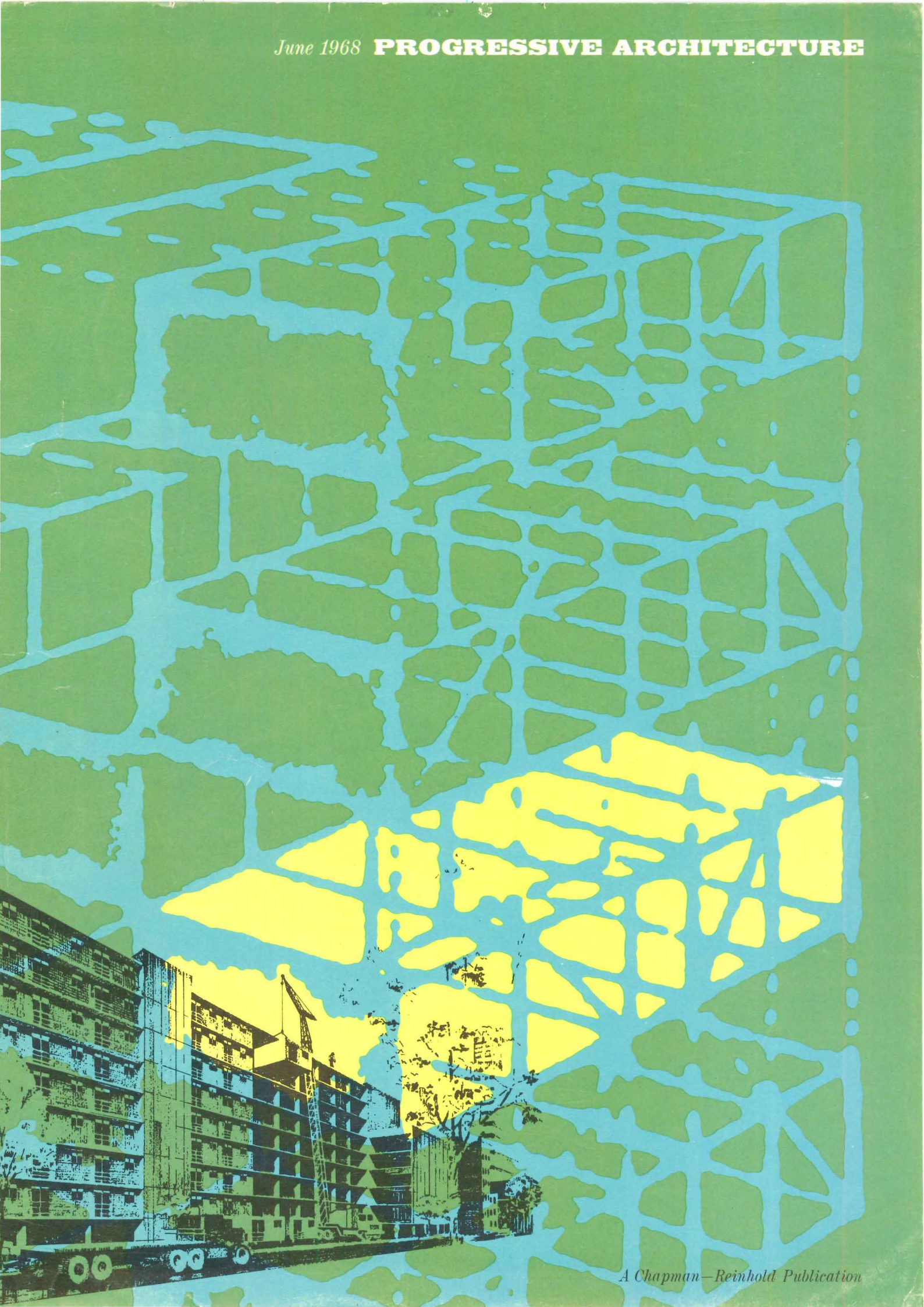
June 1968 **PROGRESSIVE ARCHITECTURE**



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Clark Science Center, Smith College, Northampton, Massachusetts. **Architect:** Shepley, Bulfinch, Richardson and Abbott, Boston Mass. **General Contractor:** Daniel O'Connell's Sons, Inc., Holyoke, Mass. **Flooring Contractor:** Kesseli and Morse, Worcester, Mass.

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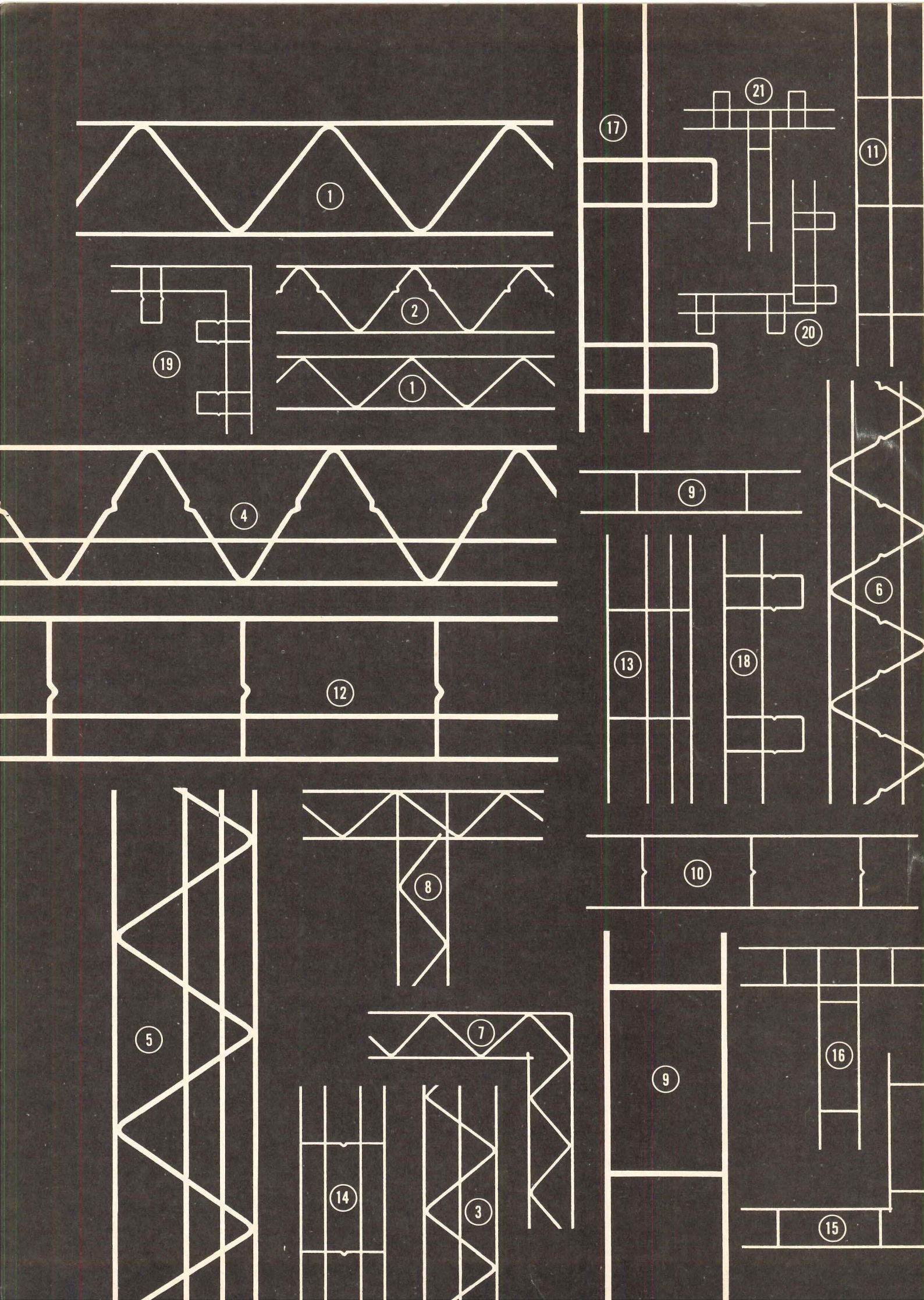
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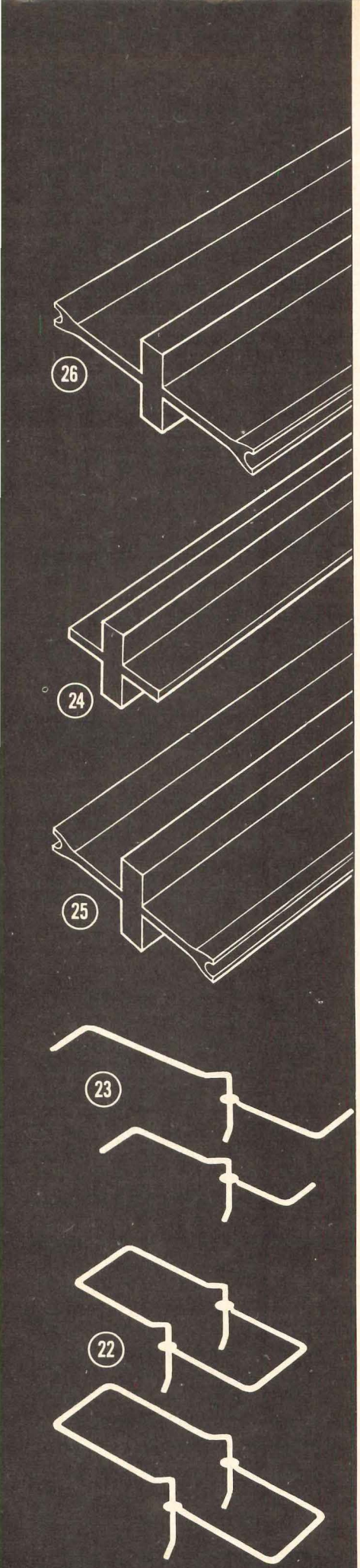

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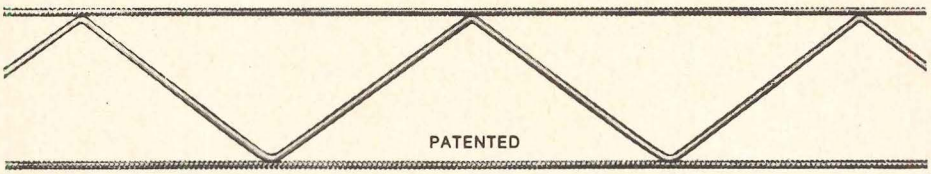

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VIEWS

Reaction to Schools Issue

Dear Editor: I saw the issue on Schools last week (APRIL 1968 P/A) and liked very much the way the subject was treated. The idea came across, though not too directly, that school buildings are educational mechanisms that use built devices, rather than the other way around. Venturi's proposal confirmed this message with clear graphic statements, even though I thought it begged the issue of nonbuildings inasmuch as he did not include the idea of using existing structures (storefronts, as in New York) as a fast and easy way of setting up day-care centers, and so on. To confirm some of these design tendencies I would have also included current research work, such as that being done by Dr. Richard Myrick on space and learning behavior, for cogent demonstrations of "performance design."

MELVIN CHARNEY
Professor Agrégé en Architecture
École D'Architecture
Quebec, Canada

Dear Editor: I have read with some interest the enormous concoction of irrelevancy by our neighbors at Rice University ("New Schools in New Towns," APRIL 1968, P/A). Surely the answer to the future of education is not television sets 6 ft on center all around town. I am beginning to wonder whether those who advocate these force-fed educational systems in preference to books were themselves slow learners in childhood who have not yet caught up with the times. When I observe my one-year-old daughter's fascination with books, I am sure of it.

L. DAVID GODBEY
Houston, Tex.

Dear Editor: I would like to convey my compliments on your April issue on schools — particularly the section entitled "Assault on the Schoolhouse." It was an excellent piece of work and said things that for a long time needed to be said.

LESTER C. HAECKEL
St. Louis, Mo.

Stone-Throwing at Book Reviews

Dear Editor: Re your book reviews of *Edward D. Stone* (APRIL 1968 P/A): Granted the subject document is presumptuously preposterous, an imposition if not an imposture; but is it hopelessly old-fashioned to exhume that childhood refrain, "Two on one is . . . (word censored) fun"?

Or, restated, is *noblesse oblige* completely dead?

LANDIS GORES
New Canaan, Conn.

A Minute Monument

Dear Editor: Malcolm Wells' cautionary note on the scars of Cooper Pedy, Australia (pp. 164–165, MARCH 1968 P/A) is well founded. He might also have shown how the itinerant miner should construct his dwelling.

Fortunately, there has evolved a functional tradition of materials and construction, and an illustration [see photo]

shows such a dwelling built into an embankment at Andamoonka — another opal mining settlement about 500 miles east of Cooper Pedy. Here, the entrance is formed with the local limestone, and a pitched roof of corrugated iron is covered with earth.

I do, however, wonder about Wells' implied suggestion that the holes should be filled in when the occupant leaves, thus denying the memory of the opal fields.

In the summer of 1960, I was working in the center, carting fuel to an oil drilling operation. The rear axle of the truck broke and our only shelter for two days was the old meat shed of an abandoned sheep station. I learned how 50 years previously a young couple had settled there, 60 miles from their nearest neighbor. They lost all their sheep in the first drought, but struggled with the desert and the heat to restock their property. In the next drought, they lost everything, and when they found that their two small children had wandered away from the homestead and perished, they abandoned their land.

But we were grateful that their memorial sheltered us. And we thought that we could feel what it had been like.

JOHN SCHENK
Cambridge, Mass.

"Pittsburgh" Praise

Dear Editor: Your article on Pittsburgh (MARCH 1968 P/A) is the most comprehensive and adroit piece that we could wish for. You articulated many of the things we were only vaguely aware of or summed up our paragraphs in a pungent phrase. I would hope that we could get many civic leaders here to read it, because it provides a perspective otherwise unattainable.

ARTHUR P. ZIEGLER, JR.
Executive Director
Pittsburgh History and Landmarks Foundation
Pittsburgh, Pa.

Dear Editor: Your Pittsburgh article in the March issue is indeed a fine piece, an excellent and comprehensive summation — aside from the fact that it's extremely well written.

BEVERLY B. SCHENARDI
Account Manager, Lando, Inc.
Pittsburgh, Pa.

Dear Editor: Your Pittsburgh article was marvelous, a fine appraisal and a sensitive critique exhibiting a keen knowledge of the many nuances of the Old Smoky City.

H.T. PATTON, JR.
Vice-President and National Field Sales Manager
McKinney Sales Co.
Scranton, Pa.

Stained-Glass Artist

Dear Editor: In your March issue you have an excellent and provocative article on "Stained Glass." Although it presents several valid points of view, the over-all ideal of producing a stained-glass window does not seem to have been explained.

You are quite right in pointing out that the "independent artists are dependent upon the studios for the execution of their large commissions." This dependence relates to the tremendous variety of glasses that must be available, to the manpower to handle large commissions, and to the furnaces and kilns usually required.

The mechanical part of cutting the selected glass, firing it where necessary, leading it (that is, glazing it), soldering it, cementing it, and making it waterproof are purely mechanical operations. The ideal is an artist who can conceive, design, and do all the artistic parts of the window himself. Few artists in America have been able to do this. It is perfectly possible for an artist to do them in connection with a craft studio, and most of the studios are delighted to afford this opportunity.

Generally speaking, an artist can be involved in the problem in three ways: He can be commissioned to design and produce a window and engage a studio

Continued on page 16

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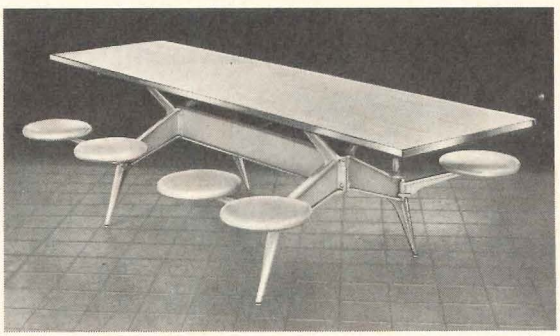

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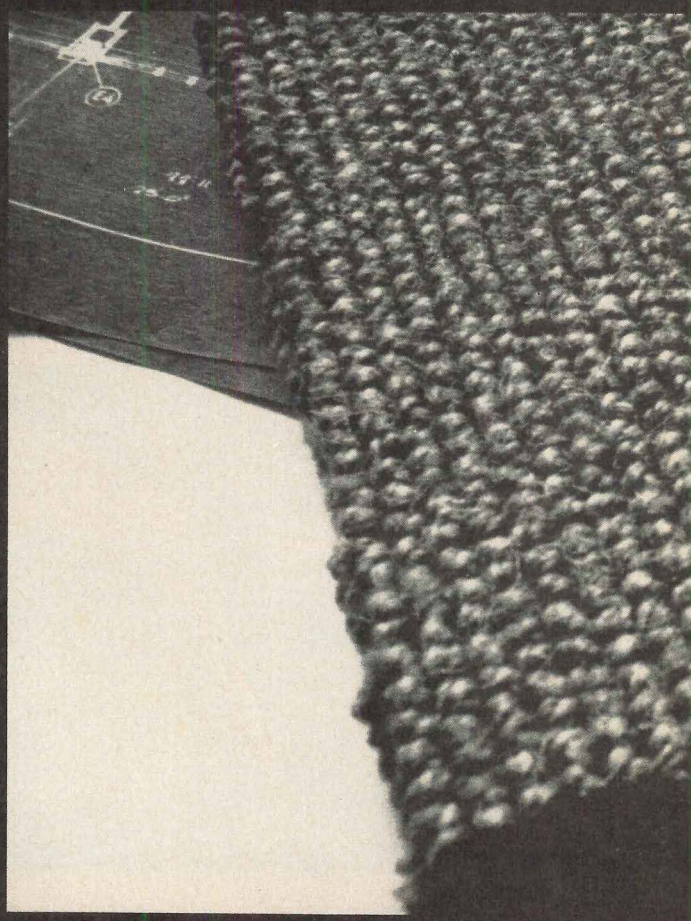

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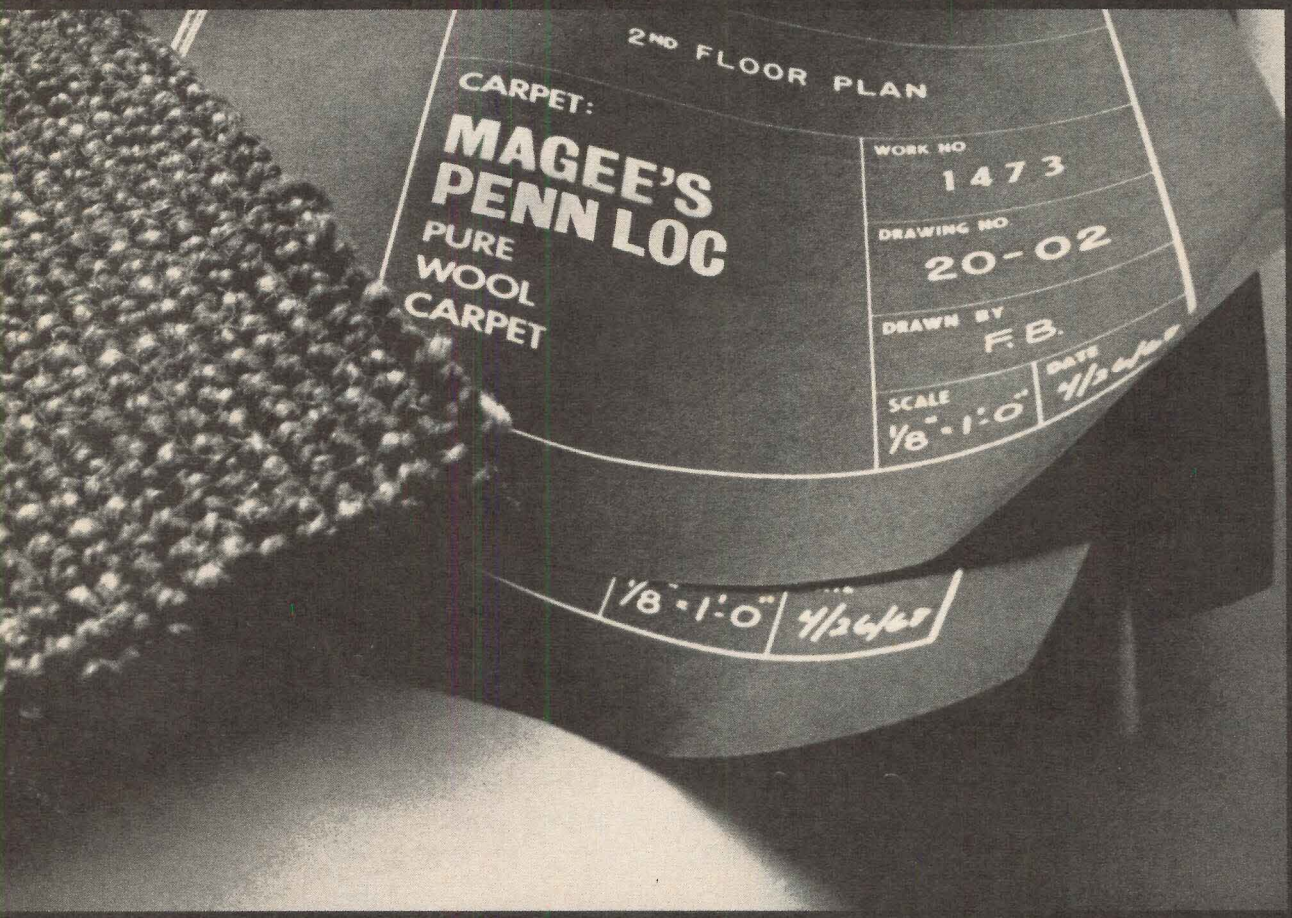

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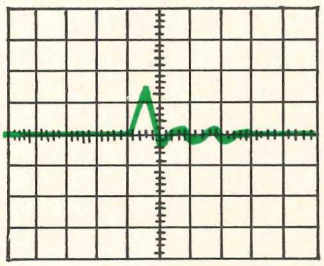

A 50-foot length of 1" pipe with water at 60 P.S.I. flow pressure and a velocity of 10 feet per second was used in these tests.

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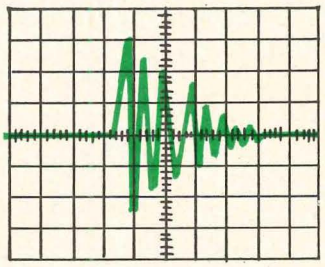
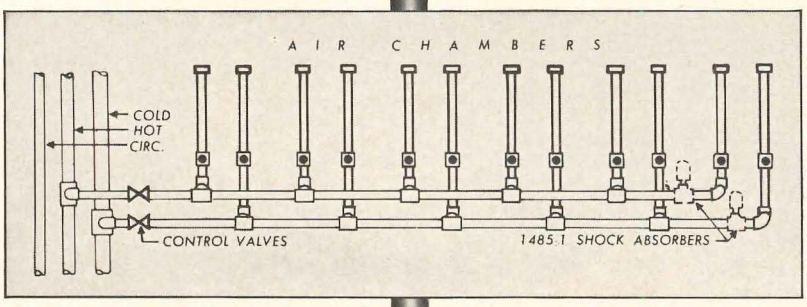


The oscillographs compare the efficiency of the Absorbotron with a fully charged and properly sized air chamber 1¼" pipe, 57" high.

AIR CHAMBER
FAILS AT
4,500 CYCLES



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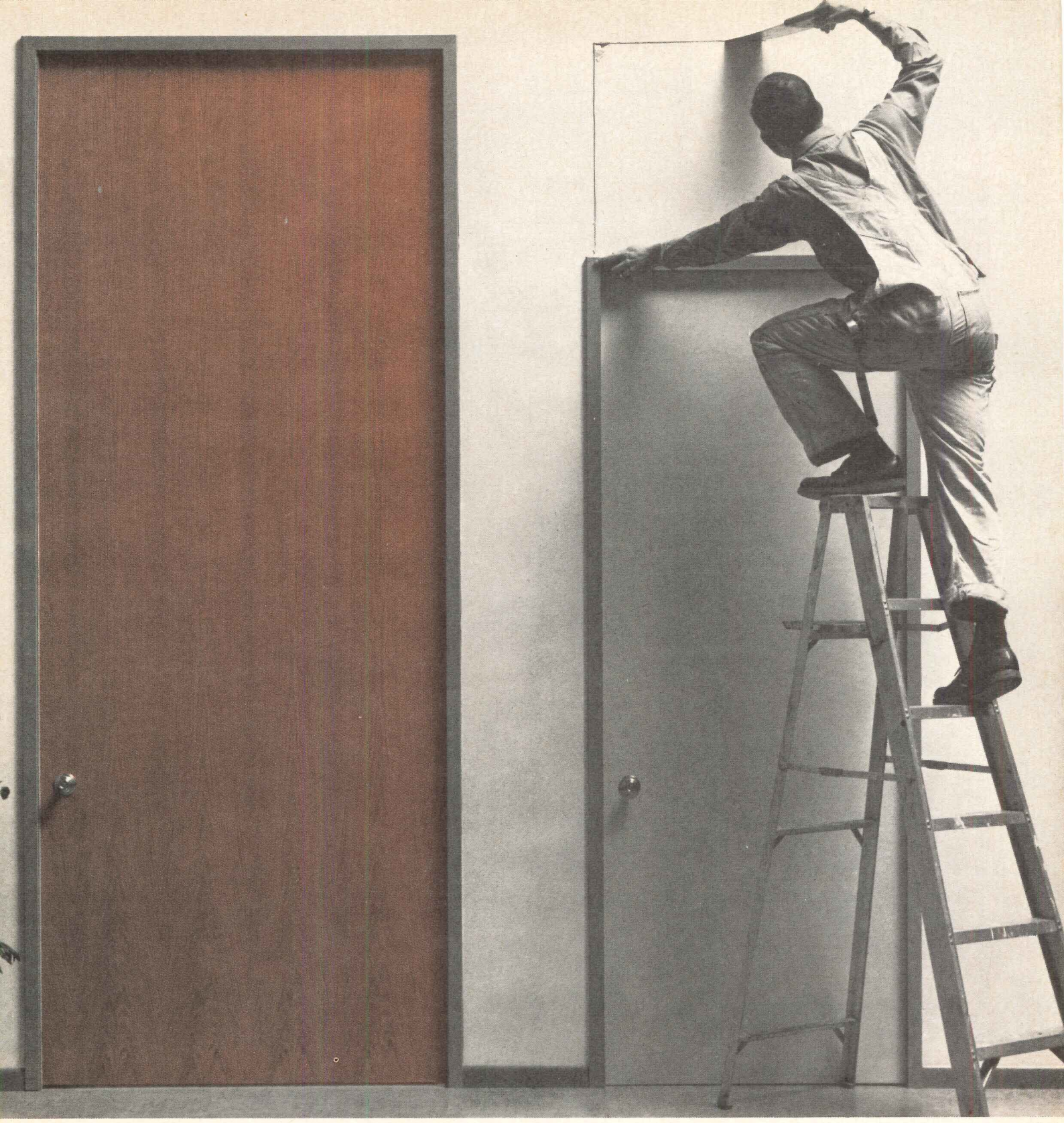

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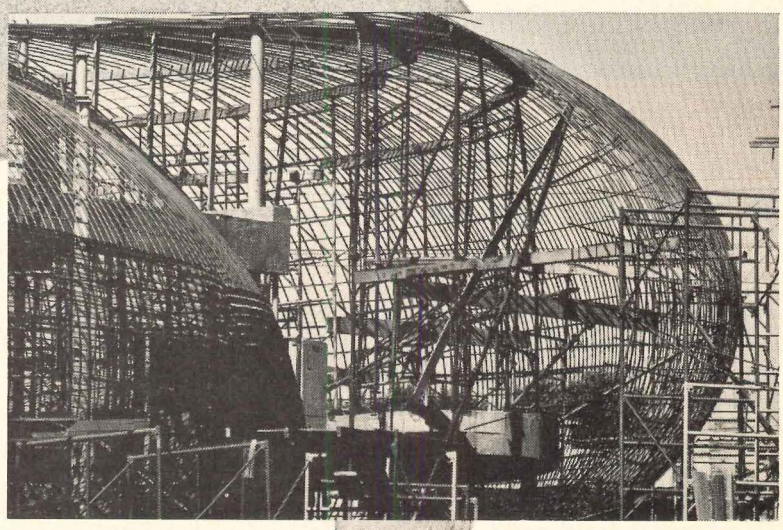

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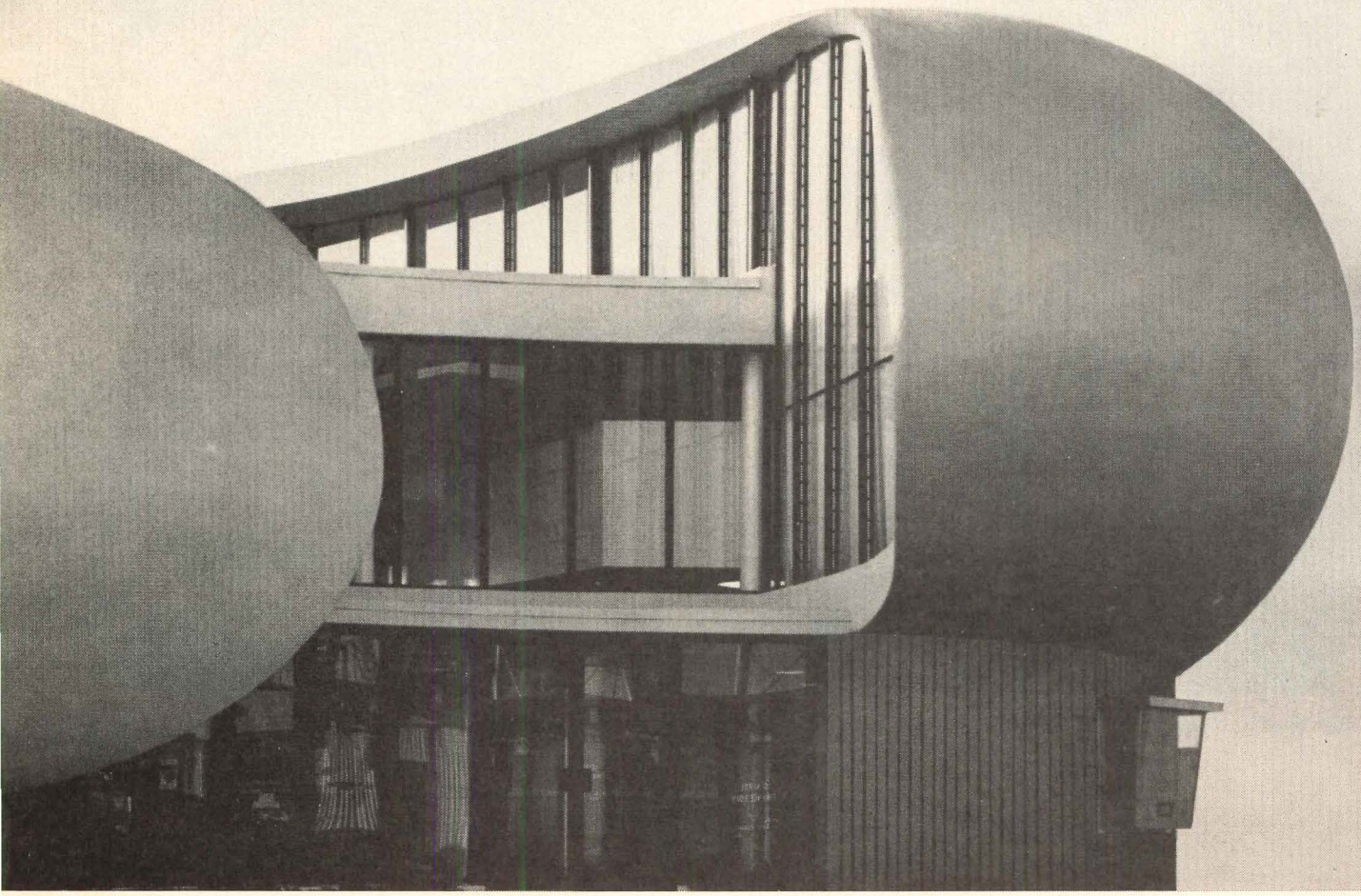
the beautiful world of reinforced concrete is taking shape



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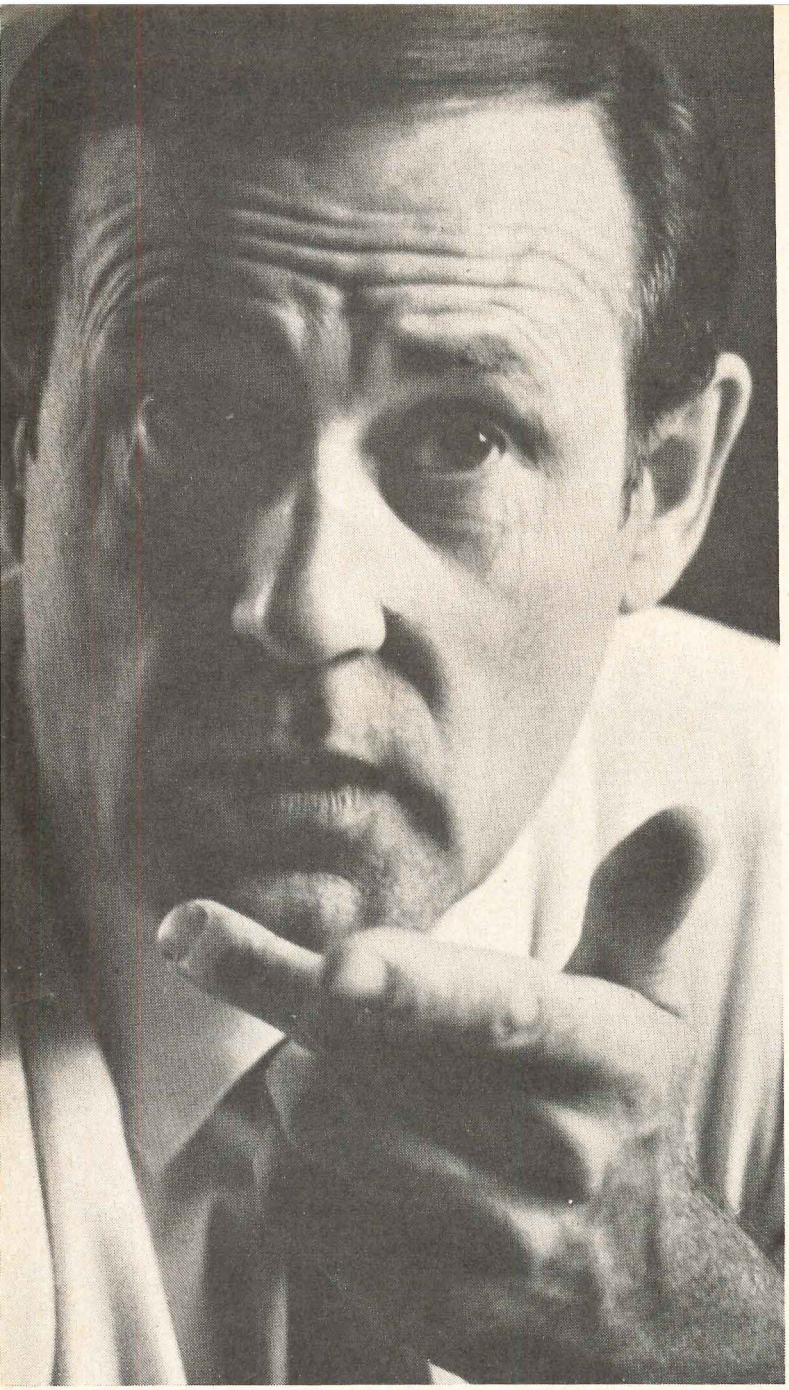

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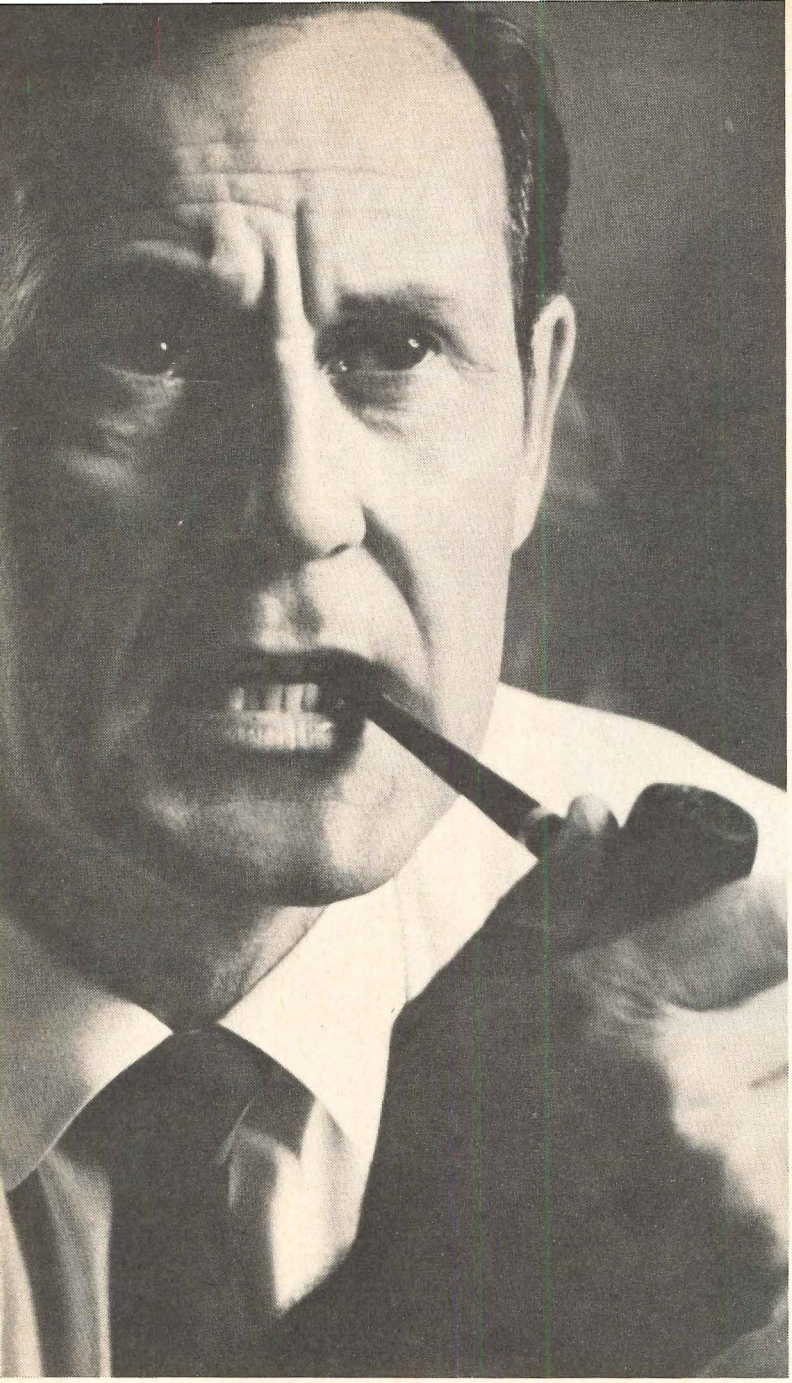

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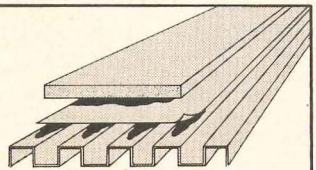

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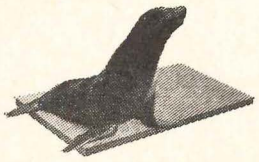

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Continued from page 6

to give him mechanical help. In many cases, where it is a distinguished job, the studio recommends an artist and he either works independently of the studio, on a separate agreement with the owner, or the studio, in some cases, agrees to engage him. In a few cases, an artist is engaged — part or full-time — with a studio. This has also happened.

The article also seems to approve of inviting several people to make sketches and to base the selection of the designer on the appearance of the sketches. The Stained Glass Association wrote a Code of Ethics and proposed that a designer be chosen by the architect on the basis of his reputation and performance for two reasons: Because the best solution involves a sympathetic discussion and collaboration between architect and designer, and because sketches made for a competition are more often made to win a competition rather than faithfully to solve a problem.

A few years ago, a group representing museum directors, liturgical critics, and craftsmen selected 20 outstanding artists or studios — about 50-50. An exhibition was held, a jury was selected, and the awards were reasonably evenly distributed between the studios and the independent artists. The artists, who were not particularly trained for stained glass, undoubtedly produced some outstanding solutions.

The above, as I see it, is a general statement of conditions as they exist and the ways in which it is possible to arrive at a really worthwhile solution for a stained glass project.

HAROLD W. RAMBUSCH
Rambusch-Designers
Craftsmen, and Lighting Engineers
New York, N.Y.

Glassy Aches and Pains

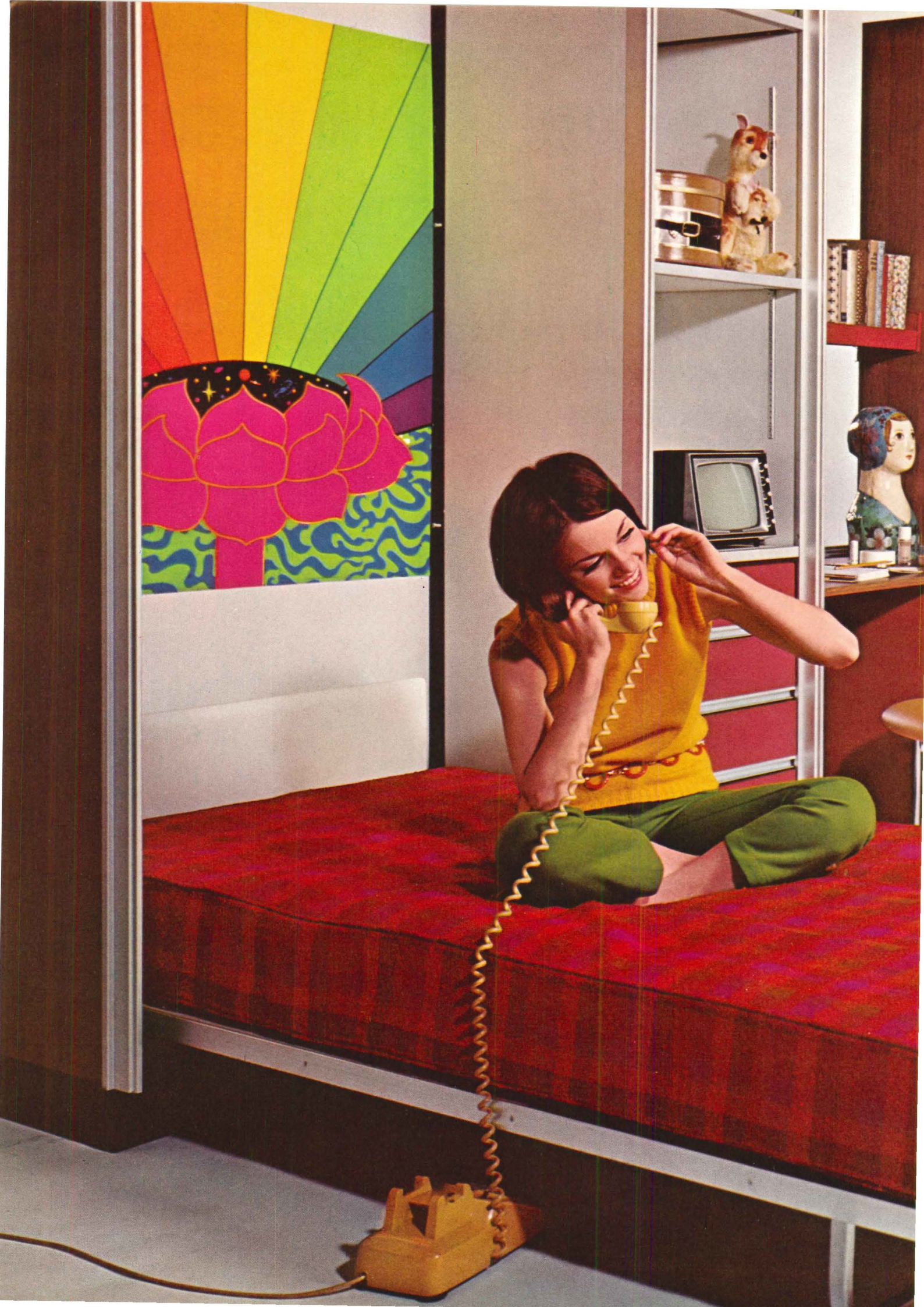
Dear Editor: Your article on stained glass (MARCH 1968 PA) suggests vividly the aches and pains in the field of stained glass.

Studios should not bury their designers in a cloak of anonymity; the studios' strength is projected by the artist's creativity. Their capability to design work that commands respect as a creative achievement and as sound in craftmanship rightly deserves credit — a signature on the window. For the artist, it would be an inspiration and responsibility to do his best for the studio's added prestige. Render unto Caesar what is Caesar's and to the artist what is rightly his.

ALBIN ELSKUS
Durhan Studios, Inc.
New York, N.Y.

Continued on page 28

A coed from Iowa told us this: "A good night's sleep is an ancient custom that's currently in."



"I like my pad kicky...

Ginny wants her room modern as PolySci 404. "In" as a boutique. Personal as a whisper.

PACE® makes the scene. It's a modular dorm furnishings system that gives each room that just-for-you look. Wardrobe, bed, desk, drawer and shelf units bunch up with Scandinavian simplicity. And not the tiniest hint of cramming.

Rooms planned around Simmons contemporary dorm systems need no closets. No millwork. No separate sleeping area. They leave extra space for extra rooms. And with steel frames, melamine plastic laminate tops, tough vinyl and baked-on enamels, PACE won't leave the scene when Ginny does.

SIMMONS

There's more to Simmons than mattresses.

"Lobbies are out.

You don't have a lobby at home, do you?"

At home they call it a living room. Real living rooms take years to happen.

But in a dorm, you don't have years. You have to build it comfortable. Now. And you have to do it with commercial furniture because that's the only kind that holds up.

Simmons upholstered dorm furniture gives you so much to choose from that no two rooms ever need look alike. Deep-toned woods. Plush vinyls. Cheery fabrics. Brushed chrome. Contemporary, Modern or Traditional.

And Simmons living rooms last longer than a Charlie Brown losing streak because they're made for dorms. And dorm traffic. And dorm people.

SIMMONS

There's more to Simmons than mattresses.

"No moss on our dean.

You ought to see his office."

After all, his business is guiding young people. And keeping in touch with young ideas.

He deserves an office that's modern. Logical. Tasteful. OFFICE SPAN II®, Simmons' component system of desks, credenzas, tables and chairs, makes faculty and administrative offices look the way they should.

But there are other reasons for planning offices around the Simmons system. One is durability. Melamine plastic laminate tops. Baked-on enamels. Welded frames and bolted assembly. And because it's a component system, hundreds of combinations can tailor each office to the work of the person using it.

How logical can you get?

SIMMONS

There's more to Simmons than mattresses.

Like to help a coed from Iowa become a happy graduate?

Ask Simmons.

We understand what it takes to make college living cheery as a homecoming bonfire.

And with lots of experience in hotel, hospital and business furnishings, we've learned what it takes to make furniture tough as well as good looking.

High-pressure melamine plastic laminate, for example. Looks just like wood. But it won't absorb or stain, and really fights off scratches, abrasions and burns. So does Sim-Clad®, Simmons' exclusive wood grain or textured covering. Bonded onto synthetic board or steel, it's just as tough as melamine.

Our one-piece, die-formed steel drawers stay solid because there are no joints to loosen. They can't warp. They won't stick because they ride on ball bearings. And our high-impact, vacuum-formed thermoplastic makes drawer fronts tougher than football helmets. Anodized aluminum extrusions protect all exposed edges.

These are just a few of the features that keep Simmons furnishings from getting old before their time. And they need virtually no maintenance.

Modular construction with standard components offers another advantage. It lets you plan furniture space needs to the inch while the building is still on the drawing board. Windows and doors wind up where they'll do the most good. Walls are where they belong.

With the Simmons system, your entire school furnishings package can be financed to suit your budget. Extended term or leasing plans are available through our American Acceptance Program. In addition, PACE® built-in dorm units meet every requirement for HUD assistance.

If you're planning new buildings—or remodeling old ones—look into Simmons complete school furniture systems. PACE for dorm rooms. Upholstered furniture for living rooms and lounges. OFFICE SPAN II for staff and faculty offices.

And as long as you're going first class, plan on Beautyrest® mattresses, too.

For further information, contact Bob Deuchler, Box D, 1870 Merchandise Mart, Chicago, Ill. 60654

SIMMONS

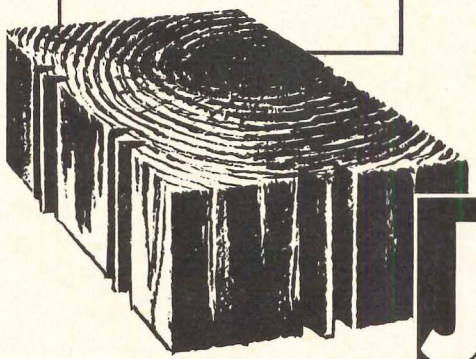
CONTRACT DIVISION • MERCHANDISE MART • CHICAGO, ILL. 60654

Research PROOF...

Wood Block Floors are better!

Check These Advantages

Comfortable... easy under foot. **Durable...** withstands heavy abuse. **Low Maintenance...** 1/3 cent per sq. ft. in 20 years. **Easy To Replace...** in sections or units. **Dustless...** protects bearings and finished parts. **Absorbs Noise. Insulates** against heat and cold. Easy to **Provide For Conduits Or Cables.**



An independent research study has definitely proved what Jennison-Wright has known all along—our wood block flooring is superior to any other industrial flooring material. That's mighty important in building design. Write for a copy of the highlights of the report or let us entertain and convince you with our 20-minute, full color sound slide film—"Magic Carpet."

JENNISON-WRIGHT

J O W ®

THE JENNISON-WRIGHT CORPORATION

DEPT. A68 • P. O. BOX 691 • TOLEDO, OHIO 43601

☐ Please send a copy of Research Report Highlights

☐ Please call for an appointment to show the "Magic Carpet"

Name_____

Title_____

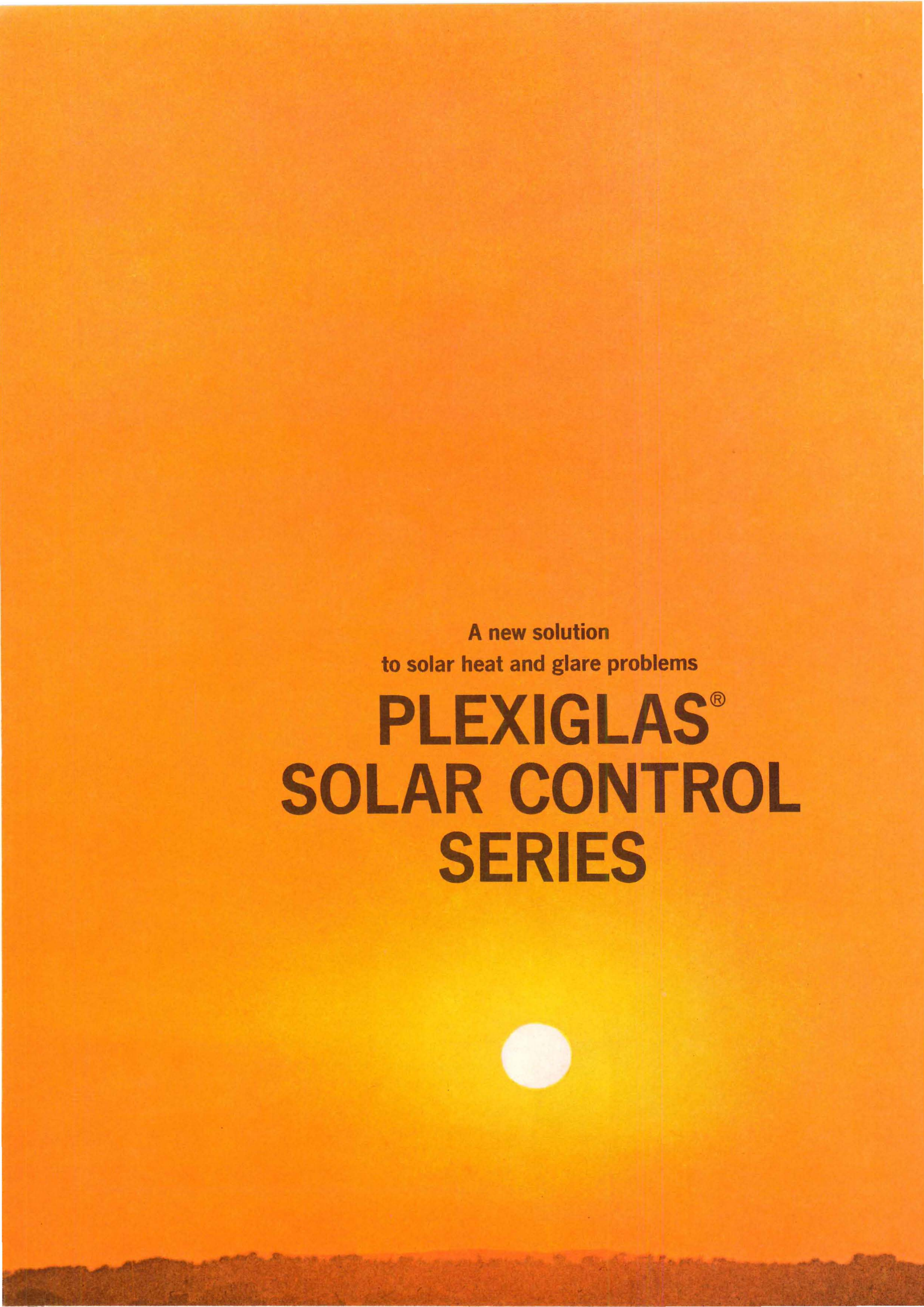
Firm_____

Address_____

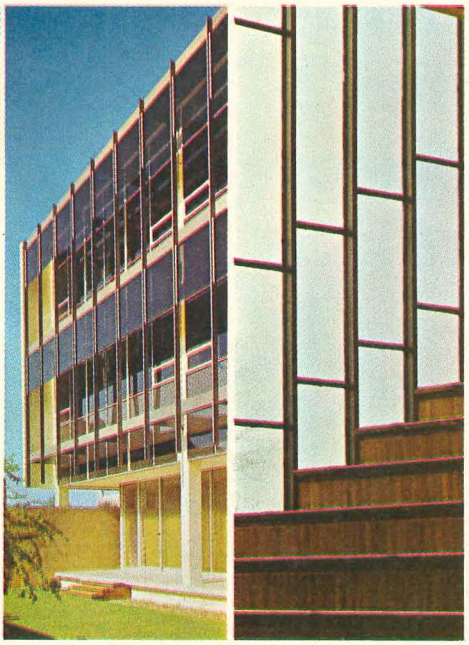
On Readers' Service Card, Circle No. 378

A new solution
to solar heat and glare problems

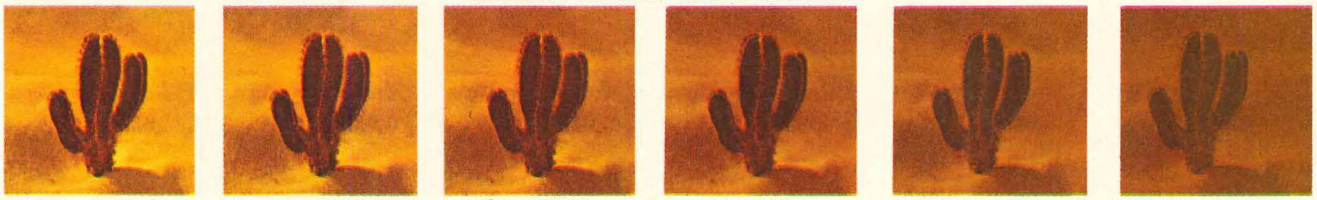
PLEXIGLAS® SOLAR CONTROL SERIES



DOME ENCLOSURES
SUN SCREENS
WINDOW GLAZING

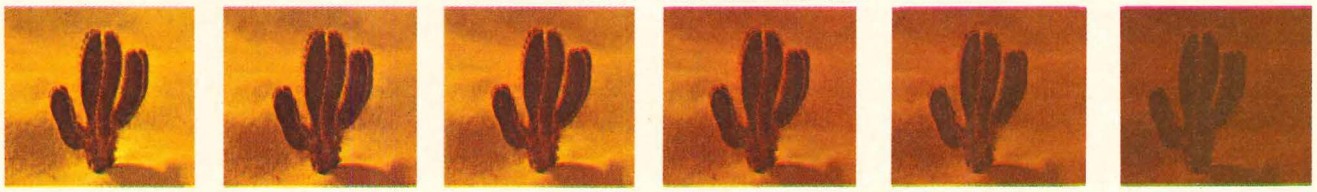


TRANSPARENT GREY SERIES



unfiltered sunshine | Grey 2515 | Grey 2514 | Grey 2094 | Grey 2537 | Grey 2538

TRANSPARENT BRONZE SERIES



unfiltered sunshine | Bronze 2540 | Bronze 2539 | Bronze 2404 | Bronze 2412 | Bronze 2370

The transparent grey and bronze colors of PLEXIGLAS acrylic sheet shown above have been developed by Rohm and Haas Company to help you control the sun's heat and glare. Each of the colors in the PLEXIGLAS Solar Control Series is produced in five densities from light to deep, providing a range of solar control values. Solar energy transmittance values range from 20% to 75% and visible light transmittance values from 10 to 76%. Using them for glazing dome enclosures, sun screens and windows, helps you achieve comfortable interior environments readily and economically.

In addition to its high breakage resistance, weatherability and light weight, PLEXIGLAS has three significant advantages for solar control glazing:

1. PLEXIGLAS is not subject to thermal shock—it will not crack when exposed simultaneously to hot sunlight on one portion and shade on another.

2. Solar energy and light transmittance values are approximately constant for all sheet thicknesses in each color density. Sheets of high color density need not be of greater, more costly thickness.

3. PLEXIGLAS is accepted under most building codes as an approved, slow-burning, light transmitting material for use in glazing and domed skylights.

Write for complete information including data on how to calculate solar heat gain for the PLEXIGLAS Solar Control Series. It's contained in our new 20-page brochure.

ROHM AND HAAS
PHILADELPHIA, PENNSYLVANIA 19105

®Trademark Reg. U.S. Pat. Off., Canada and principal Western Hemisphere countries. Sold as OROGLAS® *in other countries.*

On Readers' Service Card, Circle No. 370

Continued from page 16

Sticky Problems

Dear Editor: Your article, "Glued Building Revisited," in the FEBRUARY 1968 P/A, seems to have missed the point expressed in the title. In light of the great appeal that adhesives have for the general public, and, one would hope, for builders, it seems ironic that the editor would revisit a building in which this new fastening technique had been used and not provide any evaluation of the outcome of this five-year-old experiment.

As an engineer who is interested in gluing large surfaces, I would like to have some of the following questions answered: Is the building still in use? Have all the joints held? What have been the maintenance problems and costs? Would the architect, builder, and/or the present occupant want this construction technique to be used again?

Was this building actually revisited? The pictures look as if they were taken at the time of construction.

GEORGE N. WEBB
Baltimore, Md.

[*As stated in the first paragraph, P/A did revisit the building. The photographs were taken by Associate Editor Forrest Wilson. Obviously, the adhesive held except where we show the architect's hand exposing a lifted panel. The building's location, in New England, should indicate that it has withstood seven rather severe weather cycles. The intention of the article was to elicit further discussion. Your letter indicates we have. If you wish further information, you might contact the architect, Richard Sharpe, 71 East Town Street, Norwichtown, Conn.*—ED.]

Dear Editor: A brief note to express my pleasure at your article in the February issue on our glued building project.

I was particularly interested in the comments from manufacturers and other people in the industry with whom you apparently had the opportunity to communicate, and their rather curious lack of involvement and interest in this whole field — unless, of course, there is money in it. Obviously, there is, and perhaps one day this will be the generator of some kind of renewed activity.

RICHARD SHARPE
Norwichtown, Conn.

CORRECTION:
The fire station in Houston, Tex., described on pp. 110–113 of the MARCH 1968 P/A was incorrectly designated as Fire Station No. 58; the correct number is 57.

Universal "Vanguard" carpet made with Vectra fiber looks so "natural"... only your shepherd will know for sure.

Specifications

Pile of 100% solution dyed Vectra® olefin fiber

5/64" Gauge (12.8)

Pile Weight—28 oz. per sq. yard

Pile Height—1/8" or .125

Stitches per inch—10

Tufts per square inch—128

Primary Backing—4 oz. 100% non-woven polypropylene

Passes ASTM E-84 flame spread test on jute back

Secondary Backings (wt. per sq. yard)

1. 40 oz. high density rubber
2. 9 oz. jute
3. 60 oz. vinyl for indoor-outdoor

In Vanguard fine gauge tufted carpet, you get the prized "natural" look, coupled with the stubborn stain, fade, abrasion and static resistance you get from spun yarns of 100% Vectra® olefin fiber. And Vanguard is available in eight heather colors. The cost? Impressively low.

In short, no matter where you decide Vanguard carpet belongs . . . it belongs. For Vanguard is an indoor-outdoor carpet in the truest sense. But once you see how lush and natural it looks indoors . . . you may not have the heart to put it outside.

ENJAY Vectra® OLEFIN FIBER

A new stain, fade, abrasion and static resistant tufted carpet...in a flock of decorator colors.

For samples and information on Universal Vanguard...the carpet for commercial installations, schools, churches, lobbies and all other heavy traffic areas... write:

Universal Carpets, Inc.
Department A, Ellijay, Ga. 30540

Name_____

Company_____

Address_____

City_____

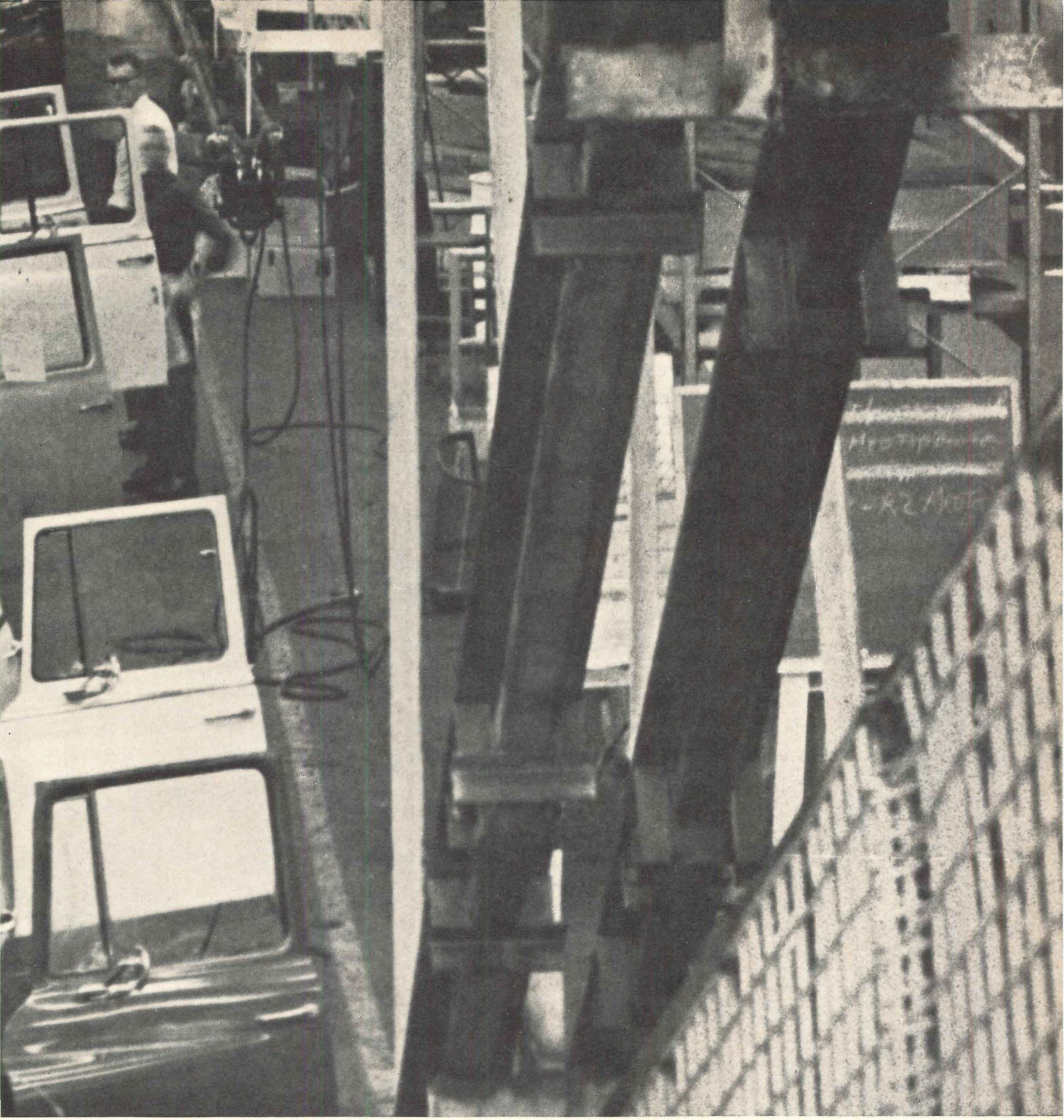
State_____ Zip_____

Vectra® olefin fiber is manufactured by Enjay Fibers and Laminates Company, Odenton, Maryland, a division of Enjay Chemical Company. Odenton: (301) WO 9-9000. New York: 350 Fifth Avenue, (212) LO 3-0720. Charlotte: One Charlottetown Center, (704) 333-0761. Enjay makes fiber, not carpet.

27 acres of year-round comfort are produced

This International Harvester truck assembly plant in Springfield, Ohio, was chosen by FACTORY magazine as a "Top 10" plant of 1967. The award is made on the basis of excellence of operation. An important part of this plant's efficiency is the year-round tempered air system provided by Gas-powered Carrier refrigeration equipment.

The selection of Gas-powered Carrier equipment was an easy one. It had just the right combination of efficiency and reliability to do the job for this mammoth installation. (The plant is about 2/5 mile long and 1/8 mile wide.)



Architect/Engineer: International Harvester Company, Chicago, Ill. • General Contractor: G. H. McGraw & Co., Hartford, Conn.
Consultant: Albert Kahn Associates, Detroit, Mich. • Mechanical Contractor: The Huffman Wolf Company, Columbus, Ohio

with a Gas-powered Carrier system.

A feature of the system is the refrigeration cycle that delivers 2,950 tons of cooling. It delivers all this from Gas energy at a cost of less than half a cent per ton/hour. And that's at peak load.

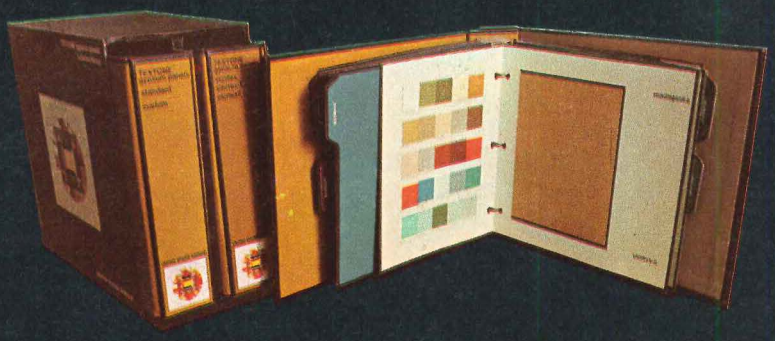
If you'd like the details on this installation and how a Gas-powered tempered air system could fit your needs, write to Carrier Air Conditioning Company, Syracuse, New York 13201. Or get in touch with your local Gas Company Sales Engineer.

AMERICAN GAS ASSOCIATION, INC.
For year-round climate conditioning, Gas makes the big difference.

On Readers' Service Card, Circle No. 324

New! Textone vinyl-surfaced gypsum panels.*

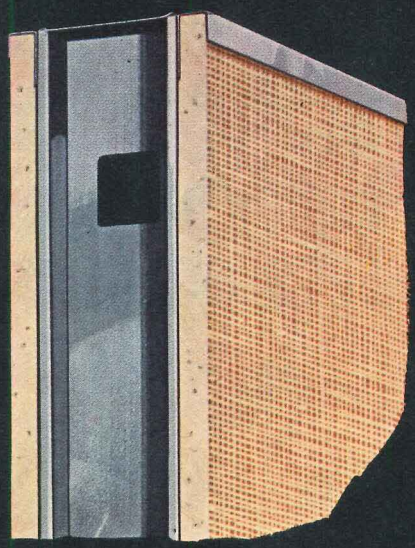
Popular VICRTEX®, VICRWALL®, and other durable vinyls are pre-laminated to wallboard to decorate U.S.G. Drywall Systems. A unique Selector Library offers you thousands of design combinations in color and texture. Ask your U.S.G. man, or write to us at 101 S. Wacker Dr., Dept. 132, Chicago, Ill. 60606.



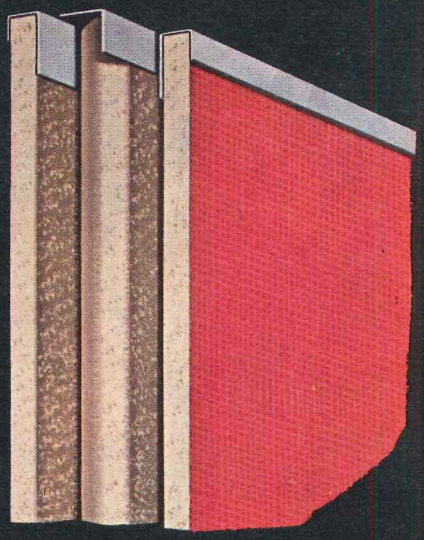
United States Gypsum

*Reg. U. S. Pat. Off. †T. M. Reg. U. S. Pat. Off. by Vaughan Interior Walls, Inc.

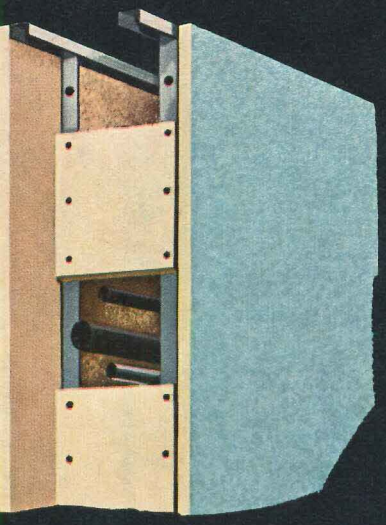
EXTONE in Jamestown Cherry on E-Z all Movable Office Partition—low-ost, flush-panel type with four basic omponents



TEXTONE in Natural Linen on USG® Metal Stud System—corridor and interior partitions within units

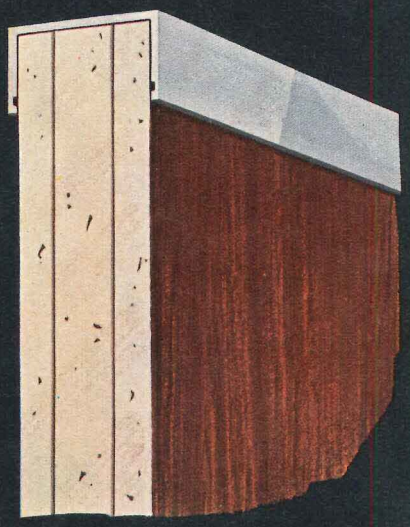


TEXTONE in Regimental Red Linen on 2" Solid Drywall System—space-saving interior partitions, up to 2-hour fire rating

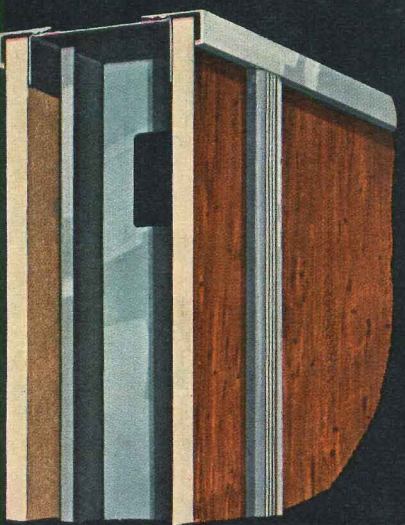


EXTONE in Azure Blue Stipple on USG etal Stud Chase Wall Partition Sys-m—low-cost pipe, utility chase walls

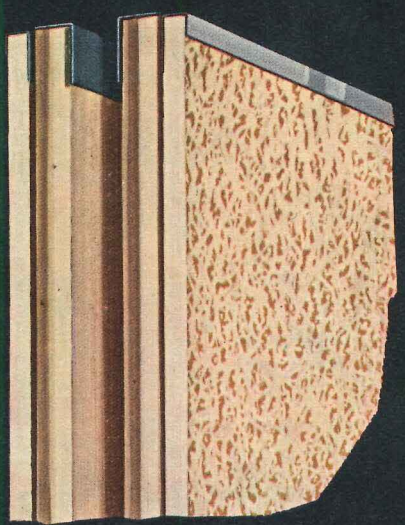
Build pre-decorated beauty into versatile U.S.G. wall systems



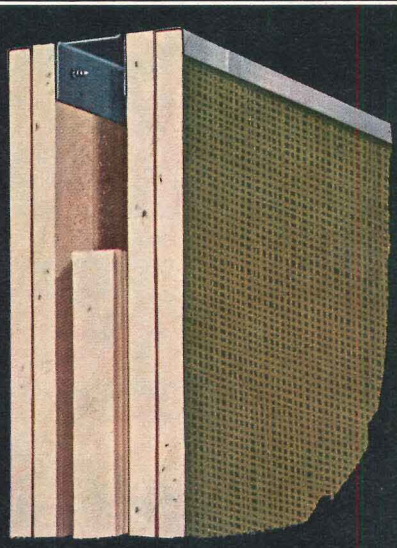
TEXTONE in Imperial Walnut on Movable VAUGHAN† Wall Partition System—almost 100% reusable, good sound control and fire resistance



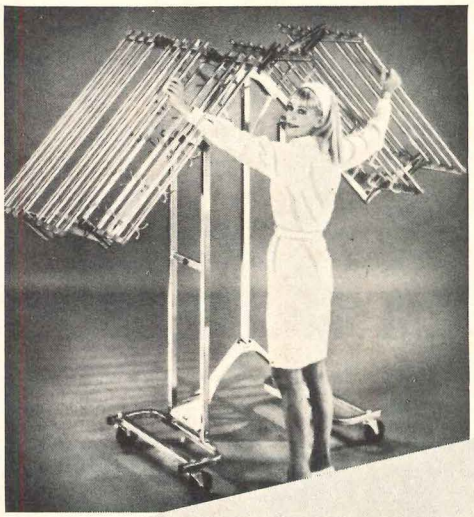
EXTONE in Antique Pecan on USG De-ountable Partition System—mov-ble, reusable, economical



TEXTONE in Golden Travertine on USG Double-Solid System—party walls, pipe chases, 46 to 60 STC

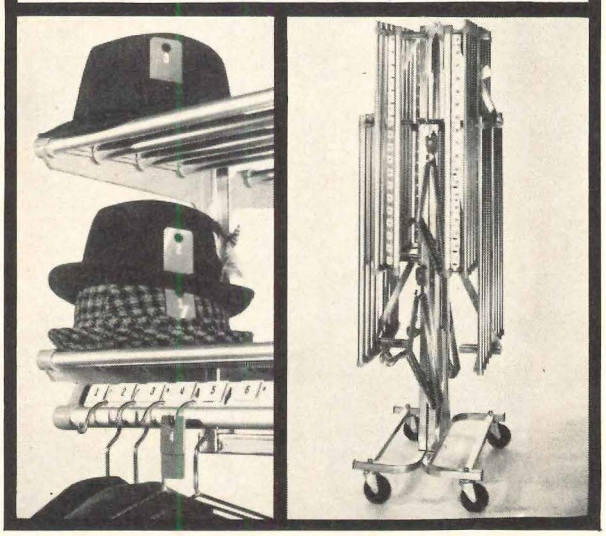


TEXTONE in Olive Linen on Rib Wall Partition System—party walls, accommodates electrical and light plumbing services



"multi•purpose"
CHECK ROOM LETS DOLLARS DO MORE

Two shelf, Model VP400



The VEEP 400 enables you to design in that much needed checkroom without permanently tying up valuable prime access space. Conveniently stored Veep 400's are always ready to turn any available area into an efficient checking facility—instantly—then disappear when not in use. Each unit is complete with its own hangers and numbered guest-checks and is of quality construction—designed to unfold and lock into a rigid trouble-free rack.

The Veep is just one of a most complete line of architecturally oriented coat racks by Vogel-Peterson Co. Write for catalog VP-510

Vogel-Peterson **COMPANY**
"The Coat Rack People"
ELMHURST • ILLINOIS

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You want your building at the lowest possible cost.

It may take our most expensive glass to do it.

t's more than glass.

It's Thermopane® insulating glass with a micro-thin coating of metal on the air-space side of one pane. We control this coating to control infrared and ultraviolet rays and cut glare. And to reduce heating and air-conditioning costs as much as 50%.

Our most expensive glass could turn out to be the most economical you can specify and it demonstrates an important L-O-F capability: the combining of materials in new ways to achieve desired characteristics.

Incidentally, our most expensive glass isn't that expensive.

Visit L-O-F in booth 104-108 at the AIA Convention and see.

Libbey-Owens-Ford Glass Co.
Toledo, Ohio 43624.

On Readers' Service Card, Circle No. 356

The Growing World of Libbey-Owens-Ford

LOF GLASS

design IDEAS IN OUTDOOR LIGHTING

DISTINCT

LAWNAIRE
Scale: 2"= 1'

GRAPHITE BLACK
AZURE BLUE
JADE GREEN
MIST BLUE
DESERT GOLD
HERITAGE WHITE
MIDNIGHT GREEN
TEXTURED ALUMINUM
SUNSET RED

SPECIFICATIONS

Both units 75 through 250 watts mercury; all popular voltages; full line of area and roadway IES lighting patterns; for mounting heights 10 to 15 feet.
For more technical information see Bulletin 67040.

CHOOSE FROM A GALAXY OF COLORS

Styling to ENHANCE your design

LAWNAIRE AND TRADITIONAIRE LUMINAIRES

MEDIUM-SOFT AND SOFT ILLUMINATION

To add flair to your designs, McGraw-Edison offers these two distinguished styles. One is strikingly contemporary, the other elegantly traditional. Each enhances your design capabilities.

LAWNAIRE
— a very smart, contemporary styling that scores beautifully in any modern setting . . . with a choice of 9 decorative colors.

TRADITIONAIRE
—a new, fresh approach to the quaint and charming lanterns of the Colonial period . . . in Antique Black only. With advanced engineering in scientific light control.

These stylings offer efficiency and flexibility in lighting while giving you an excellent source for design freedom. And McGraw-Edison quality assures long-life beauty with minimum maintenance.

Our complete outdoor lighting line includes all necessary coordinating components . . . poles, brackets, ballasts and control equipment. Service and technical assistance through your Authorized M-E Distributor backed by McGraw-Edison Field Engineers.

TRADITIONAIRE
Scale: 2"=1'

LIGHTING IDEA BOOK AVAILABLE

For your assistance, McGraw-Edison offers a helpful book entitled "An Idea Book Of Outdoor Lighting Designs." This planning guide contains specification details, application and layout information on our complete outdoor lighting line; provides suggestions on ways to incorporate this lighting into your building design with complete freedom of expression. Get your copy free from your local M-E Distributor or write McGraw-Edison Power Systems Division.

753-R

McGRAW-EDISON
POWER SYSTEMS DIVISION

On Readers' Service Card, Circle No. 360

MILWAUKEE, WISCONSIN 53201

New solid state tv system for schools, hotels, motels, hospitals, condominiums, etc., gives improved reception at lower cost.

Burlington, Iowa — A new concept in the distribution of TV and FM radio signals to all units in large buildings is now being used successfully across the country, according to John R. Winegard, president of Winegard Company, manufacturers of master antenna TV-FM systems.

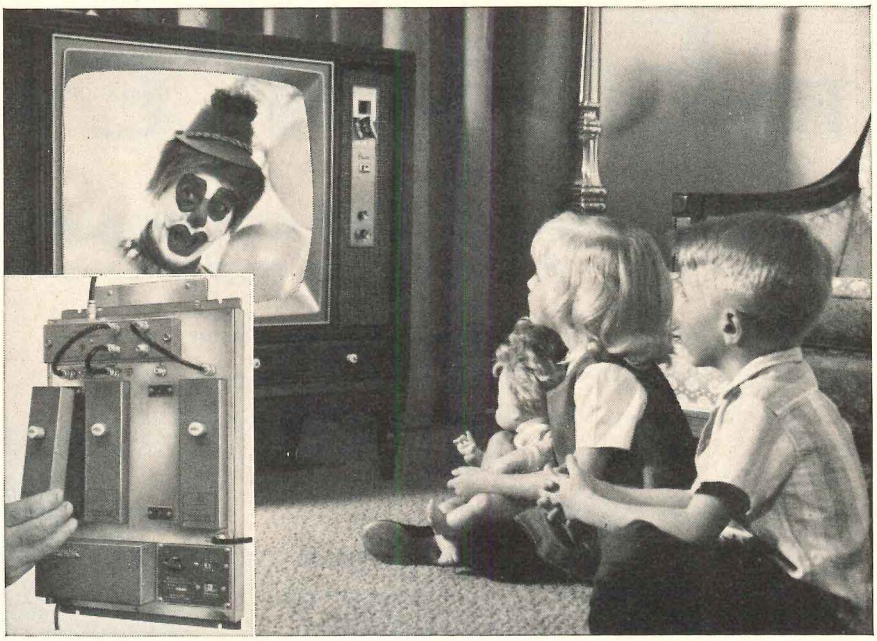
Called "Ultra-Plex", the new solid state system has been made possible through the development of unique transistors and circuitry not available until recently. "Because of these developments", Mr. Winegard stated, "it is now possible to have *complete* and individual control over *all* TV and FM signals in any area, and to provide an *equal* amount of signal to each of hundreds of outlets, if needed."

"TV-FM signal systems are certainly nothing new", Winegard added. "But up until now they have been far less than perfect and, in many cases, rather expensive. With our Ultra-Plex system, however, architects can now provide all their clients with excellent TV and FM reception on all stations in the area, including UHF, at a comparatively low, one-time equipment and installation cost and with little or no maintenance.

"There are a great many advantages to the Ultra-Plex System in addition to its low initial cost and easier installation. The one system handles any number of VHF channels (2 to 13), UHF channels (14 to 83), plus FM and FM stereo."

"New channels or stations can be added at any time simply by plugging in a solid state amplifier that costs less than $40.00. In most systems now in use, it is necessary to tear out wiring and outlets to add a new UHF channel. So you see, unless the government should make drastic changes in present TV and FM frequencies, and this is highly improbable, our Winegard Ultra-Plex System will never become obsolete."

"Naturally, we have designed all our components, including the outdoor antenna, to provide maximum performance for color as well as black & white reception. Sooner or later, everyone is going to have color tv, and it's now an accepted fact that indoor antennas such as 'rabbit ears' just aren't sensitive or selective enough for fine color reception. An Ultra-Plex System, however, will always provide great color reception if the sets are properly adjusted."



Ultra-Plex is a unique 82-channel, modular plug-in distribution system with all components, from antenna to wall plugs, matched to work together in harmony for perfect color and black & white reception. The system never becomes obsolete, because you can add new UHF or VHF channels quickly, and inexpensively whenever needed.

"A small but noteworthy feature is that Ultra-Plex solid state equipment requires far less wall mounting space than other systems. And, of course, you enjoy the extremely low operating and maintenance costs of transistor amplification in comparison to vacuum tube systems."

"I should point out that Ultra-Plex Master Antenna Systems are not only being incorporated into new buildings, but into older ones as well, and in many cases are replacing inadequate and obsolete equipment."

"We obviously can't give you all the details and specifications in this advertisement, so we have provided a coupon for your convenience. We believe it will be worth your time to find out all the facts about the Ultra-Plex Master Antenna System. Winegard Company can recommend installers in your area. And we provide complete factory layout and engineering services and equipment cost estimates at no charge."

Winegard
ANTENNA SYSTEMS

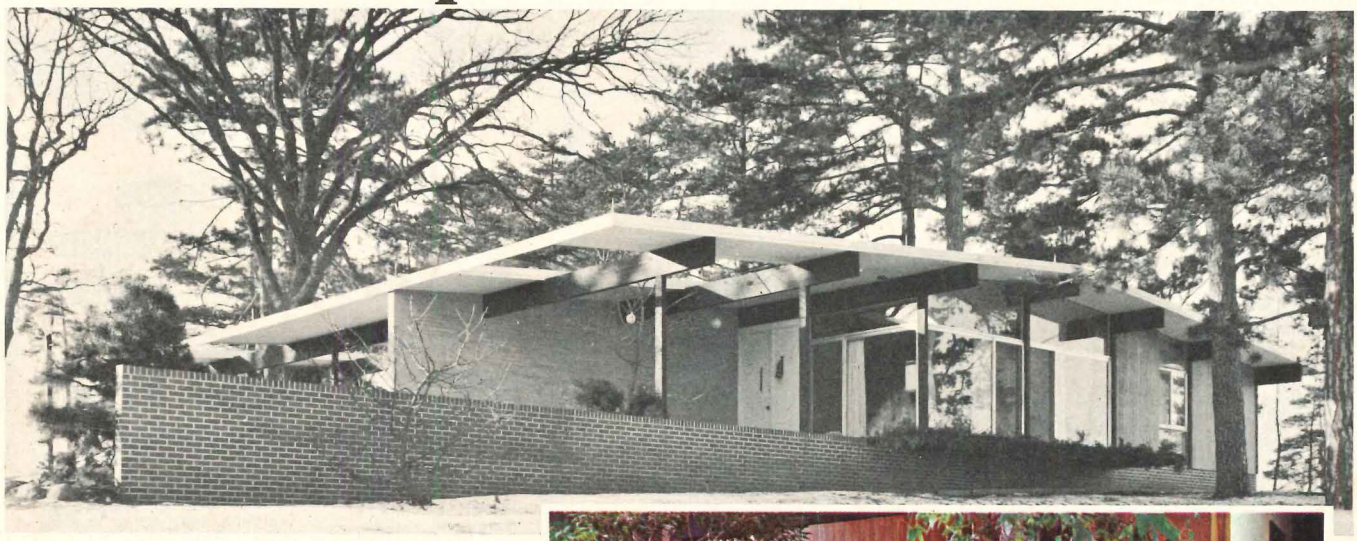
WINEGARD COMPANY P.A.
3000 Kirkwood Street
Burlington, Iowa 52601

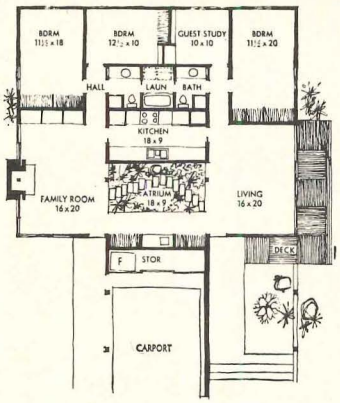
☐ Please send additional information regarding your Ultra-Plex Master Antenna Systems.
☐ Please have a representative call for an appointment.

Name_____ Title_____
Company_____ Phone_____
Address_____
City_____ State_____ Zip_____

On Readers' Service Card, Circle No. 399

Moving nature indoors is easy... with trees, plants and ceramic tile.





The pleasures of an indoor garden are obvious. But, an atrium is often gained at the expense of convenience, or given a self-defeating "fish bowl" treatment.

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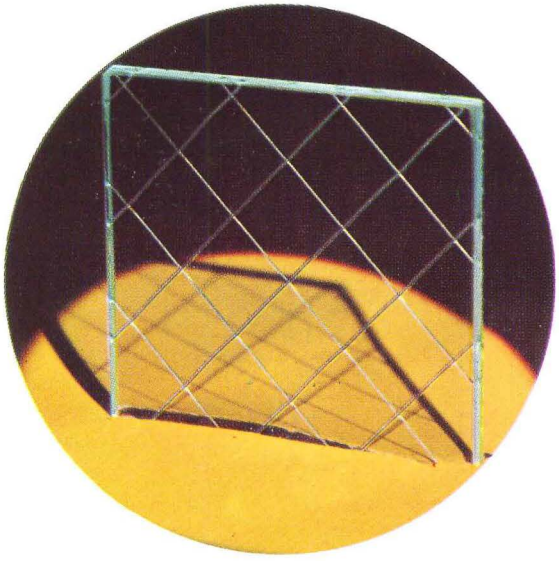

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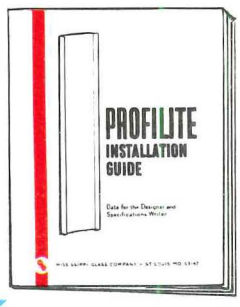

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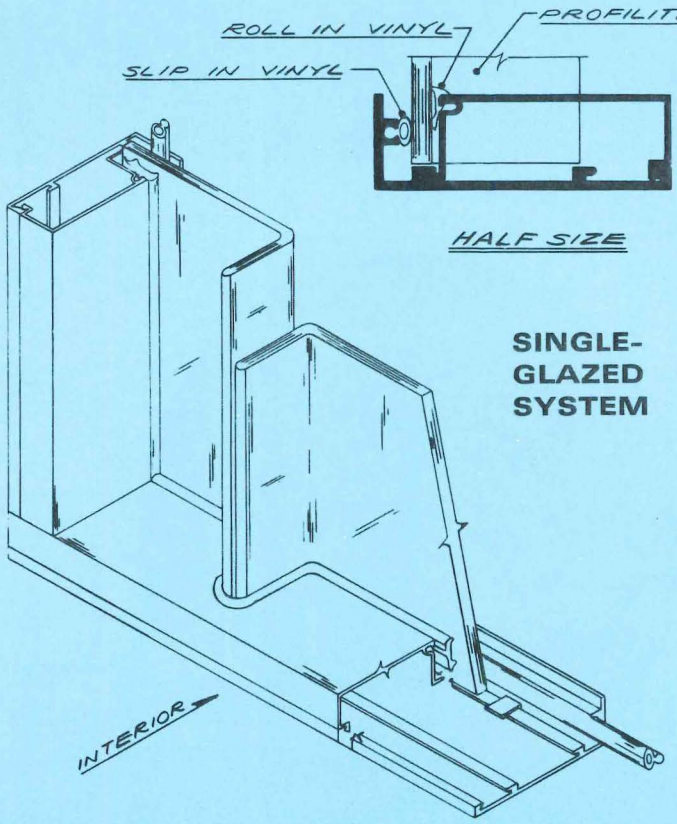

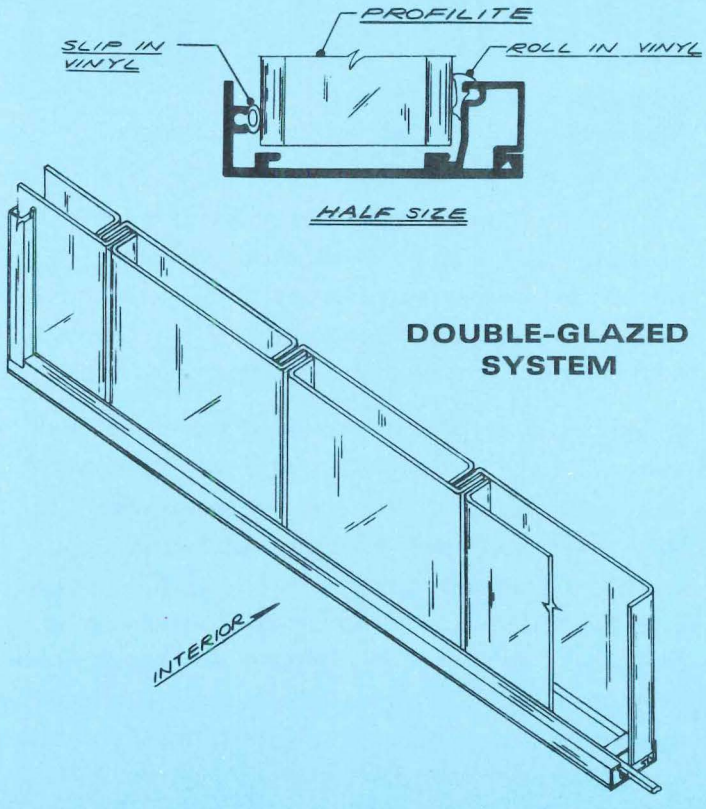

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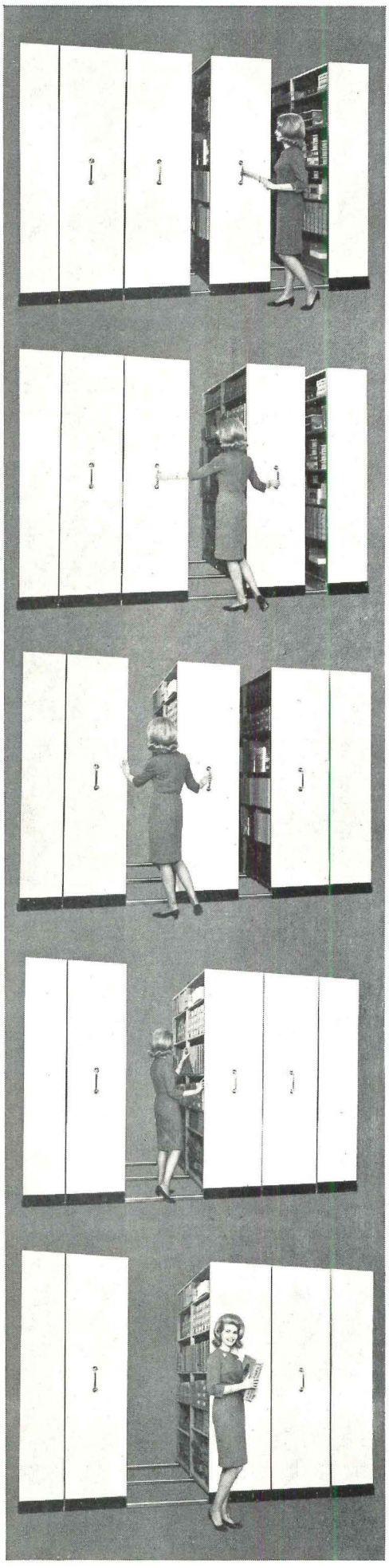

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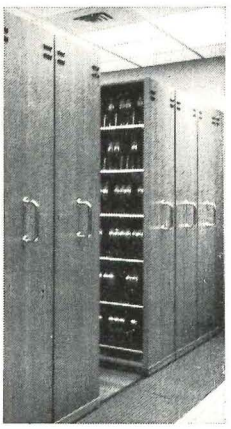

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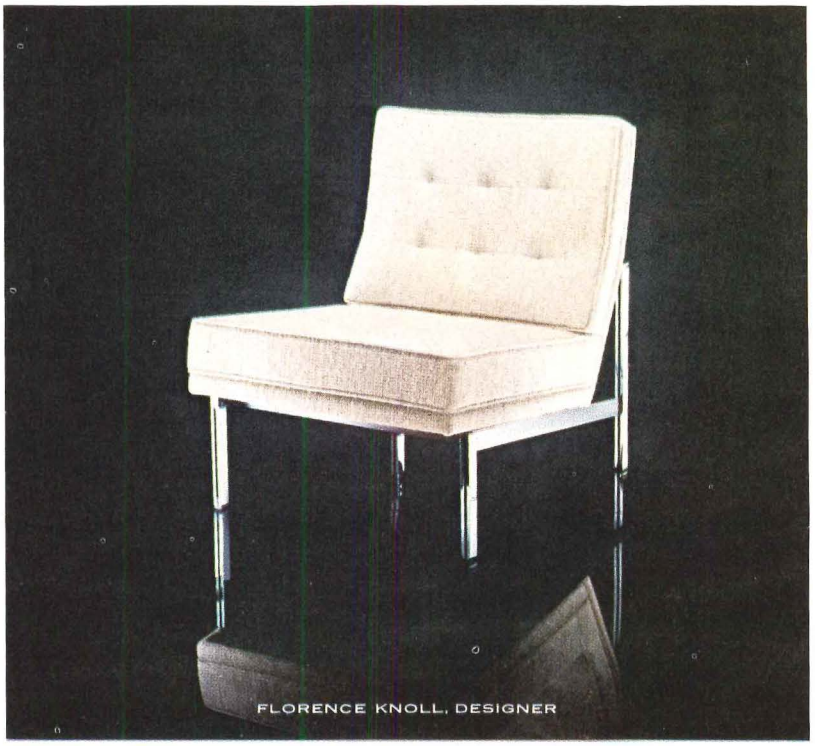

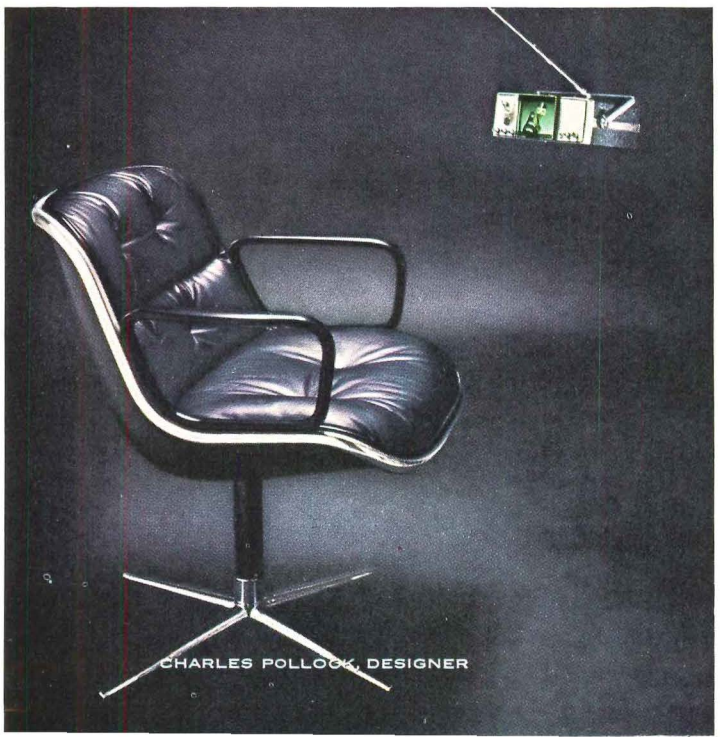

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P/A NEWS REPORT

Progressive Architecture's Monthly Digest of Buildings, Projects, People and Products *June 1968*

ARCHITECTS LEARN ABOUT COMPUTER GRAPHICS

CHICAGO, ILL. Jumping between those good old years 1968 and 2001, speakers at two recent computer graphics conferences alternately stretched their listeners' imaginations and sharpened their instincts for better business management. One conference, in New Haven, was sponsored by Yale University's Department of Architecture; the other, in Chicago, by Harvard's Laboratory for Computer Graphics.

Conferees at both meetings were treated to a glimpse of the future in a film showing a designer working with a light pen on a cathode ray tube (see p. 156, JULY 1966 P/A). As he sketched a building, filling in spaces, exits, and fenestration, the tube fed him an immediate wealth of data on such things as room areas, shadows, and distances between points.

The film, URBAN5, made by Nicholas Negroponte, a research associate at MIT, may have expanded the audiences' minds, but Professor Steven Coons, also of MIT, strained their credulity with an abbreviated account of a mechanism that will simulate a walk through any environment. Being developed by a Government agency, the mechanism (which Coons was not allowed to describe) evidently feeds electrical impulses either to a viewing screen or directly into the brain. Commenting on a simulated walk he took, Coons said, "It was just as if I were walking down a street."

But much of the conference was aimed at the everyday needs of the practicing architect. The attending architects wanted to know how computer graphics can aid their practices. They learned that computers and ink plotting machines are getting less expensive to operate as they grow more sophisticated; most can be rented on a time-sharing basis.

Moreover, ink perspective drawings produced from plans and elevations fed into a computer are available from service firms, and after the first drawing, subsequent drawings made from different viewpoints become economically feasible. With a series of computerized perspectives, a walk around a building or through a project can be shown rapidly. Researchers hope to advance to a stage where they can simulate not only building forms, but also textures, odors, and an environment's other, less tangible qualities.

In a future issue, P/A will discuss in detail the present state of computer graphics, and what future developments may bring.

ARCHITECTURAL STUDENTS JOIN COLUMBIA STRIKES: OUT OF CHAOS, MATURITY

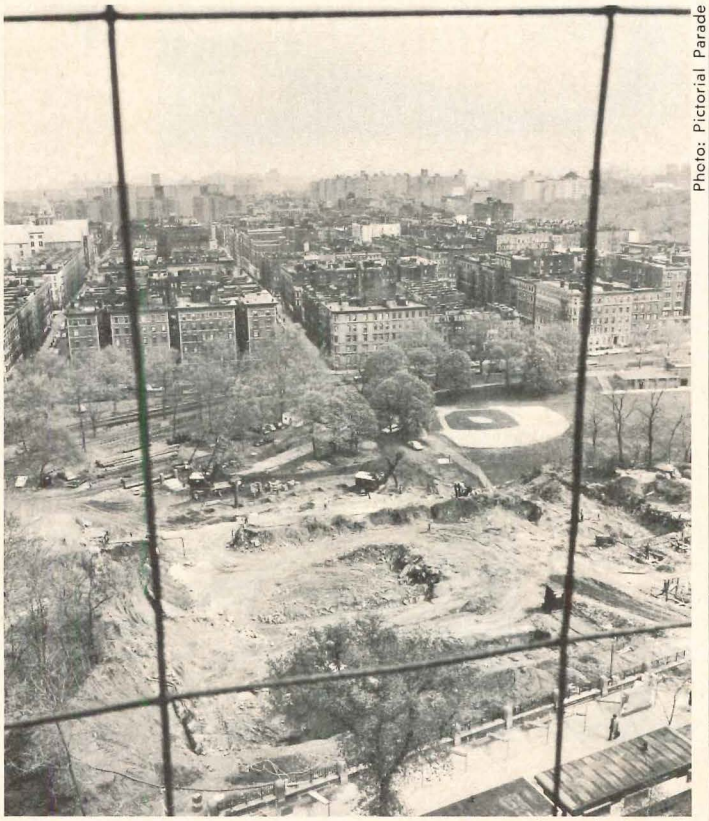


Photo: Pictorial Parade

Gym site in park.

"A system is made by individuals, and if you say that now you have established a system then it is dead. But if you have established a sensibility from which a system can come, then it is not dead."
LOUIS I. KAHN

NEW YORK, N.Y. When the student strike erupted at Columbia University early last month, students and faculty members in the architectural school were caught hard at work on their final project. Within five days, all work had stopped, classes had been suspended, five major university buildings were held by some 200 revolutionary students, and the office of University President Grayson Kirk had been ransacked.

One of the issues that ostensibly triggered the strike was an architectural one: the proposed construction of a gymnasium in Morningside Park. The particular part of Morningside Avenue from the University, is steep, rocky, and little used by anyone who is concerned with personal safety. But the entire concept of the gym and the ill-conceived use of parkland became a ready-made issue for rebellion once excavation work got under way on the foundation.

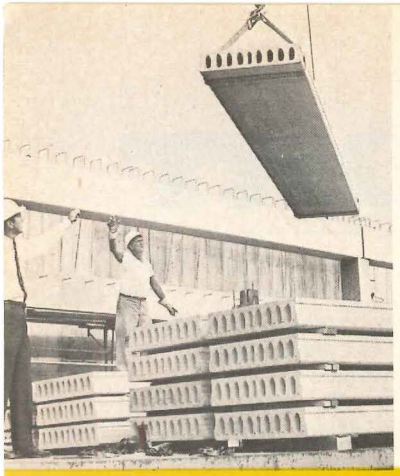
Not only would the gym take parkland, better kept for its originally intended use, but the design of the gym merely accentuated the long-festering break between town and gown. When the university first got permission to take parkland for its own use, it provided in the gym's design a separate entrance as a concession to the community — on the lower end of the sloping site. The separate entrance led to separate facilities.

Columbia has not made itself popular with its neighbors. Its policy of buying up groups of houses in run-down areas near the university and renting them out to faculty members at rates considerably below those paid by the rest of the community has been one of the actions that has opened and maintained a gulf of misunderstanding. The gym became the focus of an outlet for these, and other, long surpressed grievances.

Ironically, two weeks before the strike the faculty of the architectural school had sent the administration a formal resolution condemning the use of parkland for building.

Now, with the university in a state of siege, architectural students and faculty alike joined the demonstrations, then sat down to write out their specific objections to the gym.

The students, 175 of them, worked out a position paper entitled "Towards Future Community University Cooperation." (Total Architectural School enrollment is 380, but 125 of these are night students and had trouble getting to Columbia during the day.) The paper called for a halt to the impersonal construction of "blockbusters, huge buildings that push the community out." They affirmed their "trust in the professional ability and integrity of our professors," and called on the university to use this ready pool of professional expertise in matters of campus building and planning. The architec-



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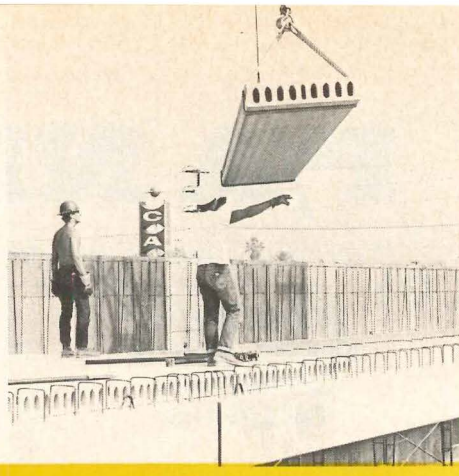
Tuesday P.M.



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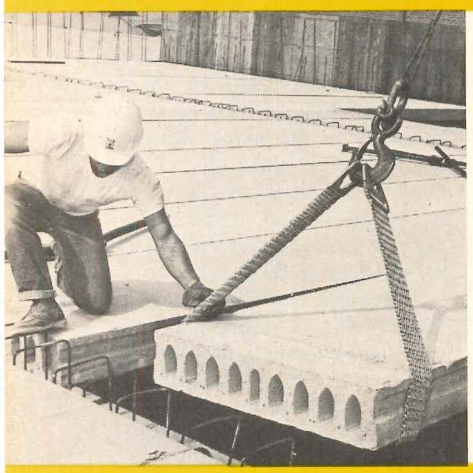

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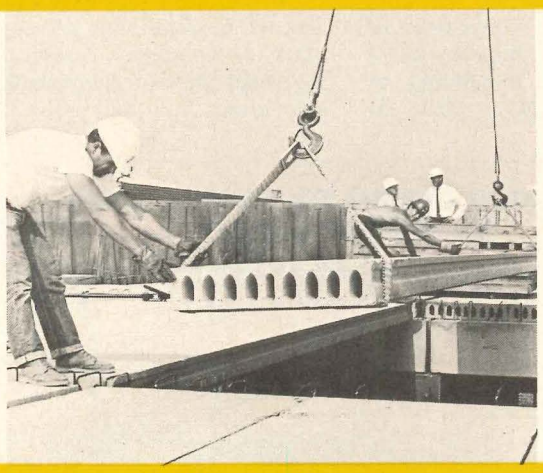

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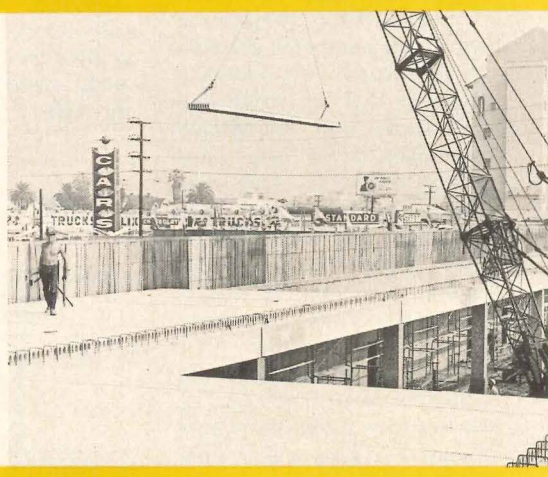

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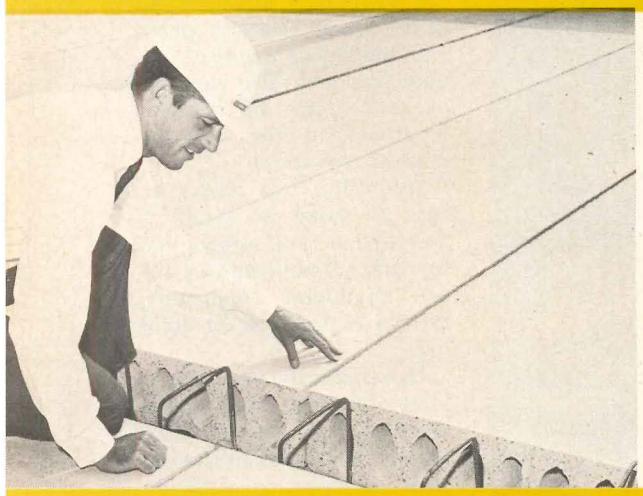

Friday P.M.

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Photos by Delmar Wilson

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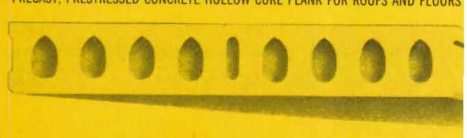


On Readers' Service Card, Circle No. 381

tural faculty was quick to endorse this statement. It then set down its own "Position and Proposal of the School of Architecture," which it has forwarded to the administration. It suggests an "equitable distribution of university power among administration, faculty, students, and, where affected, community." Members of the community on such a governing council would have power of veto in matters concerning them. It called for continuing the strike until the gym project is permanently dropped. Further, it demanded that charges against all students strikers be dropped.

The architectural school students endorse this faculty statement in essence, but they are busy working out exact proposals of their own that would emphasize the role students should have in any new administrative set-up. Discussions in recent meetings have ranged far beyond administrative matters, encompassing a basic question of what architectural education should be.

Working out these proposals is a difficult thing, because recent meetings have merely pointed up the differences among architecture students, planning students, and night students.

But the students have time to think things out. The school of architecture has suspended all classes for the rest of the academic year, assuring everyone that no one will receive a failing grade for the semester.

Perhaps some solidarity can be achieved from the whole process. Already, both faculty and students in the architectural school have shown remarkable accord with respect to each other's ideals. "The issues are moral," notes one student, "not political," which may account for some of the accord. But at the same time, political rivalries and jealousies exacerbated by the general unrest are eating away at faculty as well as students. If each group can reach accord within its own ranks, the disruption of work may not have been a waste.

As P/A goes to press, not much has been resolved. Work has been suspended on the gymnasium at the request of New York Mayor Lindsay. But there is no indication that the stoppage will be permanent, or, if it is not, that the gym will be redesigned.

URBAN BRAIN TRUST SETS UP SHOP

WASHINGTON, D.C. In late April, with much fanfare, the White House announced the formal establishment of a nonprofit corporation to research urban problems.

The new organization is the Urban Institute (see p. 23, JANUARY 1968 P/A), chartered by Congress, and funded initially with a $10 million Government appropriation, and with promise of further financial support from such organizations as the Ford Foundation.

Purpose: To "assemble and make available knowledge about city problems and programs, to conduct studies on education, transportation, pollution control and other problems of urban life." A "prospectus" issued at a White House announcement ceremony stated that the new UI will study problems of individual cities, provide independent evaluation of Federal, state and local (and private) programs for the cities. It will pay, according to announcements, "above the usual government rates" to attract "outstanding scholars" to do its work. Among other things, it will accept contracts to conduct studies for Government agencies — much as is done by the outstanding military "think factory": the RAND Corporation.

President of the new organization, which will set up headquarters in Washington, is William Gorham, who quit his job as Assistant Secretary of Health-Education-Welfare to take the post. Board chairman is Arjay Miller, vice-chairman of the Ford Motor Co. No architects are named among the 15 members of the Board of Trustees, which includes former defense Secretary Robert McNamara, and engineer-industrialist Edgar F. Kaiser.

Idea for the Urban Institute dates back to a Presidential Message on Urban and Rural Poverty, issued on March 14, 1967. In that message, President Johnson called for estab-

lishment of a research group to help find answers for city problems. Last December, the President named seven men (including McNamara and others elected to the Board of Directors) to draft a charter for such an Institute, and incorporate it as a nonprofit corporation.

There is little doubt that heavy emphasis will be placed on "the more desperate problems of the urban poor." "Much of the central city population," pointed out the report, "is poorly educated, miserably housed, inadequately served by health and recreation facilities. . . . We must mobilize our best intellectual resources to attack the problems."

Among other plans, the Institute plans to establish numerous task forces and commissions, to "help mobilize existing knowledge about existing problems."

FOREST IN THE GUGGENHIEM

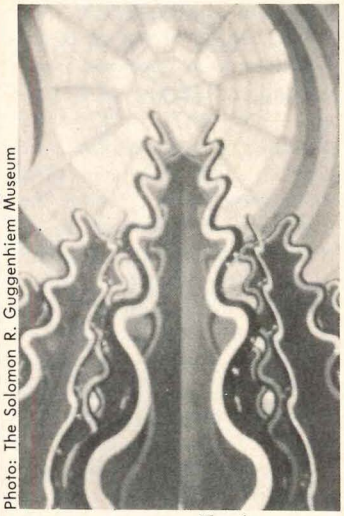


Photo: The Solomon R. Guggenhiem Museum

NEW YORK, N.Y. Environmental sculpture created a red, white, and blue forest in the limited, circular spaces of the Guggenheim Museum here during April and May, when the work of American artist Paul Feely (1910–1966) was on view in a retrospective exhibition. Nine pieces of brightly painted wood sculpture, each an elongated, three-dimensional version of a quatrefoil shape, covered 45 sq ft on the museum's ground floor and soared 21′ toward the skylighted dome of the building. From the ground, the placement of the skylight seemed a happy circumstance, for the sculpture appeared to be growing right through the domed ceiling. Wandering in and out among the individual pieces, an observer experienced contrasting feelings of exuberance and calm, surrounded by power, yet isolated from the world; the over-all effect was much like that of being in a pine forest. But this was a modern forest, where gray-green gave way to more invigorating colors.

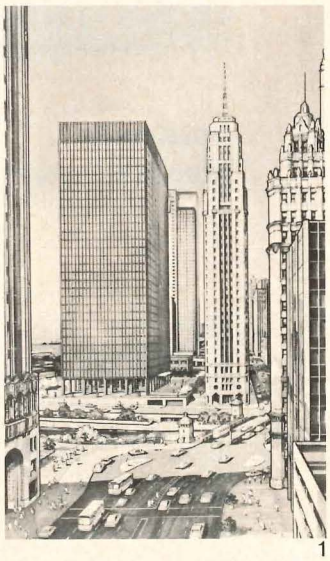
Children visiting the exhibit stretched out their arms expansively and stared open-mouthed or grinned slyly as they played a surreptitious game of hide-and-seek with the inverted corners of the "trees." Their expansive gestures seemed the most appropriate response to the environment, for, despite the hard-edgedness of the sculpture's composition and painting, the curved forms gave the impression of being on the point of sprouting like branches to fill the space they occupied. The curved edges were also responsible for optical illusions; some columns appeared to tilt, others to diverge from the pattern of shapes.

Seen from the ramps, the tree sculptures crossed lines with painted and sculpted variations on the quatrefoil shape, and with the curved lines of the ramps themselves. Since the entire museum was given over to the exhibit, the viewer who began at the top of the ramp could progress from the less interesting earlier work (characterized by the same basic shape as the more recent pieces, but without the hard edges and bright colors that provide such excitement in the latter) to a series of altering vistas provided by the building's ramps and galleries. Smaller sculptures and paintings appeared and reappeared behind the "trees" as a viewer stopped at one or another level to look across the central space.

Altogether, the installations appeared to be a great success, and to suit particularly well the kinds of spaces the Guggenheim affords. These are truly "environmental" sculptures, for they do succeed in creating a sense of their own place and space. And they're lots of fun.

CHICAGO TO HAVE ANOTHER MIES OFFICE BUILDING BY 1969

CHICAGO, ILL. Mies van der Rohe's latest proposed addition to the Windy City's skyline is this 32-story office structure **(1).** It will rise on a site along the south bank of the Chicago River, opposite the Sun-Times-Daily News building and kitty-corner from the Wrigley Building **(2).** Directly in front of the building will be a 2-acre plaza. Below grade will be a shopping concourse that will be linked eventually with the Civic Center, the Illinois Central Station, the Prudential Building, the Public Library, and Marshall Field & Company. Also beneath the plaza will be a service entrance and loading dock and three levels of parking space **(3).** Cost of the 1 million sq ft building is expected to be $40 million. Owner of the site, purchased from the Illinois Central, is Metropolitan Structures, Inc., developers of Nun's Island, Montreal.



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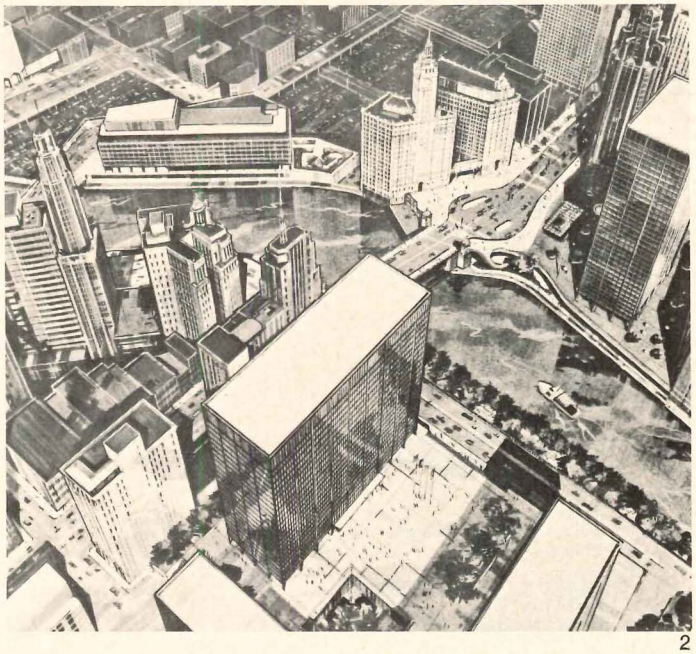

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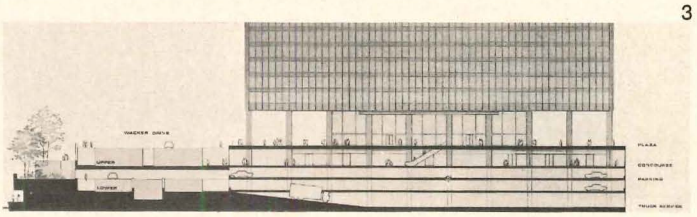
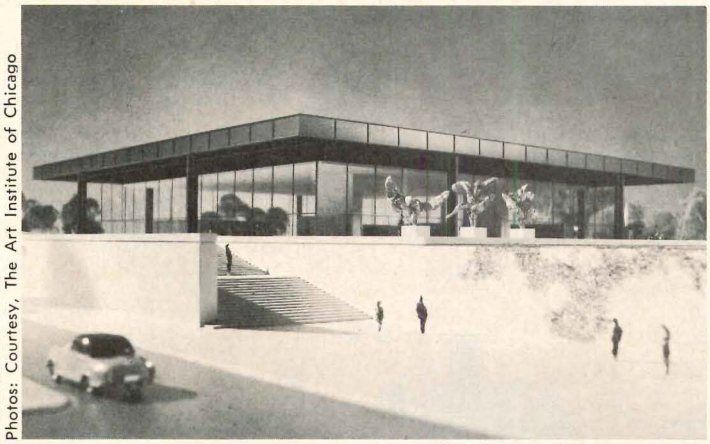


3

50 YEARS OF MIES

CHICAGO, ILL. Drawings, sketches, plans, models, and perspectives of 36 projects of Mies van der Rohe are on display through June 30 at the Art Institute of Chicago. Since 1938, when he emigrated from Germany, Mies has made Chicago his home, and, in doing so, has made Chicago. "Architecturally, this is no longer the Second City," wrote architectural critic Ada Louise Huxtable recently. And, of course, it isn't — if, indeed, it ever was. Teaching at the Illinois Institute of Technology, Mies has turned



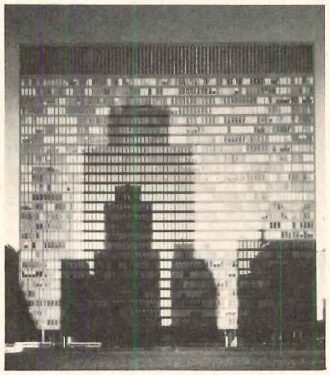
Photos: Courtesy, The Art Institute of Chicago

New National Gallery, Berlin.

out an entire generation of students, who, although encouraged to find their own idiom, have followed the master's. Mies found it entirely natural that individuals who followed the same principles and the same material disciplines should find similar results. And Chicago is rife with these results.

Projects in the retrospective exhibit span 50 years and are arranged in four categories: high buildings, low buildings, groups of buildings, and furniture.

It is 20 years since the last Mies retrospective appeared at the Museum of Modern Art in New York. Since then, architectural emphasis has shifted slowly from the monumental building to the building that solves a complexity of urban problems. Mies' buildings offer lasting solutions on both levels, and it is perhaps one of the limitations of the exhibit that its photos and models show only in part how well his buildings fit in-



Chicago Federal Center.

to and shape their surroundings. The Miesian aesthetic has been rejected in large part by the current generation of architects, and, in light of this, the exhibit is a reminder that despite this rejection, Mies, with his carefully refined detailing and proportions, is still what is happening.

The exhibit was put together by A. James Speyer, the Art Institute's Curator of 20th-Century Art with the aid of a grant from the Graham Foundation for Advanced Studies in the Fine Arts.

DMJM TEAMS WITH MASTER OF CHAMPAGNE MUSIC

SANTA MONICA, CALIF. At 21 stories, the office building planned for the General Telephone Company of California will have sweeping views of the coastline and of the city. When completed in 1971, the building, designed by Daniel, Mann, Johnson & Mendenhall (DMJM), will house some 1200 General Telephone employees in 140,000 sq ft of floor space on its seventh through twenty-first floors. DMJM will be part-owner of the building. Co-owner will be band leader Lawrence Welk, whose firm Teleklew Productions, Inc., is providing some of the capital.

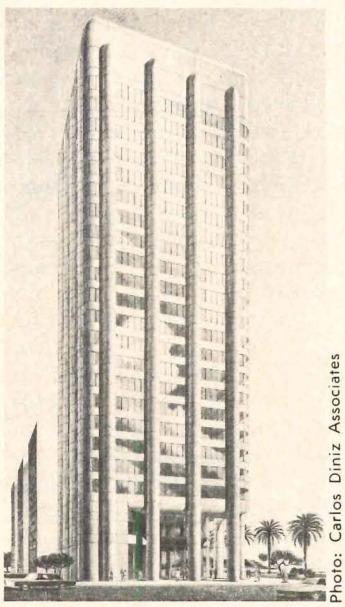


Photo: Carlos Diniz Associates

Shown in preliminary design, the building is reminiscent of Yale University's Kline Science Center designed by Philip Johnson (see pp. 90–97, FEBRUARY 1967 P/A). Like the Kline building, it will have hollow, load-bearing columns that house vertical air-conditioning ducts. The columns are free-standing and cylindrical at the base, semicircular above, and terminate in a bullnose detail at the top. The columns, like the spandrels, will be faced with precast concrete sections. Corner windows are of curved glass.

THE DEVELOPMENT OF THE NEW ARCHITECT: THE GEDDES-SPRING REPORT POINTS THE WAY

PRINCETON, N.J. The long-awaited study of education for environmental design has been completed. Conducted under the sponsorship of the AIA by Robert L. Geddes and Bernard P. Spring at Princeton University, the 59-page document is now being circulated to architectural schools throughout the U.S.

Ostensibly, it is a report that presents a framework for the study of architecture as it will be studied and practiced in years to come. But in making their inquiry attend to fundamentals, Geddes and Spring have produced a document that would be as applicable to the teaching of almost any subject as it would be to architecture. "We operated on a high level," says Spring. "There is a lot of what seemed obvious that we have left out."

What they have left in are guidelines individual schools of architecture may use in setting up interdisciplinary programs. These should be as broad as the needs of the students enrolled and as deep as the capabilities of the teachers. "We want schools to set up programs that are in accord with their own stated goals and that use the talent they have available," Spring elaborates. The report deplores the practice most schools have of setting up curriculums that ape those established at other schools. Everyone has a Design I and Design II and a Strength of Materials. Under the newly proposed system, this type of meaningless, if easy, standard setting would be avoided.

The study sets up three goals, or priorities, and these are considered standards of performance, or behavior, not of status:

(1) A student (or graduate) should be able to work effectively within the real-world constraints of present-day practice.

(2) A student (or graduate) should be able to comprehend the continuing changes in the social, economic, scientific and technological setting of our society. He should be able to constantly renew and adapt his abilities in response to these changes.

(3) A student (or graduate) should be able to formulate a concept of a better environment beyond present-day constraints to give direction to his adaptability.

Implicit in these objectives is the development of an individual who knows as much as possible about as many subjects as possible. To be able to consider a problem from all possible angles is the first step in the optimal solution of that problem. This approach can lead to the upsetting of established ways of categorizing a problem. "I don't like to be told, in the midst of considering the cost of a school, that what I should be looking at is the way children are taught and whether they should be taught that way, and that maybe I shouldn't be building a conventional school at all," said one woman at an interdisciplinary seminar at Princeton recently. But architects should be able to reduce problems to fundamentals. They should at least know enough to be able to consult the proper experts.

The Geddes-Spring report suggests a continuous curriculum divided into segments of perhaps two years each. At the end of each segment, a student would be able to stop, receive some sort of a certificate, if he passes the exams, and perform a useful professional function. If he completed the entire curriculum, he would be an environmental specialist. According to the report, such an

interdisciplinary approach does not mean "that traditional disciplines give up their identity or their professional standards. But it does demand that professional organizations, registration boards, and accrediting boards work together to create a better related institutional setting for task-oriented team work in the process of environmental design."

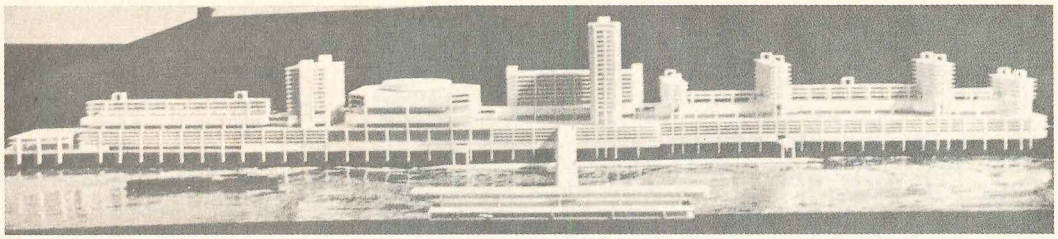
Just what might go into a study of environmental design is detailed on a three-dimensional diagram, which indicates 216 categories of ability. Although not all schools would teach all 216, each could relate its particular segment to the entire concept.

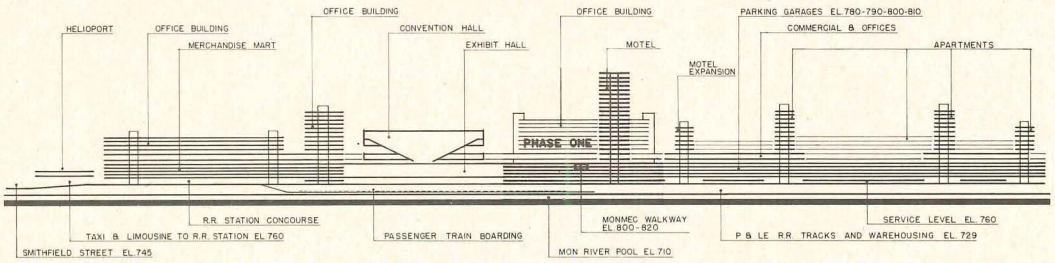
In conclusion, the report calls for national centers that would pool physical resources and teachers to develop and test environmental design curricula. And further, it suggests the establishment of several Institutes for Advanced Studies around the country where gifted teachers could go to recharge their knowledge and enthusiasm.

"A Study of Education for Environmental Design" will be the basis of continuing studies in regional and national meetings in the next few years.

COMPETITION

The **1968 HUD Awards Program for Design Excellence** will be the third in a biennial series. Architects, planners, builders, developers, and local public agencies are invited to submit HUD-assisted local design programs and projects in two categories: project design and urban design concepts. The category of project design will include building and open space design in such HUD programs as neighborhood facilities, urban beautification, historic preservation, and medical facilities. Urban design concepts include plans for large areas of urban space; entries in this category must be submitted by sponsoring local public agencies. For further information, write to: 1968 Design Awards Program, Department of Housing and Urban Development, Washington, D.C. 20410.





SECTION

PITTSBURGH WIDENS ITS PORTALS

PITTSBURGH, PA. A good deal of attention has been focused in recent years on the development of Pittsburgh's Golden Triangle, the point of land at the confluence of the Allegheny and Monongahela Rivers. The area has become the heart of the city's downtown district, with the office towers of Gateway Center forming a focal point almost at the apex of the triangle. Now, however, developers of commercial, residential, and public facilities are casting about for sites appropriate for further intensive operations. With some entrepreneurs looking to the city's perimeter for opportunities in what is known as the "Strip," a group of investors that includes a major insurance company and a national religious group has set its sights on a tract much nearer the urban core. They propose to develop a 50-acre tract directly opposite Gateway Center across the Monongahela. The land, owned by the Pennsylvania and Lake Erie Railroad, is shot through with railroad tracks and accommodates a small amount of warehousing, but these potential drawbacks have been turned to advantage by the architects' plan for intensive, multiuse development.

The arrangement of facilities on the site is, according to preliminary designs by architects Deeter-Ritchey-Sippel, determined by both horizontal and vertical division of space. Extending horizontally over the site on line with the P&LE tracks would be, first, a massing of transportation facilities; second, major commercial and office structures, and, at the end of the site nearest the Ohio River, recreational space and residential buildings. Although the complex, in plan, coheres by virtue of its overlapping structures and multilevel connections, it is its vertical structuring that binds elements and reveals the concept behind the design.

At track level, passenger platforms, railroad and truck freight loading, and 139,000 sq ft of warehousing are located, as well as a proposed marina on the river. Above the tracks, ramps permit vehicular access to a new railroad station, parking garages, and service areas, and entrance for pedestrians to a 173,000-sq-ft exhibition hall. At a third level, a heliport tops the railroad station, and a 453,-000-sq-ft merchandise mart is situated above the exhibition hall. Architects have planned a broad plaza at the fourth level, from which rises a multistory motel with convention facilities. A mechanical walk, resting on piers once used to support the Wabash Railroad bridge, extends across the river to make the connection from Monongahela Plaza to Gateway Center and the downtown district. Behind the motel, forming with the motel phase one of the complex, is a high-rise office building. Additional, low-rise office and commercial structures are planned for the same elevation adjacent to the motel, and a 310,000-sq-ft convention hall completes the market complex. Beginning at an even higher elevation, multistory apartments containing 706,000 sq ft will stand out against the background of lower commercial buildings. A 350,000-sq-ft tract of land adjacent to the site has been reserved for future construction of one of Pittsburgh's "Great High Schools" (see p. 152, APRIL 1968 P/A).

At this time, the proposal for Monongahela Plaza has not been officially approved. Developers are currently negotiating with owners of the P&LE Railroad, whose cooperation must be assured, not only for the acquisition of land, but in order to arrange a satisfactory agreement on the use of air rights above tracks and trains. Railroad officials are studying the proposal in relation to the planned development of Penn Central Park, to insure that the two projects would fill complementary needs.

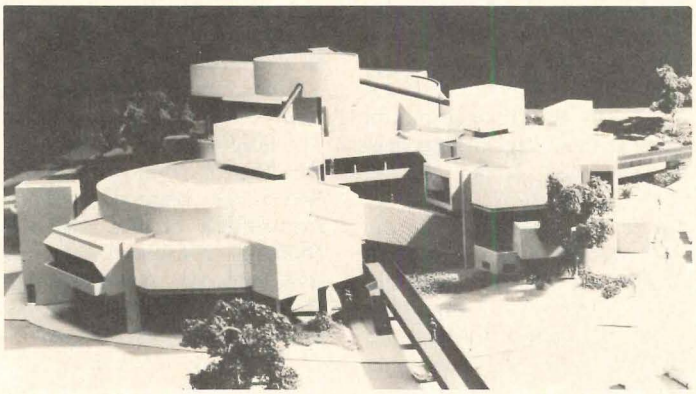
U. S. FIRMS PLAN FOR SAO PAULO

SAO PAULO, BRAZIL. Sao Paulo is growing, as they say, by leaps and bounds. In the last quarter century, its population has grown fourfold, until, with 5,500,000, it is today second in size only to New York City in the Western Hemisphere and is growing faster than any other city in the world.

Now a study is underway

to plan Sao Palo's growth to the year 2000. Financed jointly by the Brazilian government and the City of Sao Paulo, the study will be conducted by a team of six firms, four of them from the U.S. Leo A. Daly Company of Omaha is the team's planning, architecture, and engineering component. Production of a master plan for the city is expected to take slightly more than a year.

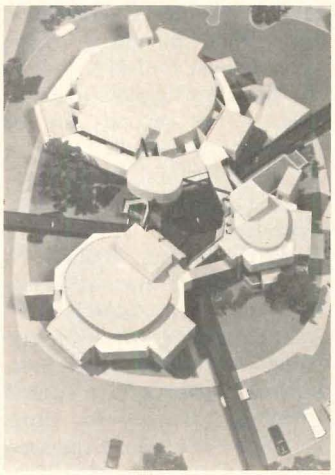
CURTAIN GOING UP IN OKLAHOMA CITY



OKLAHOMA CITY, OKLA. John M. Johansen's recently unveiled design for new Mummers Theatre in Oklahoma City is a sculptural arrangement of geometrical shapes — circles and cubes mostly — that will be the focus of visual attention for a park site in the middle of the city's urban renewal district.

Ever since plans for the $47,700,000 Project 1-A, a plan for the renewal of the entire business center (see p. 57, MARCH 1967 P/A) were drawn up, the theatre had top priority on selection and acquisition of a site for a new building. In fact, land purchase was begun even before Federal approval of the renewal program was announced. Proud of their amateur acting company, private citizens contributed $750,000 to a public fund for the new theater, to add to the $1,250,000 received by the company from the Ford Foundation in 1962. Later, when construction was delayed and costs rose, the foundation increased its contribution.

Now that enough money is available, construction has been scheduled to begin this summer. The major design elements have been given a loosely structured, open form in a refreshing departure from the solid, high-walled massiveness that is often designed to impress the public with "culture." Johansen has chosen to articulate three separate building elements rather than housing all functions in a single structure; these allow independent operations, with effective services for each from the basement level, connections at upper lobby level for convenience of management, and a free-flowing path system that carries over from the park through the building complex. The separation of elements seems wise, especially since one of them will be a theater school, with classes for children as well as adults. Largest structure in the complex will be the 600-seat theater in three-quarter round; a highly flexible arena theater will seat 250. Rehearsal hall, lobby, and office space will be housed in the same structure as the theater school. Connecting "arms" that tie the three buildings together form a truncated triangular space at the center of the complexes, a space that will, with its splashing fountains, make a pleasant setting for summer performances of plays and musicals by the troupe.

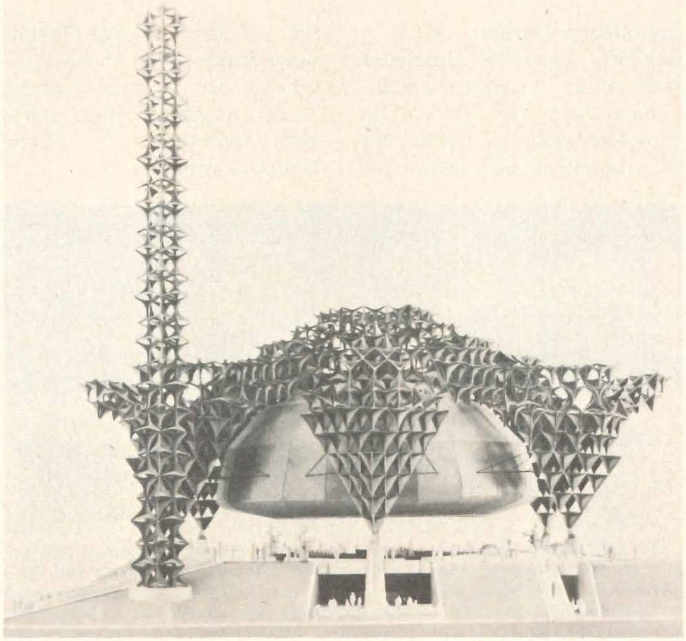


Architect Johansen chose concrete for the main buildings. Painted, fluted metal is used for the lightweight stair systems and walkways.

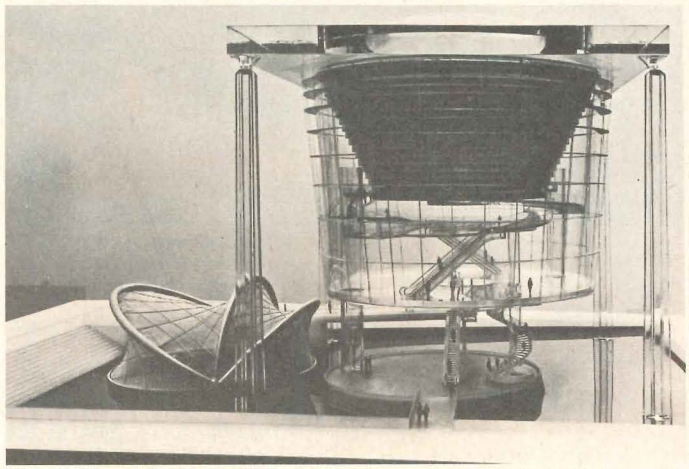
Having prevailed for 20 years, and most recently having performed in a remodeled warehouse, the Mummers Theatre deserves a new home. Now that it is assured modern facilities, it has become the first American amateur company to turn professional (again, with help from the Ford Foundation). Its director and staff have already made the performing arts a major force in the cultural life of Oklahoma City; now, perhaps, its architect has made the theater a contribution to the visual arts as well.

FANTASY PREVAILS IN OSAKA

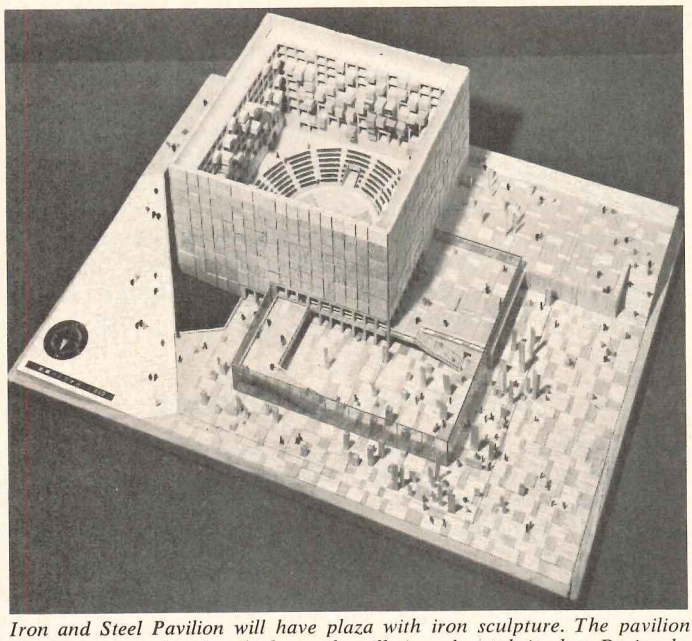
OSAKA, JAPAN. The World's Fair that will open here in 1970 shows promise of becoming the reincarnation of the dreams of an opium-nipping Samurai. All Japanese exhibitors were given an April deadline for submitting plans, and work is expected to get under way on these pavilions this month. Twenty-three foreign exhibitors were given no deadlines, and most of their proposals, including the Davis, Brody design for the U.S. pavilion, have yet to be



Global Theater for Toshiba IHI. Audience of 500 will assemble in saucer-shaped seating area on second level, be hoisted 18' into a 131' globe, and revolve slowly as nine synchronized projectors show a 15-minute film, "Light Hope for Man." Six-legged steel frame supports globe. Tower at left will rise 197'.



Electric Power Pavilion will be flanked by the U.S. and Soviet Union pavilions. It will have a semitransparent circular cone supported by four, 125' precast concrete pillars in a square pond. Also in the pond will be a floating theater.

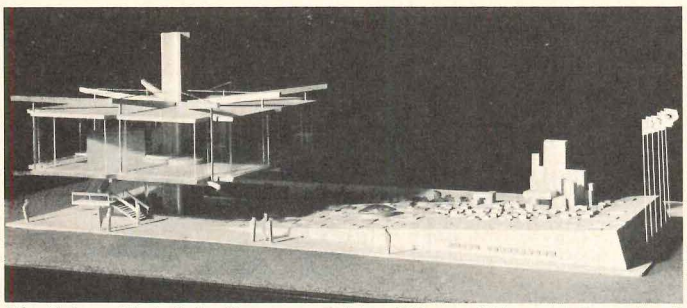


Iron and Steel Pavilion will have plaza with iron sculpture. The pavilion is a large music box in which people will sit and watch it play. Design by Kunio Maekawa & Associates.

announced. Design of the U.S. pavilion cannot be completed until funds are appropriated.

Seen here are five of the Japanese pavilions, which will be grouped in one section of the Kenzo Tange-planned fairgrounds. Not shown is a scheme for a steel framed, free-form giant dragon, which will represent 33 Mitsui Group companies.

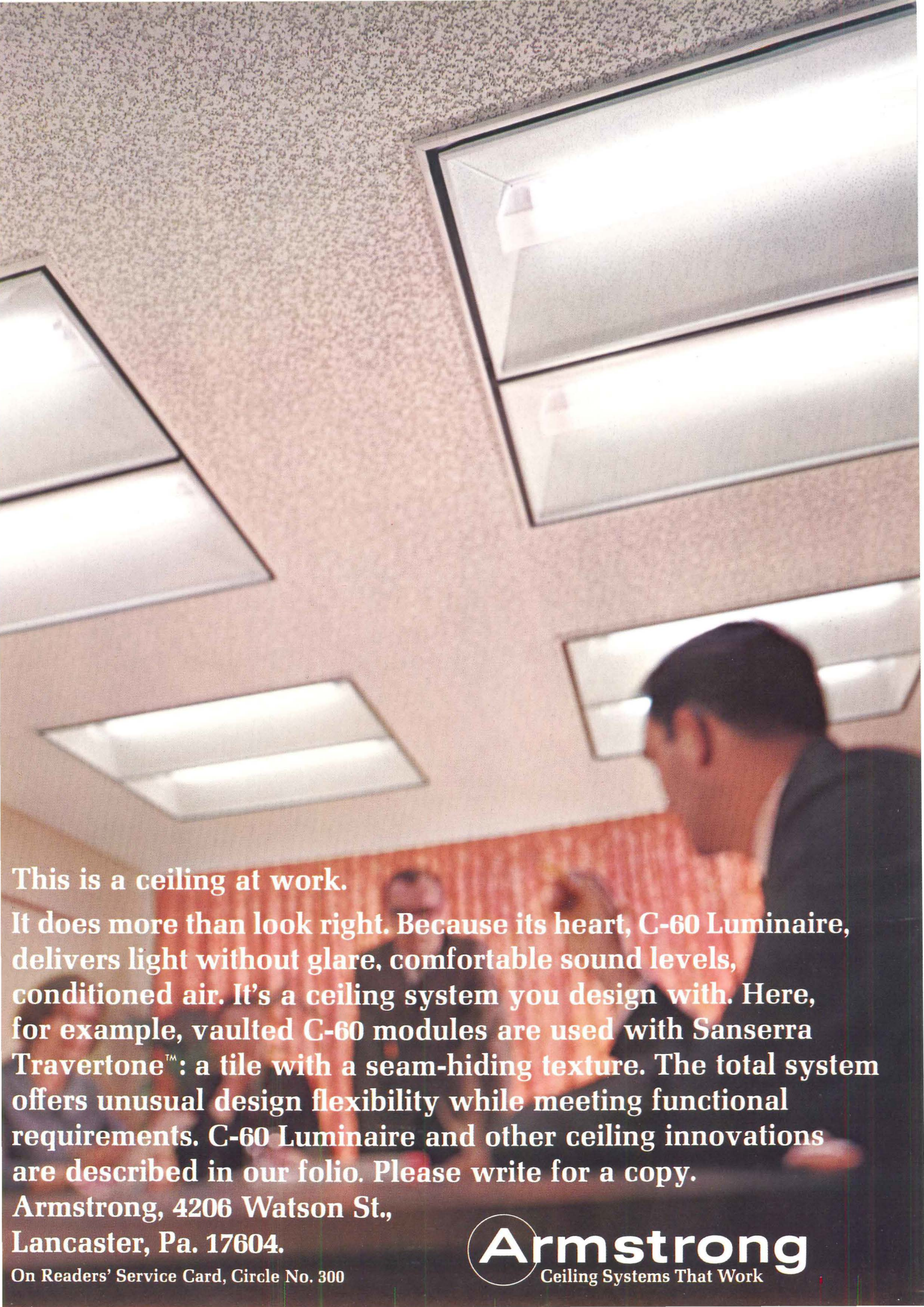
Love will be the theme of the pavilion of the Wacoal Lingerie Company and the Ricca Sewing Machine Company. The structure's core will be a flared column of white fiber glass. At its base will be a raised stage faced by a semicircle of spectator seats. Glittering link chains will be suspended for the outer rim of the ceiling and these will be agitated by air jets. Design by Takenaka Komuten.



The Takara Chair Sales Company and its affiliates will have a "Beautilion." Underground will be a 200-seat theater, whose concrete roof slabs will be exposed at grade level. Computers will give visitors personalized advice for staying healthy and attractive.

CALENDAR

Planners who want to learn about the urban church as it relates to community planning are welcome at a conference entitled **The Church in Metropolis,** to be held at the Catholic University in Washington, D.C., June 17–28. Purpose of the conference is to encourage dialogue between churchman and planner in metropolitan areas and to show how the church can participate in the planning process. Write for application forms to: Rev. Robert P. Mohan, Director of Workshops, The Catholic University of America, Washington, D.C. 20017 . . . **The American Society of Landscape Architects' 68th Annual Meeting** will be held at the Sheraton-Brock Hotel, Niagara Falls, Ontario, Canada, June 23–26. Information on program and registration may be obtained from: ASLA, 2000 K St., N.W., Washington, D.C. . . . Planners of the **86th Annual Convention and Exposition of the National Association of Plumbing Heating-Cooling Contractors** have set aside one day of the Convention as "All-Industry Day." Architects, engineers, and other members of the construction industry will be invited to participate in activities on the second day of meetings, which will run June 23–26 in Detroit's Cobo Hall. For program information, write to: PHCC, 1016 20 St., N.W., Washington, D.C. 20036 . . . A symposium on "Stainless Steel for Architecture" will be one feature of the **American Society for Testing and Materials 71st Annual Meeting,** planned for June 23–28 at the San Francisco Hilton and Sheraton Place Hotels. Details are available from: ASTM, 1916 Race St., Philadelphia, Pa. 19102 . . . **"Experiments in Environment,"** a second joint summer workshop for dancers and environmental designers (see pp. 130–137, JULY 1967 P/A), will be conducted by landscape architect Lawrence Halprin and his dancer wife Ann, July 1–24. The workshop will be held in the San Francisco Bay area, and will focus this year on "community," or group interaction with environment. Dancers who wish to participate should apply to: Halprin Summer Workshop, 15 Ravine Way, Kentfield, Calif. Students (none below senior status) and professionals in the planning and design fields should write to: Halprin Summer Workshop, 1620 Montgomery St., San Francisco, Calif. . . . **The 1968 Athens Ekistics Monthly,** will be held in Greece July 1–26. Theme of the month is "Man and His Settlements: Analysis and Definition of Problems." Application forms and additional information may be obtained from: The Director, International Programs, Athens Center of Ekistics, P.O. Box 471, Athens, Greece . . . **The Annual Meeting of the National Society of Professional Engineers** will take place July 3–6 in the Schroeder Hotel, Milwaukee, Wis. The Society's address is: 2029 K St., N.W., Washington, D.C. 20006 . . . The San Francisco Hilton will house the **Annual National Convention of the National Builders' Hardware Association and the American Society of Architectural Hardware Consultants,** August 4–7. Write for information to: NBHA, 1290 Avenue of the Americas, New York, N.Y. 10019 . . . **The 1968 Symposium at Stockholm** is a five-day session of lectures, discussions, and tours devoted to the exploration and understanding of the Swedish accomplishment of "the creation of a slum-free society." Those engaged as professionals or students in planning, architecture, engineering, government, sociology, and economics are welcome to participate. Address inquiries to: Symposium at Stockholm, P.O. Box 9137, Stockholm 9, Sweden . . . Scene of the **10th Congress of the Australian Planning Institute** will be "the most remote capital city in the world" — Perth, in the state of Western Australia. Theme of the congress is "Perth City and Region: A Case Study." Dates are August 18–24. Request information from: Australian Planning Institute, G.P.O. Box 1470, Perth, Western Australia 6001 . . . Organized by a group of students at the Columbia University School of Architecture, **Urbino Planning '68** will be a three-week seminar on aspects of growth and change in and around the Italian city of Urbino. Giancarlo de Carlo, the architect who prepared the master plan for the city, will head a staff of teachers, professionals, and visiting critics. The seminar will be held August 21–September 15 in Urbino. For further information, write to: G. Philip Smith, Student Secretary, Urbino



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Armstrong
Ceiling Systems That Work

Planning '68, School of Architecture, Columbia University, New York, N.Y. 10027 . . . The National Association of Swedish Architects invites architects, students, and journalists to register for an international symposium on **"Swedish Architecture and Town Planning,"** sponsored by the Swedish Institute, the National Association of Swedish Architects, and the Museum of Swedish Architecture. The seminar will take place in Goteborg-Oregro-Stockholm, September 8–15. For application forms, write to: Swedish National Travel Office, 505 Fifth Ave., New York, N.Y. 10017.

WASHINGTON/ FINANCIAL NEWS

By E. E. HALMOS, JR.

Financing Construction in an Election Year — There was no doubt, as Washington moved into summer, that the key question for the Government — and for architects and private industry — was one of finances.

The future of the construction industry in particular, as well as that of most other industries, rides on decisions concerning taxes, cutbacks in spending, and the like that Congress and the President must make before the current Congressional session ends.

These decisions are complicated by a number of factors: politics, for example (the race for the Presidency, and one-third of the Senate up for re-election); President Johnson's announcement of noncandidacy, which means that every major Governmental department head is already a "lame duck," and thus will do no more than what's absolutely necessary to keep his organization functioning; the rising crescendo of racially-oriented demands for "aid" to the "poor" — and rising resentment among taxpayers.

The almost unbelievable bitterness with which "poor people's" organizations have seized upon urban work — particularly highways — was brought to light in House hearings on Washington's freeway program: The charge was seriously repeated that the entire U.S. highway program is some sort of plot to uproot and destroy Negro communities.

This would indicate that many — if not most — new programs in urban areas will have to be decided primarily on a sociological basis, rather than on the basis of costs, proper route alignments or locations, since politicians must consider where the mass vote resides.

As June began, the situation was as follows:

An accommodation was being worked out between the tax-writing Ways and Means Committee of the House and the Johnson Administration, combining Johnson's cherished Federal tax increase, and some substantial hold-down of Federal spending that will affect the budget until 1972 or later.

This is no simple matter. The controls will have to be placed not on year-to-year appropriations, but on "obligational authority" under which Federal departments can continue to obligate spending for years after the appropriation has been made. Otherwise, simple cutbacks of appropriations for the next fiscal year, which starts next month, are meaningless. If, for instance, Congress does not appropriate a penny, Federal agencies would still have authority under their "obligational authority" to spend well over $130 billion.

Getting Executive agreement to a hold down on future spending has been the real stumbling block.

If a new program can be passed in time to be effective June 1, the probable effect on the construction industry is obvious: Government spending on construction work will certainly be cut or stretched out, as will planning for future work. More importantly, private industry is already beginning to hedge on its own plans, because of uncertainty about what new tax hikes may do to its capital picture.

With current prospects of a final budget deficit of some $24 billion, the over-all picture of the stability of the dollar was a cause for worry.

For the moment, available statistics on the construction industry weren't showing more than that the industry was holding its own in the first couple of months of the year: Total new work put in place in February, at a seasonally adjusted annual rate of $81,-300,000,000, was up slightly over January, and equally slightly (2%) over February a year ago; housing starts in March were at an annual rate of 1,476,000 units — unchanged from February, and up over the total a year ago.

Housing statistics hadn't caught up with the sudden rise in April of mortgage interest rates, and thus continued to show slight gains over 1967 in terms of sales and rental-vacancy rates.

Construction costs, however, continued to climb. After a spectacular drop in February, the monthly index of water and sewer construction costs made an equally spectacular gain in March to reach an all-time high of 121.20.

Taken together, these details spell out the following: Most construction (except possibly highways) will be cut back dramatically. If anything gets a boost, it will be housing in the low- and middle-income category, in an effort to relieve pressures on urban areas and curry favor with newly formed organizations of "the poor" — all of whom vote.

Highways: Who Pays? — There's little doubt that the whole direction of the U.S. Federal aid highway program will change, and it will change even before the current 41,-000-mile "interstate" system is completed (not now anticipated before 1975).

Both state officials and Federal agencies are now calling for a shift away from the 90% Federal, 10% state formula for the interstate system to something between a 75%–25% and 66.66%–33.33% basis. The reason: With 90% Federal money available, too much stress has been placed on interstate-type roads, a vast backlog of needs on primary, urban, and rural roads — the "ABC" system — has been piling up.

One revolutionary proposal will affect architects as emphasis shifts: State highway officials this month have suggested that highway money be used to buy additional right-of-way in urban areas, and that new or replacement housing be built on this extra right-of-way to handle families displaced by urban road construction.

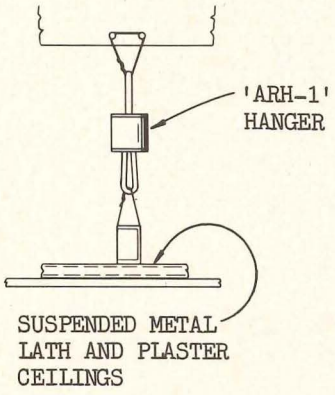
These officials argue that new or rehabilitated housing can be built on such land (vacant lots or abandoned buildings) cheaper by half than costs of relocating and rebuilding, certainly far cheaper than costs entailed in narrower right of way (more retaining walls, less chance for expanding capacity, and so on), and losses due to delays caused by long battles over route locations. Highway men aren't too sanguine about any real dent in housing for families displaced by building in "air space" over new roads.

Tidbits — Other Washington developments of interest to architects included:

- Housing and Urban Development Department issued new "minimum property standards, designed to simplify and stimulate rehabilitation of housing (example: a requirement that there be 'adequate closet and general storage space,' without specifying exact footages.)"
- The first of a series of interdisciplinary conferences, entitled "Man and His Shelter," is scheduled at the National Bureau of Standards' campus in suburban Maryland for September 23–24, with builders, architects, spec writers, and others discussing performance. Meanwhile, Building Research Advisory Board held an all-day meeting in Washington to discuss all-weather construction; and NBS held a meeting on building codes.
- The question of unionization of professional staffs got more attention as an inter-professional "action committee" (AIA, ASCE, CEC, NSPE, and others) was recommended after a meeting in Chicago. Problem also came up for discussion at national meeting on labor matters sponsored in late May by Associated General Contractors.
- The AIA published findings and recommendations of its educational task force for architectural technician training, the result of a two-year attempt to lay groundwork for filling profession's need for well-trained subprofessionals.

PRODUCTS

ACOUSTICS



Vibration absorption. "ARH-1" rubber and wire hangers are intended to absorb vibrations from mechanical equipment. Hung ceilings, ductwork, and conduits may be suspended from the hangers, which use rubber to prevent metal-to-metal contact; the rubber purportedly will not lose its elasticity. Target Enterprises, Inc., Box 136, Westbury, N.Y. 11590.
Circle 100, Readers' Service Card

AIR/TEMPERATURE

Coloring ventilators. "Perma-Vent FG" is a commercial-institutional ventilator that comes in 14 colors structured into a polyester base of 25% glass content. One of the models (4806) of this series is 37½" high, has a 5-hp motor, and is rated at 28,000 cfm. The inlet shape and specially tapered wheel blades are claimed to aid the quiet working of the high velocity products. Exitaire Co., Box 276, Pacoima, Calif. 91331.
Circle 101, Readers' Service Card

CONSTRUCTION

Clad steel. A copper-clad stainless steel, "TiGuard," costs less than solid copper sheets, has a lower thermal conductivity (reducing heating costs), and is claimed to produce stronger soldered joints. Among its applications: roofing, flashing, and reglets. Nailing and welding are said to be possible. Texas Instruments Inc., 34 Forest St., Attleboro, Mass. 02730.
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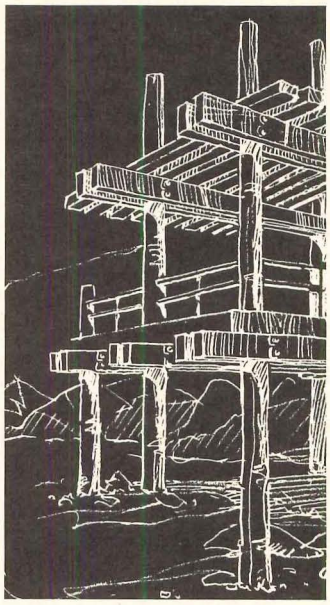
Stainless coat. Intended to be used for roofing, fascia, and other applications, "Terne-Coated Stainless Steel" sandwiches nickel-chrome stainless steel between layers of "Terne alloy," which is 20% tin and 80% lead. The product reportedly has excellent durability, never requires maintenance, and is soldered without special preparation. The malleable material weathers to a dark gray, is produced in 20" and 36" widths; length: 144". Follansbee Steel Corp., Follansbee, W.Va.
Circle 103, Readers' Service Card

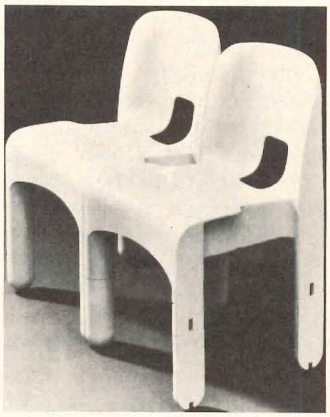


Construction poles. Resembling utility poles, "Greenpole," which is suitable for building construction, is a chemically treated Douglas fir pole guaranteed for 35 years against failure from termites and weathering. The guarantee is also applicable where a pole is in direct contact with the ground, a feature said to eliminate foundation costs. J.H. Baxter & Co., 1700 S. El Camino Real, San Mateo, Calif.
Circle 104, Readers' Service Card

DOORS/WINDOWS

Curtain wall. Specially cut neoprene gaskets combined with this company's aluminum window frames reportedly provide a 25% reduction in costs from conventional curtain wall installations. The aluminum mullions and panels accept glazing from ¼" to 1" thick. An "H"-shaped gasket, which may be used with another strip to emphasize lines, accepts the glazing and snaps into the frames. Kawneer, Niles, Mich. 49120.
Circle 105, Readers' Service Card

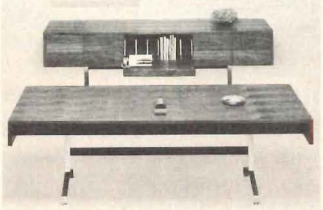
FURNISHINGS



Colombo chair. A single-piece, injection-molded plastic chair designed by Joe Colombo may be used in ganged position (shown) or stacked. Produced in 15" and 18" seat heights, the chair is suitable for adults and kids. Colors: black, white. Hank Loewenstein, Inc., Box 12383, Dallas, Tex.
Circle 106, Readers' Service Card

Auditorium seats. A movable tablet arm and a single column steel support are features of "TC 477 FTA" auditorium chairs. Supports are adaptable to level and sloping floors. Seats may be ordered with full rubber cushion or coil springs. Heywood-Wakefield Co., 206 Central St., Gardner, Mass. 01440.
Circle 107, Readers' Service Card

Musical chairs. Designed by Grant Featherston, the "Expo II Sound Chair" is a futuristic wing chair with audio loudspeakers in its chambered, high-rise sides. A 20' cable connects the chair's twin 4" speakers with amplifiers; volume control is located in the right side. The single-piece molded chair shell has foam latex over webbing. Dimensions: width, 29"; over-all height, 45½"; over-all depth, 33"; seat height, 16"; base diameter, 19". Weight: 40 lb. Eklektrix, Inc., 8900 Melrose Ave., Los Angeles, Calif. 90069.
Circle 108, Readers' Service Card



Office designs. Designed by William Sullivan, "Vertical Space Planning III" is intended for executive offices and makes extensive use of American black walnut. The desk has two shallow drawers at apron height; drawers are locked by a concealed mechanism. Credenzas have a 110-v outlet, 2 file cabinets, 4 drawers, and middle section with a drop-down panel that doubles as a table for office machines. Marble/Imperial Furniture Co., Bedford, Ohio 44146.
Circle 109, Readers' Service Card

Tilting students. The "Constellation" seat for classrooms tilts back 20°. The laminated plywood arms, however, remain horizontal for note-taking, although they may be dropped manually for easy exit. Black enameled steel columns support partially upholstered glass fiber shells. "The scientifically sculptured seat," says the firm, "supports the body in comfort." Clarin Manufacturing Co., 4640 W. Harrison St., Chicago, Ill. 60644.
Circle 110, Readers' Service Card

LIGHTING

Graphics lamp. Outdoor street lights may be specified with acrylic ellipsoids having two to four flat sides for graphics. "Visual Design Unification" system provides 2000 combinations of luminaries, poles, and colors (which are baked acrylic enamel). Kim Lighting Inc., 1467 N. Lidcombe Ave., El Monte, Calif. 91733.
Circle 111, Readers' Service Card

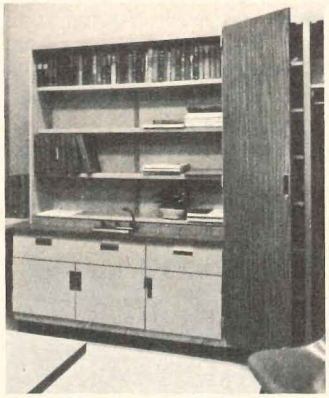
OFFICE EQUIPMENT

Compact data. "DataDeck" uses a microfilm reader and a 7″ x 26″ file that holds more than 40,000 microfilmed pages or images. Products, product data, reports of various building types or categories, analyses of specific product groups (e.g., acoustics), and a master index with cross-references are intended to serve as a replacement for cumbersome catalogs. Sample swatches of interior products are contained in a separate binder and permit a better understanding of the textures projected (11″ x 11″ images) in color on microfilm. Idac, 415 East 53 Street, New York, New York 10022.
Circle 112, Readers' Service Card

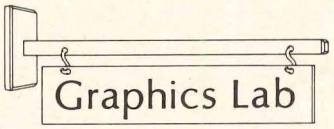
Automated drafting. "Diagrammer" uses a photo-composing system for a drafting method reportedly four times faster than manual drafting. Although capable of accepting punched tape instructions fed from a computer, the machine relies on an operator using a keyboard with 256 symbols; the noncomputerized mechanism results in reduced purchase costs. Architectural, electrical, plumbing, and other symbols are "typed" onto the film, which is then photographically processed. Correction may be made, and the keyboard operator always has a projected screen image (28″ x 40″) of previous progress, a feature that also provides a precise positioning of symbols. Merganthaler Linotype Co., 300 E. 42 St., New York, N.Y. 10017.
Circle 113, Readers' Service Card

SPECIAL EQUIPMENT

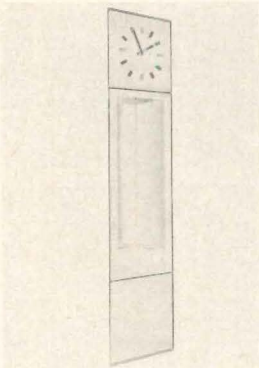
Automated delivery. A self-propelled supply delivery cart, operated electronically, performs some of a hospital's chores. A dial control permits "Amscar" to deliver nearly half a ton of supplies throughout the areas where electronic guidewires are placed inside floors. After the supplies or food are distributed, the delivery cart can also be guided through an automatic wash. Amsco Systems Co., 2710 W. 21 St., Erie, Pa. 16512.
Circle 114, Readers' Service Card



School cabinets. "Systems 20" cabinets and working counters for schools include models for science laboratories, art rooms, cafeterias, books, and general classroom storage. Drawers and other interior components may be interchanged because of uniform dimensions in the cabinets. Plastic-colored fronts (blue, gold, red, moss, gray, teak) and wood-grain may be specified. Educators Manufacturing Co., Box 1261, Tacoma, Wash. 98401.
Circle 115, Readers' Service Card



Architectural plates. "Graphics 1000" is a series of architectural plates or signs featuring routed, colored letters. Nine typefaces in five sizes per face may be specified with the countertop laminates of all such manufacturers. Knight Manufacturing Co., 5975 Armour Drive, Box 15282, Houston, Tex. 77020.
Circle 116, Readers' Service Card



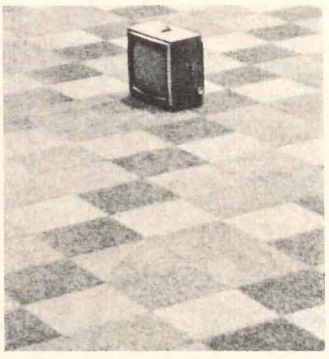
What's in a service module? With this stainless-steel module system, one can group together in one area such disparate, wall-mounted building service items as recessed drinking fountains, storage cabinets, waste receptacles, fire extinguisher cabinets, and clocks. The system, designed by a Canadian firm and now available in the U.S., won the Canada Design 67 Award of Excellence in New Product Design (steel category). Lighting fixtures are available with the system. Stainless steel or stainless and painted steel. CEB Corp., 4566 Baker St., Philadelphia, Pa.
Circle 117, Readers' Service Card

Skylight dome. A one-piece, fiber-glass-reinforced plastic dome skylight, the "Robertson Rooflight" is produced in insulated and noninsulated units. Insulated units use rigid urethane insulation (U-value: 0.53) and a condensation gutter. Air space is ⅝″ between inner and outer domes. Light transmission: single dome, 58%; double dome, 52%. H. H. Robertson Co., 2 Gateway Center, Pittsburgh, Pa. 15222.
Circle 118, Readers' Service Card

Chef's ventilators. Claimed to remove over 99% of grease from kitchen air, the "Vanguard" commercial kitchen ventilator uses a built-in waterwash device, damper, and fire extinguisher (optional) — equipment purportedly preventing flames from reaching ductwork. The water wash device is also said to nearly clean the stainless-steel ventilator. Cockle Ventilator, 1200 S. Willis Ave., Wheeling, Ill. 60090.
Circle 119, Readers' Service Card

SURFACING

Cleft palate. "Nevamar Slate" is a three-dimensional plastic laminate surface available in two grades, one for furniture and another deeper clefted pattern for vertical surfaces. The former (1/16″) is on the market; the latter will shortly be available. Manufacturer claims that there is no repetition of the pattern anywhere on a sheet. Enjay Chemical Co., Odenton, Md. 21113.
Circle 120, Readers' Service Card



Tile carpet. Floor coverings in 20″ square tiles can be laid without mastic. Both "Heugaflor" and "Heugafelt" gain their grip by interlocking their animal hair fiber. Heugafelt is 43% animal hair; Heugaflor, 14%. Both come in seven basic colors. The natural and synthetic fibers are needle-punched into hessian, mastic sealed, and jute backed. Van Heugten, Inc., 744 Broadstreet, Newark, N.J.
Circle 121, Readers' Service Card

Kentile Architectural Marbles Vinyl Asbestos Tile comes in two thicknesses: 3/32" and 1/8". Colors: 9. Greaseproof and easy to clean.

Specify this vinyl tile today. In the years ahead, they'll bless you for its practicality.

Within each of the nine monochromatic colors in *Architectural Marbles* (a Kentile exclusive), there is a pleasing random variation. Result? When extensions, repartitionings, or alterations have to be made, there's never an ugly "patched floor" look. New tiles and old live handsomely together. And you get this advantage at no extra cost. Want samples? Call your Kentile® Representative.

KENTILE FLOORS

Brooklyn, N.Y. 11215

MFRS' DATA

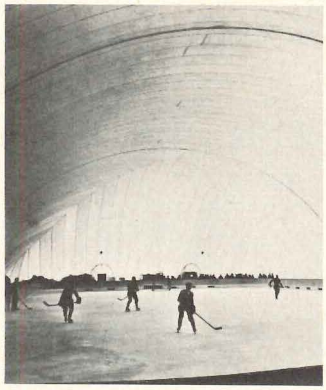
ACOUSTICS

Plenum barriers. Plenum installations of "Acoustilead," a sheet lead, are illustrated with details for joints, pan floors, ductwork, and fittings around mechanical conduits. A malleable material that can be pinch-sealed for joints, lead and its properties are described in the brochure. 4 pages. American Smelting and Refining Co., 150 St. Charles St., Newark, N.J.
Circle 200, Readers' Service Card

AIR/TEMPERATURE

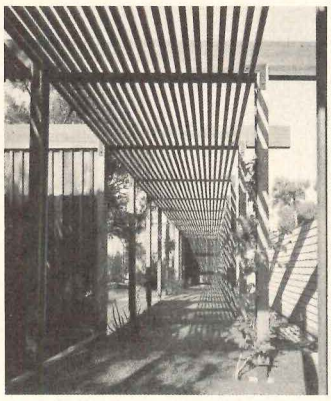
Hydronic package. A packaged floor or roof-mounted heating and air-conditioning system that also provides ventilation is said to be compact enough to eliminate an equipment room. Specs and boiler details are provided in a brochure. 4 pages. Edwards Engineering Corp., 101 Alexander Ave., Pompton Plains, N.J. 07444.
Circle 201, Readers' Service Card

CONSTRUCTION



Industrial fabrics. Industrial glass fabrics for use in air structures, geodesic domes, insulation, sheathing, laminating, and reinforcement are charted and described in a pamphlet. Filament and yarn nomenclature, weave and finish descriptions — all are accompanied by dimensional and performance data. 20 pages. J.P. Stevens & Co., Inc., 1460 Broadway, New York, N.Y. 10006.
Circle 202, Readers' Service Card

Wood, gypsum specs. A complete range of wood and gypsum products are presented with specs, full-color illustrations, suggested installations, and some details (including several joints). Among the forest products in the product catalog: structural sheathing, decking, sidings, wallboard, interior paneling, laminating, special woodwork, and underlayment. 104 pages. Georgia-Pacific Corp., Box 311, Portland, Ore. 97207.
Circle 203, Readers' Service Card



Redwood data. Details and specs for Redwood siding, walls (board and batten, tongue and groove), paneling, ceilings, grillwork, and saunas, include fastening methods, finishes, landscape design possibilities, and grading explanations. All are presented in file format. Also included: farm and industrial uses for Redwood. Suitable for loose-leaf binding. 24 pages. California Redwood Association, 617 Montgomery St., San Francisco, Calif. 94111.
Circle 204, Readers' Service Card

Steel walls. "Steelox" steel wall systems are cited with finish ratings, specs, and details for fascia, partitions, walls, windows, and corners. The panels, which are available in 40′ lengths, come with prepainted trim and fasten from within. They reportedly need no calking. 10 pages. Armco Steel, Middletown, Ohio, 45042.
Circle 205, Readers' Service Card

DOORS/WINDOWS

Pivot sets. Nine door pivot sets that replace butt hinges are claimed to distribute the weight of the door onto the floor, not the side frame. Data on hanging methods are combined with a spec guide for easy reference in the brochure. 6 pages. Rixon Closers, 9100 W. Belmont Ave., Franklin Park, Ill. 60131.
Circle 206, Readers' Service Card

FURNISHINGS

Student furniture. The "300 Series," low-cost classroom furniture, is described in brochure illustrating a tablet armchair, stacking chair, desk (adjustable height), and chair-desk combinations. Durability is claimed because heavy-gage, 1¼" welded support tubes are used. Colors: clay enamel on frames; white plastic tops; and pale versions of green, red, and brown for the polypropylene seats and backs. 4 pages. Peabody Seating Co., Inc., North Manchester, Ind.
Circle 207, Readers' Service Card

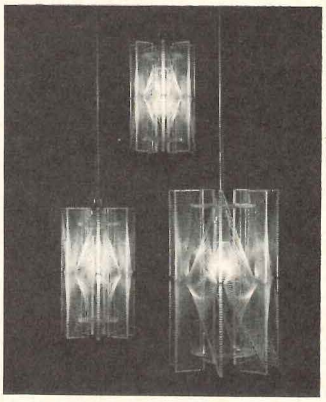
Fleshly vinyl. "Royal Naugahyde," a supple leathery-grained vinyl upholstery claimed to have been inspired by "the Mod influence," is available in that generation's splurge of colors — 32 in all (including "Nude"); 54" width. Samples, brochure. 4 pages. U.S. Rubber, Mishawaka, Ind.
Circle 208, Readers' Service Card

Mohair handbook. Handbook details the history, advantages, weights, densities, cleaning procedure, and availability of mohair when used as a fiber in interior furnishings. The current handbook is swatched with 16 samples of fabrics for drapery, upholstery, and wall covering. Designs of 12 different manufacturers are represented to give a cross-section of the kinds of weaves in which mohair can be produced. 8 pages. The Mohair Council, 501 Madison Ave., New York, N.Y. 10022.
Circle 209, Readers' Service Card

INSULATION

Insulation specs. Fire guide specs (commercial and institutional construction) for mechanical conduits and duct insulation materials are comprehensively presented. The manufacturer's insulation products are specifically mentioned. The specs use composite flame spread ratings, not component ratings. Standards are claimed equivalent with ASTM, NRPA, and UL. Booklet. 40 pages. Johns-Manville, 22 E. 40 St., New York, N.Y. 10016.
Circle 210, Readers' Service Card

LIGHTING

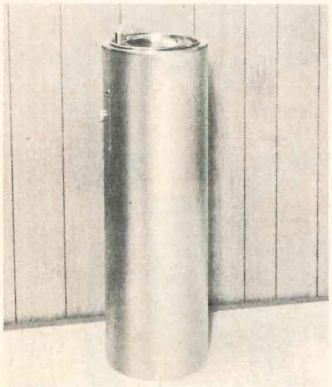


More lucite lights. Two brochures, "Dimensions and Shapes," show manufacturer's line of lighting fixtures in lucite, including lamps of clear filaments, translucent, smoky transparent, and lucite with wood. Clusters of hanging cylindrical units each formed of lucite planes radiating from a central, linear light source make up one of these lighting designs. Available as pendant from a metal canopy with choice of arrangement, and as individual units, either hanging or wall mounted. Another example is a 20-faced polyhedron, again in groups of individual units of polished translucent lucite, textured translucent lucite, or textured clear lucite. Aura-Lite, 326 Main St., Lodi, N.J. 07644.
Circle 211, Readers' Service Card

Lens discretion. Reportedly the first time that a dished, regressed lens for fluorescent fixtures has been molded in a single piece, "Controlens" is a plastic lens that eliminates

metal splays and contains a luminous flange. Brochure is illuminated with performance data and sectional details. 4 pages. Holophane Co., Inc., 6 Ave., New York, N.Y. 10036.
Circle 212, Readers' Service Card

SANITATION PLUMBING



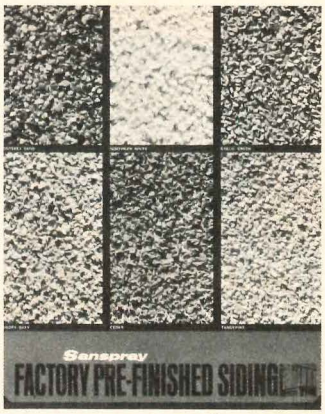
Fountain twist. Many versions of drinking fountains and electric water coolers in wall-mounted, pedestal, and table models are detailed and photographed. Manufactured in a variety of materials, types include precast stone (five colors, two aggregate finishes), anodized aluminum, fiberglass, vitreous china, and stainless steel. Also included are fountains and showers for areas where chemicals are used. Dimensional details. Catalog. 32 pages. Haws Drinking Faucet Co., 4 and Page Sts., Berkeley, Calif. 94710.
Circle 213, Readers' Service Card

SPECIAL EQUIPMENT

Decorative mesh. Woven wire meshes of brass, aluminum, and stainless steel are catalogued in 24 attractive illustrations. Applications include use as sun screens, louvers, panels, room dividers, and trim. Special orders may dictate special designs. 48 pages. Newark Wire Cloth Co., 351 Verona Ave., Newark, N.J. 07104.
Circle 214, Readers' Service Card

Educational TV. A booklet citing basic considerations for planning educational TV facilities includes information on lighting, air conditioning, and equipment. Open circuit, closed circuit, and TV course requirements are presented with correlated tables of data. 35 pages. Hub Electric Co., Inc., 2255 W. Grand Ave., Chicago, Ill.
Circle 215, Readers' Service Card

SURFACING



Stone panels. Corner, stud, joint, and fascia details for "Sanspray," a pre-finished, exterior plywood with natural stone chip facing, are illustrated with specs in a brochure describing installation methods. The panels, which use protective epoxy resins over wood and stone chips embedded in the resin, may be ordered in lengths up to 20′ and are presented in six colors. Sawing and nailing methods are virtually identical with those used on plywood panels. A decking version may be specified. 8 pages. Sanspray Siding Corp., 515 Madison Ave., New York, N.Y. 10022.
Circle 216, Readers' Service Card

PROGRESSIVE ARCHITECTURE
NEWS REPORT

REINHOLD PUBLISHING CORPORATION
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NEXT MONTH IN P/A

OMNIBUILDING

"An omnibuilding really implies a different kind of society than the one which we now have," notes architect William J. Conklin "— a society in which we have both a higher order of agreement and a higher order of freedom. An omnibuilding as a goal statement leading to a physical reality becomes, then, also a method of restructuring society."

P/A, in an issue completely devoted to omnibuilding, defines the term as "those constructions of wide-ranging scale that contain a multiplicity of uses (residential, commercial, educational, recreational, public use, light industrial, religious, etc.) in a building system consisting usually of a common structural armature with substructures or additive units imposed thereon to provide spaces for the various uses." Describing the omnibuilding approach as "likely to be the major future influence on design and planning," the July P/A delves deeply into the what-how-why-when-where of these vast concepts, and illustrates five thoughtful articles with more than 40 examples of completed, proposed, and visionary omnibuildings.

Once again, P/A seizes on one of the most important issues in architecture and planning today, and, in a special, one-topic treatment of an issue, dramatically presents the profession with its many facets. The July Omnibuilding issue will become another P/A collector's item, one which you can own, along with 11 other informative issues, simply by filling out and sending in the subscription card at the end of this issue.

Wash fixtures that serve many and save money! Bradley Washfountains save an average of 25% on floor and wall space. You can choose from 54" and 36" diameter circular and semi-circular models, plus two-person Duos. So you can specify Washfountains that get maximum use out of every square inch of available space.

What's more, Washfountains serve up to 8 people with one set of plumbing connections, cutting installation costs as much as 80%. They require practically no maintenance. And they reduce water consumption from 45% to a whopping 80%.

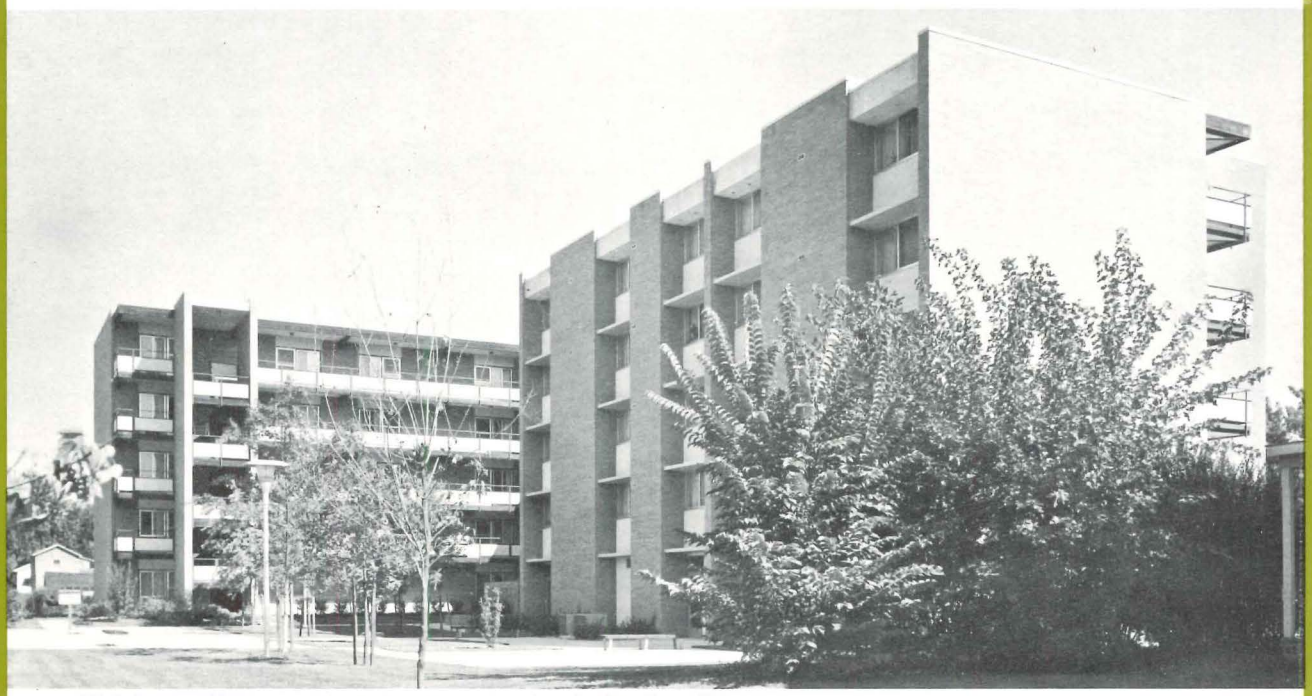
Specify Washfountains for plants, commercial buildings, schools, institutions—wherever you want to handle large groups of people economically. The more Washfountains serve, the more they save. See your Bradley representative. And write for literature. Bradley Washfountain Co., 9109 Fountain Boulevard, Menomonee Falls, Wisconsin 53051.

On Readers' Service Card, Circle No. 327

from Bradley!

BRADLEY

Housing Authority Pleased With Economical Electric Heat in New Apartment Project for the Elderly



Christensen House, public housing for the elderly, Ironton, Ohio.

THE CASE—Designed and built to provide clean, comfortable housing, Christensen House in Ironton, Ohio, is a 60-unit, high-rise apartment building for elderly persons of limited income and the city's first public housing project to be heated electrically.

The Housing Authority is pleased with the minimum maintenance, low owning and operating costs, and superior comfort features at Christensen House, and is anxiously awaiting construction of another 60-unit, high-rise apartment building also being designed for electric heating.

THE HISTORY—Designed by architects Wright, Gilfillen and Keske of Columbus, Ohio, the five-story, salmon-colored brick structure opened in June, 1966, with 57 one-bedroom apartments, two two-bedroom apartments, and one three-bedroom apartment for the building superintendent and his family.

The first floor of Christensen House contains a large community center, hobby rooms, workshops, laundry, and the Metropolitan Housing Authority's administrative offices.

Consulting engineers M. A. Rietzke & Associates of Columbus, Ohio, designed the electric heating system used in the residential areas and the electric heating and cooling system that serves the public and office areas of the building.

Each apartment is heated by electric cable embedded in the plaster ceiling and controlled by room thermostats. "This type of heat is particularly well suited for a building of this type," Mr. Rietzke explained, "because it's economical to install, simple to maintain, and can be individually controlled."

The public areas on the first floor are heated and cooled by one 3-ton and one 5-ton electric heat pump equipped with supplemental duct heaters. The Housing Authority offices are conditioned by self-contained, through-the-wall, electric heating-cooling units with individual controls.

Well-lighted, day-night recreational and lounging areas complete the total electric living picture at Christensen House.

SEE REVERSE SIDE FOR DETAIL INFORMATION

1 CATEGORY OF STRUCTURE:
High-Rise Apartment Building

2 GENERAL DESCRIPTION:
Area: 43,293 sq ft
Volume: 402,625 cu ft
Number of floors: five
Number of apartments: 60
Types of apts: 57 one-BR, 2 two-BR, 1 three-BR
Other areas: community room, offices, arts and crafts room, woodworking shop, laundry room

3 CONSTRUCTION DETAILS:
Glass: double
Exterior walls: 8″ brick and block masonry, wood-furring with 2″ mineral wool batts (R/7), gypsum board. U-factor: 0.09
Roof and ceilings: built-up roof, 2″ rigid insulation (R/7) on lightweight concrete deck, plaster finish. U-factor: 0.13
Floors: concrete with perimeter insulation
Gross exposed wall area: 29,520 sq ft
Glass area: 3,647 sq ft

4 ENVIRONMENTAL DESIGN CONDITIONS:
Heating:
Heat loss Btuh: 771,977
Normal degree days: 4,667
Ventilation requirements: 675 cfm*
Design conditions: 0°F outdoors; 75F indoors
Cooling:
Heat gain Btuh: 85,740*
Ventilation requirements: 675 cfm*
Design conditions: 95 dbt, 75 wbt outdoors; 80F, 50% rh indoors
*Administrative offices and public areas only

5 LIGHTING:
Levels in footcandles: 10-50
Levels in watts/sq ft: 1-3
Type: fluorescent and incandescent

6 HEATING AND COOLING SYSTEM:
All of the apartments are heated by electric cable imbedded in the plaster ceiling. The first floor hobby areas and community rooms are heated and cooled by one 3-ton and one 5-ton electric heat pump equipped with supplemental duct heaters, and the administrative offices are conditioned by self-contained, through-the-wall electric heating-cooling units.

7 ELECTRICAL SERVICE:
Type: underground
Voltage: 120/208v, 3 phase, 4 wire, wye
Metering: secondary

8 CONNECTED LOADS:

Heating & Cooling (12 tons)	261 kw
Lighting	83 kw
Water Heating	133 kw
Cooking	622 kw
Other	49 kw
TOTAL	1148 kw

9 INSTALLED COST:*

General Work	$546,384	$12.62/sq ft
Plumbing	69,719	1.61/sq ft
Electrical (Incl. Mech.)	107,512	2.48/sq ft
TOTALS	$723,615	$16.71/sq ft

*Building was completed 6/66. Note: Items include cost of site improvement.

10 HOURS AND METHODS OF OPERATION:
24 hours per day, seven days per week in residential units; usual five-day occupancy in office and public areas.

11 OPERATING COST:
Period: July 1966 through June 1967
Actual degree days: 4,620
Actual kwh: 582,600*
Actual cost: $8,770.48*
Avg. cost per kwh: 1.51 cents*
*For total electrical usage

Month	Degree Days	Demand	kwh	Amount
7/66		48	18,600	$ 304.81
8/66		60	22,800	371.12
9/66	67	72	24,000	406.68
10/66	335	114	39,000	611.63
11/66	542	162	63,900	888.98
12/66	901	198	72,300	1,036.80
1/67	826	198	90,900	1,153.70
2/67	932	210	74,700	1,083.37
3/67	563	240	73,500	1,154.58
4/67	257	136	37,200	659.01
5/67	197	120	41,100	638.45
6/67		90	24,600	461.35
TOTALS	4,620		582,600	$8,770.48

12 FEATURES:
Ceiling cable heat in apartments is individually controlled by room thermostats in the living and sleeping areas for total individual comfort control. The administrative offices and public areas can be individually controlled as desired.

13 REASONS FOR INSTALLING ELECTRIC HEAT:
Electric Heating was specified for Christensen House when a comparative utility analysis of initial and operating costs indicated that an all electric system could be competitive with other fuel systems plus offering considerable savings on maintenance.

14 PERSONNEL:
Owner: Ironton Metropolitan Housing Authority, James E. Thompson, Executive Director
Architects: Wright, Gilfillen and Keske
Consulting Engineers: M. A. Rietzke & Associates
General Contractor: Don King Construction Co.
Electrical Contractor: Dougherty Co.
Utility: Ohio Power Company

15 PREPARED BY:
Donald L. Cooley, Air Conditioning and Heating Sales Consultant, and Charles J. Harvey, Commercial Sales Representative, Ohio Power Company.

16 VERIFIED BY:

Ronald W. Keske, A.I.A.

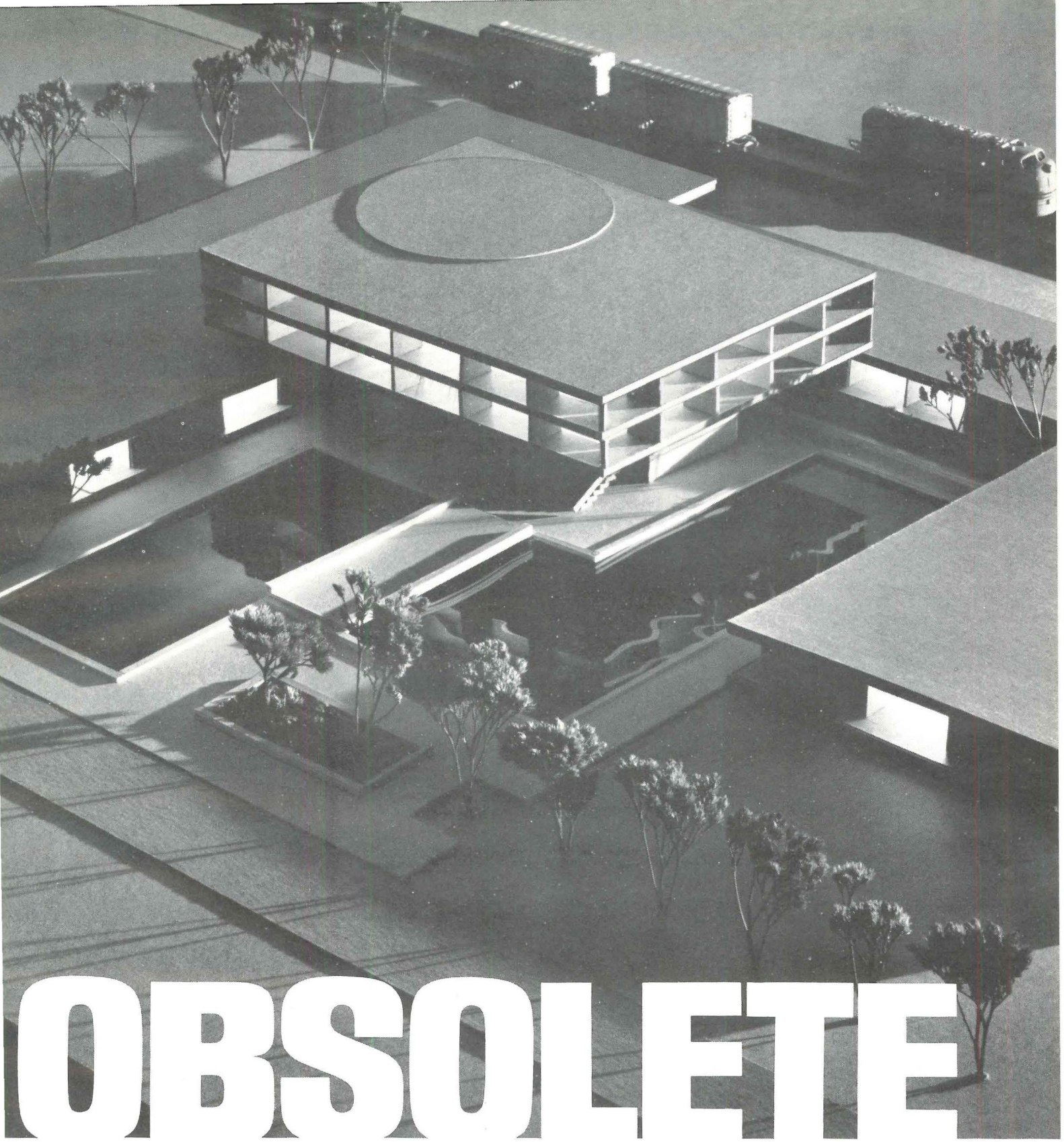
M. A. Rietzke, P.E.

Gentlemen:
Please send the complete series of Electric Heating Case Histories as they become available to me at the following address:

Name and Profession: _____
Firm, University or other affiliation: _____
Address: _____
Zip Code: _____

NOTICE: This is one of a series of case histories of buildings in all structural categories. If you are an architect or consulting engineer; an architectural or engineering student; an educator; a government employee in the structural field; a builder or owner, you may receive the complete series free by filling out the strip coupon at the left and mailing it to EHA. If you are not in one of the above categories, you may receive the series at nominal cost.

ELECTRIC HEATING ASSOCIATION, INC. 437 MADISON AVE., NEW YORK, N.Y. 10022



OBSOLETE

. . . and the owner hasn't even moved in.

It's not the design; that's as contemporary as tomorrow. It's not the construction specs; they're solid. It goes much deeper than that.

It's the communications planning. For, in this age of fast-moving information, if communications aren't the most modern available, a building's obsolete before it's even begun.

Business of tomorrow is going to depend more and more on the telephone to send information. To get information. Even to sell.

It'll use Data-Phone® service to move data across the country. Teletypewriter and Touch-Tone® telephones to tie into remote computers. Tele-Lecture and closed-circuit TV to train salesmen and inform customers.

Such considerations may or may not influence a building's exterior design. But they will definitely affect capacity and flexibility.

And that's where a Bell System Architect and Builder Service Representative comes in. He can make your next building—and every building—as modern as modern communications can make it. And insure that communications needs of the future fit in without expensive alterations.

Just call 212-393-4537 collect. We will send you a complete list of our Architect and Builder Service Representatives.

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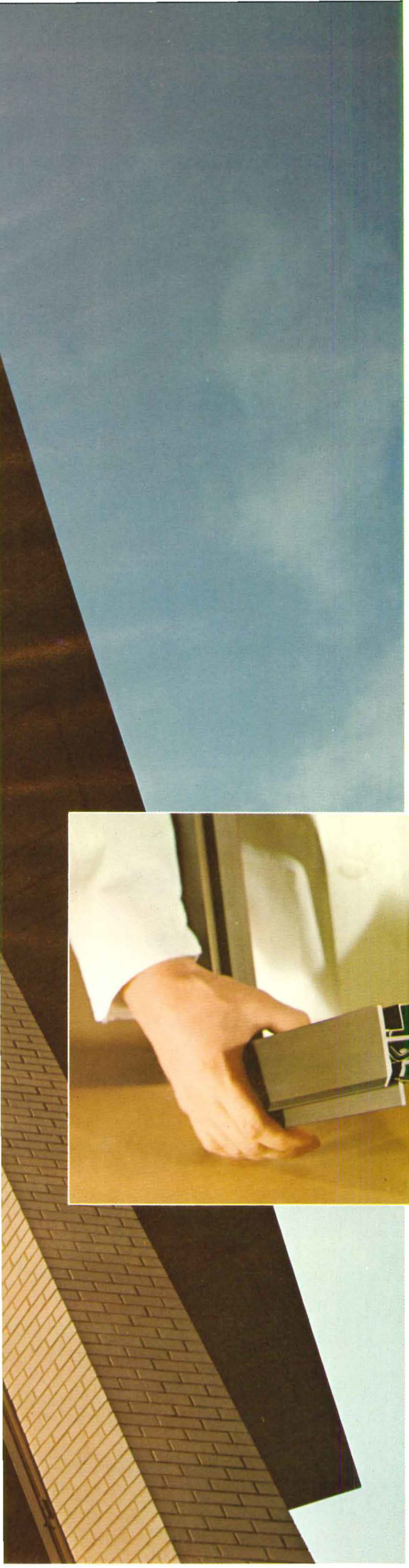
SEALAIR WINDOW, available in projected, casement, top-hinged, double hung, sliding and vertically pivoted types—all of which give far better than industry standard performances in resistance to both water and air infiltration. Credits—Cleveland Jewish Federation Building: Arch., Weinberg and Teare in Association with Edward Durell Stone, NYC; Gen. Con., D. W. Rankin, Cleveland, Ohio.



Take the KAWNEER Sealair Window that stopped leakage...

The test chamber equivalent of a 4-inch rain and 70 m.p.h. winds can't make Sealair Projected Windows leak! Proved in independent laboratory tests to exceed Industry Standards at twice the amount of water.

finish it in PERMANODIC®...

This hard color finish adds warmth, new life, new beauty to your designs. Choose from light bronze, medium bronze, dark bronze or black.

see the difference complete quality control makes...

The rich colors of Permanodic are created from alloys—not dyes. They are almost twice the thickness and hardness of clear anodized finishes. They are non-fading, resist corrosion, abrasion and the dulling effects of time, weather and industrial atmosphere.

It's impossible to specify a finer hard color finish than Permanodic. Kawneer quality control begins with the aluminum billet and continues through installation by an Authorized Kawneer Dealer.

For more details, phone the Authorized Kawneer Dealer in your area or write: Kawneer Product Information, 1105 N. Front St., Niles, Michigan.

INGENIOUS PRESSURE EQUALIZATION SLOT. Pressure within window sections equals that outside building. No siphoning action —no leakage.

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ARCHITECTURAL PRODUCTS
AMAX
ALUMINUM

New Dynamics in Architectural Aluminum

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Niles, Michigan • Richmond, California • Atlanta, Georgia
Bloomsburg, Penn. • Kawneer Company Canada, Ltd., Toronto

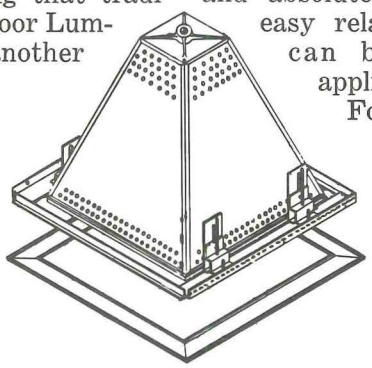
Another great new idea from Wide-Lite...

Efficient mercury vapor lighting's been recessed!

Low brightness, high level illumination was a requirement in the relighting program at the New York Coliseum—the kind of lighting that traditionally has required "Wide-Lite" Indoor Luminaires. But **recessed** lighting was another requirement.

No problem.

"Wide-Lite" Indoor Luminaires now are available with a wide choice of mounting accessories for recessed installations. Their square lens shape is ideal for use in ceilings of all types—plaster ceilings and suspended acoustical ceilings. So the advantages of dustproof construction, longer lamp life and absolutely minimal maintenance, including easy relamping from above or below, now can be yours in recessed lighting applications.

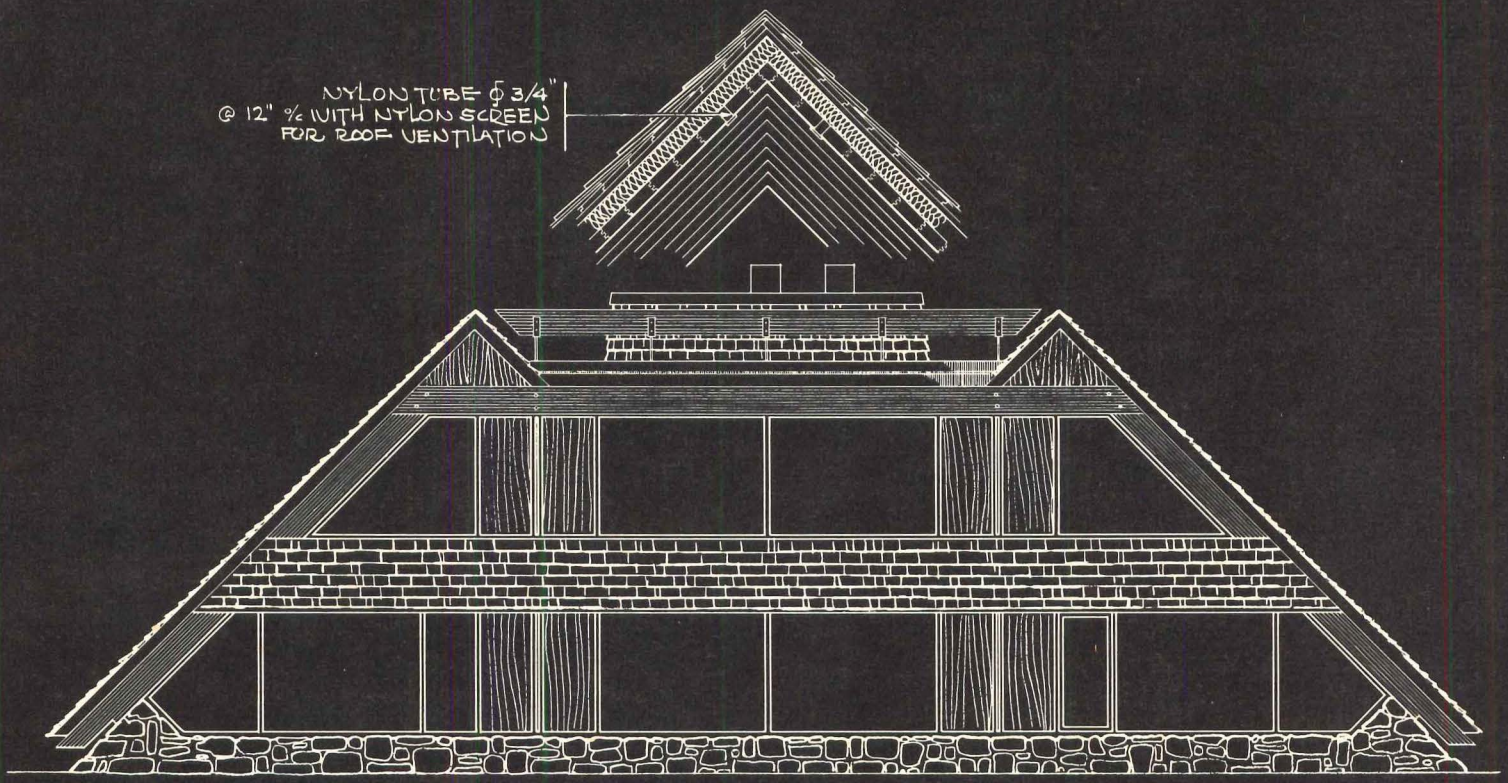


For more facts about unique "Wide-Lite" Indoor Luminaires and our new line of recessed ID mounting accessories, contact your "Wide-Lite" representative (see "Lighting Fixtures" in the Yellow Pages). Or write Dept. 24A-541.

WIDE-LITE.

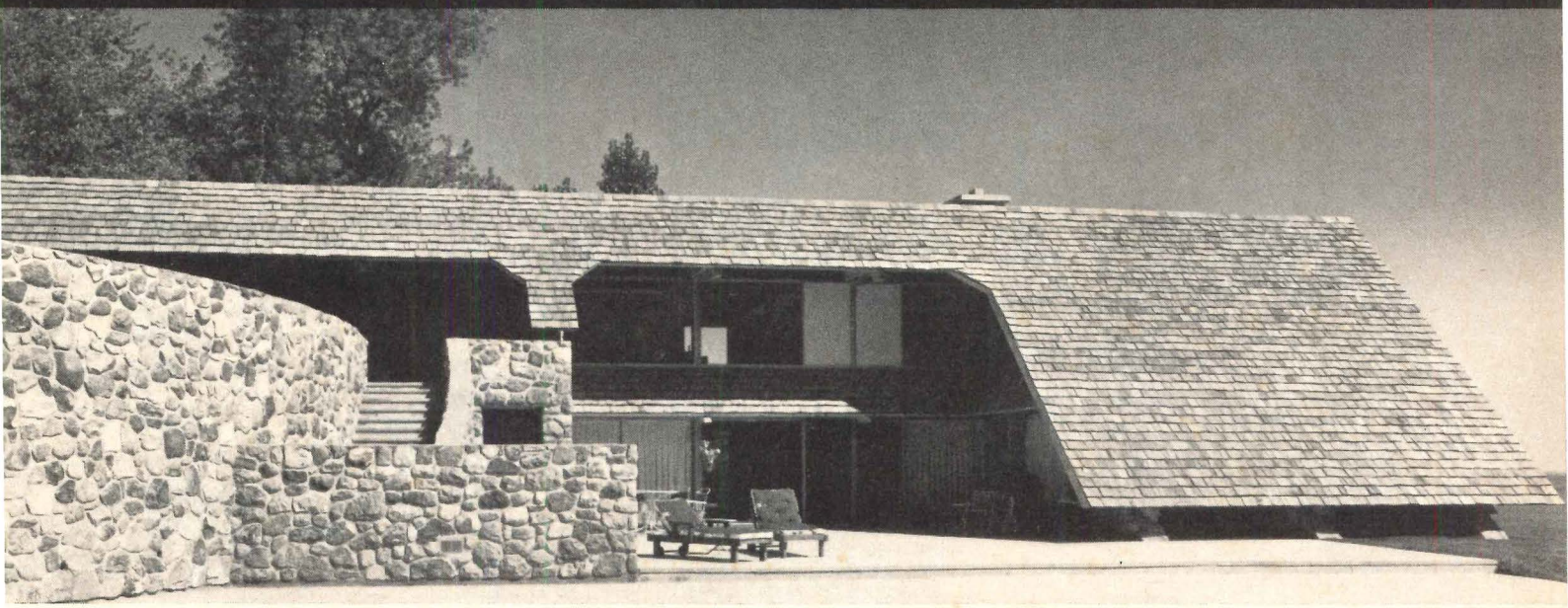
FLOODLIGHTS • POLES • INDOOR LUMINAIRES • BALLASTS • TRANSFORMERS

Wide-Lite Corporation, A Division of Esquire, Inc., 4114 Gulf Freeway Houston, Texas 77001. Also manufactured in Australia, Belgium, Canada, Mexico and Spain. *Trademark of Wide-Lite Corporation



There's more than just a beautiful roof between this home and the weather.

Residence: Montreal, Quebec. Architects: D'Astous and Pothier. Certi-Split, handsplit shakes, 24" x 3/4" to 1-1/4" with 8" exposure.



When the winter wind starts whistling long the St. Lawrence River, a home eeds all the protection it can get.

To provide it, architects D'Astous and 'othier designed this waterfront home ke an extension of the slope on which it tands—long and low with a deep slanted oof to deflect the wind and offer as ttle unprotected area as possible.

For additional warmth the roof was nsulated and held away from the home on 5½" x 13" laminated beams, like a shell, thus creating fields of warm air between it and the walls.

To make this arrangement practical, D'Astous and Pothier needed a weather-tight roofing material that would retain its attractive appearance even under the worst climate conditions. They selected red cedar shakes—naturally beautiful, remarkably insulative, strong enough to withstand winds up to hurricane velocity without damage.

Perhaps red cedar has exactly the characteristics you need for your next job, too. Why not find out? For details on Certi-Split shakes or Certigrade shingles, see our Sweet's Catalog listing 21d/Re, write or call. 5510 White Building, Seattle, Washington 98101 (In Canada: 1477 West Pender Street, Vancouver 5, B.C.)

THE CROWNING TOUCH OF QUALITY · RED CEDAR SHINGLES & HANDSPLIT SHAKES ·

Red Cedar Shingle & Handsplit Shake Bureau

One of a series presented by members of the Forest Products Promotion Council.

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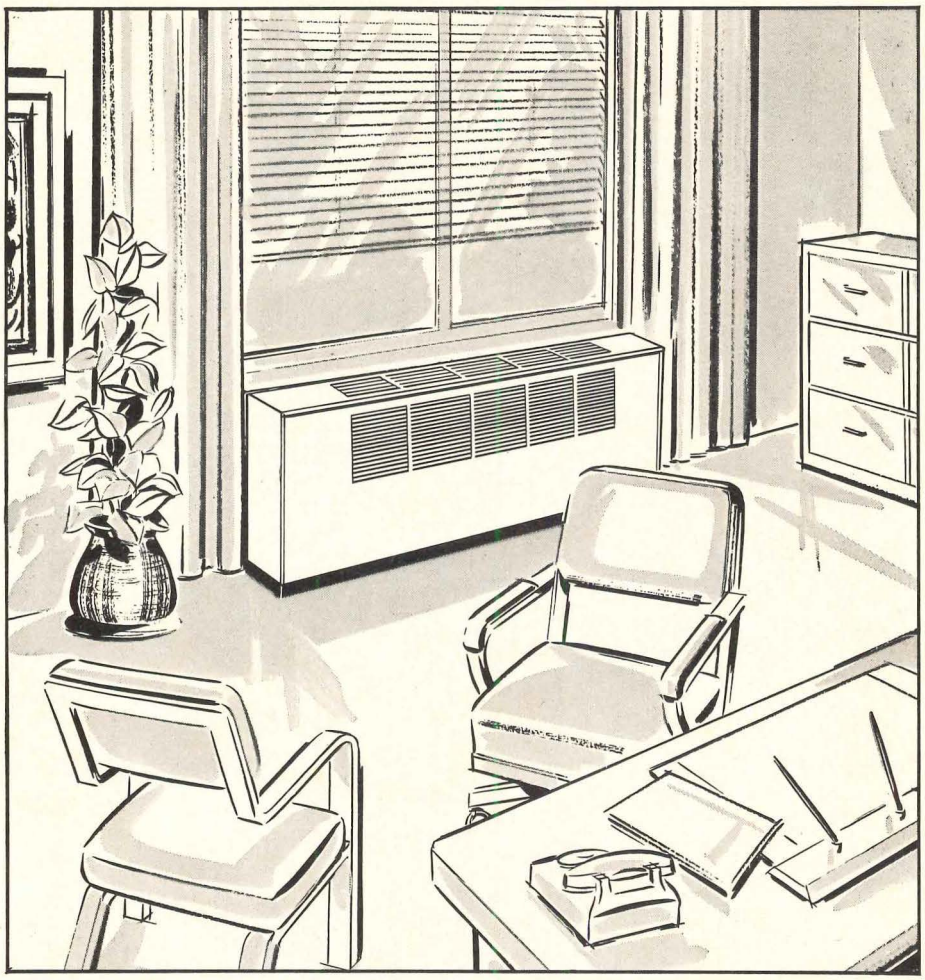
On Readers' Service Card, Circle No. 369

Take a fresh look at this terminal for our induction reheat system–it's new!



This sketch shows one of the new Carrier terminals used with our high quality single duct, constant volume system.

The system provides superior individual room control of heating and ventilating only or complete air conditioning.

And the new Carrier terminal, in two important ways, improves on a performance that up to now set the standard for this type of unit.

(1) It's even quieter than the previous model—
yet delivers higher capacity per unit.

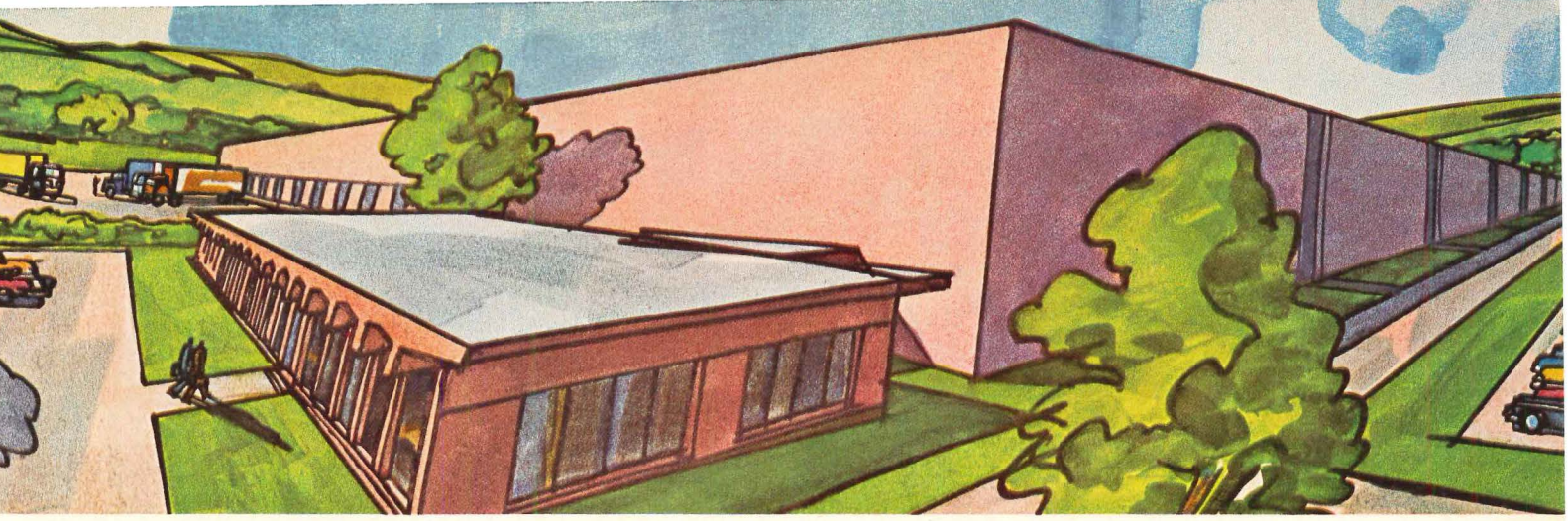
(2) It has higher reheat capacity per lineal inch—
so you can save space using smaller unit sizes.

Your choice of five models—available in 7 attractive decorator colors. Choice of steam, hot water or electric heat. Plus a large line of accessories. Capacities: 75 to 800 cfm.

For complete information about our new terminal, call your nearest Carrier representative. Or write us at Syracuse, New York 13201.

Carrier Air Conditioning Company

Carrier®



t's our new office furniture plant. Totally dedicated to solving he office problems of America's most neglected minority—usinessmen. Now we can supply everything your clients need ut people. We've got the desks, chairs and files and ideas to elp their offices—and the people in them—function more effi-iently. When you specify Art Metal furniture you specify well-nade furniture. Because we have the most modern machines doing what machines do best. And 1000 craftsmen doing what nands do best. Because we have a computerized production schedule, orders get finished on time. And delivered on time. Our new welfare center offers many benefits to your clients. The most important of which is furniture that looks beautiful and works beautifully. A solid investment for the management who pays for it. Write for more information about our improved benefits. We'll also be glad to send you the name and the address of your nearest Art Metal dealer or showroom.

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We built a welfare center for big business.

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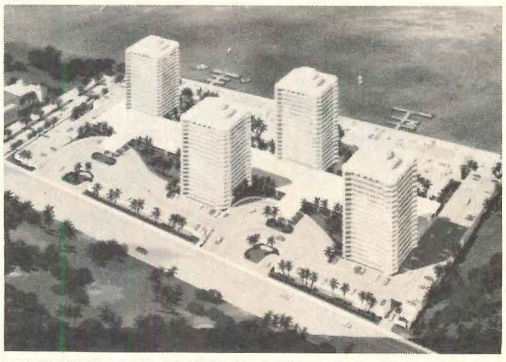
Glaverbel Drawn Sheet Glass... Flat On Its Face!

Architects' renderings never show the typical "waves" of ordinary window glass. Neither does Glaverbel. By putting meticulous craftsmanship and exacting quality control to work, Glaverbel turns out drawn sheet glass with more flatness, fewer defects, greater surface regularity. Extraordinary glass at ordinary prices. The architects of Miami's imposing The Four Ambassadors wanted glass that was rendering-perfect. They specified Glaverbel.

THE FOUR AMBASSADORS
Miami, Florida
Architect: T. Trip Russel and Associates
General Contractor: Robert Turchin Inc.
Glazing Sub-Contractor: Porterfield Industries Inc.



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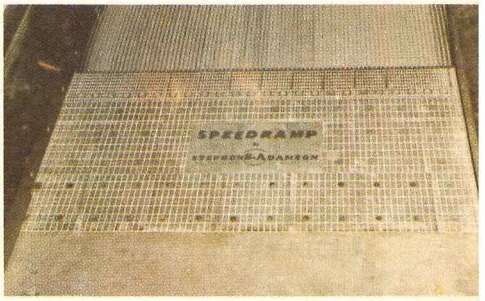


Midland Mall Shopping Center—Bald Hill Road / Warwick, Rhode Island
VICTOR GRUEN architect f.a.i.a.

Customers enjoy the stepless AiRide SpeedRamp® Passenger Conveyors at Midland Mall

The hesitation and uncertainty of waiting for a step has been eliminated. Midland Mall customers ride from one level to another on a broad flat belt. They walk right on the level entry and off from a level exit. And they can take carts, strollers, or wheelchairs along with them. AiRide SpeedRamp Passenger Conveyors provide unequalled riding comfort without steps to stumble over. Floating comb entrance and exit plates smoothly remove anything that might get into the belt grooves. Slimline design permits use of space below the units for displays or counters. Design flexibility fits any architectural plan and interior decor. Customer convenience, low capital investment and maintenance costs make AiRide SpeedRamp Passenger Conveyors the answer to your multi-level people moving need. For complete specification data on the latest concept in people moving, contact:

PASSENGER CONVEYOR DIVISION • STEPHENS-ADAMSON MFG. CO. • AURORA, ILLINOIS

TWO AIRIDE SPEEDRAMP PASSENGER CONVEYORS MOVE CUSTOMERS BETWEEN LEVELS OF ENCLOSED MALL

General Contractor—Dimeo Construction Co.
Installed by—Stephens-Adamson Mfg. Co.
Length—97′; unsupported span 51′
Change in Elevation—18′
Angle—15°
Treadway Width—39″ Grooved Belt
Speed—120 F.P.M.
Capacity—7200 Persons Per Hour
Transition—Level Entry and Exit
Panels—Single Laminated Safety Plate Glass
Trim—Stainless Steel, Satin Finish
Handrails—Moving

airide
PASSENGER CONVEYOR SYSTEMS

On Readers' Service Card, Circle No. 401

Here's a sleeper some designers haven't discovered yet—a steel roof deck, acoustically treated, which performs simultaneously as an acoustical ceiling with NRC ratings up to .70.

Inland Acoustideck® has proven its effectiveness in hundreds of applications in school auditoriums, gyms, churches, and business and industrial buildings. Still, its unique properties cry out for the innovating architect to use it in exciting new ways.

Sound control in a roof deck?

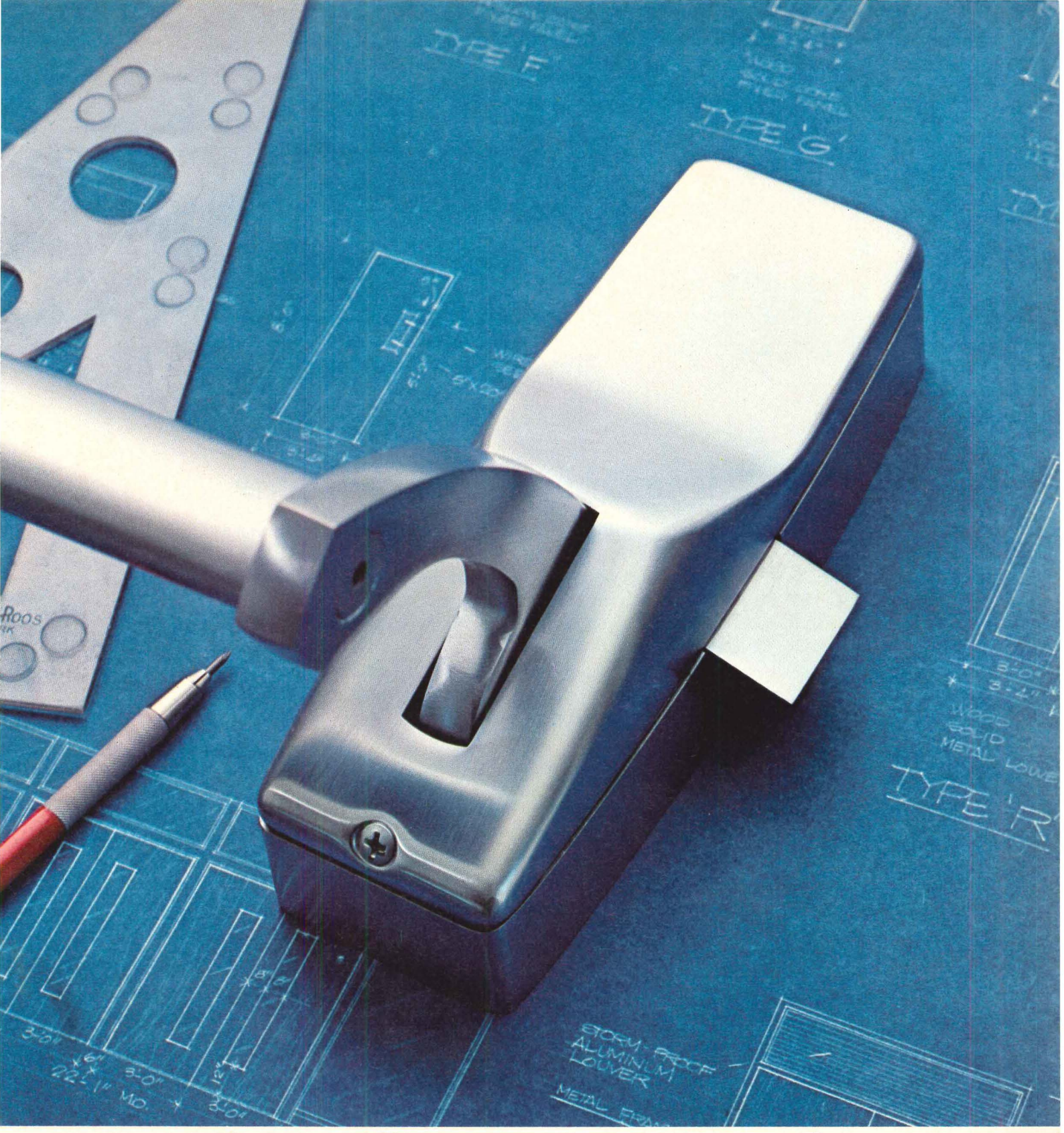
Acoustideck can be used wherever a roof deck or acoustical ceiling can. Six profiles give you a variety of ceiling effects. From an economy stand-point, Inland Acoustideck is a good buy three ways: double duty as a deck-ceiling, fast erection, low-cost maintenance in future years. Extra savings are also possible when both Acoustideck and regular Inland Roof Deck are used on the same project.

Look into Acoustideck today. Write for Catalog 248, Inland Steel Products Company, Dept. F, 4069 West Burnham Street, Milwaukee, Wisconsin 53201.

Every building starts with ideas. Inland can help you with new ideas in building.

Inland Steel Products

INLAND



When safety is on your mind, put Russwin in your plans.

When safety demands your careful consideration of emergency exit doorware, specify Russwin Exiter* Fire Bolts for any building on your boards. Their performance will back up your decision. Meet every requirement for safety, style and stamina. Positive "touch and go" action inside . . . positive security outside. Thousands installed last year in schools, offices, hospitals and stores. Contact your nearest Russwin distributor or write for latest brochure. Russwin, Division of Emhart Corporation, New Britain, Conn. 06050. In Canada — Russwin Lock Division, Belleville, Ontario.

RUSSWIN

On Readers' Service Card, Circle No. 373

Think first about Tectum

You won't have second thoughts.

If you start your planning with Tectum in mind, you can solve several problems simultaneously.

Which could help keep your design concept from being second-guessed on Monday morning.

For example, you may already know that Tectum makes a beautiful ceiling.

But maybe you didn't know that it can also be used as a decorative, acoustical, insulating form board under poured-in-place, reinforced concrete.

Gold Bond®
TECTUM

The name Gold Bond® identifies fine building products from the National Gypsum Company. For sample and further information on Tectum, write Dept. PA-68T, Buffalo, New York 14225.

George Williams College Leisure and Creative Arts Center, Downers Grove, Illinois

Architects:
Mittelbusher & Tourtelot, Chicago

Contractor:
Turner Construction Company, Chicago

Tectum Distributor:
Roeth & Cutler, Inc., Chicago

Charles and Henriette Fleischmann Atmospherium-Planetarium, University of Nevada

Architect:
Raymond Hellman, Reno, Nevada

Contractor:
McKenzie Construction, Inc., East Reno, Nevada

Tectum Distributor:
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On Readers' Service Card, Circle No. 403

Or that it's easily worked on the job to fit contours unobtainable with any other wood fiber form plank.

You see, Tectum is a lot of things you *can't* see on the surface. Like an insulator with "U" values as low as .12, and a sound absorber with noise reduction coefficients up to .80-.90.

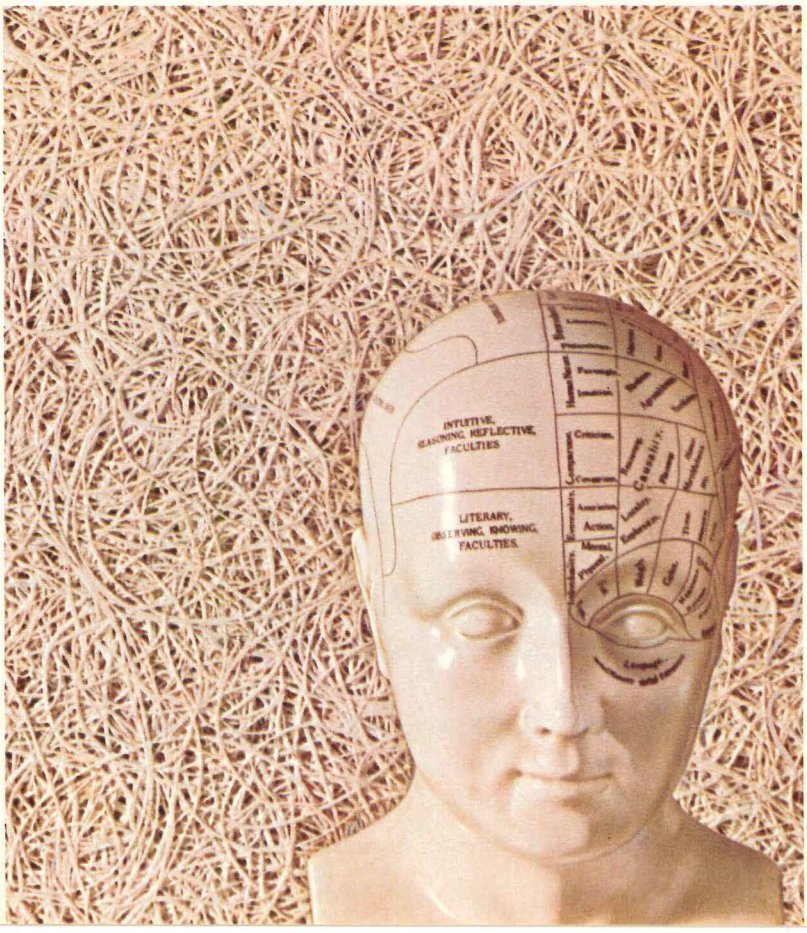
Tectum is lighter than any other wood fiber deck. So you need less structural steel.

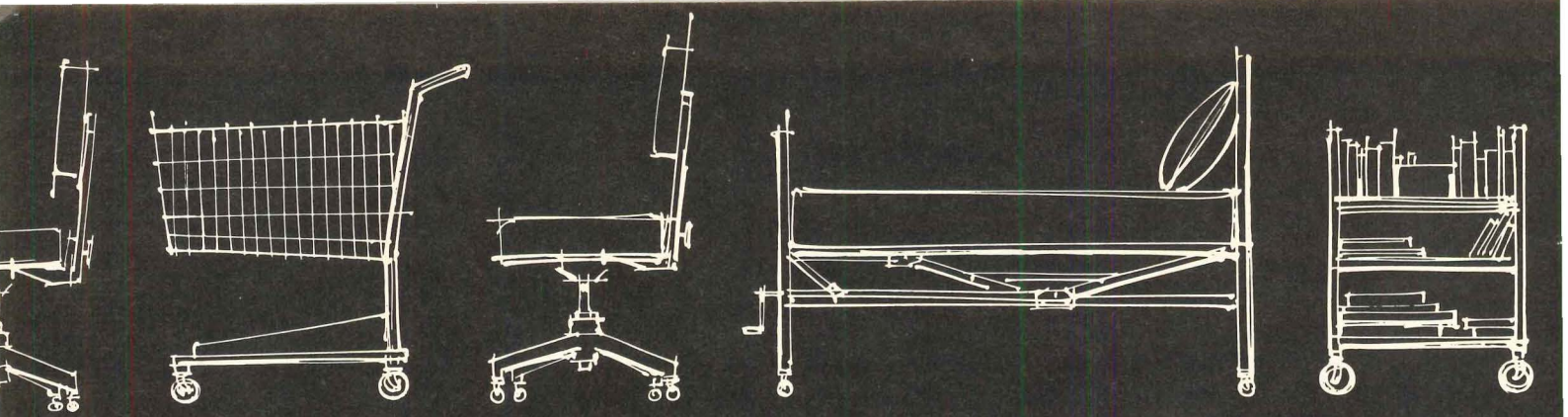
Why not look into Tectum®?

Then you won't have to look any farther.

Lightening your load is a National responsibility

Gypsum Company





Proven perfect answer for specifiers for carpeting areas with wheel activity...

Direct glue-down installation of double Jute-backed carpets

Nothing could be simpler. Double Jute-backed carpet cemented directly to the floor . . . new or old concrete or wood. Or over previously installed resilient flooring. No cushion back on the carpet. No padding under it.

Works perfectly, as Ford Motor Co. proved in a two-year test in Dearborn. Ford is now practically standardized on this technique in new office building construction and for replacements in existing structures.

Benefits

The acoustical qualities, esthetics, luxury and thermal advantages of carpet . . . *plus* easy wheel and caster movement. Conventional wheels and casters can be used. Pads are unnecessary under chair casters if carpet pile is of good commercial grade.

Savings

Double Jute-backed carpets cost substantially less than cushion-backed carpets with equal pile specifications . . . or equivalent carpets plus separate underlayment. Installation is greatly simplified.

Jute's function

Jute secondary backing is vital because it provides maximum floor bond. This quality also guards against delamination of the secondary backing from the basic carpet. Jute's greater stability prevents carpets from shifting, which can misalign floor outlets with cut-outs in carpets.

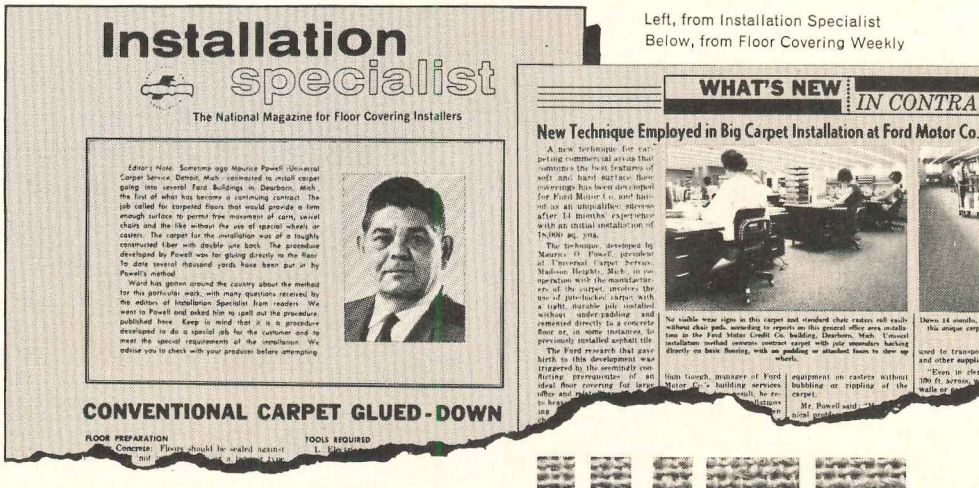
Applications

Use in any location where free movement of conventional wheels and casters is desired. General offices, hospitals, libraries, supermarkets, computer areas, restaurants, etc.

Taking up

When replacement is necessary, Jute backing comes off easily with solvents or fast-operating scrapers. None of the removal problems common with cushion backing, such as crumbling and sticking.

Write for complete copies of editorial features shown, plus outline of glue-down installation technique and additional material.



Left, from Installation Specialist
Below, from Floor Covering Weekly

JUTE

JUTE CARPET BACKING COUNCIL, INC.

25 Broadway, New York, N.Y. 10004 • American Industries, Inc. • Bemis Co., Inc. • C. G. Trading Corp. • Delca International Corp. • A. De Swaan, Inc. • Robert F. Fitzpatrick & Co. • Gillespie & Co. of New York, Inc. • Hanson & Orth, Inc. • O. G. Innes Corp. • Iselin-Jefferson Co., Inc. • Jute Industries, Ltd. • Lou Meltzer Co. • Pak-Am Inc. • William E. Peck & Co. of N. Y. Inc. • R. L. Pritchard & Co. • Revonah Spinning Mills • Stein, Hall & Co., Inc. • White Lamb Finlay Inc. • Willcox Enterprises, Inc.

On Readers' Service Card, Circle No. 353

Presidential Towers, Hollywood, Florida.
General Contractor: Arkin Construction Corp.
Electrical & HVAC Consultant: Saul Neufeld
Architect: Melvin Grossman, AID
Project Engineer: Jim Crawford

Presidential Towers declares unconditional comfort

Presidential Towers is a luxury apartment building on fashionable South Ocean Drive in Hollywood, Florida.

In this climate, almost constant air conditioning is required. Unnecessary downtime could not be tolerated.

After careful research, Saul Neufeld, the structure's mechanical and electrical designer, and the owners selected two 520-ton Chrysler Airtemp Whirl-Pac 2000 centrifugal water chillers to do the job.

The Whirl-Pac units are designed to produce the full range of capacity requirements efficiently and with a minimum of maintenance. And in this luxury building, the quiet operation of the Whirl-Pac 2000 was another prime consideration.

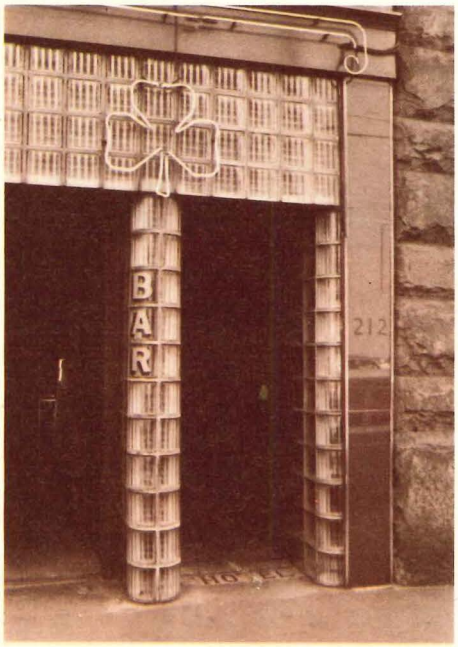
If you're planning a new building or improving an old one, give it the most modern of all climate control equipment, Chrysler Airtemp's Whirl-Pac 2000, all assembled, tested, and charged at the factory. Saving installation costs.

Call your Chrysler Airtemp Central Station Representative or write to 1600 Webster Street, Dayton, Ohio 45404, for more information.

Airtemp

CHRYSLER CORPORATION

IF YOU THINK GLASS BLOCK STILL LOOKS LIKE THIS



YOU'D BETTER

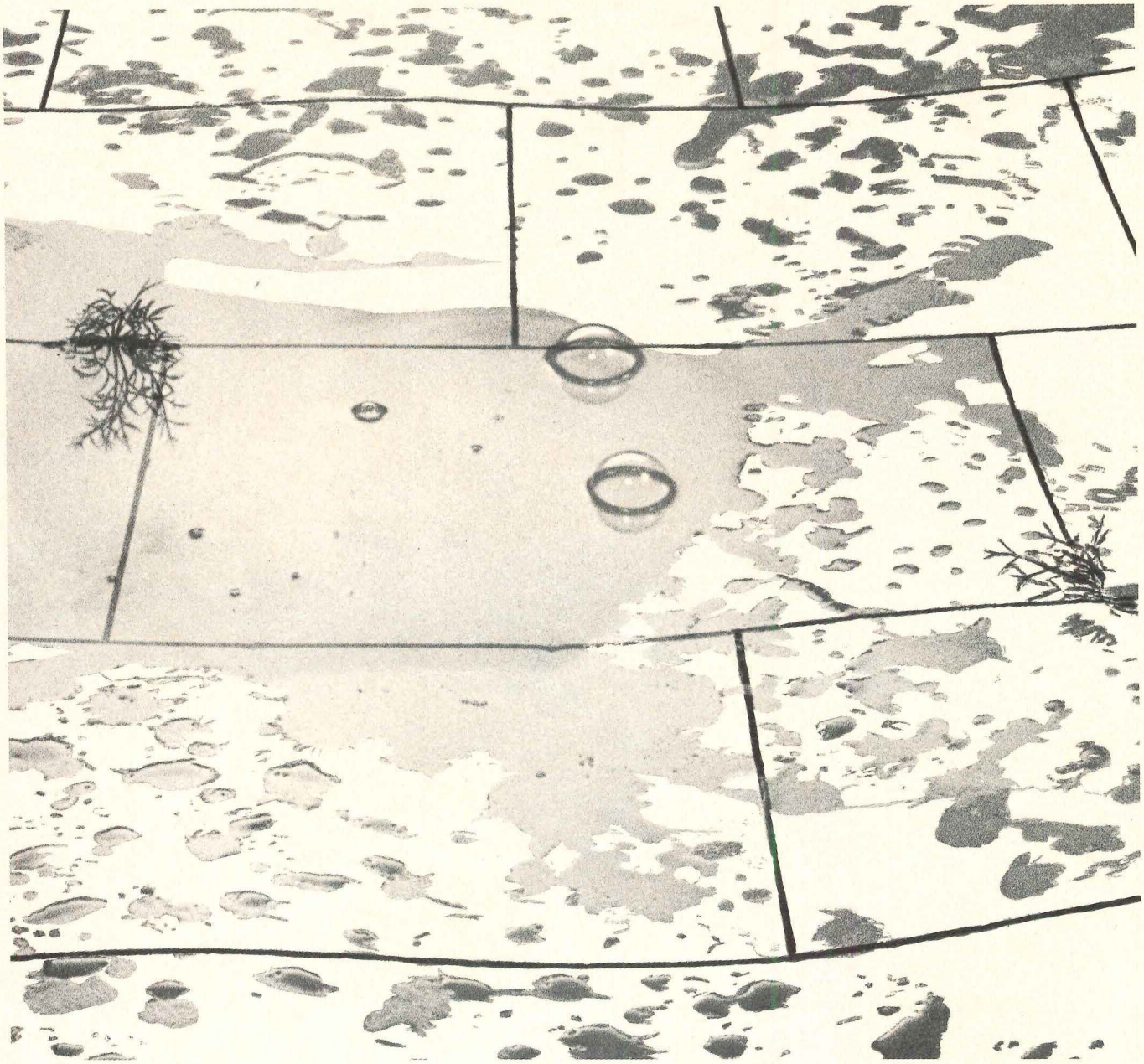
On Readers' Service Card, Circle No. 3

A lot of new things are happening with this modern, versatile building material: exciting designs, innovative uses in walls and striking sculptured effects adding new dimensions to today's buildings.

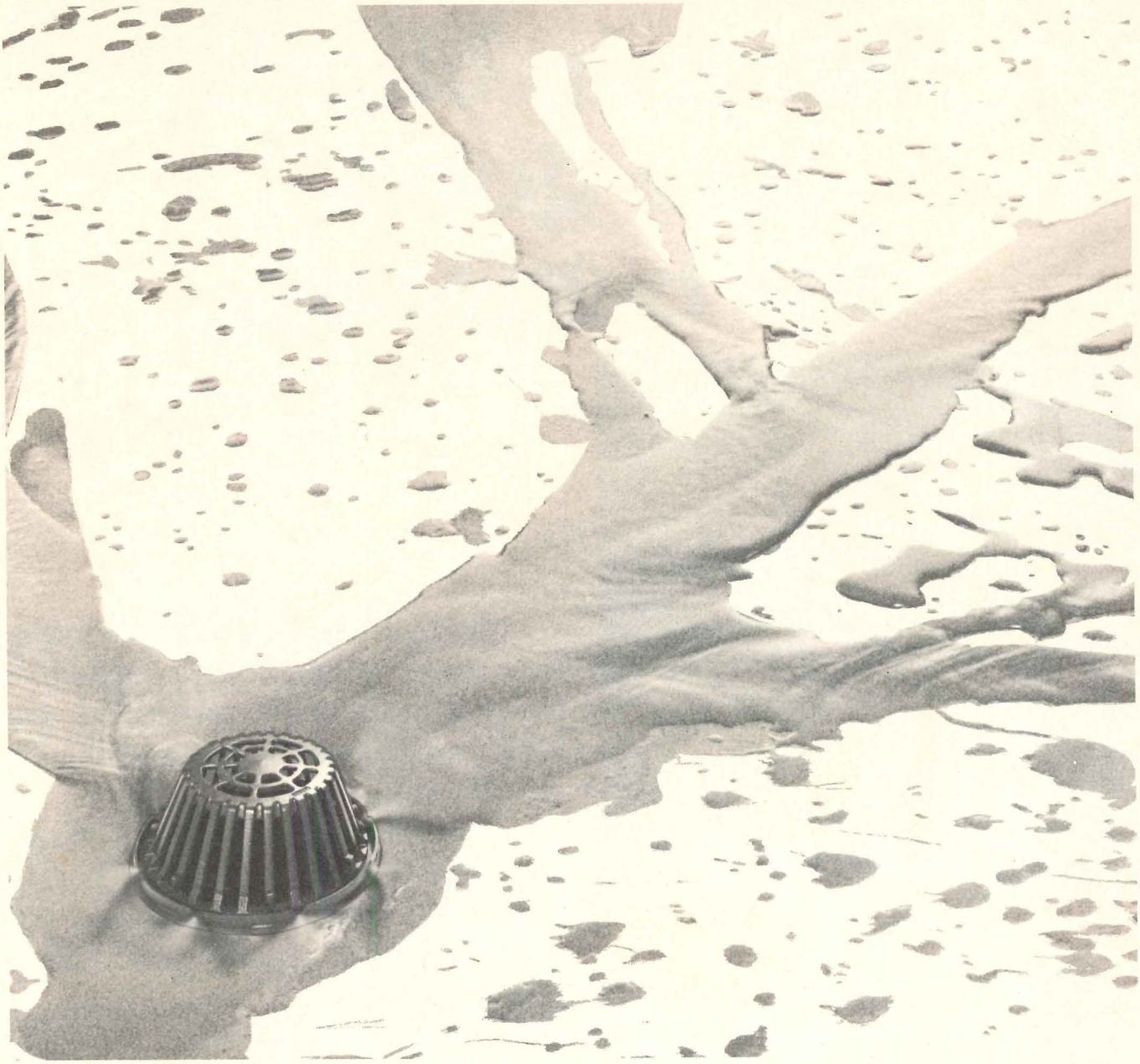
Pittsburgh Corning Intaglio III glass wall units were chosen for major portions of the perimeter wall at Bancroft Center in Berkeley, California. The architect, John H. Ostwald, created a grill-like effect with the circular patterned exterior while providing attractive natural light for the interior of the stores in this shopping center. A feeling of openness was maintained without loss of space.

PC Intaglio units are available in six unique patterns with glass and masonry textured surfaces. This offers almost limitless design possibilities in the aesthetic use of dimensional wall effects.

For a closer look at PC Intaglio and new Chiaro glass units, or Sculptured Glass Modules, write for our catalog: Pittsburgh Corning Corp., Dept. PA-68G, One Gateway Center, Pittsburgh, Pa. 15222.



Seamy roof decks have problems



that our seamless decks don't

Zonolite® is the name. Slopes for drainage are easy and economical to build into our seamless, lightweight insulating concrete systems. They are difficult and costly with seamy systems.

Our seamless systems require no taping, have no heat leaks, and are permanent. You can't say that about seamy systems.

The economical insulation range for our seamless systems is from U.24 to U.05. For seamy systems it is from U.39 to U.19.

Our seamless systems also provide potential fire insurance advantages, conform to curvilinear designs, meet the toughest hurricane and load requirements in the country, are certified internationally, and are supplied and installed by approved applicators. Seamy systems don't, can't, won't, aren't and aren't.

Our seamless systems can be applied over galvanized metal, form board, structural or pre-cast concrete.

Besides which, our seamless systems normally cost less.

Why don't you mail the coupon to find out more about them?

GRACE®

Zonolite Division, W. R. Grace & Co., Dept. PA-06
Merchandise Mart Plaza, Chicago, Ill. 60654

Gentlemen:
Please send me your latest Zonolite Roof Deck information describing economical, seamless roof deck systems for all structures.

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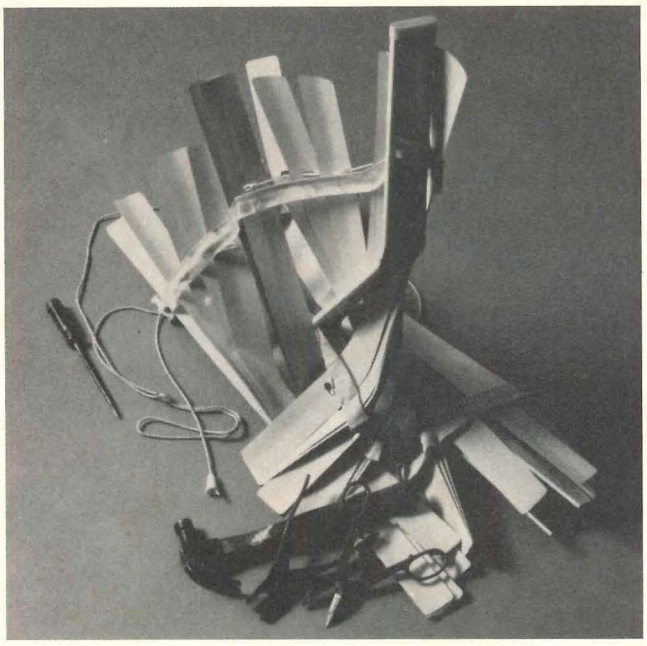
On Readers' Service Card, Circle No. 397

Bargain blinds are good for business.



Guess whose?

With a few thousand windows to treat in a commercial or residential building, even a modest saving per blind can begin to look like a bargain.

Hard to resist.

But when your bargain blinds need *one single repair* within the first five years,[1] they'll not only cost you a lot more than you bargained for...

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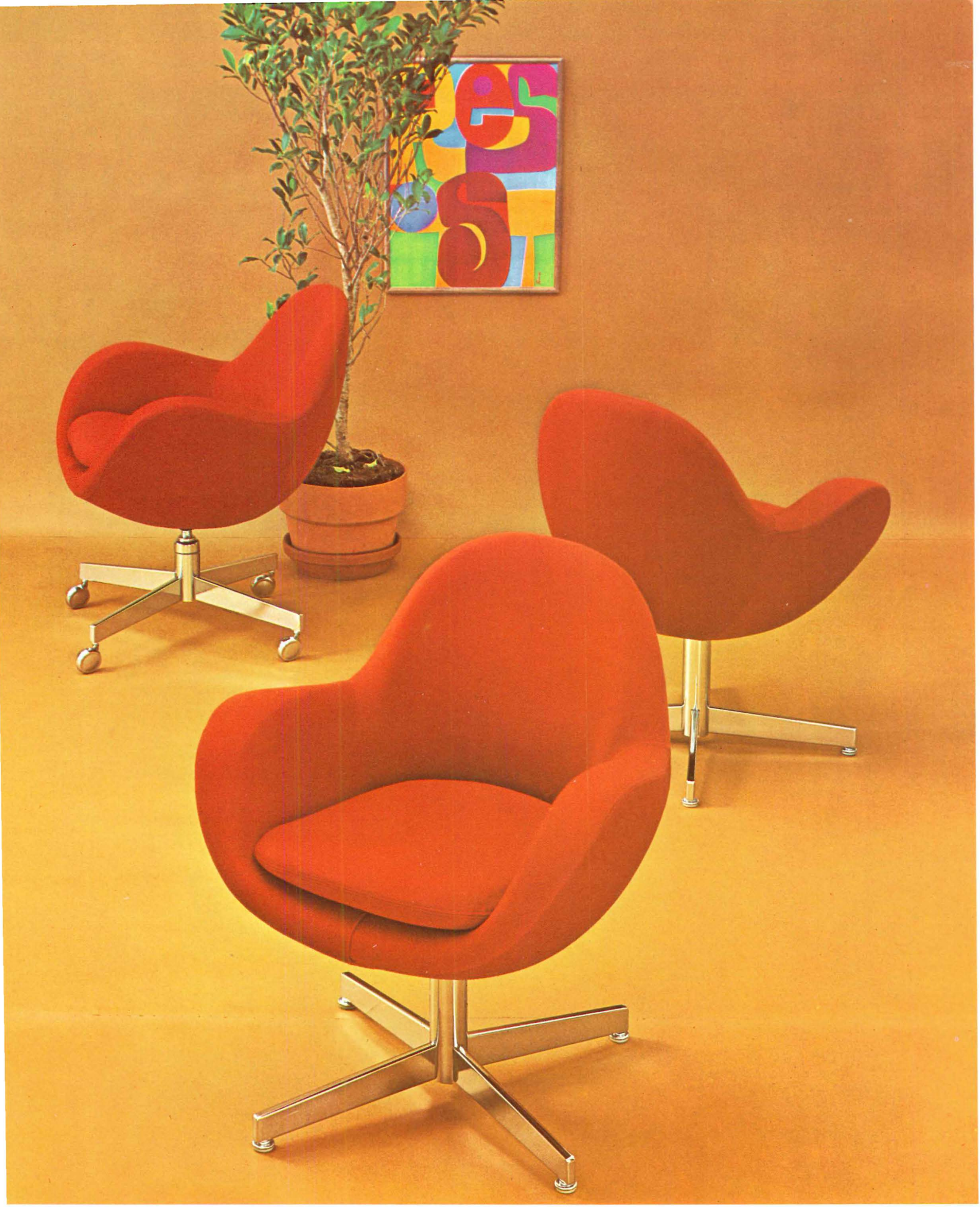

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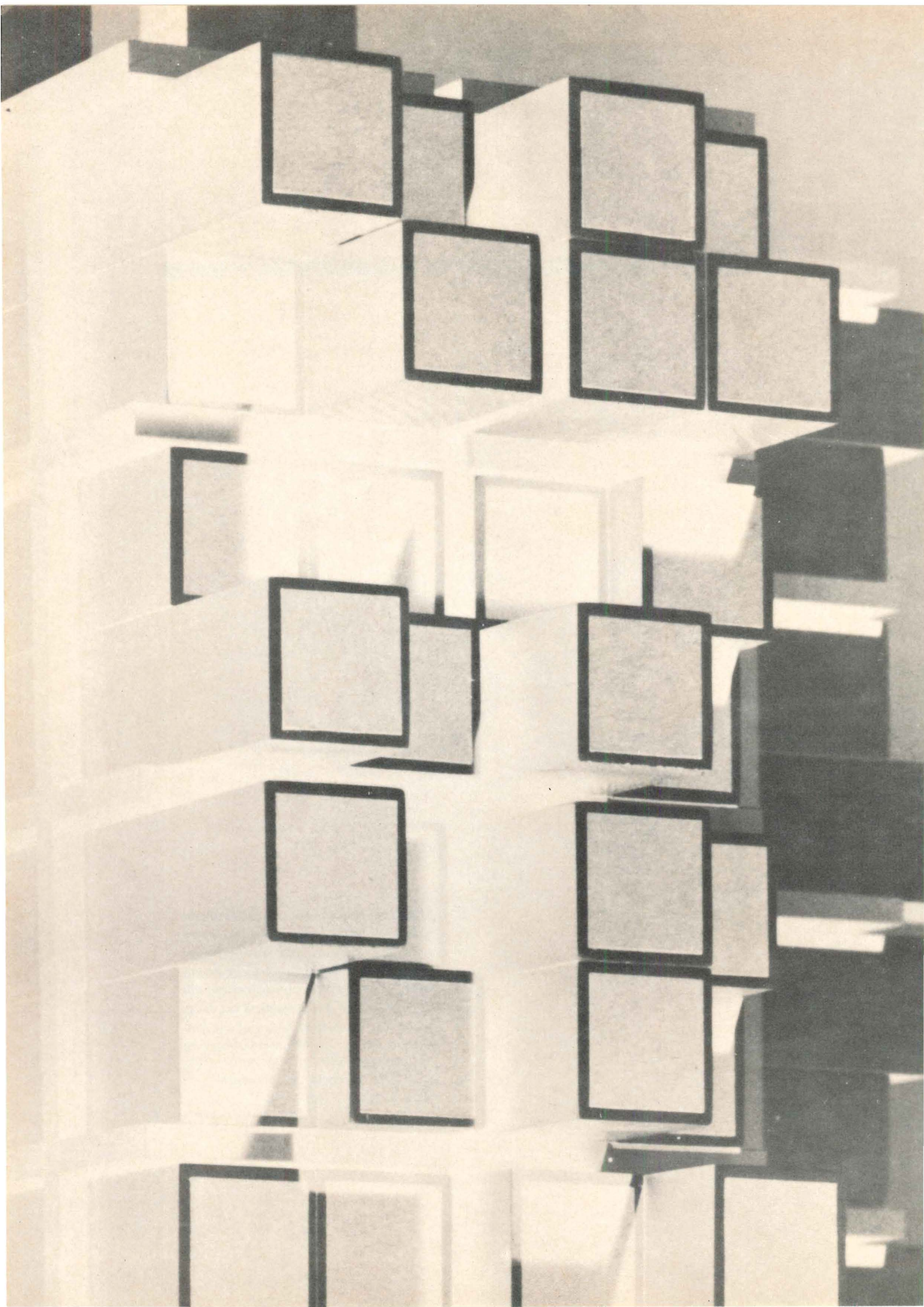
LE CORBUSIER (in 1923)



EDITORIAL

We tend to isolate phenomena, compartmentize events, label fragments of life and study them as separate entitites, often forgetting that the history of mankind is a complex weave where each thread is supported, pulled, and generally dependent on other threads. The roots of political history, for instance, are embedded deeply in the soil of economic history. The social and political upheavals of the last 100 years are the offshoot of the Industrial Revolution, when introduction of power-driven machinery eventually transformed farmers and craftsmen into seething proletarian masses. Present-day continuation of this mechanization process — the further and even more drastic automation of production — is being felt in all areas of life. It is the cotton-picking machines that are responsible to a large extent for the "urban crisis" with which we are currently so preoccupied.

When discussing the building industry, one often talks about its backwardness. As we say in this issue of P/A, for instance, an 18th-Century carpenter could rise from his grave, pick up a hammer and some nails, and start working on a contemporary construction job without attracting much attention. A rather unique situation without parallel in other industries. Even in agriculture, that traditionally last bastion of hand labor and conservative methods, mechanization advanced way beyond the pitchfork stage of development.

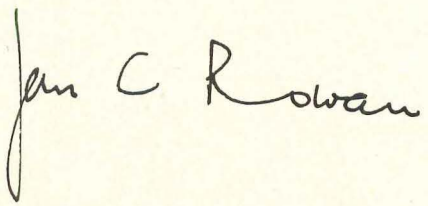
However, our 18th-Century carpenter, while hammering away, might attract the attention of one person: a shop steward of the local union who would start asking some awkward questions.

Such a scene would be a good graphic representation of the building industry's real problem: an ambivalent and somewhat parasitic existence in today's mechanized, automated, and unionized world. The building trades — and also other segments of the building field — are trying to reap advantages of social and economic progress without contributing to the causes that made this progress possible. The productivity of a plumber who makes $7.50 an hour is not much different from that of his grandfather who made 75 cents an hour. Yet his prosperity is the result of revolutionary changes that took place — but took place in other industries. Our present labor practices, with all their privileges, evolved within the automobile and other highly mechanized industries where labor productivity has been rising rapidly over the years. The building industry is simply riding the coattails of gains achieved by others.

That this anomalous situation cannot continue forever is obvious. It is also obvious that the cause and effect interweave will have to be operative in the building industry as it is in other industries.

Hence, one can question some of the arguments put forth by those who are skeptical of any fundamental change in the practices of the building industry in the foreseeable future. The usual arguments against drastic change deal with the insurmountable difficulties in modifying building codes, union practices, financing methods, professional attitudes, and similar obstacles. But the point usually not stressed is that many of those practices result from the fact that the building industry did not go through a thorough technological revolution.

When prefabrication, and therefore industrialization of construction, becomes a reality, other methods will have to change as well. Just as the assembly line transformed much of our country's economy and many of its institutions, prefabrication will inevitably transform the economy and institutions of the building industry. ■



LOWERING THE COST OF HOUSING

At a time when our cities are in crisis and the need for massive housing efforts has never seemed more urgent, P/A investigates current attempts to lower the cost and improve the quality of housing, and presents some of the more important projects underway in North America.

THE MEANDERING PATH TO SIX MILLION HOMES

Industry and Government are looking for ways to build better and faster housing within the limitations of codes and unions.

With visions of building-boxes dancing in their heads, architects today are dreaming of realizing lower-cost mass housing at last. This time, those dreams may not remain mere unfulfilled wishes.

What makes low-cost housing an imminent possibility now is the coming together at a single point in time of seemingly all the factors and forces needed to usher it along.

The crying needs of destitute urban areas for even minimal accommodation are recognized by public and professionals alike. Lack of insulating space against the heat and pressures of summer in these overpopulated and underaccommodated ghettos has caused annual spontaneous combustion. Forcibly, this has brought attention to the slums, to poverty areas, and to their real and very basic needs.

The response of politicians and local governments to these protests has been a combination of genuine desire to alleviate the situation and political expediency to give some satisfaction before election time. That interest gives a legislative nod to those anxious to produce low-cost housing, and, in the Federal Government, it also provides a source of funding.

Manufacturers of mobile homes claim an existing technology and industry that can produce urban modules at a far lower figure than has been done up to now. And they are ready to offer their services for the urgent cause of urban housing — as well as hoping to capture an even larger market than the young marrieds and retired couples who have been their staples for three generations.

In addition, the producers of raw materials and suppliers of products for housing are naturally eager to further this cause.

And on the design side, innovations in engineering and construction — notably the lifting power of cranes and helicopters and the structural power of lightweight, thin-wall concrete — are bringing the fanciful visions of architects nearer to realization.

Even the architectural profession, which has struggled impatiently and ineffectually for years to alter the process of house construction, is now striking out on its own as entrepreneurs of prefabricated systems. House construction — the only major-market business, it has been said, in which an 18th-Century workman could show up at a job site, work with his own tools, and earn today's pay — is changing, slowly but inevitably, from a crafts business to a manufacturing and retail industry. Architects who are really with it insist on bringing construction more into phase with the construction of the rest of our contemporary environment; their goal is to build houses as Detroit builds automobiles. Some architects are already succeeding.

TECHNOLOGICAL ADVANCES IN PREFAB CONSTRUCTION

The far-out image of people moving their trailer-type homes from one plug-in frame to another is getting closer in focus. It's not possible to predict exactly when it will be clearly defined, but the preliminary steps are in view.

One major step is the acceptance of a new building module based not on what a workman can comfortably pick up, but by what the highway authorities will allow on the road. This new dimension to building is the 12′ x 60′ trailer, which, with few exceptions, is the largest unit that can be towed. Its height limit on the road conveniently permits a standard room plus the running gear beneath the trailer.

So far, these units have been stacked three high to create housing with a surprising variety of forms. The next step is to rise higher, but it requires a mastery of a whole new range of technologies to get there. Above three stories, housing invariably requires elevators and this in turn demands shafts, which are not easily prefabricated. More than three stories also affects the structural and fireproofing requirements, so the costs rise beyond the present economical limits. However, there is a wealth of ideas for prefabrication of multistory housing, and some of these are shown in this issue of P/A.

To meet the needs of the ghettos, President Johnson has called for six million housing units, and expects the building industry to figure out ways of meeting the demand. Quite sensibly, the Model Cities Program recommends harnessing building technology in order to improve housing, which means better housing built faster and cheaper than is possible at present.

The U.S. Department of Housing and Urban Development (HUD), serving as agent for the Program, attacks the technology gap with zeal, expertise, and $10 million a year. Although allocating this trifling sum (the space program gets $4.6 billion) is sending a boy to do a man's job, HUD, as will be seen later, does its best to encourage architects, builders, and manufacturers to experiment with housing.

Why Reduce Costs?

The technological advances in construction follow three courses. First, the far-out, almost wishful, projects for completely new cities that should ideally be built on virgin land or over water. These cities would include plug-in towers and structures that suspend housing units from cables so that occupants can winch down their homes and ship them to another Utopian city. Meanwhile, back at the real real estate, urban life continues in the tenements for an infinite number of years.

Second, the projects that move technology out of the open-web-joist age but are practical enough to be built during the next year or two. For this technology, designers have turned to plastics for making lightweight people containers (see p. 146).

Third, present-day low-rise projects that rely heavily on prefabrication, or on taking advantage of new structural concepts to frame multistory buildings. Some of the current projects will never win architectural acclaim, but they will make it possible for later developments to combine commodity with delight. Costs are an important part of the overall program, and technology's role is to lead to construction economies.

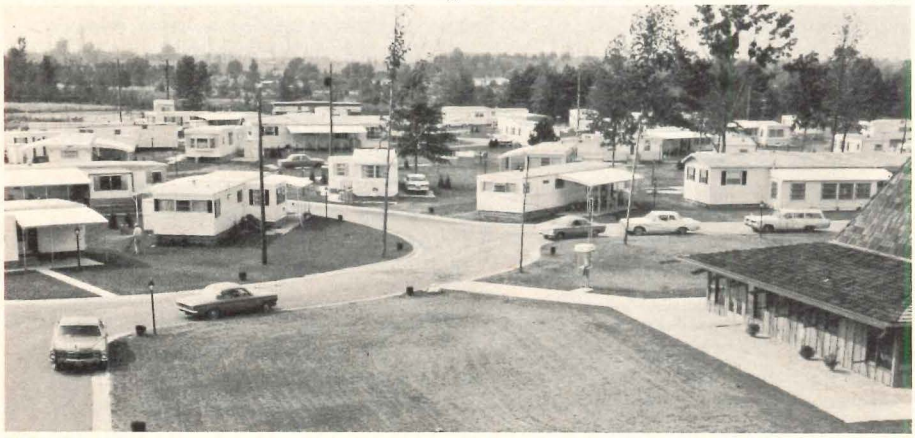
The importance of this role is in dispute within the homebuilding industry. Most of the cost-saving techniques are directed toward the structure, which, the skeptics say, is the wrong area to concentrate on. The industry believes that the most technology can do is to clip 15 per cent off the construction cost of a housing unit. But since the construction cost is only half the total cost (land, improvements, finances, etc. fill the other half), and 30 per cent of this is for mechanical and electrical work, the total savings is 5 per cent. Thus, for a $20,000 unit, technology can deliver a $1000 bonus.

A similar arithmetic is offered by critics of multistory housing where the conventional structural framing accounts for 15 per cent of the total construction cost. An innovation in framing, such as the MIT staggered truss system (see p. 135) can shave about 2 per cent off the structural cost. This leads to a minuscule two-thirds per cent reduction on the total building cost.

These diminished percentages are used by some people to justify not bothering with new construction techniques. The tide, however, is going against them, and the big wavemakers in Washington have good cause to keep their faith in technology because even a $1000 per unit saving will multiply to a fat $60 billion if the government builds the 600 million units it proposes to erect over the next 10 years.

Not all the homebuilding industry is skeptical. Manufacturers of materials and building products have a sharp eye on the future of housing. One major material manufacturer quietly put several thousand dollars into another manufacturer's prefinished, modular unit project because it believes that in the next decade most housing will be built that way, and it wanted to encourage development. A major home builder, Levitt & Sons, which was bought by International Telephone & Telegraph Corporation, now has the resources to make a new approach to house building, and is experimenting with prefinished models.

Photo: Courtesy, The National Mobile Homes Manufacturers Association



"Fifty years after all the theorists made very clear the possibilities of industrialization of structure, we have — without any help from architects — a truly industrialized organization of the utmost importance — the mobile-house industry.

"Now, the mobile-house industry is extremely naive: They are littering the countryside with the ugliest things imaginable; they pull themselves up by the bootstraps; they are outlawed in most municipalities; their things are incredibly ugly. But the fact remains that the mobile-house industry accounts for one out of every five new housing starts in the United States today and the graph goes up and up and up. Their power lies in the fact that they can produce a quite decent equivalent of a two-bedroom house, air conditioned, for $6000. They also produce a $3000 house. Now where else can you buy this kind of thing? And it isn't that technically they're advanced, because quite the opposite. If you go through a mobile-house plant, you're amazed at the level of sophistication, you really are. But it's the buying power."

PAUL RUDOLPH

New Building Units

To effect any significant savings, everyone in the construction industry (except perhaps the unions, see p. 100) agrees that more work must be done in plants and less on site. Prefabrication is the watchword, and boxes are in the fore. Panels prefabbed in a plant and assembled in the field have been used for many years, but, with few exceptions, boxes (complete units with walls, floor and roof) remained on wheels as mobile homes until the Canadian government financed Habitat in Montreal during 1967. Habitat served as a catalyst to overcome the misapprehensions designers felt about stacking prefabricated boxes.

Traditional housebuilders and mobile-home manufacturers saw a new market in boxes. The inspiration came not in a blinding flash, but from the prompting of HUD assisted by the Office of Science and Technology. These two groups encouraged builders, manufacturers, and consultants to direct their talents toward the housing market, and one manufacturer, Magnolia Homes Manufacturing Corp., ventured into a two-story housing project in Vicksburg, Miss. (see p. 130).

Magnolia is part of a large manufacturing concern, Guerdon Industries, which probably has a more forward-looking attitude than smaller companies. The majority of mobile-home manufacturers are described by an industry source as "fat and happy," and therefore they feel no compulsion to seek new markets in the alien construction industry.

Today's manufacturers of the box-shaped, prefabricated buildings are in the vanguard of a new construction technique, but most of them are trying to hide it. With few exceptions, the buildings are made to resemble the ubiquitous *schlock* architecture that reflects the lowest common denominator of public taste.

With this devaluation of form goes a re-evaluation of terminology. "Prefabricated" has the same sort of connotation as plastic used to have, so it is carefully avoided in the industry. To replace it, the industry now markets "prefinished" buildings, and this carries with it an image of wall-to-wall carpeting. In relaxed moments, the industry also speaks of piggyback units, sectionalized units or double wides. Designers often talk of modular units, since these units can, or will, serve as modular building blocks. But colloquially, "boxes" quickly and accurately describes the prefinished, sectionalized modular units.

Boxes by any name frighten potential buyers. An architect who has worked in this field for several years believes that it is almost impossible to sell boxes to homeowners because people can accept almost anything rather than modular housing. Not surprisingly, manufacturers fill their catalogs with prefinished commercial buildings faced with masonry and topped with pitched roofs surmounted by cupolas.

Photo: Courtesy, Brigadier Industries, Inc.

Although two-story motel in Charleston, S.C., appears to be conventional construction, it was built in prefabricated modules transported to the site on highway dollies.

Leasing Box Units

Contributing to the acceptance of prefinished buildings is a major marketing campaign by financial firms in the leasing business. Two of the bigger firms, C.I.T. Educational Buildings, Inc., and Mobilease Corp., take opposite courses of action. C.I.T. leases boxes for schools, libraries, banks, and other commercial buildings, but is not interested in contracts with city housing authorities. It builds its own prefinished buildings through Midwest Homes, a company that it recently bought in Carlilse, Ind.

Mobilease Corp., which is related to Pepsi Cola through Lease Plan International, does not manufacture any buildings, but buys mass-produced units and leases them to industry, school boards and to West Coast city housing agencies. These housing agencies rent their leased housing to individual tenants.

Since Mobilease has not been in the housing business long enough, it does not yet know if its customers will renew their five-year leases. Mobilease hopes they do, but if not, it will relocate the houses at an estimated cost of $125 per unit. In any case, Mobilease will not lose, because it will have paid out its houses before the first lease expires.

High Cost of High Rise

Most of the technology in housing is directed at walk-up buildings or it is confined to single building products. The cost of experimenting with a multistory building is so formidable that sponsors stay away from such projects. Most of the examples of multistory housing in this issue are paper exercises and have little or no chance of being built. One exception is the MIT staggered truss framing concept (see p. 135) that is being realized at a 17-story apartment building in St. Paul, Minn.

Among the "dreamy" concepts for multistory building are the stacked framed boxes, and the great architectural goal of "plug-in" architecture. This Freudian aspiration acknowledges the impermanence of spaces, but retains the structural framework of current construction. Plug-in may work, but its a risky venture to finance, and P/A learned of only one sponsor who has had preliminary discussion with the department of HUD that insures the mortgages on experimental housing.

Rewards From Failure

One of the better attempts to develop cost reductions in low and moderate-income housing tripped over a formula and failed. The project, a HUD Demonstration Project developed by Pratt Institute School of Architecture, Brooklyn, N.Y., met universal acclaim for combining a number of technological innovations into a multistory apartment building. A test structure passed with flying colors, and plans were drawn for a demonstration project of two 20-story buildings sponsored by a nonprofit group in Philadelphia.

Unfortunately, although HUD approved all the innovations, the FHA would not cover the mortgage because it

was to be built by a nonprofit sponsor under Section 221 (d) (3), which imposes a formula relating rents to cost. In states such as Pennsylvania, which do not have tax abatement on nonprofit housing, the formula favors walk-up structures and precludes multistory buildings because of their higher unit cost construction. No one expected the Pratt buildings to cost less than the (d) (3) formula, but the people who had put a lot of energy and money into the scheme were bitterly disappointed that the FHA would not make an exception to the rules in order to provide a practical demonstration of the new techniques.

The sponsor of the housing project, North City Corp., says it had been assured of FHA financing if construction costs were lowered. North City found that the cost would be between 8 and 11 per cent less than conventional costs, but that was insufficient to meet 221 (d) (3) demands. The FHA said the project's potential income would have supported a $3,863,200 mortgage, but the building cost estimate was $5,232,000. Furthermore, the location and rentability were not right, said FHA, but local real estate men, lawyers and architects disagreed. A well-informed source says that some people in the FHA did not want the project built, and took steps to insure that it was not.

The team that developed the Pratt project took the case to Washington to get funds from FHA to finance it as an experiment in construction. But this was before the present 233 Program, and after six months the Undersecretary for HUD wrote the sponsor that there seemed no way to finance the project.

Paradoxically, although the building was not built, many of the components have gained acceptance. U.S. Gypsum Co. is marketing three products developed for the Pratt project: a curtain wall that provides an incombustible monolithic exterior over conventional construction, used at a University of Illinois dormitory; a dry floor plank system that leads to faster construction time and is being installed in office buildings at Minneapolis and Pittsburgh; and a studless partition that will be used in an apartment building in Washington, D.C.

A HIDDEN MOBILITY

Non-mobile mobile homes are not a recent phenonemon, but grouping or stacking them is. Individuals buy genuine mobile homes or sectional houses that can be towed, and set them up in trailer courts or on single plots of land. When an owner settles down to live permanently in a mobile home, he goes to great lengths to conceal its mobility. The open space beneath the chassis is fenced off, a porch added, and all signs of running gear camouflaged.

Then why does a man buy a mobile home? Mainly because its much cheaper than standard housing. An average mobile home, says the Mobile Homes Manufacturing Association, costs about $8 per sq ft including appliances, furnishings, and some built-in furniture. Individually, mobile homes can cost from $3000 up to $12,000 for a double unit, but a typical home is about $6000.

According to the MHMA, 300,000 families will buy mobile homes this year, and last year's sales represented 30 per cent of all single-family housing starts in the U.S. Most mobile homes are paid for over a seven-year term with 6 to 6½ per cent add-on interest, which gives a real interest of 13 per cent at full term. However, FHA will insure mortgages for up to 30 years if the foundations, services, siting, and so on, meet its requirements.

Mobile homes are designed to compete for attention when displayed on a large open field, not for their living location. Consequently, sales lots look like used car lots, and the colors and trim of the homes fight to attract customers.

HIGH PROFITS IN LOW-COST HOUSING

Prefabricating boxes offers a smart man an opportunity to set up in business and make money far faster and far more profitably than in other segments of the construction industry. A declared gross profit of 30 per cent is not unusual, and since the prefabbers obtain a lot of their orders on the strength of fast delivery, they also receive a correspondingly quick payment. A manufacturer putting an $80,000 job through a shop in six weeks is paid soon after, but a general contractor may wait six months for payment on a similar size job.

Low-Cost Production

Most manufacturers build lumber boxes with the same construction as trailers: wall panels screwed and glued to both sides of 2x4 studs. The strength of the units exceeds the requirements for housing construction, but it is needed to resist the stresses incurred during lifting and transporting.

Prefabricators can start from scratch and build the whole unit in their own plant, or operate like an automobile manufacturer and assemble components bought from subcontractors. Either way, the operator can lose all the advantages of controlled factory manufacturing conditions when the units are moved onto a site. There are an estimated 30 companies making boxes, for commerce, industry, and housing, but the survival rate will be no higher than general contractors if erection and installation costs get out of hand.

The cheapest way to transport a 12-ft-wide modular unit over the road is to slip a set of temporary wheels under it, bolt on a hitch to one end of the frame, and tow it behind a highway tractor. This is how commercial and industrial buildings are delivered from plant to site. But if a manufacturer or a city housing authority wants to mitigate the trailer stigma, it will not tow the units to the site. Instead, boxes are lifted onto flat-bed trailers or sent by rail and transferred to a trailer in the local freight yard. Then, when the trucks reach the housing site, the contractor lifts off the units with a crane, and thus, right before the eyes of the neighborhood, dispels the notion that these are trailers.

Manufacturing modular units in factories instead of constructing at a site lowers the cost two ways. Conditions for working are more conducive to a systematic progress because materials are readily at hand and the men do not have to battle mud or cold weather. Secondly, the manufacturer hires workmen at lower rates than a building contractor pays.

The lower labor rates contribute heavily to the success of these projects. The men cannot install a window frame or a door buck any faster in a plant than at a building site. So, unless they are paid less than a union carpenter, the manufacturer cannot produce a competing price.

While manufacturers are seeking to reduce labor costs, labor unions are anxious to maintain wage standards for their members. If building trades union members are to work in prefabricating plants at the same rate as on sites, the manufacturers want to increase the ratio of helpers to craftsmen so that the average

wage gets down to the industrial union scale paid by the mobile-home industry.

Manufacturers also have the Model Cities Program going for them because it recommends the employment of unskilled workers from neighborhoods being rebuilt under the program. This will enable a box prefabricator to set up a temporary plant in a city where it has a housing contract, and hire local men to work under craftsmen. How the building trades unions will react remains to be seen, but the probable result is discussed on page 101.

Versatile Tinkertoys

Prefinished units are not the only method for improving housing technology. Many designers believe that prefabricated *components*, often called "Tinkertoys," offer a better way to build because they provide more options in planning and more flexibility for meeting site conditions.

Components range in size from 30-ft-long concrete walls down to the patented connections for joining any two types of 4-ft-wide wall panels. The effectiveness of the latter is limited to single-story buildings, but the concrete panels can be used in multistory structures.

In between these extremes lie the beam and column systems that proponents claim have superior planning versatility. In addition, any type of wall panels can be used, and, where climate permits, the walls need only be curtained with mats. A decisive feature of beams and columns is that individual components can be man-handled without the aid of heavy lifting equipment. This will make it easier to meet the Model Cities philosophy of employing local residents of a renewal neighborhood to build their own housing.

THE GOVERNMENT'S ROLE

Building contractors believe that it is more important to cut red tape than to cut construction costs if the industry is to deliver the Presidential quota of housing. The Government also wants to simplify procedures, and two years ago introduced the turnkey process in which a developer buys land, designs and builds housing, and sells the package to a housing authority. Of course it is not *that* simple, but the process is much faster than when a housing authority assumes the role of developer.

The Turnkey Solution

Contractors like turnkey because it is a contract building operation they understand, and they do not have Federal inspectors looking over the work throughout the construction period. And, it should lower costs because the developer can discuss construction economies with an architect and a builder during the preliminary design stages.

The *Journal of Housing*, January 1968, points out that the industry needs turnkey if it is to triple the output of low-rent units built under the conventional housing program. The target of the 1965 housing act is 60,000 additional units a year for four years.

The homebuilding industry is well aware that it has been missing a large chunk of business. Low- and moderate-income housing accounts for about one-quarter of the housing market, but the builders say that high land and development costs preclude them from developing this area. The houses built by developers for the open market average $24,000 each, which is well beyond the means of a moderate-income family.

One National Association of Home Builders official said of low and moderate-income housing, "If the clothing, food or auto industries had to see 25 per cent of a market they couldn't reach, they would be climbing up the wall."

Who Hands Out at HUD

Under the umbrella of HUD, the Federal Government offers several aids to the development of low-cost or low-income housing. Basically, it awards grants to develop prototypes and test parts or whole building concepts, and then it also insures mortgages for buildings with experimental features that would not qualify for regular FHA insurance.

The grants are made under Section 1010 of the Demonstration Cities and Metropolitan Development Act of 1966, which, because of an unfortunate connotation, was changed by usage to Model Cities Program. To administer these grants, which total $10 million a year, HUD drew together several research groups and formed in May 1967 the Office of Urban Technology and Research with a director who reports directly to the Secretary of HUD.

Urban Technology assists experimental buildings to be developed (see box), but it has no funds for insuring mortgages on the buildings. This function falls within the province of the FHA's Experimental Housing Program, which operates under Section 233 of the National Housing Act. Section 233 provides FHA mortgage insurance for projects incorporating workable experimental features. However, apart from these features, the proposed construction must meet the minimum property requirements for one of the NHA Sections such as nonprofit housing, nursing homes, or home improvements.

HUD's MONEY TREE

The Office of Urban Technology and Research administers four programs that affect housing:

Urban Renewal Demonstrations: For developing and testing new urban renewal methods and techniques . . . public bodies only . . . up to two-thirds of the cost. Section 314 NHA, 1954.

Low-Income Housing Demonstrations: For developing approaches to reducing housing costs of low-income families and increasing their ability to pay . . . public or private bodies . . . up to full cost. NHA 1961.

Urban Planning and Research Demonstrations: For preparing development plans, scheduling capital improvements, coordinating intergovernmental programs, researching needs for revising State statutes . . . public and private agencies . . . up to full cost. Section 701(b) NHA 1954.

Urban Research and Technology: For studying community conditions, industrialization, related research . . . generate technological innovations for improving quality and reducing costs of housing . . . public or private. . . . two-year contracts. Section 3(b) Dept. of Housing and Urban Development Act (1965), and Sections 1010 and 1011 Demonstration Cities and Metropolitan Development Act, 1966.

For information on the above, write: Director, Office of Urban Technology and Research, Department of Housing and Urban Development, Washington, D.C. 20410.

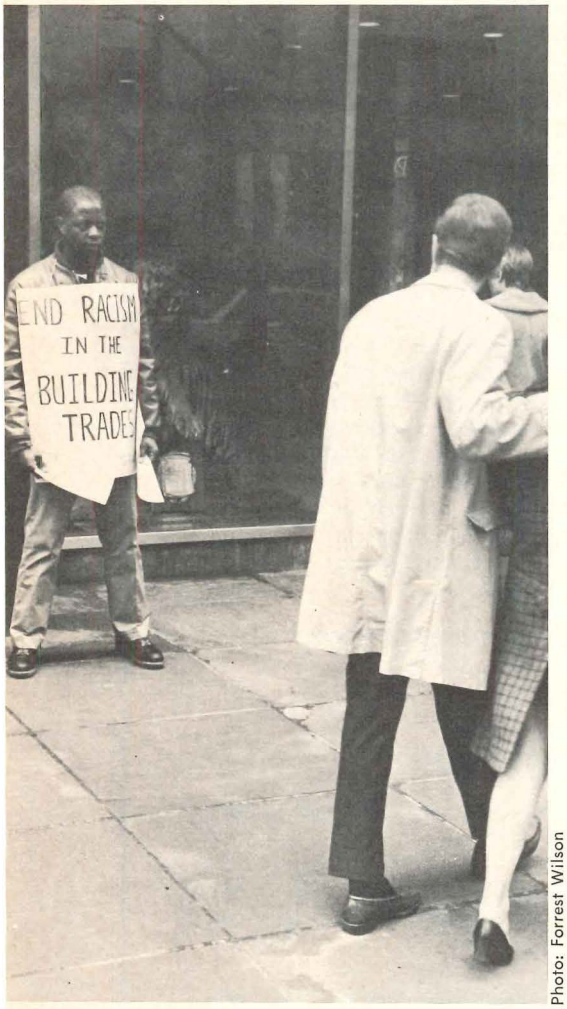


Photo: Forrest Wilson

Because the department deals with unconventional buildings, it operates with an elan not usually associated with Government bureaus. A private developer (whose project appears in this issue) was extremely skeptical of approaching FHA, but after his latest project was turned down by three insurance companies he was persuaded by a contractor to try Section 233. Now he is unstinting in his praise of the groups' enthusiasm and the way it expedited paperwork in six weeks instead of what he thought was an overly optimistic eight.

THE LABOR UNION'S VIEW

Labor has learned to adjust to prefabrication throughout its history. It has watched the paradox of mechanized mass production wiping out jobs and skills as it helps create the richest society the world has ever known. Labor has seen the skilled hand-craftsman driven into the factory to operate machines, and now watches the industrial worker being driven out of the factory by machines that operate themselves.

Today, organized labor, more affluent than ever before, is haunted by the specter of emasculation by automation that would reduce it to a powerless governmental and corporate eunuch.

The impact upon building trade union strength of industrialization and its next of kin, automation, as exemplified by Tinkertoys and boxes, is met by essentially negative devices on the part of the unions. They insist on hand labor and policing of contracts against prefabrication in an effort to protect what the unions see as an ever-shrinking number of jobs.

Labor's fears are not without justification. The possibility of sharing, with the large corporations, the plenty promised by automation seems dim indeed. If the building trade unions are to accept the idea that the welfare of the nation requires maximum job industrialization, then they will demand assurances that it will not mean their obsolescence.

The unions in addition face the demands of ghetto residents for a share of building trade jobs, which are already in danger of being moved off the building site to the industrial plant. Indeed, besides facing attack from their traditional antagonists such as the organized building contractors, they are now incurring the wrath of their former friends, the liberal politicians, who see in the unions' refusal to integrate minority groups, their stand against prefabrication, and their influence upon building codes, obstructions to their programs for renewing the cities.

Labor sees in the attempt to break union barriers to admit the underprivileged the destruction of the protective wall it has been forced to erect for its own survival. It argues that if its rights are destroyed and the ghetto residents admitted, will they be any better off without union protection than they are at present. In the drive to admit minority groups, labor seems unable to see anything other than a variation on the age-old battle to resurrect the union-breaking open shop. The ghetto residents, for their part, sensing the slowness and reluctance of the building trade unions to begin meaningful integration, may have some justification in not being too concerned with the possible destruction of the unions, which have done little to assist them and have been so unresponsive to their plight.

The Bad Guys Wear Hard Hats

The stereotype of the unionist as a bearded, bomb-throwing syndicalist, popularized in the early part of this century, has given way to an equally ominious characterization: as the obstructor of progress. As one contractor association official put it: "Unions are refusing to accept the progress made through automation and modern technology. If the unions continue to resist progress, industrial expansion, which is so necessary to create new jobs, will slow down and finally come to a halt. This union attitude can only hurt the general public by forcing higher costs, lower production, and fewer jobs."

Can a labor union overrule an architect? According to the AIA, it can. It cites cases of unions doing just that in refusing to handle prefabricated roof trusses, cabinets, prefabricated concrete forms, pre-cut insulation, premanufactured sheet metal parts, and preassembled boilers. The AIA views with alarm that architects' specifications can be set aside by union contracts.

Much of the current furor over prefabrication embodies issues that have been contested for years. The present storm centers around the now famous Philadelphia door decision of the U.S. Supreme Court *(National Woodwork Manufacturers Assoc. v. NLRB)* in April 1967. This decision, which fell like a bomb on architects' plans for Tinkertoys and boxes, involved the setting of pre-cut and mortised doors. The essentials of the case were that a contractor violated a provision of a union agreement and as a result was forced to return 3600 doors to the manufacturer. The door manufactur-

er filed charges with the NLRB, lost the case, and Pandora's box was thrown wide open.

The AIA maintains that, by the wording of the court decision, the way has been opened for the unions to strike to prevent installation or use of any kind of prefabricated product or material as long as their ultimate objective is to insure or secure work for the union members.

The contractors, on the other hand, want not only to repeal the decision but strike a blow for freedom by going one step further. They demand that Congress pass legislation prohibiting clauses in union contracts restricting the use of prefabricated products altogether. This would wipe out a number of labor agreements covering preassembled items that are not in question and open the way for strikes. The contractors are aware of this eventuality and counsel their members that it would be worth while to "take a few strikes" to win this issue.

The contractors' association also urges that every effort be made to include provisions in new agreements that specifically bar union restrictions to the use of products and materials, paving the way for uncontested use of preassembled building items. (The contractors do admit, however, that the unions have not taken advantage of the almost unlimited possibilities of obstructing preassembly that are inherent in the Supreme Court decision.)

Labor, for its part, declares that the hue and cry over the decision has been unjustly publicized by newspapers and the trade press. Among the people interviewed by P/A, a representative reply was that of William J. McSorley, Jr., assistant to the president of the Building and Construction Trades Department, AFL–CIO, who points out that this was a decision concerning a violation of a contract clause, and that it in no way presages a massive labor resistance to Tinkertoys and boxes or any other means of technological progress inherent in prefabrication.

There are very good reasons, argues McSorley, for local unions having clauses against prefabricated units, but none of these reasons is expressly designed to prevent the erection of any particular component because it was prefabricated off the site.

Building and construction trades have always been reasonable in accepting prefabrication, claims this union official. He points out the extremely high percentage of prefabricated component parts erected by union members.

McSorely then threw the ball back to the architects and contractors by declaring that the unions would welcome a site management system that would not only make building more efficient and increase

THE BATTELLE REPORT

A comprehensive study on "The State of the Art of Prefabrication in the Construction Industry" was recently undertaken by the Battelle Memorial Institute, an independent research organization, for the Building and Construction Trades Department of the AFL-CIO. A basic objective of the study was to estimate the amount and types of construction work that may be transferred from the job site to the factory and to ascertain the changes in character of work as a result of the trends toward prefabrication. It also sought to determine the effects of technological innovations upon the reallocation of manpower and skills at the job site. The Institute's findings, as they apply to boxes and Tinkertoys, include the following points:

No radical changes in materials or products are anticipated. Although a number of companies are currently conducting research and development programs, the majority are directed toward new markets and new applications for existing materials. Preassembled units are currently in wide use, but only the mobile-home industry produces totally prefabricated housing units.

Low-rise structures using about 30 per cent prefabricated shells are being built, but the possibilities for high-rise prefabrication remains unrealized. Such structures are feasible, using existing technology that would erect a preassembled shell and fill it with preassembled interior components.

Changes in prefabrication in the U.S. during the next 10 years will depend upon construction environment, construction technological advances, and factors that would constrain them. Wages, land prices, and construction activity, which constitute the construction environment, will increase fairly rapidly. This should enhance prefabrication opportunities.

As European building systems are introduced into this country, changes in construction methods are expected to occur. (There are presently four major European building firms actively seeking licenses in the U.S. and others considering the move.) The advantages of these European systems are that they reduce skill content, accelerate erection, and centralize control and responsibility for the construction process. However, a number of potential problems, such as building codes, bidding procedures, and royalty fees, must first be successfully broached. In view of this, it seems unlikely that European-sponsored systems will be introduced in the U.S. before 1975.

However, by 1975, a few U.S. firms will probably initiate some successful high-rise building systems that will represent modifications of the European systems. But to gain acceptance, they will find it necessary to relinquish some of their control over the construction process, thus diminishing the value of the building system.

The major change in construction methods will be the increased use of large interior subsystems that offer sufficient flexibility to satisfy a wide variety of individual needs and the increased use of lift-slab and tilt-up construction techniques as well as curtain-wall systems. And construction equipment will continue to become larger in an attempt to offset rising labor costs.

Architectural design innovations will continue to be subtle in nature. Buildings constructed in the next 10 years will look much like the buildings being constructed today, but there will be some degree of change in materials, organization, and assembly.

The principal constraints to the growth of prefabrication in the next 10 years will be codes, zoning, architects, unions, transportation, capital requirements, and the basic structure of the construction industry.

Prefabrication, according to the Battelle Institute, will definitely grow, but its growth will be evolutionary rather than revolutionary — much of it based on the increased acceptance of **existing** methods and techniques of prefabrication by members of the construction industry. And the greatest advances will be in the nonresidential segment of the industry.

productivity, but would, through proper scheduling of employment opportunities and sequencing work, change the seasonal nature of construction work. He believes that the 1400-hour average now worked by union members could be increased to 2000 with winterizing techniques and year-round scheduling of starts. Blaming the unions for resistance to prefabrication, he claims, is barking up the wrong tree, and advises those interested in prefabrication to look elsewhere to find the root of the problem.

THE PROBLEM OF CODES

Objectively speaking, building codes are written to provide for the health, safety, and welfare of a building's occupants and to protect property against damage. Seldom do they fail to do this. Their function has nothing to do with establishing criteria that might insure efficient and adequately equipped buildings, or encourage design innovation. In themselves, codes need neither initiate nor hamper the development of prefabricated Tinkertoys and boxes.

The Model Codes

There are four national model codes, and, according to an official of one of them, another is in the making. Since these codes do not cover plumbing and electrical work, they are augmented by two national plumbing codes and one national electrical code. In addition, there are Federal statutes governing Federal buildings, state codes covering particular municipalities within a state, and state labor laws that control building through occupancy and assembly.

Some of the more common objections to codes are that they are said to restrict home-building progress by retarding the acceptance of new and improved uses of materials and construction methods; they are said to lack uniformity; and it is claimed they often specify antiquated building procedures dating from the days when empirical, rule-of-thumb building methods were used.

In answer to such criticisms, performance codes have been offered as an alternative. However, opponents of these codes argue that local officials responsible for their enforcement are incapable of making adequate evaluations.

The various associations promoting model building codes have tried manfully to unravel the Gordian knot of intertwined, conflicting codes. Aside from the ultimate goal of unifying the model codes into a single, national system, a secondary aim is to make the performance codes workable. Since the people who sponsor and write the model codes are often building officials themselves, they are technically well equipped to evaluate and appraise the performance of new materials and methods, as well as helping industry standardize products. Such findings, when distributed to local officials, would allow them to evaluate innovative techniques.

The problem basic to codes — the chaos created by the existence of a multitude of local codes that are often conflicting and divergent — has not been solved by the model codes, since municipalities that have accepted these codes have often "adjusted" them in such ways as to restore the original chaos.

What Now?

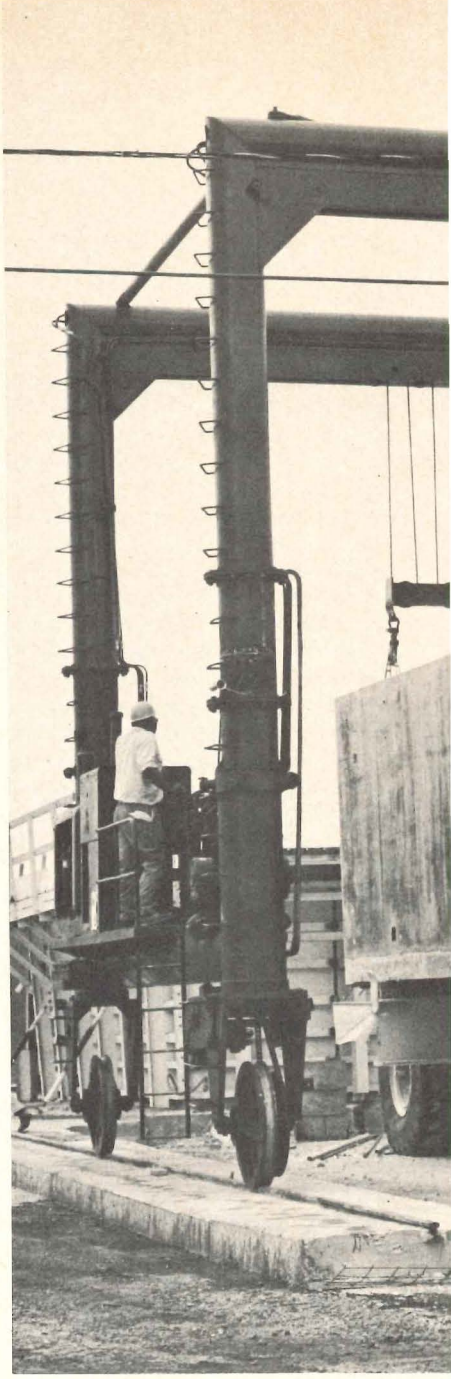
In the final analysis, the building code problem revolves around a question of priorities. There is no question as to their essential value. The question is, should this value be diluted by regional interests or should regional privileges be curtailed for the sake of national conformity?

There are also some who say that codes should not restrict themselves to the passive role of enforcement, that codes should not, as they do today, penalize innovation, but instead become a force for revitalizing the building industry. This can only be done by a combination of performance codes, highly skilled, imaginative, and incorruptible code interpreters, and the power to enforce compliance. Parts of these ingredients exist in the nations' building officials, labor skill, industrial research and development and the municipal governments, but nowhere can they all be gathered together in one place except by the Federal Government. Although some are toying with this idea, enough people vitally affected by the codes have not yet decided that this move should have top priority.

THE ARCHITECT'S CODE AND LABOR PROBLEMS

To the architect, prefabrication is a dream whose realization would relieve him of designing with hundreds and thousands of separate bits and pieces.

When the architect tries to solve this problem with prefabrication through the design of Tinkertoys and boxes, he finds



that he has changed his dream to a nightmare of code and labor problems.

The Union Obstruction

Architects find that regardless of their attempts to anticipate labor contingencies, these can seldom be accurately gauged. They find that union opposition to innovation proves costly and often seems entirely arbitrary. Furthermore, the conflict between industrial unions and field unions means duplication of work, with field unions demanding that their men be paid for work performed in prefabrication, thus effectively eliminating any savings to be gained.

Architects find that they cannot predict decisions, that there are conflicts between national unions and locals. In short, they are faced with a confusion of contingencies for which they have not been trained, either in their education

Photo: Courtesy, Armco Steel Corporation

Gantry lifts concrete modules en route to hotel at HemisFair 68. Similar modules cast in same molds are used in two-story housing project in San Antonio (see p. 122).

or their practice. More often than not, their clients, regardless of their initial enthusiasm for innovation, will be intimidated by costs that can in no way be anticipated.

Even architects as enthusiastic as Paul Rudolph, who sees the future of housing lying in mobile home techniques and who will work with the given conditions of any problem, finds that labor and codes are stumbling blocks. However, he thinks that the problem can be "finessed."

In contrast to the obstructions encountered by the architects, manufacturers of prefabricated units seem to operate with very little difficulty.

How It Is Done

In many instances, prefabricators would undoubtedly benefit from unification of labor practices. However, this has not prevented them from organizing and conducting highly efficient businesses entirely dependent upon Tinkertoy and box preassembly.

For example, the E.F. Hauserman Company completed, developed, and was awarded partitioning contracts under the SCSD programs. Hauserman employs union carpenters and has an agreement with the national union. It honors regional union stipulations and reports — in fact, boasts — a remarkably amicable relationship with unions.

However, Hauserman is a large enough organization to have regional offices, with men belonging to district unions. It has its own crew of key erectors that specialize in assembly, and sends them to work anywhere in the nation.

Even though this company has proven highly successful in the manufacture of preassembled partition units, it shied off from the prefabricated housing market when a market research analysis indicated the problems of codes and labor might be beyond even its expertise.

Marshall Erdmann, who heads an organization that designs, engineers, prefabricates, and has erected a thousand buildings all over the U.S., reports no difficulty with labor or codes.

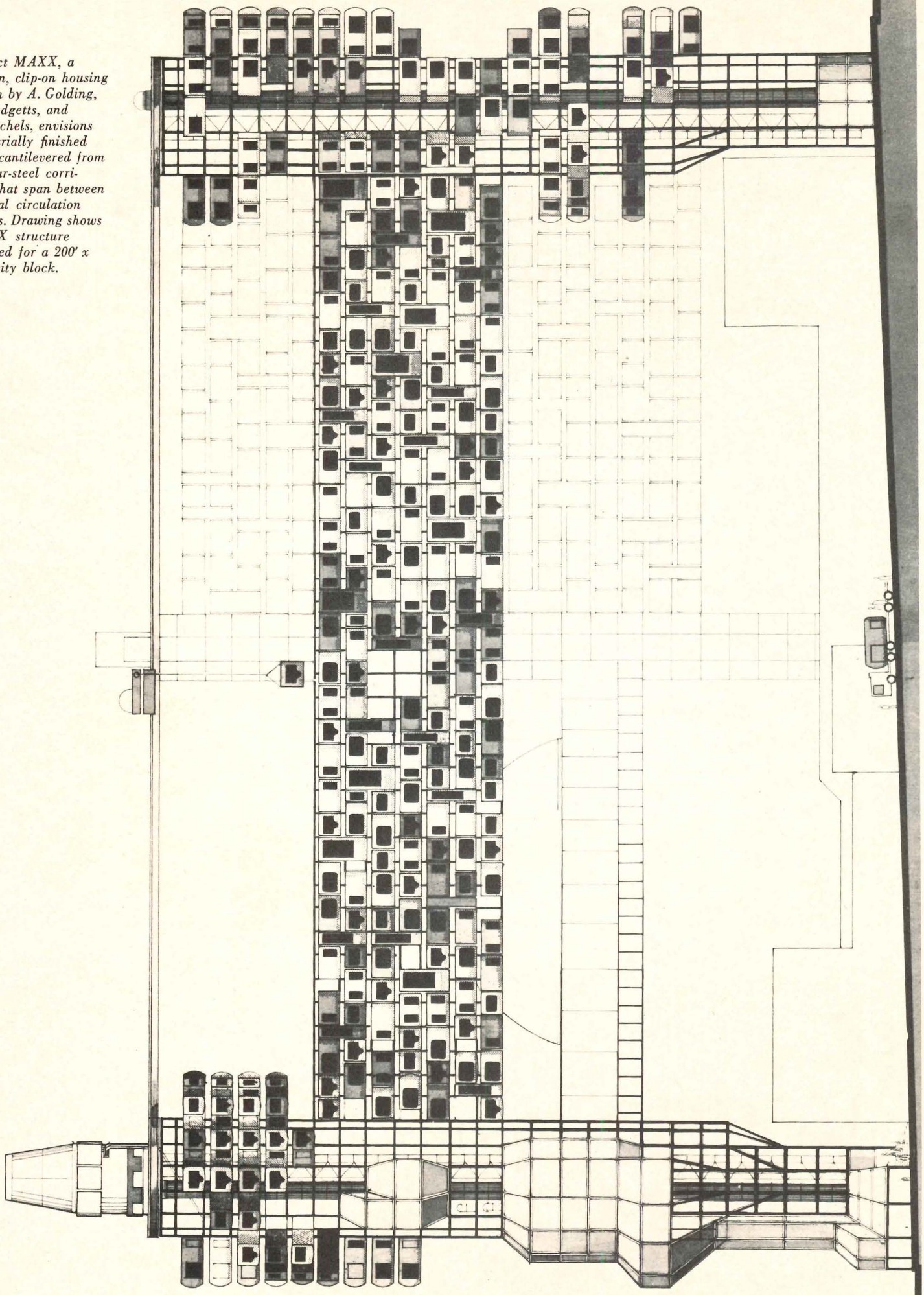
His Wisconsin plant employs union men. They are members of a prefabricators' union that was begun as a separate entity organized by an AFL union. Erdmann has agreements allowing him to send his men anywhere, and does.

Mobile Homes

Mobile-home manufacturers have lived with the problems of labor and codes for a long time. Neither of these is as bothersome or restrictive to them as they are to the architect.

In the mobile-home industry, labor is

Project MAXX, a plug-in, clip-on housing system by A. Golding, C. Hodgetts, and D. Michels, envisions industrially finished units cantilevered from tubular-steel corridors that span between vertical circulation towers. Drawing shows MAXX structure planned for a 200' x 400' city block.



about half organized, with about half the organized shops belonging to the United Auto Workers, according to one Mobile Home Association official. Shop organization is industrial rather than craft, which eliminates trade jurisdictional disputes. The main friction occurs when mobile-home units are used as part of other construction. They then come in conflict with the craft building unions.

The Mobile Home Association has adopted its own voluntary performance code, which it endorses and polices in the shop of its member manufacturers. The code has been accepted as a government standard and has met with little opposition on the part of municipal inspectors.

Zoning for mobile homes has been a greater problem than either unions or codes. Planning and zoning boards have traditionally kept the "trailer" sites along highways. This is changing, however as mobile home sites become more permanent and attractive.

The urgent need for housing is another factor that has changed the attitude of some municipalities in altering zoning restrictions against trailer homes.

What Does It All Mean

The fact that architects encounter more difficulty with unions and codes does not mean that they are less capable than the builders or manufacturers in handling these problems, although they are usually much less experienced. It means that their plans are more comprehensive. Except for the mobile-home manufacturers, no other prefabricators are producing entire units.

From the arbitrary and often inconsistent local jurisdictional disputes, it can be concluded that the unions themselves are by no means of one mind in acceptance or rejection of building prefabrication. Generally, if the prefabricated element is large enough, they ignore it, as exemplified by Erdmann having to pay a $500 penalty to a local field union that found factory ripped 2x4's inside one of his prefabricated buildings. They completely ignored the building itself.

The more dispersed an item is, the more likely it is to be questioned. For example, preassembled concrete forms have been challenged, yet entire precast boxes have not. Why should electricians who have accepted the principle of standardization to such an extent that electrical fixtures are interchangeable throughout the nation insist upon rewiring a lamp that came prewired from another electrical union shop?

All of these impediments to the realization of the progress inherent in prefabricated Tinkertoys and boxes are essentially picayune and illogical. None of them in themselves represent an organized threat to progressive building technology, although, in total, they present formidable opposition. Those who oppose them are, like them, also fragmented in outlook and unorganized.

The only possible force large enough to standardize codes, direct and protect labor, secure a rightful place for minority groups in labor unions, plan and finance the extensive use of Tinkertoys and boxes, is, of course, the Federal Government.

And yet the Government itself represents a conflicting set of forces that makes the yielding of a single solution to the problem a slow, painstaking process. For one thing, the Supreme Court decision in the Philadelphia door case, while it does not entirely eliminate prefabrication, hardly offers it any encouragement. For another, certain Government departments such as HUD are maintaining constant pressure on the unions to admit more minority group members into their ranks. And in Congress itself, the contractors' association has managed to have introduced into committee prospective legislation that would, in effect, bar unions from striking on issues involving prefabrication. Conceivably, then, the intricate system of checks and balances that forms the basis of our system of government makes the solution to code and labor problems seemingly insoluble — at least in an election year.

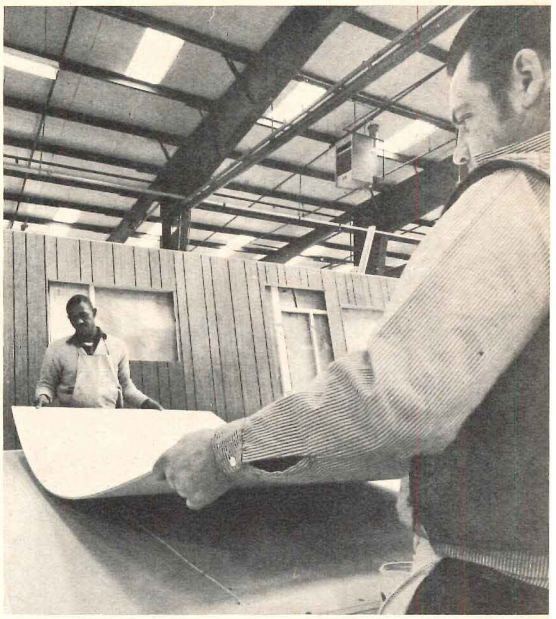
LOW-COST HOUSING AND THE URBAN ENVIRONMENT

The over-all impact of the new advances in low-cost housing construction on the imagination and design sense of architects has been considerable.

Architects' half-century-old dreams of stacking up building blocks are now joined by an entirely new vision of an urban superscale. As elements of plug-in, clip-on systems, boxes raise the Tinkertoy construction idea to an even larger scale than before, to a point where a whole living box is a Tinkertoy part for a plug-in cage or structural frame. To illustrate this change in scale, we need only be reminded that Paul Rudolph calls boxes "the 20th-Century brick."

In this search for a new scale for megalopolis, many architects see the box as expressing on the exterior the scale of a whole family-size living unit — no longer the scale of a single individual as formerly expressed by the window; they also see the supercage of a tower-of-boxes as leading further to their large-scale urban image.

As another contributing factor, most



architects have been exposed to Pop art principles, which have laxed them into recognizing the values of the previously disdained roadside trailer; whereas, concurrently, the appearance of the mobile home has been markedly improved.

Sociologicial Questions

Sociologically, also, many members of the architectural profession acclaim boxes as a means of providing a choice of housing units to satisfy every desire and make housing as available as automobiles. They see the exercise of personal choice as an emancipation — "freeing up people's minds" — which is one of the purposes of other contemporary arts in investigating choice and indeterminacy.

"My dream is for the people to be able to make the decisions about environment again," Chicago architect Walter Netsch asserts. "I want the human being in his urban acre to be able to reshape his environment." The Archigram group comes to mind as well as those South American architects, such as Sergio Bernardes in Rio and Pedro Ramirez Vazquez in Mexico, whose schemes to improve slum communities include providing floor, roof, water, and sanitation while permitting the inhabitant to devise the plan and erect walls and enclosure in his own manner.

However, not all architects and planners who favor choice and indeterminacy and who zealously yearn to provide low-cost housing agree that this will be best accomplished by energizing the mobile home industry to produce more boxes. For every architect who feels that "it is so inevitable that housing will eventually be done through mobile house techniques," as Paul Rudolph does, there is some soberly balancing disagreement.

Walter Netsch is one of those who dis-

agrees strongly on this point: "In the ghettoes, we have discovered that the question of space is a critical one, and to give people less space — such as a trailer — would be a cultural disaster. We did not succeed in taking the accepted conditions of the American bungalow or the three-story apartment and make an American city. To do just another living unit as the glue of a city is a fallacy. If you just move this in on a critical path and you substitute trailer for house, you come up with the same mess. Look at trailers in the public school areas and you will see the constraints you will have with them."

Harry Weese says, "The trailer is one of the most expensive kinds of housing you can have. Look how people trade them in every three or four years, like an automobile. First cost is one thing, but obsolescence and longevity are something else. The mobile home direction is the opposite of what I think should happen, which is that we build a supply of housing good enough for more than one decade and that can be re-used. It takes a commitment." Architect Joseph Passonneau summarizes the objection, "There is a connotation of gerrybuilding in trailerishness — that the society is dumping this junk on an underprivileged element."

Yet, as tyro-architect Craig Hodgetts points out, "For many people who have been living in tenements or government housing, the possession of their own trailer — a fully equipped home — is a great step up."

"I have no objection to the use of anything that would get people out of the filth and dirt and chaos of the ghetto," Netsch adds, "but I would feel that the trailer was only valid as a transition."

Architect Kenneth Isaacs elaborates, "The trailer manufacturers' approach has been a kindergarten one. They never really approached their problem on any other level than attempting to synthesize, within their dimensional programmatic requirements, the suburban house. They couldn't get away from this kind of dream. If they could have, they might have had something wonderful. Because the thing that was at the root of the trailer's inspiration was the idea of freedom: People wanted to be free to move."

The freedom from impedimenta that this type of housing provided is no doubt real; after all, its spatial limitations are fairly minimal. But the freedom of mobility was a chimera, since most mobile homes move only once — from factory finishing to site attachment.

Ironically, the very nonmobility of the mobile home may prove a sociological asset in terms of the potential, which some systems of modular urban high-rise offer, of not disrupting neighborhoods.

As Joseph Passonneau points out, "If the central problem of the city is *social justice*, then good housing, minimal disruption to neighborhoods, and minimal dislocation of inhabitants become equally significant sub-options."

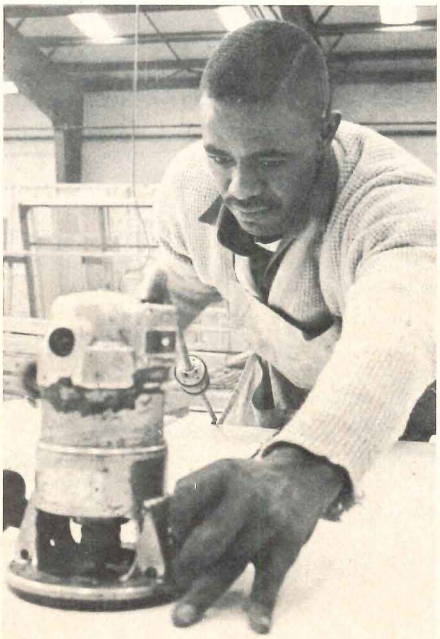
Dislocation of inhabitants is a factor frequently repeated in evidence of some modular housing schemes, in which tower cores need less than conventional space for foundations. William Morgan shows a gradual step-by-step rebuilding of neighborhoods so that most displaced inhabitants can move into a new tower on their own blocks rather than be forced to move out of the area (p. 116). Paul Rudolph's Graphic Arts Center scheme for New York (p. 110) had the same potential, but Rudolph himself questioned how well it would work in the face of the construction crew wanting to spread out on the site. Ironically, many of these projects could most easily be financed under Urban Renewal, which is in favor of bulldozing an entire block at a time. Much of the choice may therefore remain, as usual, in the power of smart money.

Choice of available housing units, in the long run, will in any case always be dependent on financial position, and in this respect again the analogy of the automobile holds true. The dream of multiple choice may be a youthful, or perhaps even a greedy one on the part of affluent segments of our society more than it is a dream of the needy poor. For they will, no doubt, always feel fortunate to acquire even one living unit.

Boxed-In

A rarely answered question is what choices will our society and our construction industry reasonably be able to provide? Will they be choices in terms of today's needs or merely choices in the lingering battle of the styles?

Now that a truly industrialized, prefabricated house appears to be realistically within reach, we seem to want something more than what industrialization seems geared to provide. We no longer see as adequate the mere box — its shelter and sustenance — now that we have elevated to prominence and have verbally and officially recognized the importance of the "environment." The box is less relevant; it can even be impermanent, perhaps. Today, we want to go beyond industrialization to something more spiritual, more psychologically fulfilling; we want to get back to the basic need for individuality.



This shift in emphasis has been illustrated recently by the change in attention from the technological aspects of our all-at-once, multilayered communication patterns, of "the medium is the message," to recognizing the basic instinctive aspects of man as "a naked ape."

How can our technology satisfy the requirements of that individuation? As Columbia University sociologist Daniel Bell has revealingly explained in his "Notes on the Post-Industrial Society," published in the periodical *The Public Interest*, there is a conflict in being able to provide a housing module that would, on the one hand, offer the best good for the most people — "a group welfare function model" in the sociologist's words — and, on the other, would also satisfy "individual utility preference." This conflict sociologist Bell and others refer to as "the paradox of the cyclical majority."

In Bell's words, "When one turns from individual decision making to that of groups, when one considers the problem of how best to amalgamate the discordant preference patterns of the members of a society so as to arrive at a compromise preference pattern for society as a whole, we seem to be at a theoretical impasse. . . . This problem — of seeking to produce a single social ordering of alternative social choices which would correspond to individual orderings — is academic, in the best sense of the word."

As a consequence, architects are working on designs for many different boxes, in a desire to change the standard industrialized mobile home, and to provide more opportunity for individual choice. It is not the mobile home manufacturer who contemplates change; according to an industry spokesman, they are not interested in the design process because they do not recognize how much they do not know about it. The mobile home manufacturer is simply depending on the structural engineer to build something that will hold his module in a high-rise rack.

Industrialized boxes, therefore, will not limit the amount of work for architects — any more than any other automation has limited jobs. And as architects Ziegelman & Ziegelman point out, "There will al-

ways be the other kind of architecture. There will never be all of one kind of building."

What will happen, as we realize our dreams of low-cost housing, as we broaden perspectives on our total society, is that we will recognize that a large group of people live in what Daniel Bell calls "new and higher substandard conditions."

The same change in perspective, the change in scale, which will permit us this wise recognition, may also be one of our greatest dangers. Urban superscale, which architects are already measuring by, has been repeatedly called one of the serious mistakes of urban housing in the past — even in HUD's own published *Report on Housing* by Robert D. Katz. Overscaled impersonal complexes, in which the architecture dwarfs the individual and causes him to lose contact with his surroundings, have been found psychologically destructive and a significant contributor to social problems. Daniel Bell agrees, "The question of the size and scope of all social units — the appropriate size of governmental units, the optimal size of various organizations, the decentralization of function and the creation of a 'human scale' in a mass society — is the most crucial sociological problem that arises out of the influence of number, density, and interaction, and the consequences of diffusion and change of scale."

For a futuristic television play, set in the impending days of interplanetary saturation as a result of the earth's population explosion, dramatist Megan Terry (of *Viet Rock* fame) depicted a single-room box as the typical living unit. To each unit are assigned nine people. Bittersweetly titled "Home," the play demonstrates how in these boxes, all life-supporting facilities and education are supplied and all communication and thought are controlled from a lunar-based headquarters by Super Big Brother, who carefully selected the nine occupants to constitute a balanced social microcosm. The interplay between them dramatically questioned whether all-pervasive planning — regardless of human instinct, passion, or choice — can be an efficacious defense against overbreeding.

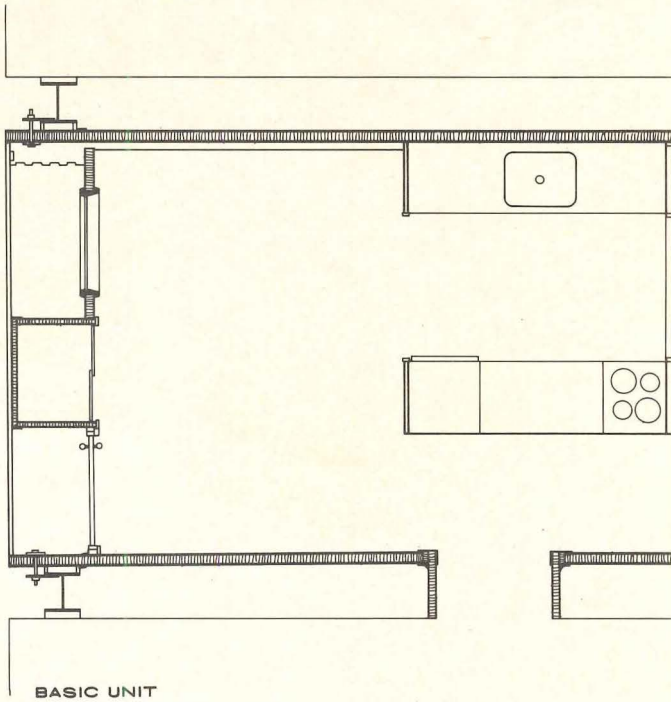
Will we start now, courageously, to push forward with today's boxes in hopes of manipulating a humanizing scale in the future, and in the hope of providing a sufficient number of housing units for the future population? Architects, politicians, industry, be forewarned: If, in apathy, we delay in seizing the present happy conjunction of A-OK factors for low-cost housing, society may ultimately have to assign nine occupants to each box everywhere — perhaps both above ground and below — in the third millennium.

Photo: Courtesy, Sikorsky Aircraft

NEW TECHNIQUES: Real and Unrealized

A survey of prefabricated techniques for speeding construction of multistory and low-rise housing.

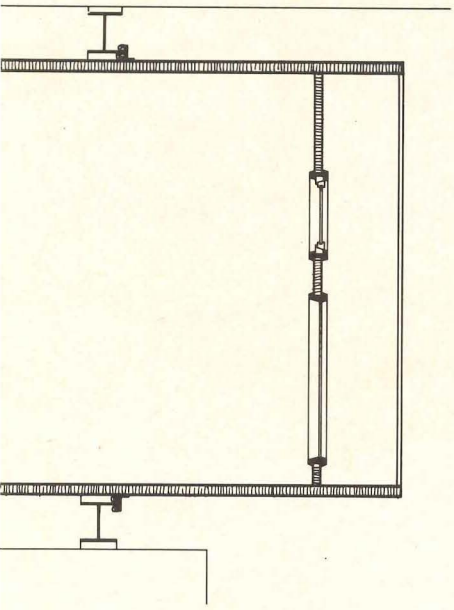
Box Units with Trade-In

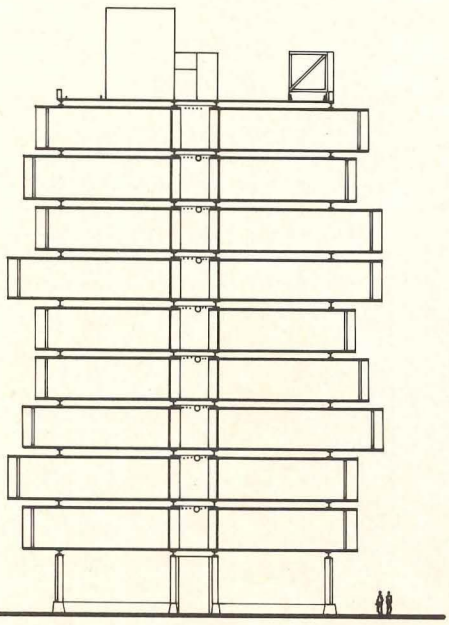


BASIC UNIT

John K. Holton, of The Perkins & Will Partnership, Chicago architects, has developed a general system of modular box living units known as PLUS (Personal Living Unit System). The purpose of this system is to make possible high-density concentration of residential units while giving each home, whether built separately or as part of a row, cluster, or high-rise frame, the advantages and character of a private home. The structure, materials, and overall design differ in the various units thus far evolved — none of which have been as yet put to use — but all are designed to be trucked, with 12 ft widths and heights of 9 or 10 ft. In general, units are constructed as box girders, with stressed-skin construction of steel or plywood over a ribbed or cellular core, and with all openings in the structurally neutral end walls as far as possible. Some units are intended for stacking two or three high. Components are designed to be readily replaced, and to be salvaged with a minimum waste of reclaimable materials.

Components





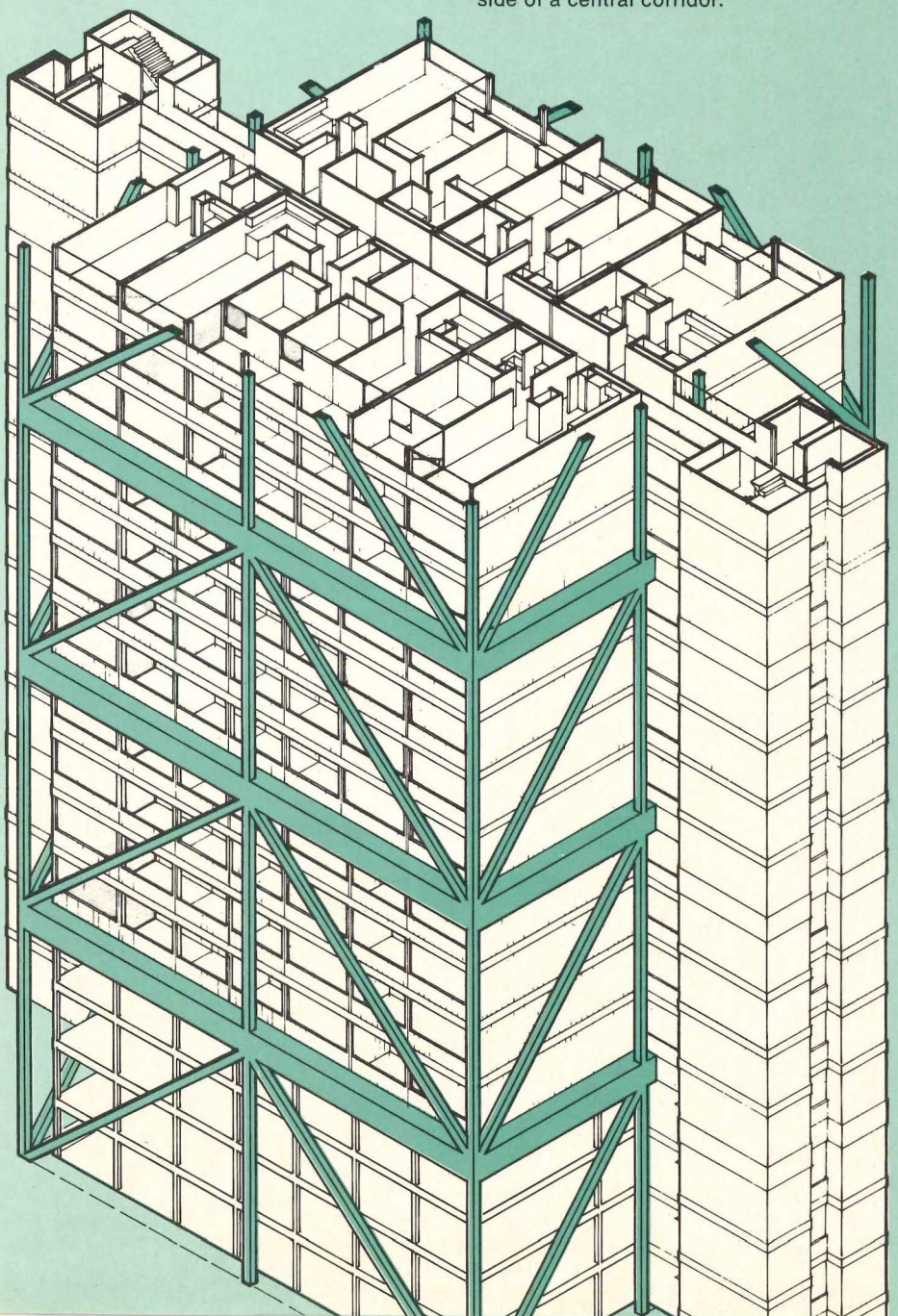
ELEVATOR BUILDING

Stacking Steel Containers

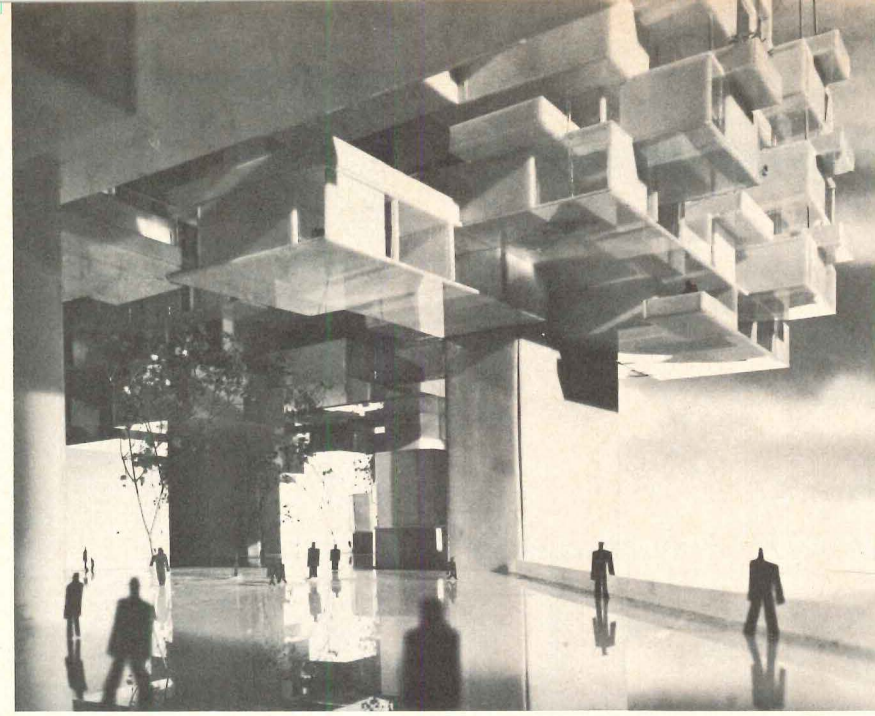
Light steel-framed modules and a framework developed by Patrick Moreau and Sim Van der Ryn is adaptable to either low-rise walkups or high-rise structures. Moreau and Van der Ryn, of Berkeley's Department of Architecture, propose a system that takes advantage of standard fabrication, standard construction techniques, and basic steel modules similar to those now in use for relocatable classrooms. Components can either be shop or field fabricated.

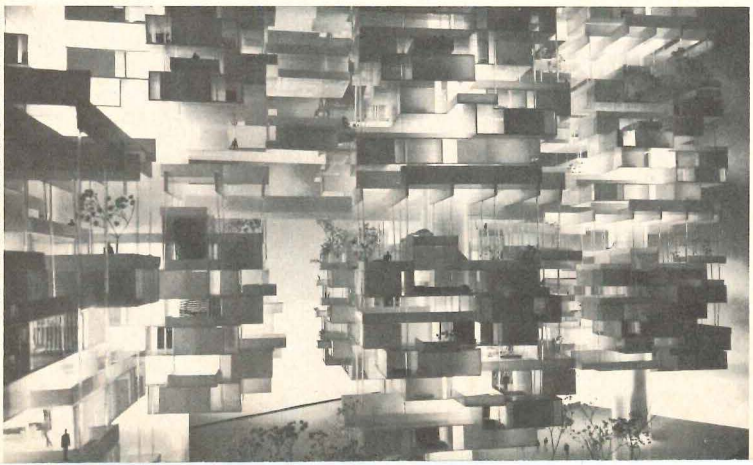
The basic module is 10 ft to 12 ft wide, and 30 ft to 40 ft long — a rigid welded box of C and Z-shape cold-rolled sections.

Stacking up to five stories requires no intermediate structure. For high-rise, however, there must be a supporting structure of concrete or fireproofed steel. Modules may cantilever up to 5 ft over the frame. In plans for a prototype apartment tower, service cores flank the building on each end, serving containers stacked on either side of a central corridor.



High-Rise Rigging





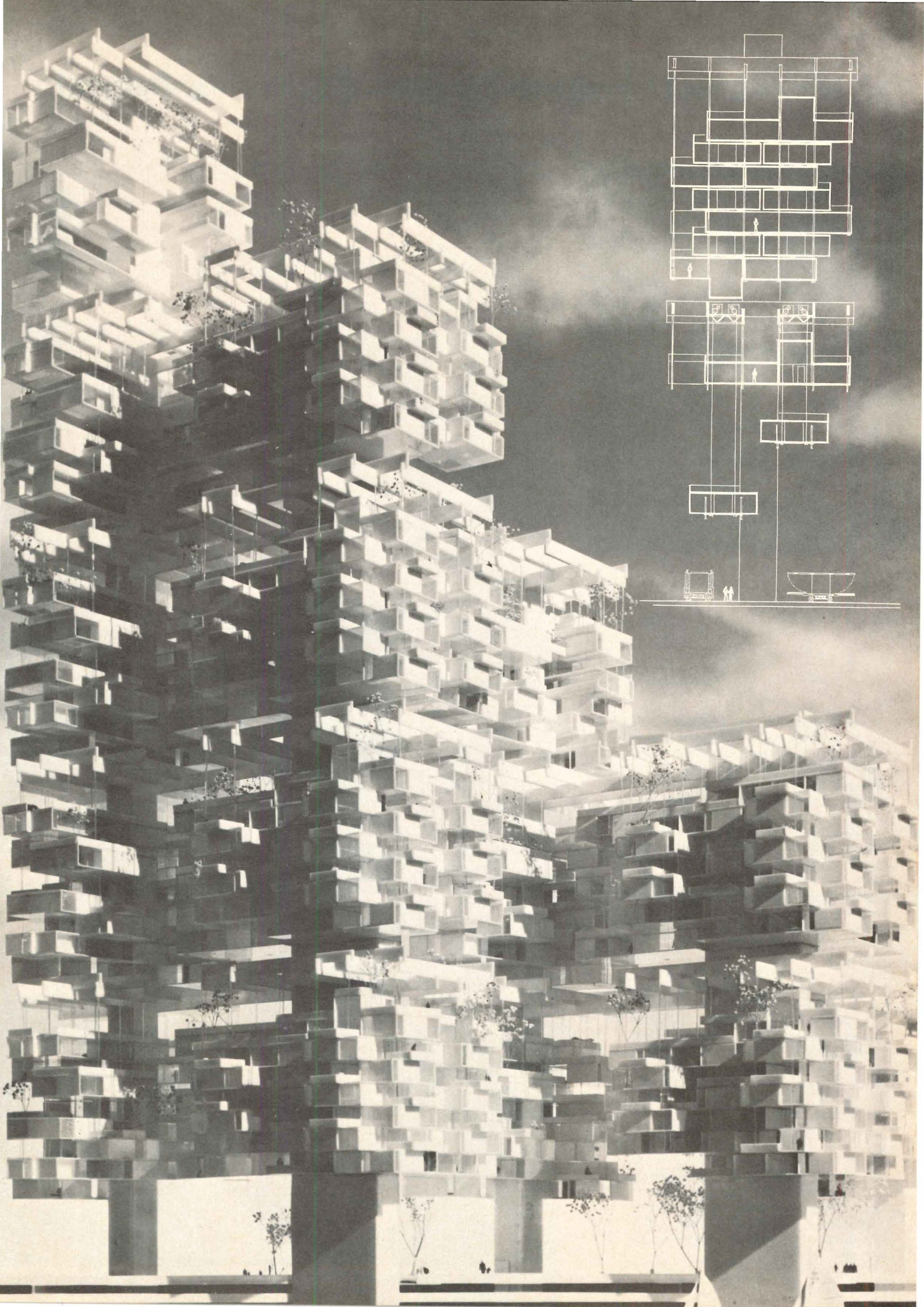
Photos, this and facing page: Ezra Stoller

Apartment towers using Paul Rudolph's prefab boxes (see p. 132) were developed by him for a project in New York City. The prefabbed living units will be suspended from trusses attached to a central core, and Rudolph makes a nautical comparison between the suspension system and a ship's rigging. The central elevator and stair core is a mast; trusses extending out from the core at about 10-story intervals would be the spars; and suspension cables are the rigging.

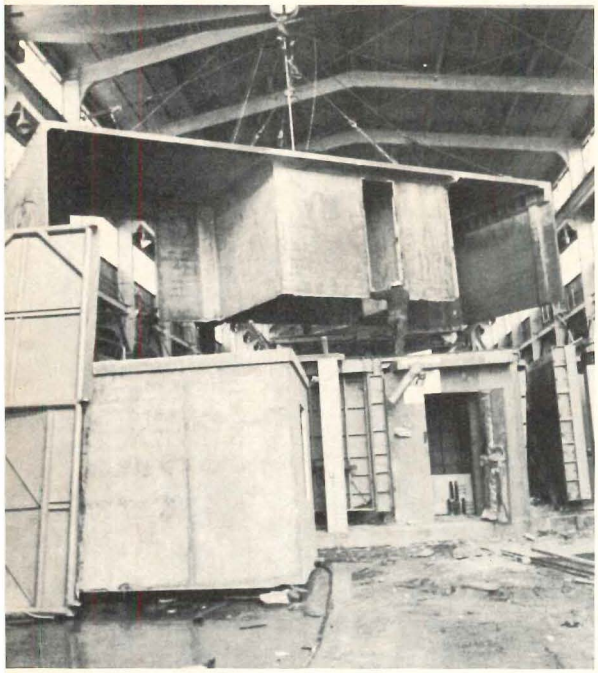
Once the core is in place, buildings would be erected from the top down. Boxes would be winched into place by the same cables that permanently support them, and about 10 levels would be hung from each cantilevered truss. For communal facilities, spaces can be left between boxes and trusses.

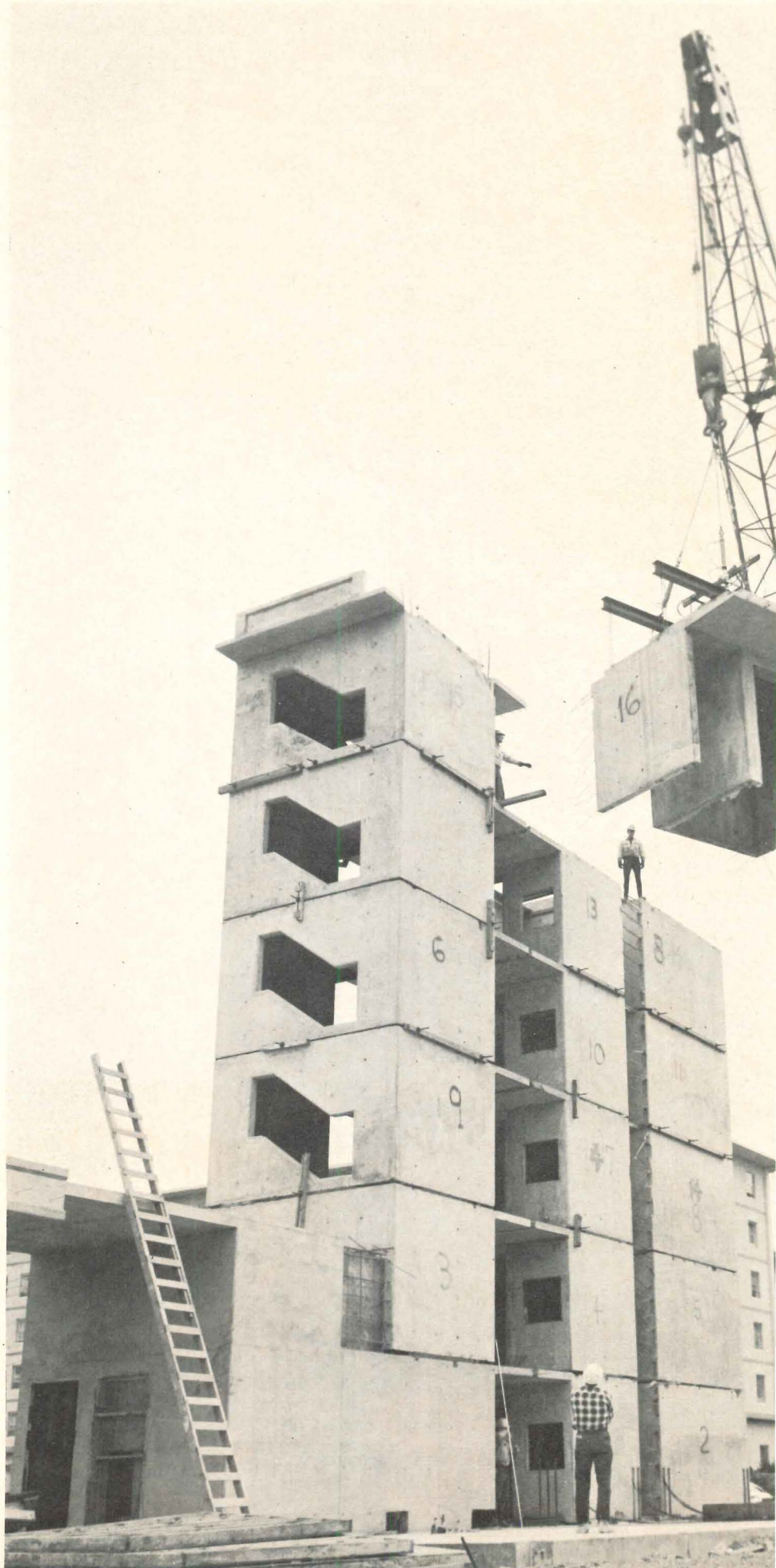
In theory, the urban scheme would take up very little space at the base, thereby keeping dislocation of nearby residents to a minimum during construction. In practice, however, Rudolph is "somewhat dubious" about how much construction space will be needed.

The project, a graphic arts center planned for the banks of the Hudson River in lower Manhattan, was to provide facilities for the city's lithographic and printing industries. In addition, it would have included office buildings and apartment towers using the suspension system. However, because of a recent change in administration at the city agency concerned with the proposal, it has been dropped, and it may be some time before another opportunity for its construction arises.



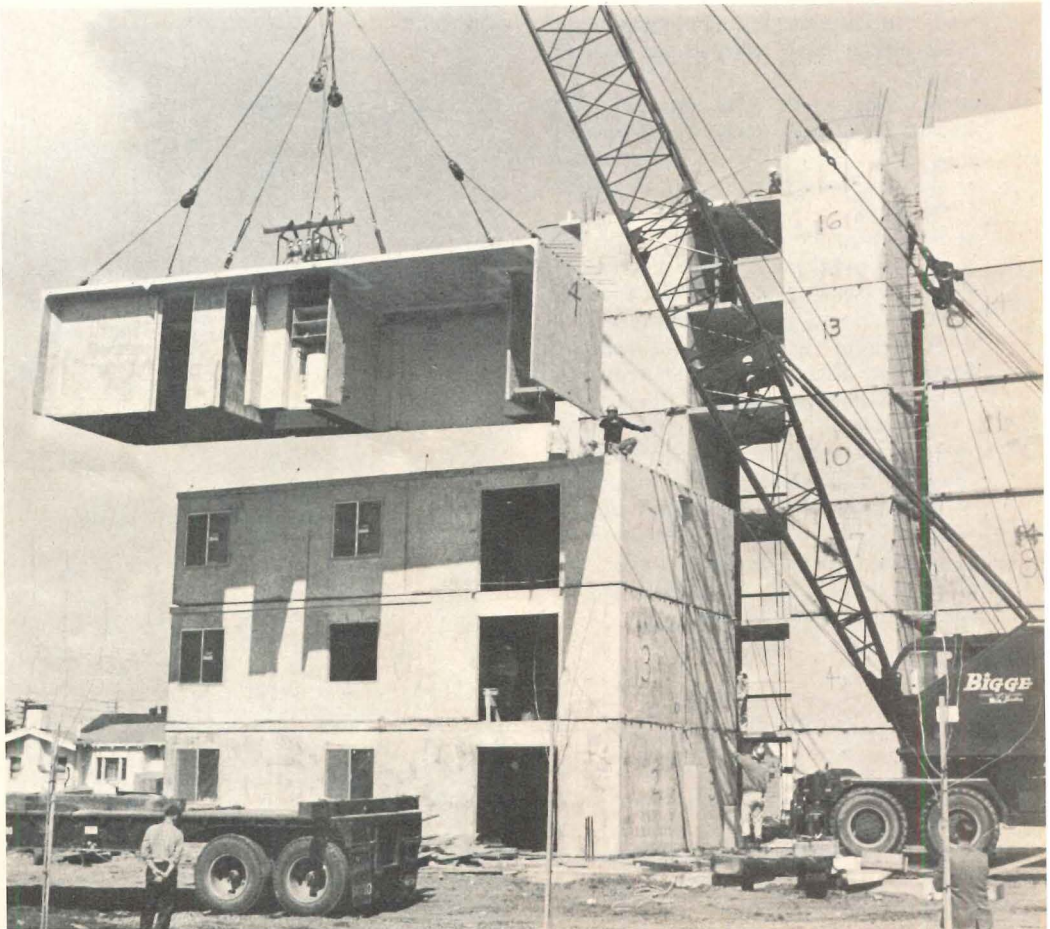
Lightness and Strength Through Expanding Cement



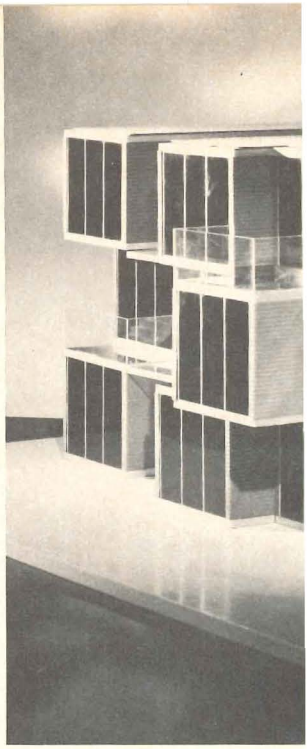


Stressed Structures, Inc., a Littleton, Colorado, building organization, has developed a type of concrete box unit for apartment buildings known as Uniment. The essential feature of this is Chem Stress Cement, which expands rather than contracts as it cures, thus prestressing any embedded reinforcement. Because of this, and because of its highly controllable expansive properties, complicated concrete work that is monolithic, light, and of exceptionally high strength is possible. In a Uniment six-story apartment house now under construction in Richmond, California, apartment units whose bearing walls are no more than 2 in. thick are being used throughout. Partitions are cast as one piece with exterior walls and ceiling slabs, and all cabinet work, plumbing, wiring, heating outlets, hardware, and painting are factory installed. Units are stacked vertically, so that the ceiling of one serves as the floor of the unit above. Each is 11′ x 36′, and the apartment house contains 24 of them. Theoretically, the stacking of these units could have taken only 24 hours, and an entire apartment building of this size could be ready for occupancy 30 days after the clearing of the site. Initial economies are estimated at approximately 20 per cent over those of conventional construction, and the cost of maintenance, because of the high quality of the concrete work, is expected to be very low.

Assembling the Uniment apartment house: removing apartment unit from mold (facing page); stacking stair and elevator units at site (center); stacking apartment units (below).



Ideas from J & L



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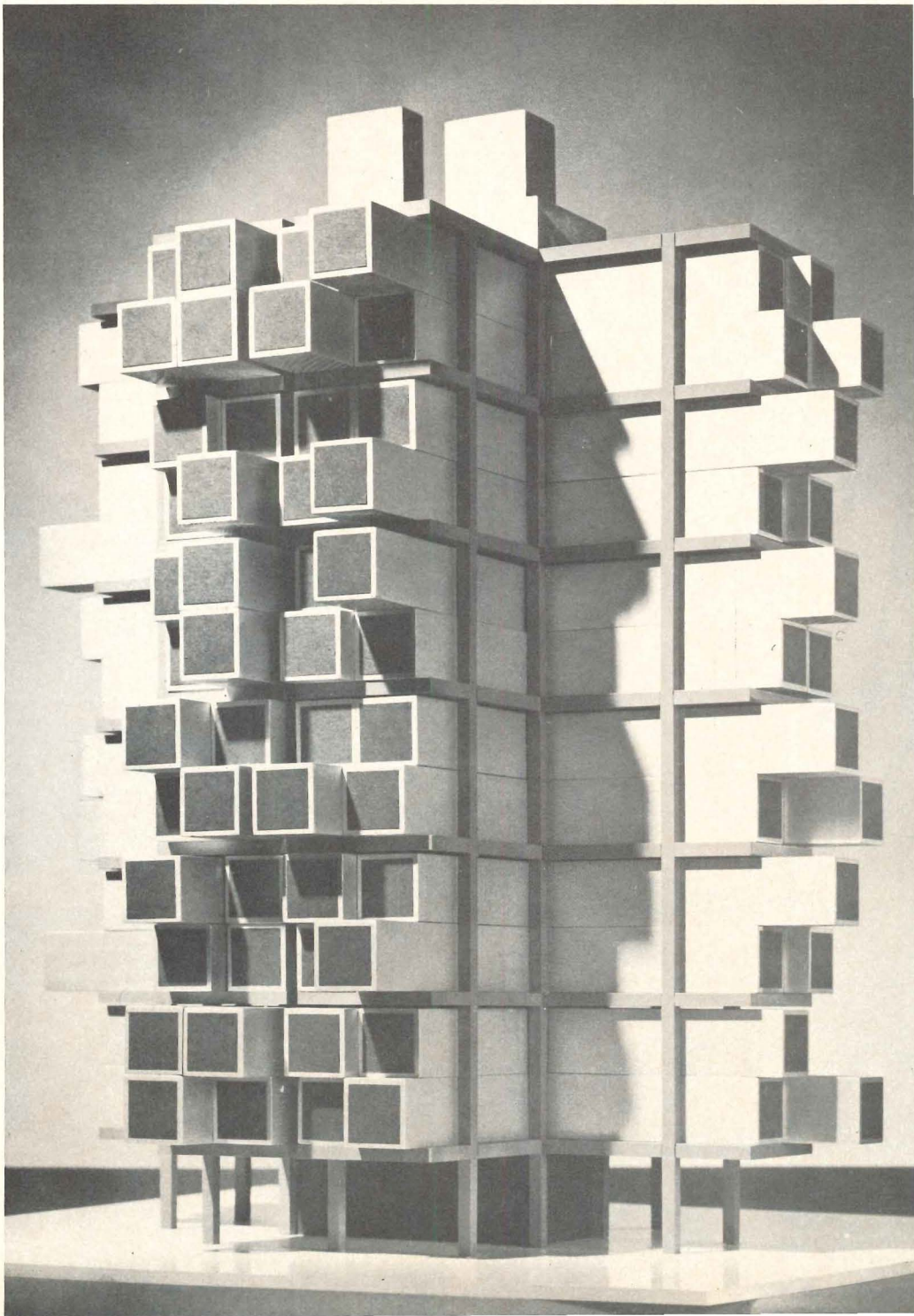
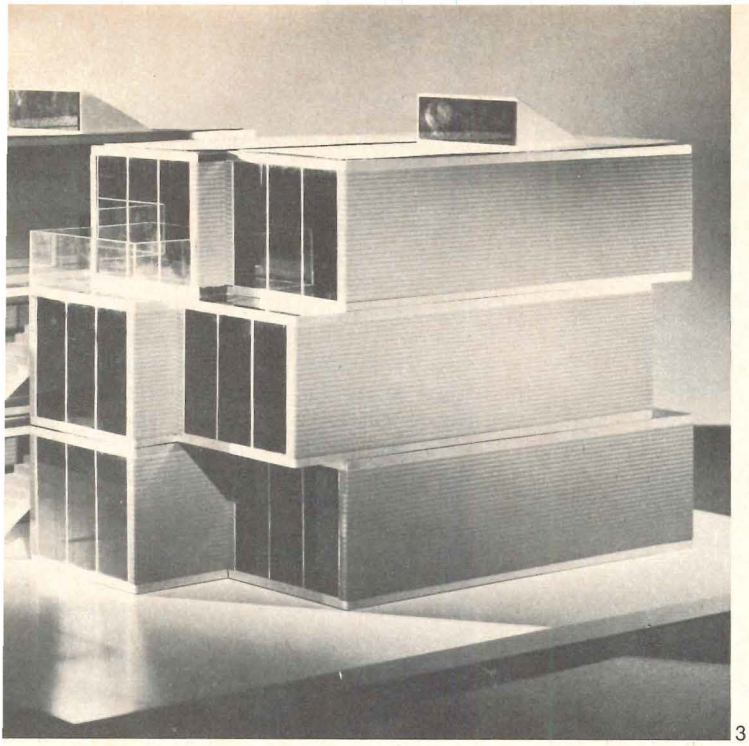


Dalton-Dalton Associates, Inc., Cleveland architects and engineers, have developed a number of schemes for steel-framed prefinished housing units, to be manufactured by the mobile home industry for the Jones & Laughlin Steel Corporation. The types developed include:

- A box apartment unit **(1),** hoisted and fitted into a cruciform-plan steel frame with a utility, stair, and elevator core. The units, up to 48 ft long and 12 ft wide, would include one apartment each. Each unit would be exposed to daylight on at least two sides.
- A "tilt-up" unit **(2),** 12 ft square and up to six stories high, trucked horizontally to the site and stood next to other units to form an elevator apartment house with a modular but possibly irregular plan.
- A "town house" unit **(3),** 36′ x 12′, stacked up to four high beside preassembled stair units to form apartments occupying one or more units on one or more stories.
- A "cross-stack" unit **(4),** 36′ x 12′, stacked modularly to form either individual houses or apartment clusters. Framing would allow cantilevering of 12 ft lengths of the units.
- A 12-ft square unit having sides that could be folded out to form a cruciform structure. Units could be joined together to make larger single-story houses.
- A "flip-top" unit, 12′ x 24′, having a hinged roof area at one end that could be raised to permit windows 16 ft high.

A number of these units would be extendable by means of panels that could unfold to create balconies or extensions of interior spaces. The studies do not closely examine roofing and wall materials, but do propose weathering steel as a siding in one design, and indicate factory-applied brick veneer for another.



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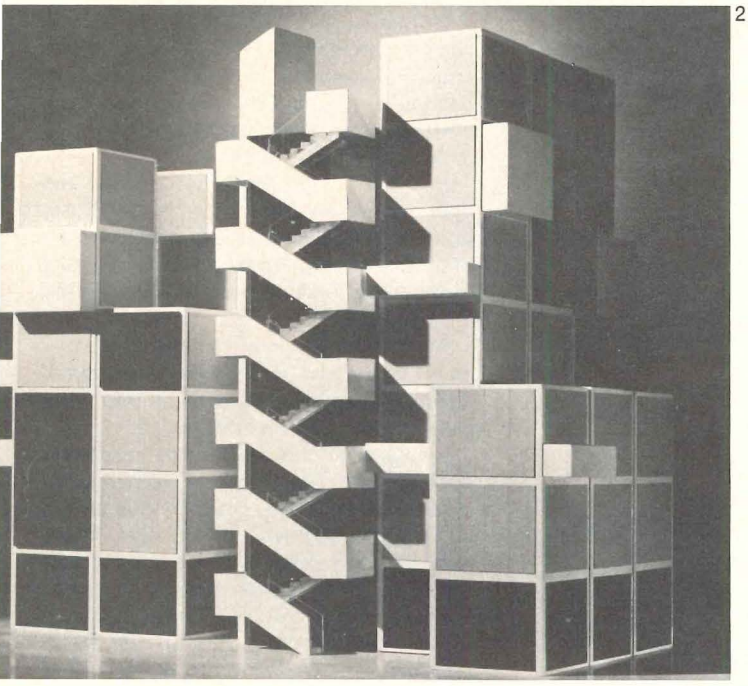

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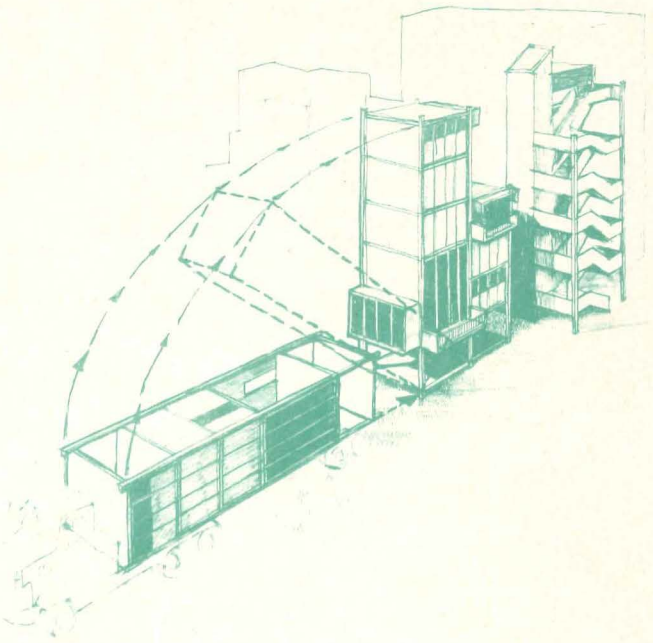

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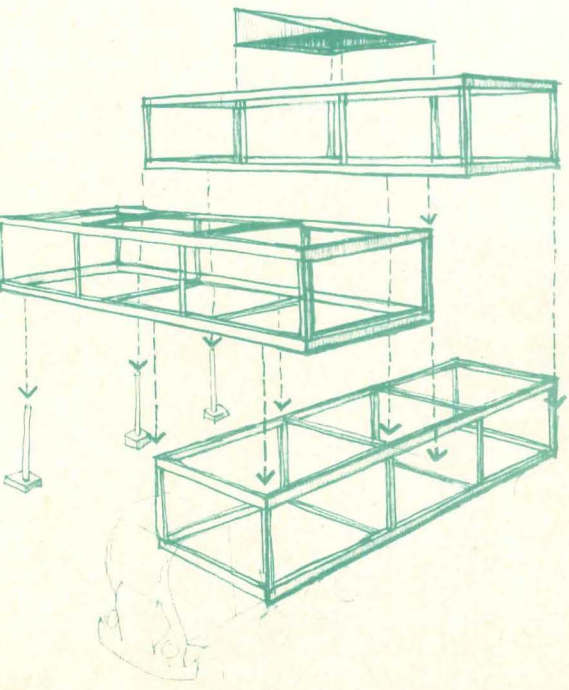
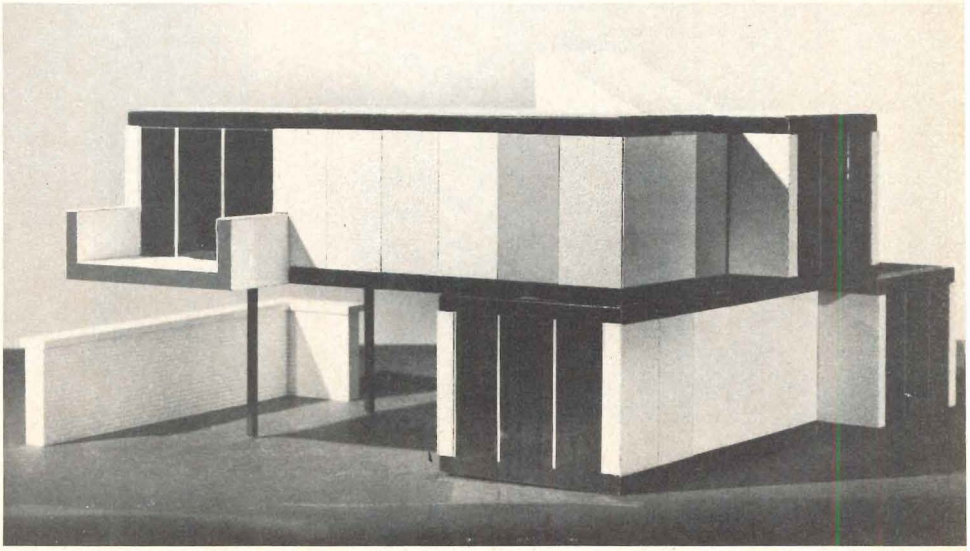
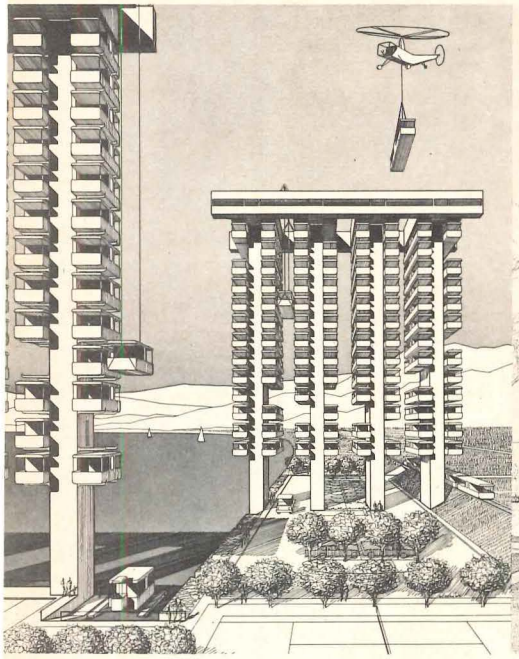




From Flying Boxes to Stacked U's



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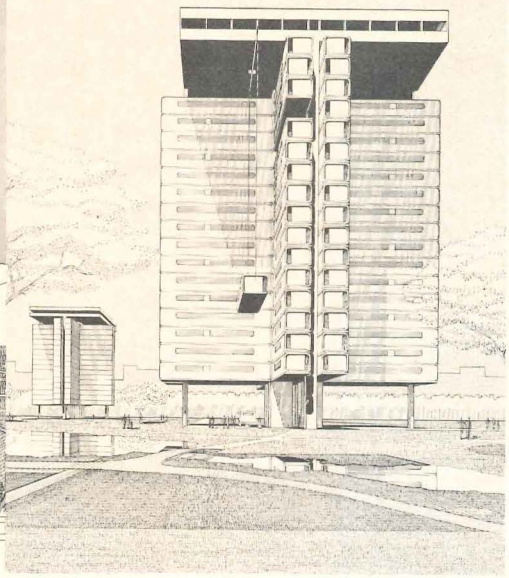

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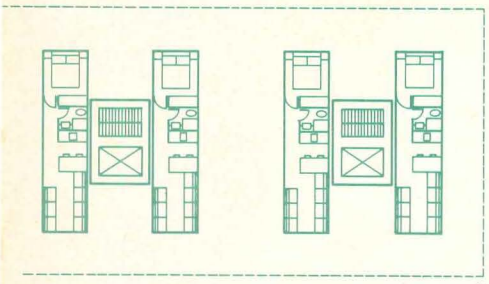

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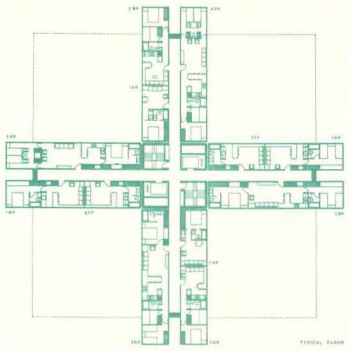

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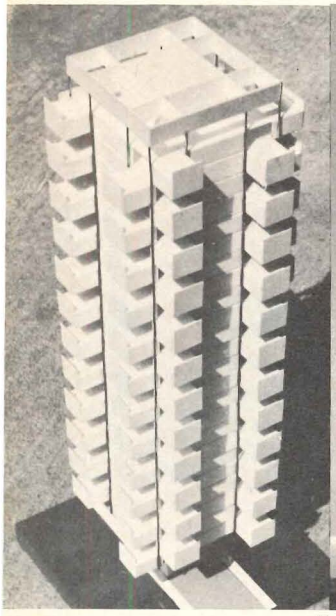

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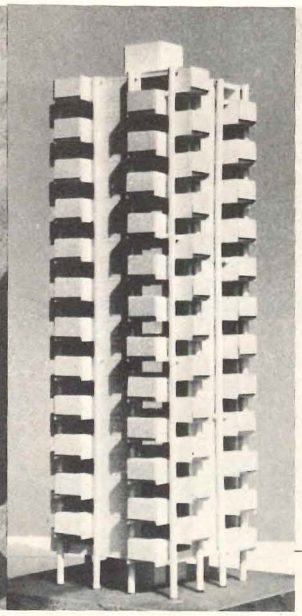

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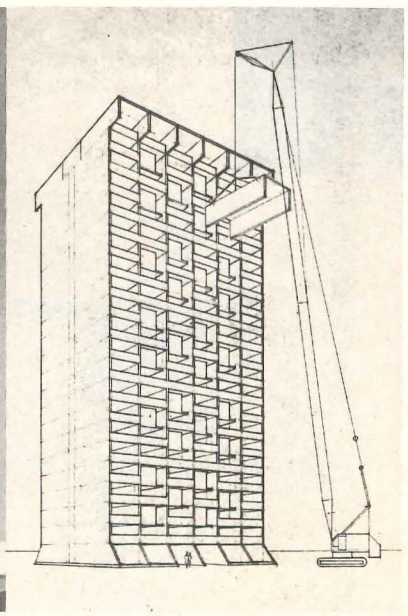

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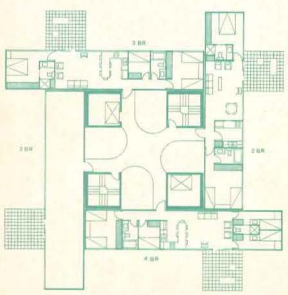

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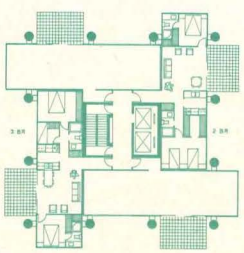

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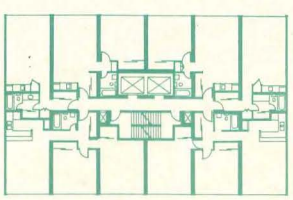

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The evolution of Florida-architect William Morgan's trailer tower scheme, which he calls "Interpod," ranges from initial visionary images to the all-too-resigned Tinkertoy reality of customary low-cost housing. Morgan has taken Interpod through six design phases over the past several years and now, with three sponsors investigating funding, is adapting the latest system for private housing, university dormitories, and turnkey housing.

Starting, in Interpod I, with a clip-on scheme of specially designed trailer "pods" — portable by air, land, or sea **(1)** — Morgan planned to slip his trailer units into racks on a tower of service cores **(2).**

Interpod II **(3)** increased the ratio of pods to core with a cruciform plan **(4)** accommodating eight units per floor, and introduced a 4-hr fire-rated floor between the units. It also proposed using standard-length trailers (instead of special pods) and subdividing them.

Morgan's development of the scheme shows a continuing simplification of the structural system — minimizing its duplications and integrating it — along with a corresponding decrease in ultimate "mobility" of the modular units.

Interpod IIIa **(5)** would have suspended open-roof boxes (from a single roof truss) in a pinwheel plan that was rotated on alternate floors **(6).** Floors of the now-stabile boxes would also serve as ceilings for the units beneath.

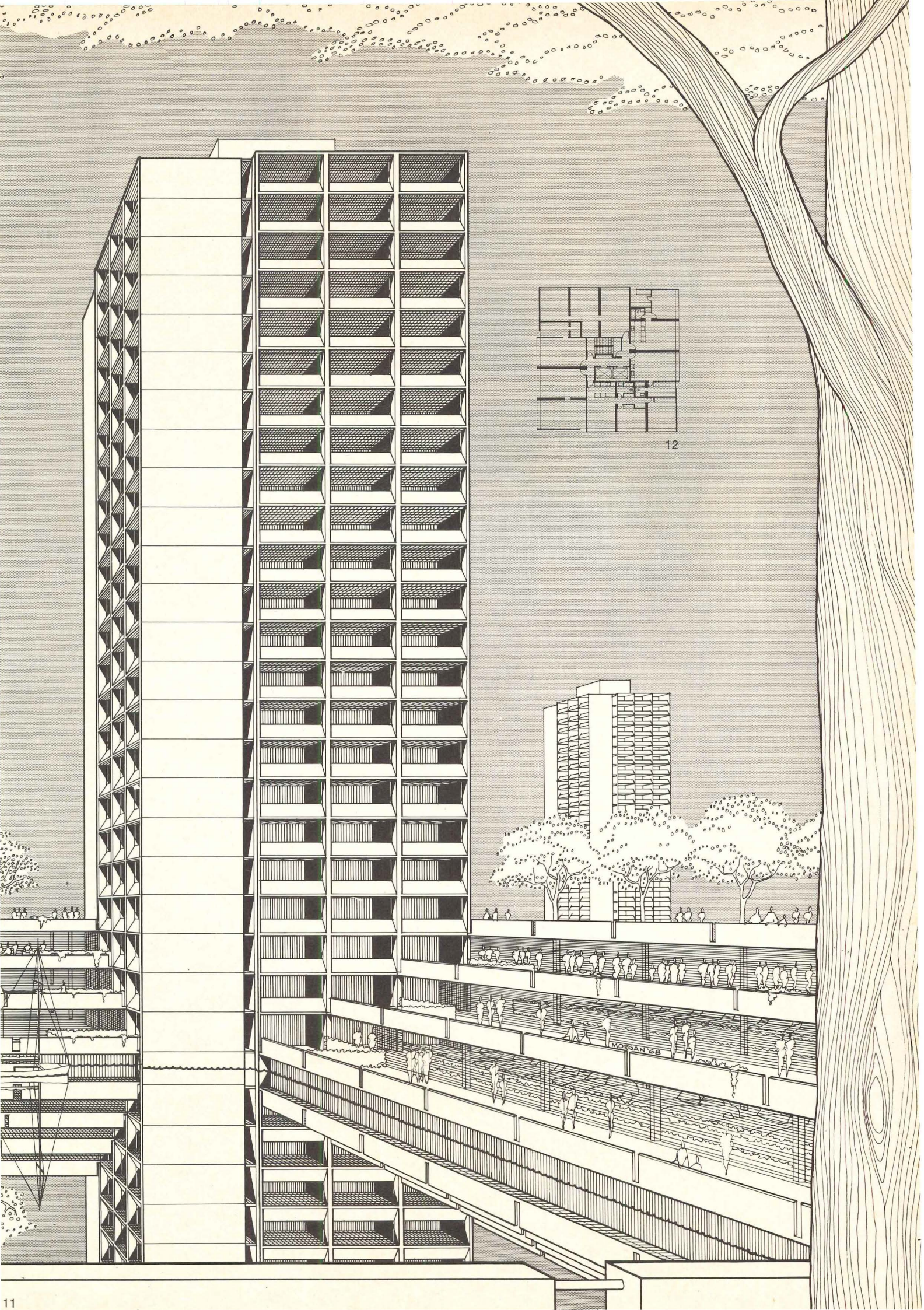
At this stage, the architect became more concerned with the environmental aspects of the system, and built into it the possibility of lot-by-lot dislocation.

In place of the suspension structure, Interpod IIIb substituted a compression system of concrete columns supporting prefinished concrete boxes **(7).** These were to be shorter than the 60-ft trailer length so as to reduce utility runs and to increase core and utility efficiency **(8).**

For Interpod IVa, a Morgan and structural engineer William Mouton, Jr., further minimized the duplication of boxes supporting themselves and an over-all frame supporting the boxes **(9).** They combined these functions by designing a box without end walls and without a floor, and planned to stack these inverted U shapes **(10).** The units measure 27′ x 14′ x 8′ high and can be shipped on their sides to comply with highway regulations. Thickness of the concrete is to be 4 in.; they weigh 20 tons (compared with Habitat's 80 tons).

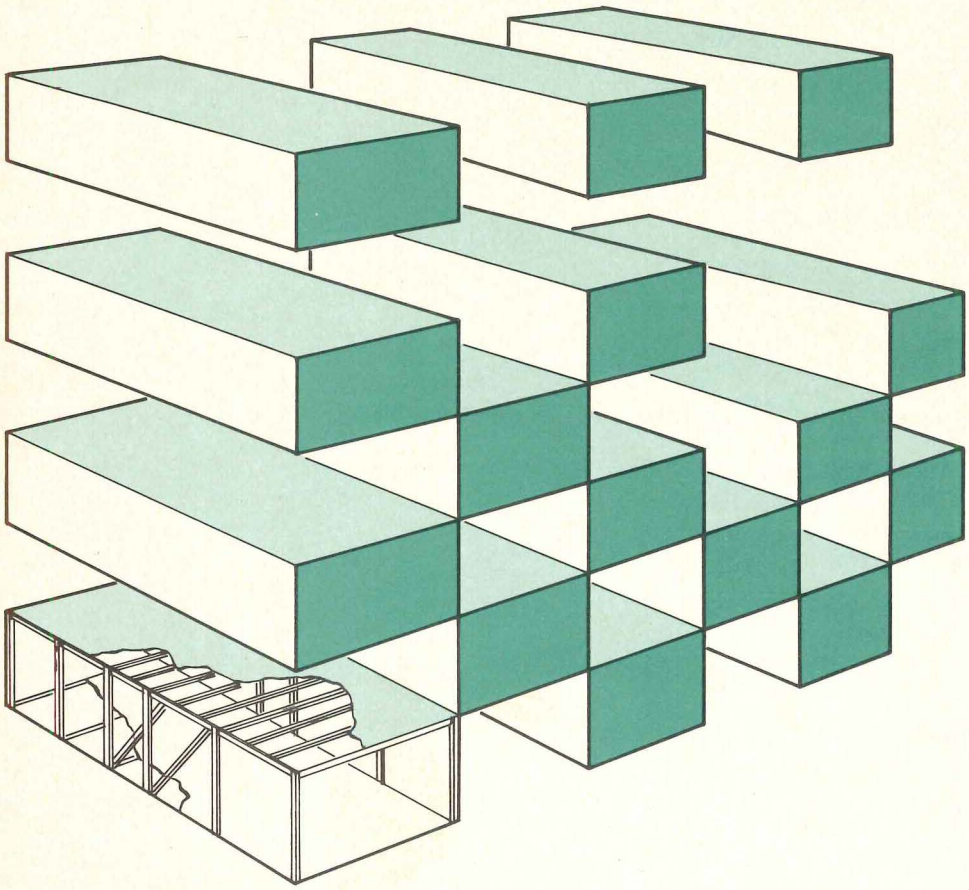
Reinforced concrete is to be cast in place between adjacent units. Rate of construction will be two floors per week, so that the core can rise at the same time; units provide their own scaffolding. Interpod IVb, the latest refinement **(11),** uses the same system of prefabricated units but in a pinwheel arrangement to form a square plan **(12).** Whereas the plan places some bathrooms back-to-back, a real integration of mechanical systems is yet to be made.

Still, one contractor estimates that the 22-story tower will cost $12.83 per sq ft including carpeting and air conditioning.

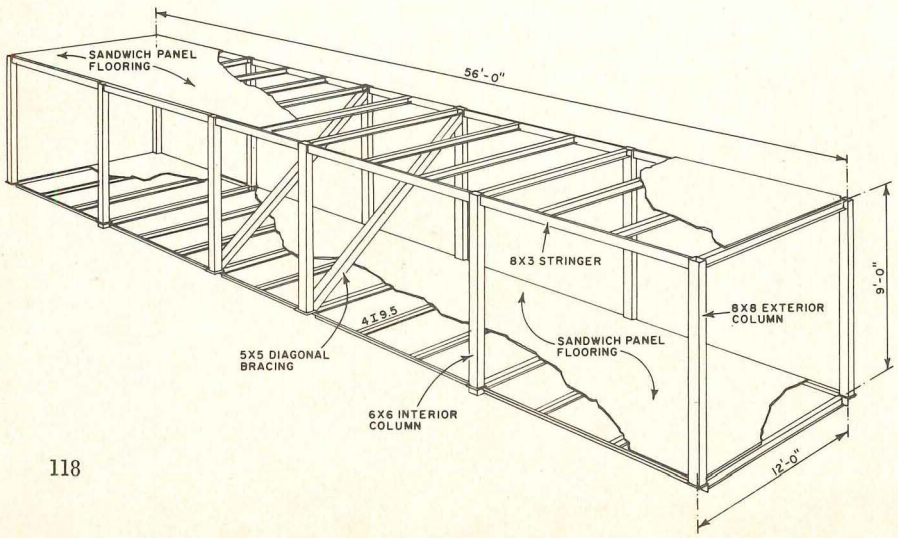


12

Checkerboard Stacking



After stacking prefabricated steel-framed units in checkerboard fashion, Trygve Hoff & Associates, Cleveland engineers, propose to fill the open spaces to form complete multistory apartment buildings. Most of the structural members are tubular. After stacking, units would be welded together. Diagonal bracing along some corridor and exterior end walls would provide continuous transverse and longitudinal bracing for the building, but leave enough panels free for doorways and windows.



More Prefabbed

One of the primary objectives of Conklin & Rossant's designs for low-income housing is adequate spaces for the large family. The architects' study was commissioned by the Reston Virginia Foundation for Community Programs, Inc., and financed with a $200,000 grant from HUD, in order to encourage a more democratic income mix in Reston and other new towns.

Since income is often inversely proportional to family size, the architects felt that more attention should be given to adequate interior spaces. The most recent scheme calls for four-bedroom apartments with a separate skylit playroom adjacent to childrens' bedrooms, and a large family kitchen combined with a dining area.

Prefinished mobile-home units will be stacked three high in cantilevered steps, two units to an apartment. Several alternatives for fire protection and stair enclosures have been suggested; and a system of coordinating factory and site-installed drain and venting systems has been worked out.

The average dwelling unit has an area of 1,200 sq ft. Costs of $7 per sq ft are expected to be feasible. Units can, of course, be grouped in various site configurations. An important aspect of site planning, say the architects, is to "help develop a strong sense of community identity, participation, and pride."

Eventually, HUD hopes to finance the construction of a demonstration project at Reston. And final designs will probably include contributions from other engineering, architectural, and industrial firms that have also been working on it.

(Model photo is of a similar, but earlier, scheme, which evolved into the present Conklin & Rossant proposal.)

Space for Large Families

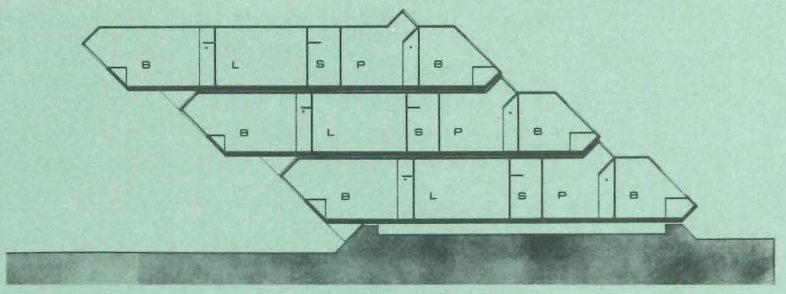
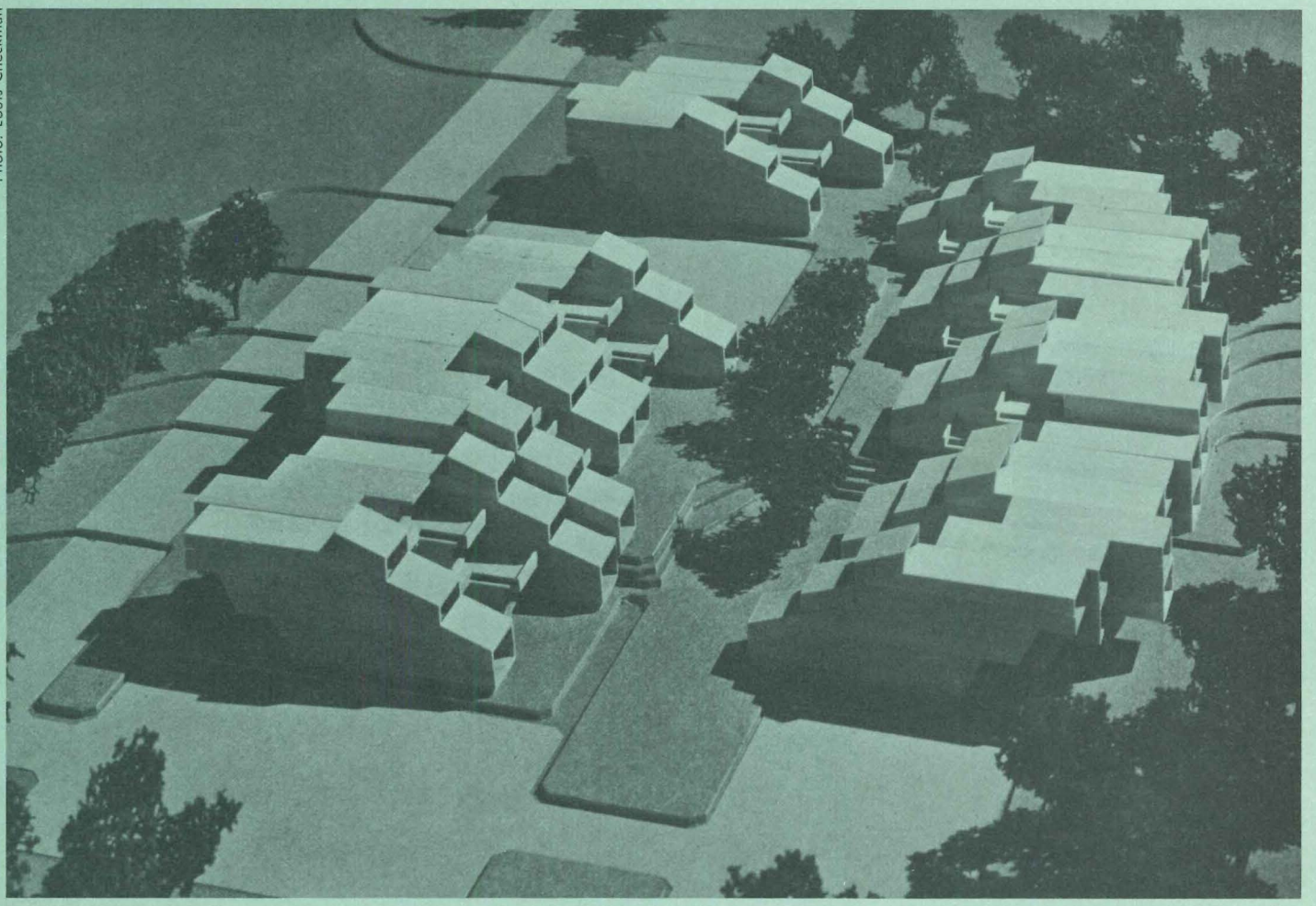
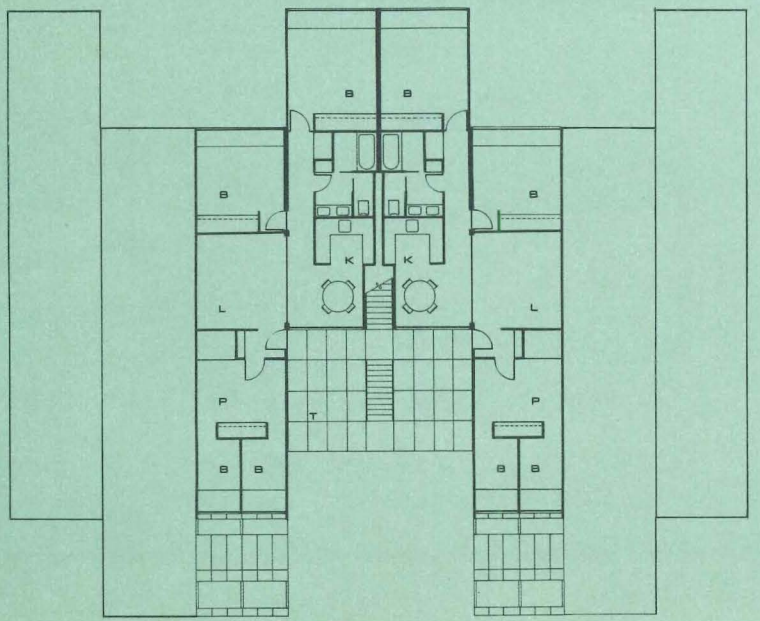
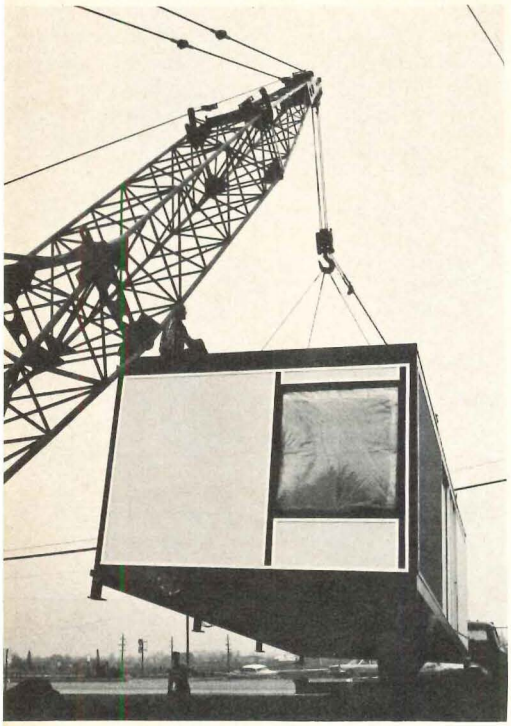


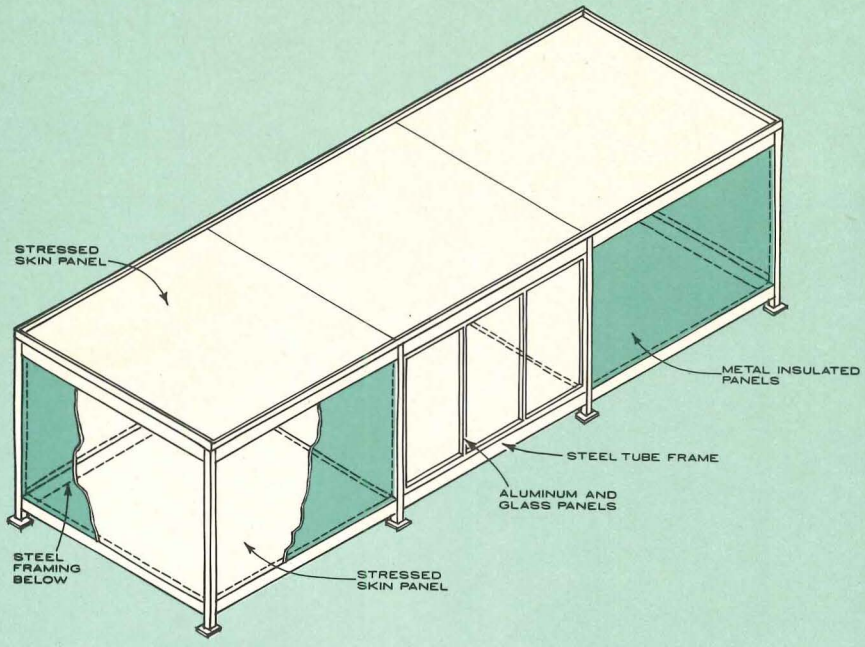
Photo: Louis Checkman

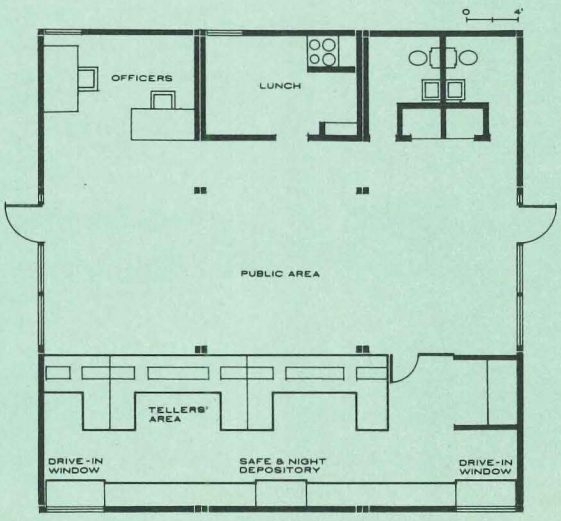




Bank Unit Shows Housing Possibilities







Ziegelman & Ziegelman, Birmingham, Michigan, architects, have developed a basic structural framing unit that can be applied to housing. As evolved originally for the temporary branch offices of a bank, the unit is a rigid frame, 37 ft by 12 ft by 8 ft high, of 4-in. tubular steel with welded joints. Units are prefinished with wooden stressed-skin floor and roof construction, and aluminum and glass wall infill panels. Interior work is done at the site. Assembly at the site takes two days. A variation of this unit has been used to build class and lecture rooms for a local community college.

In the housing application, the same unit as that for the banks is to be used, either assembled side-by-side or stacked. Preliminary research indicates a possible cost, with mass production, of $6000 per unit, prefinished with vinyl asbestos floor, painted walls and ceiling, and all plumbing, mechanical and electrical work installed. Delivery and site work are extra.

The housing proposals are based on the "Insta-Bank" system, now in use. An Insta-Bank unit is shown being hoisted (facing page, far left); in isometric projection (facing page, top); assembled with two others to form a bank (facing page, center and bottom). Also shown (this page) are a bank interior (right) and three possible combinations of units to form housing.

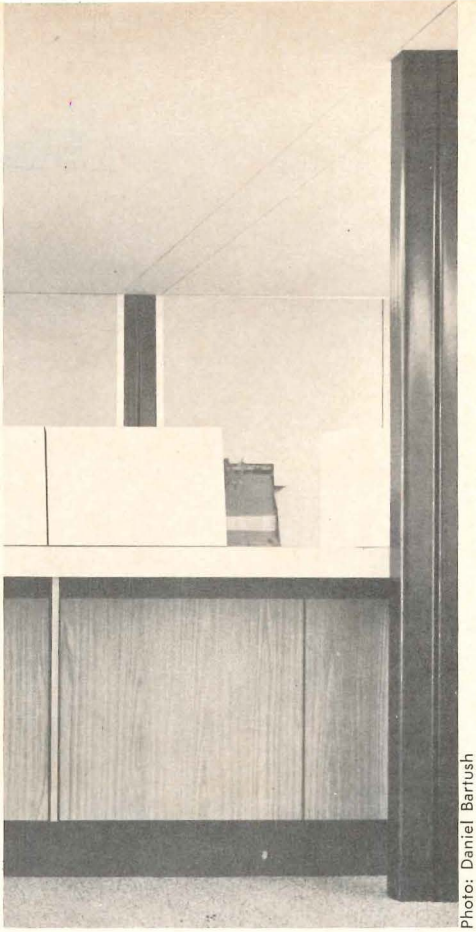
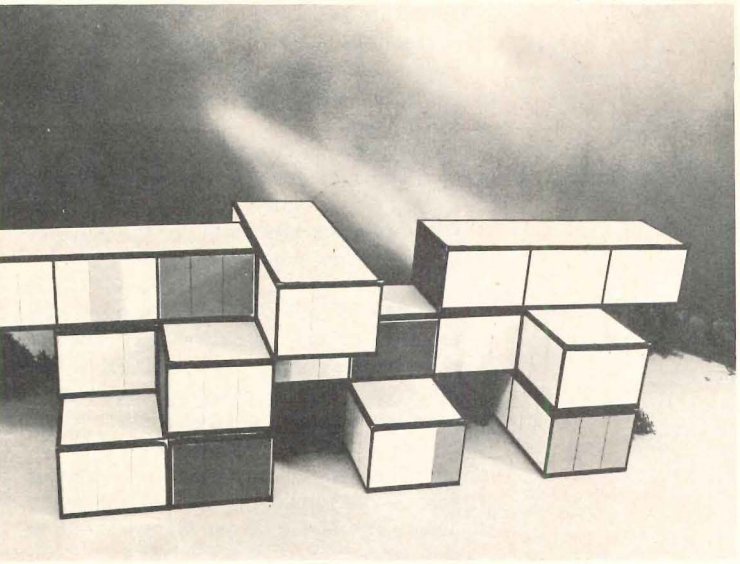
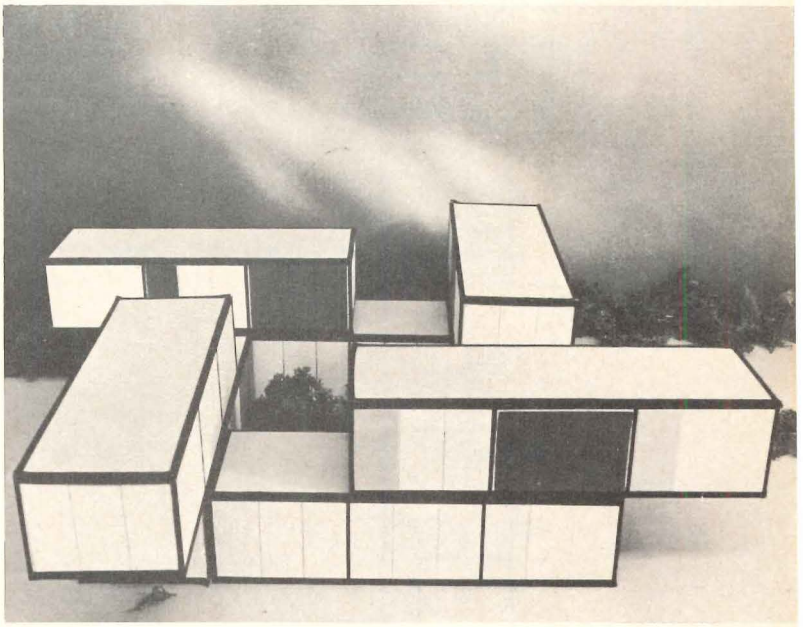
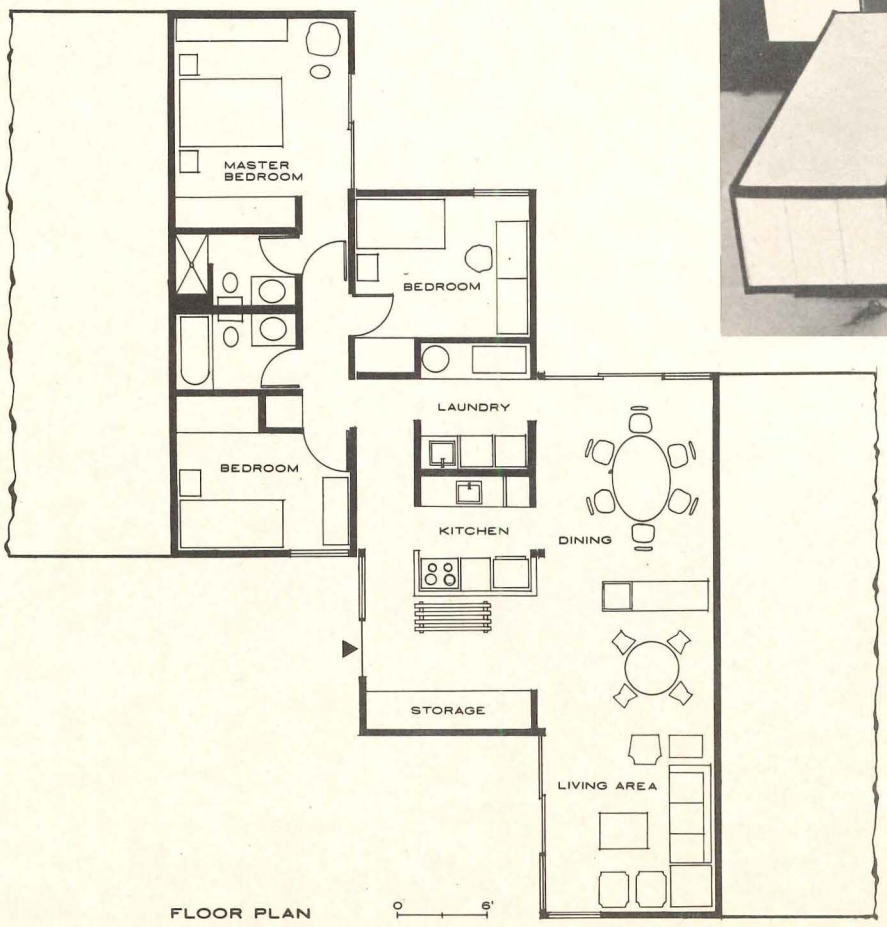


Photo: Daniel Bartush







FLOOR PLAN 0 6'

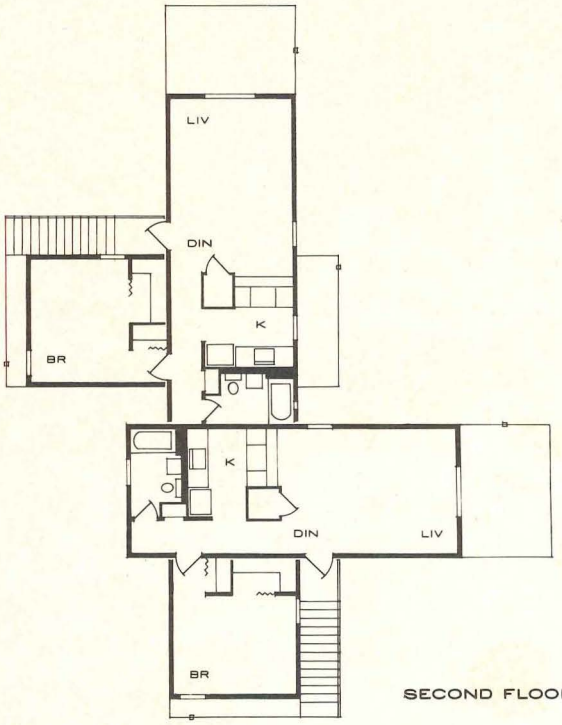
Stacked Boxes in San Antonio

The H. B. Zachry Co. of San Antonio is constructing a low-cost housing development, under the FHA's Rent Supplement Program, from precast concrete box units. Molds originally made for precasting room units at the Palacio del Rio Hotel in San Antonio, also built by Zachry, are used. Cerna & Garza of San Antonio were the architects for both projects.

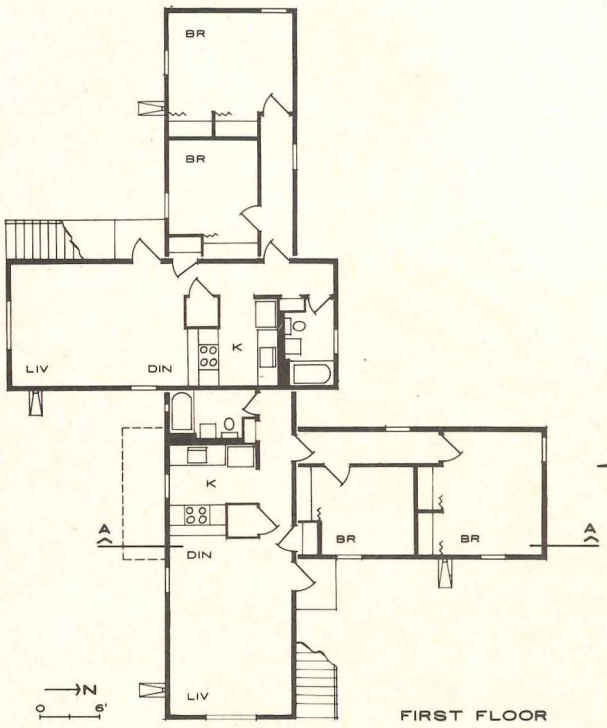
Seventeen standard units, cast in any of three lengths, but having 13 ft widths and 5 in. wall, floor, and ceiling thicknesses in all cases, are assembled to form two-story clusters, with two apartments per story. There are four standard plans for the clusters.

The units are cast in open molds that face one another in two parallel rows, one for long units, one for short. The inside wall faces and roof soffit are formed with a tunnel form mounted on a turntable located between pairs of molds so that it may be slid into either one. A curb with projecting dowels is cast with the floor in order to position the wall steel and forms. All units are cast with 3000 psi lightweight concrete and steam-cured for 12 hours. Plumbing, wiring, wooden stud partitions, painting, etc., are installed in a finishing yard before trucking to the site, five miles away. Exterior walls are sprayed with a sand-cement mixture and given two coats of latex paint, either before or after trucking.

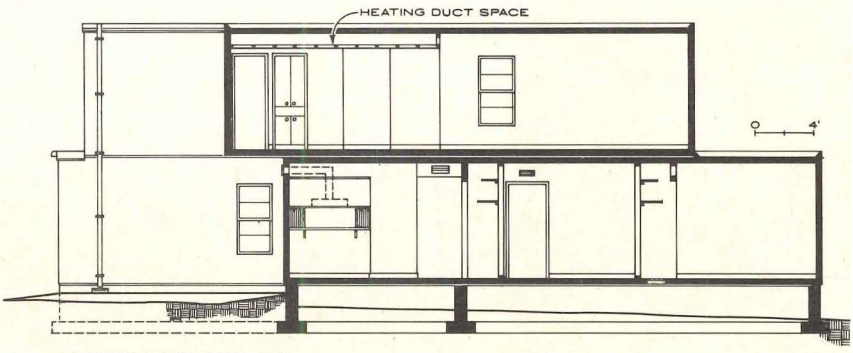
The architects say that the project has not realized any saving in cost over conventional construction methods, but feel that technical refinements and increased familiarity with the various operations involved will bring about great economies in the future.



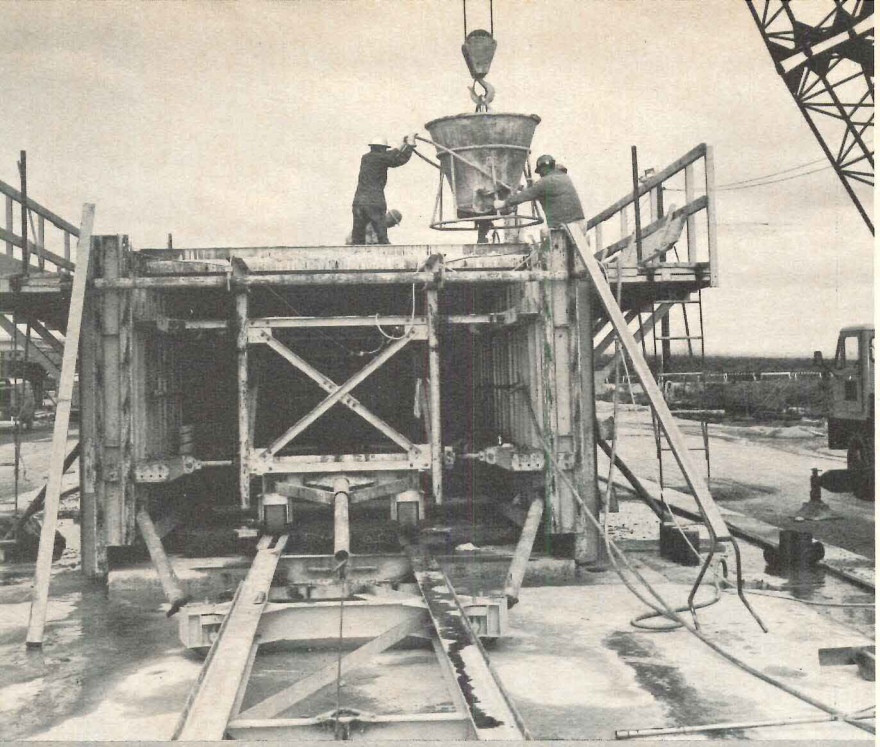
SECOND FLOOR

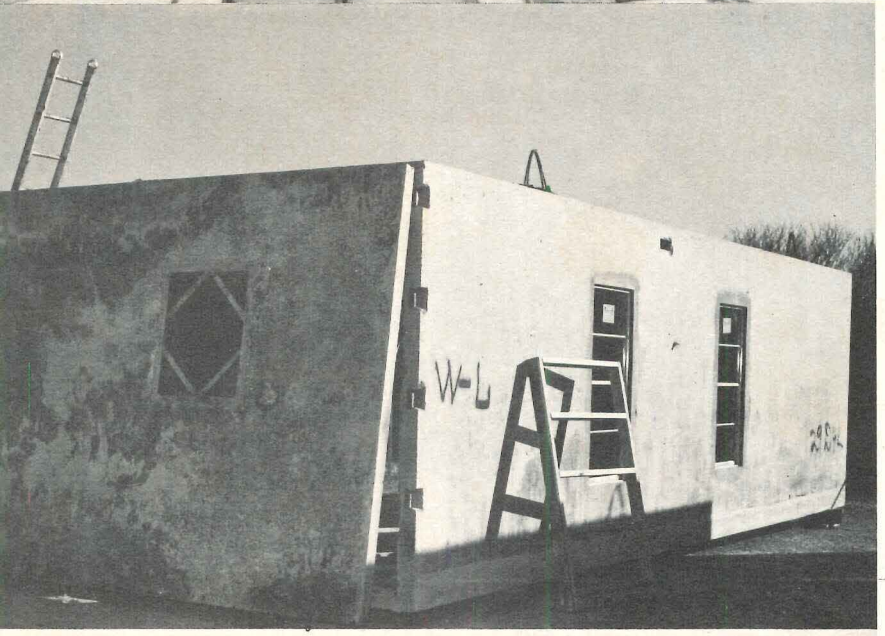


FIRST FLOOR



CROSS SECTION A-A





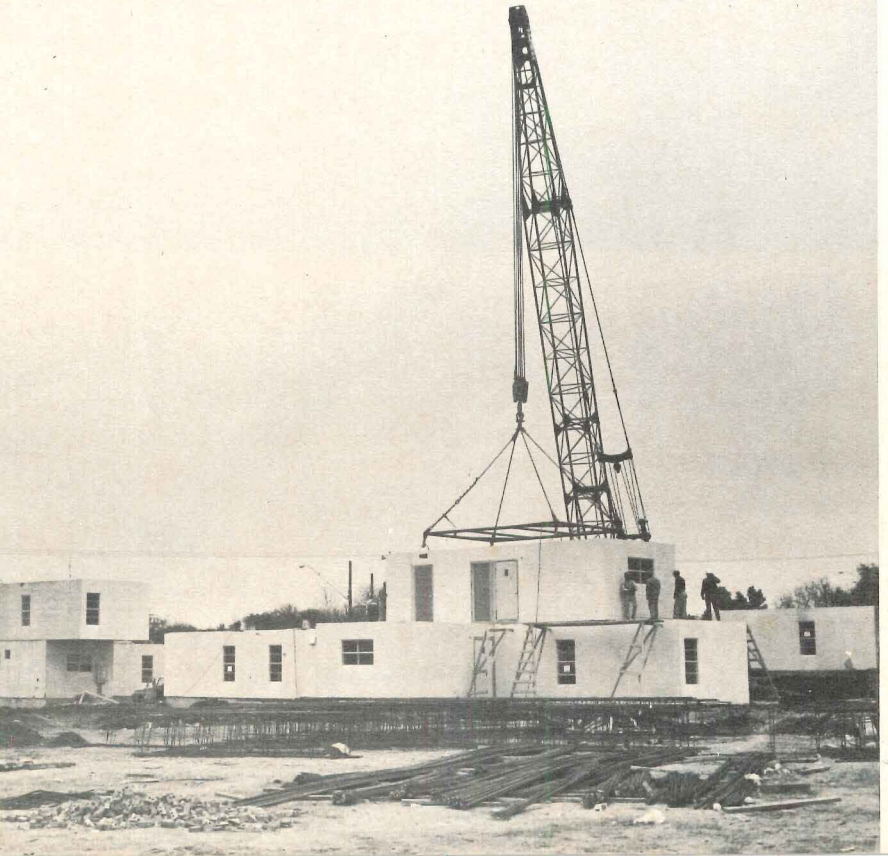
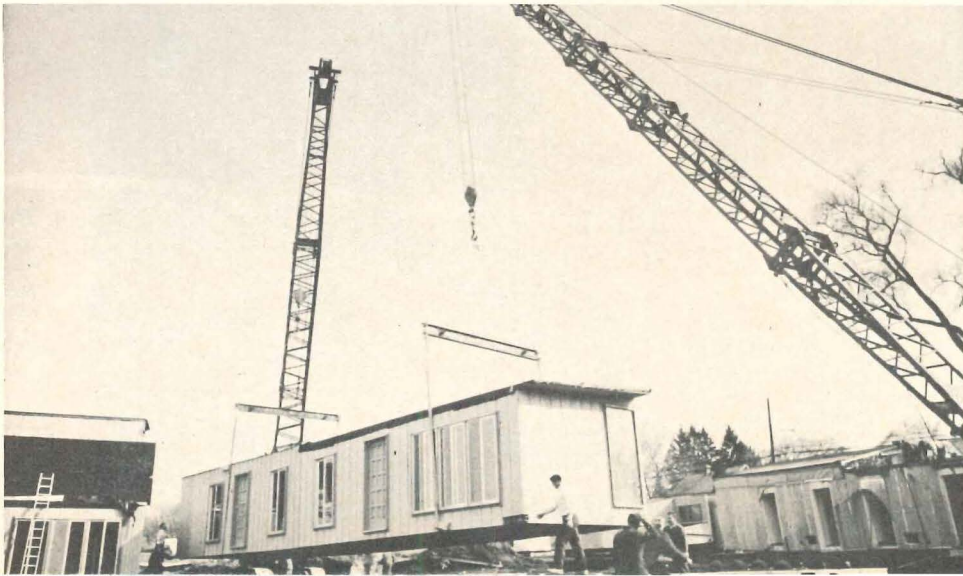


Photo: Ray Howell

Palacio del Rio Hotel under construction.

Three stages in the construction of a unit at Richard Allen Villa: casting the walls and ceiling of a unit (top) with tunnel form in place; attaching end wall (center) by means of steel embedments; stacking units at site (left).

Photo: Ed Roseberry



Enlivening the Box

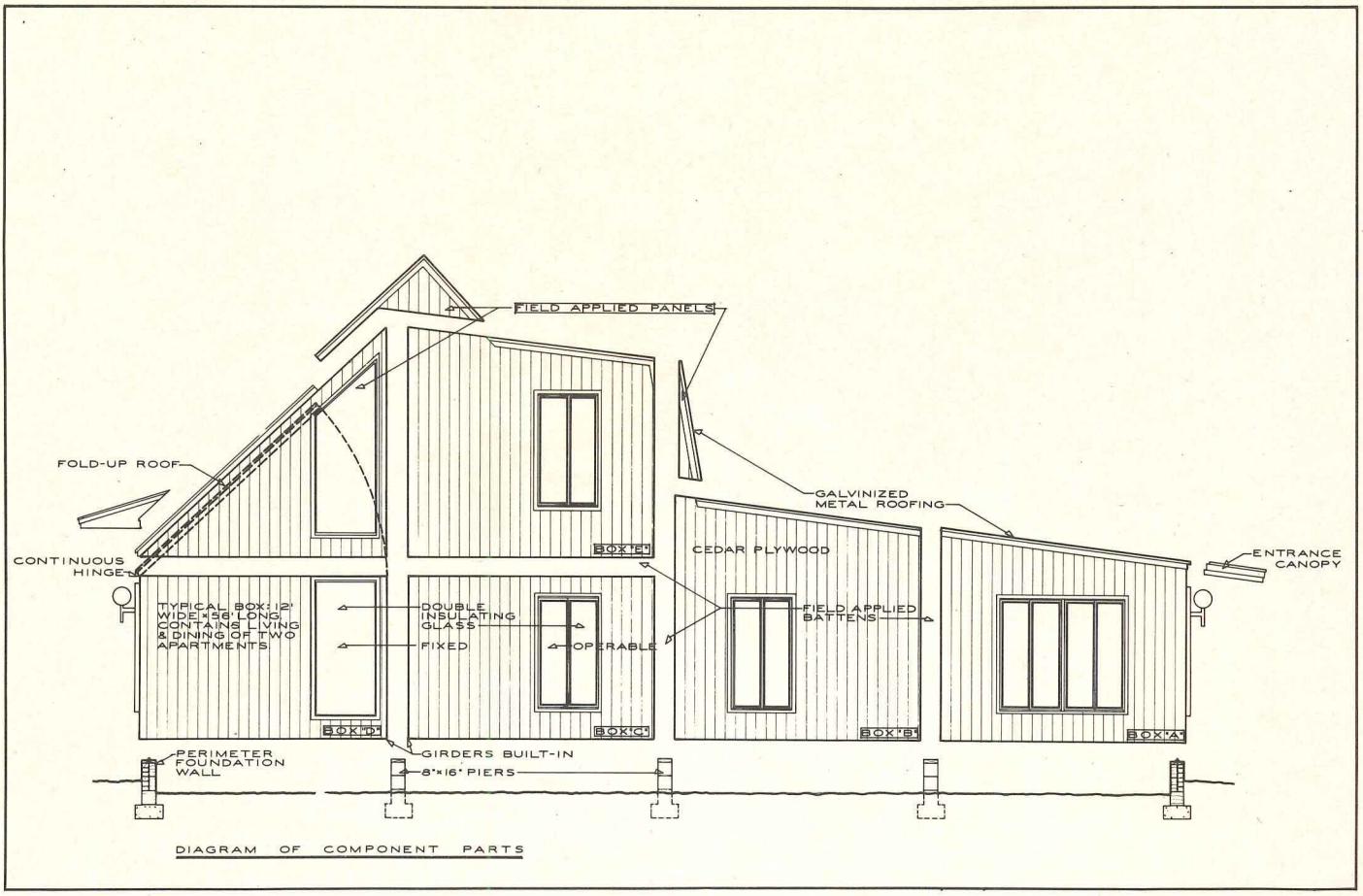
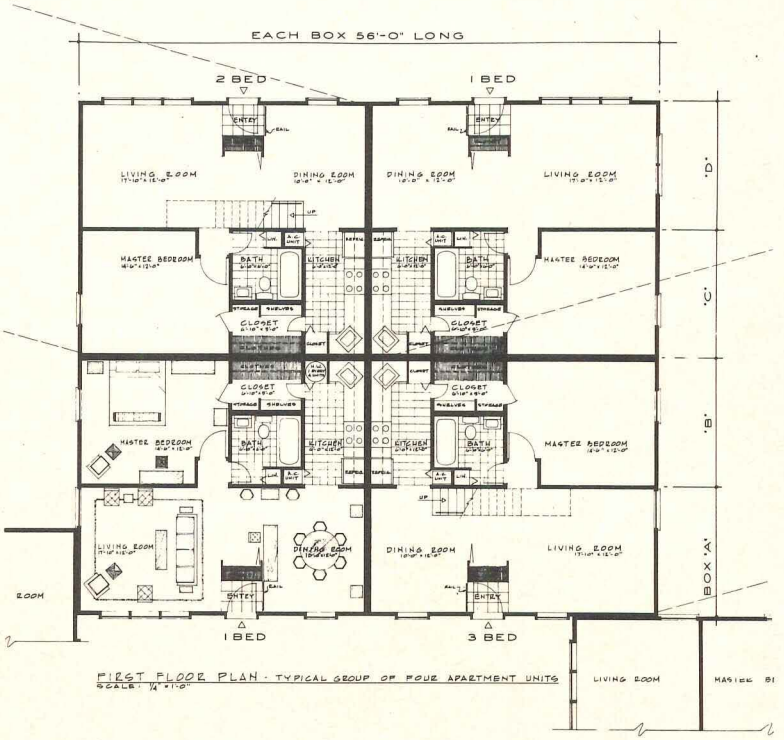


DIAGRAM OF COMPONENT PARTS



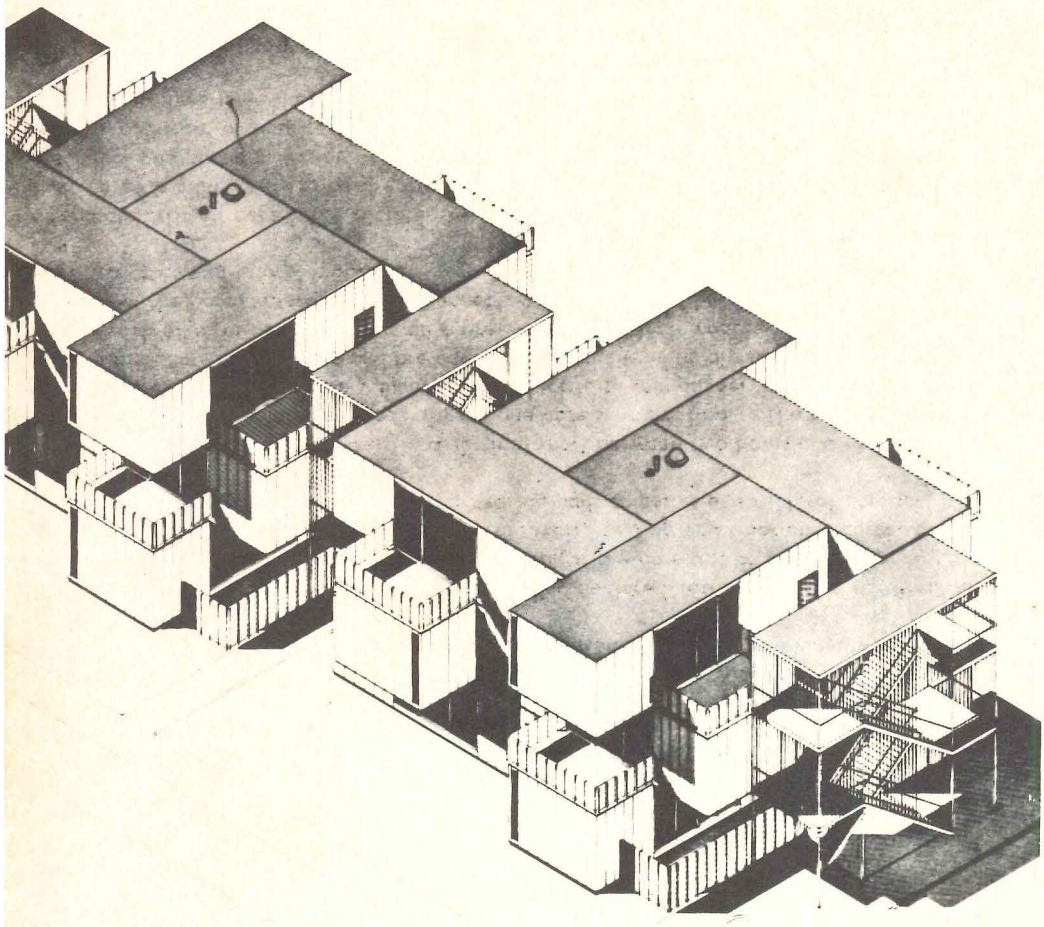
FIRST FLOOR PLAN · TYPICAL GROUP OF FOUR APARTMENT UNITS
SCALE: 1/4"=1'-0"

In developing a scheme for student housing in Amherst, Mass., architects Armstrong & Salomonsky succeeded in giving considerable life to prefab units. Working with 12′ x 56′ wood-frame boxes plus assorted "clip-on" and fold-out parts, they devised a four-apartment building in which pitched roofs and a combination of one- and two-story sections create elevations of refreshing variety. Further diversity is gained by grouping buildings in clusters of three or more. The 104-apartment project, to be built adjacent to the University of Massachusetts, will house married students and young faculty families in one- , two- , and three-bedroom units.

Boxes arrive at the site with bathroom fixtures, air conditioning, furnace, and kitchen equipment installed. Exterior siding is grooved cedar plywood. Roofing is galvanized metal. Top photo shows prototype used to perfect the final assembly model. Bottom photo is a unit at the Amherst project being crane-lifted into place.

The developer was Glen Development Co.; the prefabricators, Magnolia Homes Mfg. Corp., South Hill, Va.

Stacking Around a Utility Core

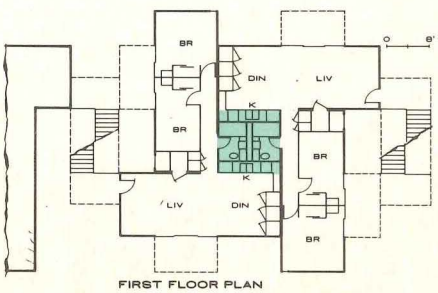


Since local codes governing electrical and plumbing systems present one of the greatest stumbling blocks to mass distribution of manufactured housing, architects Ken Fryar Associates and Ronald Goodfellow put bathrooms and kitchens into a separate, 12-ft-square core. The core, containing two kitchen walls (see drawing) and two bathrooms, can either be produced in several versions at the plant to meet varying local conditions, or constructed at the site if necessary.

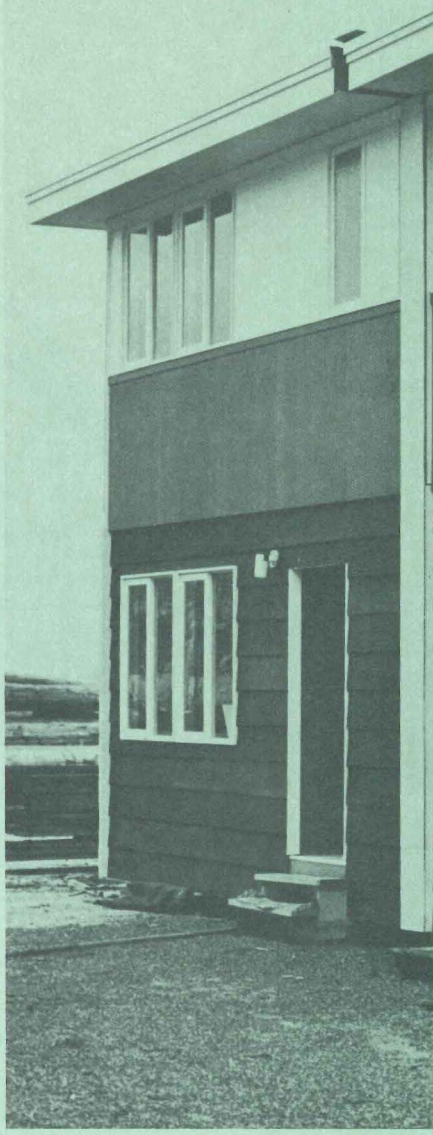
Two 12′ x 30′-8″ boxes complete the basic components in the system. One is unpartitioned for living-dining, and the other contains two bedrooms. These units are stacked around the core in a pinwheel pattern that gives each apartment a balcony off the living area. A second balcony opens onto an open, pre-engineered stairway that can link buildings together. This second access to stairs was designed to meet code requirements. The scheme is in line with the Building Officials Conference of America Type IIB construction, and is acceptable for No. 2 fire zones.

Architects estimate that a development of 12 apartments (in two buildings of three stories; two apartments per floor) can be erected by a 10-man crew in a total on-site time of 25 days. Costs, including appliances, are estimated at $8.35 per sq ft. This is about one-third less than conventional low-cost, multifamily housing.

Each unit is acoustically isolated from its neighbors by separate wall, ceiling and floor enclosures, and by vibration dampening bearing pads at points of structural contact. Each kitchen is exhausted separately through a horizontal duct over the living-dining unit. Individual gas-fired units heat and cool each apartment, requiring neither vertical flue nor outside condenser; they are vented directly to the outside. Supply and return ducts are under floors, duct connections between units being made in the field. Plans call for all baths to be served by a single air-exhaust system with a blower on the roof, but separate venting is also possible.

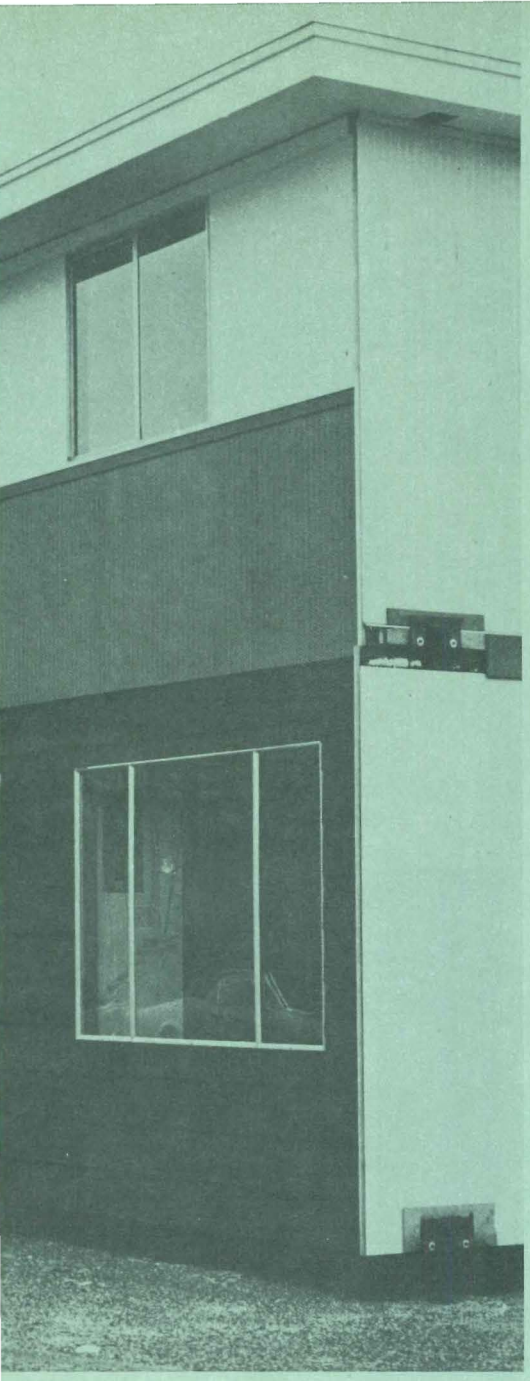


FIRST FLOOR PLAN



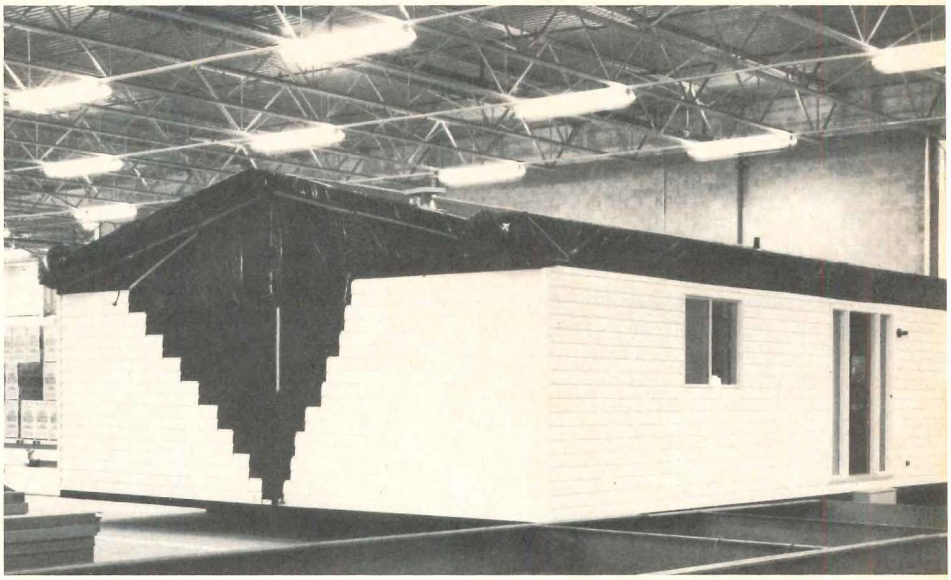
Stacking Plywo

In Vancouver, Canada, Slidus Structures Ltd., is building housing units aimed a the $4000–6000 income group. Prefinished first- and second-story units for each dwelling are stacked at the site to form semi-detached or row houses. Exterior walls are faced with plywood paneling and cedar boarding, carried by nailed plywood web beams which also carry stressed-skin plywood flooring. The Mark XI unit now in production, has two bedrooms with 400 sq ft per floor, and costs $7500. The Mark XII, now being tested, will have three bedrooms and 520 sq ft of floor, and is expected to cost $9500. Comprehensive Planning Services, design consultant for Slidus, is also working on designs for units to be stacked in high-rise frames.



tructures

Bolt-Together Halves

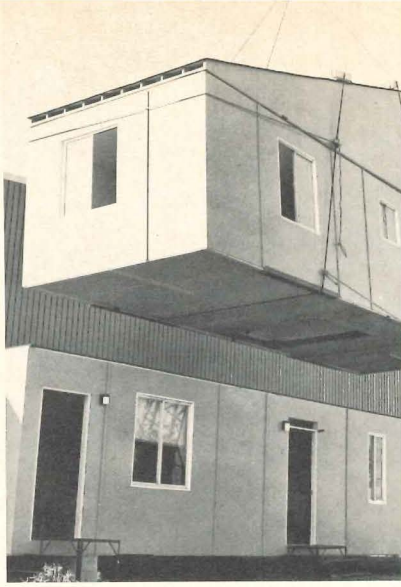


Aluminum Company of Canada, Ltd., has started production on low-cost houses that will be trucked to the site in two halves and bolted together on prepared foundations in three days. Rolling off the assembly line at the rate of five complete units per day, Alcan expects them to sell for $8,500 to $12,500. Canada's national building code, adopted by some 3000 communities, is expected to expedite mass distribution.

There are five models at present: 12 ft wide and either 44 ft or 57 ft long. They are specially insulated against Canadian winters, and completely furnished with built-in and movable furniture, drapes, and carpeting. Such options as carports, garages, and fencing are available. The three- and four-bedroom houses will be sold through a network of franchised builder-contractors, in completely planned subdivisions, and serviced like standard appliances for a 12-month period. Construction is wood frame with aluminum siding, soffit, fascia, windows, and shutters.

Alcan's U.S. subsidiary is "watching the innovation closely to evaluate its acceptance and possible implications for the U.S. housing industry."

Houses on a Hook

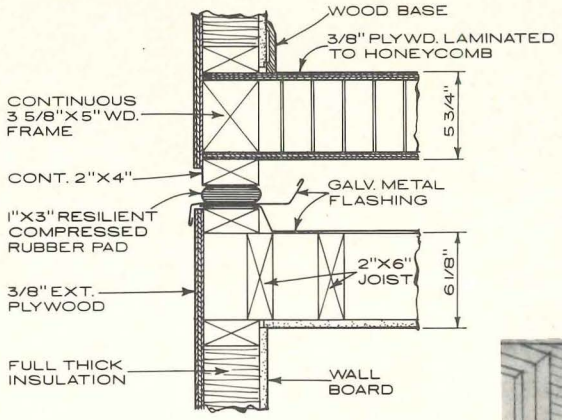


Helicoptors may set prefabricated boxes on small sites to help Baltimore, Maryland solve its inner city housing problems. A prototype structure, designed for mobile-home techniques, has already been erected. Six dwelling units should be in place on a city owned lot by summer of this year.

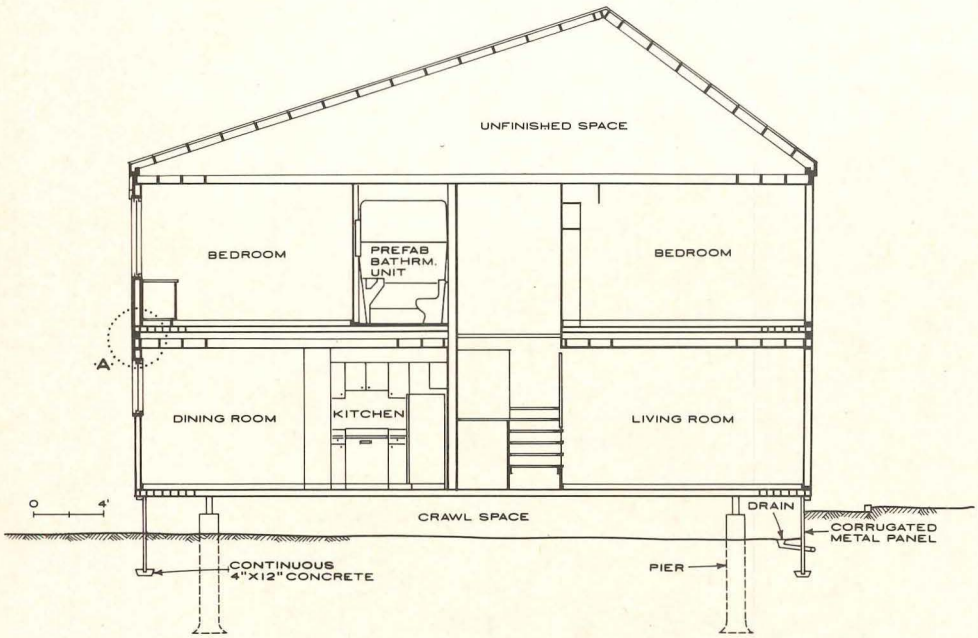
The entire three box house is factory finished, assembled, shipped and erected on the site with a minimum of field labor. Site erection time for fitting trim and making electrical and plumbing connections is estimated at one day.

The purpose of the project was to check the feasibility of present and future development of mobile home techniques for central city housing. A design and production group was formed to develop and produce the units. The composition of this organization indicates the wide range of varied interests being brought to bear on the housing problem. It includes, besides the architects, Nelson-Daft of Baltimore, Maryland, a portable building products manufacturer, an advertising consultant, interior designers, and a public relations representative.

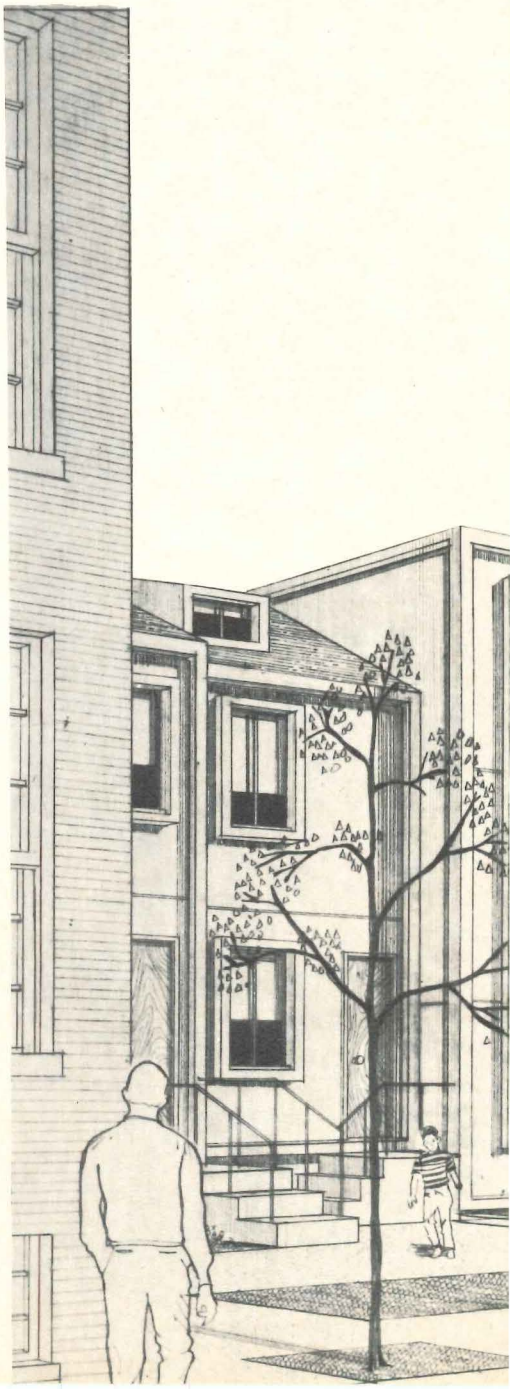
The dwellings are of the three- and four-bedroom townhouses type rental units and qualify as multifamily accommodations under the F.H.A. program for Below Market Interest Rate or Rent Supplement housing.

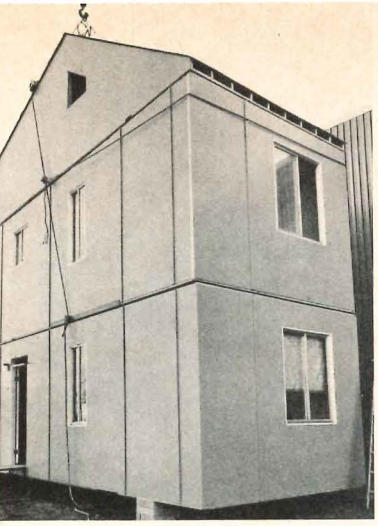


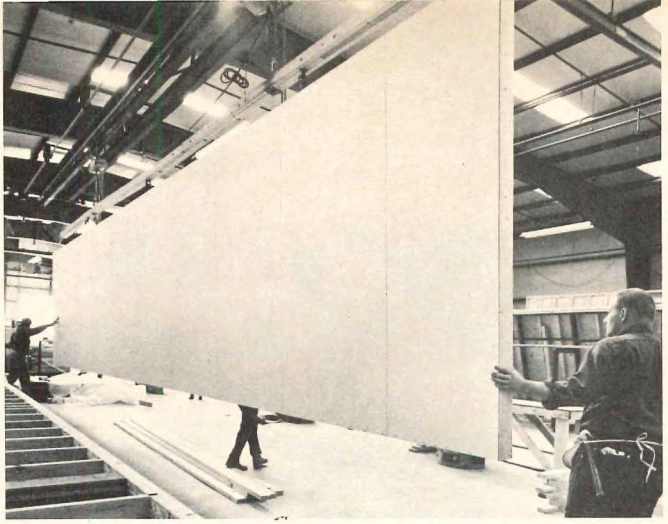
DETAIL AT 'A'

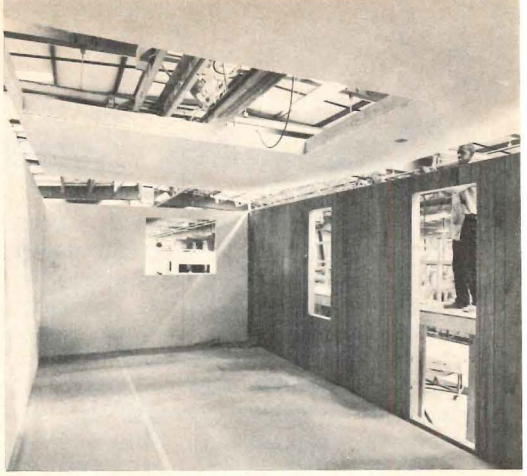


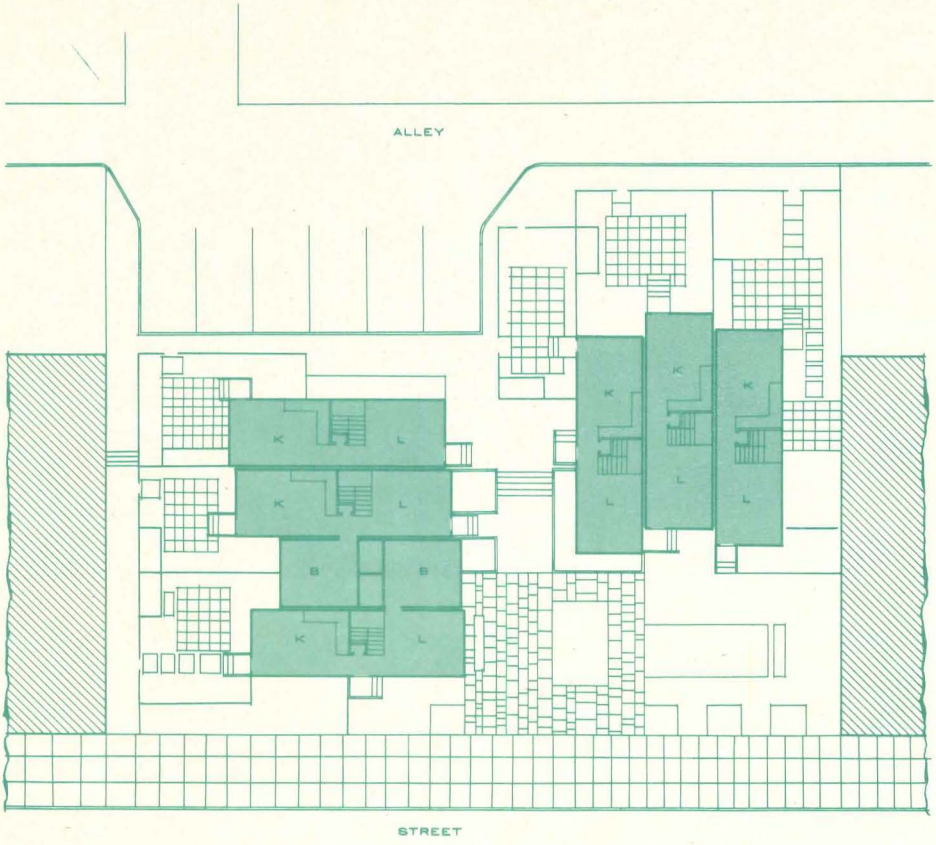
SECTION-TWO BEDROOM HOUSE











PROPOSED SITE PLAN

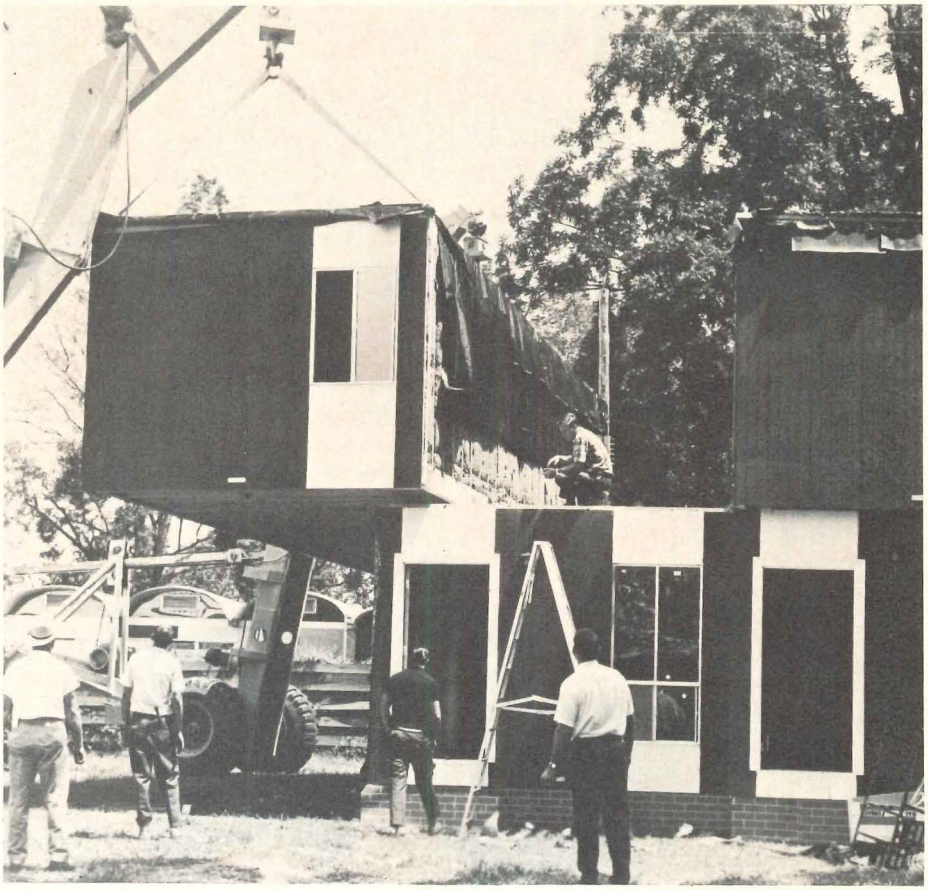
Piggyback Boxes

An assembly line at Magnolia Homes Manufacturing Corporation recently turned out prefabricated boxes for a nearby 28-unit demonstration project in Vicksburg, Miss. The boxes, of conventional wood-frame construction, were trucked to the site and erected in about two weeks. Instead of concrete foundations, they are supported on steel rails that enabled plumbers to install piping under each unit. Estimated savings are 15 per cent over standard construction, with further savings expected should the system go into mass production.

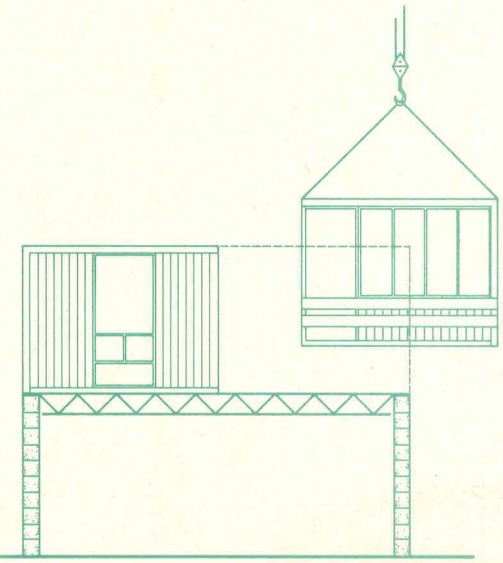
Each "piggyback" unit comprises two boxes, one stacked on top of the other by cranes. The bottom box contains living and kitchen-dining areas; the upper level has two bedrooms and a bathroom, with a storage space in each half. Exteriors of the 800-sq-ft houses are cedar plywood.

The one-acre site was cleared of a shanty town to make way for the new project, which is sponsored by a local nonprofit foundation. It is financed under Section 221 (d) (3) of the National Housing Act, and represents the first time the FHA has insured a long-term mortgage (for $224,200) for mobile-home development.

Rents will be $115 per month including utilities, but rent supplements for the project total $29,500 per year.



Masonry Walls Support Prefab Units

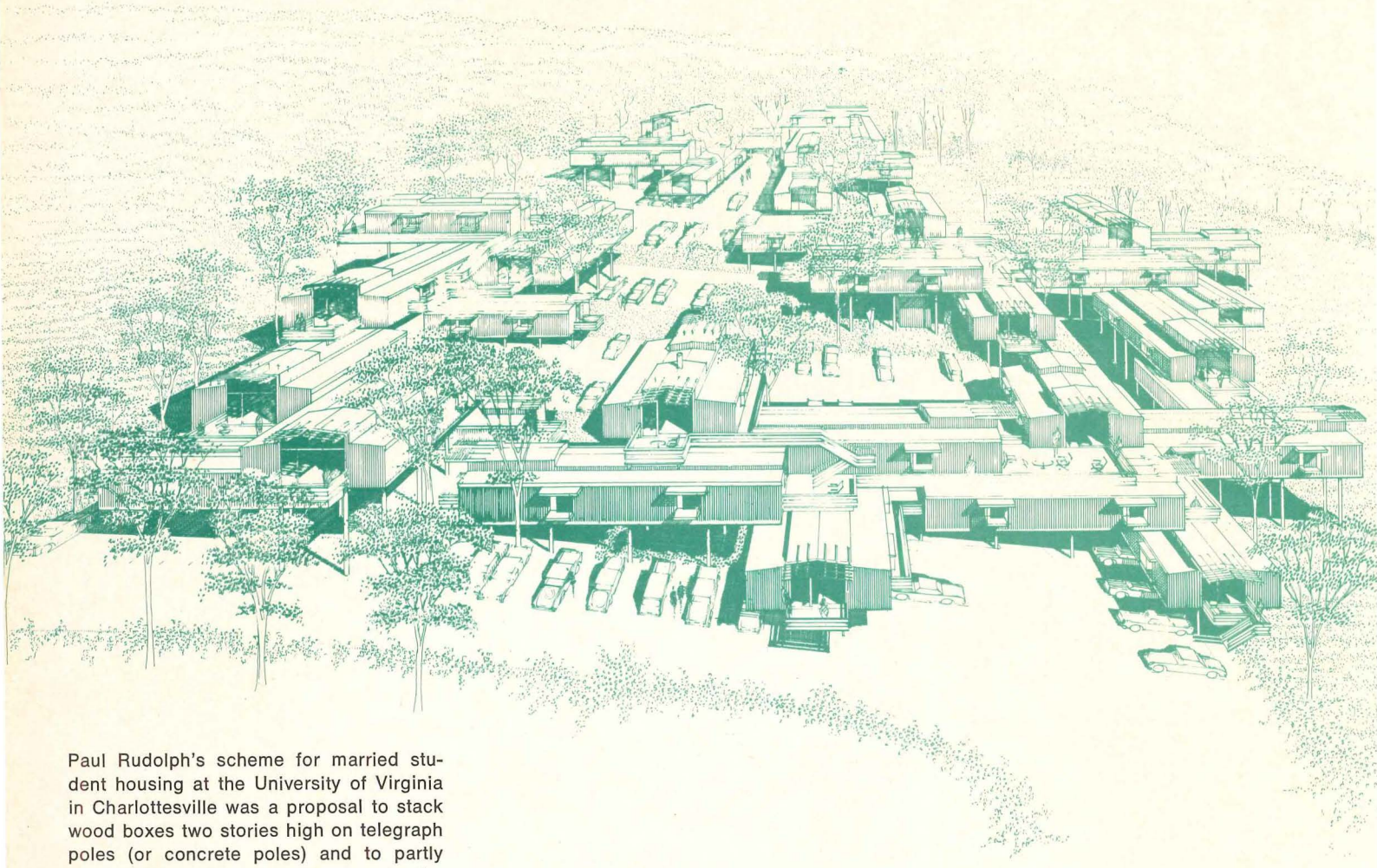


Prototype townhouses combining on-site construction with factory fabrication were built under the supervision of the Steel Co. of Canada, Ltd., for the 1967 National Home Show in Toronto.

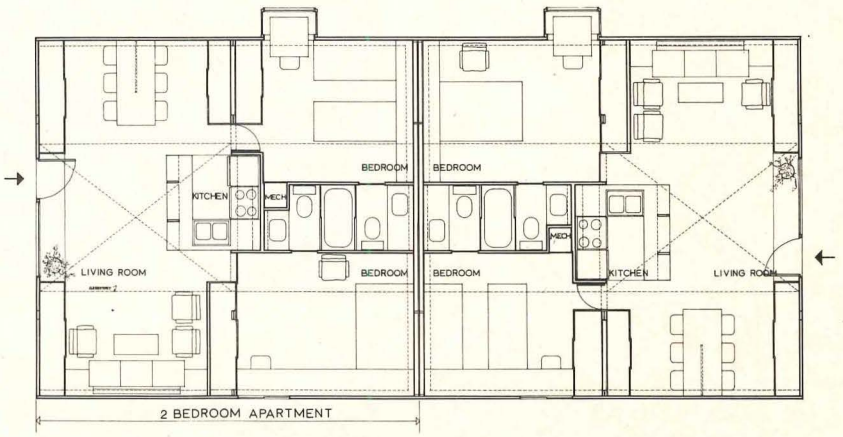
The first story of the houses, designed by Toronto architect Henry Fliess, is conventionally built on site with two parallel concrete block bearing walls spanned by 24-ft-long joists. The second story consists of two 12′ x 35′ factory-built, steel-framed units that are supported by the joists.

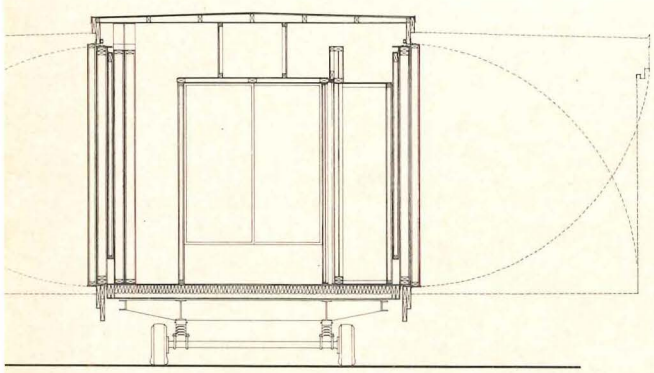
Steel-framed units arrive on the site completely finished with plumbing, wiring, and bathroom fixtures in place. Although Stelco does not intend to manufacture "Mod" houses, the company hopes to interest a Canadian manufacturer in their mass production.

Fold-Out Boxes

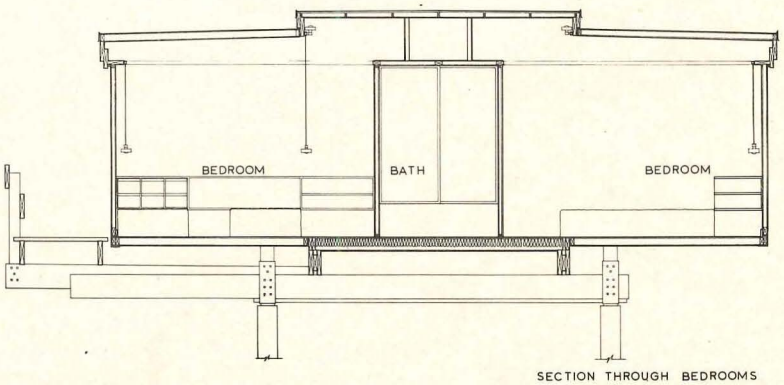


Paul Rudolph's scheme for married student housing at the University of Virginia in Charlottesville was a proposal to stack wood boxes two stories high on telegraph poles (or concrete poles) and to partly overlap the units as a response to the sloping site. At the basis of the scheme is a 12-ft-wide wood box that folds out to make a floor and ceiling 34-ft-wide. Walls shipped inside the unit are then slid out to support the fold-out panels. Furniture is also shipped inside and moved into place after the expansion procedure. Rudolph now feels that the fold-out idea is probably too tricky, and that it would be better to gang 12-ft-wide units together. In Charlottesville, code and labor problems appeared to be solved until city officials vetoed the project on "aesthetic grounds."



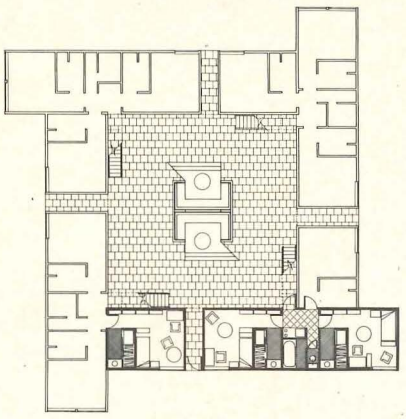


SECTION FOLDED UNIT IN TRANSIT

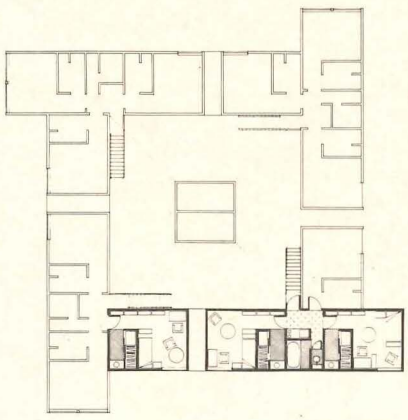


SECTION THROUGH BEDROOMS

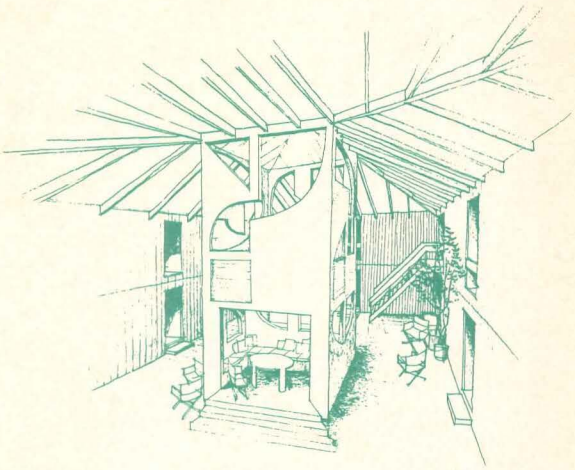
Box Dorms for U. of Conn.

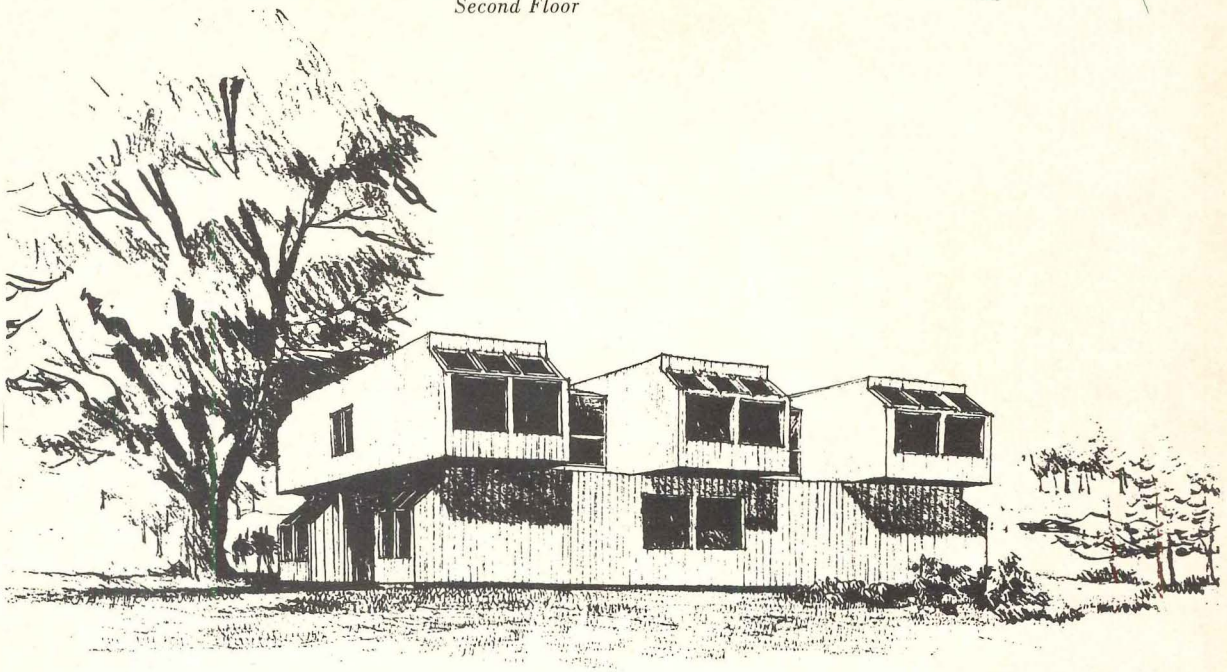


First Floor



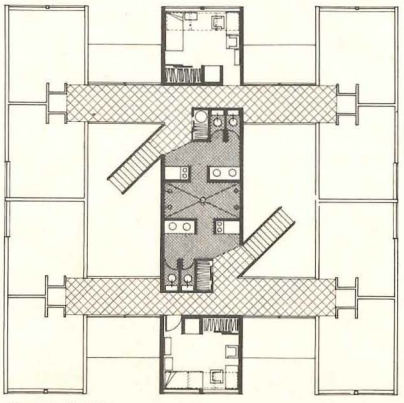
Second Floor



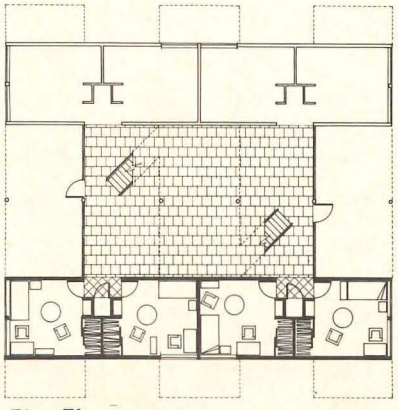


MLTW/Moore Turnbull, a New Haven architectural firm, has produced preliminary designs for men's and women's staff dormitories at the University of Connecticut that would be assembled from prefinished mobile units 60 ft by 12 ft by 10 ft high. In the women's dormitory, units would be stacked two high in a pinwheel pattern around a central courtyard, in which a special mobile unit would be stood on end to serve as a lounge area. The men's dormitory would consist of three units cross-stacked on two. In both cases, prefabricated stairs would lead to the upper floors from the central area. Construction and materials have not been decided at present.

The original proposal to the university was made jointly by the architects and by a developer, with the intention that a specified mobile homes manufacturer should make the units. The State of Connecticut, however, has insisted that the architects' plans be put up for competitive bidding in the ordinary way. Some difficulties are also expected with unions and with building codes, and the future of the project is uncertain at present.

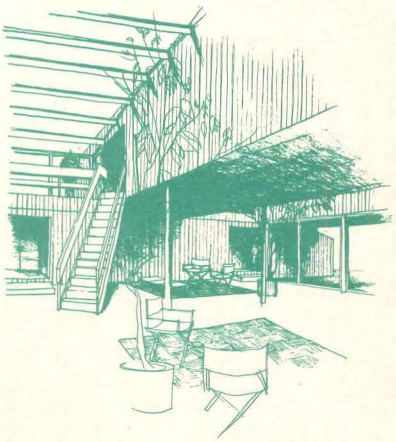


Second Floor



First Floor

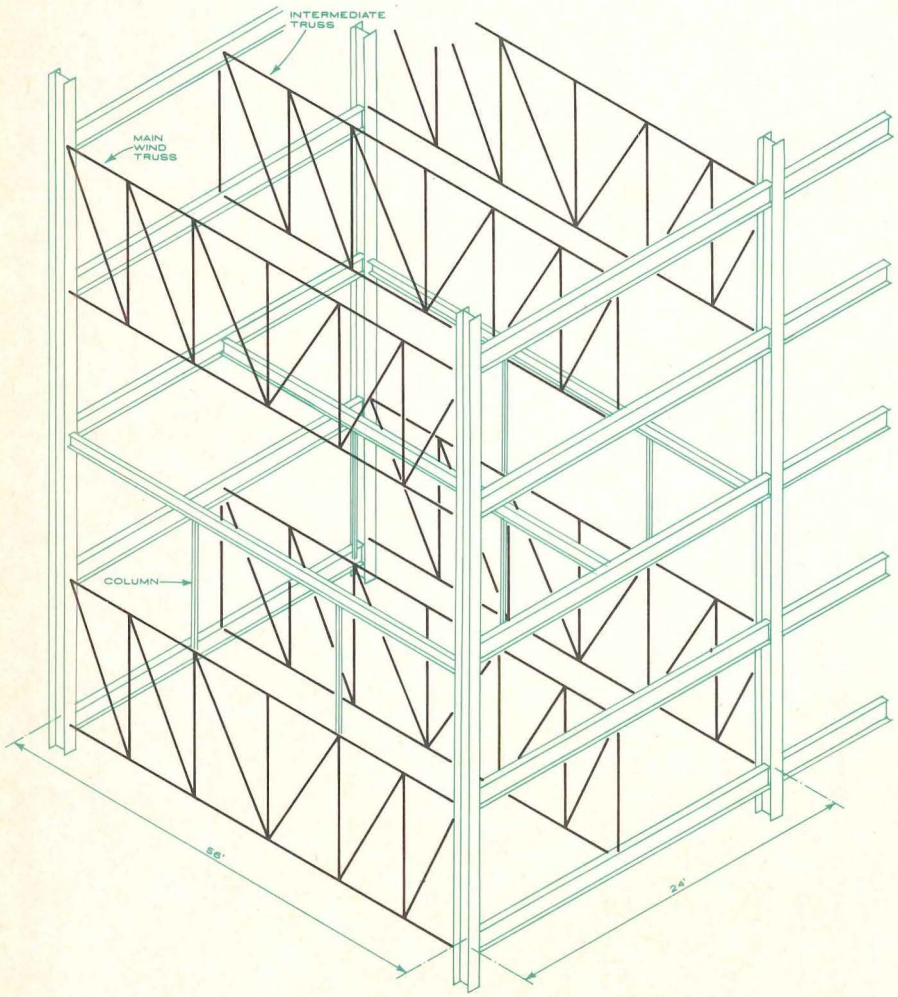
Plans and sketches for the women's dormitory (above) and the men's (left and below).



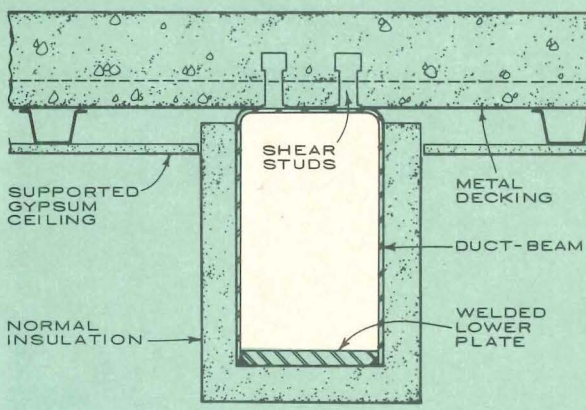
Skip Floor Framing

A multistory framing system proposed by Howard Lorenz, architect, and Thomas Villa, engineer, provides column-free interiors every third floor. The building would have story-high trusses spanning across the building at every third floor, and they would carry floor loads at bottom and top chords. At third points of the trusses, columns would extend one-story to support the next floor. This system would repeat itself throughout the building.

The designers call for exterior columns spaced 24 ft apart, but since the trusses are to be spaced on 12-ft centers, the spandrel beams would support intermediate trusses. The apartment planning requires a double-loaded corridor, which is not accepted by all housing authorities.



Box Beams Serve as Ducts



Reid & Tarics, San Francisco architects, have developed a structural system of steel hollow box beams that serve as horizontal air ducts. The system is intended to satisfy URBS Contract Documents and Performance Specifications. Beams are to be made of cold-formed or brake-formed steel plate, punched with regularly spaced holes in the webs and fitted with a welded lower flange whose thickness varies with the span. The over-all beam depth is 21 in. for all spans between 8'-4" and 35 ft. The system is regarded as suitable for both high-rise and low-rise construction.

Staggering Reduces Steel Weight

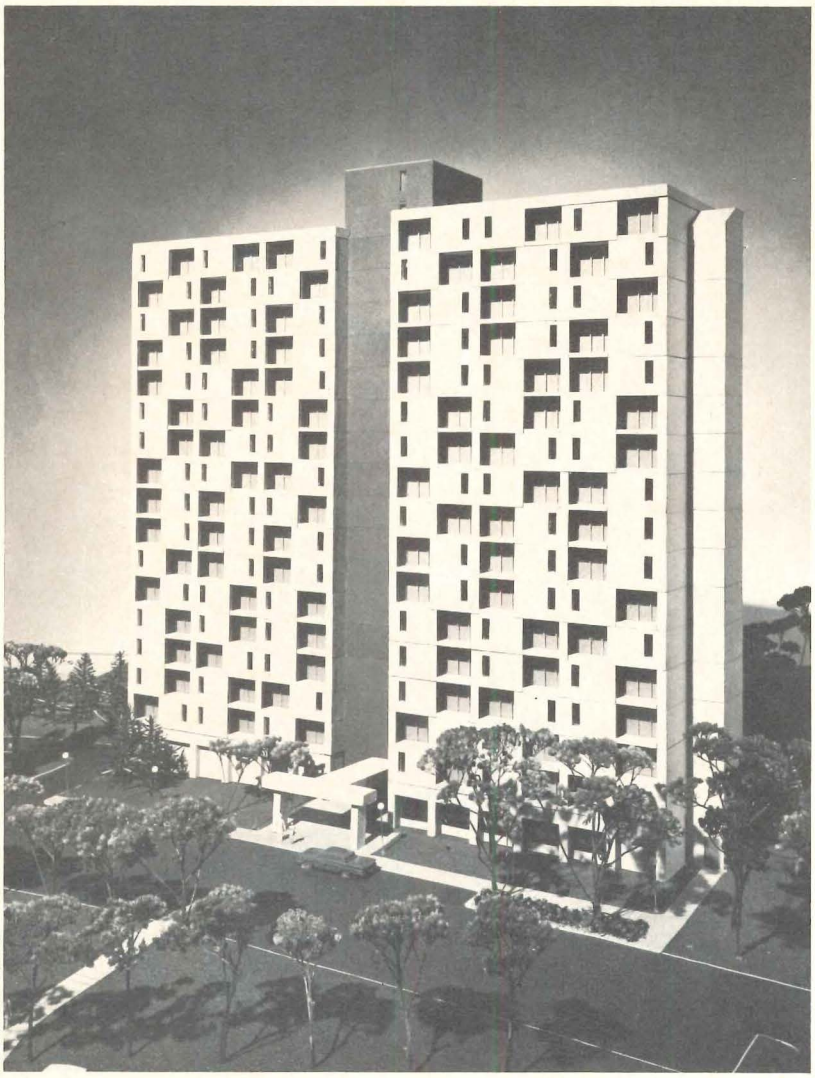
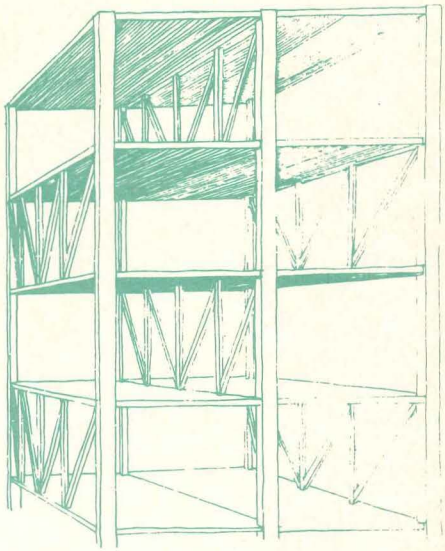
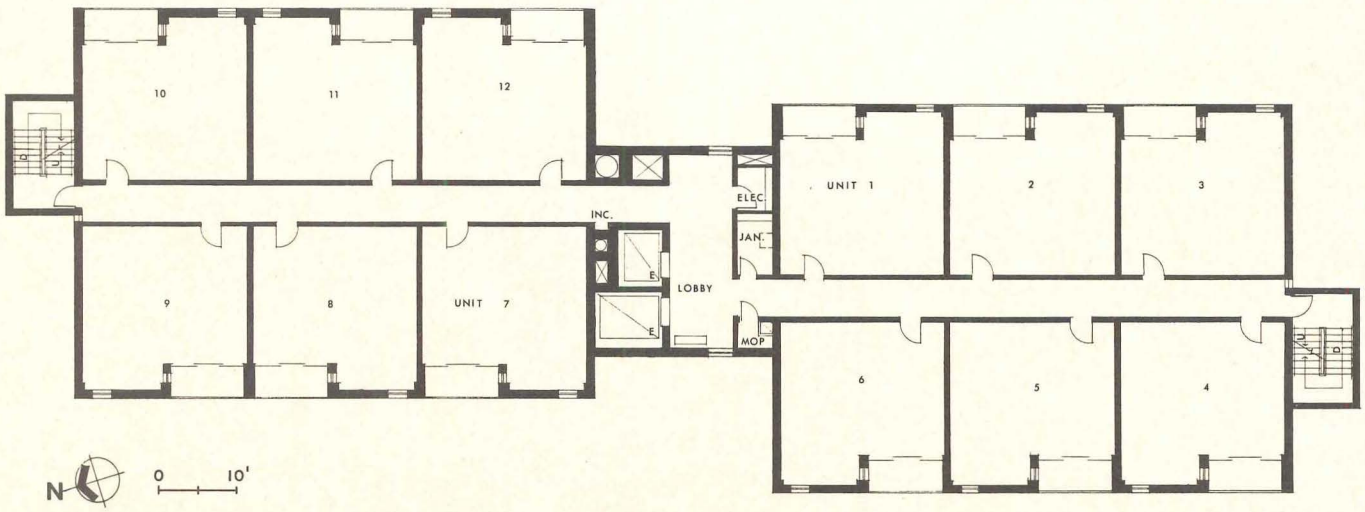


Photo: Les Turnau

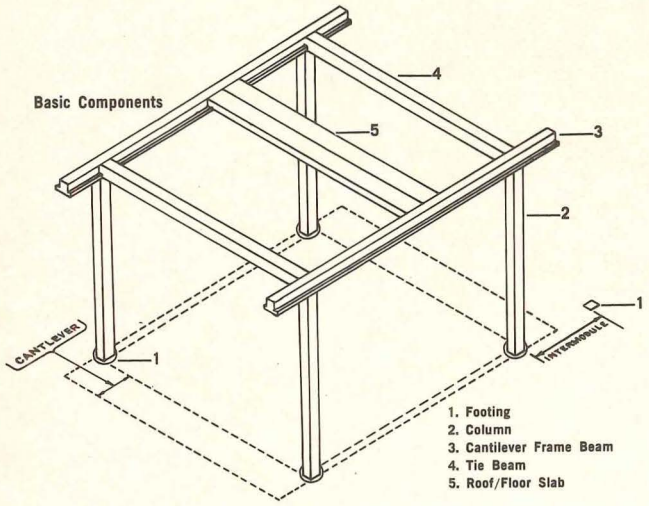


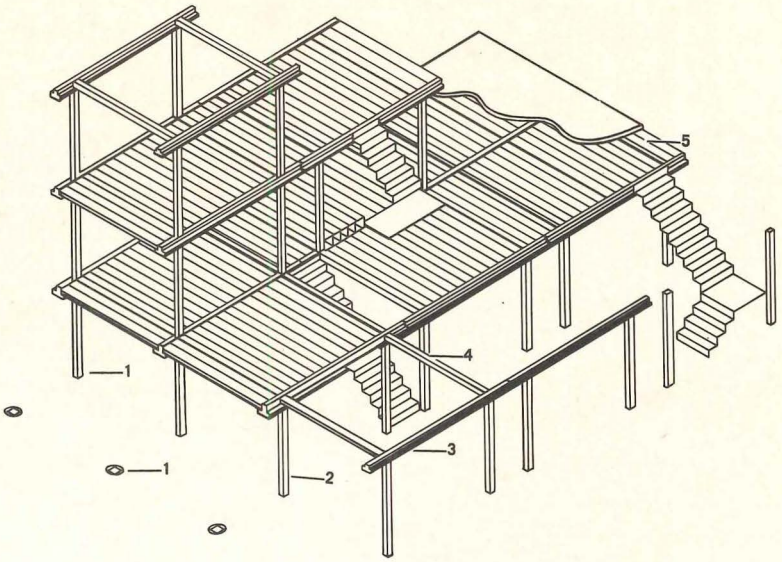
A 17-story, $2,300,000 housing project for the elderly in St. Paul, Minn., is based on a staggered truss system developed by the Departments of Architecture and Civil Engineering at MIT. The system spaces story-high trusses in a similar pattern to brickwork joints. Floors span continuously between alternate top chords and bottom chords of trusses that span between exterior columns.

Trusses are spaced 22′-8″ apart, and their diagonals serve as wind bracing in the short direction of the building. Steel weight is reported to be 7 psf, and a comparable braced frame is estimated at 9 psf. The unit cost of the 17-story building is $16.30 per sq ft. Bergstedt, Wahlberg & Wold, St. Paul, is the architect.



Do-It-Yourself Concrete Framing





Multiple Bay Configuration

Neal Mitchell, Harvard professor and head of Neal Mitchell Associates, has developed a precast concrete framing system that can be built by unskilled labor. The system consists of three main structural components: columns, beams and floor planks, which can be erected without hoists or other special construction equipment. Lightness is achieved with a cellular concrete specially developed for this purpose.

The precast frame and floor-roof panels are structurally independent, so that the quality of wall panels (which Mitchell suggests might even be something as minimal as tar paper in mild climates), can be upgraded as a home owner's financial situation improves. Because of the range of choices available in wall materials, the designer claims that the system is also adaptable to "luxury apartments."

At the site, columns are placed over connecting hardware set in precast footings. Interlocking beams span between columns; and roof or floor planks are placed on top of the beams. In a demonstration project, three men erected the four corner columns of a standard one-room house, lifted two spanning beams into place, and installed the first roof slab in 15 minutes. Based on a modular bay, the system makes it possible to add rooms either vertically (up to four stories) or horizontally as family needs change.

In Detroit, a nonprofit sponsor received a $203,000 demonstration grant from HUD to build 17 homes in one-, two- and three-story buildings. HUD expects to show that the system will lead to housing built for $7.50 per sq ft — compared with $9 for conventional construction — when mass produced. At present, however, the start of construction is delayed by the city in a dispute over whether the project meets local codes.

In Greensboro, N.C., a 30-unit complex of town houses and apartments has been sent out for bids, and work is expected to begin this summer. The low-income project, a joint venture of Mitchell's firm and Cogswell/Hausler Associates, was organized by a local nonprofit corporation. It will be built under FHA's 233 Experimental Housing Program, and sold to a preselected, nonprofit sponsor on a turnkey basis. Rents for the one- , two- , three- , and four-bedroom units are expected to be $65, $75, $85, and $95 respectively.

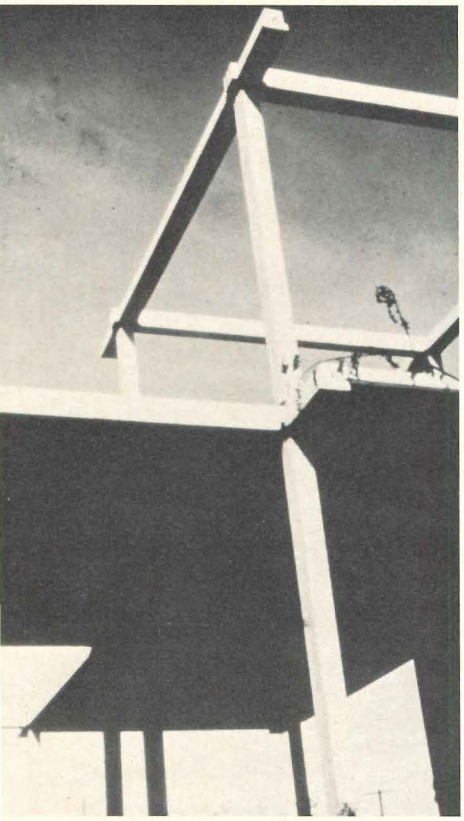
Lockheed's "Panel Lock"

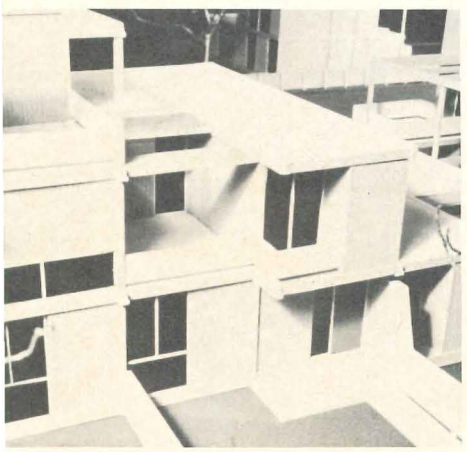
Lockheed Aircraft has entered the low-cost housing field with a system of pre-cast concrete wall and roof panels. The "Panel Lock" system, aimed at markets in underdeveloped countries or migrant-worker housing in the U.S., is built by licensees, using unskilled labor and indigenous materials where necessary.

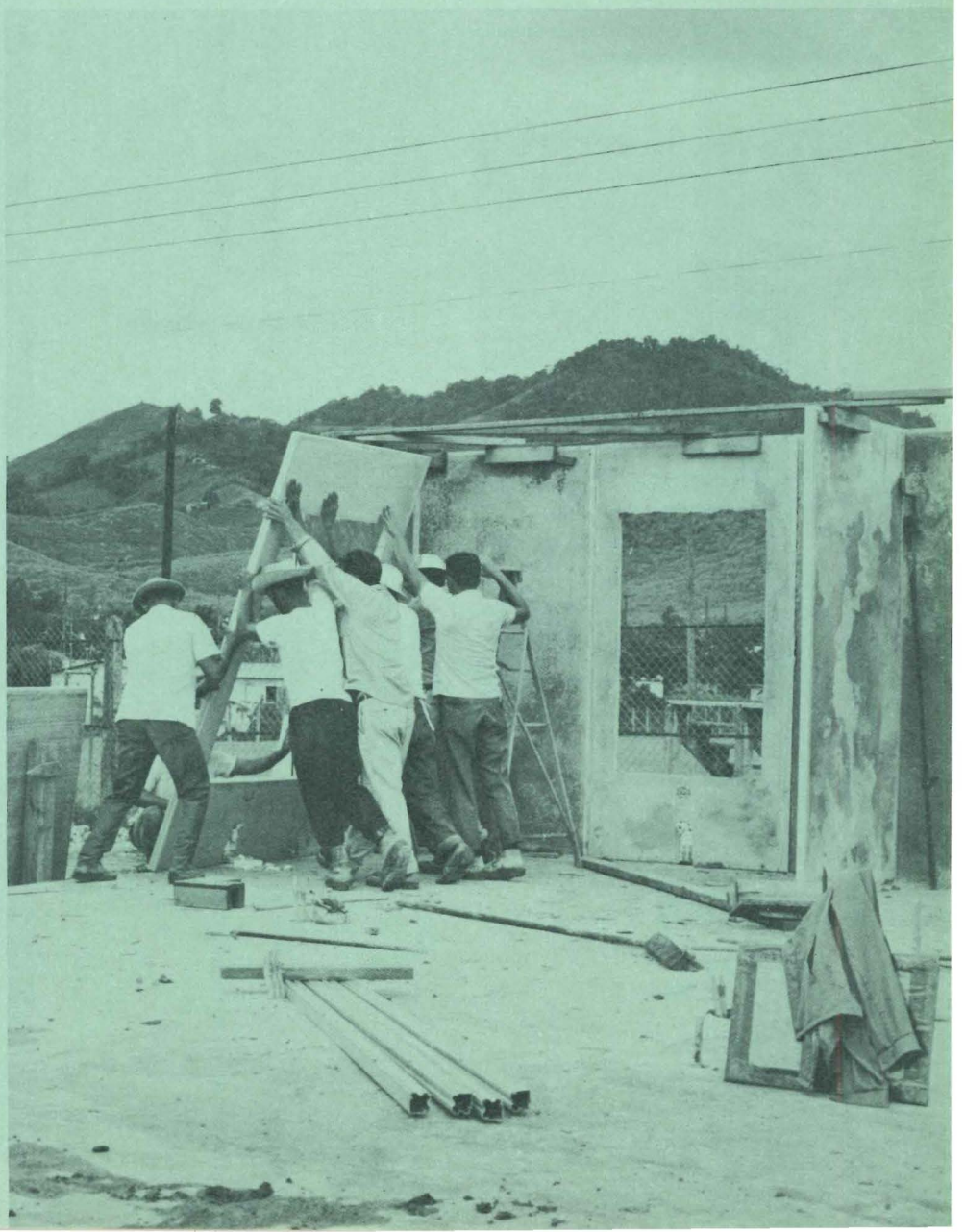
Lockheed reports that a six-man crew can erect one house in two days. Built to U.S. standards, the developer claims, houses are designed to sell for $7/sq ft, including built-in ranges, forced-air heating, and vinyl asbestos tile flooring.

Metal framing members embedded in the panel edges enclose vertical reinforcing bars extending from the floor slabs through the roof. Wall panels vary in width between 2 ft and 4 ft, so that the floor plans can be varied.

Lockheed now has licensed builders in Puerto Rico, the Philippines, and Guam. An 80-unit development in Puerto Rico has been completed with unskilled labor and is now fully occupied. Laborers, mainly off-season sugar cane workers, performed simple, one-step tasks under skilled supervision.



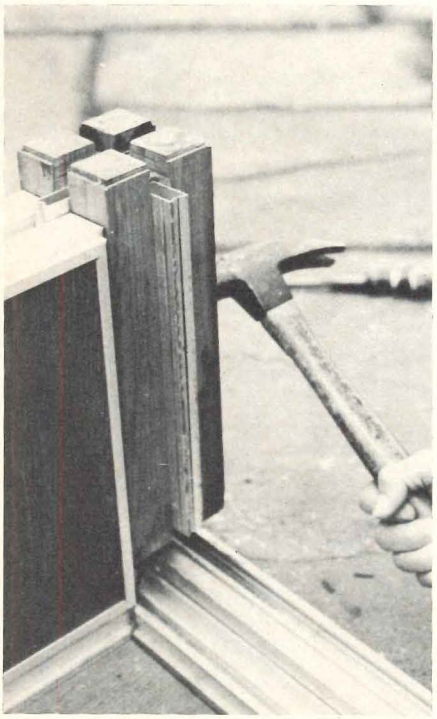




A Variety of Splines

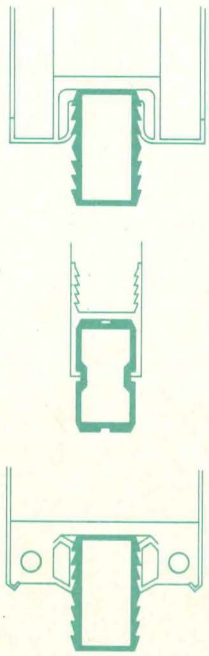
John H. Brenneman, Princeton, N. J., architect, has patented a constructional fastener, and a system of construction using this fastener, for building houses and other structures. The fastener, called Grip-Spline, is a metal extrusion, equal in length to the two components to be joined, which is slid or hammered directly into reglets cut in the components, or fitted into various adapters or inserts. The core, being hollow, may be used to carry wiring. The constructional system, called Brenloc, uses modular wall, floor, and ceiling panels fastened together with Grip-Splines. Among the advantages claimed are ease, rapidity, and economy of erection, ease of remodeling or adding to completed buildings, the possibility of integrating modular furnishings and accessories, and advantageous mortgage terms.

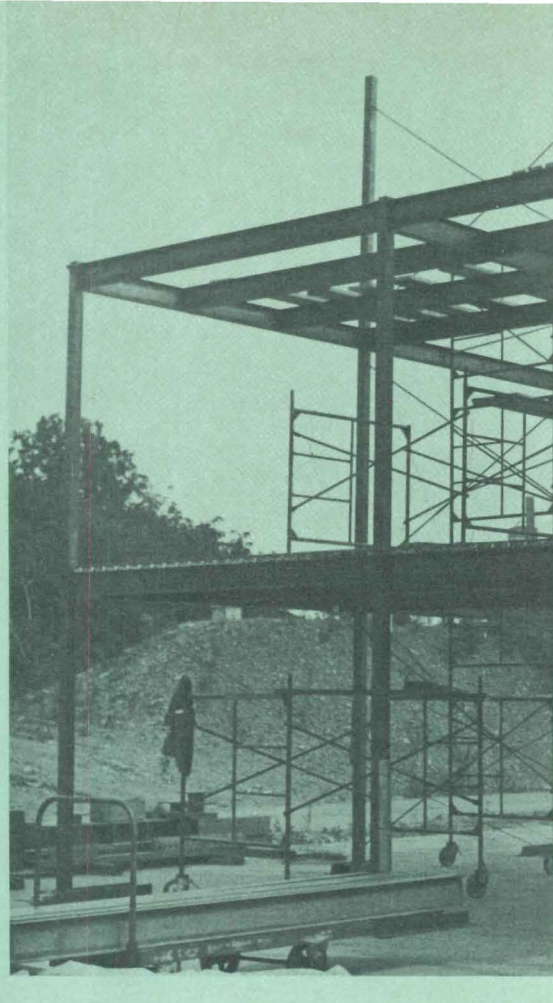
A large one-story demonstration house has been erected at Princeton.



Demonstration of a Grip-Spline assembly. Splines are already inserted in post, which is being tapped into place against panel. Post is then tapped downward onto horizontal spline seen at lower left.

Grip-Splines and Adapters

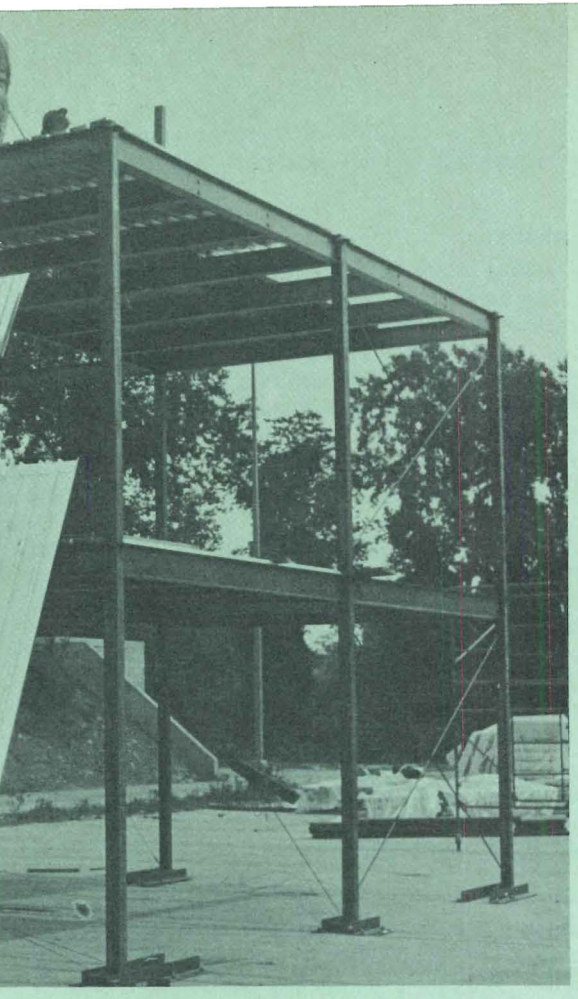




USS Self-Help Syste

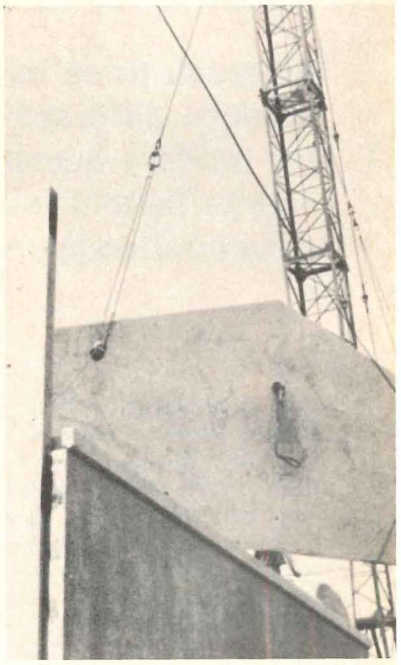
The United States Steel Corporation has experimented with structural framing systems for use in housing units that can be erected by unskilled labor. The intention was that the units, except for wiring, plumbing, and heating systems, could be erected by unemployed but able-bodied persons from the neighborhood. A further objective was to develop a complete building system competitive in cost with conventional construction.

The framing system shown here was to use two standard shapes, cut to length in a shop. A simple template and hand-operated punch would make the necessary bolt holes at the site. Tubular columns, one story high and weighing 75 lb, are joined to girders one bay wide and weighing 120 lb with connectors inserted into the columns and bolted to the upper flanges of the girders. Buildings up to four stories high could be erected with these, if suitably reinforced with diagonal bracing.



Interlocking Concrete Components

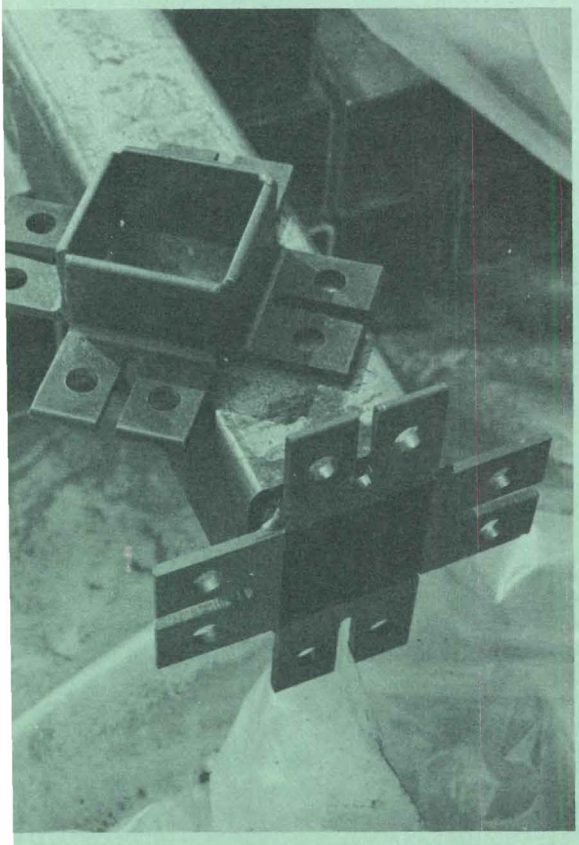
Prestressed lightweight aggregate concrete panels make up the walls, floors, and pitched roofs of six townhouses being built in Washington, D.C. The project's sponsors, the National Association of Home Builders and the Portland Cement Association, hope that it will stimulate interest in low-income housing among small homebuilders.

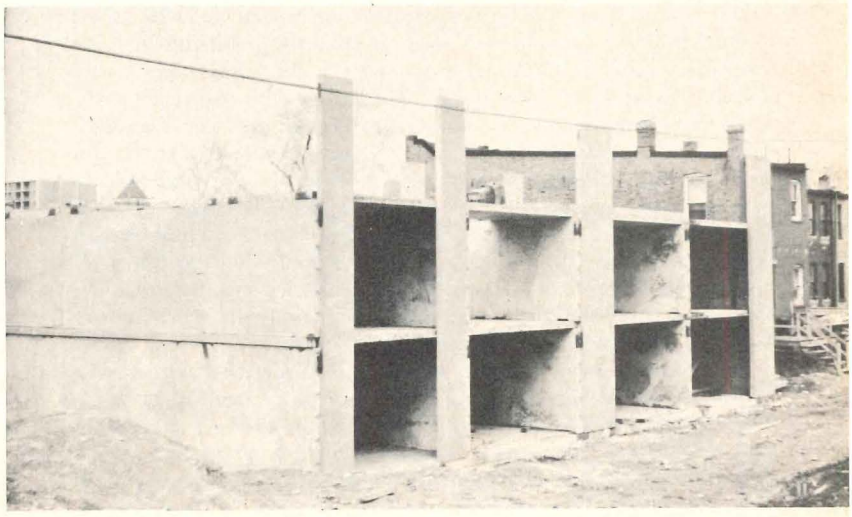


Panels for all six houses were put into place in 10 working days on the site, reports the NAHB. Using a special aggregate, panels are cast and shipped via standard trailer trucks from a plant in Richmond, Va. Weight has been reduced to 110 lbs per cu ft from the conventional 145 lbs, and the lightweight aggregate provides the further advantage of making panels self-insulating.

Testing of full-scale panel prototypes was conducted by NAHB Research Foundation, Inc., and the system was designed for fire-resistant construction in high density urban areas.

The three-story houses, designed by architects Collins & Kronstadt, Leahy, Hogan, Collins, are grouped around a small park space and common play area, and each house has a private walled patio. Houses are either 14 ft or 18 ft wide and provide either three or four bedrooms. Selling prices of about $15,000 to $19,000 are considered moderate-income prices for Washington. They do not include the cost of research and experimentation.





DOD DE-ESCALATES COSTS

Although three contract winners propose different building systems for military housing, all advocate on-site factory fabrication of structural components.

Somewhere within the Pentagon, home of the U.S. Department of Defense (DOD), is the Office of the Assistant Secretary of Defense for Family Housing, which is responsible for the annual construction of between 8000 and 10,000 housing units for officers, enlisted men, and their families. In an adventurous program of securing new technology and lower costs for its construction program, it has recently awarded contracts for three housing proposals. DOD's plan is to take the best technological innovations from each of the three winning proposals, combine them with other techniques known to DOD (which they are not yet willing to discuss), and mesh them into one industrialized building system. Two-hundred units — probably two-story rowhouses — will be built initially (within the next two years), at George Air Force Base northeast of Los Angeles. If the program is successful there, the same building system will be erected by many different contractors on other military housing sites around the country.

The basic idea behind the DOD effort is to demonstrate that an industrialized approach to building can produce cheaper and better housing than critics of the concept believe possible, and that an industrialized building system can be successfully applied to the urban middle- and low-income housing problems besetting the nation's cities. Thus, the unique program envisioned by DOD called for the design of a building system capable of producing in large quantities — about 10,000 units annually — the same high-quality housing the military now builds, but at greatly decreased costs. Reflecting the Government's increasing concern over housing shortages and the inadequacies of the construction industry, DOD also specified that solutions should be applicable to the high-density housing requirements of urban centers. Finally, because it is now widely recognized that the building industry as it is now constituted lags decades behind other industries in technology, the DOD program sought to bring about the long-expected entrance into the housing field of the giant electronics and aerospace corporations that participate in space and defense programs.

The contract winners were: Carl Koch's Techcrete system; the University of Michigan and Aerojet-General's filament-wound container system; and General Electric's pragmatic study recommending improvements in conventional house-building technology and site engineering practices. Although their solutions differ greatly from each other, it is the similarities that will have the greatest impact on the industry. All three advocate: on-site fabrication of structural components; the use of prefabricated "subsystems"; use of a total "environment system," or system building, approach to the construction and design process; innovations in solid waste and sewage disposal; changes in labor practices; and extensive innovations in site preparations and utilities engineering. In addition, they each have achieved major cost savings in materials and erection costs, as well as reducing the cost of labor from the current 40–50 per cent of the cost of production to about 25 per cent. Thus, no matter which of the building proposals DOD emphasizes in its final design, both the architectural profession and the construction industry as a whole can look forward to significant improvements in technology, and possibly to changes in the composition and size of the industry and its labor force. The families of military men, and, potentially, millions of urbanites, can look forward to considerable improvement in the quality of their dwelling environments.

David and Goliath

According to General Electric statistics, the nation's housing needs for the next eight years as currently projected requires 18 million new units — which is about 16 million more than the construction industry, operating at peak levels, can supply. Not even the indomitable David could out-wrestle Goliath in a fair fight; the thousands of small construction entrepreneurs with their antiquated methods and small business capital cannot even put up a fair fight against the growing pressures of population growth, decaying cities, and the demand for livable environments in the nation's ghettos.

Many observers believe that the only solution of the housing crisis is to bring in big business and the "systems" methods they have so successfully applied to other mammoth construction jobs in the missile and SST category. For this reason, architect Koch's office teamed up with Kaiser Industries (the probable builder of the scheme if Koch gets the nod from DOD), Westinghouse, and Battelle Institutes Laboratories.

As long ago as 1964, General Electric formed an entire corporate division called Community Systems Development Division, which reportedly is now in the planning stage of building 10 new communities.

The University of Michigan teamed up with the Aerojet-General Corporation a year ago to explore the building possibilities of reinforced plastics and the glass filament winding technique developed by Aerojet for manufacture of rocket casings. After an initial development and tooling-up phase, each of these three corporate teams claims to be able to produce the required housing quantities specified by DOD, and, once initial production problems are solved, there seems in each proposal no upward limit to the quantities possible.

Why DOD?

It has often been claimed that the labor unions, the politics involved in local code requirements, and the whole structure of the construction industry are the prime obstacles to improving house and apartment construction techniques and lowering their cost. But there are other obstacles as well: the DOD program may offer solutions to two of the most crucial prerequisites in any national effort to achieve significantly lower housing costs. First, it offers government subsidy of the expensive, and unprofitable, research, tooling-up, and prototyping phases necessary for large scale production of high-quality units. And, second, it guarantees the large-volume annual market that enables sizable unit-cost reductions. It was largely due to these government-provided conditions that the aerospace, electronics, and computer industries grew so quickly: Initial research was paid for and the customer always needed more.

The three DOD contract winners provided P/A with cost figures that indicate their initial capital investment can be paid for in about three years out of cost reductions achieved through systematizing and rationalizing the design and construction process. After that, presumably, contractors will be building as many as 10,000 units annually for the Government at a unit cost ranging between $6–$10 per sq ft. The contractors could then be in a position to enter the open market and build the units for cities and private developers, effectively undercutting in both improved quality and lowered cost almost every — if not all — house and apartment construction now being built. Moreover, two of the three winning DOD proposals could work, with only a few changes, within the existing code structure. And, finally, the additional jobs for both skilled and unskilled construction workers that would be opened up in an effort to provide the 18 million housing units that today do not have a chance of being built would help to convince labor of its true interests.

What Does It Cost the Taxpayer?

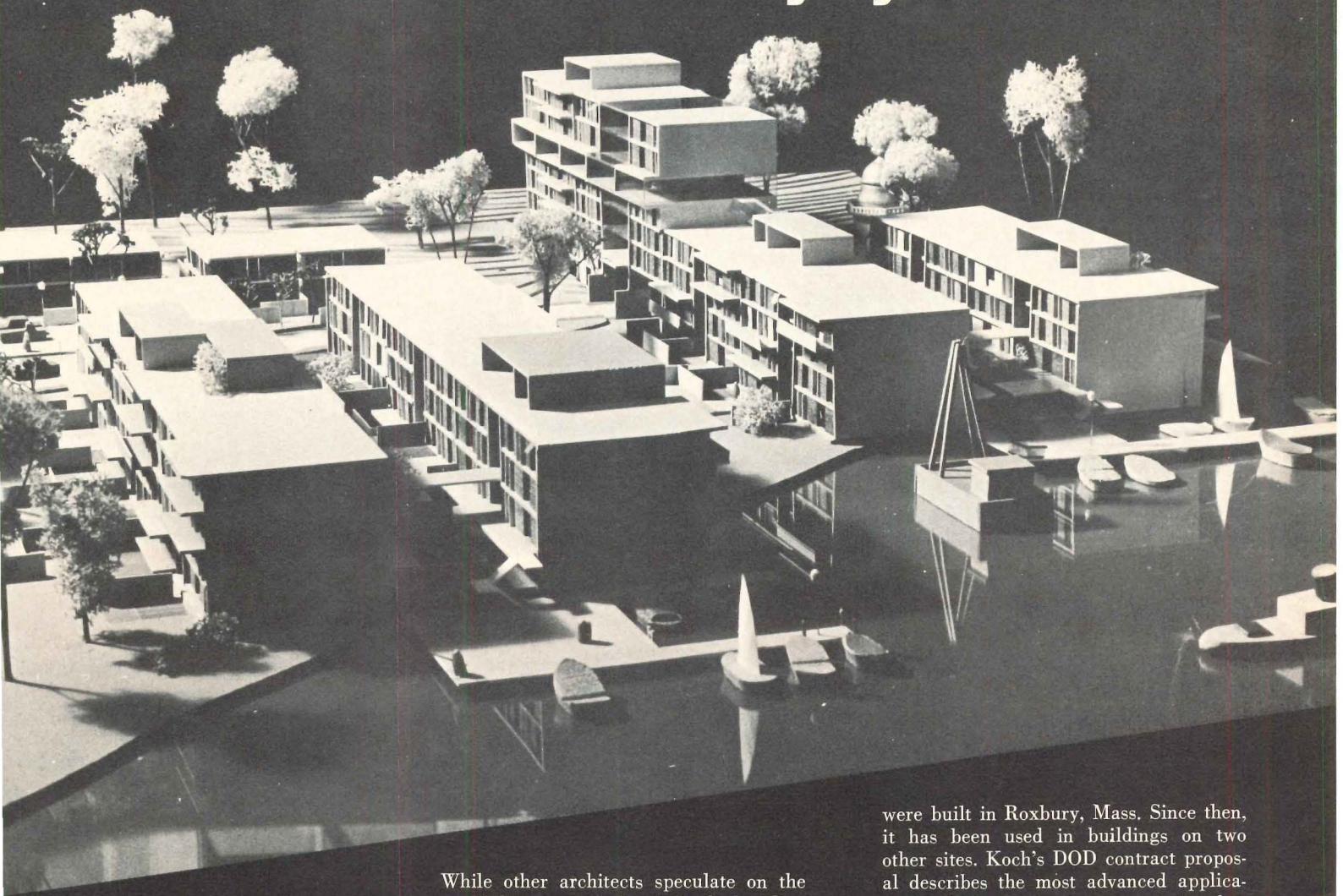
Perhaps the most remarkable aspect of the DOD program is how cheap it is: the three firms were awarded a sum total of $175,000 — $75,000 apiece to General Electric and Carl Koch, and $27,000 to the University of Michigan/Aerojet team. This is spent in about 3 minutes in the Vietnam war. The amounts of initial capital investment required for the three proposed schemes are: $3,000,000

(Koch), $4,404,000 (Michigan/Aerojet), and $7,000,000 (General Electric) — approximately equal to 4 hours' expenditure in Vietnam. And the eventual housing units produced will be significantly cheaper than currently possible with conventional techniques: 18-story apartments from $6.23 per sq ft and three- and four-story townhouses from $6.84 per sq ft (Koch), single-family detached houses from $18,935 (GE) and three-bedroom detached houses at $17,806 each (Michigan/Aerojet).

How Can DOD Do It?

Because all military housing is built on Government-owned land, codes and other restrictions can be waived if the Department of Family Housing decides to demonstrate a new industrialized building concept — a power that HUD and other "civilian" agencies lack, and that is undoubtedly required for basic technological advances in construction. In their DOD proposal, the Michigan/Aerojet team states: "The available funds and other needed resources in the civilian sector of Government are insufficient for a full-scale attack on the housing problem." It is symptomatic of the twisted value system at work in Washington, D.C., and the rest of the country, that what may turn out to be the nation's best solution to one of its most serious social problems — the lack of adequate housing for millions of people — will be sponsored and built by one of the world's greatest war machines.

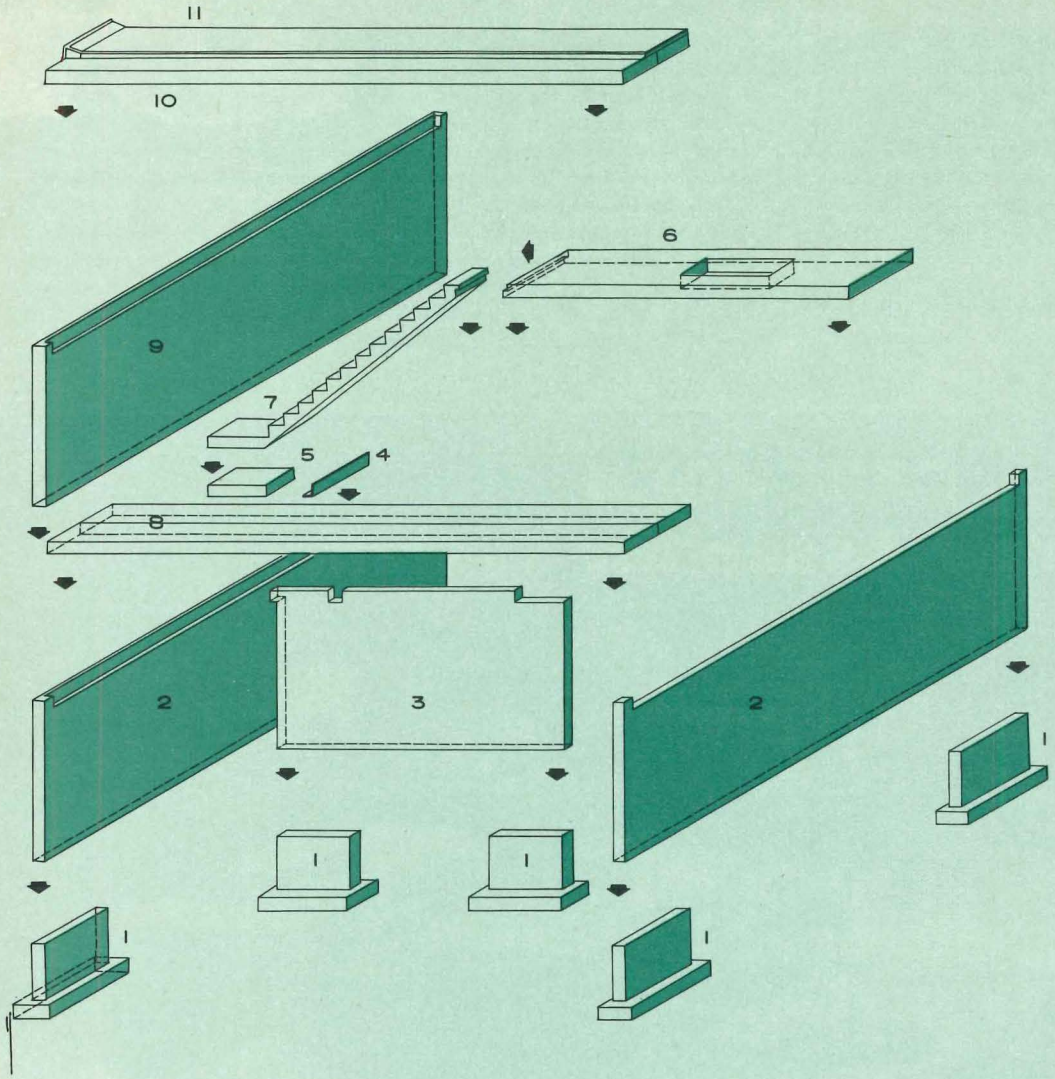
CARL KOCH
Concrete Assembly System



Low-rise units — townhouses and walk-up units— formed with the Techcrete building system are shown in a model photograph of part of an over-all site study done for the DOD project by Carl Koch's office.

While other architects speculate on the possibilities of industrialized building systems, exhibiting model photographs and renderings, Carl Koch likes to point out that not only has his system, Techcrete, already been used in several buildings, but that he has had 20 years experience in designing and constructing several different kinds of prefabricated structures. One thousand "USA Homes," an early Koch pre-fab house, for example, were built by the Government and shipped to military bases on aircraft carriers all over the world.

Techcrete, the structural system developed by Koch's office and engineer Sepp Firnkas, had its first application five years ago when 200 four-story units were built in Roxbury, Mass. Since then, it has been used in buildings on two other sites. Koch's DOD contract proposal describes the most advanced application of Techcrete so far, representing further refinement and new development of an already excellent building system. Among the additions to it proposed for the DOD project are: a trash disposal system developed by Kaiser; new site utility and sewage disposal systems developed by Westinghouse; new plumbing and mechanical systems; a revised construction scheduling and erection sequence; a complete set of prepackaged, prefabricated "subsystems" for interior finishing of the structural shell; and a construction schedule for these interior components that is integrated with the sequence for shell erection. In addition, Battelle Institute teamed with the archi-

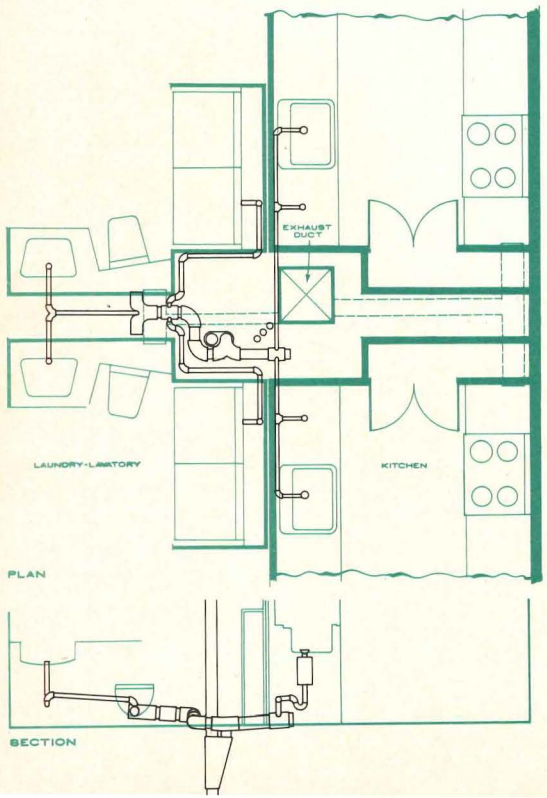


Exterior Erection Sequence:

(1) footings
(2) bearing walls
(3) shear wall
(4) landing lintel
(5) sub-landing
(6) floor slab with slot
(7) stair
(8) floor planks
(9) bearing walls
(10) roof planks
(11) roofing, insulation, and flashing

Interior Erection Sequence:

(1) plumbing tree, vent, duct, mech. service
(2) frame for curtain wall
(3) curtain wall panels
(4) window panels
(5) bath unit: walls and lavatory
(6) tub, toilet, and kitchen sink
(7) heating/air-cond. unit
(8) runners for interior partitions
(9) interior partition panel
(10) door post
(11) electric harness
(12) door panel
(13) kitchen cabinets
(14) painting
(15) vinyl wall covering
(16) vinyl base
(17) finish flooring
(18) stair rail

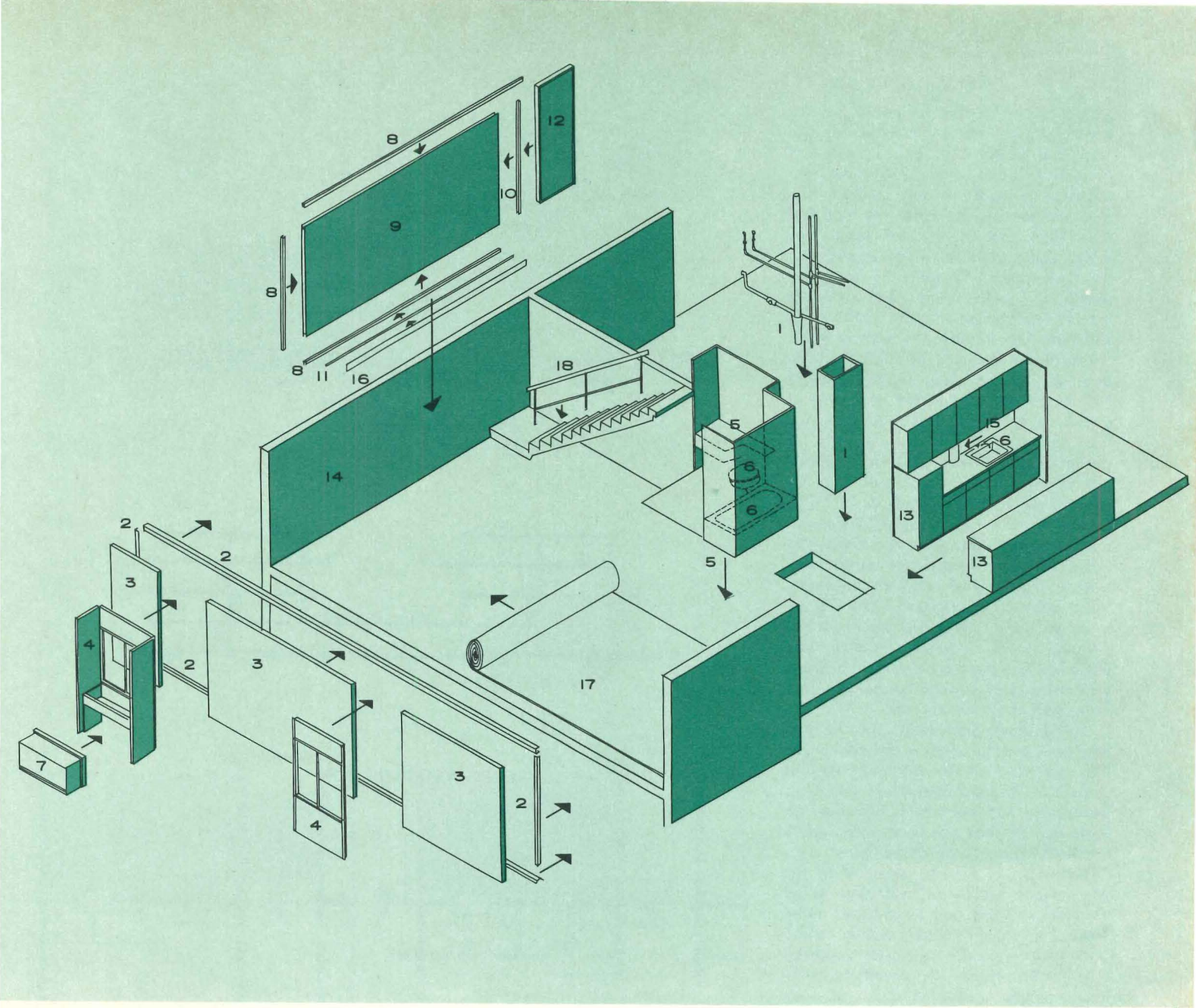


tect's firm for the DOD contract, performing heat loss and air-conditioning calculations.

The most dramatic result of the work done by Koch's office and Kaiser Industries for this project appears in their detailed cost studies. Multistory Techcrete has already been built for $10.70 and $12 per sq ft in Boston, including site development costs. The DOD analysis indicates it can eventually be built to 18-story heights for $6.23 per sq ft, excluding site and development costs, without any decrease in the high architectural quality or significant changes in local codes.

Most of the cost savings are achieved through rigid control of the construction process itself, based on extensive time and motion studies made by the Koch office on other Techcrete structures. Two types of workers are called for in the new proposal: skilled construction laborers who will assemble the structural shell and perform all jobs that involve heavy equipment; and unskilled laborers who will perform all the "light" labor — pouring concrete slabs in an on-site factory and assembling the interior components floor by floor as the structural shell is completed.

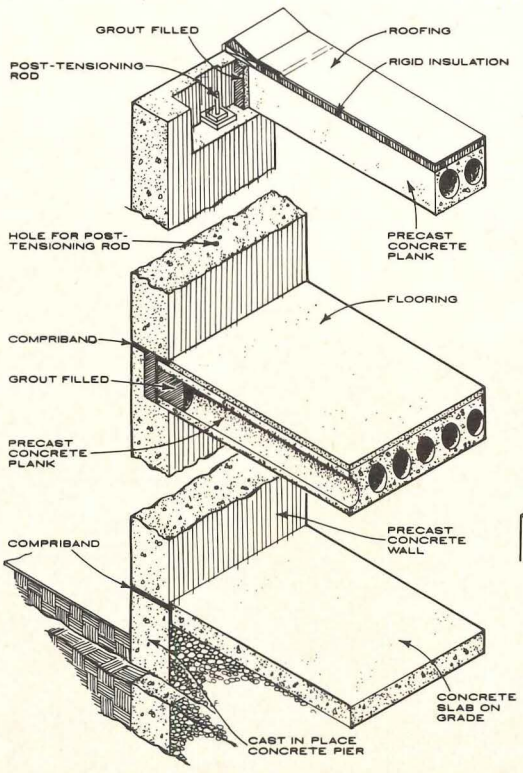
To achieve complete efficiency, the DOD proposal calls for computers, programmed with a CPM schedule devised by Koch and Kaiser, to run the job at the site. Workers will receive a punched card with the day's work written out as they report to the job; at the end of the day, the worker indicates whether he has finished everything called for, or what he has not done, or what he might have done over and above the work prescribed for him. These cards are fed into the computer, which then programs the next day's work in accordance with the CPM schedule and its new knowledge of daily progress. The schedule itself can be continuously evaluated for defects, problems will be immediately apparent, and, once

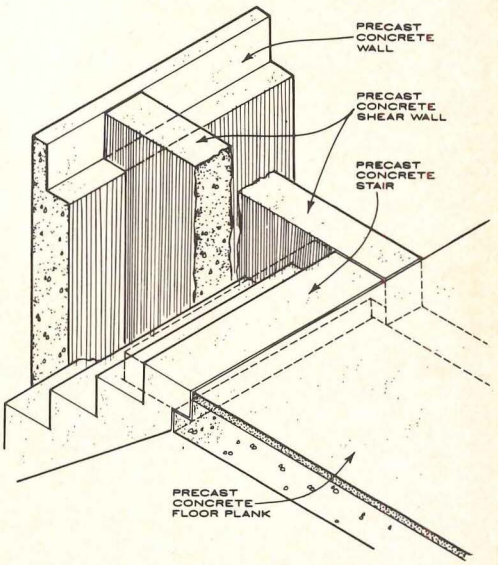


several jobs have been run this way, accurate predictions of construction time can be made, enabling accurate bidding on future projects.

On the basis of past experience with Techcrete and the scheduling studies done by Kaiser, the DOD proposal states that completion of nine-story units, from start of construction to finished building, would require only 32 weeks, with the first units ready for occupancy in 10 weeks. As the construction process receives further study and refinement, cost savings from quick completion times can be further increased.

What makes such control of construction possible in Techcrete is the design of the structural system itself, which not only enables laborers to work virtually indoors in completed shells but which also consists of relatively few components that can be combined in numerous ways to form different types of buildings, building heights, and a wide variety of





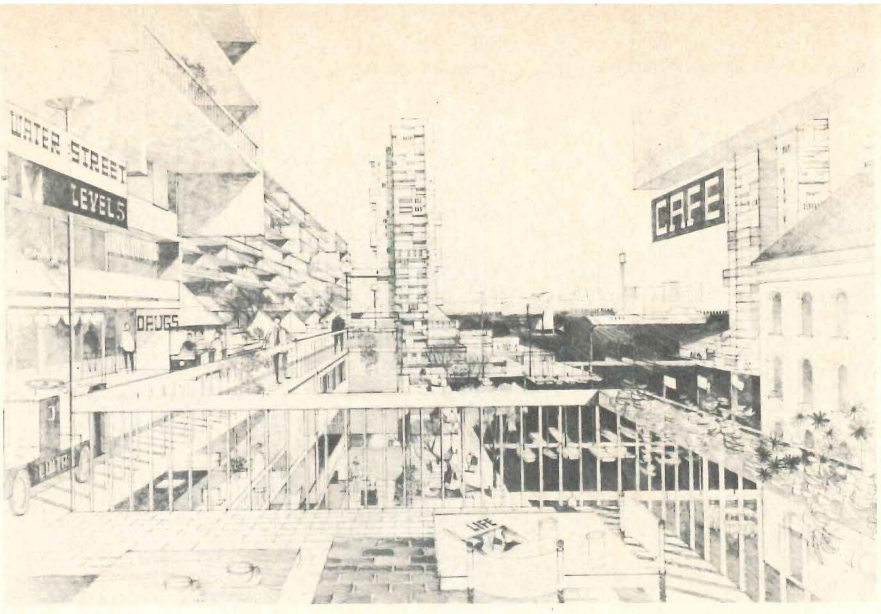
plan layouts. The basic elements of the structure are: precast, prestressed concrete floor planks 1 ft, 2 ft, 3 ft, or 4 ft wide, 8 in. thick, and 32'-6" long that comprise the basic building module; precast concrete bearing walls 8 ft high and 8 in. thick that are stacked up to any height and vertically post-tensioned with the floor planks in place to form the structure; and, when the structure reaches five stories or more, shear walls 8'x16'x8" that stabilize the bearing walls.

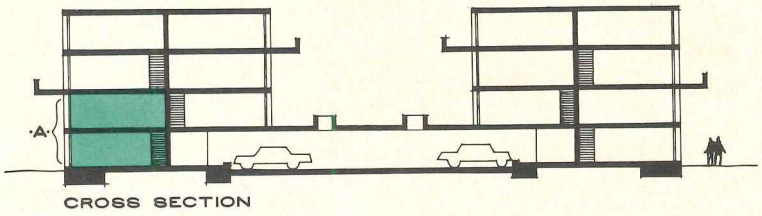
Into this basic shell fit all the subsystems or interior components: standard bathrooms composed of two wall units of ferro-cement, one containing lavatory and w.c. and the other a tub, shower, or washer-dryer. Plastic "Sovent" plumbing trees (which eliminate roof vents for waste pipes) are located in a chase formed by the wall units. Other major interior components are: a precast concrete stair unit; a panel-type curtain wall system, metal faced with an insulating foam core; a plasterboard sandwich interior partition system with metal framed prehung doors; a wood accordion door assembly for closets; an electric heating, ventilating, and air-conditioning unit that forms part of the curtain wall.

All of these components will be prepackaged and delivered to the site on the day each story of the structural shell is completed, dropped onto the correct floor, unwrapped and assembled. Families can move into the first few floors while crews are still working on the upper floors.

The clear 32 ft span provided by the floor planks enables interior plans to be extremely varied and room sizes quite large. The same structural system can be built with no modifications for two-story townhouses, three- or four-story rowhouses, apartment buildings of any height, garages, and office buildings.

With its potential of future cost reductions, its ability to accommodate to almost every site condition imaginable, the numerous variations in both appearance and plan that the structural system allows, and its already proven structural soundness, the Koch scheme is the most advanced industrialized building system in the country. Moreover, although many observers (including some architects) believe that architects and architectural firms have either no role, or only a minor one, to play in the expected mass production of buildings, Techcrete is evidence that architects, working on their own initiative, can compete (and cooperate) successfully with future manufacturers of industrialized building systems.





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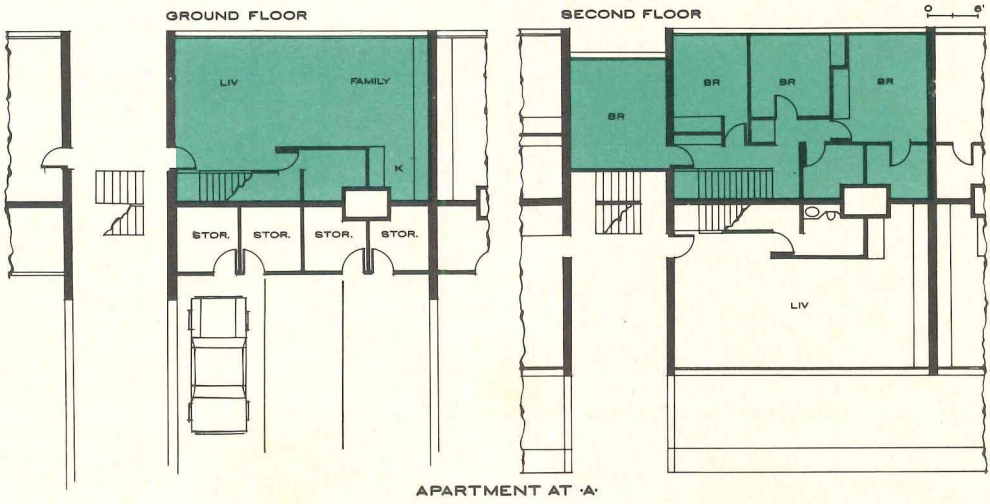
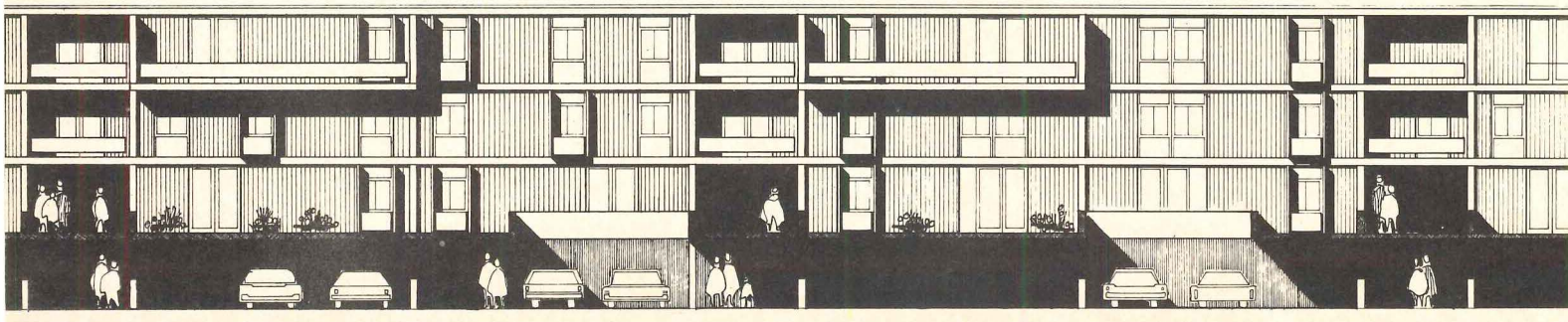
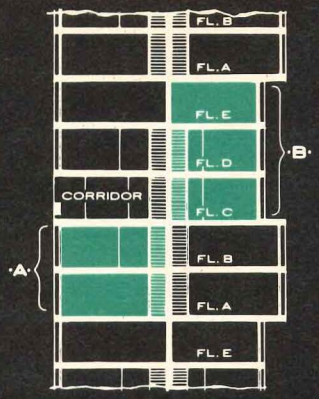


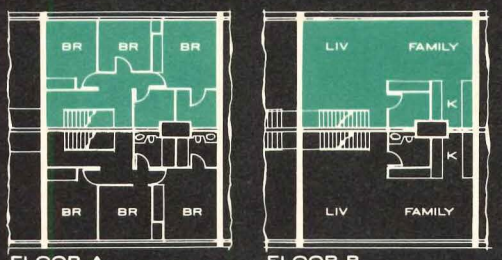
APARTMENT AT 'A'

Flexibility — of housing types, interior plans, and exterior appearance — is one of Techcrete's greatest advantages. It can be used to create high-rise urban communities (DOD project rendering, above, and model of Lewis Wharf project, facing page) or less densely grouped units of three- or four-story walk-up apartments with parking below (section and plan above and rendering below). Within the discipline of the high-rise building, several different interior plans are possible that use the same structural and interior components. Duplex apartments (plans and section, top right, facing page) or single-story, three-bedroom units (plans and section, middle, facing page) both have large room sizes and space for community and tenant activities. (Members of the Koch office who prepared the DOD proposal are: John L. Cummings, Gardner Ertman, Leon Lipshutz, Margaret Ross, Urs Gauchat, Bill Schroeder.)



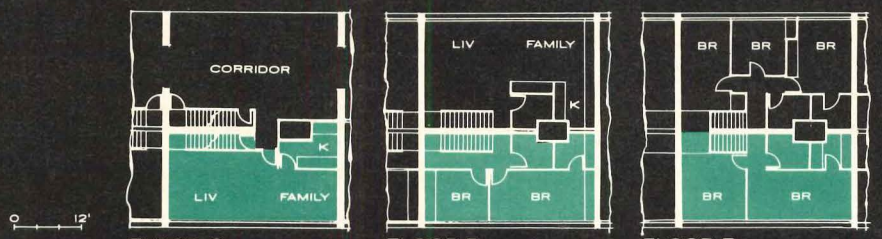


CROSS SECTION



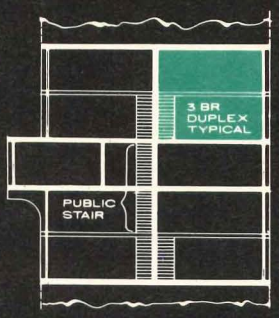
FLOOR A FLOOR B

APARTMENT AT ·A·

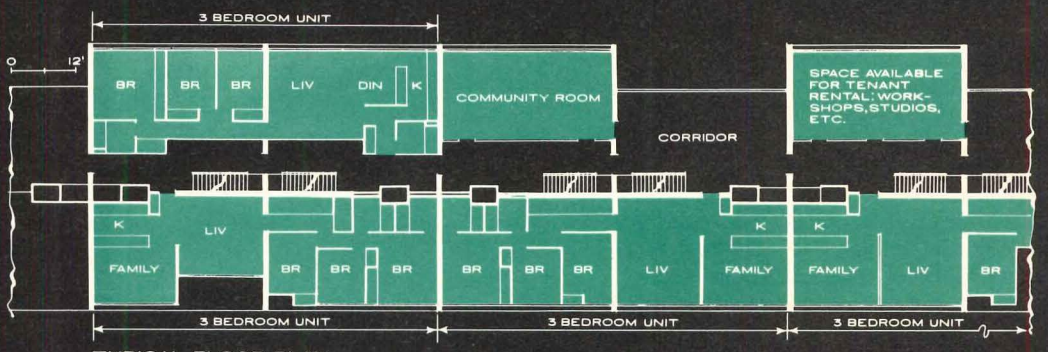


FLOOR C FLOOR D FLOOR E

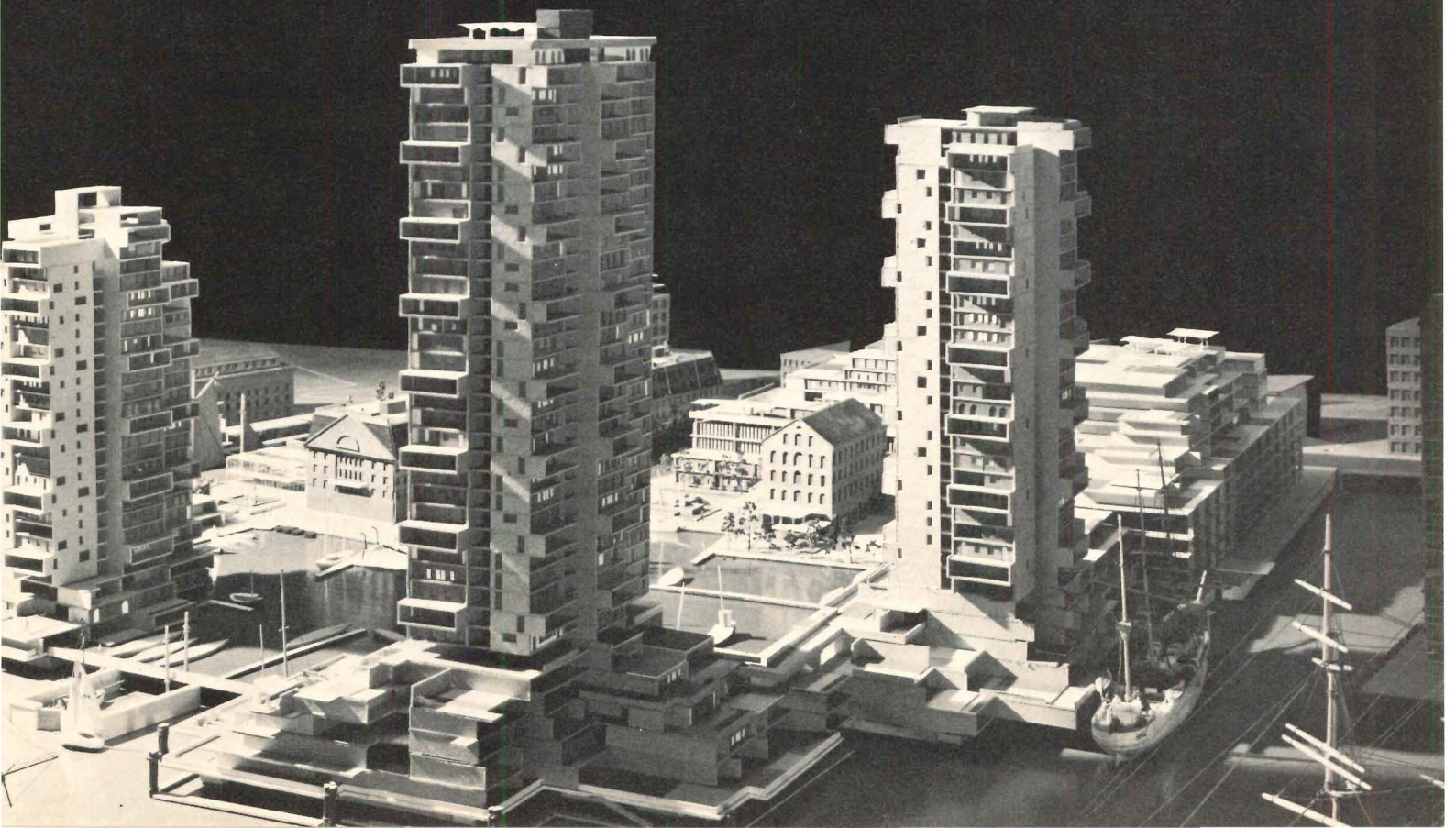
APARTMENT AT ·B·



CROSS SECTION



TYPICAL FLOOR PLAN



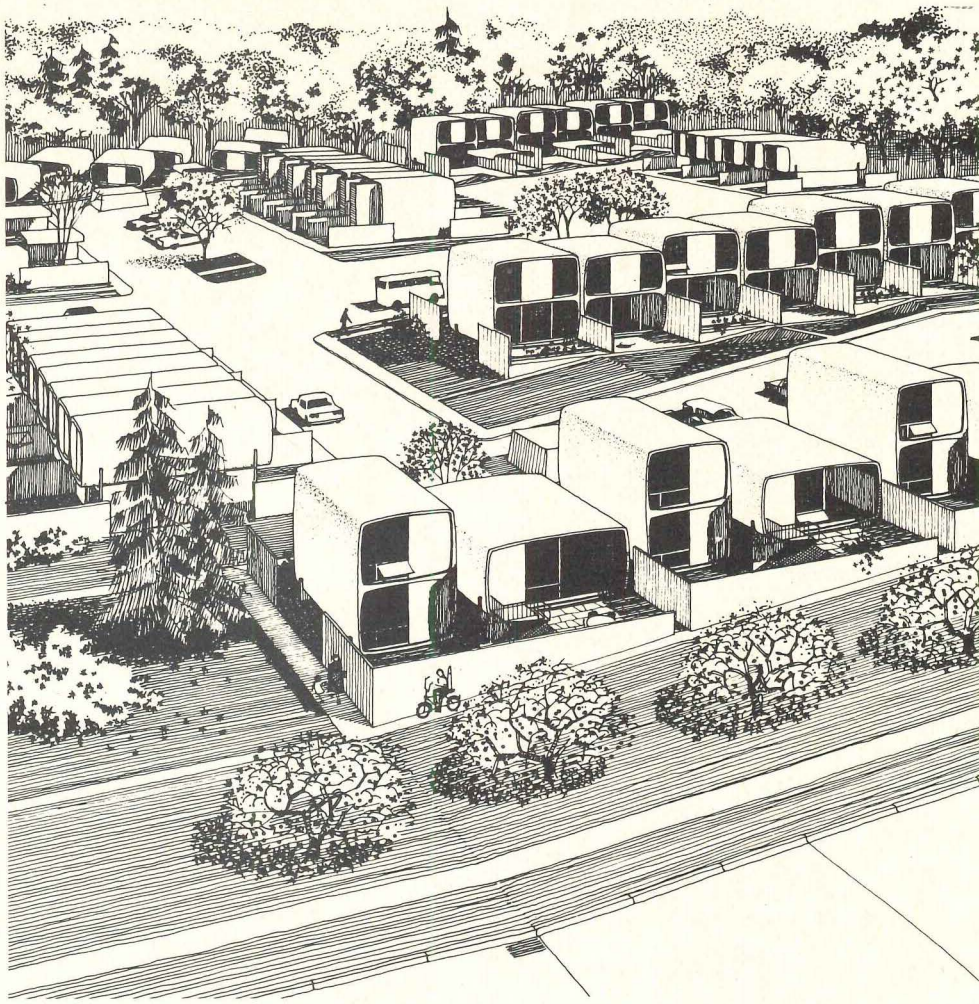
MICHIGAN/AEROJET
Spun Glass Cocoons

The University of Michigan's Architectural Research Laboratory and Aerojet-General's Structural Products Division put forward the most technologically exciting and advanced proposal of the three DOD contract winners. They propose to use filament-winding, a technology developed by the aerospace industry for making rocket engine cases. The filaments would be 80 per cent glass and 20 per cent polyester resin; houses are produced like cocoons (see sketch) by spinning the filaments around a steel mandrel. Although many shapes can be spun with the system, the research team conservatively chose a rectangle, open at both ends, that can be stacked two-high.

To make the cocoons, a mandrel is assembled at the site, so that completed units need not be transported over the roads. A mandrel consists of a steel box hinged at the corners and in the middle of each side. Jackscrews extending between the four sides and a central cylindrical column hold the mandrel in position for the spinning operation and permit the walls of the mandrel to be collapsed after spinning. The mandrel rotates on a turntable supported on an air bearing and wraps filament impregnated with resin around itself until a desired thickness is built up.

To guide the horizontal filament hoop wraps up and down the mandrel, a tower and elevator carriage are used. Core panels, fabricated off-site with vertical filament wrappings, are then applied and the uncured resin on the inner winding surface bonds the two elements together. Another horizontal winding is applied, and the resin that is impregnated in the filaments during the entire process serves to bond the core panel and outer wrapping. The completed shell, with mandrel still in place, is oven-cured, then the jackscrews are released, the mandrel plates retracted, and the mandrel separated and lifted from the shell. With this method, production rates for one mandrel are estimated at four 36′ x 20′ x 8′ shells per day, or two houses of two shells apiece.

In the next stage, to be performed in an on-site, four-station factory, cut-outs are made in the shell for piping, wiring, ducts, and stairways (see "Production System," facing page). Floor panels and bathroom units are installed and connected to water and waste systems in the floor assembly. Piping and wiring connections are made through the floor panels. In the third stage, interior partitioning, pre-hung interior doors and frames, complete wiring and fixtures, storage units, HVAC, and electrical panel packages are installed. Lastly, concrete supports and end wall enclosures are put in place. The complete unit is lifted onto a low-boy, hauled to its final location, and lifted into place by a 25-ton crane.

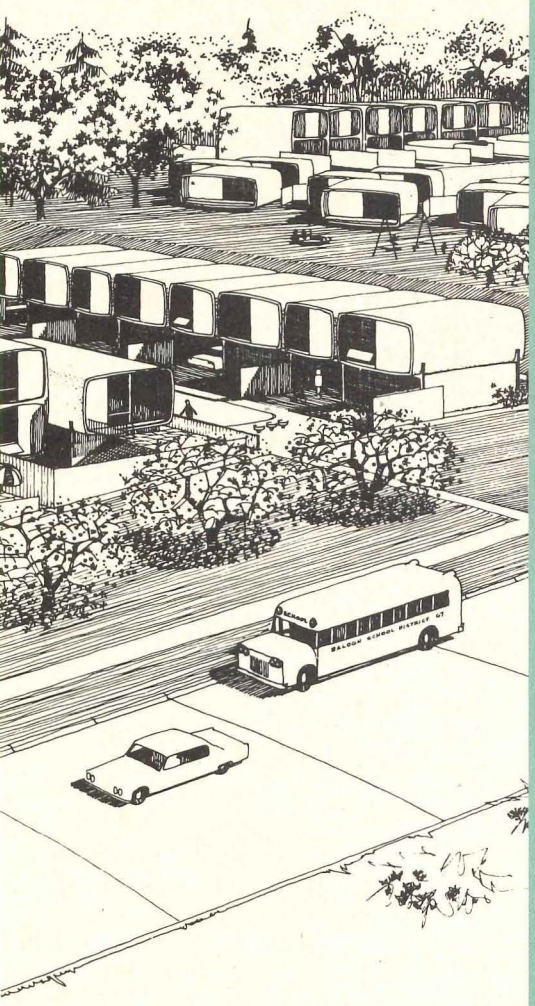


In keeping with the wholly new, wholly manufactured, process of building developed for the military housing program, all of the above-mentioned "subsystems" will be similarly advanced housing components.

Endwalls and partitions: Endwalls are sandwich panels of glass-fiber reinforced plastic with urethane foam cores, complete with windows and connections for insertion of pre-hung doors. They are attached to the shell by a neoprene structural zipper gasket. Interior parititions are low-cost reinforced vinyl-faced gypsum wallboard panels with good sound reduction properties, fastened to the shell by a butyl zipper gasket.

Flooring and Storage Units: Flooring posed the most complicated problem because of the curved cross-section of the shell. The proposed solution, which requires more research, is a 5/8-in. plywood floor supported on a light, open steel frame prefinished with vinyl flooring or vacuum-formed ABS plastic. It is expected that the flooring system can be "attachment wound" into the structure while it is still on the mandrel, but the DOD report does not indicate how this would eventually be done. Prefabricated high-density urethane foam and vacuum-formed ABS plastic storage units, as manufactured by Herman Miller Corp., will be wall hung on interior partitions and are removable if damaged.

Bathrooms and Plumbing: Glass-fiber reinforced plastic bathroom units as manufactured by Crane Company will be used. Internal piping, located in the interior partitions and floor system, will be connected in the factory. Connections to utilities and water systems can be made



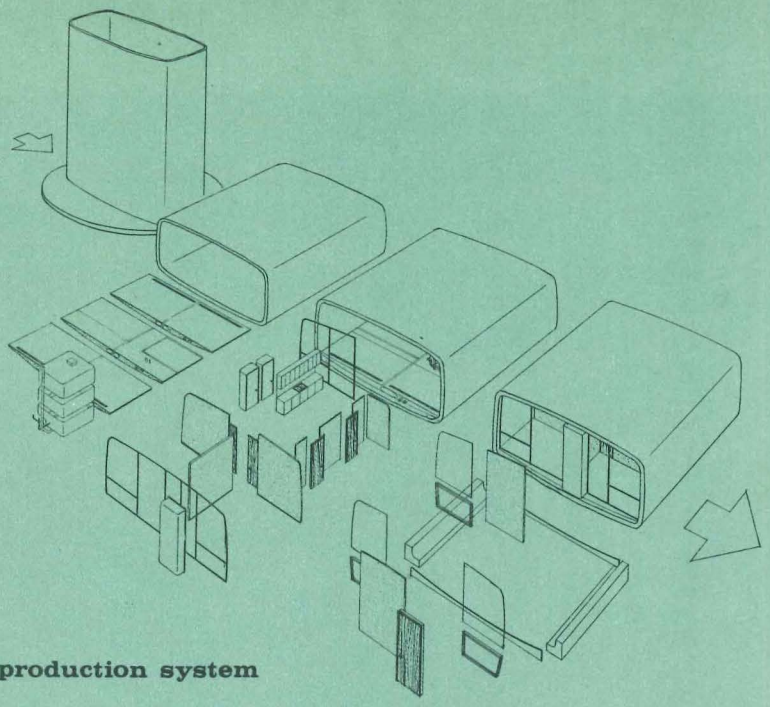
through the floor of the shell.

Heating, Cooling, and Ventilating: An electric air system developed by the Lennox Corporation for the proposal is installed in the factory with supply ducts located within floor panels and return ducts in the open space between shell and floor. A prefabricated unit, installed in the endwall or floor assembly, contains air handling equipment, compressor, condensor, and heating elements.

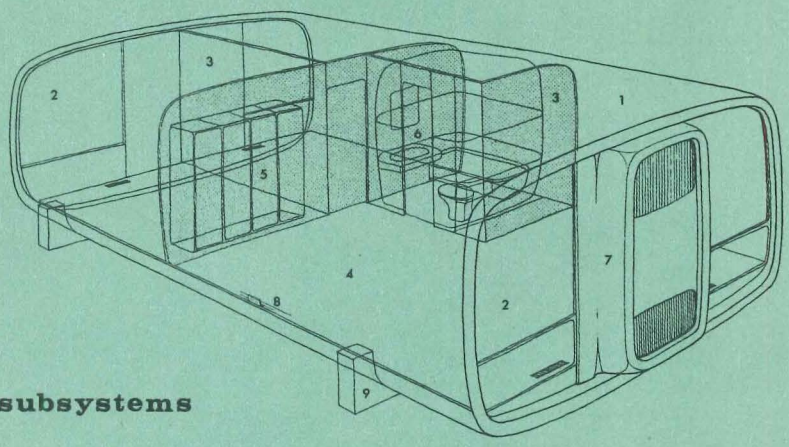
Electrical: The entire housing unit will be prewired. Switches, room lights, and base plugs will be located in the interior partitions. Wiring is to be part of the floor system and the outside connection to an underground power line is made through the floor of the shell at the mechanical unit.

Supports: Precast concrete support units are attached with through-bolts in reinforced areas of the floor shell. Foundations are either precast concrete or cast in place, depending on site conditions.

Waste Disposal System: With atmo-

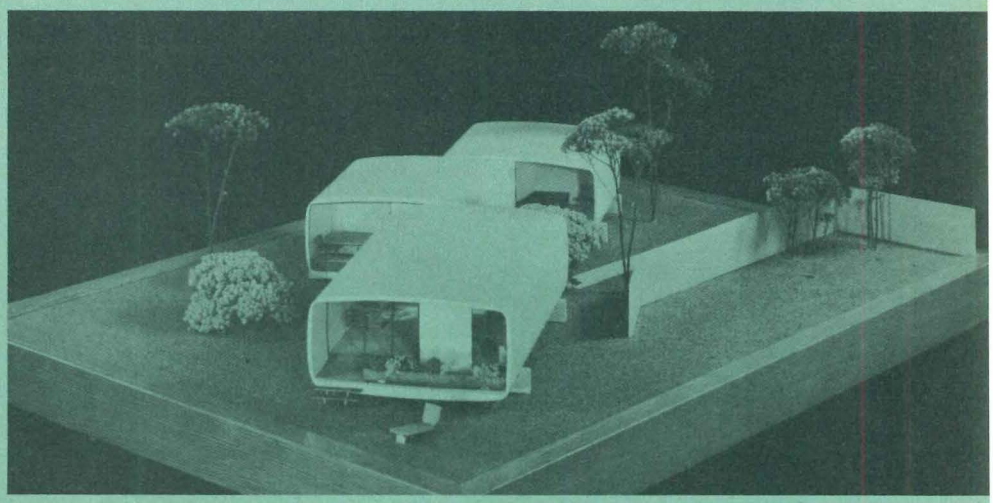


production system

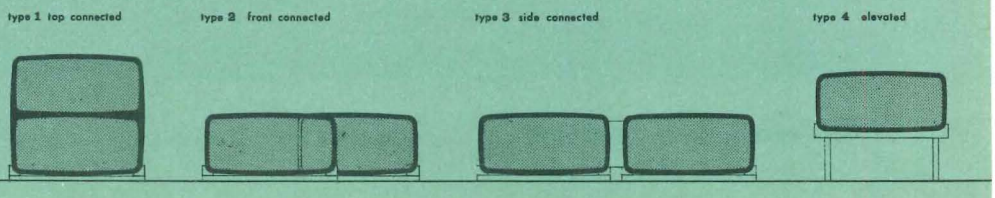


subsystems

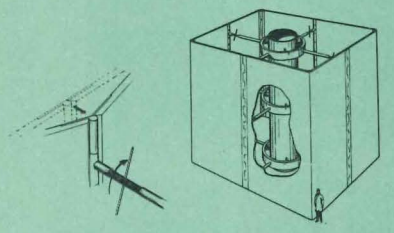
(1) shell
(2) end wall enclosure
(3) interior partition
(4) floor assembly
(5) storage units
(6) bathrooms and plumbing
(7) heating, cooling and ventilating
(8) electrical system
(9) supports



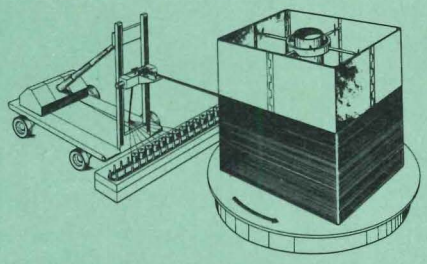
housing types



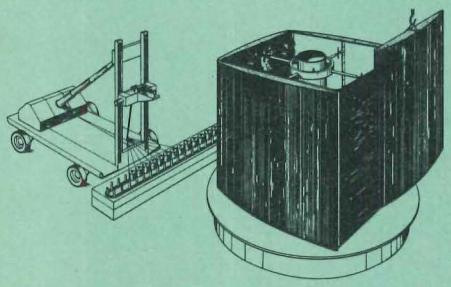
filament winding process



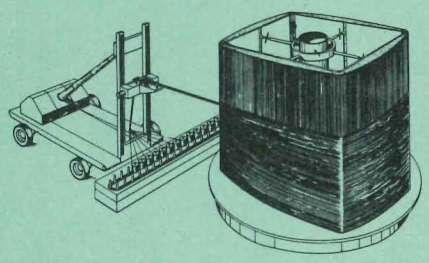
1 mandrel assembly



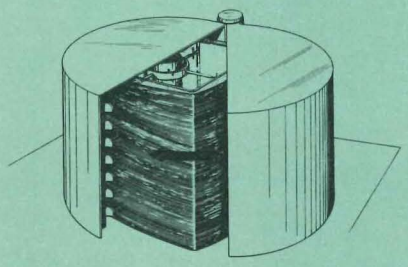
2 hoop winding of inner skin



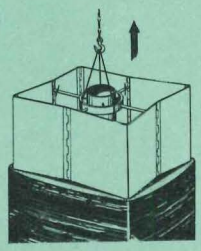
3 application of core panels



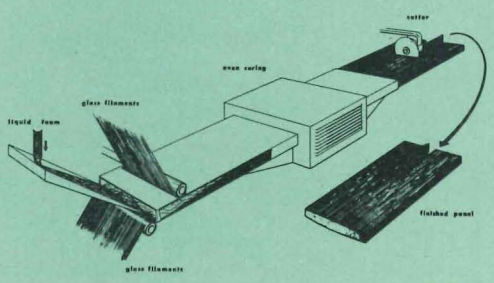
4 hoop winding of outer skin



5 curing of filament wound unit



6 mandrel removal



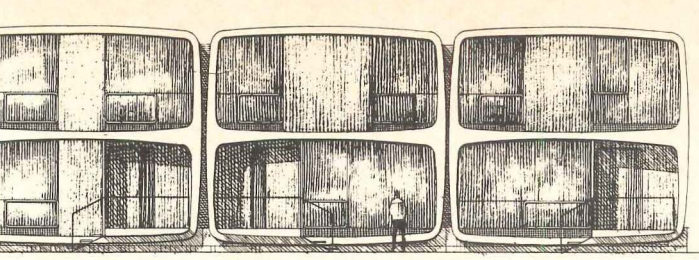
7 manufacturing of core panels

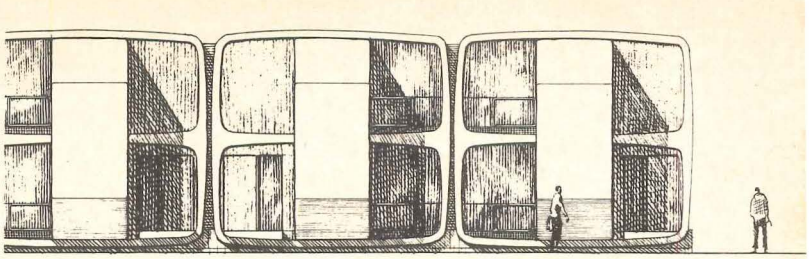
spheric and water pollution problems increasing yearly, the aerospace industry, sure to detect new markets, has been researching new techniques for solid and liquid waste disposal derived from their extensive research in the same area for space flights. They call it "the problem of waste management in an encapsulated environment" and they feel systems analysis is the tool that will eventually help them come up with solutions. Aerojet-General's Environmental Systems Division has been working on the problem since 1961; it has succeeded in developing and successfully demonstrating a waste management system in several communities on the West Coast. The DOD proposal for "waste control" has three parts: One element is a small, portable sewage treatment unit that will eliminate the need for all city sanitary sewer lines. It operates on the "trickling water" principle in which sewage is first ground and screened and then aerated. Combined with a water purification unit, the two elements permit water to be totally re-used, if people will consent to it, or the less purified water can be re-used for toilet flushing and lawn watering.

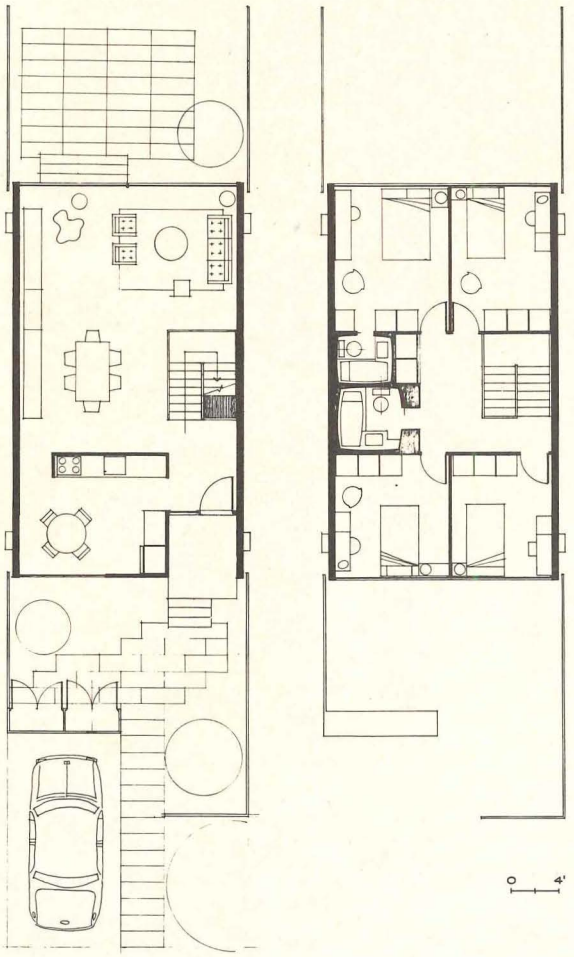
A biological process known as "reverse osmosis" has been technologically exploited so that it can be used for water purification in the second element. Briefly, membranes composed of one-celled live organisms consume waste products. Interestingly enough, the DOD report notes that similar membrane technology has been used before on such "problems" as concentrating orange juice, separating isotopes, and producing high-quality water from sea water and municipal sewage.

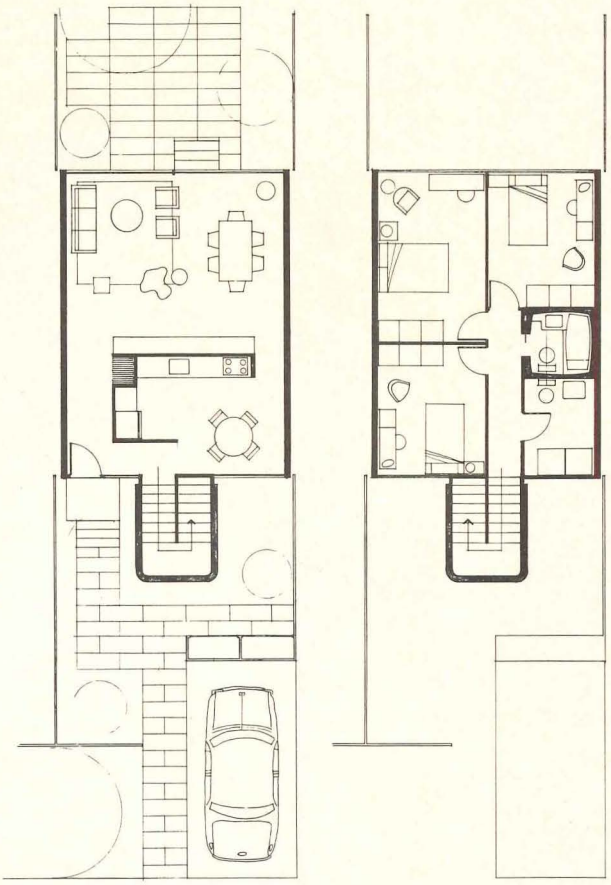
The third part of the waste system is a pneumatic transfer system for both solid waste and soiled linen. (All aspects of the waste system, as well as of the filament winding process, are fully explained in a book published by the University of Michigan Architectural Research Laboratory in Ann Arbor, Michigan.)

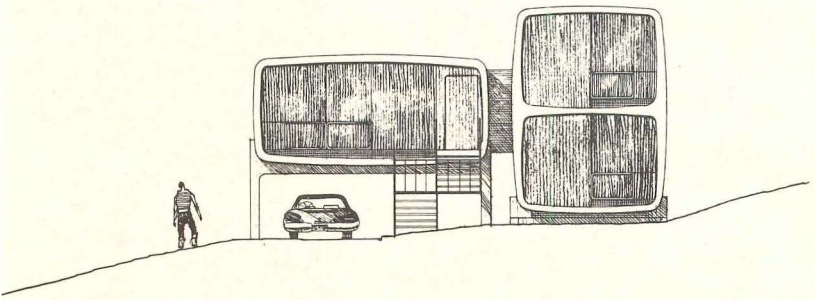
Despite all the attractions of glass filament wound, all-plastic people-containers, enthusiasm begins to cool when costs are brought into the discussion. Although there is an enormous machine at Aerojet that filament-winds rocket cases and is capable of winding other units more than 22 ft in diameter and 50 ft long, it is not possible to use it for housing because of the prohibitive expenses of transporting large units. Therefore, smaller machines would have to be built, at a cost of approximately $500,000 apiece (which includes the cost of two mandrels, handling equipment, and a transportable factory shelter). At least two such mobile factories would be required at each site, since, like other complex industrial products, filament wound housing depends on volume production for economy. The cost of houses would only begin to approach conventional house construction costs after further research and development efforts, initial production of 200 test











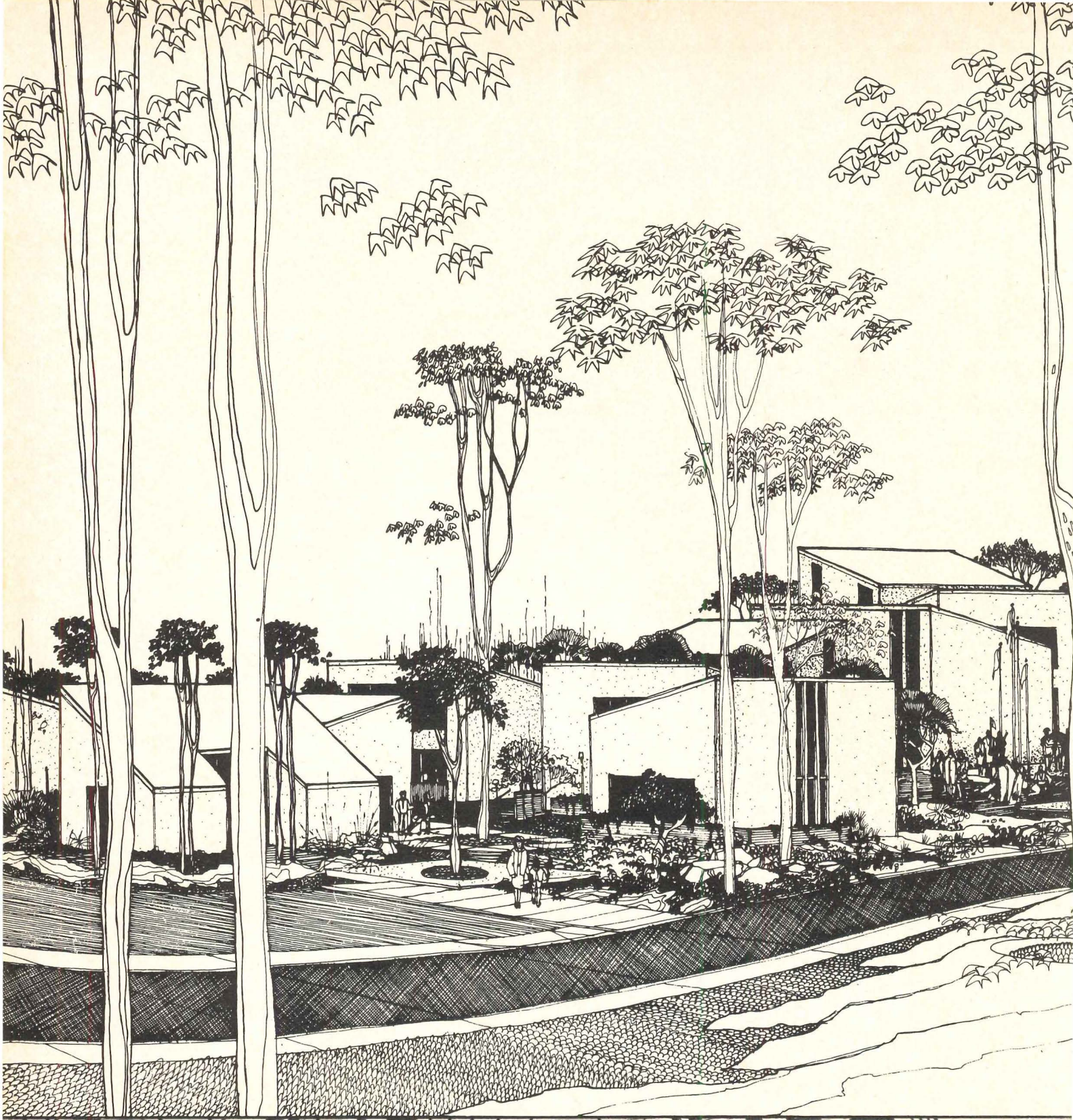
Many variations in housing types and layouts are possible with the filament wound shells. Stairwells can be attached on the outside (above) or the inside (left, top and middle), which allows interior plans to be changed accordingly. Individual shells with 3 ft or 4 ft openings cut into one wall can be plugged into two-story units by bonding a glass-reinforced plastic link between them (left).

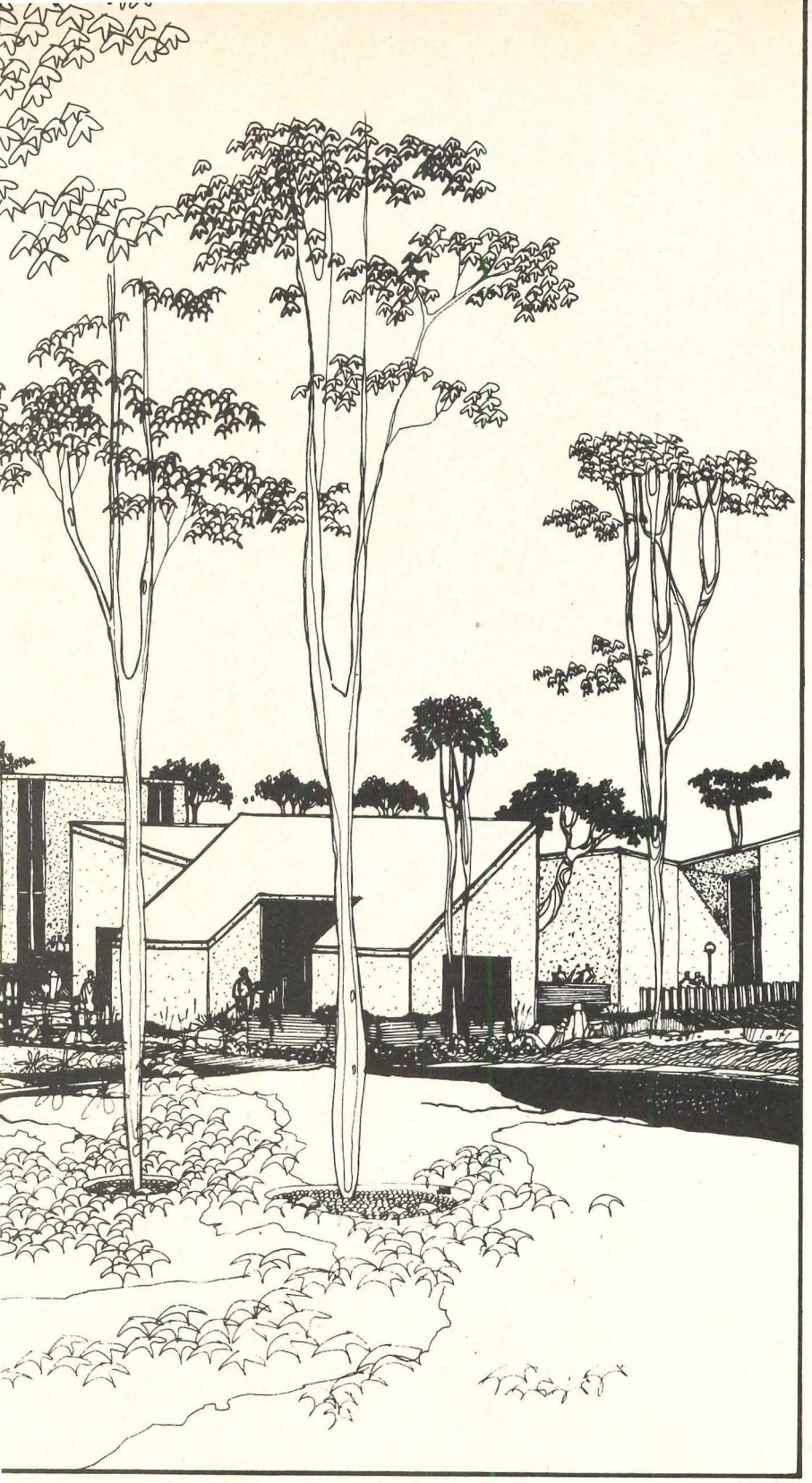
units, and a yearly production of 2000 upon which costs would be based: With production of 10,000 units annually, per sq ft costs could be reduced to around $13, and, eventually, to even less. Maintenance costs, however, would be considerably lower from the beginning, and labor costs could eventually be reduced to only 10 per cent of production cost.

After noting that "a house is the most expensive single item possessed by the average citizen," the Michigan report points out that an already enormous public investment has been made in developing filament winding technology. "Thus, it becomes simply a matter of adding a relatively small investment to an already large one to extend many times the benefits to be derived from its further development." Again, one cannot help being impressed by the almost casual approach to the expenditure of millions of dollars for blue-sky housing systems in a non-civilian government agency.

But the design possibilities inherent in the manufacturing process will make the future realization of filament winding an exciting venture. Some of the advantages of the technique mentioned in the DOD report are: the possibility of someday automating the entire process — from design to fabrication to site assemblies — because the system is basically *industrial;* Aerojet claims that the glass and plastic filaments provide the highest strength-to-weight ratio of any known manufacturing process, permitting ease of mobility and lower foundation costs; eventual combination of environmental control systems with the structural system during manufacture by utilizing honeycomb or fire-resistant foam as a divider between interior and exterior surfaces so the unit is completely insulated (an "encapsulated environment").

Members of Michigan's Architectural Research Lab who worked on the DOD proposal are: S. Paraskevopoulos, H. Borkin, W. Oberdick, R. Black, T. Balogh, R. Goodfellow, J. Crandall, C. Larson, and R. Welter.





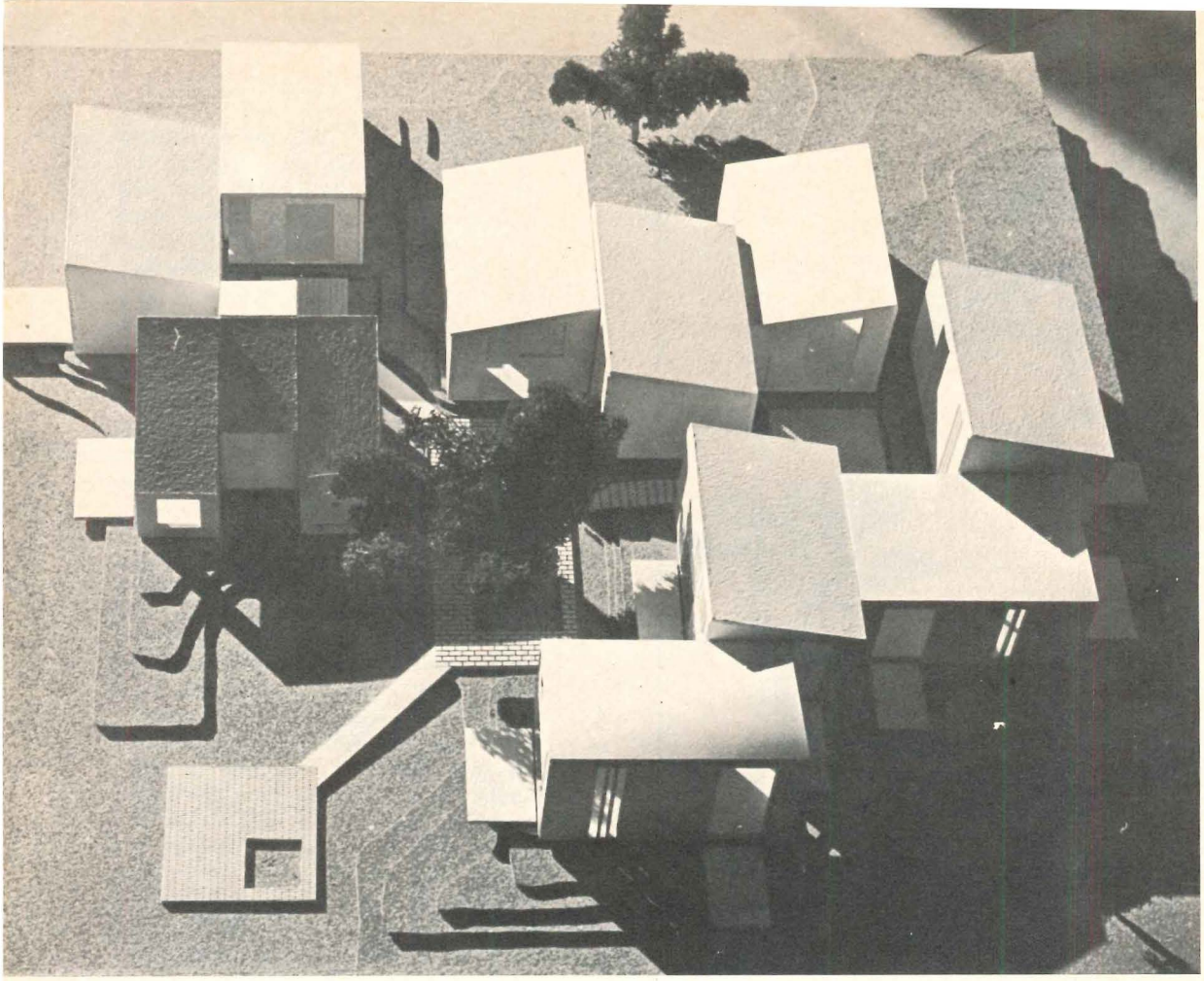
GENERAL ELECTRIC Housing Progress: A Most Important Product

General Electric's DOD family housing proposal stems from the company's desire to diversify its markets and sell more GE products. If the kind of work represented by the report is any indication of what these mundane motivations can drive corporations to produce, their entry into the construction industry should be welcomed by architects.

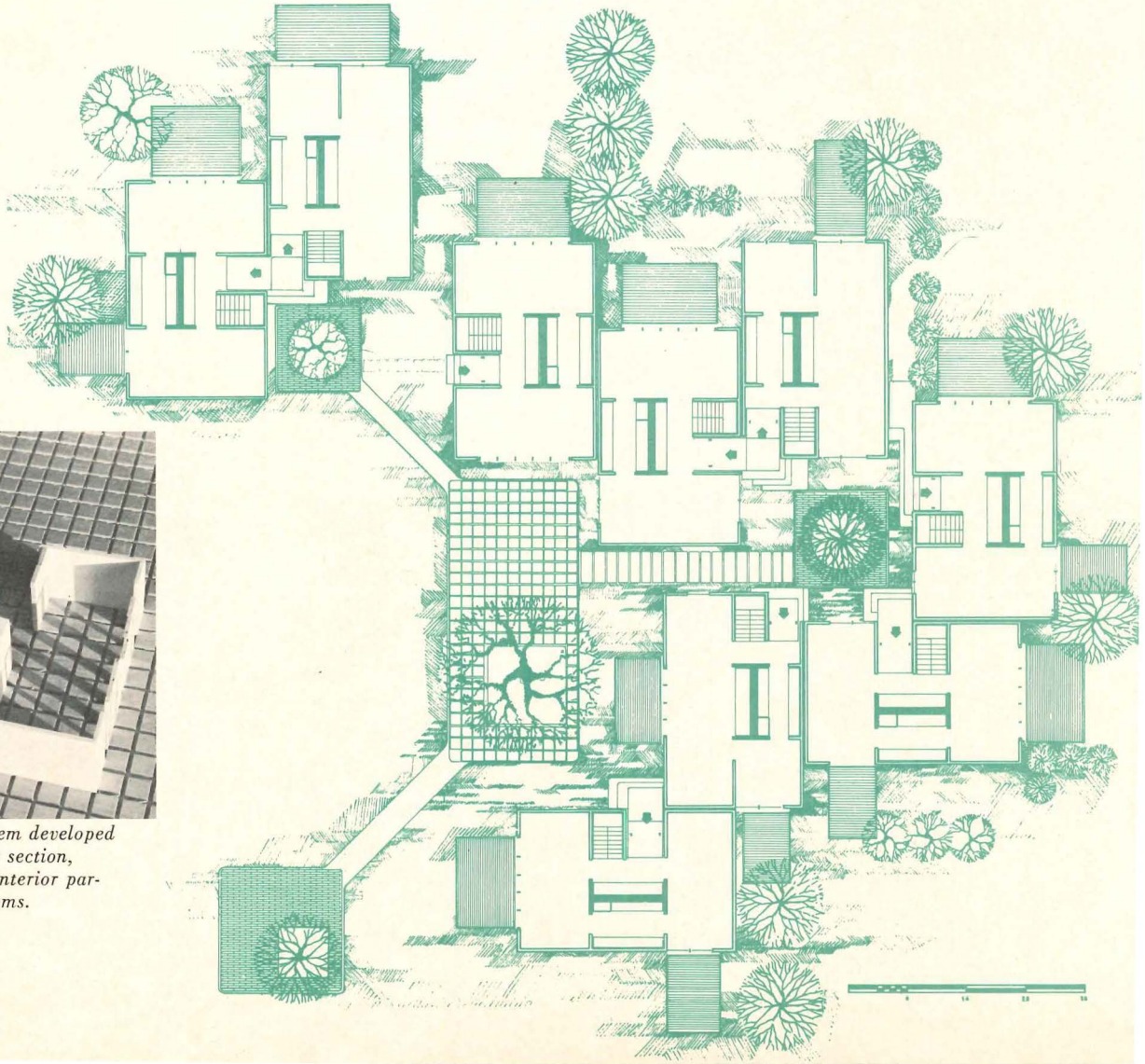
The Missile and Space Division teamed with the company's Community Systems Development Division in a joint effort for the proposal; both divisions have been working on various aspects of housing for several years and the amount of basic data they have collected (especially the cost figures for every conceivable element of a housing system), of which the report probably reveals only a minimum, is impressive. In winning the DOD contract, GE proposed a structural system, an integrated set of building components to fit that system, an on-site mobile factory unit, complete fabrication procedures with labor costs and jobs fully detailed, interior plans and site plans for small housing communities, as well as an extensive analysis of "human factors" in design. Costs are not reduced very much — a mere $1750 per house less than the standard military price of $20,000 — but the house designs are of the quality most people prefer to either plastic dwelling containers or concrete apartment houses — suburban cluster developments of town houses and/or single-family detached houses.

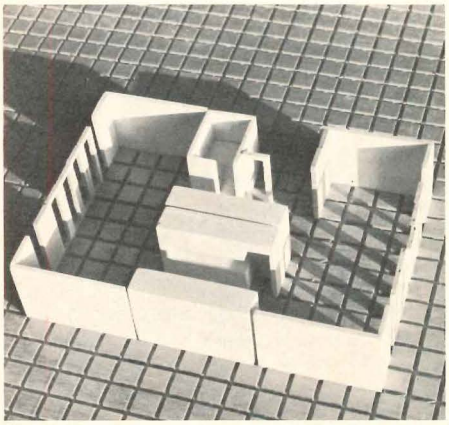
GE's architectural and engineering staff set out three major guidelines: decreasing housing costs, designing a system for houses that would be "economically operated and have low-maintenance characteristics" as well as having all the attractions of "quality, livability, and attractiveness." This may sound like a public relations claim, but adoption of these goals led the design team into an extensive systems analysis that began with a structural system, expanded into subsystem components to fit the system that could be manufactured on the site, cheaply and quickly, and combined aesthetically with the structural components, and then expanded even further — into an analysis of what the relationship should be between single units, between those units and the immediate neighborhood, and between the neighborhood and the community. In fact, their report has more pages devoted to community design problems than to technology.

The structural system has five elements, the most essential of which is a 16-ft, L-shaped sandwich panel that is used at each corner of the house. Its interior and exterior surfaces can be made of practically any material; the GE staff has investigated coated steel, asbestos, coated aluminum, and coated plywood for the exterior surfaces, sheet steel and wood for studs, and cores of fiberglass wool or urethane foam. Interior surfaces are described as plywood throughout the

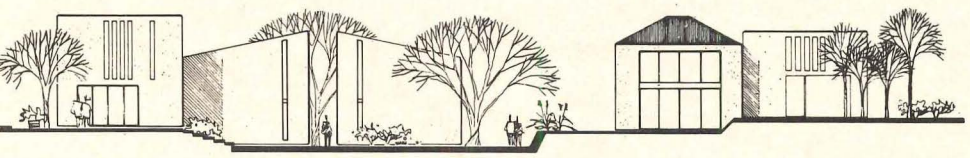


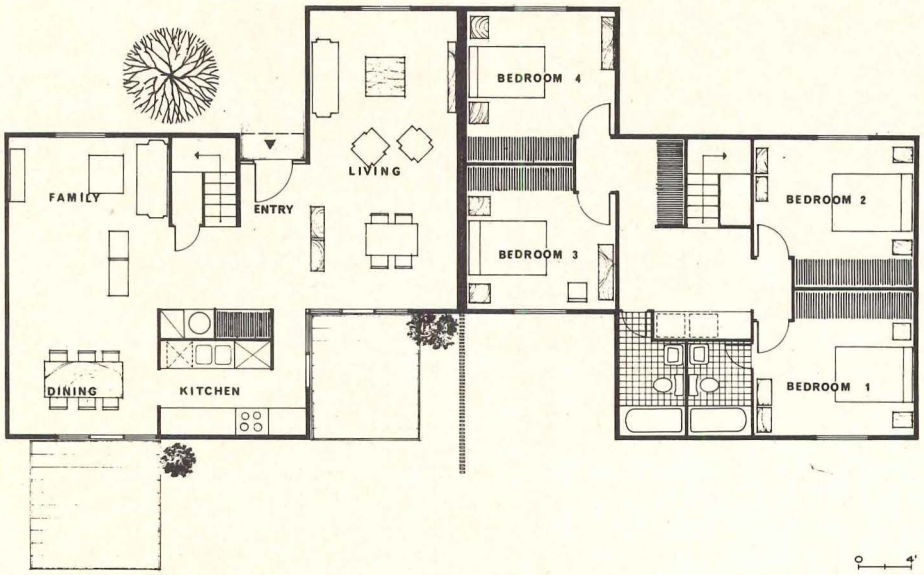
Clusters of three- and four-bedroom townhouses reflect the GE team's concern with providing both privacy and community feeling. Model photos, typical site plan (below), typical elevations (facing page), and a typical floor plan of a four-bedroom house are a sample of work currently being done by the corporation's Community Development Division (also part of the DOD proposal).

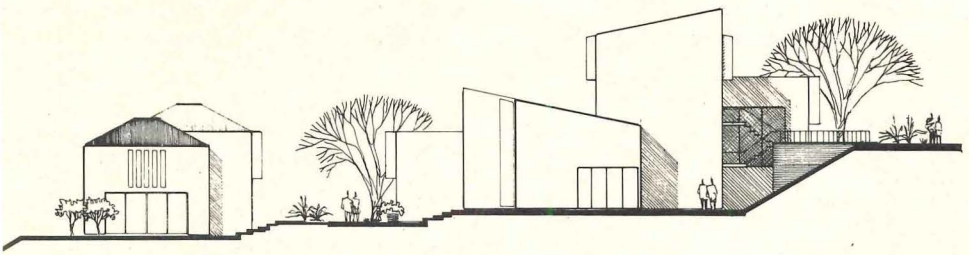


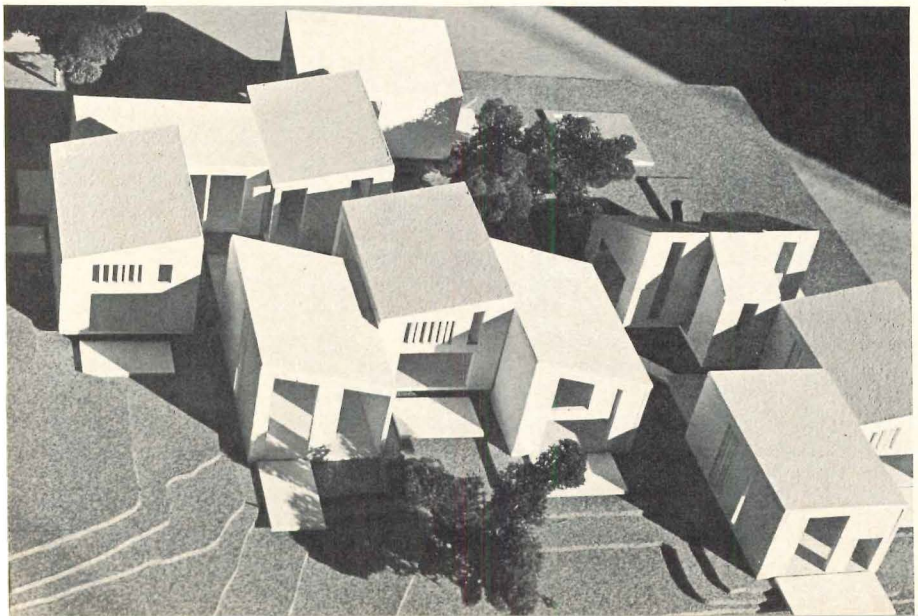


Elements of the housing system developed by GE are: L panels, glazing section, floor panels (not in photo), interior partitions, kitchens, and bathrooms.









DOD report, but, according to the technical director of the project, the L-panels can also be made of concrete. The company believes that the panel is a "true innovation in the total field of prefabricated structural dwelling components." A simple concept, it will be self-standing and so enable easier and quicker building assembly.

A second element in the structure is an "architectural freedom zone," or glazing section, that includes doors, windows, and louvres. It fits between the ends of L-panels, and can be varied according to the occupant's or architect's taste. One of the most important goals of the GE effort was to produce factory-assembled standard components, but not to allow the exterior or interior of the houses to appear standardized. The glazing section's chief purpose, then, is that it is the "essential ingredient by which the repeated use of standard elements is totally obscured." To allow a maximum amount of materials and textures on the surfaces, the panels utilized will be "structurally independent of aesthetic veneer."

Floor panels are a third element, each 12 ft wide, of any length required, made of plywood or urethane skins, and cores of either paper honeycomb or wood, with polyethylene vapor barriers. Asphalt shingles over a plywood underlay comprise the roof, which is of conventional truss design. Interior partitions have plasterboard skins and either wood or paper honeycomb cores with a vinyl covering; they are delivered to the site with closets and doorways installed. Kitchens, bathrooms, furnace room equipment, and electrical systems constitute another distinct building group.

All building components are dimensionally standardized, can be arranged in different configurations for different types of houses, and can be manufactured with different kinds of materials (depending on whether people want a "colonial" or a "modern" appearance). Most of the components will be manufactured on the site, which the GE staff feels is "essential to the effective introduction of manufacturing methods by which the dwellings could be made at reduced costs." Like the other two contract winners, General Electric sought to pay for materials and construction costs by using as many manufactured components as possible, and by developing a system capable of mass production.

On-site mobile factory units will be specially made trailers, with sides that hinge down to increase floor area, standing next to each other in whatever arrangement corresponds to the construction process. Field machinery will be limited to delivery trucks and cranes. Two such mobile factory units, operating on seven-day weeks with two shifts, according to the DOD report, can produce 10,000 units annually.

Two other departures from current construction practices used in the GE

housing system are: common trenching for supply umbilicals (water, gas, TV, telephone, and so on), found to be cheaper than current site engineering practices; and eliminating fire-fighting demands on the water supply system, thereby reducing the size and the level of water pressure normally required. Research indicates fire-fighting is better accomplished from a water storage facility or with foam-smothering.

The cost of a two-story, three-bedroom townhouse with 1250 sq ft of living space is $18,250. Savings are insignificant for a single house, but when 10,000 units are produced annually the total saving becomes $17,500,000. But there are other, more interesting cost considerations.

Because construction of the housing would be linked to the manufacturing capabilities of the entire country, through use of standardized components, labor conditions can be improved through increased productivity, rather than product price increase. The cost of construction, according to GE, has gone up 18 per cent in the last few years, whereas cost of manufactured products has gone up only 3 per cent. Thus, by adapting a manufactured building system, construction labor costs will not continue to rise since yearly improvements in productivity will offset cost of living escalations. In addition, a total saving of 20 per cent in site preparation costs will add 5 per cent savings to the above figures.

Another interesting aspect of the GE program is that it intends to leave detailed architectural and engineering drawings, foundation specifications, and so on, to "those parties presently competent to perform these functions." GE would perform as a combination contractor and corporate manager — improving "product value through development of materials and material handling methods, use of the total factory process, and continuous upgrading of product quality."

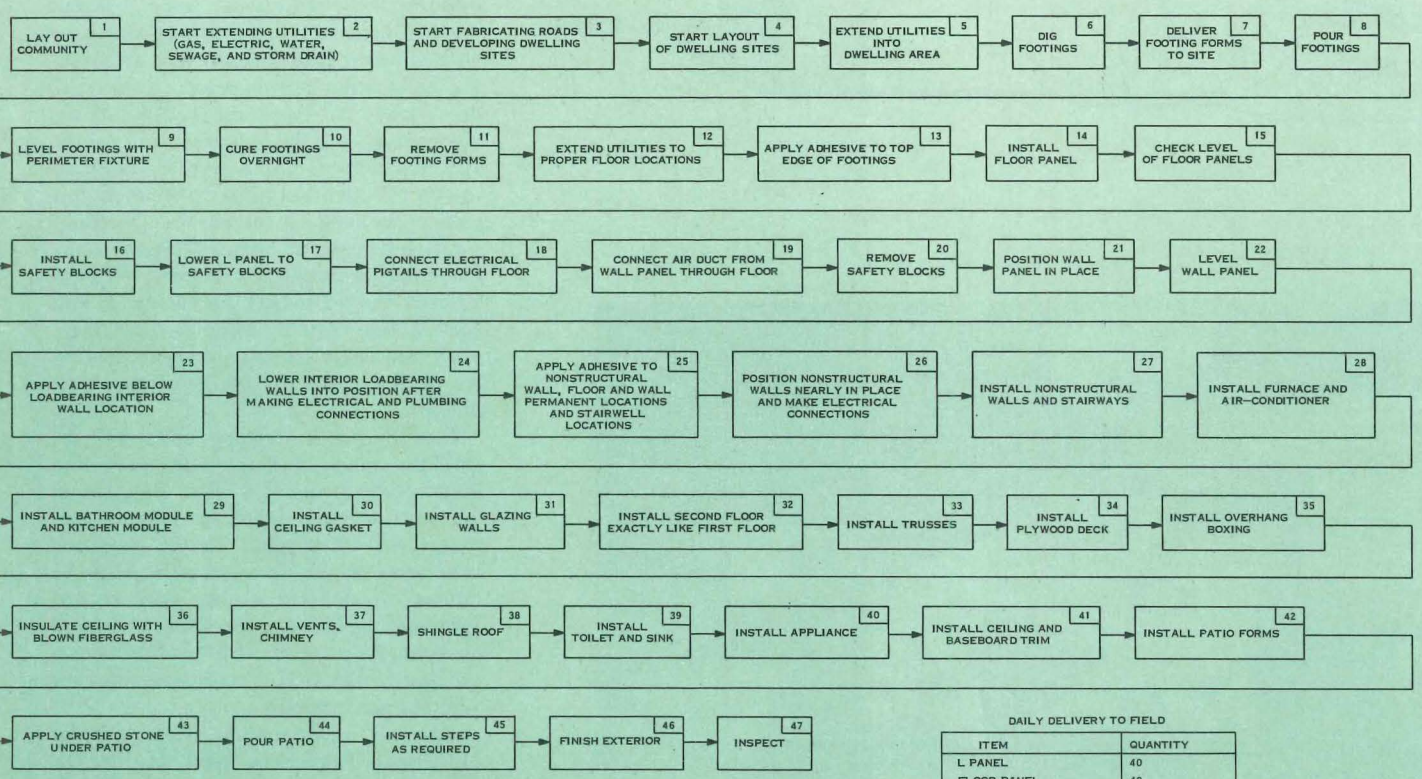
General Electric has not, at first glance, come up with anything technologically exciting. However, the more their report is studied, the more one realizes that it could change the construction industry far more quickly than either of the other winning proposals — and perhaps in a healthier way as well, since contractors could adopt many of the GE recommendations without too much expense and stay competitive with the DOD system when it enters the civilian marketplace.

The most surprising aspect of the GE report is their extensive analysis of "user needs" — the psychological, social, and physical requirements for family housing and community planning and their effect on final design. Architect Carl Koch's office and Michigan's architectural staff concentrated on technology and construction processes, but GE, supposedly a corporate monster dedicated to profit making, studied anthropometrics, motivation structures, activities of all kinds experienced within a house and small community, analyzed compatible and conflicting activities and the spaces required for them, the "nature of linkages between activity spaces" as well as barriers between activity spaces, and so on. Fully one-third of the proposal is devoted to reporting the initial findings and explaining that more work needs to be done in these areas. In keeping with this approach, emphasis was placed throughout the study on the importance of relating dwelling unit design to immediate neighborhood and over-all community design. Again, there is more space devoted to user requirements than there is to technology and construction.

GE's stated approach to the housing market is to "find out what the public wants and give it to them." They are also aiming at initial "product acceptance" by the middle-class in their housing program. Thus, cynics might dismiss the company's great emphasis on "human factors" as just another corporate image-building game of "Know Thy Consumer That Thou Might More Readily Exploit Him."

But this is probably a mistake. Because of the conceptual framework provided by the systems orientation, its approach led quite naturally to discovering what exactly people do want out of their housing, which led in turn to an analysis of *all* performance requirements — both of materials and of users. Furthermore, perhaps it is only by getting what they think they want that people will eventually discover what they *actually* need and want, rather than by continuously getting what somebody else thinks they want.

Besides its valuable studies of housing construction, materials, and materials-handling methods in mobile factories, perhaps the most important aspect of the GE approach lies in its recognition of a way to use systems analysis for the understanding of people's housing needs and desires — an area that up to now has remained in the hands of architects and housing experts whose interest is apparently focused on structural schemes, artistry, and far-out technology.



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FLOOR PANEL	40
BATHROOM MODULE	5
GLAZING PANEL	20
STRUCTURAL, INTERIOR PANELS	5
NONSTRUCTURAL INTERIOR	625 LINEAL FEET
KITCHEN UNIT	5

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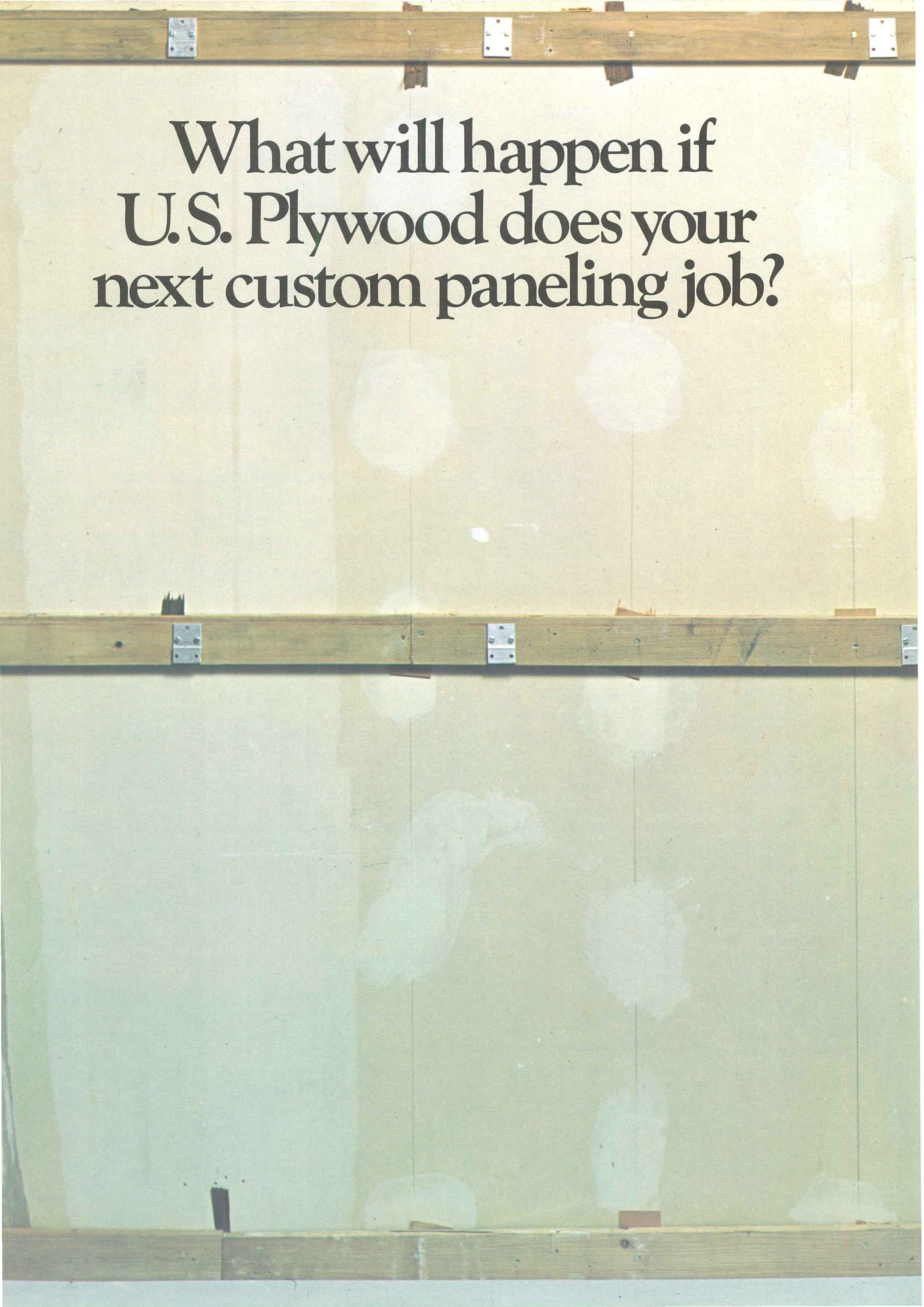

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SPECIFICATIONS CLINIC

USING AND ABUSING REFERENCE STANDARDS

BY HAROLD J. ROSEN

A wide choice of test standards leads manufacturers to use tests favorable to their products, and leaves specifiers without a means for comparing materials. Rosen is Chief Specifications Writer for Skidmore, Owings & Merrill in New York City.

In a recent column (MARCH 1968 P/A), we called attention to the benefits that accrue to architects and specifiers who make use of Reference Standards in their specifications. Most of the standards specified relate to setting forth the criteria for materials to be used in specific projects, but equally important are the reference standards established for the testing of materials.

Some problems, however, do exist with respect to standards for testing. Where a materials standard has been established, the standard usually includes the testing procedures and minimum and maximum test criteria that the material must meet. Where a materials standard has not been established by the standards producing agencies, especially for newly formulated materials, the manufacturer sets forth the physical characteristics and reports the information based on references to standards for testing.

Unfortunately, there are many testing standards available, and in the absence of a materials standard that includes test procedures, manufacturers select test standards of their own choosing so that the architect and specifier must compare apples and bananas.

For example, let us consider abrasion resistance. The American Society for Testing and Materials has three standards for testing abrasion resistance of rubber, D394, D1630, and D2228; two standards for testing abrasion resistance of paint, D658, and D698; and three standards for testing abrasion resistance of plastics, D1044, D1242, and D1395. In addition, Federal Specification Test Method Standard No. 141 has two standards for testing abrasion resistance of organic coatings, Methods 6191 and 6192; and Federal Specification Test Method Standard 406 has an abrasion resistance Method 1091 for testing plastics.

The various test methods noted above for abrasion resistance are not cited to confuse the reader, but to illustrate what choices are available to a materials manufacturer who does not have a materials standard. It also shows how a manufacturer may in turn unknowingly confuse architects and specifiers when he chooses one of many methods in reporting test data for his material.

If one looks at the new urethane floor coatings available and examines manufacturers literature, the confusion becomes quite apparent. At the moment, there is no materials standards for these floor coatings. In the absence of the materials standard, each manufacturer reports abrasion resistance by differing test methods and terms.

One manufacturer reports an abrasion resistance loss of 0.02 g based on Federal Test Method Standard 406, Method 1091 which uses the Taber Abraser and a CS-10 wheel with a 1000-g load and 1000 cycles of abrasion. Another manufacturer reports abrasion loss based on Federal Test Method Standard 141, Method 6192, using a C5-17 wheel with a 1000-g load and 1000 cycles of abrasion with a loss of 4.4 mg.

Still another manufacturer of a similar urethane floor coating refers abrasion resistance to ASTM D1044, which he reports in similar terms. However, when test method ASTM D1044 is examined, one finds that it describes a procedure for estimating the resistance of transparent plastics to surface abrasion by measurement of its optical effects using a photometer, and the abrasion resistance is reported in the percentage of transmitted light that is diffused by the abraded specimen.

ASTM D1044 notes that when resistance to abrasion of plastics is to be measured in volume loss or weight loss, test method ASTM D1242 is to be used. However, the abrader used in the latter test is not the Taber Abraser.

Some manufacturers report abrasion resistance of these floor coatings by the falling sand method of abrasion resistance using either ASTM D968 or Federal Test Method Standard No. 141, Method 6191.

In the field of vitreous enamel wall coatings, manufacturers have reported abrasion resistance by referring to the Taber Abraser Method using wheels of differing weights and varying cycles of abrasion. Obviously, correlation of competing products performance by specifiers is well nigh impossible under these circumstances. The current Federal Specification TT-C-550a refers to ASTM D658, the falling sand method for measurement of abrasion resistance, for vitreous wall surfacing.

It is quite apparent that the use of reference standards can get out of hand, and that some policing is required so that architects and specifiers can evaluate manufacturers materials on the same test basis. Although it takes time for a standards producing agency to formulate and promulgate a materials standard, there is another manner in which this information can be couched in similar terms. That device is the Construction Specifications Institute Spec-Data sheet. At the present time, manufacturers report the physical characteristics of their materials in the Spec-Data sheets by any test method they select, since CSI has not established criteria requiring manufacturers to follow specification test methods.

However, if CSI recognized the considerable assistance it could give its members by requiring manufacturers to report physical characteristics set forth in Spec-Data sheets based on similar test standards, the comparison of apples and bananas would cease.

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architect

HARRY H. LEFKOWITZ
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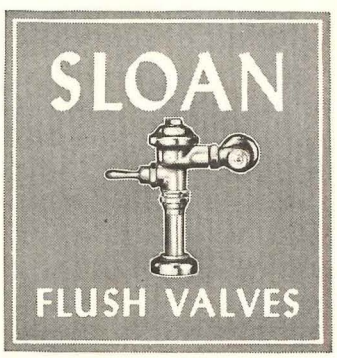

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IT'S THE LAW

FEDERAL CONTRACT FORMS

BY BERNARD TOMSON AND NORMAN COPLAN

Recent modifications in G.S.A. form contracts are examined by P/A's legal team.

The U.S. General Services Administration has issued certain procurement regulations modifying the standard form of construction contract utilized by various Federal agencies.

For many years, problems were encountered in the administration of many of the provisions contained in the form construction contract, and in 1964 a study of these problems was initiated by G.S.A. This agency stated that its prime objective in undertaking such a study was to "facilitate administrative adjustment of claims arising under construction contracts." The proposals of the study group were submitted to representatives of the building industry, professional bar groups, and other interested individuals. Eventually, in February 1968, regulations modifying certain provisions of the Federal construction contract form went into effect. These modifications deal primarily with claims of a contractor for additional compensation that may arise due to changes in the work, unanticipated site conditions, and suspension or delay of the work.

The standard construction contract form of G.S.A. prior to the 1968 modifications provided, in respect to changes, that the contracting officer could, by written order, "make changes in the drawings and/or specifications of the contract if within its general scope." It further provided that if such changes caused an increase or decrease in the contractor's cost or time, an equitable adjustment in the contract would be made. Any claim of the contractor for adjustment was asserted in writing within 30 days from the date of receipt by the contractor of notice of such change. If there was no agreement, the amount of such adjustment was to be determined under the disputes clause contained in the contract.

The amendment of this provision was for the purpose of broadening and clarifying the circumstances under which an equitable adjustment might be sought by the contractor for changes in the work. For example, the modified provision authorizes the contracting officer to make changes not only in plans or specifications within the general scope of the contract, but "in the method or manner of the performance of the work" and "in the government-furnished equipment, materials, services or site." The contracting officer is further authorized to direct acceleration in the performance of the work. The amendment also provides for equitable consideration of constructive changes in the work, by providing that any direction, instruction, interpretation or determination of the contracting officer that causes a change in the work shall be treated as a change order, provided that the contractor "gives the contracting officer written notice stating the date, circumstances and source of the order and that the contractor regards the order as a change order."

There was one additional significant modification to the form provision on changes. It is provided, contrary to the rule in effect prior to the amendment, that if there is any change in aspects of the contract work not specifically covered by a change order, causing an increase or decrease in the contractor's time or cost required for the performance of any part of the work, an equitable adjustment will be made (except for changes caused by defective specifications), provided no equitable adjustment will be made for costs incurred "more than 20 days before the contractor gives written notice." In the case of defective specifications for which the government is responsible, the form now provides that an equitable adjustment will include any increased cost reasonably incurred by the contractor in attempting to comply with such defective specifications.

The objective of broadening and clarifying the areas in which claim for a contractor's extra can be made is also reflected in the changes to the form provision relating to "changed conditions" and the provision dealing with delays in or suspension of the work. The 1968 amendments to the article on changed conditions coordinated the language of this provision with the amendments to the "changes" article. The title "changed conditions" was replaced by the title "differing site conditions" to describe more specifically the subject of the clause. The new clause provides that a contractor may be entitled to an equitable adjustment because of subsurface or latent physical conditions differing from those indicated in the contract, or because of unknown physical conditions of an unusual nature, if such conditions do materially so differ and cause an increase or decrease in the contractor's cost or of the time required for performance "of any part of the work . . . whether or not changed as the result of such conditions." This language again broadens the area of valid claim.

Similarly, the amended form provides that the contracting officer may order the contractor, in writing, to suspend, delay, or interrupt all or any part of the work, and that if the contractor's performance of all or any part of the work is suspended, delayed, or interrupted for an unreasonable period, an equitable adjustment shall be made for any increase in the performance of the contract (but not including profit).

The "differing site conditions" clause and the "suspension of work" clause, as well as the "changes" clause, do not specifically refer disputes thereunder to the disputes clause of the form contract, as did the original form. It is still intended, however, that the disputes clause apply. G.S.A., in explaining these changes, states:

"The existence of an administrative remedy is established by the disputes clause. Accordingly there is no need to reiterate in clauses covering particular aspects of the contractural agreement the availability of that remedy."

The Federal procurement regulations adopted in 1968 made no modification in such disputes clause, which provision is thought by many to require review and revision (see IT'S THE LAW, JUNE 1967 P/A).


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BOOK REVIEWS

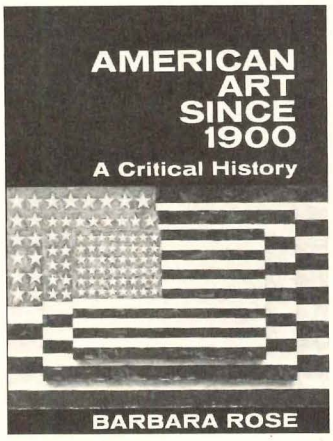
AN ILLUMINATING PREHISTORY

BY SANDRA BLUTMAN

AMERICAN ART SINCE 1900: A CRITICAL HISTORY. *By Barbara Rose. Frederick A. Praeger, 111 Fourth Ave., New York, N.Y., 1967. 319 pp., illus., $7.50. The reviewer is studying architectural history in London and writing articles for the* Encyclopaedia Britannica *on art and architecture.*

That American art is uniquely and undeniably American has long been recognized. That it is art has always been a more questionable assumption. Barbara Rose points out in the introduction to *American Art Since 1900* that past histories of the subject have attempted to see American art as a law unto itself, divorced from European developments — a culturally (if not always qualitatively) justifiable phenomenon reflecting the emergence and growth of American society. Many excuses can be made for the dearth of "great" visual art in America. Certainly the literary and regional charm and adventurous vitality of many native works made up for their lack of formal sophistication. And there were always the great exceptions such as Thomas Eakins. Today, however, the mainstream of modern art can hardly be distinguished from American art.

Miss Rose (who is married to the painter Frank Stella) has written a "critical history" and it is at once clear that it is as a critic that she has the most to contribute. The value of a selective history is limited, particularly in a book intended for the general reader who cannot be expected to distinguish the author's bias. But, as postwar American painting is still happening, perhaps its history cannot (and should not) be written. Yet it can be explained, and this Miss Rose does brilliantly. Her skill at



distilling in succinct prose the essence of a given artist's work is remarkable and illuminating. Her book must be required reading for anyone interested in knowing what modern American art is all about.

Emphasis is "on those artists who helped unite American art with the mainstream of European art," beginning with the Eight, whose importance for 20th Century American art lay not so much in their social subject matter or in their style of painting as in their efforts to free art from the enervating academicism that existed in America. Theirs was a protest philosophy, socially progressive but formally conservative.

More an aesthetic movement was that led by the photographer Alfred Stieglitz with its headquarters at "291." In the early years of the new century, Stieglitz was making it possible for the *avant-garde* public to see works by leading European modernists, including Picasso, Matisse, Picabia, and Brancusi. It was in this environment that abstract art first appeared in America in the work of Max Weber, Georgia O'Keefe, Arthur Dove, Stanton Macdonald-Wright, and several others. Links with European art were solidifying.

Miss Rose goes on to discuss the Armory Show of 1913 and its effects, the growth of abstraction, and painting of the depression years of the 30's. Everything seems to be leading up to something that will happen after World War II. She observes the coincidence of the Armory Show and the emergence of American collecting when such men as Walter Arensberg, Dr. Albert Barnes, and Duncan Phillips began to buy modern art.

Good as all this is, it is with abstract expressionism and its progeny that Miss Rose comes into her own. Her understanding of and sympathy — indeed, involvement — with contemporary painting enables her to set it before the reader so brilliantly that one tends to forget that anything else was happening outside the main movement. Champions of social realism in art and figurative imagery may feel that such work has been overlooked in the floodtide of enthusiasm for abstract modern painting. Yet Pollock, De Kooning, Gorky, Motherwell, and Still are painters who have led the mainstream and led American painting into its present position of international prestige, so such an emphasis may well be justified. The art of the 1950's and 60's — post-painterly abstraction, Pop, and Op — are given a sympathetic treatment that falls somewhere between history and criticism. That the author's interpretations are subjective may be excused by the immediacy and lack of historical perspective inherent in her subject and by her clear familiarity with many of the artists she is discussing. But it is with her many perceptive and instructive observations that the real value of the book lies.

The book's major flaws are its final two chapters — one on sculpture and the other on architecture. Here the author seems less qualified and her judgements less sure. Her eulogy of David Smith as the sculptural genius who holds a place similar to that of Frank Lloyd Wright in architecture is unconvincing, although, as with painting, her characterization and description of Smith's work is excellent. Why wasn't sculpture considered along with painting, rather than on its own, especially in light of the author's observations on the similarity of form and imagery in the work of certain sculptors and painters — Mark di Suvero and Franz Kline; David Weinrib and Arshile Gorky; and George Sugarman and Al Held.

Why was it necessary to append a chapter on American architecture? Architecture is not Miss Rose's forte and her observations are generally banal and oversimplified. The comment that "the first quarter of the century produced little architecture to compare with what was done in Chicago in the preceding decades" takes no account of the quite remarkable early achievements

Continued on page 168

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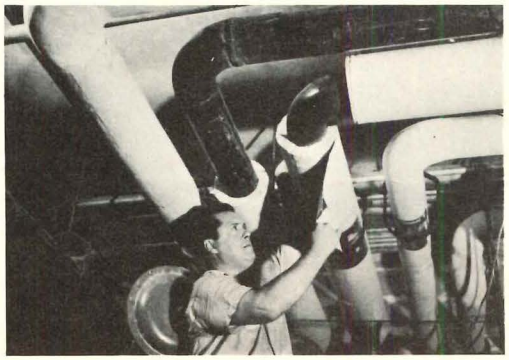

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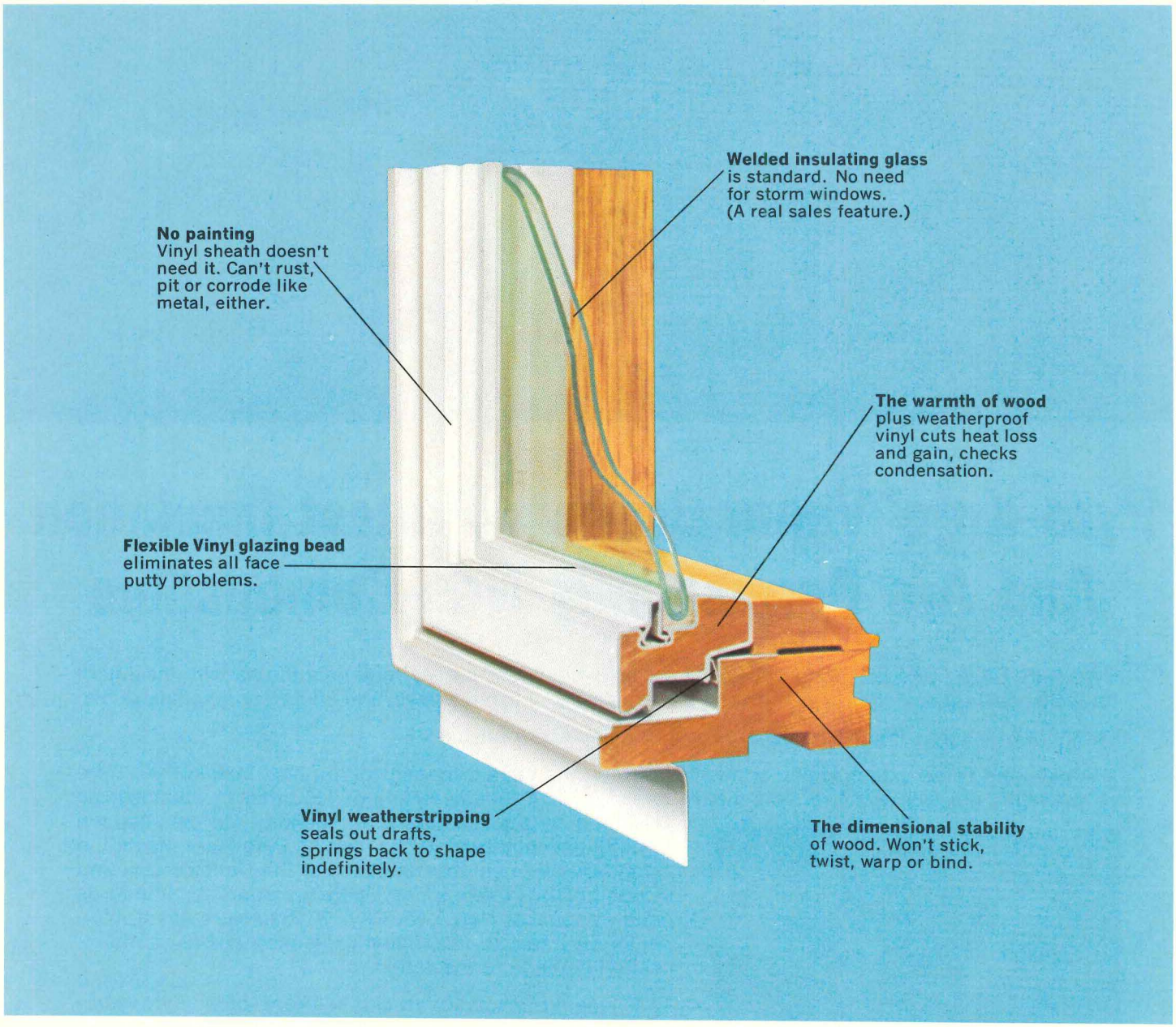

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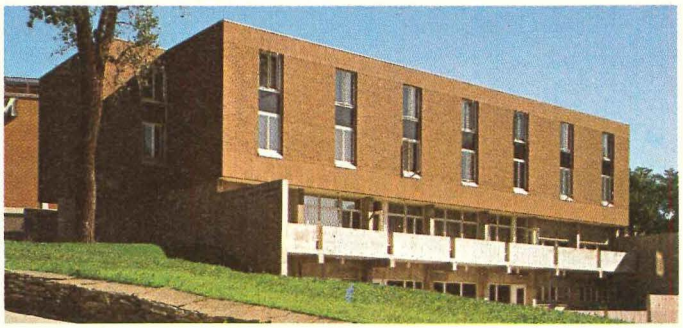

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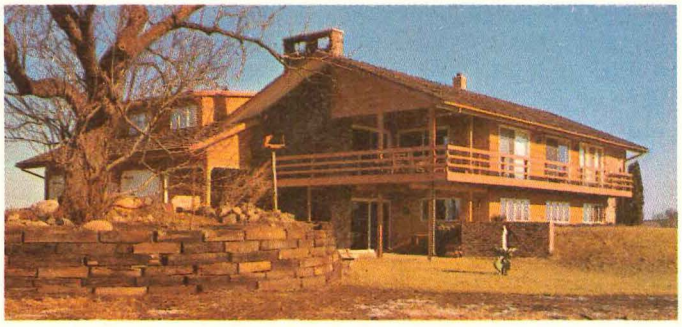
Architect: Progressive Design Associates, St. Paul, Minn.



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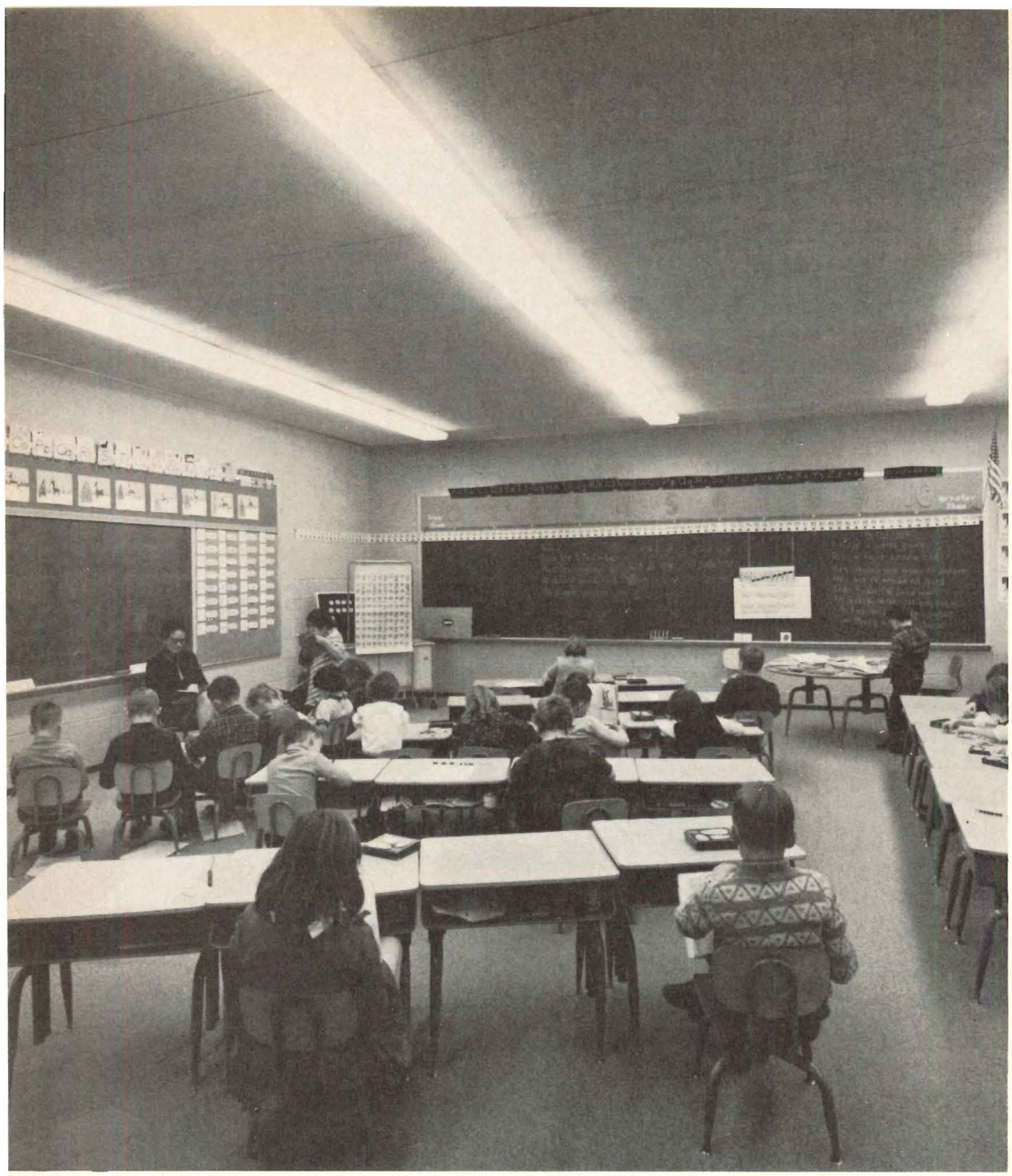

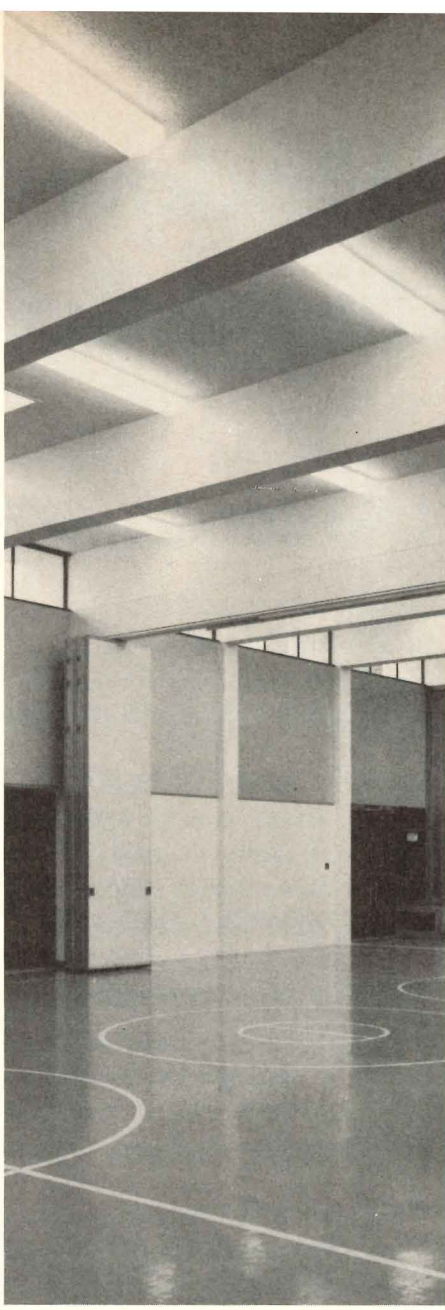

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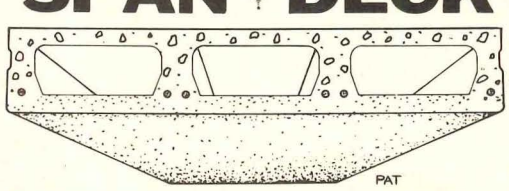

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Continued from page 162
of West Coast designers such as Schindler, Gill, and Neutra. Finally, it is slightly irritating to find Taliesin referred to as Taliesin East. Russell Hitchcock delights in saying that, if there was a Taliesin East, it was Wright's suite at the Plaza Hotel, where he lived while designing the Guggenheim.

Jove's Gentle Giant

BY WALTER KIDNEY

HENRY HOBSON RICHARDSON AND HIS WORKS. *Marianna Griswold Van Rensselaer (Mrs. Schuyler Van Rensselaer). Original edition: Houghton, Mifflin & Co., 1888; facsimile edition, with a foreword by James D. Van Trump, The Prairie School Press, 117 Fir Street, Park Forest, Ill., 1968. 152 pages, illus., $25. Reviewer is a P/A Associate Editor.*

There have been only two book-length studies on H. H. Richardson, and only now are both in print. Henry-Russell Hitchcock's *The Architecture of H. H. Richardson and His Times*, issued in 1936, amended and reissued in 1961, is the more recent, and is founded on the other, the book presently under review, which was issued in a printing of only 500 copies in 1888.

Compared to Sullivan and Wright, with whom Richardson is often bracketed, Richardson has been an underdocumented person. There are several possible reasons for this. In the first place, his work is full of imperfections. He was an evolving architect, finding himself with ever-increasing rapidity over the years, but perhaps never quite managing to do a perfect building. And, of course, his major buildings were of old-fashioned solid masonry construction, dependent on cheap labor and a handicraft tradition, a little irrelevant to our century. Had he lived 10 or 20 years longer (until 1896 or 1906, that is), he might have attacked the problem of the skeleton-framed building, and declared himself in his "treatment" of its gangling ironwork either for the past or the future. The point here is that the moral example that modern architects see in the story of his evolution is perhaps more important to present-day admirers than his actual works, as they were realized.

Secondly, Richardson was not an intellectual and not a militant. He published nothing on Architecture with a capital A, as Wright or Sullivan did so prolifically. The way he designed a building was something personal and intuitive. He was an artist who pondered and sketched, and never gave up on a detail until it was realized; even then, he sometimes had dull stonework pulled down and redone.

Thirdly, although he was memorable and picturesque, a Jovian, energetic Victorian who seemed larger than life to his many friends, he was not memorable in a way that helps a biography sell. He did not have the tragic amours of Wright, the resentful inebriation of Sullivan, or the prophetic airs of both, to spice up the narrative. He was married, but how successfully we cannot tell, and as a subject is resistant to pathos; his long painful disease, which killed him at 48, was something he simply ignored when he could and never complained about. He had an aura about him, true, but not of the sort that survives in cold print. And if he uttered aphorisms and *mots*, in chats with his friends and collaborators, that might help in a portrait of him, none of them have been handed down, apparently. Mrs. Van Rensselaer, although she was a friend of his, has none to report.

We keep being forced back upon the works themselves, then, and to seeing the man in relation to his works.

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Continued on page 172

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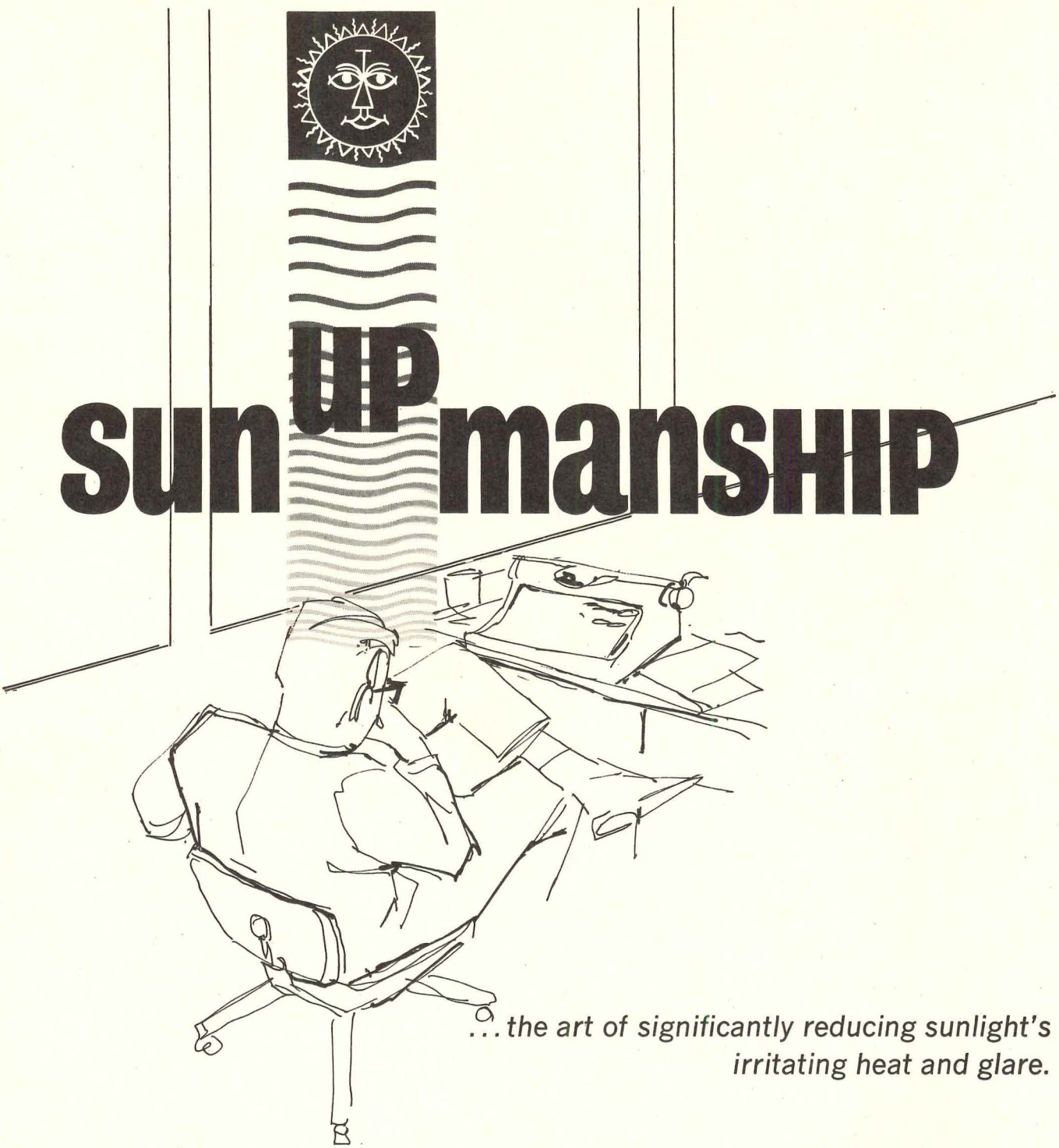

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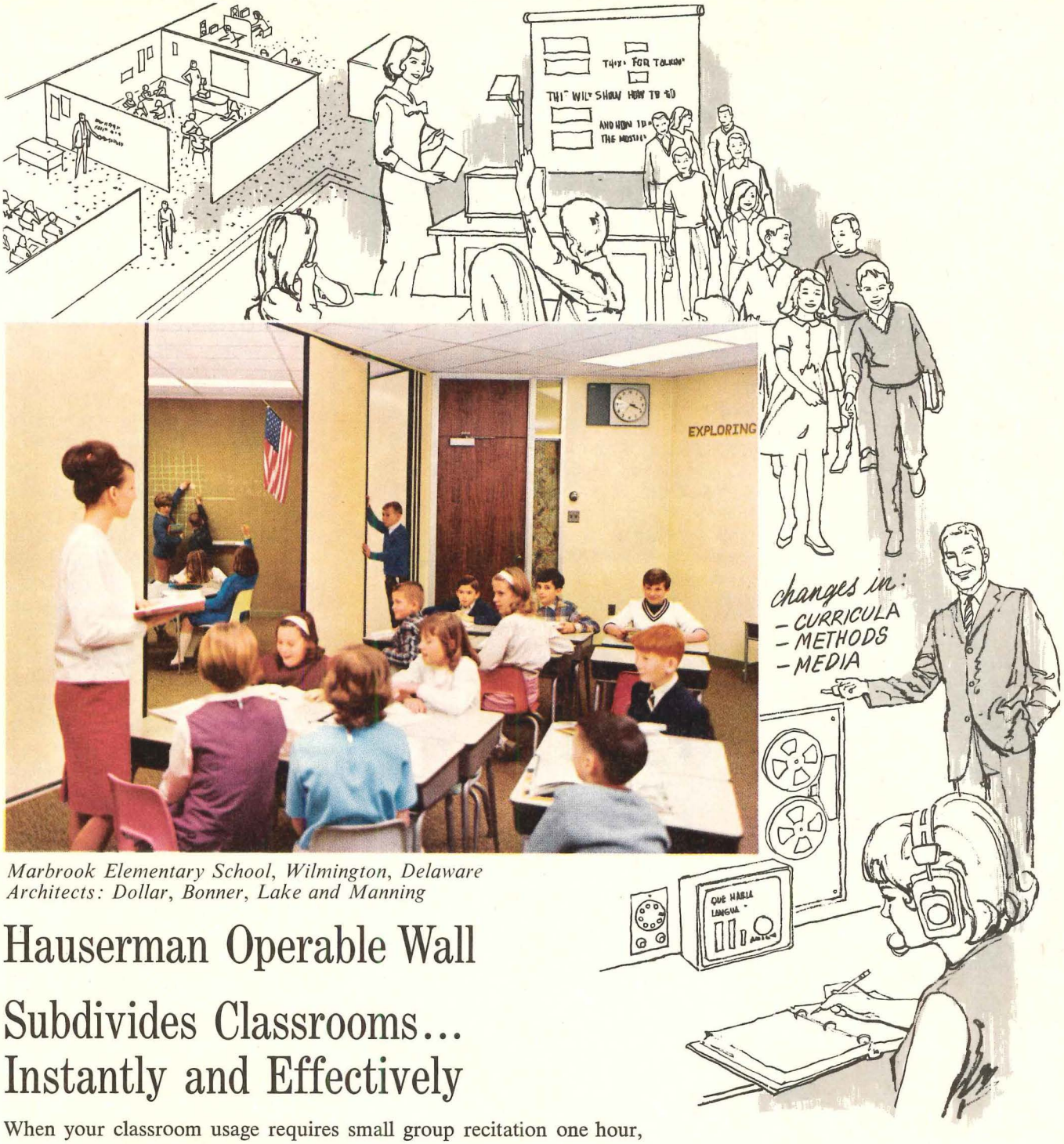

Marbrook Elementary School, Wilmington, Delaware
Architects: Dollar, Bonner, Lake and Manning

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Continued from page 168

Victorian lady named Mrs. Schuyler Van Rensselaer as a dubious investment, James Van Trump devotes his introduction to the authoress herself, not to the subject, and assures us that she knows what she is talking about, and in fact has made a major contribution to American architectural literature. This may be a slight exaggeration: Her style is cool and clear, but without the sparkle of Montgomery Schuyler. Her judgments on individual buildings are in fact more or less those we would make today, although her general viewpoint is that of a progressive, cultured person of 1888. She was writing at a time when mid-Victorian architecture, which was full of hectic originality, had come to seem harsh and illiterate. The hope of the 80's was "creative adaptation" of historic motifs — Romanesque, Colonial, or Gothic — and the visual re-education of the architect through visits to the great work of the past. Thus, Richardson's marathon tour of Romanesque Europe in 1882 (33 towns in 32 days) was in the spirit of the new American architecture. This new spirit was not the precedent-mongering of a few decades later. Persons like Mrs. Van Rensselaer probably saw the adaptation of ancient motifs as a kind of loan, floated by history to establish on a sound basis that long-discussed but languishing venture, the development of a real American architecture.

Several things, as it happened, came along to prevent such an evolution. Some architects, like McKim and White, came to love the past so much that they could only repeat it, as a blind man might follow the contours of a statue with his fingers in order to enjoy it. Other architects, like Ralph Adams Cram or Joy Wheeler Dow, saw in certain styles (here, Gothic and Colonial, respectively) a cultural language of timeless validity. Still other architects, small operators, followed the leaders of the profession, as they always have done and always will, in the choice of formal idiom. Commercial decorators and manufacturers of ready made ornamental work tended to push decorative schemes that could be designed with the minimum of mental effort and sold to the largest market. And among the clients were the snobs, Europe oriented, and the nostalgics, past-oriented, for whom ostensibly historic habitations were absolute requirements. Finally, the obstinately original architects were not always patient men; some broke into shrill, dogmatic utterances that amused and yet repelled the public, and made less possible the painless evo-

Continued on page 182

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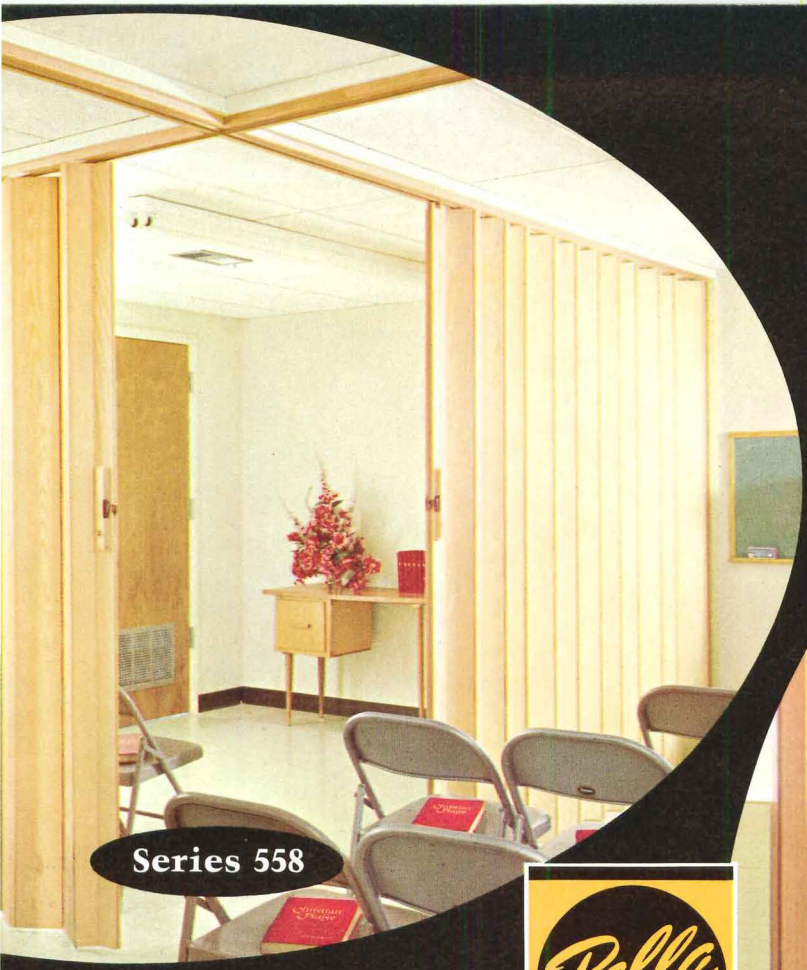

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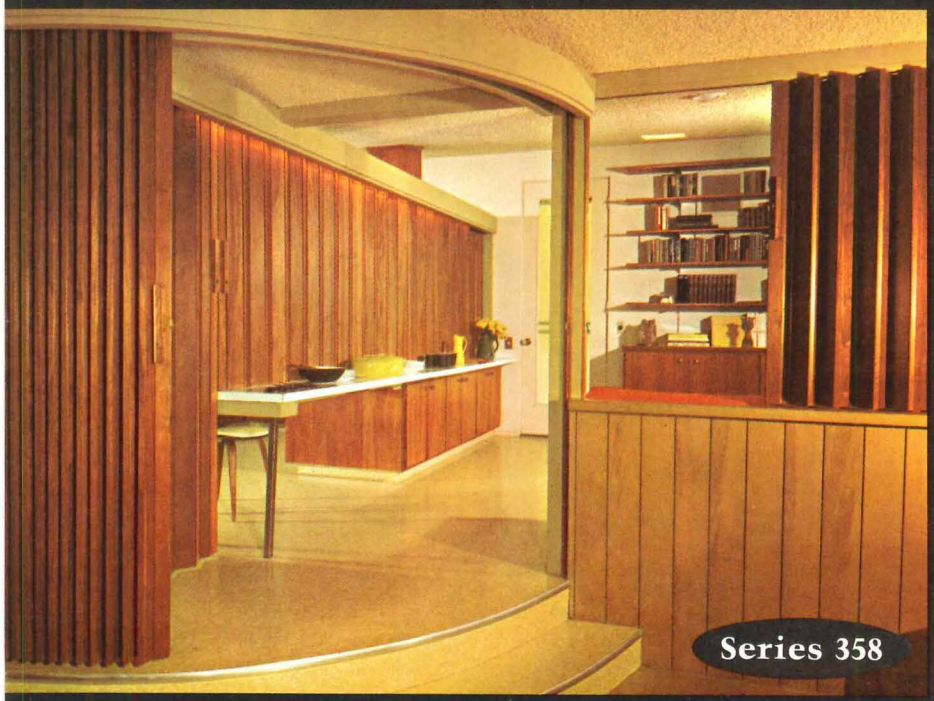

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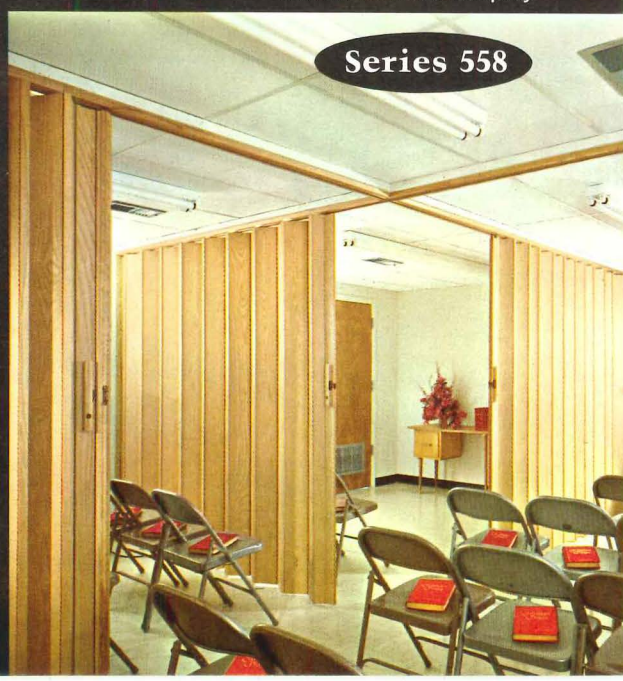

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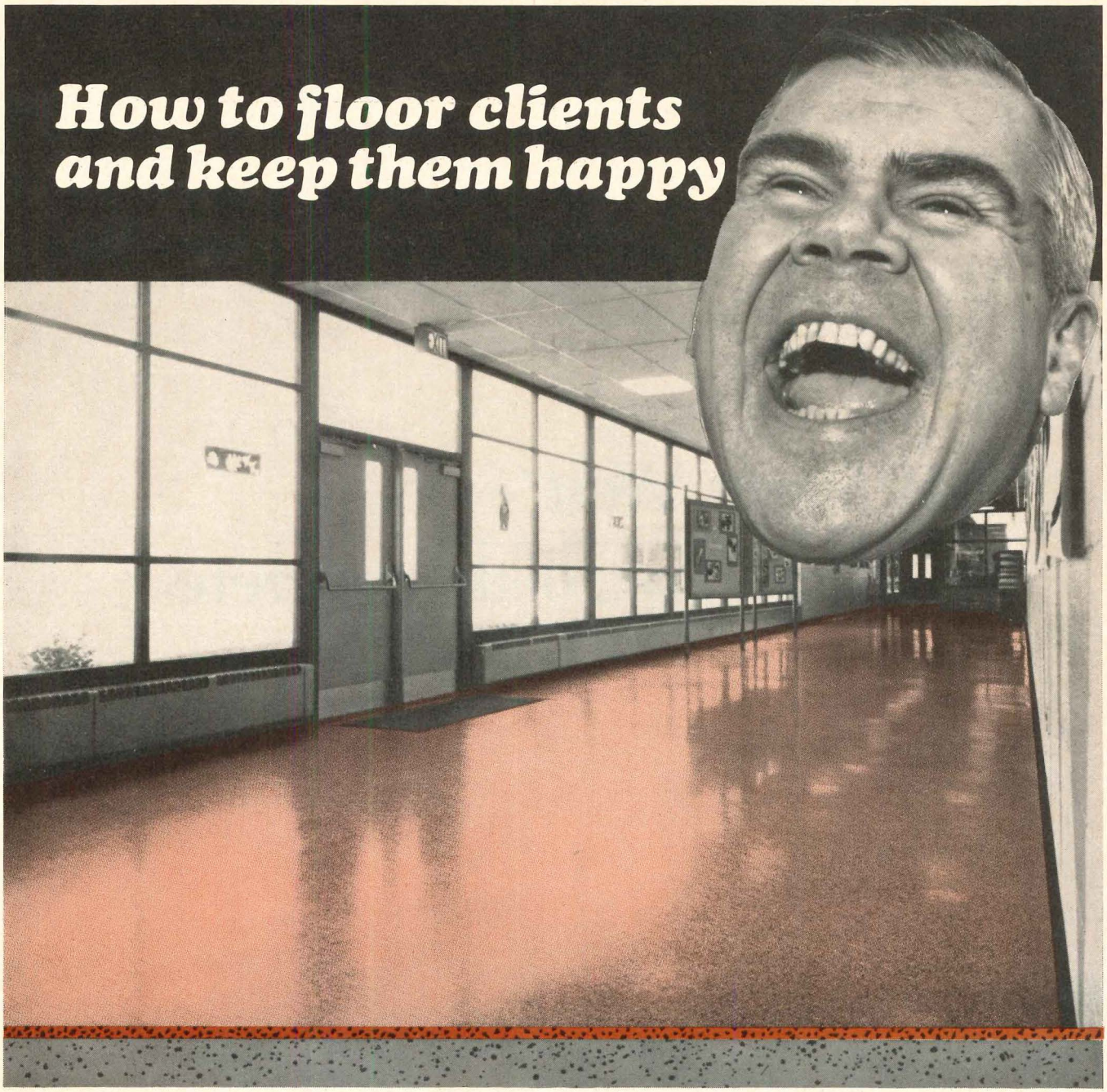

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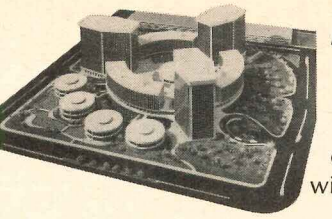

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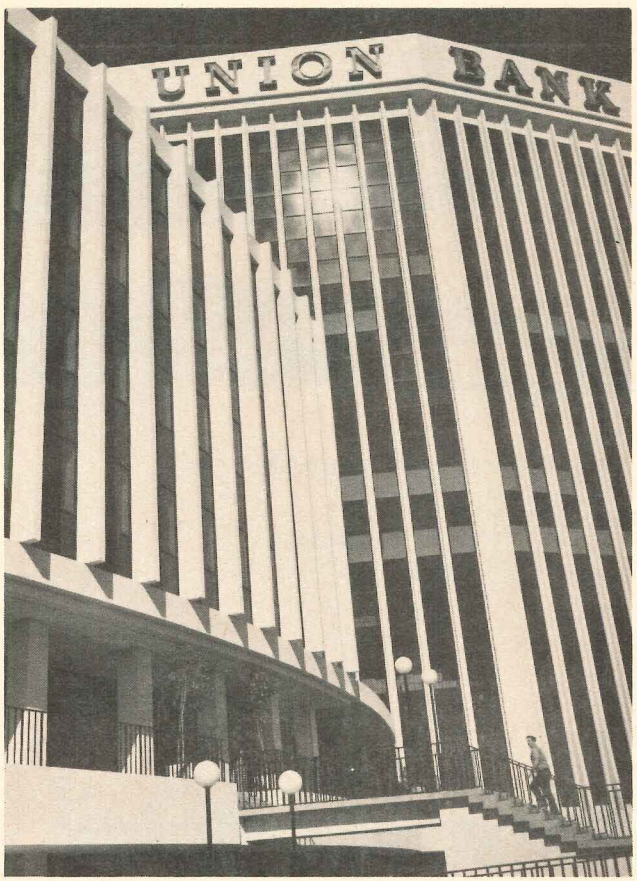

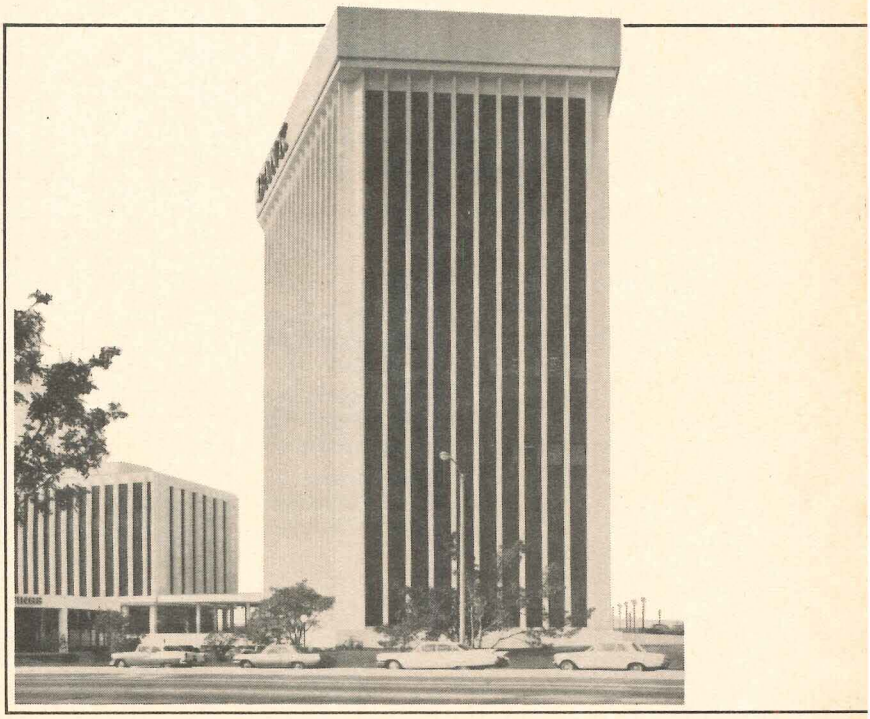

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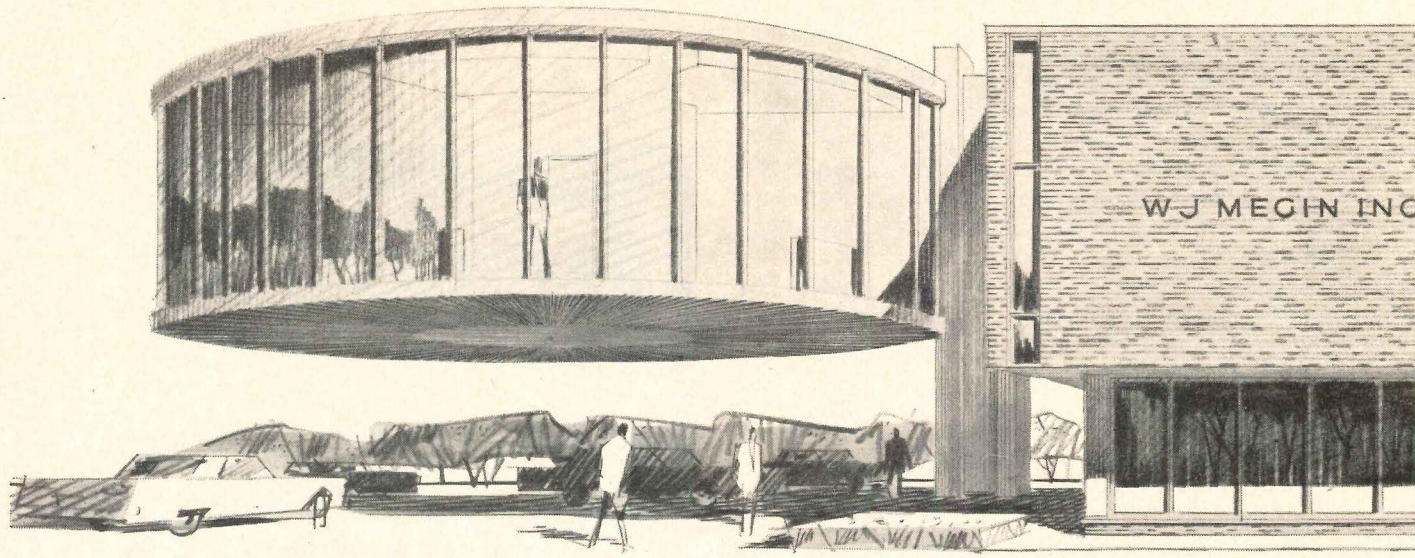

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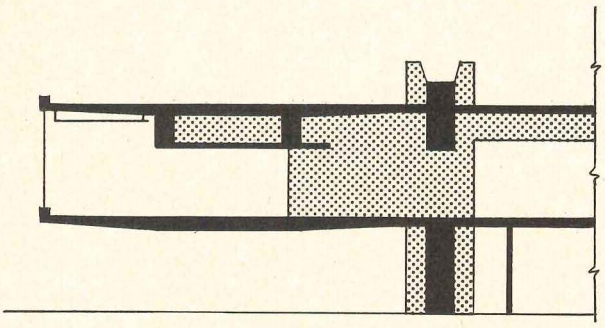

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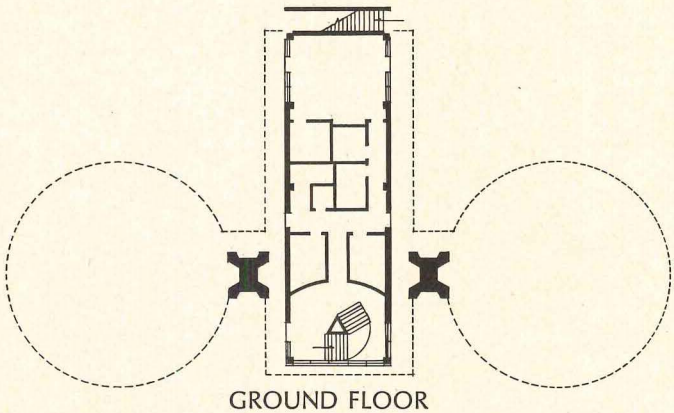

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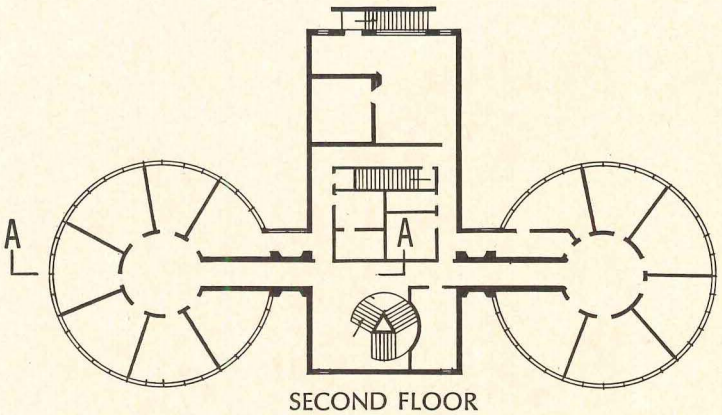
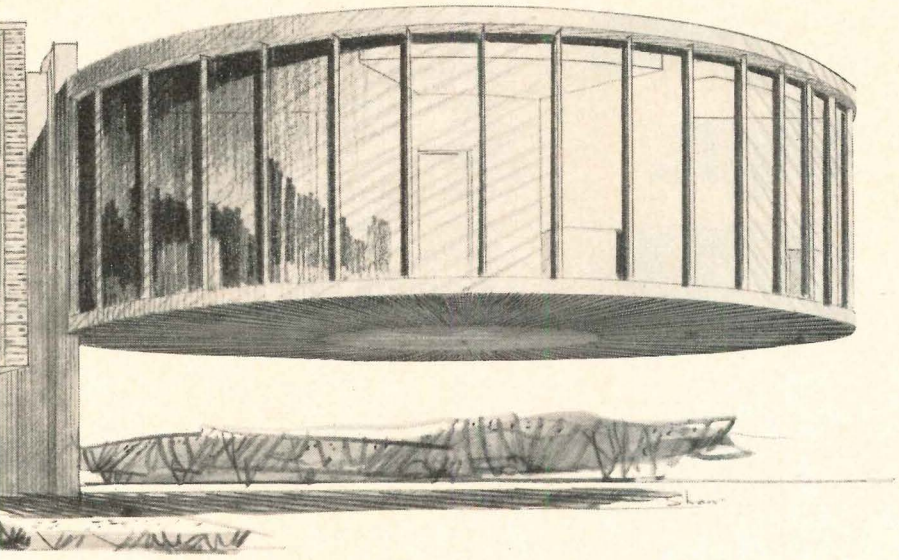
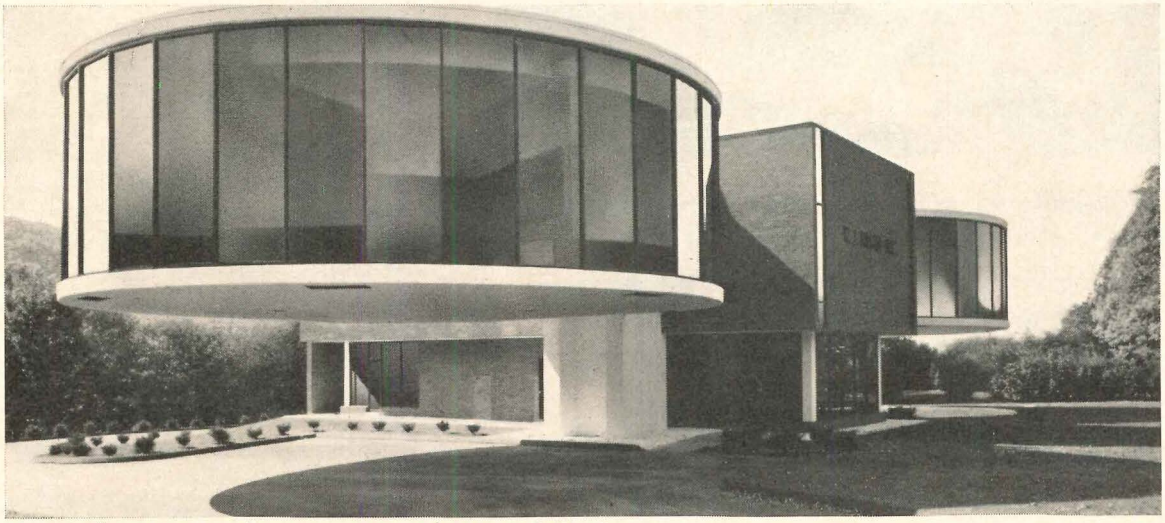


SECOND FLOOR



with All-Electric design



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How versatile is All-Electric design? The proof is in the building. The W. J. Megin Building, Naugatuck, Conn., for example. Why is it All-Electric? One reason, it would have been impractical otherwise. (See details.)

Proof of the versatility of electric heat? 175,000 commercial/industrial buildings throughout the country.

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Continued from page 172

lution of a universal 20th-Century American architecture. One of the ifs of architectural history is whether the prestigious Richardson, admired by both Louis Sullivan and Stanford White, might have made such evolution possible had he survived.

Back to the book, though. Besides the new introduction, it falls into four sections: a short biography, a survey of Richardson's works, an appreciation of him as an artist, a teacher, and a moral force in his profession, and an appendix containing a list of works, a note on instruction at the Beaux-Arts (which Richardson attended), and three examples of Richardson's businesslike writing on architectural projects and policy toward clients. The old photographs, here reproduced in halftone, lose a very small amount of clarity, but are still probably the best general photographic survey, in quality, of Richardson's work in any one book. The text is peppered with vignettes, many of them design sketches by Richardson himself.

Environmental Design As a Basic Industry

BY RICHARD P. DOBER

NEW TOWNS IN ISRAEL. *Erika Spiegel. Frederick A. Praeger, Inc., 111 Fourth Ave., New York, N.Y., 1967. 192 pp., illus., $17.50. The reviewer is an urban planner with the firm Dober, Paddock, Upton & Associates, Cambridge, Mass.*

We are all victims of the number game, especially when important problems are described by lump-sum statistics. With cigarettes measured in millimeters and national budgets now conceived in trillions, any string of digits can at first glance be a boring expression of needs or desires. To suggest that 3,800,000,000 people will require comfortable and workable communities by the year 2000 is hardly a provocative statement, so look at it this way.

During the lifetime of today's teenager, the world will have to find some way of constructing man-made environments for a population the size of Canada once every two months, every year, for the next 32 years. With minor exceptions, there are few reasons to believe any nation or group of nations is well-equipped to take on this staggering task. There are not enough professionals, no proven, institutionalized ways for public and private participation in projects of this magnitude, and genuine dangers that, if some attempts are not made to find the beginnings of a solution soon,

Continued on page 184

design idea: one material insulates..... above and beyond!

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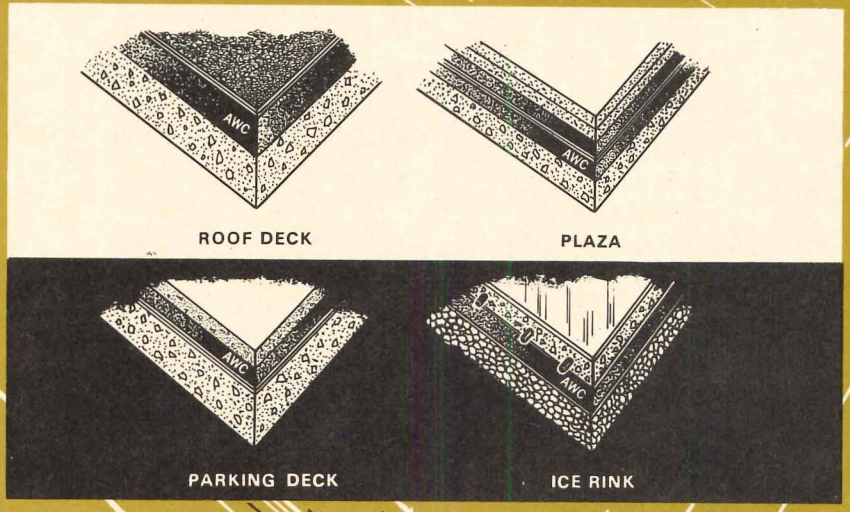
AWC performs "above and beyond" the expectations of ordinary insulations. It is applied hot and dry to roof decks, plazas, parking decks and ice rinks. When compacted in place to a specified thickness, it provides slope to drains. This monolithic layer also compacts around irregularities, and provides a smooth surface ready to receive a membrane. These and many more AWC features open the door to new architectural designs utilizing All-weather Crete. Call Silbrico for complete details and specifications.



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Continued from page 182

civil unrest, famine, and natural disasters may postpone for an intolerable period the fresh approaches to community development now desperately needed.

In this lugubrious context, Erika Spiegel's *New Towns in Israel* comes at an opportune moment. Not only is it a superb account of how a developing country has constructed new communities, but it demonstrates how these activities can be an economic and social enterprise of national importance.

The book begins with an historic account of settlement patterns at the time of the founding of the new state (1948). Three-quarters of the existing Jewish population was concentrated on 11 per cent of the land. In the next 17 years, 1,500,000 immigrants arrived, all requiring housing and employment. With the economic and administrative capacities of the country severely strained by a threefold population increase, and with little existing industry, land reclamation and community development played a key role in the use of manpower resources to fill a national need. Thirty new towns were started — some just villages, others good-sized cities. Because of national defense considerations and no real reason to be tied down to locations of power sources or water supplies, the new communities were dispersed throughout the country.

Dr. Spiegel goes on to summarize concisely the economic, social, and political issues affecting the location and design of new communities and to critically examine successes and failures, which she does particularly well. As one who was only vaguely familiar with the country's history, I found her account of cultural differences among the various immigrant groups and the resulting influence on planning and design fascinating reading. It became clear for Israel that national purpose could be well served only when environmental decisions ceased to perpetuate design patterns brought from other places. This overriding consideration then spawned pragmatic solutions that were less universal and more particular than heretofore, and hence immensely useful.

The Israeli experience with the garden-city movement chronicles well this failure of international theoretical solutions applied indiscriminately to the Israeli context. Prior to the Mandate (1948), the idea of satellite communities was introduced in Israel by English architects planning and building in the country and by Jewish architects who had received their training in Great Britain and Central Europe. Because of political conditions, the larger cities could not be comprehensively planned and the smaller rural settlements were anti-urban in philosophy and layout. The latter fitted the Zionist vision of the return to the soil: immigrants would work with their own hands and raise a large part of their own food. This ideal reflected the fears of the Great Depression and the ghetto life, which so many of the newcomers had lived through. An open land-settlement pattern was desired, with some degree of individual and community self-sufficiency.

The immediate needs of the post-1948 population led to garden cities, because they offered some hope for concentrating development in designated areas and intensely using the limited means of production. Thus, the first plans were marked by ring roads, green strips, neighborhoods, low-density housing, and adjacent gardens. But the garden-city solution did not take into account the characteristics of the Israeli geography and population. The result was a miserable and ineffective environment: waste of valuable urban land; high costs for constructing and operating roads, water,

Continued on page 186

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Coffee (cream & sugar)	Oil (paint)
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Colored Paper	Permanganate
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Egg	Rubber Cement
Fruit Juice (apple)	Shoe Dye
Furniture Dye	Shoe Polish
Furniture Polish	Tar
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Carpet shown: 100% Herculon olefin pile

Continued from page 184

and electricity; and the loss of adventuresome and lively urban atmosphere in which subcultures could freely mingle. The endless rows of small houses proved monotonous, the harsh sun made the generous roads and open spaces unusable, the individual gardens required awesome amounts of labor to maintain, and most of the occupants had little previous experience with gardening, having come from dense urban areas in Central Europe or the southern Mediterranean. The towns repelled rather than attracted settlers. All who could do so chose to live in the older and larger coastal cities. Under these circumstances, a countermovement was called for and discovery of the eventual solutions makes illuminating reading.

Israel's pragmatic manner of advancing community development has proven to be exportable. As Leopold Laufer has noted in *Israel and the Developing Countries*, between 1958 and 1966 this small and struggling country attracted some 9000 technicians who came for training, study, and observation of the Israeli methods. In addition, Israel undertook 3500 technical-assistance programs abroad.

The Praeger edition's colophon carries the motto "Books That Matter." This one certainly does. It suggests that environmental design could be a basic industry, a primary occupation — not an afterthought. Appropriately directed toward the problems of developing countries, the book may also have meaning for industrialized nations. Does anyone seriously believe that the American scene can be significantly improved without some immense reorganization of the ways we develop our communities? The automobile and aerospace industries profitably fill a third of the gross national product. Is there room for a similar corporate effort in designing and constructing the environment? Good housing alone is no longer acceptable to the consumer. The evidence is present: The average developer can no longer sell just a house, he has to market a community. The problems of the slums are more than problems of shelter. In this light *New Towns in Israel* is a twice-told tale — highly recommended.

NOTICES

New Branch Offices

ATRIUM, INC., Interior Space Designers, Jacksonville, Fla., have opened a branch office at 468 Kenridge Circle, Atlanta, Ga.

Continued on page 192

Brasilia, Portelo™ Suntan

If you lay a hand on our Brasilia™ paneling...

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As a man who deals in environment — and the texture and feel of everything that goes into it —
Rub a hand over G-P Brasilia paneling.

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Brasilia is ideal for residential applications. It's low cost makes Brasilia practical—even in "budget" homes! Its textured real-wood beauty lets you add a distinctive background to any room. And, a tough, family-proof Acryglas® finish makes Brasilia practical for even high-use areas. Take a look at Midnite, Suntan, Fawn, and Driftwood, then specify Brasilia for your next job.

Exclusive panels create personalized designs.

Gold Crest Walnut

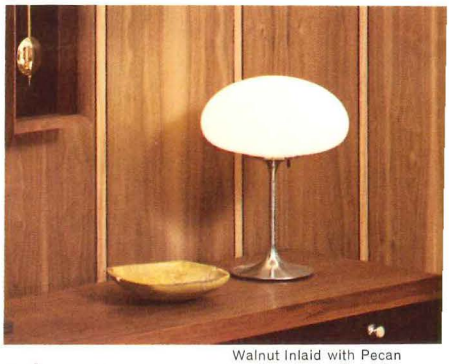
The Decorator Panel

Gold Crest.™ Every 16 inches there a is half-inch-wide channel which can be decorated with colored tape, metal strips, or fabric to compliment room decorations. Choice of Golden Elm, Pecan, American Walnut and Rosewood.

Style IV Black Walnut

The Man's Panel

Style IV.™ The handcrafted look of four-inch planks. Panels custom-matched for grain and color in distinguished American Black Walnut.



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The Luxury Panel

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An entirely new approach to Corridor Lighting – *with* Guth 15-25|25-35 Prismatic Lenses†

†T. M. and Patents applied for.

The status of corridors has advanced *architecturally* in the past 20 years. But lighting-wise they've remained "in the dark!" Light was always concentrated on the floor . . . creating a tunnel effect with "gray" walls and ceiling.

But now – there's a new concept of corridor lighting . . . made possible by the new Guth 15-25/25-35 prismatic lenses.

Those magic numbers mean 15% of the light is distributed* to the ceiling, 25% to each wall and 35% to the floor. The corridor is filled with light. Overall brightness balance is achieved and excessive contrasts eliminated. No more tunnels!

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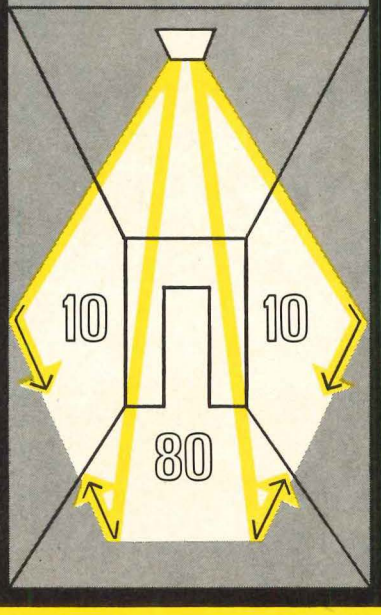
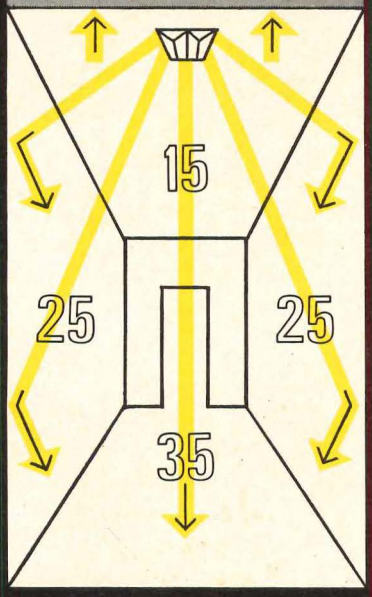
THE OLD WAY

80% of light concentrated on floor. Only 20% to walls. A tunnel effect.



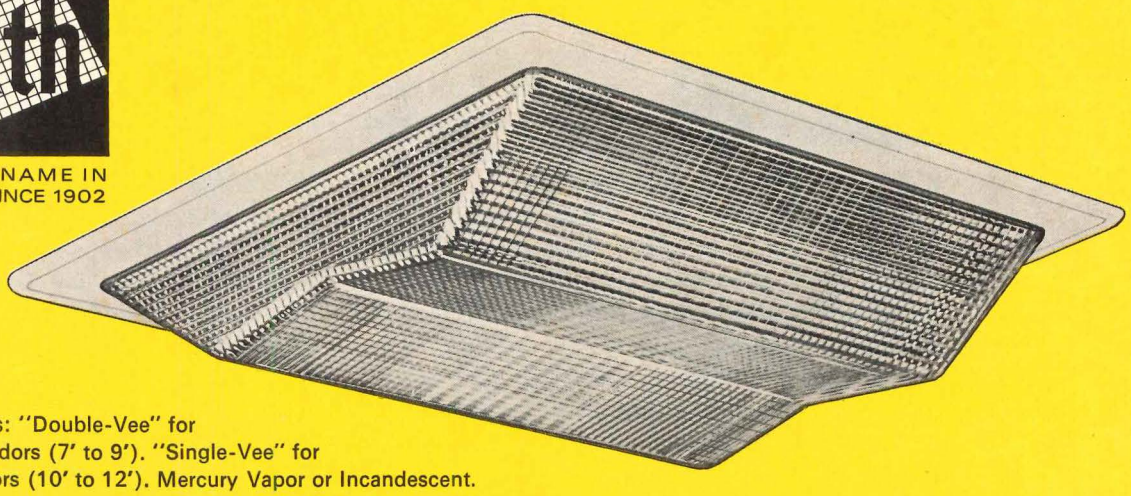
THE NEW GUTH WAY

Light distributed properly to both walls, ceiling and floor.



Guth

TRUSTED NAME IN LIGHTING SINCE 1902



Two designs: "Double-Vee" for narrow corridors (7′ to 9′). "Single-Vee" for wide corridors (10′ to 12′). Mercury Vapor or Incandescent.

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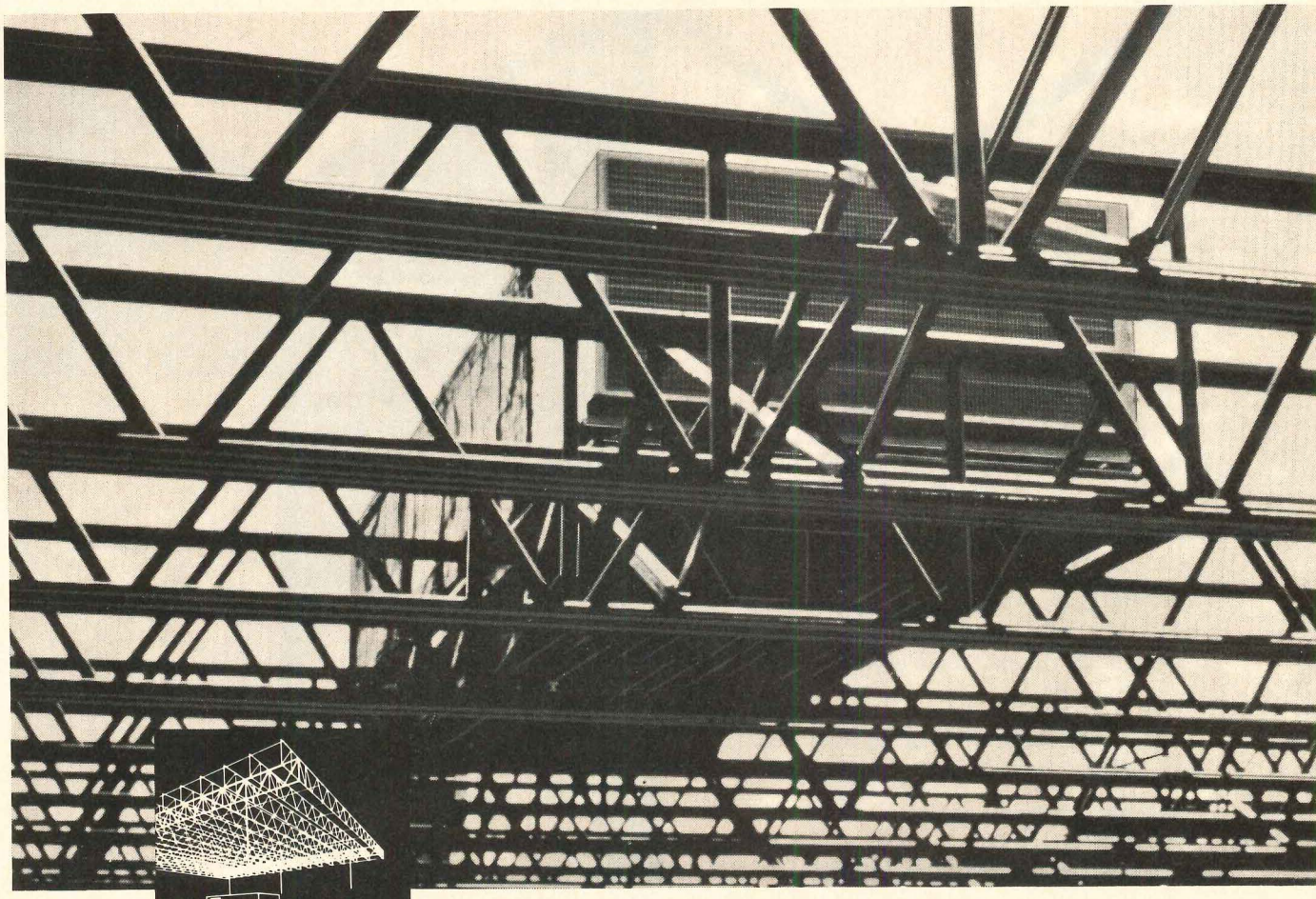
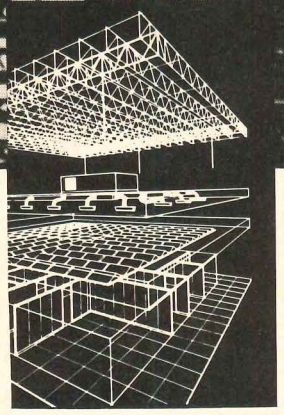
THE MACOMBER V-LOK® MODULAR COMPONENT SYSTEM:

Mechanical energy





Success of Macomber's V-LOK Modular Component System is due, in large part, to the wide choice of components it offers, and to the built-in flexibility of all components.

At present, there are four components in the system: the steel structure; mechanical energy system; lighting-ceiling; and interior partitions. Macomber Incorporated supplies the V-LOK steel structure, including floor and roof decking. There are at least two major suppliers for each of the other components, providing several possible combinations of components, all compatible with the basic 5-foot module.

All of the components are engineered to permit quick and easy changes in the floor plan of the building throughout its life. This complete flexibility of interior space allows the owner to accommodate the structure to the changing needs of the tenants. VLMC buildings need never become obsolete.

MECHANICAL ENERGY SYSTEMS

Compatible mechanical energy systems, like the other VLMC components, contribute to the flexibility of the structure. Basically, they are roof-mounted, multizone units designed to handle areas of from 4,000 to 10,000 square feet per unit. Each unit can serve four to 15 zones, and each zone is served independently of adjoining zones for maximum comfort in each.

The air supply distribution network is individually designed by the architect's engineer. In one- and two-story structures, it consists of fixed

systems contribute to building flexibility

ductwork to the intended zones, and flexible ducting from there to the air diffusers in the individual rooms. In structures of more than two stories, a remote unit is recommended, but the interior distribution network remains the same.

The 36-inch depth of the Macomber open-web girders and purlins allows passage of a duct up to 14 inches by 20 inches, so that a single duct can furnish air to an entire zone.

The flexible ducts and their air diffusers can be relocated to create a new arrangement of air supply to accommodate changes in the floor plan.

METHOD OF ROOF MOUNTING

The VLMC mechanical energy unit rests on special purlins that form an integral part of the steel structure. After installation of the unit, deck is laid up to and around the unit. This method of installation allows roof mounting of the heavy units that may be required in cold, northern climates. Absence of deck under the unit provides easier access to the mechanical component.

LENNOX DIRECT MULTIZONE SYSTEM

The Lennox Direct Multizone System uses direct-fired gas or oil heat exchangers or electric resistance heating in parallel with air-cooled refrigeration to provide precise individual zone control simultaneously in as many zones as needed. Absence of water eliminates completely the danger of costly freeze-ups. A special roof-mounting frame which exactly fits the perimeter of the DMS unit simplifies mounting and results in a neat, weatherproof installation.

Standard Lennox control systems utilize fresh outdoor air to do all the cooling when the temperature drops below 58° Fahrenheit, and to carry part of the cooling load between 58° and 65°. Above 65°, direct expansion refrigeration equipment does all the cooling.

The Lennox DMS unit is a complete factory assembly of highly integrated components in a weatherproof, sound-deadened, low-silhouette package. It includes all necessary controls factory installed, factory tested, and approved by the necessary authorized agencies.

NESBITT ROOFTOP MULTIZONE

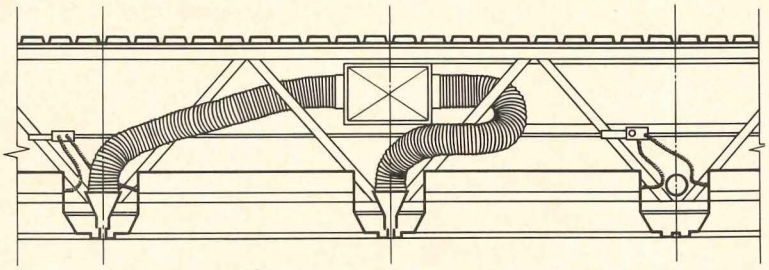
This "second generation" Nesbitt unit incorporates a new air conditioning concept that dehumidifies all air supplied to conditioned spaces during the mechanical cooling cycle. The unit permits automatic control of heating, mechanical or natural cooling, dehumidification, filtration and ventilation in as many as 12 individual spaces.

Nesbitt Rooftop Multizone design provides peak efficiency in those hours when some spaces require cooling while others must be heated. When mechanical cooling is operating, a coil in the hot deck utilizes high temperature refrigerant to reheat air flowing to spaces calling for heating. It is not necessary to operate the heat source at these times.

Placement of the cold deck over the hot deck prevents stratification of supply air. Modulation of outside-air and return-air damper banks is accomplished by a single electric or pneumatic damper motor.

All units are shipped fully assembled, precharged and factory tested, reducing on-site labor costs.

For more information on the Macomber V-LOK Modular Component System, contact your local Macomber representative, or write to *Macomber Incorporated, Canton, Ohio 44701.*



*FIXED AIR-HANDLING DUCTS fit easily through webbing of V-LOK girders and purlins. Flexible ducts carry air to diffusers, which can be "unplugged" and moved to other locations whenever changes are made in the floor plan.

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Continued from page 186

BAER & POAGE, Architects, Engineers, Planners, with main offices at Houston, Tex., announce the opening of a regional office at 182 Main St., Wytheville, Va. ALLEN R. CARNEY has been named an associate in the firm and will be director of architecture in the new office.

SVERDRUP & PARCEL & ASSOCIATES, INC., Architects and Engineers, St. Louis, Mo., have opened a design office at 1000 Apache Blvd., Tempe, Ariz.

New Addresses

M. PAUL FRIEDBERG & ASSOCIATES, Landscape Architects and Urban Designers, 270 W. 96 St., New York, N. Y. 10025.

ARTHUR LILIEN, Architect and Planner, and H. HERBERT LILIEN, Architect, 230 W. 57 St., New York, N. Y.

MCREYNOLDS COMPANY, INC., Engineers, Planners, Industrial Consultants, 638 Electric Bldg., 17 and Harney Sts., Omaha, Neb. 68102.

New Firms

BAHR & HANNA, Architects, 555 Stuart Bldg., Lincoln, Neb. 68508.

HERMAN BLUM CONSULTING ENGINEERS OF DALLAS, INC., Building Automation Concultants, 4930 Maple Ave., Dallas, Tex. 75235.

BORDONARO/SEDLETZKY, Architects and Planners, P.O. Box F, Carmel, Calif.

C. C. BRUMLEY, Architect, Arbor Dr., Anchorage, Ky.

ROBERT MELIK FINKLE, Architect, Battell Block, Middlebury, Vt. 05753.

FROESE, MAACK & BECKER, Architects, 705 Olive St., St. Louis, Mo.

HELMUT F. GEIGER, Architect and Engineer, 1544 Irving St., Rahway, N. J.

MARTIN J. GOLDMAN, Consulting Engineer, 101 Park Ave., New York, N. Y. 10017.

FENTON HOLLANDER/ARCHITECT, 16 Eliot St., Cambridge, Mass. 02138.

HERBERT H. HOWELL, Airport Design, Engineering, and Planning Consultants, 6720 N. Wildwood Ave., Chicago, Ill. 60646.

SUNSHINE, JAEGER, KUPRITZ & ASSOCIATES, Architects, 233 N. Northwest Hghwy., Park Ridge, Ill. 60068.

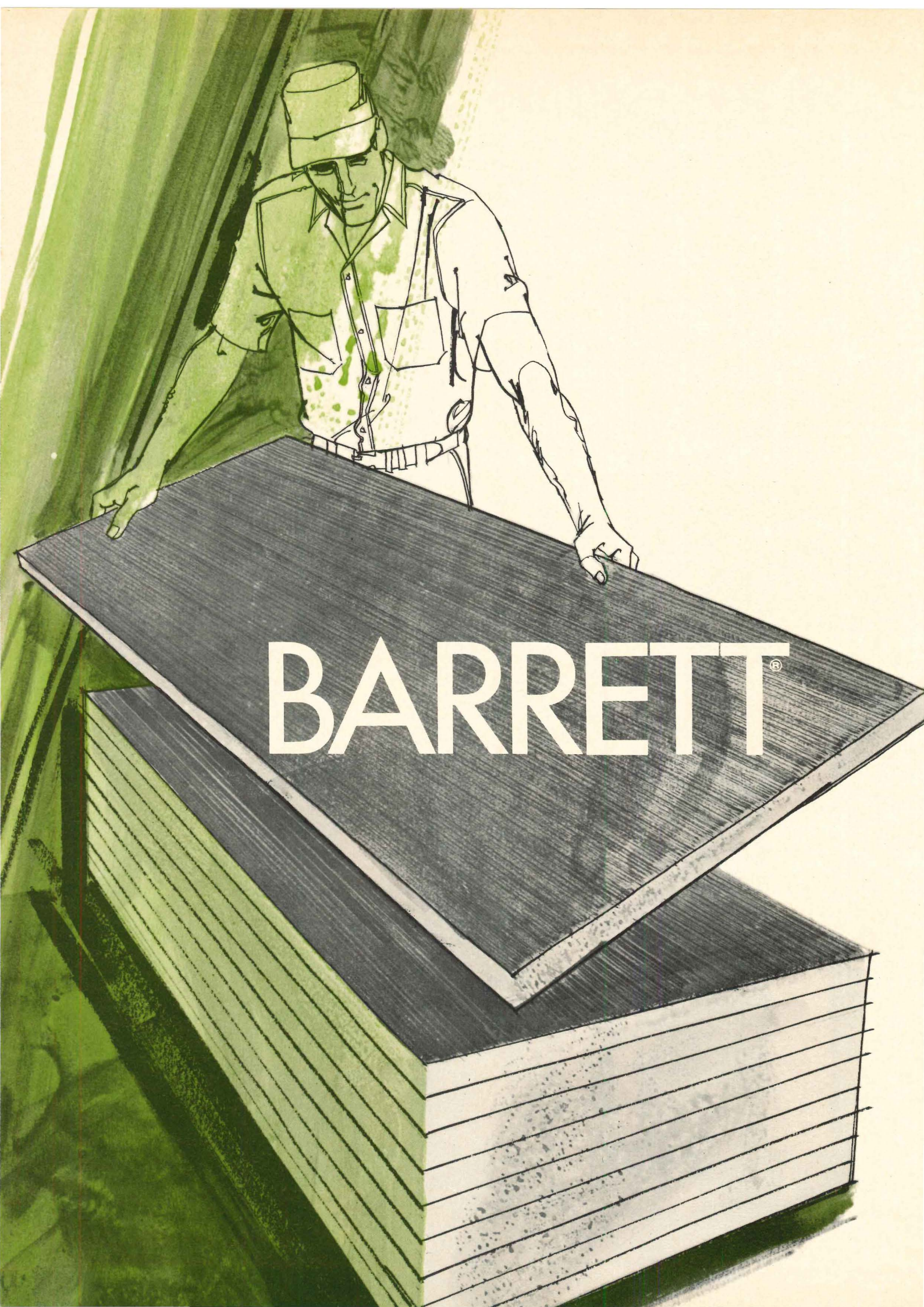
New Partners, Associates

REX WHITAKER ALLEN & ASSOCIATES, Architects, San Francisco, Calif., have named MARK A. LECHOWSKI an associate in the firm.

BURKE, KOBER, NICOLAIS & ARCHULETA, Architects and Engineers, Los Angeles, Calif., announce that CLIFFORD W. MOLES has become an associate.

EZRA GORDON–JACK M. LEVIN & ASSOCIATES, Architects, Chicago, Ill., announce the appointment of GERALD K. SLAWIN and NICHOLAS J. NOWICKI, JR., as associates in the firm. *Continued on page 196*

The LCN 2016 Closer is concealed in the head frame above the door. Arm disappears when door is closed.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Continued from page 192

WILLIAM H. HALL, Architect and Planner, New York, N.Y., has appointed JOHN D. DORAN an associate in the firm.

WILLIAM B. ITTNER, INC., Architects, St. Louis, Mo., have named WILLIAM A. BOWERSOX an associate.

JOSEPH R. LORING & ASSOCIATES, Consulting Engineers, New York, N.Y., announce the appointment of RICHARD F. HUMENN, WILLIAM J. DUNNE and JACK BEECH as associates.

MELONEY, HERRINGTON, FREESZ & LUND, Architects, Seattle, Wash., have named WALTER PHILIP WIGLEY an associate.

NEPTUNE & THOMAS ASSOCIATES, Architects and Engineers, Pasadena, Calif., have named seven new partners: JAMES F. CURRIE, P. KIRK HELM, CECIL F. KLASSEN, JOSEPH A. LEICK, ANTHONY O'KEEFE, GROVER L. STARR, and C. ALLAN SPENCER.

ELLIOT NOYES & ASSOCIATES, Architects and Industrial Designers, New Canaan, Conn., announce that ARTHUR DESALVO has become a partner in the department of architecture, and that ROBERT ANDERSON, WARREN KAFFKA, CHARLES BAFFO, ALAN GOLDBERG, and H. B. VERBRYCK have been named associates. In the department of industrial design, ERNEST BEVILACQUA has been made a partner and DINO SAVIO, ALLAN MCCROSKERY, and ROBERT GRAF have become associates.

P & W ENGINEERS, INC., Chicago, Ill., have named eight men associates. New senior associates are: JOHN A. SBAROUNIS and VYTAUTAS GERMANS. New associates are: HERBERT FRITZ, JOHN MARIN, JOHN NUNEMAKER, WILLIAM PLUCINSKI, JOHN TRUTWIN, and HOWARD VERDUIN.

THE PERKINS & WILL PARTNERSHIP, Architects, Chicago, Ill., have named new associates and senior associates. The new senior associates are: JOHN P. GALLAGHER, RICHARD A. JONES, SAUL H. KLIBANOW, RUSSELL G. MAY, and DONALD J. RICHARDS. New associates are: JOHN J. CLEMENCY, ROY E. DENG, B. JACK GOLDEN, PAUL H. HANDING, JOHN K. HOLTON, ROBERT R. KUMLIN, DENNIS KUNICKI, RAYMOND L. MOLDENHAUER, and SHELDON SCHLEGMAN.

RAYMOND & RADO, Architects, New York, N.Y., have admitted HOWARD L. BONINGTON and EDMUND H. H. CADDY, JR., as general partners in the firm.

GERD H. RUOFF, Architect, Upper Darby, Pa., has named DONALD C. ZACKER an associate.

Elections, Appointments

CHANDLER CUDLIPP ASSOCIATES, Interior Designers, New York, N.Y., announces that ROMAN HEILMAN has joined the firm as vice-president.

CHASTAIN & TINDEL, INC., Consulting Engineers, Atlanta, Ga., announce the election of THOMAS B. HARRELL, JR., to vice-presidency of the firm.

Continued on page 204

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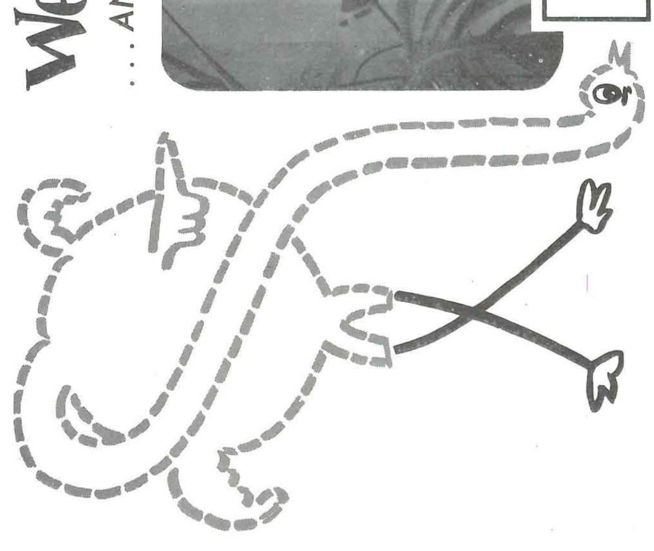

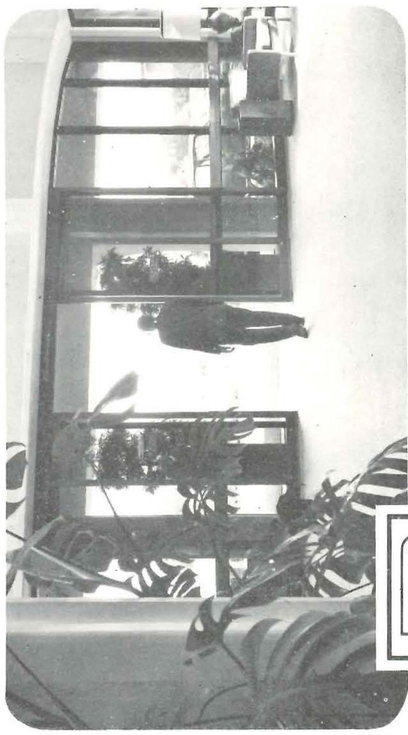

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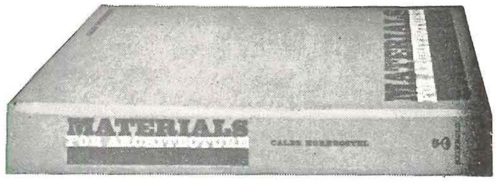

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Beauty on the Bay

an architectural report from Bethlehem Steel

BETHLEHEM STEEL

Architect/engineer for the Alcoa Building: Skidmore, Owings and Merrill.

Architect for the Golden Gateway Center: Wurster, Bernardi and Emmons; De Mars and Reay.

Owner: Golden Gateway Building Company; *contractor:* Perini Corporation; *steelwork:* Bethlehem Steel Corporation.

Beauty on the Bay

This is the Alcoa Building. It is located in San Francisco, in the Golden Gateway Center, a 20-acre redevelopment project of admirable sensitivity.

This is a refreshingly honest building. It wears its framing boldly, yet lightly. Its steel diagonal bracing, together with vertical hangers and only twelve exterior columns, form a sophisticated system for resisting seismic forces. Twenty-four office floors, encased in bronze-tinted curtain walls, are suspended within the clad steel frame. Aside from the service core, the 16,000-square-foot floors are completely column-free.

The building rises from a landscaped 28,000-square-foot plaza, punctuated with arresting fountains and sculpture. Indeed, as the building glows warm and golden in the sunlight, with restless interplay of light and shadow, it becomes not so much a building as a colossal piece of sculpture, the dominant theme of an elegantly conceived composition.

BETHLEHEM STEEL

Charles Perry's "Icosapirale" adorns the West Plaza. One per cent of the total cost of the Golden Gateway Center—about $1 million—was set aside for the purchase of works of art displayed throughout the Center.

The structure's frame stands well out from its skin. Interesting geometric patterns superimposed on the large window areas, together with a sense of security resulting from the boldly expressed earthquake-resisting system, have produced overwhelmingly favorable reactions from tenants.

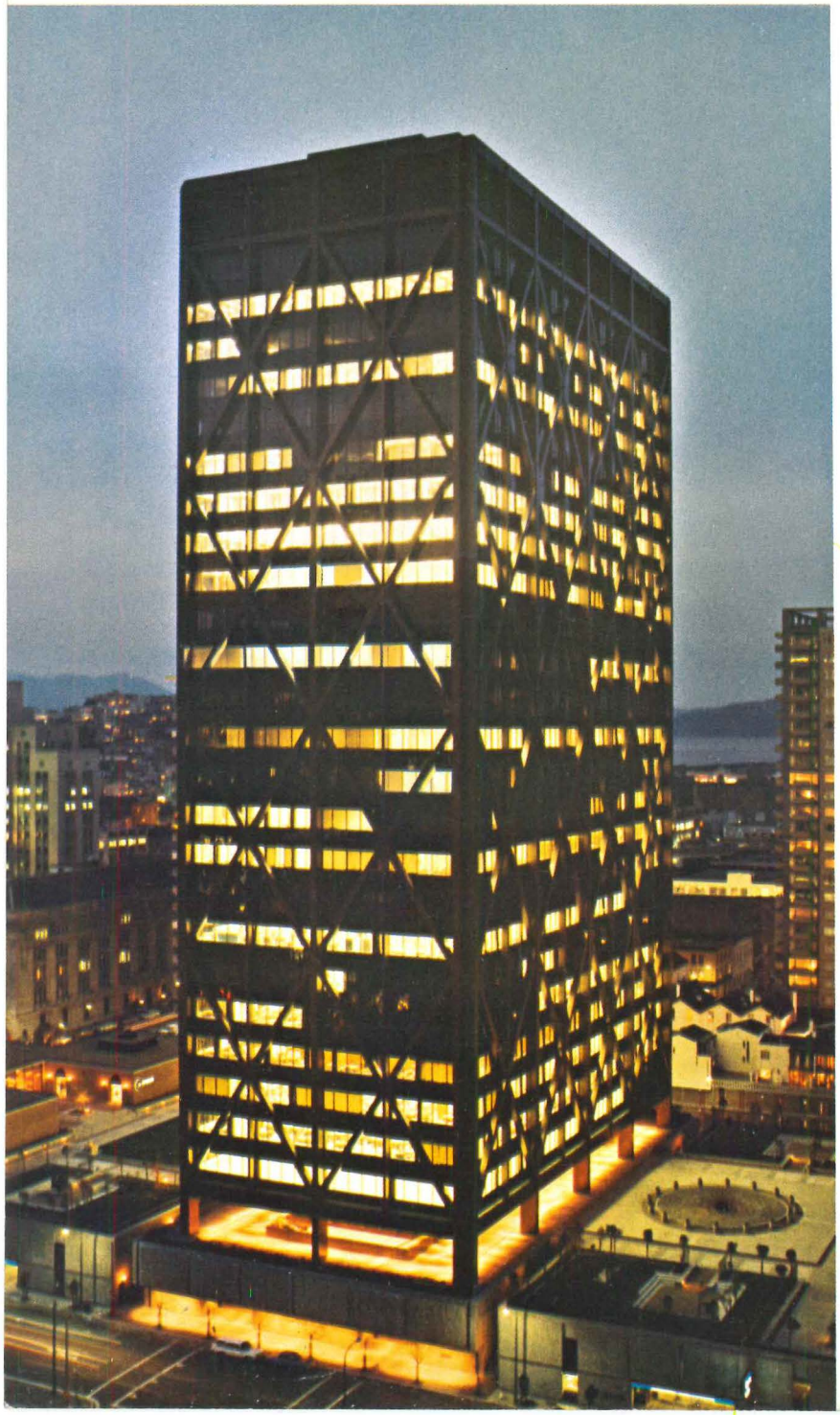
A hemispheric fountain by Robert Woodward embellishes the East Plaza. Other artistic works include the sculpture, "Horse," by Marino Marini, and other sculptures by Francois Stahly, Charles Perry, Henry Moore, Seymour Lipton, Jan Peter Stern, Jacques Overhoff, Aristides Demetrios, Beniamino Bufano, Alvin Light, and D. Faralla, a mosaic by Mark Adams, and oils by David Simpson, Ralph DuCasse, and Keith Boyle.

At plaza level the building forms a spacious covered arcade twenty-two feet high and paved with brick. Only the elevator lobby is fully enclosed.

The building shares an elevated plaza with adjoining low-rise structures. Beneath the plaza is a three-level parking garage. Motorists and pedestrians reach the plaza and entrance lobby by stairways, open escalators, or shuttle elevators.

Beauty on the Bay

The Alcoa Building, San Francisco



The Alcoa Building represents something new in steel framing for an office tower. New—although steel framing has been the dominant choice of designers for nearly one hundred years.

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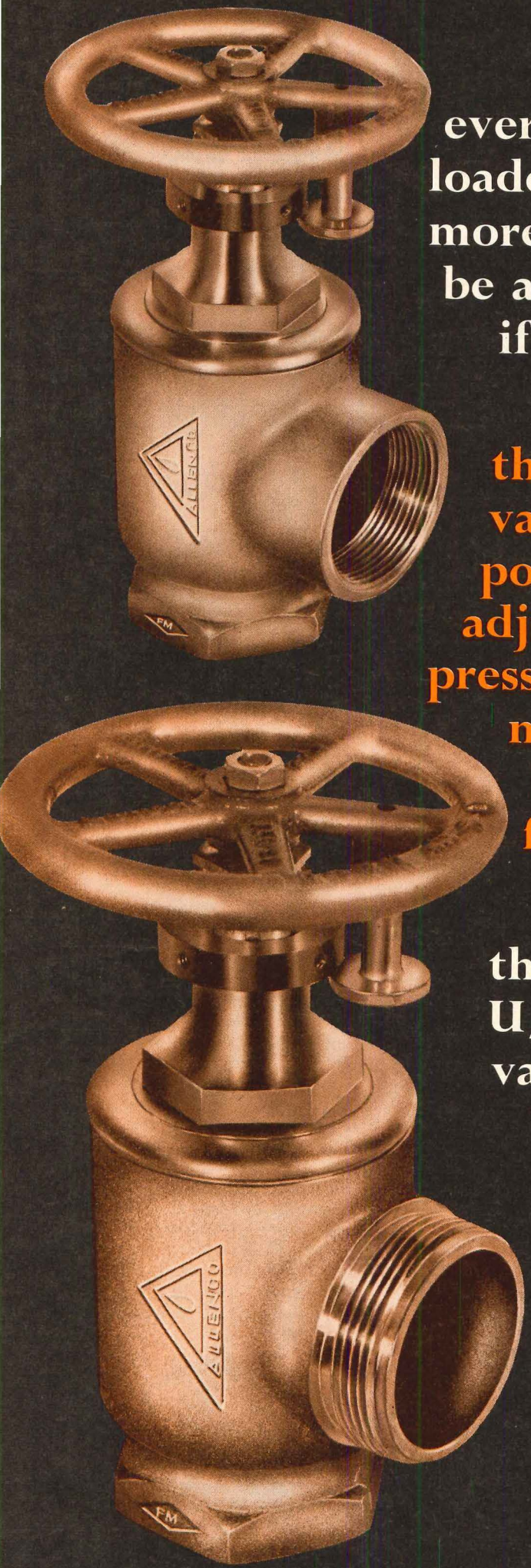
The Alcoa Building dominates Golden Gateway Center, which presently includes four high-rise apartment towers and fifty-eight two-story town houses. The steel-framed office tower provides 400,000 square feet of ultra-modern office space on twenty-four floors. Story heights are typically thirteen feet. The structure measures 210 by 105 feet in plan, and rises 395 feet above street level. Mechanical equipment is located on the twenty-sixth floor.



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Continued from page 196

DANIEL, MANN, JOHNSON & MENDENHALL, Architects, Engineers, Planners, Los Angeles, Calif., announce the merger of the Palm Springs firm of Philip Abrams Consulting Engineers with DMJM, and the appointment of PHILIP ABRAMS as vice-president and engineering director in charge of sanitary engineering and environmental systems. The board of directors of DMJM has also appointed LAWRENCE E. WILLIAMS vice-president for economics. QUIDO H. CIARDI has joined the firm as project director for military and aerospace programs. The joint venture of Kaiser Engineers/DMJM, established for the development of a rapid transit system for Los Angeles, has appointed ANTHONY J. LUMSDEN to the position of director of architecture and environmental design.

ELLERBE ARCHITECTS, St. Paul, Minn., have appointed MASAO ITABASHI as chief design architect, in charge of the firm's Washington, D.C., office.

A. EPSTEIN & SONS, INC., Architects and Engineers, Chicago, Ill., have appointed GEORGE L. NEJDI to the newly created position of production vice-president.

FORD, BACON & DAVIS, INC., Engineers, have elected WILLIAM D. BRUCE senior vice-president. CHARLES G. SCHNEIDER has been elected vice-president.

GOODFRIEND-OSTERGAARD ASSOCIATES, Acoustical Consultants, Cedar Knolls, N.J., announces the appointment of JOHN WILSON and THOMAS D. MILLER as senior engineers.

ISD INCORPORATED, Interior Designers, Chicago, Ill., and New York, N.Y., announce that JOHN KING has joined the firm as vice-president in charge of the New York office.

LOCKWOOD GREENE ENGINEERS, INC., New York, N.Y. have made known the appointment of J. J. DICKELY as director of public relations.

QUINTON ENGINEERS, LTD., Los Angeles, Calif., have named MARVIN J. ROSVOLD chief architect for the firm. They have also named LEWIS A. REDGARE a vice-president.

ROGERS ENGINEERING CO., INC., Engineers and Architects, San Francisco, Calif., have elected ALBERT J. HAMILTON vice-president.

RUST ENGINEERING COMPANY, Beverly Hills, Calif., has made RAYMOND L. HESS, JR., an executive vice-president, and J. PAUL SCHEETZ and G. FRANK GARDNER, senior vice-presidents.

SMITH, HINCHMAN & GRYLLS ASSOCIATES, INC., Architects, Engineers, and Planners, Detroit, Mich., have appointed J. RICHARD HAGGERTY to the position of Coordinator of Hospital Research and Planning.

WILBUR SMITH & ASSOCIATES, Consulting

Continued on page 206

OMNI PLUS

An Architectural Furniture System for Custom Designing Active Storage and Work Areas

The wall and front supported application of OMNI PLUS expresses structural order and organizational function while achieving more efficient utilization of space. The cantilevered effect of the wall supported application accentuates its classic architectural form which is compatible with any style or fashion. OMNI PLUS' system concept is the most complete and significant new product available to the interior designer interested in environmental design. Its vertical and horizontal flexibility has synthesized function with form, and when necessary can be front supported to combine the ruggedness needed in contract furniture with its architectural simplicity.

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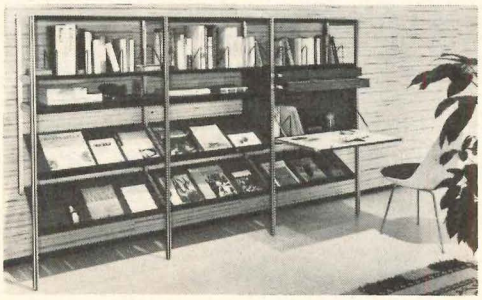
Write for the location of the showroom or dealer nearest you, and an OMNI PLUS brochure which shows a variety of applications and details about accessories. OMNI/Aluminum Extrusions, Inc., Subsidiary of Hoover Ball and Bearing Company, 468 Shepherd St., Charlotte, Michigan 48813.



Front rails may be extended to the floor for support when the requirement is more rugged. The library/periodicals rack shown above has a drop front work surface, and is ideal for professional waiting rooms and foyers. Strip lamps are available for horizontal panels.

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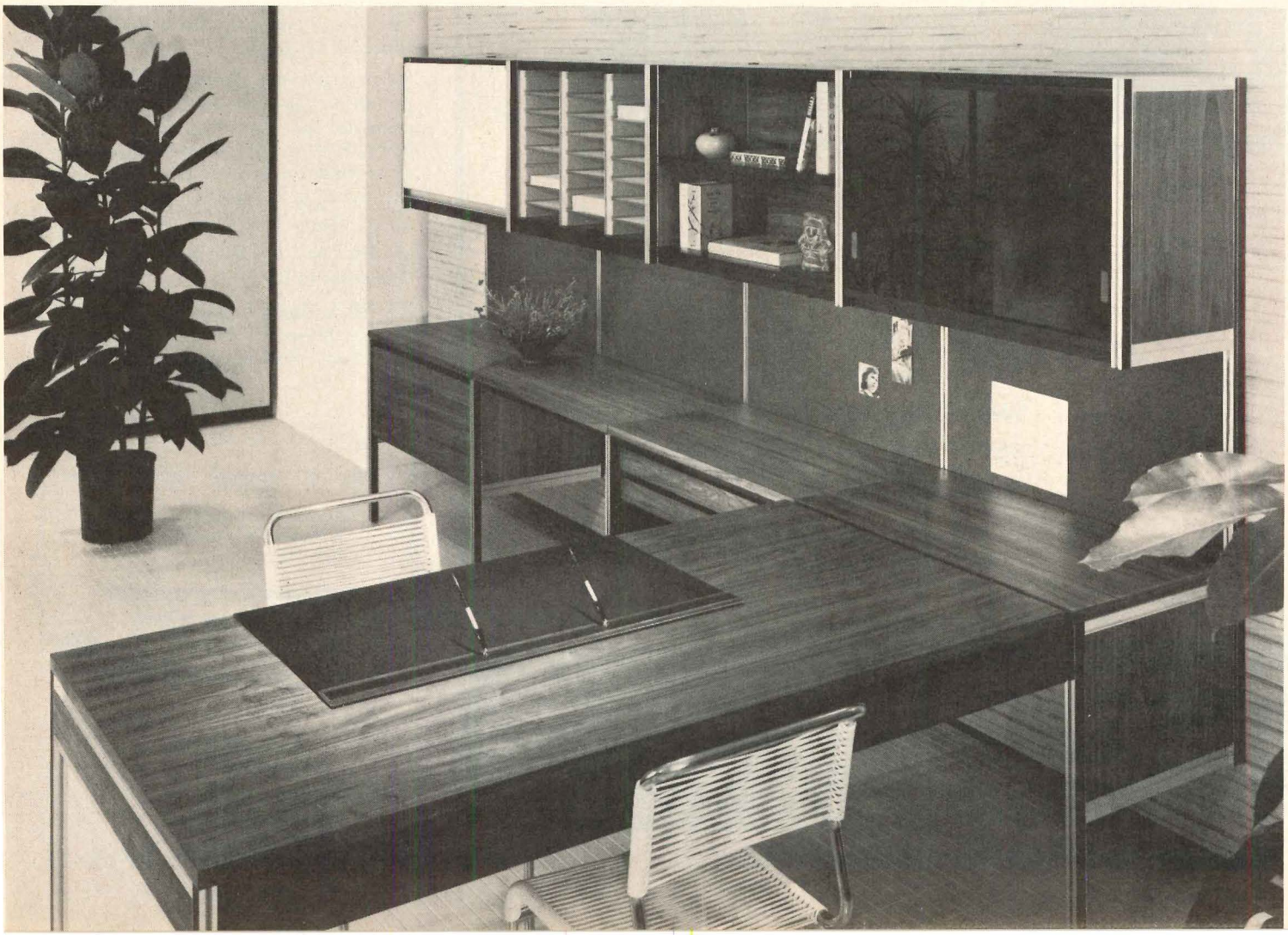

Continued from page 204

Engineers, announce that REX S. ANDERSON has joined the firm and assumed responsibility for its Richmond, Va., office.

SYSKA & HENNESSY, INC., Engineers, New York, N.Y., announce the election of CHARLES E. SCHAFFNER to the board of directors.

ADRIAN WILSON ASSOCIATES, Architects and Engineers, Los Angeles, Calif., announce the appointment of JOHN H. O'HAIR, vice-president, to head the firm's Washington, D.C., office.

Name Changes

SIDNEY R. BARRETT, ARCHITECT, AIA & ASSOCIATES, Atlanta, Ga., upon the admission of L. HENRY LOWRANCE and JAMES P. CHAPMAN as associates; formerly, SIDNEY R. BARRETT, ARCHITECT.

CAMPBELL & FRIEDLAND, Consulting Engineers, Greenvale, Long Island, N.Y., formerly, HENRY J. CAMPBELL, JR. & ASSOCIATES.

DONALDSON/SANKEY, ARCHITECTS, Montreal, Canada, upon the withdrawal from the firm of DEREK DRUMMOND: formerly, DONALDSON, DRUMMOND, SANKEY, ARCHITECTS. The firm also announces that the following have becomes associates: RUDOLF V. JAVOSKY, ALLAN THOMAS, MICHAEL WERLEMAN, and JEAN-CLAUDE HURNI.

DOLLAR, BONNER & FUNK–ARCHITECTS, Wilmington, Del., upon the retirement of WESTON HOLT BLAKE and WILLIAM R. MANNING; formerly, DOLLAR, BONNER, BLAKE & MANNING.

HARDY, HOLZMAN, PFEIFFER ASSOCIATES, Architects, New York, N.Y., upon the admission of MALCOLM HOLZMAN and NORMAN PFEIFFER as partners; formerly, HUGH HARDY & ASSOCIATES.

LASZLO PAPP & ASSOCIATES, Architects, White Plains, N.Y., upon the retirement of MILLARD F. WHITESIDE; formerly, WHITESIDE & PAPP.

POTTER, LAWSON, FINDLAY & PAWLOWSKY, INC., Architects, Madison, Wis.; formerly, LAW, LAW, POTTER & NYSTROM.

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Continued on page 214

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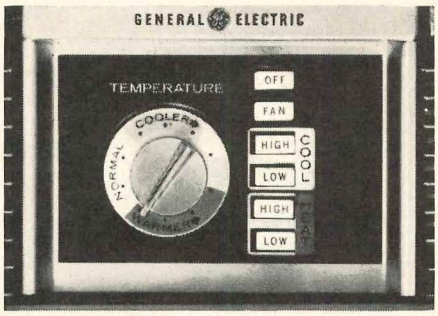

An absolute requirement among these, Dr. Bragg felt, was individual room temperature control. And that was one reason why he chose GE Zoneline units for heating and cooling.

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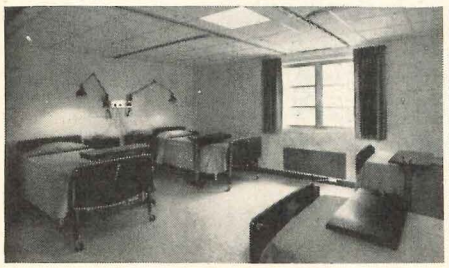
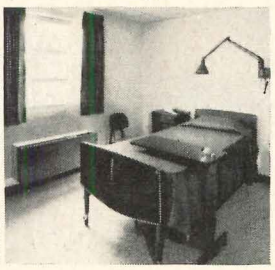
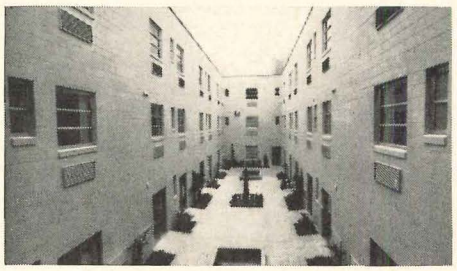




Yet another reason for choosing Zoneline, according to the doctor, was its "add on" capability. While two of the three floors are already occupied, the third will not be used until some future date. But sleeves and grilles are fitted in the vacant floor, and units can be readily installed when needed.



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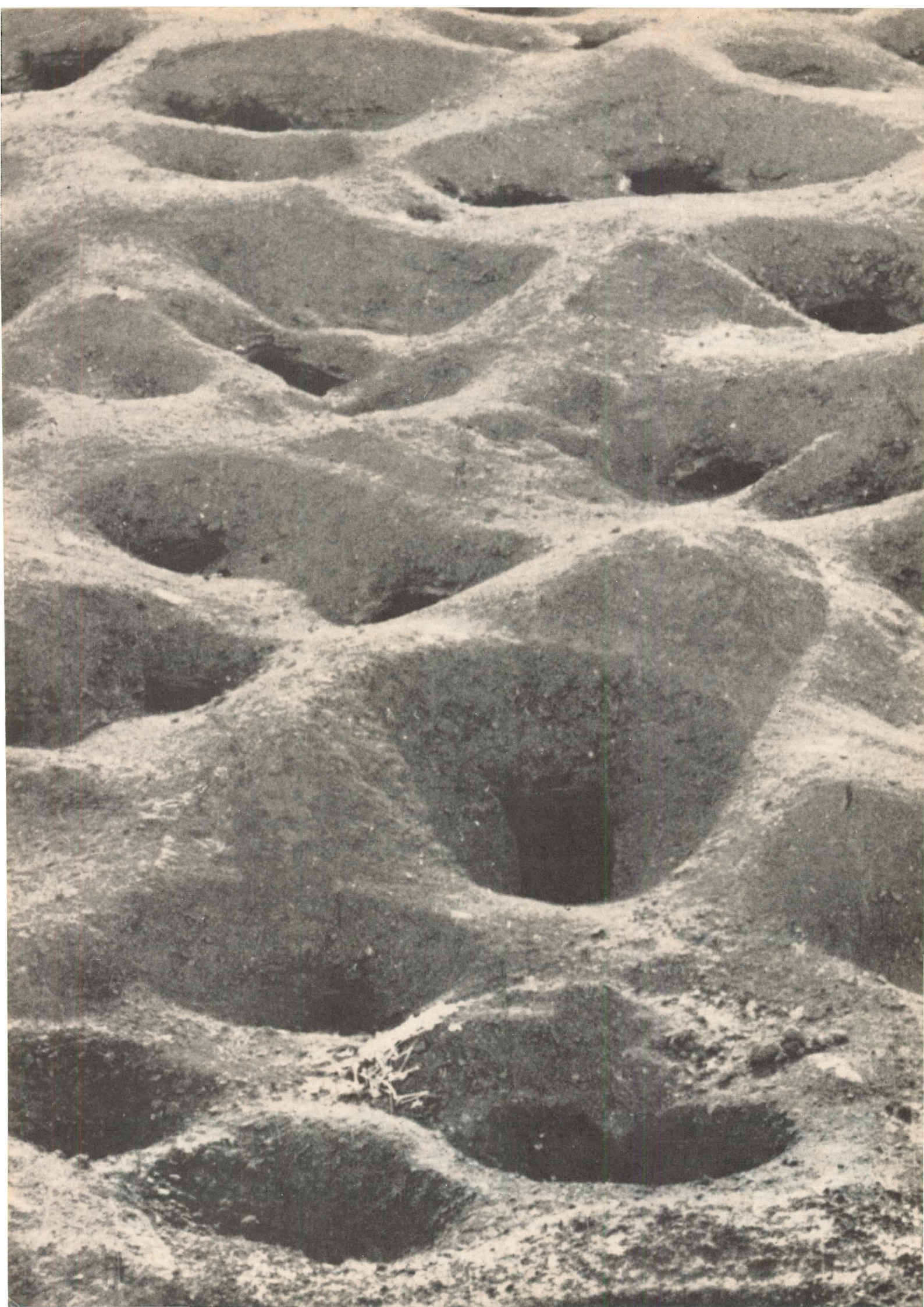

A special message to readers of Progressive Architecture

In some places, digging is a way to live.

At P/A, it's a way of life.

These eerie excavations are actually the entrances to ancient underground dwellings—still in use—in Siwa, Egypt.

The grassy mound at right is Philip Johnson's contemporary art gallery in New Canaan, Connecticut.

Worlds apart in time and space, they seem somehow similar. Merely an interesting architectural parallel? Or are both expressions of an underlying human need to be enclosed and insulated by the earth?

These "buildings"—and the questions they raise—were part of a special report on "The Earth" that appeared in a recent issue of *Progressive Architecture*. In this report, P/A editors exhaustively examined man's relationship to the earth—and the earth's relationship to architecture.

They outlined the history of excavation and reclamation. They explored the attitudes toward the earth of various architectural "schools"—dig *into* it versus build *on* it versus rise *over* it. They probed the moral, esthetic and economic implications of drastically altering the landscape. And they capped it all with a round-table discussion by prominent architects.

To prepare this 60-page, 40,000-word report, P/A editors spent three months just digging. They searched out, organized and interpreted material from dozens of sources.

They interviewed architects and builders.

They called on business and government experts.

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And they read literally millions of words about man's use and abuse of the land he lives on.

Digging like this is a way of life with P/A editors. It's part of P/A's in-depth editorial approach to major subjects of interest to architects.

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It's part of the editorial approach that makes P/A the biggest architectural magazine—and the best read.

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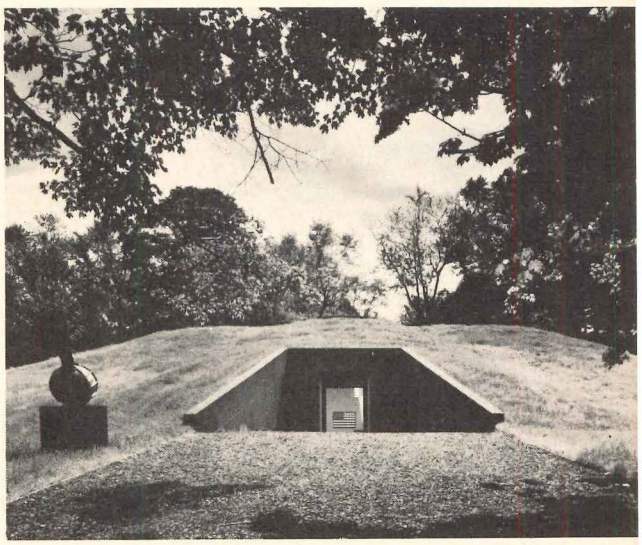

PROGRESSIVE ARCHITECTURE

JOBS AND MEN

Continued from page 207

resume and salary desired to William Stenquist, or apply at American Electric Power Service Corp., 2 Broadway, New York, N.Y. 10004. An equal opportunity employer.

ARCHITECT &/OR ARCH'L ENGR.—With special competence and interest in building systems design, detailing and working drawings. At least five years practical experience. Must believe in and qualify for changing role of architects. Please submit experience and particulars to Carl Koch & Associates, 36 Lewis Wharf, Boston, Massachusetts 02110.

ARCHITECT OR ARCH'L ENGR.—Career positions now available with professional engineering, research and market development organization. Activities involve promotion and development of the rapidly expanding market for white cement architectural concrete. Position locations are New York, Chicago and Western U.S. If you are creative and technically competent, are a people-oriented professional who enjoys travel, derives satisfaction from applying his training and experience to other's problems, and prefers a broad latitude in arranging his daily activities, you are cordially invited to submit a resume to: Portland Cement Association, Old Orchard Road, Skokie, Illinois 60076.

ARCHITECT-ARCHT'L DRAFTSMAN—Permanent position growing architectural firm. Must be experienced in production of working drawings and specifications. Work will include apartments, schools, churches, commercial buildings. Send resume to Snyder/Blackburn/Associates, 4015 North Keystone Avenue, Indianapolis, Indiana.

ARCHITECT-DESIGNER—Creative designer needed to assist senior designer in expanding practice in Allentown, Pennsylvania. Must be particularly talented in preparing preliminary presentations. Send resume to Breslin and Ridyard, 1226 Union Boulevard, Allentown, Pennsylvania 18103.

ARCHITECT OR ARCH'L ENGR.—To manage and be responsible for architectural group in a midwest company. Initial salary range: $18,000–$20,000. Reply to Box #625, PROGRESSIVE ARCHITECTURE.

ARCHITECTS—Philadelphia's Department of Public Property, responsible for the design and construction-inspection of all city owned buildings, has several excellent career positions now available at two levels: $9,247–$10,989 (requires degree in architecture and 2 years experience) and $10,989–$13,706 (requires degree in architecture and 4 years experience). Graduate work in architecture may be substituted for some experience. All appointments will be made at the initial steps of the salary ranges. Outstanding benefit program. Send resume to: Mr. Patrick Forristal, Room 1000, Municipal Services Building, Philadelphia, Pa. 19107.

ARCHITECTURAL ACOUSTICS—Opportunities for young architects interested in careers in the growing and challenging field of architectural acoustics; positions available in Los Angeles, Chicago, New York and Cambridge. Please send resume to Robert B. Newman, BOLT BERANEK AND NEWMAN, INC., 50 Moulton Street, Cambridge, Massachusetts 02138. An equal opportunity employer.

ARCHITECTURAL DESIGNER—For a lead position, large firm with good potential. Must be definitely talented with established ability and record of accomplishment, capable not only of developing fresh, outstanding planning and architectural concepts for large projects, but also thoroughly conversant with practical development of supporting details and effectively presenting work to clients. Basis of compensation will be made adequate for the right man. Replies should contain sufficient details to establish record and abilities which will warrant further discussion. All replies will be treated confidentially. Box #626, PROGRESSIVE ARCHITECTURE.

ARCHITECTURAL DESIGNER—And Senior Architectural Draftsman—Immediate opening with medium-sized firm—excellent opportunity. Must be experienced in civic, school and commercial projects. Degree preferred. Good salary. Anthony & Langford, A.I.A., 12422 E. Whittier Boulevard, Whittier, California. PH. 698-6271.

ARCHITECTURAL DRAFTSMEN—Permanent position with established medium-sized firm in Norfolk, Virginia. Congenial working atmosphere and benefits. Want experienced men capable of producing working drawings. Please submit confidential resume of experience and earnings to Lewis A. Rightmier, A.I.A. & Associates, 300 Main Street, Norfolk, Virginia.

ARCHITECTURAL TEACHERS—$7,000–$17,000 *Requirements:* Minimum, Bachelor of Architecture and experience in the field; *Positions:* Teach in a two year, architectural transfer curriculum and architectural technology program; *Location:* 22 miles northwest of Chicago, Illinois; Contact: Dr. Herbert R. Pankratz, 510 West Elk Grove Blvd., Elk Grove Village, Illinois 60007.

DESIGNER—Graduate architect, registration not required. Opportunity for talented individual in expanding firm of medium size with projects in multi-state area. Variety of work in multi-family residential, commercial, and institutional fields. Ability in graphic presentation and contemporary site and building design essential. The Shepherd Associates, Architects & Planners, 11600 West North Avenue, Milwaukee, Wisconsin 53226.

GRADUATE ARCHITECT—Three to five years experience. Needed immediately as assistant to senior architect in development of building programs, building systems research, design and feasibility studies, and design review of architectural projects. Salary commensurate with experience. Please submit resume to H.P. Portnoy, Senior Architect, Massachusetts Institute of Technology Planning Office, 50 Ames Street, Cambridge, Mass. 02139.

INSTRUCTORS—Part-time, full-time instructors wanted for Fall semester to teach courses in architectural, building construction and air conditioning technologies. Registration preferred. Send resume with details of education and experience including salary history. Write Head, Architectural Department, Voorhees Technical Institute, 450 West 41st Street, New York, N.Y. 10036.

SENIOR ARCHITECT—Cocoa Beach, Florida architect-engineer firm. Position can lead to associate status. Requirements includes bachelor's degree, registration and extensive experience with architectural-engineering firm. This person must exercise outstanding initiative, creative ability and have management capability to assume complete project responsibility. Contact Briel, Rhame, Poytner & Houser, P.O. Drawer K, Cocoa Beach, Florida 32931.

STRUCTURAL ENGINEER—Capable of chief draftsman duties, to take full responsibility of drafting room production and scheduling for fast growing architectural firm in Florida's Tampa Bay area—handling contemporary, commercial, institutional work. Ability to write specifications required. Excellent opportunity to advance and become associate. This is a well paying, long range position for a man capable of running an independent practice. Reply with complete resume salary requirements and availability to Charles Brandt Goldsmith and Associates, 1444 Gulf to Bay Boulevard, Clearwater, Florida.

TEACHING POSITION—Cooperative Extension Housing teaching position in large Eastern university to teach non-credit educational programs to professionals, craftsmen, tradesmen and families on major topics concerning the house. Advanced knowledge of new and experimental developments in building products and techniques is paramount. Architectural practice related to private housing is essential. Teaching experience is desirable. Salary and rank commensurate with education and experience (teaching and practice). Send resume to Box #627, PROGRESSIVE ARCHITECTURE.

TOP MECHANICAL ENGINEER—Search for quality. Manage mech. department prominent AE firm SE Michigan with design oriented practice in institutional field. Associates and clients require flexibility and consistent high quality. Must be registered man with superior professional qualifications and management ability. Rewards substantial but strictly based on success. Send resume and requirements to Mrs. K.L. Hanson, 607 Commerce Building, 1700 K Street, N.W., Washington, D.C. 20006.

WANTED—Senior and junior architectural draftsmen for small office in Northwest Florida. Excellent working conditions. Give full information on education, experience, starting salary, availability, age, etc. Replies held confidential. Excellent opportunity for right individual. Reply Box #628, PROGRESSIVE ARCHITECTURE.

SITUATIONS WANTED

ARCHITECT—Age: 28, B.Arch., Registered Architect, NCARB certificate. Experienced all phases including client contact. Present position: project coordinator. Seek challenging design position with aggressive architectural firm. Will consider position with American firm overseas. Married, two children. Resume upon request. Box #629, PROGRESSIVE ARCHITECTURE.

ARCHITECT—AIA, registered N.Y., NCARB. Seeks high administrative position in progressive office or industrial corporation. Eighteen years diversified experience with emphasis on commercial, institutional, industrial and hi-rise residential work. Currently project manager, institutional work. Age 44, family. Box #630, PROGRESSIVE ARCHITECTURE.

ARCHITECT—College graduate, D.A., A.R.I.B.A. Age 31, single. Seven years post graduate experience, six with large reputable Canadian firm in design and working drawings. Seeks responsible position offering total involvement with forward looking California office. Available for interview in July. Resume on request. Box #631, PROGRESSIVE ARCHITECTURE.

ARCHITECT—Graduated 1959, NYS license 1963, AIA, NCARB; married, children; well rounded experience, responsible positions with large and small progressive offices. 1965–present own proprietorship. Desire permanent, responsible position to

fully realize background, interest in architecture; New York City area only; resume, interview on request. Box #632, PROGRESSIVE ARCHITECTURE.

ARCHITECT—N.C.A.R.B. registration, 12 years comprehensive experience with liberal approach to design. Desire responsible position, preferably associateship or partnership. Resume available. Write Box #633, PROGRESSIVE ARCHITECTURE.

ARCHITECT—Seeks association with architect anticipating retirement or easing activity. 25 years experience in commercial, industrial, institutional, educational, government, and other building types. Southeastern and middle Atlantic states preferred. Box #634, PROGRESSIVE ARCHITECTURE.

ARCHITECT—Seeks to acquire principal interest or partnership in medium sized or small practice. Twenty-two years varied experience including responsible position with one of largest A-E firms. Box #635, PROGRESSIVE ARCHITECTURE.

ARCHITECT—25 years with nationally prominent architectural and architectural-engineering firms. Three years international experience. Project manager for production of plans, specifications and coordination of important projects in industrial and academic fields. Master planning, liaison, client contact and direction of construction superintendents. Box #636, PROGRESSIVE ARCHITECTURE.

PRODUCTION-MANAGEMENT-BUDGET—Experience with leading AE and engineering-construction firms. Chief assets—ability to organize and supervise teams as well as teach inexperienced personnel methods and logic in preparing drawings and specifications plus budgeting. Registered architect, age 40, 18 years experience; 8 years of college. Box #639, PROGRESSIVE ARCHITECTURE.

YOUNG—Chicago based architect-engineer team experienced in total scope of architectural services seeking phased purchase or acquisition of controlling interest in an established small or medium sized architectural firm. Area desired north of the fortieth longitude with potential growth. Reply Box #640, PROGRESSIVE ARCHITECTURE.

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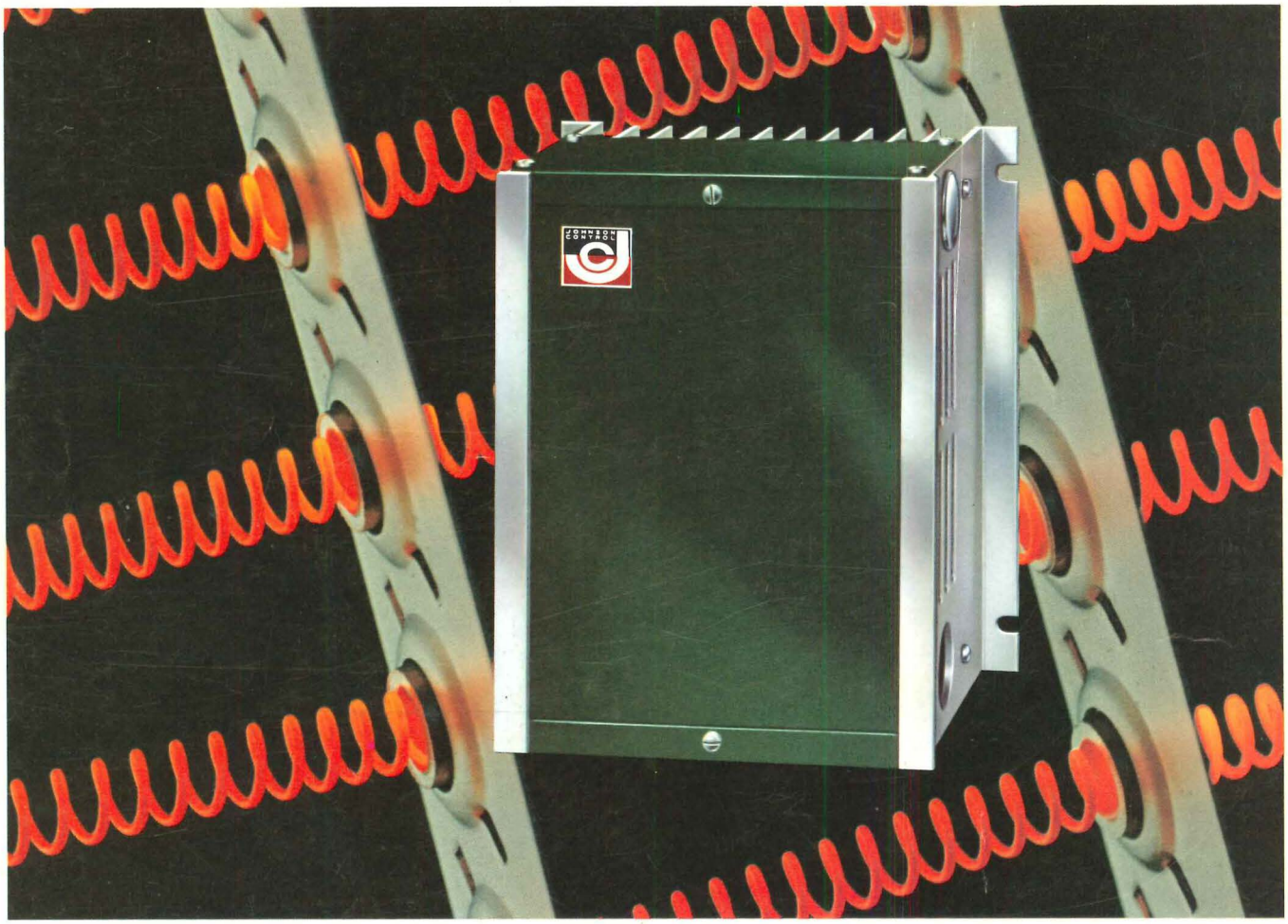

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