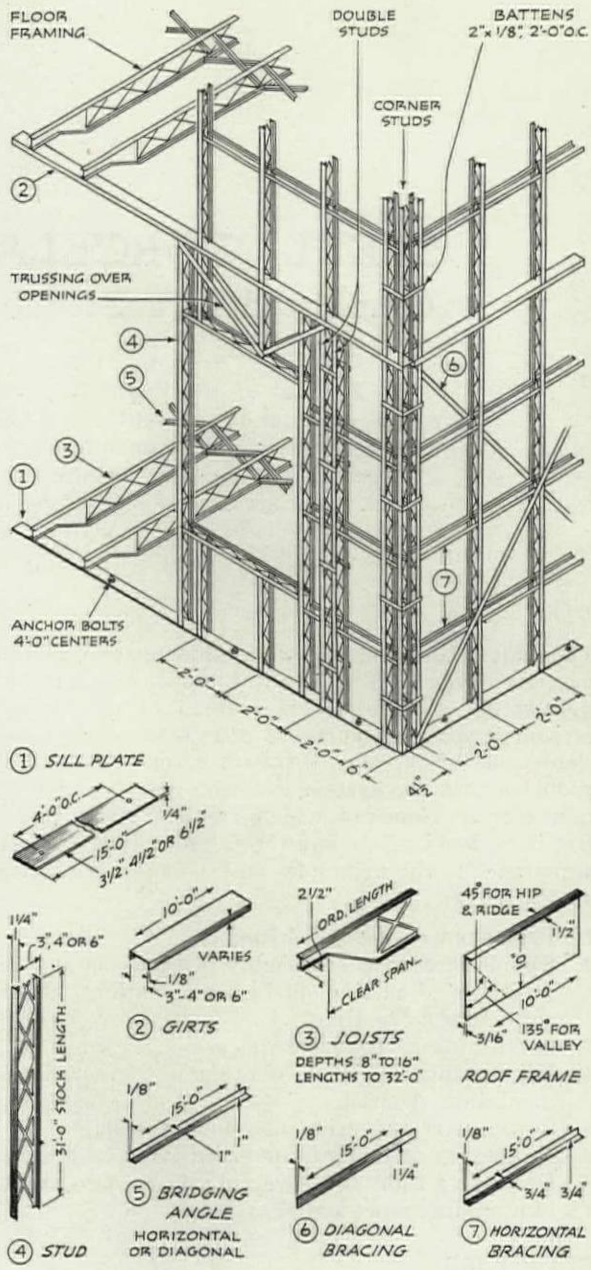
Great stress is laid upon mechanical assembly as opposed to, for instance, assembling masonry units with mortar joints. This is true of the outside skin only, in which slip-joints are employed exclusively. It is far from true of the frame, of which details are shown assembled with bolts and screws, rather than by friction or welding as is the case with several materials on the market.

In comparison with a masonry or wood outer surfacing, the mechanically assembled panels have distinct possibilities: speed of construction is potentially greatly increased, and the building can be closed in regardless of weather and temperature without impairing the ultimate strength of the wall. The whole wall assembly is quite comparable to typical domestic electric refrigerator construction. It should be noted, however, that the construction contains no provisions for interrupting heat-flow through the metallic members from outer to inner surface, or vice versa.*

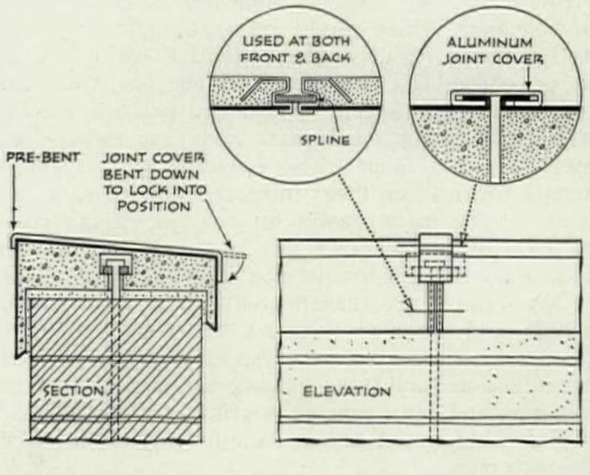
AIR-SEAL and COLOR

The author, Mr. Murray, is impressed with the value of an air-sealed construction, and the availability of color in porcelain enamel. He ascribes the deposit of dirt films on interior wall surfaces to the passage of air through wall construction, neglecting the condensation of indoor atmospheric moisture on inner faces of cool exterior walls, etc. He expects interior decoration to last five times as long on air-sealed construction as on standard construction. He claims low maintenance costs on this account, seemingly regarding it as equal in importance to the admittedly low cost of maintaining porcelain enamel.

* *See "New Developments in Steel Construction," by Carl F. Block,* Progressive Architecture, *Jan. 1946.*



Parts and method of assembly are strongly reminiscent of conventional wood framing practice.



Method of capping a masonry coping—a detail necessary because many outmoded building codes still require masonry parapets.

DAYLIGHTING FOR HOSPITALS . . . PART II

By ISADORE ROSENFIELD, Architect and Hospital Consultant

(The previous part appeared in December, 1945.)

Fairly accurate analysis of design in respect to orientation is possible either in the flat from drawings, or with models, by the application of local meteorological data. A more formalized analysis can be made of drawings by using curvilinear diagrams such as the "Burnet Diagrams" **(Figs. 3, 4, 5)** and by the "Heleodon" **(Fig. 6)**.

It is easy enough to orient a single cell or a simple structure properly. Henry N. Wright's study, previously referred to, is based on the analysis of a five-room house and a one-room weekend house. But modern buildings, particularly hospitals, are usually so complex that they may not always lend themselves to ideal orientation. View from the rooms or wards is as important psychologically as sunshine. Therefore judicious compromises in orientation must frequently be made.

The British report shows several diagrams of building shapes which, when properly oriented, will exploit sunlight to the maximum **(Fig. 7)**. Most of the shapes shown are not suitable to hospital purposes and are the product of constricted sites and the traditional approach to planning. The writer finds the T-shape **(Fig. 8)** ideal for most general hospitals, up to about 700 beds. In this case the nursing units are placed in the head of the T facing southeast, while the stem accommodates the various diagnostic and therapeutic facilities. He finds the L shape very good; some of his designs for buildings of 1,000 beds or more are a combination of L's. This is true of the building for bedridden custodial chronics on Welfare Island, N. Y. **(Fig. 9)**. While the T-shaped building would have two nursing units per floor, the double L would have four nursing units, one in each leg of each L. In the new Sea View Hospital for Tuberculosis there are to be three nursing units per floor, hence the Y shape **(Fig. 11)**. In all these examples the patients are disposed toward the sun for at least part of the day and such services as bathrooms, utility rooms, serving kitchens, etc., occupy the sides of the corridor least likely to get direct sunlight. An interesting example of a simultaneous exploitation of orientation and view, for a hospital of about 1,600 beds for the chronic sick, for whom great height of building is considered undesirable, is Goldwater Memorial Hospital, located on a narrow island **(Fig. 10)**. In order to afford patients a river view on either side of the island, wards are disposed in four chevron-shaped buildings, each four stories high, with two nursing units per floor per chevron.

The English diagram **(Fig. 7)** also shows a U shape as desirable. In the writer's opinion this is not very satisfactory for a hospital from the point of view of internal organic arrangement, notwithstanding the fact that ever so many hospitals *are* U-shaped. Which gives point to the principle that what is good for one type of building may not be good for another, and that orientation alone can not be a determining factor in shaping a building.

BUT WHAT OF THE WINDOWS?

Orientation alone is not enough. The next problem is treatment of the envelope of a building so that it will admit daylight. Traditionally, the window is an aperture in an otherwise solid wall. Precisely why is that not satisfactory?

(a) From the point of view of quantity of light such a window is inadequate because according to law it could not ordinarily be wider than 25% of the length of the wall. Only at the window would there be ample light **(Fig. 12)**.

(b) From the point of view of eye comfort such a window is unsatisfactory because it causes disturbing "brightness contrast." To exaggerate somewhat, it is like looking at an

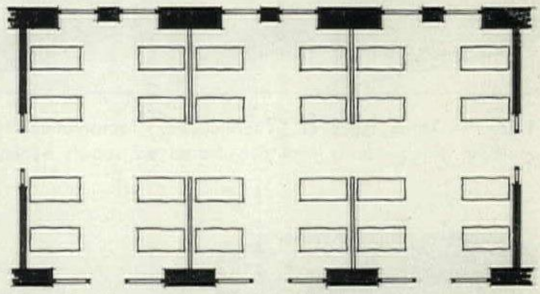


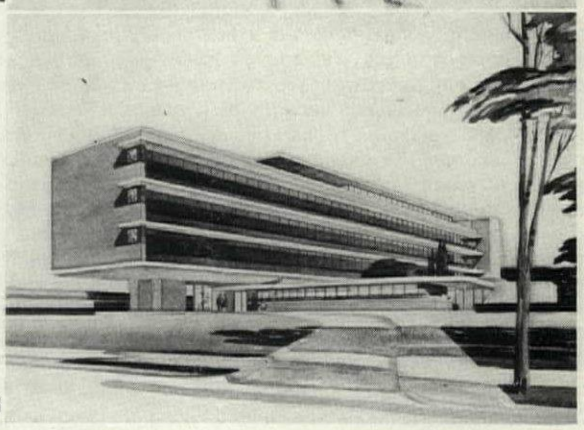
FIG. 16—Plan, typical 24-bed Riggs ward.

Dept. of Reproduction Section

FIG. 17—Triboro Hospital, New York, N. Y. Eggers and Higgins, Architects.

A

B



Photos by Harold E. Waltz

FIG. 18—A, winter view; B, summer view, showing relative sunlight penetration, proposed Faith Hospital, St. Louis, Murphy and Corrubia, Associated Architects.

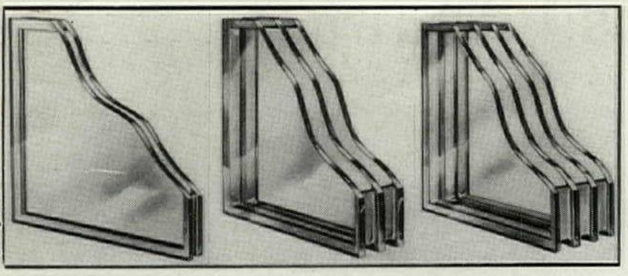


FIG. 19—Three types of "Thermopane," factory-made-to-measure multiple glazing units with dehydrated air spaces between panes.

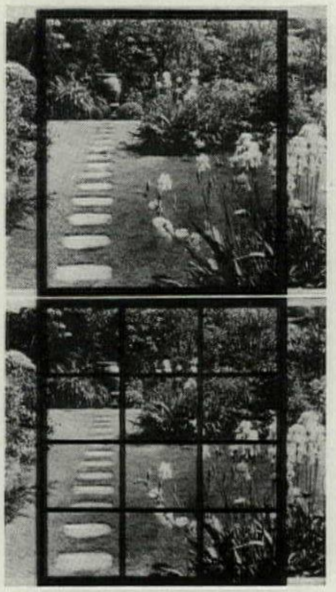


FIG. 20—Effect of muntin bars or other subdivisions on view through a window.

automobile headlight against the blackness of night (**Fig. 13**). The window and a patch on the floor are very bright while the surfaces surrounding the window appear black by contrast. The housewife who lives in a traditional house knows full well that her curtains are not all decoration, that they also serve to soften brightness contrast.

(c) From the point of view of being able to see the outdoors, the traditional window is very limited, especially when reveals are excessively deep (**Fig. 14**).

(d) From the germicidal point of view the traditional window is most unsatisfactory. Dr. Buchbinder gives meaning to this in the following words:

"If we could actually see the streptococci in a scarlet fever ward, here is what we might observe: entering about 9 o'clock in the morning, we examine one of the patients. Many streptococci are seen in his nose and throat. (There follows a description of the distribution of microorganisms on and around the patient, the bed, and the attendant.) A glance at the air of the room next reveals a fairly uniform distribution of streptococci, except for a temporary concentration within a radius of a few yards of the patient who has just sneezed, and around a bed . . . which is being changed . . . also . . . streptococci are settled on the floor in a regular manner. Further study of the floor reveals many organisms which tend to gather near the beds and *diminish in number around windows, particularly at the southern end of the room.*"

It is obvious that the bigger the window the smaller are the wall areas around it, until, if the window should reach from partition to partition, the darkness would disappear entirely from either side of the window, and partition walls would be so well lighted as to produce no annoying brightness contrast. What is true of the sides is equally true of the head of the window. The nearer the head to the ceiling, the narrower the dark overhead strip between head and ceiling. If the window extended clear to the ceiling the dark strip would be entirely eliminated. The ceiling, brightly illuminated, would produce no bright contrast with the window. It is also true that the closer the window head to the ceiling, the farther will light penetrate into the room (**Figs. 14, 15**).

POSITION OF BEDS FOR VIEW AND COMFORT

But even if enough light is brought into a room under conditions that eliminate brightness contrast, the patient's comfort is not insured unless wards and rooms are planned with due regard for it. The traditional hospital, particularly the British type, has what is known as the "barracks" plan, or more politely, is of the perimeter type. In this arrangement there is generally a separate window for each bed. The patient lies with his head to the wall. The best light is at either side of him, the poorest immediately at his head, where light *should* be good for reading and medical examinations. What is worse, he is confronted across the ward by windows which present the worst possible condition of glare and brightness contrast.

A well person sometimes may be able to adjust his position in a room so as to avoid glare, brightness contrast, and shadows, and at the same time to see the view out the window—though not always in a school, office, drafting room, shop, or indoor place of assembly. The bedridden seldom can; yet they should be the last to be called upon to endure avoidable discomfort. Hence the Riggs ward (**Fig. 16**). In this arrangement the patient lies parallel with the outside wall instead of perpendicularly to it. If he wants to look outdoors he has but to turn his head. He does not have to look at the window if he does not wish to. Conditions for reading and writing in bed, as well as light for examination, are also good.

PROBLEMS OF BIG WINDOWS

The civilized world has had hundreds of years' experience with individual windows, and accordingly has developed many devices for solving their problems. To what extent are these devices applicable to modern conditions? Without prejudice to individual windows where they may be justified, it must be admitted that big windows or glass walls do present new problems; but these can be solved.

1. The first is control of strong sunlight when it is not wanted.

This is usually solved by pulling down the shade; however, this eliminates ventilation and plunges the room into darkness.

A better way is to introduce a shelf, outside, over the window (**Fig. 15**). It must be designated with regard for the solstice in relation to height and depth of the room. The shelf should be of such projection as to permit sunlight to penetrate the room in the months of the year when it is wanted, and to cut off sunlight when it is not wanted. Of course Venetian blinds would in a measure take care of this problem, but some people do not like the dust they collect. Exterior vanes of proper adjustment afford another solution, but on western exposures enforce another compromise; one might have to give up such pleasures as a view of the sunset during the short summer months.

It is a mistake to try to solve the problems of all three sun exposures (east, south, west) with one device. Better results are obtainable if each exposure is analyzed separately, and treated accordingly. Such an approach may result in new esthetic opportunities for the alert, sensitive designer.

At Goldwater Memorial and Triboro Hospitals (**Fig. 17**) balconies at each floor were made five feet wide and adjusted more or less scientifically with respect to height and depth of patients' rooms. Where balconies are not needed shelves may be perforated to increase air circulation. The same results can be obtained with more numerous but narrower horizontal vanes, but these may shut off the sky view. Horizontal shelves used at every story (or more frequently, as vanes) not only perform the function of cutting off undesirable intense summer sun; they also act as reflectors to help diffuse light evenly through the interior (**Fig. 18 A, B**).

Direct sunlight and glare can also be controlled by the glass itself. Figured glass in the upper part of the opening would serve to diffuse light. On the other hand glass is not always satisfactory as a diffusing agent because it may transform general glare into a myriad of glaring points.

There were on the market just prior to World War II clear plastic sheets with louvers cast into them, primarily for use in lighting fixtures. So far, this type of material has not had sufficient stability under extremes of heat and humidity to promise complete satisfaction, but the principle of its composition is sound. Perhaps sheet glass can be manufactured with reflecting strips cast in, just as wire mesh is cast at present.

2. Another set of problems has to do with heat, or heat loss, and weather protection.

The small window has the virtue of resulting in low heat loss. If weather-stripped and protected by storm sash or integral double glazing, it is perfectly satisfactory so far as heat loss is concerned. On the other hand it does not bring much heat into the room when that would be desirable in winter.

For the "solar" house it is claimed that plenty of glass facing south actually brings heat into the house and thus cuts down the fuel bill. The claims have produced some doubting Thomases. The only way to evaluate the amount of fuel that could be saved by a large expanse of glass would be to build two houses of the same plan and cross section side by side; one with walls of glass facing south and the other with traditional "hole-in-the-wall" windows.*

The reader may very well observe at this point that if a glass wall allows heat to penetrate in winter, it must afford too much heat in summer. The described means of cutting off summer sunlight offset this action; shelves or vanes will stop the nearly vertical summer sunlight, but do not interfere with the low-angle sunlight of winter (**Fig. 18**).

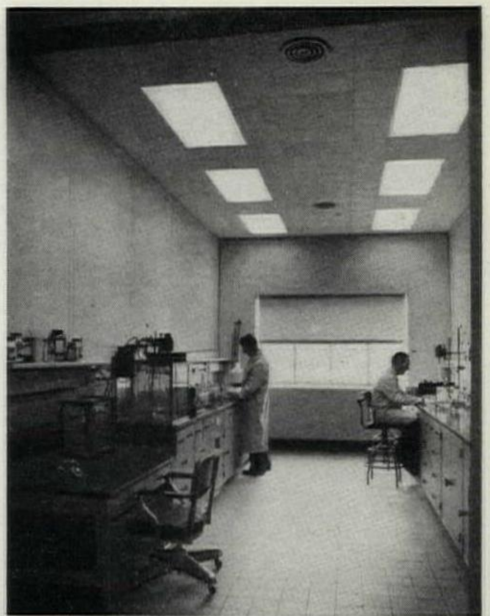
Assuming that direct sunlight does help to keep the house warm, what happens when the sun goes down or when it is overcast? Is there not more heat loss then, due to the large surfaces of glass? Again, this question has yet to be studied scientifically and answered categorically. All that can be said now is that double sash or prefabricated double glazing and weather-stripping seem to do the job. Winter sash or permanent double glazing sharply reduce surface heat loss and infiltration.

3. A third problem of large windows has to do with cost.

Building professionals know that the individual window-in-the-wall is generally costlier than the equivalent solid wall. A whole row of window units installed in a single wall opening is cheaper per unit than the individual window-in-the-wall, but still generally more costly than a solid wall of equal area.

A recent study revealed the extent to which our thinking has been warped by the traditional approach. The individual traditional window has not only to supply light but has also to protect the interior against intruders, weather, insects, strong light, and exterior temperature; it has to furnish ventilation and insure privacy. When equipped to perform all these functions, it becomes expensive. As we multiply this type of window we multiply hardware, storm sash or double glazing, weather-stripping, and screens. Thus, a six-bed ward, traditionally designed, would have two windows, each equipped with all the devices listed. The same ward, contemporarily designed, would have at least four such window units. Must all the gadgetry be quadrupled? Decidedly not. Two of the four windows may be inoperative, permitting two sets of hardware and two screens to be omitted, reducing costs for the entire bank to a total less than the cost of the wall it displaces.

* Such a demonstration study is being made by Purdue University under a grant from the Libbey-Owens-Ford Glass Co.



Photos by Sigurd Fischer

FIG. 21—Laboratory building for Firestone Tire and Rubber Company, Akron, Ohio; Voorhees, Walker, Foley and Smith, Architects.

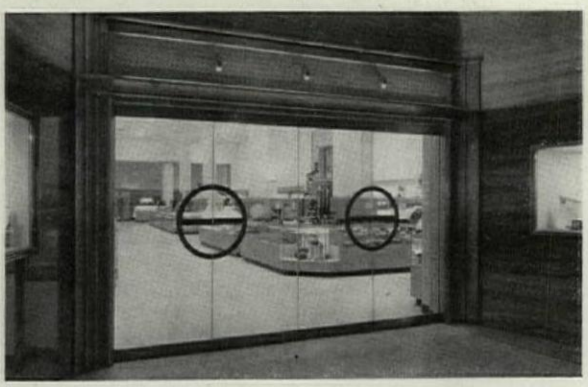
4. Clouding and frosting of glass has long been a problem, one fairly well solved for traditional windows by storm sash.

Contemporary design calls not merely for more windows, but for larger areas of glass uninterrupted by muntins, mullions, or transom bars, in order to interfere as little as possible with the view outdoors (**Fig. 20**). Storm sash in the same proportions are out of the question because of the difficulty and hazard of handling; yet without some protection much condensation may accumulate on the window sill and floor under certain conditions of relative indoor and outdoor temperature and humidity. In store show-windows special drainage facilities are provided in the bottom members of the frames. A more plausible arrangement in hospitals would be double glazing, and the form of double glazing which offers the most positive protection would seem to be the factory-assembled unit consisting of two or more layers of glass with mechanically sealed edges and dehydrated air spaces between layers (**Fig. 19**).

WINDOWS AND AIR CONDITIONING

The load imposed on an air-conditioning system by sunlight impinging directly on glass can be considerable. But the contemporary sun-shields previously discussed eliminate this difficulty in summer, when sun heat must be counteracted. Also, multi-layered glazing can be obtained with insulating value comparable to that of a 12" masonry wall furred 4" and plastered.

Voorhees, Walker, Foley and Smith, architects, designed the research laboratories for the Firestone Company in



Dick Whittington

FIG. 22—Tempered plate glass used in entrance doors.

Akron, Ohio, for complete air conditioning; at the same time, they considered it important that laboratory workers should enjoy a view of the outdoors. As they also wanted a constant level of illumination they relied for lighting entirely on fluorescent units, and installed the "picture" windows (with double-glazing-plus-air-space) to provide the view **(Fig. 21)**. This has important implications for hospital designers; in all likelihood future hospitals will be one hundred percent air conditioned. Non-believers in extensive daylighting may disagree with the wisdom of requiring all air-conditioned spaces of a hospital (particularly operating rooms, and fluoroscopy and X-ray processing rooms which must be kept entirely dark) to be daylighted. But air-conditioning systems, like all mechanical devices, may conceivably fail, and unlikely though the occurrence may be, no hospital can afford not to supplement its air-conditioning system with means of obtaining natural ventilation. Furthermore, claustrophobia is a positive factor that cannot be overlooked.

In one of the best hospitals in New York, I am informed, when the operating rooms were first blacked out at the beginning of the late war, two principal surgeons fainted during an operation. A check of the ventilating system showed temperature, humidity, and all other conditions in the operating room to be in perfect order. It was concluded that the surgeons fainted from claustrophobia, possibly coupled with some unpleasant brightness contrast.

From the previous discussion of the bactericidal quality of daylight it is also obvious that the value of daylight in keeping down cross-infection, at least in operating and delivery rooms, infant nurseries, pediatric wards, communicable disease wards, surgical supply, pre-operation, and formula rooms must not be overlooked. For these areas ample daylight becomes a *must*. In fluoroscopy and other dark rooms, windows are desirable in case of failure of the air-conditioning system. Also, a fluoroscopy room should be irradiated once in a while as, otherwise, germs in these rooms of perpetual darkness could stay alive a long time.

Many animals used for laboratory purposes are easy prey to pneumonia and other communicable diseases. They have to be kept healthy by protecting them from drafts and keeping the atmosphere clear of germs. Human lives depend upon the well-being of laboratory mice and guinea pigs. In laboratories, then, the use of actinic glass would seem fully justified.

Of course windows do no germicidal good at night. That is no argument against daylight, but rather an argument for supplying artificial irradiation at night; in fact, for employing it during the day at points where daylight may not penetrate with germicidal effectiveness. Two agencies are better than one; both should be used when we deal with human suffering and matters of life and death. Not only should there be ample glass but some of it should be operative, for the reasons outlined. Also, even where windows are intended primarily for view, some sash should be operable to facilitate cleaning, repairing, or reglazing.

SKYLIGHTS

It has been a frequent practice in hospitals to place such services as kitchens, laundries, shops, even dining rooms, in basements or sub-basements. When commercial buildings are deprived of proper daylight and ventilation the offense is against those condemned to earn their bread in an unhealthful environment, but when food is prepared and served, and laundry for patients is prepared, in unhealthful conditions, the patient as well as the worker suffers, for bacteria lingering in kitchen, dining room, or laundry are very likely to be carried to the patient. For this reason it has been the writer's practice to plan these departments above ground; in any case, to provide them with ample daylight. As these functions require deep areas, it is not easy to light them from the perimeters. To light them properly, some form of overhead light is desirable.

It has been my observation that we have something to learn about overhead lighting. All flat-with-the-roof or sloping overhead means of admitting light are likely to transmit excessive heat in summer or cold in winter, and to leak sooner or later. This leaves us monitor and saw-tooth lights. Both have vertical (or nearly vertical) sashes like ordinary windows. Monitor lights are often preferred because saw-tooth lights are reminiscent of factories. However, selection of roof-lighting means is not a matter of likes and dislikes, but one of proper delivery of light and air. If we are primarily interested in ventilation, monitors should be selected because they permit breezes to blow from one side to the other, at the same time siphoning out vitiated air. A monitor light, however, is not very efficient as a light-diffuser; light, like the breeze, travels from one side of the monitor to the other and there is scant opportunity to deflect it downward to the point of use. The saw-tooth light, on the other hand, deflects light downward from its inclined soffit, diffuses it, and eliminates at least one-half the source of brightness contrast **(See Fig. 1, Dec. 1945)**. If the soffit could economically be curved in section, it would be even more efficient as a light reflector. The monitor could be made more efficient as a deliverer of light by making its roof a double incline pitched to the center. This, however, would interfere with ventilation; such a monitor would become a pair of saw-tooths back-to-back. The sashes of overhead lights, to be most satisfactory from a leakage point of view, should be vertical.

WHAT OF THE GLASS ITSELF?

In warm climates, to admit daylight, all one has to do is to eliminate walls; protection would be necessary against insects, hurricanes, or direct sunlight. In relatively cool climates it is necessary to deal also with cold, rain, snow, etc. Many special types of glass have been devised to meet these problems.

Tempered plate glass is an answer to an important problem of light transmission as well as of vision. A few years ago the entrance of a large hospital, which looked out across the East River toward Manhattan, was designed in the Romanesque tradition; that is, as a small opening in a heavily encrusted, ornamental masonry wall. I pointed out that the architects were missing the opportunity of bringing in the beautiful view across the water and also that the lobby would be dark. The architects indignantly asked whether I expected them to design a jewelry-store front or a hospital. My answer was, "A jewelry-store front." Accordingly, the architects opened the whole front of the lobby to the river—so far as masonry was concerned; but they nullified the promise of light and view by encumbering the glass doors and transoms with much bronze work. Tempered plate glass would have solved the problem. Today glass doors almost entirely unencumbered by metal are practically the rule in stores and public buildings **(Fig. 22)**.

Laminated glass is used when greater strength is desired. Both tempered glass and laminated glass are particularly useful as glazing for institutions for the mentally sick. To avoid breakage and to prevent irresponsible patients from escaping, such glass must be confined to small dimensions and held securely in metal frames or muntins.

Heat absorbing glass, a relatively new development, offers a limited means of coping with summer heat. With ordinary glass most of the heat rays contained in sunlight pass through into the interior; very few are absorbed by the glass itself. A glass of special chemical composition and of slightly bluish-green color absorbs a good deal of sun heat (the absorption depending on glass thickness) and then releases it, partly indoors and partly outdoors, in quantities according to prevailing conditions inside and out, such as temperature, wind velocity, etc. **(Fig. 13, Dec. 1945)**.

Glass fabrics can be used as curtains to eliminate glare and diffuse light.

For many years laboratories have been faced north to insure even quality of light. That rule had validity only as long as laboratories consisted of a few rooms. In modern times laboratories, even in hospitals, occupy extensive suites, frequently several stories, often whole buildings. Certainly it would be uneconomical, even if physically possible, to place all laboratories facing north. Nowadays laboratories may face in any direction; some laboratory workers prefer the warm quality of south light provided they are safeguarded against glare and brightness contrast.

The windows in the Hoffman-LaRoche laboratories are enormous, glazed with double-glass-plus-air-space, and protected with curtains of glass fiber **(Fig. 23)**. When the laboratory workers find the sun annoying, they draw the curtains, which diffuse the light and contribute to thermal insulation. Also, curtains of glass are fireproof—a very important consideration in laboratories where there is danger of fire or explosion.

Actinic glass, such as "Vitaglass," transmits about 60% of the ultraviolet spectrum. Although it loses some of this property during the first year or so after installation, enough remains to merit consideration. It has been considered a health-contributing agent but, as far as I know, little attention has been paid its germicidal potency despite the fact that ultraviolet radiation is known to be lethal to pathogenic organisms. Other factors being equal, actinic glass is preferable to ordinary glass from the germicidal point of view.

WHAT WE DO NOT KNOW ABOUT DAYLIGHT

We know that, if there *is* such a thing as too much light during short periods, there is no such thing as too much glass, because with the utmost of glass it would still be impossible to obtain outdoor conditions, yet the maximum of daylight, once obtained, can be controlled with well tested devices. But merely to conclude that the more glass the better is not enough. It is sound in direction, but not intelligent.

We have yet to learn a great deal about light in terms of window arrangement, shielding from excessive sunlight, and the qualities of glass itself. The bacteriological experiments referred to are proof enough that we need to admit more daylight into interiors, but they fall far short of informing architects of the techniques of proper installation. In such research scientists have been concerned with one question only: *Is daylight, passing through glass, lethal to germs?* What the architect wants to know is: *What happens if the glass is single thickness, double thickness, 1/8" plate glass, 1/4" plate glass; what if storm sash are used; what if prefabricated double glazing employing different thicknesses of glass, or two sheets or three sheets, is used; what of the various kinds of figured and tinted glass? If actinic glass is more lethal than an equivalent thickness of ordinary glass, then in what form is it obtainable, and is the difference of lethality sufficient to compensate for the difference in cost?*

Other things being equal, *what is the relationship between lethality and depth of room?* Hospitals nowadays are planned with beds up to four in depth from the window. *What is the relationship in lethality as between the first bed, second bed, third, and fourth beds?* In nurseries, pediatric wards, and contagious-disease wards, beds are not only arranged in depth but also separated by glass screens. *What of the germicidal effectiveness of daylight after it has passed the first, second, and third screens?*

These are but a few questions that require answers. Others have been posed in this discussion. Many others will occur to the serious student as he delves into the problem.

The full import of the facts we now possess, and the techniques for their most effective employment in actual planning and construction, must be suitably publicized. What has yet to be ascertained about glass, daylight, and windows must be scientifically studied, and the results brought to the attention of the public and the building designer. This, in the last analysis, has to be a cooperative effort between consumer, designer, and manufacturer. It involves not only glass manufacturers but also window, hardware, screen, and other manufacturers. It involves the designer, and the bacteriologist, and the clinician.

FIG. 23—Laboratory building for Hoffman-La Roche, Inc., manufacturers of pharmaceuticals, in Nutley, N. J. Fellheimer and Wagner, Architects.

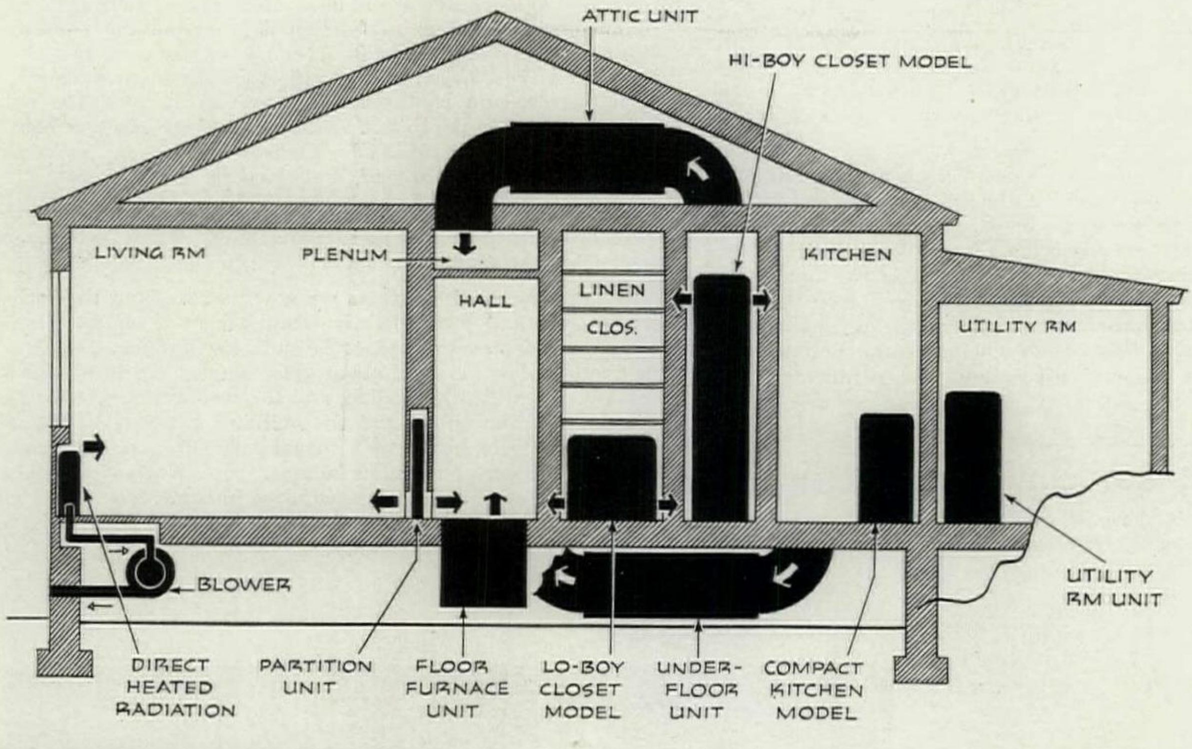
Photos by Gottscho-Schleisner

GAS HEATING EQUIPMENT

Types, Locations and, Venting Requirements

By H. P. MOREHOUSE, Chairman, Committee on Housing, American Gas Association.

What kinds of gas furnaces are becoming available? What is the best location for gas house-heating equipment? What is required for venting it? The answers to these and other questions are suggested in the following brief summary. The fuel form of gas makes possible unusual locations for heating equipment, permitting a flexibility in the design of heating systems which, coupled with new designs of furnaces, can be made to show savings in total house cubage and consequently in costs. This has great interest at the present time, when a tremendous house-building boom is in the making, when high construction costs render economy imperative, and when several million service men want homes.



FOR BASEMENTLESS HOUSES

In basementless houses there are at least nine possible out-of-the-way, space-saving locations for gas-heating equipment. All the equipment shown will function adequately without the draft that a chimney provides, but it is necessary to vent the equipment to remove products of combustion.

Attic Unit is a horizontal, forced-warm air heater designed to rest on the attic floor or on the ceiling joists. Heat is distributed downward, often into a plenum chamber and distributed either directly through registers or through a duct system.

Closet Unit, Tall ("Hi-boy") is a narrow, vertical, warm air unit, 19" x 28" in outside dimensions, which can be successfully installed in a very small closet.

Closet Unit, Low ("Lo-boy") is a new type designed to fit into the bottom of a small closet, leaving usable shelf space above. Warmed air is delivered through baseboard registers, helps keep floors warm in basementless houses.

Partition Unit is thin and narrow, designed for installation in a partition to heat one or two rooms; individual automatic controls will be available, and the unit furnishes radiant heat from ankle height to head height. This unit should be available in quantity by mid-year.

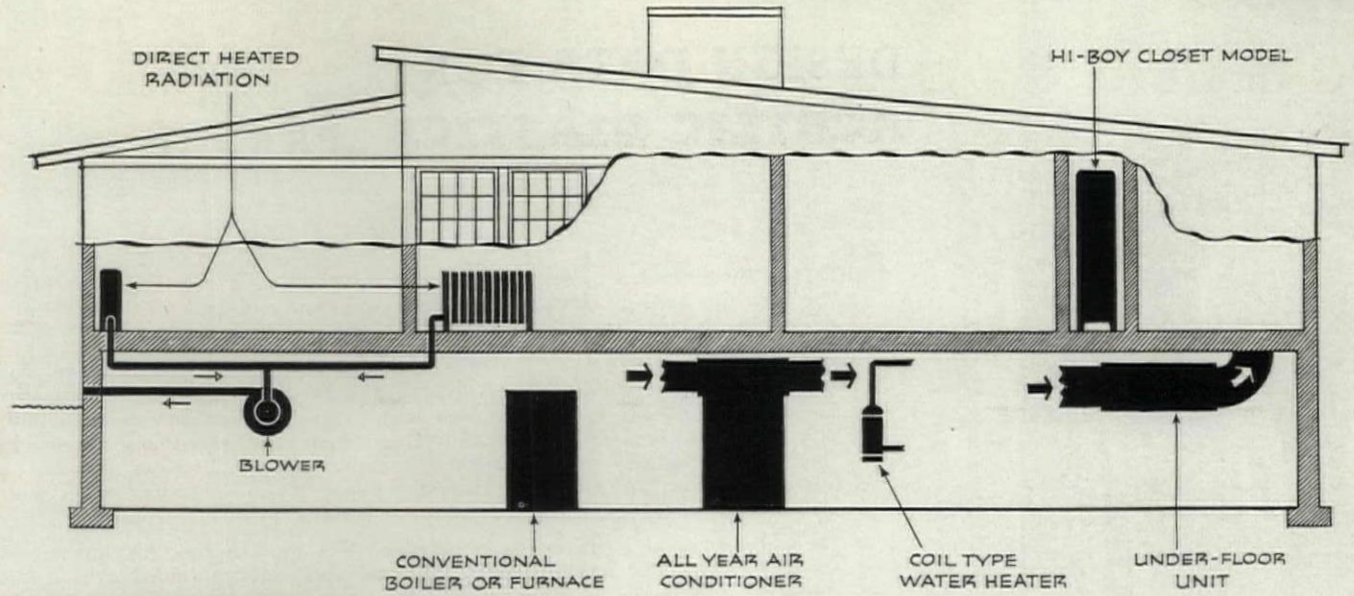
Utility Room Furnace, a conventional unit but extremely compact, will operate an air, water, or steam heating system.

Kitchen Unit, like the preceding one, can be a gas-fired central heater for any type of system; it has also been used as a small boiler connected to floor piping for panel (radiant) heating.

Floor Furnace has a grilled top outlet at floor level, familiar to many in the South and on the West Coast; a small under-floor space is needed for installation and servicing.

Individually Heated Radiators, used to a limited extent before the war, require either a mechanical exhauster (which may serve more than one radiator) or individual vents to dispose of products of combustion. Each radiator may be automatically controlled.

Under-floor Unit is the attic unit previously described, but suspended beneath the floor and connected to a duct distribution system. It requires under-floor space for installing, servicing.



HOUSES WITH BASEMENTS

The conventional boiler or furnace may serve steam, hot water, gravity or forced warm air (winter air conditioning), and all-year air conditioning systems. Houses that spread out over their sites may pose unusual heating problems.

To heat a wing separated from the main building, an attic unit or a closet model might be used; a completely excavated basement is unnecessary.

Differentiation in heating medium may be desirable, as for instance, between maid's quarters and the rest of a house. For small spaces radiation may be supplied by a conventional coil water heater, possibly with its own thermostat.

Rooms over unheated spaces, such as over garages, often cool faster than others, may require separate heating unit. Coil heater, attic unit, or direct-fired radiation are suitable.

Individual room temperature control can be simply obtained by using direct-fired radiators with individual thermostats. If a mechanical exhauster is used, no chimney is required.

NEW TYPES OF FLUES AND BURNERS

The Underwriters' Laboratories, Inc., have recently approved a new method of chimney construction, a light-weight chimney which may be supported entirely by the house framing. The type approved for gas appliances only is known as *Type B*, is made of single-wall asbestos-cement pipe, and must be marked: "For gas appliance use only." Size of flue may never be less than size of flue collar on the appliance; 4" (diam.) round flues are suitable for heating equipment up to 35,000 Btu input, 5" flues up to 55,000 Btu, 6" up to 90,000 Btu. Other shapes must be equivalent. Attic cross-overs must be kept above 30° above horizontal (45° if possible). Connection from appliance to flue should be short as possible, pitch up at least ¼" per ft. If possible, flue should penetrate roof close to ridge to avoid having long lengths of flue pipe exposed and thus subject to excessive cooling. Several appliances may be connected to one flue if capacity is adequate.

A new gas burner for domestic appliances is being released to manufacturers by the American Gas Association. Previous burners required excess air to insure complete combustion; the new "100% primary air burner" draws in all needed air through an adjustable shutter, has a shorter, brighter flame which can be placed very close to object heated. The development makes possible even greater compactness of appliances, elimination of some parts, increased operating efficiency.

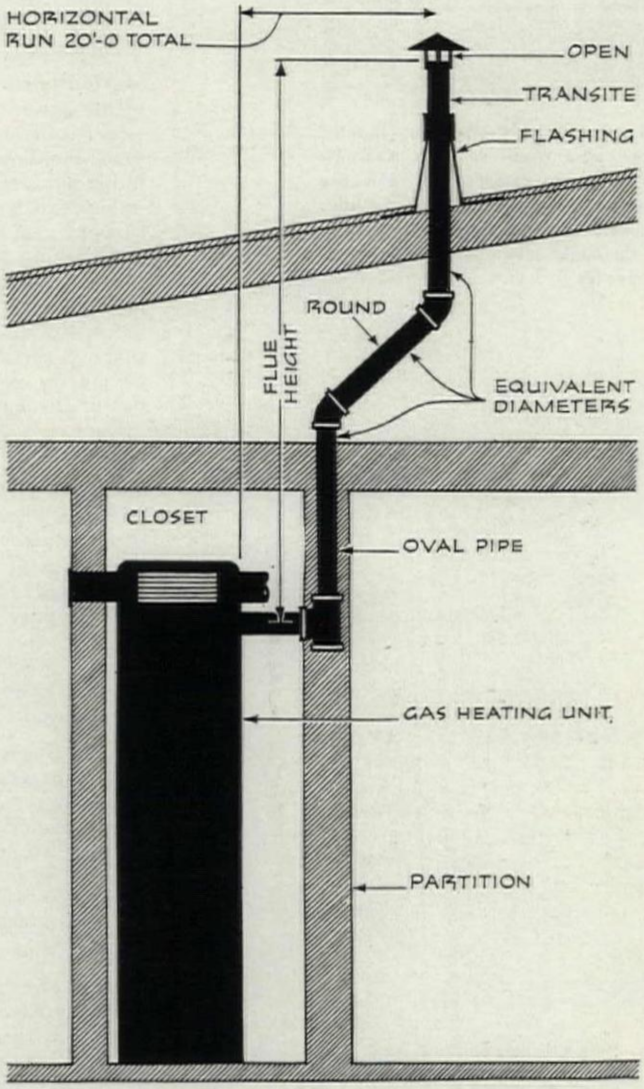
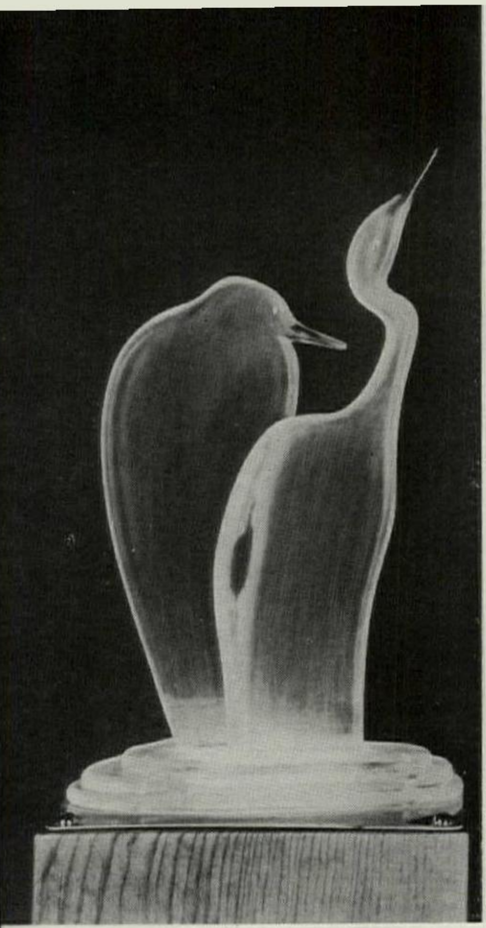


Diagram shows one method of installing new Type B flue approved *for gas appliances only* by Fire Underwriters. Made of asbestos-cement pipe, flue requires no masonry, can be supported on wood framing. According to A.S.H.V.E., total horizontal run should not exceed 20 ft in any case, and if flue height is less than 20 ft, horizontal run should not exceed flue height; other variables make competent advice necessary.



"Modern Plastics"

Plexiglas sculpture by Nishan Toor, mounted on a wood base which conceals a 7-watt bulb. The piece demonstrates effective utilization of the light-conducting qualities and the workability of acrylics, and indicates a thorough knowledge of the material's properties.

DESIGN DATA FOR **ACRYLIC PLASTICS** ...PART II

This is the second of a series of articles on plastics in relation to architecture. The first appeared in January, 1946; in it are contained data on the general characteristics, sources, trade names, etc., of acrylic resins.

There is almost no limit to the type of design suitable for execution in acrylics, except the obvious limitation of structural strength when used architecturally. The material is easy to work, is free from grain, and can be sawed, drilled, machined, routed, threaded, and swaged. In addition to all these methods of working (borrowed from the woodworking and metalworking industries) acrylics can be formed to almost any curvature, mechanically or by air pressure, when heated to 220° to 300°F. After cooling the material retains its formed contours.

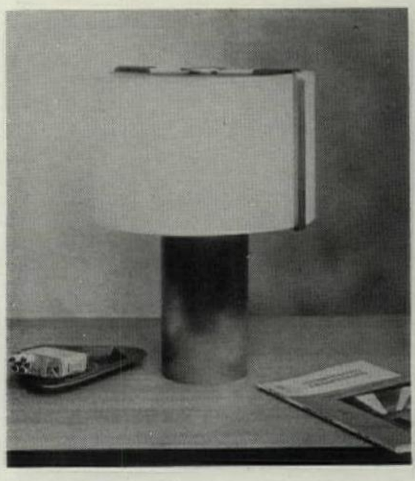
Three-dimensional surface-tension shapes (like gun turrets for airplanes) are easily formed. The acrylic sheet is heated until soft, clamped over a vacuum chamber, and the air is exhausted. This draws the sheet down to the desired depth; the vacuum is maintained until the product has cooled sufficiently to hold its shape. Contour can easily be controlled by shaping the opening in the vacuum chamber, or "pot." The hot sheet is not in contact with any form, so the surface is not impaired and optical qualities are maintained. "Snap-back" forming requires a male form which is inserted over the sheet; the vacuum is released slowly and the heated sheet snaps back to fit the male form snugly. Both types of vacuum forming require the acrylic sheet to be clamped to the form; the flange which thus becomes part of the formed shape can be used to advantage in securing the part.

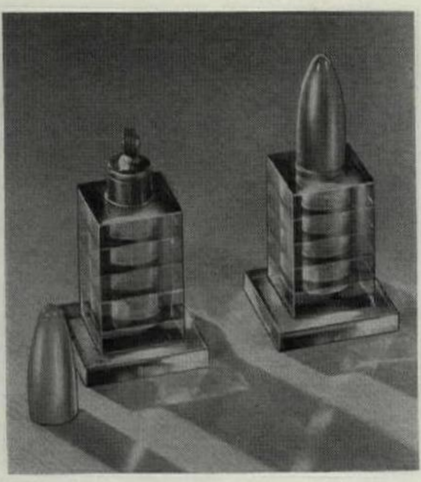
Molded parts may be manufactured by injection or compression; design requirements are in general similar, and molding is usually faster, cheaper, and permits closer control over dimensions than other fabricating methods. If design is intelligent, molding also makes it possible to simplify or eliminate many assembly or finishing operations. As far as possible, the cross section of molded pieces should be uniform and the pieces should have rounded rather than sharp corners. Sharp corners usually increase cost of molds. Filleted or rounded corners are far less apt to crack than sharp ones. The material "flows" better in molds with rounded corners, and dangers of sticking are reduced. At times, however, particularly if portions of a design are to be emphasized with "wiped-on" pigment, sharp edges are essential. If holes are to be molded in, the hole should preferably pass entirely through the material for ease in designing the mold; but depth of hole should not ordinarily exceed twice its diameter, and holes 1/16" or less in diameter should not be deeper than the diameter.

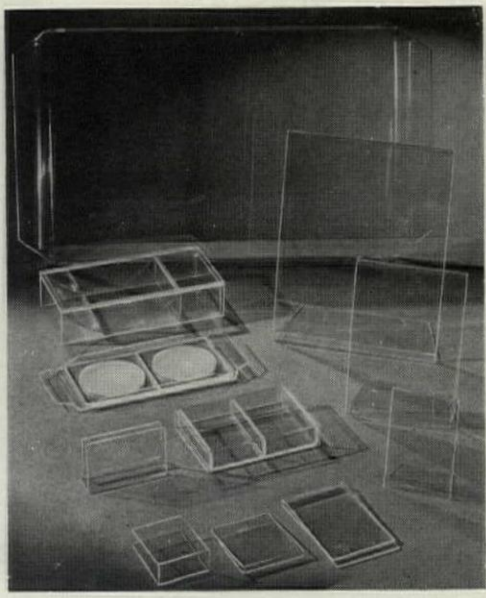
Sheet sizes. Acrylics are available in many thicknesses and sizes, from .060" to .250" thick in sheets ranging from 24" x 36" to 40" x 50"; and in thicknesses .312" and from .375" to 2.5" (in ⅛" jumps) available from 20" to 48" wide by 36" to 50" long. Special sizes and thicknesses are available at higher cost. In use, sheets of almost any available size can be used without danger of buckling if firm support, usually at edges, is provided. Manufacturers state that a sheet 24" x 24", .250" thick; or a sheet 48" x 48", .375" thick, should be self-supporting. The shower door on page 96 is 6' high by ½" thick, and proves sound from the engineering point of view. Plastic should be free to move in a supporting channel-shaped frame. Acrylics show less tendency to expand or contract with temperature changes than do other plastics, especially the acetates, but will change shape slightly more than will glass with temperature variations.

Colors. Sheet material is available at a slightly higher price in standard colors, including reds, yellows, greens, blues, and whites; and colors can be matched at extra cost. Acrylic powders for molding can be obtained in these and other colors, including opaques, at no extra cost; colors of molding powders can be matched to sample. If color is to be applied to the surface of acrylic products, alkyd base enamels, free of solvent ("four-hour" enamels) are recommended. Paint may be applied with air-brush or an ordinary brush. No special surface preparation is needed. If color is to be wiped on, however, dip-dyeing is recommended, and a sanded surface will absorb dye more quickly than polished sheet.

Mirrors of acrylic do not fog easily, but there is no special quality of acrylic sheet available for this type of work. Acrylic mirrors are not yet recommended by manufacturers unless there is great danger of breakage or some such special set of conditions which would make the use of glass impractical. Development work in this field is still under way, and therefore it is difficult to be specific. Occasionally a glass mirror has been cemented on top of acrylic sheet, but this obviously destroys the anti-fogging quality. Acrylics are anti-fogging because they hold heat so much better than glass; i.e., their heat transmission is much less. There is never the pronounced temperature differential between a room and the acrylic sheet in that room as there is with glass, and this tends to prevent the formation of steam on the plastic.



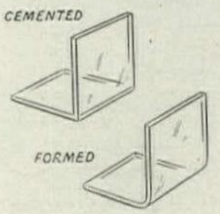




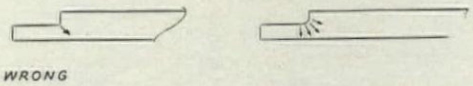
Photos courtesy Rohm & Haas, "Modern Plastics."

Left, obscure Plexiglas shade for table lamp. Center, cigarette lighter of laminated Lucite, each layer in different translucent color. Right, Plexiglas clips, picture frames, trays, boxes—examples of cementing and heat forming.

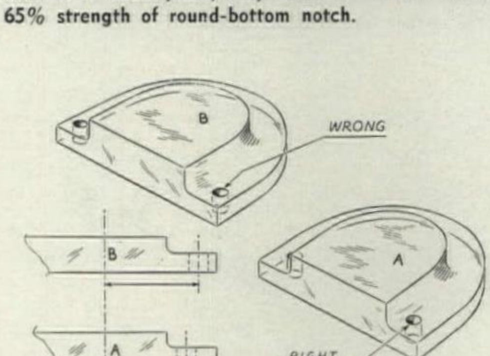
FABRICATION: ACRYLICS CAN BE WORKED IN MANY WAYS



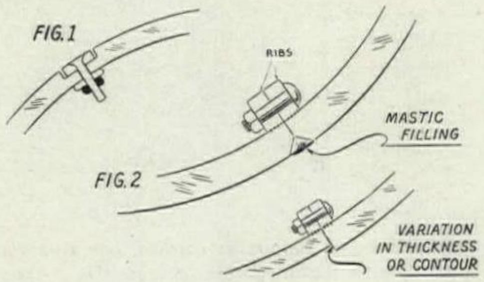
While cemented joints of good quality are easy to produce by handicraft methods, their quality is difficult to control in mass production. Particularly in decorative items, consider adding dye or pigment to cement rather than attempting completely transparent joints, or obscure joint with engraving or molding. Better still in many cases is a heat-formed joint.



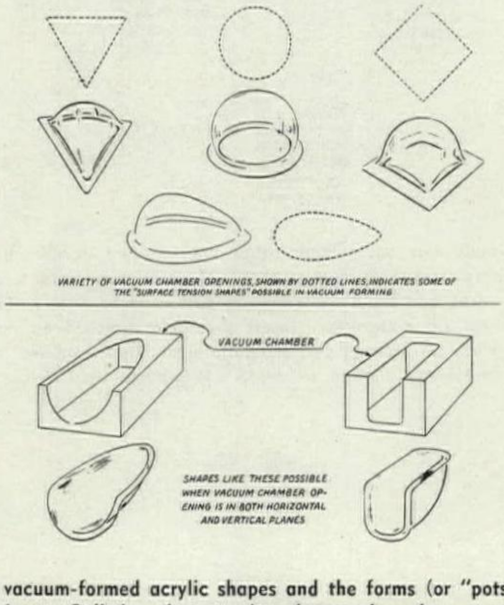
In routing, threading, etc., avoid sharp points or corners; they concentrate stresses at a weak point, may cause fractures. V-shaped notch has only 65% strength of round-bottom notch.



Keep mounting holes for panels or parts close to a thick portion of the panel; and if routing is to be done, keep width and depth of routing uniform to attain low production costs.



Multiple parts can be fastened together by mounting in a metal frame, as in Fig 1. This permits relatively thin panels. Fig. 2 shows another method, bolting together acrylic ribs cemented to circumferences of parts; matching formed parts may be difficult, outside contour of draw-formed pieces may vary; edges may be chamfered and joint filled.



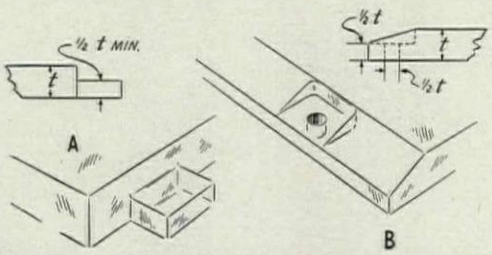
Types of vacuum-formed acrylic shapes and the forms (or "pots") which produce them. Called *surface tension shapes,* these have good optical properties. Material thins out, approximately 1/3 in a 22"-diameter hemisphere at deepest draw. In "snap-back" forming vacuum is reduced and material constricts to fit a male form of proper contour.

ACRYLIC PLASTICS

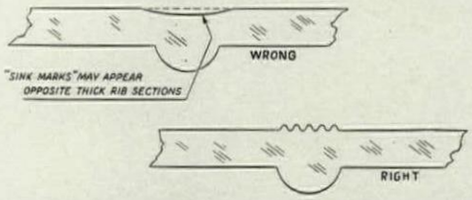
Rohm & Haas

Portion of the Plexiglas "Dream Suite" recently designed and exhibited by the manufacturers shows acrylics used in many forms: rods, tubes, flat and formed sheets; opaque, transparent; plain, decorated; and lighted both internally and externally. Note size of pieces, ranging from furniture handles to the curved, sliding shower door.

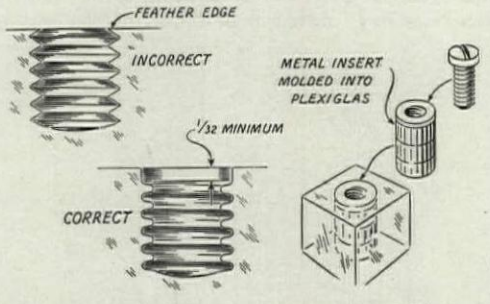
BASIC CONSIDERATIONS IN DESIGNING UNITS TO BE MOLDED



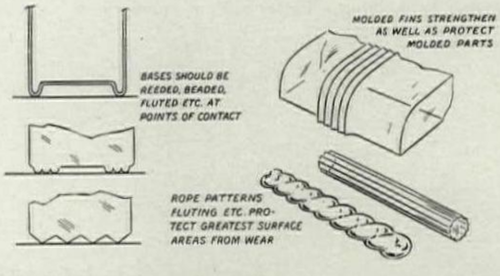
Cross section should be as uniform as possible, but assembly time may be saved by molding in mounting rims or lugs. These should be substantial; dimensions shown are minima, except that mounting holes are preferably of no greater diameter than ½ t, and should be set back from all edges of lugs a distance at least as great as thickness of the lug.



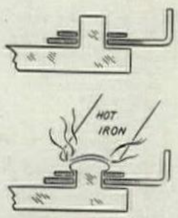
If ribs are used to reinforce an area, section may contract and shrink unevenly while cooling, due to greater volume of material. Cooling can be controlled to eliminate this but is expensive. Decoration of surface opposite rib overcomes the difficulty.



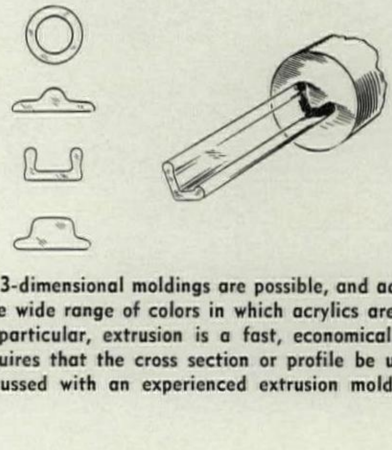
Screw threads may be molded rather than worked if hole diameter is ¼" or more; start threads at least 1/32" down from surface, and avoid all sharp corners to avoid cracking. If part is to be disassembled often, metal inserts are preferable. Insert should be finished on outside because acrylics are transparent, should project slightly above surface of plastic. Proportions limited to depth not greater than twice diameter.



If roughly handled, surface of acrylics will be marred; hence, special surface treatments are desirable for parts likely to be scratched. They also break the surface into brilliant facets.



Molded acrylic "rivets," or short projecting lugs, can be used as shown for joining plastic and metal.



Many types of 3-dimensional moldings are possible, and advantage should be taken of the wide range of colors in which acrylics are available. For long parts in particular, extrusion is a fast, economical manufacturing method; it requires that the cross section or profile be uniform. Design should be discussed with an experienced extrusion molder.

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