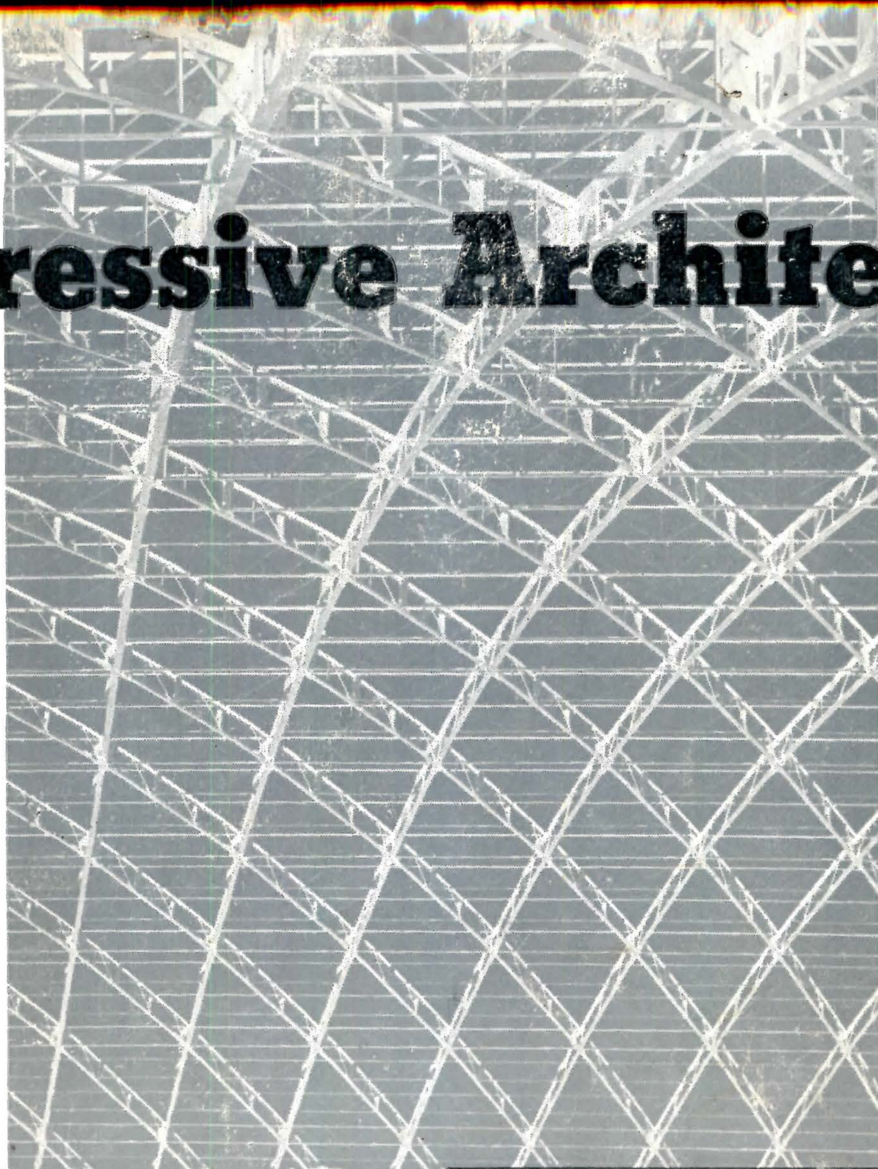
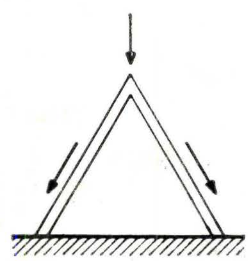
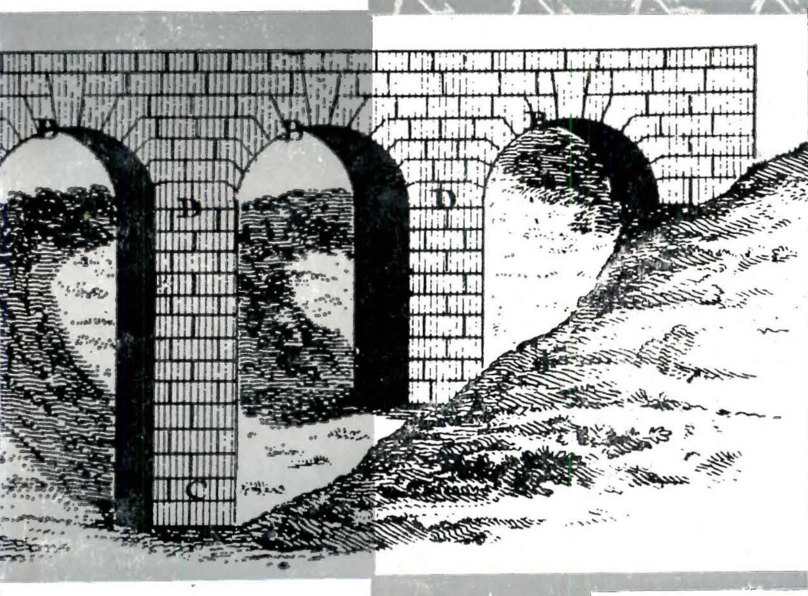
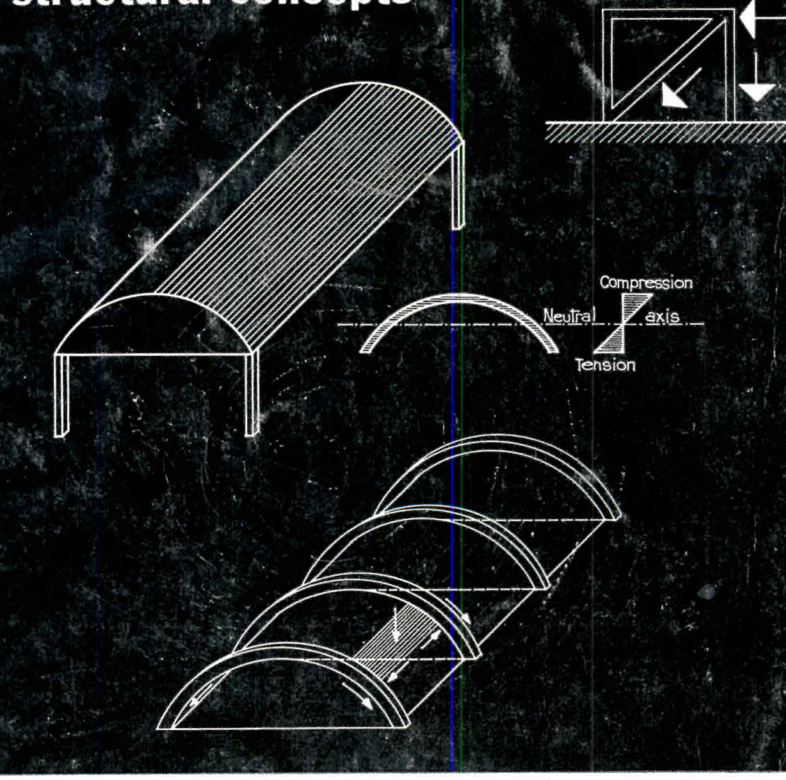
Progressive Architecture

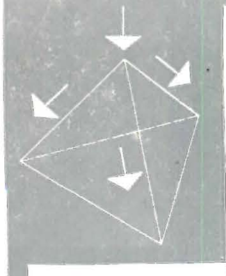






structural concepts





world's largest architectural circulation

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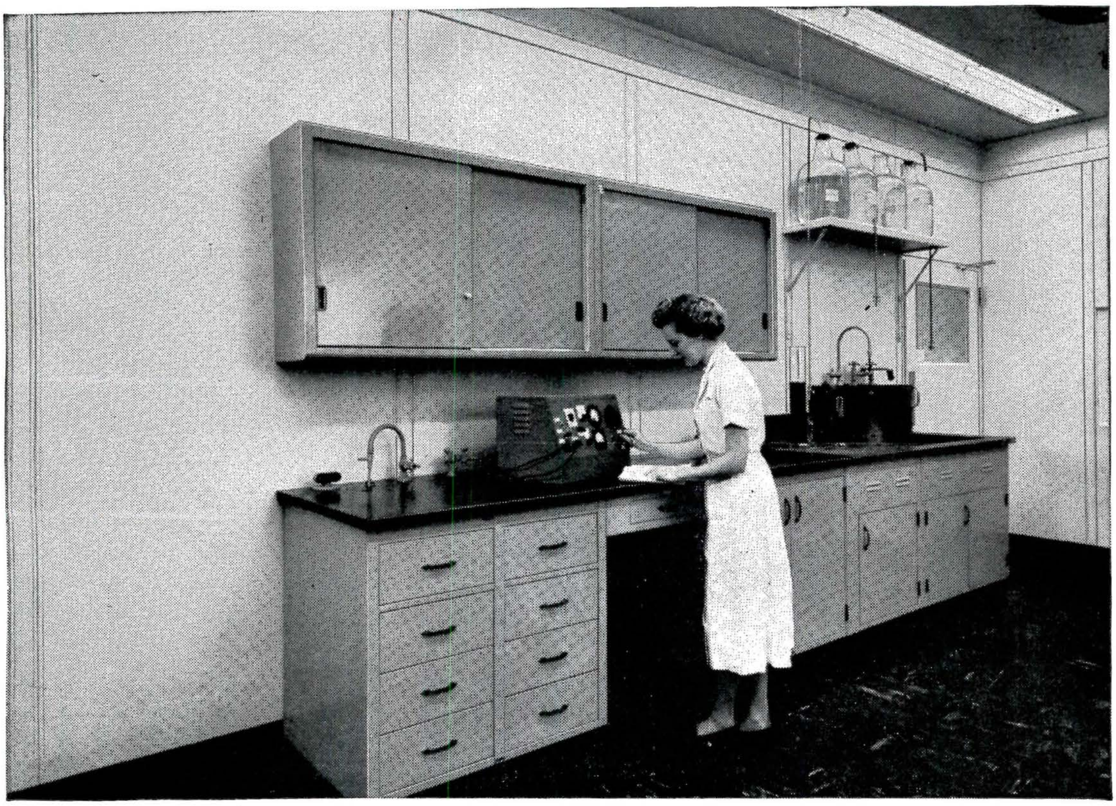
june 1954



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Captures More Fumes

IT'S A PRY-LITE
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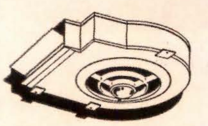

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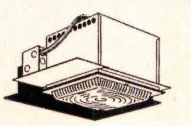

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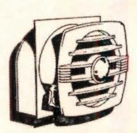

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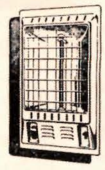

GLOMASTER
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newsletter

June 1954

Early next month PROGRESSIVE ARCHITECTURE will move, with its sister publications in Reinhold Publishing Corporation and Reinhold Book Division, to a new mid-Manhattan location. Reinhold will occupy three floors of the 430 Park Avenue Building, New York 22, N. Y. (described on page 106, May 1954 P/A). All communications should be directed to the new address, from July 12 on. Telephone: MUrray Hill 8-8600.

PROGRESSIVE ARCHITECTURE published monthly by REINHOLD PUBLISHING CORPORATION, 330 West 42nd Street, New York 36, N. Y. Ralph W. Reinhold, Chairman of the Board; Philip H. Hubbard, President and Treasurer; Fred P. Peters, Vice President and Secretary, Gilbert E. Cochran, H. Burton Lowe, Merald F. Lue, William P. Winsor, Vice Presidents; Kathleen Starke, Assistant Treasurer, Executive and Editorial offices: 330 W. 42nd St., New York 36, N. Y. Subscriptions payable in advance. Subscription prices to those who, by title, are *architects, engineers, specification writers, designers or draftsmen, or employes of architectural and engineering firms,* and to government departments, trade associations, members of the armed forces, college libraries, college students, publishers, advertisers, prospective advertisers and their employes—$5.00 for one year, $8.00 for two years, $10.00 for three years. Above prices are applicable in U. S., U. S. Possessions and Canada. Latin America and Philippine Republic—$10.00 for one year, $16.00 for two years, $20.00 for three years. All other foreign subscriptions — $15.00 for one year, $25.00 for two years, $30.00 for three years. Single copy — $1.00; special issues — $2.00 per copy. Printed by Publishers Printing Co., New York, N. Y. Re-entered as Second Class Matter September 21, 1951, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Volume XXXV, No. 6, June, 1954. In Art Index, Architectural Index.

Principal speakers at AIA Convention in Boston this month will be Gov. Christian A. Herter of Massachusetts and Edward A. Weeks, Editor of "Atlantic Monthly." Changing philosophy of architecture will be reviewed by Ralph Walker, Eero Saarinen, José Luis Sert, Paul Rudolph, and Robert W. Kennedy. Other speakers and panel participants will include Miles Colean, Paul Weidlinger, Charles Leopold, C. L. Crouch, Ben John Small, Leonard Haeger, Vincent G. Kling, John Stanley Sharp, Samuel E. Homsey, Charles S. Gibson, and Michael Waterhouse, former President of Royal Institute of British Architects.

Fine Arts Medal will be presented at AIA Convention to Sculptor Julian Hoke Harris of Atlanta. Craftsmanship Medal will be awarded to Maria Montoya Martinez, Indian potter from San Ildefonso, New Mexico. There will be no Gold Medal Award. Honorary Memberships will go to Dr. Richard Eugene Fuller, Director of Seattle Art Museum, and Morton O. Withey, former Dean of School of Engineering, University of Wisconsin.

Architects have been invited by American Hospital Association to submit exhibits of hospitals or related structures for Association's Annual Convention in Chicago, September 13 through 16. Information and entry forms available from Association at 18 East Division Street, Chicago 10, Illinois.

William W. Wurster, recently elected AIA Fellow, has also been appointed Fellow of Royal Academy of Fine Arts, Copenhagen, for his "great contributions to architecture."

Melvin H. Smith of Brooklyn, Cooper Union graduate now M.I.T. architectural student, has been awarded $5000 Lloyd Warren Scholarship for travel and study in Europe and U. S. Award was announced recently by The Beaux-Arts Institute of Design, administrator of fund.

Seventeen award winners were chosen from designs submitted to American Institute of Decorators' Annual Homefurnishings Design Competition. First awards were granted in following categories: fabrics—Eszter Haraszty; furniture—George Nelson; wall coverings—H. W. E. Riley. Designs were executed by Knoll Associates, Inc., Herman Miller Furniture Company, and Polyplastics United, Inc.

Turn page for WASHINGTON PERSPECTIVE

newsletter

Frederick Gutheim Washington Perspective

The departure of W. E. Reynolds, who retires the end of this month (June 30) as Commissioner of Public Buildings, closes an era in public buildings work. Although there has been virtually no public building activity since before the war, Reynolds played a major part in the great public construction activities of the 1930's. In more lasting fashion, he participated in the creation of the Federal Government's first centralized design and building service, and was its chief from the beginning. Here in the Public Buildings Service lie the century and a half traditions of Federal architecture.

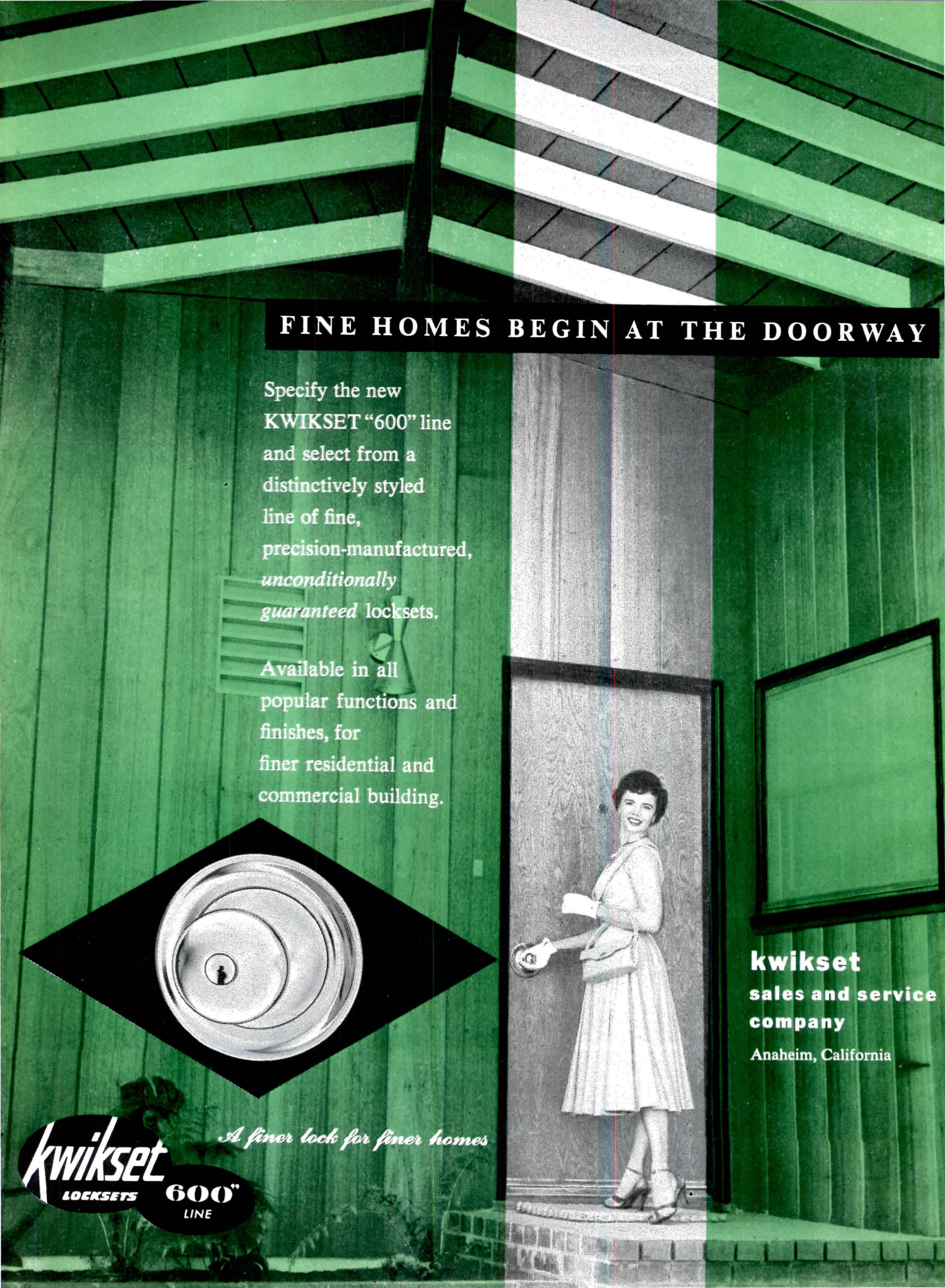
It has been Reynolds' misfortune to be obliged to watch the instrument he forged rust in its scabbard. Public building has constantly declined. The central position of PBS has been shaken by the large autonomous building programs of defense, veterans, atomic energy, and other operating departments. Congress itself has made substantial inroads on the public buildings work, and has increasingly interfered with its administration. Reynolds' successor, Peter Strobel (a Danish-born, Copenhagen-trained management engineer) has little to inherit but the public buildings management duties of a once-high office.

Nor is it easy to see a role for the depleted PBS in any future revival of Government building activity. It will play but a small part in General Bragdon's calculations of a future works program. Operating departments are once again the chief initiators of buildings they require. Decentralization is the rule. Even the Post Office Department, which is well disposed toward PBS, writes its own programs and increasingly sets its own design standards. The important field of construction represented by Federal grants-in-aid is now mainly concentrated in the Housing and Home Finance Agency. Inheritor of the public works function of the Federal Government, HHFA today is the sole repository of experience and seasoned personnel in this field. It is closer to being a real department of local government or urbanism—the critical point d'appui of any future use of public works as a depression remedy—than any other Government agency.

PBS was conceived as an integral part of a Federal Works Agency embracing public roads, public works, housing, and other construction activity—a great professional engineering service. That agency has vanished. PBS now finds itself part of the General Services Agency, a huge, diversified procurement activity in which public buildings are regarded as just-another over-the-counter purchasing job. Worse, chief support of PBS comes from the Bureau of the Budget, where it is esteemed as a vehicle for standardized buildings interchangeable among Government bureaus to meet their fluctuating requirements, and a desirable central building management agency. This is hardly the environment to stimulate construction, much less for inspired design. On the contrary, it is just the place to find support for that "ideal" type of government office building which Reynolds perforce finds most desirable—a loft, accommodating bumper-to-bumper office layouts, best represented by the General Accounting Building in Washington.

The wonder is, as one reflects upon it, that Reynolds has done so much with such unpromising working conditions. He leaves public office for a Washington consulting practice with the gratitude of architects and engineers in private practice. There is general satisfaction with his commissioning of such designers and the terms of their engagement, with policies aimed at selecting local men. Reynolds great gifts were precisely where he failed: in dealing with Congress. He ranks in my estimation with the greatest types of career administrators: with MacDonald of Public Roads, Burlew of Interior, Kerlin of Commerce, Blandford of TVA. What such a managerial career shows, however, is that mere administration is not necessarily creative above the level of devices like the lease-purchase program—Reynolds' most notable recent conception. It must be associated with some driving pressure to undertake public building, if it is to rise above workaday levels. The failure to supply this leadership on the part of Congress, the executive, or the successive heads of the General Services Administration, has run the public buildings program into the ground, to the detriment and cost of the Federal Government and the disadvantage of its operating departments.

Architects, of all those concerned with building, appreciate how enormous are the efforts that must frequently go into the promotion of a building project before even the best design can be realized. How much building is accomplished by "waiting for the order"? It is just this effort which has been lacking. With this reflection, one wonders if the chronic malfunctioning of the PBS ought not to be treated by drastic measures of reorganization, designed to secure greater support for needed public building projects. Possibly the construction and management functions should be separated. Certainly we should rename a bureau which, however efficiently it runs elevators and empties wastebaskets, is doing no building and has little prospects of doing any.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PROGRESSIVE ARCHITECTURE

pa

June 1954

Why spend $4,000 on a Cooling Plant

...when $600 plus correct detailing might do the job

THE SUMMER HEAT LOAD on a roof can be reduced from a maximum potential of 19,000 Btu per hour to as little as 600 Btu per hour by proper detailing of a house, says A. M. Watkins in "Five Top Priorities for Designing an Air-Conditioned House" in the August 1953 "House & Home."

In an average 1,000 sq. ft. $10,000 house, he states that with all the right detailing a 1-ton cooling unit costing about $600 could be safely specified; with all the wrong detailing a 7-ton unit costing up to $4,000 might be needed.

One of three important roof details is insulation: "A good thick layer of insulation spread over the ceiling will save more money than insulation can save anywhere else," explains the article. "Even 6" of ceiling insulation at 1½¢ for installation plus 2¢ a sq. ft. for each inch of thickness will pay for itself."

"Since aluminum bounces back 95% of the long heat waves re-radiated from the under-side of the roof, three-layer reflective insulation at *7¢ a sq. ft. installed would be a bargain, for it can be the cooling equivalent of 6" of bulk insulation."

For winter roof insulation, the author rates 3-aluminum-sheet multiple aluminum, when installed with four air spaces, as equal to 2½" to 3" of bulk insulation.

**Current price should be under 9½¢ sq. ft.—installed.*

COST OF INFRA INSULATION INSTALLED
in new construction between wood joists, material with labor,

Type 6-Si under 9½¢ sq. ft.

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A commercial form of multiple accordion aluminum sheets, Infra Insulation Type 6, creates an "insulating blanket" of layers of air, aluminum and fiber. In addition to the reflection of Radiation or radiant heat, inner and outer Convection are retarded by the 3 sheets of aluminum and 2 sheets of fiber. The 6 layers of air spaces have low density, therefore slight Conduction. The slight mass is capable of little heat storage.

Infra's tough continuous aluminum sheets 500′ and 750′ long are impervious to water vapor. Infiltration under its flat stapled flanges is slight. The scientific construction of multiple layers of accordion aluminum, fiber and air spaces, *minimizes* condensation formation on or within this type insulation.

The chief aspects of designing an air conditioned house—how to slash cooling costs, and the part roofs, windows, moisture, walls, and interior heat play in detailing for summer comfort—are interestingly and exhaustively discussed in Mr. Watkins' article.

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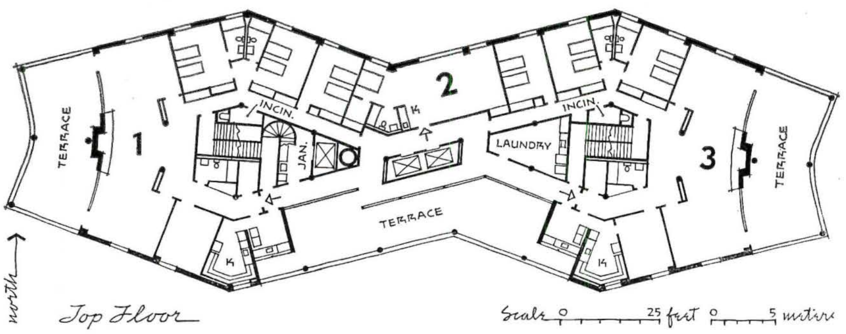
p/a progress preview

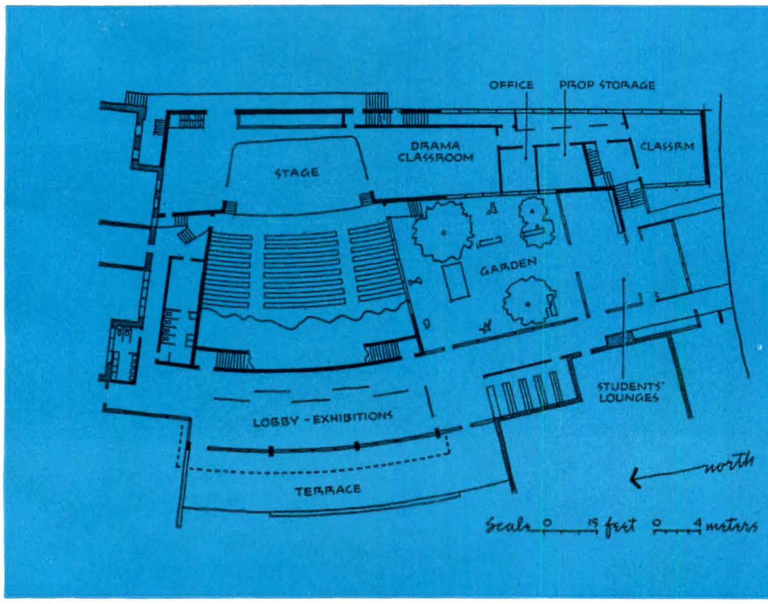
Shepley, Bulfinch, Richardson & Abbott *recently designed this "Project for an apartment house at 3134 N. Meridian Street, Indianapolis, Ind.: Allen W. Clowes, Owner." The 11th floor plan* (left) *emphasizes the generous terraces. Typical floors of the reinforced concrete structure will have 7 apartments each. Note* (model photo) *openings provided for tenants' air conditioners.*

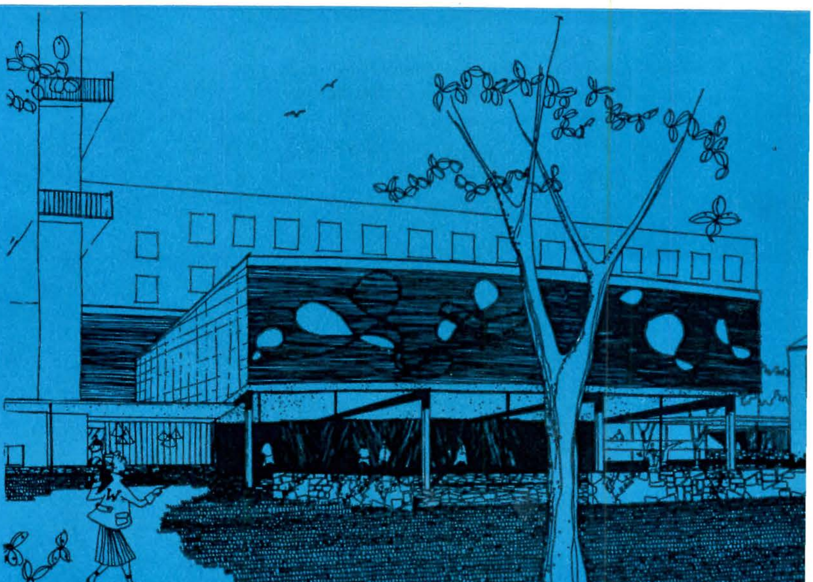


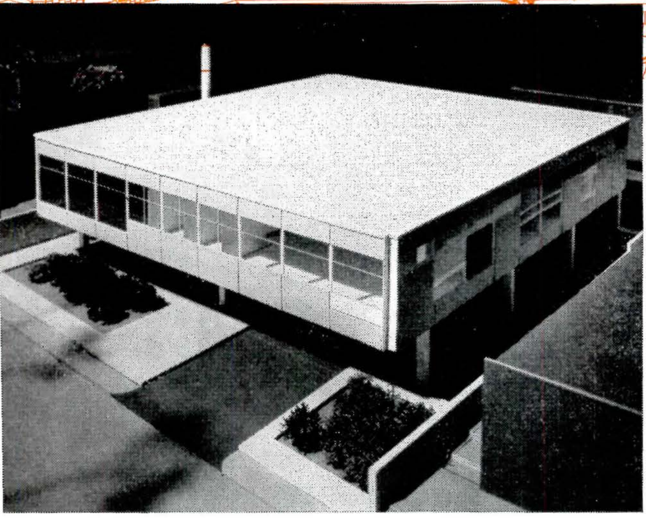
projects now on-the-boards in some leading Boston offices

1954

Carl Koch & Associates *neatly concentrated varied activities of a Theater Arts Building in the design* (below) *for Wheelock College. Approach to the theater is through the wide lobby, also used for exhibitions. The drama training area adjoins the stage. Students' lounges opening into the sculpture garden encourage informality and reflect the genial atmosphere of such a building.*

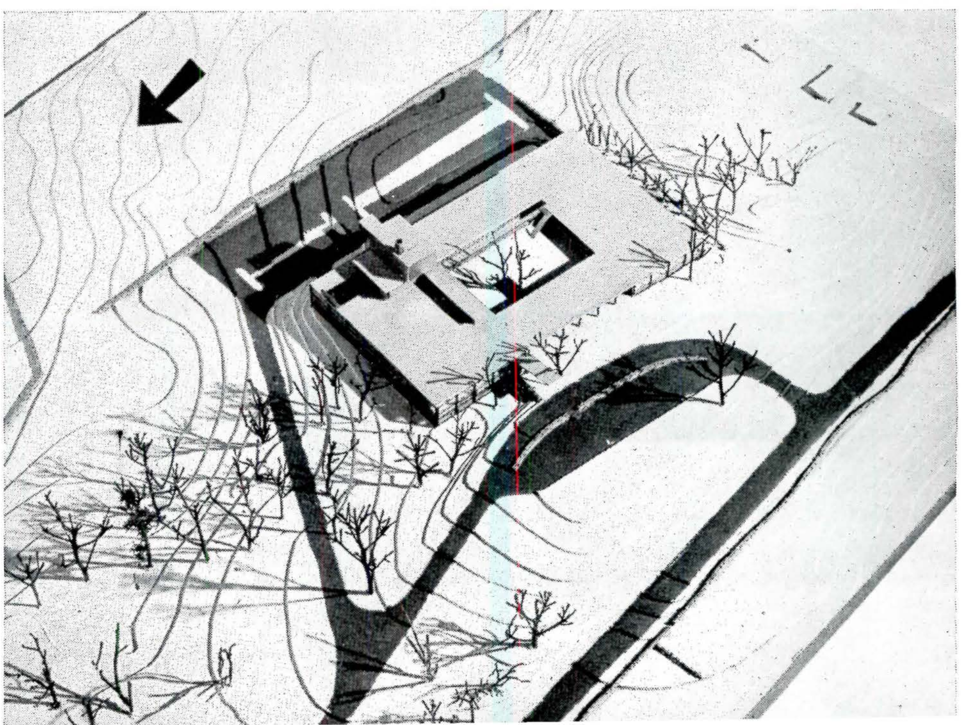






The Architects Collaborative *designed this compact, air-conditioned clinic for a group of doctors headed by Dr. Richard H. Overholt, specializing in heart and lung surgery. Facilities will be mostly on the second floor—operating suite, X-ray rooms, etc., in a central core surrounded by a corridor; doctors' offices and examination rooms around the perimeter of the plan, with large waiting room and a secretarial office, across the front. A paved parking area will occupy more than half the ground floor, the drive-in located beside the entance unit (brick-faced wall in rendering). Edward K. True was Structural Engineer; Thomas Worcester, Inc., Mechanical and Electrical Engineers.*

Anderson & Beckwith *also created an essentially one-story plan to accommodate two related companies—Boston Manufacturers Mutual Fire Insurance Co. and Mutual Boiler & Machinery Insurance Co.—moving to a 70-acre site 10 miles west of Boston. Principal business functions of both companies are planned on the second floor; employes' lounge, cafeteria, and kitchen will be in the penthouse overlooking the court; services on ground floor.*



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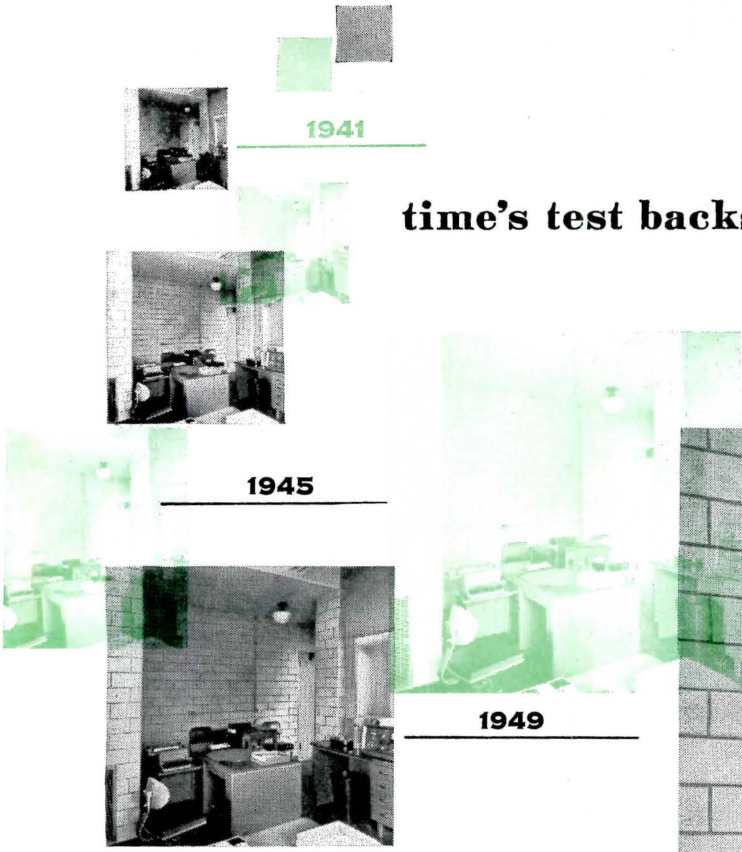

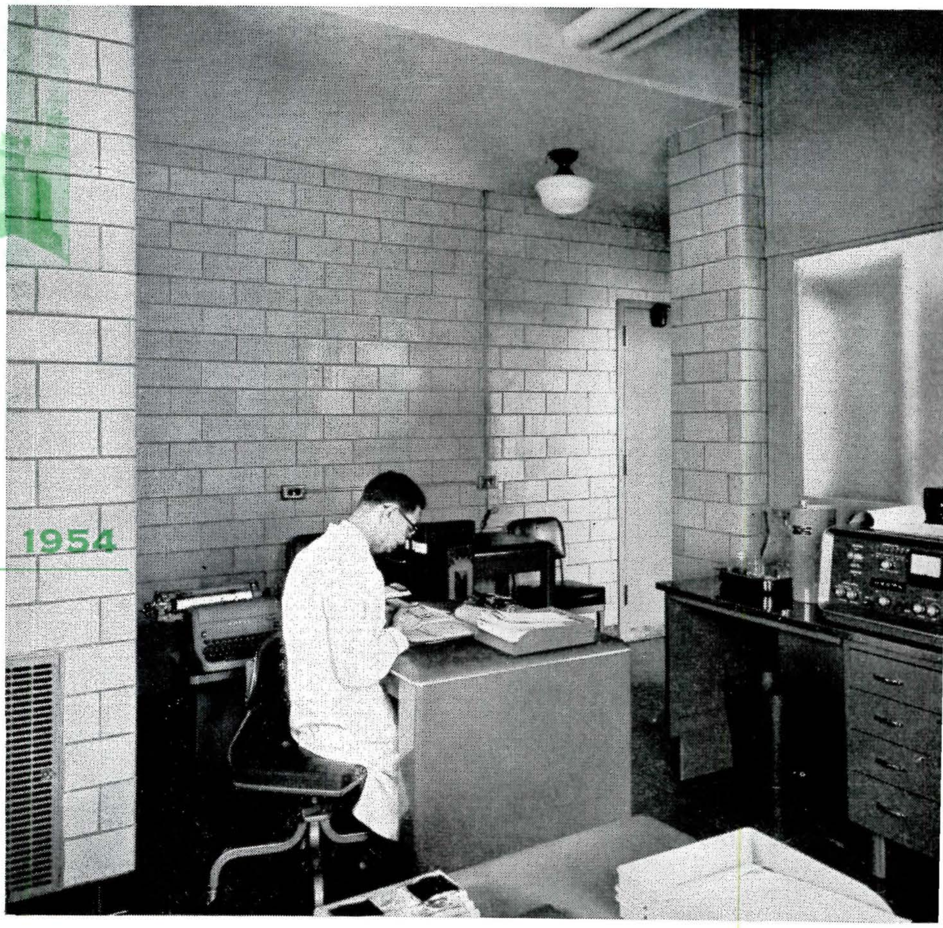

Radio—Isotope Laboratory, Lebanon Hospital, New York, N. Y. • Architect: Charles B. Meyers Associates

This typical installation of glazed structural Facing Tile in the 13-year old Lebanon Hospital, Bronx, New York, looks as clean and attractive today as it did when the building first opened.

Says Mr. I. Greenberg, Lebanon's Chief Engineer, "Facing Tile has helped us to maintain high standards of sanitation with minimum cost. It's simple to clean, and it stands up well in any hospital area—from aseptic laboratory to heavy-duty boiler room."

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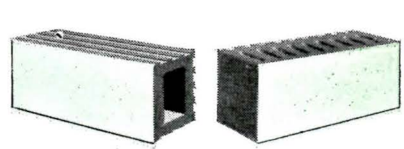

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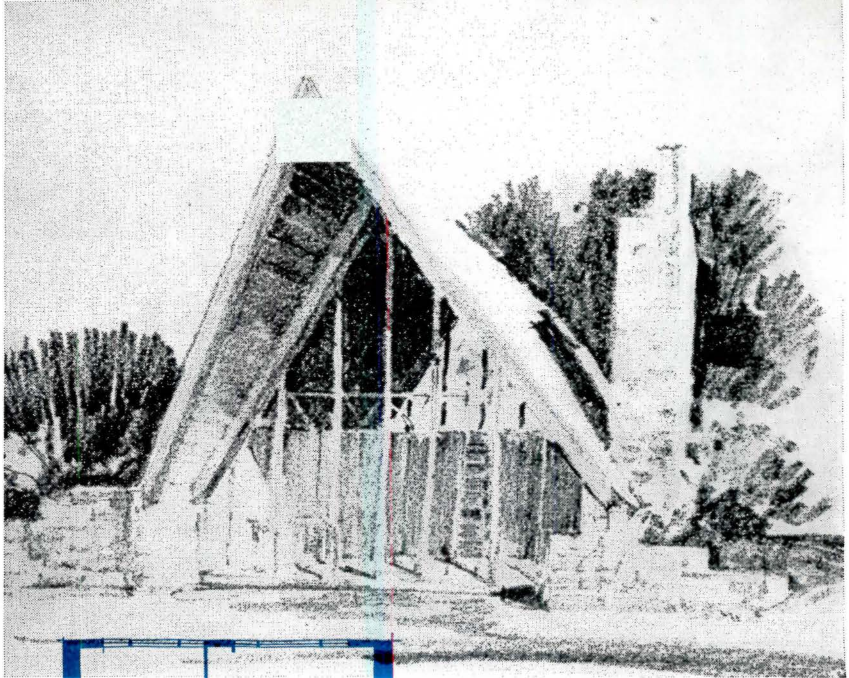
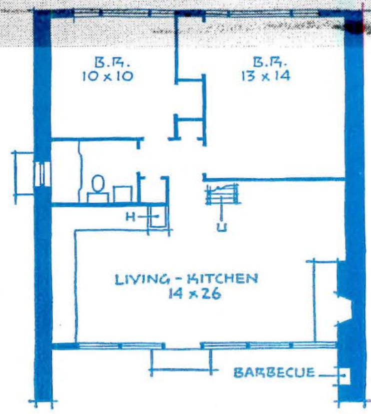
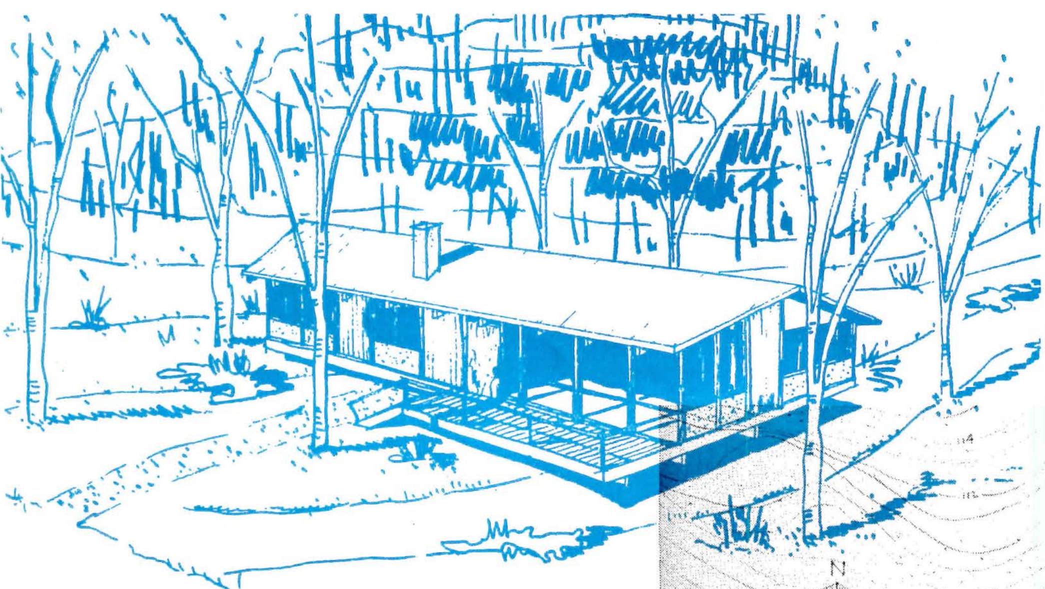
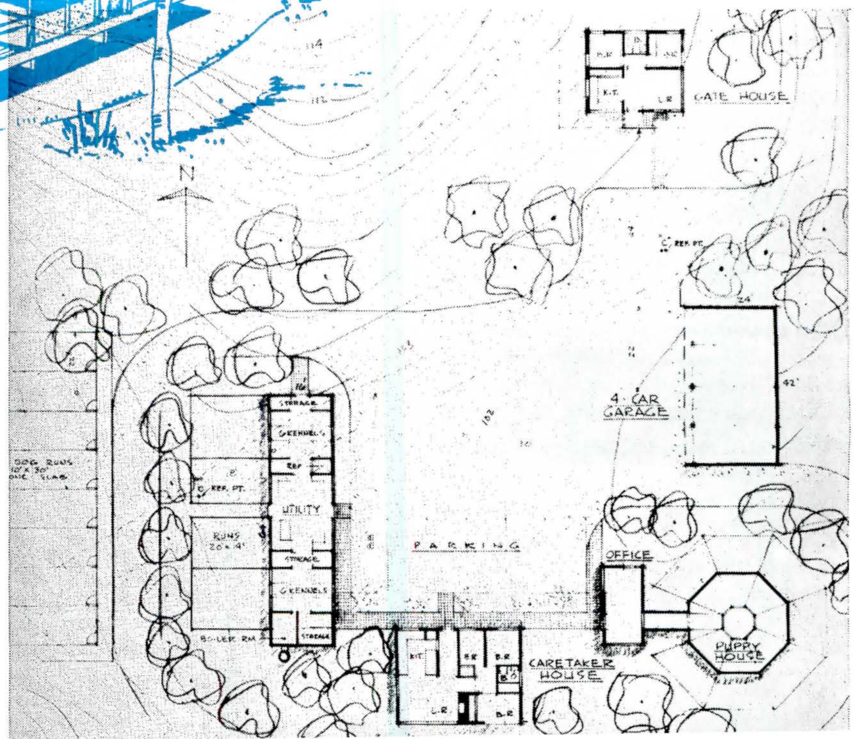


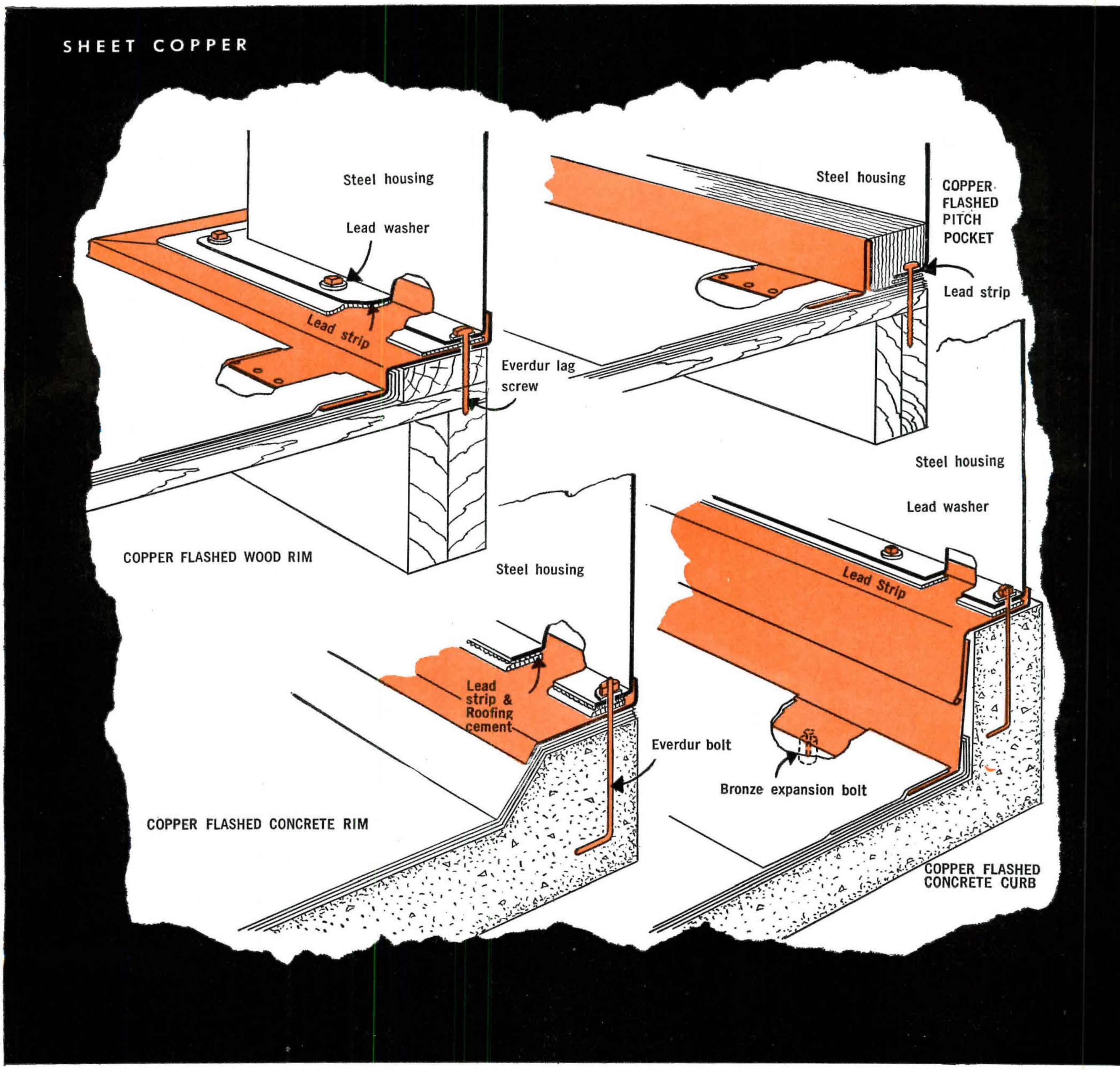
__Royal Barry Wills__ says of this small house to be built for under $5000 (without chimney) that "'T ain't traditional, 't ain't modern, but it's doggone liveable and dirt cheap—that last because it's built into the ground." This is designed to be home for a young couple.





__Saltonstall, Morton & Morton__ designed for Mr. and Mrs. Francis V. Crane, who breed and raise show dogs, this group of kennels and related buildings for a heavily wooded rural site. The sketch (above) *is of the gate house.*





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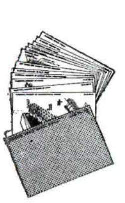
Modern flat-roof buildings usually have one or more construction features calling for roof curbs. These are: penthouse for stairs, skylights, ducts, vent pipes for plumbing, flagpole base, stub columns and many more. Properly flashed curbs keep standing or wind-driven water from leaking into the building at these points.

Shown here are several curb flashing details for both fireproof and wood construction. Flashing for a piece of equipment with a metal housing, such as a roof fan or dust collector, is also shown. Lead strips and washers isolate one active metal from the other. In general, use 16 oz. copper of cornice temper for all curb flashing. 5453



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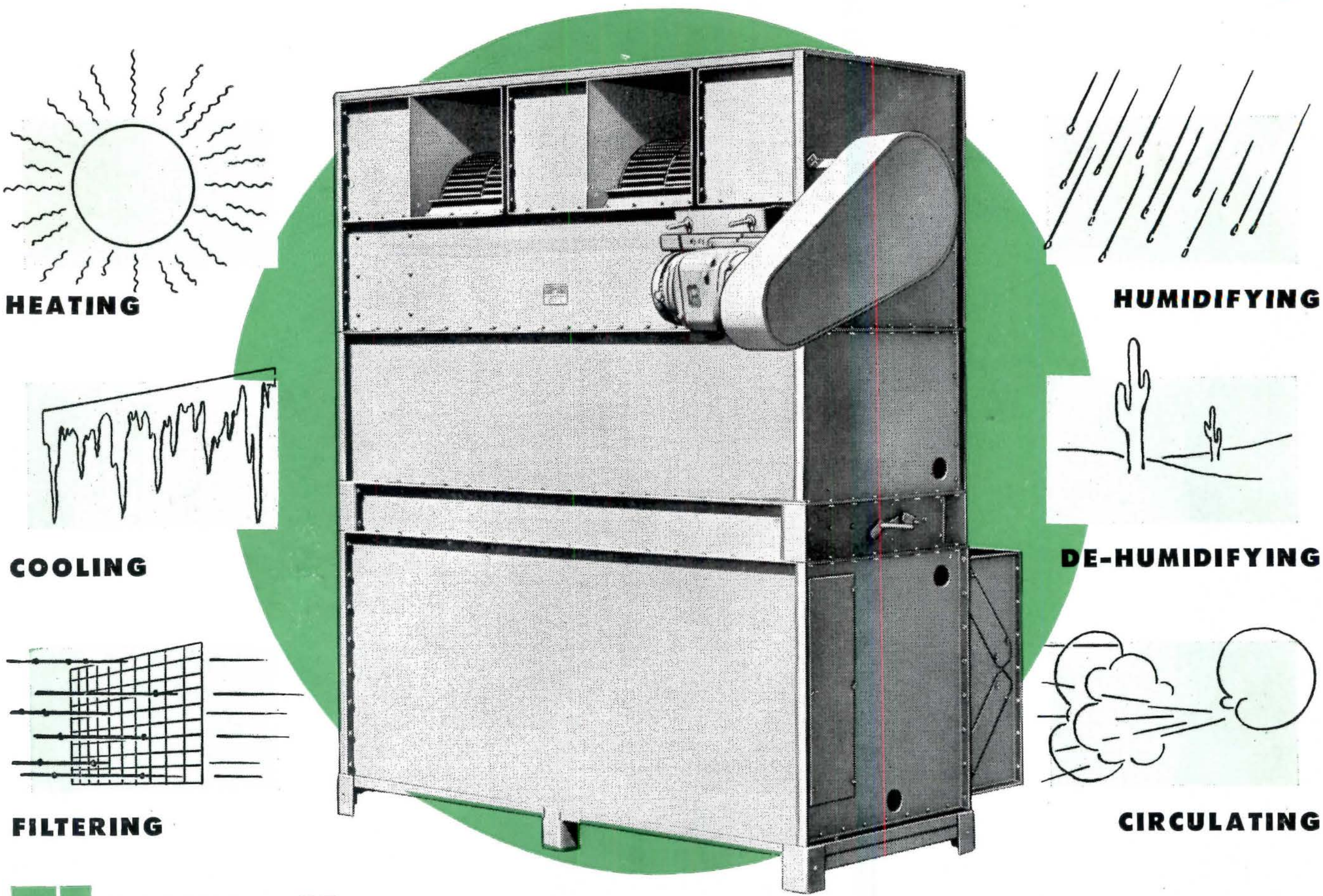

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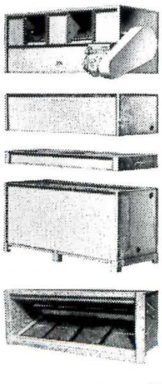

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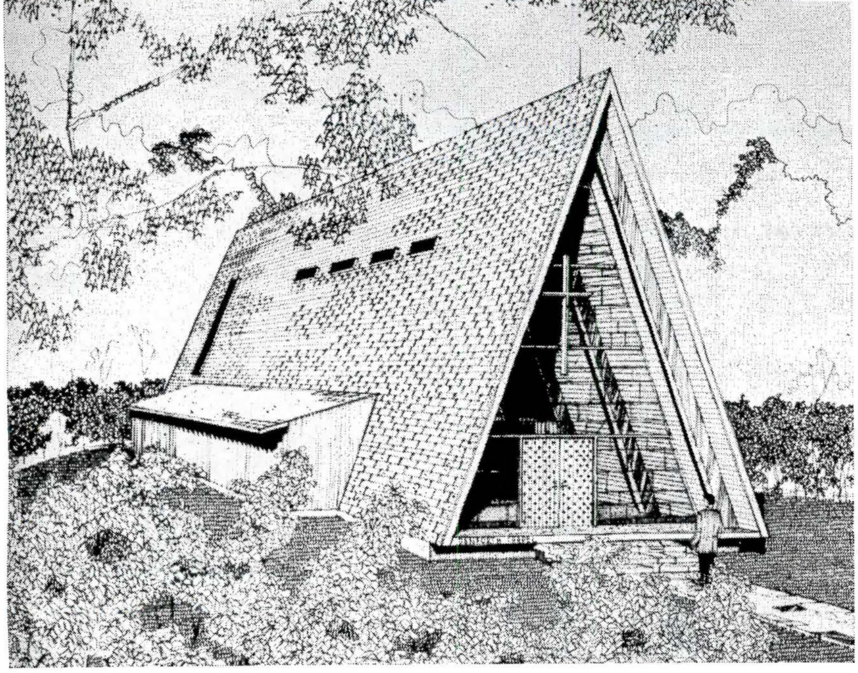
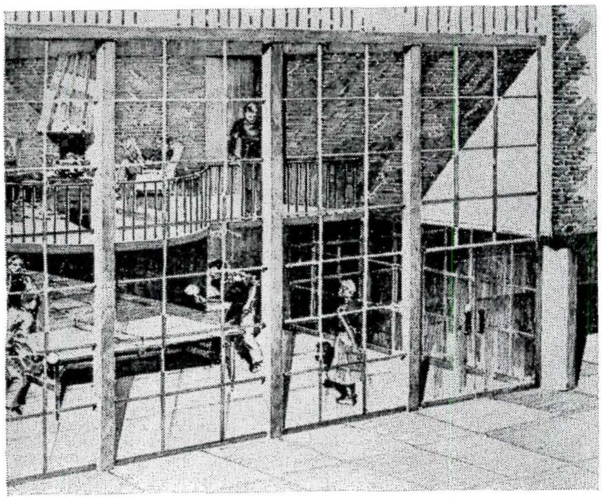
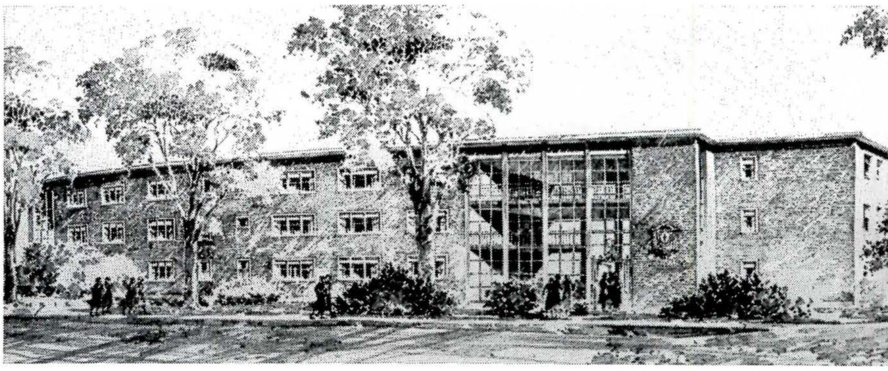
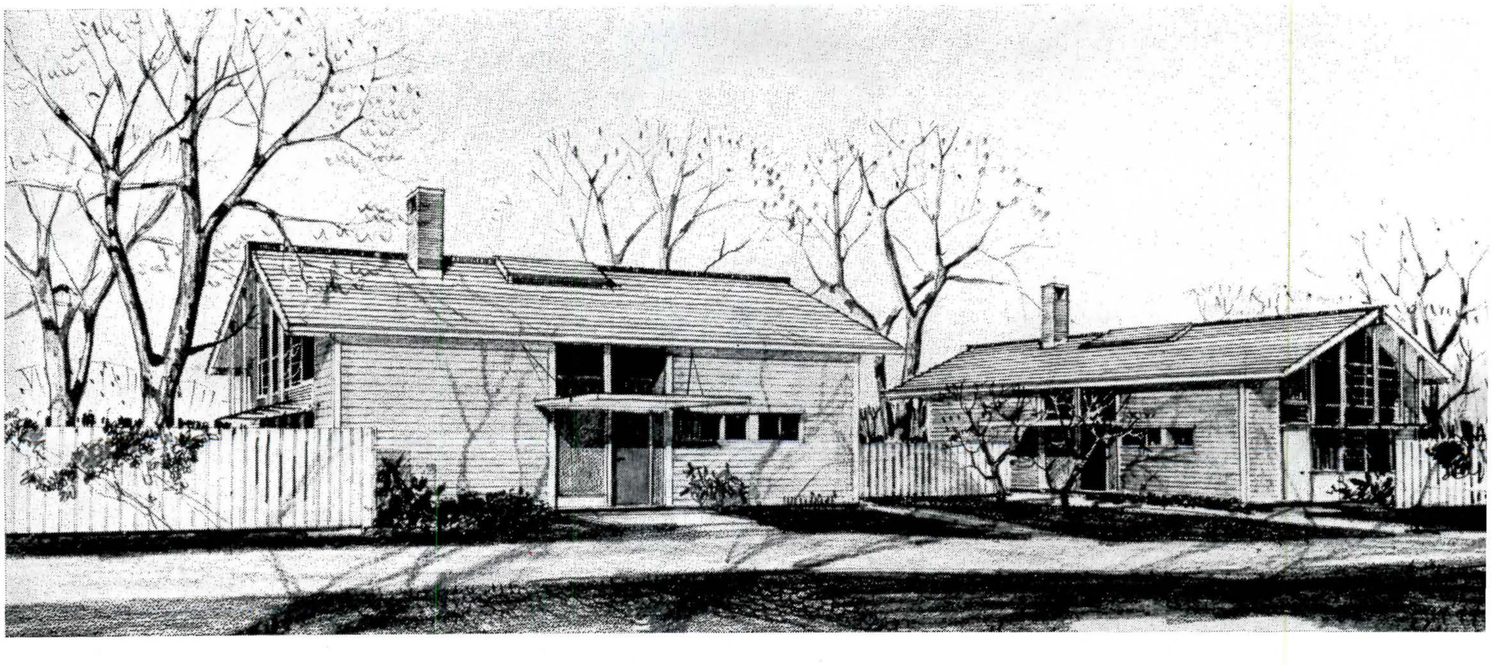


Compton & Pierce *designed this unpretentious wood structure as Danforth Chapel for University of South Dakota, Vermillion, S. D. The budget provided for the chapel is $25,000.*





Isidor Richmond & Carney Goldberg *recently designed for Bridgewater State Teacher's College the new men's dormitory* (above *and* left).



Hugh Stubbins Associates *recall the severe simplicity of the New England parsonage in these faculty houses for Episcopal Theological School, to be built off Brattle Street just back of the Longfellow mansion.*

critical discussion of "stereo-structures" (page 84)

Dear Editor: Felix Candela is an architect, I am an engineer. We are both fighting the same battle: we want architects to realize the possibilities of new structural concepts and to challenge with their creations the imagination of the engineers. Glory, then, to Candela for his biased article.

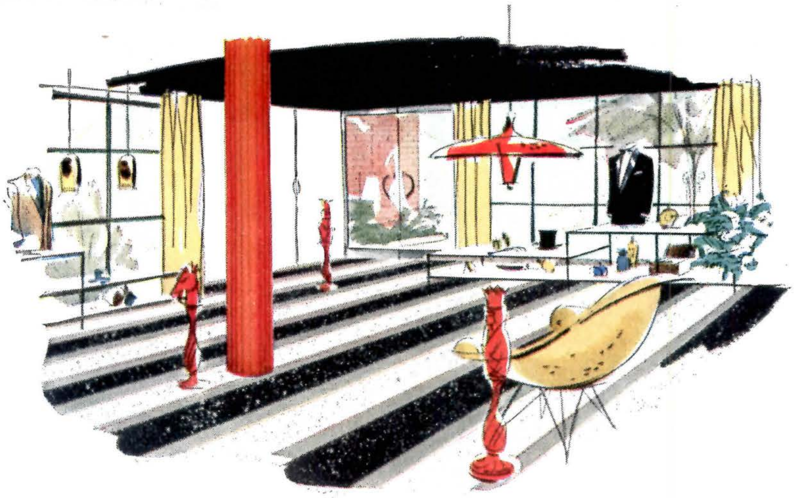
But battles must be fought with weapons capable of giving lasting fruits in victory, and I am afraid that many of Candela's assertions may imperil the results of our battle. As his "ally," I would like to throw light on a few points in his article, before the "enemies" attack.

In the field of structures "propaganda by slogans" will not do. Catchwords cannot be substituted for ideas and their understanding. "Passive and active structures" are some we run into in this article. The word "passive" seems to have disparaging connotations. An "active structure," says Candela, is "capable of changing the direction of the loads and of forcing them to move throughout the structure." By this definition the much despised beam is the "most active" structural element we can conceive of, since it is capable of taking a vertical load, changing it into horizontal stresses and back again into vertical loads, while the inclined members of Figure 1 are nothing else but inclined columns and hence hated "passive" elements. The truth of the matter is that the idea of "passive" or "active" structures is misleading and immaterial, since *all* structures are active. The only important concept here is economy, as Candela points out.

Another catchword is, of course, "stereo-structures." Apart from my personal dislike for words coined by juxtaposition of two words taken from different languages, and apart from the fact that "space-structures" says exactly the same thing by using two Latin words, I am at a loss as to what is meant by a "non-stereo" structure. Candela is absolutely right in emphasizing the "plane thinking" of most architects and engineers and in asking for more "spatial thinking" or "stereo-thought" (not to be confused with stereotyped thought), but this distinction has to do with *people*, not with *structures*. *All* structures are built and work in space.

If catchwords will not do, magic tricks will do even less. And Candela performs prestidigitation of a most interesting nature in transforming the structure of Figure 1 into a beam. This is a fabulous vanishing trick by which the essential hinge, connecting the two struts, peters out as the subtended angle approaches 180°. Of course, the two struts connected by a hinge cannot carry a vertical load if laid along a straight horizontal line; but without the hinge they can, and do so in all of our structures. Again, all that is implied here is the change from

(Continued on page 20)



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p/a views

(Continued from page 16)

direct to bending stresses and their relative economy.

And while on the subject of bending, it would be fair to recognize that the action of gravity is vertical and, unfortunately but naturally, men like to walk horizontally. Aldous Huxley's characters play tennis on a Riemann surface, but I doubt that they would like anything but horizontal planes when they are not in a playful mood. "Piled-up" boxes are not of our making: gravity is the villain and until we counteract it by powerful electro-magnetic "stereo" fields, we'll have to put up with them.

The heavy artillery fire, used by Candela against the mathematical engineers who hide the truth about the shells in order to make larger profits, must be neutralized by a counterbarrage. I am not acquainted with a single engineer interested in shells who has not tried hard to explain by words and sketches their behavior to his friends, architectural or otherwise. What the mathematical engineer cannot and will not do is sell half-truths, the other halves being, by definition, half-lies. Some of the fine points of shell design are tricky. Would anyone believe, intuitively, that the free longitudinal edges of a cylindrical shell do *not* deflect downwards under the action of a uniform snow load? Or could anyone state that, of course, he would have thought of a hyperbolic paraboloid as a good roof surface, even before the pioneering efforts of such mathematical engineers as Aimond? We are all in favor of sound intuition, but we must recognize that in science intuition is often a "post facto" rather than an "a priori" state of affairs. And whether we like it or not, structures can only be designed with a large amount of intuition and an *equal* amount of scientific knowledge. Candela has both, just as Pier Luigi Nervi has both, and that is why they build such wonderful structures.

In the present state of our civilization, it is hard to state at times what is the cause and what the effect in certain situations. But this is not so in the case of "membrane stresses versus shell thickness." The statement that "membrane theory is especially appropriate to picture the stress condition of doubly-curved surfaces," was unfamiliar to at least one reader, but while Candela's analysis of it is correct if applied to surfaces with curvatures of opposite sign (saddle surfaces), it is incorrect if applied to synclastic surfaces. The materials shells are made of are "relatively inextensible," to be sure, but this does not mean that they will *not* give in. It means, instead, that in order to give in they will develop *stresses beyond the elastic limit,* and this is why a very thin shell *cannot* develop bending stress even if the loads try to. The statement that "a thin shell cannot develop bending stresses" means: the maximum *elastic* bending moments developable in the shell are so small, because of its small thickness, that they may often be neglected. This is part of the fundamental phenomenon Candela calls "metastasis," borrowing a Greek word with cancerous connotations to ex-

(Continued on page 22)


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Neville, Sharp & Simon, Architects

(Continued from page 20)

plain one of the most useful properties of two-dimensional states of stress. Taking into consideration yield (if necessary) one *can* ascertain the results of statically indeterminate calculations, as thousands of experiments have consistently proved.

Engineers are less prone to articulation of ideas than architects and therefore less liable to attack. But actions count more than words. By their shells ye shall know them, and Candela's are wonderful.

M. G. SALVADORI
Department of Civil Engineering
Columbia University
New York, N. Y.

•

Dear Editor: Although I have read and reread Felix Candela's "Stereo-Structures," I find it difficult to give an opinion in a brief letter because of the danger of being unfair either to the author or to the "inner circle" "handful of initiates as eminent scientists" so bitterly attacked by him. The main reason for the difficulty lies in the article itself, which presents both praiseworthy and also completely erroneous ideas in an erudite language.

Anybody who advocates a more imaginative approach to structural engineering and architecture, who proposes that architects regain their lost status as "master-builders," etc. is supporting a worthwhile cause. Those who agree with the desirability of these objectives do not need convincing but those who disagree will scrutinize the validity of the arguments. Unfortunately, the argumentation of this article is erroneous in a great many instances and the reasoning is rather primitive, unprecise, and oversimplified:

Does Candela really believe that the use of the theory of elasticity is a "pseudo-scientific vogue" or that the "fundamental principle" of economy is the avoidance of bending stresses?

It also appears that he, himself, has some mistaken notions about the application of membrane stresses to shell analysis. An intuitive understanding and visualization of complex structural problems is a highly desirable quality and a great help to the engineer or architect in guiding the analytical work itself. Significant advances can only be made by imagination and inspired thinking. But to dispense with the analytical tools, because they are best expressed in the form of mathematical formulas, which Candela apparently dislikes, would mean to return to the era before Archimedes. Unfortunately, even in that period, there were those who were able to master the language of numbers and measures and those who did not; a simple addition appeared just as distasteful to the uninitiated as the differential equation, describing the equilibrium conditions of the cylindrical shell, appears to the author.

PAUL WEIDLINGER
Consulting Engineer
New York, N. Y.

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Dear Editor: Candela's statement presents, with remarkable clarity, the poten-

(Continued on page 180)

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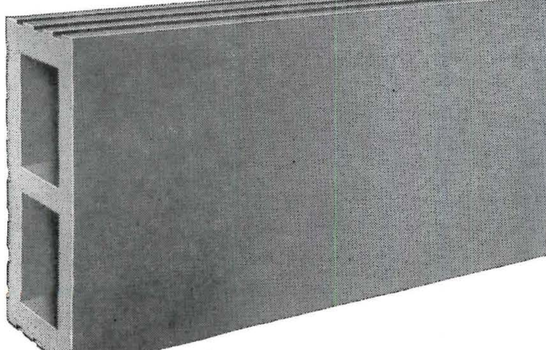

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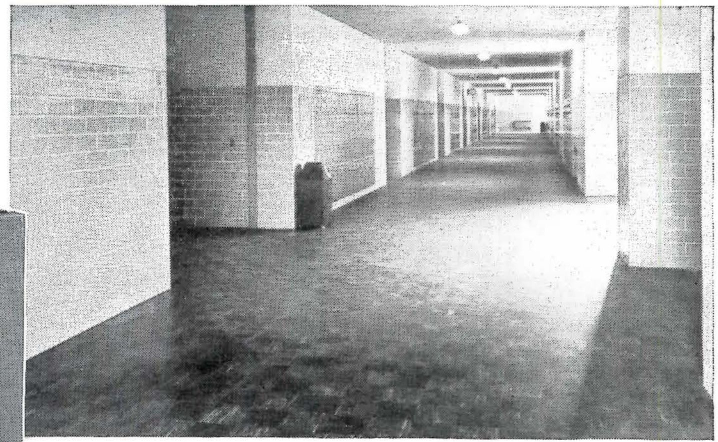

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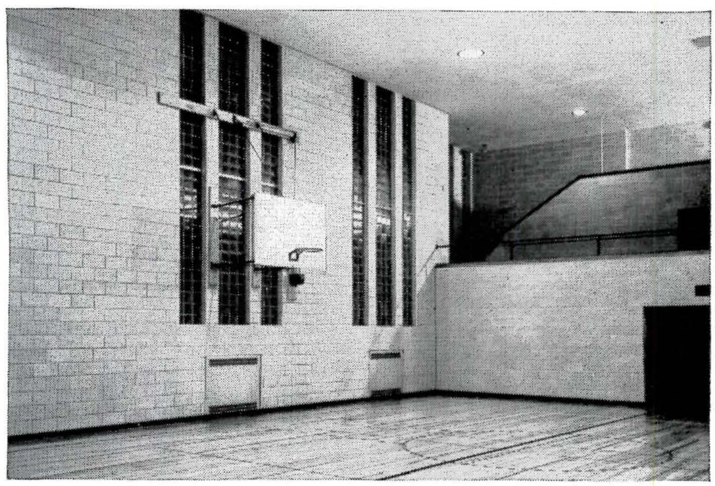

Natco "8W" Series Vitritile in Wauwatosa High School, Wauwatosa, Wisconsin
Architects: Herbst & Kuenzle

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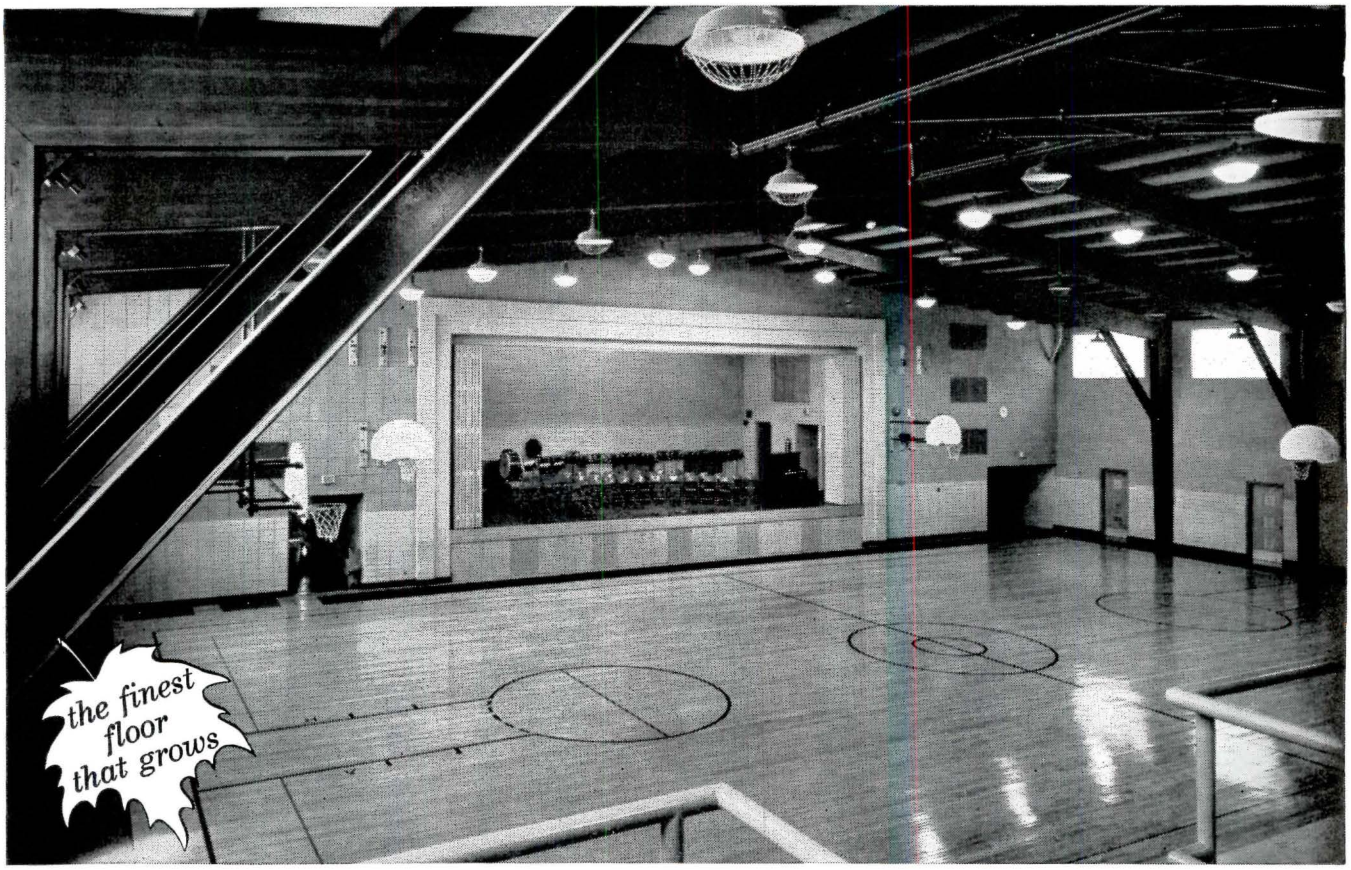
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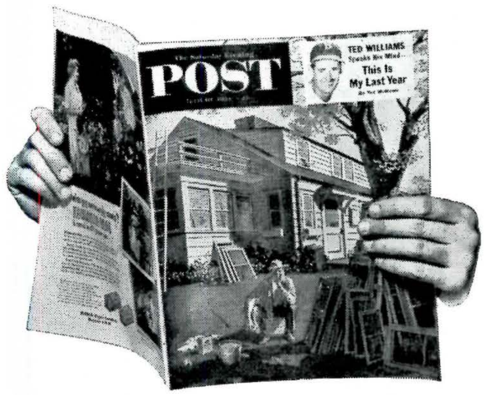

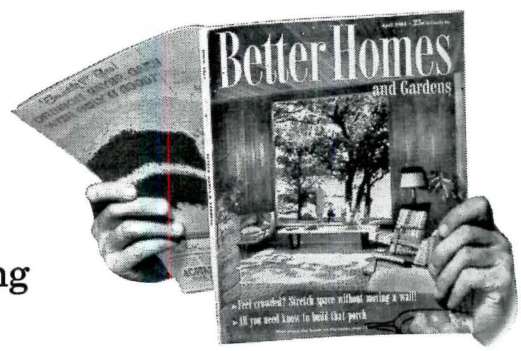

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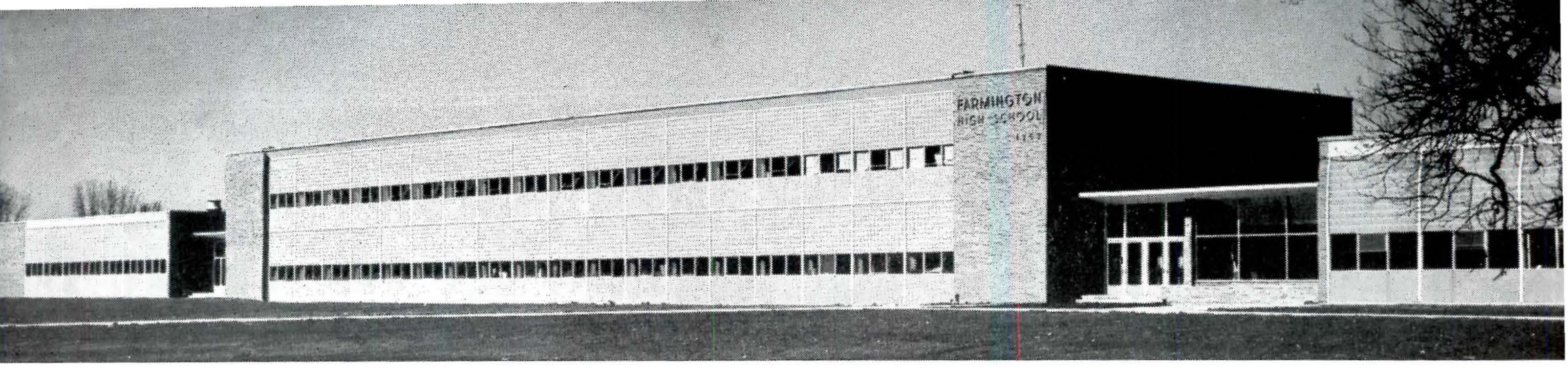

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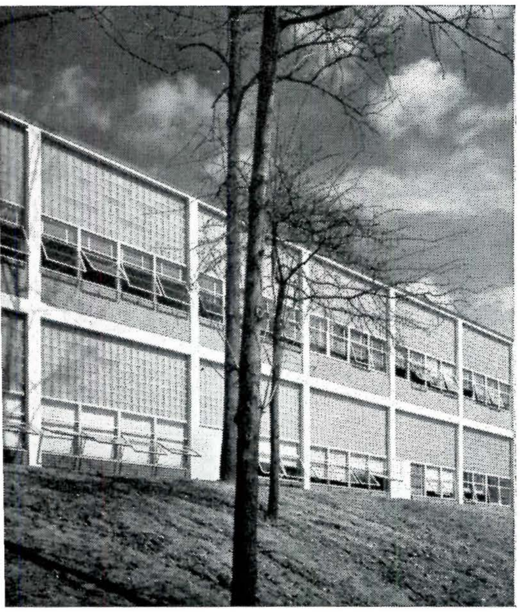

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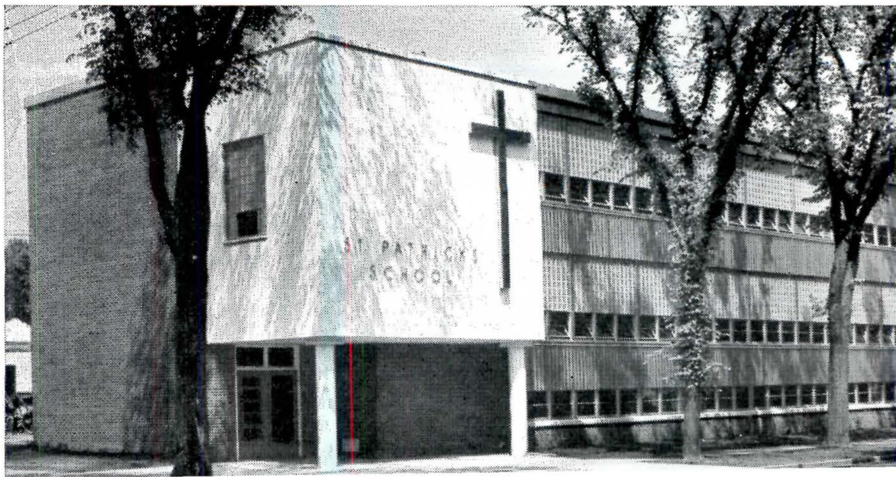
E. Rivers Elementary School.
Stevens and Wilkinson, Architects

OHIO, Boardman.
Boardman Elementary School.
Kling & Frost, Architects

MAINE, Rockland.
South End School. Eaton W. Tarbell & Associates, Architects

DISTRICT OF COLUMBIA, Terra Cotta. Western Suburban Jr. High School. Rhees Burkett, Architect

IOWA, Cedar Falls. St. Patrick's School.
Frederick Mast and Associates, Architects



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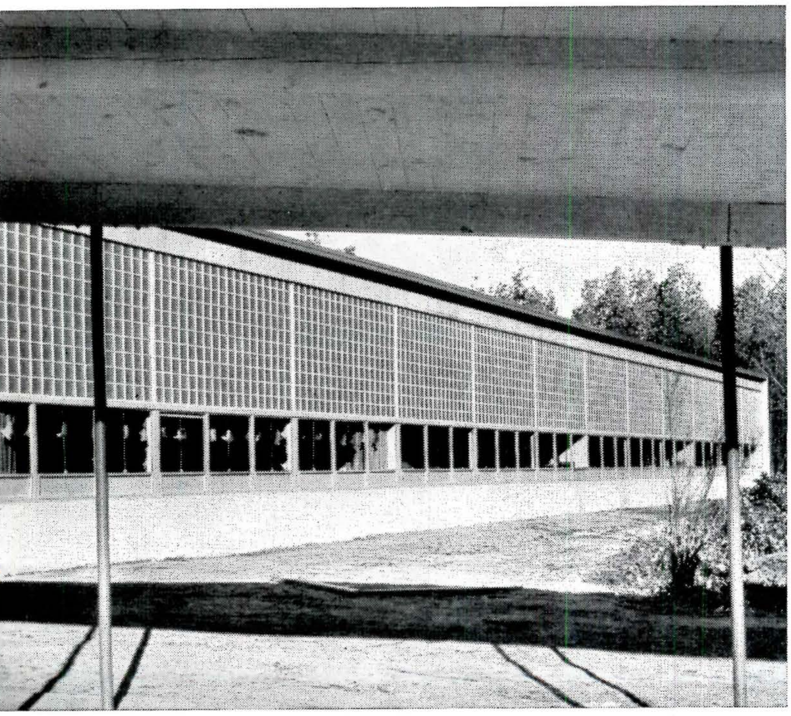
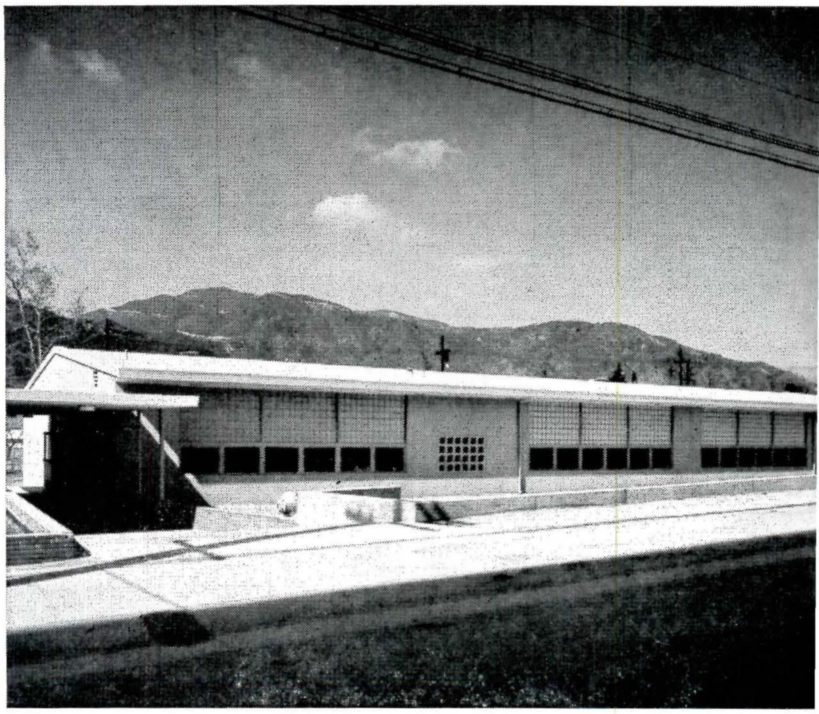


WASHINGTON, King County. Mercer Island School. Naramore-Bain-Brady and Johanson, Architects



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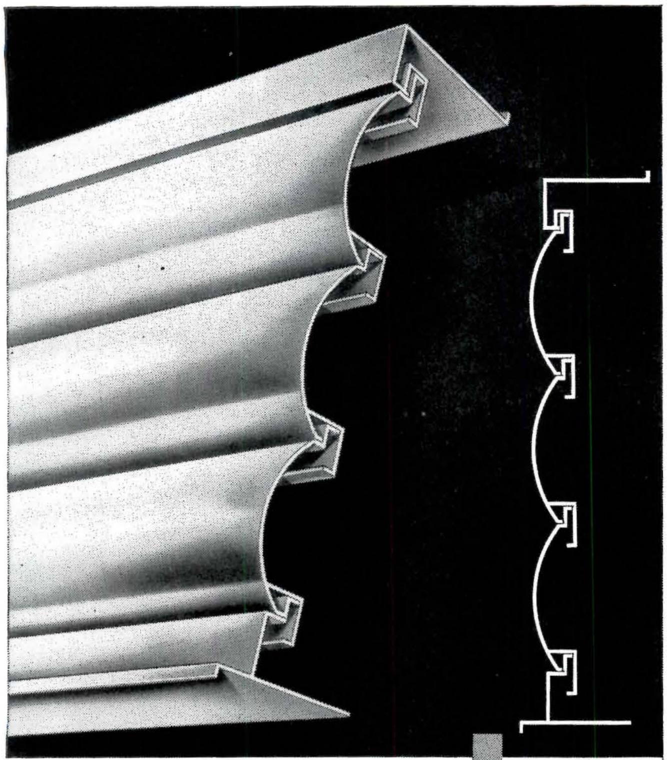

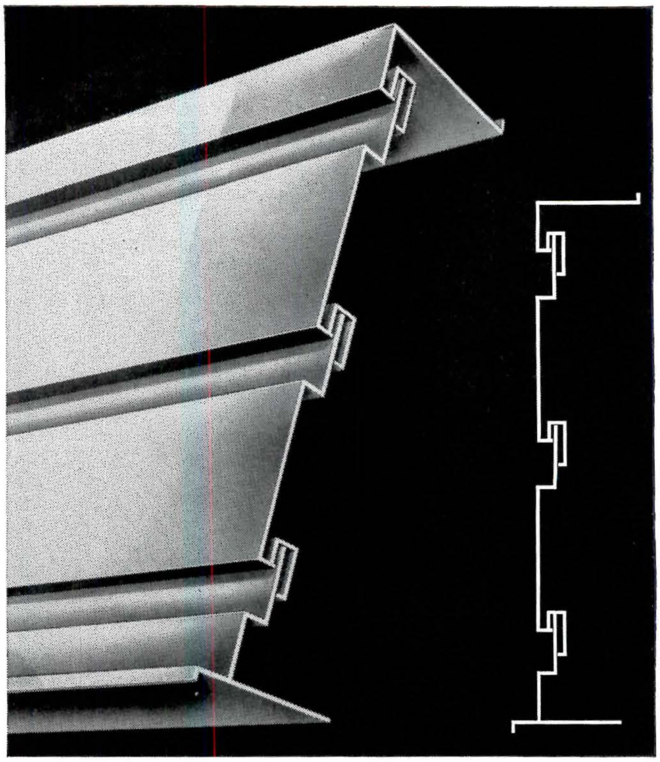

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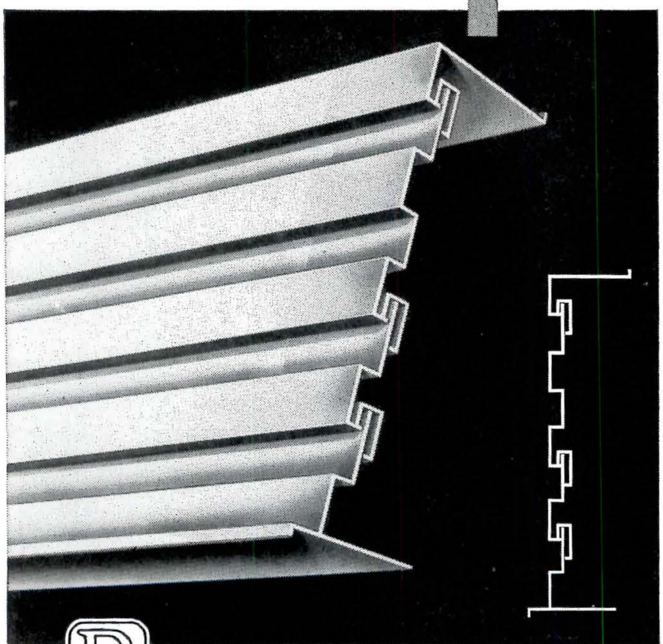

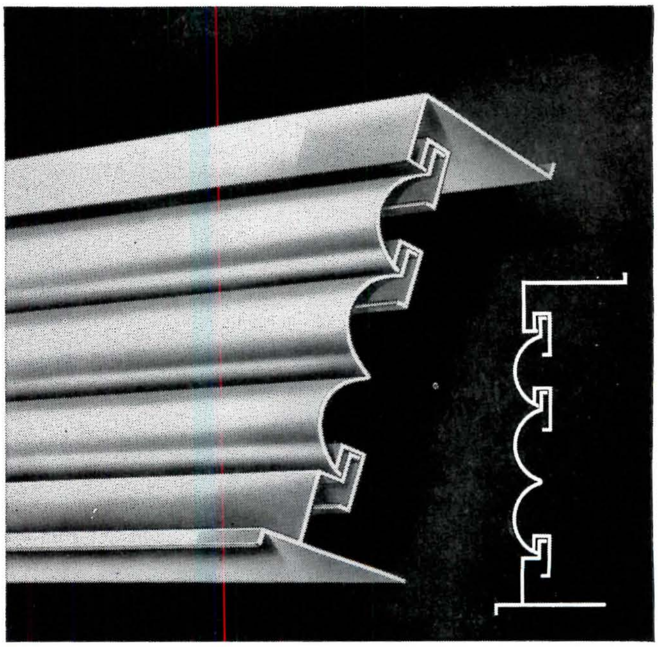

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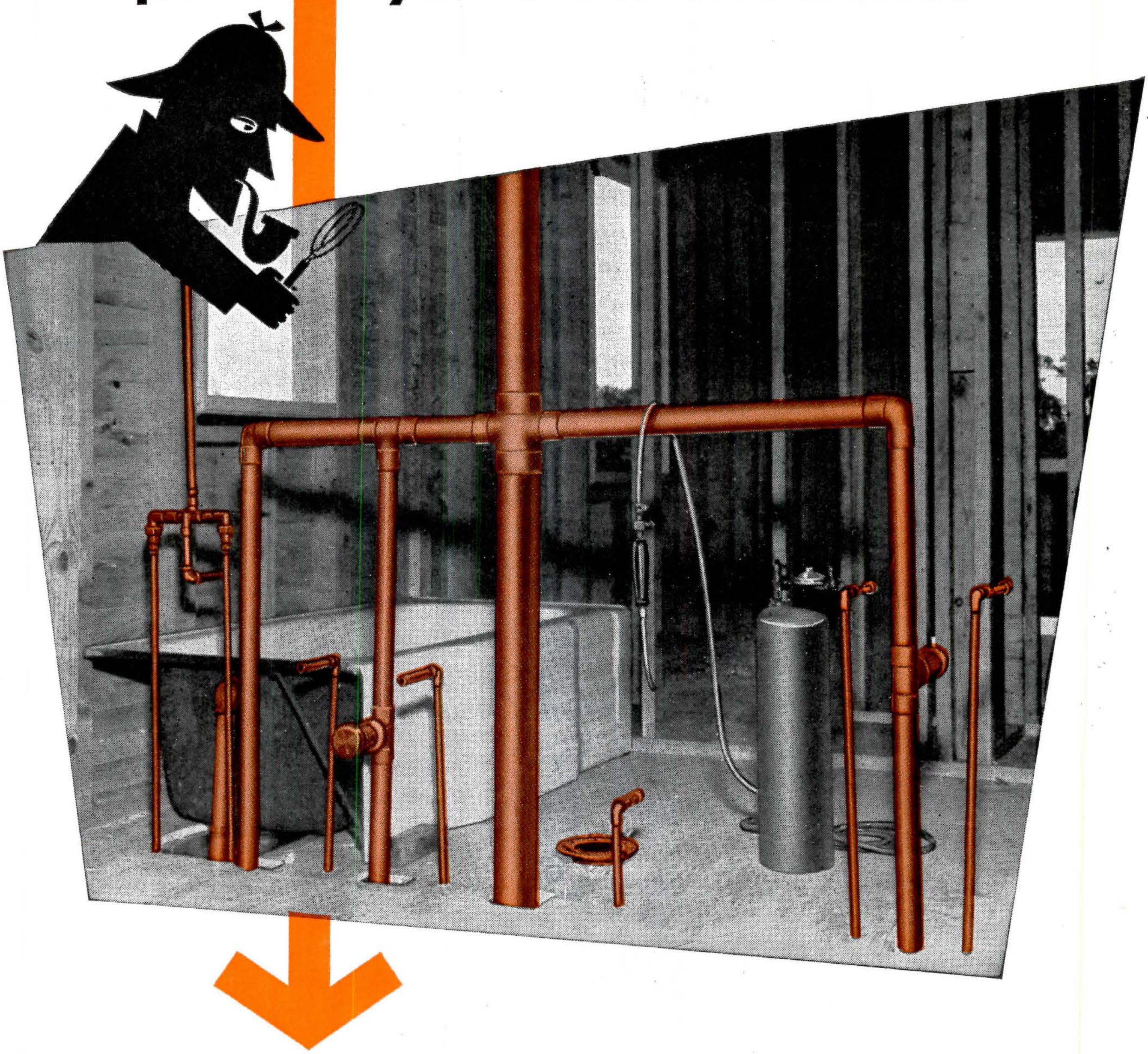

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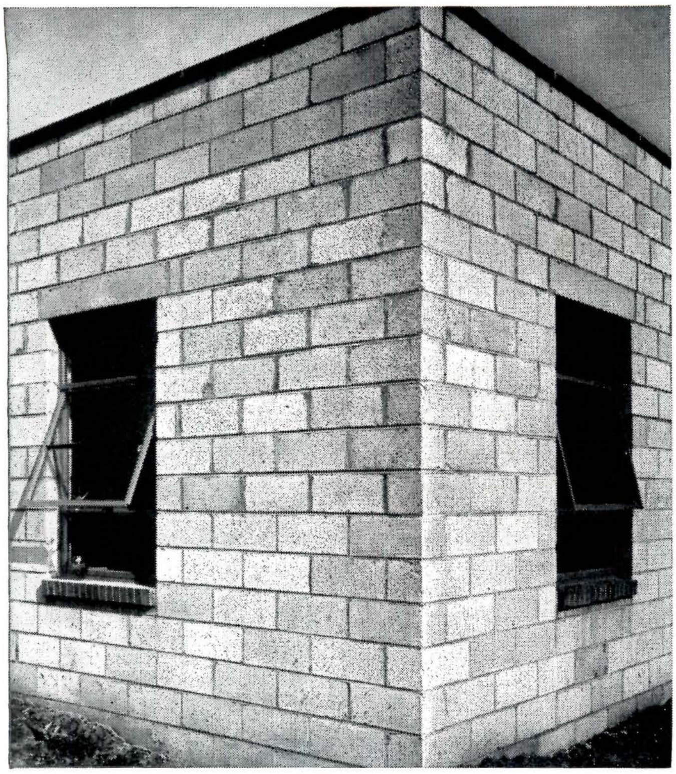

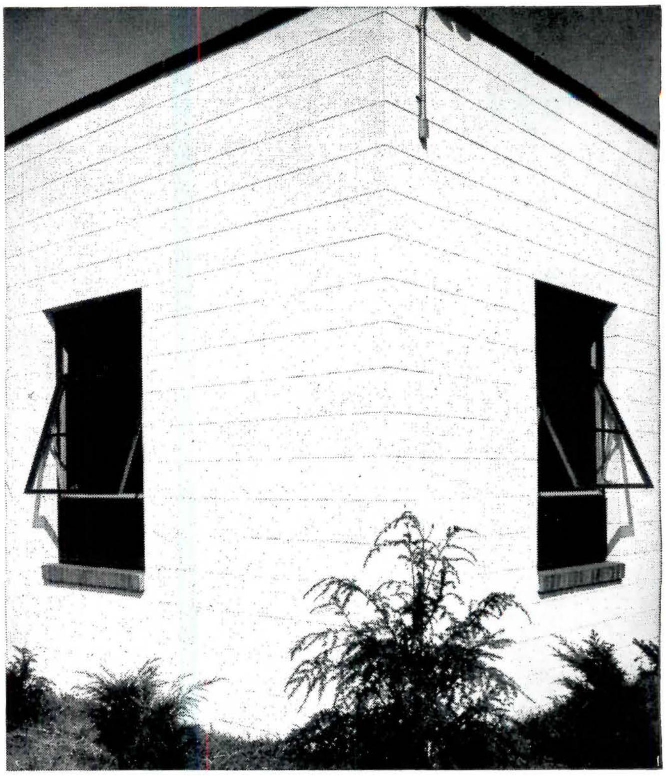

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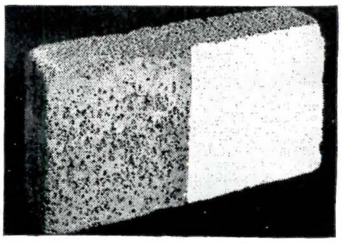

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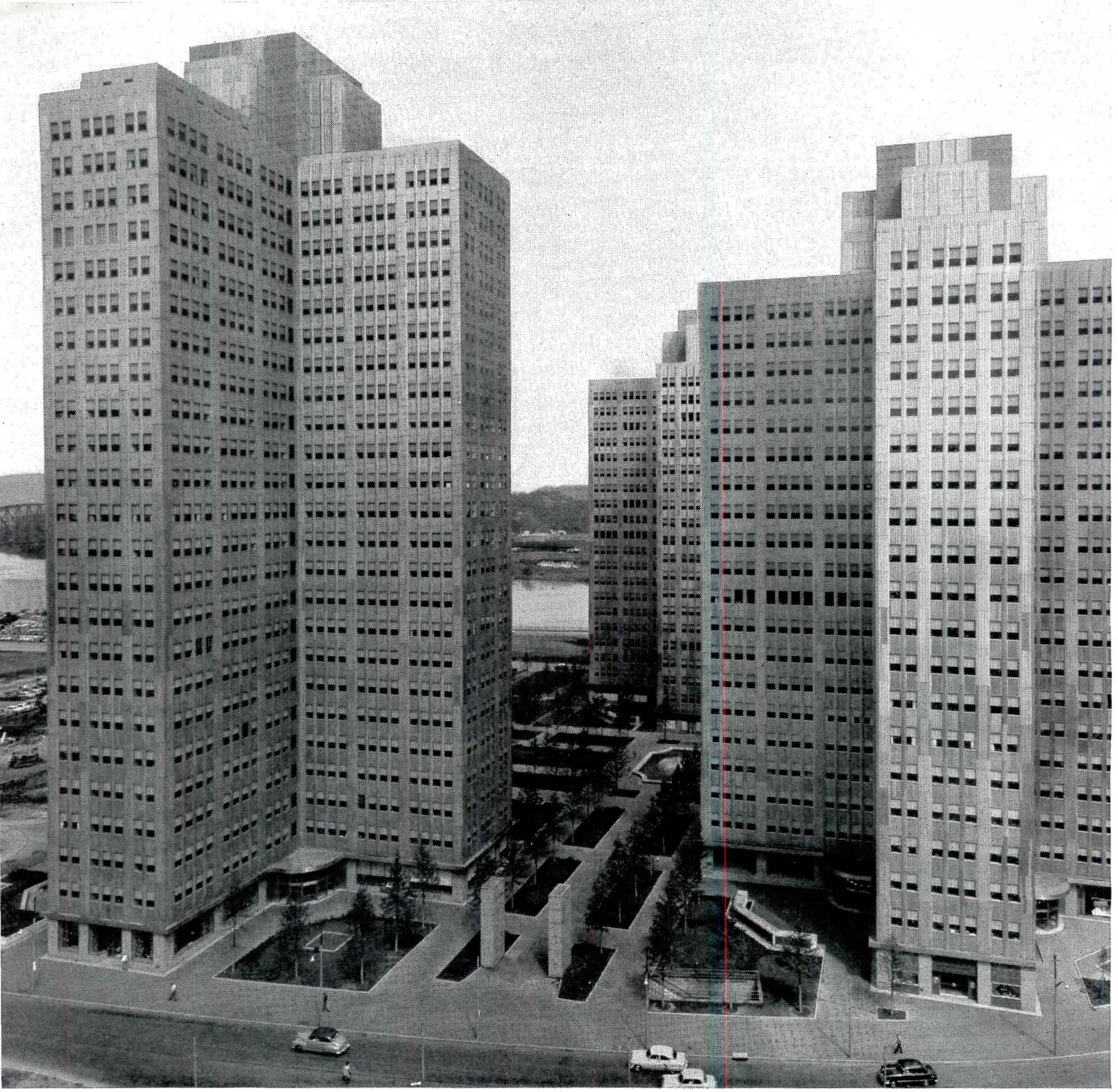
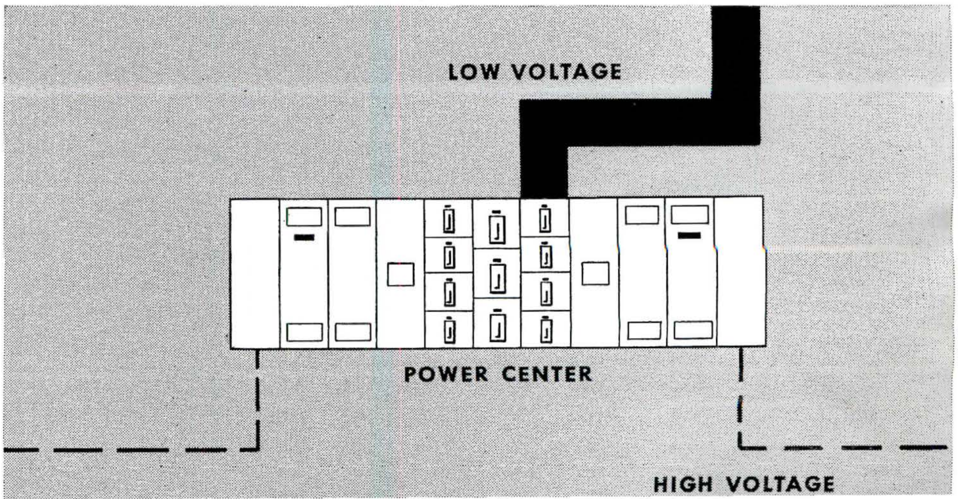
FOR TERRAZZO, PAINT, SLABS, STUCCO

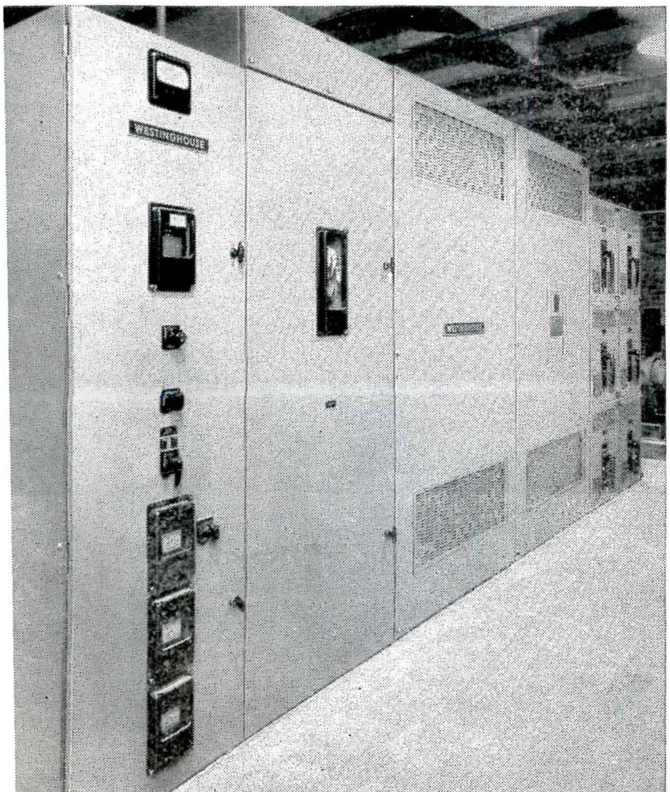
UNITED STATES STEEL HOUR—Televised alternate weeks—See your newspaper for time and station.




LOW VOLTAGE
POWER CENTER
HIGH VOLTAGE

AIM:

MATCH PEAK TRAFFIC WITH PEAK POWER



High-speed elevator service—demanded when tenants must be moved quickly during heavy traffic hours—should begin at the electrical system planning stage.

The need for completely adequate power distribution makes this so. Not only do high-speed elevators require *more* power, but their drives are usually located in the penthouse—far removed from the power source. Thus, the electrical system must carry *heavier* loads *greater* distances. Yet, it has to hold voltage and power losses to a minimum.

A typical way: *High-voltage* distribution—carrying high voltage from power source in the basement close to the electrical center of load in the penthouse. This modern practice stabilizes voltage. It eliminates line losses that result from long runs of secondary lines. It assures adequate capacity for heavy electrical loads.

At the center of load, then, high voltage is stepped down to operating levels with a Westinghouse Dry-Type Power Center. It installs anywhere to feed the elevator equipment and other local loads. No need for a vault. And the dry-type transformers and air circuit breakers minimize maintenance.

DP-5002-B

WESTINGHOUSE DRY-TYPE POWER CENTER . . .
a compact substation that permits high voltage to be carried close to elevator and other remote loads. Comes ready to install.

AIM:

MATCH E AIR C TIONING WITH MODERN CONTROL

Modern air conditioning is another tenant demand completely dependent on the electrical facilities behind it.

A number of motors and controls is involved in the modern air conditioning system. Thus, early steps should be taken electrically to assure continuous circulation of conditioned air—to the various building services.

In many modern buildings, all control equipment is located in one spot. This brings about easier operation and simplifies maintenance.

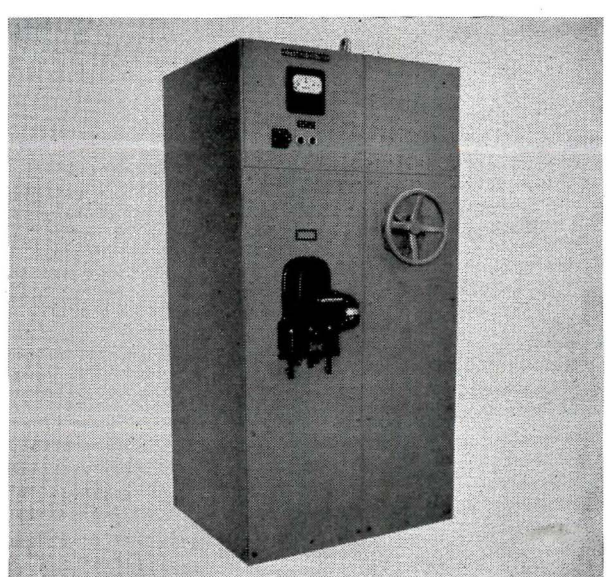
More complete integration of the controls is possible with a Westinghouse Control Center. It centralizes motor starting and protective devices in a compact enclosure that installs easily in any convenient location. Then, operating personnel can check operation of all motors at a glance.

In addition, Westinghouse Control Centers meet future requirements. This flexibility is due to standardized design and modular construction of the units.

DP-5002-C

WESTINGHOUSE CONTROL CENTER centralizes electrical control for building air conditioning systems in a single enclosure. At right: Secondary control for wound rotor motor drives . . . typical of the Westinghouse complete line of air conditioning compressor motor control.

YOU CAN BE *SURE*...IF IT'S
Westinghouse



AIM:

MATCH FIXTURES TO FUNCTIONS

Effective illumination demands this consideration: Lighting systems must be matched to functional requirements, yet blend harmoniously with building design.

This is particularly difficult in general office areas where sharp contrasts must be minimized. Thus, to keep contrast between fixture and ceiling down—to prevent specular reflection from shiny surfaces—indirect lighting is required.

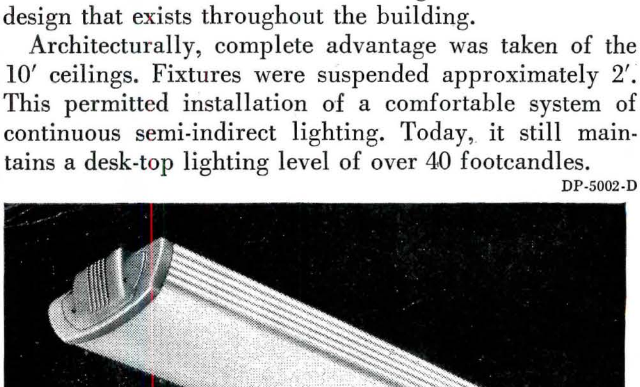
When you select the fixture, you must balance the desirability for comfort—obtained with indirect lighting—with the requirement for efficiency, realized through direct lighting.

Other factors also affect the selection. Fixture design and proportion and the ultimate lighting layout must blend with interior design.

Above is an outstanding example of how these considerations have been met. A Westinghouse CD-80 Luminaire was selected. It assures both comfort and efficiency by providing direct *and* indirect lumination. It blends well with room proportions . . . gives quality light for detailed office work . . . maintains the same high level of balanced design that exists throughout the building.

Architecturally, complete advantage was taken of the 10′ ceilings. Fixtures were suspended approximately 2′. This permitted installation of a comfortable system of continuous semi-indirect lighting. Today, it still maintains a desk-top lighting level of over 40 footcandles.

DP-5002-D



YOU CAN BE **SURE**...IF IT'S Westinghouse

AIM:

PROVIDE MAXIMUM RENTAL SPACE

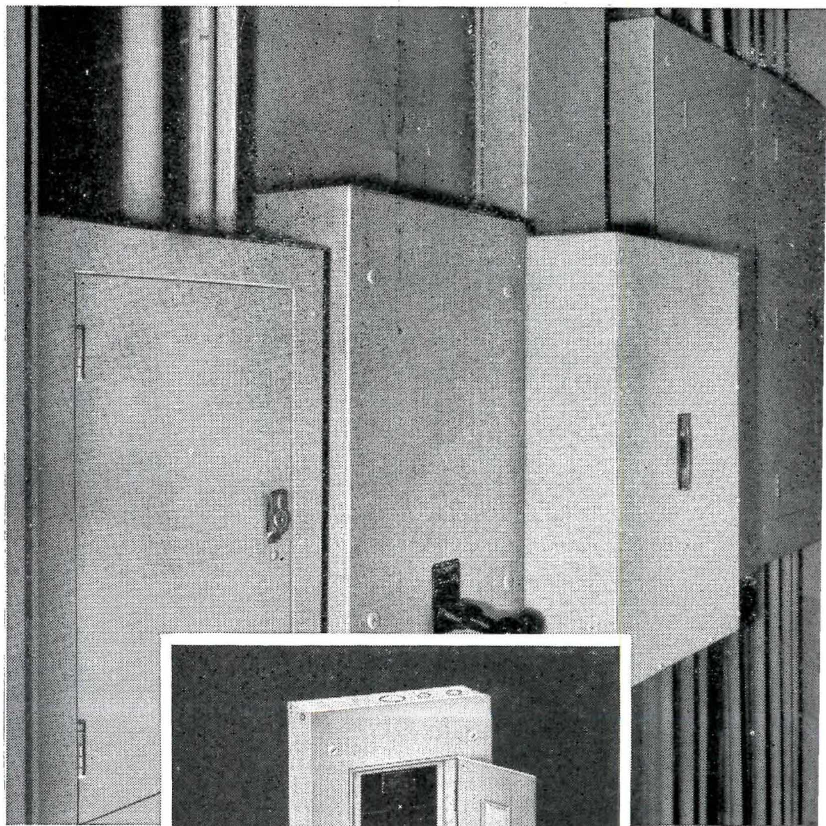
The heavier electrical loads elevator, air conditioning and lighting systems place on a building's power system make selection of its component parts a vital consideration. This equipment must have adequate capacity for increased loads. Yet, it should be compact to release maximum space to your client.

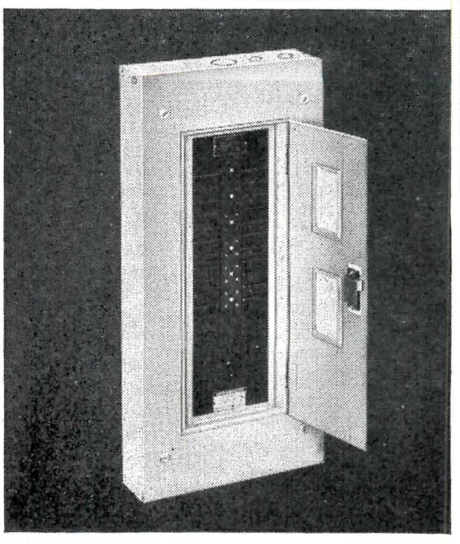
Modern distribution equipment answers these requirements. Example: Westinghouse Bus Duct—a highly efficient way to distribute low-voltage power. Up to 5000 amperes, in fact, it packs more power into less space than any other method of secondary electrical distribution.

Westinghouse Bus Duct comes in standard, prefabricated sections that adapt perfectly with building plans. It can be installed in elevator shafts or wireways. When exposed, its neat appearance blends well with interior design.

The inherent flexibility of bus duct is another "plus". It provides adequate reserve capacity to handle future loads. Expensive rewiring is eliminated.

DP-5002-E



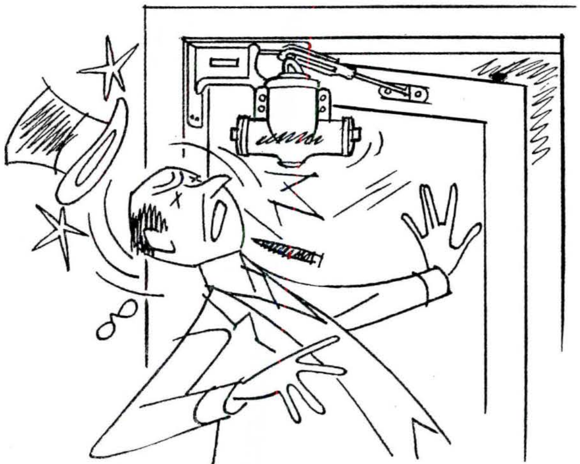


MATCH LIGHTING INSTALLATION WITH MODERN PANELBOARDS to give your clients both adequate protection and the convenience of circuit breakers. Westinghouse NPLAB-type lighting panelboard, here, features the compact Quicklag® P AB De-ion® circuit breaker. It enables you to design circuit protection into a smaller panelboard . . . and saves valuable closet space.

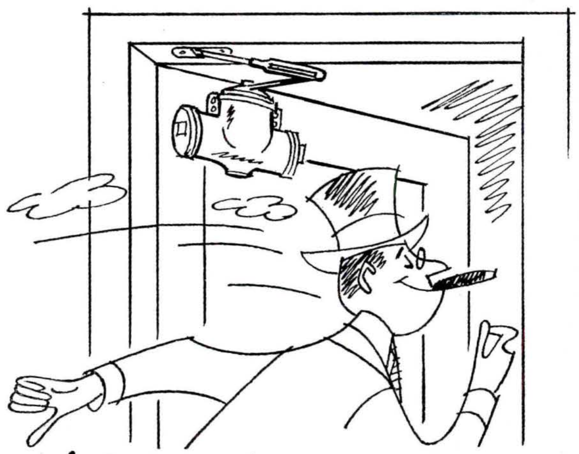
SPECIFICATION NOTES

Re: Door Closers for Recessed side of Doors

AT LAST No More of This



LOCKWOOD'S new parallel arm allows closer to be attached to door—completely eliminates problem of headroom interference.



NO LOSS of spring power, either—new leverage principle provides adequate closing power!

LOCKWOOD has complete line of parallel arm closers — non-holders, 135° holder arm, 180° holder arm and fusible link holder arms.

Best door closer news yet! LOCKWOOD

Lockwood

The mark of superior quality

LOCKWOOD HARDWARE MANUFACTURING COMPANY
Fitchburg, Massachusetts

ighter Beauty

Longer Wear

asier Cleanability

You give, and you get all three when you specify flooring made of BAKELITE Vinyl Resins

Photographs feature KenFlor, new laminated flooring made of BAKELITE Vinyl Resins by **Kentile, Inc.,** Brooklyn, N. Y.

Brighter beauty is built-in and protected by the impervious resin surface that dirt and soil can't penetrate. It's a tougher surface that resists mars, and scratches. It's far easier to keep clean. Acids, alkalies, and scores of other chemicals are strongly resisted. Grease, oils, cleansers, spilled foods do not damage. Beauty for years is assured by this unusual cleanability . . . beauty that stays "true to color."

Specify flooring "made of BAKELITE Vinyl Resins." You have greater freedom for colorful styling without service worry. You have a bright work-saving attraction for home purchasers. And you provide lower maintenance costs and greater in-service economy for users in every type of building.

BAKELITE
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VINYL RESINS
TRADE MARK

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MOBILEX® *. . . less expensively . . .*

than with any other recessed lighting fixture

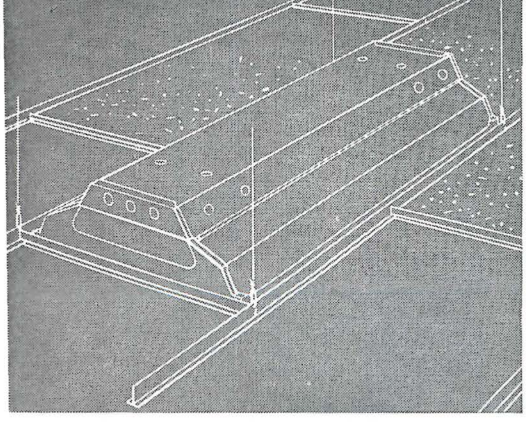
How many times in your experience have you wanted to use the good design advantages of recessed lighting—only to see your plans go by the boards because over-all ceiling costs got out of line?

You have an answer to that bottleneck now. MOBILEX. *It fits more types of ceilings—without the need of expensive custom made adapters than any other recessed lighting fixture on the market.*

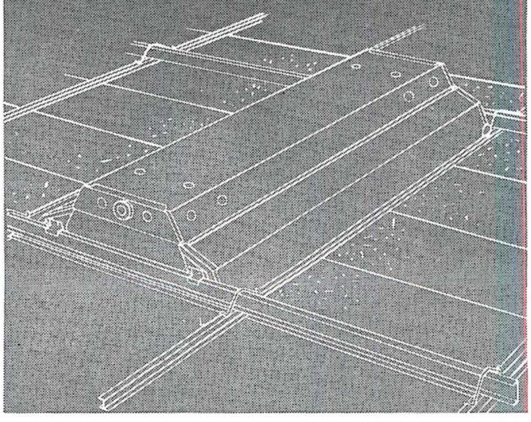
That means MOBILEX gives you a broader range of price, ceiling, and recessed lighting combinations than you've ever had to work with before. And that means a far greater opportunity for you to deliver good design and de luxe lighting—even to clients who must limit you to a modest budget.

Because we know you are always interested in new products that *really help you do a better job,* we think you'll want to see and hear more about MOBILEX. We'll be happy to arrange a MOBILEX demonstration any time you say. We promise you this: you'll find it well worth-while.

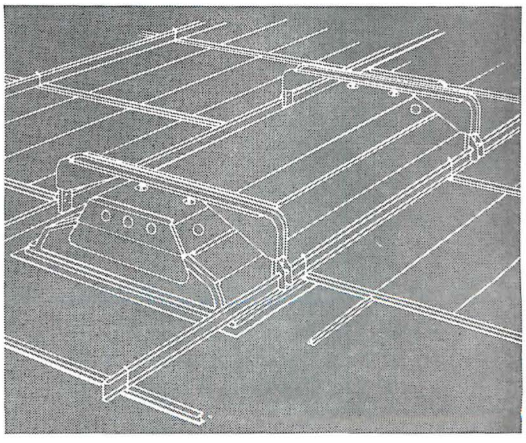
CALL OR WRITE YOUR NEAREST DAY-BRITE REPRESENTATIVE



MOBILEX FITS GRID-TYPE SUSPENDED CEILINGS. Fixture is inserted into grid opening, rests on "tee" rails, locks into place. Reduces installation costs up to 50%. Acoustical ceiling boards, MOBILEX units are interchangeable, permitting quick, low-cost revisions of lighting pattern whenever desirable. WRITE FOR BULLETIN OD-567.



MOBILEX FITS EXPOSED SPLINE SUSPENDED CEILINGS. Fixture hooks onto universal 1½" ceiling carrying channels. Multiple use of same supporting members saves material and labor costs. Acoustical tiles, MOBILEX units may be rearranged any time after initial installation. WRITE FOR BULLETIN OD-606.

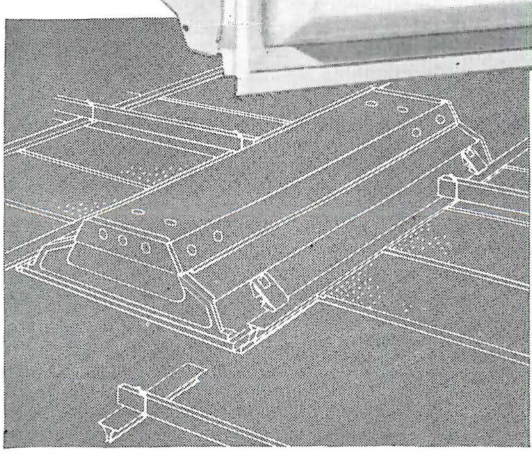


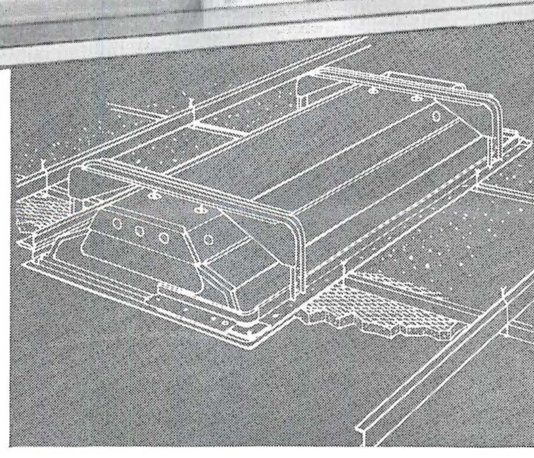
MOBILEX FITS CONCEALED MECHANICAL SUSPENDED CEILINGS. Flange type MOBILEX for acoustical ceilings using concealed metal spline, screw or adhesive methods of supporting mineral tile. This MOBILEX unit is listed with simple-to-install Day-Brite suspension straps which clamp to ceiling carrying channels.

This is **MOBILEX** with molded plastic panels.
Also available with Ribbed Skytex glass panels and BOXCO® louvers,
MOBILEX can be supplied in 2, 3 or 4 lamp arrangements for 2′ x 2′ fixtures or 2′ x 4′ fixtures.
Enclosing element frames have separable hinges and can be hinged from either side or completely removed for quick maintenance.

LOOK AT MOBILEX...
FEEL THE DIFFERENCE...
BEFORE YOU SPECIFY.

436





"DECIDEDLY BETTER"
DAY-BRITE®
Lighting Fixtures

MOBILEX FITS SNAP-IN TYPE ACOUSTICAL CEILINGS. Fixture snaps into the same "Tee-bar" rails that receive metal pan ceiling tiles. Day-Brite designed spring retaining clips snap "home" above the Tee-bars for added security.

MOBILEX FITS PLASTER CEILINGS. Simple, rugged Day-Brite plaster frames and suspension straps frame the opening and support the MOBILEX for plaster and acoustical tile-on-plaster installations. Extra long studs in suspension straps allow maximum adjustment for positioning fixture.

DAY-BRITE LIGHTING, INC.
5405 Bulwer Avenue, St. Louis 7, Missouri.
In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario.

Case history
of CECO on-the-job
performance

Architect: Victor Gruen Associated
Architects & Engineers, Inc.
General Contractor: Bryant & Detwiler Company

waffle construction plus Ceco-Meyer Steelforms

How Ceco methods saved materials

■ When architect Victor Gruen developed the original concept of Northland Center, world's largest shopping district in suburban Detroit, he had an eye for beauty and function. Beauty that would make the center a pleasant and even inspiring place to shop. Function that would make shopping as convenient and effortless as possible.

J. L. Hudson Company's branch department store is the core of the development—and here one of the major requirements was providing the greatest amount of usable space by keeping interior columns few in number and small in size. Typical spans were 29′-1″ each way, and a waffle design using 14″ deep Ceco-Meyer Steelforms provided a ceiling clear of beams, and kept steel, concrete and dead weight to the minimum. The saving in steel alone was 16% when compared with solid flat slab construction.

In other areas of the Hudson store and in the tenant and the service group buildings, one-way Ceco-Meyer Steelform floor

minus "lazy" concrete equals 16% steel savings

construction accounted for similar steel savings, eliminated "lazy, non-working" concrete, and kept dead load low.

Overall result in all buildings: wide areas of uninterrupted space—clear ceilings—a pleasing effect—highly functional. Ceco Engineering Service detailed placing plans for Ceco-Meyer Steelforms and reinforcing bars. This was a big project—5,000 tons of Ceco reinforcing steel delivered by truck to the job site—1,000,000 square feet of steelforms placed and removed by Ceco—a job requiring the service of a company skilled in its field and geared to deliver as the need dictated.

Here is another example of Ceco performing on the architect-owner-contractor-supplier team. On your next project call Ceco Product Specialists. They will help you save through product engineering. Consult Sweet's File for address. CECO

In construction products **CECO ENGINEERING** *makes the big difference*

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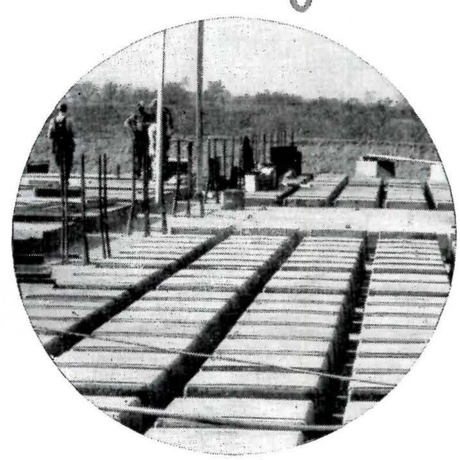
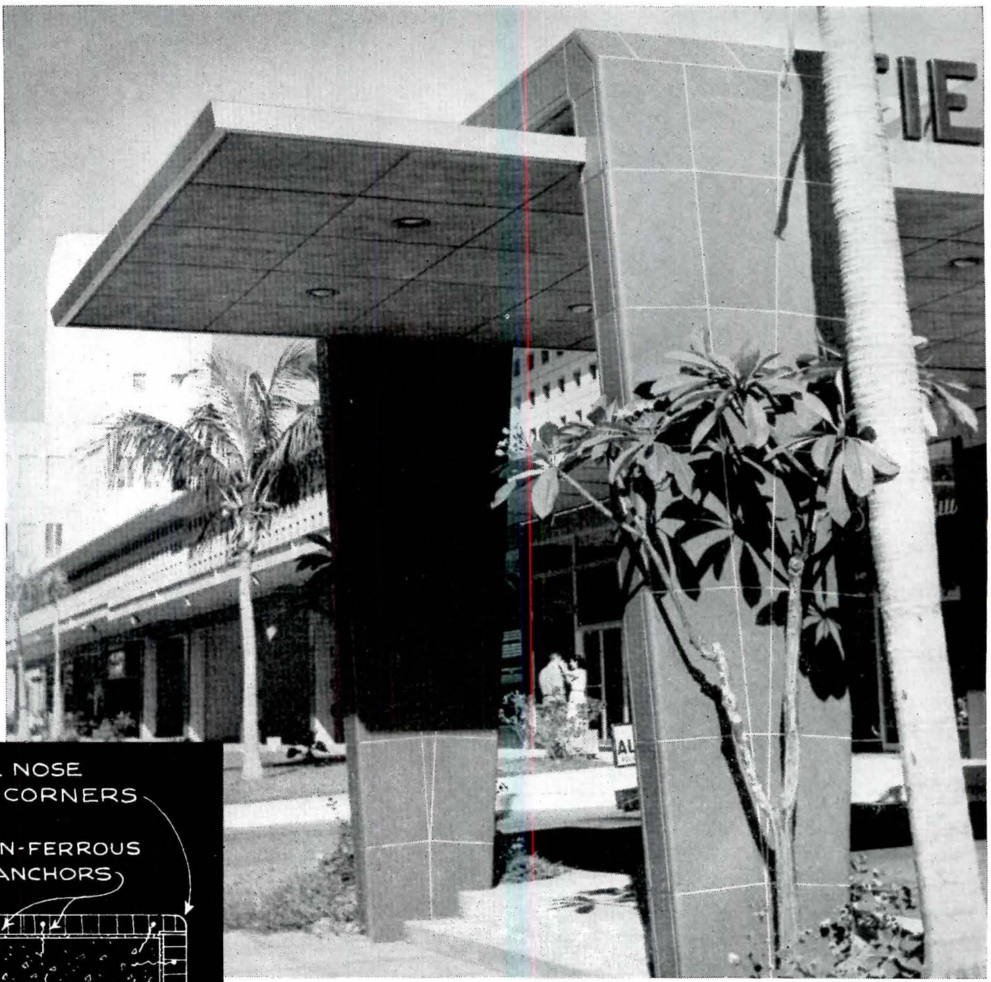


Two-way waffle design using Ceco-Meyer Steelforms permits longer spans, resulting in larger uninterrupted floor areas.

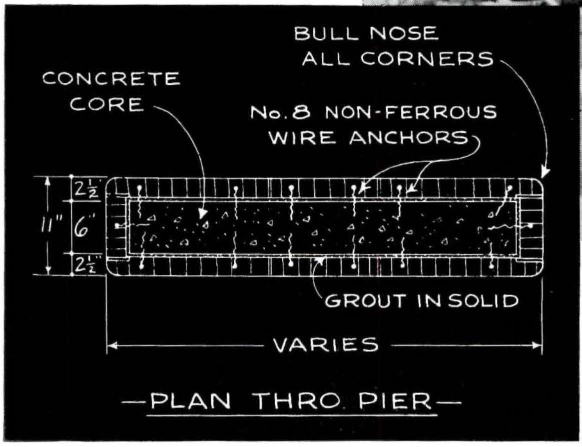
One-way Ceco-Meyer Steelforms also save steel and concrete, thus reducing dead load.



HOTEL NACIONAL DE CUBA
Shopping Plaza
HAVANA, CUBA

Rafael de Cardenas
Architect and Builder

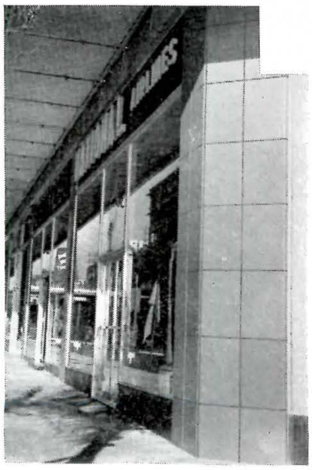
Piers for entrance canopy and store facade are 1⅞" thick Architectural Terra Cotta in units 19" x 21". Two shades of gray were specified for contrast.



Design in Architectural Terra Cotta to define more character and color

From the first moment you put pencil to project, the versatility of Architectural Terra Cotta will pace your creative planning. Choose any form, color or texture for interiors or exteriors. Architectural Terra Cotta will be custom-made to your precise specifications . . . in units large or small, plain surfaces or decorative sculpture. Whatever the building type or budget limitation, modern Architectural Terra Cotta offers advantages you'll find in no other building material. Compare . . . for custom-matched color, texture, price, durability and ease of maintenance. Write us for latest facts today.

Construction detail, data, color samples, estimates, advice on preliminary sketches, will be furnished promptly without charge on Architectural Terra Cotta and Ceramic Veneer.



F S T C

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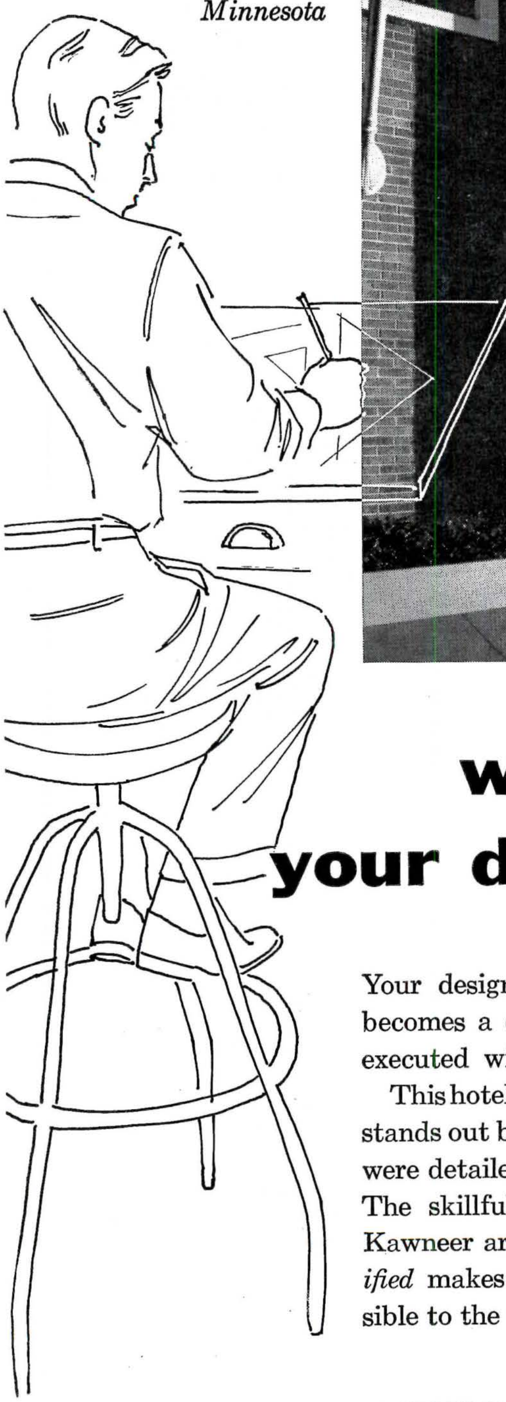
Designed and specified by Thorshov and Cerny, Inc., A.I.A. Minneapolis, Minnesota



with The Kawneer Touch your designs become reality

Your design on the drawing board becomes a distinctive fact when it's executed with *The Kawneer Touch.*

This hotel in Moorhead, Minnesota, stands out because Kawneer products were detailed, specified and installed. The skillful installation of quality Kawneer architectural metals *as specified* makes designs as close as possible to the way they were conceived.

Kawneer representatives are ready to assist with building front information, to furnish full-size details, etc., and to suggest reliable sources for prompt bids. Factory-trained Installing Dealers are listed under "Store Fronts" in telephone directories. Call the dealer located nearest you or write Kawneer, Niles, Michigan, for complete information.

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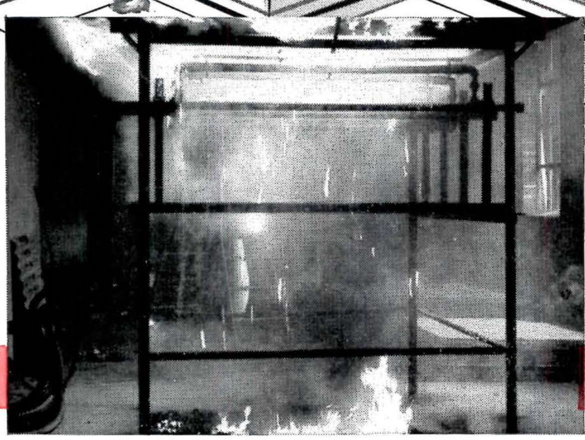
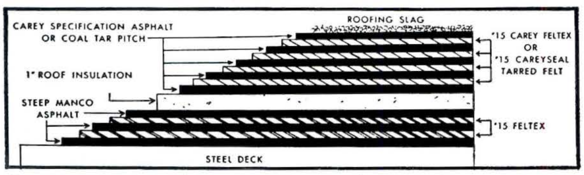
Carey announces another great

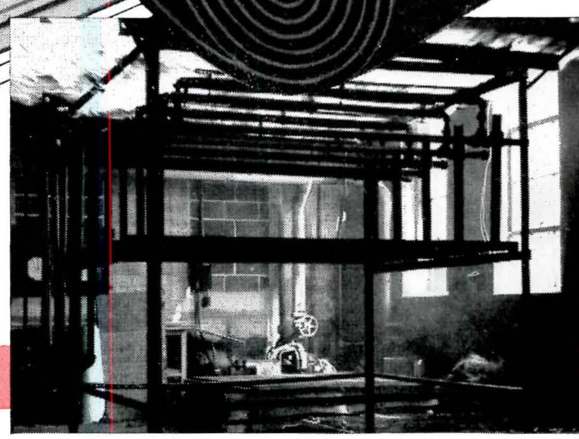
FIRE-CHEX



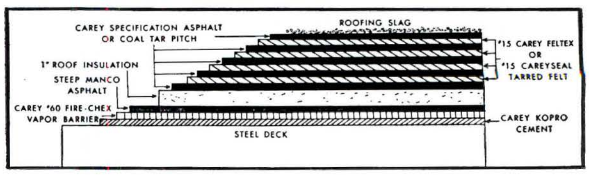
At the Carey Research Laboratories, this fire test of a conventional-vapor seal, with insulation and built-up roofing over steel deck, showed the dripping of asphalt from the vapor seal igniting as 1800° of heat builds up under the roof construction and melted bitumen flows through the joints in the deck.



Cross-section view of conventional-type 2-ply asphalt vapor barrier, insulation and roof.

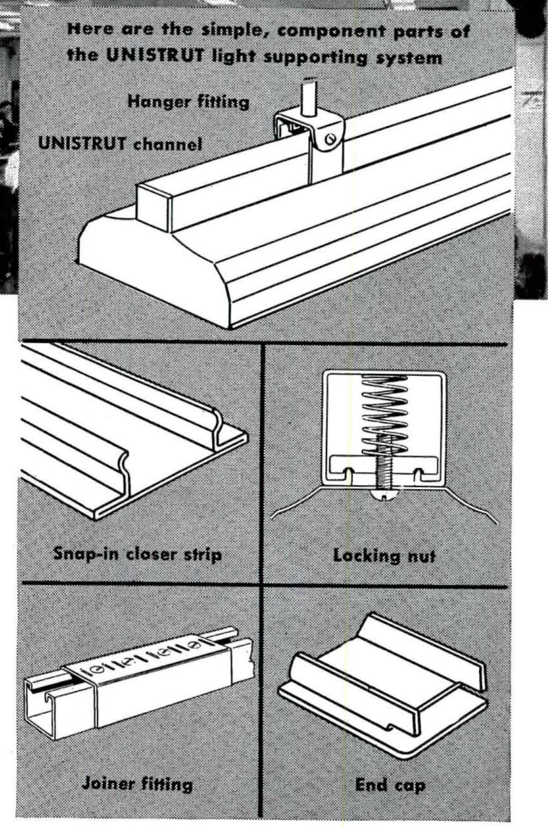


Fire test of conventional-type built-up roof with new *Fire-Chex 1-ply Vapor Barrier* over the steel deck (see diagram). Here you'll note a *complete* absence of any dripping material and only slight burning of gases. Practically no fuel is contributed to the fire by vapor barrier.



Cross-section view of Fire-Chex type 1-ply *asbestos-plastic vapor* barrier, insulation and roof.

Installation by: Hultgren Electric Corp., Electrical Contractors, Chicago, Illinois.



50% Savings!

Lighting installed at half the cost with UNISTRUT® channel and fittings

New fluorescent fixtures were recently installed on two floors of the Butler Brothers Building, Chicago, Illinois. The savings on this UNISTRUT installation over conventional methods was estimated at fifty percent. How did UNISTRUT reduce installation costs?

By using UNISTRUT channel with its continuous slot to attach fixtures quickly in perfect alignment. And by using the same channel as a wireway. This fast, easy method cut costly installation time in half!

UNISTRUT channel insures true alignment. It provides the utmost in safety because the entire row of fixtures forms a single integrated unit. Fewer hanger rods are needed and a neater, more attractive installation results. Stems or rods may be placed at any point along the channel, permitting installation on irregular ceilings. Fixtures can be fastened in a continuous row or intermittently as shown here.

Get in touch with your UNISTRUT Distributor for the full, cost-cutting facts on light supporting with UNISTRUT framing.

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U. S. Patent Numbers 2327587 2329815 2345650 2363382 2380379 2405631 2541908 Other Patents Pending

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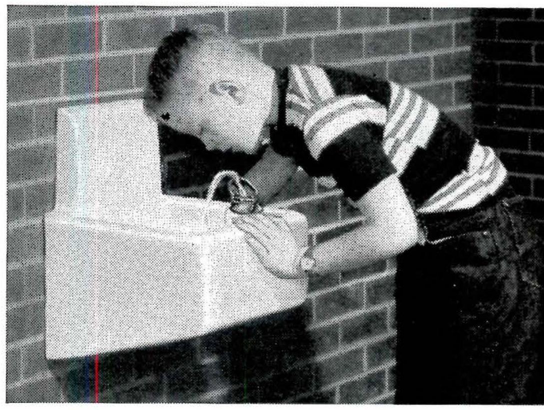
Address.......................................

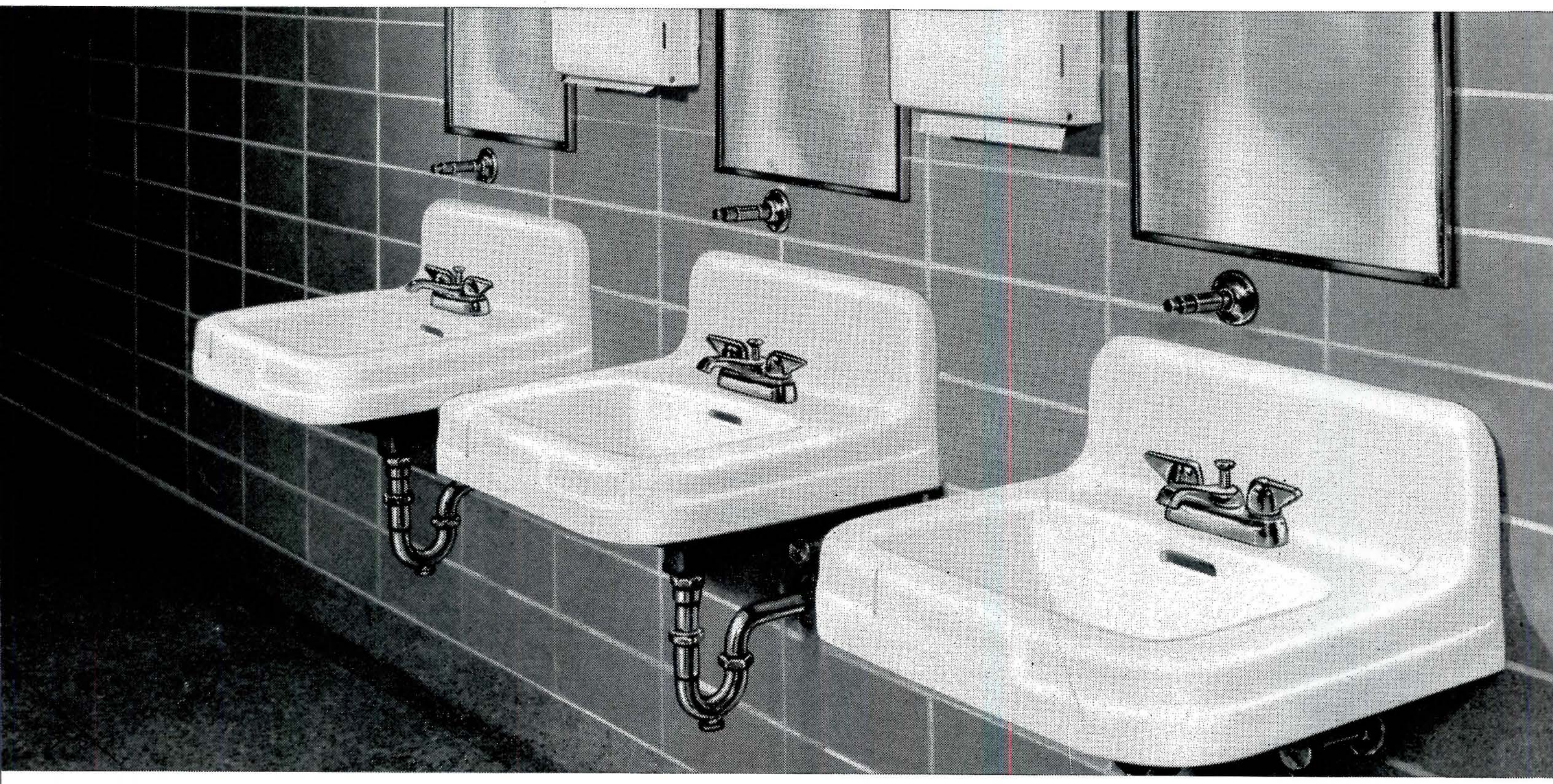
City.............................Zone....State

H w CRANE l lps y in school planning

Crane specialized washroom and laboratory fixtures for schools match the smart efficiency of modern school buildings. In fact, Crane leads in specialized styles and sizes to fit elementary and high school plans. And, of course, the wide choice of Crane prices makes it easy to fit Crane equipment into any school budget as well as any school plan.



Crane school fountains are of the highest quality vitreous china. This Crane Waterfall, one of a wide choice of both wall and floor models, includes Crane's famous Purflo angle stream bubbler to prevent contamination. Individual or central water chilling units now available with Crane drinking fountains.



Typical of the wide choice of Crane school fixtures are these Rhodile lavatories of rugged cast iron and durable porcelain enamel finish. High splash back is particularly important aid to cleanliness in elementary schools.

Besides a comprehensive choice of specialized school fixtures, Crane offers you the advantage of its unmatched reputation for quality—which is well known to school administrators. When you specify Crane equipment, they know you have recommended the best.

For complete information on Crane specialized school fixtures, see your Crane Architects' Catalog . . . or call your nearby Crane Branch or Wholesaler.

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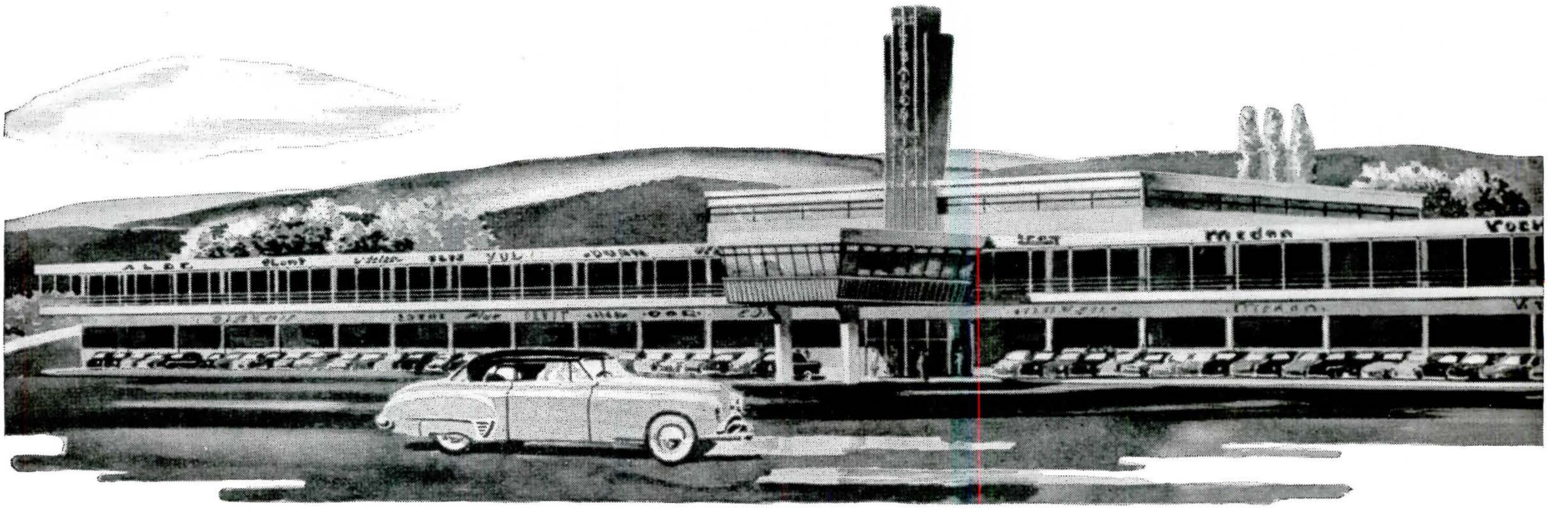
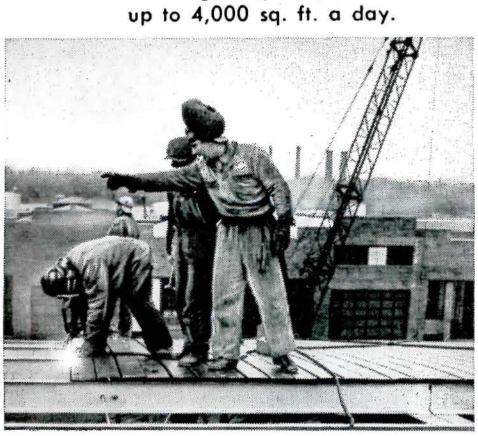


FOR PITTSBURGH'S BRAND NEW

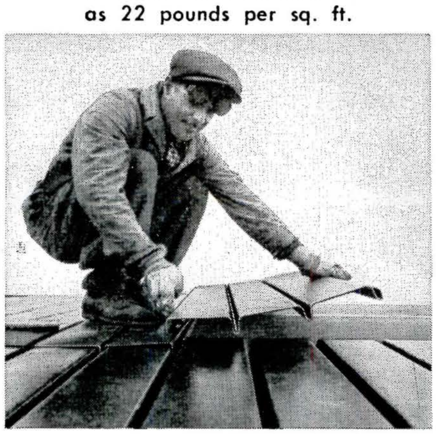
Mt. Lebanon

Architect . . . Arthur Tennyson, Pittsburgh, Pennsylvania
Designers . . . William and Barbara Pfouts, Pittsburgh, Pa.
Contractors and Builders . . Larson Construction Company, Pittsburgh, Pennsylvania
Roofing Contractors General Roofing Company, Pittsburgh, Pa.
Supplier . . . Tom Brown, Inc., Pittsburgh, Pennsylvania

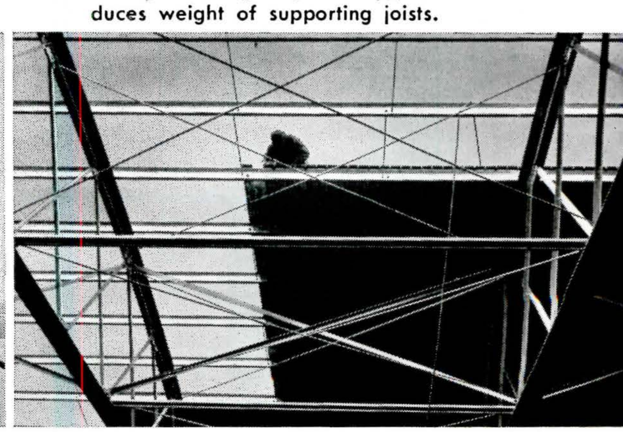
Tri-Rib goes up fast, covers up to 4,000 sq. ft. a day.



Reduces dead load as much as 22 pounds per sq. ft.

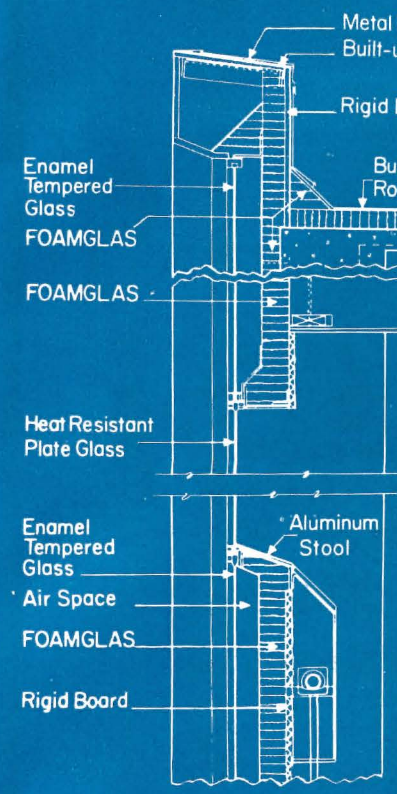


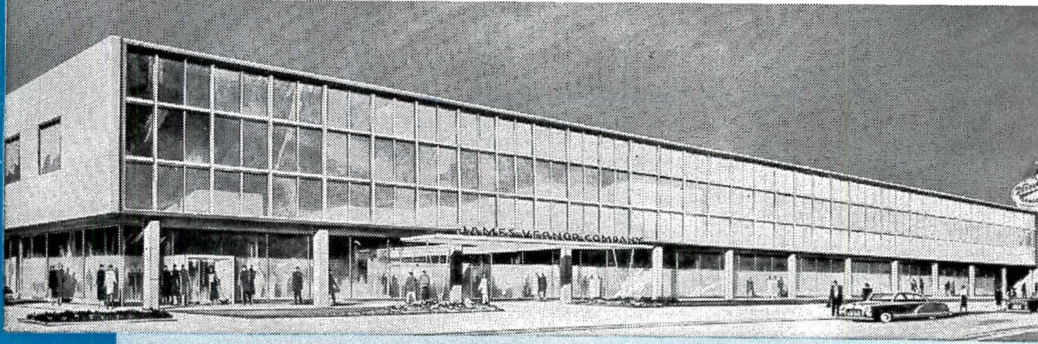
Cuts gross weight up to 40%, reduces weight of supporting joists.



Designed in accordance with specifications adopted by A.I.S.I. for light gauge structures, dated January, 1949.


BANK





Above: New main office and bottling plant for Vernor's Ginger Ale.
Below: Detroit's old Convention Hall

Architect-Engineer: Harley, Ellington & Day, Inc., Detroit
General Contractor: Perron Construction Co., Detroit
Insulation Contractor: Parham Insulation Co., Detroit

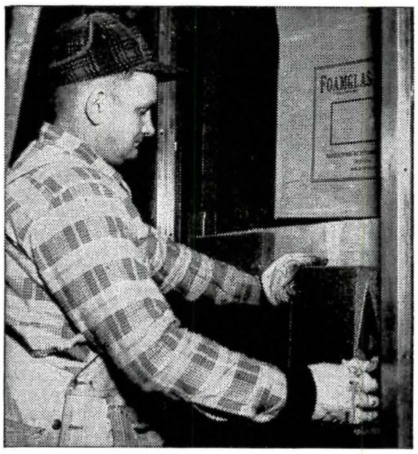
Construction above and below vision strip on Woodward Avenue side of building consists of enameled glass outer face, air space vented for condensation drainage, FOAMGLAS adhered to transit and backed up with composition wall board. End wall construction is similar except that enameled porcelain is used in place of enameled glass for the outer face.

On new *Vernor's* Ginger Ale home...
FOAMGLAS provides long-life insulating performance plus unique design advantages

Cellular, stay-dry FOAMGLAS was picked by Harley, Ellington and Day, Inc. to insulate the new home of Vernor's Ginger Ale, soon to be completed in Detroit. Created by remodeling Detroit's old Convention Hall, the new James Vernor Company Building will be comfort conditioned throughout. FOAMGLAS will help to insure efficient, inexpensive operation of both heating *and* cooling systems . . . and since the sealed glass cells of FOAMGLAS *stay dry* for lasting insulating efficiency, this saving in operating costs will continue to benefit Vernor—*year after year.*

Equally important are these bonus benefits which FOAMGLAS is providing on the Vernor job: First—because FOAMGLAS is easily shaped and fitted on the job site, it is ideally suited to the advanced type of wall construction being used (see detail above). Second—strong, rigid FOAMGLAS is used without direct structural support in some locations above and below the vision strip on the front facade. There it supports not only itself, but a rigid board backing as well.

Like Vernor, *your clients* will benefit from the outstanding insulating performance of FOAMGLAS while *you* will profit from its unique design advantages. For more information, see our catalogs in Sweet's . . . or send for our new booklets detailing the use of FOAMGLAS for walls, roofs, floors, ceilings, cold storage applications, piping or equipment. Use the coupon now!



Workman easily cuts FOAMGLAS blocks to fit between steel frame members of sub-structure.

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the cellular, stay-dry insulation

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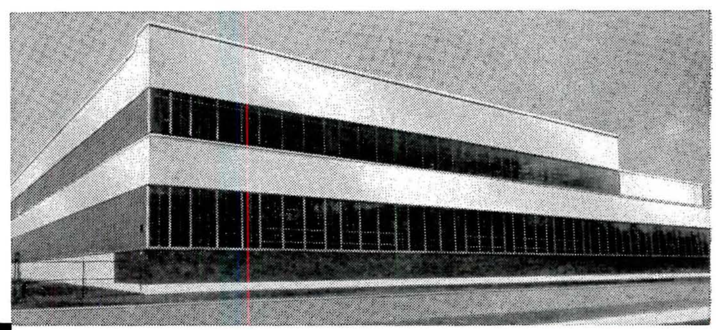
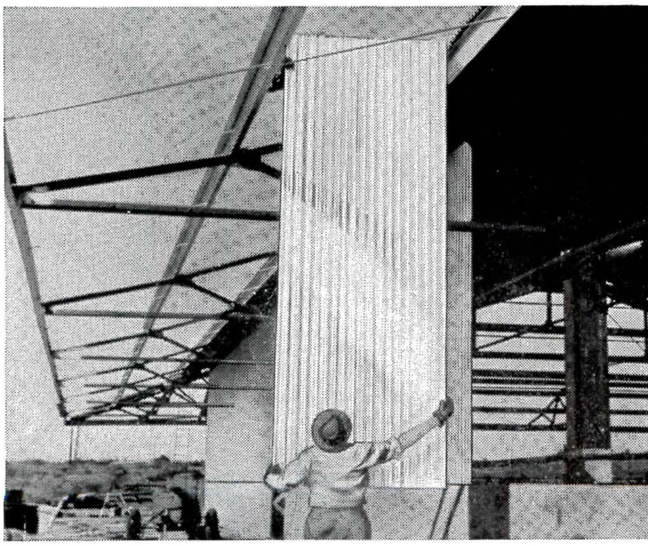
Modern appearance *and* cost-cutting efficiency... you get both in this industrial siding. The lightweight strength of ReynoSide makes possible structural economies... assures low installed cost. Its freedom from rust and resistance to corrosion mean long life with lowest maintenance.

High radiant heat reflection (up to 95%) helps cut the cost of year-round temperature control. The net result is low initial outlay and cumulative savings through the years! Write for literature.





A complete installation service is available. For name of nearest jobber-erector, call the Reynolds office listed under "Building Materials" in classified phone books of principal cities. Or write to Reynolds Metals Company, Building Products Division, 2014 S. Ninth St., Louisville 1, Ky.

SPECIFICATIONS:

Two Ribbed-Embossed Designs:

Ribs: 4" and 8" center-to-center; 1" depth.
Thickness: .032" (8" Rib also in .040").
Width: 41⅝". Nominal coverage, 40".
Lengths: Up to 14'5½".
Finish: Stipple-embossed.
Weight: 59 lbs. per 100 sq. ft.

Reynolds *Lifetime* Aluminum Industrial Corrugated also available in sheets 48⅓" wide, lengths up to 12'.

SEE "MISTER PEEPERS," starring Wally Cox, Sundays, NBC-TV Network.

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BUILDING PRODUCTS

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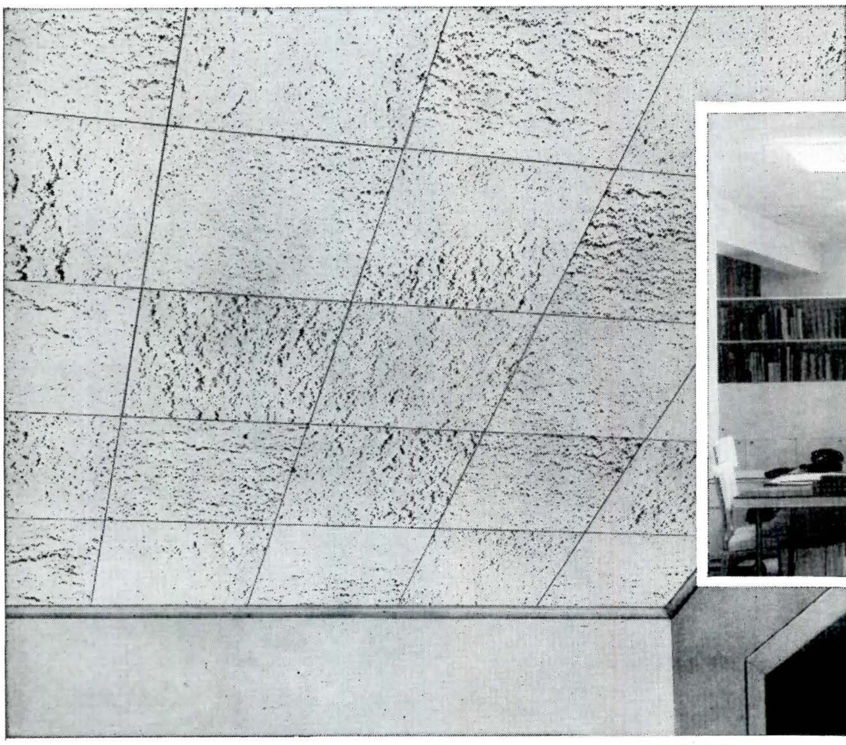
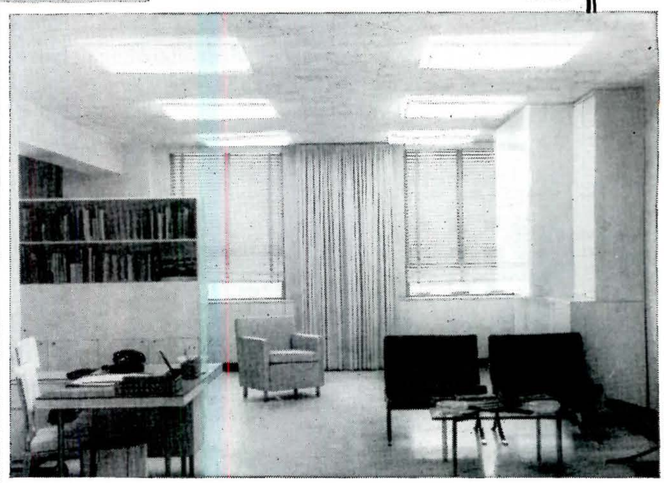
TO NOISE-CONTROL PROBLEMS...





The Johns-Manville Permacoustic Ceiling in this attractive reception room provides quiet comfort and contributes to its beauty.

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Specify J-M Permacoustic® tile for ceilings that provide unusual architectural beauty with maximum acoustical efficiency and fire safety.

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INFORMATIONAL DATA ON PERMACOUSTIC

Sizes 12" x 12" 12" x 24"	Thickness ¾"*	Color: white
	ACOUSTICAL EFFICIENCY Test No. A51-98	Test No. A51-99
cycles per second	cemented to plaster board (mounting No. 1)	mechanically mounted on special metal supports (mounting No. 7)
125	.04	.56
250	.21	.53
500	.75	.60
1000	.88	.73
2000	.85	.88
4000	.78	.88
noise reduction coefficient	.65	.70
weight per sq. ft.	1.3	1.3

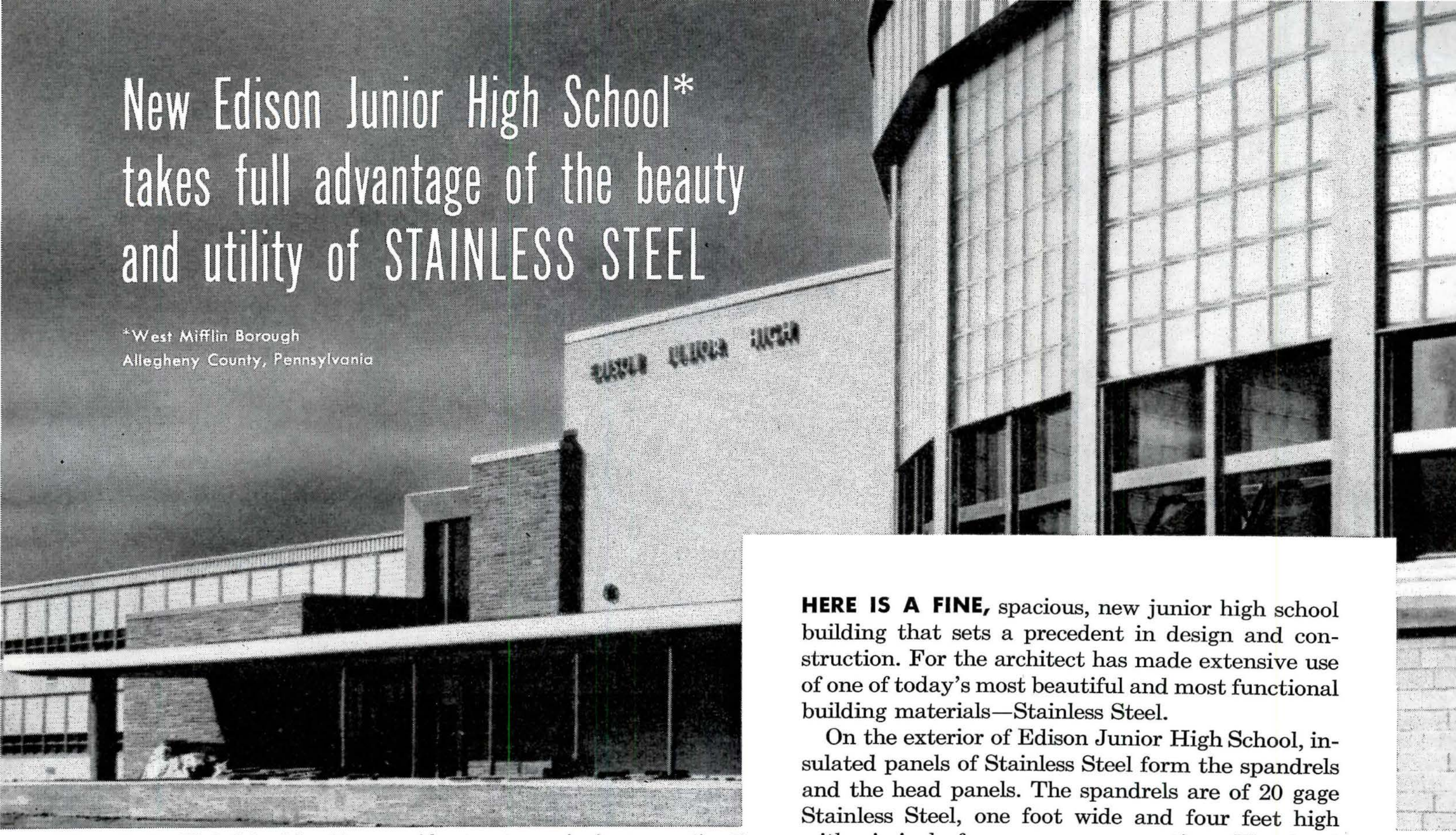
*Also available in ⅞" thickness

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville

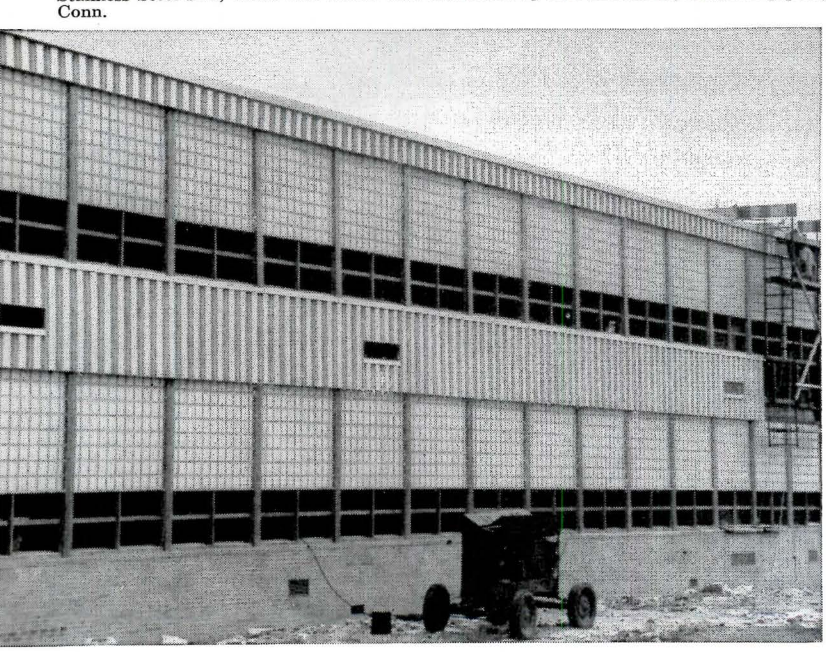
New Edison Junior High School* takes full advantage of the beauty and utility of STAINLESS STEEL

*West Mifflin Borough
Allegheny County, Pennsylvania



Edison Junior High School has 18 rooms with a two-story main classroom section 60 feet by 210 feet. A 200-foot by 120-foot wing houses a 600-seat auditorium, a cafeteria, kitchen, shops and gymnasium.

Architects: Button and McLean, Pittsburgh, Pa. General contractor: Nicholas LeDonne, Clairton, Pa. Stainless Steel panels fabricated and erected by R. C. Mahon Company, Detroit, Mich. Stainless Steel windows by Wilke Metal Products Company, Schofield, Wis. Stainless Steel sills, doors and inside trim fabricated by Trio Industries, Inc., Bridgeport, Conn.



HERE IS A FINE, spacious, new junior high school building that sets a precedent in design and construction. For the architect has made extensive use of one of today's most beautiful and most functional building materials—Stainless Steel.

On the exterior of Edison Junior High School, insulated panels of Stainless Steel form the spandrels and the head panels. The spandrels are of 20 gage Stainless Steel, one foot wide and four feet high with six-inch face square corrugation. The head panels are one foot high. Panels are insulated with one and one-half inches of Fiberglas and attached to the structural framework with clips.

The combination of Stainless with masonry and glass block makes an extremely attractive building. But the benefit of Stainless panel construction doesn't stop there. Construction with the panels was fast and went forward in all types of weather. More complete utilization of floor space was possible through this curtain-wall type construction. Maintenance on the Stainless Steel will be negligible and life will be long.

These panels are extremely efficient from a heating standpoint. They have a low rate of thermal transmission (or "U" factor).

Stainless Steel also was used in this school for sills, mullions, windows, door canopies and trim, blackboard and tackboard frames, doors and door frames, column covers and other interior trim.

If you have a new school in the planning stage, now is the time to think about Stainless Steel and its many benefits. And think in terms of USS Stainless Steel. For more information on Stainless Steel panel construction, mail the coupon below. If you like, we will have one of our representatives call.

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United States Steel Corporation
Room 4354, 525 William Penn Place
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☐ Please send me literature on Stainless Steel panel construction.

☐ Please arrange to have fabricators of Stainless Steel wall panels send me literature on their particular type of construction.

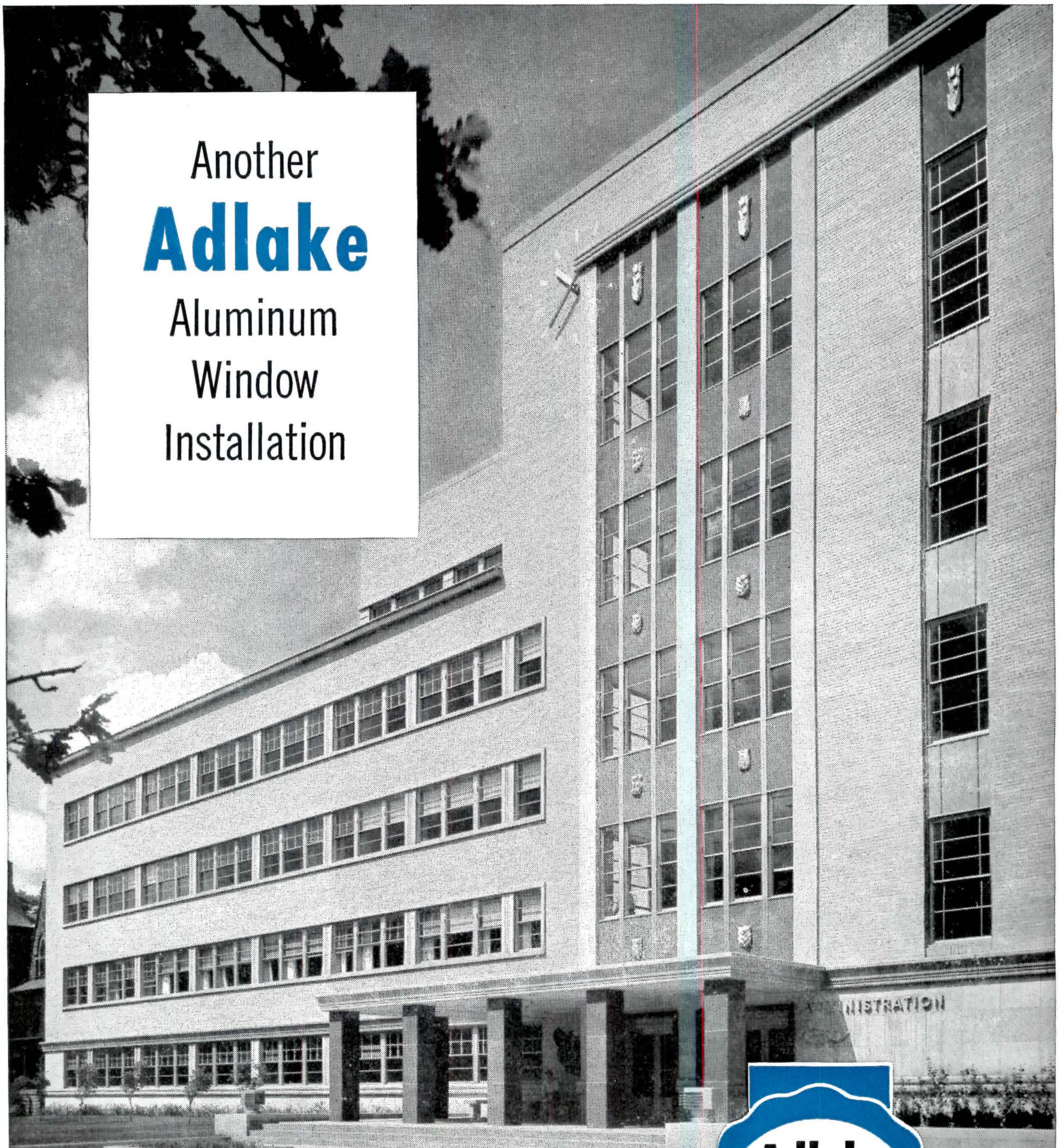
Name.......................... Title............

Address..

City.......................... State...........

United States Steel produces only the Stainless Steel from which panels of this type are made; the panels themselves are fabricated by our customers.

UNITED STATES STEEL



Administration Building, University of Michigan—Ann Arbor, Harley, Ellington & Day—Architects, Bryant & Detwiler—General Contractors

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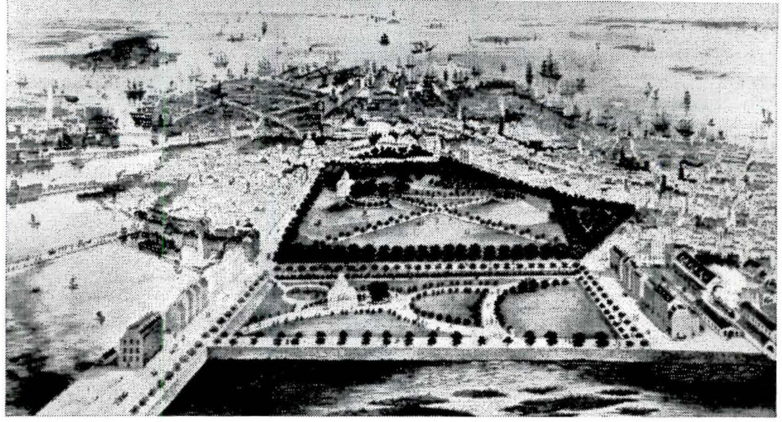


Guide to Boston Architecture

by Henry-Russell Hitchcock

Following are excerpts from the Guide *prepared for this month's Convention of the AIA in Boston.*

Of 17th Century Boston almost nothing remains except the Paul Revere house of about 1680 and some trace of the original and highly irregular layout of the streets in the district now known as the North End. Boston's growth was long southward rather than westward. All of the remaining pre-Revolutionary monuments, few, but of major individual interest, lie north of Milk Street. After the Revolution, the city continued to grow southward between the Common and the Bay in a district which was to be swept clean by fire in the early 1870's and has since been completely rebuilt. Just at the end of the 18th Century a new development began to the west on the slopes of Beacon Hill; the State House, begun somewhat earlier, provided the apex of a new city turned away from the Bay and toward the southwesterly sloping Common. What still exists of this residential development on the Hill offers Boston's most coherent architectural picture, remarkable less for individual structures (although it includes several by Bulfinch) than for the distinction of the general architectural texture, the picturesqueness of the topography, and the general level of maintenance. As is well known, Beacon Hill has few American rivals as an example of early 19th-Century urbanism and bears comparison with the best English work of the contemporary Regency period.

Wooden through much of the 17th Century, brick-built through the 18th and into the 19th, Boston began to exploit its finest available building material, Quincy granite, only in the years from 1823 on, chiefly for commercial and monumental buildings in the waterfront district. Coinciding in date with the later granite commercial buildings came the development of a new residence district, the South End, extending along Washington Street to the southwest of Dover Street. This was overshadowed within a decade by the much more extensive and coherent, if less varied and imaginative, planning of the Back Bay area laid out in 1856. Here is concentrated the most of Boston's architectural history from 1860 to 1900. Compared to the distinguished individual monuments by Richardson and McKim, Mead & White that are its highlights, or the earlier Beacon Hill district, the general level of Back Bay building architecture is low, but the houses (which were often built in groups, particularly in the earlier decades), illustrate the changing tastes of the last half of the 19th Century with entertaining variety.

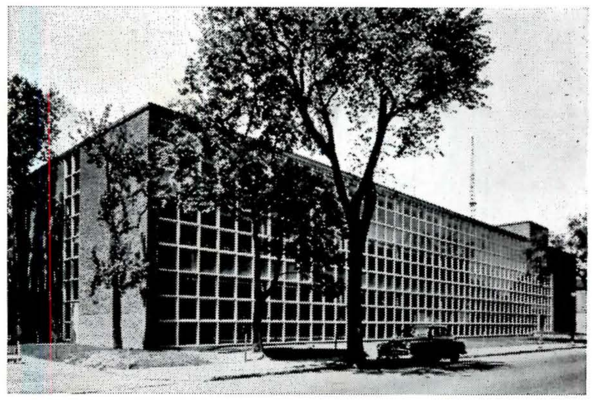
The commercial architecture of these decades is not well illustrated in Boston. The finest things, such as Richardson's Ames Estate Building on Harrison Avenue (1886-87) or the Board of Trade Building by his successors Shepley, Rutan & Coolidge (1890-92) seem almost to belong in Chicago rather than in Boston. Leery of metal construction in its early heyday, Boston architects and builders were slow to accept the skyscraper either as a type of commercial architecture or a method of construction. Restrictions in height long kept out really tall buildings and the Custom House Tower (1913-15) built by Peabody & Stearns for the Federal Government and hence not subject to local restrictions, was the first to challenge Bulfinch's State House as the climax of the city's silhouette.

Restrictions on heights were finally removed in the 1920's and in the last decades Boston has begun to build skyscrapers, but it cannot be said that they have as yet added much to the architectural wealth of the city. Leaving the few but prominent skyscrapers aside, which generally reflect the taste of the 1920's, Boston in its metropolitan core has little building of the postwar years that is notable or even conspicuous. It is outside of the areas built up before 1900 and generally outside of administrative Boston that distinguished additions have been made, as notably along the north bank of the Charles River Basin in Cambridge, where the coldly classical complex of the main Massachusetts Institute of Technology buildings erected early in the century are flanked today by boldly designed modern buildings by various architects.

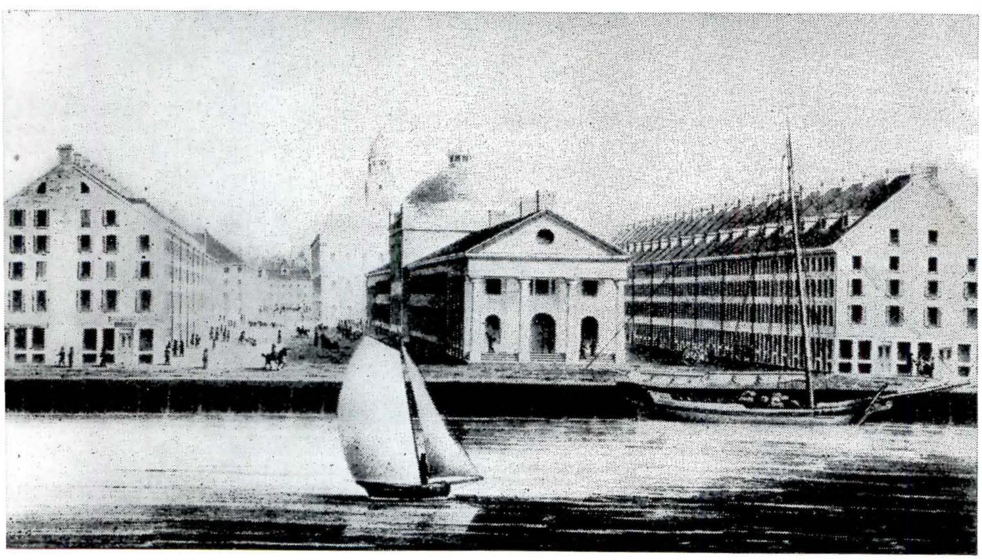
From Boston itself the architectural visitor will naturally proceed to some at least of the inner belt of suburbs. In Cambridge, further out the Charles than the M.I.T. group, there are the extensive buildings of Harvard University, ranging in time from the dormitories of the 18th Century down through major work by Bulfinch and Richardson in the early and late 19th Century, to the new Graduate Center.

The presence in Cambridge of two of the country's leading architectural schools has left its mark already on the architecture of Harvard and the Massachusetts Institute of Technology, not to speak of newer institutions such as Northeastern and Brandeis Universities; it has also produced a Boston group of modern architects whose work in the domestic field has been widely publicized.

Nowhere else but in the Boston area can one see in America so varied a range of buildings in so short a space of time. From the most considerable group of 17th Century buildings in the country, including one of the two churches of that date that have survived, through the mansions and churches of the pre-Revolutionary period and many streets lined with houses and commercial buildings of the late 18th and early 19th Centuries and the late 19th Century masterpieces of H. H. Richardson, and McKim, Mead & White, to Aalto's M.I.T. Baker House and Eero Saarinen's M.I.T. Auditorium rising beside it, this region has always made a distinguished architectural contribution. If Boston lacks the drama of New York or Chicago or San Francisco, it none the less rewards in detail.

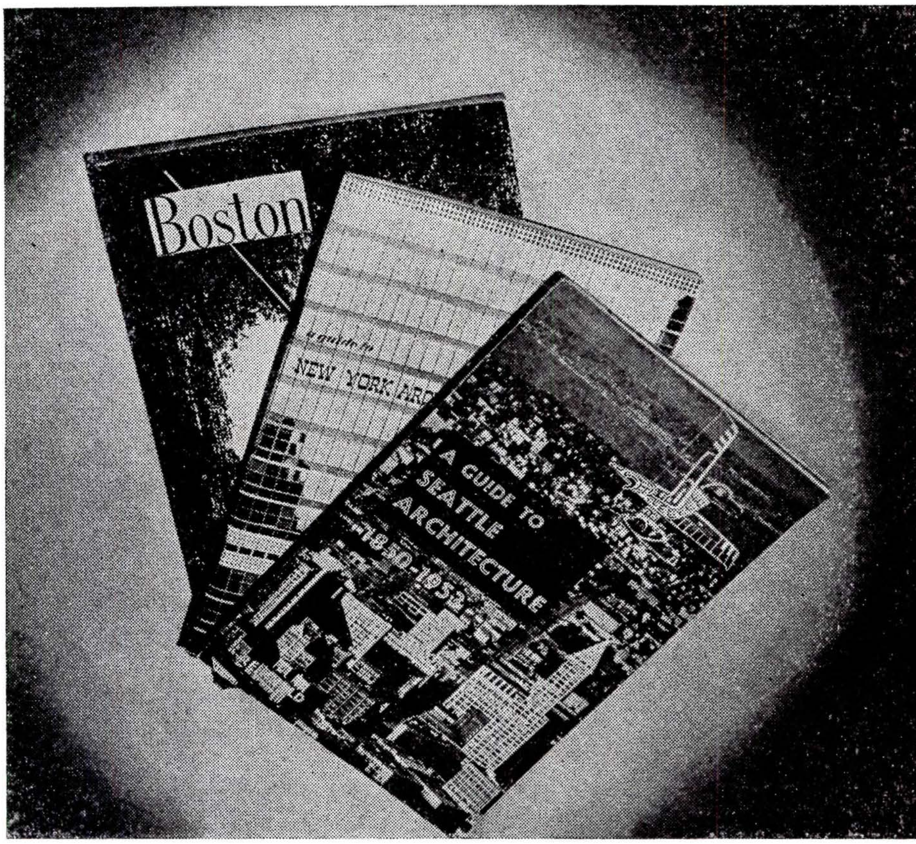


Gordon McKay Laboratory (right) *was designed by Shepley, Bulfinch, Richardson & Abbott, Architects, Boston.*
Photo: Robert D. Hawey Studio



The historic Andrews drawing of Boston waterfront (left) *showing Quincy Market is reproduced by courtesy of State Street Trust Company.* Photo: Geo. M. Cushing, Jr.

guide books help public relations



On the preceding two pages are excerpts from the *Guide to Boston Architecture* prepared under the sponsorship of a Committee of the Massachusetts State Association of Architects, host Chapter to this month's AIA Convention in Boston. This is the third such Guide, prepared by local Chapters, assisted by the AIA Board of Directors, to be published by Reinhold and distributed at the Conventions as a service to delegates and members.

Public relations activity is most successful when it is conducted in a receptive atmosphere. One difficulty in "selling" the value of an architect's services is the fact that the general public, by and large, is so ignorant of the importance of architecture in daily life, and therefore unheedful of architecture it sees—and uses—every day.

As a basic public relations activity, P/A suggests that more local architectural groups consider the "Guide to Your Town's Architecture." It is an activity being at least contemplated by several AIA Chapters that we know of, one that has already been undertaken very competently in some places, somewhat sketchily in others.

A Guide in pictures and text, pointing out historic as well as contemporary structures, relating the architectural achievement of the local area to its region, its time, its own local requirements, is an activity which can be made to attract wide local attention. It is also an enterprise into which architectural schools, local historians, and historic societies, Chambers of Commerce, and many other groups can be drawn.

Some thoughts for the benefit of other groups can be inferred from the experience with the AIA Convention Guides. In these cases, the publishing cost has been donated by the Reinhold Publishing Corporation (the magazine PROGRESSIVE ARCHITECTURE and the Reinhold Architectural Book Division)—an expense which otherwise would have to be covered by donations, subscriptions, and the sales price. In addition, the national body of the AIA has made a grant each year, to cover the cost of obtaining photographs—another cost which would have to be met by a group planning a Guide of its own. The research and writing, as well as selection of illustrative material, has been done by someone assigned the job by the local Chapter, and paid in some manner, by the Chapter. In the case of the New York Guide, Huson Jackson was the author, having received an Arnold W. Brunner grant. In Seattle, it was Victor Steinbrueck; now the Boston Committee has utilized the valuable services of Henry-Russell Hitchcock. Something of the sort could always be done in any locality—a Committee could be formed to work with and under the direction of some individual—a teacher in the nearest architectural school, perhaps.

No attempt has been made to sell the AIA Guides on any wide scale to cover these various costs. In New York, The Architectural League and several Museums have copies available, and without any promotion there has been some continuing demand for the booklet. In Seattle several bookstores displayed the Guide during the Convention last year and sold some. This is an aspect of the project that a group considering its own Guide as a public relations endeavor, not as a service to AIA members alone, would want to explore. Sales of a well-prepared booklet could undoubtedly be promoted through bookstores, travel-aid bureaus, hotels, museums, and so on. Why not think about it?

the architect's files: part 1

by Siegmund Spiegel*

Though the practice of his profession makes him the recognized "organizer of space," the architect rarely is able to maintain an orderly appearing office.

Unlike a typical commercial office where incoming and self-prepared business documents are of a size and nature which may require neither specially segregated storage areas nor multisized file receptacles, in the architect's office filing in itself presents a complexity.

In order to be able to "organize" an architect's office purely from the viewpoint of filing, let us analyze briefly the types of documents and materials involved in his practice. This material falls into two basic categories: "Business and Administration" and "Technical." As the names imply, the "Business and Administration" material, and of course all typed correspondence pertaining to architectural work, is kept in the secretary's office, while the "Technical" material is kept in or near the drafting room. Some of the material kept in the office will of course have to be consulted from time to time by individuals engaged in technical work, but generally this will be confined to persons in charge of jobs, and not the technical staff as a whole.

storage of technical material and supplies

The following is a brief, and by no means all-inclusive, list of headings for the various types of references and materials which generally are kept in or near the drafting room or, in some instances, near the person who may be the most frequent user of the particular material. (To avoid excessive waste motion by men having to use certain references, they should be stored centrally and near the particular group.)

Storage allowances must include provisions for:

- Drafting Supplies and Instruments;
- Drawing files (active and inactive);
- Building Codes, Landbooks, Zoning Maps, etc.;
- Reference and Handbooks (architectural, structural & mechanical);
- Manufacturers' Catalogs & Handbooks (too large for storage in file cabinets);
- AIA File (Manufacturers' Literature);
- Furniture File;
- Source Material File;
- Architectural Magazines and other Subscriptions;
- Library;
- Photo, Publicity, and Reprint Files;
- Color Systems;
- Modeling Supplies;
- Samples Storage;
- Shop Drawing Files;
- Construction Cost Data Files;
- Specification Files (completed jobs);
- Job "Desk" Files;
- Forms, e.g.:
  - Blueprint Order Books;
  - Transmittal Forms;
  - Timecards;
  - Record of Prints Received & Issued;
  - Building Department Application Forms; etc.

This listing of headings of materials which must be kept, though large in itself, unfortunately only represents categories of materials: the volume of actual arrivals will make it increase daily.

filing procedure for major categories

Each office, no doubt, will have its own proven way of filing and/or storing the items listed above. However, no matter how good a filing system an office may have, a certain book or drawing will inevitably become "buried" under the virtual mountain of papers constantly visible in a busy drafting room.

The following is a brief description of filing methods for some of the items mentioned above which have proved to be satisfactory:

1. *Drawings:* As a job is commenced, there is inevitably a multitude of sketches before they finally are transferred onto a "finished" drawing (Preliminary—and later—Final). In most instances there will be numerous "schemes" of preliminaries before one is selected for further development. While the job is active, drawings are preferably kept flat, or at times individually rolled on tubes, in a drawer. As drawings are issued at intermediate stages to the client or filed with the local authorities, record sets are made for the office. If the job is sizable, it may easily warrant several drawers for storage of drawings and prints. Separation is best done by assigning a drawer each to "Sketches," "Preliminaries," "Plans," "Details," etc. As final drawings are developed, a list is kept of the drawing numbers and titles and date. (This same list may be used to record issues of drawings.)

When the job is completed, no-longer-essential sketches, preliminary drawings, and superseded not-official record prints, etc. are destroyed, and job is ready for storing—and hardly any office has sufficient flat-drawer space to store the drawings there permanently—they must be filed in a place where they are out of the way and yet easily found for reference purposes.

The common types of files for drawings are:

a. Drawers—for active jobs (tracings);
b. Coops—for completed jobs;
c. Racks—for hanging of final record sets, and latest prints of active jobs;
d. Filing Cabinets — record prints folded (large jobs).

After a relatively short time, an office will have accumulated a sizable number of rolls of drawings, precluding reliance on memory as to where a particular job is stored. A loose-leaf alphabetic Index Book, giving the following details

* *Architect, Office Manager for Mayer & Whittlesey, Architects, New York, N. Y.*

NAME OR LOCATION	JOB NO.	YEAR	TYPE OF WORK	DRWG. LOCATION	REMARKS
Bertoldi, Charles	490	1948	Residence	Coop C-12	
Broadway, #10010	514	1960	12-Sty. Apartment House	Coop B-10, 11	Record Set in Hanging Rack
Brunswick, Ky.	519	1960	Master-Plan 1000-Family Development	Drawer: D-4, 5, 6	

(arranged as the table illustrates), proved to be most useful:

Name or Location; (If a private residence, it is listed under the owner's name; if a job in the city, it is listed under street address; if some jobs are known by address, as well as by name of building, cross-indexing is necessary.)

Job Number;

Year;

Type of Work; (e.g., Residence; Apartment House, Store Alteration; etc.)

Drawing Location; (If drawings are stored in more than one area, then a group of coops or drawers is identified and marked by a letter, each separate coop or drawer having a number; e.g., Coop B-4=Coop B, 4th Hole.)

Remarks.

2. *Building Codes, Landbooks, Zoning Maps, etc.:* These are kept near the man whose job calls for frequent consulting of this type of material.

3. *Reference-and-Handbooks:* Books of this type are kept in a central-location to enable all draftsmen to reach them easily. Among others, they include such drafting room "bibles" as: *Architectural Graphic Standards* (Ramsey & Sleeper); *Data Sheets* (Don Graf); *Time Saver Standards* (F. W. Dodge); *Civil Engineers' Handbook* (Merriman-Wiggin); *Architects & Builders Handbook* (Kidder-Parker); *Engineers Pocketbook* (Trautwine); *Mechanical & Electrical Equipment for Buildings* (Gay & Fawcett); *Steel Construction* (AISC); *Reinforced Concrete Design Handbook* (American Concrete Institute); *Structural Shapes* (Bethlehem); *Design, and Specifications & Costs* (Seelye); Numerous *Handbooks on Wood Construction,* "Parker's," specification reference guides and worksheets, etc.

4. *Manufacturers' Catalogs and Handbooks:* This material, too, is kept in a central location for use by most men. It includes among others: Sweet's Catalogs, and other large-size catalogs issued by various manufacturers of their products: e.g. Plumbing, Hardware, Woodwork, etc.

5. *AIA File:* This material, consisting exclusively of manufacturers' catalogs and literature, though at times duplicated in Sweet's, is kept in filing cabinets in the drafting room. This file in particular becomes overloaded frequently, as material constantly comes in by mail or by hand. Unfortunately, not all manufacturers have realized that certain types of catalogs and leaflets are of but little value to the architect. Consequently, a great deal is just glanced at and destroyed. Others have recognized the needs of the architect and have turned out very useful publications. In general, the catalogs worthwhile keeping are those which show the product in detail, give installation details at various scales for different types of construction, a brief specification, and other concise, relevant data.

The best method for filing this material is by using the AIA prepared guide: *Standard Filing System and Alphabetic Index for Filing Information on the Materials, Appliances, and Equipment in Construction and Related Activities.* (AIA Document #172).

Some manufacturers have realized that this system is most suitable to the architect and have gone so far as to classify each catalog showing the respective AIA file number printed right on the document. This is very helpful.

Another step in the right direction taken by some manufacturers is to have their catalogs distributed via the Architects & Engineers Service (in larger cities). This organization has proved to be very helpful to busy architects' offices by having a representative visit the office periodically, going over each catalog brought, commenting briefly on the product, and physically file the literature in their proper place, at the same time weeding out superseded catalogs. (The latter being a periodic chore which more often than not is neglected by the busy architects' staff.)

6. *Furniture File:* This actually could be part of the AIA file, but it may be found more useful when it is divorced from that and broken down into such subheadings as: Residential Furniture—contemporary; Residential Furniture—antique; Garden Furniture; Lighting Fixtures; etc.

The discussion in this article has been on the general subject of Drafting Room (Technical) files, and specifically on drawings, and technical reference material. Next month, continuing the discussion of filing technical data, we will consider source material, magazines, books, photographs, and the important matter of cost data.

Bernard Tomson

it's the law

The role of an architect as arbiter under the AIA form provisions was critically examined by the Appellate Division in New York in the recent case, *Gold Plastering Co., Inc.* v. *200 East End Ave. Corp.*

The contractor had entered into an agreement to lath and plaster a building then under construction. The AIA "General Conditions" were incorporated by reference and made a part of the specifications. An action was subsequently commenced by the contractor to recover damages for breach of contract and for the reasonable value of labor and materials furnished.

The owner relied heavily upon a decision rendered in its favor by the architect to whom it had submitted the dispute for determination pursuant to the "General Conditions" of the AIA, Article 39, of the standard form of the American Institute of Architects, which provides, in part:

> "The Architect shall, within a reasonable time, make decisions on all claims of the Owner or Contractor and on all other matters relating to the execution and progress of the work or the interpretation of the contract documents.
>
> "The Architect's decisions, in matters relating to artistic effect, shall be final, if within the terms of the contract documents.
>
> "Except as above, or as otherwise expressly provided in the Contract Documents, all the Architect's decisions are subject to arbitration."

Article 40 pertaining to arbitration contains the following clause:

> "It is mutually agreed that the decision of the arbitrators shall be a condition precedent to any right of legal action that either party may have against the other."

The Appellate Division, in affirming a judgment for the contractor, denied that the architect's decision had any binding effect upon the parties, particularly since the owner had failed to move to compel arbitration *or* to stay the proceedings in the instant suit. Thus, the owner had waived any right it might otherwise have had to rely on the architect's decision, by its very participation in the action.

The owner had urged vigorously that Article 39 vested jurisdiction of the dispute in the architect and that, by reason of plaintiff's failure to appeal from the architect's determination and employ the arbitration provisions of Article 40, made the architect's award a final one.

Without so much as an oblique reference to Article 40, which makes the arbitrator's decision a "condition precedent" to a law suit, the Court implied that it was apparently unnecessary to resort to arbitration after the decision of an architect because the architect himself was an "arbitrator." The Court stated:

> "While the architect is not referred to as an 'arbitrator' in the 'General Conditions' and his decisions made subject to 'arbitration' thereby, it is our opinion that the proceedings before the architect contemplated by Article 39 of the 'General Conditions' are part of a general scheme for arbitration of disputes, and that such proceedings constitute 'arbitration' within the meaning of Article 84, Civil Practice Act . . ."

The owner's contention that the architect had jurisdiction to decide the suit was likewise denied. Said the Court:

> "However, we agree with the trial court that the dispute involved here, as to breach of contract, was not one which the parties had agreed by incorporation of the 'General Conditions' to submit to the architect for determination. In our opinion, the 'claims of the owner or contractor' which the architect was authorized to determine under Article 39 of the 'General Conditions', must be construed in view of other provisions of those conditions to refer only to claims 'relating to the execution and progress of the work' and not to claims arising out of alleged breach of contract."

The AIA "General Conditions" having been made a part of the "specifications" rather than to the whole contract, the architect could not hear disputes that did not relate to the work (specifications) to be done under the contract. Since the dispute did not concern the "execution and progress of the work," but a "claim arising out of alleged breach of contract," any decision of the architect had no binding effect.

Finally, the Court rejected, as well, the defendant's contention that the architect's decision was final. Said the Court:

> ". . . it is also our opinion that in any event a decision of the architect, standing alone, was not intended to be final or to provide a basis for the entry of judgment, except insofar as it might relate to artistic matters."

This decision points up again the necessity of reconsidering the AIA "General Conditions," particularly with respect to the ethical and legal status of the architect as an "arbiter." See March 1950 P/A, October 1951 P/A, November 1951 P/A, and February 1952 P/A, IT'S THE LAW. See also September, October, and November 1953 P/A, IT'S THE LAW.

towa new stru ural concepts

Most of us live a large part of our lives in rectangular cubes of varying proportions and sizes. Structurally, these are generally reticulated boxes placed either beside each other or piled atop one another in endless monotony. Paradoxically, the post-and-lintel system is neither the most economical of material nor the most expressive of form; yet, by far, this method of framing outnumbers all others. To a great degree, this devotion to building with lineal members has been forced upon us by custom, by building-material production methods that are most suitable for lineal members, and by the fact that man's ingenuity has not yet developed for him other choices that are, in a practical way, any more acceptable. There is evidence, however, that mankind may be entering a new era of great creative activity in all arts and, looking forward to such an epoch, we may anticipate that more suitable, more economical, and less imitative structural concepts will surely evolve.

In this review we see a geodesic structural frame, rather modest in size, being used expertly to enclose a motel restaurant at Woods Hole, Massachusetts (*page 100*). Extending the possibilities of this method considerably, R. Buckminster Fuller, father of geodesic structures, contends that we possess the technology to enclose similarly the city of Chicago! Yet one must feel that such a system is not a panacea nor would such a state of structural design be desirable—even though geodesic construction offers maximum advantages for prefabrication, speed of erection, and lightness of material. Eero Saarinen, for example, found in his search for the most suitable structural system for the M.I.T. Auditorium that lightness of structure was actually incompatible with the essential purpose of an auditorium—good hearing conditions (*page 120*). Felix Candela advances another point of view in his article "Stereo-Structures" (*page 84*) wherein he analytically arrives at the concept that "doubly-curved surfaces are most appropriate from a structural point of view if a material like concrete, molded at the site, is to be utilized." Although doubly-curved surfaces are appropriate roof forms, we must recall that we shall probably always have need for multistory structures and that as man has evolved two legs of equal length, he exerts the least energy when walking on level surfaces. Louis I. Kahn envisions that a tetrahedron floor-ceiling system is best suited to integrate the diverse functions required of structure (*page 103*).

Regrettably we are denied the knowledge of what lies ahead. However, in this issue the Editors have selected a cross-section of current structure and suggest that within it one may recognize many of the principles that point toward new structural concepts for tomorrow's architecture.

stereo-structures

by Felix Candela*

The essential purpose of structure, that property which defines it as such, is to transform external loads into internal stresses and to transmit these, distributed along the structural members, to convenient locations. When considering the manner in which external loads are transmitted, two basic classifications may be established: *passive structures* conduct loads directly without changing their course, like bearing walls and columns which are merely elements interposed between the loads and the ground; *active structures* are those capable of changing the direction of loads and forcing them to move throughout the structure enclosing a certain space. The latter group may then be subdivided into *plane structures* in which the transformation of loads into internal stresses takes place in one plane (as in a conventional roof truss), and *stereo-structures* (or space frames) wherein load transformation can develop stresses in any or all directions (as in the dome).

Realizing that lineal and plane frames have been used almost exclusively for the past two centuries, it would seem evident that during this period some atrophy in structural ingenuity has not only occurred but also has continued to this day. At first glance, such an atrophy seems paradoxical and inexplainable, especially as its presence coincides with the emergence and evolution of the so-called structural science that was brought about by Augustin Louis Cauchy's development of basic equations for the Theory of Elasticity at the beginning of the 19th Century. Yet is it too much of a coincidence to be a true paradox? Upon closer analysis it might be discovered that this pseudo-scientific vogue is one of the principal causes of this atrophy.

As the emergence of steel as a building material brought standard, lineal sections, it became customary to consider all structures, including monolithic ones, as simple juxtapositions of linear members. The difficulties encountered in analytically visualizing and solving the full frame encouraged such an ideal subdivision into easily analyzable members, although in most cases the simplication was both artificial and imaginary! When the divergence between reality and invention would become intolerable, it was customary to follow blindly the totally illogical process of forcing the design to approximate the ideal conditions established by calculations, instead of attempting to rectify the initial misconception. Thus the mere tool became an end in itself and the unchallenged effects such a procedure may have on the ultimate stability of a structure were ignored. Hardy Cross' statement—"We must always remember that what we want is a structure, not merely an analysis"—is easily forgotten. Whether due to limitations of the human mind, to routine, or to structural mimetism, the outstanding fact remains that we are, almost exclusively, building frames composed of networks limited to three perpendicular planes. Although no other solution to the monotonous problem of building piled-up boxes may be readily available, it seems advisable to be thoroughly aware of the basic defects of this type of structure—its essential lack of economy—so that new solutions may be explored. In the organic structures of nature—where design progresses by natural selection and by survival of the fittest—the plane rarely occurs, the rectangular dihedral even less frequently.

Let us then analyze the simplest case of an active structure: two inclined members forming a triangle with the ground (*Figure 1*). An external force (whatever its direction) lying in the same plane, will be conducted to the points of support entirely by direct stresses parallel to the axes of both members. The analytical problem is then resolved simply by breaking the force into two components. The magnitude of these components, and consequently of the stresses acting in both members, increases as the subtended angle widens. Ultimately, when the two bars are horizontal, the stresses become infinite and the imagined structure impossible. It has been transformed into a simply-supported beam in which its structural function depends upon the bending resistance of the member. In the first case—ignoring the weight of the bars—as all fibers in each cross-section and all cross-sections of each member are working under the same stress, full advantage is taken of the material's properties. In the second case, the distribution of stresses on the cross-section follows a triangular law (*Figure 2*) with some fibers acting in tension, others acting in compression, but only the extreme fibers working at their full capacity. Furthermore, as the magnitude of the moments vary along the beam, the stresses become smaller as the supports are approached, and result in a still greater waste of material.

In the design of a reinforced-concrete beam, no allowance is made for the part in tension, due to the low tensile strength of concrete, and all of the tensile stresses are considered to be resisted by the steel reinforcement (*Figure 3*). In this manner, approximately two-thirds of a concrete section acts only as dead load, performs no structural function, yet increases the necessary size of the beam as well as its supporting columns and foundations. As a result, more than two-thirds of the material employed in a conventional reinforced-concrete structure will be perfectly useless, superfluous, and—in the end—prejudicial to its stability.

A fundamental principle of economy is thus established: *bending stresses must be avoided* by judicious selection of appropriate structural shapes. The basic contradiction in today's buildings is that the functional requirements seem to demand the presence of these bending stresses in their frames. In other words, *the structural function depends essentially on the form.* But not having the liberty to select form on a structural basis—the shape of a building being determined by other con-

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* *Architect, Mexico, D. F., and Professor, Escuela Nacional de Arquitectura.*

siderations—it is most unlikely that correct structures can originate through this design procedure. In fact, we are not using materials properly—rather, we abuse them.

Consider the simple but unstable post-and-lintel frame found in most structural compositions today (*Figure 4*). Ignoring (again) its weight, the structure will collapse if a force—either in its own plane but with a horizontal component or outside its plane—is made to act upon it. Its stability is entirely dependent on the rigidity of the joints and on the effective fastening of the columns to the ground or, in other words, on its resistance to bending. But if we transform the rectangle into two triangles by introducing a diagonal member (*Figure 5*), its stability will no longer depend upon the flexional strength of the joint members. It is not intended to rediscover here the simple and intuitive principle of triangulation, but rather to point out that its economy depends mainly on the fact that its application entails the reduction of bending stresses.

As a plane figure the triangle is indeformable; it cannot, however, resist forces outside its own plane. It is necessary to turn to the tetrahedron (*Figure 6*) to attain the basic figure of any lineal composition indeformable in space—a stereo-structure capable of resisting or transmitting, by direct stresses only, forces of any direction acting at its vertex. (*Pages 100 through 102 show structures that follow this principle of spatial triangulation.*)

Up to this point, we have dealt only with reticulated frames composed of straight bars that form the resisting skeleton and that are able to support the superimposed covering material. When this covering material is a concrete slab, to consider it as dead load only without fully exploiting its resisting properties constitutes an inadmissible waste. The tetrahedron can also be imagined as being composed of four triangular slabs. In this case, the resisting bars at the com-

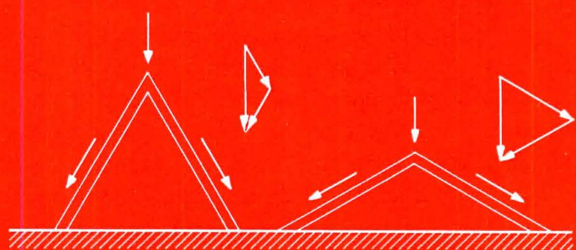


Figure 1

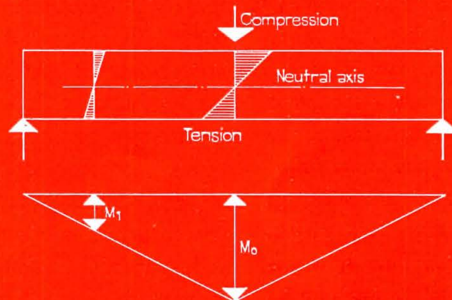


Figure 2

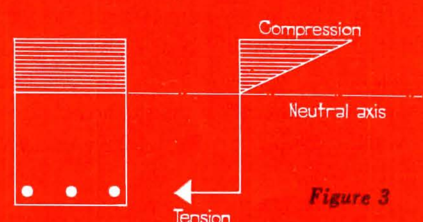


Figure 3

Figure 4

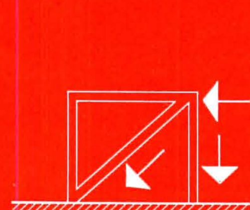


Figure 5

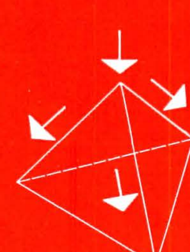


Figure 6

mon edges can be eliminated, substituting for them the intersection of the contiguous slabs which forms an angular member able to resist forces in any direction (*page 103*).

The common type of pitched roof is composed of a series of triangulated trusses bearing purlins that in turn support roofing sheets (*Figure 7*). It is common knowledge that these structures require bracing unless the roofing material is a concrete slab and the structure can profit from the stiffness of the slab in its own plane. In such a case, the triangulated trusses can even be omitted, letting the slab support itself. Thus we are arriving at the concept of surface structure or self-supporting lamina, following a process already experienced in more advanced technical fields. In automobile and aircraft construction, for example, stressed skin has almost totally displaced the initial supporting skeleton frame. To understand surface structure more fully, the traditional concept of the concrete slab—a structural element that resists loads perpendicular to its plane by bending—must be augmented to include its much greater capacity to withstand forces lying in its own plane.

Imagine a horizontal-plane slab supported continuously along two parallel sides (*Figure 8*). Its reactions are vertical and the bending moment acting at mid-span will increase rapidly with the square of the span. If we increase the thickness of a slab in order to resist a greater bending moment, we concurrently increase its own weight which, due to the unfavorable weight-strength ratio of concrete, is usually the most significant load. We thus enter a vicious circle which quickly limits the length of span for this type of structure. However, let us fold the slab to form two inclined slabs with a contiguous edge (*Figure 9*). The bending moment now becomes subdivided and the upper common edge acts as an intermediate support for the slab resisting only the normal components of the load in bending. The tangential components will be transmitted to the supporting edges by direct stresses contained in the planes of the slabs, producing oblique thrusts which will be enlarged by the forces which result from breaking up (along the planes of both slabs) the reaction at the intermediate common edge.

It is not necessary to have continuous support at the lower edges. As in the structural action of wall-like girders, the lower part of each slab may be considered as a deep beam bridging the oblique thrust between convenient points of support, where they may be counteracted. As the distance between the isolated supports becomes greater, the depth of the slab section acting as a beam also increases. Ultimately, when the distance is unusually large (*Figure 10*), the folded slab will act as two slender beams joined by their upper edges, or rather as a single hollow beam having tie-rods or buttresses at its end cross-sections.

By introducing a simple variation of form (without an appreciable increase in volume of material employed) we have now progressed from a plane to a three-dimensional structure. The theory of shells or stressed-skin construction is based on this simple principle—despite the awe of its advanced mathematical theory.

Polyhedral or "hipped-plate" structures (*Figure 11*), which the Germans call "Faltwerke" and the French call "toits plissés," are, however, subjected to considerable transverse bending when supporting uniform loads; and a substantial thickness is required for the slabs. They are only appropriate for concentrated loads at the joints or the vertex. Although the carrying capacity of the structure has been increased by means of inclination, the introduction of curvature will be necessary to further reduce the value of the transverse moment and the thickness of the slab. For uniform loads, the *funicular*[1] shape or its inverse appears to be the most efficient form.

It is a mystery that this latter principle,

[1] *If you suspend a flexible cord from two points, the shape is described as "funicular." If you freeze it in this shape, invert it, and apply the same loads, you have an "antifunicular" shape (now having compressive rather than tensile stresses).*

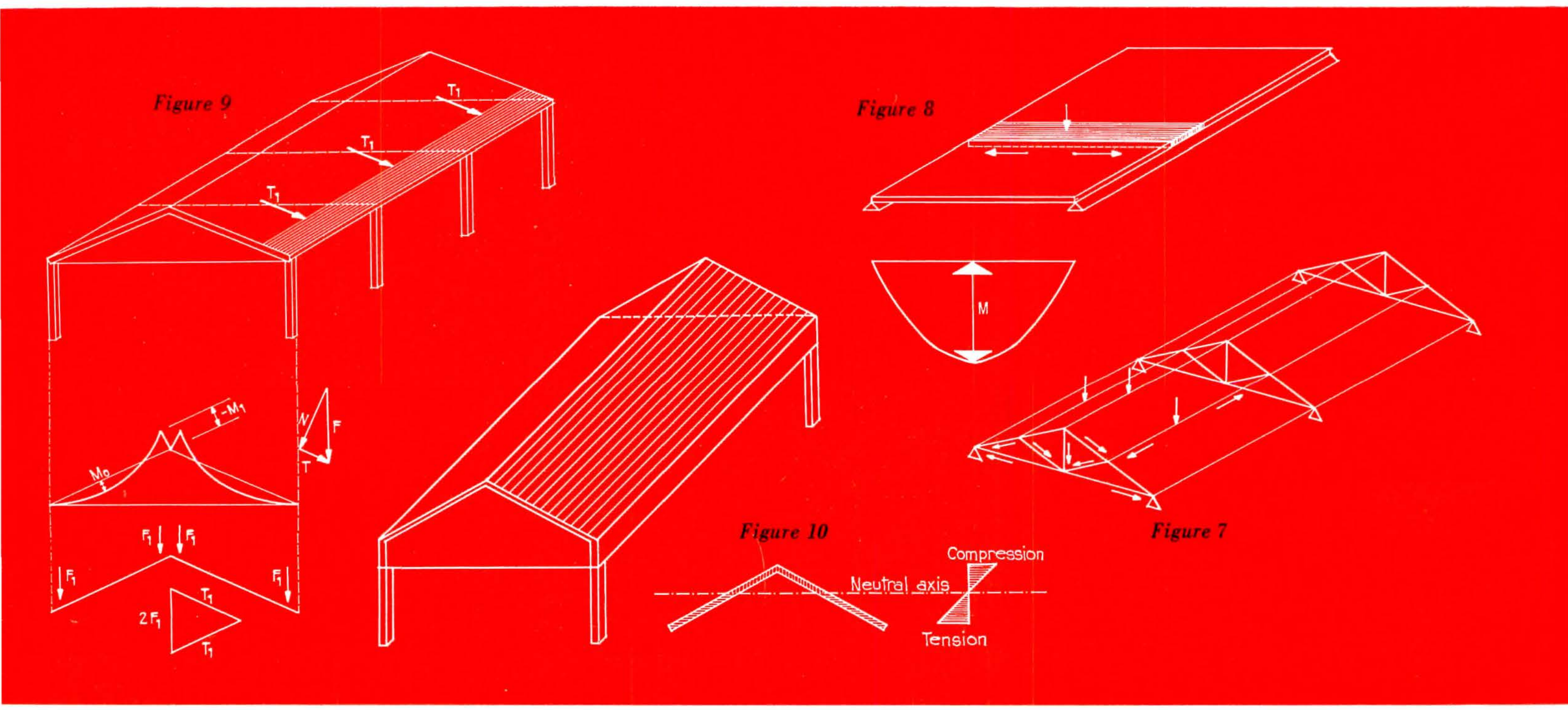


Figure 11—Hipped-plate roof for an exhibition car-porch at Mexico D.F., 1952. Overhang: 10'; thickness: 1½". F. Candela, Architect.

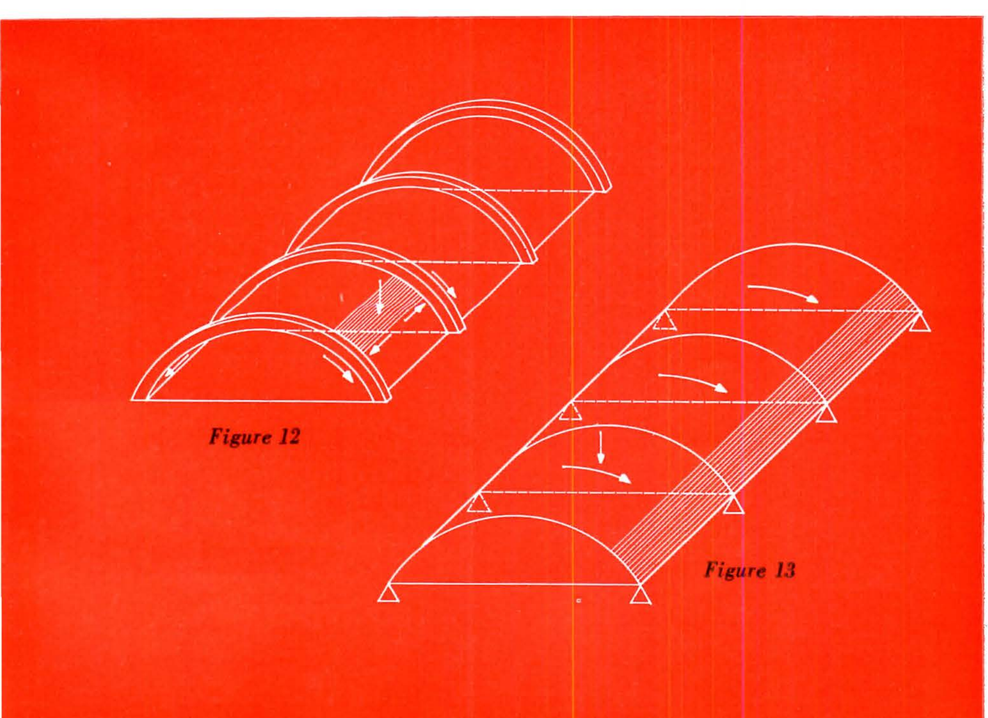


Figure 12

Figure 13

known and utilized in arches for centuries, was not extended by the pioneers of reinforced concrete to cylindrical vaults of this material. On the contrary, in the earliest reinforced-concrete vaults, and even in some vaults designed today, the main resistance to loads has been assigned to a series of closely spaced arches. In a manner similar to conventional trussed roofs, it was assumed that the weight of the intermediate vaults was transmitted directly to these arches and that the vaults acted in bending as though composed of a series of horizontal strips (*Figure 12*). This design procedure resulted in massive slabs which, although contributing to the spiritual tranquility of the owners (prone to mistake mass for safety), were definitely detrimental to their pocketbooks. The materials themselves, obviously incapable of following the designer's fancy reasoning, continued to perform in the natural way—the direct stresses following the line of maximum slope.

The principle of economy of effort is universal in nature and in the theory of structures has a mathematical interpretation in the form of certain theorems having to do with strain energy. At this time, however, it would be preferable to base our discussion on purely mechanical and intuitive reasoning.

In the type of structure described immediately above, the vault itself is the main resisting element and as long as it has an antifunicular directrix (or cross-section) it will transmit the loads directly to the springers by means of small compressive stresses. Therefore, the thickness of the concrete not only *may* be but also *should* be reduced to the practical minimum (say 1" or 1½"). The arches will then act merely as stiffening ribs capable of absorbing, in bending, those stresses not in equilibrium which are formed in the structure by deviations in the pressure line due to irregular or unexpected load conditions. It should also be noted here that it is not necessary to have continuous support at the spring lines. Following a reasoning similar to that outlined in the discussion of polyhedral structures, the lower part of the vault, acting as a slightly curved beam, will transmit the vault thrust to convenient points of support (*Figure 13*) without intervention of other structural elements. When the longitudinal distance between these points is

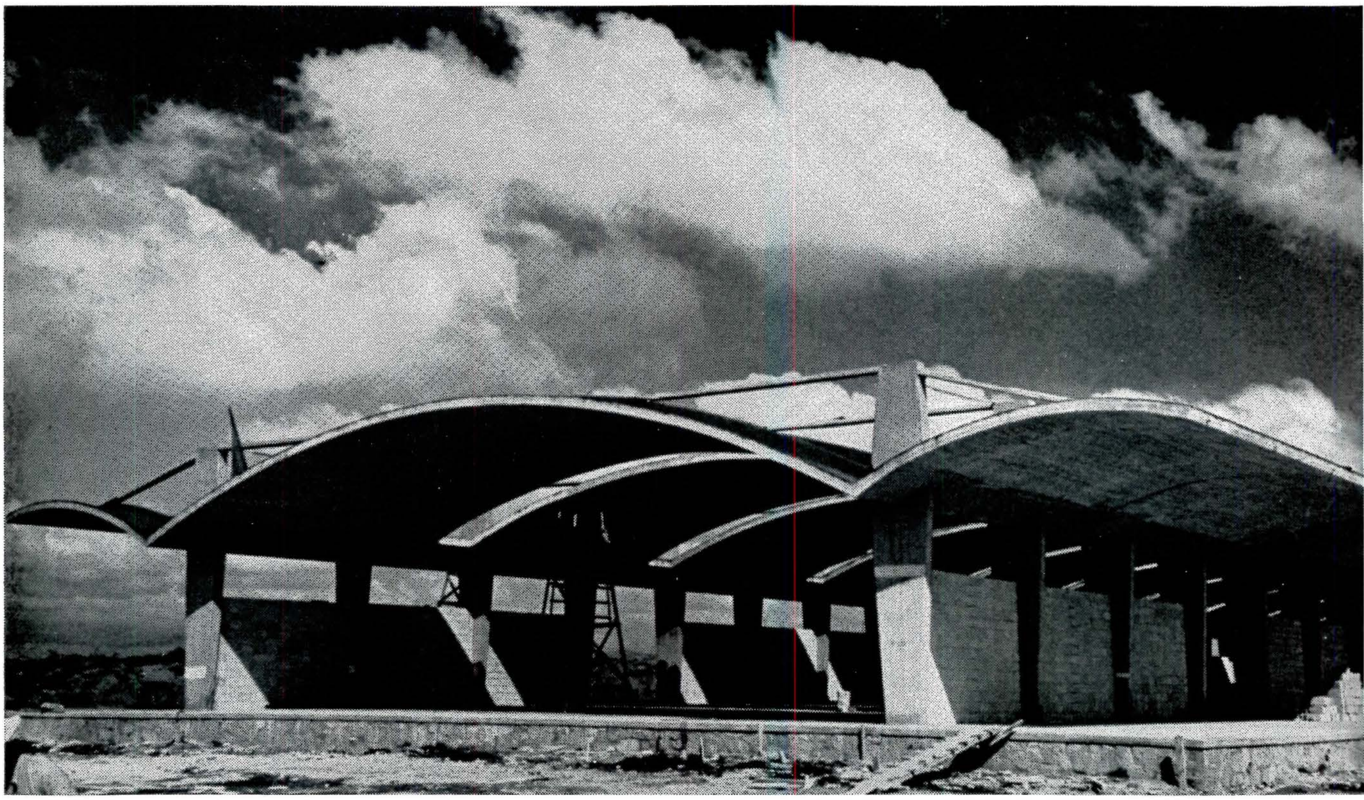


Figure 14—Warehouse for the Custom House of Mexico D.F., 1953. Short-cylindrical shells, catenary shaped. Span of central aisle, 66' with two overhangs of 20' covering the loading platforms. Thickness: 1½", increasing to 4" at the springers to form a V-shaped beam. Tie-rods above the shell expedite movement of the formwork. The structure is divided into lengths of 33' by expansion joints, coinciding with openings for roof lights. C. Recamier and F. Candela, Architects.

smaller than the vault span, such a structure is called a *short-cylindrical shell* (*Figure 14*). As this length increases, the depth of the shell section contributing to the bridging action between the supports also increases. When the length becomes two or three times the transverse span, the structure is transformed into two curved beams joined at their upper edges. Or (which amounts to the same thing) the structure is transformed into a single beam of hollow-cylindrical cross section (*Figure 15*). We are now dealing with a *long-cylindrical shell* or *barrel vault* which can be defined as a hollow beam supported at its end cross-sections where it is necessary to counteract the horizontal thrusts always produced by curved structures. (*Figure 16; this type of structure is also demonstrated in the factory presented on page 114*).

In the barrel vaults, it is no longer necessary to have an antifunicular shape since the local disequilibrium between vertical loads and shear stresses, caused by the curvature of both deep beams which form the barrel, will always create transverse bending moments. These transverse moments can be maintained within reasonable values by means of certain devices such as the use of longitudinal edge beams (*Figure 17*), vertical supports along the springers, or the consideration of the transverse continuity between adjacent vaults (*Figure 18*). Although these details may be important for practical design, they do not affect the general thinking concerning the working action of these structures.

In short-cylindrical shells, the possible asymmetry of live loads causes changes in the basic pressure line, which then cannot coincide with the directrix of the vault for all possible load conditions. Although the vault is capable of channeling these eccentric forces by means of shear stresses contained in the shell surface, it is nevertheless necessary to absorb the bending moments created by this eccentricity at some locations. This leads to the use of closely spaced stiffening arches. The size of these arches, when used for large spans and unusual accidental-load conditions, becomes so great that the characteristic lightness of this type of construction is nullified. Besides, as we increase the span, the radius of curvature of the directrix also increases, producing an almost flat shell exposed to *instability* by buckling. This further justifies the presence of stiffening arches. To avoid the

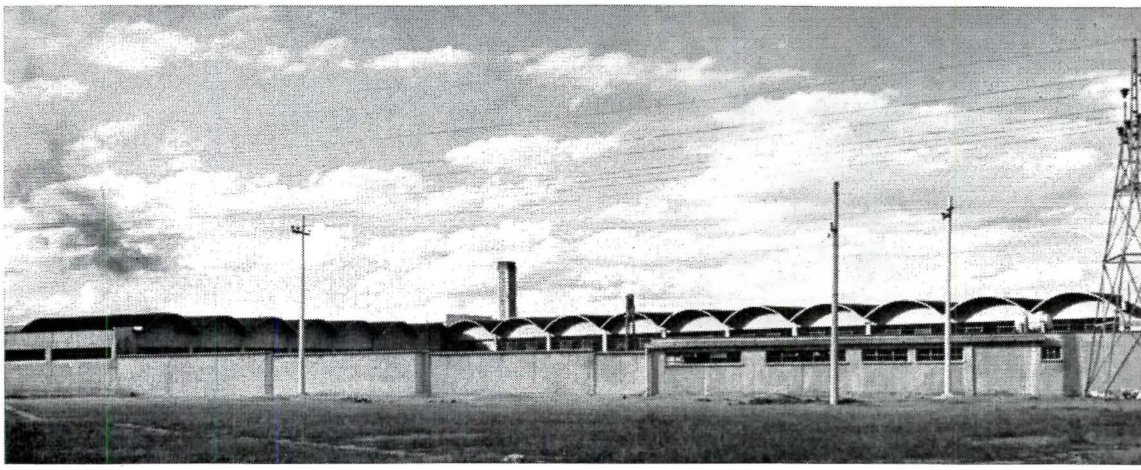


Figure 18—Factory for electronic appliances at S. Bartolo Naucalpan, Mexico, 1952. Long-cylindrical shells of cycloidal cross-section with glass blocks for illumination. Span: 45' x 15'. Thickness: 2". L. Claudin and F. Candela, Architects.

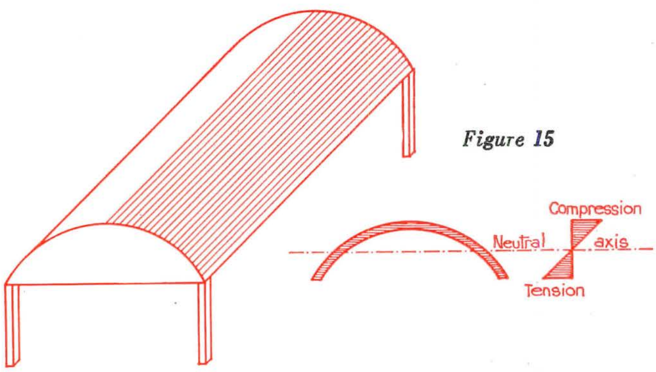
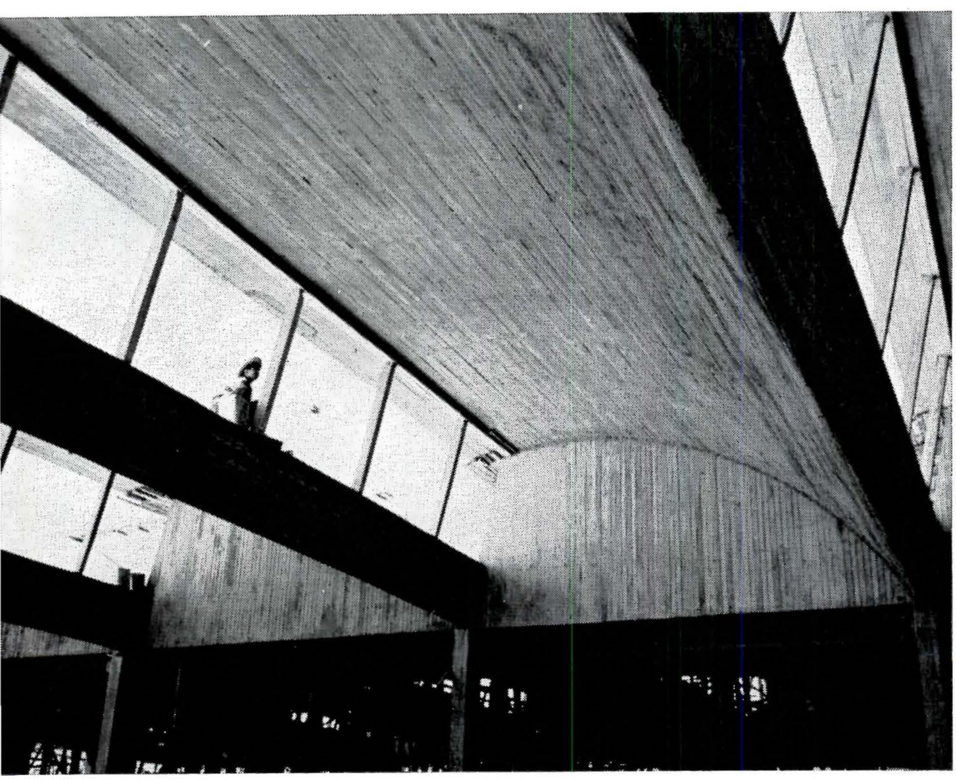


Figure 15

Figure 17—PISA factory at S. Bartolo Naucalpan, Mexico, 1951. Long-cylindrical shells with edge beams. Span: 56' x 26'. Thickness: 2½". R. Fernandez, J. L. Certucha, and F. Candela, Architects.



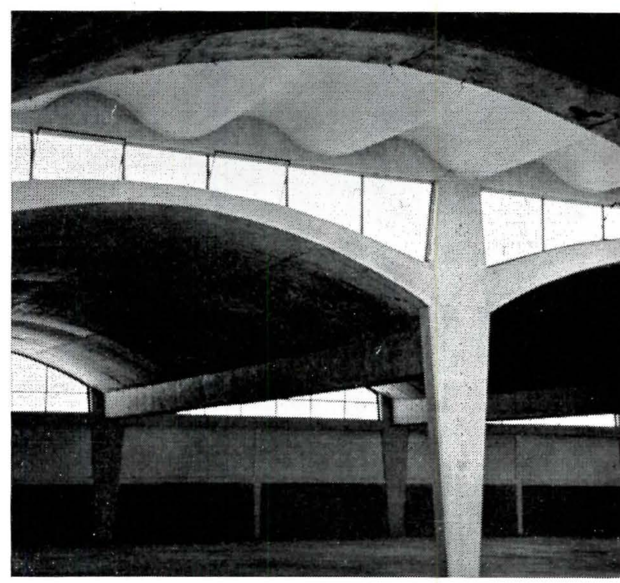


Figure 16—CIBA Pharmaceutical Laboratories. Mexico D.F., 1953. Sawtooth roof with long-cylindrical shells. Span: 52' x 20'. Thickness: 2". A. Prieto and F. Candela, Architects.

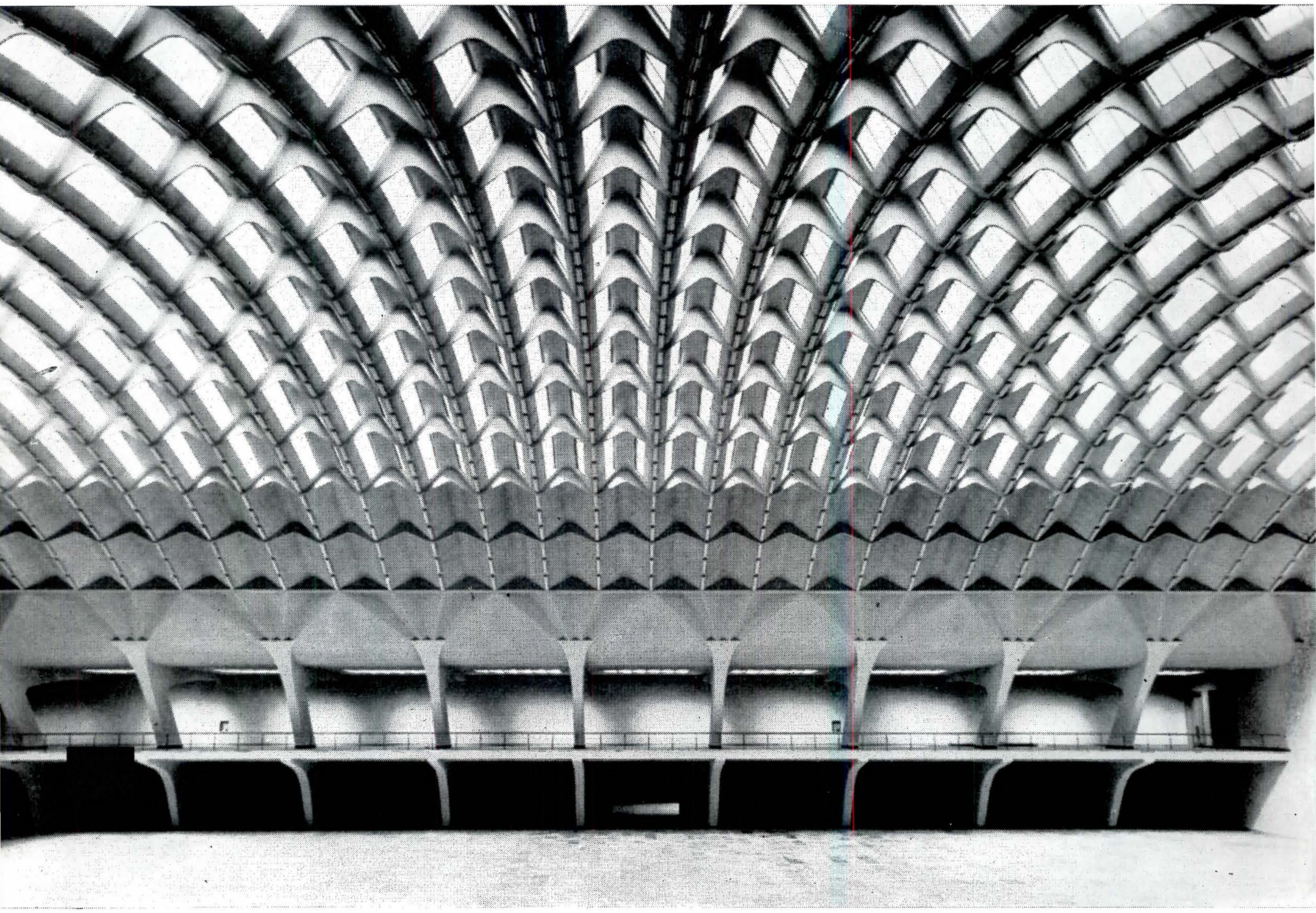


Figure 19—Turin Exhibition Hall, Turin, Italy, 1951. Doubly-curved vault of 320′ span, composed of prefab concrete sections. Interior view showing the palm-shaped form of the springer. P. L. Nervi, Engineer.

inherent waste of material that the use of these arches entails, it again becomes necessary to turn to the principle of curvature by substituting the cylinder for a doubly-curved surface. The vault will then act as antifunicular for the permanent loads, while the considerable inertia of the "waves" thus formed will permit it to act in bending as a non-funicular arch for the live loads. The transition of the curved "wave" to the necessary straight line at the springers produces esthetically interesting solutions (*Figure 19*).

It has now been shown how the successive application of the principle of curvature gradually eliminates the bending stresses in the slab and how its logical and intuitive employment leads to the full transformation of external loads into direct "membrane" stresses. Contained exclusively in the shell middle surface, these stresses allow its thickness to be reduced to a minimum. During the course of this article, we have gradually arrived at the conception of doubly-curved surfaces which are the most appropriate from a structural point of view if a material like concrete, molded at the building site, is to be utilized.

A classification of these structures can be made that distinguishes *synclastic* surfaces, in which the two principal curvatures are convex (*as in the example of the dome on page 120*), also called elliptic surfaces after the type of equation that represents them, from the *anticlastic* surfaces, also called hyperbolic, where both main curvatures have opposite signs, as in the hyperbolic paraboloid (*Figure 20*).

It is not pertinent at this time to present the mathematical theory for the stress analysis of these surfaces (which may be found in several books and many technical papers), but it does seem appropriate to mention a few intuitive principles not usually found in the aforementioned texts, that form the basis for the theory.

It is a phenomenon in technical literature dealing with shell structures that the authors are extremely liberal in their presentations of integral and complicated differential equations—especially since these mathematical procedures are so complex that they are beyond the grasp of the average practitioner. At the same time, the authors seem equally zealous in concealing the static principles on which the analytical methods are based. Thus a curtain of mystery and obscurity has been effectively drawn over these matters which, in effect, presents the handful of initiates as eminent scientists and tends to scare off the daring few who attempt to join the inner circle.

Take, for instance, the familiar statement (usually given without further explanation) that "the membrane theory is especially appropriate to picture the stress condition of doubly-curved surfaces." At most, it is advanced as a tentative explanation of the pseudo-axiomatic principle that shells, being very thin, are unable to withstand bending stresses and therefore must work by direct stresses only. This reasoning is totally erroneous, since the minimum thickness is not a cause but a consequence. However thin a shell may be, it always has some resistance to bending. Further, if these bending stresses could be present, the structure would break by bending as excessive deformations occur. The real justification of the membrane hypothesis is the impossibility of such deformations existing when doubly-curved shells are built of the relatively unextensible materials used in construction. The misunderstanding of this fact has led to the frequent mistake of applying the membrane theory to stress investigations of such inadequate cases as developable surfaces—and especially long-cylindrical shells.

Perhaps an example will clarify this point. Consider a revolution dome loaded symmetrically with respect to the axis of rotation. Substantial extensoral strains or variations of length of the parallel circles must necessarily exist before

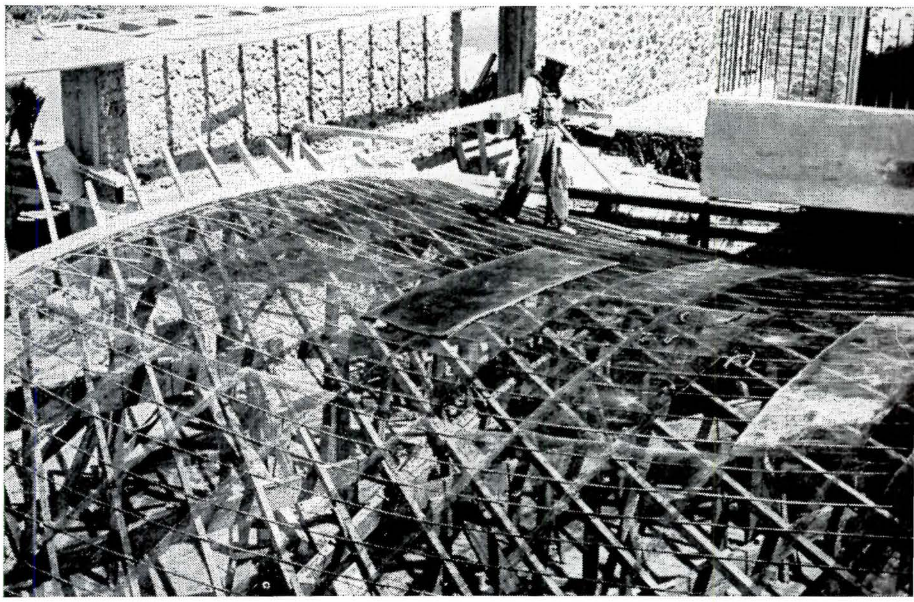
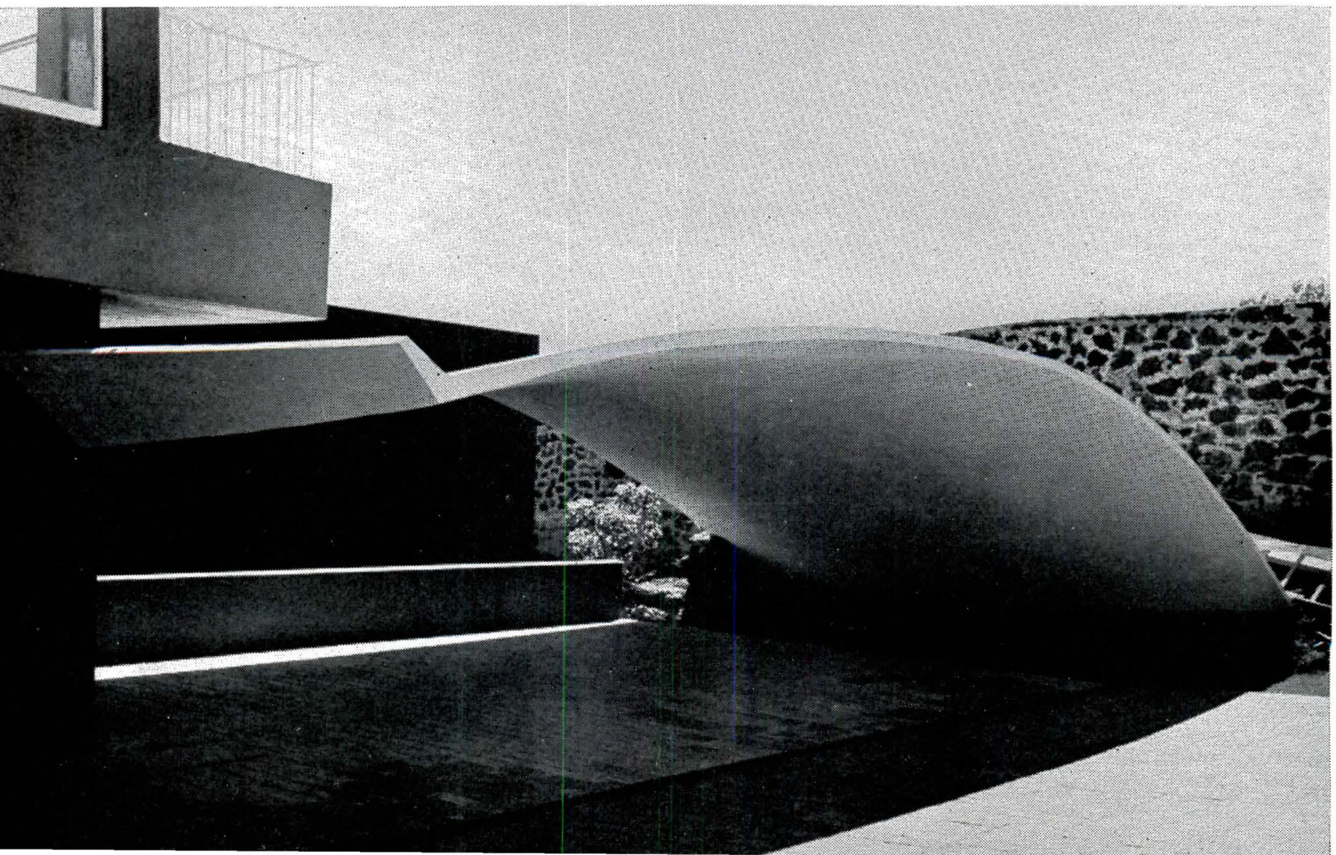


Figure 20—Carport for a residence at Jardines del Pedregal, Mexico, 1953 (right and below). *Hyperbolic paraboloid vault of 40' x 23' span. One of the springers rests on rock ground. The other one, reinforced by an edge beam to form a V-shaped member, cantilevers at both sides from an isolated support. View of the formwork and reinforcement, built of expanded metal-lath in substitution of the usual wood sheathing. Note straight purlins following one system of generators. H. Almada and F. Candela, Architects.*



changes of curvature and consequent bending may appear along the meridian lines. Similarly, for a concentrated load to produce a dent at any given point on a spherical dome, it will be necessary to have significant elongations in the circles immediately around the considered point. Such a condition is easily obtainable in a rubber ball built of very extensible material, but virtually impossible in a concrete dome until the direct stresses along the immediate circles have attained the unusually large values corresponding to the strains discussed above.

In the case of anticlastic shells, the intuitive analysis is not as easily visualized as in the dome, but the same principles, well known to the builders of automobile bodies, are involved. Consequently, it is inconsistent to extend funicular reasoning to surfaces. The behavior of a membrane is substantially different from that of a chain or a thread. The latter will bend under load seeking the curve of equilibrium; the former, as long as it is a doubly-curved surface built of unextensible material, will always be in equilibrium without bending, whatever its form or load condition. It is permissible, therefore, to consider direct stresses only, and to apply membrane equations to obtain the stress condition corresponding to the internal equilibrium.

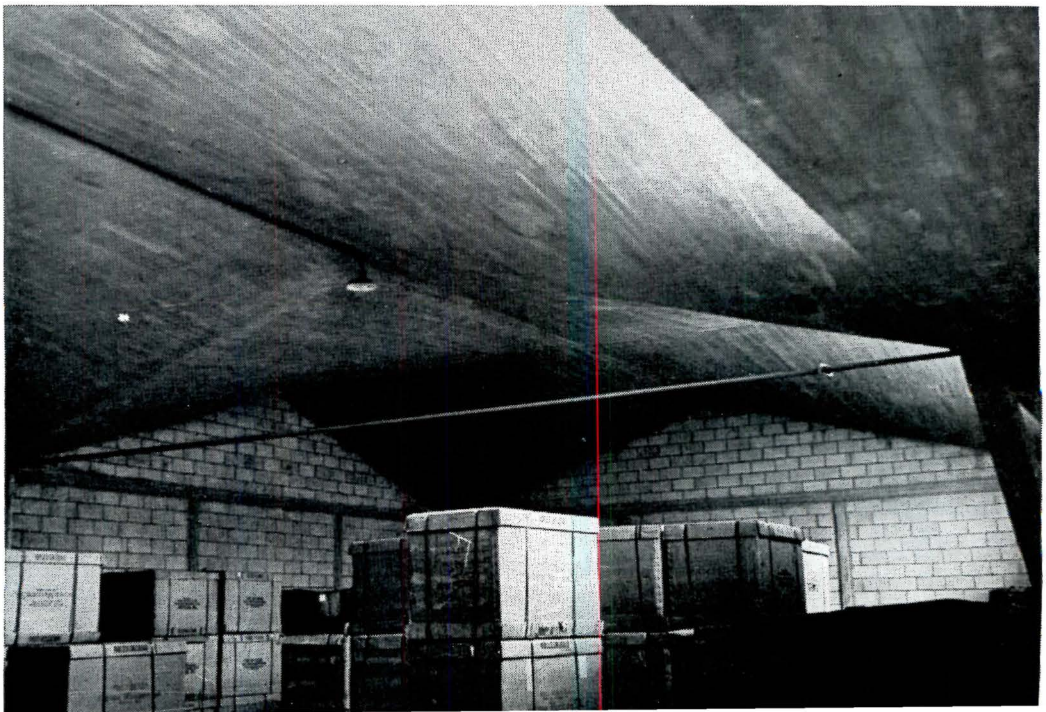
There is another intuitive consideration worth noting. It is related to the distribution of support reactions and to the manner in which the surface may prefer to rest along its boundaries. Its consideration determines the arbitrary constants that appear in the process of integrating the equilibrium equations cited above, and is closely related to the characteristic internal hyperstatic nature of these surfaces.

A statically-indeterminate or hyperstatic structure is one in which the support conditions are redundant. It is a structure in which the manner of attaining external equilibrium and, consequently, the way it behaves under loads are multiple, depending upon the support conditions. In general, the value and distribution of the reactions will depend on the strains of the structure itself and on the loading capacity and deformability of the supporting elements.

This characteristic of an indeterminate structure constitutes its greatest advantage for, profiting by it, the structure is capable of redistributing the excessive stresses from the over-strained components to the less loaded ones, following the natural transference called metastasis. This property enables these structures to survive changes in anticipated loading conditions and to withstand various support failures that would produce automatic collapse in statically-determinate frames. In the majority of cases, what actually goes on within these frames is difficult, if not impossible, to calculate. To attempt an analysis, it is necessary to assume certain simplified and arbitrary hypotheses covering the manner in which the materials deform. (These same hypotheses constitute the basis for the Theory of Elasticity.) The application of these hypotheses, however, makes it impossible to ascertain that the results of calculations will have any relation to what actually occurs in the structure.

In spite of these facts, and since it has been required to calculate everything in recent times (a requirement not essential to builders of other and less scientific years), not only are the properties of materials arbitrarily simplified for the pretentious and vain sake of fitting them into mathematical schemes, but the building art is itself impoverished by the unforgivable abandon of curved and spatial structures whose mathematical analysis at first seems difficult to undertake. The ideal and artful subdivision of monolithic frames into isolated elements by means of real or fictitious hinges, and other similar contrivances are bound to be detrimental (when they really exist) to the final stability, although they may expedite calculations.

An example will illustrate such an hyperstatic condition. Imagine a plane, horizontal slab limited by a rectangle. We may consider it as being simply supported or as rigidly clamped on all four sides; we may consider it to be supported on two opposite sides; or we may assume that it is cantilevered from one of its sides. All of these hypotheses—and many others—are compatible with the total equilibrium. They condition subsequent calculations, but are not previously influenced by them. The slab, which is highly hyperstatic, may be supported in



any one of the above ways, as long as it is reinforced according to the finally adopted criterion.

The same is true, to a still higher degree, in doubly-curved surfaces. In these three-dimensional structures, the internal equilibrium, free from bending, can be attained in many different ways. In other words, the distribution and magnitude of membrane stresses will vary according to the manner that we choose to support the surface, with the inviolable condition that the choice of the supporting reactions be compatible with the static equilibrium of the whole. Although the mathematical interpretation of this variability may lead to complex analytical considerations, there can be no doubt about the justification of the method since — direct stresses being generally low—it is not necessary to take into account (as with elastic methods) the uncertain strains of the material.

The imaginative use of structures of this type (*Figures 20* and *21*) produce unsuspected interior and exterior forms. These may enrich the intolerably limited present vocabulary of cubical masses and spaces, pending new fields of thought for the architect. Throughout this discussion, several causes of the prevalent atrophy in structural thinking have been suggested. Added to these could also be the absurd dismemberment of the craft-builder into the existing professions of architect, engineer, and contractor—a condition that leaves structural design practically out of the range of these three fields. Moreover, this separation requires that accurate plans be drawn of every detail in a building. Such a requirement will eventually prove unconstructive, following the general law of economy of effort, as it results in the abandonment of space frames in favor of plane and linear frames that are more easily represented on paper.

It is a curious phenomenon that this disregard for stereo-structures or, rather, the incapacity to comprehend them, appears periodically in the history of building or, which amounts to the same thing, in the history of the roof. The Chaldeans and Sumerians with their mud-brick architecture (a natural consequence of the scarcity of wood and lack of stone) were forced to use the dome and vault, thus creating the oriental architectonic tradition that later extended throughout the Mediterranean world. Greek and Egyptian architecture, on the other hand, ignored these constructive forms in favor of the post and lintel, using at most plane, wood trusses of a rather primitive type. Stereo-structures grew again with the combinations of Byzantine domes, the groined vaults of the Gothic cathedrals, and the vaulted compositions of the Renaissance and Baroque periods. Yet, they again disappeared in a cycle that extends to the present time—one that coincides with the emergence of iron and steel structures. Following a helicoidal development, the art of building seems to degenerate in certain periods, only to get back in step with a greater impetus in the next era of this cycle.

A parallel may be established between this cyclical succession and the periods of analysis and synthesis which characterize the progress of science and, in general, of every activity of the human mind. In the creative periods of synthesis, new ideas originate that (although based on past experience) revolutionize habitual mannerisms. Creative spirits, euphorically uninhibited, give birth to original theories and extraordinary artistic works, provoking alarm and indignation in the serious and bored reticulated minds which consider it inadmissible that one might want to enjoy the exploration of new paths. Eventually, the waters return to their shores. The journeyman of science recovers the momentarily lost control and proceeds to assimilate and carefully mill new ideas, until they, in turn, are exhausted. These are periods of analysis, sad and boring but apparently necessary for the normal evolution of human thought.

In the field of construction, we fortunately are ending a long, analytical period. The ideas that nourished it are fully developed and to continue exploiting them would be senseless. If the symptoms are to be believed, we are on the verge of a new creative epoch. Architects should be pleased with this situation, especially if they manage to regain their lost role as "master builders," since in order to build at such a time it perhaps will not be necessary to master so much science, but to have some talent.

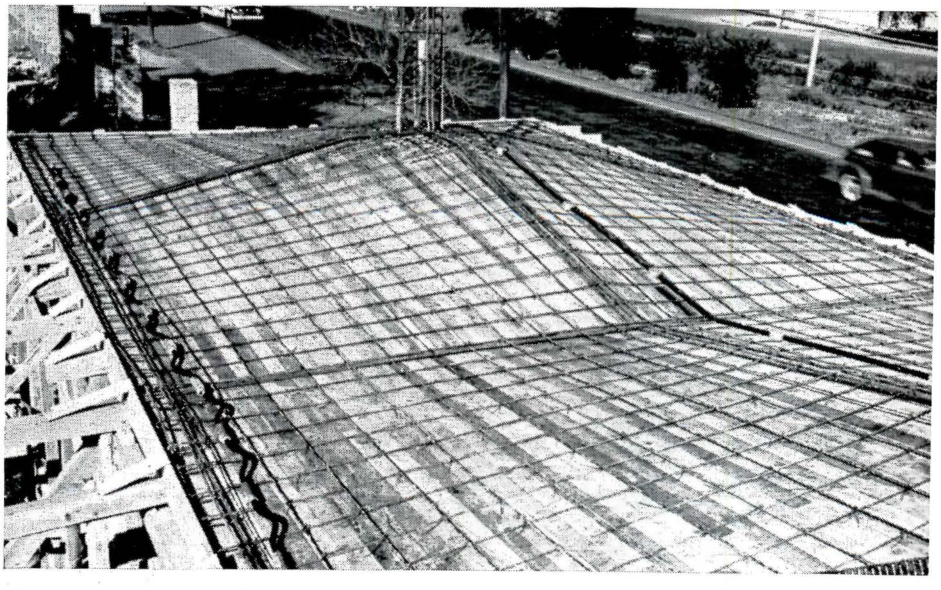
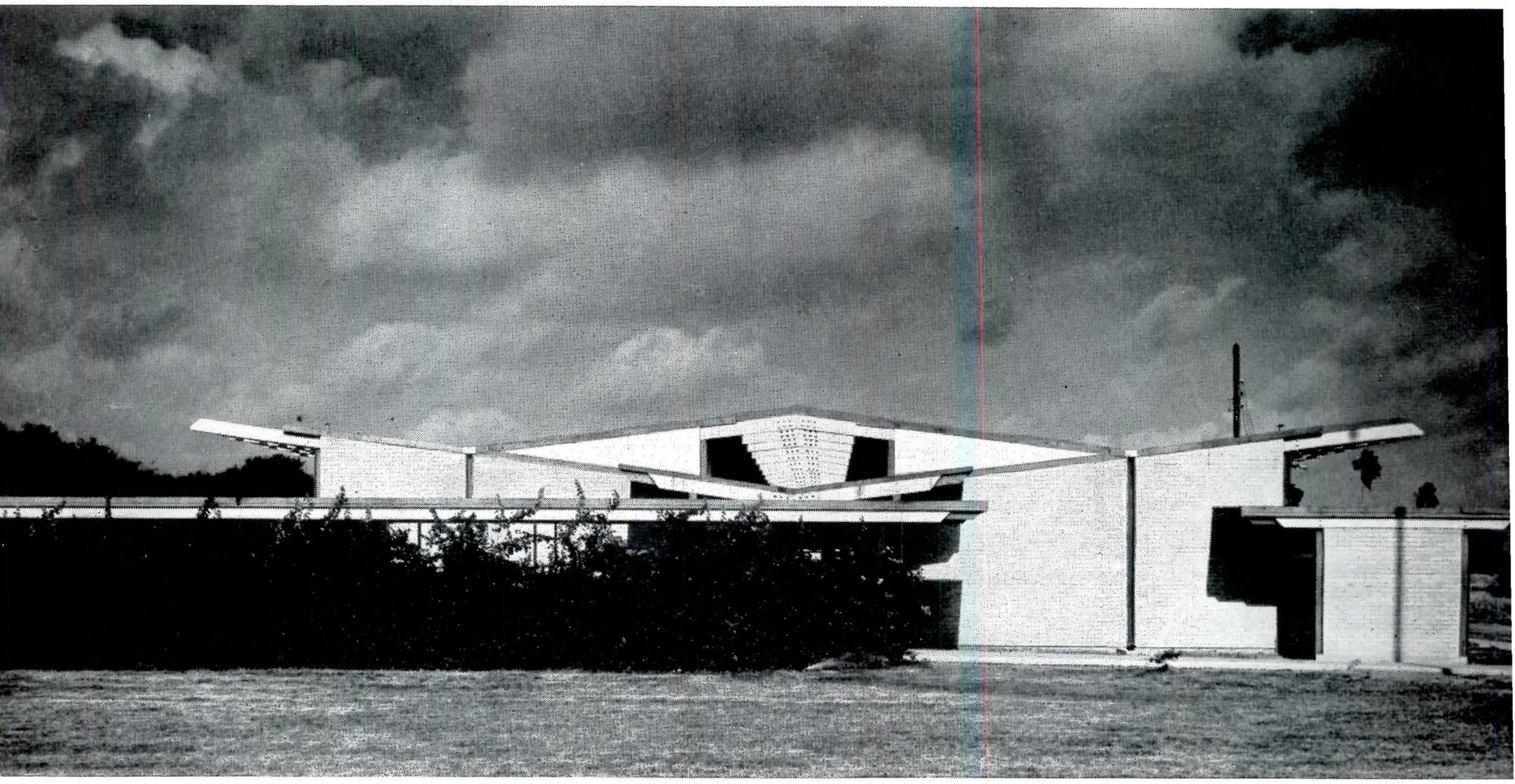


Figure 21—"Parisina" textile plant at Mexico D.F., 1953 (acrosspage *and* right). *Rectangular domes formed by four hyperbolic-parabolic tympans. Span: 40′ x 33′. Rise: 5′. Thickness: 1½″. Lighting aisles hang from the dome edges. J. Gorbea and F. Candela, Architects.*

For comment on this discussion by members of the architectural and engineering professions, see VIEWS (*page 16*).

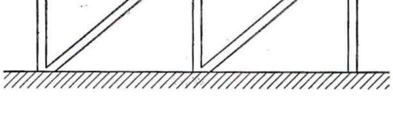


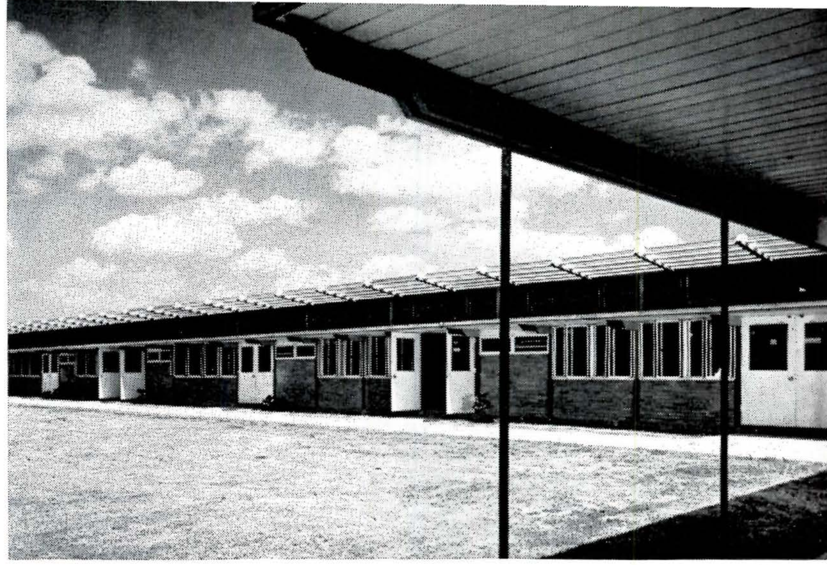
structural wood and steel

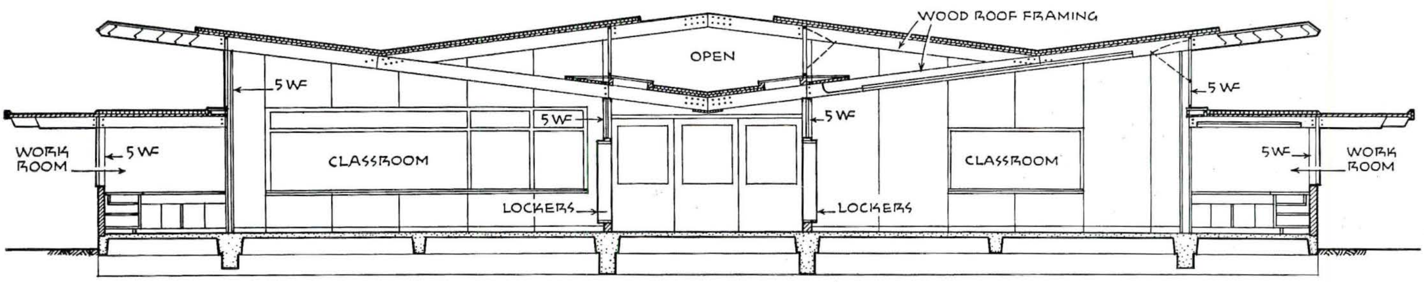
Elementary School Harlingen, Texas

David Crockett Elementary School of Harlingen, Texas, designed by Cocke, Bowman & York, and built by the Parker Construction Company, was completed in September, 1950, at a cost of $8.27 per sq ft. Rectangular in plan, this school consists of two rows of classrooms flanking a central corridor. However, the rectangular aspect is reduced greatly by the use of a truss-like ceiling and roof system which lights and ventilates the school in a most unusual way. In elevation (*above*) the building would seem to have a butterfly roof, when actually it has two butterfly roofs—one over each row of classrooms. Under certain load conditions the angular frames could work as trusses, but their primary function is to open the center of the building would seem to have a butter- the roof gutter light the corridor adequately in the daytime, and clerestory windows light and ventilate the classrooms. Notice how clerestory windows on both sides of the classrooms can be opened to release warm air at the ceiling height (*section acrosspage*). At the same time these windows are louvered to eliminate excessive direct sunlight.

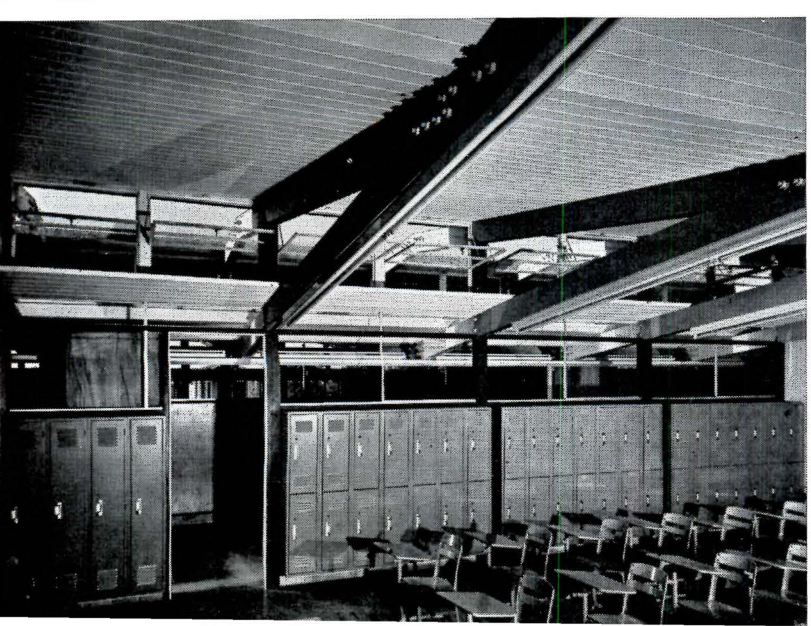
Occurring 7′ 5″ o.c., these quasi trusses are supported by 5″ WF steel columns at the corridor walls and at the clerestory windows. The columns at the clerestory windows also provide partial support for the low flat roof beneath the windows. Here, the built-up wood beams—similar in concept to the large butterfly beams—are met at the exterior walls also by 5″ WF steel columns. Between these exterior columns is a continuous line of casement windows over a brick curtain wall. The meeting of brick with steel is handled in a manner often admired in the work of Mies van der Rohe; i.e., the steel columns are left exposed, while the brick is used only as filler (*acrosspage top*).

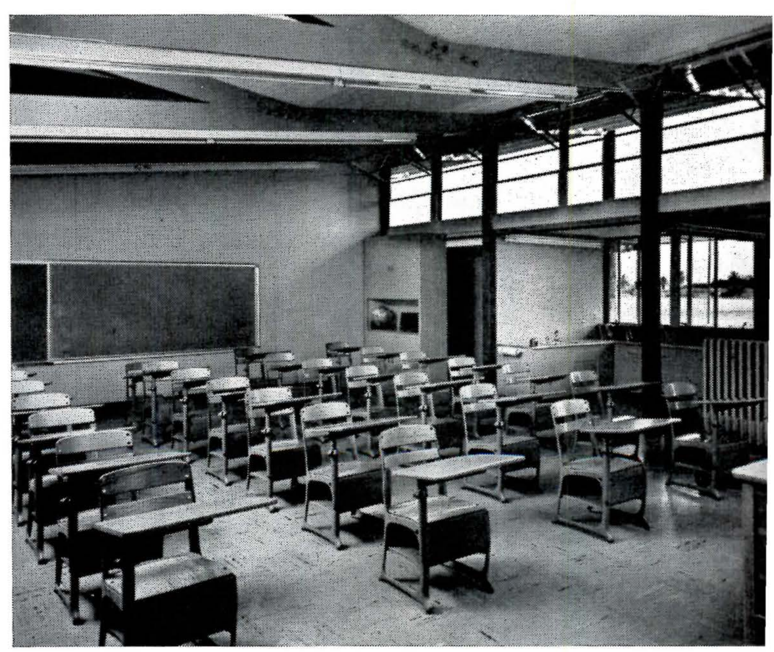






Tranverse Section

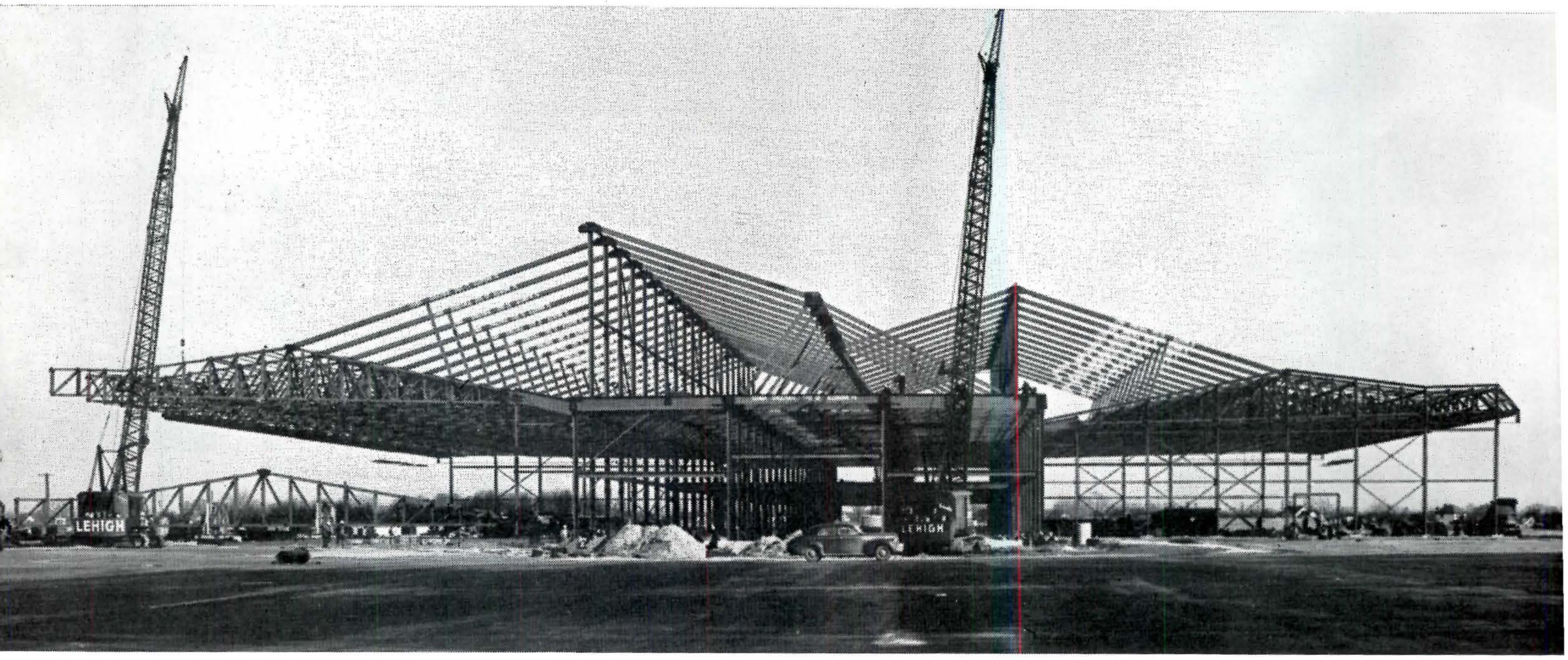




Thin fluorescent lights along bottom of trusses augment abundant daylight. Partitions between rooms are plywood over wood framing and are filled with glass insulation for sound.

Covered passageway (top) employs built-up beam which is different from other built-up beams only in size of members used.

Photos: Ulric Meisel



cantilevered-steel trusses

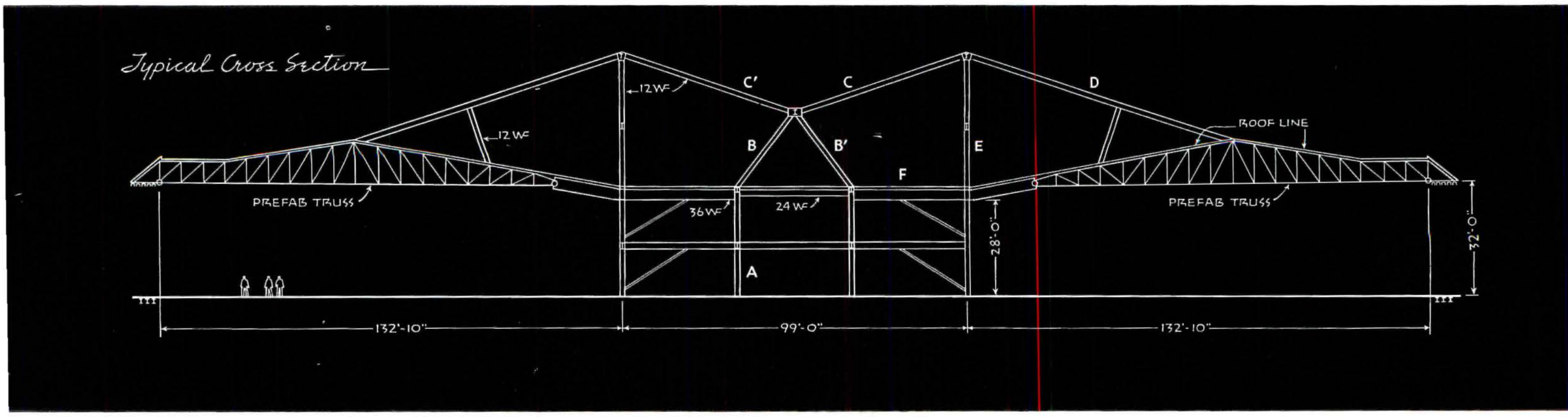
Hangar Idlewild Airport New York

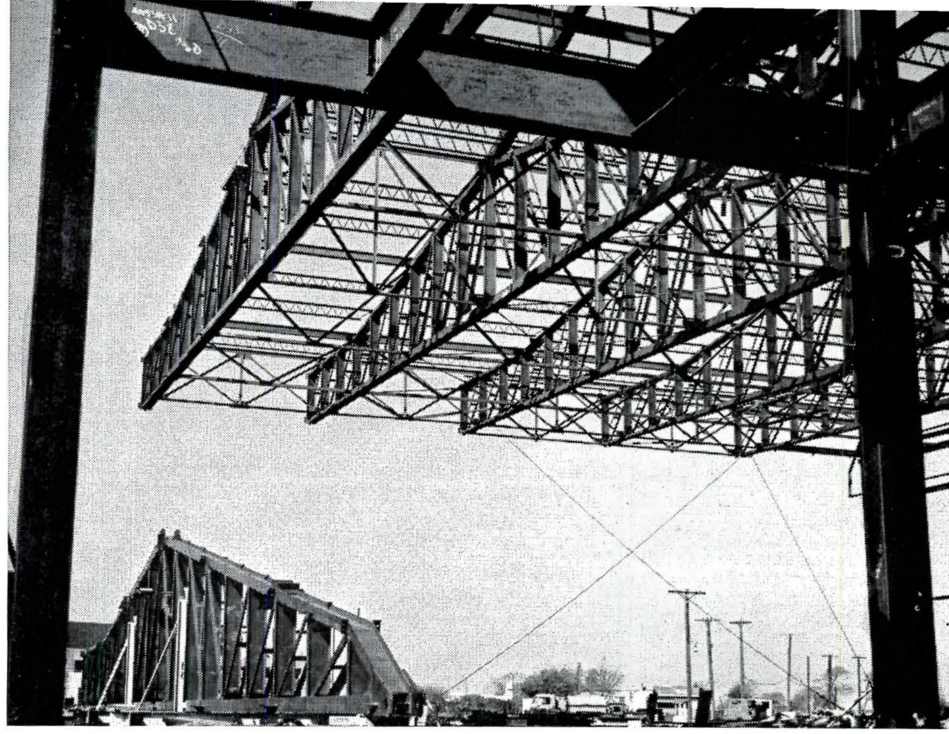
Architects and engineers are being pushed now, as never before, to come up with new and imaginative concepts of structure and design, in order to keep pace with the demands of contemporary life. To meet the challenge of housing eight of Lockheed Aircraft Corporation's giant Constellations, The Port of New York Authority's Department of Engineering designed this cantilevered-steel-truss hangar (*above*), built at Idlewild International Airport by the Lasker-Goldman Company and the Lehigh Structural Steel Company.

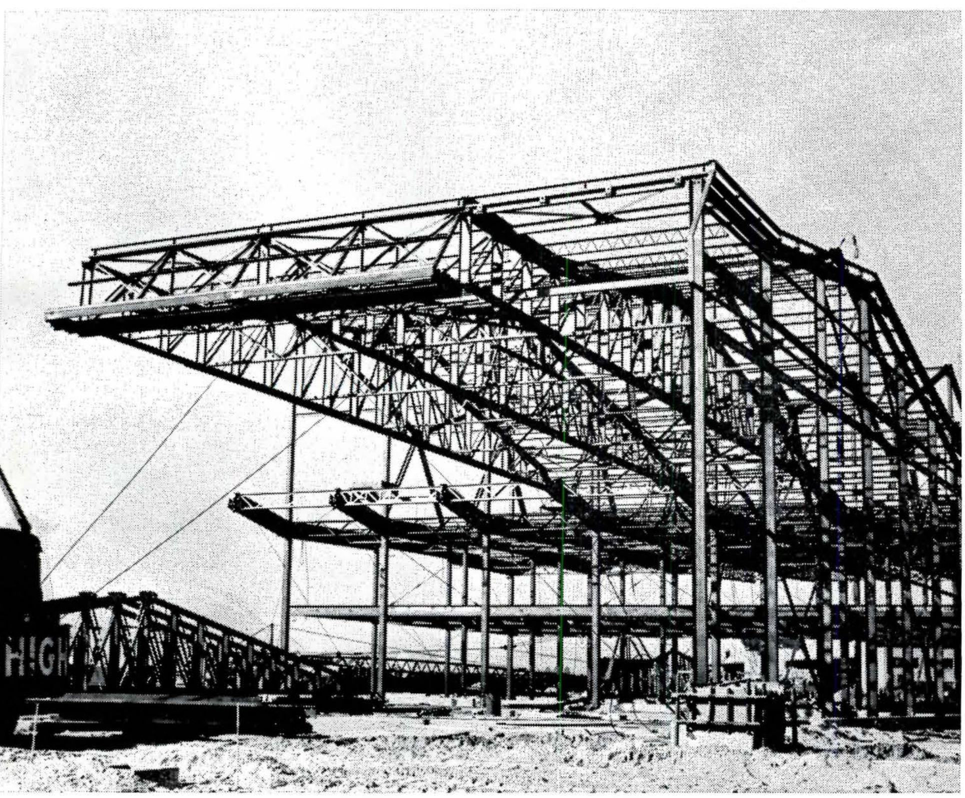
Designed to provide two enormous covered areas—133′ x 400′ each—for airplane maintenance, all but 120 ft of one side of the hangar was built under the initial contract; thus, the hangar now accommodates seven Constellations at one time. When space is needed, Lockheed not only can complete this side but also can continue both sides for another 100 yds.

Several aspects of this structure are markedly outstanding. First, it required only $11.89 and 15 lb of steel per usable sq ft of floor space to build, which is alone enough to set it apart from most similar building types today. In addition, each side of the symmetrical structure acts independently of the other (*section below*) in an ingenious system of cantilevering and suspension. Members A, B, C, and D are in tension, while members E and F are in compression. (Compression component in B, as a result of tension in B′ and C′ is not as great as its tension component resulting from tension in A and C.) Notice how trusses in foreground (*above*) are not balanced by any opposing trusses.

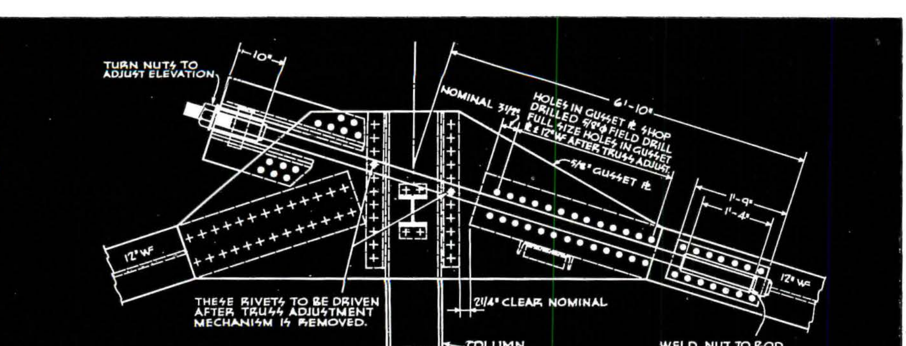
The core of the structure will be used by Lockheed for shops and offices.



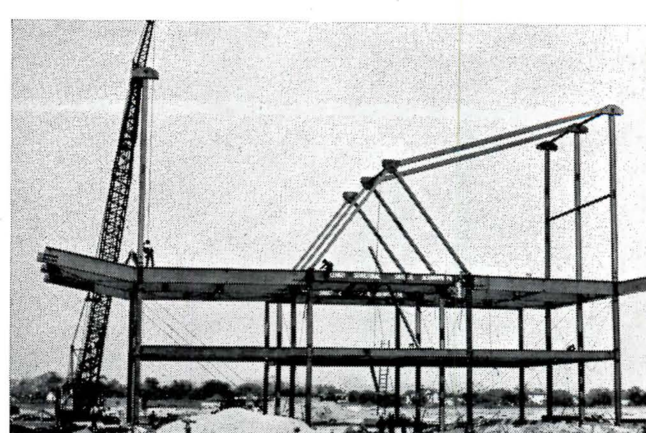


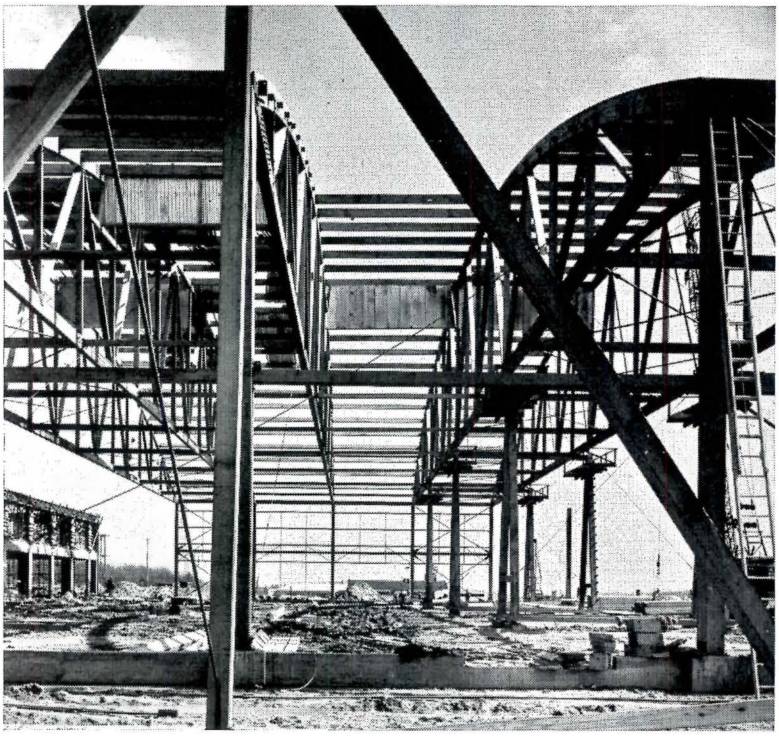


Smaller trusses, under roof line, were prefabricated at the shop and brought to the site in two parts. There the parts were joined, lifted into place, and pinned (above). Jacks at the bases of tall columns were used to align outside ends of small trusses, but, not entirely pleased with this, the Port Authority Engineers have designed another jack (below left) which will be used at the tops of the same columns in the construction of a similar hangar.



Typical Truss Jacking Detail





Construction stages: *Truss sections positioned on site and assembled for lifting. Columns raised and bolted to anchorages. Rear-end wall assembled and raised into position. Two rear trusses of each bay assembled in four sections on ground with rod bracing and purlins installed. Intermediate truss sections assembled on ground, joined into half trusses, and lifted. Next, two trusses assembled in four bridge sections. Front truss completely assembled; erected as one unit. Bridge sections lifted; joined with splice plates.*

Photos: Gottscho-Schleisner

bowstring wood trusses

Hangar Westchester County Airport New York

The largest timber trusses on record span the 250-ft width of each of the three, 150-ft-deep bays of the new hangar for New York's Westchester County Airport. Both top and bottom chords are of glued, laminated timber, the top chord, in section, being 9″ x 19½″; the bottom chord, 9″ x 17⅞″. Web members are structural-grade, sawn fir. The trusses were fabricated in four sections at the site from members precut in the shop and joined in assembly with steel splice plates.

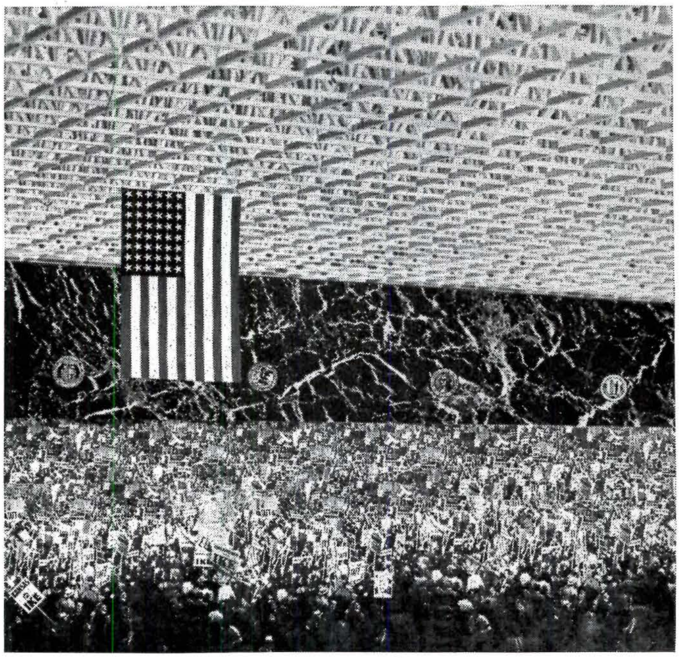
Timber purlins, 6″ x 14″ in section, were bolted to purlin hangers attached to top truss chords with bolts and shear plates. Purlins are spaced 5′ 8½″ o.c. Roof sheathing is 2″ T & G white pine installed over the purlins. The trusses rest on glued, laminated columns, 11″ x 17⅞″ 30′ tall, with timber knee bracing. Inclusion of a deluge sprinkler system, plus the fact that timber members below bottom truss chord line were pressure-treated with fire retardant, result in a structure with insurance rating equal to that of exposed steel framing.

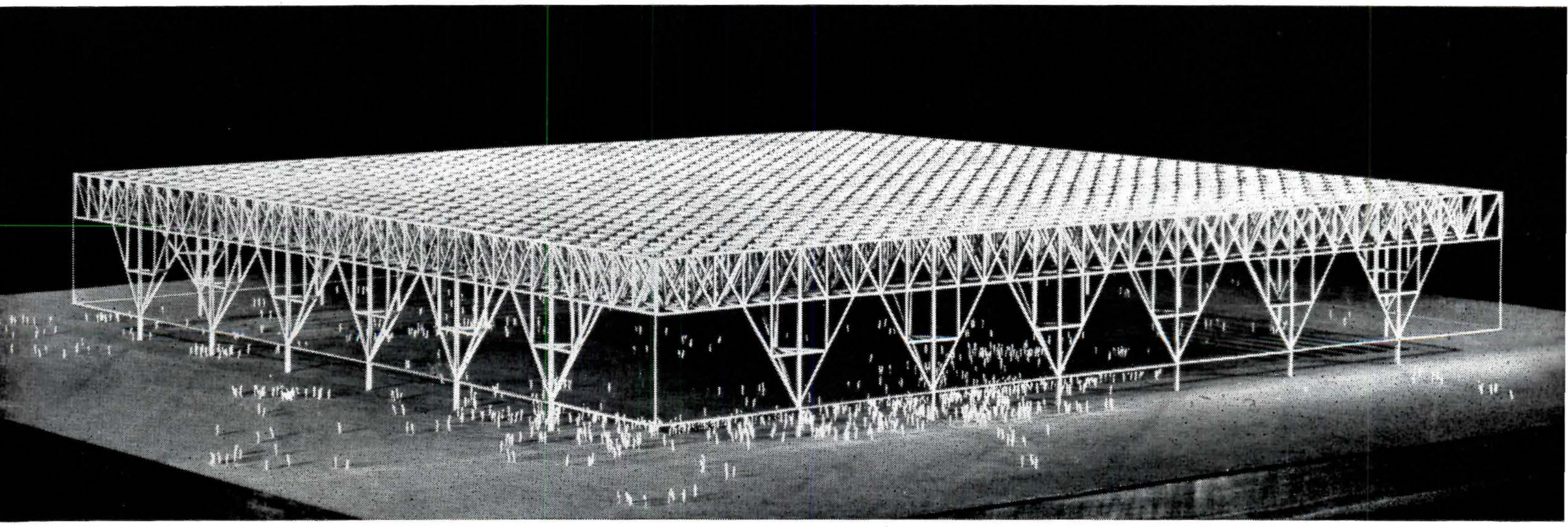
Julian K. Jastremsky was the architect; Hall & Paufve, consulting architects; Tuck & Eipel, consulting engineers; Thompson-Starrett Company, Inc., general contractors. Fabrication and erection of the clear-span trusses were handled by Timber Structures, Inc., with Larry Winkleman erection superintendent.

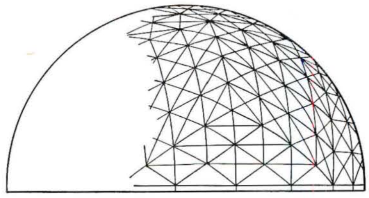
intersecting-steel trusses

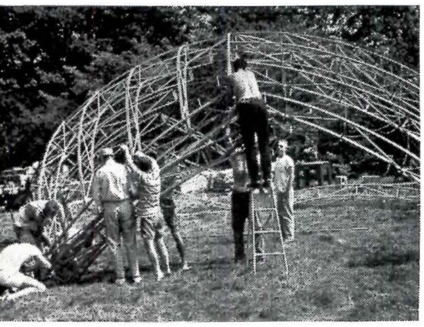
Convention Hall Chicago, Illinois

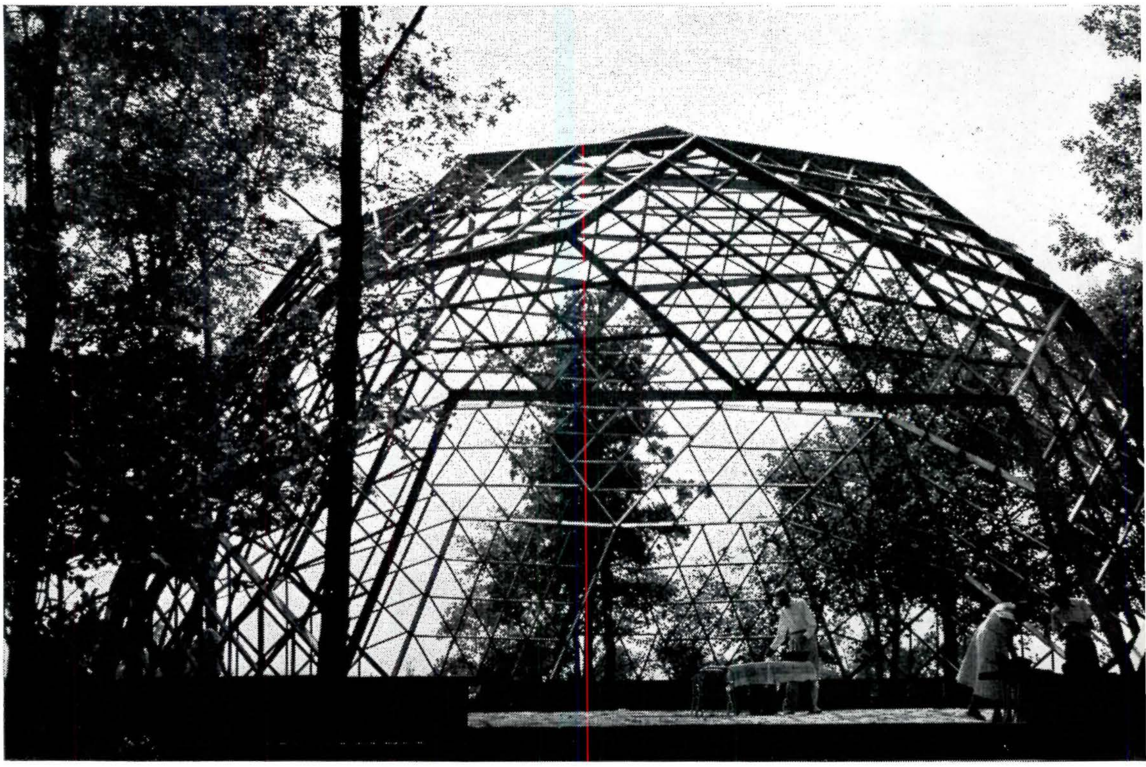
Mies van der Rohe's design for Chicago's proposed Convention Hall would provide 500,000 sq ft of exhibition and assembly area without a single interior column! Square in plan (700′ x 700′), the hall would seat 50,000 persons. Roofing such an immense, unobstructed area is considered feasible by means of a space frame composed of all-welded, intersecting-steel trusses 30 ft deep and spaced 20 ft on centers. Exterior columns are spaced 100 ft apart. Where trusses intersect, vertical members are common to each truss. The entire network would be made up of 14 in. wide flange sections and the total weight of the steel has been estimated to be approximately 30 lb per sq ft. Trusses would be properly cambered during fabrication. Construction plans propose the use of only two temporary erection columns, for each erection crew, to be removed and reused as the structure progresses. Frank J. Kornacker was the structural engineer.

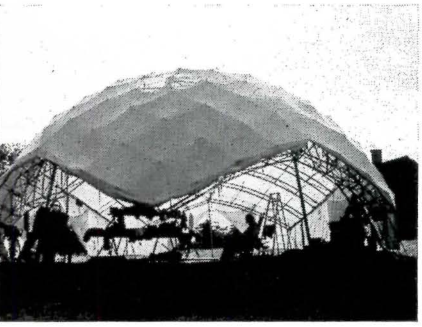










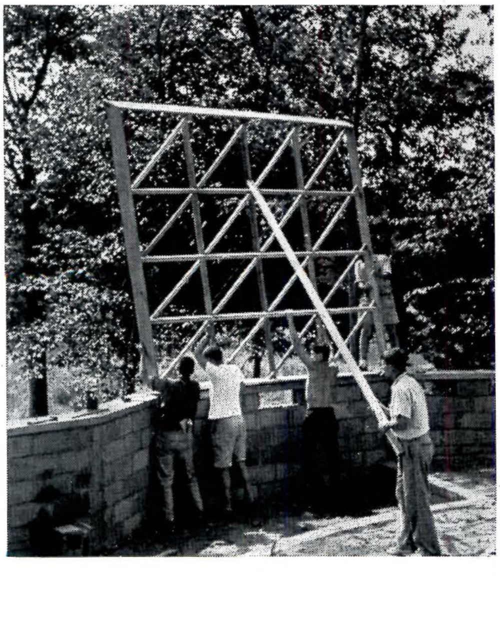


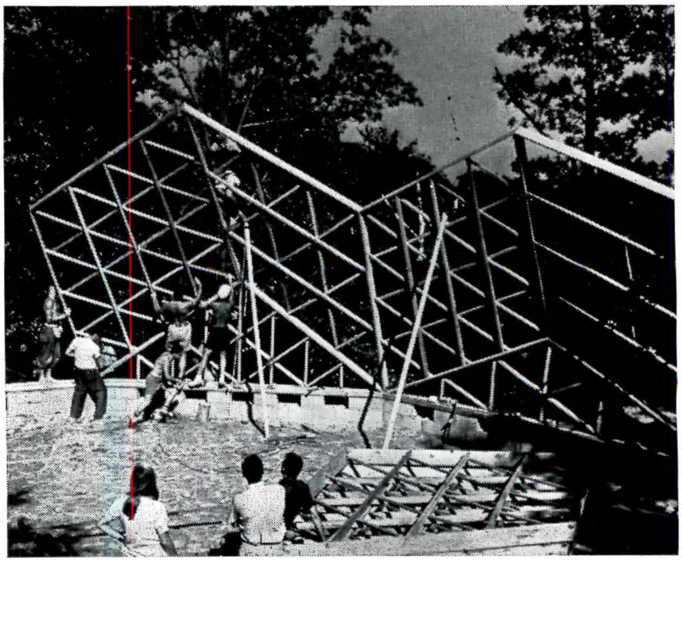
During construction, the student-builders camped in the shelter of a portable dome (top) *erected on the motel site. Man reading a good book in his rocking chair* (above) *is R. Buckminster Fuller, himself.*

On the concrete-block foundation wall, a subassembled hyperbolic diamond frame is put in place (below left). *Note the splayed shape of the 1" x 8" perimeter of the frame. Further assembly* (below right) *begins to define the dome form.*

Photos: Sam Rosenberg

geodesic wood dome *Restaurant Woods Hole, Massachusetts*





E. Gunnar Peterson of Falmouth, Massachusetts, is an extraordinary architect. Not the least of his distinctions is that for 20 years he has conducted a progressive architectural practice almost exclusively on Cape Cod and the neighboring island of Martha's Vineyard, one of the most tradition-minded areas of the country. Since many of his commissions are for sites near the ocean, his trips from job to job are frequently made by boat. He calls himself "the eel-grass architect."

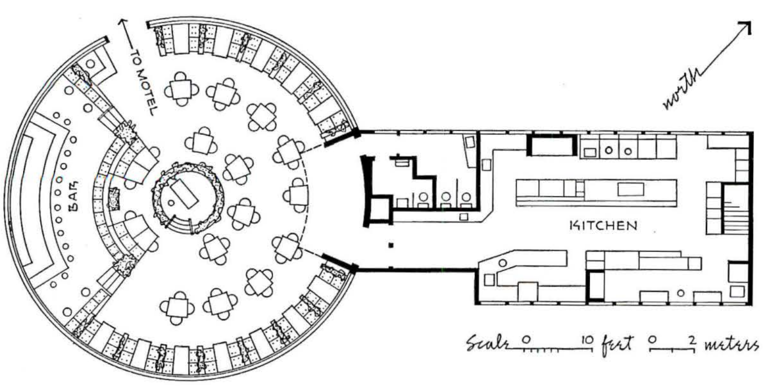
Last year, as a personal enterprise, he decided to build a modern motel in nearby Woods Hole, where steamers leave for the Vineyard and Nantucket Island. He acquired a lofty site adjacent to the village, with eye-filling seascapes seen through the trees in many directions. The motel, now open for operation, he designed himself. For the dining room, however, where he wished to span a large area economically, he tells us that "it suddenly occurred to me that a 'Bucky' Fuller dome would be the solution. It was my desire that this whole composition should be noteworthy and significant."

So, R. Buckminster Fuller engineered the dome shown here, and it was built by a group of students garnered from architectural schools in the U.S., Canada, Australia, and New Zealand.

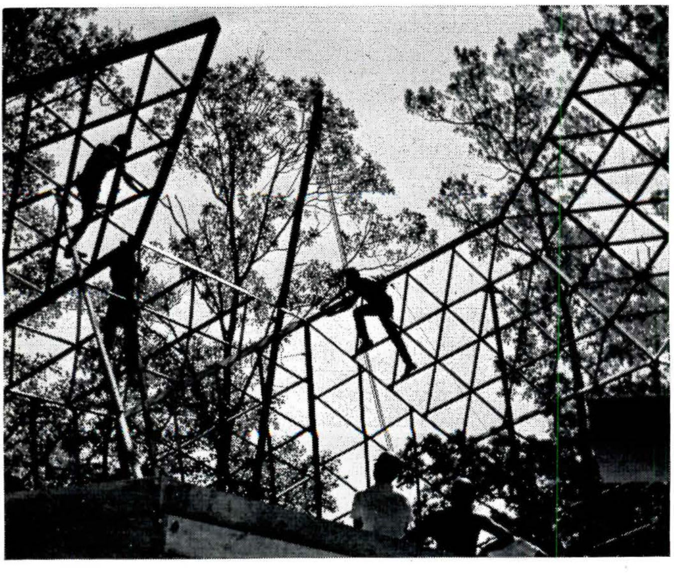
"I consider 'Bucky's' research of historical importance," Peterson remarks, "and, as I have told him many times, I think he is developing in his dome structures and what-have-you, highly useful tools for the profession at large. To my knowledge, no one has as yet performed the feat of enclosing large areas as lightly, as economically, and as beautifully as he has succeeded in doing."

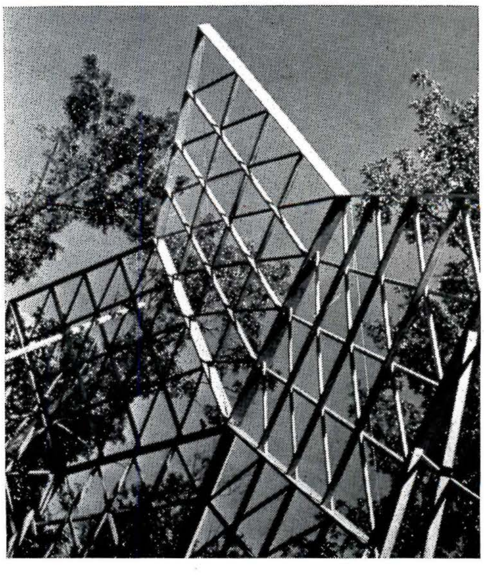
Fuller describes the Woods Hole dome as follows: "It is 54 ft in diameter and comprised of 1″ x 3″ and 1″ x 8″ Douglas fir struts subassembled into 90 hyperbolic diamonds. . . . The students processed the engineering prefabrication of parts during July and moved to the site August 1, living in a small portable dome (*small photos acrosspage*). The parts were subassembled in jigs in two weeks and finally assembled as a dome in one week. Components of the dome weigh 3½ tons and were moved to the site in one 3-ton truck. The principles of its structuring were evolved for later fabrication of corrugated stainless-steel diamonds, as an atom-bomb shock-wave-proof enclosure. . . . Peter Floyd and William Wainwright, M.I.T. graduates who acted as leaders of the student group, have contracted with Mr. Peterson to enclose the structure with . . . a new polyester-plastic clear film."

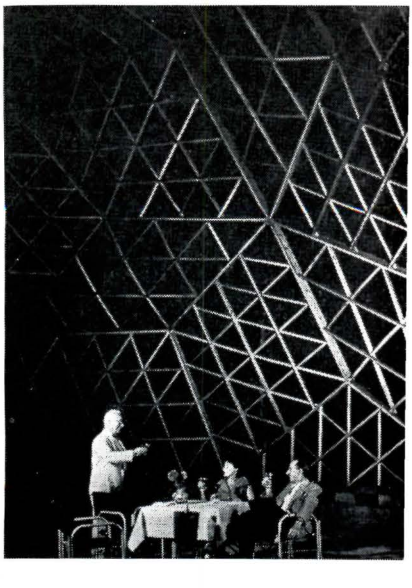
When assembled, the diamond-shape frames of the dome structure form a series of 5-pointed stars. Obviously the members will remain visible after the transparent-plastic surface is applied. "I propose to paint the structure in bone white and gold," Peterson reports, "in such a manner as to bring out the star forms."



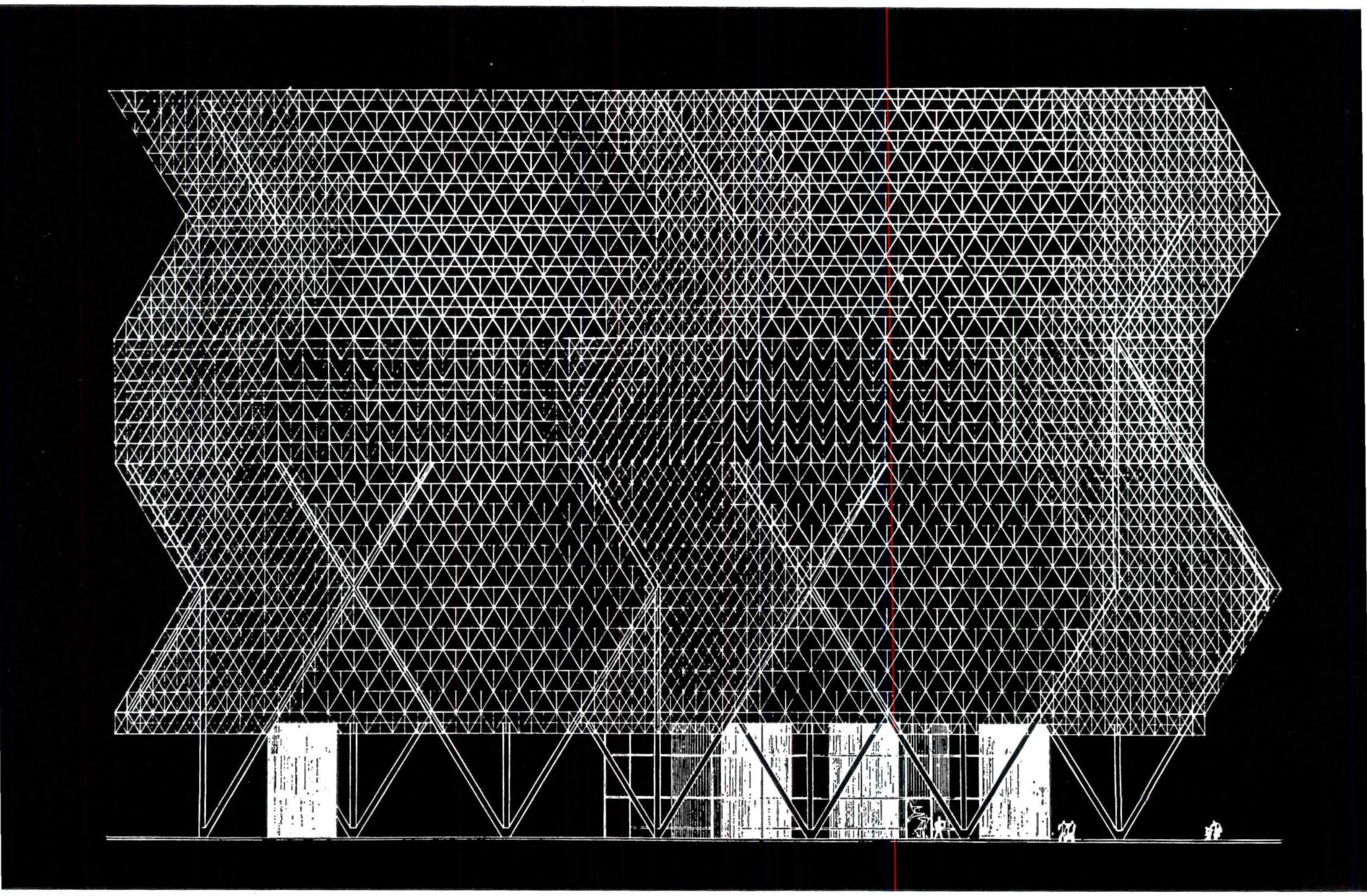
As the frames go together, they tilt ever more inward (below left).
Five frames create a giant star shape (center) *which will be painted gold.*
"Bucky" Fuller and the E. Gunnar Petersons (he is the architect who commissioned the dome for the motel he designed for himself) anticipate the opening of the restaurant and bar (right). *The exterior surfacing will be a transparent plastic film.*

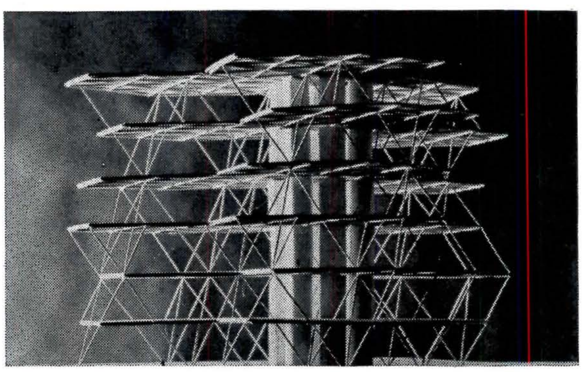






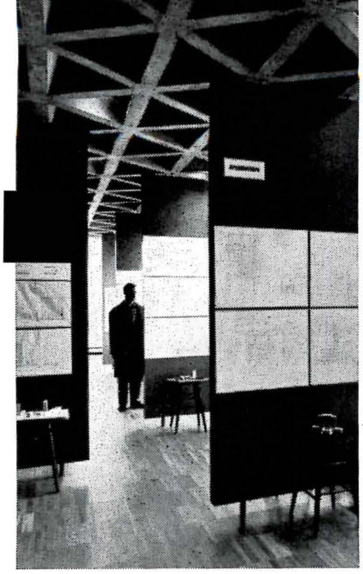
spatial triangulation *City Hall Philadelphia, Pennsylvania*



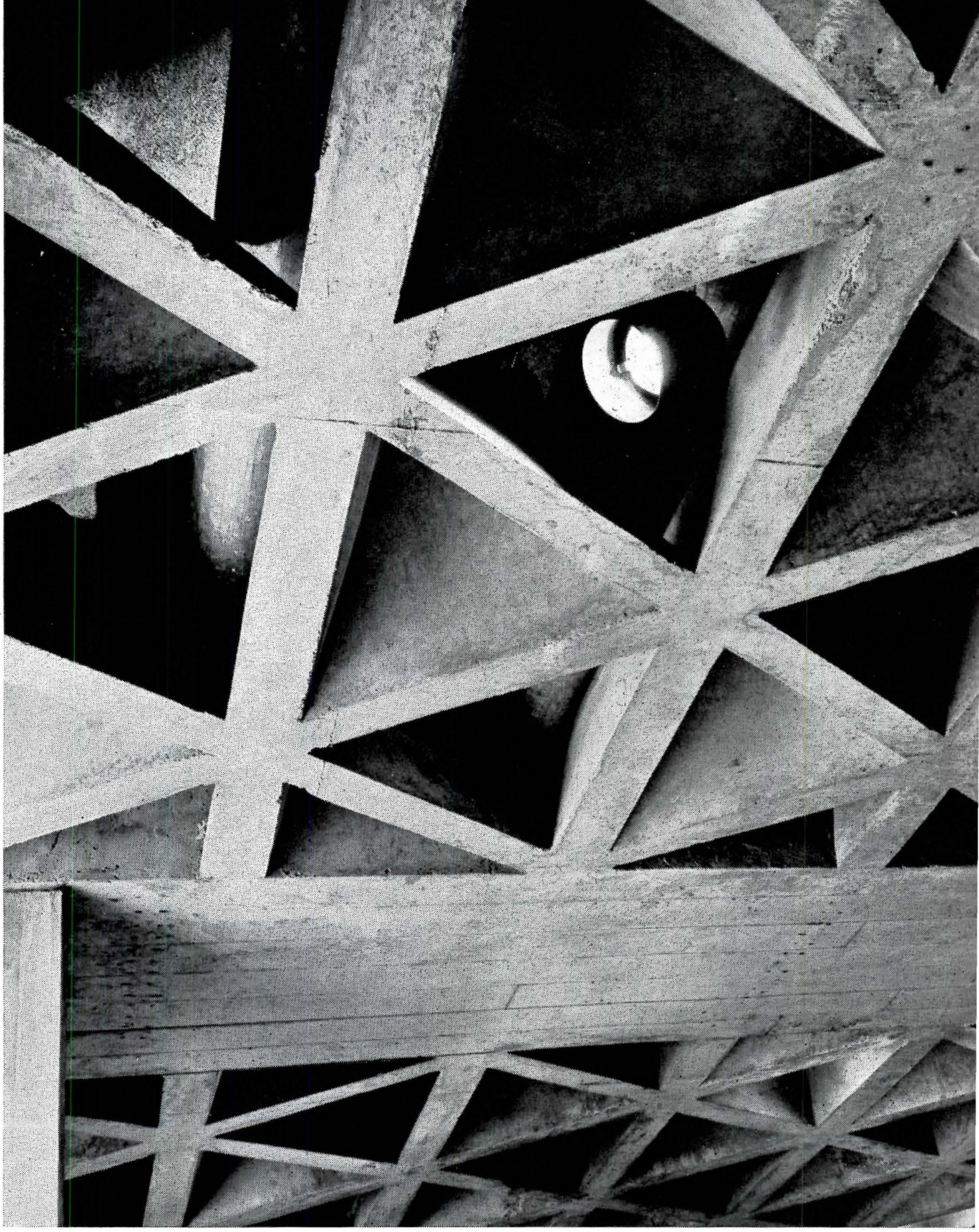


"The spaces defined by the members of a structure are as important as the members," says Louis I. Kahn. Carrying this principle into design, Kahn, with Anne G. Tyng as Associated Architect, developed the proposed City Hall for Philadelphia (*above*) and, associated with Douglas Orr, designed the new Yale Art Gallery and Design Center (*May 1954 P/A* and *acrosspage*).

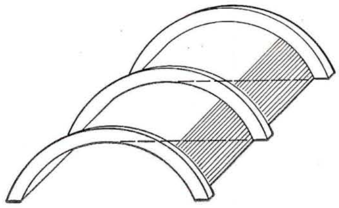
The City Hall's space-frame tower exploits structural potentials of reticulated triangulation. Triangulated frame: precast, prestressed concrete struts coming to a point every 36 ft. Floor construction: 3-ft deep, composed of precast, lightweight concrete tetrahedrons, within the voids of which are run air-conditioning ducts and wiring conduits. The three-dimensional exterior network: light tubular frames for glass-panel enclosures.

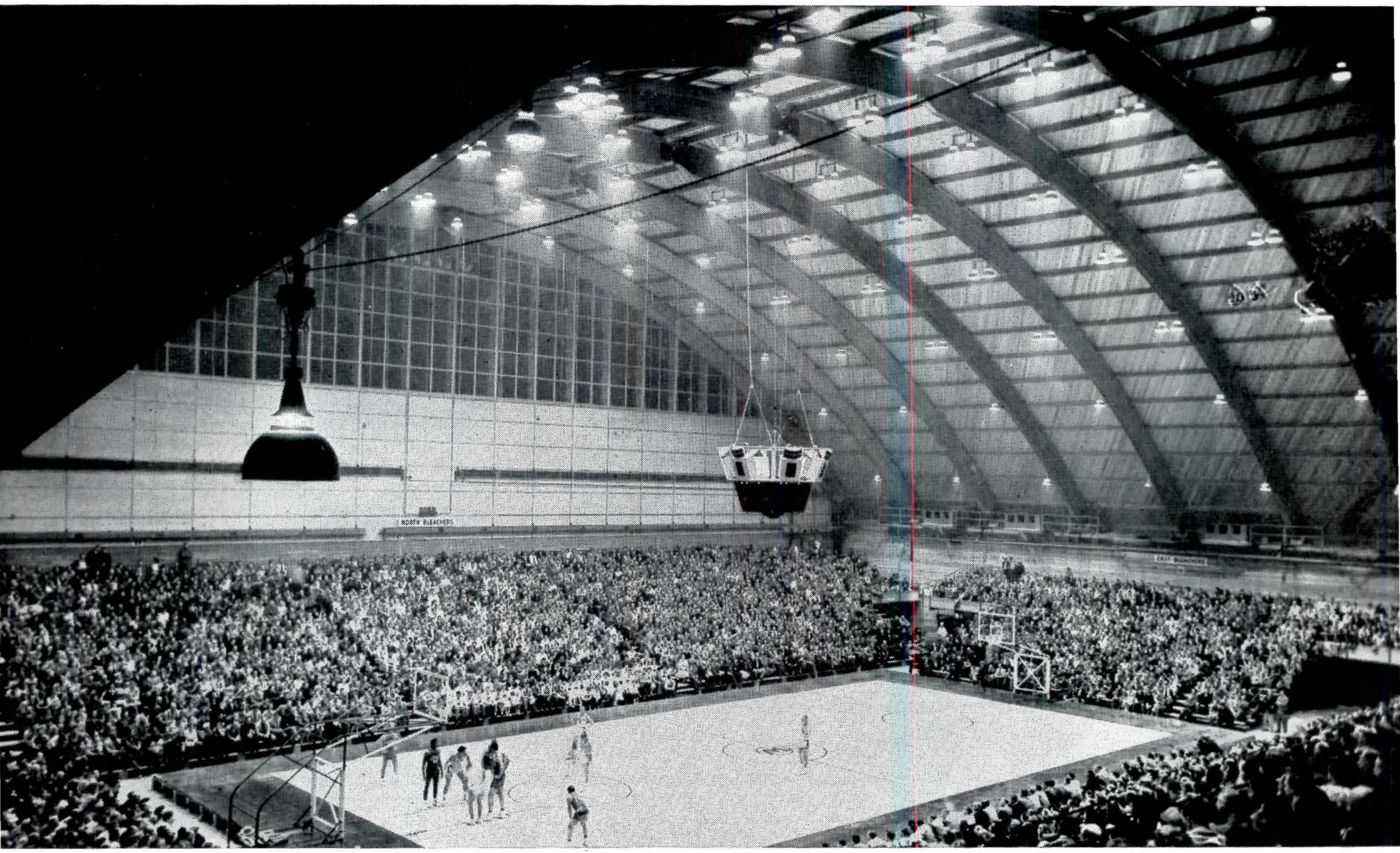


Though building codes did not allow a true space frame in the Yale Art Gallery and Design Center, some of the principles of triangulation maintain, and the "building with hollow stones" theory is employed. Within the hollows of the tetrahedral ceiling construction are harbored round, air-distribution ducts and trolley duct for attachment of lighting fixtures. With these out of the way, the floors can be subdivided at will by means of portable partitioning. Some refer to such three-dimensional structures as "aedicular." Yale Photos: Lionel Freedman
City Hall model Photo: Edward Gallob



three-dimensional concrete floor system *University Art Gallery and Design Center New Haven, Connecticut*





laminated-wood arches *Field House Montana State University Missoula, Montana*

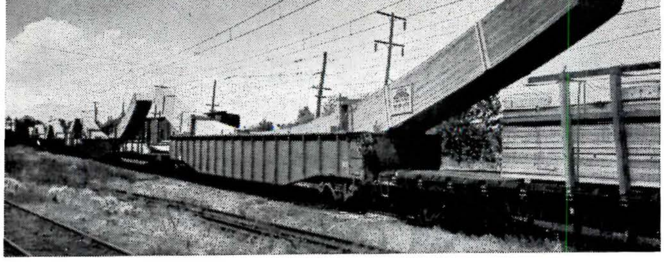
The Montana State University Field House, at Missoula, boasts the largest three-hinged laminated-wood arches in the world. Designed by Architects Brinkman & Lenon, with Structural Consultant Charles E. Kitchin, it was built by Hightower & Lubrecht, General Contractor, and was dedicated December 18, 1953.

The university needed an enclosed arena that would serve a multitude of activities—meetings, concerts, plays, athletic events, military drill, an occasional circus, rodeos, farm and livestock shows, and ice and water shows. Because of these varied functions, it was necessary to use a structural system that would eliminate interior columns. The architects made studies of many such systems, including some in which the roof was to be suspended from masts, but this three-hinged-arch scheme proved the most economical, structurally feasible, and handsome.

With a clear span of 201′ 6″, and a cross section of 3.46 sq ft (11″ x 45″), these laminated-fir arches are supported at each end by reinforced-concrete A-frames (*bottom, acrosspage*) which carry the weight and thrust of the arches to the ground.

Since these arches are unusually large, purlin and decking sizes are comparably oversized. The purlins measure 4″ x 12″ and are spaced 6′ 7″ o.c.; they are braced by 2″ T&G decking, over which asphalt roofing has been rolled. With a square footage of 49,480 and a cubic footage of 2,895,500 the cost per cubic ft was the low figure of 25.1¢.

To handle lighting for all of the various functions of the field house, a 1000 amp bus duct was installed around the entire perimeter. This is in addition to the fixed lighting system, which will cast 70 footcandles on the arena floor, for television.

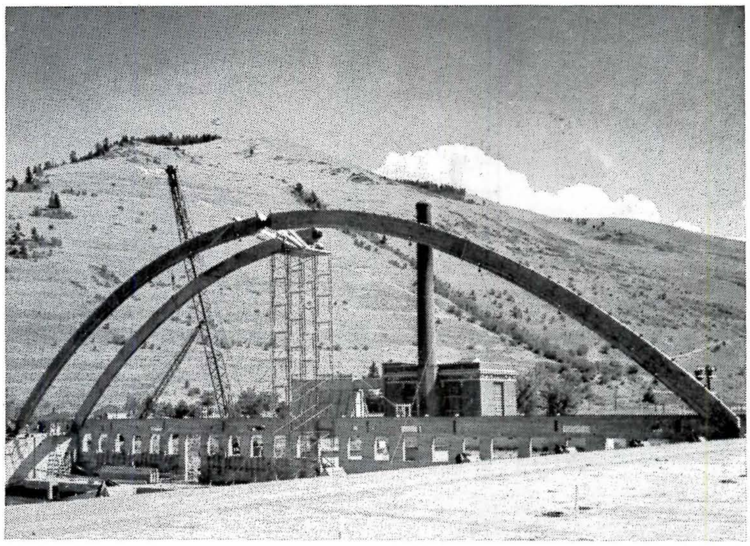


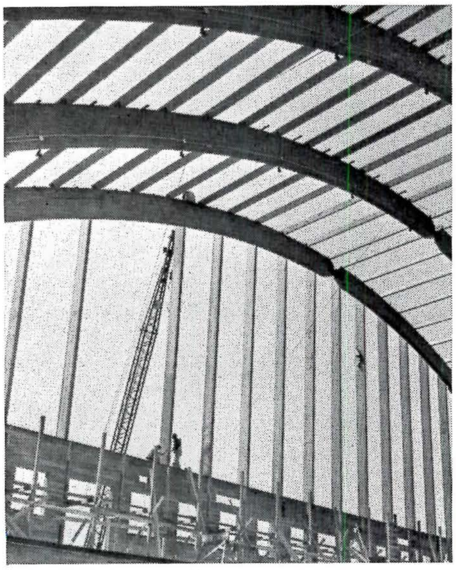
After the first arch was pinned in place, subsequent arches were tied in by the purlins (below).

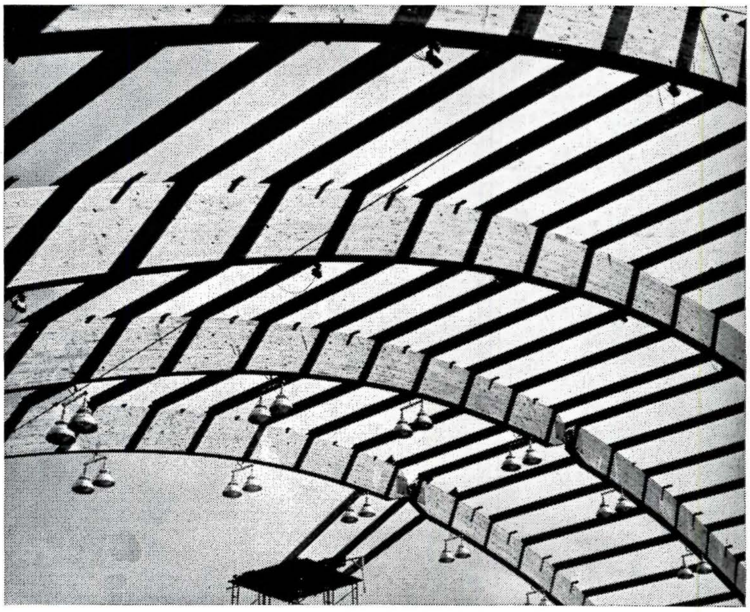
Size of arch segments against size of rail car dramatizes the scale (left); *best indication of scale is seen at footing detail* (left, bottom).

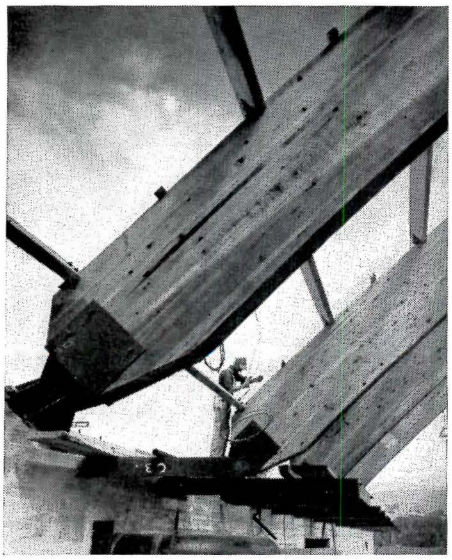
All concrete work was left unfinished.

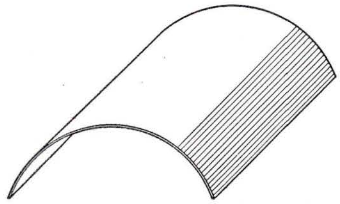
Photos: Ingvard Eide

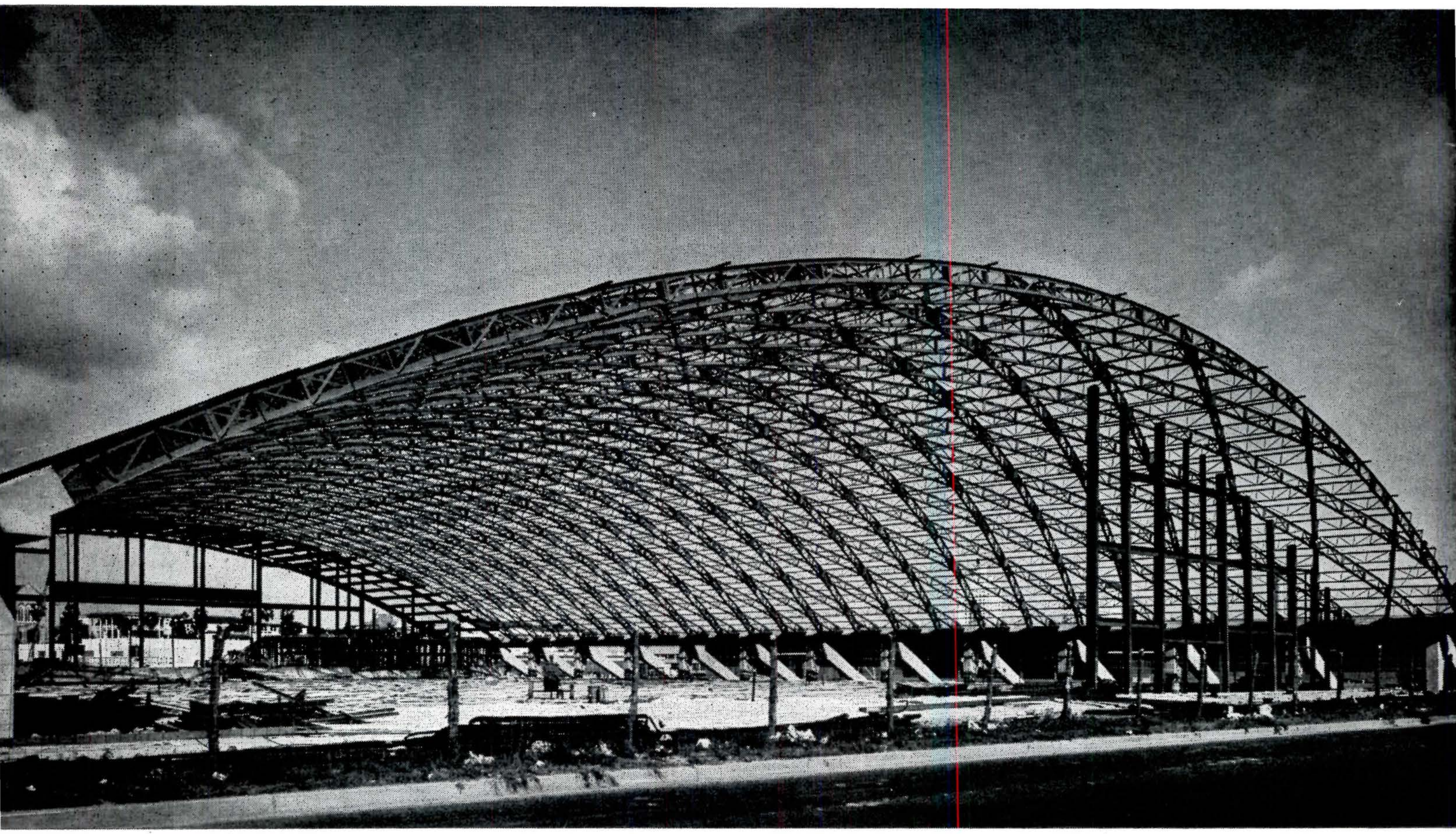










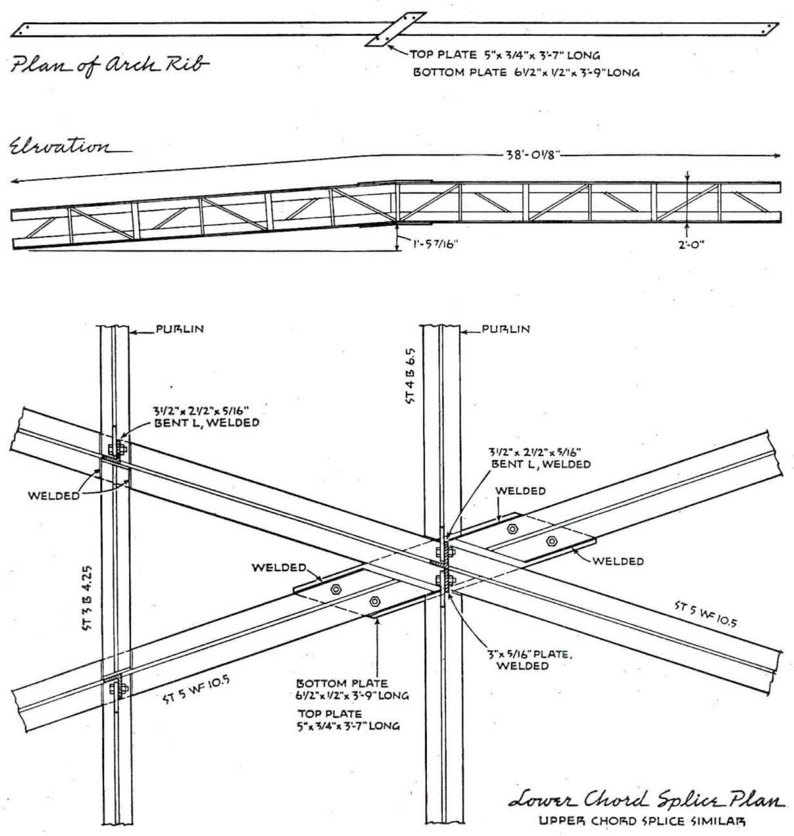


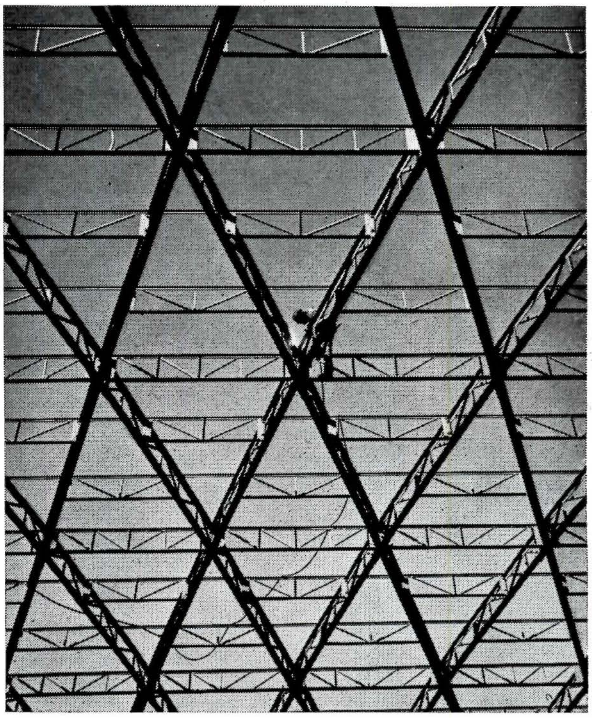
lamella steel arches *Convention and Exhibition Hall Corpus Christi, Texas*

Spanning the 224-ft width of the convention-exhibition hall for Corpus Christi is an arched steel-lamella roof. Both the purlins and the circular steel arches that span on a skew between the sill beams are 24-in.-deep, open-web members, the skewed-arch arrangement forming a bold structural pattern of diamond shapes. Except for the first few members, the arches were erected without scaffolding, cantilevering until joined; high-tensile bolts were used in erecting the arches; all other joints are welded.

The continuous, reinforced-concrete spring-line beams, supported on reinforced-concrete buttresses, occur 13 ft above floor level. The arched roof, laid out on a 224-ft radius, soars to a 42-ft clear height at the midpoint.

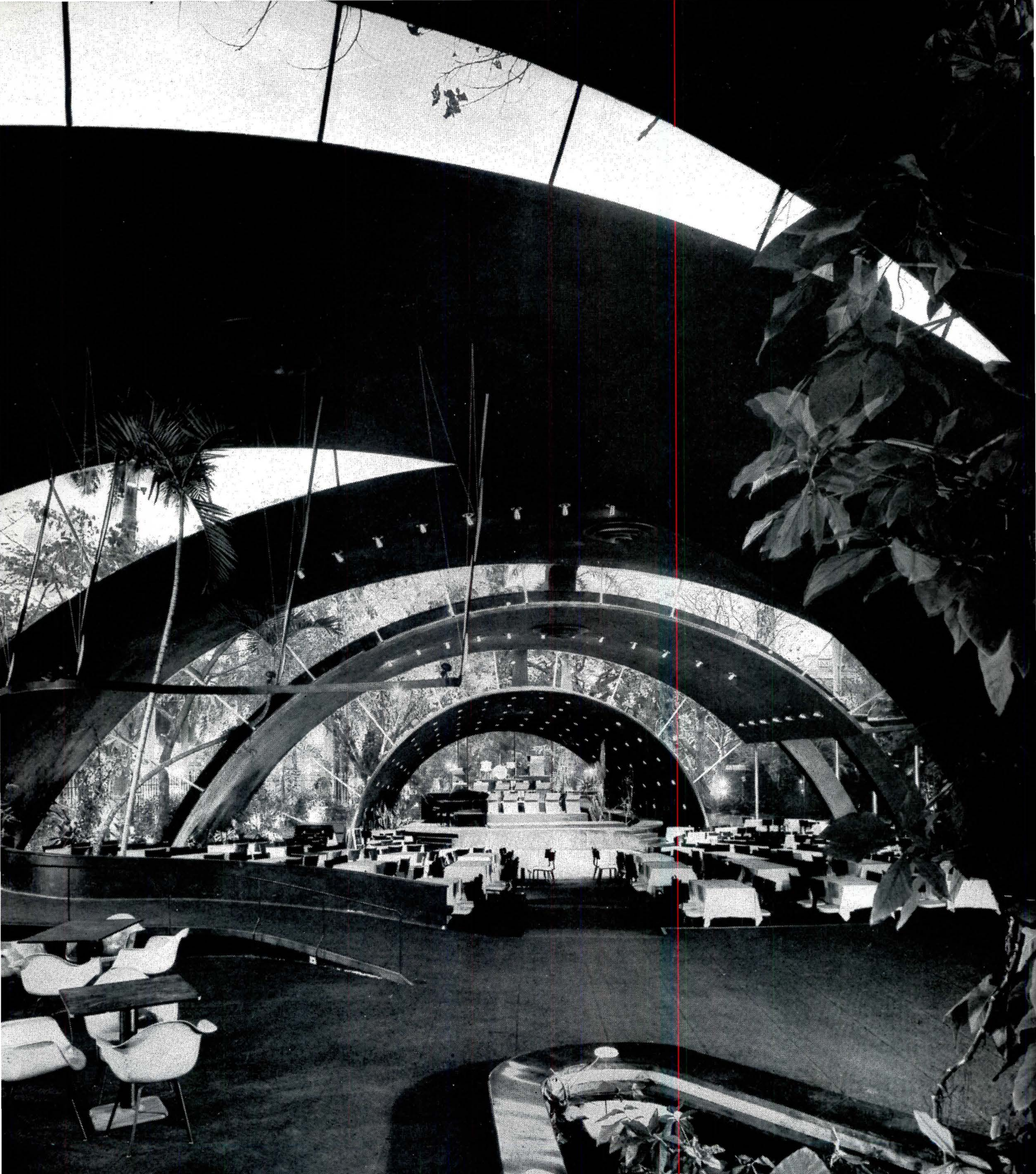
In commenting on the selection of this system for the huge building, Richard S. Colley, the architect, states: "The most logical solution for this large free space was the barrel shape. This building lies just back of the sea wall, which is merely another horizontal line just below the horizon. . . . There are no large buildings in the immediate area. . . . A box-like, conventional-type building would look like hell here. The barrel shape offers the most contrast with the ground. The least expensive framing for this sort of span is some type of space frame."





The continuous roof that covers a 65,000-sq-ft area contains 260 tons of steel and was erected in but 25 working days. Engineering for the lamella roof was worked out by G. R. Kiewitt, Chief Engineer of Roof Structures, Inc., and Hale & Harvie, Consulting Engineers; concrete and foundation work was engineered by Blucher & Naismith.

Photos: Sammy Gold

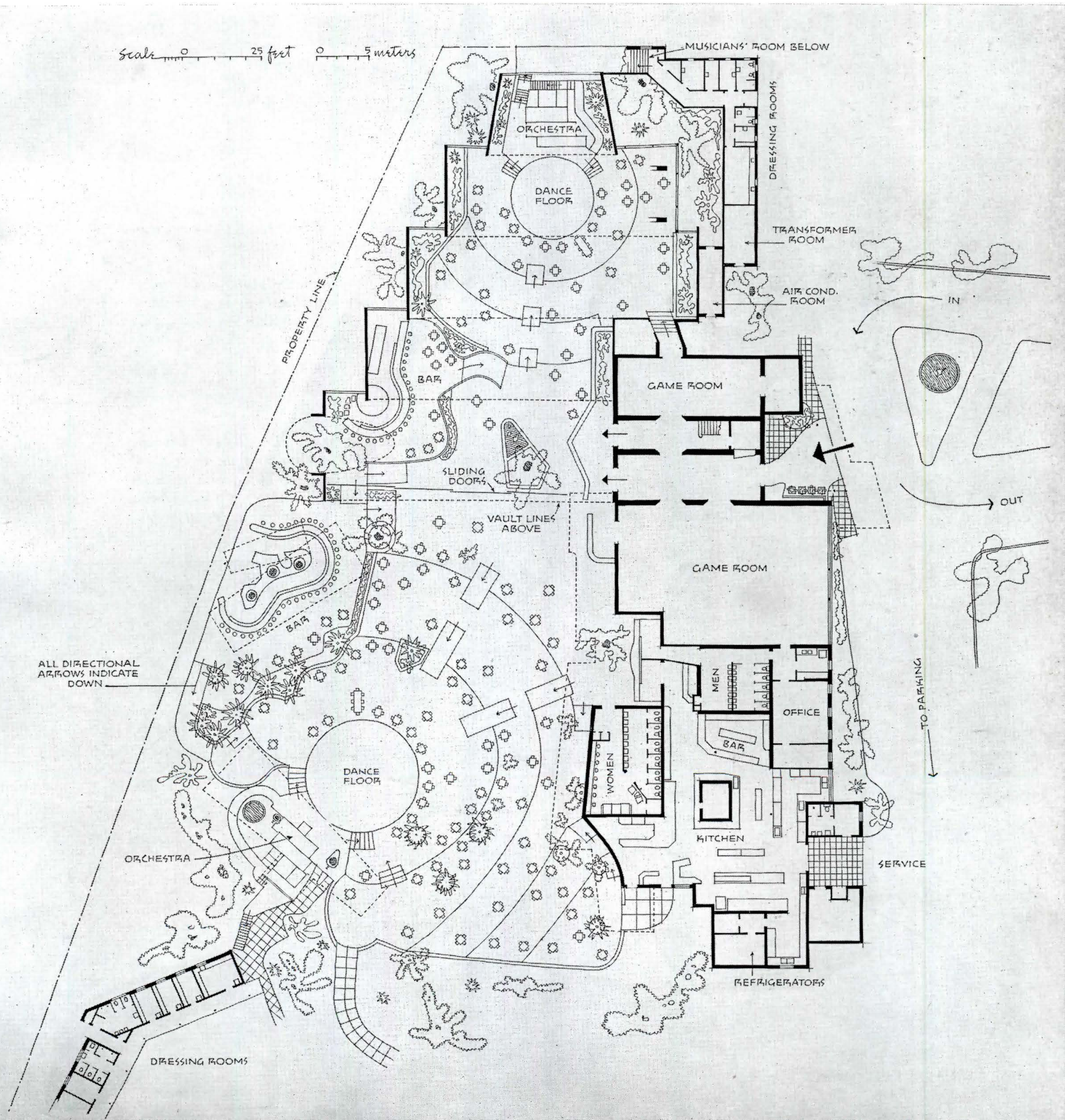


thin-shell concrete vaults *Night Club*
Havana, Cuba

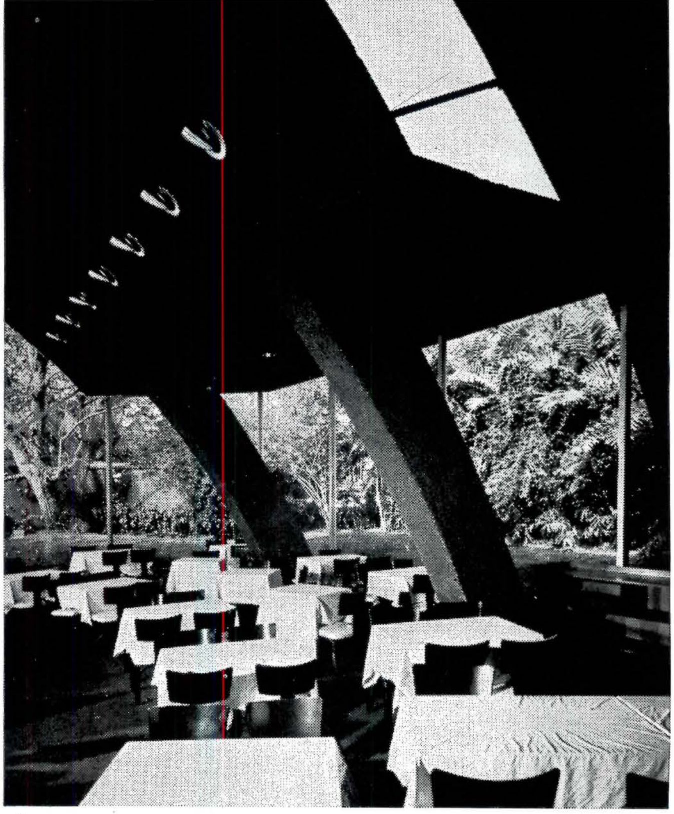
A more glamorous night club than "Tropicana" could hardly be imagined. Located on a beautiful, parklike site with magnificent trees and planting, it is partly outdoors and partly in. But so subtly and imaginatively was the air-conditioned, indoor portion contrived by the architect, Max Borges, Jr., that an almost magical illusion is created of still being in the open.

Secret of the illusory quality of the enclosed portion is use of five, thin-shell concrete vaults, for which Max Borges, Sr., also an architect, designed the reinforcement. These great arches, ranging in span from 40 to 90 ft, are placed eccentrically with respect to each other—what the architect terms "the principal artifice of the entire design"—and they decrease in height (from 33 ft to 16 ft) as they step back to the orchestra stage. Openings between the staggered vaults are glazed with clear glass, and the entire front of the tallest vault is also of glass, with sliding doors across the base. Hence, as one dances around the room, there are endless and unexpected shifts in the views of outdoors, the trees, foliage, and activities outdoors.

The vaults are only 2¾ in. thick. For inside finish, an acoustical plaster was applied, thrown through a steel screen and perforated with a spiked pallet "to produce a cool, velvety look and obtain maximum acoustical properties." Local tile is the exterior surfacing.



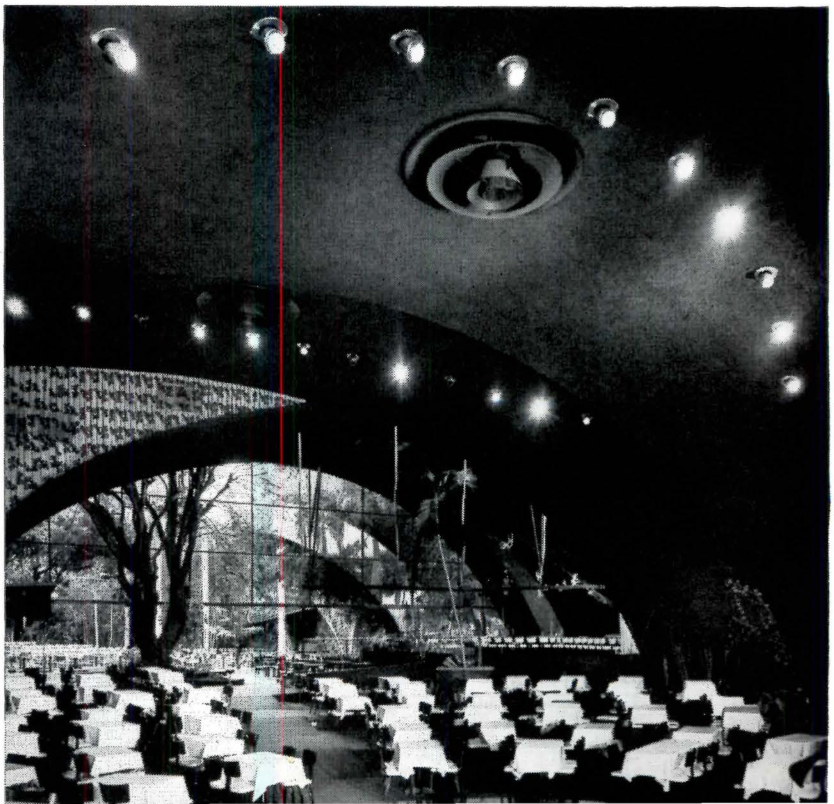
night club, Havana, Cuba



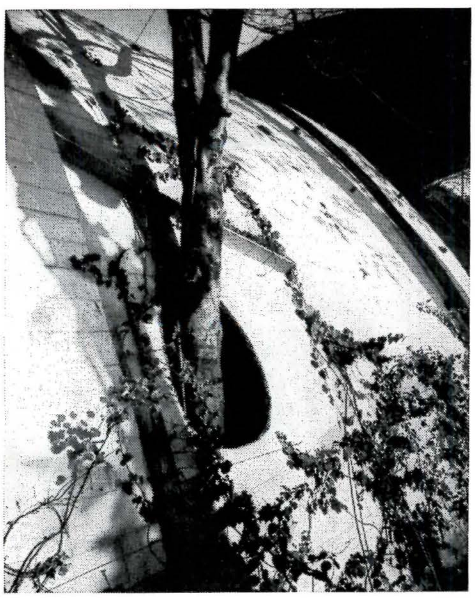
One side of the vault nearest the orchestra shell stops short of the ground and is supported on concrete ribs; walls of glass at this point reveal particularly lush planting.

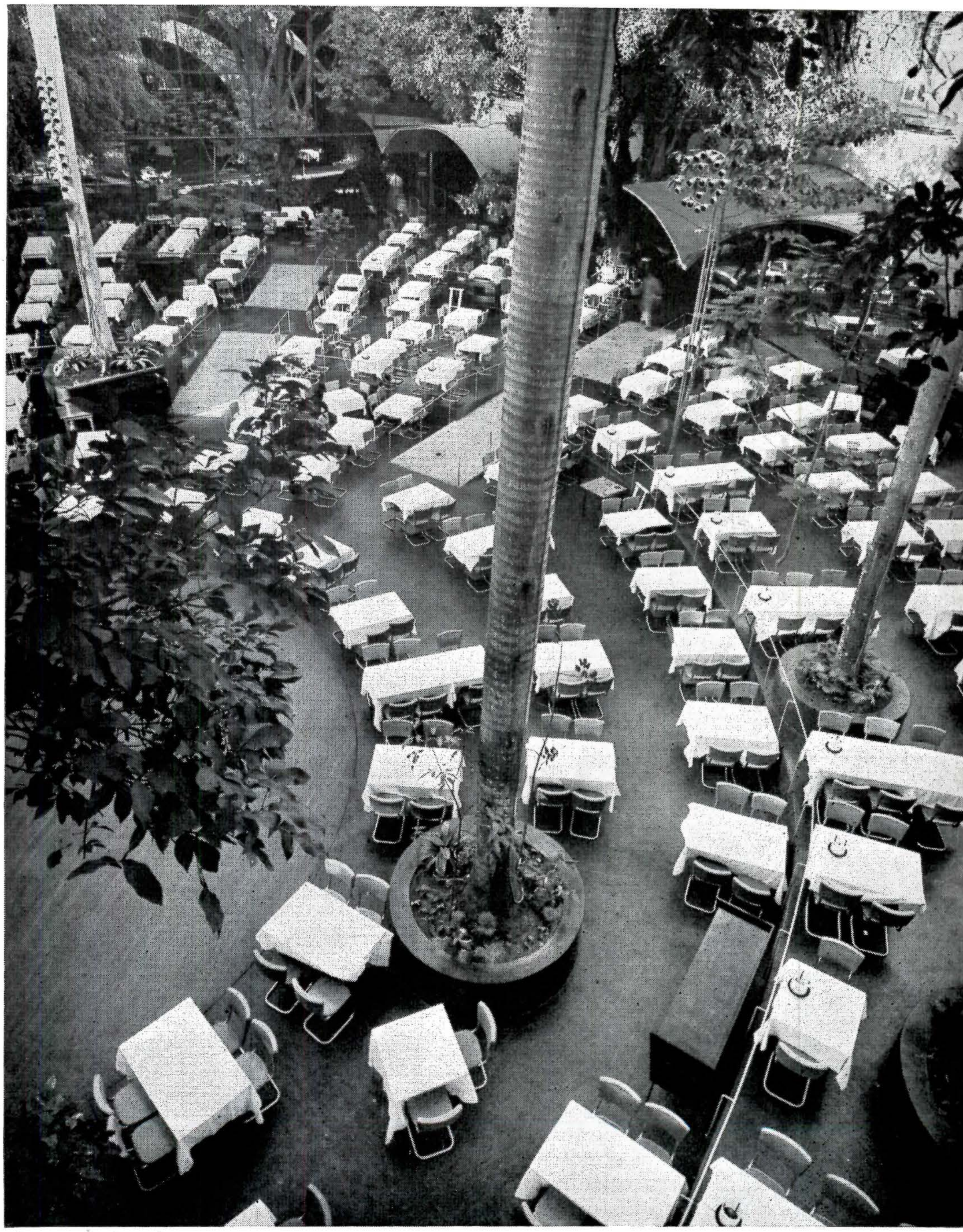
Seen from above (left) *the vaults and service lines constitute an astonishing instance of untrammeled expression.* (Ed. Note: Only birds and energetic photographers ever gain this vantage point.)

The enclosed portion of the club (below) *can accommodate up to 650 customers on the three tiers that surround the dance floor. The great glass wall of the rear vault makes all outdoors a visual expansion of indoor space.* Photos: J. Alex Langley



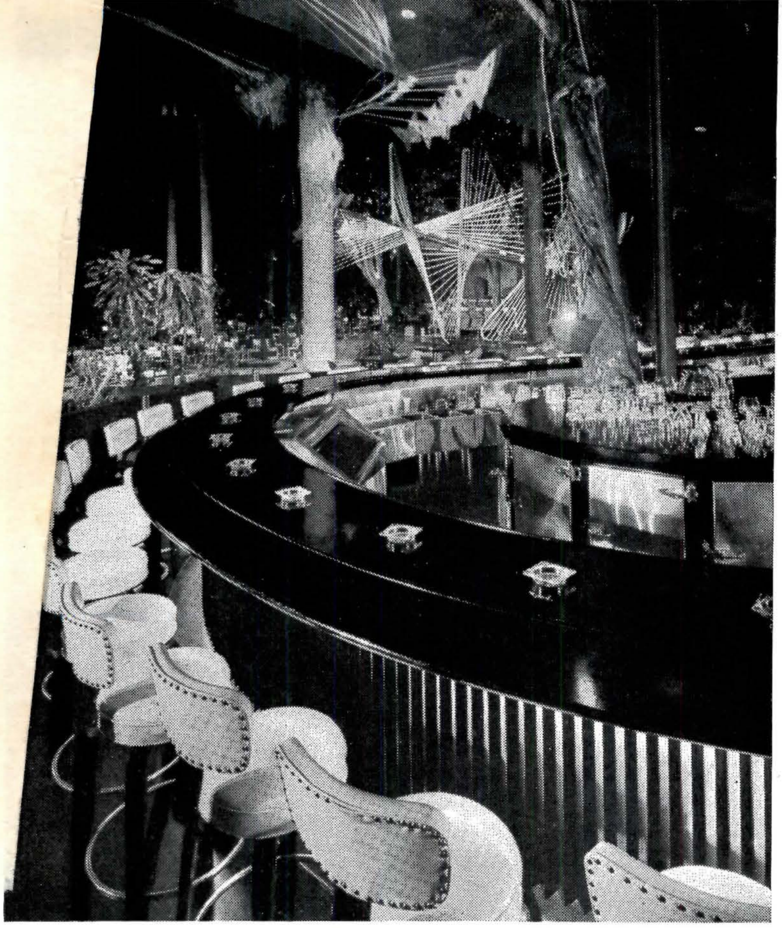
"I thought of the vault device," Borges tells us, "because one cannot say where wall ends and ceiling begins, as in the celestial sphere . . . Besides," he continues, "it proved to be the cheapest enclosure and provided an area uninterrupted by columns." Night floodlighting is designed to produce a moonlight effect. Interior surfaces of the vaults are painted dark purposely —"making the glass invisible . . . The outdoors seems to invade the indoors."



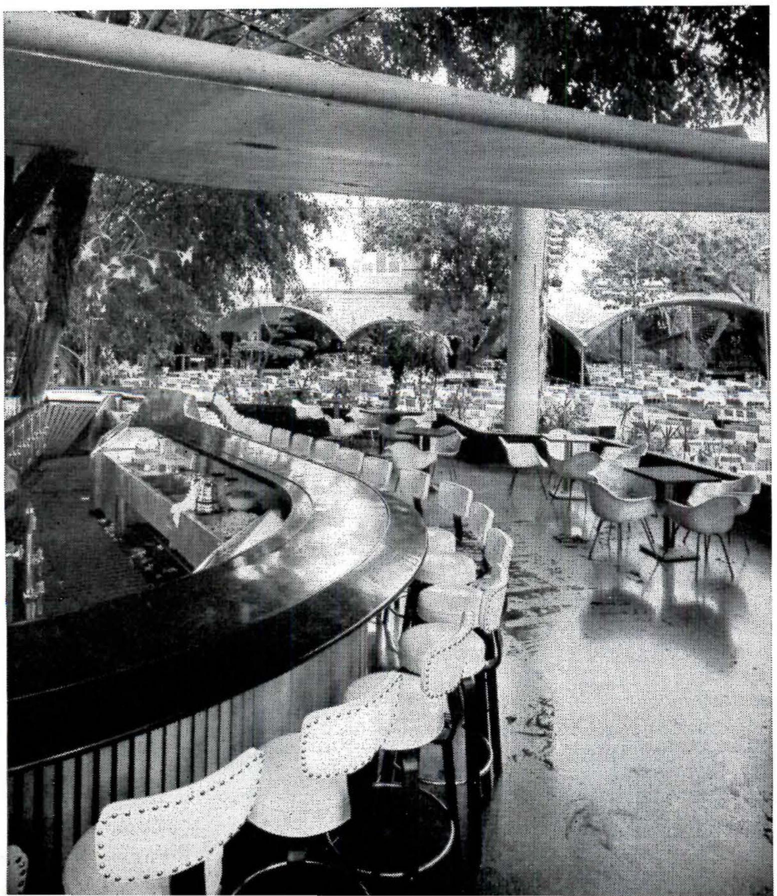


One of the most remarkable aspects of the design—possible because of the mild climate—is the casual way in which air-conditioning ducts, lighting fixtures, and wiring conduit occur on the outsides of the vaults. Here and there, further enhancing indoor-outdoor relationships, holes are left in the vaults so that trees with roots indoors emerge to spread branches skyward. Outdoor facilities step down on three levels to the round dance floor.

night club, Havana, Cuba



Considerably larger than the enclosed area, the outdoor portion of the night club (both pages) *has a bar, tiers of platforms for dining tables, a dance floor, and an orchestra stage. In connection with the latter, which performers reach by a ramp, is an elaborate, decorative stabile* (acrosspage) *made up of ¾-in. galvanized water pipes bound in a frame of 5" x ⅝" steel plates.*

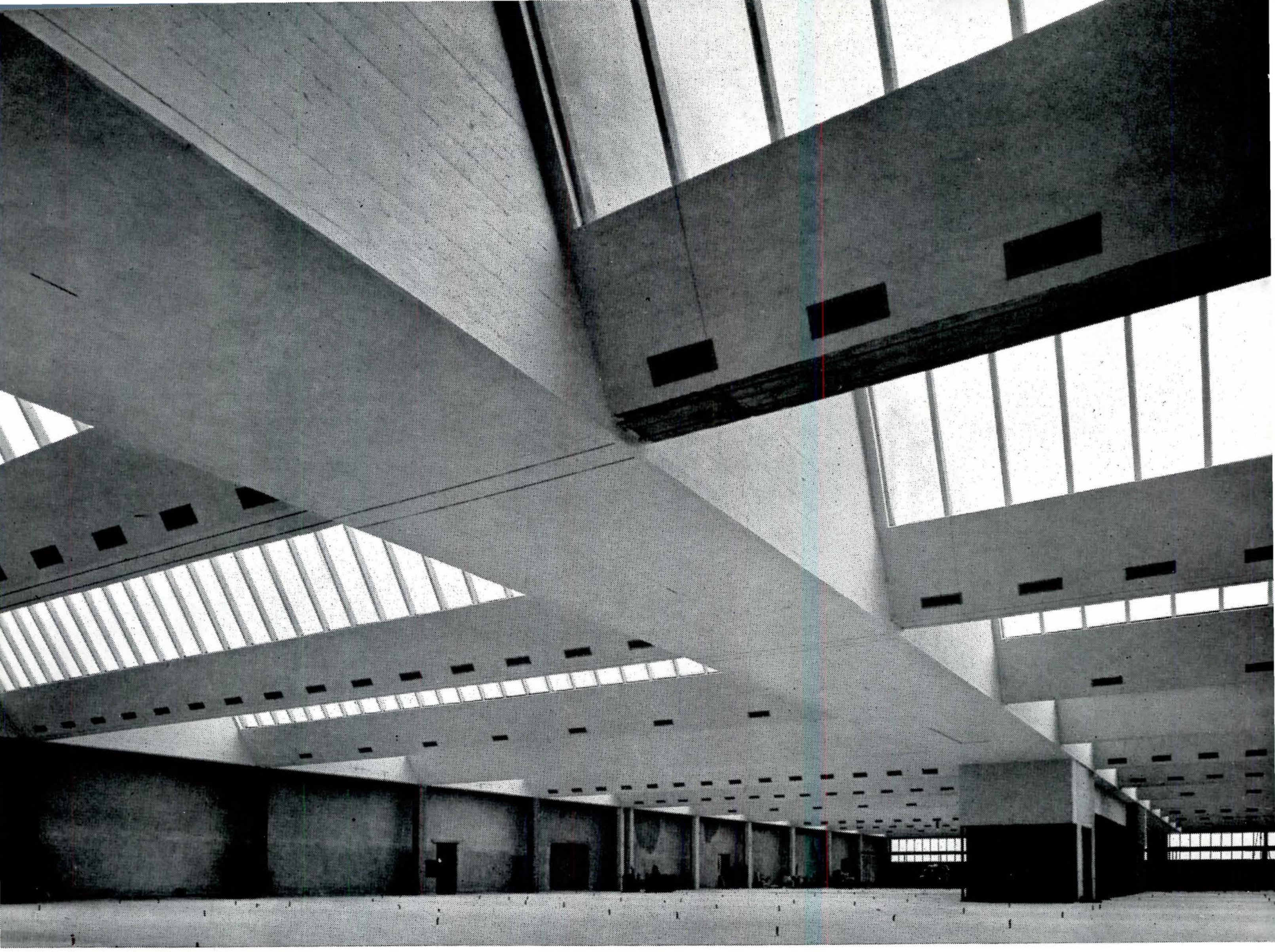


construction

Foundation, walls, roof shell: reinforced concrete: concrete — Compañía Cubana de Cemento Portland; reinforcing steel — The Youngstown Sheet and Tube Company. **Wall surfacing:** exterior: local Spanish red tile; interior: acoustical plaster—Tuckahoe Stucco Corporation; rest rooms: structural glass—Pittsburgh Plate Glass Company. **Floor surfacing:** rug—A. M. Karagheusian, Inc. **Ceiling surfacing:** acoustical plaster—Tuckahoe Stucco Corporation. **Roof surfacing:** local system employing Spanish red tile with mortar over concrete slab. **Waterproofing and dampproofing:** Truscon Laboratories, Devoe & Raynolds, Inc. **Insulation:** thermal: Spanish tile. **Roof drainage:** local cast-iron and cement pipes. **Partitions:** interior: folding—New Castle Products, Inc.; toilet: structural glass—Pittsburgh Plate Glass Company. **Windows:** fixed plate-glass—Pittsburgh Plate Glass Company. **Doors:** heat-tempered glass entrance door — Pittsburgh Plate Glass Company. **Hardware:** lock sets—Independent Lock Company; hinges—The Stanley Works. **Paint and stain:** local water paint.

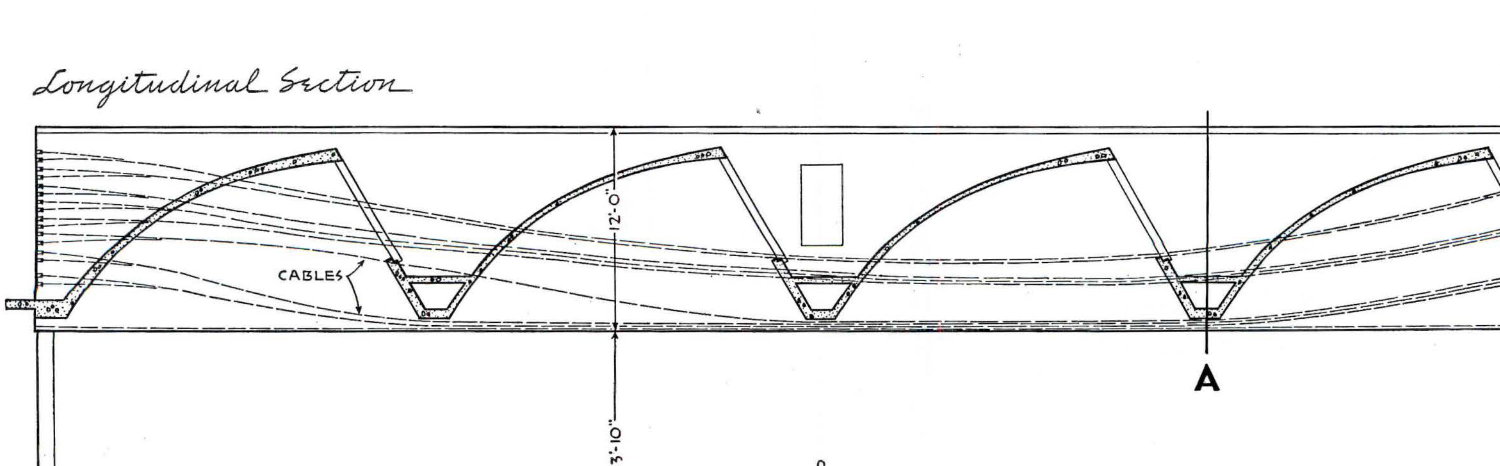
equipment

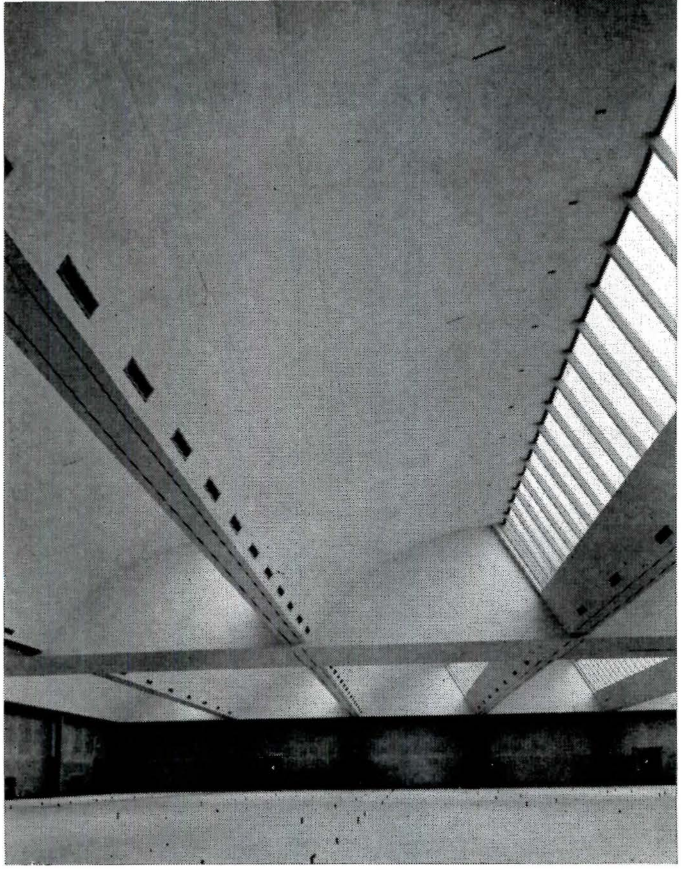
Kitchen: stainless-steel tables and sinks—Jack Conkle, Inc. **Curtains:** Ben Rose. **Public seating:** dining chairs and bar stools—Thonet Industries, Inc.; bar chairs—Herman Miller Furniture Company. **Stage lift:** Globe Hoist Company. **Lighting fixtures:** adjustable recessed ceiling fixtures—Swivelier Company, Inc.; arc spotlights and dimmers—Kliegl Bros., Universal Electric Stage Lighting Company, Inc. **Electrical distribution:** local equipment. **Plumbing and sanitation:** siphon-jet water closets—Crane Company. **Air conditioning:** 80-ton unit, compressor—Chrysler Corporation, Airtemp Division; refrigerant: Freon 12; diffusors, cooling coils—Marlo Coil Company; blowers, ventilators—American Blower Corporation; filters—Glasfloss; controls—Minneapolis-Honeywell Regulator Company.



prestressed-concrete girders with long-span vaults

Factory
Heidenheim o/ Brenz, Germany





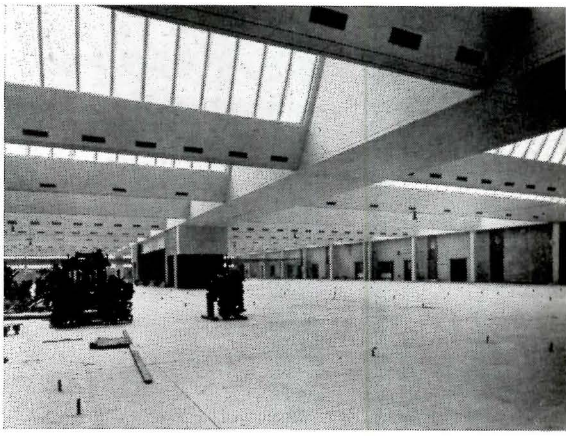
This blanket factory at Heidenheim o/ Brenz, near Ulm, Germany, demonstrates an imaginative use of prestressed concrete. Designed by Engineer K. A. Köppenhofer, with Structural Consultant Dr. F. Leonhardt, it was built last year by Contractor K. Kübler—all of Stuttgart. It was necessary for the weaving room to occupy the second floor of this two-story structure. Lighting had to be strong and rather constant; temperature and humidity of the air had to be well regulated; and the floor space had to be free from columns to allow for flexible arrangement of machinery.

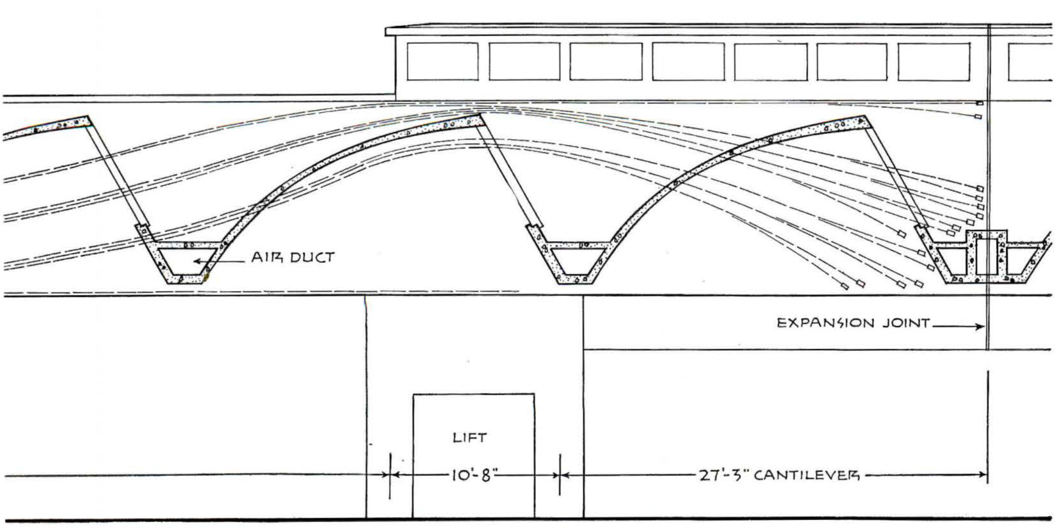
All of these requirements were met with a ceiling-roof system that is as attractive as it is functional. There is complete freedom from interior columns, vertical support being furnished by the wall columns and by the prestressed-concrete elevator shafts in the center of the floor.

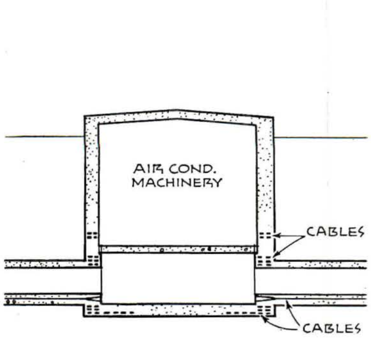
Over the elevator shafts, running the whole length of the room, is a hollow prestressed-concrete box girder, approximately 10′ x 12′ (*section below right*). A diagram (*below* and *acrosspage*) shows the placement of prestressed reinforcement bars through half the length of the girder.

Intersecting the box girder is a series of prestressed beams and shell sheds (*above*) which span a distance of 72′ each; they are supported by columns at the wall. Each of these beams is hollow at the valley, providing built-in conduits for conditioned air.

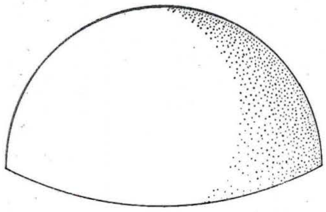
Ceiling surfaces are nonpourous cork painted white. *Photos: Otto Benner*







Section A



air-formed concrete domes

House
Hobe Sound, Florida

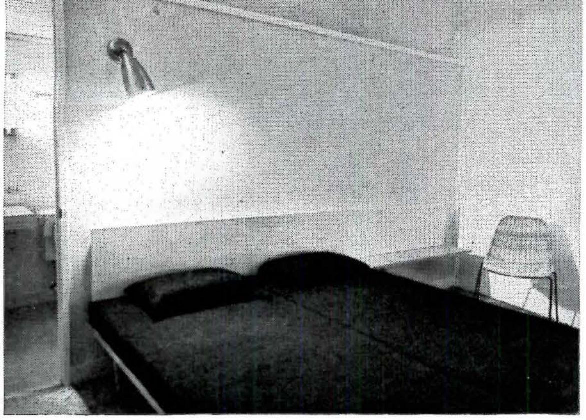
About 13 years ago, Architect Wallace Neff invented a system of concrete construction that uses a large inflated balloon in place of costly and complicated wood forms. Since then, The Airform International Construction Company, New York, has employed this system in building concrete bubbles for everything from residences to ammunition magazines.

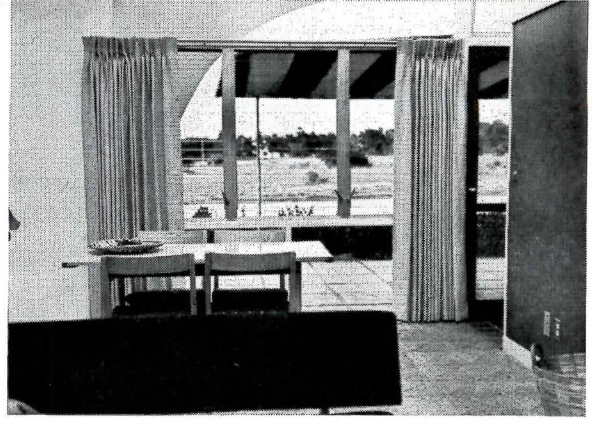
Seriously viewing the American house market, the Airform Company recently put Architect Eliot Noyes to work on the bubble to give it a shape and a plan attractive enough to compete with popular low-priced builder houses.

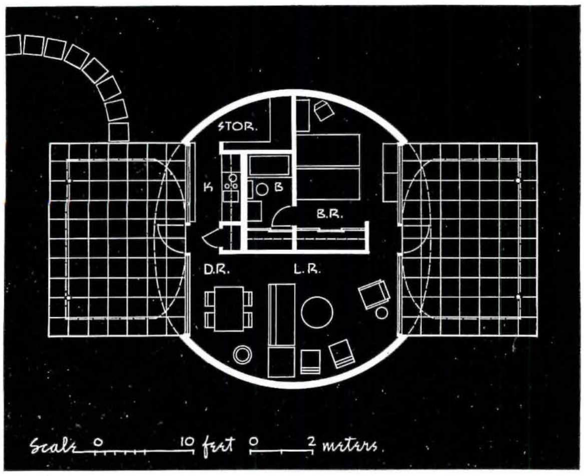
Noyes' first design (*above*) is a 30-ft-wide shell, 14 ft high at the center, in which he has made two rather deep segmental slices to let in light and air. Planned for one and two bedrooms (*acrosspage*), two of these bubbles were built recently at Hobe Sound, Florida, on an experimental basis. The Murphy Construction Company, contractor, quotes the price of $5.35 per sq ft for foundation, floor slab, double shell, vapor seal, insulation, and paint. (After the first two-in. gunnite spraying has set, vapor seal and glass-fiber insulation are applied, and another two-in. shell is sprayed over that.) On the basis of this experiment, the Airform Company hopes to build a number of such houses to sell for $6000.

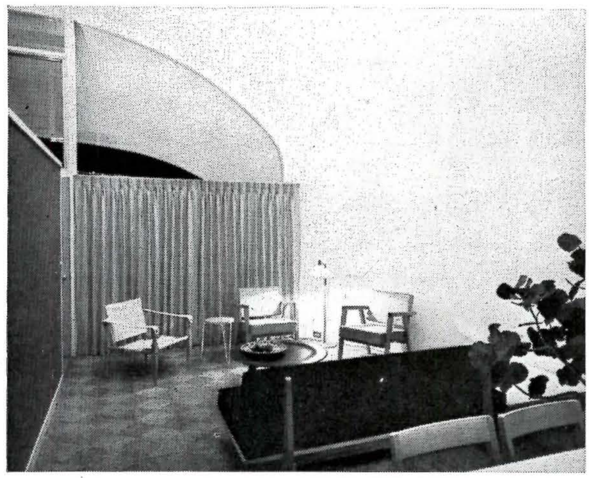
But while this possibility is being considered, Noyes is going on to "new and better" bubble designs. He has discovered, for example, that one 60-ft wide will provide about three times the space without being any higher or thicker than the 30-ft bubble. Also, he increased the segmental slices to four large ones, bringing the load down to four small bearing points, and adding greatly to the bubble's appearance.

In this form, the bubble can serve well not only for a house but also for school classrooms. Several school boards are already considering its use to cut costs.



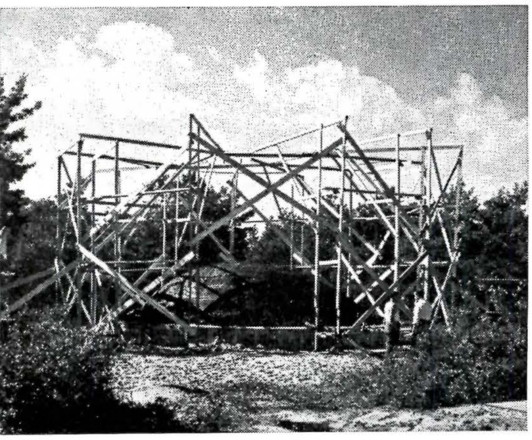


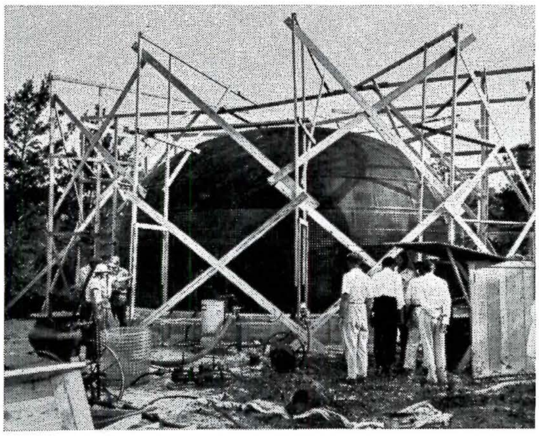


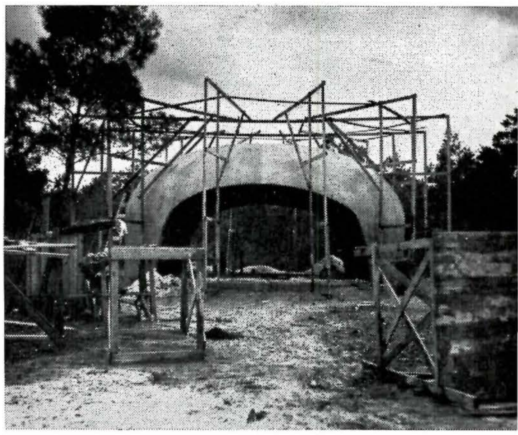


Bathroom in one-bedroom house (above) *has been covered with corrugated plastic; problem of sound and light transmission from living room to bedroom still remains.*

Balloon (below) *is inflated, covered with chicken-wire reinforcement, given wire skirt, sprayed, and, after several days, deflated. Hose from compressor maintains constant volume during temperature and air-pressure changes. Scaffolding is used only to support workmen while spraying, which is done in one day.*

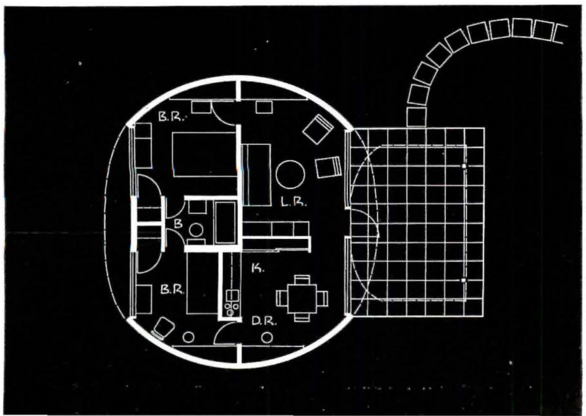


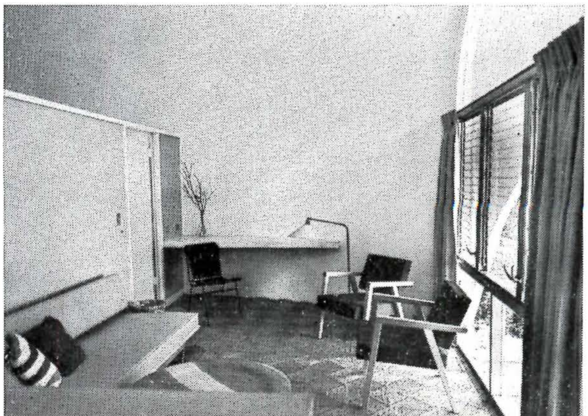




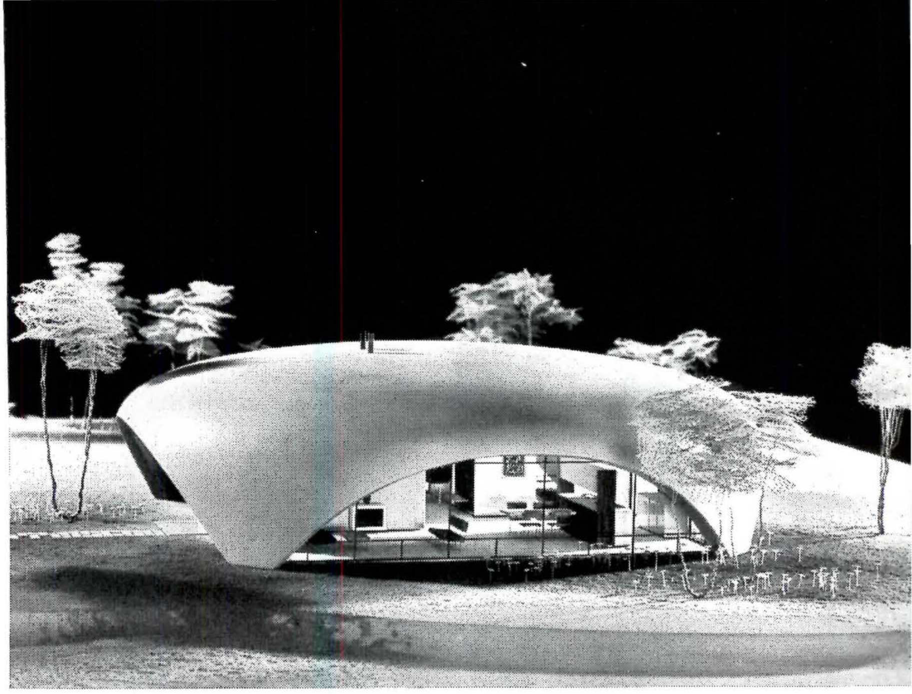
Two-bedroom house (below) *sacrifices kitchen and storage space. Partitions—gypsum wallboard on wood framing set by power nails—divide about 600 sq ft of living space.*

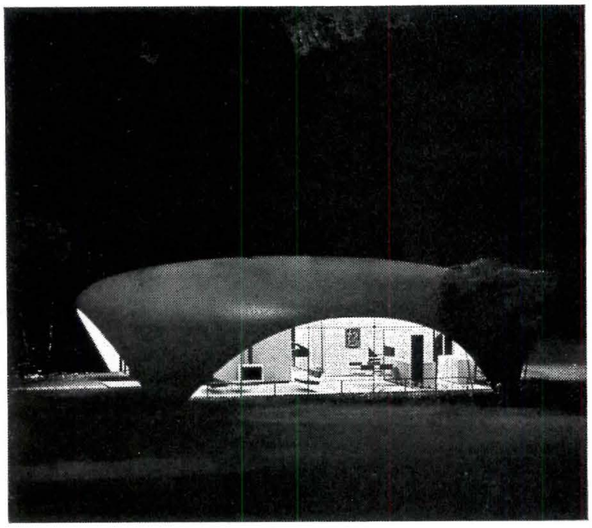
Photos, except as noted: Eliot Noyes





air-formed concrete domes

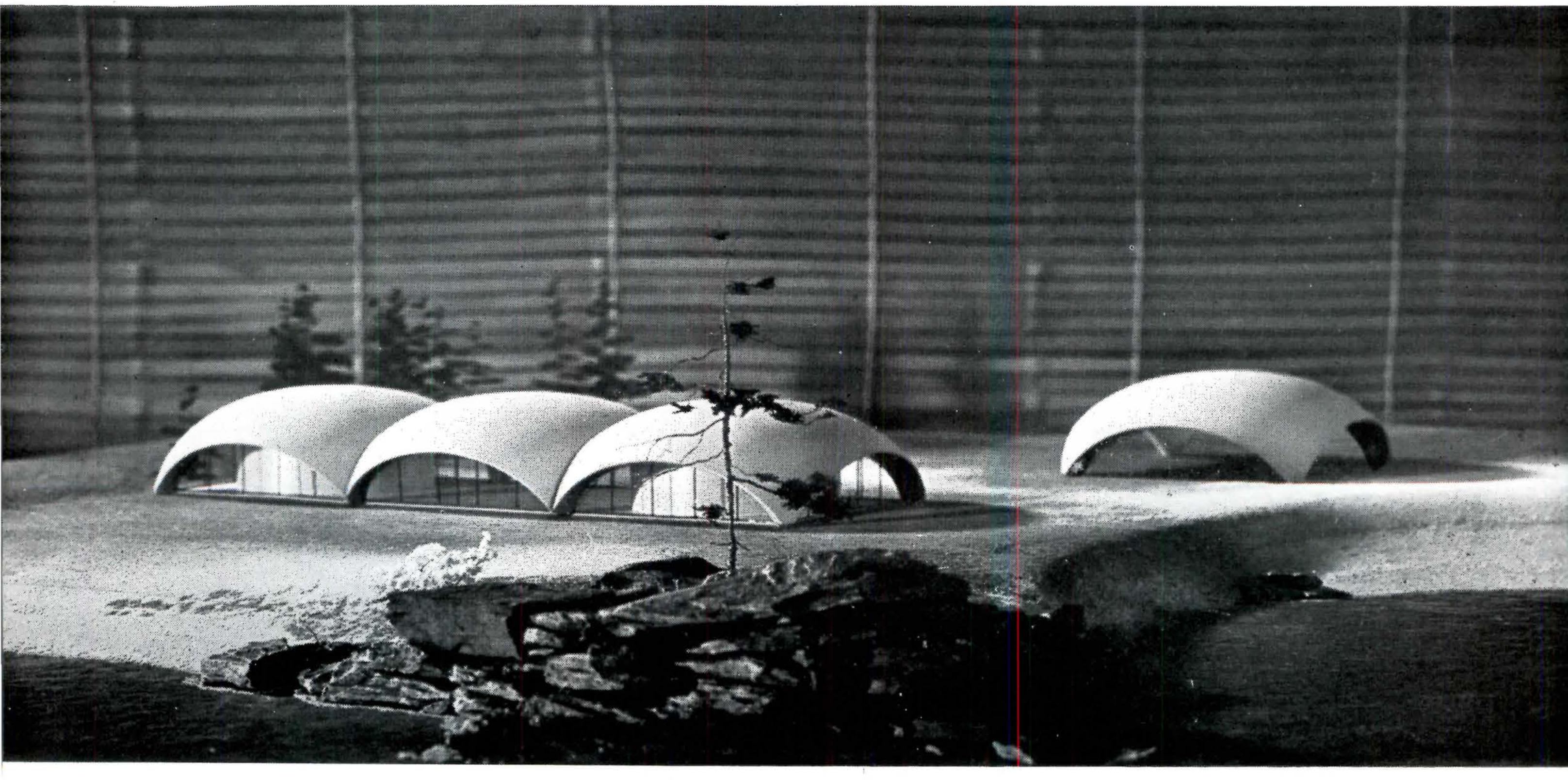


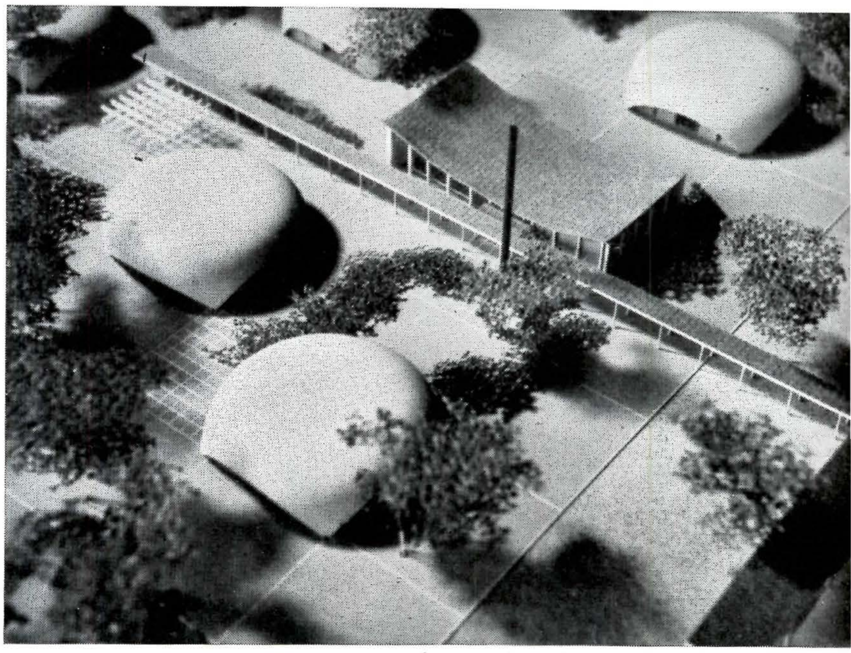


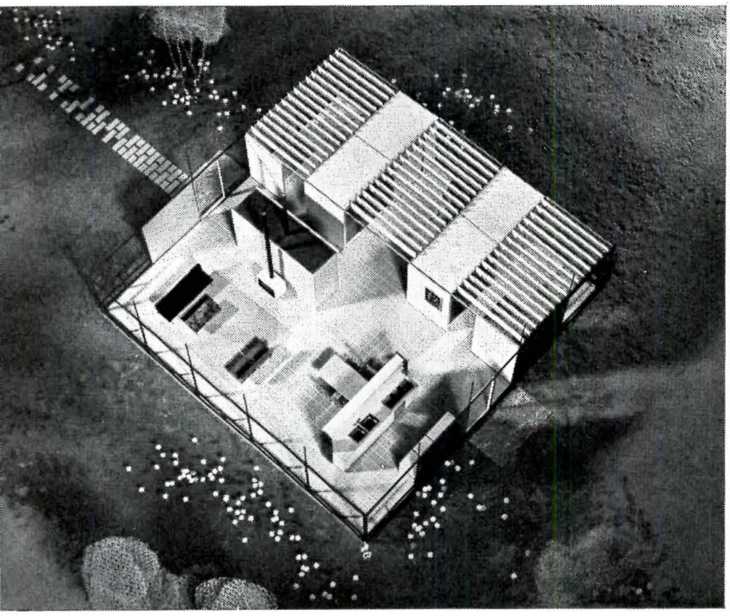
Model of 60′ bubble house (above) *shows enlarged openings. Further development* (not shown) *brings footings down to steel pins. Although footings seem to turn inward, they are actually vertical and receive the four corner posts of the frame* (acrosspage, left). *Bathrooms and closets are covered, and bedrooms have adjustable louvers to control light and sound.*

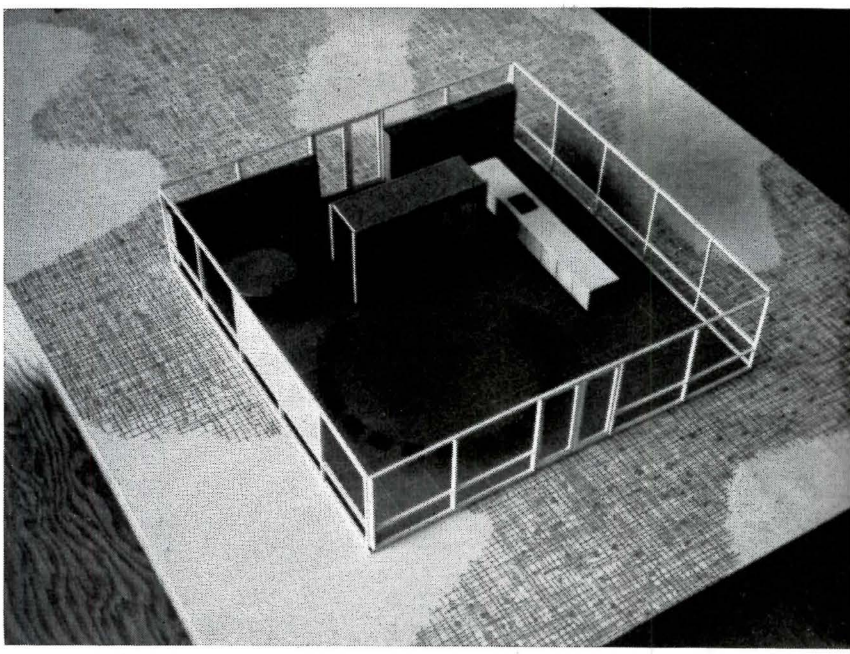
Notice the amount of sunshade provided by projected lip of shell (above *and* left).

Three intersecting shells (below) *cover two private areas and one open living area. Open shell in background makes attractive carport.* Photos of model: E. J. Cyr



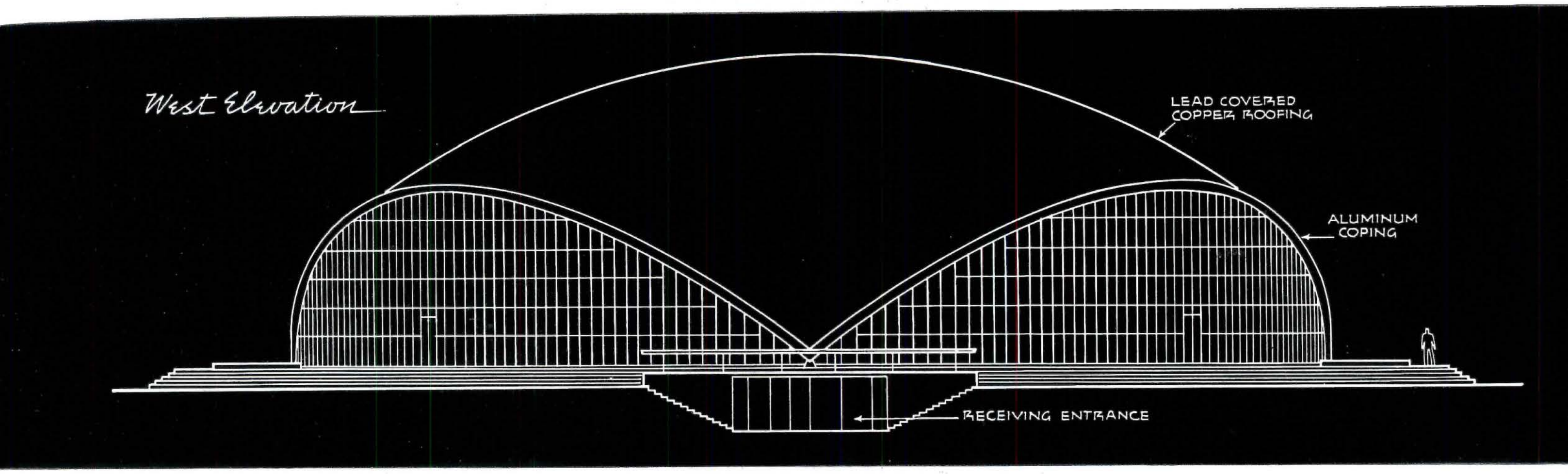






Classrooms about 42′ square can be housed under 60′ shells. Noyes believes that the cost of school construction can be reduced with the bubble method.

Kindergarten or elementary classroom (above) *is planned for 15 desks, a work table, toilet room, coat rack, sink, and supply storage.*



long-span concrete dome on three pendentives

Auditorium
Cambridge, Massachusetts

What is the correct shape for an auditorium? Should it be designed according to the best knowledge of acoustics or should the architect provide a straightforward structure and implement it with baffles and other methods of acoustical control as the situation dictates? In the early design stages of the M.I.T. Auditorium, Eero Saarinen & Associates felt that some solution would be found within thin-shell concrete which, in principle if not in form, would follow the second of these two dicta. Their study also reflected a preference to consider acoustics more as a servant than as a dictator. Today, it is fascinating to view at Cambridge, where the auditorium is still under construction, what is emerging from these primary considerations.

After a thorough period of investigation —preparation of models and sketches, discussions with engineering consultants, and meetings with the client to reconcile program requirements with actual budget conditions—a dome (112′ radius) on three pendentives evolved. Elimination of unneeded dome surfaces between bearing points provided desired window openings (27′ high) and a form (one-eighth sphere) which happily simplified structural calculations.

In the final design, the average thickness of the dome, including haunches and edge beams, is 4.8″. To the typical 3½″ shell thickness has been applied 2″ of rigid, glass-fiber insulation, a second layer of concrete 2″ thick, and lead-coated copper roofing. Although these constitute a double shell, actually the outer shell has no structural function and its mass was added for the sole purpose of reducing outside noise that would otherwise be transmitted to the interior of the auditorium. (The site is relatively noisy with large trucks passing on nearby Massachusetts Avenue and airplanes frequently flying overhead.)

For the typical portion of the shell, the total design dead load—including ductwork, acoustical baffles, catwalks, etc.—was 83 psf. Of this amount 25 psf or 30 percent is due to the outer shell. A total live load of 30 psf included wind allowance. The effect of lateral wind forces of 20 psf on the side window walls was investigated, as was the effect of normal wind pressure, including negative pressure. On the typical areas of the dome, therefore, the total design load was 113 psf—the outer shell representing 22 percent of this amount. The reaction at each of the three bearing points is approximately 1200 kips under dead plus full live load—horizontal and vertical components being approximately 850 kips. Though this unusual form necessitated an involved analysis, it followed established principles and theory.

The shell was designed for a temperature range of plus or minus 30 degrees. A lack of expansion joints is, of course, a problem encountered in any long-span structure; however, as the M.I.T. dome is relatively flexible, the deformations that can result from temperature changes will not induce excessively large forces.

Given the dome form, it would have been quite possible to frame this structure with other materials and methods—rolled-steel shapes or light-steel trusses; geodesic construction or wood or steel lamella systems. However, according to D. R. Pierce of Ammann & Whitney, New York Consulting Engineers for this project, it seems entirely improbable that any of these systems would have proven less expensive. Saarinen himself feels that compared to conventional methods, the shell dome added nothing to the cost—except for the more durable copper covering that was specified. The dome, as designed in concrete, is very nearly as light as can be tolerated acoustically. As noted before, mass actually had to be *added* to reduce sound transmission. Other structural systems would have had to carry the same load on the same span, whether or not they might be inherently lighter than concrete.

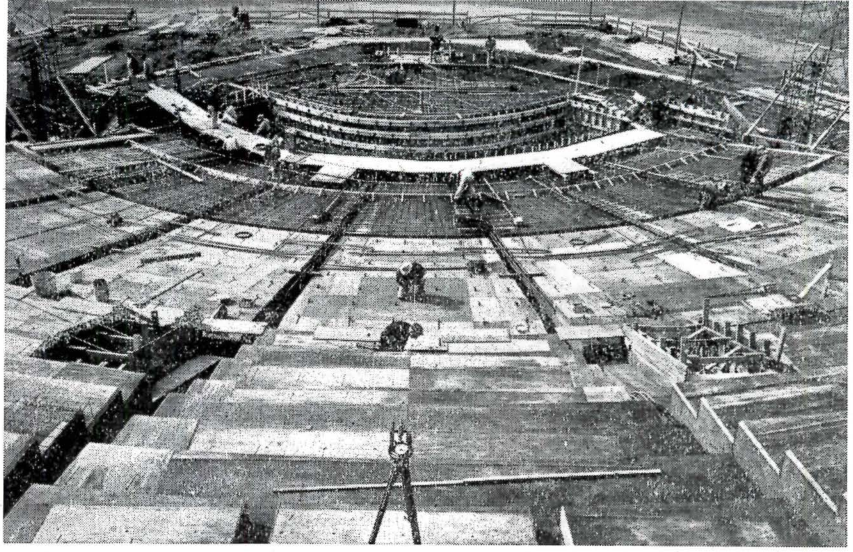
Although the ribs at the three cut edges of the dome superficially resemble arches, they actually are not, in the usual sense. They are necessary, however, to stiffen and stabilize the shell along its discontinuous edges and must deliver the reactions for the dome's stresses which exist along these edges.

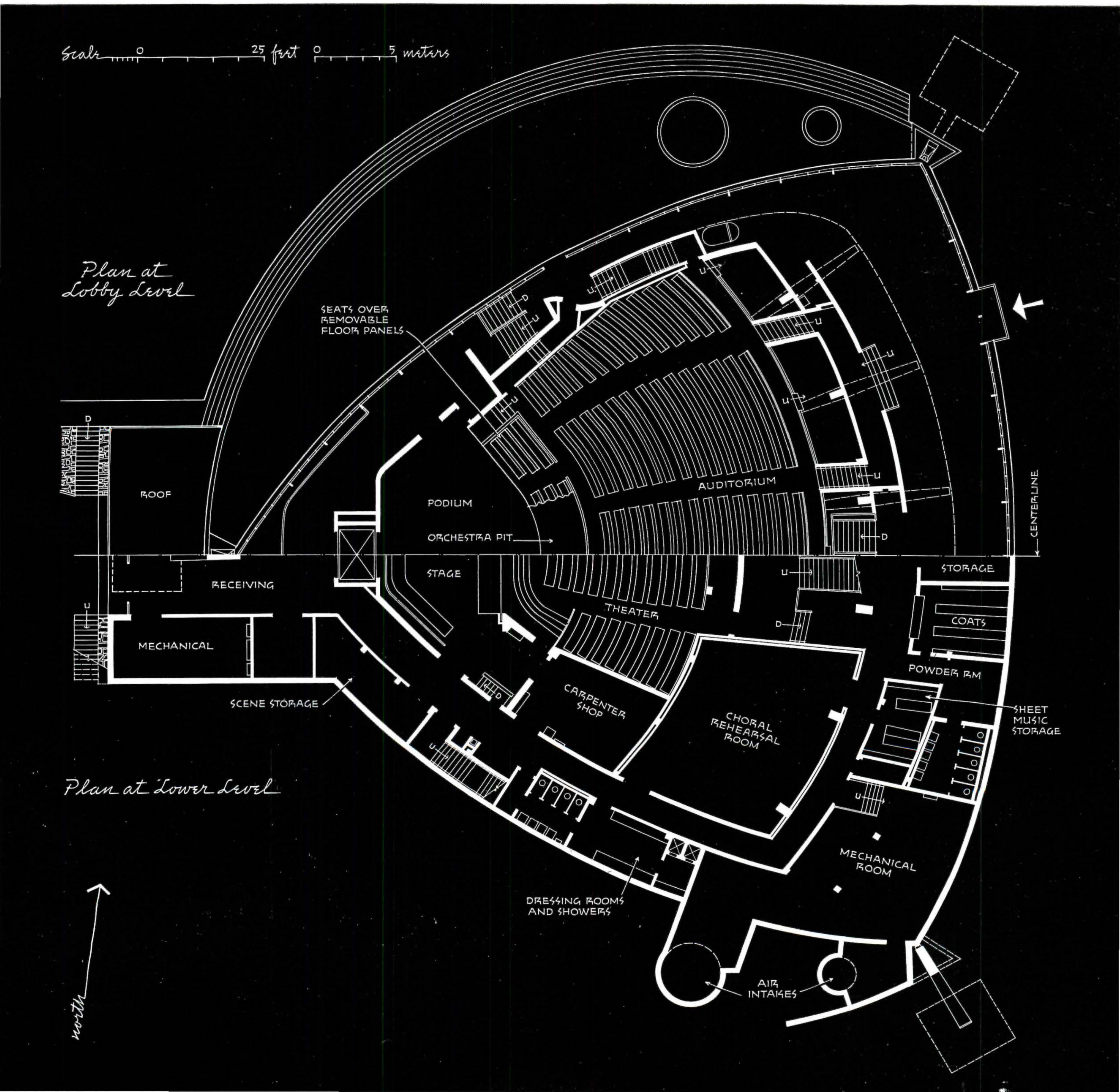
In addition to the control of outside noise, there was also the question of control of noise from the small theater below the auditorium and the two rehearsal

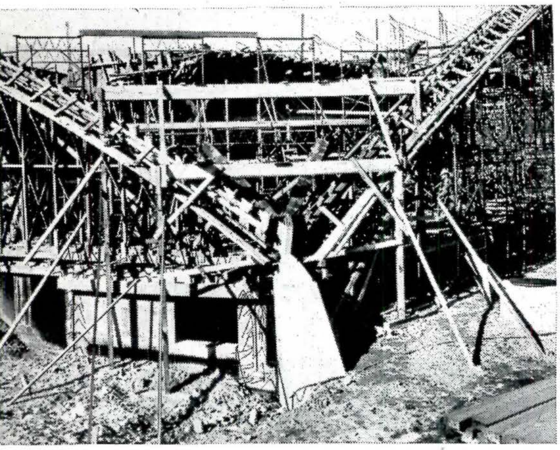
West elevation (acrosspage) *shows dome, plaza, and receiving entrance. Plaza was raised to elevate auditorium basement because of high water level. Esthetically, the raised plaza was also desirable in order to set it apart from surrounding flat land.*

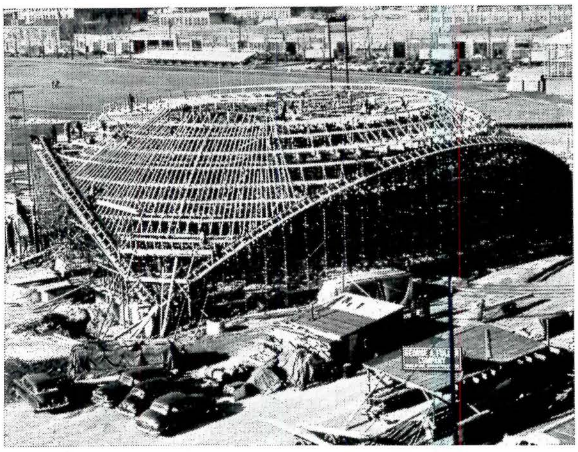
View of formwork for stage and orchestra pit (right) *is from east end of auditorium.*

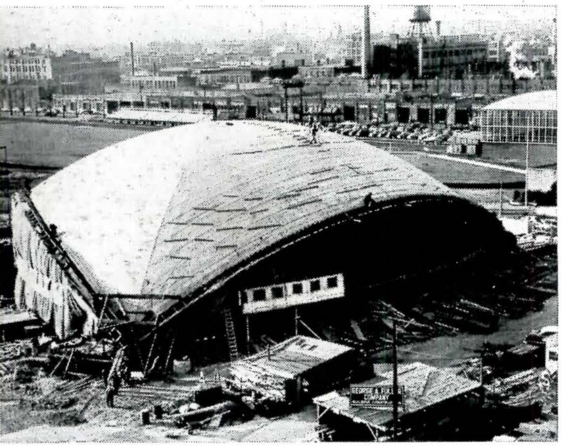
All photos (unless otherwise noted): courtesy of George A. Fuller Company

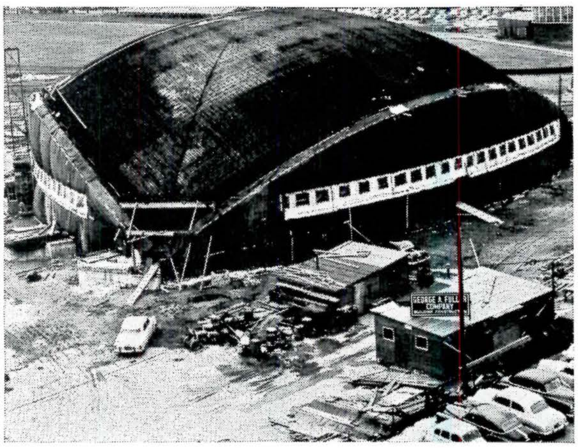


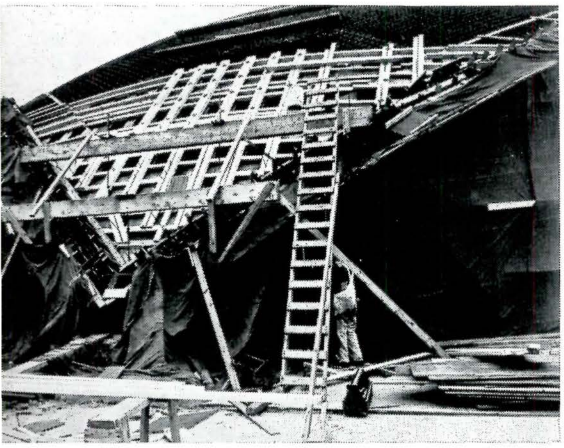


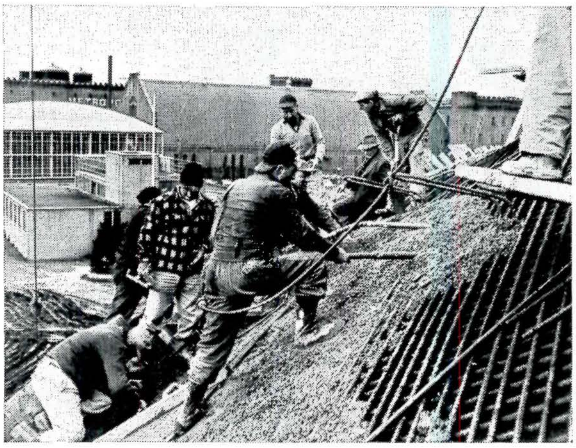










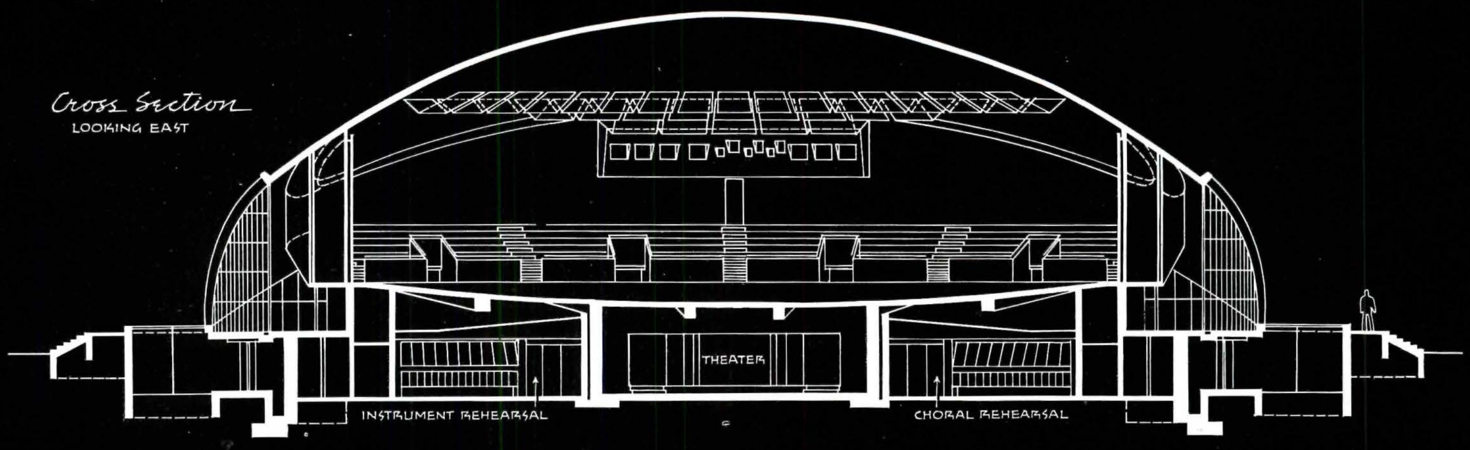


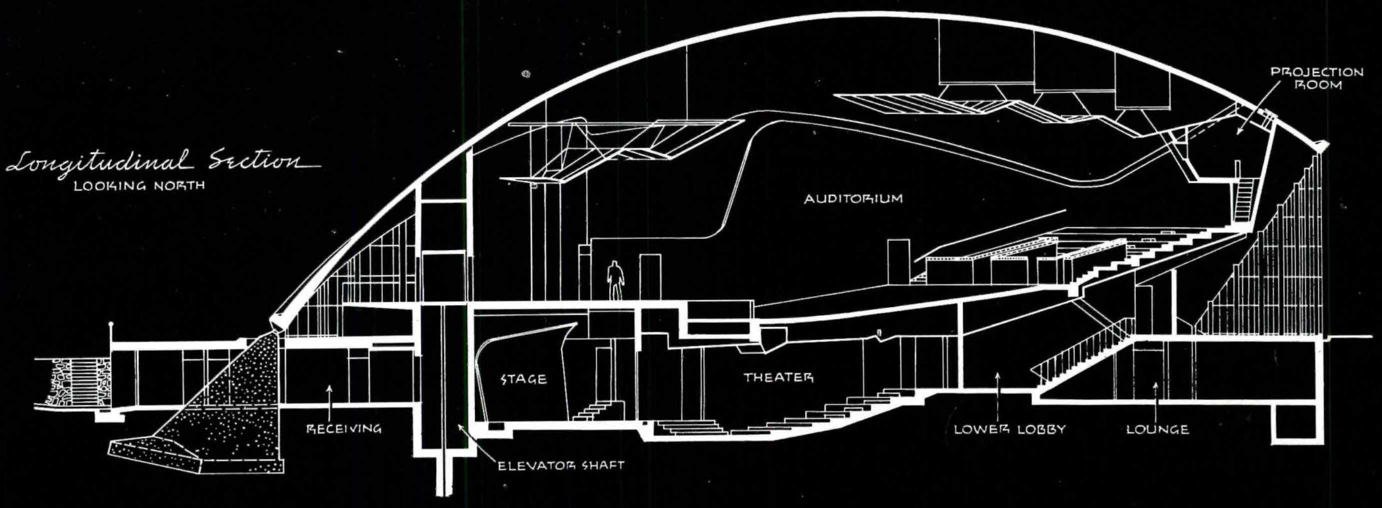
Chronological order of progress photos (left) *shows development of formwork, reinforcement, and vibration of concrete. Tarps surround part of structure after pouring of basic shell* (below, acrosspage). Photo: J. Alex Langley

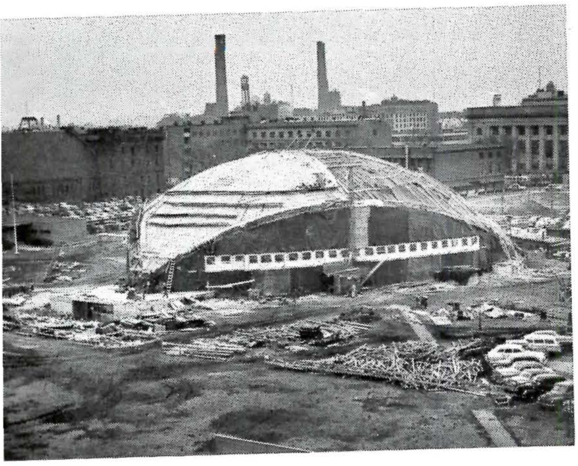
rooms adjacent to the small theater. It had to be anticipated that on occasion all of these facilities would be used simultaneously. As they are "shoe-horned" together, it was necessary to employ a rather elaborate scheme of resiliently-hung plaster ceilings over the lower halls and to separate them by means of double walls. Ductwork also required special consideration.

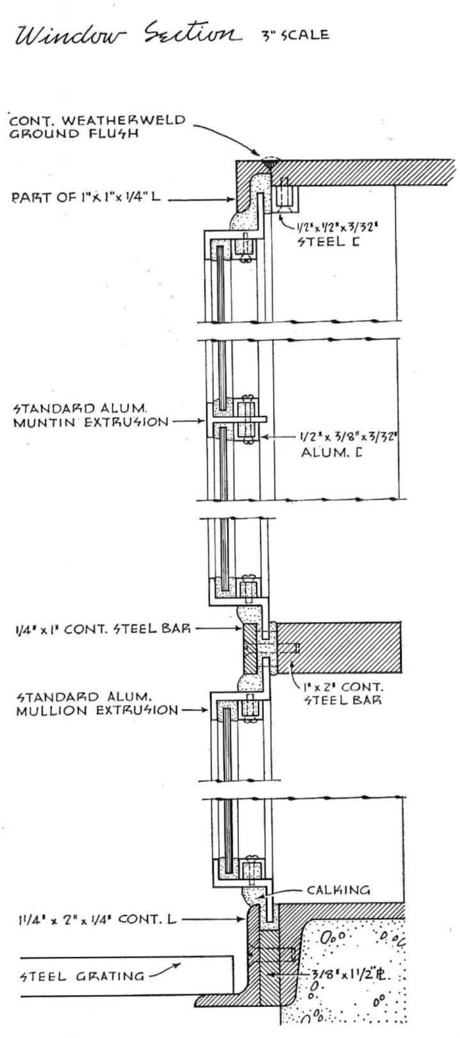
In the main auditorium, it was realized that a domed ceiling inherently produces some unusual and undesirable effects. It was equally appreciated that good performing conditions have to be provided for orchestral or choral groups on the platform. (For musical performances, it is essential that the musicians have an adequate sense of mutual support.) Therefore, Bolt, Beranek & Newman, Cambridge consultants in acoustics, suggested that a canopy made up of many surfaces be suspended over the stage areas —some of the surfaces to reflect sound into the seating area and some to return sound to the performing area (ARCHITECT'S DETAILS, *page 130*). Sound is also reflected concurrently from the main ceiling overhead.

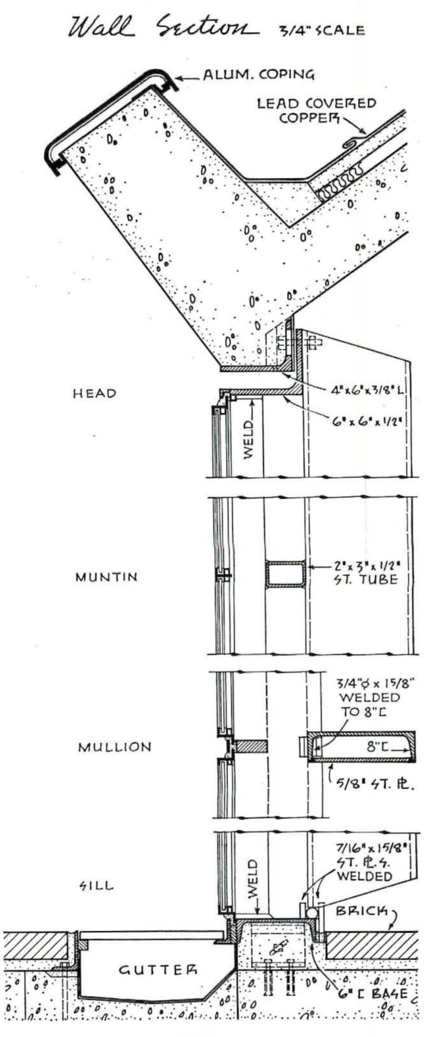
Analysis of the dome shape indicated that there would be focusing of sound in certain seating areas from the ceiling overhead. For this reason, reflecting sur-











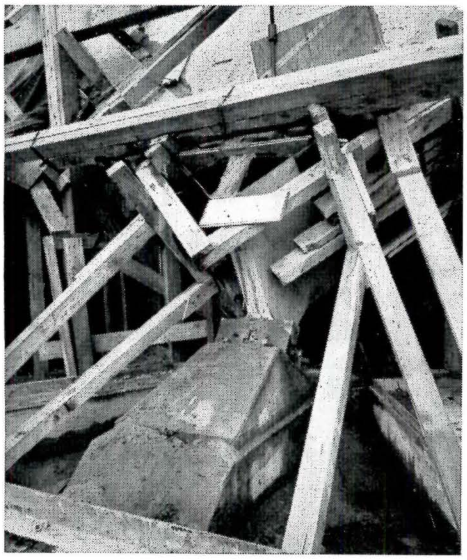
faces similar to those used above the platform cover a large portion of the rear ceiling. Conveniently, supports required for these baffles will also provide the attic necessary for air-conditioning ducts and catwalks for servicing most of the downlights and some of the spots. Even with the presence of these "floating clouds," the audience has the pleasure of being able to see the domed ceiling beyond.

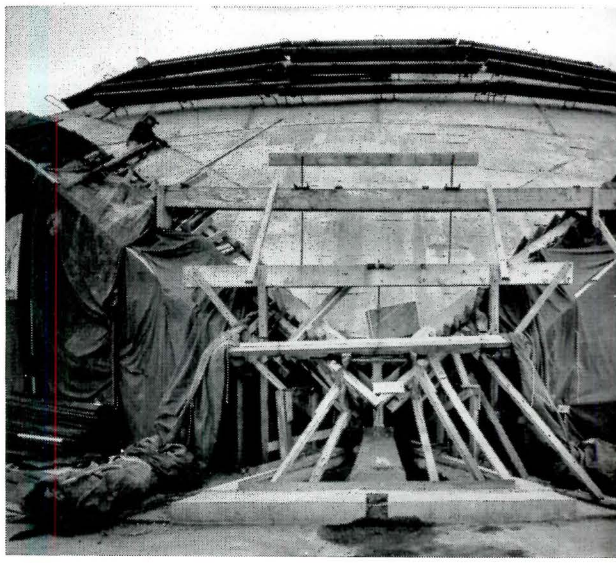
To control echo from the curved rear

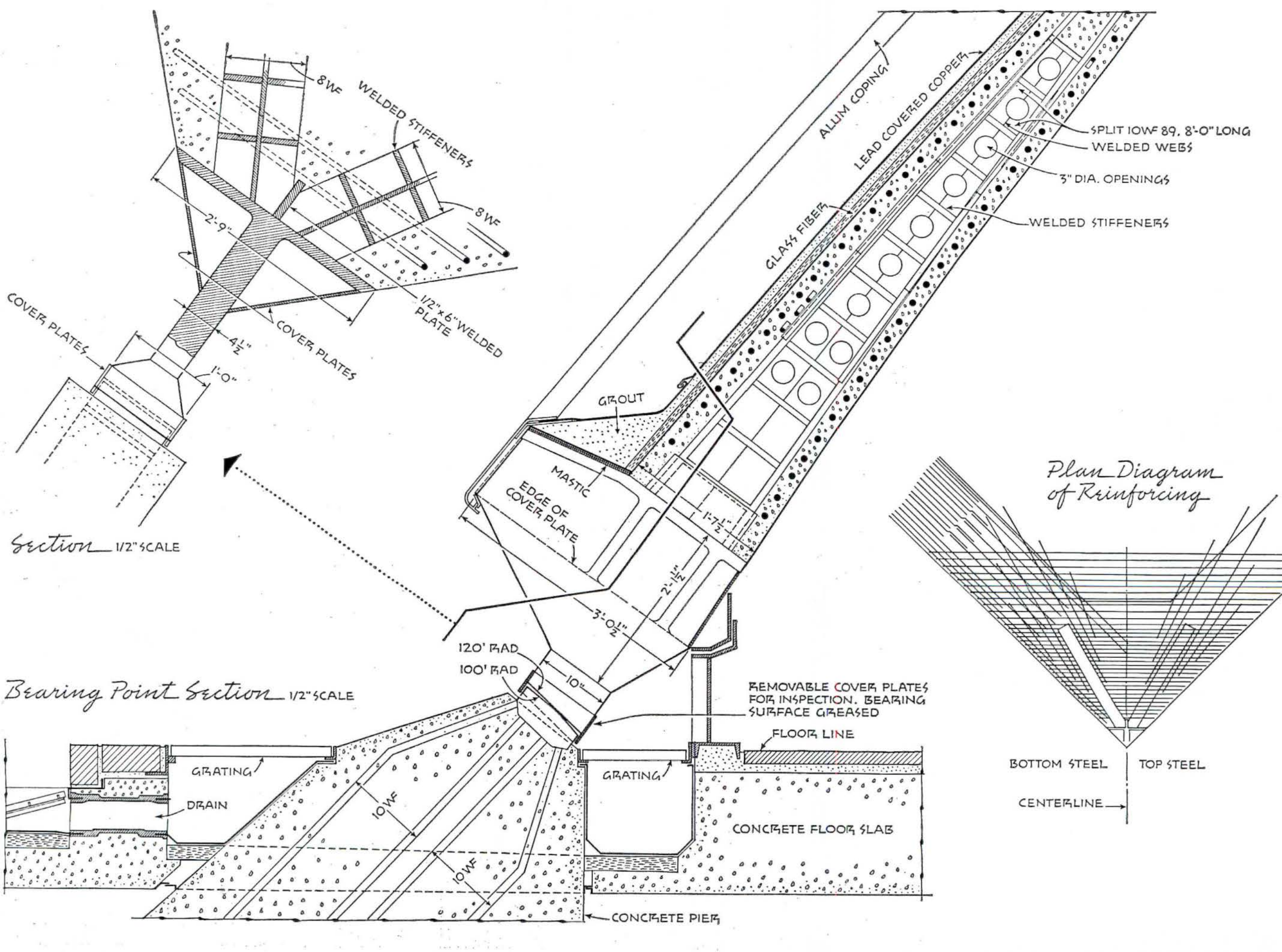
auditorium, Cambridge, Massachusetts

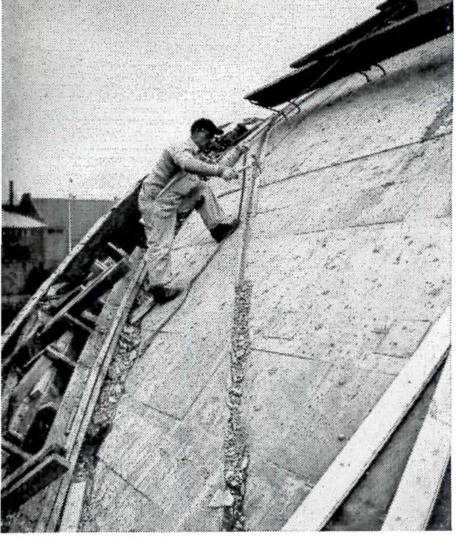
wall surfaces, the acoustic consultants have proposed the application of a deep sound-absorbing material with an extremely transparent facing. For the control of reverberation, the audience itself will provide the major sound-absorbing factor. Robert B. Newman reports that the "fabric-upholstered chairs, when empty, will 'look' much like people in chairs" and the auditorium will have a reverberation characteristic which is relatively independent of audience size. In addition, the sound-absorbing material placed on the rear wall for echo control will lend additional reverberation control. Sound-absorbing material will also be placed above the reflecting surfaces at the rear of the auditorium. This material can easily be removed in part, if it should be considered necessary to increase the reverberation time of the auditorium after it has been finished. (The apparent reverberation time in an auditorium is often quite different than that which was calculated by classical formulas.)

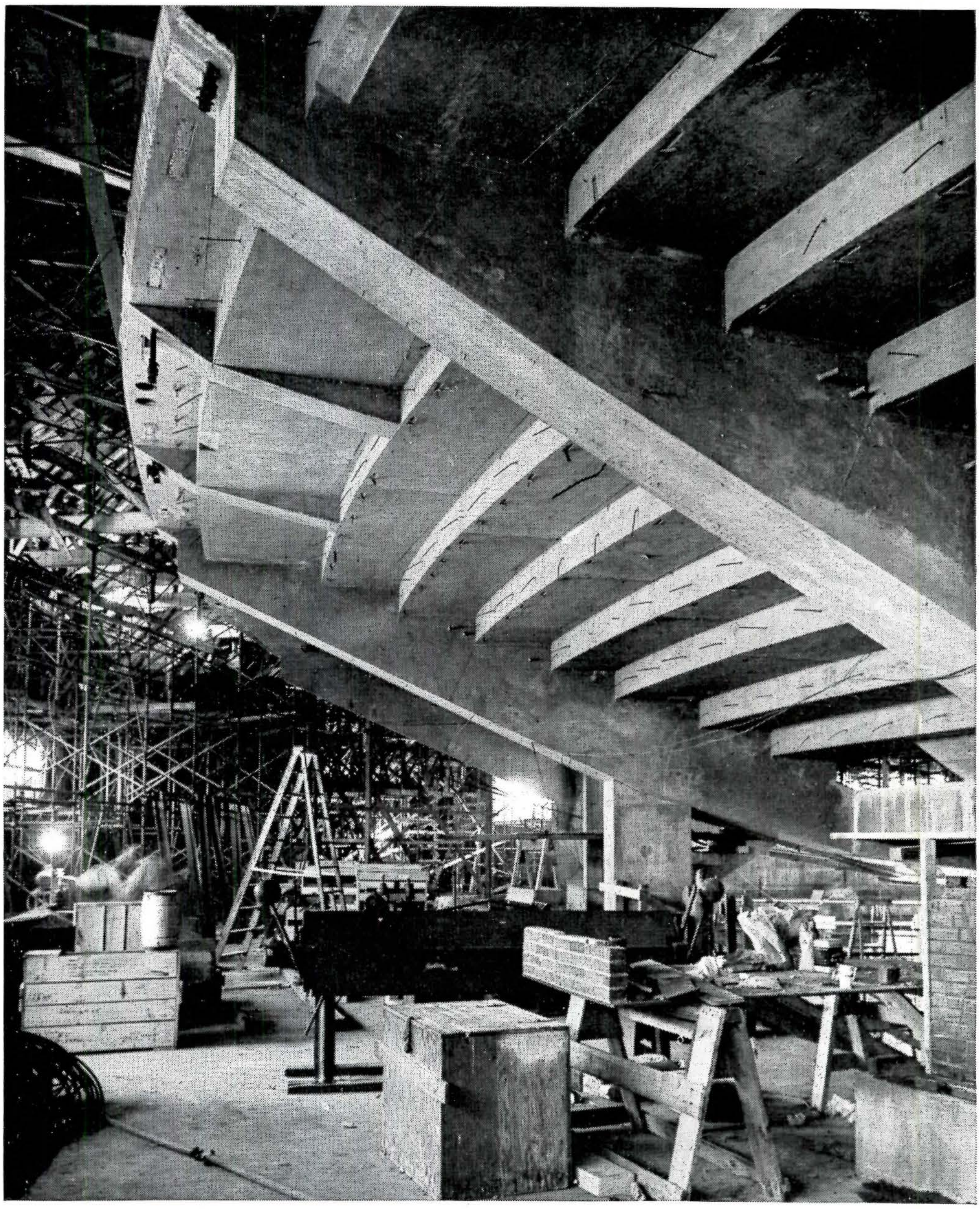
Architects for this structure were Eero Saarinen & Associates; associate architects: Anderson & Beckwith. The George A. Fuller Company, Boston office, acted as the general contractors.







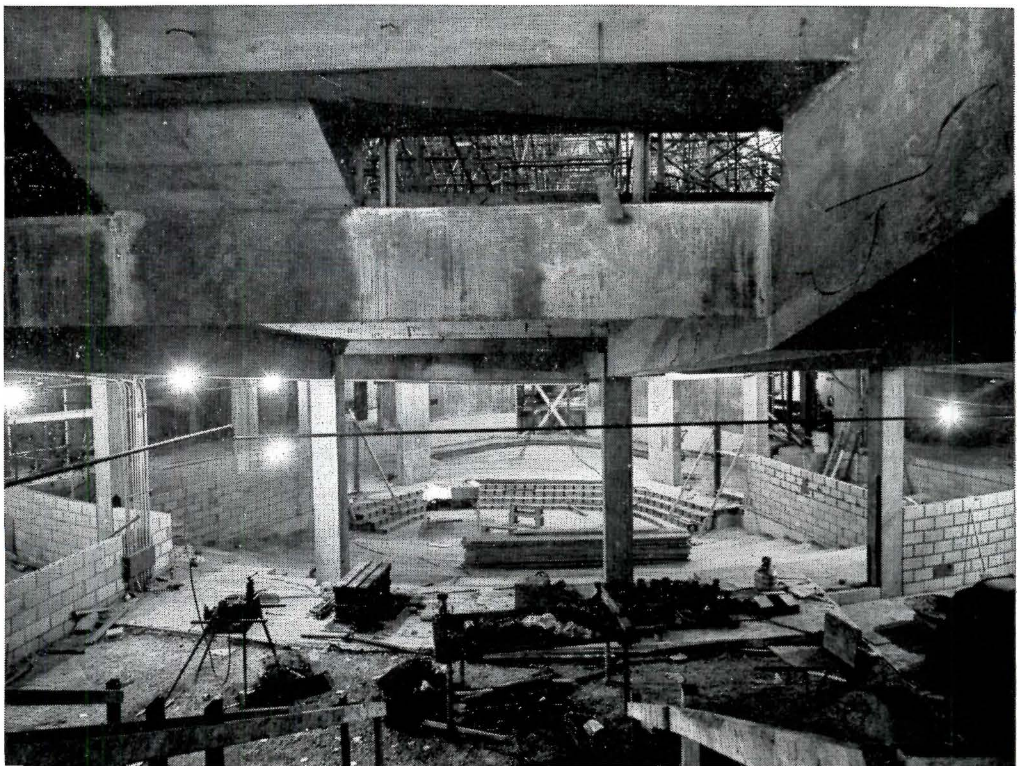




Detail photos and drawings of buttress (acrosspage). *Bed of sand and gravel underlying area has good bearing capacity and can adequately carry both vertical and horizontal thrusts. Because of basement depth, footings carried to this stratum are only slightly deeper than would otherwise have been required. Little or no movement of buttresses is anticipated. Since the dome is relatively flexible and is supported at only three points on spherical bearings, small differential deflections could be tolerated if they occur.*

Workman prepares chase before pouring of outer shell (above).

Photos (except far left): J. Alex Langley



Design of cantilever frames supporting upper part of auditorium (above right) *was complicated by heavy concentrated loads from the projection booth at extreme end of cantilever. Resulting frames are very heavy.*

In photo of small theater (below right) *carpenter shop and greenroom flank audience seating on left and right, respectively.*

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ANDERSON AND BECKWITH................ASSOCIATE ARCHITECTS
GEORGE A. FULLER COMPANY..............GENERAL CONTRACTOR

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spec small talk

seismic science

Here's a new wrinkle in subsurface exploration work. It is called the seismic method. With the proper use of the seismic refraction method and modern equipment, the depth to media of certain velocity differentials can be accurately determined. When these data are plotted, a graphic cross-section of the earth (up to certain limits, dependent upon the application) can be determined. This makes it possible to conduct a survey over any kind of terrain and under difficult conditions such as river crossings, metropolitan areas, open country—or, in fact, anywhere. This seismic method for determining thickness of overburden and depth to bedrock is based on the measurement of the time for the advance of a wavefront, usually generated by exploding a small charge of dynamite. Following the explosion, the arrival of a wavefront, both horizontal and refracted, is picked up by the seismometer. This in turn emits an electrical impulse or signal, which is transmitted by means of a cable to the amplifier. Here the signal is amplified and transmitted to the galvanometer where it is recorded. The galvanometer consists of a mirror attached to a coil and suspended in a permanent magnetic field. A beam of light is focused on the galvanometer and reflected by the mirror onto moving positive photographic paper. This produces the oscillogram. The timing lines are projected in the same manner from a disc-type light interruptor driven by a synchronous motor. These are focused on a separate mirror and then onto the moving paper; thus the recorded data and the time lines will appear on the paper as black lines on a white background. Understand? No? For more details, write Institute of Industrial Research, Syracuse University, Syracuse, New York.

pizza payoff

I'll be hornswoggled if it didn't happen again! My faithful readers (mother, father, wife, two small children) will recall that last year a building product representative dramatically opened before me a jewel case exposing in all its resplendent glory a corner of an aluminum refrigerator. The other day, in comes a guy from Hillyard Chemical Company and pulls the same gimmick. This time it was a king-sized velour-lined leather case housing a section of maple flooring, finished with his "Trophy Gymnasium Finish." After the shock wore off, the conversation got around to a variety of resilient and nonresilient flooring materials and maintenance materials such as waxes, varnishes, and finishers. That night I had a vivid dream, somewhat intensified by a pizza pie dinner, wherein varnish (represented by a stick of chewing gum—probably because varnish is made with damar and copal gums) and a swarm of bees (because of their intimacy with wax) were performing. Just as the pizza wended its weary way, I concluded hazily that it was pointless fretting about the selection of appropriate flooring materials since the maintaineers wax or varnish the very devil out of any flooring material. Conclusion: select a darn good varnish or wax and avoid pizza. Incidentally, while we are waxing loquacious on the subject, it may interest you to know that more than 65 manufacturers make wax in liquid and paste form, slippery and nonslip; some apply it hot and some apply it cold. About 26 manufacturers sell wax applicators, brushes, pads, and sprayers, both hand and electric, about 5 manufacturers sell wax removers and, for the fastidious, there is insecticidal as well as germicidal wax. More than 29 manufacturers make varnish and more than 15 make varnish removers, and that's the unvarnished truth. If you are still not impressed, you can purchase liquid combinations of hard waxes and varnish gums. See what you started Hillyard?

shiny nosing

Perhaps you had better watch your step on this one—and I do mean step. Do you know the difference between a good nonslip metal tread and a poor one? Can you predict how long it will last before those busy little feet wear it down to its slippery, naked metal? How much nonslip aggregate is enough? Do your lovely buildings have shiny nosings? Here am I writing specifications for, lo, these many eons, and didn't rightly know until Mr. Feralun brought me up sharply. I don't expect to set the world afire with my brilliant little discoveries but details like these prevent embarrassing slip-ups. Maintaineers are the first to howl about nonslip treads that quickly lose their non. Replacing treads about three to five years on centers cannot begin to justify the initial-cost saving (about 30 percent) in buying poor treads. A good nonslip tread should look dirty when new and perfectly lousy thereafter. You should see more nonslip aggregate than metal. Rub it with an iron bar until your blood pressure is over 200, to see if you can free an appreciable amount of aggregate from the base metal. Bite through the tread to see if the aggregate is more than skin deep—say 1/8". *Bon appétit!*

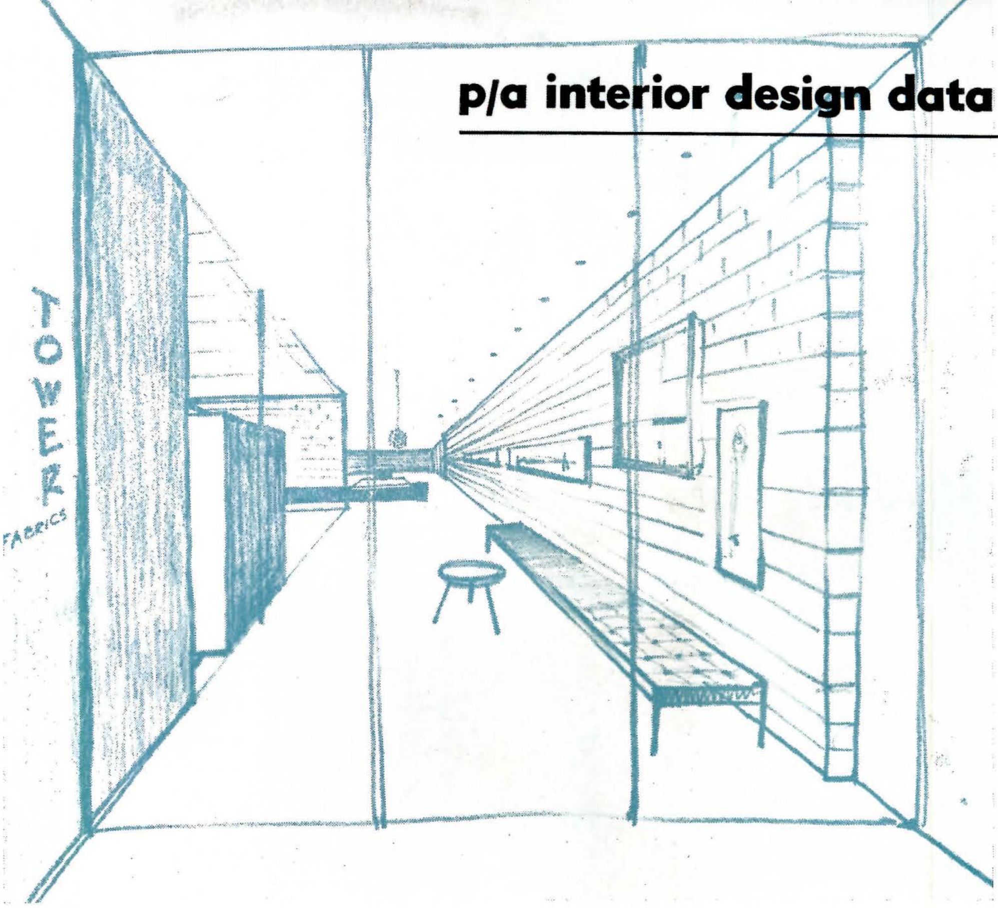
structural steel defined

Fred Severud riveted me against the wall and challenged me to define "structural steel." I said it was, well, er—you know, hard goods commonly used as columns, beams, and stuff like that there. He politely suggested that the moment my eye becomes unglued from the television set, I peek at the AISC code for the answer. I did. Here is what it said:

"The term 'structural steel' comprehends only the following categories of parts: Anchors for structural steel; bases of steel or iron; beams, purlins, girts; bearing plates for structural steel; bearing shoes for bridges; bracing; brackets; bridge pins; bridge railings of steel; columns of steel, iron, or pipe, or cement filled pipe; counterweight boxes for bridges; crane rails and stops; door frames constituting part of the steel framing; expansion joints connected to the steel frame; floor plates (checkered or smooth) connected to the steel frame; girders of steel; grillage beams and girders of steel; hangers of structural steel, if attached to the structural steel framing and shown on the framing plans; lintels shown on the framing plans or otherwise enumerated or scheduled; marquees (structural steel frame only); monorail beams of standard structural shapes; separators, angles, tees, clips and other detail fittings essential to the structural steel frame; suspended ceiling supports of structural shapes three inches or greater in depth; shop rivets, permanent shop bolts, bolts required to assemble parts for shipment and shop welds; struts; tie, hanger and sag rods forming part of the structural steel frame; and trusses."

Woe is me!

Burton A. Schutt, Architect, AIA photograph: Dale Healy



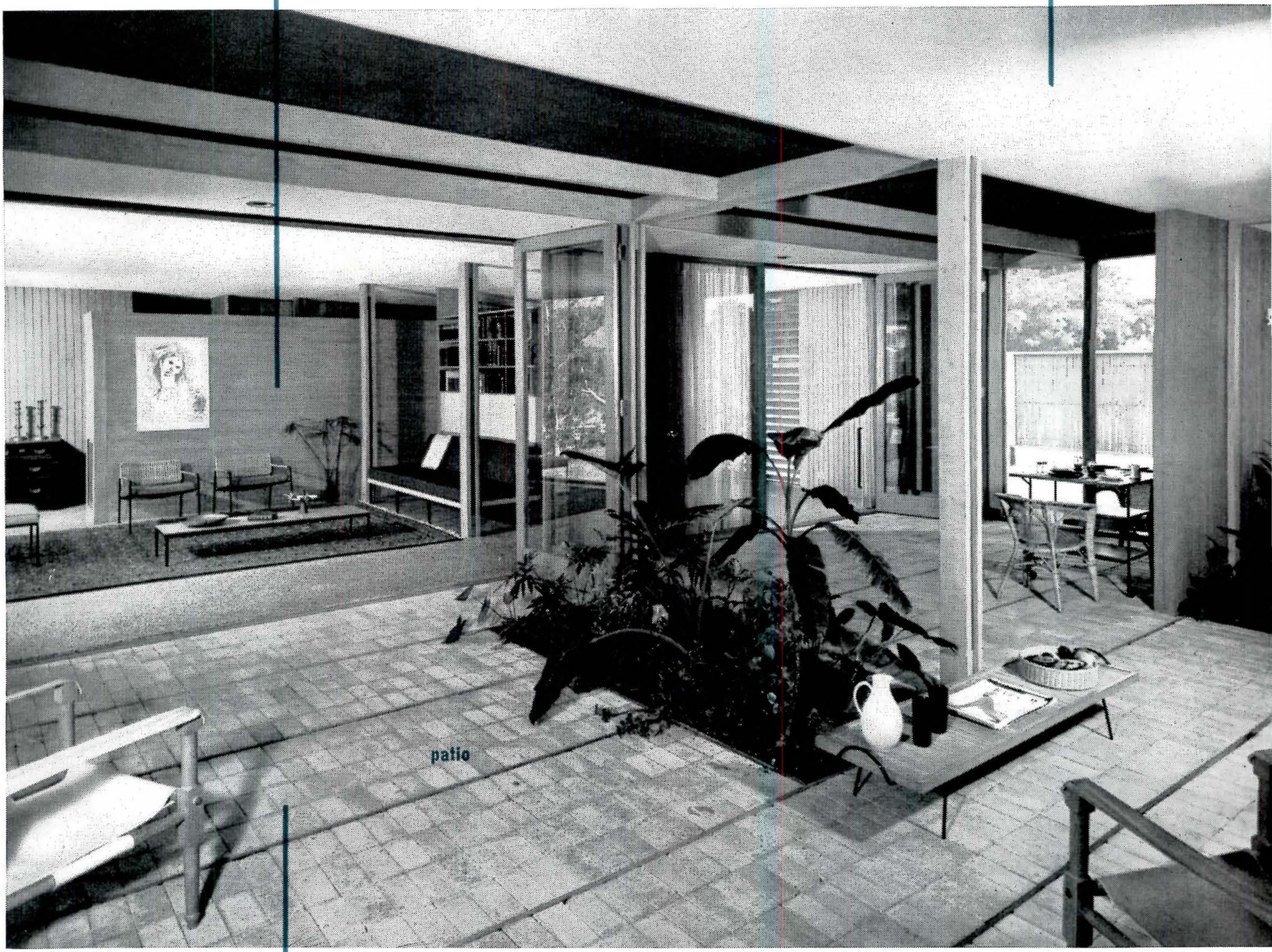
Page Beauchamp

structure determines interior design

There is an almost automatic inter-relation of the architecture and interior design in good contemporary examples. The two are integrated, if the designer thinks of them as an entity. When it is necessary for the architect to divorce himself to a degree from the actual mechanics and execution of interior design, the interior designer must always work in close accord with him from the conception of the structure. It is not enough to have good architecture, if the interior design is not sympathetic. The moment the design thoughts are separate, the finished product will suffer. But the ideal is achieved when the architecture *is* the interior design. Structure is design and design is structure. This, of course, need not lead to bleakness and coldness.

The beauty of many materials in their natural state precludes any chance of ugliness. Here we have design not for design's sake, but for design's usefulness and beauty. Walls, ceiling, and flooring should accomplish their purposes without benefit (if that term is applicable) of extraneous elements—meaningless weakeners of the original concept. All that need be added are the necessary tools of comfort—furniture and fabrics that complement the scheme and make it workable, at the same time contributing to the building's personality, color that is sympathetic, lighting that sets the stage, and humidity and temperature control for complete ease. A variation in textures and proper space division complete the picture.

structure determines interior design

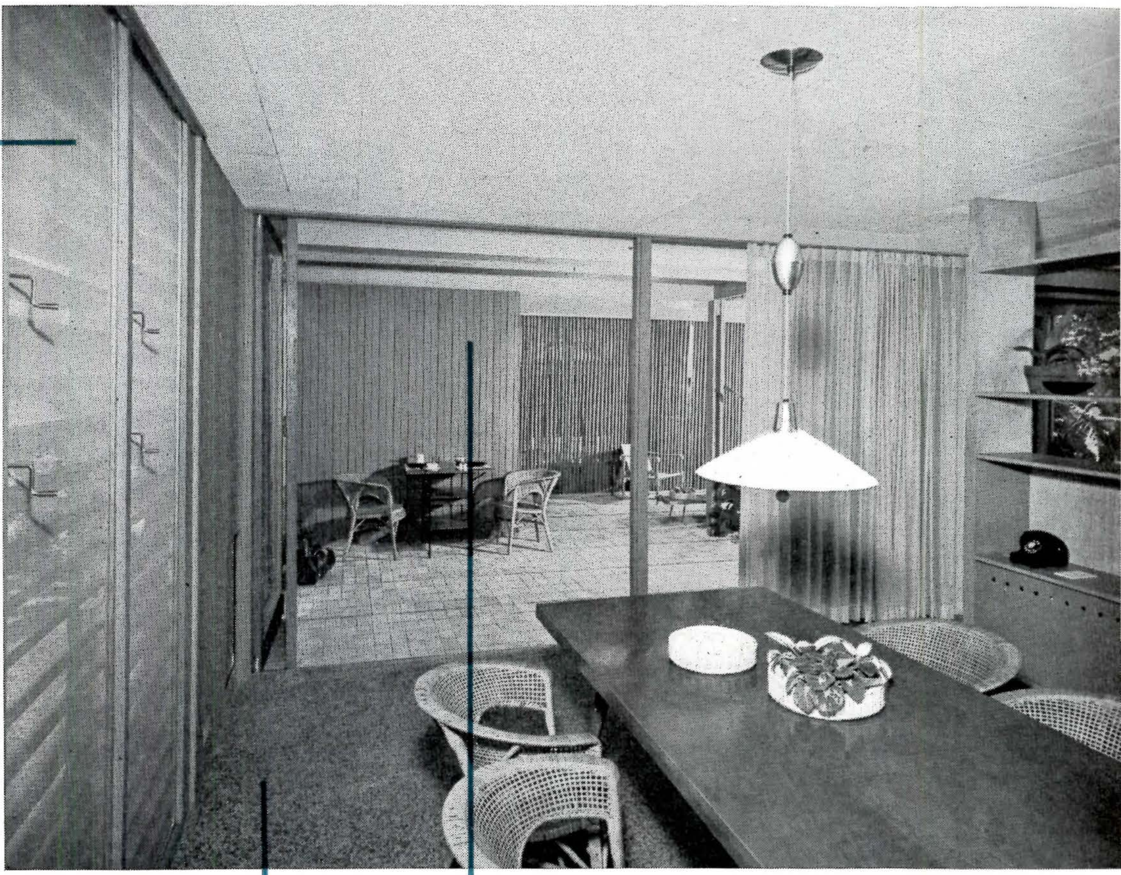


By using materials in their natural state, and by creating a private view of a patio area to each room, the designer has achieved a homelike atmosphere in a building which is combination office and residence. The partitions have been cleverly planned to allow rearrangement of rooms whenever necessary, without having to make any structural changes. The simple lines of the house lend an ease and grace normally found in a much more elaborate plan. Reliance on texture for the only ornamentation has proved successful.

Photos: Rada Photography

location	Morrison Dental Clinic, Tampa, Florida
architect	Mark Hampton

glass jalousies



terrazzo

rough-sawn cypress vertical strips

data

cabinetwork

All cabinetwork: designed by architect/ executed by contractor.

doors and windows

Windows: glass and wood jalousies/ Wagner Distributers, Miami, Fla.

equipment

Heating: "Typhoon Prop-R-Temp" Heat Pump, Tampa, Fla.

Thermostat: Minneapolis-Honeywell Regulator Company, 2753 Fourth Ave., So., Minneapolis 8, Minn.

Ceiling Exhaust Fans: Pryne & Co., Inc., N. Towne & Railroad Ave., Pomona, Calif.

furnishings and fabrics

Cane-Back Chairs: Ed Hoffman, Clearwater, Fla.

Furnishings: supplied by owner.

lighting

Recessed-Ceiling and Wall-Mounted Fixtures: General Lighting Co., Inc., 1527 Charlotte St., New York, N. Y.

walls, ceiling, flooring

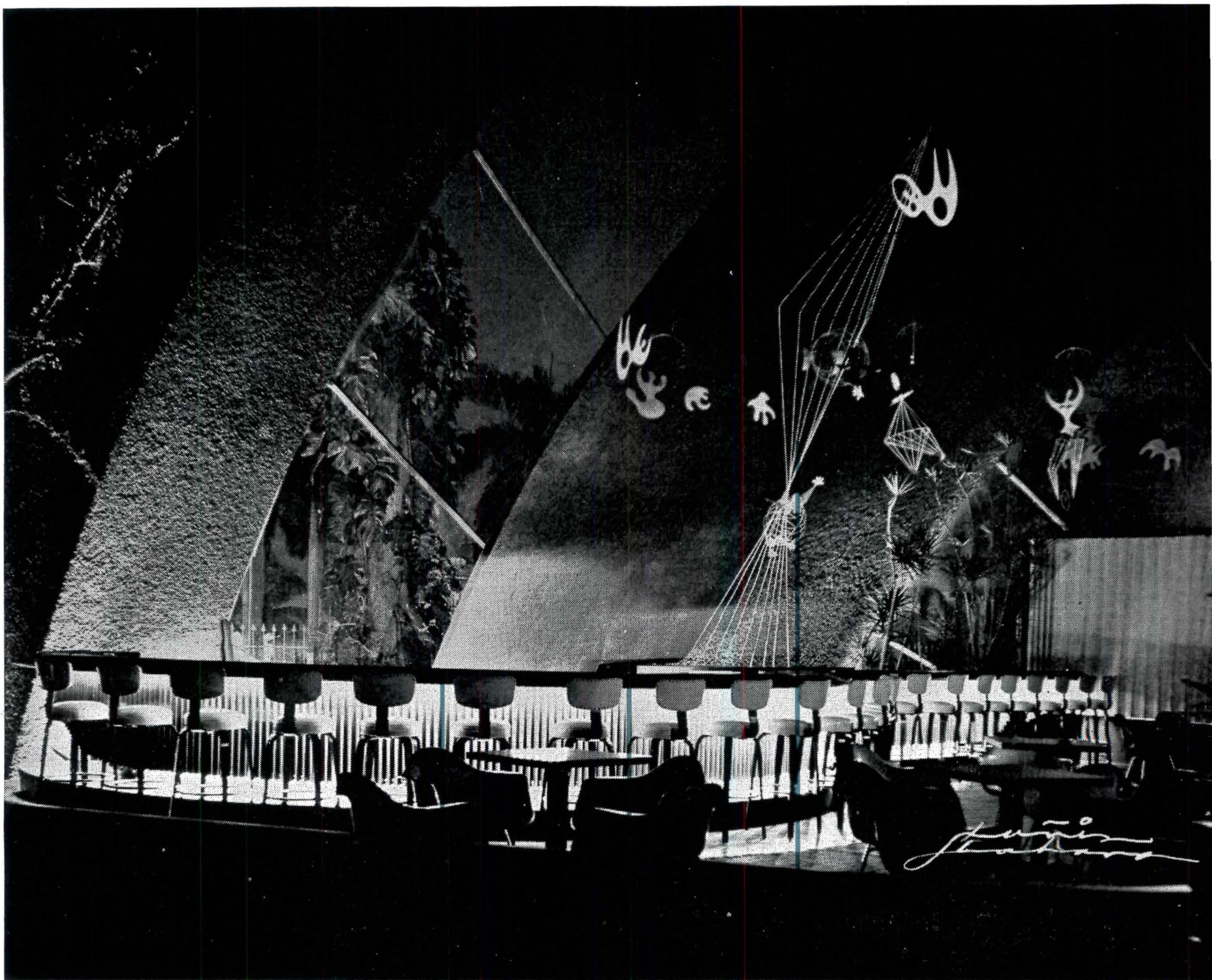
Walls: used brick, painted plywood, vertical paneling.

Ceiling: ¾" "Fiberglas"/ Owens-Corning Fiberglas Corp., 1833 Nicholas Bldg., Toledo 1, Ohio.

Flooring: monolithic terrazzo on 4" slab/ lime brick on patio.

used brick

structure determines interior design

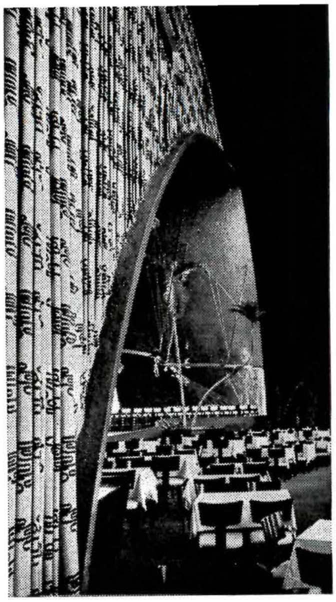


recessed lighting

mobile

serpentine bar

location	Tropicana night club, Havana, Cuba
architect	Max Borges, Jr.



The epitome of melding of architecture and interior design is reached in this structure. The ceiling and walls are the shell of concrete and glass. The structure itself is the design. Rough-textured concrete in dark color makes the glass areas seem invisible, and the surrounding glamorous plantings and tropical sky become the decor. The feeling of being out-of-doors is accomplished without sacrificing the comfort of an enclosure. Simplicity of furnishings keeps them exactly where they belong. Had the designer tried to do them in a larger scale, or in a more dramatic way, he would have destroyed the effectiveness of the building itself. *Small Photos: J. Alex Langley*
Large Photos: Muñis, Havana

data

doors and windows

Doors: "Herculite" heat-tempered glass doors/ Pittsburgh Plate Glass Co., 632 Fort Duquesne Blvd., Pittsburgh 22, Pa.

Windows: fixed plate glass/ Pittsburgh Plate Glass Co.

furnishings

Dining Chairs and Bar Stools: Thonet Industries, Inc., One Park Ave., New York, N. Y.

Bar Chairs: designed by Charles Eames/ Herman Miller Furniture Co., Zeeland, Mich.

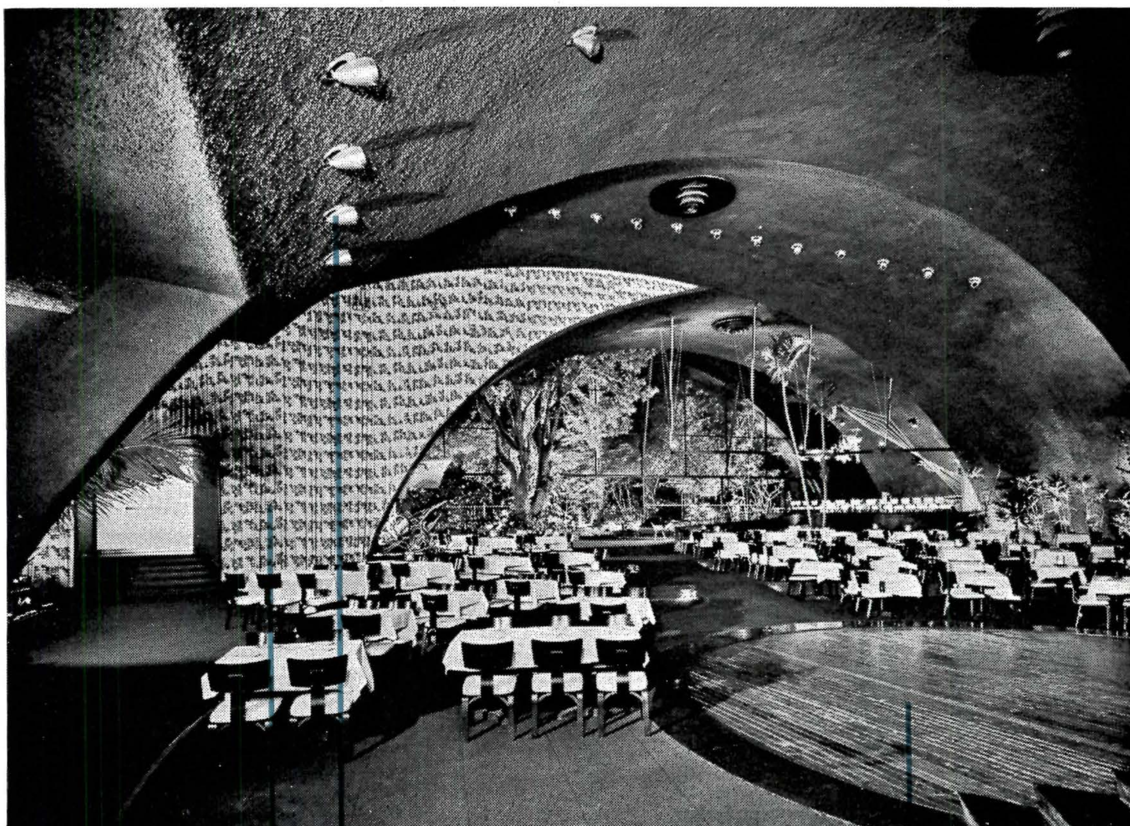
lighting

Arc Spotlights and Dimmers: Kliegl Bros., Universal Elec. Stage Lighting Co., Inc., 321 W. 50 St., New York, N. Y.

walls, ceiling, flooring

Walls, Ceiling: acoustical plaster/ Tuckahoe Stucco Corp., Tuckahoe 7, N. Y.

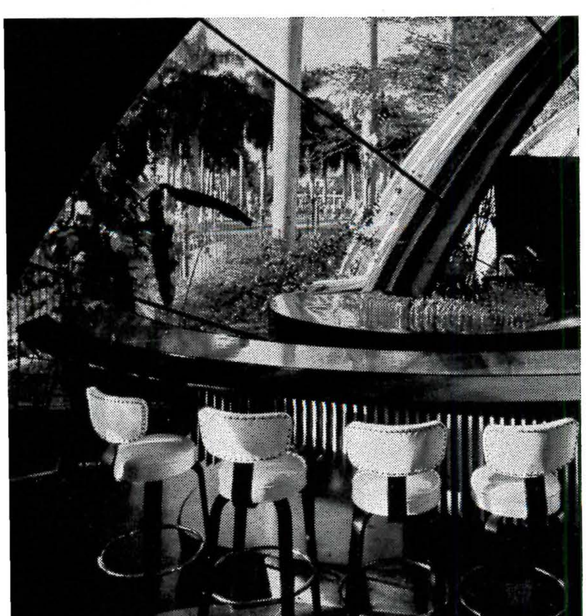
Flooring: carpeting/ A. & M. Karagheusian, Inc., 295 Fifth Ave., New York, N. Y.



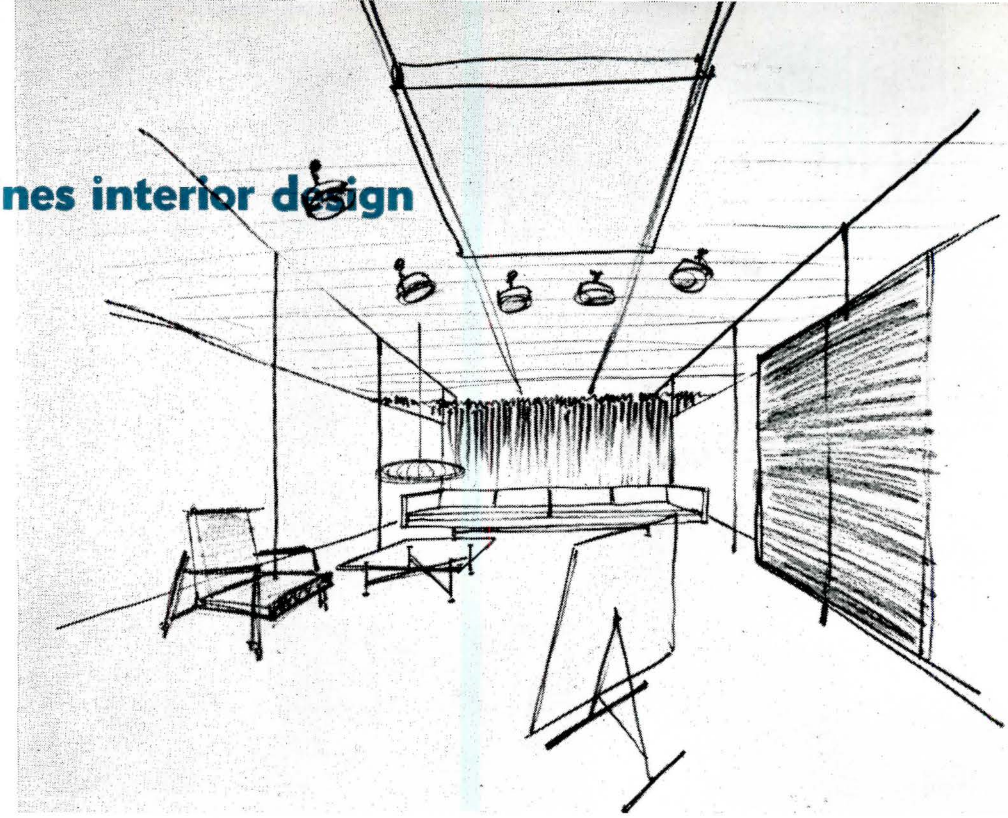
fabric-draped wall

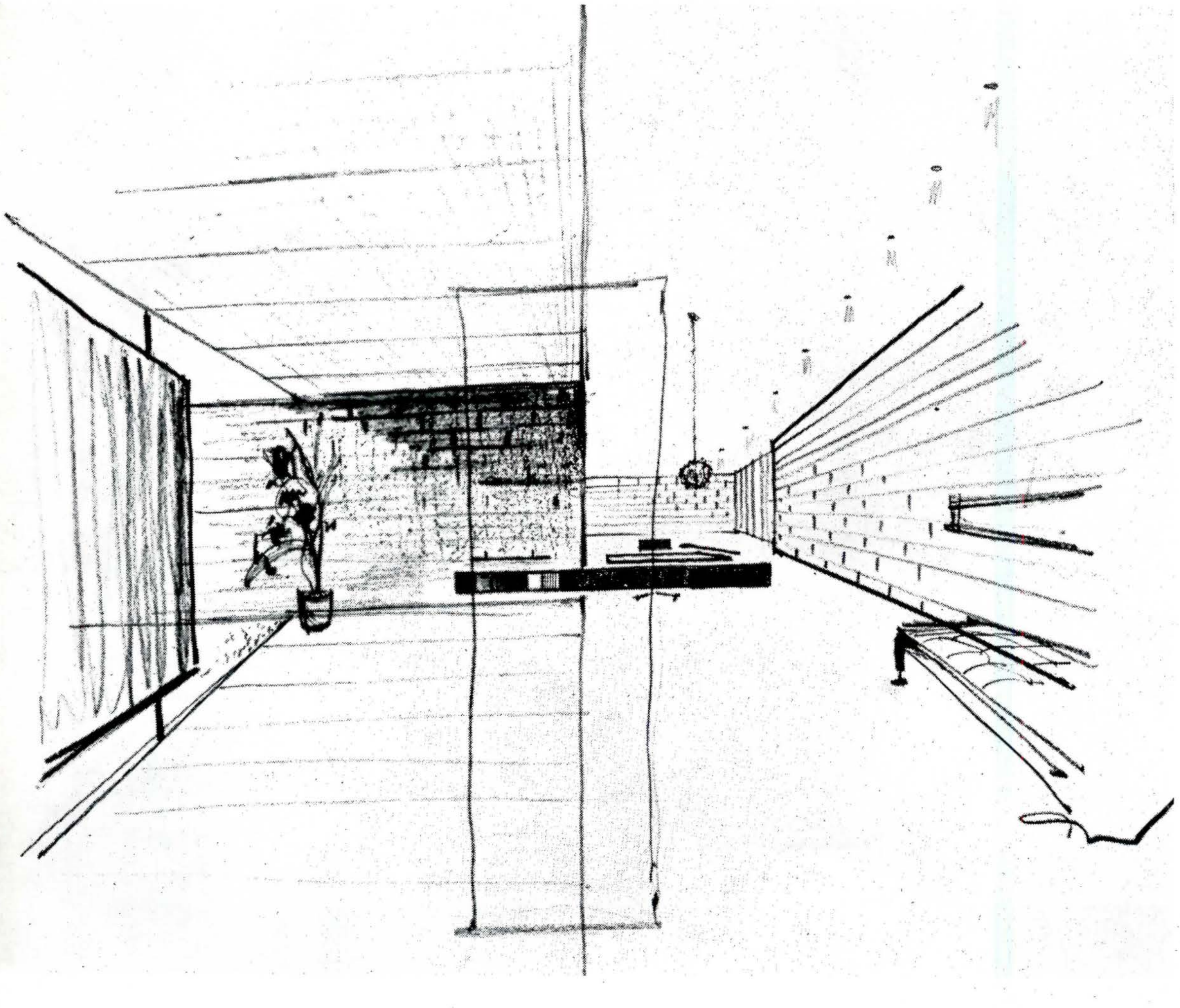
oval dance area

spotlights



structure determines interior design





location	Tower Fabric showroom, New York, New York
interior designers	Designs for Business, Inc.

A fascinating design theory is expressed in the execution of this fabric showroom. The fabrics are well-styled inexpensive ones. The designer decided that the background should be as unobtrusive as possible, yet help to give the fabrics the look of importance. Thus, the cinder blocks which determine space division have been left in their natural state. The lighting is set up in much the same way it might be in a photographic studio. No fabrics are seen in the entrance or reception area, except small squares at the reception desk. The fabrics are shown only in the showrooms. Here elegance is achieved with furniture and fabrics, but still most important are the fabrics being shown. No display interferes with the presentation.

Photo: Ben Schnall

data

cabinetwork

Reception Closet, Reception Desk, Entrance Wall, Shelving, Desks, and Tables: custom/ executed by Ezra Blank Associates, 117 Lombardy St., Brooklyn, N. Y.

doors

Doors: custom, 9 ft. high/ Jacob Kotler Co., Inc., 8 W. Fourth St., New York, N. Y.

Entrance Partition: custom design/ glass, "Misco Polished Wire Glass"/ Pittsburgh Plate Glass Co., 632 Fort Duquesne Blvd., Pitsburgh 22, Pa./ executed by Ezra Blank Associates.

equipment

Musical System: recessed in ceiling/ Allen Communications, Inc., 1845 Broadway, New York, N. Y.

furnishings and fabrics

Bench (in lobby): custom/ executed by Cumberland Upholsterers, 986 Second Ave., New York, N. Y./ upholstery: white horsehair/ Marie Nichols Fabrics, 300 E. 61 St., New York, N. Y.

Seating Units: George Tanier, 521 Madison Ave., New York, N. Y.

lighting

Recessed Pinpoint Spots: Century Lighting, Inc., 521 W. 43 St., New York, N. Y.

Clip-on Fixtures: Swiveliere Co., Inc., 30 Irving Pl., New York, N. Y.

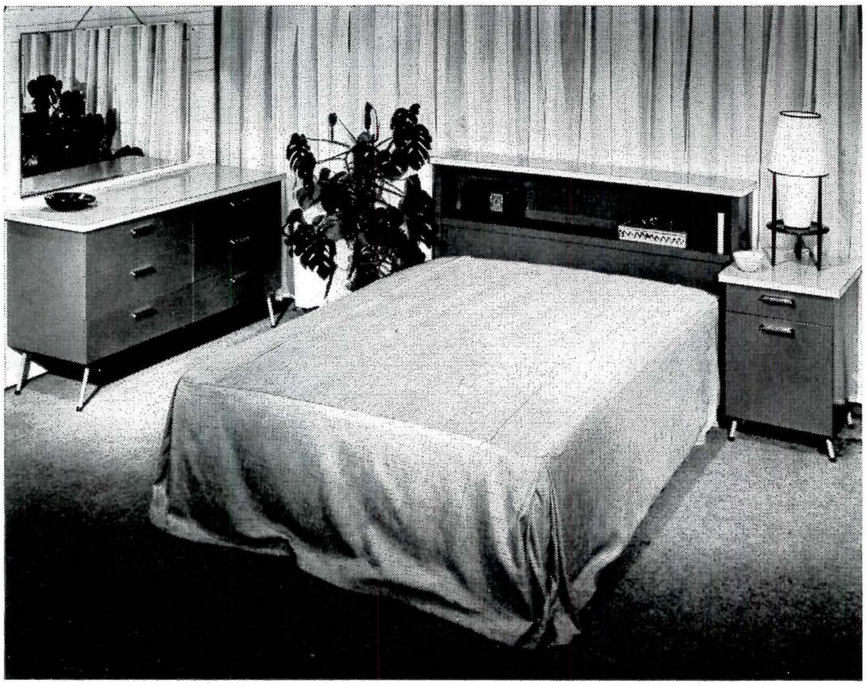
Acusti-Luminus Ceiling: luminous Ceiling, Inc., 2500 W. North Ave., Chicago 47, Ill.

walls, ceiling, flooring

Walls: cinder block, neutral gray/ Waylite Company, 424 Madison Ave., New York, N. Y.

Ceiling: acoustical tile/ Celotex Corp., 101 Park Ave., New York, N. Y.

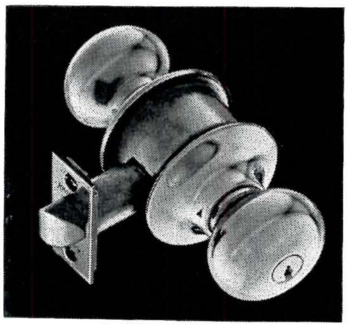
Flooring: White sheet rubber/ R.C.A., 273 Ten Eyk, Brooklyn, N. Y.; 3" x 18" herringbone-pattern cork, "Kencork"/ Kentile, Inc., 58 Second Ave., Brooklyn, N. Y.; black vinyl tile/ Robbins Floor Products, Inc., Tuscombia, Ala.



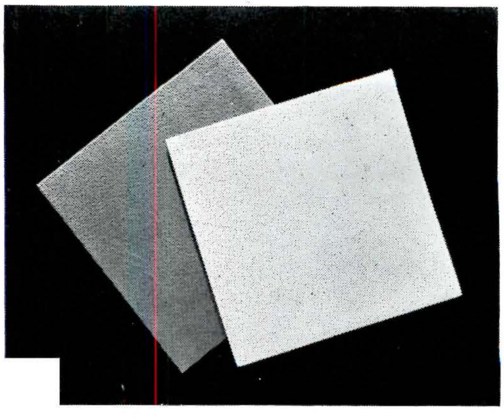
Bedroom Furniture: "For-Ever Modern"/ steel construction with plastic tops/ includes double dresser, single dresser, double and single headboards, night stand and desk/ finished in limed-oak with chocolate-brown case and white with Gothic-gray case/ designed by John Keal/ **The Stor-All Corporation, 1715 W. Florence Ave., Inglewood 5, Calif.**

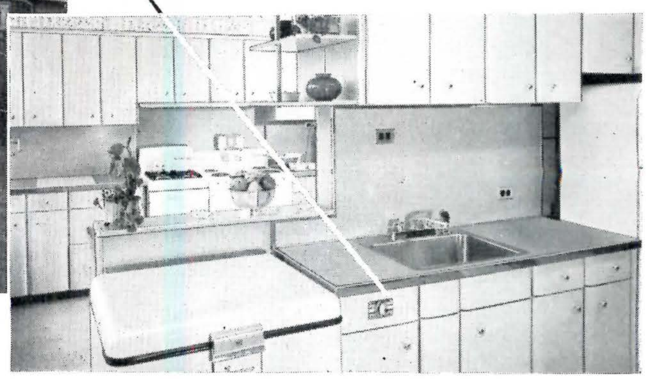
Chairs: #9480, #9481/ tapered legs of U-shaped heavy laminations/ wood stretchers, seat and back of molded plywood, upholstered in fabric-covered 2" rubber filling/ 18" x 18" x 31" high/ designed by Jean Giaccomme/ **Thonet Industries, Inc., One Park Avenue, New York, N. Y.**

Door Knob: Series 600/ 6-pin tumbler lockset/ "push button" and "turn button" combined for automatic locking/ 1/2" latch bolt/ reversible for right- or left-hand doors/ **Kwikset Locks, Inc., Anaheim, Calif.**

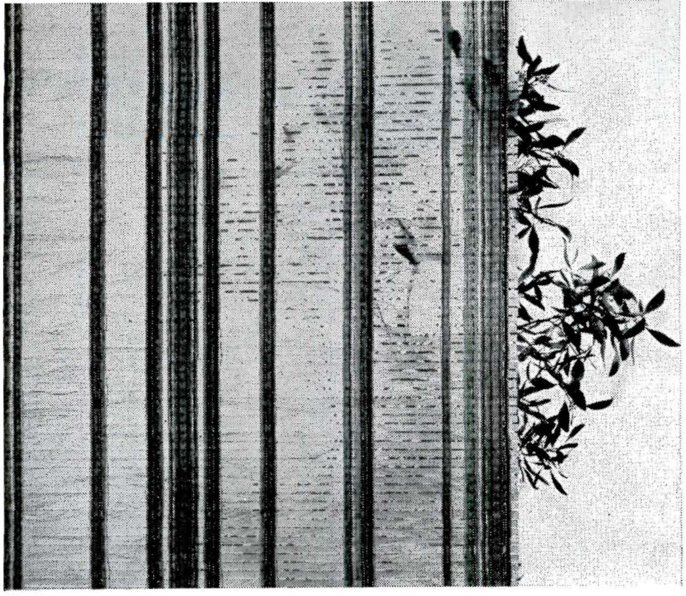


Leather Floor Tiles: 8" squares/ vinyl finish and fireproof finish/ may be cleaned with soap and water/ only care required is waxing/ applied with linoleum cement/ colors: white, rust, tan, red, green, black/ may be special ordered in any color or size/ **retail:** 65¢ per square/ **The Upholstery Leather Group, Inc., 141 E. 44 St., New York 17, N. Y.**

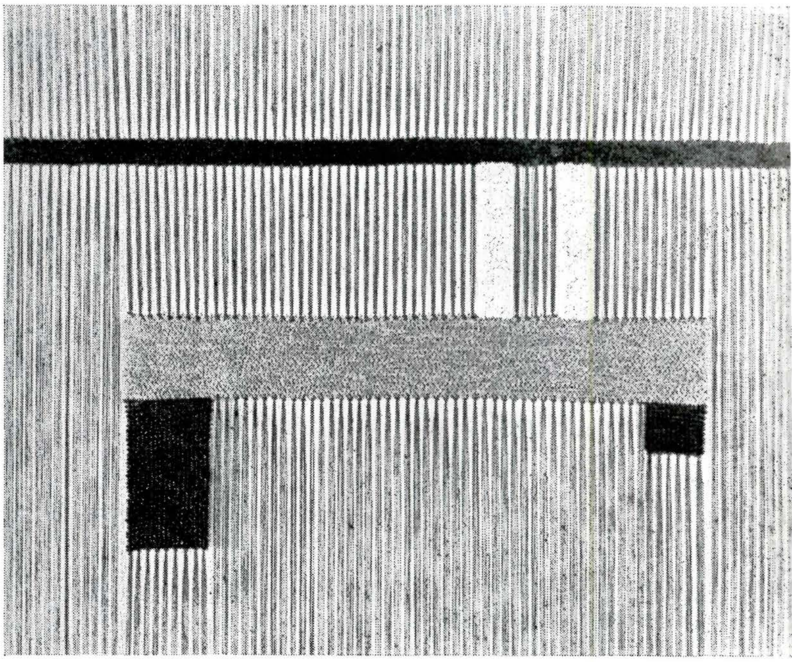




p/a interior design products

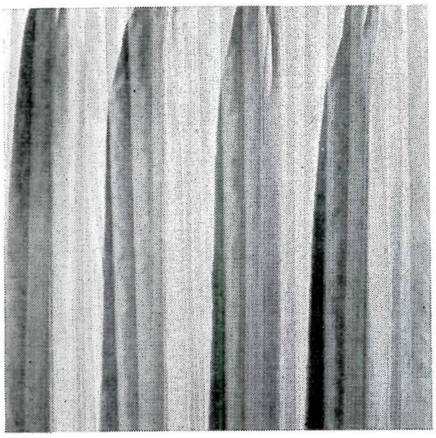


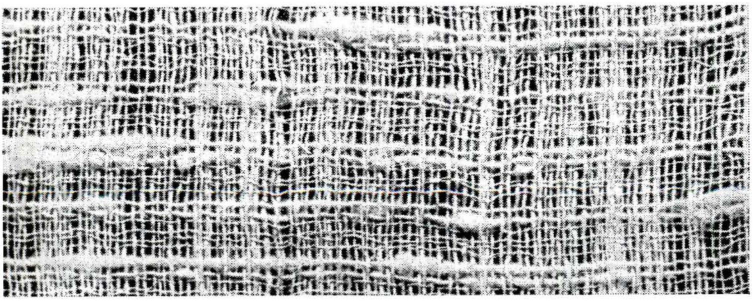
Hand-Woven Plastic Blinds: available in any width up to 96"/ opaque plastic slats woven with any color yarn to order/ may be used as standing screens, roller-type blinds, space dividers, accordion pleated blinds, or traverse draperies/ designed and executed by Helen Skowronski/ **Kneedler-Fauchere, 451 Jackson St., San Francisco, Calif.**

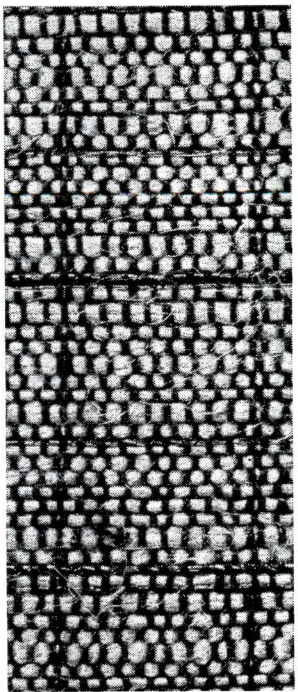


Open-Work Tapestry: motif of dark chenille yarns exposing a black cotton warp/ designed by Lynn Alexander/ **Jack Lenor Larsen, Inc., 60 E. 58 St., New York 22, N. Y.**

Drapery Liner: "Fiber-Temp"/ has insulating quality and sound absorption/ moth-proof, may be washed or dry-cleaned/ 40" wide/ **retail:** $5.25/ **Jack Lenor Larsen Inc., 60 E. 58 St., New York 22, N. Y.**

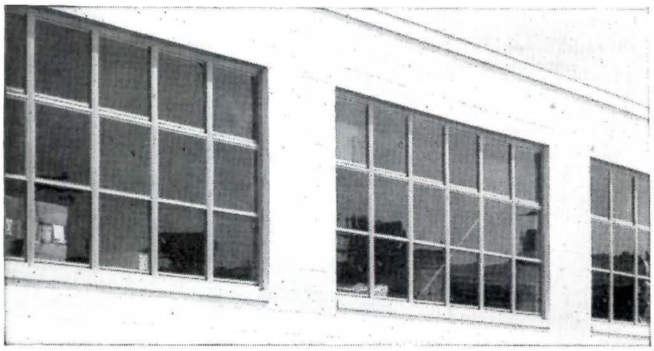






Fabrics: "Glacia"/ linen, French wool, and white aluminum/ width, 52"/ **retail:** $10.50 a yd./ "Ginger Weave"/ yarn-dyed linen, viscose, and colored Metlon guimpe/ 54" wide/ **retail:** $11.25/ **Jack Lenor Larsen, 60 E. 58 St., New York 22, N. Y.**

These **RUSCO** Products Offer Unique Advantages For Efficient Remodeling and Modernization

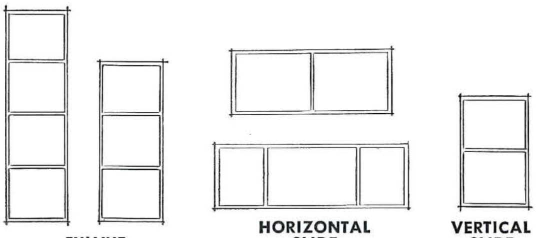


For Window Modernization—or Simplified Replacement

RUSCO *Hot-Dipped Galvanized Steel* PRIME WINDOWS

Fully Pre-Fabricated, Ready-to-Install Units

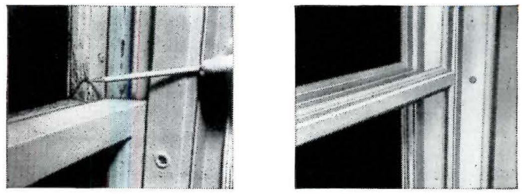
These windows offer exceptional characteristics of design flexibility, weather tightness and economy. Precision-manufactured in complete form—glazed, finish-painted with baked-on enamel, fully weatherstripped, complete with casing. Installation is extremely simple and fast. Units easily joined in series with streamlined non-load-bearing mullions. Available with insulating sash and Fiberglas screen, if desired.



FULVUE HORIZONTAL SLIDE VERTICAL SLIDE

Available in wide range of styles and sizes.

before after

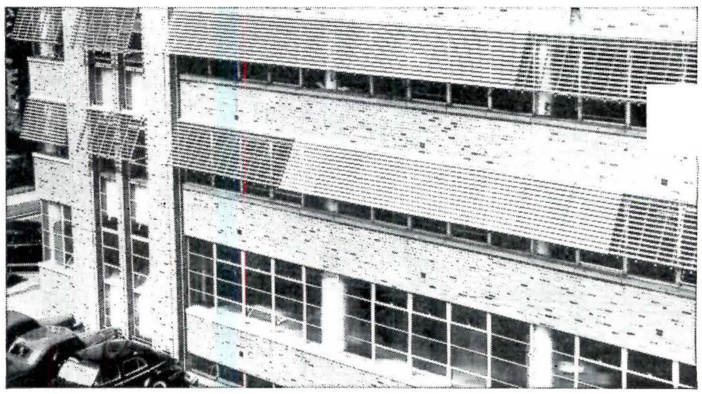


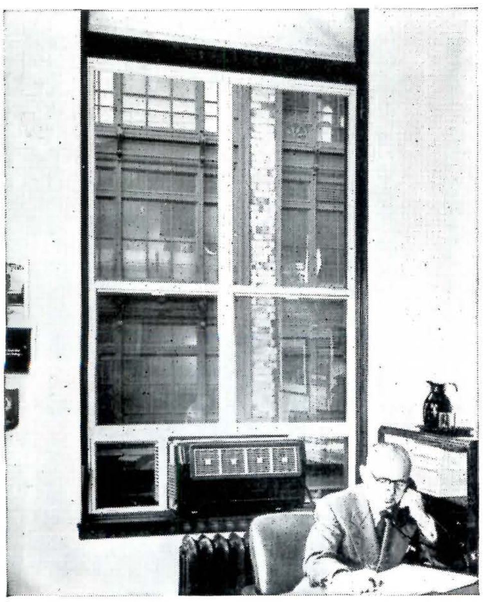
Photos show how Rusco Prime Window units with insulating sash were used to replace old, worn wood windows in Hollenden Hotel, Cleveland, Ohio. Complete replacement effected in *hours* — room back in service same day!

For Attractive, Efficient, Controlled Window Shading

RUSCO *Adjustable* VENETIAN AWNINGS

A permanent treatment that gives truly effective control of shade, light and ventilation. Louvers are adjustable from inside with gear operator. You will find Rusco Venetian Awnings an ideal answer to the proper shade treatment so necessary to efficient air conditioning installations. Allow continuous air flow, insulate against heat and dispel it. Available in Bonderized, galvanized steel or alodized aluminum —finish-painted with baked-on enamel.





For Practical, Workable Window Unit Air Conditioning

RUSCO Air Condition WINDOW

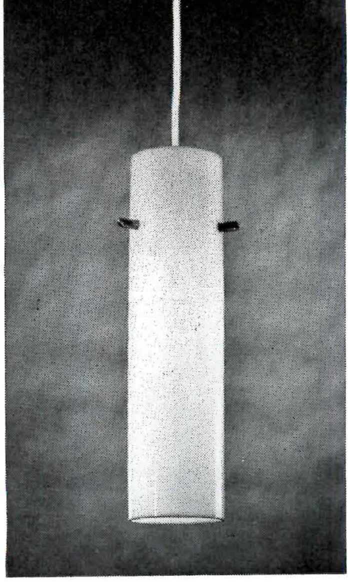
The first window unit designed to accommodate any type of window air conditioner. Completely replaces conventional window. All glass panels, including flankers, are removable from inside for washing, eliminating window cleaning problems. An extra lower glass panel replaces air conditioner unit and flankers when unit is removed for storage or servicing.

RUSCO *Hot-Dipped Galvanized Steel* **PRIME WINDOWS**

For illustrated literature and specifications, write

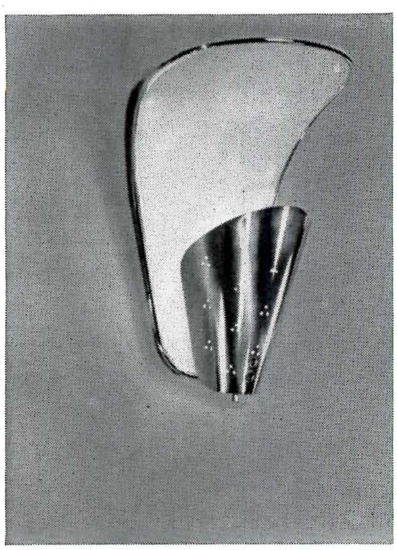
THE F. C. RUSSELL COMPANY, DEPT. 7-PA64

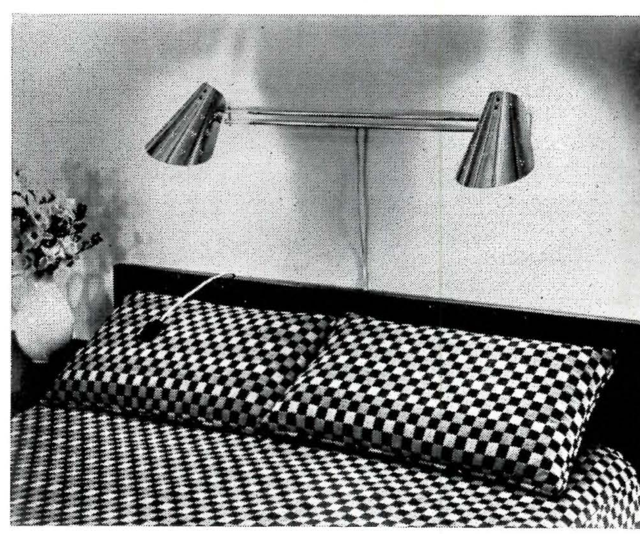
Cleveland 1, Ohio • In Canada: Toronto 13, Ontario

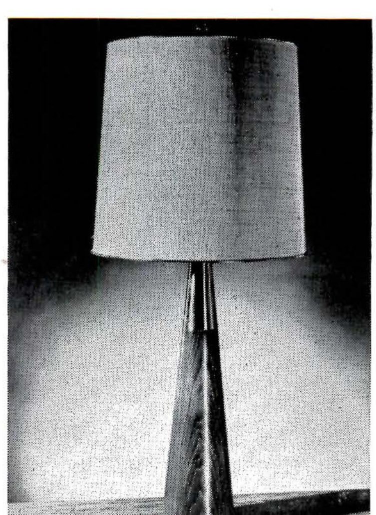


Ceiling Fixture: #560-G/ opal-glass cylinder held by three polished-brass prongs/ height, 20"; diameter, 5"/ stem available in varying lengts/ designed by Paul Meyen/ **retail:** $24/ **Habitat Associates, 837 Madison Ave., New York 22, N. Y.**

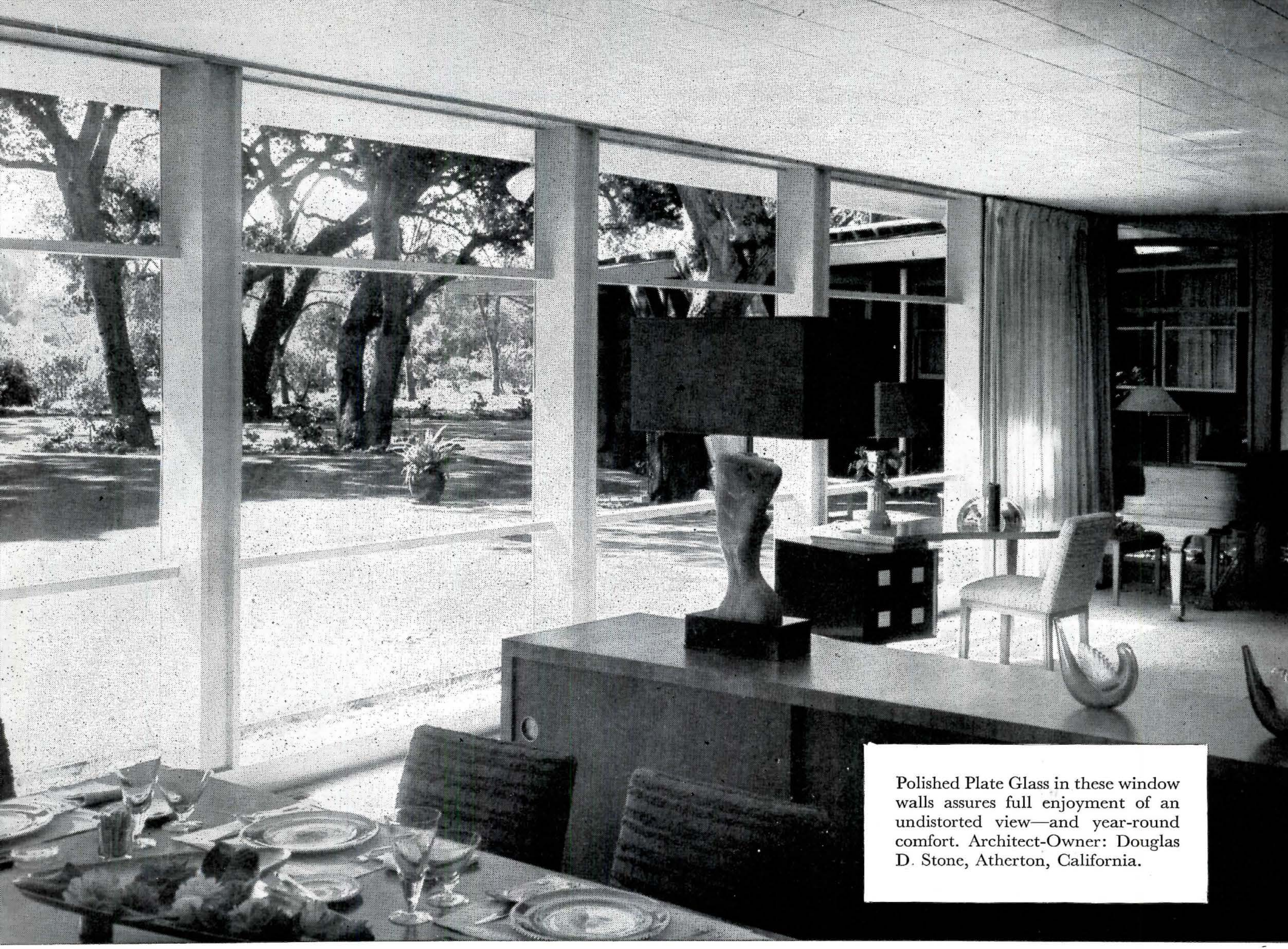
Table Lamp: #3864/ 5-arm brass tubing with pierced-brass shades/ 23" high/ designed by Edmont J. Spence/ **retail:** $80/ **Rembrandt Lamp Corp., Erie at Fairbanks Court, Chicago 11, Ill.**





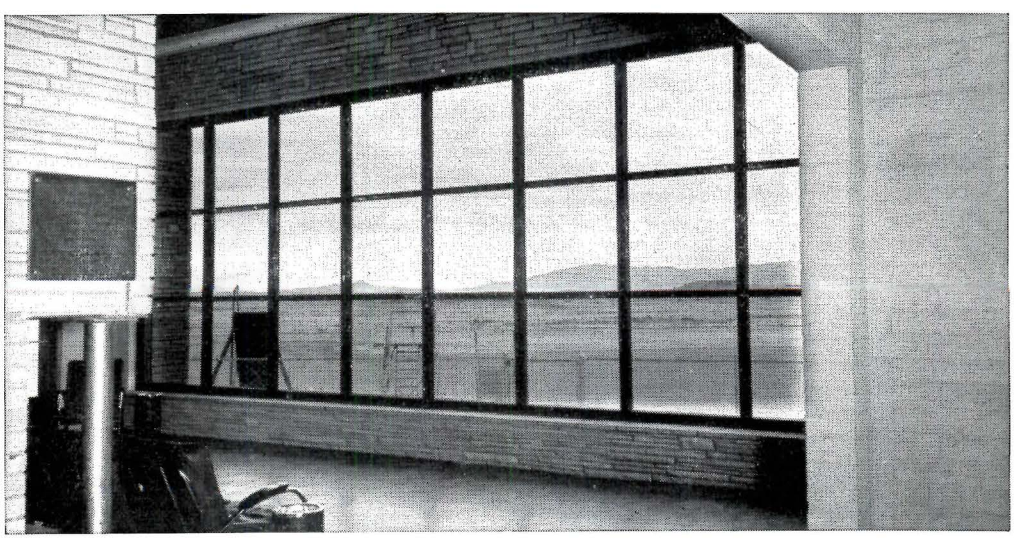


Lamps: #40508 (above), wall lamp with brass pierced shield and Italian white reflector sconce/ 16½" x 11" x 7" deep/ **retail:** $29.90/ #30703 (right), walnut-stained Korina and polished-brass conical base, Madagascar cloth shade/ designed by Gerald Thurston/ **retail:** $39/ #40507 (far right), bed lamp/ three-way switch attached to cord for convenient regulation/ 32" horizontal brass bar with two brass shields/ **retail:** $42/ **Lightolier, Inc., 11 E. 36 St., New York, N. Y.**



Polished Plate Glass in these window walls assures full enjoyment of an undistorted view—and year-round comfort. Architect-Owner: Douglas D. Stone, Atherton, California.

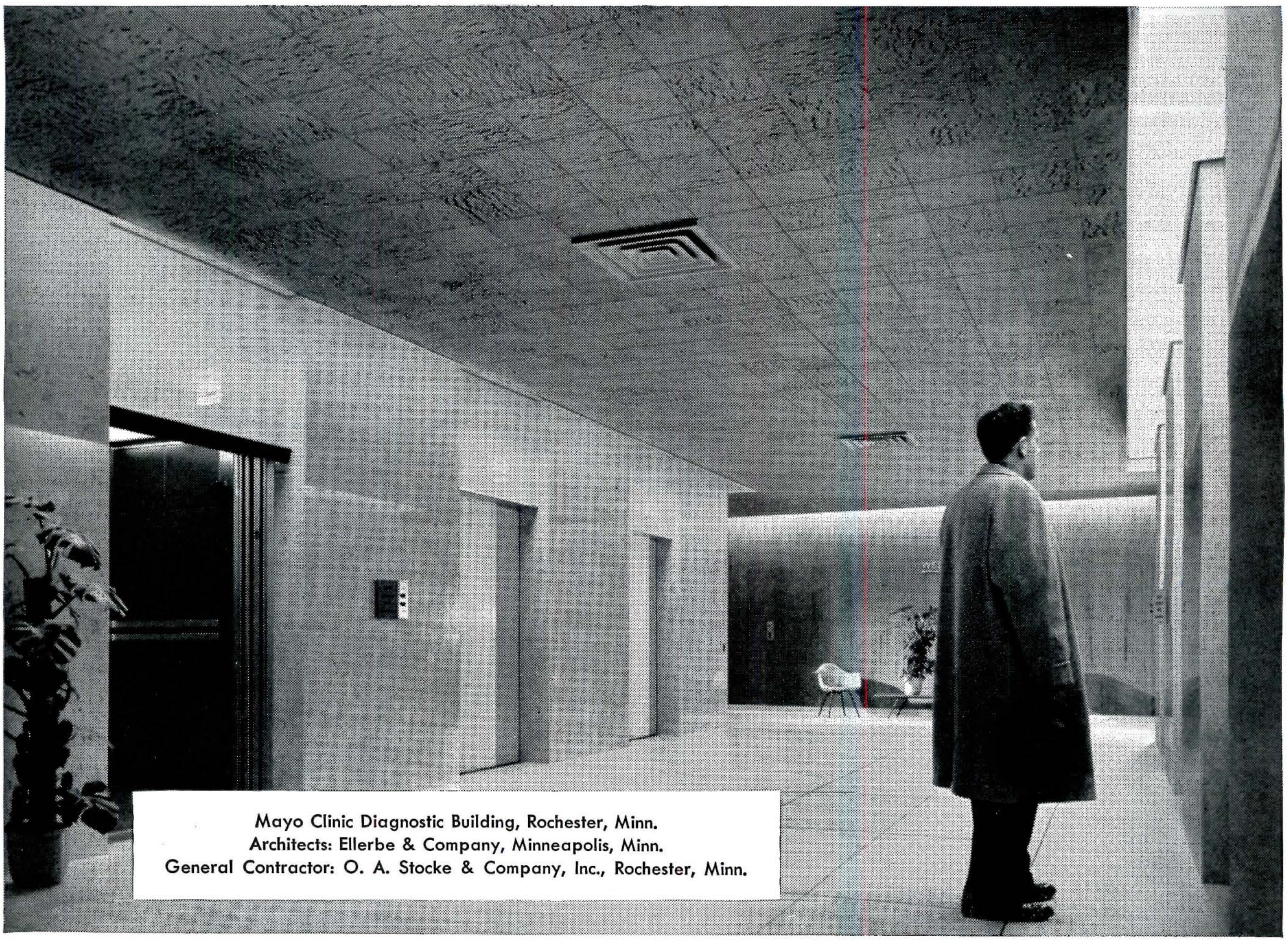
L·O·F POLISHED PLATE GLASS



Thermopane insulating glass in the Prescott (Arizona) Municipal Air Terminal Building helps insulate the building against both heat and cold . . . saves on heating costs.

POLISHED PLATE GLASS

LOF GLASS
Corrulux
FIBER-GLASS



Mayo Clinic Diagnostic Building, Rochester, Minn.
Architects: Ellerbe & Company, Minneapolis, Minn.
General Contractor: O. A. Stocke & Company, Inc., Rochester, Minn.

QUIET: Good for what "ails" a Clinic

When Mayo Clinic, Rochester, Minn., chose Acousti-Celotex tile to sound-condition its beautiful new Diagnostic Building—it hit upon the most economical, attractive, lowest-cost way possible.

For here was an example-in-use of efficient materials with high sound-absorption value . . . *plus* quick and easy installation, and minimum maintenance . . . *plus* magnetic eye-appeal that blended harmoniously with the established decor.

Varied Materials Used

In the total 187,175 square feet of acoustical treatment given the Diagnostic Building, a variety of Acousti-Celotex tile types were utilized to meet specific needs. Where frequent cleaning was an important factor, Acousteel was installed. To answer the essential purpose of *washability* and *paintability* . . . Acousti-Celotex Perforated Mineral Fiber Tile. And Celotone®, an incombustible fiber tile with rich, deep, sculptured effect, proved the ideal solution in every instance requiring smart decoration. All tile is white, except for areas such as the beautiful elevator lobby pictured above. This was spray-painted green.

Remarkable Results

In the Acousti-treated areas . . . elevator lobbies, corridors; seminar, secretaries', and audiometer rooms; and in desk sections . . . the acoustical results are extremely gratifying. Where the routine noise of daily clinic activity might be a source of high irritation to all occupants of the building . . . Acousti-Celotex Sound Conditioning brings *quiet comfort* that helps patients rest and relax, improves morale and efficiency of the clinic staff.

No matter what the project . . . whatever the requirements of acoustics, building code, or design itself . . . your local Acousti-Celotex distributor is ready to assist you. His training, backed by the world's most experienced acoustical organization, can help you solve your specifications problem. For details, write The Celotex Corporation, Dept. C-64, 120 S. LaSalle St., Chicago 3, Illinois. In Canada: Dominion Sound Equipments, Ltd., Montreal, Quebec.

Products for Every Sound Conditioning Problem

TRADE MARK

ACOUSTI-CELOTEX
REGISTERED U. S. PAT. OFF.
Sound Conditioning

THE CELOTEX CORPORATION, 120 S. LA SALLE ST., CHICAGO 3, ILLINOIS • IN CANADA: DOMINION SOUND EQUIPMENTS, LTD., MONTREAL, QUEBEC

★ *Editor's Note: Items starred are particularly noteworthy, due to immediate and widespread interest in their contents, to the conciseness and clarity with which information is presented, to announcement of a new, important product, or to some other factor which makes them especially valuable.*

air and temperature control

1-88. Central-Plant Air Conditioners (C-4.22), 6-p. folder with enclosed *Engineering Manual* describing cooling and heating units for multiroom applications. Horizontal and vertical models also provide ventilating, filtering, humidifying, and dehumidifying. Specifications; cutaway drawings; tables of dimensions, arrangements, nominal ratings, damper arrangements, dry-air friction data, valves and distributors, fan ratings. Drayer-Hanson, Inc., Box 2215 Terminal Annex, Los Angeles 54, Calif.

1-89. Electro-Air Electronic Air Cleaners, AIA 30-D-3 (C-10-4154), 8-p. bulletin giving construction features of electronic air cleaners for homes and smaller commercial and industrial buildings. Data on both horizontal and vertical units including specifications, dimensions, installation possibilities, principle of operation, cutaway drawings, and typical applications. Electro-Air Cleaner Co., 1285 Reedsdale St., Pittsburgh 33, Pa.

★ **1-90. Kewanee-Ray Boiler-Burner Unit, AIA 34-B-1 (1031),** 16-p. catalog with detailed information on boiler-burner unit for heating, power, and process steam using oil, gas, or gas-oil combination. Test data, description of construction and operation of component parts illustrated by cutaway drawing, specifications, ratings, and dimensions. Kewanee-Ross Corp., 101 Franklin St., Kewanee, Ill. and Ray Oil Burner Co., 1301 San Jose Ave., San Francisco 12, Calif.

1-91. Multi-Vent Air Diffusion Ceiling Panels (390-E-54), 6-p. folder on low-velocity air-diffusing panels for acoustical metal pan ceilings. Material and installation features, design advantages, panel cooling capacities, installation procedure for duct and plenum applications, panel selection chart. Detail drawings and photos. The Pyle-National Co., Multi-Vent Div., 1334 N. Kostner Ave., Chicago 51, Ill.

construction

2-102. The Skyline System of Roof Protection, AIA 12-B-2, file folder enclosing brochures on residential roofing systems. Required materials, application (illustrated) of built-up roofing over wood decks with inclines from ¾″ per ft to 2″ per ft; data on emulsion-type roof coating for use over existing built-up roofs, either asphalt or pitch and slag (or gravel); and application details and other information on both custom and standard asphalt-strip shingles for new construction where roof slopes are within range of 2″ to 4″ per ft. The Flintkote Co., Building Materials Div., 30 Rockefeller Plaza, New York 20, N. Y.

2-103. Reynolds Architectural Aluminum, AIA 15 (B2-12-1053), 16-p. brochure describing architectural advantages of aluminum and many of its architectural applications. Cross-section details of aluminum thresholds, sills, railings, gravelstops, and copings; tables giving sizes of square and rectangular tubing, pipe, square and rectangular bars, rods, sheet and plate, angles, channels, tees, and extrusions. Finishes, brief description of fabrication, short-form specification. Reynolds Metals Co., 2500 S. Third St., Louisville 1, Ky.

2-104. The Modern Lightweight Masonry Unit for Walls and Floors, 24-p. brochure giving detailed data on properties of hollow concrete-aggregate blocks. Available shapes and sizes; physical data including fire-retardant rating hours, sound-transmission decibel reduction, and thermal "U" value; description of various applications; exterior and interior finishes, eight pages of construction details. The Waylite Co., 105 W. Madison St., Chicago 2, Ill.

doors and windows

3-79. American Maid, AIA 29-H-32, 12-p. folder describing glass shower doors, tub enclosures, and partitions. Illustrated models, possible arrangements, construction features, illustrations of available designs. Also, information on glass refrigerator doors and stainless-steel and plate-glass medicine cabinets. American Shower Door Co., Inc., 936 N. Cahuenga Blvd., Hollywood 38, Calif.

3-80. The Kwikset "400" Line (400 4 PC-3), 4-p. booklet giving general specifications for line of locksets for interior, exterior, and closet doors. Data on cylindrical deadlock for use as auxiliary lockset, school room lockset, dummy knob, entry handle, adapter ring, and installation aids. All models illustrated. Kwikset Sales and Service Co., Anaheim, Calif.

3-81. A Perfect View Thru Malibu Sliding Glass Doors (B-108-54), 4-p. folder outlining features of sliding glass doors with 14-gage steel frames and reinforced galvanized sills for residential, industrial, or commercial installation. Data on available types and sizes, full-size details of head, threshold, closing jamb, and fixed jamb; specifications; installation details for frame and stucco, brick veneer, frame and siding, and concrete block. Photos of installations. Malibu Mfg. Corp., 8438 Melrose Ave., Los Angeles 46, Calif.

3-82. Modular Standard Wood Windows (WSS-45), 12-p. revised manual including Commercial Standard CS163-49 for Ponderosa pine stock windows, sash, and screens. Full-size details of wood windows, storm sash, single sash, and screens; tables giving opening sizes and other data on plain and check rail windows, casement, cellar, and utility sash, and storm sash and screens; information on coordination of multiple window openings; installation details. National Woodwork Manufacturers Assn., 332 S. Michigan Ave., Chicago 4, Ill.

3-83. Panaview Aluminum Sliding Doors and Windows, AIA 16-E (5302), 14-p. brochure describing sliding doors and windows made of extruded heavy-gage aluminum. Full-size details, stock sizes, specifications, suggested details (frame, concrete block, brick, and brick veneer) for both doors and windows. Photos of installations. Panaview Co., 13434 Raymer St., North Hollywood, Calif.

3-84. Russwin "Stilemaker" Heavy-Duty Locksets, 12-p. catalog covering line

(Continued on page 151)

PROGRESSIVE ARCHITECTURE, 330 W. 42nd Street, New York 36, N. Y. I should like a copy of each piece of Manufacturers' Literature circled.

1-88	3-80	4-67	8-50
1-89	3-81	4-68	8-51
1-90	3-82	5-19	8-52
1-91	3-83	5-20	9-36
2-102	3-84	6-30	9-37
2-103	4-64	6-31	
2-104	4-65	7-25	
3-79	4-66	8-49	

Name

Position

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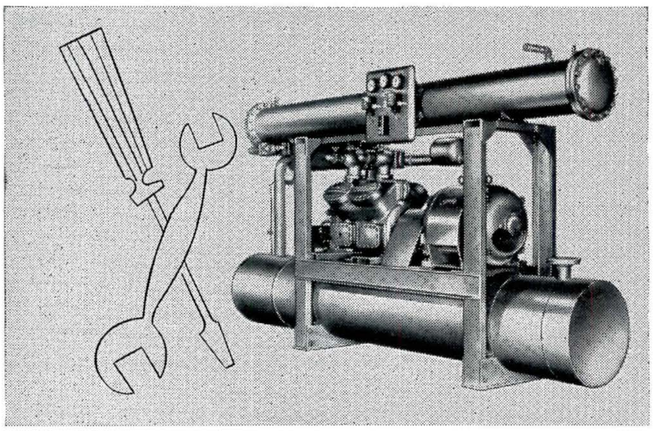
Mailing Address ☐ *Home* ☐ *Business*

City *State*

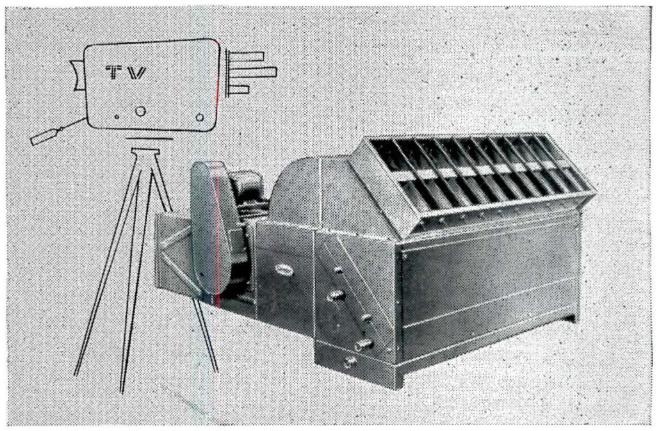
please print

(To obtain literature, coupon must be used by 8/1/54. We request students to send their inquiries directly to the manufacturers.)

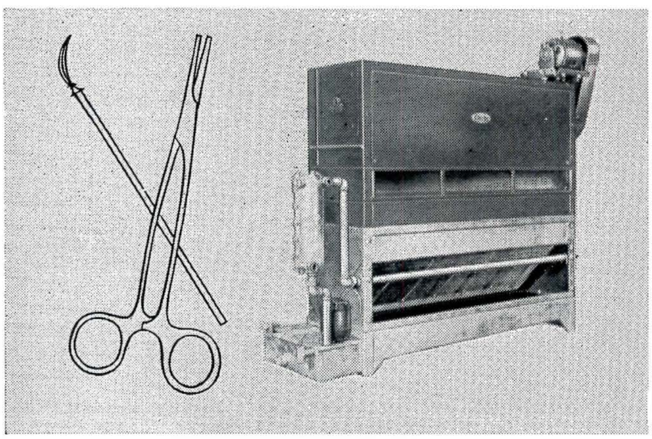
you can **fit air conditioning to <u>any</u> plan with Carrier Weathermakers**



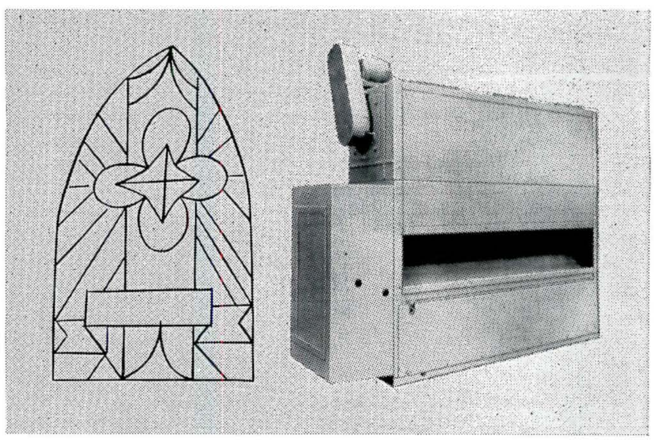
EASY INSTALLATION. Carrier's new 75-hp reciprocating water-cooling system comes from the factory completely assembled, ready for water and electric line connections. The new unit is compact, too — fits easily through an average-size doorway.



ZONES FOR TV. WTPA, Harrisburg, stars a Carrier Zoning Weathermaker. Show by show, comfort keeps pace with the programming through eleven individually controlled zones. Works equally well in office suites, department stores, motels.



IT'S THE HUMIDITY that's important in hospital operating suites, in IBM equipment rooms and in scores of laboratories and textile mills. *Exact* humidity control calls for *exactly* the right air conditioners: the Carrier Industrial Weathermaker, for one.



BIG COOLING PACKAGE. Carrier's 20-hp Commercial Weathermaker has the features of a built-up system, yet it's a compact, self-contained unit—factory assembled and tested. Ideal for churches, stores, banks, or wherever space is a problem.

Carrier

Carrier Corporation, its distributors and dealers, stand ready and willing to work with you in any phase of air conditioning. Call your local Carrier dealer. Or write to Carrier Corporation, Syracuse, New York.

AIR CONDITIONING • REFRIGERATION • INDUSTRIAL HEATING

(Continued from page 149)

of heavy-duty locksets available in three designs, with brass, bronze, or aluminum finish. Description of parts with cutaway drawing, dimensions, illustrations of models for various types of doors. Information on accessories, installation instructions. The American Hardware Corp., Russell & Erwin Div., New Britain, Conn.

electrical equipment, lighting

4-64. Art Metal Drums with Heat Control Construction, 4-p. folder with data on drum-shaped lighting fixtures available with prismatic glass or tapered or straight-sided opal glass. Description of construction, glass sizes, Electrical Testing Laboratories' report on lighting performance, installation information, drawings of models. The Art Metal Co., Cleveland 3, Ohio.

4-65. Holophane Lighting: Shopping Centers, Modern Stores, Super Markets, AIA 31-F-2 (SB-1), 80-p. handbook on store lighting design, illustrated with 110 store installation photos, 65 layout plans, and diagrams. Sections cover interior lighting, including selling areas, services, and common areas; exterior lighting, including parking courts, service yards, and walkways; general information on lighting with detailed data for determining lighting requirements; equipment and subject indices. Holophane Co., Inc., 342 Madison Ave., New York 17, N. Y.

4-66. Smithcraft Architectural Troffers (430B), 16-p. catalog on line of recessed troffers. Data on aligner hanger, shallow troffers, spot boxes, glass frames for troffer pattern lighting, plaster frames, trim flanges, ceiling suspension system, and deep troffers. Performance curves, wattages, cutaway drawings, dimensions; typical ceiling layout using ceiling suspension system; troffer installation details; and specifications. Smithcraft Lighting Division, 217 Everett, Chelsea 50, Mass.

4-67. Far-A-Matic Electric Clock and Program System, 8-p. booklet listing features of master clock and program unit with two-wire automatic reset and 24-hour spring reserve. Also, information on flush, surface, double-dial, and skeleton clocks; control boards for program system; and program signals. Wiring diagrams, dimensional drawings, and specifications. Sperti Faraday Inc., Adrian, Mich.

4-68. Swivelier Universally Adjustable Dextra-Lites, AIA 31-F-23 (134), 8-p. bulletin describing new line of adjustable incandescent and fluorescent lighting units designed for industrial and commercial use. Data on parts, available finishes, and shade dimensions of clamp and bracket units. Photos, drawings, and charts. Swivelier Co., Inc., 43 34th St., Brooklyn 32, N. Y.

finishers and protectors

5-19. Baxco Chemonited Forest Products, AIA 19-A-3, 30-p. brochure describing various types of wood products pressure treated with preservative containing copper and arsenic salts. Test results, cost comparison between treated and untreated posts, explanation of pressure treatment; photos showing use of treated lumber in industrial, farm, residential, and other types of construction. Specifications. J. H. Baxter & Co., San Francisco 4, Calif.

5-20. Floor Finishing and Maintenance, AIA 25G (2414), 6-p. folder describing line of cleaners, sealers, and waxes for various types of commercial, industrial, and institutional flooring. Recommendations for application of cleaners and finishers by company's three-step process over terrazzo, rubber tile, linoleum, concrete, asphalt tile, and wood. West Disinfecting Co., 4216 West St., Long Island City 1, N. Y.

insulation

6-30. Effect of Edge Insulation upon Temperature and Condensation on Con-

(Continued on page 152)

(Continued from page 151)

crete-Slab Floors, National Bureau of Standards Report by Harold R. Martin, Paul R. Achenbach, and Richard S. Dill. Twenty-one page report giving descriptions and results of tests of nine concrete-slab floor specimens subjected to cold-weather conditions; exposed edges were insulated in different ways for determining effect of edge insulation on floor surface temperatures and possibility of condensation. Report includes recommendations. Price: 20¢. Government Printing Office, Washington 25, D. C.

6-31. Infra Accordion Insulation, AIA 37-C-3, 4-p. folder discussing construction features of accordion-fold aluminum insulation. Information on insulating damp cellar walls and crawl spaces, ventilation, and vapor formation. Methods of installing insulation between wood beams, steel beams and trusses, around ducts and pipes, on masonry walls, cement and wood floors, and other shallow spaces. Infra Insulation, Inc., 525 Broadway, New York 12, N. Y.

sanitation, plumbing, water supply

7-25. Scott Washroom Advisory Service, AIA 29-I, 34-p. brochure featuring plans and sketches of commercial and industrial washrooms, including combination locker-shower-washrooms. In addition, data on supply closets, special wall adhesive, and line of wall-hung and recessed washroom fixtures. Scott Washroom Advisory Service, Dept. SP-1, Chester, Pa.

specialized equipment

Two brochures describing contemporary furniture, including designs by Eero Saarinen, Florence Knoll, Hans Bellman, Richard Stein, Pierre Jeanneret, and Harry Bertoia. Illustrated group includes chairs, tables, sideboard, stacking stool, daybed, sofa, and bench. Information on dimensions, fabrics, and finishes of form-wire chairs in Bertoia collection. Knoll Associates, Inc., 575 Madison Ave., New York 22, N. Y.:

8-49. Yellow Furniture Brochure
8-50. The Bertoia Brochure

8-51. Commercial Refrigerators, Cabinets, Cases, and Coolers, 96-p. catalog describing line of commercial refrigerators available with stainless-steel or porcelain exteriors. Features, dimensions, capacities, and illustrations of 37 models; data on controlled air-flow system. Also information on beverage coolers, commercial storage freezers, and walk-in coolers. Photos, charts, drawings, and specifications. Puffer-Hubbard Mfg. Co., Grand Haven, Mich.

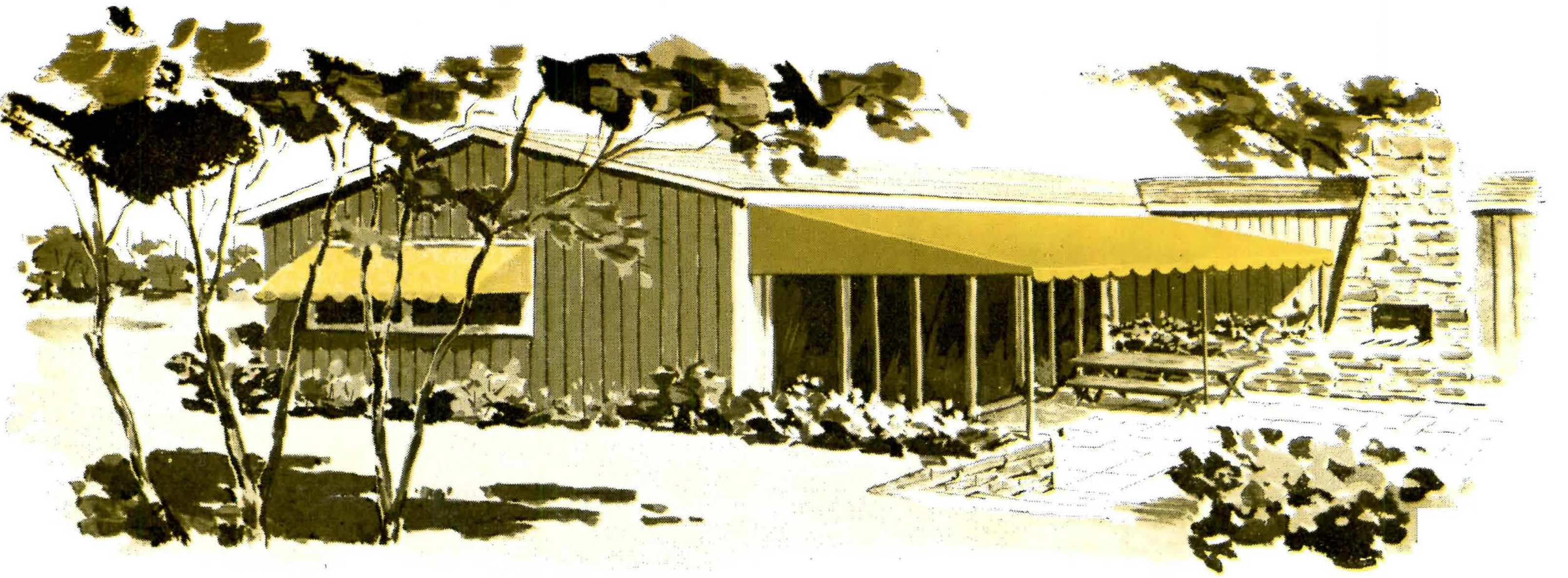
8-52. Salterini Catalog (38), 40-p. booklet illustrating wrought-iron furniture designed by Maurizio Tempestini. Chairs, tables, and other pieces shown individually or in varied settings; swatches of linen tweed, sailcloth, and other standard upholstery materials; available wrought-iron finishes. John B. Salterini Co., Inc., 510 E. 72d St., New York 21, N. Y.

surfacing materials

9-36. Maintenance of Asphalt Tile Floors in Institutional, Commercial, and Industrial Buildings, AIA 23-G (NN), 4-p. folder containing recommendations for care of asphalt tile floors in above areas. Equipment and materials required, instructions for sweeping, washing, waxing, and protecting against indentation. List of member companies. Asphalt Tile Institute, 101 Park Ave., New York 17, N. Y.

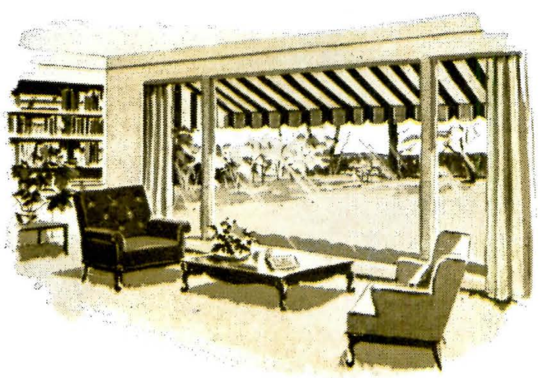
9-37. Asphalt Tile and Terraflex, AIA 23-D (FL-39A), 12-p. booklet on two types of resilient flooring; asphalt tile and vinyl-plastic asbestos tile. Installation photos in color, features, sizes, thicknesses, color charts. Information on flooring inserts, underlayment for use as cushion under any type of resilient flooring, line of adhesives, special grease-resistant asphalt tile, and asphalt tile cove base and edging strips. Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.

Put your windows where you want them



Solve the Sun Problem

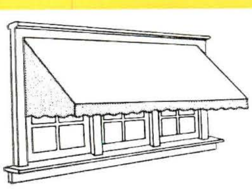
with CANVAS SHADING

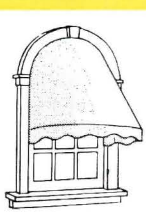


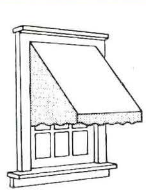
By 5 o'clock on a summer afternoon a 3' west overhang will be so nearly useless that an 8' x 12' picture window will let in almost as much heat as it would without the overhang —about 24,000 Btuh. Canvas Awnings are better than overhangs east and west because they can roll down lower when needed and give complete protection for a fraction of the cost.

Every good idea that makes it easier to keep a house cool *without* air conditioning will also make it easier to cool a house *with* air conditioning. And of primary importance in both of these is keeping the sun off glass areas, for glass lets in 35 times as much heat from the sun and 10 times as much heat from the outside air as insulated wall.

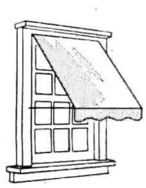
Your answer? Outside canvas shading . . . flexible, colorful, economical! With this heavy fabric effectively screening out 75% of the sun's rays, interiors stay degrees cooler. Air conditioning equipment costs less and works at maximum efficiency.
So if the nicest view is to the west, put in a big window and enjoy it. Simply shade the area with canvas.
You'll find it does more than reduce heat gain . . . at little expense, it adds a distinctive note of color, grace, and texture to attract your potential customers.

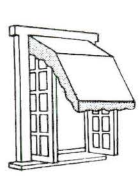






Your local canvas awning manufacturer will gladly discuss design specifications for canvas sunshades to fit any exposure and to harmonize with all styles of architecture.





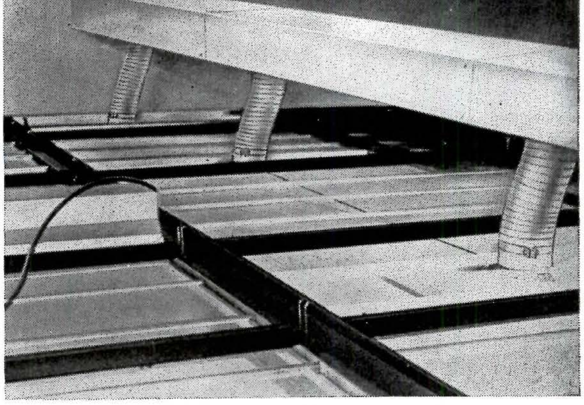
See our catalog 18f/Ca in Sweet's Architectural File or write for a free copy. It contains original and practical ideas, plus helpful instructions for specifying canvas.

Canvas Awning Institute, Inc.

and National Cotton Council

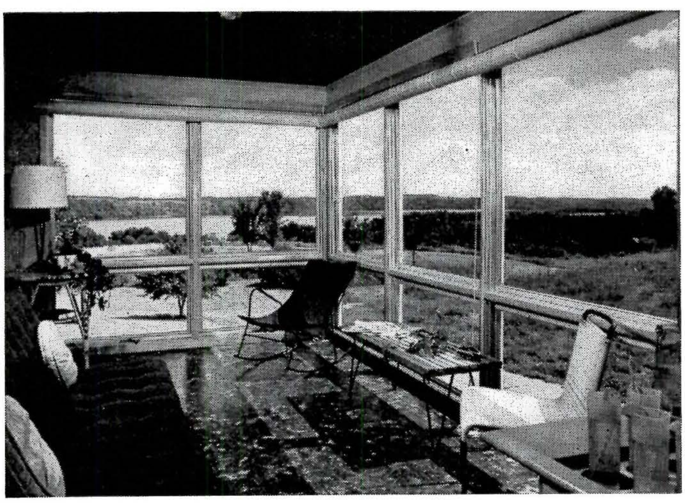
THE CANVAS AWNING INSTITUTE INC.

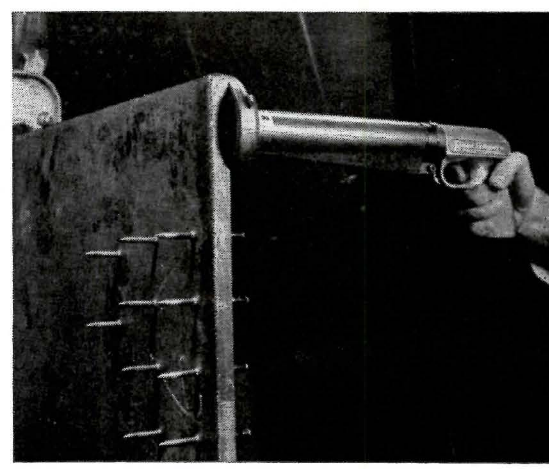
P. O. Box 1851 Memphis, Tennessee



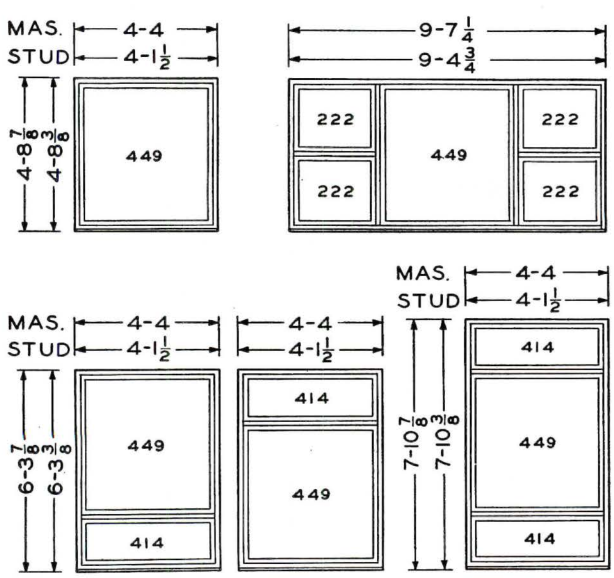
Panel-type air diffuser fitting into metal suspension ceiling is interchangeable with both acoustical tile and lighting fixtures. Flexible tubing (can be twisted, stretched, or compressed) connecting diffuser to duct permits the unit to be located as desired. A damper, controlled from the floor with simple device, regulates air volume supplied by each diffuser at point of discharge. Position of damper has no effect on diffusion pattern, an important feature where variable cooling loads may be anticipated. Connor Engineering Corp., Shelton Rock Lane, Danbury, Conn.

This powder-actuated tool can drive heavy shank fasteners into structural-steel plates up to one-in. thick (with a holding power up to 10,000 lb) and into the hardest concrete. Weight: less than eight lb; length: 15". Ramset, 12117 Berea Road, Cleveland, Ohio.





Andersen's new Flexiview picture units are combined with Flexivent ventilating units on this porch. There are three available sizes of the Flexiview: 3' 5", 3' 8", and 4' 1" wide, all in a 4' 7⅛" height. Removable double glazing will be furnished for these units. A few of the possible combinations are shown (below left). *Andersen Corp., Bayport, Minn.*



product announcements continued on page 156

(Continued from page 155)

air and temperature control

Kritzer Radiant Baseboard: newly designed baseboard unit for radiant-heating systems in schools, hospitals, and office buildings has sloped top for greater convection-radiation effectiveness. Fabricated from automobile-gage steel with louvered front, baseboard features patented damper mechanically suspended from baseboard frame, damper control operating from any point in baseboard run, and coil support bracket made up of support bracket proper, adjustable stirrup, and sliding cradle. Kritzer Radiant Coils, 2901 Lawrence Ave., Chicago 25, Ill.

Marvair Air Conditioner: new 3-ton air-conditioning unit designed for homes of 1400 to 2100 sq ft. Air-cooled unit has two cooling and dehumidifying systems, does not require plumbing, water, ductwork, or connection with heating system. Installed in attic, with conditioned air expelled into dropped ceiling or plenum in central hall, or in false chimney with side louvers to permit free air intake for cooling coils. Muncie Gear Works, Inc., Marvair Div., Muncie, Ind.

York-Shipley Homeaire: new air-conditioning system for homes up to 1000 sq ft with 1½ hp air-cooled condensing unit (using Freon 12) and hermetically-sealed refrigeration system. Center section of unit devoted to refrigerant circuit and evaporator section; one end section includes fan for circulating cool air while other contains fan for handling condenser cooling air. Dimensions: 19" high, 25" deep, 69" long. York-Shipley, Inc., York, Pa.

construction

No. 155 Elastic Compound Tape: new nonstaining fibrous mastic, composed of synthetic resin base and asbestos and inert extenders, for sealing metal seams and joints, glass and rubber channels, and other uses. Furnished in ribbons from .0040" to ¼" thick and ⅜" to 2" wide, in beads as small as ⅛" diameter. Sealer has high resistance to water and to temperatures from 375 F to —50 F, has no softening or crazing effect on plastics. Presstite Engineering Co., 3798 Chouteau Ave., St. Louis 10, Mo.

Neo-Grips: new blind expansion fasteners designed to secure objects to many types of building materials, including plaster and plaster board, gypsum products, fiber material, asbestos cement, cork, plastics, glass, ceramics, masonry, and metal. Fasteners do not require firm interior support and in many cases eliminate need for penetration of material. Cushioned expansion action of fastener sleeve exerts pressure without tearing soft materials or shattering glass, tile, or ceramics. Minimum material thickness: ½". Star Expansion Products Co., 147 Cedar St., New York 6, N. Y.

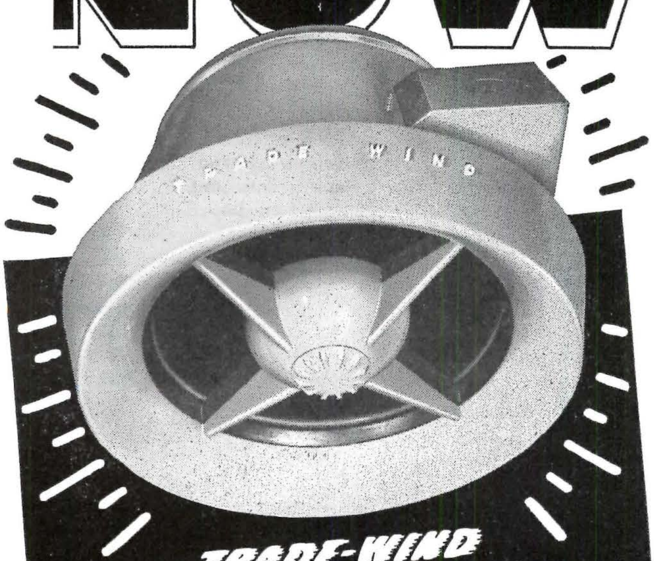
doors and windows

Tuf-Flex Door: heat-tempered polished plate-glass door now available in ½" thickness; weighs one-third less than standard heat-tempered door. Designed for stores and commercial and public buildings, doors are tempered to provide three to five times greater strength than conventional plate glass and greater resistance to physical and thermal shock. Initially furnished with alumilited-aluminum fittings, ½" model will be available with bronze fittings in various finishes. Same locks, bolts, floor checks, door holders, and other accessory equipment as ¾" model. Libbey-Owens-Ford Glass Co., Nicholas Bldg., Toledo 3, Ohio.

Pedestrian Walk-Up Window: new exterior bank window with bullet-proof glass, steel sash, and steel customers' shelf and teller's counter. Shelf provides writing space; for after-hours protection, shelf pulls flush with wall and covers depository unit. Features: insert holding pen, deposit and withdrawal slips, two-way audio system, double door on depository unit, inside

(Continued on page 158)

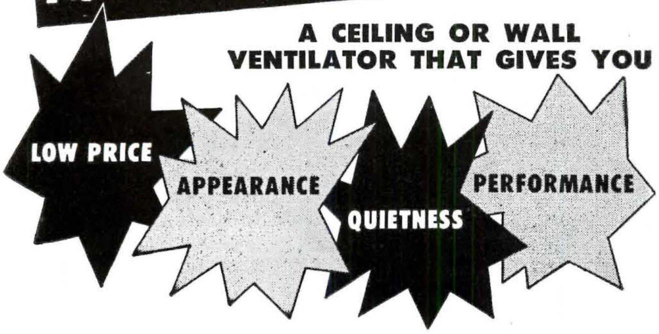
NOW



TRADE-WIND

AXIAL FLOW VENTILATOR

A CEILING OR WALL VENTILATOR THAT GIVES YOU



The new low-cost Trade-Wind **Axial Flow** Ventilator now makes it possible to use either wall or ceiling installation with the **same unit** of this revolutionary new ventilator. The unit can be installed between joists in the ceiling or between studs in the side wall.

The Trade-Wind gives you straight-through axial air flow plus super-powered suction. And it sells at a low, l-o-w price which makes kitchen ventilation a must even in the most economically designed house. And it's so good looking! Styled by a top industrial designer, the **Axial Flow** adds a new distinctiveness to every kitchen.

The optional backdraft damper, shown at left, and wall cap, shown above, are interchangeable and make the Axial Flow the most versatile ventilator on the market.

Write or wire for complete details today.

Originated by

TRADE-WIND MOTORFANS, INC.

5725-F S. MAIN ST., LOS ANGELES 37, CALIF.

Just what the Architect ordered!

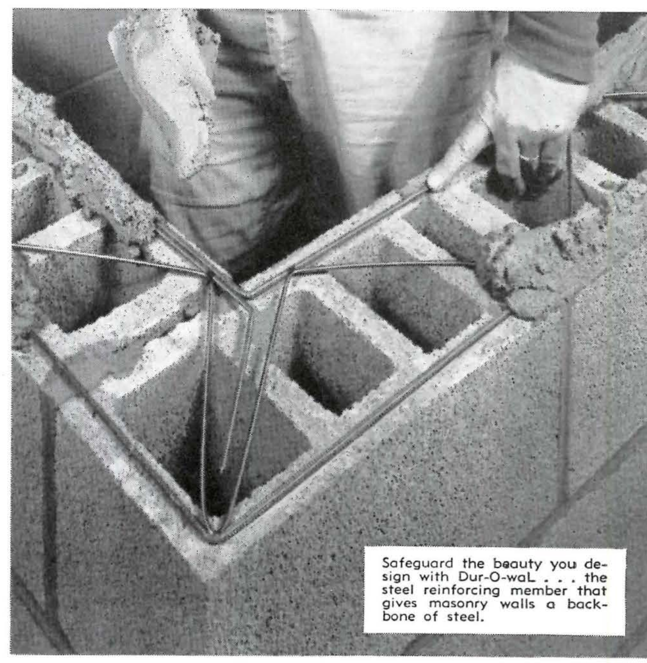
LEADING architects are studying the findings of Dur-O-waL's independent research tests. Now you can specify steel reinforcing for every masonry wall, on the basis of these scientific findings. Trussed-designed, butt-welded Dur-O-waL reinforces vertically and horizontally to combat cracks . . . safeguard masonry beauty.

Get Laboratory-Tested PERFORMANCE FACTS and Specify by Name

Independent Research Findings available now on Dur-O-waL.

Patented Dur-O-waL features a trussed design. This steel reinforcing for block, brick and tile walls assures uniform quality of product and scientifically tested performance. Get the Dur-O-waL facts today. Learn how you can save time, cut costs and combat cracks with Dur-O-waL.

Dur-O-waL is electrically-welded in a single plane of high tensile steel (100,000 p.s.i.); knurled side rods increase mortar bond. Your inquiry will receive prompt attention.



Safeguard the beauty you design with Dur-O-waL . . . the steel reinforcing member that gives masonry walls a backbone of steel.

Butt Weld

DUR-O-WAL®

WITH TRUSSED *Design*

- **Dur-O-waL Products, Inc.** P. O. Box 628, Syracuse 1, New York
- **Dur-O-waL Division** Frontier Manufacturing Co. Phoenix, Arizona
- **Dur-O-waL Products of Ala., Inc.** P. O. Box 5446, Birmingham 7, Alabama
- **Dur-O-waL Div., Dept. 1-A** Cedar Rapids Block Company, Cedar Rapids, Iowa

p/a products

(Continued from page 156)

counter space and cash drawers. Mosler Safe Co., 320 Fifth Ave., New York 1, N. Y.

electrical equipment, lighting

Holophane Outdoor Unit 415: exterior lighting fixture for public areas, industrial buildings, and other locations has glass assembly composed of small glass prisms directing light downward and outward. Weatherproof bracket hood, die-cast aluminum parts with lacquered finish, double-thick prismatic refractor. For relamping glass assembly swings open on concealed hinge. Holophane Co., Inc., 342 Madison Ave., New York 17, N. Y.

Recessed Fixtures: new line of recessed fixtures for homes and commercial buildings are self-locking, screwless, and range in size for 60, 100, and 150 watt lamps. Ready to install with ordinary house wiring, units are also available with either prewired or unwired recess boxes. Standard finishes: polished chromium, baked white enamel, and polished brass. Adjustable all-position hangers, specially-engineered light seal. Markel Electric Products, Inc., Buffalo, N. Y.

P&S 8672 Receptacle: new three-wire grounding duplex receptacle (surface type) with two current-carrying contacts and third contact to accommodate U-shaped grounding blades on special three-wire caps. For use with nonmetallic cable, receptacle is designed to mount on 2" x 4" studs. Current-carrying parts mounted in arc-resisting Urea base; knockouts for No. 12 or No. 14 standard nonmetallic sheathed cable. Rating: 15 amp, 125 volts. Pass & Seymour, Inc., Solvay Station, Syracuse 9, N. Y.

finishers, protectors

Satinwood Rez: low-luster finish for color-toned, natural, or blonded wood surfaces. Also for use as refinishing coat, finish accents color and grain qualities of wood, protects it against water or alcohol stains. Addition to line of wood finishes which includes clear sealer, blonding sealer for interior use, interior rubbing finish, and pigmented sealers for interior and exterior use. Monsanto Chemical Co., St. Louis 4, Mo.

insulation (thermal, acoustic)

Acoustilite-Random: random-pattern tileboard added to line of drilled wood-fiber acoustical tileboards with noise coefficients of .40 to .75. Available with Class F flame-resistant treated surfaces, perforated tiles have coated beveled edges. Thicknesses: ½" and ¾". Tiles may be painted without affecting sound-absorption qualities or flame-spread resistance. Insulite Co., 500 Baker Arcade Bldg., Minneapolis 2, Minn.

Fiberglas Acoustical Form Board: new glass-fiber board provides thermal and acoustical insulation, permanent form for poured-in-place gypsum roof decks, and interior ceiling. Strong enough to support spacing of 32⅝" without intermediate support, boards have .75 noise-reduction coefficient, average thermal conductance (1" thickness) of .25 Btu/sq ft/0° at 75 F mean temperature. Installed in same manner as gypsum board. Owens-Corning Fiberglas Corp., Toledo 1, Ohio.

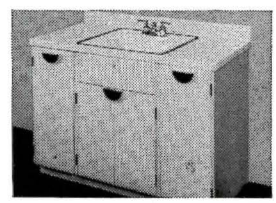
specialized equipment

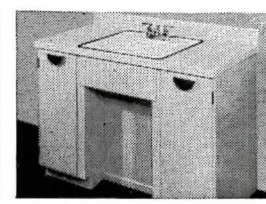
Automatic Washing Machine Tee: ridged dual tee for automatic washing machines, designed for in-the-wall installation. Makes up corner valves to approximately 8" centers. Supply lines drop down from supply tee, pipe to hose connectors join to washer. Designed for ½" threaded pipe and ½" copper tubing, tees have solid center to prevent water from by-passing. N. O. Bakken Co., P. O. Box 2014, El Monte, Calif.

PRODUCT NEWS from AMERICAN-Standard

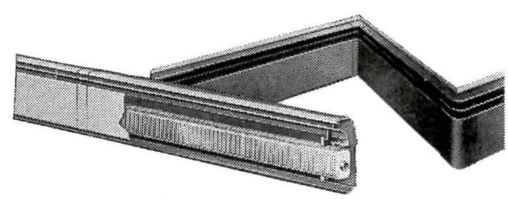
A review of products in the news and important features worth remembering

LAVATORY-DRESSING TABLES by American-Standard will add beauty and convenience—and client appeal — to the homes you plan. Each fixture combines dressing table and storage cabinet in one compact unit. Shown here are the New Dresslyn, left; the Highlyn, left below; and the Merrilyn, at right below. The New Dresslyn and Merrilyn have genuine vitreous china lavatories . . . the Highlyn has enameled cast iron lavatory. Cabinets and lavatories come in a variety of color combinations. All units are available in straight front or kneehole models.





HEATRIM PANELS are the modern way of providing comfortable, even, convected warmth throughout an entire room. They are specifically designed for forced-circulation hot water heating. Taking the place of conventional wood baseboards, Heatrim panels save floor space, leave walls unbroken, permit greater latitude in designing and decorating. They can be installed against existing walls or recessed to the depth of the plaster. They are perfect for use under picture windows . . . are also much in demand for premium-space installations.



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Dept. PA-64, Pittsburgh 30, Pa.

Without obligation on my part, please send me literature on:

☐ Lavatory-Dressing Tables
☐ Heatrim Panels

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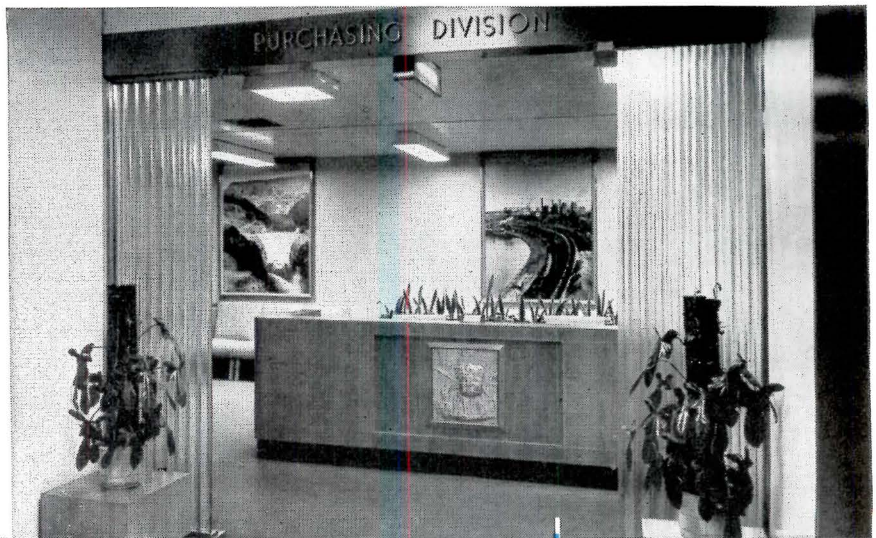
American Radiator & Standard Sanitary Corporation, Dept. PA-64, Pittsburgh 30, Pa.

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS

GLASS REFLECTS THE PATTERN OF PROGRESS



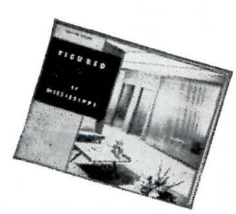
Architect:	Harrison & Abramovitz
Assoc. Architect:	William Y. Cocken
Gen. Contr.:	Turner Construction Co.
Glazing Contr.:	Pittsburgh Plate Glass Co.
Construction and	Management: John W. Galbreath & Co.

Mississippi Glass Used In Outstanding New Skyscraper Offices of U. S. Steel

The rhythmic pattern of translucent, light diffusing Structural Corrugated Glass highlights the modern interior of the 525 William Penn Place Bldg. in Pittsburgh. Used in partitions, doors, foyers . . . figured glass floods offices with copious quantities of "borrowed light" . . . yet protects privacy completely. Interiors look larger, brighter, more pleasant, with the glass that promotes working efficiency and builds employe morale.

And figured glass is as practical as it is beautiful. It never wears out, never warps, rots . . . never requires repainting or refinishing. Glass wipes shining clean, is extremely easy to maintain, always looks new. That is why more and more interiors reflect the pattern of progress with extensive use of the modern material—figured glass by Mississippi.

Structural Corrugated Glass is being specified by architects everywhere for its beauty and utility . . . offers new scope for talents . . . suggests numerous ways to handle design problems. Mississippi figured glass is manufactured in a wide variety of patterns and surface treatments and is available wherever quality glass is sold. Select glass by Mississippi and add sparkle to your ideas.



Write today for free booklet, "Figured Glass by Mississippi." Contains many ideas on ways to utilize diffusing glass in modernization or new construction.

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see our catalog in ARCHITECTURAL FILE or write for copy

WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

Before introducing **Robert Woods Kennedy** as this month's guest lecturer, I have a few comments to make to this year's graduating class of architectural students.

It has been my custom each June, for the several years we have been talking to each other, to address you directly with a valedictory, to speak words of fatherly advice, to wave a benediction, and also to drop a tear for my long departed youth and the brave victories I was to win in the depressed world of my own launching day—June 18, 1931. Graduations are much alike but as in birth, marriage, and death, it is not the common experiences but the personal ones that provide the meaning to the act. What meaning then is to be found in the milling crowd in hot, black, rented gowns and mortar boards? In the fake parchment "sheep skins"? In the handing out of a blank page, rolled in a red ribbon, to an embarrassed clod while the names are blared automatically by a Dean through loud speakers? What is this mass gift of accolades? What meaning to these clumsy and vestigial rituals?

Yes, this is the weaning, these are the vestigial rituals, the tribal circumcision rites, the coming of age. These are the gifts of the first communion with adulthood. You stand, doff the mortar board, sing the college song, toss the black tassel from left to right, and lo—a man! Silly!

This is no childish atavism, you young architects. This is the curious final magic moment of the transmittal of certain knowledge when the teacher closes the exit door to the classroom and turns around to open the entrance door once again for the next comers. Such moments in each person's history have a meaning which time alone can interpret.

For you, the change is very abrupt. You are no longer within the benevolent despotism of the architectural school. There are new disciplines and new standards and unfamiliar personalities with which to cope. The most unfamiliar personality will be your own. What will it do outside the bomb-proof shelter of the school—the shelter which did not and could not simulate the facts of life? Can you meet an employer face to face—office drudgery—the unexpected political tangles of the job? These are no different from the drudgery and political tangles of the design studio, lab., or college drafting room. You are booted out into the night. Can you take it?

This is, in part, what commencement means to you. But more important, it should mean that it is the first of many tests which you will face, tests more arduous than the final exams, the thesis, the orals, and the rest. These are the tests of convictions hardly formed, of talents scarcely fledged, of temper, humor, and of whatever personality you may have

(Continued on page 162)

out of school

(Continued from page 161)

achieved. The most trying test of all which can be survived, but only by a few, is that of true genius. The talent scouts can be wrong. The talent imitators can be wrong too. And the admirers of the talent imitators can be the wrongest of all.

I am not trying to sow the seeds of personal mistrust in you. You cannot go back through the closed door and relive the last five years. You can evaluate what these years have done for and to you, only as you thread together the course of your career—a year—ten years from now. So you can neither go back nor hang back. This is the commencement of adult life. See that you grow up. The world needs mature architects and planners as never before.

•

Robert Woods Kennedy talks here this month about the social situation in the schools. You know Kennedy as an architect and an author. His The House* *was discussed in Tom Creighton's P.S. in April P/A and you will be seeing reviews right and left. Here he ventilates the internal atmosphere of the architectural school and raises again, but in different form, some of our questions in earlier issues—in particular the one of this last February. Can anyone answer the questions he raises? Here he is:*

Can one generalize about the social situation in architectural schools? Do the students, the staff, and the administration of schools nearly always behave towards each other in about the same way? Or is each school unique? These are tricky (to use a euphemism for unpopular) questions. But they are, perhaps, rather important, both to the schools and to the profession. If the social situation in each school *is* unique, then it can only be altered and improved on the basis of its own merits. Experience gleaned in other institutions would have but little general applicability.

On the other hand, if architectural schools do tend to create typical social situations, the knowledge gained from

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* *Reinhold Publishing Corporation (1953).*

comparative studies of all of them could be applied to individual cases. We could, presumably, predict that certain actions, or sequences of actions, would cause joy or trouble. We could also predict, given a troublesome situation, that certain measures would be successful in ameliorating it, while others would not. More fundamentally, intimate knowledge of typical dynamic patterns might lead us to beneficial *changes in* the educational process.

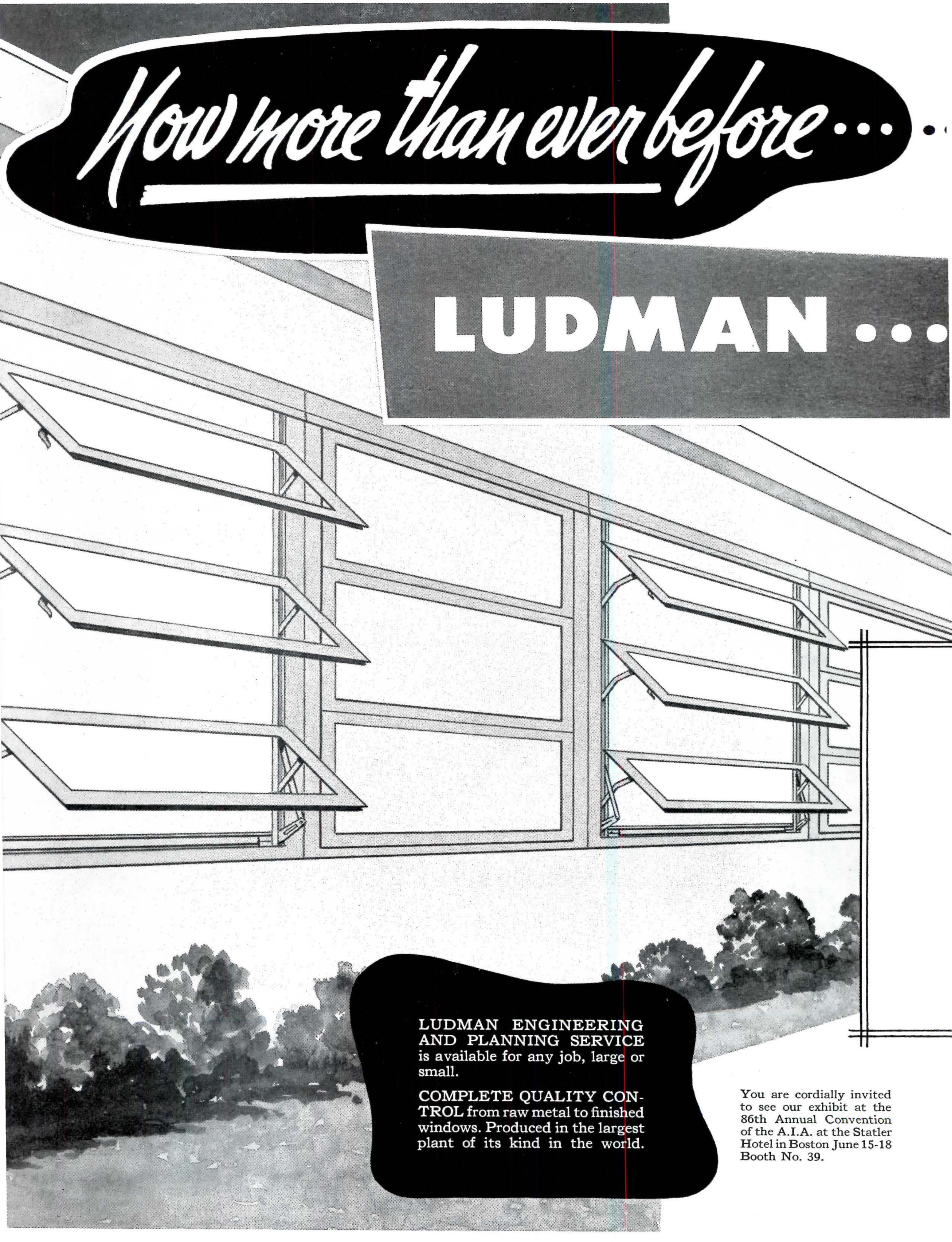
My own belief is that the schools of reputation actually are, socially speaking, all more or less alike. But this is pure hypothesis. We can not *know* whether they really do share common social attributes until they have been thoroughly studied. In the meantime, it seems to me that certain situations are typical of architectural schools and these I shall essay to describe.

We know that, at the present moment, schools of reputation limit their enrolment to students of the highest average of previous education who have applied to them for admission. No concerted attempt is made to find out whether applicants have any specific talent for architecture. The curriculum of the school into which these students enter is established, and it is based on custom, the supposed needs of graduate professionals, and on past experience with students thus selected.

The standards of the school and the abilities of the students are fitted together in such a way that there turns out to be a modicum of students really unsuited to the profession, a large number of average students, and a very small number of talented students. The school regards these students as all of the same breed; their variations are not conceived to be of kind, but rather of innate ability. In theory they are to be treated exactly alike, given exactly the same chance at a standardized education which, in its turn, is conceived of as the best. In fact, average and talented students seem to vary in many and significant ways, not only in school, but also throughout their lives.

The average student tends to approach architecture as an important, useful, and

(Continued on page 166)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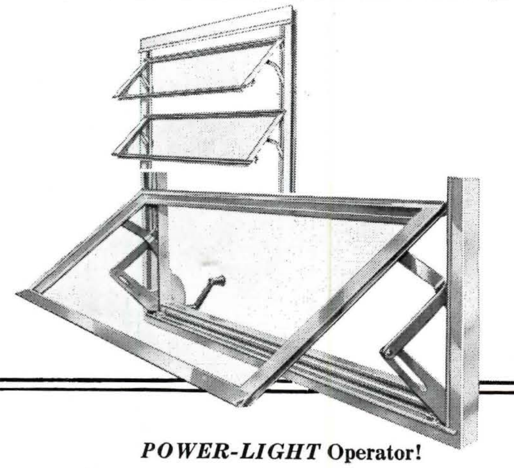
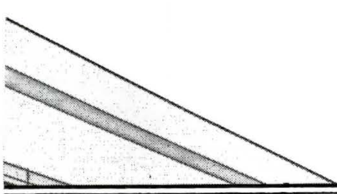
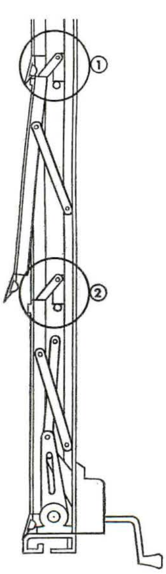


AUTO-LOK *MODEL B* WITH TORQUE BAR OPERATION

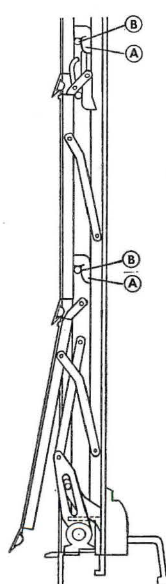
and POWER LIGHT, strip-proof operator.





Other Awning Type Windows with Torque Bar

Since it is virtually impossible for all vents in most awning type windows to be brought in at the same time, where there are no locking devices pulling in the vents, pressure must be exerted on the hinge points of those vents (see 1 and 2 on adjacent illustration) that are closed first in order to bring in the other vents. This excessive pressure will cause wear and tear on the hinge points and will throw the vents out of alignment. Minor adjustments can be made a few times, but ultimately it will be impossible because of the constant pressure on the hinge points and the limits of the adjustments to secure a permanent type closure.



Ludman Auto-Lok MODEL B Window with Torque Bar

Showing all vents closed and locked, with fresh air night vent automatically left open. Torque bar operation is required only to bring in the bottom night vent. Keepers **A** engaging pin **B** on each vent eliminate the necessity for any pressure being exerted on the hinge points of all other vents, as occurs on other awning type windows, enabling Ludman Auto-Lok windows to last for the life of the building.

Ludman's MODEL B with torque bar operation Auto-Lok window, retains all the fundamental operating principles of the Auto-Lok Standard Model A window.

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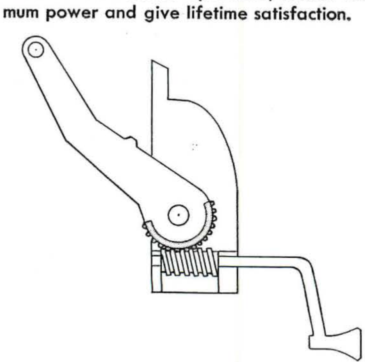

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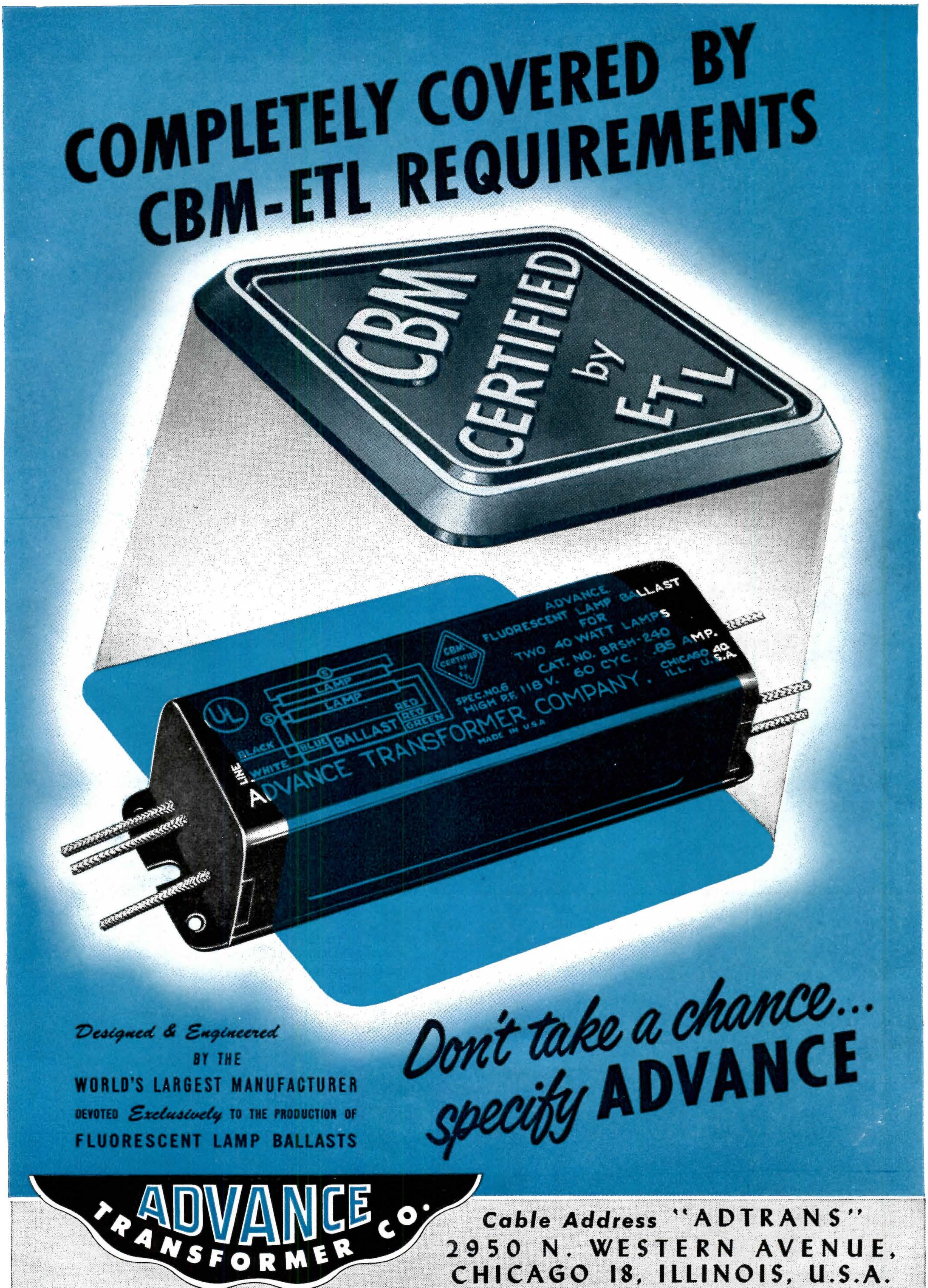
out of school

(Continued from page 163)

rewarding craft—to be learned. His attitude toward school can be summed up in a remark often directed at his professors: "Please show me the best thing to do. I am willing and eager to learn, and will do it exactly as you want me to." The attitudes implicit here are unwillingness to think, passive acceptance of authority, and good will. Such students form the great majority. In later life they do the great majority of buildings. This is by no means solely because of their relative numbers. They are characteristically better adjusted socially than their more talented brethren, have less far to go in order to reach maturity, and thus reach it sooner. As architects they make only the most minor "practical" improvements on what they have learned in school. Thus, because they are the ones chiefly responsible for the quality of our manmade environment, what they learn in school is of the most tremendous importance and significance.

The talented student seems to approach architecture as a challenge to his ingenuity and creativity. His attitude towards his professors is more often than not, "Tell me what *you* think if you must, but don't expect me to believe a word of it." In short, he tends to be quite disagreeable, or as we say nowadays—poorly adjusted socially. The fact that he is "ahead" in school, and that he can keep ahead in less time, thus creating for himself the opportunity to branch out in directions closed to average students, is deceptive. He has farther to go both emotionally and intellectually. His general development after school tends to be slower than that of his average classmate. During his apprenticeship he will wear out more jobs. His first commission will be slower to materialize. His first solid success will not be achieved until he is over forty. His ability to slap the Chamber of Commerce on the back may never catch up with the average architect's. But, even in the beginning, his fame will spread as the average student's never will. And, in the long run, he will make relatively large contributions to the main stream of architecture.

(Continued on page 170)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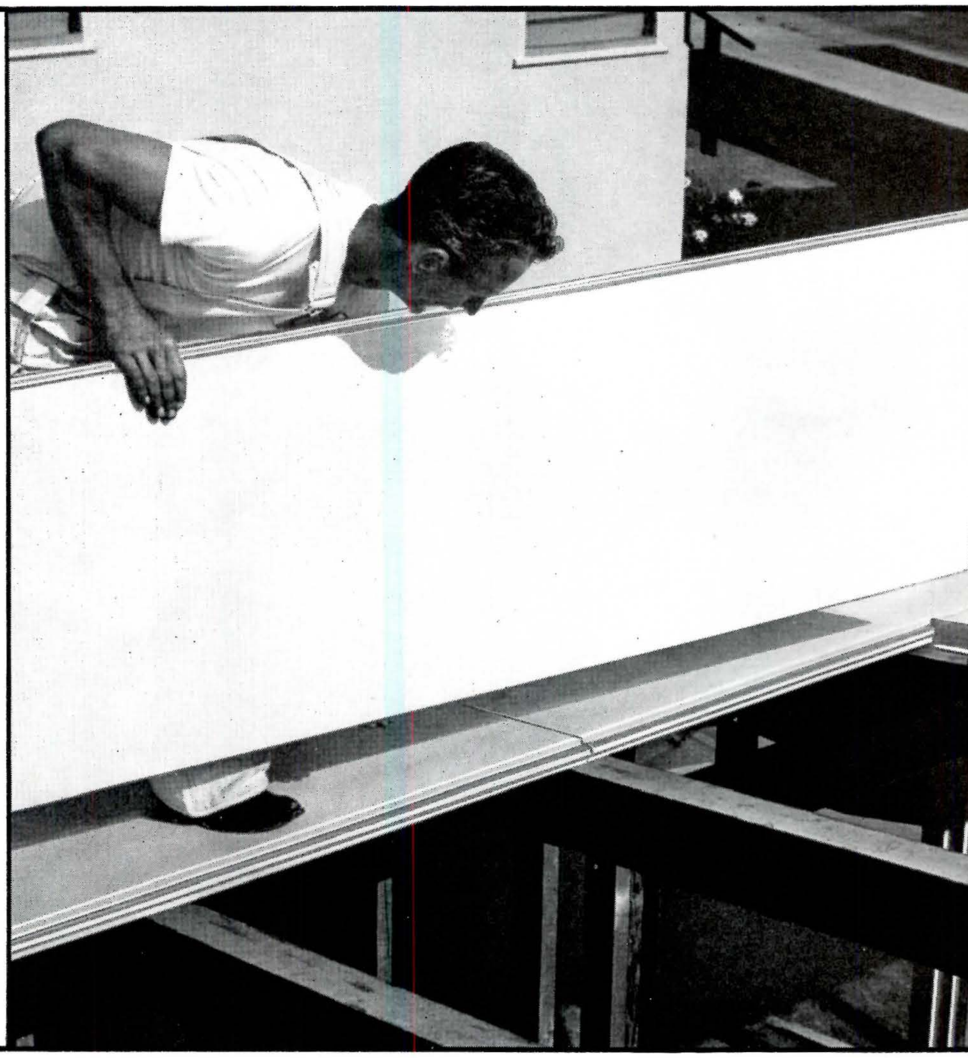

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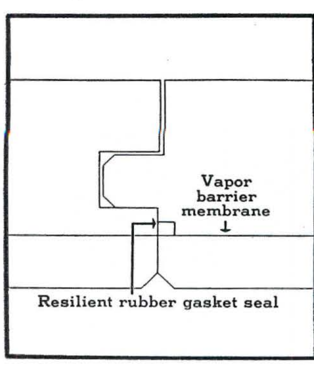

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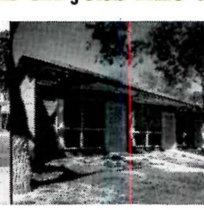
Motels


Schools


Restaurants

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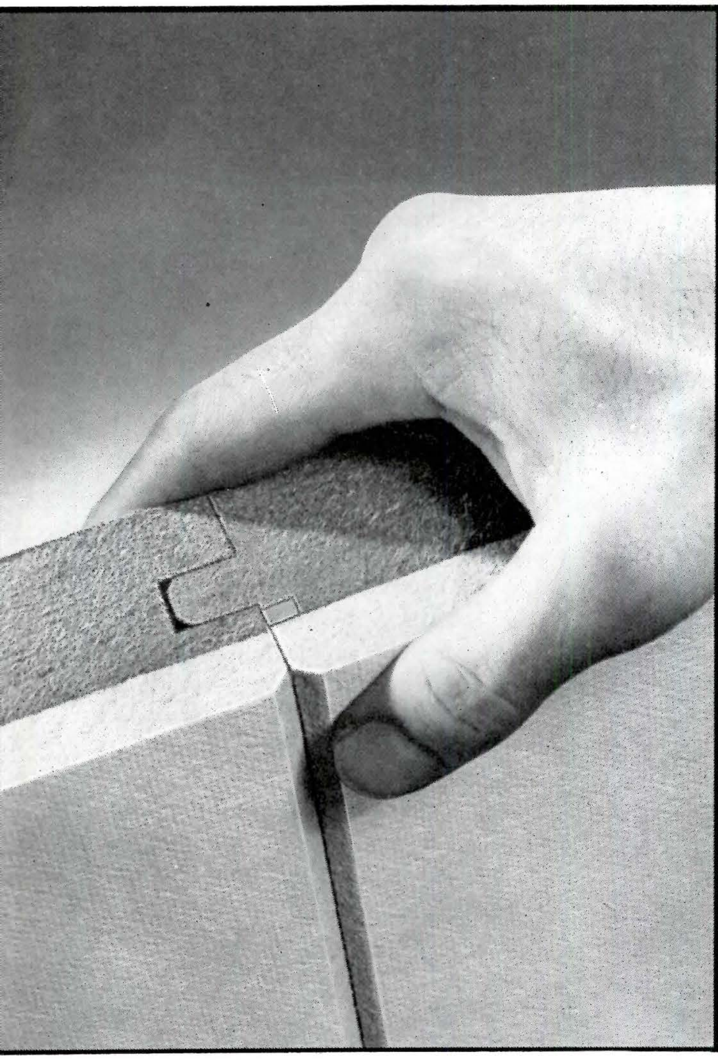

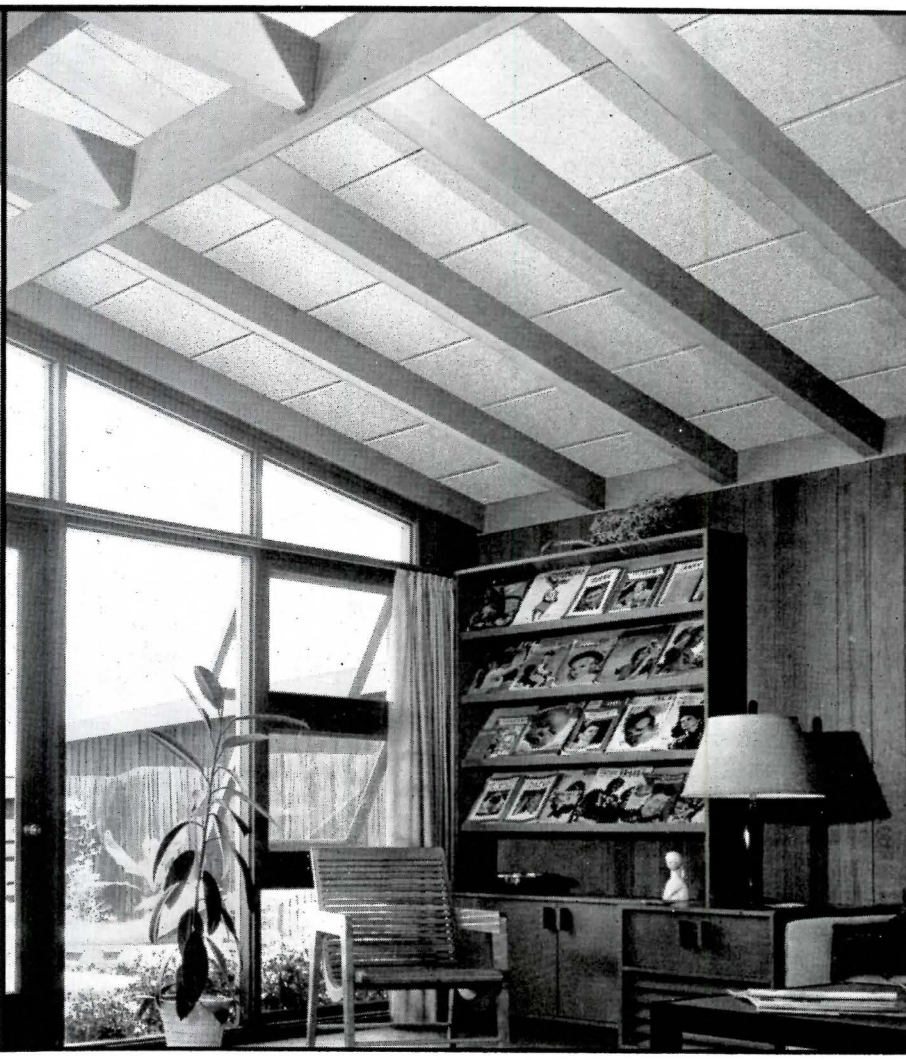

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out of school

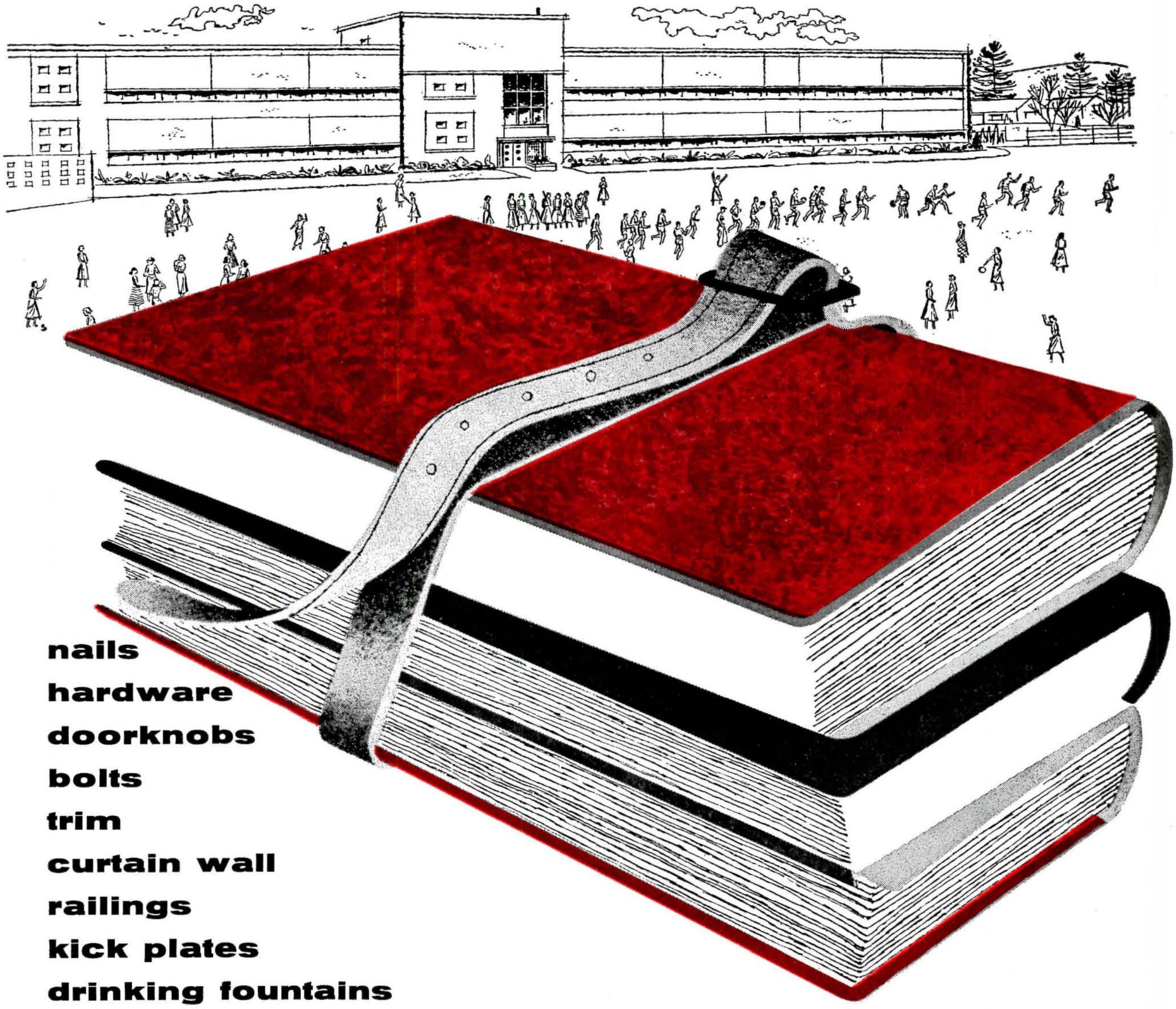
(Continued from page 166)

The average student would seem to need an education conceived of as a relatively durable set of precepts, reinforced by as many principles as he is able to absorb. The talented student will not accept precepts. Indeed he will systematically destroy and discredit them. He looks upon principles with the greatest of skepticism and distrust. He is happy only in the realm of theory. He needs and is willing to absorb more theory than the average in such areas as electricity, sanitation, acoustics, and design. Particularly he needs theory in architecture itself—the whole complex—a subject which is, today, in a sad state of neglect. And finally, he needs insights into his problems in social adjustment. The fundamental contrast is that talented students tend to need insights into how, with more speed and less destructiveness, they can bring their peculiar gifts to bear upon reality.

In schools of reputation, the staff tends to come from both groups. But while those from the talented group may represent a cross-section of their adjustment, those from the average tend to come from the top of theirs. Thus the average of ability and training for school staffs as a whole, and in general, is very much higher than the average for the profession as a whole. In the light of the average student's need for principles and precepts slightly ahead of his time, in order that they may last him well, this is exceedingly fortunate.

The tendency is for the majority of the staff to identify with the talented students, because they come from the same group, and thus tend to sympathize with their values and to understand their problems in adjustment. The administration of the school on the other hand must, for important administrative, educational, and financial reasons, support the cause of the average. The schools are in every administratively controllable sense geared for the majority, while in those areas where human nature has its way, the minority is favored. Average students nearly always feel that the professors play favorites, are only interested in brilliant

(Continued on page 174)



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out of school

(Continued from page 170)

students, and would rather speculate than preach. Talented students feel that the staff is more or less superannuated. In the end a large proportion of all students take a dim view of their professors, if for different reasons.

This situation is, in essence, a four-cornered row, where administration, staff, talented students, and average students are all pulling in somewhat different directions. Below these four groups are the submarginal students who receive, amid the general excitement, very little attention and no sympathy. This fifth group, through inattention, soft-heartedness, and a soft-headed notion that it just might contain a genius, wends its lonely way through the curriculum, and finally graduates along with its betters. At their thesis juries, the staff is utterly shocked and horrified by what they see, by the implications of letting so poor a professional loose on the world, and by the guilty feeling that if they had perhaps paid more attention to the students involved, the situation might be somewhat better. The administration on the other hand knows that to refuse such students a degree at the eleventh hour is to admit that they have not received an education, and that they never should have been allowed to believe that they could. This sort of mistake, they feel, is better kept a secret from higher powers, the public at large, and if possible, from the student himself. It is the school's mistake and to make the student suffer unduly is to compound it.

The staff and the talented students believe that the submarginal students have a destructive effect on the standards of the average students. "If so-and-so can get through on stuff like that, why should I break my neck to do so much better?" Actually this is the sort of thing students often say but seldom act upon. The real fear is that the submarginal students will create the impression *outside the school* that its standards are low, and that the staff and talented students will lose prestige therefore. In point of fact, the standards maintained by any one school seem to depend on the success with which

(Continued on page 176)

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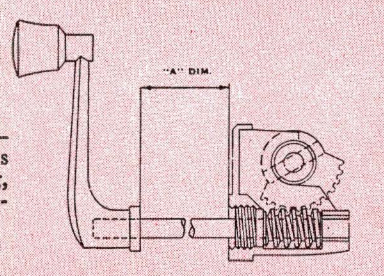
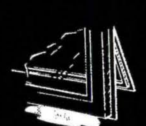


ALUMINUM AWNING WINDOWS



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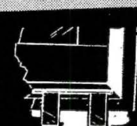

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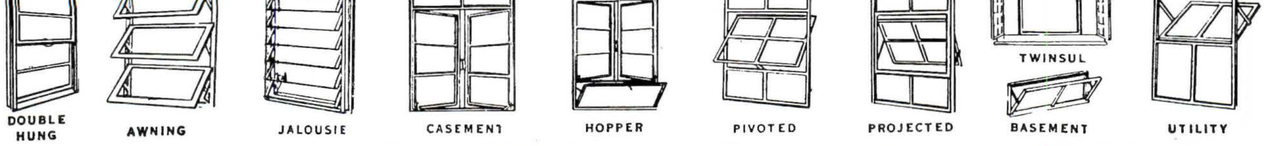

WORLD'S LARGEST MANUFACTURER OF ALUMINUM WINDOWS

out of school

(Continued from page 174)

talented students can force the highest average on the average students. One learns from and tries to please one's professors, for obvious practical reasons. But one competes with, emulates, is stimulated or depressed by one's contemporaries. Interaction in the individual class is the nexus of the school situation. The same sort of interaction, less personally but no less generally competitive, occurs in the school as a whole. Talented students of all ages seek to discover each other. The various classes compete. It is not uncommon to have a particular class recognized as tops, both socially and in terms of standards, from the day it enters. By the same token one often hears some such remark as, "Our class is dull and always has been. We just don't seem to have the stuff the third year has."

To separate talented students from average students would thus be to forfeit the importantly constructive effect that they have on the latter's standards of accomplishment. But these same high standards are not an unmixed blessing. Because the staff tends to set the best available work as the standard, a rat race can develop. This occurs in class hours. When marks are given, the reality of variations in ability forces on the staff a sudden lowering of its sights. They appear to contradict themselves. This saddens the professors, disgusts the talented students, and maddens the average students. Average students with emotional difficulties, despite the fact that they are graded realistically, can see the competitive situation as hopeless, with devastating results to their morale. In addition, the talented students (often known as "wild men" to the average) usually tend to take a systematically critical approach to teachers, to the curriculum, and to the way courses are presented. Within the confines of the talented group this barrage of criticism is not fundamentally destructive. It is counterbalanced by the ability, when it comes right down to it, to see the things despised in a much larger perspective, where they may have quite favorable values attached to them. But the average

(Continued on page 178)

out of school

(Continued from page 176)

students can not place finite criticism in this perspective. As a result, the talented students sometimes persuade them that they are wasting their time and money in a criminally mediocre institution. A small group of talented and neurotic students can destroy the morale of a whole school. Quite obviously in a situation where artyness, or pseudoscientism, or a rupture in the staff has been allowed to go too far, a wealth of material is available to them and is ably used to further the conflagration.

These factors do not entirely explain the wide and sudden swings in morale and in standards typical of architectural schools. In order fully to account for them, three other typical situations would have to be explored. The first of these has to do with the parent institution to which the school is attached. Its sympathy or scorn for its architectural school must have a significant effect on morale. The second has to do with the degree to which incoming students are oriented, both socially and professionally, to the school. At the moment new students are, in most schools of reputation, more or less abruptly switched from traditionalism to modernism. The circumstances surrounding this weaning process would seem to have a profound effect on the students' adjustment to the profession. The third has to do with professionalism in the architectural and other staff. Architects tend to think of themselves as professionals first and as teachers second. It is *subject* which is of first importance to them, not the educational process, or the morale of the school as a whole. No one could quarrel with this emphasis. On the other hand it behooves the architect-teachers to broaden their interests in the educational process, and in the dynamics of the school situation. On such scores, almost any architectural school has a lot to learn from almost any progressive elementary school.

If these hypotheses are anywhere nearly correct, it would seem that the schools and the profession have everything to gain and nothing to lose by a concerted study of education. The whole subject is fraught

(Continued on page 180)

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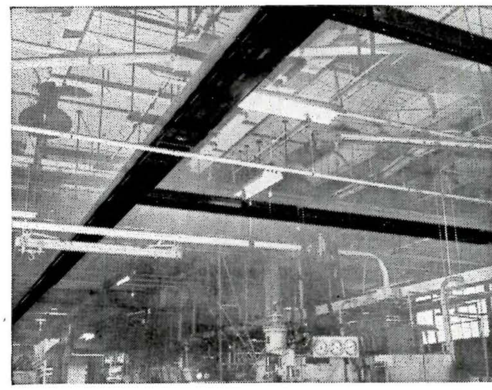

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out of school

(Continued from page 178)

with questions. How can we develop a method of testing incoming students for architectural talent? How can talented students' problems be ameliorated without undue expense, specialization, and penalties for the average? How can students in general be eased out of traditional myths without losing a sense of professional security? There are, of course, dozens of other such questions now being asked. Is it too soon to start the lengthy task of answering them?

ROBERT WOODS KENNEDY

p/a views

(Continued from page 22)

tial of creative engineering and the logic and behavior of the nondevelopable thin shell. In the spirit of this premise, may I comment on the one point where perhaps over-simplification may lead to misunderstanding. Candela states:

"Whether due to limitations of the human mind, to routine, or to structural mimetism, the outstanding fact remains that we are, almost exclusively, building frames composed of networks limited to three perpendicular planes."

The fact is very true; the primary reason, however, is that architecture of modern times is most often called to provide shelter in terms of multiple overimposed layers rather than to simply make a roof over a cleared patch of ground. As long as man will prefer to move on level surfaces—of which nature has furnished him with many a convenient example— the premise to most problems of contemporary architecture and engineering is set by the predominance of the multiple horizontal plane; furthermore, the force of gravity, for which nature is also responsible, strongly suggests the introduction of the vertical support. These are premises that one cannot disregard without arbitrary or eclectic license. Yet, for all the limitations that they may impose, they still do not prevent a successful response to the challenge of architectural and engineering design.

The success does not necessarily rest with the design of a few corrugated surfaces to cover the penthouse of a multistory building nor by the introduction of nondevelopable eyebrows as main entrance canopies.

As much as we must wholeheartedly concur with Candela about the need for deliverance from the strait jacket of mathematical conformism and for the development of confidence in intuitive imagination, so we must be aware that—in our time of easy and rapid communication—the forms derived by the engineer's creativeness risk being translated with facility into clichés or abused in exhibitionism.

EDGARDO CONTINI
Chief Engineer
Victor Gruen Associates
Los Angeles, Calif.

•

Dear Editor: Anything that is conducive to thinking in other than straight lines or planes is welcome and important. I like Candela's simple approach, taking the mystery out of doubly-curved structures. Even though the construction field at present may not be equipped to produce them efficiently and economically, the press for new shapes and forms is becoming more and more urgent day by day. When this pressure has been sufficiently built up, the newer construction methods will certainly emerge to afford the necessary relief.

For effect, Felix Candela has emphasized the importance of his subject. It is true that in nature, and the structures built within the animal world, flat surfaces are practically nonexistent, but since we are not equipped to walk on the ceiling, life within a modern community of necessity requires that most living functions be exercised on horizontal planes.

The importance of the principles expounded is therefore limited somewhat by the necessity to provide shelter against the elements. The impression left is that such a shelter can always be most successfully provided by double-curved members. This line of reasoning is of value only when the functions of the structure require relatively large, unobstructed areas. I think it would be well, therefore, to make the architects realize that this construction method offers its best potential in large spans,

(Continued on page 182)

p/a views

(Continued from page 181)

and under unusual conditions, so that the impression is not left that "stereo-structures" have a proper place in any type of building.

Another point I would like to make is that very drastic over-all economies cannot be hoped for, since the total cost of a roof is not a big item. Inversely, it is also true that even if doubly-curved structures, under many circumstances, may be more expressive than conventional types, they can be obtained at a small increased percentage cost of the whole budget. It is therefore possible to express the functions of the building by the more correct distribution of materials involved in "stereo-structures," and where the conditions are favorable, at a substantial cost saving, insofar as the roof structure itself is concerned.

I can't say that I am too much impressed by Candela's emphasis on mathematical analysis as a handicap in developing doubly-curved structures. For the job of any magnitude, the analysis part is not too serious, and I don't know of any case where the proper form has been discarded on that account. I also question his implication that an analysis is not required, and for that reason the architects can get back to the position of "master builders." I don't believe an architect would feel very comfortable under a structure whose dimensions he has picked out of thin air. It is true that newer methods such as photo-electric analysis will certainly become more and more important, but Man is not as yet equipped with the instinct of a spider, or an oriole.

I don't believe that the "architect" will ever regain his position of being the sole "master builder," but I do believe that the tendency is to create a "master builder" through a more intimate teamwork of the various professions. Anything that can be done, therefore, to broaden the team's understanding of structural principles is all to the good, and from that standpoint, Candela's article is interesting and valuable.

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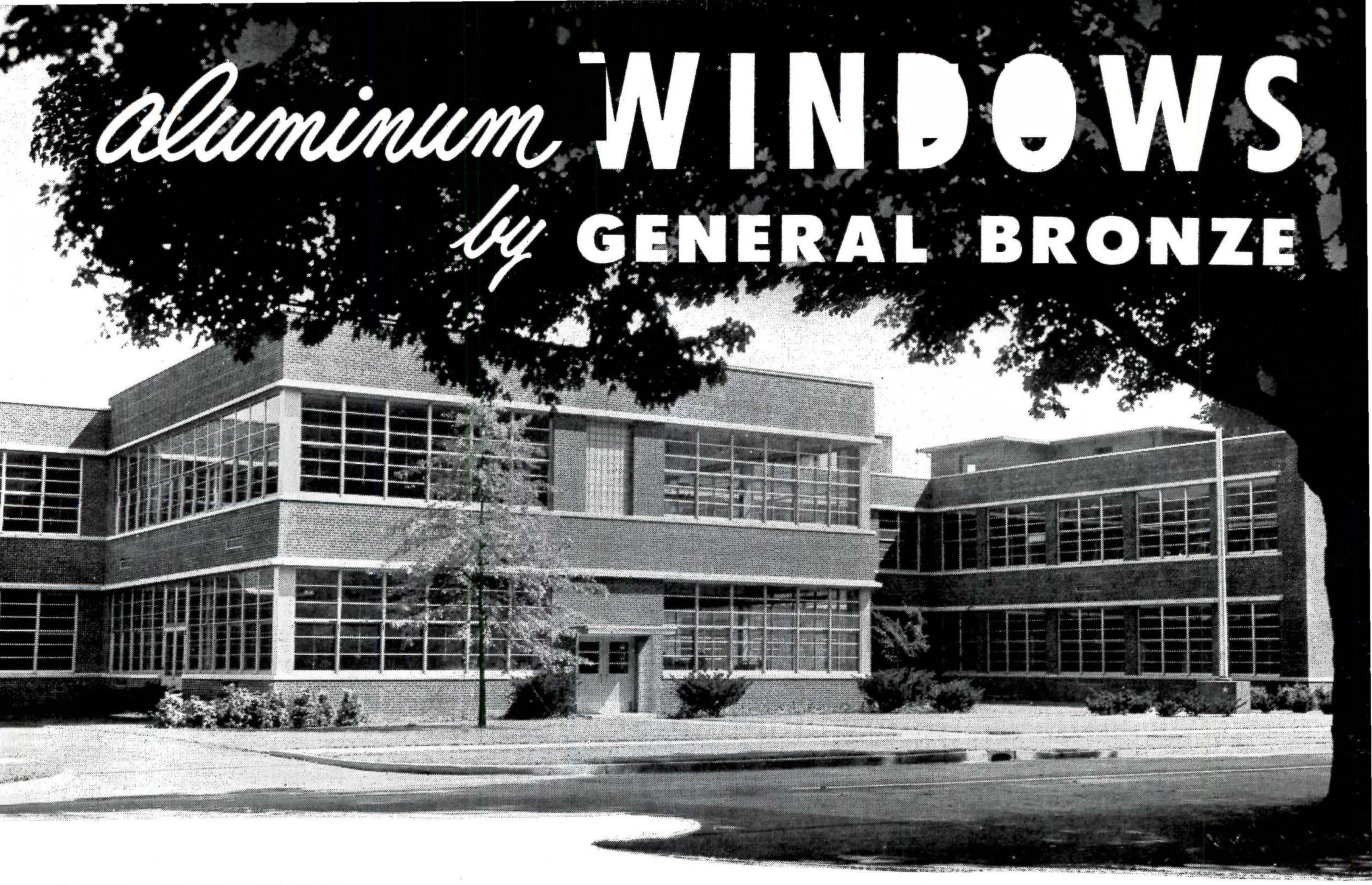
Severud-Elstad-Krueger
New York, N. Y.



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p/a reviews

books received

The Modulor. Le Corbusier. Translated by Peter de Francia and Ana Botstock. Harvard University Press, Cambridge 38, Mass., 1954. 243 pp., illus., $5

Mies van der Rohe. Second Edition. Philip C. Johnson. The Museum of Modern Art, 11 W. 53 St., New York 19, N. Y., 1954. 216 pp., illus., $7.50 (paper bound, $3.50)

The Castles of Great Britain. Sidney Toy. Published in the United States by the British Book Centre, 122 E. 55 St., New York 22, N.Y., 1954. 276 pp., illus., $5.50

Statics and Strength of Materials. Roland H. Trathen. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1954. 506 pp., illus., $7.50

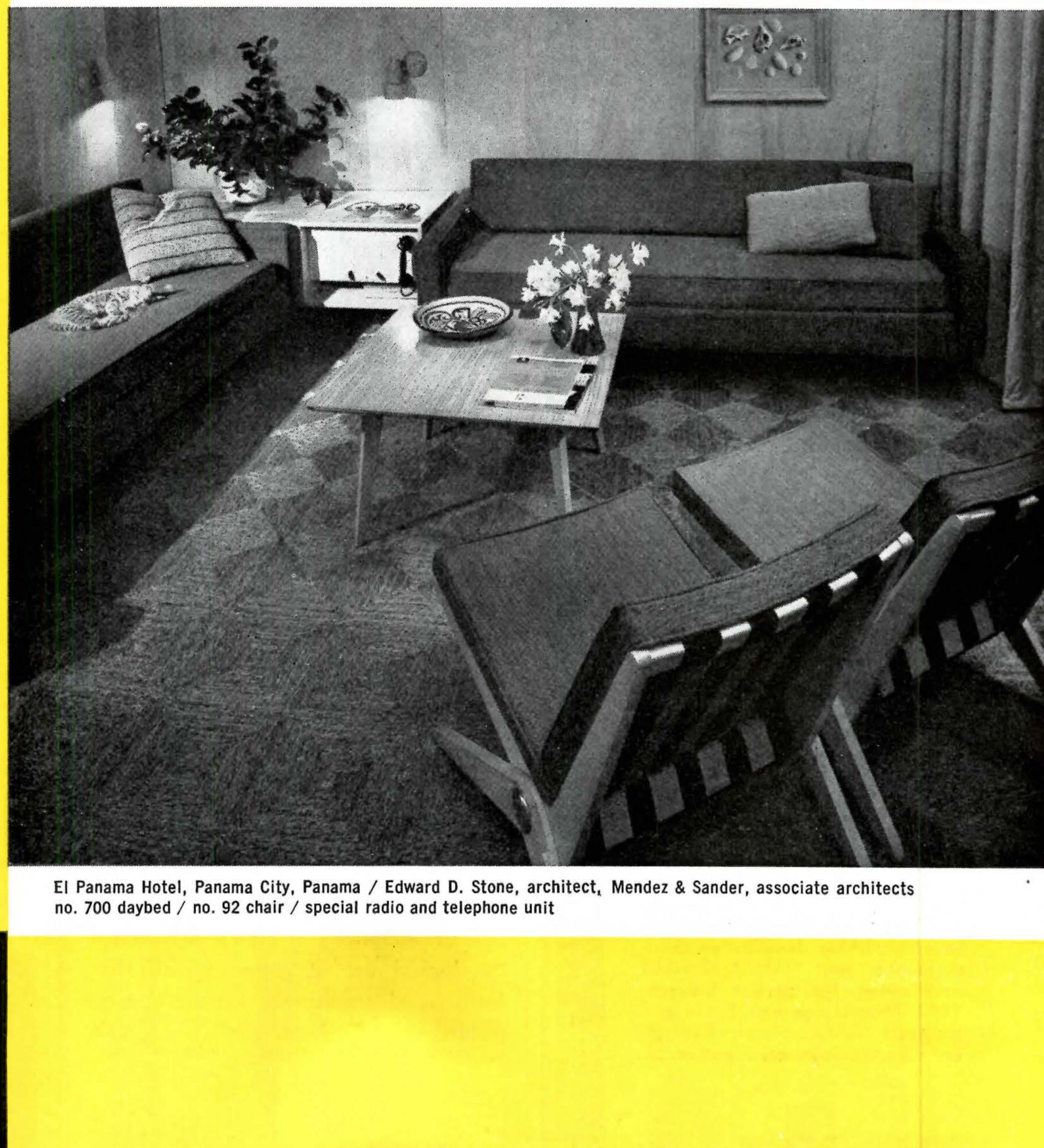
technology v. sensitivity

Contemporary Architecture of Japan. *Shinji Koike, Shokokusha Publishing Company, Inc., Tokyo, Japan. 119 pp., illus., $7*

In many ways, the opening of Japan's door, in 1886, was unfortunate for Japanese architecture, for that event marked the beginning of the end to a design tradition which must be recorded as one of the world's finest. The tide of technical and social advancement was not to be held back, nor should it have been; it is deplorable, however, that Western architects were unable to illustrate these advancements for the Japanese with anything better than the unimaginative eclecticism with which they defaced the Ginza. Nevertheless, the Japanese, who had been tied too long to prescribed materials and forms, welcomed the influx of Western ideas, regardless of their expressions.

There followed a period of experimentation with new forms—a period exemplified by the *Machine Pavilion* of Peace Exposition (1922), K. Sakurai's *Marunouchi Building* (1922), M. Yamada's *Telecommunication Office* (1925), and even by Frank Lloyd Wright's *Imperial Hotel* (1922), all in Tokyo. This movement was similar to that in America during the latter part of the 19th Century, when Richardson, Sullivan, and others

(Continued on page 188)



El Panama Hotel, Panama City, Panama / Edward D. Stone, architect, Mendez & Sander, associate architects
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reviews

(Continued from page 186)

were seeking to give expression to our rapidly advancing technology. But the rise of extreme nationalism in Japan during the '30s had much the same effect on that architecture as the Columbian Exposition of 1893 had on ours; both halted the progress of architecture.

Following World War II, during which so many of Japan's buildings were destroyed, design activity began again, perhaps too quickly and nervously, for much of what has been built in this postwar period has been grossly Western, to the exclusion of much of the native Japanese sensitivity and good judgement.

Shinji Koike's *Contemporary Architecture of Japan* is a collection of what he believes to be representative of the best postwar work. Several of the architects whose work is shown here have retained the unique Japanese touch, even when working with the plastic and heavy forms of concrete—but this is not the case often enough. It is interesting that some of the buildings most Japanese in feeling have been designed by an American architect, Antonin Raymond—*Reader's Digest* Tokyo office building, for example.

In residential design, however, there is evidence that the Japanese have not lost their touch, if the houses shown in this book can be taken as a fair representation. The characteristic cleanness of detail, the simplicity of plan and structure, the logical use of materials—all these features of traditional Japanese architecture are still there. J.K.

choice of furniture

World Furniture Treasures. Yesterday, Today, and Tomorrow. *Lester Margon. Reinhold Publishing Corp., 330 W. 42 St., New York 36, N. Y., 1954. 186 pp., illus., $7.50*

This is not a history of furniture, but a picture book of furniture particularly interesting to the author, shown in photographs and detailed drawings, complete enough to be used in reproduction of the pieces. P. B.

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JUNE GRADUATE—26, B.S. Arch. Engr.—54 B. Arch.—53 midwestern university. Desires position with firm of architects or engineers. Two years' experience architectural engineering—timber construction. References and drawings on request. Will consider any locality—preference vicinity of North Jersey. Married. Reply type of work, approximate compensation. Box 126, PROGRESSIVE ARCHITECTURE.

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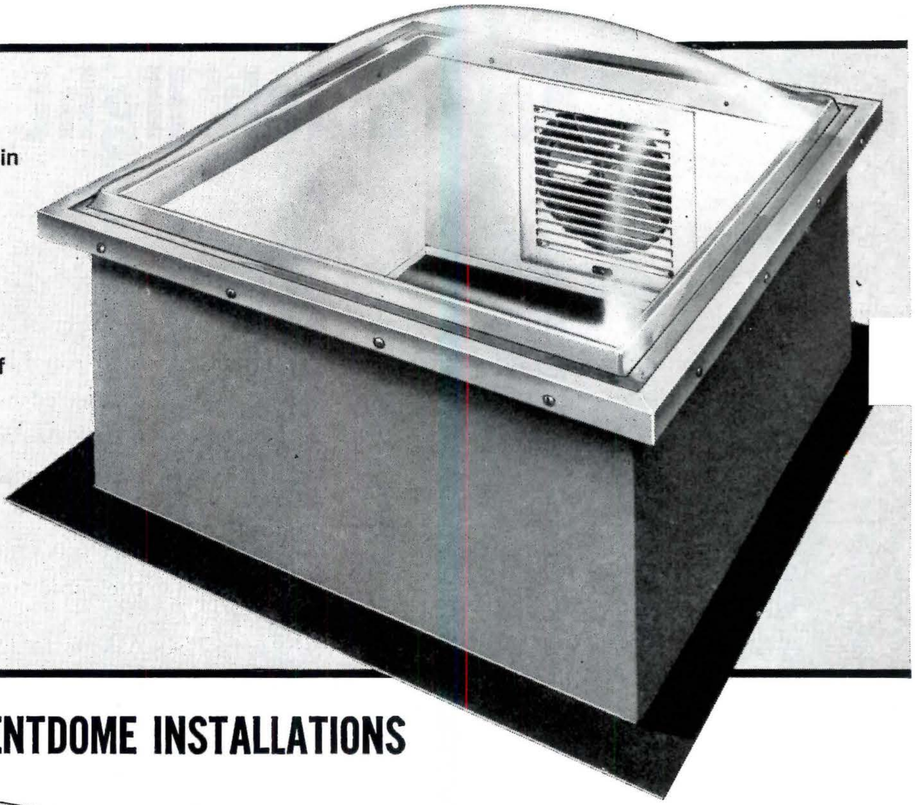

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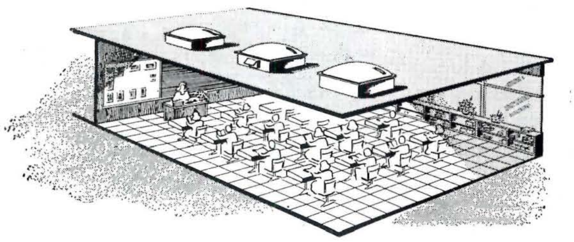

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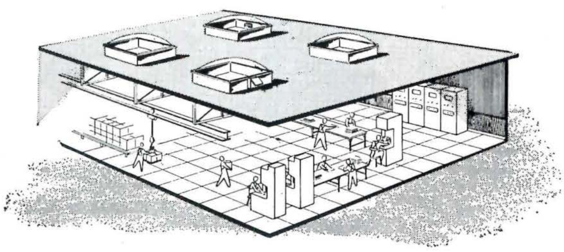

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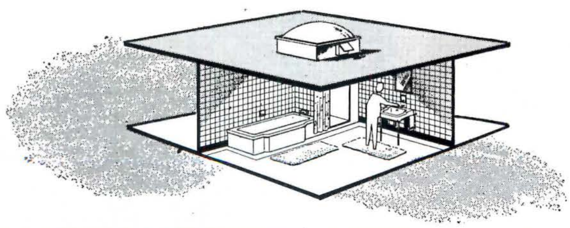

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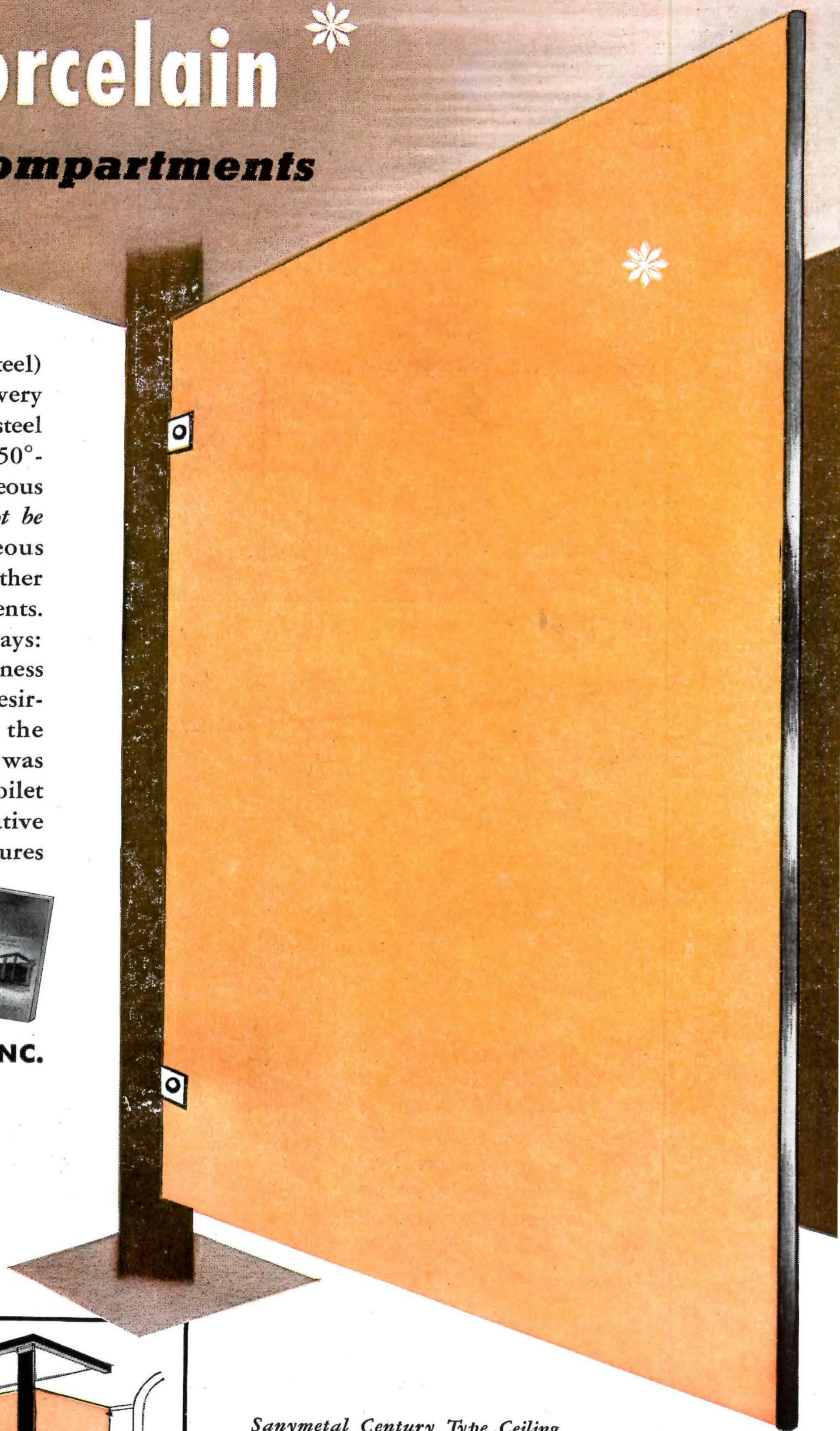

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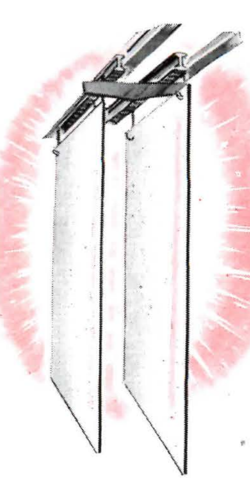

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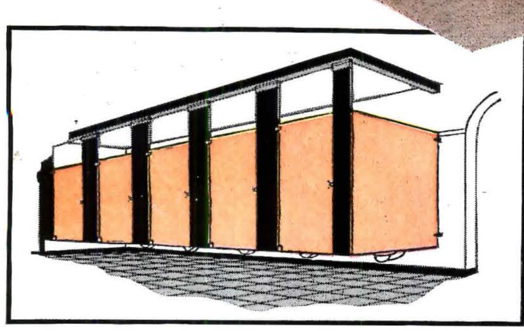

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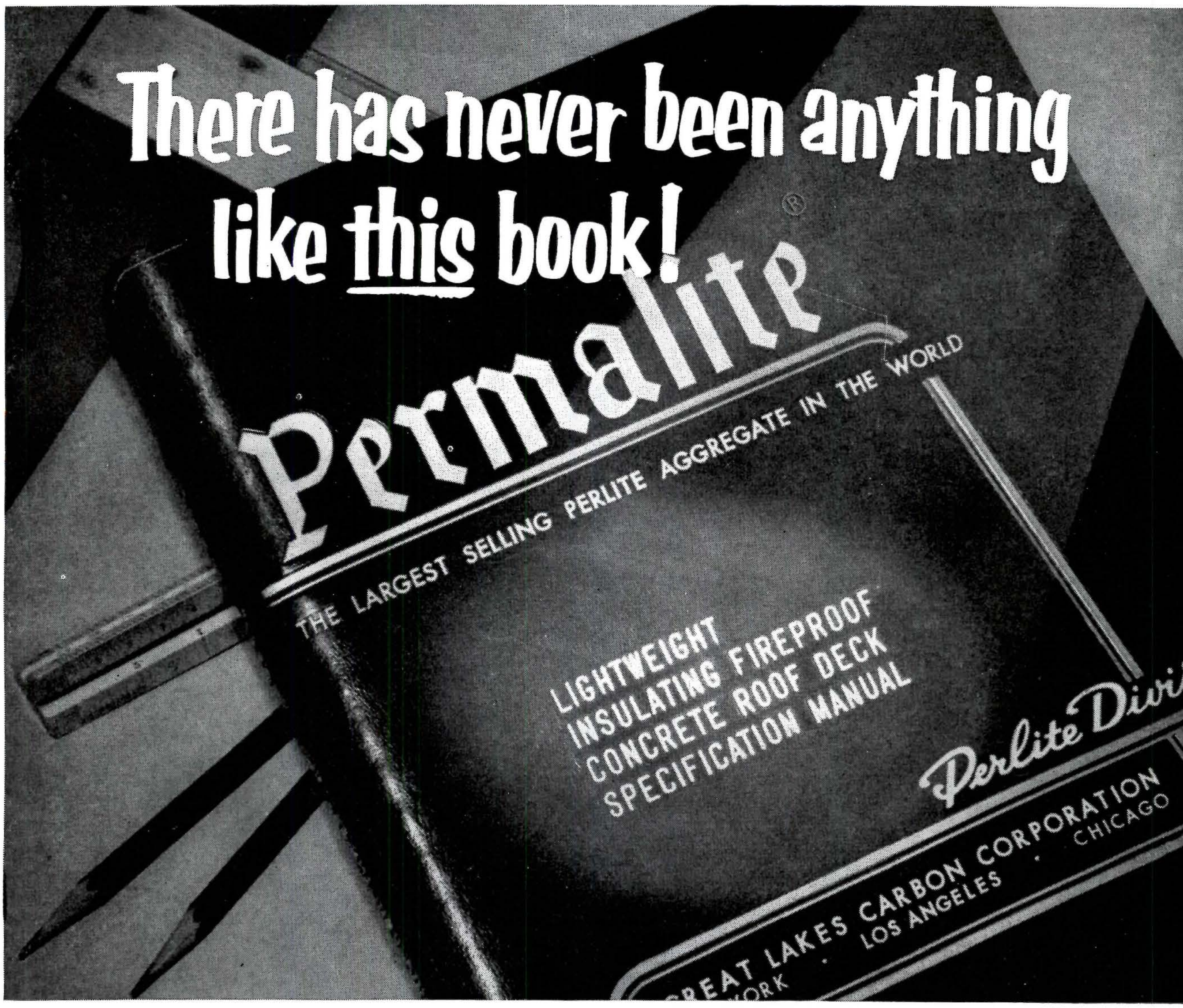

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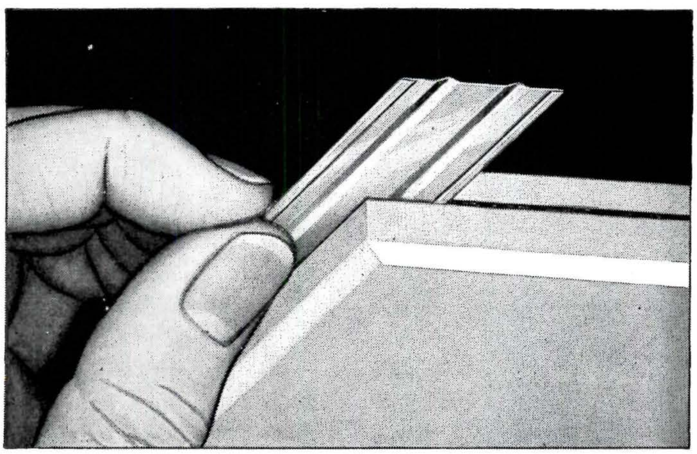
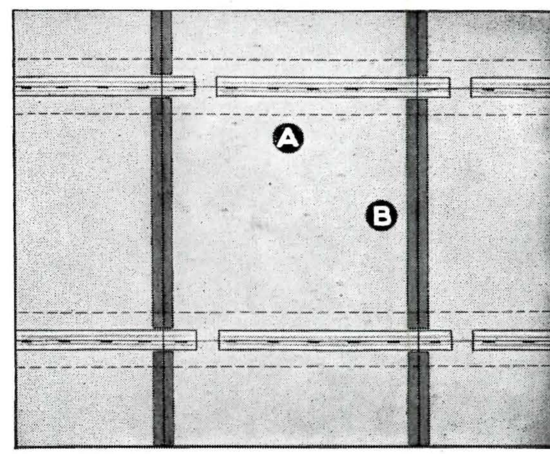
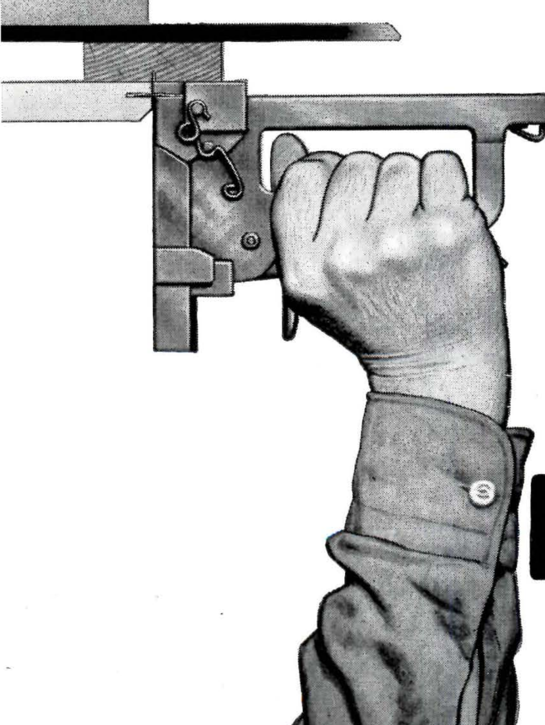


❶ Aluminum spline is inserted in kerfed edge of Fiberglas Acoustical Tile, 24" x 24" x ¾".



❸ Supporting splines (A) are parallel to furring, and continue through tile joints. Fiber cross splines (B) are used for leveling. They are not stapled, making installation still more economical.



❷ Modified hand or air tacker with special attachment holds spline away from furring strip, drives 9/16" staples flush with face of spline, and into furring strip. Staples do not pierce tile!

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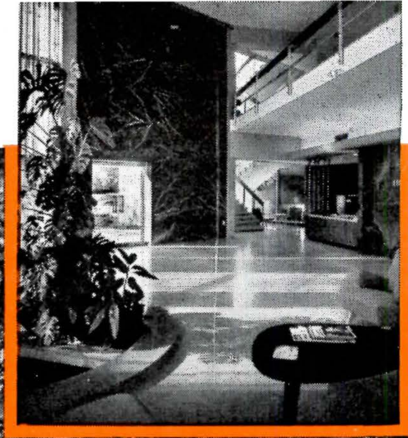

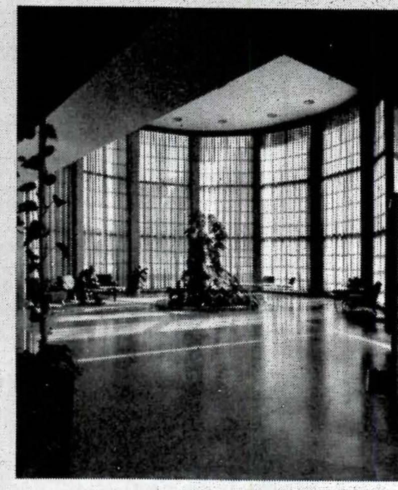

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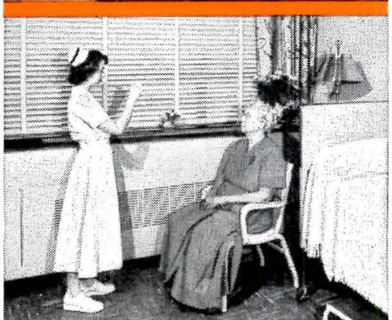

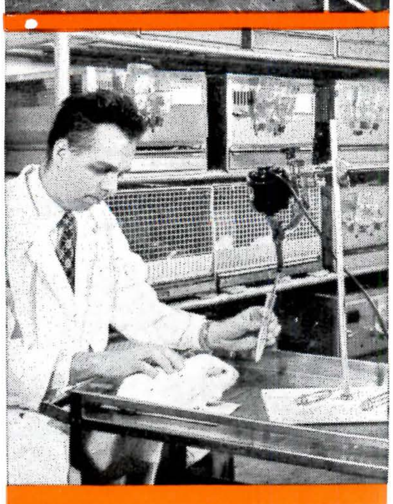

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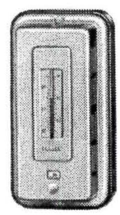


PACKLESS VALVES

Used in this Modern Research Center

Here is another of Oklahoma City's attractive modern buildings completely air conditioned and Powers controlled. It combines a three story research section of 46 laboratory units with a 20 room 16 bed hospital.

Administrative offices, conference and dining rooms, library and cold room areas, one for temperatures down to 34° F. and others down to 0° F. —are all maintained at whatever constant temperature and humidity is required.

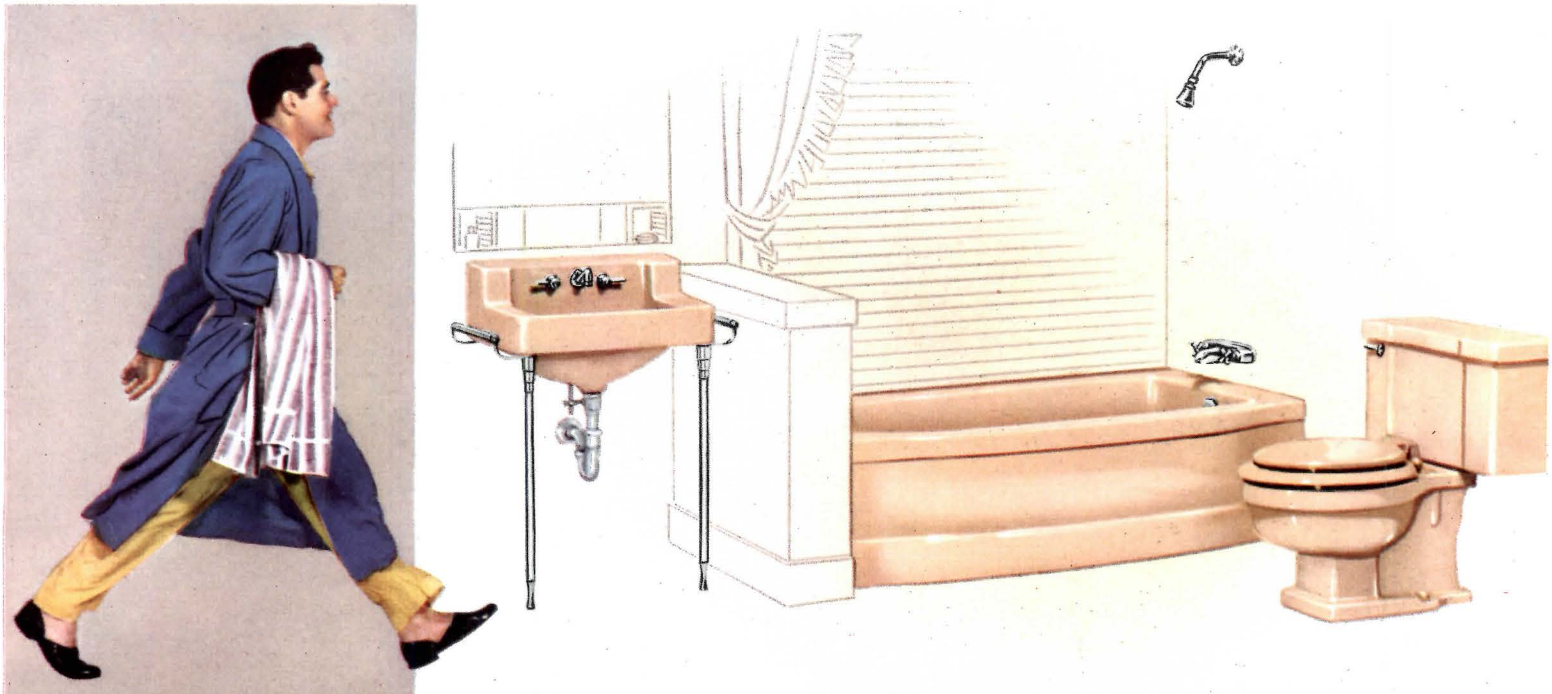
Experience gained by Powers here and in many other important small and large buildings will be helpful to you. Why not contact Powers nearest office the next time a temperature and humidity control problem arises? There's no obligation.

THE POWERS REGULATOR CO.

SKOKIE, ILLINOIS • Offices in Over 50 Cities in the U.S.A. Canada and Mexico • See Your *Phone Book*

OVER 60 YEARS OF AUTOMATIC TEMPERATURE CONTROL

(b28)



TWO BATHROOMS - a must in every modern home!

Coral—the bright new Briggs color—is being introduced to millions of potential buyers through powerful advertising in the pages of national magazines. Here is the first ad of the new series.

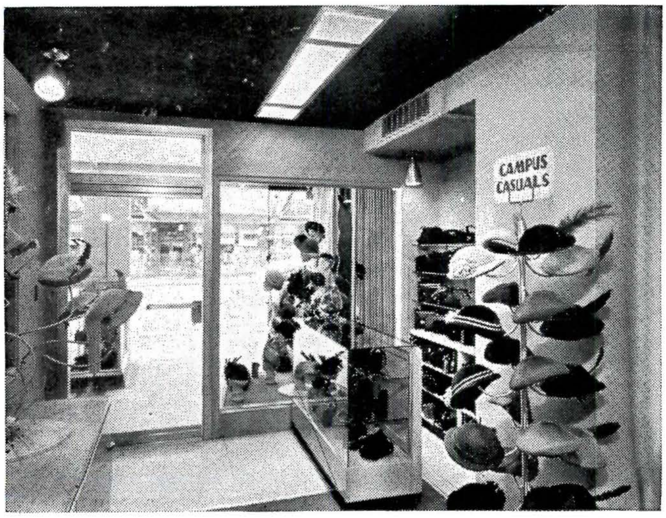
The second colorful Briggs Beautyware bathroom can sell your homes first!

You really get a prospect's attention when you start talking *two* bathrooms of glamorous Briggs Beautyware in color! Many a builder is using that fact to beat his competitors to the punch.

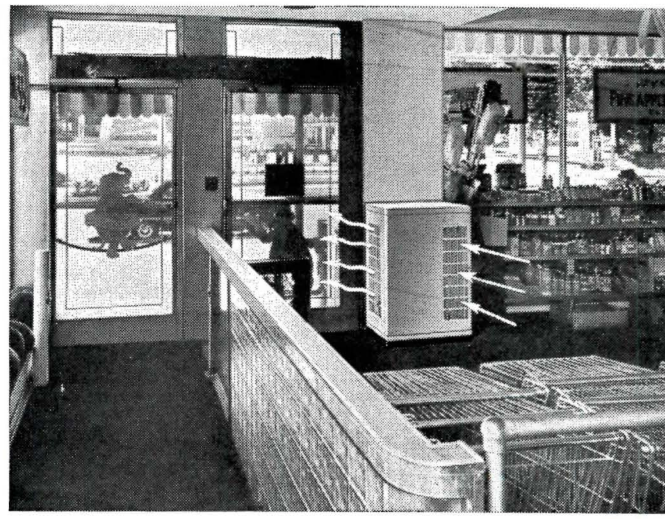
Folks love the fresh, modern look of these handsome fixtures. Four popular pastel tones—Coral, Sky Blue, Sea Green and Sandstone . . . blend harmoniously with an endless variety of color schemes. What's more, *all* Briggs Beautyware is acid-resistant. Colors won't fade. Users can depend on Briggs fixtures to keep right on looking brand new for years.

Up-to-date architects and builders know they can rely on Briggs Beautyware, too—to increase sales and boost their reputations. They're finding that the *second* Briggs bathroom is a big help in selling *any* new home faster! Always specify two bathrooms of colorful Briggs Beautyware!

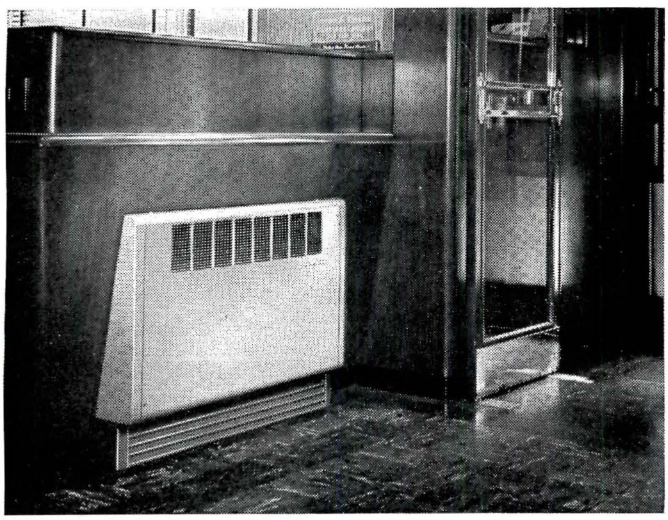
BRIGGS MANUFACTURING COMPANY • DETROIT 26, MICHIGAN BRIGGS



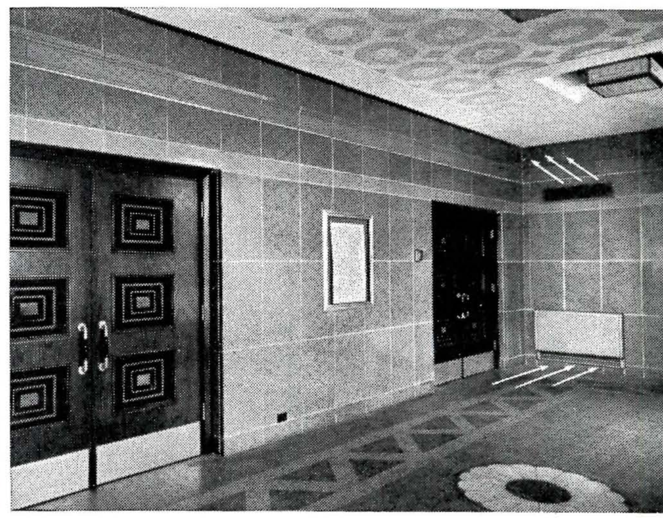
CEILING MOUNTED Type BT Cabinet, connected to duct with inlet at floor level, replaced a bulky, unattractive cast iron radiator that formerly was located below show window.



BLANKETING OPENING DOORS with a curtain of heated air, Modine Type FE Cabinet Unit protects customers and employees of this supermarket from the coldest wintry blasts.



RECESSED IN THE WALL and blending unobtrusively with the modern decor, a Modine Type BF Cabinet Unit provides economical heating, requires almost no floor space.



HARD-TO-HEAT CHURCHES offer no problems for Modine Cabinet Units. Here cold air, drawn into opening in bottom of unit, is heated and discharged through wall grille.

SEE YOUR HEATING JOB HERE?

Then Modine Cabinet Units are your low-cost answer!

YES, for the steam and hot water heating applications pictured above—and hundreds of others—versatile Modine Cabinet Units provide economical comfort. Quiet blower fans assure positive yet gentle circulation of heated air. Some models have provision for cooling with chilled water.

What's more, Cabinet Units' attractive appearance—plus their ability to replace at least two or three cast iron radiators—makes them ideal for new construction or modernization. If you've a difficult heating problem, get all the facts about Cabinet Units from the Modine representative listed in your classified phone book. Or mail the handy coupon at the right.

Modine

CABINET UNITS

MODINE MFG. CO.

1572 DeKoven Ave., Racine, Wis.

Please send me immediately a free copy of Bulletin describing Modine Cabinet Units.

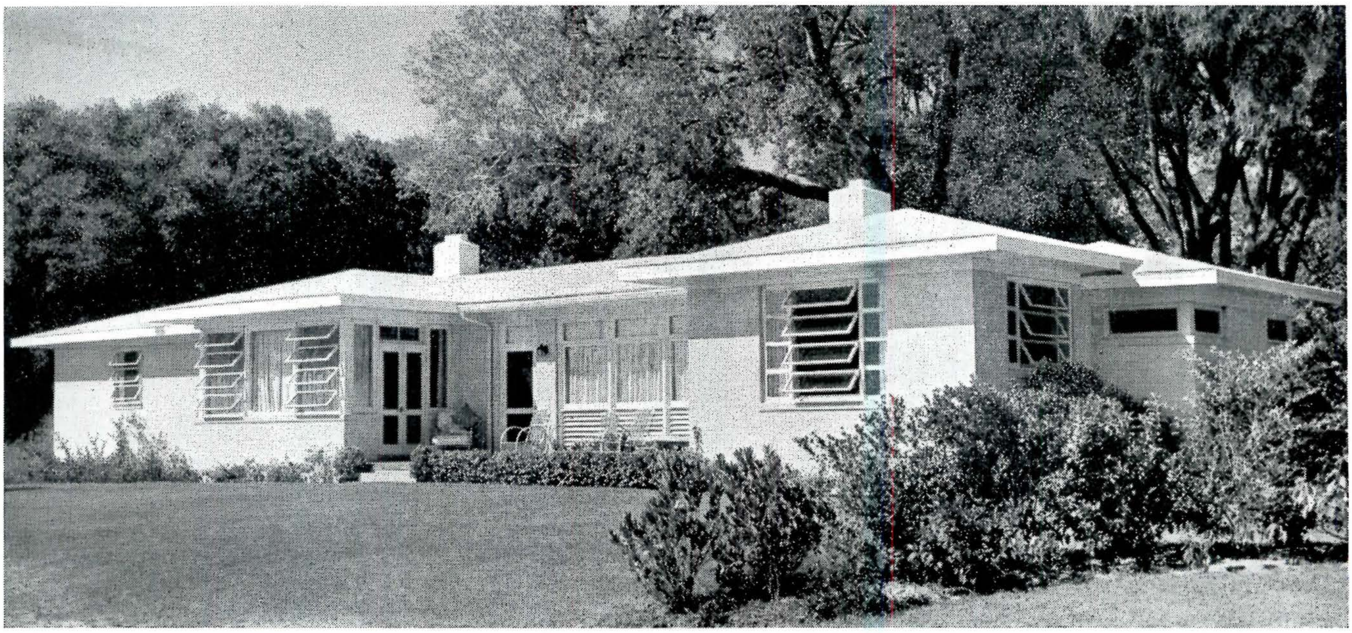
Name ....

Firm ....

Address ....

City ....Zn ....State ....

C-1234



Used with picture windows and fixed side lights, Gate City offers unlimited design possibilities.

Window Versatility in Contemporary Architecture

Gate City Wood Awning Windows are outstanding in the trend toward simplicity and functional beauty. Versatile, they can be used in almost limitless combinations. Their smart design and clean horizontal lines give any dwelling a distinct, modern appearance. And they provide the home-owner with advantages for year 'round comfort.

During warm weather, the full-vent area of Gate City windows permits complete ventilation control . . . invites fresh air from three directions. And the patented "Fixed Hinge" affords maximum rain protection. On colder days, the tight wood sash and complete weatherstripping keep **all** the warm air in . . . the cold weather out!

Perma-Treated for long life . . . designed for economical installation and maintenance, the Gate City Wood Awning Window is steadily gaining favor with home builders everywhere. Complete information will be promptly furnished upon request.

See our Catalogue in Sweet's.

®Gate City AWNING WINDOWS

Perma-treated for Long Life

"Window Craftsmen for over 40 years"

GATE CITY SASH & DOOR CO., Dept. PR-36
P.O. Box 901, Fort Lauderdale, Fla.

Gentlemen: Please send complete information on Gate City Wood Awning Windows.

Name ______________________

Address ______________________

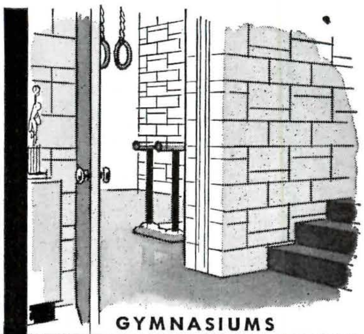
City __________ **Zone** _____ **State** __________

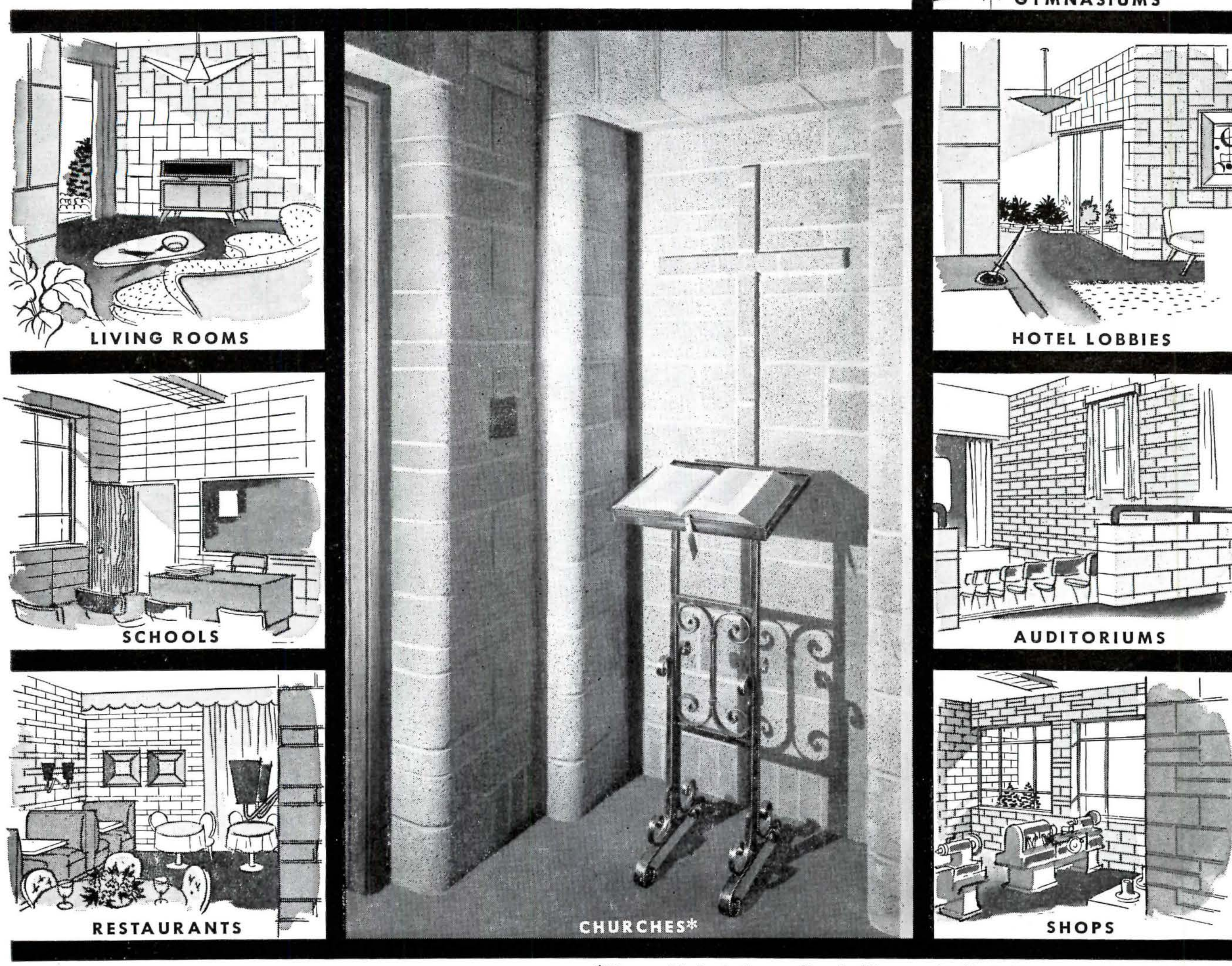
→ **A complete acoustical treatment**

→ **A decorative interior finish**

→ **An insulative structural wall**

All at one low cost!





*Diamond Lake Lutheran Church, Minneapolis; H. C. Hauser, Architect, Milwaukee

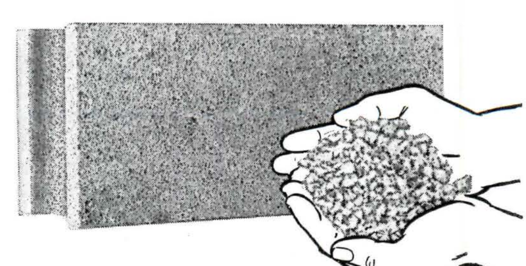
The great and growing popularity of Waylite Masonry structures is due to the combination of its several desirable qualities.

It *is* masonry. With all of masonry's desirable qualities . . . substantial . . . time- and fire-resistant . . . architecturally accepted throughout man's entire history.

But at this point the masonry characteristics of Waylite diverge. In Waylite Masonry, walls have a high thermal insulative quality that gives equitable room climate. The exposed surface of the units eliminates need for acoustical treatment. Decorative effect is easily achieved with varying sizes of units, laid in patterns; joint treatments; texture; colors. (See 24 pp. in Sweet's)

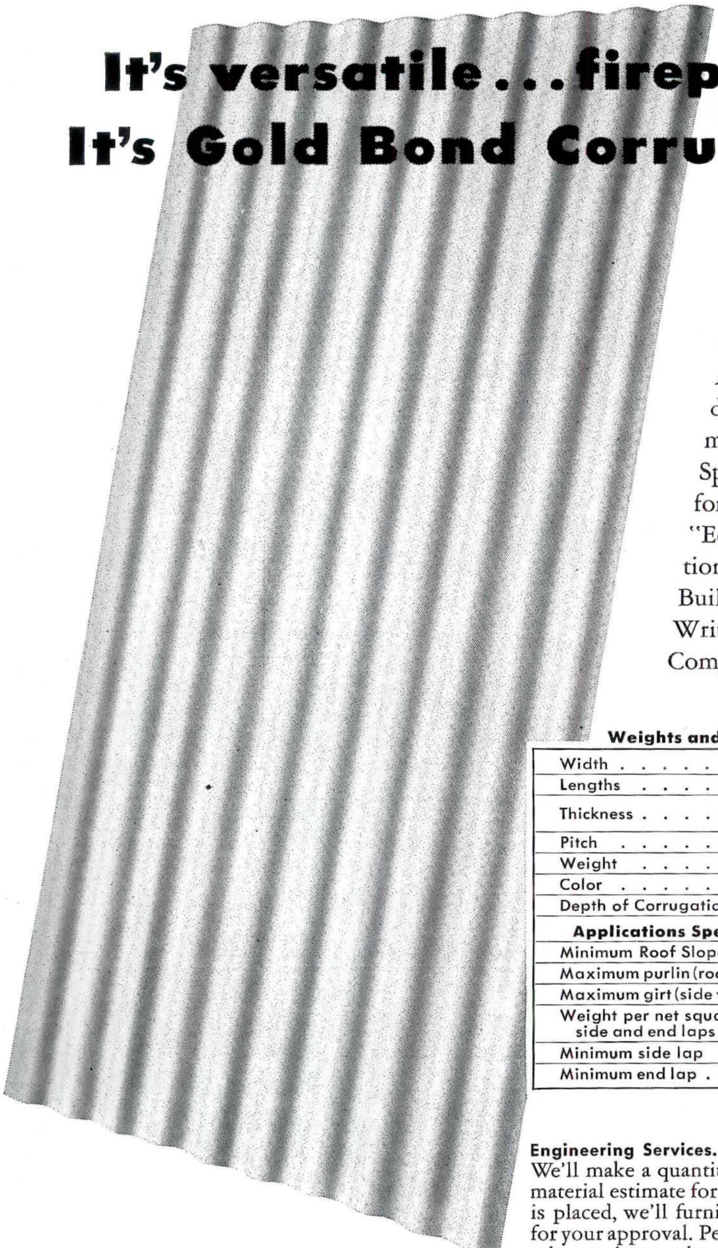
The low cost of Waylite Masonry comes in part from exclusive features of the raw aggregate material and large volume processing economies; and also in part from modern high-speed machinery and methods in the products plant.

Complete engineering and designing data is available. Address the Waylite Company, 105 W. Madison St., Chicago, or Box 30, Bethlehem, Pa.



WAYLITE

MASONRY UNITS



It's versatile . . . fireproof . . . beautiful !
It's Gold Bond Corrugated Asbestone !

GOLD BOND Corrugated is made of asbestos and cement, making it an especially valuable material in industrial construction. It's strong, fireproof and resistant to corrosive alkalis and acids.

And the *corrugations* make possible a wide variety of smart, distinctive designs . . . inside and out . . . for industrial, commercial and residential buildings.

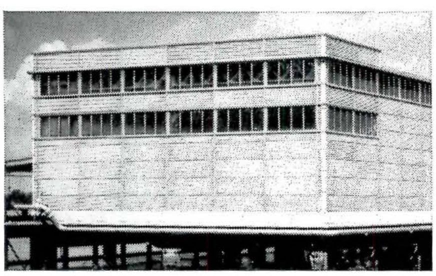
Specify Gold Bond Corrugated Asbestone "Standard 400" for application over steel framework. The lighter weight "Economy 250" goes over regular wood frame construction. Both materials are of the high quality of all Gold Bond Building products.

Write Asbestos Architect Service Department, National Gypsum Company, Buffalo 2, New York for complete information.

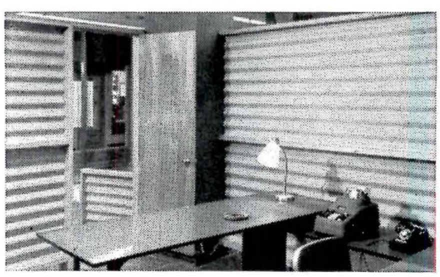
Weights and sizes:	**ECONOMY 250**	**STANDARD 400**
Width	42″	42″
Lengths	3′ to 10′ (in 1′ increments)	1′ to 12′ (in 6″ increments)
Thickness	¼″ approx.	Approx. ⅜″ at the crests and vales, $\frac{5}{16}$″ at flanks.
Pitch	4.2″	4.2″
Weight	Approx. 2.25 lbs. per sq. ft.	4 lbs. per sq. ft.
Color	Natural Cement Gray	Natural Cement Gray
Depth of Corrugation	1¼″	1½″
Applications Specifications:		
Minimum Roof Slope	3″ rise in 12″	3″ rise in 12″
Maximum purlin (roof) spacing	2′ 6″	4′-6″
Maximum girt (side wall) spacing	3′ 6″	5′-6″
Weight per net square, including side and end laps	Approx. 275 lbs.	Approx. 500 lbs.
Minimum side lap	1 corrugation (4.2″)	1 corrugation (4.2″)
Minimum end lap	6″	6″
	Refer to Sweets— AIA File 12-F-2	Refer to Sweets— AIA File 12-F

Engineering Services. Send us your plans. We'll make a quantity take-off and send a material estimate for the job. When order is placed, we'll furnish erection diagrams for your approval. Personal services of our sales engineers also available.

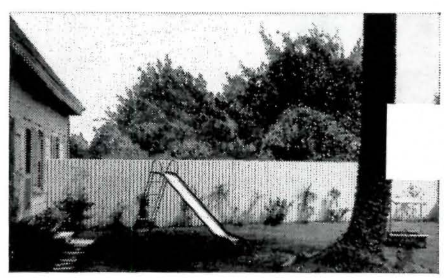
Erection Services. If you wish to have Gold Bond Corrugated Asbestone applied, we'll gladly send you names of Approved Asbestone Erectors in your area. These firms are highly skilled in all types of Asbestone applications.



Gold Bond Corrugated gives strength, clean design, weather resistance to this sugar refinery warehouse and wharf.



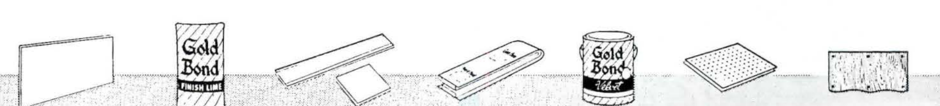
Gold Bond Corrugated sheets make simple, strong partitions. They can be painted for decorative effects.



More than just a "plain old fence." And there's no maintenance problem on this Gold Bond Corrugated fence!

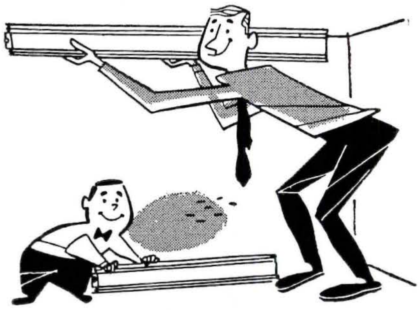
Get the undivided responsibility of National Gypsum

Specify Gold Bond® inside and out



Gypsum Board Products	Plaster and Lime	Insulation Plank and Tile	Rock Wool	Paint Products	Acoustical Tile	Asbestos-Cement Products

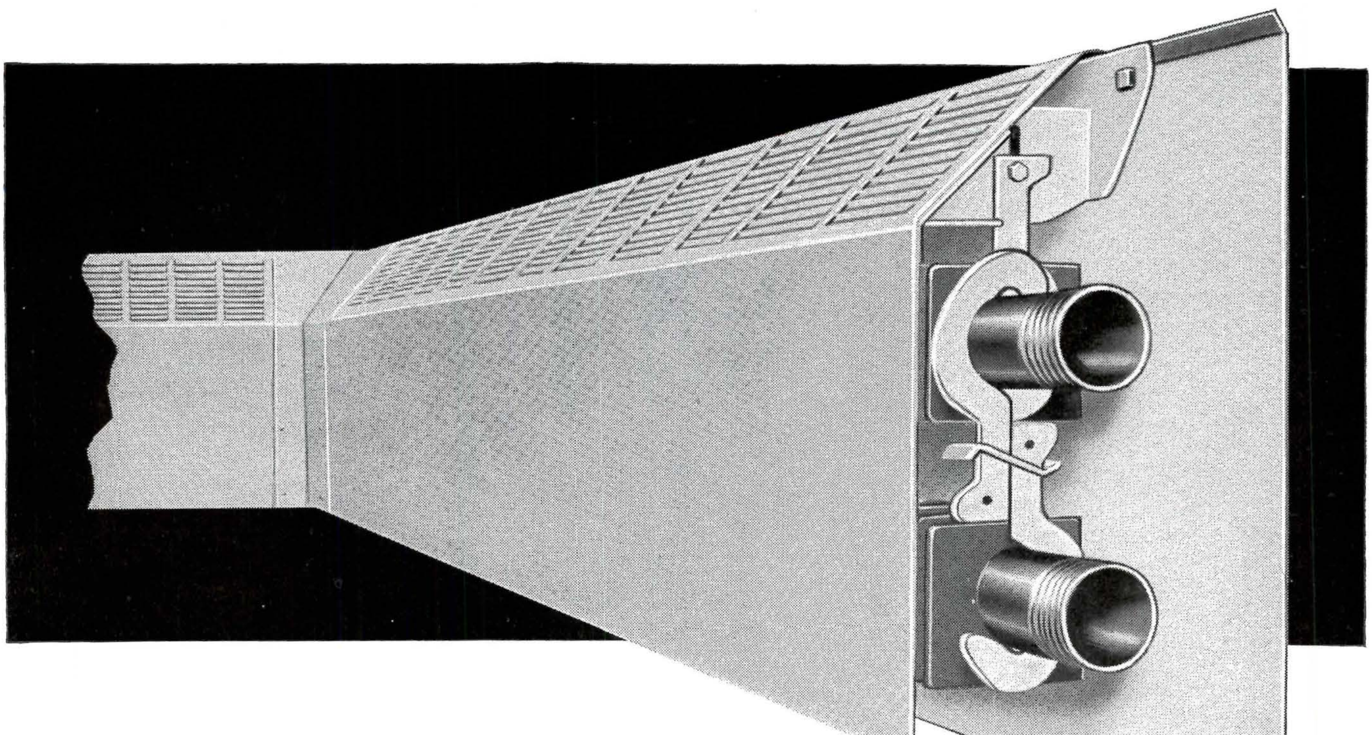
NATIONAL GYPSUM COMPANY • BUFFALO 2, NEW YORK



"Heats at *any* height"

"Full line of accessories"

"Wide choice of hangers"



WHAT WILL YOUR NEXT RADIATION JOB REQUIRE?

No matter what the requirement . . . you'll have a client-satisfying answer to any along-the-wall radiation job with attractive Dunham Fin-Vector®.

That's because I=B=R rated Fin-Vector offers such a wide choice of sizes, capacities and styles. For example, Sloping Top, Flat Top and Expanded Metal Covers—one, two or three tiers high; heating elements supported either by simple wall brackets, adjustable hook and link hangers, or ball-bearing roller brackets; two heating fin and tube sizes; an unusually complete line of accessories that conceal all traces of piping.

Fin-Vector cabinets have flanged ends for tighter fit, better finished appearance. And a new lever-operated damper assures better heating performance.

For full details, clip and mail the coupon.

DUNHAM **FIN-VECTOR RADIATION**

RADIATION • UNIT HEATERS • PUMPS • SPECIALTIES

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Chicago 6, Illinois
Please send Fin-Vector Literature.

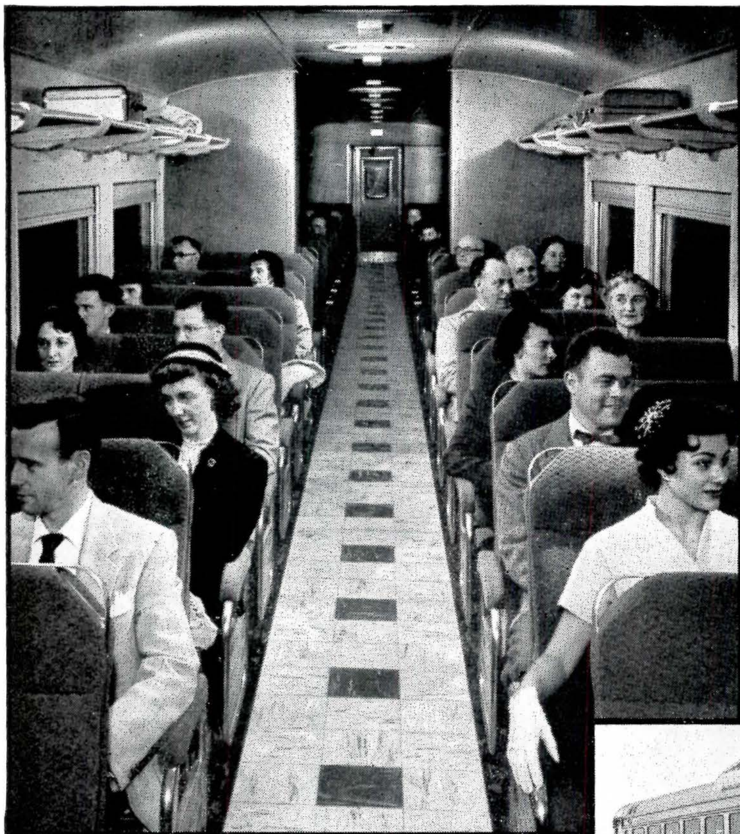
Name______________________

Company______________________

Address______________________

City____________ Zone____ State________

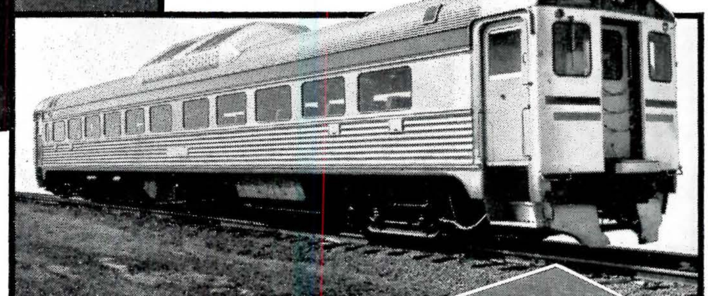
Selected for maximum wear with minimum care



Johns-Manville TERRAFLEX Vinyl Floor Tile

. . . in Budd Company R.D.C. all-stainless steel passenger cars

Heavy traffic in this Budd Company R.D.C. diesel-powered passenger car has little effect on the durable J-M Terraflex floor. A damp-mopping whenever necessary, will restore it to its first-day color beauty.



J-M Terraflex® needs less care and gives more wear than any other type of resilient floor of equal thickness . . . pays for itself through years of low-cost maintenance

As a result of its tested performance in railroad car installations, Johns-Manville Terraflex Vinyl Floor Tile is standard equipment in the Budd Company's new R.D.C. passenger cars.

J-M Terraflex is a flooring of time-proved superiority. Made of vinyl and asbestos it is exceptionally tough and resistant to traffic . . . defies grease, oil, strong soaps and mild acids.

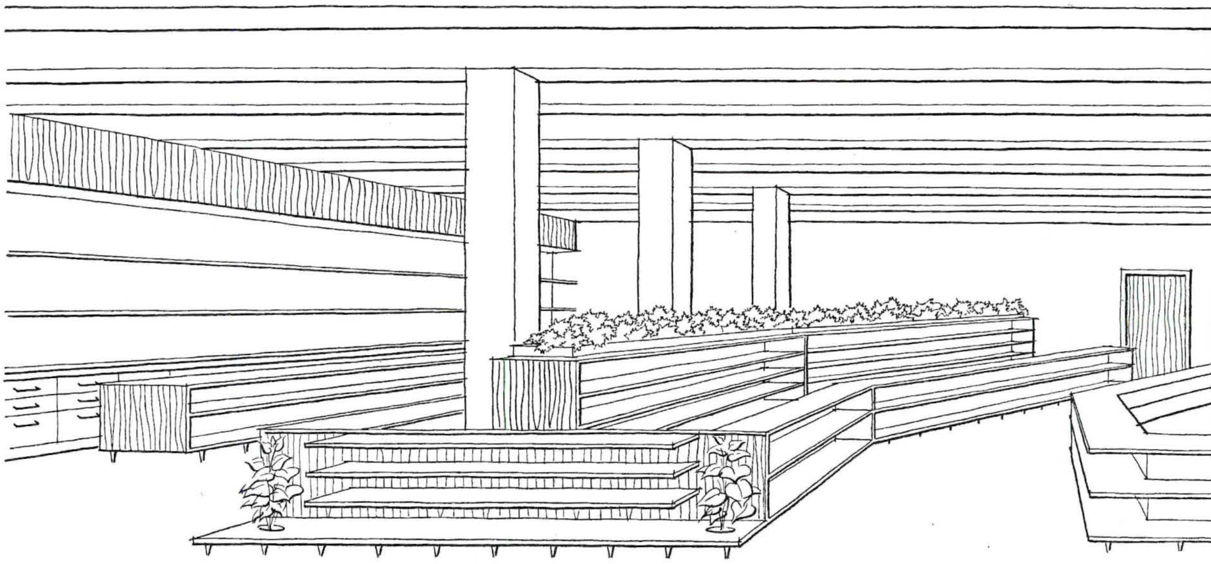
Terraflex saves time and dollars through low-cost maintenance. Its nonporous surface requires no hard scrubbing . . . damp-mopping keeps it clean and bright . . . frequent waxing is eliminated. Through years of economical service Terraflex pays for itself.

Available in a large range of striking colors, Terraflex is ideal for restaurants, public areas, schools, hospitals.

Specify J-M Terraflex whenever your plans call for resilient flooring. Its long-wearing beauty and long-time economy provide a maximum of reliable floor service. For complete information write Johns-Manville, Box 158, New York 16, N. Y.

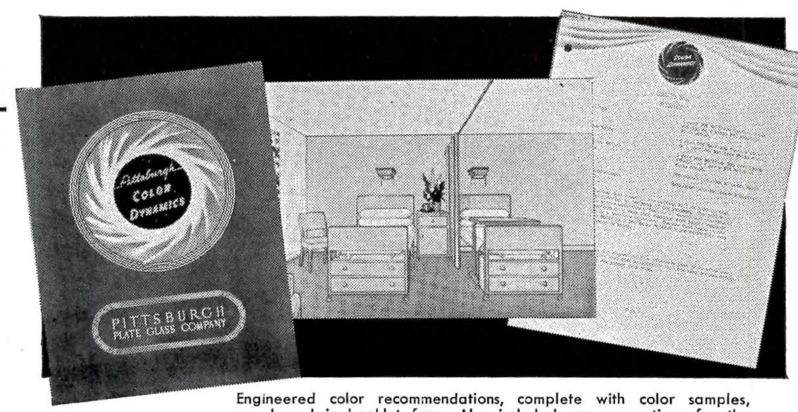
JOHNS-MANVILLE JM PRODUCTS

Jo ns-Manville



You Can Get a Complete

Engineered Color Study for Your Plans–FREE!



Engineered color recommendations, complete with color samples, are bound in booklet form. Also included are suggestions for the correct types of coatings for every kind of material and construction.

YOU can often make your plans more acceptable to your clients by including a detailed color program.

- **Almost everyone** who owns or operates an industrial, commercial or service enterprise recognizes the importance of the influence of color upon people. That's why such a detailed program of color recommendations often can be very helpful.
- **Why not let us submit** *engineered* color recommendations to go with your plans? These recommendations are based upon the principles of Pittsburgh's system of COLOR DYNAMICS®. This method of painting has successfully demonstrated its ability to improve productive efficiency, morale and well-being in many fields.
- **We'll be glad** to make such a detailed study for you without cost or obligation. Simply call your nearest Pittsburgh Plate Glass Company branch and arrange to have one of our color consultants see you at your convenience. Or mail coupon at right.

For Additional information on COLOR DYNAMICS see Sweet's Architectural File, Section 14/Pi.

MAIL THIS COUPON TODAY

Pittsburgh Plate Glass Company
Paint Division, Dept. PA-64
Pittsburgh 22, Pa.

Gentlemen:

☐ Please have your representative provide us with further information about Pittsburgh's *free* COLOR DYNAMICS engineering service for architects.

☐ Please send *free* copy of your booklet on COLOR DYNAMICS for ____industry; ____hospitals; ____schools; ____commercial buildings.

NAME________________

ADDRESS________________

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PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS • FIBER GLASS

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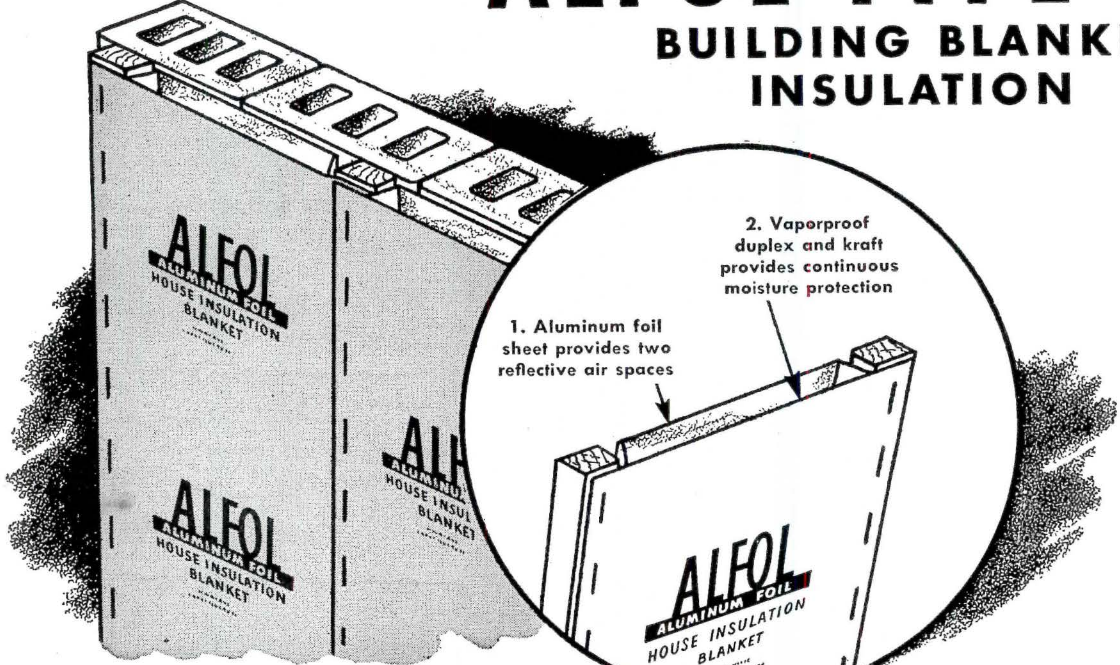
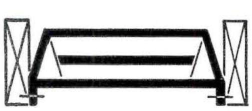
Over an inch of Insulating Efficiency plus a positive vapor barrier—all in the 7/8 inch space of a furred out Masonry Wall!

ALFOL TYPE 1A

BUILDING BLANKET INSULATION

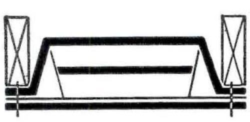


THERE'S AN ALFOL TYPE EQUALLY EFFICIENT FOR EVERY INSULATION NEED

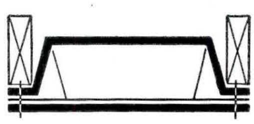


ALFOL Type IV—Four reflective air spaces for the utmost in thermal efficiency.

ALFOL Type III—Three reflective air spaces—ideal for crawl spaces, unfinished ceilings.



ALFOL Type II—Three reflective air spaces—designed to be applied across stud *faces*.



ALFOL Type I—Two reflective air spaces—in mild climates at lowest cost and top efficiency.

Alfol Type 1A Insulation is specially made for standard masonry construction. It is the only insulation that provides over an inch of insulation value plus a positive, continuous vapor barrier in the usual 7/8″ clearance available in 1″ x 2″ furred masonry walls. Refurring expense is eliminated!

Type 1A has proved effective in hundreds of installations in every section of the country. When applied the pure aluminum foil automatically "pops out" to form two reflective air spaces equal in thermal value to more than an inch of insulation. The heavy vaporproof duplex and kraft backing by which Alfol is applied across the face of the furring assures a positive, continuous vapor barrier.

Write for free literature and complete details — Address Dept. PA-1

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BUILDING BLANKET INSULATION
"FIRST IN REFLECTIVE INSULATION"

REFLECTAL CORPORATION
A Subsidiary of Borg-Warner
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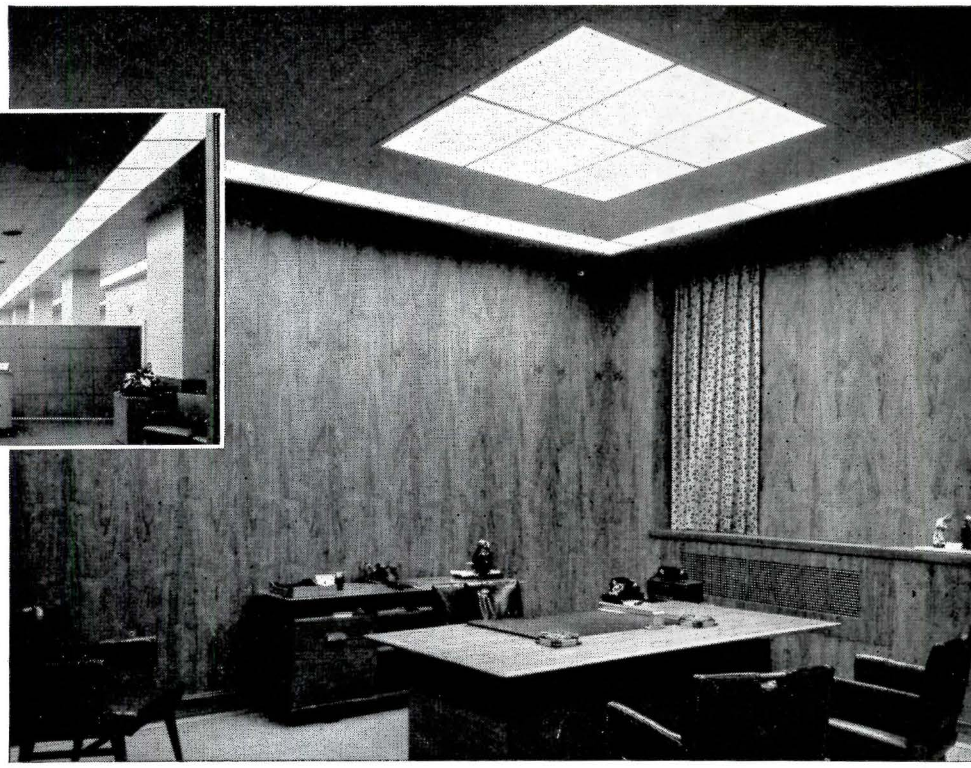
Architects—Holabird & Root & Burgee
Lighting Fixtures—Morris Kurtzon, Inc.
Electrical Contractors—Kelso-Burnett Electric Co., Inc.
Lightingware—Corning Fota-Lite

▲ Visitors are greeted in a pleasant, well-lighted reception area. Workers in the area beyond the smart panel find that Fota-Lite illumination is glare and shadow free.

A perimeter of Fota-Lite brightens this executive office, while a concentrated area over the desk provides excellent illumination for reading and writing. Fota-Lite is perfect for luxury lighting. ▶



How modern offices can use Corning Fota-Lite to advantage

The rich setting of these new offices of a large oil company show how CORNING Fota-Lite is used best. Notice how evenly it distributes light.

Fota-Lite is richly rewarding to work with. It gives you all of the lighting advantages of louvered lighting *plus* the advantages of flat glass—easy cleaning.

Fota-Lite provides high levels of illumination with low brightness. The soft opal louvers afford diffusion at normal viewing angles. Vertical light, however, is unrestricted.

Fota-Lite is not color selective. You can use it freely for wonderful effects where colors form a mood or where color encourages a buying decision.

What is Fota-Lite?

It's fine crystal glass in which tiny opal louvers are created by a photographic process. Strong, lightweight, free of warpage, Fota-Lite encloses light sources with a minimum of bulk. You can use it for an entire luminous ceiling or for keying interest to relatively small areas. Fota-Lite offers rare value when it comes to beautiful lighting and lighting that is efficient. And the smooth glass surface permits easier cleaning.

You can get complete information about Fota-Lite and other Corning products just by signing and mailing the request slip below. We'll send you a free copy of Architects and Engineering Handbook of Lighting Glassware.

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consider the taxpayer, too—

Ridge Elementary School, Homewood, Illinois • Perkins & Will, Architects and Engineers

build schools for **lowest annual cost** with **brick and tile**

Initial cost + *annual maintenance cost*
= *total building cost*

This bit of basic arithmetic shows why both pupils and taxpayers get a bonus when you build schools with beautiful, durable brick and tile—these materials save so much in annual maintenance cost that your total building cost is bound to be lower.

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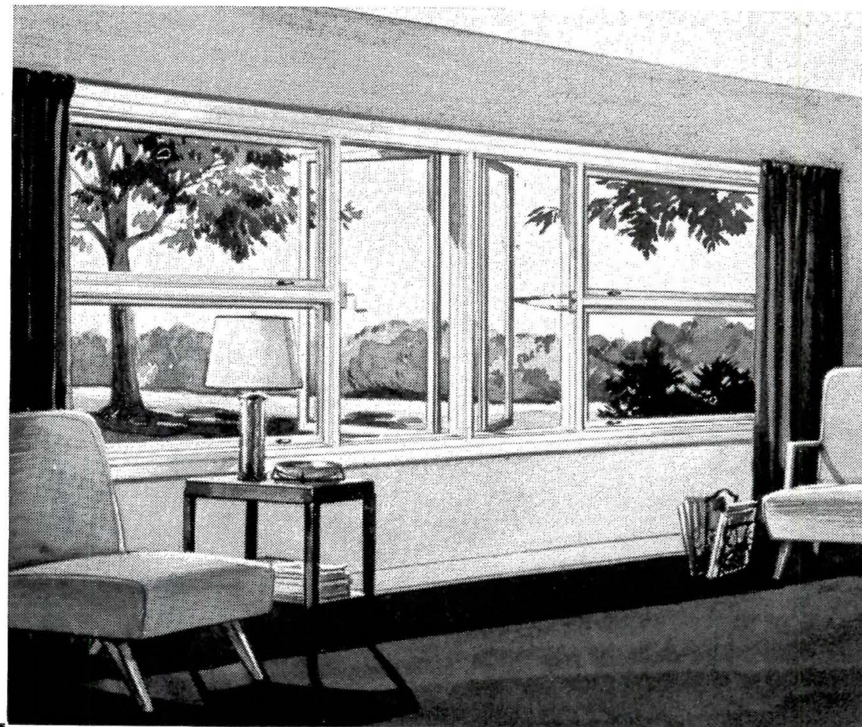
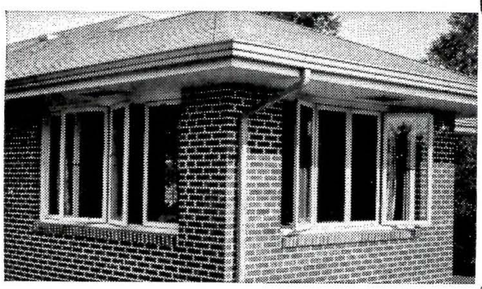
STRUCTURAL CLAY PRODUCTS INSTITUTE
1520 18th Street, N. W., Washington, D. C.

see how **CURTIS** window research keeps pace with modern building needs

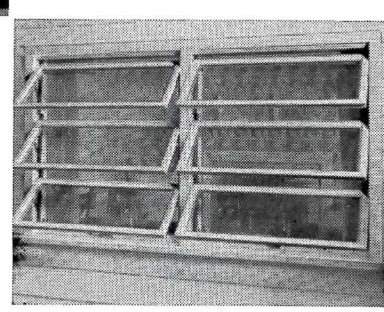
Architectural styles change—and modern window research must meet the demands for new and improved designs. For example, *the* Curtis Convertible Wood Window Unit, shown here, represents an entirely new concept in frame and sash construction. The individual units may be installed singly or in any desired combination of multiples—stacked in both width and height. Convertible Units may be used as right- or left-swing casements—awning windows—swing-in hopper-type sash and a thousand or more different window combinations that fit any wall construction and meet every budget.





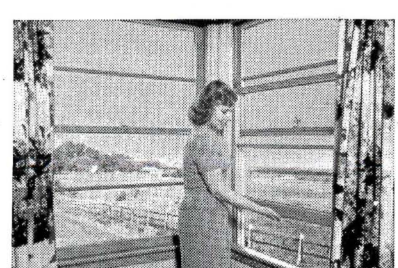
Curtis Silentite Casements offer all of the charm and beauty that only wood casements can provide, but without draft, air leakage, rattling or swinging. The Silentite Casement is trouble-proof! There is no protruding hardware—nothing to rust, rattle or get out of order. In summer Silentite will catch a breeze from every direction—cool, healthful ventilation, but no draft! And in winter, it will reduce by about 16% the heat loss that usually occurs with ordinary casements.

Modern, too, is this Curtis Silentite guarantee covering materials and workmanship—convincing proof of the extra value which is built into all Curtis Silentite windows.



Silentite awning windows allow full ventilation or almost any variety of partially open positions of the individual sash. Sash control is simple—a single crank operates the entire unit. Operating hardware is completely concealed in window frame—sash is held firmly in any position.

The famous Silentite pre-fit double-hung window unit is designed with "floating" weather-strips for maximum weather-tightness. It offers finger-tip ease of operation throughout its life. It is a *modern* window in every sense of the word—made in several sash styles and in all commonly used sizes.



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SILENTITE PRE-FIT the "*Insulated*" window

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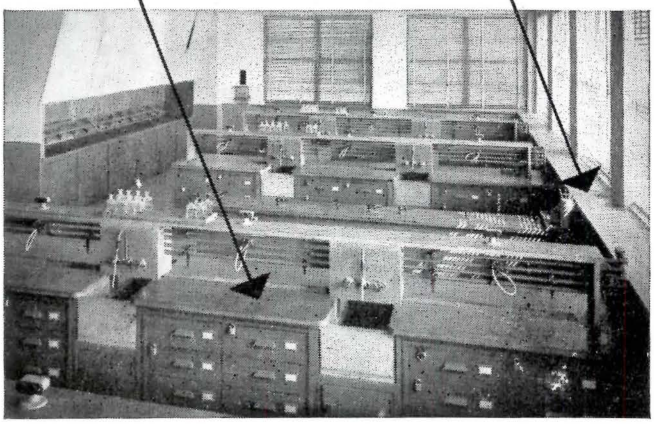

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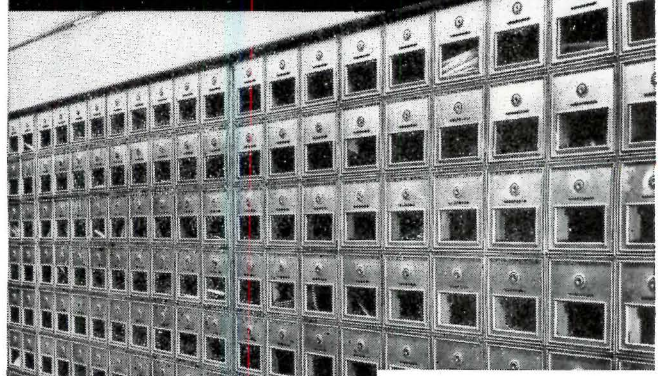

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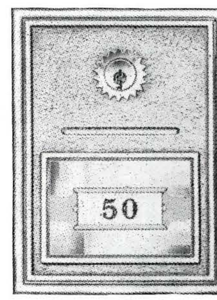

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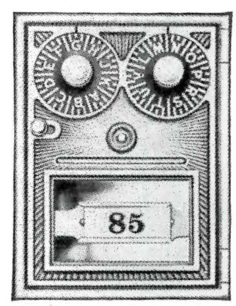

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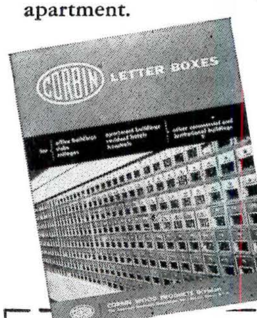

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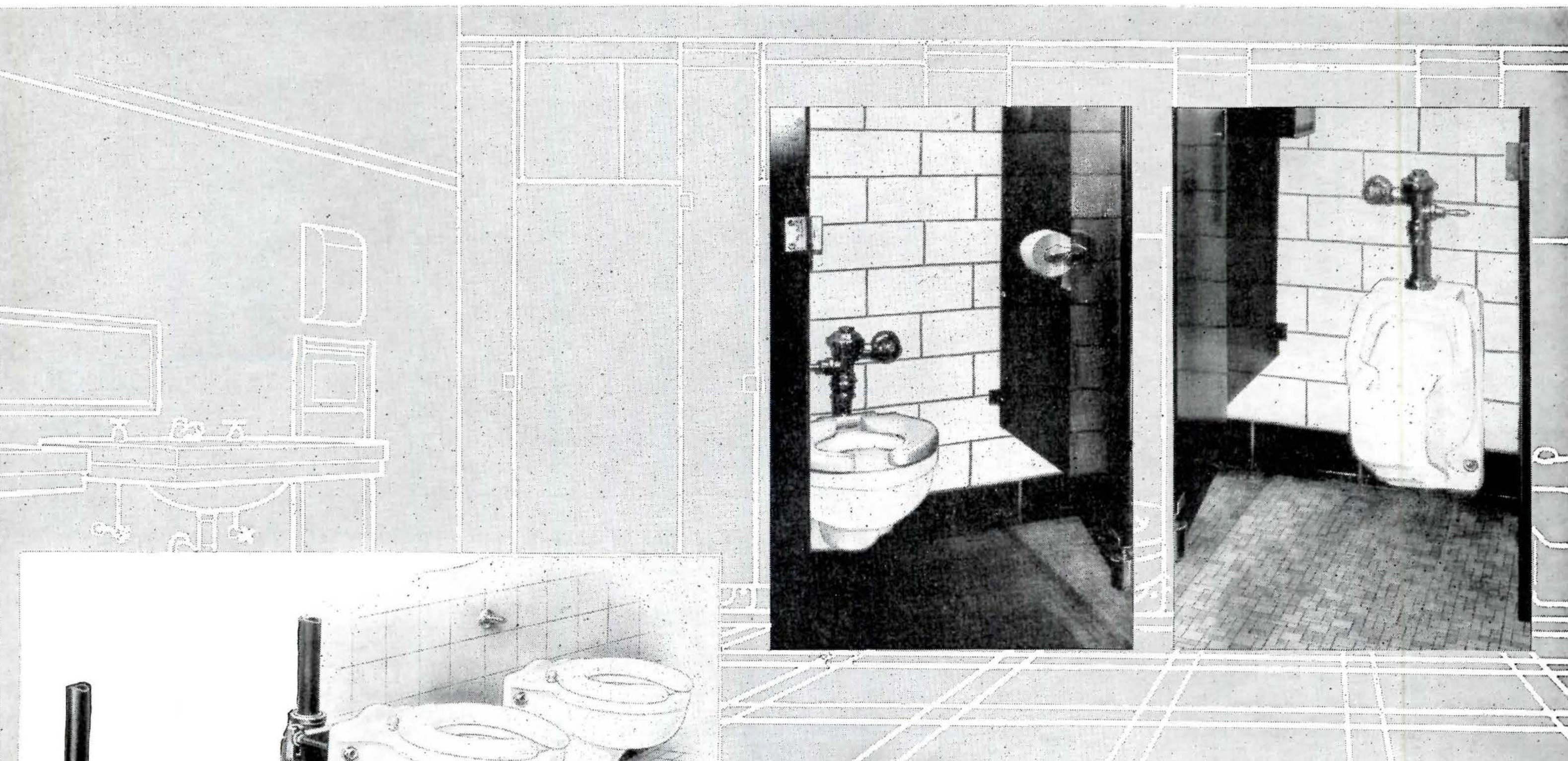

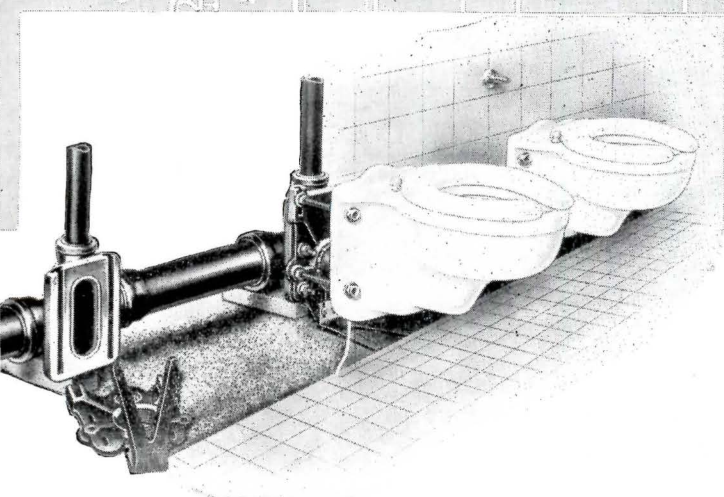

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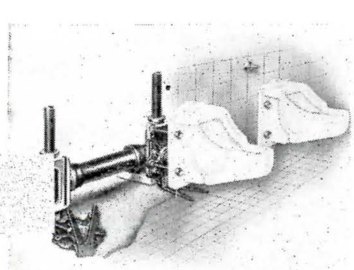

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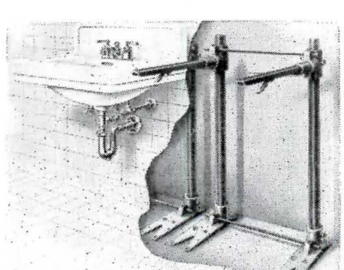

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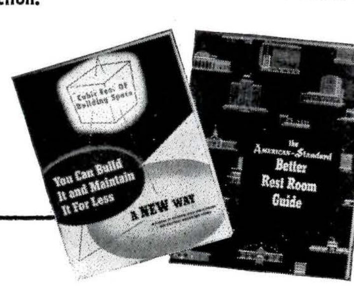

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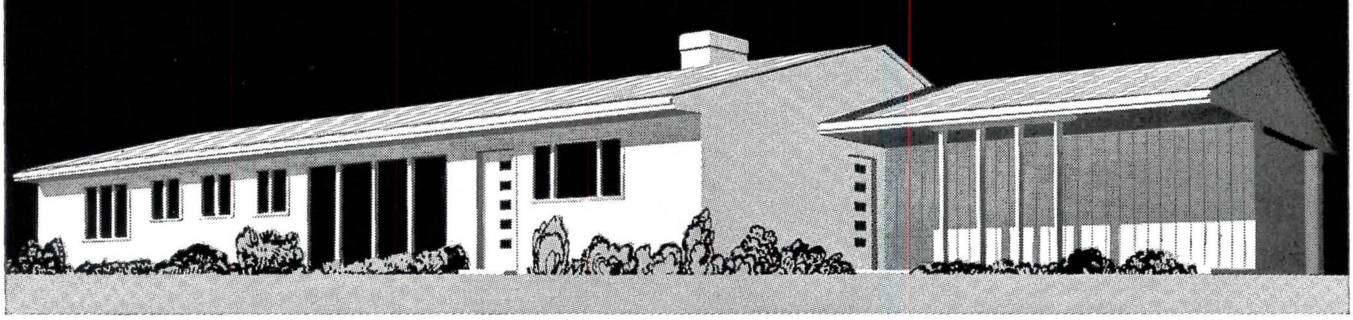

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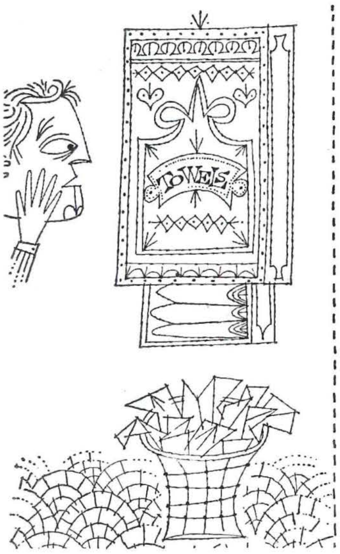

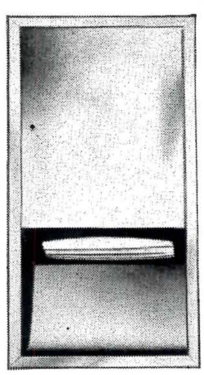

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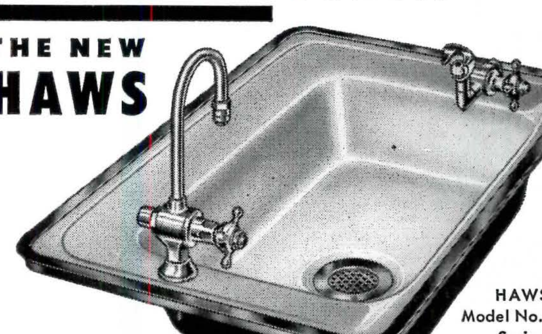

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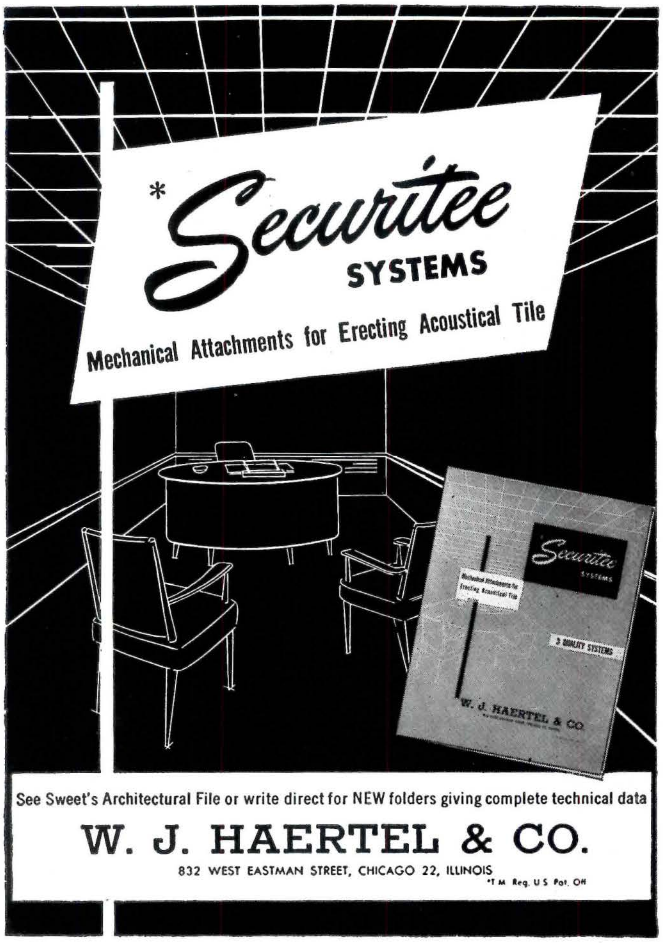
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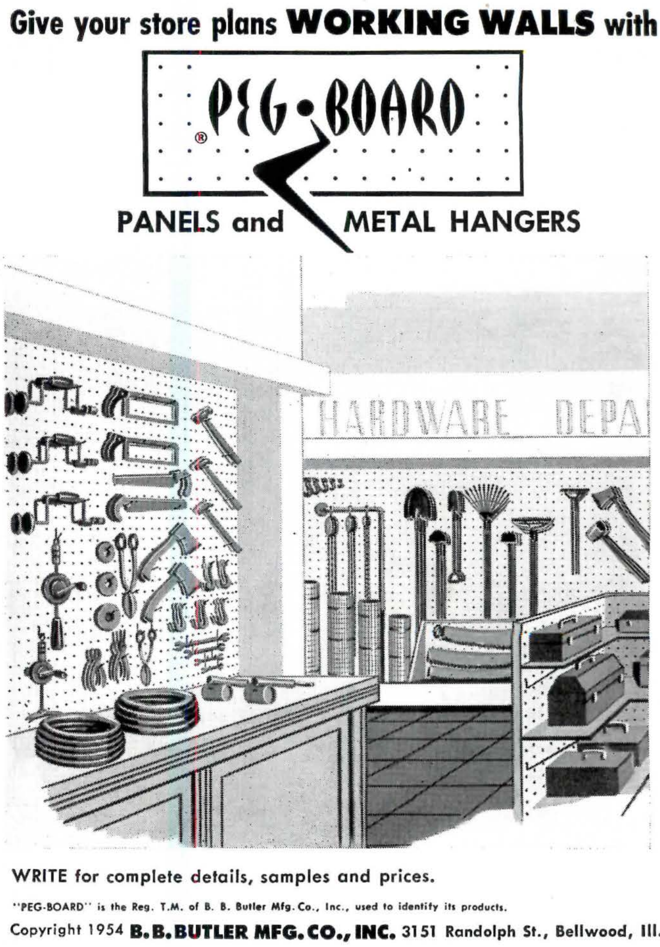
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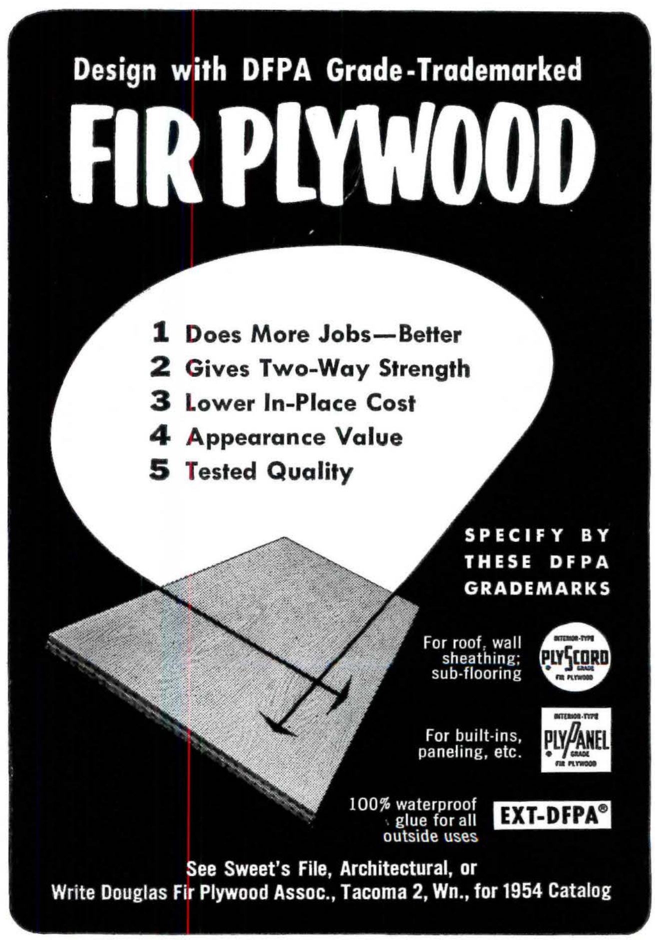
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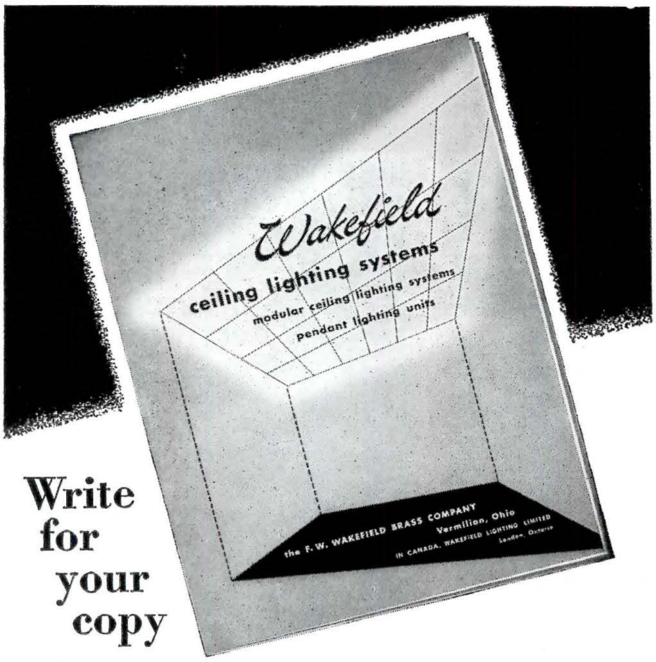

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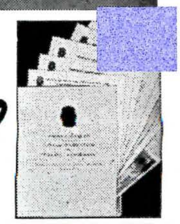

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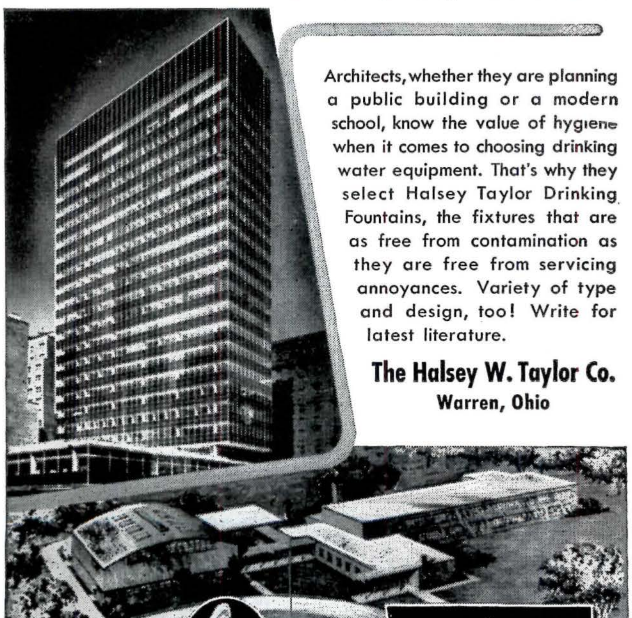

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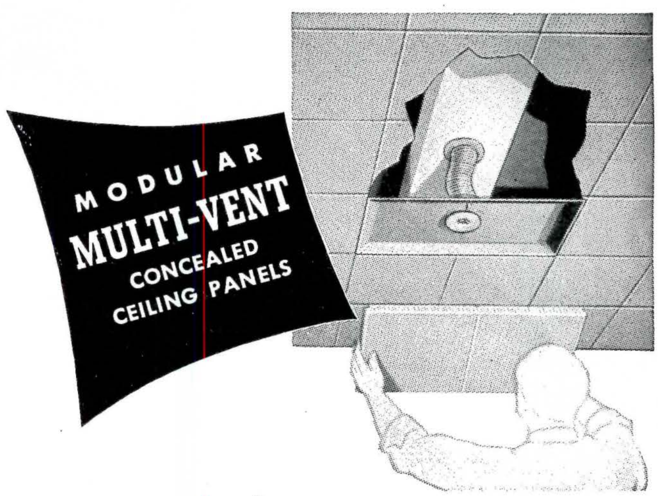

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PROGRESSIVE ARCHITECTURE P.S.

A postscript to this issue might take several forms: it is the month of the AIA Convention in Boston; the issue itself is on an important subject, which could be expanded indefinitely; it is the midpoint of the year, and the midpoint of our year's theme—the influences which produce today's architecture. Fortunately, they can all be tied together, because, much to P/A's gratification, the Convention theme that has been chosen is the same as ours for the whole year.

We announced, last October, the subject matter of each issue for 1954—a series of issues showing how architecture of these changing times is produced by the effect of certain social, economic, and technical factors. We've covered some of them: the effect on architecture of—

changing living habits (February)
more leisure time (March)
changing educational goals (April)
obsolescence of buildings (May)
. . . and now, in June, the influence of *advancing structural concepts.* Still to come are documentations of the effect of *improving health care, greater cultural values, greater mobility, improved materials, expanding commerce and industry,* and greater understanding of *environmental control.*

It becomes more and more obvious that architecture and engineering are not abstract arts—that they are related to and produced by the social, economic, and technological climate in which they operate. Even the few ivory-tower designers who still operate are affected willy-nilly—abstracts in architecture today, fascinating as works of art, are abstracts *with modern materials.* And almost all of the architectural and engineering practices, even those of the more dilettantish type, are possible only because of commercial, industrial, cultural, or institutional developments. The design of buildings is a very *objective* operation.

We are most pleased that the planners of the 86th Annual Convention of the American Institute of Architects followed, apparently, the same line of thought. It will be interesting to us to see how it is developed in the Convention seminars. A pleasant and profitable meeting to all who travel to Boston this month; it's an architecturally interesting city, both in an historic and a contemporary sense. Delegates will receive copies of the *Guide to Boston Architecture* prepared by Henry-Russell Hitchcock, under the direction of the host Chapter, published by Reinhold's Book Division and P/A for the benefit of the conventioneers. A sneak preview of this work leads off our issue this month, and the Public Relations piece discusses the possibilities of this Guide series which we began producing two years ago at the New York Convention.

•

We are greatly indebted to Mexican Architect Felix Candela for his article in this issue. It came to hand just as we were tying together various projects that seemed to make important points; and, controversial as it is, it seemed to us the most readable and thought-provoking piece on the subject yet to be published. Note, on the VIEWS pages, that some of our engineer friends are already disagreeing in part with his analysis—while admiring his work. When the manuscript arrived, its covering letter intrigued me with a statement of the problem of engineer-architect collaboration. I would like to quote it in part. After saying that the architectural profession was obviously interested in the development of new forms (particularly shell structures), and that the architectural press showed many examples, Candela's letter goes on: ". . . many of these designs are either excessively conventional, following the already known models, or utterly impractical for lack of knowledge of the simple principles involved in the preliminary steps.

"The second design phase, not shown in pictures, consists of a tremendous battle between the structural engineer and the architect—the former willing to introduce modifications which, although sometimes justified, many other times should be innecessary (*sic*). On the other hand, the architect wants to maintain his preconceived idea, but has no weapons to fight against the scientific arguments of the technician. The dialogue is impossible between people who speak different languages. The result of the struggle is always the same: science prevails and the final design has generally lost the eventual charm and fitness of detail dreamed by the architect.

"This was the case, for instance, with the Raleigh pavilion genially designed in its original stages by the late Novicki, and actually built, but artistically destroyed by other people with the help of perhaps too conservative official regulations."

Candela feels, as does anyone concerned with this problem, that the architect must become more familiar with basic structural considerations, and that "radical and very improbable changes in the curriculum of the architectural schools" are required. With his final conclusion: that "the architect should design his own structures as was usual in other, more integrated epochs," not all will agree.

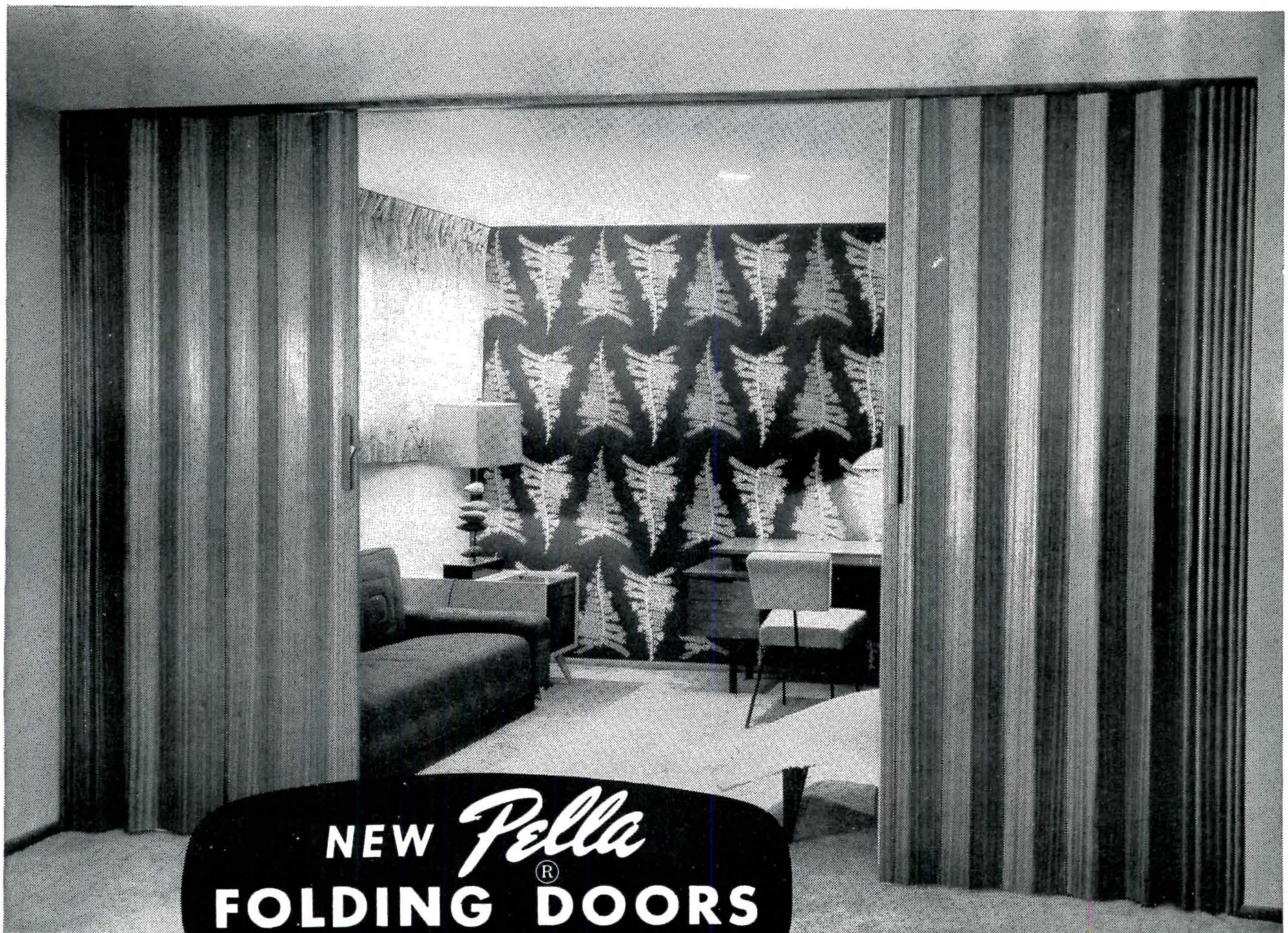
Certainly, integration and correlation on both the educational and professional levels make a necessary first step which has been fully achieved in very few instances. Even concerted efforts on non-design activities seem difficult to attain—despite some "joint committee" activities. Recently I spoke before the annual meeting of the Cleveland Engineering Society, and chose as my theme the fact that too many nonprofessionals were edging into the design of buildings, from the level of the interior decorator to that of the real-estate entrepreneur. I recommended as a preventive measure a great co-ordinated public relations activity, involving *all* the truly professional design professions, to educate the public in the difference between what a trained professional can offer and what an amateur meddling in design and construction can cook up. I sensed that this seemed an almost inconceivable objective to both architects and engineers who are more used to being at sword's point or, as Candela says, of "speaking different languages."

Candela speaks the language of Spain, but he writes well in English. Some editing was necessary in his article, but Burt Holmes and I found many of his precise uses of English words refreshingly correct. He also speaks in the language of architecture, but can express himself well in engineering terms. Perhaps engineers will find that his "engineering language" also needs some editing, but I suspect that, as in his use of English, his may be, more often than not, a correct, if unusual *usus loquandi.*

•

Come to think of it, our Latin-American friends seem rather to dominate this issue, despite the inclusion of Mies, Saarinen, Noyes, Colley, *et al.* I can't avoid a sentimental postscript on the Tropicana night club, in which I have spent a number of memorable evenings—beginning with the Pan American Architectural Conference some years ago, when none of the exciting new structure shown in this issue had been even conceived. Another time was during construction, when I pulled the power of the press for once, and got a ringside table on New Year's eve by deciding on the spot that this was a structure we wanted to publish. It's a beautiful place; even the fine, glamorous pictures in this issue don't do it justice. Notice all the U.S. building products that went into it. Max Borges, Jr., came to the States for architectural work at Harvard. Most of the patrons (except on New Year's eve!) are U.S. tourists, I suppose. But it seems to require an atmosphere such as Cuba has, for such a structure to become a reality.

Thomas H. Creighton



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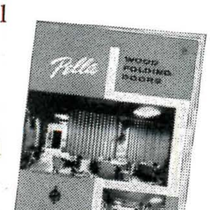

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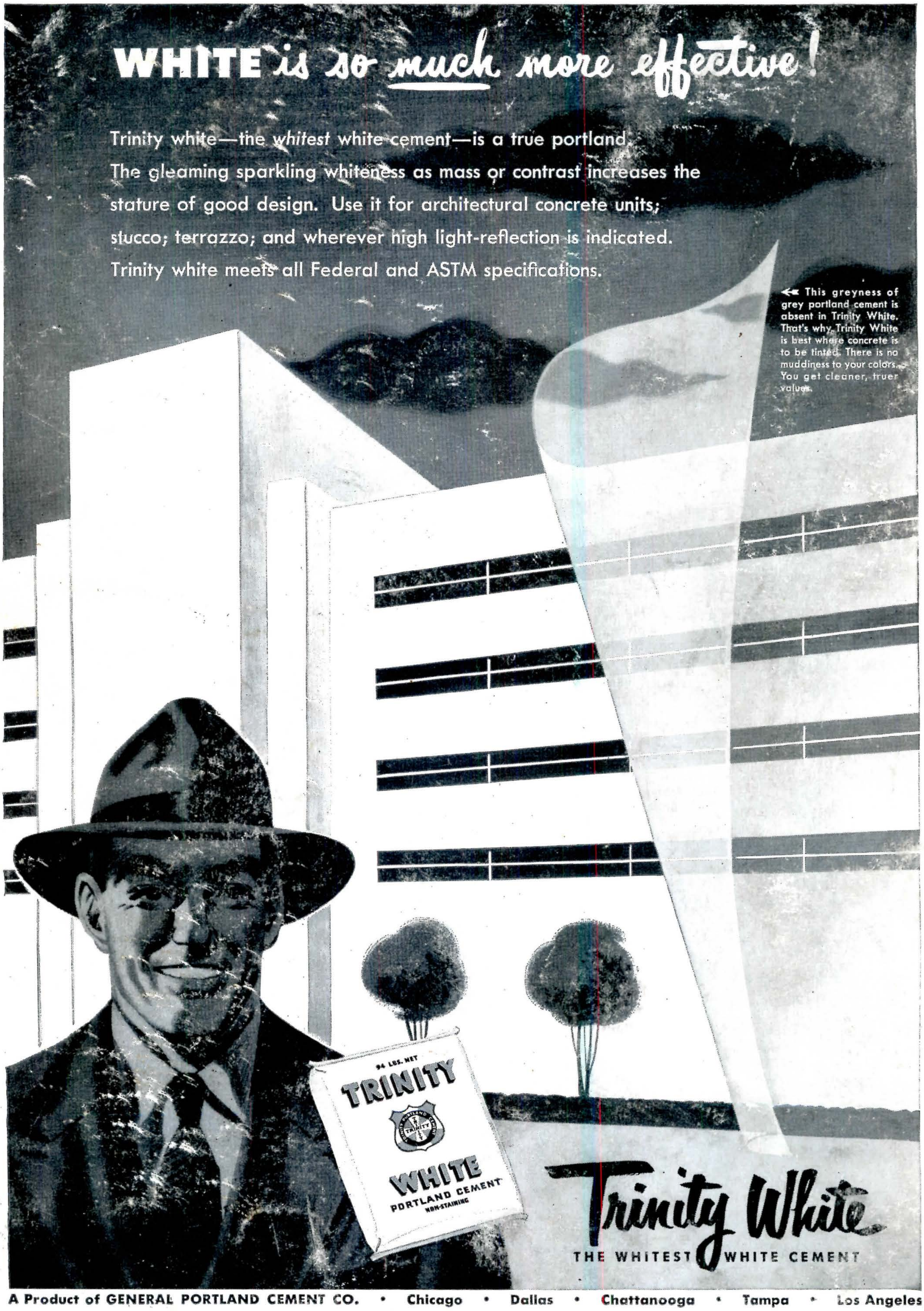
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This greyness of grey portland cement is absent in Trinity White. That's why Trinity White is best where concrete is to be tinted. There is no muddiness to your colors. You get cleaner, truer values.
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