# ARCHITECTURAL RECORD

11 NOVEMBER 1965 • TWO DOLLARS PER COPY

BUILDING TYPES STUDY: LABORATORY BUILDINGS

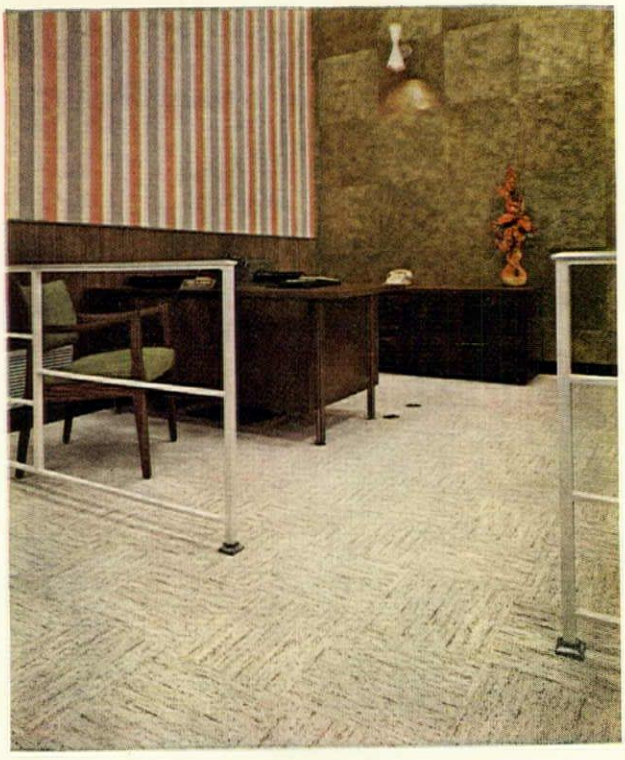
THREE CANADIAN CHURCHES

SECOND-HOME COMMUNITIES

TORONTO CITY HALL

F.W. DODGE CONSTRUCTION OUTLOOK FOR 1966

FULL CONTENTS ON PAGES 4 & 5



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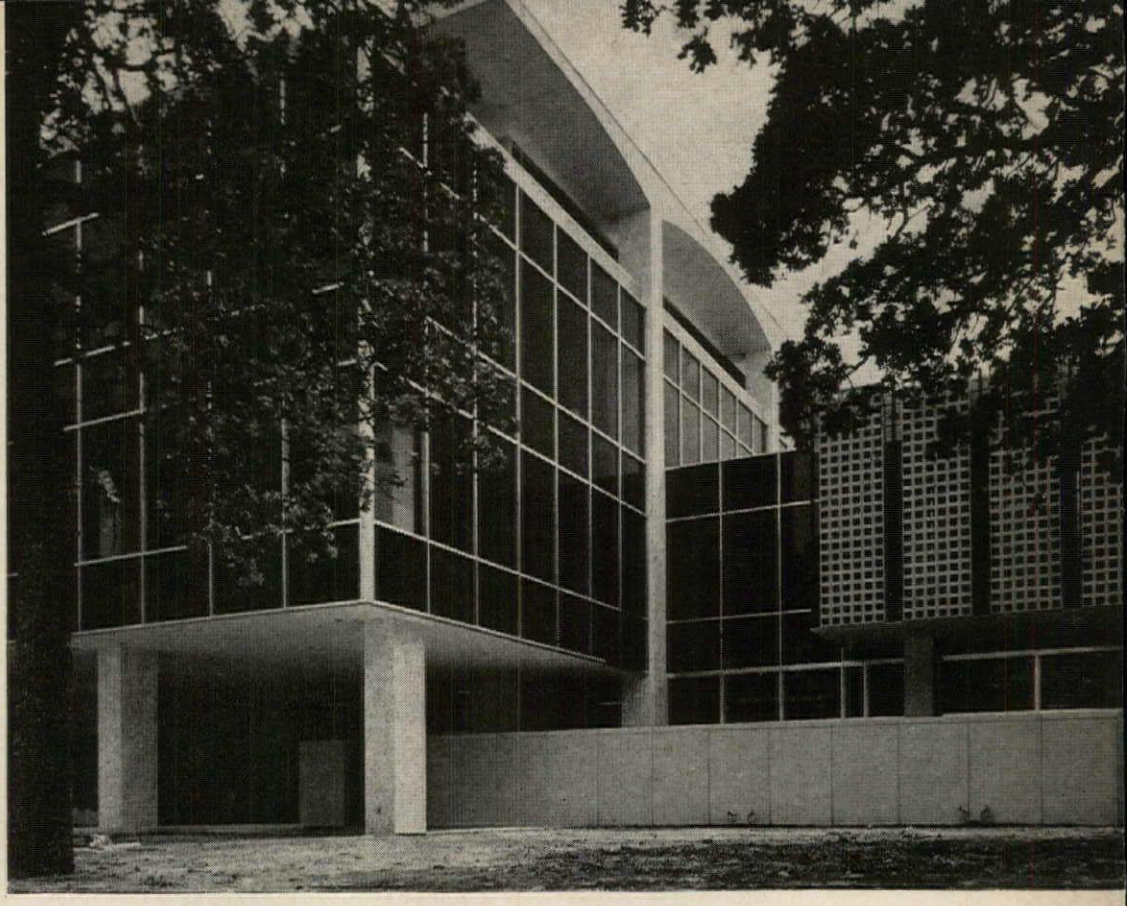

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Architectural and Interior Design:
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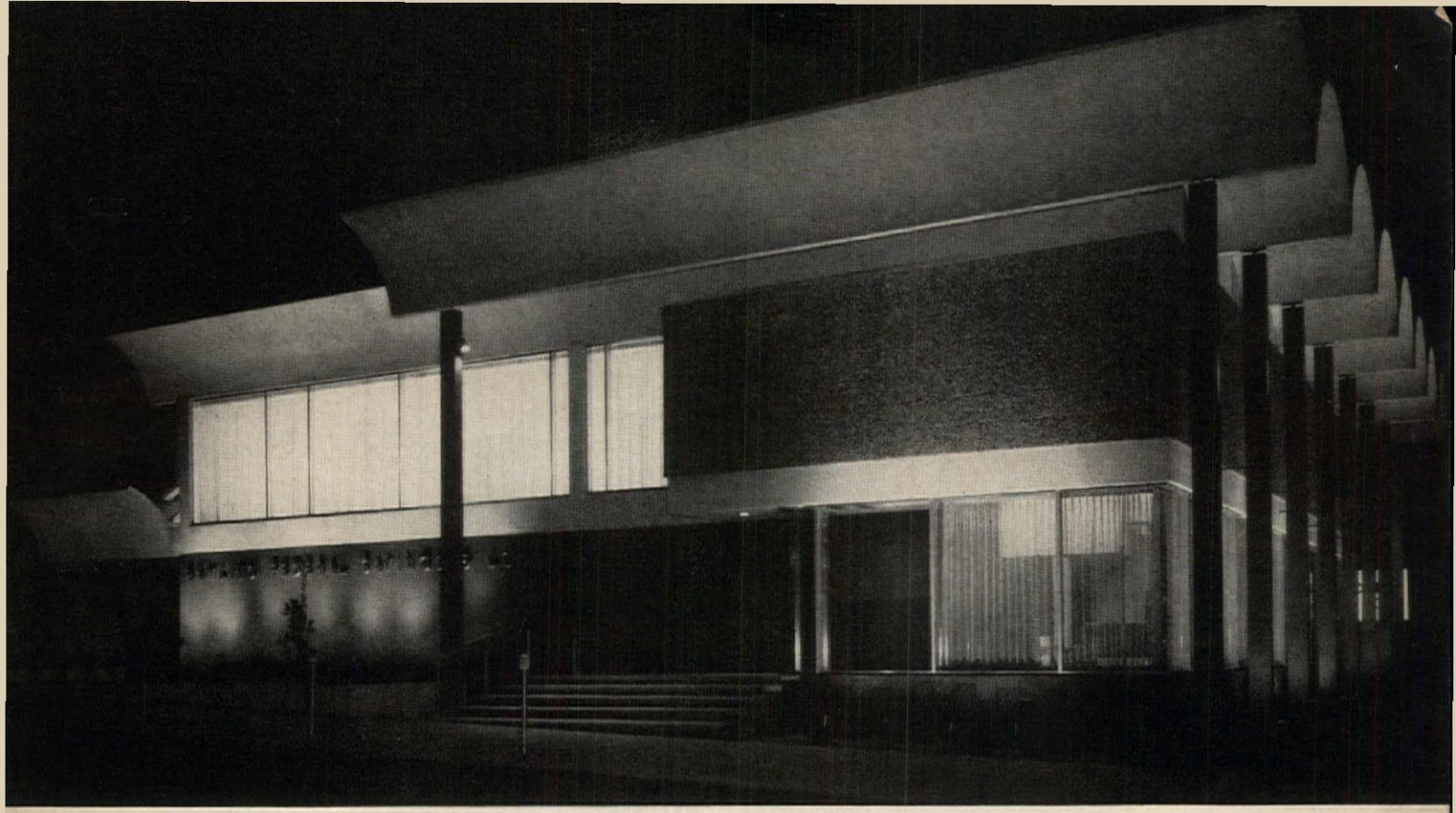

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*Advertising Index 340*

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## *Architectural Engineering*



# ARCHITECTURAL

*Architects and Buildings*



## *The Record Reports*

## *Features*



RECORD

CONTENTS

*November 1965*

## *Building Types Study 352: Laboratory Buildings*

# *Coming in the Record*

ARCHITECTURE FOR BUSINESS

*Not only are there more opportunities these days for architects to design office buildings—with still more in store, according to the F. W. Dodge prognostications for 1966 (see pages 121–128)—but more office buildings of high design quality are resulting. Or so it would appear from the intensive review of new office buildings undertaken for next month's Building Types Study on office buildings: an impressive indication of the kind of contribution architecture can make to commerce.*

GUIDE FOR PUBLICATION RESEARCH

*The twice-yearly aid to readers who remember-having-seen-but-can't-remember-when, or who are checking recent publications on a particular building type or a particular architectural or engineering subject, the* RECORD'S *semi-annual index, will be published in the December issue. (The index to the first seven issues of 1965—including Mid-May—was published in the June issue.)*


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# precast concrete fins that fool the sun...


CREDITS: *Architect:* Wilson Morris Crain and Anderson, Houston; *Contractor:* C. H. Leavell Construction Co., Houston; *Panels by:* The Rackle Co., Houston

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# Proletarianization of Engineering

One tends to think these days of young physicists and engineers as science-fiction heroes. Competing proselyters from industrial organizations can hardly wait for them to graduate from college; they make them attractive offers, not forgetting handsome laboratory quarters in vacation-land locations, with salaries to match. The boys charge out of college, picking up the world's tastiest oysters as they choose. It is difficult to think of disillusionment as their lot.

If, however, you can absorb the idea that they, too (like all other young graduates, including architects) find the world an immovable object, perhaps you can imagine that their come-down is pretty serious. If they fall in disillusionment, they fall from a higher point, or so it would seem.

But they fall, I am told, and they do fall far. According to a professor from Harvard's famous "B School" (business administration), what hits the young engineers, in the great space-age plants, is "proletarianization." The eager youth can't even get off the plane, presumably at his new west coast abode, without seeing mammoth signs with his employers' proclamation, all too apparent, that the outfit is tremendous. All around the city are other evidences of its magnitude. And when he gets to his assigned cubbyhole, he finds a great line of similar cells where other young geniuses are tackling engineering assignments. But the assignments get smaller and meaner and more impersonal. No hero now, just another in a long line of scientific oar-pullers.

According to the professor, the young scientists soon notice that affairs are less impersonal on the administrative floors. The "guys that have it made," it appears, are the "business administration" trainees. And so, said the speaker, 45 per cent of the enrollees at Harvard's "B School" are engineers, or ex-engineers, taking up new studies to get away from the assembly-line dullness of their lives.

Creativeness, a precious asset, is a very tender one. It just could be that our present world—great, growing, changing, wealthy, ever more impersonal—is increasingly discouraging to creative talents. Those creative talents might be the greatest hope for keeping the world livable, and maybe they need thoughtful nurture.

It used to be accepted that young hot shots from the universities needed to be brought down to earth, and their elders made that objective a conscious project.

Maybe it was simply the law of the jungle—the young bulls must be taught to mind their manners. Or maybe, in a modernized, "civilized" world, it is merely poor personnel management. Industrial giants have developed their competitive enlistment procedures, but have not paid enough attention to their husbandry.

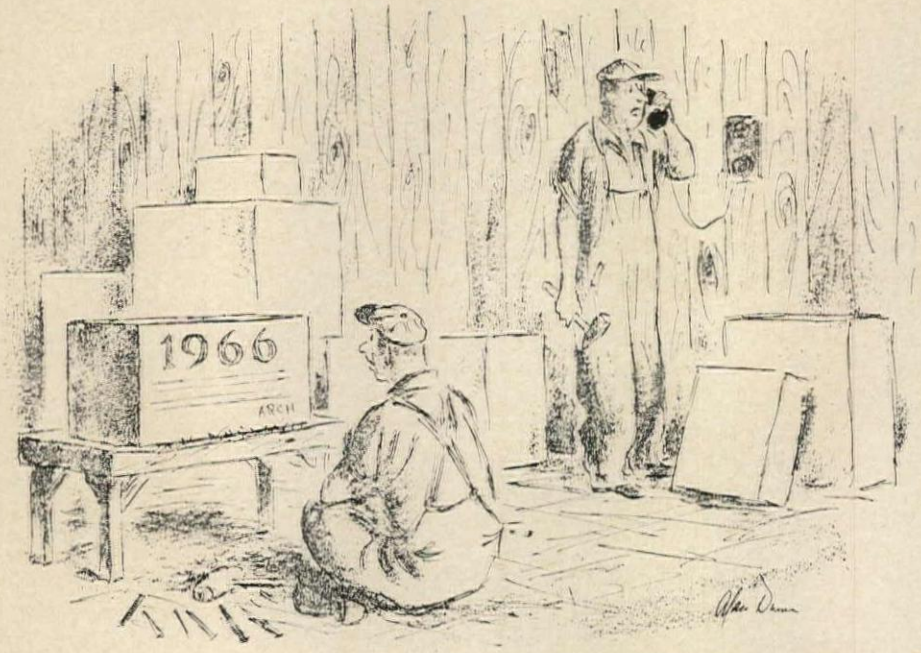
What is different today, one might theorize, is that while yesterday's world offered a generally healthful climate for creativeness, today's seems to snow it under. To bury it in what the professor called "proletarianization." Individualism generally is slipping away from us, lost in mere numbers if not in automation.

Or, some say that creative courage, as a national asset, has been weakening for thirty years. The Great Depression, followed by the New Deal, the labor union, progressive education, social security, etc., have raised a generation whose goal is security. Let us not stop now to argue these matters, but merely mark the deteriorating effect on individual inventiveness and enterprise.

I should have to believe that we still have such assets in substantial quantities. The point is that we may have to guard them more consciously than in the past.

Maybe those proletarianized engineers can be supplanted in some degree by computers. Maybe we need their brains and enterprise in business (and political) administration, and they *should* fight their way out of the sciences. But what is for sure is that the world needs creativeness in science, engineering, architecture, art, and, yes, in cooking. So let's think a little about feeding whatever tender shoots seem to hold promise.

*—Emerson Goble*




*Drawn for the* RECORD *by Alan Dunn*

"Affleck, Desbarats, Dimakopoulos, Lebensold, Sise? We have a cornerstone problem here . . ."

## Mega-structures for Macro-environment

Two very unpleasant words, in the opinion of your humble servant. But one hears them today. Plans are being drawn for some mega-structures, with multi-uses, presumably because the environment is becoming so macro that we must stack things up in new sizes and combinations.

Land values are rising so fast, one is told, that 100-and-more-story buildings are economically justified, especially since land is becoming too valuable to be used for only a part of the day, as might be the case in a single-purpose building. So we have combinations of offices, shopping center, and apartments in the same building, plus, more than likely, a subway stop and garage facilities. And naturally a helicopter port on the roof, and more than likely a marina appended to the second subbasement. A kindergarten would seem to be an obvious necessity, and perhaps more schools, and eventually a senior citizens' center.

One presumes that the proper mix of races and family incomes would somehow be arranged. It would certainly be undesirable to have only wealthy people in that vertical city, and it would get quite boring if all belonged to one profession, say architecture. All very confusing.

This so-called humble observer has been known to defend tall buildings, like Rockefeller City in the early days, or Pan Am in more recent times. The concentration of similar businesses in one center has notable advantages in cutting down horizontal traffic on the streets. But mixing up the mix is something else. It doesn't save traffic merely to put mixed interests higher in the air. Maybe in the dreamer's macro environment you can put a whole city into a single building, all self-contained and self-sufficient.

I am afraid I should find myself all out of scale. I could ride to the 100th floor for some business purpose, but I should hate to have a dwelling there. I should have to take the elevator down, every once in a while, to touch the earth, or walk through a puddle. And then I should hate like hell to go back upstairs.

## Assembly-Line Houses, Or Here We Go Again

It was around 1942 or '43, I guess, when we heard so much about assembly-line houses. The mass-production system, we were told, could turn out houses so cheaply that the conventional building system was washed up. This was of great social importance, of course, since a third of our nation was ill-housed, and a cheap, mass-produced house was the obvious answer. Such a house, and every family could have one.

I remember that we gave this matter a lot of study, and we, clever fellows that we were, didn't have much trouble figuring out that even if you gave a poor family a newly produced complete house, absolutely free of charge, that family couldn't afford it. There were such little items as land costs, foundations, utility connections, taxes, road assessments, not to mention title investigations and other miscellaneous little matters like heating and operating costs.

The tape is being played again, this time by one Glenn H. Beyer, of Cornell University, billed in a release as a housing researcher. He has trotted out the ill-fated, all-steel Lustron house, as an example of the "total house, rather than its many, individual components." He says that Lustron only needed more time to thrash out its problems.

I seem to remember it had a lot of them, not all within its own control, like the reception of the public.

Yes, I know that prefabrication has made great progress in the intervening years, and that prefab components are increasing in size and importance.

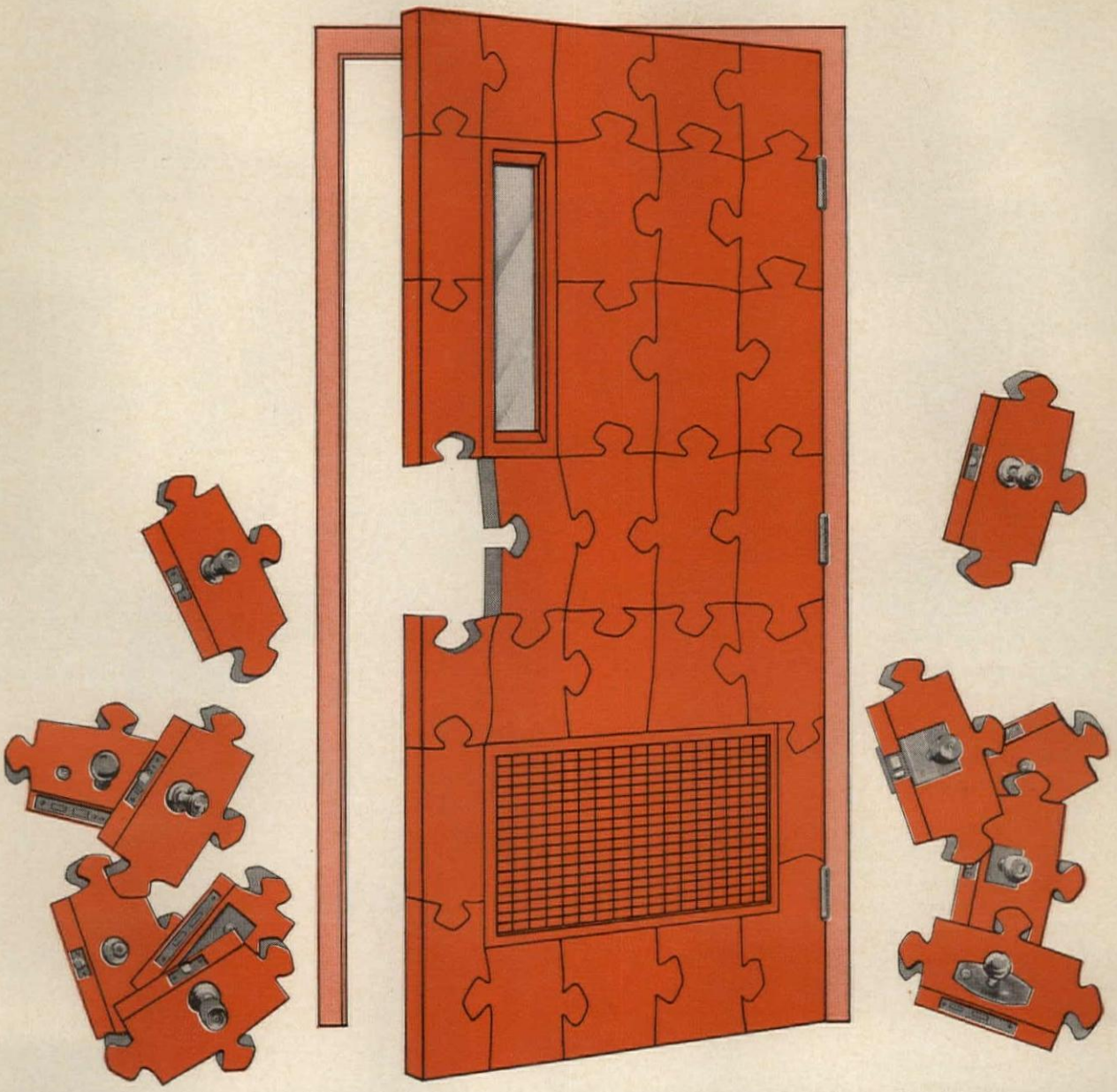
Maybe that old devil the population explosion will put new impetus in prefab acceptance. But assembly-line designs, in assembly-line quantities, on assembly-line lots, is not my own idea of what the world is waiting for. Mr. Beyer is going to find me quite stubborn.

## Let's Get Away To the South Seas

A recent report, in The New York Times, of a conference in Lae, New Guinea destroys an old dream of getting away from it all in the South Sea Islands. Those islands are having population troubles and urban congestion, and slums and poverty and crime.

And I suppose that the pretty brown-skinned girls are wearing city clothes now. And that the tourists with cameras are being replaced by business men with dispatch cases. I haven't heard that the Beatles have stopped there yet, but probably their records are lousing up the local discotheques.

I guess we're stuck with those mega-structures in our macro-environment. At least we're stuck with man-made design, for better or worse.



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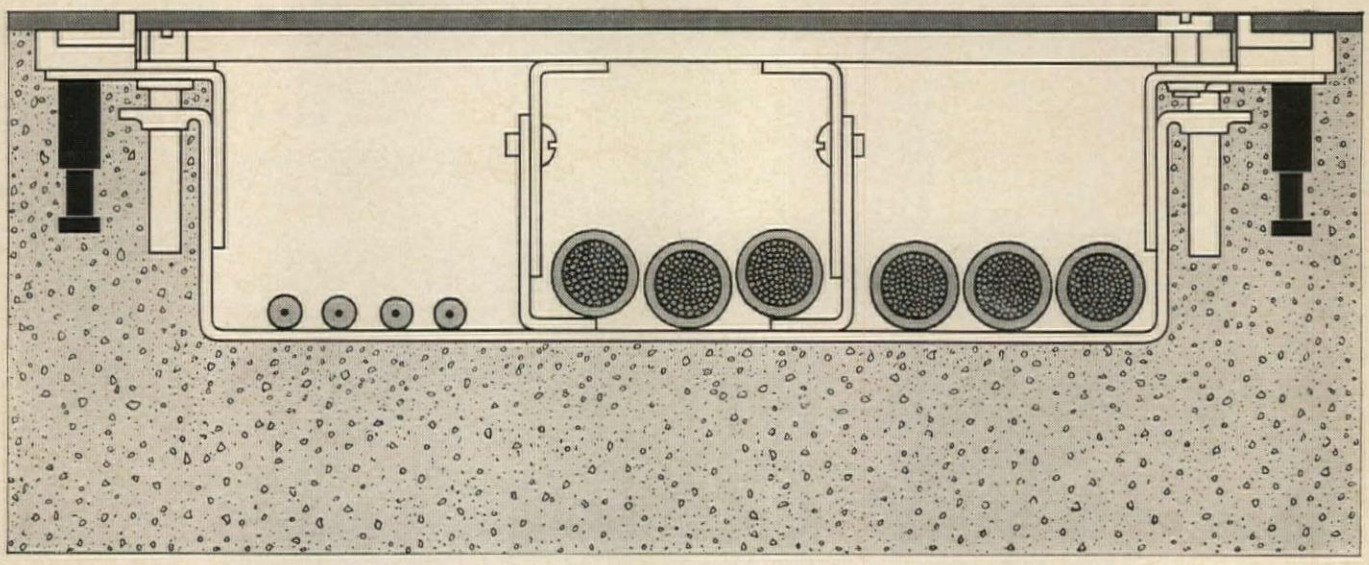

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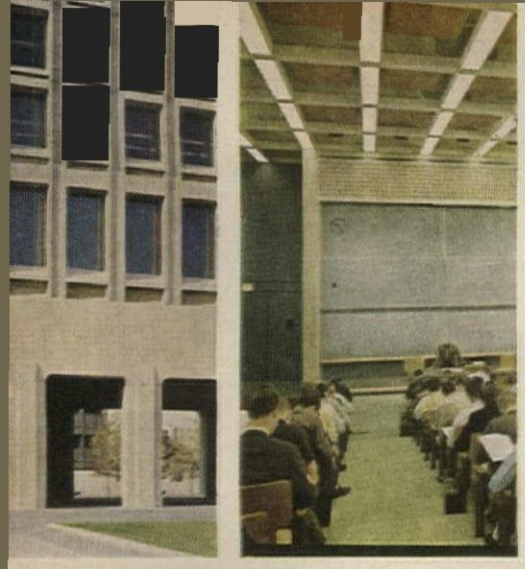

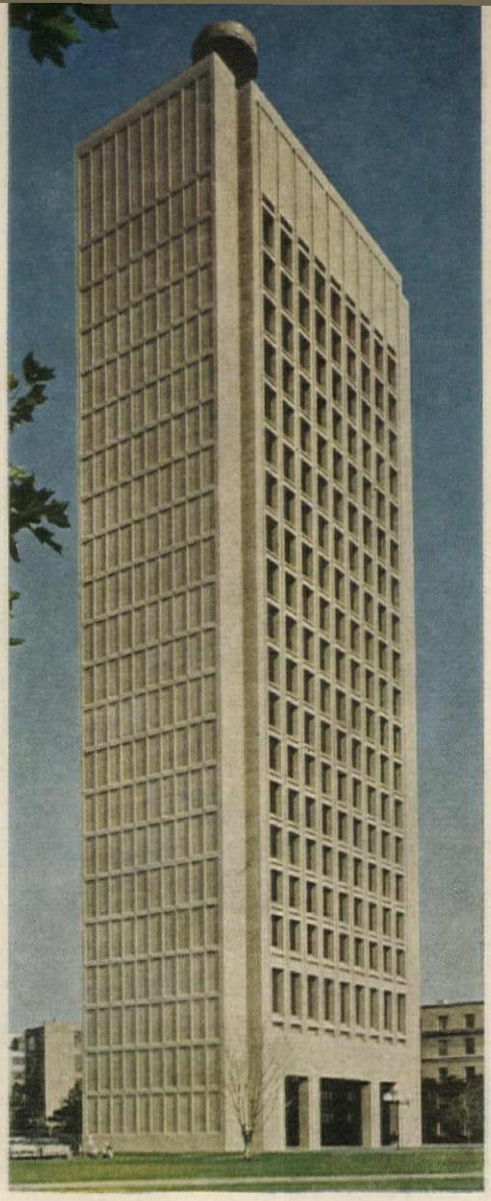

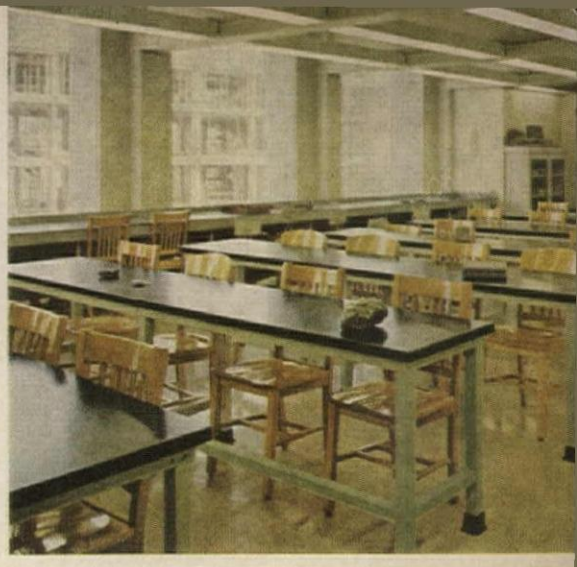

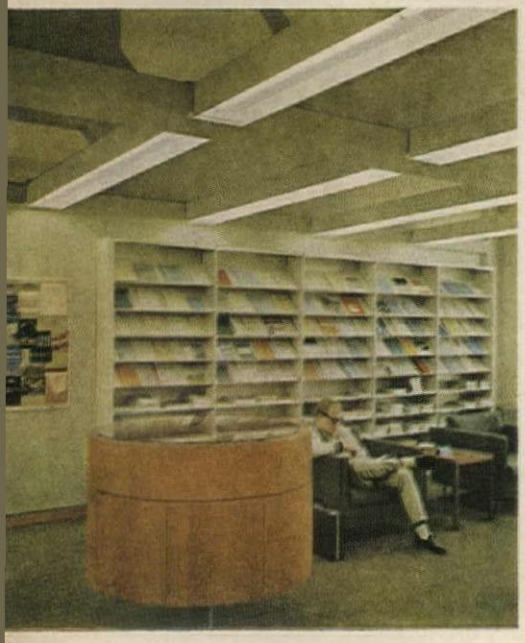

*Earth Science Center, M.I.T., Cambridge, Mass.*
*Architect: I. M. Pei & Associates, New York; Painting Contractor: H. Newton Marshall Co., Inc., Boston Mass.*

# The reasons top architects specify DEVOE add up to quite a story

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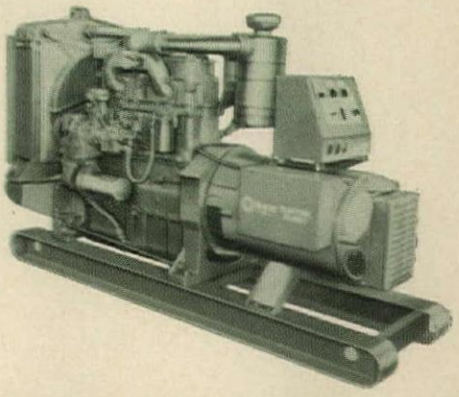

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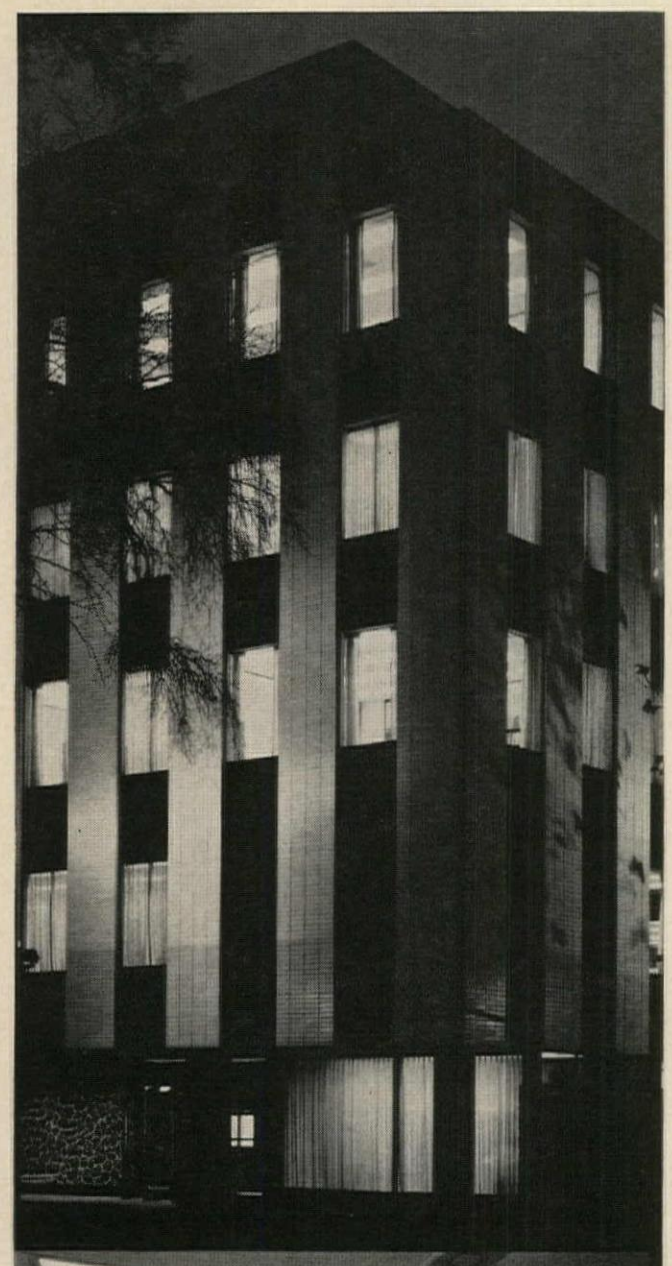
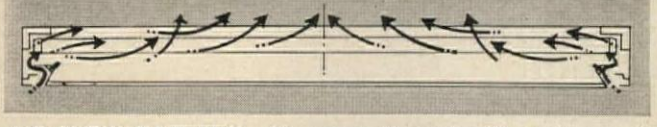
Studebaker CORPORATION

For more data, circle 9 on Inquiry Card





AIR FLOW PATTERN—Air moves through diffuser frame air controllers, passes over the lamps and ballasts, and out through slots in troffer center area.

# LPI HAS A STANDARD LINE OF HEAT REMOVAL TROFFERS THAT CAN HELP YOU PUT "HEAT-WITH-LIGHT" INTO YOUR NEXT JOB

## *JUST AS IT DID ON THIS ONE.*

Latest IES recommended lighting levels of 150 footcandles are provided as part of the integrated heating, cooling, and illuminating system in this building. Separate conventional systems were originally planned, but cost studies led to the adoption of the integrated system using LPI recessed fluorescent lighting and heat-removal fixtures. The savings are significant. Heat generated by the higher footcandle system is used, in the winter, as the primary source of building heat. And, in the summer, the extra heat generated may be vented directly outside, or used in an air conditioning heat exchanger.

The LPI heat removal troffers that make modern systems such as these possible are standard, proven components. They're available in flange or lay-in types, in 4 or 8 feet lengths, for 2 or 4 lamps, and with your choice of lenses. For complete information on these fixtures, and how they can help you put "heat-with-light" into your next jobs, call your LPI representative or write us.

LPI-S-217

The 990 Grove Street Building, Evanston, Illinois.

Owners: John O. Todd and Myron R. Holmgren. Architect: Barancik, Conte and Associates, Chicago. Contractor: Stenn-Gassman Engineers, Inc., Chicago. Engineers and Lighting Consultants: Melvin Cohen and Associates, Inc., Chicago. Electrical Contractor: Maron Electric Company, Chicago. Coordinator for Public Service Company of Northern Illinois: Gilbert Knott, P. E.

LPI® FLUORESCENT LIGHTING

Lighting Products Inc., Highland Park, Illinois 60036

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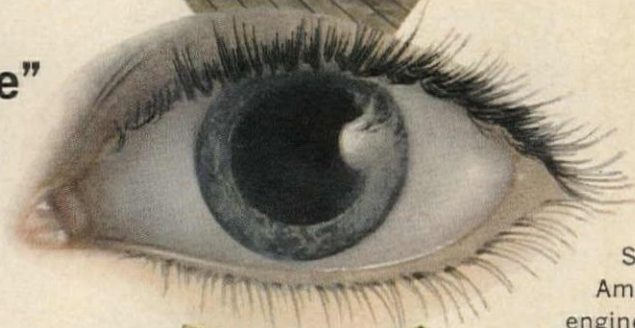
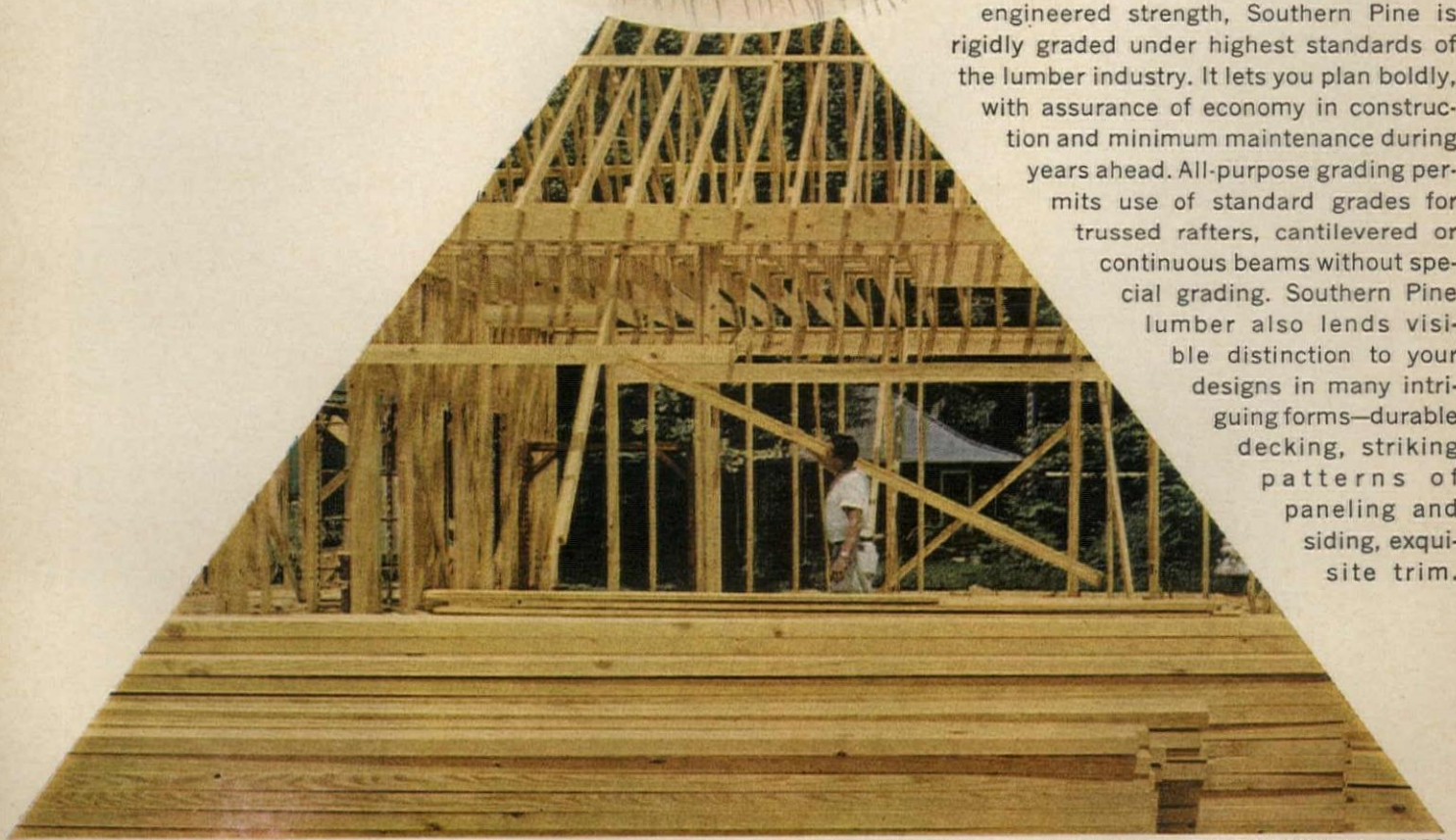
## Look!..

## Beneath the surface beauty is the "Hidden Value" of Southern Pine...



Architects know the importance of quality in framing lumber for integrity of design and security. That is why so many are specifying Southern Pine. Pre-shrunk to *full* American Lumber Standard sizes, with engineered strength, Southern Pine is rigidly graded under highest standards of the lumber industry. It lets you plan boldly, with assurance of economy in construction and minimum maintenance during years ahead. All-purpose grading permits use of standard grades for trussed rafters, cantilevered or continuous beams without special grading. Southern Pine lumber also lends visible distinction to your designs in many intriguing forms—durable decking, striking patterns of paneling and siding, exquisite trim.



SPECIFY SOUTHERN PINE FROM THE MEMBER MILLS OF THE SOUTHERN PINE ASSOCIATION, P. O. BOX 52468, NEW ORLEANS, LA. 70150.

a specification from Hillyard . . .

# FOR A GYMNASIUM FINISH that will withstand multiple use

**PRODUCT NAME:** *TROPHY® SEAL & TROPHY® FINISH*

**DESCRIPTION:** A seal and a finish especially formulated for wood gymnasium floors to give a light, durable, slip resistant playing surface that will resist rubber burning and marking.

**SPECIFICATION AND HOW TO APPLY:** An epoxy seal and finish. Apply with lambswool applicator. Seal coat fills porous wood surface. Game markings, using Hillyard Gym line paint, are painted in before finish coats are applied. Two finish coats are required. See Sweets Arch. File for detailed specification.

**COVERAGE (Average):** Trophy Seal—350 sq. ft. per gallon. Trophy Finish—500 sq. ft. per gallon.

**TECHNICAL DATA:** N. V. M.: Trophy Seal – 28%, Trophy Finish, 40%. Color: Gardner (typical) 4-5 (extremely light). Drying time: 7 hours to overnight (depending on humidity). Produces a glare free surface with proper light refraction. Exceeds all standards for abrasion resistance. Non-darkening—eliminates need for removing or sanding off finish for 10-15 years.

**GUARANTEE:** Controlled uniformity. When applied according to directions and under supervision of a Hillyard representative, all claims for the product are guaranteed.

**MAINTENANCE:** Regular treatment with Hillyard Super Hil-Tone dressing for conditioning and dust control.

**APPROVALS:** Maple Flooring Mfrs. Assn., Institutional Research Council. Listed by Underwriters' Laboratories as "slip resistant" In use: 12 years on all major basketball tournament floors.

**REFERENCES:** Sweets Architectural File, section $\frac{13n}{Hi}$
A.I.A. File No. 25G
A.I.A. Building Products Register

TINLEY PARK HIGH SCHOOL, TINLEY PARK, ILLINOIS
ARCHITECT – NICOL AND NICOL, CHICAGO, ILLINOIS

*Write, wire or call collect for complete information and specifications on Hillyard TROPHY SEAL & TROPHY FINISH. You may also want your nearby Hillyard architectural consultant to demonstrate TROPHY SEAL & TROPHY FINISH in your office or on the job site.*


Since 1907

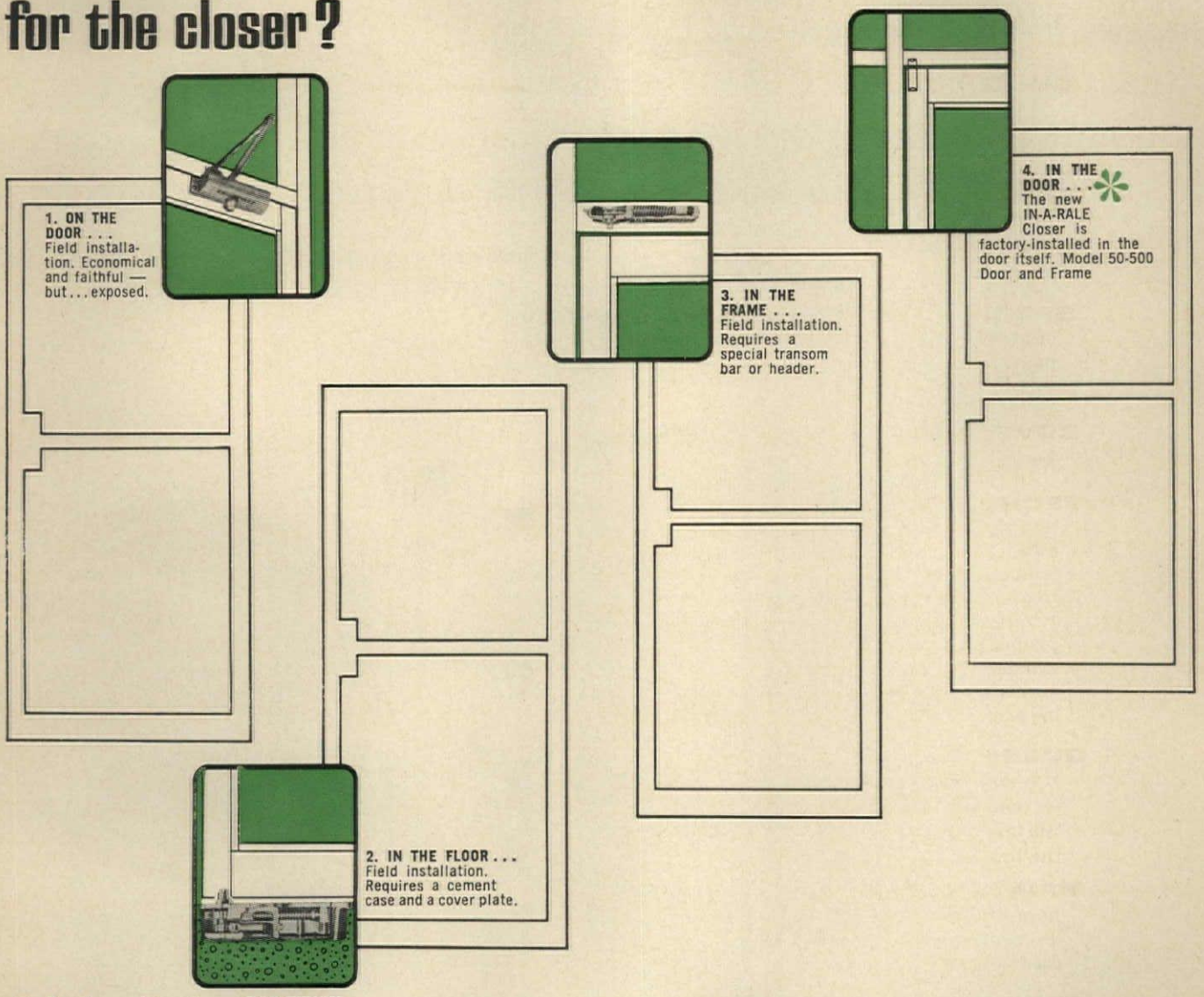
**HILLYARD FLOOR TREATMENTS**

St. Joseph, Missouri, U.S.A.
Totowa, New Jersey • San Jose, California

*The Most Widely Recommended and Approved Treatments For Every Surface*

For more data, circle 12 on Inquiry Card

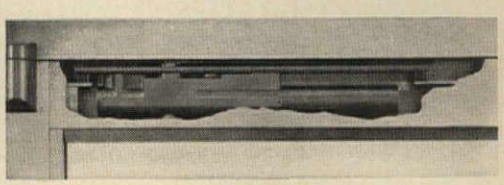
# Where is the best place for the closer?




***Only Amarlite has ALL FOUR:***

## Only Amarlite puts the in-a-RALE* closer in the door!

***Specify*** **in-a-RALE**-a revolutionary new concept in closers that gives you more of what you're looking for: ■ This competitively priced unit is the first complete entrance package with a factory-installed closer! The entrance goes in fast and easy. No on-the-job closer installation required! ■ It precisely meets architectural specifications ■ Closer is invisible . . . and quality features include disappearing arm, adjustable hydraulic back-check, hold-open, shock-absorber, adjustable sweep speed and latching speed. ■ Specify IN-A-RALE for your next job . . . it's another EXCLUSIVE from the AMARLITE DIVISION of Anaconda Aluminum Company. P. O. Box 1719, Atlanta, Georgia 30301.



**Amarlite**
OF ANACONDA ALUMINUM ®

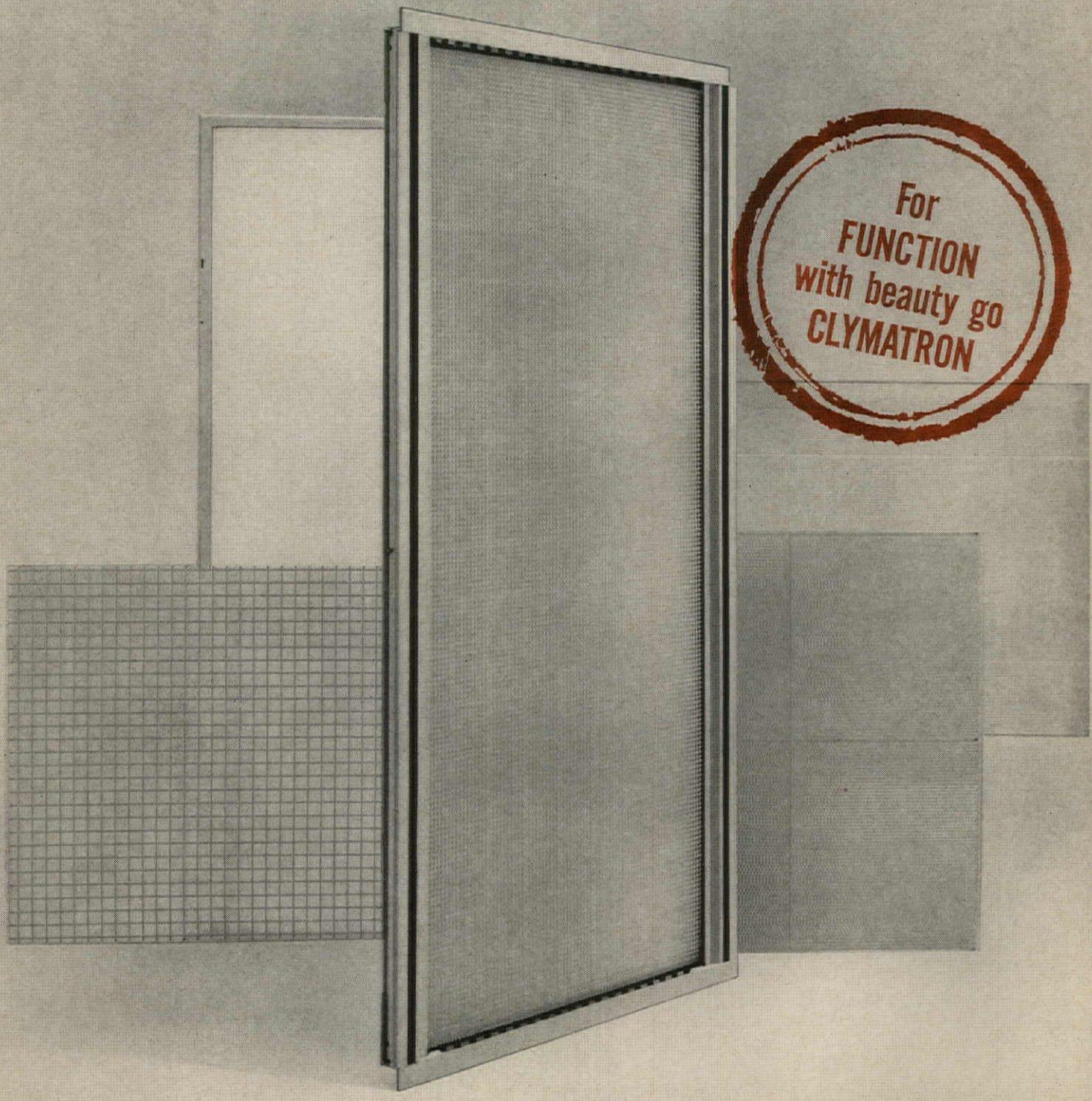
For more data, circle 13 on Inquiry Card

For more data, circle 14 on Inquiry Card ➔

Meet CLYMATRON II, son of Clymatron. Better than its pa. Puts out more footcandles of cooler light. Better looking, too. Has extruded aluminum trim, regressed splay, frameless or framed enclosures. Besides lighting, Clymatron II handles air...lots more of it in fact, with a new adjustable baffle controlling its direction from vertical to horizontal...transfers heat...even provides total heating. In fact, it does so many things, it takes a brochure to explain the whole story. Better write for it!

DAY-BRITE®

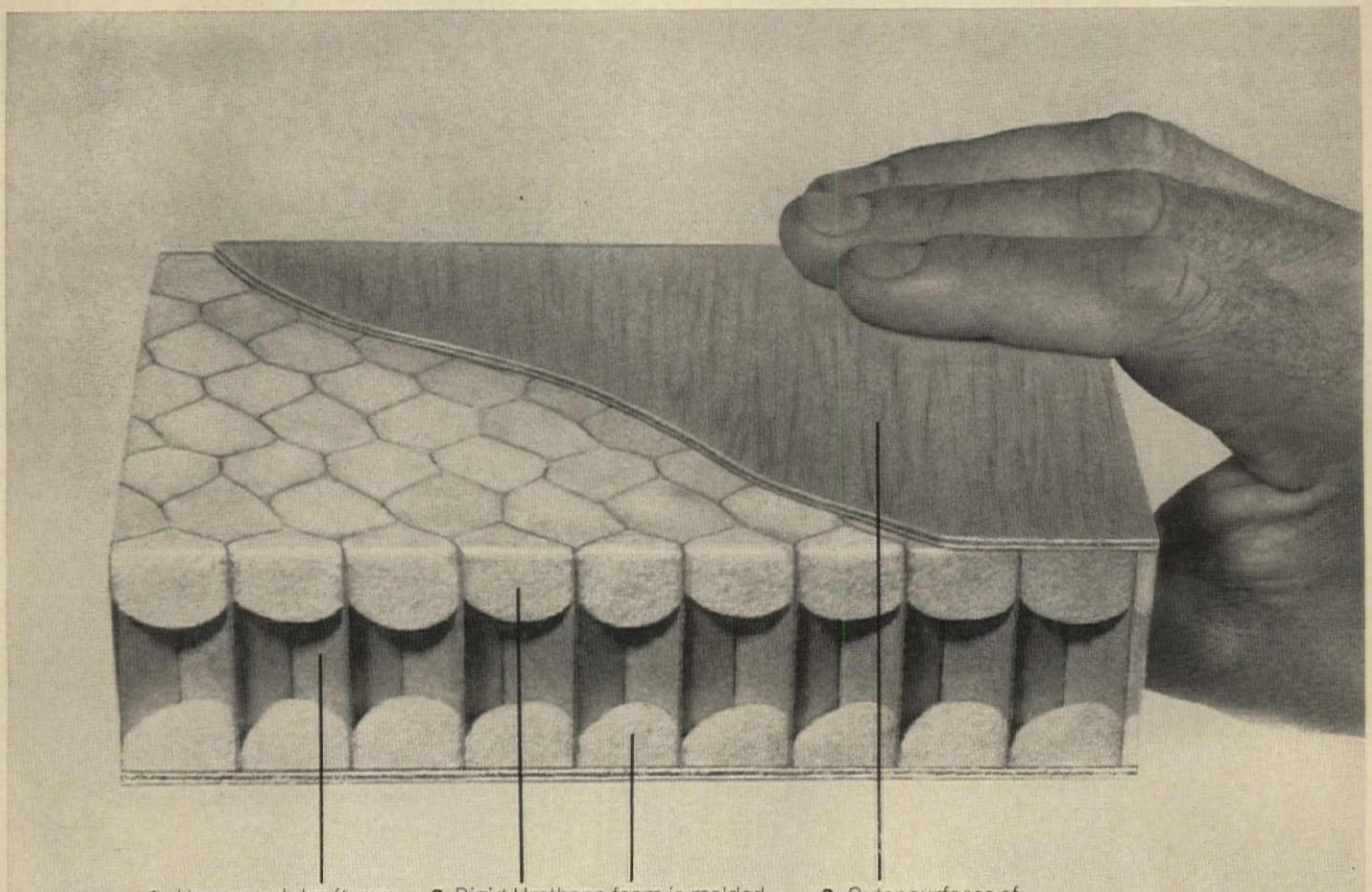
DAY-BRITE LIGHTING · 5411 BULWER · ST. LOUIS, MO. 63147
A DIVISION OF EMERSON ELECTRIC CO.




Give an eye to NOVI. Brand new recessed fixture for offices, stores, hospitals. Only $3\frac{15}{16}$" deep! Has "regressed splay"... a fancy way of saying the lens is indented. Extruded aluminum trim comes in white (anodized if you desire). Lots of low brightness control. Bigger luminous area with either frameless plastic, aluminum-framed glass or plastic lens. So you see. Ceilings just won't know what they're missing... until you specify NOVI!

DAY-BRITE®

DAY-BRITE LIGHTING · 5411 BULWER · ST. LOUIS, MO. 63147
A DIVISION OF EMERSON ELECTRIC CO.



**1.** Honeycomb kraft core, pound for pound, produces the strongest and most economical sandwich structure known.

**2.** Rigid Urethane foam is molded into the top and bottom sections of each Honeycomb cell. With trapped air between the Urethane layers, it need not be necessary to fill the cells completely with foam to obtain the required amount of insulation.

**3.** Outer surfaces of the composite URECOMB core provide a continuing bonding surface for the application of wood, metal, asbestos, plastics or whatever facing material suits the designer's taste.

# A new sandwich created for your taste

**Union-Camp's new URECOMB core gives you the insulation of rigid Urethane foam plus the strength of Honeycomb—in one lightweight sandwich panel core.**

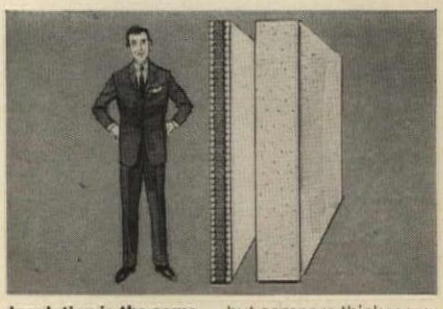
What a combination! Rigid Urethane foam —an outstanding insulator. And Union Honeycomb—incredibly strong and lightweight. Together, they make URECOMB—the most efficient structural sandwich core ever developed.

**Amazing strength-weight ratio.** The URECOMB core in a typical wall panel (2" thick) has a compression strength of more than 50 lbs. per square inch...yet it may weigh less than ½ a pound per square foot!

**Built-in insulation.** URECOMB core has good heat resistance and an outstanding coefficient of thermal conductivity. The two pound density of the Urethane in URECOMB has a "K" factor of 0.12...about twice as effective as the next best insulation. This may allow reductions in insulative panel thicknesses of up to 50%.

**Flammability.** The Urethane used in URECOMB is self-extinguishing. This characteristic of the Urethane foam is desirable in many applications. When sandwich constructions are involved, non-fire retarding foams have been found suitable, since the facings obstruct surface flame spread and prevent air from entering and feeding the flame in the core.

URECOMB insulated panels are easy to handle. Easy to install. Lightweight to ship. They are extremely rigid—ideal for floors, walls, partitions, roofs of varied structures.



**Insulation is the same**...but compare thicknesses and weights! URECOMB's unique combination of strength/weight and insulation can reduce panel thicknesses by as much as 50%... and still do the required job. For information write:

URECOMB

UNION-CAMP
HONEYCOMB DIVISION
Union Bag-Camp Paper Corporation · 233 Broadway N.Y. 7, N.Y.

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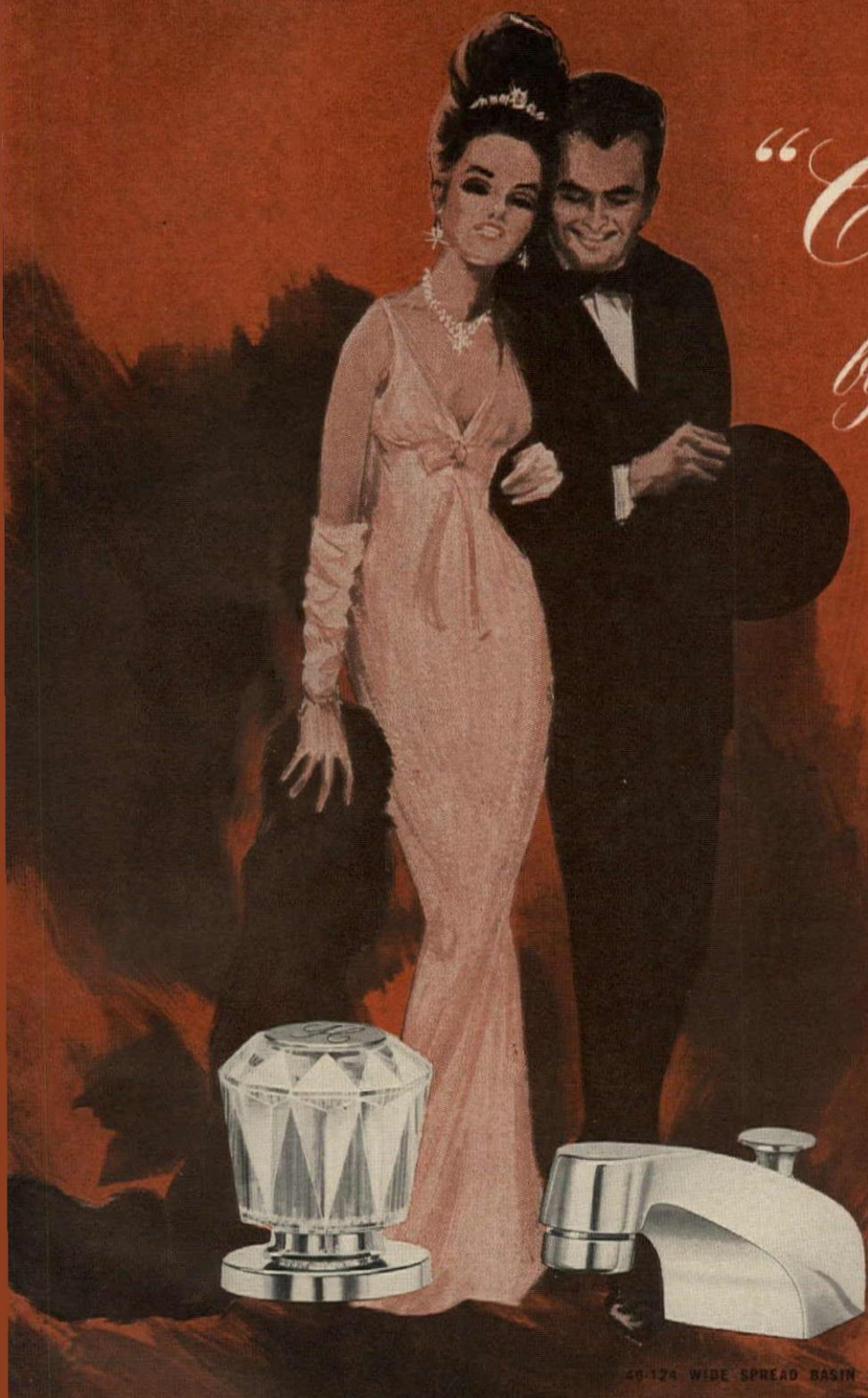
For more data, circle 15 on Inquiry Card

For more data, circle 16 on Inquiry Card →

# The Distinctive Simplicity of Elegance



## "Contessa"™

## by Price Pfister

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PRESTIGE LINE

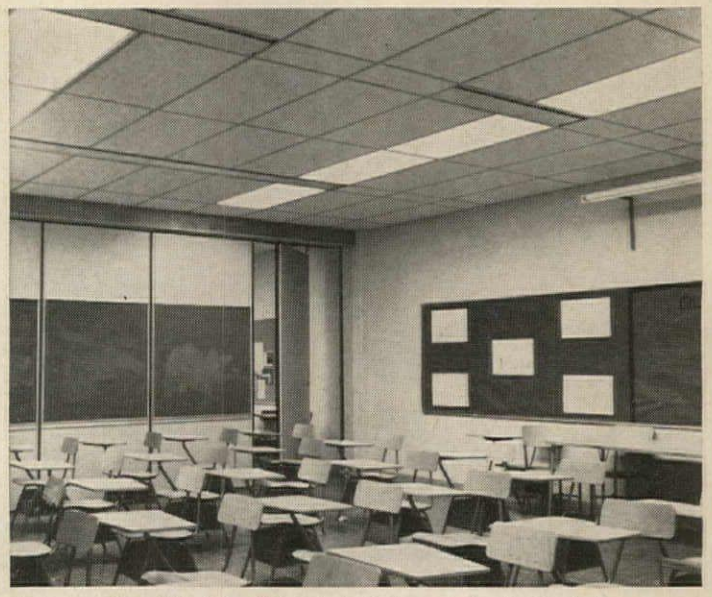


48-124 WIDE SPREAD BASIN SET

Contessa means more than exquisite elegance and superb styling. Behind the restrained, cut-crystal purity of long-lasting clear lucite, is the Price Pfister hallmark of exceptional quality and functional design, meticulously crafted for long years of treasured use. ■ To the contractor, it means consistent savings on installation costs and elimination of unwanted call-backs. This, combined with attractive low cost makes Contessa ideal for any specifications, from tract homes to luxury high-rise dwellings. ■ Contessa, with its **accent on elegance,** is yet another prestige product of plumbing brass — by Price Pfister.

Price Pfister
BRASS MFG. CO.
ESTABLISHED 1910

**PRICE PFISTER BRASS MFG. CO.**
13500 Paxton Street, Pacoima, California 91331
Sold only through wholesalers.
Warehouses in these principal cities:
Birmingham, Alabama; Chicago, Illinois; Dallas, Texas; Pacoima, California; Elizabeth, New Jersey.
Price Pfister's Products — Install Easier — Work Better — Last Longer.



Classroom of Randolph Junior High School, Montgomery County, Maryland.
Architect: Burket, Tilghman, Nelson Associates.
Consulting Engineer: H. Walton Redmile Associates.

## Will you step into this classroom for a moment, please?

We'd like to call your attention to two things.

One that you can see: our new Carrier Moduline® Ceiling Air Terminals with automatic self-contained temperature control.

And the other you can't: a new kind of air conditioning system Moduline units make possible—the Dual Conduit System.

Classroom walls can be folded back to create a large team teaching area. Yet expansion or contraction of teaching space poses no problems for the Carrier Dual Conduit System because of its inherent modular air distribution and control.

The Dual Conduit System provides Randolph Junior High and other schools with a space-saving all-air system that heats or cools in each module at the command of a built-in thermostat. Operating costs are low because Dual Conduit always "follows the load," taking full advantage of diversity afforded by unoccupied areas.

Moduline units also make possible a very simple variable-volume *single duct system*. It is ideal for economical automatic temperature control in office buildings and hospitals. Control zones as small as 100 square feet are highly practical. Partitioning modules may be as small as 25 square feet.

We've covered both systems in detail in a brochure that illustrates many attractive ceiling arrangements achieved by architects using Moduline units.

For your copy of "Carrier puts climate control into a new perspective," call your nearest Carrier representative. Or write us in Syracuse, New York 13201. In Canada: Carrier Air Conditioning (Canada) Ltd., Bramalea, Ontario.

**Carrier Air Conditioning Company**

More people put their confidence in Carrier air conditioning than in any other make

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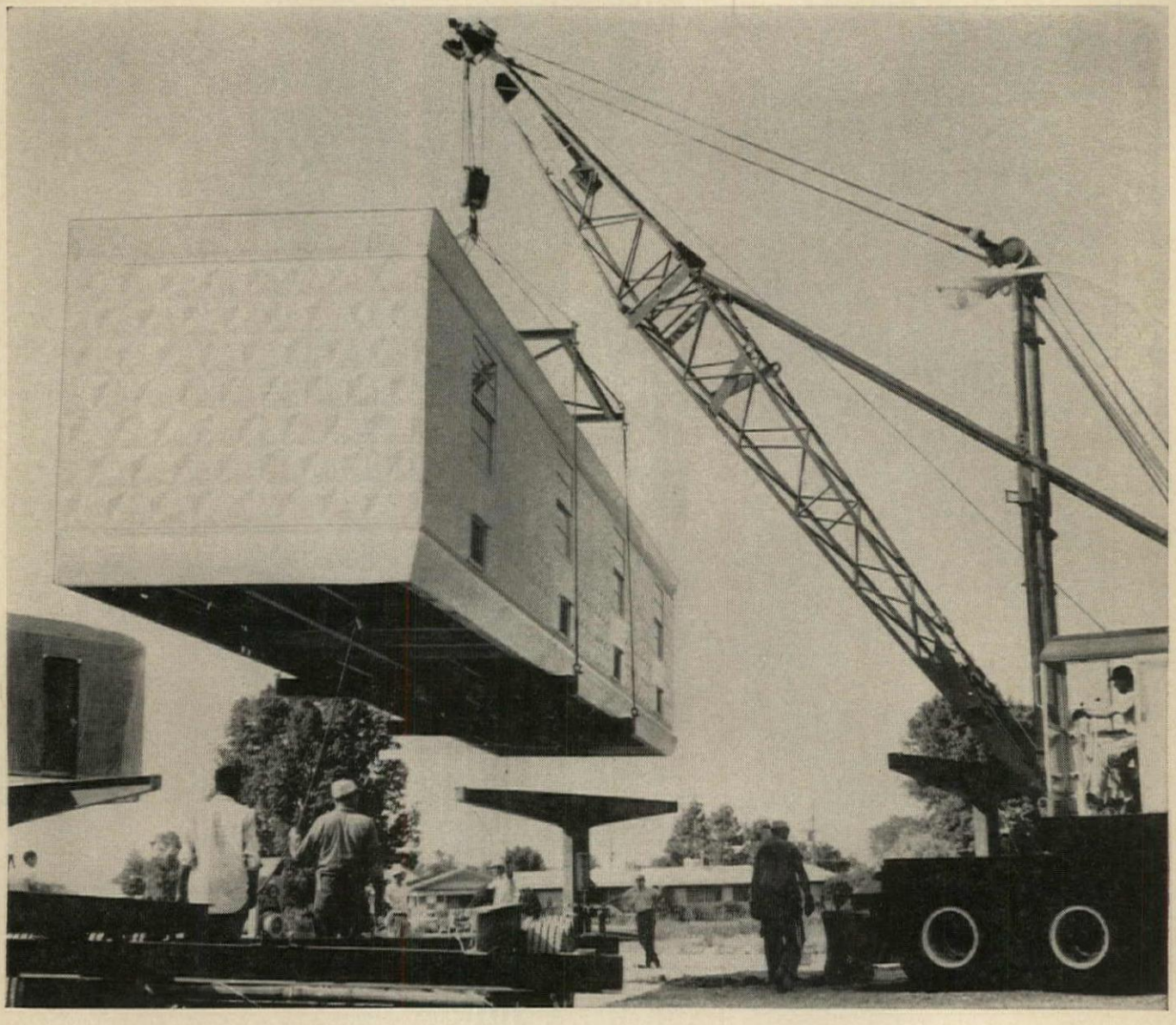
ailable in 9" x 9" and 3" x 9" tiles. Write for free design booklet. American Biltrite Rubber Co., Inc., Dept.AR1165, Trenton 7, N.J. Showrooms: New York (979 Third Avenue), Chicago, Los Angeles, San Francisco, Dallas, Toronto, Montreal, London.

**his is Amtico's new solid vinyl flooring, Beacon Hill. If you want something that looks more authentic, see a bricklayer.**

AMTICO



# New Hetron®/Hetrofoam® sandwich panel system helps make four-room modules possible

Hetrofoam-based polyurethane insulation foamed between skins of reinforced Hetron polyester resin and plywood panels forms the exterior walls of this module.

The four-room component is a unit of a 32-room Holiday Inn Jr. motel.

Hetrofoam-based foam is almost unlimited in its scope of fabrication. It fills the space around the electrical conduit and roughed-in plumbing in the walls. It shapes itself to the stylized triangular pyramids of the Hetron skin.

Hetron and Hetrofoam lend themselves to large fabrications such as these 8x10 and 8x14 ft. module panels.

SECTION OF SANDWICH PANEL.

They are relatively lightweight. They help make handling and assembly easy and help keep shipping costs low when the modules are shipped from plant to erection site. **Won't support combustion.** Hetrofoam-based polyurethane foam is rated nonburning by ASTM D-1692-59T.

Typical Hetron polyester laminates test within a range of 20 for highly filled panels to 75 for translucent panels in a flame-spread rating by ASTM E-84-50T.

**Would big modules help you solve a design problem?** There may well be dozens of applications where low-cost, mass-produced modules based on a Hetron/Hetrofoam sandwich panel system offer a practical solution.

We'll be glad to send you technical data on properties of Hetron and Hetrofoam and give you engineering help on the project you have in mind. Please write Durez® Plastics Division, Hooker Chemical Corporation, 8011 Walck Road, North Tonawanda, N.Y. 14121.

HOOKER CHEMICALS® PLASTICS

DUREZ PLASTICS DIVISION

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For more data, circle 20 on Inquiry Card →

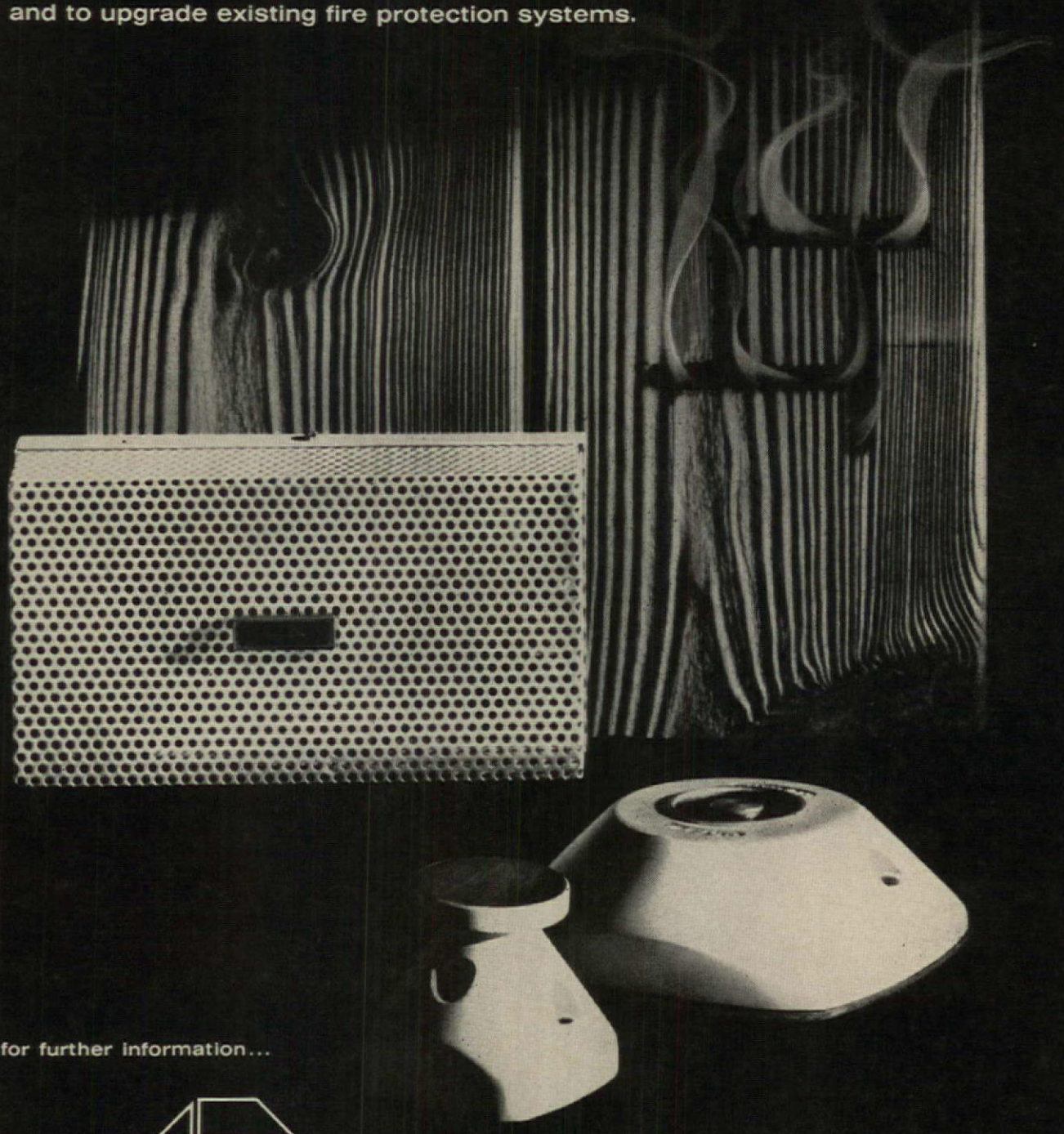
# FIREMARK symbol of fire protection

## A SIMPLE, LOW-COST, TWO-COMPONENT SYSTEM*

FIREMARK Smoke Detector with FIREMARK Door Holder-Release.
Detects smoke...releases doors...confines smoke...protects lives and property.

Employs an exclusive detection system that has years of proven reliability in aircraft and industrial applications.

*Specified for use in: ▪ corridors ▪ stairways ▪ offices ▪ assembly areas ▪ storerooms ▪ laboratories ▪ record rooms ▪ maintenance shops ▪ boiler rooms and to upgrade existing fire protection systems.



for further information...

A DIVISION OF RIXSON INC

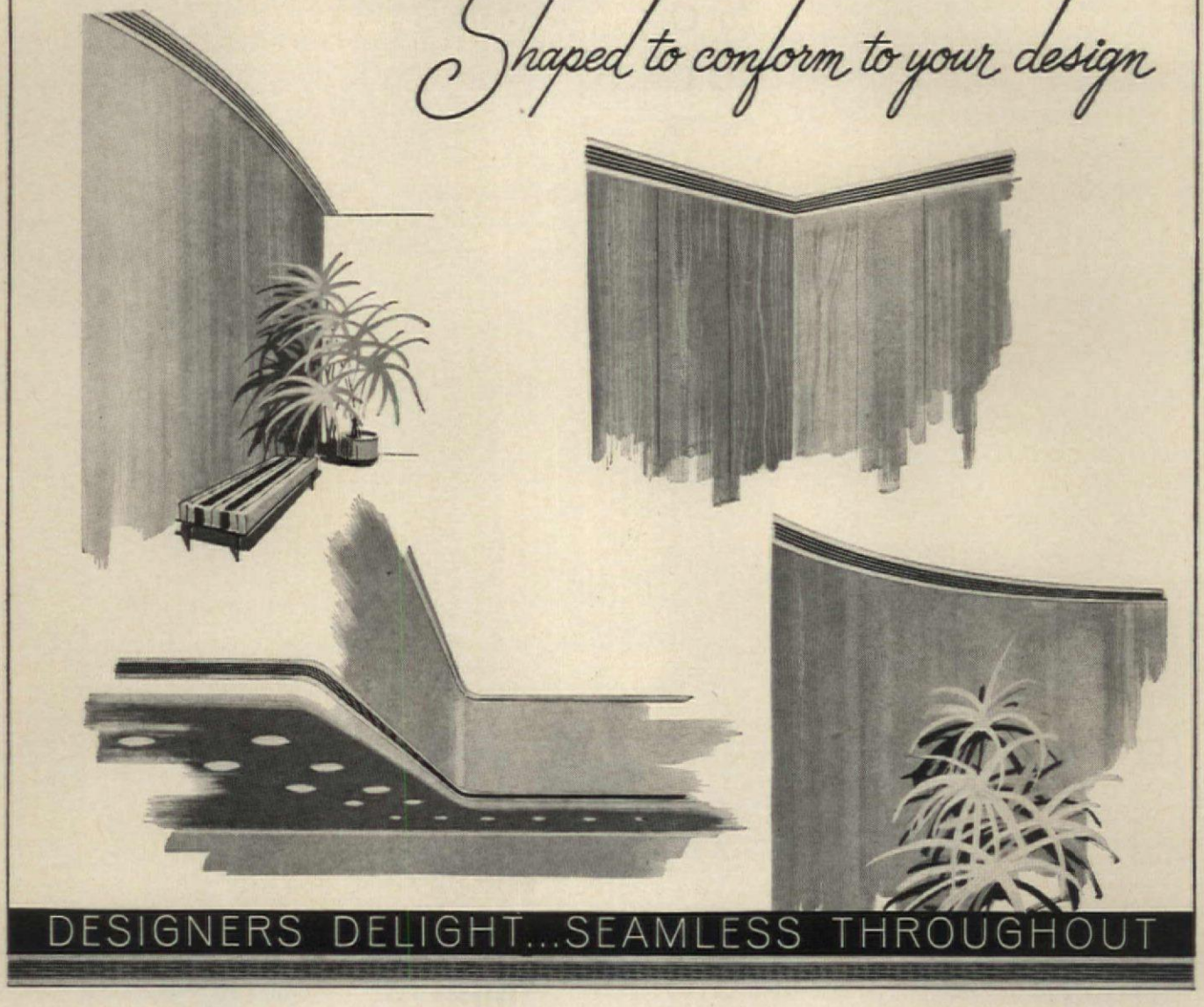
FIREMARK

9100 WEST BELMONT AVENUE, FRANKLIN PARK, ILLINOIS

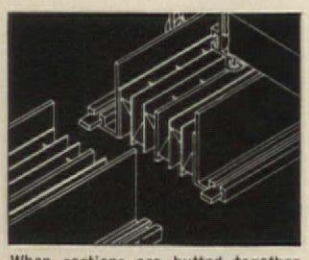
43 RACINE ROAD, REXDALE, ONTARIO, CANADA

# STRIPLINE

## Shaped to conform to your design



## DESIGNERS DELIGHT...SEAMLESS THROUGHOUT



When sections are butted together for a continuous run, inter-locking tabs assure perfect alignment—result is a decorative inconspicuous slot.

Architects and interior designers agree there is practically no limit to where and how decorative functional Stripline slot-type diffusers can be utilized. Regardless of the desired placement, Stripline's slim-trim conformation can be incorporated to blend in with the general scheme without calling attention to the mechanical installation.

When desired as a straight-line decorative border, curved, arched, or shaped to accommodate a slight contour, you can depend upon the versatility of a seamless continuous unit regardless of length.

Stripline slot-type diffusers are made of aluminum extrusions, designed with a slim-trim styling . . . no visible attaching screws . . . seamless appearance regardless of length . . . separate plaster frames . . . removable core . . . design eliminates complicated and expensive duct connections . . . simplified installation . . . built in diffusing vanes for engineered air distribution.

To assist in selecting and sizing the type Stripline best suited to your requirements, you can depend upon the reliable data printed in catalog ES. 105. Write for your copy.

AGITAIR®

AIR DEVICES INC., 185 Madison Avenue, New York 16, New York

*BETTER PRODUCTS FOR*...AIR DISTRIBUTION • AIR CLEANING • EXHAUST

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# You're looking at Philadelphia through a new glass from PPG that shuts out 70% of the sun's heat and has a "U" value of .35


Photo taken through a sample of SOLARBAN TWINDOW simulating typical building location. Camera: 4x5 Calumet, 1/50 sec at f/11 with Ektachrome daylight.

| COMPARATIVE PERFORMANCE DATA | | U Value | Maximum Heat Gain (BTU/hr./sq. ft.) | Visible Light Transmittance % |
|---|---|---|---|---|
| **PLATE GLASS** | | | | |
| Regular Plate Glass | ¼" | 1.1 | 200 | 88 |
| Solargray® | ¼" | 1.1 | 150 | 42 |
| Solarbronze® | ¼" | 1.1 | 150 | 51 |
| Solex® | ¼" | 1.1 | 150 | 73 |
| LHR Clear | ¼" | 1.1 | 140 | 47 |
| LHR Solargray | ¼" | 1.1 | 110 | 24 |
| LHR Solarbronze | ¼" | 1.1 | 110 | 27 |
| LHR Solex | ¼" | 1.1 | 110 | 35 |
| **SHEET GLASS** | | | | |
| Clear Sheet Glass | 3/32" | 1.1 | 205 | 90 |
| Graylite™ 31 | ⅛" | 1.1 | 170 | 31 |
| Graylite 61 | 3/16" | 1.1 | 195 | 61 |
| Graylite 56 | 7/32" | 1.1 | 190 | 56 |
| Graylite 14 | 7/32" | 1.1 | 150 | 14 |
| Graylite 52 | ¼" | 1.1 | 185 | 52 |
| **HIGH PERFORMANCE** (Insulating, Heat and Glare Reducing) | | | | |
| Clear Twindow® | | .60 | 170 | 78 |
| **Solarban Twindow** | | .35 | 65 | 20 |
| LHR Solargray Twindow | | .60 | 90 | 22 |
| LHR Solarbronze Twindow | | .60 | 90 | 25 |
| LHR Solex Twindow | | .60 | 90 | 32 |
| Solargray Twindow | | .60 | 115 | 36 |
| Solarbronze Twindow | | .60 | 115 | 45 |
| Solex Twindow | | .60 | 115 | 65 |

**INDUSTRY'S MOST COMPLETE LINE OF ENVIRONMENTAL GLASSES.**

It's called PPG SOLARBAN™ TWINDOW®—the latest and most effective Glass Conditioning product. It transmits only one third as much heat as regular ¼" plate glass, cutting heat loss or heat gain 66%. And it transmits only about 20% of the sun's visible rays, greatly reducing glare.

What gives PPG SOLARBAN TWINDOW these remarkable properties? Actually, it's two panes of glass enclosing a dry air space. On the air space side of the indoor pane, an exclusive coating reflects 46% of the sun's total energy.

SOLARBAN TWINDOW is the ideal environmental glass in any climate or location. It provides the ultimate in indoor comfort. And the savings in heating and air conditioning costs may more than make up the difference in price.

PPG makes environmental glasses to control the sun's heat and glare on any orientation, of any building, in any environment. For details on these modern glass products, contact your nearest PPG Architectural Representative, consult Sweet's Catalog or write: Pittsburgh Plate Glass Company, One Gateway Center, Pittsburgh, Pennsylvania 15222.

Pittsburgh Plate Glass Company, Pittsburgh, Pa.

PPG makes the glass that makes the difference

another product for Glass Conditioning from PPG

*Glass Conditioning is a service mark of the Pittsburgh Plate Glass Company

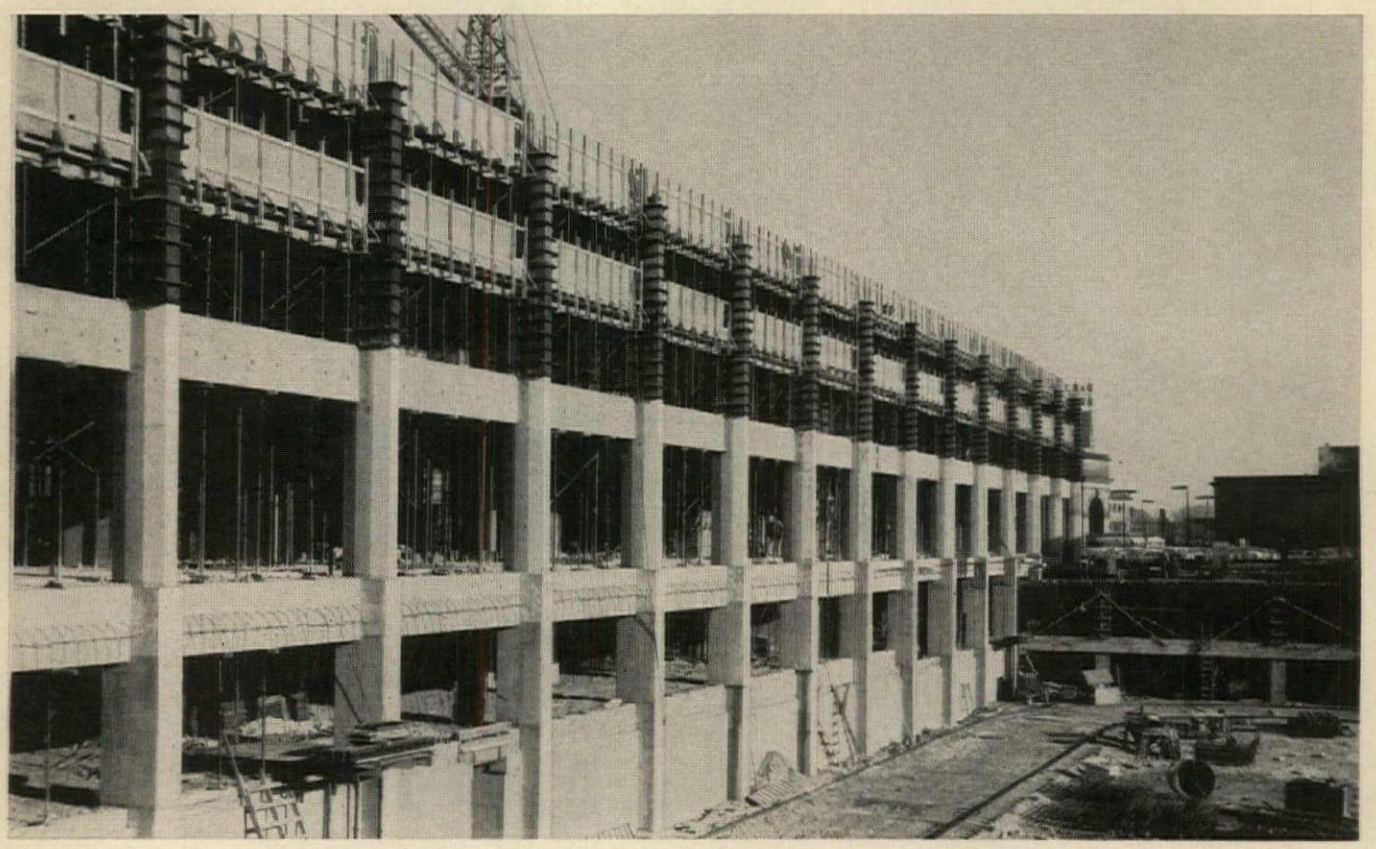
For more data, circle 22 on Inquiry Card

# APARTMENT COMPLEX FEATURES REINFORCED CONCRETE FRAME

## (structurally and aesthetically)

## LEHIGH CEMENTS USED

The Towers, Gateway Center, Minneapolis, Minn. Complex consists of 27-story and 16-story apartment buildings plus residential plaza and underground parking garage.



Exposed columns rise as an integral part of the cast-in-place structural frame. Precast exposed aggregate units form the spandrels at second and top floors and are used in some interior hall areas.

• Exposed vertical columns of the concrete structural frame provide an attractive architectural effect to this dwelling complex in the widely known Gateway Center, Minneapolis. Spandrels of precast exposed aggregate concrete at two levels of the structure further enhance the beauty.

Lehigh Cement was used in the ready mix for cast-in-place concrete of the complex and Lehigh Early Strength Cement in the precast units. Lehigh Portland Cement Company, Allentown, Pa.

*Owner:* Knutson Companies, Inc., Minneapolis, Minn. and Countrywide Realty, Inc., New York, N. Y.

*Architect:* John A. Pruyn, New York, N. Y.

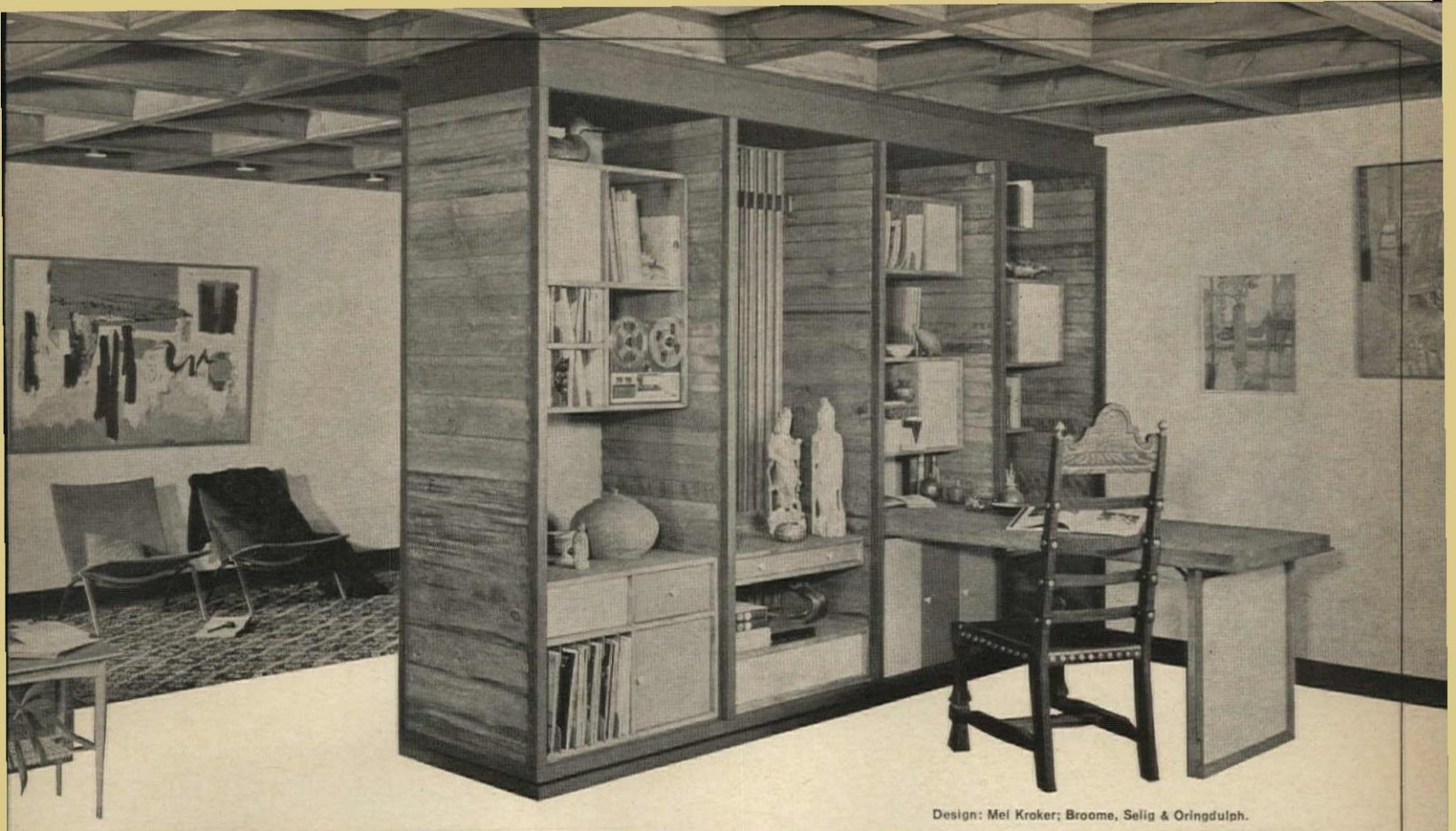
*Consulting Structural Engineer:* Wayman C. Wing, New York, N. Y.

*Contractor:* Standard Construction Co., Minneapolis, Minn.

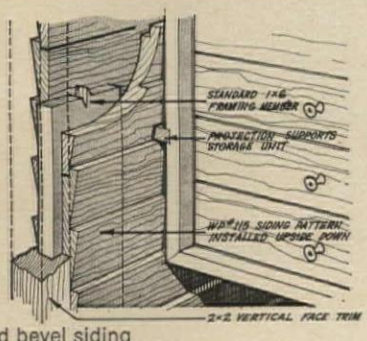
*Precast Panels:* American Artstone, New Ulm, Minn.

*Ready Mix Concrete:* Ready Mixed Concrete Co., Minneapolis, Minn.

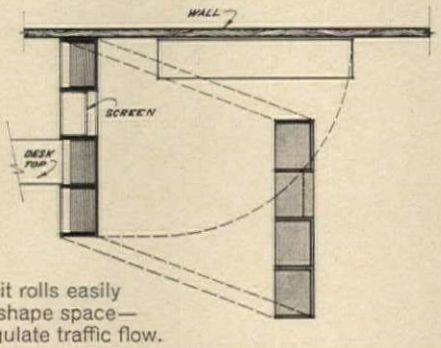
LEHIGH CEMENTS



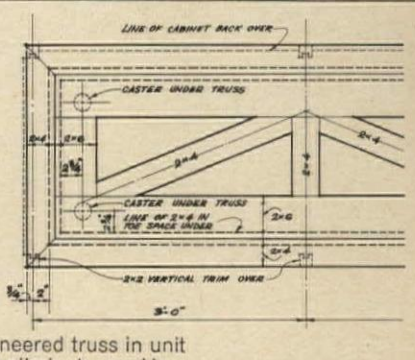
Design: Mel Kroker; Broome, Selig & Oringdulph.




Inverted bevel siding for shelves without hardware.




Unit rolls easily to shape space—regulate traffic flow.




Engineered truss in unit base eliminates racking.

# Meet the Caravan... a floating wall of storage engineered to shape space and create rooms.

The Caravan wall is more than just a new look at the old storage problem. An integral part of the home—and still movable—it actually invites an entirely new concept in home design. It can stand with its back against the wall; or as a peninsular room divider; even as an island of family activity in the middle of a room. Whatever its situation, the Caravan offers unlimited space-shaping opportunities.

This unique moving wall of storage is the result of Western Wood and imaginative design meeting head-on. Its engineered truss allows it to be moved easily without a hint of racking.

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The shelves require no supporting hardware; they rest on stock Western Wood siding pattern 115 (or any bevel siding pattern) placed upside down. The display shelves, the tape-deck cabinet and all tailored units are movable and interchangeable.

No other building material meets the storage challenge with so much beauty and function as does Western Wood. Whether flat-side or edge, pure wood always turns its beauty-side out. Staining it highlights wood's natural texture and grain; painting it is a breeze; waxing it brings out the natural warmth and beauty for all to see.

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# BORDEN DECOR PANELS: DECA-GRID

The aluminum sun screens on the school building above are Deca-Grid style Borden Decor Panel. The lightweight panels were furnished with tilted spacers to provide the proper degree of shading.

The tilting of the Deca-Grid spacers is known as the slant-tab variation, in which the slant-tabs (spacers) may be mounted at angles of 30°, 45°, 60° or 90°. The slant-tabs may be specified in various lengths as well, depending on the chosen angle of mounting. With the Deca-Grid style, specifications for spacings and spacer bar positions may be varied almost indefinitely.

All the Borden Decor Panel styles, including Deca-Grid, Deca-Gril, Deca-Ring and Decor-Plank, are highly versatile in design specification and in application such as facades, dividers, grilles, fencing, refacing of existing buildings, etc. Fabricated in standard or custom designs in sturdy, lightweight aluminum, Borden Decor Panels provide a handsome, flexible, maintenance-free building component.

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Roger Sturtevant

COLLABORATIVE MEDAL OF HONOR to Deere and Company, Moline, Illinois. Architect: Eero Saarinen and Associates; structural engineers: Ammann & Whitney; mechanical engineers: Burns & McDonnell; landscape architects: Sasaki, Dawson, DeMay Associates, Inc.; muralist: Alexander Girard. Contractor: Huber, Hunt & Nichols.

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GOLD MEDAL FOR ENGINEERING to Ammann & Whitney, structural engineers, for Assembly Hall, University of Illinois, Urbana, Illinois. Architect: Harrison & Abramovitz; mechanical and electrical engineers: Syska & Hennessy; site landscaping consultants: Clarke & Rapuano; and general contractor: Felmley-Dickerson.

GOLD MEDAL FOR ARCHITECTURE (*at left*) to Sert, Jackson & Gourley, architects, for Francis Greenwood Peabody Terrace Married Student Housing at Harvard University, Cambridge, Massachusetts. Structural engineers: Nichols, Norton & Zaldastani; mechanical and electrical engineers: Sidney J. Greenleaf & Associates; landscape archiects: Sasaki, Walker & Associates; and general contractor: Vappi & Company, Inc.

## Winners Announced In Gold Medal Competition of Architectural League

As we go to press the winners have been announced in the 63rd National Gold Medal Exhibition of the Building Arts of The Architectural League of New York. In addition to the winners shown here, there are two other gold medals, one for sculpture and one for design and crafts (to be shown in a more complete report in December), six silver medals, nine honorable mentions and three citations. The exhibition is composed of both invited and open submissions of work by American practitioners of the building arts. Paul F. Damaz, Architectural League vice president for architecture, was chairman of the Gold Medal Competition. The exhibition will be on view at the exhibition hall of the United States Plywood Corporation in New York City until December 1 and then will be circulated nationally to schools, museums and other institutions by the American Federation of Arts.

## Step Up Communication with Architects, Producers Told

The expanding scale of architectural practice and—as reflected in recent court decisions—the expanding legal responsibility of the architect are also vastly expanding his need for reliable and current technical information about building products and materials, Architect Charles Luckman told the 27th annual Building Products Executives Conference in Washington, D.C. on October 7.

Mr. Luckman expressed amazement at inquiries as to whether architects involved in large, complex projects could possibly interest themselves in the selection of materials: "In our office, design and materials are considered to be synonymous."

Following the all-day conference. at which Mr. Luckman was the only architect speaker, President Wallace F. Traendly of F. W. Dodge Company, a division of McGraw-Hill, Inc., was host to the conferees at a dinner at which the F. W. Dodge Construction Outlook for 1966 (pp. 121-128) was presented by Chief Economist George A. Christies, Jr.

## Academic Appointments

**University of Michigan**, Ann Arbor: **Jacques C. Brownson** has been named Professor and Chairman of the Department of Architecture. He has been design chief for C. F. Murphy Associates, Chicago. He replaces **Professor Walter Sanders**, chairman for 10 years, who has asked to be relieved of administrative responsibility to devote himself to teaching and practice.

**New York Institute of Technology**, New York City: **Professor Aly S. Dadras** has been named Chairman of the Department of Architectural Technology. Professor Dadras, now a registered architect and city planner in New York, heads his own firm of Dadras International City Planners.

## Holland Firm Presents "A Program of Smells"

Steendrukkerij de Jong & Company, a printing concern in Hilversum, Holland presented "a program of smells" from August 16 to September 22, created by Wim Schipper. The program catalogue explains thusly: "During the performances in the small hall of Steendrukkerij de Jong & Company there are many things of interest to be sniffed. The 22-year-old Wim Schipper, a young artist of whom it could hardly be said that conventionality is one of his qualities, opens the program with a presentation, produced with southern temperament, of a full-flavored Orange odor, which at once brings the odorence in a lively mood. The next smell, of a somewhat more serious character and of a deeper fragrance, is the pencil, immediately calling up memories of work, school and office. Then after the intermission, winter pleasures are recalled by Schippers by his wittily brought Anise. Unexpected sensuality is exhaled in the fourth and last part of the program; some of those present had already been noticeably restless under its influence and from various twitching nostrils it could be seen that the sultry Musk, the basis of so many alluring perfumes, was familiar to many, though perhaps subconsciously. The program of scents presented here can be regarded as a proof that this young odorant may yet expect to attract much notice."

## GSA Names Architectural Advisory Panel

A panel of 17 architects has been named by the General Services Administration to review the designs of buildings erected by the GSA; to review GSA design standards and procedures and recommend any changes it thinks are needed or desirable; to advise GSA administrator Lawson B. Knott on selection of architects for "nationally significant" projects; and to propose criteria for choosing architects and drawing up contracts with them.

Serving on the panel will be Max Abramovitz, David L. Eggers and Grant Fordyce of New York City; Max Brooks of Austin, Texas; Joseph G. Durrant of Dubuque, Iowa; Max Flatow of Albuquerque; Albert S. Goleman of Houston; Robert F. Hastings of Detroit; James Hunter of Boulder, Colorado; George E. Kassabaum of St. Louis; Vincent G. Kling of Philadelphia; Charles Luckman and Henry L. Wright of Los Angeles; William G. Lyles of Columbia, South Carolina; Arthur Gould Odell of Charlotte, North Carolina; Cyrus Silling of Charleston, West Virginia; and Warren W. Taylor of Nashville.

## President Signs Arts Bill And Transportation Bill

A new bill creating the National Foundation for the Arts and the Humanities was signed by President Lyndon Johnson in Washington on September 29. "We in America have not always been kind to the artists and the scholars who are the creators and the keepers of our vision," said the President. "Somehow, the scientists always seem to get the penthouse, while the arts and humanities get the basement . . . What this bill really does is to bring active support to this great national asset, to make fresher the winds of art in this great land."

In signing the Rapid Rail Transportation Bill on September 30, President Johnson said: ". . . The same science and technology which gave us our airplanes and our space probes, I believe, could also give us better and faster and more economical transportation on the ground. And a lot of us need it more on the ground than we need it orbiting the earth."

First Place: U. S. Army Academic Building, Fort Benning, Georgia. Architect: Abreu and Robeson, Inc., Atlanta; supervised by: U.S. Army Engineer District, Savannah; contractor: The Jordon Company.

## Army Chief of Engineers Holds Award Competition

One first place and one honorable mention were awarded in the U. S. Army Chief of Engineers' first annual Distinguished Architectural Achievement Awards. The award winners were chosen from a field of 10 entries from all over the world and were selected by a jury composed of J. Roy Carroll, Jr. of the firm of Carroll, Grisdale and Van Alen, Philadelphia; Edward John Maher, of the firm of Maher and Marten, San Francisco; and Joseph D. Murphy of the firm of Murphy and Mackey, St. Louis.

Honorable Mention: Second Army Medical Laboratory, Fort George Meade, Maryland. Architect: Faulkner, Kingsbury and Stenhouse; supervised by: U.S. Army District, Baltimore; contractor: Pirraci Construction Company.

Major General R. G. MacDonnell, Deputy Chief of Engineers, said the awards were the initital phase of a program designed to encourage quality design in all Corps of Engineers projects. "Our ultimate goal," said General MacDonnell, "is to stimulate architects both within the Corps and in private firms to strive for a high degree of architectural quality, regardless of project size and budget."

## Architect—Researcher's Conference Draws Many Participants

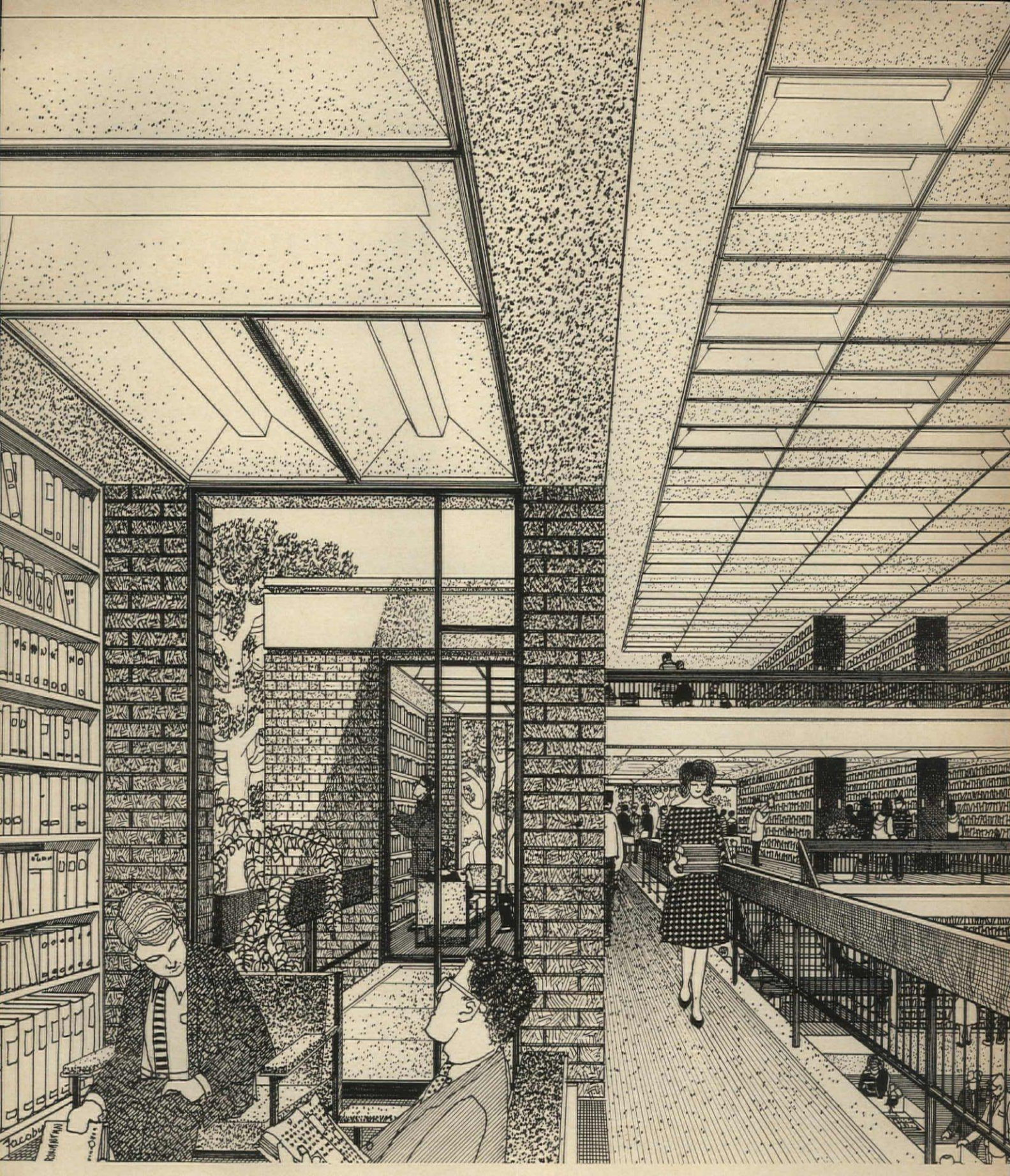
A conference on architectural research, sponsored by the A.I.A.'s Committee on Research for Architecture and the University of Michigan's Architectural Research Laboratory, drew a large group of architects and educators to Ann Arbor on October 7 and 8. The registration was nearly four times the 30 or so participants that had been expected, indicating that widespread interest in the architect's research problems came as a pleasant surprise to the organizers of the conference.

Despite the great degree of interest, it was clear that there is still a long way to go before architects can take the kind of technology that sends men to the moon and apply it to the problems of their profession. There were, however, many encouraging signs of progress. Mrs. Roslyn Lindheim of the University of California described a hospital research study that was a model of clarity and common sense, experiments with plastics being conducted at the University of Michigan demonstrate new construction methods, and the scientific study of perception and investigations into new uses of the computer seem to have many architectural potentialities.

At an evening session, Robert Geddes of Princeton outlined an A.I.A. sponsored program to study the nation's architectural schools.

## Othmar Ammann Dies

Othmar Ammann, designer of many notable bridges including the Verrazano-Narrows and the George Washington in New York City, died at his home in Rye, New York on September 22 at the age of 86. He was a principal in the engineering firm of Ammann and Whitney, which was organized in 1939.



There is virtually no limit to the design effects possible with Armstrong Luminaire Ceiling Systems. In this modern library, the versatile, new C-60 System permits a variety of module arrangements, allowing light levels to be tailored to the specific needs of each area—from entrance hall to study niches.

For complete information on the all-new C-60 Luminaire Ceiling System, including full application-engineering data and guide specifications, write: Armstrong Cork Co., Building Products Division, 4211 Rock Street, Lancaster, Pennsylvania.

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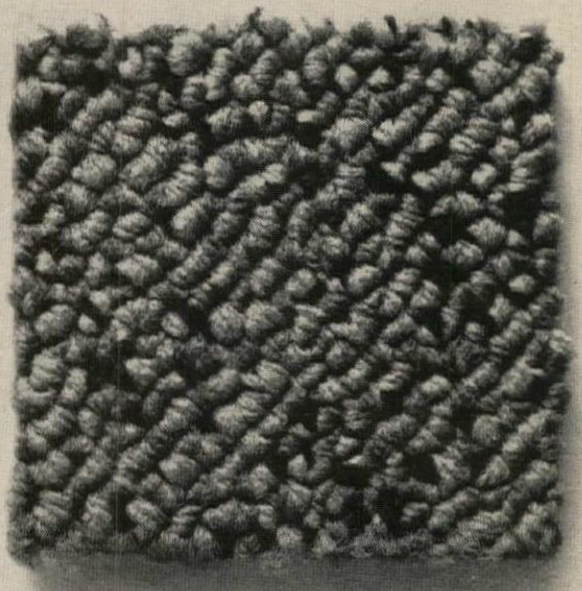

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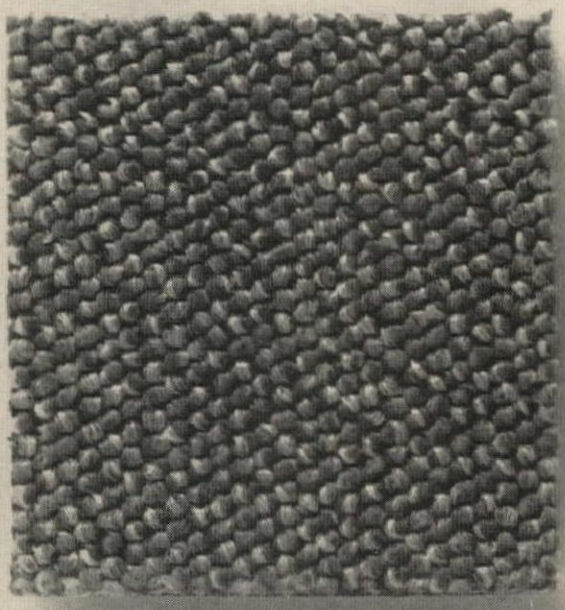

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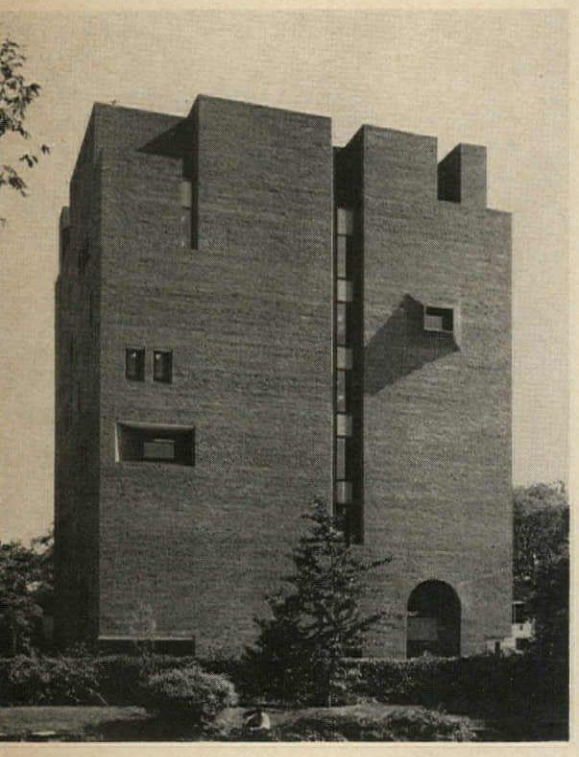
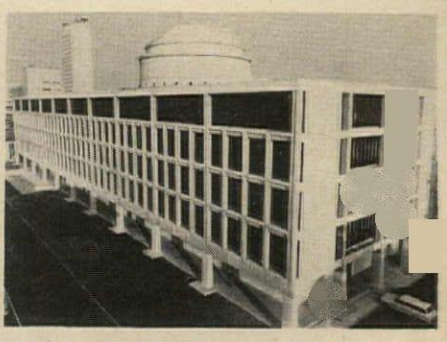


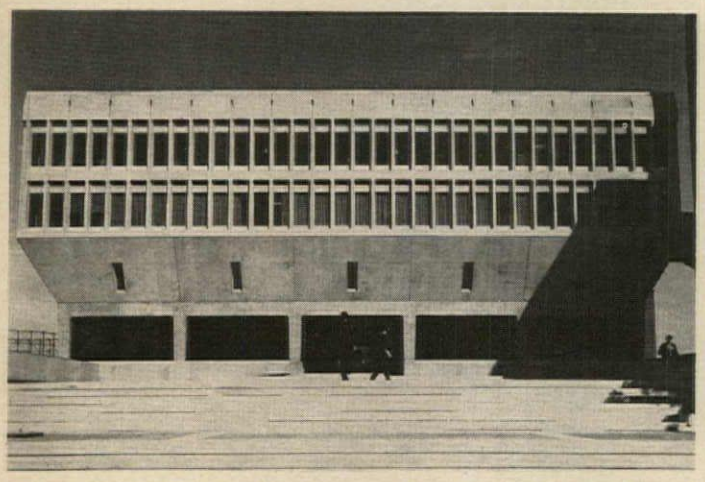
## Education Building Completed at Harvard

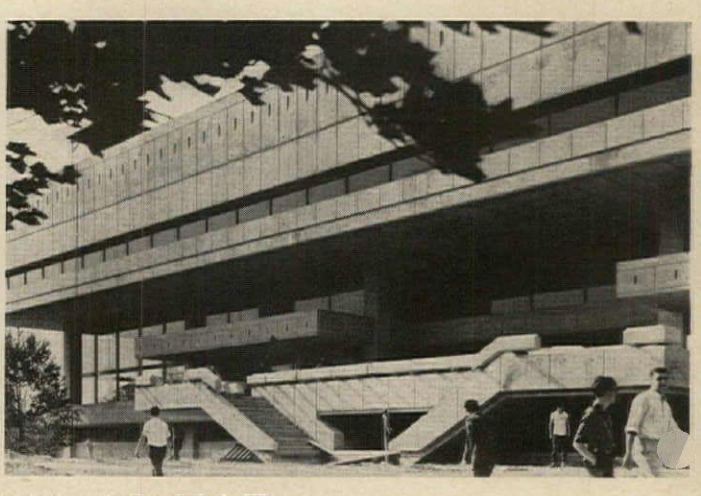
Roy E. Larsen Hall at Harvard University, Cambridge, Massachusetts is a seven-story, 47,200-square-foot structure which brings together many of the teaching and research programs of the Graduate School of Education. The building is set within a courtyard and is faced with traditional Harvard brick to relate to the older architecture of the University. The floor levels are defined by stringcourses of brick set vertically and by vertical slits of windows on two sides of the building. Grouped on upper floors of the structure are faculty and research areas with each floor organized around an informal meeting area. Architects were Caudill, Rowlett & Scott. Consulting engineers were Wald & Zigas; contractor, G. C. Wexler Construction Company.



## SOM At M.I.T.

The recently dedicated $6-million building for the interdepartmental Center for Materials Science and Engineering at the Massachusetts Institute of Technology is a five-story concrete and glass structure which is parallel to and immediately north of M.I.T.'s main building (dome in background). Architects are Skidmore, Owings & Merrill and contractor was the George A. Fuller Construction Company.



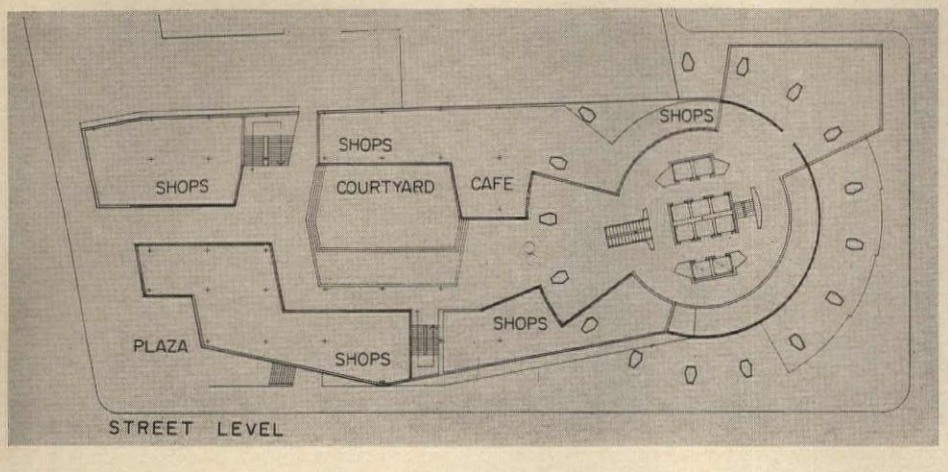


## Two Buildings Designed by Catalano Are Finished At M.I.T.

The $5.2-million Julius Adams Stratton Building at the Massachusetts Institute of Technology in Cambridge (*above right*) is a poured concrete and glass structure of five stories which will serve as a student center. The center contains dining areas, rooms for social events and student activities, and reading rooms. The Grover M. Hermann Building will house an economics library and social science departments. The five-story structure, including basement, cost $3 million and is of poured concrete, precast concrete and glass construction. Both buildings were designed by Eduardo Catalano in association with Robert C. Brannen and Paul Shimamoto. General contractor for the Stratton Building was G. C. Wexler Construction Company: contractor for the Hermann Building: Canter Construction Company.

## Engineering Building Planned For Yale

The proposed $9-million Engineering and Applied Science Laboratory at Yale University, New Haven, Connecticut, designed by Architect Marcel Breuer, is a six-story precast concrete structure which will provide facilities for research laboratories, departmental library and offices. Subdivision of window openings by vertical mullions, according to Mr. Breuer, will contribute protection against sunlight. The first floor wall will be recessed behind the building's supporting columns. A terrace level will be provided under which will be a truck dock, an audio visual hall, a lecture room and a lounge.

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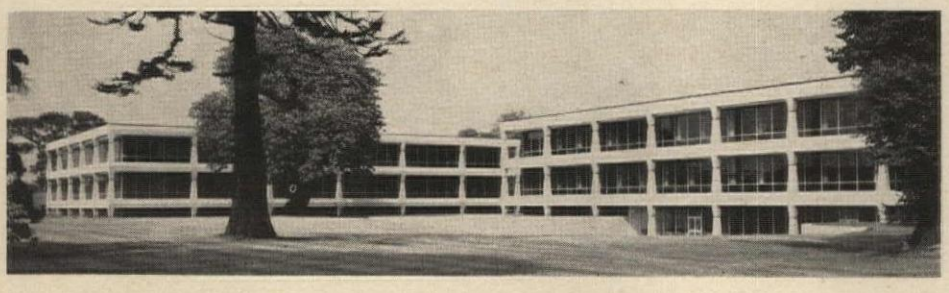
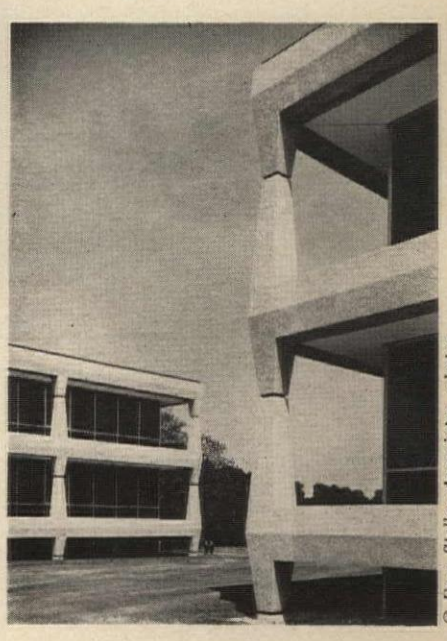
## Proposed Montreal Building Integrates 425-foot Tower With Three-Story Base

La Tour Laurier in Montreal was designed by Craig, Zeidler & Strong in association with Beauvais & Lusignan so that the tower rises directly from street level and is interconnected with its base, because the architects felt that otherwise "the volume of the base and the tower would be out of proportion to each other." All activities in the base are turned in towards an interior mall. The base also has three parking levels. The equivalent of the first six stories in the tower are visually opened and used to link the activities of the shopping colonades in the base with the office building. The building will contain 750,000 square feet and will cost $20 million. The developers and contractors are Three Star Construction Ltd.





© Ezra Stoller Associates, photos

## English Buildings Preserve Park-like Setting

The Research and Administraion Center of H. J. Heinz Company, Ltd. at Hayes, Middlesex, England is comprised of two buildings, the Administrative Offices, above right, and the Research Department and Laboratories, connected by a tunnel. Both buildings have only two floors above grade and one below so as to preserve the park-like setting. The buildings have reinforced concrete frames with glass walls set back five feet. They contain a total floor area of 125,000 square feet. Architects are the New York office of Skidmore, Owings & Merrill in association with Mathews, Ryan & Simpson.

## New Macy's In Queens

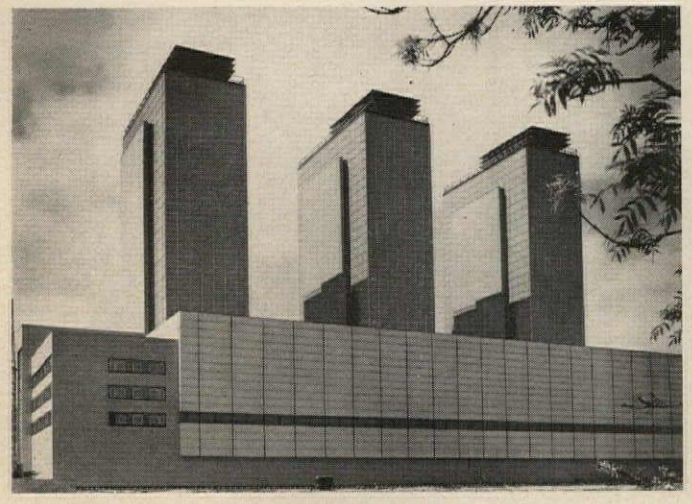
The new Queens branch of Macy's Department Store in New York City is a 426-foot-in-diameter circular structure (except for a nick—see arrow—where a landowner would not sell) containing 326,500 square feet on four levels. Around the store and forming the exterior above ground level will be a multi-deck parking garage for 1,250 cars serviced by two helix ramps. Architects, Skidmore, Owings & Merrill: contractor, Walter Kidde Constructors, Inc.

# PHOTOGRAPHY CONTEST HELD IN GERMANY

Shown on these pages are the 10 top winners in the 1965 architectural photography contest conducted by the Association of German Cities. The theme of the contest was "Signs of the Future," and the reason for this theme was to show the progress Germany had made in the past 20 years in public building. Over 1,000 participants from 173 cities submitted about 3,000 pictures. The jury consisted of Joseph Walther Lollatz, deputy president of the German Academy for Town and Region Planning (retired), Essen; L. Fritz Gruber, commissioner and promoter of the Cologne Fair Corporation; and Jost Torbohm, member of the editorial staff of the German publication "Der Staedtetag." A total of 217 prizes were awarded including 22 cash prizes, top one being $500, 65 book prizes, and 130 special prizes from the cities ranging from $50 to $100.

First Prize: Skyscraper in the Berlin Hansa-Quarter; architects: Jaenecke, Samuelson; sculptor: Bernhard Heiliger; and photographer: Robert Häusser, Mannheim-Käfertal.

Second Prize: City Theater of Gelsenkirchen; architects: Werner Ruhnau, Ortwin Rave, Max von Hausen; and photographer: Martin Frank, Gelsenkirchen-Buer.

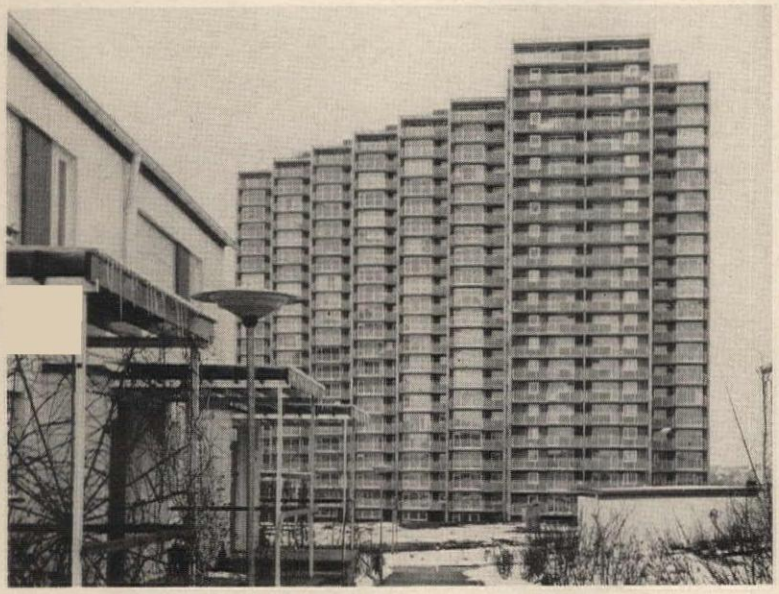


Second Prize: Heating Power-works of Hannover designers: Municipal Superstructure Board of Works—City Works of Hannover; photographer: Joachim Giesel, Hannover-Buchholz.

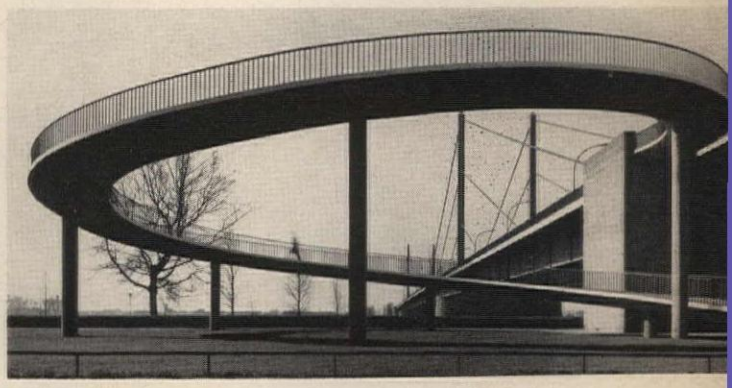
Second Prize: Mastersinger Hall, Nuremberg; architect: Harald Löbermann; and photographer Horst Harren, Nuremberg.

Third Prize: Friedrich-Ebert-Hall, Ludwigshafen; architect, Roland Rainer; and photographer: Werner Kortokraks, Ludwigshafen.

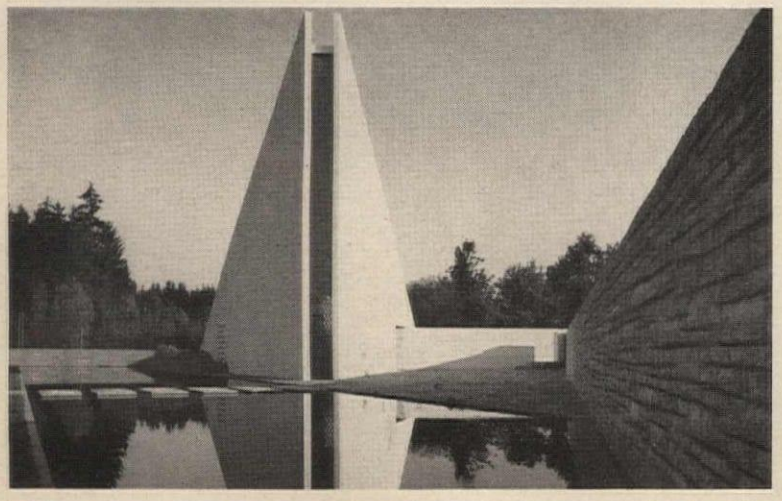
Third Prize: Skyscraper in Bremen-Neue Vahr; architect: Alvar Aalto; and photographer: Gudrun Lorisch, Bremen.



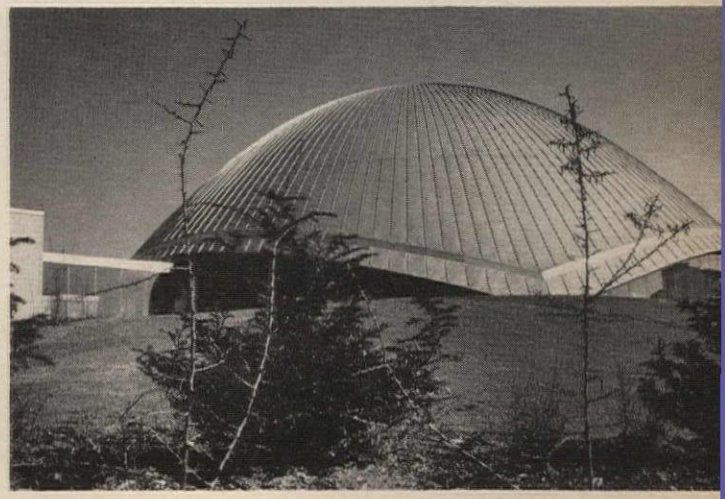
Third Prize: Apartment-skyscraper in Stuttgart-Fasanenhof; architect: Wilhelm Tiedje, Josef Lehmbrock; and photographer: Babette Kaemmez, Stuttgart-Fasanenhof.



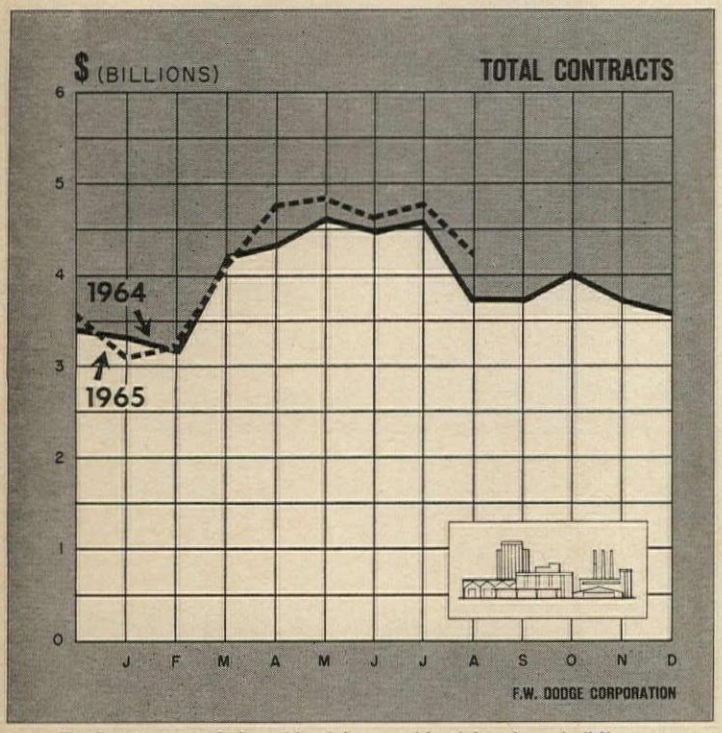
Third Prize: Pedestrian Platform at the Theodore-Heuss-Bridge in Duesseldorf; architect: Friedrich Tamms; and photographer: Inge Goertz-Bauer, Duesseldorf.



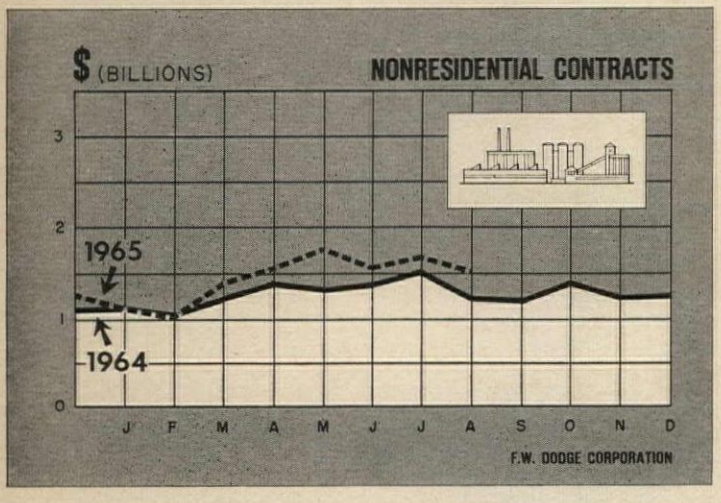
Third Prize: Chapel at the "Waldfriedhof" (Cemetery) in Munich; architect Helmut Schoener; and photographer: Sieglinde Weigner, Munich.

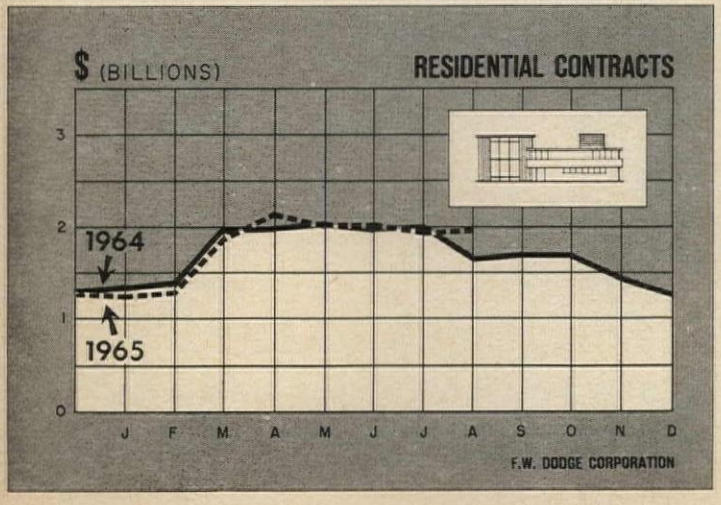


Third Prize: Planetarium in Bochum; designer: Municipal Board of Works, Bochum; and photographer: Helmut Muschiol, Bochum-Weitmar.




*Total contracts include residential, nonresidential and non-building contracts*




# "R & D" BUILDING—A NEW HIGH

It's a bit unusual to deal with the subjects of *industrial* and *educational* building in the same context. Their obvious differences—private vs. public; commercial vs. academic—are what normally get the emphasis. But there are also some important links between these two seemingly unrelated building types, and not the least of them is that factories and schools are two of this year's hottest construction markets.

Another thing these two building types have in common is that between them they give rise to an overwhelming proportion of all the laboratory and research facility construction that takes place, and it's this feature that brings them together here.

One aspect of the many-fold increase in industrial research and development expenditures over the past decade or so has been the development of the research center, a building or complex of buildings—often in an entirely different location from the firm's manufacturing facilities—devoted exclusively to pure and applied research. In 1965, industry has been responsible for roughly a quarter of all laboratory construction, and, as might be expected, the highly research-minded chemical industry leads all the others in such building. Also high on the list of industries which have been putting up new research facilities in a big way are rubber products manufacturers, building materials makers, and the electronics industry.

The really big share of lab and research facility building —most of the remaining three-quarters of the total expenditure—is done by the nation's colleges and universities. And with the flood of Federal funds being made available through a variety of existing and new programs, academic research building is also showing the fastest rate of growth these days.

Laboratory construction is expensive building, averaging just over $24 per square foot. That makes the typical lab just about twice as costly to build as an equivalent unit of housing, for example, and well over half again as expensive as most types of nonresidential buildings. Research facilities built for educational institutions, incidentally, run significantly higher in unit cost than their industrial counterparts.

Regionally, the Northeast (New England and the Middle Atlantic states) generates a disproportionately large share of laboratory building. This area, which normally accounts for just about a quarter of the nation's total building activity, was responsible for fully a third of all research facility construction last year. Reason: that's where the heaviest concentration of colleges and universities is found. It's also where higher educational building is expanding fastest, and laboratory construction is growing right along with the classrooms and dormitories.

With industrial and higher educational building booming along the way they are, it's a cinch that the volume of laboratory construction will top half a billion dollars for the first time this year.

*George A. Christie, Chief Economist*
*F. W. Dodge Company*
*A division of McGraw-Hill, Inc.*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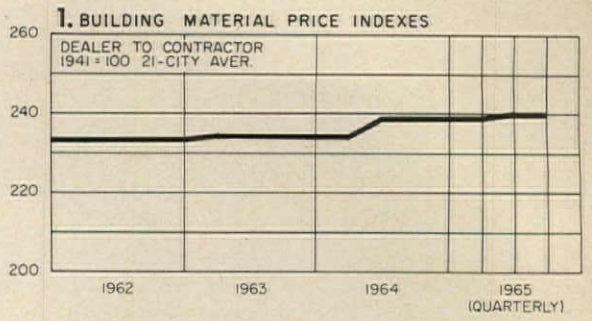
# *Building Construction Costs*

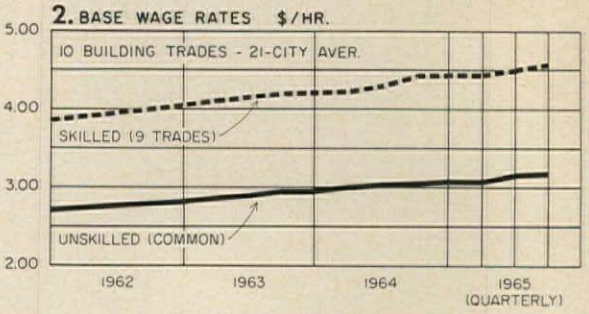
*By William H. Edgerton*
*Manager-Editor, Dow Building Cost Calculator,*
*an F. W. Dodge service*

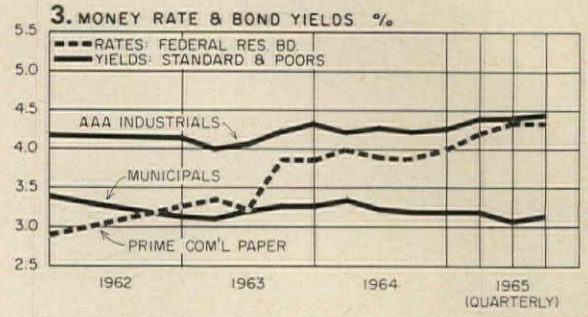
**The information presented here permits quick approximations of building construction costs in 21 leading cities and their suburban areas (within a 25-mile radius). The tables and charts can be used independently, or in combination as a system of complementary cost indicators. Information is included on past and present costs, and future cost can be projected by analysis of cost trends.**

A. CURRENT BUILDING COST INDEXES—OCTOBER 1965
1941 Averages for each city = 100.0

| Metropolitan Area | Cost Differential | Current Dow Index Residential | Current Dow Index Nonresidential | Per Cent Change Year Ago Res. & Nonres. |
|---|---|---|---|---|
| U. S. Average | 8.5 | 270.8 | 288.6 | +1.88 |
| Atlanta | 7.2 | 306.5 | 325.0 | +2.23 |
| Baltimore | 7.9 | 272.6 | 290.0 | +1.49 |
| Birmingham | 7.4 | 250.1 | 268.9 | +1.53 |
| Boston | 8.5 | 246.1 | 260.5 | +2.22 |
| Chicago | 8.9 | 299.8 | 315.4 | +1.53 |
| Cincinnati | 8.8 | 260.7 | 277.1 | +1.29 |
| Cleveland | 9.4 | 278.2 | 295.7 | +3.29 |
| Dallas | 7.7 | 254.2 | 262.5 | +1.16 |
| Denver | 8.3 | 279.0 | 296.6 | +2.01 |
| Detroit | 9.0 | 273.7 | 287.3 | +2.23 |
| Kansas City | 8.3 | 244.7 | 259.1 | +2.36 |
| Los Angeles | 8.4 | 276.9 | 303.0 | +2.99 |
| Miami | 8.4 | 267.1 | 280.4 | +1.20 |
| Minneapolis | 8.8 | 270.6 | 287.7 | +0.95 |
| New Orleans | 7.8 | 244.5 | 259.1 | +2.11 |
| New York | 10.0 | 282.1 | 303.4 | +2.98 |
| Philadelphia | 8.7 | 269.7 | 283.2 | +1.93 |
| Pittsburgh | 9.0 | 253.4 | 269.4 | +0.79 |
| St. Louis | 9.1 | 268.2 | 284.1 | +3.24 |
| San Francisco | 8.5 | 344.1 | 376.5 | +1.07 |
| Seattle | 8.4 | 246.4 | 275.3 | +0.90 |




B. HISTORICAL BUILDING COST INDEXES—AVERAGE OF ALL BUILDING TYPES, 21 CITIES — 1941 average for each city = 100

| Metropolitan Area | 1952 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 (Quarterly) 1st | 2nd | 3rd | 4th | 1965 (Quarterly) 1st | 2nd | 3rd | 4th |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **U.S. AVERAGE 21 Cities** | 213.5 | 248.9 | 255.0 | 259.2 | 264.6 | 266.8 | 273.4 | 274.7 | 276.8 | 278.6 | 279.3 | 279.5 | 281.0 | 283.7 | |
| **Atlanta** | 223.5 | 277.7 | 283.3 | 289.0 | 294.7 | 298.2 | 305.7 | 310.0 | 312.3 | 313.4 | 313.7 | 313.9 | 317.9 | 320.6 | |
| **Baltimore** | 213.3 | 251.9 | 264.5 | 272.6 | 269.9 | 271.8 | 275.5 | 277.2 | 279.3 | 280.5 | 280.6 | 280.5 | 281.0 | 284.7 | |
| **Birmingham** | 208.1 | 233.2 | 233.2 | 240.2 | 249.9 | 250.0 | 256.3 | 258.0 | 259.9 | 260.1 | 260.9 | 261.2 | 264.1 | 264.9 | |
| **Boston** | 199.0 | 230.5 | 230.5 | 232.8 | 237.5 | 239.8 | 244.1 | 246.1 | 247.9 | 251.3 | 252.1 | 251.7 | 252.6 | 256.3 | |
| **Chicago** | 231.2 | 273.2 | 278.6 | 284.2 | 289.9 | 292.0 | 301.0 | 302.2 | 304.5 | 305.1 | 306.6 | 306.5 | 307.3 | 310.2 | |
| **Cincinnati** | 207.7 | 250.0 | 250.0 | 255.0 | 257.6 | 258.8 | 263.9 | 265.1 | 267.1 | 268.9 | 269.5 | 269.4 | 270.2 | 272.9 | |
| **Cleveland** | 220.7 | 257.9 | 260.5 | 263.1 | 265.7 | 268.5 | 275.8 | 276.3 | 278.4 | 282.0 | 283.0 | 282.3 | 283.4 | 290.8 | |
| **Dallas** | 221.9 | 230.5 | 237.5 | 239.9 | 244.7 | 246.9 | 253.0 | 253.7 | 255.6 | 255.6 | 256.4 | 256.9 | 257.9 | 259.5 | |
| **Denver** | 211.8 | 252.8 | 257.9 | 257.9 | 270.9 | 274.9 | 282.5 | 282.6 | 284.7 | 287.3 | 287.3 | 287.3 | 288.2 | 292.7 | |
| **Detroit** | 197.8 | 239.8 | 249.4 | 259.5 | 264.7 | 265.9 | 272.2 | 272.7 | 274.7 | 277.7 | 277.7 | 277.7 | 279.3 | 283.5 | |
| **Kansas City** | 213.3 | 235.0 | 239.6 | 237.1 | 237.1 | 240.1 | 247.8 | 246.2 | 248.0 | 249.6 | 250.5 | 251.2 | 252.0 | 255.0 | |
| **Los Angeles** | 210.3 | 253.4 | 263.5 | 263.6 | 274.3 | 276.3 | 282.5 | 284.0 | 286.1 | 286.1 | 288.2 | 288.9 | 289.7 | 295.8 | |
| **Miami** | 199.4 | 239.3 | 249.0 | 256.5 | 259.1 | 260.3 | 269.3 | 270.1 | 272.1 | 273.1 | 274.4 | 274.4 | 275.4 | 276.6 | |
| **Minneapolis** | 213.5 | 249.9 | 254.9 | 260.0 | 267.9 | 269.0 | 275.3 | 275.0 | 277.1 | 281.6 | 282.4 | 283.4 | 283.6 | 283.9 | |
| **New Orleans** | 207.1 | 235.1 | 237.5 | 242.3 | 244.7 | 245.1 | 248.3 | 247.1 | 248.9 | 249.3 | 249.9 | 250.5 | 253.1 | 255.1 | |
| **New York** | 207.4 | 247.6 | 260.2 | 265.4 | 270.8 | 276.0 | 282.3 | 284.8 | 286.9 | 289.7 | 289.4 | 290.2 | 294.0 | 296.0 | |
| **Philadelphia** | 228.3 | 257.6 | 262.8 | 262.8 | 265.4 | 265.2 | 271.2 | 271.1 | 273.1 | 274.5 | 275.2 | 275.5 | 276.4 | 279.5 | |
| **Pittsburgh** | 204.0 | 236.4 | 241.1 | 243.5 | 250.9 | 251.8 | 258.2 | 260.8 | 262.7 | 262.9 | 263.8 | 264.0 | 264.9 | 265.9 | |
| **St. Louis** | 213.1 | 239.7 | 246.9 | 251.9 | 256.9 | 255.4 | 263.4 | 266.8 | 268.8 | 271.4 | 272.1 | 272.9 | 276.1 | 279.9 | |
| **San Francisco** | 266.4 | 308.6 | 321.1 | 327.5 | 337.4 | 343.3 | 352.4 | 358.2 | 360.9 | 364.1 | 365.4 | 366.6 | 366.9 | 367.7 | |
| **Seattle** | 191.8 | 225.8 | 232.7 | 237.4 | 247.0 | 252.5 | 260.6 | 260.1 | 262.0 | 265.7 | 266.6 | 265.1 | 266.3 | 267.8 | |

**HOW TO USE TABLES AND CHARTS:** Building costs may be directly compared to costs in the 1941 base year in tables A and B: an index of 256.3 for a given city for a certain period means that costs in that city for that period are 2.563 times 1941 costs, an increase of 156.3% over 1941 costs.

TABLE A. 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 first city are 25% higher than costs in second. Also, costs in second city are 80% of those in first (8.0 ÷ 10.0 = 80%) or 20% lower in the second city

TABLE B. 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 index for a city for one period (200.0) divided by index for a second period (150.0) equals 133%, the costs in the one period are 33% higher than those of the other. Also, second period costs are 75% of those of the other date (150.0 ÷ 200.0 = 75%) or 25% lower in the second period. CHART 1. Building materials indexes reflect prices paid by builders for quantity purchases delivered at construction sites. CHART 2. The $1.20 per hour gap between skilled and unskilled labor has remained fairly constant. CHART 3. Barometric business indicators that reflect variations in the state of the money market

# It's too late when the tenants move in

. . . to think about the many modern communications services that today's businesses use.

Equipment to handle thousands of telephones. Television, teletypewriter, data transmission . . . services like these.

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Call the Architects and Builders Service at your local Bell Telephone Business Office.

No obligation, of course.

For further information on communications planning, see Sweet's Architectural File 33a/Be.

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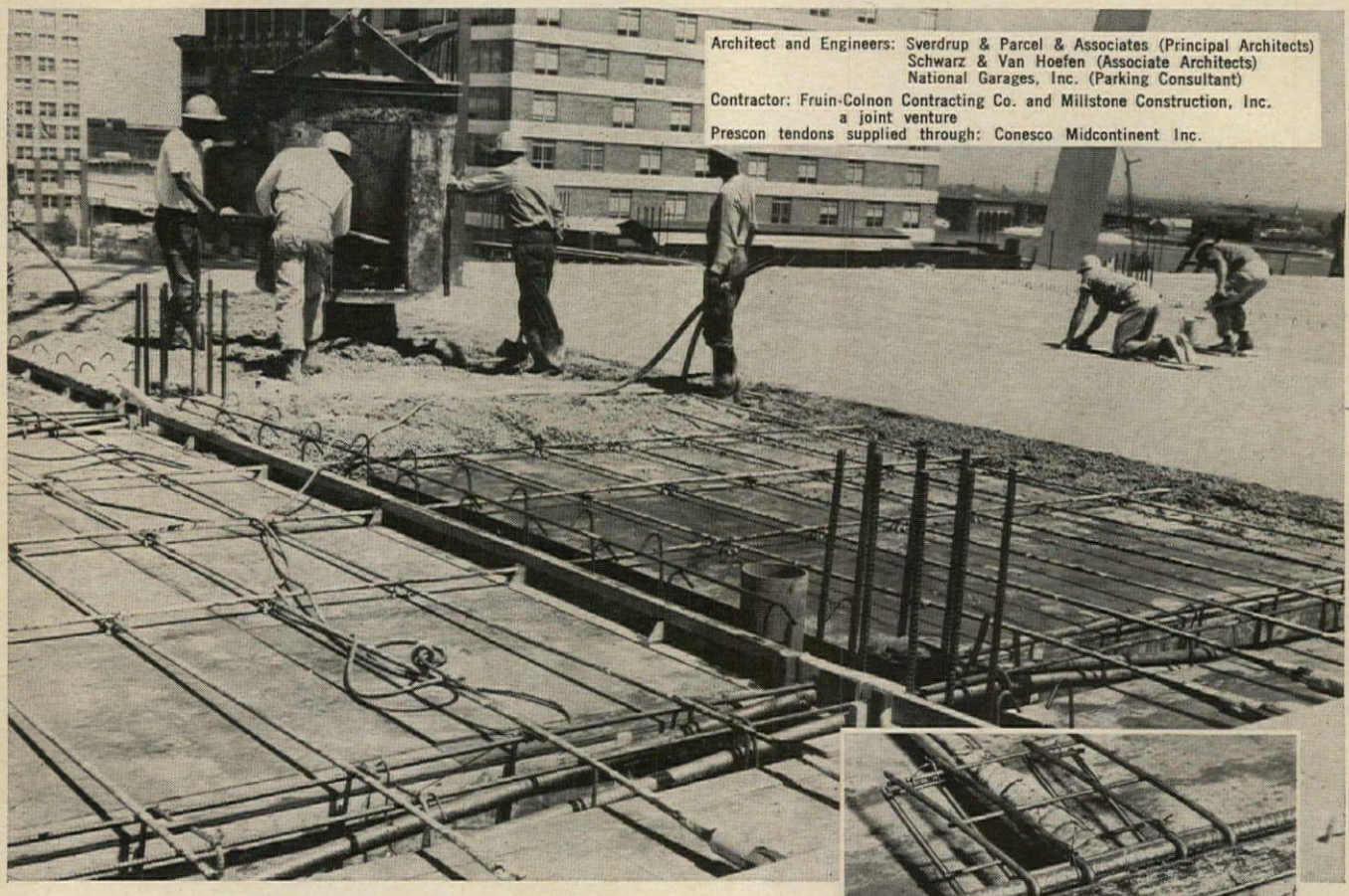
# How to build a parking garage with 54 ft. spans and beams 2 ft. - 3 in. deep



Architect and Engineers: Sverdrup & Parcel & Associates (Principal Architects)
Schwarz & Van Hoefen (Associate Architects)
National Garages, Inc. (Parking Consultant)
Contractor: Fruin-Colnon Contracting Co. and Millstone Construction, Inc.
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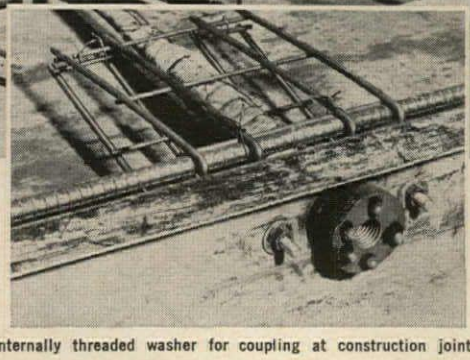

Internally threaded washer for coupling at construction joint

Stadium Parking Garage East of the Civic Center Redevelopment Corp.'s Downtown Sports Stadium Project, St. Louis, has nine parking decks, each 510′ x 216′, providing for self-parking 2,640 cars. Levels 2 through 9 have beams (2′3″ deep) and slabs (5″ thick), both post-tensioned using Prescon positive end anchorage tendons. Concrete for the columns was placed only after the deck and beams to be supported had been post-tensioned. This permitted elastic shortening of the lightweight concrete decks, without restraint.

Transverse tendons, 216′ long in both slabs and beams were continuous and were simultaneously stressed from each end. Longitudinal tendons were coupled at construction joints providing continuity. Mastic coated tendons were used in the slabs and grouted tendons in the beams.

If you are concerned with design flexibility or construction costs, or time, you should check the advantages gained from the positive end anchorage Prescon System of post-tensioning.

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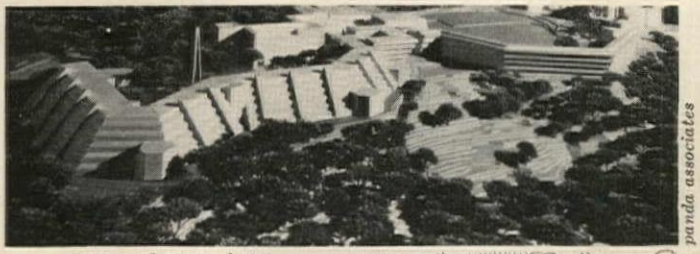

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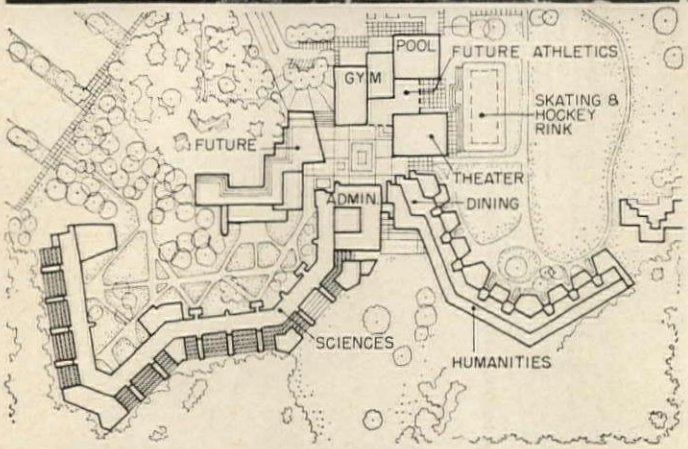
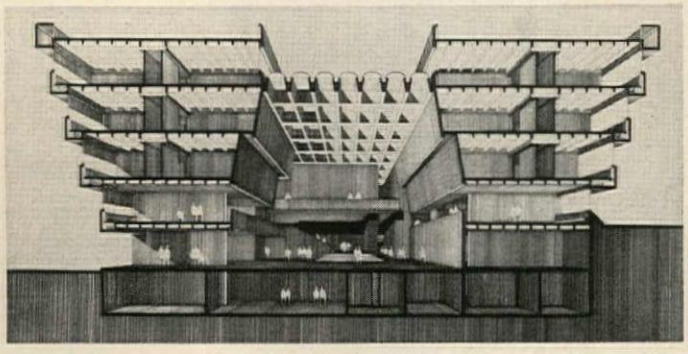



## New Campus Rises In Canada

The partially completed new campus of Scarborough College of the University of Toronto was designed by architect John Andrews, who is associated on the project with Page and Steele, architects, to provide for a step-by-step increase of students from 500 to 1,500 and then to 5,000 over a seven-year period. Included in the first phase are four basic zones: the humanities; dining and recreational facilities; administration and library; and science. All of the buildings will have concrete exteriors, finished in various textures.

The humanities zone is designed with each succeeding story larger than the one below so that the building provides its own sun protection. Included are individual offices, seminar rooms and six lecture rooms varying in capacity from 50 to 200 students. The dining and recreational facilities, capable of accommodating 2,500 to 3,000 in Phase I, afford a variety of choices for meeting and dining. The administrative offices are grouped around the "meeting place" (section below), a four-story hall lit by 61 skylights, which will be the hub of university activity. Library space will also be provided in this building in the first phase. Interior pedestrian walkways will be provided throughout the project. The science building, which will contain 50 laboratories, is designed with each upper story becoming smaller to provide direct light through plastic diffusing screens in the sloping ceiling. Consulting engineers are Ewbank, Pillar & Associates, Ltd. and general contractor is E.G.M. Cape Company (1956) Ltd.

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Construction Details on
Opposite Page

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Want to know more about Garrett-AiResearch total Gas energy systems? Call your local Gas Company Sales Engineer. Or write: The Garrett Corp., AiResearch Manufacturing Division, 180 North Aviation Blvd., El Segundo, Cal.

AMERICAN GAS ASSOCIATION, INC.

**For total energy...Gas makes the big difference**

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# Installed... Ceramic Tile by Ginori of Italy Costs No More!

*By now you know there's nothing quite like Ginori Tile. The extensive variety of unique printed and embossed patterns, the refreshing Italian colorings, provide unlimited inspiration for dramatic decor. But did you know that the TOTAL cost of a Ginori installation, figuring both tile and labor charges, can compare most favorably with an ordinary installation? Let us prove it to you . . . as we have proved it in numerous installations throughout America, in home and apartment developments, in hotels and commercial buildings!*

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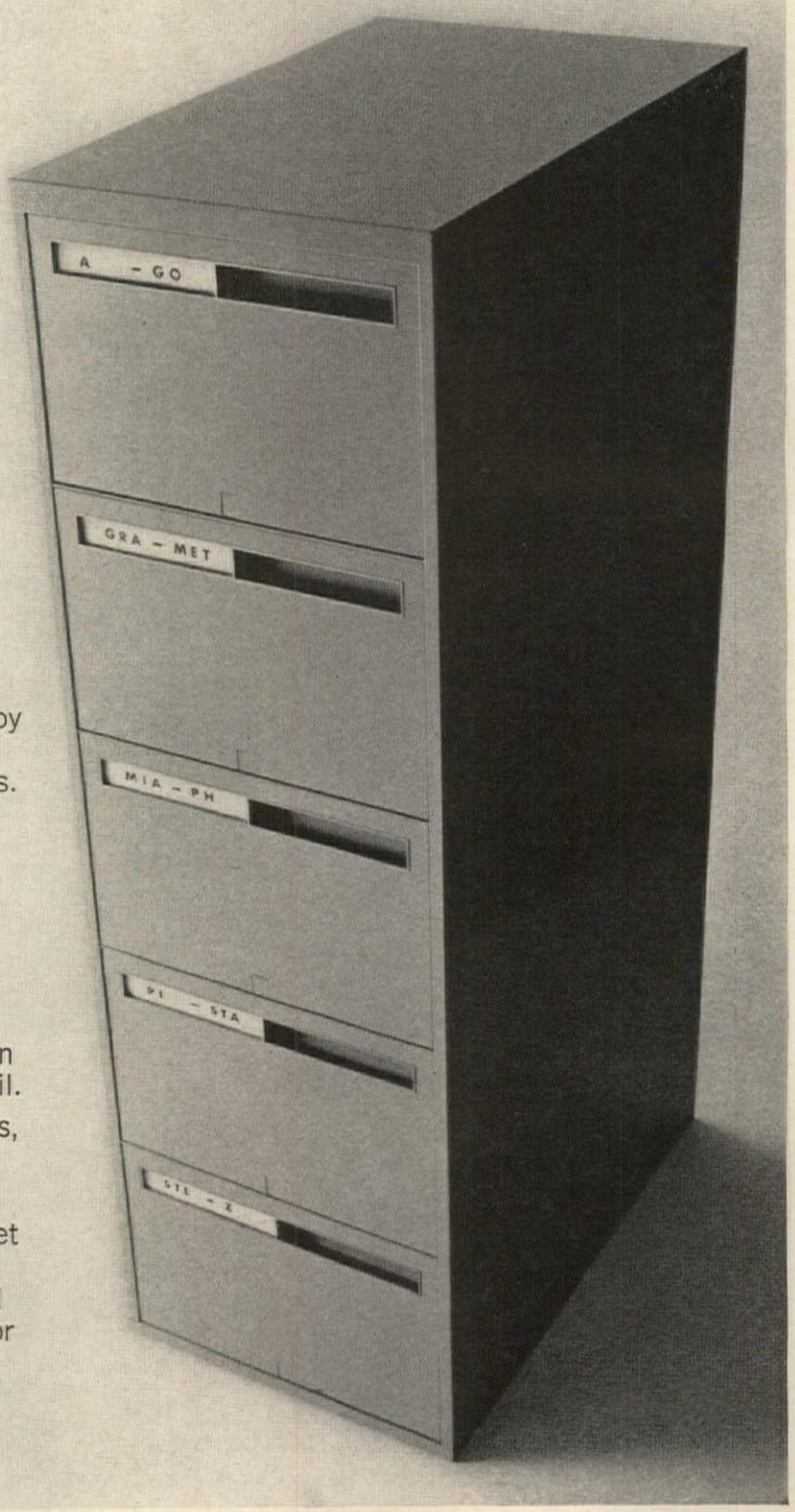
# Our file cabinet has a nice clean face.




Note the drawer handles.
There aren't any.

No thumb latches that stick out, either. Or old fashioned label holders. Or knobby guide rods. Or any of those funny little gadgets found outside ordinary cabinets.

Nothing shows on our 500 file cabinet except a clean, contemporary look.

Take the recessed combination label holder and drawer pull. First of its kind. On one side is the label holder. Big enough to list the entire alphabet. On the other is the recessed pull. With just a couple of finger-tips your secretary can open the drawer. Without breaking a nail.

Our 500 file comes in 4 different heights, too. From 2-drawer to 5-drawer. All in letter or legal size width.

Everything about our clean faced cabinet is made the way office furniture ought to be. Furniture that looks beautiful and works beautifully—a solid investment for the management who pays for it.

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# Grey 55° Shielding Louver

The **lowest brightness translucent** louver commercially available. The American Louver Company, prime developer of the plastic egg crate louver, proudly announces this new development in brightness control. The 55° shielding louver (used instead of 45° shielding where high footcandle levels are required) is now available molded in **lo-brightness translucent** grey. Provides soft, glare free illumination. Efficient as over 70% of the panel is open, yet unobtrusive as the **translucent** grey blends harmoniously with the decour in the background rather than glaring whitely in all directions.

As the footcandle on the work surface increases, the brightness of the luminaire (or ceiling) must be controlled accordingly. The 55° shielding louver, molded in **lo-brightness translucent** grey makes tomorrows level of illumination available today.

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REVIEWS



## Planning Guide

PRATT PLANNING, HOUSING AND URBAN RENEWAL GUIDE FOR NEW YORKERS. *By Robert Alpern; Edited by Astrid Monson and George M. Raymond. School of Architecture, Pratt Institute, Brooklyn, N.Y. 200 pp. $3.00.*

The Pratt Institute has put together this very useful guide for New York citizens, in the hopes that it "will not only show the need for new planning policies, programs, and procedures, but also help get better results from the existing ones." To do this, the Guide lists and explains many of the city's departments, commissions and boards and their often very complicated procedures in city planning.

Pointing out the areas in which citizens can and should take part, Mr. Alpern discusses such subjects as "Neighborhood Character and Appearance," "Schools" and "Housing and Urban Renewal." He gives information as to hearings and notices as well as documents and publications which could help citizens to take a more effective part in city planning.

Such a book about a city would be must reading for any architect as well as the citizens. It might suggest a service A.I.A. chapters across the country could perform for their communities to help inform both professional and citizen participation in community planning.

## Libraries

PLANNING ACADEMIC AND RESEARCH LIBRARY BUILDINGS. *By Keyes D. Metcalf. McGraw-Hill Book Company, 330 W. 42nd St., New York, N.Y. 10036. 417 pp., illus. $10.00.*

The architect concerned with the planning of library buildings should find this book a good substitute for first-hand experience. The author brings 60 years of experience to his task.

Keyes D. Metcalf, Librarian of Harvard College, Emeritus, has encountered many of the problems involved in planning a library building. Under a grant by The Council on Library Resources he has written this comprehensive book which is non-technical enough to also assist the laymen involved in library planning.

Libraries for the future are discussed initially. Of particular interest is the chapter on the modular system and why it is desirable in library buildings: "A building consisting largely of space that can be used for almost any purpose without extensive or expensive alterations should in the long run save money and prevent complications which so often arise as space requirements change. The modular system or some adaptation of it is now standard practice in libraries as well as in other buildings. Like most innovations, however, the modular system is not a panacea."

Other chapters include discussions of: height problems; traffic patterns; decisions regarding accommodations for readers and staff; problems connected with housing the collections; lighting, heating, ventilation; the program for mechanical facilities; site selection; and the technical details of specifications and contract documents.

The text is well illustrated with architectural plans and elevations. Five appendixes provide: examples of items for inclusion in the program; formulas and tables useful in determining ceiling heights, equipment sizes, stack capacities, card catalogue tray arrangements, etc.; a list of equipment; an annotated bibliography; and a glossary.

## Industrial Architecture

BUILDINGS FOR INDUSTRY, *Volumes I and II. By Walter Henn. Hayden Book Company, Inc., 850 Third Ave., New York, N.Y. Vol. I. 410 pp., illus. $22.50. Vol. II. 355 pp., illus. $22.50.*

These are the first two volumes in a series on modern buildings for industry and commerce. Volume I is subtitled "Plans, Structures and Details." These are arranged in order of subject under nine main head-

*continued on page 72*

# New Air Wall partitions offer quick room change flexibility—plus the permanent beauty of Videne by Goodyear

A new portable partitioning system by Air Wall Division of Hupp Corporation reduces space changing to a 15-minute job. Simply inflate the patented "Pneumatic" locking system with air and the telescoping cap expands to hold panel firmly in place. Result: a "quick change" wall that looks like a permanent part of the room!

Hupp chose VIDENE Paneling by Goodyear to beautify and protect the Air Wall system.

VIDENE paneling resists fading and marring like no other wall product. It will not chip, crack or peel with age and is highly resistant to abrasion and staining.

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Air Wall portable partitions are currently in use in thousands of fine commercial installations: Hospitals, restaurants, schools, churches, motels, offices.

For more information on Portable Partitions, write to Hupp Corporation, Air Wall Division, 8140 E. Rosecrans Ave., Paramount, California.

For more information on VIDENE Paneling write: VIDENE Division, The Goodyear Tire & Rubber Company, Dept. K-10, Akron, Ohio 44316.

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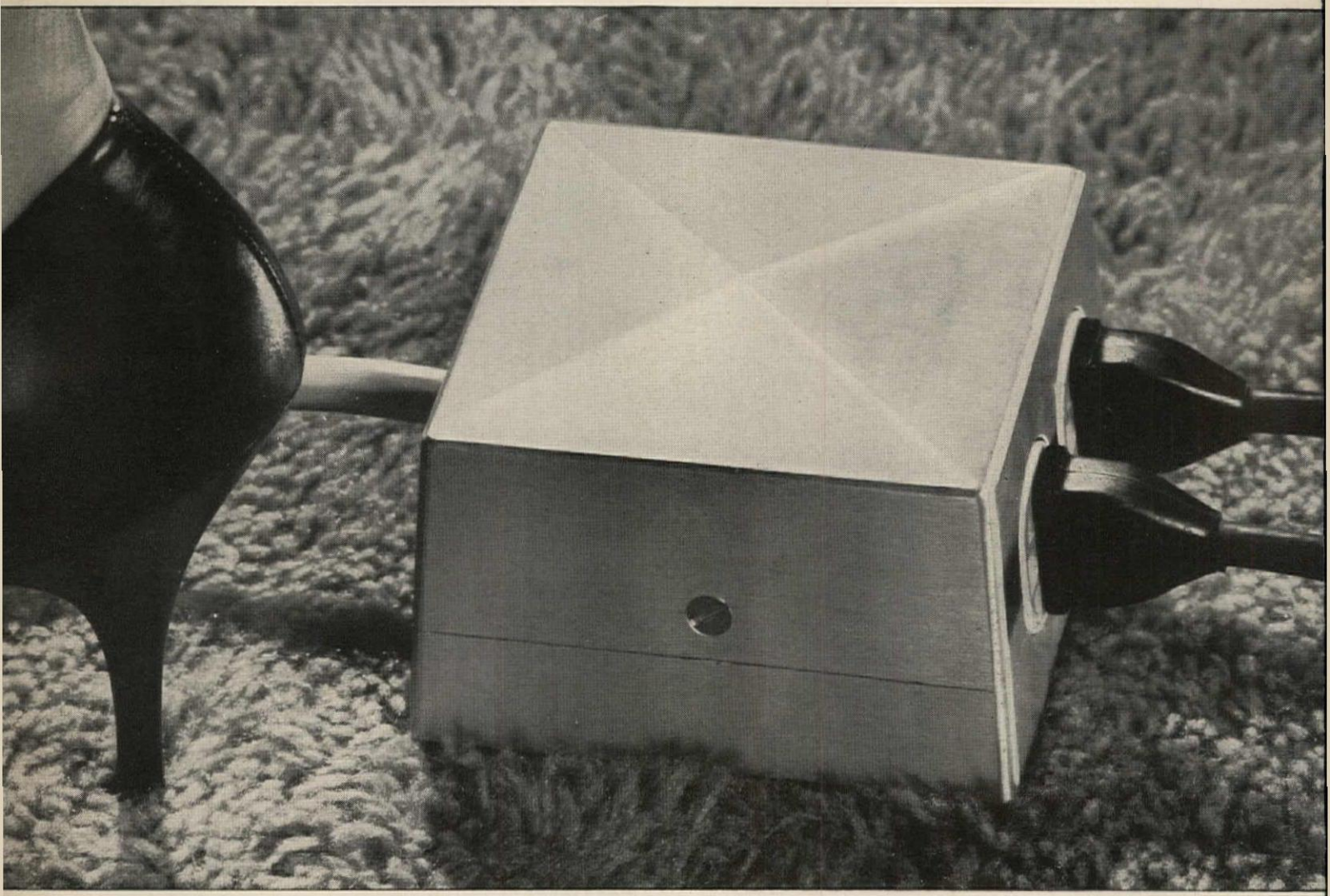
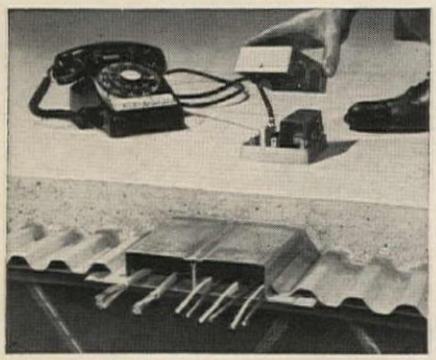
## NEW DUAL-SERVICE INSERT AND FLOOR FITTING FOR CEL-WAY



# Telephone and power outlets in one fixture!



*NEW ECONOMY FOR THIN FLOOR SLABS!*
Cel-Way System provides full in-floor electrification . . . and saves concrete in steel joist floor construction.

**Why one fixture is better than two.** Granco's new Cel-Way In-Floor Electrification System puts electrical and telephone outlets in one compact floor fitting. Result: you've just eliminated 50% of the floor fixtures. Imagine a finished floor like the one above, with these new, single, low-profile, satin-finish fittings. All the double-fixture, dust-traps are gone. Floors are *now* attractive, uncluttered, easy to wax and clean.

But that's just the beginning. With Cel-Way, your installation costs are substantially reduced too. Compact, dual-service insert easily accommodates 100-pair cable; is roomy enough to house two amphenol jacks. The die-cast, contoured fitting and insert also make it easy to pull thick cables through cells to fitting. Marker screws pinpoint insert location for future use.

These are just a few of the reasons why you'll find Cel-Way practical for your next in-floor electrification system. Write today for more information on the exclusive features and benefits of this promising new floor system. Granco Steel Products Company, 6506 N. Broadway, St. Louis, Missouri 63147.

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## GRANCO / IMAGINATION IN STEEL

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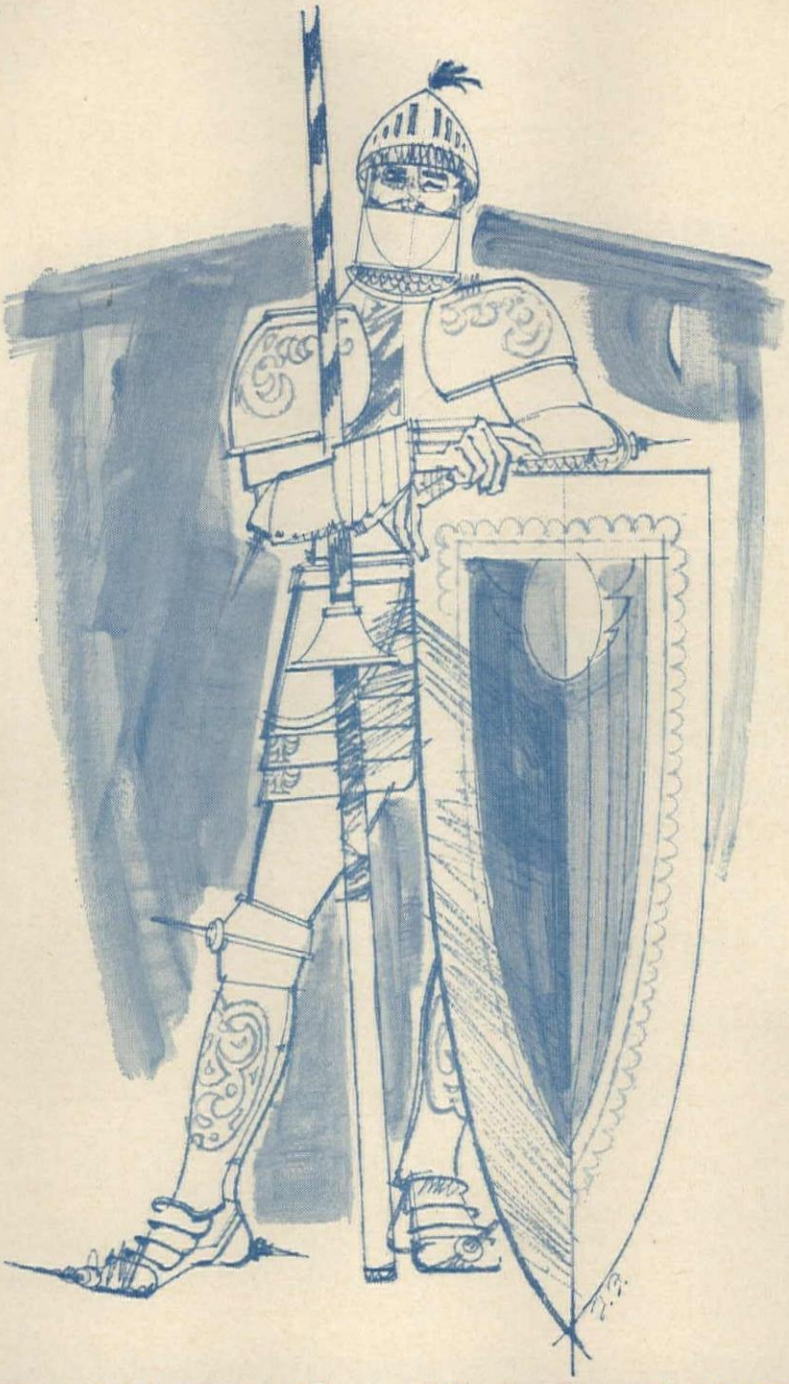

## *For metal protection with design flexibility*

# ...NEW FLUROPON BY DESOTO

Specify Fluropon(TM) and have the ultimate in metal protection—*now* and *20 years* from now!

This new exterior metal coating *fuses* to aluminum or steel to form a hard film that lasts far longer than ordinary metal finishes. Fluropon will not delaminate; will not chip or shatter; will not show color differences from panel to panel.

Fluropon provides excellent resistance to humidity, salt atmosphere, acids, alkalies, corrosive chemicals, most solvents. Since detergents and acid cleaners do not affect its finish, Fluropon simplifies maintenance.

**Wide Range of Applications**

Flexibility in designing with metal is assured since Fluropon-coated metals can be roll formed, press formed, drawn, stamped—all without affecting adhesion. This makes it an ideal metal coating for components such as windows, doors, louvers, roofing, trim, hardware—as well as for colorful exterior panels.

For more complete information about Fluropon, ask for our colorful new booklet: "Now Exterior Color with a 20-Year Life."

Architectural Finishes Dept.

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

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## *Required Reading*

*continued from page 68*

ings: site layouts and external facilities; building work; single story structures; basic techniques; circulation, communication, transportation; lighting; services; heating, ventilation, air conditioning; fire and lightning protection; and work offices.

There are some 3,000 dimensioned drawings which obviously took an immense amount of research work.

The second volume contains photographs, plans and elevations of 140 typical industrial and office buildings, drawn from 27 different countries. British and Continental architecture predominates but the rest of the world is well represented.

## House Design

NEW HOUSES. *Collected and described by Penelope Whiting, A.R.I.B.A. The Architectural Press, 9-13, Queen Anne's Gate, Westminster, London S.W.1. 168 pp., illus. 30s.*

This book, a survey of 30 English houses, is a useful addition to an architect's collection of books on contemporary house design. Penelope Whiting, architect and housewife, shows houses which vary in cost, in purpose and in personal taste.

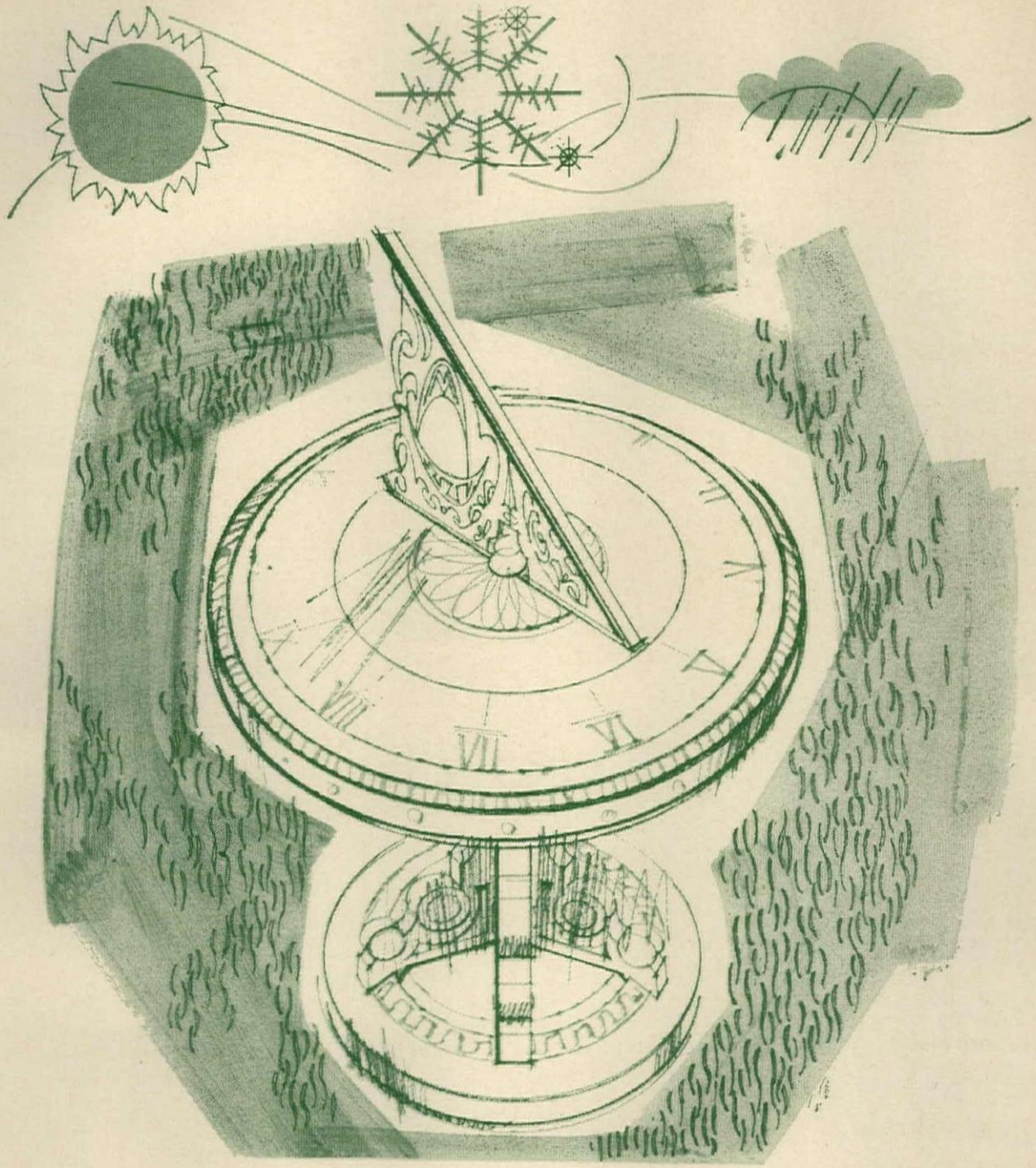
Of her purpose Miss Whiting has said, "The success with which architects have met their clients' brief without forsaking their own principles, will be discussed and an attempt will be made to show the factors which led to the various solutions." There is no attempt to assess modern architectural trends.

The author describes the occupations, needs and interests of each client, and the subsequent influence of these factors on the final design. In addition, she discusses clearly and concisely site planning considerations, the planning of each house, structure and materials and mechanical equipment.

Books Received

PHYSICS BUILDINGS TODAY *and* CHECKLIST FOR PHYSICS BUILDINGS. *American Institute of*

*continued on page 76*



***For exterior colors with timeless beauty***

# ...NEW FLUROPON BY DESOTO

Time, sun, the elements leave Fluropon's(TM) colors virtually unchanged for 20 years.

Why? Simply because this newly developed fluorocarbon polymeric coating far surpasses today's conventional finishes in color retention. Even under severest weather conditions, Fluropon won't fade, won't chalk.

With Fluropon, color match is never a problem—even in combination runs. Spray painting after forming not only allows exact color matching, but also provides flexibility in designing such building components as panels, soffits, doors, louvers, trim, hardware.

Fluropon's wide range of standard colors makes it a simple matter to attain dramatic effects using one color in mass, a complementary color in trim. And cleaning, even with strongest solutions, does not dim the luster of Fluropon-coated metals.

For more information about Fluropon, send for our new booklet: "Now Exterior Color with a 20-Year Life."

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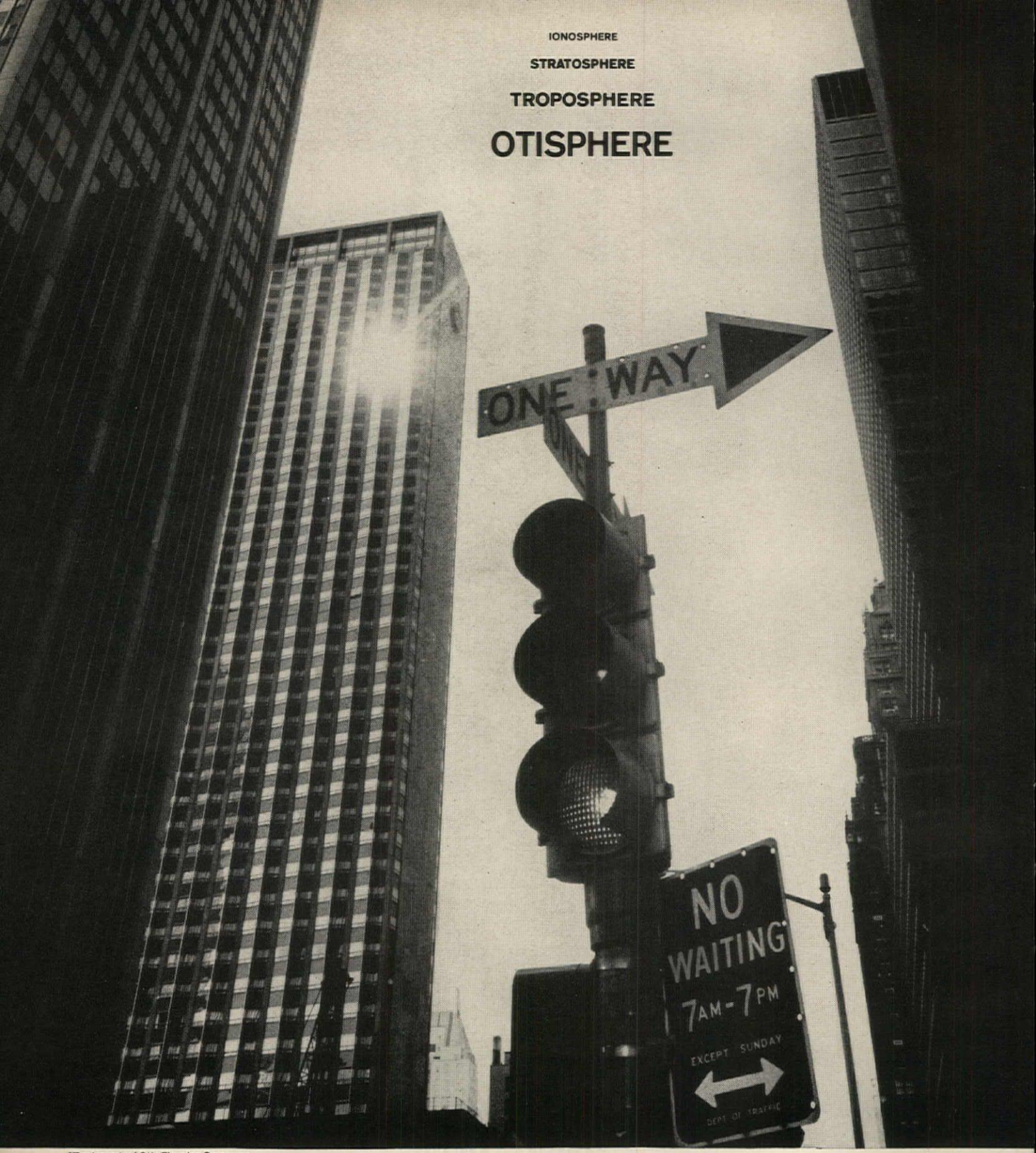


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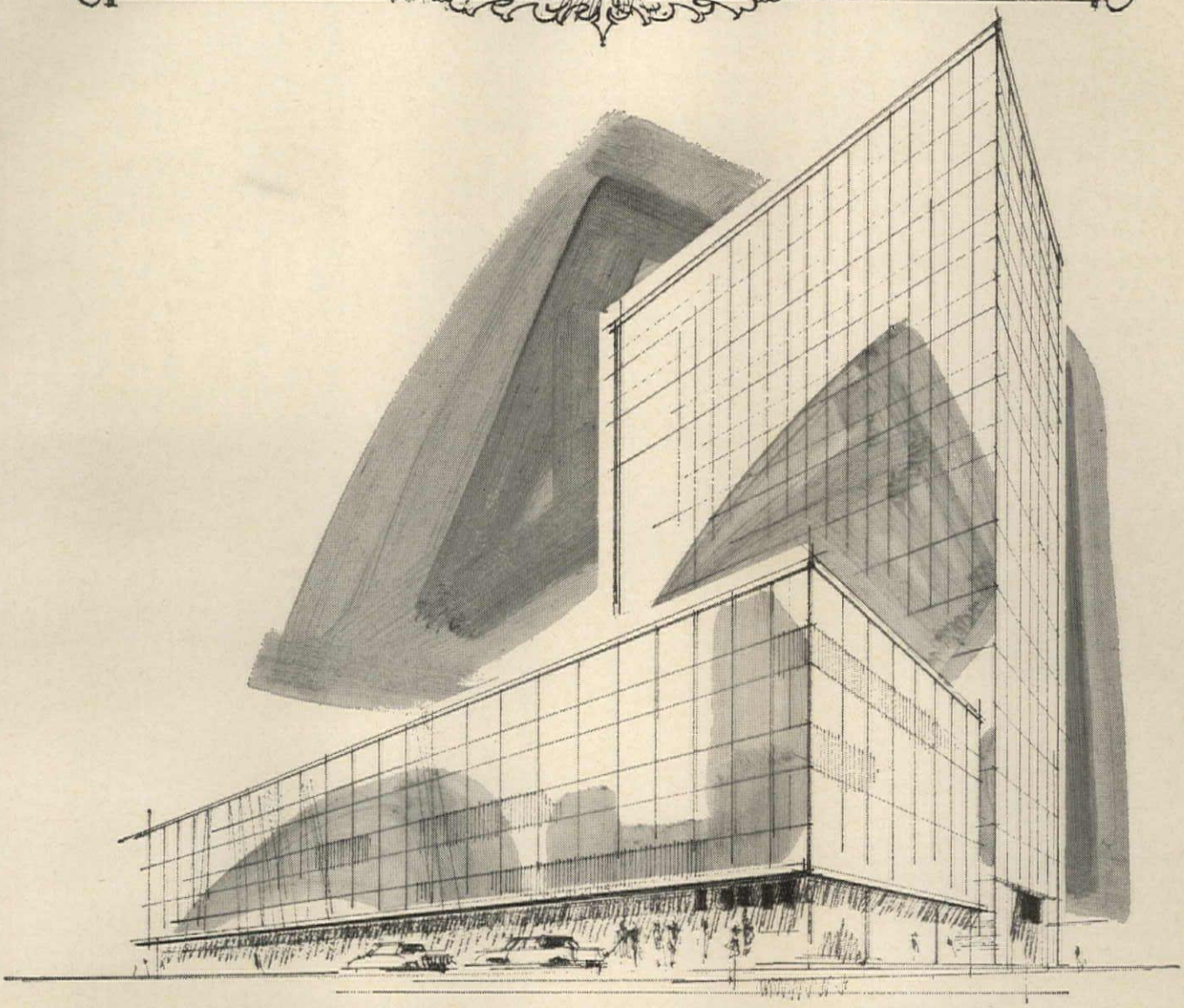
DeSoto guarantees to its customers a minimum of 20 years of useful decorative and protective life for Fluropon when applied according to the manufacturer's specifications.



## For real economy in exterior metal protection

# ...NEW FLUROPON BY DESOTO

This new and colorful exterior metal coating costs less to *apply* to aluminum or steel than any other long-lasting finish. Costs less in the long run, too! Here's why:

Fluropon's(TM) *applied cost* is one-sixth that of porcelainizing (and there's no chipping or shattering); one-fifth that of anodizing (and there's no color difference from panel to panel); one-half that of laminated films (and there's never any delaminating to worry about).

**Forget About Maintenance**

As for maintenance or *long run* costs, consider this: Fluropon's tough, smooth surface resists practically all atmospheric conditions, detergents, cleaners; retains colors at full value.

DeSoto guarantees to its customers a minimum of 20 years of useful decorative and protective life for Fluropon when applied according to the manufacturer's specifications.

For the full story of Fluropon, send for our new color brochure: "Now Exterior Color with a 20-Year Life."

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# *Required Reading*

*continued from page 72*

*Physics, 335 E. 45th St., New York, N.Y. 100017. 83 pp., illus. No charge.*

COMPACTION OF SOILS—STP *377. By the American Society for Testing and Materials, 1916 Race St., Philadelphia, Pa. 19103. 142 pp. $4.90.*

LOCAL REGULATION OF MOBILE HOME PARKS, TRAVEL TRAILER PARKS AND RELATED FACILITIES. *By Frederick H. Bair, Jr., Mobile Homes Manufacturers Association, 20 N. Wacker Drive, Chicago, Ill. 60606. 94 pp.*

VIEWING EUROPE FROM THE SKETCHING STOOL OF CHARLES C. COUNCELL. *Charles C. Councell, P.O. Box 1253, Clemson, S.C. 29631. 59 prints. $15.00.*

RENEWAL OF TOWN AND VILLAGE I. *By George S. Duggar. Martinus Nijhoff, 9 Lange Voorhout, P.O.B. 269, The Hague, Netherlands. 243 pp., illus. 13.50 guilders.*

PRACTICAL APPLICATIONS OF DYNAMIC SYMMETRY. *By Jay Hambidge. The Devin-Adair Company, 23 E. 26th St., New York, N.Y. 10010. 128 pp., illus. $4.95.*

PICASSO'S WORLD OF CHILDREN. *By Helen Kay. Doubleday, 277 Park Ave., New York, N.Y. 10017. 242 pp., illus. $25.00.*

THE GOLDEN HORSESHOE, THE LIFE AND TIMES OF THE METROPOLITAN OPERA HOUSE. *By Frank Merkling, John W. Freeman and Gerald Fitzgerald with Arthur Solin. The Viking Press, Inc., 625 Madison Ave., New York, N.Y. 10022. 319 pp., illus. $16.50.*

APARTMENT HOUSE INCINERATORS. *Report No. 29 to the Federal Housing Administration. Prepared for The National Academy of Sciences by the Building Research Advisory Board, Division of Engineering and Industrial Research, National Council, 2101 Consitution Ave., Washington, D.C. 20418. 38 pp. $2.00.*

CRITERIA FOR COMPACTED FILLS, *Report No. 24 to the Federal Housing Administration. Prepared for The National Academy of Sciences by the Building Research Advisory Board, Division of Engineering and Industrial Research, National Research Council, 2101 Constitution Ave., Washington, D.C. 20418. 58 pp. $2.00.*

AMERICAN HOUSES IN HISTORY. *By Arnold Nicholson. The Viking Press, Inc., 625 Madison Ave., New York, N.Y. 10022. 260 pp., illus. $12.95.*

URBAN REAL ESTATE RESEARCH-1963. *By Jerome P. Pickard and Gene C. Tweraser. Research Monograph 10, Urban Land Institute, 1200 18th St., N.W., Washington, D.C. 20036. 96 pp. $4.00.*

FRENCH ROYAL FURNITURE. *By Pierre Verlet. Clarkson N. Potter, Inc., 23 E. 67th St., New York, N.Y. 10021. 201 pp., illus. $12.50.*


# Concrete gives a world trade center built-in sales appeal

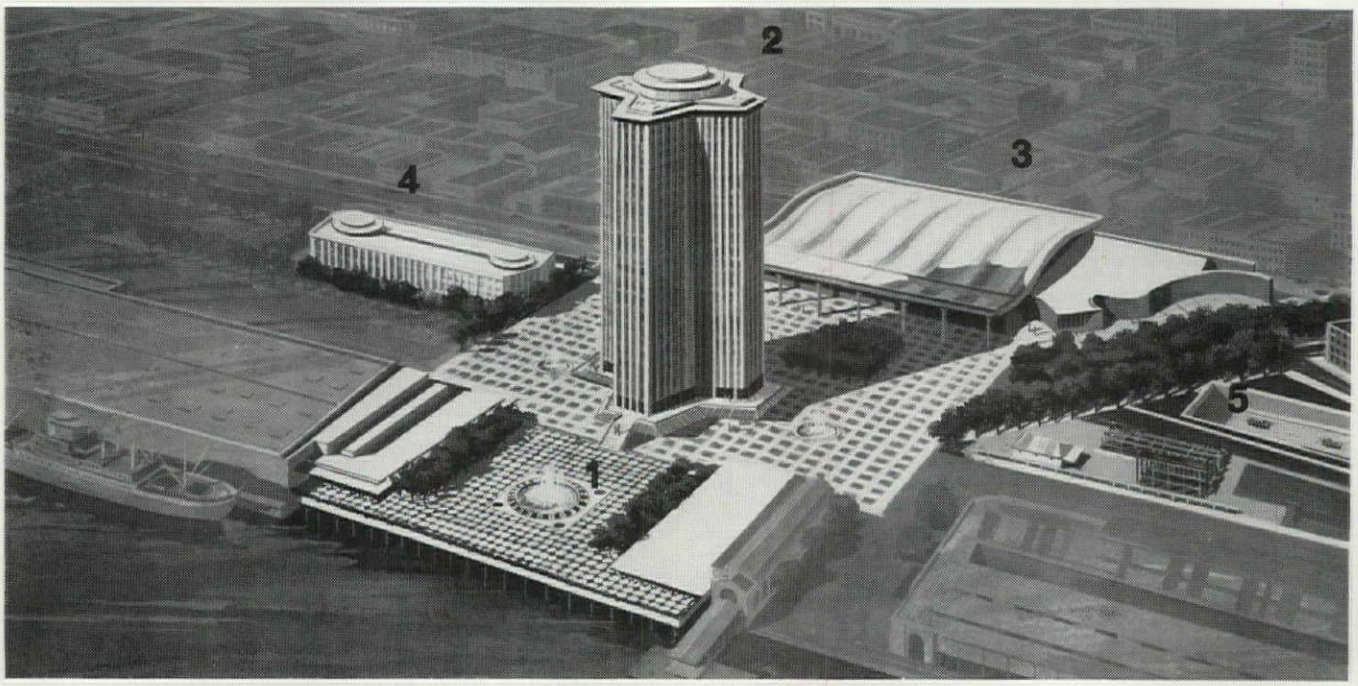
The buildings of New Orleans' new International Trade Center are designed to serve the buyers and sellers of merchandise from every corner of the world. Here, through the imaginative use of concrete, is expressed the very spirit and pace of modern-day trade. □ In the Convention-Exhibition building, the New Orleans architects used a concrete barrel shell roof to create striking beauty, as well as an interior clear span of 253 feet, sufficient to seat 17,600 people. Textured exterior concrete walls provide tasteful contrast. □ The adjacent 33-story Trade Mart tower also utilizes concrete throughout. The highly compressible qualities of New Orleans' soils were mastered by prestressed concrete piles, providing firm foundations for the light but strong reinforced concrete frame and floors designed by advanced new structural criteria. Gleaming exterior curtain wall panels of precast concrete assure visual interest. An eight-story concrete parking tower is nearby.

**Portland Cement Association**

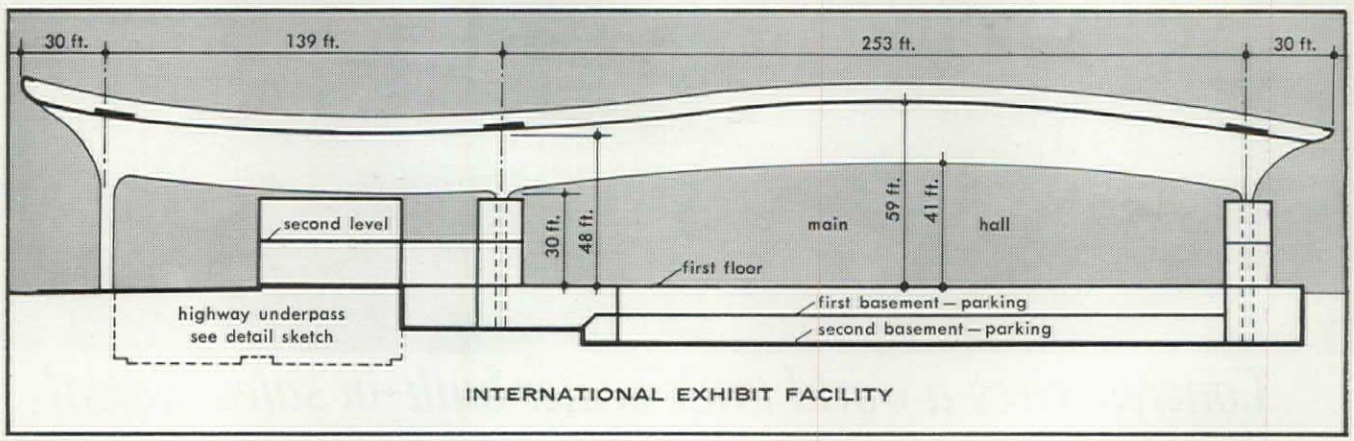
*An organization to improve and extend the uses of concrete, made possible by the financial support of most competing cement manufacturers in the United States and Canada*

NEW ORLEANS INTERNATIONAL EXHIBITION FACILITY: ARCHITECTS: CURTIS & DAVIS, EDWARD B. SILVERSTEIN & ASSOCIATES, AND MATHES, BERGMAN & ASSOCIATES, ALL OF NEW ORLEANS. STRUCTURAL ENGINEERS: WORTHINGTON, SKILLING, HELLE & JACKSON, SEATTLE, WASH., AND A. W. THOMPSON & ASSOCIATES, NEW ORLEANS. CONTRACTOR: C. H. LEAVELL CONSTRUCTION CO., EL PASO, TEXAS. INTERNATIONAL TRADE MART: ARCHITECT: EDWARD DURELL STONE, NEW YORK. ASSOCIATE ARCHITECT: ROBERT LEE HALL AND ASSOCIATES, MEMPHIS, TENN. STRUCTURAL ENGINEERS: ELLER AND REAVES, MEMPHIS, TENN. CONTRACTOR: BLOOMFIELD BUILDING INDUSTRIES, MEMPHIS, TENN. HIGHWAY UNDERPASS: STRUCTURAL ENGINEERS: B. M. DORNBLATT & ASSOCIATES, INC., NEW ORLEANS

## International Trade Center dominates New Orleans skyline with spectacular architecture




Covering six city blocks, the all-concrete, 40-million-dollar New Orleans Trade Center, pictured in the illustration above, is located where the mighty Mississippi River meets Canal Street—the main thoroughfare of New Orleans. One of the widest streets in America, it terminates at the five-acre Plaza (1). Dominating the entire complex is the 33-story, 407-ft. high, reinforced concrete Trade Mart tower (2), providing 520,000 square feet of office and commercial space. The Mart tower is flanked by two other concrete structures, the International Exhibition Facility (3), a long-span, prestressed concrete barrel shell structure supported on tapered diamond-shaped columns, and an eight-story Parking Facility. (4). Passing under the entire Trade Center complex is a six-lane section (5) of Interstate highway 310.

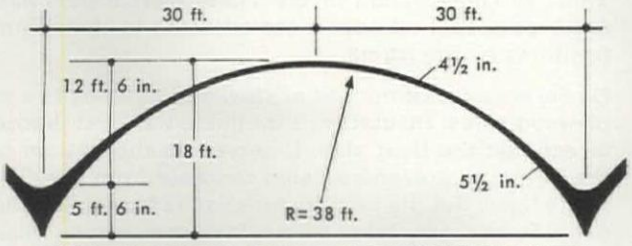



## Undulating concrete shell roof of Exhibition Facility provides economical, column-free space

Long, cylindrical barrel shells roof an area roughly 420x452 ft. in the Exhibition Facility. Associated architects for the building noted: "The need was for a maximum column-free space to accommodate exhibit shows and large meetings. After months of study, it was determined that a thin shell concrete roof would accomplish a fluid architectural form which would compare favorably in cost to a conventional type frame." In addition to providing a fire-safe, low-maintenance structure spanning large areas, a concrete shell roof eliminates the necessity for a hung ceiling to hide unsightly structural elements.

Interesting architectural treatment was achieved by using diamond-shaped, cast-in-place columns to support the shell. The columns are skewed 45 degrees to the shell and taper from 5 ft. 6 in. at the floor line to 3 ft. 6 in. at the top. Models were used to study the relationship between shell and column to find the desired esthetic effect. Such freedom in form is obtainable only with concrete.

## World's longest barrel shell span achieved by prestressing



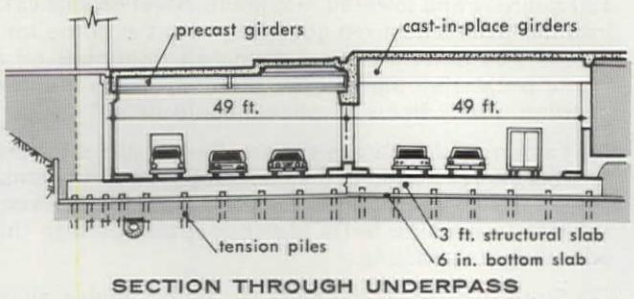
TYPICAL SHELL ROOF OF EXHIBIT FACILITY

Each barrel of the Exhibit Facility roof is 60 ft. wide and rises 18 feet. The thickness varies from 4½ in. at the crown to 5½ in. at the valleys where the shell flares into "V" shaped beams 5 ft. 6 in. deep. Through shell action and prestressing, a 253-ft. clear span was possible over the main hall, believed to be the world's longest for a barrel. A side span has a 139-ft. column-free area. In addition there is a 30-ft. cantilever all around the building.

The entire roof is prestressed in two directions. Draped steel strands used in each barrel over the main hall carry a force of 1,820 tons; similar strands in each valley beam carry 840 tons. The shell is post-tensioned transversely at the column lines. Design of the shell roof was based on concrete with a strength of 4,000 lb. per sq. in. at 28 days after casting.

## Shell structure and six-lane highway underpass supported on concrete-filled tension piles

A 900-ft.-long, six-lane segment of Interstate 310, passing beneath the front section of the Exhibition Facility is incorporated into the foundation system of the structure, (see section). Since the surface of the Mississippi River, nearby, will periodically be above the roadway elevation, the structure must be held down by tension piles. Sixty-foot-long, concrete-filled shell piles perform this task. They were designed for an uplift force of 24 tons per pile.



SECTION THROUGH UNDERPASS

A 6-in. concrete dry bottom protects a continuous reinforced slab 3 ft. thick, the top surface of which serves as the pavement. Columns with continuous caps support the roof down the centerline.

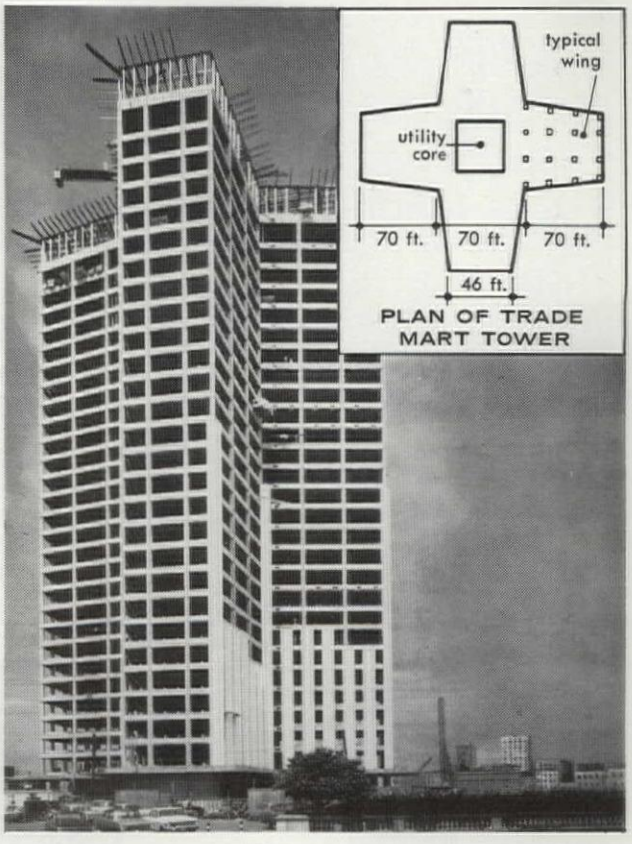
The typical underpass roof consists of standard pre-cast, prestressed concrete highway girders spaced at 7 ft. 6 in. and topped with a 7½-in. monolithic slab. This roof structure is designed for H20-S16 highway loading, since the surface is part of plaza and service drives. Where highway passes beneath the Exhibit Facility, the precast girders are replaced by cast-in-place girders on 15-ft. centers.

## 616 prestressed concrete piles support 33-story Trade Mart tower

The Trade Mart tower is a reinforced concrete frame structure clad in white concrete panels. Prestressed concrete piles were chosen for the foundation after comparison with several other types showed concrete carried the greatest load per pile dollar. More than 64,000 lineal feet of octagonal piling were used.

Lightweight aggregate concrete was used throughout in the frame and curtain wall, resulting in over 12,000 tons savings in dead load. This reduction in dead load means substantial savings in the cost of the foundation and reinforcing steel in the frame.

The frame design was based on the 1963 ACI Code using ultimate strength design criteria. A concrete strength of 3,000 psi was used in the pan-joist floor system, with 4,000 psi concrete used for columns and walls above the 3rd floor, and 5,000 psi below this point. Column sizes were held to a minimum through use of ultimate strength design and new large-size reinforcing bars. Exterior columns were 24 in. square, interior columns a maximum of 30 in. square.

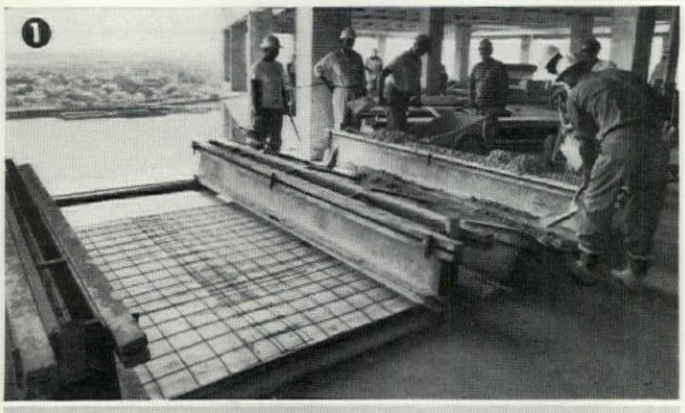


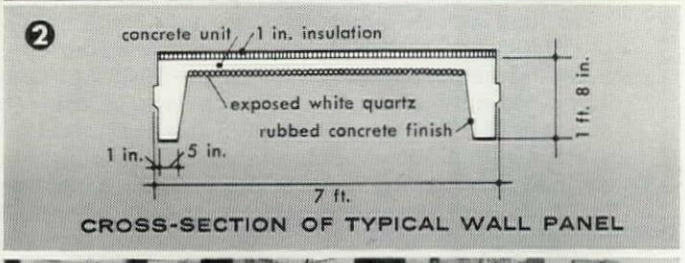
PLAN OF TRADE MART TOWER

## Concrete framing and wall panels offer dramatic cost savings

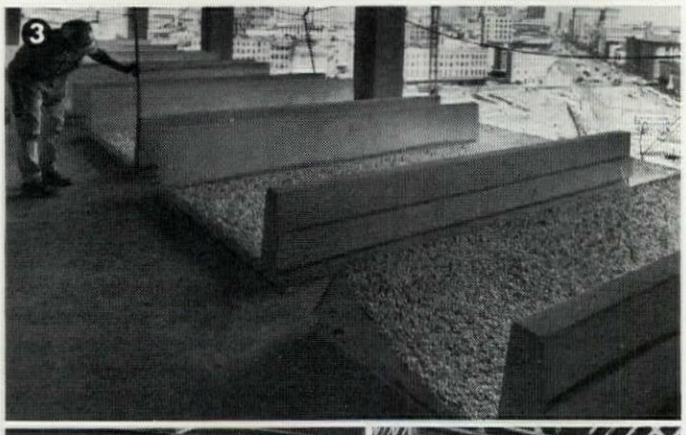
Total cost of the completed tower, including interior finishing, was a little over 15 dollars per square foot, according to Harry Bloomfield, President of Bloomfield Building Industries, contractor on the Trade Mart tower. Mr. Bloomfield noted, "We do not believe we could have accomplished the Trade Mart in steel for at least 5 dollars per square foot more, and we feel we have a much better building with concrete."

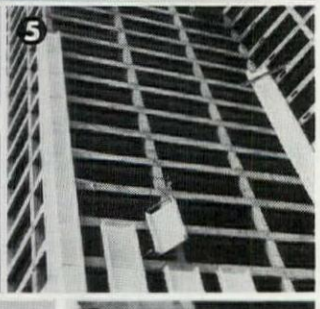
## The best ideas are more exciting in CONCRETE

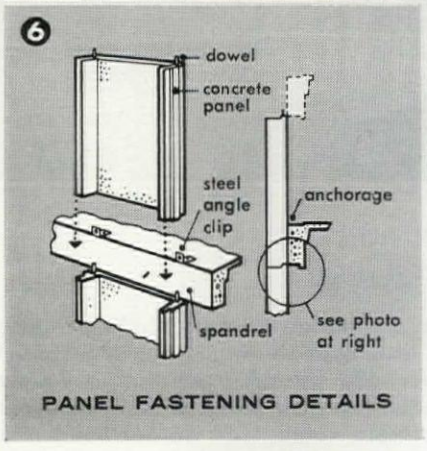




CROSS-SECTION OF TYPICAL WALL PANEL







PANEL FASTENING DETAILS

### Curtain walls of white cement concrete achieve dramatic architectural effect and economy

Precast concrete wall panels have considerable economic advantage over many other types of curtain walls. In construction of the Trade Mart tower, wall units were cast on each floor adjacent to their final positions on the frame.

(1) Forms were composed of steel end bulkheads and plywood sides. Insulation, 1 in. thick, was first placed directly on the floor slab. It served as the bottom of the form and prevented panel concrete from bonding to the floor. But, its primary function is to insulate the panel from the building frame, thus overcoming most problems with air conditioning and heating. White, lightweight aggregate concrete for all panels was ready mixed. Typical cubic yard quantities are:

| | |
|---|---|
| White portland cement | 611 lb. |
| Fine aggregate (sand) | 1360 lb. |
| Coarse aggregate (lightweight expanded clay) | 725 lb. |
| Water | 357 lb. |
| Air-entraining agent | 3.25 oz. |

(2) This cross-section of a typical wall panel shows critical dimensions and reveals its channel-shaped simplicity. The panels in most cases were 11 ft. 6 in. long with 1 ft. 8 in. protruding ribs. When hung on the building frame, the panels had a 4 ft. 6 in. space between them to receive metal window units.

(3) The panels shown here, undergoing final inspection, were cured five days, or until a strength of 5,000 psi was reached, whichever occurred first. The unit in the foreground is a corner panel (648 required), other units shown are interior panels (1,404 required). Ribs are rubbed white concrete with contrasting areas between surfaced with a glistening white quartz aggregate set in a white cement matrix. Quartz is spread by hand and tamped into surface before concrete sets. Excess aggregate is blown off with air jets.

(4) Erection of the panels was simple and expedient. With one end attached to a hoist line, the panels were lifted off the floor with a hydraulic hand truck and rolled to the floor edge where the hoist took over.

(5) Once clear of the floor edge, panels were rotated 180 degrees and lowered into place. Steel dowels cast into the panels assured good alignment with the unit below. The hoist was on a monorail, mounted on a frame projecting high on the building. From the one position, many floors of panels could be set.

(6) Fastening details are simple. Panels are attached to steel angles bolted to the concrete spandrel beams, two at top of each panel, and two near the bottom. Inserts to receive bolts are incorporated into the panels during casting.

(7) Slotted holes in the steel fastening angles allow for minor adjustments in panel alignment. Hook eyes screwed into inserts cast into the top of the panel provide convenient pick-up points for the hoist line.

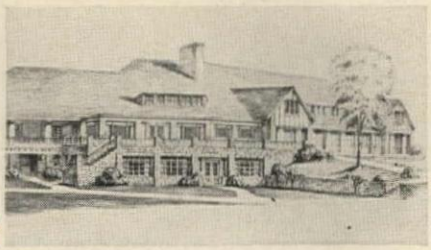
### New PCA publications provide basic information on modern concrete design and construction.

Write for your free copy of Structural Data Sheets 1962-65 (U.S. and Canada only)

**PORTLAND CEMENT ASSOCIATION** Dept. A11-8, 33 West Grand Avenue, Chicago, Illinois 60610

*An organization to improve and extend the uses of concrete, made possible by the financial support of most competing cement manufacturers in the United States and Canada*

**The place:**



Gracious Kahkwa Country Club
Erie, Pennsylvania

**The man:**

Robert A. Adams, Designer

**The carpets:**

**Bigelows.** Custom Bigelows carved with border and crest adorn the entrance rotunda while a specially designed dual-shaded bronze Wilton carpet glamourizes the ballroom. The locker room, grille, lounge and dining room are also luxuriously carpeted in specially designed Wilton carpets.

Why do designers like Robert Adams insist on specifying Bigelow? Because they know that for every hotel, motel or commercial building, Bigelow has or can custom-create the perfect carpet. Our carpet counselors will give you all the help you need in solving any kind of carpet problem—at no charge. Simply call your nearest Bigelow sales office. Or for a colorful free brochure on commercial carpets, write Dept. A, 140 Madison Avenue, New York, N.Y. 10016. Find out for yourself why

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← For more data, circle 116 on Inquiry Card

For more data, circle 117 on Inquiry Card

## *On the Calendar*

**November**

**9-10** Motel Days Program, National Hotel and Motel Exposition—New York Coliseum, New York City

**10-12** Fall Conference, Building Research Institute—Washington Hilton Hotel, Washington, D.C.

**13-15** Annual Meeting, Air-Conditioning and Refrigeration Institute—Hollywood Beach Hotel, Hollywood Beach, Fla.

**16-18** 11th Annual International Nuclear Industry Trade Show, Atomfair '65 and Annual Conference of the Atomic Industrial Forum and the 1965 Winter Meeting of the American Nuclear Society—Sheraton-Park Hotel, Washington

**17-19** 30th Annual Meeting, The Aluminum Association—Plaza Hotel, New York City

**17-20** Annual Conference, Florida Region, American Institute of Architects—Jack Tar Hotel, Clearwater, Fla.

**December**

**5-10** Eleventh Annual Convention, Prestressed Concrete Institute—Americana Hotel, Miami Beach, Fla.; followed by a 3-day Caribbean cruise

**January**

**5-8** Winter Meeting, National Society of Professional Engineers—Americana Hotel, Bal Harbour, Fla.

**18-21** International Symposium on Solar Radiation, American Society for Testing and Materials—International Hotel, Los Angeles

**20-23** Winter Professional Meeting of the National Society of Professional Engineers—Jung Hotel, New Orleans

**25-28** 17th International Heating & Air-Conditioning Exposition, American Society of Heating, Refrigerating & Air-Conditioning Engineers—McCormick Place, Chicago

**25-29** National Meeting on Steel, American Society for Testing and Materials—Del Prado Hotel, Mexico City

## *Office Notes*

*Offices Opened*

Joseph H. Rudd, A.I.A., in association with Donald E. Nielsen and Fred C. Gast Jr., has opened an office for the practice of architecture, 1600 Southeast Ankeny Street, Portland, Ore. 97214.

David B. Yarbrough, Architect, has

*continued on page 130*

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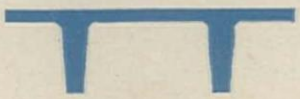

### DOUBLE TEE

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### CHANNEL SLABS

A very rigid member with minimum deflection characteristics at maximum load conditions. Used where heavy floor and roof loads are encountered in short and medium span ranges.

### MONOWING OR F SECTION

Primary roof and floor deck members, used to best advantage where hidden joints are required for architectural reasons. Provides spans to 60 feet with minimum depth.

### BOX GIRDER

Principal application as girder in heavily loaded structural framing systems. Void accommodates mechanical and electrical services. Also provides complete deck requiring grouting only between members. Ideal for industrial applications.

### INVERTED T BEAM

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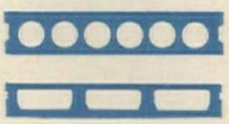

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# ANOTHER RECORD YEAR FORECAST IN F.W. DODGE CONSTRUCTION OUTLOOK FOR 1966

Major Gains Expected In Hospitals, Educational And Public Buildings; Modest Gain for Housing, With Rental Market Favored

There is significant news for architects (and the engineers who work with them) in the F.W. Dodge Construction Outlook for 1966. Not only is dollar volume of total construction expected to reach a new record high of $51.5 billion, 4.2 per cent above the anticipated 1965 level, but some of the most notable gains are in exactly those kinds of construction activity in which there are the greatest opportunities for architects.

Hospital buildings are expected to have the biggest percentage increase of all; and public buildings, educational buildings and apartments are also among the five categories of building construction which are expected to show percentage increases of 5 per cent or more. Housing will have increases of 5 per cent in the one- and two-family as well as the apartments category, but "it will continue to be the kind of market favoring rental housing." Office buildings, manufacturing buildings and religious buildings are also expected to show increases next year.

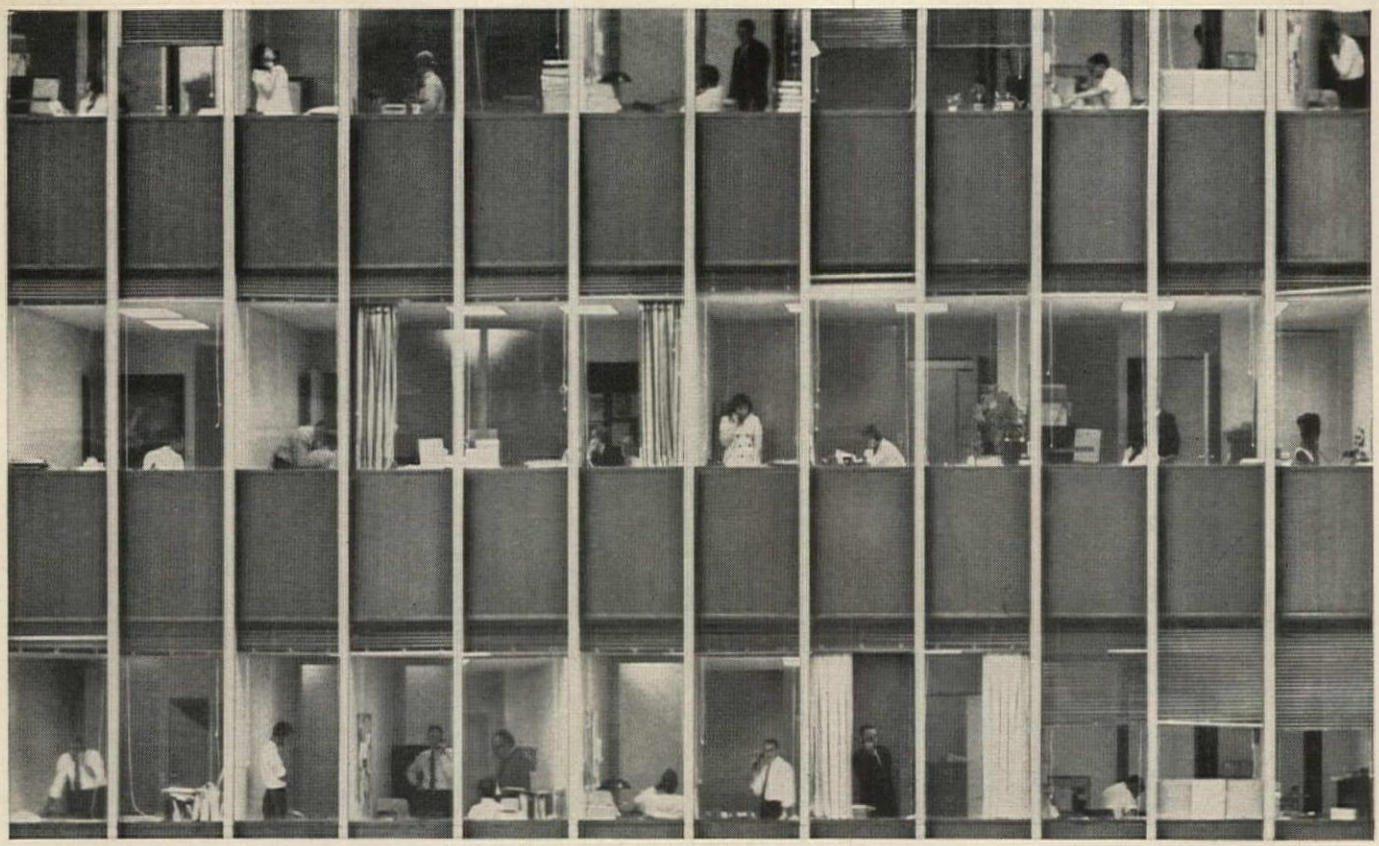
The annual Dodge forecast for the year ahead, the major national indicator of future construction activity, is prepared by the Economics Department of F.W. Dodge, a division of McGraw-Hill, Inc. The 1966 forecast was first presented on October 7, at the 27th annual Building Products Executives Conference in Washington, D.C. Key excerpts from the major sections of the forecast follow.

## *The Community Demand For Construction in 1966*

The construction needs of the community, which involve everything from schools and hospitals to highways and missile bases, are mostly long-term demands which build up steadily over the years. While there is usually always a large backlog of requirements for such facilities, the key to short-run changes in the community types of construction (since most of these needs are met out of public funds) is the flow of appropriations through the many existing and new legislative programs which provide for such work.

The total of all community-generated construction activity (about equal in aggregate value to the big housing market, or worth roughly two-fifths of total construction contract value) has been advancing steadily at close to 5 per cent for each of the last two years. In total, 1966 will show another gain at nearly the same rate, although major changes will be taking place among the individual construction categories in this group.

EDUCATIONAL BUILDING is now getting very substantial financial backing from some important new Federal programs—a trend which began with the 1963 Higher Education Facilities Act. The current year brought further stimulation to school building with the passage of the Elementary and Secondary Education Act, and the very recent Higher Education Act of '65. The latter program, in addition to its teaching grants and scholarship provisions, expanded by some $160 million the college construction authority originally provided in the '63 Facilities Act. The result: educational building is now growing at a rate unlike anything since the grade school boom of the Fifties. Today, of course, it's mostly college expansion (classrooms and dorms alike) and despite 1965's 13 per cent gain, 1966 contract values will be up another 5 per cent.



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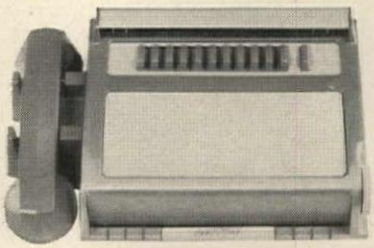

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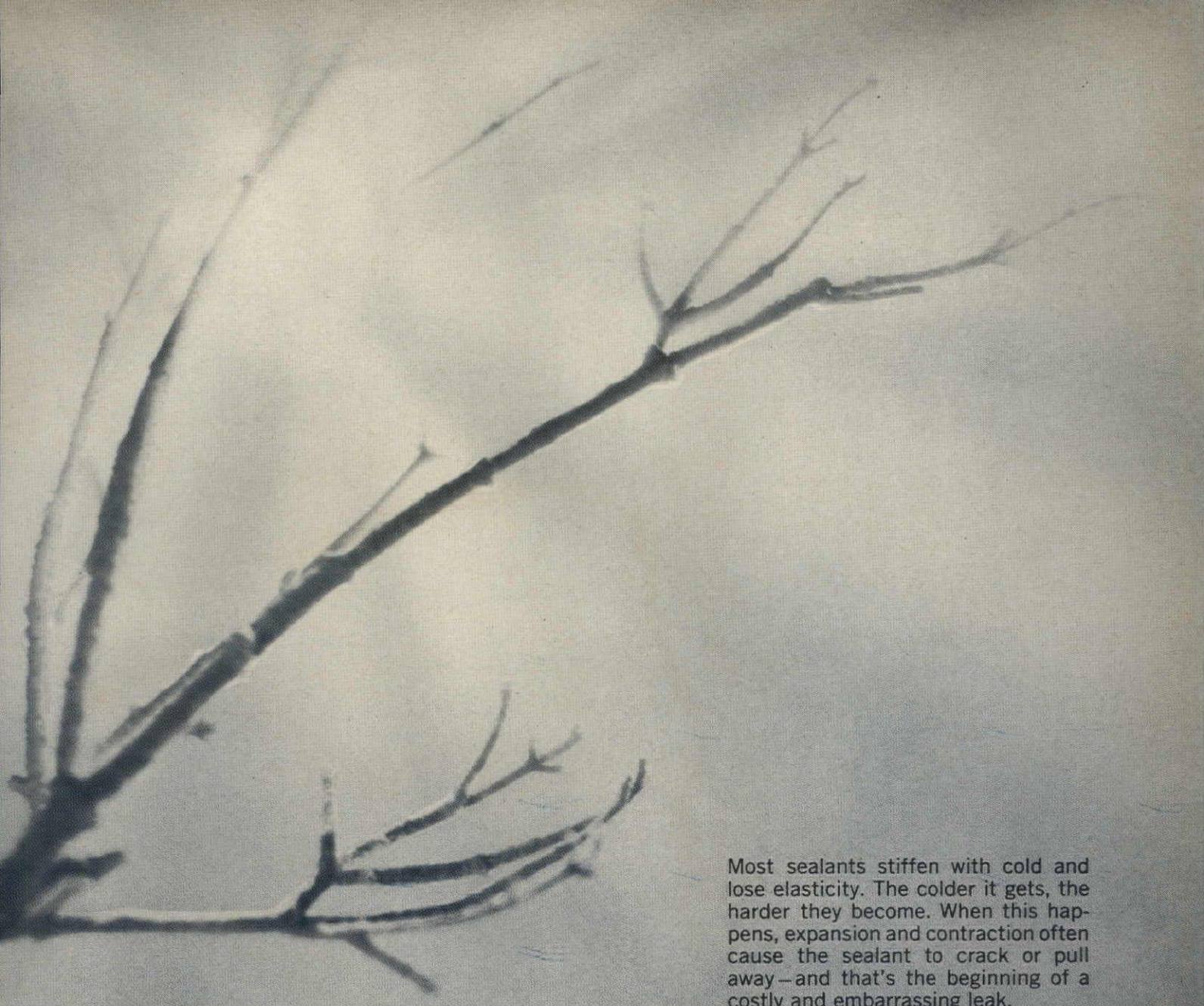

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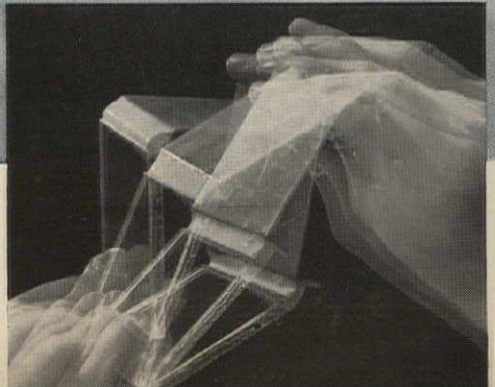

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For nearest distributor, see Sweet's Architectural File.

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| Construction Type | Contract Value (Millions of Dollars) 1965 preliminary* | 1966 estimated | Per Cent Change |
|---|---|---|---|
| **NONRESIDENTIAL BUILDINGS** | | | |
| Commercial | 5,325 | 5,475 | +3 |
| Manufacturing | 3,075 | 3,125 | +2 |
| Educational | 4,025 | 4,225 | +5 |
| Hospital | 1,550 | 1,700 | +10 |
| Public | 750 | 800 | +7 |
| Religious | 775 | 800 | +3 |
| Recreational | 750 | 700 | —7 |
| Miscellaneous | 575 | 575 | — |
| TOTAL | **16,825** | **17,400** | **+3.4%** |
| **RESIDENTIAL BUILDINGS** | | | |
| One and Two Family | 14,325 | 15,100 | +5 |
| Apartments | 5,225 | 5,500 | +5 |
| Nonhousekeeping | 1,675 | 1,700 | +1 |
| TOTAL | **21,225** | **22,300** | **+5.1%** |
| TOTAL BUILDINGS | **38,050** | **39,700** | **+4.3%** |
| **NONBUILDING CONSTRUCTION** | | | |
| Streets, Highways and Bridges | 5,500 | 5,850 | +6 |
| Utilities | 1,450 | 1,550 | +9 |
| Sewer and Water | 1,650 | 1,700 | +3 |
| Other Nonbuilding Construction | 2,750 | 2,675 | —3 |
| TOTAL | **11,350** | **11,775** | **+3.7%** |
| **TOTAL CONSTRUCTION** | **49,400** | **51,475** | **+4.2%** |
| **Dodge Index** (1957-59=100) | **143.1** | **149.2** | |

*Eight months actual; four months estimated.

F.W. DODGE ESTIMATES as given in the 1966 Construction Outlook are shown above. They are based on construction contract value recorded (and anticipated) in the monthly tabulation of Dodge construction statistics on contracts awarded for future construction.

HIGHWAY CONSTRUCTION, the other big spending category in the community group, is slated for a better than average gain in 1966. The two backbone programs, the Interstate and the ABC, will be supplemented next year by a number of "quick start" road projects under the Appalachian Aid program, while the Interstate work will be speeded up with a twice-normal-size $200 million increase in allocations. The ABC program does without an increase next year, but the net impact will bring a solid 6 per cent expansion in street and highway contract value.

HOSPITAL BUILDING slipped back a notch in 1965 after four consecutive years of spectacular growth. The current pause is likely to be a brief one in view of the activity boiling within the several health facilities programs. The long-standing Hill-Burton Act got an increase in appropriations for the first time in four years; the Mental Health Facilities Act ('63) has a large backlog —more than $200 million—of appropriations and so far none of it contracted out. The Health Professions Act (also '63 vintage) has another $100+ million soon to be committed for construction. Biggest of all in terms of hospital building potential, though, is this year's Medicare program, which is going to put a tremendous strain on existing hospital and nursing facilities. Next year a 10 per cent increase in hospital contract value will be the start of another big wave of hospital and health facilities construction.

SEWER AND WATER CONSTRUCTION, though unimpressive in 1965, is another area in which interest is growing rapidly. As yet, there has been nothing in the way of public appropriations to provide the impact of the Accelerated Public Works program of two years ago, and municipal bond sales for this work have been lagging a bit during the first half of 1965. At best, 1966 will show only modest expansion, but within a few years, both water supply and sewerage control are likely to be getting heavier Federal and state backing.

## *The Business Demand For Construction in 1966*

The $10 billion package of industrial and commercial construction which reflects the building requirements of the business community has closely paralleled the vigorous growth of total capital spending over the past several years. The past year's 8 per cent increase, following a 12 per cent expansion in 1964 (a pace nearly twice that of total economic activity), has made this group of construction types by far the fastest growing of the demand categories.

Manufacturing plants have clearly been the driving force behind this strong rise, but within the past year, store and office construction joined in the advance. In next year's climate of somewhat slower over-all economic growth, business construction is still more likely to show a gain than a loss, but the gain this time will be quite a bit smaller—about 3 per cent. The key individual building types making up the business demand group can be expected to behave as follows:

MANUFACTURING BUILDING stands to be most directly affected by a change in the rate of total business output. With the three-year growth trend in manufacturing building contracts noticeably slowing in late '65, next year's course is apt to be quite flat, but providing a bit more in total over 1965.

OFFICE BUILDINGS snapped out of a 1964 slump and advanced sharply in 1965. The combination of low and stable office vacancy rates in most major cities, and a healthy backlog of plans for office buildings which haven't yet reached the contract stage, indicate a high and rising volume of this type of building in 1966.

STORE AND WAREHOUSE BUILDING, after a period of very slow growth between 1960 and 1963, began to pick up in 1964 and shot ahead by more than 15 per cent in 1965. Demand for retail building will remain strong in 1966, though it will likely ease back a bit from the present unsupportable rate.

UTILITIES CONSTRUCTION settled back about 5 per cent in 1965 after the unusually big surge the year before. Renewed expansion in 1966 of electric generation and transmission facilities, natural gas pipelines, and communications is indicated by utilities companies' growth plans, and should bring a new record contract total next year.

## *The Family Demand For Construction in 1966*

Many different factors enter into the total demand for housing. The primary ones, which govern the need for shelter, are the rate of family formation and the volume of demolition of existing structures. These basic needs—which become modified by such other factors as population mobility, housing vacancies and families living together—are translated into effective building demand via changes in incomes, credit and government programs.

Once more, in 1966, there will not be enough of a change in any of these basic elements to get the housing industry really moving off the plateau it has been on for the past few years. The supply of mortgage funds has hardly been restricting housing growth; nor has the expansion of personal income. And neither of these factors is likely to change very much in the year ahead. Demolitions of the existing housing stock, which lead to the replacement of something in excess of 400,000 units (mostly rental) each year, are not apt to increase in view of the recent trend in urban renewal which emphasizes rehabilitation rather than removal of run-down housing. This puts the growth of total housing demand in 1966 squarely up to the most elementary factor of all—the formation of new households. And here, recent events offer great promise, but less in the way of immediate fulfillment.

The past year brought a big increase in the number of newly formed households, and the 1966 total will be large as well. Almost all of this growth, however, is developing from the celebrated young adult group whose members are finding

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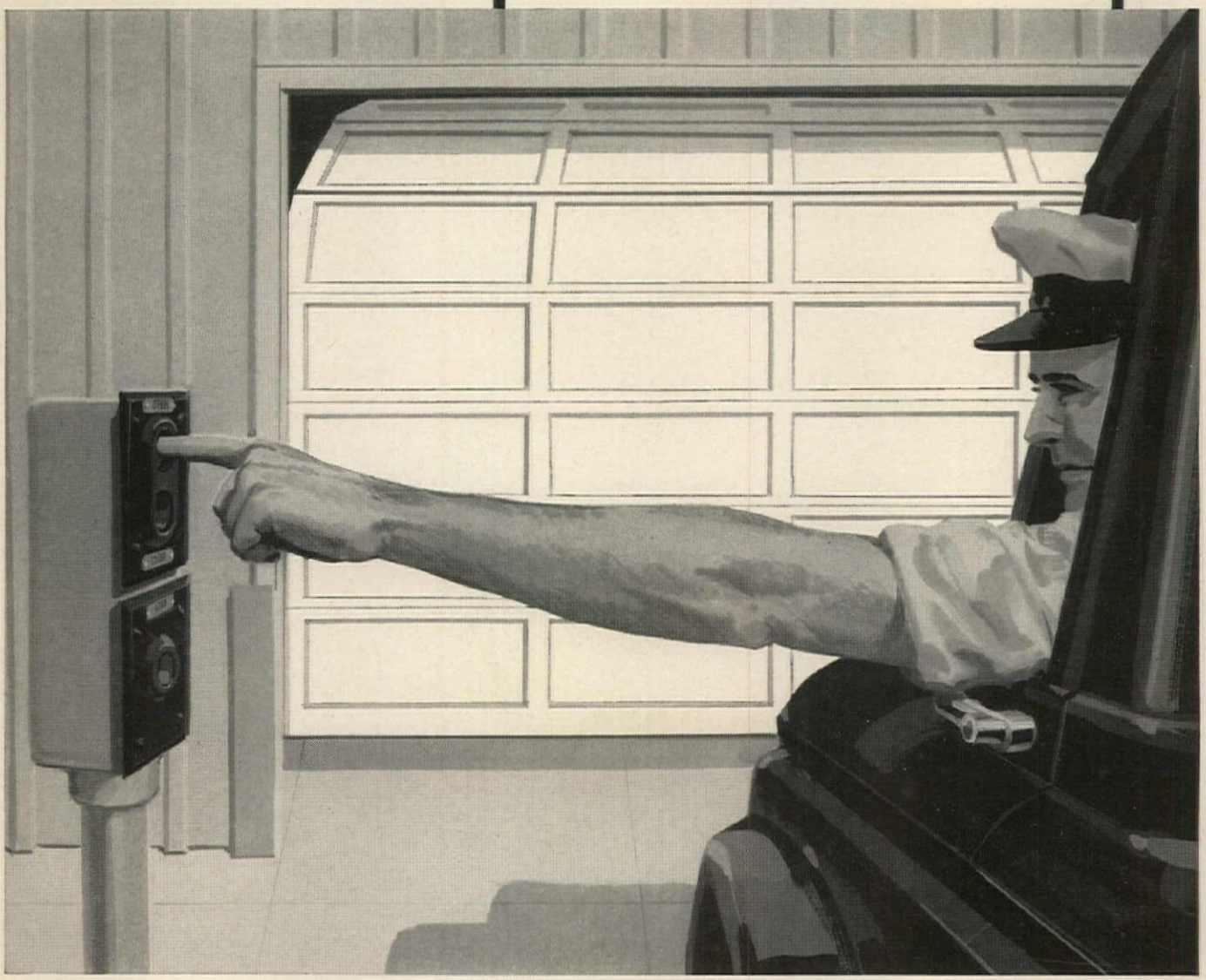

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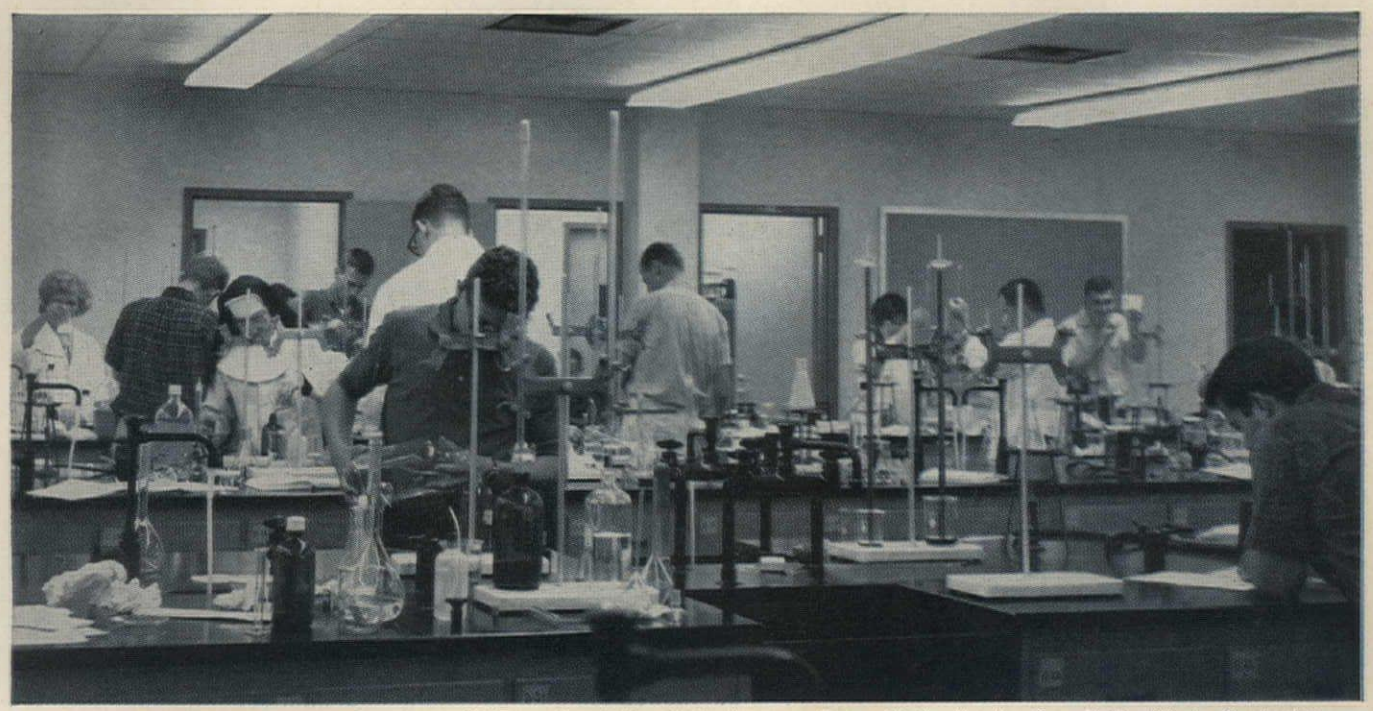

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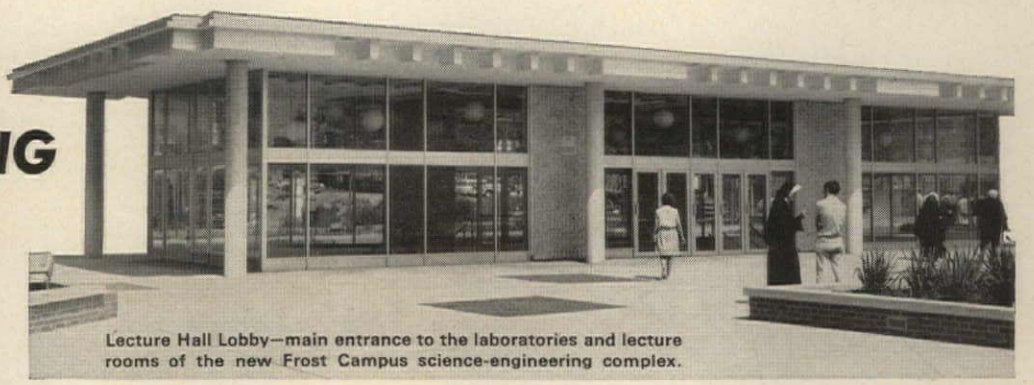

Lecture Hall Lobby—main entrance to the laboratories and lecture rooms of the new Frost Campus science-engineering complex.

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employment and setting up separate living quarters as individuals—as yet a rather low-powered source of housing demand. Growth in husband-wife families is showing little change so far, and marriages are only beginning to move upward.

Next year is likely to offer more of the same—another large gain in individuals and further moderate growth in marriages. It will continue to be the kind of a market favoring rental housing. The expansion in single-family housing demand which will develop from family formation is still only in its early stages, with the major impact a few years away.

A new element was introduced into the housing market in 1965, and that year's Housing Act holds the potential of a major stimulus to homebuilding in the years ahead. The rent supplement provision and the several other features of the Act will undoubtedly raise the level of homebuilding, but the timing is apt to be delayed till late in 1966, at best.

Is next year going to be another soft year for housing, then? No, though it's not likely to be a record-setter, either. Although there's little prospect for a significant change in total housing demand next year, there is room for good improvement over the 1965 volume as the depressed Western housing market returns to a more normal level in 1966. And normal for the West is worth roughly a quarter of the national total, implying a pickup next year of close to 35,000 units. With the rest of the nation holding even (changes in other regions will just about balance out), the Western potential alone could provide an over-all increase in dwelling units of 2 per cent. In addition, the steadily upward trend in the size and cost of newly built housing can be counted on to provide another 3 per cent in next year's residential contract value. Together, these forces will boost the dollar total for new housing in 1966 by 5 per cent.

It should be kept in mind that next year's gains are not so much growth as they are a return to a more normal level of operations after a moderate decline. The broader expansion—which will get under way as the new housing programs take effect and as the anticipated sharp rise in marriages begins—is as yet more than a year away. Once it starts, however, the trend of home-building will be on the way up for a long time.

## *Regional Patterns In Construction*

NORTHEAST—Construction activity in the Northeast is now accelerating after barely being able to keep up with the national pace over the last several years. The current advance, sparked by a fast rise in commercial and manufacturing building and a recovery in the New York City housing market, should continue in 1966.

MIDWEST—Ever since the demand for consumer durables and capital equipment began to take off early in 1963, construction in the industrial core of the nation has been moving up quickly. Business-related construction was still carrying the area ahead late in 1965, but more of the recent growth has been coming from housing. In the year ahead, both housing and industrial building are likely to weaken, causing total construction to ease back somewhat.

SOUTH—This area's construction market is still digesting the fast-paced advance made during the early Sixties. The current shakiness in all major categories has made the South the weakest of the four regions through 1965. Look for a gradual improvement all across the board in 1966 as the area's economic development and prosperity absorb the excess supply still remaining in some building types.

WEST—The decline in Western contracts which began late in 1964 can be attributed entirely to housing. In fact, steady advances in business and community demand have softened to a large extent the effects of the sharp drop in residential building there. Continued population inflows and general business expansion, together with a recent rise in unemployment in the West's defense-related industries, indicate that housing can be expected to move ahead in 1966.

Copies of the F.W. Dodge Construction Outlook for 1966 are available upon request, to the extent of a limited supply.

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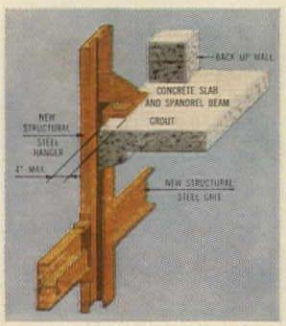
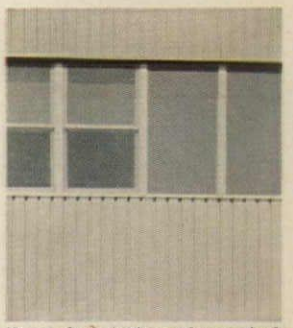



A new metal subframe to carry the aluminum window and spandrel panels was tied into the original reinforced concrete frame.



Deep-fluted Plasteel spandrel panels, manufactured from Alcoa Aluminum, were partially preassembled at the fabricating plant.

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## *Office Notes*

*continued from page 118*

opened offices for the practice of architecture, The Northcrest Building, 8609 Northwest Plaza Drive, Dallas 75225.

*New Firms, Firm Changes*

**Durham, Anderson & Freed, Architects,** Seattle have announced as partners **Richard V. Peterson, A.I.A.** and **Harold K. Roe, P.E.** and as associates **James E. Boone, Stephen M. Dam, Richard O. Parker** and **K. E. Richardson, A.I.A.**

**Gibbs, Tomblinson & Harburn, Architects,** Flint, Mich. have named **David L. Hanoute, A.I.A.** an Associate.

**Donald T. Morton** and **Loyd W. Olson,** A.I.B.D. have changed the name of their firm from **Nor-Cal Engineers and Designers** to **Nor-Cal Design Group. Herb Widmer,** A.I.A. has become an associate in the Santa Rosa, Calif. firm.

The Office of **Scrimenti, Swackhamer and Perantoni,** Architects, Somerville, N.J., has appointed **Richard Byron Shive, A.I.A.** and **Martin J. Spinelli, Jr., A.I.A.** Associates.

The Detroit architectural firm of **Eberle M. Smith Associates, Inc.** has named **Robert H. Liles** an Associate.

**Ralph B. Thomas** has joined the Chicago firm of **Jensen and Halstead,** Architects and Engineers, as a partner.

**James E. Thompson,** A.I.A. and **Barrett R. Davies,** A.I.A. have formed the partnership of **Thompson and Davies, Architects,** 646 Hamilton St., Somerset, N.J. and 12 Loriann Rd., W.T., Plainfield, N.J.

**Zurheide-Herrmann, Inc.,** a St. Louis consulting engineering firm formerly Smith-Zurheide & Associates, have elected **Charles H. Zurheide** president.

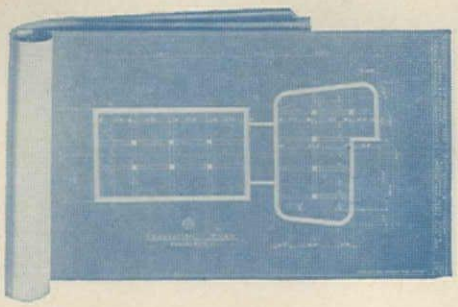
*New Addresses*

**Viggo Bonnesen,** Consulting Engineer, 1530 Summer Street, Stamford, Conn.

**George, Miles & Buhr,** Architects and Engineers, First Shore Federal Building, South Division at Camden, Salisbury, Md. 21801.

**Norman Jaffe, A.I.A.,** Architect, 962 Park Ave., New York City 10028.

**Bertrand J. Marlier, A.I.A.,** Architect, 6900 Thomas Boulevard, Pittsburg 8.



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10a/Do and 8a/Dow. Or write us. The Dow Chemical Company,
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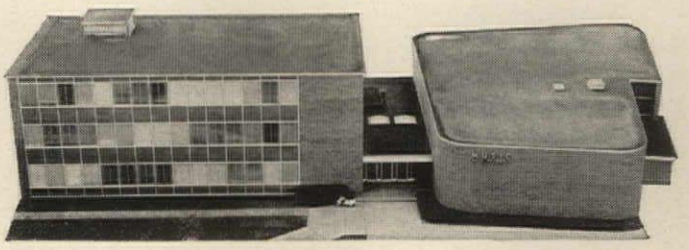


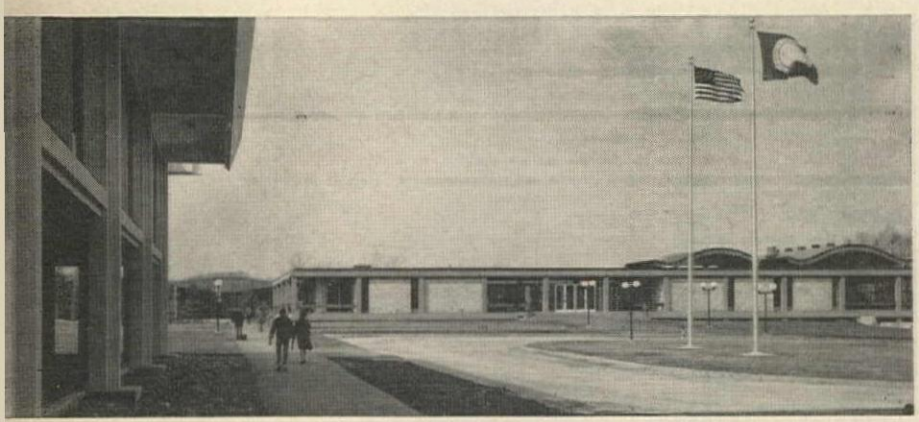
# OK. Now forget it.

(Only until your next job, that is.)

DOW

For more data, circle 131 on Inquiry Card

CORNING COMMUNITY COLLEGE, Corning, New York; Architects: WARNER, BURNS, TOAN, LUNDE, New York; Structural Engineers: SEVERUD-PERRONE-FISCHER-STURM-CONLIN-BANDEL, New York; General Contractor: ROGER & McCAY, INC., New York; Precast, Prestressed Concrete: FORMIGLI SALES COMPANY, Philadelphia, Pa.



Student Center looking west. Each main building is so placed that additional elements may be added at a future date without crowding.

# Community College precast with Incor®

New York's new community college in upstate Corning is one of many two-year colleges being built to cope with the mounting educational needs of the nation. Conceived as an entity, its structures have a consistent character. Each building is placed to accommodate future expansion without crowding.

Economical, fire-safe precast concrete was selected as the basic structural material for all buildings, with an exposed finish of beach pebble aggregate. Precast and prestressed "Spancrete" hollow-core floor and roof slabs—and over 1600 other concrete structural members—were produced at the precaster's yard and truck-transported 200 miles to the construction site.

On a construction budget of $20 per square foot, rigidly planned production and delivery schedules moved the project to a smooth completion during severe winter weather. "Incor" 24-hour portland cement in a 5000-psi mix was used throughout, assuring rapid turnover of the forms, and sound, high-quality units at low production cost.

Use of precast concrete permitted construction during severe winter weather.

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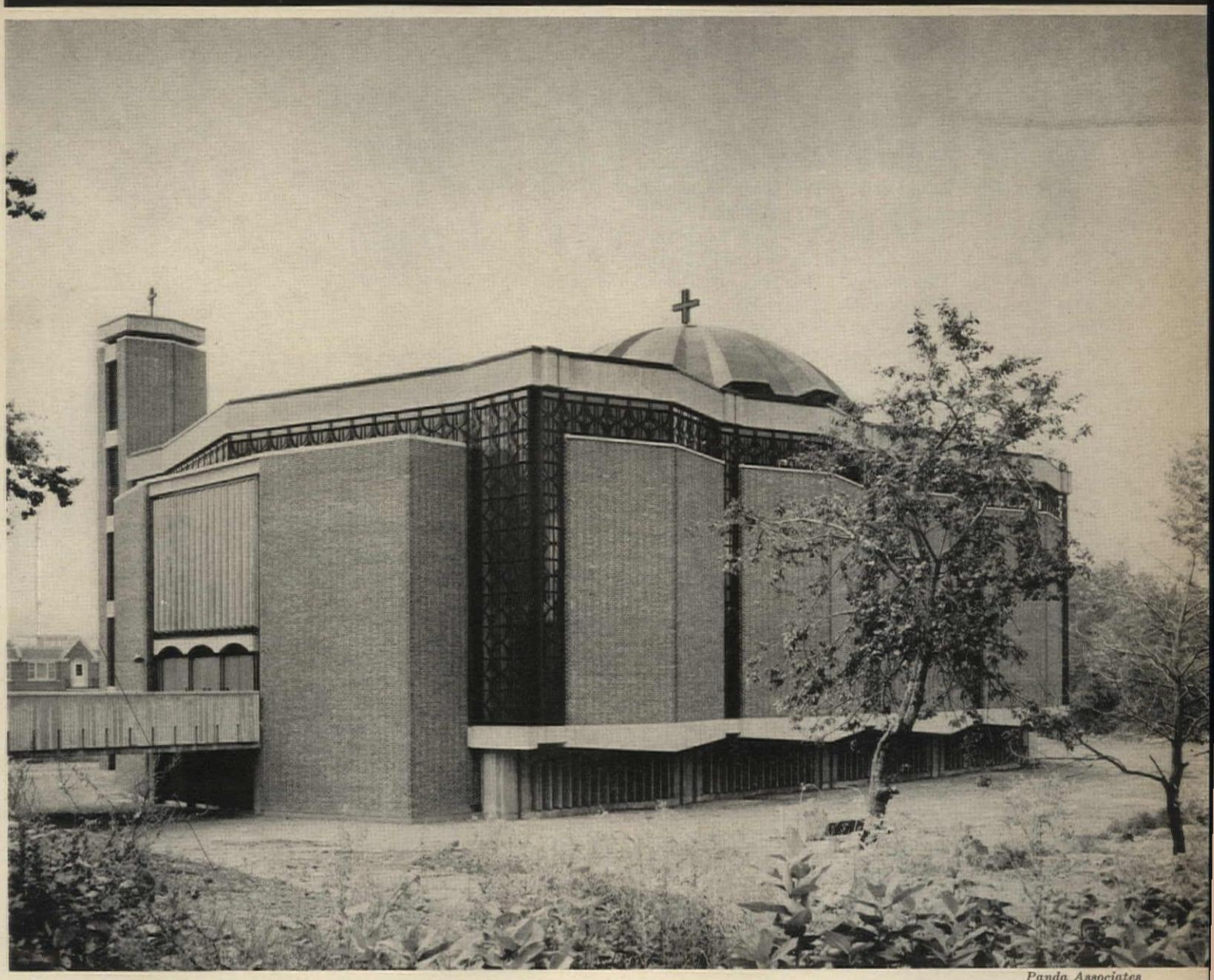


*Panda Associates*

St. George's Greek Orthodox Cathedral, Montreal, Canada.

# Liturgy and Tradition Shape Designs for Three Faiths

Contemporary church architecture in the United States doesn't seem to be improving. Some architects appear to regard a church commission as a creative holiday from program and function, an opportunity to express a highly personal esthetic, and a chance to span a space like never before. Many churches do not represent a serious solution to the question of what a church should be, but suggest that the architect and key members of the building committee, if not the minister, consider a new church an anachronism in our culture, without a real purpose, and not to be programed and solved in an earnest manner as a school, factory or hospital might be. At their worst, a few current religious buildings appear to be the anxious designs of architects who seem tormented by a sense of God's absence, and are barely reassured by their own presence, as "formgivers" to an empty function. Three new Canadian churches by Affleck, Desbarats, Dimakopoulos, Lebensold and Sise indicate that these architects can be counted among those for whom liturgical function and tradition are authentic considerations, subject to analysis and the source of form.

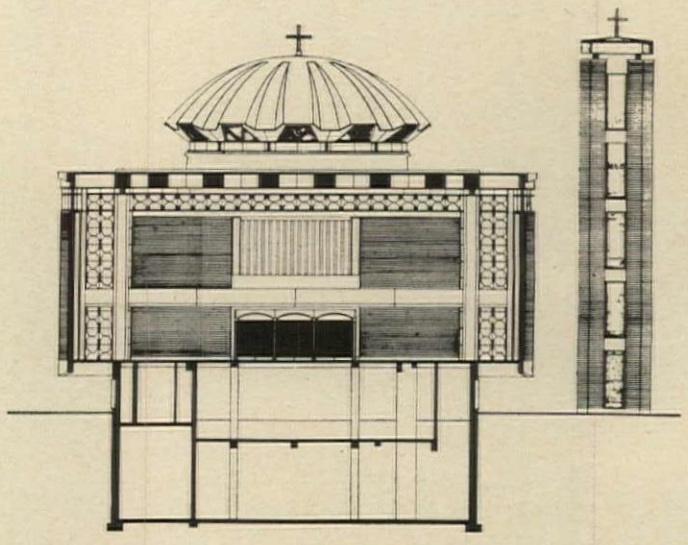
**St. George's Greek Orthodox Cathedral**

In the choice of form for this church, consideration of tradition was the determining factor. The partner-in-charge and designer of the church, Dimitri Dimakopoulos, has created a neo-Byzantine structure, rectangular in plan, with a dome set within a cross formed by the perimeter of the mezzanine, a single bay of each sidewall and the plan profile of the screens to the left and right of the sanctuary. The architect's justification for working within an architectural tradition stemming from ancient Greece and the Orient, which was ascendant from 330 to 1453, is based upon the extreme religious and social conservatism of the Greek Orthodox community in Canada and the strength of its ties to Greece. This community still shares what Henri Peyre describes as "that aspiration to the sublime, that yearning for stability in the midst of a universe addicted to change that lay at the source of Byzantine art and culture." The ancient forms have been translated into a contemporary structural system consisting of a dome made of 12 precast concrete sections, the loads of which are transferred to a concrete support ring by short steel built-up columns; a poured-in-place-concrete lamella roof, and poured-in-place-concrete columns, which are not integral with the roof and are given separate articulation by steel supports at the intersection of column and ceiling plane. The brick walls are wedge shaped for acoustic purposes. A campanile, not in the Byzantine tradition but desired by the congregation, composes well with the building.

Byzantine churches were plain without and richly embellished within. The congregation of the cathedral has installed ornamental screens and other enriching elements to mitigate the raw but elegant simplicity of the exposed concrete and brick. It is possible that given time and increasing prosperity the faithful will decorate every square inch of the interior with marble and mosaic, thus acquiring considerably more tradition than Dimakopoulos could wish. Vestigial historicism, unfortunately, with time can become less vestigial. So far the depredation has been slight and the interior is unusually handsome.

**St. Gerard Majella Church and Presbytery**

While the Greek Orthodox Church endeavors to maintain its tradition and liturgy intact, the Roman Catholic Church is re-examining its tradition, reforming its liturgy and seeking appropriate architectural expression. From the great ecumenical conference still convening in Rome have come new directives for the celebration of the Mass. Since the end of World War II there have been two major attempts to define architectural consequences deriving from the Roman Catholic liturgy. The first, referred to as the directives of the German Liturgical Commission and published in 1947, stems from the clarification of principles developed by such leading German church architects of the twenties and thirties as Rudolf Schwarz, and Dominikus Böhm. Ten years later in 1957 the bishop of the Roman Catholic diocese



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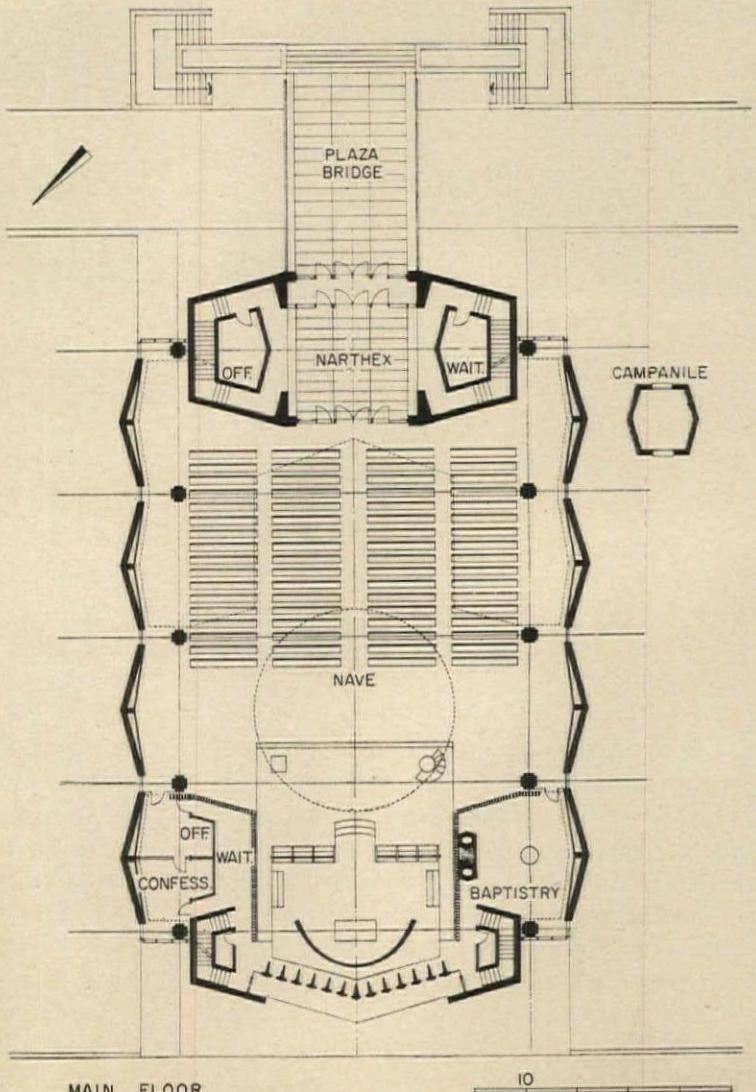


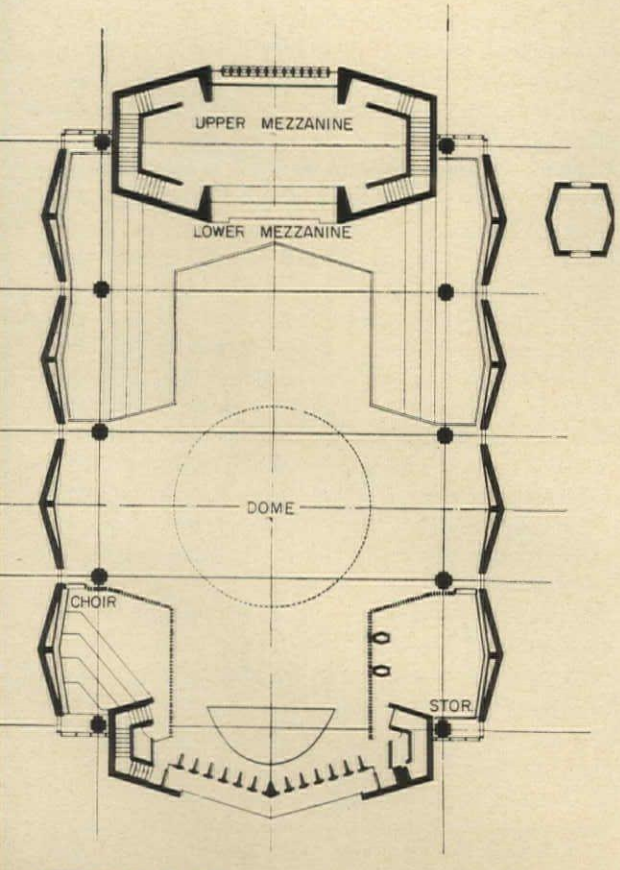

MAIN FLOOR

*Han-Sa*

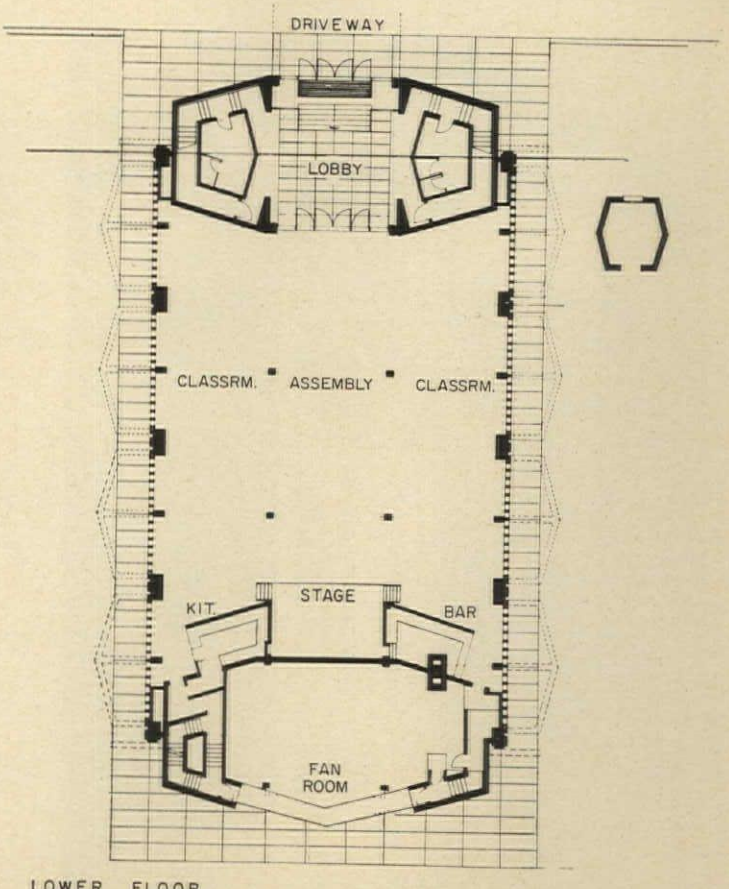
View toward altar. Glazing is pale yellow.

*Marcel Corbeau*

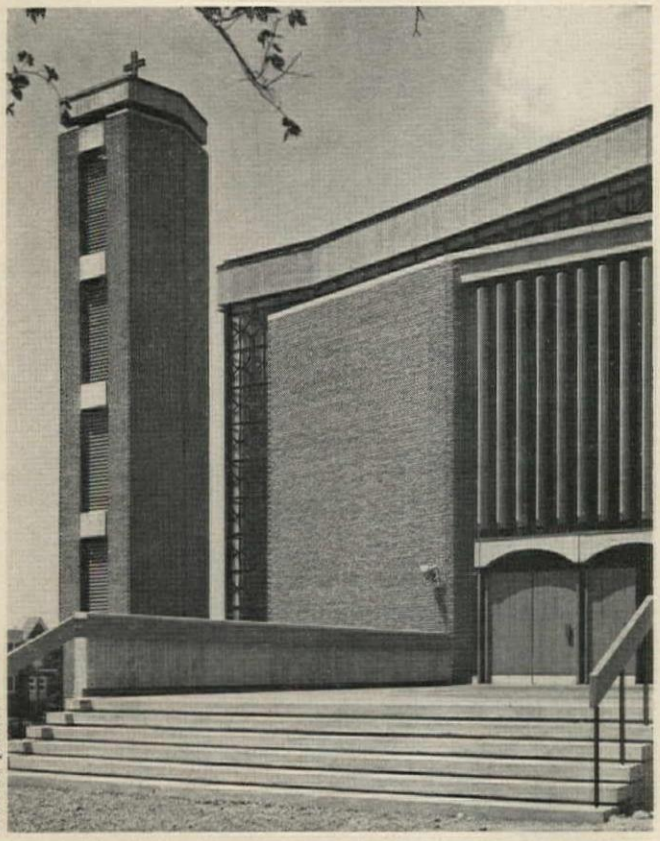
**The mezzanine, called "gynaekonitis," was traditionally for women.**




MEZZANINE FLOOR

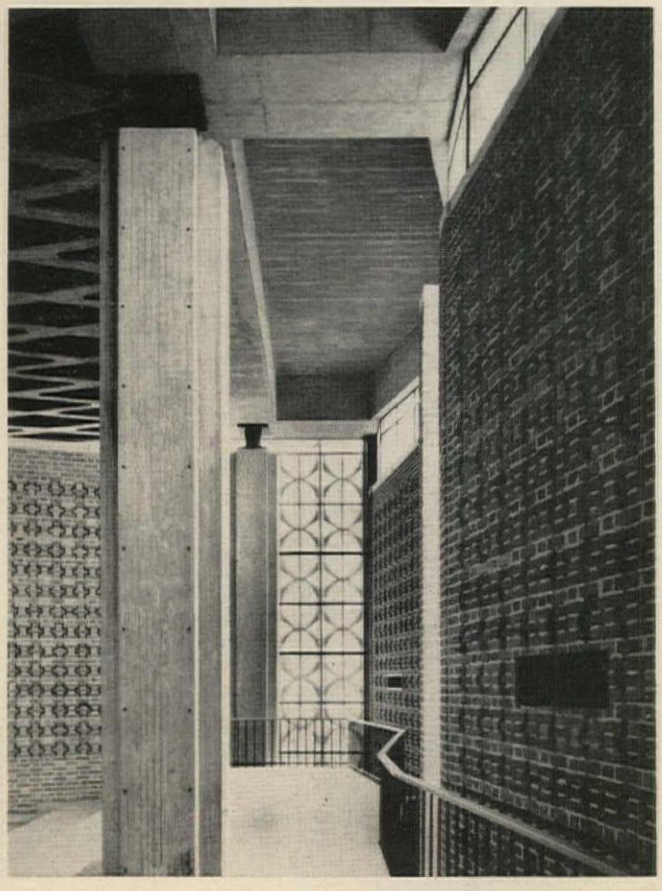



LOWER FLOOR



*Han-Sa photos*

For the exterior, honest expression of structure and modest materials is in the Byzantine as well as the contemporary tradition; for the interior a stricter historicism would require gilt and mosaic. The compromise: windows of yellow tinted glass in combination with ornamental metal screens. In the daytime, through this filter, the interior is bathed in a complex pattern of golden light, a hint of ancient richness.



*Panda Associates*

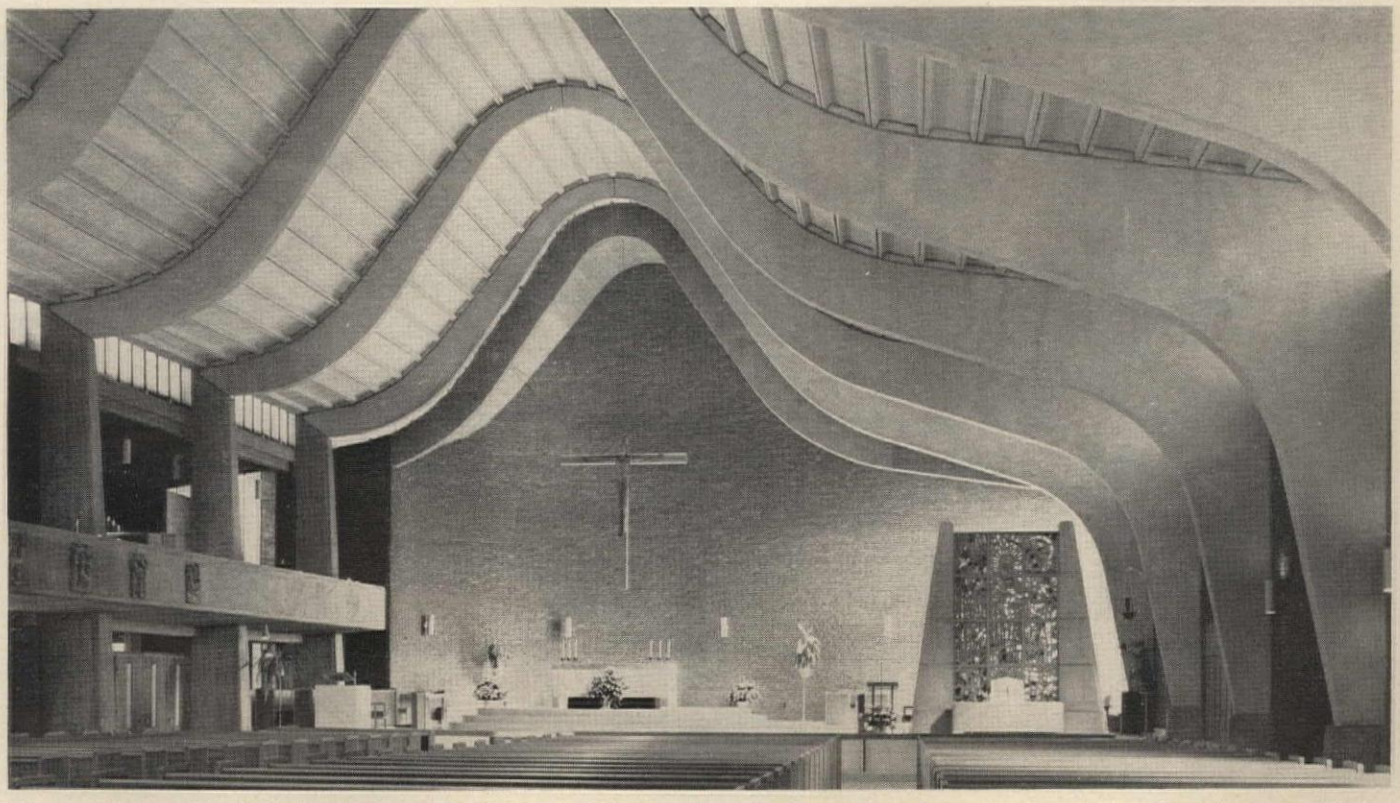
of Superior, Wisconsin formed a panel which issued directives similar to those of the German Liturgical Commission but more detailed in analysis of architectural applications. Subsequent statements of principle in the past eight years reflect developing liturgical scholarship and practice. It would be an overstatement to suggest that the newer liturgical criteria will generate architectural forms yet to be seen or imagined. It is correct to say, however, that these directives help to create a church program to be resolved—a more challenging opportunity for some architects than the prospect of unlimited self-expression in the creation of an autonomous monument.

A careful examination of the plan of St. Gerard Majella suggests that its partner-in-charge, Guy Desbarats, and its design developer, Eva Vecsei, had the new liturgical formulations much in mind. The church and presbytery fill a rectangular site surrounded on three sides by boulevards and on the fourth by the church parking lot. The complex includes a meeting hall which because of the limited size of the site and cost considerations was to go in the basement. The soil conditions were not good, the water table was four feet below the then existing grade, making a deep basement excavation impracticable. The architects' solution places the entrance vestibule seven feet, six inches below the level of the nave floor and five feet above the basement meeting room floor.

The approach from the vestibule to the narthex doors, which open upon the nave main aisle, is oblique and up a flight of stairs. The entrance vestibule doors are approximately 42 feet from the sidewalk curb and front upon a shallow plaza. Reaching the narthex by means of a stair is clearly a solution to the problem of the high water table, but at the same time the stair plays a part in an entrance sequence which is in the spirit if not the letter of the following directive of the German Liturgical Commission: "However necessary it may be to remind people, preoccupied as they often are with the externals of life, of the existence of God, it is best to avoid building a church so that it gives directly on a noisy shopping street. It is desirable that on one's way to church one should pass first through an enclosed square to a formal *atrium*, and should thus have a moment of silence in which to collect oneself for the stillness of God within the church." The doors leading from narthex to nave are centered on the axis perpendicular to the main altar in harmony with the directive "that the treatment of the entrances, and especially the main entrance, should be so emphatic as to thrust upon the worshipper the parallel between the doors of the church and the gates of heaven." The plan carefully subordinates the side altar, for devotion to the Blessed Sacrament, to the main altar where the celebration of the Mass takes place. The German Liturgical Commission states:

"In planning the interior it would be wrong to take as one's starting point, as some have, not the eucharistic sacrifice but the devotion to the real presence in the reserved sacrament, and thereby

The forms of St. Gerard Majella were inspired by the great curved walls of the old baroque churches of French Canada.



The curving roof is high to accommodate the choir loft over the "Crying Gallery," reaches its peak on the axis perpendicular to the main altar and quickly descends to provide an intimate low roof over the section reserved for private prayer and contemplation of the Blessed Sacrament. A careful attempt was made to emphasize in plan and function the primacy of the Mass.

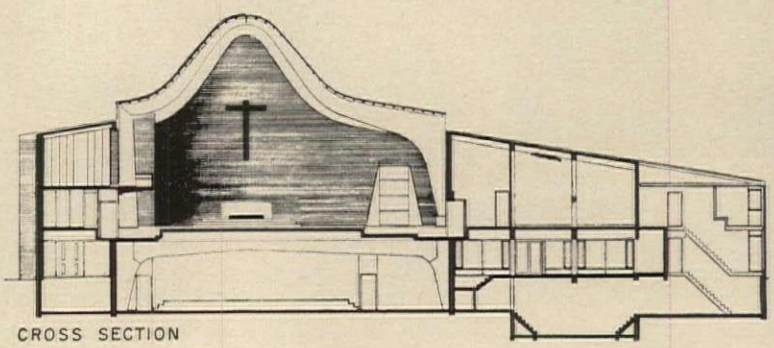
to give to the atmosphere of the church a one-sided emphasis on adoration and contemplation. It would be wrong because this devotion to the real presence in the reserved sacrament does not take first place among the purposes which a church must serve."

The location of the main altar permits the priest to conduct the Mass while facing the congregation, to emphasize the communal aspect of the eucharistic sacrifice. This is in accordance with the new procedures which have stemmed from the current ecumenical conference. The plan as a whole satisfies what the German directives postulate as the requirements of the Roman liturgy: "orientation towards the altar, emphatic opposition of priest and congregation, and provision for orderly processions in two directions. . . ." The plan also observes the traditional east/west alignment in which the altar is to the East focussing upon God who, like the sun, is symbolically enthroned there. The altar itself is placed in a clearly defined sanctuary and is visibly free from the surrounding walls. The German directives caution against too many windows in the wall behind the altar and the advice is heeded here. The plan follows the directives which assert that the sermon should be preached from an ambo at the altar rail, that the choir which leads the congregation in prayer and hymns should be up front, and that the baptismal font be given a room of its own. The German architectural directives on baptism are rather specific and were carefully followed (photo, page 139). "In the ideal church this 'spring of baptism' (*fons*) would be given a monumental treatment and placed in a separate room near the entrance. According to a venerable tradition this room should be circular or polygonal, with the font in the center; and the inward meaning of the ritual of baptism leads to the same architectural solution. For at the core of this ritual man appears not as an actor, but merely as the passive recipient of the mysterious action of God, and accordingly the appropriate architectural form is not a long room, which in symbolic language expresses action, but a room which is centrally planned, and which, since its axis is vertical, has a passive character."

A Wisconsin directive may account for the step of descent toward the font. It explains: "By this means the inner meaning of baptism as a mystical descent into the death of Christ and the corresponding ascent with him into the Easter life of resurrection is visually symbolized."

**Tifereth Jerusalem Synagogue**

The third religious building in the group by Affleck, Desbarats, Dimakopoulos, Lebensold and Sise is as different from the tradition bound St. George's Greek Orthodox Cathedral and the liturgically alive St. Gerard Majella as the first two are from each other. It has been said that the synagogue has no architectural tradition, Jewish temples of worship having always been constructed in the prevailing style of the period. Concern on the part of Jewish theologians for de-



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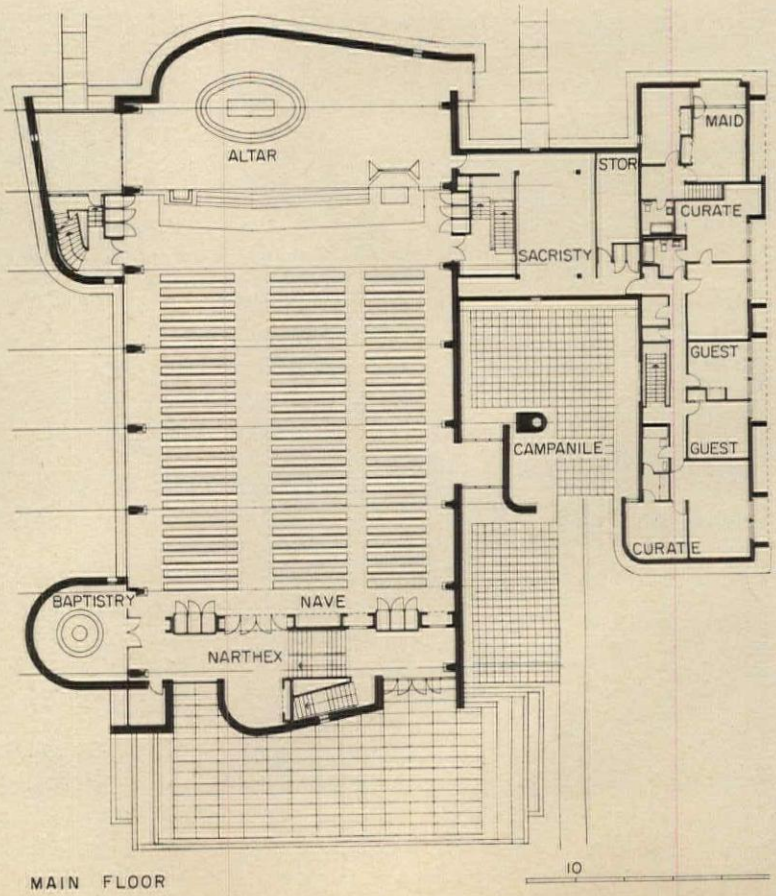


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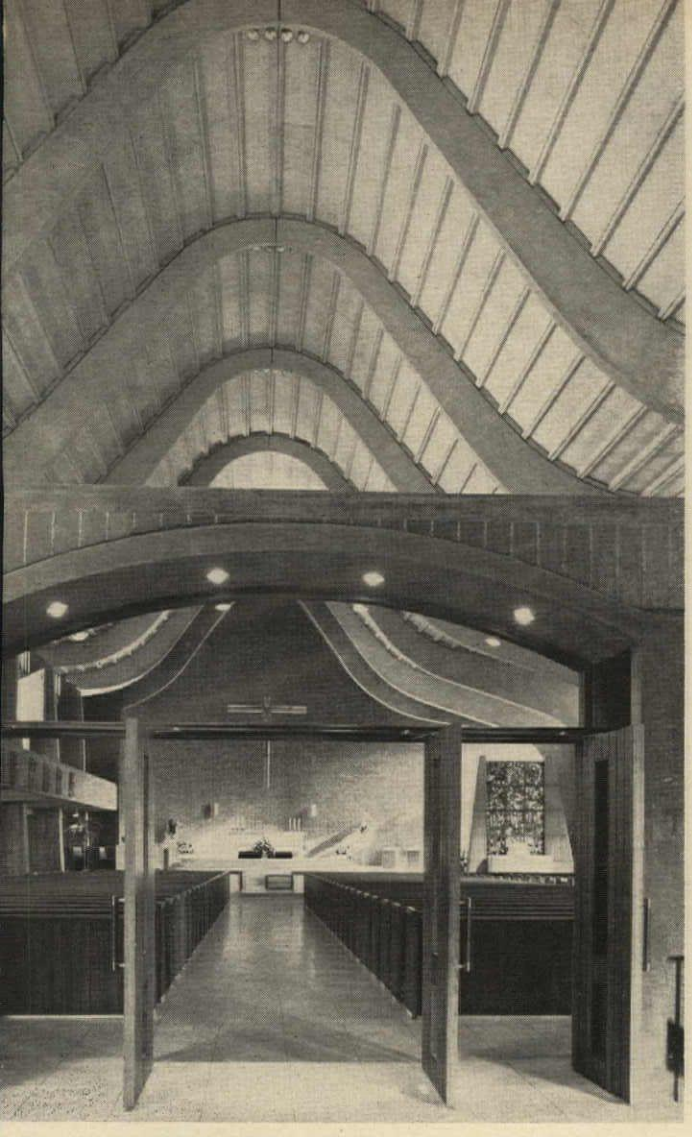
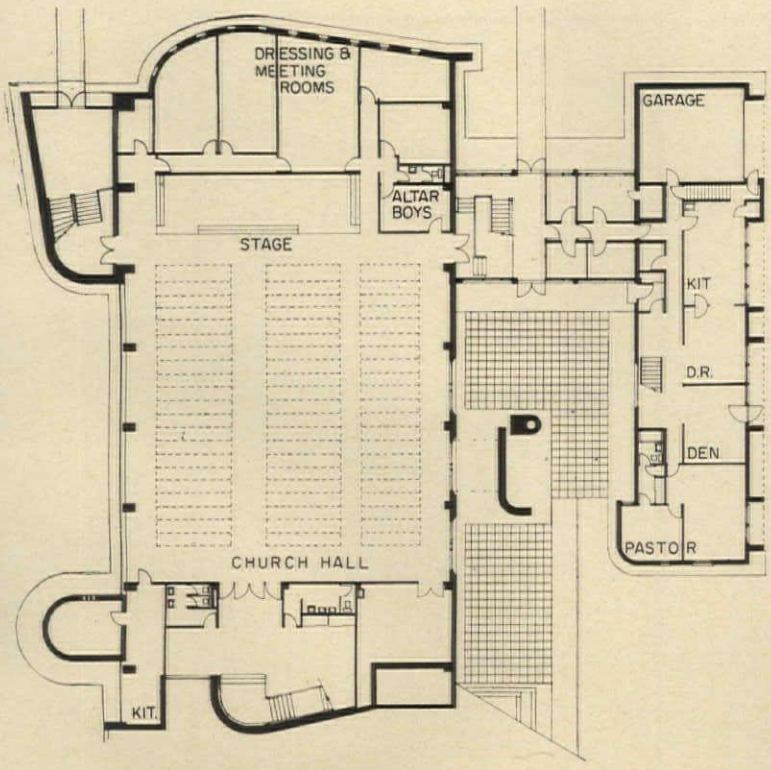


The structure is of reinforced and precast concrete.

Han-Sa (left), Chris F. Payne (right)

Walls are rough grey-buff brick. Translucent panels are fiber glass.

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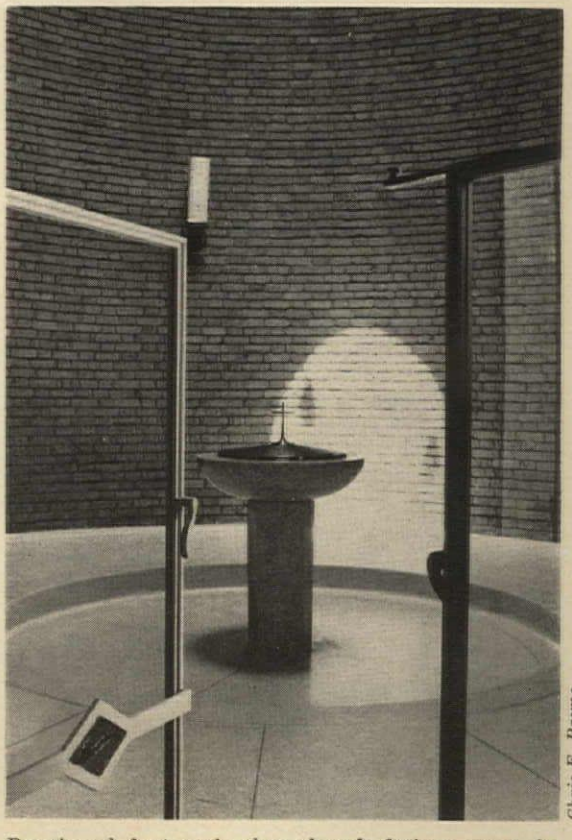

Chris F. Payne

Baptismal font and other church fittings were designed by Jean C. Charuest. Font is one step down.

veloped architectural expression of liturgical belief has been limited to the discussion of such matters as the primacy of worship or study in the synagogue, or whether worship and study are perhaps synonomous. The ark with its tablet and scroll is considered to symbolically represent the centrality of the Law and is revered. The bimah represents the congregation in prayer, interpretation and study. The architectural prominence given the one or the other in the synagogue plan has sufficient relevance to Jewish life to become a subject of discussion in Orthodox, Conservative and Reform circles. The effect of the foregoing considerations on architectural form, however, appears negligible when compared to the subtly rationalized architectural concepts firmly asserted by Catholic and Protestant intellectual leaders. This lack both of tradition and liturgical assertion in the synagogue program gives the architect the disadvantage of fewer clearly defined requirements, and the benefit of no dogmatic rules. His job becomes the ordering of two functional elements, the ark and the bimah in relation to a congregation which doubles in size on the High Holy Days, and which therefore must occupy an expanding and contracting space. Study is done in separate classrooms.

—*Mildred F. Schmertz*

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St. George's Greek Orthodox Cathedral, owner: Hellenic-Canadian Community of Montreal; associated architects: Affleck/Desbarats/Dimakopoulos/Lebensold/Michaud/Sise and Kimon Caragianis, M.R.A.I.C. partner-in-charge: Dimitri Dimakopoulos, project architect: Jerry Miller, structural engineering consultant: J. Adjeleian & Associates; mechanical & electrical engineering consultants: Jas. P. Keith and Associates; acoustical consultant: N. J. Pappas & associates; general contractor: Douglas Bremner Contractors & Builders

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St. Gerard Majella Church & Presbytery, owner: Les Syndies de la Paroisse St. Gerard Majella; architects: Affleck / Desbarats / Dimakopoulos / Lebensold / Sise, partner-in-charge: Guy Desbarats, design developer: Eva Vecsei; structural engineering consultants: Bourgeois & Martineau; mechanical and electrical engineering consultants: Laflamme, Lefrançois & Gauthier; general contractor: Désourdy Frères; art work incorporated in church: (designed in collaboration with architects) Jean-Paul Mousseau: curtain wall of coloured fibreglass panels; Bernard Monna: cast concrete 'Way Of The Cross' panels, terra cotta corpus over Main Altar; Jean C. Charuest: church fittings (altar, baptismal font, pews, etc.)

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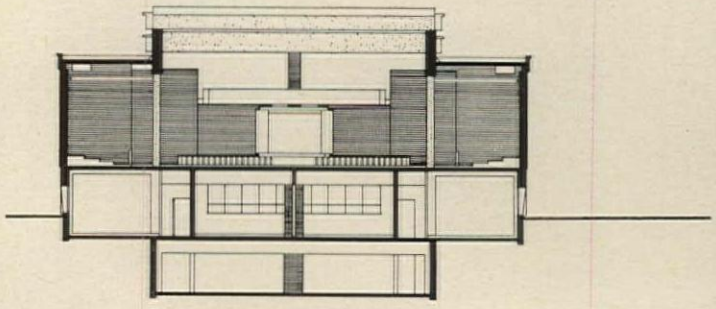
Tifereth Jerusalem Synagogue, owner: Congregation Tifereth Jerusalem; architects: Affleck/Desbarats/Dimakopoulos/Lebensold/Sise, partner-in-charge: Fred Lebensold, design developer: Eva Vecsei; structural engineering consultants: Eskenazi & Baracs; mechanical and electrical engineers: Loebenberg, Bernstein & Slone; general contractors: Douglas Bremner Contractors & Builders, Ltd

The synagogue is symmetrical about each axis.



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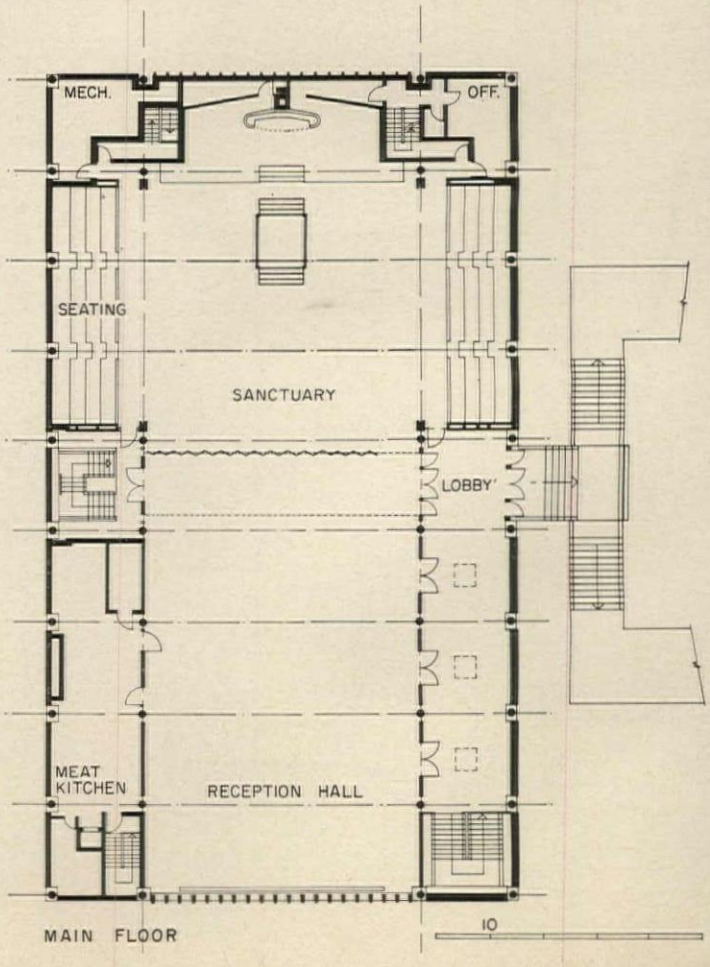
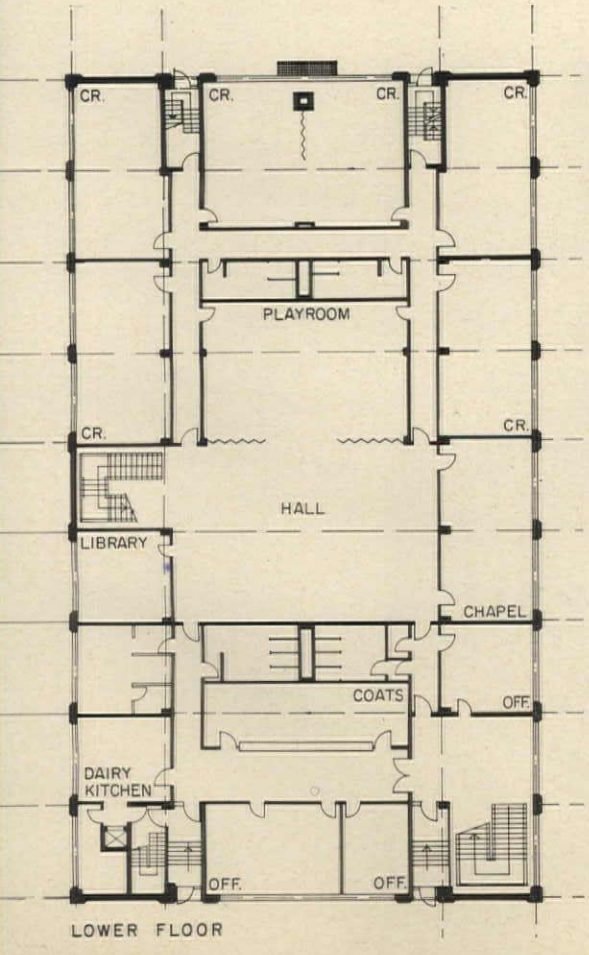


The structural system is primarily exposed precast concrete.

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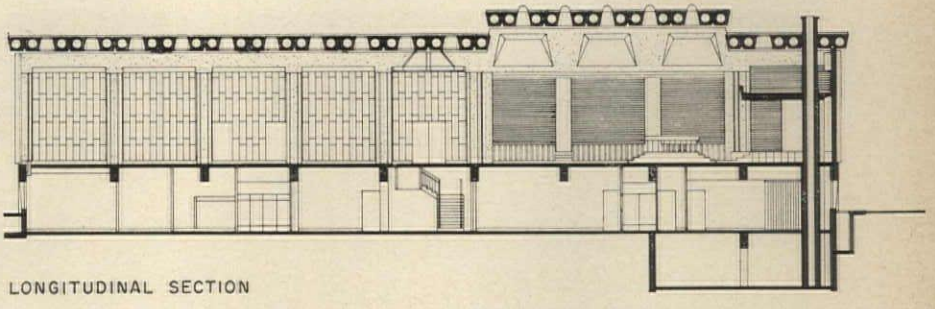
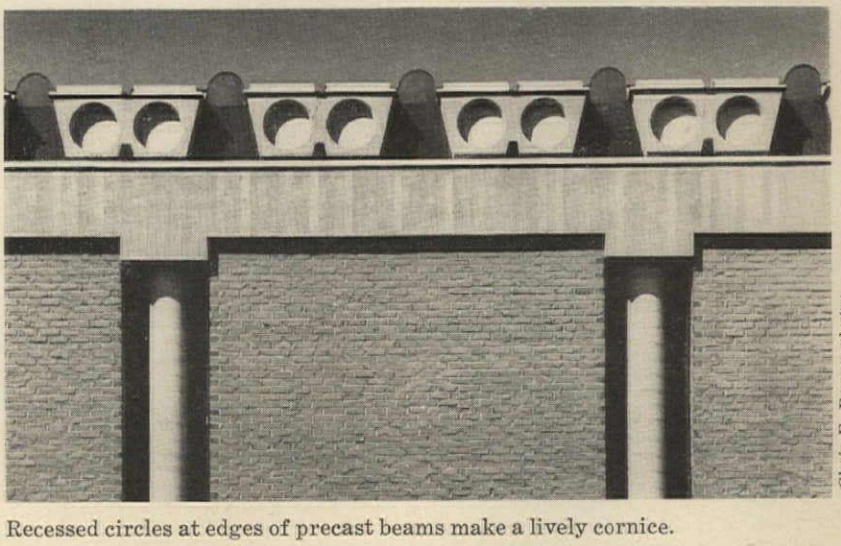
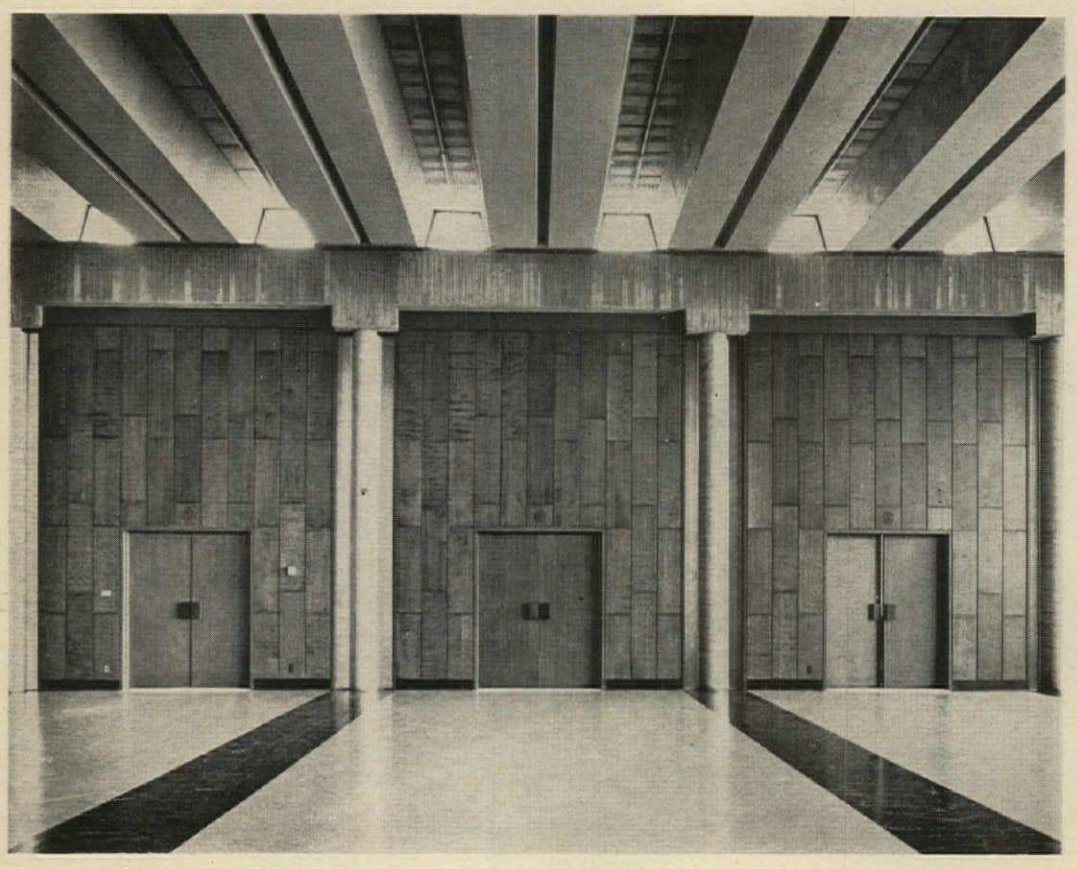


LONGITUDINAL SECTION



Recessed circles at edges of precast beams make a lively cornice.

*Chris F. Payne photos*



Reception hall.

View toward bimah and ark.

# SECOND-HOME COMMUNITIES

**The best of these big new developments—usually outside commuting range of the cities, with housing intended mostly for weekend, vacation, and eventual retirement use—are establishing standards of environment and house design virtually unknown in the suburbs.**

Fred Lyons

"All the projects start with big pieces of land . . . most of it beautiful"—this is the coastline at Sea Ranch.

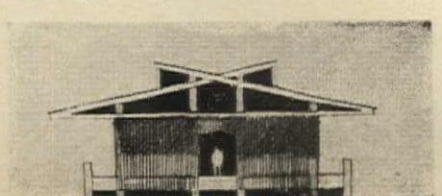
A comparison between housing in the good new second-home communities and the bulk of suburban and exurban communities may seem unfair. For one thing, the land is usually cheaper and/or more beautiful. For another, most of the houses are smaller than most families would accept for their year-round house.

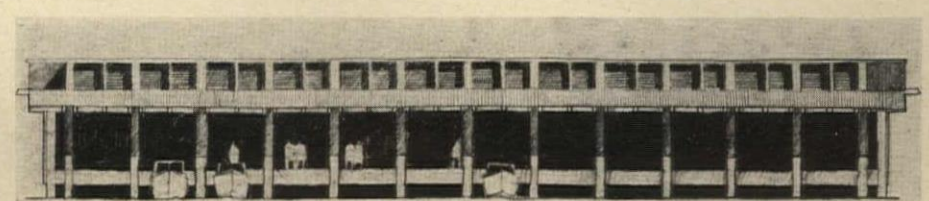
But most of what makes the four second-house communities shown on the following pages so much more pleasant than most "development" housing are *design* ideas—in land planning and house design. Indeed, two of the four communities are located adjacent to other housing that is depressingly ordinary—a good indication that it was not special conditions, but special effort and talent that make the difference.

This comes, no doubt, as no surprise to the readers of ARCHITECTURAL RECORD. But there are three questions left to be answered. Why did the developers of these communities (unlike so many developers) retain architects and other professionals to do the designing? Why did the architects and other professionals who did the design ( unlike so many architects and other professionals who "can't be bothered" or "can't make money" designing houses) involve themselves? And finally, why did the developers in turn choose to market their thoughtfully-designed product on the basis of design, instead of (like most developers) selling on a "choice-of-contemporary-or-colonial" or "glamorous-bathroom" basis? The success of these projects may well have some important bearing on the whole architect-homebuilder relationship. And if that is too hopeful a concept, may this article then serve as a kind of building type study for what is indeed a fast-growing area of construction—communities of second homes.

The best estimates put the number of second houses at something around two million—and the rate of building is accelerating along with discretionary income. Traditionally, vacation houses were "hideaways." But increasingly, these houses are being built in communities of second houses like those shown on the following pages. The reason, says Charles Fraser, developer of Sea Pines Plantation (page 145) : "25 years ago a family could pick a nice spot and build their vacation house. Today, 'nice spots' are hard to find. Further, people seem much more anxious to be near well developed recreation facilities than in the past, and perhaps,

"Recreation is everywhere in second-home communities"—this is the marina building at Bryan Beach.





most important, they have learned that where the environment is not controlled, it can get pretty hideous pretty quickly."

The important word (and the single concept that links all four projects on the following pages) is *environment*. And while the environment of each of the four communities is very different, there is surprising consistency in the way that these different environments were created.

All of the projects started with big pieces of land—the smallest is 680 acres—but before the first earth was moved a detailed plan for the use of the land was complete.

In each case, the land plans are designed to minimize the disturbance to the land and most especially to leave untouched for the mutual benefit of all the homeowners the areas of greatest natural beauty. At Sea Pines, over 1,600 of 5,200 acres will be left as wildlife preserve. At New Seabury (page 148) 59 per cent of the land will be left open. At Sea Ranch (see page 152), the planned housing will scarcely intrude on the magnificent site, and each unit will share the ocean view.

In each case, recreation facilities are an important and integral part of the land plan—set up not as a special facility or park, but made a part of the total environment.

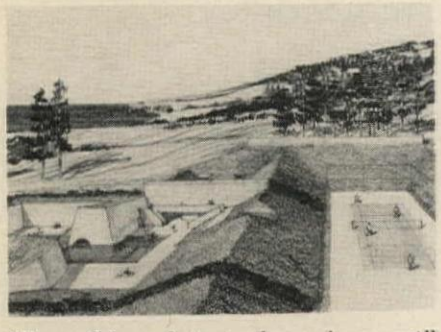
Typically, the housing has a contemporary feeling—and sometimes a playfulness or fanciful air that is not only appropriate to the vacation-weekend use of the houses, but refreshingly free of any suggestion that "status is sought here." (Idea worth entertaining: are the houses in the good vacation communities so much better than most suburban houses not just because interested architects have designed them, but because budget limitations and the obviously-called-for use of inexpensive and simply finished materials has imposed a useful design discipline?)

Significantly, while the two projects that have been under development for some years (Sea Pines and New Seabury) both started as all-single-family-house projects, both have been revised to include at least some rental and condominium higher-density housing. And the plans for both projects that are just getting underway—Bryan Beach and Sea Ranch—include complexes of higher-density housing.

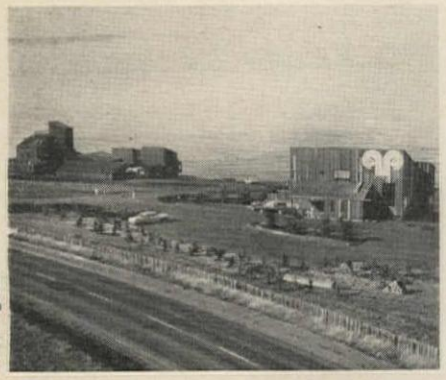
All of the communities are planned to include a strong social focal point—a higher-density complex of restaurant and low-rise apartments and/or condominiums, or a major clubhouse complex, or—as at Sea Ranch—a country store.

All of the communities have strong covenants and architectural controls, vigorously applied by a committee (in all cases including the architects involved in the project) which can bar new building on purely esthetic grounds. For example, Hanslin (whose New Seabury committee includes the four architects who work actively with him) says: "Our sole interest is control of the environment, and our powers are extremely arbitrary. We also control what the homeowner does with his property—he must maintain it (or we will and bill him); he cannot change the color of his house or cut down a tree or build a fence without our approval; and we have, for example, required one owner to remove his Radio-Free-Europe-size television antenna."

But the most important common element of these four second-home communities is this: They are being designed by teams of professionals—architects, landscape architects, land planners, engineers, conservation experts and others—working effectively together with developers who are playing for big stakes—and the long run.



"Everything relates to the environment"—these tennis courts are set down out of the wind at Sea Ranch.



*Fred Lyons*

"Each of the communities has a social focal point"—the country store at Sea Ranch, the golf club house at Sea Pines.

*Sea Pines Plantation*
*Hilton Head Island, S. C.*

*Frederick C. Baldwin*

## VARIED LAND USE, CONSISTENT DESIGN

Sea Pines Plantation is at the southern end of the biggest ocean-front island between New York and Florida, reached by a bridge from the shore road near Savannah. Most of its 5,200 acres is beautifully wooded with live oaks, pines, sabal palms, magnolia, myrtle and hickory trees. Two sides of the project open on broad ocean beaches; the "inland side," laced with creeks, faces a protected bay.

In the late 1950's, as the first step in the development of this land, Sea Pines president Charles Fraser retained land planner Hideo Sasaki to develop the master plan, which was promptly awarded the Certificate of Excellence in Design of the American Society of Landscape Architects. Its major features:

1. A cluster scheme (see drawing, below right) for waterfront land that puts up to six rows of lots on the desirable ocean side of the road, with wide walkways—owned and maintained by the company—that open most houses (even those well back from the road) to an ocean view and provides auto-free access to the beach for all.

2. The fairways of the golf course (designed by golf course architect George W. Cobb) spread out through developed (or to-be-developed) areas, rather than being concentrated on a solid block of land—a device which vastly increases the perimeter that can be developed as sites.

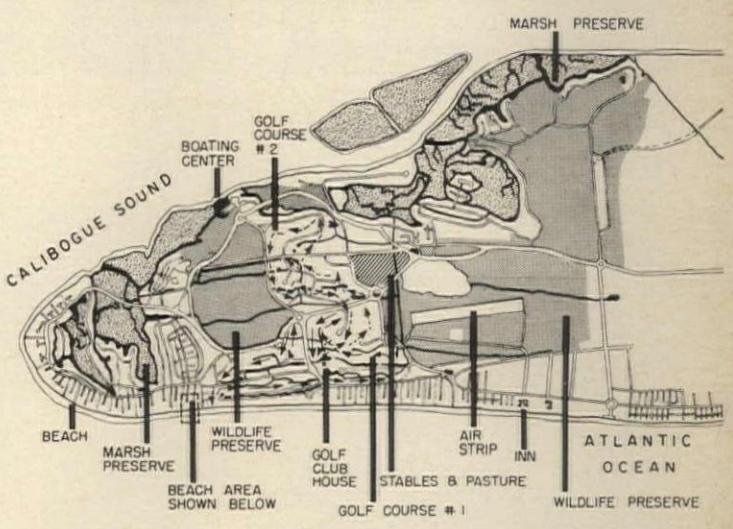
3. Over 1,600 acres of the 5,200 acres is permanently set aside in its natural state as a refuge for wildlife. Indeed, in total, the master plan contemplates only 2,200 homesites in the 5,200 acres.

Another early step was the retention of Yale University law professor Dr. Myres S. McDougal, who developed the concepts of the deed covenants which have helped maintain a uniform character for the work of several different architects (see following pages).

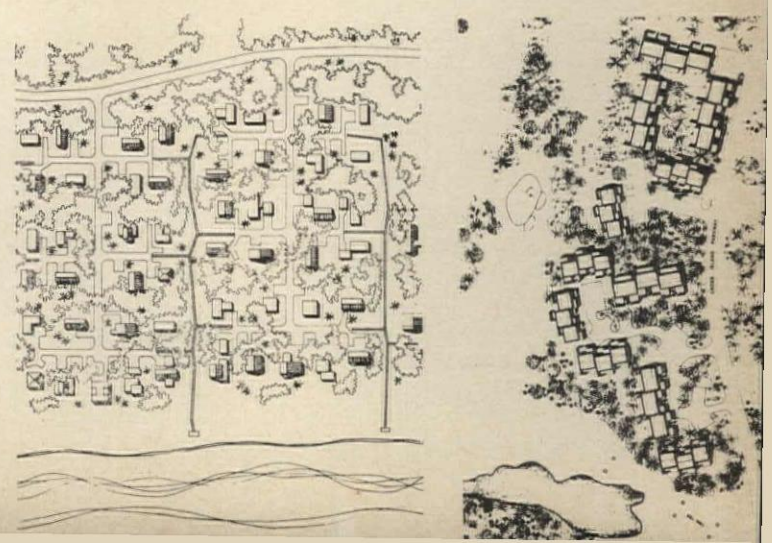
In the six years since the master plan was drawn, some changes have been made, but the over-all concept has been consistently maintained. The major changes:

1. "We vastly underestimated the demand for recreation, even though it was an important element in the original plan," says Fraser. Examples: A second golf course has already been added, and the master plan is being revised to include a third and a fourth. Also in the planning stage: a marina and sailing center on the bay, skeet and trap ranges, camping areas, horseback riding area and stables, and swimming pool area.

2. A new focal point for the community—a "townlet" with docks and other waterfront facilities surrounded by townhouses and stores—is planned for the near future. The existing focal point—the 80-room William Hilton Inn, owned and operated by the developer—is not "enough of a center for the growing population."




At Sea Pines, much of the land is set aside in wildlife preserve. Arrows indicate the fairways of the golf courses. *Below*, schemes for sites along ocean, and along fairways.



*Andrew's Studio*

Architects: Corkern & Wiggins

*Andrew's Studio*

Architect: John Wade

*Frank J. Miller*

Architects: McGinty & Stanley

*Andrew's Studio*

Architects: McGinty & Stanley

*Frederick C. Baldwin*

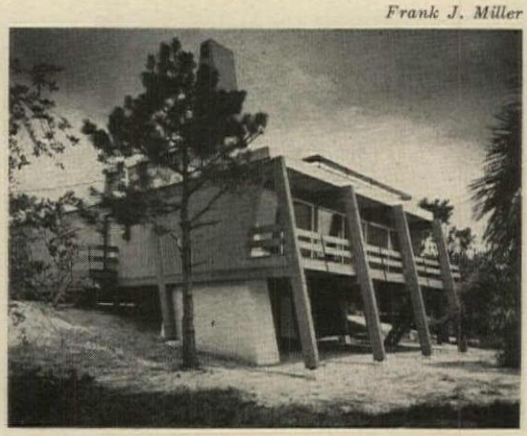
Architects: McGinty & Stanley

Architects: Corkern & Wiggins

*Frank J. Miller*

Architect: John Wade

*Frank J. Miller*



Architect: John Wade

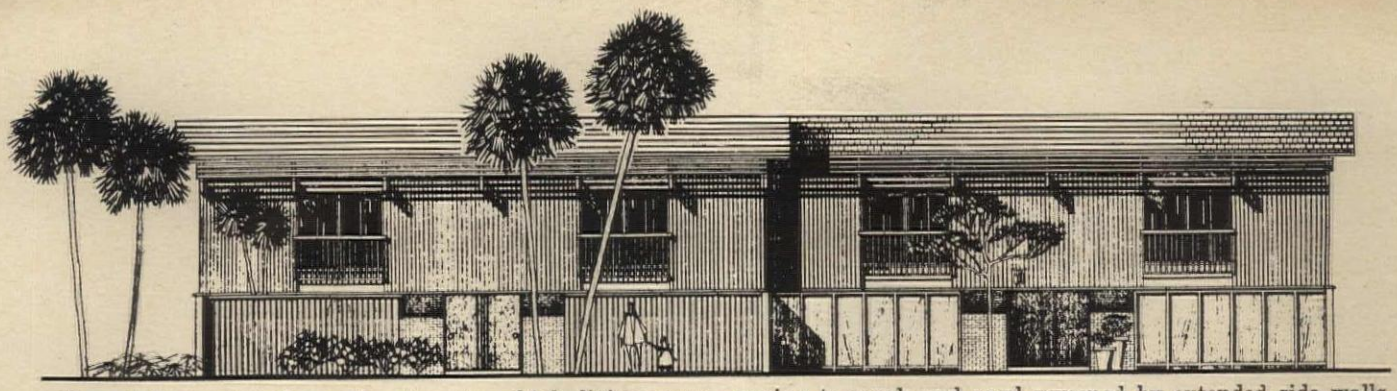
*Andrew's Studio*

Architects: McGinty & Stanley

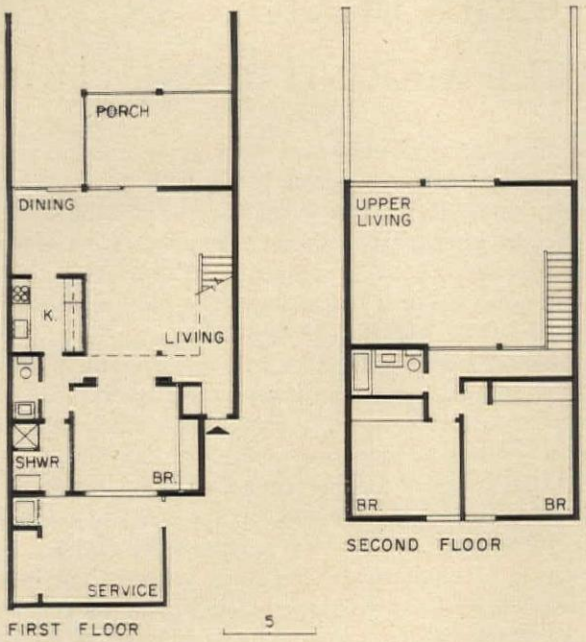
## *Houses at Sea Pines are all custom designed, but all in character*

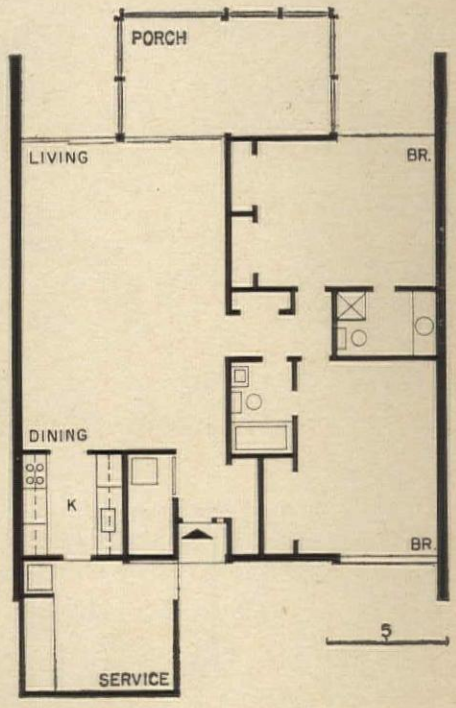
Detailed covenants and architectural controls apply to all housing. The most important are those governing exterior materials and finishes (most houses are bleached cypress and redwood) and restricting changes by the owner in house or site. The architectural controls are administered by a committee, headed by Fraser and including local architects, which is empowered to bar construction of a house on "purely esthetic grounds." Fraser built a number of prototype houses—designed by architect John Wade—to establish the character of the area. "We had to persuade the first 25 or 30 buyers to adopt our indigenous style—people wanted southern colonial, columns and all," says Fraser. But since then (see sampling above) there has been great consistency in the design of the 187 houses which have been built (800 lots have been sold).

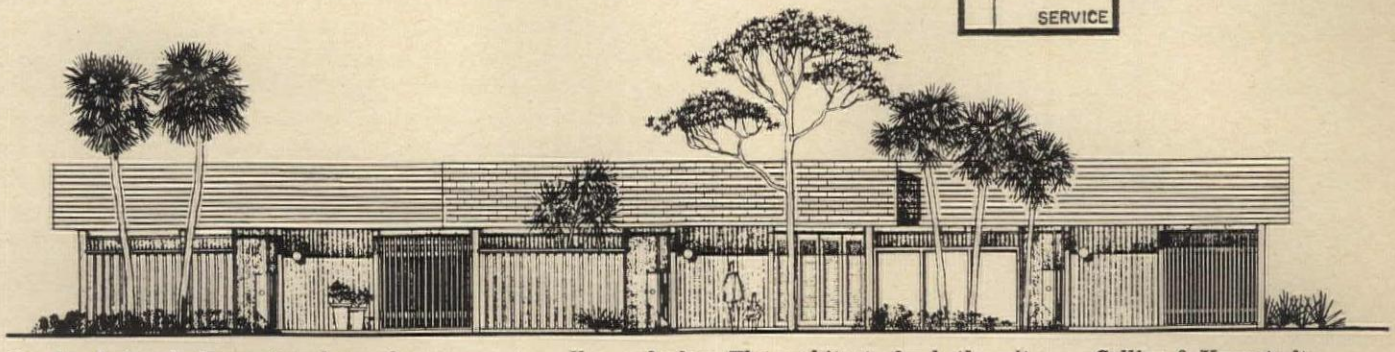
Some lot buyers, Fraser says, have houses designed by architects from their home area, but the bulk of the houses are now done by two Savannah firms—McGinty and Stanley Associates, and Corkern and Wiggins—both of which maintain offices on the island.



Three-bedroom townhouse has two-story-high living room opening to porch and yard screened by extended side walls.



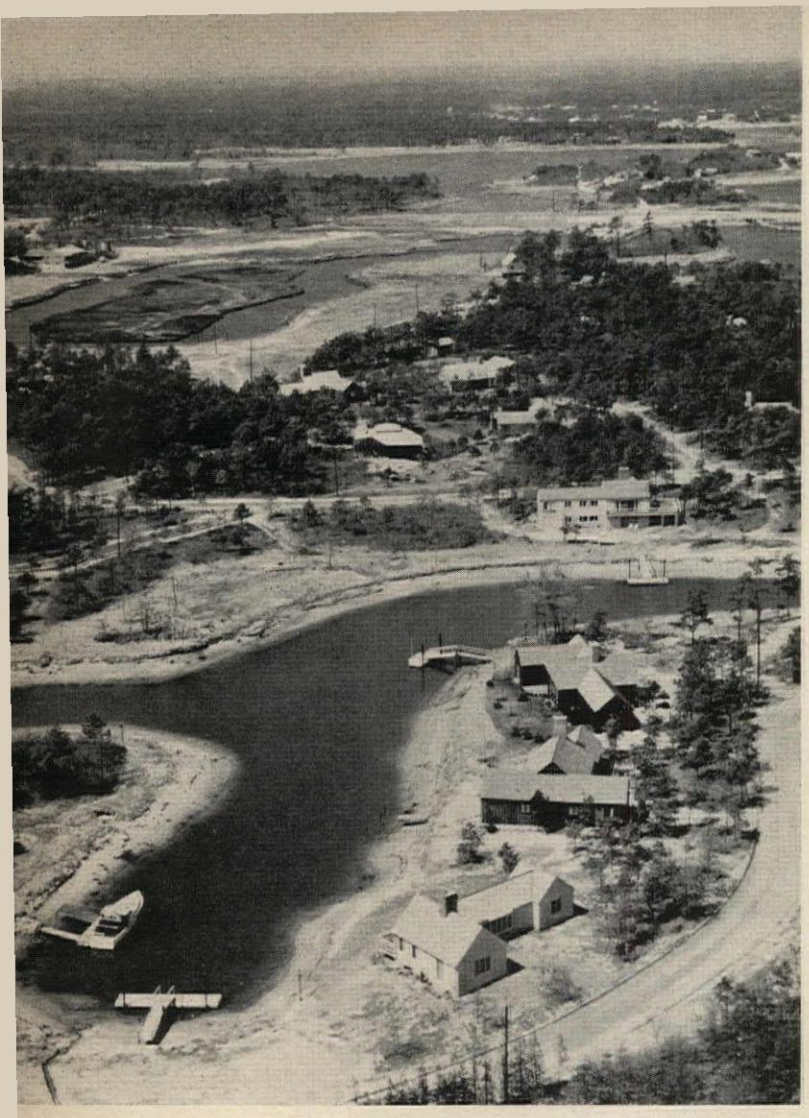



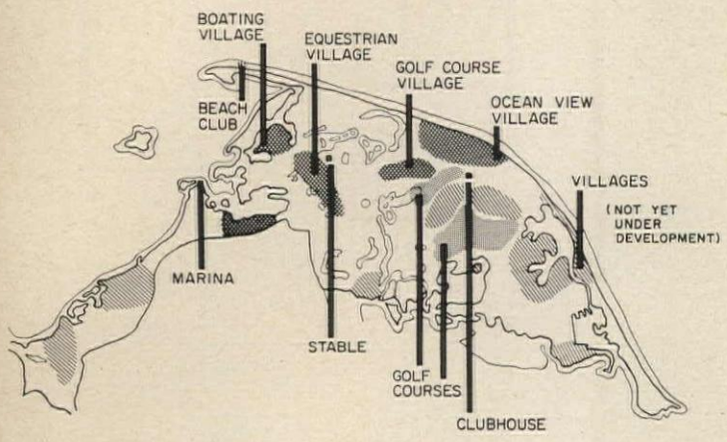



One-level, two-bedroom townhouse has compact, well zoned plan. The architects for both units are Collins & Kronstadt.

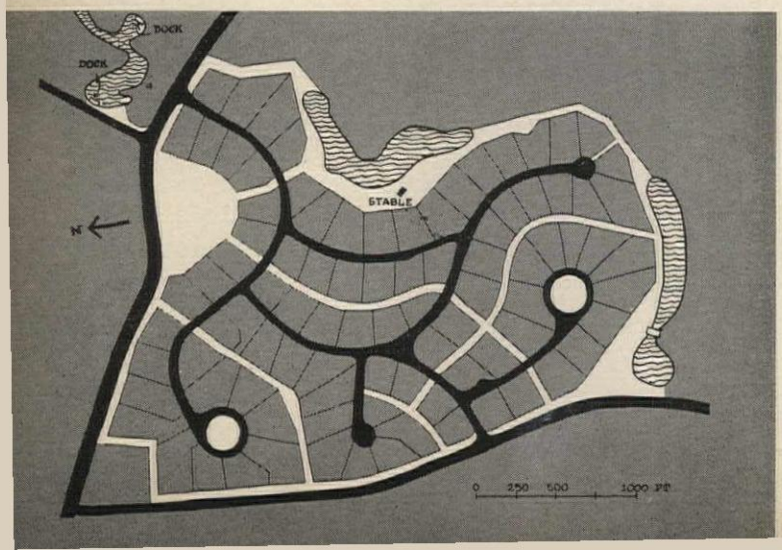
*The biggest planning surprise has been the demand for condominiums*

Last year, developer Fraser retained architects Collins & Kronstadt of Silver Springs, Maryland to design some one- and two-story, two- and three-bedroom condominum clusters for sites along the golf courses. No sooner had construction begun on the first cluster of nine than they were sold. And within 60 days, a second cluster of 18 (just being completed), a third cluster of 16 (just being started), and a fourth cluster of 18 were presold. And there is now a waiting list of 40 families. Why the demand? Fraser thinks there are several answers. First the prices ($21,000 for the three-bedroom, two-bath condominiums) are well below the median price for custom houses ($27,500) and lot ($7,500) at Sea Pines. Second, condominium owners can have the staff of the nearby William Hilton Inn clean and maintain the unit and its landscaping. And perhaps most important, Fraser feels that the condominiums are attracting a different group of buyers than those who will undertake the uncertainities and self-discipline involved in having a custom house designed. The condominiums offer a package—"here it is and here is what it costs."






Land at New Seabury is divided into 14 villages, each planned around a different kind of recreation. Example, *below:* riding trails serve as greenbelts between houses in High Wood.



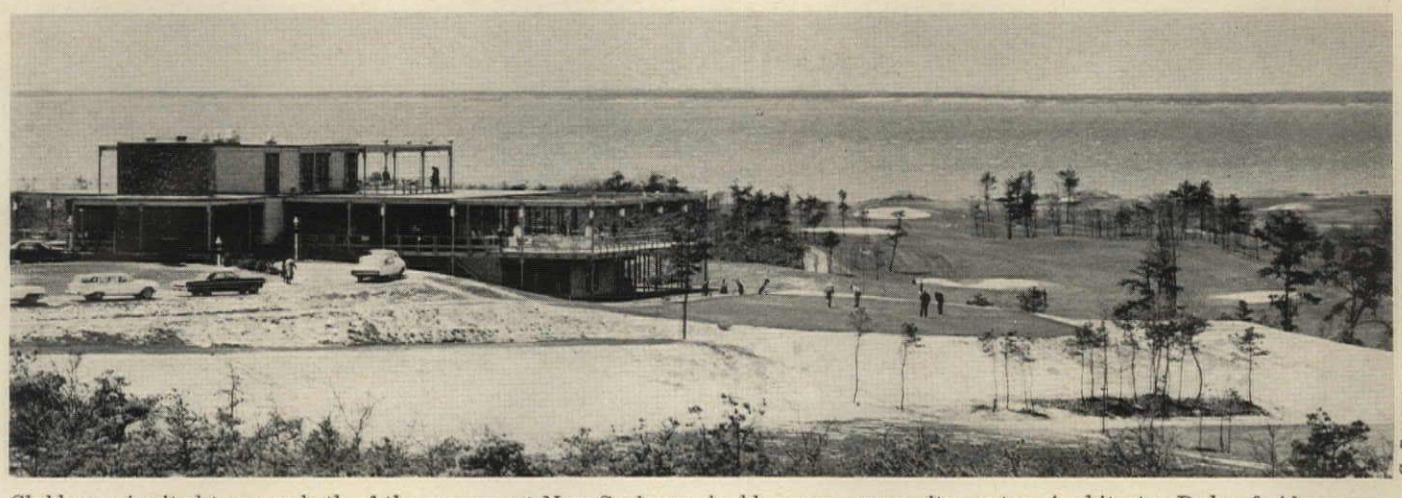

*New Seabury*
*Waquoit, Cape Cod, Massachusetts*

# A SERIES OF VILLAGES BUILT AROUND RECREATION

New Seabury is a 3,000-acre area of beaches, cranberry bog, salt marshes, and woods being developed in a unique way by Emil Hanslin & Associates. The land has been planned as 14 separate villages (see plan), each separated from the next by belts of open land or water, and each planned and designed to attract families with different interests (and different budgets).

Hanslin opened the first village—Bright Coves—in 1962. Laid out to put almost all houses on natural waterways threading in from the beach, it was designed to attract swimming and boat conscious families. Land in this village is now 85 per cent sold out, and 96 houses have been built there. The second village to open, in 1963, was High Wood, an equestrian center with stable and riding trails (see opposite) that form a green belt between houses. Three other villages are currently under development—Triton Sound, a community of houses on large lots overlooking the sea, Summer Sea, a cluster plan community for families who want close neighbors, Greensward East, a community of homes on the golf course. Still to open; two more golf course communities, several communities of high-density rental and coop units on the water, a purely summer-rental village reminiscent of Cape Cod's Provincetown art center, a village for hunters and freshwater fishermen in an area well away from the ocean, a village on a protected cove for less adventurous sailors, a quiet river village, an artists and writers colony, and a community of lower-priced houses. There were, in the original plan, 11 villages. Hanslin dropped the idea of a retirement community: "It's a great marketing idea—Come join the party! But I don't think it's a good idea—everyone gets old together." He added three golf-course villages around the courses originally planned in open space.

The original concept was Hanslin's—but he promptly brought in a consulting team of widely varied talents including land planners, landscape designers, architects Robert Woods Kennedy, Royal Barry Wills, Robert Damora, and Rudolph Bedar and Phineas Alpers to develop the concept and design the houses (following pages). Group discussions were held to suggest schemes and establish goals. After that, says Hanslin, "they all went back to their offices to find their own way to the goals." Significantly, only one of the original "team" of architects is no longer designing houses for New Seabury. Three firms (pages 150 and 151) have become part of the effort within the last year. And Hanslin is now actively searching for other outside-of-New England architects who will work into the project. To date, 200 houses have been built—all but 20 of them designed by team members—and over 500 lots have been sold.



C. Spooner

Clubhouse is sited to serve both of the courses at New Seabury, doubles as a community center. Architects: Bedar & Alpers.

In High Woods village: trails wind in and around the houses. Stable is nearby.

In Bright Coves village: catamaran taxi takes owners . . . to gaily striped tent which serves as the beach clubhouse.

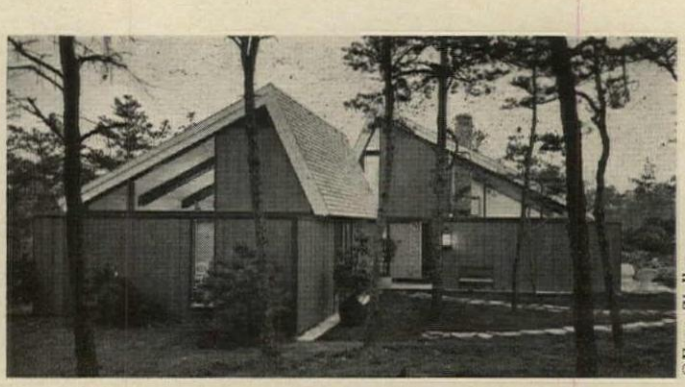
## *Recreation facilities are everywhere and "indispensable"*

Only 30 per cent of the land at New Seabury is planned for building sites; 59 per cent is open and recreation space. "And the use of this open land is critical to the success of the project," says Hanslin. The original plan called for a small-boat marina and tennis-court complex, a beach club, a riding academy, a golf course, and trails in the wooded areas. In the three years of the project, a second golf course has been added, the riding facilities have been tripled in capacity, the trails and open spaces are now laid out to a much more sophisticated plan. Hanslin recently retained two conservation experts to choose the best land to be left for conservation and wildlife preservation and to overlay a conservation map on the land-use map.

The only major change in the original recreation plan: the addition of the golf clubhouse (designed by Bedar & Alpers) which includes a bar and restaurant. "This was needed less for the golfers," says Hanslin, "than as a focal point for the community, especially during the winter months [the beach club serves in the summer]."

Lisanti Inc.

The first display houses at New Seabury, designed by three different architects (see text), established "team" concept.



©Ezra Stoller

For the second village: house by Royal Barry Wills Associates . . . and house by Bedar & Alpers. Note "salt-box" form.

Lisanti Inc.

Robert Woods Kennedy's second house, for the "riding village."

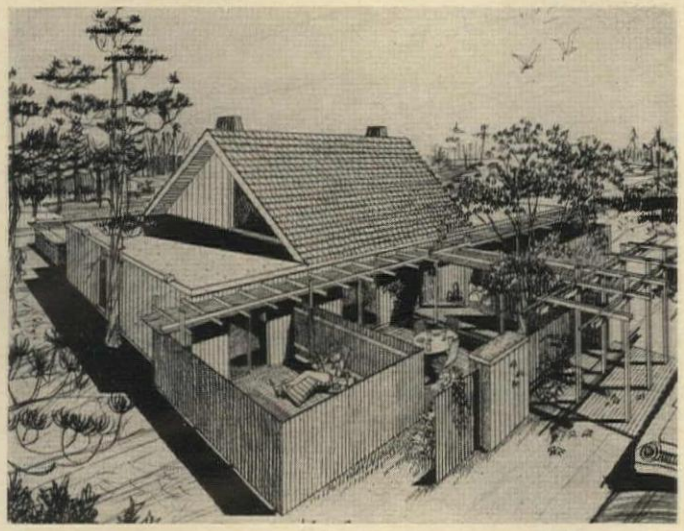
Better Homes and Gardens photo by Lisanti Inc.

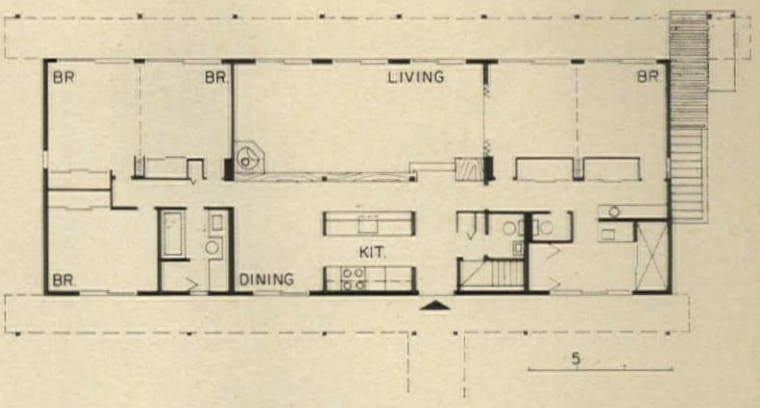
The first house for New Seabury by Claude Miquelle.

## *The houses at New Seabury: some solid New England, some more for fun*

The first houses built at New Seabury were (top photo, left to right) designed by Robert Damora, Royal Barry Wills, Bedar & Alpers, and (house not shown) Robert Woods Kennedy. The Damora house has won a host of design awards, including an Award of Merit in the 1965 AIA National Honor Award Program, and was a Record House of 1962. Since then (see above and opposite) the Wills firm, Kennedy, and Bedar & Alpers have each designed at least two new houses, variations on their basic designs, and custom houses for lot owners. Architect Claude Miquelle has joined the "team" with two houses. About 20 houses have been designed by other architects chosen by lot owners—"and we welcome this," says Hanslin, "because it adds fresh talent to the project."

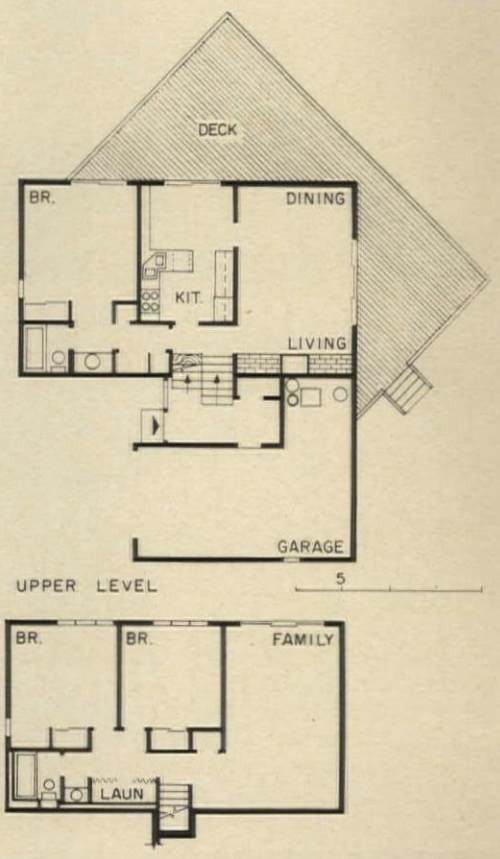
There are some common design characteristics—all of the houses are designed and materials chosen to minimize maintenance. Most relate closely to the outdoors, with big glass areas and decks. And most—in deference to the built-for-sale market—are at least reminiscent of one or another of the basic New England forms.






Next year's models include this Bedar & Alpers house, which can have various bedroom arrangements around the living area.

Better Homes and Gardens *photo by Lisanti Inc.*



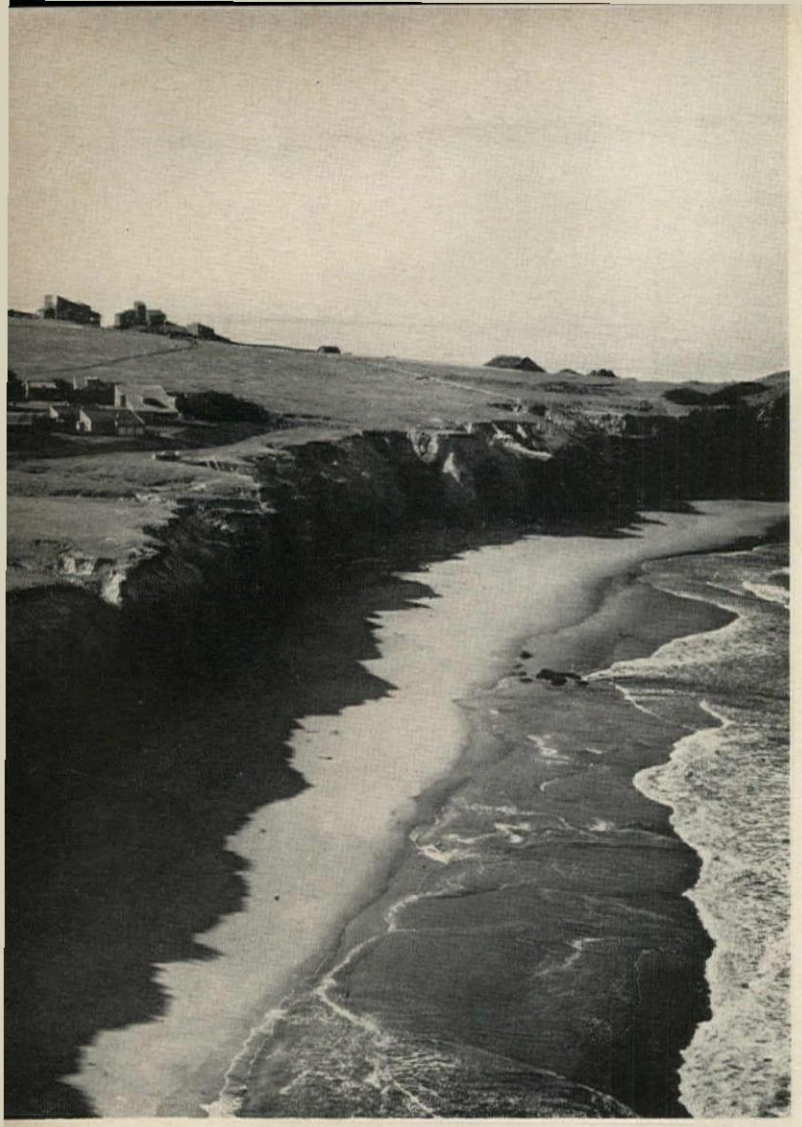

Also new: this house by Claude Miquelle, again reminiscent of the New England salt box, but opened wide with a big deck.

## *Ahead: more new houses and more community facilities*

The photo and drawings above show two of next year's display models by Bedar & Alpers (top) and Claude Miquelle (the two Miquelle houses will be featured in an upcoming issue of *Better Homes and Gardens*). Both are typical of the flexible designs of most New Seabury houses: For example, in the Bedar & Alpers design, by arranging bedroom wings around the central living room-kitchen core, the house can be built with anywhere from one to six bedrooms.

Now in the preliminary stage by Katzman Associates: a shopping center. The central mall of the center will have booths and kiosks for selling food and the arts and crafts of Cape Cod. Tables and benches will be spaced about for relaxation. "We hope to create," says Hanslin, "something of the feeling of the Farmer's Market in Los Angeles."

Also in the planning stage, by Los Angeles architect Richard Leitch: a series of about 100 condominiums or rental units to be built around a year-round resort hotel—all separate from the village centers. These additions will serve as additional focal points within the project.



*The Sea Ranch*
*Sonoma County, California*

# DESIGNED TO SERVE THE LAND IT USES

The extraordinary and almost untouched beauty of this 5,000-acre stretch of California coastline north of San Francisco demanded exceptional planning to permit its use by people without destroying its special qualities.

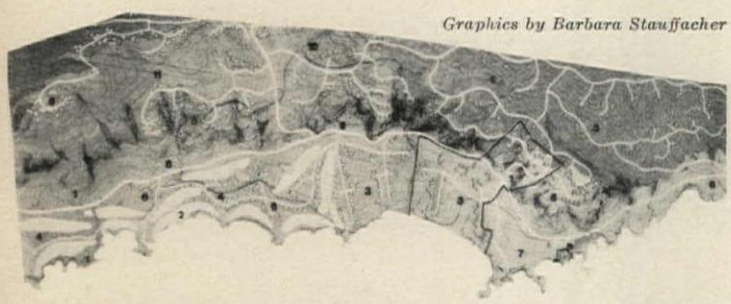
Its owners, Oceanic Properties, Inc. retained Lawrence Halprin & Associates as land planners and landscape architects, as well as architects Joseph Esherick & Associates, and Lyndon, Turnbull, Moore & Whitaker; and civil engineers Sarles, Brelje and Race. And from the beginning of the project, planning, landscape and architectural considerations have been interwoven. Simultaneous studies and analyses were made of the natural factors—sun, wind, fog, rain, vegetation—and of the few examples of indigenous architecture to discover the particular characteristics of the area. And the results of these studies have been exploited to the full in both the land-use planning and design of the buildings and facilities.

In the first phase of the master plan, three kinds of residential areas are being developed: the condominium apartment units set on a grassy terrace with water below (see opposite and page 155); the ocean terrace lots on the great open plain with its parallel hedgerows; and the hillside lots, also for individual houses (see page 154) in the forested area above the terrace.

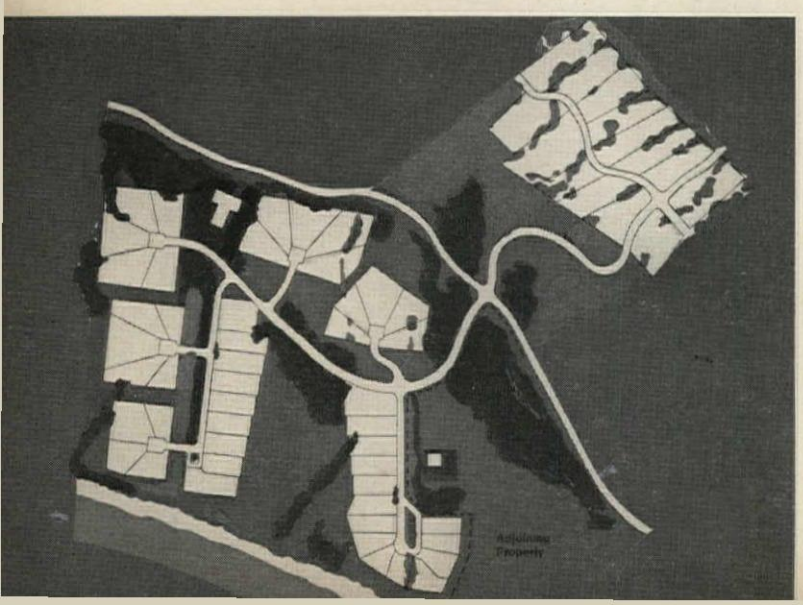
Two important principles underlie the disposition of these types. One is that the special elements which give the area its distinctive beauty—the hilly slopes, the open meadows, and the beaches—are kept in common ownership so that their beauty is shared (and maintained) by all and the integrity of the natural landscape remains unchanged. The other is that residential units are clustered so as to keep as much as possible of the land free and open, and in common ownership. Thus, on the ocean terrace, all lots front on a great common; and in the forested section, lots open onto steep land and look out over the terrace to the ocean. The condominium has its common area, also.

Included in the master plan is a land management program based on "dynamic conservation": native grasses, once plentiful, are being brought back by extensive reseeding; forests are being thinned by "prescribed burning", a streamlined version of the old Indian method; lost meadows are being restored; trees are being planted to provide growth of various ages to maintain forests. Overgrazed lands—these pastures have been used for over 100 years—are being reconstituted and grazing has been curtailed but not eliminated, as there is still a sound economic basis for some agricultural use. Where the coastline has receded (due to overgrazing and wind erosion) fill is being placed to restore an earlier line.

*Graphics by Barbara Stauffacher*

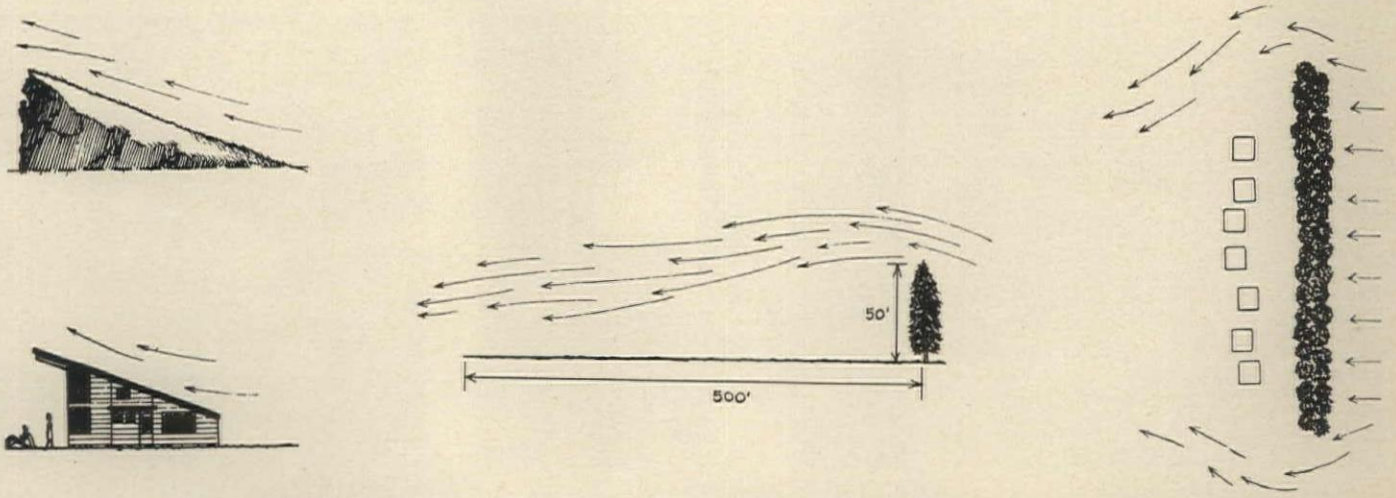


Much of the land will be left in (1) commons and (2) fairways. Drawing shows (3) ocean-terrace sites, (4) golf-course lots, (5) forest lots, (6) condominium village, (7) shopping facilities, (8) recreation area, (9) commercial zone, (10) stable compound, and (11) airport. *Below:* typical cluster scheme.



Fred Lyons photos

Prototype condominium is sited on broad meadow sloping down to the ocean cliff. Its unusual shed-roof form grew out of . . .

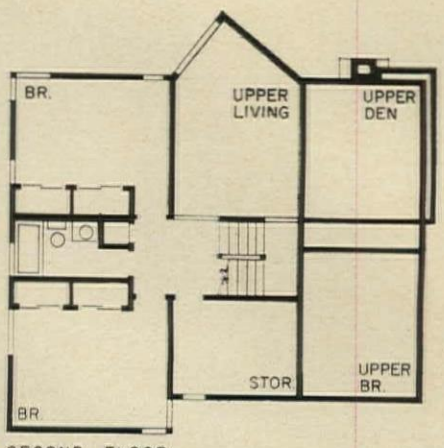



. . . wind studies by architects and planners, which showed flow patterns over the cliffs, and over and around hedgerows.

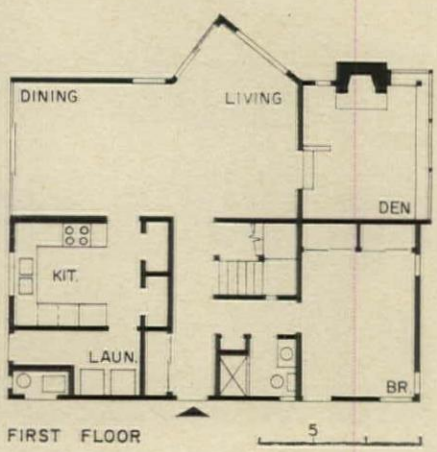
## *The form and orientation of the buildings grew out of studies of the land*

The ecological studies included research on wind conditions and solar radiation—and their effect on human comfort. What these studies showed directly influenced the design of the Sea Ranch buildings. The shed roofs act much as the hedgerows do to provide a windless area on the ground adjacent to them (see charts). Solar radiation studies indicated how much and where glazed areas could contribute to comfort indoors. Bioclimatic studies to determine heat, air conditioning, and shade needs affected design, and were incidentally translated into a chart to show clothing needs for comfort outdoors at different times of day and different seasons.

In such a place, the activity of recreation becomes of secondary interest, for the place itself is recreation. Beaches, common areas, hills for hiking and walking invite an individual approach to recreation. But there will also be facilities for group activity; a golf course, croquet and bowling lawns, and—in sunken areas for protection from the wind (see page 144)—several tennis courts and a swimming pool.



SECOND FLOOR



FIRST FLOOR

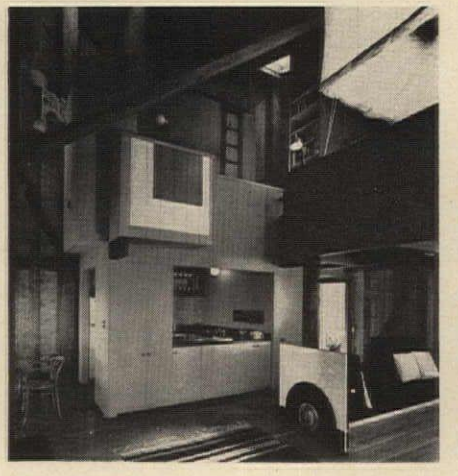
House by Joseph Esherick uses rough and simple finishes appropriate to area and to the vacation-time use of the buildings.

## *The prototype houses reflect the character of the land*

Four houses designed by Joseph Esherick, demonstrating architecturally the same principles which are guiding the land development, have been built and are on display to prospective buyers. "Rough and simple," in keeping with the natural environment, the houses are designed to make possible an easy in-and-out relationship with the out-of-doors and to provide the best possible views from each site. Large windows on the south side admit sunlight and warmth, and look down the coast.

The houses are clustered so that they appear as a unit from a distance, make use of the hedgerows to gain protection from wind, and are oriented—as are the hedgerows—at right angles to the coast. (The usual approach of lining up sites parallel to the coast would have blocked at least part of the view from all but the lowest row.)

Shed roofs are either shingled, like the exterior walls, or sod, a further tie with the land. A louvered fence around the patio is designed to draw the wind in and out in an upward flow, a system which permits some almost tropical plants to grow in the wind-free garden.

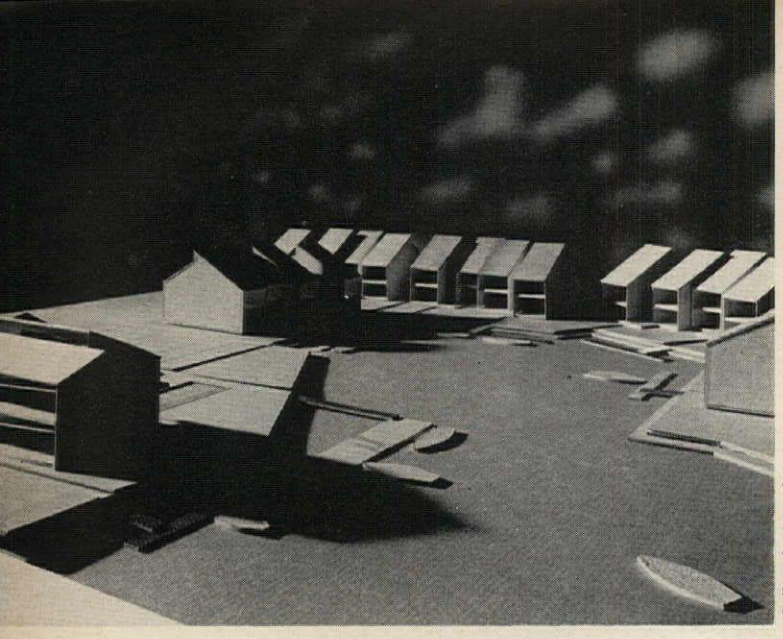


Fred Lyons photos

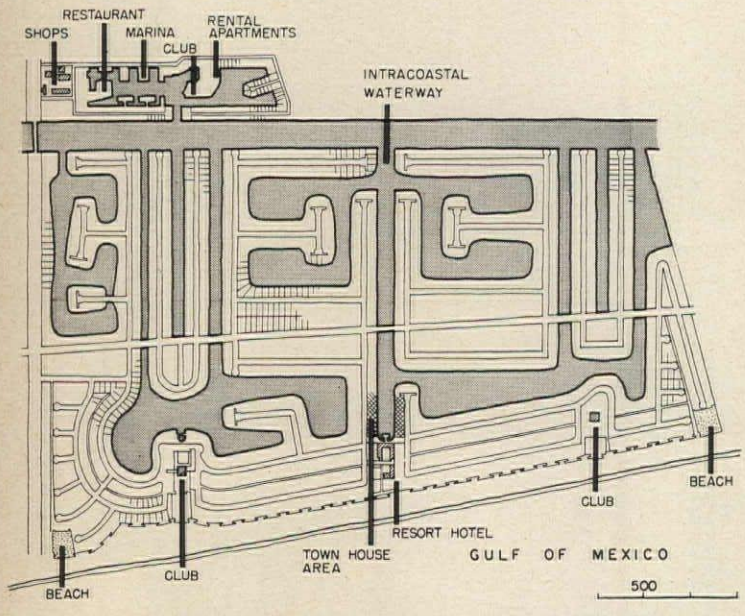
Condominium complex by Lyndon, Turnbull, Moore & Whitaker is full of visual surprises and fascinating spaces.

## *The condominiums are "enclosures within enclosures"*

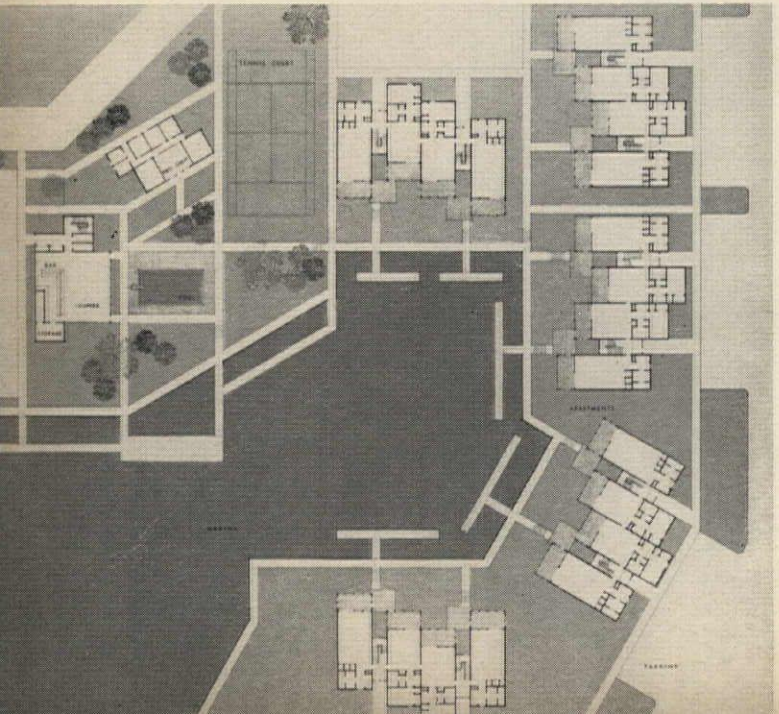
The condominium apartments, designed by Lyndon, Turnbull, Moore & Whitaker, are the first of several such clusters of units. Bioclimatic and wind studies not only dictated the shed roofs and the skylights—which admit plenty of sunlight and keep the apartments comfortably warm—but suggested the omission of most openings on the north side. Each of the 10 units has views to the ocean, and some also open to the courtyard, where the angles of the roofs, the plain board surfaces of the exterior walls and the windows—sometimes protruding, sometimes recessed—provide an unexpected linear and spatial experience. Inside there is more diversity: as the architects describe it, ". . . enclosures within enclosures, starting with a basic 24-foot cube surrounded by glass bays, terraces and decks, themselves enclosed. Inside the cubes, more cubes: a two-story box with kitchen below and bath-dressing room above; or a four-poster space enclosing a hearth-centered living area with a skylit sleeping room above, enclosed for privacy by canvas canopies." Again, materials are simple and easily maintained.



Stiles & Associates




Land plan for Bryan Beach uses canals and lake areas as open space. Over two-thirds of the houses are directly on the water. This is a much higher-density complex—at top is prototype model for a rental apartment area, built just off the harbor. *Below,* a detail section of the land plan, again the apartment complex.



*Bryan Beach*
*Freeport, Texas*

# HIGHLY DESIGNED USE OF HIGHLY DEVELOPED LAND

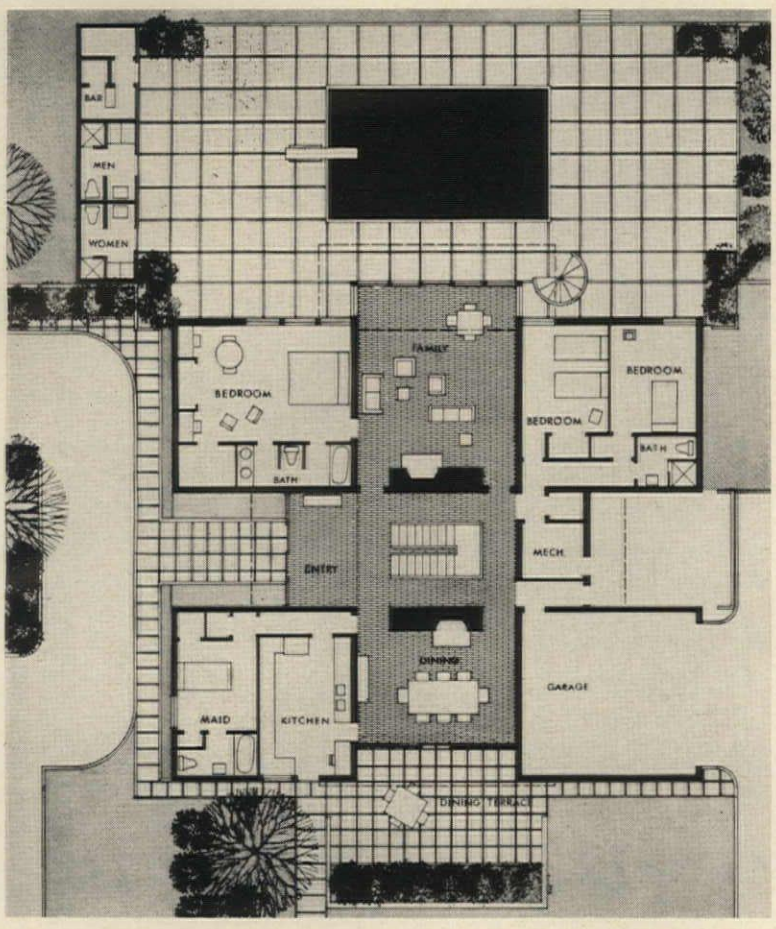
Construction of this 680-acre project is just beginning on one of the few major expanses of open beach left on the Texas Gulf coast. The land—held by the Bryan family for over 100 years—is 58 miles from Houston, and 40 miles from Galveston; bounded on the inland side by the Intracoastal Waterway but with access to the Gulf.

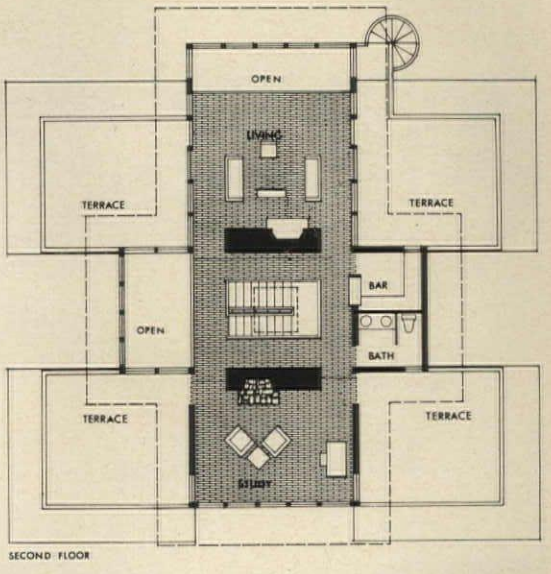
The developers, Bryan Beach, Inc. of Houston, retained Houston architect Clovis Heimsath to develop an architectural concept and land plan for the area. The plan (drawing, left) is based on a series of canals that put over two thirds of the lots (1,237 of 1,817) directly on the water. The canals are 78 feet wide, and 7 feet deep at low tide, so they can accommodate almost any pleasure boat; are bulkheaded with steel-reinforced concrete. Material dredged from the canals and the 25 acres of lake area (see plan) has been used to fill the land areas from +3 or +4 feet to +9 feet—above any anticipated hurricane high-water level. (The distances that fill could economically be hauled or pumped greatly influenced the configuration of the waterways, reports architect Heimsath). As a result of this land-development work, which involved 82,710 feet of bulkheading (and was engineered by Brown & Root of Houston, engineers and contractors) Bryan Beach property is insurable with full coverage for loss from hurricane, rising water, and wave and wash damage.

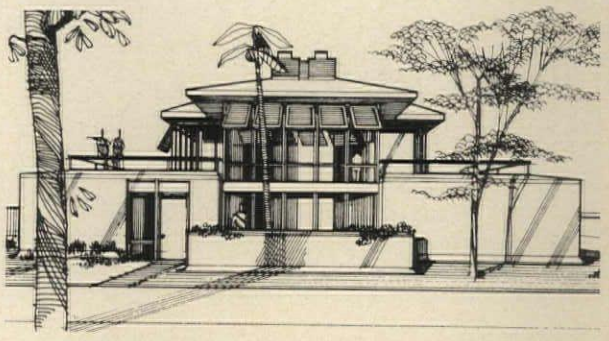
Recreation facilities are an important part of the plan. The canals will make this a prime area for yachtsmen and fishermen, and a 40-acre marina development on the Waterway is already completed. To be built, on a site open to both the lake and the Gulf: a clubhouse complex with dining room and meeting halls, a swimming pool and tennis courts, and a "children's marina" on the lake side for small fishing boats and sailboats. Several private beach sites have been spaced along the Gulf.

Something over 150 lots have been sold—at prices ranging from under $4,000 for lots not directly on the water to over $8,000 for lake lots and around $25,000 for Gulf lots. Most owners plan on building for vacation and/or retirement use. There is no present plan to allow any bulk sale of lots, and the company has turned down offers by homebuilders. Lot owners who are ready to build are referred to Heimsath, but may choose any architect they wish. Designs are, however, subject to approval by an architectural review committee which includes the president of Bryan Beach, a representative of the major lenders on the project, and Heimsath.

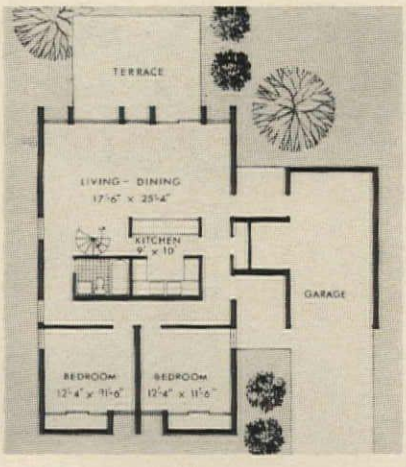
While the bulk of the housing will be single-family (see opposite), there are prototype designs for three and four-plex units (page 158), apartment-motels (left), for-sale townhouses, and a resort hotel.

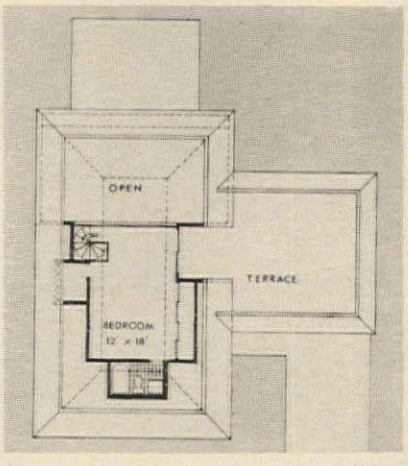


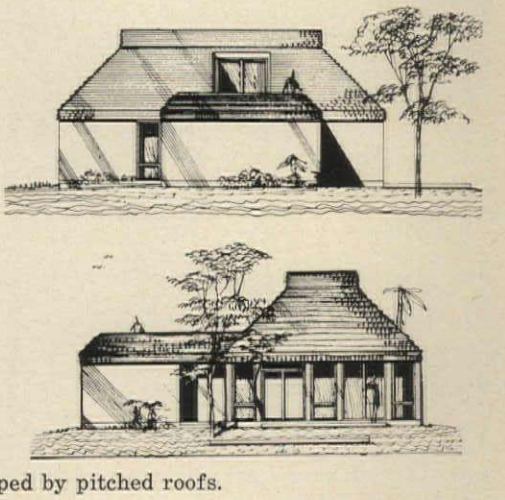



Larger prototype house puts low bedroom wings around the dominant central living area. Quiet living area is on upper level.



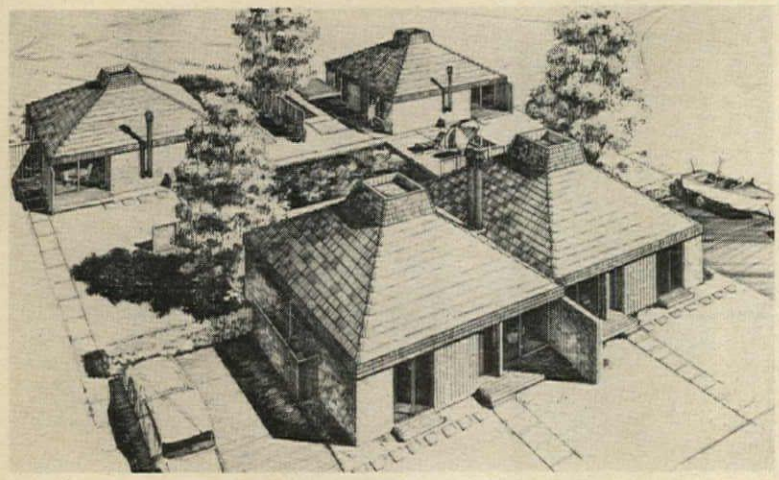
Small prototype house fits same design concept—strong, low, horizontal lines topped by pitched roofs.

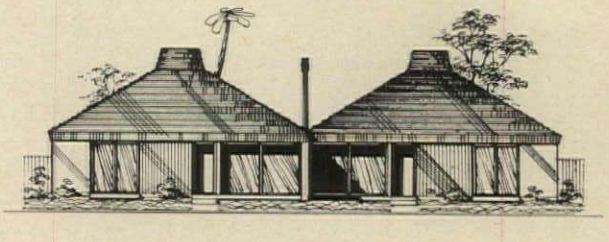
## *Prototype houses are being built to set a design standard*

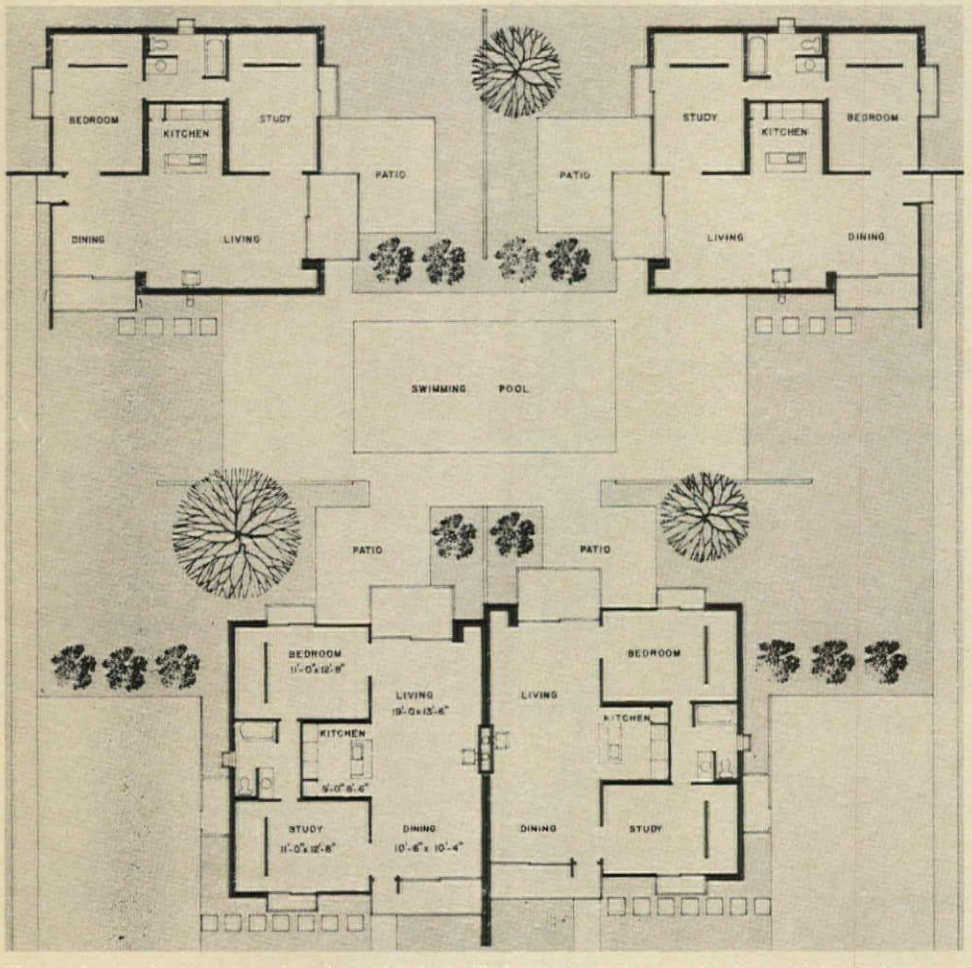
Along with the land planning, architect Heimsath was asked to design a series of prototype houses for Bryan Beach. The two houses shown above, says Heimsath, "were designed to echo the strong horizontal lines of the flat land and bulkheading with a strong horizontal roof line, topped with a series of pitched forms."

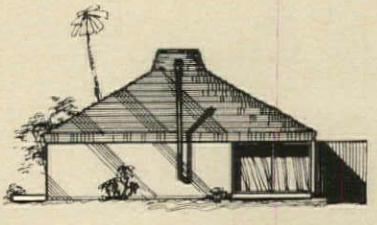
In the smaller prototype, the pyramidal roof is the dominant design element, and—as the plan shows—is hollowed out to make a master bedroom and bath on the second floor. In a similar model, the roof creates an open skylighted ceiling for the central living area. In these houses, as in the larger house at top, a variety of flat-roofed bedroom and service-room wings can be "plugged in" to the central living area.

Architect Heimsath is developing other prototypes on different basic forms, but is emphatic that "once the project is far enough along for a good design standard to be established, I think it is important that other design-oriented architects be brought in to enrich the project with a diversity of approaches."







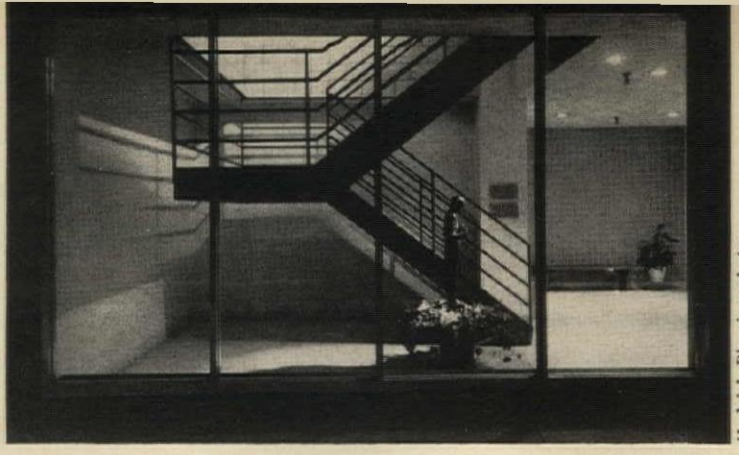



Four-plex units, designed primarily for off-the-water sites, turn inward to their own sheltered swimming and recreation area.

## *Also in the prototype and planning stage: higher-density housing*

Mixed in among the single-family houses—"haphazardly I hope," says Heimsath—will be a number of three- and four-plex clusters. The drawing above shows one prototype, echoing, of course, the same flat-planes-with-pitched-roof concept as the prototype houses. These will probably be built on the much-cheaper lots off the water, and turn inward to their own private patio, garden, and swimming pool/recreation area.

Further, (drawing on page 156), a cluster of apartment-motel units will be built around a small harbor off the Waterway, adjacent to the marina and a restaurant-shopping area. "This section will be rental housing. We expect that many units will rent to year-round residents, since Freeport has a shortage of apartments." The area will be incorporated as a club "for Texas reasons" (county laws curtail use of liquor in public restaurants). In a cluster on the Gulf side of the project a resort hotel will be built, separated from the single-family residential area by clusters of built-for-sale townhouses, and it will doubtless serve as the social center of the new community.



Hedrich-Blessing photos

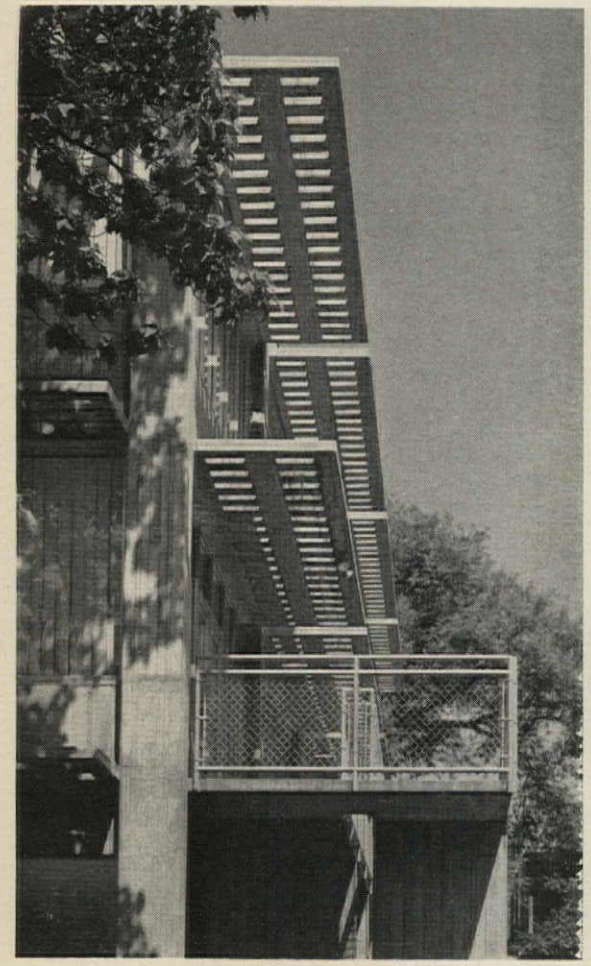
# CONCRETE FOR SHADE AND PATTERN

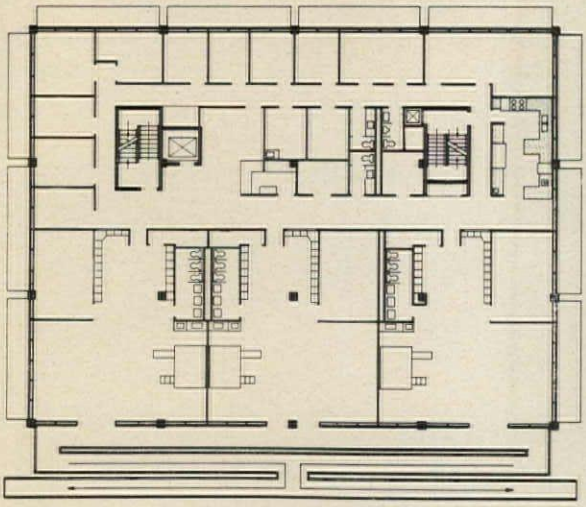
Design for Child Care Center in Chicago, by George Fred Keck and William Keck, makes use of concrete overhangs to break the sun and provide decoration too

Regarding the design of this new building for Chicago's oldest charitable institution, architect George Fred Keck says, "In past years we have been identified with sun control, and continue to be concerned with the functional uses of sunlight and with attempts to equalize its seasonal effects. Here we go one step further, continuing to hold to the functional elements, but making them available also for decorative use. The aspects and shadows on sunny days are then constantly changing the patterns of light and shade as the sun runs though its arc each day. This effect does away with the heaviness typical of *in situ* concrete buildings, and introduces a new lightness for such structures."

The plot was small, yet it was necessary to provide off-street parking and outdoor play space in addition to the three-story building itself. Thus, a large part of the ground floor building area was given over to play space, much of it under roof for use in unfavorable weather. Access to this area from the second floor is provided by ramps (see plan on next page), regarded by the architects as better than stairs for children under six.

A placement center for adoption and foster care occupies the top floor, which includes a medical clinic and a series of offices for interviews. The remainder of the building is given over to facilities for the day care of small children with working mothers and an experimental pre-teen after school play group. Mechanical equipment, including the air-conditioning plant, is located in the penthouse. A generous basement provides ample storage space.





SECOND FLOOR

A detail of the perforated concrete sunshades is shown in the photo at top left; a typical group activity room at top right; an office for adoption and foster care conferences immediately above. The structural frame of the building is of reinforced concrete; the roof is framed with steel joists and a concrete deck; floors are concrete slabs variously finished with vinyl tile, ceramic tile, or terrazzo; ceilings are of acoustical plaster; sash are aluminum, glazed with sheet glass; partitions consist of steel joists plastered; interior doors are wood—exterior doors aluminum.

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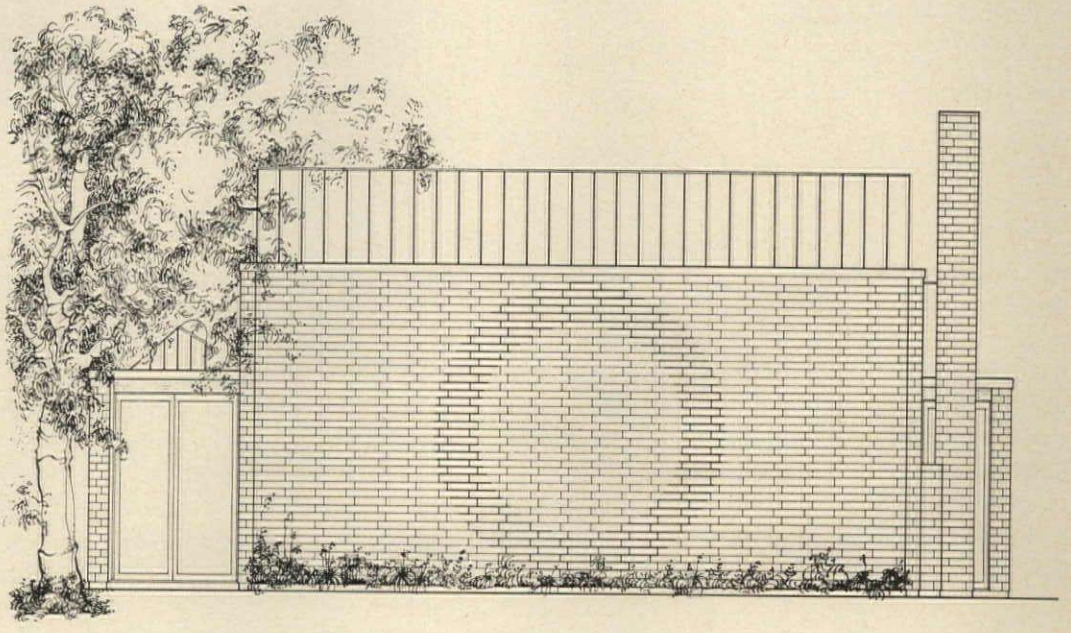
Mary Barnheisel Building; Day Care Center and Staff Offices, Chicago Child Care Society, Chicago, Illinois. Architects: George Fred Keck—William Keck; structural engineers: George Kennedy & Associates; mechanical engineers: Samuel R. Lewis & Associates; interiors: Marianne Willisch; contractor: R. C. Weiboldt Company

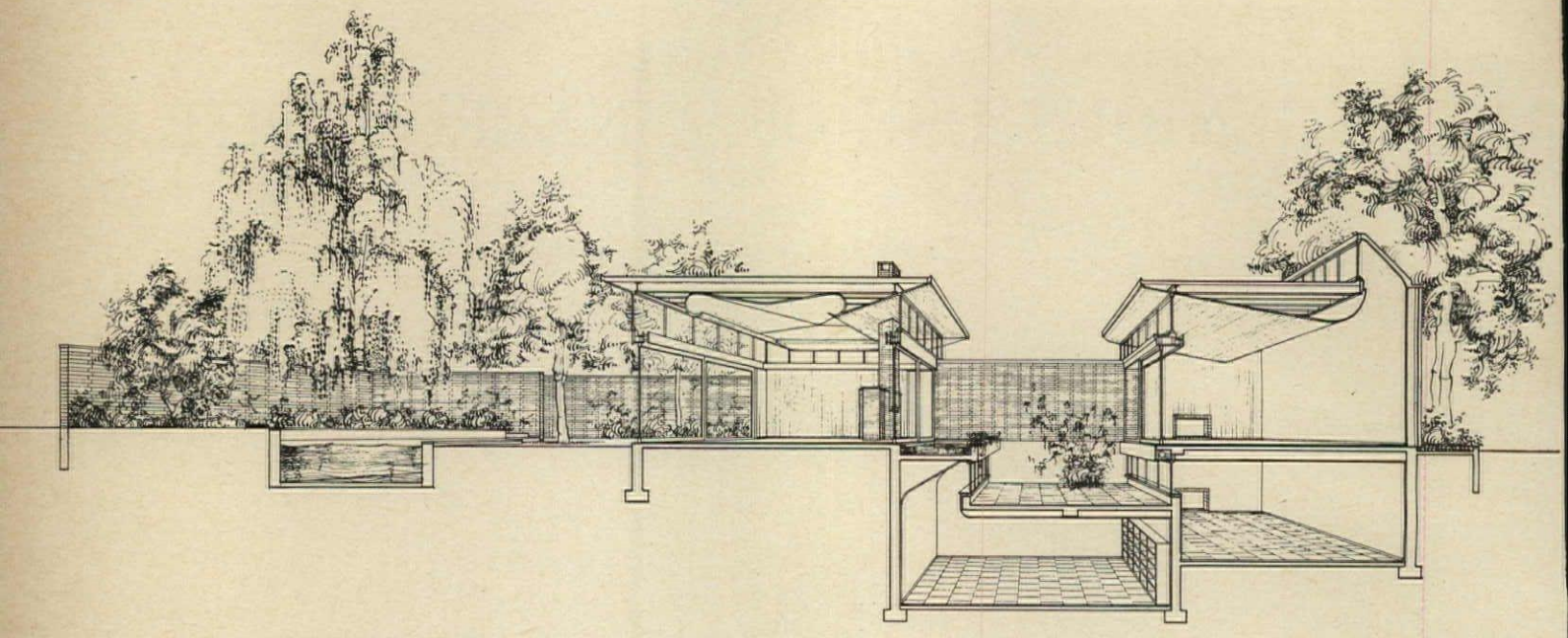
# AN INGENIOUS USE OF A NARROW SITE

The blank street facade of this club house conceals an open and spacious interior



The club building is one of the most interesting problems an architect can encounter, and opportunities to design them are becoming increasingly rare. Most flourishing clubs today are really second cousins to hotels or restaurants; but the design of an authentic private club provides an opportunity to study a sequence of several spaces, and to work out their relationships to each other purely in terms of the effect they will have upon the observer. This building in New Haven, Connecticut, designed by Professor King-Lui Wu of the Yale School of Art and Architecture, is modest in scale; but it achieves its effects in the true club tradition. The building becomes a private world, a secure retreat, in which every element has its own importance and its scale has been carefully controlled.

Professor Wu has used the narrow urban site to good advantage, hiding his building behind tall garden walls and a blank facade rendered more mysterious with an intaglio mural by Josef Albers. The garden, designed by landscape architect, Dan Kiley, and

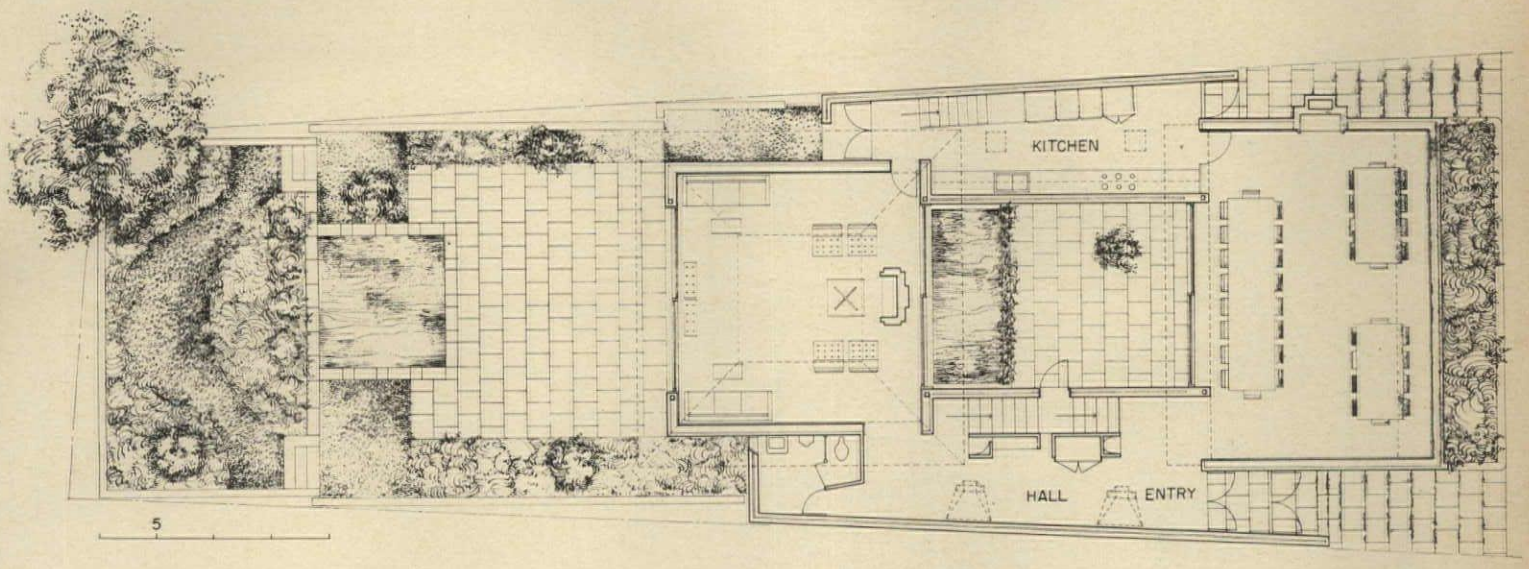


the interior courtyard permit large areas of glass and bring light and air deep into the building. The interior courtyard is a complicated multi-level space, with its reflecting pool and reflecting glass areas providing an outlook for all the rooms. The site is small and irregular in shape, but the major spaces have been given a definite form by treating them as pavilions. The living room is square with a clerestory all the way around (the glass is opaque to keep neighbors from looking in), and the ceiling is coved so that the artificial lighting will create a clerestory effect at night and also balance the light during the day. The same balanced light principle is employed in the dining area, where a large scoop skylight brings light down on to the blank north wall. The shape of the hung ceiling helps relate the reflected light from above to the direct view into the courtyard. Below the dining room is a music room with a piano and record player, and, a half level lower, there is a small study library.

*Joseph W. Molitor Photos*

View from garden court towards the living room . . .

and from the living room out into the garden court.



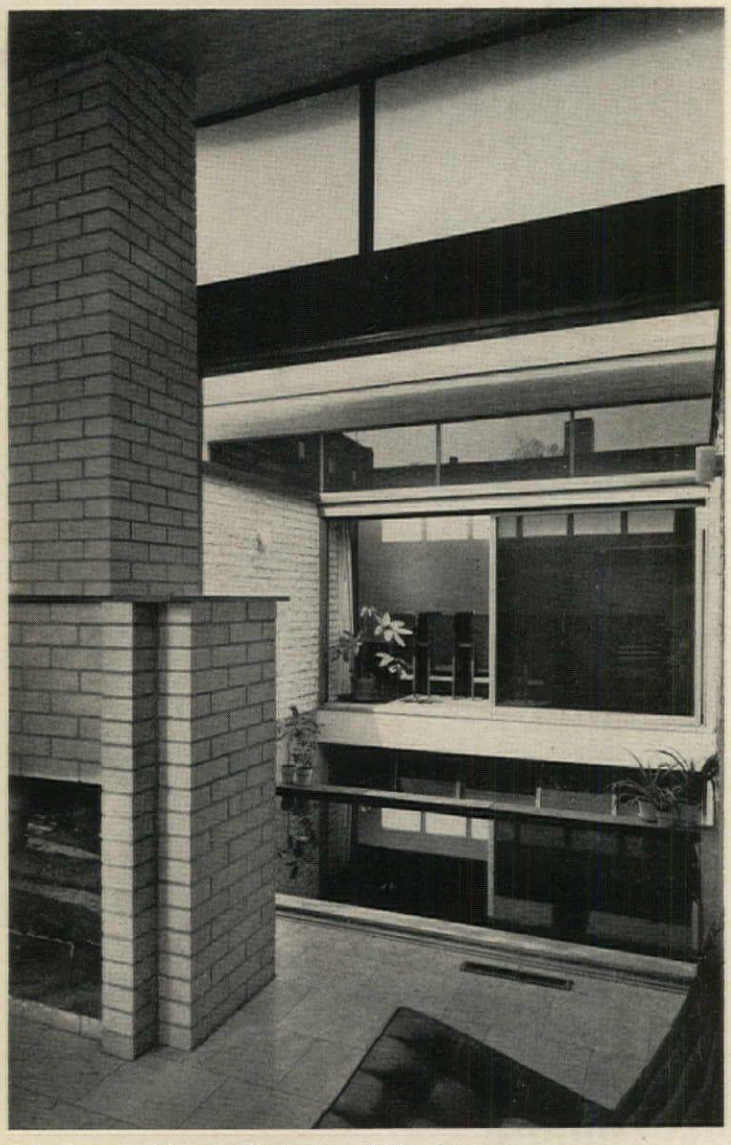

The club is designed so that it can be used both for formal meetings and by individual members stopping in at odd hours of the day. The garden more than doubles the effective area of the living room in good weather, providing an excellent setting for large parties or receptions.

The entrance hall is given skylights and niches to accommodate the club's collection of paintings and sculpture. The service entrance is separated from the main door as far as is possible on so small a site, and partially screened by the chimney of the dining room fireplace which is pulled out from the wall for this purpose.

All exterior walls consist of 4-inch by 4-inch by 16-inch concrete block with a marble aggregate; some of the interiors are paneled in walnut, and the floors are of Italian marble, bluestone and walnut blocks. All cabinet work was specially made, and the dining tables and chairs and the Moroccan rug were manufactured to Professor Wu's design.

Music room receives light from inner courtyard.

Skylight brings light down on blank wall in dining room.



Interior court is complicated, multi-level space.

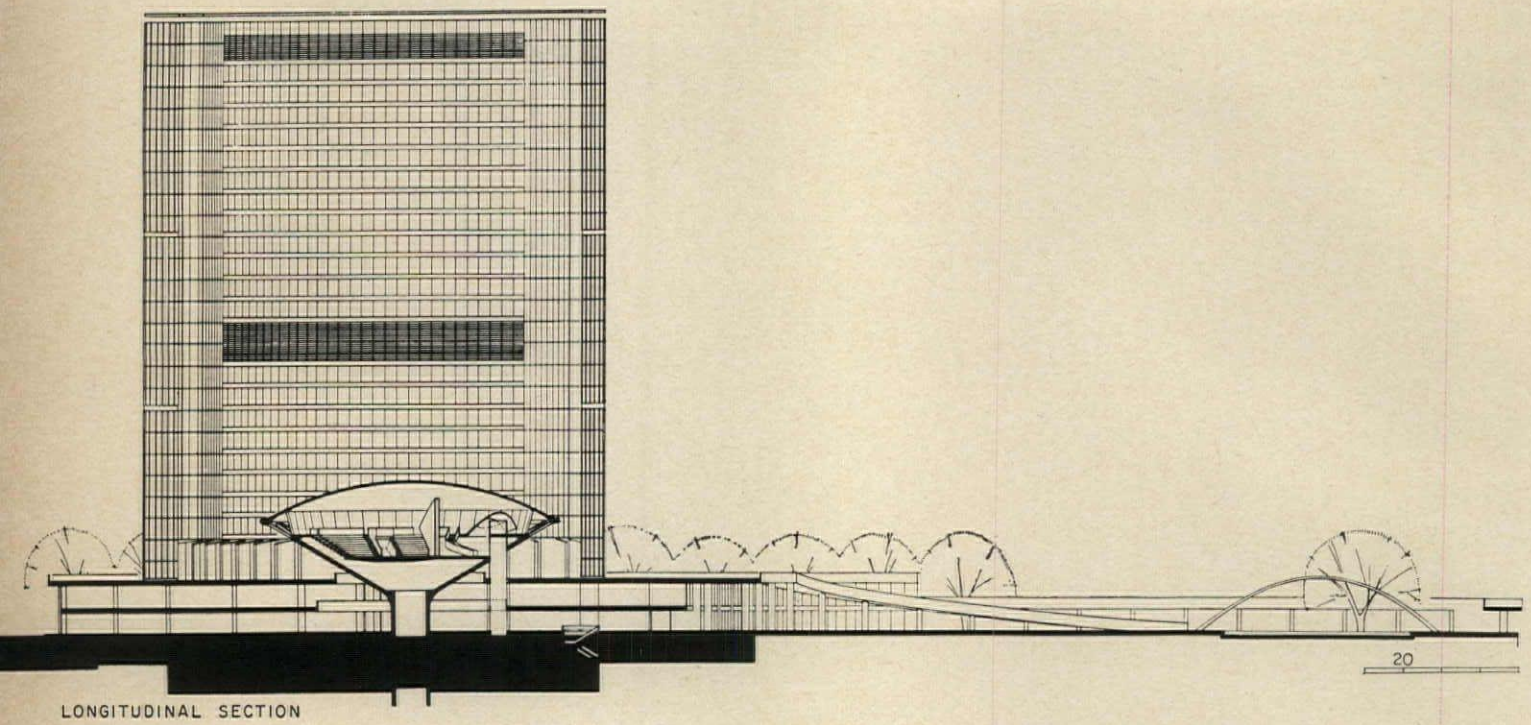
Entrance hall is also gallery for painting and sculpture.

*Club house in New Haven, Connecticut, designed by King-Lui Wu. Structural engineer: Henry Pfisterer; landscape architect: Dan Kiley; general contractor: United Building Company*

*Joseph W. Molitor Photos*

# TORONTO CITY HALL: CONTINUING CONTROVERSY

Architects often deplore that most competition winning buildings, when finished, show extensive revision of the premiated concept, so that design quality frequently gets lost in the process. The Toronto City Hall, on the contrary, has been executed by the late Viljo Revell in a partnership with John B. Parkin Associates with unusual fidelity to the essentials of the Finnish architect's much criticized basic scheme, which won an international design competition held in 1958. For this reason, both the majority and minority viewpoints of the competition jury, which have been included on the following pages, are still pertinent to any assessment of the finished complex.




LONGITUDINAL SECTION

**The Competition:**
**Judges Did Not Agree**

There were 520 submissions from architects in 42 countries to the international competition held in 1958 to select the design for a new city hall and civic square for the city of Toronto.

Of the eight projects which reached the finals, the scheme of Viljo Revell was stated to be the unanimous choice of the five competition judges. (The group of judges included an Englishman, Sir William Holford, two Canadians, C. E. Pratt and Gordon Stephenson, an Italian, Ernesto Rogers, and an American, the late Eero Saarinen.) Their reports of seven years ago can now be tested against the reality of the completed structure.

Since Holford and Stephenson, while agreeing that the Revell design was the most original in conception, had reservations on several important aspects of the winning design, both a majority and a minority report were issued. The minority report is here presented in part:

"The jury were unanimous in regarding the winning design as the most original in conception of any of those submitted.

"They were less unanimous about the suitability of this monumental design to the site prepared for it, and as an answer to the requirements of the administrative programme. On this there were strong differences of opinion—as there are likely to be in any democratic assembly.

"As a minority we were highly critical of some aspects of this design. We were also conscious of the carefully drawn conditions, the cost of the project in the minds of the council and the public, and the need for a building which is efficient and workable, and flexible enough to meet the requirements of growth and change. . . .

"Since no worthwhile judgment is entirely uncritical, (our) reservations may also be useful to strengthen or modify the design of the city hall and the city square as it is finally executed.

**Relation to the City**

"1. On the east and north sides, and to some degree to the west as seen from University Avenue, the winning design shuts out the city around it, presenting the blank concrete walls (356 feet and 290 feet high) to surrounding streets and buildings. This might have an adverse effect on the future redevelopment of these sectors; whereas the new city hall could otherwise be expected to spark off a number of surrounding projects, eventually leading to a really significant renewal of this part of the city. Much could be done to reduce this adverse effect.

"2. The city square, which in our opinion should hope to attract citizens of all ages in a rich and varied way, still appears in the final stage of the competition as a somewhat stark design. It could be given greater landscape interest and amenity, and a more human scale.

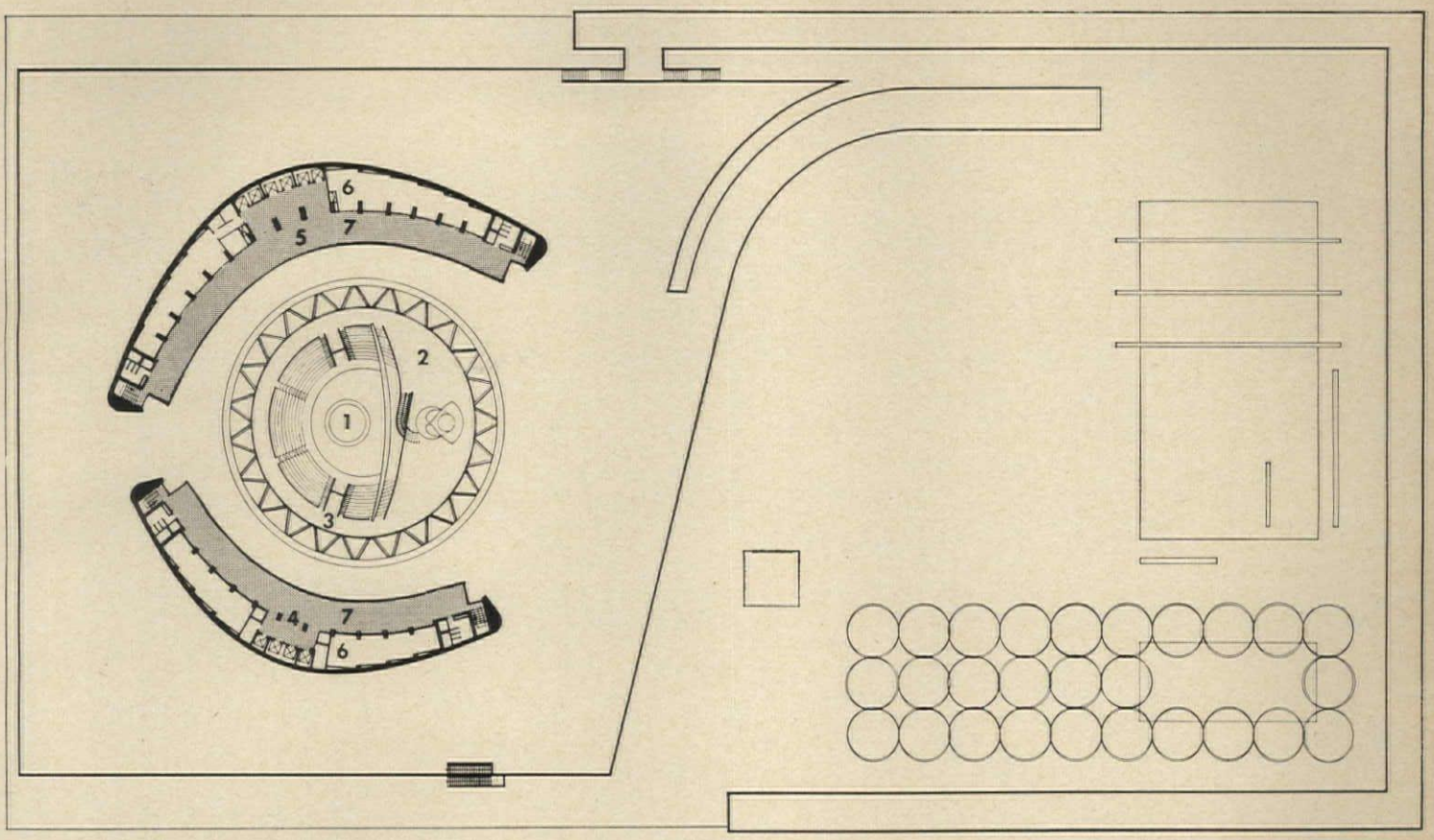
**The Building as a Work Place**

"3. The four main elements in the scheme—the civic square, the four-level base or podium (which covers nearly half the site), the two office towers, and the council and executive suite—are connected to each other by an external ramp, by escalators, by a large number of elevators in ten different places, as well as by emergency stairs. Internal circulation within the building is complicated, as it involves movement from one office tower to another or to the council suite; and the one-sided office towers have longer horizontal lines of communication than are found in two-sided arrangements of offices.

"4. The council chamber and suite, although placed in the very focus of the design, have defects as working accommodation, and a poor outlook.

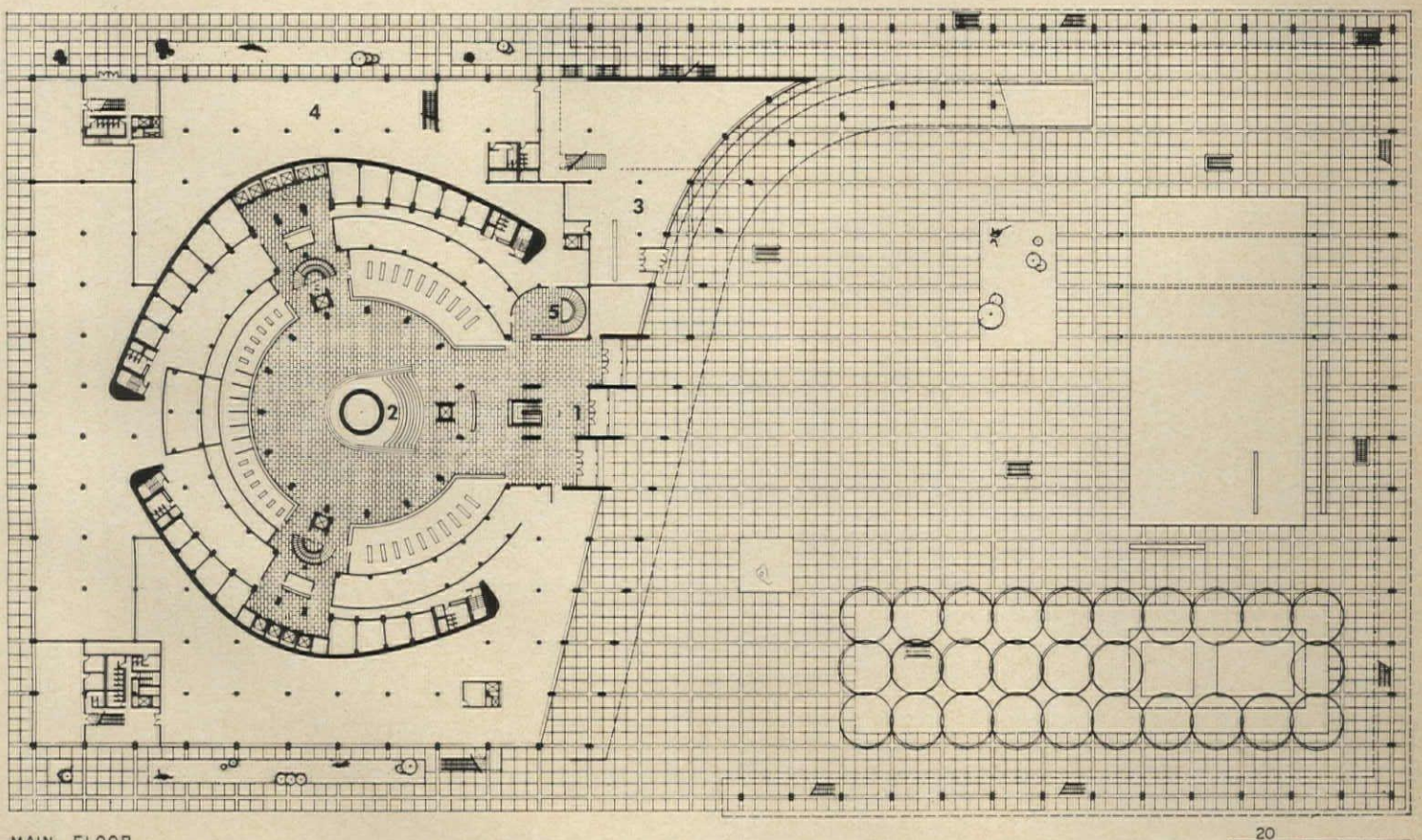
**Structure and Cost**

"5. The form of construction proposed for the office towers is probably the most expensive which could




COUNCIL CHAMBER AND TYPICAL TOWER FLOORS

1. Council Chamber 2. Members' Lounge 3. Gallery Walkway 4. West Tower Typical Office Floor
5. East Tower Typical Office Floor 6. Private Offices 7. General Office Area

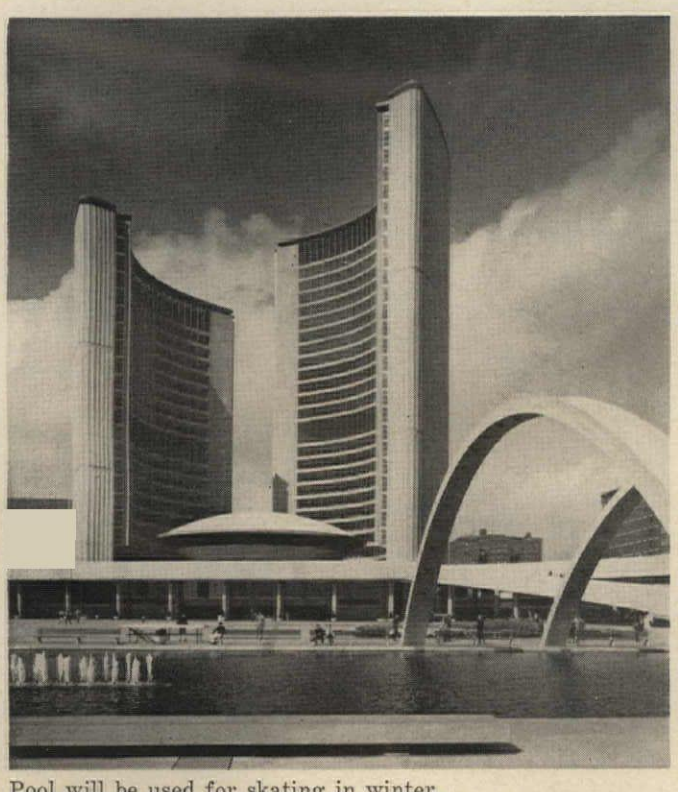



MAIN FLOOR

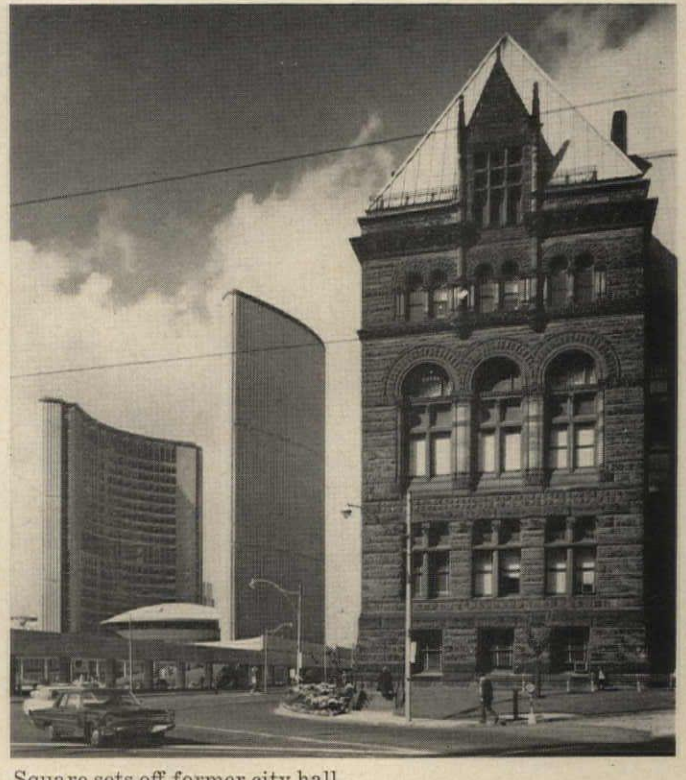
1. Main Entrance 2. Hall of Memory 3. Public Library 4. County Registry Office 5. Stairway to Cafeteria

Council chamber at podium level.

Ramp leading to podium was planned for ceremonial purposes.



Pool will be used for skating in winter.



Square sets off former city hall.

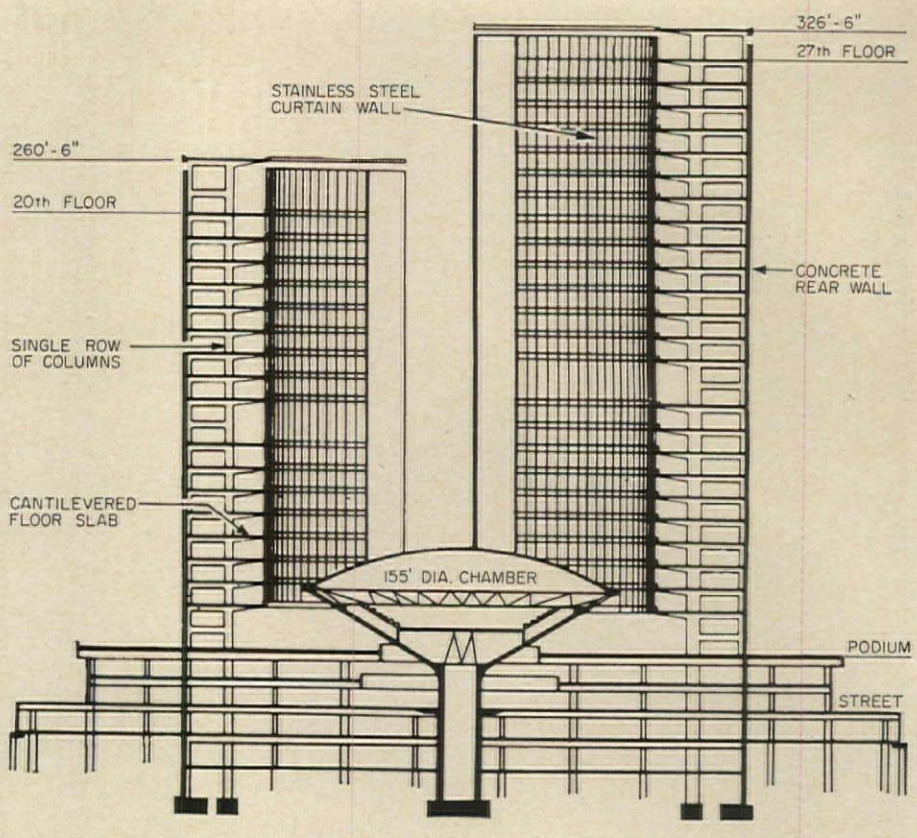
be devised for vertical slabs. The huge cross-buttressed reinforced-concrete walls support floors which are, in effect, trays cantilevered in one direction. The open ends of the trays are covered by a glazed curtain wall. It is doubtful whether the cantilevers would register in the mind of an external observer, and it seems reasonable to suggest that the form of construction could be modified and reduced in cost.

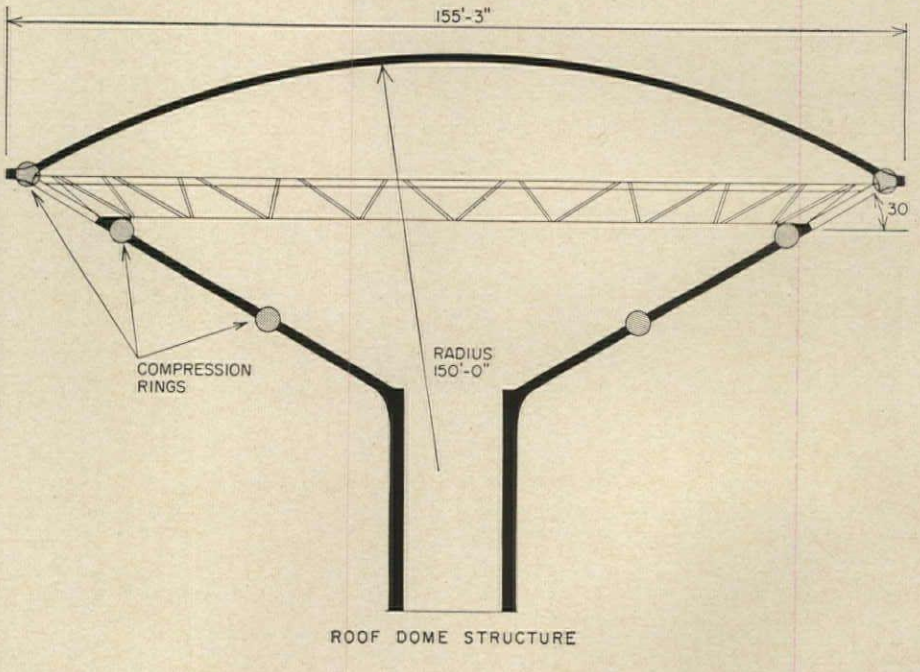
"6. Because of the variety of unusual structural forms, and the considerable space demanded for circulation, the design as presented would, in our estimate, cost much more than the figure which the council had in mind. By considerable revision, economies in space and structure could be made without changing the main effect of the composition.

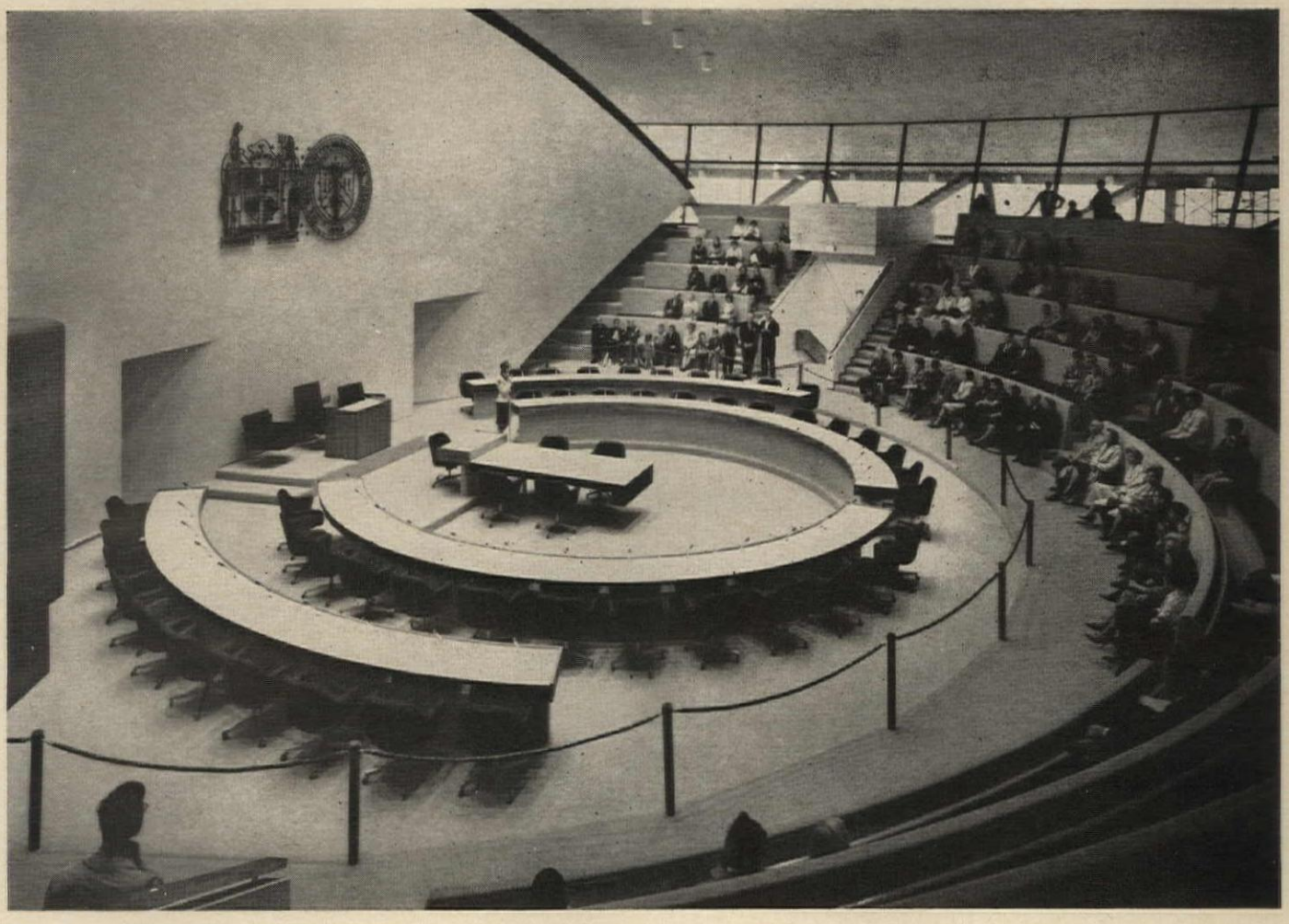
"Both in the conditions of competition, and in the report of the jury on the preliminary stage, the need for reasonable economy was stressed. In order to realize the design and preserve its integrity, even with the revisions suggested, the council should be prepared to increase the sum voted."

In December 1956, less than a year before the competition rules were established, Toronto voters approved the allocation of $18 million for their new city hall. Costs of the winning scheme estimated in 1959 were $24.4 million. The cost to date of city hall and square has been $27.035 million (including $900,000 for a cafeteria not in the original estimate).

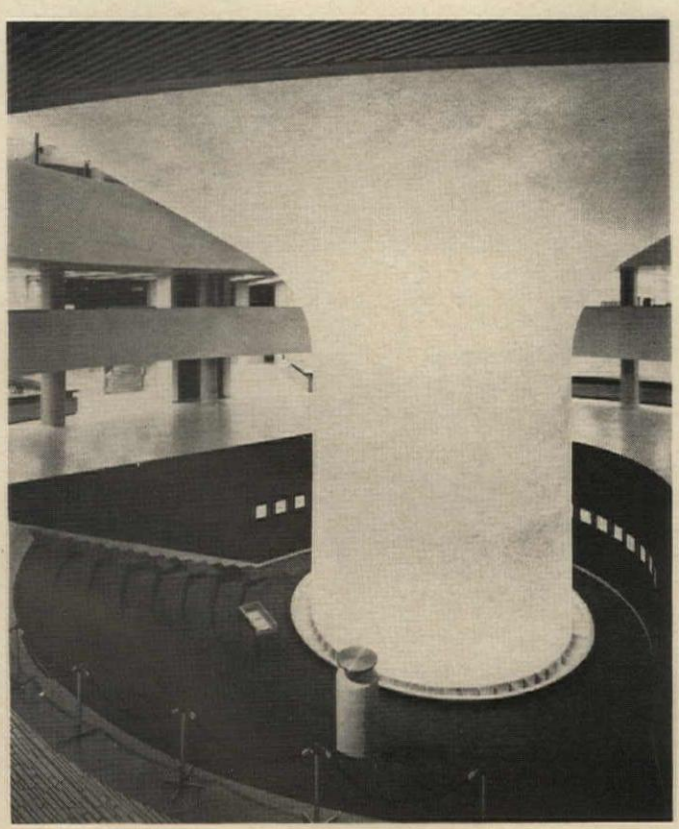
The majority report proposed two options: To choose "a relatively low, horizontal building, placed within the square . . . detached from the buildings around it, achieving an effect of dignity by its simple contrast with its background. . . . (We) regarded this concept as very promising and indeed, five of the final proposals are in this category. (Alternately) the city hall could be a distinctive building, different in form and materials from standard commercial buildings. It would be impressive when seen from the square and its immediate neighborhood, and also a distinctive feature of the silhouette of Toronto as seen from the distance. In appraising the eight finalists the majority concluded that the winning architect had achieved a design which fulfilled this last approach excellently. . . . The design of the square is very important. The winner not only



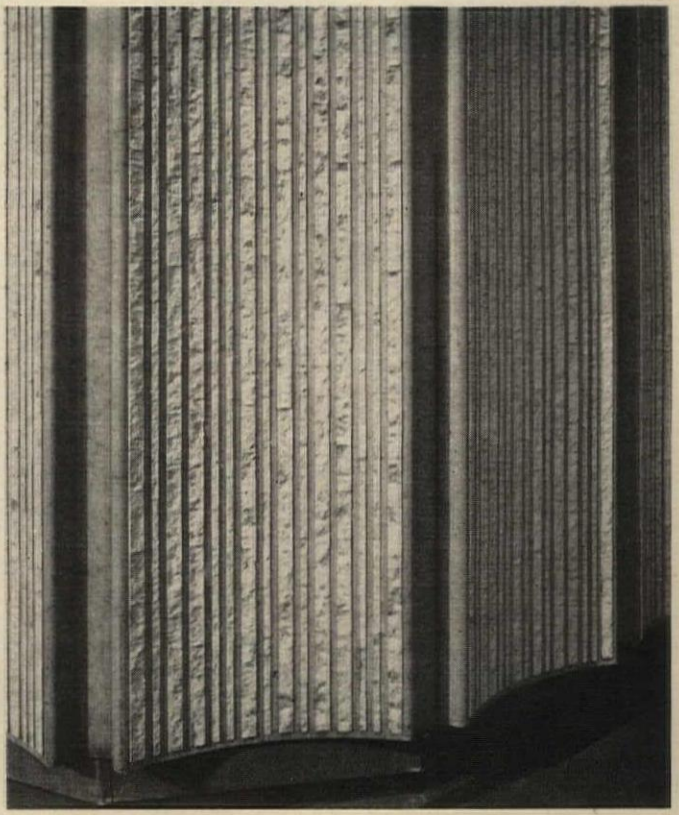





The council chamber seats 300 persons.



Column supporting council chamber was not a part of the original concept. It is 20 ft in diameter and 27 in. thick.



Pre-cast panels were used as exterior formwork. Striations are Italian Botticino marble.

Typical interiors. Slotted ceiling grill is standard throughout buildings.

achieves a handsome space but successfully emphasizes the present city hall, a building which (we) regard as a most handsome example of its period. . . . The placing of the council chamber is also of great significance. For this the majority favoured the idea of emphasizing its location as a symbol of democratic government."

**Design and Structure**

The allocation of space in the city hall relates closely to the system of government in Toronto, consisting of both the City of Toronto and the Municipality of Metropolitan Toronto. This dual aspect of the government is suggested by the two towers themselves, which enclose the council chamber, considered the unifying element.

The structure of the council chamber consists essentially of three portions. The first portion is the roof, which is a reinforced concrete dome with a prestressed ring beam, supported on inclined precast concrete struts. The second portion is the main body of the structure, an inverted cone with two prestressed ring beams. The generator of the cone is inclined at an angle of 30 degrees to the horizontal. This cone is supported by the third portion of the structure, a cylindrical reinforced concrete shaft which passes down through the podium to a foundation on shale.

Structurally, each of the two towers consists of a convex curved reinforced concrete wall referred to as the "back wall," and an interior line of columns. Each floor is supported on the back wall, and cantilevers beyond the columns to the glass line on the concave face of the towers.

For design purposes, the towers were considered to be vertical cylindrical shells reinforced by a series of transverse diaphragms (the floor slabs) and also reinforced by longitudinal columns or buttresses.

---

Toronto City Hall; Owner: Corporation of the City of Toronto; location: Toronto; Architect: Viljo Revell-John B. Parkin Associates, Associated Architects & Engineers; structural engineers: Severud-Elstad-Kreuger-Associates; mechanical engineers: Jaros, Baum & Bolles; lighting consultant: Richard Kelly; acoustic consultant: Professor V. L. Henderson; landscape architects: Sasaki Strong & Associates Ltd.; general contractors: Anglin-Norcross (Ontario) Limited

# LABORATORY BUILDINGS:

## The Architecture of the Unpredictable

*By Jonathan Barnett*

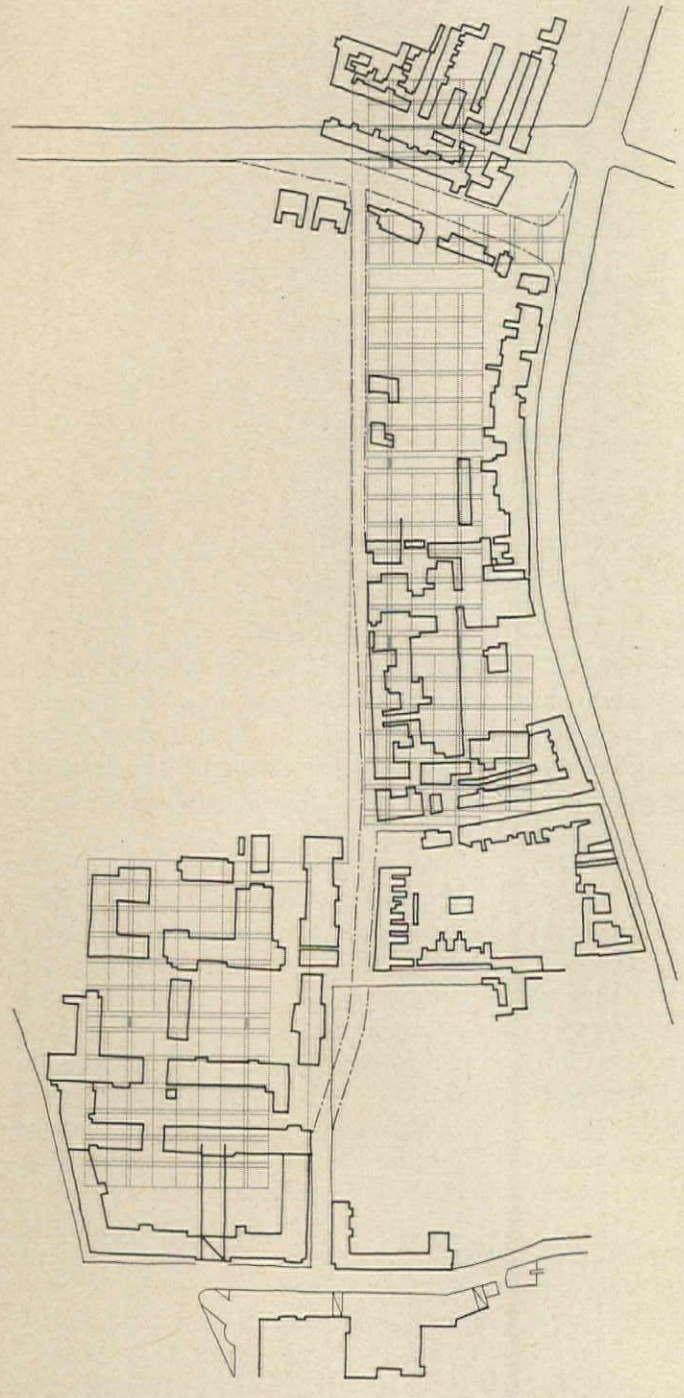
The requirements of a scientific laboratory today are not the same as they were a few years ago, because the scientist client has acquired a more sophisticated appreciation of the ways in which a building can help or hinder his work. The time has past when a scientist moved to a new building from a structure that was either completely outmoded or had never been designed for scientific work in the first place. Today the scientist has either worked in a new laboratory building himself, or has had ample opportunity to meet and talk with those who do; and in the process he has acquired a long new list of likes and dislikes.

The basic problem, of course, remains the same: how to provide for flexibility and growth. Scientific research can be concerned with quantities so small that they are invisible under a microscope, or with problems so large that they must be dealt with in conditions resembling a factory. A scientist may surround himself with vast quantities of incredibly intricate and delicate equipment, or he may simply sit looking out the window and scribble an equation on a blackboard from time to time. The trouble is that no one knows when the equation scribbler might desert his blackboard and start feverishly assembling equipment, or when the researcher probing the nature of the atom might decide it would be helpful to construct a building two miles long. The course of Science is by its nature unpredictable, so that the shape of research facilities must needs be unpredictable as well.

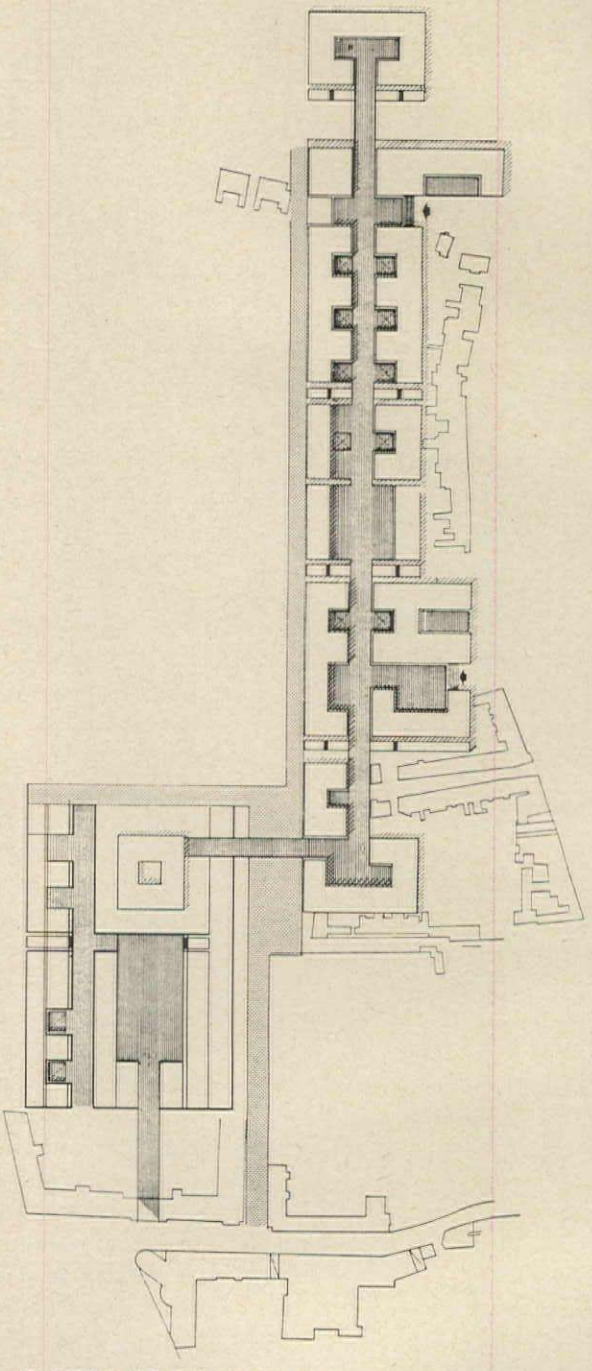
This unpredictability affects the design of laboratories in many different ways. It affects the relationship between office space, bench space, and special equipment areas, it affects the location and distribution of piping and air-conditioning, it affects the design and placement of laboratory furniture and equipment, and also the elaborate shielding and insulation that many experiments require.

It is no longer sufficient to talk of flexibility in terms of modules, and of growth in terms of adding a new building. At the same time, flexibility is likely to be the most expensive of requirements; and provision for growth can interfere with present operations.

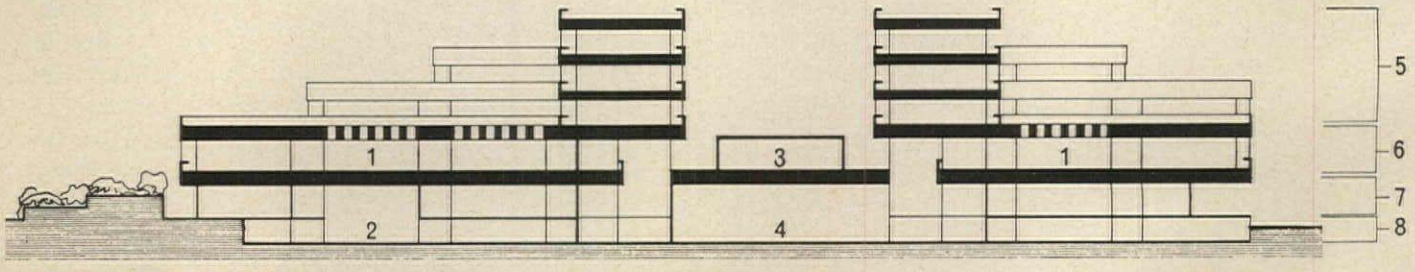
For the convenience of the reader, this Building Type Study is divided into five sections: Planning for Flexibility and Growth; Planning the Laboratory Complex; The Distribution of Services; Placement of Furniture and Equipment; and Problems of Shielding and Contamination. It should be understood that this division is to some extent an arbitrary one, as the problems discussed in each section are closely interrelated.



GRID PLACED ON SITE



BUILDING DEVELOPED FROM GRID




1. TEACHING LABORATORIES
2. SERVICE ROAD
3. LIBRARY
4. LECTURE ROOM
5. RESEARCH AREAS
6. UNDERGRADUATE AREAS
7. LECTURE ROOMS AND STORAGE
8. CAR PARKING

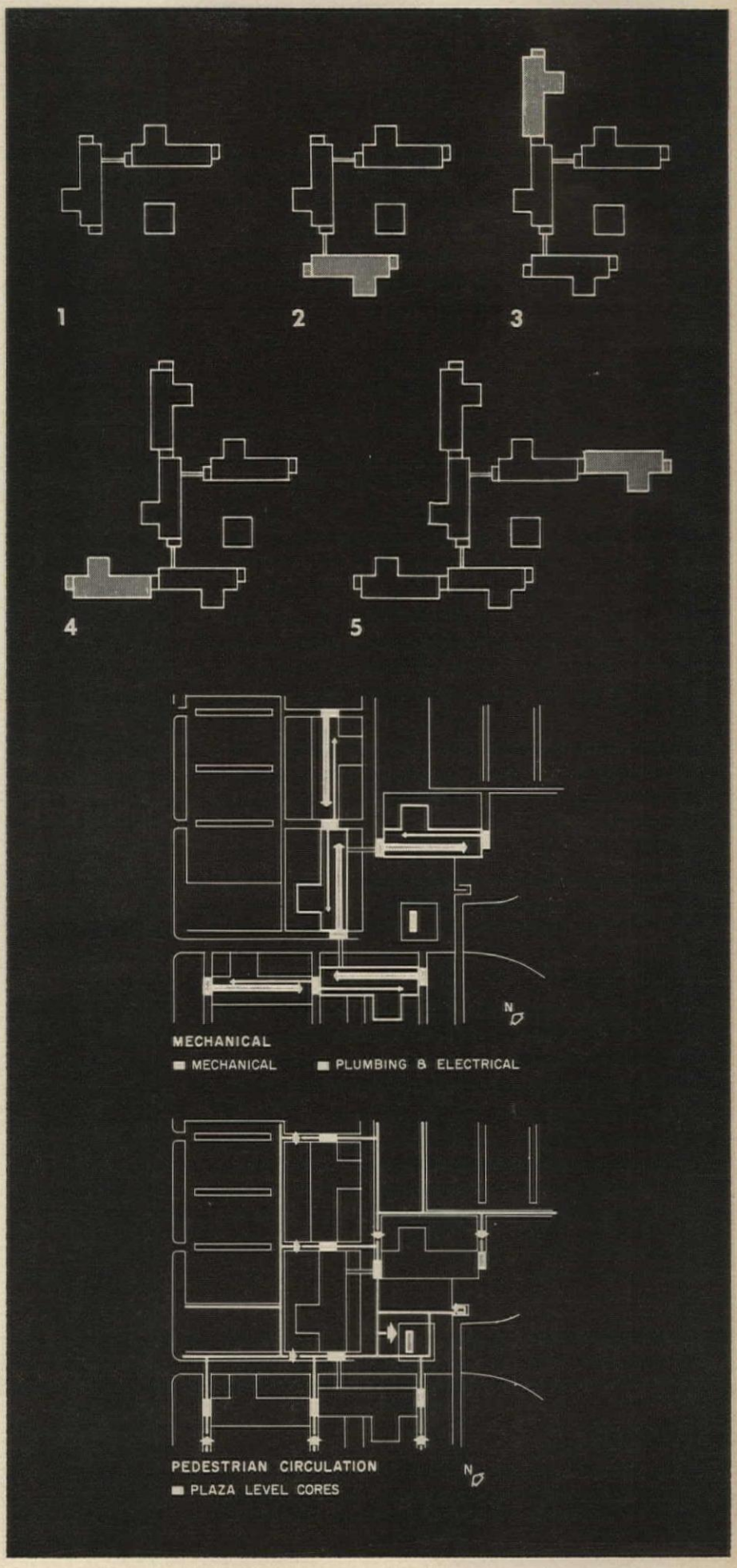
# PLANNING FOR FLEXIBILITY AND GROWTH

*There is now some general agreement that, in considering the science areas of universities, we are no longer considering separate buildings but a general principle or system of layout in which individual departments and faculties form part of a larger concept.*

—Professor Sir Leslie Martin
writing in *Architectural Design*

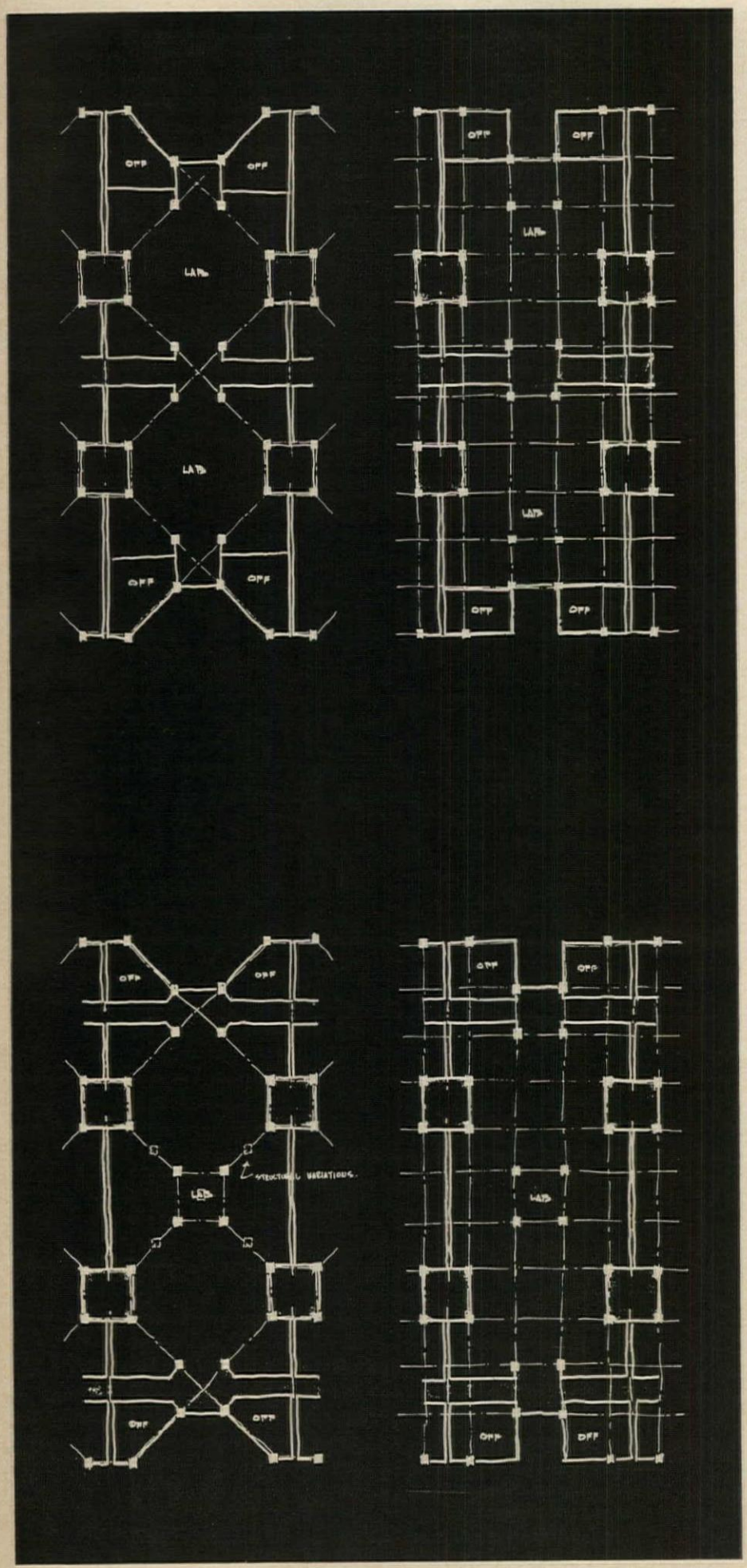
Science areas in universities have more flexibility and growth problems than industrial laboratories; not only must there be areas for teaching as well as research, but also all the scientific disciplines tend to be grouped in one place. As a result, more and more architects are trying to develop comprehensive systems which will relate the needs of various departments and disciplines and provide ways of sharing certain facilities, such as lecture halls and teaching laboratories. In addition, such a system can provide an architectural recognition of the increasingly interdisciplinary nature of much scientific research: for example, by placing Bio-physics between Biology and Physics, with the capability of expanding in either direction.

The system developed by Sir Leslie Martin, and shown at left, consists of a regular grid derived from considerations of space, lighting, and an integrated system of structures and services. The grid forms 35-foot squares separated by five-foot strips. Ducts and services can be introduced at any point within these strips. The system is also divided vertically, with large areas such as lecture halls, work-




LEFT:
Studies by Professor Sir Leslie Martin of a comprehensive planning grid for university laboratories, and of the type of development that can be based upon it.

RIGHT:
Planning studies by The Architects' Collaborative for an industrial research complex, showing increments of growth, circulation pattern and services pathways.




shops, and special laboratories for heavy equipment at the lowest level, teaching laboratories above, and research areas on top. As shown in the drawings, the grid can be applied to a site, giving a rough indication of present areas and future expansion possibilities. Architectural development can go on in stages, in relation to the grid, forming segments of a larger system rather than single buildings.

**Industrial research facilities do not yet require such a comprehensive solution.** The studies of an industrial research complex by The Architects' Collaborative that appear on the previous page show the type of planning that is usually needed. It is still essential to visualize approximately what the ultimate extent of the building complex will be, in order to make meaningful decisions about individual units. It is also necessary to determine lines of development and of growth for circulation and services.

Industrial laboratory space is likely to be more uniform than a university or government facility. The range of research is relatively narrow, and, as there is no strong tenure system, industry is less likely to design a laboratory around the requirements of a particular scientist. At present, therefore, Industry tends to think of new laboratory space in terms of adding blocks of a set size and type. The long-range outlook, however, is probably towards the more flexible approach already employed by the universities.

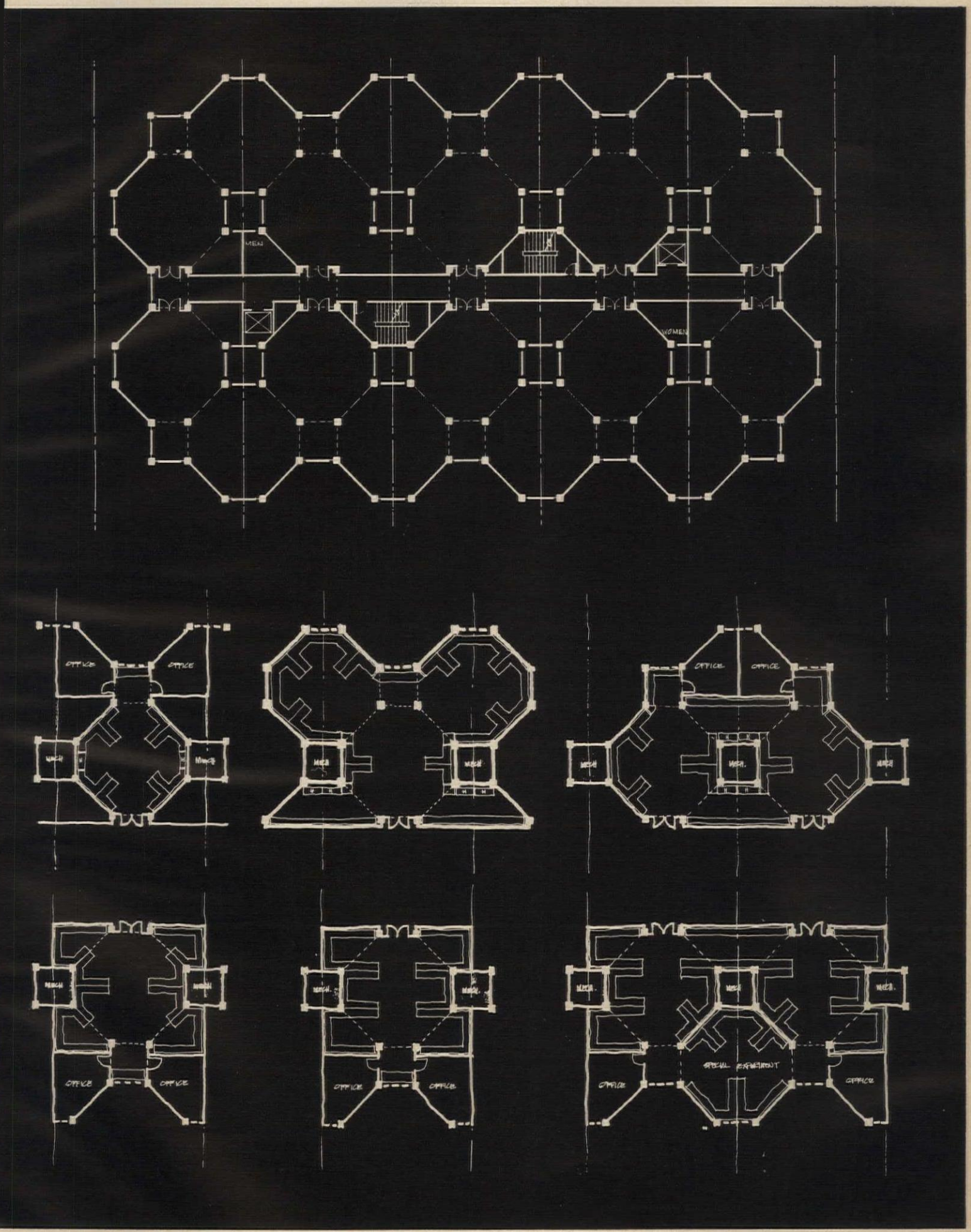
Skidmore, Owings and Merrill's Chicago office has been devoting quite a lot of attention to the development of comprehensive laboratory grids for universities, like the one shown on these pages. Such grids lend themselves to growth of almost any shape, and in almost any direction.

LEFT:

Laboratory planning grid by Skidmore, Owings and Merrill. A system of square bays which accepts either a diagonal or a rectilinear planning grid. Column clusters mark out circulation areas or service shafts.

RIGHT:

A building unit in this system which employs a diagonal grid, and some laboratory arrangements that would be possible.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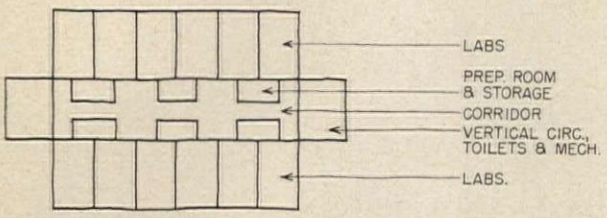
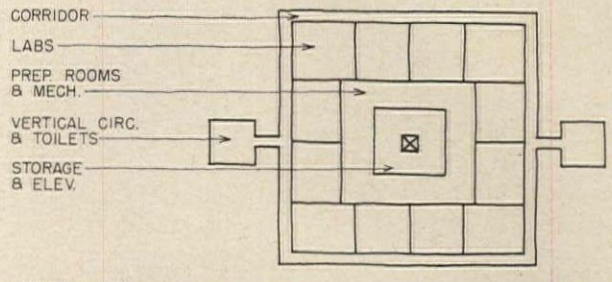
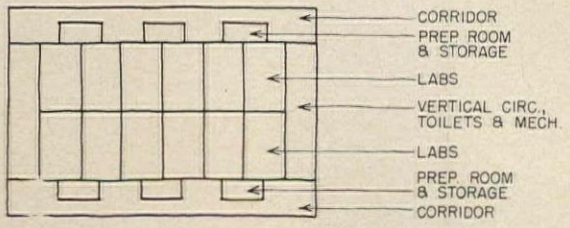
SPECIAL EXPERIMENT



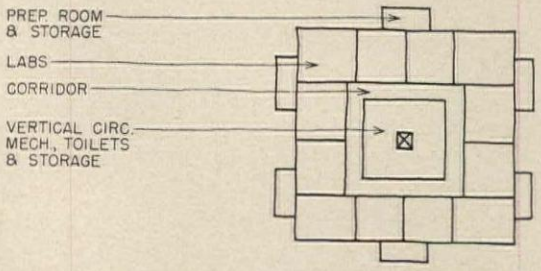

Feasibility: *Structural:* Compact plan may reduce cost. *Mechanical:* Although cores are separated, short mechanical runs reduce cost. *Circulation:* Double loaded corridors most economical. *Flexibility:* Changes may be made easily.



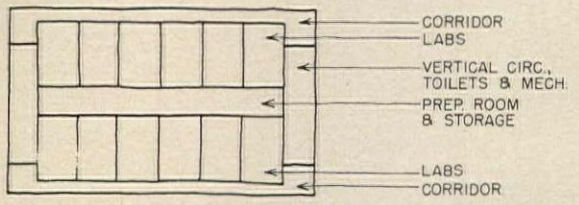

Feasibility: *Structural:* Economical arrangement. *Mechanical:* Very compact and economical. *Circulation:* Excessive corridors. *Flexibility:* Fair.



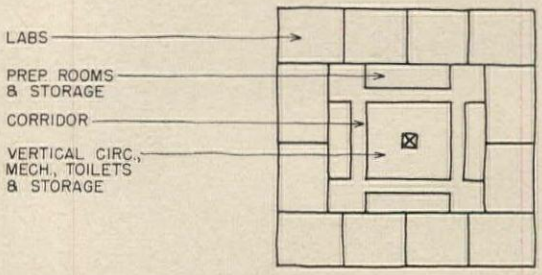

Feasibility: *Structural:* Compact plan. *Mechanical:* Separated cores and double runs of ducts, etc. may add to cost. *Circulation:* Doubling number of corridors is uneconomical. *Flexibility:* Rooms may be changed and added with ease.



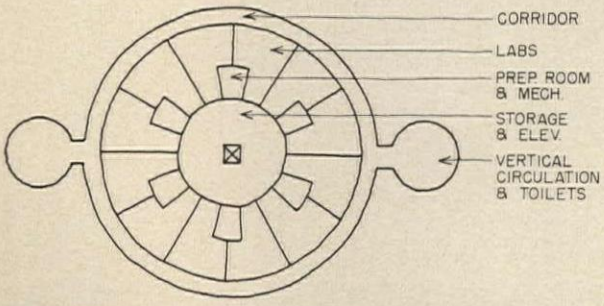

Feasibility: *Structural:* Fairly economical. *Mechanical:* Very compact and economical. *Circulation:* Very economical corridor arrangement. *Flexibility:* Fair.



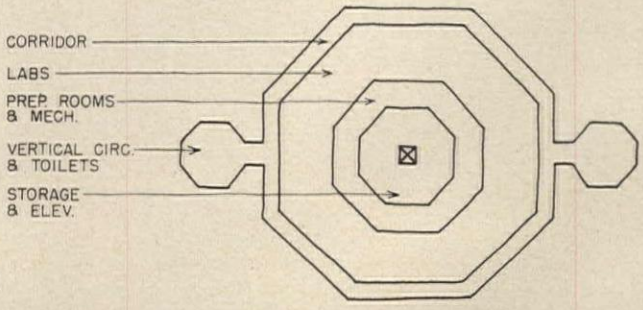

Feasibility: *Structural:* Compact plan may reduce cost. *Mechanical:* Compact system may reduce cost. *Circulation:* Double corridors uneconomical. *Flexibility:* Not as flexible as scheme above.




Feasibility: *Structural:* Economical arrangement. *Mechanical:* Very compact and economical. *Circulation:* Minimum length of corridors. *Flexibility:* Rooms changed and additions made easily.




Feasibility: *Structural:* Good form for economical structure. *Mechanical:* Very compact and economical. *Circulation:* Excessive corridors. *Flexibility:* Not too flexible.

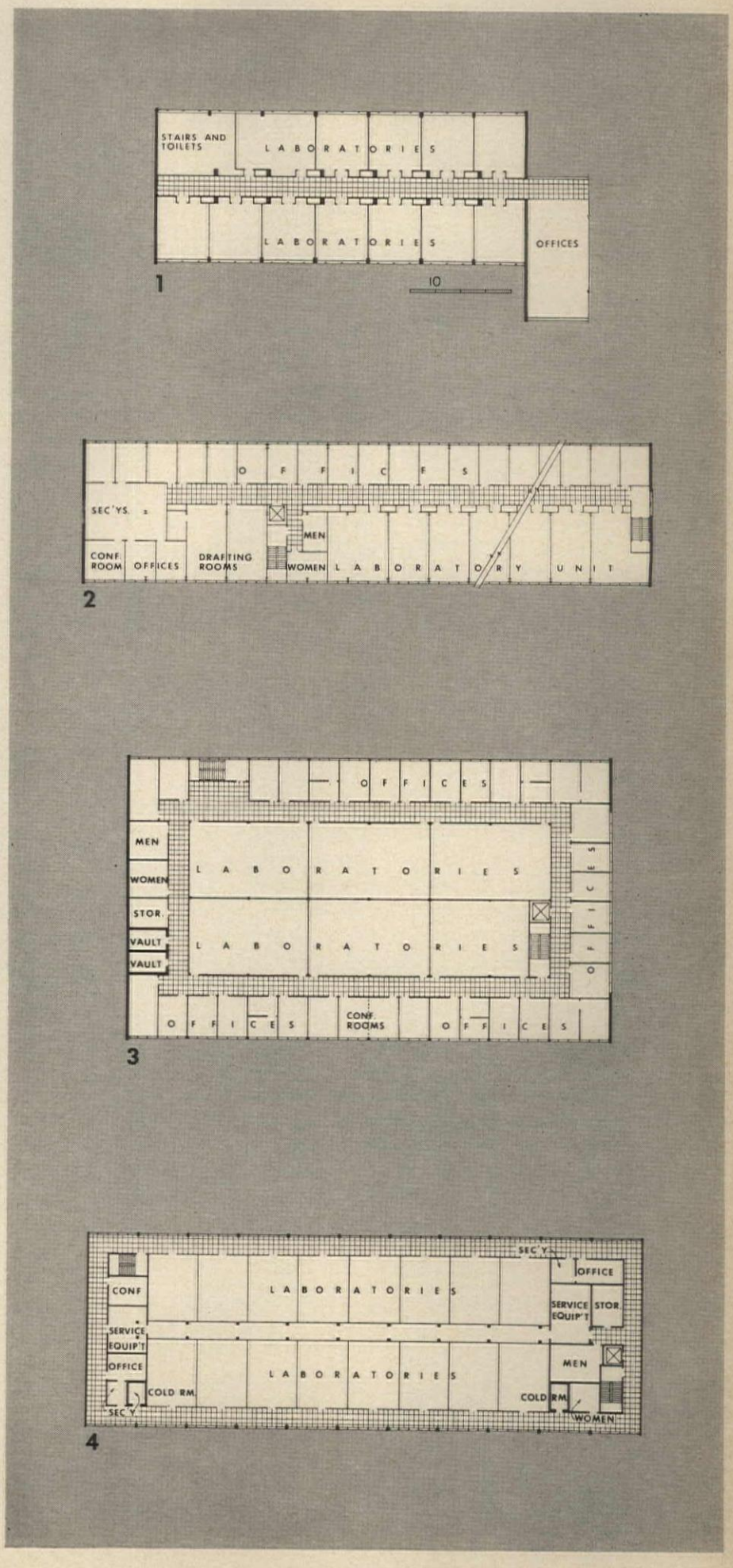



Feasibility: *Structural:* Economical structure. *Mechanical:* Very compact and economical. *Circulation:* Excessive corridors. *Flexibility:* Not too flexible.

# PLANNING THE LABORATORY COMPLEX

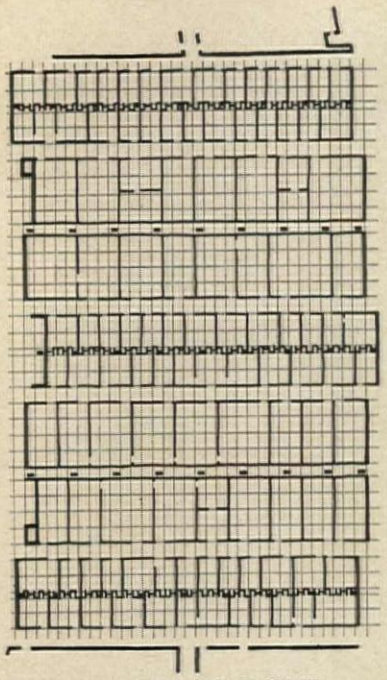
**There are four basic areas in any laboratory complex:** the area for research itself; the administrative offices; general support facilities, such as an auditorium or a cafeteria; and service facilities, such as shops and the boiler plant. The addition of teaching requirements does not change this pattern as much as might be imagined. Elementary science courses are taught in special teaching laboratories and demonstration lecture halls; but more advanced students are quickly integrated into the research organization. Undergraduates at many universities are already working on research projects during their last year, or years; and graduate students, while technically still being instructed, are in fact engaged upon independent work.

The research areas are naturally the portion of the laboratory complex that presents the most problems. The chief difficulty with the other elements is to prevent them from interfering with the design of the research areas. A badly located auditorium or boiler plant can strangle expansion and interfere with efficient operation. The most comprehensive method of avoiding such difficulties is an over-all planning grid such as the one described in the previous section of this article. In any case, a master plan must make provision for independent growth of all four of the basic elements of the laboratory complex, either through a campus type of development, or through sufficient articulation and separation of each area.

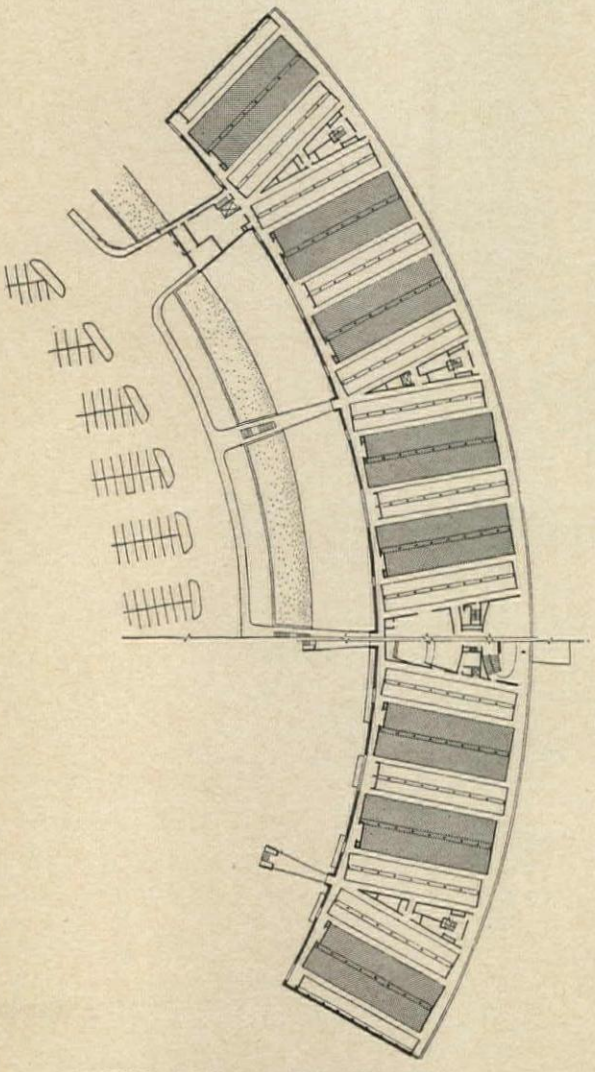



LEFT:
Comparative study of different teaching laboratory layouts by Hellmuth, Obata, and Kassabaum, with an evaluation of each in terms of economy and flexibility.

RIGHT:
Four plans by Walter Kidde Constructors, Inc. showing different basic methods of organizing an industrial laboratory (from ARCHITECTURAL RECORD, November 1962).



LABS AND OFFICES ARE PLANNED ON 4' X 6' GRID



TONE INDICATES LABORATORY AREAS

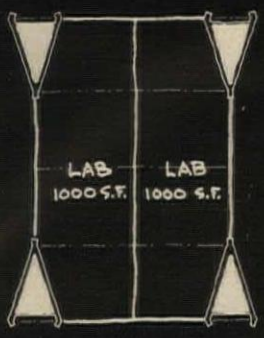
**The research portion of the laboratory is itself divided into several basic elements.** Most research areas require desk space as well as bench space; and more and more experiments are requiring some sort of controlled environment, with closely regulated temperature and humidity, or the elimination of outside contamination. Controlled environment installations and other ancillary facilities frequently cannot be accommodated within the ordinary research areas. In addition, scientists frequently wish to have conference rooms directly associated with research, and there are usually some fairly extensive storage requirements.

**Economy of construction can conflict with efficient operation.** Bench areas and special installations require elaborate piping services and air-conditioning; desk space, conference rooms, and storage areas do not. Bench space and special installations are usually fairly large areas, desk space, conference rooms and storage form smaller units. In terms of economy it makes sense to group like functions and like areas; and separate desk space and conference rooms from research. Unfortunately most scientists prefer desk space to be near their research, and special installations need to be associated with research as well. The design of teaching laboratories provides an analagous situation, with less need for desk space, but a requirement for preparation rooms. Resolving these contradictory requirements, while still providing for flexibility and growth, is perhaps the most difficult problem in designing a laboratory.

Theoretically the possible solutions range from placing all desk space in a separate building to incorporating all offices within the laboratories. The

LEFT:
IBM Research Laboratories at Yorktown Heights, New York by Eero Saarinen and Associates. Both offices and laboratories occupy interior spaces surrounded by corridors.

RIGHT:
A comparative study by Skidmore, Owings and Merrill of different ratios of office and laboratory space possible within a single, flexible system.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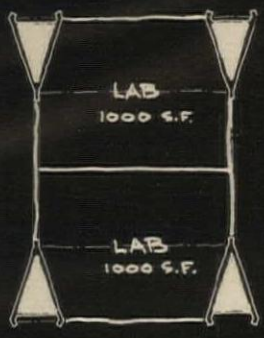
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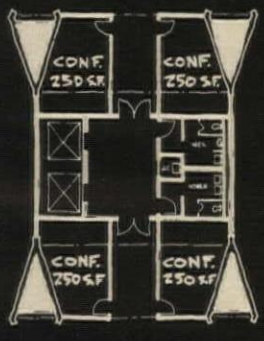
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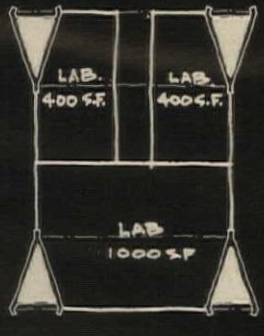
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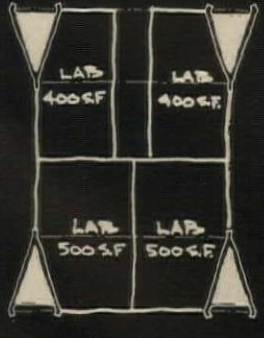
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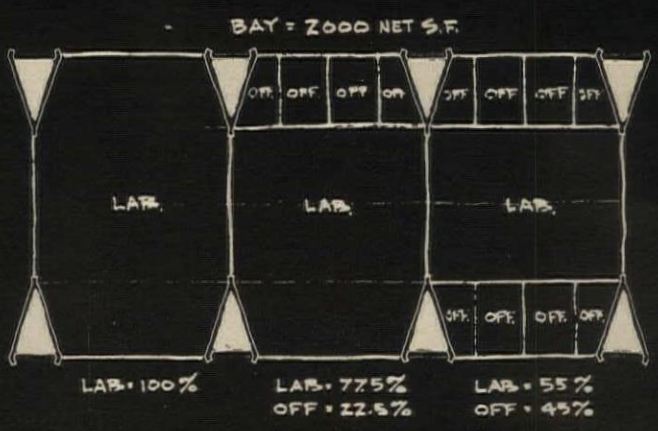
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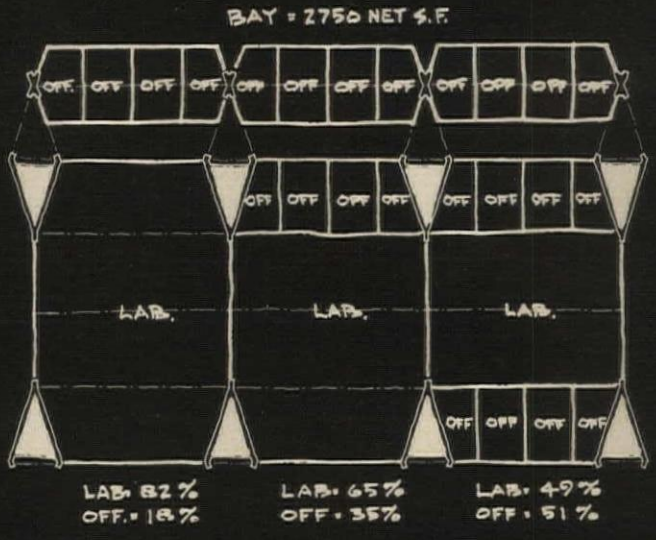
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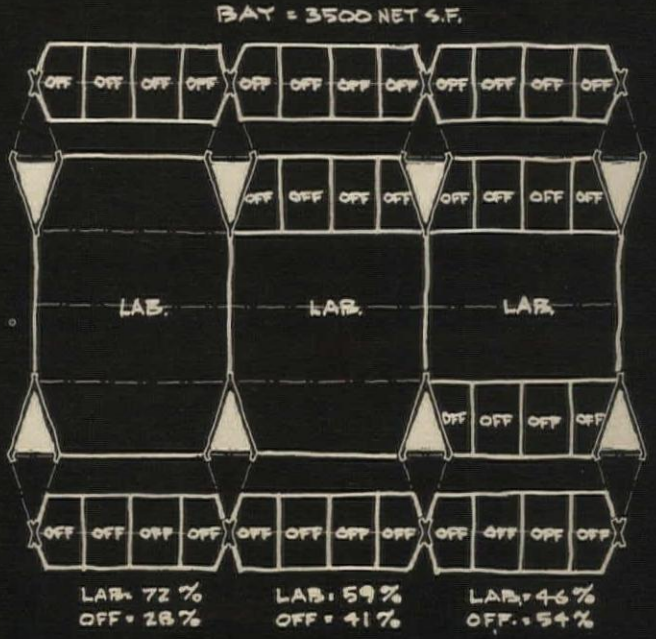
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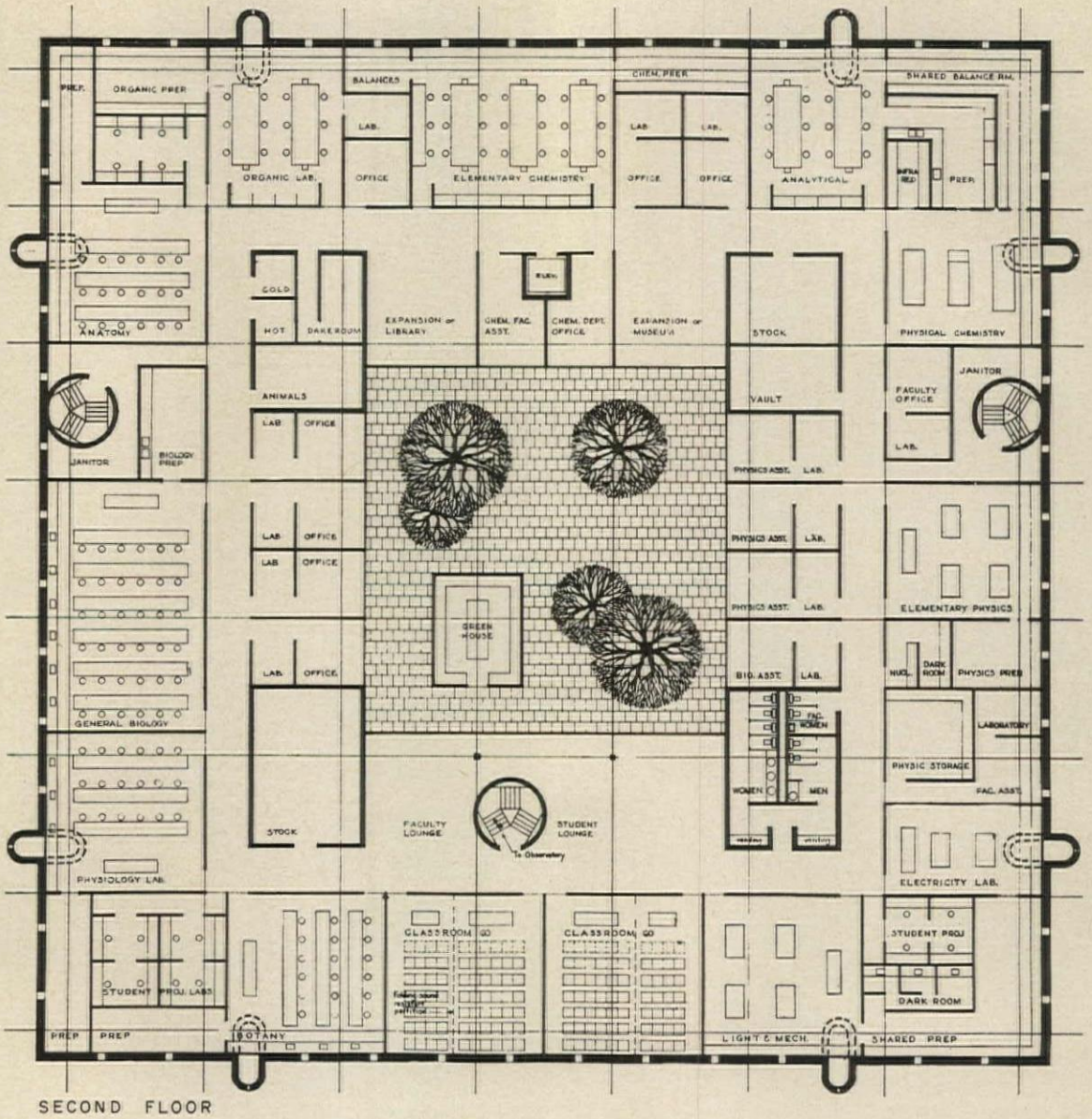
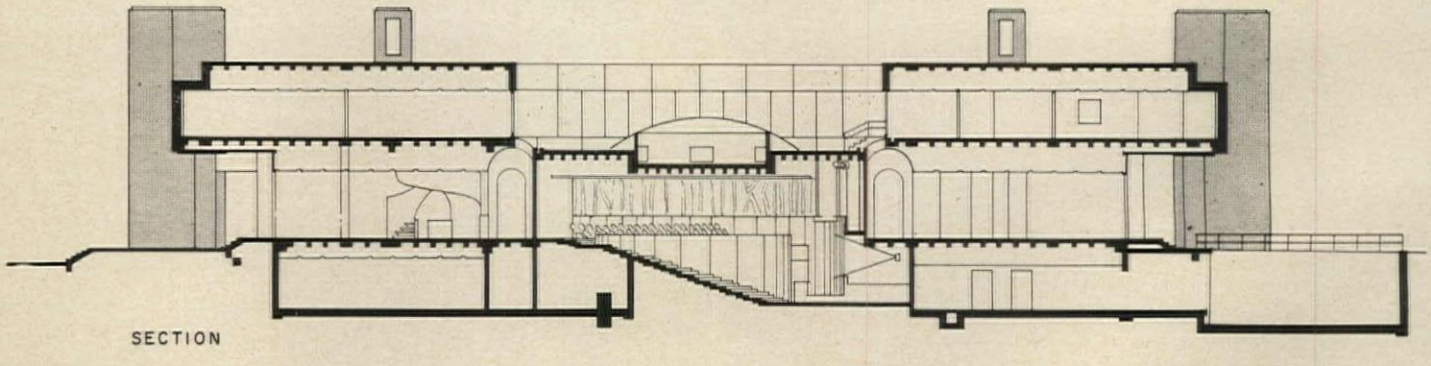



SECOND FLOOR



SECTION

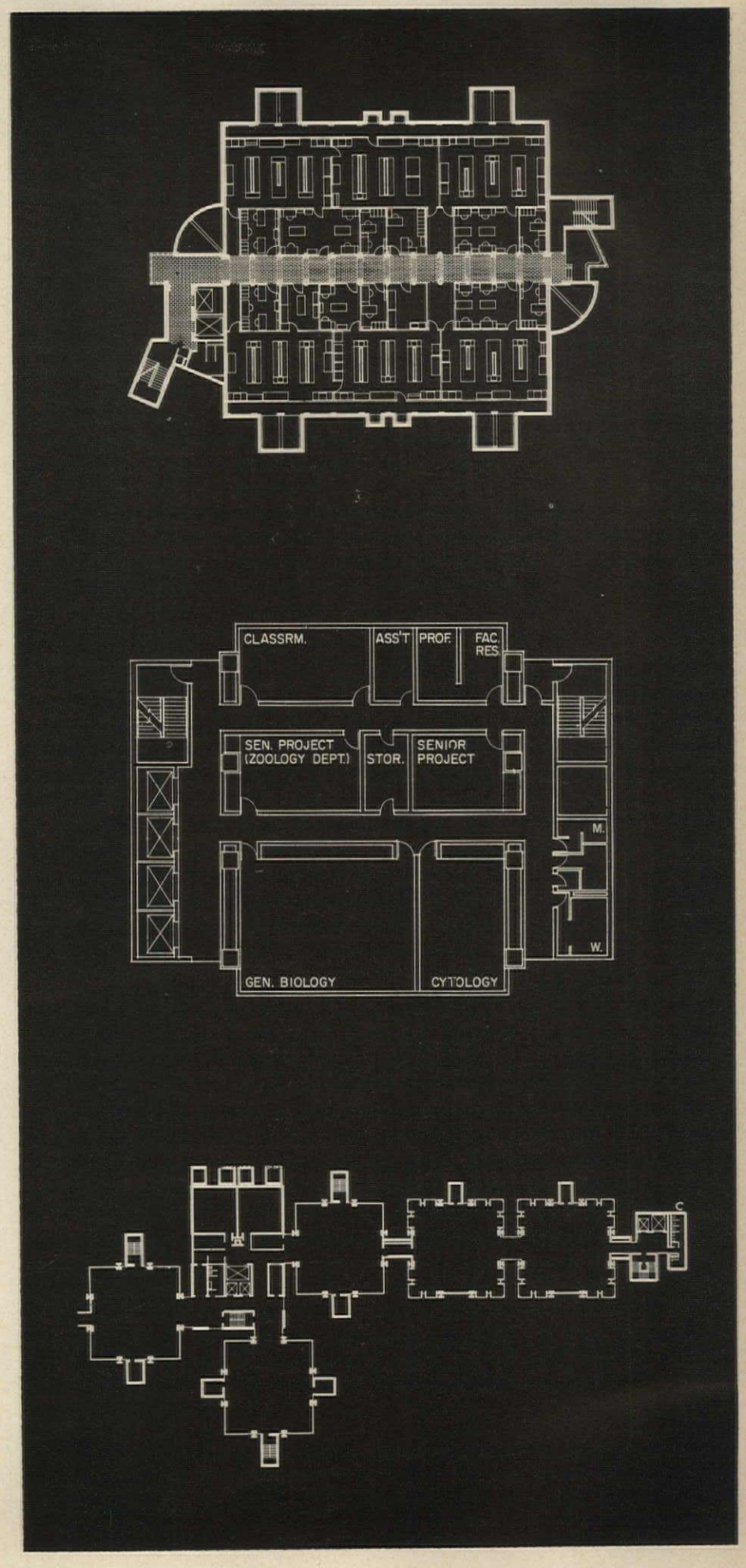
degree of separation possible, and the ratio of one type of space to the other, varies from discipline to discipline. The studies by Skidmore, Owings and Merrill on page 181 give a graphic representation of some of the possibilities, within a flexible space system which can be used for either purpose.

**The comparative study of eight different teaching laboratory layouts,** by Hellmuth, Obata, & Kassabaum, which is shown on page 178, assumes that all office space is located in a separate wing. Each method of organization is evaluated in terms of economy of construction and mechanical equipment, circulation and flexibility.

**A comparison of four basic types of industrial laboratories,** designed by architect Frank Whitney of Walter Kidde Constructors, Inc. is shown on page 179. The first one places the desk space within the laboratory itself. The second places the offices on one side of the corridor and the laboratories on the other. The third plan provides core laboratories and perimeter offices; the fourth provides a peripheral corridor and interior laboratories, with the desk space again incorporated in the research area. These four plans are representative of standard practice: most laboratories will be found to conform to one or another of these basic classifications.

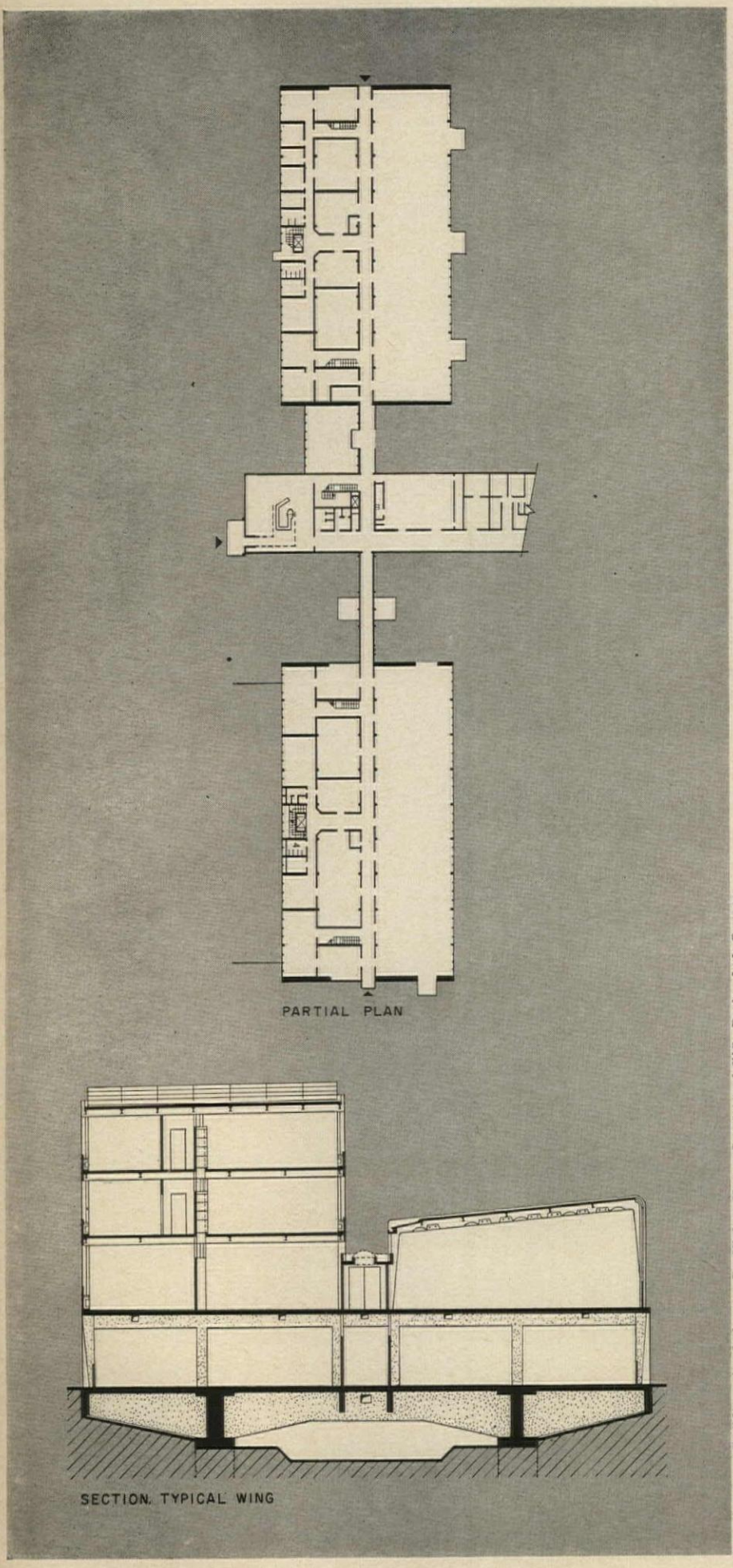
There are, however, other possibilities. Eero Saarinen's design for the IBM Research Headquarters in Yorktown Heights places both labotories and offices within a peripheral corridor system. If you accept the concept that all working accommodation should be interior space, this is a highly efficient and consistent method of organization.

Some laboratories are organized as




LEFT:
**Science building at Hollins College by Douglas Orr, deCossy, Winder & Associates. Peripheral service towers and a flexible plan.**

RIGHT:
**Laboratory tower plans from: the Agronomy Building at Cornell University by Ulrich Franzen, a projected science building at Barnard College by Vincent G. Kling and Louis I. Kahn's Richards Laboratories.**




*Drawing from Buildings for Industry, By Walter Henn. Courtesy of Iliffe Books, Ltd. © 1965*

towers, rather than horizontally. Ulrich Franzen's laboratory tower at Cornell (page 183) also provides interior accommodation, with laboratories that can be entered either directly from the corridor, or through the offices. Vincent G. Kling's projected science building at Barnard College is a tower, as are, of course, Louis I. Kahn's Richards Medical Laboratories at the University of Pennsylvania. Kahn's first towers provide completely undifferentiated space, which can be used as laboratories, offices or corridors. The later towers have desk space around the periphery on some of the floors. The plans of both of these buildings are also illustrated on page 183.

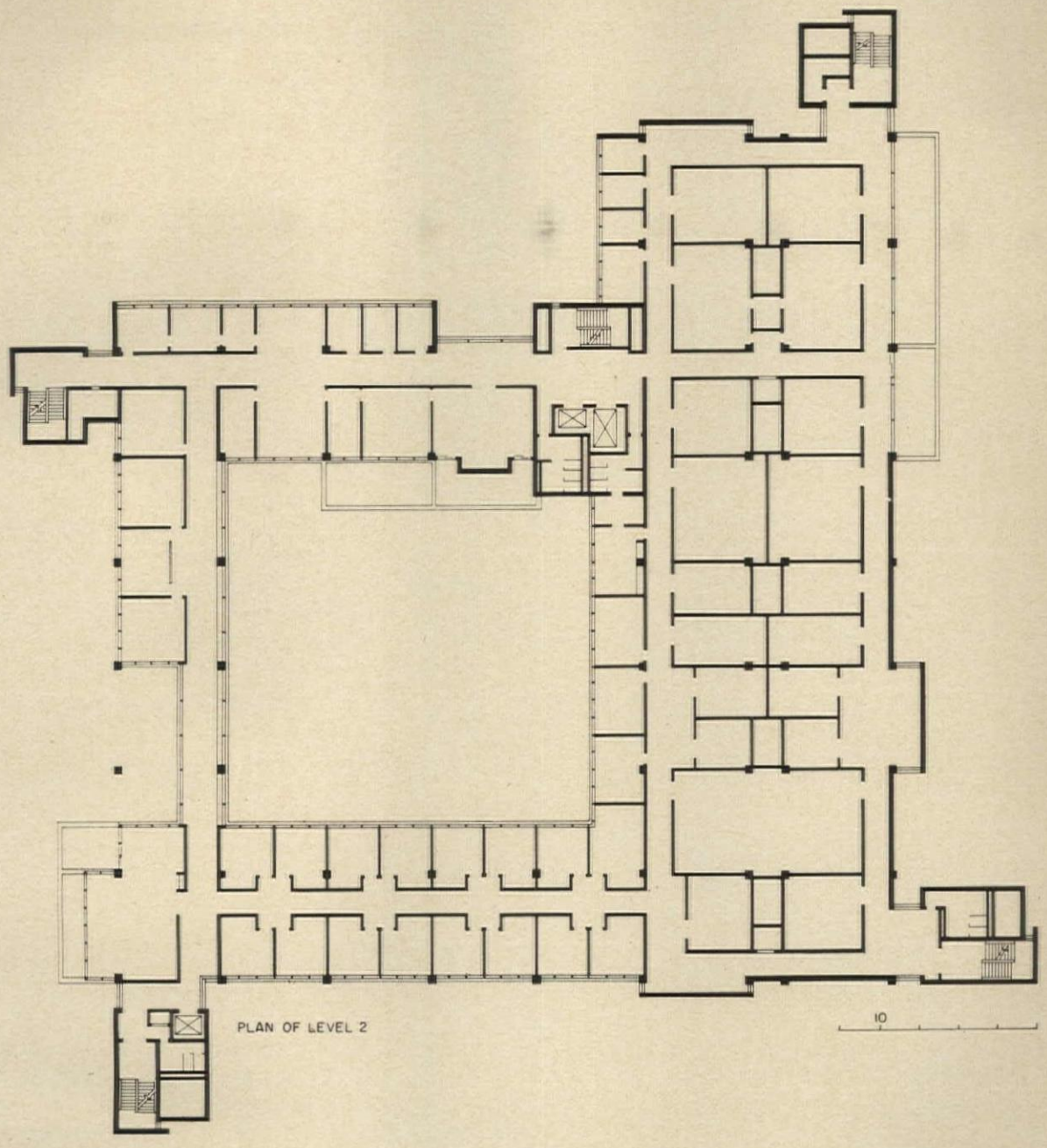
**College buildings tend to have more individual requirements built into them** than industrial laboratories do. Hugh Stubbins' Physics Building at Princeton, shown on the opposite page, and the Science Building at Hollins College (page 182) are good examples. The Princeton building contains teaching and research facilities for both theoretical and applied physics, with careful attention given to the needs of individual faculty members. Compare the section of the Princeton building with the theoretical study on page 174.

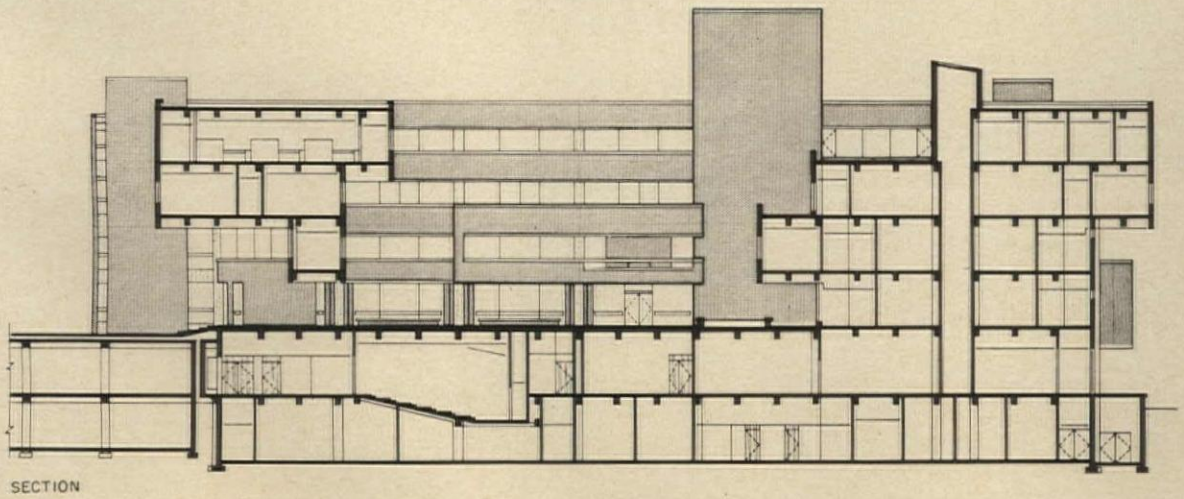
The Science Building at Hollins College by Douglas Orr, deCossy, Winder & Associates, is a more specifically instructional building, with a clearly limited size, but considerable flexibility within the confines of the present building.

**Some laboratories require experimental manufacturing or testing facilities** in addition to desk and research areas. The research laboratories for Thomson-Houston at Bagneux, France show one way of associating laboratories with this type of space.

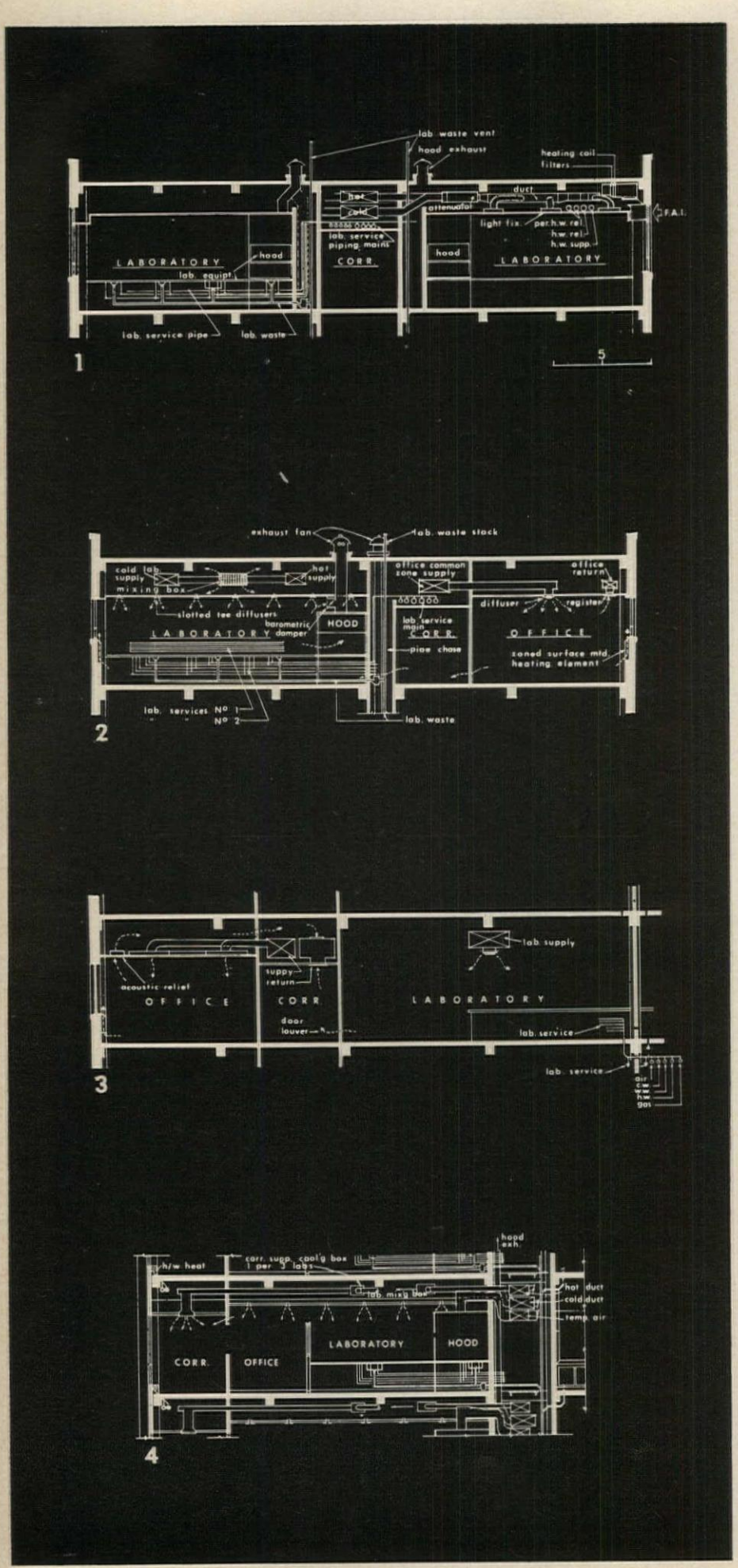
LEFT:
Laboratories for Compagnie Francaise Thomson-Houston by René A. Coulon, showing the association of factory-like experimental areas with laboratories.

RIGHT:
Physics Building at Princeton University by Hugh Stubbins and Associates reflects requirements of individual researchers more than industrial facility would.



SECTION




# DISTRIBUTION OF LABORATORY SERVICES

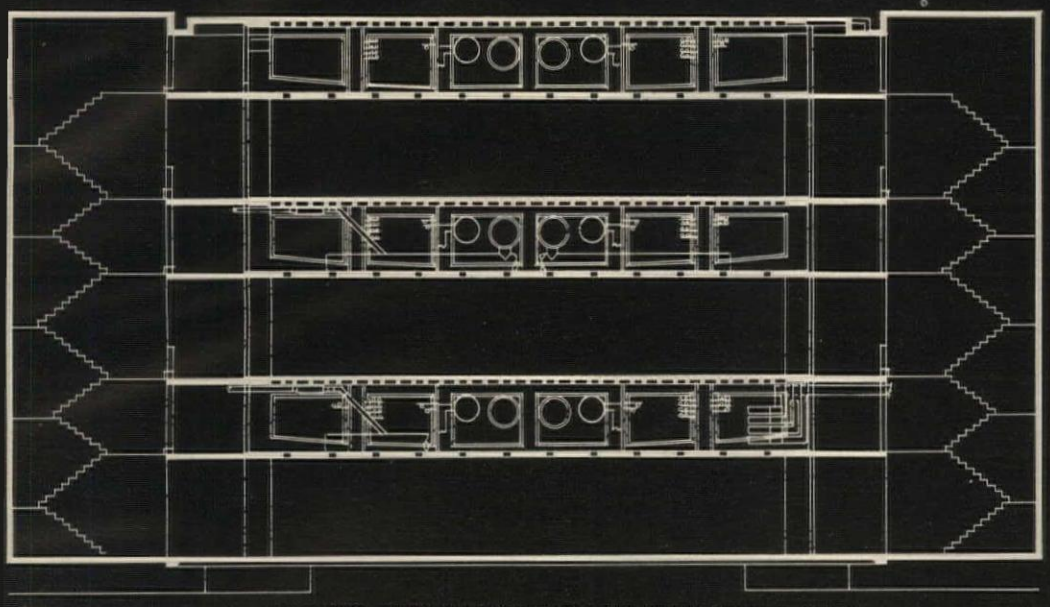
Essentially there are two basic ways of bringing plumbing and air-conditioning services to the laboratories: horizontally and vertically. The epitome of a horizontal system is Louis I. Kahn's Salk Institute for Biological Studies in San Diego, California. It has a mechanical floor, tall enough for a man to walk around in, contained within the structural system that spans each of the laboratory floors. These service areas are fed from vertical chases at the end of the building, so that the area devoted to mechanical distribution is actually greater than that devoted to research. The advantages of this arrangement are its almost complete flexibility, and its ability to permit extensive changes in one area, with the minimum of disturbance to other experiments. Flexibility on such a scale, however, is obviously expensive; and is by no means necessary in every case.

**An unusually compact and consistent vertical system** is used at Skidmore, Owings and Merrill's Center for Space Research at M.I.T. Vertical chases on 36-foot centers carry the laboratory services and all of the air-conditioning, except for the unit air-conditioners along the window wall. As shown on the plan at right, the horizontal duct runs are kept unusually short. These service shafts are fed from a single mechanical distribution floor; and the chases are large enough so that they can be entered and serviced.

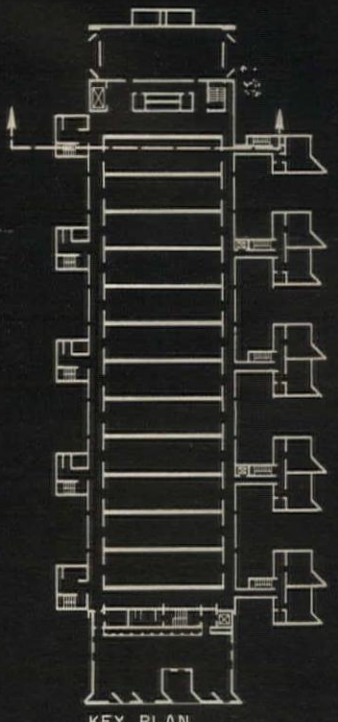
These two designs demonstrate the increasing proportion of laboratory

LEFT:
Some typical methods of servicing laboratories, from buildings by Walter Kidde Constructors, Inc. Reprinted from ARCHITECTURAL RECORD, November, 1962.

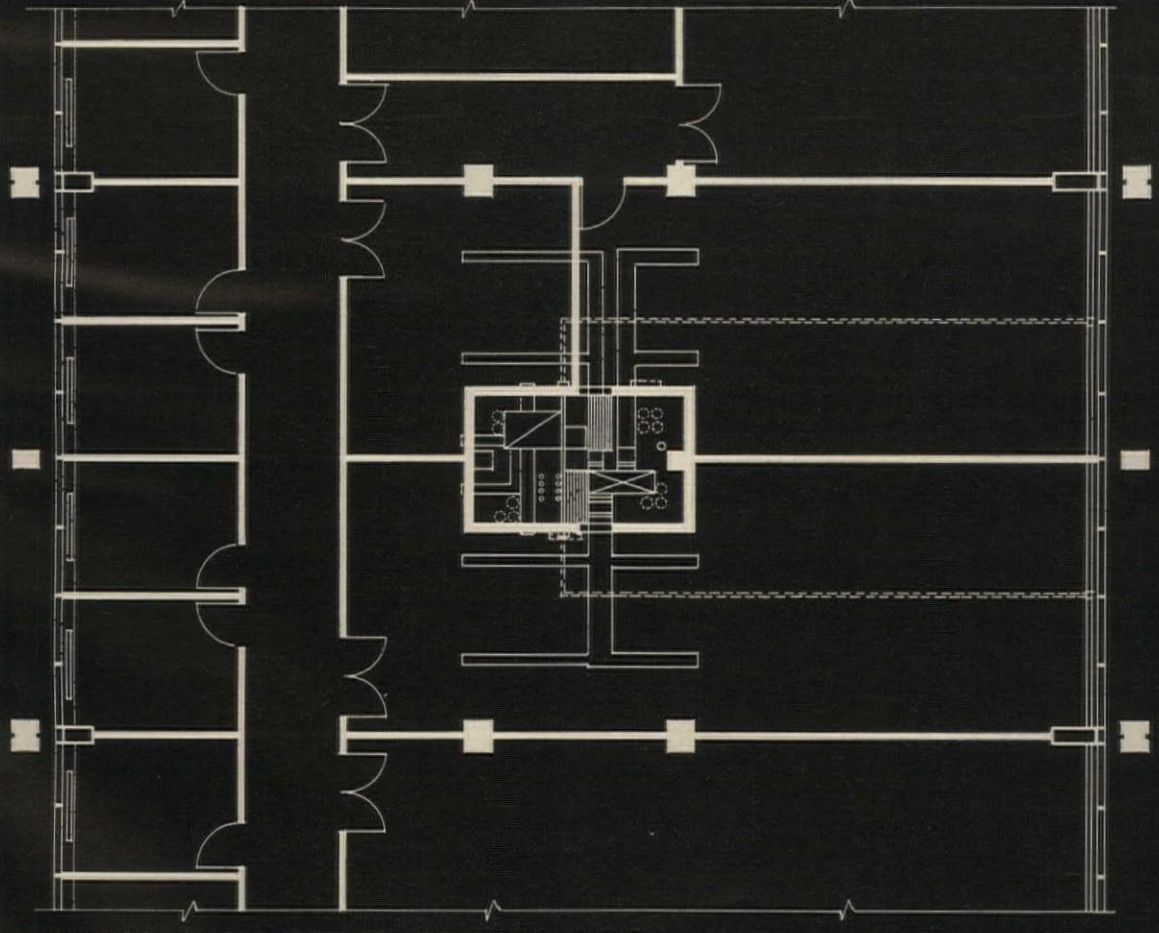
RIGHT:
A horizontal servicing system at Louis I. Kahn's Salk Institute in San Diego, and a vertical system: Skidmore, Owings and Merrill's Center for Space Research at M.I.T.



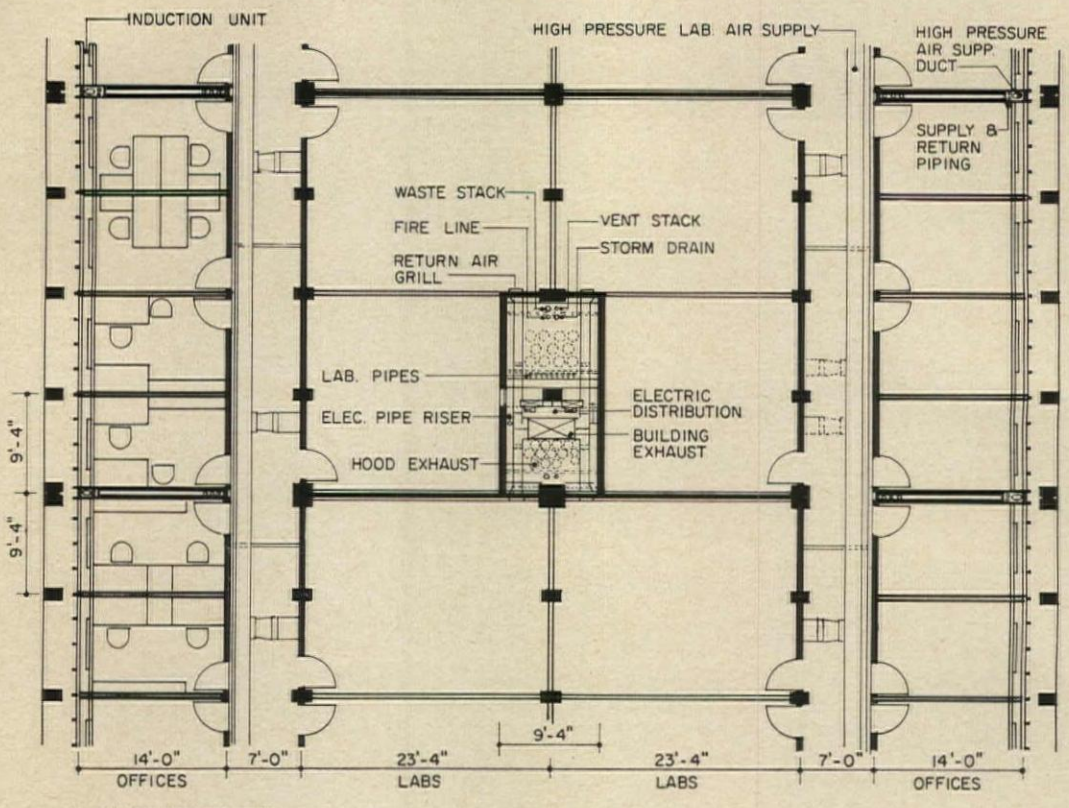
DRAWING BY FRED S. DUBIN ASSOCIATES OF SALK INSTITUTE FOR BIOLOGICAL STUDIES, SAN DIEGO.
ARCHITECT: LOUIS I. KAHN



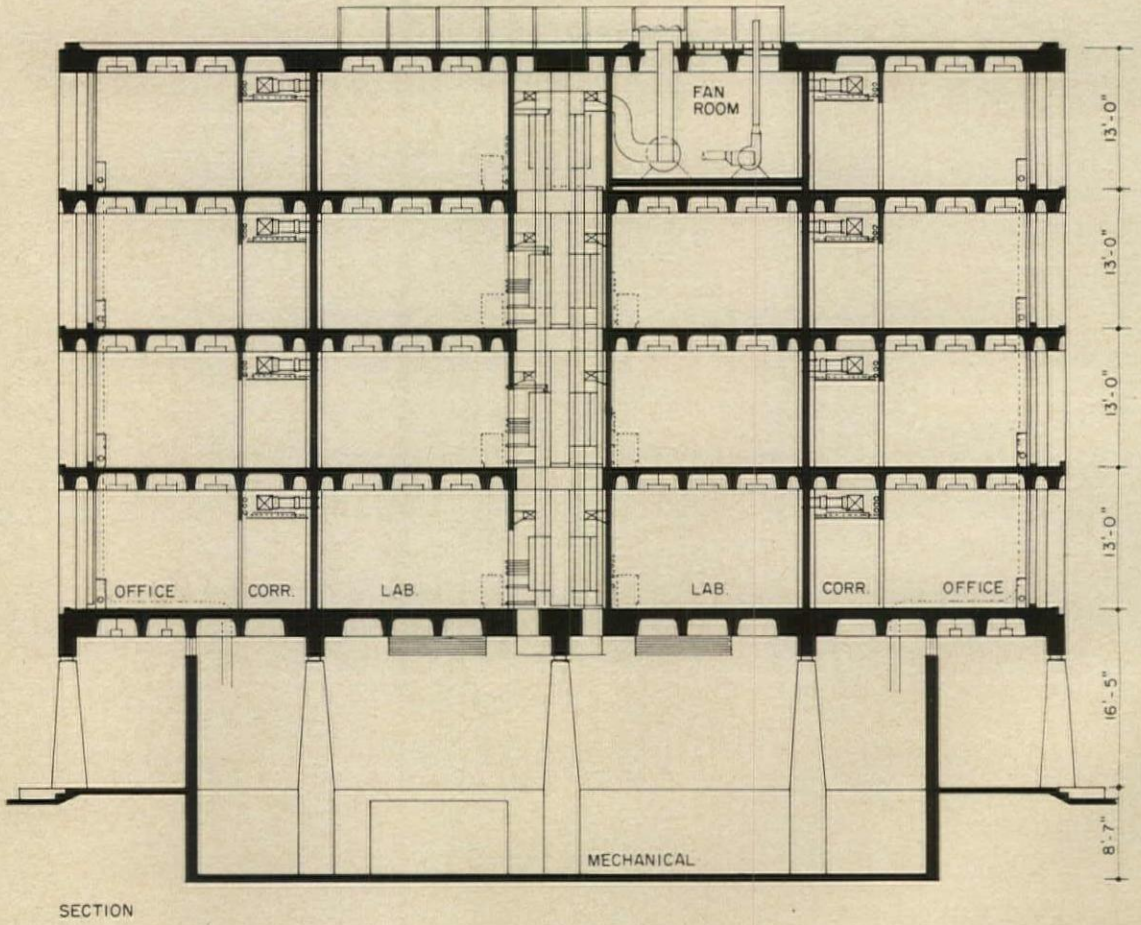
KEY PLAN



PLAN OF TYPICAL BAYS, CENTER FOR SPACE RESEARCH AT M.I.T.
ARCHITECTS: SKIDMORE, OWINGS AND MERRILL




PLAN OF TYPICAL BAY

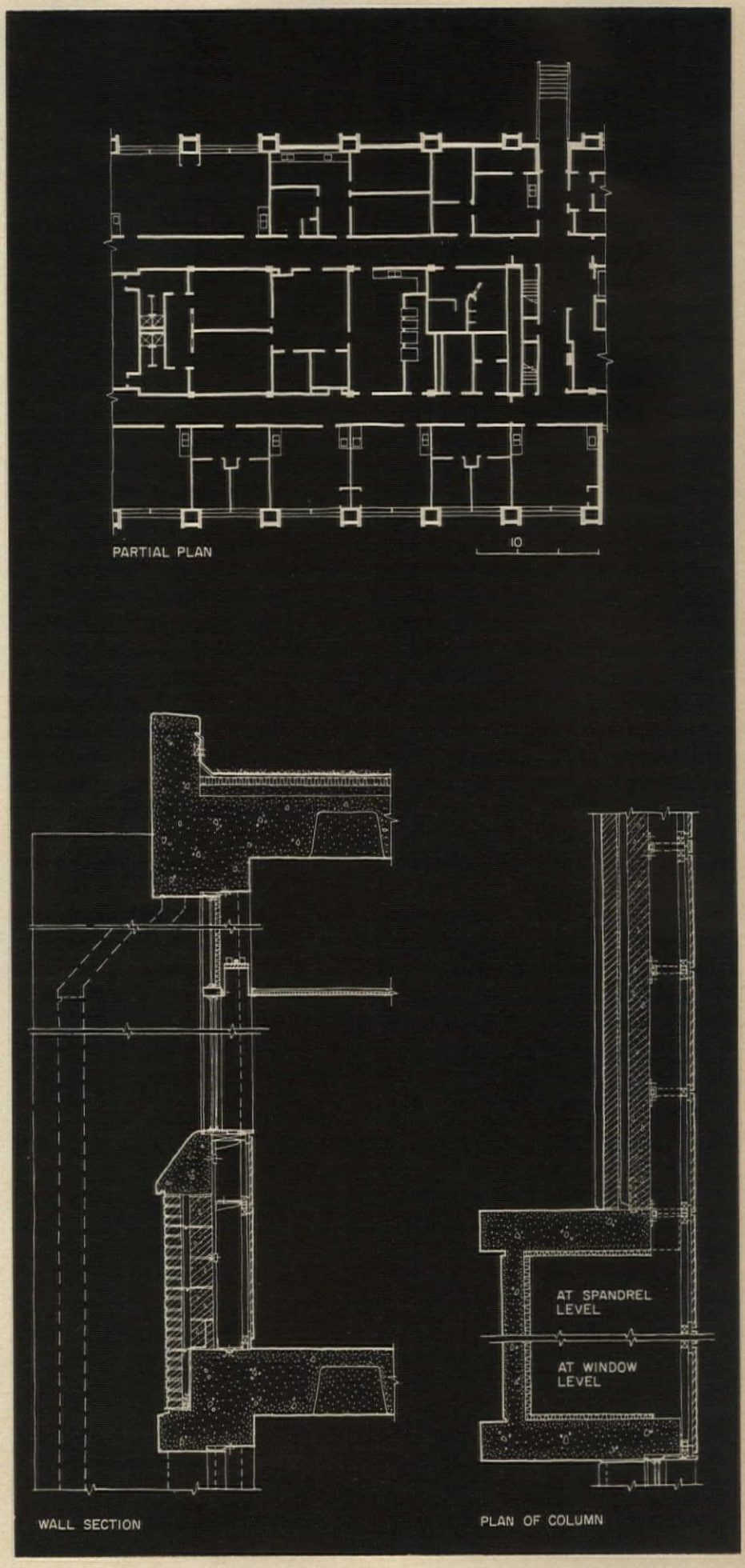



SECTION

space being devoted to mechanical equipment. The traditional means of servicing laboratory buildings are far less elaborate. The most typical method is probably the system shown in the first two sections on page 186, a compromise between horizontal and vertical modes of distribution. The corridor ceiling is used for the horizontal air-conditioning runs, because a corridor need not be as high as a laboratory. The vertical chases are spaced out along the corridor; they need not be large enough to enter, as it is possible to service them from the circulation space. Obviously, this is a simple and economical system, and one which still meets the needs of a great many buildings.

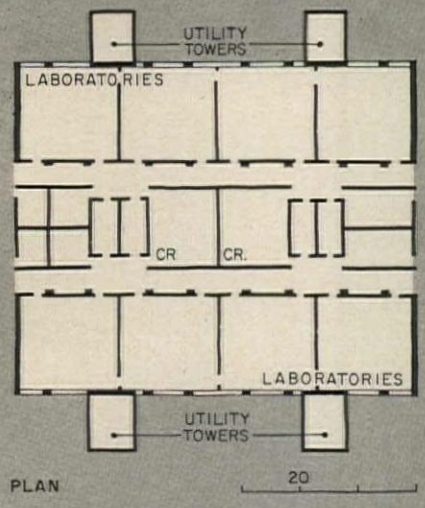
As mechanical needs, and particularly the air-conditioning requirements, continue to increase, the multiplicity of small, vertical chases begins to look less and less efficient. The fourth section on page 186 indicates one possible modification: a consolidated vertical chase running the length of the laboratory area.

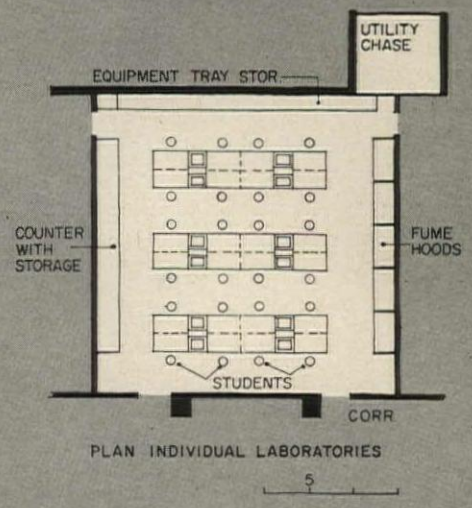
**Hugh Stubbins' Primate Research Center for Harvard** uses the columns to form mechanical chases, with horizontal runs occurring in the spandrels, but this building is not heavily serviced. The mechanical requirements of a typical laboratory seem to be moving closer to those of Caudill, Rowlett and Scott's Olin Hall of Science at Colorado College, where the entire peripheral wall is a pipe chase. A more complete integration of mechanical and structural systems is possible in larger buildings with long spans, such as Caudill, Rowlett and Scott's Science Building at the University of Miami. Both of the last two buildings have been published in the RECORD. (January 1965, pages 120-123).

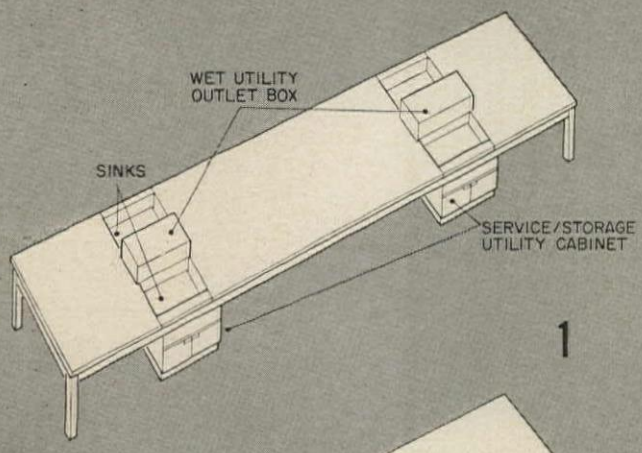


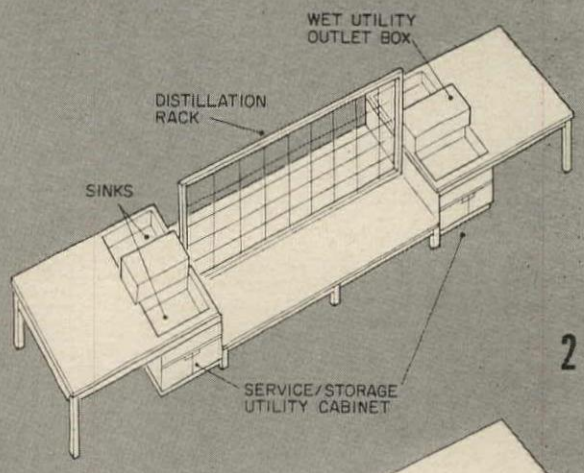

LEFT:
Partial plan and section of the Materials Sciences Building at M.I.T. by Skidmore, Owings and Merrill.

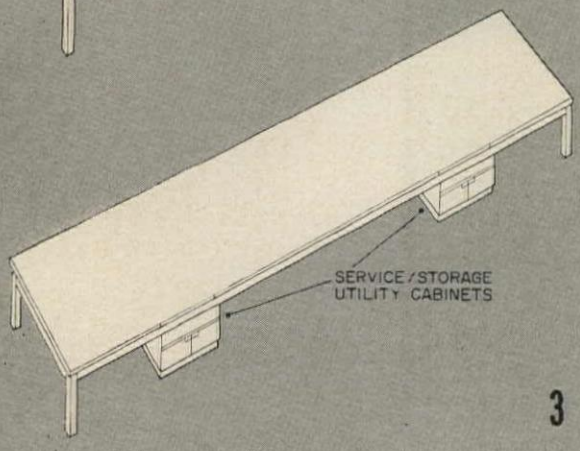
RIGHT:
Partial plan and details of the New England Regional Primate Research Center at Southboro, Massachusetts showing servicing system integrated with structure. Hugh Stubbins and Associates, Inc. were the architects.

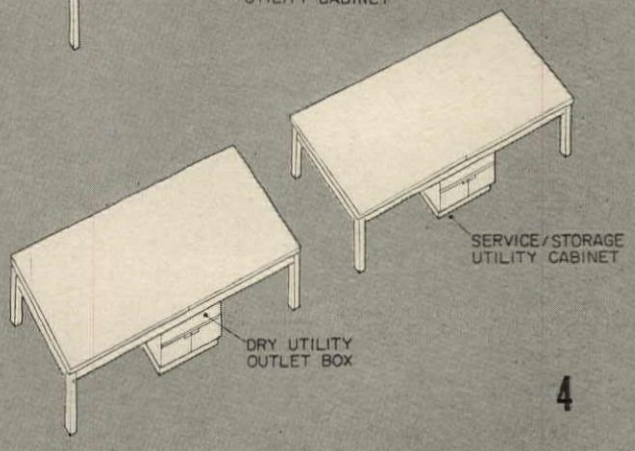

UTILITY TOWERS
LABORATORIES
CR
CR.
LABORATORIES
UTILITY TOWERS
PLAN
20

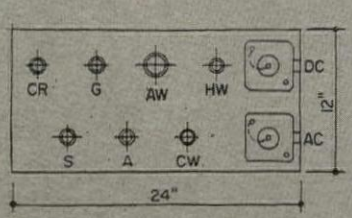

UTILITY CHASE
EQUIPMENT TRAY STOR
COUNTER WITH STORAGE
FUME HOODS
STUDENTS
CORR
PLAN INDIVIDUAL LABORATORIES
5

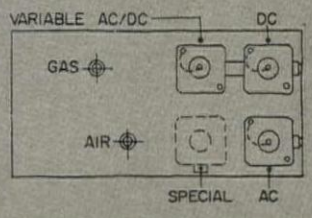

WET UTILITY OUTLET BOX
SINKS
SERVICE/STORAGE UTILITY CABINET
1

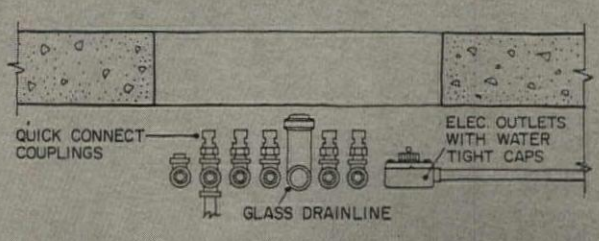

WET UTILITY OUTLET BOX
DISTILLATION RACK
SINKS
SERVICE/STORAGE UTILITY CABINET
2


SERVICE/STORAGE UTILITY CABINETS
3


SERVICE/STORAGE UTILITY CABINET
DRY UTILITY OUTLET BOX
4


CR
G
AW
HW
DC
12"
S
A
CW
AC
24"
CENTER TABLE WET SERVICES


VARIABLE AC/DC
DC
GAS
AIR
SPECIAL
AC
CENTER TABLE DRY SERVICES


QUICK CONNECT COUPLINGS
ELEC. OUTLETS WITH WATER TIGHT CAPS
GLASS DRAINLINE

# LABORATORY FURNITURE AND EQUIPMENT

Considering the exacting requirements of scientific research, it is surprising how little specific information exists about the optimum nature of the scientist's working environment. The dimensional tables at right are the result of a comprehensive study conducted by Britain's Nuffield Foundation in 1960. They are based only on physical movements, but they do indicate that the widely accepted 10-foot module for scientific laboratories is very often not large enough. Not only does it produce uncomfortable working spaces, but it does not provide room for certain new types of laboratory equipment, particularly electronic instruments, which are frequently larger than the standard bench width.

**Surveys of scientists tend to produce straight-line 45-degree-angle graphs:** the bigger the module and the longer the bench, the better the scientists like it. However, it is possible to arrive at a minimum dimension appropriate for a particular client or discipline. For example, the firm of Smith, Smith, Haines, Lundberg, and Waehler established an 11-foot module for laboratories at the National Bureau of Standards, after building a full-scale mock-up with movable walls and letting the client examine the possibilities. Such an elaborate technique is only appropriate for a large job; but the choice of module is an important decision, and by no means to be taken for granted.

**To achieve full utilization of space devoted to teaching laboratories,** it is possible to make them convertible

LEFT:
Convertible teaching laboratories developed for Southern Illinois University by Hellmuth, Obata & Kassabaum, Inc. See ARCHITECTURAL RECORD, August 1963, Page 169.

RIGHT:
Minimum working dimensions in laboratories, from research by the Nuffield Foundation Division for Architectural Studies under the direction of Lord Llewelyn Davies.

**Body measurements relevant to bench spacing.**

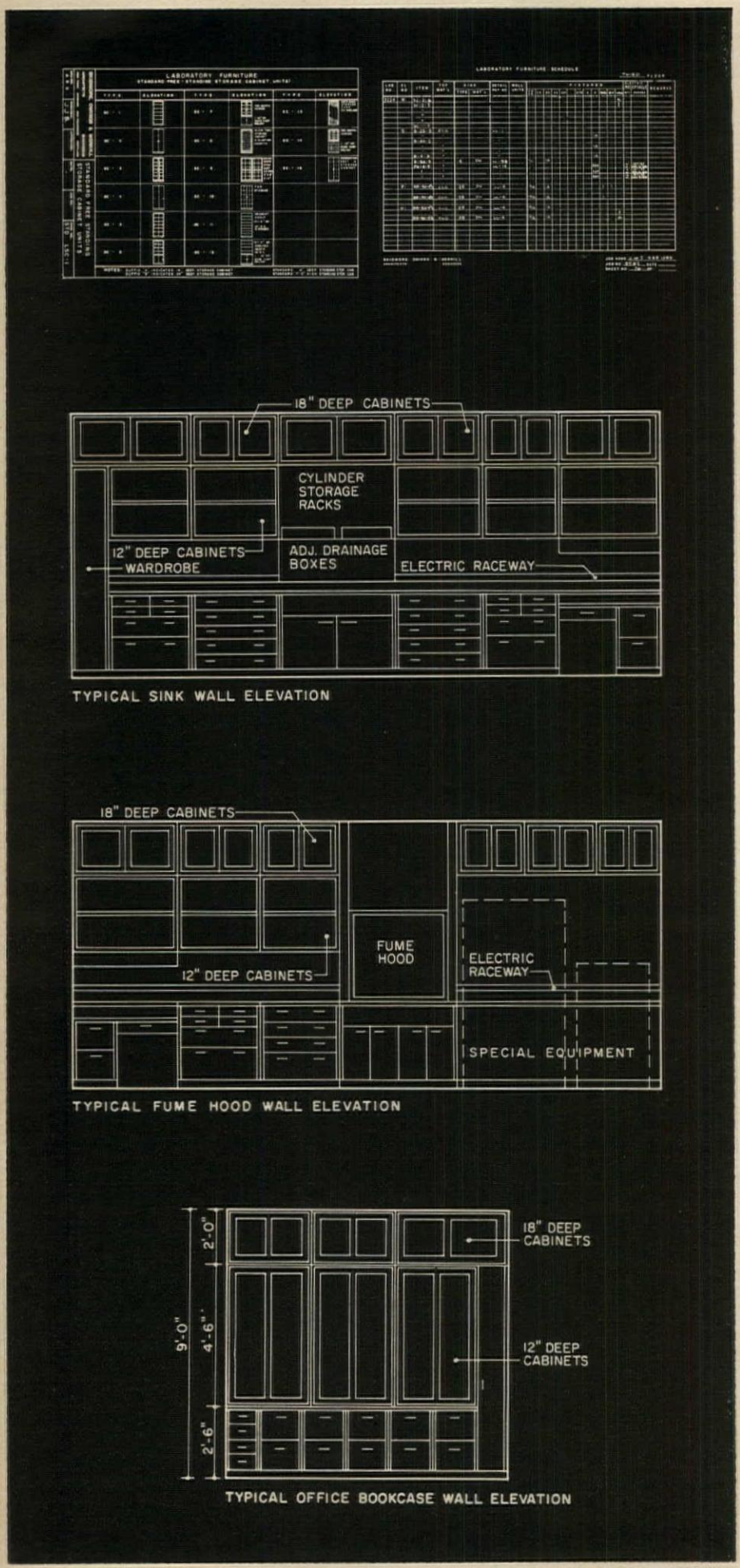
| *Activity* | *Average* | *To allow for 97 per cent of population* |
|---|---|---|
| (1) Working position | 18.7 in. | 21.1 in. |
| (2) Walking between benches | 18.5 in. | 21.0 in. |
| (3) Bending (derived from arm length correlated with trunk length) | 48.8 in. | 52.8 in. |

| *Activities in gangway carried out opposite each other* | *Dimensions** | | | |
|---|---|---|---|---|
| | *Average men* | | *Large men* | |
| (1) 1 working and 1 passing (sitting or standing) | 43.2 in. | Adequate for normal sized people only | 48.1 in. | Adequate for all subjects |
| (2) 1 working and 1 getting up from sitting to standing position (18 in. allowed for chair) | 57.4 in. | Not quite adequate | 63.2 in. | 60 in. considered adequate |
| (3) 1 working and 1 bending (allowing 36 in. as average bending, *not* 48 in.) | as in (1) above | | as in (1) above | |
| (4) 2 working and 1 passing | 61.9 in. | 60 in. not enough | 69.2 in. | 66 in. considered adequate |

**Recommended heights and clearances for laboratory furniture.**

| *Type of bench* | *Bench height* | *Seat height* | *Minimum vertical clearance from ground to underside of bench* |
|---|---|---|---|
| Sitting only | 2 ft. 4 in. (28 in.) | 1 ft. 5 in. (17 in.) | 2 ft. 2 in. (26 in.) |
| Standing and sitting | 2 ft. 10 in. (34 in.) | 2 ft. 1 in. (25 in.) | 2 ft. 8 in. (32 in.) |
| Standing and sitting | 3 ft. 0 in. (36 in.) | 2 ft. 3 in. (27 in.) | 2 ft. 10 in. (34 in.) |

| | *Minimum horizontal clearances under bench* | | |
|---|---|---|---|
| *Type of bench* | *At bench level* | *At ground level* | *Minimum knee-hole width* |
| Sitting only | 1 ft. 6 in. (18 in.) | 2 ft. 0 in. (24 in.) | 1 ft. 11 in. (23 in.) |
| Standing and sitting | 1 ft. 6 in. (18 in.) | 2 ft. 0 in. (24 in.) | 1 ft. 11 in. (23 in.) |
| Standing and sitting | 1 ft. 6 in. (18 in.) | 2 ft. 0 in. (24 in.) | 1 ft. 11 in. (23 in.) |




from one discipline to another. Hellmuth, Obata and Kassabaum developed convertible teaching laboratories for the University of Southern Illinois under a grant from the Educational Facilities Laboratories of the Ford Foundation. A plan, and some of the permutations, are shown on page 190.

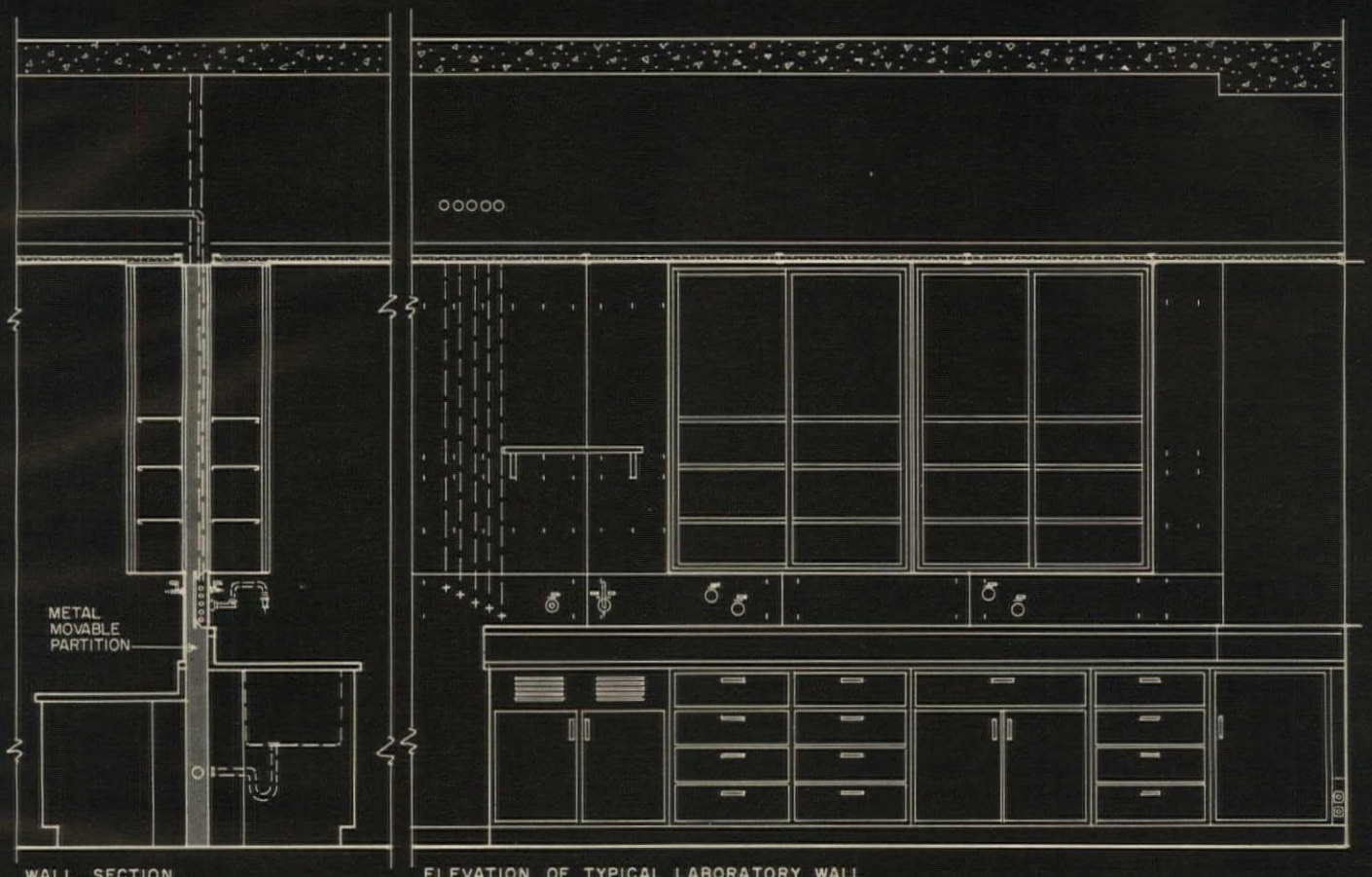
**Similar standardization is not possible in research laboratories,** of course; but it is possible to systematize the choice of laboratory furniture by the use of a standard check-list. Samples of Skidmore, Owings and Merrill's check-list system are shown at left (top). These lists are an office standard; they are used by the client in selecting furniture, in the design of the laboratories, and in compiling the specification.

**The familiar service strip running along the top of the bench** tends to produce a fairly permanent installation of laboratory furniture. The trend today is towards more flexible arrangements. The Hellmuth, Obata, and Kassabaum teaching laboratory system places service runs in the floor with quick-connect couplings at predetermined points. The services are suspended from the wall in Hugh Stubbins' Primate Research Center, and are run inside a hollow-metal movable partition at Vincent G. Kling's Medical Research Laboratories at the University of Connecticut.

**The theoretical scientist has been the forgotten man in laboratory design,** but several recent buildings have made an attempt to surround him with a "creative" environment. The office towers of the Salk Center and the viewing balconies of I. M. Pei's Atmospheric Research Laboratories in Boulder, Colorado give the scientist full advantage of beautiful natural surroundings.

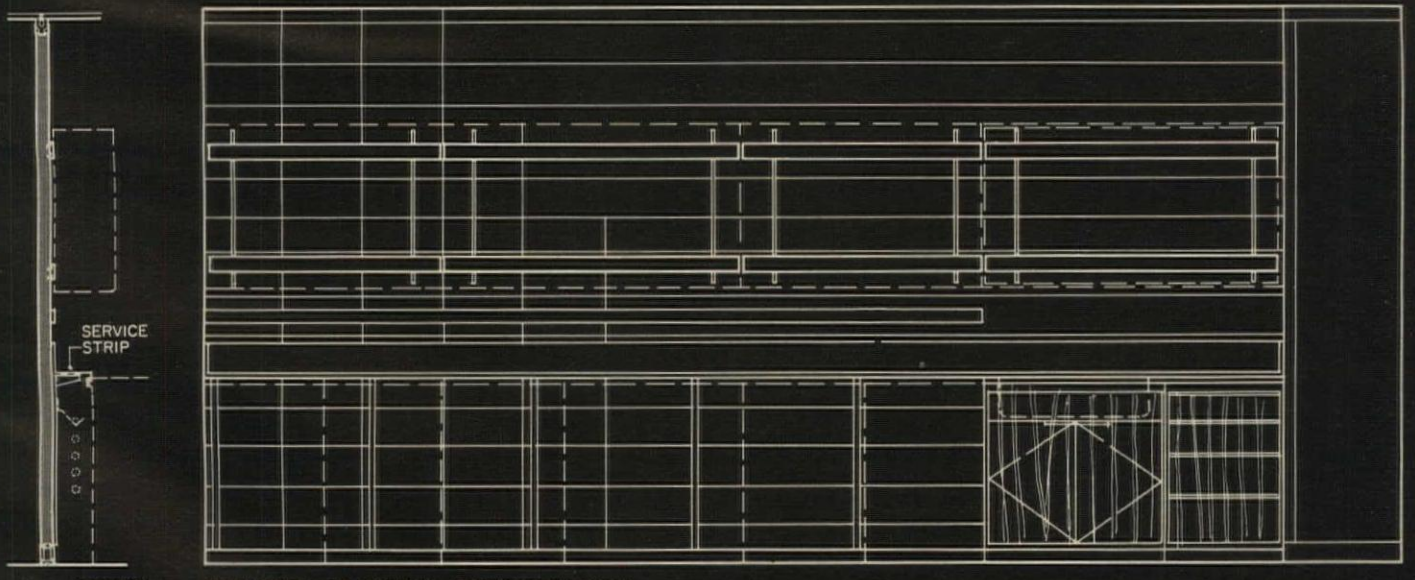
LEFT:
Samples of SOM's check-list for laboratory furniture; and a typical research laboratory at Wayne State University's Basic Science Building by Giffels and Rossetti.

RIGHT:
Wall sections and laboratory details (*top*) at Vincent G. Kling's Medical Research Laboratories, University of Connecticut, and of Hugh Stubbins's Primate Research Center.



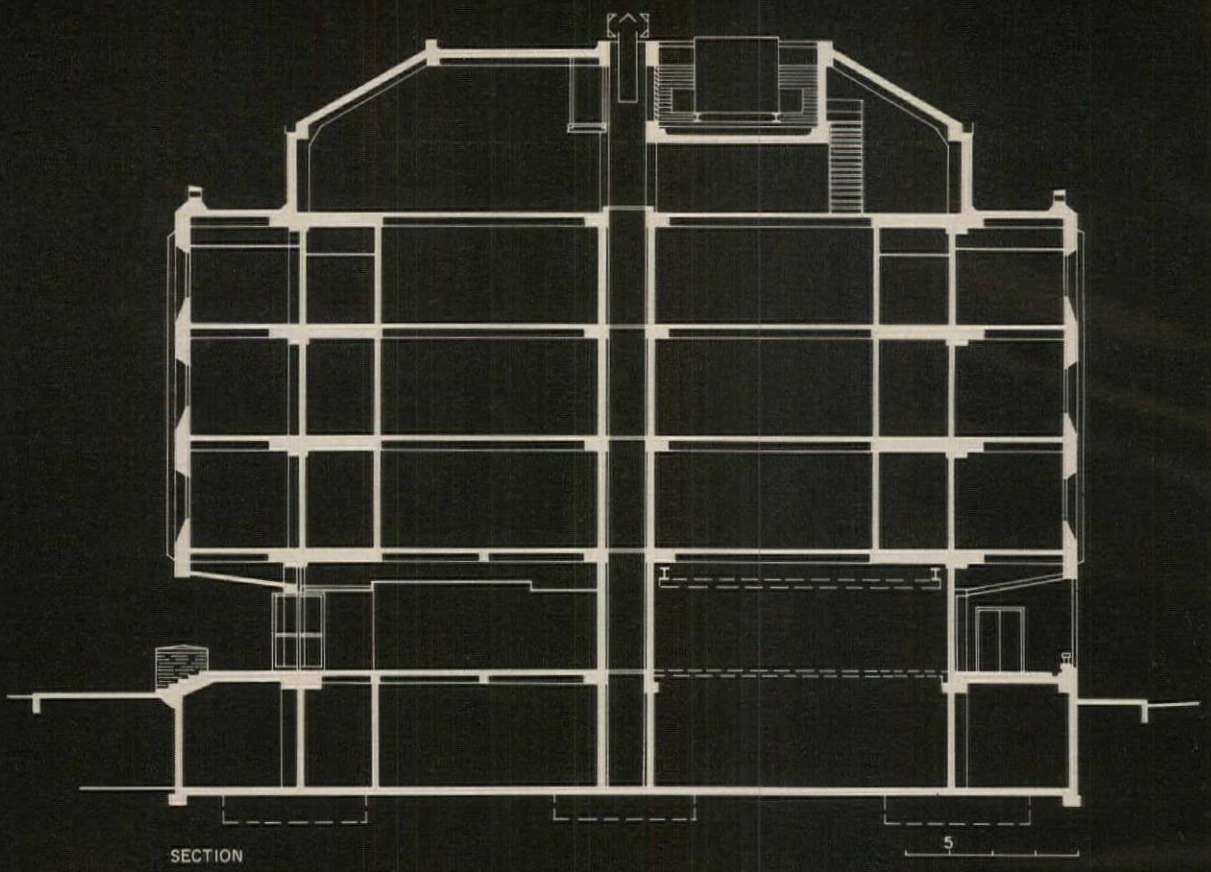

WALL SECTION

ELEVATION OF TYPICAL LABORATORY WALL

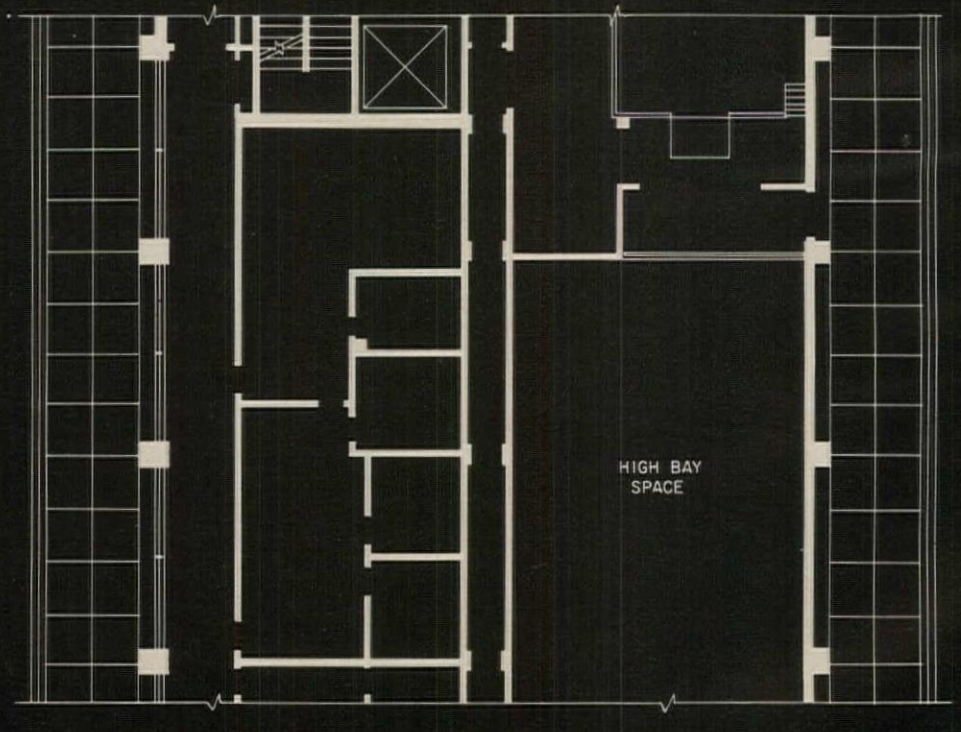



WALL SECTION

ELEVATION OF TYPICAL LABORATORY WALL




SECTION




PARTIAL PLAN

# PROBLEMS OF SHIELDING AND CONTAMINATION

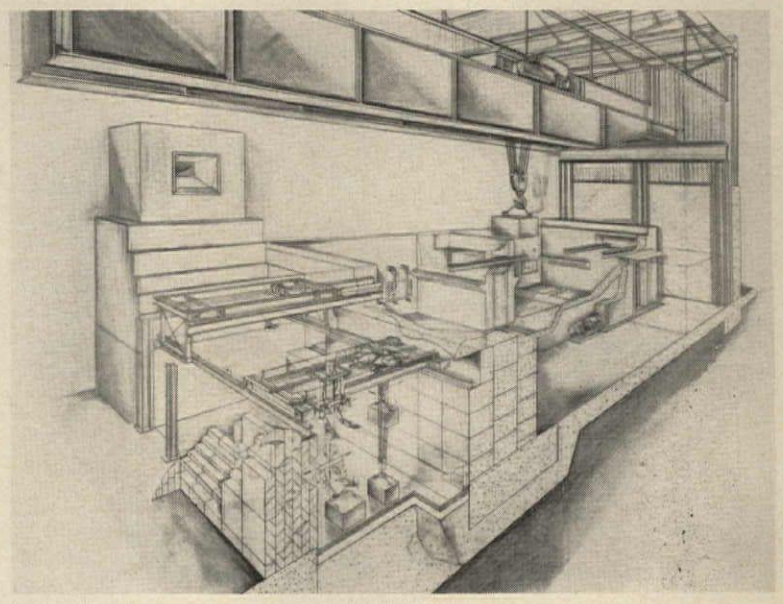
Many types of modern research present a situation in which the experimenter must be protected from the consequences of his experiment; or the experiment must be protected from outside contamination. Sometimes both requirements occur.

Radioactive materials can require as much as *twenty-four* feet of shielding to protect the experimenter. As cranes are needed to move the large, heavy masses of concrete or lead shielding, the typical laboratory for such experiments becomes a high-bay space similar to areas required by industry. Special remote-handling equipment manipulates radioactive materials inside the shielding.

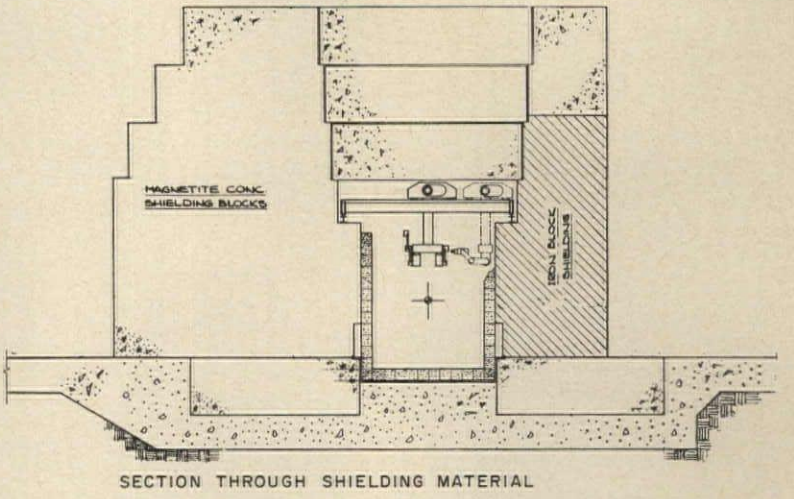
The illustrations at right reflect the capabilities of the Giffels and Rossetti office, which designed the shielding and the remote handling equipment, as well as the buildings.

**The section at left, of the Franklin Institute** in Philadelphia by Vincent G. Kling, shows a high-bay space integrated into a laboratory complex where the capability to perform many different types of experiment was required. Much work involving radioactivity, however, must be done in separate, isolated buildings.

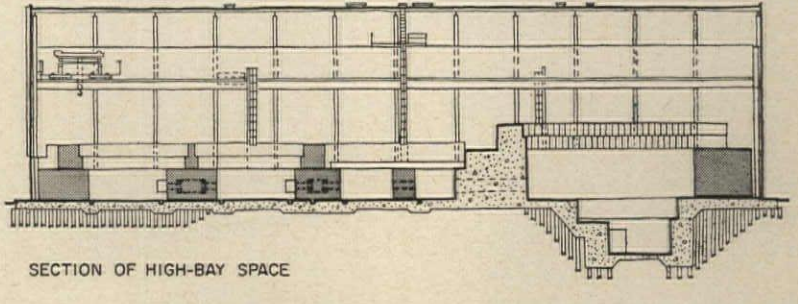
**Laminar air flow, a steady downward wash of air** without air pockets or eddies, is used in the clean rooms of R.C.A.'s assembly plant in Lancaster, Pennsylvania designed by Vincent G. Kling & Associates (p. 196). It is the first use of this technique on such a scale, and gives a pre-vision of the possible requirements of the laboratory of the future.



PERSPECTIVE OF REMOTE HANDLING EQUIPMENT



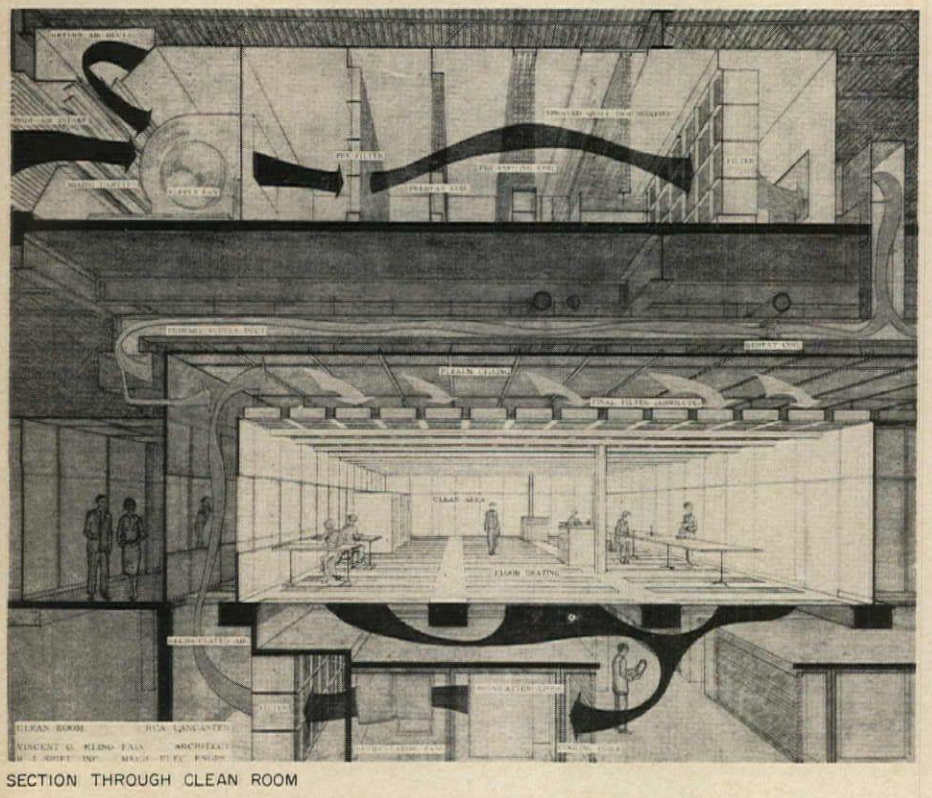

SECTION THROUGH SHIELDING MATERIAL



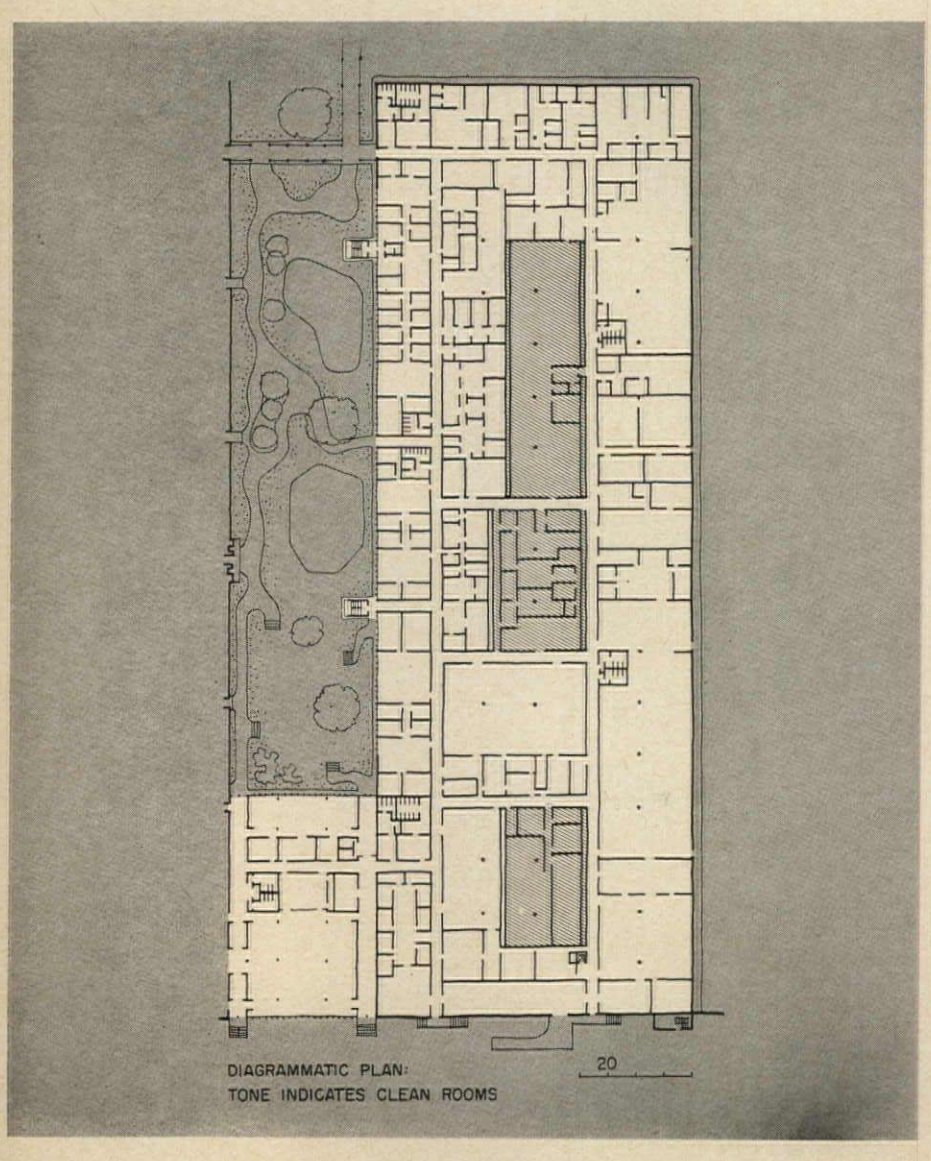
SECTION OF HIGH-BAY SPACE

LEFT:
Partial plan and section of the Franklin Institute, Philadelphia, Pennsylvania by Vincent G. Kling & Associates.

RIGHT:
Designs for research with radioactive materials by Giffels and Rossetti, showing remote handling equipment, the size and placement of shielding material, and the high-bay space to handle the heavy shielding.



SECTION THROUGH CLEAN ROOM




DIAGRAMMATIC PLAN:
TONE INDICATES CLEAN ROOMS

LEFT:
At top, a diagram of the laminar air flow used in the clean rooms at R.C.A. plant in Lancaster, Pennsylvania designed by Vincent G. Kling & Associates. The diagrammatic plan shows the location of the rooms. System is considerably more effective than conventional clean rooms: no air-borne particles can be measured with conventional equipment at bench level and above. Area below bench is not critical, because of flow.

# Architectural Engineering

## Industrialized Housing: A Reaction to European Approach and Methods

The problems of industrializing (prefabricating) public housing in the United States are 25 per cent technical, 40 per cent sociological and 35 per cent jurisdictional, in the view of one American manufacturer who attended the recent C.I.B. Congress for Industrialized Building in Copenhagen. George J. Santry, President of Schokbeton Products Corporation, says that in Europe production of industrialized components is considered necessary to provide public housing for a rapidly expanding population. Santry believes that the problems in the industrialization of housing in Europe are, by contrast, 75 per cent technical and 25 per cent sociological.

He reports that much of the public housing is inferior to middle- and upper-income housing from a construction standpoint. However the low-income housing has an attractive aspect because of the provision of large pieces of land for projects and the provision of parks, playgrounds and parking areas.

## Case Histories On Ethical Problems In Engineering Practice

Ethical standards in the practice of engineering is the subject of two new publications sponsored by engineering society groups concerned with these matters. "Ethical Problems in Engineering" is a 299-page book covering 168 case problems. A variety of opinion is expressed since over 150 people commented on various of 130 cases. The problems are divided into groups according to the particular area of work, i.e., ethical problems of the consulting engineer, the engineer in industry, the construction engineer, and the engineer in education. Each of these chapters is introduced by a discussion of the nature of the problems in the field covered. This book, written under the sponsorship of the Ethics Committee of the American Society for Engineering Education, is published by John Wiley & Sons, Inc. at a cost of $6.50.

The second publication is "Opinions of The Board of Ethical Review," published by the National Society of Professional Engineers, containing 58 cases which are based on the Canons of Ethics developed by the Engineers' Council for Professional Development, supplemented by Rules of Professional Conduct developed by N.S.P.E. Additional opinions of the Board of Ethical Review are published on occasion in American Engineer. This volume is available for $1.50 (75 cents to members) from N.S.P.E., 2029 K Street N.W., Washington, D.C. 20006.

## The Architect And New Materials

What does the architect look for in new materials? Architect Jack Train, of the New York office of Skidmore Owings & Merrill, listed four basic requirements in a talk delivered at the Conference on Cellular Plastics in Construction: (1) A complete and accurate account of each new material available; (2) A material that will fit within the manufacturing and installation practices of the present construction industry; (3) Products or materials that provide new or better solutions to the myriad of problems plaguing the construction industry; (4) Assurance that architects are not left alone "holding the bag" when new materials and products specified in good faith do not work out exactly as claimed by manufacturers.

Train went on to say that, "Some form of breakdown in communications between architects and manufacturers probably accounts for more wasted dollars and wasted product potential than any other item." He suggested that new materials be announced to the architectural profession in considerably more technical terms. Train said he felt that manufacturers are not often enough attuned to the building industry needs, but think they are, and thus develop products that are really not in demand. Train also said that, all too often, the manufacturer will recognize a general need and, in an attempt to meet it, will produce a product that fits his existing manufacturing equipment or technique, which, in turn, calls for certain compromises in the intended product. He may even hire an architect employee or consultant to assist him in his product design, but as long as he places manufacturing process ahead of final product, their services will be largely wasted."

The meeting was sponsored by the Society of the Plastics Industry, Inc. and the Michigan Society of Architect of A.I.A.

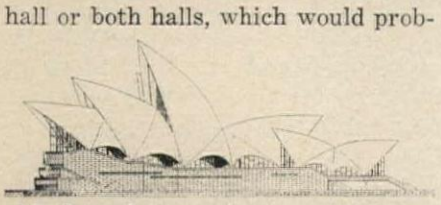
## Sydney Opera House: The Engineer's Story

The progress of the Sydney Opera House has been described by British engineer, Ove Arup, as a battle, but not as one might expect a battle between architect and engineer, or even between designer and client, but a battle in which client, architect and engineer are banded together to translate architect Jorn Utzon's original design concept into the reality of a successful, and perhaps even a great building.

The story of the struggle to find a viable structural solution for Utzon's Sydney Opera House has been spun out by Arup in *Architectural Design*, March 1965. This article provides a very revealing study of the relationship of the engineer and the architect in a highly complex structural situation. In recent years many architects have taken the position that the best structural and the best architectural forms are necessarily identical. But the whole story of the Sydney Opera House is the story of

translating a form, which was originally chosen for esthetic reasons, into a reasonable structure—even though Utzon thought his original design was structurally reasonable. He "was very disappointed" when told by Arup "that the shape was not very suitable structurally" and joined forces with Arup to research other possibilities.

However, Arup says, "it soon became clear that any alteration to the cross-section which would eliminate some of the bending stress induced by self-weight would completely destroy the architectural character, the crispness and the soaring sail-like quality of the structure. To replace the sails with rabbit ears would be disastrous. And to make a dome-like structure over the whole of each hall or both halls, which would prob-



ably have been easier, was of course out. So in the end Utzon and I decided that the scheme had to go forward as designed by Utzon, more or less. It is one of those not infrequent cases where the best architectural form and the best structural form are not the same."

The next phase in the struggle was working out the construction of the concrete shells and here there seems to have been an almost infinite process of trial and error and of modification of original ideas. Originally "each shell was different, there was no repetition, and this made precasting very costly." After many months of testing, calculating and considerable "heart searchings," Arup tells us that "Utzon phoned from Copenhagen that he had solved the whole problem of pre-casting. It transpired that he had changed the whole shape of the shells by cutting each of them out of the same sphere. So now they are all spherical, and the ribs follow meridian curves on spheres of the same radius, 246 ft. That means that all the ribs are identical, although of different length and cut off at different angles at the spine end." The geometry of the new scheme took about 18 months to work out and in Arup's words "without computers it would have been quite impossible. It is even necessary to use computers for the setting out of drawings, because we are working in three dimensions all the time. But the use of spherical surfaces certainly made the formwork simpler. There are about 2,500 concrete segments in the roof weighing seven to 12 tons each, and most of the forms for the rib segments, by far in the majority, can be reused 30 to 40 times."

In the course of the seven or eight years that work on the Sydney Opera House has been going on, Arup says that his firm alone has spent more than 375,000 man hours on the job and over 1,800 computer hours, and he evidently still does not feel that all their troubles are over . . . "the solving of and the calculations for the building process is by far the most difficult part of the job . . . and there is still ample opportunity for plenty of headaches to arise."

Whatever critics may think of the Sydney Opera House when it is ultimately completed, it undoubtedly represents a kind of creative collaboration between architect and engineer which is all too rarely seen; as Arup puts it "all that has happened on the job so far is structural engineering—and at the same time architecture."

## Exposed Concrete Techniques

Portland Cement Association's Structural Bureau has issued a new group of information circulars on exposed concrete. Subjects covered in the circulars include: (1) Fiber Glass Reinforced Plastic Forms; (2) Exposed Aggregate Textures; (3) Textures and Patterns from Plastic Form Liners; (4) Patterns and Designs (for jobsite precast concrete panels) and (5) Textures Produced by Various Form Liners.

## New Concepts In Plastic Design For Multi-Story Frames

Late this summer Lehigh University presented a 10-day conference on Plastic Design of Multi-Story Frames which was attended by over 400 engineering educators and practicing structural engineers. Purpose of the program was to encourage the educators to introduce the new concepts of plastic design of multi-story steel frames into their curricula as early as possible, and to provide engineers with greater insight into the actual behavior of multi-story frames and plastic analysis techniques and design procedures.

Until now plastic design in steel has been limited in this country to one-story and two-story rigid frames and to continuous beams, because of the lack of experimental evidence and analytical tools. Plastic design, which recognizes the reserve strength in continuous structures, gives the structural designer a more realistic understanding of structural behavior. Savings over conventional (elastic) design are expected to be in the range of 10 to 20 per cent of unfabricated materials cost.

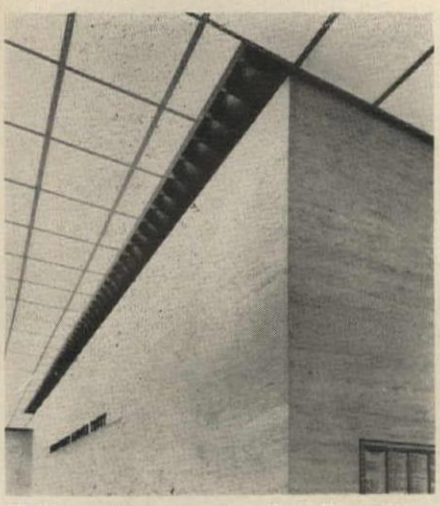
The term plastic theory is derived from a phenomenon that occurs after a structural member exceeds the elastic limit (stress proportional to strain). In effect "plastic" hinges develop at points of peak bending moment. Upon formation of these hinges, moments are redistributed from the most highly stressed portions of a continuous frame to those carrying less stress.

Plastic theory now incorporated in building codes assumes that axial forces may be neglected. To extend plastic theory to multi-story frames, researchers had to find a way to compute secondary stresses due to sidesway and buckling deflections, and to calculate the reduction in axial load capacity of beam-columns.

Research in plastic design at Lehigh began in 1947. By the mid-1950's, plastic design methods had been formulated for one-story and two-story buildings.

The conference included lectures by members of the University's civil engineering department, and demonstrations of 10 structural load tests which included a full-size three-story steel frame.

## This Month's AE Section



This continuous recessed wall washing trough is equipped with 150-watt R-40 spot lamps 9 in. apart, separated by aluminum baffles for shielding. It is employed in the lobby shown *below, right.*

# TECHNIQUES TO IMPROVE LIGHTING EFFECTS

*By David A. Mintz, Lighting Consultant*

Good lighting must start off with the development of a proper lighting concept in architectural terms. In other words, the lighting scheme must suit the use of space in question. But once the concept is established, there are many different types of equipment and equipment arrangement that can be employed to achieve the desired result. How the lighting is handled in a technical sense will depend on a variety of factors which include the general character of the architecture, certain preferences of the architectural designer, surfacing materials within the room, height available above the ceiling for recessed fixtures, area of the ceiling and/or wall available for fixture placement, and, of course, cost.

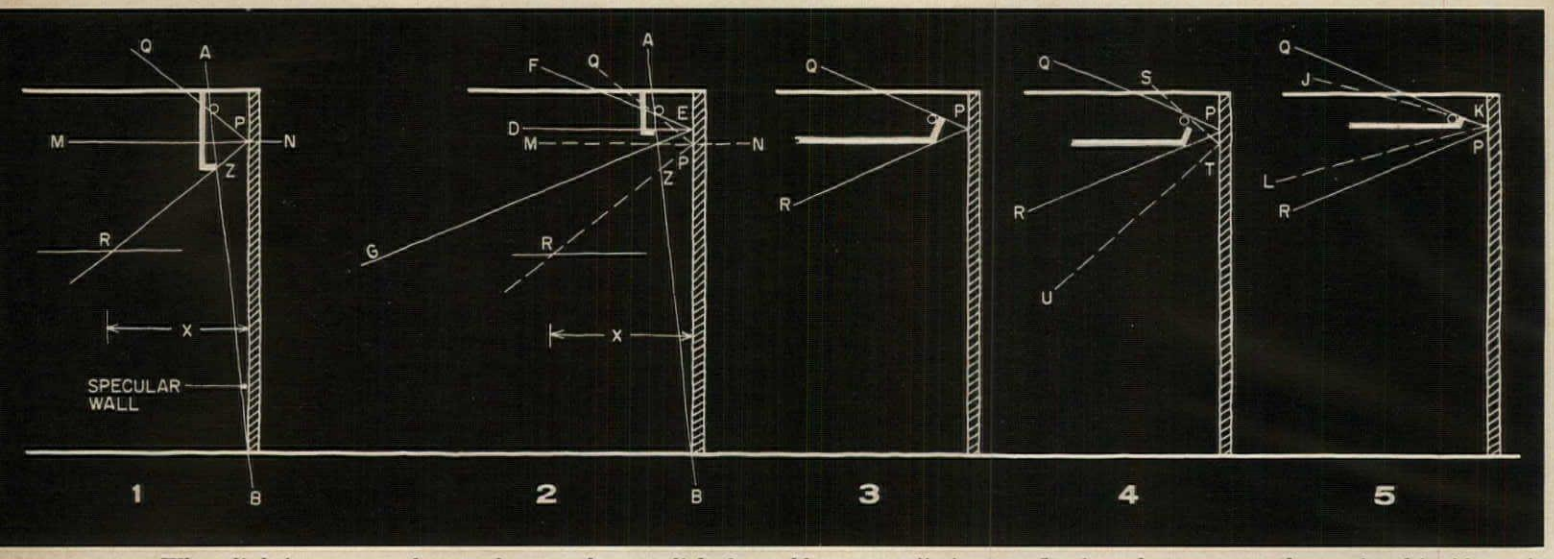
There seems to be a widespread belief that good lighting is necessarily expensive. In fact the opposite is more often true; attention to lighting at an early enough stage in the planning process can actually save money. Knowledgeable fixture selection often makes a substantial difference to cost estimates, and the working out of lighting requirements before the building is designed can avoid later, frequently expensive, changes in position of power outlets, fixture location, type of fixture used, or even quite drastic redesigning. Sometimes requirements for flexibility can be met by simple variations in lighting rather than by more expensive architectural elements.

More positively, of course, good lighting, irrespective of cost, can vastly improve an architectural

*Louis Reens*


Wall wash lighting of the focal wall of this lobby achieves good distribution from top to bottom without hot spots or shadows from the fixture. The matte surface of the travertine eliminates light source and other confusing reflections.


By contrast, multiple reflections obscure the effect of this sculptured corporate symbol. If lighting units were recessed and regressed above the ceiling line and placed close to the wall, reflections would then be out of the sight lines.




When lighting a specular surface, such as polished marble, lamp image reflections cannot be eliminated but can be contoured so as not to show. For example, in Figure (1) the light shield must intersect the line RN to eliminate reflections beyond distance X. When the baffle is shortened as in (2), possible angles of reflection are proportionately higher; point G is considerably beyond the cut-off point R. When determining how to eliminate reflections from a cove, the angle of incidence is taken tangent to the light source with the source inside the angle. The lip of the cove must intersect both the angle of incidence and the angle of reflection (3). In (4) where the lip of the cove is too short, direct reflections will be seen as shown by angle STU. Where the cove is shallow as in (5), reflections are seen as shown by the angle JKL.

scheme, just as poor lighting can nullify good architecture. The full power of an architectural concept may never be realized because of such common errors as:

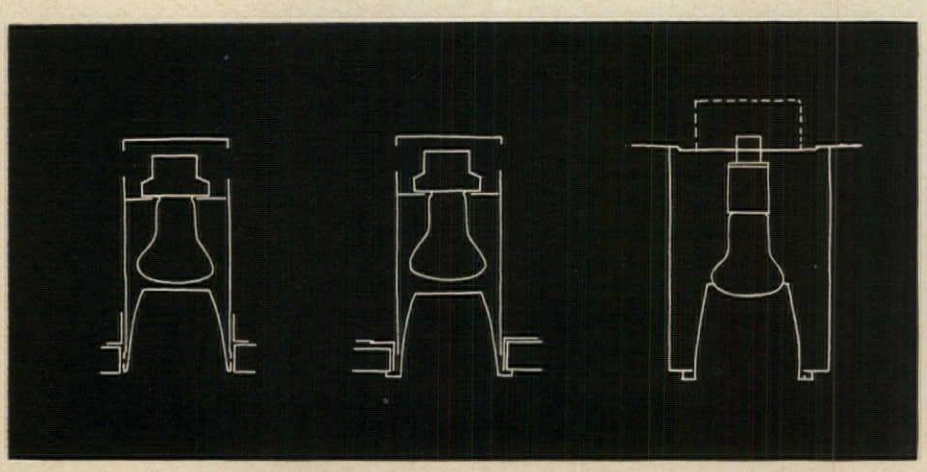
1. insufficient intensity
2. excessive brightness
3. too much contrast
4. lack of visual relief
5. improper treatment of specular surfaces
6. failure to highlight outstanding architectural features
7. selection of fixtures or quality of light inappropriate to the architecture
8. neglect of the relationship between daylight and interior lighting

In order to avoid these pitfalls and to create a meaningful lighting pattern within a building, it is desirable that someone in the design team should be well acquainted with lighting techniques and design details, as well as having a thorough knowledge of available fixtures and materials. He should also be aware of such things as the effect of light on different types of materials, and the ability of different kinds of lighting to produce variations in visual atmosphere. He must also, of course, coordinate such things as heat loads, power requirements, duct work and piping requirements with the electrical and mechanical engineers.

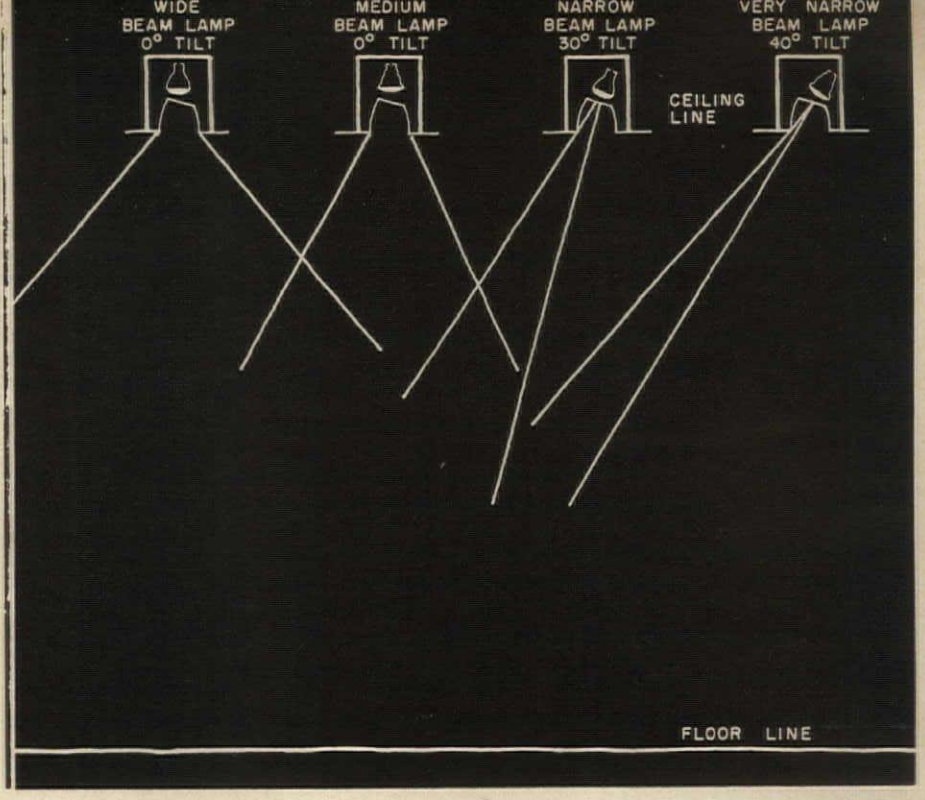
### Importance of Early Planning

The importance of giving consideration to lighting requirements as early as possible in the design process can best be illustrated by a few examples. Very often insufficient space is provided in the ceiling to accommodate the lighting equipment needed to accomplish the design objectives. Often the deficiency is only a few inches but requires time consuming and expensive redesigning, or the use of specially modified fixtures before it can be corrected.

Another example is the treatment of the prominently featured marble wall, often placed in lobbies or at the end of a vista through a building. It is not enough for the architect to know that he wants to light this wall for emphasis, as there are many ways to light a wall, each of which requires a different set of ceiling conditions in

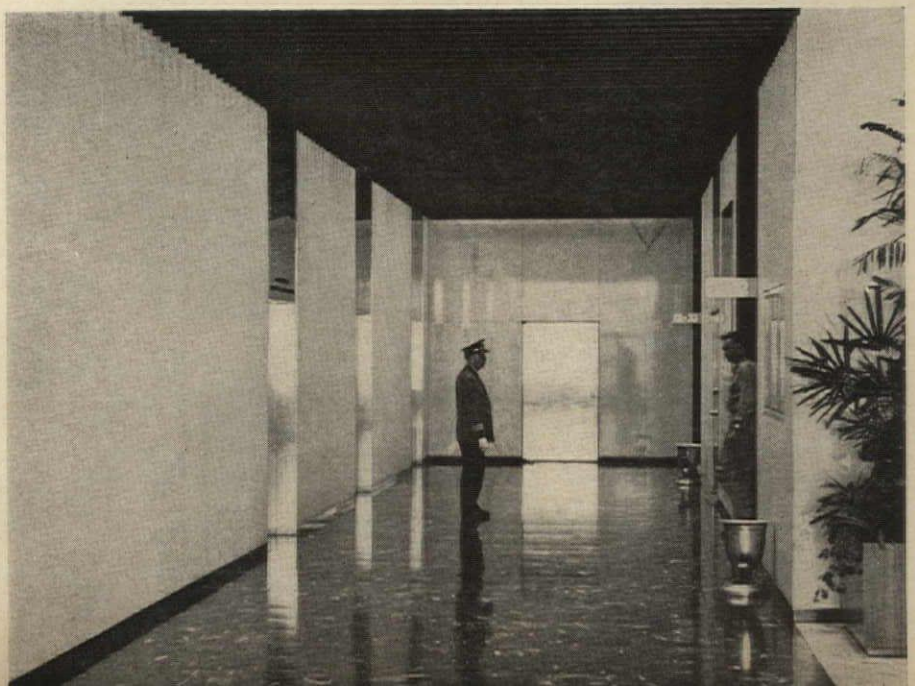


The lighting effect from these three fixtures would be exactly the same. Because of the cone-type shielding of the aperture, these downlights have a very low apparent brightness. But the architectural appearance of the ceiling would differ in each case. The unit at far left has no ceiling trim at all; the cone with the center unit has an accent trim; the whole downlight is below the ceiling with the unit at right.




Flexibility in terms of lighting effect can be achieved by using a lighting fixture which will accept several different lamps which, in turn, have different characteristics of distribution and wattage. The adjustable cone downlight illustrated could be used in a lobby in which exhibits, temporary booths or varying furniture layouts might be placed. Equipped with reflector flood lamps, the unit can serve as a low brightness downlight. Seating areas or counter spaces could be highlighted by using the narrower beam and more intense PAR flood lamps. Individual objects or displays could be accented by spot-type lamps, tilted to the desired angle. This kind of installation would maintain a clean ceiling and uniform pattern of fixtures, while providing for many different lighting situations.

The elegant, rather formal appearance of this lobby exhibition area is diminished by the unsightly lighting hardware protruding from the ceiling, which seems to have been an afterthought. Adjustable units capable of providing downlighting or accent lighting as required could have been used instead and would not have been visually disturbing to the architecture.



Black rather than white baffles were used with this luminous ceiling, thus establishing a relationship between floor and ceiling pattern. This otherwise routine treatment is a successful example of how special emphasis can be achieved through careful integration of lighting and architecture.

In this department store the high brightness of the ceiling and columns far exceeds the brightness of the merchandise, drawing the eye upwards away from the sales counters. Although the uplighting "enlarges" the space, downlighting should have been used with the uplighting to emphasize the sales counters.

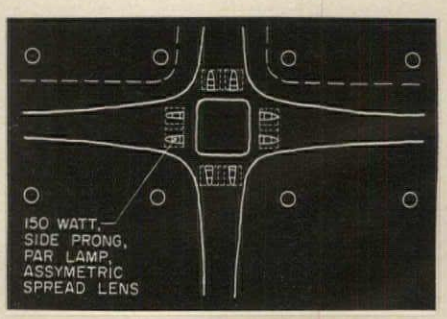
The use of a luminous ceiling in this space produces a diffuse non-directional source of light, so that the elaborately sculptured wall is washed almost flat because of the lack of shadows. Angled, directional lighting focused on the wall would have brought the sculptured designs into sharp relief.

regard to depth, spacing from the wall and shielding from the sides. It is important to decide whether a specular or matte finish is required, and to be aware of the vastly different space and position requirements for each. The approximate color of the wall, whether it is to be lighted evenly, lighted in grade wash or splashed with a pattern of accented highlights must all be agreed upon before exact lighting specifications can be drawn up. If graphic material is to be placed on the wall, a decision must be made as to whether this should be highlighted or not. All of these wall treatments require specific allocations of space and power which should be determined before the area is detailed. If these decisions cannot for any reason be made at an early stage of the planning, then it will be necessary to develop a set of ceiling conditions which will allow for alternate solutions at a later date.

If factors concerning space are not known at the time of design, flexibility can be built in by the use of units which can accept a variety of lamps, which in turn can have different characteristics of distribution and wattage. The inclusion of dimming equipment also provides a means of variation and balance after installation.

Extreme contrast between indoor and outdoor brightness can create considerable discomfort. This problem can often be overcome by control of floor, wall and ceiling colors in conjunction with location of lighting sources, use of louvers, tinted glass and choice of window shapes.

*Louis Reens*




The floating cloud effect of these ceiling panels is enhanced by lighting the columns as well as the area above the clouds. Integration of column and ceiling lighting emphasizes the special character of the ceiling treatment.

# WHAT BELONGS IN ACOUSTICAL SPECIFICATIONS

## Part 2 (Conclusion)

*By Ranger Farrell, Ranger Farrell and Associates*

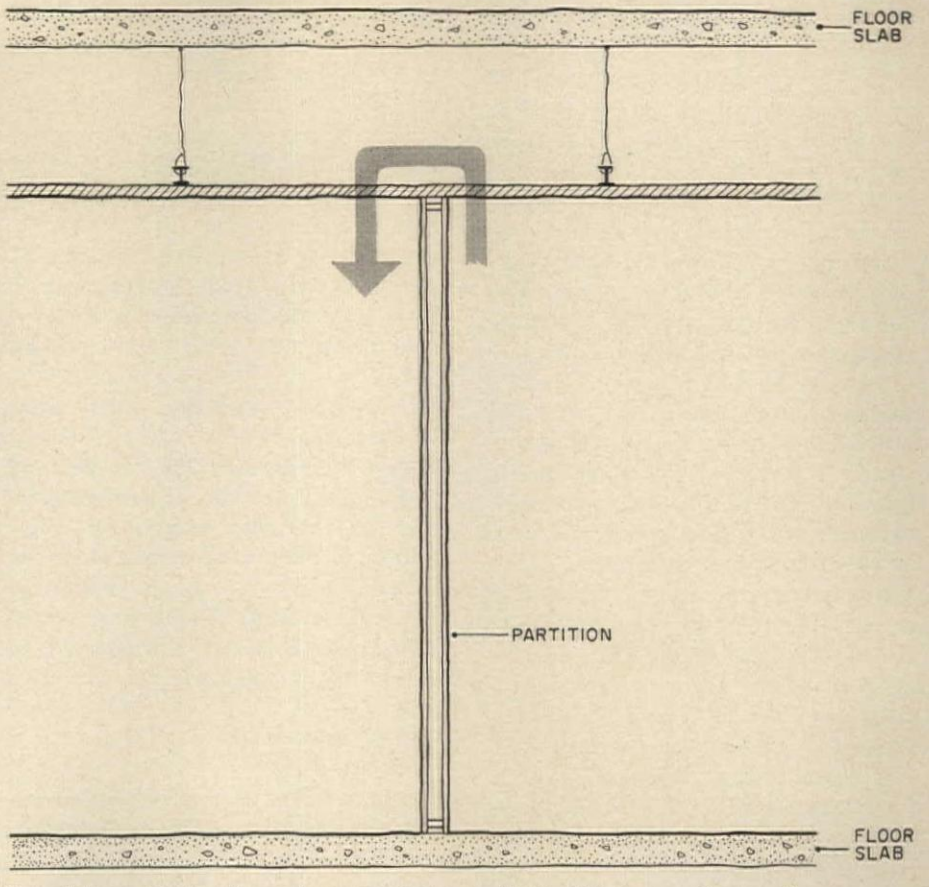
*Part 1, in the September issue, dealt with points to be included in acoustical specifications on mechanical equipment. This concluding article covers sound transmission, sound absorbing materials, vibration, and lease writing.*

### Power Level versus Sound Pressure Level

An area in which there has been considerable misunderstanding of the responsibilities involved is the specification of noise levels of various pieces of mechanical equipment. Many specifications still being published are based on sound pressure levels to be expected in a room when a given device is installed. Such specification may either be on a frequency basis as discussed previously or equally often on an A scale sound level meter basis. Specifying the sound pressure level which will result in the room is analogous to ordering a furnace which will result in 70 degree temperature in the completed structure.

The manufacturer should not be expected to do the heat loss calculations which will permit him to know how many Btu's are required to achieve a constant 70 degree temperature. Obviously, one orders a furnace by its Btu output and the mechanical engineer is responsible for establishing the requirement based on his knowledge of the building construction, local outdoor temperature, etc.

The acoustical property analogous to the furnace Btu capacity is the acoustic power level and again it is the mechanical engineers' responsibility to establish from the power level what the final sound pressure level will be in terms of the room size, absorption, and any intervening walls, floors, mufflers, etc., between the noisy device and building occupants. We feel there is no rational justification for the specification of mechanical equipment noise on any other basis than that of the acoustic power level.




Sound transmission through suspended acoustical ceilings was frequently a source of complaint in the past. Now manufacturers of acoustical tile publish sound attenuation data on their products, making it possible to specify the correct acoustical ceiling to achieve privacy between two adjoining spaces.

### Sound Transmission

Specifications dealing with minimum acceptable sound transmission loss of various building structures such as partitions (fixed and folding), doors, ceilings, and floor constructions should be written only when large numbers of such dividers are to be used or when the divider is factory fabricated. For example, the partition used to surround mechanical equipment, a computer room, broadcast studio, etc., should be designed by the architect through the use of available literature or with the use of a consultant. The construction should be shown on the drawings and no indication need be given of the anticipated acoustical performance. On the other hand, if many similar spaces are to be separated by a given type of divider, say plaster on metal studs separating hotel bedrooms or movable metal partitions separating private offices in a large building, a specification is desirable, particularly if it requires submission of acceptable laboratory test data on an identical partition construction.

Another instance of a type of product for which acoustical performance specifications are applicable is in the area of doors and operable partitions. Here the purpose of the specification is two-fold: first, through the submission of acceptable test data, the manufacturer proves his ability to accomplish the desired end, and, second, through the requirement that a

certain field result be achieved one gains assurance of proper installation in the field.

The effective method of specification of sound transmission appears to be as follows: In addition to the normal statement of the scope and limit of the specification, the specification should require one-half octave band sound transmission loss data obtained according to A.S.T.M.-E90-61T. This submitted report should give a description of the test facility and preferably the name of the facility.*

On the particular matter of measurement of sound transmission on doors for conventionally sized openings (as opposed to folding partitions or special custom installations) there appears to be no ideally suited test procedure. Probably the most effective method of tests is the A.S.T.M.-E90-61T test, wherein the test report clearly states that the door was in operable condition including all typical hardware. Unfortunately there are in the extant literature quite a few test reports on doors and panels sealed into the test opening. Since the effectiveness of the door gaskets is the prime determinant in the effectiveness of the door's isolation ability, sealed in place tests are meaningless.

A sound transmission path which, for a number of years, proved troublesome in many buildings was the path up through the suspended sound absorbing ceiling along the plenum and down to an adjacent space through its suspended ceiling. The manufacturers of acoustic tile who, for many years, have cooperated with one another through the Acoustical Materials Association, sponsored the development of the A.M.A. 1-2 room-to-room procedure. As a result, almost all manufacturers have had their product measured in the laboratory and published the resulting data in their own brochures and jointly in the Bulletin of the A.M.A. This is the only source of such information; however, it is reliable and completely acceptable as a basis of specification of proof of performance.

Rather analogous to ceiling ratings is a specialized problem of sound transmission through air diffusion devices when used as return air grilles in plenum return ventilating systems. The Air Diffusion Council (A.D.C.) has recently prepared a standard designated A.D.-63 which describes a test procedure almost identical to A.M.A. 1-2 and which gives a reliable indication of the seriousness of this sound transmission path.

There are only two independent laboratories capable of performing either A.M.A. 1-2 tests or A.D.-63 tests. These are Geiger and Hamme and the laboratory of Michael J. Kodaras. It should be noted that the latter's facility is not yet suited to the measurement of sound transmission through partitions referred to previously, but will be soon.

### Sound Transmission Through Floor

The rating of sound transmission through floors must be done in two ways. First, there is the question of rating it for air-borne sound transmission in which case tests can be conducted according to A.S.T.M.-E90-61T in either the National Bureau of Standards Laboratory or the Riverbank Laboratory. Unfortunately, because of the cost of installing floor constructions, relatively little data are available in the existing literature. However, the structural requirements often make necessary a ceiling so heavy that air-borne sound transmission is of relatively small importance. This is almost entirely true for typical occupancies when a suspended ceiling is utilized in conjunction with the floor. It is the present standard in multi-family dwellings, at least here in the New York City area, to utilize 5 or 6 in. concrete slabs with a coating of plaster directly applied to the underside. It is important to note that this is not sufficient to satisfy all apartment dwellers.

The second way of rating floors is for impact noise. The only existing reference in this area is the Federal Housing Administration Bulletin No. 750 which describes a method of test and also one number rating. There is some question as to the correlation between the test results and the consumer satisfaction. Although it will do little harm to specify impact noise ratings using either frequency dependent data or the impact noise rating (I.N.R.) outlined in Bulletin 750, there is some question as to whether it will do much good. In the first place, the floor and ceiling construction is usually established by the architect and structural engineer rather than let out on competitive bidding basis where the bidder may substitute alternate constructions of his own conception. It would seem, therefore, rather than specify impact noise requirements it is best that the architect and his engineer simply check the noise rating of the construction and determine its acceptability on the basis of their own judgment.

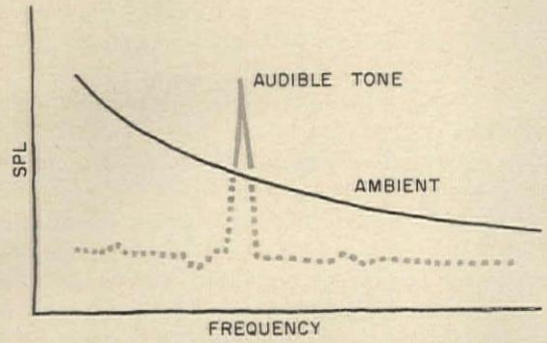
### Sound Absorption

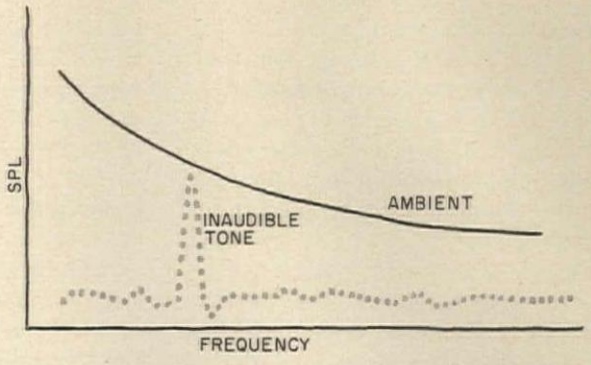
It might be said that, in general, specifications have their greatest usefulness at a period in the history of building technology when a particular product or building system is undergoing rapid development. For example, in the early Twenties the use of acoustic tile in rooms was just coming into common and widespread acceptance. During the period in which acoustic tile was gaining acceptance, specifications stating minimum absorption requirements would have proven very useful.

As the industry has developed it has learned well how to provide sufficient and efficient sound absorption. As a result one can order any one of nearly 100 different acoustic tiles simply on the basis of appearance or some other non-acoustic criterion and assume that the product will absorb sound satisfactorily and adequately. This statement is made with particular reference to large areas of tile installation such as office buildings. Obviously, for special rooms such as auditoriums and broadcast studios, which must be individually engineered, writing specifications for material performance is not justified.

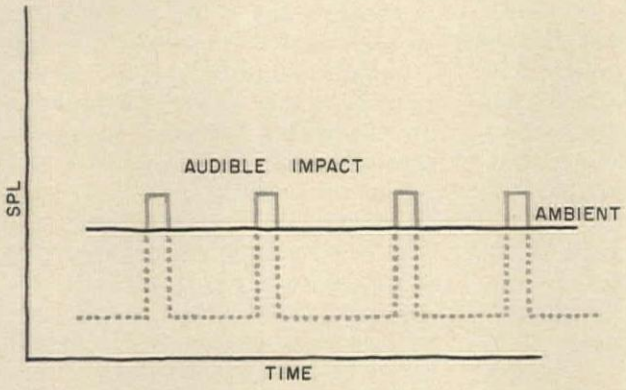
There are times, however, when it is desirable to specify minimum sound absorption requirements. An

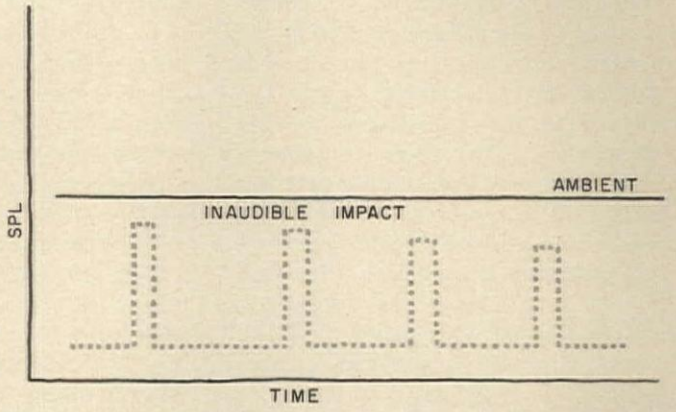
*Three independent laboratories in this country and one in Canada are fully equipped to conduct tests in accordance with the standard. These laboratories are the ones at the Bureau of Standards in Washington, D.C., the Riverbank Acoustical Laboratories at the Illinois Institute of Technology, the Building Research Council in Toronto and Cedar Knolls Laboratories, Cedar Knolls, N.J., Geiger and Hamme Laboratories in Ann Arbor, Michigan, perform a test according to A.M.A. 1-2 two-room procedure which this author believes is acceptable and perhaps even slightly preferable for certain kinds of constructions. This special method of test is conducted on ceilings and partitions and it seems particularly well suited to folding partitions and movable partitions.




Electrical transformers produce a humming noise with a peak at the frequency of the current. If the ambient noise is on the low side, the peak frequency will be heard over it. On the other hand, if the ambient noise is high enough, the sound will be masked. The acoustical specification covering transformers should take this phenomenon into account.




These graphs illustrate the masking of a different kind of noise, a printer's stapling machine, for example, which does not produce a steady noise but repetitive impact. Still the ambient must be high enough at all times to mask the impact.

example is a manufacturer who is introducing a new product and has made claims on its performance without benefit of acoustical testing. Another example is in the use of material which is subject to improper installation such as acoustical plaster.

Such specifications should require laboratory data issued according to Sound Absorption of Acoustic Materials in Reverberation Rooms, A.S.T.M. standard C.423-1960T at either Riverbank, Bureau of Standards, or Geiger and Hamme laboratories. Some acoustic tile manufacturers operate their own test laboratories and for the most part data from these laboratories are acceptable. Care should be taken to see that industrial laboratories have used procedures according to the C423-1960T standard.

Having required proof of ability to perform in the form of laboratory data, it is unfortunately a bit difficult to establish conformance in the field. This is particularly true when other absorbing elements such as carpets, drapes, furnishings, etc., are included in the final design. If it is possible to make field tests in a room stripped of most other absorbing materials, one can obtain at least an order of magnitude estimate of the absorption coefficients of the installed product. Unfortunately, with material such as acoustic plaster, if it does not conform to the minimum requirements in the field, it is next to impossible to have it removed, nor is there any way to improve its efficiency short of adhesive-applying an efficient acoustic tile to the acoustic plaster installation which, in most cases, will be impractical.

### Vibration Isolation Effectiveness

For the most part, the isolation of vibration to prevent "feelable" acoustic energy or vibration-induced noise must be accomplished by the mechanical engineer at the drawing board stage. There is no commonly accepted way, for example, of specifying the isolation efficiency of a flexible pipe connection, flexible electrical conduit, etc. As a matter of fact, about the only thing that one can specify is the effectiveness of the vibration isolation mounts themselves. Although the precise design and selection of the mount is a complicated function of the weight and rpm of the vibration source and the nature of the supporting construction, the following areas should be covered in the specification:

The isolation efficiency of the mount in its vertical direction should be covered. This is usually done by specifying the amount the device will deflect under the applied load of the vibration source. In addition, some indication of the type of mount should be made; i.e., steel spring, spring and rubber in series, rubber in shear, ribbed rubber pads, etc. In view of the prevalence of certain badly designed isolation mounts it is also important to specify that the stiffness in the two lateral directions shall be equal to or less than the stiffness in the vertical direction. Also, because of some poor installation practices it should be clearly

stated that the mounts shall be installed in such a manner that they will not "bottom" during either operation conditions or stopping and starting of the device. In those cases where high stopping and starting torques are generated by the device, rubber snubbers may be used to avoid metal-to-metal contact. These snubbers obviously will have a greater stiffness than other portions of the mount.

**Lease Writing**

The primary purpose of including lease clauses stating acceptable acoustical conditions in a rented space is, of course, satisfaction of the tenant. However, this satisfaction will actually be achieved only if the owner and his consultants provide suitable construction or equipment. Thus, the actual reason for writing acoustical lease clauses is that the design and engineering of construction and equipment which will affect the outcome within the "demised" premises is out of the control of the tenant. It is usually sufficient in preparing an acoustical lease clause to state the nature of the acceptable result, i.e., maximum acceptable noise or vibration levels without reference to the source of that noise or the means of isolation of that noise. For example, a lease clause stating that noises shall not exceed NC-35 within the "demised" premises hopefully protects the tenant from such things as a noisy tenant next door, noisy building mechanical equipment owned and operated by the owner, or even the passage of subway trains beneath the foundations of the building.

Unfortunately, the majority of lease clauses written today say little more than that the tenant shall occupy a space without *undue* noise or vibration. Specifically, such a broad statement though it may be satisfactory for problems in the extreme, will be subject to a broad range of interpretation if the problem is disturbing, but only marginally so.

Lease clauses have been prepared which cover both acceptable limits of noise and of vibration. To do this effectively one must have clearly defined criteria to tell us what people consider acceptable. With noise we believe we have such criteria.

These are specifically stated in the noise criteria or NC curves published by Beranek in Noise Control, Vol. 3, No. 1, 19-27, January 1957, and also in his book "Noise Reduction", McGraw-Hill Book Company, Inc. 1960. It is not sufficient, however, to merely state that the noise levels in the demised space shall not exceed some one of the NC curves. The applicability of the NC curves is limited to noises which are steady state (do not vary as a function of time) and broad band (do not contain tone components). As a result, in addition to the statement of maximum acceptable NC curves, it is also necessary to place a limit on the allowable time fluctuations of the noise (to cover such a case as an electrically driven stapling machine located on the floor above) and on the acceptable level of sounds containing strong tone components (to cover a problem such as that existing when a wall mounted transformer is adjacent to the premises).

The most effective way to limit noises of an intermittent nature would be to relate the acceptable level to the steady state noise from other building equipment or traffic.

Unfortunately, the lessee cannot be expected to know what the actual ambient sound will be in all spaces of the building. For that reason it is probably more practical and will be more acceptable to the lessee if the limit of intermittent noises is related to the maximum acceptable steady state noise levels given in a previous section of the lease. For example, if steady state noises are restricted to NC-20 intermittent noises should probably be limited to either NC-25 or NC-30.

A similar approach must be taken with noises containing tone components. A restriction of this nature does not guarantee that sounds of these special types will be inaudible and in fact, if the steady state noises are well below the maximum allowable as stated in the lease, the intermittent sounds or those containing tones may be clearly audible. However, the response of the lessee in such a case would logically be—"It is not that I am making too much noise, it is that this space is abnormally quiet." The solution of such a problem should be in the hands of the tenant. The practical solution is, by one means or another, to increase the ambient noise to something below that he has stated he considers acceptable but which is sufficiently high to mask out the intruding sound.

Unfortunately, insufficient work has been done on "feelable" vibration criteria. It would seem best not to attempt to require the building owner to meet vibration limitations *per se*. It would appear from what data are available that vibration levels sufficient to just induce uncomfortable feeling will generate noise far in excess of any normal reasonable requirement set forth in a lease clause as described above. There are, of course, some special areas such as the micro-analytic balance-room where special vibration isolation limitations must be imposed. Such special conditions are clearly the responsibility of the tenant and he must provide within his own equipment the required isolation measures.

The specification and the lease clause must be prepared specifically and individually for each project. It is also extremely desirable that the document be reviewed by all interested parties for general comment before it is accepted by any of the parties. By interested parties, is meant the acoustical consultant, the eventual tenant, any manufacturers involved, and, in some cases, by lawyers. Obviously the manufacturer of the product or the lessor may wish to see more tolerant numbers given but this judgment in the end must be made by the occupant who will have to weigh the cost of stringent requirements against the comforts gained thereby.

In conclusion, it could be said that a badly written acoustical specification or lease clause can almost do more harm than no such document. In the case of specifications, in an attempt to "play it safe" many specification writers have arbitrarily lowered permissible noise levels to the point where it is virtually impossible to achieve the stated condition. The result of this is that manufacturers simply toss the specification into the "old circular file" and bid on the basis of their standard product. In the case of lease clauses, loosely worded requirements are not defensible in court yet are so common that most leases are signed without any scrutiny of the clause. Thus, unless it is the intent to write a meaningful specification or lease, it is recommended that none be written.

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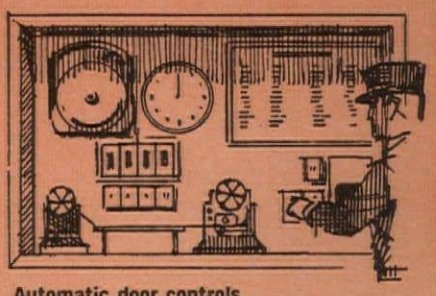

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**See Sweet's File 16-J for full details.**

For more data, circle 81 on Inquiry Card

## The New Russwin 2800 Series Door Closer

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Russwin's new 2800 series door closer is designed for every door in your building — in function and in price.

With the new 2800 series, such features as back checks and delayed-action closing are optional — you decide the operating functions and cost level for each door. They are non-handed (except for fusible-link arm types). They mount conventionally or upside down. Inverted mounting permits more headroom for standard 6'8" doors . . . mounts on frames as narrow as 1¾", keeps closers on the inside of exterior doors to protect them from the elements.

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For details on this exciting new product, see your Russwin supplier. Or write Russwin, Division of Emhart Corporation, New Britain, Conn.

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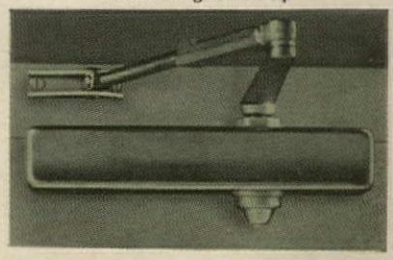

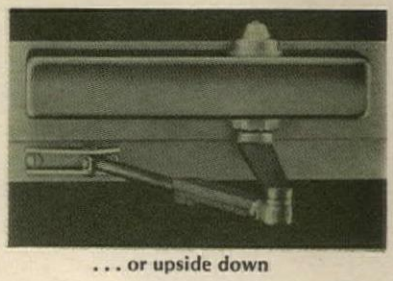

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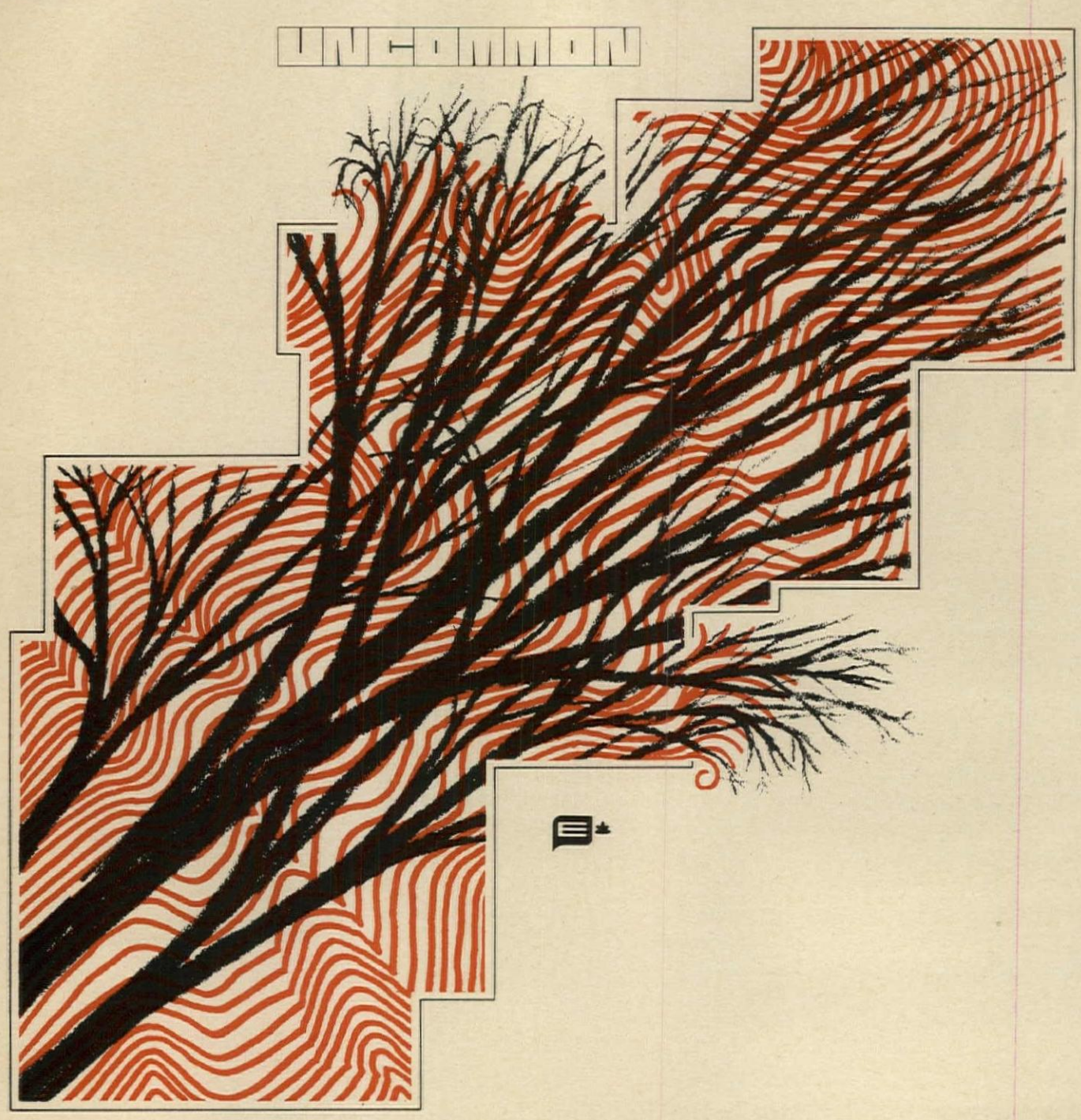



*"Uncommon" describes every aspect of Eggers' hardwood plywood manufacturing. Here the custom production of architectural plywood is a specialty. Achieving in beautiful plywood what the architect's creative mind visualizes calls for uncommon skill in interpreting a design, faithful adherence to specifications, and unusual ability in attaining beauty of grain and finish. Eggers custom craftsmanship experience — which began in 1884 — proves that the beauty and warmth of wood is only the starting point in producing distinctive paneling. Vital to final appearance are the skills required to expertly match face veneers . . . to provide perfect finishing that reveals species texture and color . . . to achieve precisely the effect you want. These demand uncommon, custom craftsmanship. This is Eggers' specialty. This is seen in distinctive installations all over America where doors match panels, transoms match doors, panels match panels (in heights up to 16 feet); and in a wide range of office furniture, dividers, table tops and other applications — wherever beautiful plywood is used. This is your assurance that whatever your mind visualizes for your next project, Eggers can produce it — with uncommon excellence. Write for our Plywood Catalog for Architects.* **Eggers Plywood Company,** *Two Rivers, Wisconsin, Phone: 414-793-1351*

For more data, circle 83 on Inquiry Card

# A GUIDE TO THE USE OF ACRYLIC PAINTS

*By Gerould Allyn**

Part 2: Surface Preparation and Application

*Part 1 of this article discussed the history, development and characteristics of water-based paints with emphasis on the properties of acrylic emulsion latex paints.*

## SURFACE PREPARATION

### Masonry Surfaces

For best results, slightly different surface preparation is required for each of the primary types of unpainted masonry surfaces, such as concrete, stucco, asbestos cement shingle and concrete block. Problems encountered with these substrates usually stem from their alkalinity, porosity and surface texture.

Cracks and holes in new or previously unpainted stucco concrete or stone should be carefully patched, and the patches allowed to dry. Recently poured concrete may have an oily surface from curing compounds which may cause blistering and peeling if permitted to remain on the surface when the paint is applied. It must be removed, either by sandblasting or by allowing it to weather for several months before painting.

Unpainted aggregate and concrete block is usually porous. After filling cracks, a fill coat of cement-based paint worked into the surface with a stiff brush will seal and smooth it. Two top coats of paint will usually be sufficient for durable performance on the resulting smooth, dense surface. Some manufacturers make a special penetrating primer for porous surfaces of this type. Others recommend a coat of the same paint to be used for the top coat. Repainting with mortar is often necessary on brick surfaces. It should be allowed to dry thoroughly before applying paint.

Preparation before painting is particularly important before repainting a masonry surface. If the old coating shows no peeling or blistering and has only slight surface chalk, a masonry surface may be repainted after repair of cracks and breaks. However, heavily chalked masonry surface coatings which show extensive flaking and peeling should be removed completely to provide a firm surface for adhesion of the new paint. This is usually done by sandblasting.

Penetrating type surface conditioners have been used successfully on chalky surfaces. They penetrate the chalked layer and bind it to the underlying masonry. They require several days for drying before topcoats can be applied.

Efflorescence present on either old or new masonry surfaces should be removed by washing with a 5 per cent solution of hydrochloric acid and rinsing thoroughly with clean water. Mildew should also be removed before paint is applied. Methods for removing mildew include scrubbing with a solution of sodium-hypochlorite (bleach) and trisodium phosphate, steam cleaning, and sandblasting.

It is risky to repaint masonry surfaces previously covered with cementitious coatings, lime or whitewash because these coatings continue to deteriorate under new paint. The result is reduced adhesion as time passes, even though good adhesion appears to be obtained initially. Although satisfactory service has been obtained over such surfaces with 100 per cent acrylic emulsion paint, problems and failures frequently occur.

These chalks often contain materials which are not efficiently wetted by water and tend to crumble or lose adhesion readily. Such surfaces have very high water demand, leading to excessive wicking and premature drying of the paint film. Predampening or dilution of the first coat of paint often improves penetration. However, it is best to remove old coatings before repainting.

### Wood Surfaces

Wood has a number of characteristics potentially detrimental to the performance of a paint. Its non-uniform dimensional variations, its tendency to pick up moisture and the resulting problems of grain cracking and blistering have been mentioned. Other problems which adversely affect the coatability and appearance of the paint system include knots, pitch pockets and various extractable color bodies such as saps, tannins and rosin.

Based upon the particular problems associated with painting them, the common soft woods used for building siding and trim are generally classified as either grain-cracking or staining types.

The grain-cracking woods include the firs, spruces and pines. Among the grain-cracking woods, yellow pine gives the greatest difficulty. Paint durability is poorest on board where the grain is non-uniform or in flat-grain pieces. Coatings on grain-cracking woods must combine superior flexibility and outstanding adhesion.

Cedar, southern cypress and redwood are staining-type woods. Their fine, uniform grain, more regular expansion and contraction, improves paint durability. However, they contain both water and oil-soluble extractives which may migrate to the surface and stain through the primer. Unless primers contain inhibiting mechanisms for precipitating stain extractives, stain bodies will migrate outward through successive topcoats.

The importance of the prime coat is well recognized. And until recently, most paint manufacturers continued to recommend oil based prim-

*The author is with the Coatings Department of Rohm & Haas Company, Philadelphia, Pennsylvania

ers for bare wood surfaces. However, oil based primers have certain shortcomings.

Because they cure by oxidation, oil paint films lose flexibility and become brittle with age. This permits little dimensional fluctuation and cracking is a common form of failure in old oil-paint film. Oil paints adhere badly when applied over damp substrates. Blistering is another source of trouble. Also, during the two or three days oil primers must dry before top coating, they are subject to dirt collection, mildew or the damaging effects of dew or rain.

Within the past several years 100 per cent acrylic emulsion latex primers have been developed for both non-staining and staining-type woods. Thus the ease and speed of application provided by acrylic top coats is now available for the entire paint system. Normally the primer coat dries in less than an hour and top coats can be applied the same day, often without moving scaffolding. No solvent is required, and cleanup is swift and convenient.

It is a misconception that applying any water thinned paint directly to bare wood leads to warping, splitting or cupping. Properly formulated 100 per cent acrylic emulsion primers give excellent protection against these faults. Some paint manufacturers modify synthetic emulsion paints with oils or alkyds to produce an all-purpose primer, although this is unnecessary if the correct acrylic emulsion is used.

Surface preparation of new wood surfaces is basically a problem of selecting the proper primer if the surface is clean. Repainting of wood surfaces poses greater problems in surface preparation depending upon the condition of the old paint film. Adhesion is the primary problem encountered when repainting gloss paint and aged but unweathered surfaces which are often found under eaves and in other protected areas. To attain maximum adhesion and durability, these surfaces should be cleaned of dirt and mildew. Glossy or oily deposits should be removed either chemically with solvent type cleaners or physically with sandpaper. Iron nailheads should be counter sunk and puttied or primed with an oil paint before an acrylic paint system is applied, to prevent rust from bleeding through the top coats.

Performance of new paint over chalky surfaces depends upon the type and degree of chalk, and weather conditions at the time of application. The degree of chalk is particularly important because of chalk's water demand which extracts water from the new paint causing the film to form on the surface rather than penetrating to the substrate. Therefore, as in the preparation of chalked masonry surfaces, the surface should be prewetted and water-based paint applied to the damp surface.

Weather affects the drying speed of paint. Low humidity, dry breezes and direct sunlight can cause premature film formation and reduced penetration. This can be minimized by the proper surface preparation including prewetting.

As sound a surface as possible should be re-established by scraping, and by puttying and priming of exposed nailheads. If the exposed surface is bare wood, primer should be used before applying the top coat.

Mildew should be removed from wood surfaces in the same manner as from masonry surfaces.

Knots in wood are a problem for two reasons. First, they may become loose and rupture the paint film. Secondly, they contain high concentrations of tannins which stain. Shellacking helps to contain tannin and prevent staining if the knot does not move and break the shellac film. Only removal of the knot can guarantee tightness.

**Interior Surfaces**

Sealers and primers are especially important on wallboard, plaster, concrete, stucco, brick and similar materials which have high absorption properties and are also alkaline.

The water and solvent resistant properties of the acrylic emulsions are particularly useful in undercoats as they do not soften or lose adhesion when recoated. Primers and top coats can be applied the same day without moving scaffolding. Practically any type of coat, including water based paints, oil paints, enamels, varnishes and lacquers, can be applied over acrylic emulsion base coats. The pigmented primers provide excellent sealing over fresh plaster, cement, cinder block and wallboard.

Although previously restricted to flat paints, one acrylic emulsion has recently been developed with which semi-gloss interior latex paints are now being produced. These paints can be applied over glossy surfaces and provide all the advantages of other acrylic emulsion paints as well as better scrub resistance and stain removal characteristic of enamels.

**Other Materials**

Asphalt shingles, and asphalt roll roofing have been coated successfully with pastel colored or white acrylic emulsion paints. These light colored paints reflect a large percentage of sunlight and therefore reduce indoor temperatures in hot climates. Since water is used as the thinner rather than a solvent, asphalt bleed-through is not a problem.

One of the increasing variety of substrates which are being coated with 100 per cent acrylic emulsion exterior paints is galvanized iron. As acrylic emulsion paint films are flexible they expand and contract with the metal through temperature changes. For best results, the acrylic paint should be applied to bare metal. The surface of most new galvanized metal has been treated to prevent "white rust". To insure maximum paint adhesion this coating should be removed before painting. Wiping with mineral spirits is sometimes helpful. An alternative is to permit the metal to weather for at least six months.

**Specifying Paint Systems**

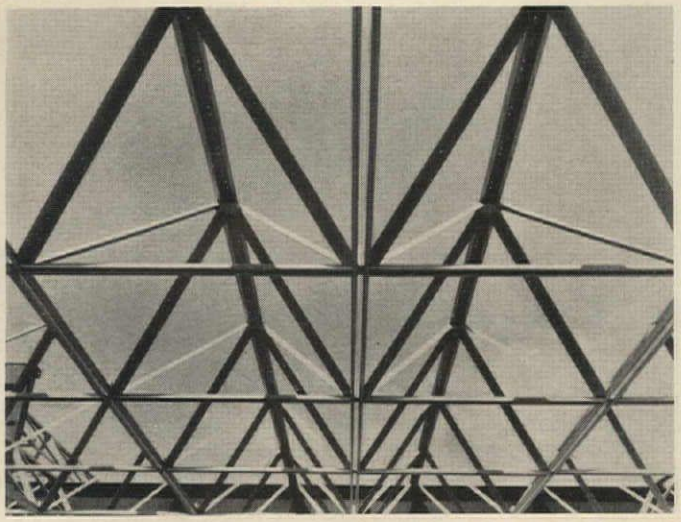
The following references might be helpful in drawing up painting specifictions:

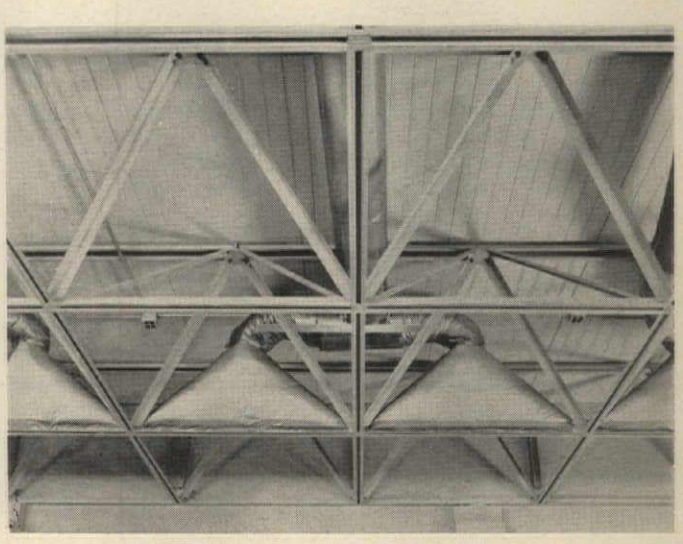
"A Guide to Modern Painting Specifications," published by the Painting and Decorating Contractors of America, outlines specifications for three types of jobs—standard, premium and minimum. Designed to help the architect prepare sound specifications in order to obtain fair and meaningful painting bids, it will help insure that all aspects of the job are covered.

Federal Specification TT-P-0019B specifically covers the use of exterior acrylic emulsion paints on exterior masonry surfaces. A similar specification for exterior wood surfaces is being prepared but has not yet been published. The U.S. Army Corps of Engineers publishes a Paint Manual for Civil Works and Military Construction which is available from the Office of the Chief of Engineers.

For more information circle selected item numbers on Reader Service Inquiry Card, pages 293-294

# STEEL SPACE TRUSS FOR FLEXIBLE SCHOOL BUILDING





The Bertha Ronzone elementary school in Las Vegas, Nevada, is the first school building to be completed using the new *Space Grid* component system. This long-span system allows a high degree of interior flexibility; use of movable partitions makes possible constant and easy adjustment of room dimensions while the elements of the physical environment—heating, cooling, ventilation, light and sound—can be varied to match the requirements of the flexible arrangement of space. Ducts and light fixtures can be shifted due to the open, modular design of the framework. The *Space Grid* system meets the principles developed by the School Construction Systems Development Project, a program sponsored by the Educational Facilities Laboratories to improve the quality, speed and economics of school construction.

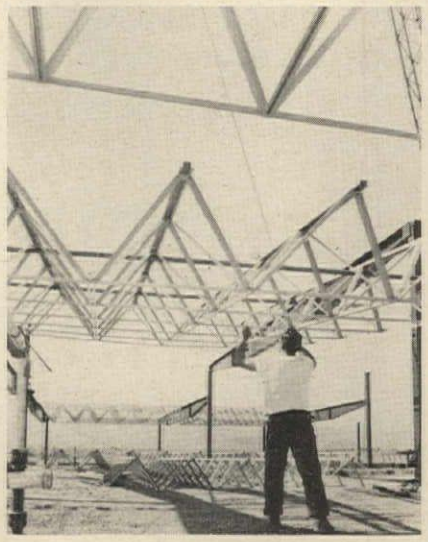
*Space Grid* is a steel space truss which defines both the roof line and the ceiling plane. A three-dimensional grid, it is composed of space pyramids, each one 35 in. in depth with a 5 ft by 5 ft base. The pyramids are joined at the base to form the desired bay length, and connected at the apex with a steel chord. A series of these space trusses, assembled in parallel, constitutes the overhead bays and forms a secondary structural system. Trusses arrive at the site pre-painted in correct lengths. A system of roof beams and columns provides the primary structural support. The system is expandable on all sides, and the company claims that the basic structure for a *Space Grid* school of 150,000 sq ft can be delivered and erected in about six weeks.

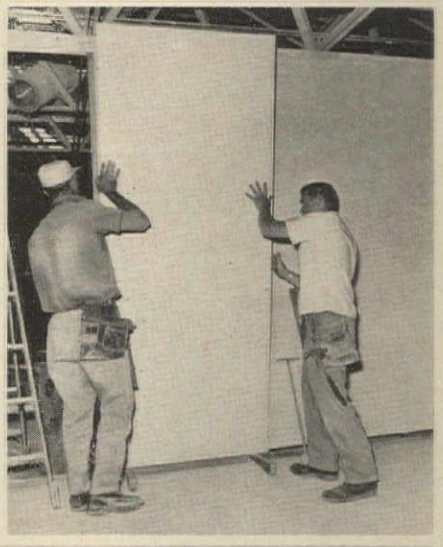
The inside of the space truss forms a "mechanical envelope," which houses lighting coffers, heating-cooling-ventilating ducts, return air plenum and electrical raceways in a readily accessible overhead location.

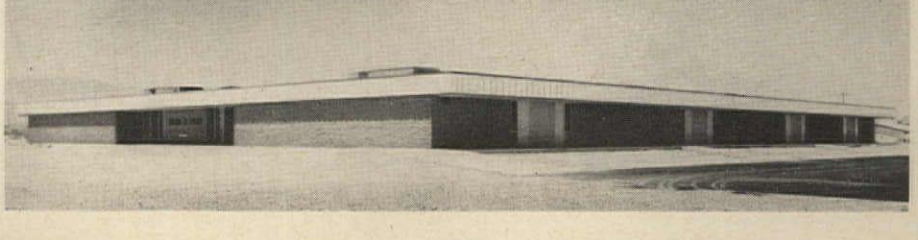
The lower chords of the space truss are separated by a 1-in. slot, which accommodates air diffusers, permits return air to enter the plenum above, and also forms the ceiling connection for wall partitions. *Butler Manufacturing Company, Kansas City, Mo.*

CIRCLE 300 ON INQUIRY CARD

*more products on page 220*







# Office Literature

For more information circle selected item numbers on Reader Service Inquiry Card, pages 293–294

### PLANS FOR DENTISTS

Plans for almost any kind and size of dentist's office are set out in a comprehensive 134-page book, publication no. AD 154. Layouts are based on the most recent professional practices and standards. The plans include dimensions of laboratories, dark rooms, operatories, reception rooms and dental and professional equipment. Suggested specifications are given for general construction, electrical, gas, waste and water lines. Office sizes shown in the book range from 147 sq ft to 3600 sq ft. *The Weber Dental Manufacturing Company, Canton, Ohio.*

CIRCLE 400 ON INQUIRY CARD

### CERAMIC TILES

The *Designer Series* of ceramic tiles in a wide range of shapes, colors and finishes are displayed in a new catalog. Both floor and wall tiles are shown, and colored illustrations show suggested applications throughout the home. *Stylon Corporation, Boston, Mass.**

CIRCLE 401 ON INQUIRY CARD

### THE STORY OF POST-TENSIONING

*Stressteel's* latest technical manual, no. SS-6, gives detailed information on the company's post-tensioning techniques, materials and anchorages. The first section sets out advantages and special features of *Stressteel* tensioning, this is followed by descriptions of standard components, wedge and grip devices, and a series of typical anchorage details. The manual also contains a chapter on post-tensioning precast units, as well as information on *Stressteel* bars and sheathing methods. *Stressteel Corporation, Wilkes-Barre, Pa.*

CIRCLE 402 ON INQUIRY CARD

### DRAFTING EQUIPMENT

A revised edition of the company's school, engineering and drafting supplies catalog contains 48 pages describing a wide range of tracing and drawing papers, vellums, films, slide rules and drawing instruments. *The Lietz Company, San Francisco, Calif.*

CIRCLE 403 ON INQUIRY CARD

### EDUCATIONAL LIGHTING

A new 60-page manual gives comprehensive information on all phases of school lighting including classrooms, gyms, offices, corridors, entrances, yards and parking lots. The first part of the booklet deals with the fundamentals of school lighting and covers such topics as illumination levels, glare and visual comfort, cost analysis and lighting efficiency. A photometric and scissors curve, reflection diagrams a cost analysis form, a vertical surface lighting diagram and a number of photos are used to illustrate this part of the text. The rest of the booklet is devoted to specific examples of school lighting equipment, which are shown with illustrations. *Holophane Company, Inc., New York City.*

CIRCLE 404 ON INQUIRY CARD

### BATHROOM ACCESSORIES

A new colorful catalog illustrates the company's wide selection of bathroom cabinets and accessories. New models in the 1965 line include the *Panorama* mirror-cabinet combination, the *Beverly* mirror, a three piece unit consisting of upper and lower mounting strips and a large wall mirror designed for surface installation. and two new cabinets with antique white and gold embossed wood picture frames. *Miami-Carey Division, The Philip Carey Manufacturing Company, Cincinnati, Ohio.**

CIRCLE 405 ON INQUIRY CARD

### WATER HAMMER ARRESTORS

Information to assist architects in solving the problems of water hammer and hydrostatic shock is given in a recently published manual. The booklet describes in detail the causes of water hammer, and includes charts and drawings, to indicate the proper methods for sizing and location of water hammer arrestors for pipe lines and fixtures. An authoritative standard—PDI-WH-201—has now been developed, and typical test certificates furnished by the U.S. Testing Laboratory are included showing which manufacturers make units to meet the new standard. *Plumbing and Drainage Institute, Oak Park Ill.*

CIRCLE 406 ON INQUIRY CARD

### POSTS AND RAILS

A handsome catalog contains 173 pages of rails, posts, balusters, rail panels and room dividers. *Railglass*, a new combination of tempered glass, aluminum and railwood, is introduced in the first 17 pages of the catalog. The catalog is generously illustrated by detail drawings, as well as drawings of assembled units. *Blumcraft of Pittsburgh, Pittsburgh, Pa.**

CIRCLE 407 ON INQUIRY CARD

### CONTROL OF CENTRIFUGAL FAN NOISE

A technical report dealing with the control of noise from mechanical draft fan systems handling large volumes of air or gas in industrial installations is now available. The 16-page bulletin presents the necessary information for providing acoustic design parameters to evaluate industrial fan noise problems. An easy to use short form for calculating the type of noise control required is also included as well as a guide to the correct application of silencers. Tabulations of noise hazards, outdoor and indoor noise criteria and a pressure drop selection chart. *Industrial Acoustics Company, Inc., Bronx, N.Y.*

CIRCLE 408 ON INQUIRY CARD

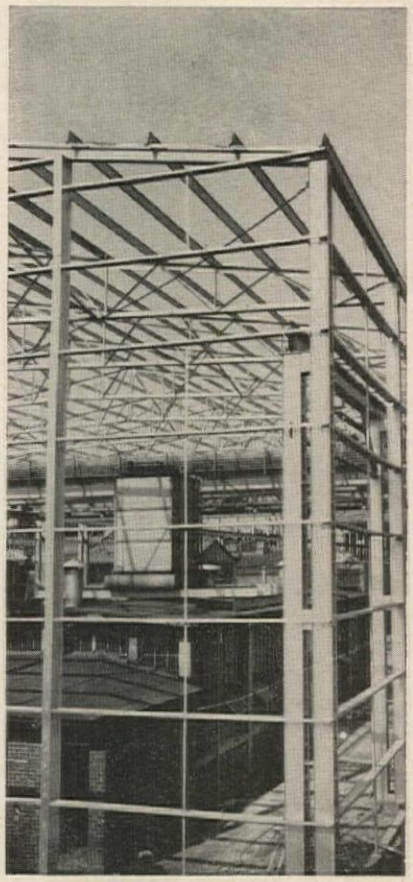
### LOW-VOLTAGE SWITCHGEAR

A full line of compact, low-voltage switchgear for a wide range of industrial, utility and commercial applications is detailed in a new 24-page bulletin, no. 3200-1B. Complete design information, dimension, weights, selection and application data, and guide specifications are given in the brochure. The metal-enclosed switchgear is available with manual or electrical stored-energy *K-Line* circuit breakers in continuous current ratings of 225-4000 amperes for voltages up to 600 volts a-c and interrupting capacity up to 130,000 symmetrical rms amps, and *K-Don* current limiting breakers for higher interrupting requirements. *I-T-E Circuit Breaker Company, Philadelphia, Pa.*

CIRCLE 408 ON INQUIRY CARD

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

*more literature on page 278*



J&L lightweight structural steel used by Holston Steel Structures, Inc., Bristol, Tennessee, reduced the steel weight in the composite crane and building columns by 26 tons.

SYMBOL OF STRENGTH, LONG LIFE AND ECONOMY

# You don't have to "put up" with J&L lightweight structurals just because everybody else does

We can give you some much better reasons.

Putting up a building with J&L lightweight structurals solves a lot of architectural and construction problems. More important, it prevents them. That's why you'll find them used so widely, wherever you go.

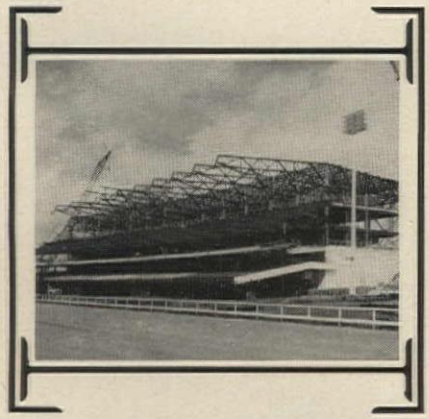
Light weight means minimum dead loads, therefore important savings in structural support and foundations. It also makes possible faster, easier construction, requiring less manpower . . . and man hours.

Flexibility? J&L lightweight structurals are available in high strength grades, too, so you can choose from several carrying capacities within each beam size.

Simplicity? There are fewer pieces to handle when you use maximum length lightweight structurals as continuous members. And simplified end connections keep fabricating requirements to the barest minimum.

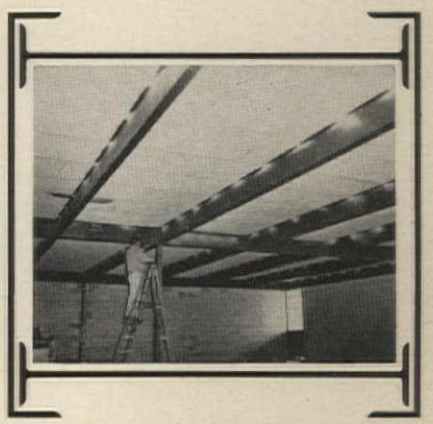
Versatility? Architects enjoy an unusual degree of design freedom when they work with J&L lightweight structurals, since they are compatible with other building materials.

Check into these and other advantages of J&L lightweight structurals. When all the facts are in, we're sure you'll "put up" with nothing less!



Florida race track grandstand roof, designed to withstand 72 lbs. per sq. ft. uplift, uses J&L lightweight structurals provided by Peden Steel Company, Raleigh, North Carolina.

Holiday Inn Jr. Motel, Memphis, Tennessee, has a J&L lightweight structural framework to resist deflection both for cantilever loading when in place and for over-the-road hauling.

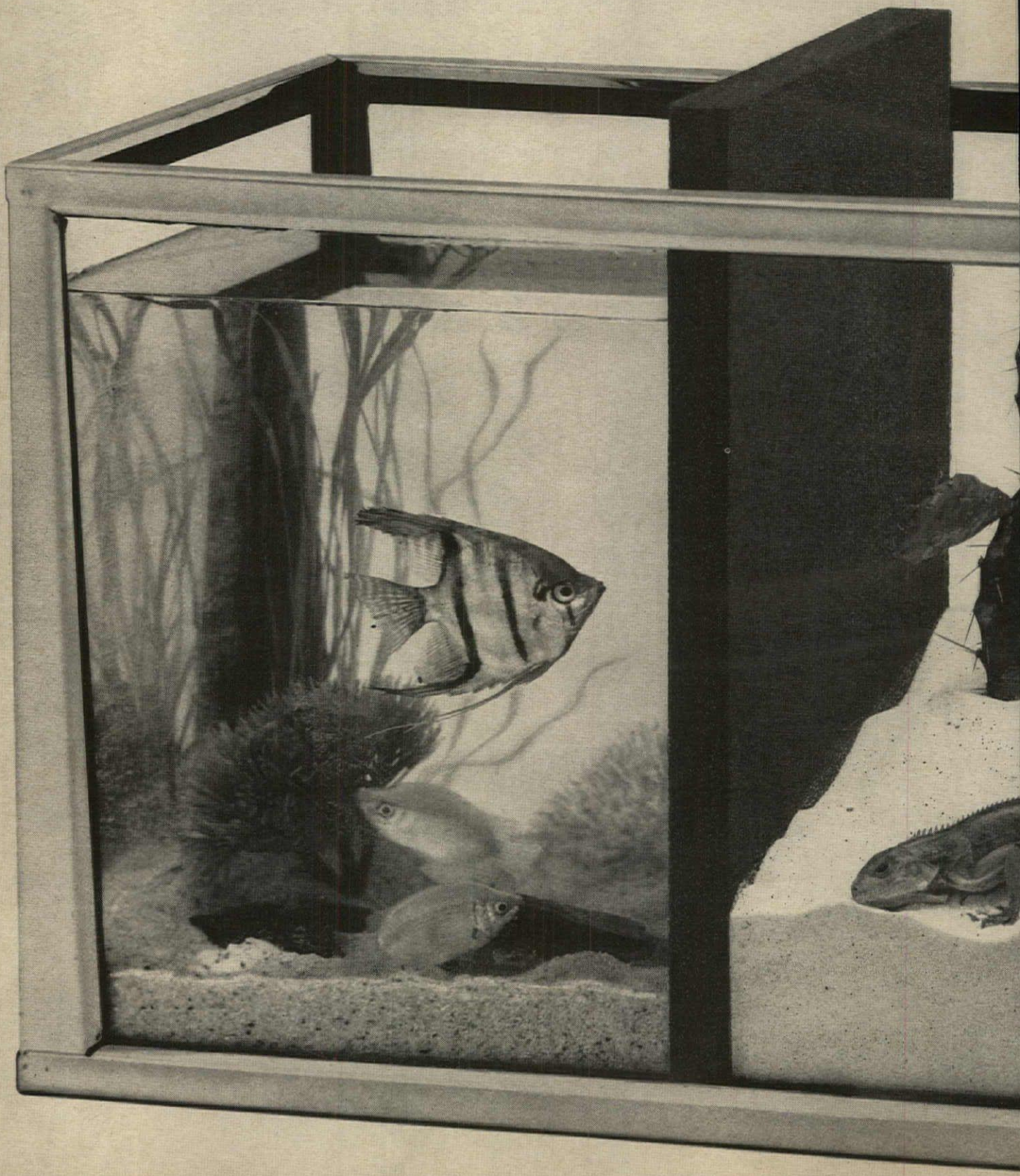


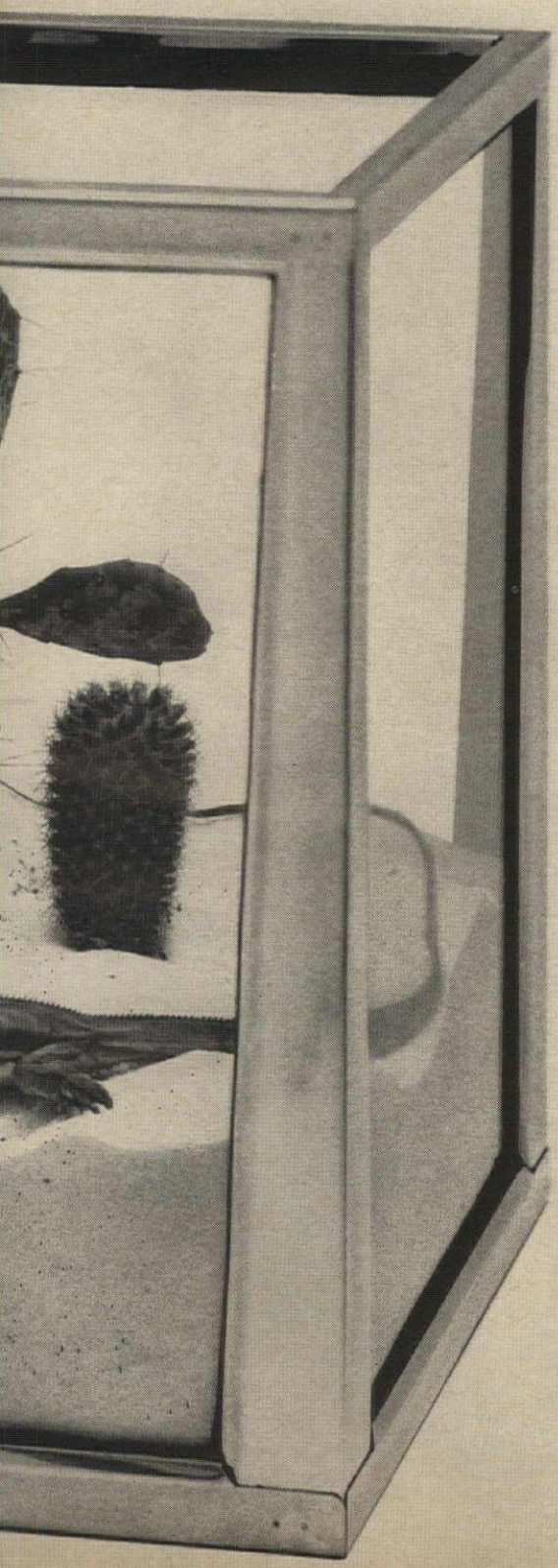
These exposed J&L lightweight structurals, fabricated by Ray Steel Company of Fort Worth, Texas, for the Eagle Mountain-Saginaw Junior High School blend in with the interior decor.

**Jones & Laughlin Steel Corporation**
3 Gateway Center, Pittsburgh, Pennsylvania 15230 STEEL

For more data, circle 84 on Inquiry Card

# Here's the proof in waterproof FOAMGLAS®





# The only roof insulation that can keep the aquarium from watering the cactus

We named it an aquaterrium. An aquarium on one side . . . a terrarium on the other. It may be the only one in the world. We built it to demonstrate that Pittsburgh Corning's FOAMGLAS cellular glass insulation is absolutely waterproof.

FOAMGLAS will never let the water through to drown the cactus. A cactus doesn't like water . . . and neither does your insulation.

Once your FOAMGLAS Roof Insulation is down, our 20-year guarantee protects your client. We can make that guarantee because FOAMGLAS stays dry and always keeps its original insulating efficiency. FOAMGLAS permeability (moisture absorption) is zero. No other roof insulation makes this claim.

A new feature of FOAMGLAS®-BOARD roof insulation is the small bevel on each 4' bottom edge of the board. These beveled edges provide a vapor pressure escape channel for moisture trapped between insulation and deck. The elimination of pressure build-up reduces wrinkling and blistering of the roofing.

Investigate the only waterproof roof insulation . . . available in 2' x 4' bevel edge FOAMGLAS-BOARD in thicknesses of 1½", 1¾" and 2".

PITTSBURGH pc® CORNING

Foamglas® cellular glass insulation is manufactured and sold in Western Europe by Pittsburgh Corning de Belgique, S.A., Brussels.

For more data, circle 85 on Inquiry Card

PITTSBURGH CORNING CORPORATION, DEPT. AR-115
ONE GATEWAY CENTER, PITTSBURGH, PENNA. 15222

Gentlemen: I'm interested in the FOAMGLAS waterproof story. Please ☐ send free sample of FOAMGLAS-BOARD; ☐ send copy of sample guarantee; ☐ send literature; ☐ have your representative call.

NAME_____ TITLE_____

FIRM_____

ADDRESS_____

CITY_____ STATE_____ ZIP_____

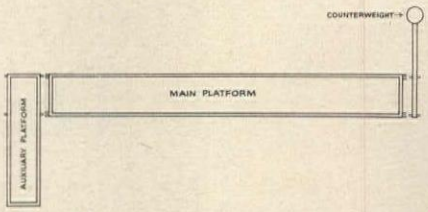
For more data, circle 85 on Inquiry Card

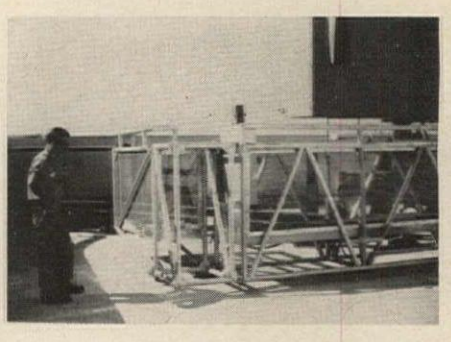
## *Product Reports*

*continued from page 213*

### WINDOW CLEANING PLATFORM FOR DIFFICULT CORNERS

An ingenious window cleaning device for use on buildings with inaccessible, recessed corner windows, consists of a main platform to which an auxiliary platform can be added at right angles. To prevent the main platform from tipping due to the off-center weight of the added platform and workers, a counterweight was designed for attachment at opposite ends of the main section, as shown in the diagram. The auxiliary platform and the counterweight are interchangeable end for end, making it possible to work around right-hand or left-hand corners. Both can be easily attached by means of four stainless steel pins. The unit was first developed for the Ferre building, Miami, Florida, where compatible hoisting equipment and safety features were also devised. *Mayco Crane Corp., Los Angeles, Calif.*



CIRCLE 301 ON INQUIRY CARD

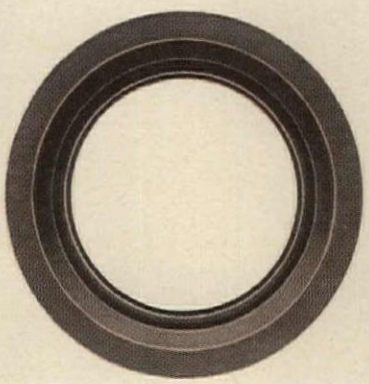
### ROLLING COUNTER CLOSURE HAS UL FIRE RATING APPROVAL

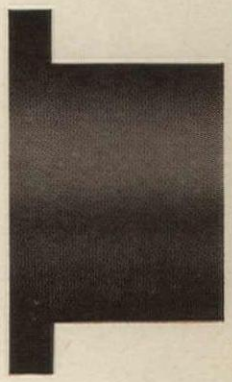
The *Counter-Fire* steel rolling closure has received National Fire Underwriters' Laboratories approval as Class B, 1½-hr fire rating. The shutters are designed for openings up to 6 ft wide and 5 ft high. Fire safety is provided by means of a fusible link mechanism; in case of fire, the link melts, and the shutter closes automatically. Standard equipment includes stainless or galvanized steel shutters, with frame or sill for between jambs installations, or sill only for face-of-wall installations. *J. G. Wilson Corporation, Norfolk, Va.*

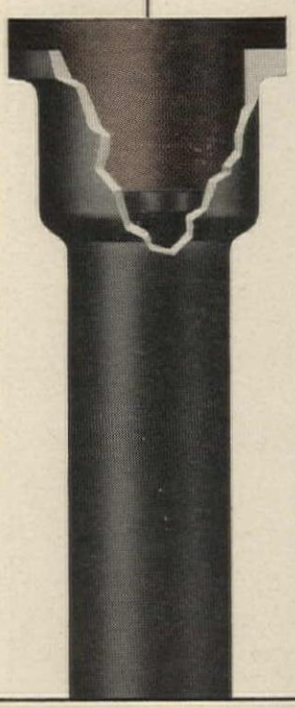
CIRCLE 302 ON INQUIRY CARD

*more products on page 254*

# money saver!







**New neoprene compression gaskets speed cast iron soil pipe installations—save you money on time and labor!**

In less than a minute, neoprene gaskets form a permanent, one-piece seal that is unaffected by abrasion, oil, fungus, weathering and temperature extremes.

If you're not using them now, try them on your next installation. They'll provide decades of trouble-free performance for your customers. Plus—substantial savings for you.

Qualified counsel and assistance to code committees available in all areas through resident district manager. Contact the Institute; we'll put him in touch with you.

**CAST IRON SOIL PIPE INSTITUTE**
**1824-26 Jefferson Place, N.W., Washington, D.C. 20036**

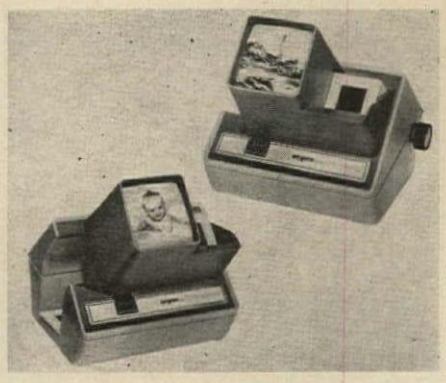
For more data, circle 113 on Inquiry Card

## *Product Reports*

*continued from page 220*

### AUTOMATIC SLIDE VIEWER

The company's new *Electromatic* slide viewer features a 3 × magnification of 35 mm slides, stack loading of up to 36 slides, and a device which automatically changes the slide every five seconds. It also has a stop and go switch to hold slides



for longer viewing. The unit operates on a 115-120 volt 60 cycle current and is unconditionally guaranteed for one year, even against accidental damage. The price is under $20. *Argus, Inc., Chicago, Ill.*

CIRCLE 303 ON INQUIRY CARD

### VERSATILE SEATING GROUP

A slight separation between the rear legs and the back is a distinctive feature of the *60* series of seating units. Consisting of three basic pieces, a low chair, two-seater and three-seater sofa, the group can provide for many variations in seating requirements and fits in well with a number of different environments.

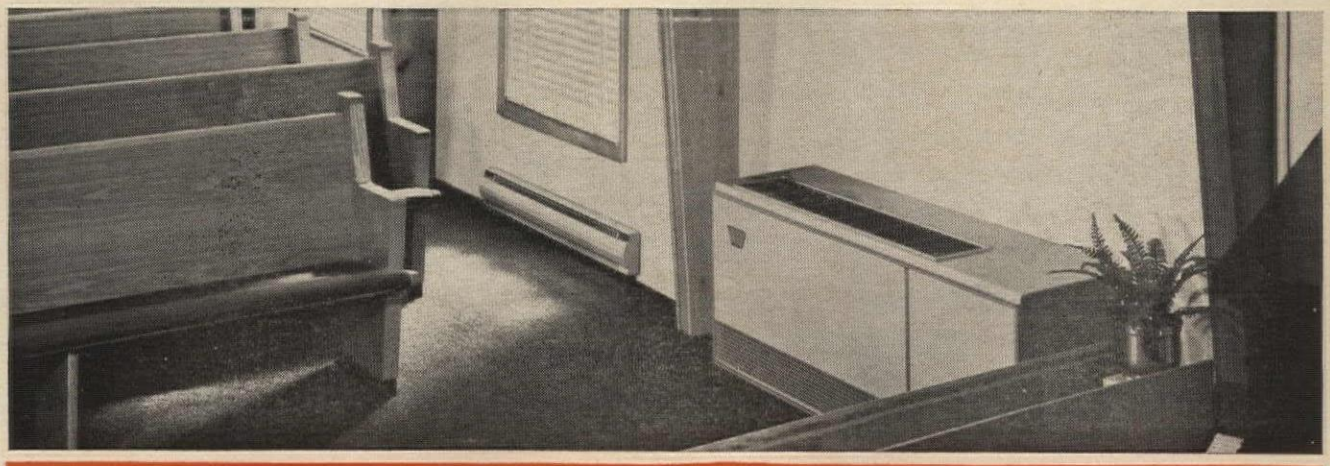
The pieces are available with wood or upholstered arms, with or without arms or with one arm on either side as required. *Jens Rison Design, Inc., New York City*

CIRCLE 304 ON INQUIRY CARD

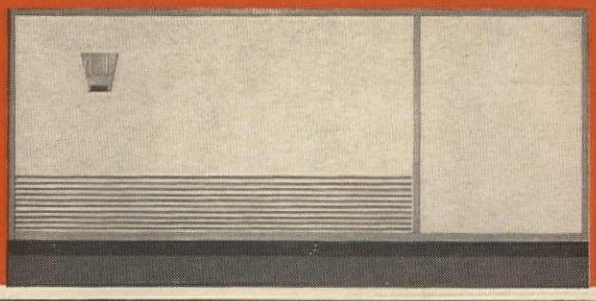
*more products on page 258*

## Specify Chromalox® Modulaire Type MD year-round electric, self-contained, air conditioner

for customed comfort heating □ cooling □ dehumidifying □ circulating □ filtering and ventilating □ **Cooling capacity:** 18,000 BTU at 95 F. outdoor temperature—air to air operation □ **Heating capacity:** Up to 6,000 watts (20,500 BTU) heating in four control stages. Optional connections available for additional 2000 watts flanking "Draft Barrier" heat. □ **Ventilation capacity:** 0 to 150 CFM. Setting made at factory per order □ **Supply voltage:** 208, 240 or 277 volts, single-phase, 60-cycle □ **Electrical protection:** 2 pole 40 amp circuit breaker (by others) □ **Evaporator fans:** 600 CFM at high speed, 550 CFM at low speed. □ **Evaporator coil:** 3-row staggered ½" O.D. copper tube, corrugated aluminum fins, low 300 FPM face velocity for high humidity removal. Condensate evaporated to outdoors; no plumbing or drain lines needed □ **Dimensions:** Exterior cabinet 54" long, 26" high, 16¼" deep. Wall opening 41" long, 18⅛" high □ **Mounting weight:** Approximately 400 lbs. □ **One Modulaire** for rooms 400—600 sq. ft. in area □ **Two Modulaires** (one Master and one Syncro) in typical classroom with 700—1000 sq. ft. area.



Girard Baptist Church, Girard, Pennsylvania



**Chromalox Modulaire Type MD** for new and existing classrooms □ churches □ restaurants □ laboratories □ larger offices □ libraries □ conference rooms □ other commerical and institutional applications. □ **Modulaire Type MJ** self-contained units for electrically heating and cooling smaller areas such as offices, utility rooms, etc.

WC-50A

**CHROMALOX**
***electric HEATING/COOLING***
EDWIN L. WIEGAND COMPANY
7741 THOMAS BOULEVARD, PITTSBURGH, PA. 15208

**Tell me more about Chromalox Modulaire units:**
- ☐ **Modulaire Type MD Bulletin F03100**
- ☐ **Modulaire Type MJ Bulletin F03102**
- ☐ **Have a Chromalox representative call me**

name, title

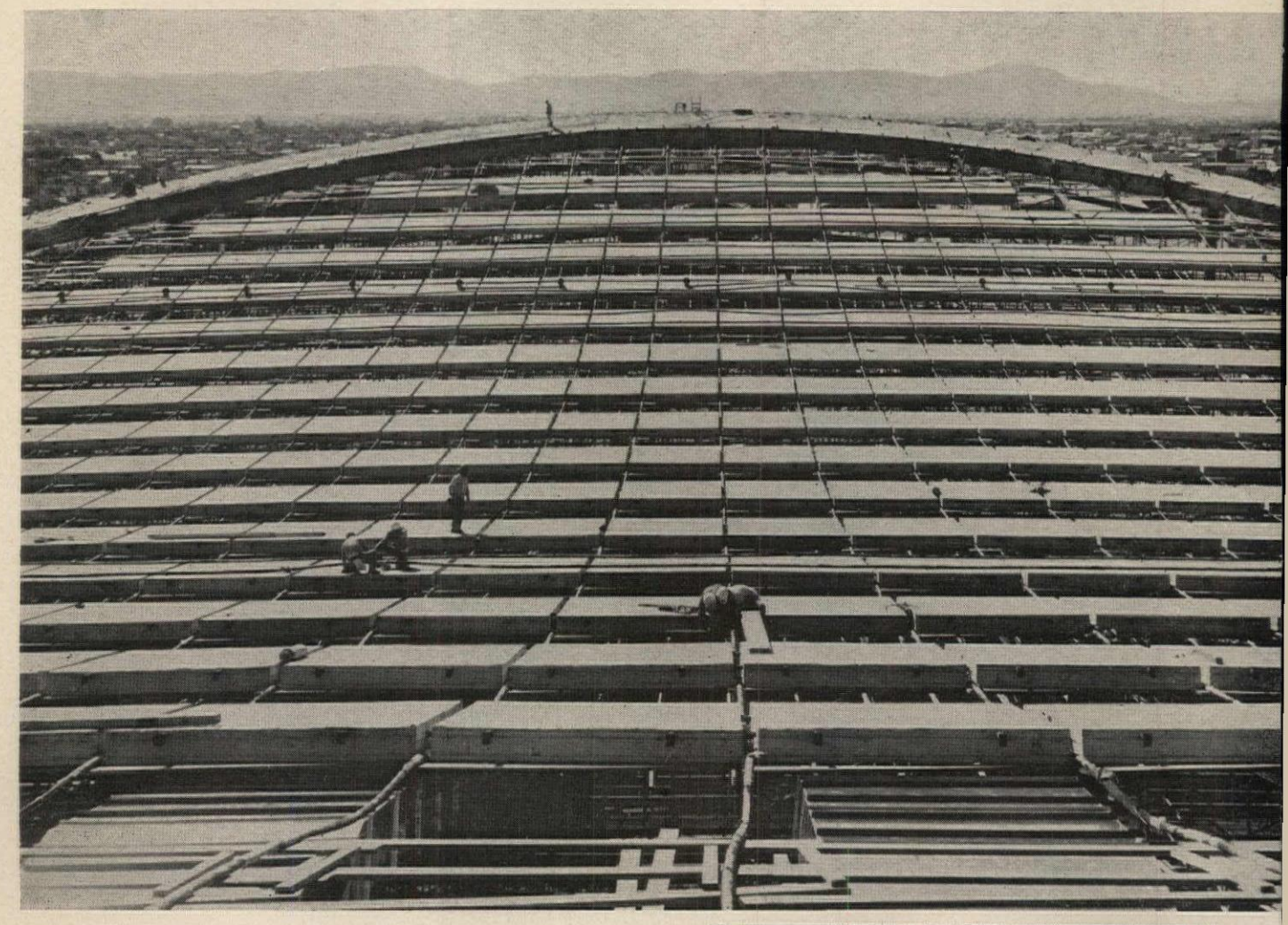
affiliation

address

city, state, zip

For more data, circle 115 on Inquiry Card

# THESE BIG, BOLD ROOFS



**SUSPENDED HYPERBOLIC PARABOLOID**—Believed to be by far the world's largest of its type, the circular saddle-type roof of the Arizona Veteran's Memorial Coliseum at Phoenix boldly spans a column-free area of 119,500 square feet, giving an unobstructed view from all 15,000 seats in the arena. The roof structure consists of a reinforced concrete compression ring of 380′ diameter with a 10′ x 10′ gridwork of Ryerson post-tensioning tendons strung across its center. Precast panels are hung on the tendons and the spaces between them filled with grout. The north-south tendons sag 33′ from ends to center. East-west tendons rise 5′ from ends to center and serve as tie-downs to overcome aerodynamic lift. Tensioning to a range of 462,000 to 544,000 lb. was applied in stages before, during and after grouting.
**Management and Operations Consultant:** Emmett Race.
**Architects and Engineers:** Associated State Capitol Architects; Lescher & Mahoney; Place & Place.
**Consulting Engineer** on roof structure; T.Y. Lin & Associates, Dallas, Tex.
**General Contractor:** Manhattan-Dickman Construction.
**Arizona State Fair Commission.**

**ANOTHER OF THE WORLD'S LARGEST CLEAR-SPAN BUILDINGS**—the Seattle Center Coliseum, also makes use of post-tensioning by Ryerson. Four triangular steel trusses and a post-tensioned concrete edge beam form four hyperbolic paraboloids and support a two-way system of tensioned tendons. These tendons provide rigid support for aluminum panels that cover the 400-foot square roof.
**Architect:** Paul Thiry.
**Structural Engineer:** Peter H. Hostmark and Associates.
**Contractor:** Howard S. Wright Construction Co.

# PROVE THE POINT...

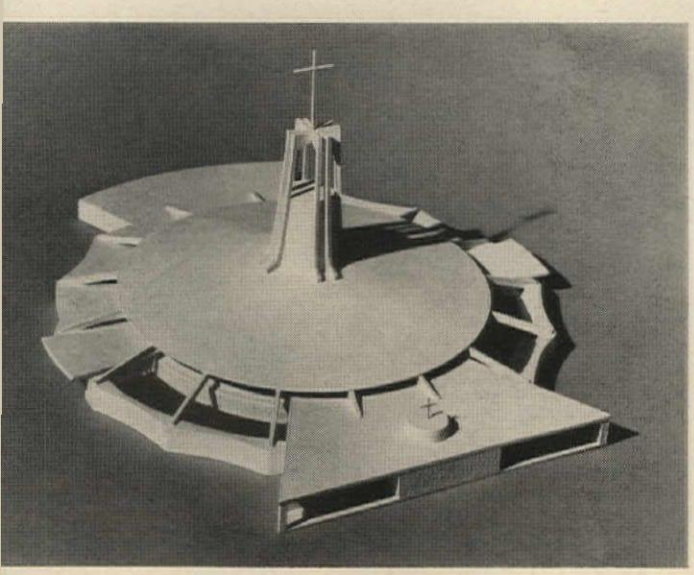
## BBRV POST-TENSIONING BY RYERSON

- minimizes support requirements
- maximizes freedom of design
- at reasonable cost

**LONGEST SINGLE SPAN FOLDED PLATE ROOF** is a distinctive architectural feature of the Physical Education Building at Indiana State University in Terre Haute. Longitudinally the span is 160′ between support points with a 3′ overhang at each end. In the transverse direction each of eight segments has a horizontal span of 26′ and a vertical rise of 11½′. Each side of each segment is post-tensioned by six Ryerson tendons.
**Architects:** Ewing Miller & Assoc. • **Architectural Designer:** David J. Field.
**Structural Engineer:** Homer Howe • **Contractor:** J. L. Simmons Co.

**CANTILEVERED HYPERBOLIC PARABOLOID**—The dramatic saddle shell roof of Edens Theatre at Northbrook, Ill. (also probably the largest of its type) stretches 159′ between working points at abutments; 221′ from tip to tip. The entire shell (only 4″ thick) is rotated about the abutment points so that one tip is 59½′ above floor level; the other only 39½′. Vertical Ryerson post-tensioning tendons prestressed the abutment walls, and these rest on post-tensioned foundation pads. To absorb horizontal thrust, the pads are connected by a post-tensioned tie beam.
**Architect:** Perkins and Will • **Engineer:** The Engineers Collaborative.
**Contractor:** Chell and Anderson.

**GRACEFUL SWEEP OF THIS THIN-SHELL DOME** spans 268′ and covers an auditorium seating 7200, with provision for a balcony seating 5000 more. Yet, cost of structural elements was only $178,000 and total building cost only $6.50 psf. The concrete dome, cast on the ground and lifted into place, is circled by a tension ring in which twelve Ryerson post-tensioning tendons of 40 wires each supply a force of 720,000 lb. Warner Auditorium for The Church of God, Anderson, Indiana.
**Architect:** Johnson, Ritchhart & Associates.
**General Contractor:** Lewis Construction Co.



**STRUCTURAL STEEL POST-TENSIONED**—contributing to the eloquent forms of this structure is a less common use of post-tensioning. The WF beam tension ring (which resists the horizontal thrust of 32 big triangular steel space trusses supporting the dome) is circled by 8 Ryerson post-tensioning tendons. These are anchored at staggered points so that a complete ring, 4-tendons deep, exerts a force of 400 kips, with 300 kips more in reserve for live load. Result: Weight of the WF ring beam could be reduced by two-thirds and, of course, supporting structure also lightened. St. John Brebeuf Church, Niles, Illinois.
**Architect:** Gaul and Voosen. • **Engineer:** Paul Rogers & Associates.
**General Contractor:** Valenti Builders, Inc.
**Steel Subcontractor:** Pittsburgh-Des Moines Steel Co.

*If you would like more information on Ryerson post-tensioning service or help on a current project, call your nearby Ryerson plant or write Box 8000-A, Chicago, Illinois 60680.*

**RYERSON**

JOSEPH T. RYERSON & SON, INC., MEMBER OF THE INLAND STEEL FAMILY

For more data, circle 63 on Inquiry Card

## *Product Reports*

*continued from page 254*

### LIBRARY FURNITURE

Recently introduced single and double library carrels feature slanted reading-writing surfaces, and a depth of 22 in. to provide the student with greater privacy. The slanted tops are of plastic laminate with grey vinyl edges. The sides, back, and divider are of oil walnut, but are also available in lacquer. An 8-in.-wide shelf near the top of each carrel provides a place for extra books or reference materials and also acts as a

shield for the fluorescent light, which can be obtained as an accessory. Buffed cast-aluminum legs flush at the ends of the unit prevent uncomfortable knee bumping. *Herman Miller, Inc., Zeeland, Mich.*

CIRCLE 305 ON INQUIRY CARD

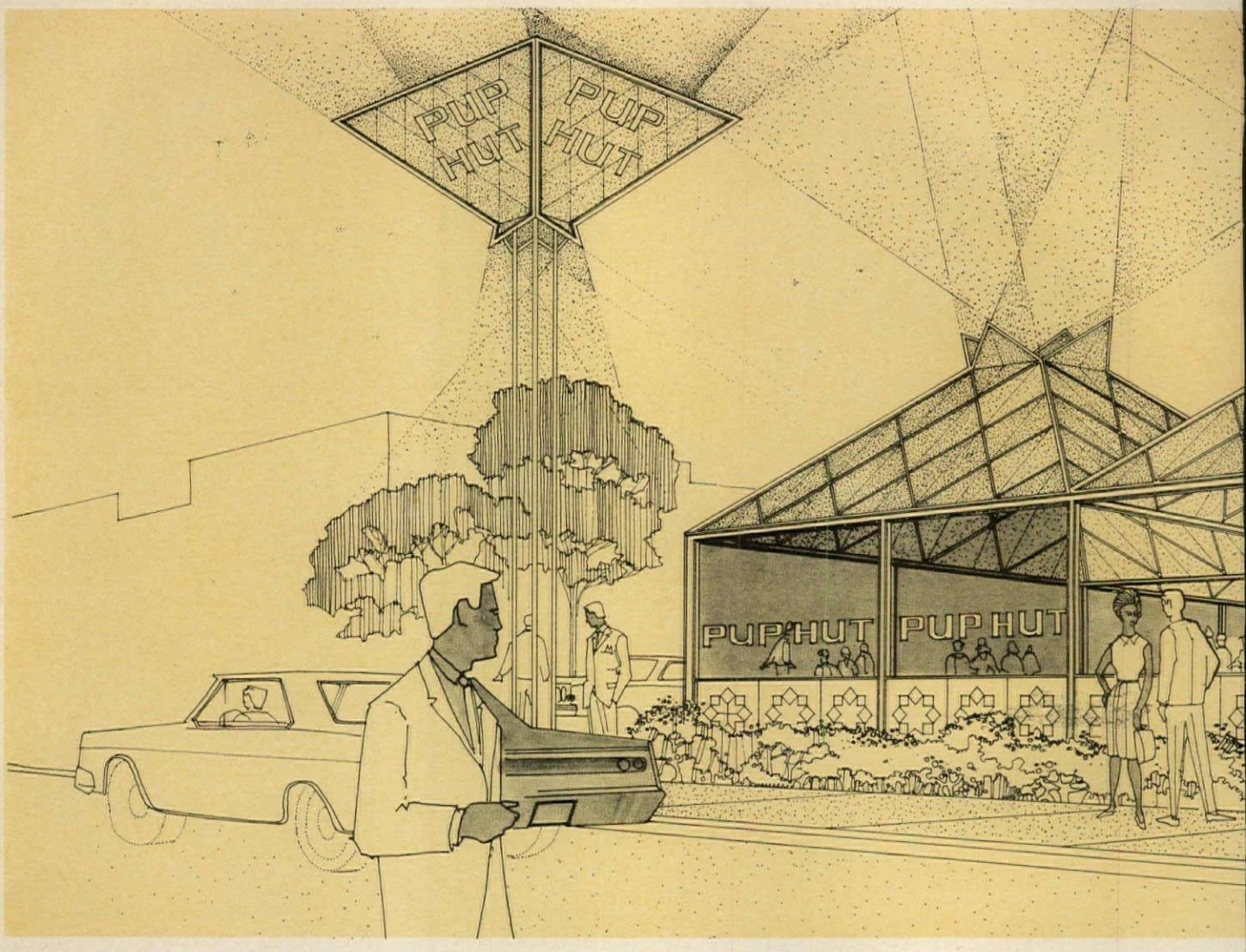
### PROTECTIVE METAL COATING

*Fluorpon*, a new fluorocarbon metal coating, is said to combine durability and versatility at considerably less than the cost of comparable inorganic metal finishes. *Fluorpon* is available in a range of eight medium gloss colors, and can be applied to steel or aluminum in flat stock, preformed parts, and in coil form on conventional coating lines, with or without a primer coat. *Fluorpon* fuses during the baking cycle, thus forming a physical rather than a chemical bond, which helps give it its high degree of durability and abrasion resistance. *DeSoto Chemical Coatings, Inc., Des Plaines, Ill.*

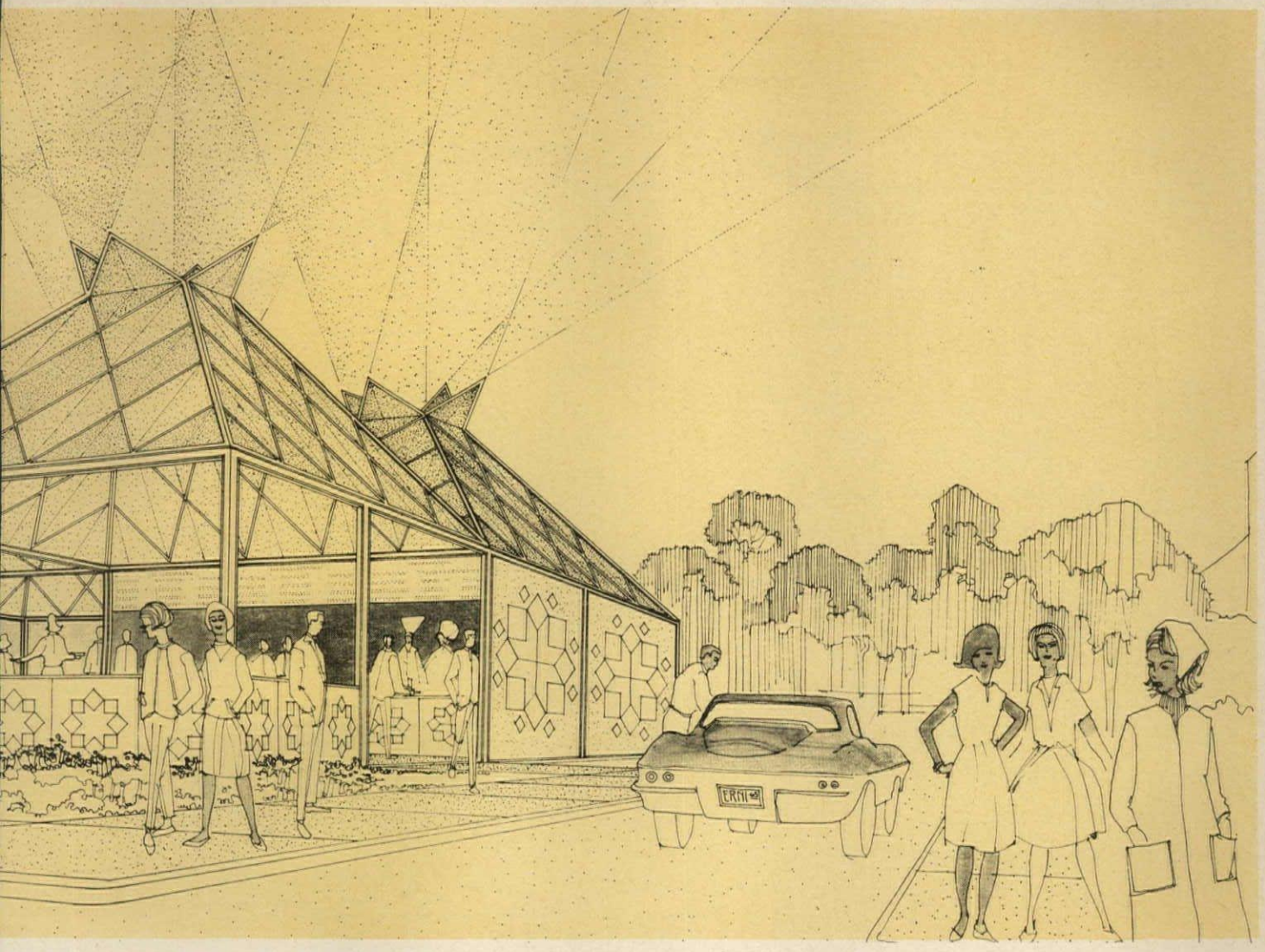
CIRCLE 306 ON INQUIRY CARD

*more products on page 266*


**who'd of thought of making a restaurant out of awnings? Glen Raven did**




**with Sunbrella®. The fabric that's limited only by your imagination.**



To prove the point, Glen Raven commissioned a noted San Francisco design firm, Donald Clever, Inc., to develop a completely new, workable building concept utilizing the unique advantages of Sunbrella Acrilan® outdoor fabric.

The result is this revolutionary Pup Hut, an all-Sunbrella, all-weather restaurant using removable steel-framed panels of Sunbrella for everything—from the dramatic pyramid roof, side walls and signage to the sun blinds, director chairs and decorative motifs. (See next page for complete working drawings.)

Mr. Clever found that, "Sunbrella makes it possible—and practical—to design a construction system using awnings as an extension of the architecture of the building, rather than the conventional way when the awnings are an applied element, often unrelated." This restaurant design is the property of Glen Raven. We invite you to use it. No fee.

And what are the unique advantages of Sunbrella that make this revolutionary idea practical? And an economical investment?

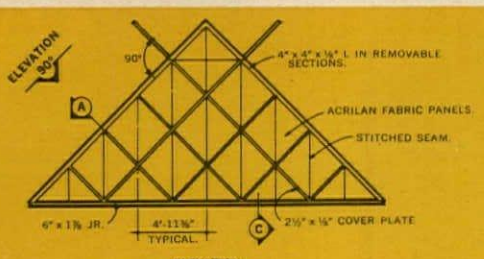
Sunbrella fabrics are woven of 100% Acrilan®, the Chemstrand Company's high-performance acrylic fiber, guaranteed for five years from date of installation. They can't crack, peel or rot—even if you leave them up all year, even if you store them damp.

They're unaffected by air-borne chemicals; the performance features and durability will not be affected by mildew in any climate. They won't shrink, or wrinkle. They breathe, keep air 22% cooler underneath, increase air-conditioning efficiency. And the clean, fresh Sunbrella colors and patterns—all 37 of them—are solution-dyed.

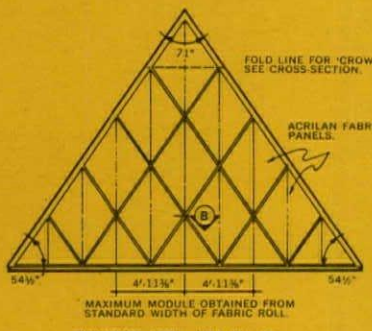
Whenever you have something new, or novel, or different to do outdoors, use Sunbrella. There's no limit to what your imagination can do with it.

Glen Raven Mills Inc., Glen Raven, North Carolina

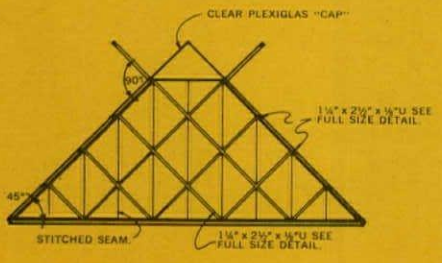
For more data, circle 73 on Inquiry Card



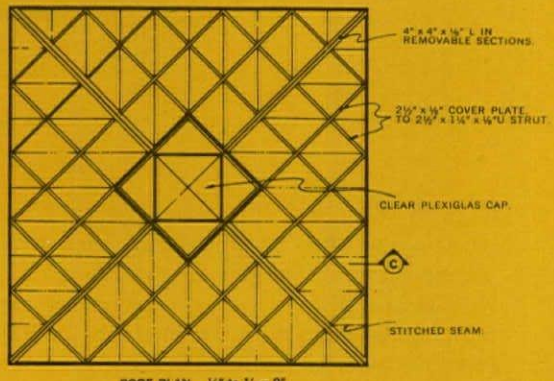

ELEVATION



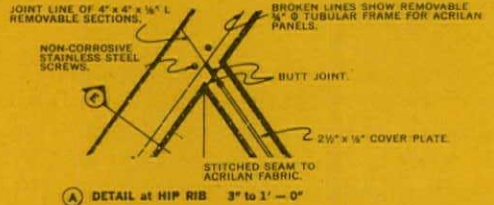

ELEVATION at 90° ¼" to 1' — 0"



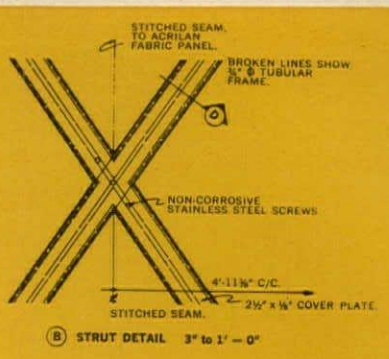

CROSS-SECTION ¼" to 1' — 0"



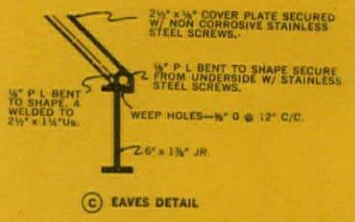

ROOF PLAN ¼" to 1' — 0"



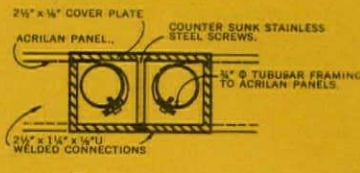

A DETAIL at HIP RIB 3" to 1' — 0"



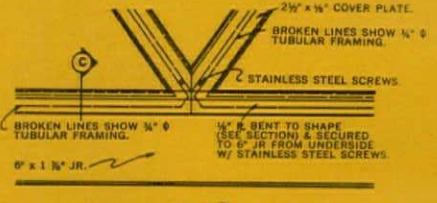

B STRUT DETAIL 3" to 1' — 0"



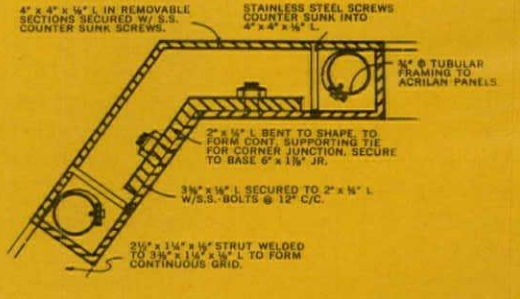

C EAVES DETAIL




D STRUT FULL SIZE




ELEVATION DETAIL C 3" to 1' — 0"




E HIP RIB DETAIL FULL SIZE

**STEEL WORK**

**Steel:** Furnish and install plates, steel shapes, bolts, screws, etc., as shown on the drawings and as necessary for the job.

All steel work excluding ¾" diameter tubular frames to be fabricated from hot rolled steel, to sizes and shapes as shown on drawing.

**Shop Drawings:** Submit complete shop drawings for designer's written approval before commencing fabrication.

**Workmanship:** To be best practice in modern structural shops.

**Welding:** To conform to American Welding Society.

**Channels:** All channels to be shop welded to form continuous grid with flanges at intersection points cut away to allow for insertion of ¾" diameter tubular steel frames, and to form a continuous gutter.

All ¾" diameter tubular steel framing to be cadmium plated steel, and to be consistent in overall size and shape. Diamond shape may be formed by crimping.

**Roof:** The roof shall be fabricated in four basic triangular grids, with the perimeter 6" x 1⅞"JR and the four 2" x 2" x ¼LS bolted together. The triangular grids will then be secured into place on this frame with non-corrosive stainless steel bolts. If this structure is supported by posts, use one 4" x 4" x ⅜" WF at each corner connected with angle brackets bolted to 6" JR.

All bolts and metal screws shall be non-corrosive stainless steel with countersunk heads.

**ACRILAN® PANELS**

**Fabric:** All fabric panels to be Glen Raven Sunbrella awning fabric, made from Acrilan® Acrylic Fiber. It shall be stretched fully taut and smooth and securely fastened to the ¾" diameter tubular steel frames. Each panel to have one stitched seam on the longest diagonal.

**Roof Cap:** Roof cap shall be of ½" clear Plexiglas with corners cemented together to form water-proof joints.

**PAINTING**

**Surface Preparation:** All metal shall be thoroughly cleaned, degreased, etched and dried before painting.

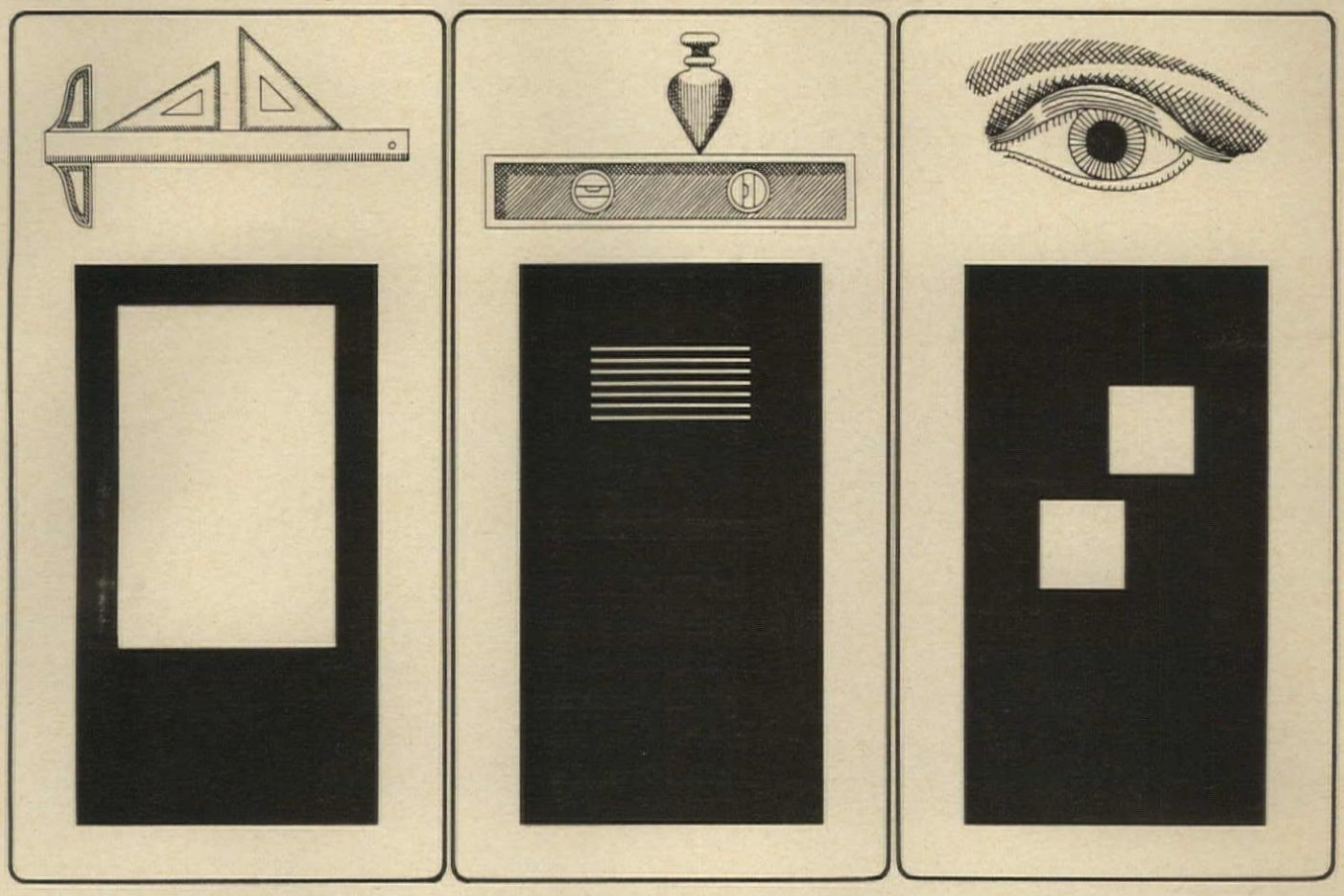
All steel work is to be completely shop painted with 3M Velvet Coating before erection and touched up as required after erection.

**Primer:** To be suitable for alkyd enamel top coat, i.e. DuPont 63 or 65 Line Air Dry or 828 Line Baking Primer or approved equal. Primer to be thoroughly dry before application of 3M Velvet Coating.

**Finish Coat:** Finish coat shall be 3M Velvet Coating by the Minnesota Mining & Manufacturing Company. Their printed instructions shall be followed at all times.

# Architects·Builders·Owners

Solve custom door requirements from Republic's standard, stock line



You can find exactly the doors you need — whatever the performance requirements — whatever the glass or louver treatment — in the complete line of Republic Standard Stock Doors. What's more they're available from a network of warehouses — on overnight shipment in most cases.

- For architects this complete line of doors — with its wide range of styles, heights, widths, thicknesses and applications — means almost unlimited design freedom.
- For the builder the convenience of fast shipments means fewer job delays, no wasted time or money.
- For the owner, selecting from the Republic line of standard doors means assured performance in place, at the outset and over the years.

Leading the Republic line of Republic Standard Doors is the new IMPERIAL — setting the pace for appearance and function. This trim, handsome Full Flush Door fits any interior. It is so versatile that any Flush Panel IMPERIAL Door, with a glass frame section and snap-in glazing bead provided, adapts quickly and easily to any glazing or louver treatment. It's reversible, too. "No handing." Available in standard widths up to four feet.

To extend your range of choices, Republic also provides Flush Panel Doors of style and panel construction in Series 50, 1⅜" thick and Series 57, 1¾" thick. They're available in a full variety of leaf designs and glass sizes.

All Republic Doors are designed for service and durability, built to hang square and stay that way in heavy use. Sturdy, heavy gage steel construction means no sag, bind, warp or split — ever. Exterior surfaces are rust inhibited with a five-step phosphatizing process. Protected and prepared for painting with a baked on prime coat, every Republic Door is individually packaged to ship, stock and deliver in perfect condition.

A network of Republic warehouses waits to serve you . . . in most cases overnight. Call or write for a complete catalog or for answers to your specific questions.

Modern
Versatile
Economical

REPUBLIC STEEL

## MANUFACTURING DIVISION

REPUBLIC STEEL CORPORATION

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CALL THE MAN FROM MANUFACTURING!

**MANUFACTURING DIVISION**
Republic Steel Corporation

Please send literature on the following:

☐ New Republic IMPERIAL Doors ☐ Standard Doors and Frames
☐ Fire Doors ☐ Metal Lath ☐ Steel Windows

Name_____ Title_____

Company_____

Address_____

City_____ State_____ Zip_____

For more data, circle 75 on Inquiry Card

# INNER-SPACE MISSION

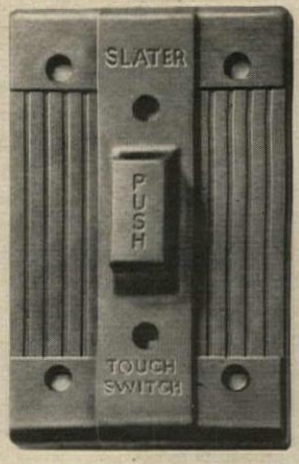
First of 400 Lennox 16-ton DMS cooling units being installed on prototype building of Ford Foundation SCSD project in California.

## *Product Reports*

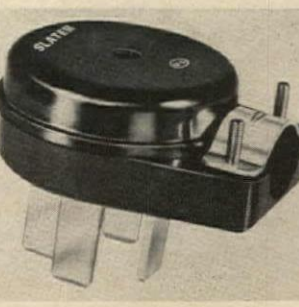
*continued from page 258*

### WALLPLATE AND GROUNDING CAPS

A new weatherproof plate for tap/on-tap/off switches has been added to the company's line of weatherproof devices. The neoprene plate fits standard weatherproof or FS box mounting, and is said to be unaffected by grease, oil, hot water, live steam, etc. An internal steel reinforced plate gives reinforcement to the neoprene.




Four new heavy duty caps have been added by Slater to their line of power outlets and caps. Catalog models *3861* and *3867* are both of the universal type and are assembled with 30 ampere "L" shaped ground prongs. For 50 ampere devices, a flat



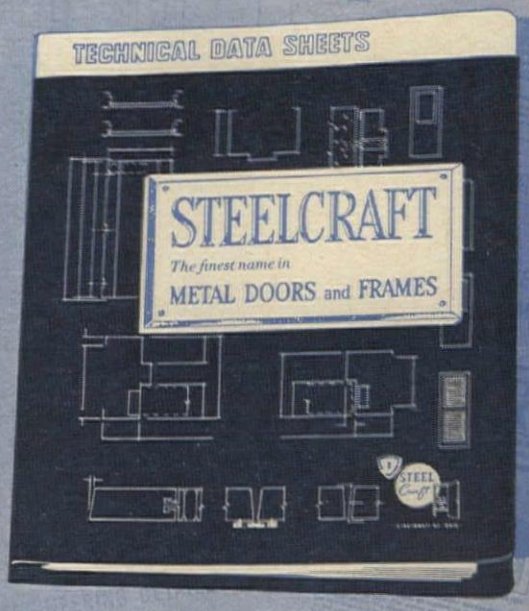
ground prong is also furnished to replace the "L" ground prong. In the 60 ampere types, Catalog model *3865* is rated at 250 volts, and model *3866* at 125/250 volts. *Slater Electric Inc., Glen Cove, N.Y.*

CIRCLE 307 ON INQUIRY CARD

*more products on page 270*

steelcraft metal door/frame idea no. 19 in a series

# Technical Data Manual... the industry's most complete working reference on *Metal Doors* and *Frames*

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STEEL Craft®

*finest name in metal doors and frames*

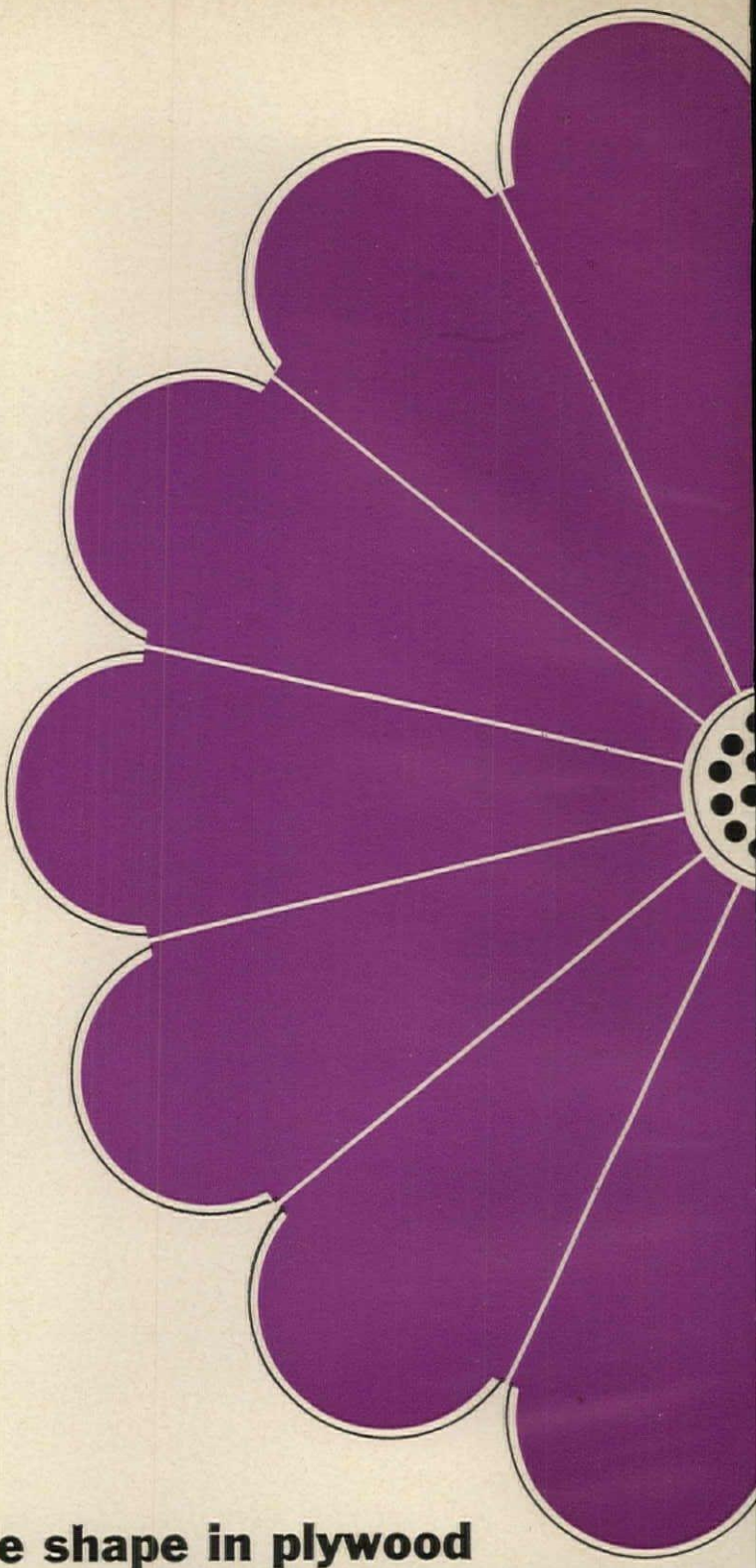
**Here is the most complete source of technical data in the industry. The T. D. Manual contains specifications covering all types of Hollow Metal Doors, Frames, U.L. Labeled Fire Doors and accessories—along with details for their application in all kinds of construction. This valuable source of up-to-date information is available for your permanent reference shelf.**

Since Steelcraft distributors personally keep these manuals up-to-date, they are hand delivered and not mailed. May we have one delivered to you? Just write us.

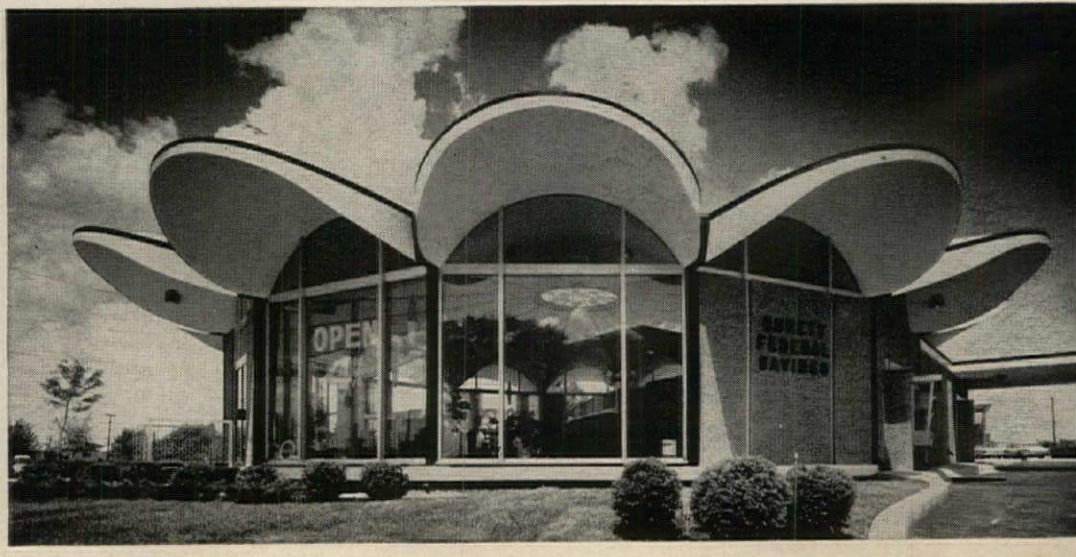


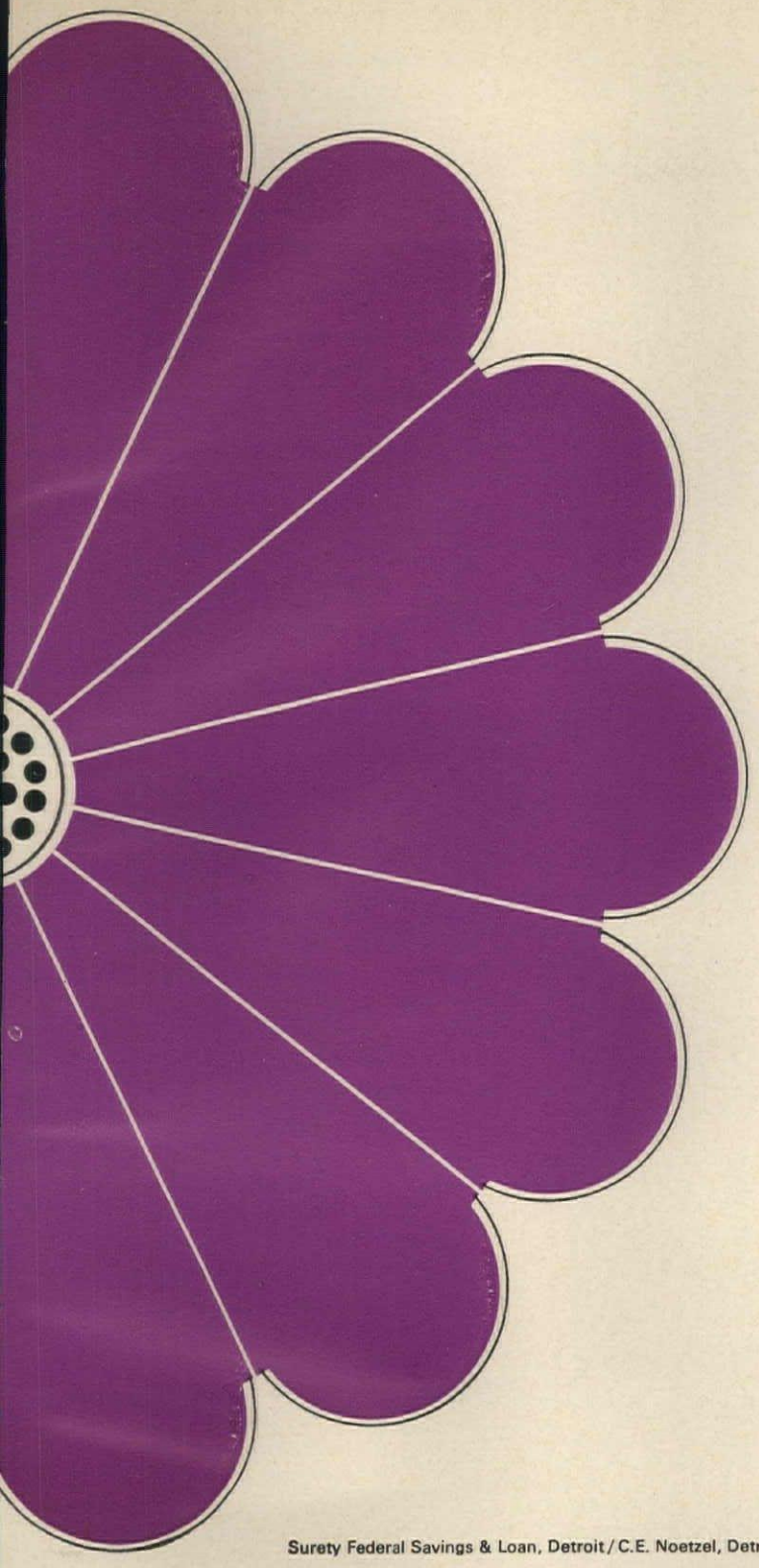
The Steelcraft Manufacturing Company, 9017 Blue Ash Road, Cincinnati, Ohio 45242, U. S. A.
The Steelcraft Manufacturing Company of Canada, Ltd.—Malton (Toronto), Ontario, Canada

For more data, circle 125 on Inquiry Card



**the most exciting ideas take shape in plywood**





Surety Federal Savings & Loan, Detroit / C.E. Noetzel, Detroit, Architect / Plywood Structural Div., G.H.L. Corp., Auburn Heights, Mich., Fabricator

Fourteen petal-shaped plywood components roof this drive-in bank that blossoms by a busy Detroit highway. It's another case where only plywood could reconcile a demanding design with a tight budget. Concrete was considered but would have cost twice as much. The conical plywood panels were so lightweight and so carefully engineered that they took only three days to install. Whenever your designs call for unusual shapes, high strength and low cost, look into plywood components and structural systems. For more on DFPA plywood, write us at Tacoma, Wash. 98401 (US only).

AMERICAN PLYWOOD ASSOCIATION

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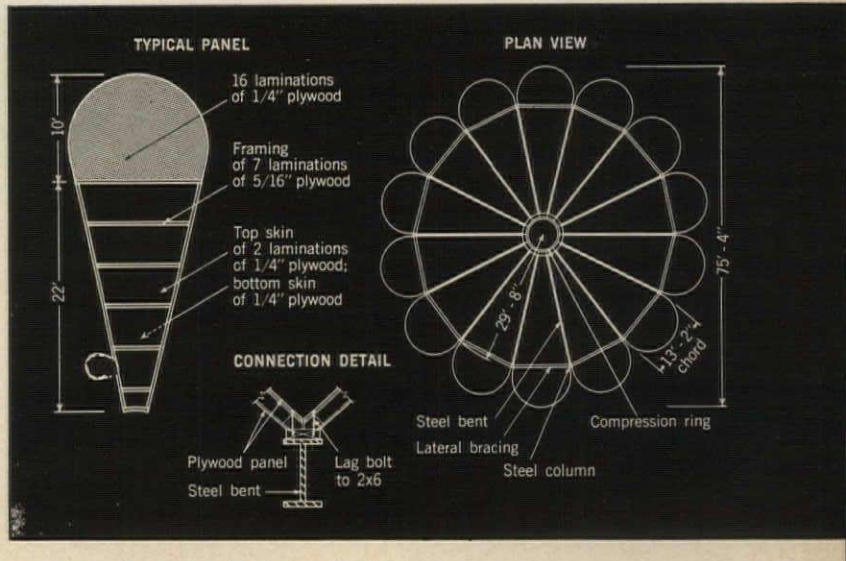


## *Product Reports*

*continued from page 266*

### LATERAL FILING CABINETS

Lateral filing cabinets which can hold most standard form and paper sizes are available in 2-drawer, 3-drawer, 4-drawer and 5-drawer models in a wide variety of colors and sizes. Stainless steel rails, that accommodate hanging folders, run parallel to the front of the cabinet

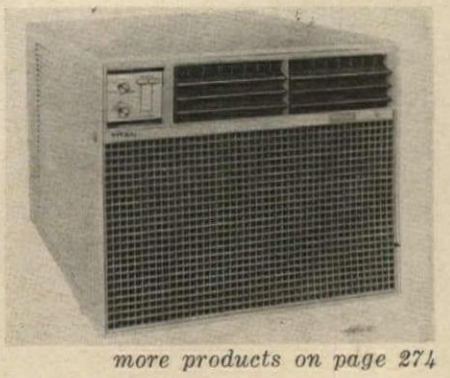
for lateral filing, but rails can easily be fitted in a cross-wise direction for front-to-back filing if required. *Oxford Filing Supply Company, Inc., Garden City, N.Y.*

CIRCLE 308 ON INQUIRY CARD

### ROOM AIR CONDITIONER

The *Titan* room air conditioning unit, is one of a large selection of new room air conditioners and package air conditioning and heating lines offered in the company's 1966 product selection. The *Titan* is available in a range of six cooling only models, and one heat pump. Four-way air distribution and new front location of controls are some of the special features of this unit. *Airtemp Division, Chrysler Corporation, Dayton, Ohio.*

CIRCLE 309 ON INQUIRY CARD



*more products on page 274*

# Investment Opportunity

Her dreams will be the realities of tomorrow—sleek, shiny birds will aim at the moon and cars will whisk her from city to city on cushions of air.

But dreams and children alike must have the proper atmosphere to thrive. Freedom and stability provide this. It is our task to foster this atmosphere in the present and protect it for the future. We have an investment in it for our children.

You can protect this investment by joining with other leading American businessmen to promote the Treasury Department's Payroll Savings Plan for U. S. Savings Bonds. The Treasury's plan works for stability in our economy and strength in the defense of our liberties. By fostering the love of individual freedom and the economic well-being of the nation, it provides a strong, steady foundation that will not waver under the challenges of tomorrow.

When you bring the Payroll Savings Plan into your plant—*when you encourage your employees to enroll*—you are investing in the dreamers of our today. In the engineers, scientists and teachers of our tomorrow. In America's future. In freedom itself.

Don't pass this investment opportunity by. Call your State Savings Bonds Director. Or write today directly to the Treasury Department, United States Savings Bonds Division, Washington, D. C., 20226.

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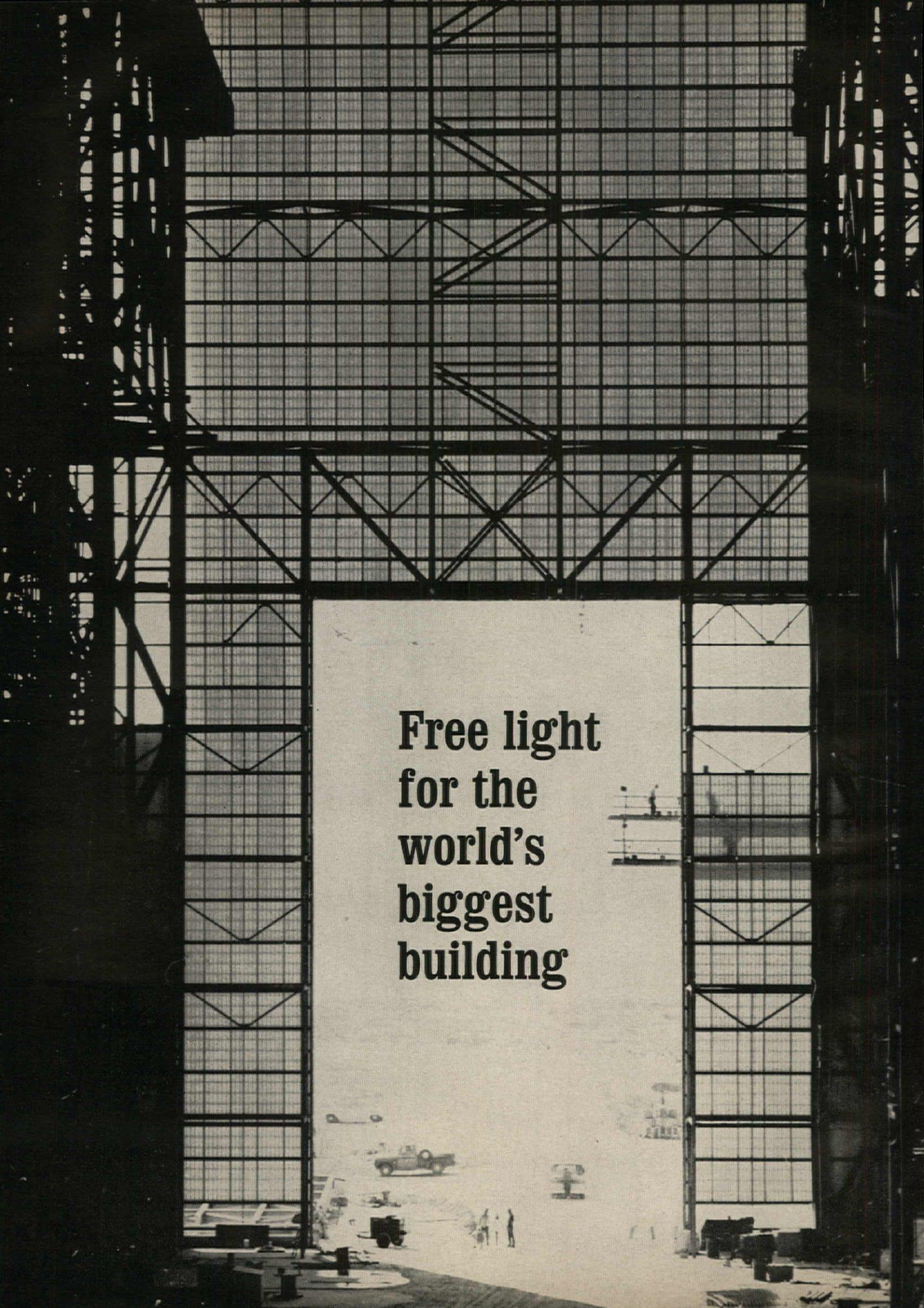
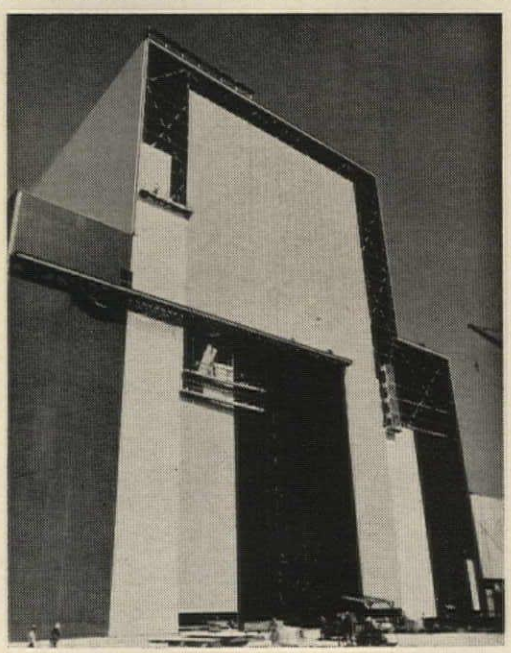
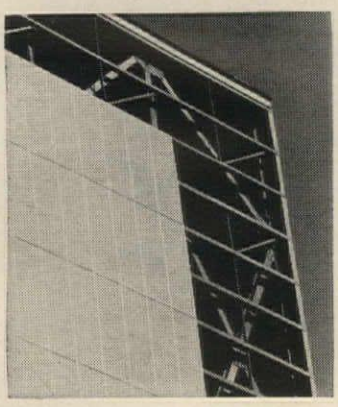

Free light
for the
world's
biggest
building

Hetron-based panels protect Saturn V rockets from the elements at the Vehicle Assembly Building on Merritt Island. Architects: Urbahn-Roberts-Seelye-Moran. Filon Corporation produced the reinforced Hetron sheets. Panel Structures Inc. is the fabricator.



## Hetron®-based hurricane-proof panels let daylight into 129,482,000 cu. ft.

A hurricane tearing along at 125 miles an hour won't shatter these Hetron-based translucent panels. Neither will shock waves set up by rocket launchings at nearby Cape Kennedy.



That's why the architects chose them to let light into the vast interior of the Vehicle Assembly Building.

The big 4 x 12-foot panels are reinforced Hetron polyester resin laminated to aluminum grids. Their fabricator says they "are the strongest ever built." Coated with Tedlar,* they are expected to resist the brilliant Florida sunshine up to six times as long as standard panels.

*No glare.* You can specify Hetron-based panels for high, medium or low light transmission. Whether you let in a flood or a trickle, it is light without glare and only the softest of shadows.

*No flame.* Panels made of Hetron polyester resin can't spread a fire. Typically, they test within a range of 35 to 75 in flame-spread rating by VL Tunnel Test. They are qualified to carry the Factory Mutual seal of approval and the U/L label.

We don't supply these strong, weather-resistant panels—just the Hetron that makes them safer. We'll be glad to send you a list of fabricators. Please write Durez® Plastics Division, Hooker Chemical Corporation, 8011 Walck Road, North Tonawanda, N. Y. 14121.

*Du Pont registered trademark for its PVF film.

HOOKER CHEMICALS® PLASTICS

DUREZ PLASTICS DIVISION

For more data, circle 133 on Inquiry Card

## *Product Reports*

*continued from page 270*

### FLEXIBLE DUCTING

A new flexible fiber-glass duct, which bends around studding and thus speeds installation is said by the company to be less than half the weight of sheet metal duct, has built-in acoustical properties to eliminate fan and

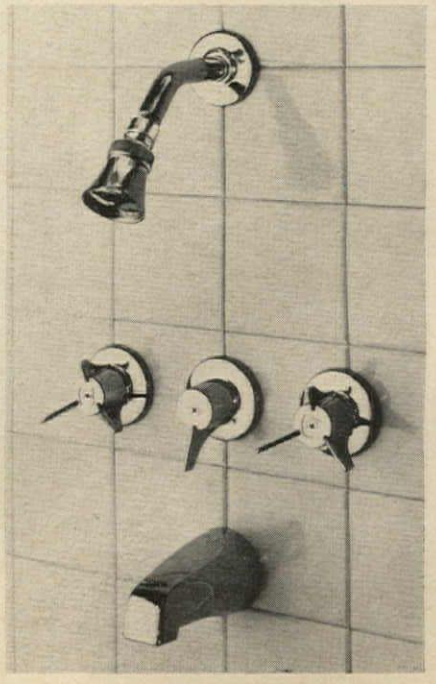
equipment noise, and is surrounded by a vinyl vapor barrier to prevent condensation. Maximum air temperature and velocity for the new product are 240 deg. and 2,400 ft per minute. *Owens-Corning, Santa Clara, Calif.*

CIRCLE 310 ON INQUIRY CARD

### BATH AND SHOWER TRIM

The *Mark III* line of bath tub and shower fixtures have been specially designed to combine good appearance and practicality and can be adapted to difficult wall thicknesses. *Union Brass & Metal Manufacturing Company, St. Paul, Minn.*

CIRCLE 311 ON INQUIRY CARD



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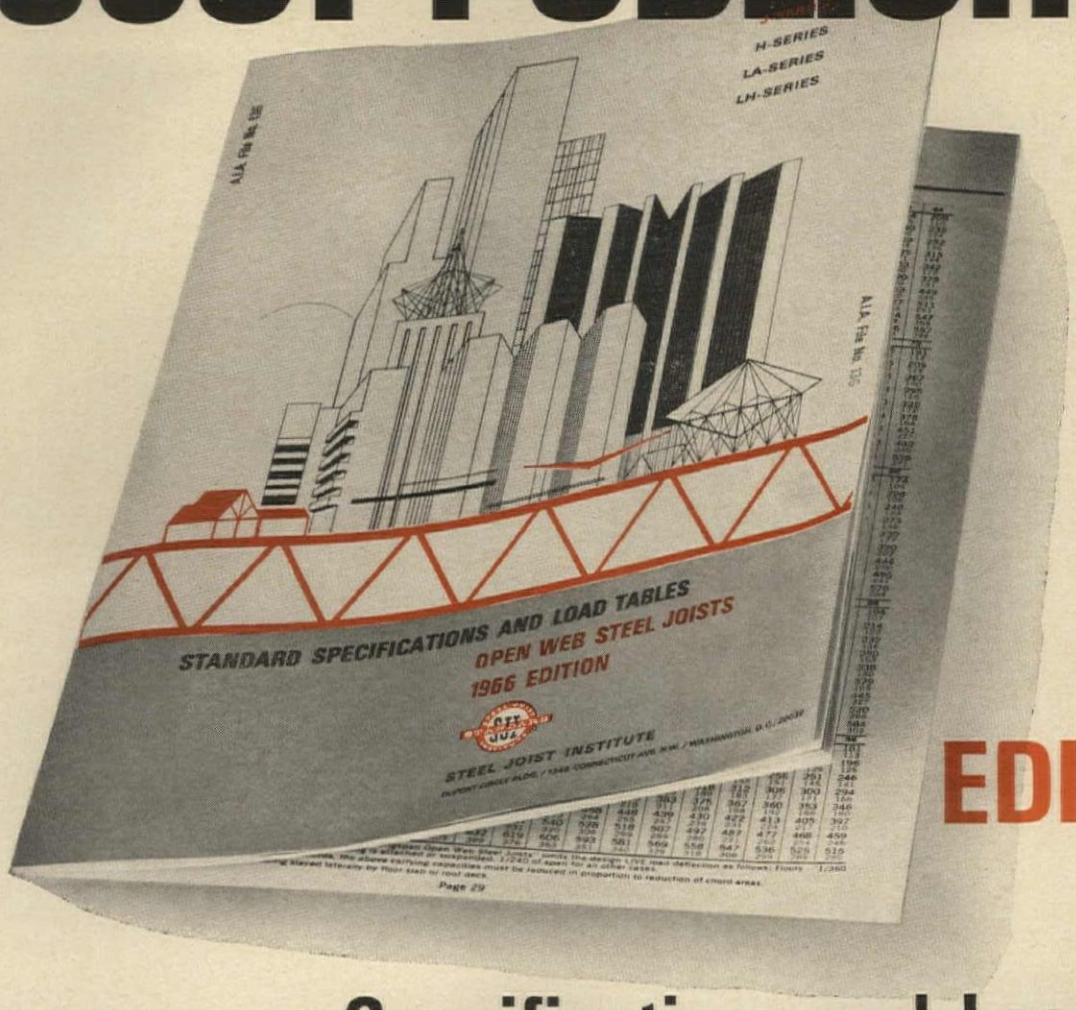
# JUST PUBLISHED!




## 1966 EDITION!

## Specifications and Load Tables for High Strength Open Web Steel Joists

Here, from the Steel Joist Institute, are 32 pages of specifications, load tables and everything else you need for fast, accurate specification of joists to carry uniform loads on spans up to 96 feet. Covers the following joists: J-SERIES, joists made from 36,000 PSI minimum yield strength steel; LA-SERIES, longspan joists compatible with the J-Series; H-SERIES, high-strength joists made from 50,000 PSI minimum yield strength steel; LH-SERIES, longspan joists compatible with the H-Series. Send for your free copy of this valuable booklet.

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Please send me a complimentary copy of the 1966 Edition of Specifications and Load Tables.

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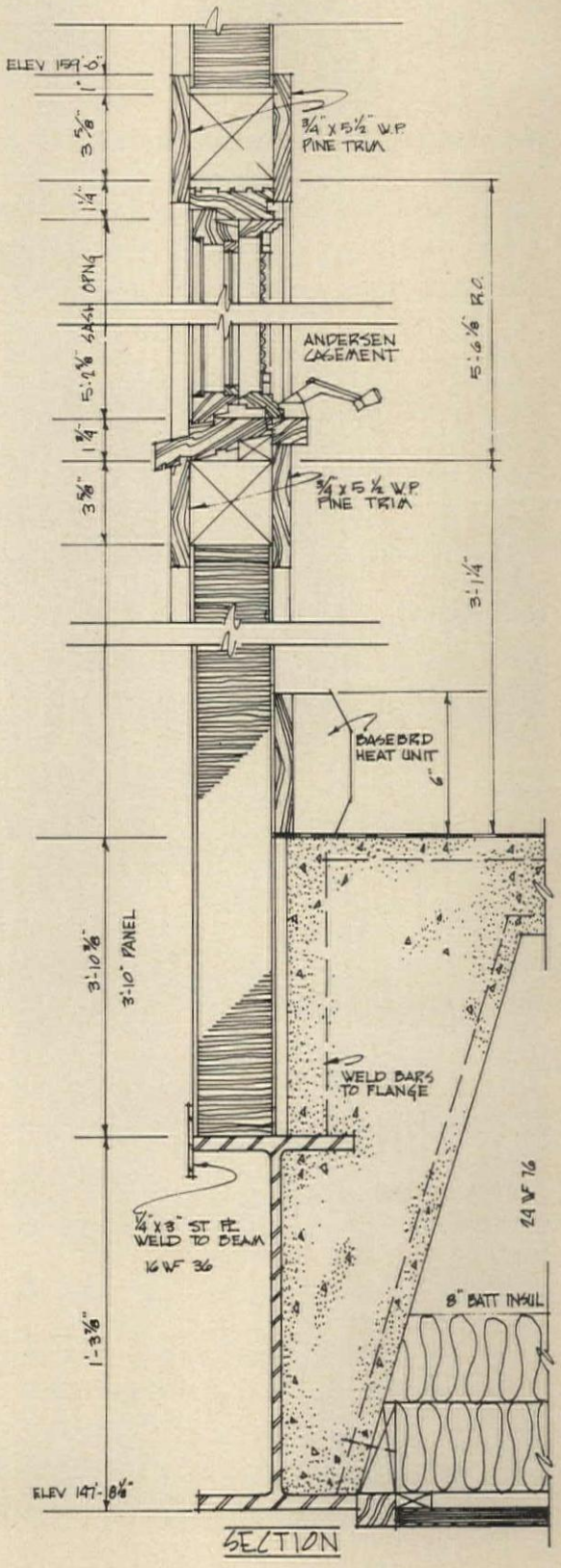
Company_____

Address_____

City_____ State_____ Zip_____

For more data, circle 135 on Inquiry Card

*Immanuel Baptist Church, Fort Wayne, Indiana*
*Architect: Orus O. Eash, Fort Wayne, Indiana*
*Windows: Andersen Casements*




provide draft-free comfort . . . because they're precision built to be at least 4 times **more weathertight** than ordinary windows.

Check Sweet's File. Or contact your Andersen distributor for a Tracing Detail File. All Andersen Windows are readily available in the United States and Canada.

**Andersen Windowalls**
TRADEMARK OF ANDERSEN CORPORATION
*America's Most Wanted Windows*
ANDERSEN CORPORATION • BAYPORT, MINNESOTA

## *Office Literature*

*continued from page 215*

### CHAIN LINK FENCE SYSTEM

Details and suggested applications of *Colorbond* resin-clad steel fence system are given in a foldout catalog. Specifications and prices of all components of the system are set out in chart form; categories of equipment are coded according to appropriate usage, and an explanation of the charts is given to make it easy for customers to specify exactly what they need for individual requirements. *Colorguard Corporation, New York City*

CIRCLE 409 ON INQUIRY CARD

### ELEVATORS FOR LOW-RISE BUILDINGS

A new 28-page catalog gives details of *Oildraulic* passenger elevators for use in buildings up to seven stories high. Details of the controller, power units, plungers and other components are described and illustrated. Specific advantages of these elevators for low rise buildings are discussed; general recommendations and specification data are also included. *Dover Corporation, Elevator Division, Memphis, Tenn.**

CIRCLE 410 ON INQUIRY CARD

### CONSTRUCTION MATERIALS

The major products in the Sealtight line of construction materials are on display in a new, expanded catalog. Seven types of expansion joint for concrete construction, premoulded tongue and groove joints, dummy joints, a variety of joint sealing compounds, concrete curing compounds and a new vapor seal with a *Plasmatic* core are among the items described and illustrated. *W. R. Meadows, Inc., Elgin, Ill.**

CIRCLE 411 ON INQUIRY CARD

### TERRAZZO FLOORING PROCESS

A method for installing thin-set portland cement terrazzo floors, called the *Terrabonding Process* is described in a new brochure. The process, based on the use of *Terrabond* adhesive is a direct-to-slab bonding technique, which permits terrazzo toppings to be applied in thicknesses as small as 3/8 in. directly over structural slabs, at a cost claimed to be substantially lower than that of conventional terrazzo systems. *Thiokol Chemical Corporation, Trenton, N.J.**

CIRCLE 412 ON INQUIRY CARD

### LOW BRIGHTNESS FIXTURES

This new illustrated and detailed catalog describes the company's line of low brightness downlights, accent and up-lights, and wall washers. The equipment is categorized according to the basic reflectors which each have a separate listing. Diagrams are included to show how different lighting designs can be arrived at by specifying various combinations of catalog letters and numbers. The catalog includes complete specifications for standard equipment and aperture matched integrated equipment, designed especially for use in buildings where low brightness is an important requirement. *Lighting and Electronics Inc., Brooklyn, N.Y.*

CIRCLE 413 ON INQUIRY CARD

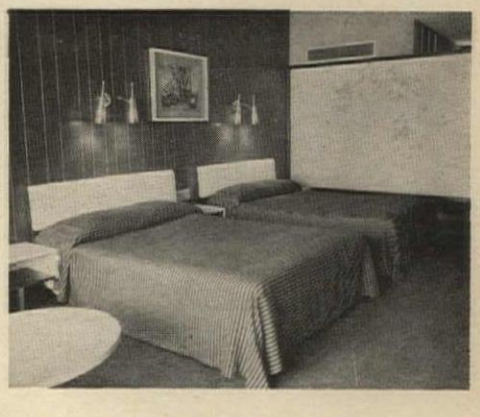
**Additional product information in Sweet's Architectural File*

*more literature on page 282*

# This Howard Johnson's Motor Lodge also treats guests to individual control comfort with an Arkla Gas system.

Comfort is a matter of personal preference at this modern lodge in Texarkana. Arriving guests find their room a cool 75°. Within three minutes, this can be changed to the exact temperature desired. Thermostat controls quickly adjust the amount of circulating chilled or heated water entering the fan coil unit.

What's behind it all? Dependable Arkla direct Gas-fired Chiller-Heaters and steam-fired Chillers. And throughout the lodge complex, a wide variety of flexible Arkla Gas equipment has been added to meet expansion demands. Initial costs have been moderate. And operating costs have been held low by the great economy of Gas Energy.



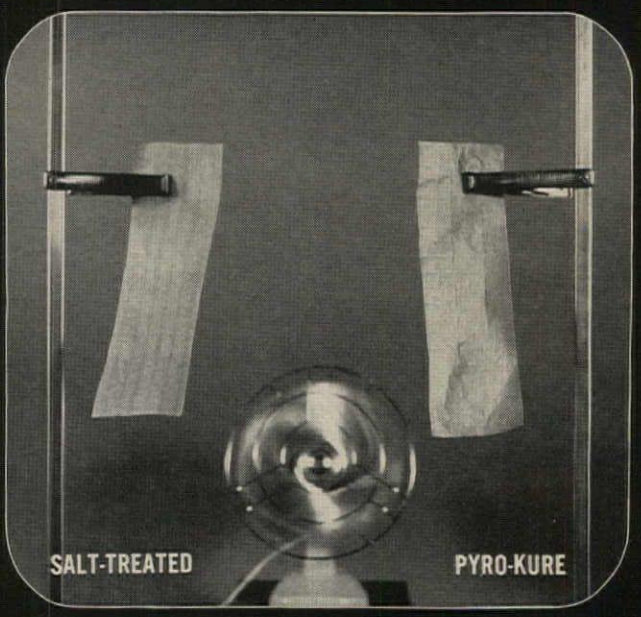
Year-round air conditioning by Arkla and Gas can benefit you. Call your local Gas Company sales engineer. Or write: Arkla Air Conditioning Company, 810 East Franklin, Evansville, Indiana. AMERICAN GAS ASSOCIATION, INC.

**For heating & cooling... Gas is good business**

For more data, circle 137 on Inquiry Card

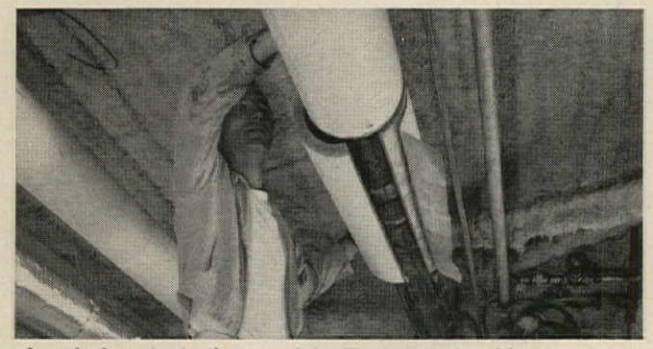
# *Specify the U/L Rated Vapor Barrier that passes every test . . .*


(1) Barriers are exposed to moisture.




(2) Barriers are then dried out.

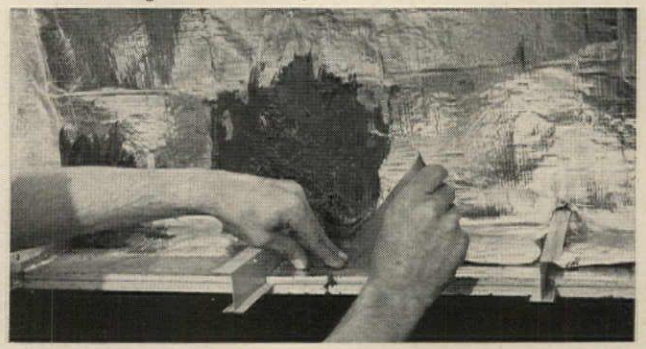
## FOUR PLACES TO SPECIFY PYRO-KURE VAPOR BARRIERS FOR PERMANENT PROTECTION AGAINST FIRE



**Insulation Jacketing on Low Temperature Lines**
A Pyro-Kure grade is available for use on lines carrying temperatures from +50°F to sub-zero.

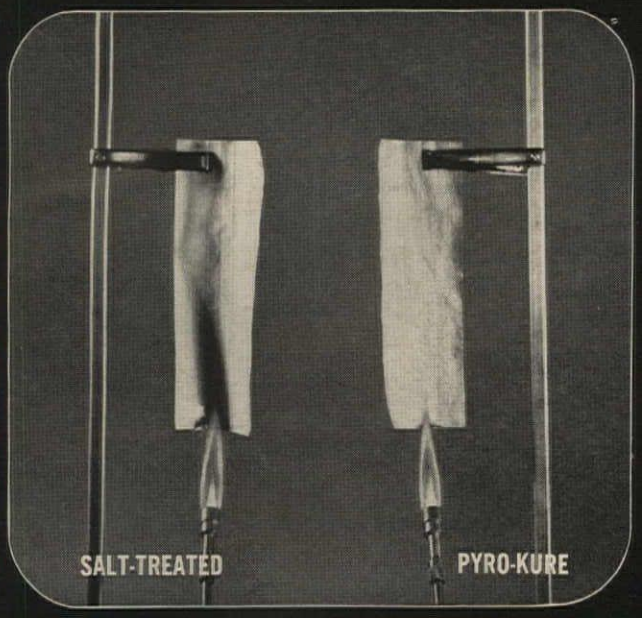
**Insulation Facing for Ducts, Walls and Ceilings**
A number of Pyro-Kure grades are available for vapor barrier applications throughout the building.

**Insulation Jacketing on Service Lines**
Pyro-Kure 601 provides a permanent noncombustible barrier for lines carrying temperatures from +50°F and up.

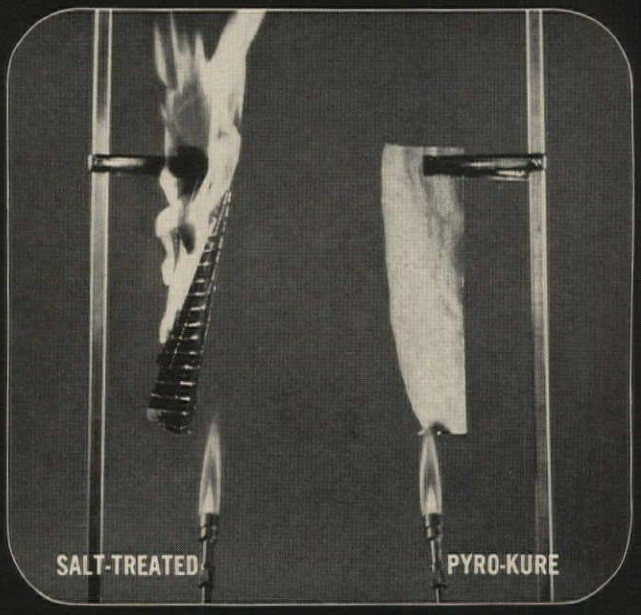


**Zone Barriers and Reflective Liners**
Pyro-Kure now provides permanent noncombustibility plus airproofness for ventilated ceilings and for lighting plenums.

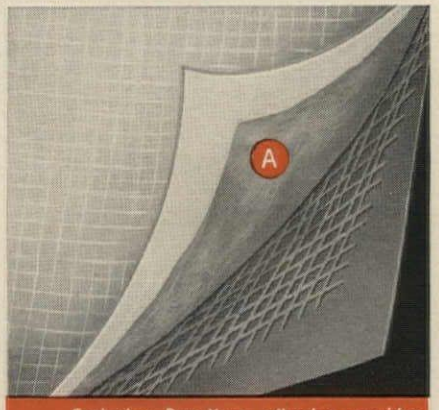
# Pyro-Kure®:
# PERMANENTLY NONCOMBUSTIBLE




(3) Flame is applied, treated barrier starts to burn.




(4) Treated barrier engulfed by flames. Pyro-Kure snuffs out flame, won't burn ever!




A Exclusive Pyro-Kure adhesive provides permanent flame extinguishing property.

**This dramatic flame-snuffing ability** comes from Sisalkraft's exclusive Pyro-Kure adhesive. It is a patented flame-extinguishing formulation that keeps the Vapor Barrier noncombustible no matter what environments it might be subjected to or how long it is in place.

This is not true with other "rated" barriers. Moisture, humidity and aging can cause other types of flame-extinguishing chemical to leach out, or corrode aluminum.

This difference is why Pyro-Kure is called the **permanently noncombustible** vapor barrier. Why its U/L Flame Spread Rating of "25 or less . . ." is not restricted in any way or will never be reduced. It is also why Pyro-Kure Vapor Barriers comply with the National Building Code standard for **Noncombustibility** as defined by the American Insurance Association.

**Specify Pyro-Kure Vapor Barriers.** Give your clients maximum protection against fire hazard, and against condensation. Various grades are available, including aluminum foil to kraft, vinyl film to foil, and kraft to kraft, from leading insulation manufacturers under their own brand names, or through insulation contractors for local application. All grades are reinforced with glass fibers for strength. Complete specifications are in Sweet's Catalogs.

**Send for Samples and Technical Data Kit** which includes perm ratings and other physical property information. Write: Sisalkraft, 41 Starkey Ave., Attleboro, Massachusetts 02303.

ST REGIS
SISALKRAFT DIVISION

For more data, circle 138 on Inquiry Card

## *Office Literature*

*continued from page 278*

### CONTRACT FURNITURE

A comprehensive line of contract furniture is illustrated in a well laid out catalog. The items illustrated include desks, small tables, conference tables, planters, modular benches and a very wide range of different kinds of chairs. *The Weinberg Corporation, Philadelphia, Pa.*

CIRCLE 414 ON INQUIRY CARD

### FOUNDATION FAILURES

Typical examples of distress, failure and collapse in structures where the foundation design or construction was faulty are presented in a 32-page book by Dr. Jacob Feld, consulting engineer. The booklet covers examples from the Leaning Tower of Pisa to the recent Alaska earthquake, and emphasizes the importance of thorough analysis and testing of soil, foundation material and design, with relation to the loads they are expected to have to bear. *Soiltest, Inc., Cenco Instruments Corporation, Evanston, Ill.*

CIRCLE 415 ON INQUIRY CARD

### CEILING AND PARTITION SYSTEM

Details of the *Fifty-Fiver* steel stud partition and ceiling system are given in a 4-page illustrated brochure. Dimensions, allowable loads, and detail drawings are included. The system is said to be quick to install, and installation photos are also shown in the booklet. *Goodson Steel Corporation, Dallas, Tex.*

CIRCLE 416 ON INQUIRY CARD

### ENGINE GENERATOR SETS

Two complete lines of *Fairbanks Morse* engine generating sets are described in a 12-page brochure. The lines are characterized by the fuel they use, one being fueled by diesel, the other by gasoline or gas. Many sizes and types of unit are discussed and tables are included to show ratings and other characteristics of each unit. *Colt Industries, Fairbanks Morse Power Systems Division, Beloit, Wis.*

CIRCLE 417 ON INQUIRY CARD

### SWIMMING POOLS

A design and engineering manual contains sample plans of pools of various shapes and sizes, and discusses a number of elements which might affect layout and design. Construction details, installation drawings and written specifications are included as well as minimum codes and standards affecting construction. Extensive equipment information is also given covering chlorination, filtration, deck fitting and electrical equipment. *Paddock Seablue, Dallas, Tex.*

CIRCLE 418 ON INQUIRY CARD

### METAL TIE FOR CAVITY WALLS

An 8-page technical bulletin describes the results of tests conducted by the IIT Research Institute on the "Effect of Type of Metal Tie on the Horizontal Flexural Strength of Cavity Walls". Rectangular, truss, and ladder ties are compared, and investigation procedures and analysis described. *Dur-O-waL National, Inc., Cedar Rapids, Iowa.**

CIRCLE 419 ON INQUIRY CARD

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



For more data, circle 139 on Inquiry Card

For more data, circle 140 on Inquiry Card →

# What small but significant Carnes detail contributes to the elegance of the Century Plaza Hotel?

Century Plaza Hotel, West Los Angeles, California
Architect and Engineer: Minoru, Yamasaki
General Contractor: George A. Fuller Co., Los Angeles, California
Sheet Metal Contractor: Climate Conditioning Corp., Stanton, California
A Western International Hotel

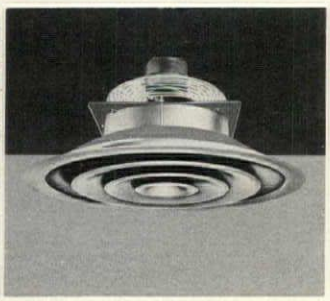
*Carnes has the answer on the next page*

**ANSWER:**
**Carnes eliminated the visible screws customarily used to attach outlets to a wall or ceiling. In this luxury hotel, each of the hundreds of Carnes extruded aluminum air distribution outlets is connected to ductwork with specially devised concealed fasteners. An insignificant detail? Not to the architect, whose sole intent was to make the Century Plaza one of the world's outstanding hotels in every detail. And certainly not to Carnes, where developing products of excellence for specific applications has contributed to acknowledged leadership. Another example of Carnes' engineering superiority is shown in the new air distribution system described below.**

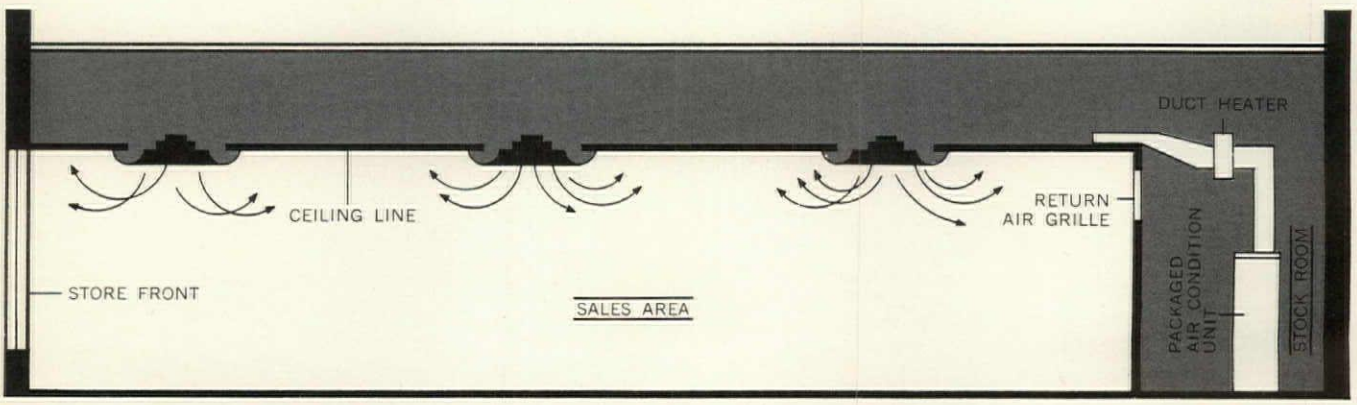
---

# INTRODUCING THE CARNES MOTORIZED AIR DISTRIBUTION SYSTEM

Pat. Pend.



## New, simplified air conditioning system for large space areas eliminates 90% of ductwork, cuts cost up to 50% by using ceiling mounted motorized, fan-propelled air diffusers.




Proven in 123 installations! An economical, flexible method of delivering conditioned air to specific areas in accordance with needs, via ceiling mounted diffusers. Eliminates up to 90% of costly insulated ductwork otherwise used, by utilizing conventional air conditioning equipment and building construction.
Saves 50% or more in initial system installation costs by eliminating the need for sealed, pressurized ceiling plenums. Provides the comfort of "space balanced" air in even the largest supers, shopping centers and similar spacious quarters. Includes all the advantages of "traffic flow plan" engineering — with maximum changeover flexibility.
It's there — everything — built into Carnes' new Motorized Air Distribution System.
Write for Carnes' facts-catalog No. D-48K.

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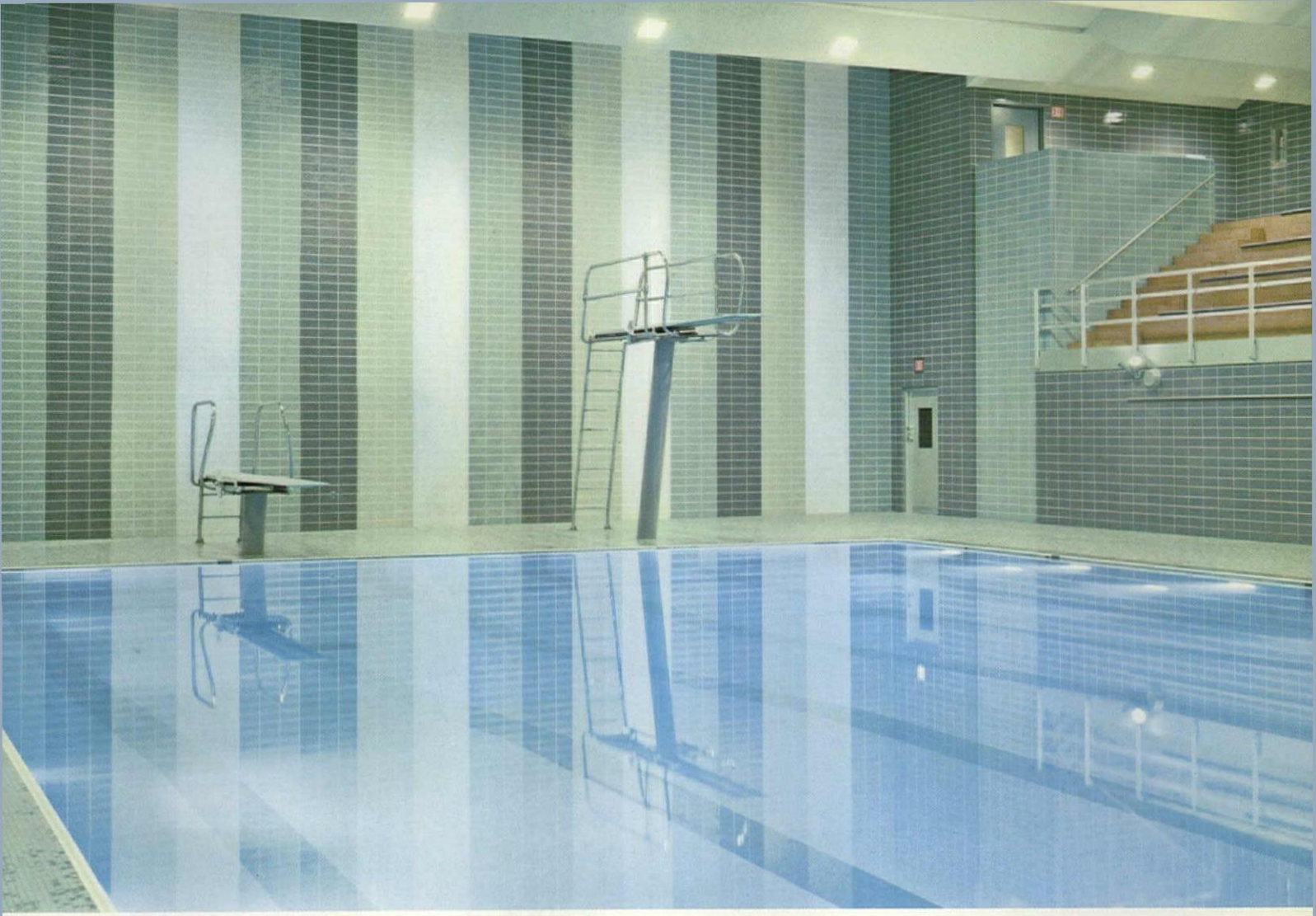
Verona, Wisconsin

Canada: Vapor Carnes Ltd., Montreal 26, Quebec



# a new dimension in sound control

# Natcoustile

One of many applications of Natco products at Campion Jesuit High School.

Here, even the liveliest youngsters can't cause a reverberating, ear shattering din. Because Natco Ceramic Glazed Natcoustile forms the walls surrounding the pool at Campion Jesuit High School, Prairie du Chien, Wisconsin.

Natcoustile — a perforated face unit — cuts noise up to 65%. High sound absorption in this *genuine* structural clay unit is combined with a permanent ceramic glazed finish. Natcoustile is load bearing, and fireproof, too. Modern Natcoustile complements the refreshing aqua shading in the pool with an accent of modest charcoal, blue-green and white. Of course, a variety of other colors are available to match your color scheme.

Natco ceramic glazed Vitritile is used in other areas of the school. Natco has structural clay products to meet every design requirement. Write for catalog S-65.

Natcoustile
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in random or uniform patterns.

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**IN CANADA:** Natco Clay Products, Ltd., Toronto, Ont.

For more data, circle 152 on Inquiry Card →

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Shelby High School, Shelby, North Carolina. Architect: Holland & Riviere, Inc., Shelby

# Terrazzo throughout for a new high school

In the new Shelby High School, the architect chose terrazzo, not only for high-traffic areas, but for attractive, low-upkeep floors throughout the entire building. The school was built at a cost of $9.25 per square foot for the building—*and this included terrazzo in the classrooms.*

Few flooring materials have the history of terrazzo. Few can match its beauty. Terrazzo floors laid centuries ago still serve as dramatic tests of time and use. Terrazzo's long life and low maintenance make it a highly desirable flooring material for today's structures.

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York leadership in total environment control is demonstrated in buildings of every type, in every climate. Recent York advances in sound control, in odor control, have been recognized as major steps in improved air conditioning. And these advances are helping architects and engineers create better climates for working and living.

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**HOUSTON BAPTIST COLLEGE,** 7502 Fondren Road, is air conditioned by a York central system. Architects, Milton McGinty & Lloyd, Morgan & Jones; Consulting Engineer, Bernard Johnson Engineers, Inc.; Mechanical Contractor, Dolen-Tanner; General Contractor, H. A. Lott, Inc.

or college classrooms . . .

# CONDITIONING

poration, York, Pennsylvania. In Canada, contact National-Shipley, Ltd., Rexdale Boulevard, Rexdale, Ontario.

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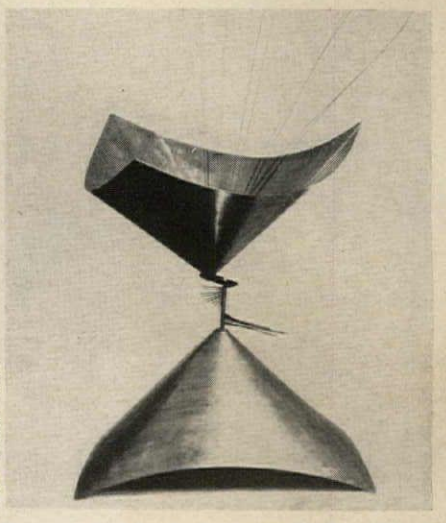
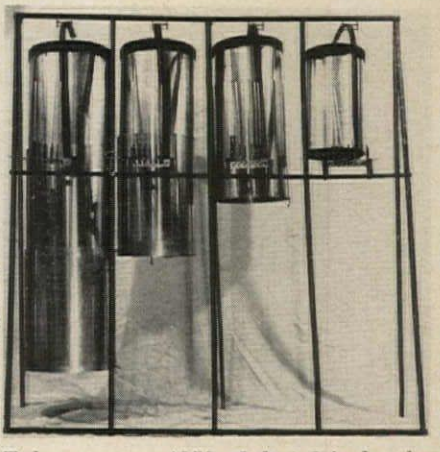
## "Structures For Sound" Exhibited In New York

"Structures for Sound," an exhibit at the Museum of Modern Art in New York which continues until December 5, is a fascinating conglomeration of unconventional musical instruments developed during the past 12 years by French sculptor François Baschet, who also studied acoustics, and by his brother Bernard, a professional sound engineer. Included are 12 examples made of glass rods and various metals such as iron, steel and aluminum; and white plastic balloons, cardboard cones and metal sounding foils which are used as amplifiers. The instruments are played by the use of moistened fingers, rubber mallets or bows, or are plucked like a harp or played like a piano. Earphones have been installed in the galleries so that the publice can listen to a recording of music composed for the diverse sounds of the instruments.



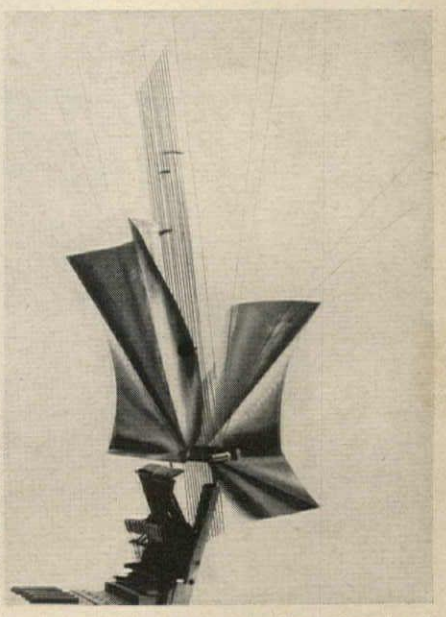
*Kurt Blum, Bern*

Zanza; 1964; 3 feet by 2 feet by 2 feet; steel needles, aluminum cones; played by plucking the needles; sounds like a harp.



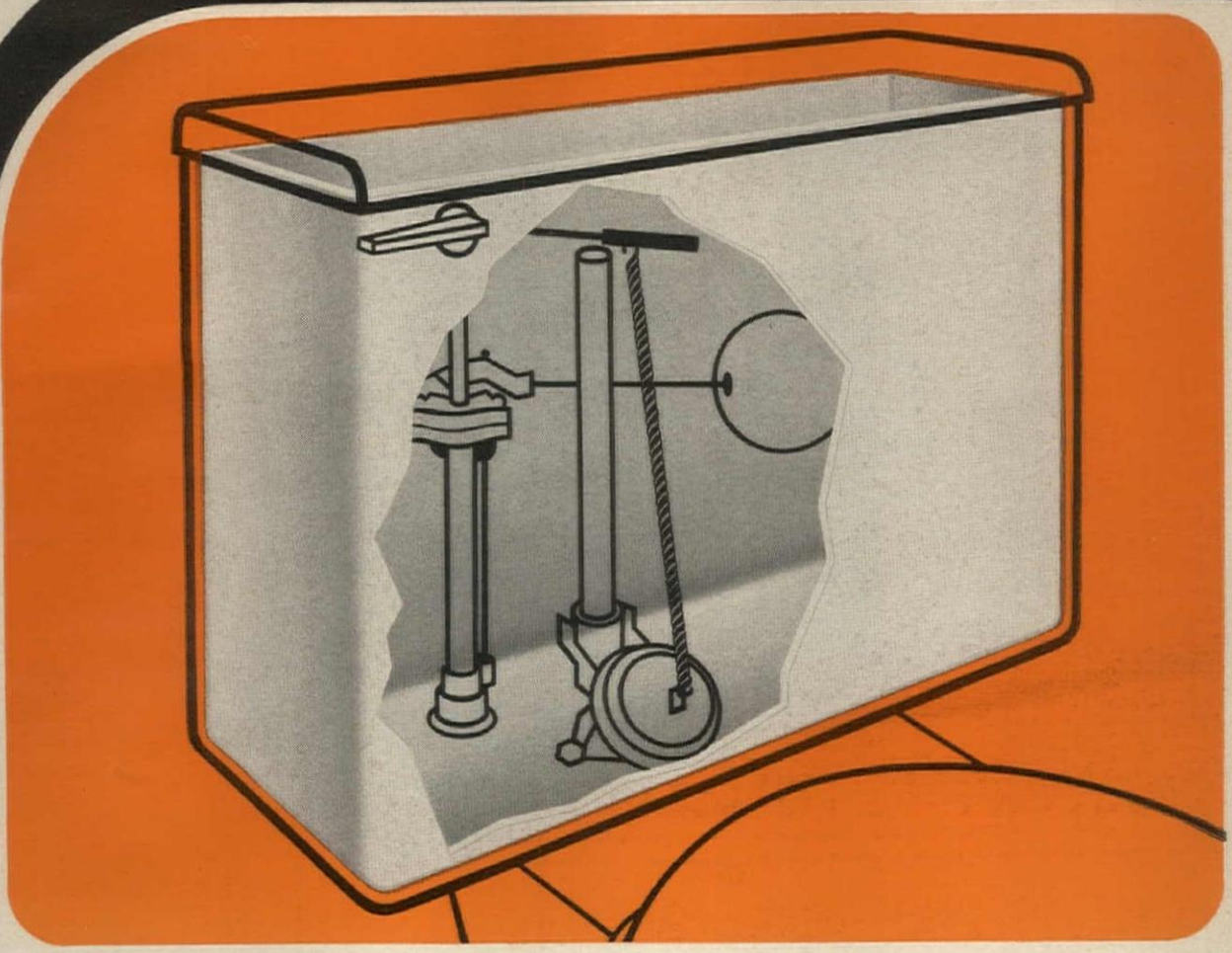
*Didier Baussy, Paris*

Tubes graves; 1959; 6 feet 6 inches by 6 feet 6 inches by 3 feet; metal rods, glass rods, aluminum cylinders; played with moistened fingers; sounds like a string base.



*Mirella Ricciardi, Paris*

Petit piano; 1963; 4 feet by 2 feet by 1 foot 9 inches; steel rods, aluminum foils; played like a piano; sounds like a glockenspiel.



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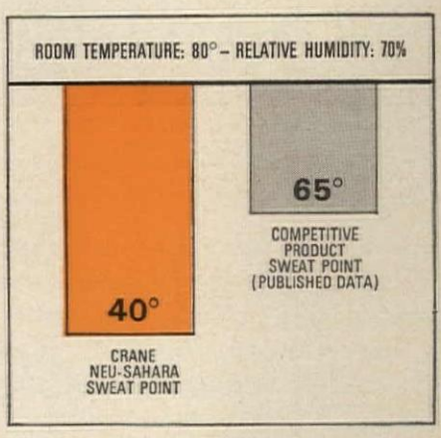
The so-called "insulated" closet tank isn't new—but an insulated tank that *really* ends tank-wiping and floor-mopping is new. New from Crane . . . the Neu-Sahara, the tank that stays sweat-free even when bathroom temperatures soar to a shower-steamy 80° with 70% humidity. Even when the tank water is near freezing.

*Under similar conditions, a major competitive "insulated" tank starts sweating when the water is around 60°. (See chart at right).*

To prove the insulation superiority of Neu-Sahara's molded-in liner, we put one filled with ice cubes in a 100° room. After 24 hours, the cubes were still cubes. No sweat on the tank!

Neu-Sahara doesn't need a bulky oversize tank, either. The urethane liner will not separate, and won't absorb water. It soaks up sound instead, to make operation whisper-quiet.

Neu-Sahara tanks will make eight styles of Crane closets sell faster. Write for details: Crane Co., Dept. 008, 4100 S. Kedzie Ave., Chicago 60632.

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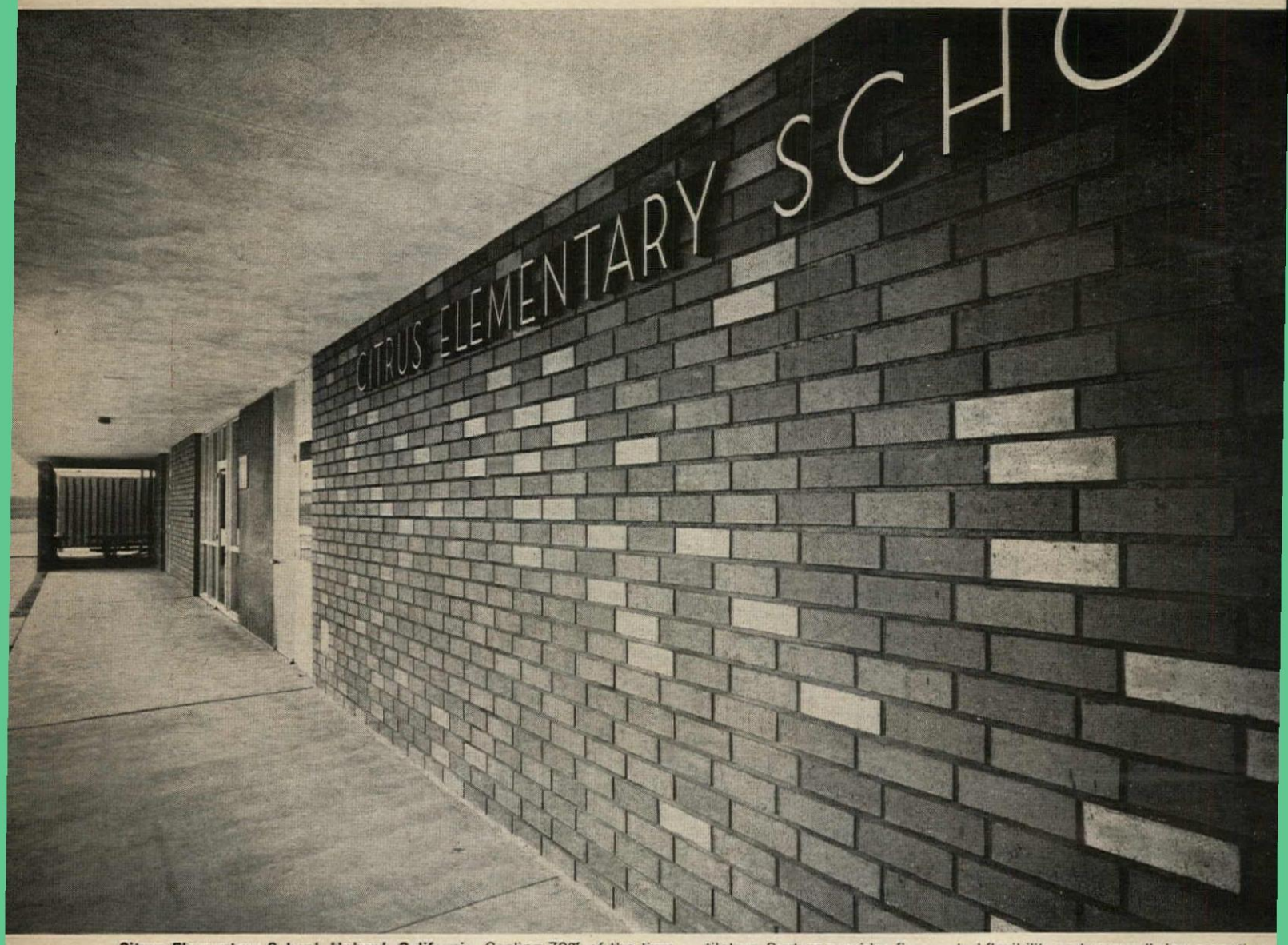
# Talk to Trane for total school




**Citrus Elementary School, Upland, California.** Cooling 70% of the time, heating 10% of time maintains optimum thermal environment. Design utilizes two TRANE air-cooled water chillers, individual classroom unit ventilators. System provides fine control flexibility and unusually low operating cost. Harnish, Morgan and Causey, Architects, Ontario, California. Robert C. Ring and Associates, Consulting Engineers, Upland, California.

**In climates as varied as Southern California and Northern Ohio, in every style of architecture, Trane offers one-source responsibility for your total school needs—cooling, heating and ventilating.**

Today's total air conditioning needs for schools require specialists in many fields. With TRANE you get all the answers from a single source.

### 35 years' experience in school field

TRANE knows the school market and what is needed to provide the ideal climate for learning. It has 35 years' experience in the school market and is also a major manufacturer of air conditioning and refrigeration products. That's why TRANE has long been recognized as the company to call upon to air condition schools of all types.

### There is only one *best* way to air condition a school . . . now or later . . . and you get objective advice from TRANE

Because TRANE offers broad lines of many types of equipment—to meet any requirement in any school plan—it can provide impartial assistance to school boards, architects and consulting engineers in selecting the best system for a school. Means you're free to pick and choose and base your specifications entirely on *what's best for your plans.*

### Single source responsibility

With *all* the air conditioning, heating and ventilating equipment for your school from TRANE, you can look to *one* manufacturer for equipment performance and service needs. There's no "buck passing." TRANE assumes responsibility. *That's single source responsibility!*

# air conditioning requirements

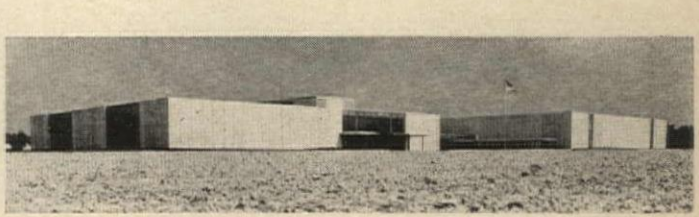
**Mayfield Senior High School, in suburban Cleveland.** Features total air conditioning—heating, ventilating and cooling equipment by TRANE. Unique architectural design (see exterior, below) made possible totally air conditioned school at a cost of $11.50 per sq. ft.—15% below area's average non-air conditioned school construction costs. Ward and Schneider, Architects, Cleveland. Byers, Urban, Klug & Pittenger, Consulting Engineers, Cleveland.

## Local offices sell and service only TRANE equipment

With TRANE there's the added assurance of on-the-spot attention. There are 120 TRANE sales offices located strategically throughout the United States. They're staffed by graduate sales engineers and factory-trained service engineers who sell and service only TRANE equipment. Their only concern is your satisfaction.

## Talk to TRANE

For greater school design flexibility, plus the air conditioning that's best with your plans, contact your local TRANE sales office. Your TRANE Sales Engineer will be happy to give you specific information on the complete TRANE lines of school heating, cooling and ventilating equipment. Just contact him.



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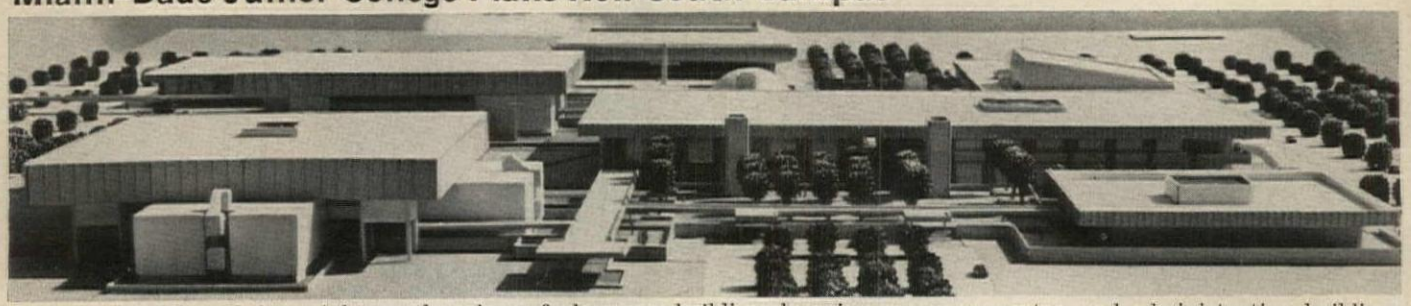
## Miami-Dade Junior College Plans New South Campus



In foreground from left to right are the science & classroom building, learning resources center, and administration building; in background are the technology and classroom building, gymnasium, and fine arts building.

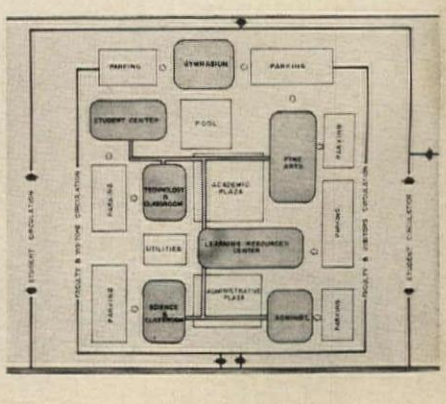
Construction is expected to start in September on the $7.8 million first phase of the south campus of Miami-Dade Junior College in Florida. Architects and engineers for the project are the firm of Pancoast, Ferendino, Grafton & Skeels.

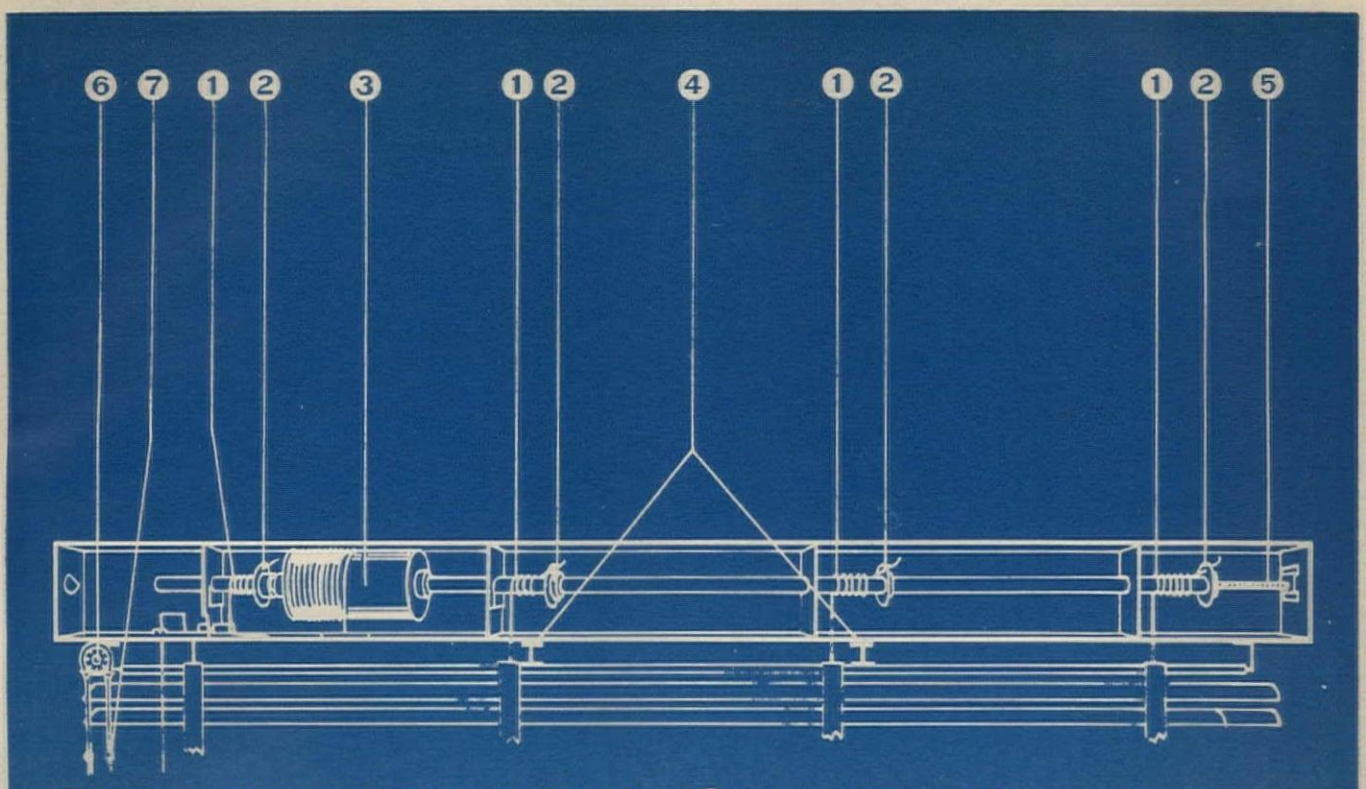
Included in the first phase of the three-phase master campus plan are three major buildings—a science and classroom building; an administration building; and a learning resources center. Phase one also includes a service building, two architectural "lakes," athletic fields and an entry plaza, plus landscaping of surrounding grounds and parking areas.

The science and classroom building is a three-story structure containing 125,000 square feet. The bottom two floors will contain laboratories and offices with the third story devoted to classrooms.

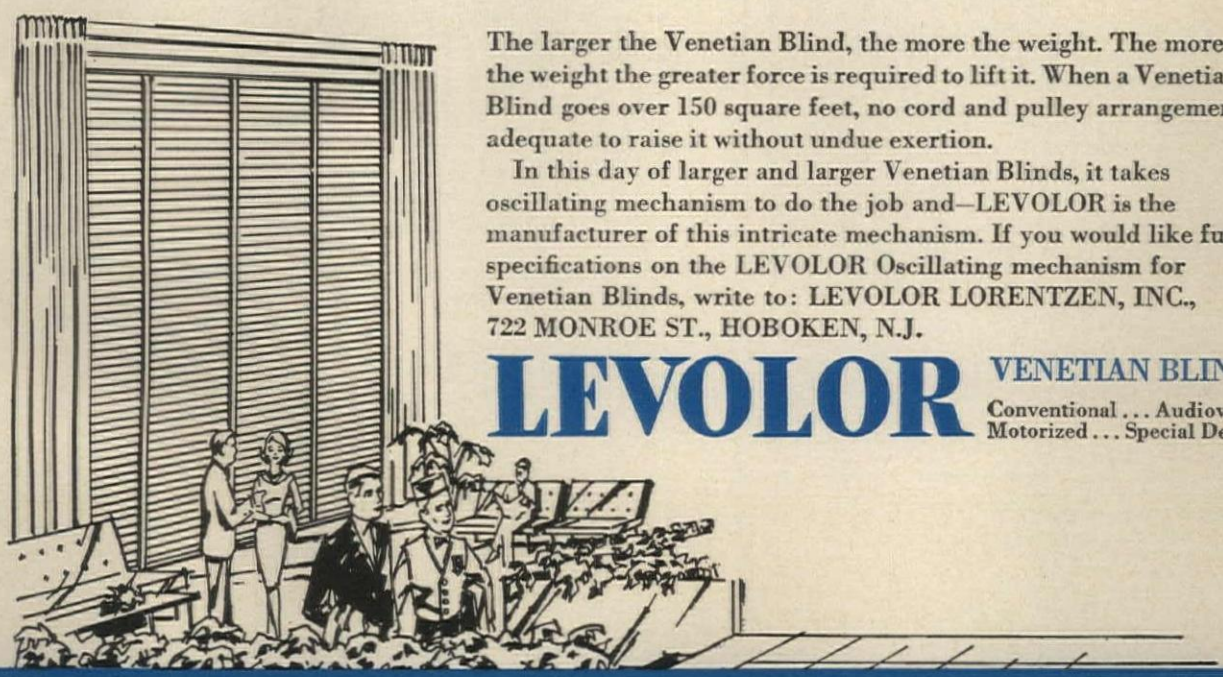
The administration building will house headquarters for both the existing north campus of the college and the new south campus. The one-story structure will contain 24,000 square feet.

The east half of the two-story learning resources center will contain library areas surrounded by classrooms which can yield to future library expansion. The other half of the structure, which contains 128,000 square feet, will contain four concentric teaching auditoria beneath a second story of audio-visual areas.






# When they want to raise the Big ones, they come to LEVOLOR



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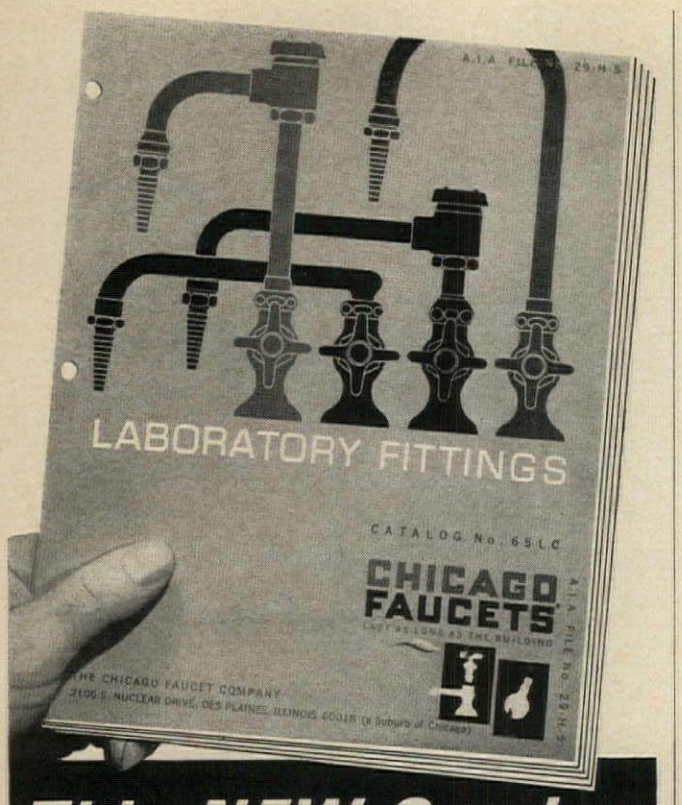


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# architects

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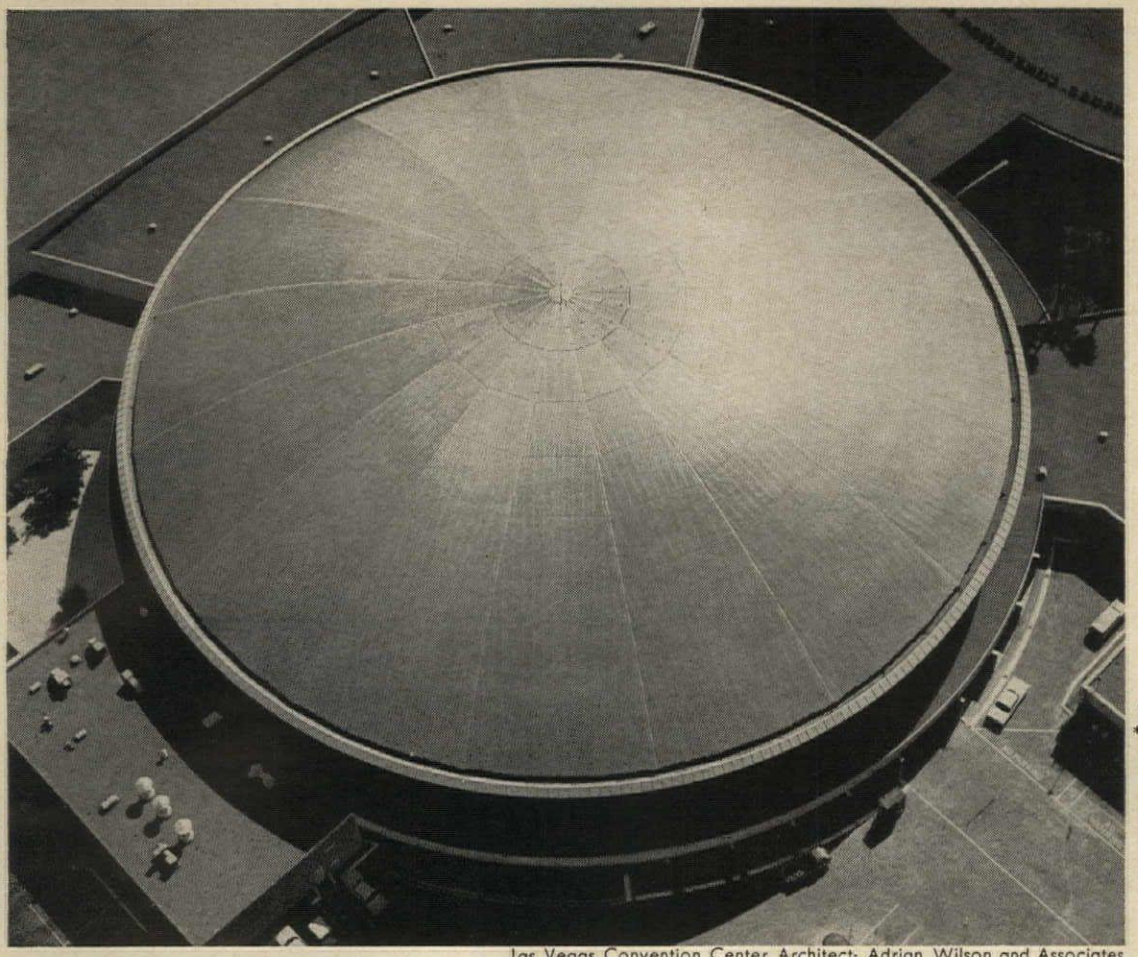

Las Vegas Convention Center Architect: Adrian Wilson and Associates

*4-Inch Rib was specified for the Las Vegas Convention Center.

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## From X-Rays to Flowers to Architecture to Computers: A Logical Progression

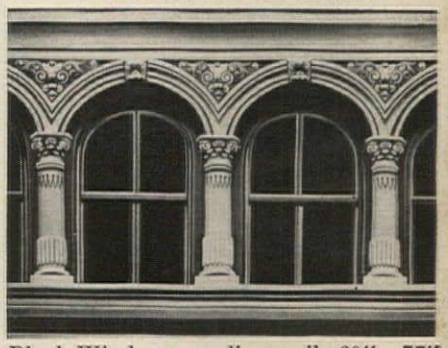
Lowell Nesbitt, 32-year-old New York artist whose one-man show closed last month at the Howard Wise Gallery in New York City, has logically evolved in subject matter from X-rays of the human body to massive, almost stylized representations of flowers, to blow-ups of the static repetition of details in early 20th century architecture, to enlargements of exterior and interior details of IBM machines. The artist's reasons for this subjective progression are architectonic.

According to Mr. Nesbitt, he first started in 1963 with X-rays of the human body because "it shows the body at its most architectonic and geometric state. The X-rays had soft echoes within them that logically led to the portrayal of flower petals."

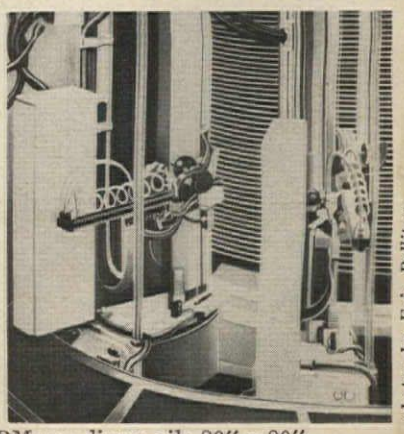
He then jumped to the more temporal representation of details from early 20th century architecture, having been inspired by the architecture of South Broadway in Manhattan. "There is the same repetition of forms in human ribs, flower petals, columns and windows or steps of a staircase," said the artist, "and this repetition carries over into the magnetic tape of computers." The computer detail paintings represent to the artist the present and the future. Mr. Nesbitt was inspired by the machines in IBM showroom windows which the artist thought "were very dull looking but would be exciting as paintings."

The next step in this logical progression is not known, but could there possibly be another logical step?

Orchid—'65; medium: oil; 50" x 50"



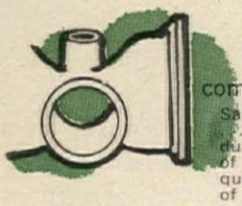
Black Windows; medium: oil; 60" x 77"



IBM; medium: oil; 80" x 80"

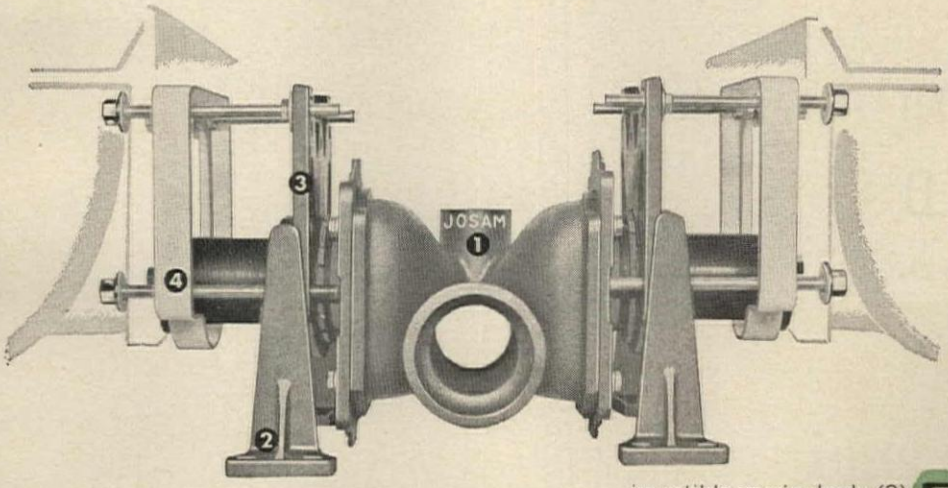
photos by Eric Pollitzer

# WHAT MAKES AN OFF-THE-FLOOR INSTALLATION COST LESS?



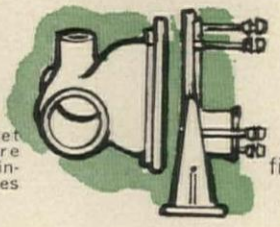
common vent (1)
Saves chase space . . . substantially reduces the number of connections required in a battery of toilets

positioning frame (4)
Simplifies alignment. . . Saves one or more hours of labor per bowl* . . . saves fixture breakage . . . saves call-backs . . . acts as template for wall finish, saving tile-setting time.




invertible carrier body (3)
Fits all types of toilets, blow-out or syphon jet . . . saves handling time . . . eliminates stocking and ordering of different carriers.

buttress foot (2)
Short Bulldog feet do not interfere with any type of finished floor . . . saves installation time



fitting and carrier are separate
provide more adaptability to meet changing conditions of installation . . . save revision time and labor

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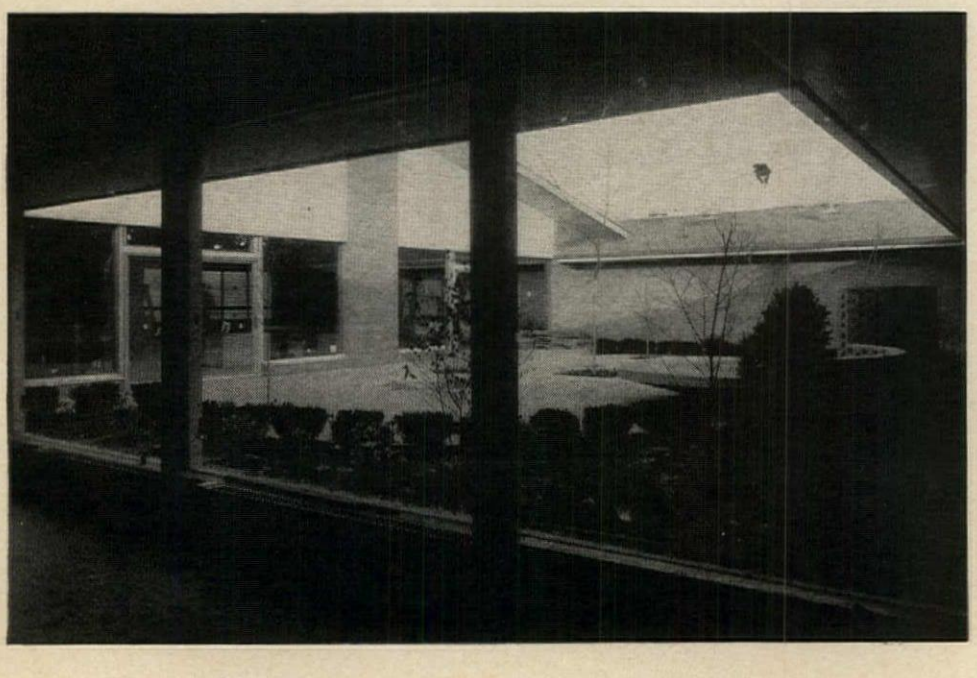
For more data, circle 167 on Inquiry Card


The Edwin A. Penick Memorial Home at Southern Pines, North Carolina, is glazed with *Parallel-O-Grey*® plate glass for its glare-reducing and heat-absorbing values. Colors seen through this neutral grey glass are unaffected. The home is operated by the Episcopal diocese of North Carolina. Architects: Louis H. Asbury & Associates, Charlotte, N. C. Glazing Contractor: Pritchard Paint & Glass Co., Charlotte.



Darlington House, a Jewish home for the aged, in Toledo, Ohio, is entirely glazed with *Thermopane*® insulating glass for the year-round comfort of patients. Architects and Engineers: Samborn, Steketee, Otis & Evans, Toledo. Glazing Contractor: Ohio Plate Glass Co., Toledo.

Capistrano-By-The-Sea, a geriatrics hospital at Dana Point, California, sits on a peak overlooking the Pacific Ocean on one side and facing woods and rolling hills on the other. The building is glazed with *Parallel-O-Plate®* glass and has sliding glass doors opening onto small patios. All glass areas are protected from the sun with wide roof overhangs. Architects: Ramberg & Lowrey, Santa Ana. Glazing Contractor: Arrow Glass Co., Santa Ana, Calif.

# Three ways to provide visual freedom for the aged

These three buildings, designed for the care or housing of the aged, are in widely separated geographical locations. They all avoid the dreary institutional look of small windows. Instead, large window walls open interiors to beautiful landscapes around them. Comforting to the occupants.

Each building is glazed with a different L·O·F flat glass product. L·O·F makes a particular kind of glass for every purpose in Open World design. For information, refer to Sweet's Architectural File or call your L·O·F glass distributor or dealer, listed under "Glass" in the Yellow Pages. Or write to Libbey·Owens·Ford Glass Company, Toledo, Ohio 43624.

LOF GLASS

**Libbey·Owens·Ford** Toledo, Ohio

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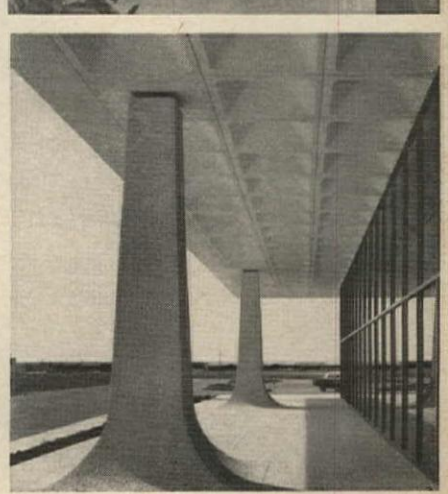
## Elegant Texas Bank Designed by Welton Becket

The recently completed First State Bank of Clear Lake City, Texas, designed by Welton Becket and Associates, architects and engineers, has a massive, clear span structural steel roof gaining support from two columns on each of its four sides, providing a 9,000-square-foot clear span over the 6,000-square-foot bank. The $450,000 fully glass-enclosed bank utilizes a two-way built up joist-type truss to achieve the span.

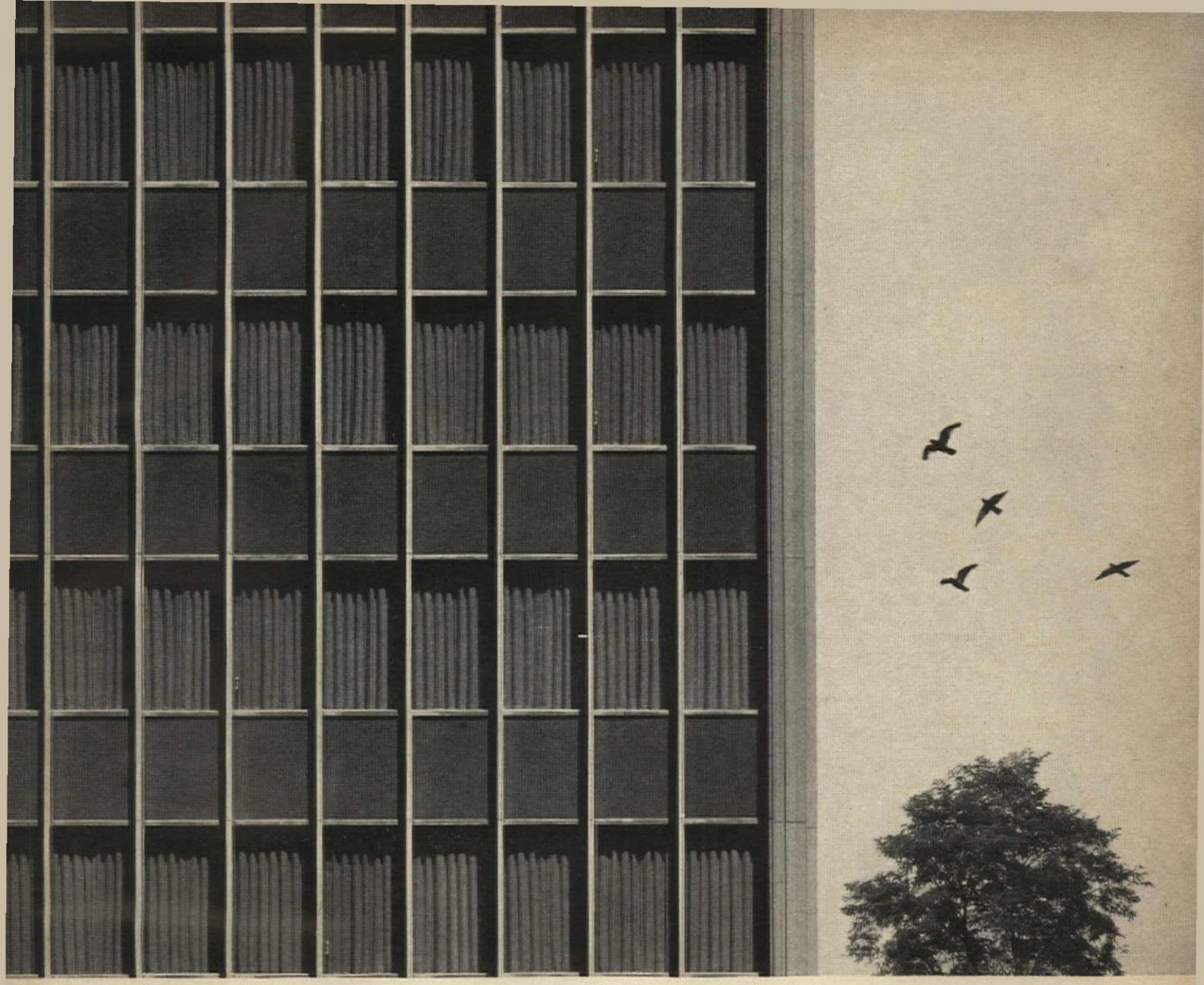
Photos by Balthazar Korab

Exposed aggregate covering the exterior floor of the 11,000-square-foot podium on which the bank rests matches the exposed aggregate of the sculptured roof-support columns. The glass enclosing the bank is tinted grey for sun control and is set in simple bronze anodized rectangular frames. The bronze frames harmonize with the white tones of the roof facia.

The bank has a four-foot two-inch module which is carried through the entire project. Interior colors were selected by the architects for elegance and refinement and range through beige, brown and black tones with other accent colors. Three drive-up teller windows are provided as well as parking for 45 cars. Clear Lake City is a joint venture of the Del E. Webb Corporation and Humble Oil and Refining Company.



# You can make any building look better



# with PPG Feneshield® fabrics

Does that scene on the left look familiar? It should. It's typical of a building where window treatment has gotten out of hand. Result: an unfortunate mixture of shading devices, loss of clean architectural lines, compromise of building design, a generally unattractive impression.

The exterior appearance of any building . . . new or old . . . can be improved immensely through the specification of Feneshield fabrics, made of PPG Feneshield® fiber glass yarns, such as those shown above.

Feneshield fabrics can be obtained in a wide variety of weaves, colors, and patterns to complement any building design. These fabrics present a pleasing appearance at every window, permit a bold flow of line from street level to top floor, eliminate random vertical settings, and enhance the total architectural concept of any building.

**But that's just one of Feneshield fabrics' advantages.** These same fabrics can also control interior environment. Through PPG research, all Feneshield fabrics are performance-rated according to fabric characteristics. Through this Feneshield system, drapery fabrics can be chosen to subdue radiant heat, control glare, improve sound control, enhance a good view or modify a bad one.

**What about costs?** Over a five year period, total initial and maintenance costs for Feneshield fabrics are less than those for mechanical shading devices.

**Get more facts.** Participating drapery converters have authorized Feneshield presentations showing the wide range of beautiful fabrics now available.

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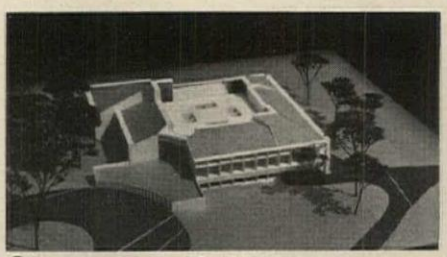
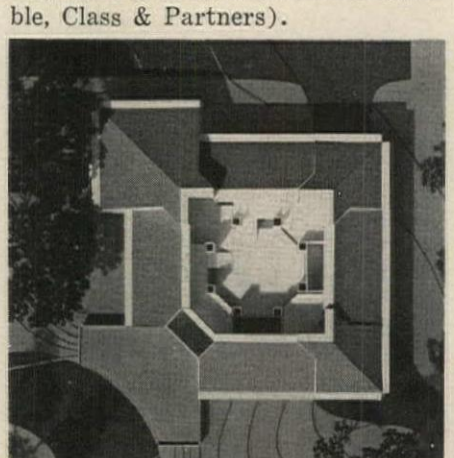
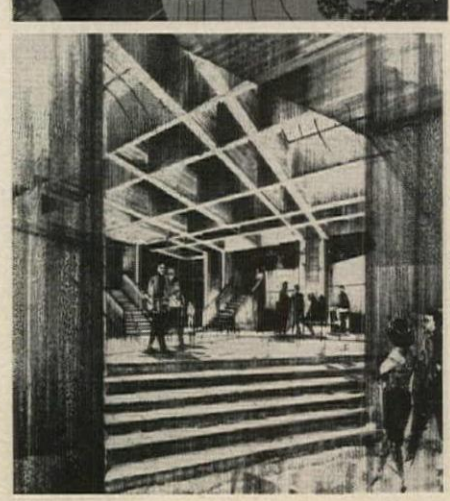


## Classroom Building Has Central Commons

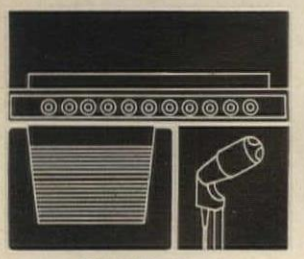
The classroom building for the college and the theological school at The Academy of the New Church, Bryn Athyn, Pennsylvania is a two-story structure designed for a capacity of 200. A notable feature of the design is a two-story, top-lighted central commons which serves as a lobby for the lecture room/chapel, also extending for both levels. On the first level around the commons are two 50-seat lecture rooms, one for 25, an education laboratory, four seminar rooms, and offices.

On the upper level are the student and faculty lounges, and the Theological School. The building will be faced with smooth concrete and will have pitched roofs covered with hand-split cedar shakes to contrast with the concrete. Architects were Martin, Stewart, Noble & Class (now Stewart, Noble, Class & Partners).

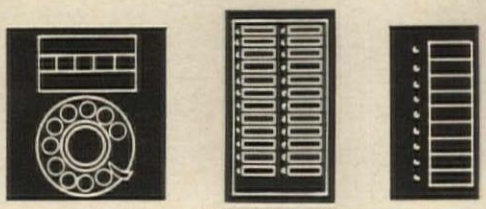




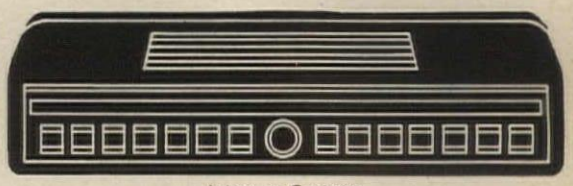
*photos by Lawrence S. Williams, Inc.*



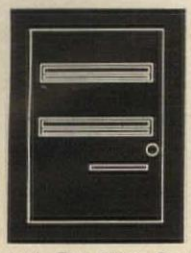
Sound Systems



Personnel Registry Systems



Intercom Systems



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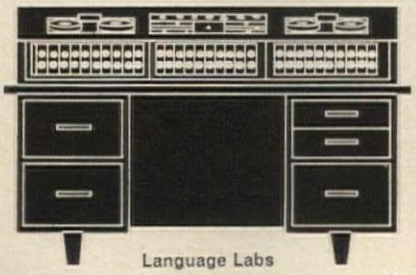

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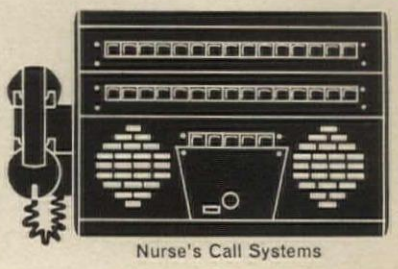

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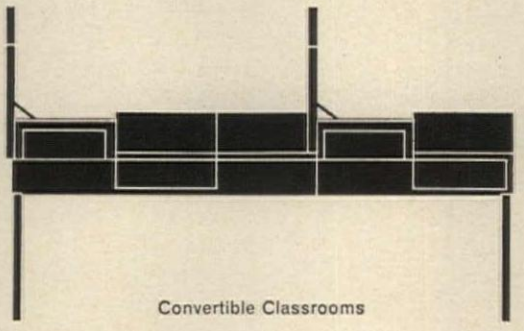
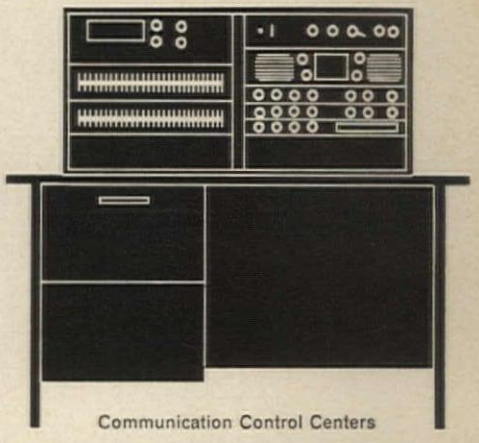


Convertible Classrooms



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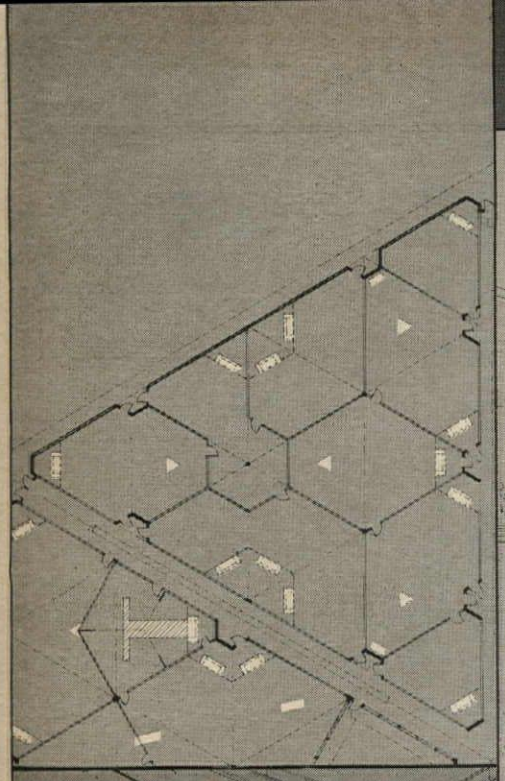
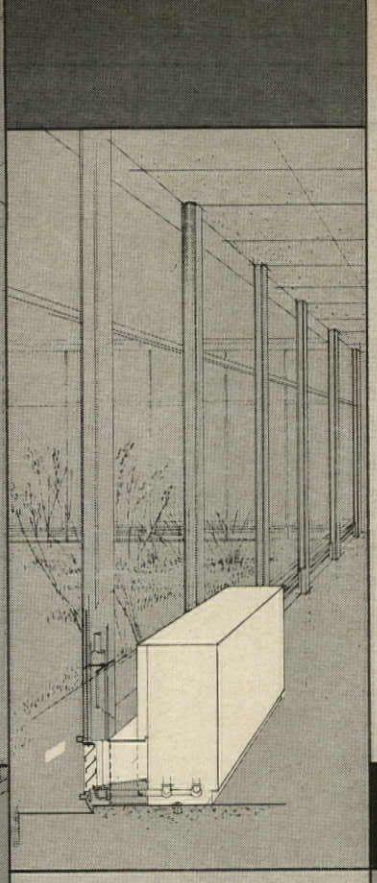
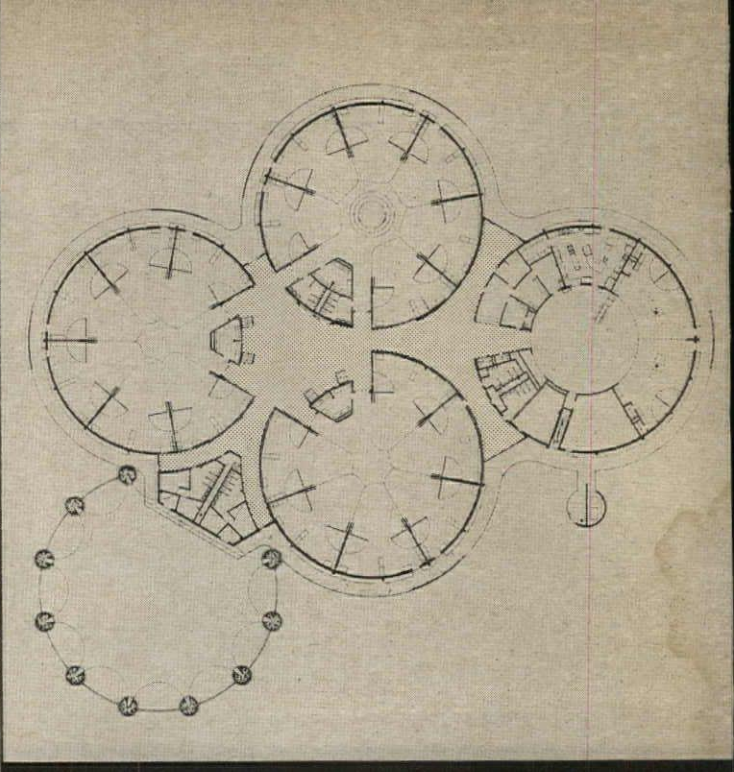
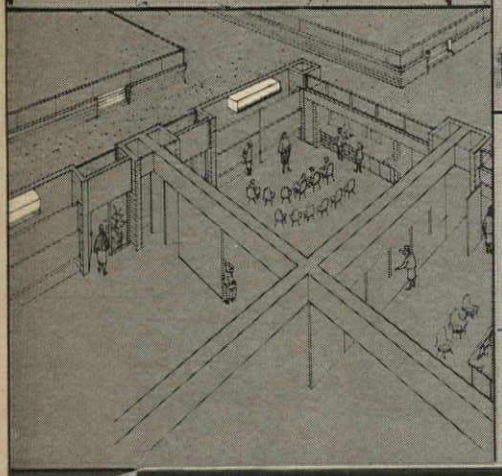
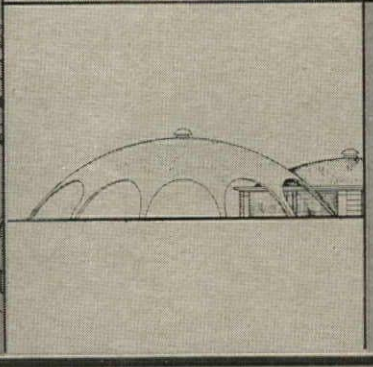


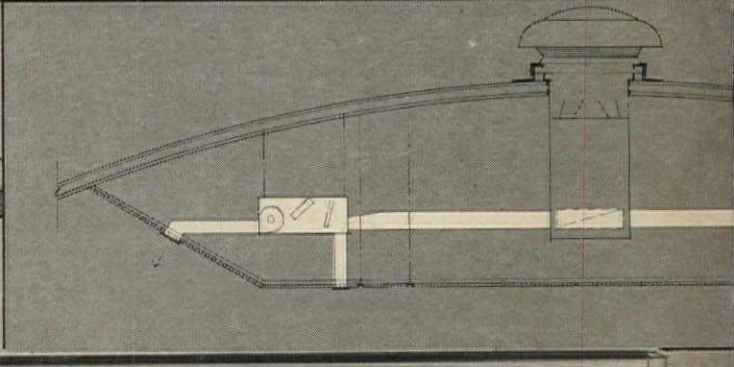


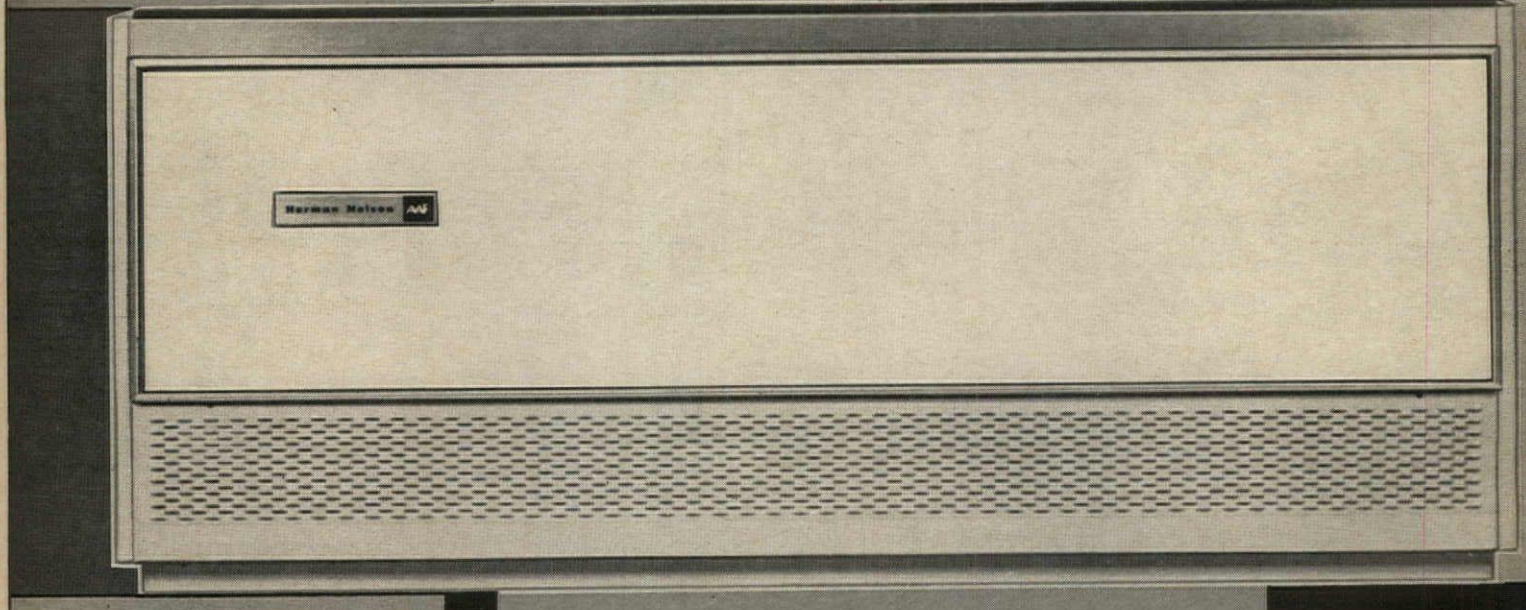


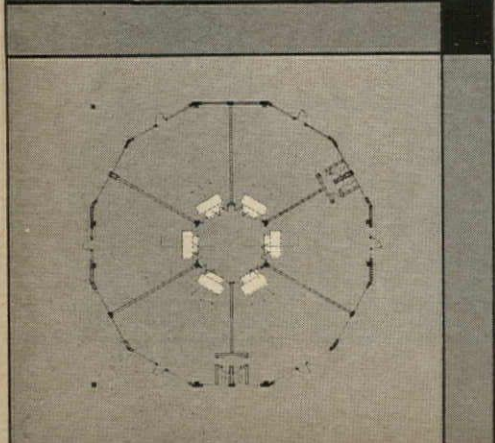
SCHOOL PLANS shown here are from a new AAF/Herman Nelson brochure showing how unit ventilators fit into the most advanced school designs by some of America's leading architects. Write for your copy.

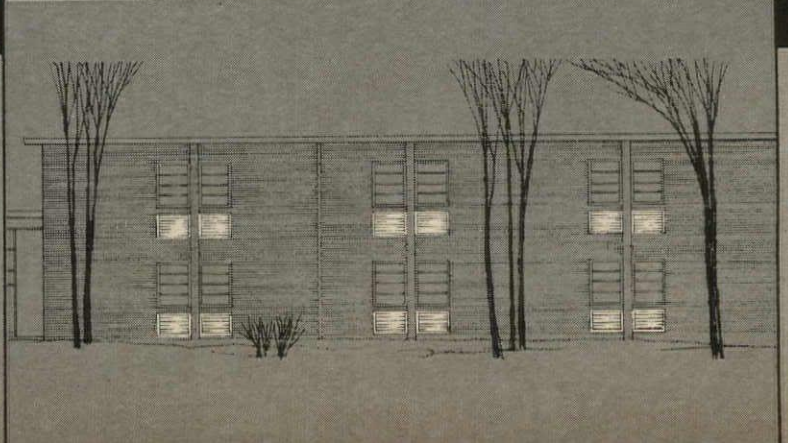


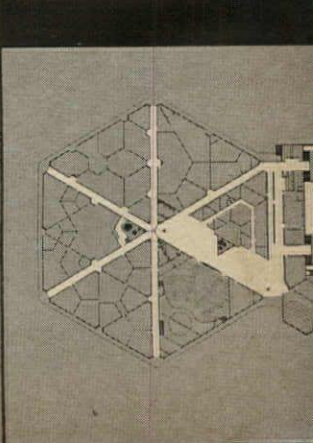










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Bill Mitchell

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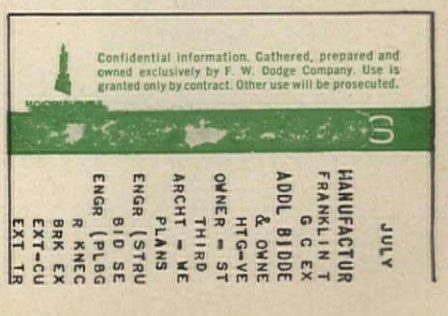

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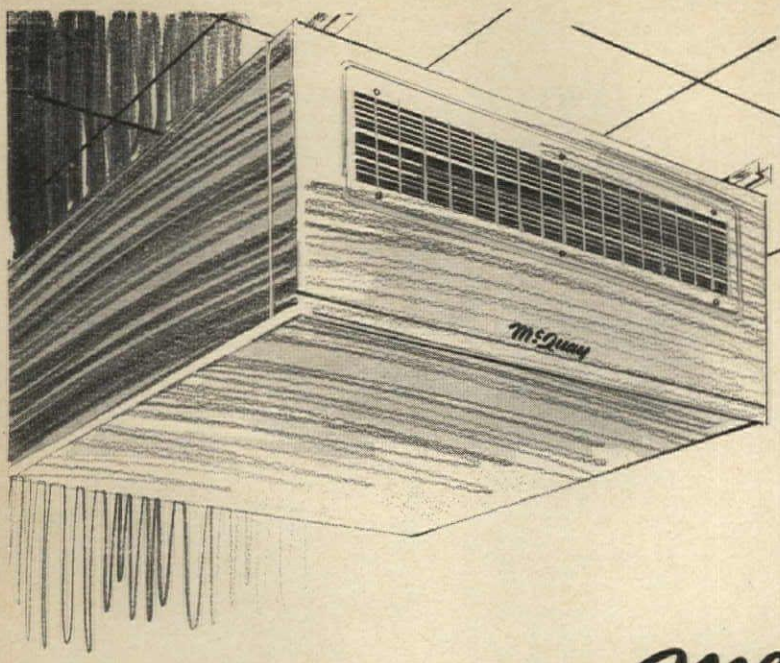


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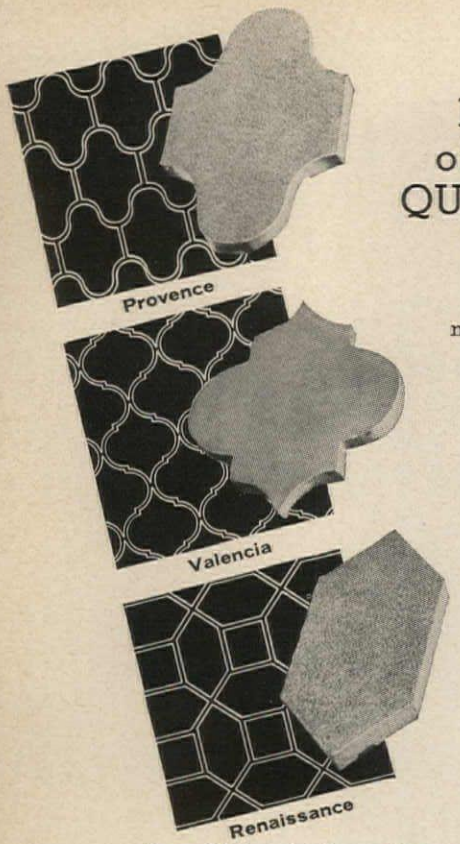


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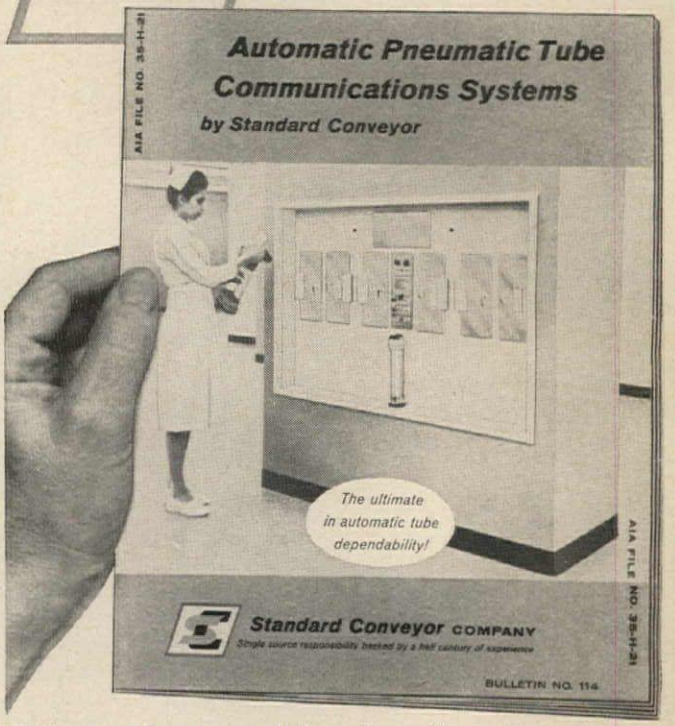


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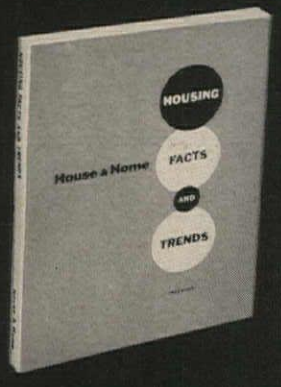


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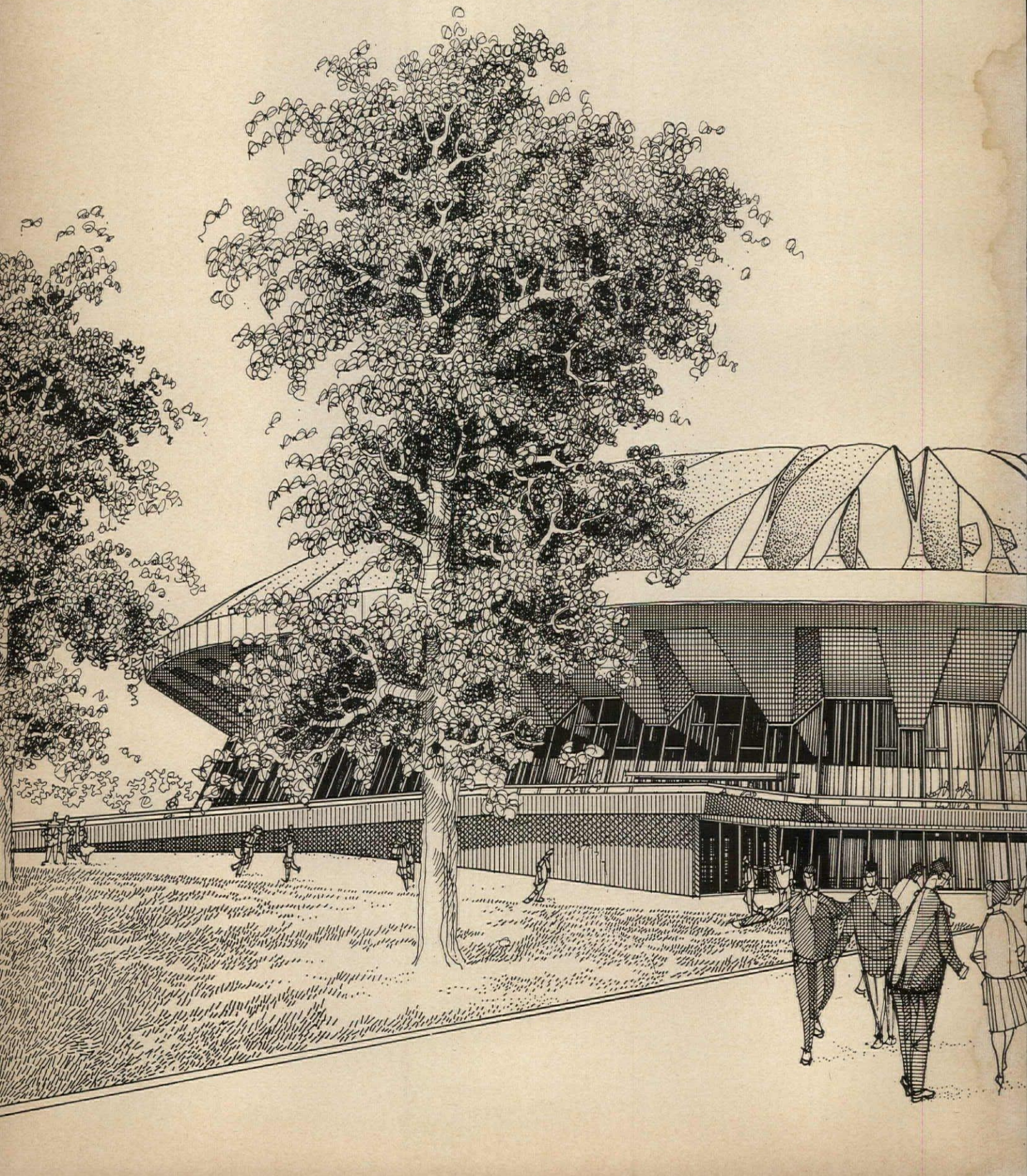

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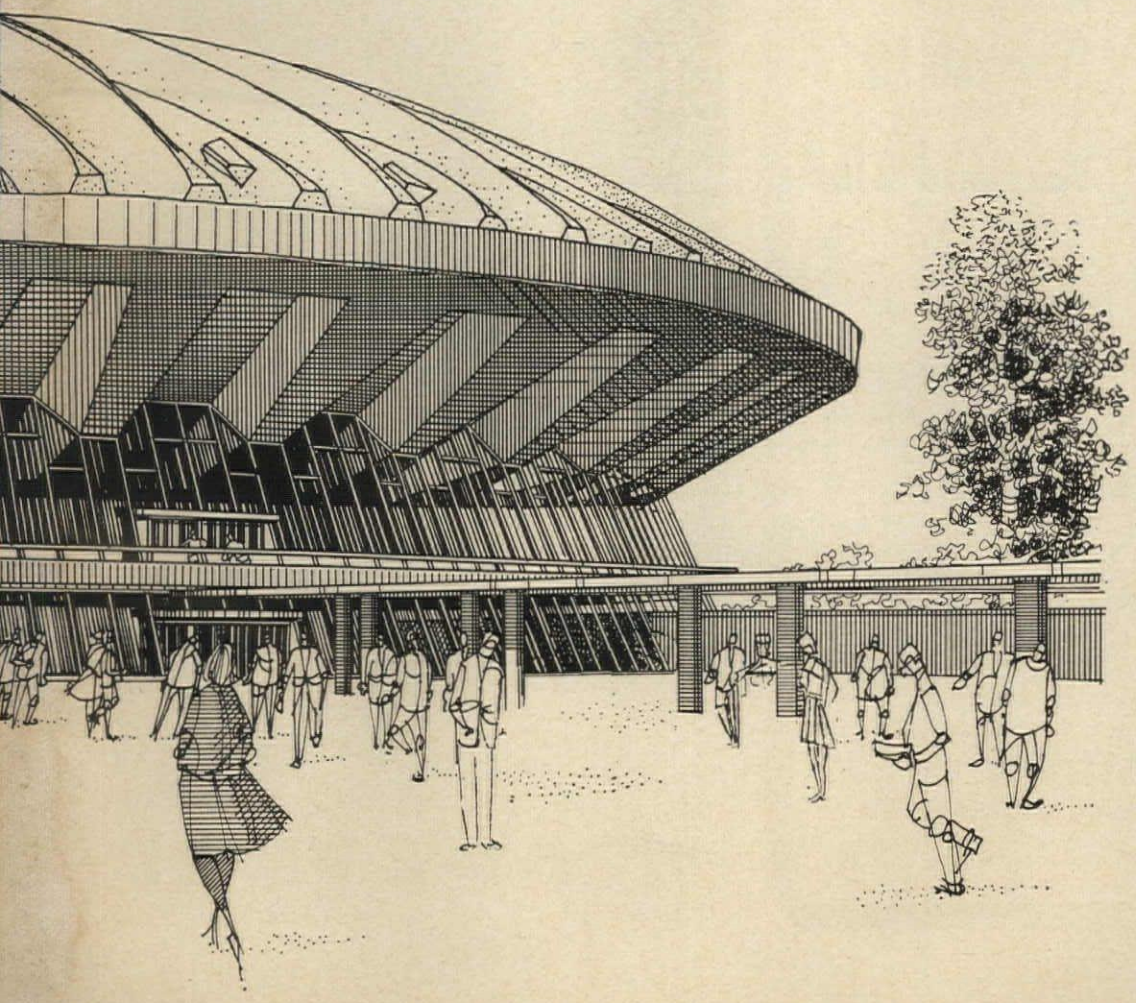

Assembly Hall, University of Illinois,

Champaign-Urbana, Illinois

Architects: Harrison & Abramovitz

Drawing by Davis Bité

# "VIM" goes High...Wide...and LAMSON with Selective Vertical Conveyors

The Post Office has developed a farsighted Vertical Improved Mail (VIM) System for fast, continuous service in high-rise buildings. At the heart of this system is the selective vertical conveyor.

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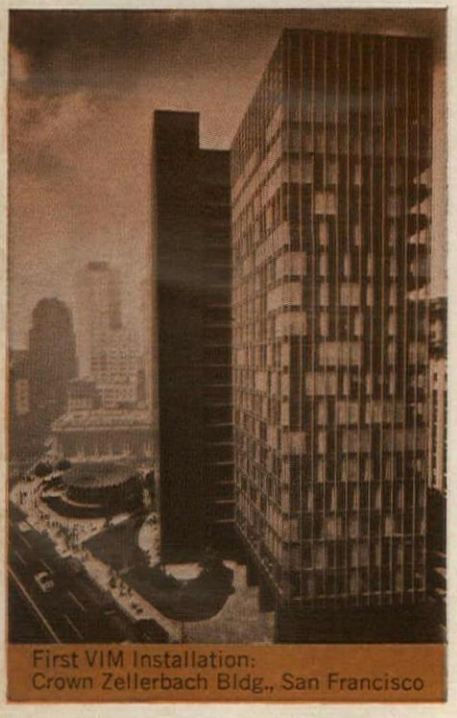
In addition to the selective vertical conveyor, a VIM System also includes a truck dock and a Post Office operated mail room at street or basement level. Here, incoming mail is sorted and locked in tenants' trays for automatic dispatch to all floors via the conveyor. Tenants pick up trays at floor service stations. Outgoing mail may also be sent down to the Post Office mail room from these points.

VIM offers many advantages: mail is delivered early to all floors . . . security is improved . . . congestion from bags and carts in building is relieved . . . day-long mailing permits faster processing to and through the main Post Office . . . contract messenger service is reduced. Equally important: major tenants occupying several floors can use conveyors for their own interoffice distribution of mail, supplies, EDP tapes and cards, etc.

Continuous, high-speed mail service is the lifeline of any business. In designing new high-rise buildings, consider carefully the additional income, efficiency and utility value provided by making provision for a VIM System. For full details on selective vertical conveyors, write to: LAMSON CORPORATION, 183 Lamson Street, Syracuse, New York 13201.



First VIM Installation:
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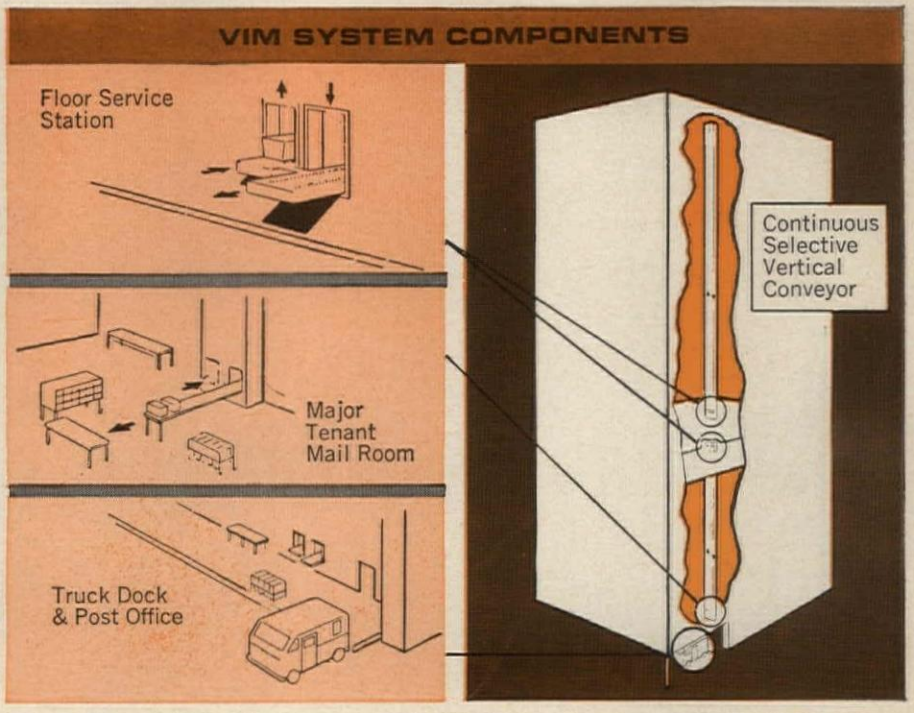


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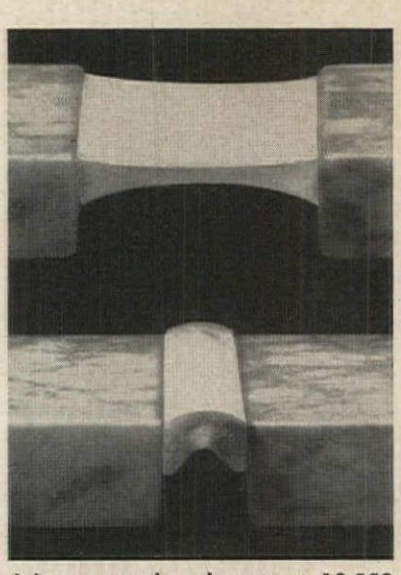
# 9 tons of G-E Silicone Construction Sealant seal new UN Plaza

G-E Silicone Construction Sealant is an amazing synthetic rubber that cures in air. It's waterproof. It won't crumble, harden or peel. So it's the first really *permanent* sealing compound.

At the new United Nations Plaza apartment and office building, just across from the famous United Nations Building in New York City, nine tons of Silicone Construction Sealant were used for various sealing applications. Seven tons of Silicone Construction Sealant were used to glaze the windows. Another two tons seal the aluminum curtain walls. G-E Silicone Sealant is also used to caulk air ducts as well as miscellaneous caulking throughout the thirty-eight story twin-tower skyscraper.

G-E Silicone Construction Sealant applies quickly and smoothly from a standard caulking gun, forming a tight bond to glass, metal, masonry and other common building materials. No mixing either. And it can be applied easily in any weather . . . never stiffens in cold or runs because of heat. Cleanup is a cinch. So you save time while you get a good looking, permanent seal that minimizes callbacks.



**Joints expand and contract 10,950 times in 30 years . . . and so will G-E Silicone Construction Sealant.**

Available in a wide range of colors, as well as a translucent form, G-E Silicone Construction Sealant blends in well with almost any material. It's stocked by local distributors and in many building supply stores. For complete information, including a new bulletin on guide specifications for Silicone Construction Sealant, check the distributor nearest you, or write to Section BG11160R, Silicone Products Dept., General Electric Company, Waterford, New York.

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