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BUILDING TYPES STUDY: SCHOOLS

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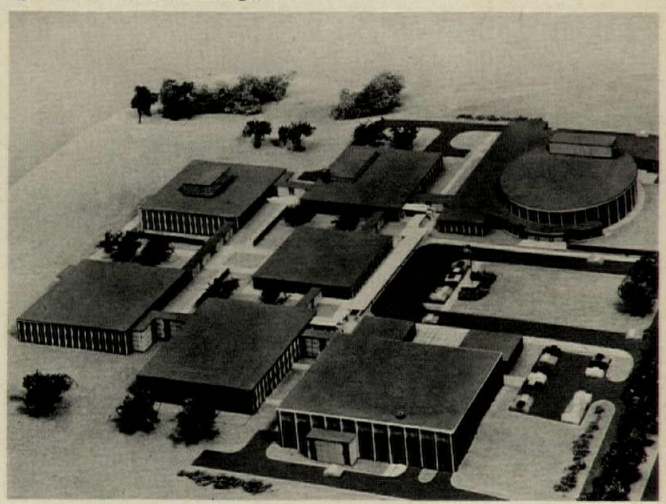

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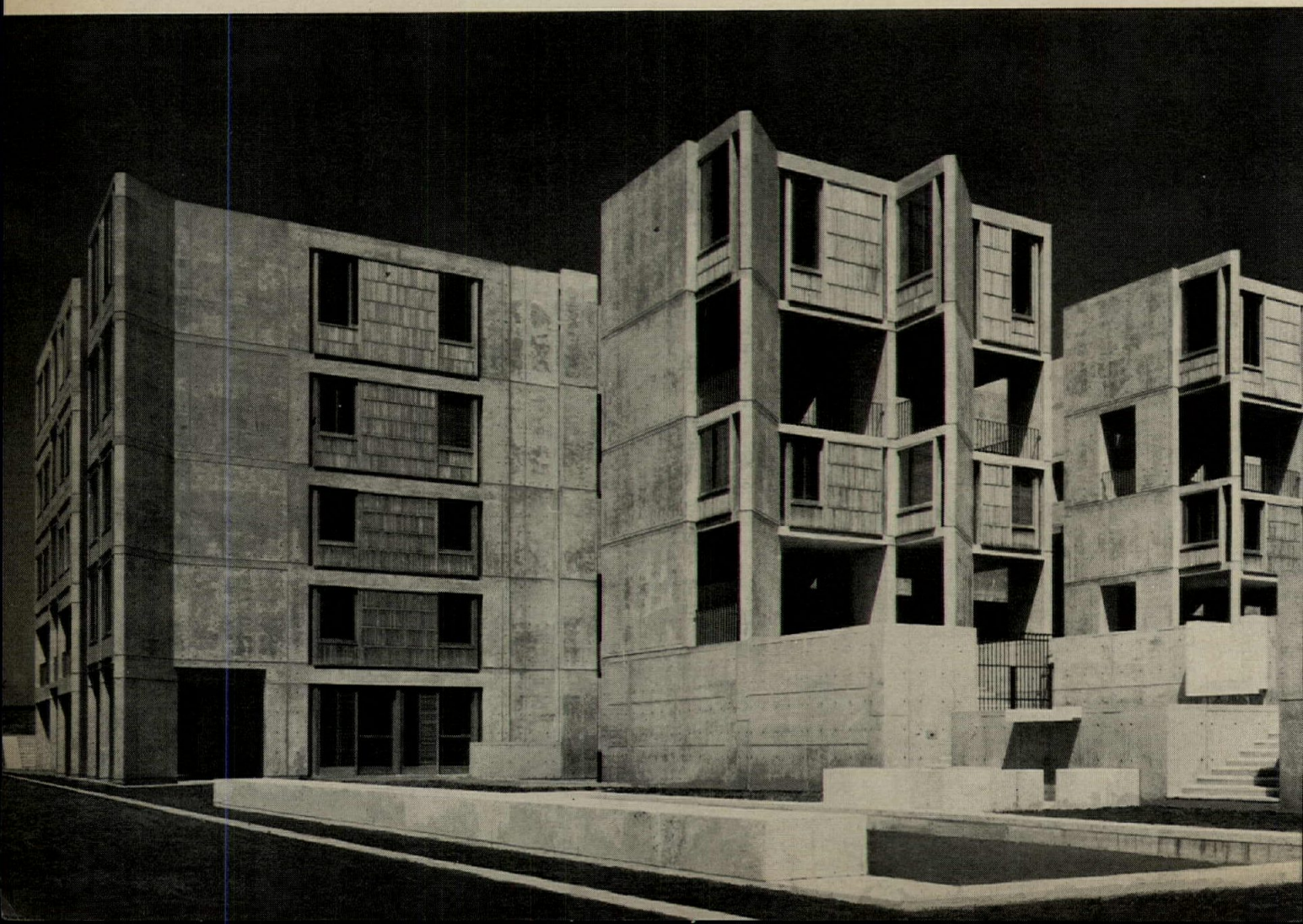

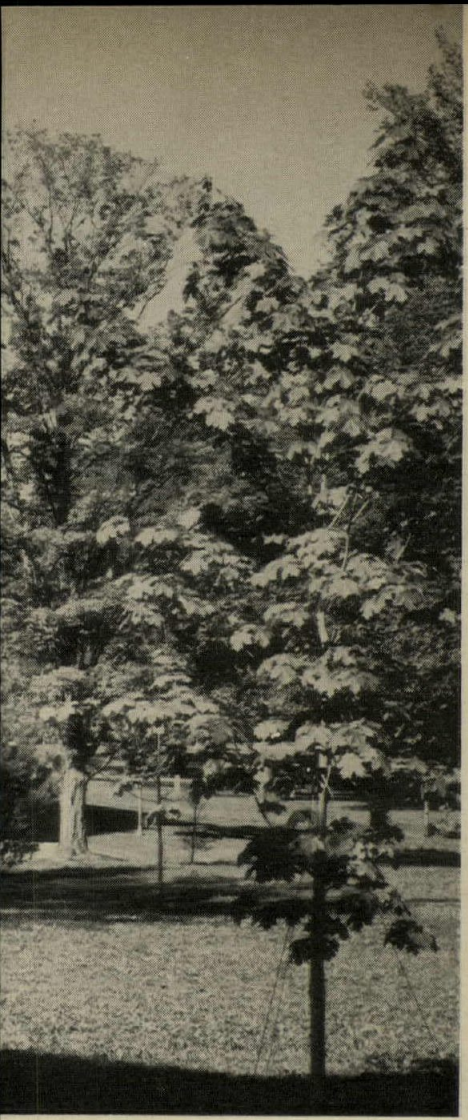

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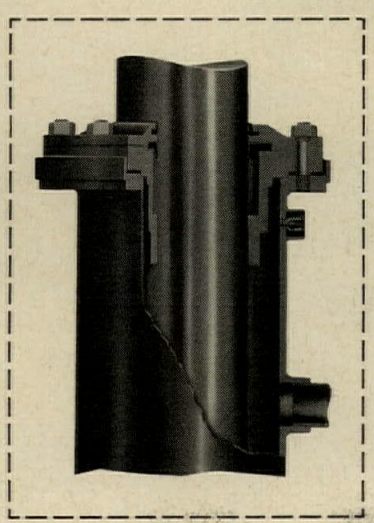

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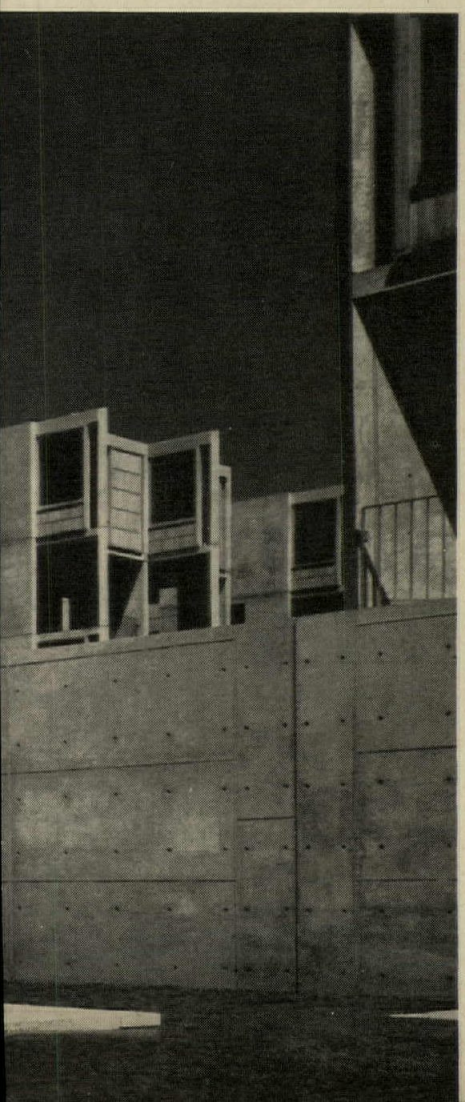

SALK INSTITUTE FOR BIOLOGICAL STUDIES, La Jolla, Calif. Architect: Louis I. Kahn. General Contractor: George A. Fuller Company, Inc. 14 Dover Oildraulic Elevators installed or specified for various buildings in the project. Dover Elevator Co., Los Angeles.

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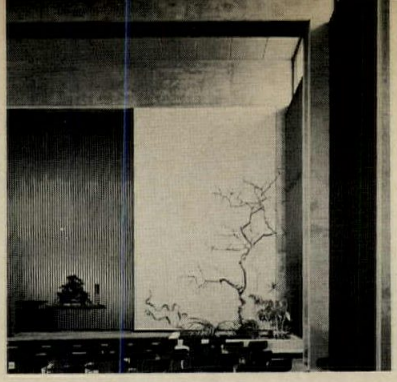

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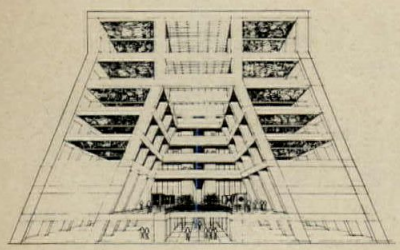

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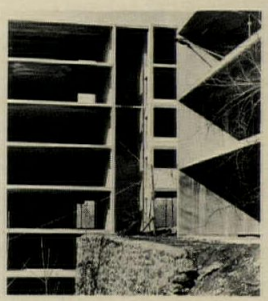

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COLLEGE BUILDING COMPLEXES

Colleges with limited land for expansion are constructing new facilities in denser patterns. These structures tend to be larger and more complicated in their spatial organization than single college buildings on generous sites. Examples will include work at the Universities of Virginia and Rochester by Sasaki, Dawson & DeMay.

A TOWN THAT CONSERVES THE LANDSCAPE

Paul Rudolph's design for the new town of Stafford, located on the Potomac about an hour and a half south of Washington, D.C., uses the buildings to accentuate the natural form of the landscape and preserves large areas in an unspoiled state. Some characteristic Rudolph drawings will show the concept in detail.

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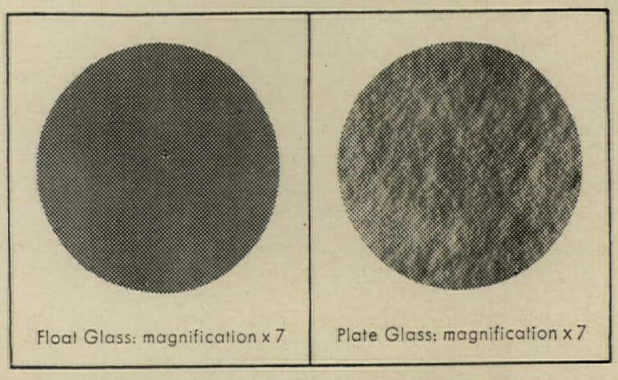

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TWO GREAT ARCHITECTS HIT BY PUBLIC TASTE

Two great contemporary architects—both of whom I am pleased to call friends—have just suffered the rejection of projects because of vagaries of public taste. While such rejection of a design is not exactly unknown to architects, the reasons in these two instances struck me as interesting. Both of those architects represent a high degree of sophistication, but this quality had sort of opposite effects.

The first is Marcel Breuer, whose design (done with Herbert Beckhard) for the Franklin Delano Roosevelt Memorial has just been rejected by the Fine Arts Commission of Washington, which must pass on buildings and so forth for the Mall. The second is Paul Rudolph, who was just asked to resign from a group of architects selected to do a school for New Canaan, Conn.

If the members of the Fine Arts Commission protest that they are not the public, I shall remind them that their reaction to the new design for the FDR Memorial is so parallel to the public's reaction to the earlier, prize-winning design by Pedersen, Tilney, Hoberman, Wasserman and Beer which also was rejected, as to make no real difference.

It is clear that there was agreement that contemporary architectural thought and memorials just do not come into phase with each other. Some of the ideas expressed by the earlier award-winners and by Breuer and Beckhard were in essence the same: 1. the Greek temple idea was not presently suitable; 2. the deification of the man commemorated was a rather limited idea of the purpose of a memorial; 3. in this and later ages FDR will be remembered more for his powerful statements than for his personal characteristics; 4. a new memorial did not necessarily have to match in style the famous ones on the Mall, the memorials to Lincoln, Washington and Jefferson; 5. a statue may or may not be the central element. And I should say that most architects would join in these conceptual ideas.

It does seem clear by now, however, that such thoughts do not match those of the general public—a memorial should be a temple or a great shaft, idolatry is the function of a memorial, and there should be a statue equal to that wonderful one of Lincoln.

Or, while trying to assess public reaction, one might simply say that what is wanted is an awesome, monumental quality, something that would bring hordes of visitors, and that, in a design for a memorial, modern architectural thought is rejected. It would seem now that any FDR memorial will have to wait for a closer rapport between designers and those busloads of tourists.

The odd twist comes in the objection to Paul Rudolph as the chief designer in a group doing a school. Here the objection was that an architectural achievement that would bring visitors was just what the townspeople were anxious to avoid. They were actually afraid, says the New York Times, that something architecturally strong might attract new settlers to New Canaan.

The Times story quotes the town's spokesman: "We don't want a monument or an architectural landmark that people will drive miles to see. We just want a school. Citizens here want to be left alone, and some of them were afraid that if we let Rudolph do the school people would read about it in national magazines and say 'Look what Rudolph did in New Canaan; let's move there.' " The building committee forthwith resigned, so one is entitled to suppose that peace did not reign in New Canaan.

You want to attract tourists, so you have something eclectic and sentimental. You don't want to attract tourists, or residents, so you shun something strong and contemporary.

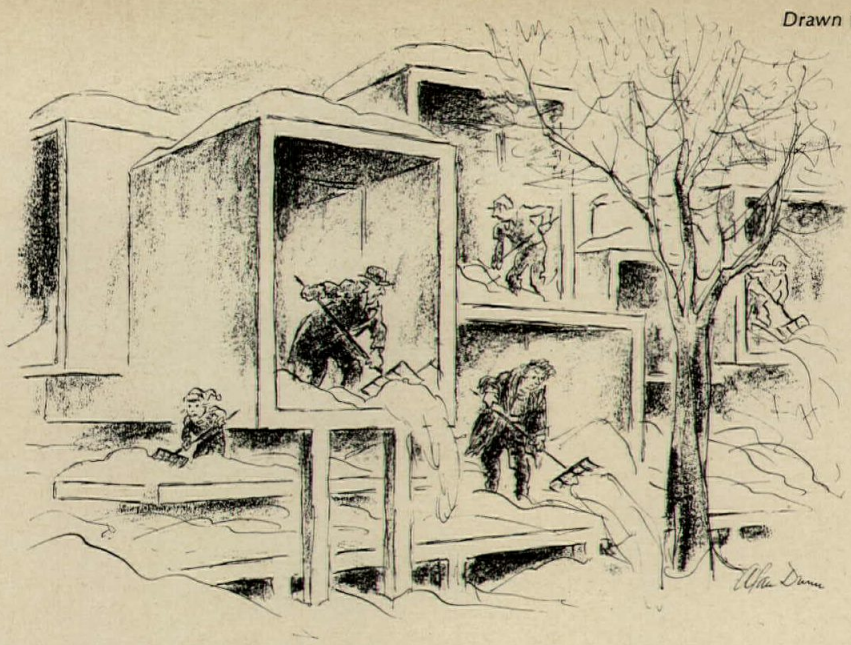
Well, I suppose there's some sense in there someplace.

I don't feel like drawing any heavy or penetrating conclusions from these two stories. I must say that to me there was a little shock in both of them. It would certainly seem that contemporary architecture has rejected the sentimentality of familiar memorials, but has found no acceptable substitute; has in fact rather scorned the concept of monuments or memorials. If in early history these were great generators of architectural thought, they certainly aren't now. Another great generator of architectural opportunity was the pride of a community in its schools. Many a small town had only the city hall or the school to provide a bit of architectural identity, and there was great pride in the mausoleum styles that then prevailed.

Well, I can at least repeat the familiar observation that the places for great innovative individual architecture have to be carefully chosen.

—Emerson Goble

Drawn for the RECORD *by Alan Dunn*



Things getting crowded? Move to New Mexico

We have heard so much about our crowded cities that it is a relief to read a bit of rebuttal from a recent talk by J. B. Jackson of Santa Fe, editor of Landscape Magazine:

"... We all have more space than we know what to do with. We listen respectfully to Easterners who tell us about the population squeeze and lack of room for expansion and the need to control urban sprawl and protect the open countryside. But when we go 10 miles from where we live we find ourselves in the midst of complete solitude, miles and miles of it. The most serious problem an environmental designer has here in the Mountain West is how to deal with *too much space.*"

Airports getting crowded; shall we travel by bus?

If this timid observer reads anything more about the congestion in the air around airports, he is going to find some other means of transportation than flying, if it's shank's mare. When a two-hour flight becomes three hours because of nervously flying around in a landing pattern, with the pilot more nervous than anybody else, I'm not happy. And I begin to doubt the saving in time, at least in shorter trips.

Planners never can seem to see things large enough. Old Dan Burnham did, we are told, and he not only left us those undying words, but also a "front" for the city of Chicago that has been a real boon for 40 or 50 years.

All the planning for airplanes has been at too small a scale. All the planning for automobiles has failed to appreciate the loads that the highways would attract. Even bus terminals are all too small, and the buses have to fight congestion on the highways.

It would seem high time to get those 120-mile-an-hour trains going, and, of course, those new subway systems where they are planned. It has been pointed out, however, that railroads couldn't take very much of the present travel load without running into overload conditions of their own.

Our much vaunted mobility is seriously threatened. Hurry up with those electronic travel-savers, or the next step will be rationed traveling.

Aerospace planning talent will solve all problems

Where the authors of the statement here quoted can find such self-assurance is a little beyond my imagination, but I thought you might be interested nevertheless. Two "aerospace scientists" have the city planning problems all wrapped up, and they clearly don't need any help (or not much) from architects, engineers, planners and so on. The two with the wisdom are Vernal M. Tyler and Carl F. Asiala Jr., of the McDonnell company. Here is the lead of a recent paper:

"A systems engineering approach involving analysis of large urban problems as an integrated whole by utilizing aerospace engineering techniques can be profitable. A proposed city of the future suggests a basic module of radially disposed pairs of high-rise buildings equally spaced about a one-mile diameter circle capable of housing 865,000 people per square mile. The tower-type complexes which efficiently contain all of the city's socio-economic functions, are interconnected with counter-rotating, stepped-up speed mass transportation systems in an automatically controlled environment. Pertinent social and governmental problems are encountered in implanting such a concept, and in transferring aerospace techniques into non-aerospace areas. Evaluation of present aerospace company departments shows the possible need of acquisition of non-aerospace company techniques in certain specialized areas. Systems approaches to immediate needs in the fields of education, bio-medical systems and mass-transportation systems are causing complete new thinking toward these areas and in aerospace company management. Diversification of the aerospace scientific talent to solving urban problems appears to be not only promising from a profit standpoint, but essential to the safety, happiness, and health of future generations."

"It's not important that architecture be brilliant"

Speaking of great individual design (preceding page) President Charles M. Nes Jr., of the A.I.A. said in a recent speech:

"I will now utter a heresy, if I have not already committed it. I believe—in fact many in our profession now believe—that it is not very important whether the architecture of the buildings in a new town or city is brilliant or not. In a stylistic sense, this is, I believe, quite unimportant. Victor Gruen said rather acutely that, if you asked visitors who had just left Rockefeller Center what kind of architecture it had in it, they wouldn't have the slightest idea. They would remember instead the sense of pedestrian space, the alternate feelings of enclosure and openness, the sense of unity, the flowers, fountains and ice skating rink. What we value in San Francisco is not a handful of good buildings but the dramatic terrain, the light, the parks and terraces, the sense of bridges and water, the sound of the trolley bell." —*E.G.*

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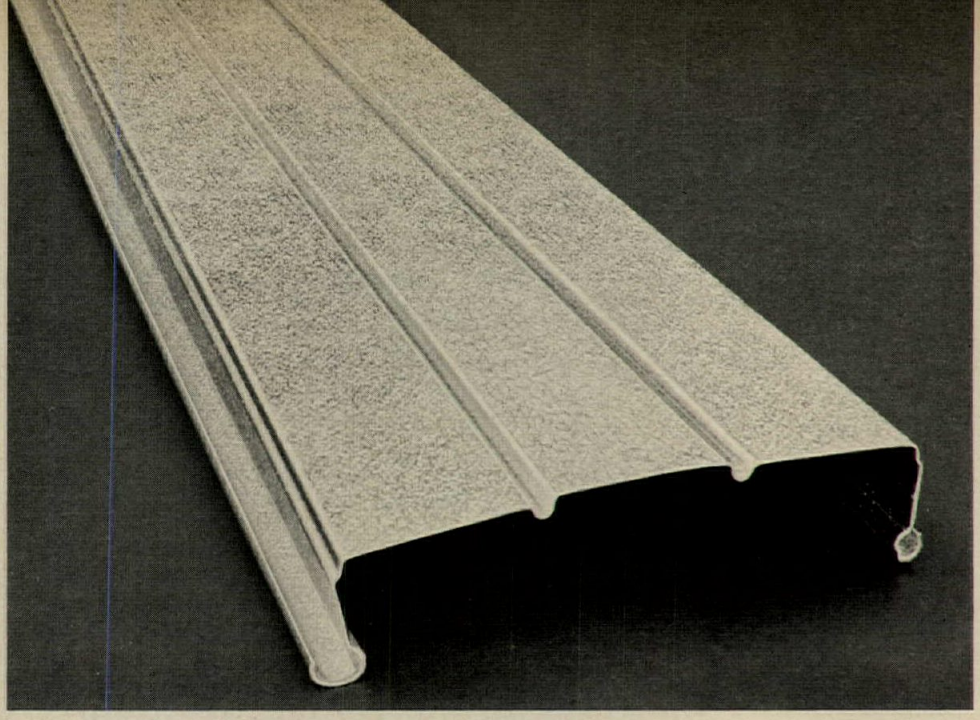


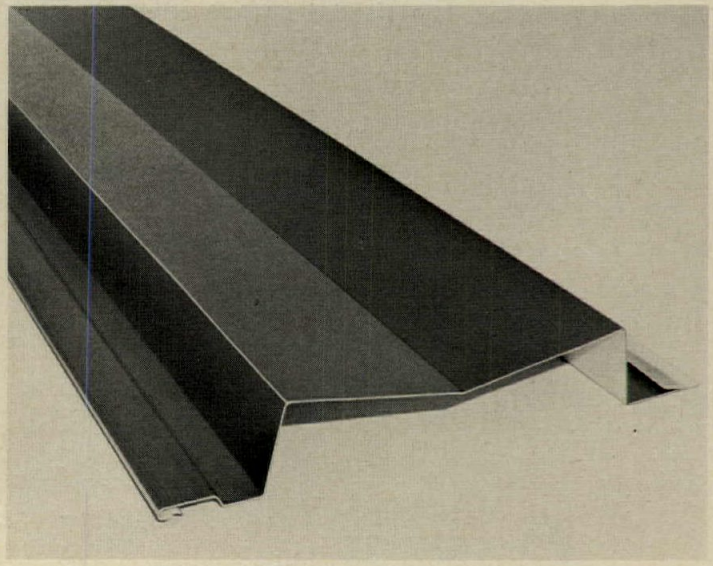
Zip-Rib by Kaiser Aluminum & Chemical Sales, Inc.

Now it's FLUROPON

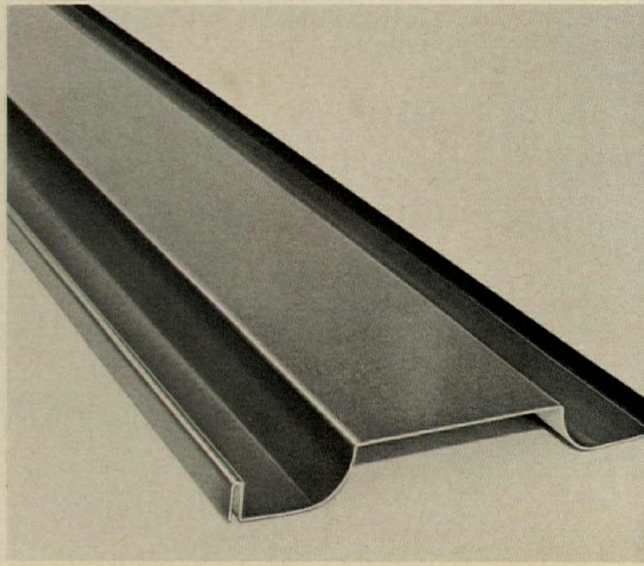
SPECIFICATION: All exposed exterior metal (aluminum and/or HDG steel)—including panels, spandrels, columns, supports, mullions, leaders, facias, copings, louvers, battens, screens, flashing, jambs, sills, fenestration and hardware as applicable and as detailed—shall be chemically cleaned, pre-treated (primed in the case of HDG steel) and coated with Fluropon as manufactured by DeSoto Chemical Coatings, Inc. Fluropon must be applied by an experienced processor in accordance with Fluropon fusion process instructions printed by the manufacturer. Colors as selected by the architect,(Longform specification available on request).

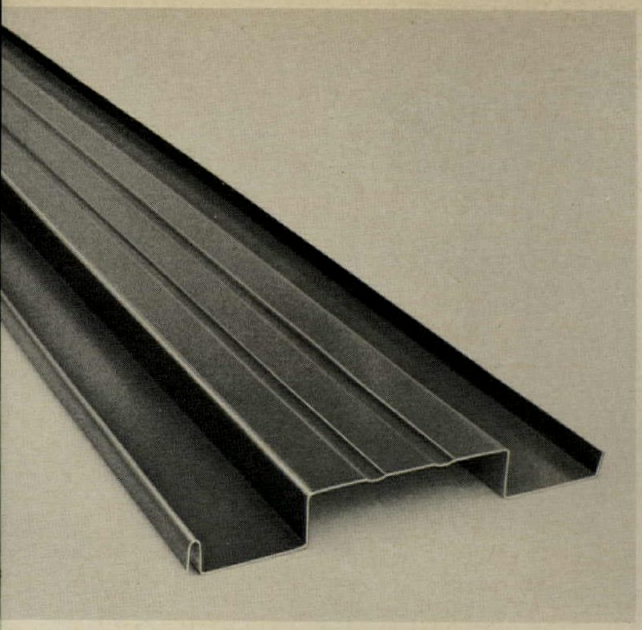
FLUROPON is the newly developed fluorocarbon polymeric coating which fuses to metal to form a highly protective and decorative finish with unequalled durability. The exceptional characteristics of Fluropon assure lasting appeal and long range economies. Available in 24 standard colors. Fluropon coated aluminum or hot dipped galvanized steel panels, louvers and window wall components are commercially available from processors listed on opposite page. Consult them or write direct for any technical information.

Stran-Wall by Stran-Steel Corporation

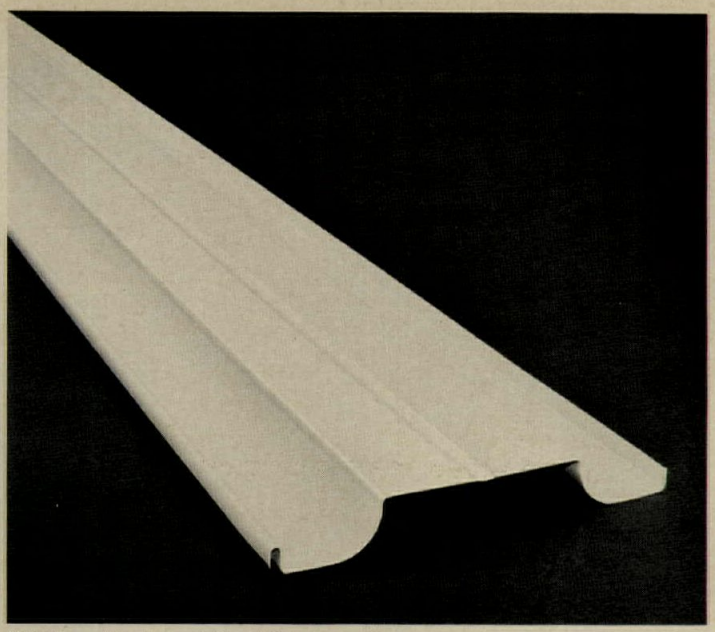


S-Panel by Walcon Corporation





Section 300 Fluted Pattern by The R. C. Mahon Co.



E W Panel by Inland Steel Products Co.

by a distinguished list of Processors

BUILDINGS & BUILDING PANELS

Aluminum Company of America
Alply Products Division
1501 Alcoa Building
Pittsburgh, Pennsylvania 15219

Aluminum Company of Canada, Limited
P. O. Box 6090, Montreal 3, Quebec, Canada

The Binkley Company
Building Products Division
P. O. Box 70, Warrenton, Missouri

Inland Steel Products Co.
P. O. Box 393, Milwaukee, Wisconsin 53201

Kaiser Aluminum & Chemical Sales, Inc.
300 Lakeside Drive, Oakland, California

The R. C. Mahon Co.
Building Products Division
6565 East Eight Mile Road, Warren, Michigan 48091

Pasco Steel
1301 Lexington Avenue, Pomona, California 91766

Plasteel Products Corporation
McAdams Avenue, Washington, Pennsylvania

Rheem Dudley Buildings
A Division of Rheem Manufacturing Co.
14001 South Garfield Avenue, Paramount, California

H. H. Robertson Company
Architectural Products Division
Pittsburgh, Pennsylvania

Elwin G. Smith & Company, Inc.
100 Walls Street, Pittsburgh, Pennsylvania 15202

Soulé Steel Company
1750 Army Street, San Francisco, California 94119

Stran-Steel Corporation
P. O. Box 14205, Houston, Texas 77021

Walcon Corporation
4375 2nd Street, Ecorse 29, Detroit, Michigan

George D. Widman, Inc.
17823 Evelyn Avenue, Gardena, California 90247

WINDOWS, LOUVERS AND ACCESSORIES

The William Bayley Company
1200 Warder Street, Springfield, Ohio

Blomberg Building Materials
1453 Blair Avenue, Sacramento, California

Brown Manufacturing Company
P. O. Box 14488, Oklahoma City, Oklahoma

Construction Specialties
55 Winans Avenue, Cranford, New Jersey
725 Twin Oaks Valley Road, San Marcos, California
895 Thermal Road, Port Credit, Toronto, Canada

O. O. McKinley Company, Inc.
P. O. Box 55265, Indianapolis, Indiana 46205

Metal Trim, Inc.
Box 632, Jackson, Mississippi

Northrop Architectural Systems
999 South Hatcher Avenue, City of Industry, California

Porce-Len Incorporated
31 Haig Street, Hamden, Connecticut 06514

CONTACT YOUR FLUROPON REPRESENTATIVE AT DESOTO CHEMICAL COATINGS, INC., OFFICES:

D. D. Wilkes
8600 River Road, Pennsauken, New Jersey 08110
Area Code: 609-665-6700

G. F. Bowes
1034 S. Kostner Avenue, Chicago, Illinois 60624
Area Code: 312-632-3700

R. D. Cox
Fourth & Cedar Streets, Berkeley, California 94710
Area Code: 415-526-1525

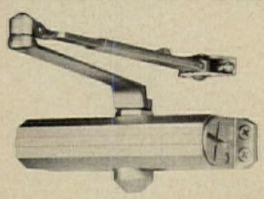
A. J. Loberg
Forest Lane and Shiloh Road, Garland, Texas 75041
Area Code: 214-276-5181

DeSoto Chemical Coatings, Inc.
1700 S. Mt. Prospect Road, Des Plaines, Illinois 60018

For more data, circle 6 on inquiry card

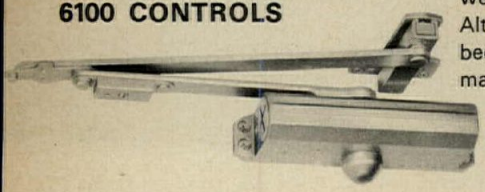
In schools, where there's lots of use . . . . . .

NORTON SERIES 1600 CLOSERS



Series 1600 closer provides door control for these busy gymnasium doors. Even here, where the closers were selected for their ability to withstand heavy traffic, installations are attractive; compatible with other door hardware.

NORTON SERIES 6100 CONTROLS



Series 6120 Uni-Trol controllers are used to control these main entrance doors as well as side exit doors. During off-peak traffic, units operate as regular door closers. Although traffic does not warrant it at the moment, the hold open mechanism has been engaged and the doors are being held open. Installation shown at right was made to correct a door control problem on an existing building.

and some abuse
NORTON® CLOSERS CONTROL DOORS—NOT DESIGN

Remember, the first impression received of your building is the contact made at the doors. This first contact is very important. At the same time, these doors must be properly controlled to assure the safety and convenience of the users of the building. Norton door controls have been designed with these dual purposes in mind—preservation of the esthetic appearance of the building while providing dependable door control.

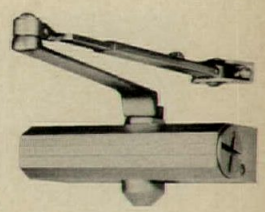
This problem is particularly acute in school buildings where the volume of traffic and the exuberance of the children put all hardware to its ultimate test. On school buildings, especially, rugged dependability and efficient door control are a necessity. You can be sure of maximum safety and long life without disrupting the esthetic appearance of your building because all Norton door control products have been engineered to control doors—not design.

NORTON SERIES 1600 CLOSERS . . . . . .

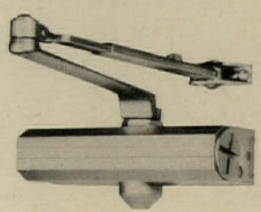
Series 1600 Tri-Style door closers offer an almost unlimited degree of application flexibility. They can be installed anywhere and you're assured perfect door control. Norton Series 1600 closers are capable of withstanding the heaviest traffic year after year.

Choose the mounting best suited to your decor.

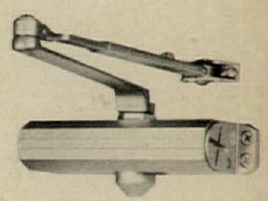
BACK MOUNTING: Closer is mounted to the door by means of thru bolts installed from the opposite side of the door.



INVISIBLE MOUNTING: Perma-hold Plate is mounted to the door. Closer is then locked to the plate. No screws are visible.



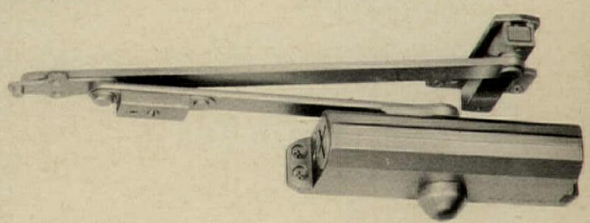
EXPOSED MOUNTING: Closer is mounted to the door by means of exposed screws.



NORTON SERIES 6100 CONTROLS . . . . . .

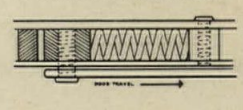
Series 6100 Uni-Trol control is a combination door closer/door holder. Your door is under control at all times, regardless of the volume of traffic and door frame and controller is protected from the roughest use.

This unique door control has been designed to coordinate all door control functions.



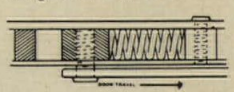
(1) Cushions the opening of the door

At almost full open, the arm engages a spring in the shock absorber mounted to the soffit plate. Opening momentum is absorbed.



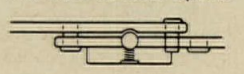
(2) Stops the door

As the spring in the shock absorber is compressed, the door is stopped. There's no shock to the door, hinges or Uni-trol.



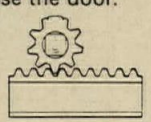
(3) Holds the door open

Spring loaded hardened steel ball in the holding mechanism is engaged by a recess in the Uni-trol fore-arm. The door is held open.



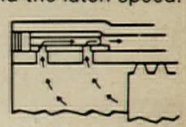
(4) Closes the door

When released a dependable Norton spring-loaded rack-and-pinion mechanism supplies power to close the door.



(5) Regulates closing and latch speeds

Dependable Norton hydraulic system provides key-operated control to regulate both closing speed and the latch speed.



FOR MORE INFORMATION CONTACT YOUR NORTON REPRESENTATIVE OR WRITE:

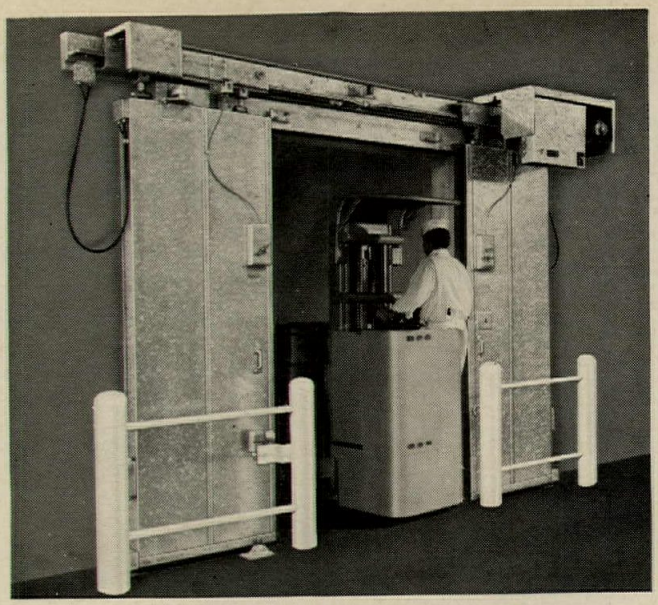
EATON YALE & TOWNE INC.

NORTON® DOOR CLOSER DIVISION
372 Meyer Road, Bensenville, Illinois, 60106
77 Carlingview Drive, Etobicoke, Ontario, Canada

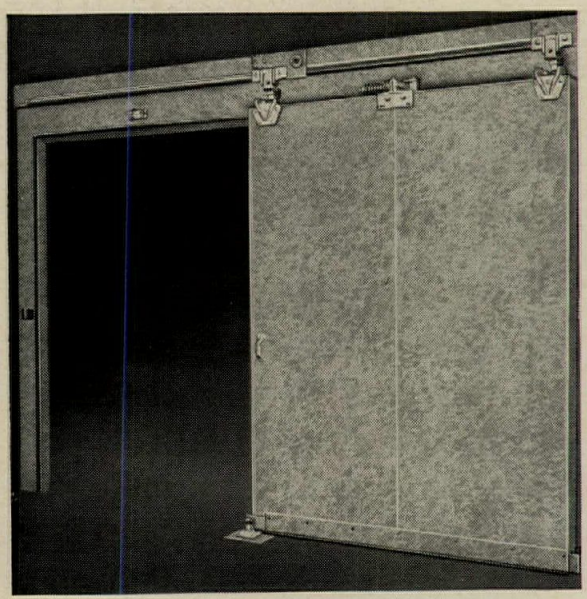
1134

For more data, circle 7 on inquiry card

Jamison horizontal sliding doors solve problems of limited wall or floor space, heavy traffic

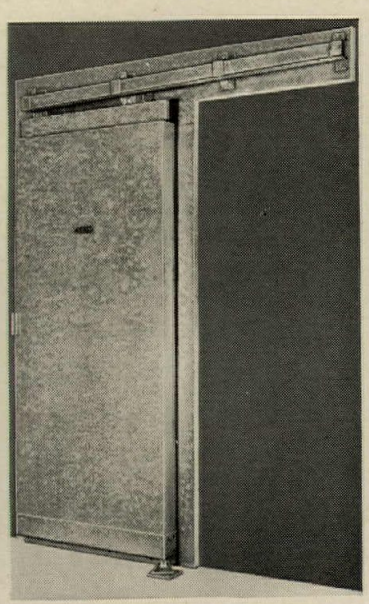


FAST, AUTOMATIC OPERATION speeds traffic, saves refrigeration. Electroglide Mark II bi-parting door is also available as single leaf door, right or left hand side.



COMPACT, LIGHTWEIGHT, EASY OPERATION. Manual Mark II horizontal sliding door. Spring-assist opening, rugged construction, positive seal. Wide range of sizes for all types of trucks.

LIGHTWEIGHT, ATTRACTIVE Jamolite® plastic door provides better appearance, easy operation. Widely used in food service installations.



RUGGED, LOW COST Jamison MHS horizontal sliding door. Manual operation, self-closing; for personnel passage and smaller trucks.

Jamison horizontal sliding doors can save space in narrow vestibules, corridors or loading docks, and can accommodate the widest doorways. Write for complete data to Jamison Cold Storage Door Company, Hagerstown, Md.

JAMISON

COLD STORAGE DOORS

For more data, circle 8 on inquiry card

After you've said that Reynolds Aluminum roofing and siding is

...good-looking and durable

...easy and economical to install

...available in many colors, textures, styles

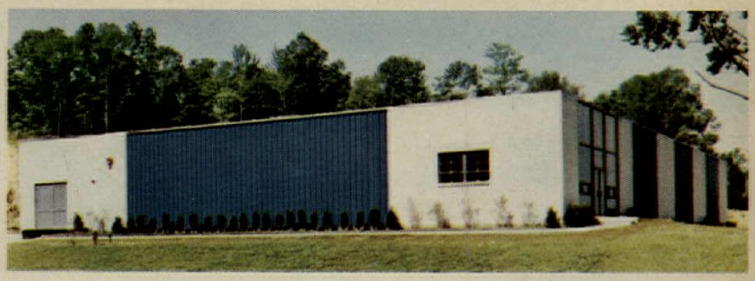
...strong and heat reflective

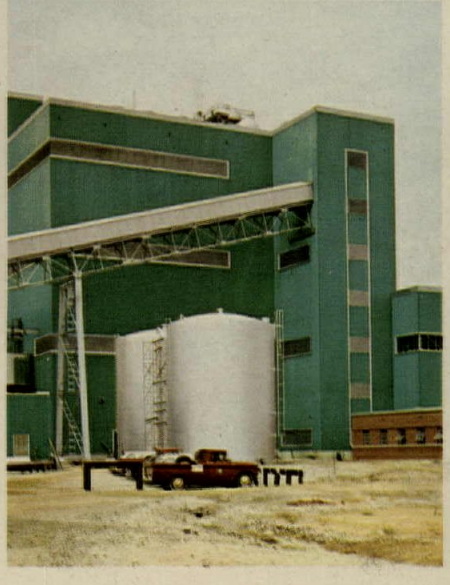
...and requires less structural support

What more can you say?

Plenty. Turn the page and see.

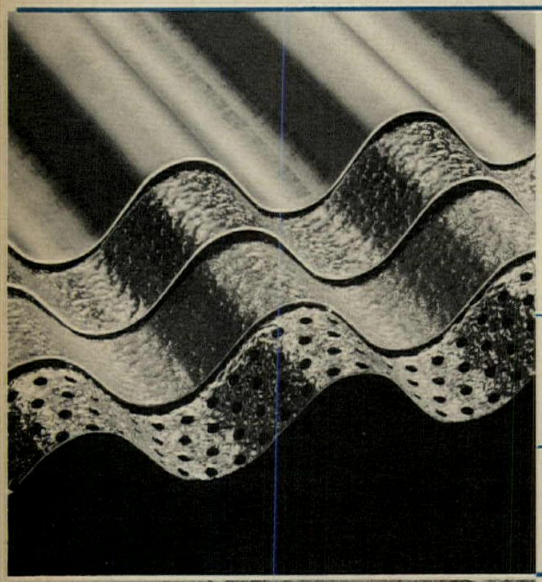
REYNOLDS ALUMINUM





COLORWELD: Selected finish front side; with colorweld clear finish reverse side.
LO-GLO (DOUBLE-EMBOSSED): Front side pinseal embossed followed by stucco-embossing to give specular gloss reading of 10 or less at 85° angle (ASTM D-523); reverse side stucco-embossed only.
STUCCO-EMBOSSED: Both sides stucco pattern finish.
MILL FINISH: As produced by cold mill, unembossed and unpainted.

REYNOLDS ALUMINUM ROOFI



COMMERCIAL CORRUGATED

By far the most popular roofing and siding sheet for general purpose use on commercial and industrial buildings. This configuration still represents the best combination of strength and economy while providing all the advantages of aluminum siding. May be used both for exterior and interior sheets of a field-assembled wall. (Finishes illustrated at left, top-to bottom, are: Mill Finish, Stucco-Embossed, Double-Embossed and Perforated Stucco-Embossed.)

THICK-NESS	SHEET WIDTH	COVER-AGE
.024	48⅓″	45⅓″
	47″	
	35″	32″
	33¾″	
.032	48⅓″	45⅓″
	47″	
	35″	32″
	33¾″	
.040	48⅓″	45⅓″
	47″	

PRE-CURVED CORRUGATED

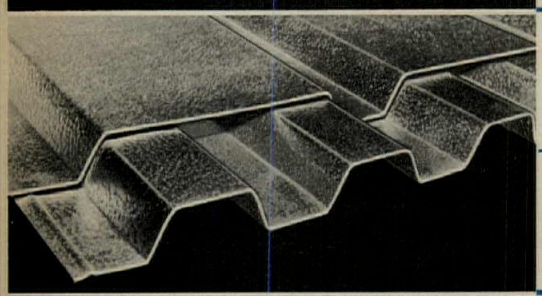
The same configuration as commercial corrugated but pre-curved (to radii greater than 30″ with sheet lengths from 5′ to 14′6″, longer on special inquiry) for uses such as conveyor covers, barrel-vaulted walkway covers, marina boat shelters, and other special uses. (Length of sheet becomes arc-length after pre-curving.)

.032	48⅓″ 47″	45⅓″
	35″ 33¾″	32″

PERFORATED CORRUGATED

For use as an interior sheet only where corrugated would otherwise be used, but where acoustical treatment is desired for noise reduction. Due to the 14% open area this sheet provides an N.R.C. of up to 0.90 (depending upon insulation used for the wall assembly) at minimum cost for effective acoustical treatment, and pleasing appearance.

.024	33¾″	32″



8″ RIB

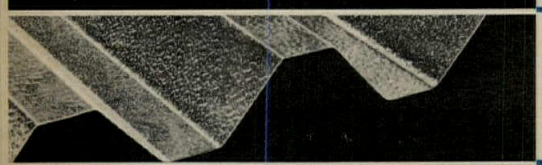
The best combination of appearance and economy where great spanning strength is not required. This configuration achieves a "paneled" look at low cost and is ideal for remodeling and "face-lifting" applications on older buildings, deep-fascias,and other applications where strength is secondary to appearance and economy.

.032 .040	49 7/16″	48″

4″ RIB

Second to corrugated in popularity—and with good reason. This configuration is the best combination of maximum strength with good economy for a wall siding where more emphasis is placed on an aesthetically pleasing appearance. This panel can also be used upside-down as a roofing panel, in addition to being the best all-around siding panel.

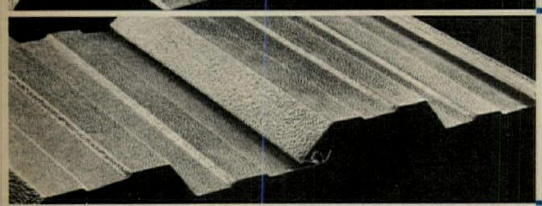
.024 .032 .040	45 7/16″	44″



V-BEAM

Designed as both a roofing and siding sheet for maximum spanning strength. This deep configuration is ideal for great spans and provides a bonus in appearance with its handsome shadow line. While the cost is somewhat higher than the other configurations, it is often offset by savings in structural costs achieved by its greater spanning properties, and savings in labor costs resulting from the wide-coverage and fewer number of sheets to erect. Note: V-Beam also available in pre-curved.

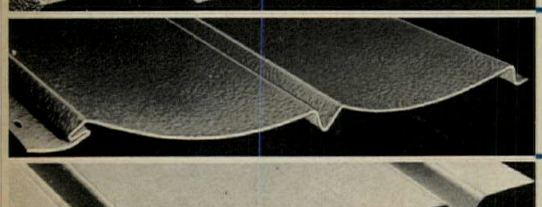
.024 .032 .040 .050	44 13/16″	42⅔″



CONCEALED CLIP PANEL

Reynold's unique new wall panel with all fasteners concealed, yet absolutely weatherproof, for those prestige jobs which demand the very finest quality wall panel available, and where concern for appearance and attention to detail is taken for granted. The deep shadow line and wide-pitch rhythm of this handsome configuration achieve a strong textured pattern designed to harmonize with most other materials for maximum over-all architectural effect and structural strength. Also ideal for "face-lifting" older buildings, and designed to be used for roofing as well.

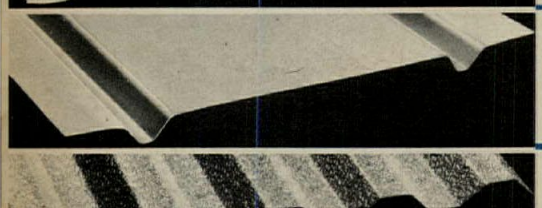
.024 .032 .040 .050	13.35″	12″



REYNO-WALL

A versatile wall panel featuring concealed fasteners and concealed side laps, classic sculptured surface with an interesting interplay of light and shadows over wide concave flutes and sharp valleys. Panel is ideal for refacing and modernizing old masonry surfaces in need of cleaning, tuckpointing or replacement — the perfect answer for facing concrete block structures to give beauty and complete weatherproofing.

.032	13.25″	12″



COMMERCIAL CRIMP

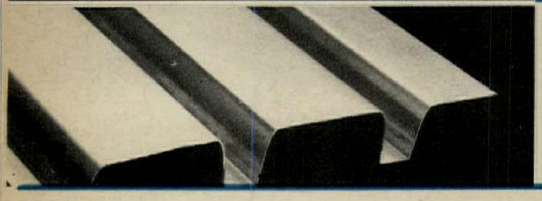
Designed as an interior siding sheet only, this configuration depends primarily on the exterior sheet to resist wind loads, but provides the wide-flat, shallow-rib appearance at minimum cost.

.024 .032	33″	32″

PANEL RIB

A wide coverage sheet for interior use only, where a ribbed interior appearance is desirable and low cost and high performance is of paramount importance.

.0215	49¾″	48″



ROOF DECK

A no-maintenance corrosion resistant roof-deck that never requires painting and has high spanning strength for conventional built-up roofs. Widely used in high-moisture and sanitary condition applications prevalent in industries such as food processing, textiles, etc., where lower cost roof-decks require constant cleaning and repainting, and actually become more expensive over the service life. In addition, the permanently reflective aluminum deck improves the "U" value of the roof section by over 7%, compared to steel decks, resulting in significant savings in heating and cooling costs.

.036 .040 .050	24 13/16″	24″

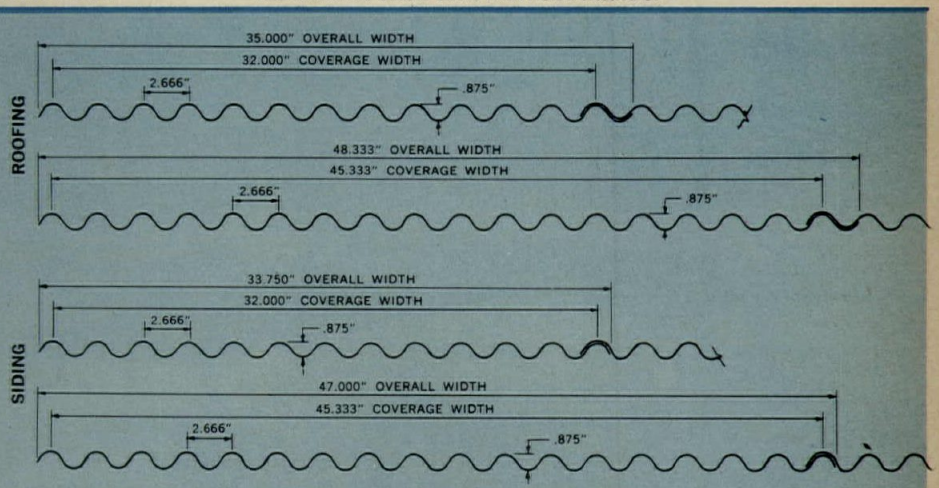
D SIDING PRODUCT DATA

COST COMPARISON PER SQUARE of material only expressed as percentage of the cost of 47" wide .032 stucco-embossed corrugated as 100% (bold face in column). Percentages based on coverage area—not sheet area.
Percentage comparison of any two products obtained by dividing their percentages and multiplying by 100:
150% ÷ 75% × 100 = 200%

COLOR AVAILABILITY
Refer to No. noted below
① Polar White ② Mint Green ③ Desert Beige ④ Dawn Blue ⑤ Drift. Gray ⑥ Heron Blue ⑦ Vivid Cream ⑧ Terra Cotta

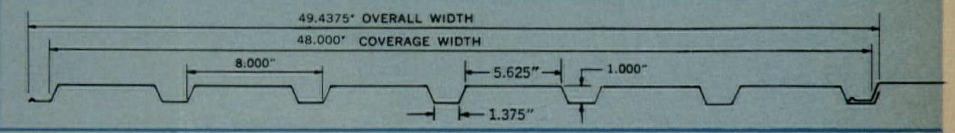
ALL DRAWINGS BELOW SHOW FRONT SIDE FACING UP

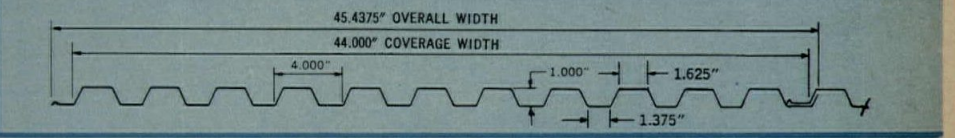
COST COMPARISON PER SQUARE (%) SEE BOXES UPPER CORNERS				AVAILABLE LENGTHS	COLOR AVAILABILITY
LORWELD UC-EMB.	DOUBLE EMB	STUCCO-EMBOSSED	MILL FINISH		
99.2 96.4	Not Avail.	77.7 75.8	76.0 74.1	3′ to 30′ in 6″ increments	① thru ④ ① thru ④
Not Avail.	Not Avail.	79.6 76.9	78.0 75.3		Not Avail.
126.9 123.5	106.4 103.7	102.7 **100.0**	100.5 98.0		① thru ⑧ ① thru ④
Not Avail.	Not Avail.	105.2 101.5	103.0 99.5		Not Avail.
155.8 151.5	133.0 129.3	128.2 125.0	125.7 122.1		① thru ④ ① thru ④
Not Avail.	Not Avail.	119.0 115.9 122.0 117.8	Not Available	5′ thru 14′6′ in 6″ increments	Not Avail.
Not Avail.	Not Avail.	94.1	Not Available	3′ to 30′ in 6″ increments	Not Avail.

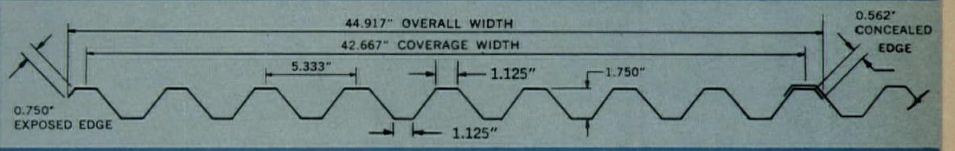


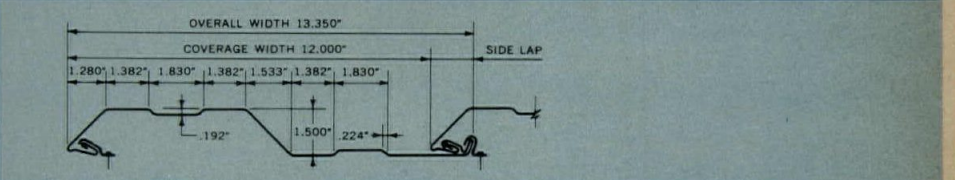
PRE-CURVED—SAME AS DETAILS ABOVE

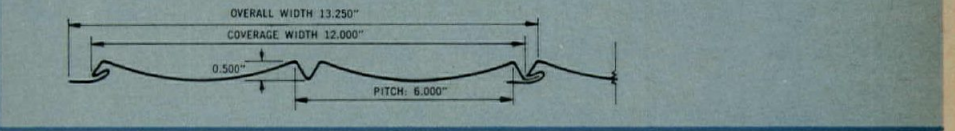
128.6 154.0	109.0 133.0	105.3 128.3	Not Available	3′ to 30′ in 6″ increments	① thru ④ ① thru ④
111.1 142.9 171.0	Not Avail. 120.5 147.0	87.7 116.3 141.8	Not Available	3′ to 30′ in 6″ increments	① thru ④ ① thru ⑧ ① thru ④
114.1 153.3 177.0 217.8	Not Avail. 126.9 150.0 Not Avail.	93.5 123.7 146.4 182.6	91.2 120.6 142.7 178.1	3′ to 30′ in 6″ increments	① thru ④ ① thru ④ ① thru ④ Subj. to inq.
145.8 167.5 200.0	Not Avail.	121.5 146.8 178.5	Not Available	4 to 39′ in 6″ increments	① thru ④ ① thru ④ ① only
Subject to special inquiry					Subj. to inq.
144.8	Not Avail.	Not Available	Not Available	3′ to 20′	① thru ⑧ Plus Ivy Dark Green
*83.4 *104.2	Not Avail.	Not Available	72.8 92.6	5′ to 12′ in 6″ increments	① and ②
*UNEMBOSSED COLORWELD					
73.0	Not Avail.	50.0	Not Available	6′ to 24′	① ② ④ ⑤ & Ivy Green
Not Available Not Available	Not Available Not Available	170.0 189.0		5′ to 25′ 6″	Not Avail.
Subject to special inquiry					

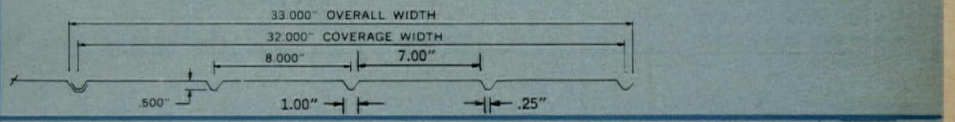


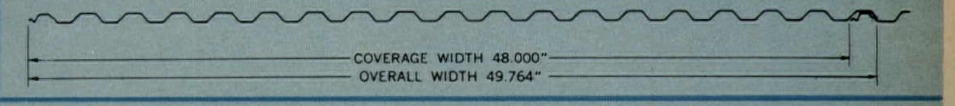


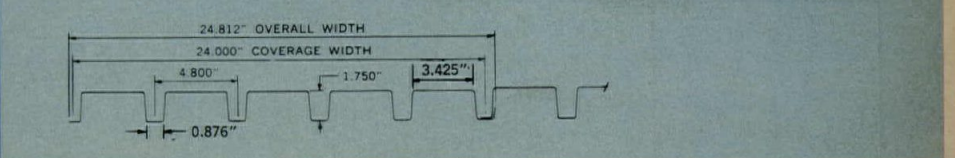












3 MORE REYNOLDS ALUMINUM PRODUCTS

for beauty, durability, and performance

Expanded aluminum grid facing system

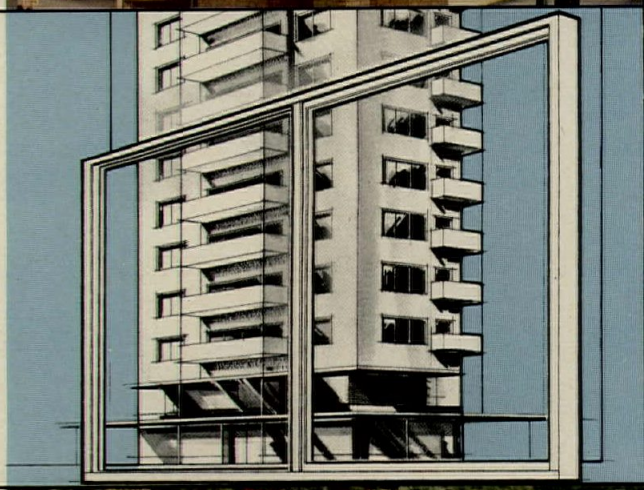
For new construction or modernizing exteriors of existing structures, Reynolds Economy Expanded Grid System offers these solid advantages: fast, simple installation, a variety of effects with different patterns, colors and finishes, low labor and materials costs.

Decrometal Unipanels up to 27' long simply fit into a grid of lightweight extrusions, the latter mounted on the existing structure. It has the appearance of cast material, but without the weight. Self-cleaning and maintenance-free, this system permits light and air to enter, reduces solar heat load. Check coupon for literature or see Sweet's File 3e/Rey.

Aluminum sliding window series 224

Function and beauty go together in this superbly engineered horizontal sliding window series. A full range of sizes—1, 2, 3 or 4 moving panels to fit all openings. Accommodates any size glass from double strength to ⅝" sealed insulating glass. Box sill eliminates moisture-clogged drain holes, provides positive drainage.

Full perimeter double weatherstripping stops drafts, seals 100%. Easy to install and operate, insect screening installed from inside, held by Nylon cam locks. Maximum strength, door-type design, popular for quality, high-rise apartment construction. Ask for literature.



Reynolds Aluminum Shingle-Shakes® for roofing and sidewalls

For truly distinctive commercial buildings, to provide not only texture and shadow accent, Reynolds Aluminum Shingle-Shakes have proved themselves in both new construction and remodeling work. Exclusive 4-way interlock installation gives a weather-tight seal, without exposed nailheads.

Aluminum's light weight speeds installation, cuts down on hours and crew size. Brilliant Colorweld® baked enamel finishes last many years longer, are available in white, terrace green, sandalwood, charcoal, hunter red, natural aluminum, special colors. See Sweet's File 21c/Rey or check coupon below.

Please send me full architectural information on the following building products of Reynolds Aluminum.

- ☐ Commercial roofing and siding
- ☐ Expanded aluminum facings
- ☐ Sliding window series 224
- ☐ Shingle-Shakes for roofing and sidewalls

Name_____ Title_____

Company_____

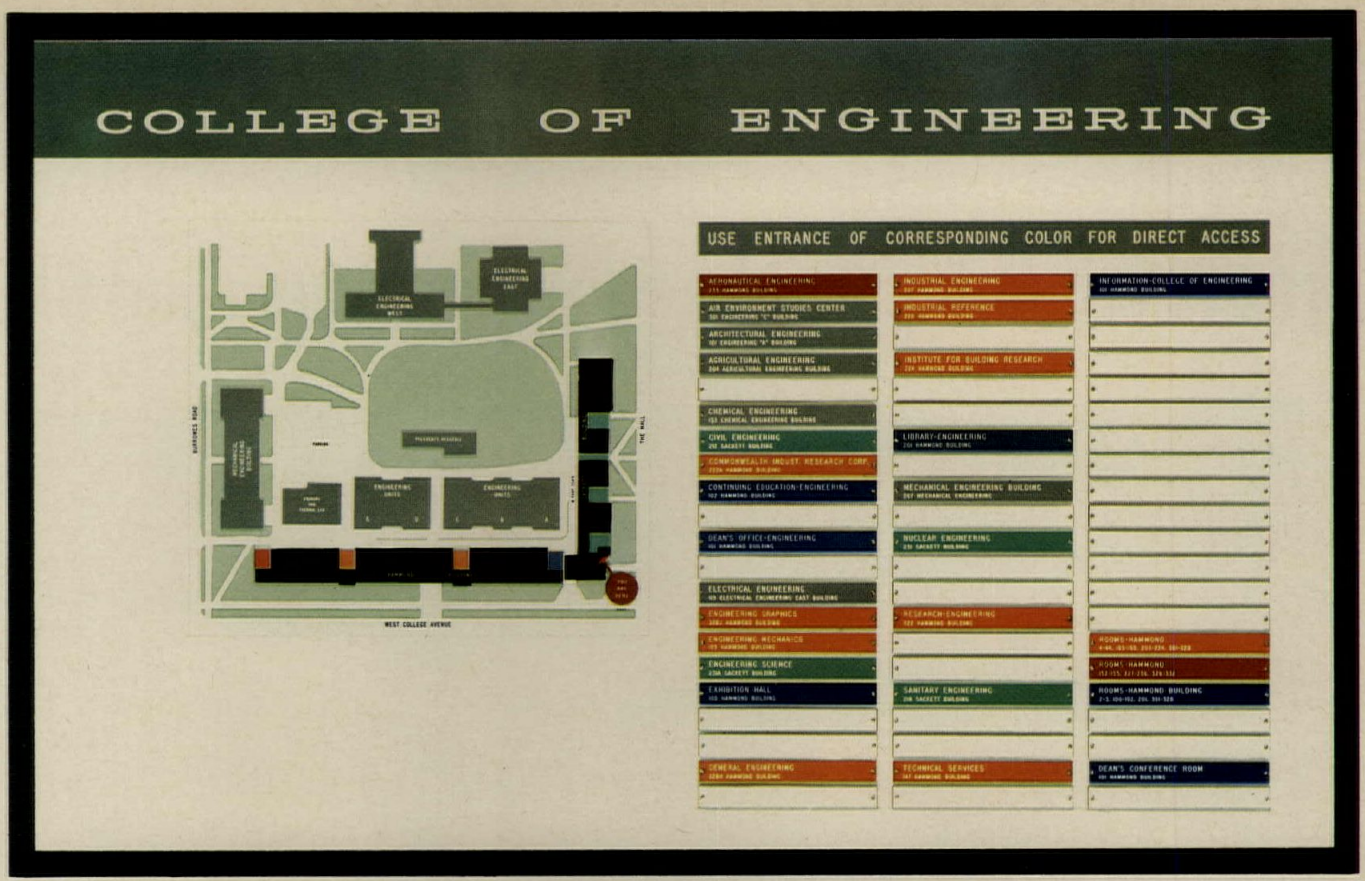
Address_____

City_____ State_____ Zip_____

REYNOLDS ALUMINUM
Building Products

Watch **"The Red Skelton Hour,"** Tuesdays, CBS-TV

Building Products and Supply Division
Reynolds Metals Co., Dept. AR-0167
325 W. Touhy Avenue, Park Ridge, Illinois 60068



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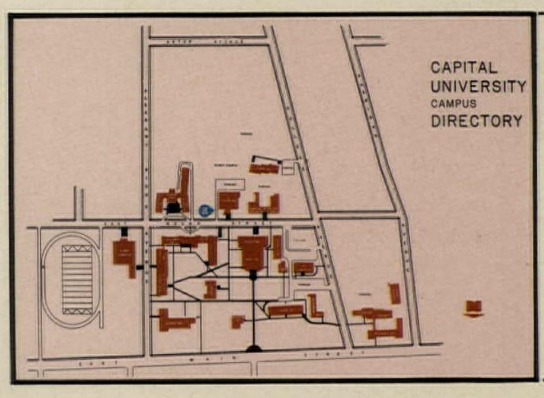
Brilliant color-coding, maintenance-free material, indoor as well as outdoor application, maximum legibility, and complete flexibility of design characterize these colorful displays.

A revolutionary new system of manufacture now enables us to offer the distinctiveness of individual hand-crafting with the economies of production methods.

We invite you to write for further information on our unique process, quotations per your sketch or specifications, quantity discounts, samples of material.

See our catalog in Sweets Architectural file



BEST® MANUFACTURING COMPANY
3214 Troost, Kansas City, Mo. 64109—AC 816—JE 1-6611

☐ Send me actual color chips ☐ Send me complete catalog

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Company_____

Address_____

City_____ State_____ Zip_____

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"Tomorrow" is built into Westinghouse partitio

Westinghouse executive movable partitions

You can design for today and for the future with Westinghouse movable partitions. The versatility you need for the future is already there.

Need surfaces befitting an executive office? You can have them in a variety of Micarta® woodgrains. Or in natural wood veneers. Or glass.

Want maintenance-free surfaces color-coordinated (Eliot Noyes colors) to a master plan for clerical offices, supervisors' offices? Yours in a variety of Micarta Loglare surfaces. Remember, Micarta — the original high pressure laminate–gives you flint-hard surfaces. Acid resistant, alkali resistant, with permanent finishes. Tough, and virtually maintenance free.

And salvable!

The first time Westinghouse partitions need to be rearranged, they prove their economy. They can be moved from building to building or across the country. Disassembled and reassembled by building maintenance personnel. With as much as 100% salvability.

Westinghouse partitions are easy to install, too. Anywhere in the nation. By Westinghouse crews, by the contractors' crews, or by building maintenance crews after minimum instruction from a nearby Westinghouse representative. No system is easier to install, easier to move quickly, economically.

You can plan monolithic walls 12′ high or accent them with mullions with, perhaps, a contrasting snap-in batten. Or call for dividers just 42″ high. Westinghouse partitions afford you great freedom of design within the unity of system and surfaces as you desire.

You'll like the engineering refinements you'll find in Westinghouse partitions. They're there to make your planning easier — to make the finished jobs far more satisfactory.

Remember, Westinghouse partitions are backed by a national network of sales, service representatives. Ask one to call on you. Phone the Westinghouse sales office in your area. For more product information, see our catalogs in Sweet's, or write our Grand Rapids' office.

SEE SWEET'S ARCHITECTURAL FILE **13a Wes**

Circle No. 11 on Inquiry Card

clean rooms, computer rooms, raised flooring

Westinghouse clean rooms and laminar flow work stations

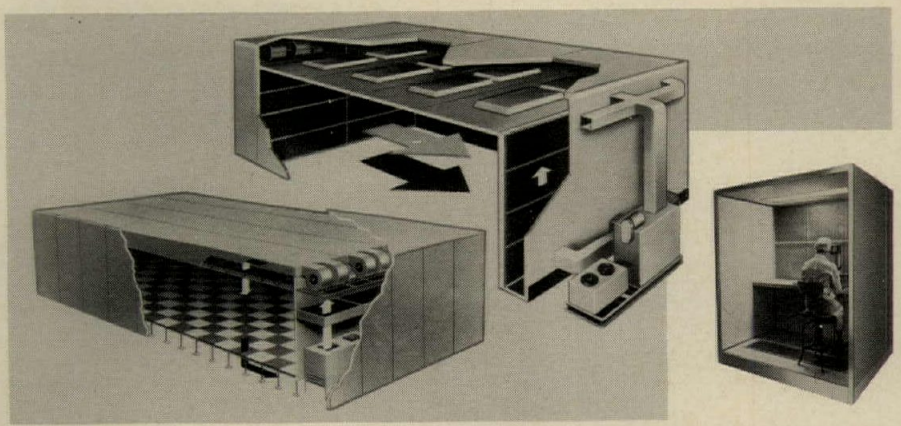
Westinghouse makes more than 70 models of prefabricated clean rooms and laminar flow work stations for industry, laboratories, hospitals. From this supply of prefabricated components you can plan rooms large enough to house hundreds of workers. Or specify portable stations (miniature fields of controlled environment) that roll from job to job. Or any size, any shape in between.

All functional components — Micarta clad, sandwich walls; Micarta clad raised flooring; the blowers; the filters; the illumination are manufactured by Westinghouse. And are guaranteed by Westinghouse.

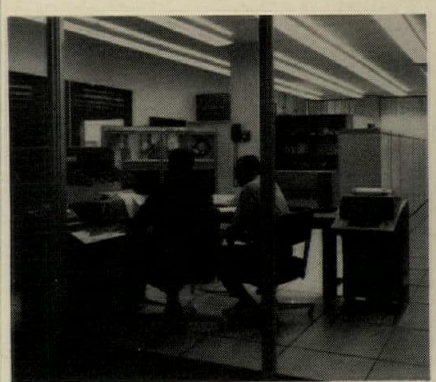
Air contamination, temperature, humidity, illumination, vibration levels are precisely controlled to your requirements.

Whenever you plan controlled environmental rooms or stations, call in one of our Westinghouse environmental systems men. They're located across the nation. Ready to serve you. Just phone the Westinghouse sales office in your area.

Circle No. 12 on Inquiry Card



SEE SWEET'S ARCHITECTURAL FILE 35b / Wes



Westinghouse computer room components

You can plan computer rooms, component by component or as a package from Westinghouse. Either way the owner gets the same nationwide guarantee. Westinghouse makes the walls, the raised floors, the air conditioning, the lighting. Makes it easy to plan, easy to enlarge. Write for full information.

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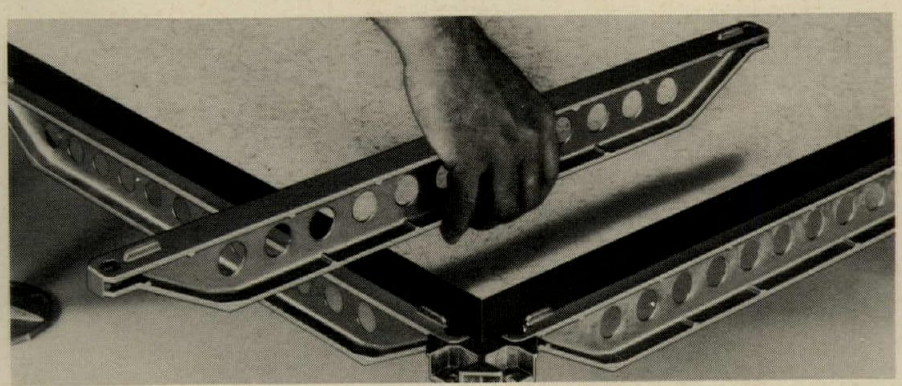
SEE SWEET'S ARCHITECTURAL FILE 29m / We



Westinghouse raised flooring system

After buying 80 raised floors for their own computer rooms, Westinghouse decided to manufacture their own. Previous shortcomings were engineered out. Results? A rugged, corrosion-proof and almost maintenance-free raised flooring system.

It consists of tough, cast aluminum pedestals, sturdy short-length aluminum girders, and vinyl edged, Micarta clad floor panels. Floor level can be maintained at ± 1/16″ in 10 ft. Especially convenient is the short girder system. It permits instant access in any direction for lay-in wiring rather than stringing services under immovable long girders. The floor is rated at 250 lbs. per sq. ft. live load. And new applications beyond E.D.P. installations are being discovered regularly.

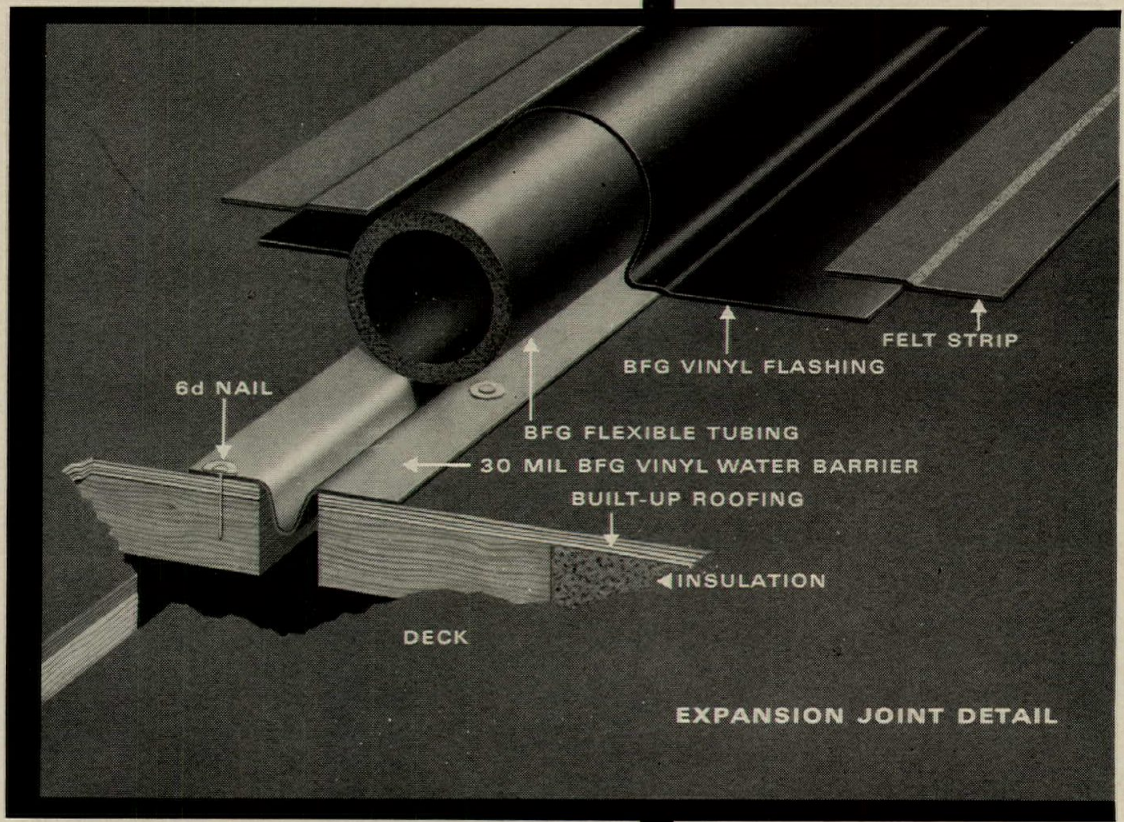
Truly, the floor of the future—the Westinghouse raised flooring system. See our catalog in Sweet's Architectural File or write today for more information.

Circle No. 13 on Inquiry Card

SEE SWEET'S ARCHITECTURAL FILE 11k / We

Westinghouse Electric Corporation
Architectural Systems Division, 4300 36th St., S.E., Grand Rapids, Michigan 49508

Announcing the expansion joint that'll outlast the roof



Sometimes one good idea begets another. Like BFG Flexible Vinyl Flashing which has now become part of a remarkable new kind of expansion joint. An expansion joint so durable it will probably outlast the roof.

The BFG expansion joint consists of a tough outer layer of 60 mil flexible PVC sheeting laid unadhered over flexible foam tubing.

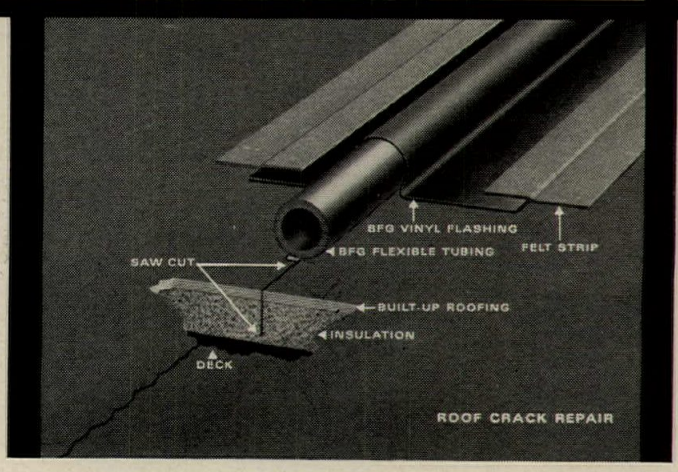
It's fast and easy to install, has a low profile, and eliminates the need for troublesome, hard-to-get metal work. Withstands temperature extremes without damage. Adjusts to building movement and vibration. And is fire resistant.

You can get it in either black or white. Find out more about BFG's improved expansion joint by writing B.F.Goodrich Building Products Department RE-19, Akron, Ohio 44318.

B.F.Goodrich

BFG®

FLEXIBLE VINYL FLASHING

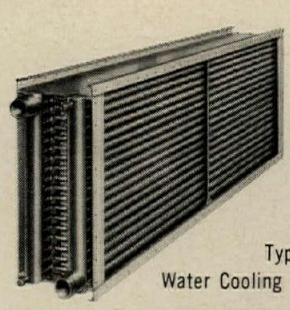


BFG BUILDING PRODUCTS:
Vinyl Water Barrier, Flexible Vinyl Flashing, One-Ply Roofing, Flexible Insulation Tubing, Vinyl Waterstops, Rigid Vinyl Foam Insulation.

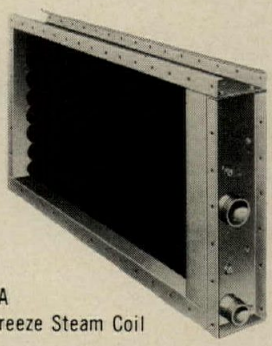
For more data, circle 10 on inquiry card

For more data, circle 15 on inquiry card

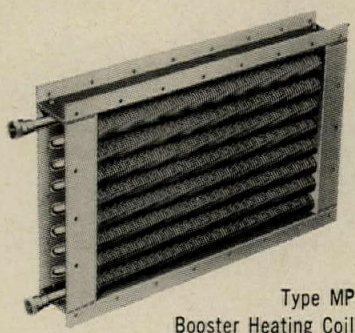
SARGENT®
A complete line of advanced architectural hardware, including the Sargent Maximum Security System
New Haven, Connecticut • Peterborough, Ontario



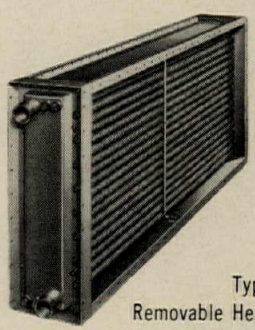
Type C
Water Cooling Coil



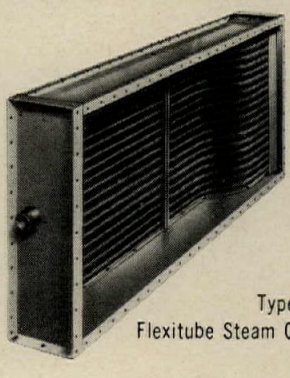
Type A
Non-Freeze Steam Coil



Type MP
Booster Heating Coil



Type R
Removable Header
Water Cooling Coil



Type B
Flexitube Steam Coil

How to Get the Temperature Rise (or Drop) You Need— at Today's High Duct Velocities

Don't go to the expense of increasing the area at the exchanger section to slow the air down. Use *Aerofin SMOOTH-FIN coils* and operate at full duct velocity.

Aerofin coils have the needed extra capacity per sq. ft. of face area. Smooth fins prevent excessive turbulence. Air resistance is normal. You don't need bigger blowers or more power.

Aerofin standard encased units are arranged for quick, economical installation.

AEROFIN CORPORATION

Lynchburg, Virginia 24505

Aerofin is sold only by manufacturers of fan system apparatus. List on request.

ENGINEERING OFFICES IN PRINCIPAL CITIES

Beautiful Densylon®

...works where tile wouldn't and carpet couldn't.

There's nothing like Densylon.* Even we can't improve the performance of our heavy-duty, heavy-traffic wonder. So we gave it more flair. Now Densylon comes in great new patterns and textures, all at the same old price of our familiar Densylon tweeds.

Now Densylon gives your clients style as well as the carpet image in heavy traffic areas where you once had to settle for hard flooring. Carpet luxury, carpet quiet, carpet comfort, plus the lowest maintenance costs of any flooring material in the world—tile or carpet.

Out-performs tile and carpet

Don't confuse Densylon with ordinary commercial carpeting. Densylon is unique. Built for 10-ton truck maneuvers, it won't buckle, ripple, crush, pill, fizz, lint, stain. Nowhere. No how.

Let the buyer beware

Densylon is difficult to make. Few even attempt it, though they may try to imitate its look. If you see a look-alike, look closer. And ask questions.

Ask about the fiber. Densylon's is exclusive. Round, dense, solid continuous filament nylon especially engineered to be the toughest, densest, soil- and stain-resistant fiber in the world.

Ask about the weave. Densylon's is exclusive. Twice as dense and tight as anything in the industry. A low, tough, compact surface, impervious to dirt, grime, spills, wear and tear.

Ask about the backing. Densylon's is exclusive. Super-tough, strong as steel, And it can't mildew. Or rot.

Ask about the cushioning. Densylon's is a thick, acoustical, resilient slab of B. F. Goodrich sponge rubber. Perma-Bonded® to Densylon's tough surface and guaranteed for life.

Finally, ask about the selection. Densylon is the one, the only that comes in a full range of superb patterns and textures as well as tweeds. At no extra cost!

Don't get us wrong. There's nothing wrong with commercial carpeting. We're the largest exclusive manufacturer of it ourselves. We have created Modu/Floors® to handle every kind of carpet need—in every kind of fiber, every type of construction; for every type of job. It's great for low to medium-high traffic jobs. But not in place of hard flooring. For that, you need Densylon.

See Densylon in action

Only CCC makes Densylon. And only Densylon has replaced hard flooring in hundreds of installations throughout the country... in hundreds of installations near *you*. This is not something you have to judge from a swatch. Let our man show you Densylon, installed, at work... give you the facts and figures on exactly how it applies to your job, on the job.

Send coupon now. You have to see Densylon to believe it.

This is a photo of a piece of our Densylon installation at the G. E. Pavilion at the World's Fair, exactly as we yanked it off the floor. G. E. clocked it out at 15,697,000. 15,697,000 pairs of everything from high spike heels to cowboy boots. 15,697,000 assorted strollers, baby carriages, tramped-on hot dogs, mustard, ice cream cones, Cokes, candy, popcorn, chewing gum. Downhill yet!

**CCC's trademark for its sponge-bonded, high-density nylon carpet*

CCC
10 West 33rd Street
New York, New York 10001 Dept. AR-3

Attention: Mr. Walter Brooks

☐ Please have a CCC Field Engineer show me Densylon in action.
☐ Please send Densylon Portfolio.
☐ Please send information on Modu/Floors.

Name_____

Title_____ Phone_____

Organization_____

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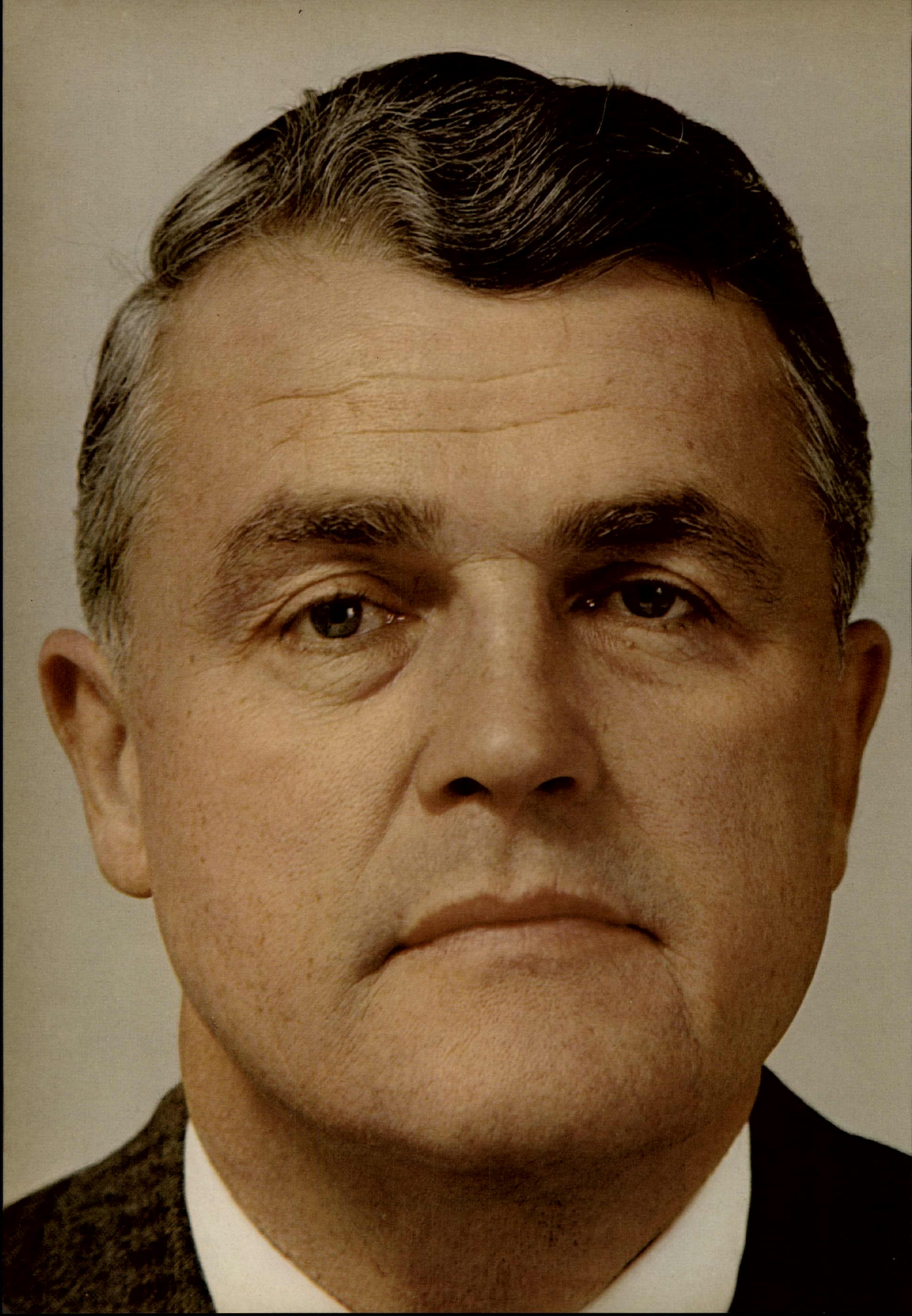
manufactured by **Densylon/CCC**

Commercial Carpet Corporation offices in principal cities—(Los Angeles, San Francisco, **Pacific Commercial Carpet Corporation).**



Give me rooms with value

Give him PACE by Simmons— he'll appreciate your sagacity

Long-term value. That's what the College Housing Administrator wants. And he wants it in rooms that are both functional and comfortable for the students.

So give him new Simmons PACE, the dormitory furniture designed to take the hard knocks of a halfback, yet please the most discerning coed with its style and liveability.

PACE systems capitalize on every inch of floor space, often freeing up enough for additional rooms.

Seven standard wardrobes can be used individually or in a variety of combinations. They're built to take abuse and can be assembled by unskilled laborers in minutes for a considerable savings in labor costs.

The Wall-a-Bed®, a real space-saver, can be operated by the tiniest coed. It features the famous Beautyrest mattress for full comfort without the need for a box spring.

PACE cabinets, dressers, desks, bookcases and chairs add even more versatility to your interior design. Chests, in Traditional, Contemporary or Elite styles, are available with legs or toe bases—or without to fit inside wardrobes.

It all adds up to value for the school and freedom for the architect/designer. Ask our representative for full details. You'll appreciate his sagacity as well.

SIMMONS

CONTRACT DIVISION • MERCHANDISE MART • CHICAGO, ILL. 60654

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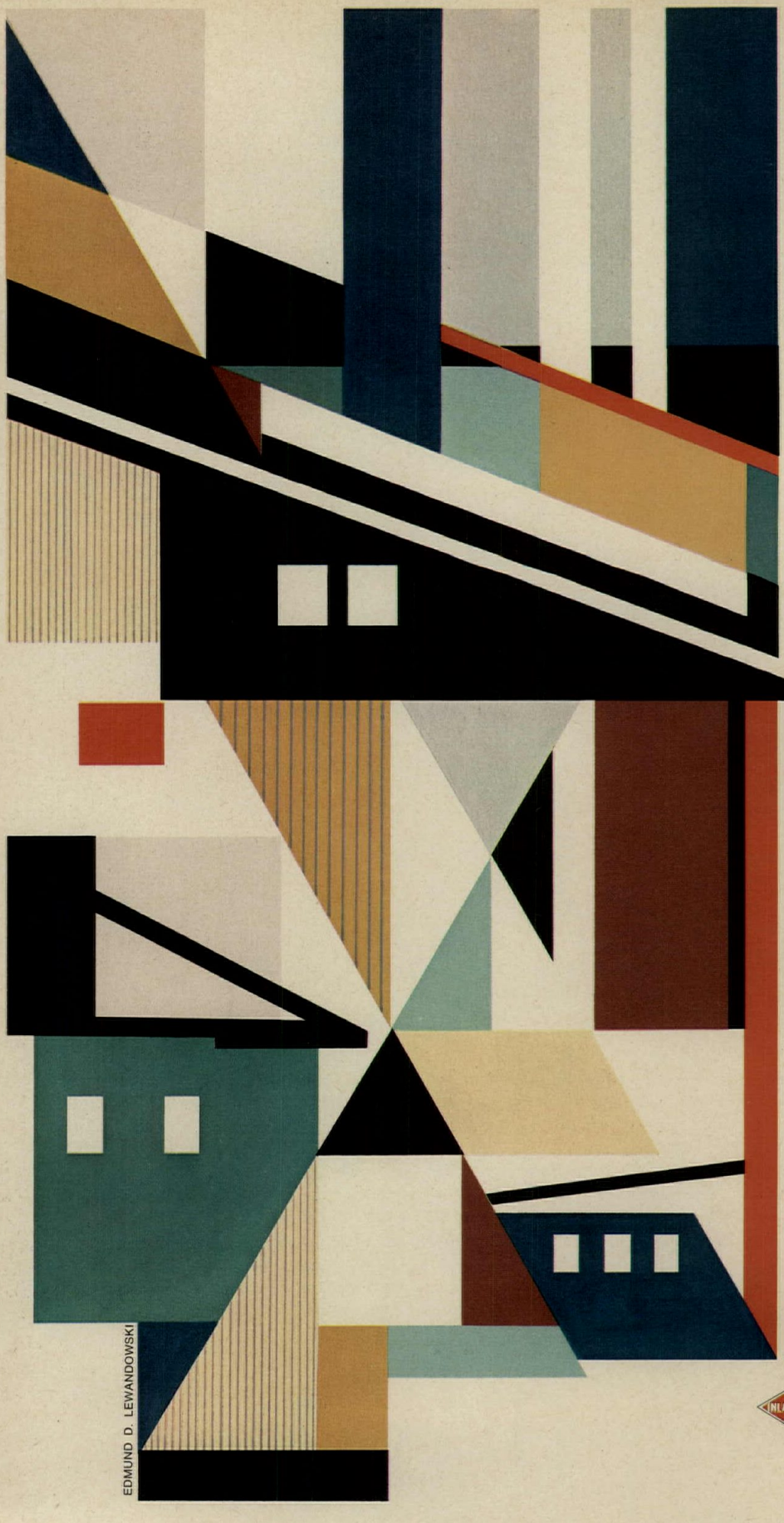

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Colors a client can get all wrapped up in

New hues will soon appear on the horizon; Inland has broadened its offering of Duofinish colors on wall panels. These are trend-setting colors. Colors that enable you to be dramatic — or serene. That help to heighten interest in form and shadow. Oven-cured colors highly resistant to contaminated atmospheres and scorching sunlight.

Add to this: A selection of distinctive panel profiles. The resistance of steel to denting. A reliable supplier with facilities to meet delivery schedules, even on your biggest jobs.

For complete information, see Sweet's section 15b. Or write today for catalog and color brochure to Inland Steel Products Company, Dept. C, 4033 West Burnham Street, Milwaukee, Wisconsin 53201.

Inland Wall Systems

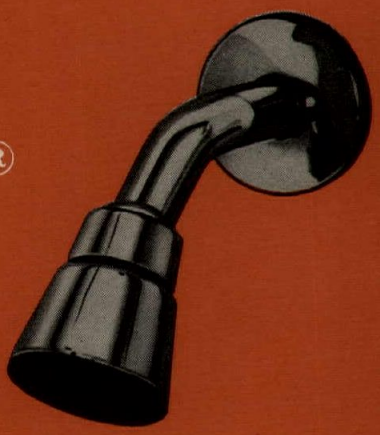
For more data, circle 19 on inquiry card

MIX'N MATCH

FLOW-MATIC®

and

Contessa®



Price Pfister – the only manufacturer offering two prestige lines with coordinated styling. Each line is complete and comprehensive in itself – coordinates with the other in any combination of valves and faucets for matchless decorator effects.

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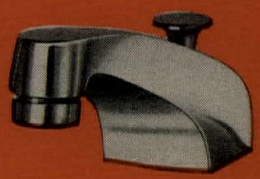

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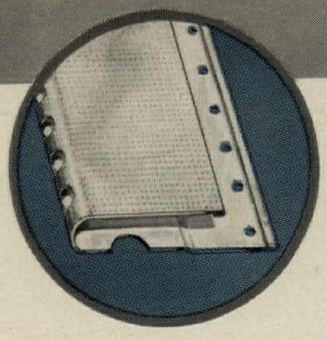

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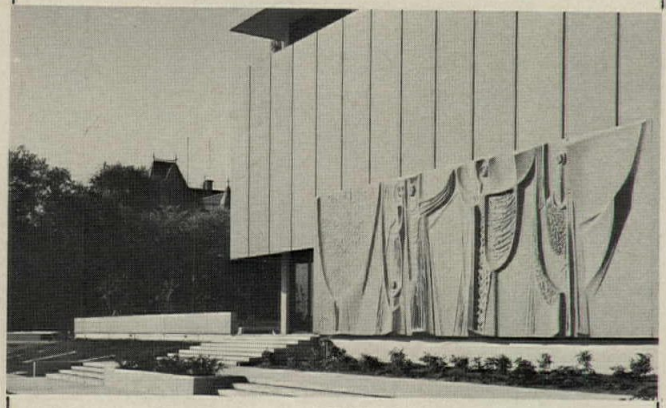

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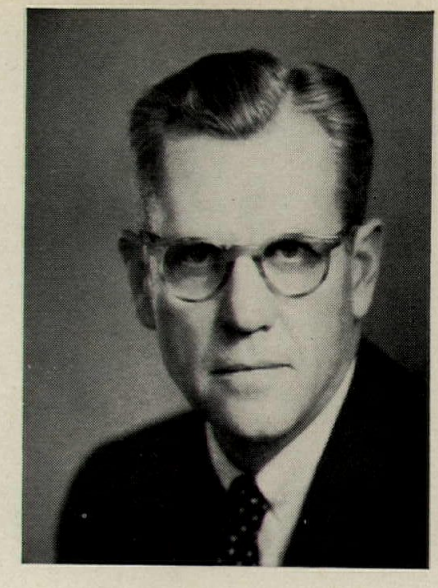

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"Our colleges and universities must have enormous quantities of new money almost constantly if they are to be enabled to serve society as it needs to be served. Every business institution benefits today from the money and labors that those now dead have put into the building of these institutions. We are all dependent upon them for future numbers of educated young men and women from which to choose, and for the continued expansion of man's knowledge of the world he inhabits.

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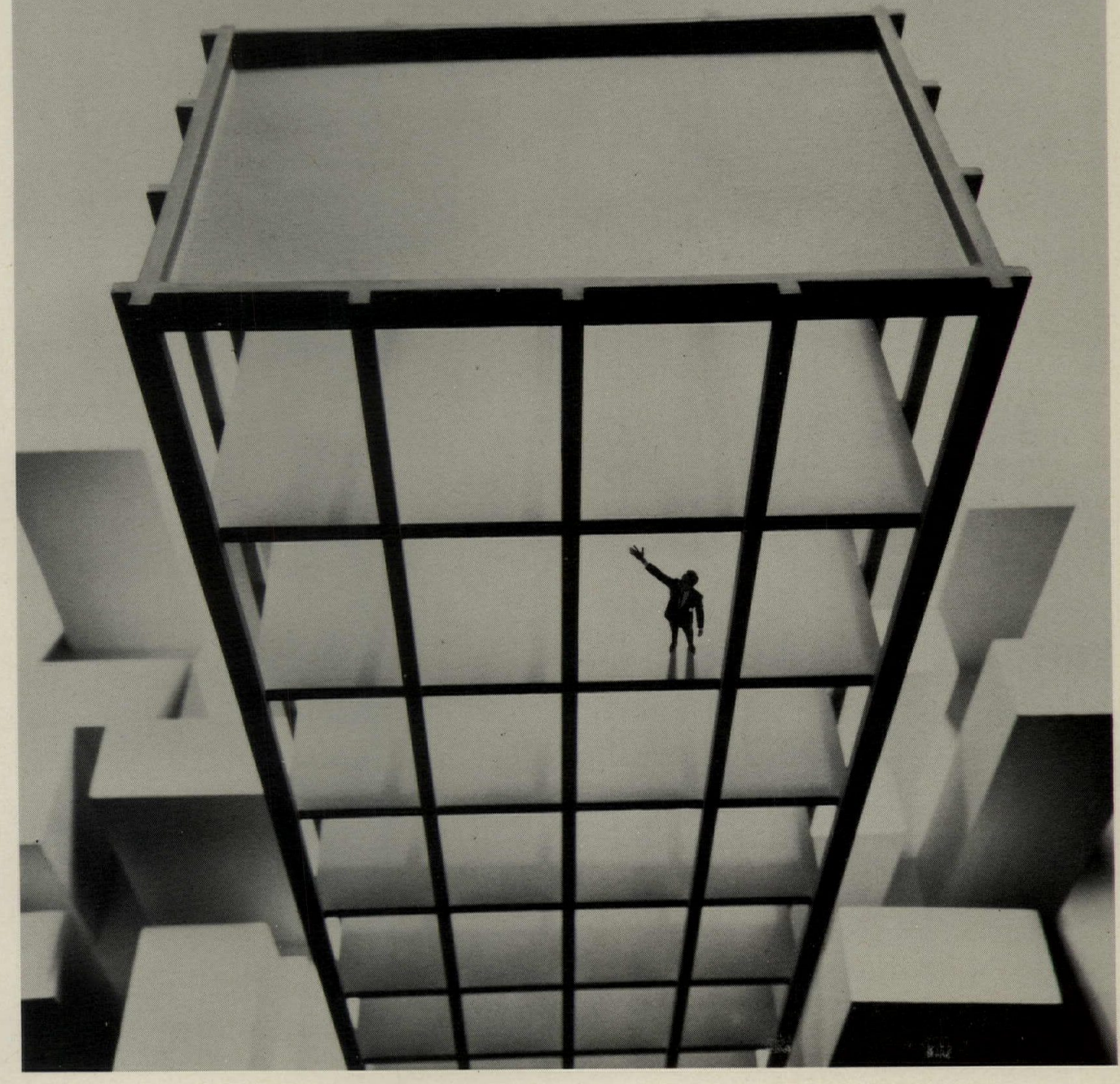

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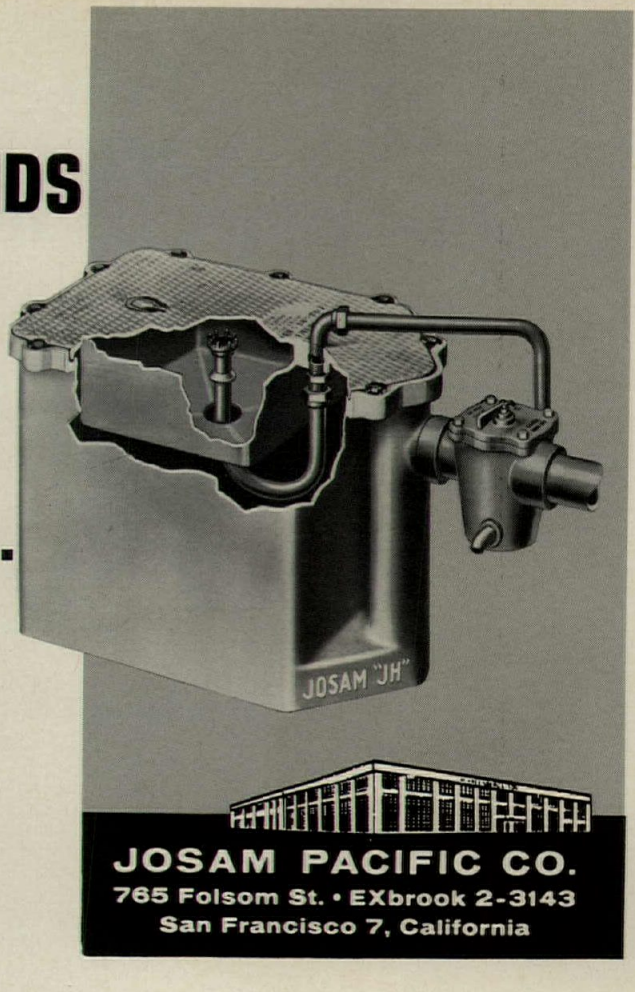

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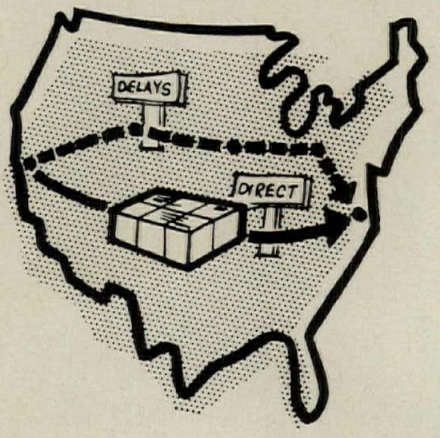

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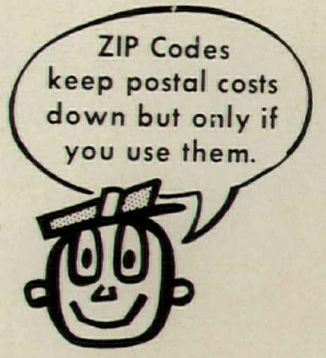

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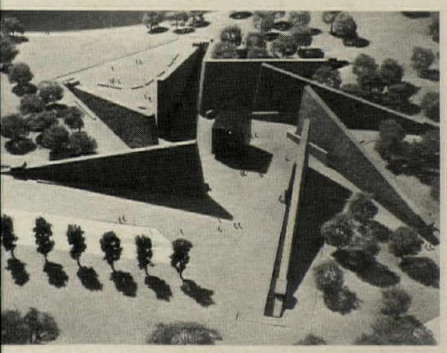


Fine Arts Commission rejects Breuer's FDR Memorial

The Fine Arts Commission in Washington, D.C., has unanimously rejected the new design for the Franklin Delano Roosevelt Memorial (photo above) prepared by Marcel Breuer and Herbert Beckhard, architects (RECORD January, page 35). The Breuer design, which had been unanimously approved by the FDR Memorial Commission and by a representative of the Roosevelt family, is now in a state of flux, and the chances of its being built are in doubt (see editorial, page 9).

The Fine Arts Commission statement, issued on January 27, reads: "After careful study and analysis, the Commission of Fine Arts has rejected unanimously the new proposal for a memorial to President Franklin Roosevelt.

"The Commission feels that such a memorial requires the highest standard of artistic achievement and significance. The proposed design does not fulfill either criteria.

"The Commission has studied all aspects of the plan and reached its conclusion with great reluctance, aware of the many difficulties that have been faced by the designer and the Roosevelt Memorial Commission."

Senator Eugene McCarthy of Minnesota, who is the probable next chairman of the Roosevelt Commission, issued the following statement: "It is difficult to believe that the Fine Arts Commission could have unanimously rejected the Breuer plan. In any case, the Commission owes us more than the simple statement of rejection made in its announcement: it owes us an explanation. This may be a time when the Fine Arts Commission and its advice should be disregarded. My recommendation is that the FDR Commission proceed with necessary Congressional action to construct the memorial designed by Marcel Breuer." The FDR Commission, composed of four members of the House of Representatives, four members of the Senate, and four outside members, is scheduled to meet March 1 to elect a new chairman to replace Representative Eugene J. Keogh, who has retired from the House.

In another action, a group composed mainly of architects under the leadership of I. M. Pei, has sent a telegram to both commissions in support of the design. The telegram states: "We are concerned about the current deadlock over the design of the FDR Memorial. We respectfully suggest that the Fine Arts Commission, the FDR Memorial Commission, the Roosevelt family, and Marcel Breuer, the architect, meet jointly to find a solution acceptable to all. We wish to express our continuing faith in Marcel Breuer." Those signing the telegram included: Edward Larrabee Barnes; Peter Blake; Eduardo Catalano; William W. Caudill; Henry N. Cobb; William J. Conklin; Ulrich Franzen; Robert L. Geddes; Romaldo Giurgola; John M. Johansen; Philip C. Johnson; Gyorgy Kepes; Morris Ketchum Jr.; G. E. Kidder Smith; Joseph R. Passonneau; I. M. Pei; G. Holmes Perkins; Jose Luis Sert, Rufus Stillman; and Harry M. Weese.

Architecture head named at North Carolina State

Robert P. Burns Jr. has been named head of the Department of Architecture at North Carolina State University, Raleigh. Mr. Burns, 33 years old, has served as a designer for the firms of Eduardo Catalano and Pietro Belluschi, and holds degrees from North Carolina State and the Massachusetts Institute of Technology. He succeeds Dean of Design Henry Kamphoefner, who has been serving as acting head of the department.

THE RECORD REPORTS ON:

Industrial complex provides "daylight awareness" 274

Engineering library will house 150,000 volumes 284

School designed for the mentally retarded 284

Office building will have ground floor arcade 288

University building will house international conference center 288

First "turnkey" project completed for HUD

Claridge Towers, housing for the elderly in Washington, D.C., is the first building in the country to be completed under the "turnkey" approach of the Department of Housing and Urban Development. "Under turnkey," said HUD Secretary Weaver at the dedication of the building, "a builder or developer comes to the housing authority with a proposal to build. If the local authority likes the idea, it contracts to buy the finished product at a fixed price. Federal funds are still used in the purchase of the building, but the contractor is able to obtain normal commercial financing for construction." The turnkey approach realizes a saving of time and money, says Secretary Weaver, and "results in greater involvement both by private construction and financing interests in the development of low-rent public housing, an urgent need in our country today."

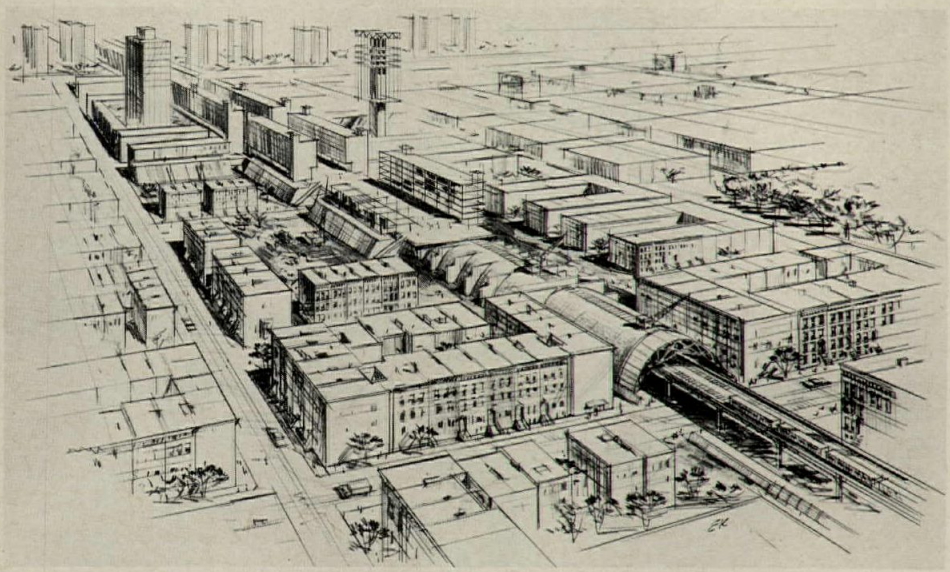
Since HUD announced the new concept early last year, it has received applications from 58 localities in 22 states proposing 14,000 units of housing. There are about 1,000 units under construction, and another 1,500 units under contract.

Claridge Towers is a 10-story building costing $5.3 million, and contains 343 apartments—285 efficiencies and 58 one-bedroom units. The project was designed by Bucher-Meyers and Associates, and the contractor was Whiting-Turner, Inc. The project was under the auspices of the National Capital Housing Authority.

Heckscher named as New York City cultural head

August Heckscher has been named Administrator of Recreation and Cultural Affairs in New York City, succeeding Thomas P. F. Hoving who is leaving the post to become director of the Metropolitan Museum of Art. Mr. Heckscher's position makes him head of New York City's Parks Department. Mr. Heckscher, formerly an adviser on the arts to Presidents Eisenhower and Kennedy, was, at the time of his appointment, director of the Twentieth Century Fund. Speaking about his new post, Mr. Heckscher stated: "We are acknowledging fully, at last, the role of the city in the broad fields of recreation and cultural affairs. We have a chance to do some pioneering here. Everything we do will have the aim of making New York a brighter, gayer place."

At the same time, architect Arthur Rosenblatt was named First Deputy Administrator of Recreation and Cultural Affairs. Mr. Rosenblatt held the position of director of design of the New York City Department of Parks at the time of his appointment.



Planning exhibit in New York hopes to spur public opinion

"The New City: Architecture and Urban Renewal," an exhibit of four demonstration projects for upper Manhattan, on display at the Museum of Modern Art, New York City, through March 13, is "put forth for public discussion to suggest a frame of reference within which various interpretations and details are possible." The exhibit, co-sponsored by the Museum and the City of New York, is comprised of proposals by four teams of architects and planners associated with the faculties of four universities—Columbia, Cornell, Princeton, and Massachusetts Institute of Technology.

Shown above is a construction perspective of the Columbia project—"Housing Without Relocation." The project calls for a 37-block-long building to be erected in stages over exposed railroad tracks in upper Manhattan. The project calls for a concrete vault to be constructed over the tracks with new housing, shops, and community facilities built on top of the vault. The proposal is intended to solve the problem of providing "housing and other kinds of renewal without relocating the people for whom such improvements are intended, and at the same time convert neighborhood blights into acceptable components of the visual scene." Columbia team members include Jacquelin T. Robertson, Richard Weinstein, Giovanni Pasanella, RECORD Associate Editor Jonathan Barnett, and Myles Weintraub.

Other projects and team members include: "Opening The Grid Plan," Cornell, with team members Colin Rowe and Thomas Schumacher—Jerry A. Wells and Alfred H. Koetter; "Building The Waterfront," Princeton, with team members Peter D. Eisenman and Michael Graves; and "Designing New Land," M.I.T., with team members Stanford Anderson, Robert Goodman and Henry A. Millon.

"All the proposals made in the exhibition are technically and economically feasible," says Arthur Drexler, director of the exhibition and of the Museum's Department of Architecture and Design. "Would they yield an urban scene healthier and more beautiful than what we have had? The four teams of architects and the Museum think they would. But do they represent changes we really want? Only the public—which includes officials both elected and appointed—can decide. The exhibition is meant to help the process along."

Civil engineers cite St. Louis Gateway Arch

The American Society of Civil Engineer has named the Gateway Arch in St. Lou as the "Outstanding Civil Engineerin Achievement of 1967." The 630-foot-hig arch was designed by Eero Saarinen wit Severud-Perrone-Fischer-Sturm-Conlin Bandel as structural engineers. Selectio of the winning project was made by jury of engineering editors, includin RECORD Senior Editor Robert E. Fische

McLuhan will deliver Purves Lecture at A.I.A. convention

Marshall McLuhan, author of the contro versial and thought-provoking book "Un derstanding Media," (see pages 151-152 will deliver the third annual Purves Me morial Lecture at the 99th annual con vention of the American Institute of Ar chitects which will be held in New Yor City from May 14-18. It has also bee announced that architect Robert H. Lev son of the firm of Wakeling, Levison & Williams of Clearwater, Florida, will re ceive the 1967 Edward C. Kempe Award. The award is presented for "sig nificant contribution to the Institute an to the profession of architecture."

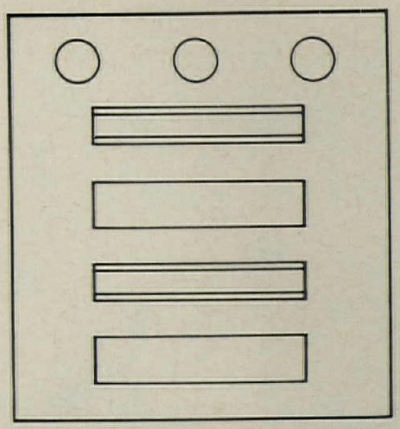
Warburton named consultant to HUD

Ralph J. Warburton, chief of planning fo Skidmore, Owings & Merrill, Chicago has been named a consultant to the De partment of Housing and Urban Deve opment. Mr. Warburton will advise HUD on "matters relating to program policy review, evaluation, operations, and lia son with professional, academic, deve opment, and research organizations." M Warburton is the second architect t work with HUD on a consulting basis joining architect George T. Rockrise, wh was named adviser on design last June.

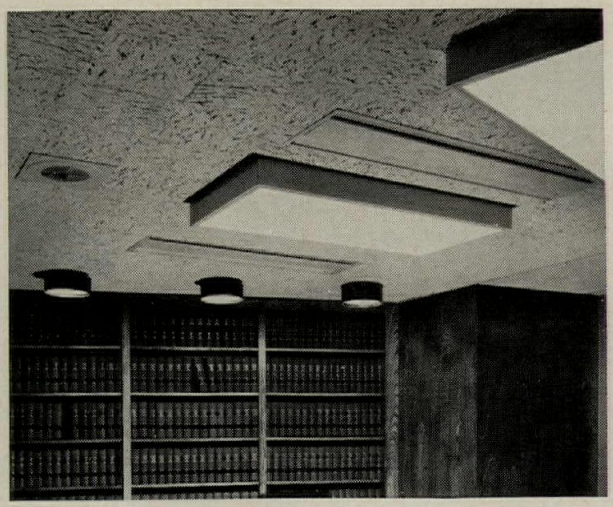
Post Office Department names advisory panel

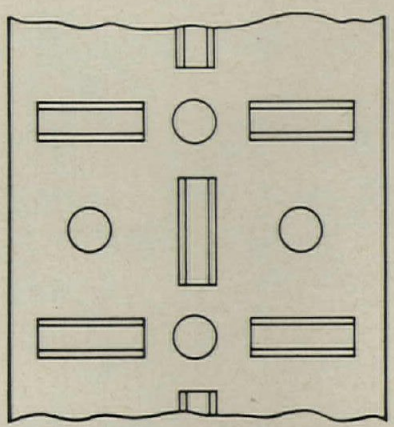
Postmaster General Lawrence F. O'Brie has announced the formation of a 29 man advisory panel to "provide a clos link with the engineering, academic an business communities" to help the Pos Office Department "apply the lastes scientific advances and technology t the postal service." The panel, which i known as the Research and Engineerin Advisory Council, is composed of busi ness, industrial, academic and profes sional leaders and includes architect Ezra D. Ehrenkrantz, Leland W. King, an Charles M. Nes Jr.

more news on page 27

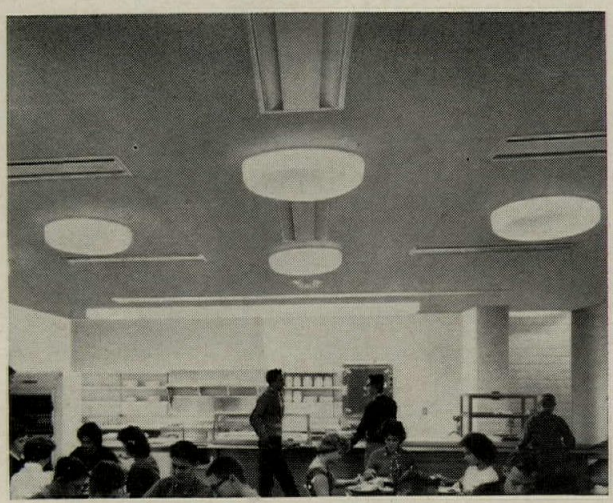


In this library and reception room, two Moduline units have been combined with circular surface-mounted light fixtures.





Moduline units in this school cafeteria are separated by incandescent lights, but can still be served by straight-line ductwork.



Adaptable Carrier Moduline air terminals have no "or equal"

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They have a clean, functional 1′ x 4′ face dimension. Harmonize with any type of hung ceiling. Integrate with lights in dozens of ways. And may be installed as random singles, linked in pairs, or coupled in lines of any length.

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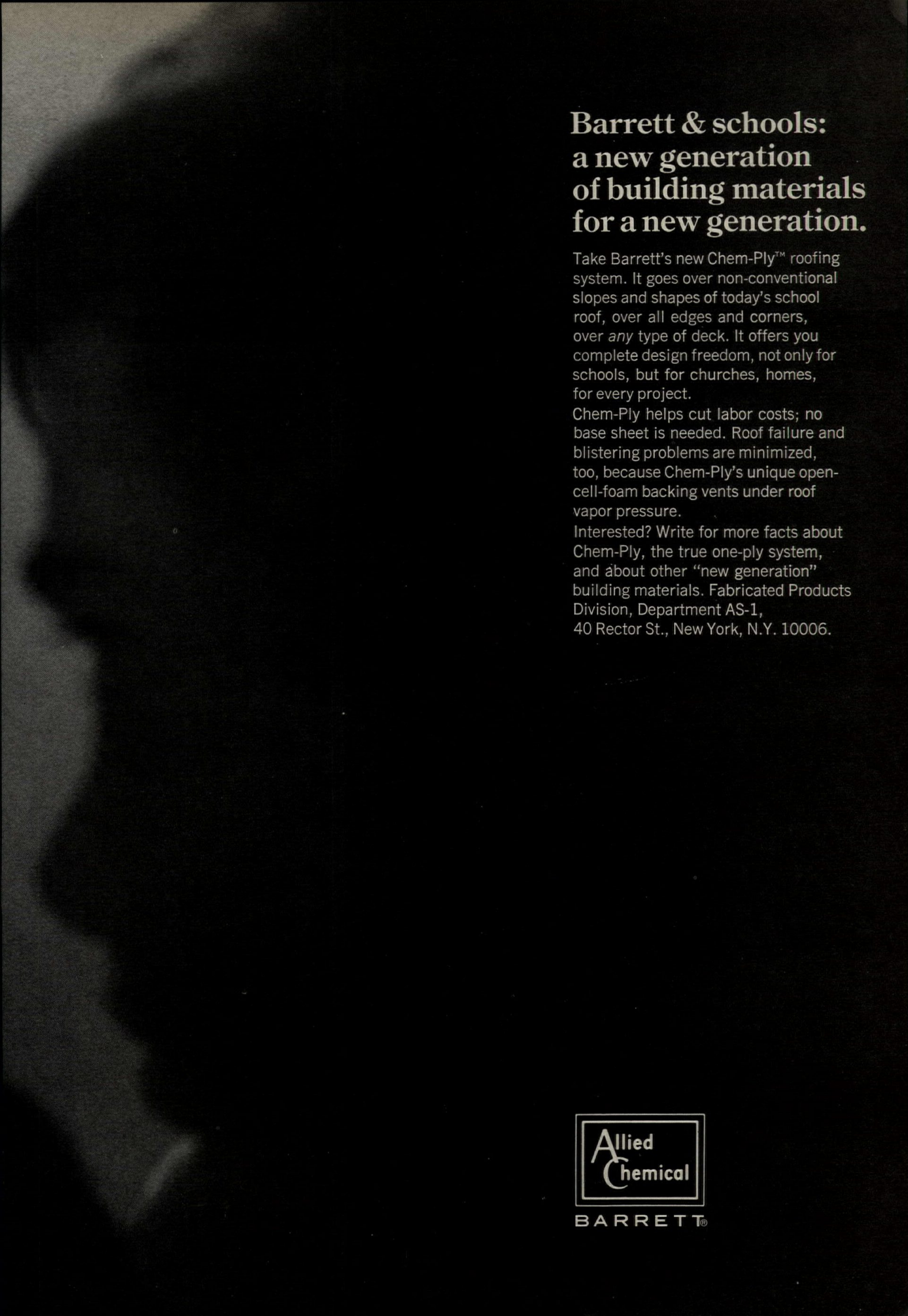

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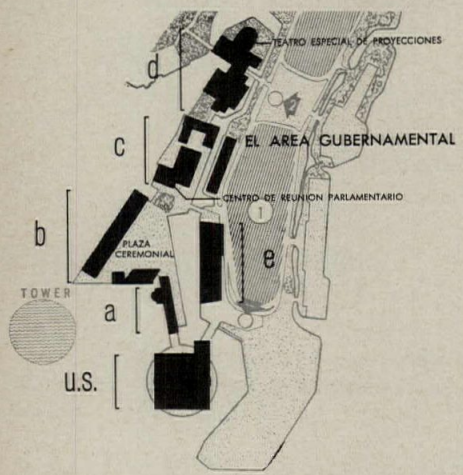
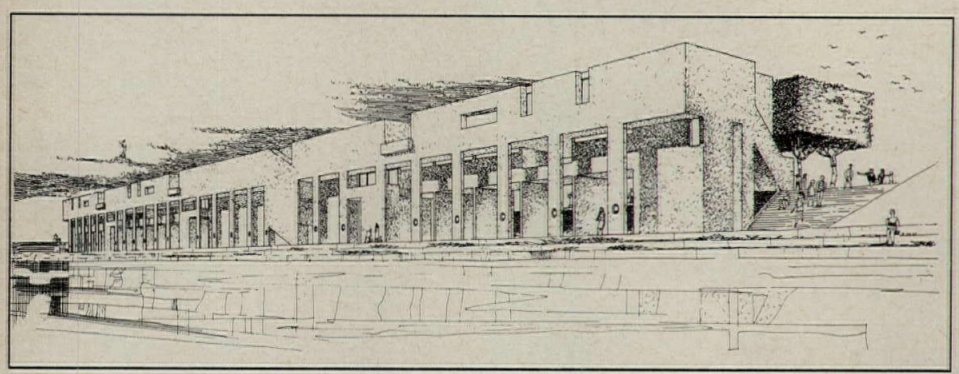
INTERAMA exposition hailed as "full-scale experiment in urban design"

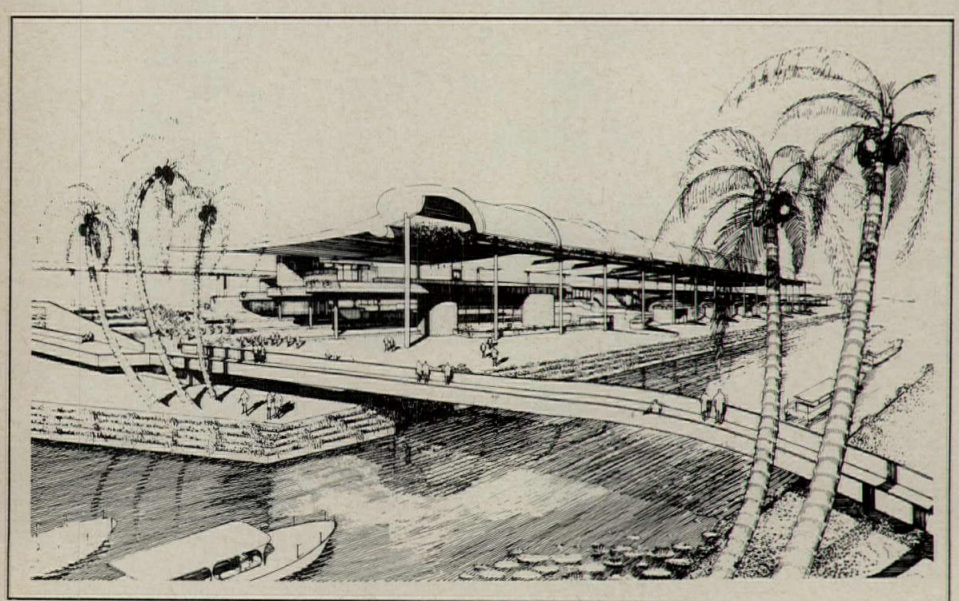


a: Harry M. Weese; b: Louis I. Kahn; c: Marcel Breuer; d: Jose Luis Sert; e: Paul Rudolph; and U.S.: Edward Durell Stone.

An extraordinary collaboration by six architects for a six-building complex will mark the start of construction at INTERAMA, a permanent exposition of the Western Hemisphere nations to be located on a 680-acre landfill tract on a peninsula between Miami and Miami Beach. Architects for the $22 million international area of the Inter-American Cultural and Trade Center, as INTERAMA is formally called, are Marcel Breuer, Louis I. Kahn, Paul Rudolph, Jose Luis Sert, Edward Durell Stone, and Harry M. Weese. The INTERAMA authority is a non-profit agency of the State of Florida. The buildings are Federally financed and will be provided free to the 20 Central and South American and Caribbean nations expected to participate, with each country providing its own exhibits. The international area will be composed of four multi-national structures where each country will be provided living facilities for a commissioner and 15 students to live in and act as guides. Three of these buildings will also contain special facilities for use by all nations. A fifth structure will house the United States Pavilion and the sixth will serve as an international bazaar for all nations. Also planned for INTERAMA are areas for industry, culture and leisure. Robert Brown is architect in charge of INTERAMA, and Edward Stone Jr. is landscape architect.

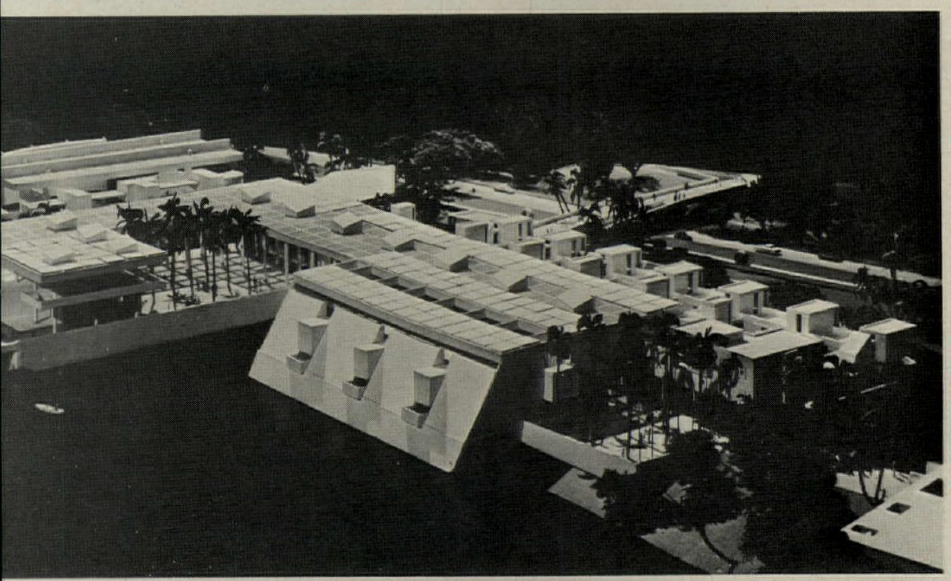


National Houses, designed by Harry M. Weese, for Caribbean countries including Haiti, Dominican Republic and Trinidad-Tobago, provide faciiities similar in program to houses designed by Kahn, Sert and Breuer. Each house will contain reception area, living quarters for a commissioner and family, dormitories for resident student guides, library, study and reading room, salon for small gatherings, and dining area and lounge. Mr. Weese called INTERAMA "a new institution within the world's fair family of experience, that is, in a sense, theater."

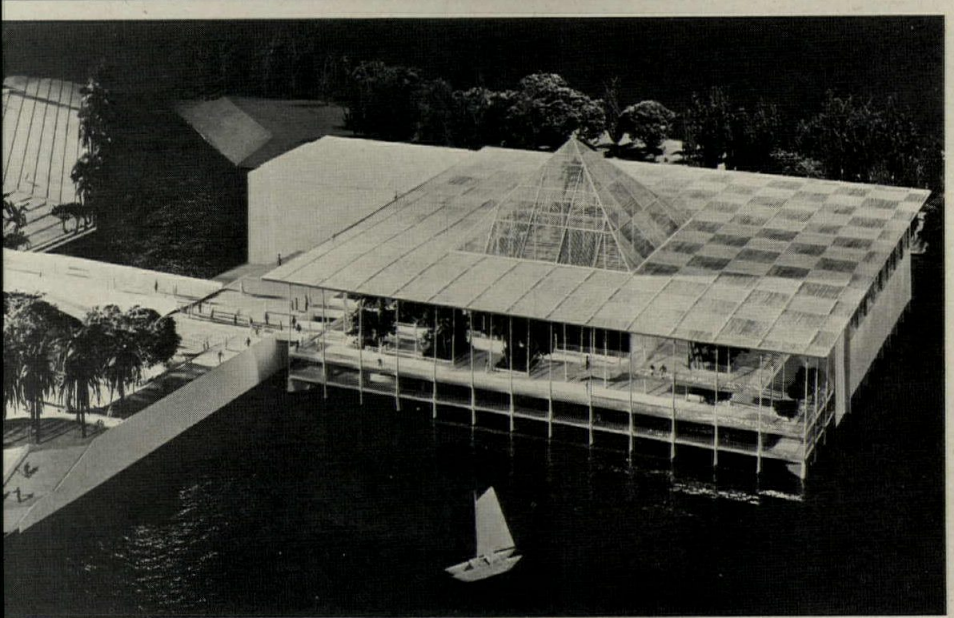


The International Bazaar, designed by Paul Rudolph, will provide for all participating nations an area to demonstrate and sell crafts and products. Mr. Rudolph points out that there is "considerable coherence at INTERAMA. It came about partially due to the landfill site. The buildings are dependent on water, walkways and planting. They should not be thought of as a series of individual structures, but as a whole. Each architect thought in terms of the whole project."

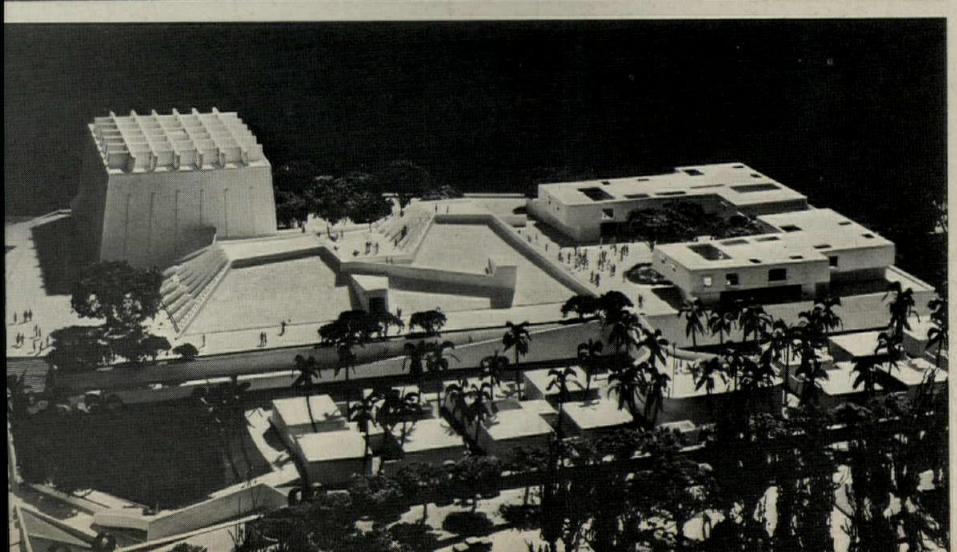
The Ceremonial Plaza area, designed by Louis I. Kahn, will provide residential facilities for seven countries—Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama—facing on a plaza to be used by all 20 nations. The buildings are "subdued in favor of the plaza," says Mr. Kahn. "The seven houses belong to the square. The square is not framed by buildings but is open to the buildings." Mr. Kahn cited INTERAMA as "a new institution of man," and added that "it is important to realize the changing character of established institutions and to translate them in architectural terms."



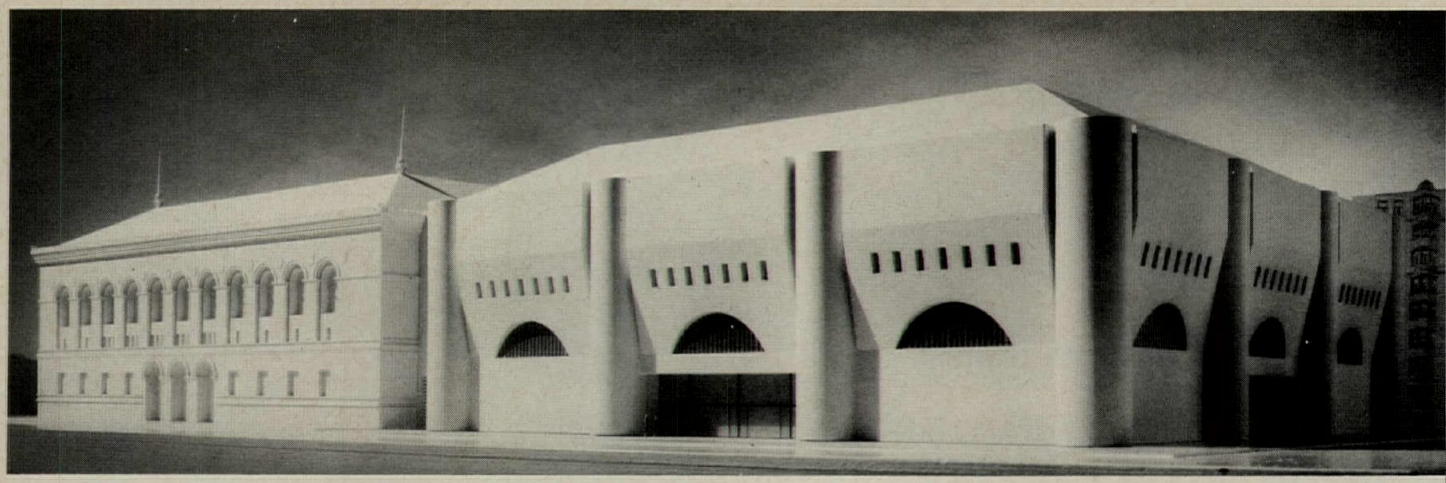
The Special Projection Theater area, designed by Jose Luis Sert, will provide houses for six nations—Bolivia, Chile, Colombia, Ecuador, Peru and Venezuela—as well as the theater to be shared by all nations. The theater will have 360-degree projection facilities and is adaptable for theatrical performances. "INTERAMA has the same principles and size as the center of a city," says Mr. Sert. "It serves as a full-scale experiment in urban design. There is a distillation of the designs and open spaces so they all fit together."



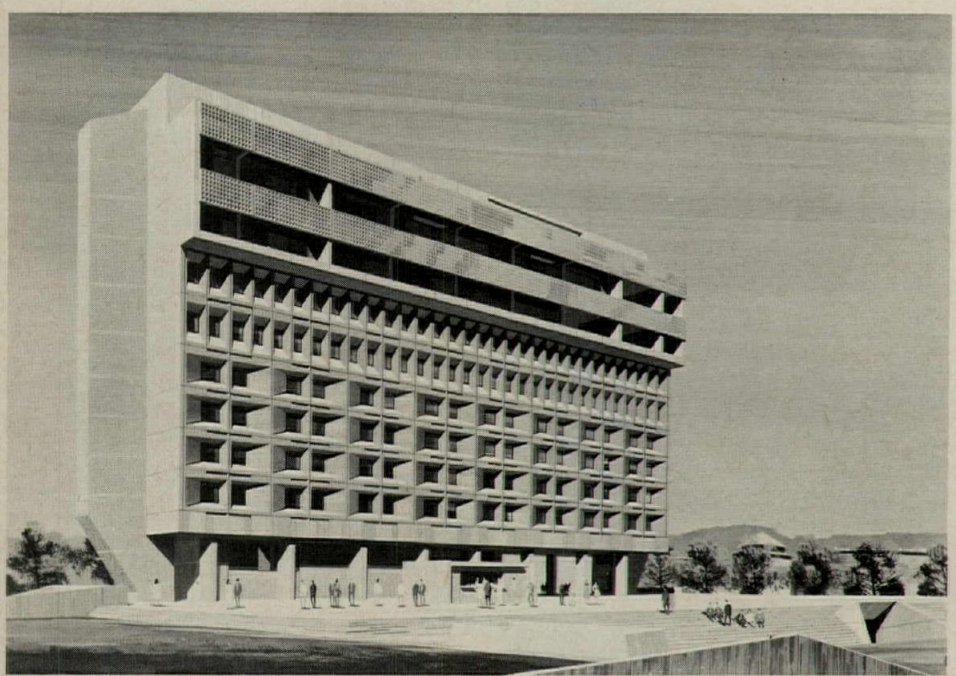
The United States Pavilion, designed by Edward Durell Stone, has two major elements—an exhibition hall and a theater—grouped around a series of tropical gardens. The exhibit, which will cost $5.8 million, will contain a "knowledge bank" for presentation of audio-visual materials. Also included will be residential facilities for 50 students from different nations. "The distinguishing feature of the INTERAMA project," says Mr. Stone, "is that it has been conceived and planned as a large-scale, permanent, international exhibit area, rather than one following the usual pattern of short-term expositions which have been a great waste of effort and money."



The Parliamentary Meeting Center area, designed by Marcel Breuer, will provide national houses for four countries—Argentina, Brazil, Paraguay, and Uruguay—as well as facilities for conferences and seminars to be shared by all nations. The parliamentary building will have a seating capacity of 250 and will include observation galleries for the public. "INTERAMA shows that very individual architects can work together," says Mr. Breuer. "Architecture, in terms of large-scale planning, very much needs such a precedent."



An addition to the Boston Public Library, designed as a joint venture by Philip Johnson and Architects Design Group, Inc., respects the original library (at left in model photo) designed by McKim, Mead & White by conforming to the height and roofline and using the same pink granite facing material. The new library will provide seating space for 1,000, and could contain 3,000,000 volumes. The 480,000-square-foot addition will contain two underground levels, mezzanine, and eight floors, and will be organized around an interior court. The upper five floors will be suspended from roof trusses, permitting very thin floor construction, so that a full eight floors can be constructed within the height limitation. Structural engineer for the project is William J. LeMessurier.



A campus center at the University of Massachusetts, Amherst, designed by Marcel Breuer and Herbert Beckhard, architects, combines a variety of functions, and this variety is expressed with varying exterior panels. In two underground levels are student union and activity areas. At terrace level are lobby, office and reception areas. Floors two to five contain hotel facilities and apartments. Floors six and seven contain offices for a continuing education program, labor center and conference areas. The top two floors are restaurant facilities including a formal restaurant with outdoor terrace. The center, which will have an exterior of precast and cast-in-place concrete, will contain 287,000 square feet.

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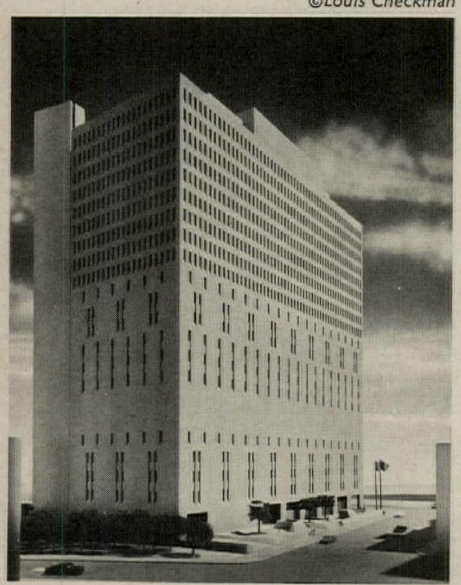
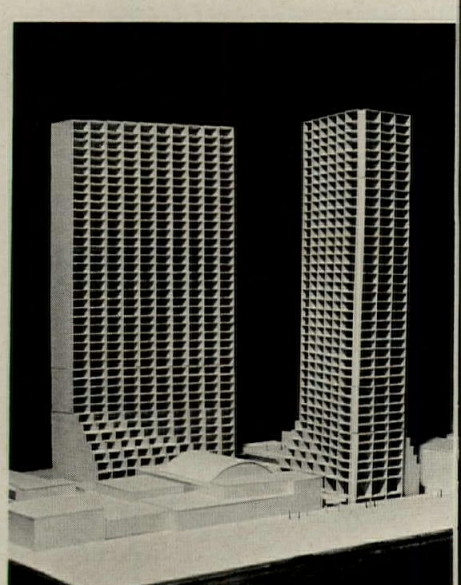
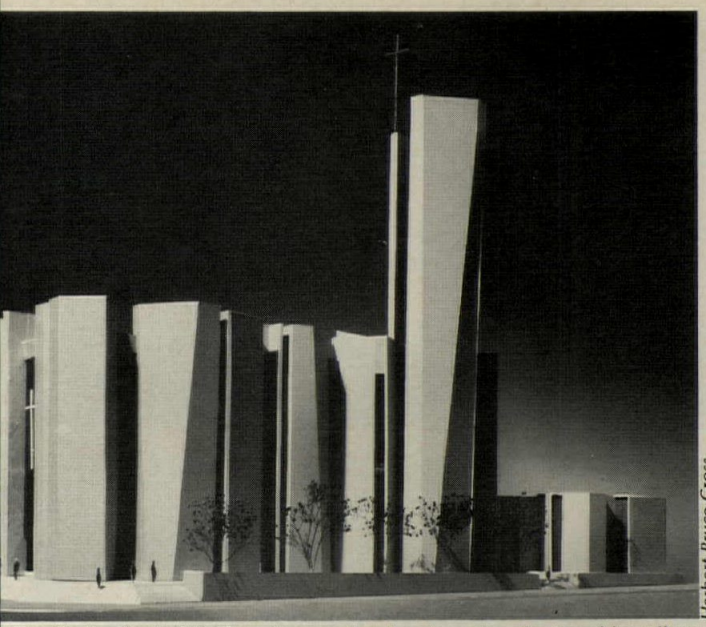


An operations center for Manufacturers Hanover Trust Company, New York (left), designed by Carson, Lundin & Shaw, is a 22-story structure with a brick exterior to relate it to nearby brick landmarks. The architects said that the Stockholm City Hall was the reference point for the design of the building. The building, scheduled for occupancy in 1969, will contain 800,000 square feet.

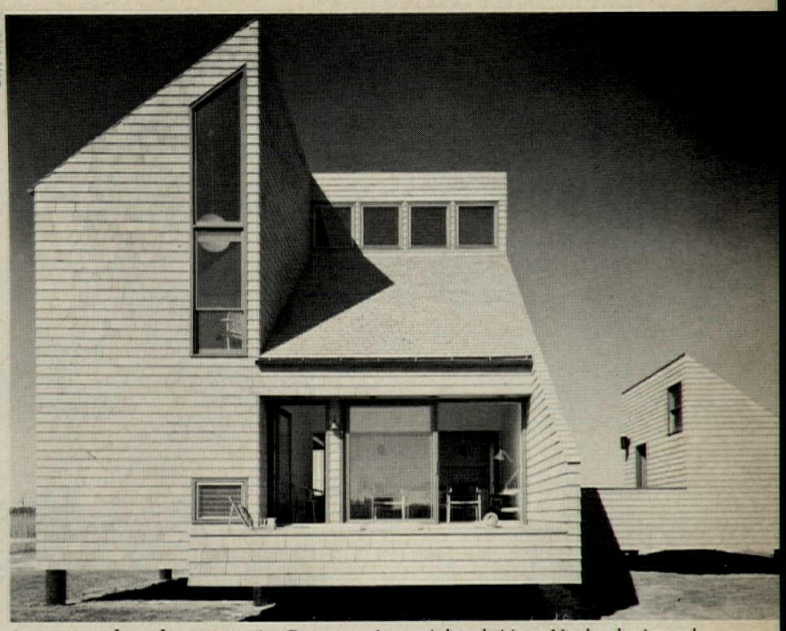
A residential complex in Chicago, designed by Fridstein and Fitch, will have two 41-story towers sharing recreational and service facilities on a terrace above street level. At street leel is a parking area for 300 cars. The towers have staggered setbacks at the bases for sun orientation and maximum lake view. One of the towers will be built as a condominium and the other will be a rental unit.





Herbert Bruce Cross

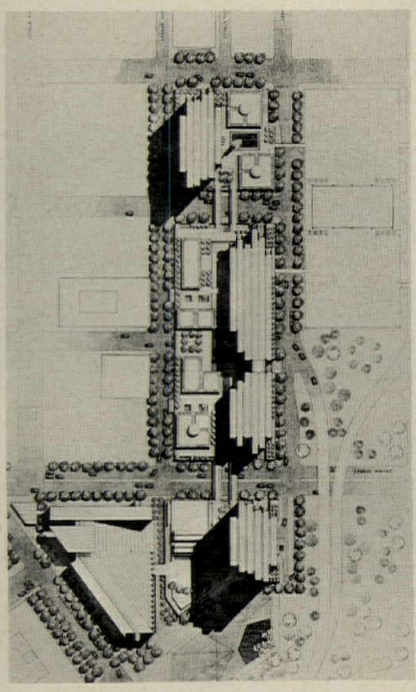
The St. Basil's Parish Church complex, Los Angeles, designed by Albert C. Martin and Associates, will include a church seating 1,100, a basement hall which will accommodate 500, and a three-story rectory behind the church. The walls will consist of 80-foot-high textured concrete towers separated by full-height shafts of glass with three towers rising to a height of 150 feet. General contractor for the 40,000-square-foot complex is Pozzo Construction Company.



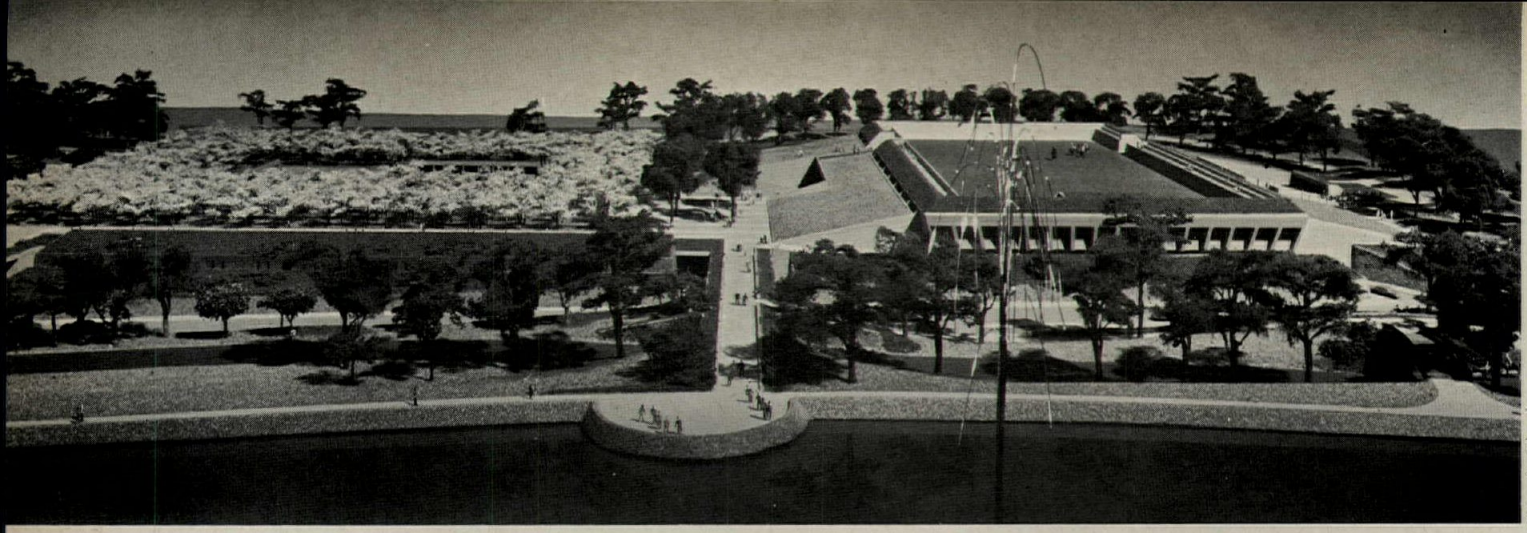
Bill Maris

A summer beach cottage in Quogue, Long Island, New York, designed by Hobart D. Betts, has been presented the first award citation in the fifth annual house competition of the New York Chapter of the American Institute of Architects. The cedar-shingle cottage, designed for a family of five, was built at a budget of $25,000 and contains two children's bunk rooms, two double bedrooms, two baths, a living and dining room and kitchen.

Over-all view of center (left) shows hotel in left foreground, 60-story office building in center, 25-story office building behind, and 45-story tower in rear. Site plan for center (below) shows L-shaped, five-block, 8.5-acre project area in downtown San Francisco near the harbor. Eight-hundred-room hotel is shown at right.



Embarcadero Center, a $125-million complex proposed for San Francisco and designed by John Portman of the firm of Edwards & Portman, will group its units on a landscaped pedestrian plaza two levels above traffic. Included in the complex are three office towers —one 60 stories (which would make it the tallest building in San Francisco), one 45 stories, and another 25 stories—providing total gross office space of 2.85 million square feet. The office towers are designed to provide a maximum number of corner offices. The 800-room hotel stacks its guest rooms on the semi-pyramidal side of the structure, each room having a balcony. An enclosed garden court will occupy the entire 16 floors of the hotel tower, with clear-sided elevators suspended from an inner wall of the court. An entertainment center will feature three theaters seating a total of 3,600, as well as art galleries and museum. The entire complex will be constructed of pre-cast concrete with a rough-hewn finish. Underground parking is provided for 2,000 cars. Landscape architects are Sasaki, Dawson, Demay Associates.



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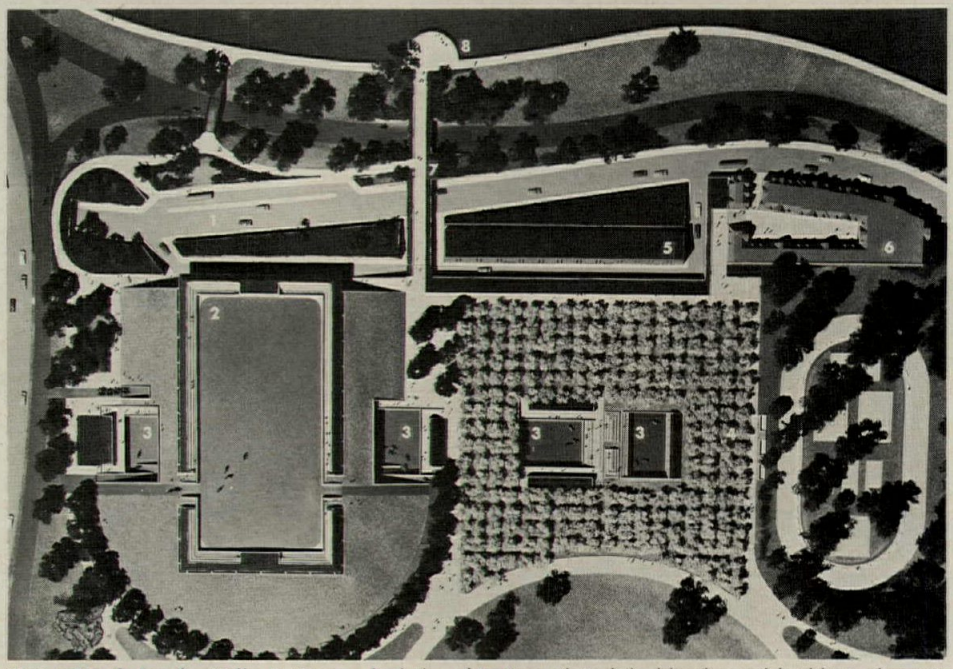
Design that respects landscape wins Central Park competition

The firm of Kelly & Gruzen has been declared the winner in a limited competition for the design of a $5.7-million police and stable facility in Central Park, New York City. Other firms invited to compete included Whittlesey, Conklin & Rossant, second prize winner; Philip Johnson Associates, third prize winner; the office of Edward Larrabee Barnes; and Marcel Breuer & Associates. In preparing their submissions, each of the architects was assigned a cost estimator from the firm of McKee-Berger-Mansueto, Inc., to assure that each entry could be built within budget. Funds for the competition came from Urban America, Inc. which provided $15,000 for each entrant as well as prizes of $10,000, $8,000 and $5,000 for the premiated entries. Serving on the jury were Thomas P. F. Hoving and Arthur Rosenblatt of the Parks Department; Peter Blake representing Urban America; New York Police Commissioner Leary; architects William Breger, Lewis Davis, Paul Rudolph and I. M. Pei; and landscape architect M. Paul Friedberg. Architect Fred Bentel served as professional adviser.

more buildings in the news on page 50



First prize design by Kelly & Gruzen had the objective of "subtle blending of building elements into land forms which are suited to the tradition of Olmstead's Central Park theme." This design uses the roof of the indoor riding ring as the outdoor riding arena, reducing the project's ground coverage. Indoor rink will have seating for 1,500 while the upper ring will have seats for 1,000 spectators built into a sloping, 15-foot-high earth mound, the major visible form of the entire project. Structural engineers: Farkas & Barron. Key: (1) 86th Street Transverse; (2) outdoor riding ring; (3) corrals; (4) orchard above the stables; (5) police precinct; (6) Vaux building—new horse museum; (7) new foot bridge; (8) reservoir lookout.

©Louis Checkman

Second prize design by Whittlesey, Conklin & Rossant, has only one structure above grade, the roof of the indoor riding ring. Described by Mr. Conklin as "mountain-like landscape forms," the 40-foot-high roof structure has compression rings at the top engaging radial steel columns. Surfaces between the steel radials are formed of concrete with slate. At top of the conical shapes are skylights.

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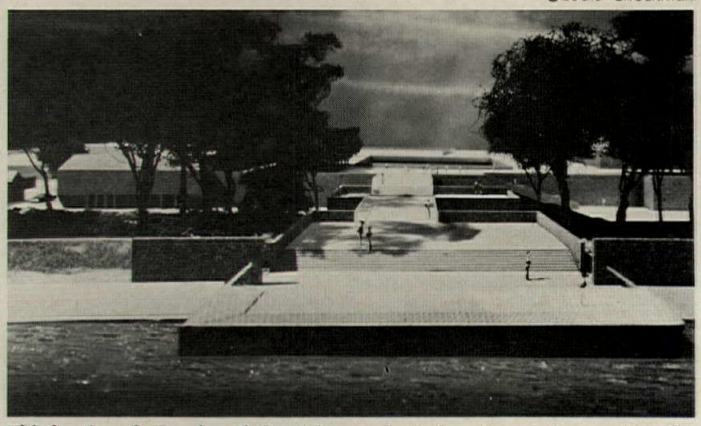

Third prize design by Philip Johnson had the aim of "preserving the park to the greatest degree" so that "the buildings almost vanish." The terrace level is high enough to give a view of the reservoir. "The facades, mansards and dormers, all that is valuable of the Vaux buildings, are preserved in our design," says the architect. All exterior walls and mansard pitches would be bush-hammered brick.

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LETTERS

Great architecture and common sense
Thanks for the January "Behind the Record." "Preserve It, If It's Great Architecture" is ably expressed with your great common sense and integrity. All of us have these problems and decisions to make and advise, and I, for one, appreciate your excellent advice.

Thanks, too, for "Chicago's Multi-Use Giant," an excellent, comprehensive, and interesting accounting of the design, architecture, structure, and use of this great concept. It was inspiring, too, to read about the great team of technicians who put the complex together.

John N. Richards, F.A.I.A.
Toledo, Ohio

Chicago's new giant—for giants only?
Your article on SOM's new John Hancock Center in Chicago was very revealing as far as the determination of design and structure are concerned, but you neglect the implications of the 100-story, all-purpose building in the modern city.

Corbusier advocated a city of towers in which many segments of civilization were to be housed. SOM's Bruce Graham and developer Jerry Wolman seem to believe in this ideal and neglect the fact that such a structure ignores the humanness of a city: the fact that a city consists of people and that the architect builds for people.

The problem as I see it is one of putting hundreds of apartments high up in a structure which is designed to be the second highest TV antenna in the world. I believe that the human being wants something that he can call his own: something with which he can identify. In a building such as the John Hancock Center, a man becomes a number on an IBM card; in trying to identify his own apartment in the structure it becomes similar to the problem of identifying a single star in the Milky Way. To point out his apartment to a friend one would have to say, "I'm the fifteenth window over from the crossbar of the fourth diagonal brace." Man becomes merely a number on a grid in a civilization that is becoming too impersonal, denying Man's individuality. He has another number in a long string of numbers that have been assigned to him. The essential number with Man is *one;* if Man loses his identity to a computer, or to a number in a grid, the city loses its identity as a place of people and bigness becomes an end in itself.

The responsibility of the architect is to maintain the human scale in building. SOM has become too fascinated with its image as a giant-builder and has forgotten that men design for men.

James T. Biehle
Graduate School of Fine Arts
University of Pennsylvania
Philadelphia

SOM's John Hancock Center should be considered—among other things—as a needed experiment in finding ways to make the city better for the people who do want to live there and who recognize certain necessary innovations. Undoubtedly, the building will provide more humans who want it with a convenience to the city, and yet it will be a means of almost instant escape into their own private castles in the sky—imagine the magnificent view!

We do not believe that all men need to point out their own window from the street below in order to identify with a building or to maintain their humanness and peace of mind. The aspirations and achievements that such buildings symbolize—whether for one man or the entire race of man—will be enough for many mortals. —N.L.M.

"Design of Cities"
The story about the book in the January issue is very fine. I appreciate deeply the care and sensitivity with which you have presented the material and also the fine things you have said about the book.

Edmund N. Bacon
Executive Director
Philadelphia City Planning Commission

I just finished reading and looking at the extract from Bacon's forthcoming book "Design of Cities." It's very sharp and exciting stuff, and you have me holding my breath for the finished volume.

William I. Goodman, Chairman
Department of Urban Planning
University of Illinois
Urbana

Purpose versus masterwork
It is with considerable consternation that I find under "Letters" of your January issue, one of your readers claiming that every effort should be exerted to prevent the demolition of the Frank Lloyd Wright Imperial Hotel in Tokyo.

The original section of the Hotel has become so obsolete, that the majority of the guests resent greatly the assignment of rooms in that section in lieu of the newer wings. Accordingly, it is my belief that this is not an area where restoration should be imposed, since, current methods, materials and design demand the replacement of structures used for commercial purposes, regardless of the so called masterwork.

Samuel Z. Moskowitz, F.A.I.A.
Wilkes-Barre, Pennsylvania

Safety violations?
The picture of the instant rehabilitation package in your January 1967 issue, page 175, shows two serious safety violations: 1) People should not be permitted to stand under a suspended load; 2) The cable clips on the wire rope sling are incorrectly installed. The U of the cable clips should always be installed on the dead end of the wire rope.

Jerry Kosro
Chief, Engineering Branch
Department of Housing & Urban Development
San Francisco

I think the large photograph may be deceiving in its perspective. I don't believe the people were standing directly under the unit, although, it does look like one workman might be headed that way. —R.F.

The new frontier and ETV
Your story on architectural developments in American Samoa (December 1966) is most interesting. I read it both for its references to the educational TV project there and for my own personal interest in design, having been an editor of Forum in the Henry Wright-Doug Haskell days.

Our White House Task Force on Educational Television in Developing Nations has been giving continuing attention to the Samoa ETV project as a prototype for similar efforts in Asia, Africa and Latin America. Its design—both architectural and educational—will undoubtedly have a great influence in ETV's development in these areas.

Wilson Dizard
Assistant Deputy Director
Operational Policy
Office of Policy and Research
United States Information Agency

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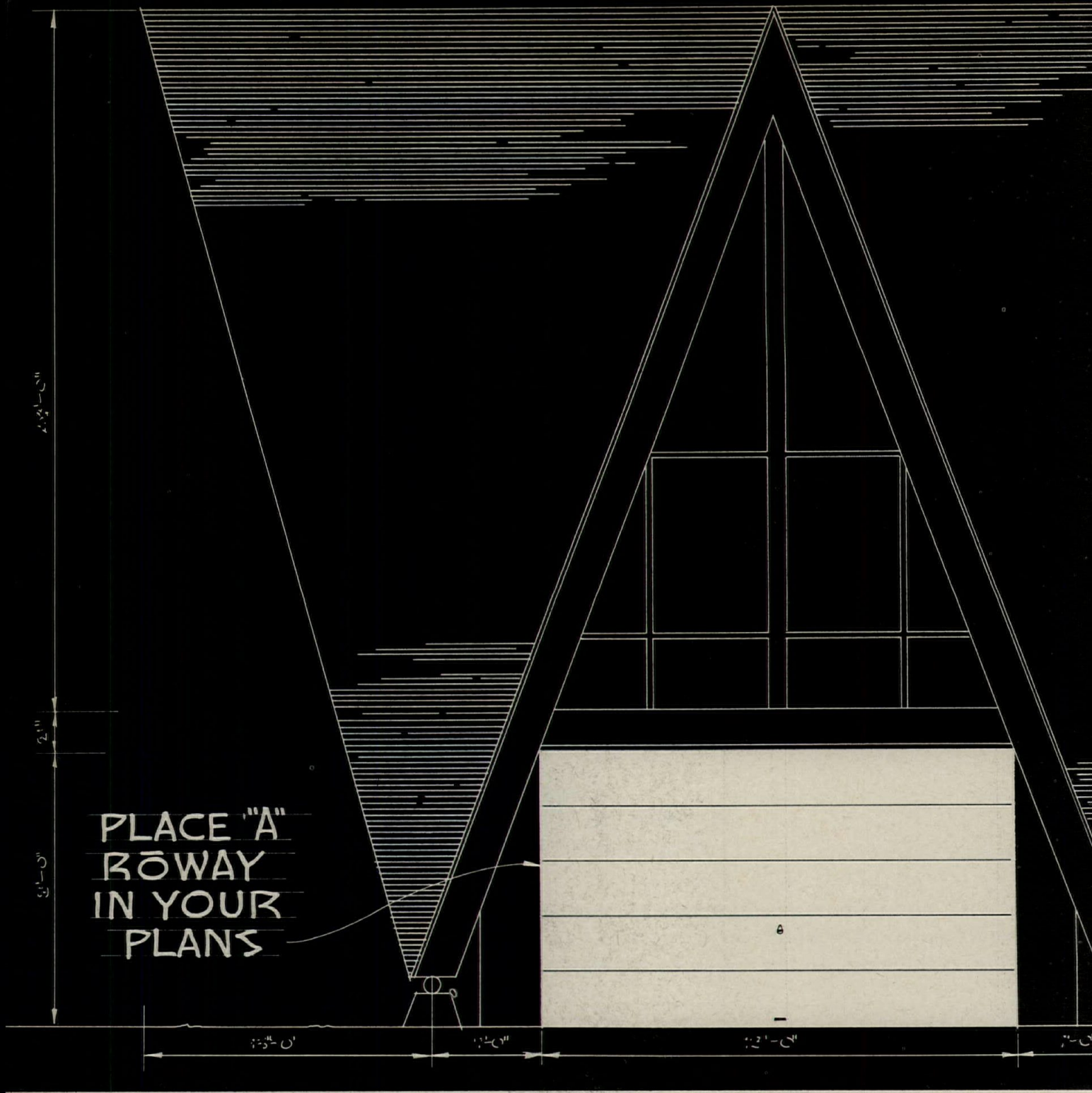

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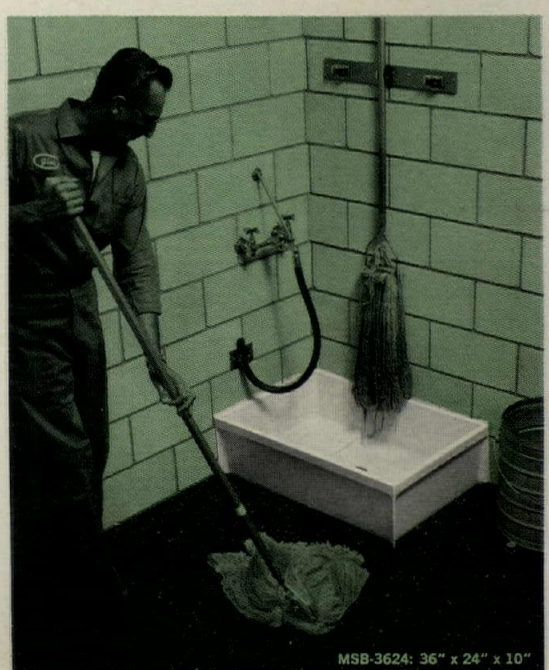

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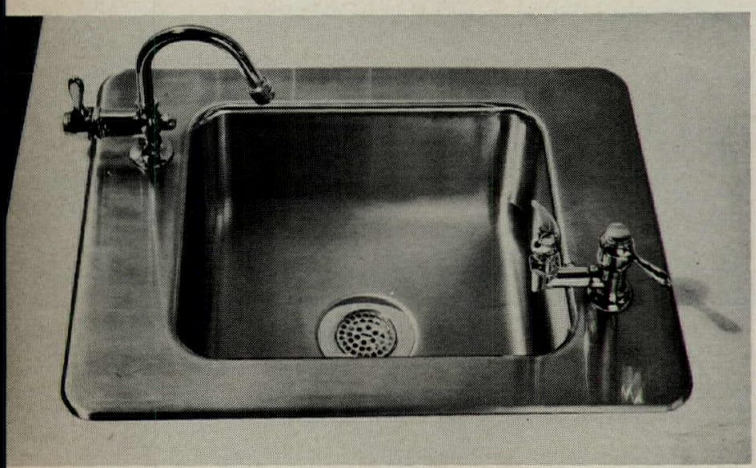
World fair in 1968 is planned in Texas

Construction is well under way at Hemis-Fair '68, a world's fair sanctioned by the Bureau of International Expositions, which will be held in San Antonio, Texas, from April 6 to October 6, 1968. The fair will mark the 250th anniversary of the city of San Antonio and will be located on a 92.6-acre site 200 yards from the Alamo. Theme of the fair is "The Confluence of Civilizations in the Americas." A 622-foot Tower of the Americas, financed by a $5.5-million bond issue, will dominate the site and will remain as a permanent structure, as will the other projects shown on these pages. Included in the exposition will be a foreign nation sector (10 foreign countries have thus far announced their participation), business and industrial exhibits, and amusement area. Transportation on site will be achieved by a 7,000-foot minirail, a mile of waterways diverted from the San Antonio River, a 1,700-foot skyride and footpaths. Director of master-planning, design and architecture is architect Allison B. Peery. Landscape architect is Robert Copeland with Stewart E. King and James E. Keeter as consultants.



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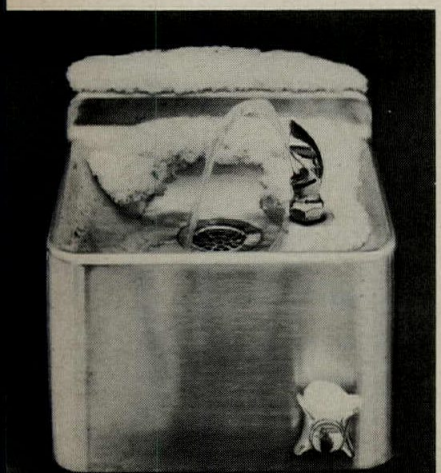

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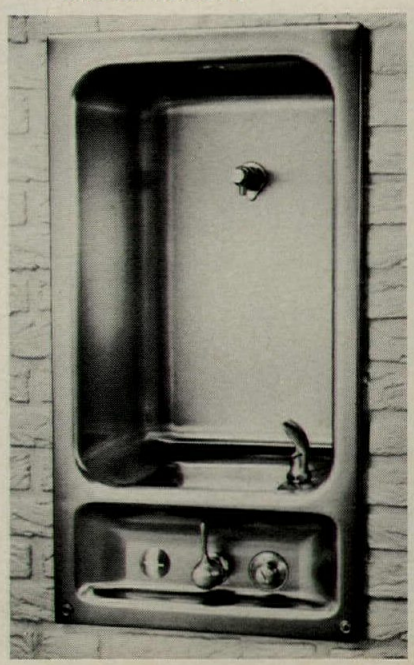

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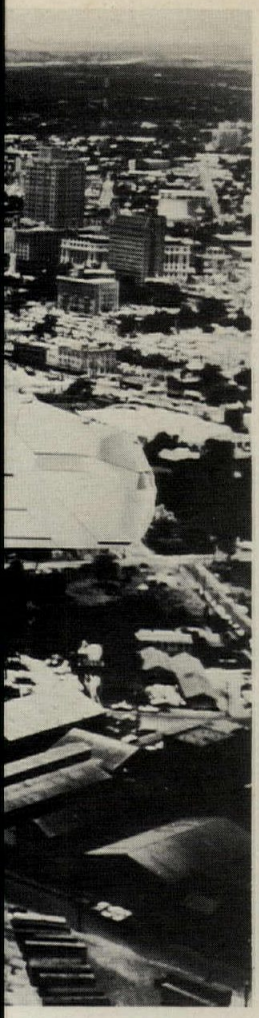

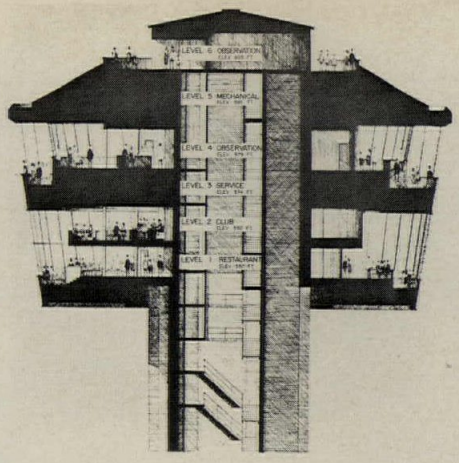

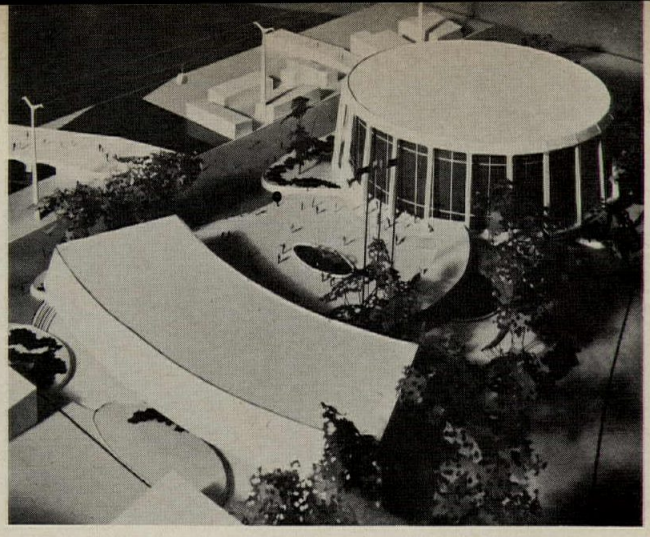

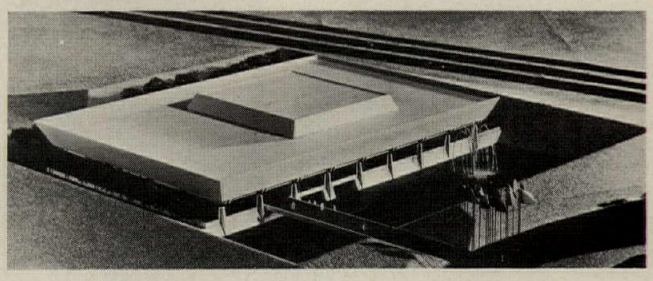

Above: Shown is the top section of the 622-foot Hemisfair tower designed by O'Neil Ford & Associates. At right, from top: Confluence Theater, part of $6.75-million United States Pavilion, designed by Marmon & Mok in conjunction with Donald Deskey Associates, industrial planning consultants, will contain a three-screen, 1,200-seat theater. Three-building, $10.5-million, Civic Center, designed by Noonan & Krocker & Associates and Phelps & Simmons, will include a 10,000-seat arena, 2,800-seat theater, 3,100-seat banquet hall, and 100,000 square feet of exhibit area. Texas State Pavilion, a $10-million, three-level concrete and glass structure, was designed by Caudill, Rowlett, Scott in association with Callins & Wagner with Mullen & Powell as structural engineers.

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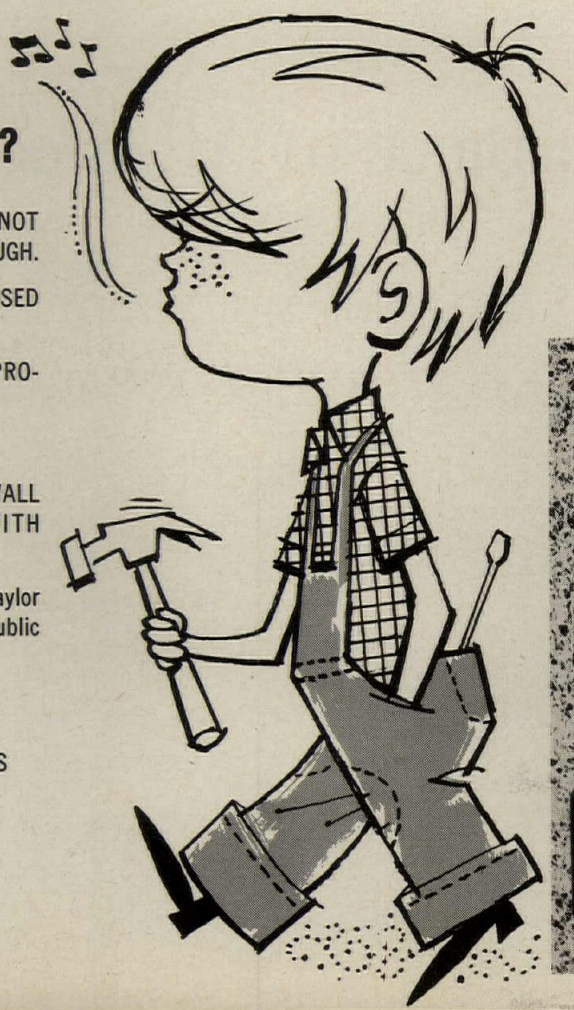

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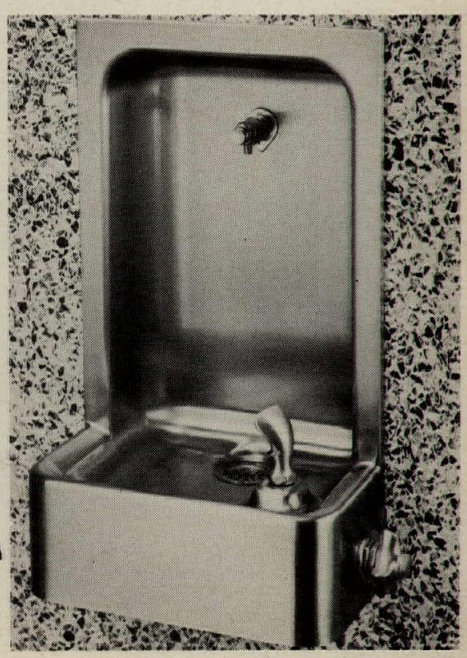
MODEL No. 5800



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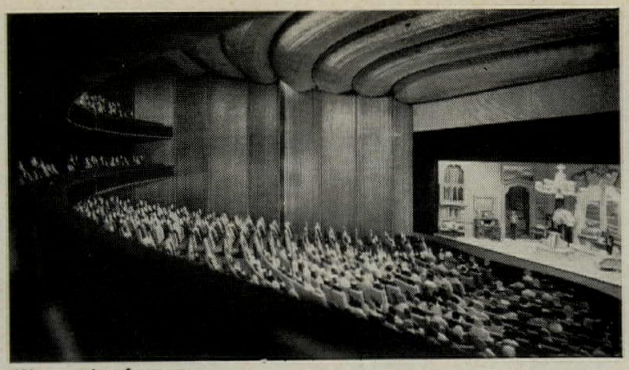
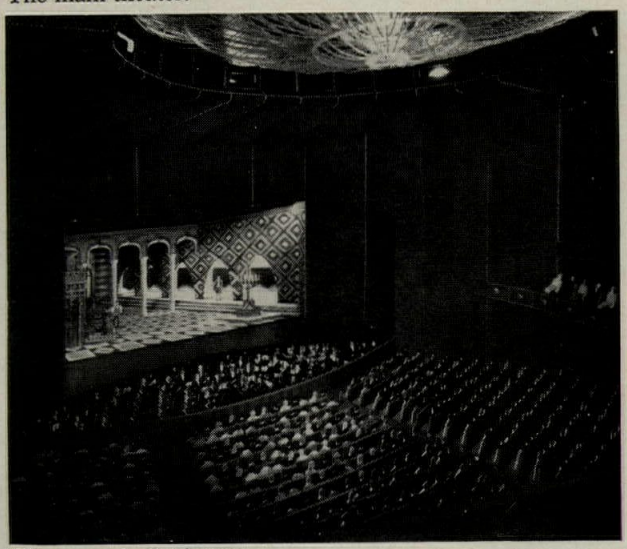
Structural engineers:	Severud-Perrone-Fischer, Sturm-Conlin-Bandel Associates
Mechanical and electrical engineers:	Syska and Hennessy, Inc.



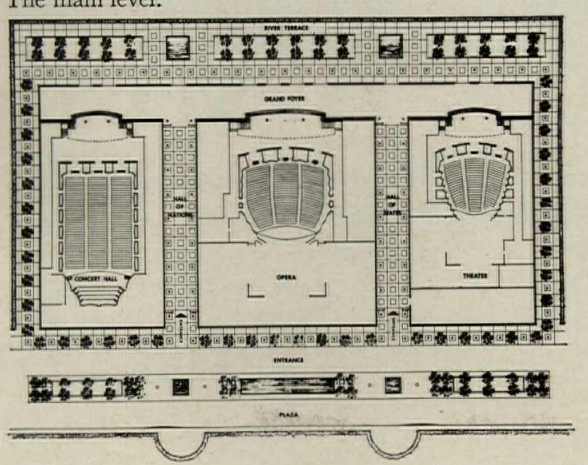
The main theater.



The opera-ballet house.

The concert hall.

The main level.



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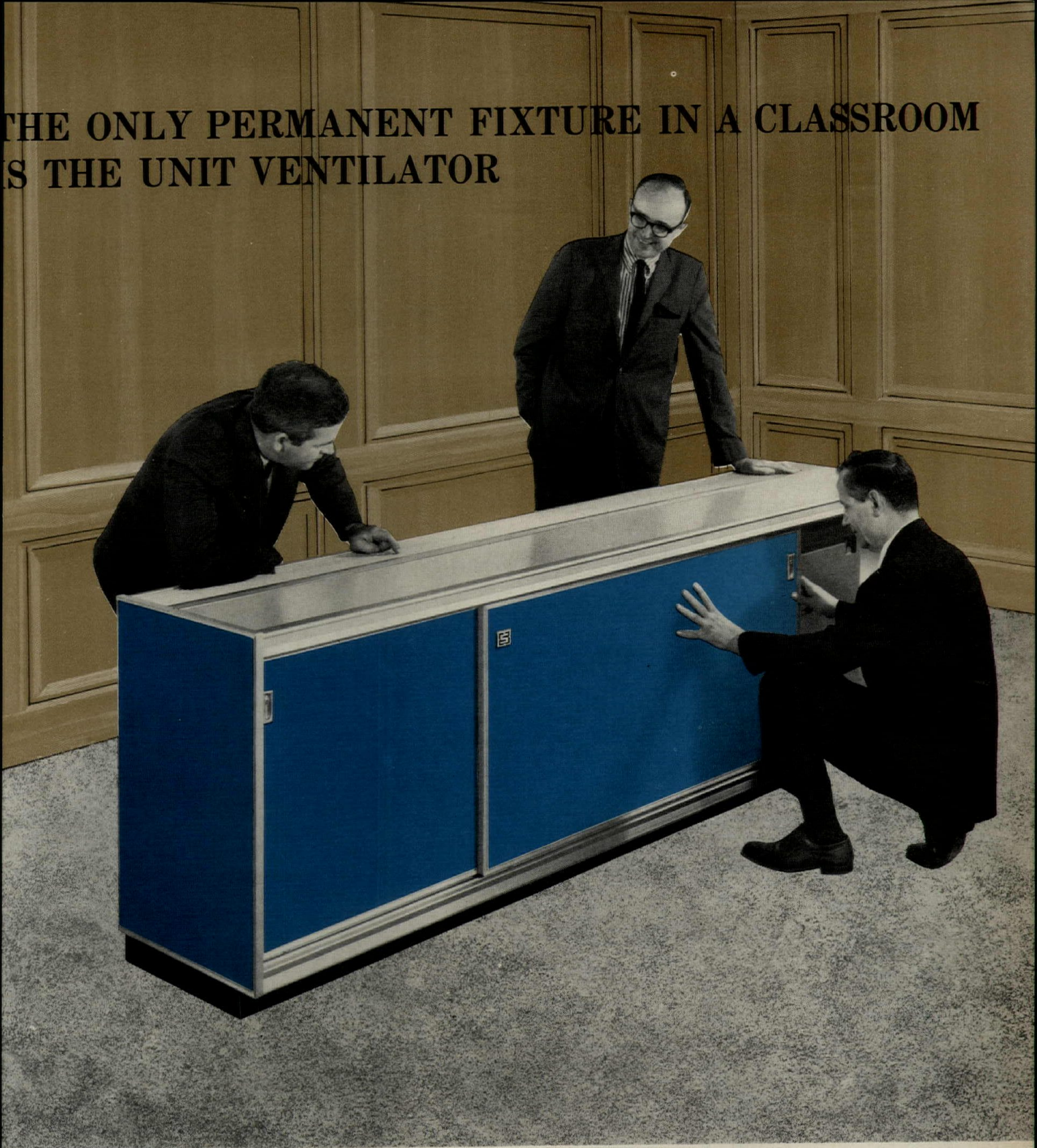

The make you specify and the reasons for it should be "board room" sound.

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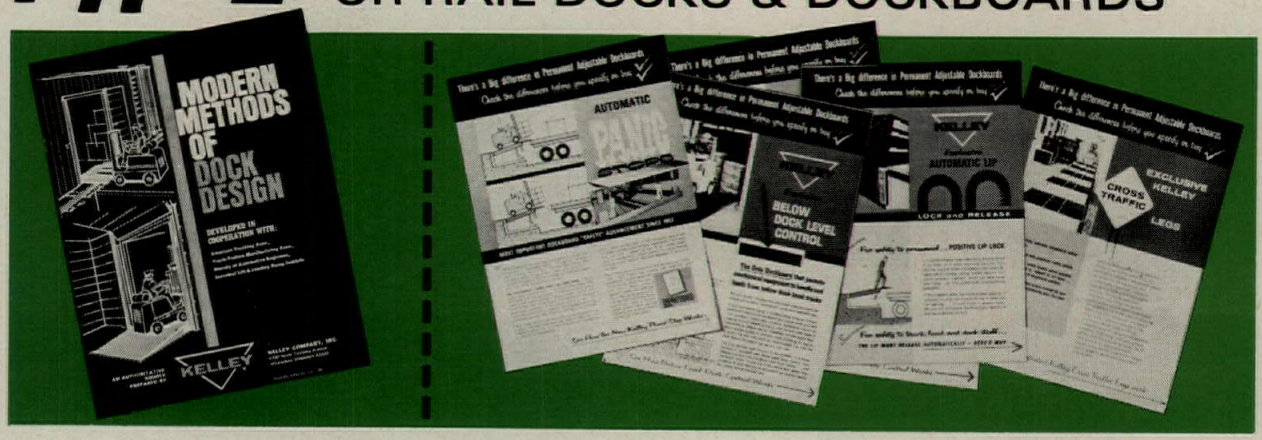

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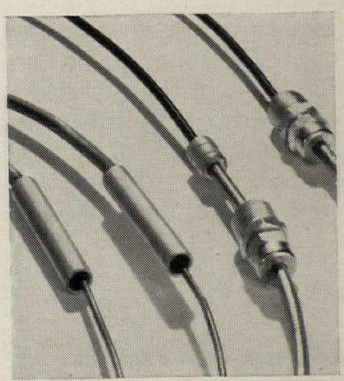

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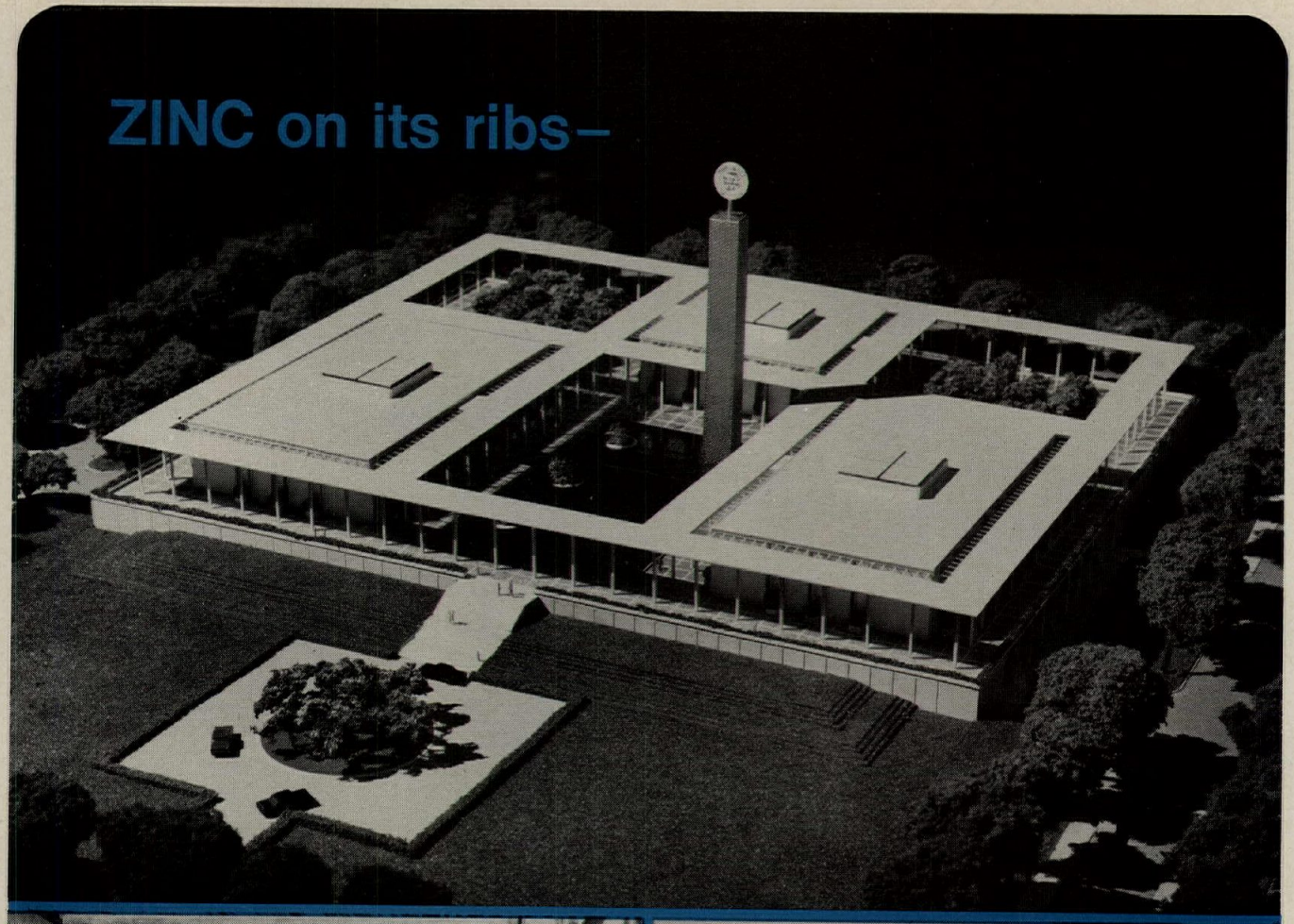

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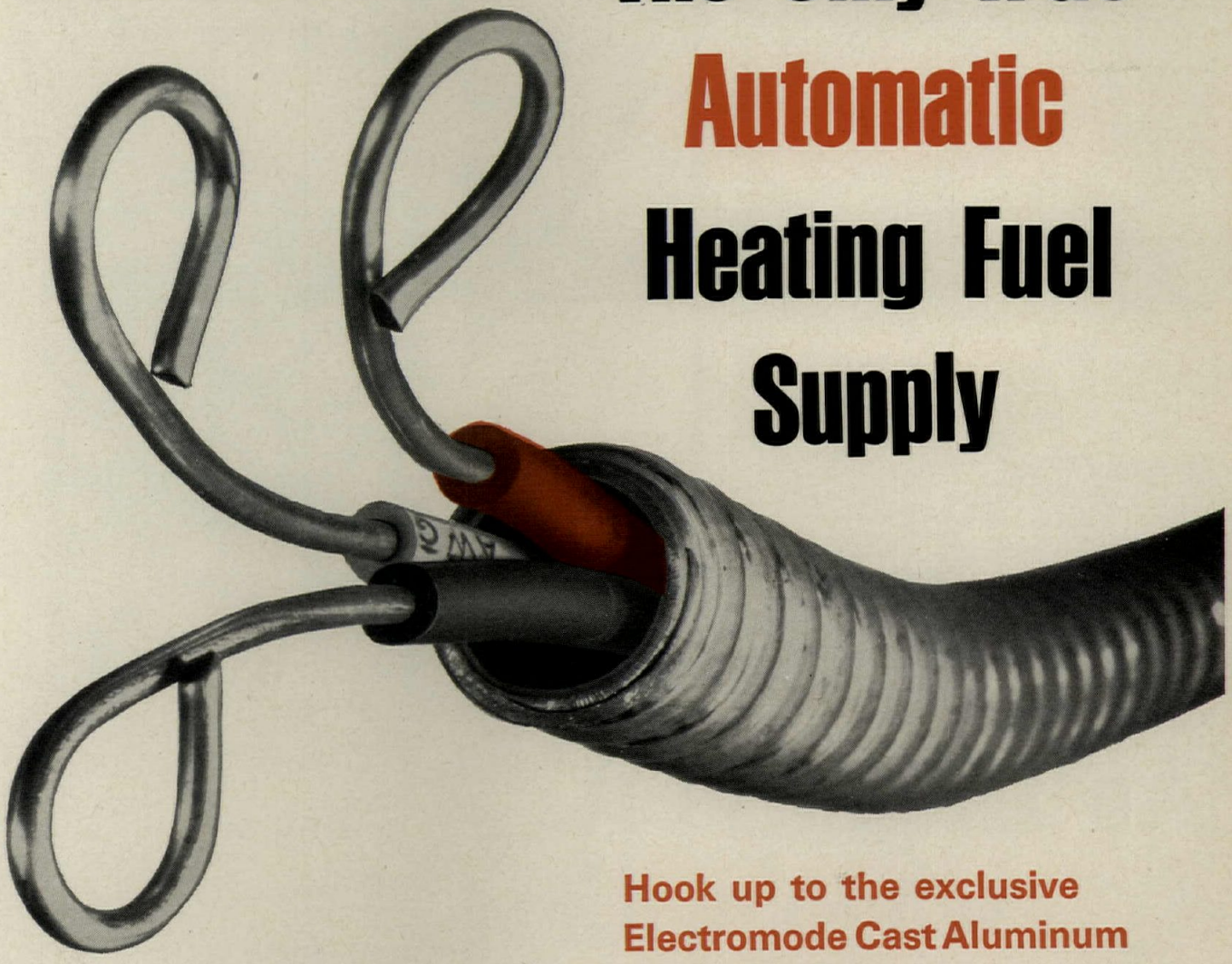

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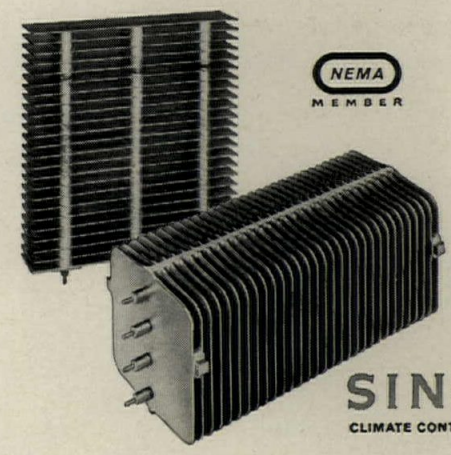

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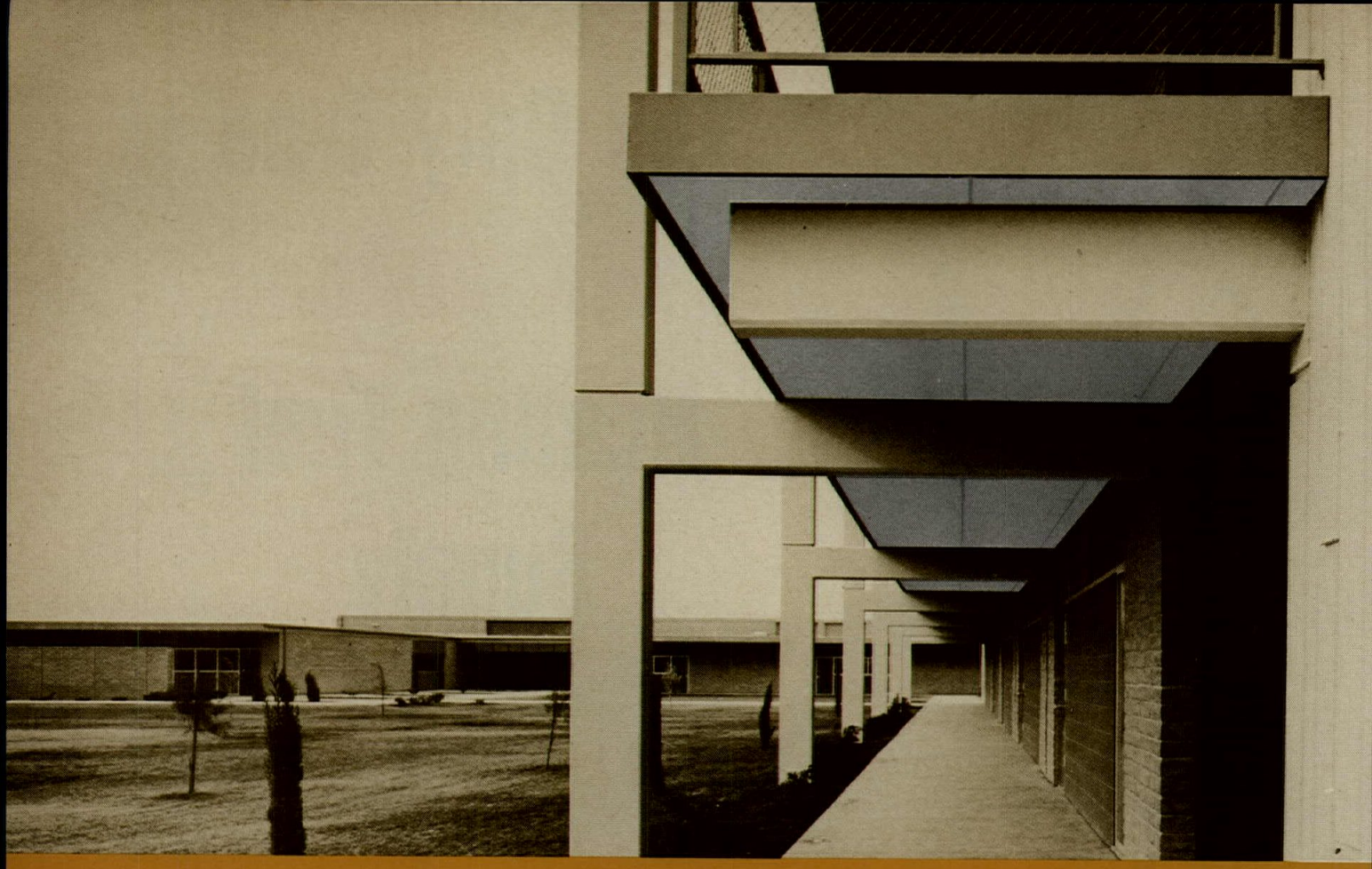

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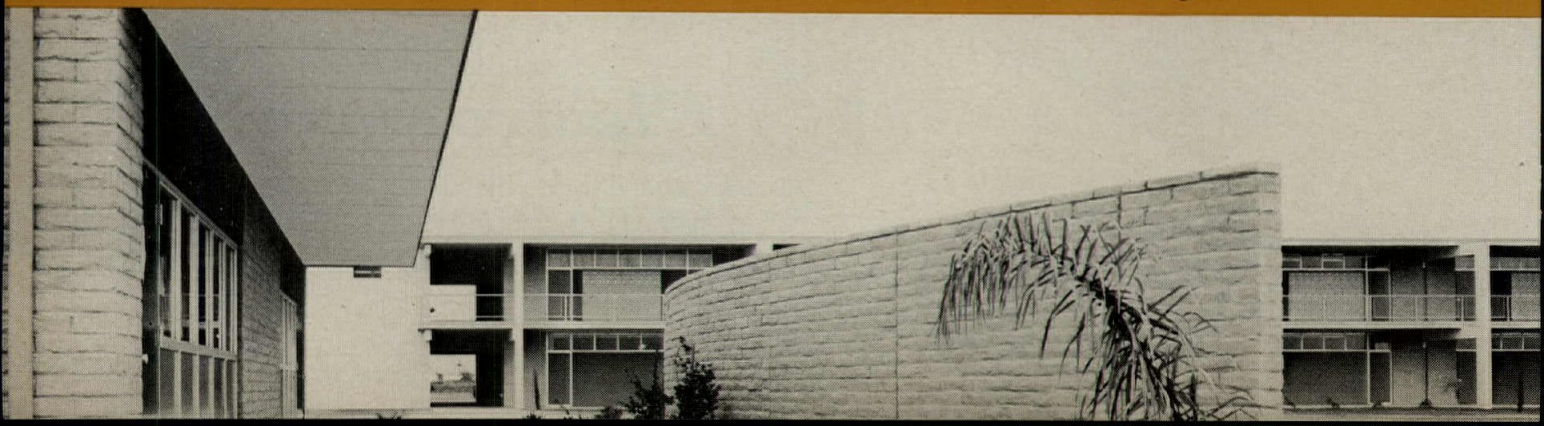

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Structural Engineer: Sam Caruso
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ON THE CALENDAR

MARCH

6-9 Associated General Contractors Convention—San Diego.

20-22 Intercon I: First International Contract Exposition & Congress—The Merchandise Mart, Chicago.

20-23 1967 Session, Alberta Association of Architects. Theme: Architectural Education—Banff School of Fine Arts, Banff, Alberta, Canada.

APRIL

1-6 National Planning Conference, American Society of Planning Officials—Shamrock Hilton Hotel, Houston.

1-7 Annual Convention, American Concrete Institute—Royal York Hotel, Toronto, Ontario, Canada.

19-20 Engineering Institute: "Energy Utilization," University of Wisconsin—Madison, Wisc.

20-21 American Institute of Steel Construction National Engineering Conference—Sheraton-Palace Hotel, San Francisco, Calif.

23-27 Third North American Conference, University of Illinois—Urbana, Ill.

24-48 48th Annual Meeting, American Welding Society—Sheraton-Cadillac Hotel, Detroit.

MAY

7-10 29th Annual Convention of the National Association of Architectural Metal Manufacturers—Bismarck Hotel, Chicago, Ill.

8-11 First joint convention of the Consulting Engineers Council/USA and the International Federation of Consulting Engineers—Shoreham Hotel, Washington, D.C.

8-12 ASCE Structural Engineering Conference—Olympic Hotel, Seattle, Wash.

12-14 Annual Meeting, Association of Collegiate Schools of Architecture—Barbizon-Plaza Hotel, New York City.

14-18 99th Convention of the American Institute of Architects and 17th Annual Building Products Exhibit—New York Hilton, New York City.

15-19 23rd Annual Technical Conference, Society of Plastic Engineers—Cobo Hall, Detroit, Mich.

20-28 International Commission of Illu-

continued on page 70

mini-signs
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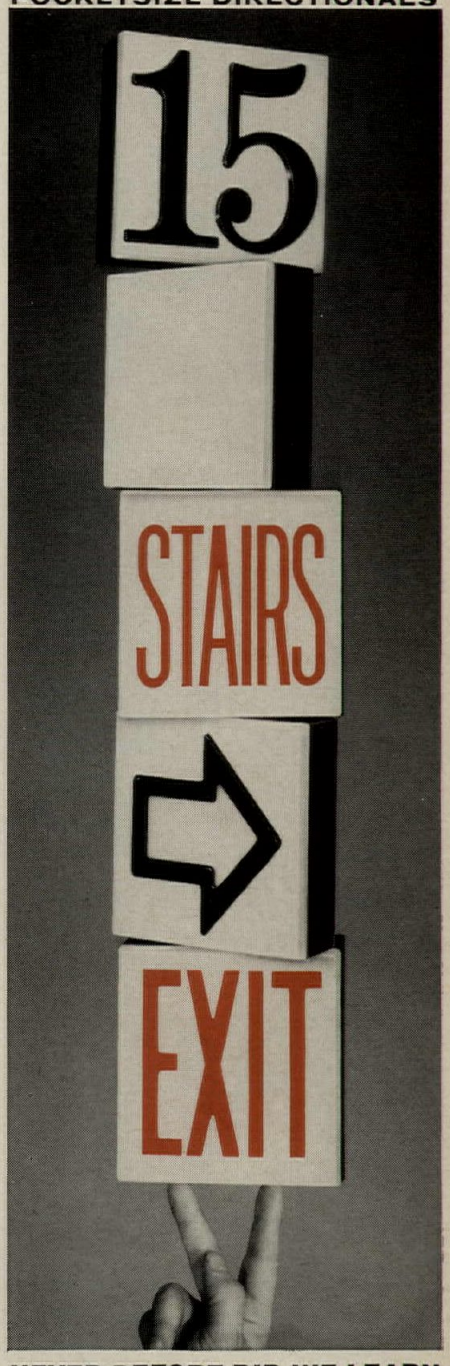

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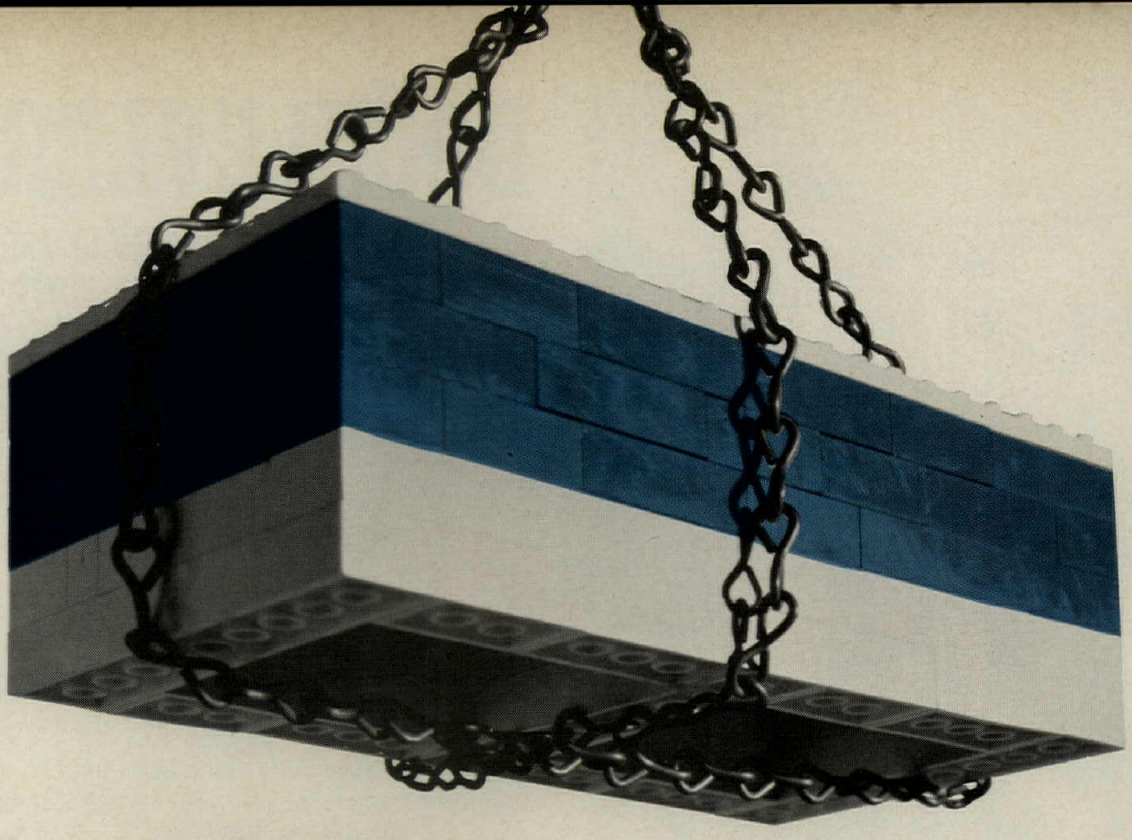

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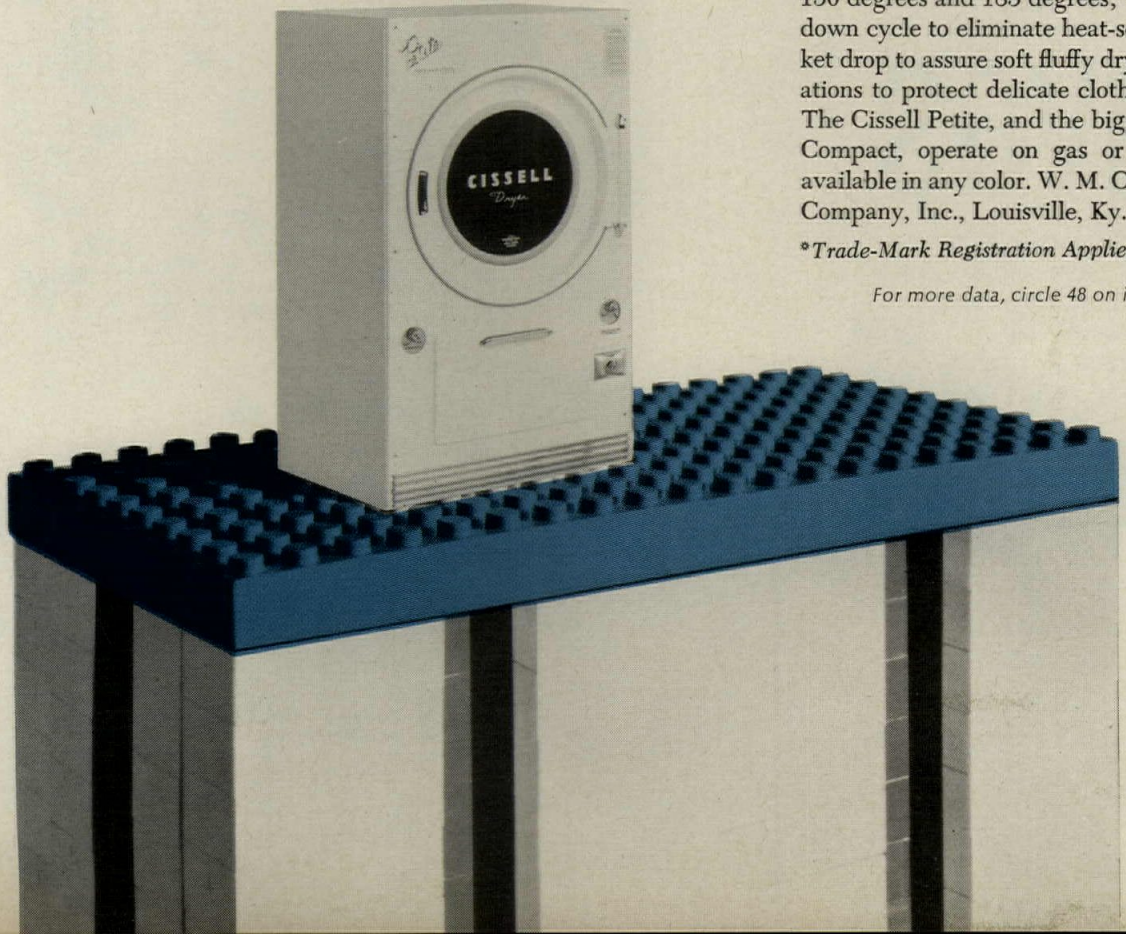

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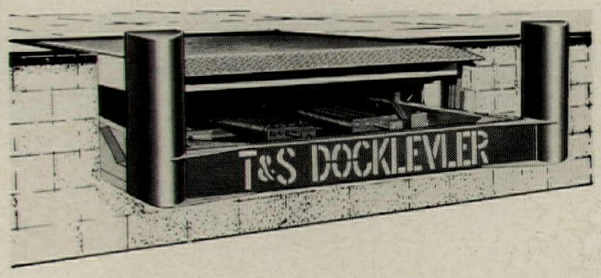

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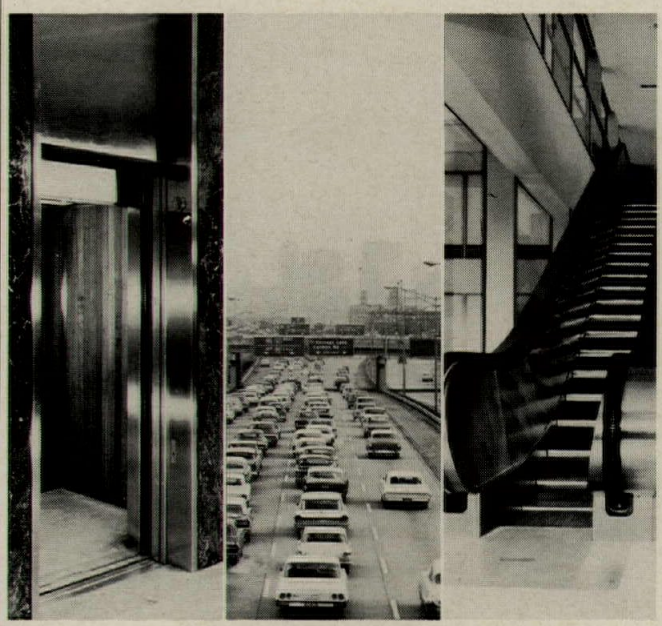

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and precision performance that never stops!

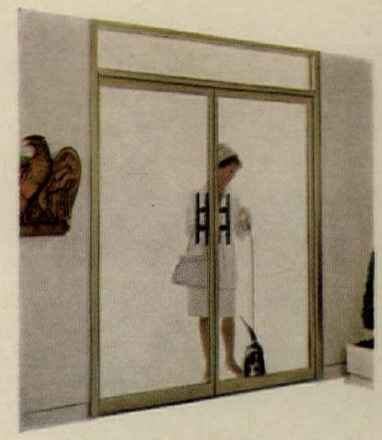
Now with **PERMANODIC*** *color*

Whatever you're planning—skyscraper, storefront, apartment, hospital, school or salon—Kawneer has an entrance package designed to meet your requirements for performance and appearance.

Independent laboratory tests and on-the-job installations prove Kawneer entrances last longer and are engineered to deliver superior performance—even after years of vigorous traffic and extreme weather conditions.

Now, there is an additional advantage to specifying Kawneer—Permanodic colors! These anodic hard color finishes add new warmth. And their beauty is *lasting*. Permanodic finishes are created from alloys, not dyes, and therefore are non-fading, resist corrosion and abrasion. These new entrance packages also offer exciting, new hardware options including Permanodic bars and new grips in teal, earth or black.

For superior performance, permanent beauty, and the savings these features afford, specify a Kawneer entrance package. Write for specification file, number P. E. 64, or Sweets File 16 E/KA.



Full Vision 128 Entrance Package—
shown Permanodic Light Bronze No. 26.

Narrow Stile 190 Entrance Package—
shown in Alumilite No. 204 A1R1.

Wide Stile 500 Entrance Package—
shown in Permanodic Black No. 29.

Extra Duty 350 Entrance Package—
shown in Permanodic Medium Bronze No. 28.

All entrances illustrated with concealed overhead closer. 190, 350 and 500 available with 5 closer options. 125 and 128 with concealed closer only.

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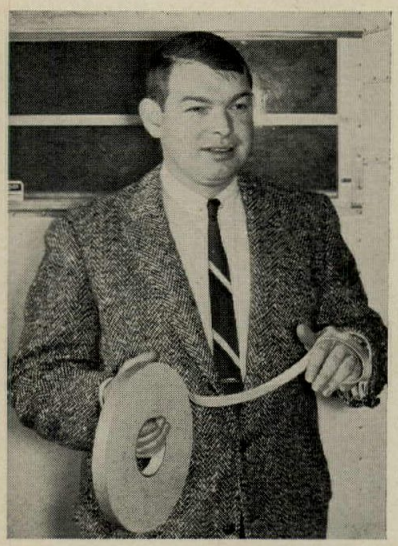
Our new BEAR vinyl foam tape seals, cushions and insulates practically everything...

Even people packages

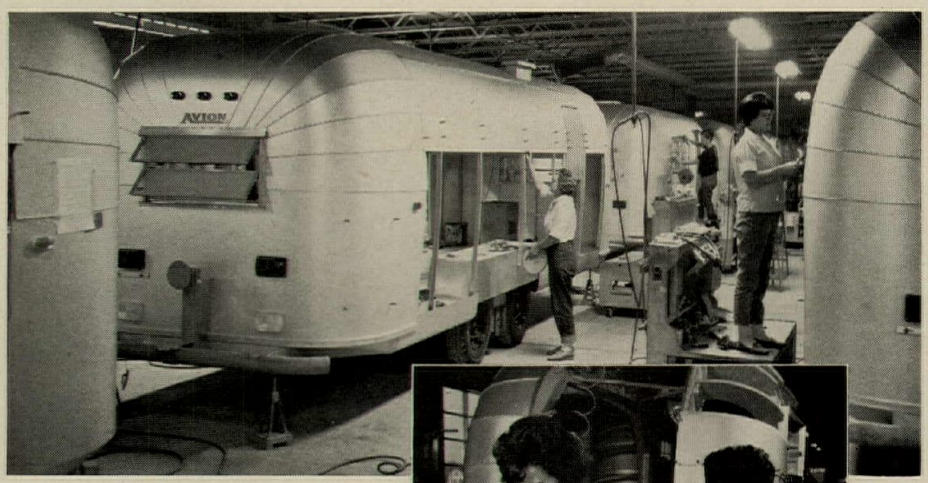
step up to AVION quality

Free color catalog available from Avion Coach Corporation, 1300 East Empire Ave., Benton Harbor, Mich.



"Avion coaches enjoy the reputation of highest quality and dependability. Thorough testing is completed before we accept any components. It is a pleasure to add the benefits of a new product such as BEAR vinyl foam tapes to our production."

FRANK CULBY
Director of Purchases



BEAR Vinyl Foam Tape seals out wind, rain, dust . . . acts as a vibration dampener . . . sticks at a touch . . . no waste . . . no cleanup . . . offers built-in recovery.

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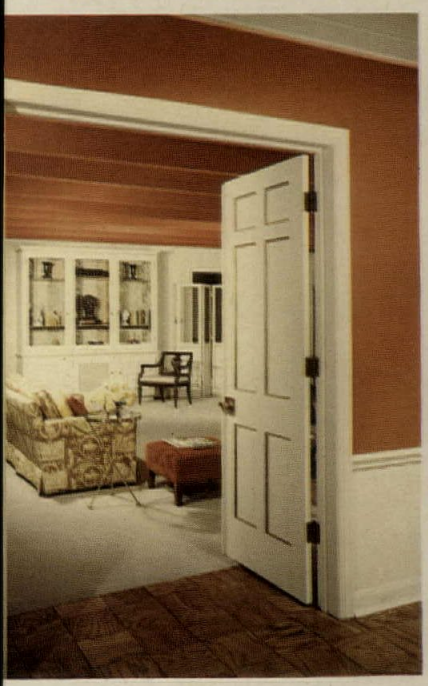

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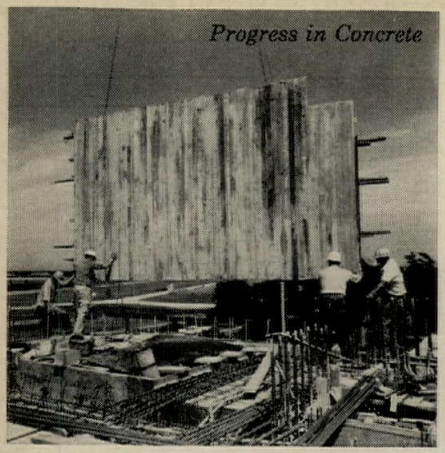
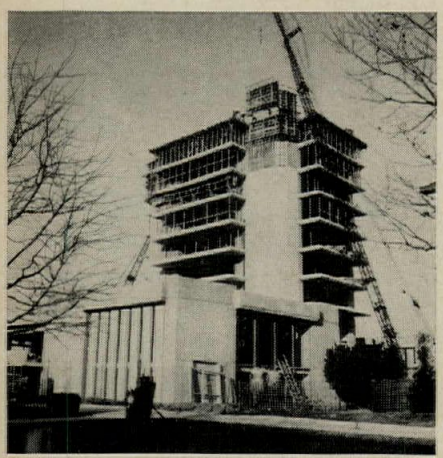


SYMONS STEEL-PLY FORMS GANGED AND LINED



Gerace and Castagna, Manhasset, New York, contractor; Warner, Burns, Toan and Lunde, architects.

Hofstra University, Hempstead, Long Island, recently constructed a new library tower which expanded their facilities three times.

Four 140′ high mitered and tapered corner shafts, poured in place, form the library design base. To form these corner shafts, Symons Steel-Ply Forms were assembled in 11′ x 15′ x 20′ gang sections, and lined with Spruce and Pine, 4″ wide and varying in thickness. A rough finish was obtained by staggering the varied thickness boards, and by intermingling circular saw cut boards.

Symons Forms were chosen because they could be ganged and hold an irregular mitered shape. Also, careful formwork construction was essential to insure that the texture of the rough-sawed lumber butt-joined pattern showed. The mitered corners, which have a 11° angle, were formed with Symons hinged corners. Two gang sections were joined with the corner and a 2″ steel filler to complete the formwork. Finishing was easy because Symons Gang Form Ties with their positive breakback and a .225 diameter, left small tie holes which were easy to fill.

Forms may be rented, purchased or rented with purchase option. *Architectural Bulletins sent on request.*

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MORE SAVINGS WITH SYMONS

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continued from page 61

mination Congress—Shoreham Hotel, Washington, D.C.

31-June 3 Seventh Annual Conference, U.S. Institute for Theatre Technology—Barbizon-Plaza, New York City.

OFFICE NOTES

OFFICES OPENED

Hall and Goodhue, Architects-City Planners have opened a San Francisco office at 100 Bush St. They also have an office at 380 Cannery Row, Monterey, Calif.

John Hejduk A.I.A., Architect announces the opening of an office at 207 East 37th St., New York City.

Irwin B. Lefkowitz, A.I.A. has opened an office for the practice of architecture at 100 Stevens Ave., Mount Vernon, N.Y.

Architect **Leroy B. Miller, A.I.A.** announces the establishment of new offices at 113 North San Vicente Blvd., Beverly Hills, Calif.

O'Kelly, Mendez & Brunner, Architects-Engineers have established new offices at 1500 Franklin D. Roosevelt Ave., San Juan, Puerto Rico.

Michael H. Spector, Architect has opened his own office with architectural, planning and interior design services at 21 Kings Place, Great Neck, N.Y. He also has recently opened an office in New York City.

G. John Stevens has opened his own architectural office at 6623 Gratiot Ave., Detroit, Mich.

Jonas Vizbaras/Architect has opened his own architectural office at 518 Willis Ave., Bronx, N.Y.

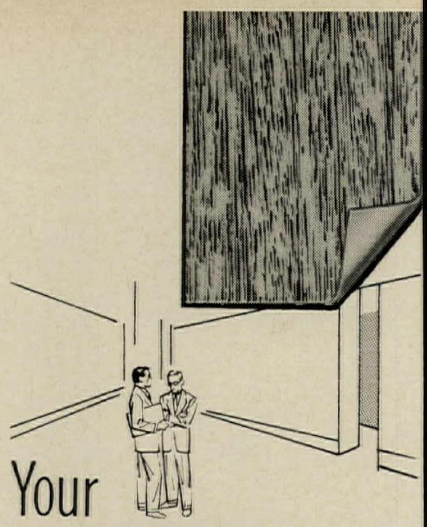
Irv Weiner Architect A.I.A. announces the opening of his office at 212 East 49th St., New York City.

NEW FIRMS, FIRM CHANGES

Harold S. Bradley, president and partner of **Bradley & Bradley, Inc.,** Architects, Rockford, Ill. has appointed his son, **Charles M. Bradley,** president and **Richard F. Wolfley,** vice president. The 82-year-old firm will continue practice in Rockford, Ill.

David Castro-Blanco, Robert Piscioneri and **Leslie Feder** have formed a partnership under the firm name **Castro-Blanco, Piscioneri & Feder, Architects** to be located at 103 Park Ave., New York City. The new firm will continue the practice formerly conducted as **Robert J. Piscioneri & Associates, Architects.**

continued on page 109



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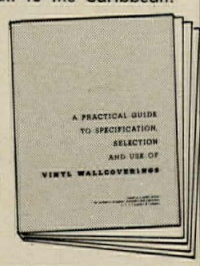

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Cleanly detailed without exposed hardware, it provides large areas of light and involves none of the costs and complications of luminous ceilings. Sky-Light was engineered to integrate with a conventional tile or plaster ceiling.

A system of coordinated units in six sizes up to 4′ x 4′ allows you to illuminate large work areas, create traffic patterns and accentuate small areas all with a continuity of design.

The frame is made of matte white, heavy-gauge extruded aluminum that will not bow. The corners are mitered and welded to reduce the trim to a minimum. A deep reveal gives the frame a soft luster which does away with the dark cluttered appearance usually produced by flat runners.

And the structural acrylic diffuser is matte-finished on both sides to completely eliminate reflections from windows or other light sources.

Write us for further information, or visit our showrooms.

We think it's a major step forward in the lighting of large areas.

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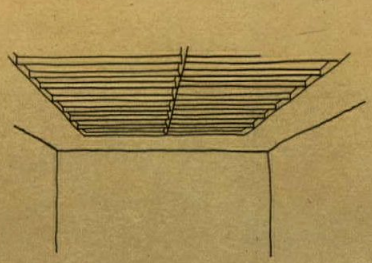

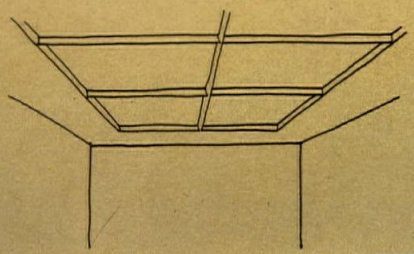

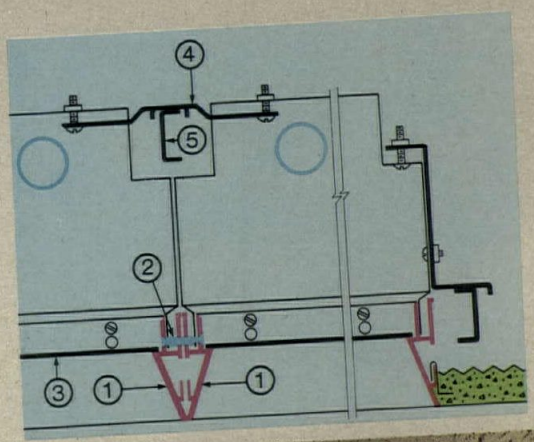

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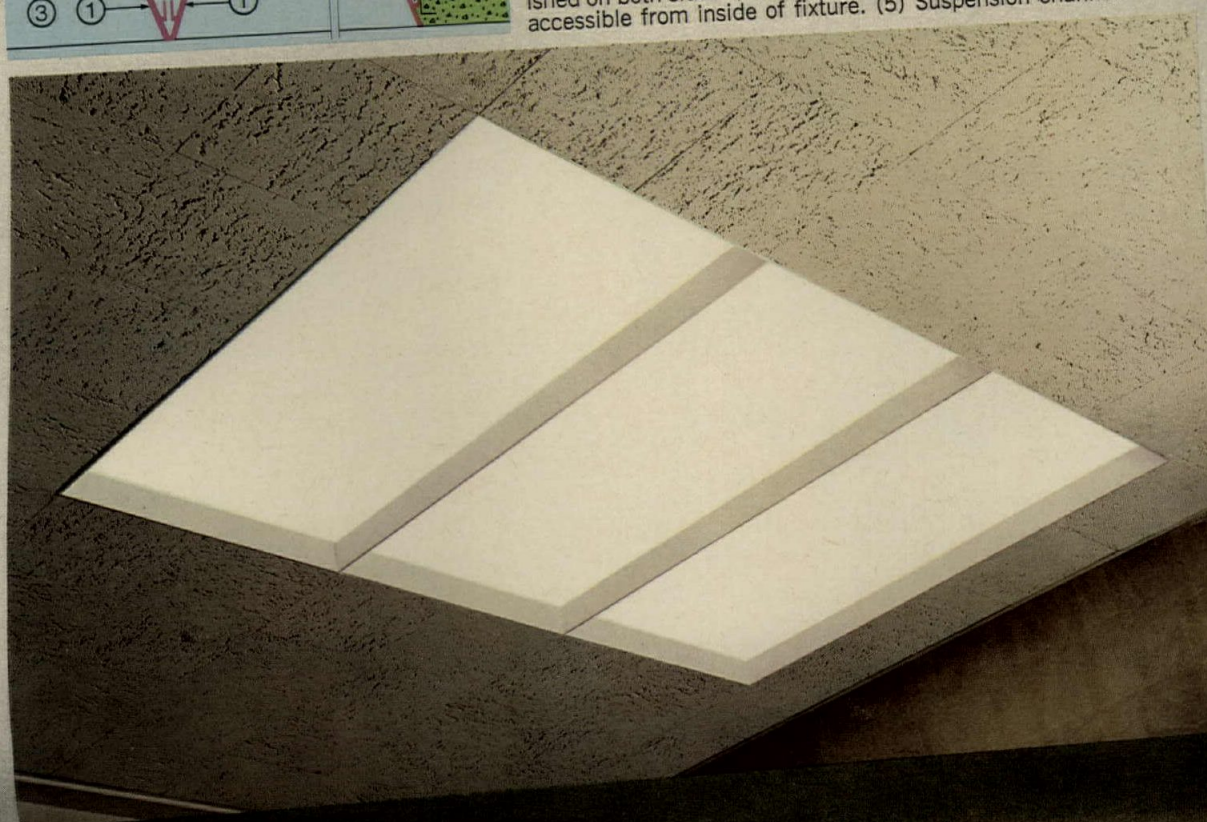
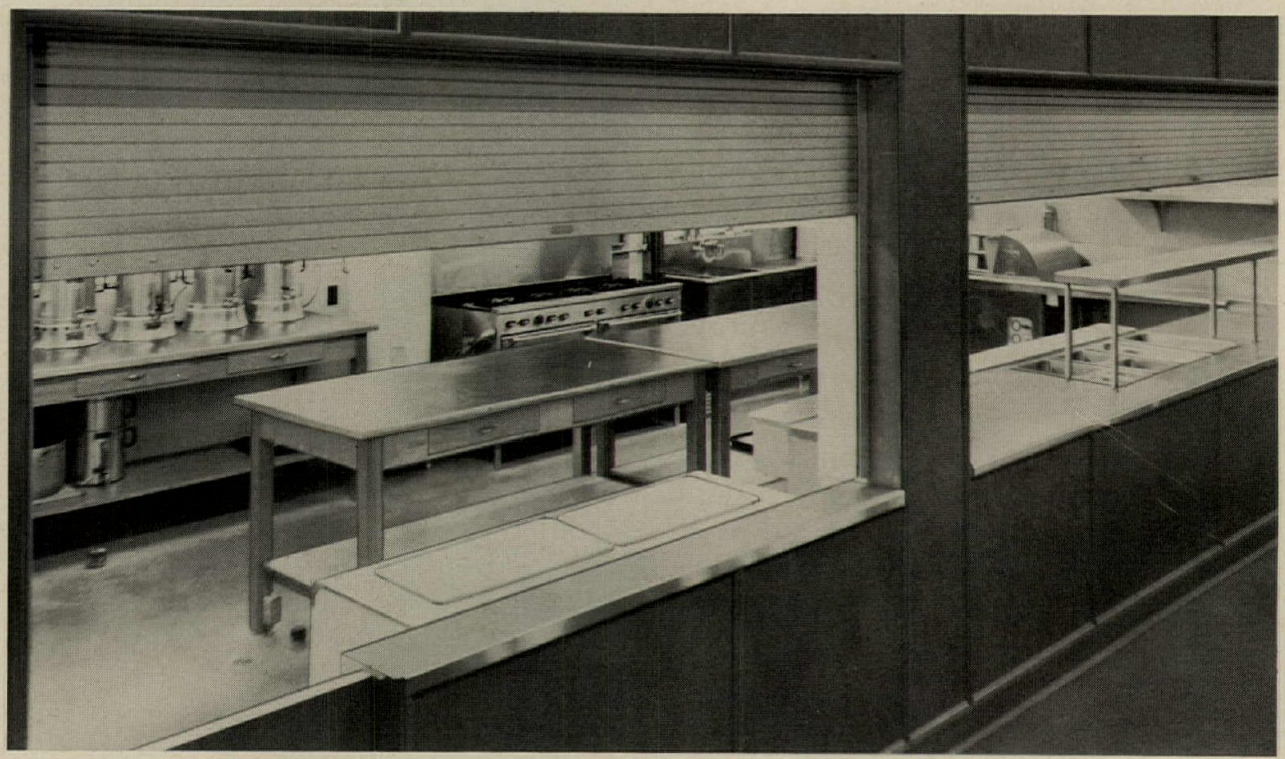
(1) Extruded aluminum trim (.125″ wall), with mitred, welded corners and matte white finish. (2) Cap screw clamps and precisely aligns fixtures. (3) Structural acrylic diffuser, matte finished on both sides. (4) Fully adjustable pattern mounting hanger, accessible from inside of fixture. (5) Suspension channel.



Now...an answer to one of your difficult closure problems...



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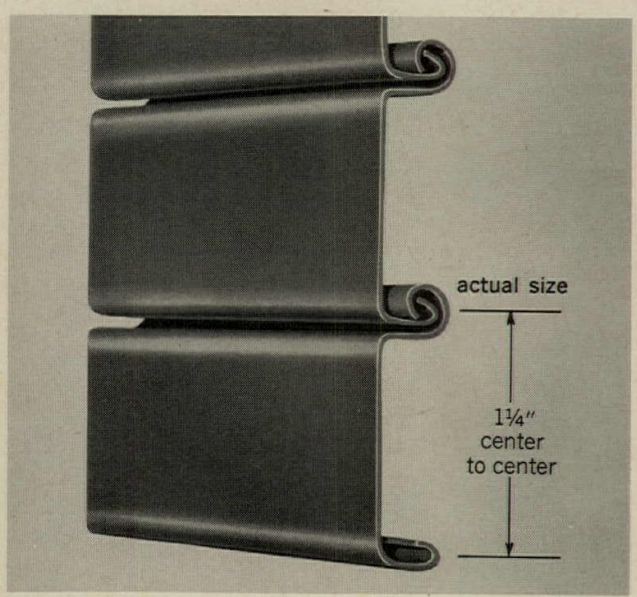
Service-counter closures offering maximum fire protection used to look massive, heavy and cold. Now they need not.

We have a solution to the problem, no matter how critical your taste. It's the new Cookson FD10 Series U.L. Labeled Counter Fire Doors, styled in slim lines to complement modern decor.



Available in either push-up or crank operated design, FD10 Series Doors are being specified and used extensively in schools, cafeterias, offices, stores, ticket windows, hospitals . . . wherever fire safety and security must be provided without sacrifice of appearance.

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Key To Slim-Line Styling Of The FD10 Series

The curtains of the Cookson FD10 Series Doors are fabricated from the miniaturized #10 slat, in either galvanized or stainless steel. With a center-to-center dimension of only 1¼", this slat has permitted substantial reduction of head and side room requirements.

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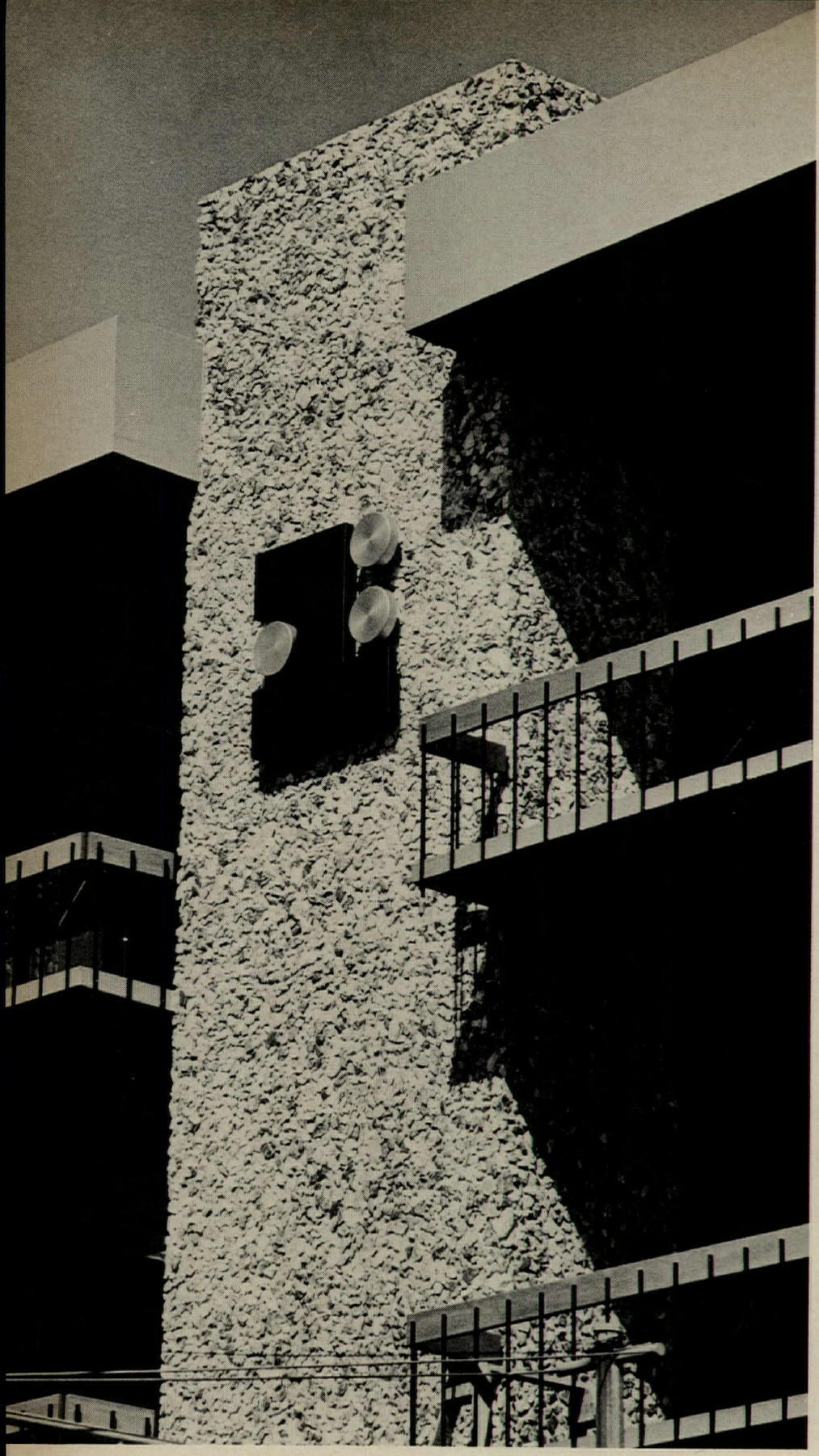

Mo-Sai projects an image of strength and solidarity for savings and loan offices

Deeply textured Mo-Sai facing units 9 feet wide by 25 feet tall were used as forms for the poured-in-place concrete structural columns. The few required joints were well concealed, giving the columns a monolithic appearance both inside and out. Random quartz aggregates from dark brown to almost white impart a warm, friendly color. Mo-Sai in contrast with exotic wood paneling was used to create the dramatic teller windows and was also used throughout the unusually beautiful offices. The rough textures and colors of the Mo-Sai were chosen by the architects as an expression of the rugged beauty of the Northwest.

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Architects: Branch, Branch & Garrison
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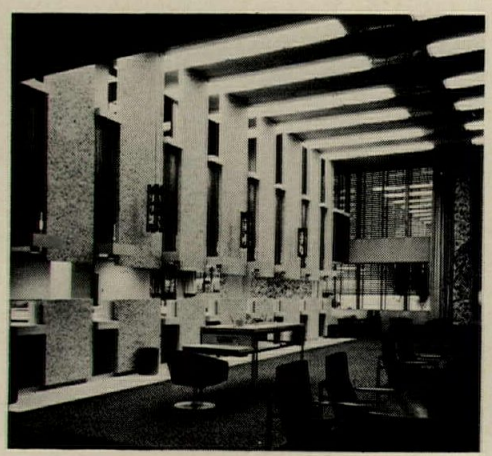

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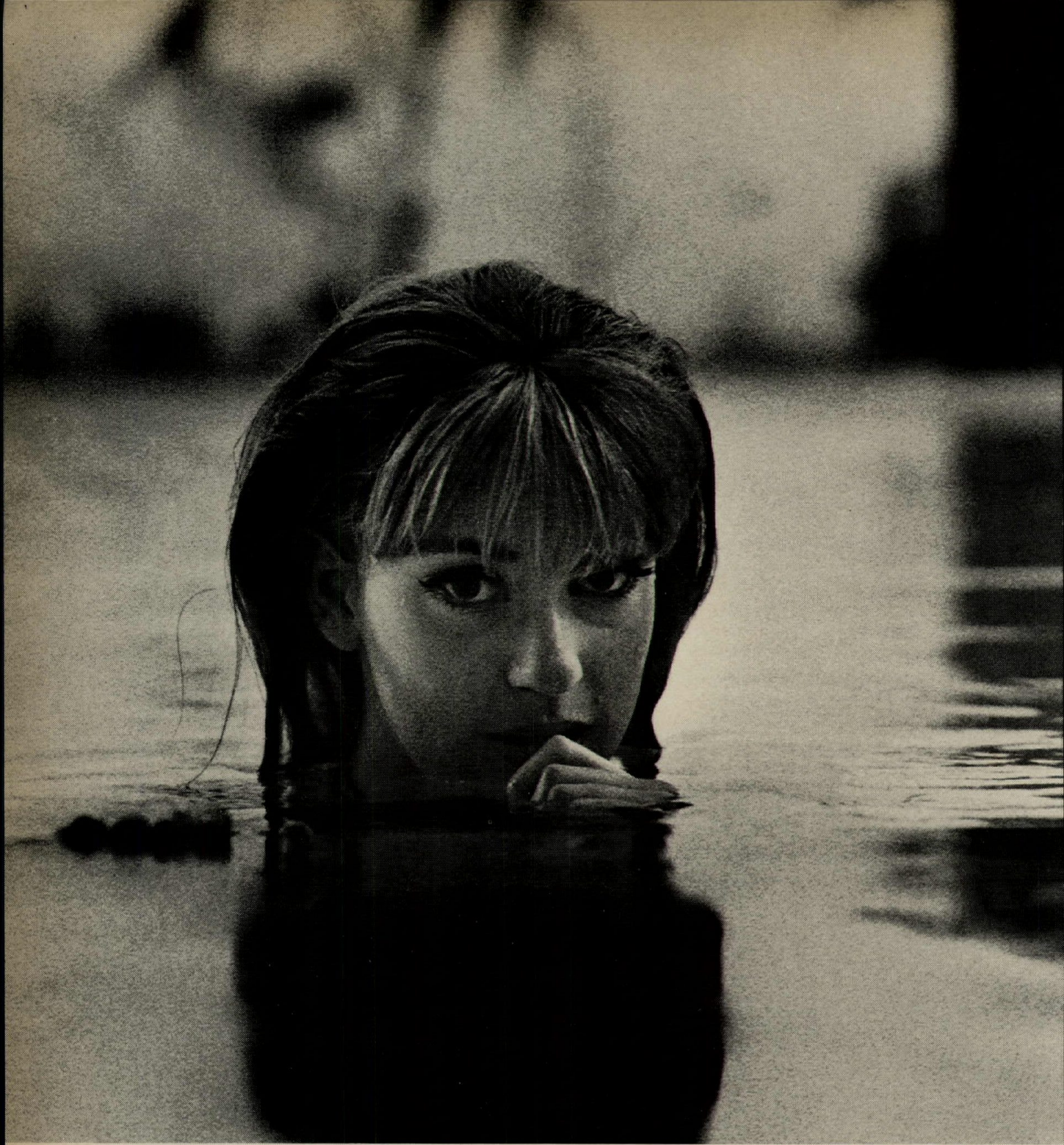

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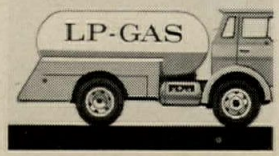

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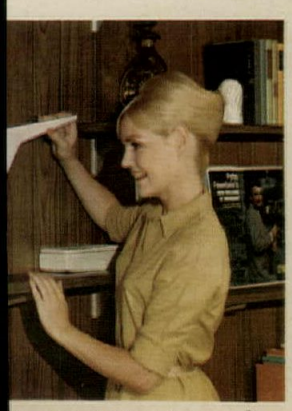
IMAGINE—A PANELED WALL THAT DECORATES & WORKS—CHANGES with CHANGING TASTES



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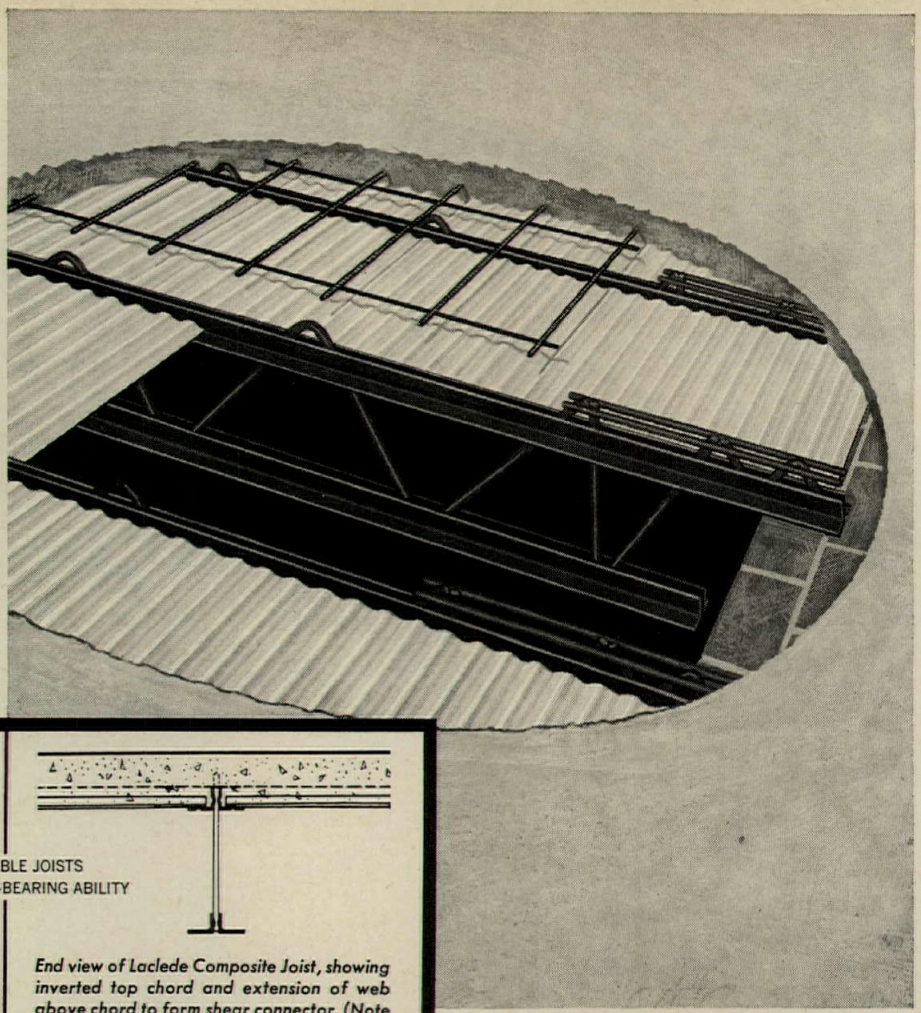
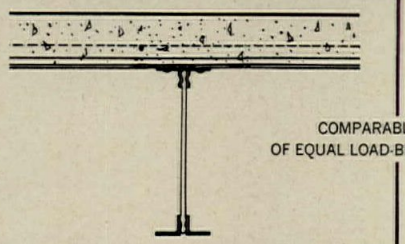
LACLEDE composite joists improve floor construction





COMPARABLE JOISTS
OF EQUAL LOAD-BEARING ABILITY

End view silhouette of conventional open web steel joist.

End view of Laclede Composite Joist, showing inverted top chord and extension of web above chord to form shear connector. (Note additional head room).

Combines the Advantages of Concrete and Steel for

Deck can be easily placed by one man.

- **LONGER SPANS WITH LESS DEFLECTION**
- **MORE EFFICIENT STEEL DESIGN**
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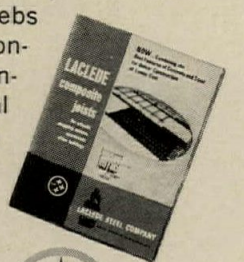
- **SAVING IN HEAD ROOM**
- **MORE EFFICIENT AND ECONOMICAL STEEL PLACING AND FORMING**
- **EQUALLY USEFUL WITH STEEL, CONCRETE AND MASONRY CONSTRUCTION**

Here, after extensive research, is the perfect blending of steel and concrete for better construction at lower cost, permitting more efficient steel placement and slab form installation than usually required with many types of steel joist construction. In Laclede Composite Joists, top chords are inverted to form a shelf on which prefabricated deck is easily and quickly placed by one man. Webs extend above top chords, acting as built-in shear connectors which do not have to be welded on. The concrete acts, in effect, as the top chord of the structural system. Laclede Composite Joists are available in a wide range of lengths, depths and load bearing capacities. Write for new technical brochure.



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Planned cost control: an instrument for good design

The rigid cost limits under which most buildings today are designed, could be turned into a useful design discipline rather than—as is most often the case—erupting like "a time bomb set to go off when bids come in." So said British architect, A. G. Aldersey-Williams in an evocative address to the 1966 RIBA Conference in Dublin.

Last-minute compromise with cost defeats design

Under the title "The Interdependence of Design Decisions" Mr. Aldersey-Williams drew together a number of "random ideas" which he felt had a significant effect on the efficient functioning of the design team. His most pressing concern was with the way in which last minute, *ad hoc* decisions—made to save expense—often result in uncomfortable, unbalanced or unattractive architectural solutions that do not in the end even have the merit of being particularly cheap. If cost were assessed at a much earlier stage, Mr. Aldersey-Williams maintained, economic solutions could usually be arrived at which did not so seriously compromise the finished building.

Early programed costing retains control at the design phase

To combat these difficulties, he suggested the formulation of a "cost plan" to act as a regulator in design decisions and to give a basis for evaluating where economies can best be achieved. Such a cost plan would establish a "theoretical minimum" for which a building meeting the program requirements could be erected. This theoretical minimum would not be considered as an actual realizable optimum, but would function as a basic datum against which the final cost of the building could be manipulated and compared. The minimum realizable cost might turn out to be datum plus 50 per cent, while to get a really first class interior environment, the client might decide for datum plus 75 per cent. The setting up of such a cost datum should, says Mr. Aldersey-Williams, "enable us to cost design decisions and their implications from the beginning. To put it more crudely, if A does this C1 must do that (to maintain the same performance standards), C2 this, and so on. Therefore, the cost of A's decision is a+c1+c2+ . . . . . Cost is then the means of weighting conflicting decisions."

Architect's judgment remains in control

Of course, as Mr. Aldersey-Williams recognizes, this still leaves the essential problem of "comparing imponderables" to the individual judgment of the architect who must in the last analysis decide "whether a reduction in the standard of sound insulation is worth an improvement in thermal comfort, or whether either are worth more than a better floor finish" but at least the alternatives and their implications are clearly stated before irreversible decisions are made.

And the architect's commitment to good design is clarified

To those who may complain that knowing the cost of a decision before making it might inhibit the architect to such an extent that "Architecture with a capital A" would cease to exist, Mr. Williams replies that this might not be such a bad thing "since we would certainly have much more good building. In fact, nothing I have said need limit anybody though it might take a good deal more strength of character to make a decision when you know in advance that it is going to cost another $30,000."

LBJ suggests trust fund to finance highway beauty

A beautiful America is still part of the President's valiant but glimmering dream of a Great Society, but in the face of continued spending in Viet Nam, it may become more and more difficult to afford the inevitable enabling appropriations.

In order to maintain the highway beautification program, President Johnson has suggested the creation of a special Trust Fund to finance highway beauty as well as safety. If the new trust fund, however, results in a cut in more basic highway spending, the President will find it difficult to get the necessary approval.

Although beauty obviously comes lower in the list of priorities than safety, there is a strong case for combining the two. The removal of bric-a-brac from our highways and the creation of a better ordered and more uniform system of lights and signs are unquestionably important factors in improving both.

ARCHITECTURAL BUSINESS THIS MONTH

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Construction pricing and scheduling made easier by new reference manual

F. W. Dodge's new Construction Pricing and Scheduling Manual is a comparatively slim volume which packs a vast amount of information on the cost, labor and time involved in construction of all kinds—from showerstall installation to road excavation—into its 170 pages. The information is presented in easily readable tabular form with the relevant data under two headings "output per day" and "cost". The "output per day" category defines the number and type of men needed on a job and the amount of work they can achieve in a day; the "cost" category on the other side of the page divides cost into labor and material price; the space in between these two columns gives details of the construction item concerned. Two tables at the front are devoted to an adjustment index for the major building trade costs throughout the country in a form which reflects each city's percentage of the prices shown in the manual. An alphabetical subject index at the back gives all the construction types and items dealt with in the manual.

The new manual, which will become an annual reference volume, aims at providing sufficient information in compact form to enable architects, engineers, construction supervisors and contractors to prepare progress charts and critical path scheduling on all their work. The manual was edited by estimator Norman Foster.

The manual can be obtained—price $9.95, initial copy, $8.95 for additional copies—from Dodge Construction Pricing and Scheduling Manual, 330 West 42nd Street, New York, N.Y. 10036

Revised wording inserted in indemnification clause

Revised wording for subparagraph 4.18.3 of the new contract document has been formally agreed by the A.I.A., the AGC, and representatives of the insurance industry (Record, Feb., page 81). The new wording which will be included in the next printing of Document A 201, "General Conditions of the Contract" reads as follows:

"The obligation of the contractor under this paragraph 4.18 shall not extend to the liability of the architect, his agents or employees arising out of (1) the preparation or approval of maps, drawings, opinions, reports, change orders, designs or specifications, or (2) the giving of or the failure to give directions or instructions by the architect, his agents or employees provided such giving or failure to give is the primary cause of the injury or damage."

A notice setting out the new wording is being circulated to members by the A.I.A. with instructions to substitute the new clause whenever the present edition of A 201 is used.

Although this may be only the first of a number of modifications, the new wording should certainly relieve contractors of their fears that the hold harmless clause represents any kind of unwarranted shelving of responsibility on the part of the architect. Perhaps more significantly it does suggest that continued discussion of the issues between interested parties will be productive.

Tax and investment advice for self-employed architects and engineers

Advice on how to minimize taxes and make sound investments is always welcome particularly at this time of year, so a publication put out by the Consulting Engineers Council under the title "Tax Saving Plans for the Self-Employed" should find an interested readership.

The booklet explains recent amendments to the Self Employed Individuals Tax Retirement Act, which were signed into effect last November. Two of these revisions—specifically supported by the C.E.C.—increase tax-deferrable annual pension contributions from $1,250 to $2,500 for self-employed retirement pensions and allow computation of annual retirement plan contribution on the full amount of net profit rather than the previous figure of only 30 per cent.

The booklet gives details of how to obtain tax benefits on retirement plans; how best to invest retirement saving and answers the questions "how much to save, how much is tax-deductable, how are benefits drawn and taxed?" in relation to state and Federal laws. A well drawn index gives a quick indication of the subject matter, how it is approached and of what value it may be to the individual reader. Copies can be obtained, price 50 cents to members, $1 to nonmembers, from the Consulting Engineers Council, 1155-15th Street, N.W., Washington, D.C. 20005.

How to participate in mortgage financing

On the investment angle, the Institutional Monetary Corporation has put out a brochure explaining the Mortgage Trust Indenture Program, which is a scheme that makes possible greater participation by small and large investors in the potentials offered by large-scale mortgage financing of commercial, industrial and residential projects.

The booklet, which gives details of the formation and operation and the advantages of the program, can be obtained by writing to the Institutional Monetary Corporation, 295 Madison Avenue, New York, N.Y. 10017

A setback for plastic pipe in Ohio as stay-order stops code action

At the eleventh hour, a suit by the Jamison Plumbing and Heating Company of Springfield, Ohio, has apparently halted formal approval of plastic pipe and fittings for drain waste and vent application under the Ohio State Building Code. Despite strong opposition from the Cast Iron Soil Pipe Institute, the Ohio Board of Building Standards was apparently ready to add approved plastic drain waste to the Code as from the beginning of January this year, but the Jamison suit —filed on December 30—automatically produced a temporary stay order.

The Cast Iron Institute is reportedly claiming that this stay order makes the use of plastic pipe illegal in Cleveland, but since that city has a home rule charter, the secretary of the Cleveland Board of Building Standards maintains that the use of plastic pipe is still permissible in Cleveland—provided it meets the city's building code standard.

The wrangle between the cast iron and the plastic pipe industries remains a bitter one, with Counsel for the Plastic Pipe Institute presently considering whether to take action with the Ohio Attorney General's office in defense of the Board of Building Standards' position.

COMMENT AND CONTRACT TABULATION

George A. Christie, Chief Economist
F. W. Dodge Company,
A Division of McGraw-Hill

Two new clues to 1967 industrial/commercial building

Two important new pieces of economic information have just been made available as a result of a pair of timely surveys by the McGraw-Hill (Publications Division) Economics Department. These reports put some new light on the increasingly problematical short-term outlook for industrial and commercial building.

One of them is a special, interim check-up on last fall's broader survey of businessmen's plans for 1967 capital spending. The other questionnaire asked for corporate executives' expectations for profits in the year ahead. Since businessmen invest in new plant and equipment for the purpose of turning a profit, these two up-to-date measures of corporate plans and expectations are even more meaningful in combination than they are individually.

First, the profit outlook. The economy has been expanding for nearly six years now, and corporate profits have grown with it. But recently the rate of increase in pre-tax profits has begun to slow down. Last year's gain was 8 per cent, while in both 1964 and 1965 profits rose by 13 per cent.

Results of the latest survey indicate that though many corporations expect to improve on last year's performance, the 1967 gain will be considerably smaller and more difficult to achieve. U.S. corporations now expect profits before taxes to rise 4 per cent this year—only half the 1966 increase. Against this background, what are corporations doing about their investment plans?

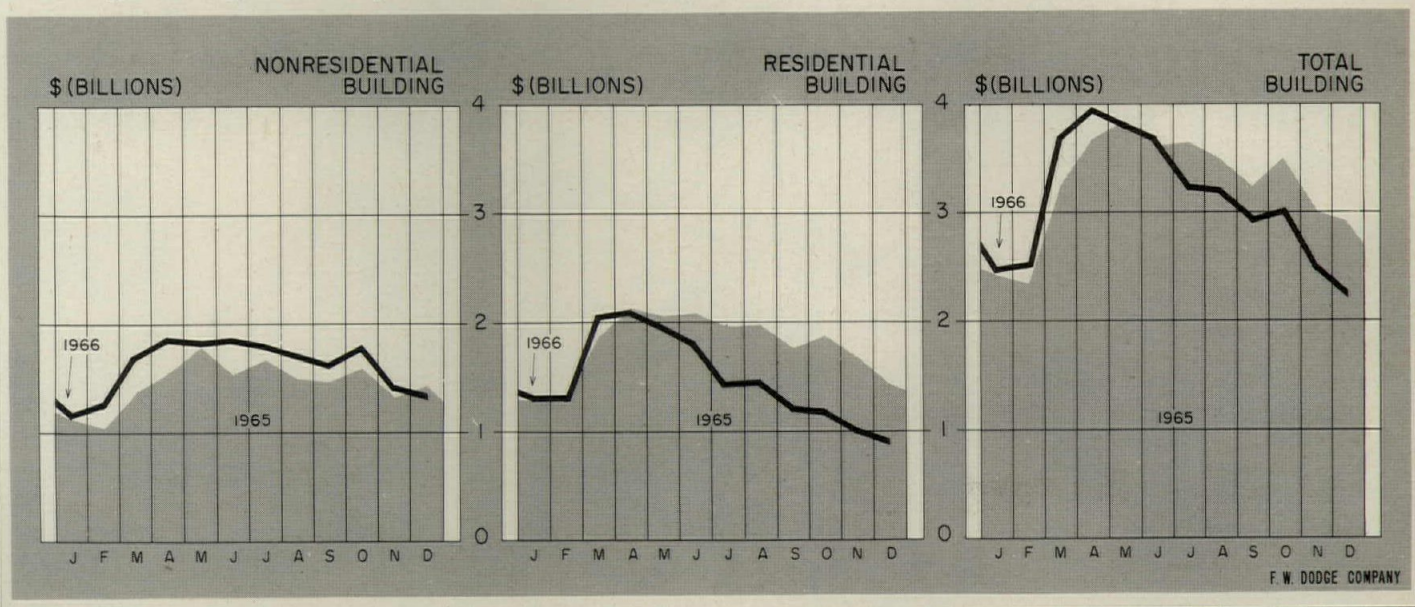
Capital spending intentions. Here, too, we can see a similar pattern shaping up. Corporate investment in new plant and equipment has expanded spectacularly over the past five years. Between 1961 and 1966, the growth in annual capital spending was 76 per cent, and this past year's gain was still 17 per cent.

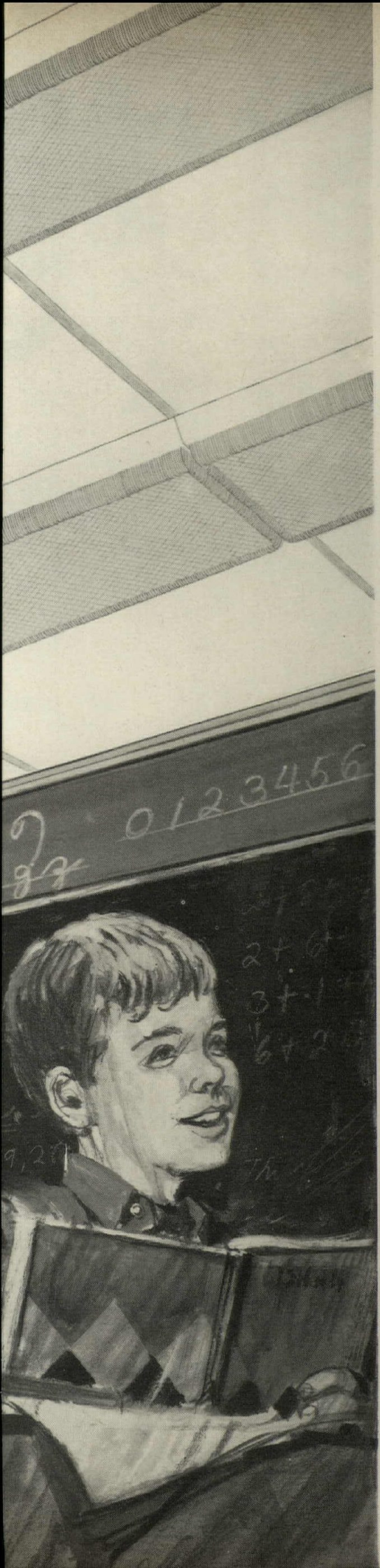
Intentions for 1967—as revealed in the most recent survey—indicate further expansion, but at the more modest rate of 6 per cent. And even that represents an improvement over the 5 per cent increase that was being planned at the time of the fall '66 survey. That lower outlook was unquestionably influenced by last year's suspension of the investment tax credit and accelerated depreciation, and the latest (higher) rate probably reflects the result of some second thoughts. Nevertheless, it's clear that in terms of either profit expectations or planned outlays for plant and equipment, 1967 shapes up as the year in which these steeply rising curves start to flatten out.

New contracting In '67. For new contracting of industrial and commercial building (as well as for new orders for machinery and equipment) these recent developments may be even more foreboding. This is because a lot of the 6 per cent gain in *expenditures* implied for 1967 is already "locked in" with the very strong volume of construction contracts and the heavy backlog of equipment orders that were put on the books in the latter part of last year. Allowing for a six-month or more building period, and up to a year's wait for equipment deliveries, the level of 1967 plant and equipment spending has already been

Right now, new industrial and commercial building contracting—which will be having its greatest expenditure impact around mid-year—is actually weakening a bit. The flow of these new commitments for future business-related construction during the next two critical quarters will provide an early test of whether the five-year-long growth of capital spending is merely pausing for a while or is heading for a downturn.

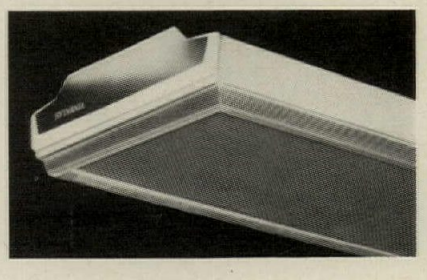
Building activity: monthly contract tabulations





From Sylvania: where new ideas are brought to light

A real softie– never lets a harsh glare spoil bright surfaces



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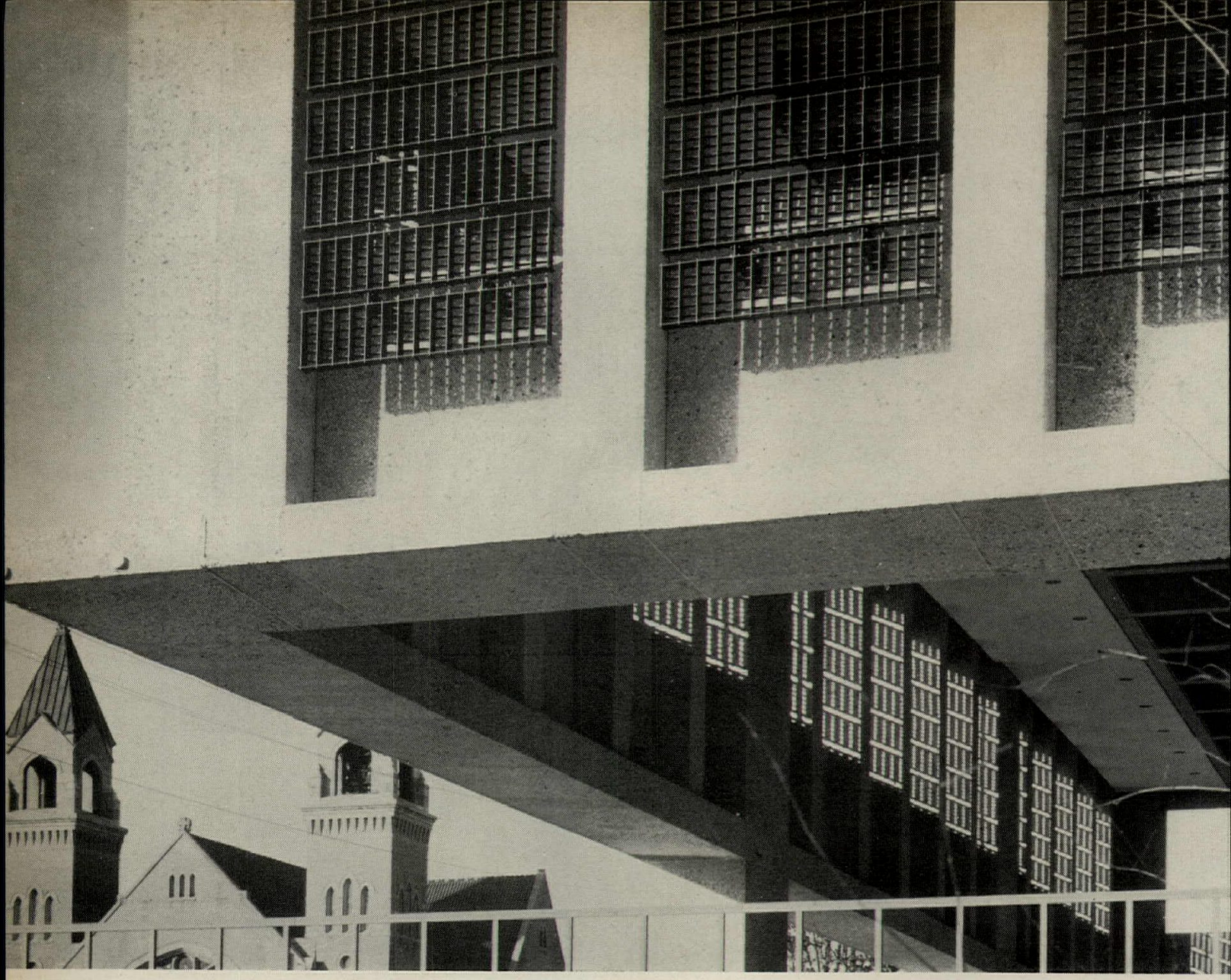

BORDEN DECOR PANEL: Custom Design Screening

The North Carolina Mutual Life Insurance Co. building in Durham, North Carolina, is shown here. Designed by Welton Becket, F.A.I.A., Architect, of New York City, this multi-story structure utilizes custom designed screening of Borden Decor Panel in rich Kalcolor Bronze finish.

Created to complement and enhance the character of the building, the Decor Panel screens were custom designed and specified, individually fabricated, and tailored for special erection methods—all within a fixed budget. The savings effected by Borden's fabrication and erection techniques made it possible for the architect to use the handsome bronze finish as well—still within the initial budget.

Sturdy, lightweight aluminum Borden Decor Panel, in both custom and standard designs, is a versatile architectural medium, widely used for facades, screening, sunshades, dividers, partitions, grilles, etc. It is particularly valuable for refacing of existing buildings. For more detailed information on custom and standard Borden Decor Panel:

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TRENDS AND ANALYSIS

Lawrence C. Jaquith, Economist
McKee-Berger-Mansueto Inc.
Construction Consultants

Orderly cost trends permit rational substitutions

Tracking the price vagaries of building materials over the past year has been a bit like following the stock market. Architects have been confronted with a confusion of ups and downs, especially in mechanical and electrical components. Excessive demand explained the over-all direction, which was obviously upward, but internally there was a grab bag of changes. Major suppliers often mixed price increases with some decreases in their product line, employing a logic that apparently defied cost considerations. In reality, many of these mixed price changes were ploys in guideline gamesmanship—the art of raising prices without incurring the government's wrath.

Price changes more orderly as artificial pressures ease

The concept of a 3.2 per cent guideline has now been mercifully retired—after being used by most labor unions as a jumping off point for wage demands—and some price readjustments are taking place. This is primarily true in those industries that were more subject to administration pressures than others, and in general of those that are finding profits trimmed by increased wage costs.

But with the easing of inflationary pressures, the increases that take place this year are not likely to be as sizeable, or as difficult to follow, as they were in 1966.

Substitute materials may warrant a new look

Architects will now be better able to assess the significance of the actual changes that have occurred affecting the economy of using one material in place of another. And with the pace of construction tapering off, a greater premium is being placed on just such cost considerations.

The most obvious areas for weighing the relative costs of materials are where new products are being introduced. But this is an all-of-the-time concern; it is following a period of major price fluctuations that *closer* attention should also be given to reappraising the relative costs of some traditional substitutes.

One prime example of cost substitution: aluminum vs. copper wire

Until something like a year ago, the saving gained by using aluminum wire was practically negligible. Since then, both products have increased in price, but because world copper supply is limited (in part by political unrest in mining areas) and defense requirements have increased drastically, copper prices have been forced up much higher. As a result, the potential savings in using aluminum wire are now generally recognized to be quite substantial. As a per cent of total job cost, they are, in fact, probably more than is realized.

Depending on size, copper thermoplastic (insulation) wire is approximately two to three times as expensive as aluminum thermoplastic wire (THW) with comparable capacity. In most instances, the latter requires a larger (and more expensive) conduit. Including conduit cost, rigid-conduit aluminum THW is still approximately 35 to 45 per cent less expensive than rigid-conduit copper THW. In thin wall electrical metal tube, aluminum THW is approximately 40 to 50 per cent less expensive. While the difference is not as great on the smaller branch sizes, these figures represent the average potential savings in materials cost on most sizes.

Lighter weight means lower labor costs

In addition to the differences in the cost of material, there are some differences in labor costs as well: in the feeder sizes, there is a potential saving on incidental handling since the weight of aluminum wire and cable is approximately one-third that of copper. About 25 per cent less time and effort is required.

But the real savings come on the actual assembly and installation time of the feeder sizes, in particular in laying out, measuring, and pulling the cable. The same size crew is required but less time is involved. The estimating guidelines used by most electrical contractors show that total labor savings on aluminum wire in gages #6 to #2 should be approximately 5 per cent; in sizes #1 to 400 Mcm (thousands of circular mils) approximately 10 per cent; in sizes 500 Mcm to 1,000 Mcm, approximately 12 per cent. Many contractors find that over-all savings in labor can be even greater —as much as 30 per cent.

In the branch circuit sizes actual installation costs of copper and aluminum are about the same. In these small sizes, the weight difference is not a significant factor and the degree of difficulty of installation is more dependent on the type of insulation than on the conductor.

Over-all savings average over 1 per cent of the job

In dollars and cents, the savings on materials and labor costs can add up to a substantial figure. The electrical contract is usually about 10 to 15 per cent of the total cost of a job. Approximately 18 to 23 per cent of this sub-contract is for the purchase and installation of wire. Since most of this cost is for the material itself, the purchase of wire is approximately 1.5 to 3.0 per cent of the total cost of the job.

On this basis, the estimated savings obtainable through the substitution of aluminum wire would average over $10,000 on a million dollar job.

Presumably this figure would be larger on certain building types—hospitals, factories, etc.—where the electrical requirements are greater. On these building types, or on multi-million dollar buildings, the increased per cent savings would be a function of the greater requirements, not simply of a larger electrical contract. Larger wire would be needed and in these sizes the saving on aluminum is greater than in smaller sizes, in terms of both material and labor costs.

A late decision may eliminate savings on labor

If, in the early stages of design, these potential savings are not considered to be significant, the architect can always substitute aluminum for copper wire at a later date without sacrificing design. The labor savings, however, on the installation of aluminum wire can usually be obtained only prior to bidding. If alu-

minum is specified in a subsequent change, the subcontractor is less likely to pass these savings along.

The architect might approach the matter by suggesting that the engineer consider aluminum wire or by giving the contractor an option. The engineer might overlook the possible savings on aluminum wire, preferring to work with the more familiar design requirements of copper wire. The architect must weigh existing preferences against the potential savings. On most projects economic considerations should be the deciding factor.

The potential savings gained through the use of aluminum wire will obviously not be a crucial factor in coming in under a budget. But the extension of this approach to other areas may. By reappraising the relative costs of substitute materials in the light of recent price changes, the architect can undoubtedly reveal similar savings, and hopefully avoid the expense of redesign.

Entrenchment in law fosters abuses in either single or separate contract systems

The apparently inexhaustible controversy of separate versus single construction contracts still rages. A recent flurry is the reported effort of New York's Mayor Lindsay to obtain permission from the State Legislature to allow New York City's construction to be let under a single general contract instead of the four-prime-contract format now required under state law.

Specialty subcontractors (heating, ventilating and air conditioning, plumbing and electrical) have persuaded the legislatures in many states that separate bids from each of these subcontract trades is a superior contracting format. Single contracts to G.C.'s, they insist, breed inordinate bid "shopping", employment of subcontractors of marginal worth, and an inferior construction product all around.

The general contractors, of course, dispute this. How, they ask, can they have responsibility for the over-all performance of a construction effort when they have no authority over the major subs. Efforts to assign the subcontracts to the general contractor for "co-ordination and administration" are no solution, they assert. Co-ordination is not control, administration is not supervision, and lagging construction schedules are often attributable to applications of the multi-contract method.

No system guarantees freedom from abuse

We are often asked to formulate an optimum contracting format. In particular, these questions are pressed: 1) Which system is best from a job management point of view?; and 2) Which system will result in the least construction cost?

Experience has recommended these answers: First, neither system is "best". Both are temptations to abuse. However, if good contractors are employed, the single contract seems to us to offer the best opportunity for timely completion of project goals. In many areas, where construction demand exceeds industry capability, simple economic factors will mitigate against inordinate bid shopping. As a further precaution, the architect should always retain the right to reject sub-standard subcontractors.

Where there is no choice, construction costs go up

The worst abuse, under either system, however, comes from its entrenchment in law. Where the multi-contract system has enjoyed years of mandatory application, costs increase and job control diminishes. Where a single contract bidding procedure is long established by law, the use of low-priced, low-quality subcontractors is an ever present hazard.

Generally, the single contract will produce the lowest bids, but low bids are not the final expression of cost. Weak subcontractors and even good subcontractors whose bids have been "shopped" to below the profit level produce situations resulting in claims for extra compensation and frequent delays.

Control and flexibility are the key factors

For private work, where the architect can monitor the selection of subcontractors, the single contract is, in our opinion, best and cheapest. For public work, we recommend that neither system be entrenched in law. Here the greatest advantage to the owner and his architect is flexibility. The contract system employed should be based on a current evaluation of the market conditions, not on an environment that existed years ago when a state purchasing act was passed. In time, the mandatory separate contract system will develop its own abuses, at least equal to those which led to its adoption. Flexibility and the good judgment of the architect are the answers to this problem.

Consider first costs as a long-term investment

To the owner-occupant, the true cost of a building is obviously the initial cost plus the operating and maintenance costs over the life of the building during his occupancy—less whatever profit he may derive from sale at the end of his occupancy. Yet an initial saving without regard to future costs often dominates the consideration of building costs during establishment of the budget.

Translate cost facts into owner's language

From experience the architect might know that in the long run it would be to the owner's advantage to have a more expensive roof. Unfortunately he might not be able to prove this to the owner.

Here is a point of divergence between the languages pertaining to the concept of "total building cost". Both the owner and the architect may agree with this concept in theory. But to put it into practice the owner has to be shown—in the same dollars-and-cents logic that he applies to an initial saving. The architect may state that an improvement in design will ultimately result in lower maintenance costs and may even quote an approximate figure. These terms may still not have sufficient meaning to the owner in his own language.

Demonstrate specific return on the investment dollar

The owner regards a building as an investment and from it he expects a certain rate of return. The architect, in suggesting an improvement in design, is suggesting a way to enhance the owner's investment. If the owner expects to receive a return of 5 per cent a year on a $10-million investment, he is justified in expecting that an additional expenditure will also return 5 per cent—or close to it.

The architect may then face a doubly difficult task in proving that a real saving exists. First he must determine the maintenance and operation savings that would be gained from a given change in design. This in itself is a problem since data in this area are scarce. And if he does succeed he may then have to determine whether the return from the additional investment will approximate the owner's expected rate of return from the initial investment. If the architect does succeed in presenting his findings in this way, then he is offering proof in terms that the owner can grasp.

NDEXES AND INDICATORS

Villiam H. Edgerton
Manager-Editor, Dow Building Cost Calculator,
An F. W. Dodge service

MARCH 1967 BUILDING COST INDEXES

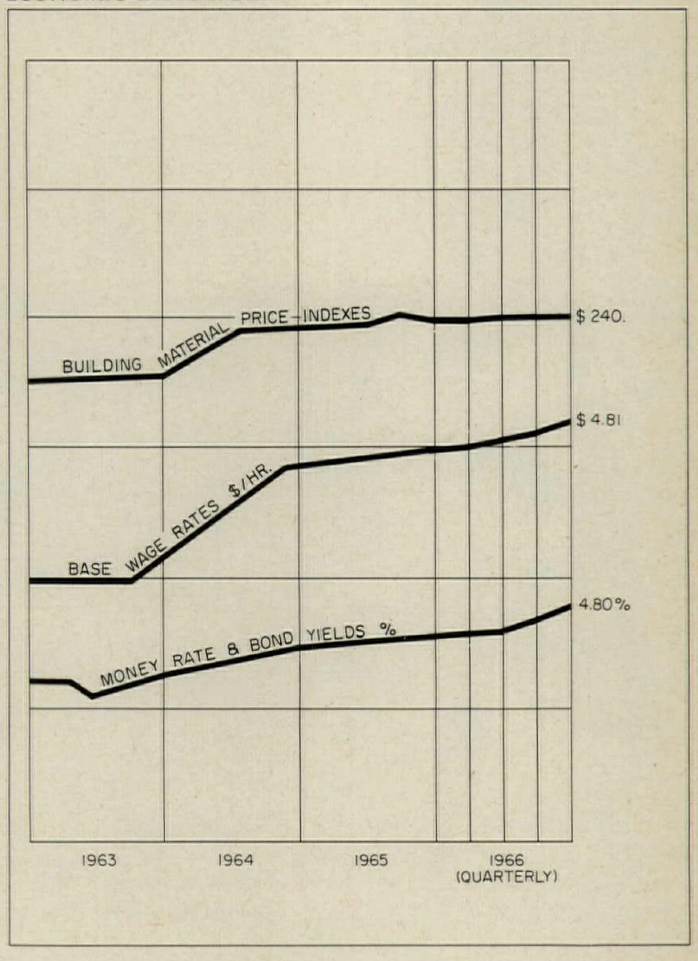
1941 averages for each city = 100.0

Metropolitan area	Cost differential	Current Dow Index residential	Current Dow Index non-res.	% change year ago res. & non-res.
U.S. Average	8.5	278.7	296.8	+2.26
Atlanta	7.2	317.1	336.3	+3.04
Baltimore	7.7	277.4	295.1	+1.22
Birmingham	7.5	257.0	276.3	+2.33
Boston	8.5	251.6	266.3	+1.59
Chicago	8.9	308.7	324.5	+2.33
Cincinnati	8.8	265.6	282.3	+1.35
Cleveland	9.2	285.9	303.9	+2.18
Dallas	7.7	261.4	270.0	+2.22
Denver	8.3	282.9	300.8	+0.88
Detroit	8.9	286.9	301.2	+4.24
Kansas City, Mo.	8.3	249.4	263.9	+1.16
Los Angeles	8.3	283.6	310.3	+1.78
Miami	8.4	273.0	286.6	+1.62
Minneapolis	8.8	277.7	295.2	+2.10
New Orleans	7.8	250.6	265.6	+1.91
New York	10.0	294.3	316.5	+3.79
Philadelphia	8.7	276.5	290.2	+1.81
Pittsburgh	9.1	258.7	275.1	+1.49
St. Louis	9.1	277.4	293.9	+2.95
San Francisco	8.5	362.6	396.7	+4.98
Seattle	8.4	253.8	283.2	+2.41

Differences in costs between two cities may be compared by dividing the cost differential figure of one city by that of a second; if the cost differential of one city (10.0) divided by that of a second (8.0) equals 125%, then costs in the first city are 25% higher than costs in the second. Also, costs in the second city are 80% of those in the first (8.0÷10.00=80%) or they are 20% lower in the second city.

The information presented here indicates trends of building construction costs in 21 leading cities and their suburban areas (within a 25-mile radius). Information is included on past and present costs, and future costs can be projected by analysis of cost trends.

ECONOMIC INDICATORS



HISTORICAL BUILDING COST INDEXES—AVERAGE OF ALL BUILDING TYPES, 21 CITIES

1941 average for each city = 100.00

Metropolitan area	1952	1959	1960	1961	1962	1963	1964	1965 (Quarterly) 1st	1965 (Quarterly) 2nd	1965 (Quarterly) 3rd	1965 (Quarterly) 4th	1966 (Quarterly) 1st	1966 (Quarterly) 2nd	1966 (Quarterly) 3rd	1966 (Quarterly) 4th
U.S. Average	213.5	255.0	259.2	264.6	266.8	273.4	279.3	279.5	281.0	288.7	284.9	286.3	287.3	290.4	286.6
Atlanta	223.5	283.3	289.0	294.7	298.2	305.7	313.7	313.9	317.9	320.6	321.5	322.2	323.3	328.5	329.8
Baltimore	213.3	264.5	272.6	269.9	271.8	275.5	280.6	280.5	281.0	284.7	285.7	288.6	289.6	289.4	290.9
Birmingham	208.1	233.2	240.2	249.9	250.0	256.3	260.9	261.2	264.1	264.9	265.6	267.1	268.1	269.7	270.7
Boston	199.0	230.5	232.8	237.5	239.8	244.1	252.1	251.7	252.6	256.3	257.8	258.5	259.6	260.9	262.0
Chicago	231.2	278.6	284.2	289.9	292.0	301.0	306.6	306.5	307.3	310.2	311.7	312.6	313.7	318.9	320.4
Cincinnati	207.7	250.0	255.0	257.6	258.8	263.9	269.5	269.4	270.2	272.9	274.0	274.7	275.7	277.2	278.3
Cleveland	220.7	260.5	263.1	265.7	268.5	275.8	283.0	282.3	283.4	290.8	292.3	293.0	294.1	299.2	300.7
Dallas	221.9	237.5	239.9	244.7	246.9	253.0	256.4	256.9	257.9	259.5	260.8	261.7	262.6	265.8	266.9
Denver	211.8	257.9	257.9	270.9	274.9	282.5	287.3	287.3	288.2	292.7	294.0	294.6	295.5	296.6	297.5
Detroit	197.8	249.4	259.5	264.7	265.9	272.2	277.7	277.7	279.3	283.5	284.7	285.5	286.5	295.7	296.9
Kansas City	213.3	239.6	237.1	237.1	240.1	247.8	250.5	251.2	252.0	255.0	256.4	257.3	258.2	260.0	261.0
Los Angeles	210.3	263.5	263.6	274.3	276.3	282.5	288.2	288.9	289.7	295.8	297.1	298.0	298.6	301.6	302.7
Miami	199.4	249.0	256.5	259.1	260.3	269.3	274.4	274.4	275.4	276.6	277.5	278.4	279.2	282.9	284.0
Minneapolis	213.5	254.9	260.0	267.9	269.0	275.3	282.4	283.4	283.6	283.9	285.0	285.7	286.6	288.3	289.4
New Orleans	207.1	237.5	242.3	244.7	245.1	248.3	249.9	250.5	253.1	255.1	256.3	257.1	258.0	258.8	259.8
New York	207.4	260.2	265.4	270.8	276.0	282.3	289.4	290.2	294.0	296.0	297.1	297.8	298.7	302.8	304.0
Philadelphia	228.3	262.8	262.8	265.4	265.2	271.2	275.2	275.5	276.4	279.5	280.8	281.7	282.6	285.3	286.6
Pittsburgh	204.0	241.1	243.5	250.9	251.8	258.2	263.8	264.0	264.9	265.9	267.0	268.9	270.1	270.7	271.7
St. Louis	213.1	246.9	251.9	256.9	255.4	263.4	272.1	272.9	276.1	279.9	280.9	282.2	283.2	287.0	288.3
San Francisco	266.4	321.1	327.5	337.4	343.3	352.4	365.4	366.6	366.9	367.7	368.6	376.2	377.7	384.7	386.0
Seattle	191.8	232.7	237.4	247.0	252.5	260.6	266.6	265.1	266.3	267.8	268.9	271.1	272.1	273.9	275.0

Costs in a given city for a certain period may be compared with costs in another period by dividing one index into the other; if the index for a city for one period (200.0) divided by the index for a second period (150.0) equals 133%, the costs in the one period are 33% higher than the costs in the other. Also, second period costs are 75% of those in the first period (150.0÷200.0=75%) or they are 25% lower in the second period.

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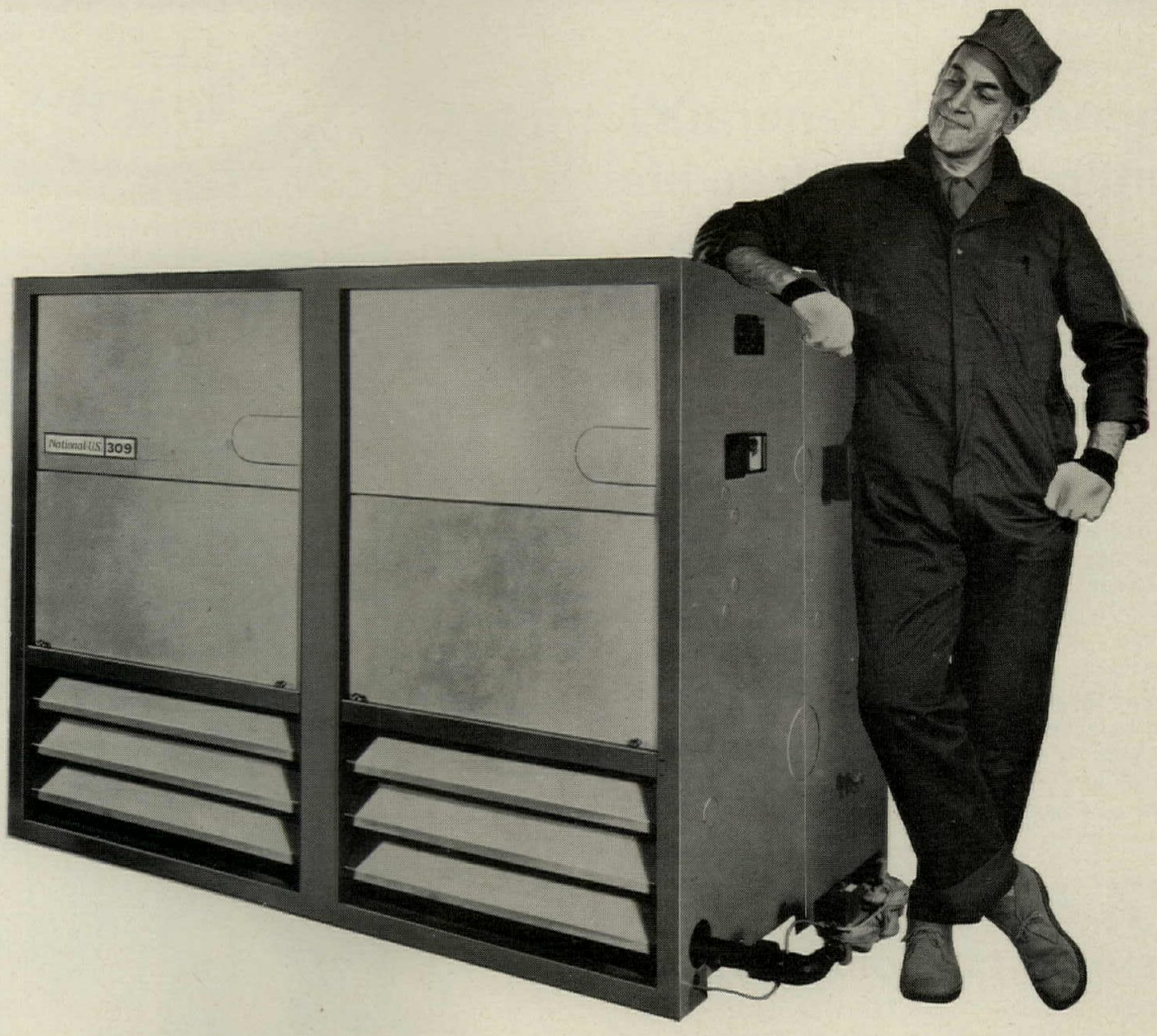

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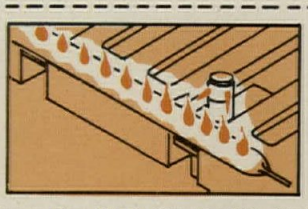

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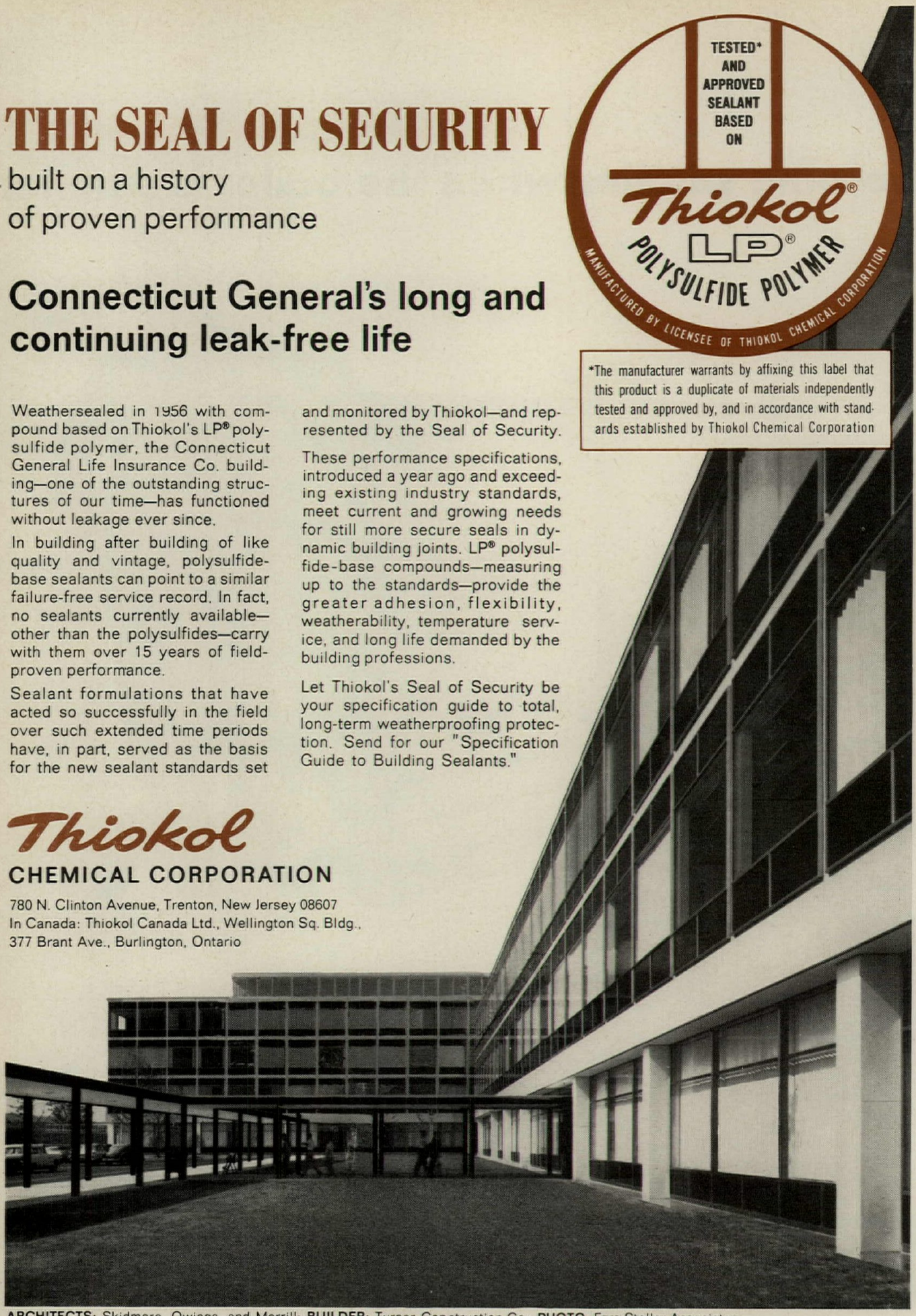

ARCHITECTS: Skidmore, Owings, and Merrill; **BUILDER:** Turner Construction Co.; **PHOTO:** Ezra Stoller Associates

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OFFICE MANAGEMENT

Harry A. Golemon
Senior Partner
Golemon & Rolfe Architects
Houston, Texas

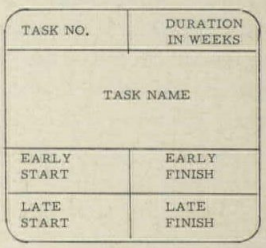
Network planning: management tool for architects

Part two of two parts

Characteristics and uses of the precedence diagramming method (PDM) of network planning applied to architectural production processes are described.

The basic function of the PDM diagram is to display the work items represented by rectangles. The PWI's (preceding work items) which indicate the relationships between work items are depicted by an arrow when a serial relationship is indicated or an arrow with a lag factor when other relationships must be expressed.

Each ingredient of the work item shown on the sketch below is essential to the PDM diagram and must be incorporated into the work item rectangle. The following rectangle format is suggested to represent a "work item" in the PDM network diagram:



Time estimating of "work items" is accomplished in the same manner for PDM and CPM-PERT. Time is usually estimated in work days or work weeks. The project schedule will of course be only as good as the time estimates used. Thus, it is of utmost importance that the best estimate possible be obtained.

In PDM, if lag factors are expressed as percentages of "work items", no estimates of time for lag factors are required. However, if they are expressed in work days or work weeks they must also be estimated.

Usually the time estimating should be the last function in the planning. By this time the project is more clearly understood and, therefore, more intelligent estimates can be made.

Analysis of the network

Computation and analysis of the network is the final step of network planning, and is accomplished in basically the same way in PDM and CPM-PERT. One of the most important determinations in analyzing a network is that of the critical path. For every task three possible early start-late start and early finish-late finish relationships can occur when the network is computed.

Early start can be before late start, which means that early finish will be before late finish. In this case the time duration between the earliest possible start date and the latest allowable finish date for the task is longer than the time duration required to accomplish the task. As a result slack or float time exists in the schedule for accomplishing the particular task, thus allowing a certain degree of flexibility for performing the task. If the over-all schedule is to be maintained, however, the task must be complete by the late finish date.

Secondly, early start can be the same as late start which means that early finish will be the same as late finish. In this case the time duration between the "earliest possible start date" and the "latest allowable finish date" for the task is equal to the time duration required to accomplish the task. Tasks in this category have no slack or float time and are said to be on the critical path.

The third possibility exists that analysis computation will show early start to be after late start which means that early finish will be after late finish. In this case the time duration between the earliest possible start date and the latest allowable finish date is shorter than the time duration required to accomplish the task. So-called "negative slack" or "negative float" time exists in the schedule for accomplishing this particular task. This means that the over-all finish date cannot be met, and that the network must be revised by increasing over-all duration, or by changing work flow logic and time estimates. Both revisions in time duration and changes in work flow logic may be necessary to meet the client requirements. It might be pointed out that if float time exists for every task in a network the over-all time can be reduced.

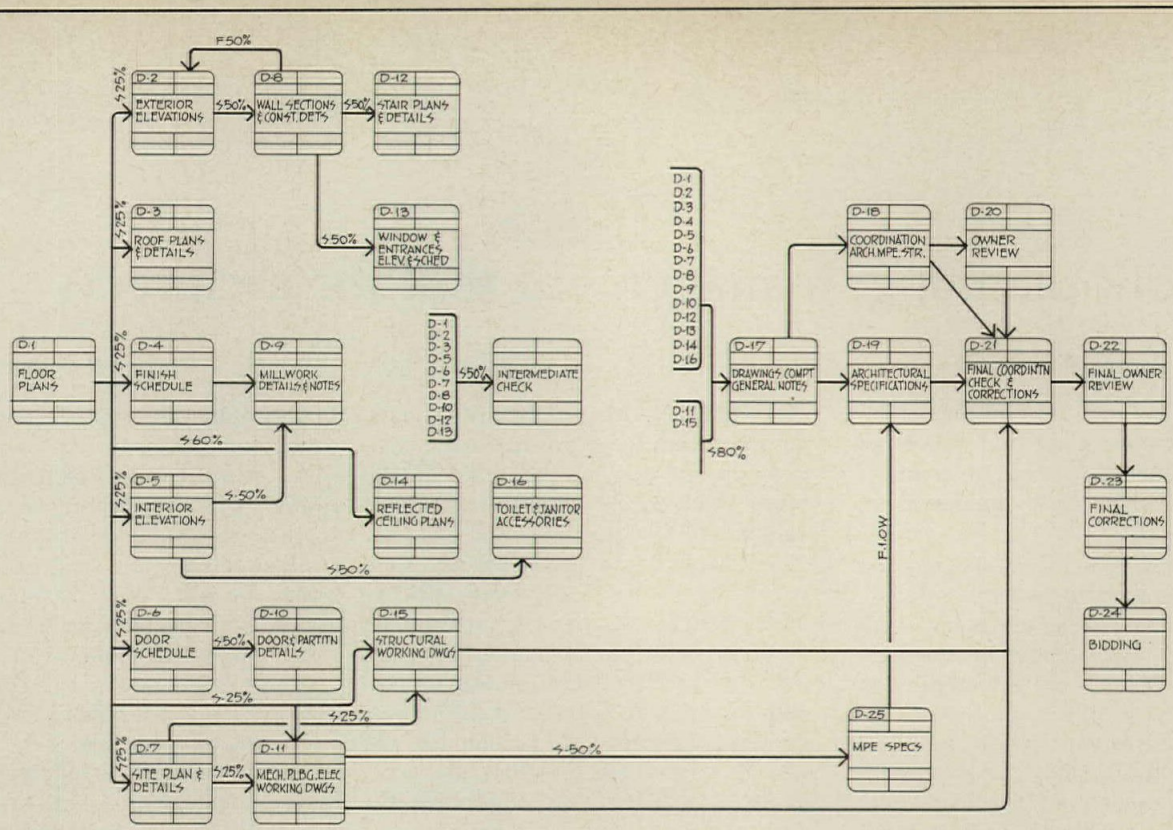
Networks can be calculated either by hand or by computer. Hand computation is practical only on small- or medium-size projects. When networks are to be calculated by computer, the network data must be noted on data sheets for key punch.

A great variety of reports are available with computer calculation. The tasks can be arranged by number, chronologically by early start, early finish, late start or late finish, by amount of float time, and by performing disciplines on bar charts and in numerous other ways.

How G & R was sold on network planning

To emphasize the significance of network planning in an architect's office, it would be beneficial to briefly cite an experience in the firm of Goleman & Rolfe Architects. In 1963 Golemon & Rolfe and Pierce & Pierce, Architects, were commissioned to design a new $18-million Houston Intercontinental Airport Terminal Complex. It was tremendously complicated since it involved the City Aviation Department and Public Works Department, the City Council, several airlines, and the Federal Aviation Agency. After extensive research and design effort, everyone approved a design concept in April of 1964, and working drawings were ready to begin about mid 1964. The city required that the project be under construction by March 1965. The architects had six months to complete all working drawings and specifications.

Personnel from Golemon & Rolfe had been previously exposed to network scheduling and the firm had actually been using an over-simplified network chart to schedule its work. Also, the firm had specified the PERT method to be used during construction scheduling on a Federal Aviation project. After discussing the problem with the airport engineers it was decided that the only possible hope of completing the contract drawings and specifications on schedule was to take time (two weeks were allowed) and network plan all the contract drawings and specifications (including engineering and specialized consultants' work). Project control methods consultant (The Service Bureau Corporation) was commissioned. The tasks were outlined and sequenced (about 700 total), time schedules were assigned, and the network was computed. The first com-



C-PDM network showing lag factors

puter run indicated the finish date was six weeks past the deadline. The network was reanalyzed to tighten up all possible lag and recomputed. The next computer run indicated the project could be completed on time with no time to spare. It also outlined all the tasks that were on the critical path. Every two weeks the network was up-dated and recomputed, which resulted in a print-out of every task and event. The print-outs also indicated whether or not the task schedules were being met. The project was completed on time. What was thought to be impossible was *not* impossible with proper prior planning using Network Planning and Analysis as a technique. Incidentally, all computer consultation and computer runs cost $924.68.

Since March 1965, the Goleman & Rolfe staff has enthusiastically adopted network planning and analysis as a management tool. Within the past year all personnel have been exposed to network procedures and all project architects have been trained to network plan their own projects. If a project architect has had no previous experience in actual network planning, it takes from three to five days, depending on the complexities of the project, for him to become skilled enough to network in detail the design development or contract drawing phase of his assigned project. His responsibilities relative to the network are outlined to him by the design co-ordinator or contract drawing co-ordinator, using examples of actual G & R networks as guides. After the initial discussion when instructions are given and questions are answered, the project architect works under periodic supervision until he has networked the project phase to the satisfaction of the firm. The second project networked by the project architect requires practically no supesvision except final constructive criticism of the resulting network.

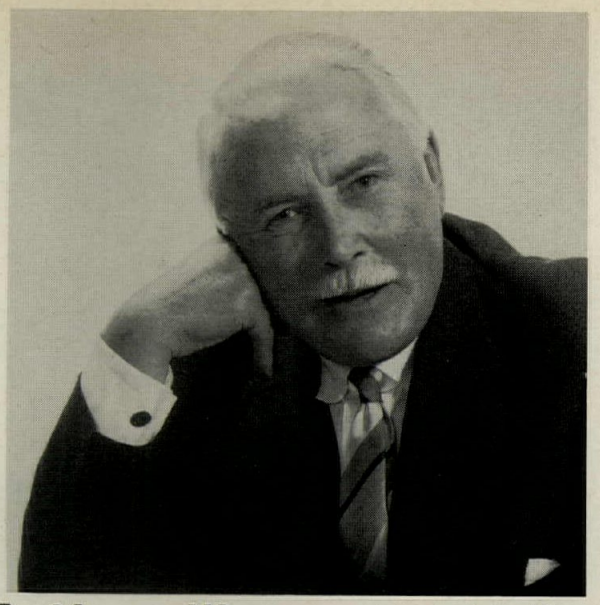
It might be emphasized that almost any network may be calculated by computer at any time. The use of computers is not necessary to successfully use the network, but there are times when their use will make the network more successful. The related airport story is an example. It is wise for architects who are jointly ventured or associated with other firms to co-operatively network associates' tasks separately and then to integrate them into an over-all network.

How the network communicates with clients

The "Master Network," as it is called at Golemon & Rolfe, is a very significant tool that can be used by architects to communicate with their clients during the progress development of a project. The master network is one showing major work phases as events in time and the client's involvement in making these events come to pass. This network includes client conferences in which major decisions should be made. It includes the architect's submittal of concept, schematics and preliminary studies and recommendations. The master network is explained to the client and given to him as a matter of record. The client's involvement is shown as major events in the network diagram. If the client delays making a decision and/or giving approval, the schedule is revised immediately by letter. This approach not only indicates to the client that he is a major participant in the development of his project but it also indicates to him that his timely decisions are of paramount importance. Of course, the architect must fulfill his obligations also. The design development phase is networked simultaneously with, or immediately after the master network.

Illustration C shows a contract drawing phase network of a small- to medium-size project using the PDM system. The networks will vary in different architects' offices depending on each office's approach to producing contract documents. However, the illustration should serve as a guide to most architects and can be easily understood by all architects.

Network planning is not a substitute for talent, but is an instrument that will allow talent to be used most efficiently. It is not an answer to solve all problems, but it is a technique that will define problem areas that can be given special attention. It makes no decisions, but it is a technique that aids the decision maker



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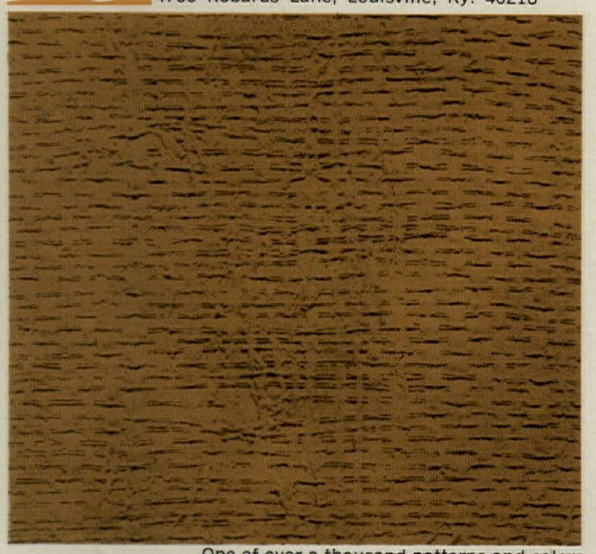

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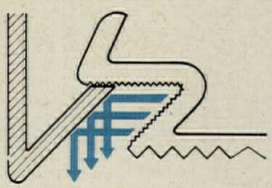

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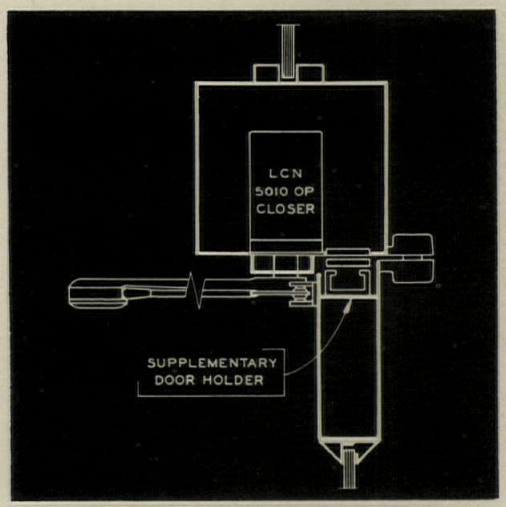

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OFFICE NOTES

continued from page 70

Bayne Collins and **Harold R. Odom** have opened an architectural office at 1113 Beck Ave., Panama City, Fla.

Robert M. Cooke, C. Douglas Cherry, William C. Dobbing and **William L. Heuser** have formed the consulting engineer firm under the firm name of **Cooke, Cherry Dobbing and Heuser** located in Hope, N.J., P.O. Box 95.

Ekdahl, Davis and DePew, Architects, Topeka, Kansas announce the appointment of **Ralph E. Persson, John R. Adams** and **Charles J. Burton** as associate members of the firm.

Fordyce & Hamby Associates of New York City have named three new partners, **Lloyd Slomanson, J. Karl Justin** and **Ian Hutton Smith,** and three associates, **C. Woodford Dayton, I. E. Drescher** and **Manuel A. Tavarez.**

Roland A. Gallimore, A.I.A. and **Hamilton Ross, A.I.A.** have become associates of the firm of **Geddes Brecher Qualls Cunningham: Architects,** of Philadelphia and Princeton, N.J.

The firm of **J. Norman Stark, A.I.A.,** architect and associates of Cleveland, has acquired the architectural practice of the late **Louis J. Rotman.** The staff and office of the late Mr. Rotman, at 31715 Vine St., Willowick, Ohio, will be maintained by Mr. Stark as a branch office.

William R. Webster has been appointed chief architect at the Washington, D.C. offices of **Stottler, Stagg, Meredith & Associates,** architectural firm.

ADDENDA

The RECORD regrets the omission of complete credits for the Christian Science Organization Building in the February issue (pages 137-142). Credits should have been given as follows: architect: Paul Rudolph—job captain; John Damico; structural engineers: Spiegel & Zamecnik; engineers: van Zelm, Heywood & Shadford; supervising architects: Smith, Seaton & Olach; contractors: Felmley-Dickerson Co.

The listing of credits for the Oceanography Research Facility, Bureau of Commercial Fisheries, University of California, San Diego which appeared in the January issue, "Buildings in the News," (pages 42-43) should have included the architectural firm, Frank L. Hope & Assocs.

Correct credits for the Arrival Plaza at La Ronde at Expo 67 (October, 1966, page 176) should read Sasaki, Strong and Associates, Limited, and James E. Secord. Issalys & Gareau—Lalonde & Pauer Associates were responsible for the design of the arrival station itself.

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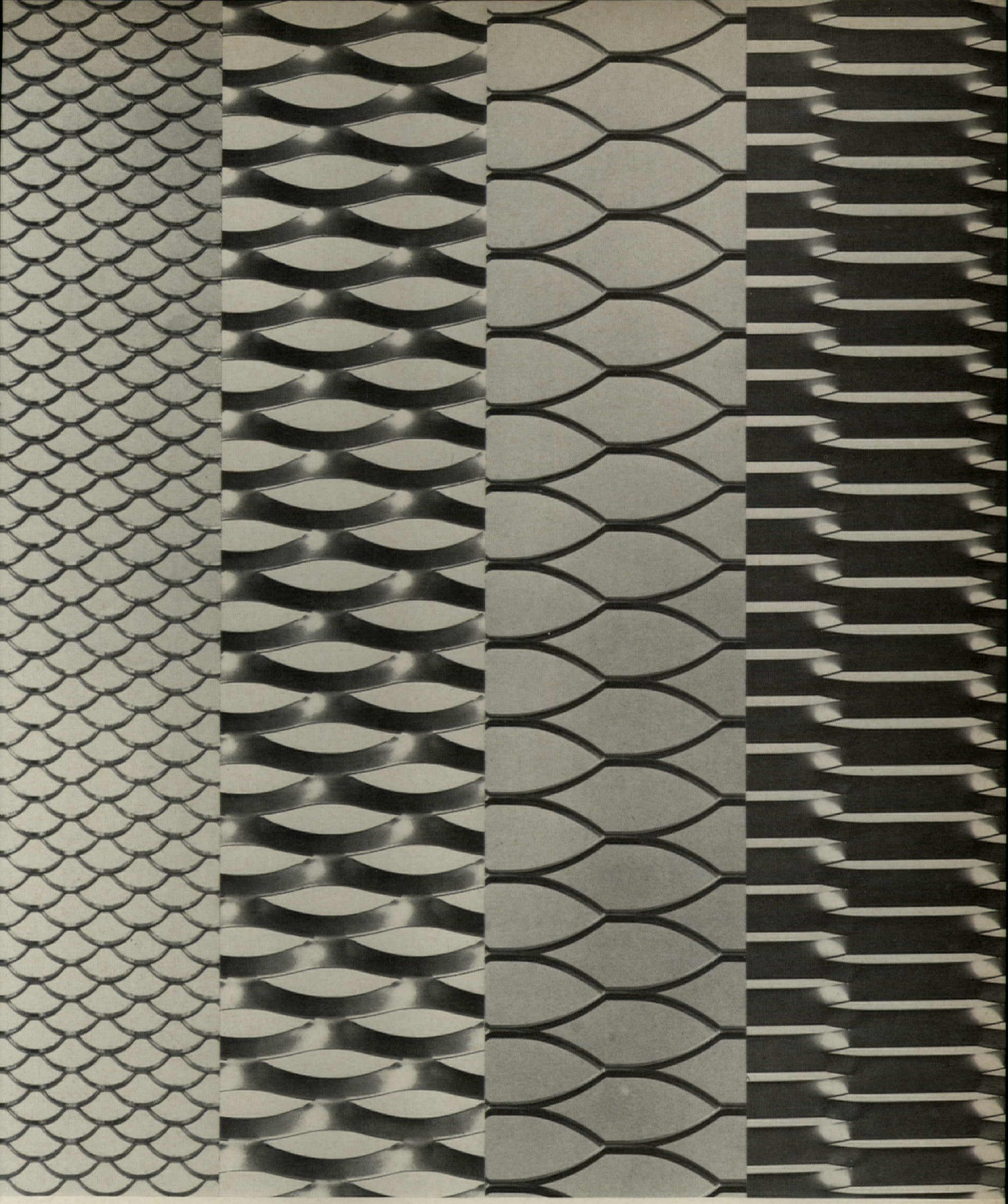

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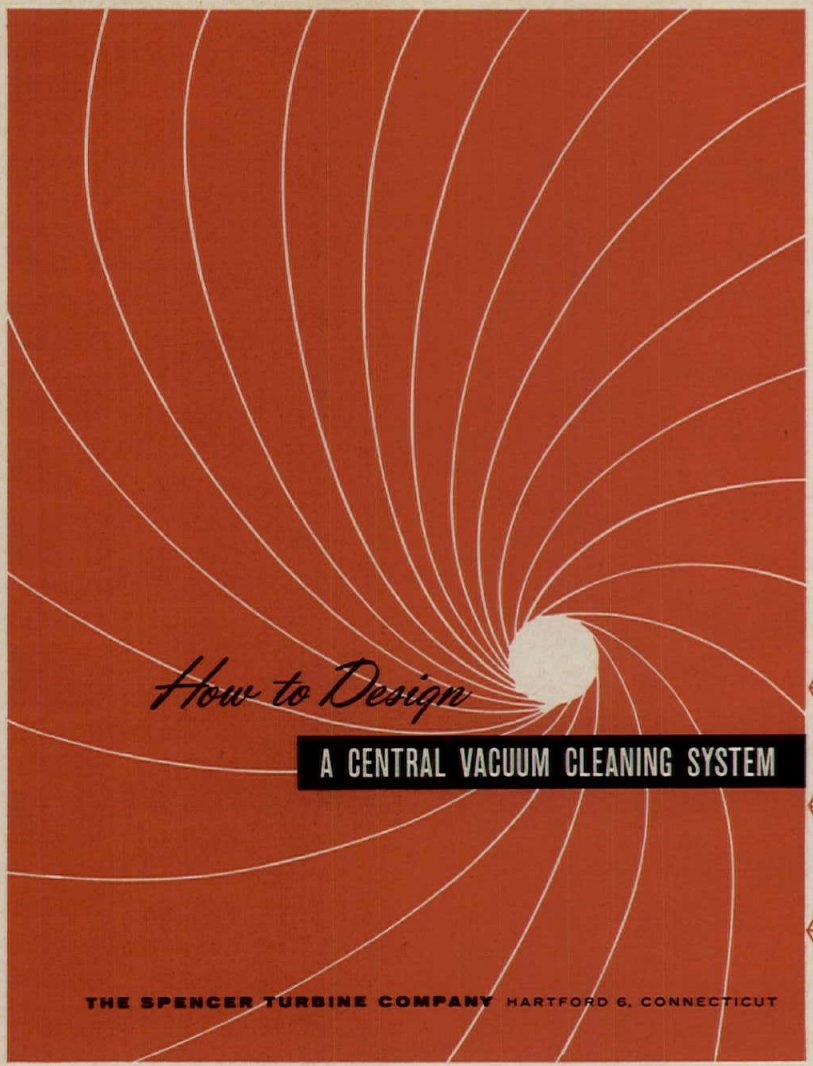

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Tradition-free architecture for a "free church": a Unitarian center by Pietro Belluschi

The term "free church" or "free faith" as used by Unitarians describes their belief in the right of each member of the religious fellowship to engage in his own free yet disciplined search for truth. Since this search may lead him down many diverse spiritual paths, Unitarians consider inappropriate for themselves a church architecture which has been derived from accepted ecclesiastical forms expressing traditional faiths. This makes hard work for the architects Unitarians hire, since even the most innovative designers depend upon traditional or modified liturgical concepts as guides to building a church. And as a result, Unitarian buildings—denied the evocative forms handed down by older faiths—are often dull and disappointing.

Among the churches included in the ever-growing volume of distinguished work by Pietro Belluschi are several for the Unitarian faith. His latest, the Unitarian Church in Rockford, Illinois, designed in association with C. Edward Ware, proves once more that when the program demands it, he is able to design a handsome and successful church without recourse to historical derivation. Said Belluschi: "The beautiful site called for more than the usual effort; it needed a strong symbolic expression, a form removed from the old uninspired ecclesiastical tradition, yet possessing convincing qualities particularly relevant to the special Unitarian commitments. To this end, we endeavored to give the building structural integrity and to fulfill the program given to us with maximum economy, yet without cheapness. We strove to give clarity to the plan, while providing a sequence of visual experiences—relying on good proportions, effective lighting and honest materials."

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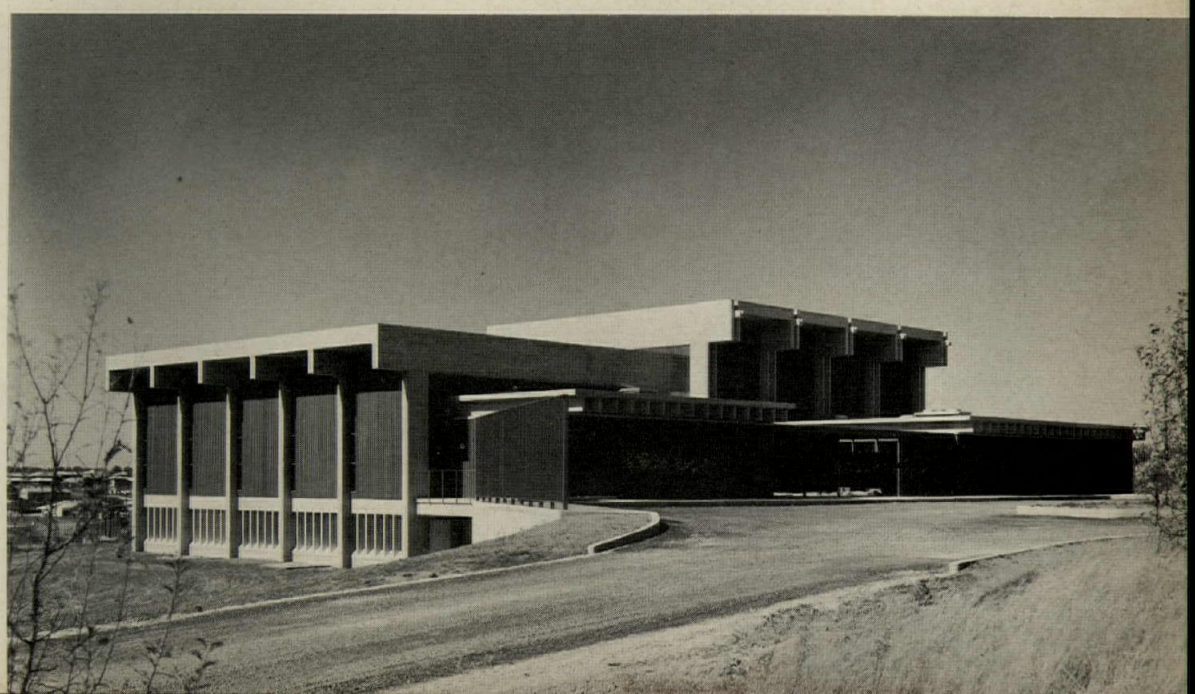
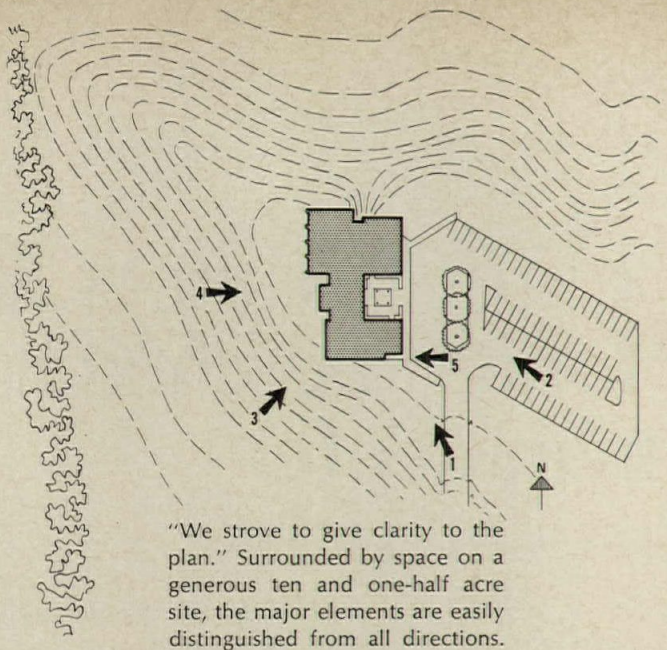
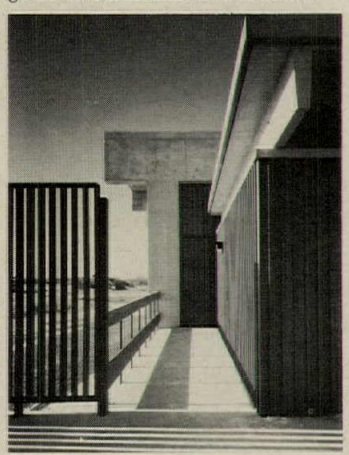




"We strove to give clarity to the plan." Surrounded by space on a generous ten and one-half acre site, the major elements are easily distinguished from all directions. Looking east (4) and northeast (3) the sanctuary is seen to be linked by the narthex to the fellowship hall. The slope of the site provides full exposure to the classrooms and small chapel below. Elements to the north and south of the entrance court or atrium share a lower roof (2). These include offices, the library, lounge and a small kitchen adjacent to the fellowship hall. A small bridge (5) gives direct access to the hall.



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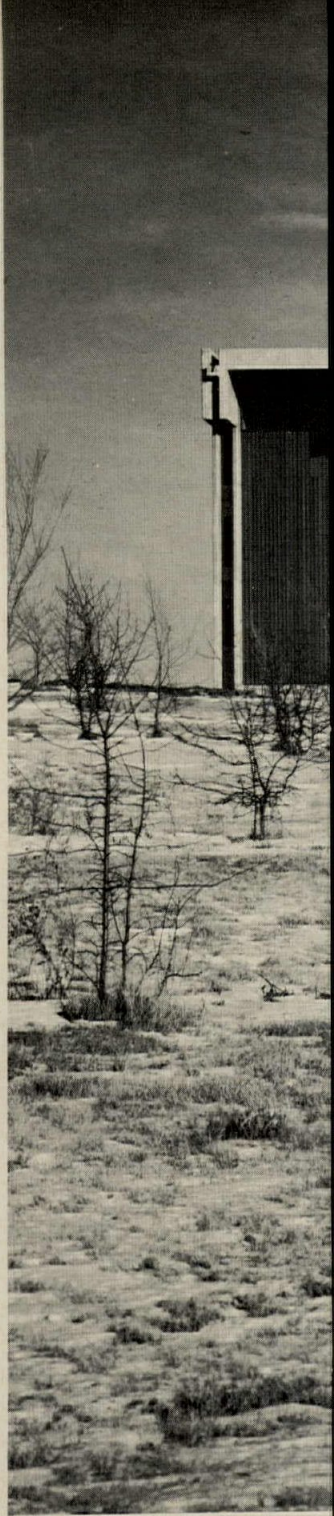

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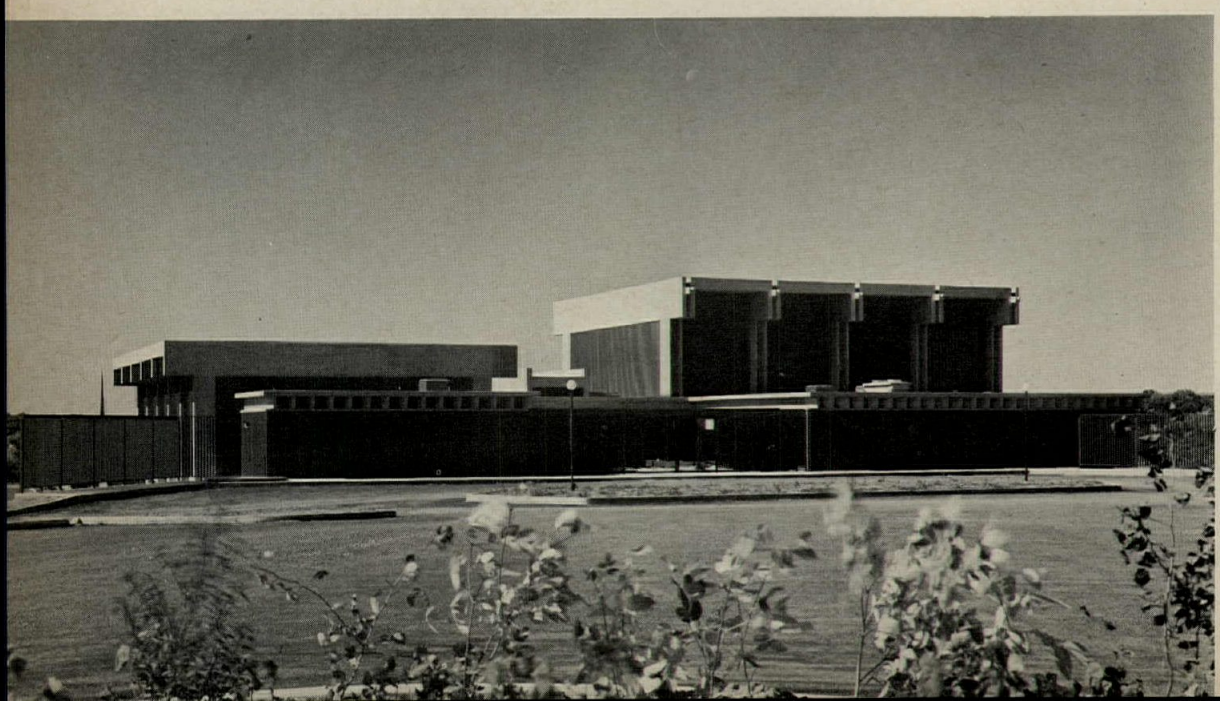

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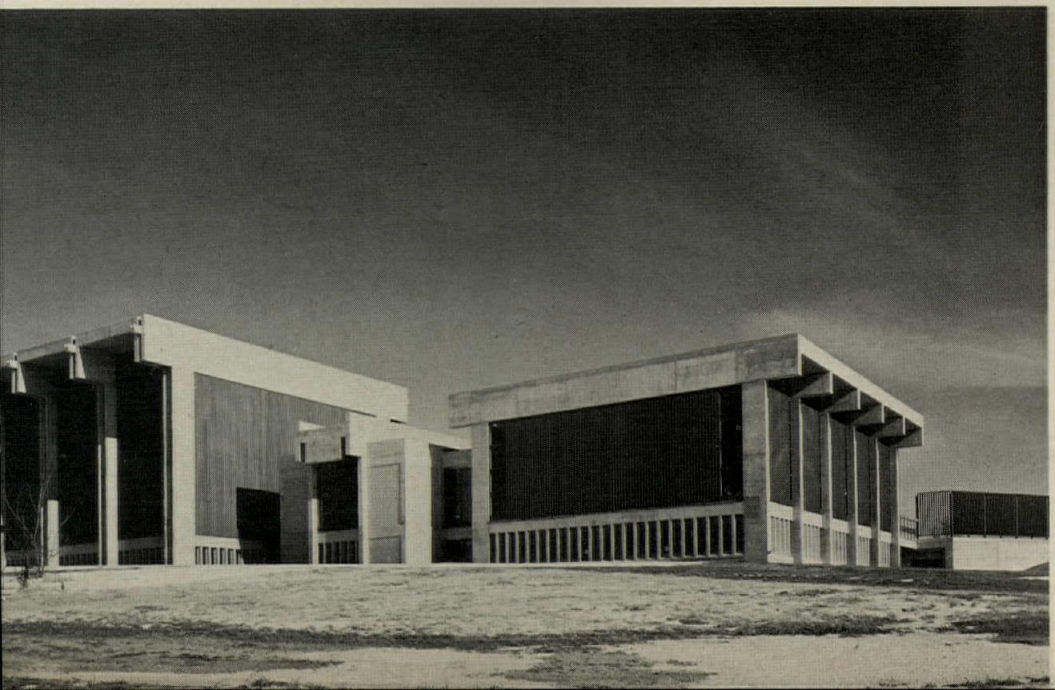
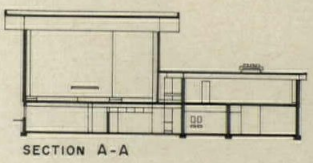
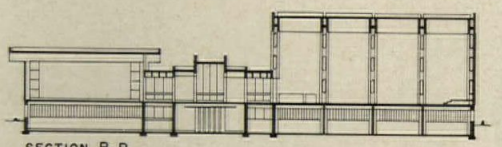
Bill Engdahl, Hedrich-Blessing photos

3





SECTION A-A



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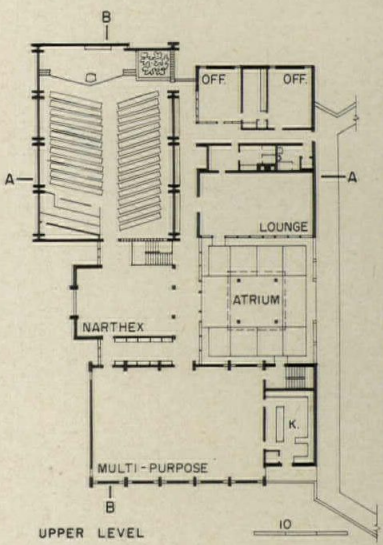
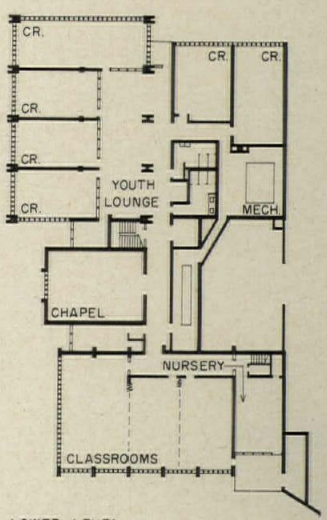


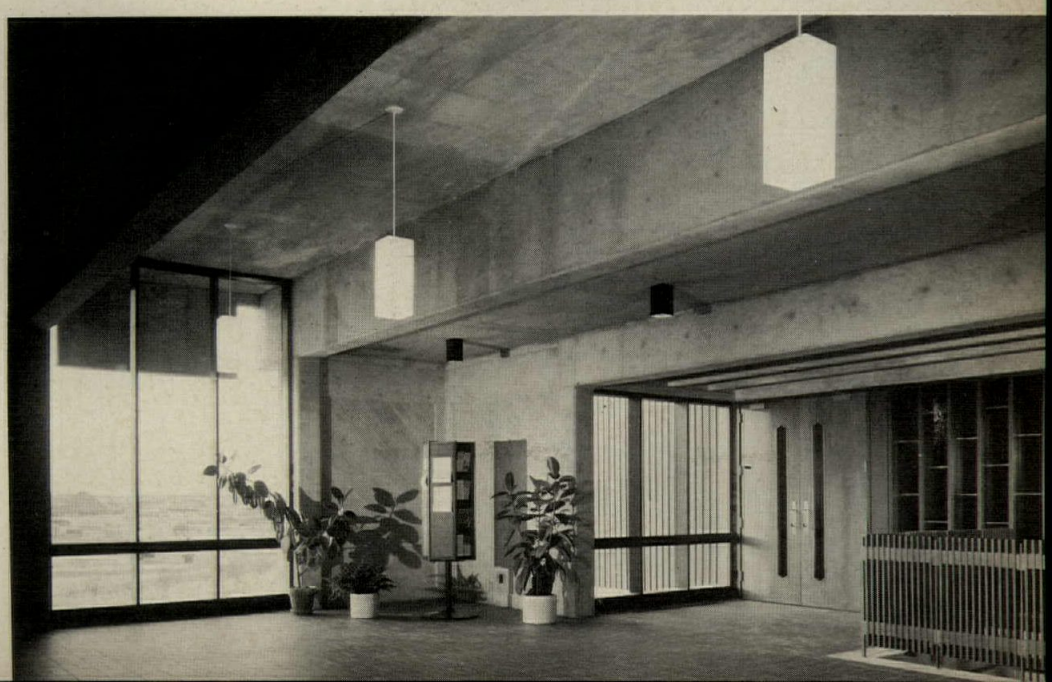
UPPER LEVEL

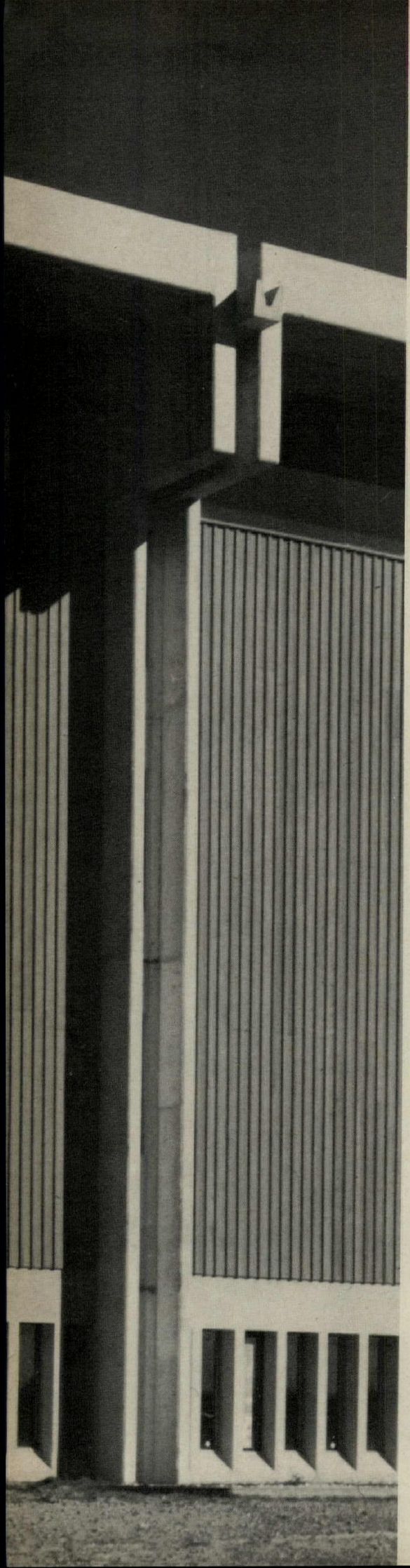


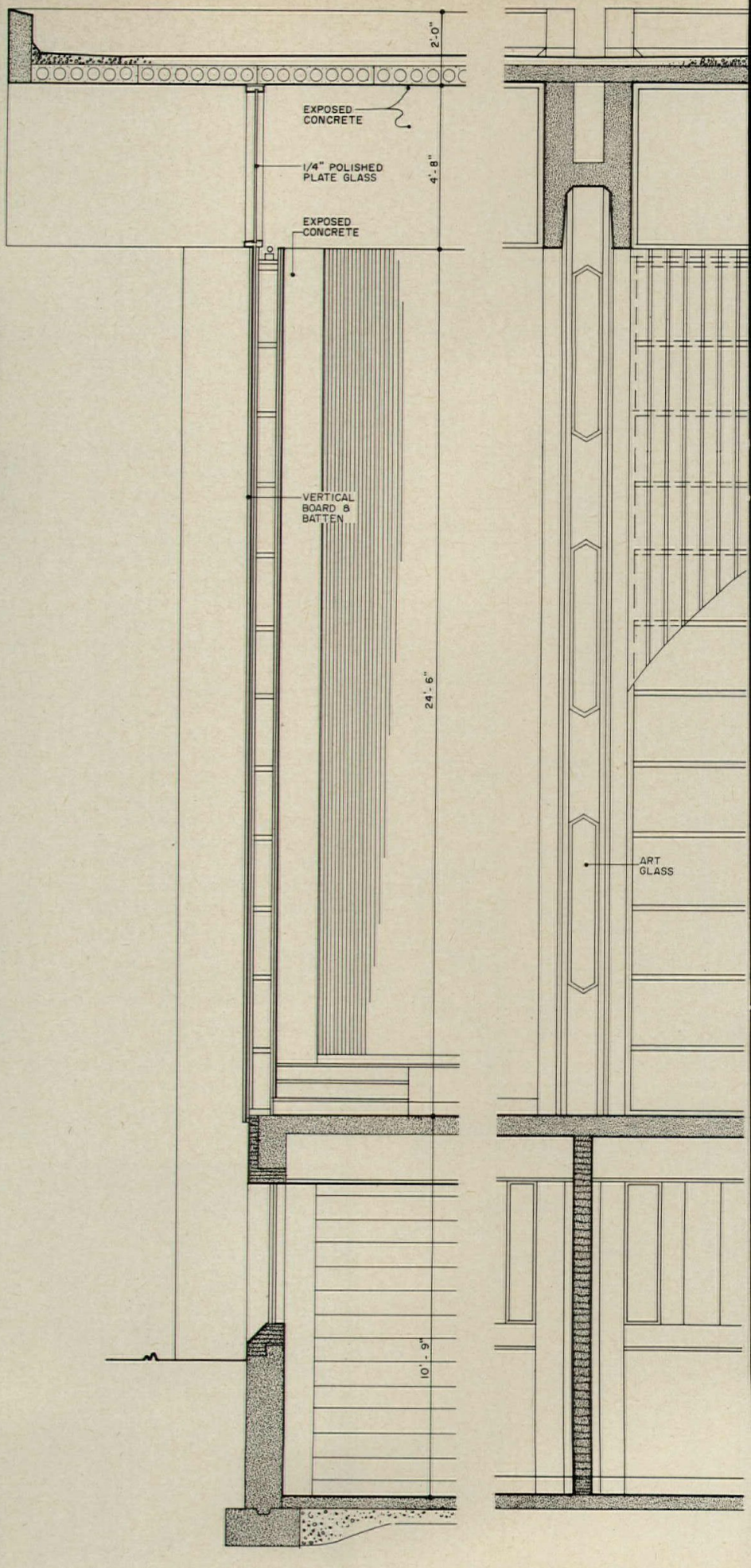
LOWER LEVEL

"We relied on good proportions, effective lighting and honest materials." The sanctuary beams and columns are precast concrete in an H-form (see details overleaf). The entire space receives natural light from the east and west through clerestory windows located above the redwood board-and-batten panels between the beams. A narrow panel of glass at the front of the sanctuary provides a focus of strong light on the rear wall and a one-bay-wide panel of glass strips illuminates the entire platform area with east light. The photograph on the right shows these sources of light, as well as the narrow inserts of art glass in the concrete columns, which cast multi-colored reflections into the space. In the photograph of the narthex below, the sanctuary entrance appears on the right.

THE UNITARIAN CHURCH, Rockford, Illinois. Architects: *Pietro Belluschi and C. Edward Ware Associates;* structural engineers: *The Engineers Collaborative;* mechanical engineer: *Kenneth F. Biddle;* general contractor: *Pearce-Butler Company.*







Details of sanctuary beam and column

photos by Eugene H. Fleming III

FIVE SMALL-SCALE COMMUNITIES —PROJECTS IN DESIGN BY HOK—STRESS UNITY BY INTEGRATING BUILDINGS AND SPACES

TOTAL COMMUNITY DESIGN: "...A SEQUENCE OF SPACES"

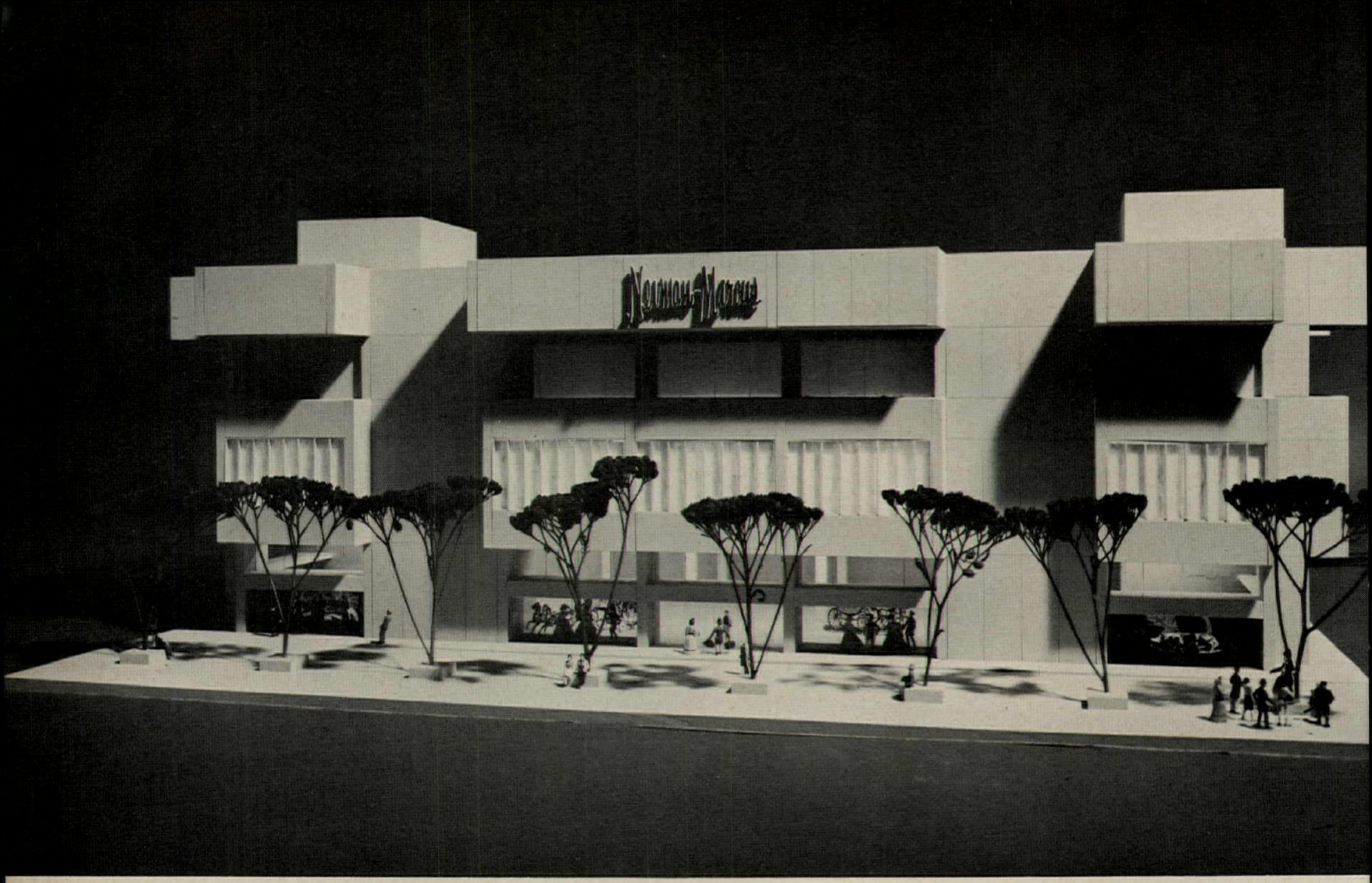
"If, as Marshall McLuhan observes, 'the medium is the message,' then architecture must create a universe of spaces. The design of a single room can affect its use, but the design of an entire community will be the measure of its success or failure. There must be a sequence of spaces, programed to fulfill the conscious and unconscious needs of each participant as an individual, as a member of a small group and as a part of the entire community.

"There are five distinct communities reviewed in the following pages: a commercial center, a correctional institution, an office-research complex and two university residential complexes. They belong together, not only because they are the work of the same architects, but because they represent total solutions—a succession of requirements met with a progression of spaces.

"Certain concepts and approaches are found in all the projects:

- Each complex is treated as a community from the very beginning, with architecture as a positive main force. We have mentally walked through it and sensed the heights, the contractions and the opening of spaces.
- Pedestrian circulation is integral to design, not an afterthought, and automobile traffic is kept on the periphery.
- Materials are kept to a minimum to provide continuity and wholeness. The most appropriate material for local construction conditions was selected, consistent with design philosophy.
- A whole range of areas is consciously formed by building units: private, semiprivate and public."

Gyo Obata, principal in charge of design
Hellmuth, Obata and Kassabaum

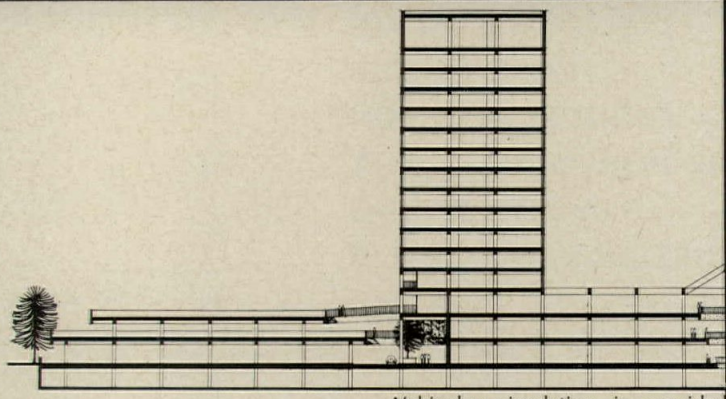


NEW ENCLOSED-MALL SHOPPING CENTER IS DESIGNED AS A SMALL COMMERCIAL CITY

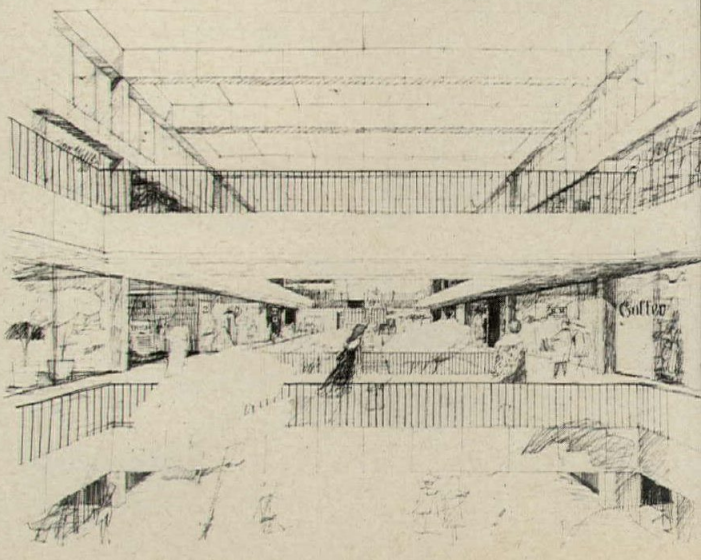
A new step in the advancement of the shopping center from its earlier "shopping strip" days, toward becoming a more complete commercial sub-city can be noted in this project, now being designed for Houston. In addition to the usual shops and high fashion department stores, the development (to be called West Oak Plaza Shopping Center) will include three office towers, a hotel, and parking for 7,000 automobiles on three levels flanking the center. The Neiman-Marcus organization will locate a store in the development (model photo above, and right in plan) and requested separate architectural services from Hellmuth, Obata and Kassabaum.

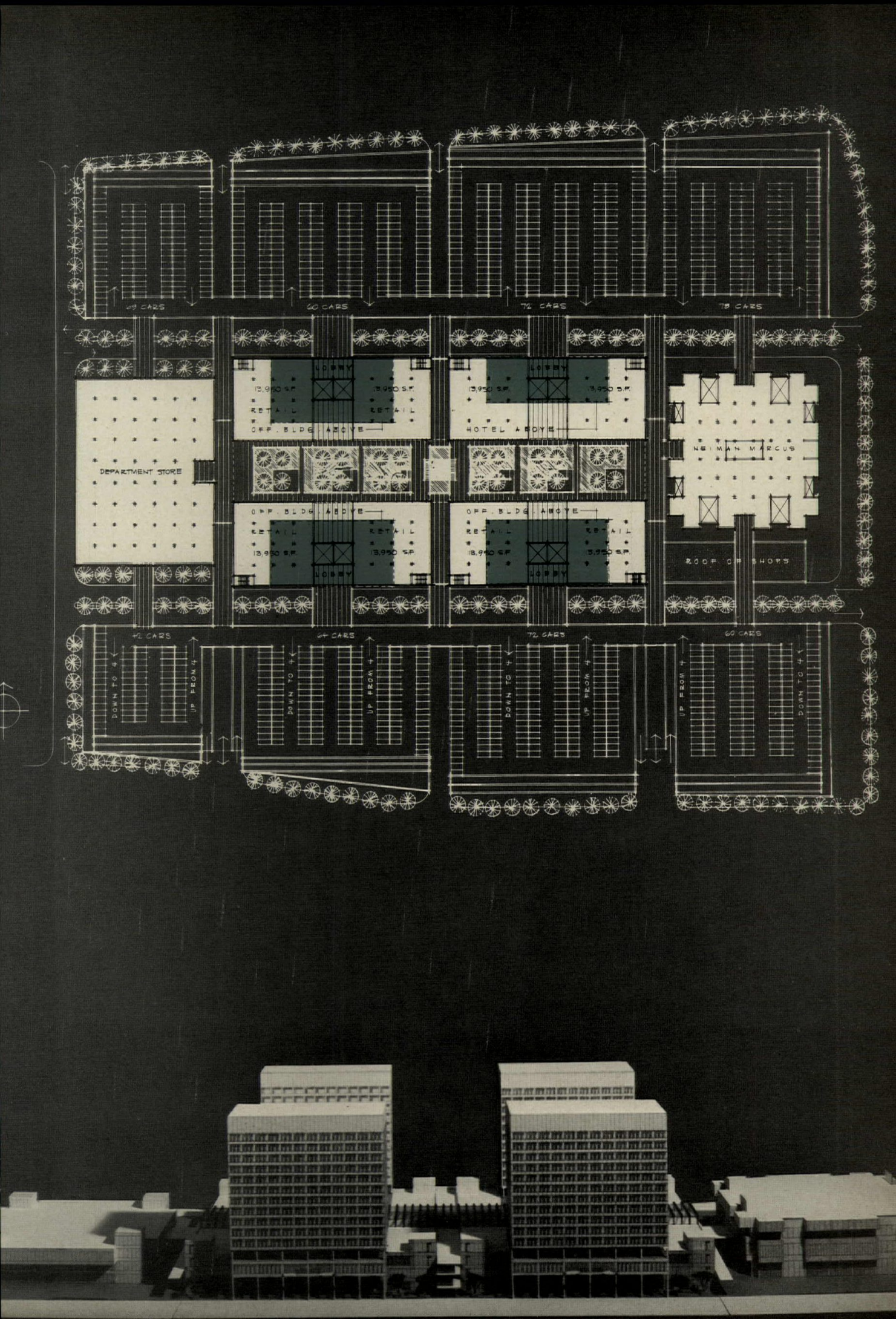
A central, enclosed and air-conditioned mall has been planned as the chief organizational and circulation element, and, placed under a skylight, becomes the center's "great space." The mall will be multi-level, with the middle level serving as the main shopping walkway. Stores can penetrate more than one level, where desired. All structures will be white concrete, sand blasted to bring out a beige aggregate.

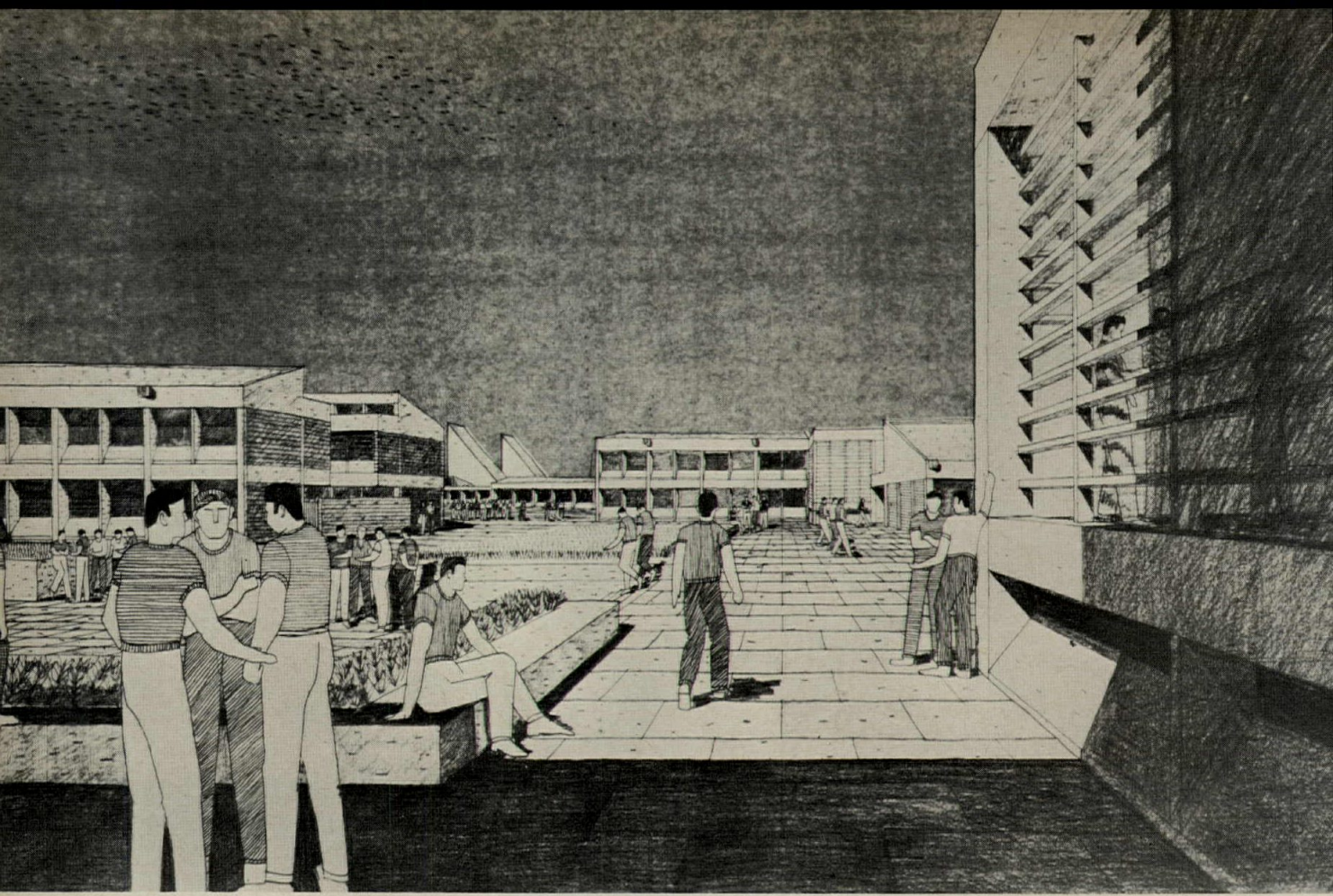
WEST OAK PLAZA SHOPPING CENTER / NEIMAN-MARCUS STORE, Houston, Texas. Architects: *Hellmuth, Obata and Kassamaum, Inc.—Gyo Obata, principal in charge of design (Neiman-Marcus project manager, Jon J. Worstell; project designer, Alvin Lever; West Oak Center project architect, Robert E. Stauder; project designer, Terry F. Cashen);* associate architect for West Oak: *Neuhaus and Taylor;* interior designer, Neiman-Marcus:*Eleanor Le Maire Associates;* landscape architect: *Lawrence Halprin Associates;* structural engineer: *Elmer Ellisor Engineers;* mechanical engineer: *I. A. Naman & Associates;* food service consultant, Neiman-Marcus: *Flambert and Flambert.*



Vehicular circulation is provided around the center by a wide boulevard, with exits to any of the three parking levels. Although designed together, and of similar materials, each part of the project will have its own clear identity. As the design is still in progress, small differences occur in the illustrations.




69 CARS
60 CARS
72 CARS
78 CARS
LOBBY
13,950 S.F.
RETAIL
OFF. BLDG. ABOVE
HOTEL ABOVE
DEPARTMENT STORE
NEIMAN MARCUS
ROOF OF SHOPS
42 CARS
64 CARS
72 CARS
60 CARS
DOWN TO 4
UP FROM 4



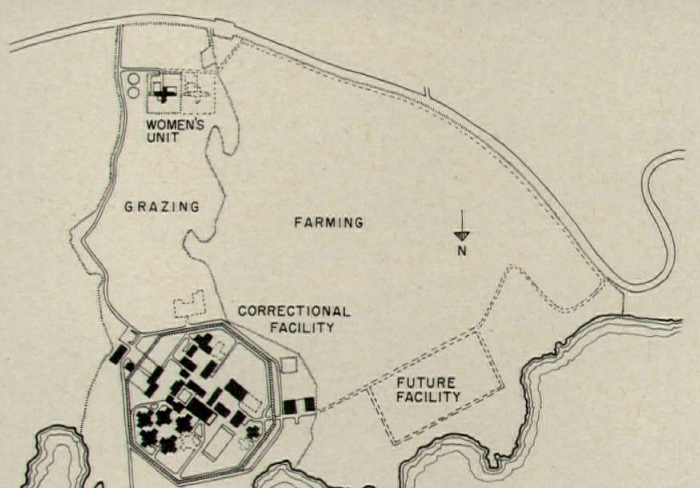
MEDIUM-CONTROL CUSTODY AND REHABILITATION ARE DESIGNED INTO NEW PRISON IN HAWAII

This institution, for 600 adult inmates, is designed to accommodate the complete range of activities for a community: living, working and recreation, plus special treatment and special handling facilities. Plazas, gardens, and pre-cast concrete grilles for security, underscore the strong emphasis placed on creating an encouraging environment for rehabilitation and training of inmates, so they may be returned to society sufficiently skilled and adjusted to become useful citizens.

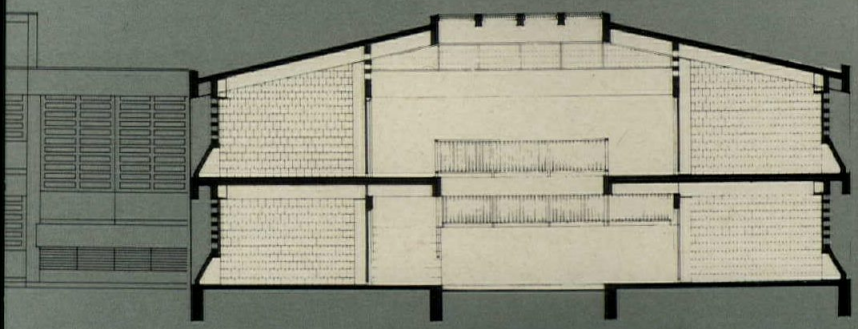
In order to protect against obsolescene, a master plan was prepared for the entire 500-acre site at Pauwela Point; the institution, as presently designed (plan, far right) is the first stage of the plan, with future provision for a women's unit, a satellite unit related to the current one, and a farming area.

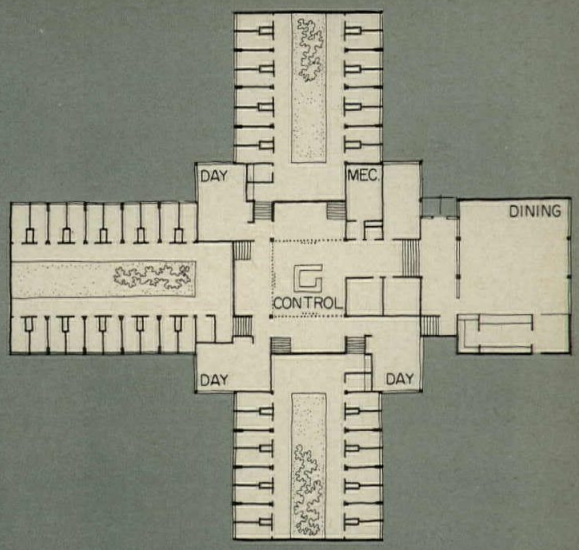
Special consideration was given to the selection of building materials in view of weather conditions and local construction methods: the whole structural system will be based on precast structural members, with concrete masonry for fill-in walls. The mild climate led to an indoor-outdoor relationship, with covered exterior circulation instead of corridors.

HAWAII ADULT CORRECTIONAL TRAINING FACILITY, Pauwela Point, Hawaii. Architects: *Kenneth F. Brown and Ernest H. Hara;* consulting architects: *Hellmuth, Obata and Kassabaum, Inc.—Gyo Obata, pincipal in charge of design; project architect for HOK, J. Tom Bear; HOK project team, Daniel B. Gale, Chih Chen Jen, Jerry Martin;* structural engineer: *Harold Tanimura;* electrical engineer: *Wynn Nakamura;* mechanical engineer: *Clarence Nakashima;* food service consultant: *Flambert and Flambert.*

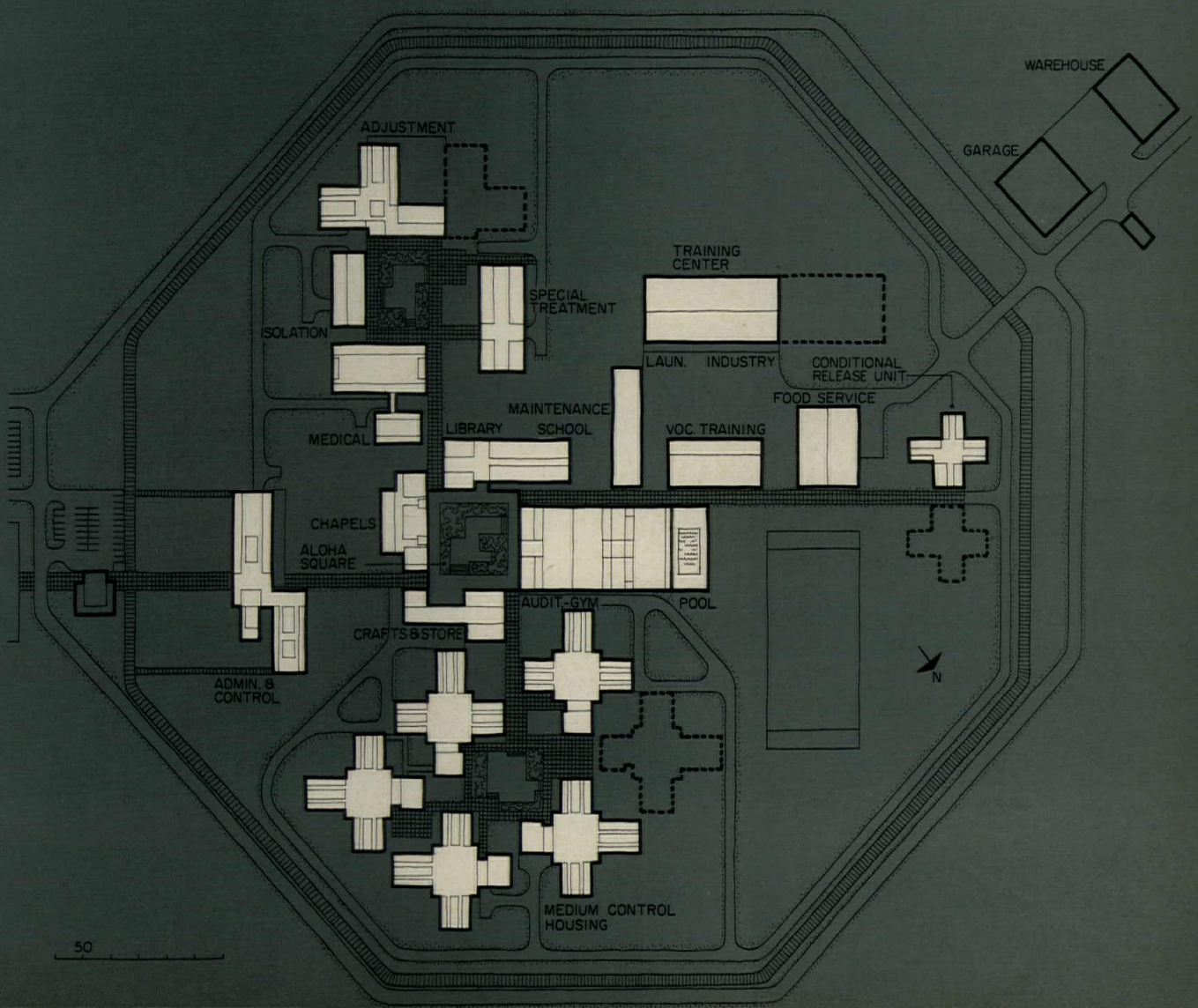


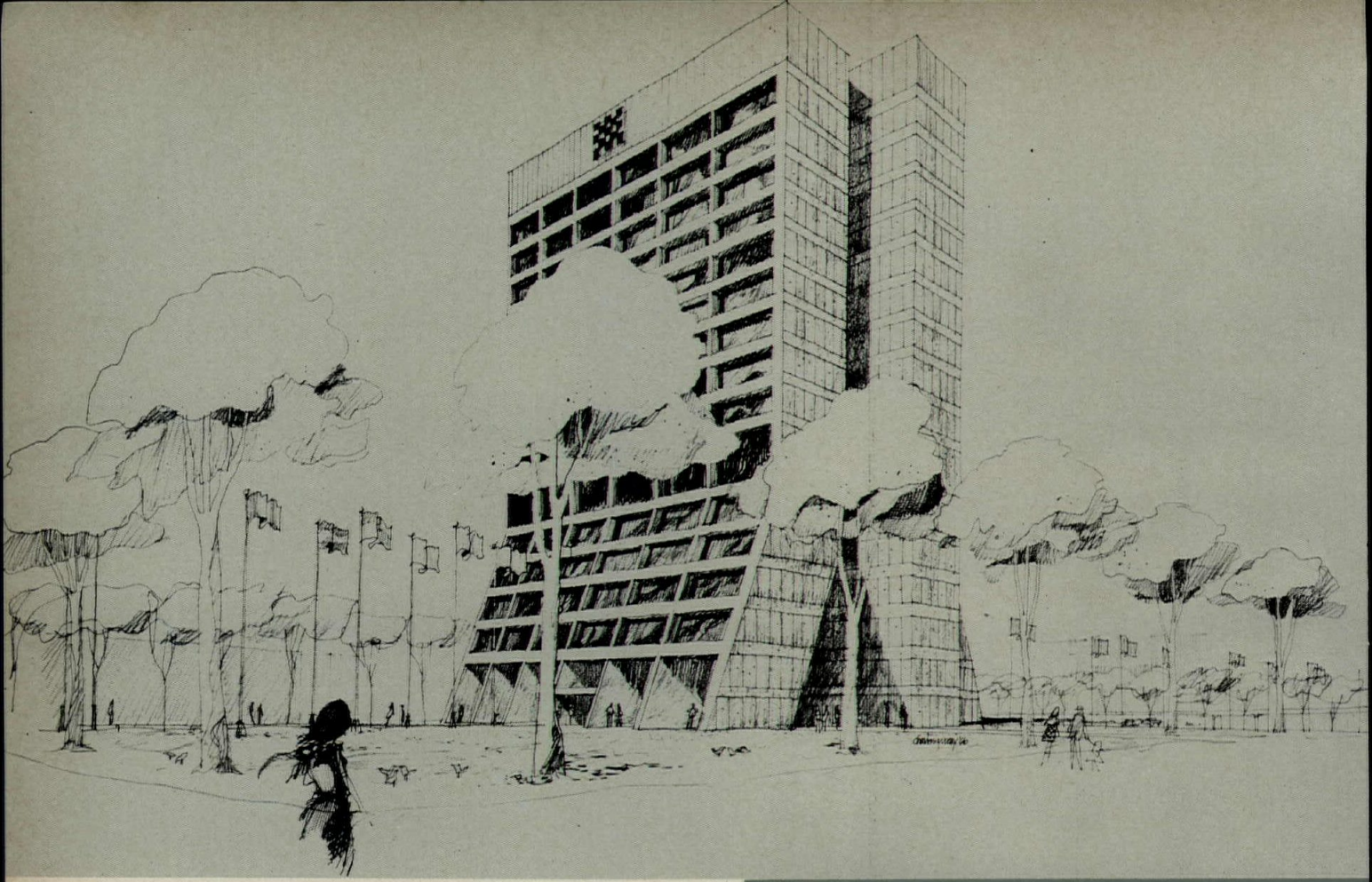
The first stage of construction, an octagon in the master plan (left), is organized around a community center called Aloha Square (sketch below) which is formed by the library and school, chapels, crafts shops and auditorium-gymnasium. From here, covered circulation spines extend to four centers: housing, training, special treatment and administration.





An open garden (sketch, far left) is placed in the center of the housing complex to take advantage of the climate and natural ventilation. Housing units are planned in manageable sizes (above and left) for treatment, counseling and control. Each unit has a central control point, with inmates' rooms extending a half level up or down. Each room has sleeping, study and sanitary facilities.



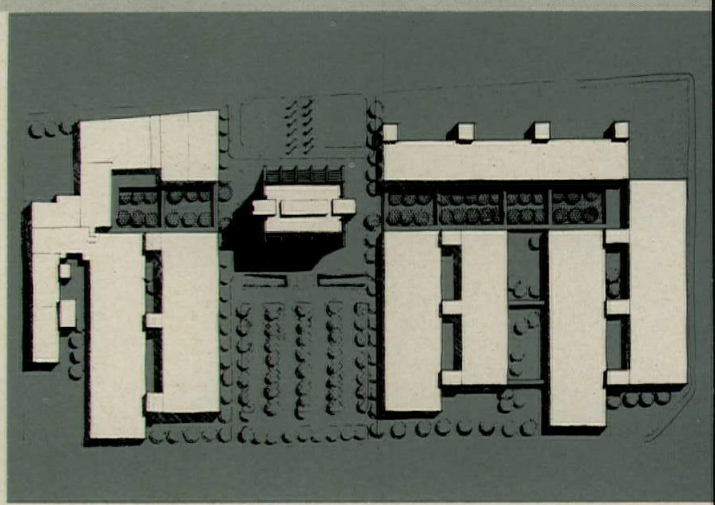


"CHECKERBOARD SQUARE" GETS NEW MASTER PLAN FOR HEADQUARTERS AND RESEARCH CENTER

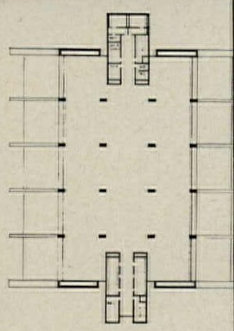
The use of architecture and planning to project "corporate identity" makes a striking impact in this new master plan and corporate headquaters for Ralston-Purina, advertised nationally as "Checkerboard Square." Over-all development of existing and future facilities was formed around a walkway spine at ground level; offices were placed on one side, and research elements on the other, of the new headquarters tower. An underground walk was planned to connect all the facilities for protected circulation.

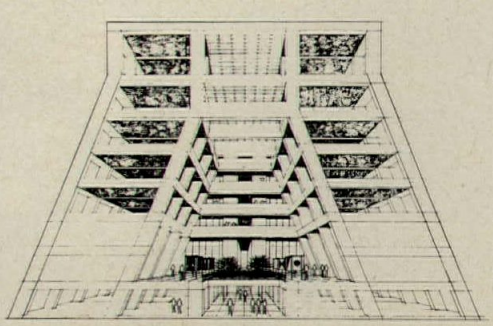
A very dramatic central exhibition space was created in the main tower, to identify the entire complex. The building has typical office space on the upper levels, with two service core areas at the ends. As the building descends to the ground, the office spaces are separated to create a big central, sheltered "place". This space, which will rise vertically for five levels, will contain educational exhibits to show the range of Ralston's corporate activity. The east and west walls of the tower will contain cells for the vertical rise of the mechanical air system. Each floor is an exposed concrete waffle slab, with plenum space above, formed by metal decking, for the air distribution and electrical systems. The exterior will be sandblasted.

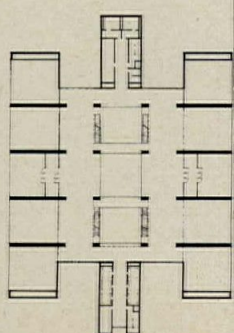
RALSTON-PURINA: MASTER PLAN AND OFFICE BUILDING, St. Louis, Missouri. Architects: *Hellmuth, Obata and Kassabaum, Inc.—Gyo Obata, principal in charge of design; project architect, Jerome Sincoff; project team, George B. Hagee, Terry F. Cashen, John M. Newman;* structural engineer: *Le Messurier Associates, Inc.;* mechanical engineer: *Harold Brehm.*

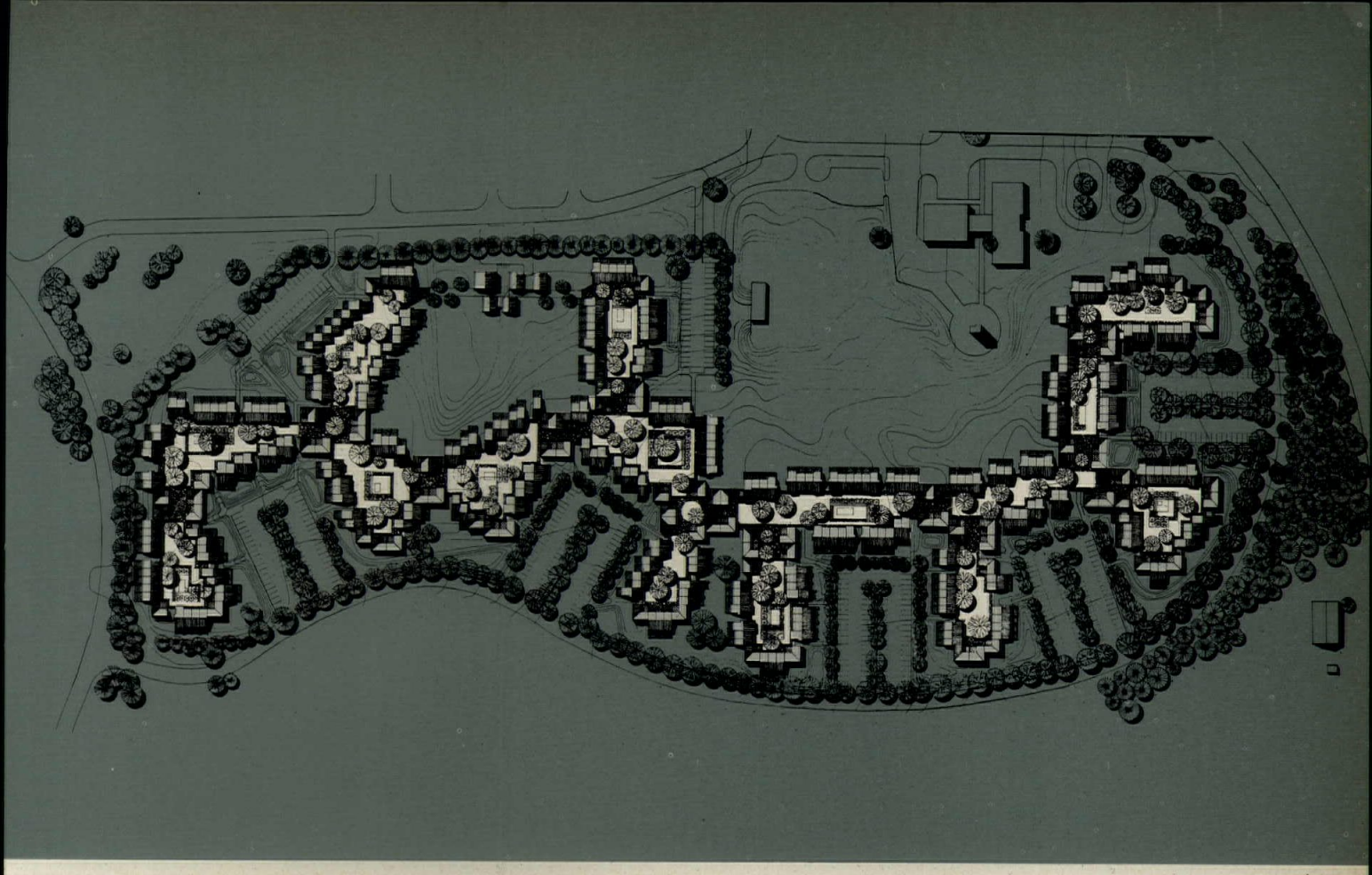


In addition to the attention-getting qualities of the flag-rimmed plaza and soaring exhibit hall, the main headquarters tower provides Ralston's administrative office workers with very adaptable, flexible space. Use of service towers at the ends, and planning on a 5-foot by 5-foot grid provide free, easily partitioned office floors. The architects note that "the vertical cores will recall the grain elevators Ralston has across the country."









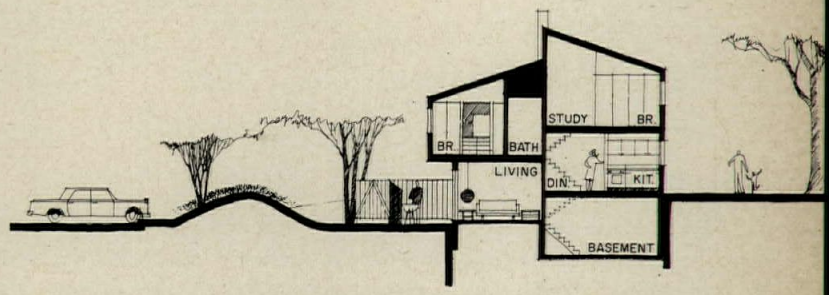
A PEDESTRIAN MALL LINKS HOUSING CLUSTERS TO FORM A COMMUNITY AT UNIVERSITY OF MICHIGAN

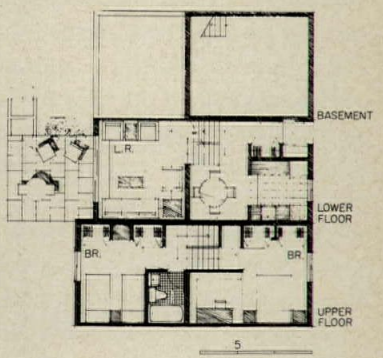
An extremely pleasant pedestrian walkway is the main organizing design feature of this married-student housing development for 400 families. Not only does it connect the series of small housing clusters with traffic-free walks, but it provides safe and easily supervised play spaces for the children.

Access by car is established around the perimeter of the development. Seven parking areas are provided, with mounds placed to screen cars from view in the living rooms, and patios. Paved and landscaped walkways connect all areas.

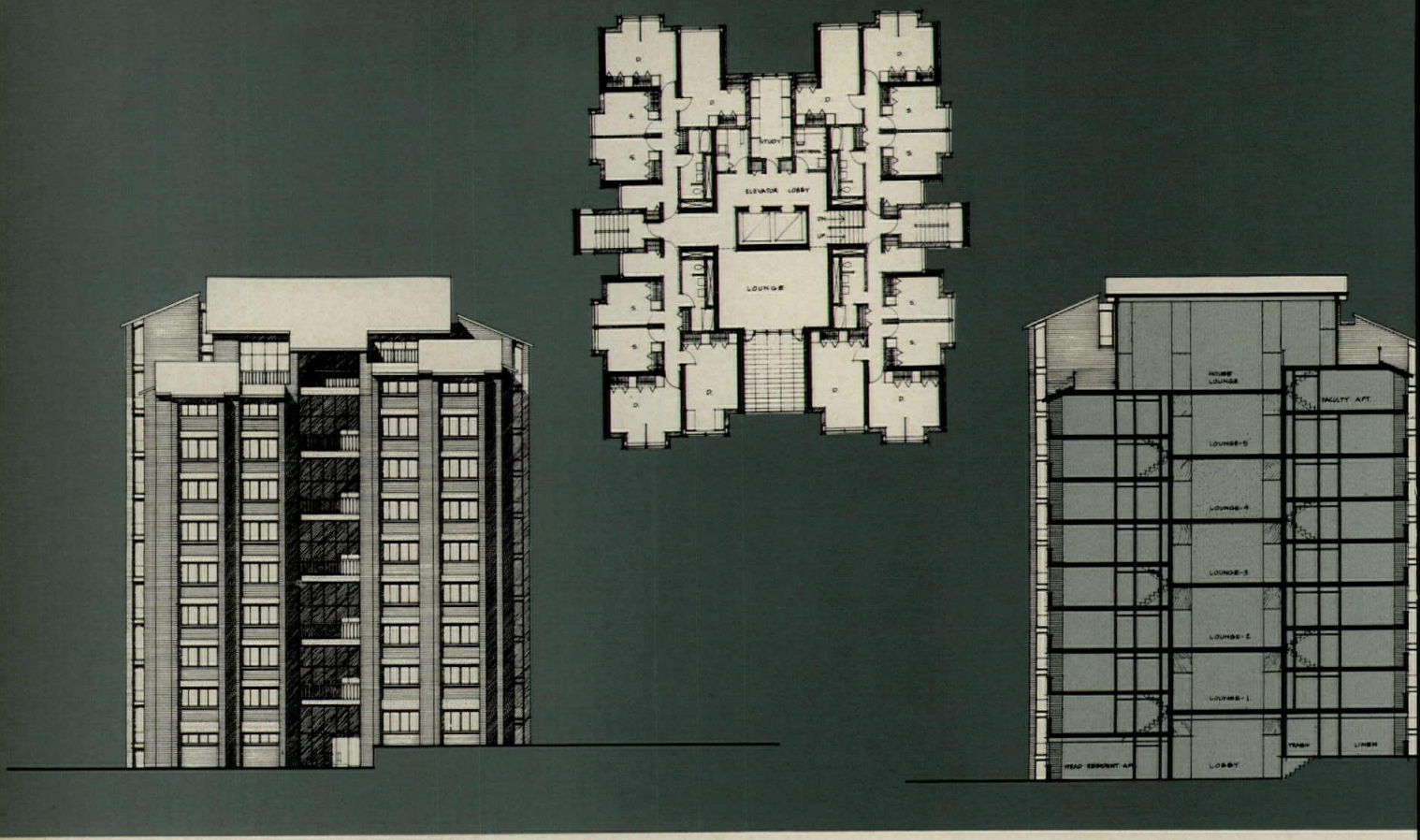
There are some five variations in house plans, ranging from one-bedroom apartments to three-bedroom houses. For privacy and quiet for study and living, major rooms of all the houses face away from the center walkway and play area. The university required designs which could be implemented at a cost comparable to builder-planned housing in the Ann Arbor-Detroit area; to achieve simple and good, but economical architecture, HOK worked with a builder-consultant in analyzing cost alternates and builder construction methods. Materials are fairly uniform: brick and rough-sawn western cedar walls and dark brown sloping shingle roofs.

UNIVERSITY OF MICHIGAN: MARRIED STUDENT HOUSING, Ann Arbor, Michigan. Architects: *Hellmuth, Obata and Kassabaum, Inc.—Gyo Obata, principal in charge of design; project architect, Chester E. Roemer; project designer, Robert E. Edmonds;* landscape architect, *Neil Porterfield;* mechanical engineer: *Harold Brehm;* structural consultant: *The Engineers Collaborative;* construction management consultant: *Bryant & Detwiler; Nelson Construction Company.*





Village-like plazas are created in the center of each cluster of houses linked by the center walkway. The designs of the houses are fresh and trim, but relatively quiet and unified. One of the five different schemes is shown here, a split-level, two-bedroom row house. The section clearly shows the separation of central walk and play area, secondary areas in the houses, privacy for major rooms, outdoor living, and parking screened by mounds.

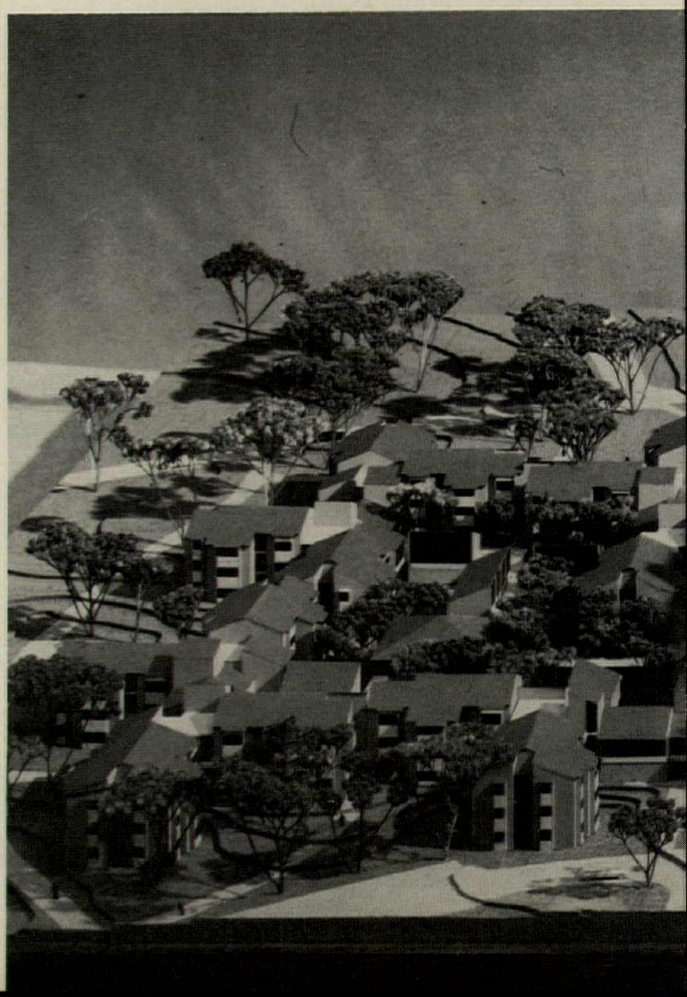


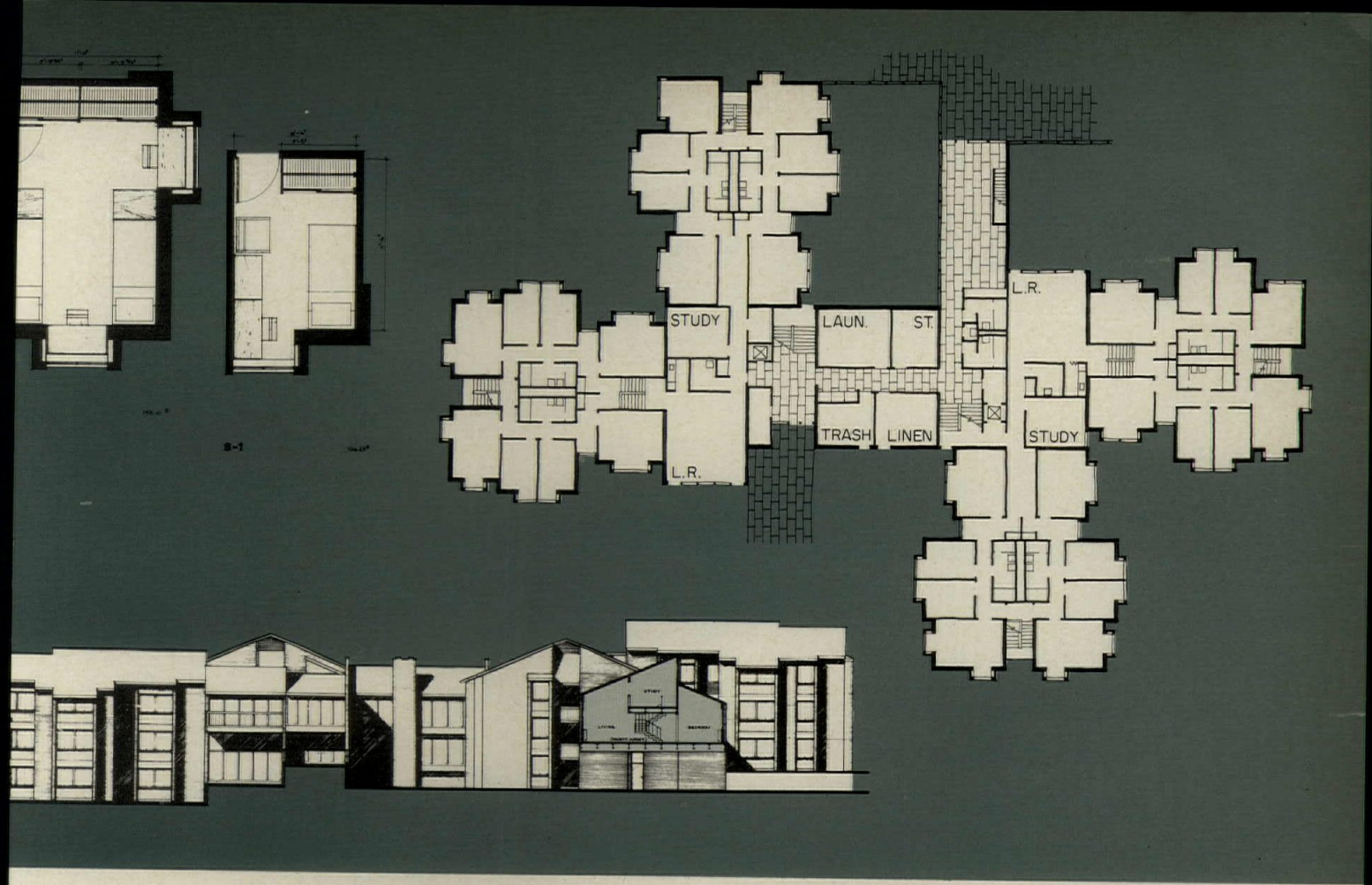
CORNELL'S NEW STUDENT HOUSING FORMS UNIFIED RESIDENTIAL COMPLEX

The Cornell program for this new residence complex for 1,500 undergraduate men and women stated: "The quality of housing provided for its students by a collegiate institution should be a measure of its educational principles. This implies . . . the creation of a residential setting that will serve to strengthen an individual's potential as a student and as a mature citizen of his community. . . . The quality of his housing should be commensurate with the standards of excellence prescribed for his academic program." Toward this end, details of the program were compiled and written over a six-year period, but the administrators made it clear that design implementation of all these requirements was still completely in the hands of the architects.

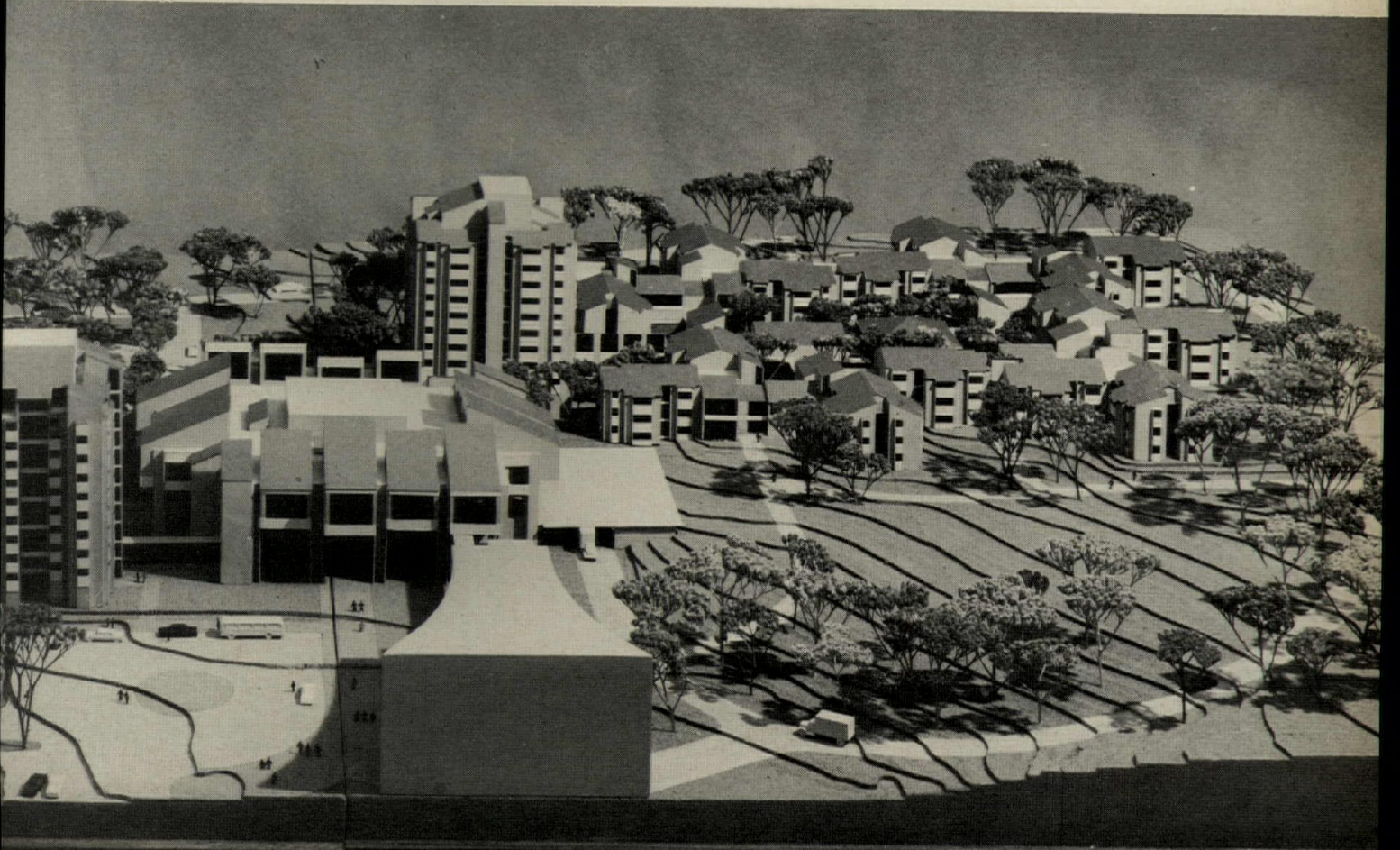
The sprightly and extremely interesting residential community shown here is the result of such a far-sighted program. The complex contains eight low-rise houses and two high-rise units grouped around a central Commons building. All the buildings are related in character by brick walls and a sloping shingle roof system, and are arranged to form a pedestrian walkway system which leads through a progression of spaces designed for a variety of uses.

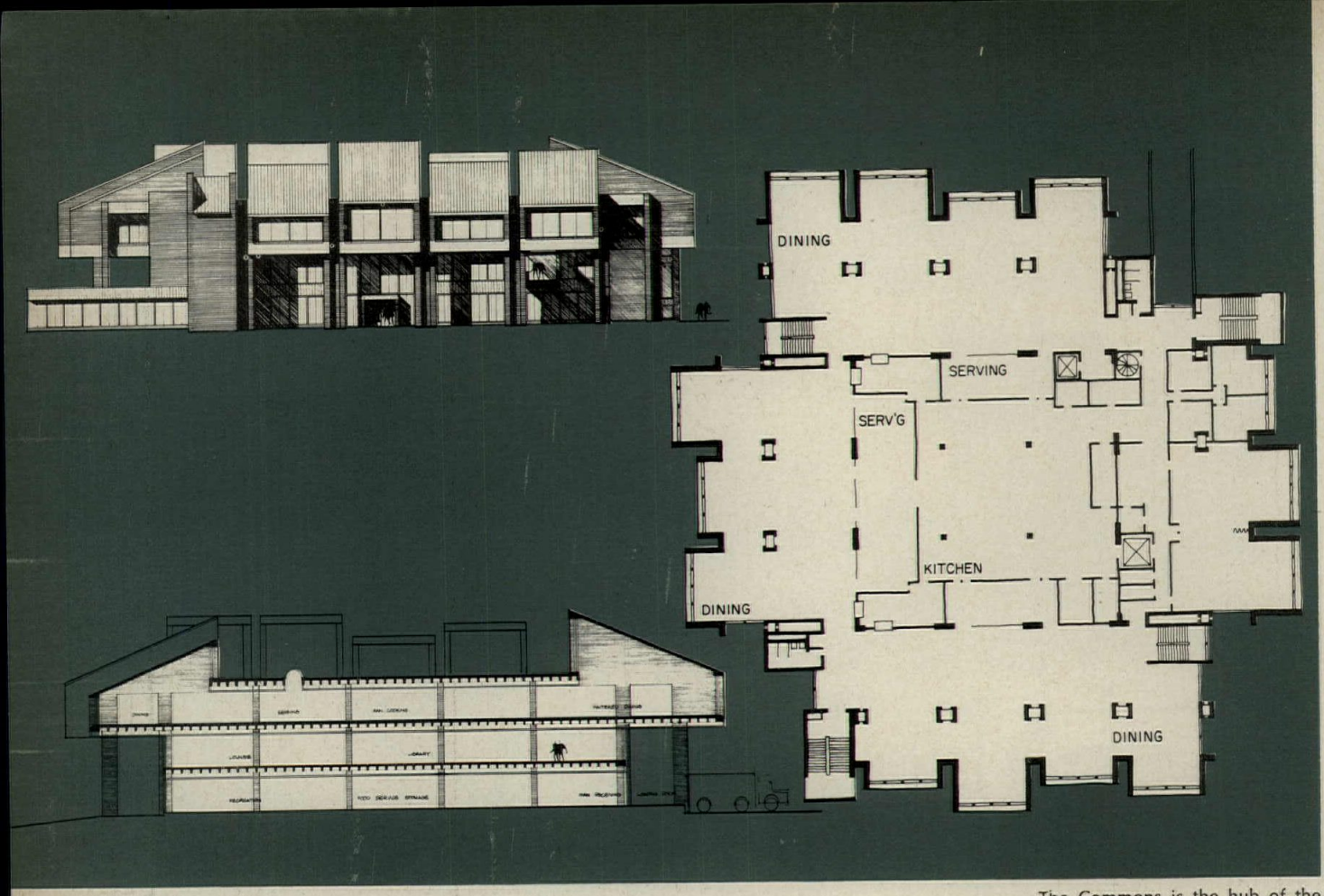
CORNELL UNIVERSITY: STUDENT HOUSING, Ithaca, New York. Architects: *Hellmuth, Obata and Kassabaum, Inc.—Gyo Obata, principal in charge of design; project architect, King Graf; project designer, James R. Henrekin;* landscape architect, *Neil Porterfield;* interior designer, *Michael D. Tatum;* structural engineer: *Le Messurier Associates, Inc.;* mechanical engineer: *Harold Brehm;* food service consultant: *Flambert and Flambert.*



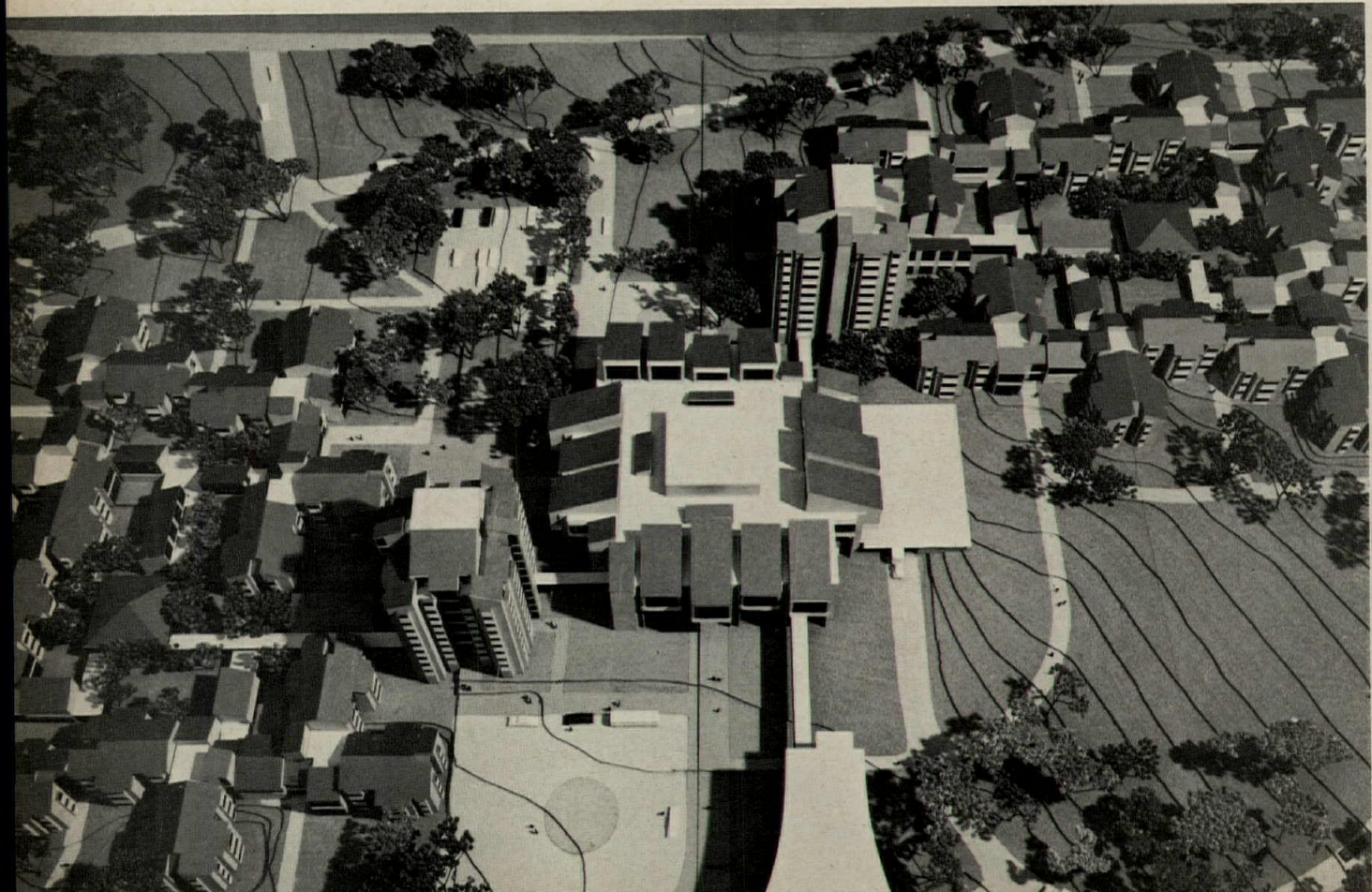


Both high-rise (above left) and low-rise (above) residence building are comprised of suites of single and double rooms for five or six students; six suites comprise a "primary living unit" which has kitchen, living room and group study space; four units form a house, with lounges, laundry, faculty and advisor apartments.

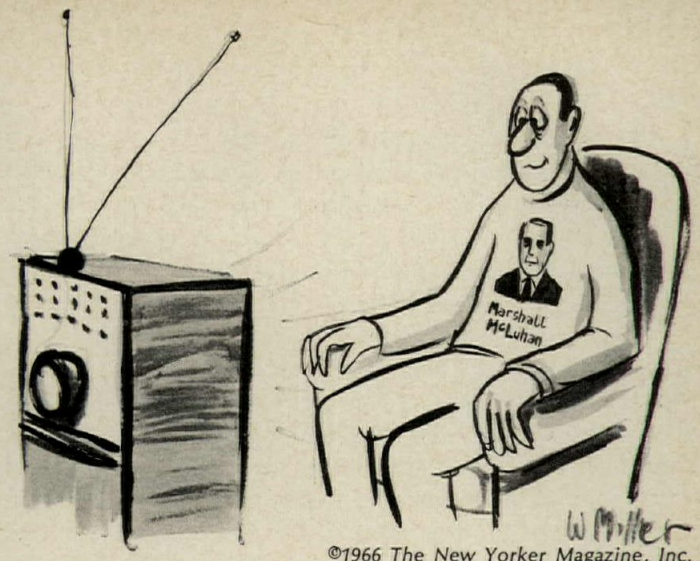




The Commons is the hub of the residence complex for Cornell, and contains administrative offices, library, food service, lounge and other student services and activities facilities. Food service is concentrated on the top floor: students may select from a variety of menus in any of three serving areas and then proceed to any of 14 dining rooms to eat. The exterior reflects these.



ARCHITECTURE IN THE ELECTRONIC AGE



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Some months ago John Johansen sent us a copy of a review he had written for the *American Scholar* which took Marshall McLuhan's theory that the new electronic means of communication are going to make a tremendous change in the nature of our society, and set about projecting the kind of changes he thought were in store for architecture. We had been noticing for some time that almost every architect who came into the office had the paperback edition of McLuhan's *Understanding Media* tucked into an overcoat pocket, or nestling among the model photos in his briefcase, and we began to think that it was time to see whether McLuhan himself was willing to relate his theories of communication directly to the problems of architecture and planning.

A recent trip to Canada provided an opportunity to arrange an appointment at the University of Toronto's Center for Culture and Technology, of which Professor McLuhan is the director. The center occupies part of a wood frame house on a street that is clearly doomed to make way for the University's expansion program. McLuhan and an associate, Harley Parker, were seated at a large wooden table covered with neatly arranged manila file folders. They were, McLuhan explained, embarked on a historical survey of concepts of non-visual space and had just gotten as far as E. E. Cummings and Paul Klee.

Non-visual space seemed a good point at which to begin, and McLuhan obligingly elaborated. The printed word, in his view, had fostered a linear and sequential view of reality, in which ideas seemed to follow each other in order. Electronic communication, however, was so close to instantaneous that several ideas could be received simultaneously. The architect, he continued, still encounters the world in visual terms, "but the spaces created by an age of electronic technology are not visual spaces." Visual space, in McLuhan's terminology, is uniform, continuous, and connected; and associated with traditional concepts of reason, order, and civilization. To explain non-visual space, McLuhan reverts to the kind of reasoning by analogy that pervades both his conversation and his writing; "to a blind man, the most significant space is the gap: for him, as for the Oriental, it is the interval that is important—not the connection; and the interval is tactile and auditory, not visual. Electronic space is also tactile and auditory; the boy who holds a transistor radio to his ear is creating an acoustic space bubble, which is like an aqualung."

It is McLuhan's argument that, in what he calls "the electric age," visual continuity is replaced by a simultaneous field. A McLuhan analogy: "In a space capsule there is no right-side-up." Another, more elaborate sample of analogic reasoning: "The slum is the most *avant garde* space in our society; it includes all the senses; and *avante garde* art creates spaces which are exactly like a slum."

McLuhan accounts for the obscurity of his theories with an aphorism: "The future of the future is the present; but the present is so obvious that it is invisible." The corollary of this concept might well be the most convincing explanation yet devised for the history of architecture over the last 200 years: "A new environment does not reveal itself until it has been superseded. The old technologies become today's art forms, so that what appears as today is always yesterday."

Using an analysis of the present to discover the shape of the future might be called McLuhan's basic methodology, and he takes aspects of contemporary culture—that others might consider passing fads—and treats them with enormous seriousness. For example, the new improvised dances of the discotheque strike McLuhan as a response to the simultaneity of a primarily aural environment, whereas traditional ballroom dancing ("uniform, continuous, connected") is a relic of the visual world of print. Similarly, he looks at the cacaphony of the city today and concludes that its future is "a showcase of new technologies." He also observes that the railroad established the spacing of today's cities (a linear sequential pattern) whereas the airplane has made "all cities suburbs of each other," (simultaneity).

McLuhan, however, does not view with alarm. Indeed it could be said that he views with delight. The environment, he remarks cheerfully, is a teaching machine; and he looks forward to man's complete mastery over his teacher: "In the world of space technology, the planet becomes a human artifact, not a natural habitat. In the new satellite environment, the planet becomes Williamsburg: we are going to deal with it tenderly as a cherished archaeological exhibit."

McLuhan foresees that the role of the architect and other creative people will be a primary one in the situation he describes: "The artist leaves the ivory tower for the control tower, and abandons the shaping of art in order to program the environment itself as a work of art."

A happy thought on which to end, and McLuhan is a convincing speaker; but somehow, in retrospect, it all seemed to become a great deal less simple and straightforward. We therefore decided to send a transcript of McLuhan's remarks to a group of architects and planners across the country, to see what their reactions would be.

In general, the architects' comments showed considerable interest in McLuhan's ideas, and considerable dismay over the way they are expressed. Atlanta architect Fred Bainbridge said that McLuhan's style reminded him of the items that the New Yorker magazine runs under the heading "The Mysterious East." John Hedjuk, chairman of the department of architecture at Cooper Union, suggested that perhaps McLuhan had modeled his discourse on Gertrude Stein's, while Memphis architect Roy Harrover remarked wryly that McLuhan's mode of expression was not uniform, continuous or connected.

Most of the architects contacted, however, agreed with McLuhan's basic premise. Gyo Obata, of the St. Louis firm of Hellmuth, Obata and Kassabaum, said that he agreed completely with McLuhan's view that our environment will be changed drastically by electronic technology; and Roy Harrover stated that "McLuhan seems to me generally to have constructed a vision of our current environment which is quite valid. Although this vision is based upon a study of media in the extremely broad sense of the term, I do feel that it is pertinent to architecture and planning, since any philosophy which affects our attitude to the world around us will automatically affect our architecture."

The concept of non-visual space won a great deal less acceptance. Robert Anderson, a partner in the office of John Andrews, architect in Toronto, pointed out that one could infer "that McLuhan himself encounters the world in visual terms, for the evidence that architects are aware of more than visual form is less apparent, and somewhat difficult to find, but extant nevertheless."

John Hedjuk's dissent was much sharper: "as long as men have eyes, there will be space that a man can see, and this is visual. We now still live in a visual environment, and I suspect that we will continue to do so for some time; nor is visual space necessarily uniform, continuous and connected. As for the comment that, for the blind man, the most significant space is the gap, I would remind Mr. McLuhan that Leonardo da Vinci said that 'Blindness is the sister of death.' " Boston architect Earl Flansburgh added that, just as no amount of phonograph recordings will diminish the need for live performance, in the same way "man is only willing to accept illusionary space—the acoustic aqualung—if he cannot embrace the more complete experience."

John Johansen, in his review in the *American Scholar*, had postulated a translation of McLuhan's non-visual approach into architectural terms: "If the images of the electronic world are continuous, simultaneous, nonclassified or noncodified, . . . the viewer will expect all parts and aspects of the building to be made known, to be immediately comprehensible, not as a complete impression but as an all-inclusive image. Buildings will reveal themselves totally. They will clearly express their elements, functions and processes. The viewer will identify with them, feel an empathy with them. . . . The facade in the traditional sense, no matter how richly sculpted or how irregular or bold, will disappear in favor of separate habitable enclosures posed freely in space. . . .

"As modern physics no longer sees a universe which is compact, tightly organized, and in which everything is governed by strict causality, so too, our impressions will not be ordered, controlled, or in sequence. . . .

"Not only is the fixed axial reference point of the Renaissance out of date; but so also is the 'space-time,' or moving station point, conceived by Siegfried Giedion—which might be said to represent the mechanical age of the wheel. . . . We will have a new station point of the electronic age; one that is multiple and simultaneous, a 'simul-station.' . . . The total architectural environment, as McLuhan has said, will be a mythological world in which all things are connected in the human mind and experience, as opposed to the Aristotelian classified world of knowledge and exact definition."

West coast architect Sim Van der Ryn found such an architectural interpretation of McLuhan much too optimistic. "Has it ever occurred to McLuhan that extending man through media can have, and does have, dehumanizing effects? For example, McLuhan does not touch on the steady erosion of privacy through electronic penetration or the ever-increasing bombardment of urban man's sensory equipment."

There is no doubt that McLuhan takes a much more sanguine view of the future than most of the people who make predictions about the environment. Gyo Obata considered such optimism an implied criticism of the prevailing professional attitude: "I think McLuhan's point about the planet becoming a Williamsburg and a cherished archaeological exhibit is a dig at our professional environmental planners and architects, which, hopefully, will cause us to readjust our thinking to the changing world."

Others, however, could not agree. Earl Flansburgh pointed out that any attempt at environmental control must still take place "within the friendly parameters of the earth's basic properties." Roy Harrover observed that the ability of the architect to be an interpreter of society was weakened by the contradictory pressures of being in control. Robert Anderson put the same thought in even stronger terms: "If we are to 'program the environment,' it must not be 'as a work of art,' for art admits of no imperatives. Programing infers an ever increasing knowledge of the sources of human behavior and implies an ever-increasing temptation to control it. Architects must be governed by strong moral imperatives to resist this temptation."

Whether or not McLuhan's view of the future promises the kind of specific architectural results that John Johansen foresees (and it is questionable whether McLuhan sees the future this way himself), most of the architects contacted seemed to feel that McLuhan's attempt to assess the future impact of communications technology deserved to be taken seriously. The aggregate effect of recent technological inventions is still incalculable, and any and all prophecies should be gratefully received.

—*Jonathan Barnett*

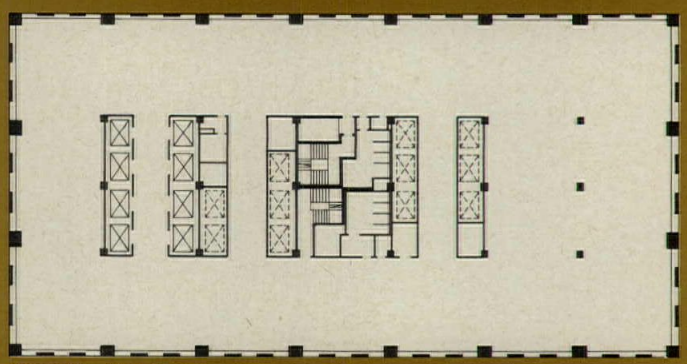
Hedrich-Blessing photos

An office tower and plaza in downtown Cleveland offers proof that speculative building need not be unattractive or carelessly built

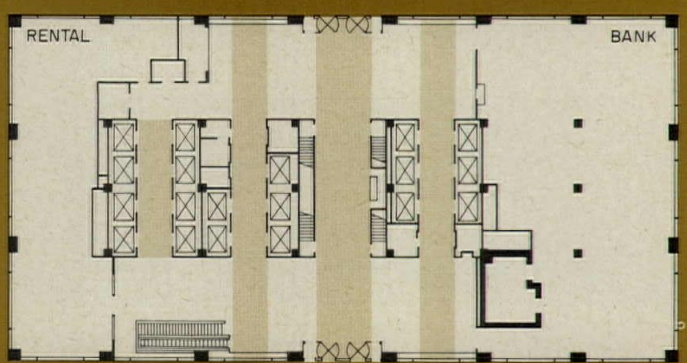
ERIEVIEW PLAZA

This 40-story office building, underground parking garage, and plaza is a speculative venture, and within the disciplines that imposes is clearly of superior architectural quality. It serves to demonstrate the truth of architect Max Abramovitz' statement that "speculative buildings do not have to look cheap or vulgar; a breakthrough is possible here or there." Erieview is obviously not the same sort of thing as the typical ill-shaped, unattractive ventures we see on every hand, and in which the single, unrelenting objective is maximum rental area at rock-bottom cost.

Yet Erieview has been a commercial success; was 50 per cent rented before construction was begun, and has been fully rented since completion. It is built of durable—but not costly—materials, chosen for visual appeal and low maintenance costs; and is of familiar, tested construction—see details, page 156. The three-member team that developed the project—owner Galbreath-Ruffin, architects Harrison & Abramovitz, and Turner Construction—has worked together on a number of such projects, and has worked effectively in pooling experience and know-how in reducing costs and in developing a sharper sense of real versus assumed values. The resulting buildings have an almost institutional look, secured at rental-market cost.



TYPICAL FLOOR



GROUND FLOOR

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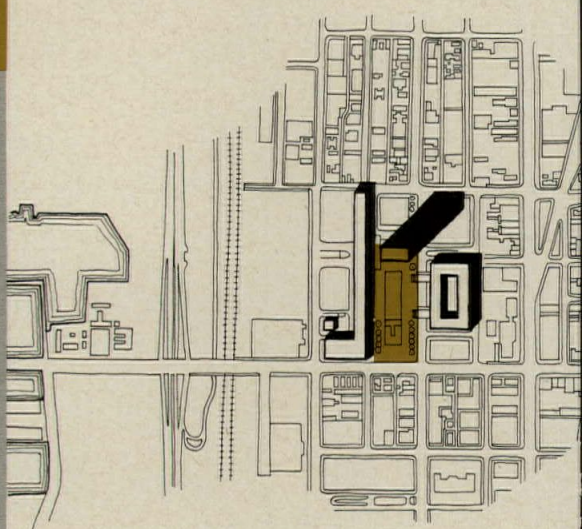
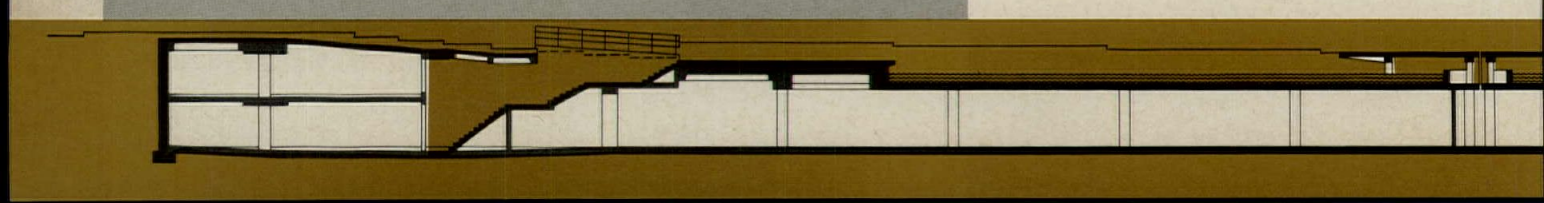


Plans of a typical office floor and of the lobby floor are shown above; a section through the parking garage underlying the plaza and pool is shown below. The garage is entered either from the building or from the open stair at the opposite end of the plaza; note how the precast concrete fountains function also as ventilators for the garage space. The platform of the bridge spanning the pool is floodlighted and is planned to be used for band concerts, etc.; the portion of the pool beyond it can be frozen for skating. The plaza is paved in two tones of gray concrete.

The telephone company occupies the lower one-third of the building, and the housing of their long-lines equipment accounts for the change in exterior wall treatment for the lower floors.



INTAKE
EXHAUST
EXHAUST

OFFICE BUILDING, GARAGE, AND PLAZA

ERIEVIEW PLAZA, CLEVELAND, OHIO

ARCHITECTS: *HARRISON & ABRAMOVITZ*

DEVELOPER-OWNER: *GALBREATH-RUFFIN CORPORATION*

FOUNDATION ENGINEERS: *BARBER, MAGEE & HOFFMAN*

STRUCTURAL ENGINEERS: *EDWARDS & HJORTH*

MECHANICAL ENGINEERS: *JAROS, BAUM & BOLLES*

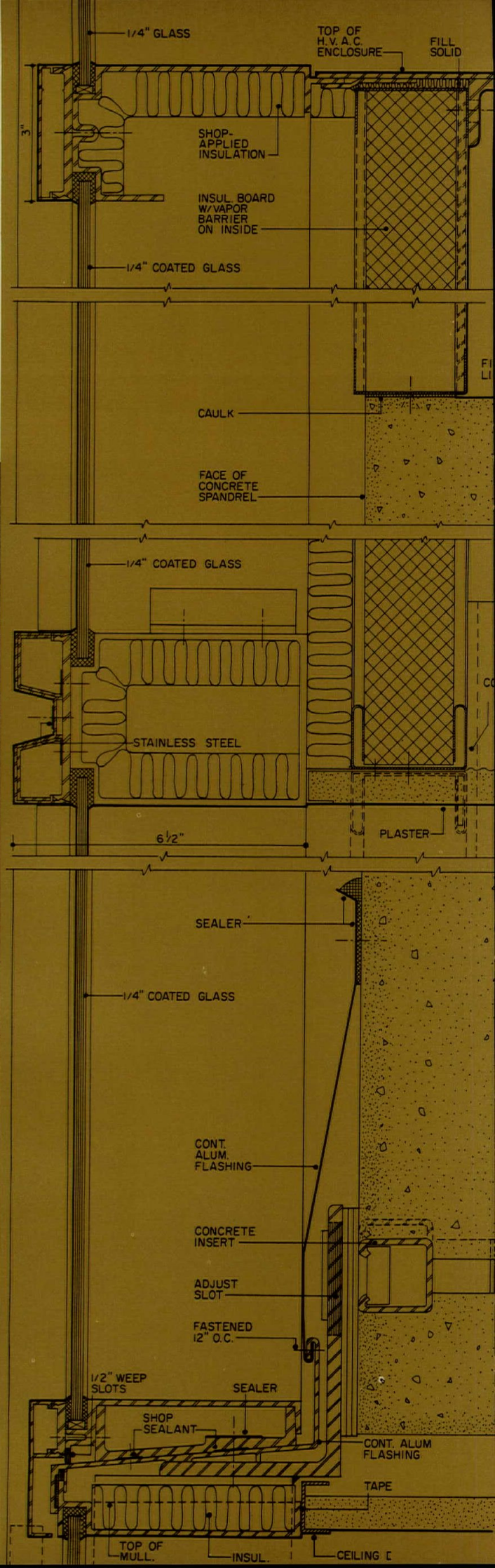
ELECTRICAL ENGINEERS: *EBNER ASSOCIATES*

GENERAL CONTRACTOR: *TURNER CONSTRUCTION COMPANY*

The lobby, shown above, is finished in black and white marble; has a gray terrazzo floor and acoustic plaster ceiling; has clear glazing held in polished stainless steel surrounds.

Details of the exterior wall—composed of black granite, gray glass, gray-coated spandrel glass, and dark-anodized aluminum—are shown at right. These details are not revolutionary in concept, but are sound, eminently sensible, and thoroughly studied.

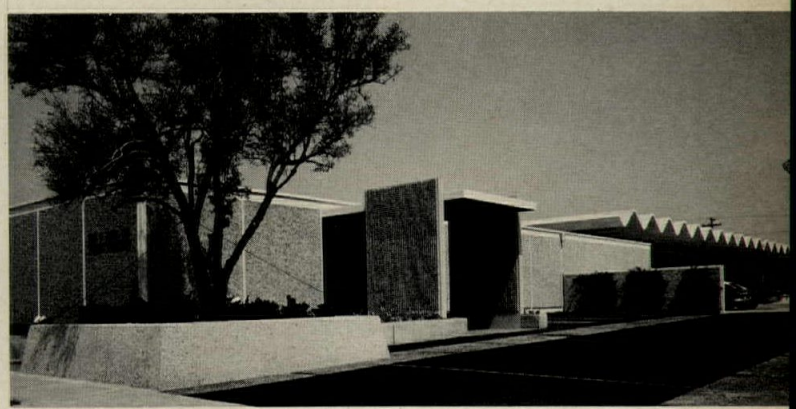
Construction contracts were awarded on the basis of an upset price approved by the owner's engineering department. The Erieview base building—with rental areas having a smooth concrete floor slab, plastered exterior walls, acoustical tile ceiling, and lighting troffers—was built for less than $25 per square foot.



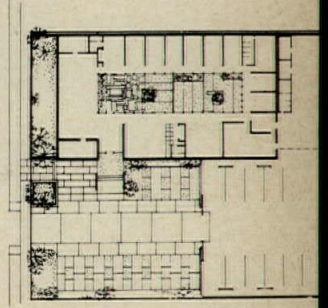
LOW-RISE OFFICE BUILDINGS

Small business buildings—the "taxpayers" of the depression era—have become a building type in themselves during the last decade, reflecting not only a general affluence but the measure of individual business success. When well-designed, such buildings contribute to the quality of a neighborhood—even decaying industrial areas—by their own character. Fortunately, an increasing number of these buildings are well designed, as the examples on these pages attest, investing the areas of their location with a new, economically negotiable vitality. In its continuing presentations of small business buildings, ARCHITECTURAL RECORD makes the point that commercially effective design not only does not need to be exhibitionist, but that its reliance on the architectural virtues of restraint and repose, scale and appropriateness nets lasting economic value.

Offices and product display

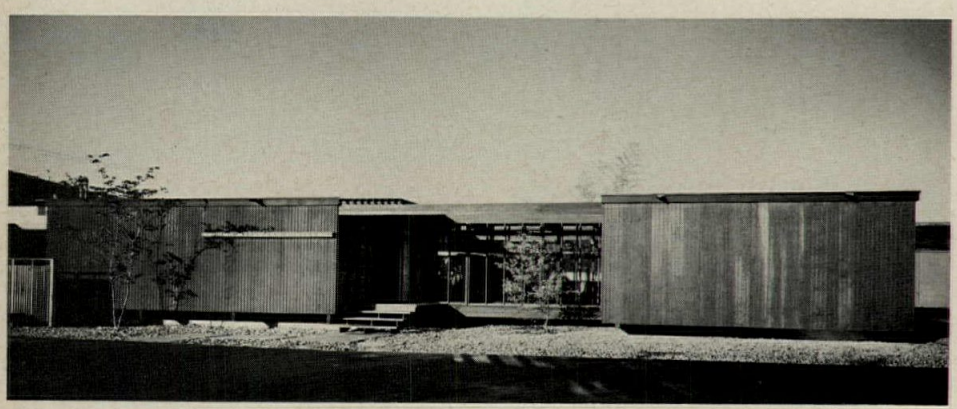


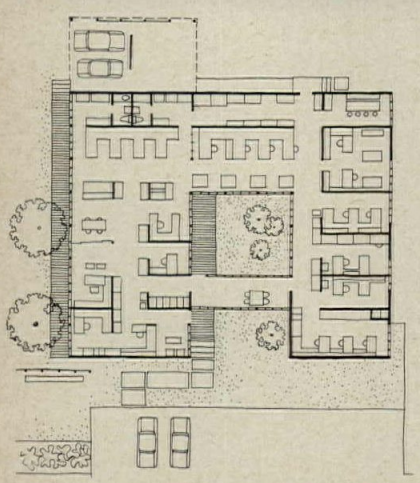
This handsomely executed building for a concrete contractor displays in its components the variety and quality of his specialty: precast fence panels, tilt-up walls, folded plate roof and poured-in-place concrete in a broad range of finishes. The difficult feat of combining types and textures is achieved by sophisticated selection and juxtaposition of finishes, carefully analyzed connections, precise detailing, and basically simple forms. The landscaped patio at the center of the building is an important part of the office function, used for special events involving large groups of field personnel. The architects were also responsible for selection of furnishings and of color, as well as for landscaping.



BEN F. SMITH OFFICE BUILDING, El Monte, California. Architects: *Neptune & Thomas & Associates;* electrical engineer: *William H. King;* contractor: *Ben F. Smith Company.*

Crisp details and an open plan for easy expansion



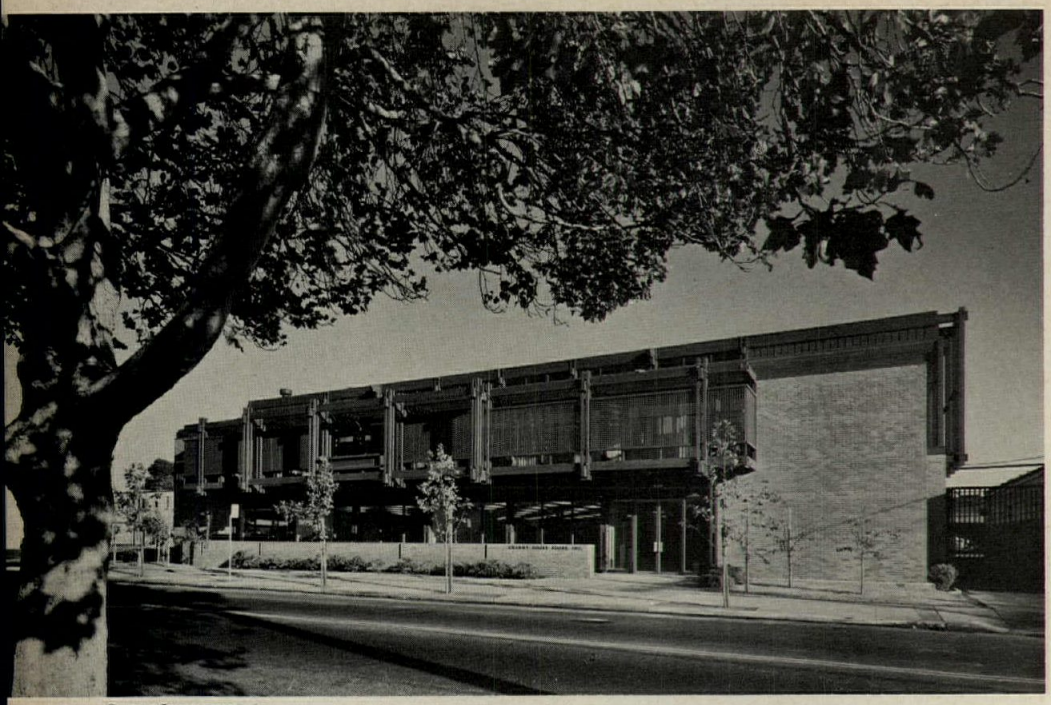


The open court at the center of this inviting small building developed as the result of additions that became necessary within a year of completion of the original rectangular building; it has become a focus for the whole building. No addition was contemplated when the original building was designed, but the open interiors and the simple window-frame structural system greatly facilitated the addition. The straightforward and precise handling of the structure and of the spaces created, and the wholly appropriate furnishings (most of them products of the building's owner), give the building an air of elegance exceptional in buildings of this kind. The all-glass walls and see-through character of the building make for easy supervision of the offices, and the corridors which enclose the court give free circulation through the building. East and west end walls are of exterior textured plywood, stained; other walls are floor to ceiling glass panels. A heat pump supplies conditioned air.

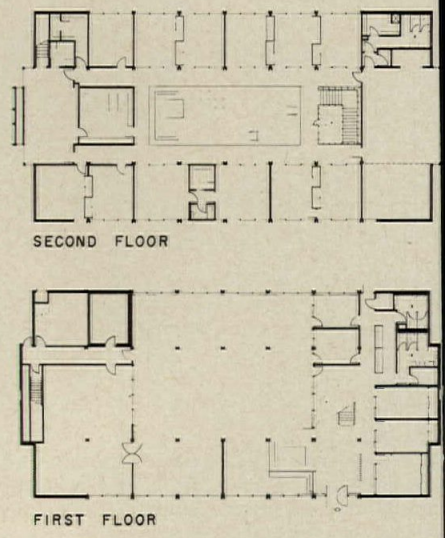
TACOMA MILLWORK SUPPLY COMPANY OFFICES, Tacoma, Washington. Architects: *Mary Lund Davis and Allan Bucholz;* general contractor: *Brian Laird.*

In this remarkably well-ordered small building, everything has its place, including a computer system. The new wing doubled the size of the original building but added a court and retained the transparent character of the original, with the result that what might have seemed very tight quarters has an air of spaciousness.

Photographs by Morley Baer

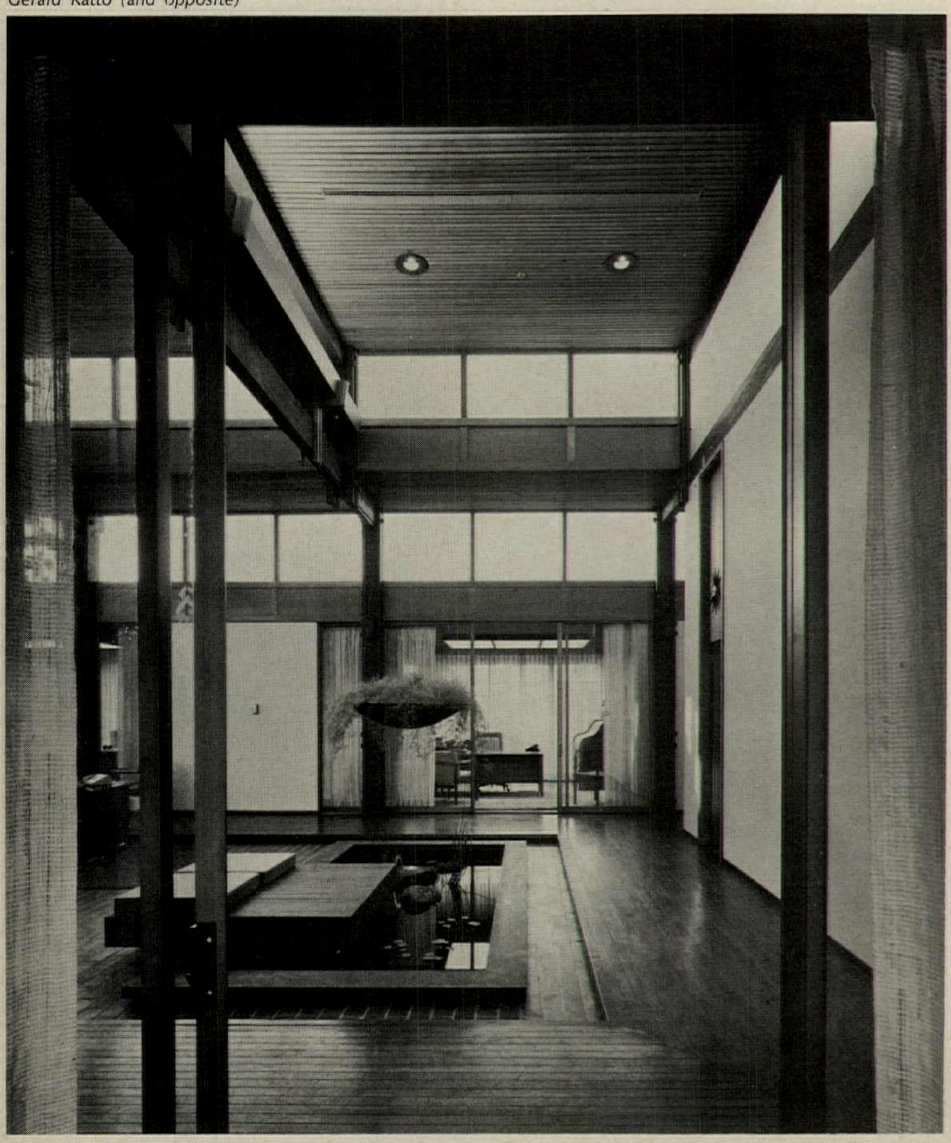


Roger Sturtevant



Office efficiency in an informal environment

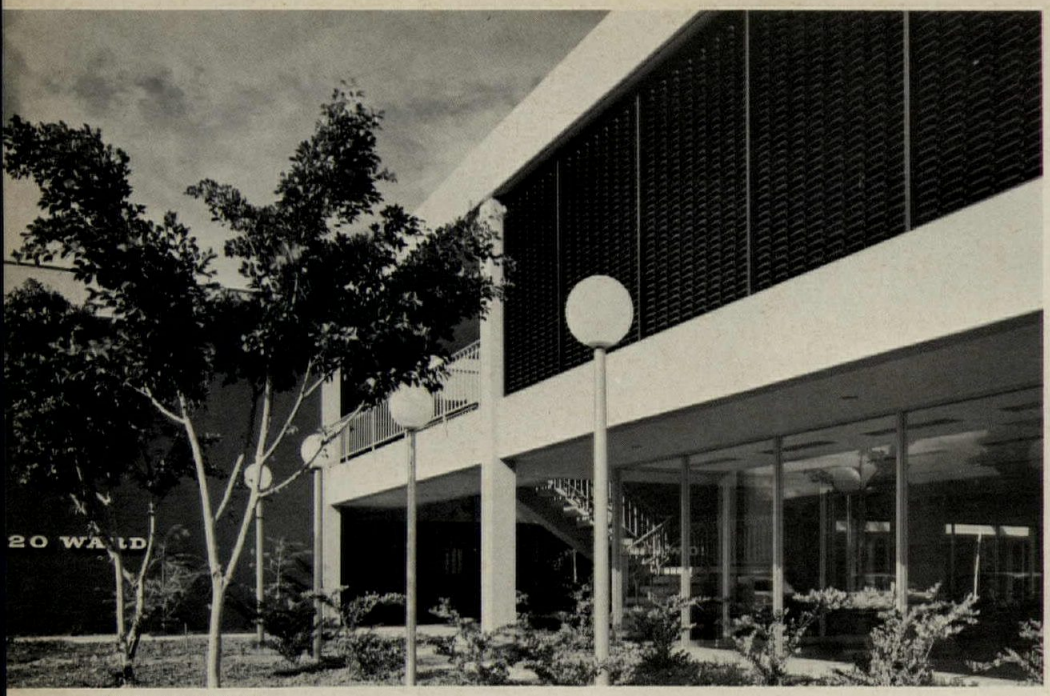
Gerald Ratto (and opposite)



This headquarters office building for a manufacturer of potato chips and similar foods is located on a site adjacent to a warehouse on the plant grounds. The redwood and brick exterior, and the handsome interior with its enclosed second-story court, convey the informality characteristic of the company, and effectively answer the client request for "a building that would function efficiently as an office yet feel something like a home." The brick-floored court serves as a pleasant outlook for the executives' offices which surround it, but is also functionally important as the executive secretarial pool area and as circulation on the second floor. The arrangement allows privacy for executive offices but, as one executive says "is so intimate that we have never needed an intercom system." Cost of the building was $352,600.

HEAD OFFICES FOR GRANNY GOOSE FOODS, INC., Oakland, California. Architects: *Neill Smith and Associates;* interiors: *Janet Bennett;* structural engineers: *Gilbert Forsberg, Diekmann & Schmidt;* mechanical and electrical engineer: *Alexander Boome;* landscape architects: *Sasaki, Walker & Associates,* Inc.; general contractor: *Bayshore Construction Company.*

Pool and planting, brick and redwood help to create a "homelike envionment", with accounting, purchasing and package design departments on the first floor, executives work upstairs in quiet and with no unnecessary interruptions.

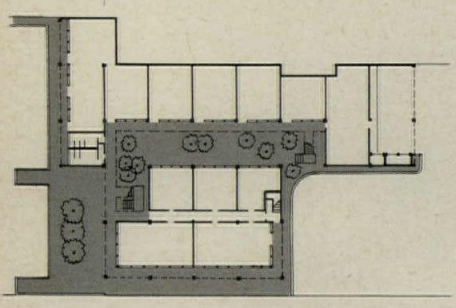


Photos by R. Wenkam

Open court makes all offices prime rental space

The business and professional center at 320 Ward Street in Honolulu is actually two buildings, joined at one end by a balcony and separated along their length by a landscaped court onto which most offices open. Less conventional than the owner had expected, the design nevertheless met his requirement for a rental office building of economical cost. The building has a prestressed concrete frame, with filler walls of either concrete block or glass. The handsome treatment of the two stairways offsets the disadvantage of second floor location, and parking at each end of the building makes the setting spacious.

320 WARD STREET, Honolulu, Hawaii. Architect: *Thomas O. Wells;* structural engineer: *Walter Lun Associates;* mechanical engineer: *Frederick Kohloss Associates;* electrical engineer: *Bennett & Drake;* landscape architect: *George Wolters;* general contractor: *Haas and Haynie.*



Access to second floor offices is by stairway and open balcony, suitable in the tropical Hawaiian climate. Offices which do not overlook the court have deck space between sliding glass walls and metal sunscreen.

COMPUTERIZED COST ESTIMATING

Progress report on an analysis system that could permit comparative assessments of cost and benefit at every design stage from schematics to working drawings

There can be little argument that one of the greatest and most needed benefits the architect could receive from computer technology would be the ability to exercise detailed and accurate control over construction costs.

It has been quite a while since the good old days when anyone could be certain what a building would cost before the working drawings went out for bids. Fluctuating prices and increasing complexity have made all but the most obvious over-all estimates an uncertain business, and the comparative cost of all the possible construction alternatives has tended to slip from the designer's control. Even the professional estimator needs more and more detailed information; and developing accurate estimates for a number of design alternatives is a cumbersome and expensive process.

Cost vs. benefit

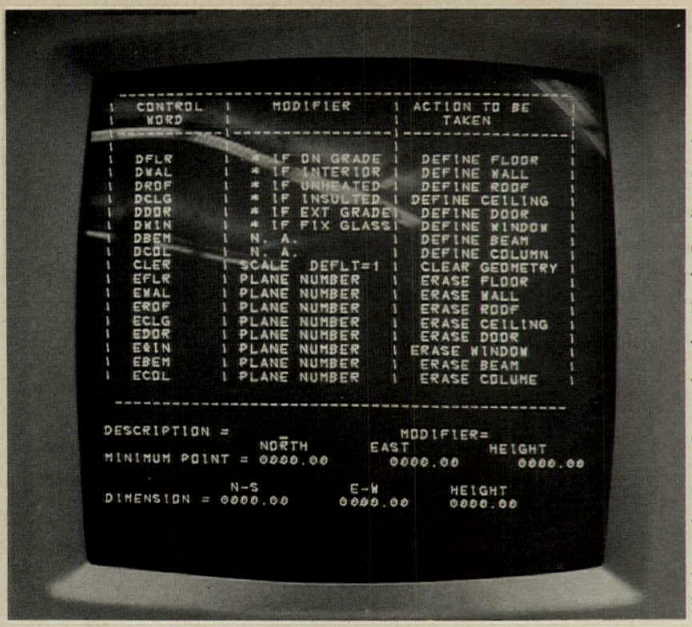
The problem is that the relationship between cost and benefit is quite a complicated one. Moving a wall two inches may add proportionately far more, or far less, to the over-all cost than the change in the space might seem to warrant, depending on the way in which a whole series of complex factors happens to interact. If up-to-date construction data could be gathered on a regional basis and processed by the appropriate computer program, it ought to be possible to calculate the critical points in the relationship between cost and benefit: the exact width of the row house after which the cost may be expected to rise steeply, or the optimum ratio of glazing to solid wall.

Such calculations are theoretically quite possible without a computer; but the arithmetic is so extensive, and so tedious, that in practice it seldom is attempted. Devising techniques for computerized cost-benefit analysis is not so easy either. Programing concepts which are simple enough to grasp in theory, invariably turn out to be difficult to put into practice. Programing a computer is something like writing a set of instructions on how to tie a pair of shoelaces; you have to analyze exactly what the steps are, describing them accurately and in order; and there is always more to it than you think at first.

Research in progress

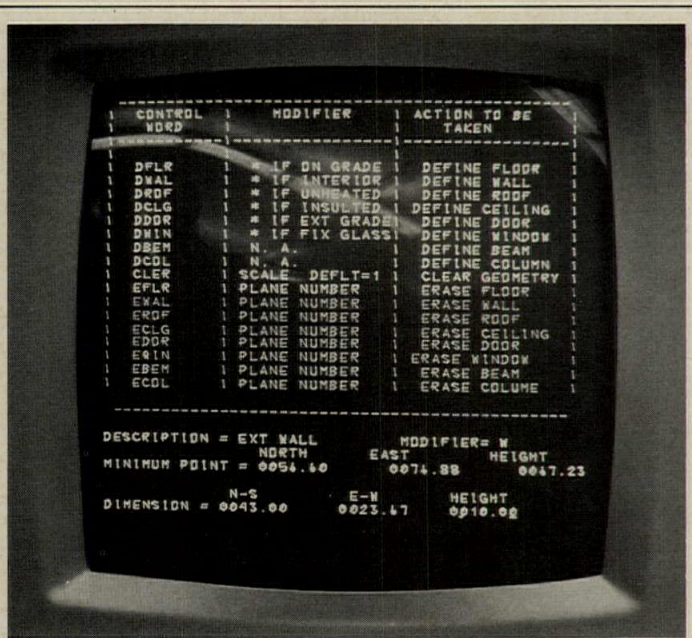
Making up computer programs capable of a cost analysis for all the steps in the construction process is therefore a formidable task; but one which, once accomplished, would be of incalculable value to the whole construction industry.

Some of the most important work on this topic is presently taking place in



All photos by Peter Range for the North Carolina Fund

Architect Arthur Cogswell putting a geometrical description of a building into a computer. He holds the "light pen" at the appropriate point on the input form that appears on the display screen, and then types the information on the keyboard. A three dimensional co-ordinate system uses compass directions to define location of each plane surface in the building; the designer must keep these locations clearly in mind during input process.



Screen shows input form with the dimensional information for one wall filled in. A complete geometrical description of the entire building shell, and all major sub-areas such as doors and windows, is a necessary first step to this computerized cost analysis system. Descriptive process also includes certain basic information about the nature of the building, such as whether glass is fixed or movable, presence of insulation in the wall, and so on.

a small architectural office in the sleep college town of Chapel Hill, North Caro lina. The study began when Chapel H architect Arthur Cogswell, and his asso ciate Werner Hausler, received a $30,00 grant from The North Carolina Fund develop improved means of providin housing for low income families. It soo became clear that the central problem designing such housing lay in predictin construction cost; and Cogswell turne for aid to another North Carolina arch tect, David Sides, whose company, Dat pro, Inc., had been one of the pioneers providing computer services for desig professionals and building contractors.

Sides and Cogswell, backed by a additional $160,000 from the U.S. De partment of Housing and Urban Develop ment, have begun to put together a sy tem that, in the words of a visiting opera tions researcher from England, will b simple, but devilishly cunning. It shou eventually permit the designer to mak comparative assessments of cost an benefit at every stage, from schematics t working drawings, although the prima development effort at the moment directed at the schematic phase of desig

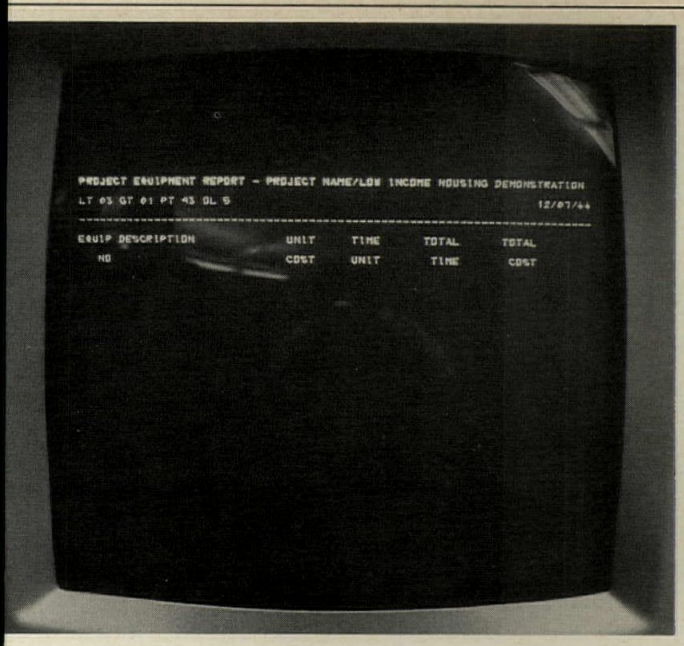
How it works

The first thing the designer does is supply the computer with a geometri description of the building. Each plan is located on a three-dimensional co ordinate system; in other words, the de signer designates a point on his buildin (presumably the lower left hand corne of the ground floor) as O, and every othe point is located in reference to it.

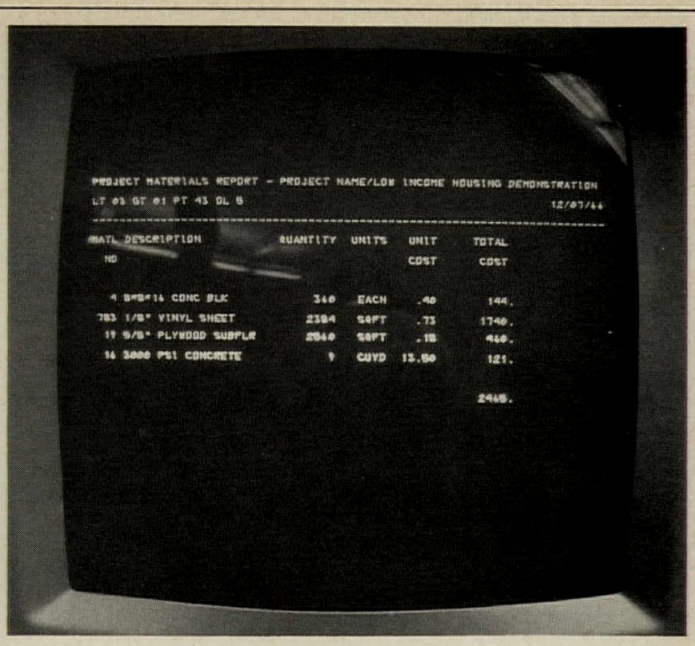
This information can be put into th computer in a number of different way When computer graphic systems base on the Sketchpad program become gen erally available, the designer can simp draw his building on a cathode ray tub with a "light pen" (see Computer Aide Design and Automated Working Draw ings," October 1965, pages 85-97). Th designer can also draw his building o graph paper; and a clerk at a computer service center can put the information o punch cards for him. The illustration show a third method, with the designe typing in the co-ordinates on a keyboar and monitoring a display which show how the information has been registered

Each geometrical plane (walls, cei ings, etc.) is given a code number; an then the areas of each, and the areas o major subdivisions such as the doors an windows, are automatically calculated

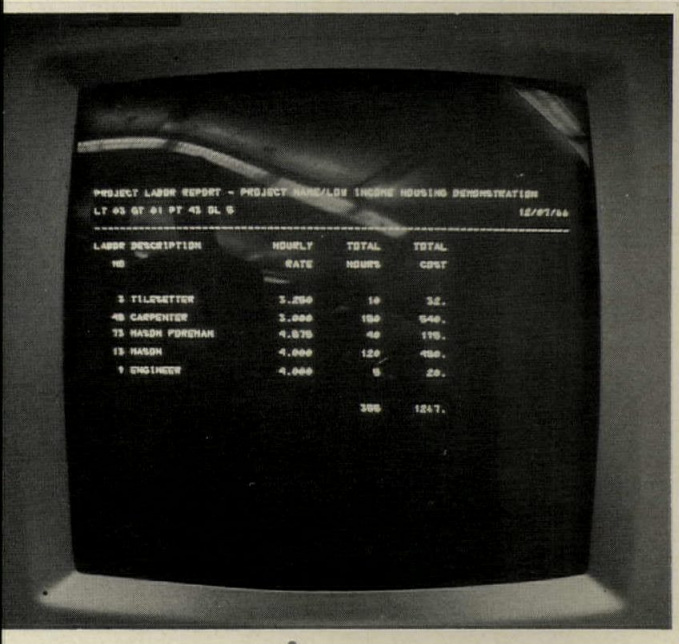
Certain basic data would already b in the computer memory: unit cost in formation for building materials, hour wage rates prevailing in the area, est mates of the amount of time needed t perform various construction operation



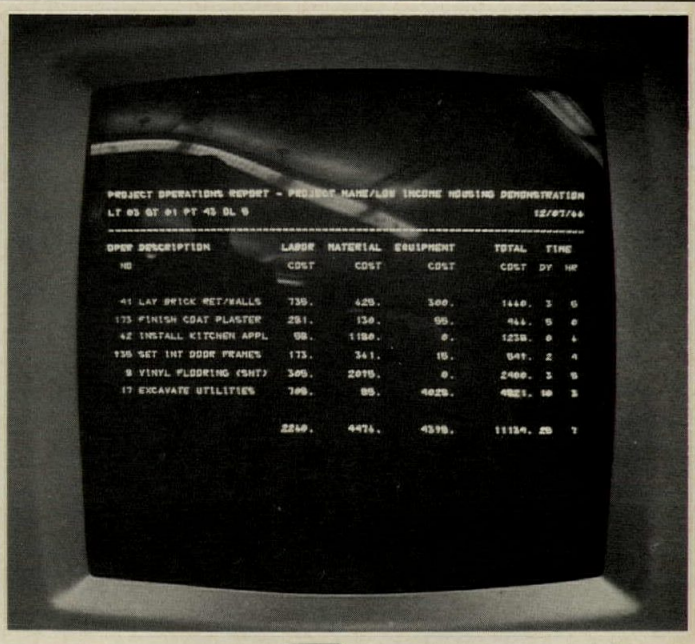
After basic construction data, derived from the experience of contractors in the surrounding area, has been placed in the computer memory, the computer is ready to start calculating cost figures that relate the unit cost of materials, hourly wages, rates of work, and the price of equipment, to the geometrical description of the building supplied by the designer. The output form, above, shows how equipment cost would be displayed.



Cost break-downs for a number of different materials are shown on the screen, above. The computer can display, or print out, total materials costs for the entire building, materials costs for a particular part of the building, or total costs for a single individual material. The designer can also receive comparative cost figures for different materials used in the same situation, can assess the effect of different combinations on over-all cost.



Labor figures show both an hourly rate and an estimate of the amount of time necessary to perform all the operations required in the construction of the building. Operations information is compiled from the same kind of data presently used by contractors to determine critical path network diagrams. The figures make it possible to see what effect a change of materials would have on labor costs, and would show which was easiest to build.



Operations reports combine cost information about labor, materials, and equipment, and comparative operations reports would give the most detailed insight into the complex inter-actions of the different factors that go into over-all cost. By this means the designers of the system hope to be able to develop new kinds of low-cost housing that can embody significant cost savings, although they would be built within confines of present technology.

as well as the data for cost figures for necessary equipment.

The designer would then designate a basic category of construction, such as wood frame, or brick and block walls with steel bar joists, with enough additional information to fill out a general outline specification. As long as the designer is talking about a reasonably typical building, it is then possible to take the same kind of information that is used to draw-up critical path network diagrams (which would also be stored in the computer memory ready for use) and compile a list of the required construction operations.

Cost comparisons

The computer would then be ready to calculate construction costs in a number of different ways, both in detail and in over-all figures; and the designer could receive print-outs of construction costs on an operations basis—and also in terms of equipment, labor and materials. Having once established this kind of cost information, the designer could proceed to modify the building in many different respects, and be able to learn almost immediately the relative effect these modifications would have upon the cost. He could print out detailed cost comparisons for different types of structures, or wall materials; and could also see at once what the monetary value of a change in square footage would be.

Garbage in—garbage out

The above adage—that an information system is only as good as the data that goes into it—is a much overworked expression among computer types, but it is still a valuable qualification to make at this point. The best basic data that is now available to go into the Cogswell-Sides system is by no means garbage, but has certain very definite limitations. Essentially this data would have to be obtained from contractors; and represents the kind of information, based on experience, that contractors use for estimating at the present time. The computerized system can shuffle and cut this information rapidly and usefully, but it can not make it more detailed and explicit. Providing refinement of detail requires a much wider data base, and a constant process of updating; both of which are going to be expensive. You can hear most of the music on a cheap phonograph; but a good stereo set may cost ten times as much, and something approaching audio perfection can cost ten times as much again.

The advantages of hi-fi data

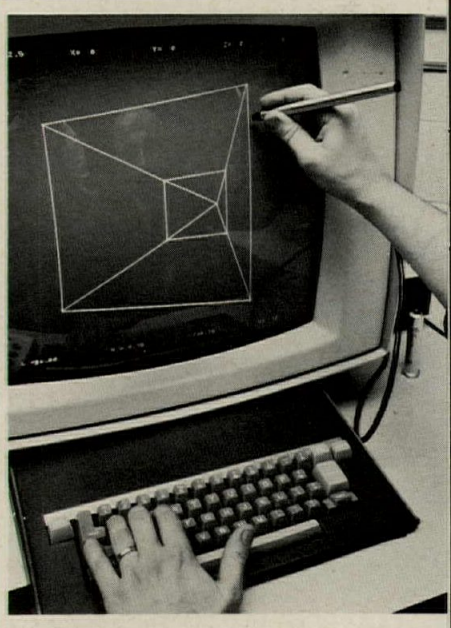
If a computerized cost estimating system could be backed up by really sophisticated data collection, it could have a very considerable effect on the relationship between the architect and the contractor. At the present time, the architect begins with schematic drawings and eventually produces a highly detailed and complex set of contract documents. The contractor takes these documents and breaks them down into take-offs that end up by approximating the information in the architect's first schematics. As David Sides points out, there would seem to be some wasted effort implicit in this situation. If both designer and builder were using the same cost data, and had equal faith in its accuracy, it might well be possible to simplify both the contract documents and bidding procedures in general. In fact, there would be little left to bid competitively except the contractor's profit margin.

Proving the pudding

Arthur Cogswell hopes to be able to use computerized cost estimating techniques in the design of a number of low cost housing units. His objective is to produce new housing types that have a significantly lower cost than conventional units, without going outside of the existing building technology. It is not necessary to wait for the housing, however, to see the potential significance of the programs; and these programs are certain to improve, becoming more flexible and capable of more complex applications, the more frequently they are used, and the more people work with them.

Research by architects

The fact that this research project was initiated and carried out by architects has some very definite advantages. The computer programs follow the way in which an architect would naturally work, providing a method of evaluating his own designs, rather than attempting to automate the design process. The more typical computer-oriented approach would have been to produce some kind of optimization program that concentrated on generating the cheapest possible building, to the exclusion of everything else. In any event, the major computer companies and other centers of research in computer programing have so far demonstrated relatively little interest in the special problems of the architect, even in the area of computer graphics. The fact that a small architectural office was able to find the financing for a study of this type ought to spur the study of such subjects as adapting computerized drawing techniques to architectural needs. The dearth of apparent interest from other quarters indicates that the initiative for such developments will have to come from the architect.—*Jonathan Barnett.*



Computer graphic techniques may one day make it much easier for the architect to place a description of the building he is designing in the computer memory, as he will be able to draw it directly on the face of a cathode ray tube by means of a "light pen." Cost figures could then be related to purely graphic descriptions of the building, giving the designer even more immediate access to the cost effects of new dimensions or configurations.

SCHOOL DESIGN MUST KEEP PACE WITH EDUCATIONAL INNOVATION

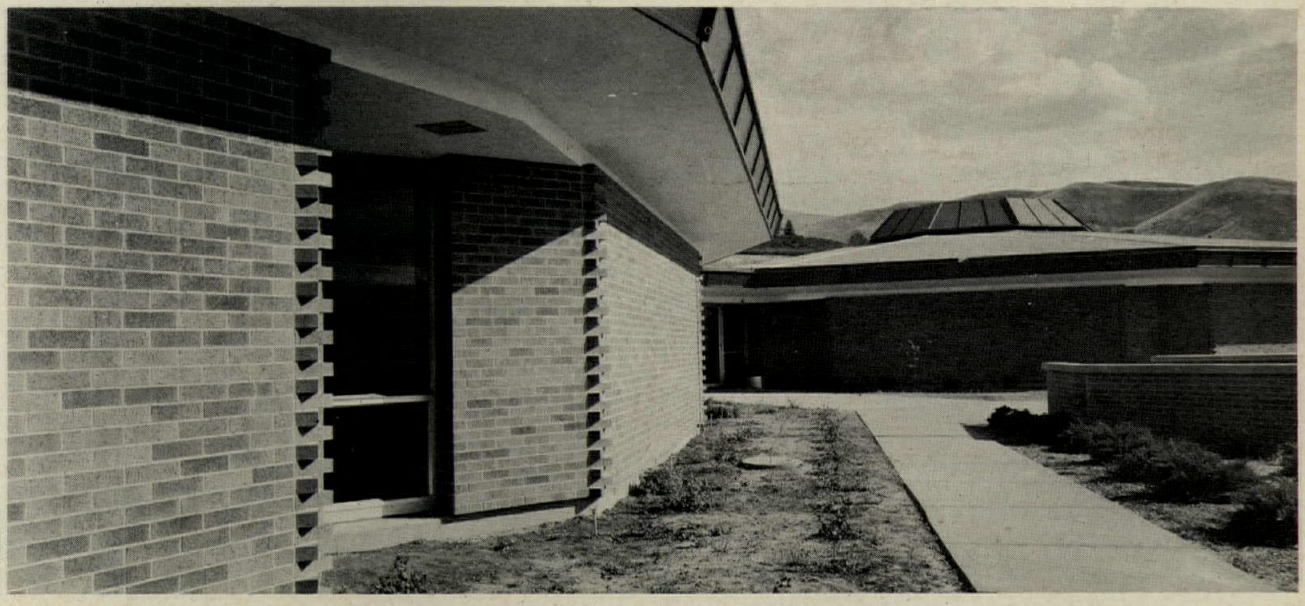
and provide for both the seemingly constant revisions of teaching methods and equipment and for the best possible environment for learning. For some years now, most everyone has been in ostensible agreement with these objectives. But in the brass-tacks world of actual construction, school design usually continues to be ruled by the more easily understood, brass-tacks qualities: minimum cost, minimum maintenance, minimum political or social controversy.

However virtuous and, in most cases, necessary these last qualities may be, they must be considered as hurdles on the track to better school buildings, and not as ultimate goals in themselves. When they do become the main objectives, the resulting cheap, supposedly-easy-to-keep, usually innocuous, usually rigidly-planned structure becomes quickly obsolete and also becomes a major stumbling block to initiative in advancing teaching and learning techniques.

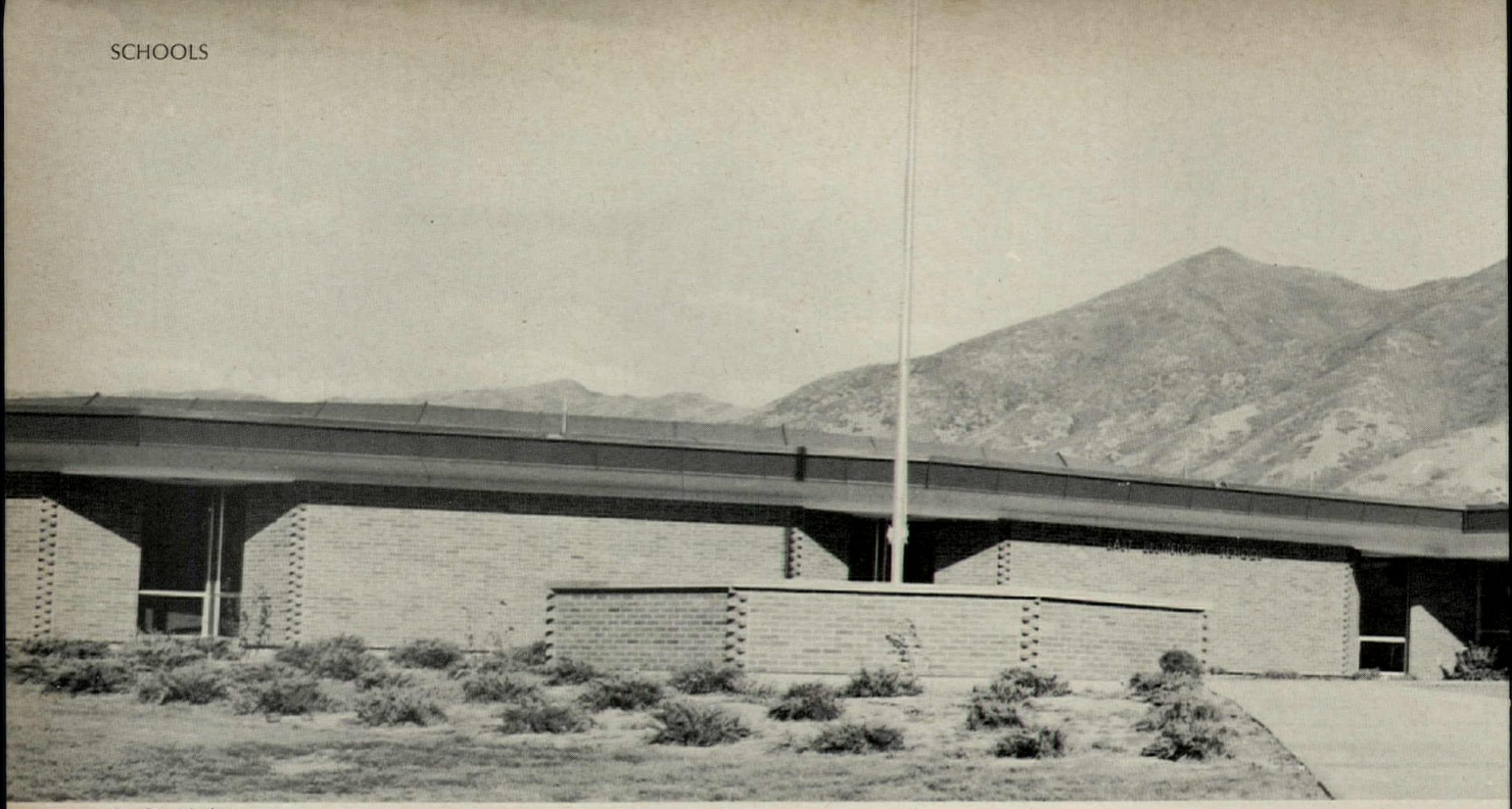
The current ferment in the field of educational theory, on the other hand, makes the concept of the "best" environment (and, obviously, of the building which creates it) a very difficult one to arrive at. The element of potential and probable change precludes the formulation of any complete set of standards. Even where the most "advanced" educational techniques have been planned and built for, educators employing them are wisely keeping a watchful eye on the need for modifications in method or equipment that may be needed for assuring sound and lasting education. We are probably, and hopefully, only at the beginning of an era of finding out more and more about the learning process. The speed-up in technological advance makes it imperative that each person have more skills and more knowledge. And more and more research programs, with government or foundation backing, are constantly being initiated to explore methods of instilling them.

A plethora of ways to improve education is now actually being tried out: team teaching, variable groupings of pupils, teaching machines, television and other audio-visual aids, ungraded schools, consolidated schools, split-up unit schools,

BUILDING TYPES STUDY 368



Hal Rumel



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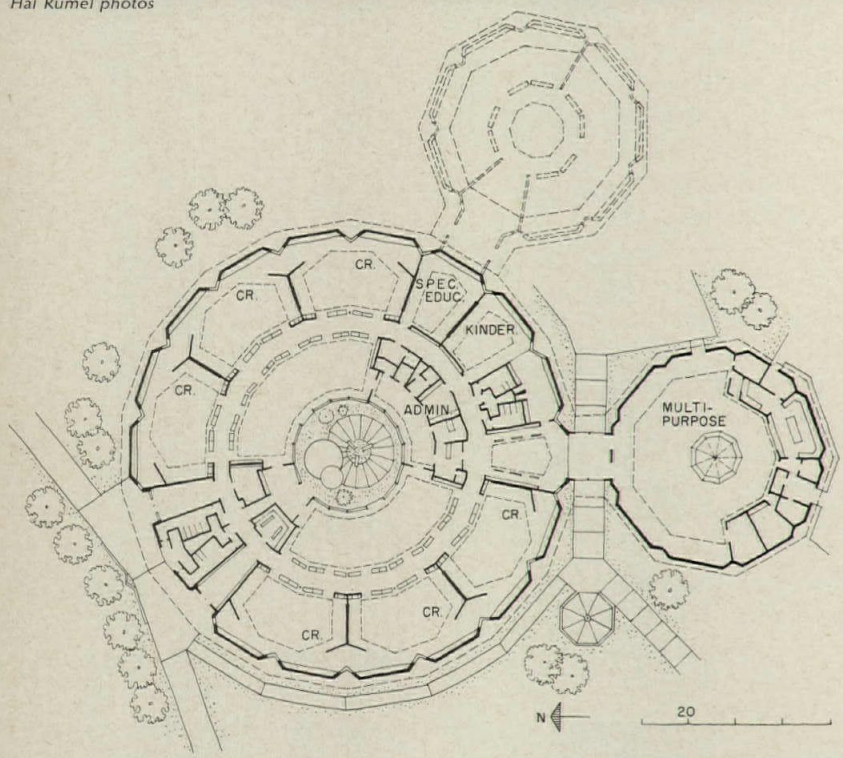
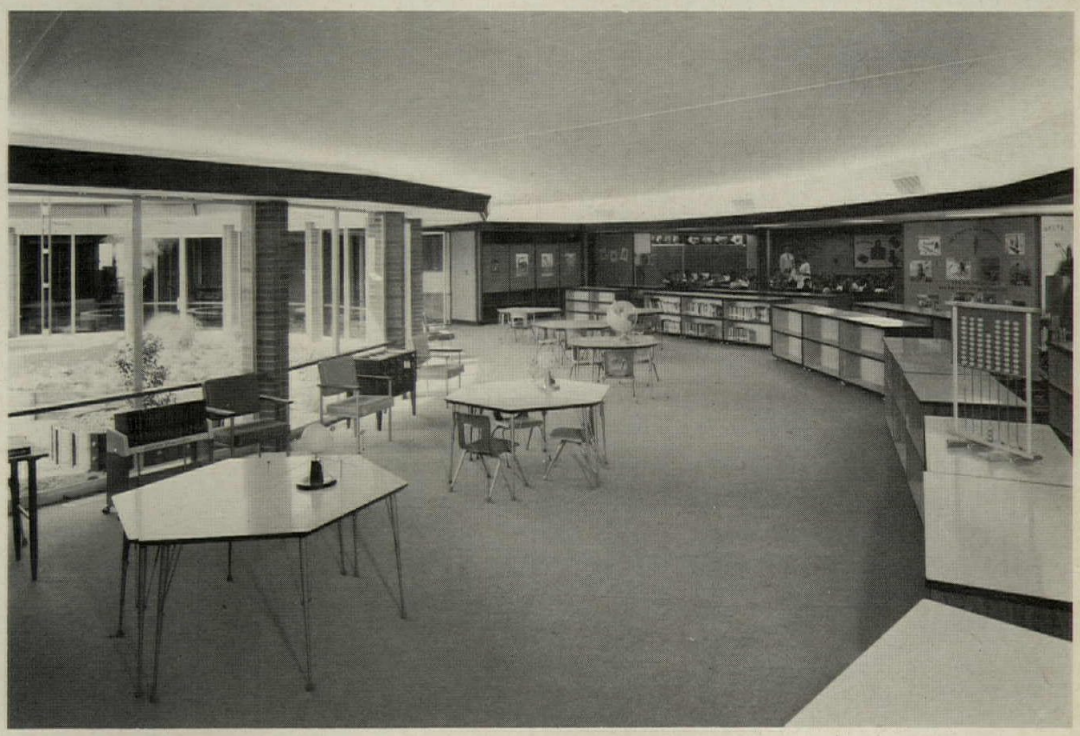


divisible classrooms and auditoriums, open-plan schools, windowless schools, resource centers, educational parks—one can seemingly go on and on. These will, in due time, all be thoroughly tested, accepted or rejected, improved and added to. Architecturally, the only sure way of coping with them all is to provide sound buildings with a reasonable degree of flexibility, convertibility and possibility of expansion.

But there is another tremendous factor in improving learning where the role of architectural design is more positive, though many people seem to be less positive about it. That is the effect on learning of a student's physical and emotional response to his surroundings. Response not only to heating and cooling and lighting and acoustics and other aids to physical comfort and efficiency, but response to visual and tactile environment, to scale, to openness or enclosure, to all the factors of mental and emotional comfort and efficiency. This is an area that probably needs, and will certainly get, more scientific probing and measurement, but, after all, isn't the creation of such response what true architecture is all about? After adequate provision to keep the rain out, perhaps the best set of "standards" for a school building today might be something like, "keep it pleasant, but keep it loose."

A round, open plan is one current answer

One of the "loosest" concepts among the newer schools is the round building with an open plan. And it has a growing list of adherents, including the oracle-of-the-moment, Marshall McLuhan, who has predicted that the round school is one of the waves of the future. Arguments in its favor range from the arch-practical to the whimsical. The open plan, in itself, is

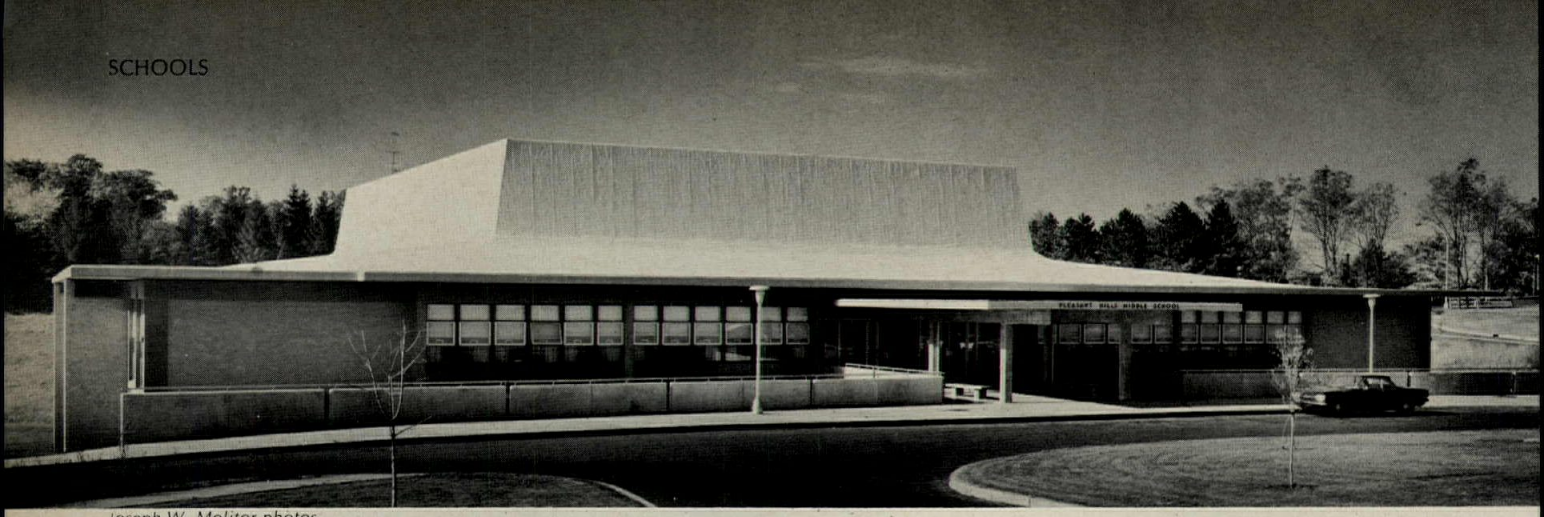


Flexibility of use and concern for the individual child were the chief reasons for adopting a circular plan in this elementary school in Tooele, Utah. Perhaps another reason was to stress enclosure, security and shelter in a rather wild, barren landscape. The solution does, in fact, work well both functionally and psychologically. The interior spaces radiating out from the courtyard to the class or group areas—with the instructional materials center in between—are efficient, pleasant and informal. The courtyard is equipped with a pole supporting three gas infra-red heaters which give year-round heat to stimulate experiments with unusual tropical-plant and pond life.

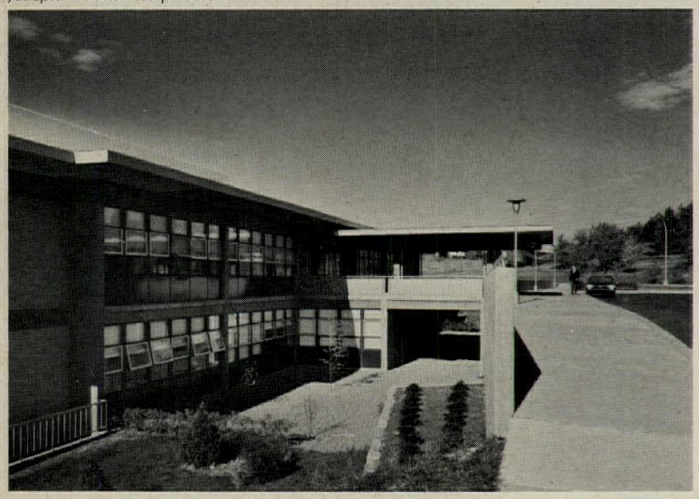
EAST ELEMENTARY SCHOOL, Tooele, Utah. Architects: *Scott, Louie & Browning;* structural engineer: *Edmun W. Allen;* mechanical engineers: *Tregeagle and Associates;* electrical engineers: *Allied Western Engineering;* contractors: *Hogan & Tingey.*

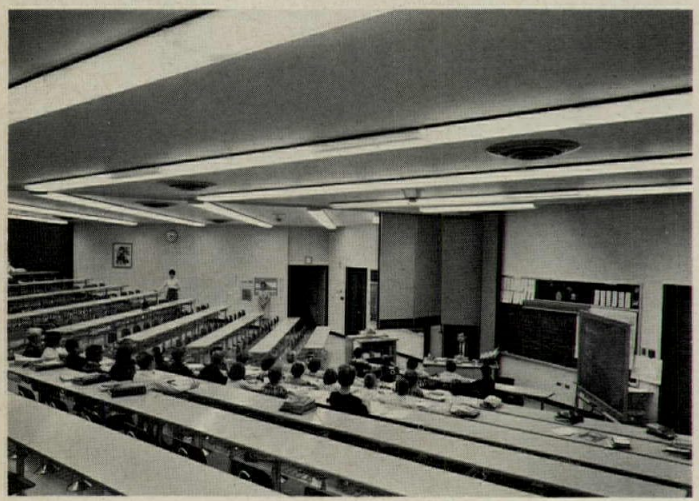
obviously the most "flexible"—you just move the furniture. And the round shape "has less peripheral wall, less roof area, less foundation, less waste circulation space" and less resemblance to the sometimes hated "box". Whatever stand one takes, it has to be admitted that the exterior of a round school is a difficult design problem; some that have been built have had more resemblance to a gypsy encampment than to a center of education and development of culture.

A few of the round schools, however, have turned out to be quite successful designs. Scott, Louie & Browning's East Elementary School for Tooele, Utah, shown here, is one of them. While some rudimentary partitioning is used to define classroom areas, it is quite close to being a completely open plan. The architects explain that the shape evolved very logically: "The school board called for a building which would 'get out of the way' of the educational program. The flexibility designed into this building is such that it can house a traditional program, or a program of variable teacher-utilization concepts, as well as one which can place greater emphasis on the individual child. The scheme evolved directly from a team teaching program, from the requirement that each student be provided direct access to the instructional materials center (IMC), and that the advantages of the IMC be available directly to all classrooms. Six large group areas were placed around this area, and contain the equivalent of twelve conventional-size teaching stations. (Three of the groups are for lower grades and three for the higher grades. However, at present the six groups are not identified by the conventional grade classification system, and future plans aim for a non-graded school.) The sector of the IMC closest to each half of the classes contains materials



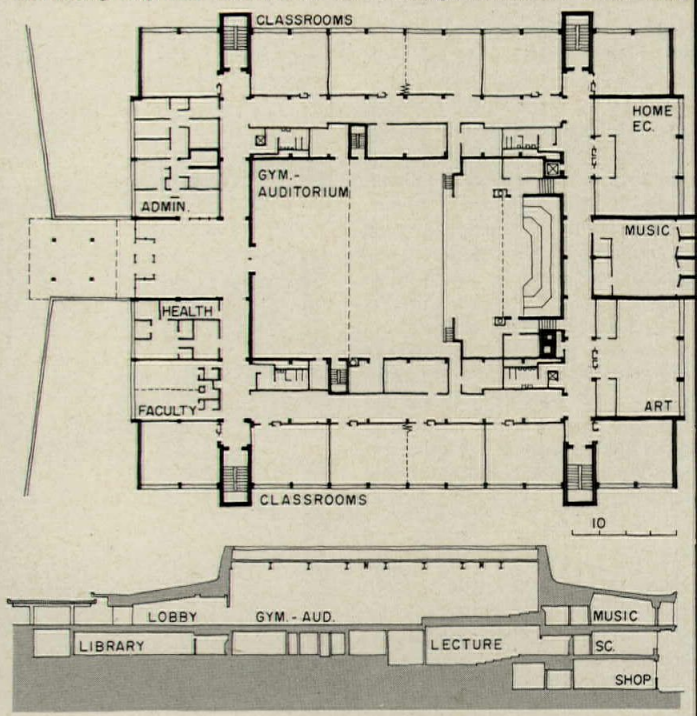
Joseph W. Molitor photos





Pleasant Hills Middle School makes an asset of a rather awkward, sloping site by placing the main entry on the street level and orienting the two lower levels in the other direction where they face out over the playing fields. Since views of the school are mainly from above, the roof structure becomes an important design feature which articulates the gymnasium-auditorium space within. Classrooms are planned around a central core of common-use spaces.

PLEASANT HILLS MIDDLE SCHOOL, Pleasant Hills Borough, Pennsylvania. Architects *Celli-Flynn—partner-in-charge: Mario C. Celli; designer and job captain: Sylvester Damianos;* landscape architects: *Simonds & Simonds,* consulting engineer (electrical): *Carl J. Long;* contractor: *M.S.I. Corp*



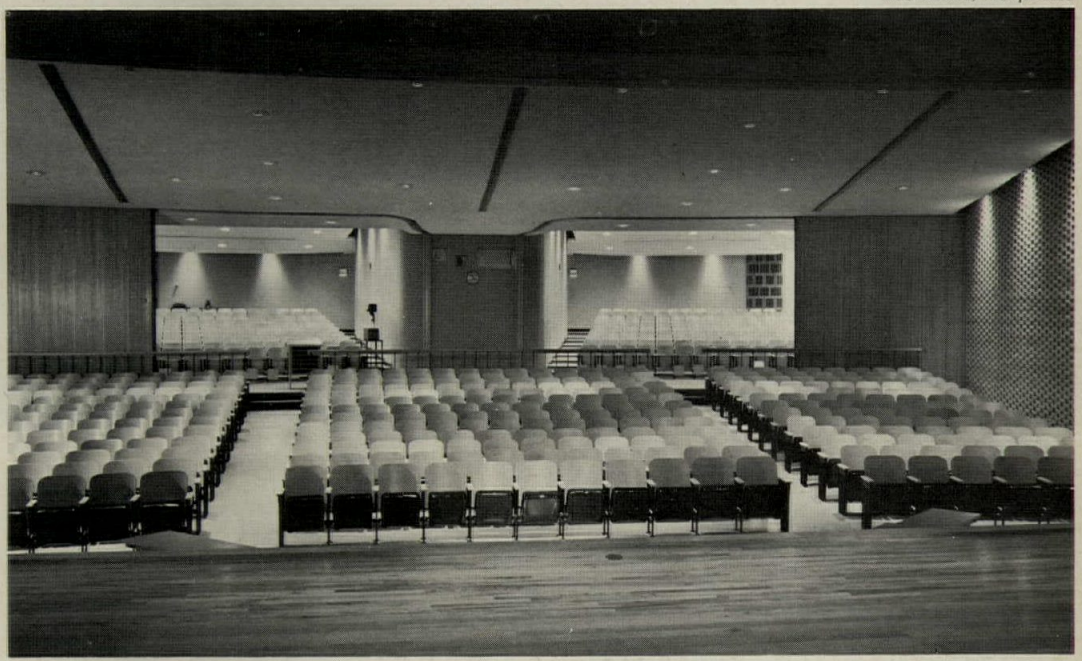
used by those particular students. Combined within the IMC space are the teachers' work and lounge area, audio-visual equipment, book storage and a "messy" project room. The teaching staff is provided facilities for group conferences as well as for individual preparation." Thus, a hub and spokes scheme, with a center court for relief was evolved. Almost every inch of it is "usable" space, and was built for the reasonable cost of $13.65 per square foot.

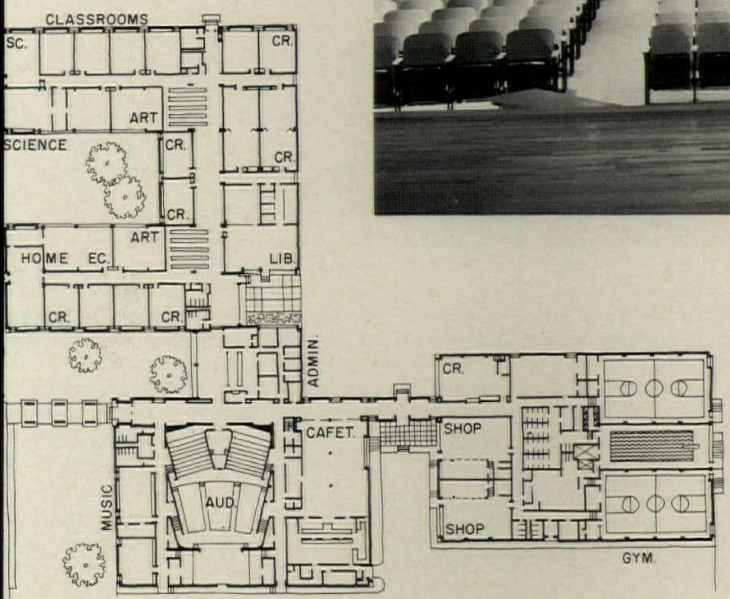
Good scale is vital to good school environment

A very young child's relationship with room and building sizes is very different from that of a full-scale adult; a school must be sensitive to both, for pupils and faculty. The Utah school solves this fairly well with low ceilings for the most part, and some subdivision of the open space. The exterior also has a fairly domestic scale and reflects the school's modest size.

The handling of a big school, though, especially a multi-story one, poses a considerable problem of scale relationship to avoid an overpowering, barracks-like impact on the child. The Pleasant Hills, Pennsylvania, Middle School (above), by Celli-Flynn, exploits a sloping site to great advantage for such a building. The structure is set at the bottom of the slope, with the entry from the top of the bluff into the upper level. Taller spaces on the upper level for the gymnasium-auditorium core are concealed by an interestingly-shaped roof mass. Thus, from the entrance drive, the large school has the appearance of a single story structure with a big, double-pitched, somewhat Hawaiian roof. A covered entry plaza spans the hollow to the school; specially designed gardens will make the approach an extremely pleasant one. Each of the three floors

Bob Hawks, Inc. photos





A junior high school used extensively for adult evening activity demanded considerable care in planning to provide for a progressive education program on a limited budget. The auditorium—usually the most expensive and least used space in a school—was given 100 per cent usage by central location and three-way divisibility into two medium-sized lecture rooms and one large space. This makes it suitable for team-teaching, assembly, audio-visual education. The over-all school plan is grouped in three separate but connected buildings: cafeteria-auditorium; classroom-resource center; industrial arts and physical education.

THOMAS GILCREASE JUNIOR HIGH SCHOOL, Tulsa, Oklahoma. Architects: *Donald H. Honn & Associates;* structural engineers: *Netherton, Dollemeyer and Solnok;* mechanical and electrical engineers: *Warren Smith & Associates;* contractor: *Langley Construction Co.*

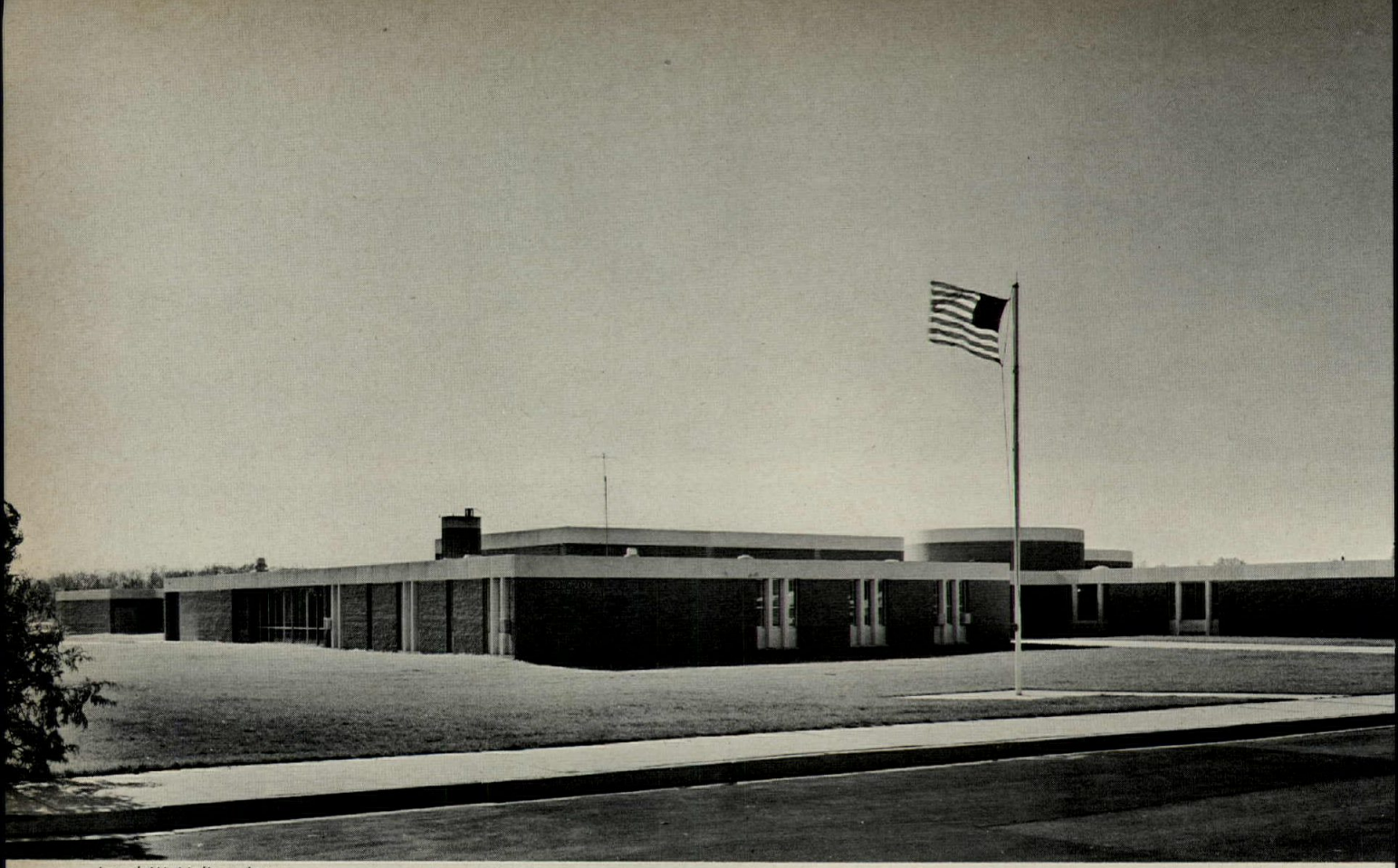
exits to grade. In addition, stair towers at the four corners of the circulation corridors minimize and disperse the student traffic. Variable-sized classrooms, including a divisible large group instruction hall, provide for anticipated team-teaching, and further the sense of scale and variety of room spaces for the pupils.

The multi-winged, court-dotted scheme for the Thomas Gilcrease Junior High School in Tulsa, Oklahoma by Donald Honn (shown in photographs above) illustrates another method of avoiding too big a scale for a one-story scheme. Many interiors, including the auditorium, are divisible.

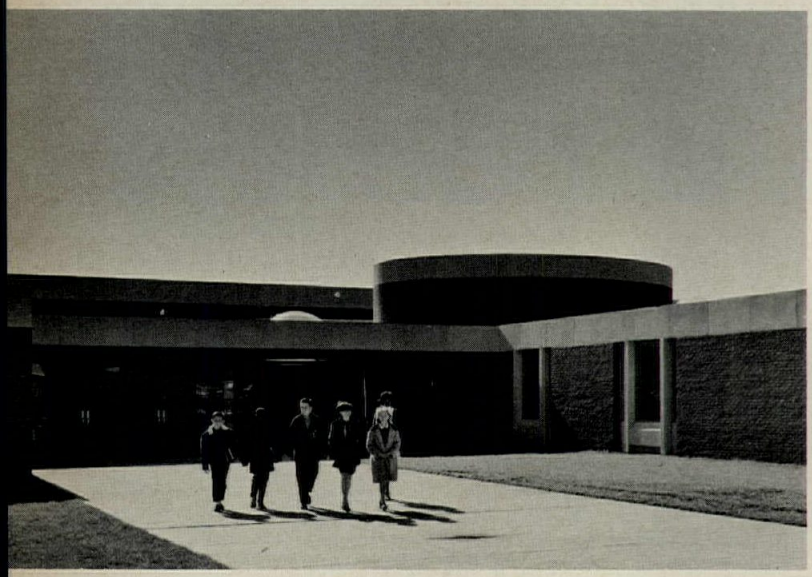
Gilcrease School has 106,000 square feet for approximately 1,000 students. It is located on a 20-acre, rolling site and was constructed at a cost of $1.4 million, for a unit cost of $12.36 per square foot.

Architect Honn comments that, "The design problems presented by the Building and Planning Department of the Tulsa Educational System were remarkably similar to those voiced in this article. Of a more general nature, the superintendent of Building and Planning asked me specifically to 'design a building to fit our educational program'. In our first interview he mentioned the fact that so many of the buildings were designed with no thought to the actual teaching processes that existed and are used. He mentioned specifically team teaching, expanded day programs, adult education programs and the need for more individual study and counselling. The Tulsa School System is no different than any other in that their finances are always short of their needs.

"Our research and examination of the present Tulsa junior high schools indicated that the auditorium was used less than



Joseph W. Molitor photos



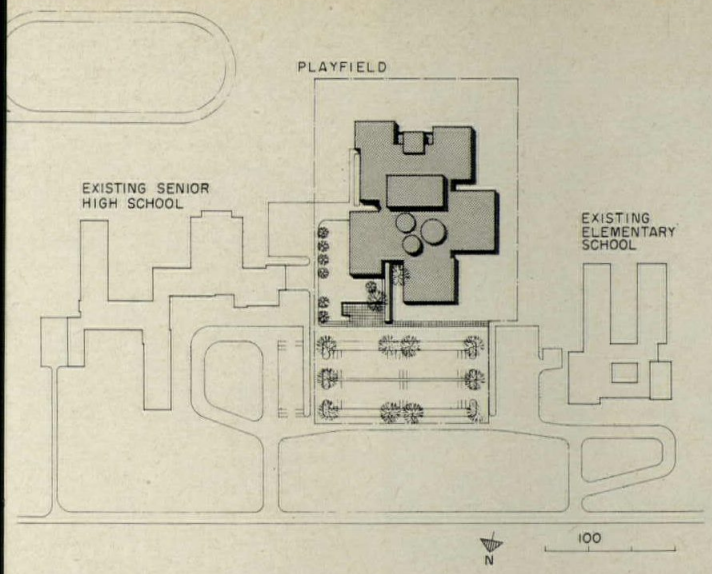
A restricted site in between existing elementary and senior high schools demanded a rather compact plan for the junior high which completes the campus. Circulation had to be carefully worked out to allow students from the other schools to make use of communal facilities without interrupting the normal educational program of the junior school. The problem was solved by placing the commons area as a distinct block in the center of the plan with its own access routes from outside and incorporating three circular interior spaces containing library, planetarium and audio-visual unit. The informal seating area around these rooms makes a pleasantly relaxed environment for small group meetings between staff and students from all the schools. The large multi-purpose room across from the commons can also be reached directly from the outside. Structure of the new building is open-web steel joists with red brick walls and white concrete fascia.

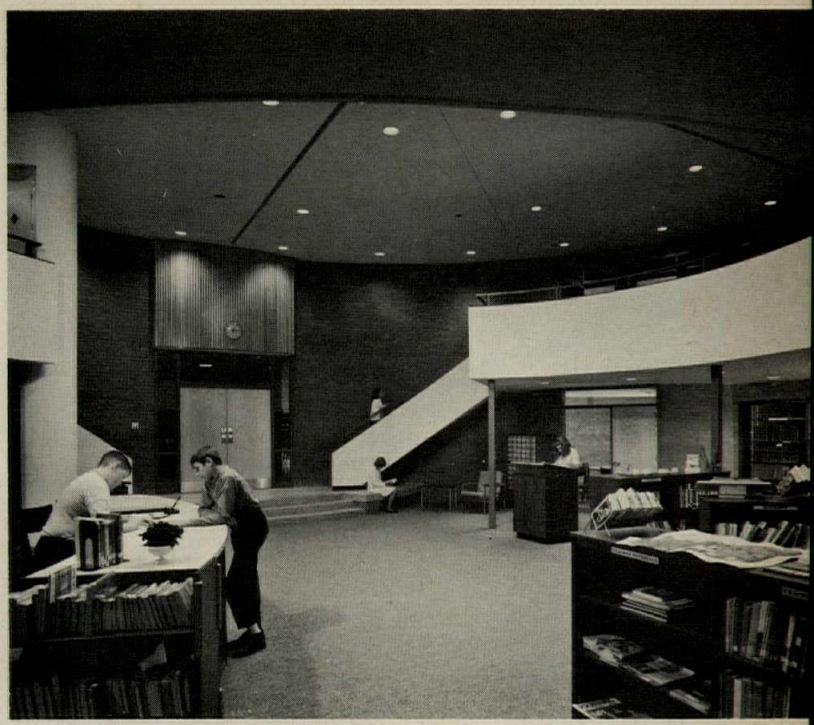
EDGEWOOD JUNIOR HIGH SCHOOL, Edgewood, Maryland. Architects: *Fisher, Nes, Campbell & Partners—partner in charge: Charles H. Richter;* structural engineer: *Van Rensselaer P. Saxe;* mechanical and electrical engineers: *Whitman, Requardt & Associates;* contractor: *Lachi Construction Company.*

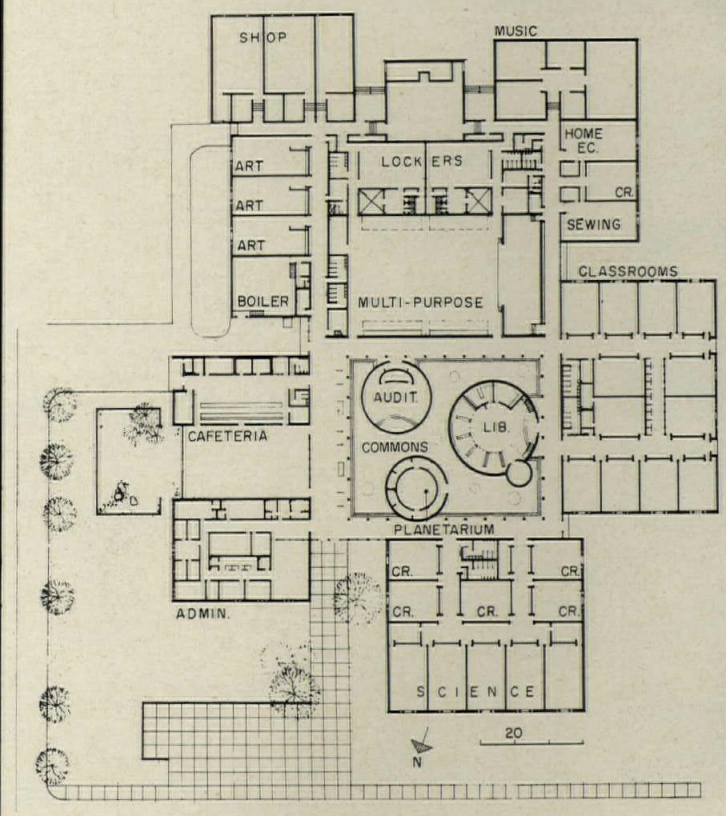
10 per cent of the teaching time. Since this is the most expensive space in the building it seemed logical to us to find some way to put this space to use 100 per cent of the time if possible. This led to the layout of the auditorium located in the center of the building and with a configuration which can be divided into two medium-sized lecture rooms separated acoustically from, and isolated from the traffic of, the main auditorium. In this way we provided two 130-seat isolated lecture rooms and one 390-seat assembly room. This has proven to be especially usable and fulfills many of the requirements for team teaching, auditorium education, and assembly areas for all purposes.

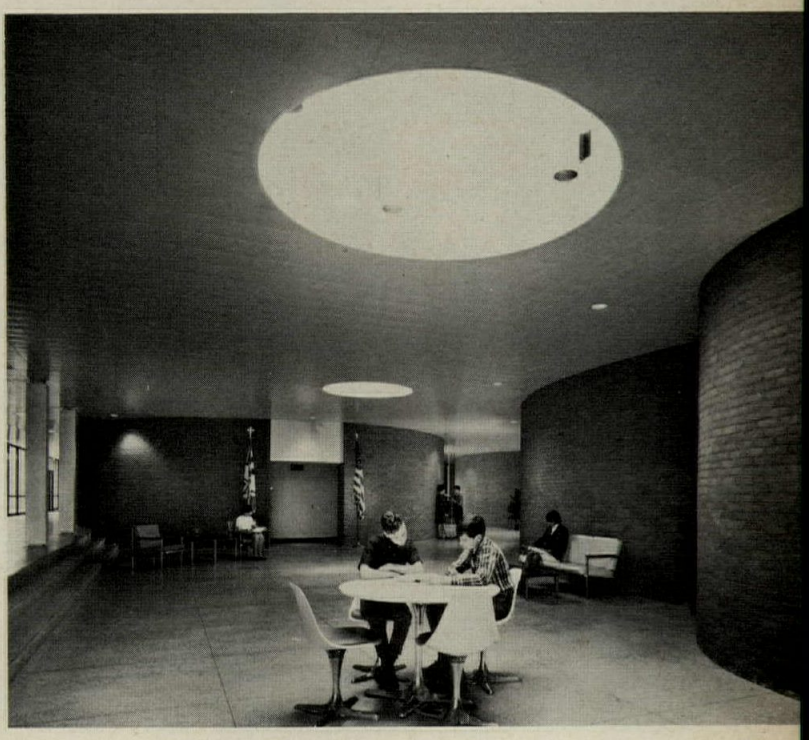
"Our second recommendation was to expand the library area into a curriculum center. By doing this we provided an enclosed librarian and teacher's workroom area. In this area the teachers have reference material and work space for individual research and lesson preparation away from the classroom. We also provided three small and two medium-sized conference rooms. The small rooms can handle four or five students and an instructor. These rooms are used for group discussion and for counseling and individual or group research. Immediately across the hall from the library four classrooms are equipped with soundproof folding doors which can be used for larger group instruction.

"In plan the building is grouped into three separate and distinct areas: the classroom and instruction area; the cafeteria, auditorium and music section; industrial arts and physical education area. This facilitates segregation of the noisy areas away from the study areas and also made it possible to use only the areas required for evening programs. By use of folding gates any section can be completely isolated and cut off from









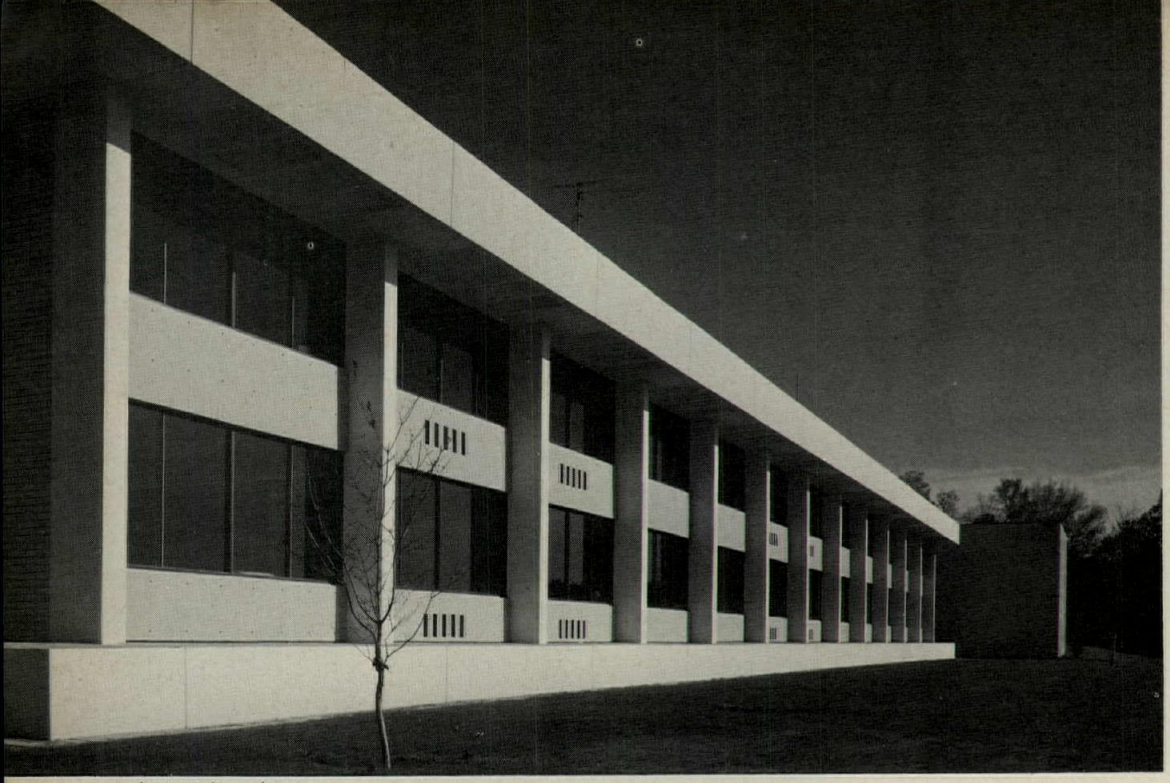
the balance of the building. This, of course, saves on maintenance and provides for better supervision of evening crowds."

The educational "campus" is a growing trend

Though few of the proposed "educational parks", which would consolidate an entire town's school system are under serious consideration at the moment (see RECORD, February 1966), many towns are creating smaller all-grade campuses by constructing different-grade schools close to each other on the same site. Edgewood, Maryland, has recently added a junior high school between existing elementary and high schools to create such a compound. Fisher, Nes, Campbell & Partners have also included facilities within the new building for the combined use of all three schools, and established free access to the common-use areas (and those used for community functions) in such a manner that they will give a minimum of interference or distraction to the normal educational schedules. Such a system can help relieve financial burdens considerably by making duplication of many facilities and some expensive audio-visual equipment unnecessary for each school. The concept of a central resources center becomes a natural bonus for such an arrangement and can be used to promote informal contact between staff and students.

Change can be planned into "permanent" structures

Another new school which has been added on a site adjoining an existing senior high school, and which could form the nucleus of a future all-grade campus, is the John Jay Junior High School in Cross River, New York, by Norton and Hume, architects (photos overleaf).

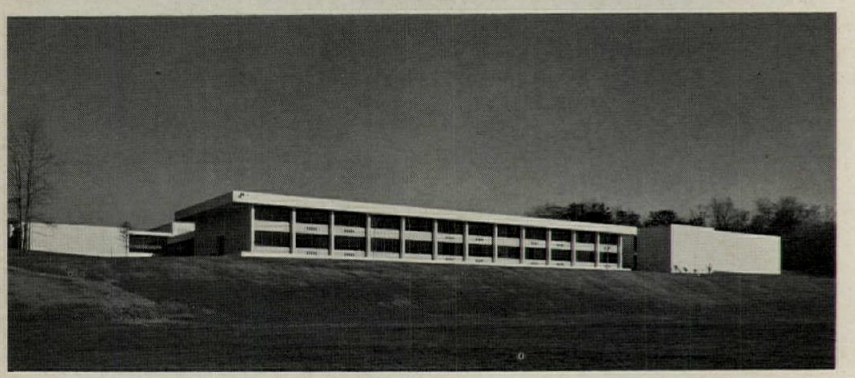


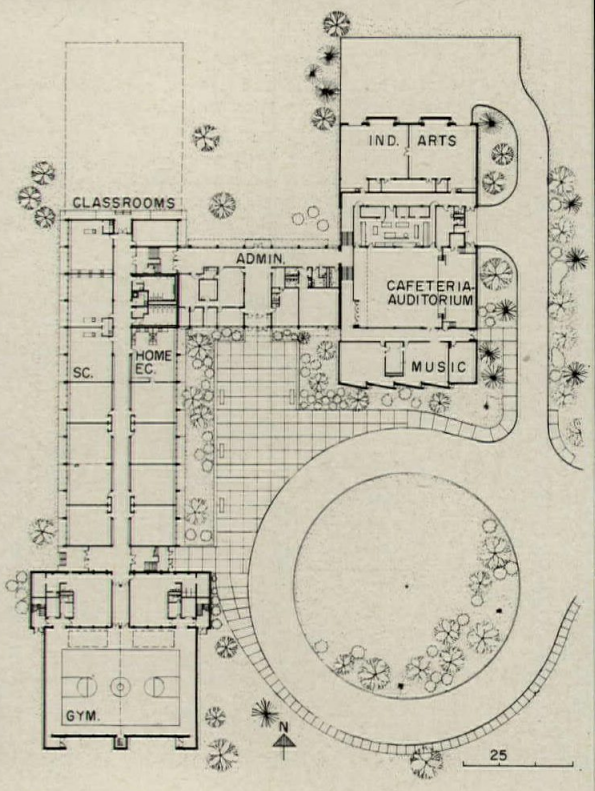
Joseph W. Molitor photos

Sited on the same campus as the existing senior high, this junior high school was planned around a conventional teaching program but allows for the possibility of change to a team-teaching system in the future. A modular, exposed-concrete, two-story classroom building permits expansion at one end, but maintains easy access to the gymnasium and cafeteria-administration buildings on either side.

In order to distinguish the building from the neighboring senior high, which is a loosely-planned group of single-story, steel-frame and red-brick buildings, the new junior school uses a compact two-story plan executed in concrete and white brick. The scale is a careful blend of the formal and informal.

JOHN JAY JUNIOR HIGH SCHOOL, Cross River, New York. Architects: *Norton and Hume;* site engineers: *Staunton and Freeman;* structural engineer: *Viggo Bonnesen;* mechanical engineers: *Hill and Harrigan.*





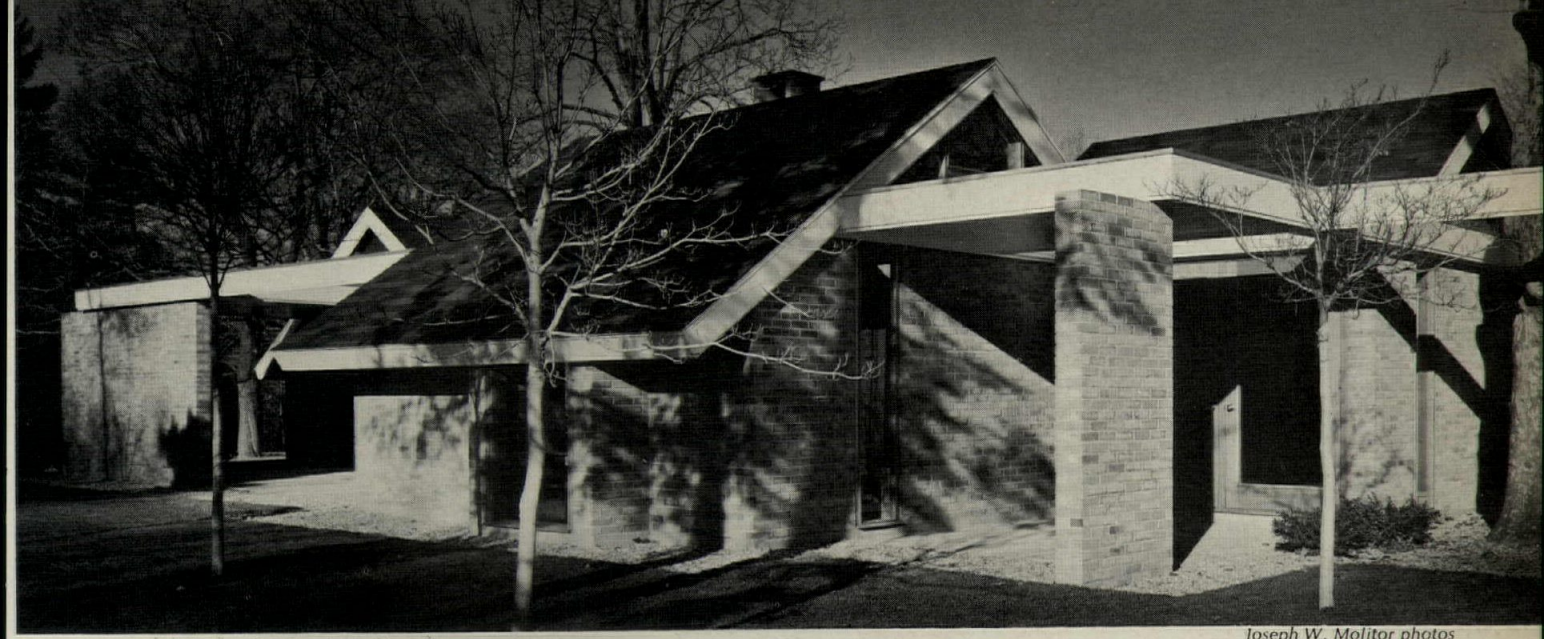
The school had all the usual requirements for low maintenance, reasonable cost, a conventional junior high program, independent identity and no shared facilities. However, unlike many usual schools built from such a program, this school was carefully designed for a possible future change to the middle-school, team-teaching concept, and for future expansion in size. This was achieved by creating separate blocks for functions which would not have to change in the future (gymnasium, administration and cafeteria-auditorium) and placing all classrooms in a two-story central wing that could be changed internally or expanded at one end. Modular planning with an exposed concrete frame, and easily shiftable mechanical and lighting systems will permit easy modification of classroom sizes when required.

The various elements of the block plan are worked into the slope of the site at different levels, and give a very pleasant sense of size and scale. In no aspect, though, does the school give an air of impermanence for its current, standard program. Careful handling of all details add up to a trim sophistication and a sensitive environment for the junior high age level. Concrete and white brick walls contrast with the Senior High.

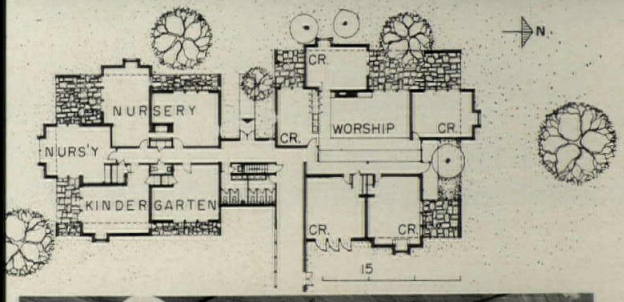
A more domestic scale is best for the very young

The younger the child, the more every effort should be made to avoid an institutional quality, and to keep a residential, small-scaled environment in teaching areas for them.

A little addition, much more important than its size for respecting the needs of a child, is the North Shore Unitarian Church School, in Plandome, New York by architects Bentel & Bentel. Though it is a religious school, its architectural lessons



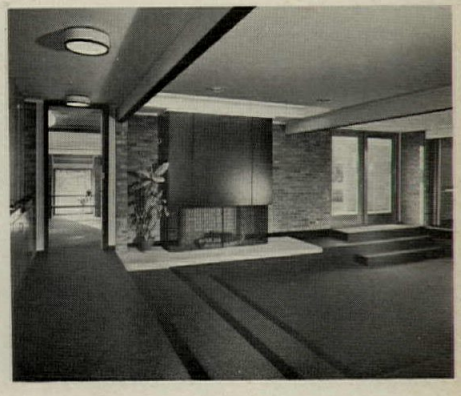
Joseph W. Molitor photos



A warm, reassuring, yet exciting environment for very young children has been achieved in this charming Unitarian Church School, which was planned as an addition to existing church and school buildings. The architects' aim was to break the building down into small-enough units for individual children to feel a sense of identity and belonging. They accomplished this by expressing each classroom as an independent unit with its own pitched roof—a building form with which all children are familiar, but which has the dual advantage of giving extra ceiling height inside the rooms. The effect of this is enhanced by glazing in the gable ends.

Interiors are simple, but pleasant, with exposed brick walls, informal arrangement of furniture and carpeted floors. The central "worship studio" has a fireplace.

NORTH SHORE UNITARIAN CHURCH SCHOOL, Plandome, New York. Architects: *Bentel & Bentel—supervising associate: John Barbiere;* mechanical engineers: *McGuiness and Duncan;* contractor: *Glenn Rich Construction Corp.*



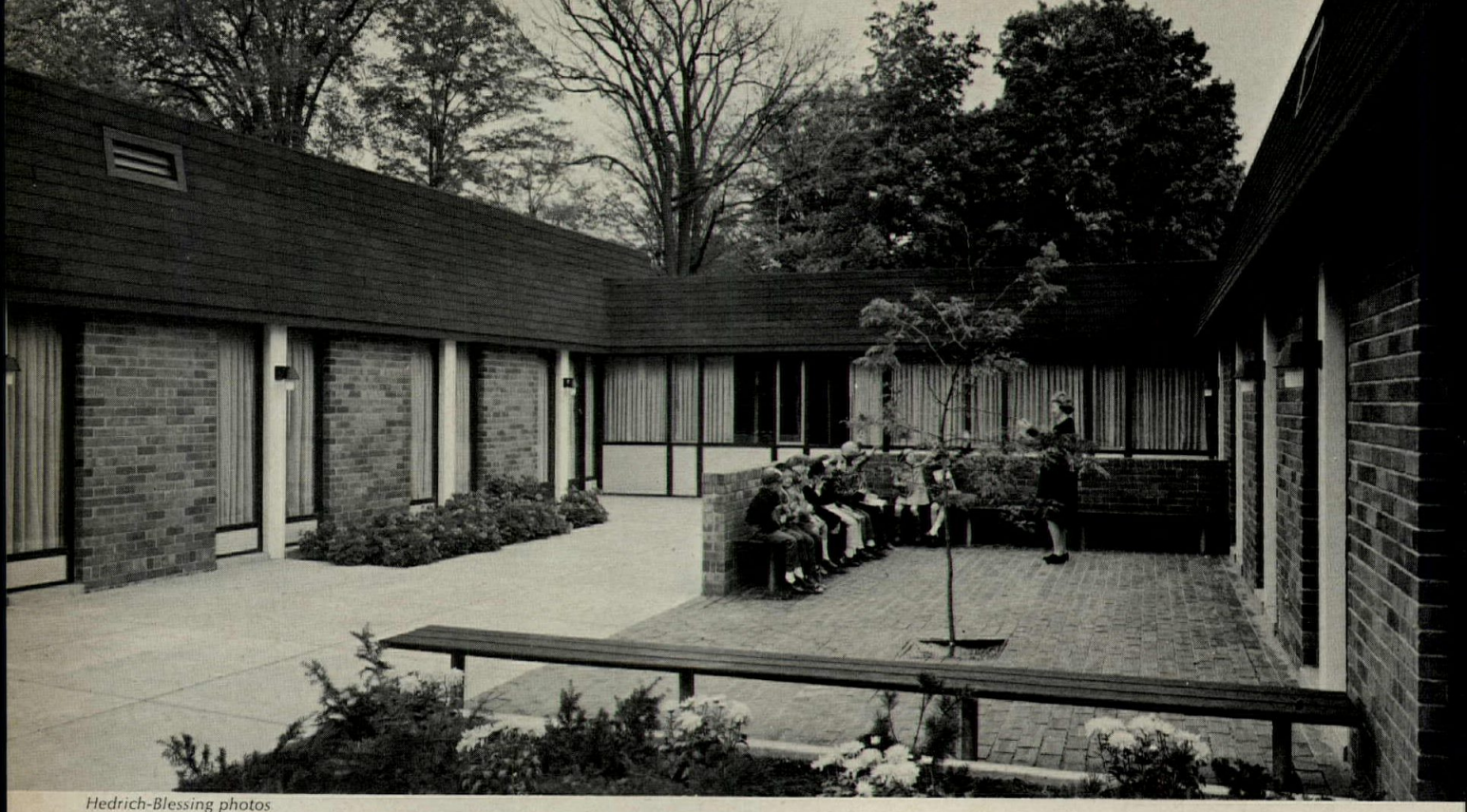
could well be applied to any additions, for the lowest grades, to larger buildings or complexes. In essence, it is a fairly compact, if irregular shaped, little building—but each element is clearly identifiable. In arriving at the scheme, the architects soon decided that, "if the basic unit of a school is the child, then the class is the next larger unit to be considered. The student identifies with the school in a social way through his class. Wouldn't it be desirable for that unit to be identifiable? This articulation was felt to be superior to the repetitive pattern of windows found in so many schools. The child could then see the part that he and his classroom play in the total school.

"Within the classrooms themselves, changes in ceiling height were sought to continue this 'quality of choice' so that different class routines and teaching methods would be encouraged by the many ways the room could be used. Outdoor spaces are designed to relate to the rooms not only to expand the feeling of space, but also to be used during good weather.

"What has resulted from these concepts is a village of classrooms in which every room has individuality, but still remains part of the whole. Light enters the rooms in different ways, and unique experiences await the child as he moves through the grades. Such a free composition had to stand free of the existing school and in fact, the long existing facade acts as an excellent foil for the rambling new school." Carpets and informal seating give warmth and intimacy.

Appropriate school design can help revitalize city areas

Similar considerations of creating an environment compatible to the elementary child went into the planning of the slightly larger Lincoln Elementary School in La Porte, Indiana by the



Hedrich-Blessing photos

The addition of this attractive new elementary school to an existing building in downtown LaPorte, Indiana, has been successful in revitalizing an eroding neighborhood and has provided, at comparatively low cost, a very pleasant school environment for children whose educational needs might otherwise have been overlooked by the planning authorities. The school was designed with brick walls, bay windows, and sheltering mansard roofs to relate to the neighboring residential buildings. The large maple trees were retained to underline the residential character of the building. Two rows of classrooms are linked, but separated, by a library resource center, which is carpeted for acoustical reasons. A sheltered interior court between the library and multi-use space adds an outdoor classroom for use in good weather.

LINCOLN ELEMENTARY SCHOOL, La Porte, Indiana. Architects: *The Perkins & Will Partnership;* contractors: *Tonn and Blank, Inc.*

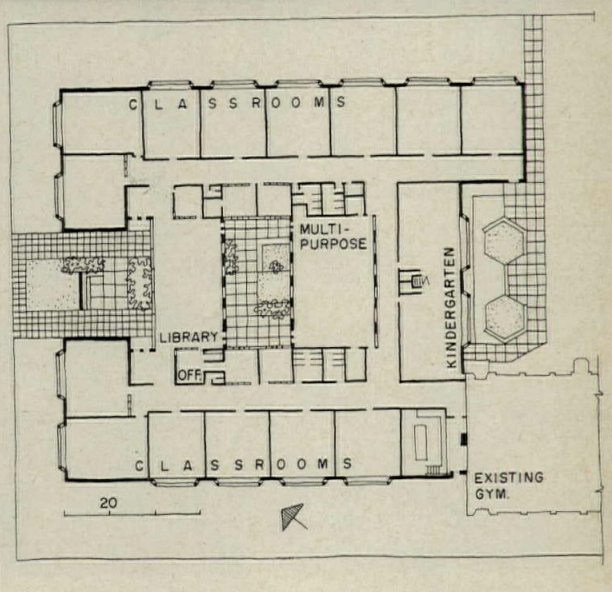
Perkins & Will Partnership. It is also an annex to an existing school, and carries the added requirement of helping to revitalize the downtown area of the city and provide elementary facilities near the hub area for children who are frequently neglected in school planning.

The educational philosophy of the community in which this school was built was expressed by the Superintendent of Schools: "We believe it is our duty to provide educational opportunities for all children regardless of place of residence, race, religion, economic status or mental ability. We believe that education must be based upon mastery of certain fundamental skills, concepts and appreciations. We also believe that it is our responsibility to provide an environment that is conducive to the learning and development of the child."

The resulting school is a thoroughly modern one with a carpeted library resource center, some divisible team teaching classrooms, individual study spaces and special facilities for remedial reading and the like.

The design itself, however, has been kept relatively quiet and free of stylistic pyrotechnics—emphasis instead has been placed on suitably small scale, warmth and friendliness. Brown brick, bay windows, wood paneling, sweeping overhangs, and mansard roofs with black shingles all relate the building to the residential structures surrounding the site.

On the school's success as a social factor, the architects comment: "The school board's decision to provide a new educational facility in the hub area of the city has given stability to the community and impetus to revitalization. There is a lesson to be learned here for other communities, evidenced by the revitalized spirit in the area, as to what can happen to a portion



of a community that might begin to erode into slum areas. As a result of construction of a carefully designed new school, at very low cost, the neighborhood has become a desirable part of the community in which to live. This should be an inspiration for other cities to revitalize."

There is a lot of school building to be done

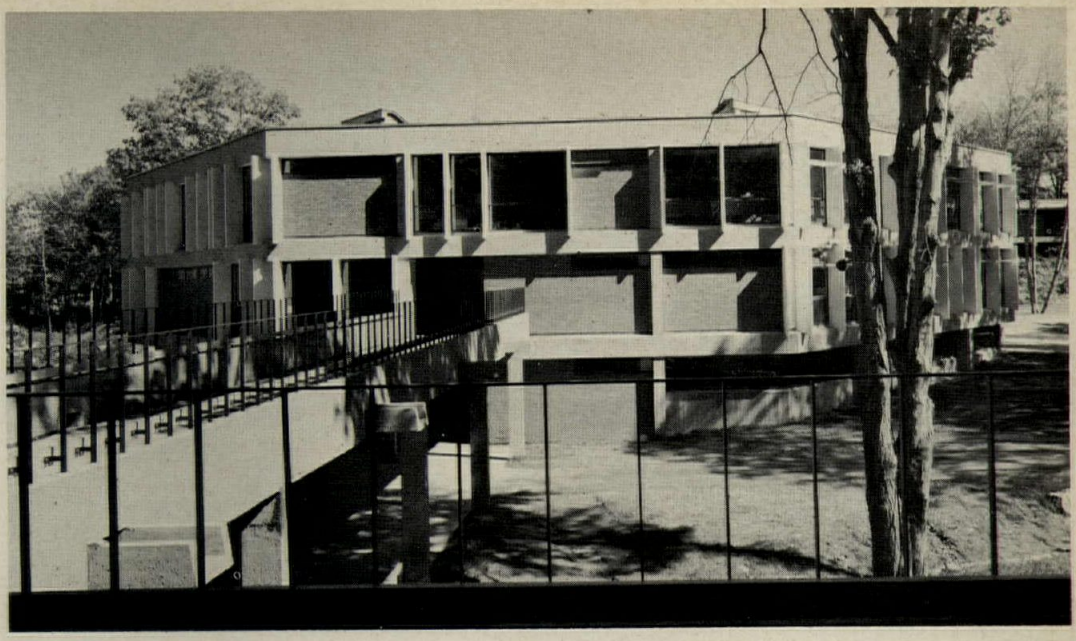
After the post World War II baby-boom crop neared university age, many firms concerned with school design began, quite logically, to shift their major attention to college buildings. There is a growing realization, however, that the decline in the rate of increase in school construction is a temporary one: there is a predicted new baby-boom coming, and an enormous number of our older schools are in dire need of renovation or expansion. As it is, our school population is an enormous one. The New York Times reported that 50 million pupils were enrolled in 1966 in the kingergarten through high school grades of our public and private schools. If this number does swell to even greater dimensions, let us hope that the schools now being built can cope with the situation without the temporary classroom expediencies of the last go-round.

All the schools shown here form only a tiny sampling of the many good ones which seek to provide a better environment for learning—and only a glimmer of the many ways it can be achieved. Each does, however, offer some lessons, and possibly some inspiration, to counteract the many arguments that good, forward-thinking design is incompatible with minimum cost, minimum maintenance, minimum political or social controversy. If brass tacks are necessary, let them be handsome and lasting ones!

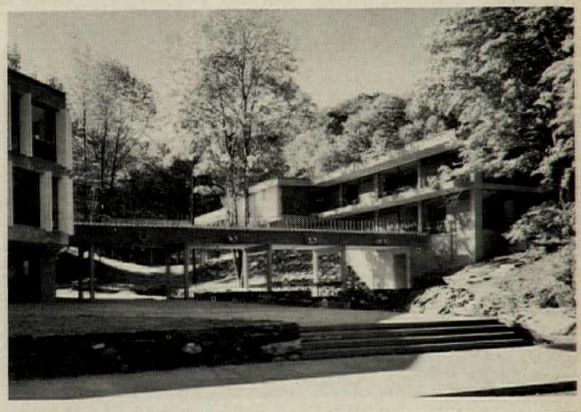
Strongly stated structural framework encloses flexible environment for a middle school

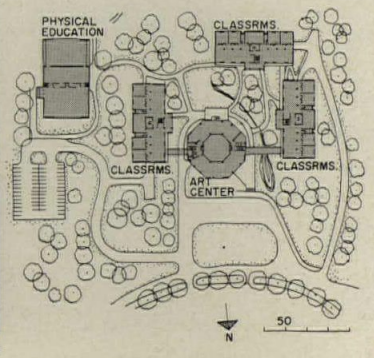
TAC's reputation for good school architecture is confirmed and even reinforced by this design for a middle school for some 1,000 students in Bedford, New York. As demonstrated throughout this study, the major current concerns in school design are to humanize the scale of the buildings; provide for contact between students and teachers at a personal level; compensate for the difficulties of large enrollment and limited staff by flexible classroom arrangements; and stress the importance of the individual child. The Bedford School meets all these requirements in an environment which is at the same time stimulating and reassuring. There should be no sinking feeling in the stomach on approaching this school on the first morning of the school year. As with many larger schools today, the total planning unit is subdivided into houses, in this case three houses grouped around the central octagonal building containing the arts center, library and administration. The auditorium on the upper level is equipped with a movable stage; smaller, acoustically treated art and music rooms are located around one end of the central space, while the library at the other end is accessible via connecting walkways from all three houses.

FOX LANE MIDDLE SCHOOL, Bedford, New York. Architects: *The Architects Collaborative, Inc.—principals in charge: John C. Harkness, Sarah P. Harkness, Herbert Gallagher; design team: Ernest N. Wright; Joseph F. Schappa;* structural engineers: *Souza and True;* mechanical engineers: *Reardon and Turner;* electrical engineers: *John Maguire Engineering;* contractors: *Mars Associates and Normel Construction Corporation.*

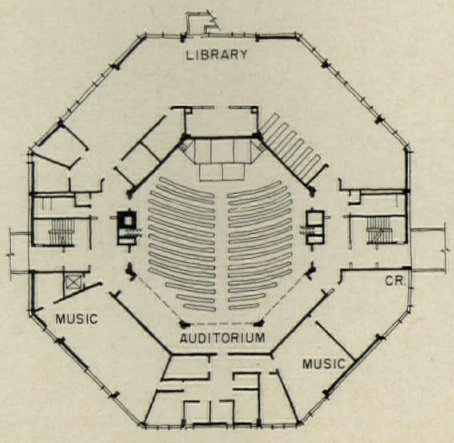


The site plan exploits a substantial grade change by placing the three houses along the sides of a bowl-shaped hollow surrounding the central building, and connecting the buildings by concrete bridges which form covered walks at the lower level. The high land at the back of the school has been graded for playing fields, and a separate physical education building in the corner of the site takes advantage of a southern exposure to provide year-round play facilities. The reinforced concrete frame of the building has projecting slabs to provide a sun screen. Precast concrete grills and fins provide additional protection.

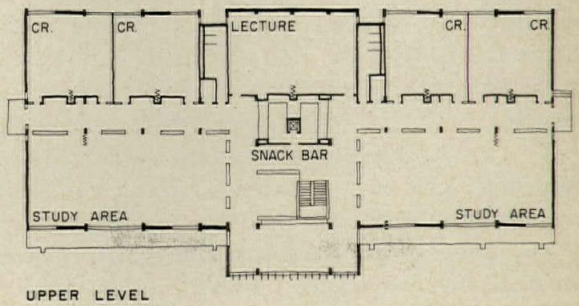




© Ezra Stoller (Esto) photos



SECOND LEVEL



UPPER LEVEL

Balthazar Korab photos

Easy expansion is one of the virtues of a satellite classroom scheme, as can be noted in the plan at right. In addition to future classroom units, the central core is also designed to be expanded by a swimming pool adjoining the present gym lockers, and additional art and science rooms. The various units are linked by glass-enclosed corridors, one of which serves as an entrance lobby and has a block of plain white concrete panels for emphasis.

The interiors of the school have painted masonry block walls, acoustical tile ceilings and asphalt tile floors. Aluminum is used for hardware, window sash and exterior doors.

A library with an adjoining terrace is on the second floor of the central core; the cafeteria-auditorium and gymnasium are two stories high.

The school site is next to an existing senior high school, playfields and a park, reflecting the trend toward closer relationship between the various school grade levels.

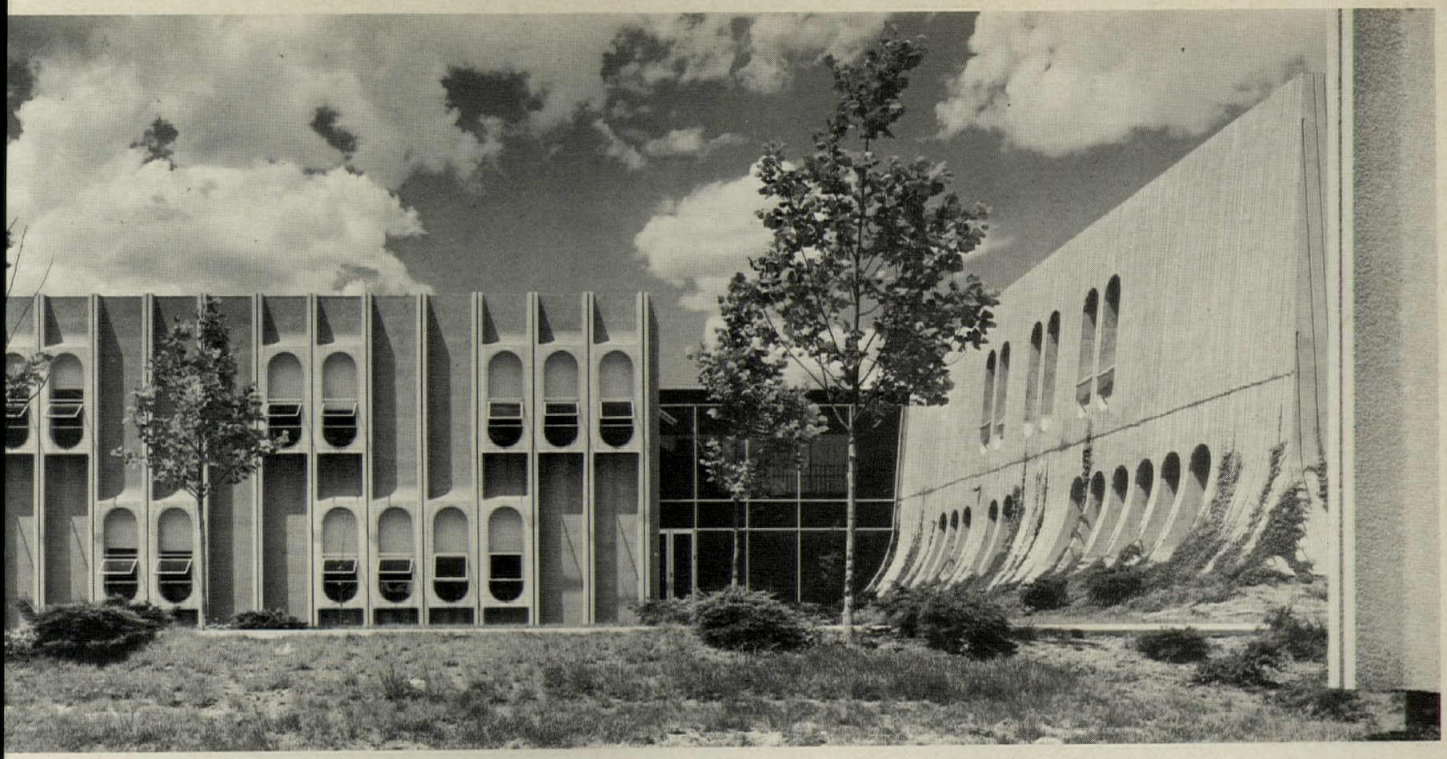
Innovative school design "breaks the box" by use of satellite classroom units and concrete curves

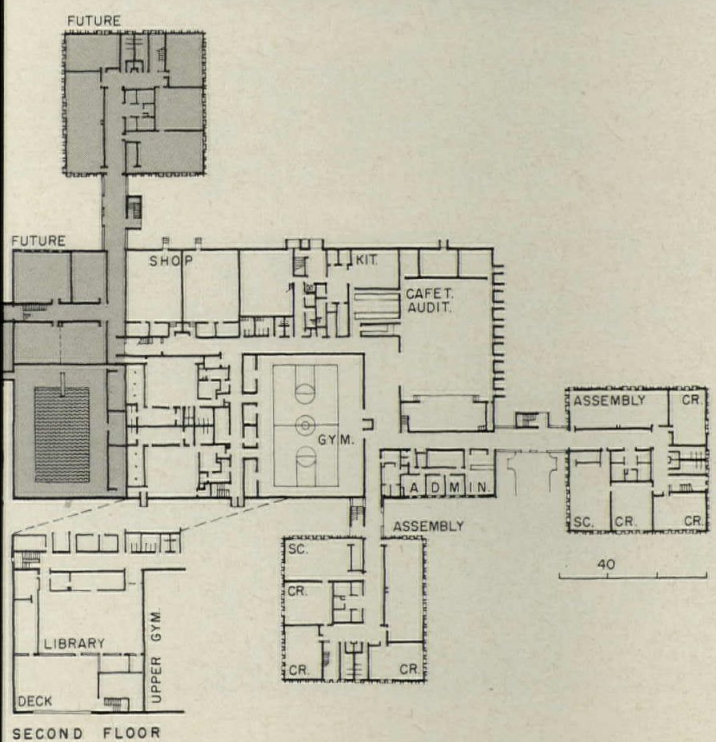
The tendency of larger schools to wind up as stolid, box-like monoliths has been effectively avoided in this school by a plan which places all specialized facilities in a large central block, surrounded by a series of classroom blocks. Two of these smaller units have been built, with another planned for future expansion. Such a scheme also divides the student body into smaller groups for better relationships and more personalized instruction. Flexibility for different-sized teaching groups is also provided within each unit.

To further emphasize this separation of the parts of the school, different, but related, design techniques have been used for the central block and the classrooms. The center core has swooping, striated concrete walls, pierced by deep-set oval windows; the classroom units are clad by lighter-appearing concrete panels, emphasized by projecting fins and banks of windows. Color is also used to emphasize the design: the core is natural gray concrete, and the inset panels of the classrooms are a beige aggregate with the fin edges and window surrounds natural gray concrete.

When completely finished, with the addition of another classroom unit and extension of the main block, the complex will appear as indicated in the sketch below right.

AMELIA EARHART JUNIOR HIGH SCHOOL, Detroit, Michigan. Architects: *Meathe, Kessler and Associates, Inc.*; structural engineers: *McClurg, McClurg, Paxton & Mikle, Inc.*; landscape architects: *Johnson, Johnson & Roy, Inc.*; contractor: *Alfred A. Smith, Inc.*





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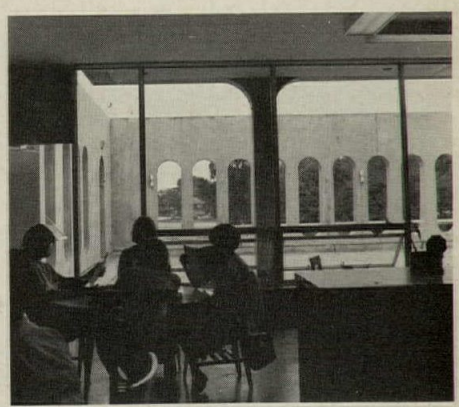
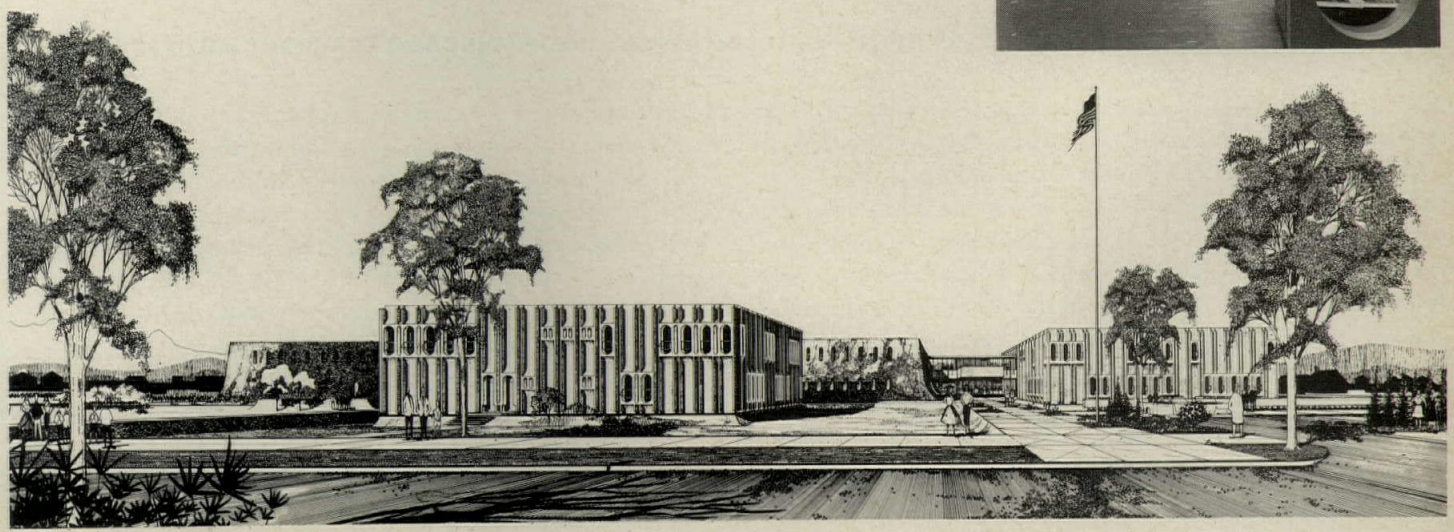




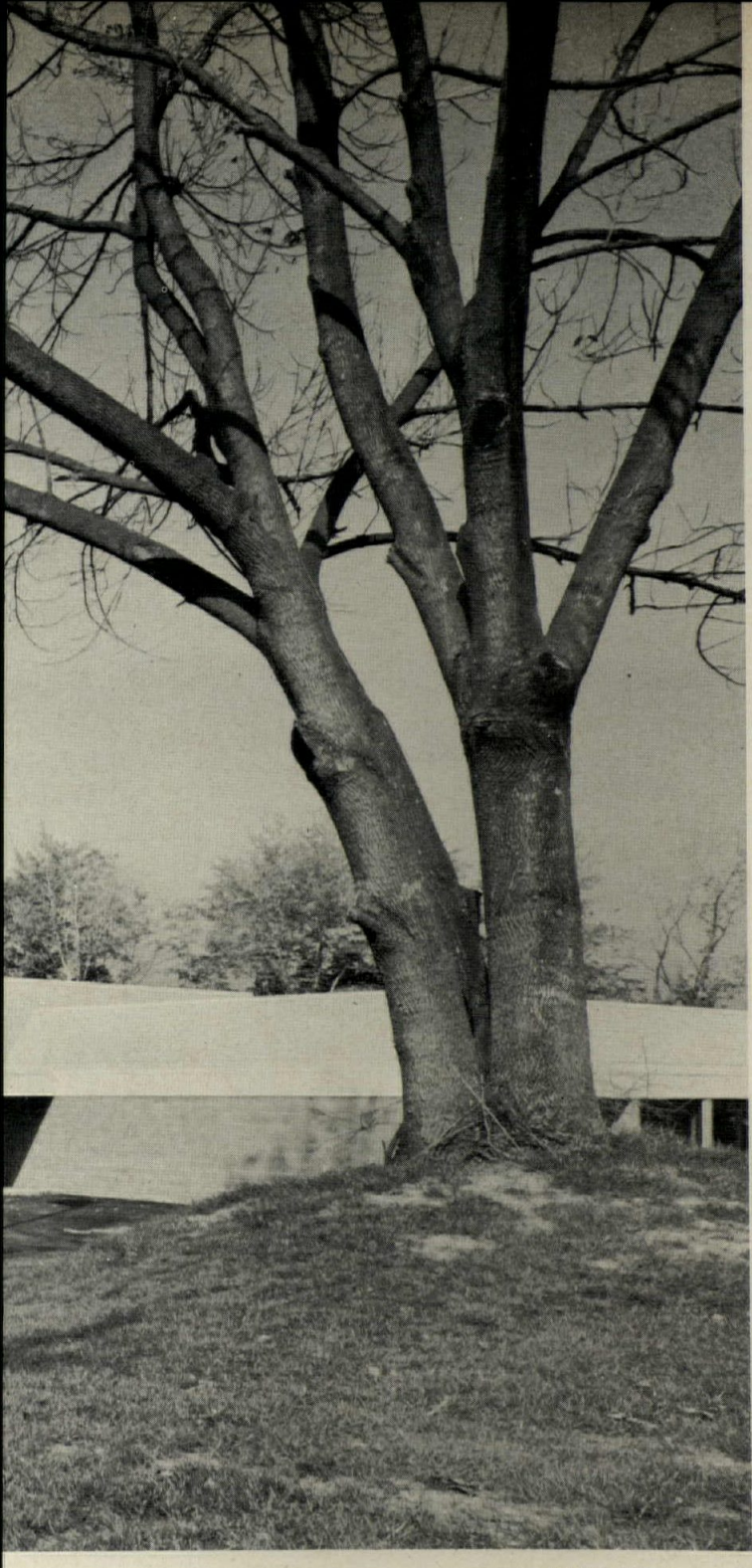
Ezra Stoller Associates photos

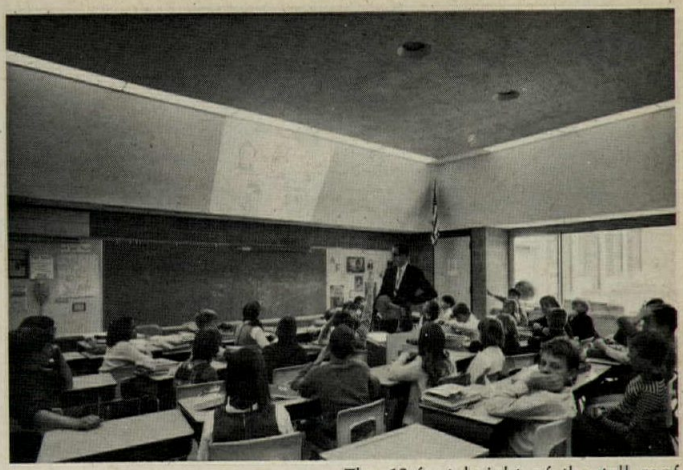
Skilled use of "pop-up" roofs gives good scale and visual-aids projection space for a K-6 school

This quietly handsome school combines provision for team teaching and extensive use of audio-visual aids, with good scale and a good teaching environment for children.

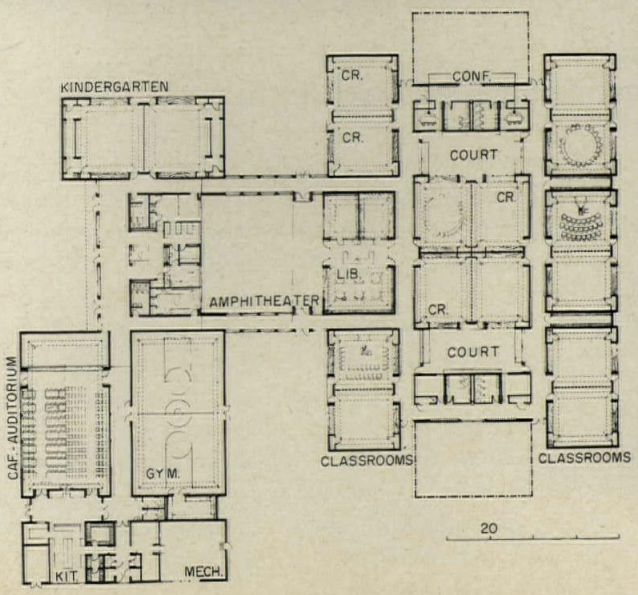
The school, designed for kindergarten through sixth grade, will currently house 430 pupils in two kindergarten rooms and 14 classrooms. Planned expansion for four more classrooms will raise the capacity to 530 pupils in the future. The classrooms are paired, with soundproof, movable walls between. A centralized library is well related to all the classrooms, and contains a teachers' research center. In addition to a combination auditorium-cafeteria and a playroom-gymnasium, the plan includes an administrative suite, teachers' rooms, conference and small instruction rooms and service areas. This variety of available teaching spaces, relieved by several courts, apparently functions quite well for the large and small group instruction methods of the team teaching system. The school principal, Clark Dexter, has commented that, "It works just beautifully." As to the effectiveness of the sliding, acoustic operable walls between classrooms, he notes that, "They're as soundproof as a cinder block wall, and move very readily."

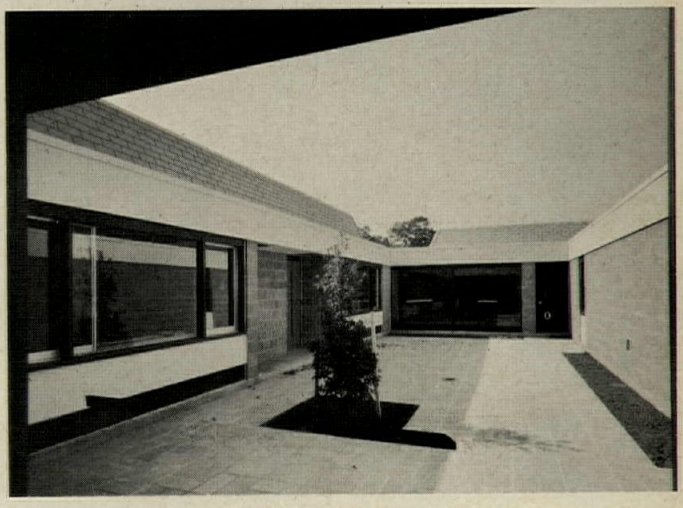
OX RIDGE ELEMENTARY SCHOOL, Darien, Connecticut. Architects: *Sherwood, Mills & Smith—partner in charge: Thorne Sherwood; design architect: Robert C. Rogus; production architect: William S. Valus;* structural and mechanical engineers: *Werner, Jensen & Korst;* site consultant: *Cushine & Freeman;* kitchen consultant: *Henry H. Rothman;* contractor: *Sam Grasso Company, Inc.*

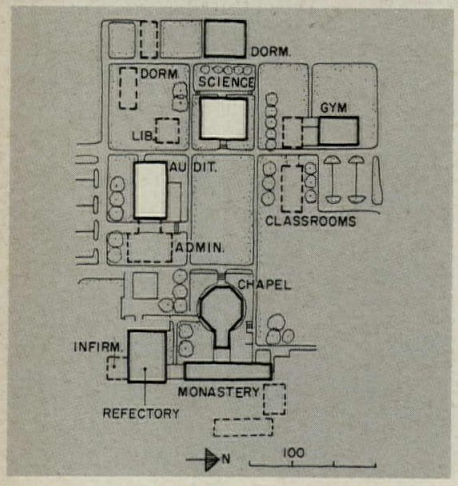




The 12-foot height of the tall roof sections (above) gives an added function as a continuous, interference-free visual-aids projection surface. Central floor outlets have been provided for the overhead projectors that are standard equipment for each classroom. All the other, flat-roofed areas are 7 feet, 4 inches high (below). This roof variation gives the needed space and reasonable room proportions, while keeping a rather small, intimate scale. The architects' stated intention was "to create visually a sort of children's village of low silhouette for the benefit of youngsters and to be in scale with the residential environment." All materials were selected for low maintenance: skeleton steel frame, concrete block walls, vinyl asbestos floors.







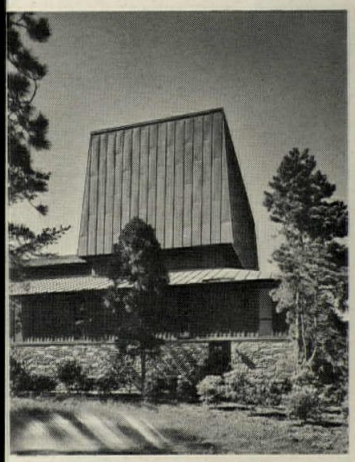
The master plan includes a new classroom building, library and new dormitories. Landscaping between the buildings is fairly formal, but gentle, and the whole complex has something of the feeling of a traditional university campus. The interior of the auditorium is a very pleasant space, the lofty ceiling and clean wood detailing making an excellent foil for some well chosen seating and lighting fixtures.

Two new buildings for a priory school respect tradition but embrace the future

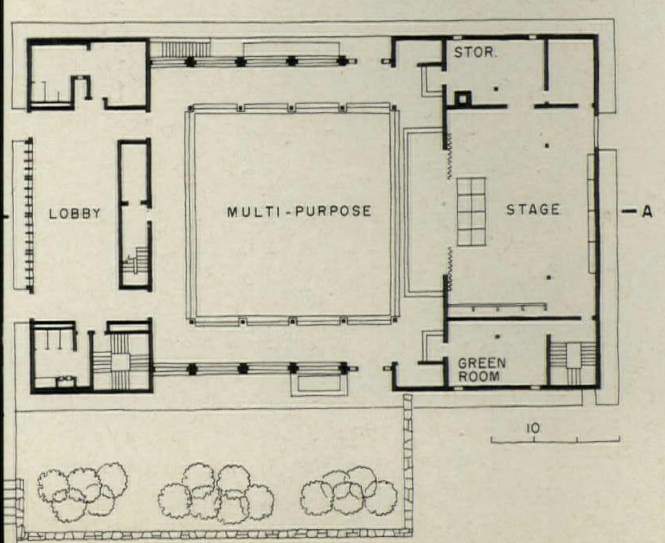
Two new buildings have recently been added to the boys' preparatory school which forms part of the Portsmouth Priory complex in rural Rhode Island. When the main monastery and chapel were erected (RECORD, July 1959, page 148) Belluschi, who was associated architect for both projects, was concerned to continue the vernacular of the existing farm community and to establish an "interwoven texture" of forms and materials throughout the site, which would characterize both the strength and the simplicity of the order of St. Benedict which it served.

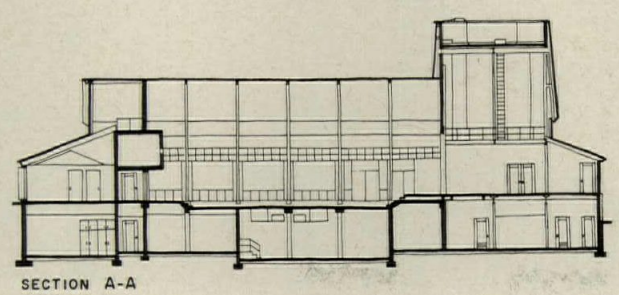
The multi-purpose building (this spread) and the science building (overleaf) are conceived in the continuing tradition of the community: both are simple in form; both are sheathed in natural redwood, with rubble stone retaining walls; both are carefully planned in relation to the complex as a whole. The science building was placed directly opposite the chapel—with the multi-purpose building between—to symbolize the complementary functions of science and religion in the modern world and the Priory's contemporary approach to education.

A 300-seat auditorium is the main feature of the multi-purpose building, which also provides a generous stage and stage house, and a projection room at one end for movie and slide displays. By depressing the central part of the auditorium, the architects were able to make it double extremely well as a dance floor. Student newspaper offices, a printing press, meeting rooms, and offices for various extracurricular activities are all accommodated on the lower floor of the building.

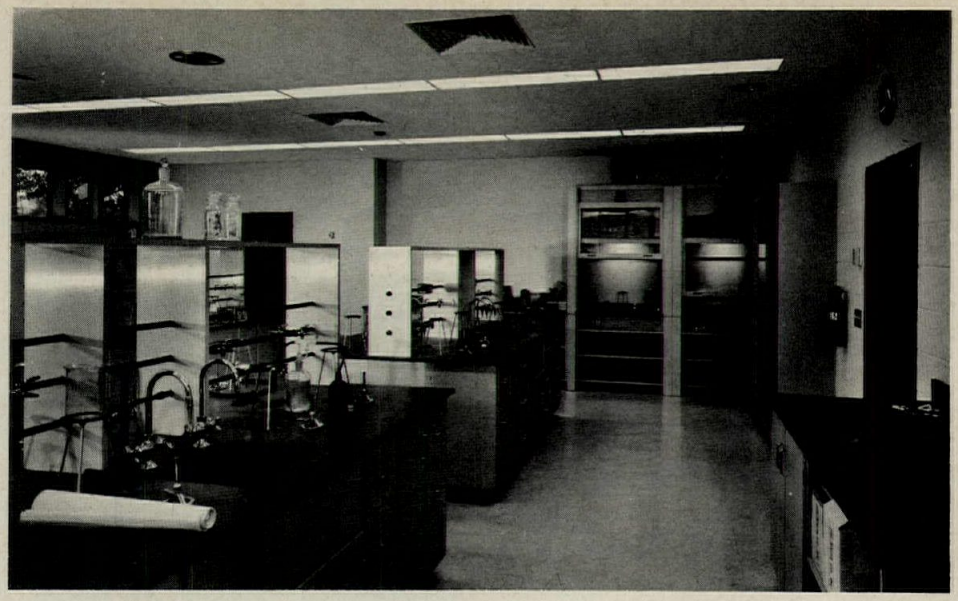


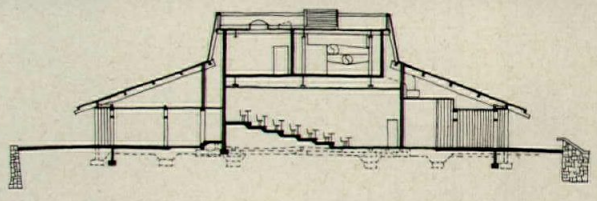
Joseph W. Molitor photos



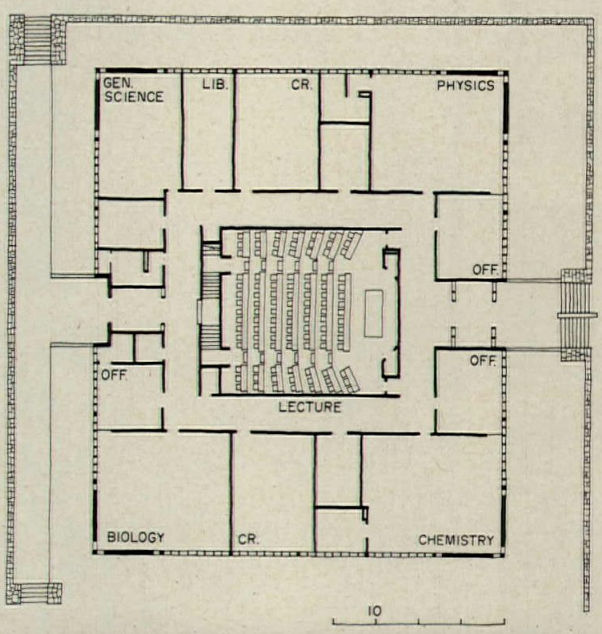


SECTION A-A

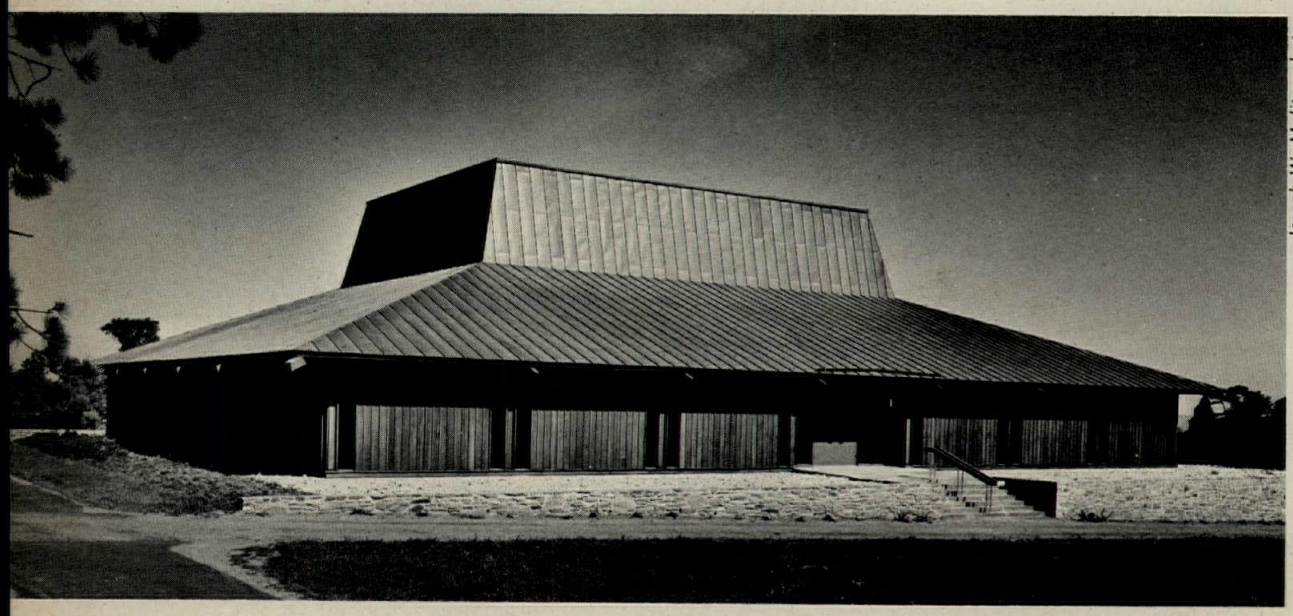




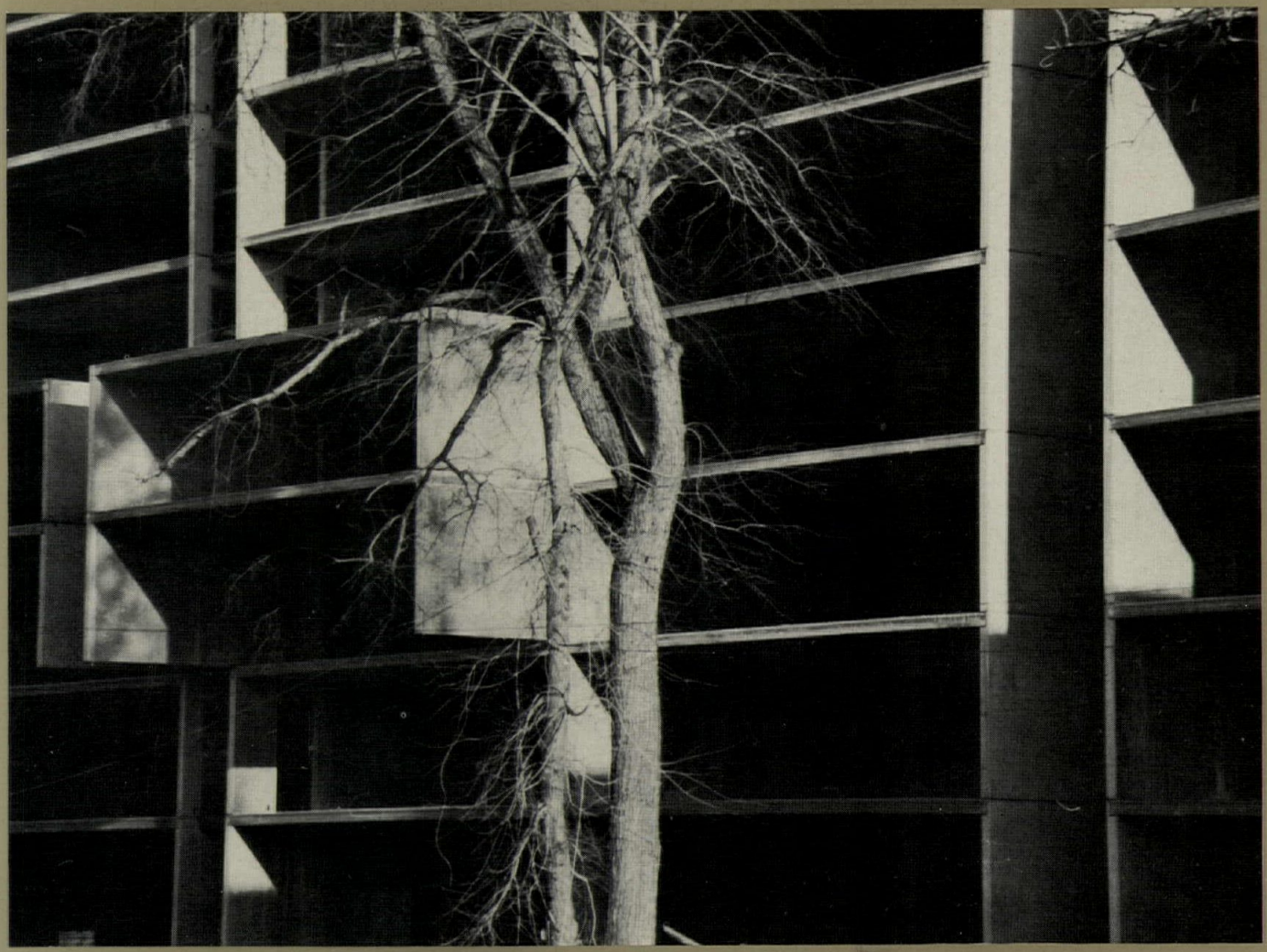
From the outside, the science building is very much a smaller version of the multi-purpose building, with the same redwood detailing, and dominant copper roof. Inside, however, the science building consists of a series of functional, well-planned laboratory and classroom spaces built around a large, central lecture theater. Interior walls and partitions are exposed masonry block; ceilings are suspended acoustic tile. Narrow, floor-to-ceiling windows lighten the rooms and give attractive glimpses of the outdoors, but do not create the physical and psychological difficulties of discomfort and lack of concentration that very large glass areas in schools sometimes arouse.



MULTIPURPOSE AND SCIENCE BUILDINGS, PORTSMOUTH PRIORY SCHOOL, Portsmouth, Rhode Island. Associated architects: *Pietro Belluschi; and Robinson, Green & Beretta;* contractor: *F. L. Collins;* acoustical consultants: *Bolt, Beranek & Newman.*



Joseph W. Molitor photos



FINALLY: A LOW-COST COMPONENT SYSTEM FOR HOUSING THAT REALLY WORKS

Carl Koch's Techcrete system avoids design restrictions, uses simple components, works equally well for low-rise or high-rise

Techcrete, as the new system is named, is probably the most flexible prefabricated building system for multi-family housing to come along so far in this country. It avoids most of the restrictions —in planning, exterior treatment, cost, and construction complications—which have deterred other systems more rigid or more complex in concept and in application.

At first look, the new system developed by Carl Koch & Associates in collaboration with structural engineer Sepp Firnkas, is so seemingly simple as to belie its potential. But on further examination, the possibilities begin to unfold.

The key to flexibility is a 32-ft-span, open-ended framework of precast concrete units which can be stacked one on top of the other for as many stories as are needed, and extended as much horizontally as the plan dictates. The structure consists of bearing wall panels, which are erected first, and which support 32-ft pretensioned precast planks, 40-in. wide. These floor planks are "clamped" to the walls by post-tensioned steel rods. The remaining two walls can be enclosed with non-load-bearing materials. The basic system goes together very much like a child's building of blocks.

The system has advantages in design and construction

In brief: 1) The system is economical for both low-rise and high-rise apartment

I believe that the gap between conventional building methods—which are overgeneralized—and European "building systems"—which for the American market are overspecific—can be bridged by a "system" which originates as a planning process. Of necessity, this planning system starts as the solution to a specific project . . . but a project which is potentially one of many. Thus our system was first developed for a particular family of plan types. It began under a contract for the Boston Redevelopment Authority to meet the requirements of 221(d)(3) housing for the three renewal areas in Boston.

Looking back at our original criteria for design, it boils down to this short list:

1. A design method to lower first and continuing cost and increase quality.
2. A flexible design method to permit the widest possible range of uses and appearance to meet variations in site, density, local preference.
3. A process which offers the greatest possible opportunity for speeding up and simplifying the process of building from first realization of need to occupancy (a large factor in reducing cost.)

In developing the Techcrete system, we chose reinforced concrete as a structural material because of its ready availability, economy, its fire and soundproofing qualities, its indestructability.

We decided, on the basis of the European experience, that a simple bearing wall system was the most effective way to use the material to meet housing requirements—especially since present-day prestressing technology permits wide spans at low cost providing adequate planning flexibility.

Our immediate divergence from the nearest European analagous systems was in our emphasis on planning and appearance flexibility. As designers, our efforts centered on working out a series of planning modules which would permit a small number of interrelated components and sub-components with the greatest flexibility of assembly possible.

This planning method makes use of three main ways to lower cost:

1. The standardization and mass production of interchangeable parts, designed for assembly in a wide variation of ways.
2. A continuing design discipline to encourage the simplification and standardization of equipment, parts and finish, which can, as they prove their applicability and efficiency, become an integral part of the system.
3. A direction of design and assembly of the system components to assure the maximum effectiveness at minimum cost of each custom or unique aspect of each of the separate designs.

We stand ready to help and are anxious to be helped by any architect working on this problem. Our system is not the only answer, but it is one answer . . . and it will be an increasingly good one if enough of us use it and improve it.

Pure design in the grand manner was, is and will always be part of good building. Functionally adequate buildings can be built without an architect. Our goal as architects should be to strengthen our function, that of a co-ordinator of the building process, into a meaningful accomplishing position, where we can apply our design talent effectively. When and if this is done, it will give building a dimension which most of it now lacks—a unity contributed by design which will make a related whole of the disparate pieces contributed by architect, developer, manufacturer and building authority.

There is no question in my mind that this unity can be accomplished. It can, it must and it will. Our government is taking a new look at how to do it. Industry is getting ready to tackle it on its own. Good or bad, there is one thing certain. In 15 years we will either be working for General Electric, General Dynamics, General Motors, or General Cities—or they will be working for us. Which do you prefer?

—Carl Koch

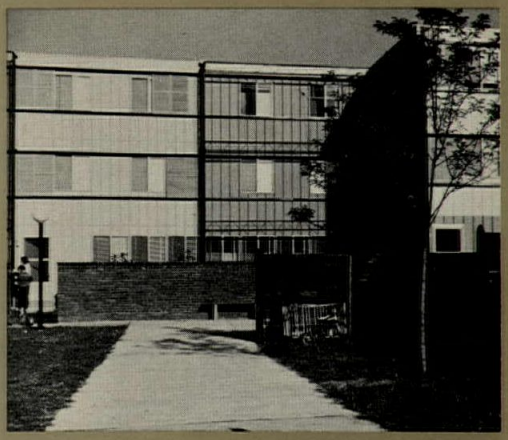
buildings; 2) the 32-ft span allows an almost infinite variety of plans; 3) the structural envelope has only a few elements; 4) apartment units can be so disposed, floor-to-floor, as to permit stacking of pipes for heating and plumbing; and slots, which are later concreted, can be provided between floor planks to permit horizontal runs of piping; 5) the 32-ft span allows the use of standard 4-foot sheet materials for exterior walls without cutting; and 6) standard construction materials can be used for the non-bearing exterior walls and for partitioning. The exterior walls may be greatly varied in appearance, using either standard, factory-finished siding materials; or bricks; or, if warranted by the project, custom-designed wall panels. Standard types of dry-wall construction can be used for interior partitioning.

This system escapes what could be marketing rigidities of the factory production line while still taking advantage of its economies and factory quality control. That is to say, the system has flexibility without demanding big inventories of a wide variety of factory manufactured components.

But most important, the system makes use of accepted structural technique, existing mass-produced building products, and available heavy-duty construction equipment. At the same time—since both techniques and materials are familiar—only ordinary labor is required, except for the post-tensioning of the structural elements. The trades involved for the Techcrete system in Boston include steelworkers, stonemasons and bricklayers, cement finishers, carpenters and laborers.

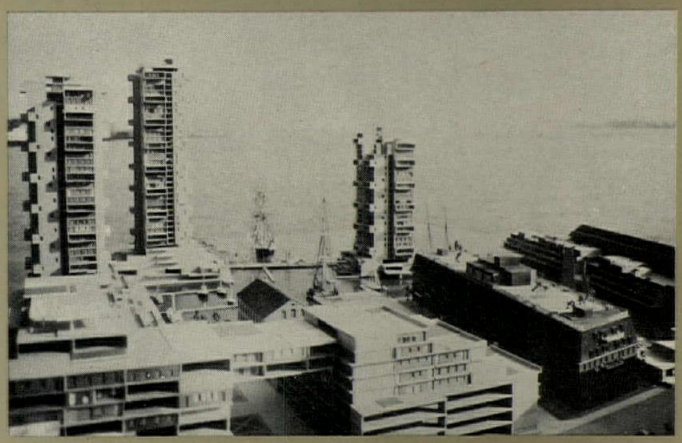
The system also has real cost advantages

The first application of the Techcrete system—the 200-family Academy Home project in Roxbury—has been built and occupied for two years. In addition to it another project a block away totaling 385 units (including a number of high-rise units) is under construction and partly occupied. This represents between $8 million and $9 million worth of build-



ANCESTRY OF NEW SYSTEM

Carl Koch's commercially unsuccessful Acorn house (top left) was designed for factory fabrication and minimum field labor. His highly popular Techbuilt house relies more completely on factory produced components. Early use of factory-produced steel structural components and prefinished sheet siding are shown in the above photos. Right: one of the first examples of the long-span precast system, in the Roxbury section of Boston, has a highly varied use of exterior materials.



FUTURE APPLICATIONS

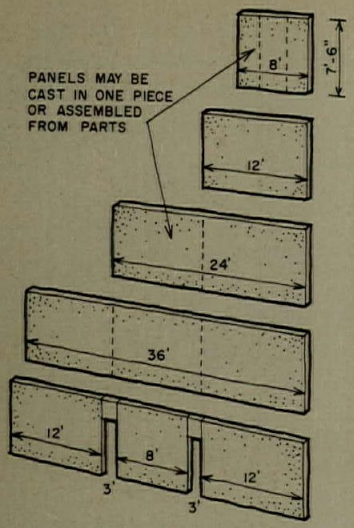
Proposed as part of the redevelopment of the wharf area in Boston are three tower apartments (left) which would utilize the Techcrete system developed by Carl Koch & Associates and Sepp Firnkas, structural engineer. A number of the walls are extended to provide balconies. Strongly textured concrete facades feature the exterior of apartment buildings designed by architect F. A. Stahl, employing the same precast-prestressed system.

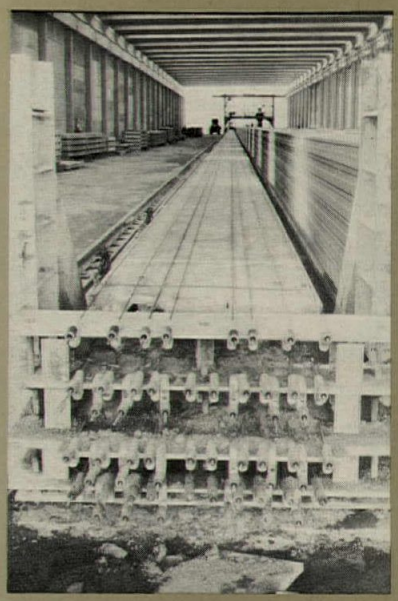
ing, and works out to about $10.70 per square foot. This is at least a 10 per cent saving over the nearest comparable construction. This saving (in total construction cost) has been effected entirely in the concrete structure, or little more than one-fourth of the total cost of the building. If the market for the system's standard component can be increased, it should be possible to reduce costs further.

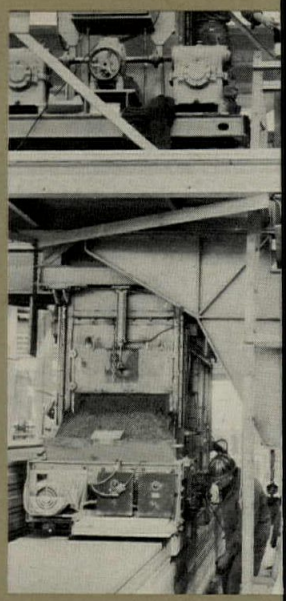
The 32-ft module is based on careful planning studies

During evolution of the new system, which was originally developed for low-rent housing in the renewal and relocation areas of Boston, planning bays (or spans) of 20 to 30 ft were first evaluated. In apartment planning a 20-ft base works well for a three-bedroom unit but less well for a two-bedroom unit. A base of 24 ft is uneconomical in planning single units and too small to permit two living rooms. A base of 28 ft will barely permit two apartments on a bedroom floor, with the possibility of three bedrooms in width, but two living rooms in 28 ft are inadequate as a repeatable standard. A 32-ft base allows two units at either a bedroom or living room level and combinations of one, two, three or four bedrooms are easily obtainable.

A 32-ft clear span was physically possible because of the availability of prestressed concrete floor planks, 40 in. wide and 8 in. thick. Bearing-wall precast panels which support these planks may be 36 ft or more long. And shear wall panels at the stair wells have been cast five stories (40 ft) in height. Thus these units are in keeping with the principle of maximum flexibility using a minimum number of elements. Larger, therefore fewer, parts save time at several stages, starting with initial design and carrying through to site work. The system strikes a balance between the extremes of 100 per cent flexibility with an inordinate number of pieces to inventory, ship and site assemble, and the total absence of flexibility with a wholly factory-built packaged unit. The components combine structure, enclosure, and finish.

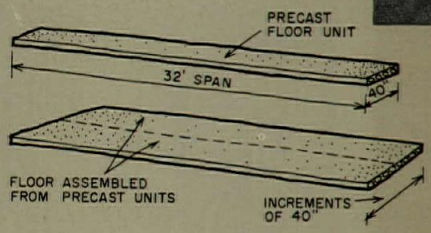


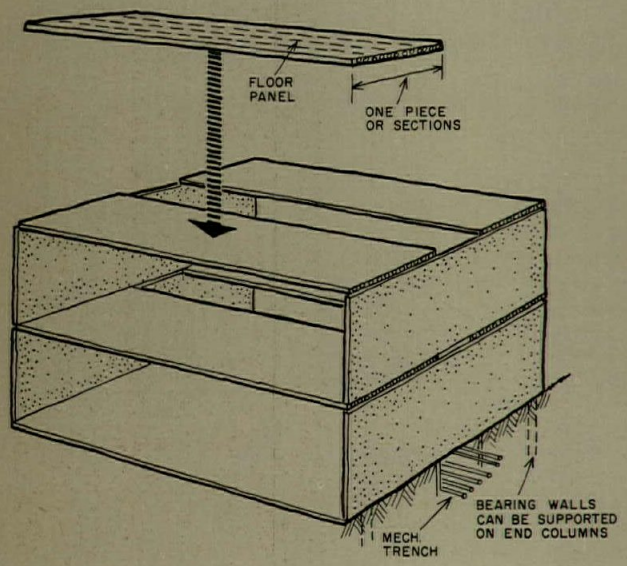


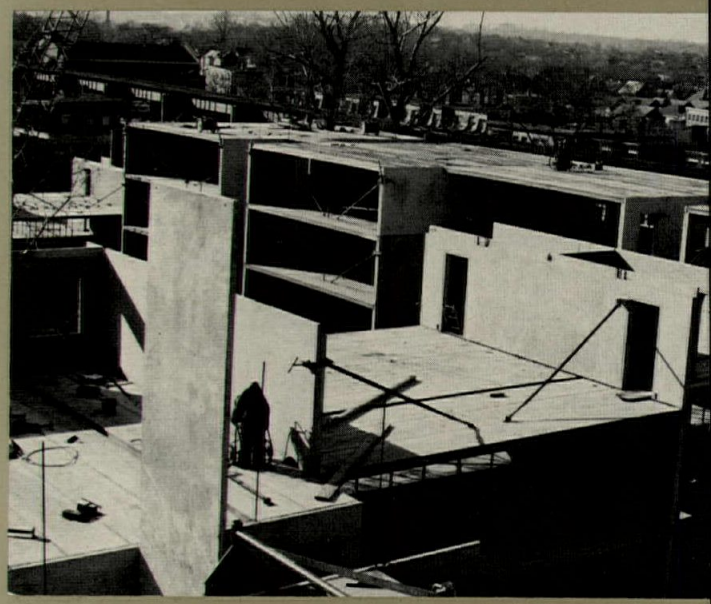


BASIC SYSTEM COMPONENTS

The exceptionally high degree of planning flexibility is made possibly by the 32-ft pretensioned concrete floor planks. Bearing wall panels can be as long as needed within the capacity of a crane—in some cases over 40 ft.







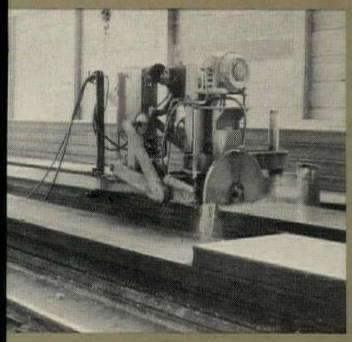
Carl Koch refers to the Techcrete system as an open system because the 32-ft-span concrete "boxes" can be stacked to considerable heights (the structure has been calculated for a 32-story building), and arranged in many forms (row houses, back-to-back row houses, quadrefoils—i.e., a grouping of four units within a cross-shaped party wall system). In other words, more room can be provided by simply adding on more units. His prefabricated Acorn house, in contrast, is a "closed" system—the only way that you could get more space was to use more houses. While the Techbuilt house would be classed as a closed system in a sense, the freedom it provides in interior planning is reflected in the Techcrete system.

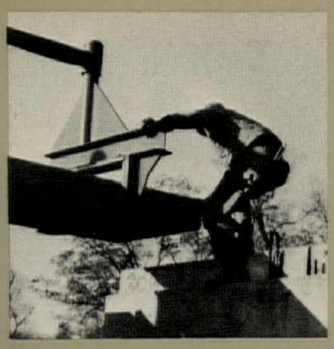
While the system was first used for low-cost rental housing in Boston ($75 to $105 per month for one- to four-bedroom units), with construction costs running $10.70 per square foot for apartment buildings up to nine stories in height, it is by no means limited to this class of building. In fact, by their exteriors one would not guess that the buildings were low rental. For higher-cost rentals, more money could be spent on interior finishing, heating and air conditioning, and perhaps on special exterior materials. (In the low-cost units, for example, flooring was asphalt tile and heating was hot-water baseboard convectors. While the original apartments in the Boston low-cost housing had individual boilers for each apartment, later buildings employed central hot water boilers.)

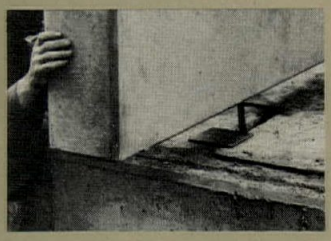
The key to structural stability is continuous post-tensioning

Prestressing rods, generally two for each wall panel, running continuously from foundation up through walls to the roof, clamp the floor panels and the bearing wall panels together in a rigid frame. Up to five stories, this is all that would be needed to provide structural stability, including lateral loads. Above this height, shear walls are required to complement the prestressed rigid frames.

The first step is to anchor the first group of rods to the foundation. Then

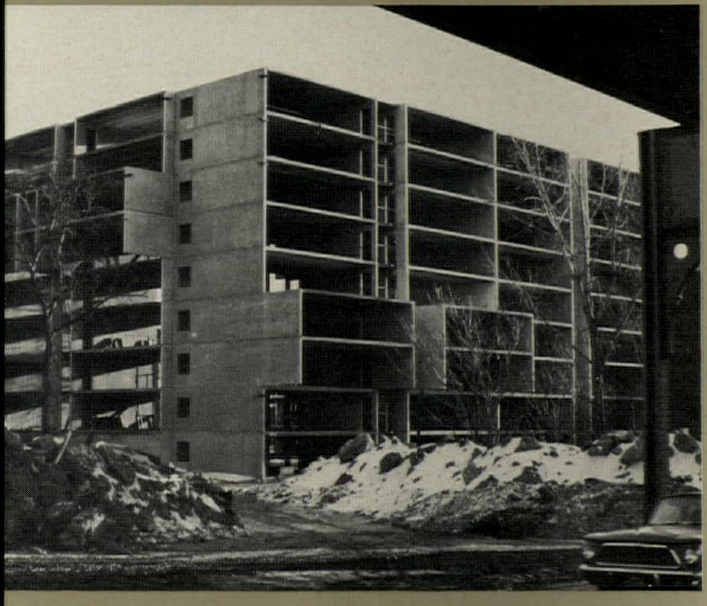


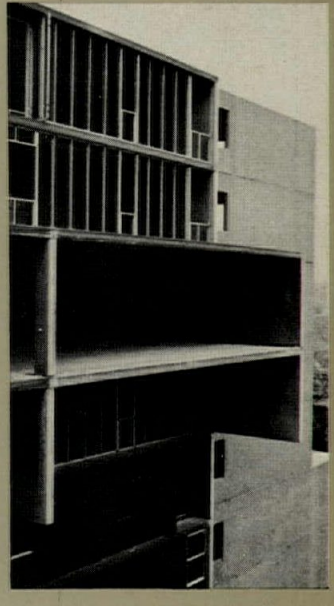




FROM FACTORY TO FIELD

Both the pretensioned floor units and the ordinary reinforced wall panels are factory-produced. The floor planks are cast continuously by use of an extrusion machine (photos left) after the wires have been pretensioned between anchorages. The planks are then sawed off in 32-ft lengths. At the site, wall panels are guided in place over post-tensioning rods; then the floor planks are set on ledges cast in the wall panels. Finally the rods are post-tensioned by jacks and anchored. The process is then repeated.





THE FINISHED SHELL

The high-rise units (left), which will provide low-rental units in the Roxbury section of Boston, are ready to receive the non-load-bearing curtain walls. These are constructed of standard light-gage steel studs to which are applied insulating sheathing and exterior finish of prefinished asbestos cement panels, steel panels, aluminum siding or brick veneer. Inside walls are gypsum board. Fenestration can easily be varied.

irst-floor bearing wall slabs are guided over these rods. These rods are post-tensioned by means of hydraulic jacks, and after the tensioning force has been applied a temporary anchorage maintains this tension which gives stability to the wall panels. Next, another series of 8-ft-long rods is connected by threaded coupling devices to the first set. The second floor bearing wall panels are guided over these rods. After the floor planks for the second floor have been placed, these rods are tensioned, but the tension force is slightly greater than that applied to the first floor rods. This process is repeated, right up to the top story. The result is that the prestressing force is continuous from top to bottom, rather than each floor having its individual prestressing force. The only anchorages providing any restraining action are those at the foundation and at the roof.

The precast shear walls separating stairs are stabilized by being bolted to the walls. These panels are joined vertically by means of dowel connections.

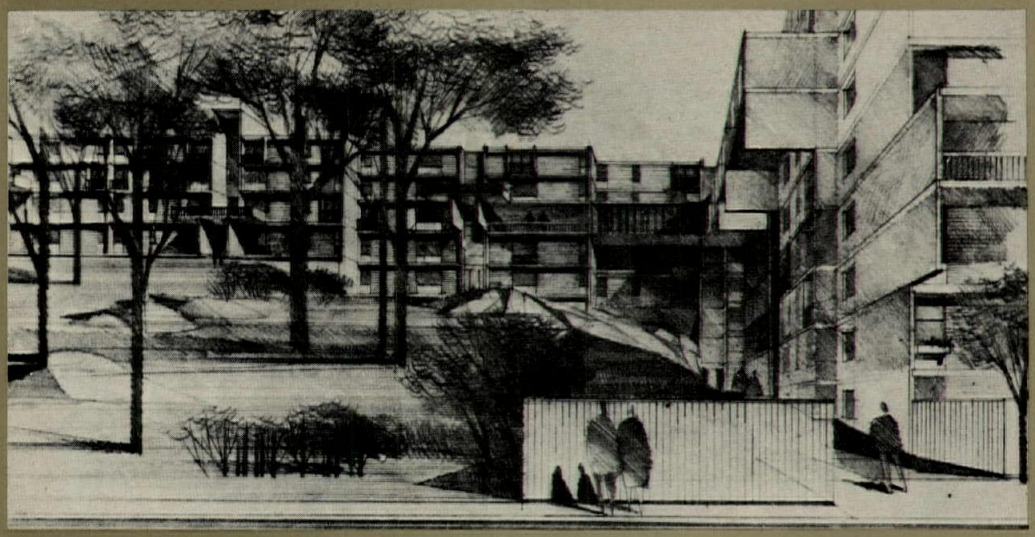
For high-rise apartment buildings, elevator cores will be constructed of story-height precast concrete boxes, stacked one atop the other and post-tensioned for continuity.

While there is no set limit on the number of possible stories, the walls obviously will have to be thicker the higher the building goes. For a 32-story building the bottom three floors would need to be 20-in. thick. A 13-story-building could be built with 8-in.-thick bearing walls throughout.

The post-tensioning system is uniquely suited to American practice

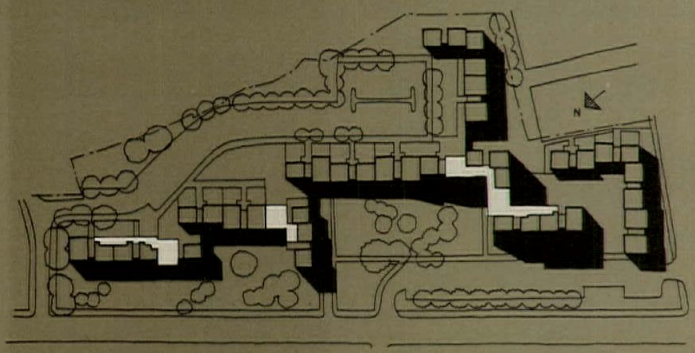
For one thing, pre-tensioned planks, while a European development, are not generally used there for apartment building construction because room sizes are smaller and apartment plans are far more standardized than would be acceptable here—thus there is no particular need for long prestressed spans which cost more than ordinary reinforced panels.

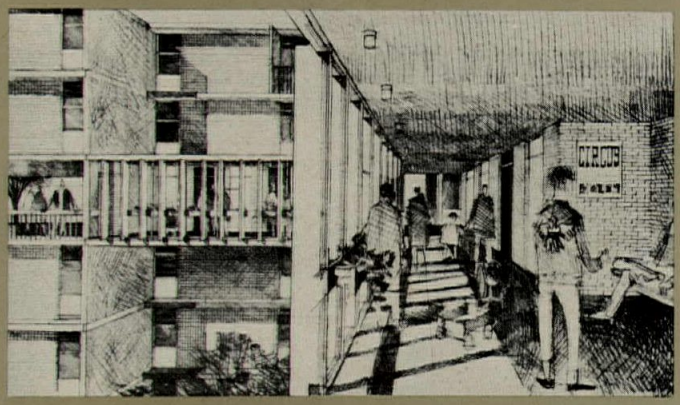
Secondly, heavier construction equipment—cranes and trucks—are more readily available in the States than in Eu-

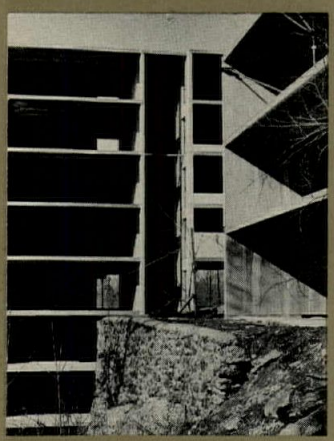


THE SLOPING SITE—A VIRTUE

The prestressed open-ended box is highly adaptable to sloping sites and can provide a wide variety of plan configurations. Cantilevered walls support floors for storage areas, balconies, or continuous walkways. These walkways are particularly valuable in providing horizontal circulation so that apartment dwellers can enter a high-rise building somewhere in the middle and walk either up or down two stories, thus eliminating the need for elevators in low-rental housing. The plan (below left) shows actual horizontal circulation via integral walkways and terrace areas in the Academy Homes development in the Roxbury section of Boston.

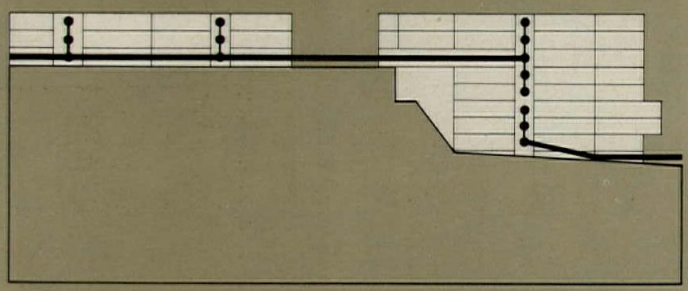






NINE FLOORS, NO ELEVATORS

The sectional drawing (right) illustrates how—by providing building entrances at two different levels, and horizontal circulation via walkways—a nine-story building can comply with FHA requirements that tenants will not have to walk more than two stories up or two stories down. The photo (left) shows an actual structure built at different elevations.



rope. It is easy to find a number of 100-ton cranes in an American city—not so in Europe. (This is so even though the Europeans have pioneered in such equipment as tower cranes on rails and tower cranes hoisted by jacks.) This means that larger and fewer panels can be used in the Techcrete system. European systems typically use a large number of small precast panels for walls and floors; or small room-sized precast wall panels and poured-in-place floor slabs.

Also, it is said, the tax structure of many European countries favors the construction of elaborate precasting facilities in which many machines are available to produce a wide variety of structural components. But this demands extremely careful coordination between field use and factory production to utilize plant capacity most efficiently and to avoid overstocking and shortages.

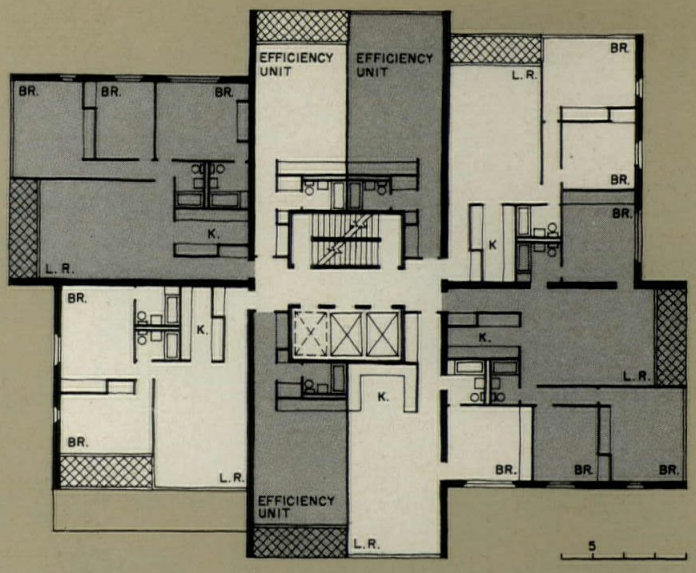
Here, in contrast, the precast manufacturer hopes for continuous high production of similar items. Thus, automated machinery which extrudes concrete plank is estimated to be available from over 50 different local manufacturers. The extrusion machines, again, are a European development. But the American market offers a much higher potential volume for prestressed planks, so, in general, it is much more readily available here.

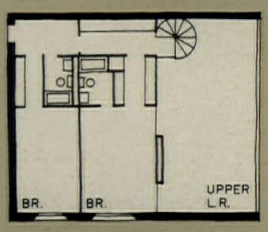
By and large, joint details of European industrialized systems for housing are fairly fussy, requiring skilled labor.

The system can work on sloped or unstable sites

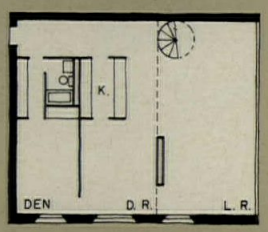
The modular system is adaptable to a variety of sloping sites, producing buildings which can be stepped up and down a hillside to allow for grade changes and provide extra dwelling units at the lower levels. It is also possible to build economically over poor soil conditions or even watery marshland with caissons or piles set approximately under the four corners of the units.

A site with a sharp drop-off can be used to great advantage in low-cost housing, since with entrances provided at several levels, elevators can be eliminated. For example, it is possible to have a nine-story building without elevators

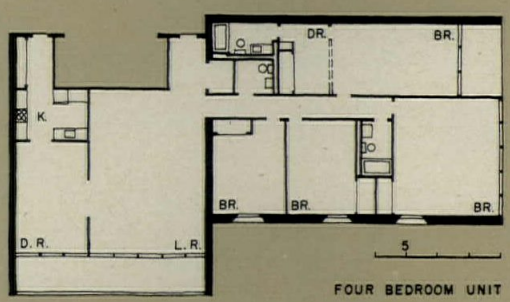




UPPER FLOOR



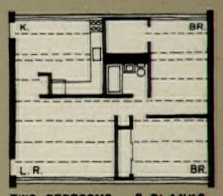
LOWER FLOOR - DUPLEX UNIT



FOUR BEDROOM UNIT

PICK ANY PLAN

The 32-foot building block module permits an almost endless variety of plans. Plans (right) show how additional bedrooms are provided in low-rental row houses, merely by adding more floor planks and shifting the various rooms, while leaving bathrooms in the center. The plan (left, top) is for a high-rise, elevator apartment building with a central core. As can be noted, there are a number of different apartments in this example; other possibilities are at left. One of these is a duplex; the other, a rather large higher-rent apartment.



TWO BEDROOMS - 8 PLANKS

THREE BEDROOMS - 9 PLANKS

FOUR BEDROOMS - 11 PLANKS

that will still meet FHA requirements (see page 192). With entrances at two levels, people can walk up two floors or down two floors.

Vertical circulation can be handled in a variety of ways depending on whether the apartment buildings are low-rise or high-rise. If high-rise, elevatoring in medium to high-rise apartment buildings may be provided by center-core access or by corridors and stairs in skip-stop arrangement.

For the low-cost housing in the Roxbury section of Boston, both low-rise and high-rise apartment buildings utilize stair slots—one slot between two of the 32-ft modules serves two buildings.

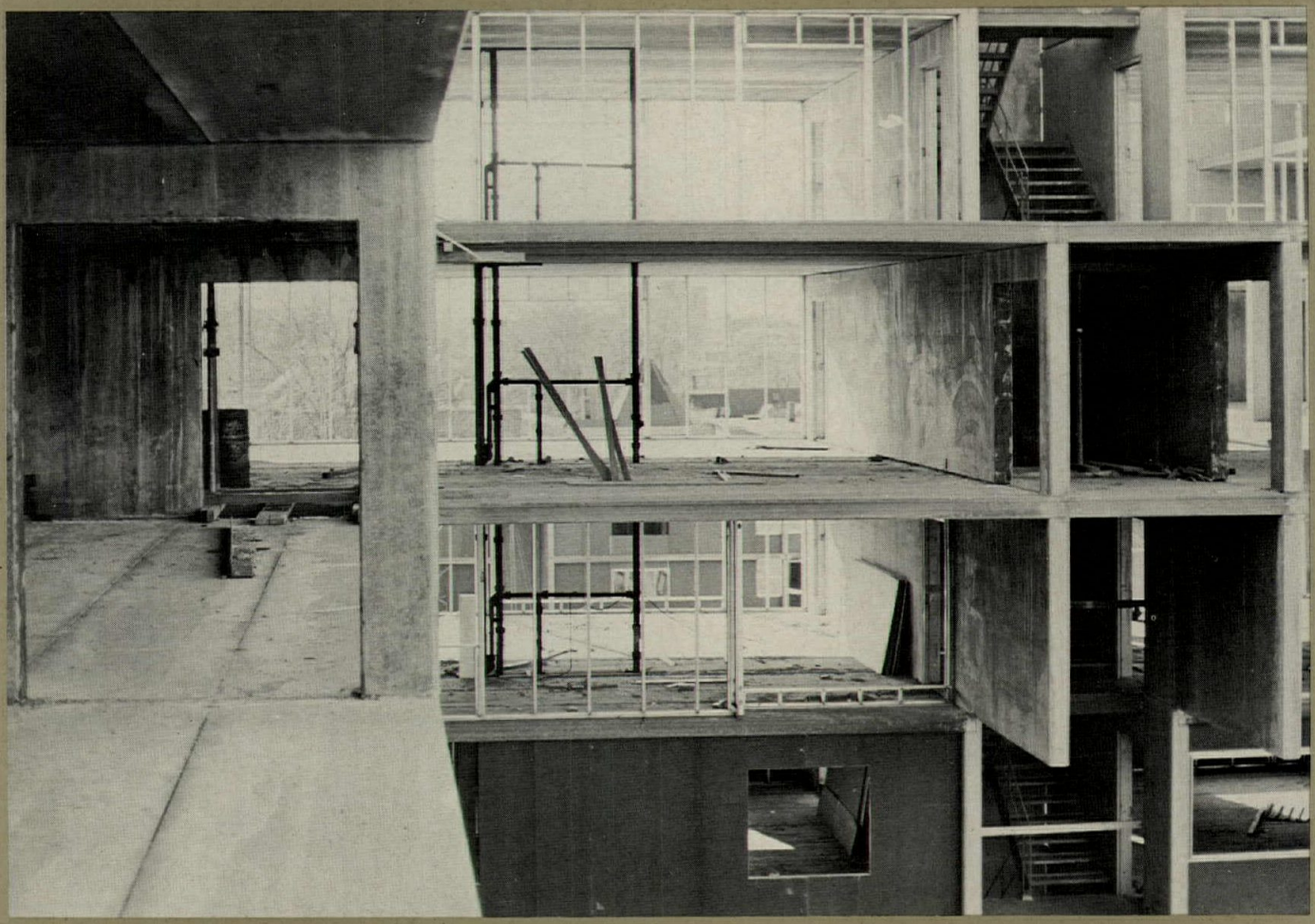
For some of the high-rise units, walkways are provided at some of the apartment peripheries to provide the necessary horizontal circulation that will permit elevatorless buildings. Such walkways, however, need not be confined to low-cost buildings. They may be an amenity in more expensive buildings, serving as an arcade for shops and other facilities.

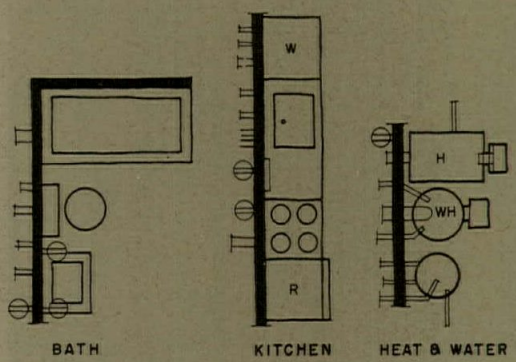
Mechanical integration is well worked out—flexible but not fancy

The Techcrete system does not yet include a prefabbed mechanical core. Emphasis so far has been straight-line alignments of services so that mechanical chases are easily facilitated. Chase space is provided by leaving space between floor planks. As can be seen by examining the floor plans on page 94, it is possible to have a wide diversity of apartment plans while still to a large extent maintaining mechanical chase alignment. The wiring within apartments is run in the cored holes of the prestressed floor planks, and then down or up through the hollow interior partitions in the conventional manner.

The system will be available to other architects

In order to further the short-range goal of encouraging application of the current Techcrete system and the long-range goal of continually improving the sys-



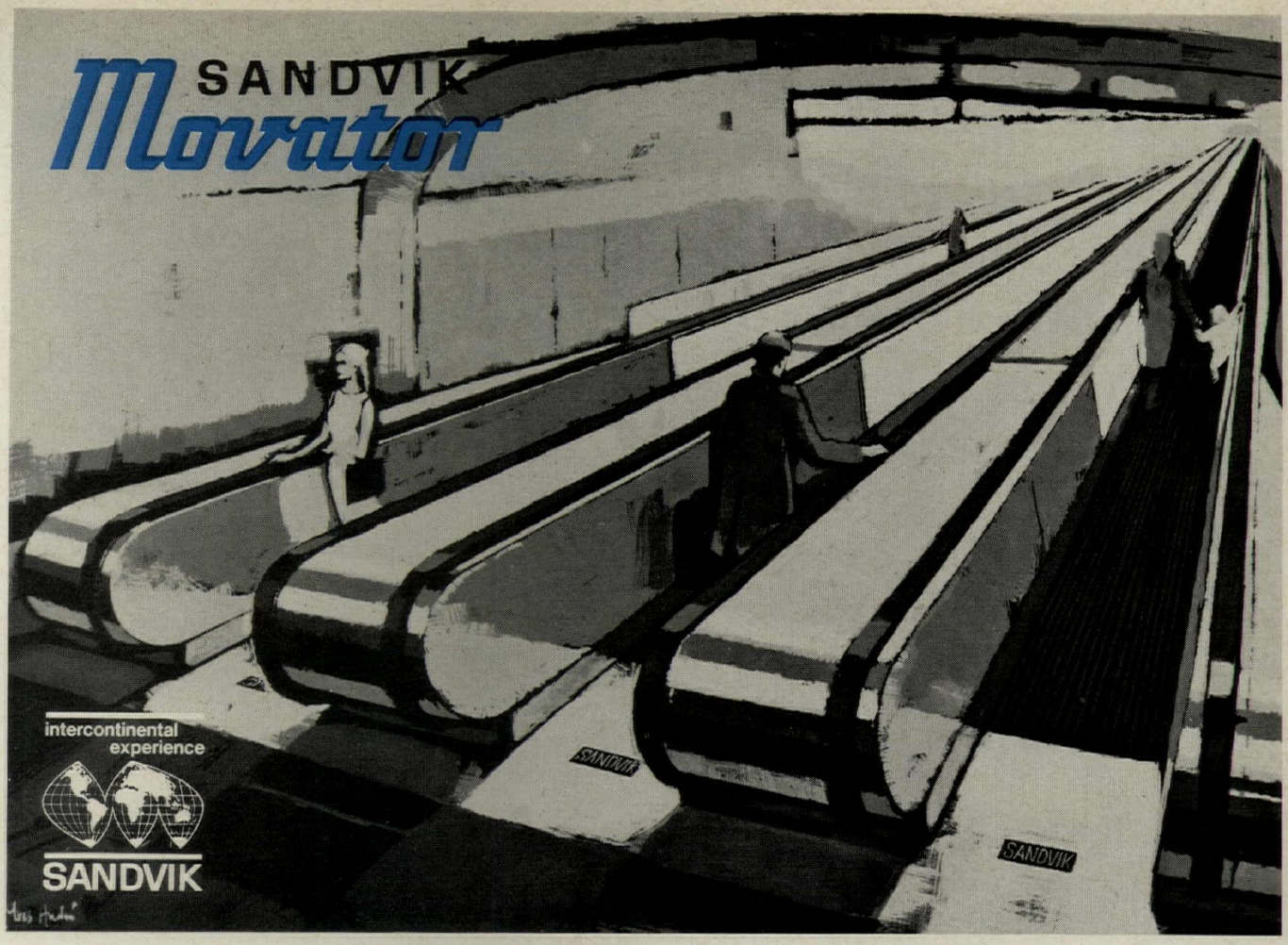


SPACE FOR MECHANICALS

While mechanical and electrical services are installed conventionally, the kitchen, bath and heater modules are installed so that the services are lined up. In this way a slot left between floor planks can be used for mechanical chases. Drainage and vent lines can be seen in place in this shell. This photo also shows a perimeter walkway for horizontal circulation, exterior wall studs in place on several floors, and on one floor, the insulating sheathing in place.

tems approach to the building of housing, Sepp Firnkas and Carl Koch & Associates have set up a separate non-profit corporation which is expected to, through a service charge applied to the sale of system components, assist architects, engineers, fabricators and developers in taking full advantage of the system through Techcrete's experience, engineering, data, plans and cost estimates. The revenue from the service charge will be used to help support further research. In addition, Techcrete will be looking to private foundations and government agencies for grants to underwrite continuing studies.

These studies would include: 1) improvements in design, construction and erection of the present components; 2) a program to develop new structural, mechanical and auxiliary components to further integrate these elements with the existing system; 3) a program to obtain cooperation of labor unions and municipal, state and federal agencies and code officials; 4) a program to enlist research and development work with industry for products, components and methods; 5) a program to inform and develop the interest of potential architects, sponsors and builders whose coordinate use and development of the Techcrete system will provide a guaranteed market of a size which will warrant the contemplated research on new components to cut costs, while adding to the system's quality.



100,000 Frenchmen per day proved it, so Paris installs 3 more

For over two years, 100,000 Parisians per day have been carried smoothly and efficiently between subway lines of the Metro on two SANDVIK MOVATORS—moving walks of rubber-covered steel. ☐ As a result of this success, three more SANDVIK MOVATORS, each 600 feet long with a capacity of over 12,000 passengers per hour, are being installed at the Metro's Maine-Montparnasse junction. Each MOVATOR is 44" wide—providing ample space for persons with luggage, and passing room for those who wish to walk ahead of others on the MOVATOR. ☐ To the Paris Metro as to the new Skaggs PayLess Drug Store in San Francisco, SANDVIK MOVATORS provide an exclusive combination of advantages—a heavy-gauge, one-piece endless belt of solid spring steel gives rigidity and no-stretching—grooved rubber covering assures a safe non-slip surface—SANDVIK wide-rib, narrow-groove tread and special landing plate design prevents heel-catching more positively than any other design. ☐ Write for SANDVIK MOVATOR booklet or contact Sandvik.

SS-8671

SANDVIK

SANDVIK STEEL, INC., Fair Lawn, New Jersey
MOVATOR DIVISION
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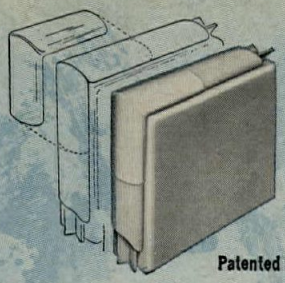
For more data, circle 96 on inquiry card

Why cover the corner when you're going to paint it?



Patented U.S.A.

Every exposed corner of every Weis toilet compartment—partition, door and stile is capped with a stainless steel corner reinforcement. Eliminates destructive welding, brazing and grinding which removes protective zinc coating.

Another Weis idea for greater protection—longer life!

WEIS

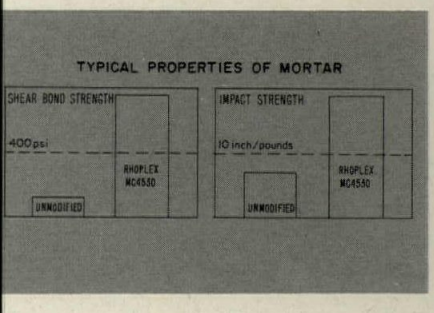
HENRY WEIS MFG. CO.
ELKHART, INDIANA

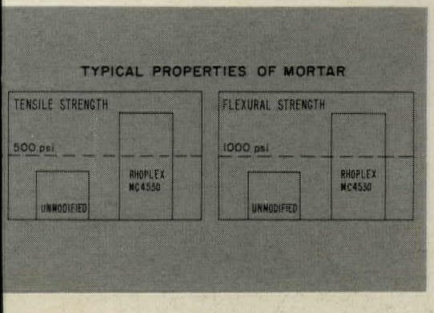
For more data, circle 97 on inquiry card

Acrylic-latex additives create extra-strength new concretes

By John E. Gallagher, Rohm and Haas Company

By a process still not thoroughly understood, new additives developed by Rohm and Haas greatly improve the adhesion, tensile, flexural and impact strength of concrete systems. The cost: justified where high strength or strong adhesion is needed, or where excessive vibration, heavy traffic, or chemicals are a problem.





A greater than two-fold increase in tensile and flexural strength of the acrylic latex modified mortars (graphs left) is only part of their value. The modified cements adhere well to regular concrete, wood, steel, stone and numerous other materials. In addition, unlike the vinyl-acetate and butadiene-styrene latexes used for cement modification, acrylic modified cement systems have good wet-strength properties as well as excellent exterior color stability. Compressive strength is not significantly improved, but this does not alter the effectiveness of the latex cement as a whole (test results below).

The additives replace most of the water and "fill the voids"

Although the development of this acrylic latex represents a great deal of technical knowledge, accumulated by Rohm and Haas in years of making acrylic polymers, it is not known exactly why or how the additives modify the characteristics of cement systems.

Acrylic latex (like other synthetic latexes or emulsions) consists of plastic particles dispersed in water, giving a milky liquid appearance. The latex added to Portland cement systems is related to the acrylic polymers which Rohm and Haas produces for use as vehicles in water-based paints, and is similar to these materials in that it can be spread in a thin layer and will dry to a tough clear flexible plastic film.

The function of the water in an ordinary mortar of 3/1 sand/cement and water is to hydrate the calcium silicate to form a mixture that will first flow, then form a gel structure that hardens. Through hydration and evaporation, the gel is left with small void spaces which act as tiny pockets of weakness.

It is believed that when an acrylic latex is substituted for ¾ of the water normally used, the latex enters the mixture—somewhat like liquid marbles—to fill these voids. These highly adhesive polymer particles disperse throughout the cement mortar, thereby reinforcing the structure as well as contributing to the adhesive action between the cement gel and sand. They help to retard water evaporation, air hydration and control shrinkage.

The concrete has been tested for strength, adhesion, weathering

In tests by Rohm and Haas, the modified cement was cast face up over precast concrete, exterior plywood, asbestos cement and other panels. Quartz, marble granite and other mineral aggregates were applied by hand and lightly pressed into the surface with a wooden trowel. The permanence of these versatile panels was verified by various tests. The results:

Typical strength* properties of facing

Tensile	300 per cent	ASTM C190-59
Flexural	200 per cent	ASTM C348-61T
Adhesion	400 per cent	ASTM C321-54T
Compression	100 per cent	ASTM C109-64

* Strength expressed as per cent of strength of a standard Portland cement/sand (1/2) mixture cured 28 days.

The adhesive strength is such that the facing adheres permanently to the backing and anchors the aggregate firmly.

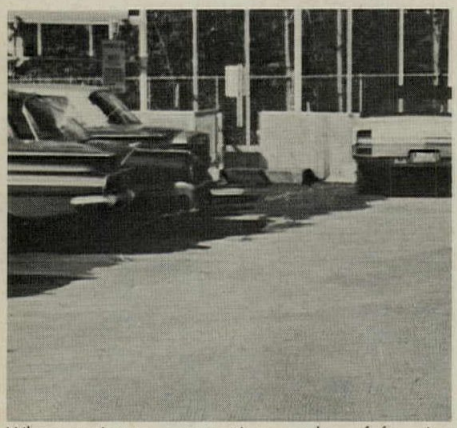
▪ Other tests have shown that acrylic latex modified cement facings combine these strength characteristics with excellent weathering properties:

Test results of facing

Freeze-thaw resistance (150 cycles) ASTM C291-61T	no effect
Accelerated weathering, Atlas weather-ometer, 1,000 hours	no effect
Exterior exposure 13 months, Newtown, Pa.	no effect

Freeze/thaw and accelerated weathering had no significant effect on the facing—no evidence of aggregate loss or deterioration of the cement matrix is evident. Panels on exterior exposure at Newtown, Pennsylvania exposure station also show no change.

Marble chips (left) being blown into acrylic latex bedding test panels (above) show no adverse effects of weathering



When moisture penetration, cycles of freezing and thawing, and vehicle wear caused the 30,000 sq ft pavement of a Waterbury, Conn. parking garage to crumble, scale and pit, the lot was resurfaced with a ¼-in. topping of acrylic latex modified cement. Two years later (lower photo) area is in good condition.

The Cyclorama Building has a shallow-fluted finish in white spray-applied acrylic latex cement

▪ Facings on lightweight concrete were tested for interface adhesion; the base concrete failed in two out of four test specimens. Acrylic latex modified cement facings exhibited less shrinkage than regular cement mortars and proved practically impermeable to water. They have a coefficient of thermal expansion approximately equal to unmodified cement mortars, which is substantiated by the fact that there was no change in the interface shear strength of faced concrete panels as a result of accelerated weathering exterior exposure and freeze/thaw cycling.

Applications: from parking lots to decorative panels

The versatile properties of the acrylic latex modified cement suit it to various applications. It has been used for patching at Rohm and Haas' Philadelphia plant and for resurfacing at a Waterbury, Connecticut parking lot (photo above).

The chemical and stain resistance properties make it ideal for hospitals. The color-fast pastels and whites, excellent adhesion, and the resistance to spalling and cracking due to freezing make it good in troweled or spray-applied decorative cement coatings and stucco such as that on the Cyclorama Building at Gettysburg (photo above).

In addition, acrylic latex modified cement may be used as a bedding coat for decorative exposed aggregate (photos top), in repair for highways and bridges, and in tile grouts and adhesives, brick mortars and underlayments.

Because of its strength, it is being used to cover thin-shell concrete slabs and panels. It is good for patching and grouting, and as a cement paint it is being used for color and decoration of precast concrete components.

Acrylic latex modified cement paints provide weather-resistant coatings which do not deteriorate after wetting and drying, resist rot, fungus and stain-through and give long-lasting color. A clear, durable non-yellowing glaze coating of an acrylic polymer is recommended where acrylic latex modified cement aggregate-faced panels are installed in areas of heavy traffic or where a surface film from smoke, smog or stain is likely to develop.

Cost of a typical formulation: 22 cents per sq ft per in. thickness

The ultimate price of an acrylic latex modified cement aggregate-faced panel would depend largely upon the type of backing, the aggregate type and size and the thickness of the cement needed to bond the particular aggregate. The following table, however, is a typical formulation with area coverage and raw material costs for Rhoplex MC-4530 Modified Cement Mortar:

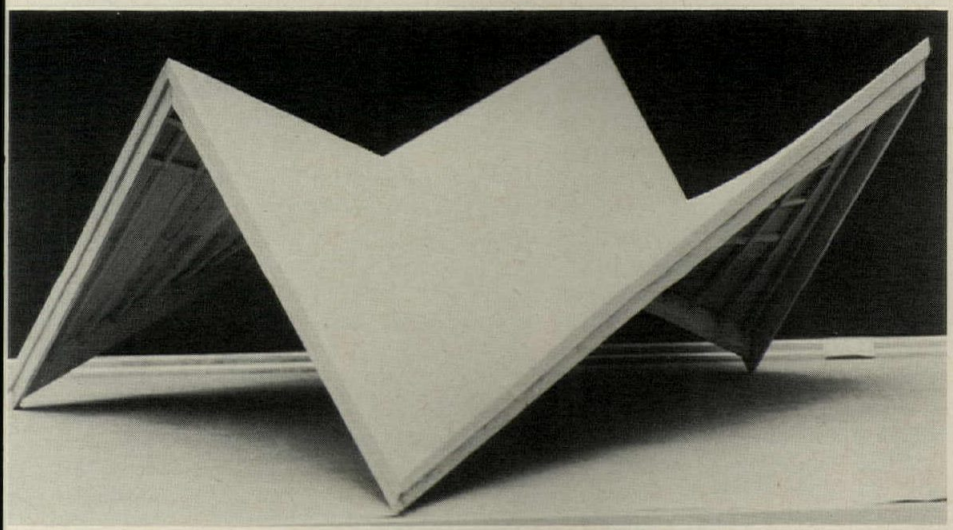
Typical formulation:

3 bags sand
1 bag cement
5 gal. Rhoplex MC-4530
water as required

Thickness of applied mortar	Area coverage	Raw materials cost/sq ft *
1 in.	40 sq ft	$0.22
½ in.	80 sq ft	0.11
¼ in.	160 sq ft	0.055

* Basis for RMC calculations:
1. Sand calculated at $2.65/ton in quantities of one to three tons
2. Portland cement calculated at $5.30/four 94-lb bags delivered
3. Rhoplex MC-4530 (45 per cent solids) calculated at $.16/lb in bulk delivered

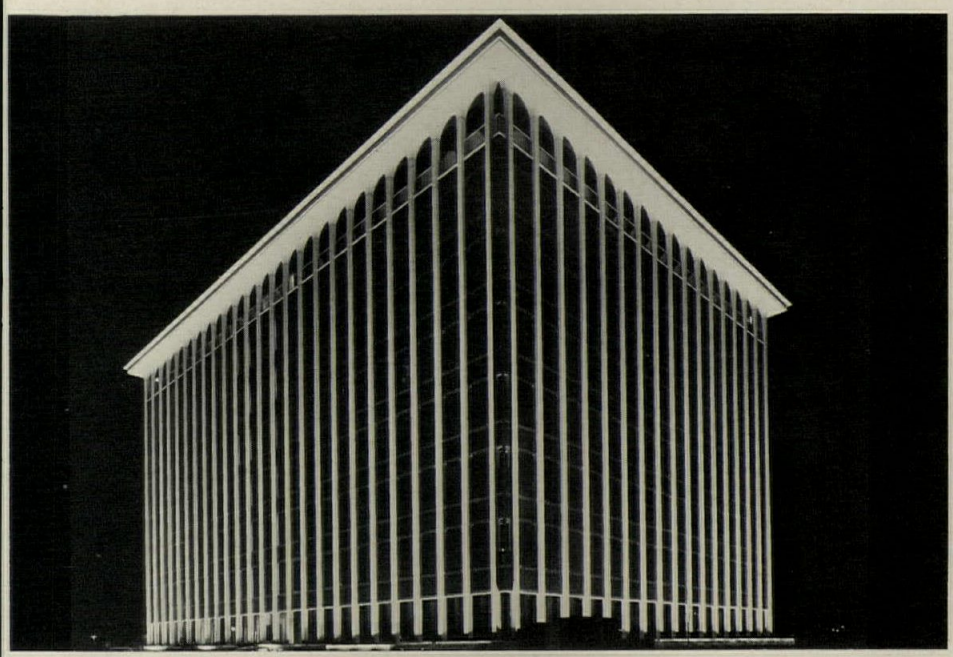
For more information circle selected item numbers on Reader Service Inquiry Card, pages 315-316



Silicone rubber roof coating resists weathering—breathes

This roofing allows interior moisture to escape, yet exterior water cannot enter. Tests report high resistance to cold and heat. The material which is roller applied to concrete or plywood decks can be applied in any weather (the material remains liquid to —65 deg) and solidifies to a lightweight, permanently flexible rubber membrane. Two coats give an average thickness of 22 mils. Photo demonstrates roofing's adaptability to varied roof configurations. ▪ General Electric, Waterford, N.Y.

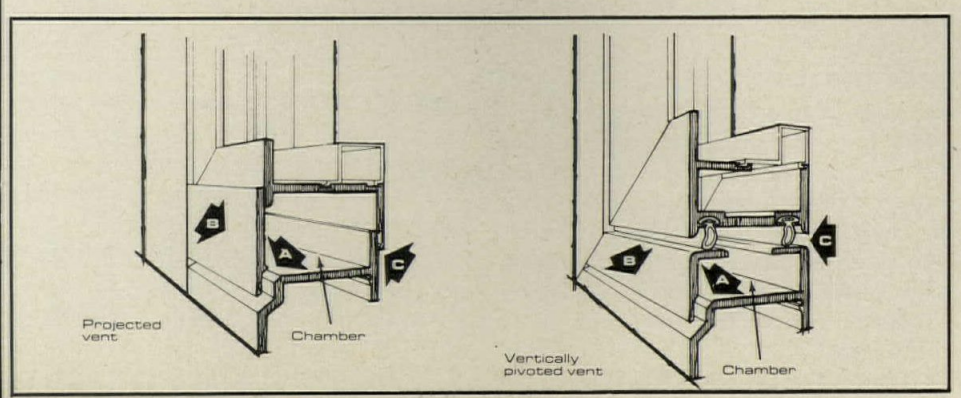
Circle 300 on inquiry card



Floodlight fixtures provide uniform lighting patterns

A total of 84 *SW floodlight* fixtures provide the smooth uniform beam patterns that illuminate the eight-story Empire Central Building in Dallas, designed by Neuhaus & Taylor. The SW fixtures may be used with high-intensity discharge sources, such as the General Electric 400-watt *Lucalox* in this installation, as well as with metallic additive lamps and conventional mercury vapor lamps. The fixtures may be mounted vertically or horizontally and offer a choice of reflectors. Here the floodlights, mounted on concrete posts 3 ft high and 1 ft square along all four sides of the building, are aimed almost vertically (85 deg average angle). Wide-Lite Corporation, Houston.

Circle 301 on inquiry card



Aluminum windows minimize water and air leakage

In the *Series 2900* windows, a pressure-equalization slot (A) allows air pressure to build inside the windows' chamber. Baffle (B) blocks most water from entering, but any that does get in flows back out through slot (A). Weatherstripping and air seal are located at (C). ▪ The Ceco Corporation, Chicago.

Circle 302 on inquiry card

OFFICE LITERATURE

For more information circle selected item numbers on Reader Service Inquiry Card, pages 315-316

COPPER / *Contemporary Copper* is a 96-page handbook of sheet copper fundamentals, design, details and specifications. The first section treats the essential properties of the material, the structural criteria applicable to it, and the basic methods of joining it. The second section shows how copper can be used as a design element. A third section includes standard recommended copper details, and a fourth section covers typical applications. Letterhead requests. ▪ Copper Development Association Inc., 405 Lexington Ave., New York City.

FIBER GLASS PRODUCTS / A catalog file of glass fiber and aluminum products for architectural applications contains sheets on loading dock canopy, panel properties, panel installation details, and a balcony divider. Letterhead requests. ▪ Fiberlux Products, Inc., 59 S. Terrace Ave., Mt. Vernon, N.Y.

STEEL BOLT ASSEMBLIES / A 24-page brochure gives information on the A-325 carbon steel bolt and the A-490 heat treated alloy steel bolt. Properties, working stresses, and other data are listed. ▪ Republic Steel Corporation, Cleveland.

Circle 400 on inquiry card

FURNACE CONTROLS / Bulletins S-1062 and S-1046 explain the *Selectra* controls that sense temperature changes of as little as 1/10 deg and immediately adjusts the furnace flame to compensate. ▪ Maxitrol Company, Southfield, Mich.

Circle 401 on inquiry card

ALUMINUM FINISHES / "Designation Systems for Aluminum Finishes" is an 8-page booklet detailing a system that allows aluminum users to specify the finish by a series of numbers and letters. The booklet covers mechanical and chemical finishes and anodic and other coatings. ▪ The Aluminum Association, New York.

Circle 402 on inquiry card

GLASS / All patterns for rolled, figured, and wired glass are illustrated in a 20-page catalog. Installations include industrial, commercial, school, church, institutional and residential structures. ▪ Mississippi Glass Company, St. Louis.

Circle 403 on inquiry card

SUSPENDED STRUCTURES / H. Seymour Howard, Jr., professor of architecture, Pratt Institute, has prepared a 37-page booklet on hanging steel cable as a structural shape. The special requirements of suspension system design, recent applications of the beam & cable, hammock, inflated membrane and other systems are discussed and illustrated. One section, dealing with proposed projects, studies the development of concepts for a school, a market, and an entertainment tent. ▪ United States Steel, Pittsburgh.

Circle 404 on inquiry card

NOISE-CONTROL STRUCTURES / An illustrated manual details the "do-it-yourself" *Moduline* system of designing and assembling such sound retardant structures as soundproof partitions, gas turbine and cooling tower enclosures, production tunnels, quality control and research rooms and supervisory offices. The 27-page application manual contains over 75 engineering sketches. The pre-engineered noise control panels that are the basis for the structures are 4-in.-thick modular panels of steel with acoustic fill. ▪ Industrial Acoustics Company, Inc., Bronx, N.Y.

Circle 405 on inquiry card

DOORS AND WOODWORK / Decorator doors featuring moulded, hand-finished carvings in Milano gold, Granada iron, white and gold are part of a 16-page color catalog. Individual carvings for other decorative purposes include entrance doors, Dutch doors, panel, sash and louver doors as well as traditional and contemporary designs for stairways, mantels, room dividers, cabinets, blinds and shutters. ▪ Morgan Company, Oshkosh, Wisconsin.

Circle 406 on inquiry card

DECK AND FORMS / One 8-page booklet provides data on *Strongform*, the concrete form for structural concrete and lightweight insulating concrete applications. Another 8-page catalog describes five types of roof deck for built-up roofs and conventional reinforced concrete slab construction. ▪ Bowman Building Products Division, Cyclops Corporation, Pittsburgh.

Circle 407 on inquiry card

BOLTED STRUCTURAL JOINTS / A revised 16-page specification booklet covers the design and assembly of structural joints using ASTM A325 high-strength bolts and ASTM A490 high-strength alloy steel bolts. This bolt specification supersedes the earlier 1964 A.I.S.C. standards. ▪ American Institute of Steel Construction, New York, N.Y.

Circle 408 on inquiry card

ELECTRIC HEATING / A new line of electric heat including baseboard, radiant cable, fan-driven and radiant wall heaters, and commercial and industrial unit heaters is described in a 28-page illustrated catalog. ▪ Bryant Electric Company, Bridgeport, Conn.

Circle 409 on inquiry card

LOCKING HARDWARE / A full line of locks, trim, door closers and exit devices, including fire exit hardware, is illustrated in a 16-page booklet. Included is a chart showing application of locks in specific locations. ▪ Sargent & Company, New Haven, Conn.

Circle 410 on inquiry card

HEATING PLANTS / A 4-page brochure describes the operation of heavy-duty oil heating systems with multiple and independent boiler modules. The brochure stresses the role of input modulation in eliminating short cycling. ▪ Hydrotherm, Inc., Northvale, N.J.

Circle 411 on inquiry card

MOVABLE WALL / An 8-page catalog explains how the aluminum or stainless steel *Phantom Wall 90* opens store fronts, shopping centers, and walls to provide unimpeded pedestrian traffic. The catalog illustrates installation for standard interiors, heavy duty exteriors, and swing doors. ▪ The Alumiline Corporation, Pawtucket, R.I.

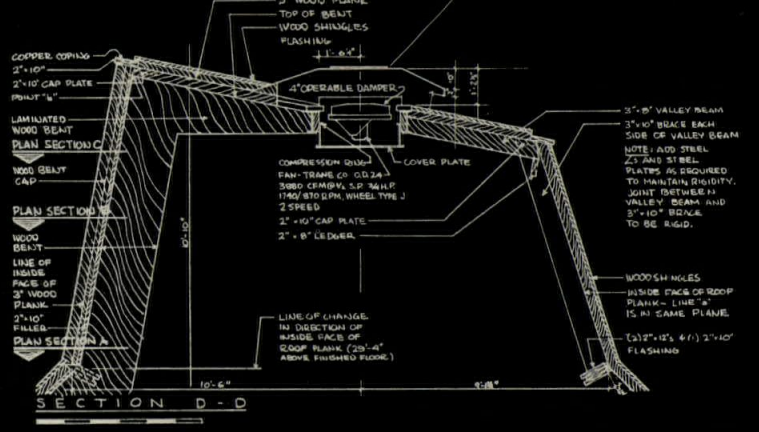
Circle 412 on inquiry card

SERVICE DOORS / Roof scuttles, smoke hatches, and basement doors are among a broad line of special-service doors detailed in a 16-page catalog. ▪ The Bilco Co., New Haven, Conn.

Circle 413 on inquiry card

**Additional product information in Sweet's Architectural File*

more literature on page 271



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

Synagogue, Norwalk, Connecticut
Architects: Oppenheimer, Brady and Lehrecke, Architects
Certi-Split Handsplit-Resawn Shakes,
24" x ½" to ¾" with 8" to the weather.

Red Cedar Handsplit Shakes: Richly restrained

A roof of red cedar handsplit shakes has a look all its own. Satisfyingly rich. Reassuringly well-ordered. And underneath the good looks, a catalog of practical advantages ranging from durability to strength to insulative capacity. There is a thickness and style of shake for every demand. Detailed information on Certi-Split handsplit shakes (and Certigrade red cedar shingles) may be found in our Sweet's catalog listing, 21d/Re. For further information give us a call, or write.

The specification of Certi-Split *for red cedar handsplit shakes and* Certigrade *for red cedar shingles gives both architect and client the protection of Bureau-enforced product grade supervision.*

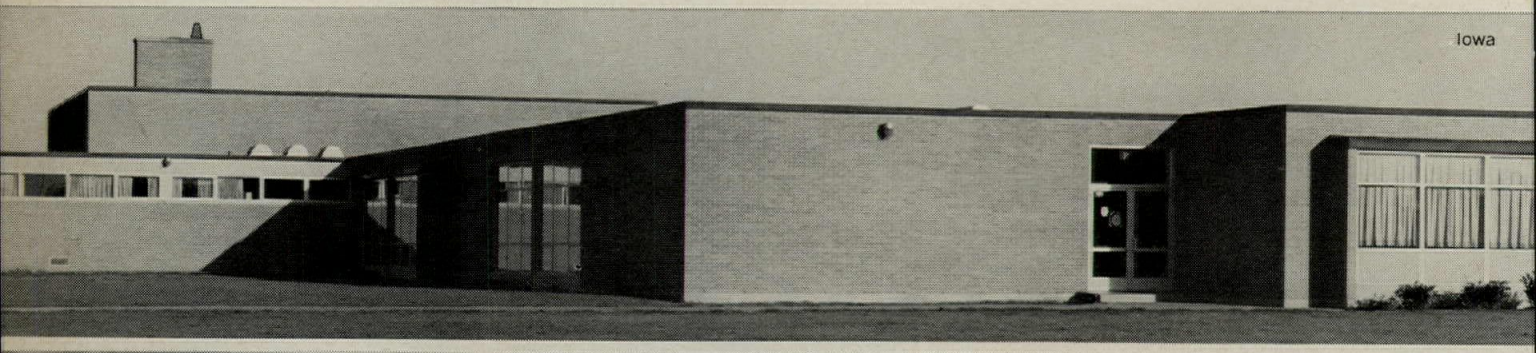
RED CEDAR SHINGLE & HANDSPLIT SHAKE BUREAU

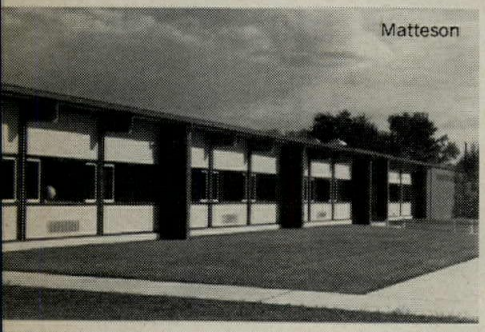
5510 White Building, Seattle, Washington 98101
(In Canada: 1477 West Pender Street, Vancouver 5, B.C.)

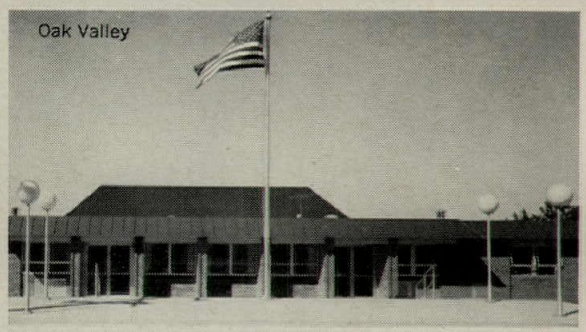
For more data, circle 98 on inquiry card

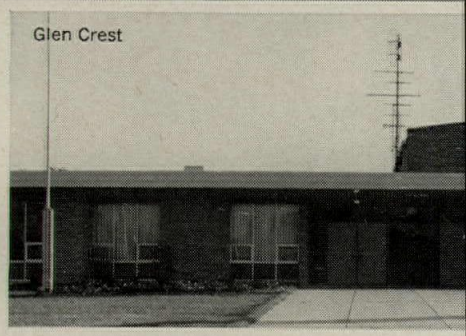
New facts on Gas vs. Electric Heat:

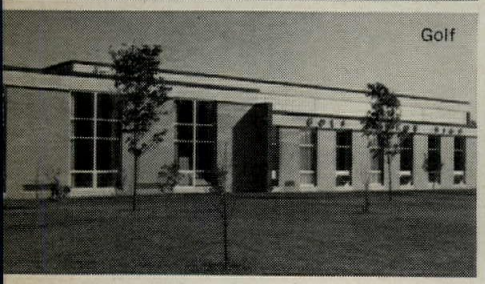
Eight Illinois schools are bid both ways.

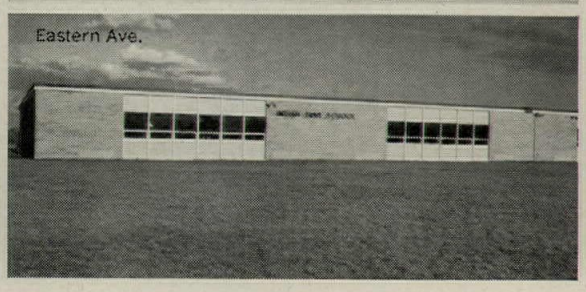












Now actual figures from independent sources have cut through the cost confusion about Gas and electric school heating.

In first costs: A study was made of 8 new Illinois schools, each bid two ways. The actual-bid figures at the right tell the story. The consulting engineers who made the study concluded: no basic first-cost difference between Gas and electric systems. (Low Gas operating costs made it the unanimous choice.)

Is there proof of Gas operating economy? Actual-cost data on two identical New York schools (one with Gas heating, the other with electric) showed Gas 50% less to operate. And a 4-year Midwest school system study showed an even bigger margin: Gas 7 to 1 over electricity. (Wherever you are, count on at least 2 or 3 to 1.)

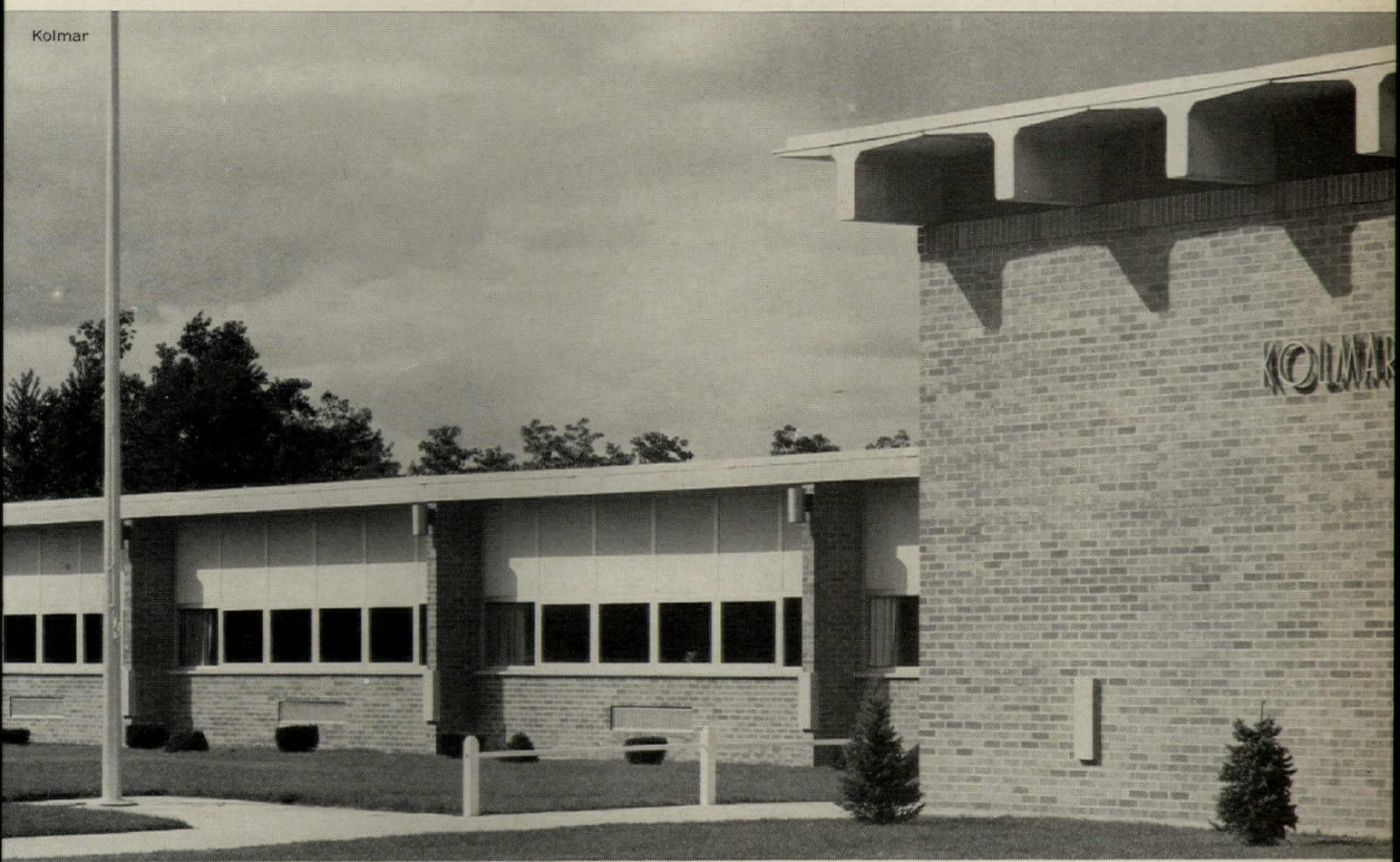
Learn more about these carefully controlled tests. And the great economy of Gas. Your local Gas company has all the details. AMERICAN GAS ASSOCIATION, INC.

For heating and cooling...Gas makes the big difference

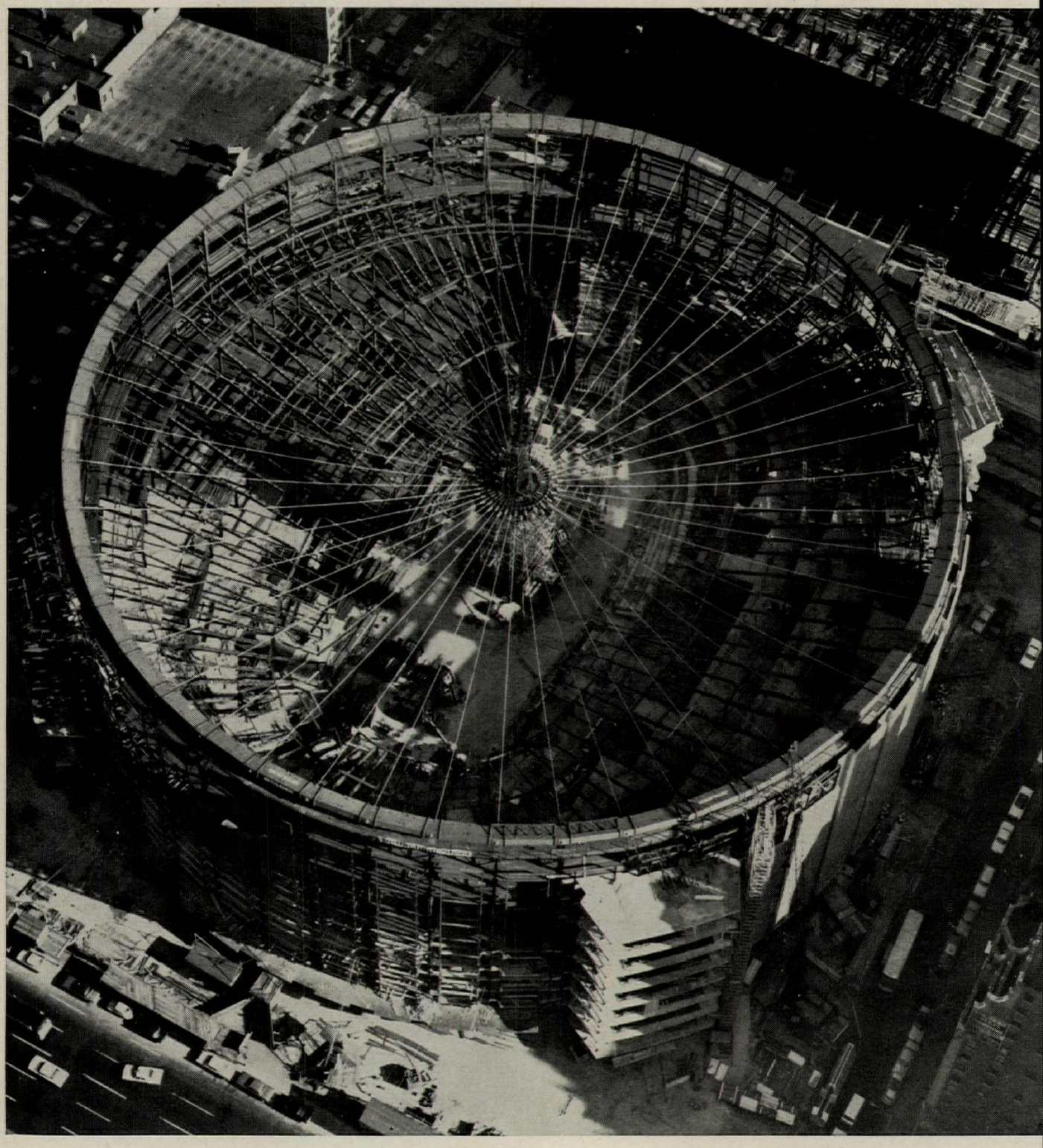
For more data, circle 99 on inquiry card

Result:

no basic difference in first costs. Gas heat is chosen for operating economy.



Location, Name of School	Square Feet	TOTAL CONSTRUCTION BIDS Gas	Electric (Resistance)	Date of Bid	System Installed
Crestwood (Kolmar)	34,000	$418,153	$444,054	Mar. '64	Gas Heat
Matteson (Matteson)	11,720	154,886	151,900	Mar. '64	Gas Heat
Morton Grove (Golf)	28,653	474,730	466,982	Dec. '60	Gas Heat
Villa Park (Iowa)	24,130	309,847	304,880	Feb. '62	Gas Heat
Glen Ellyn (Glen Crest)	34,270	436,838	456,467	Apr. '62	Gas Heat
Malta (Malta High)	35,470	430,353	424,122	Feb. '64	Gas Heat
Joliet (Oak Valley)	20,400	336,561	337,684	Mar. '64	Gas Heat
Plainfield (Eastern Ave.)	20,800	290,348	284,755	Aug. '63	Gas Heat



Madison Square Garden suspended roof to give column-free view to 20,000 fans

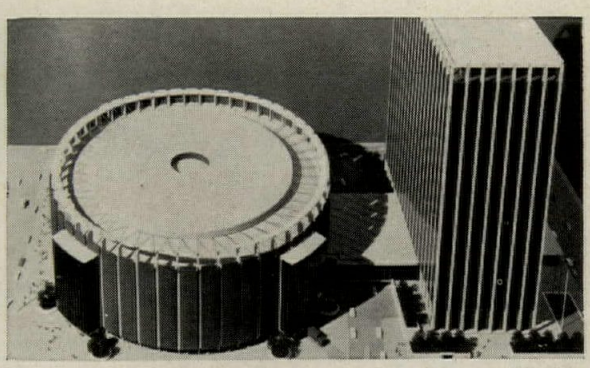
The great feature of any cable-roof is its elimination of interior columns to provide unobstructed space. This is what the designers had in mind when they planned a 425-ft diameter cable-suspended roof for New York City's Madison Square Garden Sports and Entertainment Center.

The unusual placement of the building's mechanical elements—on top of the cables—frees for other uses the space this equipment (air-conditioning, heating, electrical) would have taken.

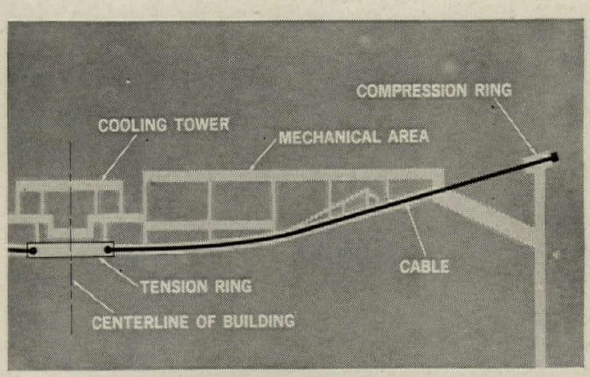
The cables, each weighing about 3½ tons, were strung in a pre-determined sequence. The three-phase system involved the erection of diametrically opposite cables to prevent unbalancing of the system.

Besides supplying the 48 strand assemblies (3¾-in.), each approximately 195 ft long, Bethlehem has provided the technical assistance of its wire rope specialists.

If you are planning a cable-roof structure, you may benefit from a chat with a Bethlehem engineer. Just get in touch with our nearest office. *Bethlehem Steel Corporation, Bethlehem, Pa.*



Madison Square Garden Sports and Entertainment Center is part of a $116-million complex which will also include a 29-story office building.



The area on top of the steel cables is framed with structural steel to carry mechanical equipment. Bethlehem supplied 14,000 tons of structural steel for the building's framework.

Measuring 425 ft in extreme diameter, the building has a height of 150 ft. Below its 20,234 seats will be a 5,227-seat amphitheater, a 501-seat Cinema, a Hall of Fame, the National Art Museum of Sport, and a 48-lane bowling center.

Owner: Madison Square Garden Center, Inc.
Owner's Consultant: Tishman Realty & Construction Co., Inc.
Architect: Charles Luckman Associates
Structural engineer: Severud-Perrone-Fischer-Sturm-Conlin-Bandel
General contractor: Turner Construction Co.-Del Webb Corp., a joint venture
Steelwork and cables: Bethlehem Steel

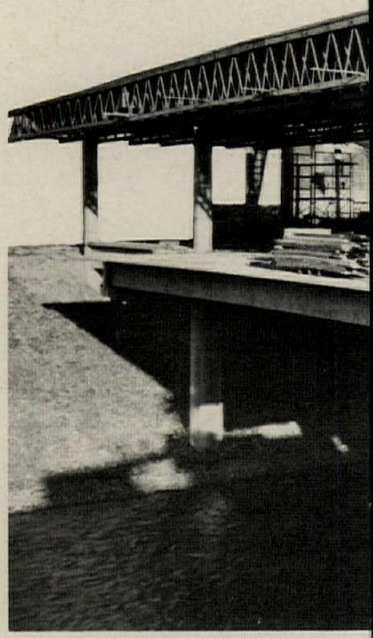
BETHLEHEM STEEL

BETHLEHEM STEEL

For more data, circle 100 on inquiry card

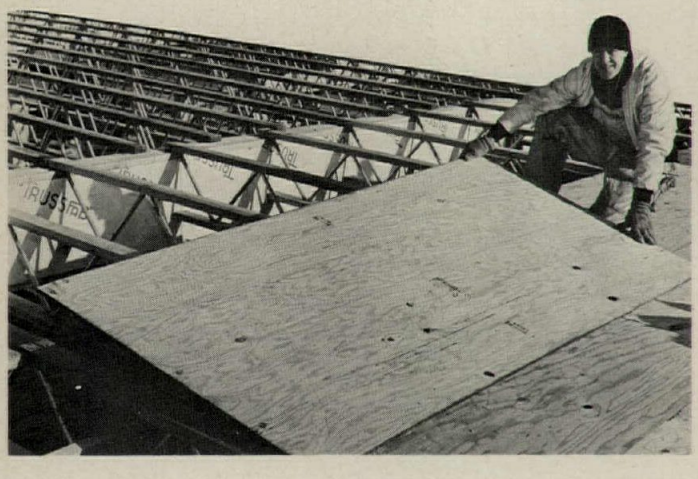
Flat or curved. Cantilevered. Concave. Snow loads, wind loads, seismic loads. Spans to 100 ft.

There's nothing this plywood and open-web joist system won't do— at rock-bottom cost.



For example:

This new roof system has two basic components: *one,* long-span joists with tubular steel webbing and lumber chords. *Two,* plywood roof decking, which is nailed to the top chord.



There are several lightweight, long-span joist systen available (those at left are Trus-joists®). Because plywoo is easily fastened to lumber chords, only carpenter lab is needed.

Other key advantages: ready availability of plywoo High strength and stiffness for long spans. Adaptabili to dozens of roof profiles. Open webs for duct work, wirin

umbing. Built-in framing for direct ceiling applica-
Custom fabrication. And quick delivery.
demountable branch bank (left) shows what the
can do for a roof.
building had to be low-cost, yet distinctive. Architects
s & Ellison, A.I.A., Seattle, specified 43-ft. Trus-joists,
g downward 2 ft. toward center at a constant radius.
wood and Trus-joists were also the most economical
n to the unique, over-a-river design of the Renton,
public library above. Architects Johnston-Campa-
& Co. of Renton decided on the 80-ft. river span for
tic reasons, and to conserve land for a parking lot.
se are only a few ways the system is proving itself,
r the country. And not just for roofs. In Chicago, for
le, Alschuler, Wolfson & Associates recently designed
artment house using Trus-joists and plywood for all
floors as well as the roof deck.
more facts on roof designs or other plywood construc-
tion systems (including floors and walls) send the coupon. Or get in touch with any of our regional offices: Atlanta, Chicago, Dallas, Detroit, Los Angeles, Minneapolis, New York, San Francisco, Washington, D.C.

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☐ Send your free 48-page manual, Plywood Construction Systems.

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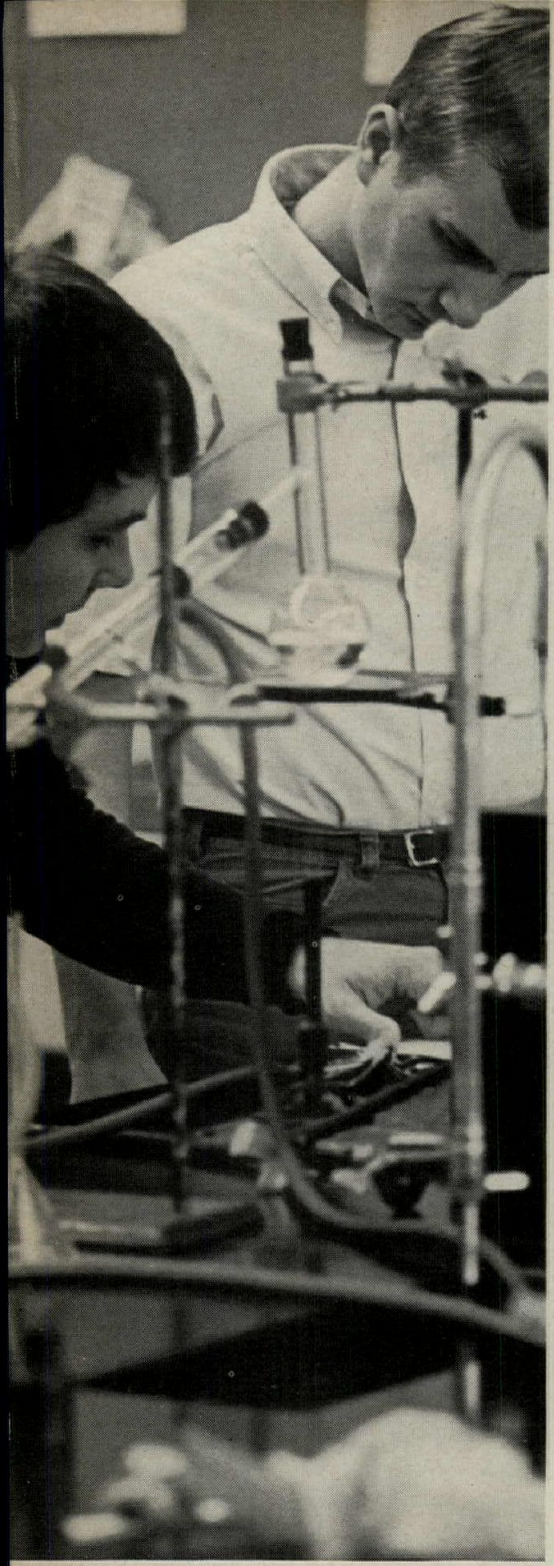
Firm_____

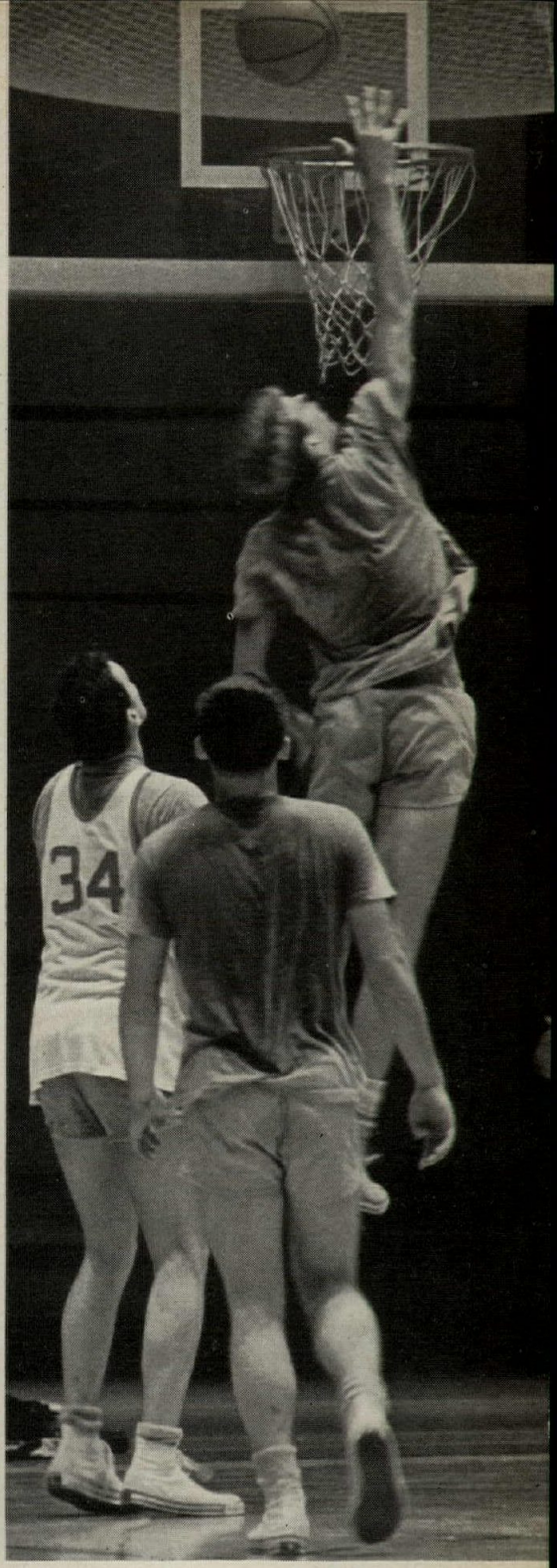
Address_____

City_____ State_____ Zip_____ (USA only)

For more data, circle 101 on inquiry card



Chem 101 to basketball practice



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In the auditorium and gymnasium—Modine central station units heat, cool, filter and dehumidify wide, open areas.

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Firm _____

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City _____ State _____

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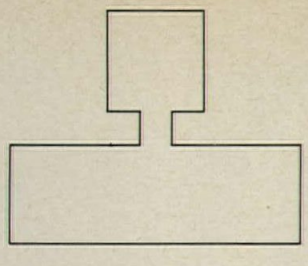
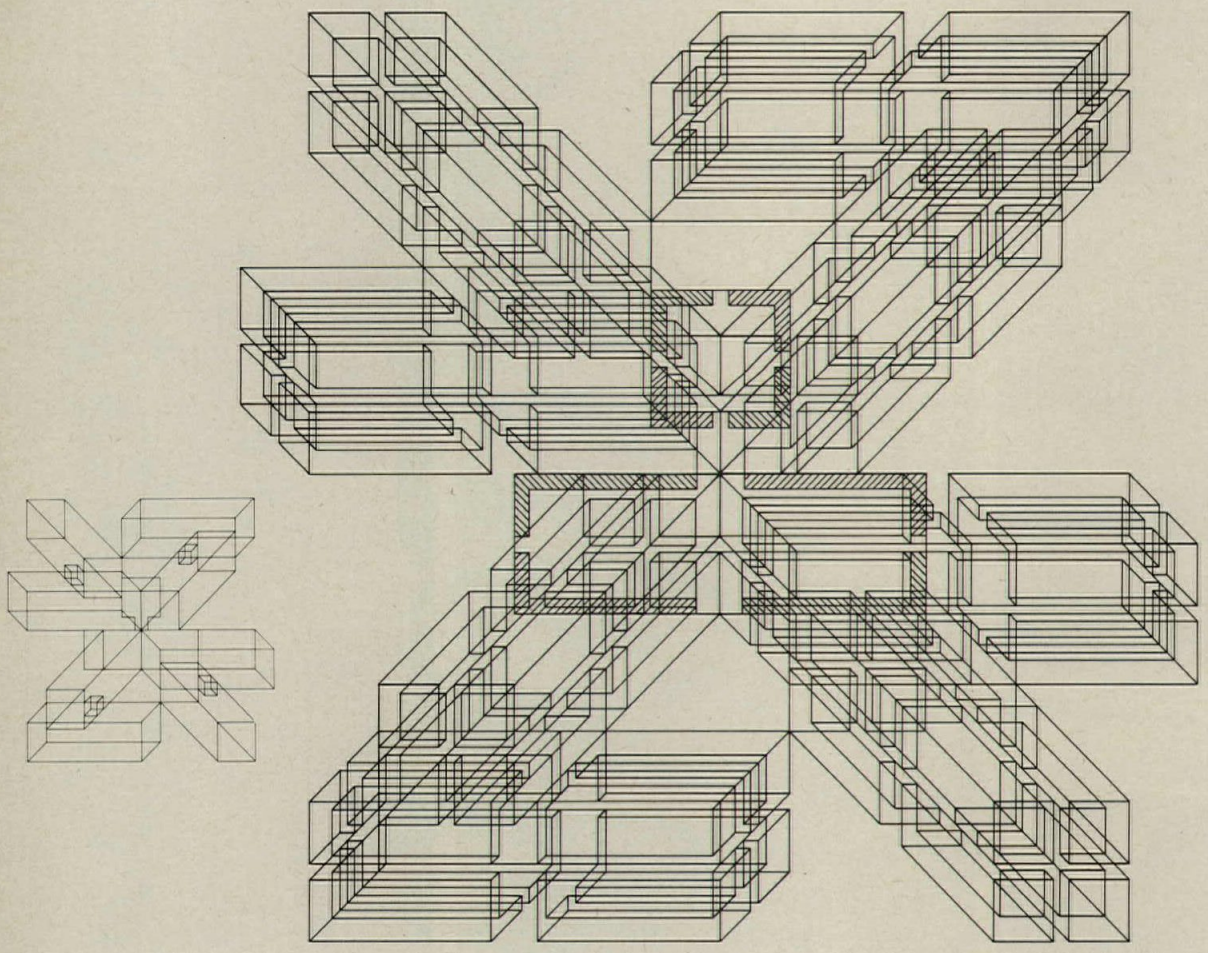
For more data, circle 102 on inquiry card

The formal generators of masonry structure:

The linked figure

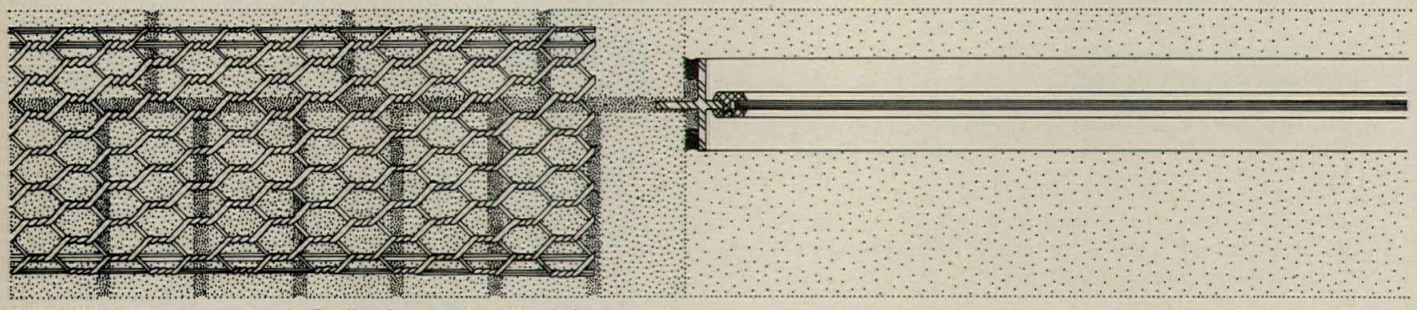


no. 5 of 36

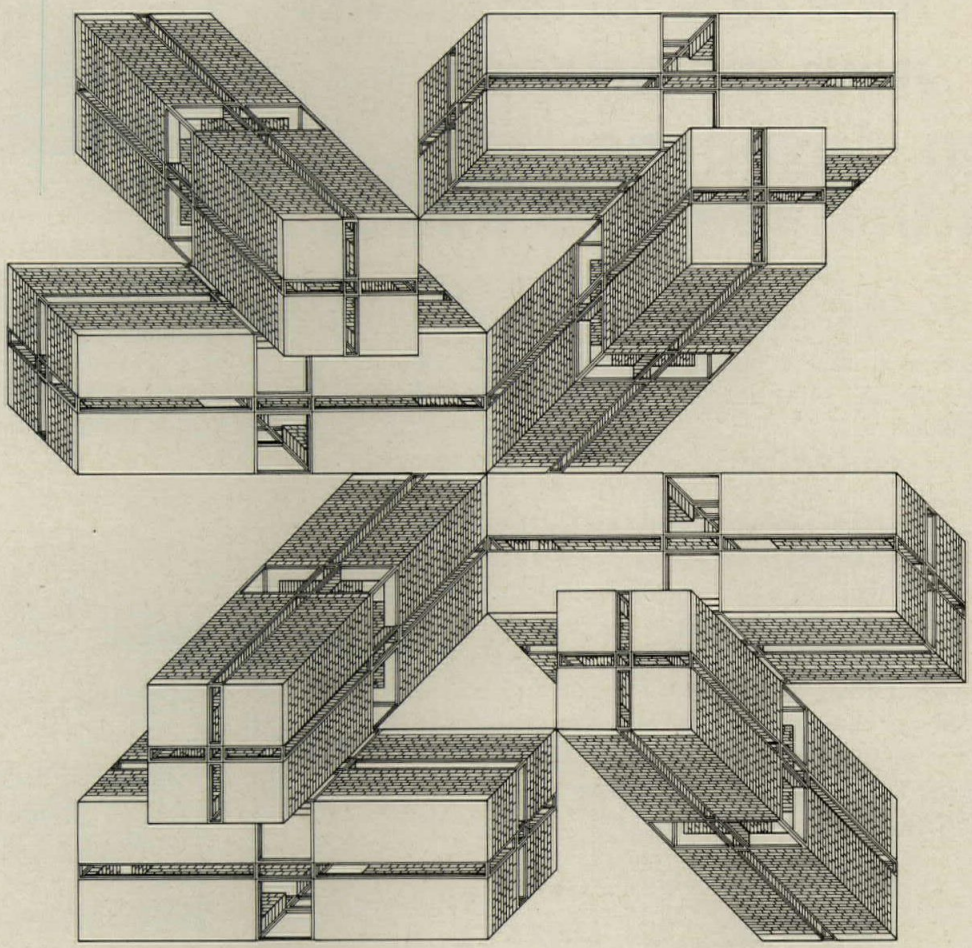


In our fifth exploration of masonry structures, architect Stanley Tigerman uses the linked figure as his basis for design. Beginning with the two dimensional figure, he isometrically expands into the third dimension—and then evolves into the complete structure.

Throughout this series we shall continue to show how the basic orthogonal shapes of masonry construction—the square, lozenge, rectangle, pinwheel, cross and linked figure—can be developed and projected. We hope that these drawings will serve as idea stimulators and time-savers.



12" solid brick masonry wall, English bond with extruded stainless steel sash section and rubber gasket fixed glazing.



STANLEY TIGERMAN, ARCHITECT

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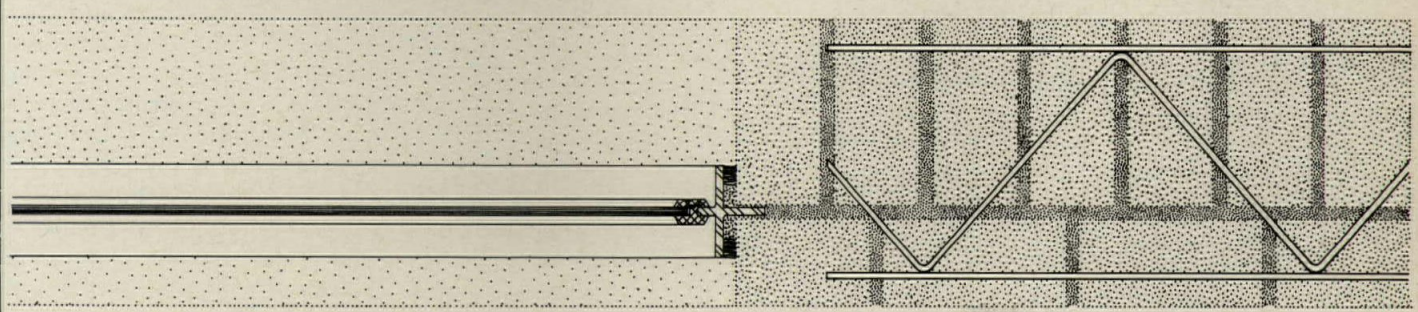
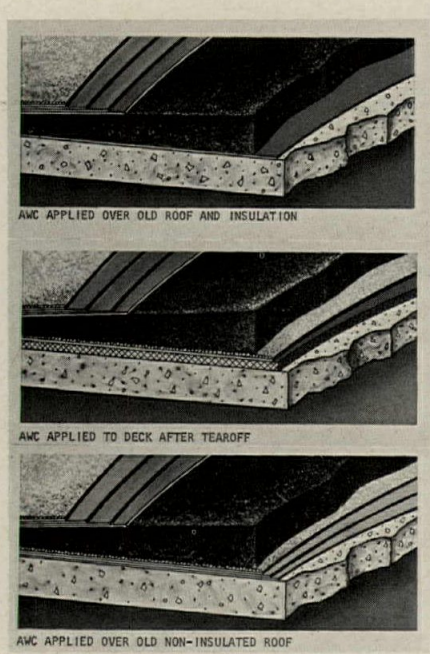


For more data, circle 103 on inquiry card

continued from page 20

INSULATION / Two spray mixes (one for 2200 F and one good to 1350 F) go on at 600 lb/hr with no nozzle clogging and low rebound loss. Application technique permits rapid insulation of industrial equipment. Both mixes provide a laminate construction which permits varying of wall thicknesses. ▪ The Babcock & Wilcox Company, Augusta, Georgia.

Circle 303 on inquiry card



RE-ROOFING INSULATION / All-weather *Crete* insulation can be applied directly over old roofing to provide a smooth, dry and seamless insulated roof deck ready immediately for new roofing. The insulation is a combination of a volcanic glass rock and a rigidly controlled thermoplastic binder. Being a dry fill type insulation, thickness can be varied to provide needed drainage, leveling of old decks and even cover protusions, pipes and girders. ▪ Silbrico Corporation, Hodgkins, Ill.

Circle 304 on inquiry card

more products on page 234

L·O·F announces new larger sizes new design flexibility new low prices on Mirropane® ...the "see-thru" mirror

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Mirropane Selection Table

Type	Thickness	Primary Advantage	Maximum Standard Size
Regular Polished Plate	⅛"	Lightest weight	72" x 120"
Plate or Float	¼"	Economical standard type	72" x 120"†
Heavy Duty Plate	⅜", ½", ⅝", ¾"	Strength, sound reduction	72" x 120"
Parallel-O-Grey®	13/64", ¼", ⅜", ½"	Best performance lower light ratio	72" x 120"
Laminated Safety Glass	¼", ⅜", ½", ⅝", ¾", ⅞", 1"	Safety and sound reduction	72" x 120"
Tuf-flex® Tempered	¼", ⅜", ½", ⅝", ¾"	Thermal shock, impact protection	72" x 120"

†Available up to 120" x 144" on special order.

For more data, circle 104 on inquiry card

One man operates the Honeywell Control Center that starts, stops, adjusts, reveals, alarms, monitors, analyzes, and checks almost everything in a modern shopping center. Shown here: Southdale Center, Edina, Minn. Victor Gruen Associates, Architects.

Now! Honeywell 1-man Control can keep every store comfortable, protect it against fire and theft...

...and save thousands every year.

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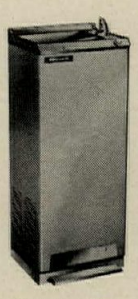

Model HWFA

Model HWTA

Model REGR

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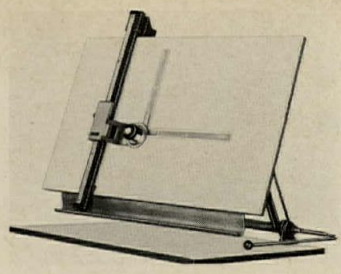
continued from page 214



DRAWING BOARD / The *Roga L* permits full use of the desk while keeping sketches and drawings in full view and ready for work. A special device allows the board to be swung to a vertical position when not in use. Board size is 28 by 47 in. with a drawing area of 28 by 40 in. ▪ Kuhlmann-Impex, Inc., Houston

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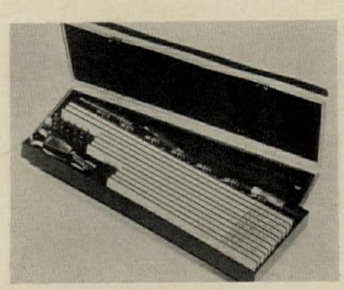

LETTERING SET / The *Leroy II* is a redesigned version of the lettering set frequently used as standard equipment for draftsmen. It is housed in a metal-reinforced outer casing which is more durable and more resistant to moisture, warping or dust. The scribing instrument has been redesigned to permit more comfortable gripping and to simplify adjustment of points. The one-piece lift-out tray allows entire contents to be set on work surface. Slanted storage of templates shows numbers while in tray. ▪ Keuffel & Esser Co., Hoboken, N.J.

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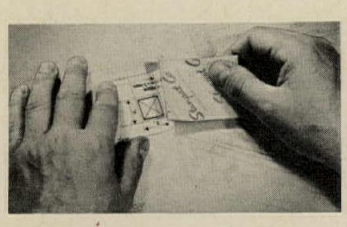
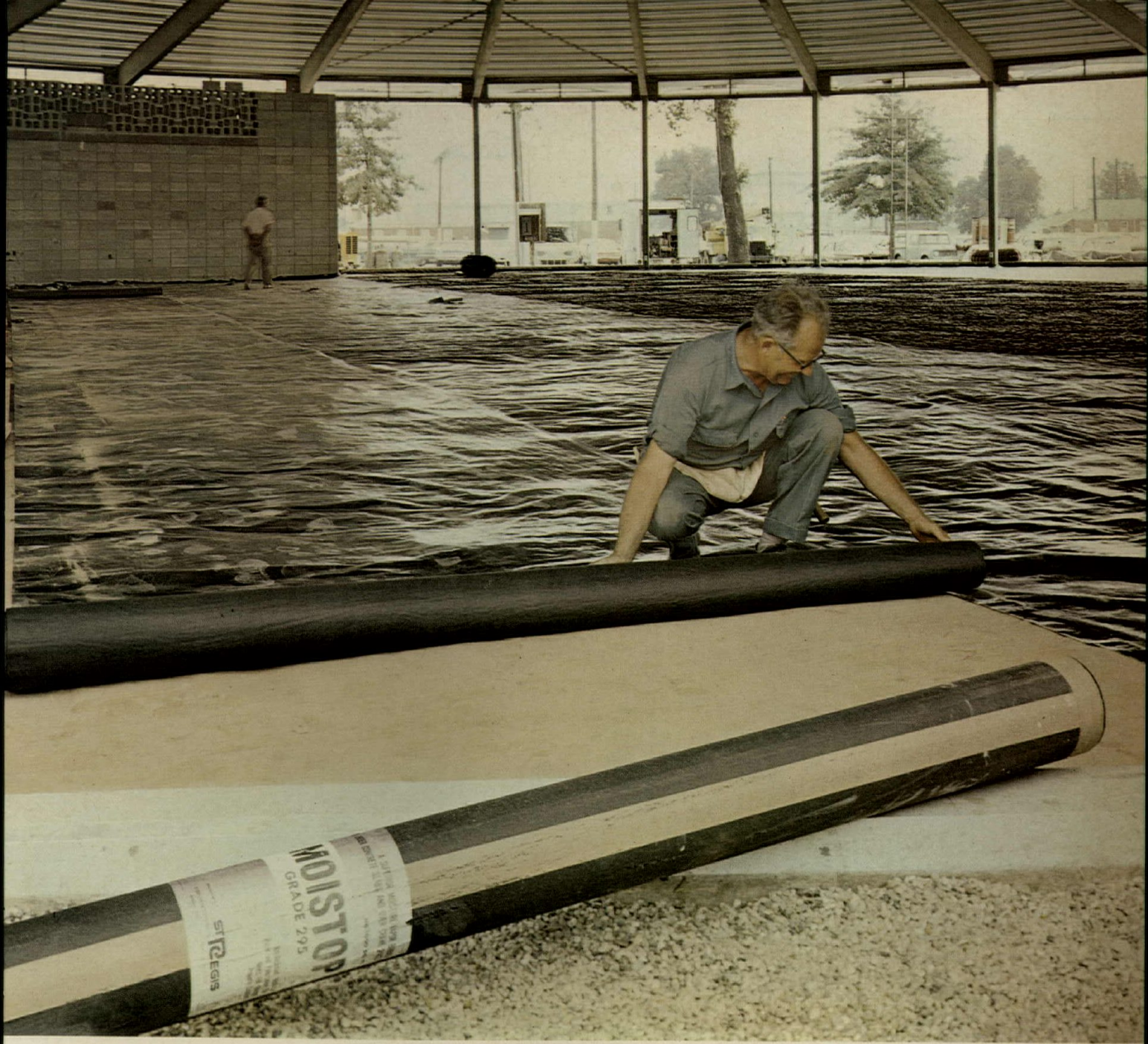


PRE-PRINTED DRAWING SYMBOLS Special 8½ by 11 in. sheets allow anyone to make his own repetitive symbols for any diagram, spec, detail, title block or any other drawings on an electrostatic copier. ▪ Stanpat Products Inc., Port Washington, N.Y.

Circle 307 on inquiry card

more products on page 238



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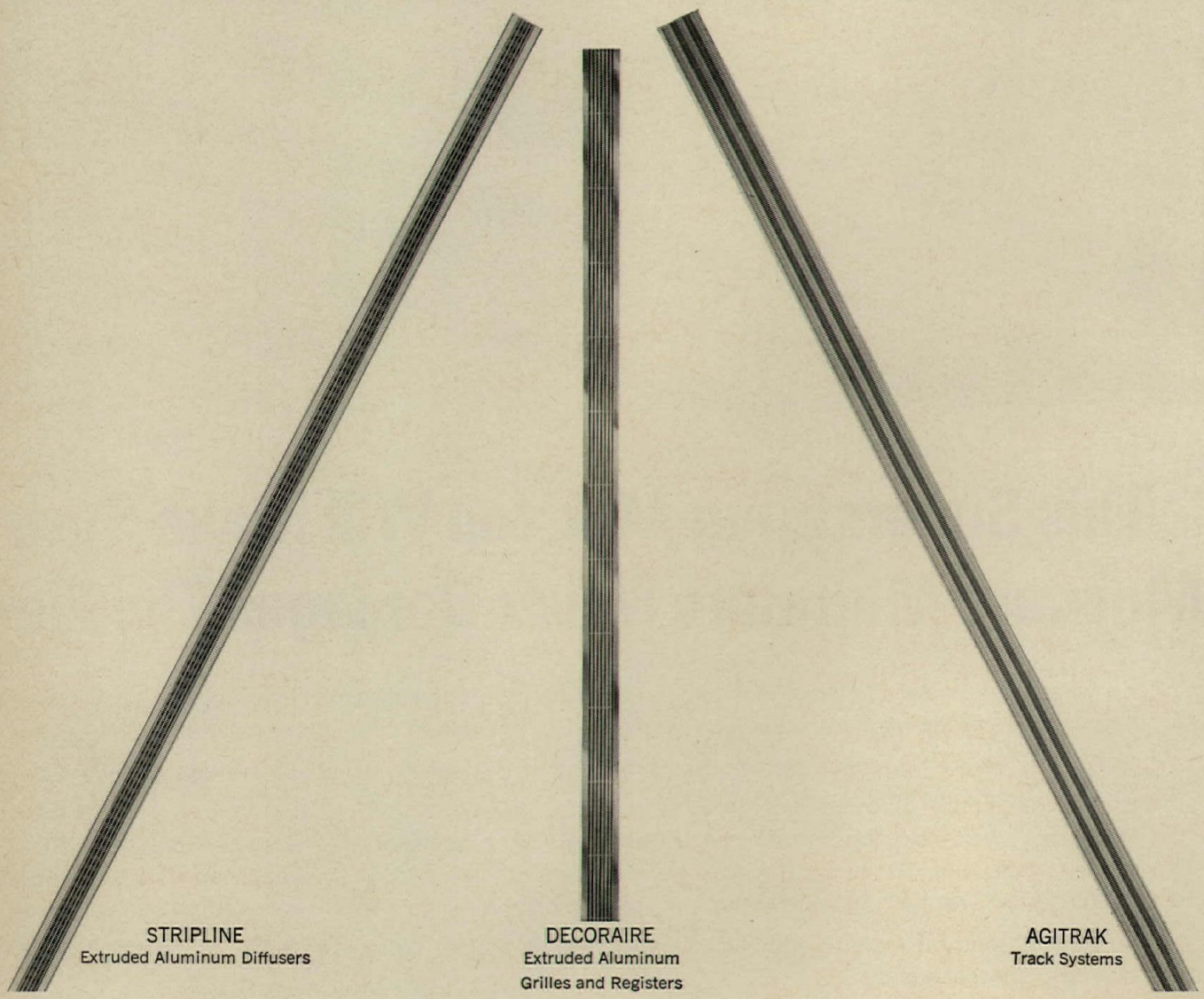

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Imperial House, Dallas, Texas
Architect: George L. Dahl, Inc.

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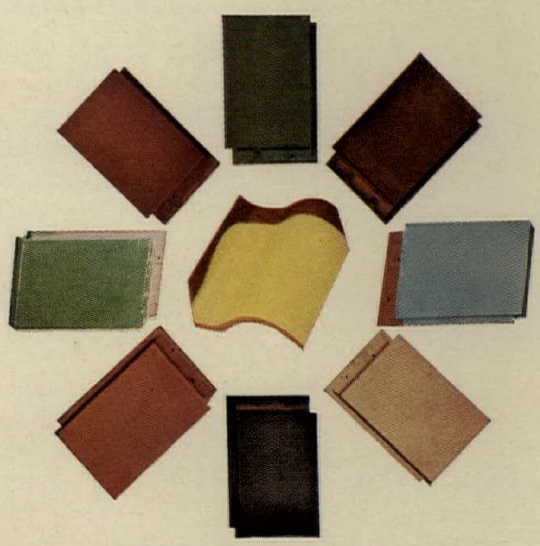

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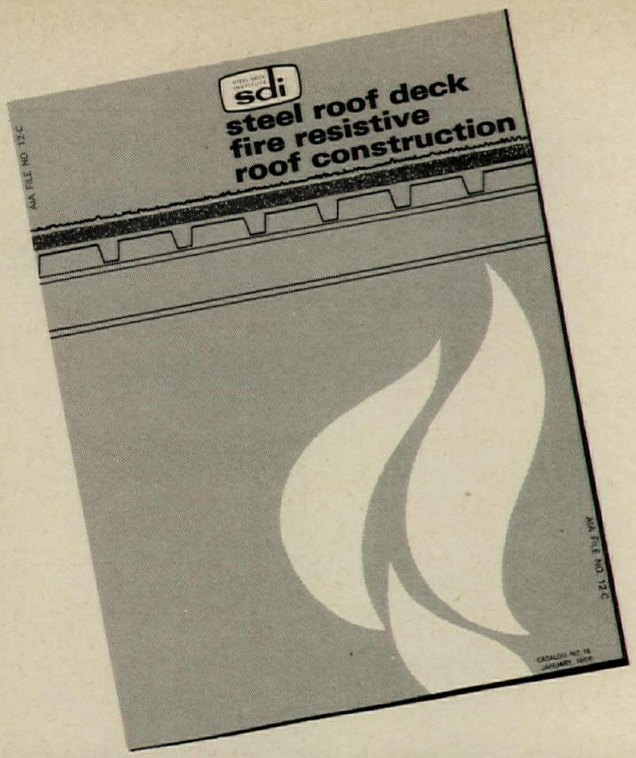

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Gives complete summary of Steel Roof Deck fire ratings and construction details.

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This popular booklet which gives cost comparison examples between "fire-resistance" and "non-combustible" construction has just been revised.

For more data, circle 116 on inquiry card

continued from page 234

SEAMLESS WALLS / *Vinyl Walltone Textured Enamel* is handled like paint, is sprayed on walls and ceilings, and is made to look and feel like vinyl cloth. ▪ Plextone Corporation of America, Newark, N.J.

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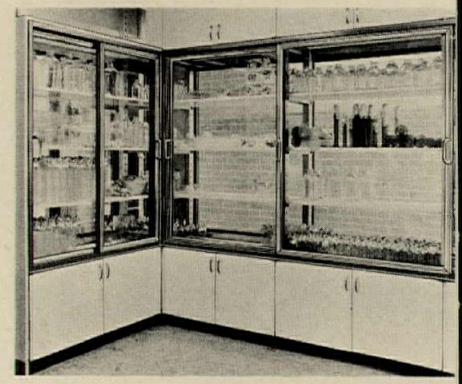

SLIDING GLASS DOORS / *Riji-Clad* sliding glass doors for wall cabinets seal against dust and air currents to improve storing of materials in laboratories, hospitals, and research centers. Doors glide on low friction rollers and feature strong, narrow frames with wide glass areas. Doors provide good insulation for warming or cooling cabinets. ▪ Amerace Corporation, Butler, N.J.

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SANITARY SYSTEMS / The electrically operated *Monomatic* recirculating flush toilet may be installed in minutes or may be a portable unit. Its many uses include areas where conventional plumbing is impractical: recreational homes, basements, attics, spare rooms, guest cottages, and poolside dressing rooms. It is being used in hospitals as a portable, bedside flushing toilet. The unit needs no venting, complicated plumbing or holding tank. An initial charge of four gallons of water will accommodate 80 to 100 uses. ▪ Monogram Industries, Inc., Los Angeles.

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more products on page 244

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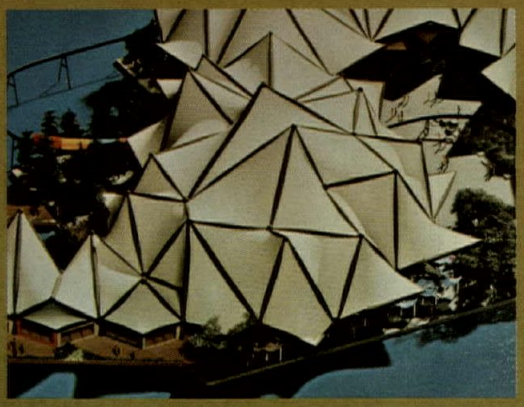

Tremco sealants at expo67.

Tremco knowledgeability in sealants has led to their use in 75 of the 102 structures at Expo '67... like the Ontario Pavilion (above) by Architects Fairfield and Dubois. To see details in print, send for your free copy of "Tremco at Expo '67".

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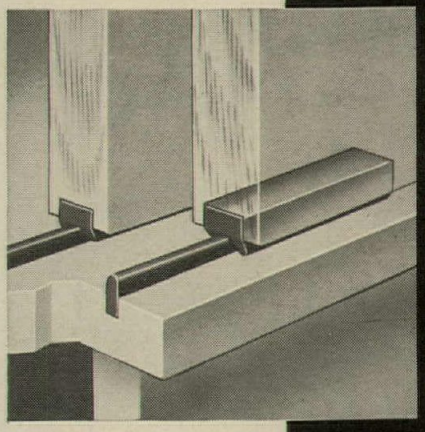

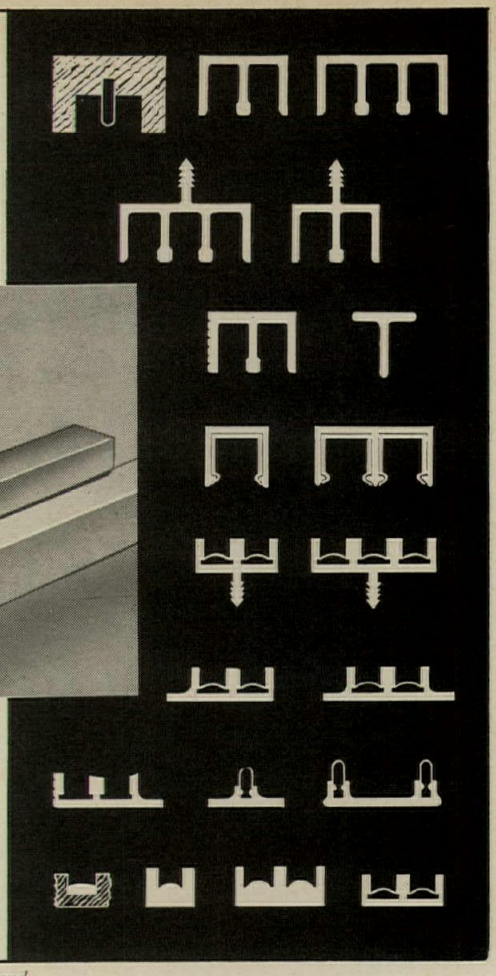

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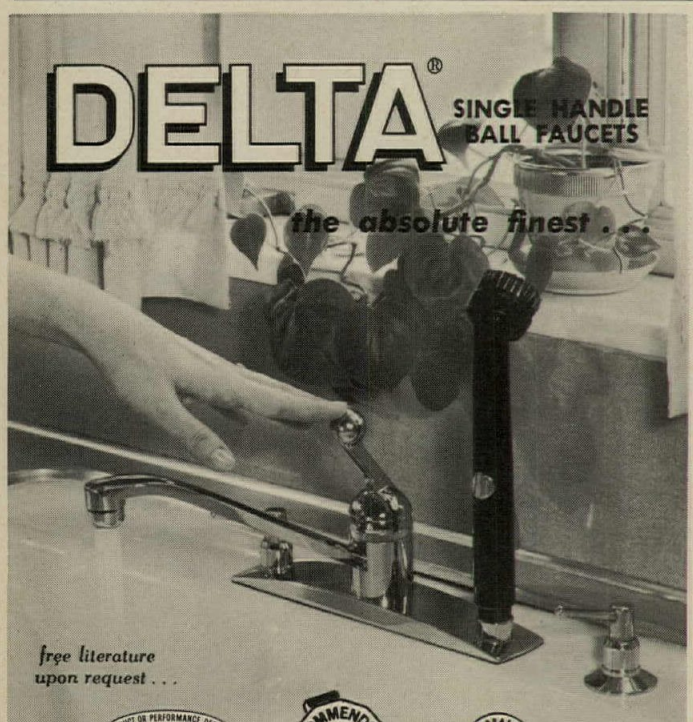

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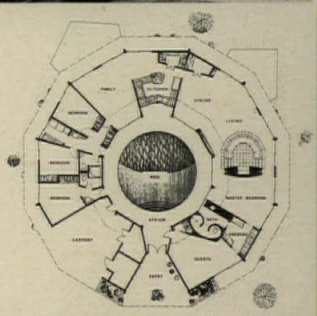
Ceramic tile lends carefree warmth to an unusual circular home by John Nyberg.



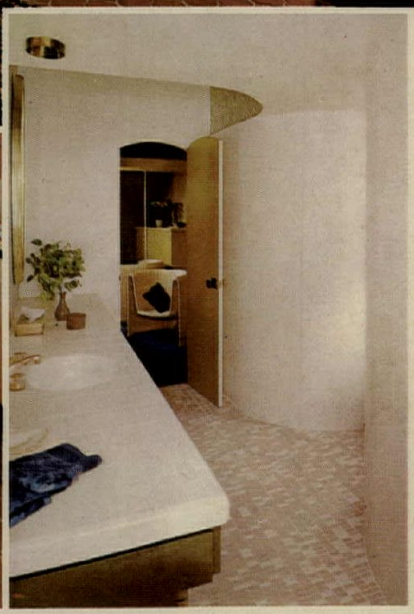
Located in Pasadena, California, this circular home has an atrium as its focal point. All rooms of the masonry and tile structure open off the atrium with its circular pool.

Designed by the firm of Nyberg and Bissner as Mr. Nyberg's home, ceramic tile is used both decoratively and functionally. Quarry tile floors are found in the living room dining, area, kitchen and den. It is also used for kitchen counter tops and back splashes.

Scored glazed tile is used for bathroom counter tops and walls including a unique circular treatment of the walls of the master bath.

In keeping with the contemporary Spanish feeling sought for, extensive use of tile is made throughout other areas of this five bedroom home. Tile contractor for the home was C&D Tile Company of San Gabriel.

If you're looking for a material with limitless possibilities in combined decorative and functional use, look for ceramic tile made in the U.S.A. and Quality Certified by the Tile Council of America. The triangular seal at right is your assurance of glazed wall tile, ceramic mosaic tile and quarry tile that is tested to meet the most rigid government specifications. For more information about Certified Quality Tile, a material that can be used with confidence indoors and out, write: Tile Council of America, Inc., 800 Second Avenue, New York, N.Y. 10017. Or, see the current Sweets Architectural File.



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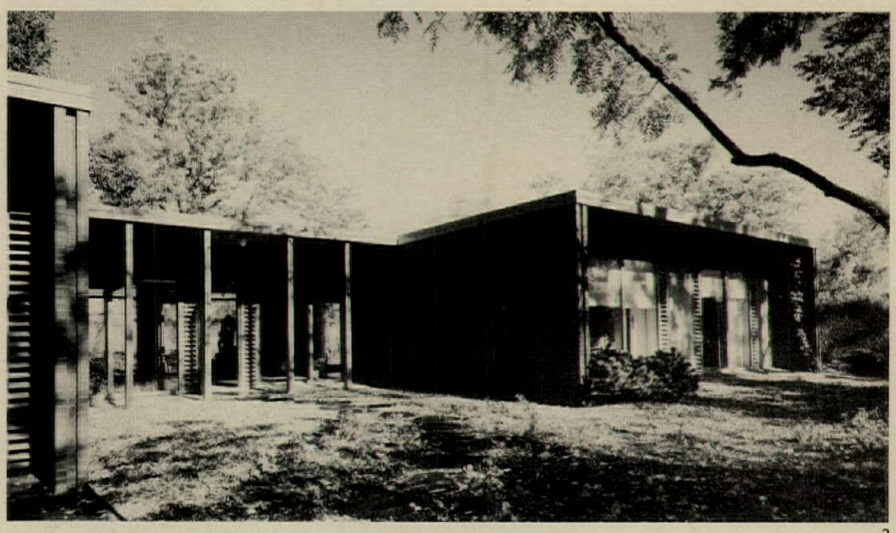

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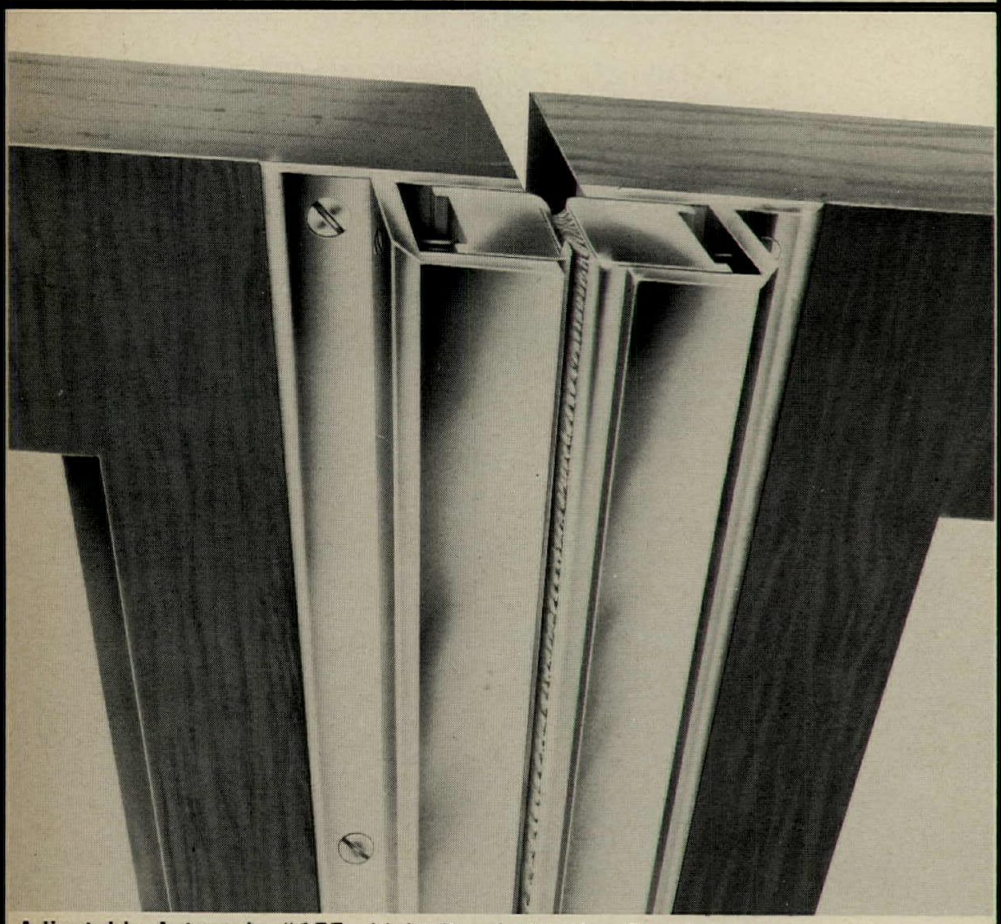

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continued from page 238

PATIO DOOR / *Insul-Dor* is reported to allow 81 per cent less air infiltration than the established standard. Polypropylene pile has been added at points of potential leakage and a vinyl insert for the sill helps prevent "wicking" of water. Wood members are reinforced by recessed metal which promises continued alignment, proper seal and easy operation. ▪ R.O.W. Window Sales Co., Ferndale, Mich.

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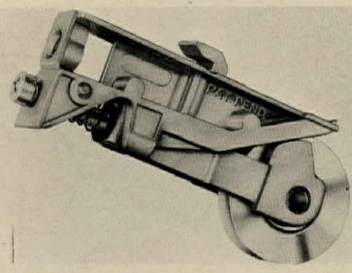

ROLLER-CARRIER / A roller-carrier expressly for heavier patio doors has proved capable of supporting sliding panels weighing up to 1¼ tons. Panels are said to be easily moved with a fingertip touch. ▪ Allen-Stevens Corporation, Woodside, N.Y.

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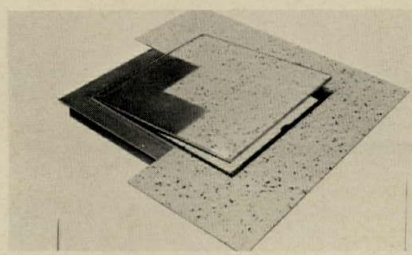


FLOOR DOORS / Two types, T and K, have concealed hinges, built-in torsion bars, hold-open locking at 90 degrees, and vinyl grip handles and gasketing to prevent metal to metal contact. The type T door is hidden by the floor covering material. The type K has a ¼ in. aluminum diamond pattern plate. ▪ The Bilco Company, New Haven, Conn.

Circle 313 on inquiry card

more products on page 254

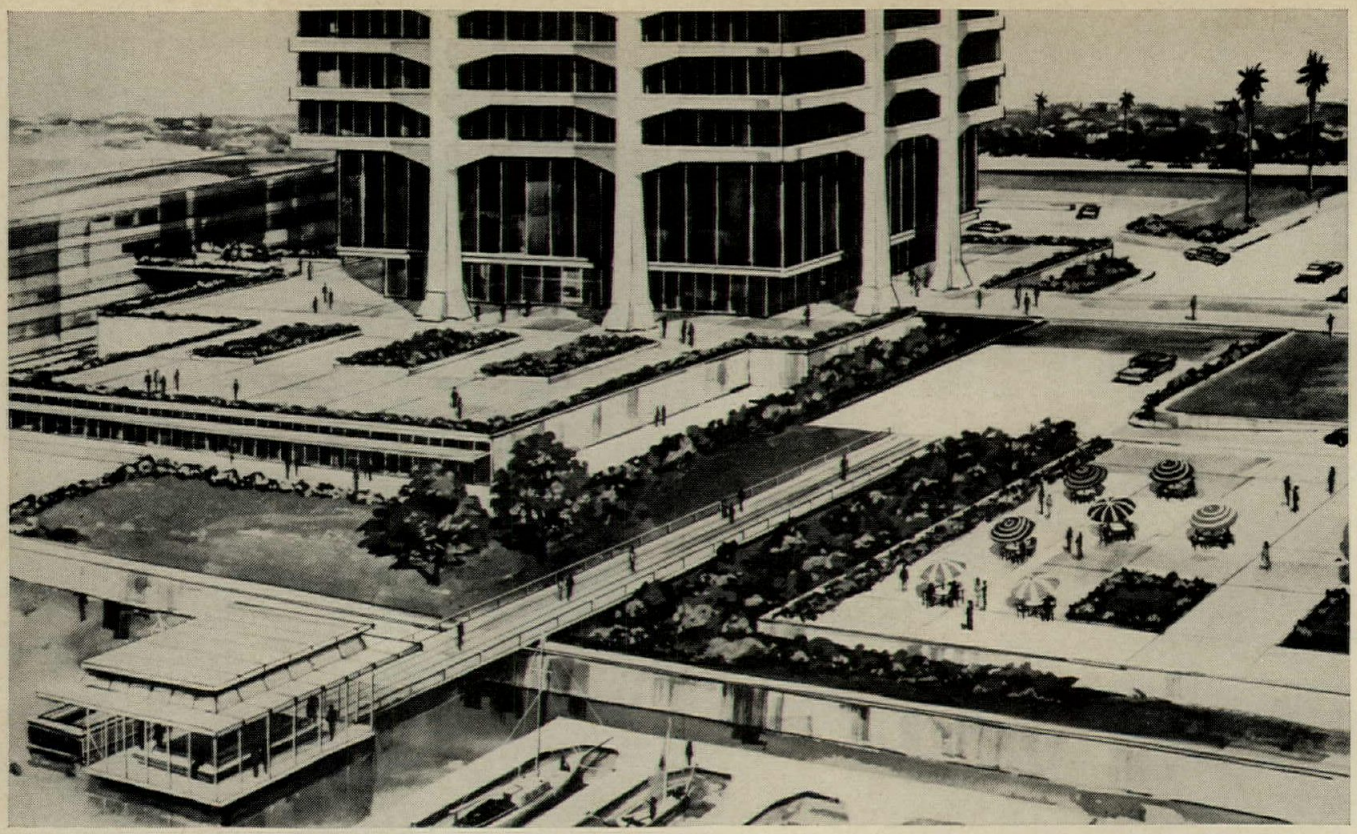
Prestressed concrete reaches new heights in strength and beauty

Tallest precast, posttensioned concrete structure in the nation, Gulf Life Tower in Jacksonville, Florida, emphasizes the esthetic potential of today's concrete.

Architectural and structural expressions are integrated in a boldly sculptured white concrete frame, further accentuated by the continuous grey window wall enclosing the uninterrupted office area. The dramatic design makes the most of the 27-story building's prominence on the city skyline and takes effective advantage of the Florida sun and sky.

Technological advances continually extend the versatility of concrete and open up new opportunity for imaginative design. Some of the innovations included in the design and construction of the Gulf Life Tower are detailed on the following pages.

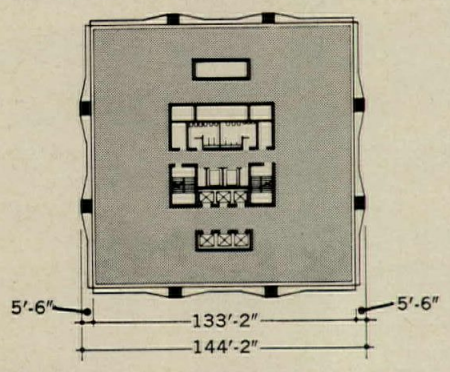
Gulf Life Center, Jacksonville, Florida.
Architects: Welton Becket and Associates, Los Angeles, New York, San Francisco and Houston.
Associate architects: Kemp, Bunch and Jackson, Jacksonville, Fla.
Structural engineers: Richard R. Bradshaw, Inc., Van Nuys, Calif.
General contractor: Auchter Co.
Precast concrete: Concrete Materials of Georgia, Inc.
Prestress by Capitol Prestress Co.
Ready Mix by Capitol Concrete Co.



Prestressed concrete structure rises 430 ft. above a broad podium

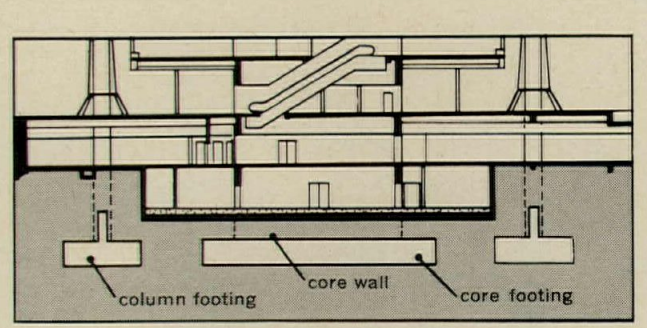
The 27-story Gulf Life Tower will be the focal point of the 12-acre Gulf Life Center in Jacksonville. Included on the river-front site is a multi-level parking garage for about 1100 automobiles, a small marina, a 300-room hotel and convention facilities. A glass-enclosed lobby at the podium level is set back from a second level bank. Precast concrete bridges will span the drives providing pedestrian access to the garage and rest of the center. A concourse level below the podium includes a 600-seat cafeteria overlooking the river, and an employe lounge. This complex will further enhance the commercial waterfront of Jacksonville's St. Johns River. The podium level is framed with 7-ft.-wide precast, prestressed concrete single-tees, and is surfaced with terrazzo. The extensive and varied use of concrete provides visual unity to this boldly conceived complex.

Eight exterior columns plus center core support tower

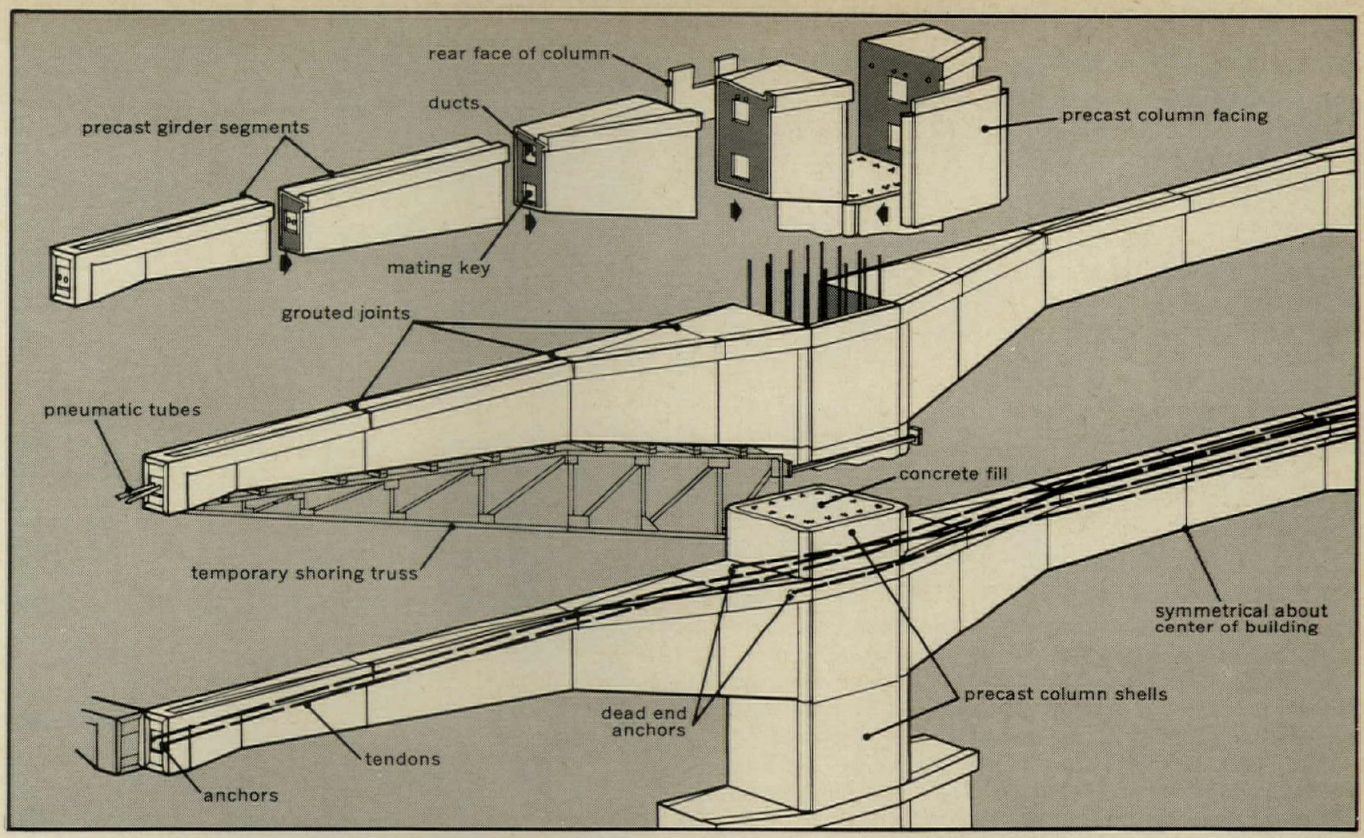


Completely exposed columns provide uninterrupted glass area—set back from the inner column surface. Core contains elevator shafts, stair wells, rest rooms, and mechanical shafts. Gross space totals 512,000 sq. ft. The 360,000 sq. ft. of office space enjoys complete flexibility offered by the long-span prestressed concrete double-tee floor units.

Single spread footing supports 430-ft. core



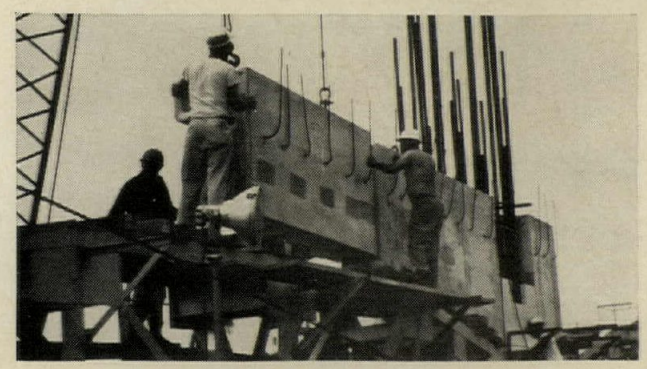
A massive spread footing supports the tower's central core; four individual spread footings support each pair of the eight exterior columns. The podium, from which the Gulf Tower emerges, is supported by piles. Hydrostatic pressure from beneath the tower's basement floor slab is resisted by several walls that cantilever from the central core.



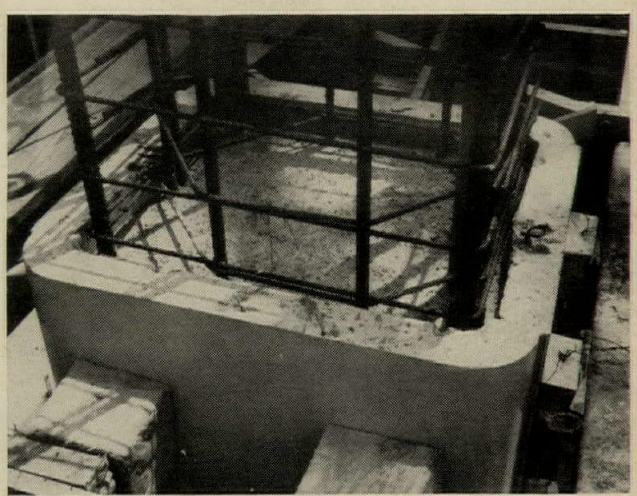
Posttensioned, precast segments form 133-ft. girder

The segmental posttensioning techniques used are simple, fast and economical. Although the erection sequence varies depending upon the number of tendons used, the fundamental steps are as follows:

- Precast column shell sections are placed and filled with lightweight concrete.
- Temporary shoring truss is secured in position.
- Precast girder segments are placed and aligned, sealing the periphery of the joint with gummed, foamed plastic tape.
- Rubber pneumatic tubes are threaded into mating prestressing ducts and inflated to 5 psi.
- With tape sealing periphery of joint and tubes sealing duct holes, the 1-in. space between segments is filled with high-early-strength grout. (3,000 psi in 24 hrs.)
- Tubes are deflated and withdrawn. Tendons are inserted, each consisting of twelve ½-in., 270 ksi strands.
- Tendons are stressed and anchored (Freyssinet Method) as columns above girder are placed.
- Ducts are pressure grouted to protect tendons.



Columns combine precast, cast-in-place techniques



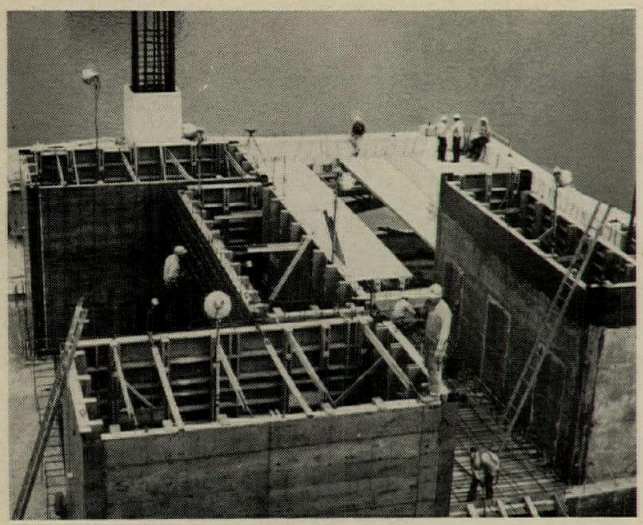
Each column is composed of a precast shell into which fresh concrete is placed. This provides uniform color and texture . . . and precludes the necessity for the decorative concrete mix throughout the entire column. Columns taper from a width of 6 ft. 9 in. at the third floor to 4 ft. at the penthouse, and are typically 5 ft. 6 in. deep. Mix design data for the column concrete fill are:

Portland cement, Type I	800 lbs.
Fine aggregate (sand)	1245 lbs.
Coarse aggregate (lightweight expanded shale)	735 lbs.
Water	43.8 gals.
Water/cement ratio	5.2 gal. per bag
Entrained air	4 percent
Slump	4.25 in.
Strength at 28 days	5000 psi

Turn page for more information

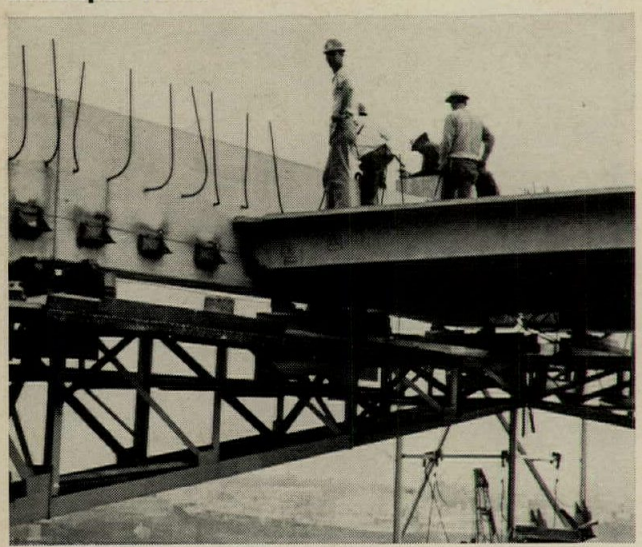
For more data, circle 121 on inquiry card

Construction of core walls

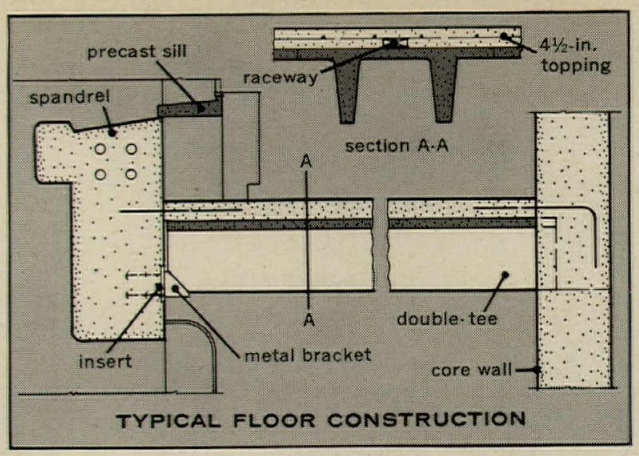


Core walls of Gulf Tower progressed simultaneously with the exterior precast concrete framework. Consequently, it was possible for the prestressed concrete double-tee floor slabs to be positioned directly atop the core wall. Wall forms were of ¾-in. plywood on 2x6-in. horizontal studs, backed up by double 2x8 vertical walers. Heavy-duty, 9,000-lb. ties held forms against concrete pressures. The structural core as designed resists all wind forces acting on the building.

Precast, prestressed concrete double-tee floor slabs span 40 ft.

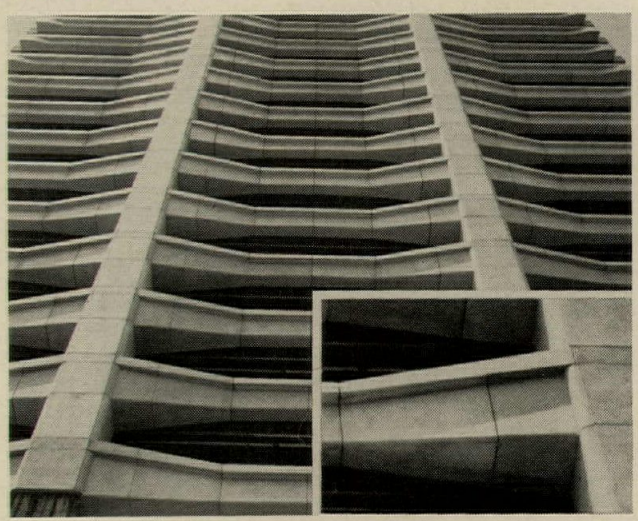


Metal brackets welded to inserts in the spandrel beams support one end of the 18-in.-deep double-tees. The opposite end rests in pockets cast in the core wall or on precast concrete planks which are part of a composite girder extending from the column to the core wall. Tees are placed in north-south, east-west directions on alternate floors to equalize load distribution on the columns. A 4½-in. lightweight concrete topping is placed over the double-tees providing flexibility in accommodating electrical raceways. Air conditioning units located under the window area have individual temperature controls for office space.



TYPICAL FLOOR CONSTRUCTION

Exposed white concrete sculpture ascends high above Jacksonville skyline



White cement and white quartz sand combine to create a bold sculpture which dramatically defines the individual "work areas" of the office building. Tinted glare-reducing glass contrasts sharply with the white concrete frame. The frame segments were cast in Tedlar-coated steel molds resulting in dimensional accuracy and uniformity of color and texture. The precast concrete exterior surface is permanent and will require little or no maintenance.

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Please send me literature relating to the techniques used in construction of the Gulf Life Tower (U.S. and Canada only).

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continued from page 244

BLACK EXTRUSIONS / A new alloy reduces the time needed to produce black architectural extrusions and is reported to produce a deeper, more lustrous black color than its predecessor, *Type 13*. The faster finishing time and improved extrudability of the new *Anoclad A13* promise to add up to major savings in production costs. A similar replacement for gold colored products will also be available. ▪ Aluminum Company of America, Pittsburgh.

Circle 314 on inquiry card

MAGNETIC DOOR CLOSER / An electromagnet that normally holds a fire-barrier door open, automatically releases to close the door in case of fire. Since the exact intensity of holding force can be dialed, the *Doorman* is suitable for hospitals, schools, colleges, factories, dormitories, department stores, hotels, motels municipal buildings—wherever doors should be closed quickly to prevent smoke and fire spread. ▪ Honeywell's Commercial Division, Minneapolis.

Circle 315 on inquiry card

CONCRETE FINISHING AID / *Confilm* said to eliminate or minimize the effect of wind, heat, and dryness in finishing concrete surfaces. *Confilm* is not a curing agent, but a liquid that, when sprayed over concrete immediately after screeding, reduces evaporation from the plastic surface up to 80 per cent. Plastic cracking, crusting, stickiness, efflorescence and uneven surfaces are greatly minimized. ▪ Master Builders, Cleveland

Circle 316 on inquiry card

LATROBE
Electrical
PRODUCTS

190 Series

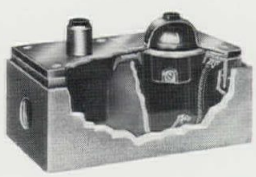
152 Series

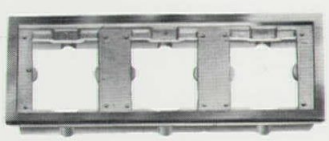
122 Series

142 Series

120 Series

351 Series


252 Series


A-Frame

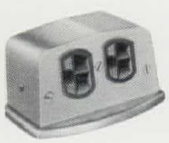
100 Series

117

118 Series

113

330


308-G

277

292-G

284-S-G

284-V-G

220-GT

1220-GT

305

306-RG

198

Fullman (Latrobe) Floor Boxes and Accessories constitute a complete line, yet the varieties are held to a minimum . . . Specifying, obtaining and maintaining is simplified . . . In addition to exploded views showing all components (with part numbers), a separate page shows most-often-ordered spare parts.

Floor boxes (and Accessories) our business for over 35 years. Distributed Nationally thru Electrical Wholesalers throughout U.S.A.

Write Dept. "AR" for your copy of our Catalog

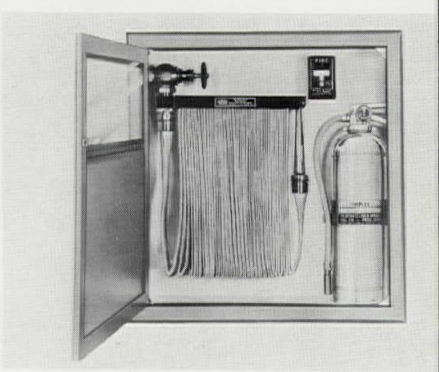
Fullman Manufacturing Co.

1209-1215 Jefferson Street • Latrobe, Penna., 15650

For more data, circle 125 on inquiry card

ENVIRONMENTAL ROOMS / An added 8-in. interior width to the *V.I.P. fifty-six* controlled environmental rooms provides up to 25 per cent increase in loading area, and up to 56 cubic ft of added chamber space over previous models. The "Lumen-Aire" ceiling plenum serves as a combination air-conditioning and air-flow chamber and permits uniform light transmission throughout the room. ▪ Lab-Line Environeers Inc., Melrose Park, Ill.

Circle 317 on inquiry card



FIRE CABINETS / A complete line of fire hose and extinguisher cabinets have been specially designed for building with shallow walls. The cabinets can be completely recessed in a 6-in. wall or semi-recessed in a 4-in. wall. ▪ Potter Roemer, Inc., Los Angeles.

Circle 318 on inquiry card

more products on page 26

For more data, circle 124 on inquiry card

For more data, circle 126 on inquiry card

Tsk, Tsk, is it nice to walk all over the one you love?

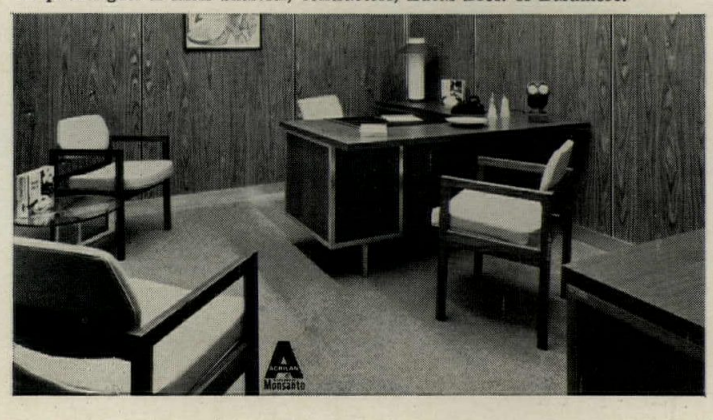
(Very nice. When Gulistan Carpet is the one.)

Soft, deep, luxurious Gulistan® Carpet of Acrilan* acrylic is very nice to walk on. To look at. And it also saves a tremendous amount of time and money on care and maintenance. Perhaps that is why Maryland Cup Corp., makers of Sweetheart Cups, have carpeted important areas of their ultra modern plant in Towson, Maryland, with these beautiful carpets. In the offices: Gulistan *Charter Oak,* with a smart crush-resistant pile. In the Conference Rooms: Gulistan *Appointment,* glamorous cut and loop texture. Both are Performance rated for Heaviest Traffic. Catalogue in Sweet's Architectural File #13L, A.I.A. File 28E.

Stevens Gulistan Carpet

*Reg.TM Monsanto's Textiles Division

Gulistan Carpet offers many benefits at the new facilities of the Maryland Cup Corp. Designer is Alan Shaivitz; contractors, Lucas Bros. of Baltimore.



Gulistan Carpet Division, J. P. Stevens & Co., Inc.
295 Fifth Avenue, New York, N.Y. 10016

Please send me the whole story on how Gulistan Carpet contributes quiet, warmth, comfort and beauty at less cost. Include free samples of Gulistan Carpet.

Name_____

Address_____

City_____ State_____ Zip_____

AR3-67

For more data, circle 127 on inquiry card

SIGNAL
TELEPHON
POWE
249
7A

CEL-WAY

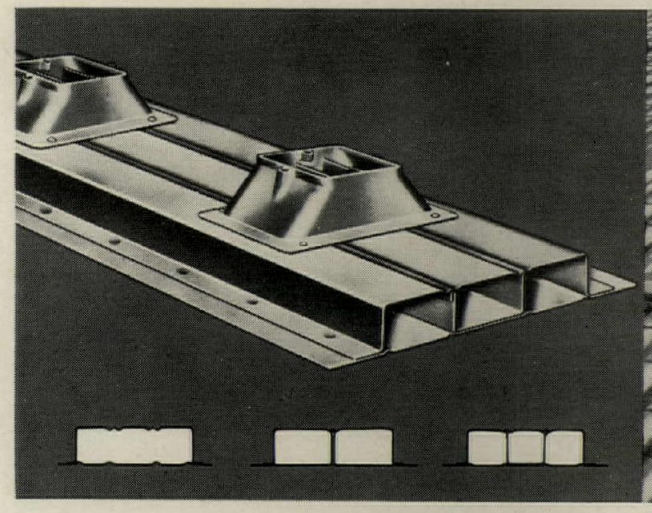
Puts Telephone, Electric and Signal Service Anywhere You Want it... *in One Fitting*

Instant success. It's Cel-Way, the in-floor electrification system that makes a success of any building. Cel-Way puts telephone service, electric outlets, even special signal service anywhere you want it today . . . or anywhere it might be needed in the future.

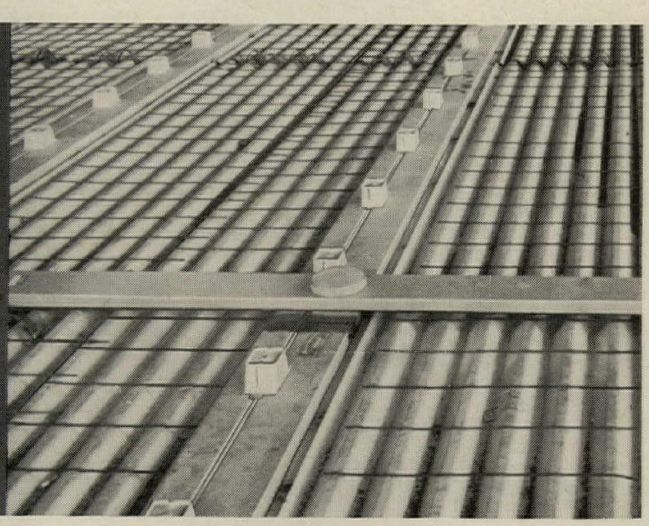
New, architectural style fittings eliminate floor clutter. They provide outlets for either telephone or electric or signal service—or all three—in a single fitting. Even accommodate up to 5 telephone amphenol jacks in a single fitting. Twelve types available for a variety of service requirements.

Cel-Way is the practical, economical way to electrify floor slabs—a method that's compatible with all types of construction: slabs 2½″ thick and up, for slabs on grade or concrete or steel frame construction.

Get complete information. See Sweet's File 1J/GR or write for Cel-Way product manual. Granco Steel Products Company, 6506 North Broadway, St. Louis, Mo. 63147. A subsidiary of Granite City Steel Co.



Factory-installed single, double or triple inserts can be spaced at any centering along cells to provide access to single, double or triple cells. Service fittings can then be installed at any desired location. Openings in inserts are designed to facilitate pulling large cables.



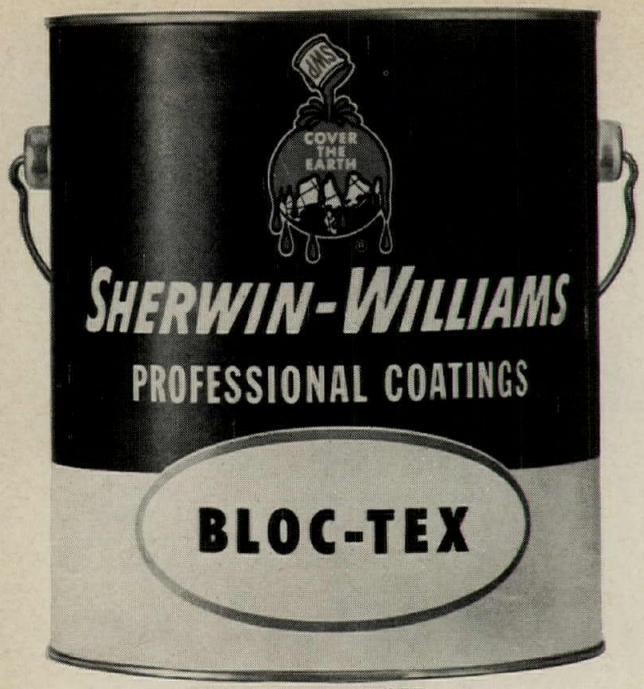
Cells and pre-set insert spacing can be designed to fit any building module, thus assuring widest flexibility of desk or equipment placement. Pre-set inserts eliminate noise, mess, and expense of core drilling through slabs for later relocation. Unique cell transitions provide practical way to get header ducts into thin slabs.

GRANCO®

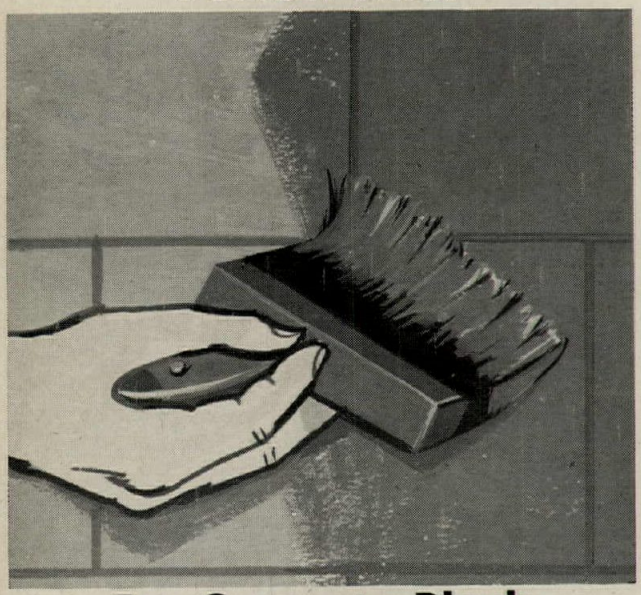
IMAGINATION IN STEEL

Steel

For more data, circle 139 on inquiry card



Perfect Filler



For Concrete Block

Sherwin-Williams Bloc-Tex® is a new type of block filler that produces smoother and superior cement block surfaces. □ An entirely new aggregate-free filler, it may be applied easily by brush, airless or conventional spray. □ Quick-drying Bloc-Tex dries to touch in 2 hours. It may be top coated, if necessary, in 24 hours. When finished with two coats of masonry type paint, exterior surfaces will withstand the most severe weather conditions. □ For complete facts on Bloc-Tex for filling concrete block, use the coupon below.

PROFESSIONAL COATINGS DIVISION
THE SHERWIN-WILLIAMS CO.
101 Prospect Avenue N.W., Cleveland, Ohio 44101
Please send me your free brochure B-901 on Bloc-Tex for filling concrete block.
Name_____
Address_____
City_____ State_____ Zip_____

For more data, circle 129 on inquiry card

WHEN YOU WANT A 12′x12′ WALK-IN... SPECIFY NORRIS

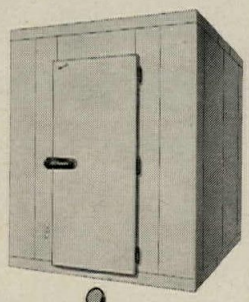
AND GET A 12′x12′ WALK-IN

Norris walk-in coolers, freezers and combinations are supplied in actual, not nominal, dimensions

When it comes to walk-ins, Norris deals in actual, not nominal dimensions. That means you get the size walk-in you specify to within 6″ increments—whether it be a small storage unit or an entire walk-in warehouse.

Specifying Norris has other advantages, too. Like 3″ walls that provide full protection over a 120° F. inside-outside temperature difference yet offer valuable extra interior space. Like your choice of frothed-in-place polyurethane or glass fibre insulation. And like modular, pre-fabricated construction that makes assembly quick and easy.

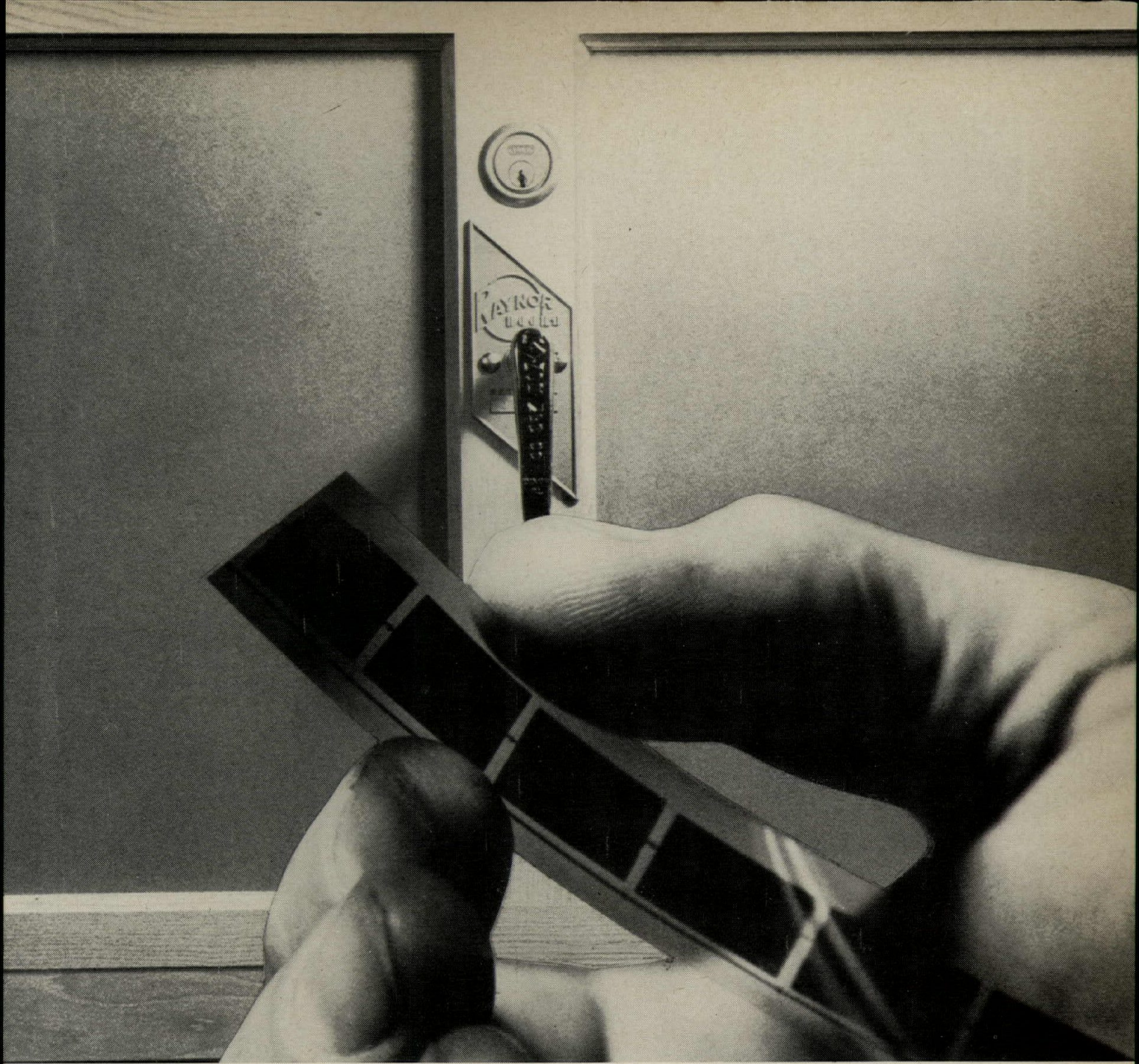
Norris walk-ins are available with your choice of accessories, and glass doors are available for both normal- and low-temperature merchandising applications. The next time you specify a walk-in, why not look first to Norris?



Write for descriptive literature designed to make it easy for you to specify!

Norris
NORRIS DISPENSERS, INC.
2720 LYNDALE AVENUE SOUTH
MINNEAPOLIS, MINNESOTA 55408

For more data, circle 105 on inquiry card



Each Raynor overhead-type door is on data film to assure easy replacement of damaged parts. Anytime.

Every Raynor door detail is permanently registered on data film for positive identification and quick replacement of damaged parts years from now. Data film registration is exclusive with Raynor, and covers all Raynor overhead-type doors — wood, Raylon (fiberglass), aluminum and steel. If a Raynor door is ever damaged or you want to match existing doors for a building addition, Raynor makes it easy. Any time. Ask your Raynor representative about our exclusive architectural shop drawing service — another way you can depend on Raynor.

RAYNOR
The Brand You Can Depend On

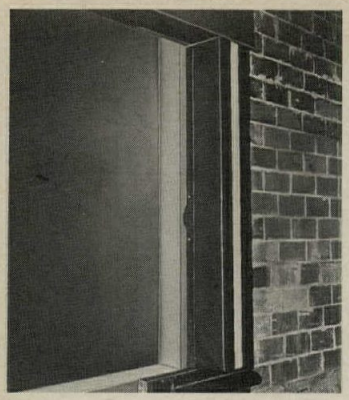
Raynor Manufacturing Company, Dixon, Illinois, Dept. H
Please send me free literature on Raynor garage doors.

NAME _____

ADDRESS _____

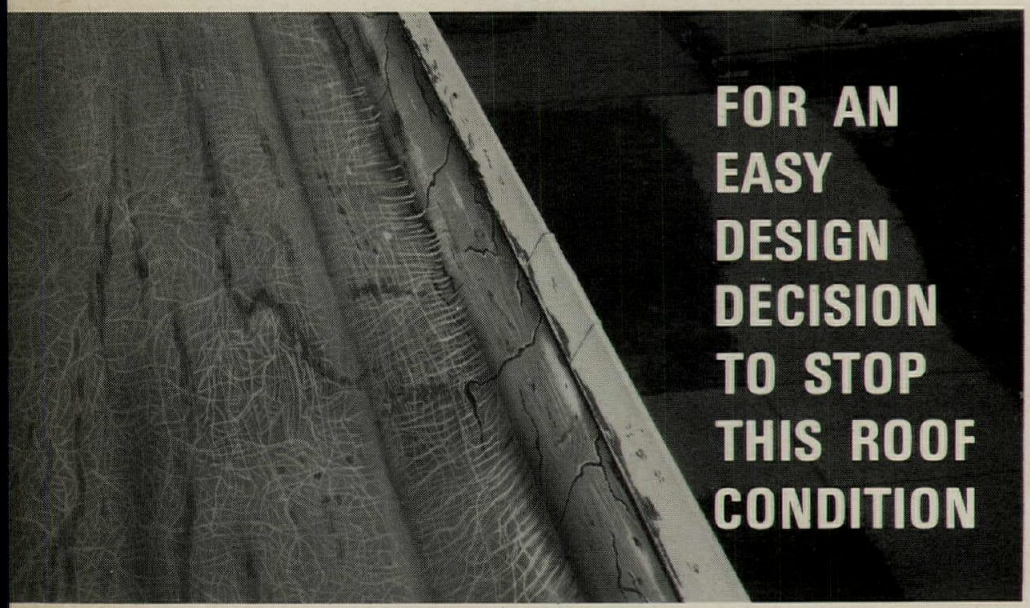
For more data, circle 130 on inquiry card

continued from page 254



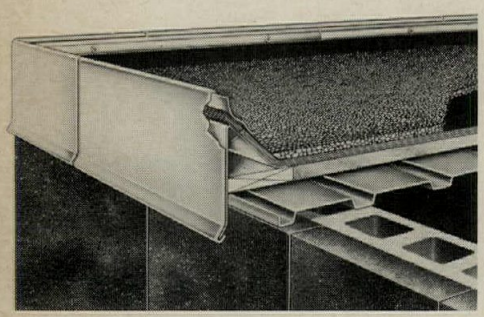
LOADING DOCKS / Model *TS-582* is a loading-dock installation that has adjustable side pads to accommodate various truck widths. The pads are mounted on steel channels, suspended on ball-bearing sheaves, which in turn run on steel tracks. The self-supporting construction is capable of absorbing the full force of the vehicle as it backs against the foam-filled pads, partially compressing them in order to obtain the required sealing effect. ▪ W. B. McGuire Co., Inc., Plattsburgh, N.Y.

Circle 319 on inquiry card

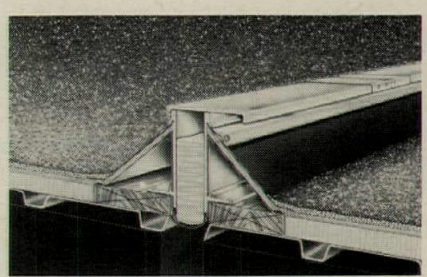


See SWEET'S 21G-Hi

Your decision is easy because the potential trouble and damage caused by a roof leak could be very expensive for your client; the installed cost of the Hickman safeguard System, which insures positive control of roof water at eaves and along expansion joints, is comparable to less effective methods . . . Our 8 pages in Sweet's explain how thermal reaction between roofing felts and metal water dams—the main reason for cracked felts—is neutralized. Make that design decision for Hickman; it is even easier after you see how tar drippings and water stains on walls are eliminated; becomes very easy when you examine the striking fascia profiles which enable you to combine wall beauty with positive roof perimeter protection.



This cross section from Sweet's, shows how the free-floating fascia interlocks with, but moves independently of, the galvanized steel water dam. The graceful fascia profiles are available in Kalcolors, porcelain and baked enamel.



In addition to protection from cracked felts along the water dams, the expansion joint provides safeguards against leakage into the joint itself. A vinyl strip at the bottom, from one roof edge to the other, moves with the roof to form a positive, continuous seal. The extruded aluminum sides and related components, being free-floating, are also independent of thermal reaction between the water dam and felts. Transitions and junctions are factory fabricated.

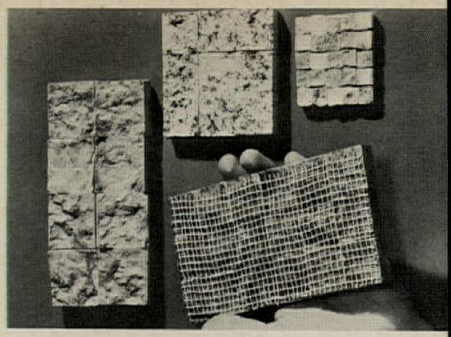
In Sweet's there are engineering drawing and sample specs; the roster of area sales reps; a list of typical installation where Hickman Safeguard System is proving itself (some from 1958).

HICKMAN *Safeguard*
expansion joint
fascia, and water dam system (pat.)

WRITE FOR EXPANSION JOINT DETAILS AND ADDITIONAL SWEET'S PAGES.

W. P. HICKMAN COMPANY, INC. 2520 INDUSTRIAL ROW, (313) 549 8484
TROY, MICHIGAN 48084

For more data, circle 131 on inquiry card

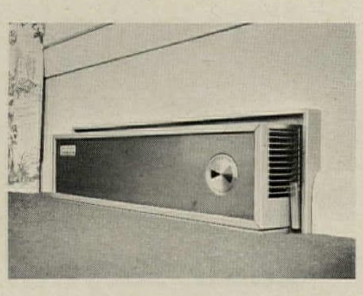


MOSAIC TILE/*Marwall*, available in pre-assembled panels of split-faced marble mosiac, mounted on mesh, provides the look of marble for wainscoting, walls and decorative trim. Cost is reported to be approximately that of tile. *Marwall* is available in over 50 different types and colors and may be polished or rough cut, one hue, a checkerboard pattern or a combination of veined marble with plain. ▪ Walker and Zanger, Inc., New York.

Circle 324 on inquiry card

JOINT SEALANT / A one-part acrylic sealant assures a weather-tight seal even between dissimilar building materials. *Sonac* can be used for joints up to ¾ in. and accommodate a 20 per cent change in joint width. The manufacturer reports that the sealant performs well on both porous and non-porous surfaces with minimal shrinkage and without staining or sagging. ▪ Sonneborn Building Products, Inc., Des Plaines, Ill.

Circle 325 on inquiry card



HEATING-COOLING SYSTEMS / An air diffuser continuously monitors the air temperature supplied by a heating-cooling system to automatically regulate the air flow in various draft-free patterns. Each time the fan goes on, the baseboard-mounted *Flomatic-400* directs the initial, cooler air in a jet toward the ceiling. As the air temperature increases, the air flow pattern changes until desired blanketing of the wall is achieved. ▪ Hart & Cooley Manufacturing Co., Holland, Mich.

Circle 326 on inquiry card

more products on page 267

The building that could not burn.

McCormick Place.

Six years young. Strong as steel. Impervious as concrete.

Certainly a fireproof structure. Only it burned down.

McCormick Place was insured.

But insurance could not put out the fire. Nor could insurance hope to compensate for the staggering costs of being out of business during the long rebuilding months ahead.

Authorities say that an automatic sprinkler system in the main exhibit hall could have controlled the fire and significantly reduced the $150 million-dollar loss.

Please take this hard lesson to heart. The buildings you design to be "fireproof" are not fireproof. Contents—including people—will burn. Your client's ability to stay in business demands "Automatic" Sprinkler protection.

An "Automatic" Sprinkler system puts out fires almost before they begin. With minimal water damage, since 95% of fires are extinguished with three heads or less.

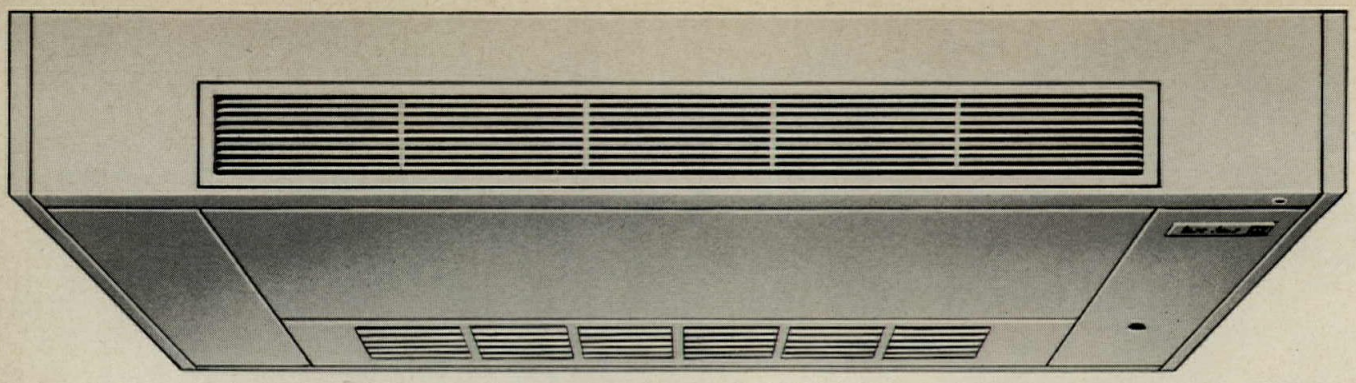
Sprinklers do not add another cost to your building. You can realize economies in construction which more than offset the cost of "Automatic" Sprinklers—and your client can lease his "Automatic" Sprinkler system without capital outlay. Even make lease payments out of insurance premium savings.

To find out how, write immediately to Mr. E. A. Stroupe, Marketing Manager, "Automatic" Sprinkler Corporation of America, Dept. AR-367, Box 6929, Cleveland, Ohio 44101, for your free copy of our fact-filled book entitled "The High Cost of Burning."

You owe it to your client to act promptly.

"Automatic" Sprinkler
CORPORATION OF AMERICA
CLEVELAND, OHIO 44101

Meet the growing family of "Automatic" Sprinkler: American LaFrance Division • "Automatic" Process Piping Co., Inc. • "Automatic" Vandalarm Division • Badger Fire Extinguisher Company, Inc. • "Blaze Guard" Manufacturing Division • Fee & Mason Manufacturing Company, Inc. • Hydraxtor Company • Kersey Manufacturing Co. • Powhatan Brass & Iron Works • Safway Steel Products • William Stanley Company



CEILING

UNIT VENTILATORS

AAF/Herman Nelson introduces a new design for overhead installation.

Now, AAF/Herman Nelson has engineered the "SG" unit ventilator expressly for ceiling installation. Here's what the new line means for you:

First, new unit offers total inlet/outlet flexibility: four outdoor air inlets, four return air inlets, four conditioned air outlets.

Second, choose the air-handling capacity that best suits your requirements. Five models available to handle up to 2,000 cfm at ½" external static pressure. Can be installed for remote operation.

Third, variety of coil options lets you fit unit to any heating/cooling system.

Fourth, SG unit ventilators can be installed in most ceiling configurations.

Fifth, glass-fiber filtering rolls make sure your classroom air stays clean. Filtering media is easily advanced by hand crank—from the floor. And an automatic signal light tells when the job must be done. One roll lasts two years in average installation.

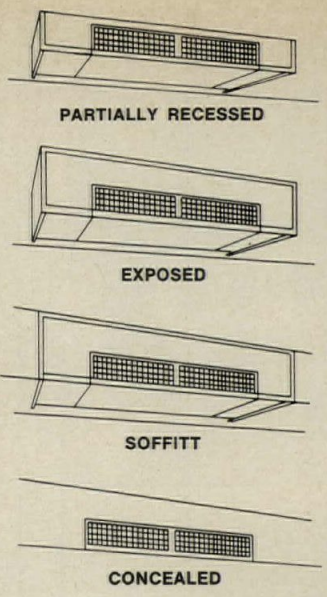
Sixth, positive back-draft protection keeps fuel costs down.

Seventh, maintenance is never a problem. Motor and bearings are permanently lubricated and sealed at the factory. Motor has automatic reset thermal overload protection.

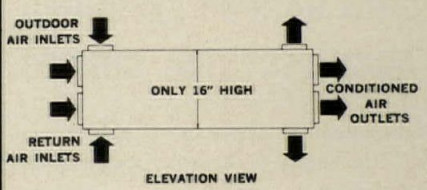
Add them all together and wrap them in the famous AAF/Herman Nelson five-year written warranty on parts and labor, and you know why things are looking up in ceiling unit ventilation. See your representative for full information about the new SG line. Or write: Herman Nelson, School Products Division, American Air Filter Company, Inc., 215 Central Avenue, Louisville, Ky. 40208.

AAF Herman Nelson
SCHOOL PRODUCTS DIVISION

For more data, circle 133 on inquiry card



"SG" ceiling unit ventilators offer total air inlet/outlet flexibility—meet variety of architectural requirements



Whatever the room requirements, there's an "SG" unit designed to fit in. Low unit height meets critical soffitt dimensions. For partially and fully recessed units, wall guard flanges are standard accessories. Choose from nine baked-enamel colors to accent or harmonize with room decor. Or specify prime coat only for finishing on the job.

AAF

For more data, circle 133 on inquiry card

continued from page 264

EPOXY TERRAZZO / A new flooring material is said to give a lifetime stable conductivity of 150,000 to 250,000 ohms to floors in hospitals and laboratories. The material can be laid in two days and requires no special bed preparation. It is seamless and remains impervious to germs bacteria, water, grease, oils, solvents, chemicals and most acids. ▪ H. B. Fuller Company, St. Paul, Minn.

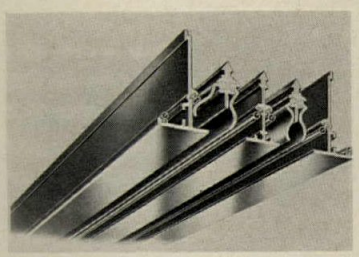
Circle 320 on inquiry card

FILES / Companion units that match the *Roll Out Conserv-a-file* cabinets in size and color are lockable units available with sliding doors, adjustable shelves, or clothes hanger rods. Units measure 36¾ in. wide by 63½ in. high. Depths may be 17 in. or 20 in. ▪ Supreme Steel Equipment Corp., Brooklyn, N.Y.

Circle 321 on inquiry card

INCINERATOR CLEANER / A compact scrubber removes dust particles from flue gases of apartment house incinerators. The 3000-cfm unit, which may be installed either in the basement or on the roof, requires only 15 gpm of water. The water is recirculated from a reservoir in the base of the unit. ▪ Johnson-March Corp., Philadelphia.

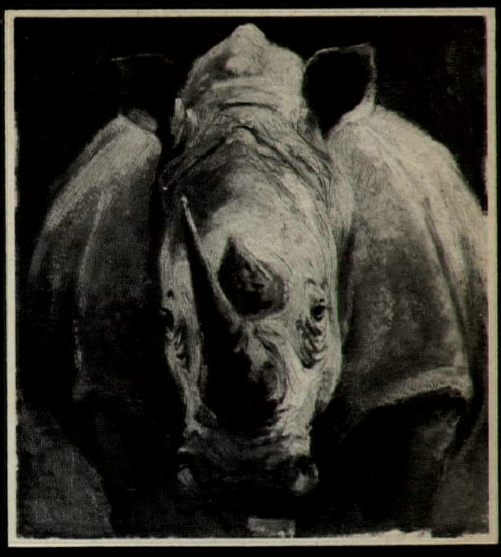
Circle 322 on inquiry card



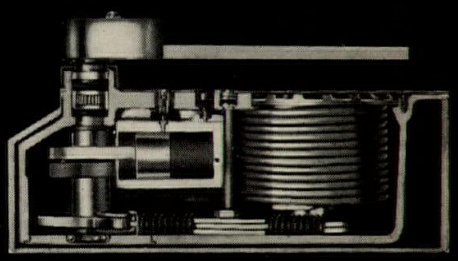
DIFFUSER / The all anodized aluminum "ASD" *Air-Slot* continuous line diffuser, in ¾-in. and ½-in. wide single or multiple slots, features face-side adjustment of the air pattern, flow rate control, and blank off, with the same vanes. Standard sections are up to 8 ft long, with dual alignment key-strips. ▪ AirGuide Corporation, Hialeah, Fla.

Circle 323 on inquiry card

For more data, circle 134 on inquiry card



RUGGED



STRONG

STURDY

No. 27 (offset hung)—No. 28 (center hung) — No. 327 (independently hung) concealed floor closers . . . the most rugged devices ever developed to control single acting doors. The only floor closers of their kind to permit all normal adjustments without removal of cover plate or threshold.

Choose selective on-off hold-open, automatic or non hold-open. Positive stop: Nos. 27 and 28 at 85°, 90° or 105°. . . No. 327 at 90° or 95°.

For exterior or heavy interior doors of any kind . . . you cannot specify a better control.

RIXSON CLOSERS

A DIVISION OF RIXSON INC.

FRANKLIN PARK, ILLINOIS • REXDALE, ONTARIO

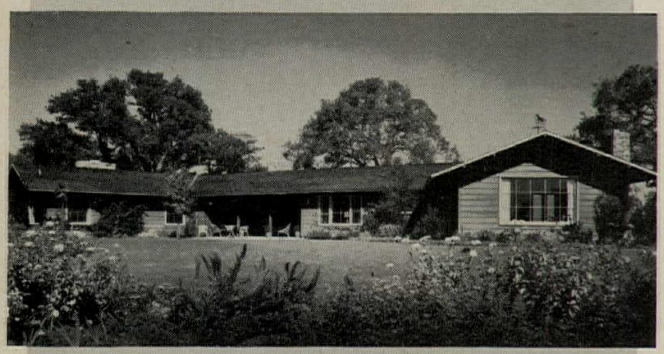
specify...Cabot's

Enhance the beauty of REDWOOD

inside . . .

House in Los Altos, Calif.
Architect: Bolton, White and Jack Herman, San Francisco
Paneling and woodwork finished with Cabot's Stain Wax.

outside . . .



Redwood siding and trim stained with Cabot's Creosote Stain.

Specify

Cabot's

Finishes for

REDWOOD

Architects and builders know that Cabot produces the ideal finishes for Redwood. • Easy to apply and economical • Accent the texture and grain

For exteriors:

Your choice of finishes — clear, natural, gloss, driftwood or stains in 35 distinctive colors.

For interiors:

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Samuel Cabot, Inc.
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For more data, circle 135 on inquiry card

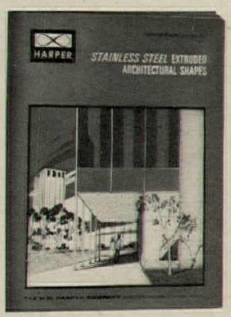
MUSSON Safety TREADS are BEAUTIFUL, too!

MAXIMUM NON-SLIP STAIR SAFETY can be had in beautiful Musson Molded rubber. Accented with ¾" black abrasive strips—one is 1" from front with ¾" separation to second — they give super safe footing. Treads are 12½" deep, with 3/16" and 5/16" thicknesses; lengths of 36", 42", 48", 60", 72". For wood, metal, pan filled or concrete steps. Marbleized Colors: Red, Green, Gray, Mahogany, Black, Birch, Beige, Walnut.

Write For Catalog, Samples, Prices

THE R. C. MUSSON RUBBER CO.
1320 Archwood Ave. Akron, Ohio 44306

For more data, circle 161 on inquiry card



NEW TECHNICAL BULLETIN ON HARPER EXTRUDED STAINLESS STEEL ARCHITECTURAL SHAPES

Now you can get thinner-than-ever, complex *extruded* architectural shapes in all the stainless steel alloys . . . in lengths to 60 feet . . . and this free new 28-page technical bulletin tells you all about it.

Thanks to Harper's breakthrough in extrusion technology and expansion of facilities, extruded stainless steel shapes—standards and specials—are now commercially available at economical prices for a host of architectural applications. Window and door members, door pulls, handrails, curtain wall sections, thresholds and gravel stops are a few examples.

In addition to listing data on physical properties of Harper stainless steel extrusions, the new bulletin illustrates design possibilities and limitations . . . contains specific design suggestions . . . and includes data on cutting, welding and various finishing operations.

Use the Reader Service Card in this issue of *Architectural Record* to get your free copy of our new Technical Bulletin No. 205. Or write direct to The H. M. Harper Company, Alloy Mill Products Division, 8244 Lehigh Avenue, Morton Grove, Illinois 60053, U.S.A.

For more data, circle 168 on inquiry card

What's come over steel?

The new Lyon concept:

QUIET STRENGTH . . . WITH FLAIR!

You're looking at the forerunner of what others *may* offer in steel furniture... later! Every inch is *totally* new; freshly designed to provide greater strength, soundproofing and elegance per dollar than ever before!

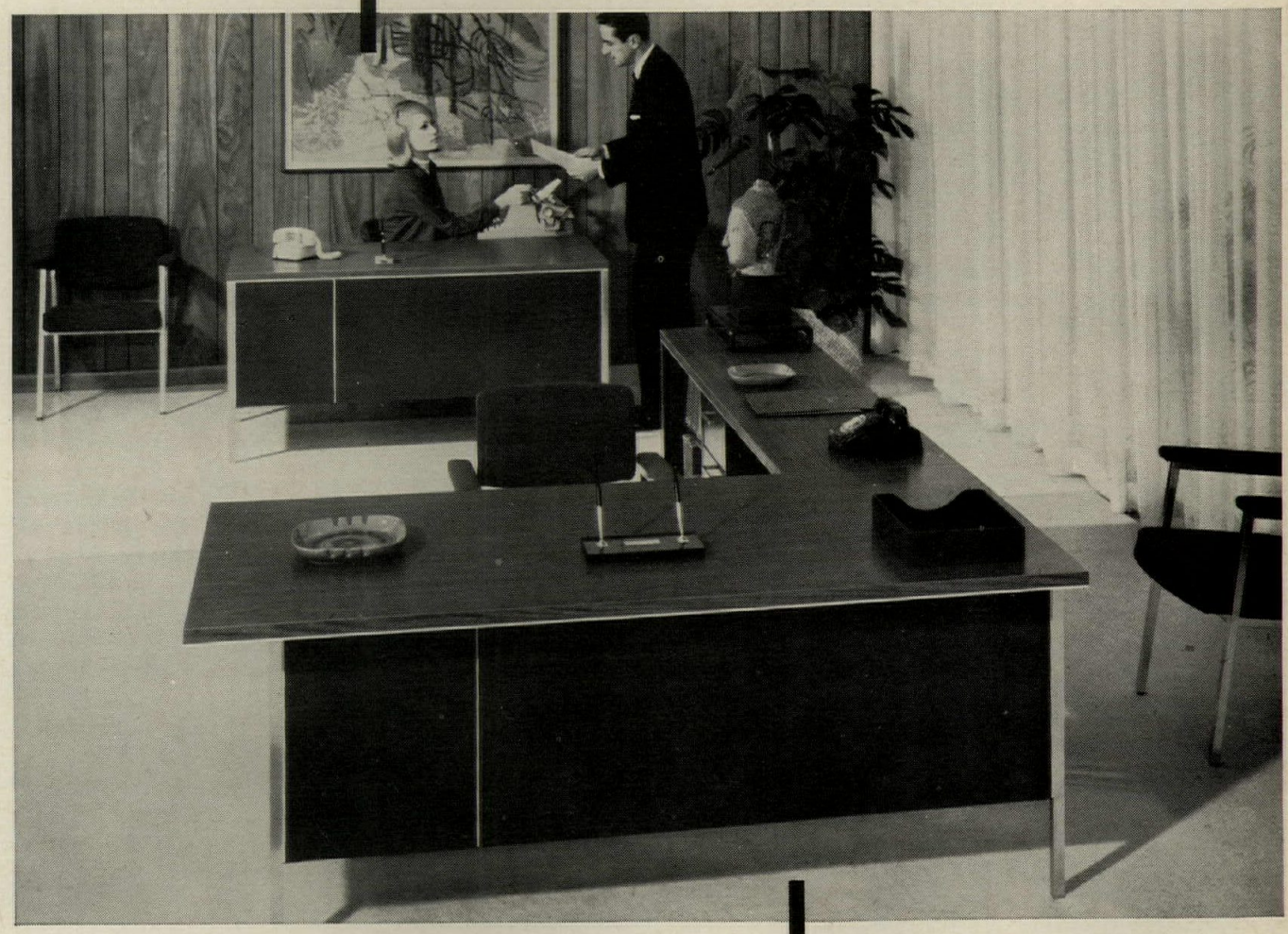
Lyon desk tops are sturdily constructed of two layers of steel, the lower layer continuously ribbed for maximum strength. We made them the main structural member, from which all other members stem. Result: the greatest beam and torsional strength in the industry.

Back panels are double wall type, with honeycomb filler for complete soundproofing. Lyon pedestals are continuous-welded tubular structures which completely gird the front opening. These too, are *fully* sound proofed. Our exclusive "lock-in-top" feature controls *all* drawers, provides for interchangeability of pedestals.

We've sculptured our steel carefully, for less massive appearance, more leg room. Complete serenity is provided by double-walled drawers, lubric plastic glides, and rubber bumpers. To top it all off, there's a choice of 9 lustrous 100% acrylic finishes that will last with the furniture.

Can such features come without a premium price? Certainly! See your Lyon office furniture dealer! Ask him about the "unprecedented 7*" Lyon advantages.

*Patents Pending



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Showrooms: New York, Chicago, Los Angeles

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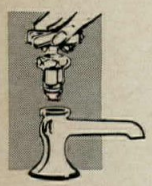
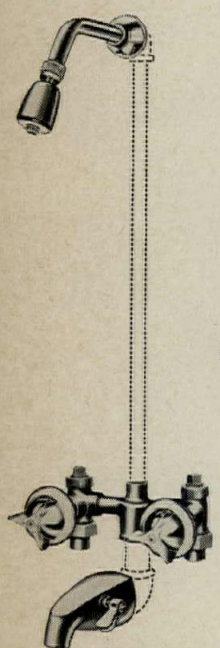
What's the Big Idea in Chicago Faucets?



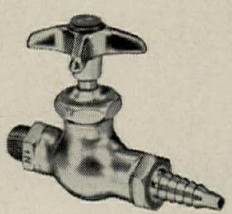
It's simple really. The faucet body doesn't wear out. The parts that do wear are all in one replaceable unit. And today's unit still fits Chicago Faucets made as much as 50 years ago—completely renews the operating heart almost as easily as you'd change a light bulb.

No other faucet can offer you such assurance of long life expectancy, ease of maintenance, or honest economy. Keep the Chicago Faucet idea in mind for your next job.



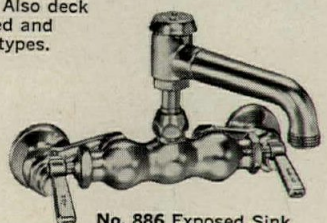
No. 1749-6
Built-in Tub and Shower Fittings.

You can get this Big Idea in the biggest selection of faucets available—for residential, commercial, institutional and laboratory use. Write for catalogs.



No. 937
Laboratory Table Fitting, Available for water, steam, gas or air service. Also deck mounted and turret types.

No. HC807
Push Button Lavatory Spout allows about 10 seconds flow, then closes automatically. Smart new answer for public or school washrooms.



No. 886 Exposed Sink Faucet, with integral vacuum breaker. Other types with wall brace, pail hook, integral stops, etc.

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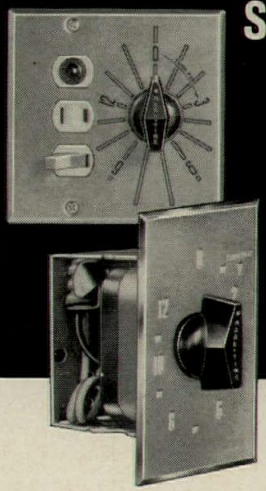

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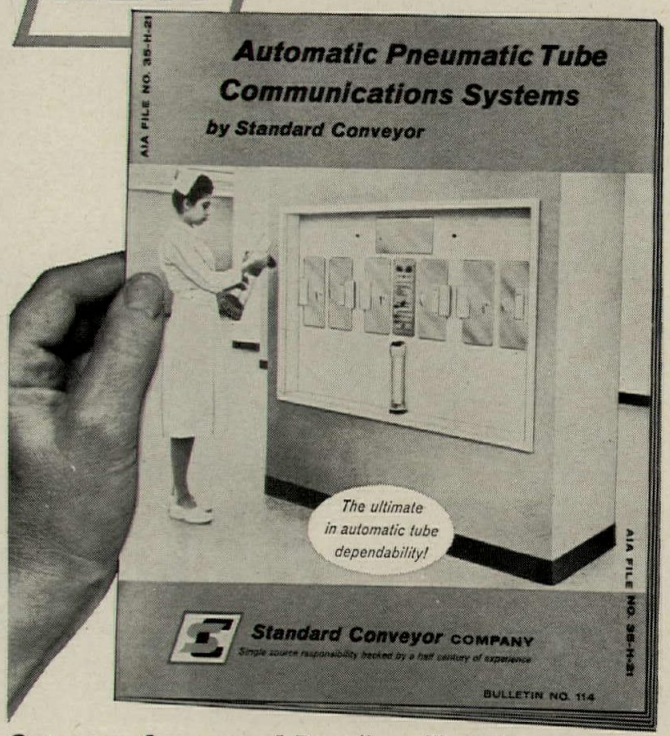
NEW All you need to know about



Get your free copy! Describes, illustrates new type automatic tube systems featuring greater dependability, quieter operation. 12 pages. ***Standard Conveyor Co., 312-C Second St., North St. Paul, Minn. 55109.***

For more data, circle 170 on inquiry card

continued from page 202

STEEL LOCKERS / An 8-page catalog shows steel locker units for schools, plants and offices. Units are suitable for varied uses and space requirements. Included are samples of the 12 decorator finishes available. ▪ Penco Products Inc., Oaks, Pa.

Circle 414 on inquiry card

WALL JAMBS / The *Pioneer Frame Selector* determines the appropriate jamb sizes for all wall types, including poured masonry, concrete block, laminated partitions, wood stud, and steel stud. ▪ Pioneer Industries, Carlstadt, N.J.

Circle 415 on inquiry card

GLASS DOORS / A 12-page booklet features styles and combinations of *Tuf-flex* glass doors. Specific sections deal with fittings, safety hardware and custom doors. ▪ Libby-Owens-Ford Glass Company, Toledo, Ohio.

Circle 416 on inquiry card

HEATING SYSTEMS / A 20-page illustrated catalog describes unit and air heaters and multi-unit installations for various types of industrial and commercial structures. The catalog includes performance charts for air heaters. ▪ PowRmatic, Inc., Palisades Park, N.J.

Circle 417 on inquiry card

FLOODLIGHTING / The selection, specification and installation of floodlights, brackets, poles and related equipment for indoor and outdoor use are illustrated in a revised guide. Recommended illumination levels for sports and exterior lighting, isocandle curves and other data are included. ▪ Spero Electric Corp., Cleveland, Ohio.

Circle 418 on inquiry card

SOUND CONTROL / A 12-page rated sound control construction system booklet includes sound control definitions, selector guide for both floor and partition systems for sound control, suggestions for added quiet conditioning and a summary of the FHA minimum property standards for multi-family housing. ▪ The Celotex Corporation, Tampa, Fla.

Circle 419 on inquiry card

CONDENSING UNITS / Air-cooled condensers and condensing units of from 7½- to 60-ton capacities available in 19 different space-saving, weight-conserving models are reviewed in a newly revised, 8-page technical information "digest." The units are specially designed for roof-top installation. ▪ Acme Industries, Inc., Jackson, Mich.

Circle 420 on inquiry card

For more data, circle 138 on inquiry card

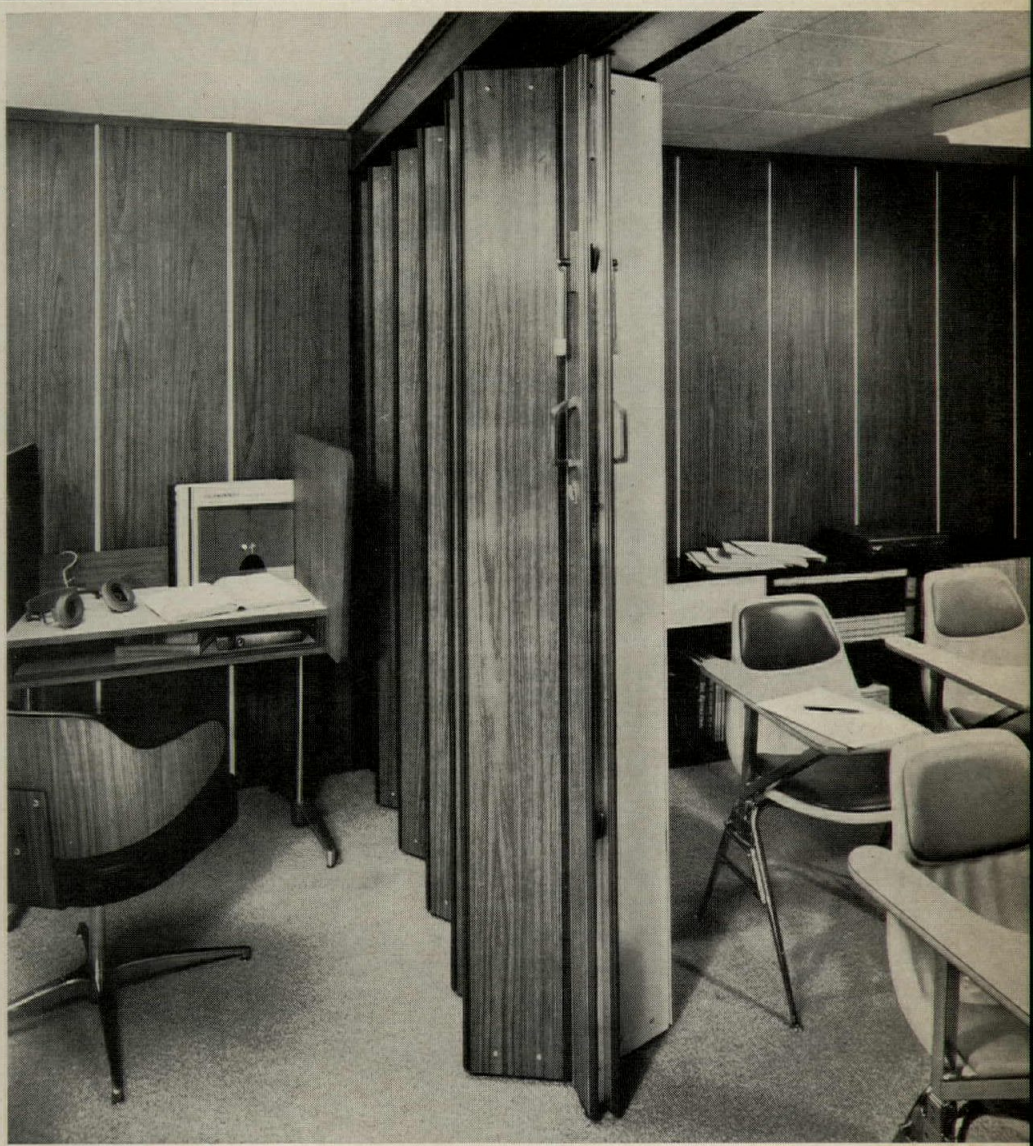
INDUSTRIAL LUMINAIRES / The 96-model line of *Filterglow* enclosed and *Econoglow* open-ventilated luminaires is described in a 24-page bulletin that includes single or twin-mounted designs for mercury-vapor, Lucalox or Multi-vapor lamps, in 400-and 1000-watt ratings Detailed charts give photometric data. ▪ General Electric Company, Schenectady, N.Y.

Circle 421 on inquiry card

STEEL CABLES / A booklet entitled "Tentative Criteria for Structural Applications of Steel Cables for Buildings" defines common terms used in steel cable construction and makes specific recommendations on a variety of major factors in the design and construction of cable structures. These include preparation of plans and drawings as well as general specifications covering loads, deflection, cable fabrication and protection, end fittings, erection techniques and, construction inspection. ▪ American Iron and Steel Institute, New York.

Circle 422 on inquiry card

** Additional product information in Sweet's Architectural File*



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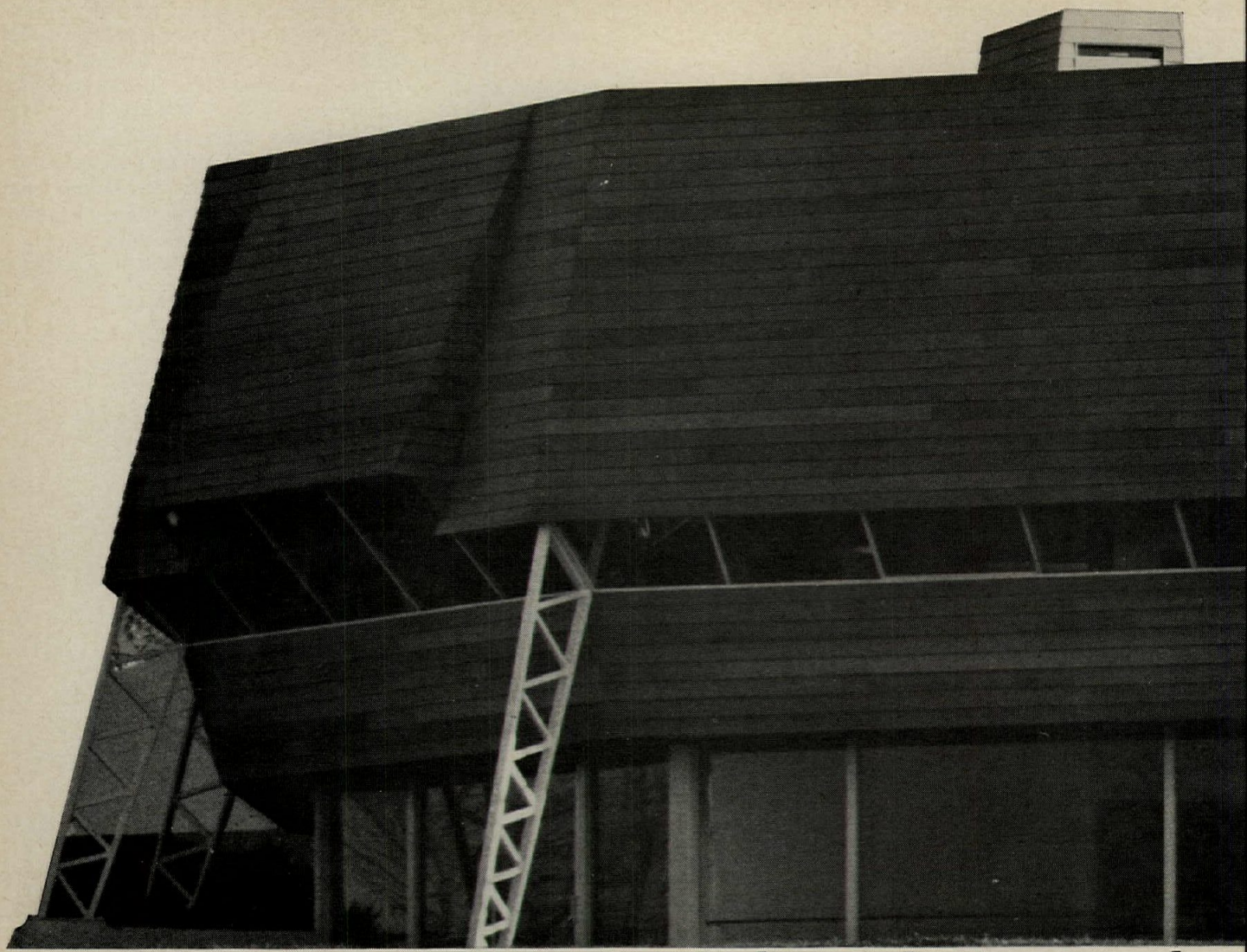
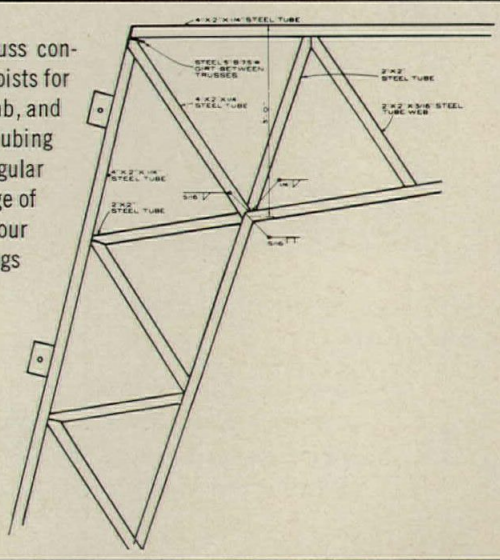
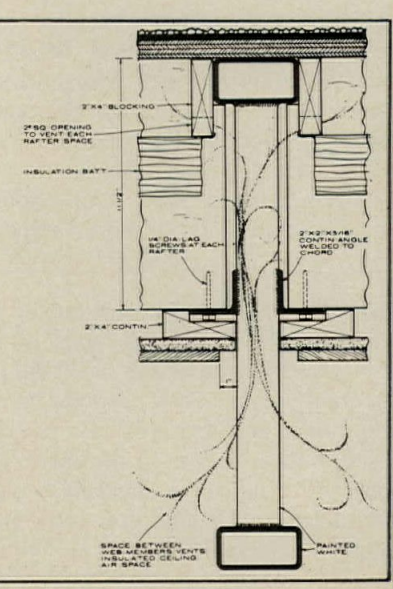


Republic Steel Tubing helps make

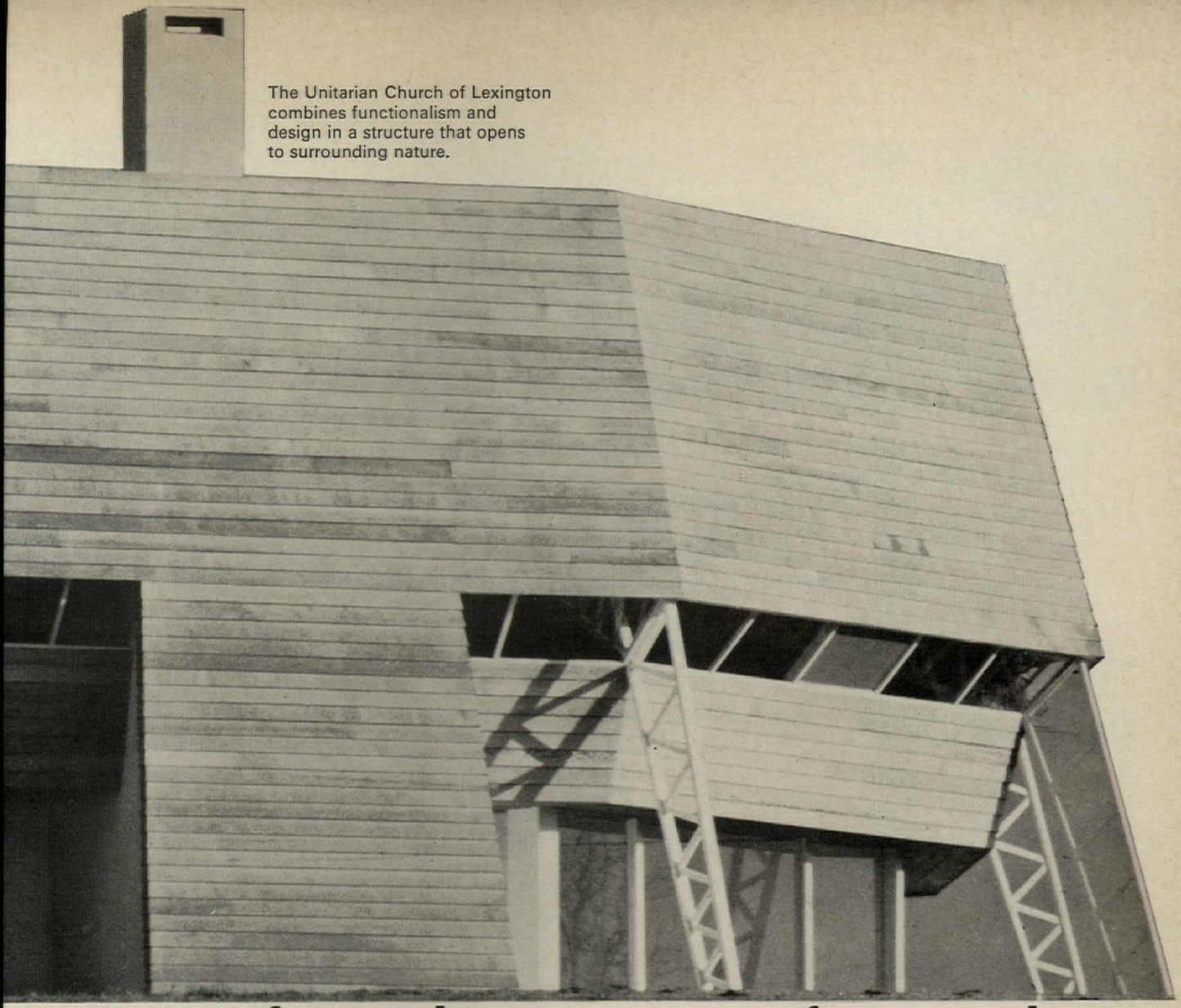
Detailed truss, left, and typical joist to truss connection, right, show steel trusses and wood joists for church roof, reinforced concrete frame and slab, and concrete block infilling. Republic Structural Tubing is available in round, square, and rectangular shapes in a full range of sizes. Take advantage of this high strength welded steel tubing for your next design and construction project. (Drawings courtesy of Progressive Architecture.)





Steel

This STEELMARK of the American Steel Industry on a product assures you it is modern, versatile, economical Steel. Put it on products you sell; look for it on products you buy.



The Unitarian Church of Lexington combines functionalism and design in a structure that opens to surrounding nature.

a place of worship a tower of strength.

Architect Herb Greene specified Republic Structural Tubing for trusses in the new Unitarian Church of Lexington, Ky.

The Unitarians of Lexington wanted their new church to be more than just a meeting place for Sunday services. It had to accommodate weddings and square dances and musicales, plus a theater-in-the-round. And it all had to be accomplished with a small budget.

So, architect Herb Greene set to work. He designed a church of steel, concrete, and wood.

The finished two-story structure is supported by ten Republic Structural Steel Tubing trusses. Each truss member is welded onto an I-beam at a point 10 feet from the center of the compression ring. Truss, beam, and ring form an arch that runs into the ground and is bolted onto a concrete footing.

Not only do the white-painted steel trusses add a decorative touch inside, they look like supporting stilts on the outside . . . placed to keep the heavy wooden "umbrella" from tipping.

The Unitarians now have their church. And it's more than just a building. Utilizing Republic Structural Steel Tubing, Herb Greene made it an economical tower of strength.

☐ Please send me the name of the nearest Republic ELECTRUNITE Structural Steel Tubing distributor.

☐ Please send me your brochure with strength tables on Republic ELECTRUNITE® Structural Steel Tubing.

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Company_____

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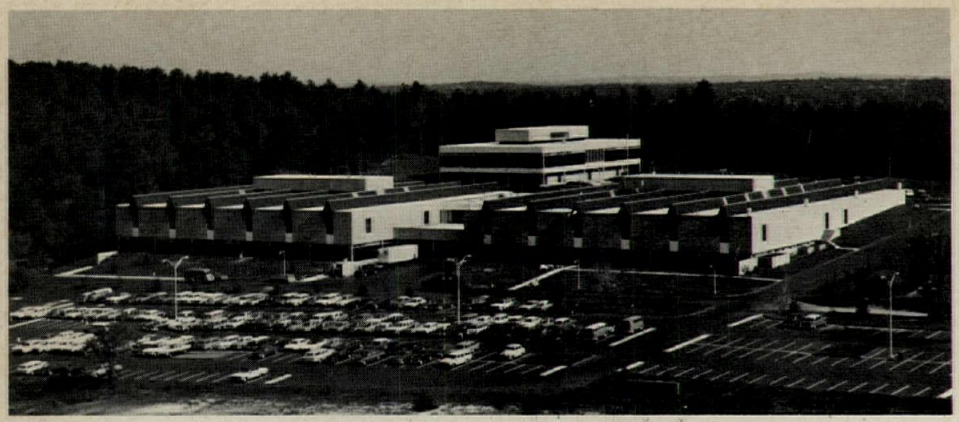
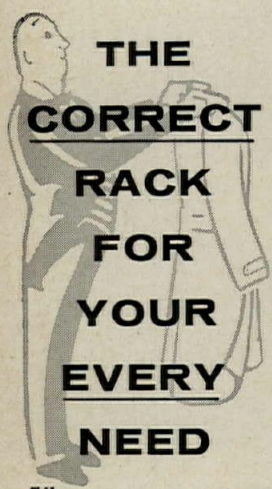
City_____ State_____ Zip_____

REPUBLIC STEEL
CORPORATION
STEEL AND TUBES DIVISION
201 East 131st Street
Cleveland, Ohio 44108

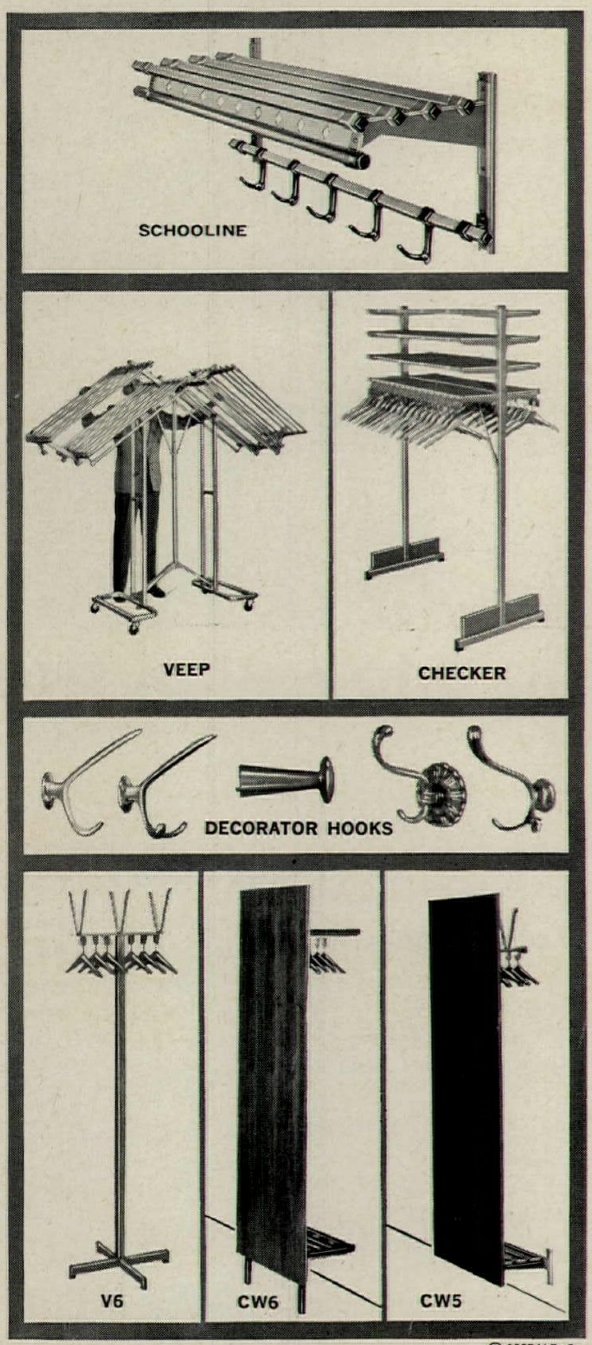
For more data, circle 128 on inquiry card





THE CORRECT RACK FOR YOUR EVERY NEED

T.M.



Vogel-Peterson is not a "one-type-for-all" company. Rather it provides complete lines of superior wardrobe units, specifically designed to exactly meet specific needs. Each rack illustrated represents a complete line of matching units. *Top to bottom:* The indestructible "Schooline," self-cleaning, square tubular steel. Fold-Away Veeps. Smartly designed Checker racks. Garment hooks of sculptured brass or cast aluminum with (cloisonne-like) enamel inserts. Modern costumers and sensational wall-mounted hidden wardrobes.

Patents Pending

© 1965 V.P. Co.

Write for Architects Catalog FL-52 with (styles, finishes and specifications). Requirements studies, layouts, load factors, etc. furnished to architects.

VOGEL-PETERSON CO.

"The Coat Rack People" ELMHURST, ILL.

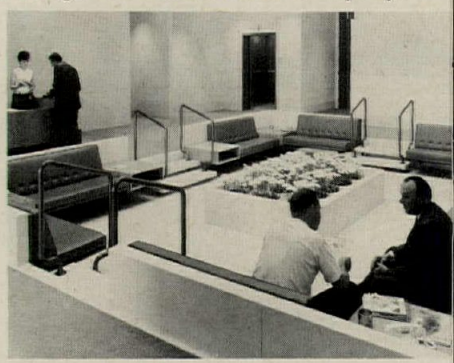
For more data, circle 140 on inquiry card

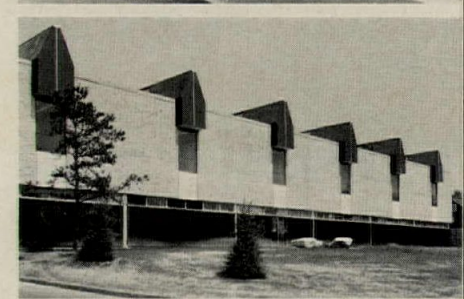
Industrial complex provides "daylight awareness"

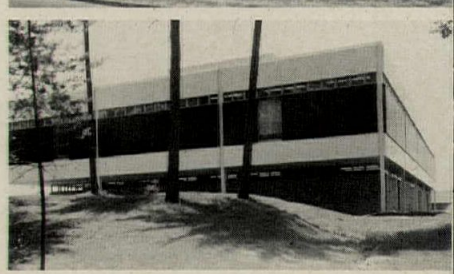
The recently completed three-building headquarters of Edgerton, Germeshausen & Grier, Inc., in Bedford, Massachusetts provides "daylight awareness" rather than direct scenic views by use of skylights and raised window levels throughout the complex. The reason for such fenestration: "In buildings designed for work, exterior windows offering large scenic views are of little real value; instead, such windows may well be detrimental because of the difficulties they impose on environmental control."

The complex consists of a two-story administration building containing 30,000 square feet, connected to one of two research and development buildings (containing 55,000 and 70,000 square feet) distinguished by their long skylights which terminate in overhanging gables. The research buildings are connected by a 12,000-square-foot, two-story cafeteria link.

Architects are Charles Luckman Associates; structural engineer: Stephen Olko; electrical and mechanical engineers: Wald & Zigas; interior design (color and furniture selection): Hans Kriek's Associates; landscape architect: Jack Nazar; and general contractor: George B. H. Macomber Company.







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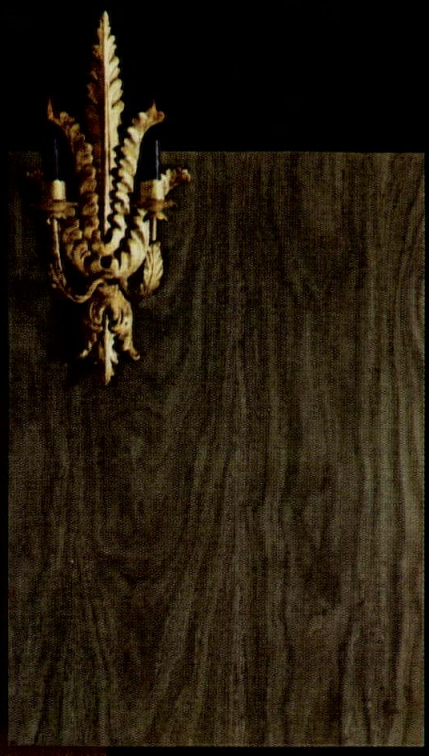
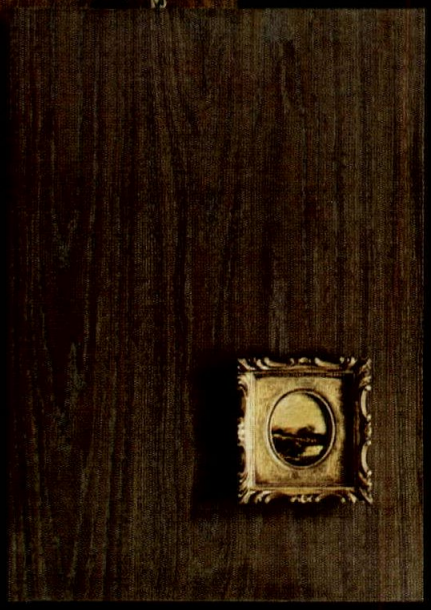


Mediterranean
Pecan W-51

Rosewood
W-39

Colonial Cherry W-50



Black Oak W-45

Cathedral
Walnut W-27

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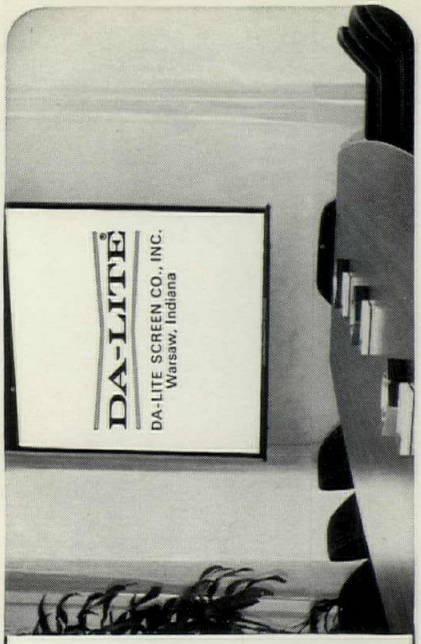
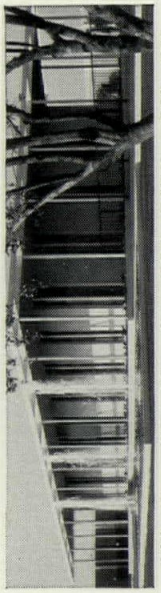


Missile Systems Div. of Atlantic Research Corporation selects two Da-Lite® automatic projection screens.

See our ad in Sweet's Catalog



The Atlantic Research Corporation's Missile Systems Division, Costa Mesa, California, utilizes two projection screens. Both fully automatic. And both made by Da-Lite, the originator of the first electrically operated screen.

Why Da-Lite? Fully automatic operation—goes down and up, and out of sight, at the touch of the button • Ease of handling • Space conservation • Built-to-last construction • And sensible prices.

Electrically operated Da-Lite screens (4 models in all) are designed for easy installation on the wall, ceiling or within the ceiling. Sizes from 50" x 50" thru 20' x 20'.

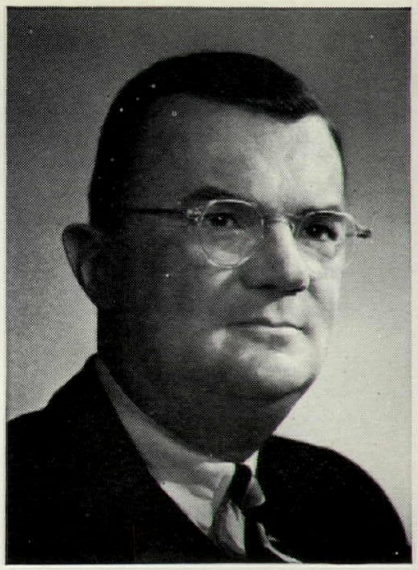
The Da-Lite screens were purchased from A. F. Milliron Co., Inc. Write for information and the name of a franchised Da-Lite dealer near you.

Engineering library will house 150,000 volumes

The Mart Memorial Library at Lehigh University, Bethlehem, Pennsylvania, designed by Steinmann and Cain, will house 150,000 volumes and will seat 350. The $1.5-million structure will also house a special laboratory area for investigation of ways to help bring the vast stock of recorded knowledge under more adequate control. This library, for books related to science and engineering, will be a three-story building faced in brick and glass with limestone trim. Also provided will be an all-night study room, closed-circuit television system and electronic data processing equipment.

School designed for the mentally retarded

The South Eleventh Street School, Newark, New Jersey, designed by Frank Grad & Sons, architects and engineers, will serve the needs of trainable mentally retarded children. The building will have simple functional spaces connected by corridors which are deliberately kept as short as possible and which are varied by slight differences in shape and color, to enable the students to find their way about easily with a minimum of confusion. The $1,347,000, 41,000-square-foot school will contain 20 classrooms and five workshops on two levels and will surround a large square courtyard. Other facilities provided will include a two-level cafeteria-auditorium, administrative offices, library/conference room, faculty lounge and gymnasium. The school will serve 250 pupils between the ages of five and 20 years.



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"The greatness of America stems importantly from our many fine educational institutions, and industry is critically dependent on their graduates.

"The du Pont Company hires a large number of college graduates each year. As these employees gain business knowledge and experience, they supply tomorrow's need for managers and leaders of our Company.

"In 1966 we will grant $2,200,000 to 213 colleges and universities in all parts of the nation to help them educate leaders of the future. This represents the largest grant in the 48-year history of the du Pont Company's Aid-to-Education program."

Lammot du Pont Copeland, President, E. I. du Pont de Nemours & Co. (Inc.)

A major problem in the education of students is rising costs. If companies wish to insure the availability of college talent, they must help support colleges with financial aid.

SPECIAL TO CORPORATE OFFICERS—A new booklet of particular interest if your company has not yet established an aid-to-education program. Write for: **"How to Aid Education—and Yourself"**, Box 36, Times Square Station, New York, N.Y. 10036

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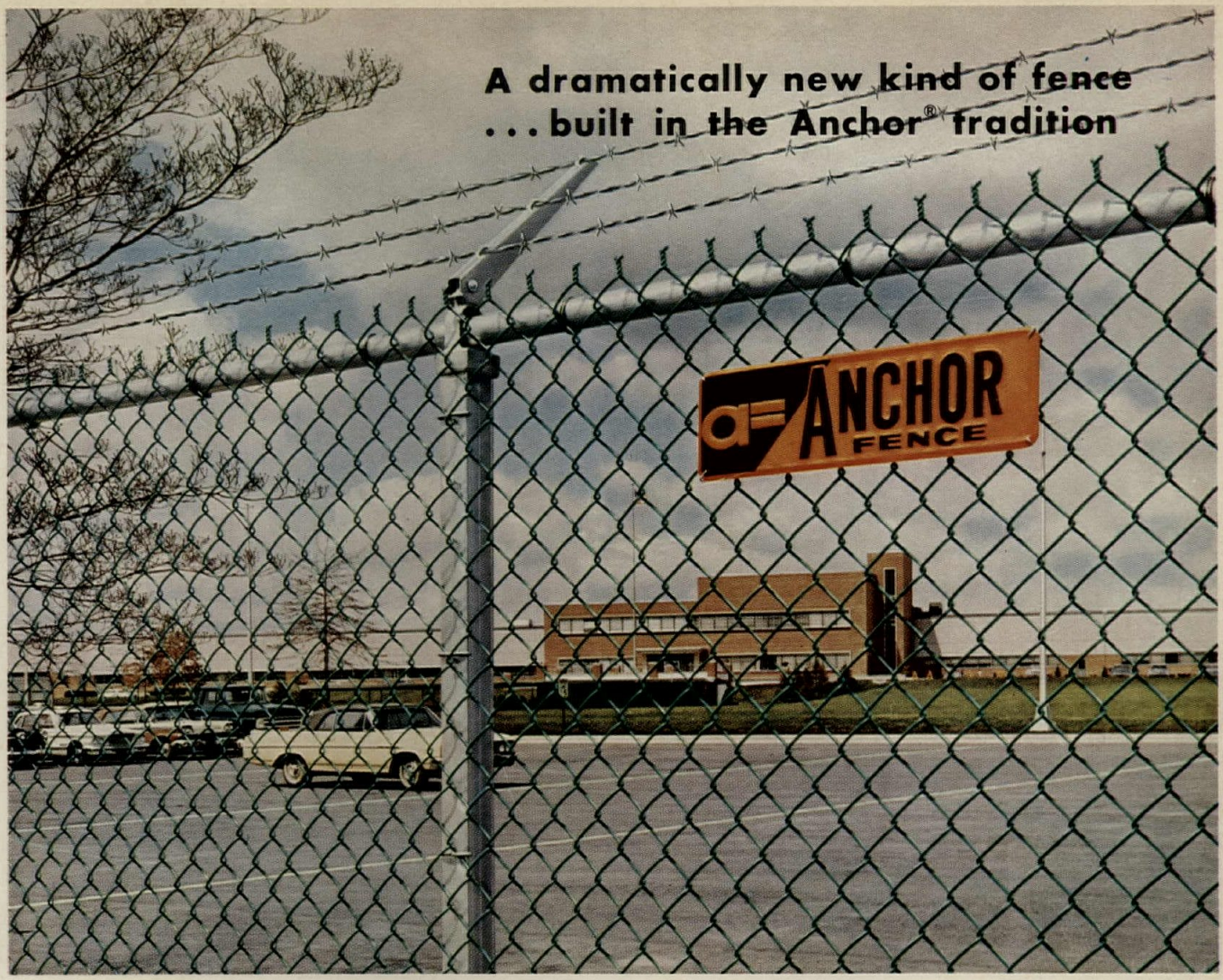

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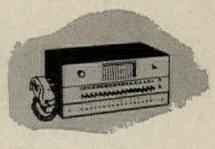

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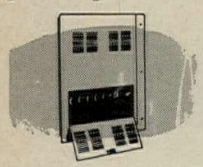

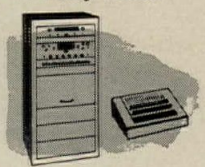

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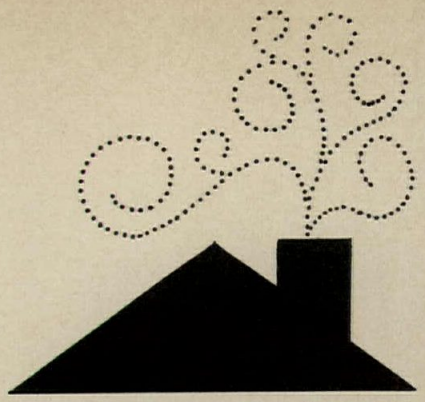
A 12-story office building for the John Hancock Mutual Life Insurance Company on Pennsylvania Avenue, Washington, D.C., designed by Edmund W. Dreyfuss and Associates, will be set back 50 feet from the street to conform with the redevelopment plans of the President's Commission on Pennsylvania Avenue. The $15-million project will be cantilevered at the third floor, creating a second-floor pedestrian walk and a ground-level arcade. The building will contain approximately 400,000 square feet and will have four underground parking levels for more than 300 cars. Basic exterior materials will be high-relief precast concrete panels and tinted glass.

University building will house international conference center

The School of International Affairs at Columbia University, New York City, will have 300,000 square feet in a five-story base structure, partially below grade, and a 10-story tower. The $12.9-million building will house a 600,000-volume library, classrooms, offices, specialized facilities for visiting scholars, television, audio-visual and translation equipment, and an international conference center on the top floor. Architects are Harrison and Abramovitz.



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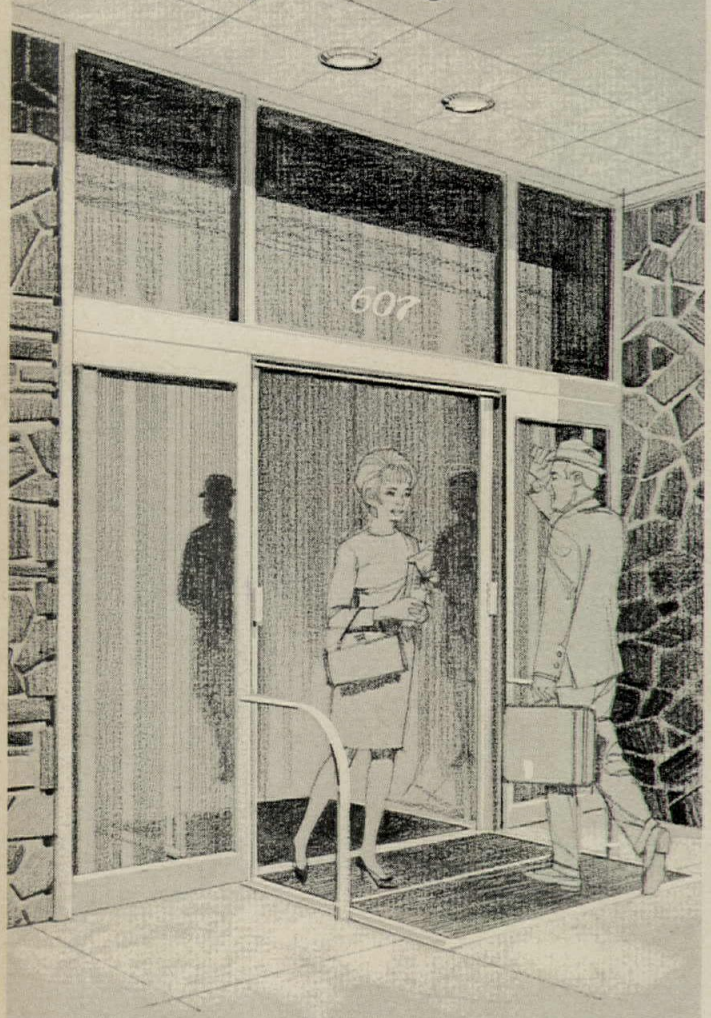

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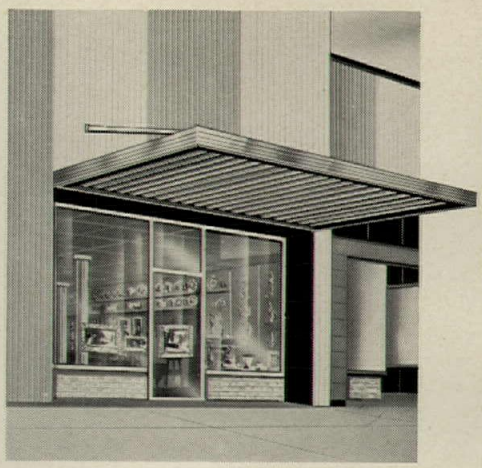

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ARCHITECTURE DESCRIBED BY GENEALOGY, AS LANGUAGE, AS CULTURAL VALUE

This month's book section reviews three entirely different approaches to the history of art and architecture. The first develops a highly selective viewpoint towards recent buildings and ends by exhorting the profession to live up to the pattern that the historians have developed. The second traces the history of an architectural theory and notes its manifestations and influences at the present time. The third attempts to treat the art of a certain period as an integral part of the other events that took place at the same time—an approach that has been attempted but rarely, and might have some useful results if it were tried more often.

TWENTIETH-CENTURY ARCHITECTURE, THE MIDDLE YEARS 1940-65. *By John Jacobus. Frederick A. Praeger, Publishers, 111 Fourth Ave., New York, N.Y. 215 pp., illus. $18.50.*

It is hard to believe that a book that is so scholarly, so complete, and so well presented as this one might nevertheless be setting forward some very questionable conclusions. It is, however, the very clarity and completeness of this work that make its point of view so difficult to accept. Ostensibly a history of architecture from 1940 through 1965, the book is really a detailed chapter from a historical description whose outlines have been established by historians like Sigfried Giedion and Nikolaus Pevsner. Mr. Jacobus acknowledges this cumulative heritage in an introductory chapter entitled "A Genealogy for Contemporary Architecture." The word "genealogy" seems to be used in all seriousness, although it is precisely around the differences between history and genealogy that all criticisms of this book must center.

The genealogical view of modern architecture that Pevsner and Giedion propagandized, and which Mr. Jacobus accepts, sets up a very small number of architects and buildings as the ancestors of almost all the architecture of today. This view, in turn, sets up a false comparison between the order and clarity that seems to have obtained in the days of the carefully selected ancestors, and the variety and comparative confusion that prevail at the present time.

As ideas do not really reproduce the way human beings do, a selective genealogical view of history leads to all kinds of contradictions which the completeness of Mr. Jacobus's study shows up very clearly. For example, Hans Scharoun, who gets fairly cursory treatment as an ancestor (he was apparently only a friend of the family) suddenly receives a full historical biography of his own in the section devoted to present-day architecture in Germany. Mr. Scharoun was blackballed from the "International Style," and he never made the "mainstream" as the art historians have been defining the mainstream; but here he is still inconveniently building important structures like the Berlin Philharmonic, and a conscientious historian knows that he requires some kind of historical explanation.

It is only fair to add that the genealogical view of modern architecture is the prevailing one at the moment. All over the country, art historians are busy imparting it to their students, using precisely the same illustrations that appear in Mr. Jacobus's book. All over the country graduate students are busy researching ever more insignificant aspects of the grand genealogical design; while art-historian-critics lean pantingly over the drafting boards of the great, ready to add each new tracing to the patterns of history. Very few people, however, seem to be giving any thought to the problem that—viewed from the perspective of any other kind of history—this whole top-heavy structure is founded upon a highly debatable assumption.

—Jonathan Barnett

THE CLASSICAL LANGUAGE OF ARCHITECTURE. *By John Summerson. The M.I.T. Press, Massachusetts Institute of Technology, Cambridge, Mass. 56 pp., illus. $5.95.*

Under the Beaux Arts system, what the British Art Historian Sir John Summerson refers to as the "classical language of architecture" was thoroughly learned and fluently spoken; but this language has passed out of architectural currency in very much the same way that Latin has vanished from the scholarly curriculum.

Summerson considers that the five Greek and Roman Orders were essential ingredients of classicism; but that classicism could also be considered a "demonstrable harmony of parts" of which the Orders were often, but not always, a manifestation. In a series of six radio talks (only the British could be expected to listen to a radio program about the Orders) Summerson undertook to explain the "grammatical workings of this architectural language" to a non-professional audience. The listeners could send in for a pamphlet of illustrations; and now both illustrations and the lectures are available as a book.

The entire work is pervaded by Summerson's charming style and seemingly effortless scholarship. What could have been an exceedingly dry analysis in someone else's hands becomes a means for investigating many of architecture's most subtle aspects. In Summerson's opinion it was Bramante's contemporary, Serlio, rather than Vitruvius or Alberti, who gave the five Orders the symbolic authority which made them a systematic, and international, architectural language. The major part of the book becomes an analysis of the way in which this language developed during the High Renaissance and the Baroque, the effects on it of 18th-century rationalism and archaeology, and its continuing influence both on the form of buildings and as a concept of rational procedure.

For those whose contact with architectural history has been mainly through the propagandistic efforts of the genealogical school, Sir John Summerson on the Orders should be quite a revelation.

continued on page 304

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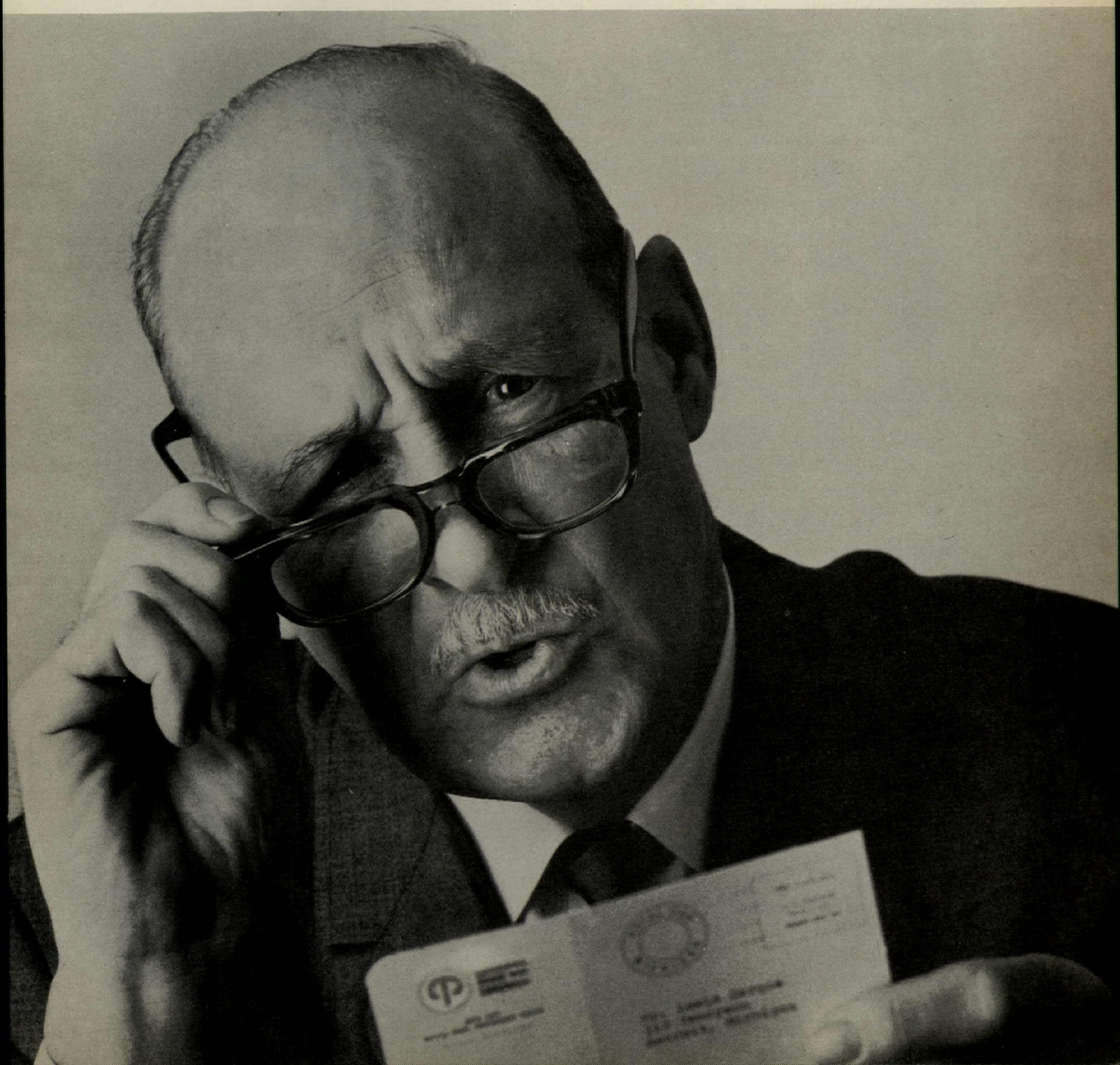

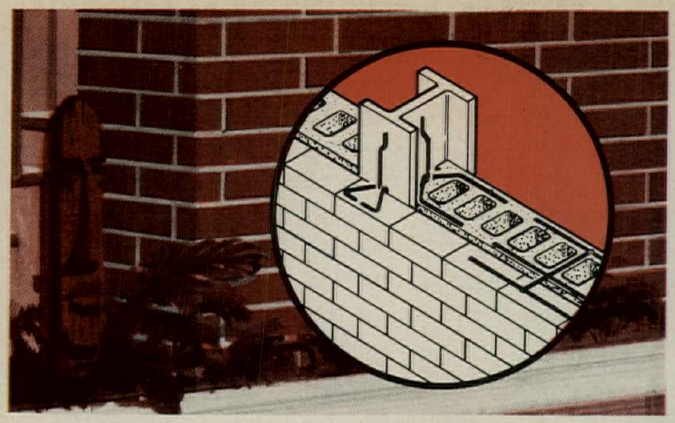

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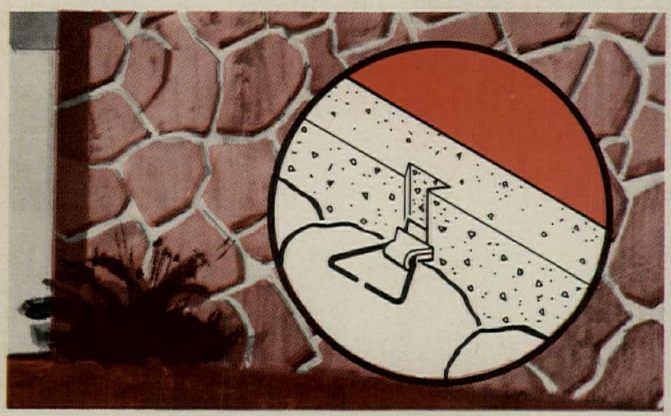

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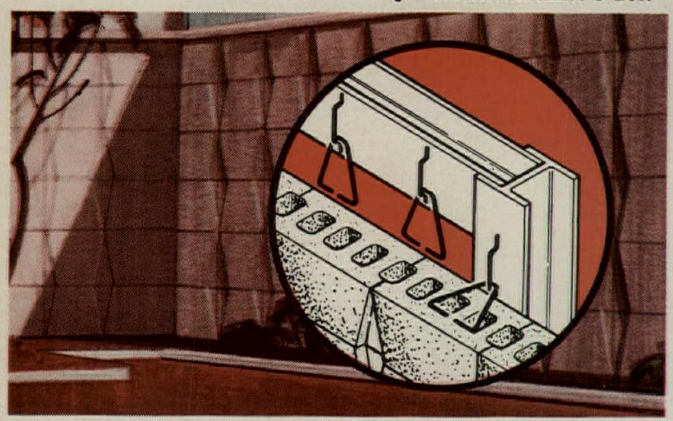

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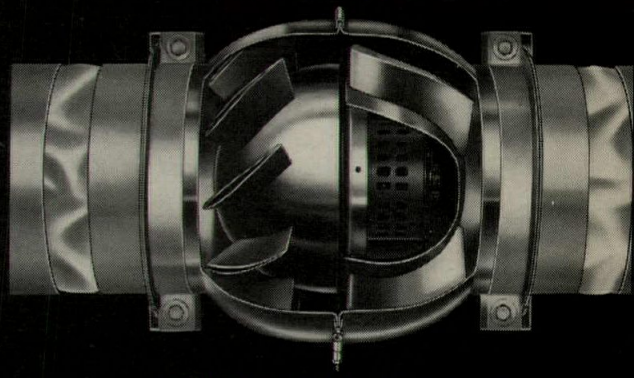

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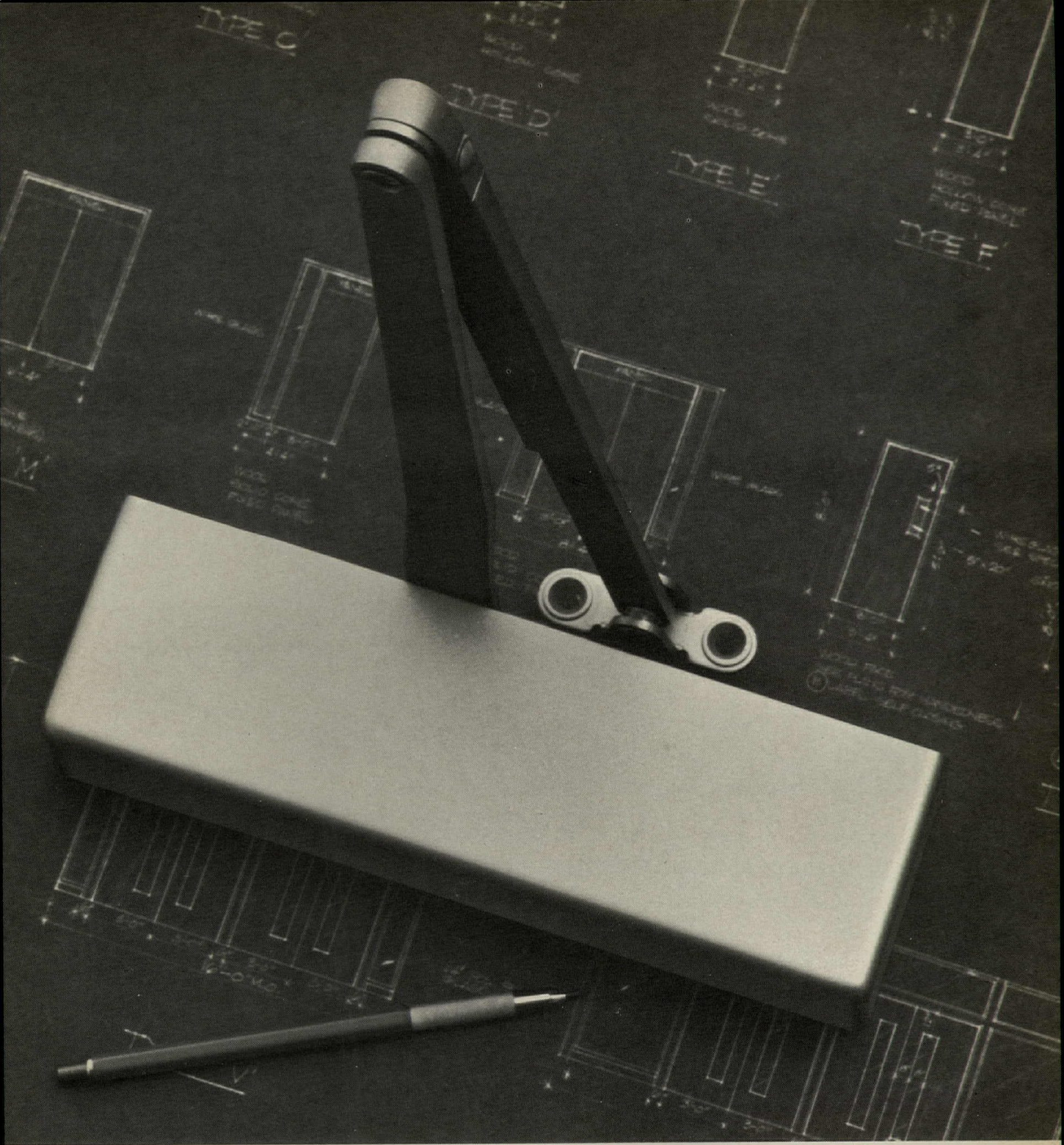

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continued from page 300

Early America

THE ARTIST IN AMERICAN SOCIETY. *The Formative Years 1790-1860. By Neal Harris. George Braziller, 1 Park Avenue, New York, N.Y. 432 pp., illus. $7.50.*

Mr. Harris is a historian who has decided to deal with a subject usually left to the more specialized methodology of art history—American art in the period between 1790 and 1860. Not surprisingly, his primary focus is the artist and his place in society, rather than the works of art themselves. The book's content is consequently refreshingly objective. Instead of the self-conscious analyses of painting and sculpture with which so many art histories abound, there are many citations of contemporary essays, newspapers and biographies—the source material of the cultural historian.

On the other hand, this book's genesis as a Harvard doctoral dissertation is still quite apparent; and the author's desire not to leave anything out has a tendency to make life extremely difficult for the ordinary reader, who would have been delighted to take Mr. Harris's expertise for granted in exchange for a simpler narrative.

Nevertheless, there is clearly a great deal of benefit in considering the problems of art and architecture in the context of other events. Mr. Harris points out that the artist in the early years of the United States was cut off from traditional ecclesiastical and aristocratic patronage and surrounded by a society with a puritanical view of any activity that was not demonstrably useful. Many present-day attitudes seem clearly traceable to this early set of circumstances, although Mr. Harris does not over-stress the parallels. Surely it would be worth while for someone to explore the reasons why so-called "modern" architecture was more acceptable as a European export than the far more subtle work of Wright had been, and how similar the mechanism of eventual acceptance was to the earlier importation of academic classicism. Anyone who is interested in the tendency of Americans to take their new artistic formulations from Europe will find valuable information in Mr. Harris's book. Similarly, the place of the artist in our society (who pays for art and is art worth what it costs?) is clearly traceable right back to the early days of the republic, as is the artist's response: the organization of academies and professional societies.

Mr. Harris's book shows that it would be enormously usefull if more professional historians would turn their attention to art, because by doing so, they might induce art historians to devote more attention to historical context.

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TEXAS HOMES OF THE 19TH CENTURY. *By Drury Blakeley Alexander. The University of Texas Press, Austin, Texas 78712. 276 pp., illus. $15.00.*

THE SANCTUARY OF HEMITHEA AT KASTABOS. *By J. M. Cook and W. H. Plommer. Cambridge University Press, 32 East 57th St., New York, N.Y. 10022. 180 pp., illus. $15.00.*

HANDBOOK OF MECHANICAL SPECIFICATIONS FOR BUILDINGS AND PLANTS, *A Checklist for Engineers and Architects. By Robert Henderson Emerick. McGraw-Hill Book Company, 330 West 42nd St., New York, N.Y. 10036. 482 pp., illus. $12.50*

THE VILLAS OF FRASCATI 1550-1750. *By Carl L. Franck. Transatlantic Arts, Inc., 565 Fifth Avenue, New York, N.Y. 10017. 174 pp., illus. $13.50.*

DESIGN OF THIN CONCRETE SHELLS, *Vol. II. By A. M. Haas. John Wiley & Sons, Inc., 605 Third Avenue, N.Y. 10016. 242 pp., illus. $14.95.*

PROJECT METRAN, *An Integrated, Evolutionary Transportation System for Urban Areas. Edited by Mark E. Hanson. The M.I.T. Press, 50 Ames St., Cambridge, Mass. 02142. 262 pp., illus. $7.50.*

THE GUIDE TO HOME REMODELING. *By A. J. Harmon. Holt, Rinehart and Winston, Inc., 383 Madison Ave., New York, N.Y. 10017. 255 pp., illus. $14.95.*

continued on page 309

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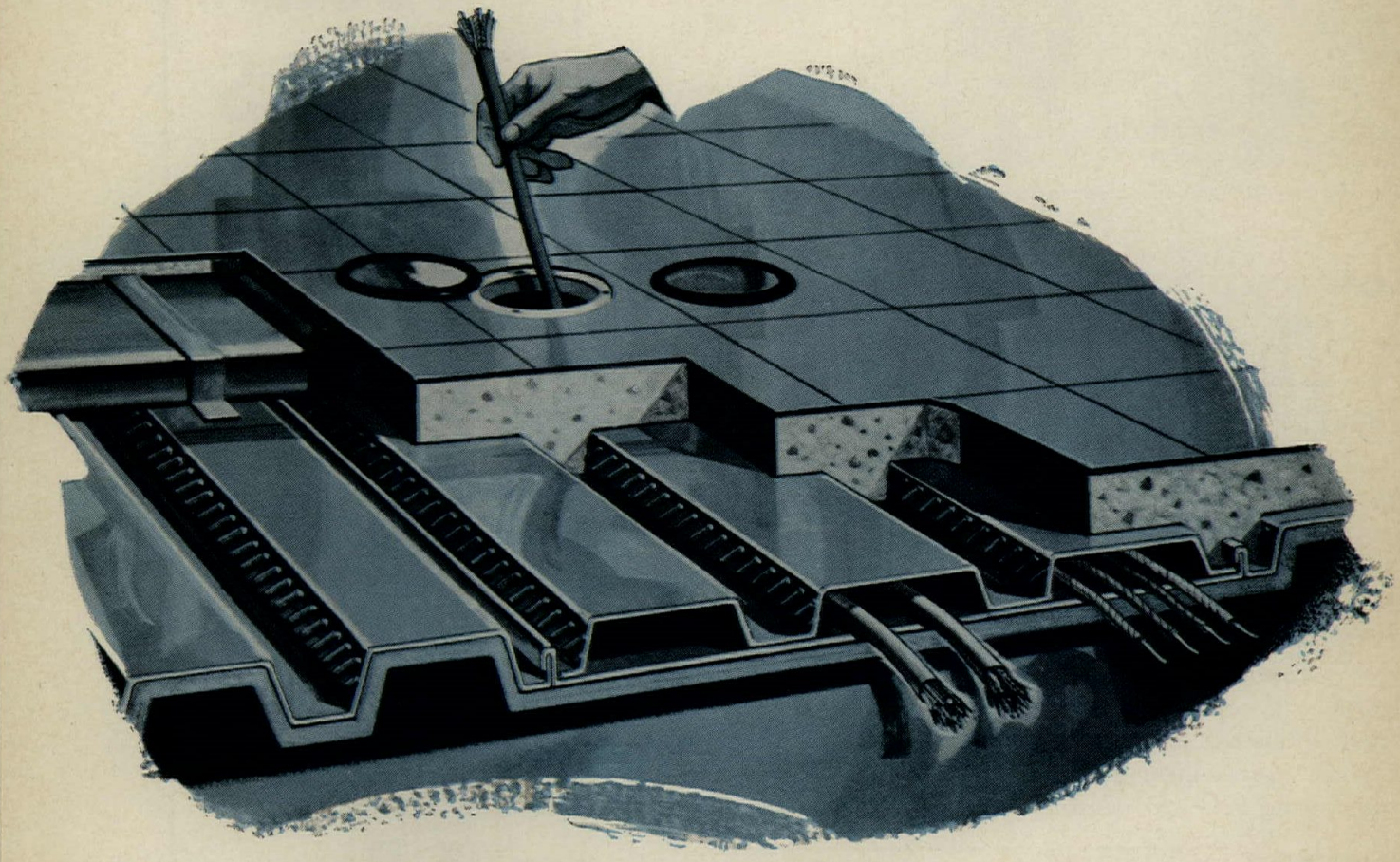

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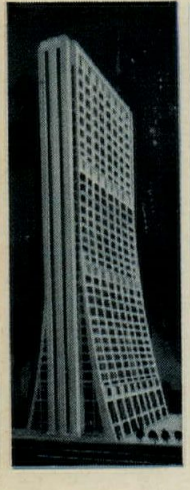

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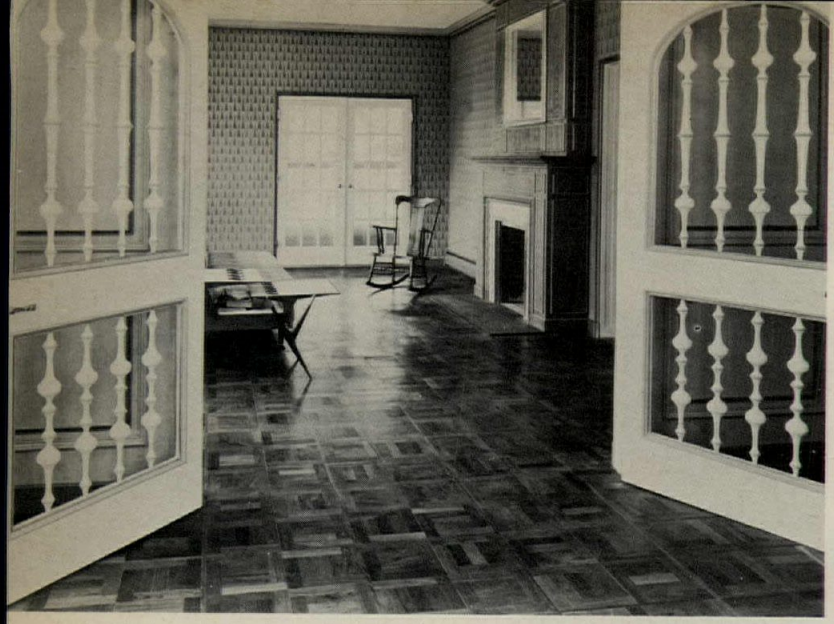

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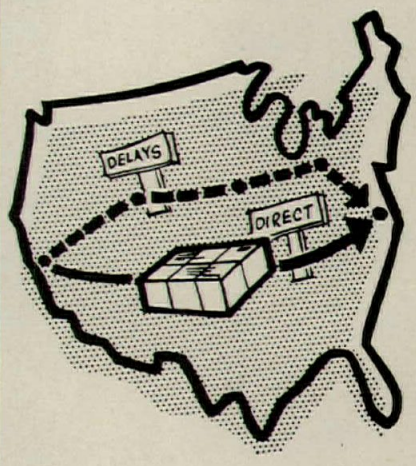

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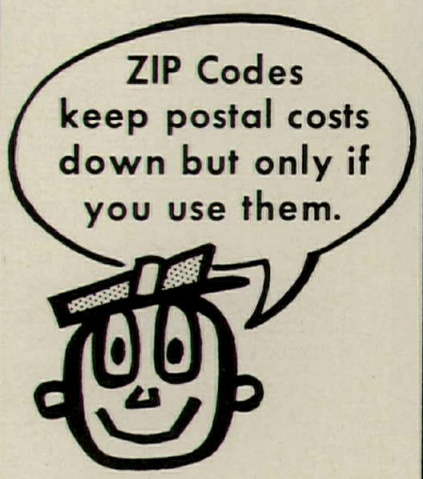

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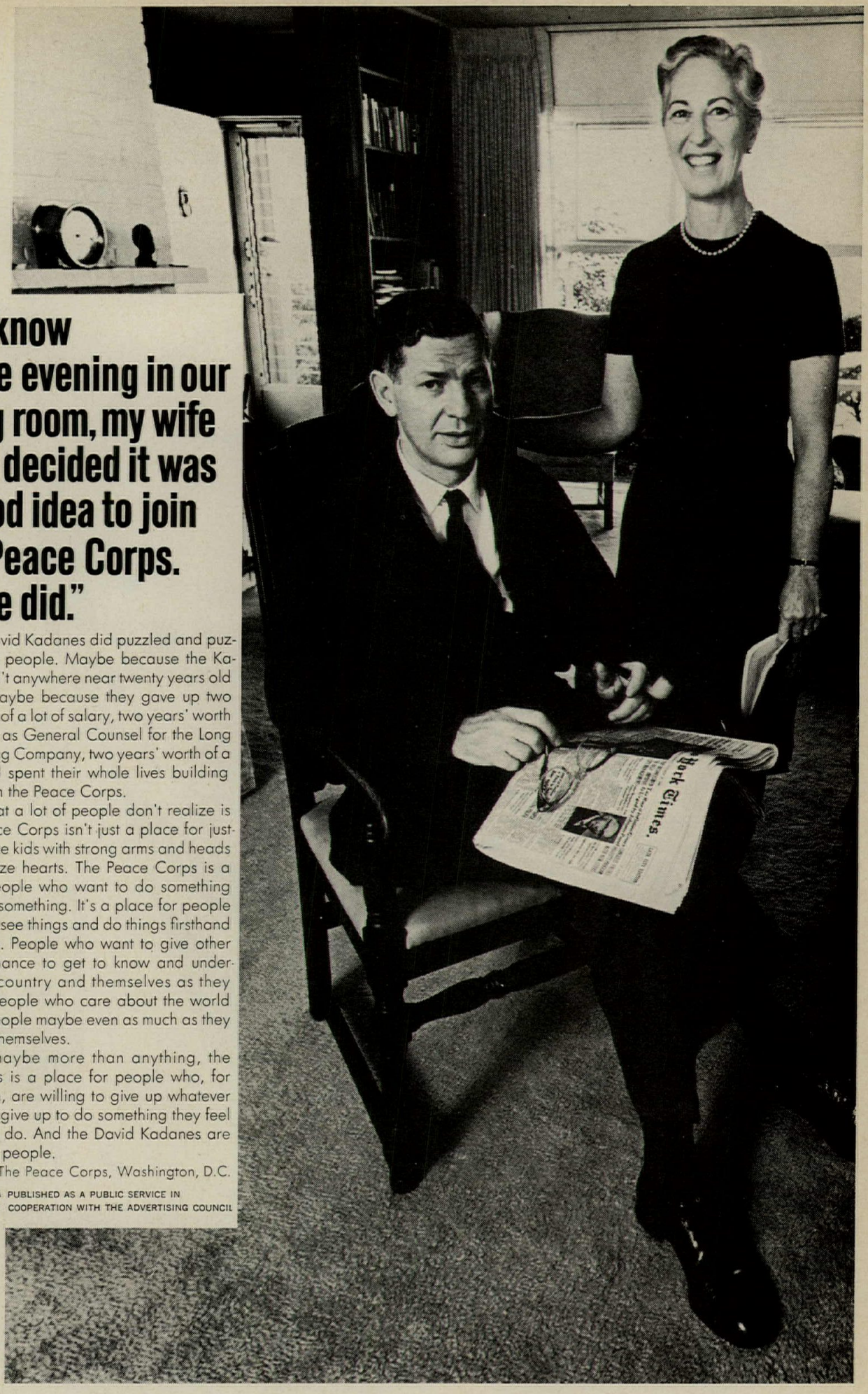

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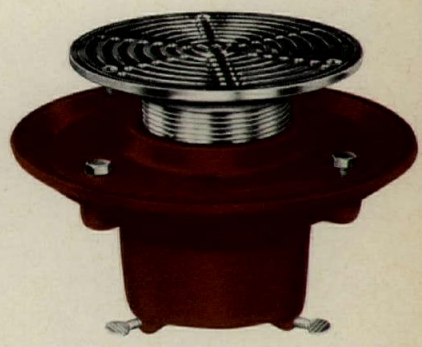

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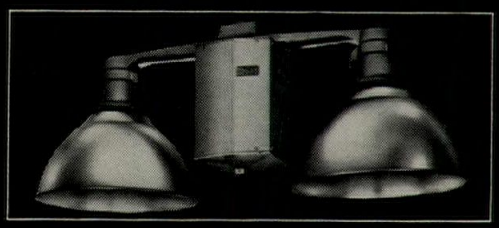

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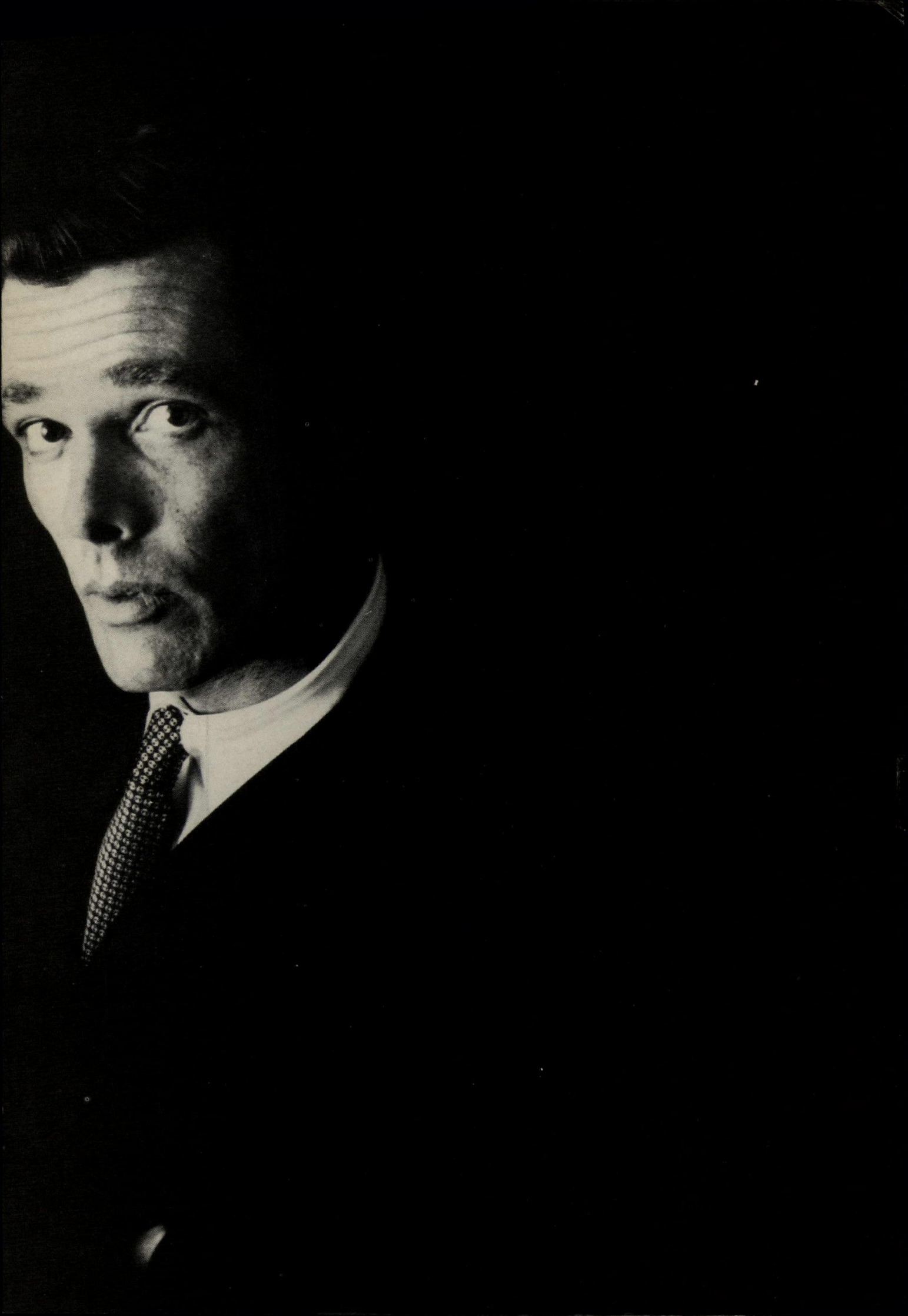

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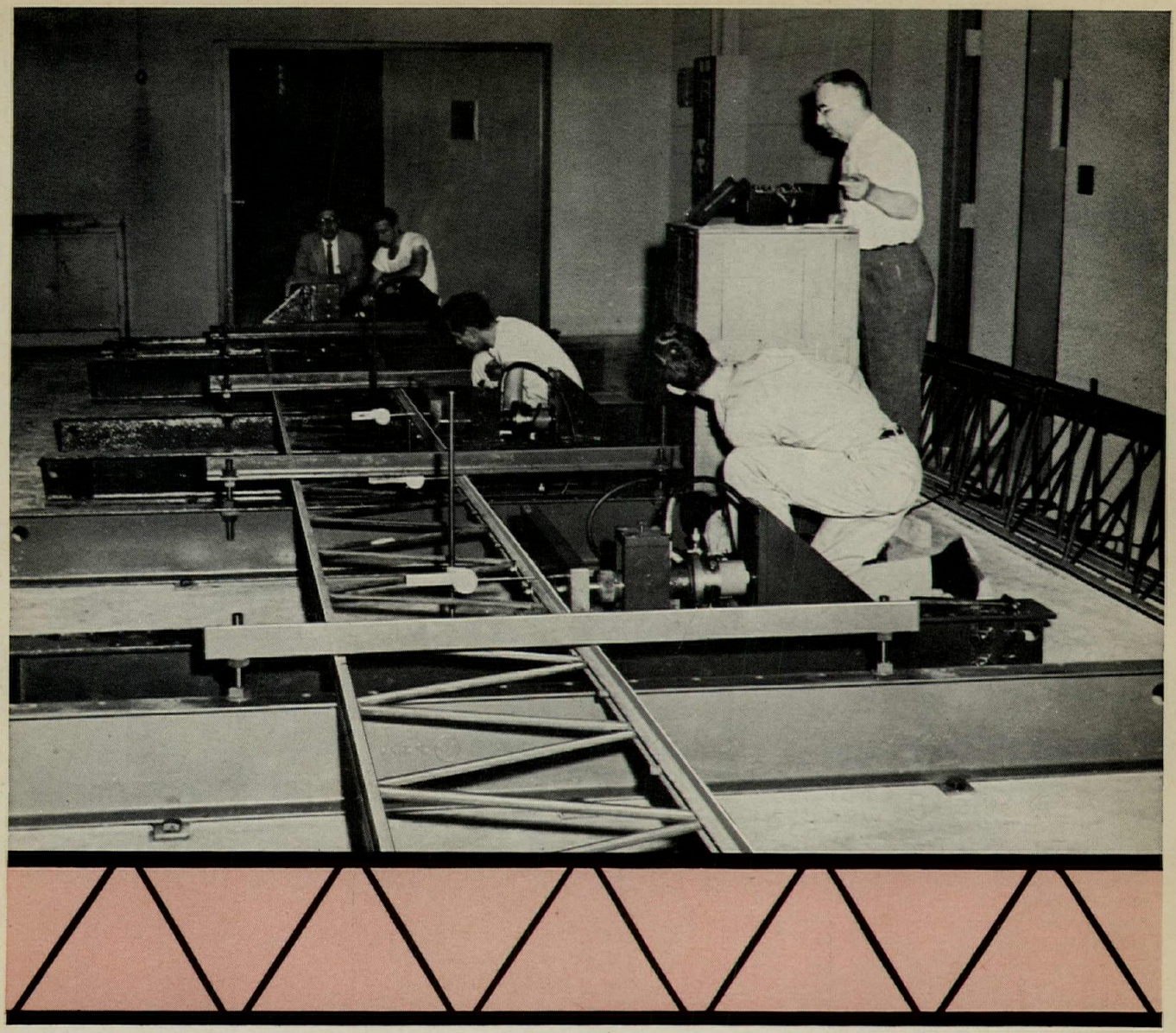

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