Pencil Points

the magazine of architecture

March, 1944

References Required

● Wherever men fight for the cause of freedom, "Connecticut" communications and aircraft ignition products are helping them win. When the boys come home and peacetime competition returns, ask <u>their</u> opinion of the products we make. They are our references.

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Say What You Mean

Architects habitually transmit their ideas to one another and to the public in three ways; by means of the written or spoken word, by drawings or graphic diagrams, and by their completed works. Is it too much to expect of them that, however they choose to express themselves, they shall say what they mean, clearly and unmistakably?

Much of the confusion in the world results from the failure of minds to meet, largely because of inexactness in using language. A good deal of such misunderstanding is produced wilfully through well-known tricks of argumentation. Have you never felt frustrated when the participants in some debate went off in different directions by using the same words to mean different things?

We can recall feeling sometimes similarly baffled when we have listened to certain architects talking about architecture, or have read what they have written. In these cases, of course, the lack of clarity was not intentional; it arose from either carelessness or ineptitude. The profession as a whole is, we hope, more rigorously precise in writing specifications and contracts.

But we are not quarreling with the amiable incoherencies that mark friendly discussions among professional men about the common object of their affections—architecture itself. After all, love is an unsettling influence. We complain rather against a tendency, too often shown in recent years, to be esoteric and mystifying through drawings. Something should be done about this.

The purpose of architectural drawings, as we understand it, is to convey to the beholder—whether he be professional or layman—a clear understanding of the architect's intention. To succeed in doing this it is important that unnecessary complexity be avoided, and that the graphic symbolism used shall be as nearly as possible universally intelligible.

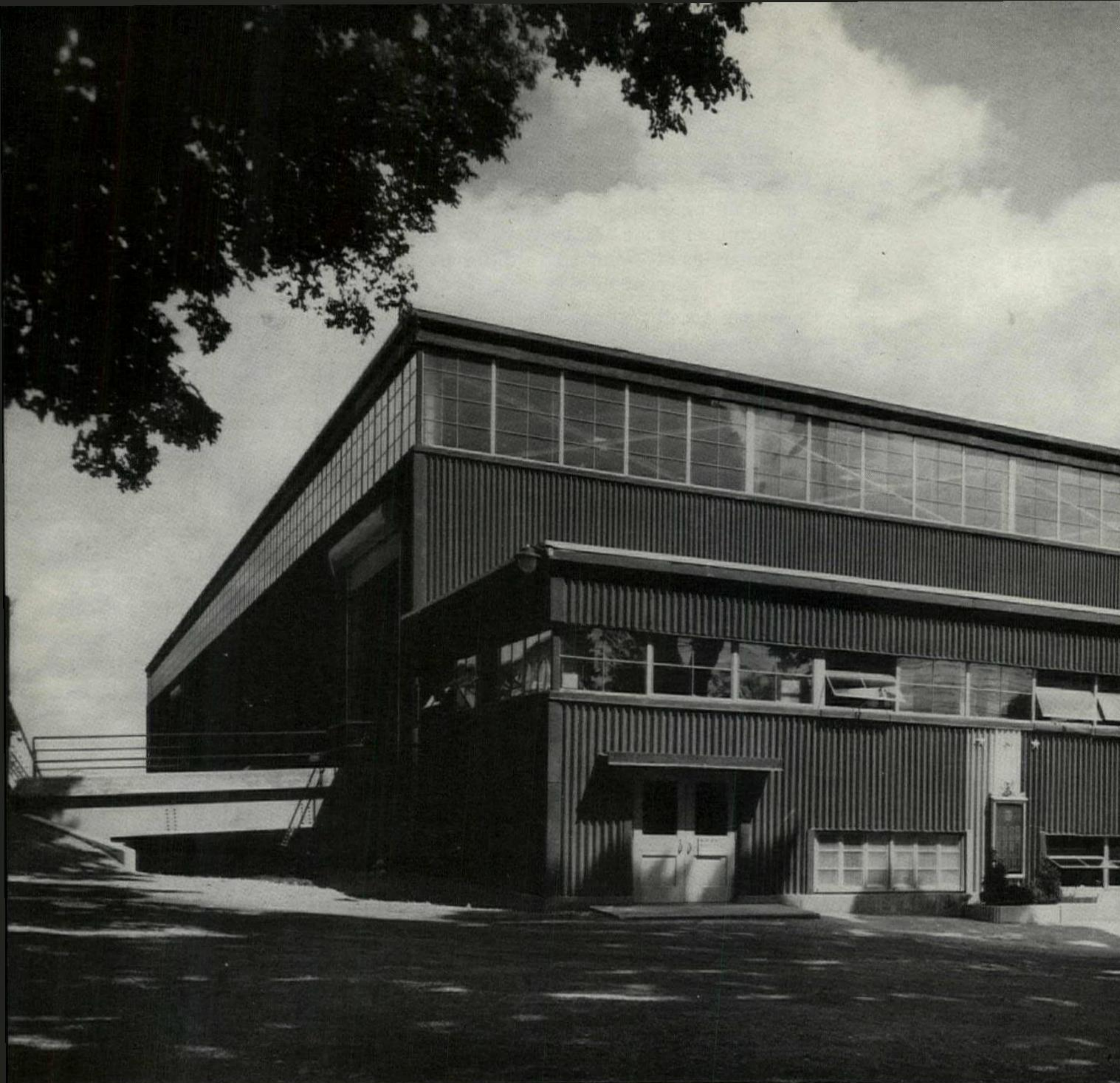
There was a time, not so long ago, when this condition prevailed in America, and a drawing made by an architectural draftsman in any part of the country was quite clear to everyone who might have occasion to read it in any other part of the country.

Within the past ten years or so, however, an increasing number of drawings have appeared in publications, in competitions, and elsewhere which, though they may tell their story to the initiated technicians, are difficult for the ordinary person to read and understand. We have a notion that by making them thus the designers and draftsmen concerned also make it unnecessarily hard for their often really brilliant ideas to be appreciated and accepted. Wherein lies the advantage?

As for the third and ultimate means of architectural expression, we are quite positive that much of the undeniable confusion that shows in the architecture of the past few decades in America comes from the failure of designers to be candid and clear about what they were saying in solid, three-dimensional form. Too much misguided effort went into attempts to make buildings seem to be that which they were not. Too much pomp and circumstance, too much cheap exhibitionistic splendor was put into designs that should have been clean and fine and straightforward statements of their purposes and their structural systems, dependent for their beauty on things more fundamental than historic detail.

The fakery got by for a while but "you can't fool all of the people all of the time." Luckily, a healthy reaction has taken place and good architects today find satisfaction in a simpler, more direct approach to their design problems. We have had a breathing spell during the war in which to reflect upon our past sins. In the name of Architecture, let us *all* resolve that in the new world of after the war we will honestly say what we mean—and mean what we say.

Kenneth Reid

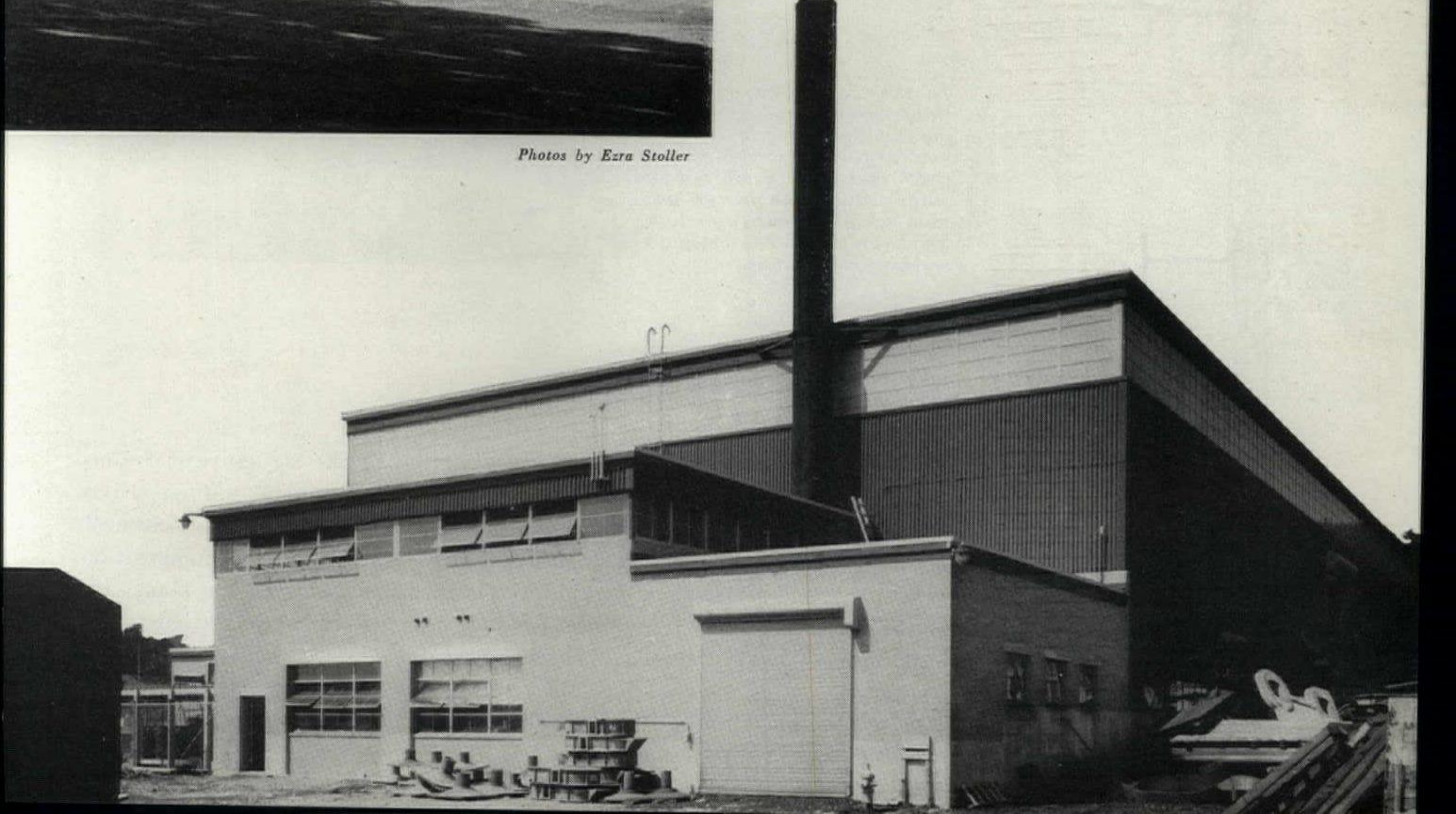


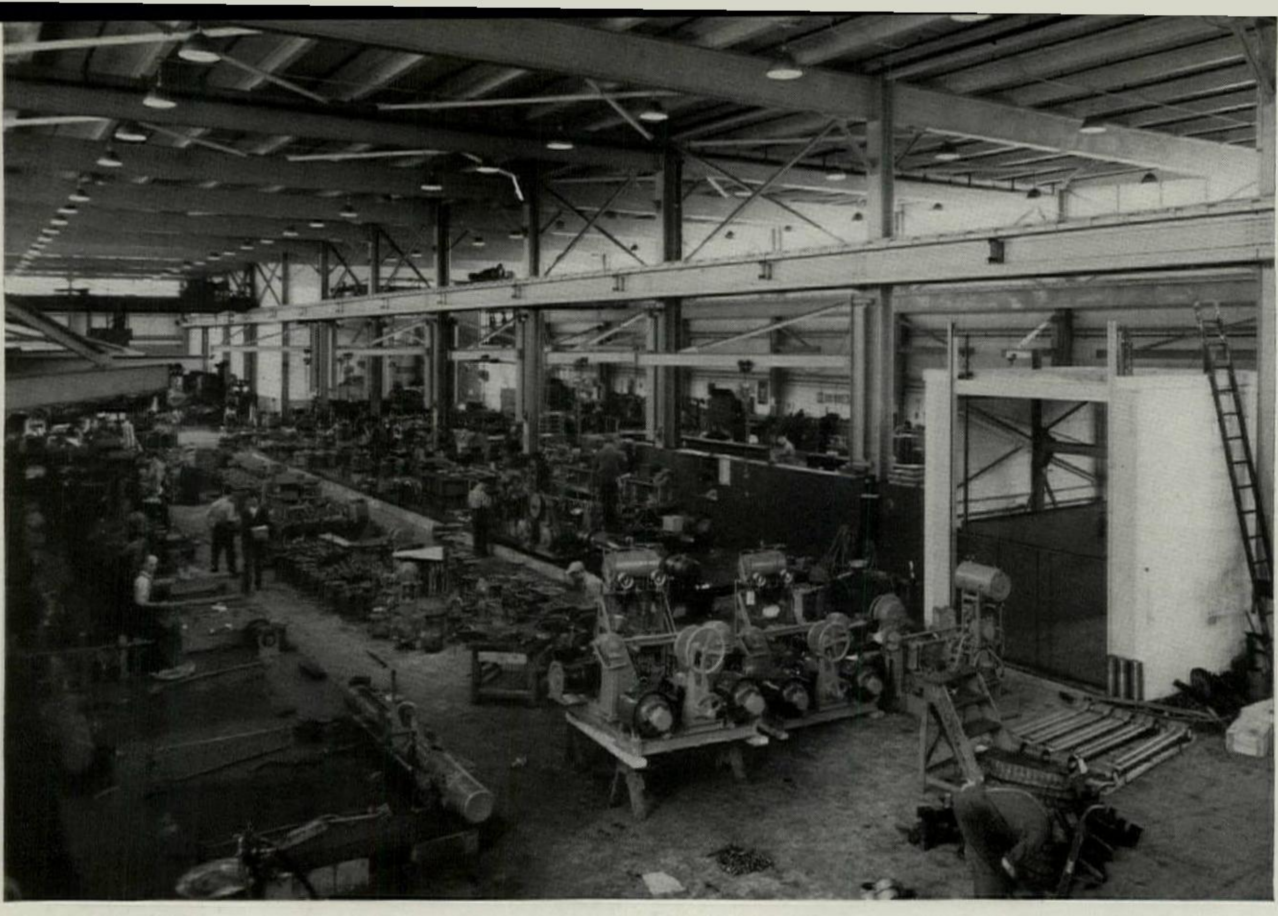
Machine Shop and Assembly Building for a War Plant in Maine

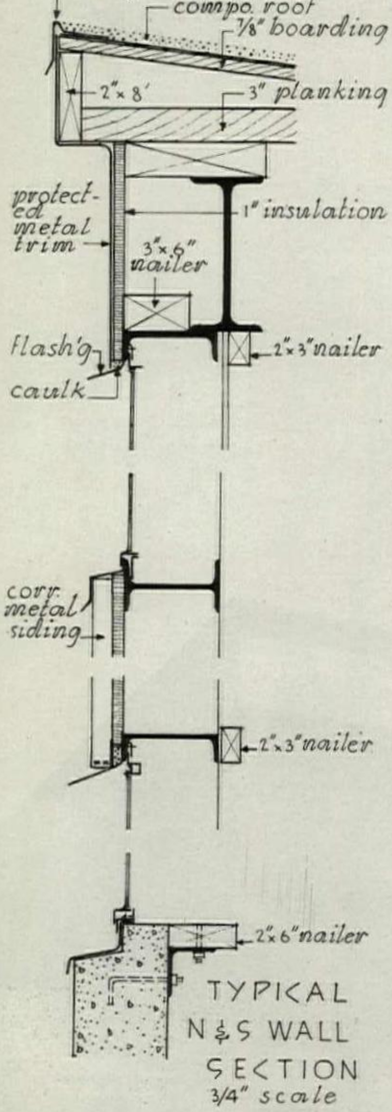
Alonzo J. Harriman,
Architect-Engineer

A sizable group of architects and designers (not to mention certain building-material manufacturers) contend that the ultimate in architectural design is approached when structure, surface finish, and decoration tend to merge, if not to be, in fact, one and the same. To that group, this unit of a war-industry installation will appeal with special force. To be sure, in this case the exterior material—insulated corrugated metal siding—is not load-bearing, but its use as a building envelope is honestly expressed, with the steel frame clearly showing both on the interior and through the window strips from the exterior. Certainly the architect has capitalized on the inherent qualities of the material in his use of it as a bold element of his design. For all designers, the building's cleancut lines and sound structural system (see details, page 38) are worthy of more than passing notice. The explanation of why this building is so honest and uncompromising is better understood when you know something about the architect, how he thinks and how he works—as you will, if you turn to page 39.

Photos by Ezra Stoller







In the work area, high bay lighting units are mounted at practically ceiling level. With mercury-vapor and incandescent elements combined in single units, the lamps provide a high intensity of light and comfortable, non-glare working conditions.

Built on concrete foundations, the main portion of the structure is framed in steel, with wall envelope of insulated corrugated metal siding. Fixed steel sash rim the top of the building on all four sides; at work-area levels and in service rooms, the sash are operable. The roof is of composition. While wartime restrictions forbid any detailed discussion of the plans, size of the structure or nature of the product, the general organization of the building may be of interest. At basement level are located boiler and heating equipment, garage space, first aid room and storage areas. On the main floor are the machining, assembly, and finishing rooms, employee locker and washrooms, and supervisory offices.

Perspectives

Practical Idealist from the Pine Tree State: Alonzo J. Harriman

Alonzo J. Harriman, architect-engineer, designer of the industrial plants immediately preceding and following this sketch, was born in Maine, July 6, 1898. Couple that with the fact that Maine is the home today of Mr. Harriman's successful practice, and you've an impressive, rather rare, instance of the professional man who realizes the humble hopes of those who fondly state: "There's no place like home." Must be a conservative, you say?

Yes, Alonzo Harriman's a conservative. But he's not the diehard who builds his life on the "what's-good-enough-for-father-is-good-enough-for-me" concept; nor the Procrustes who finds a tradition acceptable and ever after tries to make every thing and everybody fit the inflexible gospel. Harriman is the conservative who subscribes to basic principles, rather than to traditional practices; the man who, when faced with a problem, cuts through the mumbo-jumbo of prejudices and styles and conventions and asks himself fundamental questions: What is the desired end? By what logical routes may it be reached? What techniques, old or new, will best solve the problem?

His choice of career, choice of residence, solution to design problems and his theories and beliefs all evidence this skeptical sort of conservatism based on reality. For instance, he lives and works in Maine, not because his parents did, or because anyone told him to, or even that it's particularly lucrative for an architect to do so (which it's not), but because "I like the Maine climate, the lakes and woods, and the recreation they afford. The thing that a city dweller looks forward to all year is available in 15 minutes from any point in Maine. I like and understand Maine people." It's seldom been our privilege to listen to more solid reasons. It makes us, in turn, "like and understand" Mr. Harriman. And we suspect that most city dwellers will share with us this admiration, not to say a touch of honest envy.

He spent his childhood in Bath, and most of what has happened to him since is the result of smelling the sea and watching the Yankee drama of ships going down to it. The University of Maine, in 1920, graduated him as a B.S. in Mechanical Engineering. During collegiate summers he eschewed the typical collegian's escapist holiday; he worked in the Bath Iron Works. For a time he was a draftsman, but even more significant was the experience he gained by earnestly trying himself out at every phase of the shipbuilding operation; he was successively machinist, fitter, riveter, and member of trial crews. He had a sweaty year, following graduation, in the Works' boiler shop.

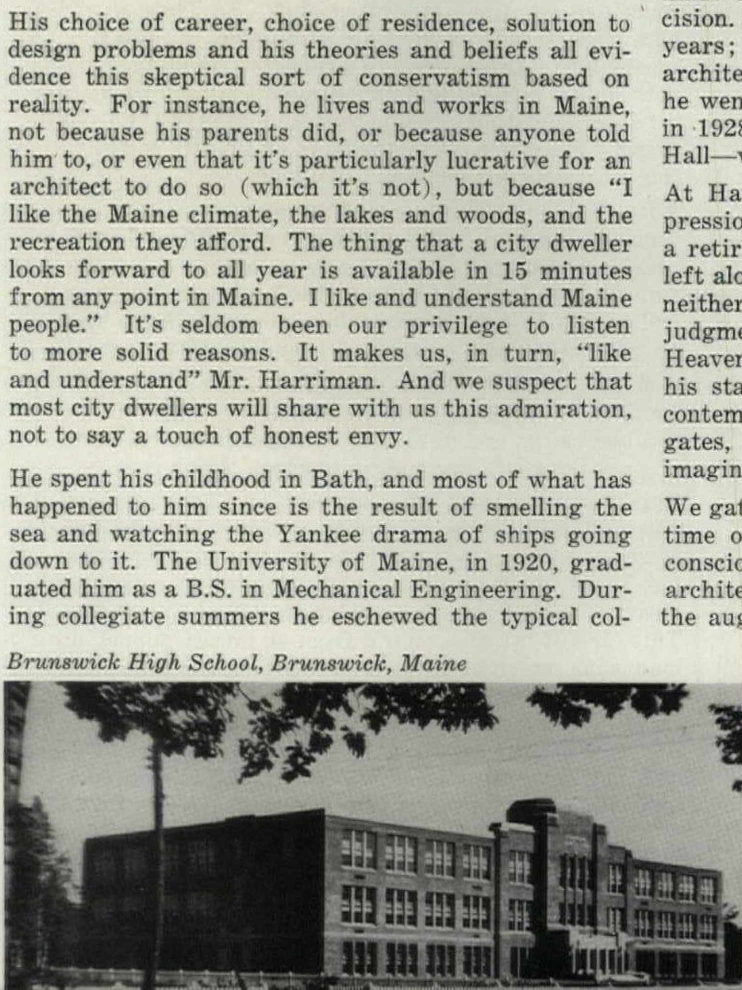
"I intended originally to be a shipbuilder," he says, "and my studies in mechanical engineering and work with ship-construction, design, and operation were all focused to this end. Lack of work in this line in 1921, however, indicated a change, and I shifted to building construction, working as an engineer in an architect's office. I became much interested in architecture. . . ." "Furthermore," he tells us, "I discovered that structural design for buildings was much simpler than for ships."!! (With that sort of experience and application, it isn't surprising that Harriman is equipped to lay out and design iron works and shipyard installations [just when most needed for a national emergency] as few of his colleagues could.)

At about the time he made his discovery, Harriman made a typical—methodical, honest, forthright—decision. He'd worked as a structural engineer for five years; he was nearing 30, but he preferred to be an architect-engineer rather than just an engineer. So he went back to school—to Harvard this time. And, in 1928, he emerged from the Yard—and Robinson Hall—with an M.A. in Architecture.

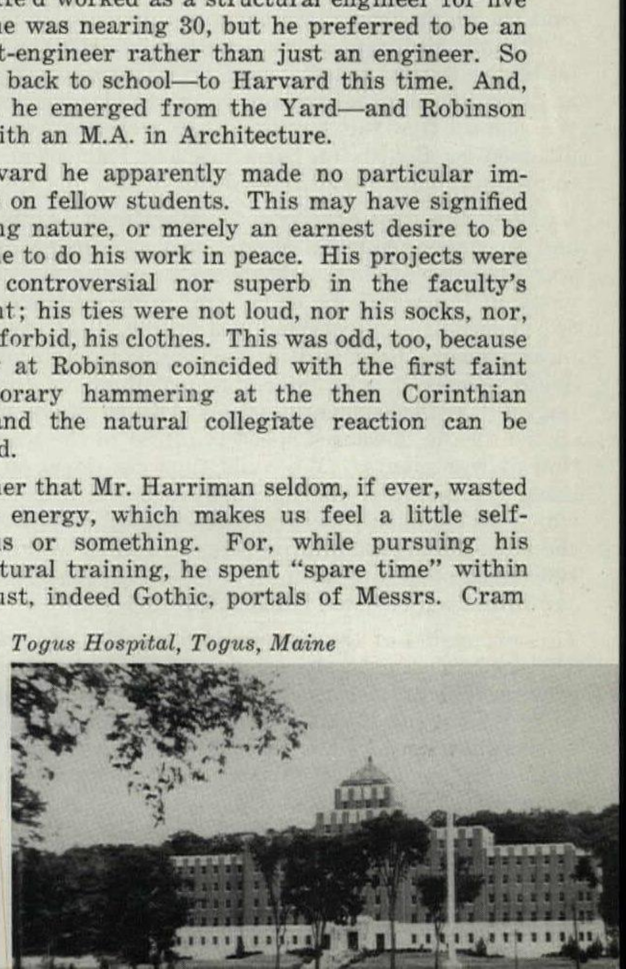
At Harvard he apparently made no particular impression on fellow students. This may have signified a retiring nature, or merely an earnest desire to be left alone to do his work in peace. His projects were neither controversial nor superb in the faculty's judgment; his ties were not loud, nor his socks, nor, Heaven forbid, his clothes. This was odd, too, because his stay at Robinson coincided with the first faint contemporary hammering at the then Corinthian gates, and the natural collegiate reaction can be imagined.

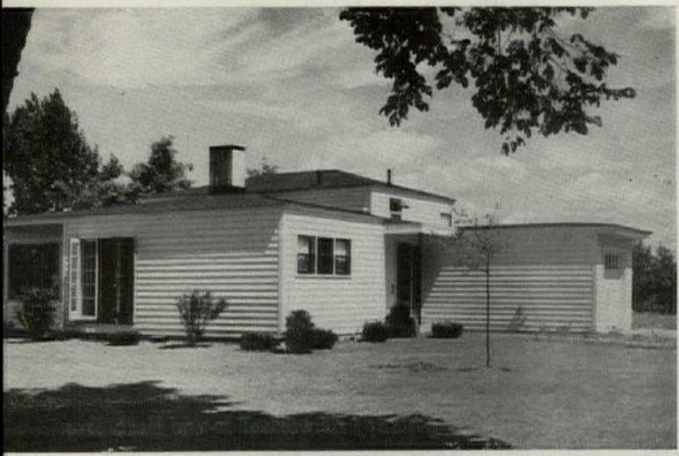
We gather that Mr. Harriman seldom, if ever, wasted time or energy, which makes us feel a little self-conscious or something. For, while pursuing his architectural training, he spent "spare time" within the august, indeed Gothic, portals of Messrs. Cram

Brunswick High School, Brunswick, Maine



Togus Hospital, Togus, Maine





Residence by Alonzo J. Harriman, Architect

and Ferguson in Boston to undertake part-time work as structural and architectural draftsman.

While he was at Harvard he decided to return to Maine to live. Along with assaying the amenities of existence in his home state, he also considered the financial outlook, and again reached a good, solid Harriman decision. "Although not as lucrative as practice elsewhere might have been," he comments, "the ratio of the earnings of the profession to the community was just as high." Again, typically methodical answers to familiar, basic questions: What can I do? What do I wish to do? How can I best do it?

A partnership—Harry S. Coombs and Alonzo J. Harriman—existed from 1928 to 1939. Most of the practice consisted of schools, institutional and municipal buildings. From cursory study of the photographs of two typical jobs of the period (bottom page 39), it would appear that the designs were adequate if not especially newsworthy. It may be assumed, we think, that the planning and the construction were as forthright and thorough as the architect himself, but the buildings hardly reflect broad imaginative flights or any considerable departures from standard practice. We suspect that the "architecture" was strongly conditioned by Boards of Directors and Education, not to mention budgetary limitations.

In 1939, the firm of Alonzo J. Harriman, Architect and Engineer, Auburn, Maine, was established. The war brought expansion of boom proportions. "Previous to the war," we learn, "my office consisted of two men and a secretary. In January, 1941, we put in an office in Bath and in April of 1941, another in South Portland and later, one in Portland." The reason for these several offices was to serve more efficiently the increased speed required in the production of war plants. "We could thus cut down on the usual lag between the job and the architect's office which so commonly occurs when the office is not at the site. The maximum personnel in 1942 was about 100. Each office was an individual organization under our direct supervision."

This expansion of the firm from 3 men to 100 within 3 years is obviously abnormal, a giant and one-sided growth that only a global war would have brought about. Knowing Alonzo Harriman, we are not surprised that he coped with it in an expeditious and methodical manner. Postwar years will undoubtedly mean retrenchment; that this, also, will be handled with deliberate confidence is a foregone conclusion—knowing Alonzo Harriman.

The work of the firm both during the war years and those immediately preceding has been mainly on housing projects and industrial plants. There was FPHA housing in Bath, Brunswick, and South Portland; there were the greatly expanded facilities of the Bath Iron Works; and shipyards in South Portland. Other work included: a ferry slip for the U. S. Maritime Commission, low-cost housing for the Navy, a hospital and six schools for FWA, and sundry small municipal buildings, schools, and residences.

We question whether Mr. Harriman's experience is even approximately duplicated by that of any member of the profession. Which only goes to show how untypical "an architect" is, how fatuous become most generalized statements about "The Architect" in the light of the vital experience of any single, active practitioner. But while there is no fixed pattern for becoming, or any all-inclusive definition of "an architect," there is an area of basic principles within which all architects survive and progress. It should be enlightening for others to know upon what convictions Mr. Harriman has built his successful practice.

Good architectural design, Mr. Harriman believes, is "honest planning for the service the structure is to render—with emphasis on scientific rather than the *beaux arts* approach." He feels that architects should make much more sincere selection of structural materials than is usually the case, considering length of life and maintenance first, and cost second. "Appearance should be the final consideration," he maintains, "not the first; appropriateness and good taste will be obtained if the first two are correct."

Concerning two matters on which many architects are wobbly, Mr. Harriman has this to say: "Architects should have greater knowledge of advanced structural engineering principles, such as are now developed by airplane design, so that they may give the public a scientifically engineered building that is more efficient, a building in which structure and surface coverings form an integrated unit. . . . They should also have a more extensive knowledge of industry, especially of processes and products; building products should be used and encouraged that can be mass produced and that are tougher and lighter than our present materials, with the idea of greatly reducing the ratio between dead and live loads."

With disarming frankness, Harriman erases generations of contrary opinion when he testifies that he considers architecture "entirely as a science. I continually look for means and methods of using mechanical energy to replace muscular energy, so as to keep up with other and competing branches of industry."

A final recommendation and admonition to the profession: "Forget the 1900 standards of ethics relative to advertising, and fight fire with fire, or the majority of architects will become contractors' employees."

These controversial observations are full of fight. Alonzo Harriman may have been born and raised in Maine, and he may have returned there to practice, but there's nothing insular or cloistered about his ideas. His challenge is as salty as a Northeast blow. This kind of thing—coming from an unself-important man who sat right here in a chair in our office trying to say it over the gale that drummed past our twelfth-story window—was a little startling. It was no less so when he wrote it to us in black on white. You may quarrel with Alonzo J. Harriman's particular beliefs and hopes. He has a serene answer. "You may gather," he writes, "I am an idealist and, therefore, I am not afraid of standing alone." Those too timid to do likewise may ponder the fact that he *had* four offices employing 100 men going at one time in the Pine Tree State.

Photo by Ezra Stoller

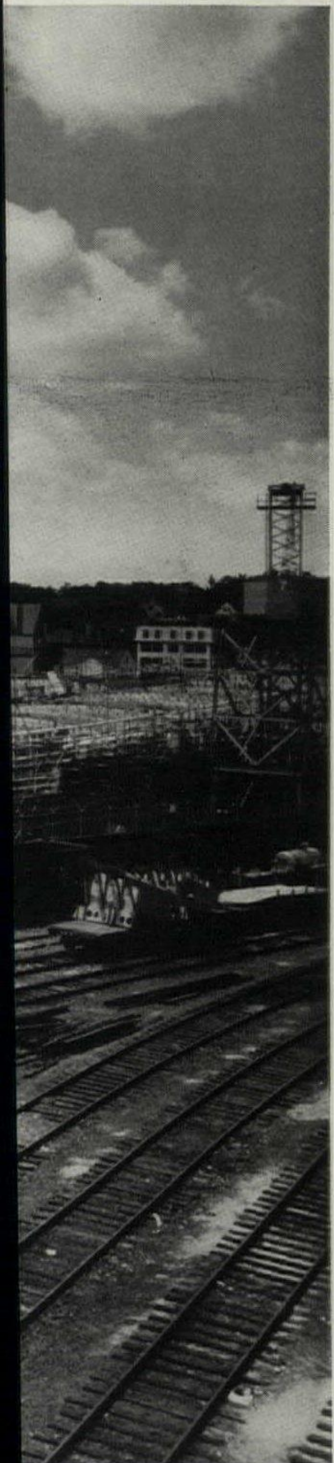
Iron Works—Expanded Facilities

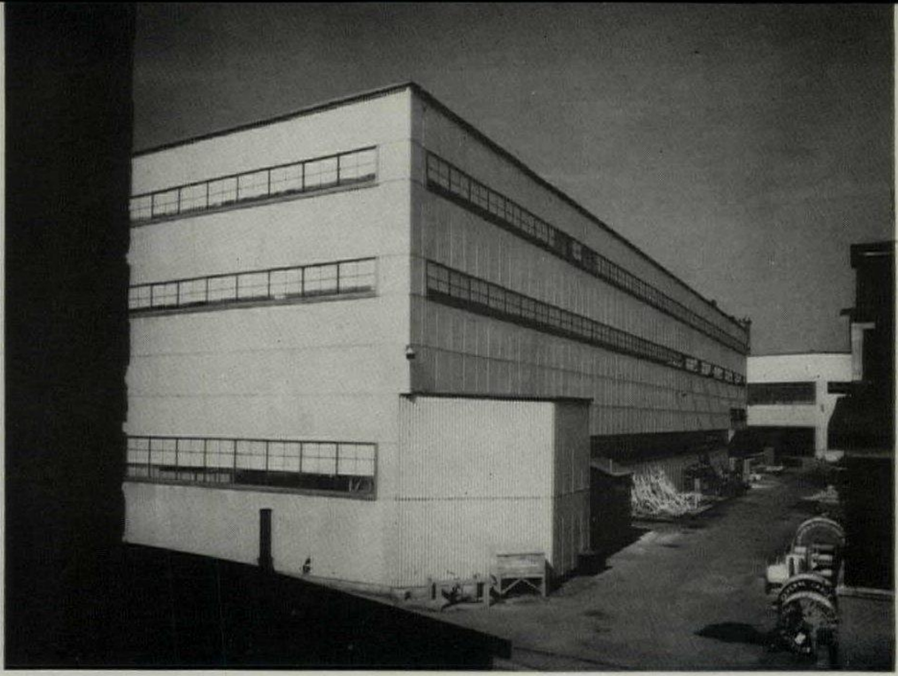
Alonzo J. Harriman, Architect-Engineer

Design of an iron works and shipbuilding installation requires an extraordinary degree of specialization. Many—if not most—architects would have to start with the A-B-C's and conduct extended research before attacking such a project with confidence. Not so, Alonzo Harriman. For, he had originally intended to be a shipbuilder and, before he became an architect, he had worked in practically every department of this very iron works—including the boiler shop. Little wonder, then, that he was able to handle the assignment with the speed and precision demanded for emergency war construction. Little wonder, either, that the units of the project have such an authoritative air of fitness for purpose. The architect's work included docks, dredging, a welding building, storage building, office building, paint shop, yard services, and utilities.

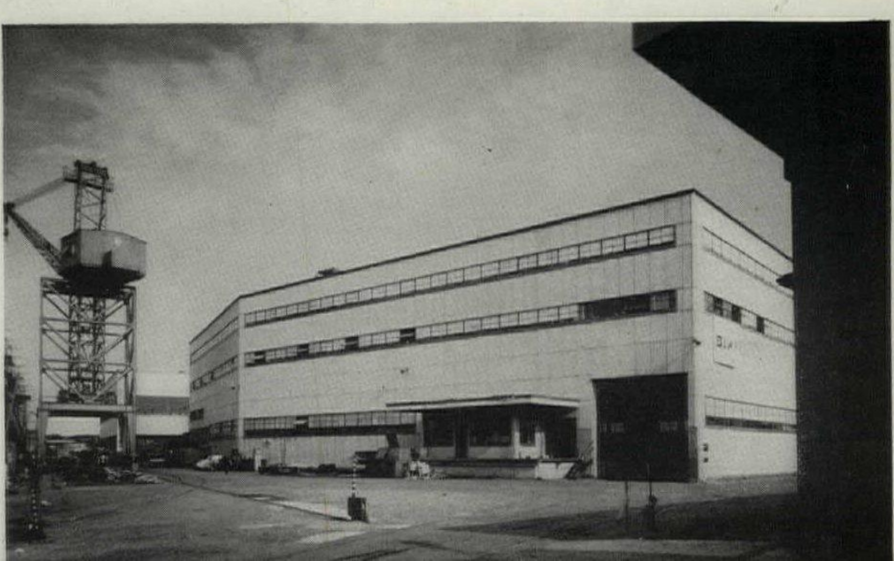
Alonzo J. Harriman, Architect-Engineer

Photos by Ezra Stoller





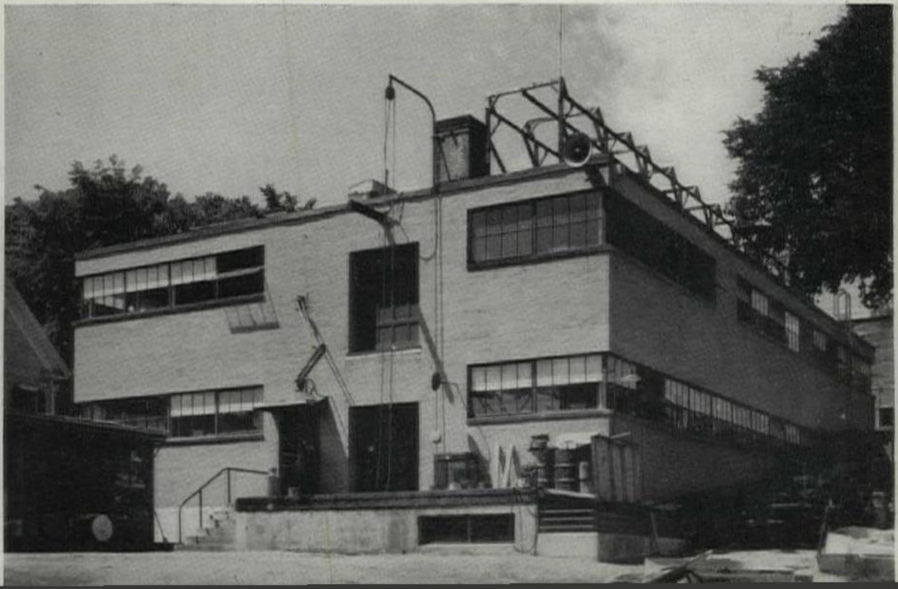
The large photograph at left shows the general organization of the expanded facilities for the Iron Works. At left, in the background, adjoining a new dock, is the new welding building; the storage building is in center background, and additional new construction is under way at right. Detail photographs of the storage building appear above and below this column of text. In addition to storage space, the building contains employee wash rooms, telephone switchboard room, and certain mechanical equipment used throughout the yard. Construction of the building consists of a steel frame, with wall surfaces of corrugated asbestos siding; sash are of steel; the roof is tar and gravel. As in the case of the first industrial plant shown in this issue, it is noteworthy that the structural materials themselves, well organized, need nothing to supplement them in the way of surface finishes or applied decoration. This results not only in a highly functional, somewhat austere building, but also in lowered costs, both initial and maintenance.



Photos by Ezra Stoller

The photograph of the welding building shows clearly the frank use of corrugated siding and horizontal window strips to form the building design, without fuss or feathers. Built like the storage building on the preceding page, frame and sash are steel, and the roof is tar and gravel. Inside (see photo at top of facing page), the welding floor is made of ¾-inch steel plate; light sources are high-bay units combining elements of both mercury vapor and incandescent lamps.

The Works drafting room, located in the main administration building (not otherwise shown here) is a well-lighted room with acoustic ceiling. Walls are of common brick; floors, linoleum.



The paint shop building occurs in an adjoining yard. Brick walls, steel sash and loading-dock appurtenances compose to give this tidy structure a nautical air.

Critical Materials Notwithstanding...

Albert Kahn

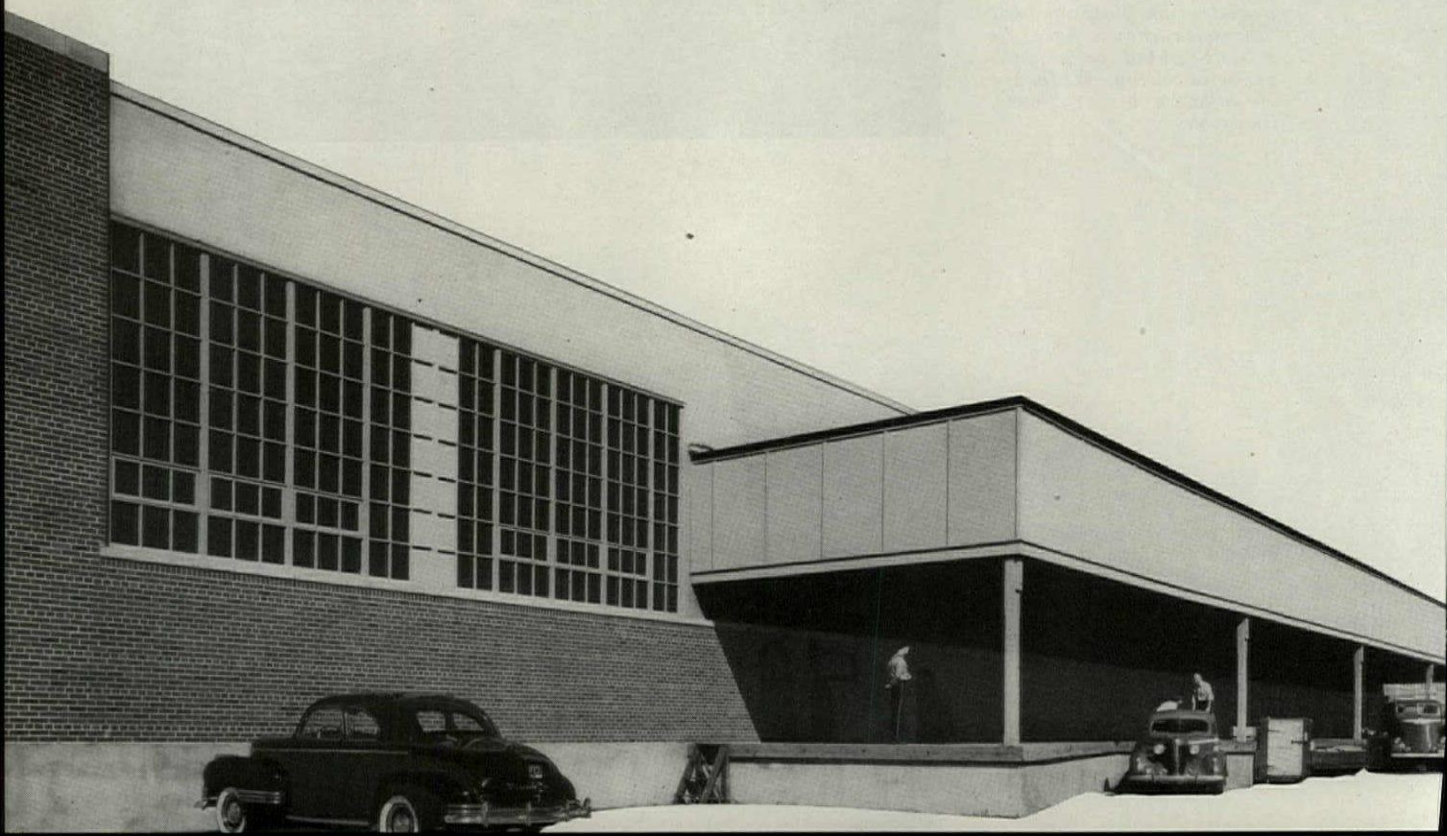
Associated Architects

and Engineers, Inc.

Designed and built at a time when restrictions on the use of steel and other scarce materials were most severe, this sizable midwestern aircraft-engine assembly plant is an excellent example of ingenuity in overcoming limitations to meet wartime needs. The bottom seven and one-half feet of the exterior walls—from footings to sills—are of brick; wood sash extend from sills to spandrel beams, and the roof construction, detailed on succeeding pages, is as practical as it is ingenious in providing a satisfactory temporary solution, easily adapted for later conversion, when materials are again available. All floors are surfaced with wood blocks.

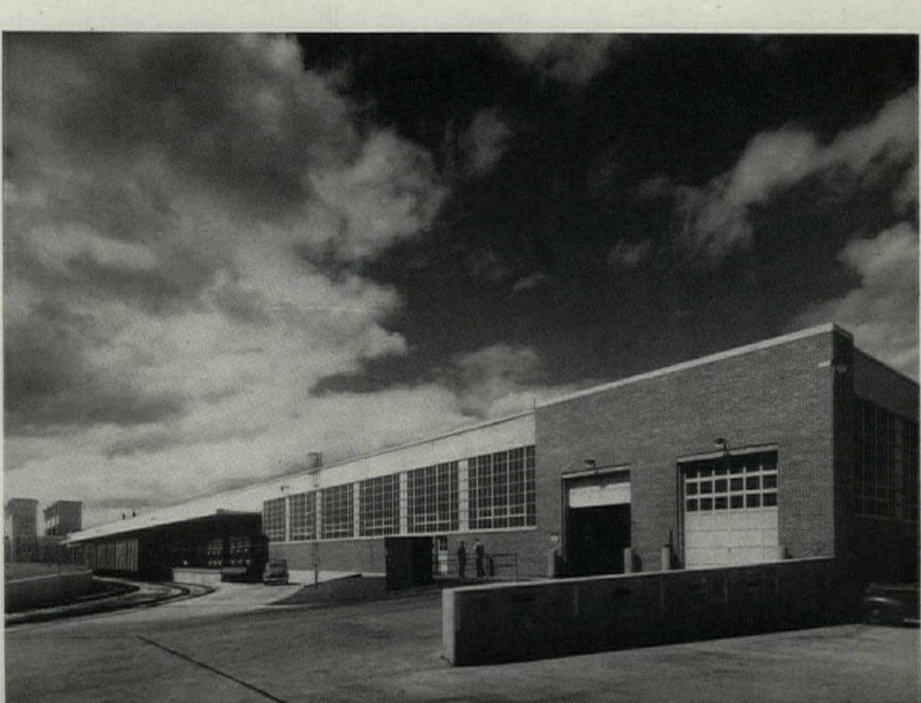
An expansion of previously existing facilities, the one-story structure uses power and other services from the main plant; executive offices and related activities are also apart from the new structure. Loading facilities are organized along two sides of the building—a truck-loading dock of the serrated type along one wall (photo below) and railway dockage with depressed tracks on another side, shown in the photograph at the bottom of the facing page.

Everything is laid out at ground level with the exception of employe wash rooms, which are located in basement spaces. Four fans, installed on the roof, provide summer and winter ventilation. As with all war plants, construction speed was an important factor. In this case, ground was broken in May of last year, and by fall, finished engines were coming off the line.



Photos by Hedrich-Blessing Studios

Above: The main entrance of the plant is flanked by unbroken rows of wood sash.
Below: Facing page, the truck dock; this page, rail accommodations.



Albert Kahn

Associated Architects

and Engineers, Inc.

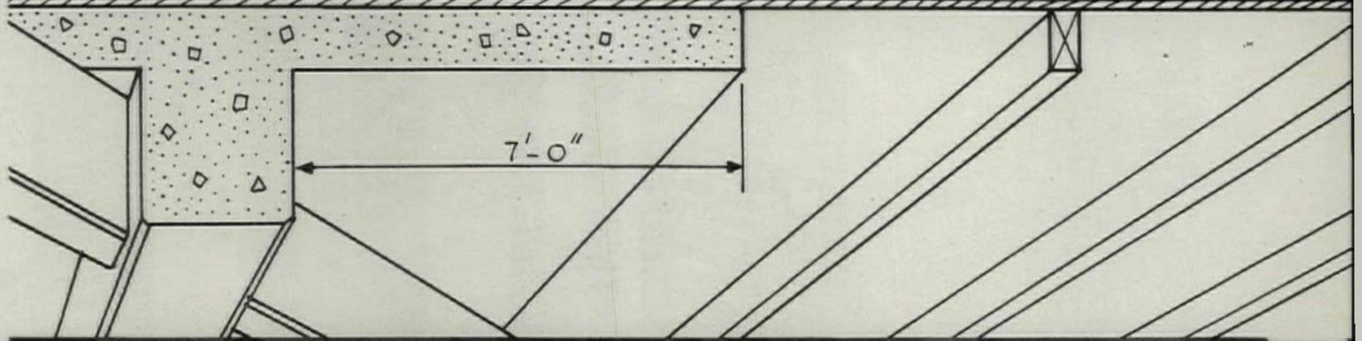
Photos by Hedrich-Blessing Studios

The roof structural system merits particular attention. Lacking steel and other materials required to construct monitors, the architects worked out a skillful temporary installation that can be replaced by monitors at a later date. A study of the extension drawing on the facing page reveals the method employed.

"T" sections of reinforced concrete in both the supporting end column and in the cross slabs run the full length of the building, and parallel to each other. Before the roof was finished, the architects comment, the framing gave the appearance of a huge train shed with "T"-shaped shelters running along the trackage.

The cantilevered roof slabs extend seven feet on either side of the vertical supporting columns, and from the edge of one slab to the edge of the slab in the next parallel "T" section is a span of 26 feet. This gap is temporarily bridged over by timber construction.

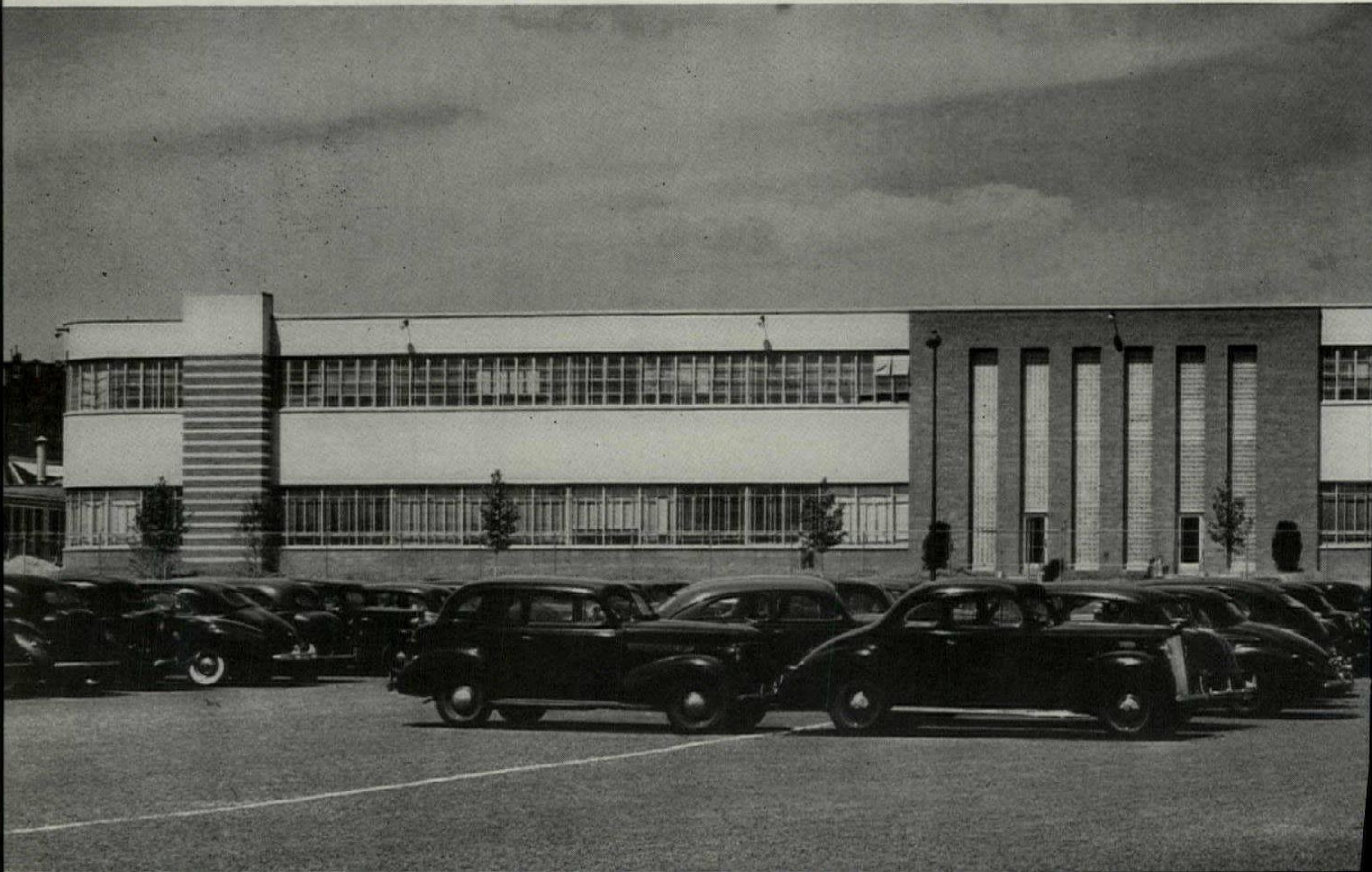
This system has the dual advantage of requiring no steel except available reinforcing steel in the concrete, and the timbers may readily be knocked out at some future time, if the owners decide to install a monitor-type roof.

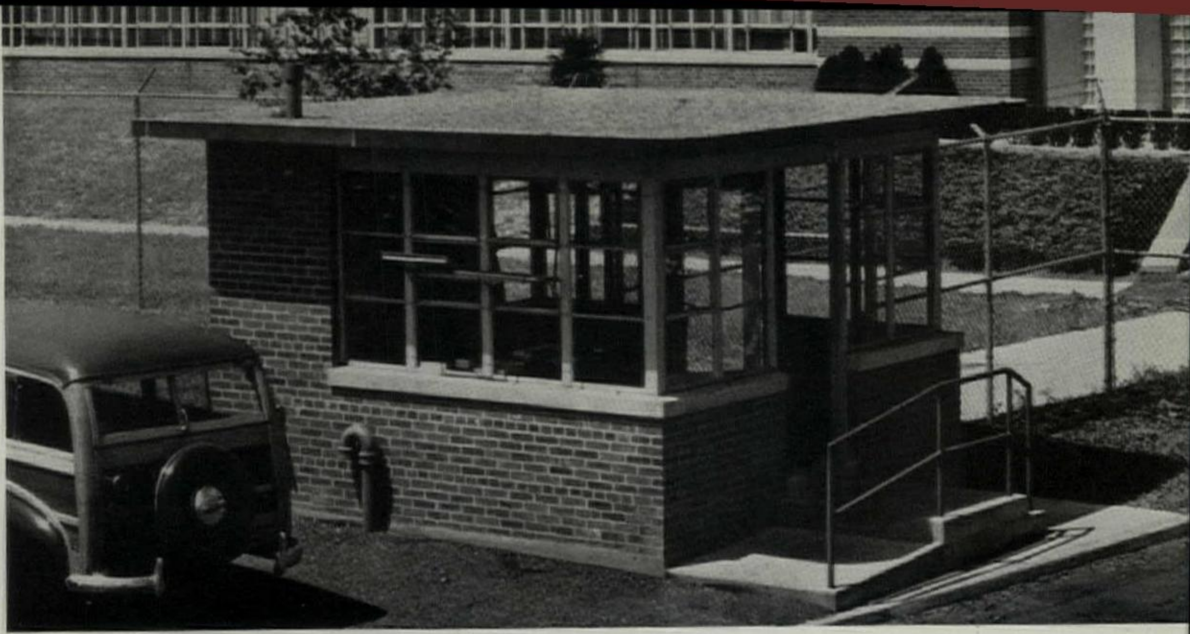


The cafeteria is a light-flooded room designed for efficient handling of large numbers of diners. One cantilevered slab of the novel roof construction is clearly seen in the section extending in from the window wall.

Walter Kidde Constructors, Inc.,

Engineers and Builders





The Face That a War Plant Presents to the World

J. Floyd Yewell, Architect

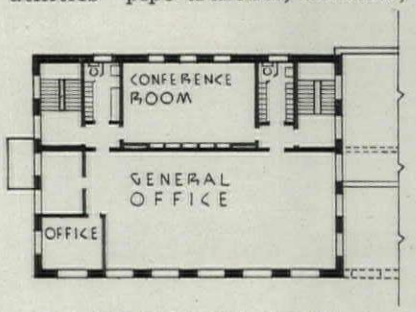
This structure contains administrative offices and service facilities for an extensive, single-story factory building at the rear. The two-story portion consists of executive offices (at either side of the circular corner elements), drafting rooms (left-hand end of the ground floor), kitchen, cafeteria, and dining rooms (entire second floor), and office workers' locker and wash rooms (immediately adjoining the entrance at the center). The rows of steel casement sash are set into walls faced with buff brick; bands of limestone separate the red-brick courses in the end piers. The roof is of precast slabs surfaced with built-up roofing. Office space, cafeteria and dining rooms are completely air-conditioned, employing a split system, with concealed radiation under all windows. Fluorescent lighting is used throughout, furnishing 50 foot candles in the office portion of the building and 35 foot candles in the factory proper.

Photos by Rodney McCay Morgan

Planned for Expansion — Plant Offices and Laboratory, Plattsburg, N.Y.

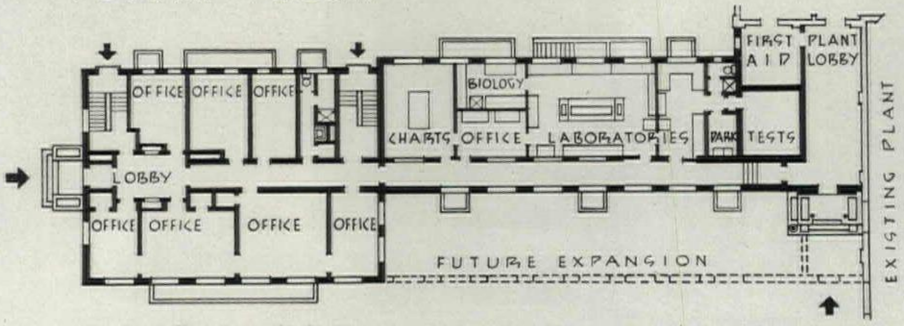
Francis W. Roudebush,
Hugh McDonald Martin,
Architects

Expanded operations of the Berst-Forster-Dixfield Company, manufacturers of paper and wood-pulp products, necessitated construction of a wing to house business offices and a research and testing laboratory, with attendant office space, chart room, and dark room. The site, adjoining the main plant, was a triangular strip, much of which was already occupied by essential utilities—pipe trenches, conduits, and the plant water tower.



SECOND FLOOR

The solution is a narrow block organized along the free side of this strip. On both first and second floors, provision is made for future expansion—to almost double the present enclosed space—without moving existing facilities. At the basement level is a series of storage rooms and space for heating and air-conditioning equipment. The forthright layout of the other two floors speaks for itself.



FIRST FLOOR

Roudebush and Martin,

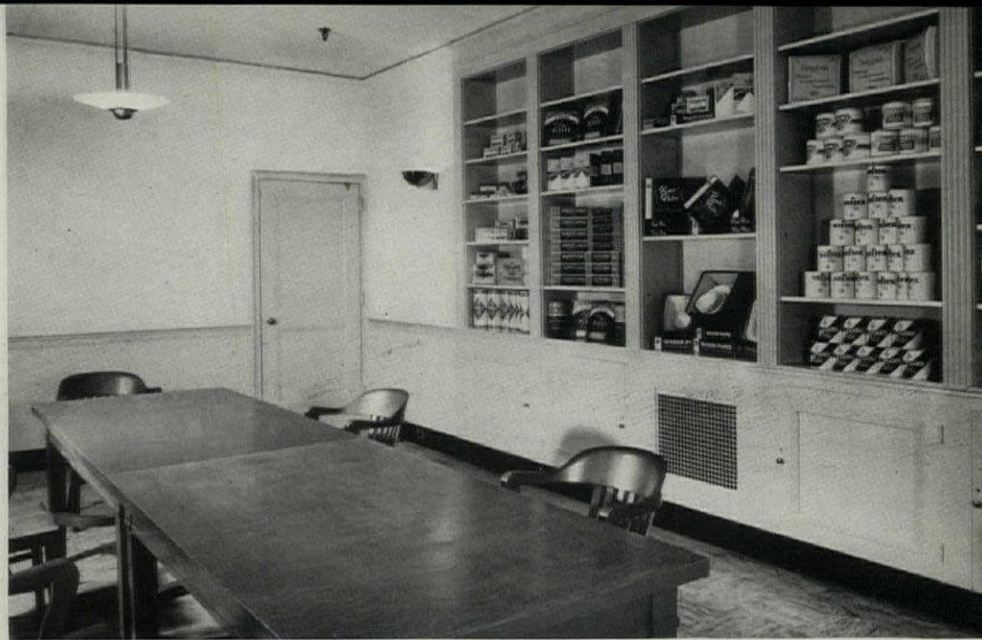
Architects

On the second floor, the control office commands the entire general work area.

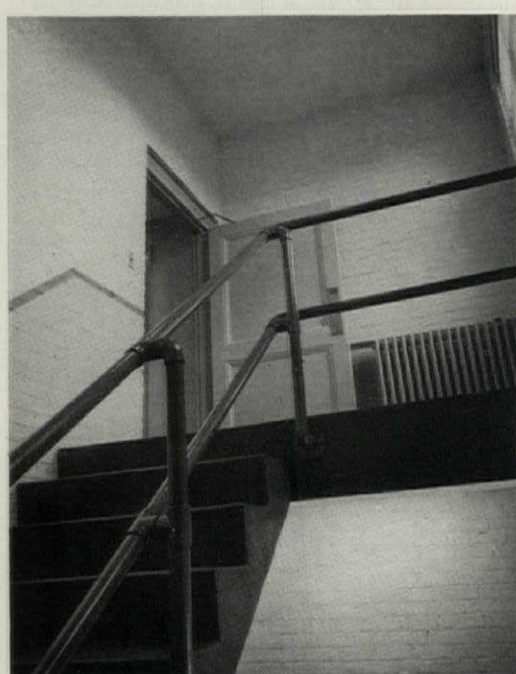
Photos by Rodney McCay Morgan

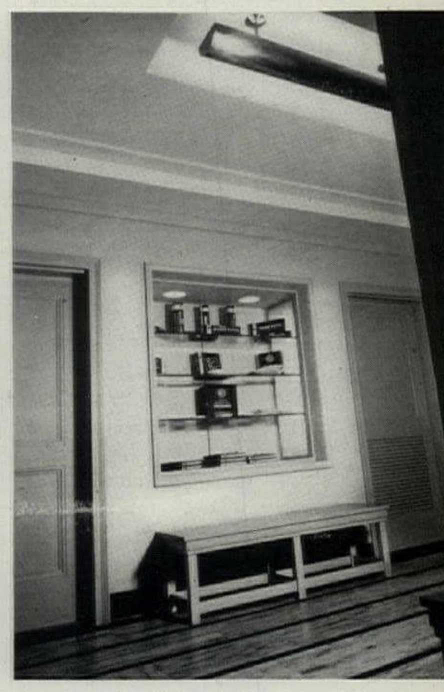
Materials and structural system were chosen for their local adaptability. Both exterior and main interior walls are brick bearing walls; interior divisions—of the laboratory and of the second-floor control office—are movable steel and glass units. Floors are of concrete arch construction, surfaced with rubber tile.

In the office section, walls and ceilings have a plaster finish; the laboratory walls are painted brick. The building roof is composition applied to concrete slabs, supported by steel bar joists. Forced, humidified ventilation is provided throughout, with steam heat supplied by the company plant. An indication of the care and economy with which the building was designed is the fact that cost of the complete structure (excluding portable equipment) came within thirty dollars of the estimates.



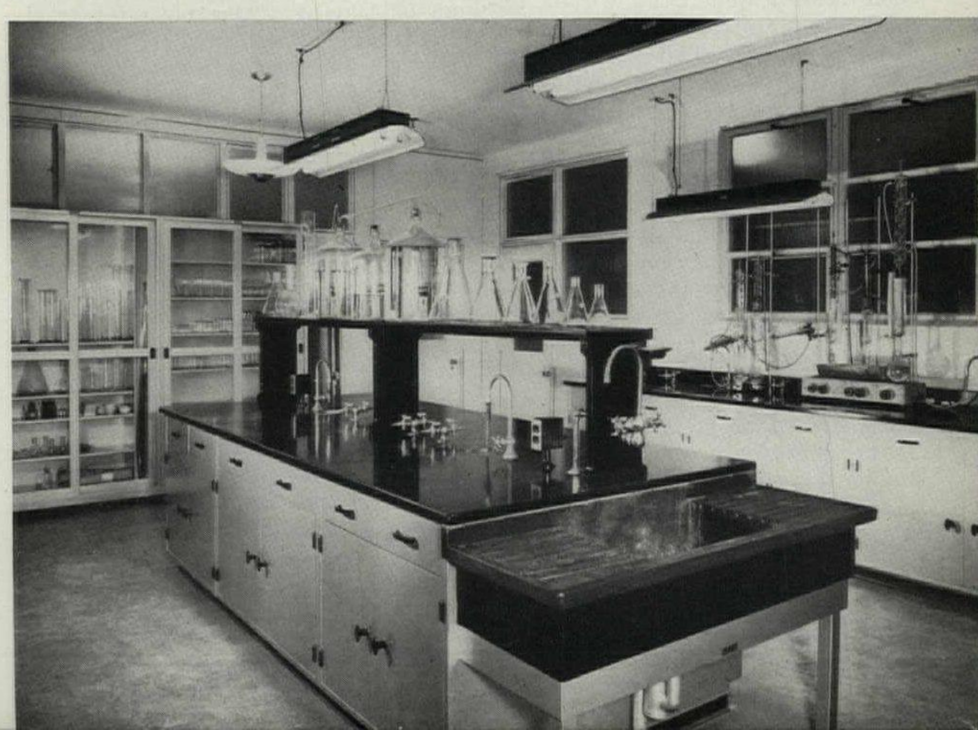
Second-floor conference room





Research and testing laboratory

Stair detail and display niche in the ground-floor lobby



Industrial Lighting Practice

by Cecil I. Cady

Engineer, of the firm of Voorhees, Walker, Foley and Smith

The war has brought a new era in factory lighting. Old factories have been transformed, and gigantic new factories have been built to turn out staggering quantities of new products by new processes manned by new personnel. Under the spur of absolute necessity to roll out a continuous flow of "enough . . . on time," little short of optimum lighting standards have been countenanced.

New types of roof and wall construction have been developed to raise the distribution of daylight; to provide excellent artificial light, vastly improved electric lamps and fixtures and new techniques of application have appeared. New building-surface finishes conserve the light for service rather than losing it by absorption.

And all of this concentrated development, focused on "winning the war with production" has brought a highly significant by-product, a gain which heralds a hopeful new age in industrial working conditions. The worker, whether man or woman, works better, is healthier, subject to fewer hazards, is less physically and nervously tired at the end of the day than with the old low-lighting intensities. Eyestrain and the associated headaches and stomach troubles are reduced. Indeed, records show that good lighting impels the worker, unconsciously, to work faster, to make fewer mistakes. Thus, the worker not only produces more with less effort, but he is happier doing it. Everyone gains.

Objectives

In the illustrations accompanying this article, several typical examples of recent factory installations are shown. Before discussing these, though, it may be profitable to ask: What is the primary objective in designing an industrial lighting system? Briefly, it is to provide sufficient light of acceptable quality to enable the worker to perform his task safely, efficiently and comfortably.

To accomplish this objective, the source of light, whether natural or artificial, must be distributed so that the shape, size, and color of the work object is in contrast with its surroundings. The light reflected from the object must enter the eye and register a characteristic image on the retina. The quantity, brightness, and color of the light must cause the image to produce a prompt and accurate stimulus in the nerve system connecting the retina to the brain, thus enabling the brain to recognize the object. As is clear, this business of "seeing" is a complex operation involving not only physical laws of light behavior, but also physiological and psychological reactions of the human body.

In a factory, the main seeing task may be to focus on a point or a small area of surface, or to observe the action of a tool or the fitting together of two pieces of material. A secondary seeing task may be the manipulation of various machine controls or hand tools which the eye must perceive the instant attention is momentarily diverted from the main task. So, the lighting must enable the worker to see with clarity, accuracy, and speed. It should guide his eye and attention to the essential (focal) point of interest.

As to expense, let me paraphrase an old saying: "One pays for good lighting; why not have it?" Due to the efficiency of present-day light sources, the amortized first costs and operating costs of high-level lighting are infinitesimal, compared to the costs of the process labor and materials for which the lighting is supplied. Good lighting is economic as well as humanitarian. The war-production experience of plant managers and workers will cause them to insist on equal or better lighting in postwar factories.

What is good lighting? Consider for a moment some things which militate against seeing clearly, accurately, speedily, and comfortably. First, there is a kind of camouflage lighting, a deception of light and shadow, irregular areas of light and shade, irregular blocks of color, designed with the purpose of confusing the observer. The present war discovers fighting men with faces, hands, clothes, and weapons spotted with color to simulate shadows and natural objects in order to prevent their discovery by the enemy observer. In some factories in the past, the "lighting" has worked in a similar manner, leaving indefinite and distorting areas of light and shadow. Under such conditions, the worker must consciously or unconsciously make a definite physical and nervous effort to focus his attention in order to see the work in hand.

Another enemy of good lighting is glare, a knockout blow to the eye. In a seeming paradox, if the lighting level of the whole field of vision is increased to perhaps one fiftieth of the brightness of the glare area, the eye adjusts itself and tolerates the bright source. An everyday example is the relative offense of a bright automobile headlight at night and in the daytime. In fact, glare is frequently a matter of excessive brightness contrasts in the field of vision rather than any fixed light value. The unshielded bare light source, and the direct rays of the sun through windows are our worst offenders as glare-producers.

Then, there is a kind of "detour" lighting due to lack of contrast between surfaces that fails to fix the attention. The eye ranges at random before focusing on the point of action. Where sufficient light is present, the necessary contrast may be created through scientific use of color.

Factory Lighting

In good factory lighting, the entire environment of the worker should be lighted to a level where all objects in the field of vision are clearly discerned. A variation of the order of 20 to 1 in brightness between areas in the field of vision may be comfortable, but light sources, including windows, with a brightness of say 100 times the room brightness should be shielded in some manner to pre-

The editors thank the following organizations and publications for the use of the photographs that illustrate this article: The Austin Co., Benjamin Electric Manufacturing Co., E. I. DuPont DeNemours & Co., Inc., Electrical Contracting, General Electric Co., Holophane Co., Illuminating Engineering Society, Sylvania Electric Products Inc., Westinghouse Electric and Manufacturing Co.

vent such direct light impinging on the eye.

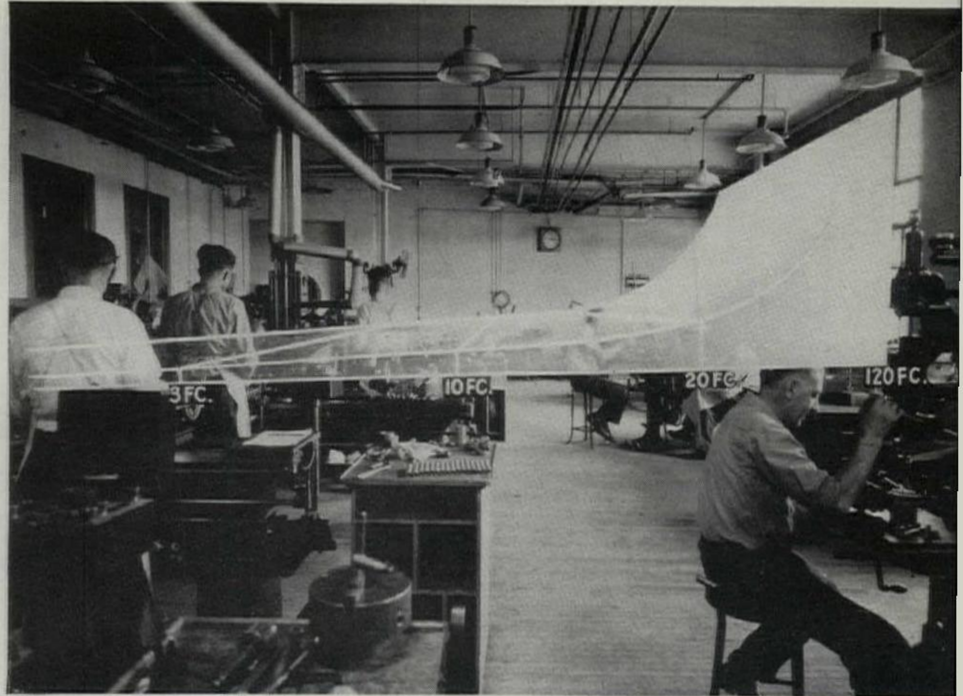
Modern factory buildings in daytime operation are lighted by daylight, a combination of daylight and electric light, or, in the case of windowless factories, entirely by electric light. Each system has its advocate.

Many still feel that no artificial light equals daylight. Much study has been given to the design of industrial buildings in order to utilize natural light to the full. Modern single-story buildings have been built with sawtooth roof construction; with high monitors, and with skylights that have a glass area equal to 30 percent of the floor area. Multi-story buildings have been built with high ceilings and walls largely of glass or glass block.

It is important to note that for buildings in which daylight is used, the amount and color quality of the light varies not only with changing weather conditions, but with the hour of the day and the season of the year.

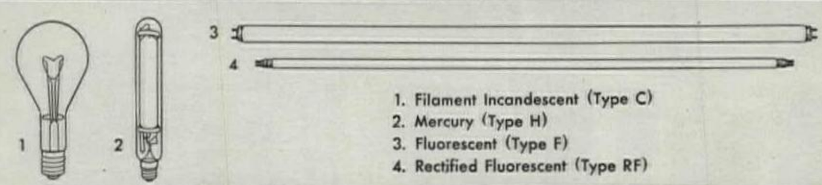
Records and studies of the Weather Bureau and of the lighting profession showed, over a three-year period, approximately one-third of the daytime work hours were clear, one-third cloudy, and one-third partly cloudy. This data, based on average conditions in twelve typical industrial regions from coast to coast, is entirely typical for the northeastern seaboard area. On a typical clear June day in New York City, the daylight intensity in the early morning and late afternoon work periods is approximately one-third of the midday intensity, as measured by light from the north sky.

These variations in daylight supply generally necessitate use of electric light to a substantial extent even in well designed "daylight" buildings. Advocates of windowless buildings emphasize this point and add that monitors, skylights, and windows are expensive in both first cost and maintenance and that they cause large heat gain in summer and loss in winter. Their answer is to do away with



The overlay shows the character of light distribution from a wall window.

TYPES OF LAMPS FOR FACTORY LIGHTING

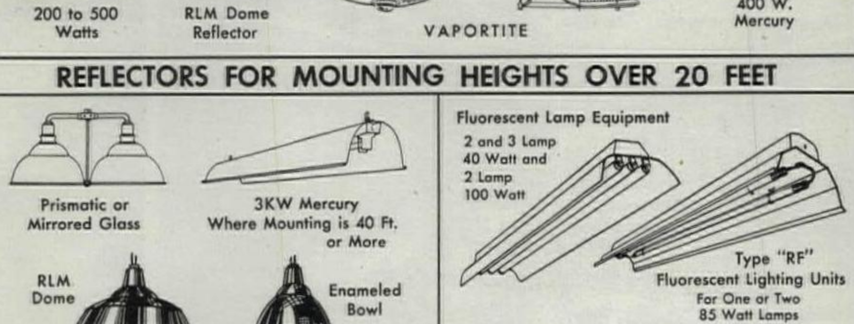


1. Filament Incandescent (Type C)
2. Mercury (Type H)
3. Fluorescent (Type F)
4. Rectified Fluorescent (Type RF)

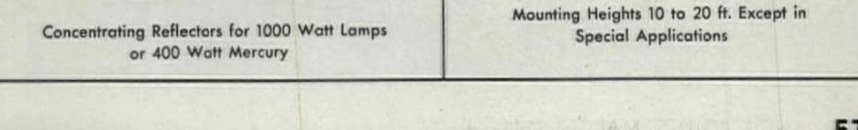
POSTWAR LAMPS RECENTLY ANNOUNCED

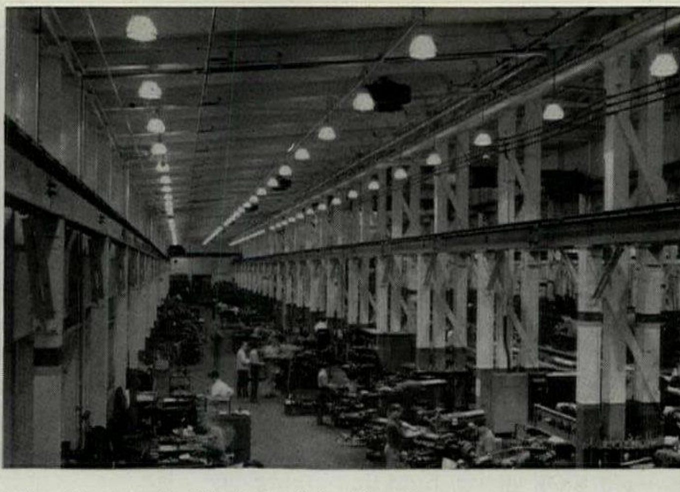
CIRCULAR FLUORESCENT LAMPS Sizes to be produced and current consumption			LONG THIN FLUORESCENT LAMPS Sizes to be produced	
Approx. Overall Outside Diameter of Circle	Maximum Tube Size	Approx. Watts	Length Including Sockets	Approx. Tube Diameter
8½ in.	1¼ in.	20	5½ ft.	½ in.
12¼ in.	1¼ in.	30	5½ ft.	¾ in.
16 in.	1¼ - 1½ in.	40	5½ ft.	1 in.
			7½ - 8 ft.	¾ in.

REFLECTORS FOR FILAMENT INCANDESCENT LAMPS (TYPE C) EXCEPT AS NOTED (MOUNTING HEIGHT 10 TO 20 FT. ABOVE FLOOR)



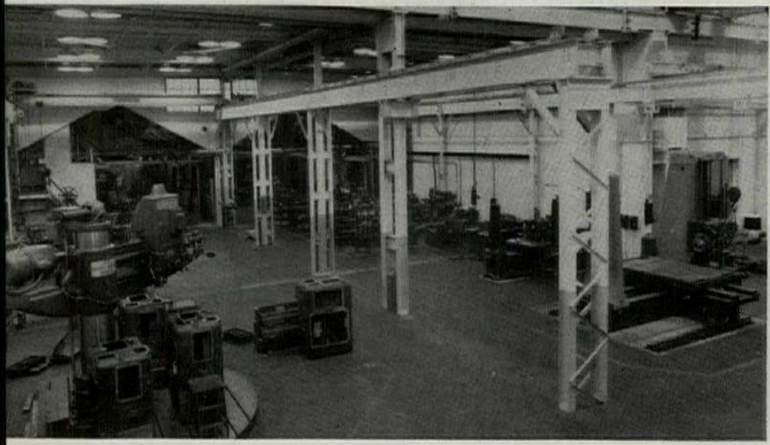
REFLECTORS FOR MOUNTING HEIGHTS OVER 20 FEET

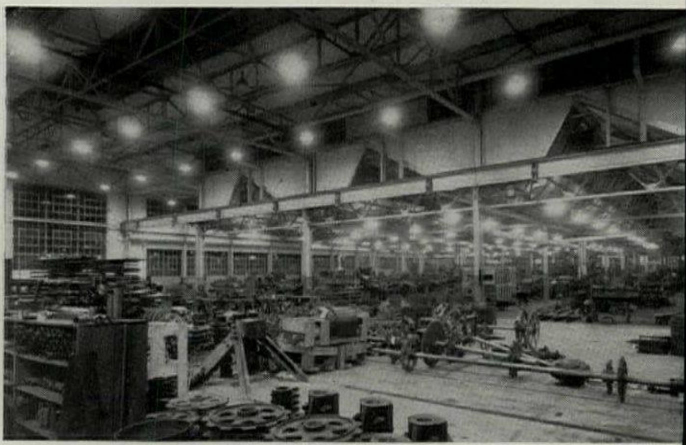




Flexibility of incandescent filament lamps and reflectors is illustrated in the three photographs above. At left, 200-watt lamps are used, spaced 10' by 10' and mounted 10' above the floor to produce 14 to 20 foot candles. A refurbished old factory, it is representative of many which may be relighted and painted in light colors for profitable use. 500-watt lamps are used in the installation shown in the central photograph. Spaced 16' by 20', these are mounted 23' above the floor and produce 20 foot candles.

The three photographs in the row below show modern factory buildings with high-intensity lighting using mercury Type H lamps. In the installation at left, each 400-watt mercury unit is accompanied by 600 watts of incandescent filament lamps in an adjoining reflector. The central photograph shows an instance where there are two fixtures with mercury lamps for every incandescent lamp fixture. Both arrangements are in common use for blending light from two sources.





The two pictures immediately below illustrate two types of installations employing fluorescent units; at left, the units are placed end to end to form continuous rows. A recent development in equipping installations of this type is the "Forlamp" ballast, by means of which each group of four lamps is operated directly from a 460-volt, three-phase power bus. This device effects considerable savings in both wiring costs and in critical materials. The photograph of the office work area shows the use of single-lamp units, at low-level mounting, to provide 36.4 foot candles. This type of system is useful to meet requirements on and below mezzanines and in special process departments.

Here, several silver bowl lamps within one reflector give well diffused high-level lighting in a small shop. But the dark dado, floor, and benches absorb a lot of unused, but paid-for light. After repainting with selected light-reflecting paints, the lighting value of a similar room was nearly doubled.

The illustration below shows the use of 3,000-watt mercury lamps, mounted at 34' height to give the unusual lighting intensity of 110 foot candles. Interiors of all three of these buildings are finished in light colors. Notice the large window, skylight, and monitor windows in the photos below and at center.

The advantage of a white cement floor is obvious in the photograph below. In these large, undivided buildings, some hundreds of feet wide and thousands of feet long, overall lighting efficiency is comparatively high; the light flux emitted by the fixtures is reflected many times by the aluminum covering on the planes and by white floors. Relatively little is absorbed by walls.

all daylight and substitute a system involving complete control of lighting, heating, ventilation or air conditioning.

Both types of buildings are shown in the illustrations.

Basic Types of Lamps

Current factory electric lighting may be classified by the type of lamp and fixture used, by the mounting height of the light unit, or by the light intensity. The lamps and fixtures available have been severely restricted by WPB in order to conserve aluminum, copper, steel, and zinc. This has resulted in the temporary elimination of many industrial lighting units of considerable merit and drastic redesign of others. Glass and plastic reflectors have been extensively used; steel reflectors have been reduced in gauge or replaced by non-metallic materials.

The principal lamps and fixture types now in use are shown in diagrams. They include the filament incandescent lamp (Type C) in voltages from 60 to 1500 watts, high intensity mercury lamps (Type H) in 400-watt and 3000-watt ratings, the fluorescent lamp (Type F) in 40-watt and 100-watt ratings and the rectified fluorescent mercury lamp (Type RF) in 85-watt rating.

The filament incandescent lamp is used in both ordinary and high mounting heights. For all-around usefulness and light intensities up to 15 to 20 foot candles, it has the advantages of low first cost, simplicity, and ruggedness. Furthermore, it is available in a wide range of sizes and, within limits. lamps of one size may be substituted for another, giving flexibility not readily obtainable with some other types.

The standardized RLM porcelain enamel steel reflectors, prismatic glass or mirrored glass reflectors for filament incandescent lamps are made in a variety of shapes and sizes to suit the lighting service conditions and lamp sizes, as shown (page 57).

The high pressure mercury lamp (Type H) was developed in 1935 and has substantially twice the light output for the same current consumption as the filament incandescent lamp. It is excessively bright and must be well shielded from the eye. Because of its high output efficiency and its large wattage it is applicable to mounting heights of 20 feet or more for the 400-watt size and 40 feet for the 3000-watt size.

These lamps, with the necessary special transformer equipment, are higher in first cost than filament incandescent lamps. This is compensated for, however, by their higher light output. If the building is air conditioned, their lower heat emission is also important. Thus, their yearly overall cost is generally favorable. The light from these lamps is principally in the yellow-green (blue) part of the spectrum. The eye is especially responsive in this spectrum area, and these units are particularly valuable for illumination of precision work where color is not a factor.

Frequently, filament incandescent lamps are used in conjunction with mercury lamps, either in the same fixture or in alternate fixtures, in order to supply a red component to the light. The mercury lamps have an objectionable feature, where current interruptions occur from lightning storms in some parts of the country: they will not relight after current interruption until they have cooled off. For this reason, it is customary to use at least some incandescent filament lamps in any mercury installation as insurance that there will be some light immediately on restoration of current after an interruption.

Reflectors for the 400-watt mercury lamp are of porcelain enamel steel or prismatic or mirrored glass, specially designed to distribute the light from high mounting heights. Reflectors for the 3000-watt mercury lamp are of porcelain enamel steel for high mounting heights.

The fluorescent lamp (Type F) was introduced in 1938 and has been available in a variety of sizes and colors. At the present time, its use in industry is limited to the 40-watt and 100-watt sizes, in either white or soft white. The limitation on use of critical materials has caused radical changes in the fixture design for these lamps. The "Victory Model" shown in the diagram on Page 57 is typical of a non-metallic fixture which may be equipped with either two or three lamps and installed as a single unit or in tandem with others to form continuous-fixture units. Continuous row lighting effects economies in wiring and installation costs where numerous fixtures for high lighting intensities are used.

Type F fluorescent lamp fixtures are used where higher light intensities are desired than are obtainable economically with filament incandescent lamps. The dividing line economically and psychologically is somewhat elastic. The surface brightness of the fluorescent lamp is relatively low as compared with other sources, although it should not be unshielded in the field of vision except for occasional seeing. On the other hand, because of this low surface brightness, the emission of light per unit of volume is low compared with other light sources. This results in bulky fixtures. Then, too, where fluorescent fixtures must be hung at high mounting heights, their efficiency is reduced. Other factors, however, may influence their choice even at mounting heights up to 35 feet—for instance, where a worker must look up much of the time to work on the underside of airplane body and wing surfaces. He is, therefore, constantly looking directly at the light sources, and the low brightness of the fluorescent lamp is believed to be less objectionable than the higher brightness of the other sources available. The color quality of light from these lamps more nearly matches daylight color values than does the light from any other except certain specialized ones.

The rectified fluorescent lamp (Type RF) is a refined development of the Cooper Hewitt mercury vapor lamp. It is rated at 85 watts, and one or two lamps are installed in a trough reflector as needed for the light intensity desired.

The unit is more compact than the fluorescent (Type F) of equivalent output, and the efficiency is comparable with that of the Type H mercury lamp. Its wattage and surface brightness are much lower than for the Type H lamps. These factors make it suitable for normal mounting heights of from 10 to 20 feet. While the color quality is characteristically yellow-green, it is claimed that there is sufficient red to make it generally satisfactory for high intensity lighting for typical precision tasks; for example in a machine shop or textile mill. It has found wide acceptance where high light intensities are required with moderate mounting heights and where color discrimination is not important.

All of the mercury lamps (Type H and RF) require special transformers which are relatively high in first cost. This is offset, where lamps are burned many hours in the year, by their low current consumption and long life—3,000 hours or more. And they maintain their high operating efficiencies during their entire lives. This is not the case with filament incandescent (Type C) lamps and fluorescent (Type F) types, which, particularly near the end of their rated lives, decline sharply in efficiency.

The question of maintenance of lighting equipment will not be discussed in detail, but it is important that suitable facilities be provided for servicing lighting units at regular intervals. Clean lamps and reflectors are just as important as clean windows—perhaps more so. Because with dirty windows, one can turn on the electric lights to make up the light deficiency, but a dirty lamp or reflector must be replaced or cleaned to function as planned.

What About Color?

The lighting units themselves are but part of the story. What happens to the light after it leaves the light fixture?

A large part of it falls on the building walls, floor, and ceiling. Another large part falls on the machinery and product in process. The amount that is immediately absorbed and lost is frequently the determining factor in whether the lighting is good or bad. For some time, most have agreed with the general premise that upper walls and ceiling of a factory should be light in color. Now, however, architects, engineers and plant managers are increasingly stressing the need for light-reflecting colors for lower walls and floor and fixed equipment. No longer is it considered necessary to use dark floors and a dark dado so the dirt will not be seen. (The introduction of special materials for whitening floors is well described in the July, 1942, issue of PENCIL POINTS.)

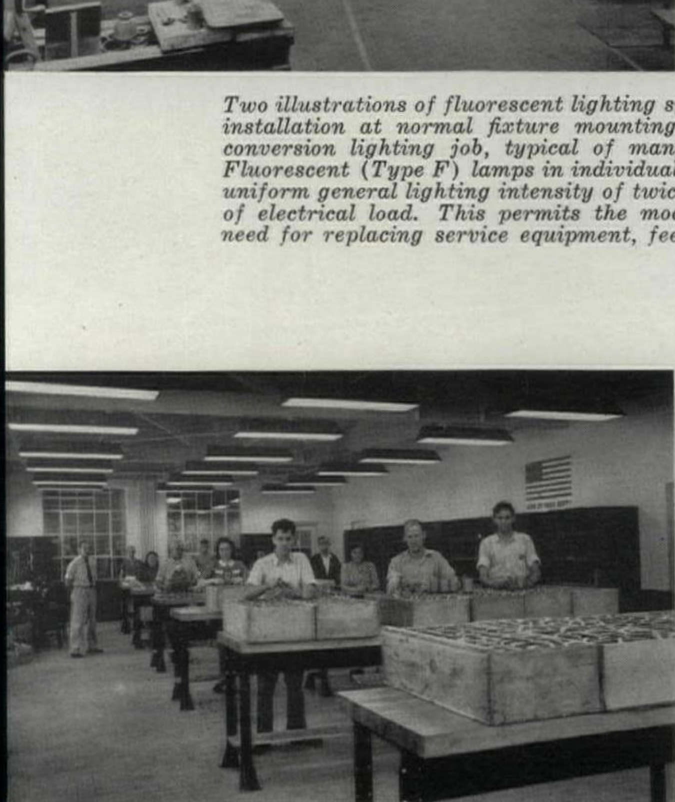
The use of attention-attracting colors on operating levers and other important parts of machines has been put in successful practice. The multitude of war workers who have experienced these improved working conditions will expect to find them extended in the postwar plants. The growing activity of labor-management committees will undoubtedly be a strong influence for such improvements for the comfort, well-being, and greater efficiency of the worker.

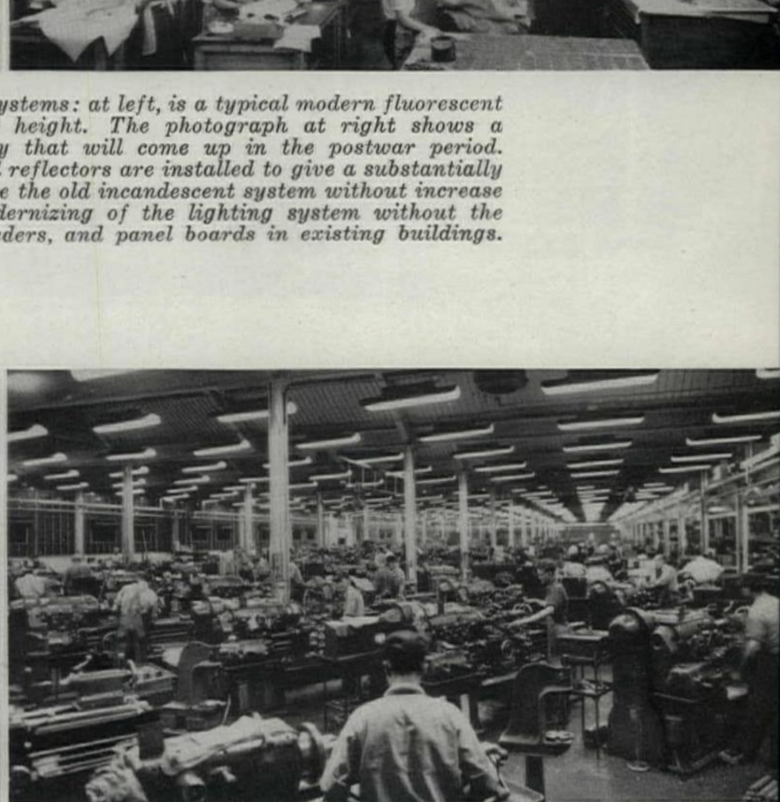
New Lamp Developments

Lamp-research laboratories have developed dozens of new light sources and lamps for special applications in the war effort. These have been developed for military purposes and are still more or less secret. While they have been used principally on planes, ships, and for other combat purposes, some may be the forerunner of new lamps for factory lighting.

Information is trickling out that the fluorescent lamp (Type F) in particular will be greatly improved by new starting and control equipment. New sizes have already been announced as listed on Page 57. These even include circular shapes, which may be combined with straight lamps in patterns to form a design feature. Good news, too, is the development of the cold cathode fluorescent lamp which can be installed in long lengths and requires less auxiliary control.

Two illustrations of fluorescent lighting systems: at left, is a typical modern fluorescent installation at normal fixture mounting height. The photograph at right shows a conversion lighting job, typical of many that will come up in the postwar period. Fluorescent (Type F) lamps in individual reflectors are installed to give a substantially uniform general lighting intensity of twice the old incandescent system without increase of electrical load. This permits the modernizing of the lighting system without the need for replacing service equipment, feeders, and panel boards in existing buildings.

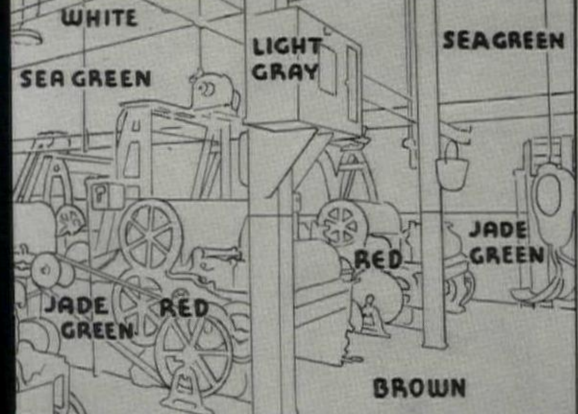


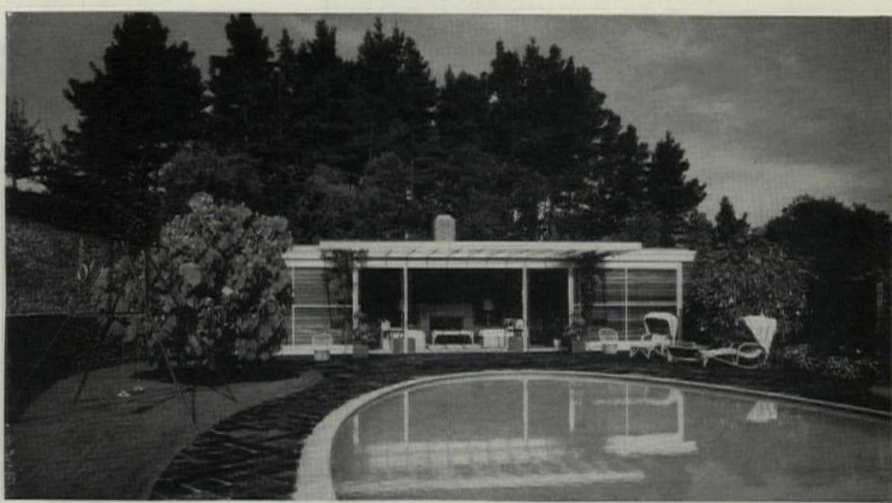


this experimental powder packing room in a govern-ent arsenal, high lighting intensities are used. The tures are dust proof and vapor proof (to exclude wder), and rated as explosion proof, as well. The hting intensity is 55 foot candles.

Here is illustrated the use of the rectified fluorescent (Type RF) lamp for an average machine-shop mounting height. The average illumination is 45 foot candles.

The two photographs below illustrate the use of light-reflecting paints not only on walls, floors and ceiling, but on machinery as well. Colors are used to distinguish "safe" from hazardous machine parts and to focus attention on operating levers and work areas. In addition to improved seeing comfort, the use of color is said to improve the worker's morale. Certainly it promotes good housekeeping.





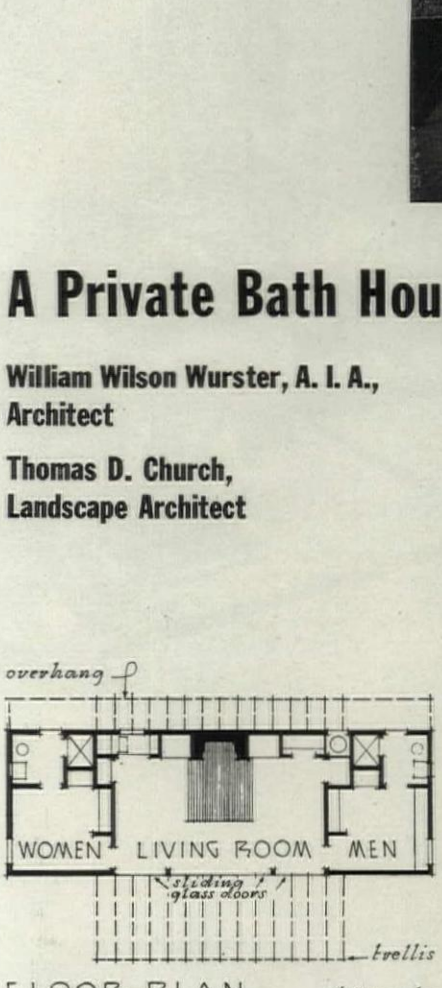
Photos by Roger Sturtevant

A Private Bath House That Is NOT "A Cutey-Pie Little Number"

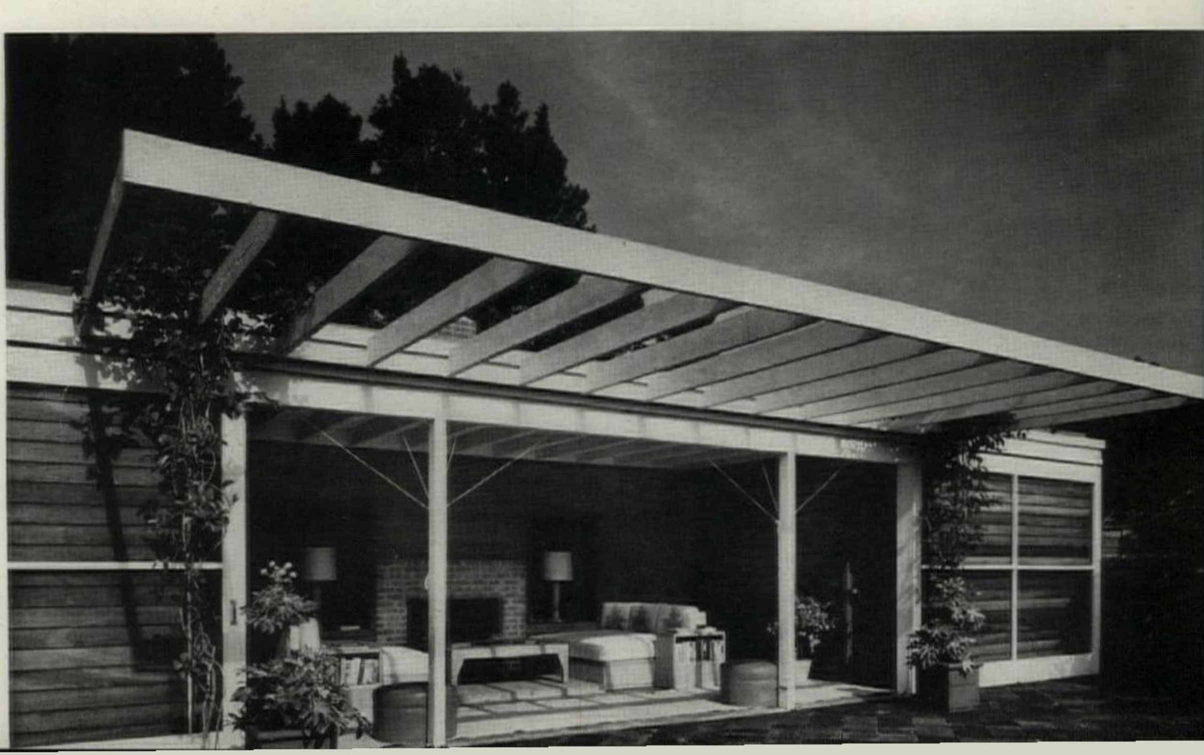
William Wilson Wurster, A. I. A., Architect

Thomas D. Church, Landscape Architect

The quotation is the architect's, but we are happy to set it in boldface type. The restricted world where such things as private bath houses exist is so full of miniature temples of Venus, Dolly Dingle cottages, and itty-bitty editions of the "big house" that it is a delight to find a satisfactory and straightforward solution to the problem. The program for this California bath house called for the usual facilities, plus an open, pool-side living and dining room, complete with electrical cooking equipment. The architect comments: "It has always seemed to me that pools make nearby enclosed space unattractive if at all dark; I, therefore, strove to work out a scheme that should not have a dank air." To assist in the brightening process, the entire front four feet of the living room ceiling (unfortunately not caught in the photographs) is a skylight. The white-painted trim and frame for the sliding doors are striking against the oiled redwood wall surfaces. Almost perfect integration exists, we'd say, between the house and Thomas Church's intelligent landscape design that uses absorbent wood block paving for the "dripping area" bordering the oval pool.



FLOOR PLAN 1/16" scale

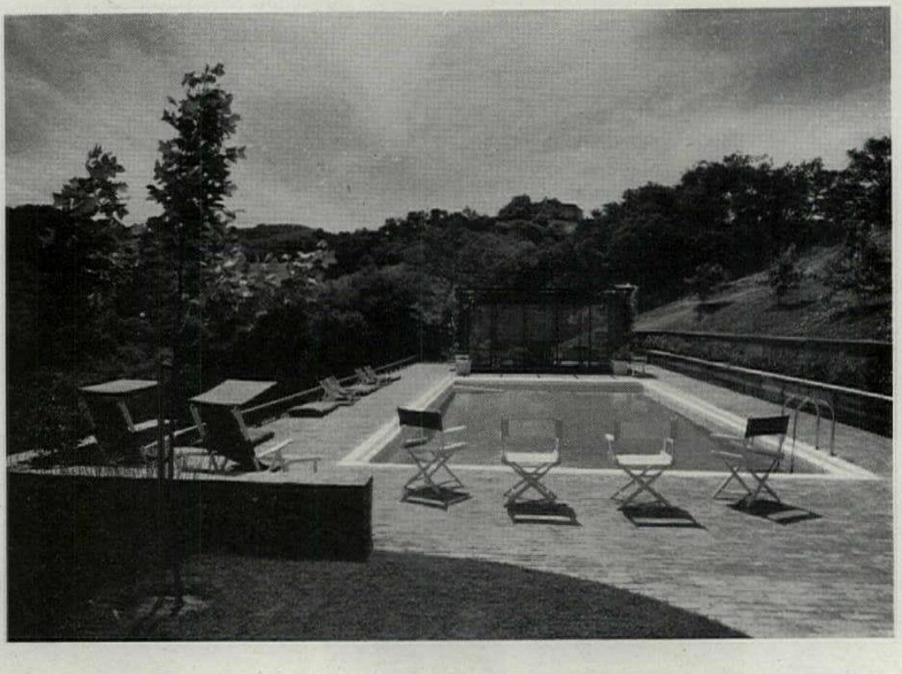


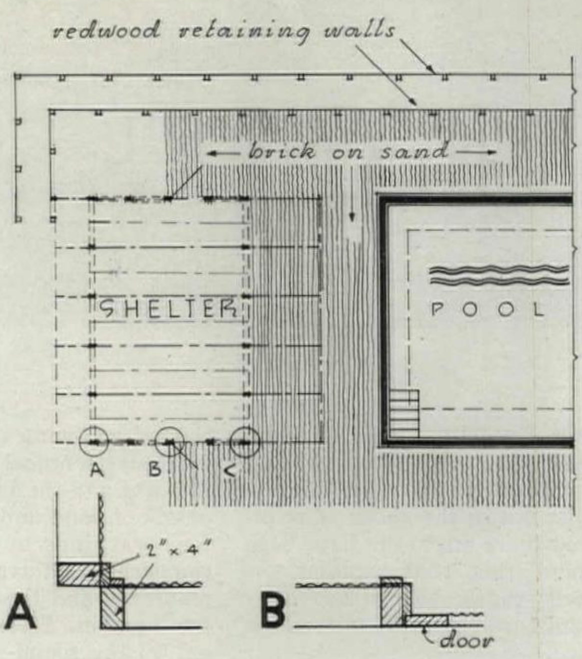
Photos by Roger Sturtevant

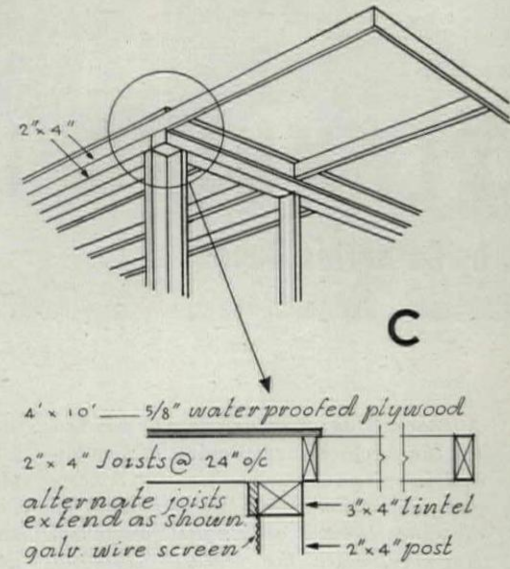
Poolside Shelter, Saratoga, Calif.

William Wilson Wurster, A.I.A., Architect

Thomas D. Church, Landscape Architect

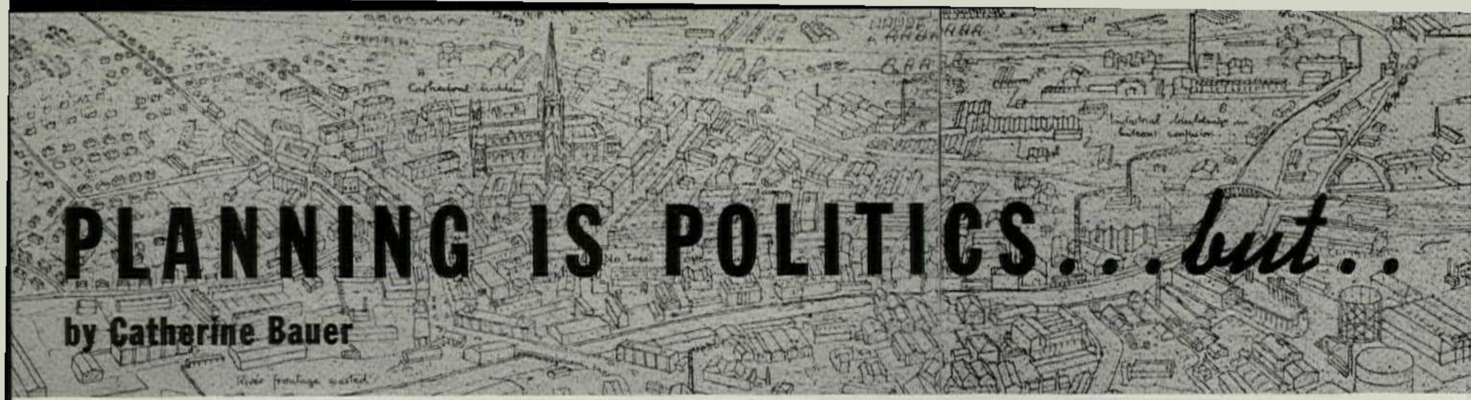






There are wasps in Saratoga
And the sun gets plenty hot;
But within this screened enclosure
People sit, and wasps are not

Though we state the explanation of this disarming bit of architecture in a jingle (maybe we should run a competition for frozen music to accompany it), it isn't because we feel that the structure is inconsequential, but because it argues its own good case without any of our help. The problem: To design a sun shelter, alongside a swimming pool, where spectators could sit in comfort, watch the swimming and talk with the swimmers, and—when food is brought—be spared the jealousies of wasps. Solution: A brick platform, enclosed in a frame of redwood two-by-fours and roofed with oiled redwood waterproof plywood; one door; all tightly screened. There's just something about a simple problem so simply solved and so agreeably proportioned that makes us feel like singing.



PLANNING IS POLITICS . . . *but* . .

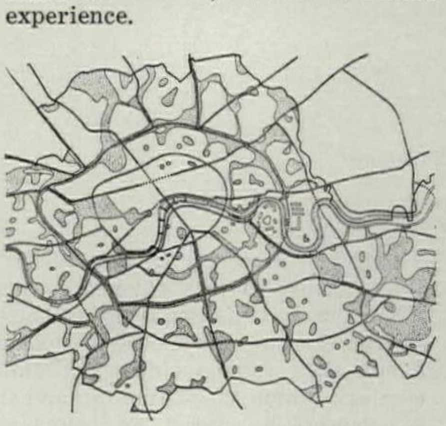
by Catherine Bauer

Author's Note: *This article was written for the* Architectural Review *of London and, in spite of some revision for American publication, still shows evidence of direction toward an English audience. However, since the postwar planning situation in England is distinguished from that in America chiefly by being farther advanced, in public awareness as well as in professional boldness, the points I have tried to make may have at least equal validity on this side of the Atlantic.* —*C.B.*

For a solid fortnight, I have been reading English publications on postwar planning and housing. And now, with the 2-foot stack topped by the County of London Plan all duly checked off, I find myself regarding the lot with admiration, hope, and a vague but persistent worry, about equally mingled.

The volume of output alone is enough to inspire not only admiration but respectful envy on the part of any American interested in the field. We have little to place alongside, and much of that seems narrow, negative, dull, or opportunist by comparison. (Lewis Mumford's pamphlet, *The Social Foundations of Postwar Building*, for instance, is published in England but not in the U. S. A.)

Good printing, literate sentences and clear ideas cogently expressed are in the best English tradition of social analysis. And on top of that an earnest sincerity comes through, a sense of vital urgency that past planning literature too often lacked. If the blitz did it, the shock of realization that there might not have been an England, then that explains the secret guilty regret deep within many American liberals, that we missed the experience.

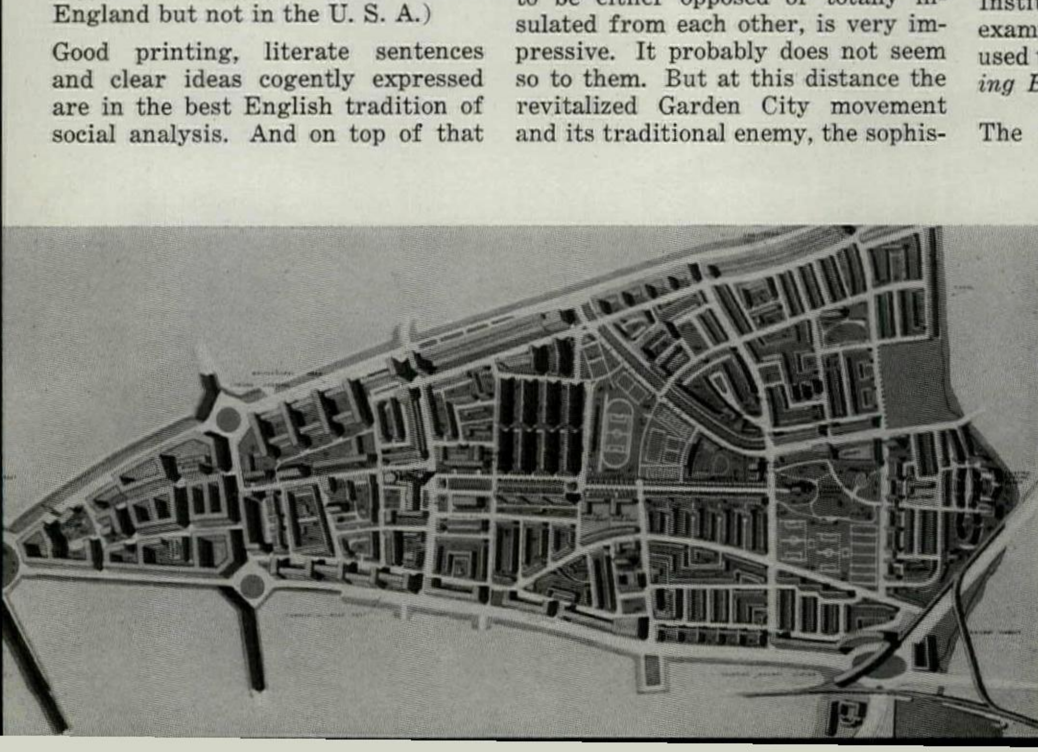


Toward a system of greenbelts with connecting "fingers," to serve and protect the reconstructed districts of the new plan. (Drawing from "County of London Plan, 1943")

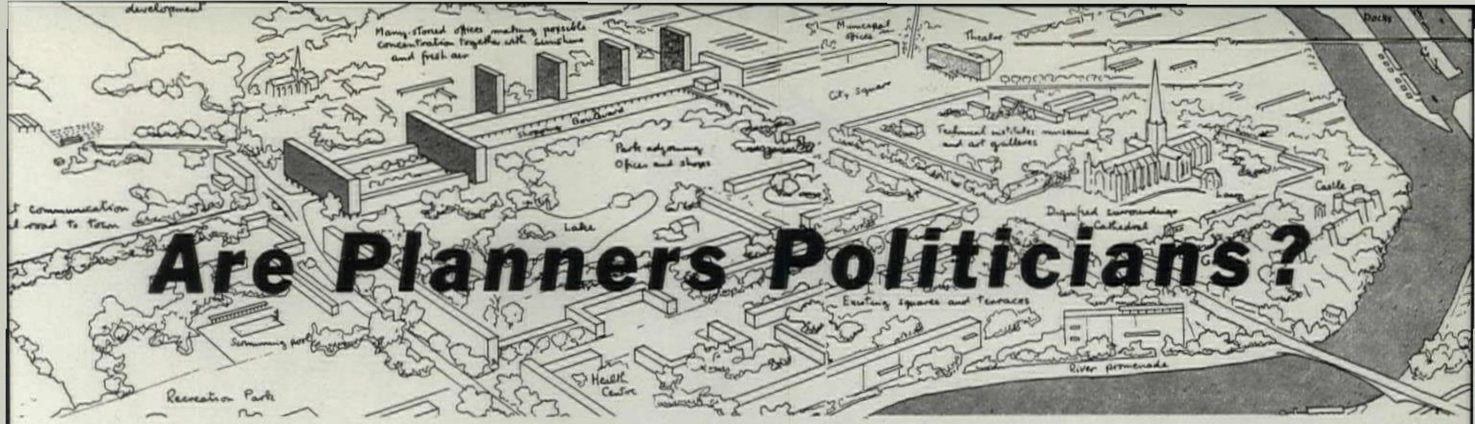
The degree of unanimity on general purpose—or at least on the nature of the problem—among people and groups whom I had always thought to be either opposed or totally insulated from each other, is very impressive. It probably does not seem so to them. But at this distance the revitalized Garden City movement and its traditional enemy, the sophisticated left-wing architects, the ponderously technical Royal Commission Reports and the bright popular pamphlets on land and cities; the portentous warnings of the agriculturists, the brave efforts toward regional planning, and the concrete proposals for London, Birmingham, and Coventry; the social-workers' studies of head-lice among evacuees and the *Economist's* hard-boiled analysis of the housing industry; the routine reports of the Housing Centre and the National Housing and Town Planning Council and, yes, even the grandly impervious schemes of the Royal Academy, and of those newer academicians who envision a sort of vacuum-packed revolution, untouched by human hands . . . all seem to be asking the same questions. And even arriving at many of the same answers, however varied the language.

The general tone is positive. Necks vie with each other to stick out the farthest. Such a ringing statement as that of the London Regional Reconstruction Committee of the Royal Institute of British Architects, that "there can be no place in the Councils of Peace for the timid, the disinterested or the obstructionist", would be unthinkable from the American Institute of Architects, as would the examples of fresh modern design used to illustrate the RIBA's *Rebuilding Britain* publications.

The fact that it *can* happen, that



Reconstruction plan for a 1,500-acre area in Stepney, at 136 persons per acre net, plus 4 acres of open space per 1,000 persons. Multi-story elevator apartments and row houses are included. (Drawings in center of page and at left from "County of London Plan, 1943")



Are Planners Politicians?

Drawings: Yesterday, and Tomorrow, from end papers, "Living in Cities," by Ralph Tubbs

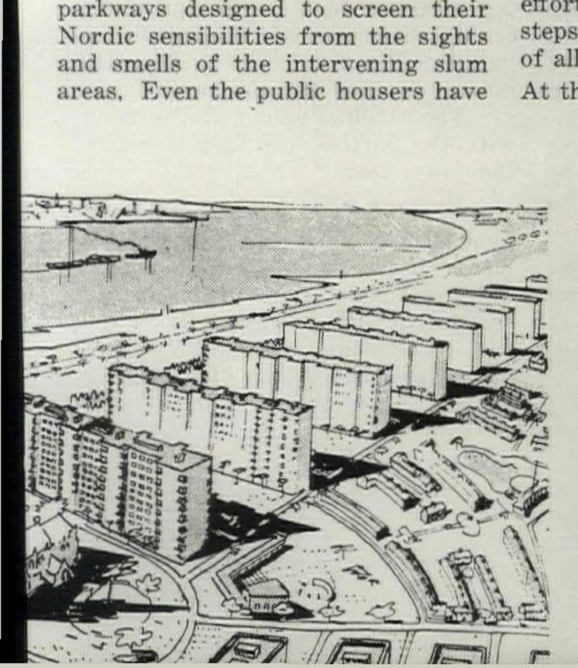
those professionally concerned can at least get together on the axiom that proper land-use is of universal importance transcending any private interest, should give hope and stimulus to us in America. And we need it, not only because we also face crises in land-use, but because this nation may undergo a period of deep reaction, during which American progressives will have to seek strength and inspiration wherever they can find it, abroad if not at home.

The English seem to have resolved and forgotten at last the crude conflict that has for a generation made schizophrenia the occupational disease of planners on both sides of the Atlantic: the conflict between those who consider the purpose of city planning to be the improvement of the general welfare and amenity, and those who set out to preserve property owners from the degrading and devaluing influence of hoi polloi. The development of class-zoning in the U. S. A. has made one wonder sometimes if the ideal democracy as envisioned by many professional planners might not consist solely of "protected suburbs" where, by careful gradations, each economic group from Junior Executives upward would be separately embalmed behind standard set-backs, driving back and forth to work on parkways designed to screen their Nordic sensibilities from the sights and smells of the intervening slum areas. Even the public housers have not been untouched by this idolum. The newer version of this conflict, currently confusing the American public, is of course the "Urban Redevelopment" movement. In the sacred name of "master plans", "bold reconstruction", "saving cities", and whatnot, it is proposed to bail out with Federal subsidy the owners of slum and blighted property—*not* in order to rehouse their present tenants properly, but to stimulate another wave of speculative over-building for the well-to-do and thus, it is naively hoped, to turn the tide of decentralization and preserve down-town property values based on high densities and even higher hopes.

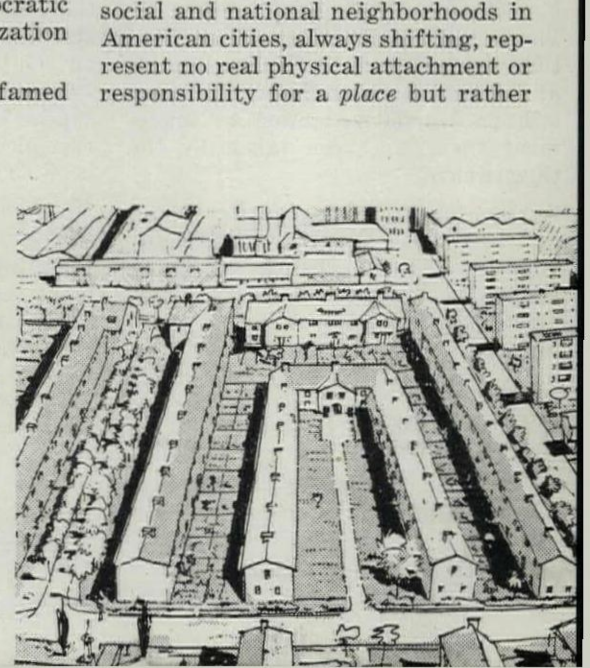
In this whole stack of English publications, there is not one evidence of any such confusion. The famous Royal Commission studies of population distribution and land-use—the *Barlow, Scott,* and *Uthwatt Reports*—are entirely concerned with the functional requirements of agriculture, healthy living, modern industry, and convenience of communication. They face squarely the decentralizing influence inherent in the development of automobiles and electric power, and their frank and open purpose is to prevent speculative profit in land, and to devalue slums. Indeed, the Uthwatt Report boils down to an effort to find just and democratic steps toward eventual nationalization of all land.

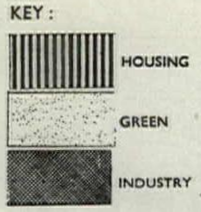
At the urban level the equally famed Plan for the County of London by Abercrombie and Forshaw also rests on honest functional arguments—indicated by the excellent divisions, Community, Metropolis, Machine—with no blurring qualifications based on relative land prices or status quo problems in County finances. Proposed residential densities, right or wrong (and there is much healthy argument on this score), are solely geared to questions of need in relation to work and recreation opportunity, and are supported by detailed analysis of resulting living standards.

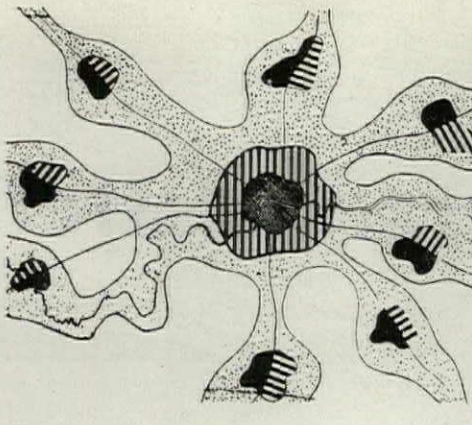
The fact that restoration and protection of the historic neighborhood communities of London is a primary objective, the core of all elements of the plan, seems to me sound. If it is conservative, it is so in the sense of conservation of resources rather than any political connotation. (The Minister of Town and Country Planning characterized the Plan as "a happy combination of piety and revolution".) Superficially though I know London, if anyone had asked me to name its outstanding quality I would have said the distinction between one district and another—in name, in popular tradition, in group affiliation, in physical aspect. Most big cities simply have "good" and "bad" sections. And the all too clearly marked social and national neighborhoods in American cities, always shifting, represent no real physical attachment or responsibility for a *place* but rather

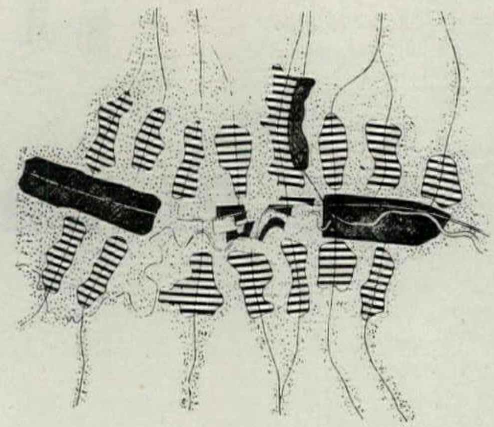


Apartments versus Houses: There is much opposition to the 136 to 200 persons-per-acre-net densities proposed for London's central areas, and the resulting high proportion of families rehoused in elevator apartments rather than traditional row houses. Meanwhile numerous polls indicate that at least 90 per cent of English families want houses with gardens. New York City officialdom duly accepts the 416 to 445 persons per net acre proposed for Metropolitan's Stuyvesant Town. (Drawings from "Your London Has a Plan")









How to reshape sprawling London? The Satellite principle, dear to Garden City exponents, versus the Linear principle put forward by the MARS group of young, modern architects (Drawings from "Towards a New Britain").

are imposed from without or result from the self-defense of minorities against discrimination.

The one social danger in such a course, that of crystallizing class distinctions more than ever, has been directly faced in the London Plan, and the concrete proposals for "a greater mingling of the different groups of London society" are among the best things embodied in the proposal. The fact that varied types, heights, and densities of buildings are recommended for each district, to meet a carefully studied variety of needs (again, whether they are correct in detail or not), also represents a great step ahead of blanket zoning. The principle that families with children, whatever their income, need more open space than do adult couples or single workers, even of highest income, is, again, applied common sense.

* * *

It seems clear, all in all, that England is undergoing a bona fide Intellectual Renaissance. But the epithet "intellectual" brings me to that vague and perhaps unfounded worry which somehow qualifies my enthusiasm for this impressive pile of literature.

It reads like a revolution . . . but is it real?

The Uthwatt proposals came out more than a year ago; the Barlow Report, at the beginning of the war . . . and still no legislative action to implement them has been taken by the Government.

A recent editorial in the *Economist* indicated that the Uthwatt Report "has now little chance of being adopted". True, two important new agencies, a Ministry of Works and a Ministry of Town and Country Planning, have been set up, but their respective Ministers sound irritably and suspiciously defensive when confronted by demands for action from local authorities. And even the most progressive local governments are powerless to proceed beyond paper plans, or even to adopt such plans, until basic national policy on land-use controls, on industrial location and agriculture, on regional government and housing (in some rough sense at least) is established. When, and in what form, is such policy likely to come forth?

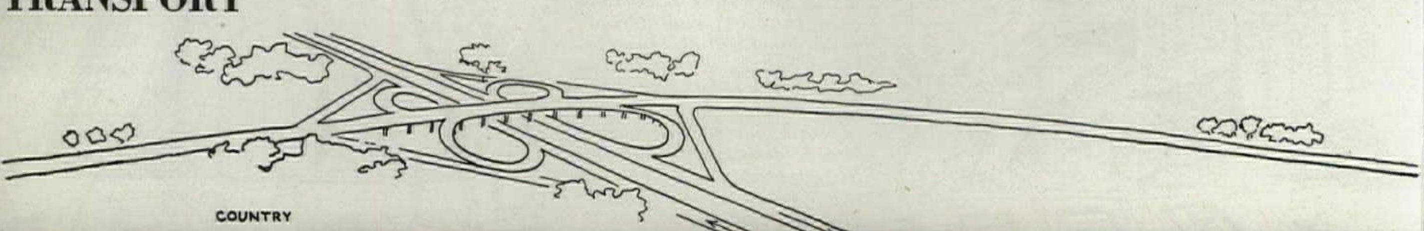
Is there, perhaps, a partial explanation of this delay and growing uncertainty in the fact that these documents on my desk, every one of which contemplates basic changes in the entire social-economic structure of the nation, are almost entirely devoid of political ideas or even a political frame of reference? There are exceptions, of course, but mostly among lay writers without authority in the planning or architectural fields. And in some cases this gap may result from delicacy rather than naivete, while in others it is probably due to the unavoidable curbs of official status. Moreover, several of the pamphlets are quite brilliant instruments for general public education and stimulation. But on the other hand there are numerous implications and statements like the following from Dr. Gutkind's monumental treatise: "There is a fair chance that planning can be kept out of the party machinery, although the danger is not yet over. The heat of political emotions and slogans might well debase 'planning' . . . " Ominous nonsense.

Planning *is* politics, if it is anything more than mental gymnastics. And taking monetary profit out of land is revolutionary politics, whether advocated by a Hyde Park agitator or by a Royal Commission. It cannot *and should not* be decided by the experts and intellectuals alone, no matter how rational, eloquent, scientifically objective, high-minded, progressive, or correct they may be. Nor can it just be tacked onto the present social system as an isolated reform. If it comes at all, it is bound to be part of a great wave that will change a lot of other things even more. I have some sympathy with the caustic sneers of Sir Gwilym Gibbon for the "Utopian planners". He does at least understand that it is not only useless but irresponsible to make radical proposals without recognizing their revolutionary political implications.

Architects and planners in England and America, perhaps professional people in general, almost never use the word "politics" except in an invidious or deprecatory sense, although it is clearly the life-blood of democracy. Indeed, while reiterating constant regard for the latter institution, they tend to ignore the only basis for democracy acknowledged in our respective countries, the party system. (Nor do they propose anything else to replace it). And yet, as Herman Finer of the London School of Economics said in an excellent article, "The paramount, the indispensible authority in the planning process, has to come from the political parties. Planning [otherwise] cannot but be puny and rather academic . . . The cardinal responsibility rests with the parties, for that is where the power rests."

I may well be wrong. Perhaps these publications simply reflect the ultimate purpose and refined expression of a great popular movement already recognized and implemented by the parties. Perhaps the calm objective understatement is just "the English

TRANSPORT



way", too subtle and orderly to be understood by Americans who are used to tirades on every public issue.

But what *are* the party platforms with respect to physical reconstruction, land-use planning and housing? My information is scattered, and I hereby apologize in advance and with pleasure if my deductions err on the side of pessimism. But it seems clear that the Conservatives have no positive program at all, although their distinguished organ, the *London Times*, has taken an enlightened stand on many issues. A fairly recent 7-point Liberal program that I came on apparently includes nothing on land-use controls and only a vague reference to housing . . . although, again, one of their leading members, Sir Ernest Simon, advocates out-and-out land nationalization and a forthright housing policy. The Labour Party does have a statement on *Housing and Planning After the War*, which is quite strong on land nationalization and housing standards at least; and Lewis Silkin, a Labour M.P. from London, has done an excellent Fabian pamphlet on *The Nation's Land*. But there is little evidence that the unions or the cooperatives are really mobilizing their constituents to get action.

Mr. Finer says that among the different categories of postwar reform currently proposed, physical reconstruction is "not one that chiefly moves the man in the street". This is strange, since it touches him more directly and tangibly than any of the others except possibly social security. Can it really mean that workers are satisfied with their environment as it is? Hardly.

In the past, the progressive forces in England did an exemplary job of popular education and political organization for public housing and slum clearance—with the result that this is one element in reconstruction quite certain to go forward, with or without proper planning to make it effective. And for a while it looked as if an even better job had been done recently for social security in the Beveridge Plan—in any case enough to guarantee respectful consideration, even with qualifications, by the government. Is no one undertaking the same sort of responsible *political* work for land planning?

It is a curious and interesting fact that, of all British institutions, the Church seems to have taken its political responsibilities more seriously, and directed its forces more effectively toward progressive goals in the social field, than perhaps any other. *Malvern and After*, a leaflet introduced by the Archbishop of York, proposes that "far-reaching changes in the present system of land ownership are required. . . . In particular, the owner of the sites of cities has hardly any function that would not be as well or better performed by a public body, while he absorbs a great deal of wealth communally created. This is particularly true of those who own land on the outskirts of growing towns . . ."

* * *

But I have over-simplified the problem. Deeper than organization politics are the underlying social trends that reflect popular choice and desire —and the political and administrative framework which can best guide these forces toward the desired goals. The County of London Plan, to take an example, still seems to me primarily a static architectural or physical scheme, comprehensive and deeply social-minded though it is. The *dynamics* are lacking, somehow.

Take the matter of decentralization. Outstanding among metropolitan plans in its objectivity toward probable loss of population from the central districts, it nevertheless fails to face the overwhelming strength of the drive away from congestion toward houses-and-gardens and a natural environment. The Plan proposes the orderly removal of some 500,000 people, together with a proportionate amount of industry, from London's central congested areas. And yet, if the more advanced American experience with automobiles were fully interpreted, and the enormous centrifugal stimulus of war-time evacuation and central destruction allowed for, I believe it would be clear that many more than half a million will move out anyway, with or without a plan to guide them. As for the other end of decentralization, the London Plan is not nearly as bold or concrete as the Birmingham proposal to establish a self-sufficient satellite industrial town 20 or 30 miles out.

London County has serious limitations, of course, in planning for its future at the present moment. It cannot officially make a plan to include the entire London region, any more than New York could make decisions for northern New Jersey or western Connecticut. And it can take few positive steps of any kind until, as indicated earlier, there is an established national policy on certain broad but vital questions. Nevertheless, the County Plan would have been far more effective than it is had it included a clear analysis of its own limitations, of the *division of responsibility*—national, regional, local, *and* individual—necessary for progressive action.

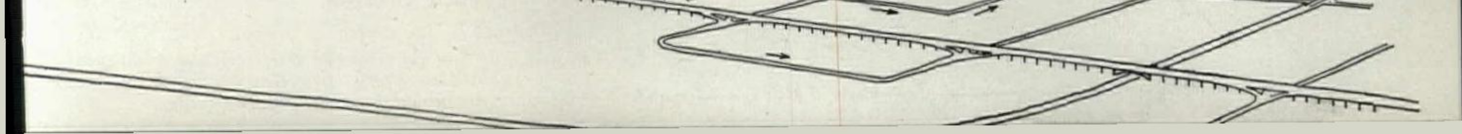
If definition of the responsibilities at the regional and national level has been neglected, it has been totally ignored for the smaller unit—the district, neighborhood, or citizen's group. Perhaps every Londoner knows without being told just what his own job would be, or that of a District Council, in the reconstruction process. But perhaps on the other hand, an opportunity to stimulate democratic initiative and effective political action may have been lost.

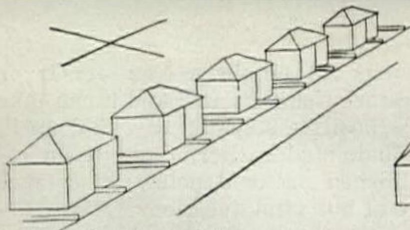
Citizen participation in the planning process seems to me to be the great political challenge of our time. On its solution may well depend the survival of the entire democratic experiment. J. R. Richards observed very acutely in the *Architectural Review* that ". . . to distribute the responsibilities of a highly organized community life equitably is just as much the function of social planning as to distribute its benefits." And I suspect that the progressive planners have been taking too much responsibility on their own shoulders rather than otherwise. Instead of trying to decide every point of policy or technique themselves on a "scientific" basis (which usually comes down to guessing what people want anyway —for there *is* no pure intellectual solution to such problems as decentralization), they might better develop some machinery which would allow people to decide for themselves.

The role of the "expert" in the structure of a rapidly shifting democratic society is one of the most delicate and difficult problems of our time. And it is nowhere more confused or further from solution than in our own field—which, while technically complex, is at the same time very literally "close to home" for the individual citizen.

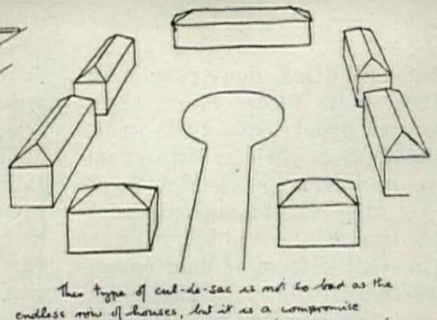
As the *New Statesman* put it, what we need primarily is not paper plans,

Drawings from "Living in Cities"





Rows of semi-detached or separate houses destroy the unity of the street. They have not the quality of the town or the country



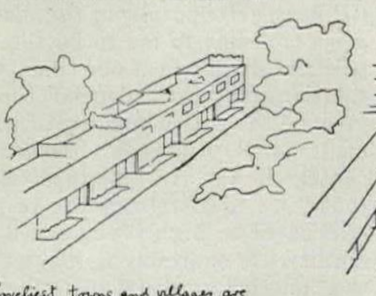
This type of cul-de-sac is not so bad as the endless row of houses, but it is a compromise. It has neither the dignity of the square, nor the informal harmony of the village green

however logical, but some scheme, devised in our own terms, which would "bring into play the new motives and the new driving force . . . which enabled the Russians to perform the economic miracles of the past two decades." And Herbert Read in his Foreword to *Creative Demobilization* went a step further in defining the terms likely to produce a dynamic movement, particularly in countries such as ours: "Cooperation is the only 'technique' of intellectual and moral progress, and it is a technique which implies collaboration and not direction, freedom of initiative, not the impress of authority."

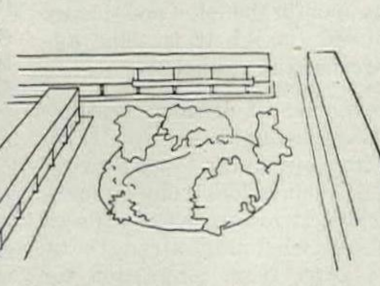
not to some coldly rational planner with ideas about perfect cities or the "social service state."

Questionnaires and polls are no solution, although the English have uncovered some interesting facts about popular housing desires by this means. What is needed is not just statistical information on average tastes and prejudices, but a mechanism for sharing the knowledge and responsibility and thus, eventually, improving the average capacity for decision.

One asks (with parallel questions in mind for America): is the great co-



The loveliest towns and villages are composed of terrace houses. The simple form gives repose, without loss of individuality



The square is in the best tradition of English town-planning. Here is both spaciousness and seclusion

If we assume that individual initiative and responsibility were attributes solely of the uncontrolled private-profit system, and therefore obsolescent, we are lost from the start. Most of our citizens will prefer to hang on to that system till the bitter end at such a price. And power-minded intellectuals impressed by Managerial theories should not fool themselves. If democratic leadership fails and people grow so weary and cynical that they finally give up the desire for individual choice, they will turn to a Huey Long or a Mosley,

operative movement in Britain so dead that it offers no handle for democratic planning? Are the citizens of the East End so degraded that they cannot find leaders of their own to help decide whether a quarter or a half of them should move away, where they should go, and if the rest will thrive better in cottages or in 10-story apartments? What happened to that lively tenants' organization of pre-war days? Why can't the unions and the new shop-steward movement play an important part in formulating and carrying out a policy for the relocation of industry? What neighborhood organizations exist that could galvanize the Boroughs and Districts to positive action within the larger scheme of things?

Paternalism and progressive reform have always been curiously close in Britain: is there no move even now to distinguish between them? We borrowed the general outline of our public housing legislation from England and, basically sound though it is, it needs amendment to encourage cooperatives and other forms of direct initiative and responsibility.

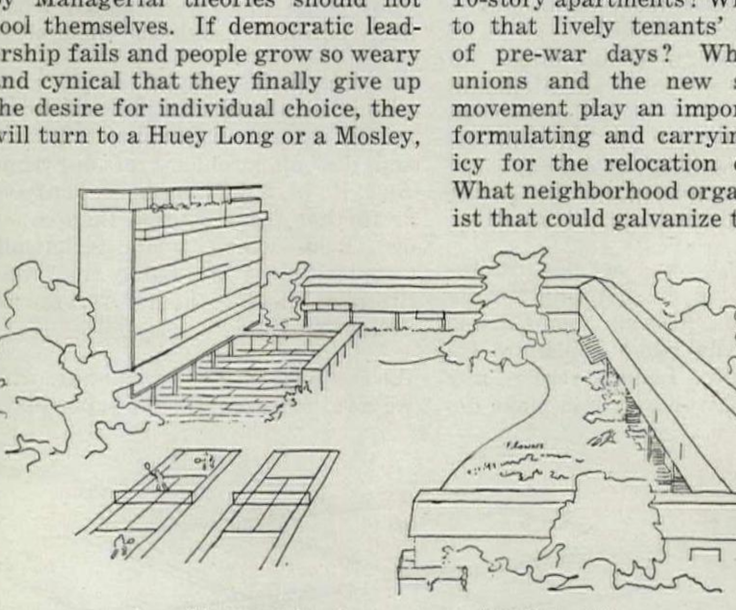
Many issues are too novel or complex, of course, for simple immediate majority decision. Where new forms and techniques and major dislocations are involved, difficult to decide all at once in the abstract, frank experiment and persuasion by demonstration must play an important part. Where complete new towns are to be built (as will happen, for instance, in our own Columbia Basin), perhaps the *first* step should not be land purchase or detailed plans, but finding some few individuals of adventurous spirit who really want to take part in such an enterprise. If a group of people themselves make such demands of government, so much the better.

Once purely designers, the professional planners have gradually accepted the notion that they must also be managers. Now it is time for them to become organizers as well . . . and politicians. As a matter of fact, town planners, in the days when they thrived on the patronage of rich and powerful autocrats, were well acquainted with the art of politics. Perhaps their present relative ineffectiveness simply indicates that they have never relearned the political arts in a form suitable for democracy.

In some respects the people are already ahead of the planners. A half-articulate new faith in an "economy of abundance" is spreading in both England and America—vastly stimulated by the otherwise inexplicable phenomenon of general prosperity in the midst of a desperate and costly war. But let no man confuse this revolutionary vision with any popular desire to be fitted into a scientifically perfect or even ideally beautiful environment as determined solely by the experts. The very word "abundance" implies maximum personal choice, even including whim and waste.

Dean Hudnut of the Harvard School of Design suggests, with his usual shocking common sense, that city planners ought to be elected by the people they serve—"to attain that lack of continuity which, however costly in practical terms, is the certain evidence of vitality in the democratic process."

(The April issue will contain a complete bibliography of British publications, prepared by Catherine Bauer.)



Drawings from "Living in Cities"

Open squares and the peaceful lawns of the college quadrangle. Tall blocks of flats and horizontal terraces integrated into a balanced whole

Photos by Julius Shulman

Southern California House and Studio Workshop

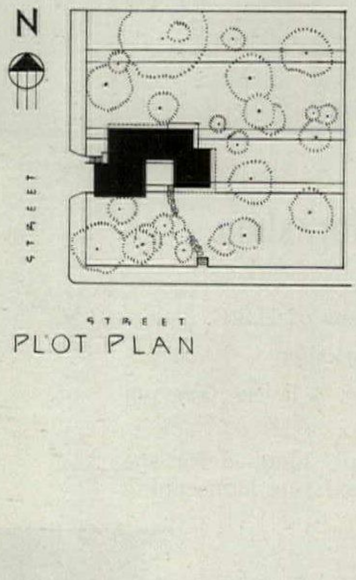
Raphael S. Soriano, Designer

Client: The noted ceramist, Prof. Glen Lukens of U.S.C.

Design Problem: A combined home and workshop

Site: 30-year-old garden; magnificent trees; 4 levels (see plot plan)

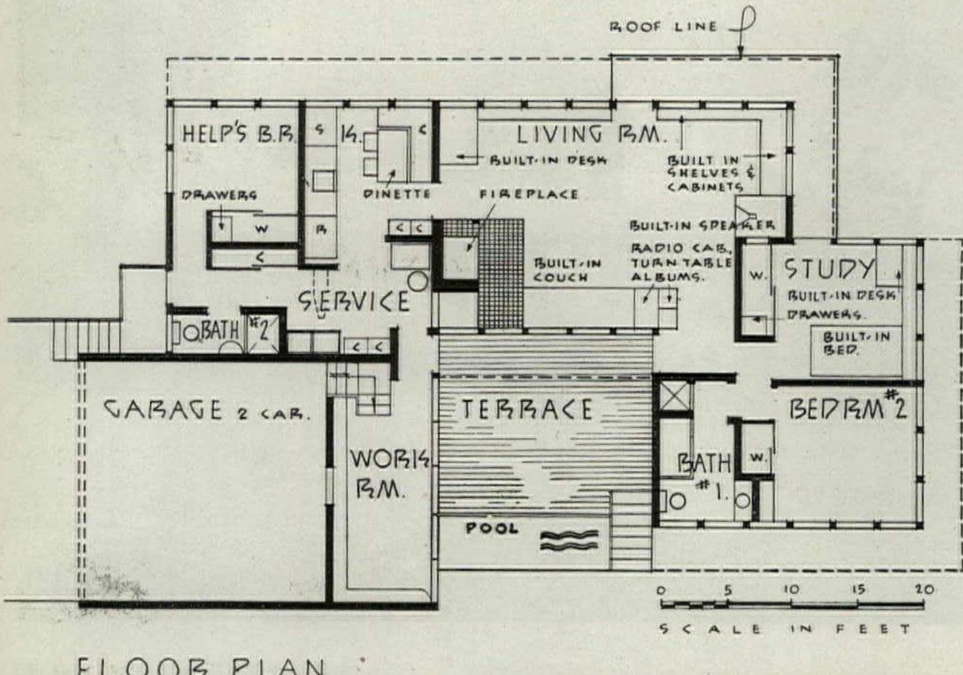
Solution: A newsworthy structure, informally planned for specialized use, organized with rare respect for existing landscaping



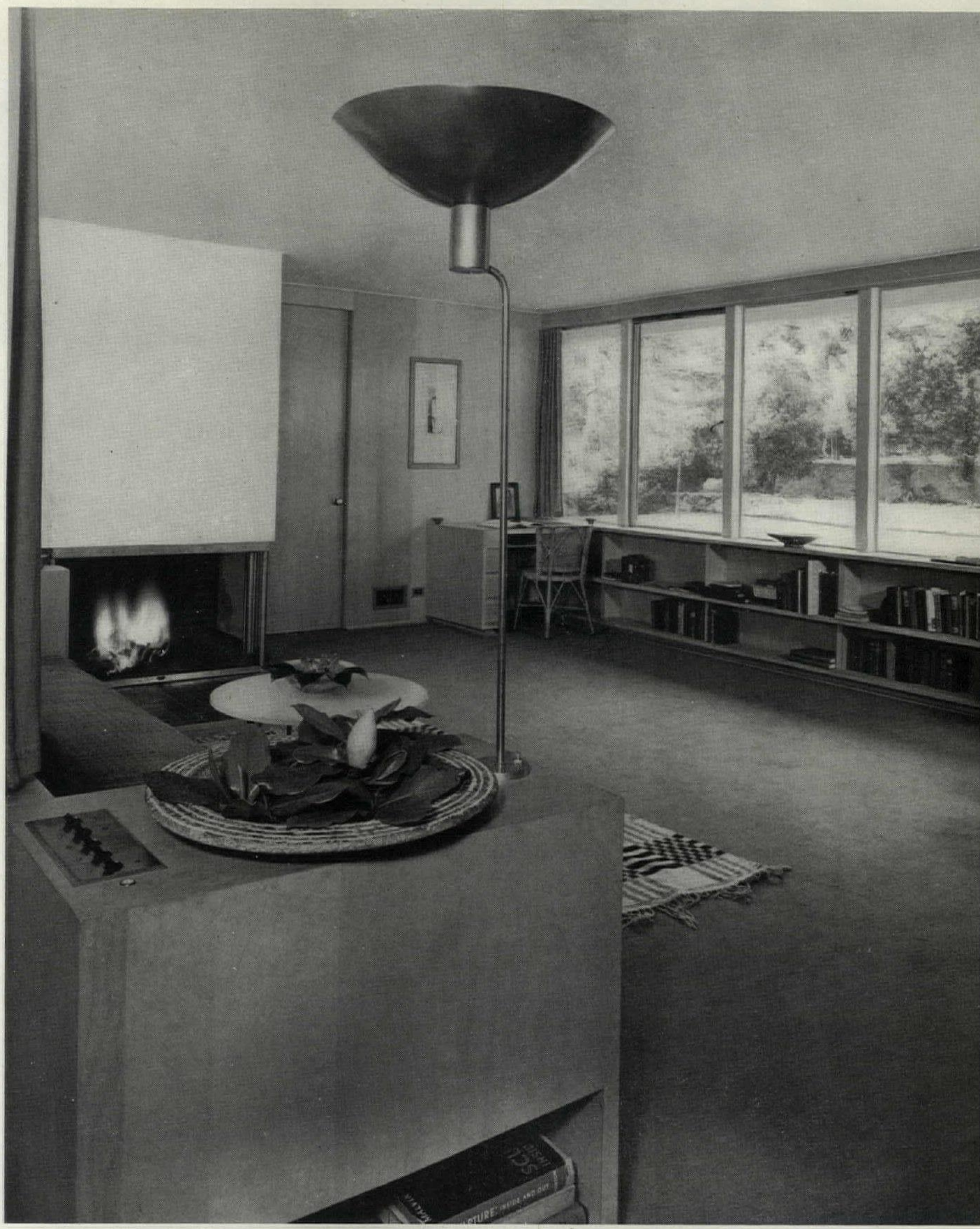
PLOT PLAN

Informality is the keynote of the plan. Witness the fact that while the small house has five doors to the outside, it has no "Front Door"—on center or otherwise. From the raised terrace facing the lower garden, entrances open into both the living and workshop-service areas; openings to the upper-level garden occur in both the bedroom-study and in the window wall of the living room proper. Yet another outside door, located on the west wall, leads into the service hall.

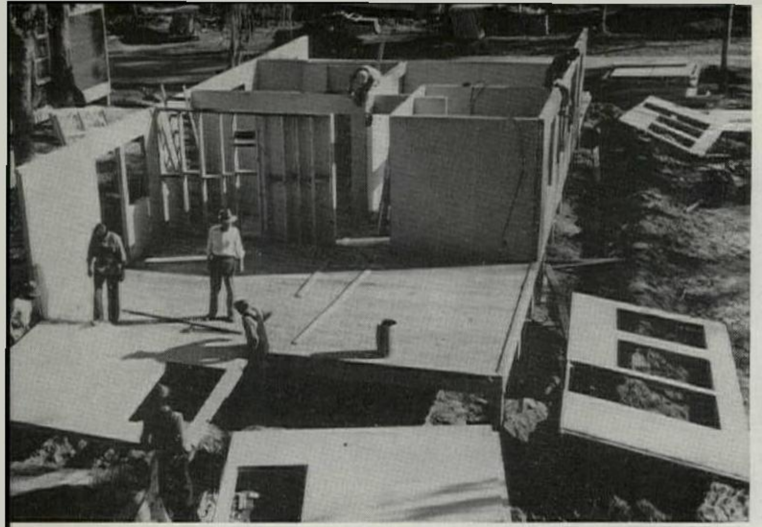
Special attention was given to the placement of Professor Lukens' workshop. Materials and heavy sacks of clay, delivered at the garage, are readily brought in through an access door in the wall. Visitors approaching the house from the lower garden gain a display of the artist's work through the wall-height windows bordering the terrace, and they may enter the workshop without passing through the house itself. The stuccoed walls are framed with 4″ by 4″ redwood posts; windows are of the casement type.



FLOOR PLAN



The interior of the house is Soriano at his best—bold window walls and excellently proportioned clean wall planes of varying surface textures organized into a harmonious unit. Extensive built-in units—shelving, cabinets, radio and record changer—keep miscellaneous possessions under control and are schemed as an integral part of the design, not provided as an afterthought. The writing desk and fireside couch are both built in, the latter terminated by a radio-recorder-storage unit which also serves to separate the living area from the door leading out to the raised terrace. Above the deep fireplace, open on two sides, plain plaster walls are dramatic contrast to the rich wood surfaces of the rest of the room—magnolia plywood, 4 ft. by 8 ft. by ¼ in.



Design for Prefabrication—Some Personal Observations

by Carroll A. Towne, Chief, Division of Recreation and Public Grounds, Department of Regional Studies, TVA

An essential phase of the prefabrication process is, of course, design; no prefabricator can escape it. But there is no law which dictates that he must employ an architect to design his product; nor is there an established custom which suggests that he might employ one to design his production methods. And a lot of prefabricators are allergic to architects; they suspect them of ulterior motives, such as trying to make the customer take what the architect thinks he needs, instead of giving him what he wants.

There is, nevertheless, a growing mass of evidence that architects are better than anyone else at predicting public taste in architecture—understandable in view of the fact that it is their business to influence it. This gives them plenty of reason to design for prefabrication, and for prefabricators to be sensitive to their efforts. The question that faces the architects is how to go about it. Many architects are fearful of prefabrication because quantity production demands standardization and tends to limit or eliminate freedom of design.

The techniques of prefabrication are by no means stabilized. It is true that a large and growing group of prefabricators have established a common ground. This group favors the factory fabrication, to varying degrees of completion, of panels which are shipped to and erected on the building site. Nearly half the work (which includes installation of plumbing, wiring and other machinery for living) is done in the field. Most of the systems employ on the one hand modular units of measure for dimensioning the panels and on the other, ingenious schemes for rapidly joining them in the field, and have been aimed at speeding up both factory fabrication and field erection of panels.

Aside from the fact that modular units of measure materially larger than those found on an architect's scale constitute a major limitation on freedom of design, the assumption that prefabrication is going to stop at this halfway mark is open to serious question in the light of both current events and legitimate speculation.

A view of the future, which need be neither too long nor too broad, must include consideration of the prefabricator's urge to pull more and more work into the plant, to devote his time to manufacturing rather than field construction. In time this urge will conquer all obstacles set up by opposing interests. It has already found expression. No objective survey of the prefabrication industry can exclude the humble trailer. It may appear to many as the lowest form of human shelter, but it leaves the plant (in considerable numbers) complete to the last gadget. The trailer manufacturer until recently had no on-site problems: he sold his product as consumer goods FOB plant or sales room. When the government began talking ready-to-move-in-on-site jobs, he hired a few strong backs in the field to set his product on prefabricated wooden horses. The trailer industry has bred a big brother: the expansible trailer. This affair is designed for transportation over the highway, and can be unfolded into a full-sized house at destination.

A link between the trailer and the panel house can be found in the demountable house designed by TVA. Nine hundred and fifty houses of this type have been built, and of these, 450 left a plant or factory as completed houses separated into sections as few as possible and as large as highway regulations would permit. (The balance were built on-site.) Many more will have been manufactured and placed before this article appears in print.

A hundred houses were delivered, fully equipped *and* furnished, at a TVA project, 48 hours and 600 miles from the plant in which they were built. On this project, *less than five per cent* of the cost of each house, including foundations and service connections, was spent on site.

The point about these TVA houses is that they could have been shipped out of the plant in panels. Instead, the panels which make them up were preassembled in the plant in order to reduce on-site effort. Transporting these panels in preassembled sections cost more than would transporting them unassembled, but in every case the economies gained by plant assembly, coupled with plant installation of plumbing, wiring, fixtures, trim, and accessories equaled or more than offset the excess transportation costs.

This would not always be the case. There are situations that demand field erection of panels, or indeed of pre-cut pieces. The essential fact is that houses can be designed to permit a degree of prefabrication best suited to each particular circumstance, and the range of choice lies between complete on-site assembly of pre-cut pieces and complete factory fabrication.

The architect may choose that his house shall unfold like a flower or an accordian, that it shall slice into pieces like a loaf of bread, or that it shall fly through the air suspended from a helicopter: so long as it can be unfolded, buttoned up or otherwise assembled at the site for a tenth its total cost, he is sâfe in the knowledge that he can make the principle of prefabrication yield its ultimate advantages. Any system which falls short of this goal is likely to fall behind in the race to offer the most satisfaction to the consumer for his dollar. The designer and the sponsor may find themselves fighting to protect specialized and possibly obsolete plant investments. That is not a happy spot for a professional interested in freedom to interpret consumer needs and wants. Nor is it necessary to get caught in such a spot. The designer is in a position to work with almost any prefabricator in terms of the latter's current techniques, but in a manner that will adjust them to permit preassembly as well as prefabrication. There is hardly a prefabricator now in business who could not make these adjustments.

But freedom from design limitations imposed by field assembly of panels solves only part of the problem. The modular unit creates a whole host of limitations in its own rights. Many scholarly studies on the subject of modular design have been made and published. Most of them have been justified on the grounds that standardization is essential to effective mass production. This is an undisputed principle, although there are obvious limits which prevent its complete application to practical cases. And practical cases, no matter how many words are written on the theory, are the points at which the architect, the prefabricator, and the consumer meet.

It is the architect's job to get the other two together. For many years he has been measuring the consumer's needs with a scale on which the modular unit is one sixteenth of an inch. When his prefabricating friend plaintively whispers the intriguing word "standardization" in his ear it certainly behooves him to listen carefully, but hardly to toss his six-foot rule overboard for a four-foot stick with no marks on it.

It has been said frequently of late that an amazing variety of designs can be worked out with this stick, and that the stick can be exchanged, with little loss, for a cube. The variety of designs that have been produced with these devices is indeed amazing, and the results demonstrate remarkable ingenuity, but they do not, and never can, interpret consumer needs with the degree of sensitivity inherent in a six-foot rule.

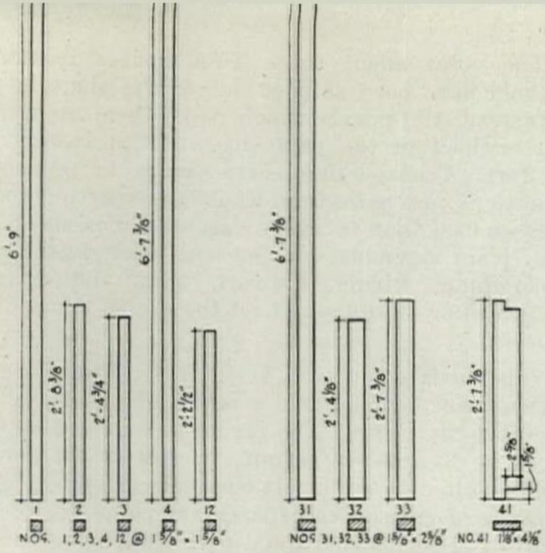
To the creative architect a module is a menace. The real problem he must solve is to select the least menacing device for standardization that he can find.

Because the architect's freedom, and indeed his ability to survive at all, is so deeply affected by the prefabricator's demand for standardization, he has every right and reason to inspect the conditions in the plant which create this demand. In doing so, he cannot afford to be superficial, nor to confuse fundamental conditions such as conservation of manpower and materials, with less fundamental ones like capital investment in obsolete machines and patterns. Neither need he take as gospel the technical jargon that impresses the layman with the omnipotence of mass production; frequently a plant is successful in spite of its production techniques. Somehow the architect must impress the prefabricator that research aimed at producing customer appeal is just as important as that aimed at lowering production costs. Customer appeal, except in terms of price, is not secured by standardization, and both the architect and the prefabricator should recognize that fact.

The average plant starts its operations with stock dimensioned lumber and sheet materials. These stock materials first go to the saws where they are cut to lengths and widths required by the design the plant produces. From the saws the materials move

to the production lines. It is here that the architect will have his troubles in distinguishing between legitimate and illegitimate claims for standardization. As a case in point, most plants use jig tables for assembling pre-cut pieces into panels. Jigs may be very simple or very complex; there may be a separate one for every panel or a single adjustable one for the whole lot; they may stand still, with a separate crew doing all of the work required on each one, or they may move, with several crews performing special tasks on each one as it moves by their stations.

These jigs share one attribute. Their primary function is to provide a pattern for arranging pre-cut pieces of material. To the architect, therefore, they are glorified shop drawings, and he should devoutly hope that they are subject to quick replacement by or adjustment to new patterns. The propensity on the part of prefabricators to regard fixed pattern jigs as permanent investments is, from the architect's point of view, the last defensible obstacle to freedom of design. It is this propensity that, in considerable measure, encourages the search for the universal module.



The Smaller the Unit . . .

the Greater the Variety . . .

Why should prefabricators value their jigs so highly? There are two reasons, one good and one bad. The bad reason is that the jigs cost a lot. This is avoidable, at least in regard to fixed patterns. Adjustable jigs are commonplace, and where they are too expensive, removable jig sheets on permanent tables should not be too difficult to devise.

The good reason is fundamental. One of the basic points made by proponents of mass production is that repetition of a given task by each individual on the production line promotes speed and efficiency. This is probably true, although if speed and efficiency are obtained on the production line by lowering it elsewhere in the plant, or by sinking capital into expensive gadgets that have a merry but short life, the net gains may be dubious.

In any event, the architect must be as persuasive as he can in suggesting a degree of freedom at the jig tables. One scheme might work as follows: If the architect produces a design which provides for maximum standardization of individual pieces, to be arranged in a relatively large variety of patterns, he will be able to claim a number of advantages to the whole plant operation that may offset possible losses in efficiency due to variety of patterns at the jig tables. To illustrate the point, the number of stockpiles at the jig tables might be cut in half. This would reduce time and chances for error in distributing materials to the stockpiles; it would conserve floor space; and jig table crews would spend less time in finding the right pieces. This is an elementary example, and might not apply in many plants, but it serves to indicate the idea.

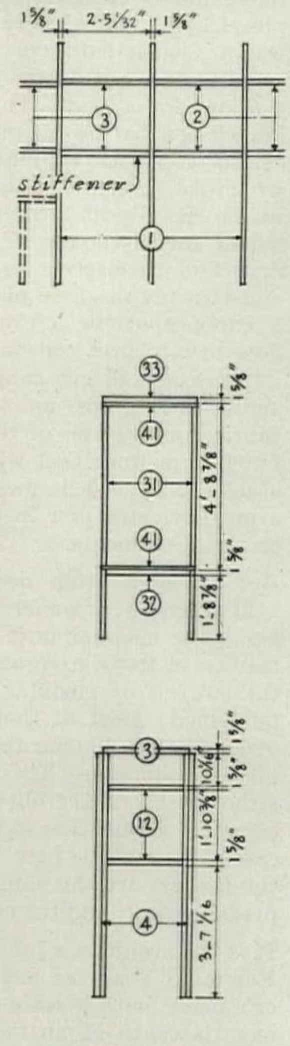
Examining this idea more carefully, can the architect do a more creative job with standardized pieces than with standardized panels or cubic units? He probably can, on the general theory that the smaller the unit, the greater the variety of designs it will produce. Thus the lowly brick, a modular unit, permits the designer more freedom than its larger counterpart, the concrete block.

In the early stages of attempting to standardize the pieces that make up a structure, a lot of obvious adjustments which do not adversely affect design will show up, but as the work progresses, the struggle between standardization and sensitivity to design will increase in vigor, until at last the architect, his conscience battered but unbowed, will declare a truce and place his solution before the prefabricator. The latter, it may be presumed, will debate the doubtful points, arguing for minor adjustments that make big gains. The result should be a victory for design, as compared with the results obtained with standard panels.

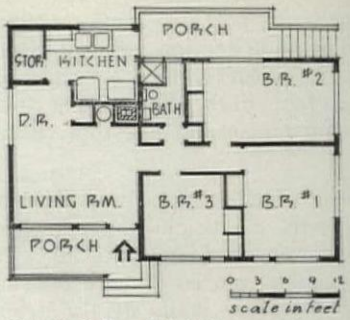
In the final analysis the professional objective is to design *for* prefabrication, *not* prefabricated design. Mass production of design may be justified for war housing or some other emergency, but it seems to have no more significance to prefabrication than it does to conventional construction.

The interests of both prefabrication and design will best be served if both join in the search for the point at which maximum standardization consistent with design objectives can be secured.

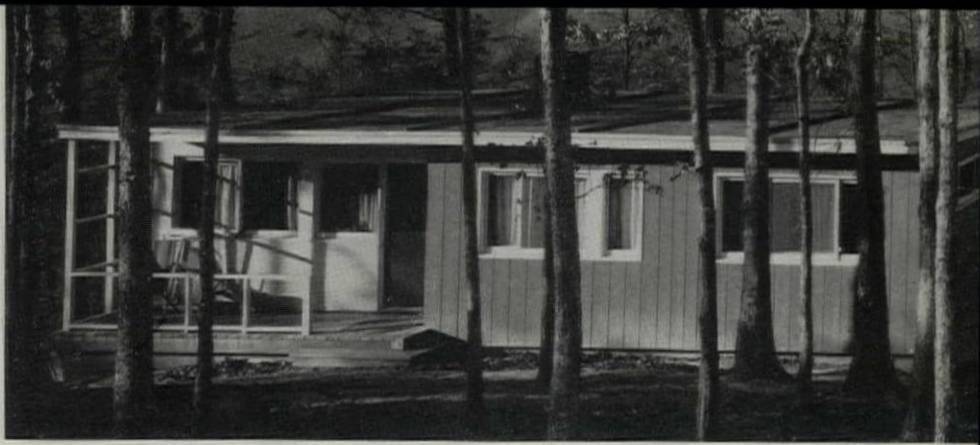
This is the exact point beyond which the architect must not go if he would survive as a creative force. It also marks the spot where the consumer will get the most house for the fewest dollars, and this, it may be presumed, is the final objective of everyone concerned.



TYPICAL FRAMING ASSEMBLIES
3/16" SCALE



FLOOR PLAN



Demountable Houses . . Smith Creek Village, Apalachia Dam, TVA

Roland Wank, A. I. A.,

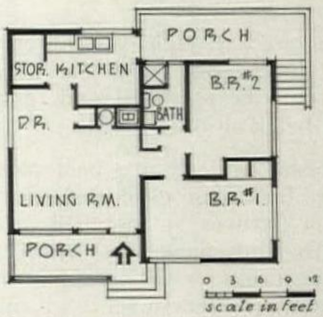
Head Architect

Apalachia Dam powerhouse, constructed by the Tennessee Valley Authority in 1943, is located about ten miles downstream from Apalachia Dam on the Hiwassee River in a sparsely settled and relatively isolated mountain region. Virtually no private housing was available within twenty-five miles of the powerhouse. The Authority considered it essential that, to insure continuous operation and protection of the plant, a small village be provided for operations and safety service personnel and their families stationed at Apalachia powerhouse.

Because of the rugged topography of the area, the Village is located about 1½ highway miles from the powerhouse on a ridge overlooking the Hiwassee River, Smith Creek, and the Cherokee National Forest. The Village consists of 20 single-family houses; a community building which includes school rooms, general store, post office, and village office (see February, 1944, PENCIL POINTS); utility systems, and streets and paths.

Of the 20 houses, 14 are two-bedroom houses and 6 are a three-bedroom type. All are of one-story frame construction, and so designed structurally as to permit subsequent removal and re-use elsewhere should operation of the Village after the war be unnecessary. The steeply sloping site required high foundations under the rear parts of the houses; these were sheated in wood, resulting in a semi-basement adapted for rough storage. Heaters were kept on the main floor level because location in such basements might not readily adapt itself to new sites to which houses might be moved.

Although on-site constructed of conventional materials and methods familiar to all builders, the houses at Smith Creek Village are made both demountable and weatherproof through the use of a few relatively simple expedients, which are described in the following paragraphs.



FLOOR PLAN

The houses are so framed above the cinder block pier foundations that they can be easily separated into a series of uniform-sized, portable sections—virtually "slices" of a house, each section being a rigid, three-dimensional unit $7\frac{1}{2}$ feet wide, 22 feet long and approximately $9\frac{1}{2}$ feet high. There are four sections to a two-bedroom house and five to a three-bedroom house.

Exterior walls composed of 2" x 4" studs 24" on center and insulated with 2" thick paper-backed batt type insulation are covered in general with 1" x 10" tongue and groove V-jointed vertical boards, applied conventionally. Exterior walls at the front and rear porches and the foundation enclosure are covered with 1" x 8" flush-jointed horizontal shiplap. At the wall joint where sections adjoin, the horizontal shiplap is finished with a mitre cut on the board ends.

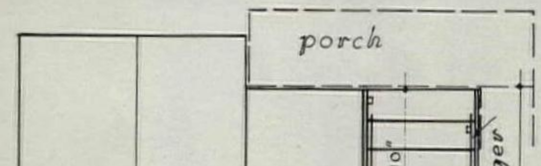
Interior wall and ceiling surfaces are covered with $\frac{3}{8}$" thick plaster board with taped joints except in bathroom where asbestos-cement board is used on walls and ceiling. Ceilings are thoroughly insulated with 4" thick paper-backed batt type insulation.

Factory finished standard grade 13/16" x $3\frac{1}{4}$" face oak flooring is laid parallel to the long dimension of the sections over waterproof paper on a yellow pine sub-floor. A loose piece of finished flooring is inserted over the joint between sections when they are bolted together.

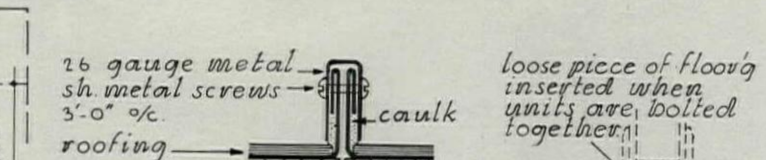
The slightly sloping roof surface is covered with a 3-ply built-up composition roof and the roof joint between sections is metal flashed and covered with a metal joint cap.

A chimney composed of precast, light-weight concrete blocks lined with terra cotta flue tiles was constructed because it could be salvaged and more easily dismantled than a brick chimney.

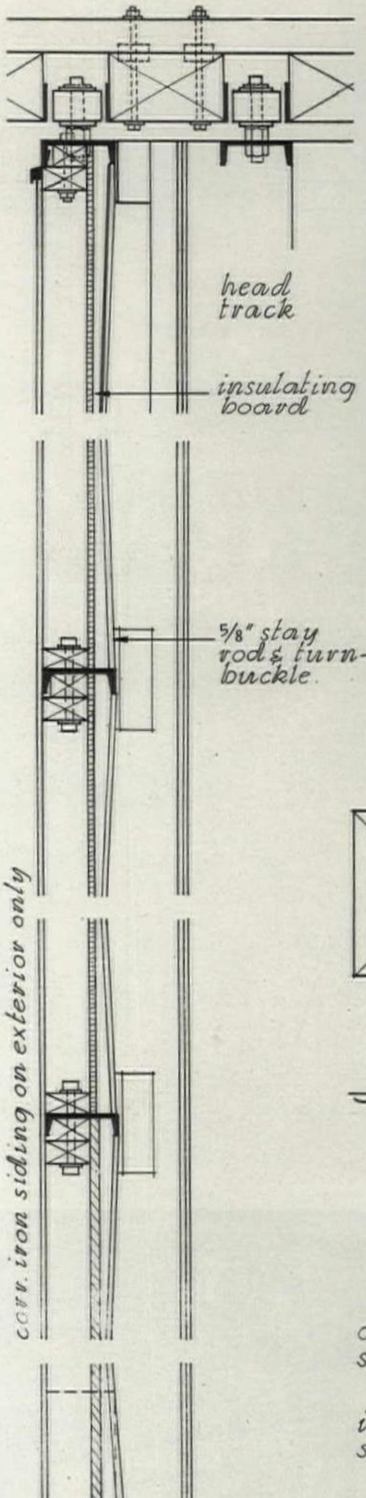
Utility connections between sections are held to a minimum. All plumbing, including concealed pipes for kitchen and bathroom fixtures, is installed in a compact arrangement with joint connections between sections. Concrete septic tanks with open-jointed drain tile disposal lines are installed to serve groups of two and three houses. All electrical work including wiring, fixtures, and some appliances, is installed as integral to each section. Circuits of adjoining sections are connected merely by wiring the end of the circuit of one section to a junction box for interconnection of house sections.



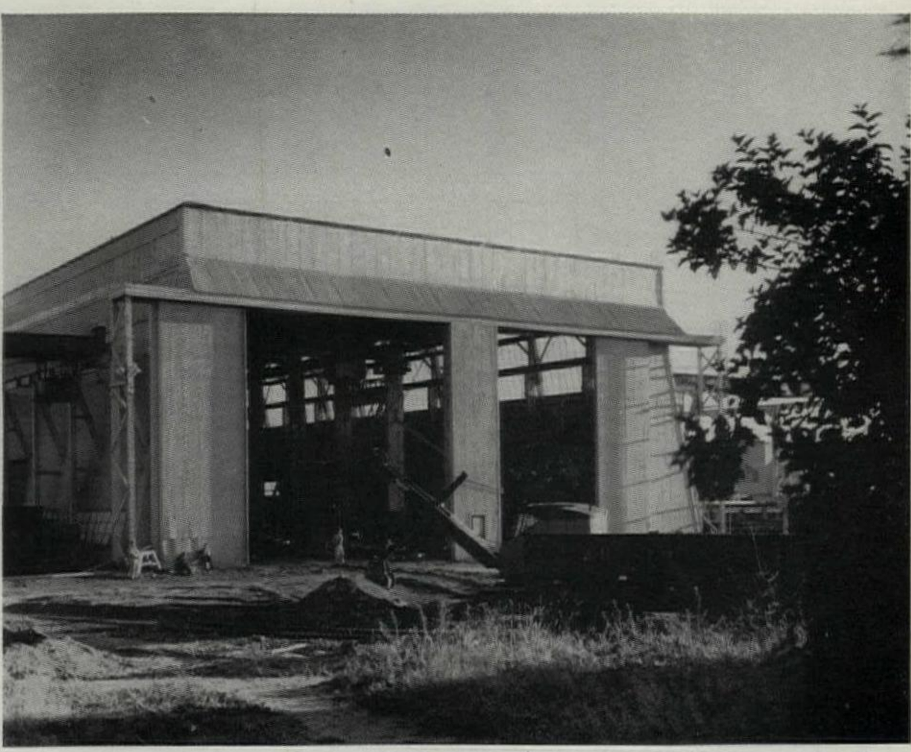
FLOOR FRAMING PLAN



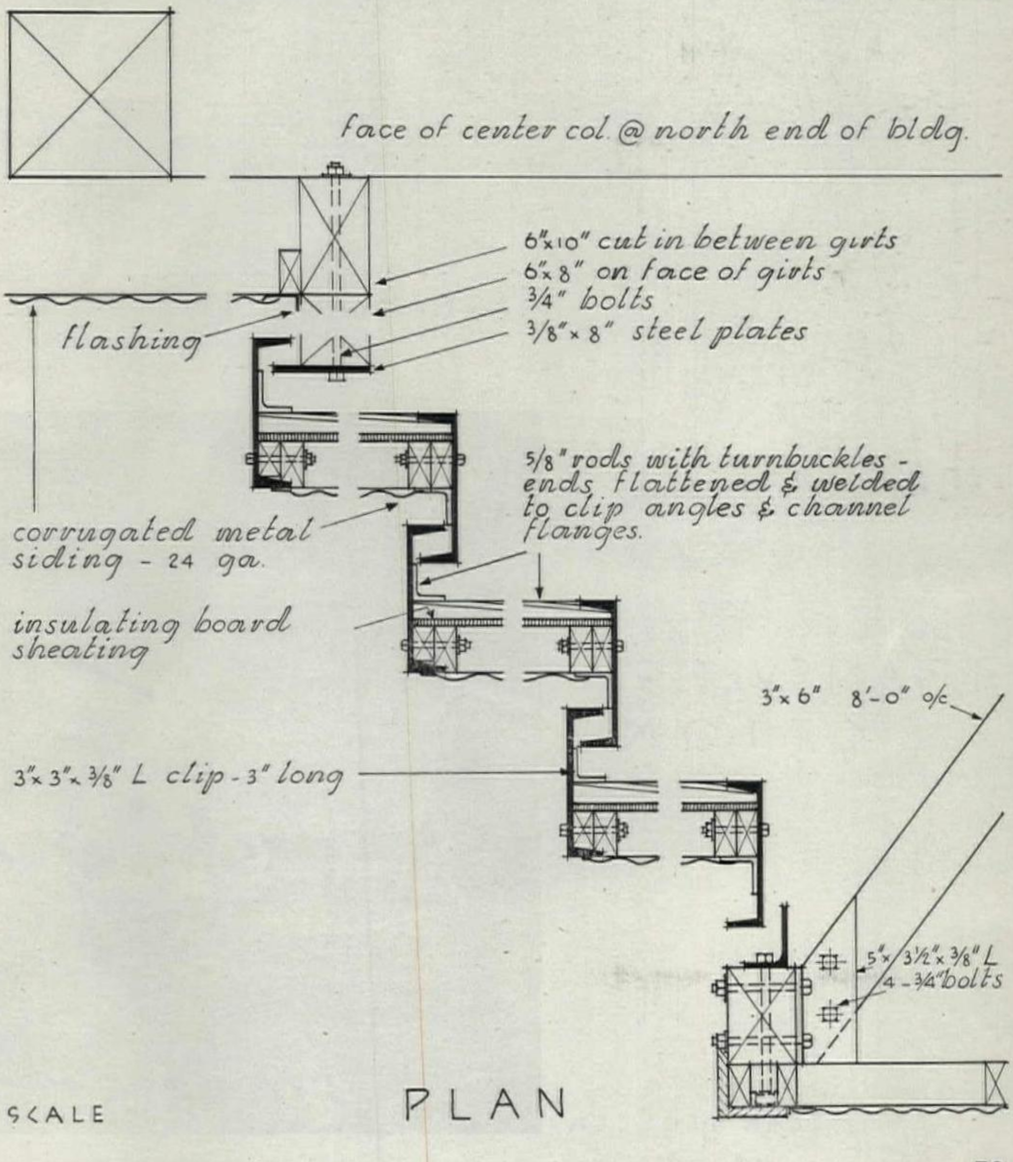
TYPICAL FRAMING JOINTS



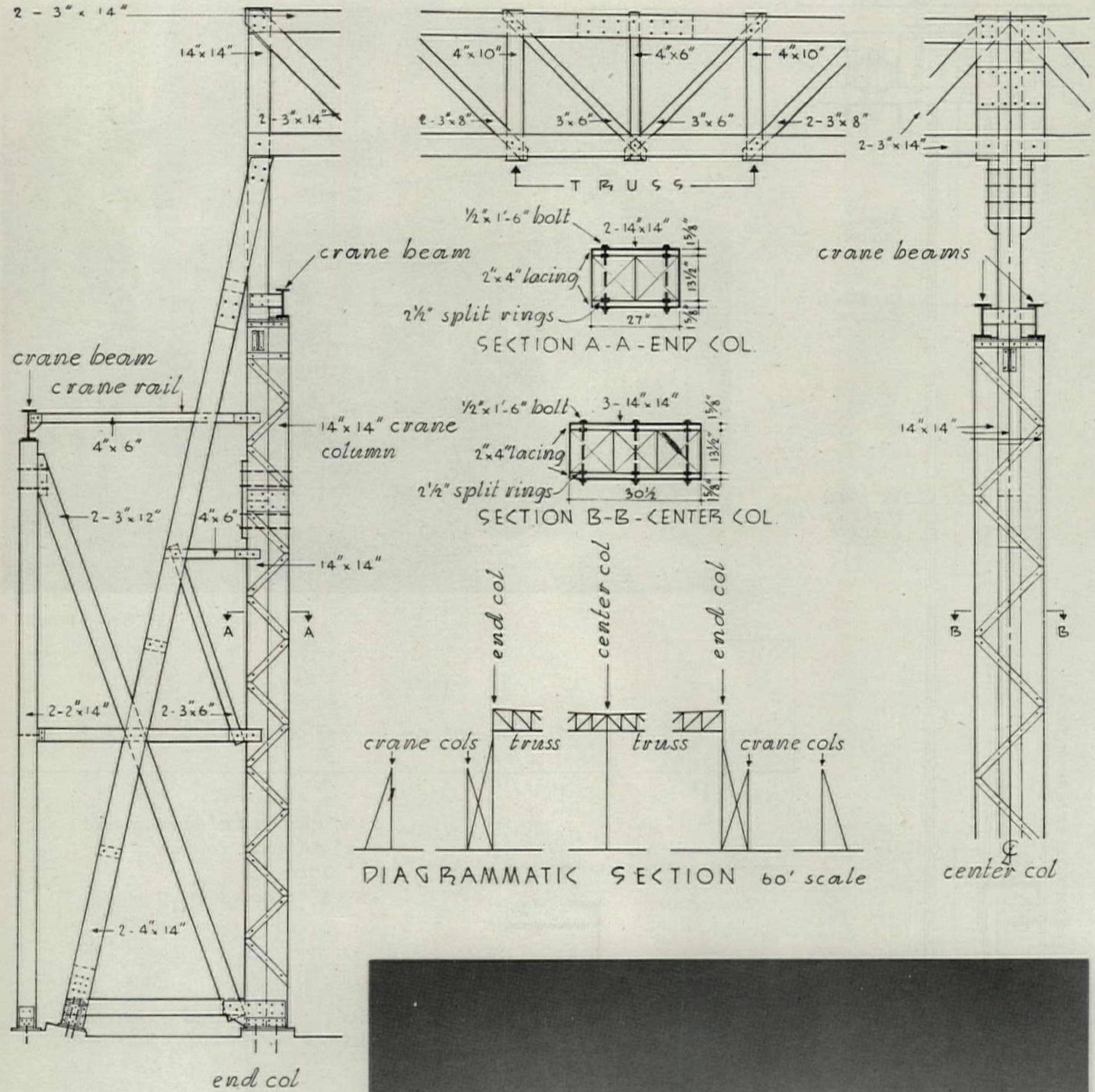
SECTION 3/4" SCALE



EZRA STOLLER

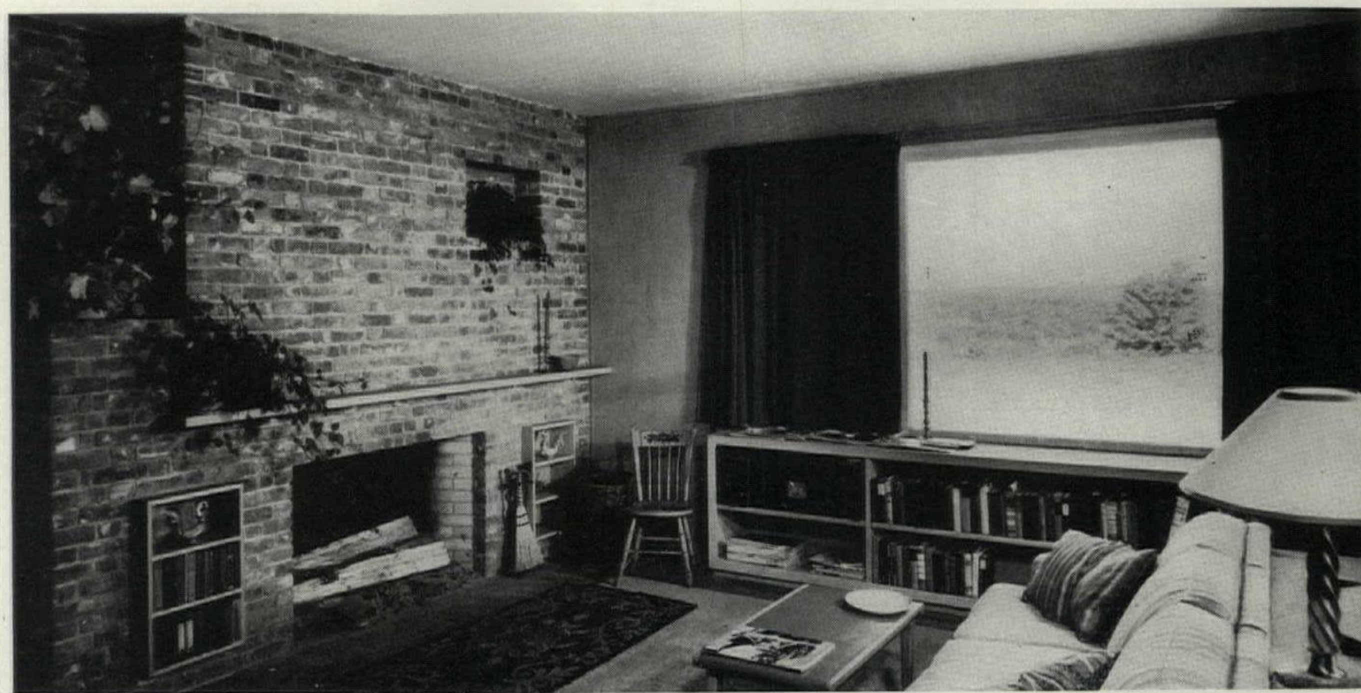


PLAN

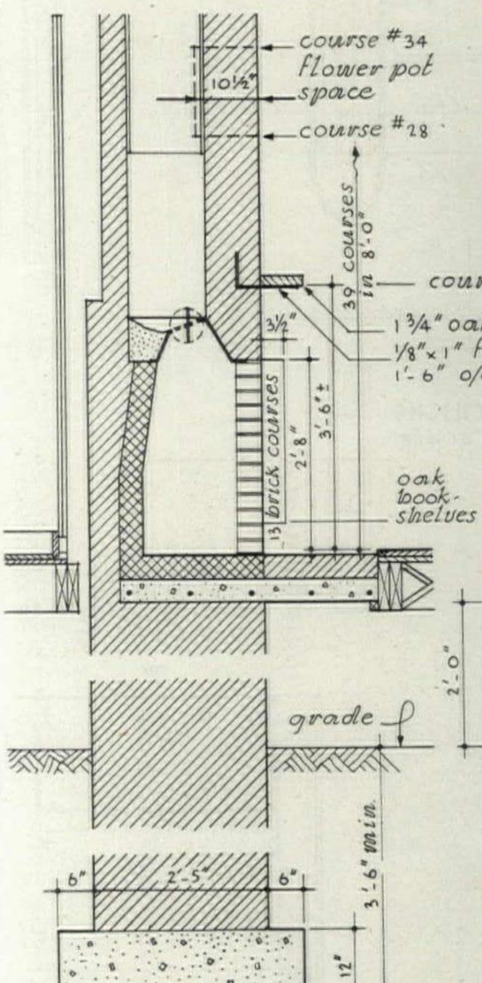


TRANSVERSE SECTION
1/8" SCALE

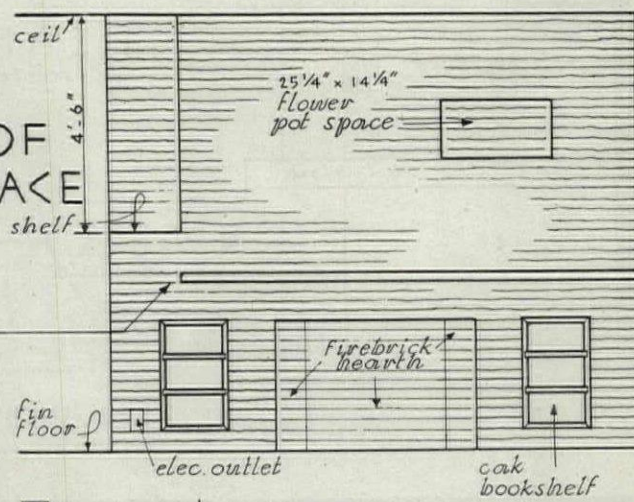
EZRA STOLLER



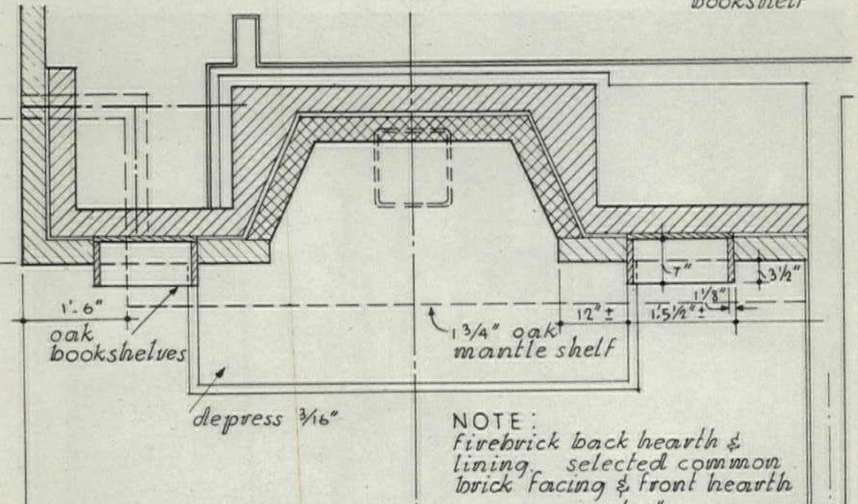
RICHARD GARRISON



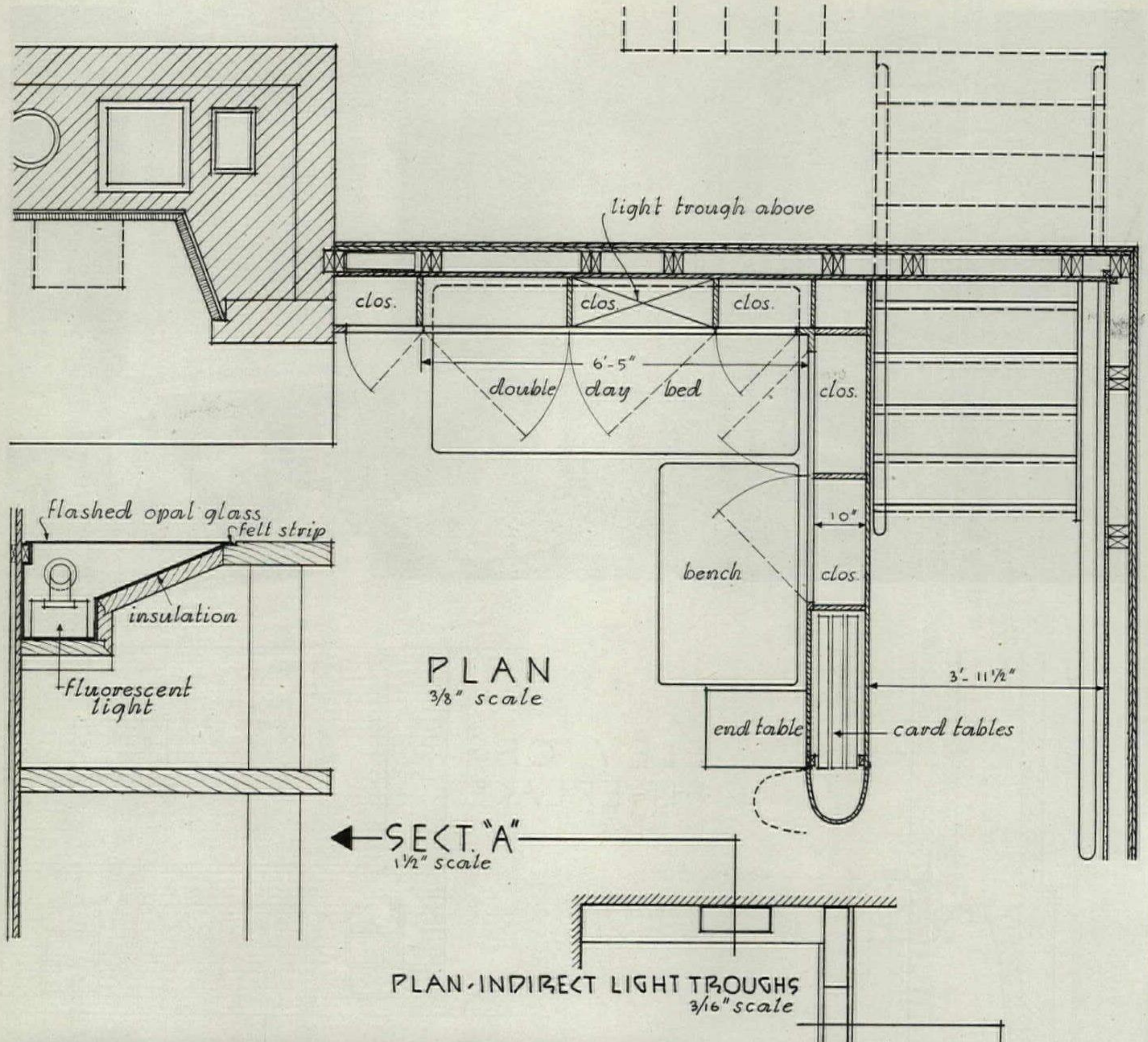
SECTION THRU FIREPLACE
⅜" scale

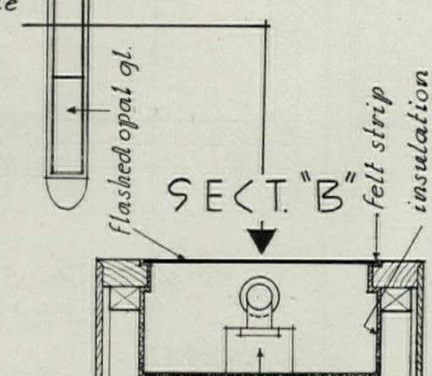


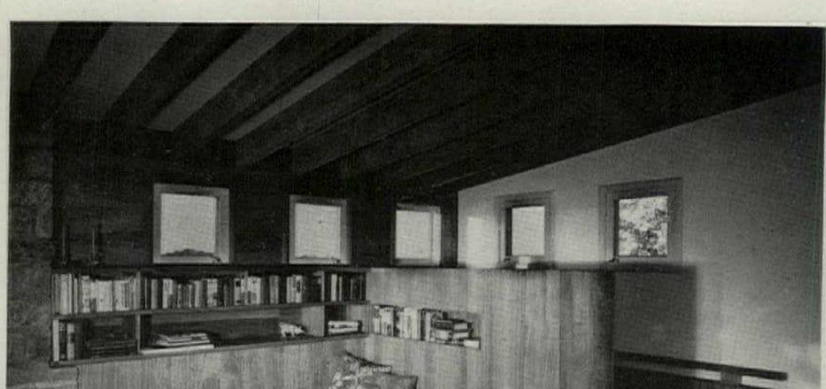
ELEV. OF FIREPLACE
¼" scale



PLAN OF FIREPLACE
⅜" scale







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