

CONTEMPORARY ARTS MUSEUM FOR HOUSTON BY GUNNAR BIRKERTS & ASSOCIATES

AN ELEGANT NEW JERSEY HOUSE BY DONALD MALLOW

TEL AVIV'S FORCEFUL NEW MUSEUM

BUILDING TYPES STUDY: LOW-INCOME HOUSING

ARCHITECTURAL ENGINEERING: NEW METHODS FOR EVALUATING LIGHTING SYSTEMS

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ARCHITECTURAL RECORD

OCTOBER 1971

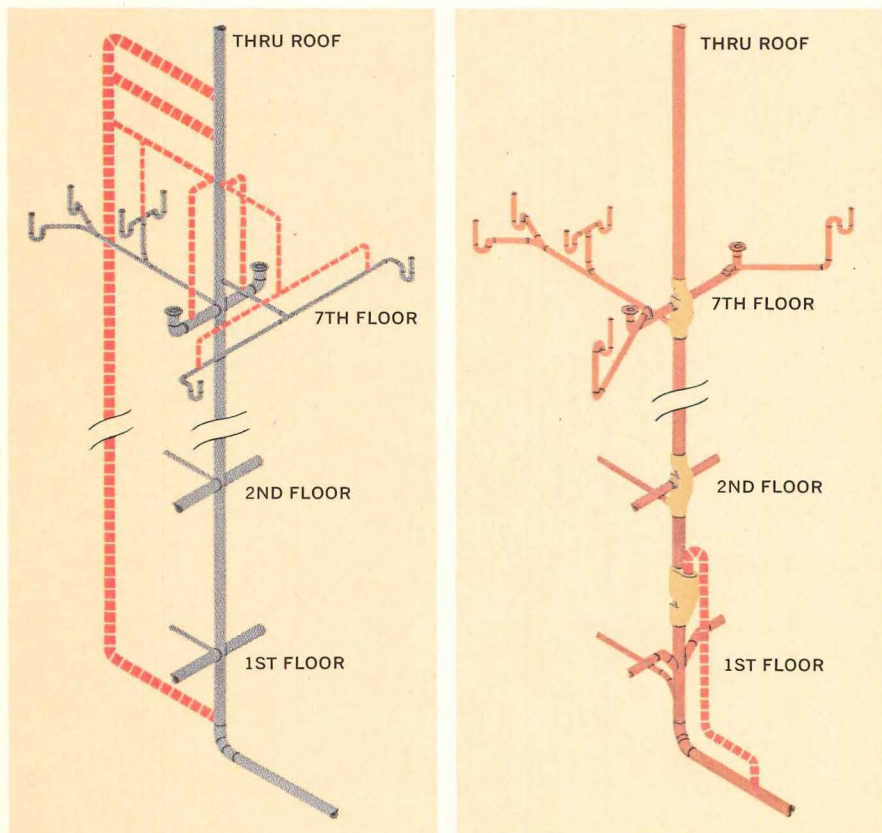
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THREE DOLLARS PER COPY



Copper Sovent single-stack plumbing system. The new way to cut multi-story drainage costs.



The simplicity and economy of the Copper Sovent system (right) are dramatically shown in this graphic comparison with the traditional two-pipe system. One contractor, on a recent 200-unit job, returned a credit of \$13,000 to the Housing Authority, based on savings with Sovent.

But that's just the beginning. Forty additional major installations are being planned right now, for a grand total of more than 8,000 apartments.

Couldn't you use more room or flexibility in your new building design?

For a detailed design handbook on the Copper Sovent single-stack plumbing system, write us: Copper Development Association Inc., 405 Lexington Ave., New York, N.Y. 10017.

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Even though the Copper Sovent single-stack plumbing system is a major construction breakthrough, it's really very simple.

The soil and vent stacks are combined into one Sovent self-ventilating stack.

What you don't need any more is a separate vent pipe.

So you can put fixtures, like island sinks, where you want them. Not where the old two-pipe drainage system forced you to put them.

Plus you get more square feet of income-producing space because the Copper Sovent system takes up less space in the walls.


And because the Copper Sovent system weighs less, you get more room in your structural load estimates.

There's more room in your budget too because the Copper Sovent system is easier and cheaper to install.

Since it was first installed in the Habitat Apartments at Montreal's Expo '67, the Copper Sovent system has been used in 18 high-rise buildings across the United States.



For more data, circle 2 on inquiry card



AREALUME

Stonco introduces a new concept in architectural illumination: geometric area lighting.

Why a geometric approach?

Until now, most outdoor and area lighting fixtures bore little or no relation to the geometry of the building they were lighting. Awkward, bulky shapes clashed with the architecture, and were difficult to adapt to modern building planes and angles.

Stonco's innovation

Stonco has changed all that. We've designed the first complete series of architectural area lighting fixtures

that are geometric, flexible, modular ... and harmonize perfectly with today's building styles.

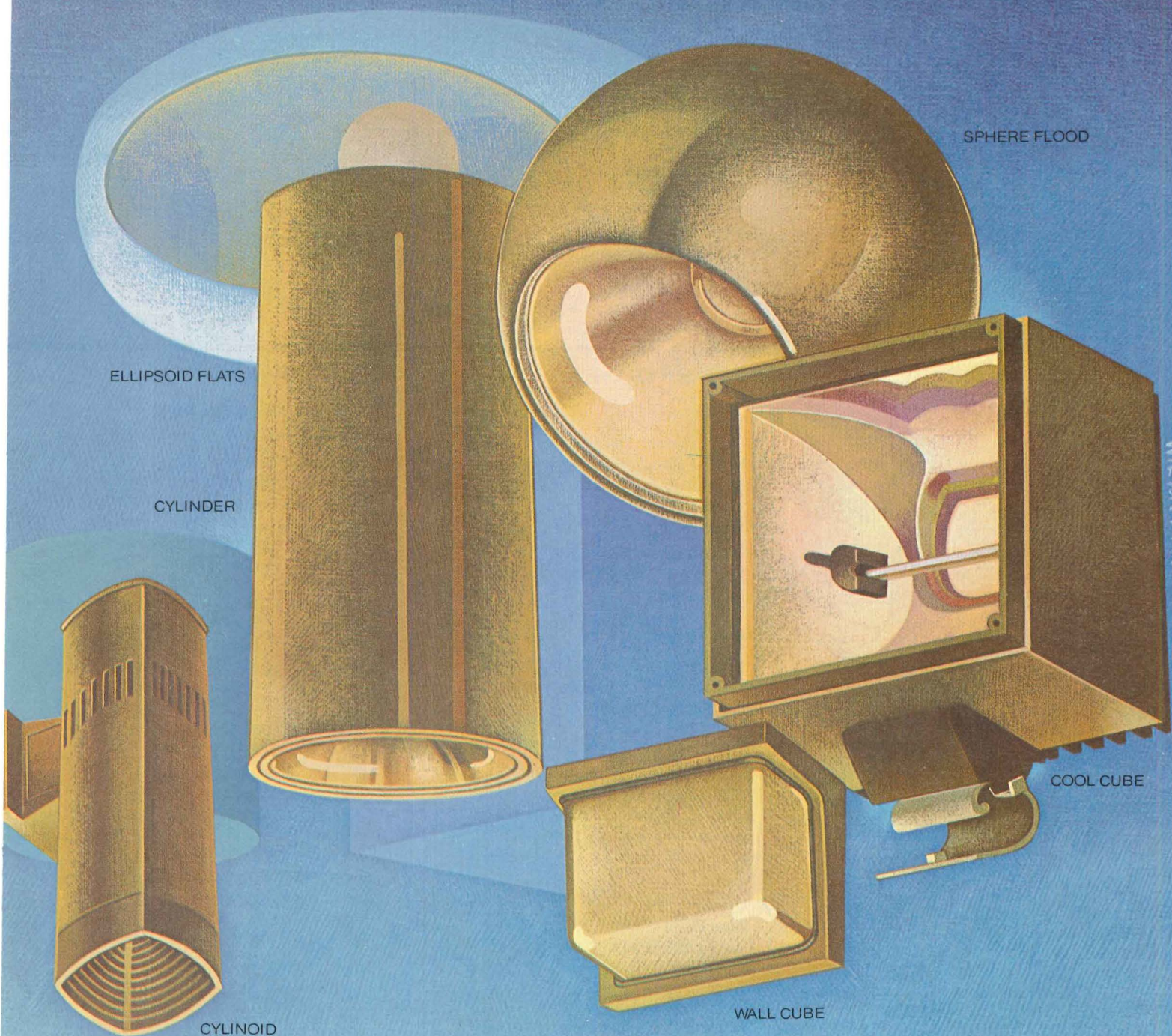
Back to fundamentals

We did it by going back to the basic shapes of modern architecture—the cube, the sphere, the cylinder. Then we designed fixtures with clean, uncluttered lines to match these geometric forms. Now, by selecting from a wide choice of new Stonco lighting fixtures you can design area lighting as an integral

part of your building plan.

A brilliant example: Cool Cube

Consider the quartz area flood. Most conventional types are distracting in shape, unfinished in appearance. But Stonco designed Cool Cube—up to 1500W of tungsten halogen lighting—as a compact cube that has all the inherent quality a fine building exterior demands. It's made with extruded aluminum satin-polished and anodized to a deep bronze



ELLIPSOID FLATS

CYLINDER

CYLINOID

SPHERE FLOOD

COOL CUBE

WALL CUBE

WILSON McLEAN

finish. And a new socket design, integral with the housing, provides a more efficient heat sink.

Plus a square luminaire

Another example: the usual outdoor bracket is rounded, bulky and a problem to adapt to walkways and tunnels. Not Stonco's new Wall Cube®. We fashioned it as a crisp, square unit that mounts in almost any position on any surface to direct all the light you need, wherever you need it.

And, for variety...

To relieve the rectangular look, Stonco also offers you architectural-quality fixtures in other basic shapes: cylindrical area floods, new Arealume® pole-top designs, Cylinoid Downlights®, prismatics and opals. All are styles to blend into your plan, alone or in combination with other Stonco geometric fixtures.

How can you learn more?

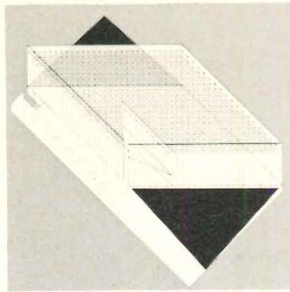
Our new brochure, "The Shape of

Architectural Lighting," illustrates all the styles, features and options that the latest Stonco geometric area fixtures offer you. For your copy, simply circle the reader service card. Or write for details to Keene Corporation, Stonco Lighting, 2345 Vaux Hall Rd., Union, N.J. 07083.

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STONCO LIGHTING

We've just begun to grow.



Cover: Contemporary Arts Museum, Houston, Texas
Architects: Gunnar Birkerts & Associates

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PPG introduces TOTAL VISION SYSTEMS

Total Vision Systems introduce true wall-to-wall transparency

PPG's Total Vision Systems (TVS) are beautiful, all-glass fabrications of clear annealed float glass vision lights, clear annealed float glass vertical mullions and black silicone structural sealants.

Total Vision Systems offer you the freedom to design, for the first time, true wall-to-wall transparency. The systems' glass walls give your installation openness, elegance and unre-

stricted views. The costs compare favorably with other monumental constructions of similar prestigious character.

PPG's Total Vision Systems rely on three-quarter-inch-thick clear annealed float glass mullions as the major supporting element. The width and thickness of the large lights of clear float glass forming the vision areas are governed by glass and silicone design requirements at the design windload. Unobtrusive PPG Architectural Metals aluminum sections frame the system at head, jambs and sill.

An infinite variety of designs and configurations may be achieved within

the engineering parameters of TVS. (We have successfully tested Total Vision Systems as high as 30 feet with windloads of 30 psf—nearly 100-mph wind velocity.) Complete information on glass recommendations, installation techniques, glazing details and other data on TVS are contained in the technical bulletin: *Total Vision Systems PDS t-1*. Contact your PPG Architectural Representative or write PPG Industries, Inc., Technical Services Department, One Gateway Center, Pittsburgh, Pa. 15222.

PPG: a Concern for the Future

Shown at left, mullion detail of TVS installation at Dollar Savings Bank office, Pittsburgh, Pennsylvania.

Architect: Ingham Kaffka Marcu, Pittsburgh, Pennsylvania.

At right, Visitors' Information Pavilion in Founder's Square, Louisville, Kentucky. The architect employed a variation of PPG's Total Vision Systems to provide "see-throughability" or transparency in his design, as well as to provide a strong visual symbol visitors to this park could identify. Owner and operator: City of Louisville. Architect: Lawrence Melillo, Louisville, Kentucky.



For more data, circle 4 on inquiry card



134 reasons why All-weather Crete excels as a roof and plaza deck insulation

134 pages of technical data provides information about All-weather Crete . . . data that answers almost every conceivable question about constructions utilizing this insulation. These pages contain physical properties, K factors, U Values, tables, Underwriter Laboratory tests, Factory Mutual tests, BOCA and other code approvals, independent laboratory tests, detail drawings, specifications, product comparisons, and

to top it all, a listing of over 4,000 major architectural achievements using All-weather Crete. It has taken years of experience plus many thousands of dollars in testing, proving and perfecting what we believe to be the finest insulation available.

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If you have any questions, contact Silbrico Corporation, 6300 River Road, Hodgkins, Illinois 60525, or see Sweets for the address of your local All-weather Crete Licensed Applicator. Then you be the judge . . . see for yourself why the use of All-weather Crete insulation is steadily growing.



City and suburb: Instead of shouting, how about talking?

Maybe it's just because it's school opening time, and the newspapers and late news are full of the day's dose of man's inhumanity to man, but you've got to wonder whether all the problems of living and working in and around our cities haven't reached—as school integration did a few years ago—the outer limit of polarization and whether we can't stop shouting at each other and start talking to each other about solving the problems.

The problems of almost any city are, of course, related in every way with the ring of suburbs: The cities, to an ever-increasing extent, are left with the poor, most of the blacks, most of the old people, and a declining tax base; and the suburbs are filling with people who like the way of life and the schools they have bought along with their houses, and intend to keep it that way.

The process that seems prevalent today is a shouting, participatory brand of politics (call it community action if you prefer) in both city and suburb that does nothing but drive the wedge deeper between city and suburb, middle-income and poor, black and white, city-dweller and suburbanite. Further, we've seen the Supreme Court of the United States make it possible for any suburb to keep out public housing by simply holding a referendum—without discussing the root cause of the problem, much less suggesting any alternative solution. And a caricature of suburban protectionism occurred recently in Newport Beach, California, which annexed a foot-wide strip around a large section of unincorporated land to keep a poorer neighboring town from "encroaching"—sort of an invisible

but effectively unclimbable Chinese Wall.

Many corporations, of course, are seeking relief from the problems (and taxes) of the cities by moving to the suburbs—but surely this is only a temporary solution. (Watch the suburban town become a city before your very eyes! Except a city with none of the conveniences and cultural advantages and opportunities for interchange of ideas).

"The good life" outside the cities cannot last, of course, if the cities' problems aren't solved. But few people—ordinary citizens, or government officials alike—seem to be doing anything about that simple fact. Not because, I think, they don't want to, but because they don't know how.

There are no "solutions" of course. But there is a process for working toward a solution—a way towards reason, away from polarization; a way towards humanity, away from selfishness—and it is, of course, broader-scale planning.

Most planning efforts haven't worked too well so far because they've been too narrow in scope—cities have made plans but have no money to implement them. Suburbs have made plans—to block any changes in their way of life. But a new experiment—in Hartford, Conn.—is worth careful attention.

The Greater Hartford Process, Inc. is an unusual corporation, formed back in 1969 by officials of 20 corporations in the Hartford, Connecticut area, for the express purpose of improving the quality of life in the area. Its goals are "to do no less than solve the urban problems of Greater Hartford, . . . When we finish [says its recent brochure] we will have in existence the

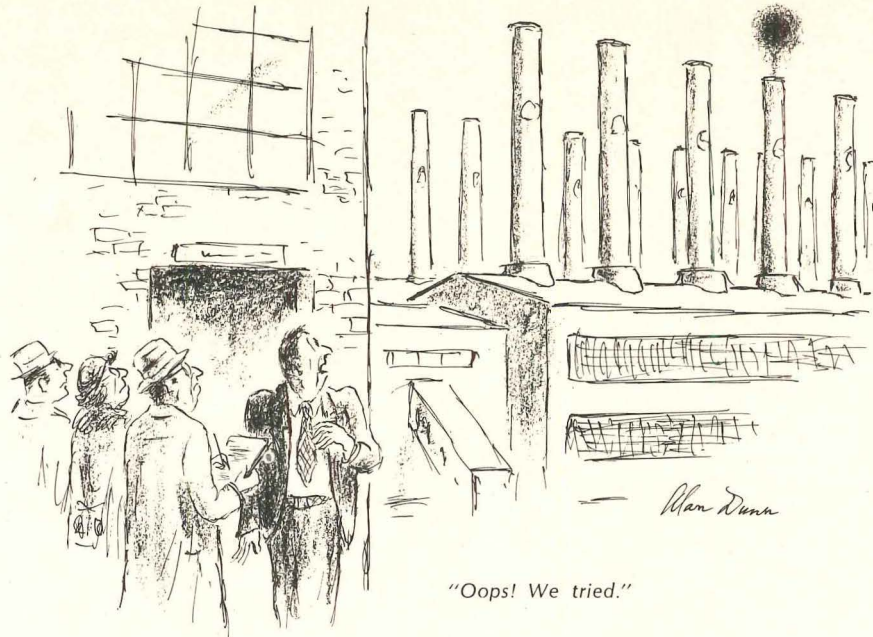
organizational structures for carrying out the process with all projects interrelated . . . We will not only have begun the process of rejuvenation of the region, but will have in effect a continuing self-renewal process for the cities and towns of the region." Isn't that what most regions need?

The Greater Hartford Process employed James Rouse's American City Corporation to develop the process, still in its formative stages, but to be analyzed for its "exportability" to other urban areas by a meeting this month of the Urban Land Institute.

What is so interesting about this project is its scale—there are 29 separate government jurisdictions involved, representing some 750,000 people, and its scope—for it is investigating not just physical planning problems of the sort with which we are all now familiar, but the integrally related social and economic problems such as job training, employment, race relations, education, and health services.

Could not any set of urban and suburban governments move away from polarization and protectionism by agreeing on these broad goals of the Hartford Process? They are to:

- "1. Create new social and economic values,
- "2. Match development needs with opportunities,
- "3. Give local government a stronger economic base,
- "4. Provide more choices in housing, recreation, and jobs,
- "5. Give builders, investors, and developers a rational framework in which to plan their investments,
- "6. Give local planning agencies the challenge and opportunity to plan for real projects that can actually be built in a reasonable time and according to higher standards of performance,
- "7. Invite citizens to join in the process of setting goals and checking on how well agencies and developers are performing, and [finally, and here's the tough nut]:



“Oops! We tried.”

“8. Challenge institutions and community agencies to respond to changing community patterns and to change their delivery systems.”

Isn't that challenge “to respond to changing community patterns” one that might be met if we stopped shouting at each other and started talking? Might not that “challenge to respond to changing community patterns” be accepted if everyone understood the goals and method of accomplishment?

For example: I persist in believing that most large-acre zoning is not fundamentally racial, but fundamentally economic. I persist in believing that the root cause of opposition to higher-density housing in most zoned communities is school costs, and that if government financing of low- and middle-income housing also included some relief towards the cost of building the new classrooms that the new children in town would require, many good burghers would become a good deal less militant.

George Kostritsky of RTKL (which has been deeply involved in broad scale planning projects in many parts of the country) said it well in a recent speech:

“It has become clear that individual projects, no matter how important or how difficult to execute, how exciting after they are complete, no matter if they raise the tax return to the city (which is debatable), do not go to the root of the evil. . . . There is a more vital, more dramatic, and far broader planning approach that is essential if the health of the American community is to be improved in any lasting way . . .”

The Hartford Process is one exciting example of that new approach. It does assume two things that these days no one seems to be assuming: 1) It assumes that the problems and antagonisms that divide people can be solved, and 2) It assumes quite simply, a belief in people.

And maybe it's time we tried assuming that.
—Walter F. Wagner Jr.

We've got a new relationship with a beautiful lady in Paris

Last week we learned that *L'Architecture d'Aujourd'hui*, which we're sure is admired by our readers as much as it is by us, had become, if not exactly a sister publication, a sort of sister-in-law.

For that fine architectural publication has just been acquired by Technic Union (France), and thus becomes an affiliate publication of McGraw-Hill's International Publications Division.

The new relationship that exists between *L'Architecture d'Aujourd'hui* and RECORD is a great pleasure to the editors of this staff, and Marc Emery, rédacteur en chef, has been kind enough to express similar sentiments to us. It is the hope of both of us that a fairly active editorial collaboration between our staffs can be built up. I doubt that we would ever run exactly the same story in the same way—no two editors (even if they are sisters-in-law) could ever agree on the same pictures or the same evaluation of any work of architecture. But I'm in hope that RECORD's coverage of architecture around the world will be strengthened by the insights and researches of the *L'Architecture d'Aujourd'hui* staff; and while they are well represented in this country by correspondents Annie Damaz and Stanley Tigerman, both good and old friends of the RECORD, we stand ready to make whatever editorial contribution our compatriots in Paris wish. For we both have the same goal: to advance the cause of architecture.

At any rate, all of us here are delighted at the news, and at the opportunity.

And maybe even a chance to visit Paris in the springtime. . . .

There is still time to submit your work for . . .

1) Record Interiors of 1972, which will be published in January. Any architect-de-

signed interior is eligible for consideration by the editors. Deadline: November 1.

2) Record Houses of 1972. Architects are invited to submit single-family houses and multi-family buildings built in the U.S.

In either case, photographs need not be of professional quality, but should be clear, fully describing the architectural intent.

Coming in the Record for the next two months

In November, the Building Types Study will be on hotels, and the examples will indicate how fresh and innovative this often maligned building type can be. There will also be a collection of vacation houses, a look at the designs for the Chicago rapid transit done by Myron Goldsmith of SOM's Chicago office, and a feature on the Johnson library in Austin, Texas by Max Brooks and Gordon Bunshaft.

December's one-subject issue on “New Life for Old Buildings” will include a review of some of the best recent restoration jobs (including some of Harry Weese's extraordinary work in Chicago); some fine examples of work done in adding (within contemporary idiom) major additions to distinguished older buildings; a section on rehabilitation of old buildings for new uses; a section on rehabilitation of old buildings for the same use; and some detailed analysis of the practice problems (including the need for X-ray vision) that architects have found in dealing with older buildings. Most building types are involved. And wait 'til you see some of the pictures. . . .

In January, we'll be publishing RECORD INTERIORS of 1972, examples of the best architect-designed interiors in various building types across the country; a Building Types Study on college buildings; and the report of a very special seminar on energy conservation in building. —W.W.

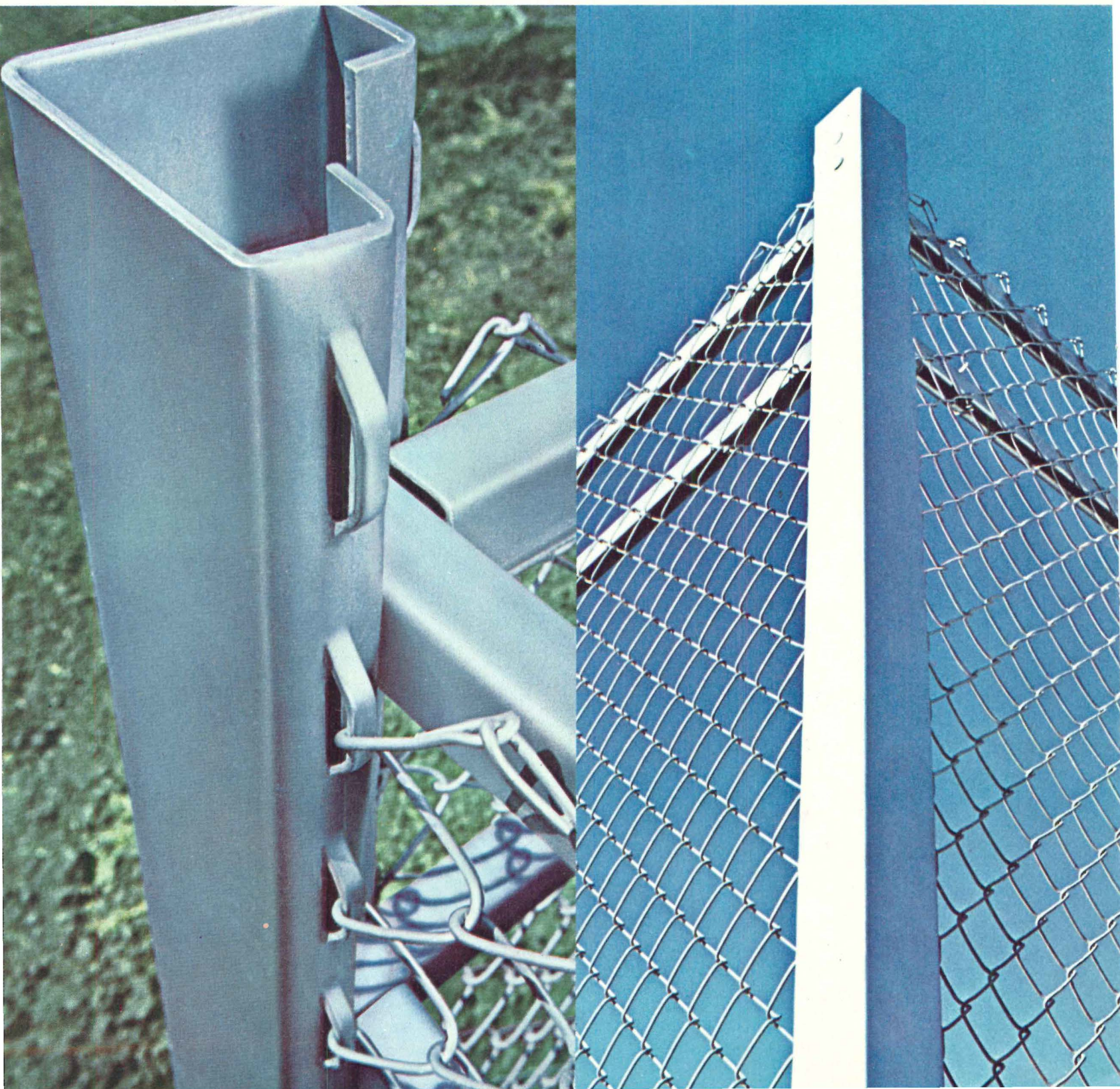


What's happened to the necessary evil?

There's a whole new technology to the necessary evil...the fence. Take 1½ minutes and catch up with it.

The usual chain link fence uses pipe posts. Not USS CYCLONE Type II. Look at this terminal post. It's one-piece, box beam construction. No hidden places where moisture can collect and cause corrosion. And notice the fabric isn't just fastened on . . . it's woven right into lock loops, each with 1200 lbs. holding power.

Result: the new look in chain link fence. A clean, neat, architectural appearance. Posts and top rails have a functional, square configuration. No protruding fittings, nuts, or bolts. Very compatible with modern design. It also means a more vandal-proof fence and lower maintenance costs.

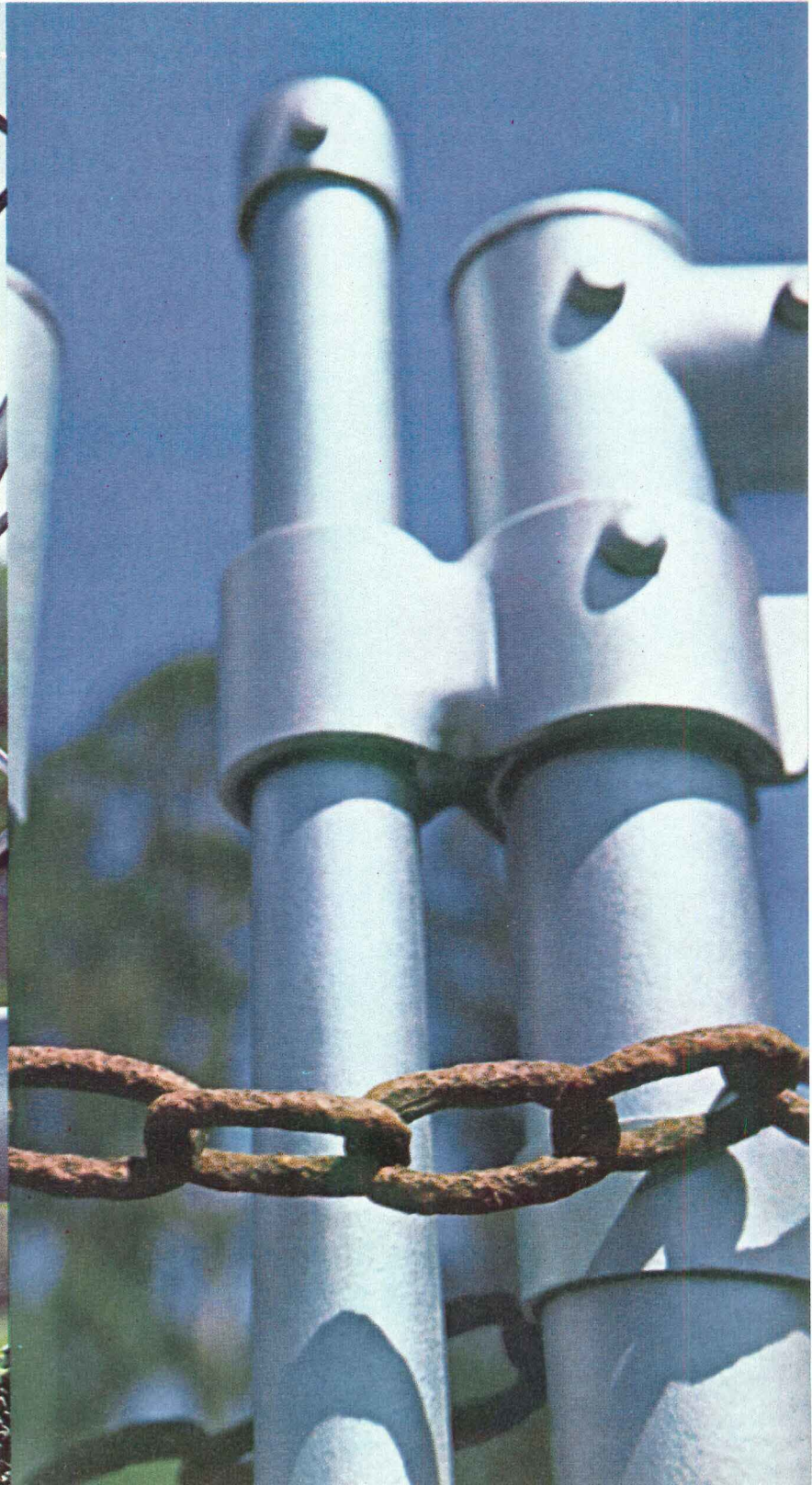
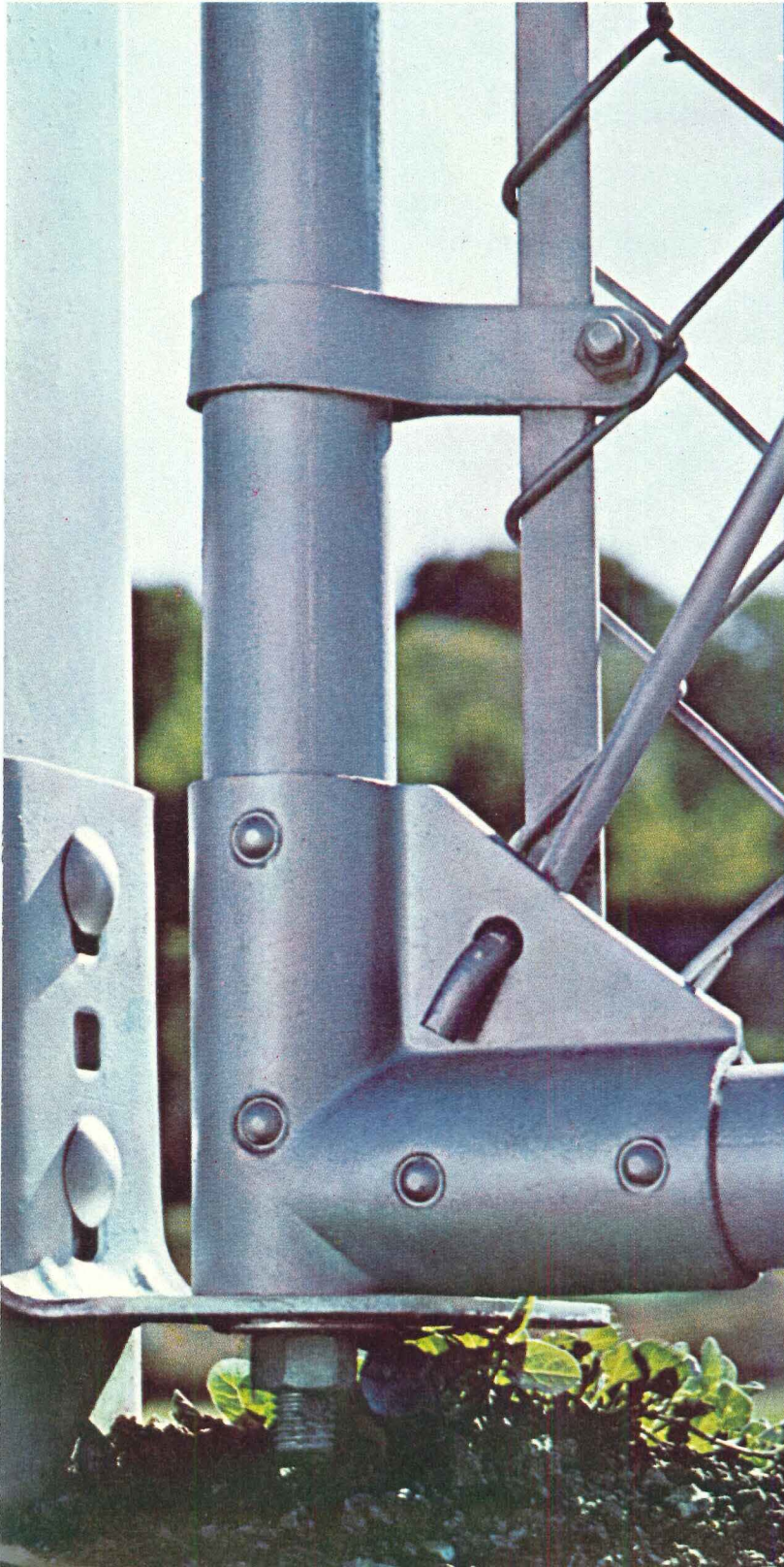


USS Cyclone Fence

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Gates are a key to fence quality. Most industrial gates are welded. This not only invites rust at the weld . . . it makes for expensive repairs. CYCLONE gates are riveted. Remove a few rivets, replace any damaged part, and you have a new gate. And our adjustable truss rods make it easy to correct sag.

Corrosion protection in a fence is directly proportional to the amount of zinc coating. CYCLONE doesn't take shortcuts. CYCLONE terminal posts, line posts, and top rails, for instance, have a 2-oz. coating . . . not the 1.2-oz. coating often used. Gates and fittings are heavily galvanized. Complete specs on the next page.



How to specify the new technology in fence:

Basic Specifications* (Circle one of each):

Height: 6', 7', 8', 9'

Fabric 2" mesh: 6 ga., 9 ga., or 11 ga.

Barbed Wire: 3 strands, 6 strands, none

Top rail or Top Tension wire, Bottom rail or Bottom Tension Wire

Line Posts: 2.7#H or 4.1#H

Fabric shall be zinc coated class II chain link per ASTM specification A-392-68 or shall be aluminum coated per ASTM specification A-491-68. Fabric shall be connected: to line posts with 6 ga. wire clips every 14"; to top rail with 9 ga. wires every 24"; to terminal, corner, and gate posts by integrally weaving into the post or by using 1/4" x 3/4" tension bars tied to the post every 14" with 11 ga. 1" wide steel bands and 3/8" diameter bolts and nuts; to tension wire with 11 ga. hog rings every 24".

Barbed Wire shall have a class 2 aluminum coating per ASTM A-585-69 or a class 3 galvanized coating per ASTM A-121-66 and consists of two 12 1/2" gage stranded line wires with 14 gage barbs and a 4 point pattern on 5" centers.

Top rail shall be 1 1/4" (1.66" O.D.) standard weight pipe or 1 5/8" x 1 1/4" roll formed sections. Top rail shall pass through intermediate post tops and form a continuous brace within each stretch of fence and be securely fastened to terminal posts.

End, corner, and pull posts shall be 2 7/8" O.D. pipe, 5.79 pounds per foot, or 3 1/2" x 3 1/2" roll formed sections with integral fabric loops, 5.14 pounds per foot. Posts for swing gates shall be according to the following gate leaf widths:

		Lbs. Per lineal Foot
Up to 6'	3 1/2" x 3 1/2" roll formed section or	5.14
	2 7/8" O.D. pipe	5.79
Over 6' to 13'	4" O.D.	9.11
Over 13' to 18'	6 5/8" O.D.	18.97
Over 18'	8 5/8" O.D.	24.70

Gate frames shall be 1.90" O.D. pipe connected with fittings riveted at each corner. Each frame shall have 3/8" diameter adjustable truss rods. Gates shall have positive type latching devices with provisions for padlocking; and drive gates shall have a center plunger rod, catch, and semi-automatic outer catches.

All posts, rails, and appurtenances shall be hot-dipped zinc coated steel per ASTM specifications A-120-65, A-123-66 or A-153-65, whichever is applicable. Pipe posts shall have tops which exclude moisture. End, corner, pull, and gate posts shall be braced with the same material as top rail and trussed to line posts with 3/8" rods and tighteners. Each post shall be set in a concrete foundation of 1-2-4 mix having a minimum diameter of 9" or three times the diameter of the post and at least 36" deep. Line posts shall be evenly spaced 10' or less apart.

Standard tolerances apply. Installation shall be by experienced fence erectors, on lines and grades furnished by owner.

*Non-restrictive specifications

USS Cyclone Fence
USS & Cyclone are registered trademarks

For more data, circle 6 on inquiry card

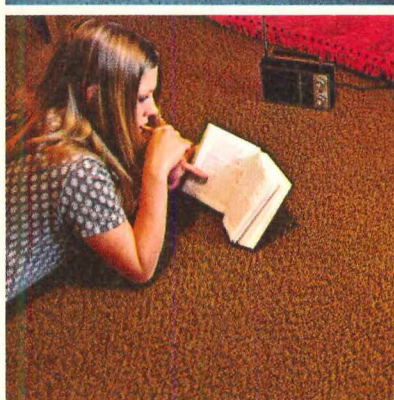
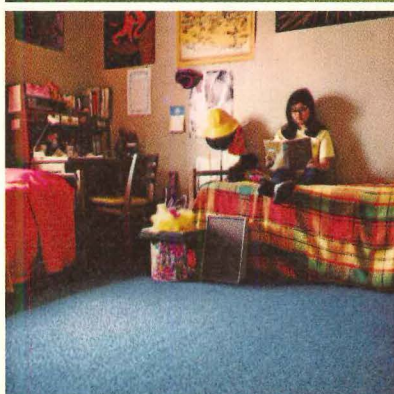
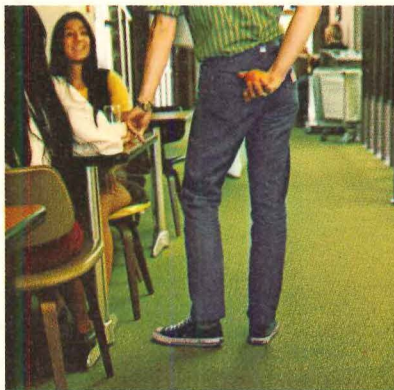


Carpet of Antron® keeps students' spirits up and maintenance costs down at San Jose State College, San Jose, Cal.

Students are hard on carpets. While they track in dirt, spill food, and ride bicycles down the corridors, they still want attractive dorms, a low noise level, and clean floors for dancing, wrestling, and studying.

Carpet with pile of Antron* nylon was chosen for its outstanding ability to hide soil between cleanings. Dirt and spots which do show can be easily removed. Carpet of "Antron" stays looking like new.

"Antron" can cut maintenance costs considerably: at San Jose it reduced cleaning hours and freed men to work in other areas. Ruben Douglas,



Custodial Superintendent, says he can't wait to have carpet of "Antron" installed throughout.

The students are pleased with their bright, clean surroundings. Food complaints, traditional barometer of student dissatisfaction, have plummeted since carpet of "Antron" was installed in the cafeteria.

San Jose is putting down 6,000 more yards of carpet of "Antron" this year. With reports like these, shouldn't you look into "Antron"?

Contact your mill or write to Contract Specialist, DuPont, Room 401, Centre Road Building, Wilmington, Del. 19898.



*DuPont registered trademark. DuPont makes fibers, not carpets.

WHEN CARPET DOES IT, CARPET OF SOIL-HIDING ANTRON® DOES IT BEST.

For more data, circle 7 on inquiry card

A little essay of sorts about The Noise Explosion, and what can be done about it, by U.S. Plywood.

Noise (someone brilliant once said) is sound at the wrong time in the wrong place.

There's too much of it today. And it's getting worse.

As a nation, we haven't made a Federal case of it. Yet.

But we're making a national *cause* out of it. The Environmental Protection Agency in Washington, D.C., has now established an office to find out just how noisy the United States is, and how much noisier it's likely to get.

Well, if you ever had a gaggle of typewriters — or a giggle of secretaries — outside your office... or been hit by Rock from parties in the apartment across the hall... and even though the door is closed, the noise seeps in maddeningly:

Then *you* don't have to wait for official reports to be concerned about the disturbing effect of The Noise Explosion on the American environment.

We're concerned at U.S. Plywood.

And we're doing something about it.

We're building Weldwood Acoustical Doors: one of the most technologically advanced noise-controlling systems in the world.

Doors that do more with less. Because they don't depend on sheer bulk for sound control.

Our Acoustical Door Systems have been designed to employ unique materials and methods of construction. Each is only 1 $\frac{3}{4}$ " thick, yet Weldwood's exclusive process enables them to equal *or exceed* the effectiveness of thicker acoustical doors.

And with their superior engineering our acoustical doors are still competitively priced.

In addition to efficiency and economy, there is also versatility.

You can specify from a wide range of attractive hardwood door faces (as well as



from your choice of many other materials) to complement any decorative scheme.

Even though it is a sophisticated noise-controlling unit, the Weldwood Acoustical Door is simple to install. It offers a variety of accessories, including perimeter sealing, threshold sealing, and astragals matched to the face and finish of the door.

Weldwood sound-isolating STC-28, STC-36, STC-40

and STC-49 Acoustical Door Systems all function on our *multum in parvo* principle of more noise-control from less door.

All provide predictable sound control between rooms for a broad range of building applications.

Contact the Architectural Salesman at your local U.S. Plywood office for detailed information.

If this little essay made sense, wait till you see our masterwork:

A slim opus called "Weldwood Acoustical Door Systems."

It's yours free with this coupon. Send for it. And do your bit to help muffle The Noise Explosion in America.



U.S. Plywood

A Division of U.S. Plywood-Champion Papers Inc.
777 Third Avenue, New York, N.Y. 10017

**WELDWOOD®
ACOUSTICAL
DOOR SYSTEMS**

U.S. Plywood, Dept. AR-10
777 Third Avenue, New York, New York 10017

Please rush my free literary masterwork, so I can see what can be done about fighting The Noise Explosion with Weldwood Acoustical Doors.

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

For more data, circle 8 on inquiry card



NATURE-TONE porcelain panels complement this arboreal setting

Honeywell Inc., has developed an engineering and manufacturing complex for its computer systems division on a wooded 76-acre tract at Billerica, Massachusetts. The Detroit architectural firm of Giffels Associates, Inc., placed strong emphasis on harmonizing the project with the scenic beauty of the site.

Warm-colored brick and dark-tinted plate glass were chosen to compose the sidewalls, while sweeping fascias were created in soft earthy-brown porcelain-on-steel panels to bring strong horizontal unity to the facade.

Architects can specify Nature-tone porcelain-

enameled panels from a palette of twenty-four matte-finish hues created by color experts in collaboration with prominent architects. All porcelain-on-steel panels can be designed in a variety of embossed textured patterns.

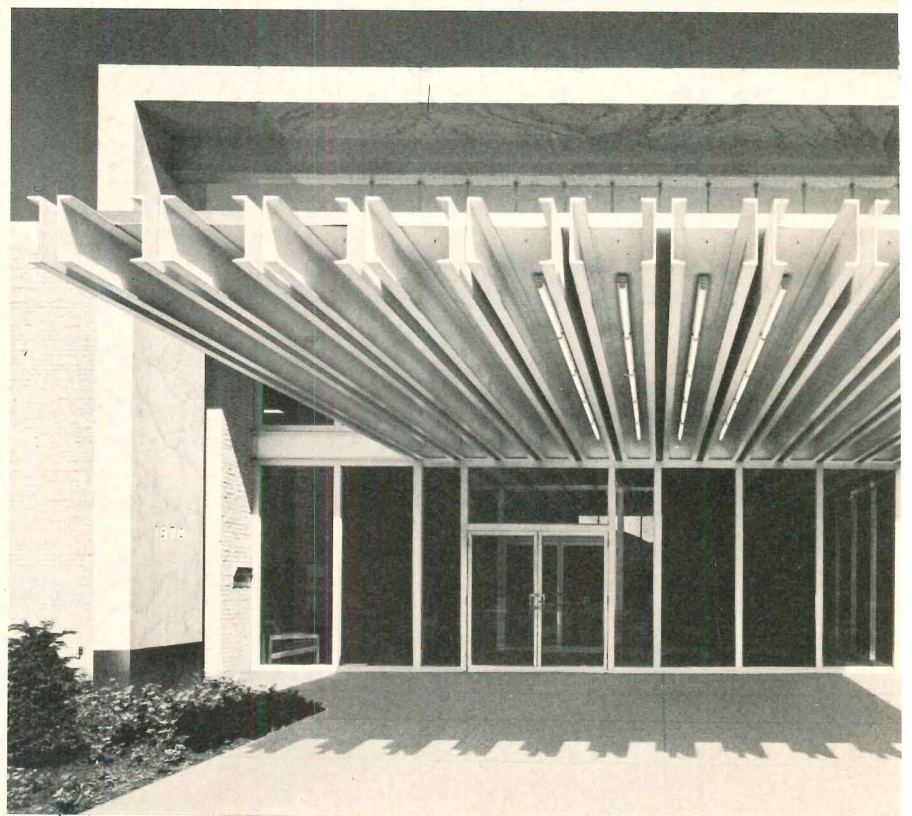
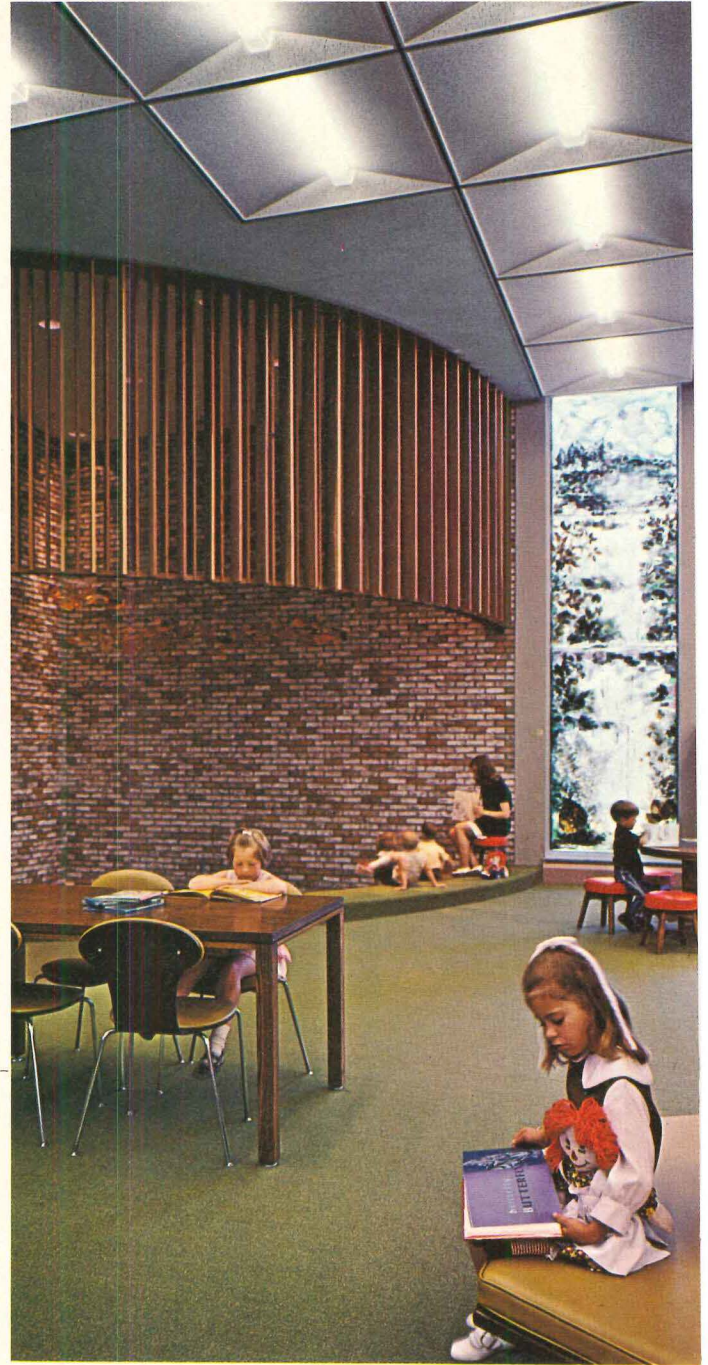
Porcelain-enameled steel panels are rigid, light, corrosion-resistant, color-fast, and clean. Bethlehem supplies special enameling sheets to fabricators who form and coat architectural panels. Write us for a brochure on Nature-tone finishes. Room 1047, Bethlehem Steel Corporation, Bethlehem, PA 18016.

BETHLEHEM STEEL



Architects: Giffels Associates, Inc., Detroit, Michigan
General Contractor: Aberthaw Construction Co., Boston, Mass.
Steel Fabricators: Lyons Iron Works, Manchester, New Hampshire
 Porcelain-on-steel panels by The Bettinger Corporation, Milford, Massachusetts

**What makes
this ceiling system
right for this job?**



The way it adapts to a large open area.

The ceiling system is Armstrong Luminaire—18,000 square feet of it at a ceiling height of 17 feet. And in a setting where high-level lighting and design effect are both of paramount importance, Luminaire really gets a chance to prove its adaptability. 60" x 60" modules provide a big, bold design effect. (Luminaire is adaptable to 1,183 other sizes from 24" x 41" to 60" x 72".) High-level lighting comes from Luminaire lighting fixtures with two 4' tubes. A comfortable 120 footcandles maintained is the result. (Luminaire is also adaptable to other types of fixtures.) Rounding out the story, the Luminaire System provides a method for the diffusion of conditioned air.

What can Luminaire or any of the other Armstrong ceiling systems do for you? Write for our folio and find out. Armstrong, 4210 Rock Street, Lancaster, PA 17604.

For more data, circle 1 on inquiry card

Armstrong / **CEILING SYSTEMS THAT WORK**

Taylor Memorial Public Library, Cuyahoga Falls, Ohio
ARCHITECT: Trefon Sagadencky, AIA, Cuyahoga Falls, Ohio
GENERAL CONTRACTOR: The Edward Barr Corporation, Akron, Ohio
MECHANICAL CONTRACTOR: J. W. Geopfert Company, Inc., Akron, Ohio
ELECTRICAL CONTRACTOR: John P. Novatny Electric Company, Akron, Ohio
CEILING SYSTEMS CONTRACTOR: AFC Interior Construction, Akron, Ohio



Announcing fiber glass walls for high rise buildings. They snap in to save money.



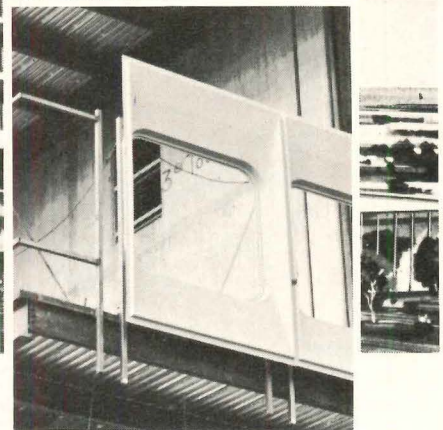
Architect: Cann & Termohlen,
Palo Alto, California

Technical Plastics Corp. makes them.* PPG makes it possible.

The twelve-story IED Building in Mountain View, California, is the first high rise in the United States to use fiber glass reinforced polyester panels for its exterior curtainwalls. The panels, molded by Technical Plastics Corp., were clipped to window frames made of steel tubing, and snapped into place on steel floors at ground level. Entire floors were then jacked up into position. This spectacular "top to bottom" building operation saved significant amounts of time and labor costs, and was possible, in part, because of the panels' light weight, only 85 pounds each.

But the building's architects found a lot of other advantages in using the paneled walls. The panels offer design flexibility, esthetic appeal, relative freedom from maintenance and lower cost than other curtainwall materials. In fact, similar panels were used on the interior of the building. They, too, were snapped into place.

PPG worked closely with Technical Plastics to help select the best fiber glass product for use in this exciting new building-material idea. Can we help you with your ideas? Contact Technical Plastics Corp., 19 Janis Way, Santa Cruz,



Fiber glass panels clipped to steel frame on third floor of IED Building.

California 95060. Or write PPG Industries, Inc., Department 906-B, Fiber Glass Division, One Gateway Center, Pittsburgh, Pa. 15222.

*These panels were produced by Technical Plastics Corp. under license from International Environmental Dynamics, Inc., Menlo Park, California.

PPG: a Concern for the Future

Fiber Glass 
INDUSTRIES

For more data, circle 22 on inquiry card



1.

2.



Single source responsibility

Typical designs and occupancies: 1. The 62,000 square foot laminating plant of Pioneer Plastics Corporation. 2. Beck/Arnley Corporation of California, distributor of auto parts. Both designed by Field and Silverman, A.I.A., Beverly Hills, California. 3. Under Sea Industries, 35,000 square feet, a manufacturer of sea diving equipment. Designed by Latt, Jackson & Associates, Inc., Austin W. Daly, A.I.A., Los Angeles. Developer Boise Cascade Building Company, Gardena, California. Air Conditioning contractor, Landmark Heating & Air Conditioning, Torrance, California.

3.



One manufacturer, Lennox, is responsible for the HVAC equipment and controls in this 800-acre industrial park. It's the Dominguez Industrial Park, adjoining Los Angeles. A Boise Cascade development, centered in a 2000 acre industrial complex. Buildings like these, for light manufacturing or service companies, are custom designed, and available for purchase or lease.

(continued overleaf . . .)

continued...

single source responsibility: the Lennox concept

Innovative design themes, creative landscaping and wide traffic arteries add to the park feeling. Special zoning plans keep compatible industries adjacent to one another. Sites range from one acre up.

The developers have standardized on Lennox Air Conditioning and Heating, and one contractor, Landmark Heating & Air Conditioning Company of Torrance, and one source for the service contract, also provided by Landmark.

This standardization offers Boise Cascade important benefits. Design and purchasing time is reduced. Because the system is fully packaged, the cost of purchase is predictable. On-site labor is minimal. Service contracts fix the cost of owning. A full range of equipment is offered. Functional capabilities are known. It is easy to integrate Lennox systems into any plans, for any type of occupancy.

Sleek, low-profile silhouettes preserve the esthetics of the development.

Because Lennox systems are modular, principally rooftop, they pose no problems for expansion. New units can be added as a building grows. Walls can be moved or added as the owner adjusts to change. Single and multizone units provide precisely needed environments for different occupancies . . . offices, production or warehousing.

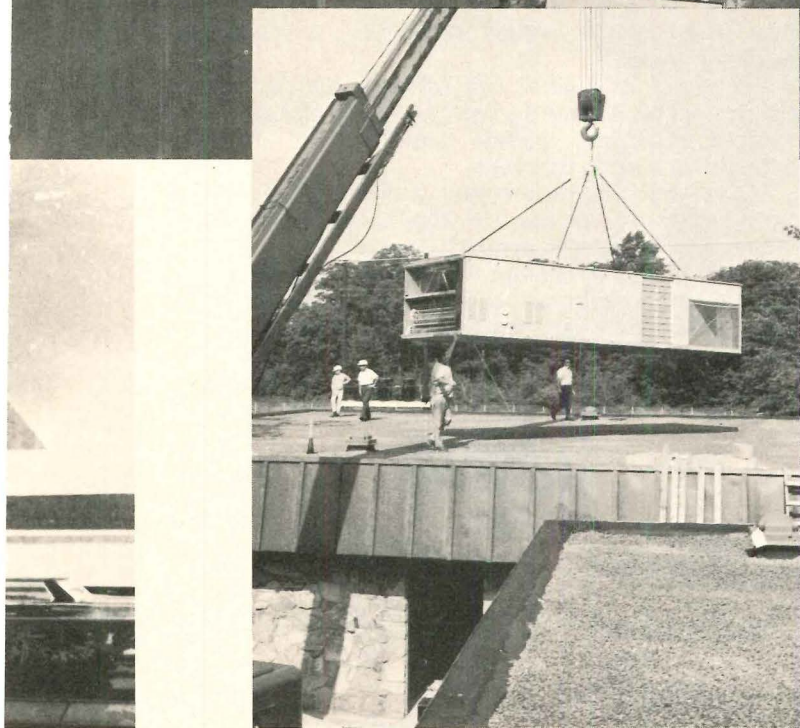
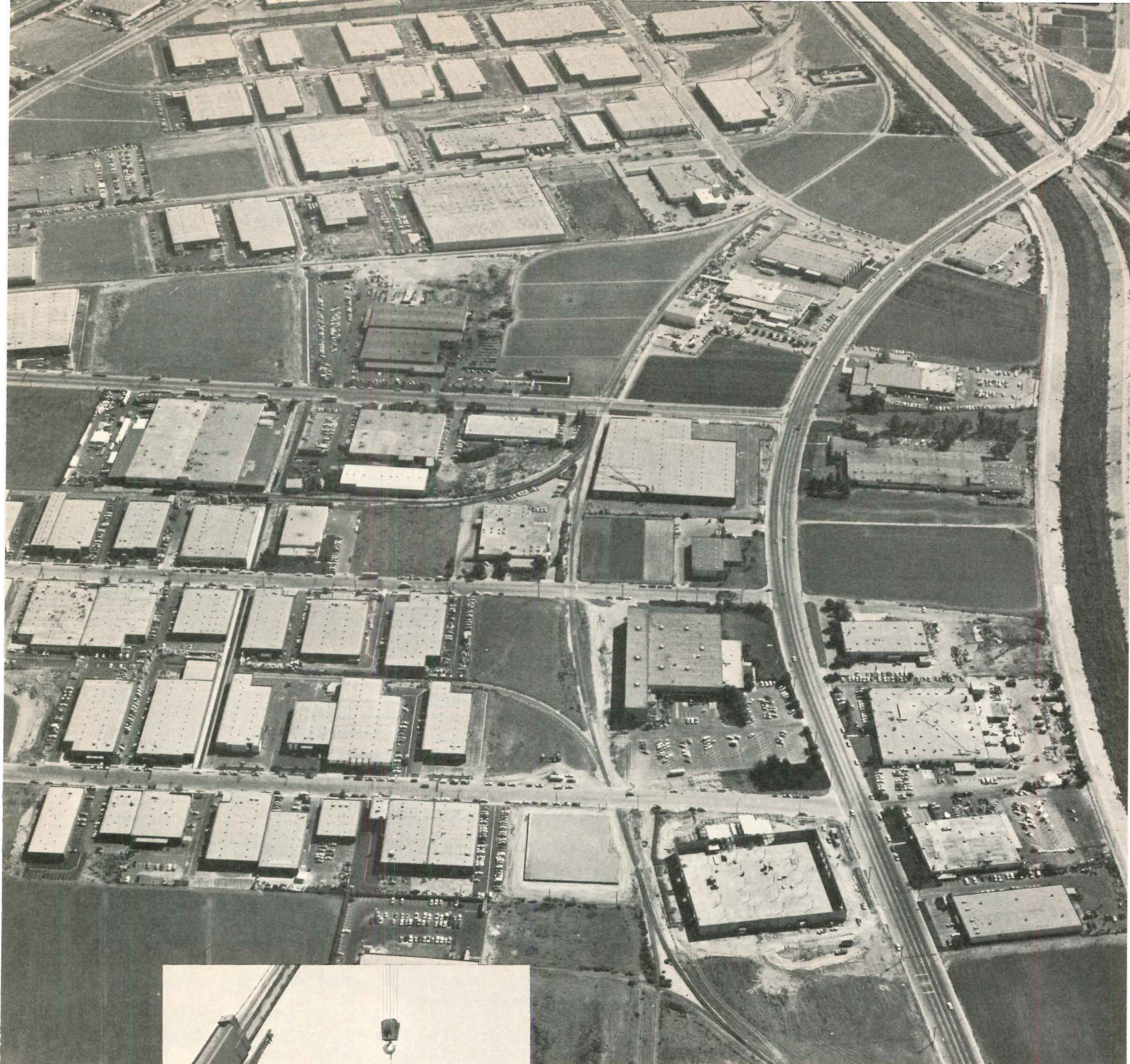
If you are planning a development, consider the esthetics, the comfort, the economies, the performance of Lennox Air Conditioning and Heating. Write Lennox Industries Inc., 979 South 12th Avenue, Marshalltown, Iowa 50158.

LENNOX
AIR CONDITIONING • HEATING

For more data, circle 9 on inquiry card

Tri-Lite Manufacturing Company, Inc., manufacturer of light fixtures, occupies this 24,000 square foot building. Architect: Latt, Jackson and Associates, Los Angeles. Located in Broadway-Rosecrans Industrial Park.

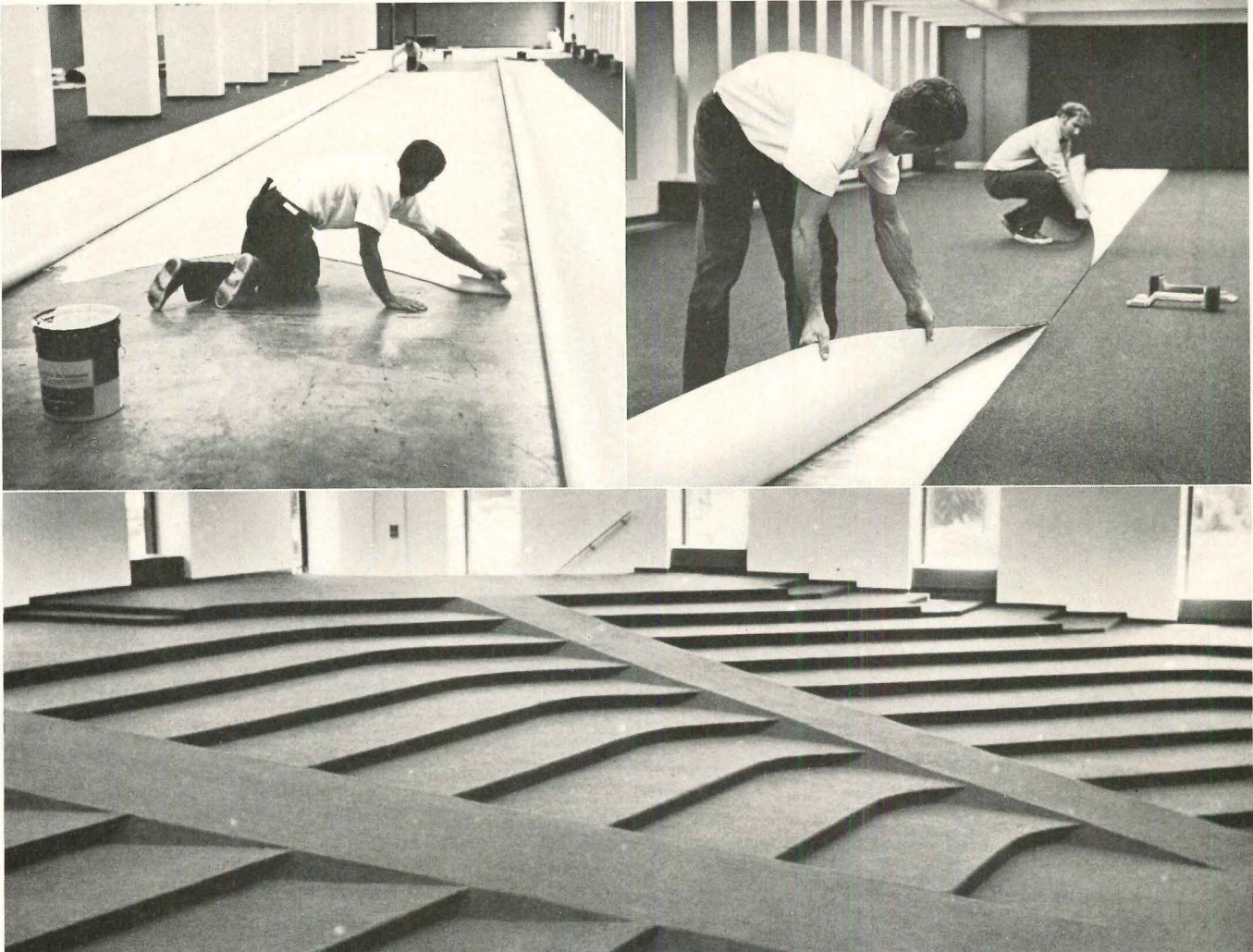




Aerial view of 800 acre Domingues Industrial Park, Los Angeles. At present stage of development, there are 225 Lennox gas-electric air conditioning, heating, ventilating units installed on rooftops.

Lennox air conditioning, heating and ventilating units are completely factory-assembled, wired and tested. Choice of: gas, oil, electric or hot water heat with up to 33 tons DX cooling. They are shipped ready to lower onto a Lennox roof mounting frame. Optional Power Saver™ cools with outside air when temperatures are under 70°F.

AT GEORGETOWN UNIVERSITY LAW CENTER 13,000 SQUARE YARDS OF LOKTUFT® DUON WENT DOWN WITHOUT A FIGHT.



You're looking at just part of the obstacle course that carpet installers were faced with at Georgetown University.

The job, sold by M. S. Ginn & Co., Washington, D.C. called for a glue-down installation of thick 85 ounce carpeting by Bigelow.

So the secondary backing had to be pliable enough to fit a heavy carpet into any troublespot. And tough enough to hold it there.

Loktuft Duon was the secondary backing they used on the carpet.

Non-woven Loktuft cut cleanly and neatly. Without fraying or raveling. No matter how intricate the cuts they had to make.

This was particularly important in the amphitheater-shaped area on the first floor where sloping aisles and curved stepped floors complicated the installation problem.

"That's where we expected to separate the men from the boys", said Jimmie Byrd, President of Superior Carpet Shops, Inc., who handled the entire instal-

lation. "But Loktuft worked beautifully. It made a difficult job easier."

Every inch of Loktuft laid perfectly flat. No bubbling, no rippling. Not even a hint of a grinning seam.

Most important, Loktuft came with a built-in reputation for staying that way.

Made with Marvess® olefin, a Phillips 66 fiber, Loktuft resists rot, mildew and insect damage. And it won't pucker or shrink from moisture exposure.

Which makes it ideal for installations where dampness or high humidity can be harmful to natural fiber backings. And that includes the not-always-great outdoors.

Loktuft Duon. Who'd have thought a secondary backing this tough could ever go down this easy?

Loktuft
A PHILLIPS 66 CARPET BACKING

PHILLIPS FIBERS CORPORATION AND SUPERIOR CARPET SHOP ARE MEMBERS OF THE NATIONAL ASSOCIATION OF FLOOR COVERING INSTALLERS.

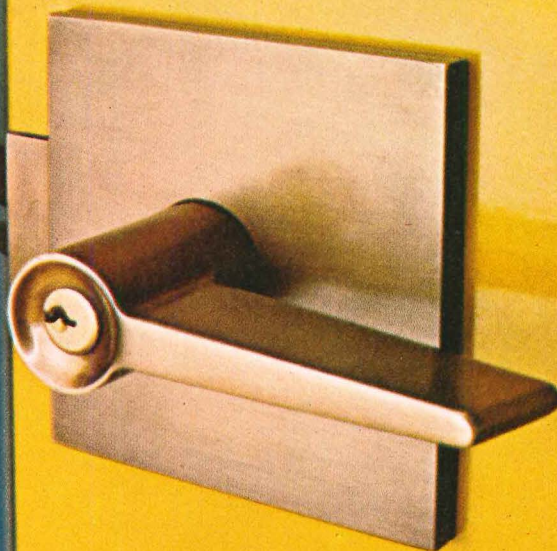
PHILLIPS FIBERS CORPORATION, GREENVILLE, S. C., A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY. PRODUCERS OF: MARVESS® OLEFIN, QUINTESS® POLYESTER, PHILLIPS 66® NYLON AND LOKTUFT® CARPET BACKING. MARKETING OFFICES: P. O. BOX 66, GREENVILLE, SOUTH CAROLINA 29602. TELEPHONE (803) 242-6600; 1120 AVENUE OF THE AMERICAS, NEW YORK, NEW YORK 10036. TELEPHONE (212) 697-5050.

For more data, circle 10 on inquiry card

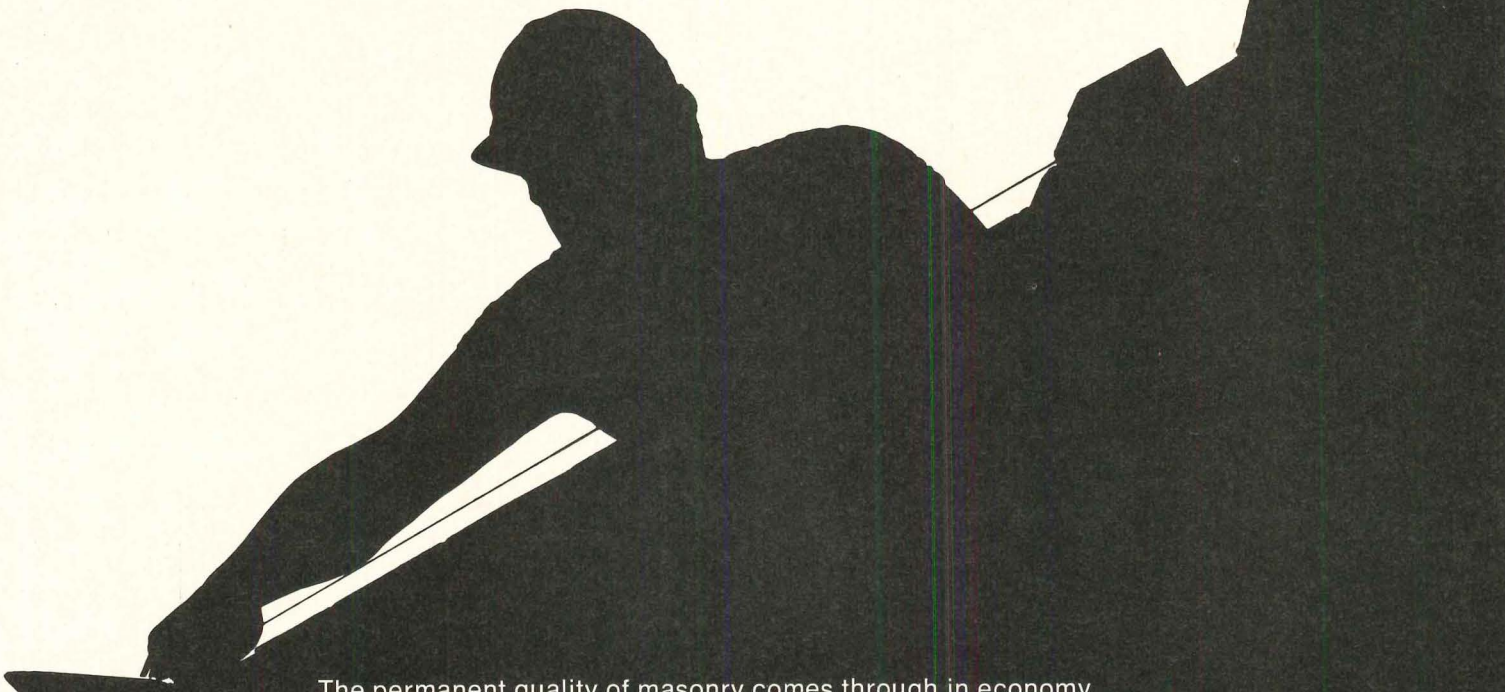
910L Metro... where you program for security

When the input is Corbin, you're programming for safety, security and speed. Corbin Unit® locksets are renowned for combining maximum security and fast, economical installation with design leadership second to none. Contact a Corbin distributor for information and service or write P & F Corbin, Division of Emhart Corporation, Berlin, Conn. 06037. In Canada, Corbin Lock Division.

For more data, circle 11 on inquiry card



Today and every day for fifty years a masonry wall will cost you less.



The permanent quality of masonry comes through in economy. A new comparative cost analysis by professional engineers demonstrates both the *initial* and *ultimate* cost advantages of masonry. Comparing comparable walls of different materials, the study shows that initially, a six-inch precast concrete panel wall costs 24 per cent more than a 10-inch brick and block cavity wall; a metal sandwich panel costs 29 per cent more than the masonry wall, and a double plate glass wall costs 33 per cent more. Over the 50-year life of a building, "ultimate cost" analysis shows that the precast concrete panel will cost 16 per cent more than masonry, the metal panel 21 per cent more, and the double plate glass 217 per cent more. This study is contained in a booklet which also provides the methodology by which an architect, engineer, businessman, or public official can make his own "ultimate cost" analysis of comparative wall materials. Can you afford to pass up savings this large (with the permanent beauty of masonry thrown in free of charge)?



INTERNATIONAL MASONRY INSTITUTE

Please send me *Walls to Save Dollars*, by professional engineers of the Structural Clay Products Institute, plus the National Concrete Masonry Association's analysis of the "ultimate cost" of concrete block walls in multi-family housing.

For more data, circle 12 on inquiry card

WALLS TO SAVE DOLLARS

A comparative cost analysis for the
man who spends money for buildings

(name and title) _____ a

(firm) _____

(address) _____

Mail this coupon to: IMI, 823 15th St., N.W.
Washington, D.C. 20005
(202) 783-3908

The same know-how that built our reputation now builds our laminate casework.

The same careful attention to detail, the same design expertise, the same flexibility that architects have come to rely upon in St. Charles custom casework of steel and wood is now to be found in our new plastic laminate casework. It,

too, bears the unmistakable signs of St. Charles craftsmanship—functional strength and cleanliness of line. If your need is for plastic laminate, look to St. Charles for casework that outperforms the rest.

St. Charles® Plastic Laminate Casework

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A St. Charles residential kitchen complements your good taste.

No matter what your color or style preference, no matter what your choice of materials, no matter what your special requirements, you can count on St. Charles to create custom kitchen casework that's a beautiful reflection of what you had in mind

—and then some. Add to this our industry-wide reputation for service, our extensive production facilities and engineering know-how, and our on-time dependability, and you'll see why specifying St. Charles saves many man hours—yours.

 *St. Charles*® Custom Kitchens

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We build better classroom casework because we've done our homework.

We know, for instance, the way in which a colorful and neatly-organized room can stimulate students and teachers alike. We know, too, how important a part minimum maintenance plays in your plans. And how you appreciate on-

time dependability and the complete flexibility of design that only made-to-order casework allows. And we know enough to offer two distinct lines—one heavy, one light. After all, we've been doing our homework for over 35 years.



St. Charles® Custom School Storage Furniture

Write for our School Catalog, Dept. AR-4 • St. Charles Manufacturing Company, St. Charles, Illinois 60174

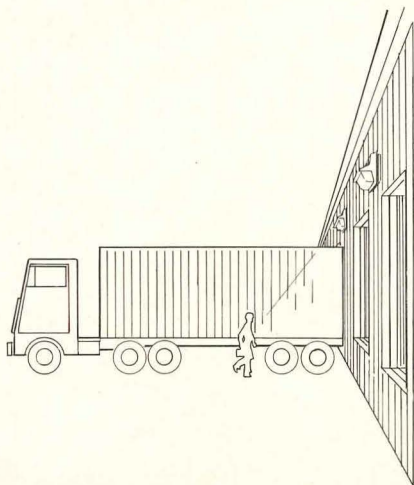
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LANDMARK



beautiful way to light the way



Security lighting can be beautiful, and Landmark shows the way with this compact, clean-line Side-Lite. Use it any place light must be projected out and down from a flat surface—walks and entranceways, loading docks, building grounds, parking garages and ramps. You'll get efficient, uniform lighting that protects and beautifies.

The trim design combines a cast aluminum housing with glass prismatic refractor that projects only 8-9/16" from the mounting surface.

Entire front swings open for easy access. Fins provide excellent ballast heat dissipation. Easily installed with bolts through rear housing. Available in incandescent to 300 watts, mercury vapor in 100, 175 and 250 watts.

Optional photoelectric control is concealed inside upper housing. Also optional are decorator colors, wire safety guard. For complete specifications and prices on the Landmark Side-Lite write: ITT Landmark Lighting, Southaven, Mississippi 38671.

LANDMARK LIGHTING ITT

For more data, circle 16 on inquiry card

When he's old enough for the Hall of Fame, coatings made with KYNAR 500® will still be batting 1.000

When his name is on one of those bats, finishes based on KYNAR 500® will still retain their true color for 20 years plus.* And that's a long, long ball game. In spite of attack by sun, weather and pollutants.

KYNAR 500 is the best base for color coatings on architectural metals. It resists chemicals, chalking, corrosion and mortar stain. And won't crack, craze or fade. So matching is easy.

Invest in a colorful future. Use KYNAR 500 on your next building. Write Pennwalt Corporation, Pennwalt Building, Three Parkway, Philadelphia, Pennsylvania 19102.

*based on accelerated life tests.

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Make your base specification **KYNAR 500®**



PENNWALT
ARCHITECTURAL COATINGS

For more data, circle 17 on inquiry card



Explore new dimensions in inner space from Keene: The Interiors People.

From now on when you're thinking interior building components, think Keene.

Because we've made interiors our specialty. In fact, Keene alone offers you manufacturing capabilities in all key areas of interior construction. Seven of our plants produce compatible lines of acoustical ceiling products, lighting and air distribution systems and movable walls.

In all Keene interior products, the accent is on advanced engineering tech-

niques. Like ceiling systems that give you instant access to overhead utilities. Movable walls that are literally a snap to install. We've even combined technologies to pioneer complete modular interior systems.

Keene interior products feature exciting styling, too. For example, our movable walls come in colorful finishes to match any decor. And Keene lighting fixtures are available in a wide choice of types and geometries, or can be custom-designed to meet your special needs.

Whether your design calls for the latest in interior building products and components, or total interior systems, look to the specialists in inner space. Call in the Interiors People from Keene.

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CORPORATION

345 Park Avenue, New York, N.Y. 10022

We've just begun to grow.

To

L'architecture d'aujourd'hui

we say

Soyez le bienvenu

ARCHITECTURAL RECORD extends a warm welcome to L'ARCHITECTURE D'AUJOURD'HUI, Europe's leading architectural magazine, which through its recent acquisition by Technic Union (France), becomes an affiliate publication of McGraw-Hill's International Publications Division.

The close family ties that now exist between L'ARCHITECTURE D'AUJOURD'HUI and ARCHITECTURAL RECORD present both publications with exciting new opportunities for collaboration in keeping their respective readers closely attuned to important architectural developments throughout the world.



Clark Art Center Theatre, Rockford College, Rockford, Illinois. Architects: The Perkins & Will Partnership. General Contractor: Gúst. G. Larson & Sons, Inc. Dover Stage Lift installed by Lamps Elevator Sales and Service, Inc. Hedrich Blessing photograph.

Dover Stage Lift helps create a theatre for all seasons.

A college theatre should be able to handle many styles of theatrical presentations. Which is why so many new college theatres include a Dover Stage Lift in their plans.

For example, take a look at what the Dover Stage Lift does at the Clark Arts Center Theatre at Rockford College. This double-decked, 56' x 18' lift changes the stage from a regular proscenium set-up to a musical theatre with orchestra pit, or to a classical or thrust stage.

Dover has been making hydraulic stage lifts for over 25 years. We manu-

facture more of them than anybody else in the business. Dover Lifts are in the Metropolitan Opera House, New York; the Julliard School, New York; Harvard's Loeb Drama Center; the Santa Fe Opera House; and the Stardust Hotel, Las Vegas.

We custom-design every Dover Stage Lift to meet specific requirements, of course. Dover engineers have solved stage lift problems for buildings ranging from high school auditoriums to mammoth convention halls. They'll be glad to help you with design or engineering assistance.

For more information, see our catalog in Sweet's Files. Or write Dover Corporation, Elevator Division, Dept. A-10, P. O. Box 2177, Memphis, Tenn. 38102. In Canada: Dover-Turnbull.



the elevator innovators

For more data, circle 23 on inquiry card

News in brief

Construction of new housing units increased sharply in the second quarter of the year, according to latest figures released by F. W. Dodge, with the Los Angeles-Long Beach area leading the nation in the production of new dwelling units with 17,097. Following close behind Los Angeles in new housing volume were Chicago (16,237), New York (13,654), Washington (12,103), San Diego (11,105) and San Francisco (11,063).

Canadian architect Arthur Erickson is this year's recipient of the Royal Bank Award (eligibility limited to Canadian citizens or persons legally domiciled in Canada). For "his contributions to the betterment of the world we live in," Erickson receives a gold medal and a grant of \$50,000.

Scottish architect Alex Gordon became the 54th President of the Royal Institute of British Architects on July 1. During his term of office, he intends to place his highest priority on bringing together all the professions concerned with the built environment.

The Royal Institute of British Architects wishes to hear from American architects who plan to visit Britain this year and would like to speak to student audiences in British schools of architecture. Speakers would not normally receive a fee but their travel expenses within Britain would be paid if they wish. Contact: Michael Merchant, R.I.B.A. Student Relations, 66 Portland Place, London WIN 4AD, United Kingdom.

The American Institute of Architects announces its 1972 Honor Awards Program. Open to all licensed architects, entries must be received at AIA national headquarters not later than December 3, 1971.

A distinguished Service Award was bestowed on Rob Cuscaden, architect critic for the Chicago Sun-Times. The award was given in recognition of Mr. Cuscaden's "contribution to Chicago architecture through his excellent reporting and criticism."

Alexander Kouzmanoff has been named chairman of the Division of Architecture at Columbia University. Kouzmanoff succeeds Romaldo Giurgola who served in the post for six years and remains a member of the design faculty.

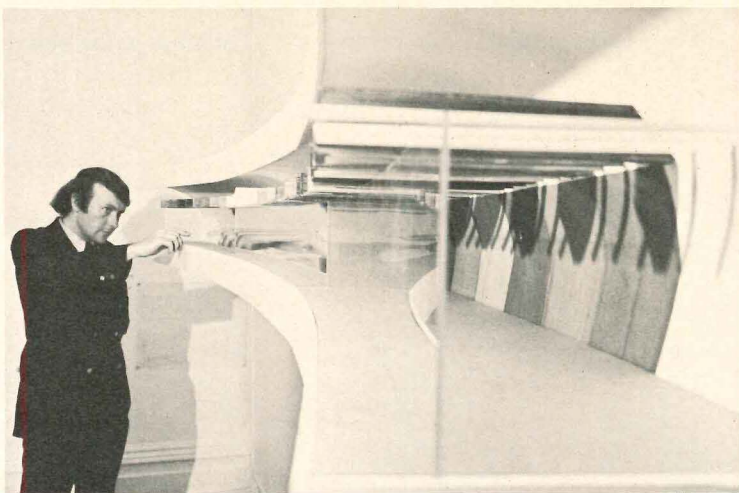
This year's winner of the InterRoyal International Student Design Competition is James Michael Brady of California State Polytechnic College at San Luis Obispo. His winning design for a 4000-square-foot office/studio earned him five hundred dollars and a trip to New York City.

Herman D. J. Spiegel has been named Dean at Yale University's School of Art and Architecture. Having served as Acting Dean since last January, Spiegel replaces Charles W. Moore whose five-year tenure ended this year.

The fifty-fourth Annual Conference of the American Institute of Planners will convene at the San Francisco Hilton October 24-28, 1971. The program will include distinguished speakers as well as fifty papers to be presented by planners involved in a variety of projects across the country.

Architects and engineers will meet on November 29-30 in St. Louis to hear spokesmen from Federal agencies describe new government building programs. Of special interest will be a discussion of the Department of Defense construction program with a budget of \$2 billion for fiscal 1972. The conference will also focus attention on the Federal government's program to preserve the environment.

Construction of New York City's \$100 million convention and exhibition center will begin in eighteen months on a midtown site on the city's West Side. Completion is expected early in 1976 in time for the nation's Bicentennial observances. Preston Robert Tisch, speaking for the project's Board of Directors, announced recently that architects for the center will be selected soon. Plans and detailed cost estimates must be approved by the city before construction can begin.



New York City master plan under attack

The recently published Master Plan for New York City "lacks most of the substance of city planning" according to a challenge issued by the New York Chapter, American Institute of Planners. Conceding that it is "voluminous, profusely illustrated, beautifully written and expensive," the planners argue that it "omits any real historical analysis of the city's development, any overall description of its problems and potentials, and almost all well-

defined programs for countering shortcomings by capitalizing on latent strengths."

In rebuttal, Donald Elliott, chairman of the City Planning Commission, argued that "a traditional physical plan would be inappropriate for a large United States city in the nineteen-seventies." Describing the new plan as "an agenda for action," Elliott asked planners to adopt a "healthy skepticism about traditional methods."

Dodge Reports extends service to cover all states

Dodge Reports, daily source of advance information on new construction projects, will expand its coverage to encompass the entire continental United States, plus Alaska, beginning in January 1972.

The expansion will add Alaska, Colorado, Idaho, Montana, Oregon, Utah, Washington, Wyoming, Northern California and Northern Nevada to the coverage of *Dodge Reports*. Thus, all states except Hawaii are now covered.

Breakthrough contracts signed by HUD

HUD Secretary George Romney announced that all 22 Breakthrough contracts have now been signed. These contracts, which total nearly \$63 million, will be divided over nine demonstration sites in various cities. In spite of recent budget slashes by the House Appropriations Committee, production and erection costs will still be borne by a combination of private mortgage funds and HUD's Research and Technology Funding assistance.

GSA makes preliminary selections

The General Services Administration last week narrowed the field of construction managers for its \$37 million law enforcement training complex at Beltsville, Maryland to five firms or joint ventures.

From the list of 35 preliminary submissions, the agency selected Walter Kidde Constructors, Inc., New York; Lester B. Knight

& Associates, Inc., Chicago, and George A. Fuller Co., New York (joint); Morrison-Knudson Co., Inc., Boise, Idaho; Tishman Realty & Construction Co., New York, and Turner Construction Co., New York and MDC Systems, Cherry Hill, New Jersey (joint). From these five it was expected to make a final choice very soon.

New "tandem plan" for government-subsidized mortgages

Faced with new pressures on the seven per cent FHA-insured and VA-guaranteed loans, the Administration hastily structured a "tandem plan" in which the government is now subsidizing a portion of the points mark-up on these housing mortgages. This enables mortgage originators to sell their FHA and VA loans (within certain price limits) to the Government National Mortgage Association (GNMA) of the Housing and Urban Development Department. GNMA, in turn, sells them to the indepen-

dent Federal National Mortgage Association at market rate. GNMA, through a new \$2 billion authority, picks up the difference.

This arrangement is an alternative to two other choices the Federal housing planners faced—holding the FHA rate at seven per cent and thus watching the strength leave the housing boom, or raising the rate and seeing prices soar out of buyer reach. HUD officials estimate the new plan will accommodate 760,000 housing mortgages in its first year of operation for a

TAC architect wins Boston Subway competition

The Institute of Contemporary Art recently sponsored a competition to beautify Boston's State Street subway station—described by an Institute spokesman as "worn, dirty and depressing for the 10,000 passengers who use it daily." The competition, open to local artists, was won by Robert Vincent Kennedy of the Architects Collaborative. His design uses light and color "to alter the psychological length of the passageway" and he estimates the cost of his project at \$4,500.

OAE vote in California

In its continuing effort to organize California architectural office employees—and to serve as their bargaining agents (RECORD, April 1971)—the Organization of Architectural Employees appears to have suffered a setback. Under the direction of NLRB, elections were held in five offices. Four of the offices voted against OAE, one voted in favor, and the vote in one office was tied. While admittedly disappointed in the results, OAE will continue its organizational efforts.

The official counts obtained from NLRB:

- 1) Skidmore, Owings & Merrill: 23 for OAE, 59 against
- 2) Howard Friedman: 2 for OAE, 3 against
- 3) Fisher-Friedman: 3 for OAE, 6 against
- 4) Hertzka & Knowles: 16 for OAE, 2 against
- 5) Wurster, Bernardi & Emmons: 7 to 7 tie, with one vote challenged by OAE. NLRB will decide the challenge in Washington perhaps later this month. Other offices may vote in future.

This is the government's first major effort to construct a public building using a construction manager as coordinator of the project. Interest in the approach ran high as GSA outlined its plan to nearly 100 representatives of architectural, engineering, construction, and "systems" firms who attended an agency-sponsored briefing.

total mortgage volume of \$15 billion. A "roll-over" principle is applied to stretch GNMA's \$2 billion authority to this extent.

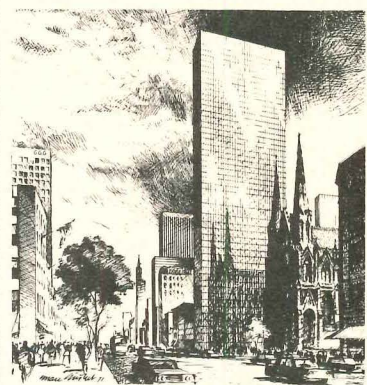
Units eligible for the program cannot exceed \$22,000 in mortgage amount except for a \$24,500 ceiling on four-bedroom residences. This limits advantages of the program in high cost areas. There will be pressures to allow a higher amount.

In its first auction of mortgage commitments GNMA accepted \$48,188,900 of the \$155 million in bids it received.

"Mobility—the fifth freedom"

Speakers at the Fifth International Conference on Urban Transportation held in Pittsburgh, September 8 through 10, placed heavy emphasis on the need to coordinate transportation planning with all other aspects of urban and environmental planning. A strong proponent of such comprehensive planning was Vice-President Spiro Agnew who made a number of points in his speech that would interest architects. "The lack of good public transportation is as much a part of the urban dilemma today as housing, schools and jobs. It ties in while all of them and, in fact, may be the key that unlocks the overall problem and revitalizes our cities," he said. "So it is time we stop thinking of transportation as an end in itself and approach it as part of a whole."

K. Leroy Irvis, of the Pennsylvania State Legislature and J. Herbert Holloman, MIT, responded to the theme of the meeting, "Mobility—the fifth freedom?", by calling for truly public transportation, free fares for the urban poor. A number of speakers called for better design of transit systems but it is significant that the strongest plea came from two Europeans, Michael Robbins of London and Pierre Weil of Paris.



Combined-use building implements "Fifth Avenue plan"

New York Mayor John Lindsay and Arthur Cohen of Arlen Realty and Development Corporation jointly unveiled plans for Olympic Towers, a new 50-story, combined-use building of Fifth Avenue at Fifty-first Street. In a city accustomed to gigantism, announcement of another building of nearly a million square feet would ordinarily cause scant interest. Several features, however, make this project interesting. The towering structure will have retail stores at street level and offices above. Twenty-seven floors of luxury co-op apartments will be superimposed over the offices. The mix of uses reintroduces 24-hour activity to Fifth Avenue and is the first such structure under the new, controversial "incentive zoning" regulations on Fifth Avenue. Skidmore, Owings & Merrill are the architects and Arlen Realty and Victory Carriers—an Onassis holding—are joint owners.



Sidewalk zoning: some sensible proposals

In a recent study of New York City's overburdened sidewalks, the Regional Plan Association, Inc. suggested guidelines to reduce pedestrian congestion. Tying walking space to building areas, the study makes many recommendations. Among the most urgent:

- 1) implementing zoning formulas to achieve satisfactory sidewalk standards in new building construction.
- 2) selective widening of sidewalks on streets where existing buildings

will not soon be replaced.

- 3) relocating obstacles of street furniture such as newspaper kiosks and subway entrances, so that they no longer impede pedestrian flow.
- 4) complete reconstruction of mid-town subway Stations by private builders as a trade-off for height bonuses. New stations would be daylighted and have direct access to surrounding buildings.

All recommendations are aimed at higher urban densities with lower sidewalk congestion.

Too late for Tahoe?

Lake Tahoe, the beautiful lake bordering both California and Nevada, has been threatened in the past few years by intense development. However, a plan to preserve the natural areas and limit development around the lake has been approved by the Advisory Planning Committee of the Tahoe Regional

Planning Agency. The plan sets a 280,000 population ceiling on the Tahoe area, accomplished by using strict land use codes. It emphasizes development for the metropolitan centers on the north and south shores and proposes that the government purchase 34,380 acres to preserve remaining natural areas.

HUD in Minneapolis

HUD support of the first major "new town-in-town" has been announced. A \$24 million offer of guarantee assistance has been granted to finance the development of Cedar Riverside, a high-density new community in Minneapolis under the New Community Development Act of 1970. The over 100-acre community will be coupled with a 340-acre urban renewal project just outside Minneapolis CBD. Eventual population of the new town will be 30,000, in 12,500 dwelling units phased over 20 years, many subsidized through Federal and municipal programs.

Preliminary plans suggest that some cultural facilities might be built on a "paired" basis with the new community of Jonathan, some 20 miles away. Also planned are an innovative central heating/cooling plant, "people mover" internal transportation system, an experimental education program, and comprehensive medical services tied into nearby existing hospitals. Planners include Minneapolis architect Ralph Rapson; Heikki von Hertzen, planner and developer of Tapiola; Barton-Aschman Associates; Sasaki, Walker Associates; and Lawrence Halprin.



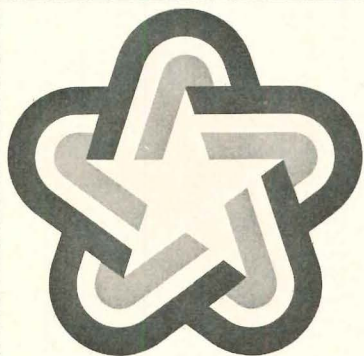
Peter Britton



"Festival of Life"

Late this summer, Phoenix House sponsored its 3rd Annual "Festival of Life" Happening, at Hart Island, New York. Featuring a festival of films from the 1930's, a variety of musical entertainments, rides, games and an assortment of amuse-

ments, the Happening was housed in a 750,000 cubic foot plastic air-supported structure—the largest such structure ever erected. Japanese architect Yukihiisa Isobe designed "the bubble" and provided the event's technical planning.



Official Bicentennial Symbol

The Franklin Mint is sponsoring a national competition for the design of Bicentennial medals that commemorate each state's contribution to the nation. The prize: \$50,000.

Group to study tall buildings

Six hundred fifty architects, engineers, environmentalists, planners, and other professionals from 34 nations (including U. S. and U.S.S.R.) have combined to form a research organization concerned with all aspects of planning, design and construction of tall buildings. Established jointly by the American Society of Civil Engineers and the International Association for Bridge and Structural Engineers, the new group is funded by the National Science Foundation and has headquarters at Lehigh University, Bethlehem, Pennsylvania. Dr. Lynn S. Beedle will serve as the group's first chairman.

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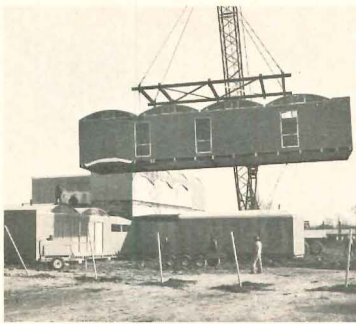
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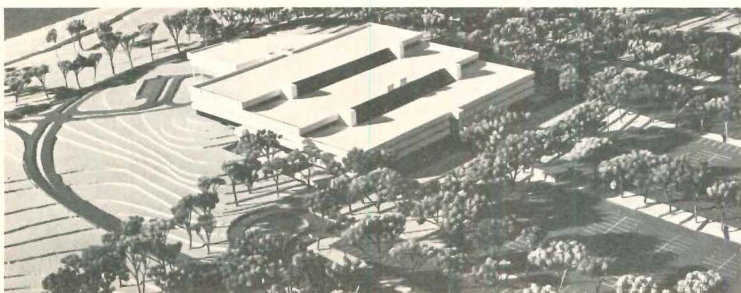
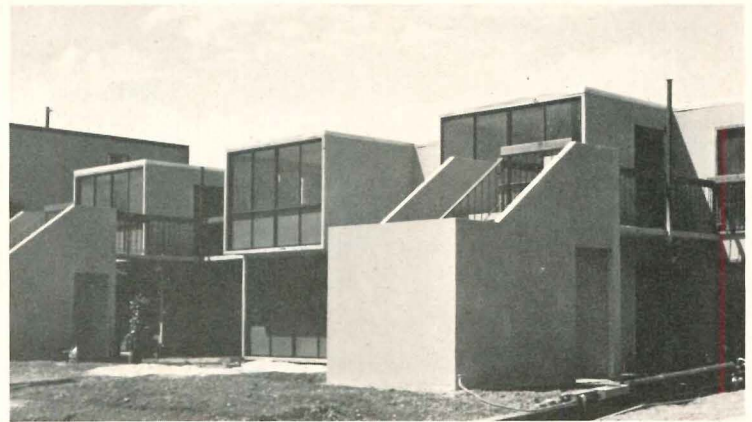
For more data, circle 25 on inquiry card



Modular apartments in Mountain View, Calif. (below), erected by Building Block Investment Group, are the first built in accordance with a state Factory Built Housing Law allowing for certification and inspection in a factory. Erection of 38 modules—about six per living unit— took 12 hours; finishing took six men three weeks. The 12-ton modules—12 by 12 by 8 ft with 4-in.-thick steel-reinforced concrete walls—are 75 per cent prefinished in the factory including painting and installation of all utilities and cabinets. Bart Jones was architect in charge. Licenses to use the system are now being sold here and abroad.



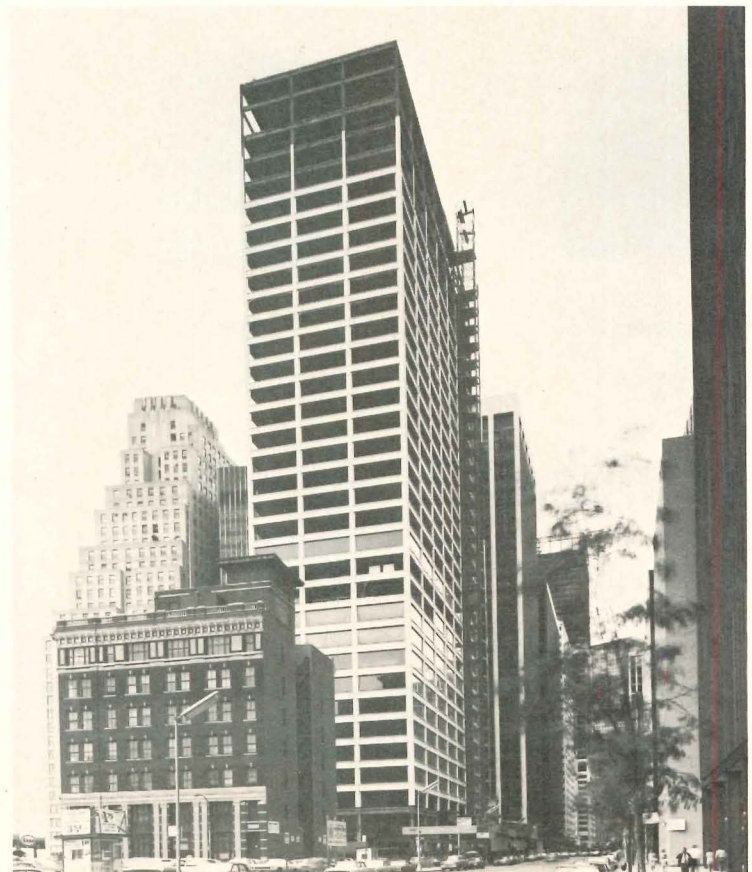
Modular apartments in New Haven (above), the first of Paul Rudolph's "20th century brick" projects (RECORD Sept. 1970) to be constructed, is complete. 148 apartments made of 333 wood modules, and a two-module community center, were built by Coastal Trailer Co. In plan, four L-shaped apartments, with two- to five-bedrooms and private court, cluster around a core. Cost: \$17.16 per sq ft.

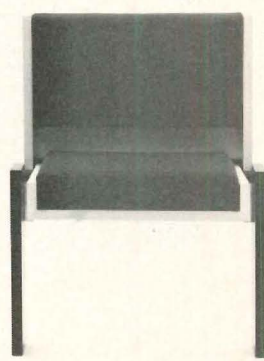
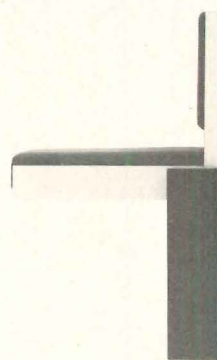
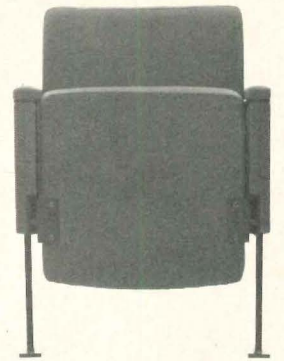
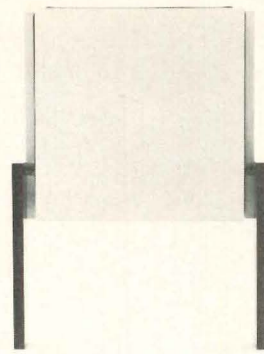
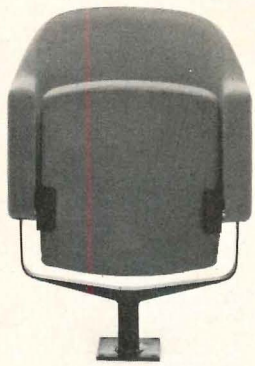


The Western Union Telegraph Co. building in Upper Saddle River, N.J. by Kahn and Jacobs is under construction. It steps down the site having only one continuous floor. Two 24- by 230-foot light courts, with sloping glass roofs and surrounded by offices, light the lowest levels. Lloyd Doughty is partner in charge; Der Scutt, project designer.

Jay Hoops

88 Pine Street, I. M. Pei's first New York City office building has 38 stories with aluminum columns and beams and baked-white aluminum curtain walls. The 26-ft-wide windows have three panes sealed with clear plastic pipe and transparent sealants.





westminster
designed by
Dickinson / Smith

62-63
designed by
Peter Dickinson

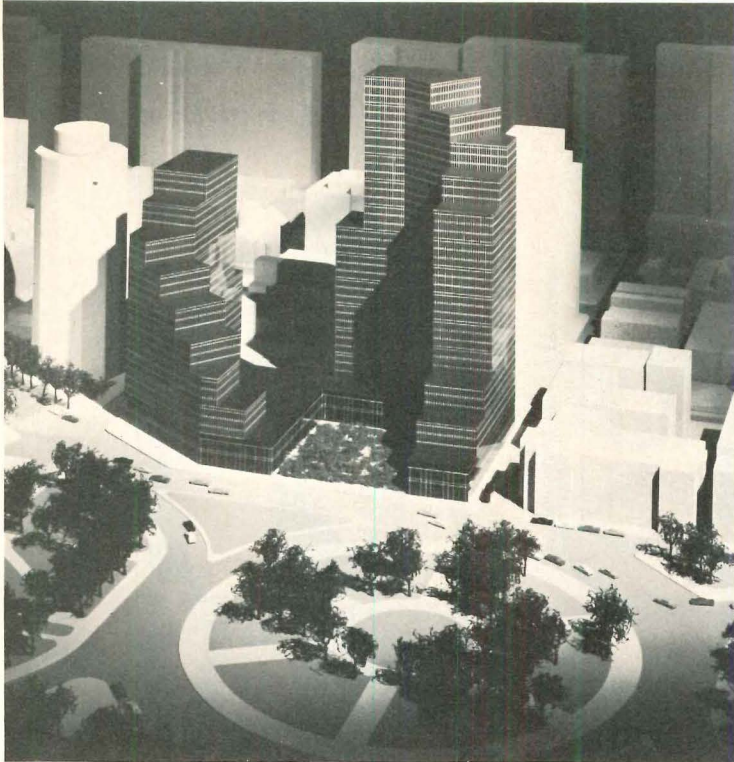
urbino
designed by
Giancarlo DeCarlo

T-100
designed by
Dave Woods

J&G auditorium seating

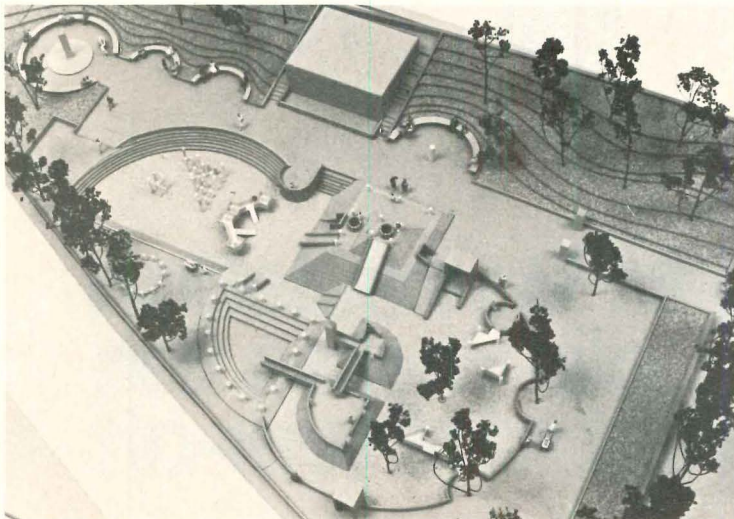
J&G Furniture Co., Inc., Quakertown, Pa. 18951

complimentary layout service



Logan Complex, designed by Philip Johnson and John Burgee, will be a 35-story, 351-unit apartment condominium and a 27-story, 450-room luxury hotel on Logan Circle near the center of Philadelphia. This \$40 million project with two silver mirror-glass and aluminum towers will have an underground parking area for 450 to 650 cars and, on ground

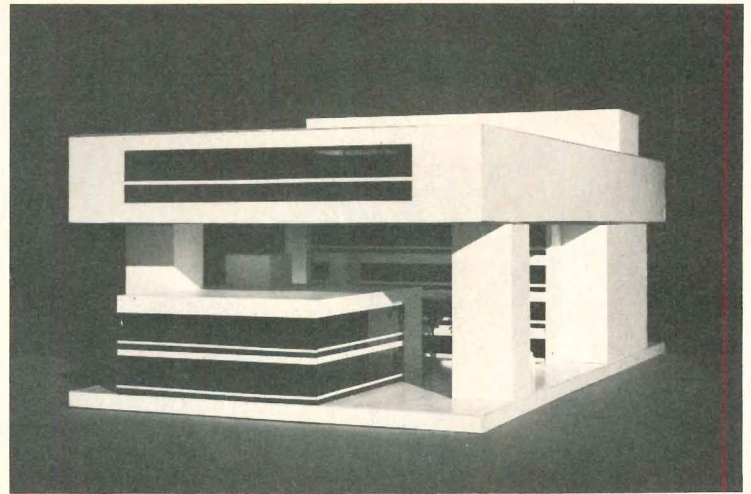
level, an enclosed shopping arcade, ballroom, restaurant and cocktail lounge. Apartments of 900 to 1900 square feet and up to 3 bedrooms will start at \$39,000. Completion is scheduled for late 1973. Johnson said of his design, "I wanted to give the arrangement of the buildings a cup or bowl-like effect—a sort of open welcoming shape."



The Ancient Play Garden for Central Park, sponsored by The Estée and Joseph Lauder Foundation, Inc., is designed by Richard Dattner to give children insight into

ancient cultures, more awareness of nature, and graduated challenges. It includes a pyramid, sundial, river, nature trail, amphitheater and treehouses.

Thom Abel

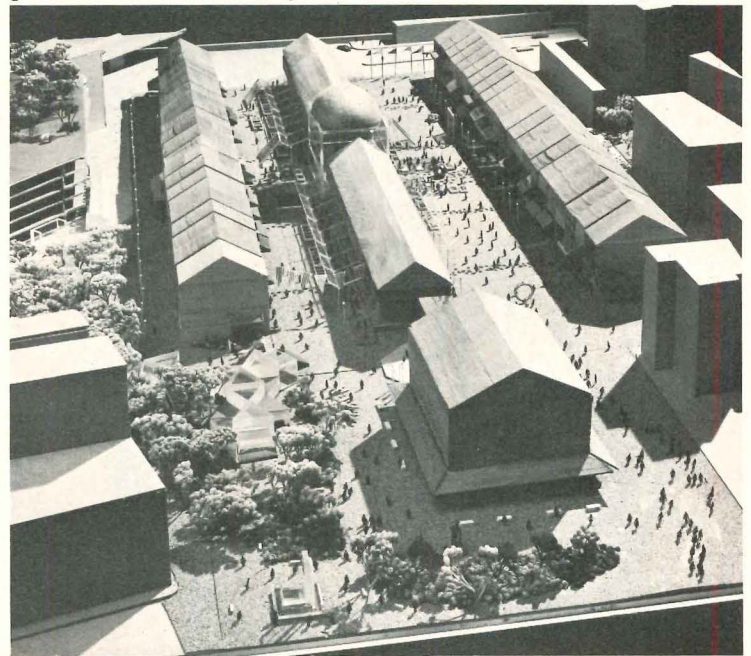


The Library, Administration and Student Faculty Building for the new Medical College of Ohio at Toledo, by Don M. Hisaka and Associates, will be the focal point of the campus. The Student-Faculty

lounge and cafeteria are in a semi-detached pavilion beside a ravine. Administrative areas are on the first two levels of the main wing with the library above. The fifth floor, loft-like space roofs the portico.

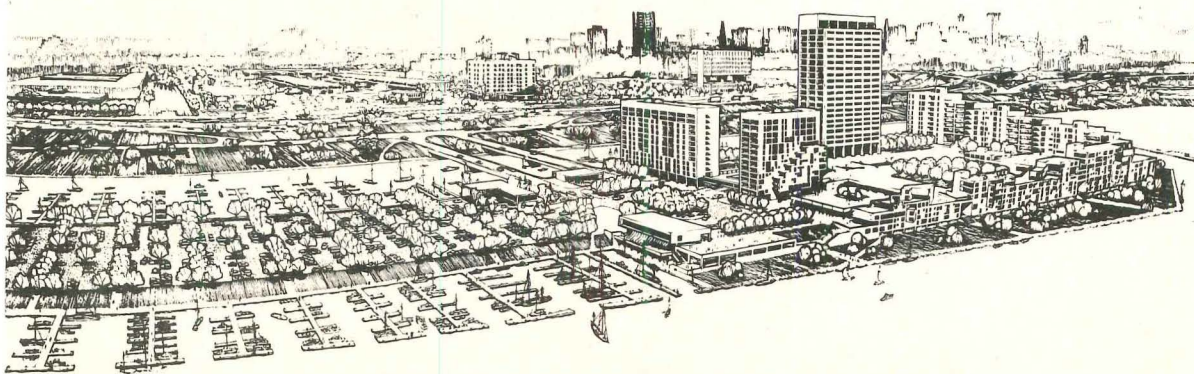
Faneuil Hall Market area, Boston, will be developed by Van Arkle & Moss, Inc. and R. M. Bradley & Co. Benjamin Thompson's design based on a sense of the festivity of markets, proceeds from a feasibility study by F. A. Stahl and Associates and Architectural Heritage, Inc. In Thompson's plan the streets are for pedestrians, parades and fairs, ground floors for zoned shops with

selected offices above. An indoor street in the central, Greek revival building will have food shops interspersed with a variety of restaurants. Exterior canopies will create arcades (to be enclosed and heated in winter) for vendors and cafes. The other buildings will have a variety of shops. Thompson will encourage lively, rich sign, display and street furniture design.



Robert D. Harvey

Long Wharf Harborside, a plan for a 61-acre island to be constructed 300 feet into New Haven harbor—within five minutes from downtown—needs a developer. The city will turn over the land, now six feet under water, at virtually no cost. Envisioned for the over \$50 million project to be completed within the decade are: a 750-slip pollution-controlled marina; up to 1000 apartments and 300,000 square feet of offices; motel; restaurants, shops, services, a public park and parking for each.





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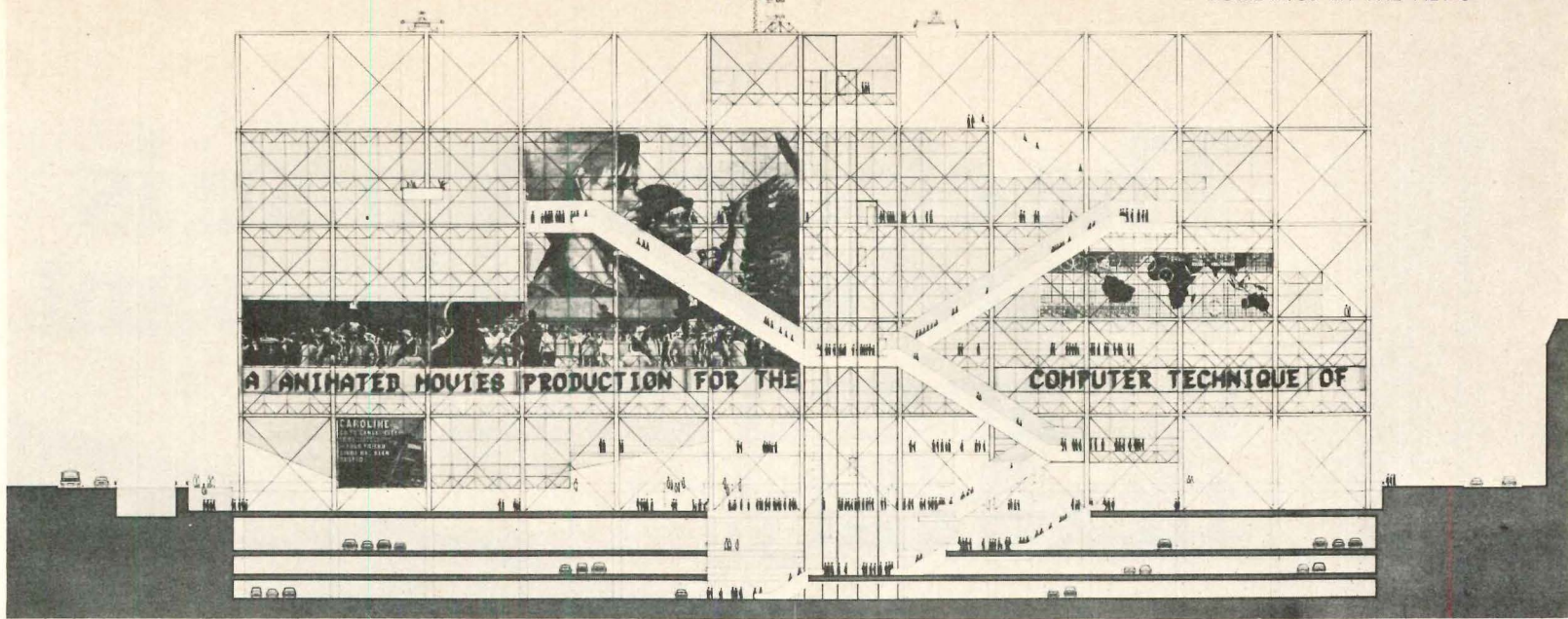
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WINNERS OF PARIS ARTS CENTER COMPETITION

Piano + Rogers, an Italian-English architectural team, and Ove Arup & Partners, Engineers, of England, are winners of the international competition for design of Beaubourg Center for contemporary arts and information. Their scheme features extraordinary flexibility (movable floors, elevators and walls).

The architects say, "This center of constantly changing information is a cross between an information-oriented, computerized Times Square and the British Museum." It is a large box composed of solid, translucent and transparent panels clipped onto the 3-dimensional structural grill on the outside of the building. These panels will indicate major department entrances and display current information and games by television, projection, computer, etc. The street facade will have displays legible to moving traffic while those on the square will relate to more static viewers.

Fire escapes, elevators and escalators can be clipped onto the structural grill wherever intensity of use indicates. Cranes on the roof will maintain and move these clip-

on elements which leave the interior floor space uninterrupted.

The building is on piloti which allows seeing under it to houses (which might become part of the center) on Rue Saint Martin, which Piano + Rogers hope to close off to expand the square. Like the square, the roof is open with the restaurant suspended over it.

The structure consists of columns fabricated on site from steel tubes (filled with treated water for fire and corrosion protection) of constant external diameter but varying wall thickness. These and associated cross members are permanent, providing the basic stability. The floors of concrete planks and their supporting beams are movable by virtue of a special friction collar.

This is believed to be the first international competition held in France. Of 681 entries 190 were French, 138 American. The jury (below), itself international, was advised by a group of technicians. The winners received about \$45,000 and the commission. The runners up (below) received about \$2,000.

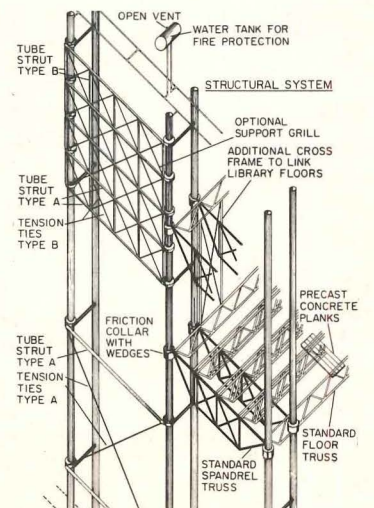
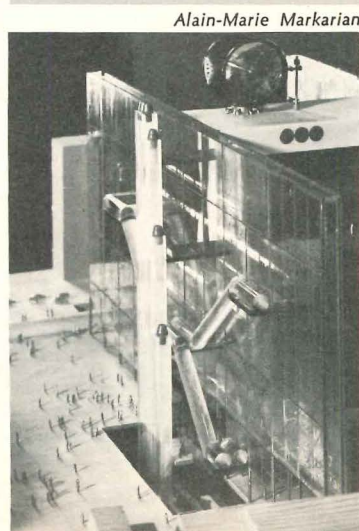
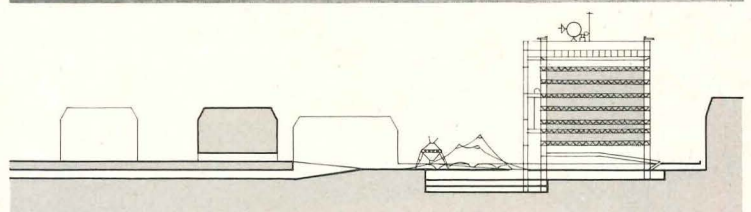
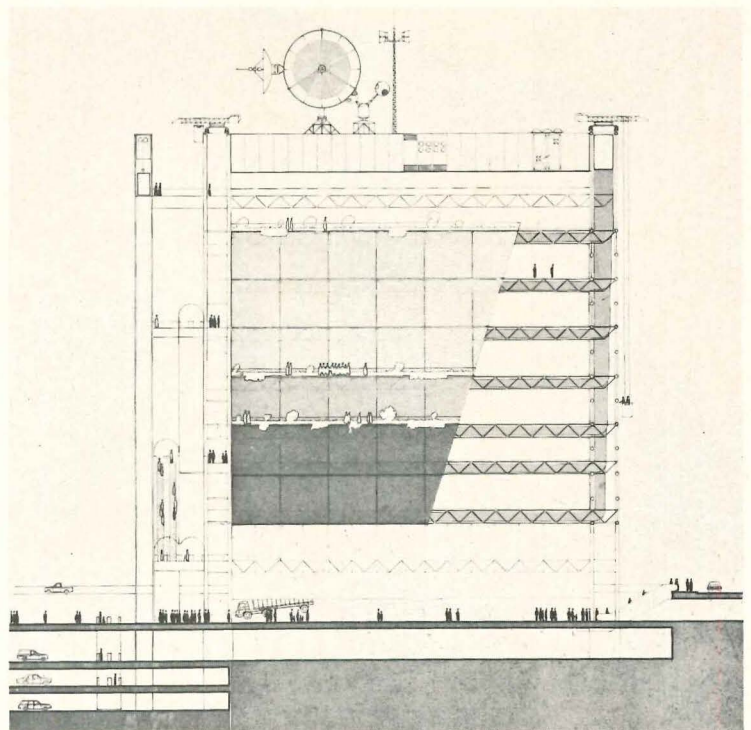
The 30 Premiated Runners-up

AUSTRALIA: K. Maher, C. Stewart, C. Burton, R. Apperuy—Kensington. BELGIUM: Baudon, Dupuis, Emery, Gilet, Hayot, Van Vaethen, Tetard—Brussels. BRAZIL: Paulo A. Mendez Da Rocha—Sao Paulo. CANADA: J.E. Searle, E.R. Wilbee, D.C. Rowland—Don Mills, Ontario; Moshe Safdie with Heather Willson Cass Hoffmeister, Lawrence, Deborah Lee, Clinton Sheerr, James Strickland, Robert Yudell—Montreal; Erickson, Massey with Rein Raimet, Andrea Roost—Vancouver. DENMARK: Tarquini Martensson, Mikael Tarp Jensen—Copenhagen. FRANCE: Dehertogh—Paris; Ducharme, Grosjean, Laras, Le Bouar, Minost, 'Olafs, Poinot, Robert, Simon—Paris; Morand—Paris; Seris, Lefebvre, Anne and Eric Delpech de Frayssinet—Paris; Ernesto Zepeda—92 Chatillon. GERMANY: Schiedhelm with Myra Berker, Warhaftig—Berlin. GREAT BRITAIN: Dennis Crompton, Nora Kohen, Will Alsop, Juluis Tabacek—London; Robert Stones, Wolfgang Pearlman—Manchester. HOLLAND: Prof. J.L.C. Choisy, Ouendag, Martens—Delft. JAPAN: Kisho N. Kurokawa—Tokyo. RUSSIA: Platonov with Karpov, Korbut, Korneeva, Panfil, Repin, Yakovenko, Levenchtein—Moscow. SPAIN: Andres Perea Ortega—Madrid. TURKEY: Ahmet Gulgonen, Kemal

Aran, Selahattin Onur, Metin Demiray. UNITED STATES: Macdonald Becket—Los Angeles; Arthur S. Takeuchi, Alexander Corazzo—Chicago; Paul Chu Lin, Bartley Guthrie, Willem Tazelaar, Stanley Boles—Franklin, Mich.; James E. Stageberg, Thomas H. Hodne—Minneapolis; Jorge Ambrosoni with Tadeusz Berezowski, David Soffer, Macario Aquirre—New York City; Lien C. Chen, John K. Copelin, William M.S. Lee, Louis R. Pounders—New York City; Andrew and Maria Zdzienicki—New York City; John Gabriel Richard—Eugene, Ore.; Giovanni Cosco, Nathaniel East, Galbreath, Richard Huffman, Russell Weeks and wives—Philadelphia (given special mention); John M. Thornley, Raimund, J. Abraham, Friedrich St. Florian, J. Harris, W. Snyder, A. Wexler—Providence, R.I.

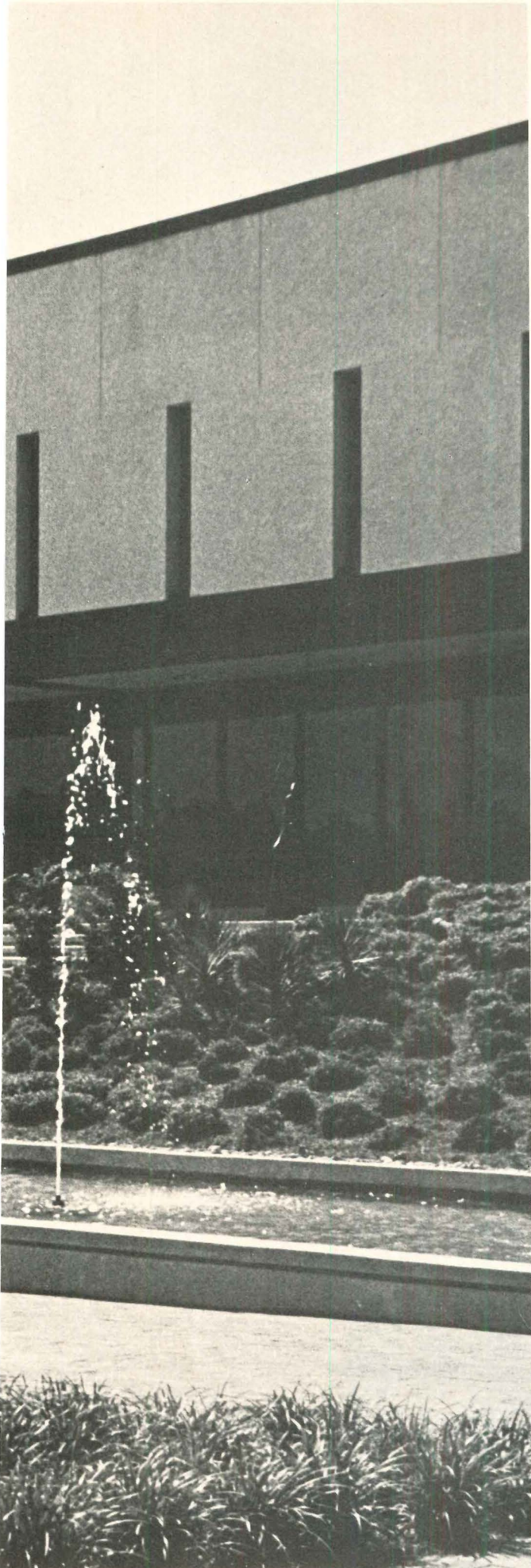
Jury

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for architects who want
unlimited design
flexibility.**





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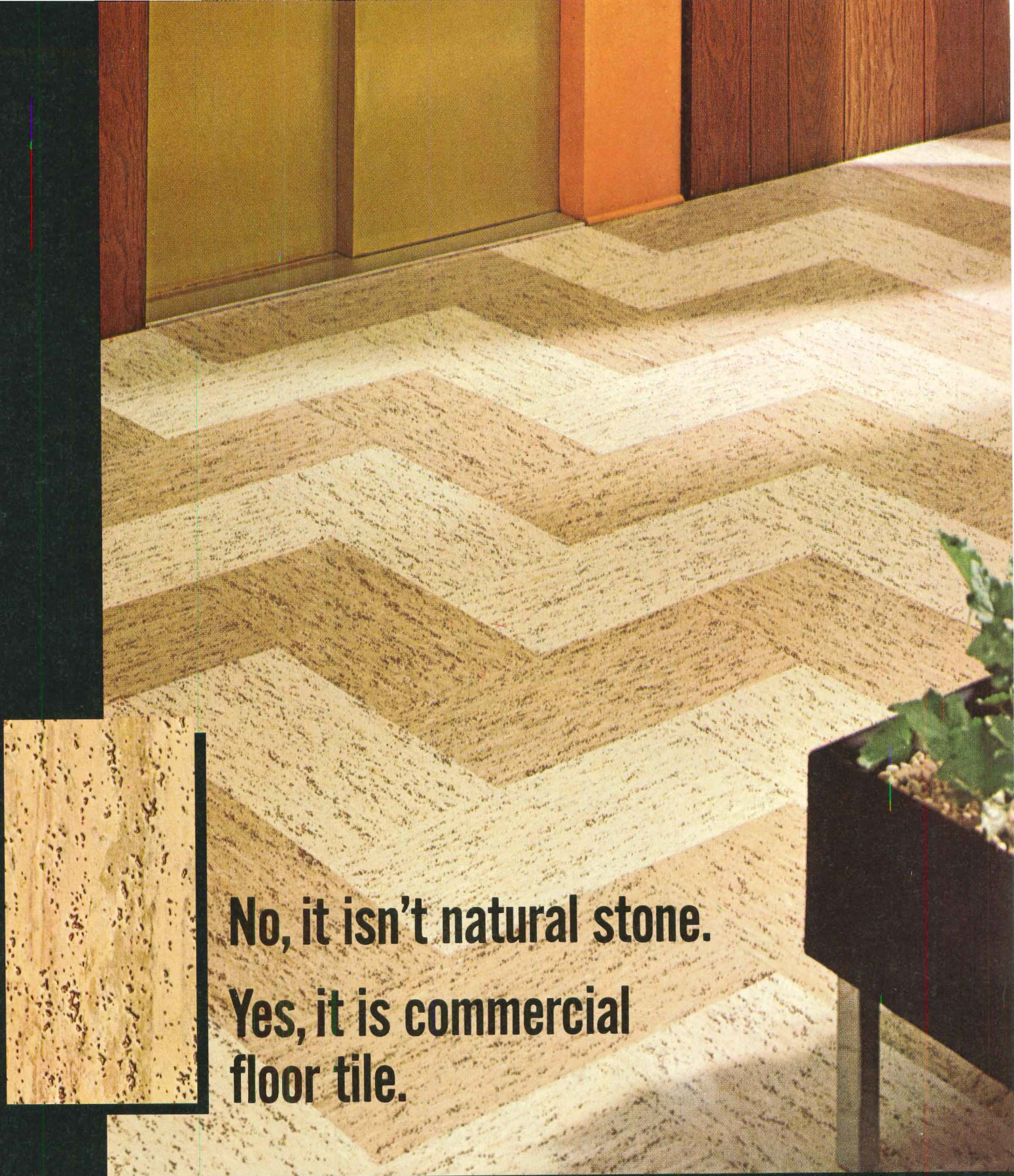
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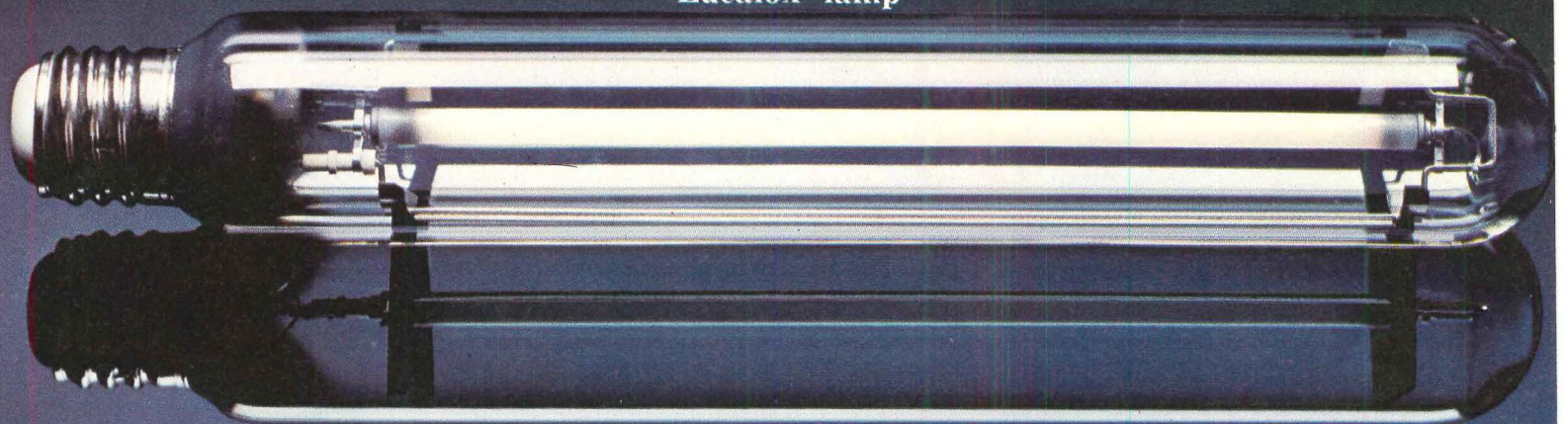


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Owner: Phipps Land Co.
Architect: Toombs, Amisano & Wells
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The lighting efficiency of the Lucalox lamp becomes even more impressive when you consider that it's double the efficiency of the average mercury lamp (which is around 60 lumens per watt). That's a pretty good reason to think about updating your present mercury or other type of lighting system.

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Often, to increase your lighting levels, no change in existing wiring or electrical distribution systems is required when Lucalox lamps and fixtures replace your existing lighting units.

Lucalox lighting has many applications: street lighting, parking lots, industrial lighting, highways and others. Anywhere you want to increase your lighting levels and conserve electricity.

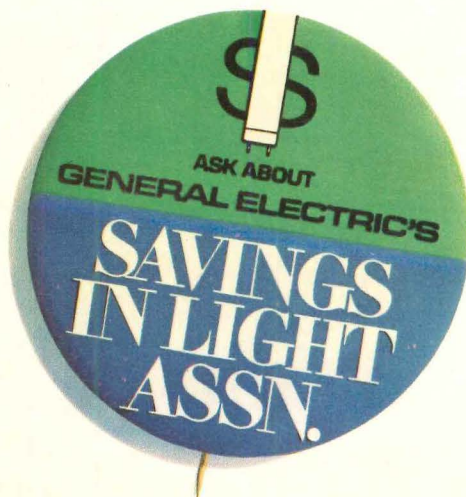
(And nobody knows for sure how much improved lighting may save by reducing accidents and crime, or by increasing productivity in factories, etc.)

Lucalox lamps are available in three sizes: 250 watts for smaller areas, the popular 400-watt size and a 1000-watt lamp for high mounting areas.

You can't beat Lucalox lamps for efficiency and savings in your total cost of light. And since most of the cost of light is in maintenance, power, etc., the way Lucalox lamps perform can mean major savings in your total lighting costs. And, as is usual in lighting, the cost of the lamps is relatively unimportant.

So take advantage of Lucalox lamps. Call your General Electric lamp representative. Or write: General Electric, Dept. C-110, Nela Park, Cleveland, Ohio 44112.

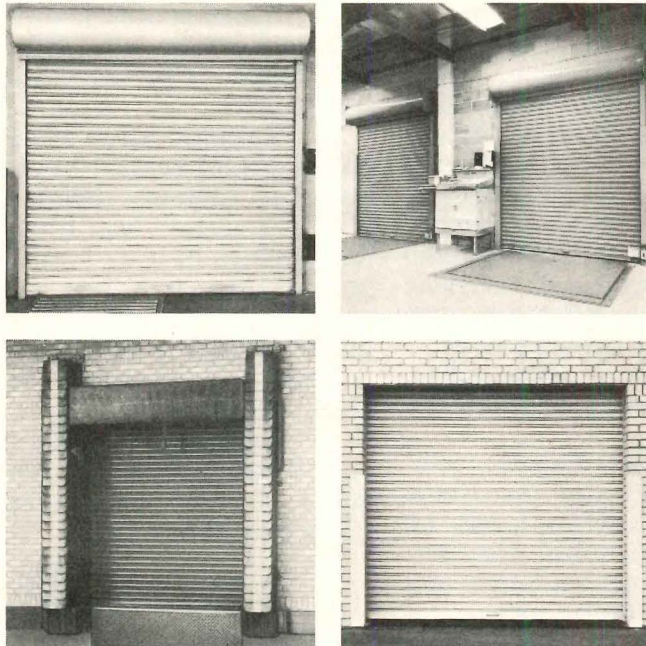
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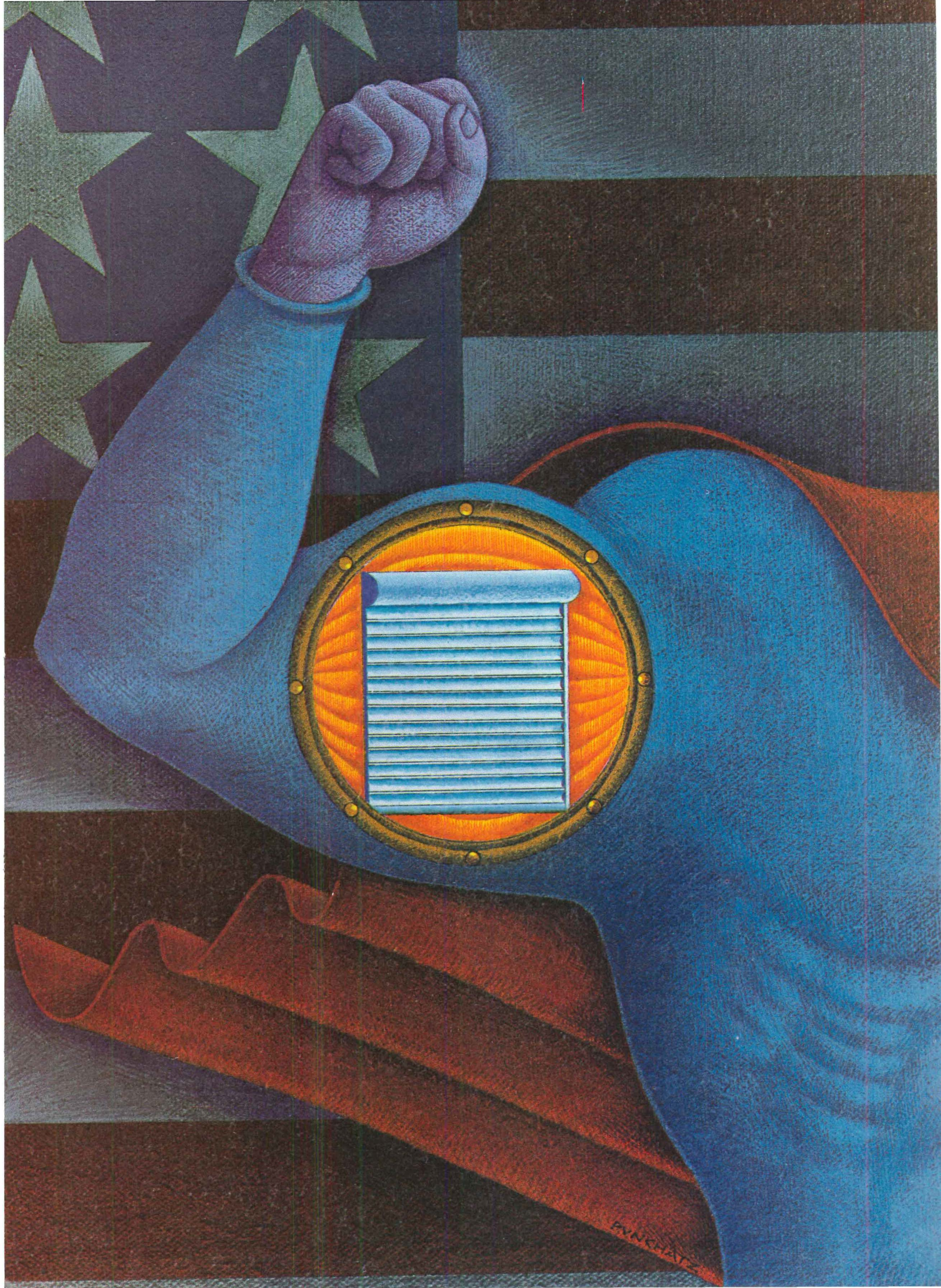


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That's what our Rolling Metal Doors are. They're versatile. Durable. Long-lasting. In short, Super. □ Rolling Metal Doors and Grilles are part of the vast array of doors and related equipment offered by our nationwide network of factory-trained distributors. When you specify any Overhead Door product, you do so with the utmost assurance that it will be delivered to your jobsite on time. □ Special Engineering and Design Service. . . new product development. . . full one-year warranty on all products. . . consistently top-drawer quality — these characteristics reflect our basic business outlook at Overhead Door. We market the greatest variety of door designs, functions, and materials from one source in America. And we've been doing it for 50 years. □ Specify Overhead Door products. You can live with them. Because they're Super.





New Plexiglas[®] 70 acrylic plastic. So strong even Harmon "Killer" Killebrew can't break it.

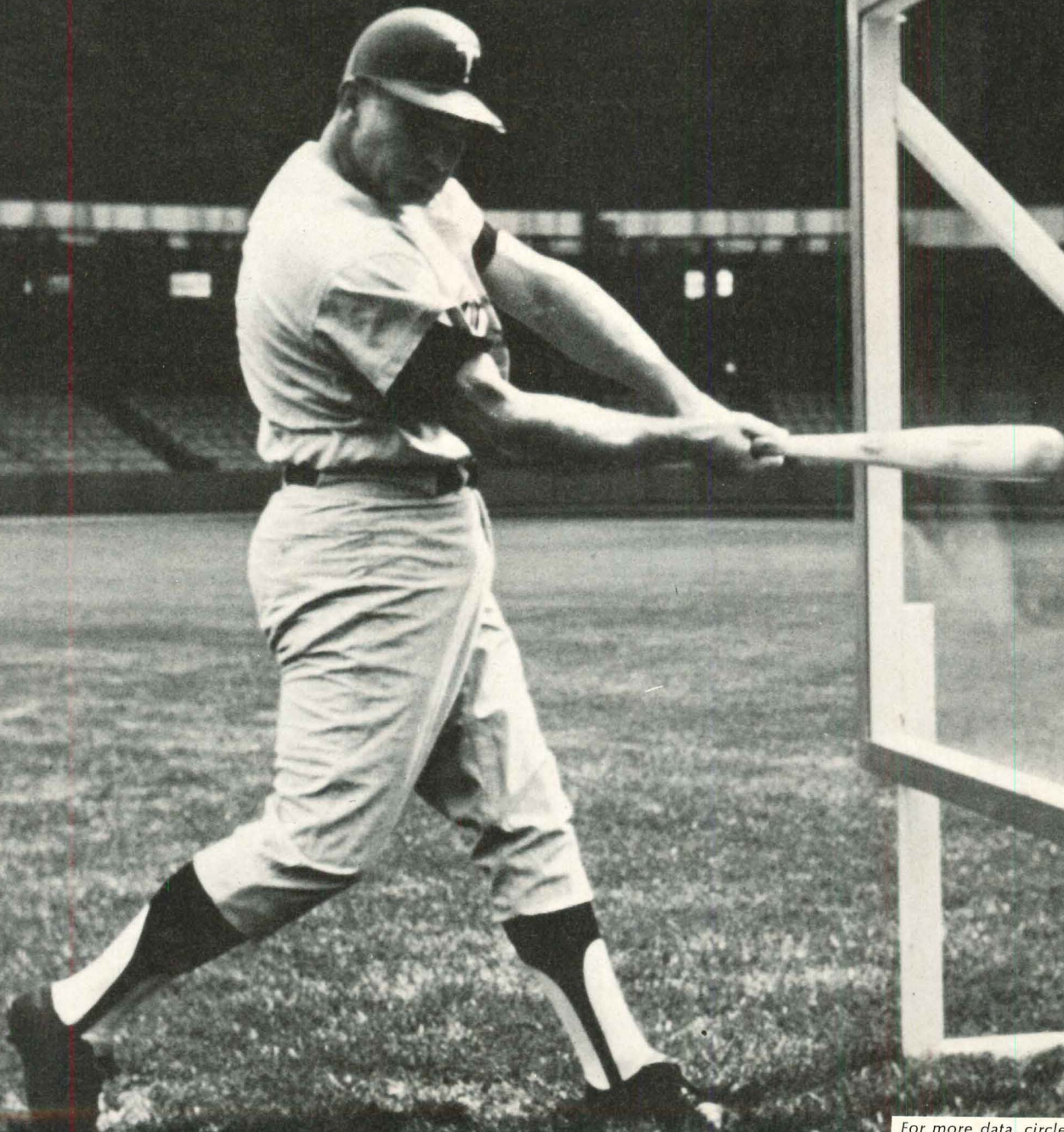
Plexiglas 70 is a recent addition to the Rohm and Haas full line of acrylic sheet which features Plexiglas G, the all-purpose acrylic sheet. Plexiglas 70 is the toughest acrylic sheet on the market. It has withstood test after test of exposure to severe vandalism attacks. Even when Minnesota Twins slugger Harmon Killebrew took 100 swings at a $\frac{3}{16}$ " piece of Plexiglas 70, he couldn't break it.

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Now Rohm and Haas, the leader

in the field of acrylics, is providing a much tougher acrylic glazing material. It's Plexiglas 70. Write to us for descriptive literature.

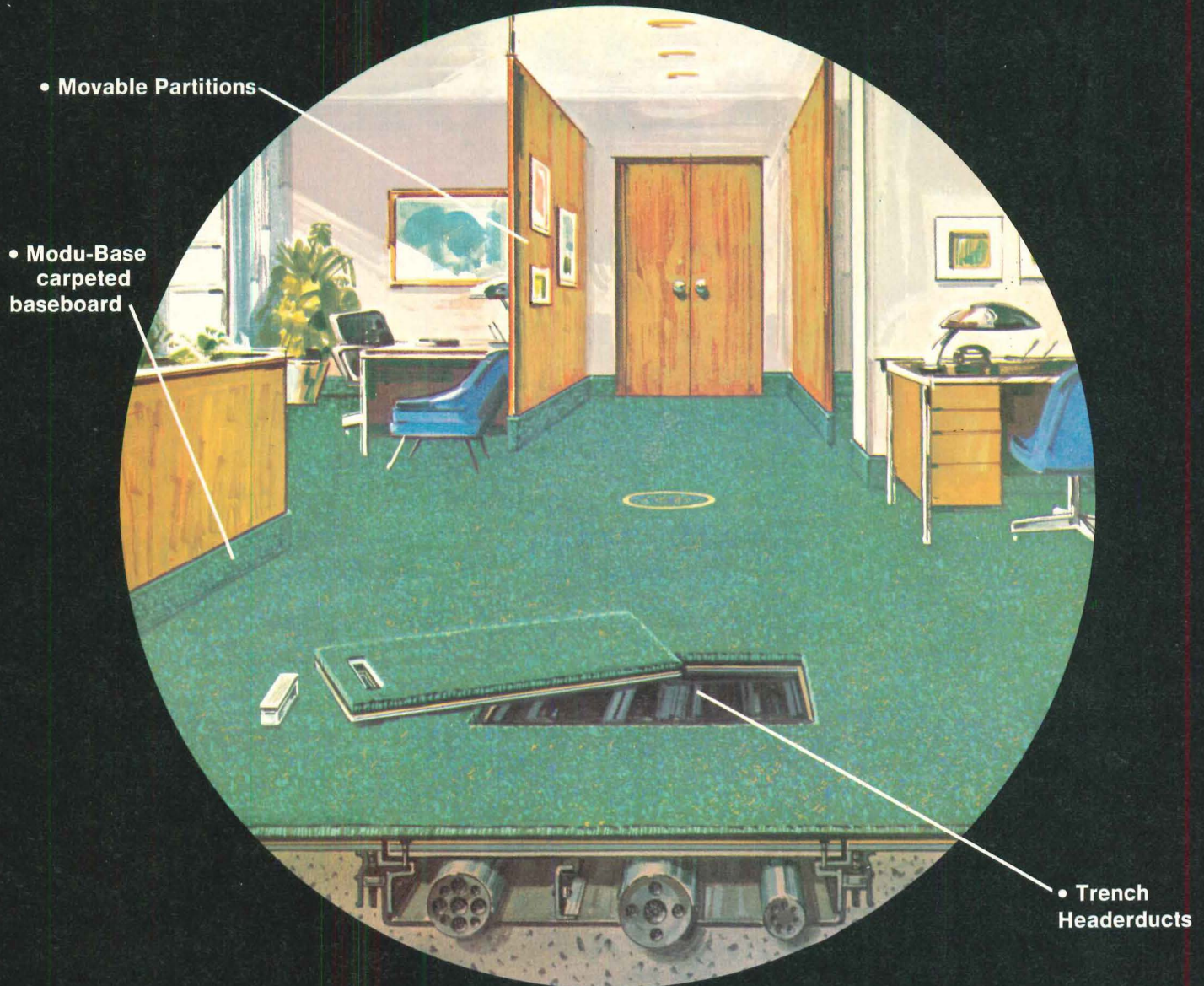
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CCC has this very complex problem down to a precise system—the unique Acrylic 73 Carpet System. We analyze every element involved—right from the blueprints. Recommendations are based on design, function and maintenance factors.

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Please send me a copy of the booklet, "Office Carpet Systems, with Acrylic 73". Please have a CCC consultant contact me.

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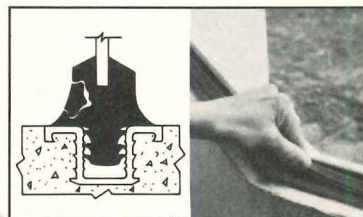
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Redundantly reliable.

That's how builder/owner We're Associates describe their new office community in Huntington, Long Island. Reliability is one of the reasons that architect William A. Schroeder, R.A., specified glazing gaskets of Du Pont Neoprene.

Neoprene gaskets have proven reliability. They are neat for better appearance. Resilient to hold their grip and keep a tight seal. Dependable because, properly compounded, Neoprene has proven resistance to sun, weather, heat, cold, ozone, chemicals and wear. And, they're fire-resistant because Neoprene won't propagate flame.

The "STANLOCK" Neoprene gaskets,



manufactured by the Standard Products Company, Port Clinton, Ohio, are of a special spline type design for precast

concrete. Coupled with a patented reglet, this gasketing system provides a dependable seal for either single or double glazed windows.

Du Pont makes Neoprene synthetic rubber, not gaskets.

For information on other architectural uses of Neoprene, write Du Pont Co., Room 22064, Wilmington, DE 19898.

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An elevator breakdown in a hospital could be a lot more than an inconvenience. That's why the specialists at Otis are helping many hospitals make sure their emergency cases aren't elevator breakdowns.

Otis has been behind almost every major advance and development in elevator technology. We specialize in custom-built hospital elevator and dumbwaiter systems. We also have a pre-engineered standard model

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And, as the world's largest elevator service organization, we offer a complete program of manufacturer's "preventive maintenance" with Extended Coverage, for hospital elevator and dumbwaiter systems... Otis Maintenance includes continual checks to avoid emergency shut-

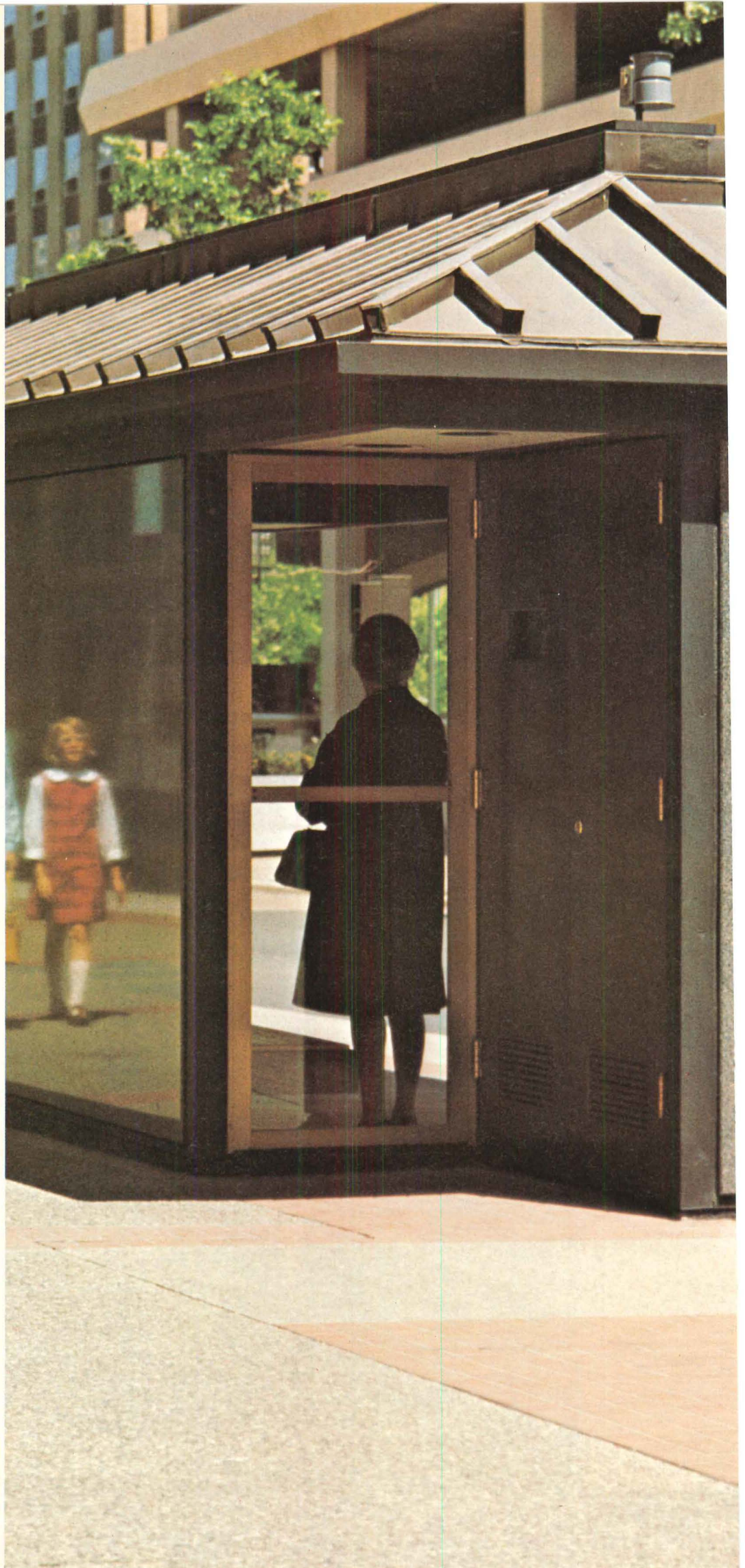
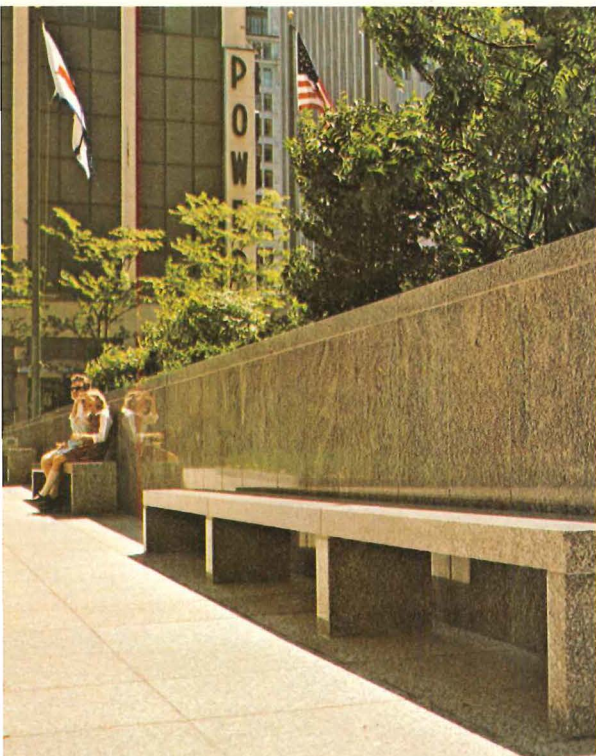
downs as well as annual safety tests and special full load, full speed test procedures to assure safe operation.

Hospitals can't settle for less than leadership quality in their equipment. So it's no wonder they place their trust in Otis Elevator Company, the world leader in elevator manufacturing and service.

Otis[®]
HAS A SYSTEM

**Otis specializes in moving
heartbeats, labor pains, fractures,
laundry, visitors
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If granite is so expensive, why didn't someone tell the Minneapolis Downtown Council?

The decision to make ample use of granite along the Nicollet Mall in Minneapolis wasn't exactly a snap judgment based on vague notions about cost: it was made after careful consideration of the facts about granite.

And when you consider the facts, it's easy to see why granite paving and street furniture have become significant parts of today's cityscape as malls and plazas gain in popularity. The natural beauty of polished granite resists weather, stains and all types of traffic

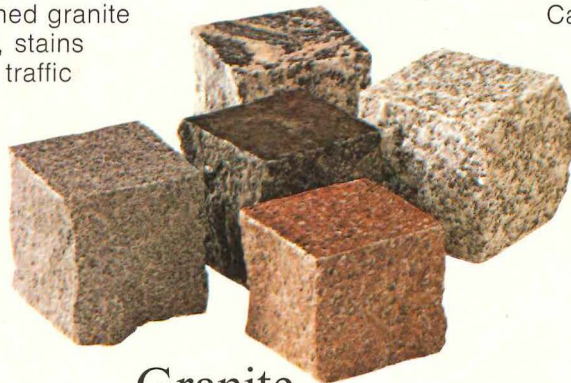
as no other building material can. It won't fade or deteriorate, and it requires virtually no maintenance. Comes in a wide spectrum of colors, too.

How expensive is granite? Talk to our Customer Service Department about that. Tell them what you want to do and they'll tell you how it can be done. Step by step. And likely as not you'll find that granite fits your plans well on a cost-in-place basis. Refer to Sweet's

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He'll safely satisfy a new building's power distribution needs, and keep pace with needs as they change. Many factors contribute to the ready

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And remember: when he installs electrical systems, he *guarantees* electrical systems . . . for one full year. A qualified electrical contractor takes a lot of pride in his work. And you can count on it.

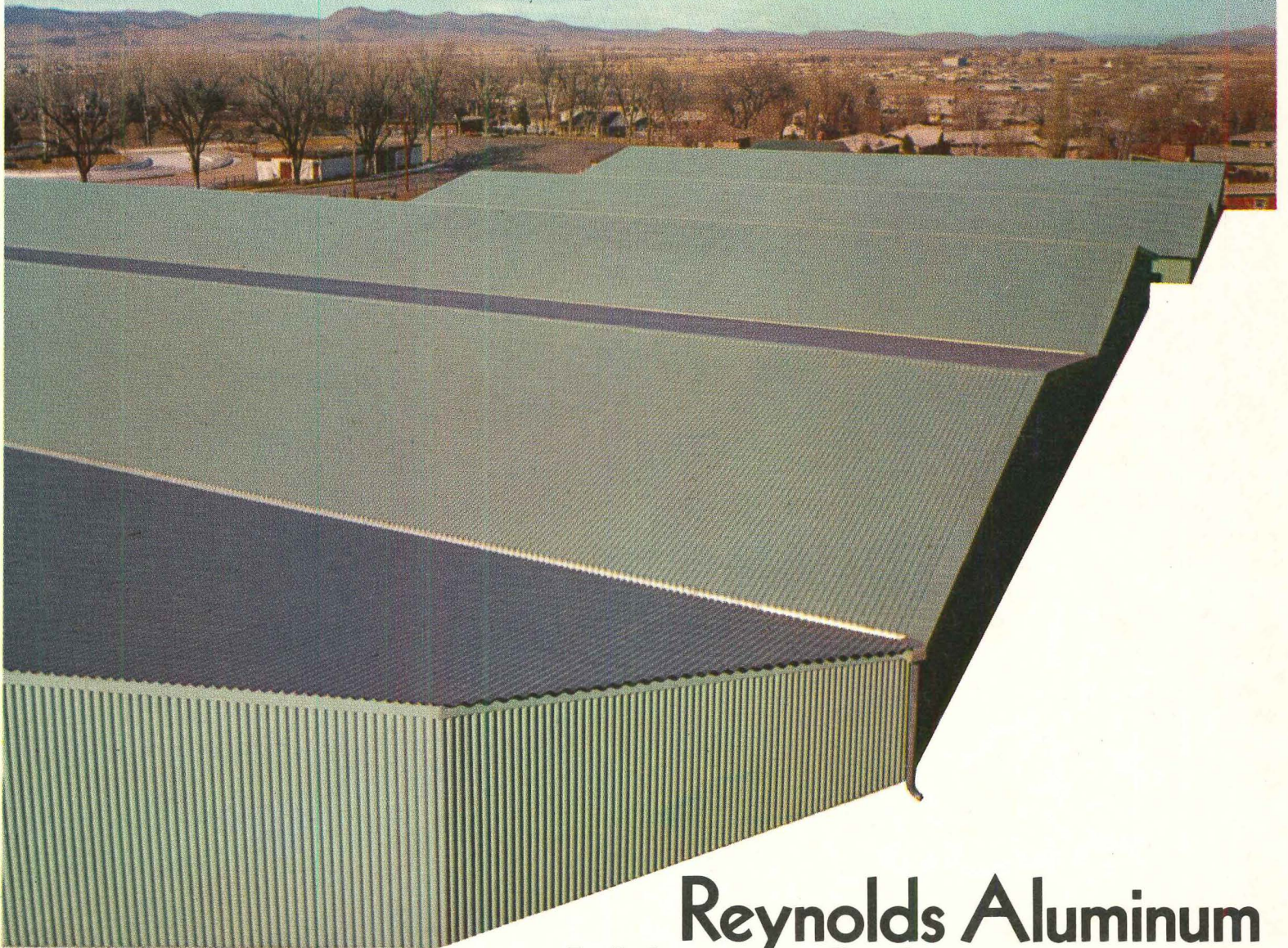
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If you've never thought of aluminum as a material to protect a water supply, the city engineers of Longmont, Colorado, can tell you about it.

They've built a water reservoir cover of 130,000 sq. ft. of Reynolds Aluminum commercial V-beam roofing and siding to help keep the city's water supply clean and fresh.

Longmont's old wood structure was rotting. Dirt, debris, and algae were threatening the purity of the water supply. After evaluating wood, galvanized, and other materials, the engineers decided the answer was a new reservoir canopy of strong lightweight, corrosion-resistant Reynolds Aluminum. This was no small decision, as the structure uses enough material to cover nearly 3 acres, a substantial investment for any community.

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The light weight and strength of the panels made construction faster and simpler.

Reynolds Aluminum Building Products—including roofing, siding and accessories—are available for a broad range of commercial and industrial structures. For the Reynolds catalog or details, contact your local Reynolds office, or see Sweets Architectural File No. 7.3/REY, Industrial Construction File No. 7.3/REY, or send in the coupon.



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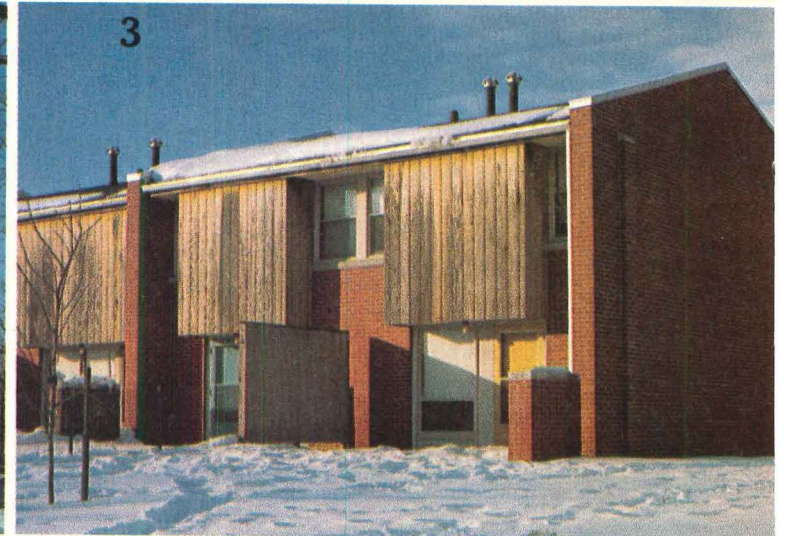
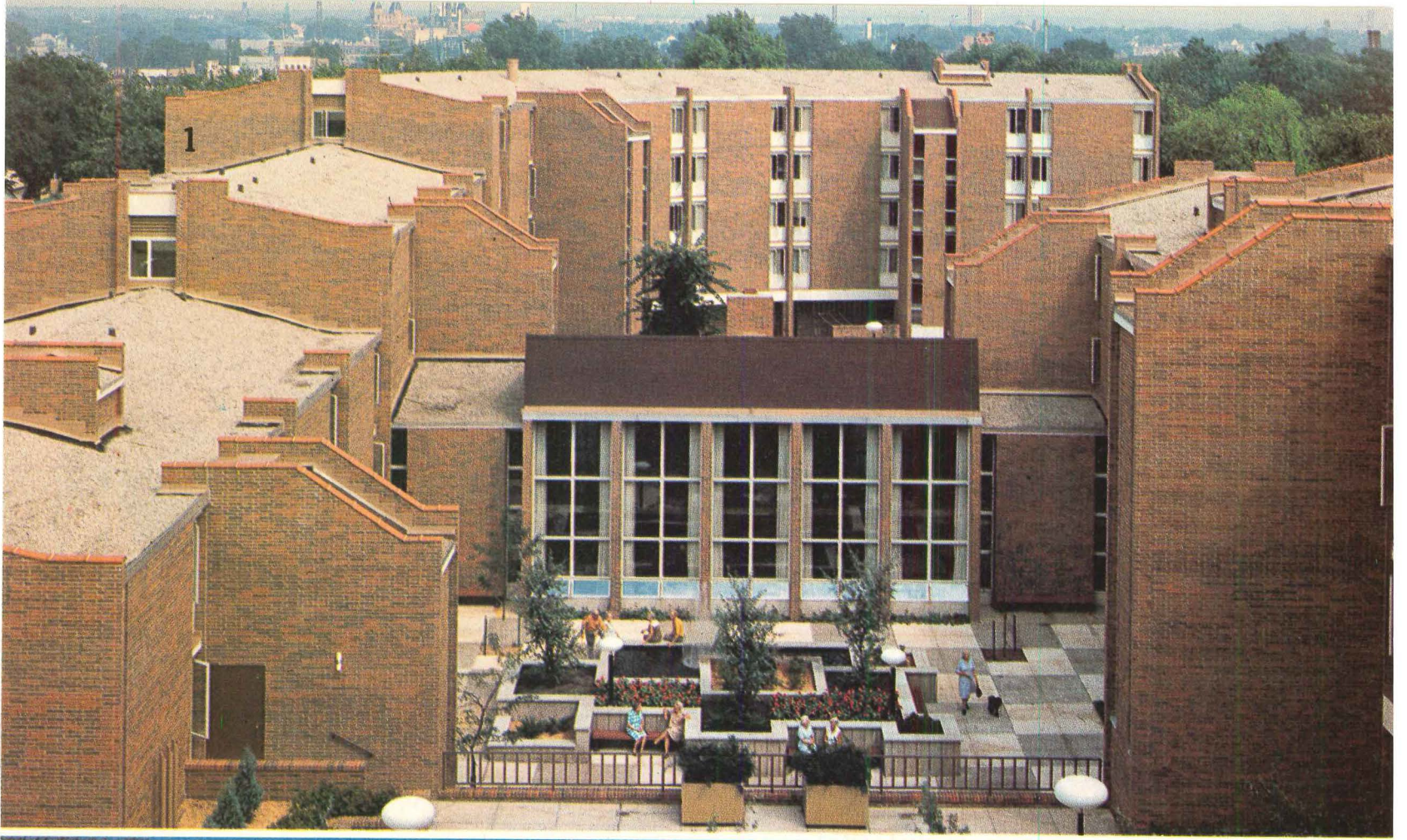
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Fuel costs are lower. Andersen Windows are made with a solid core of wood—one of nature's best insulators. Our weathertight construction and welded insulating glass (optional) complete the tight design against heat, cold, dust and drafts.

Andersen Windows will cost less over the long run, and their beauty lasts as long as the building. That's why it pays to specify the best.

1. Minneapolis Housing for the Elderly

The architects wanted to make this large, 290-unit housing project into a real "home" for the residents. So Bettenburg, Townsend, Stolte and Comb, Inc. created a living community with friendly courtyard and recreation areas.

Adding warmth and pleasantness to the surroundings are Perma-Shield Fixed and Casement Windows equipped with welded insulating glass which seals out cold Minnesota winters and keeps residents snug and warm.

2. Columbia Court Public Housing

Precast concrete "shadow panels" give this 90-unit complex in Muskegon Heights, Michigan its distinctive look.

The architects, Haughey, Black & Associates, designed special recesses into the panels where Perma-Shield Casement windows fit snugly.

The white vinyl sheathing on the outside blends well with the smooth-surfaced concrete. These windows can be opened straight out, allowing elderly residents to clean both surfaces from the inside—another cost-cutting benefit of Andersen Windows.

3. Family Housing Project

Hackner, Schroeder, Roslansky & Associates received an award from the Wisconsin Chapter of the A.I.A. for this series of townhouse groups in La Crosse, Wisconsin.

They were cited for the use of materials which added dignity and distinction to these low-cost dwellings. Among the materials used were Andersen Beauty-Line™ and Narroline™ Windows.

Beauty-Line windows combine a fixed upper sash with a ventilating, awning-style lower sash. They can be used singly or in groups, making them as versatile as they are attractive.

4. Award-winning Low-Rent Apartments

Located in Herman, Minnesota, this group of one-story 4-plexes received an award from the Minnesota Chapter of the A.I.A. for being the best representative example of the theme of "Involvement."

The architects, R. F. Ackermann and Associates, carried the residential character of the neighborhood into these apartments with a warm and simple design.

Adding to this feeling are graceful gliding doors by Andersen. They open onto comfortable, private decks. Andersen Beauty-Line Windows provide picture window beauty at a practical price.

For more information on Andersen Windows and Gliding Doors, check your Sweet's file or contact your nearest dealer or distributor.

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Window beauty is Andersen. Andersen Corp., Bayport, Minnesota 55003

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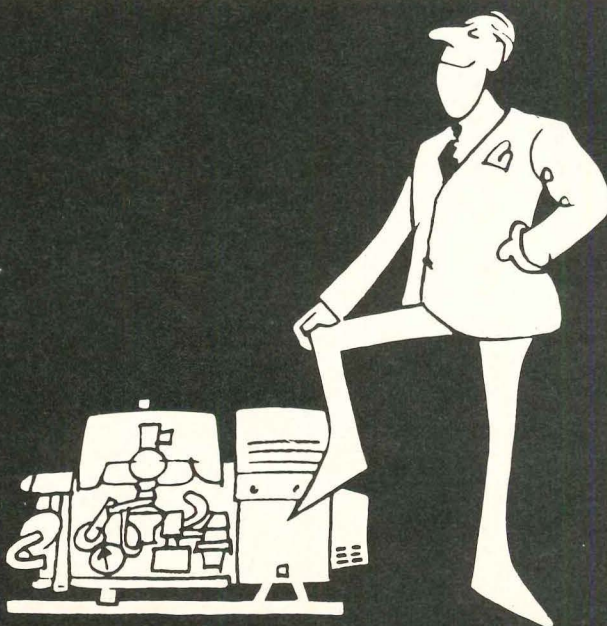
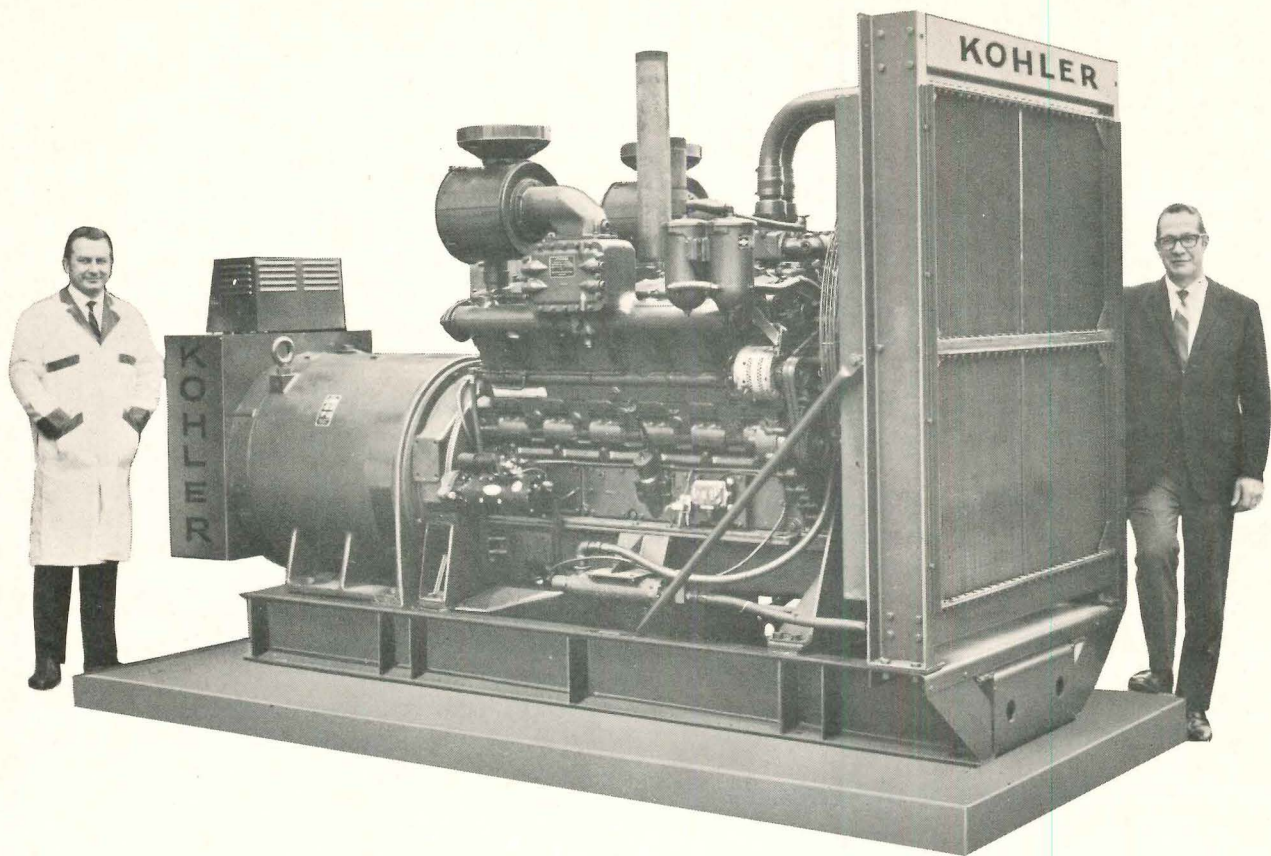
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For big jobs, choose a brushless 500,000 watt set. Or find your problem solver from 63 other models with more than 300 significant adaptations. Gas, gasoline or diesel fueled. With a full line of accessories, including automatic takeover and special exhaust silencers (so important in hospitals and nursing homes).

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Budget control of the phased construction project

Following is an extract from a chapter on construction project anatomy in the book, "Professional Construction Management and Project Administration," now on the press for joint publication by ARCHITECTURAL RECORD and the American Institute of Architects. This extract is based on conversations with Philip J. Meathe, Jr., president of Smith, Hinchman and Grylls, and Harry A. Golemon, senior partner of Golemon and Rolfe.

The ability to save time by phased design and construction commits the client to early purchase and construction starts of certain systems well before the bids are in on later systems. If he is committed to a fixed maximum budget—as he usually is—he may well ask what recourse or assurances he has if at, say, the half-way point in construction he finds the bids are coming in substantially over estimates, and he cannot fund the overrun. At least under conventional methods he can abandon the project—or re-design it—before construction starts, and he knows what his completed costs are going to be. That is, he has bid prices.

The answer resides in two important qualities of the construction management of phased construction, as described by Philip J. Meathe, Jr., president of Smith, Hinchman and Grylls. First is the early and continuously refined accuracy of what has been called the "conceptual" estimating process (as opposed to "take-off" estimating). The client's, architect's, engineer's and construction manager's own cost data, contractors' and manufacturers' price information and other resources of the industry make it possible to set reasonable "high-and-low" limits on probable systems costs at the end of the schematic design phase. Second, the isolation of those costs system by system makes it possible to spread design flexibility throughout components of the entire project rather than forcing a massive paring job on quality after all bidding documents are completed and bids have come in over the budget.

So, the control point for the client's "go" or "no go" decision on the project shifts from the over-all post-bid point to the end of the schematic phase. It is based on a summation of "high" estimates for some 30 or 40 itemized systems and subsystems. It further makes the assumption that subsequent cost developments, includ-

ing the individually bid prices on systems, will average out well within the over-all "high" limit plus a conventional contingency reserve.

If bids on any one system come in substantially higher than the "high" limit on that system—and thereby threaten the average—the owner, project administrator, architect, engineer and construction manager agree on one of three options (or a combination of all three):

- a) re-design the system,
- b) spread the overrun among probable margins left within other systems so far uncommitted,
- c) dip into contingency reserves to make up the difference.

At that point, assuming previously bid systems have averaged well within their individual high-low ranges, there is also a cushion of reserve represented by summation of the differences or gaps between accepted bids and estimated "highs" on those systems. That gap is not listed among the three options above, because it exists mainly as an indicator of safety or freedom from re-design; and at any given point in the multiple bidding procedure, the gap may be either positive or negative within some acceptable margin dictated by judgment, experience and job conditions.

An example of how the method works is tabulated below in simplified terms of five systems. Note that, since the method depends on management control of averages, the system estimates are in terms of costs per square foot of the whole project.

System	Estimate		Lowest Bid	Gap	Cumulative Gap	Cumulative per of Job
	Low	High				
A	1.00	1.25	1.05	-.20		5
B	1.50	1.75	1.50	-.25	-.45	12
C	2.00	2.50	2.60	+.10	-.35	20
D	3.25	4.00	3.80	-.20	-.55	38
E	2.25	2.75	4.00	+1.25	+.70	50
	10.00	12.25	12.95			

The plus or minus tabulation of the gap is, of course, a convention to express the cumulative gap as positive for overrun and negative for under-the-wire. The substantial difference between the ten-cent overrun in system C and the \$1.25 overrun in system E calls for the application of different options and criteria in each case. The overrun of system E is big enough to "threaten the average" and calls for serious evaluation and direct action as described for alternatives a, b and c above.

There are three important points in-

involved here: 1) If the construction manager, acting as professional agent, has induced the client to make a financial commitment on the basis of estimates at the schematic phase, then he must do better than "explain" aberrations. He is now equipped with knowledge that enables him to make responsible correction of the overrun. 2) His own contract should spell out the limits of his liability in this area. 3) When the cumulative gap is still under the wire, he must do better than congratulate himself. He must advise the owner (or project administrator) of the implications of that under-run in terms of project finance. A few cents per square foot on a million square feet can mean a substantial sum in any money market, and the owner is entitled to take advantage of the earliest possible knowledge of any reduction.

One of the important adjuncts to these considerations is the inevitably increasing role of the owner (project administrator) in the whole building process. He becomes more intimately involved, not only in matters of budget and finance, but also in the design as it unfolds, system by system. He is enabled to see the design consequences of his decisions in time for those decisions to have a balanced over-all effect on the quality of his project. In fact, this method will not work well at all unless the owner does maintain continuous participation in what has been called a "united team action program," UTAP.

Two simplistic questions may arise: 1) What do the new methods do to client-architect relationships? 2) How does the modest-sized architectural firm fit into the new pattern? The answers are, again: 1) There are no "new" client-architect relationships—unless more intimate involvement of the client in his own building can be called such. 2) There are no criteria of firm size involved. There are only the criteria of awareness of the problem and professional respect for the complexity of consultation services. They may be enlisted (but not entirely performed) by one man—theoretically. But in a real world, one can set criteria for at least three men involved in evaluation of any management services commissioned in this field. They are: 1) a designer, 2) a field expert, and 3) a manager. Without at least acknowledgment of the need for the expertise of those roles, the small office is not equipped to enter into this arena.

Pursuit of the guaranteed max

A variation of the system-by-system, design-and-bid approach previously outlined is described by Harry A. Golemon, senior partner of Golemon and Rolfe Architects, Houston, as serving both to condense the over-all project time and to permit a firmly bid cost commitment for the whole project prior to the beginning of construction. The method again involves overlapping, but with the difference that AE processes and construction processes are inter-phased on both sides of a single bidding interval that is moved up much earlier into the design development phase. It still takes advantage of the logic of systems sequence. The procedure is to prepare sets of a modified kind of bidding document comprising complete specifications system by system but only partially detailed drawings equivalent to preliminary drawings plus certain key details. These so-called "drawn bid documents" contain only sufficient detail to begin the bidding process. Hence, the method calls for a schedule of pre-bid conferences among designers and interested contractors so that the points that are important for the contractors to consider can be carried forward from the preliminaries into the "drawn bid document" phase.

All systems then are bid at one time, either by a single general contractor or any variation of the multiple contract process. The method permits the overall design process to remain open so that any necessary adjustments of design to meet the budget can be applied freely to all systems in the project. The owner then has an assured (if not guaranteed) maximum cost bid before construction starts.

Many clients are eager for and sometimes insistent upon a guaranteed maximum cost quite early in the design development of their projects. This has worked fairly well in the past for office buildings and industrial structures where systems are relatively simple and cost histories are

readily available. When the idea of the guaranteed maximum is carried into more complex buildings such as hospitals, laboratories and some educational buildings, the advantages of the guarantee as well as the certainty of the amount become illusory. Any guarantee of price calls for an added amount covering the margin of risk, and the amount grows larger with the risk.

There is a double-loading on the guarantee. First, the contingency element must be larger when the information available to the bidder is limited as it is in early design phases and may be in simplified versions of bid documents. Second, the price of the guarantee increases as competition shrinks. For these reasons, the "drawn bid documents" together with the pre-bid conferences must give participating contractors confidence in the conditions of the work, and the process must be held open to all available competition.

Drawn bid documents are not construction documents. The latter (i.e., conventional working drawings) are prepared after the bidding process by filling in the voids of detail not required for the bidding of the systems. The working drawings are prepared sequentially, so that, for example, the construction of foundations can proceed while working drawings for the later phases of the project are being completed.

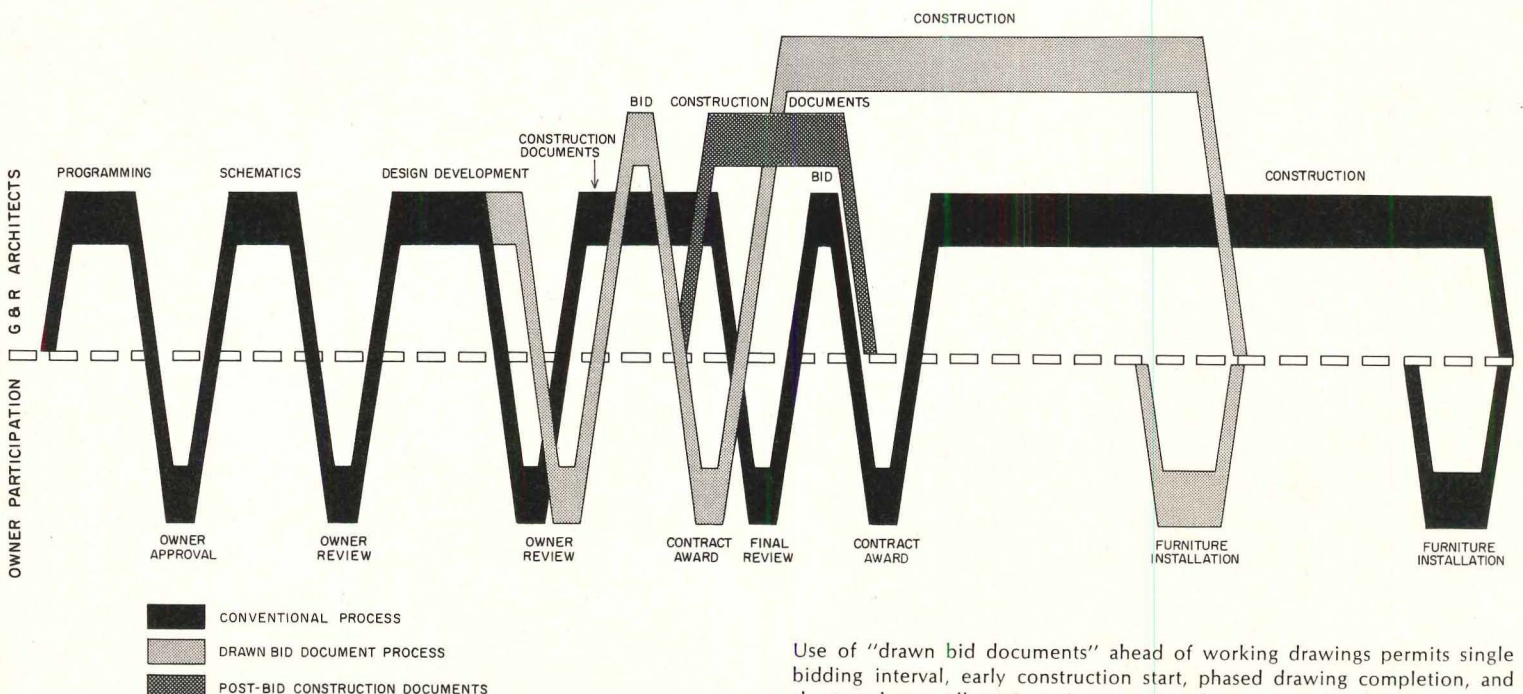
To get maximum benefit from the method in terms of shortened project time span, it is important to develop the bidding documents on certain systems that are first in the construction sequence (foundation and structure, for example) to a more advanced degree, perhaps even to working drawings, so that the contractor can begin his work as soon as possible after acceptance of bids. It turns out that working drawings for those early systems tend to be the simpler ones of the sequence, so the pre-bid design time is not seriously extended by their detail.

There are two conditions of the de-

sign and construction process that must prevail if this method is to operate well. First, contractors must be prepared with both the skills and the willingness to evaluate the condensed form of drawn bidding documents, and they must commit themselves firmly to the price of the bid at that point. At the same time, the architect-engineer must have access to a sophisticated cost control system that enters into the process at the very beginning of project definition, so that he can begin to zero in on final costs as soon as the scope of the project is defined and the general order of spaces and materials is established. If the early cost projections relate to the systems and to a convention of specification classification that is widely understood, this provides a format that translates readily into succeeding phases of the process. It is suggested that the 16 categories of the Construction Specifications Institute might be considered for this format.

By involving the contractor not only in the pre-bid conference but also in the actual preparation of working drawings after bids are in on the "drawn bid documents", many problems in field interpretation are avoided. Mr. Golemon points out further that the conventional working drawing that is prepared as a bidding document sometimes reflects the architect-engineer's notion of how construction is done rather than the contractor's more immediate familiarity with the construction process and his individual modes of operation. A judicious increase in participation by contractors during preparation of both the condensed bidding documents and post-bid working drawings helps to avoid recycling of shop drawings, according to Golemon. Another advantage of the method is the fact that it can be applied by an architectural office of any size to a broad range of project size and to either competitively bid or negotiated contracts.

—William B. Foxhall



Use of "drawn bid documents" ahead of working drawings permits single bidding interval, early construction start, phased drawing completion, and shortened over-all project time compared to conventional sequence.



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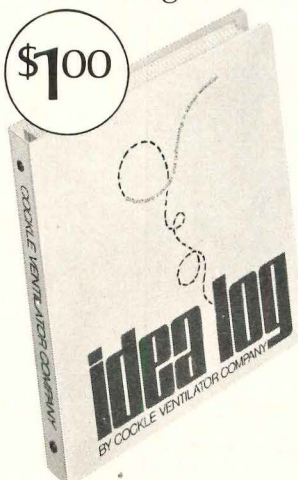
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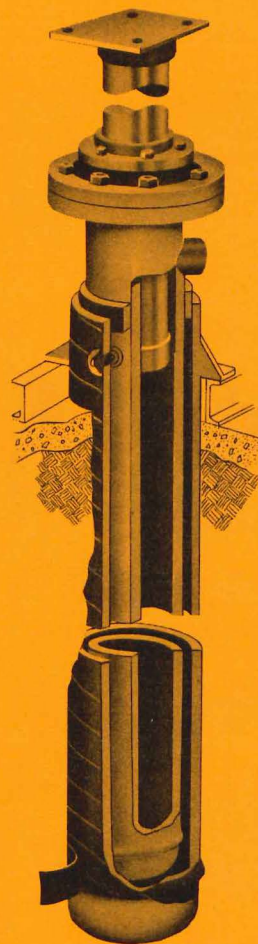
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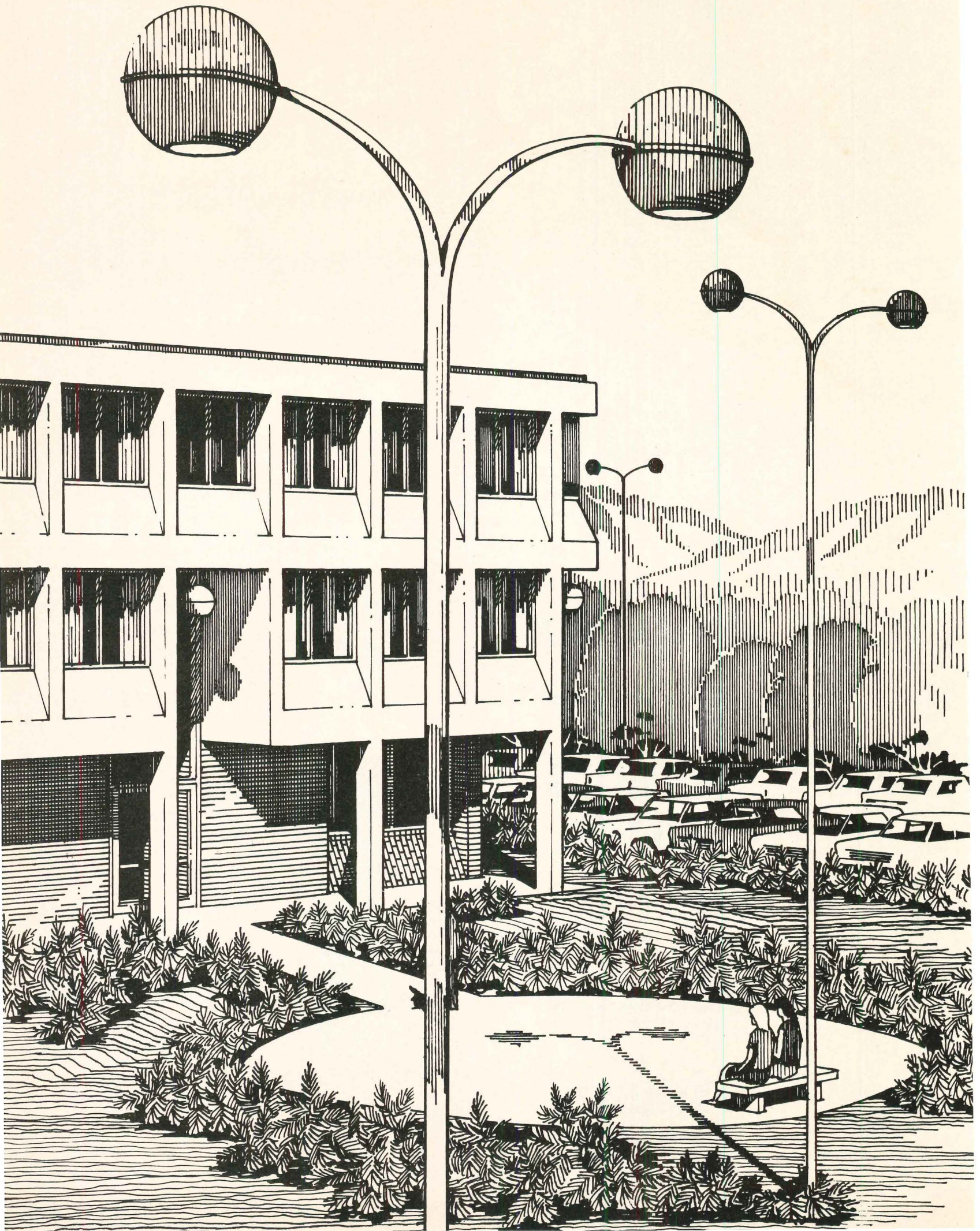
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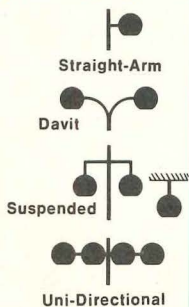
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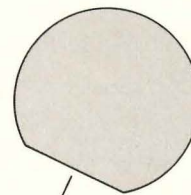
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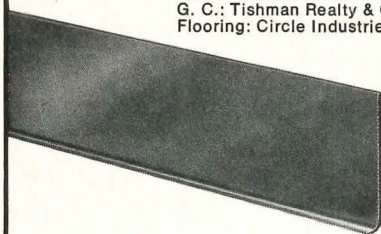
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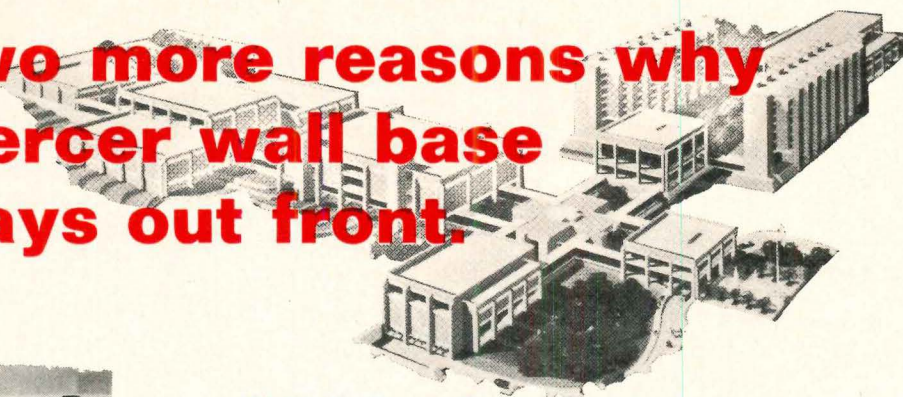
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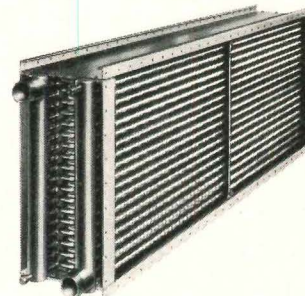
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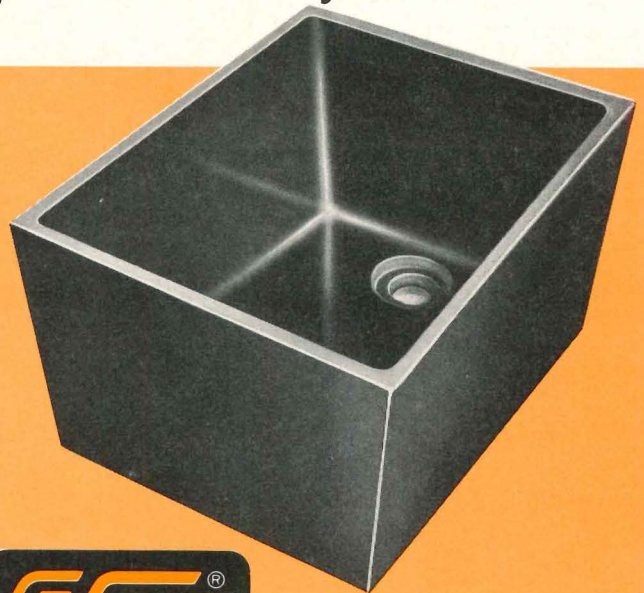
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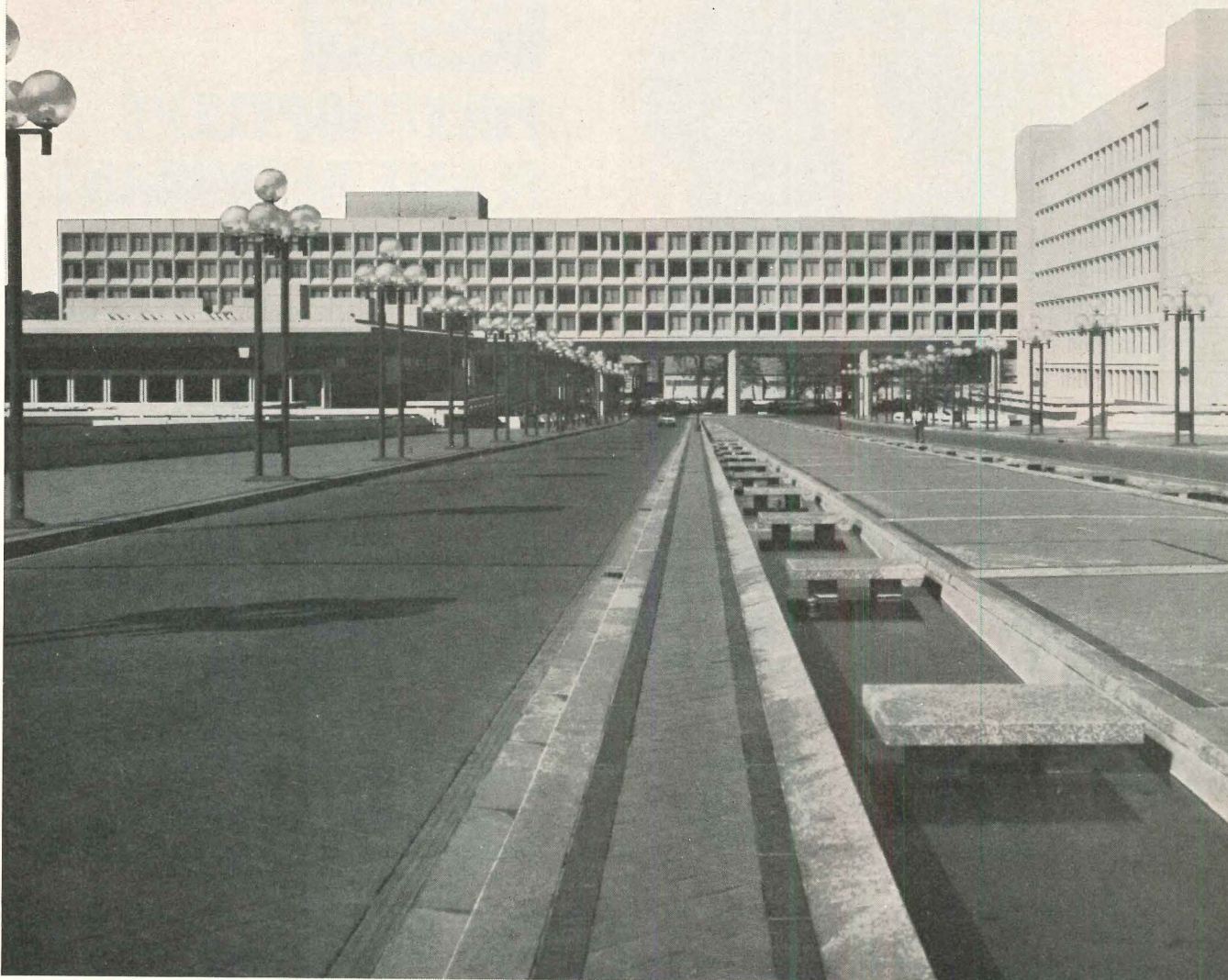
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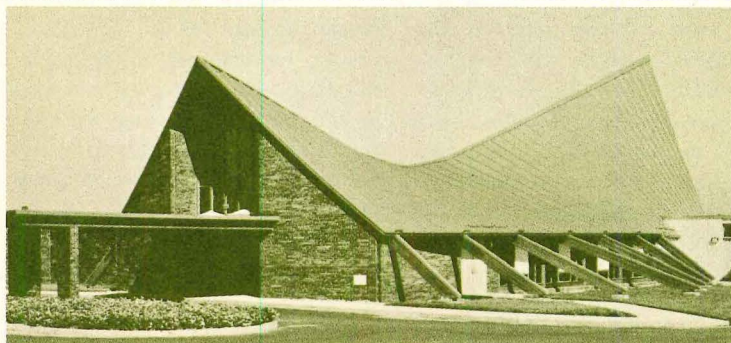
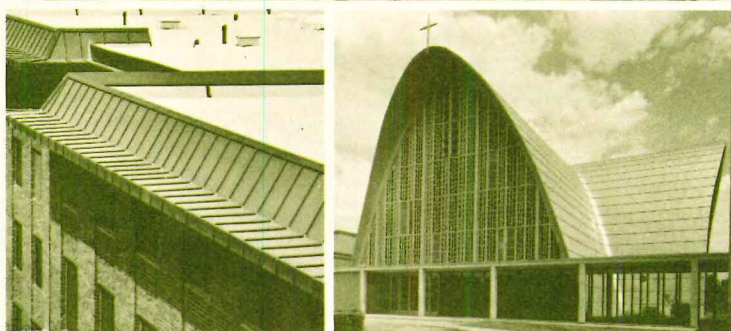
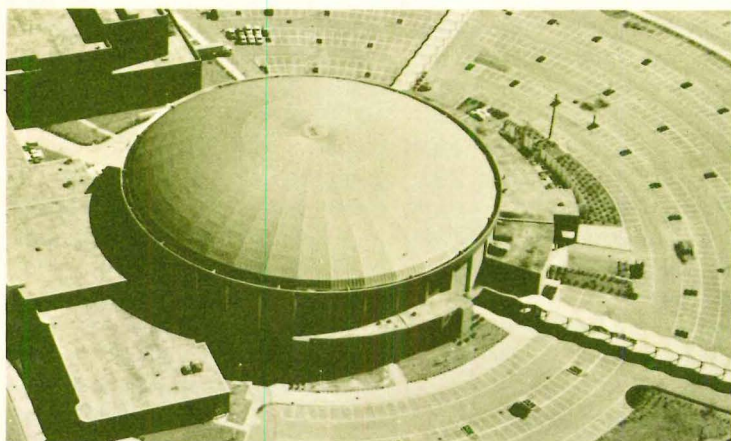
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James E. Carlson
 Manager, Economic Research
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Construction markets: cross-section and perspective

The term "construction project" covers everything from a 50-story office building to a two-bedroom cottage with an expansion attic. Between these two extremes lies a whole spectrum of project types that have little in common except that members of the *construction* trades work on them, they are put together with something called *construction* materials, and someone called a *construction* contractor is generally responsible for seeing to it that they are put together properly.

But, these common factors allow us to look at the industry from another perspective. The usual arrangement of construction data is a functional one that sorts out the value of activity by genus, specie, and sub-specie of project type. A cross-sectional slice of these data will show how much of the total value of the various project types is accounted for by wage payments to labor, how much for materials, and how much for contractors' fees and expenses.

Of the three factors, materials used by the industry account for the largest share in terms of total dollar value. Last year, for instance, the value of construction materials shipped stood at \$55 billion. The Commerce Department breaks this series down into five major product groupings: iron, steel, and fabricated metal products, which account for 35 per cent of the total value of shipments, on the average; stone, clay and glass products, 29 per cent; wood and wood products, 25 per cent; paint and related products, eight per cent; and petroleum and coal, take in three per cent.

Breaking it down a little finer, the four major individual materials types in terms of dollar value shipped are: raw lumber, structural steel, ready-mix concrete, and paint. In any given year, they account for between one-fourth and one-third of the total, depending on the mix construction projects.

Construction labor, 1970: \$36 billion

Employee compensation, the wages and salaries of construction workers, totaled almost \$36 billion last year. The largest proportion of this total, 50 per cent, goes to the employees of special trade contractors—electrical or plumbing and heating specialists, for example—who work as sub-contractors on individual projects. Employees of general contractors claim

about 28 per cent of the total wage bill, while those who work for heavy construction contractors—contractors engaged in heavy engineering work such as highways, bridges, or hydro-electric projects—pick up the remaining 22 per cent in their paychecks. These proportions are remarkably stable over time, indicating that, at this general level, shifts in the over-all "mix" of construction activity have little impact on the kinds of skills required.

This is not necessarily the case when we examine the components a little more closely. The wages and salaries of electricians, for instance, accounted for more than 10 per cent of the total wage figure last year. In 1960, the electricians' portion was closer to eight per cent of the total. Stone masons, on the other hand, accounted for eight per cent of the total in 1960, but only six per cent last year. The gains made by electricians are due entirely to the fact that there are 84,000 more of them now than there were in 1960, while there are 23,000 fewer masons. The gain in average weekly earnings between the two trades over the period is roughly the same—plus 65 per cent.

The proportion of total wages to total materials is another area that has undergone some change over the past decade. Adding the total construction wage bill to the total value of construction materials shipments we find that wages accounted for 35 per cent of this sum in 1960, while last year the wage proportion was closer to 40 per cent. Sharp rises in hourly wage rates in the construction trades in recent years are partly responsible for this shift, but a lot is also due to shifts in the mix of construction. The late sixties, when most of the gain in the wages proportion occurred, were characterized by a relatively low volume of housing activity. Since housing requires both fewer, and less costly workers per equal volume of output than other types of construction, the fact that there was less of it in the construction total over this period affected the data accordingly. The first six months of 1971, a period of very strong housing activity, has seen a reversal of this trend in wages. The wage proportion of the total shifted down to 38 per cent in 1971's first half.

Funds going for contractors' fees and expenses totaled over \$10 billion in 1970,

up significantly from the \$6 billion figure in 1960. The profits portion of this figure stood at \$6 billion last year, down from the \$7 billion record in pre-recession 1969.

The \$101 billion total obtained by adding these three major components together—\$55 billion in construction materials shipments, \$36 billion in construction wages, and \$10 billion in contractors fees and expenses—serves as another measure of the construction industry.

Some figures don't get counted

It is not surprising that this figure does not correspond with the \$91 billion figure reported by the Commerce Department as the total value of construction put-in-place last year, though. A lot of the "do-it-yourself" type construction work done by either private individuals or businesses is not counted in the construction put-in-place series. So, the \$91 billion figure is not *total* total construction, but something short of the full measure. On the other side, the value of construction materials shipped includes the materials used by these "do-it-yourselfers." In addition, the shipments figures include data on materials that are not used in construction at all. The value of these materials cannot be separated out because of the restrictions of the data classification system.

The *overstated* materials figure is mirrored by the construction wages figure, which is probably somewhat *understated*. The wages of short-duration workers, the wages of working family members of small contractors, and the wages of employees of non-construction businesses who perform maintenance and repair and other construction-related work for these businesses usually fail to get picked up in the count. In addition, a logically consistent measure of total construction activity would have to place an imputed value on the time spent by private individuals performing construction-related work around their homes.

On balance, the amount by which the value of materials is overstated appears to be *smaller* than the amount by which the wage portion is understated. By how much? This is a guesstimate, but a figure for *total* total construction in 1970 that ranged 10 to 15 per cent above the \$101 billion we've been discussing would not be unrealistic, it seems.



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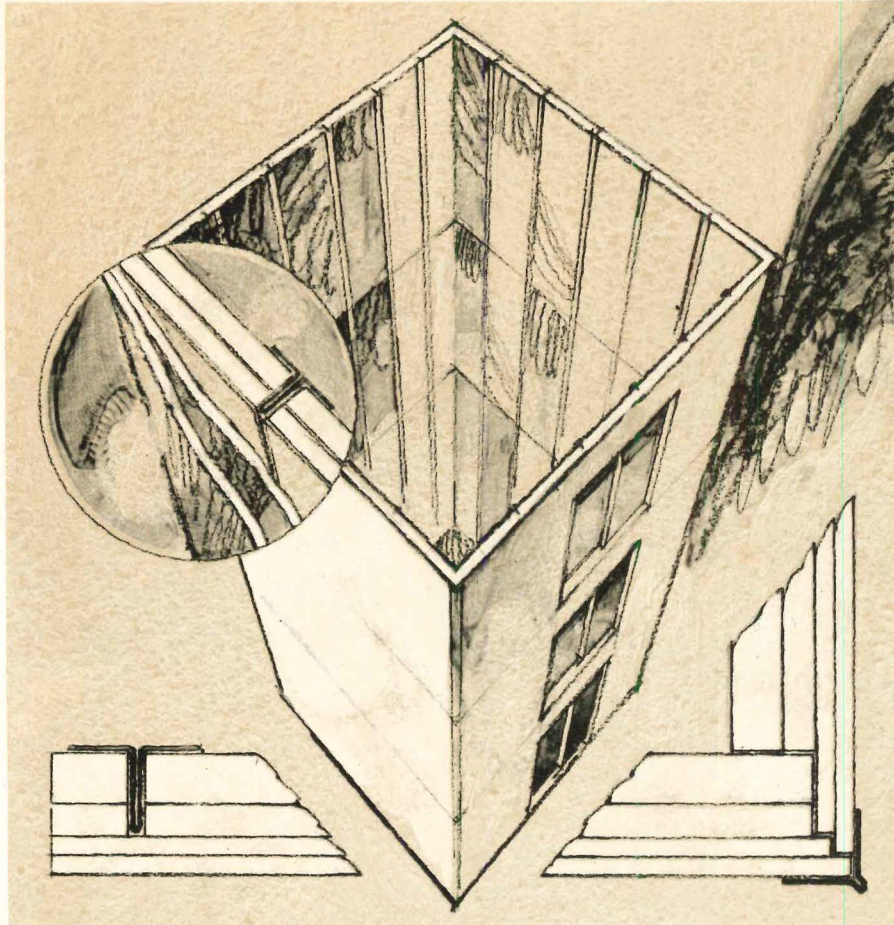
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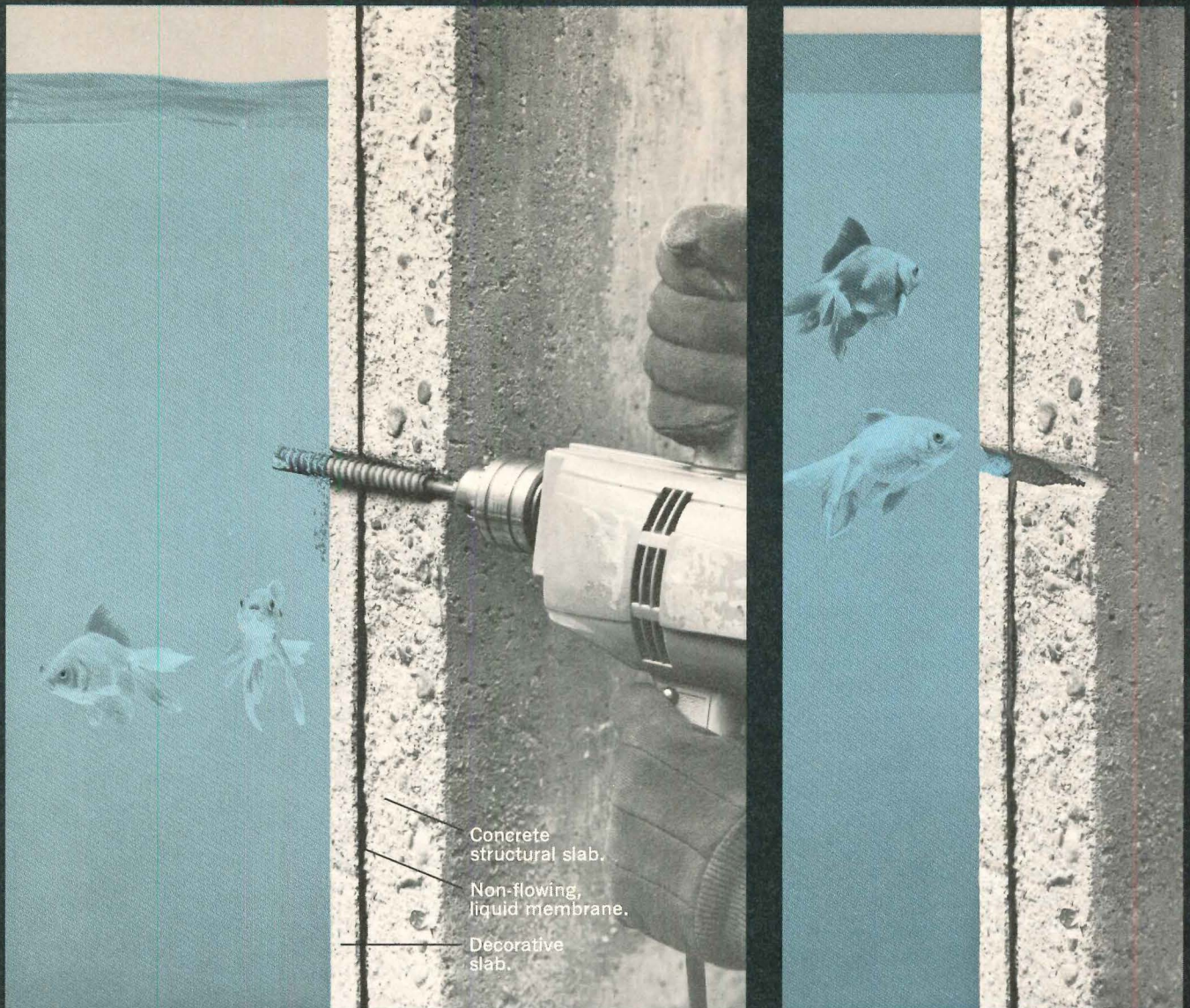


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Building cost indexes

The information presented in the tables indicates trends of building construction costs in 33 leading cities and their suburban areas (within a 25-mile radius). The table to the right presents correct cost indexes for non-residential construction, residential construction, masonry construction and steel construction. Differences in costs between two cities can be compared by dividing the cost differential figure of one city by that of a second city.

The table below presents historical building costs indexes for non-residential construction; future costs can be projected after examining past trends.

All the indexes are based on wage rates for nine skilled trades, together with common labor, and prices of five basic building materials are included in the index for each listed city.

1941 average for each city = 100.00

Metropolitan area	Cost differential	Current Indexes			% change year ago res. & non-res.	
		non-res.	residential	masonry	steel	
OCTOBER 1971						
U.S. Average	8.5	351.6	330.2	344.9	336.7	+ 8.27
Atlanta	7.8	453.0	427.2	441.9	433.3	+ 10.99
Baltimore	7.9	368.5	347.0	361.2	352.7	+ 11.09
Birmingham	7.2	320.8	298.5	312.6	306.8	+ 3.43
Boston	8.7	345.7	325.8	341.9	332.9	+ 12.50
Buffalo	9.2	384.5	361.5	379.2	368.3	+ 7.21
Chicago	8.8	399.1	379.5	386.7	381.1	+ 7.70
Cincinnati	9.0	379.5	357.2	372.2	363.0	+ 11.60
Cleveland	9.8	399.4	375.9	391.3	382.4	+ 8.49
Columbus, Ohio	9.0	379.3	356.2	369.8	363.2	+ 9.27
Dallas	7.7	346.8	335.9	340.2	332.7	+ 9.71
Denver	8.4	383.6	361.0	381.0	368.3	+ 9.50
Detroit	9.5	391.4	372.9	390.9	377.4	+ 8.56
Houston	8.1	342.9	322.1	334.6	328.5	+ 7.96
Indianapolis	8.8	332.5	312.4	324.9	318.3	+ 7.80
Kansas City, Mo.	8.2	336.1	316.7	328.2	320.7	+ 8.87
Los Angeles	8.1	385.0	352.1	373.2	367.4	+ 7.76
Louisville, Ky.	8.1	347.2	326.1	339.2	332.4	+ 8.16
Memphis	7.8	337.1	316.6	328.2	322.7	+ 8.49
Miami	8.6	373.7	356.1	365.4	357.0	+ 8.15
Milwaukee	9.2	406.4	381.7	402.4	389.6	+ 5.98
Minneapolis	8.9	372.4	350.4	365.9	356.2	+ 6.85
Newark	9.0	352.2	330.7	347.6	339.0	+ 10.12
New Orleans	7.9	334.3	315.6	330.1	322.2	+ 7.11
New York	10.0	390.1	362.8	378.1	370.1	+ 7.87
Philadelphia	8.5	362.7	345.6	357.0	348.6	+ 8.05
Phoenix	8.2	197.2	185.3	190.6	187.7	+ 8.67
Pittsburgh	9.1	344.2	323.9	339.2	330.0	+ 6.45
St. Louis	9.2	366.9	346.4	362.0	351.5	+ 7.07
San Antonio	8.0	144.5	135.8	141.5	137.9	+ 8.21
San Diego	8.2	141.7	133.1	138.7	136.1	+ 6.56
San Francisco	9.0	493.7	451.4	488.8	474.9	+ 5.35
Seattle	9.0	358.4	320.9	356.0	341.8	+ 6.37
Washington, D.C.	7.7	331.3	311.1	321.7	316.2	+ 11.02

Cost differentials compare current local costs, not indexes.

Metropolitan area	HISTORICAL BUILDING COST INDEXES—AVERAGE OF ALL BUILDING TYPES, 21 CITIES									1941 average for each city = 100.00						
	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Quarterly)				1971 (Quarterly)			
									1st	2nd	3rd	4th	1st	2nd	3rd	4th
Atlanta	298.2	305.7	313.7	321.5	329.8	335.7	353.1	384.0	399.9	406.2	408.1	422.4	424.0	445.1	447.2	
Baltimore	271.8	275.5	280.6	285.7	280.9	295.8	308.7	322.8	323.7	330.3	332.2	348.8	350.3	360.5	362.5	
Birmingham	250.0	256.3	260.9	265.6	270.7	274.7	284.3	303.4	303.5	308.6	310.2	309.3	310.6	314.6	316.4	
Boston	239.8	244.1	252.1	257.8	262.0	265.7	277.1	295.0	300.5	305.6	307.3	328.6	330.0	338.9	341.0	
Chicago	292.0	301.0	306.6	311.7	320.4	328.4	339.5	356.1	362.2	368.6	370.6	386.1	387.7	391.0	393.2	
Cincinnati	258.8	263.9	269.5	274.0	278.3	288.2	302.6	325.8	332.8	338.4	340.1	348.5	350.0	372.3	374.3	
Cleveland	268.5	275.8	283.0	292.3	300.7	303.7	331.5	358.3	359.7	366.1	368.1	380.1	381.6	391.1	393.5	
Dallas	246.9	253.0	256.4	260.8	266.9	270.4	281.7	308.6	310.4	314.4	316.1	327.1	328.6	341.4	343.4	
Denver	274.9	282.5	287.3	294.0	297.5	305.1	312.5	339.0	343.4	348.4	350.3	368.1	369.7	377.1	379.1	
Detroit	265.9	272.2	277.7	284.7	296.9	301.2	316.4	352.9	355.2	360.5	360.6	377.4	379.0	384.6	386.8	
Kansas City	240.1	247.8	250.5	256.4	261.0	264.3	278.0	295.5	301.8	306.8	308.8	315.3	316.6	329.5	331.5	
Los Angeles	276.3	282.5	288.2	297.1	302.7	310.1	320.1	344.1	346.4	355.3	357.3	361.9	363.4	374.2	376.4	
Miami	260.3	269.3	274.4	277.5	284.0	286.1	305.3	392.3	338.2	343.5	345.5	353.2	354.7	366.8	368.9	
Minneapolis	269.0	275.3	282.4	285.0	289.4	300.2	309.4	331.2	341.6	346.6	348.5	361.1	362.7	366.0	368.0	
New Orleans	245.1	284.3	240.9	256.3	259.8	267.6	274.2	297.5	305.4	310.6	312.2	318.9	320.4	327.9	329.8	
New York	276.0	282.3	289.4	297.1	304.0	313.6	321.4	344.5	351.1	360.5	361.7	366.0	367.7	378.9	381.0	
Philadelphia	265.2	271.2	275.2	280.8	286.6	293.7	301.7	321.0	328.9	337.7	335.7	346.5	348.0	356.4	358.4	
Pittsburgh	251.8	258.2	263.8	267.0	271.1	275.0	293.8	311.0	316.9	321.6	323.3	327.2	328.7	338.1	340.1	
St. Louis	255.4	263.4	272.1	280.9	288.3	293.2	304.4	324.7	335.2	340.8	342.7	344.4	345.9	360.0	361.9	
San Francisco	343.3	352.4	365.4	368.6	386.0	390.8	402.9	441.1	455.4	466.9	468.6	465.1	466.8	480.7	482.6	
Seattle	252.5	260.6	266.6	268.9	275.0	283.5	292.2	317.8	325.4	335.1	336.9	341.8	343.3	347.1	349.0	

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

A GAF Timberline roof gives a building the rugged, prestigious look of wood shake shingles.

But Timberline also provides the safety and maintenance-free convenience of modern asphalt shingles.

Simply put, Timberline gives homeowners the best of both worlds.

Timberline won't rot, crack, warp or split. It's fire-resistant. And Timberline has a special self-sealing adhesive that helps to keep it down in high winds.

As for beauty, you have to see Timberline to really appreciate it. Its unique double-layer, staggered-cut de-

sign remarkably duplicates the deep uneven shadow pattern of a wood shingle roof. And it comes in six subtle wood tone colors. All with the rich varied shadow line that can do wonders for the appearance of a building.

Timberline roof shingles are fast and easy to apply. Warranted for 25 years by GAF, one of America's leading manufacturers of building materials.

For further details, call your GAF Building Products dealer or send the coupon. In Sweet's, see GAF Building Materials insert.

For more data, circle 51 on inquiry card

GAF Corporation
Building Products Division, Dept. AR-10
140 West 51 Street
New York, New York 10020

Yes, I'd like more information on GAF Timberline Roof Shingles.

- Please send further details, including specifications and application data.
 Please have your representative call.

 **Timberline**TM
ROOF SHINGLES

Name _____

Address _____

City _____ State _____ Zip _____

A GAF TimberlineTM roof. The only thing better than the way it looks is the way it lasts.



TIMELESS THONET

This is *Focus*. Spare. Clean. Rhythmic. A future classic.
Chrome plated frame. Side or armchair. And, like all Thonet
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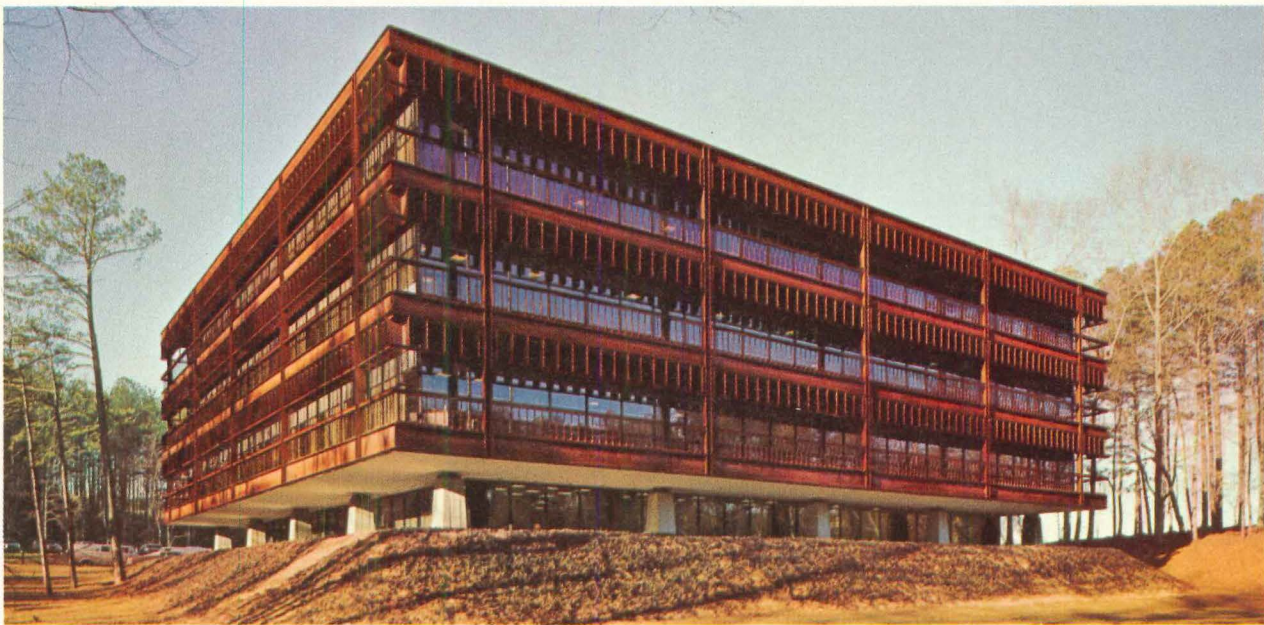


THONET 
CENTER OF DESIGN

For more data, circle 52 on inquiry card



Fluid-filled exterior columns let the beauty of bare steel show through.



Owner: American Security Insurance Co., Atlanta, Ga. Architects: Taylor and Collum, Atlanta, Ga. Structural Engineer: Jack Wilborn, Atlanta, Ga. Mechanical Engineers: Newcomb & Boyd, Atlanta, Ga. General Contractor: Batson-Cook Company, Atlanta, Ga. Structural Fabricator: Owen of Georgia, Inc., Lawrenceville, Ga. Steel Erector: Williams Enterprises of Georgia, Inc., Smyrna, Ga.

When the American Security Insurance Company built their home office on this wooded site in Atlanta, an exposed frame of USS COR-TEN Steel was a natural choice.

This remarkable steel weathers to a rich dark russet color that blends in handsomely with the rustic surroundings. And it doesn't need painting.

Twenty columns of bare COR-TEN Steel carry the second, third and fourth floors to second floor girders, which cantilever over concrete piers.

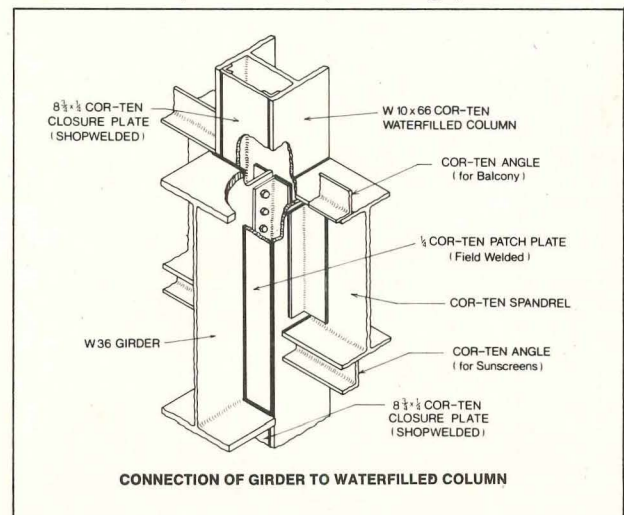
In order to retain the honest look of a bare steel frame, the designers avoided conventional exterior fireproofing methods, and filled the columns with fluid.

The W 10 x 66 exterior columns are filled with 1,800 gallons of water, antifreeze, and rust inhibitor.

In case of fire, the fluid inside the columns absorbs the heat, and convection currents circulate the water solution within the closed-loop system. Any steam generated is vented through a roof tank, which contains enough reserve fluid for 4 hours of fire protection—in excess of the building code requirements.

If you're planning a new building, you should investigate fluid-filled columns. For a more complete story on USS and COR-TEN are registered trademarks

this building, get a copy of our STRUCTURAL REPORT (ADUSS 27-5048). Call a USS Construction Marketing Representative through the nearest USS Sales Office or write U.S. Steel, P.O. Box 86, Pittsburgh, Pa. 15230.



Vari-Tran[®] coated insulating glass (one of L-O-F's most expensive glasses) in an all electric building.

Result: lower construction costs, lower cost of operation.



Avco Financial Center, Newport Beach, California. Owner: Balboa Insurance Company • Architects: Welton Becket and Associates • Consulting Mechanical Engineers: James A. Knowles and Associates, Los Angeles • Glazing Contractor: Golden State Glass Company, Los Angeles

How Vari-Tran reduced the cost per rentable square foot.

James A. Knowles and Associates, Consulting Mechanical Engineers, of Los Angeles, made a glass cost analysis of glazing this building with Thermopane® insulating glass with an outboard light of Vari-Tran 114 coating versus conventional 1/4" Parallel-O-Grey® plate. They compared the glass in terms of heat loss and gain, initial glass costs, total building cost, effects on taxes and insurance, annual operating costs, etc. (See summary.)

Vari-Tran justified on construction cost savings, alone.

The study definitely proved that Thermopane/Vari-Tran would save the owners money on initial and long-range investment. With Vari-Tran's superior heat-reflecting qualities, it was economically feasible to design an all-electric building, eliminating space requirements for boilers.



The reflective glass increased rentable area on the upper 15 stories due to smaller fan-coil machinery on each floor. The estimated rental area gained was 3% of total on these floors, representing rental income of \$46,656 per year. The additional rental income, and owning and operating cost savings, total \$66,478 per year. If this amount were capitalized at 10%, an initial investment of \$664,780 could be justified.



The improved 'U' value of the double glazed glass had a significant effect on reducing the size — and cost — of the heat recovery cycle required by all-electric concept.

As to the aesthetics, the silvery Vari-Tran 114 blends with the aluminum exterior columns and the spandrels of Tuf-flex® tempered glass, also Vari-Tran coated. (Vari-Tran is available in golden as well as silvery coatings in light transmittances of 8, 14 and 20 percent. Each provides significant reduction in solar heat and glare.)

If you would like a computerized cost analysis of the glass wall of a building you're planning, contact your L-O-F Architectural Representative, or Architectural Dept., Libbey-Owens-Ford Company, Toledo, Ohio 43624.

Here's what Vari-Tran, the glass that cuts building costs, will save.

ECONOMIC GLASS COST ANALYSIS

by James A. Knowles and Associates, Los Angeles

A differential 'Annual Cost of Owning and Operating' between the larger capacity air conditioning plant required for the conventional heat absorbing glass as opposed to the plant capacity required by the Vari-Tran 114 is as follows:

1. Additional Investment —

A. Added A.C. Machinery Cost	\$56,300
B. Larger Roof Machinery Space	\$ 6,320
C. Larger Gas, Electrical Services.	<u>\$ 7,100</u>
Total Additional Investment	\$69,720

2. Additional Annual Owning Cost —

A. Amortization and Depreciation for 20 years at 10% (CRF-0.11746)	\$ 8,200
B. Taxes and Insurance.	<u>\$ 3,140</u>
Total Added Annual Owning Cost	\$11,340

3. Additional Annual Operating Cost —

A. Preventive Maintenance	\$ 719
B. Repairs and Replacement	\$ 992
C. Gas, Water and Electricity	<u>\$ 6,771</u>
Total Added Annual Operating Cost	\$ 8,482

4. Summary —

A. Additional Annual Owning Cost	\$11,340
B. Additional Annual Operating Cost	<u>\$ 8,482</u>
Total Added Owning and Operating Cost for conventional heat absorbing glass	\$19,822

LOF GLASS **Hi-Performance Glass**
The glass that cuts building costs

When You Specify Terrazzo, Specify Hillyard Onex-Seal II®

More than half a million square feet of this lustrous terrazzo was sealed and finished with Onex-Seal II in accordance with specifications in the Hillyard Uniform Numbered File—Division 9.

Onex-Seal II is a buffing seal—finish of the type recommended by the National Terrazzo

Mosaic Association for Portland and Oxychloride Terrazzo in all colors (even white).

It insures that Portland and thin set terrazzo floors are properly sealed for protection and finished for beauty. Sealing guards against penetration of dirt and stains while enhancing the natural beauty of all colors, even white. It prevents efflorescence, produces a hard non-flaking, slip resistant mirror finish.

To insure that any floor will continue to live up to the standards you specify, call on a trained Hillyard Architectural Consultant to recommend correct finish and maintenance programs.

See our specifications manual in Sweet's and write for Uniform Numbered Files for every type of floor.



Houston International Airport Houston, Texas

Architects: Golemon & Rolfe, Houston;
Pierce & Pierce, Houston

For more data, circle 54 on inquiry card

To Gates 6 7 8 9 10





TEXAS STADIUM

Owner — The City of IRVING, TEXAS
 Architect — A. Warren Morey & Assoc., Dallas, Texas
 Gen. Contractor — Tecon Corp., Dallas, Texas
 Builder — J. W. Bateson Co., Inc.
 subsidiary of
 Centex Corp.
 Dallas, Texas



FENESTRA steel doors and frames face a long, tough life in the NEW home of the DALLAS COWBOYS

What better place for a door to show its ability to take it than in Texas Stadium . . . new home of professional football's Dallas Cowboys. But Fenestra all steel Doors and Frames are more than up to the task. We build 'em tough . . . just like the Cowboys. Whether the application is a new stadium, a school, dormitory, apartment building, motor-hotel . . . you name it . . . it's the right place for attractive Fenestra steel Doors and Frames. And remember, now these precision-made doors are available in a full spectrum of colors. Prefinished at the factory . . . with appliance type enamel. The complete line, including Fen-Dry drywall frames is available from a nearby Fenestra distributor. Why not join the swing to Fenestra? Where things happen in steel doors, frames and versatile architectural entrance systems. Your Fenestra distributor is listed in the Yellow Pages under Doors-Metal. Or see us in Sweets

FENESTRA IS LOCAL EVERYWHERE



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*You can give a
doctor's office
a tranquil
effect with
"La Strada"
on the walls.*



GUARD®

*You can give
an ad agency
a dramatic
effect with
"Mod Dot"
on the walls.*



Wall-Tex®

*You can give
a model agency
an elegant
effect with
"Dominique"
on the walls.*



Satinesque®

Our wallcoverings can give your interiors tranquility, drama, elegance...and more.



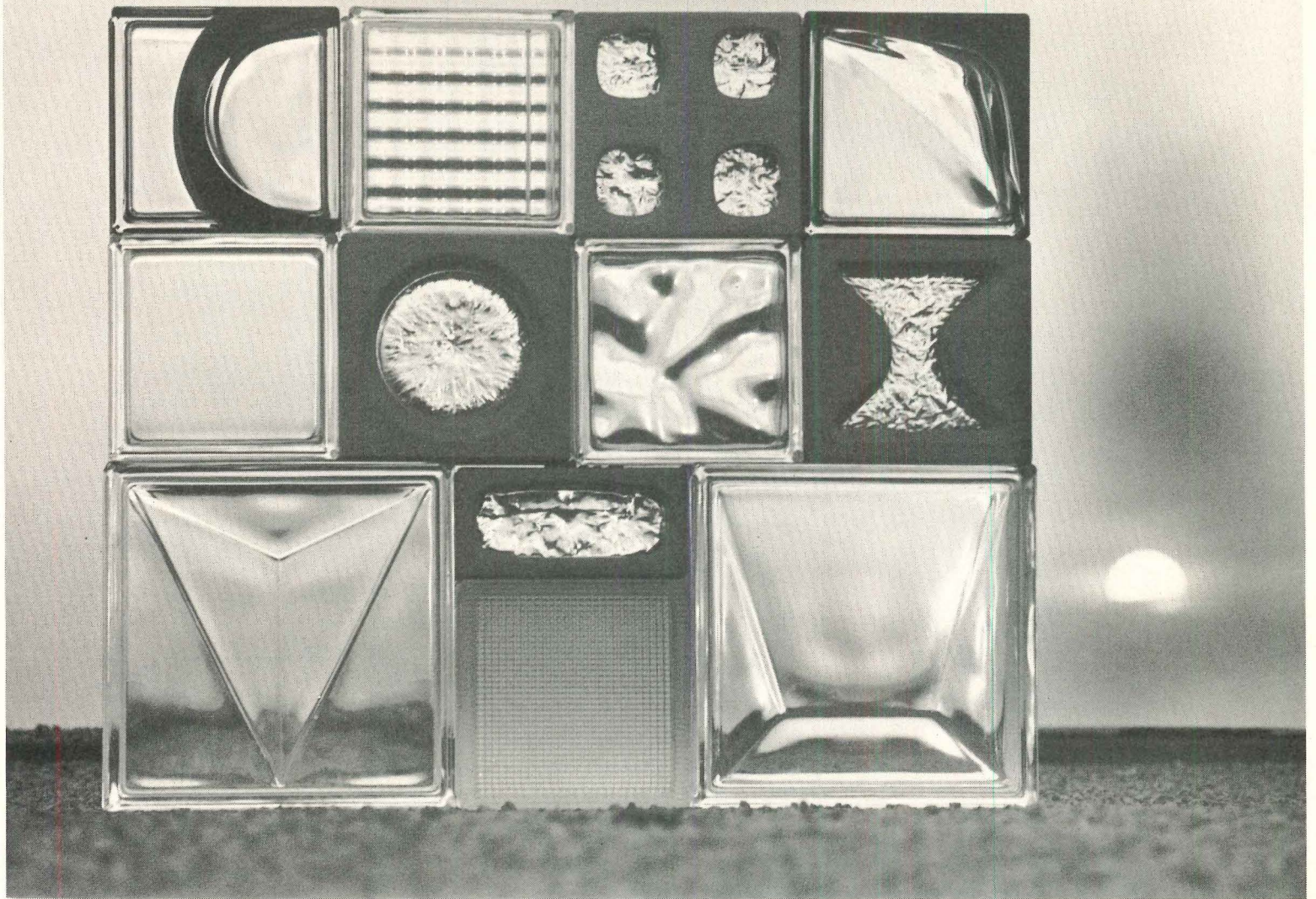
When you want an interior to have a special mood or sense or feel, turn to the special offerings of Columbus Coated Fabrics. Throughout our three basic lines—Guard®, Satin-esque®, Wall-Tex®—you'll see over 1200 fabric-backed vinyl wallcoverings, each with a special statement of its own. And special practicalities: all our wallcoverings are pre-trimmed for perfect matches, easy to put up, easy to clean, easy to take down when it's time for a change. They'll also hide wall blemishes in renovation projects and keep their good looks for years. You know, offering more patterns than anyone in the industry ought to be enough, but it isn't. So we have a Custom Design Center to come up with anything else you might have in mind. We'll also go on site making sure everything's right before, during, and after installation. We meet building codes and are UL listed. Write for further specifications. You'll find we've got a lot to give, too.



COLUMBUS COATED FABRICS
Division of Borden Chemical, Borden, Inc.
Dept. C, Columbus, Ohio 43216

For more data, circle 56 on inquiry card

Pittsburgh Corning announces twelve beautiful ways to accent concrete, steel or aluminum.



It's the new look of glass blocks. Patterns, textures and sculptured effects with the emphasis on accent. Skyscraping designs with long, narrow lines of light and texture. Low, solid designs with patterns and relief. Light, shape, harmony or contrast. It's the new look of glass blocks to spark your imagination for new uses.

But still with functional advantages like control of light, noise, insulation and solar heat. Without maintenance. For more information on the many different styles, patterns and characteristics of glass blocks, write Pittsburgh Corning Corporation, Dept. AR-101, One Gateway Center, Pittsburgh, Pa. 15222.



For more data, circle 57 on inquiry card



New ACOUSTONE* Panels upgrade ceilings fast using existing grids.

Now, you can specify the most distinctive acoustical ceiling surface made, in 2 x 4' as well as 2 x 2' modules. Beautiful new large module ACOUSTONE tile and panels help you achieve a bigger-all-over effect on new interiors; adapt quickly, easily to any existing grid system to carry out a prestige image on remodeling projects. ACOUSTONE also delivers consistently reliable sound absorption up to .85 NRC; meets Federal Spec. SS-S-118a for Type III, Class 25 fire resistance. And its foil backing reflects summer heat, adds to air conditioning efficiency, keeps ceilings cleaner, too.



"F" Fissured



Glacier



Finesse

Three popular ACOUSTONE patterns. Factory-applied heat cured, washable vinyl coating. See your U.S.G. Representative. Or write to us for literature, 101 S. Wacker Drive, Chicago, Illinois 60606, Dept. AR-101,

*Reg. U.S. Pat. Off.

UNITED STATES GYPSUM 
BUILDING AMERICA

For more data, circle 58 on inquiry card



DESIGN CONCEPT: A resort complex on a steep ridge overlooking a bay area, providing the arriving vacationer with a feeling of being absorbed into the recreational environment. Demands of the building program are 1) to create a high density that can afford a maximum variety of activities and service for the inhabitants, and 2) provide an architecture that is both informal and harmonious with the natural beauty of the site.

INNOVATION IN DESIGN. One of a series created for DAP Architectural Sealants. Design and rendering by Richard P. Howard Associates, Architectural Illustrators, Sylvania, Ohio. Harold R. Roe, A.I.A.

utility

DAP Butyl-Flex® gives all the protection of 20-year sealants in caulking joints where movement is minimal. This accounts for nine out of ten cases where a seal is desired against sun, snow and storm. No other caulk comes close to this combination of long-term dependability and widespread utility. But then no other caulk has the high butyl content of Butyl-Flex. That's why no other caulk matches its outstanding elongation and tenacious adhesion between similar and dissimilar construction materials. For catalog describing Butyl-Flex and other DAP Architectural Sealants, please write: DAP Inc., General Offices: Dayton, Ohio 45401. Subsidiary of *Plough, Inc.*



DAP® ARCHITECTURAL SEALANTS

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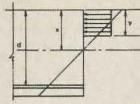
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FLEXURE

Table S.2.1 Continuum, K_c , for determining ultimate moment capacity - bonded prestressing and

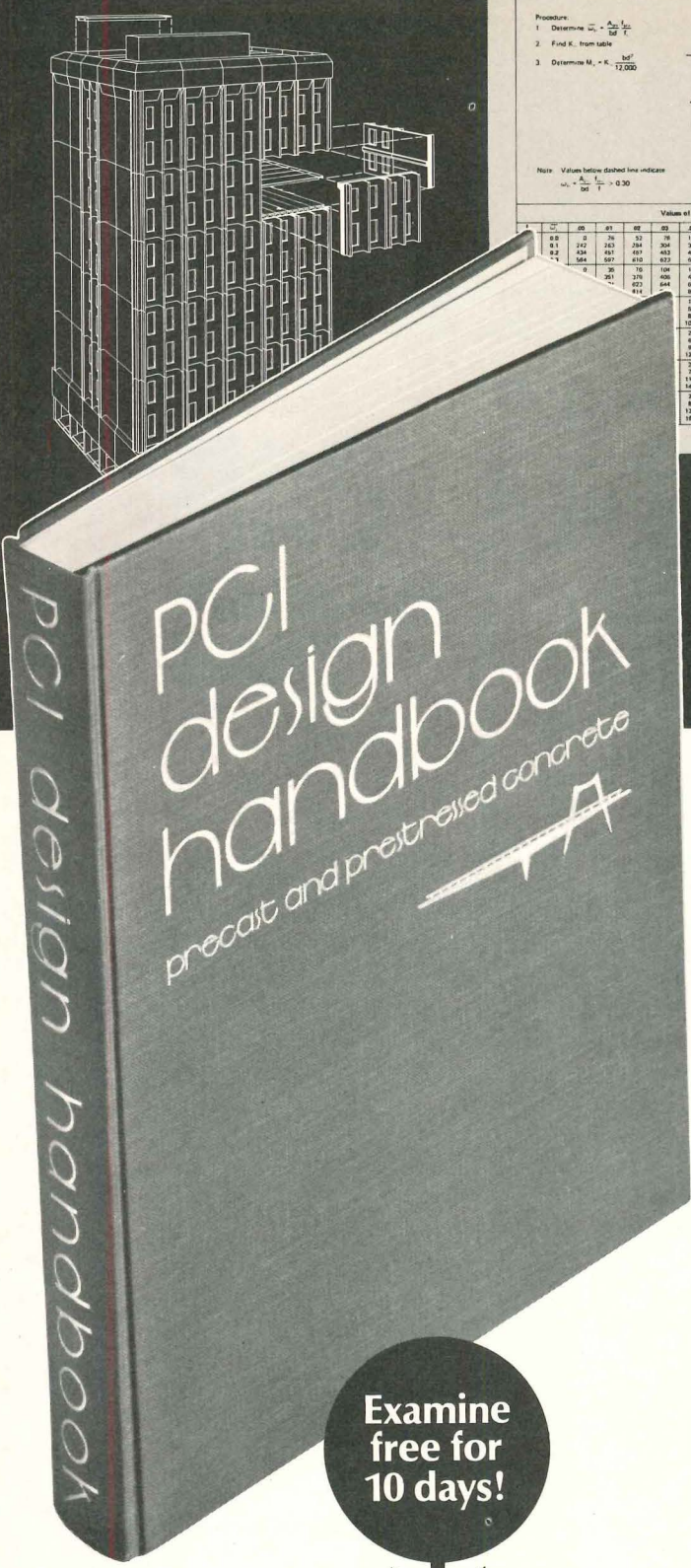
- Procedure:
 1. Determine $\omega_p = \frac{A_{ps} f_{ps}}{b d^2 f_c}$
 2. Find K_c from table
 3. Determine $M_u = K_c \frac{b d^2 f_c}{12,000}$



Note: Values below dashed line indicate $\omega_p = \frac{A_{ps} f_{ps}}{b d^2 f_c} > 0.30$

Values of K_c

ω_p	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.0	0	26	52	78	103	127	151	175	197	220
0.1	272	284	296	307	318	329	340	351	361	371
0.2	434	457	481	503	524	544	563	581	600	617
0.3	584	627	670	712	752	791	828	864	899	933
0.4	719	778	835	890	943	994	1043	1090	1135	1179
0.5	839	909	977	1042	1104	1163	1220	1274	1326	1376
0.6	944	1026	1106	1183	1257	1328	1396	1461	1523	1583
0.7	1034	1128	1211	1291	1368	1442	1513	1581	1646	1709
0.8	1109	1206	1283	1358	1430	1498	1562	1623	1681	1737
0.9	1169	1269	1341	1413	1482	1548	1611	1671	1728	1783



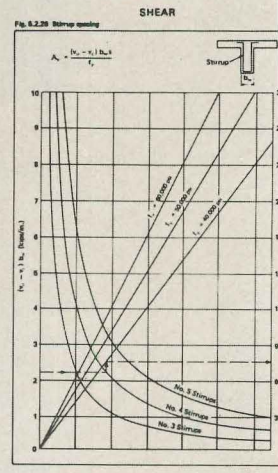
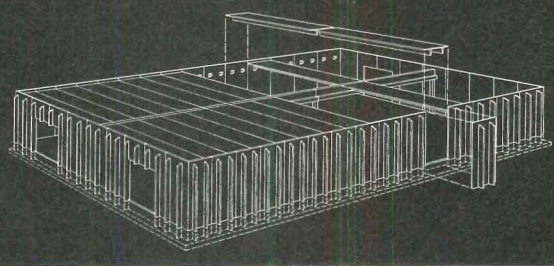
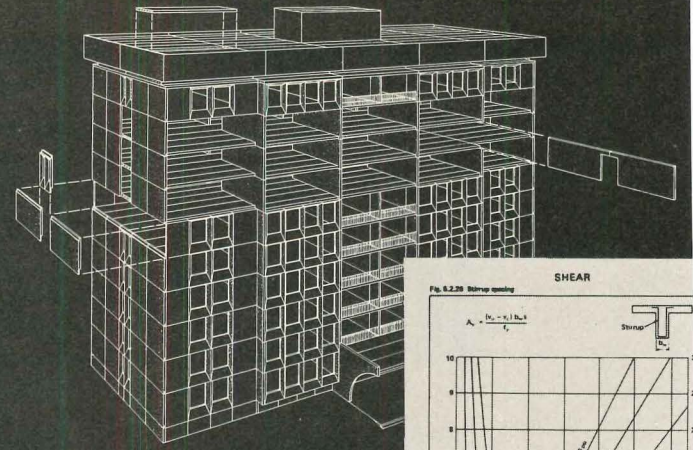
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It's here! Prestressed Concrete Institute's first comprehensive design handbook. Saves engineering time and money!

This first edition of a nationwide design handbook for prestressed and precast concrete, because of its practical nature, goes far beyond the traditional handbook. Complete with 250 load tables and graphical design aids, this handbook helps the designer (whatever his level of familiarity with the subject) to know prestressed concrete as a complete building system and to make the most of its use. Explicit design examples fully explain how to use the handbook. The book aims to standardize procedures and provide a common language for the designer, owner and manufacturer.

Exciting new material, much of it never before available, is in the form of ready-to-use tables, charts and graphs for the design and use of prestressed concrete. The material provides for quick and easy selection of sections and systems, design of components, and checking of design validity.

The Handbook is 384-pages, hard-cover, 8 1/2" x 11". Contents are based on the ACI Building Code 318-71. Here are some of those contents:

Assembly Concepts. Numerous construction examples. Wall-bearing, beam-column framing, and long-span use of prestressed concrete in both single and multi-story buildings.

Framing Considerations. Design criteria, types of loads, response of structure to loads, and selection of structural members.

Product Information and Capability. Double-tee, single-tee, and beam load tables, including rectangular beams, L-shaped beams, and inverted tee beams. Flatslabs and hollow-core slabs.

Design Procedures. For pretensioned and post-tensioned members. Architectural precast panels. Loss of prestress, in both pretensioned and post-tensioned members.

Design Aids. Flexure, shear, deflection, and camber. Many examples of each.

Connections. Comprehensive coverage of their design. Typical connection details.

Related Considerations. Thermal properties, including heat transfer, condensation, water-vapor transmission, and vapor barriers. Acoustical properties, including sound control, absorption, vibration, and noise control. Fire resistance. Coordination with mechanical, electrical, and other sub-systems.

Guide Specifications. For precast, prestressed concrete construction of buildings. For architectural precast concrete. For post-tensioning materials.

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For your copy of this long-awaited PCI Design Handbook, mail the coupon now. For more data, circle 60 on inquiry card



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New directions for Gunnar Birkerts

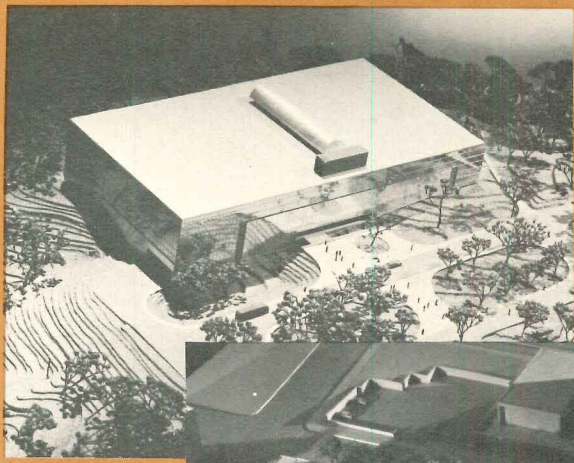
The six projects shown at the left and on the following pages signify an important change in the design approach of one of the nation's best architects. Birkerts has become fascinated with simple as opposed to complex geometric forms and currently disavows amorphous or capricious shapes. He doesn't leave his pure geometries alone, however, but carves into them, creating voids which have a complementary geometry. The most readily grasped example of this approach can be seen in the model photo of the Metropolitan Savings and Loan Bank in Southfield, Michigan (3), in which a cylinder is subtracted from a cube. The Duluth Public Library (2), and Houston's new Contemporary Arts Museum (6) belong also to Birkerts' new architecture by subtraction.

Birkerts makes dramatic use of interpenetrating geometric forms while creating elegant juxtapositions of opaque and translucent surfaces as in the Dance Instructional Facility for the SUNY Campus at Purchase, New York (4) and the IBM Computer Building at Sterling Forest, New York (1). Most significantly he has begun to build at a larger scale as in the Federal Reserve Bank of Minneapolis (5). In this structure he supports a large office building by spanning an entire city block by means of catenary arches. This solution, because it has the potential of spanning thruways and occupying other types of air rights space, could become a model for future high density, multi-layered urban design.

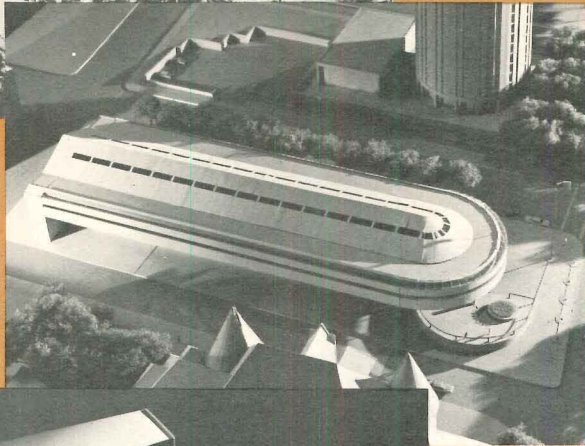
One of Birkerts' key interests is in furthering prefabrication technology. All six projects are thin-skin buildings consisting of cores and wrapping. The wrappings, whether metal, stone or glass, are prefabricated.

Members of Gunnar Birkerts' staff who served as design assistants for these projects are: Algimantas Bublys, D. Bartley Guthrie, Paul Chu Lin, William Wolfe and Stanley Boles (drawings).

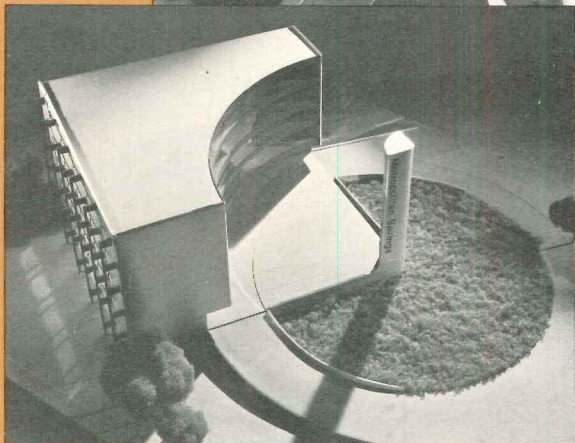
—Mildred F. Schmertz



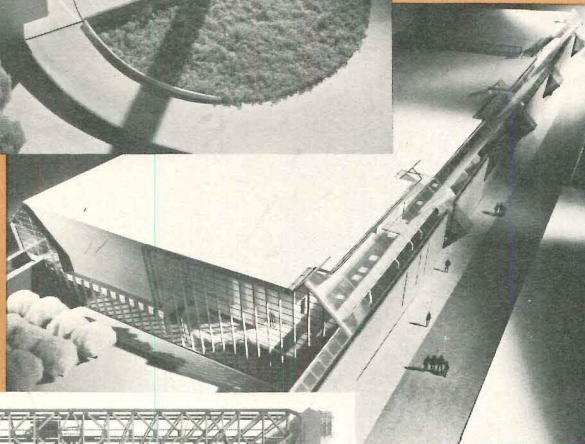
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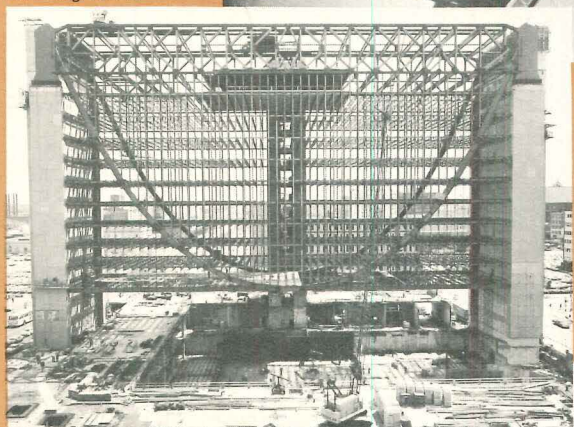


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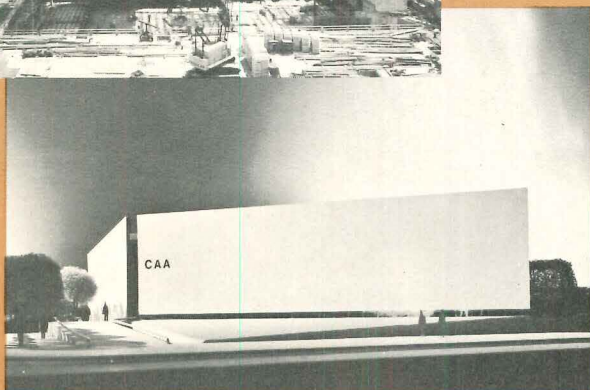


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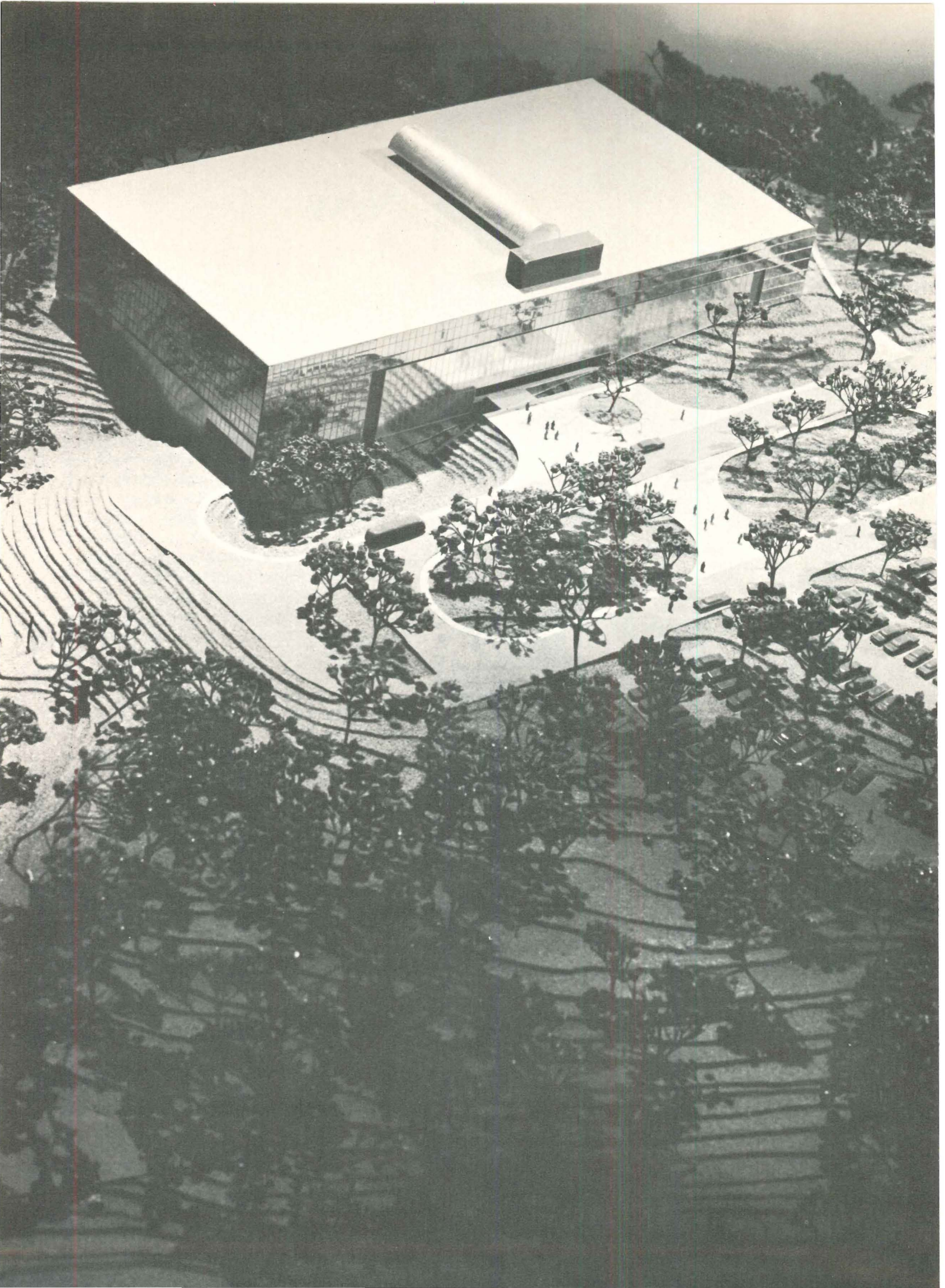
Schawang Studio

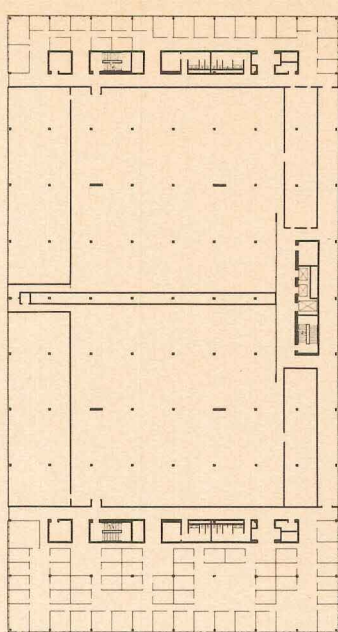


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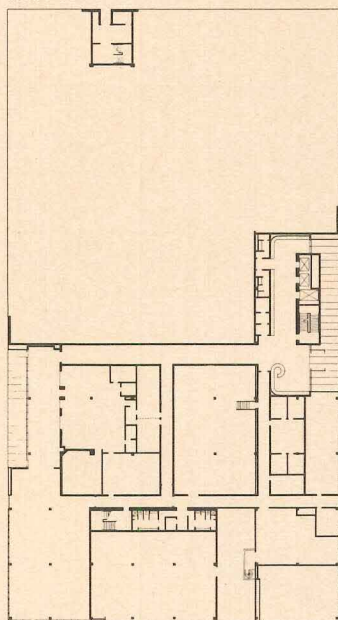


6





FIRST-SECOND FLOOR

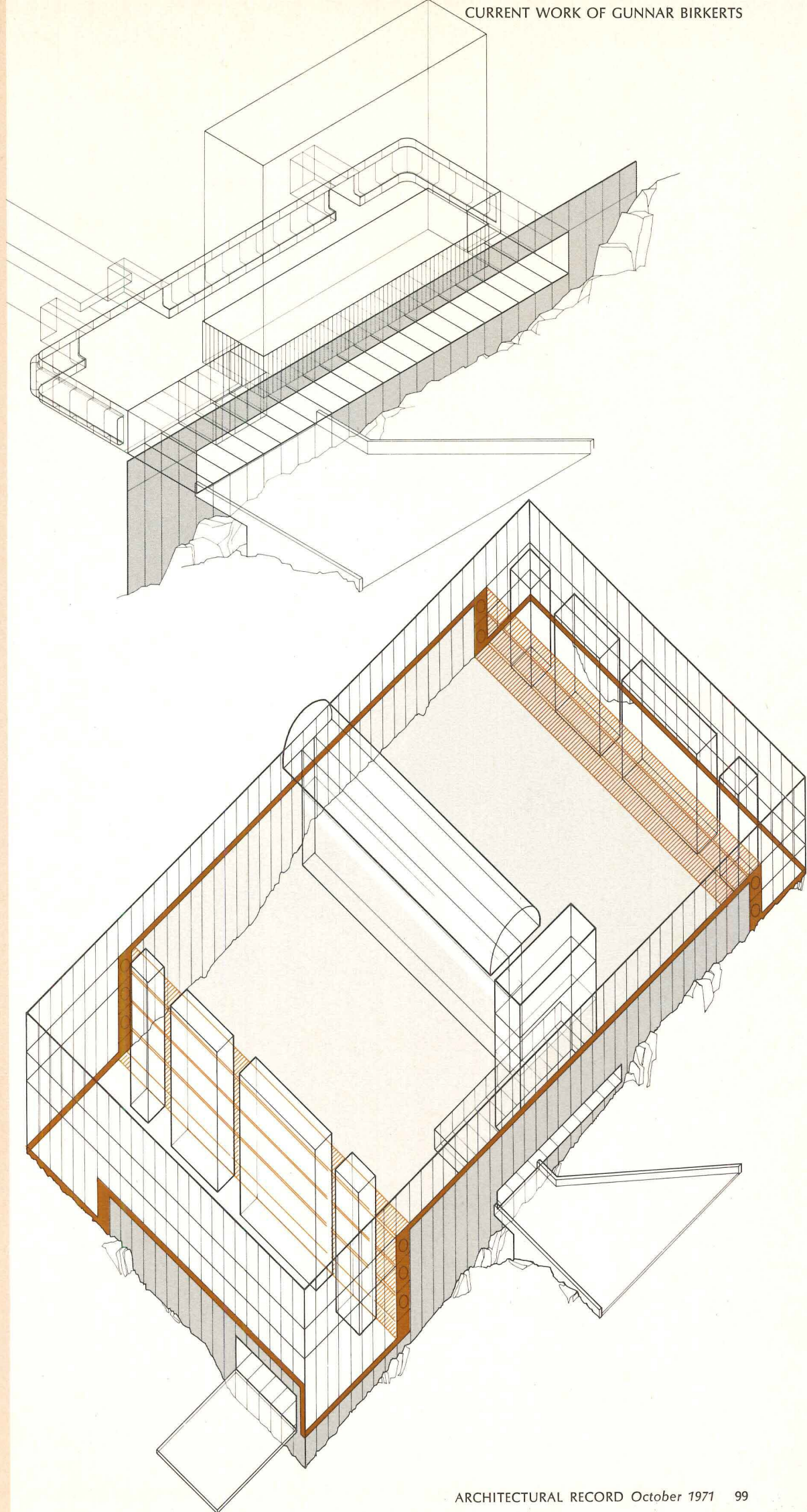


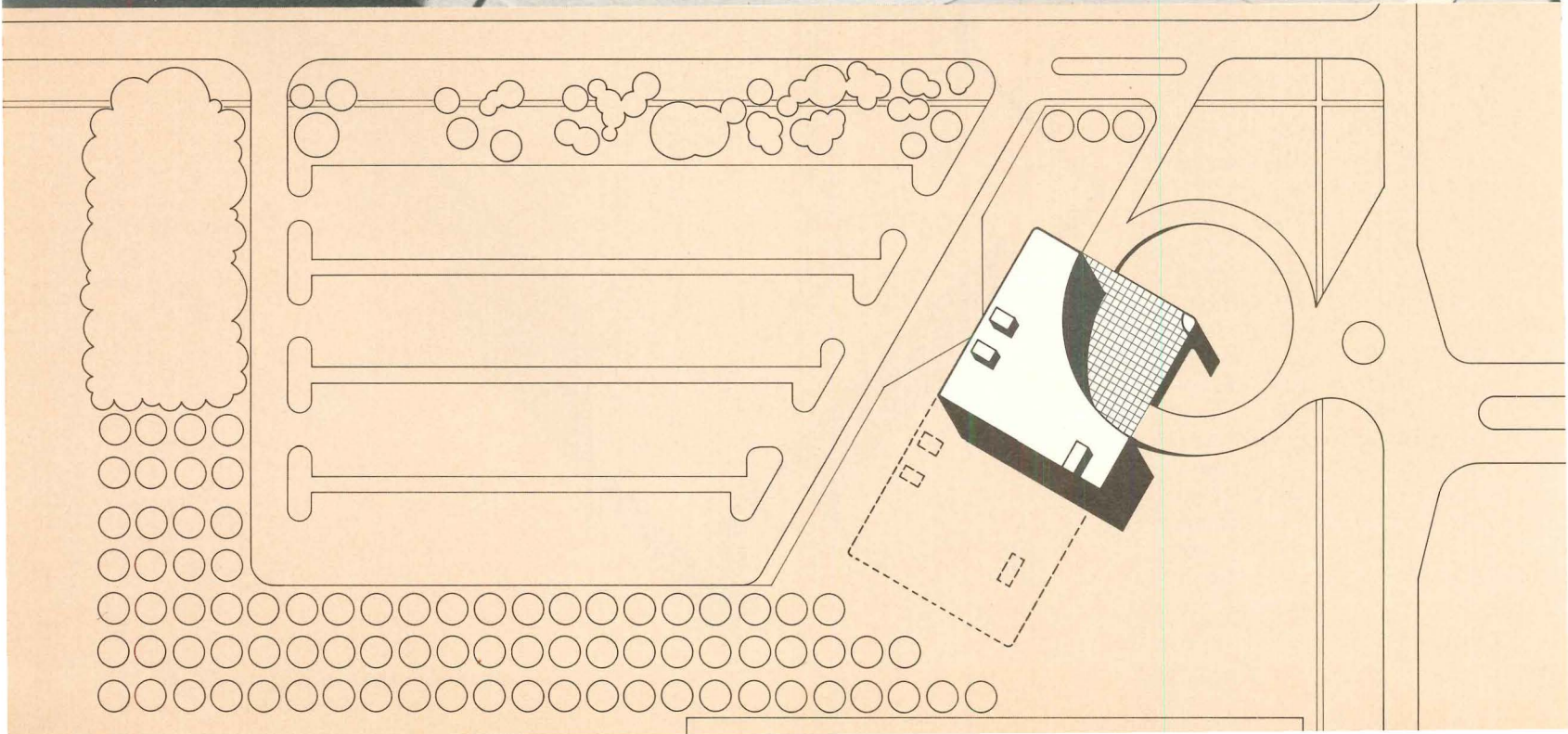
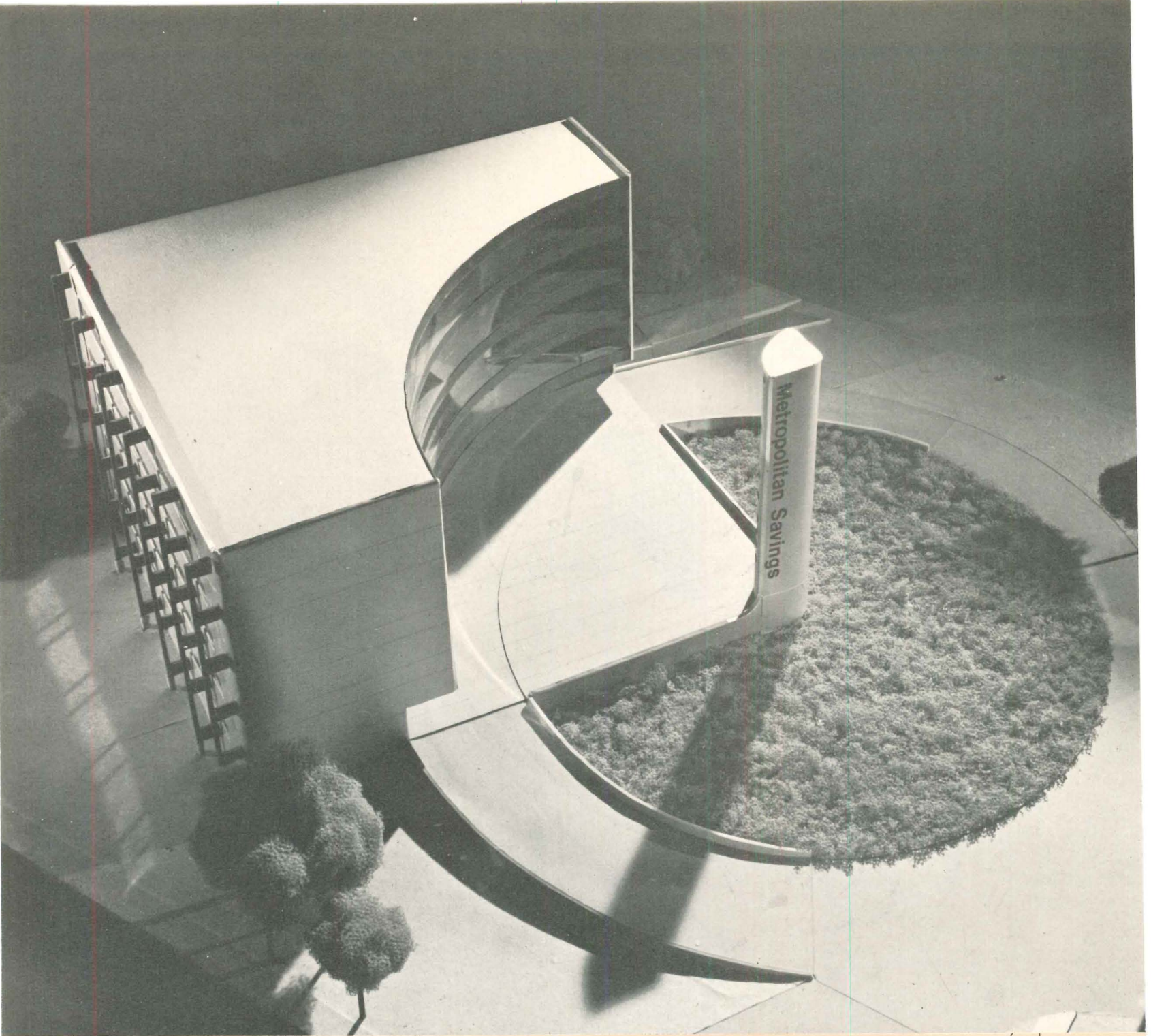
LOBBY LEVEL

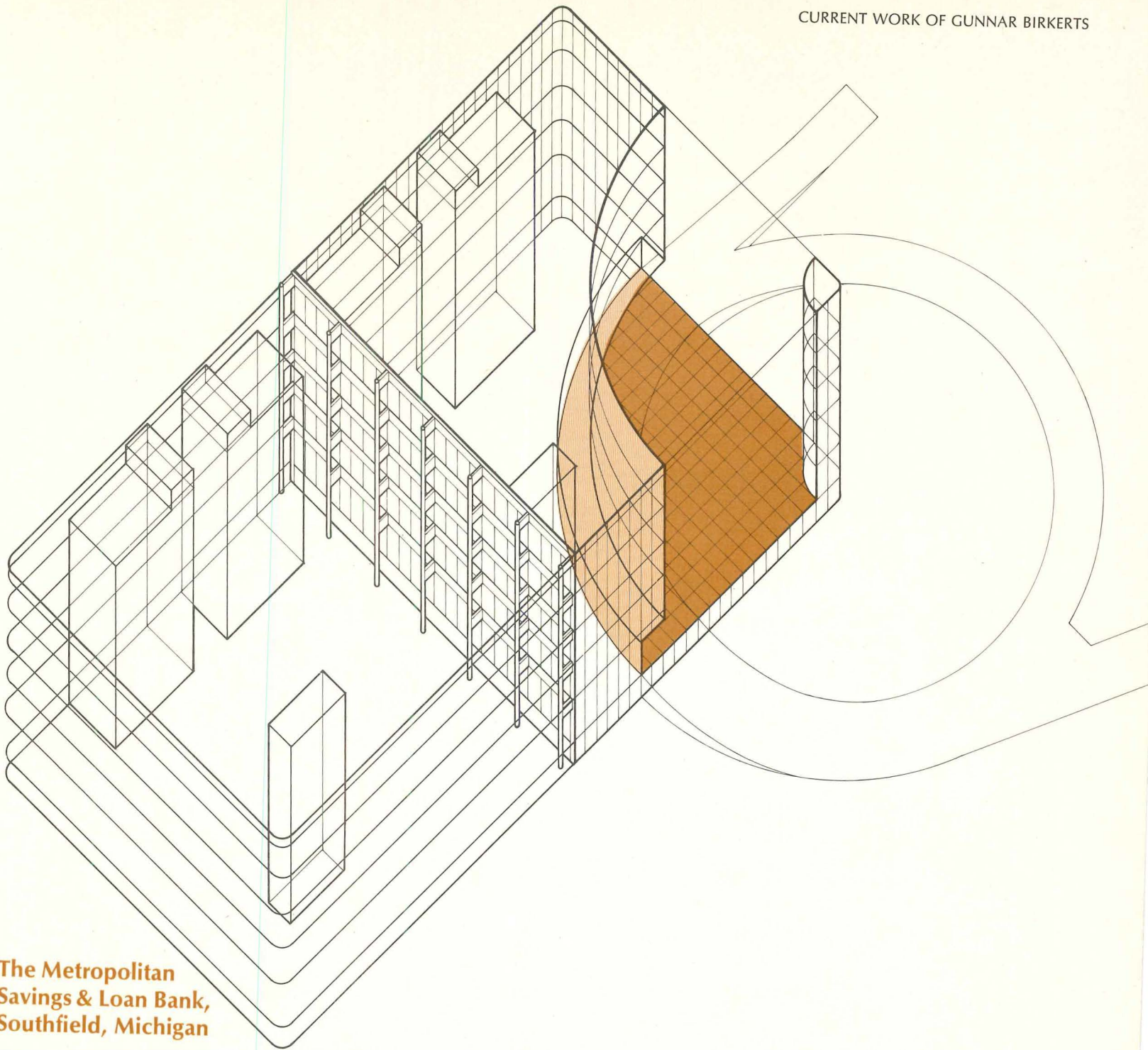
IBM-MCISC Computer Center Facility, Sterling Forest, New York

According to architect Birkerts this IBM in-house computer building was meant to appear as a "foreign object in the landscape—like the slab in the film 'Space Odyssey'. To this end it has no base—the metal comes right to the stone and is scribed to the rock."

The building is conceived as an abstract container for computer technology and has been placed on the site in a manner which interferes as little as possible with the natural terrain. It is a steel-framed modular structure enclosed by a precision-machined skin of 20 per cent reflective glass panels sheathing the office space, and 20 per cent reflective aluminum panels wrapping the computer and service areas.





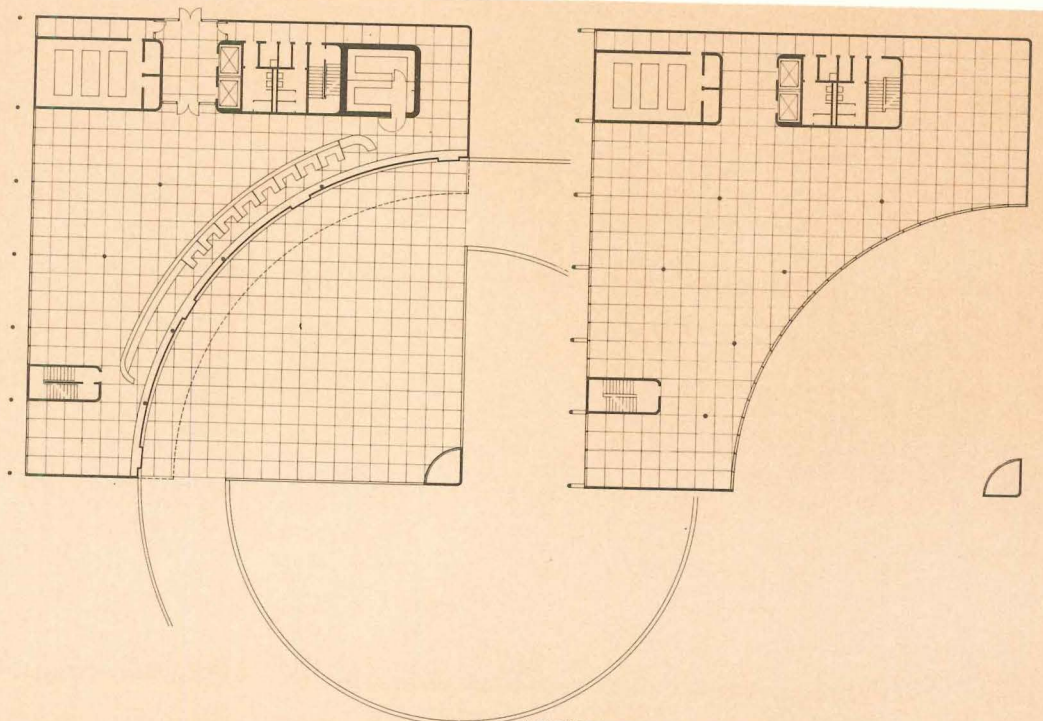


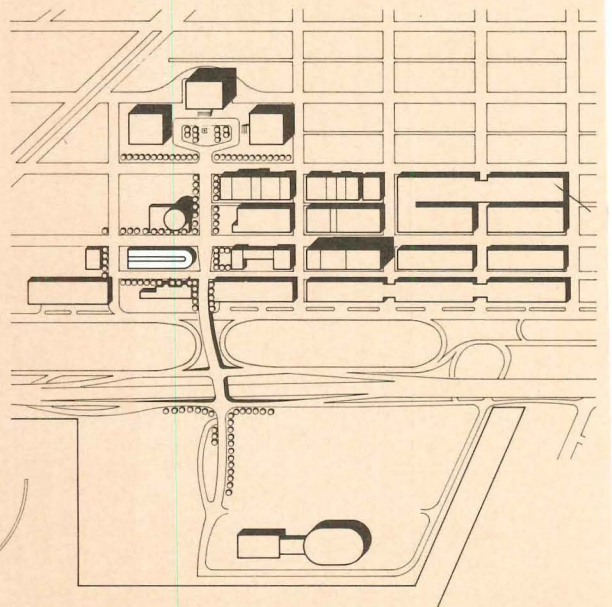
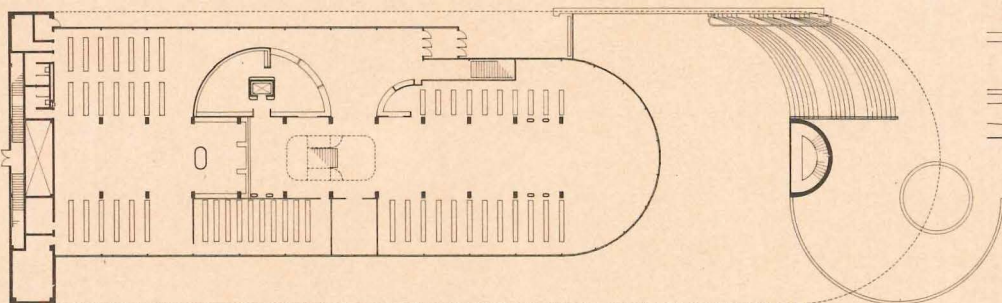
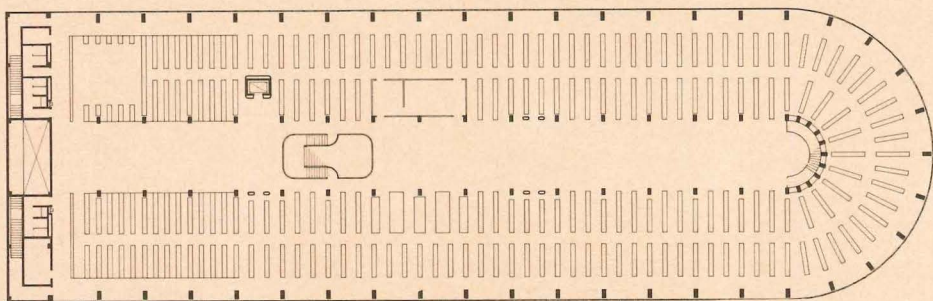
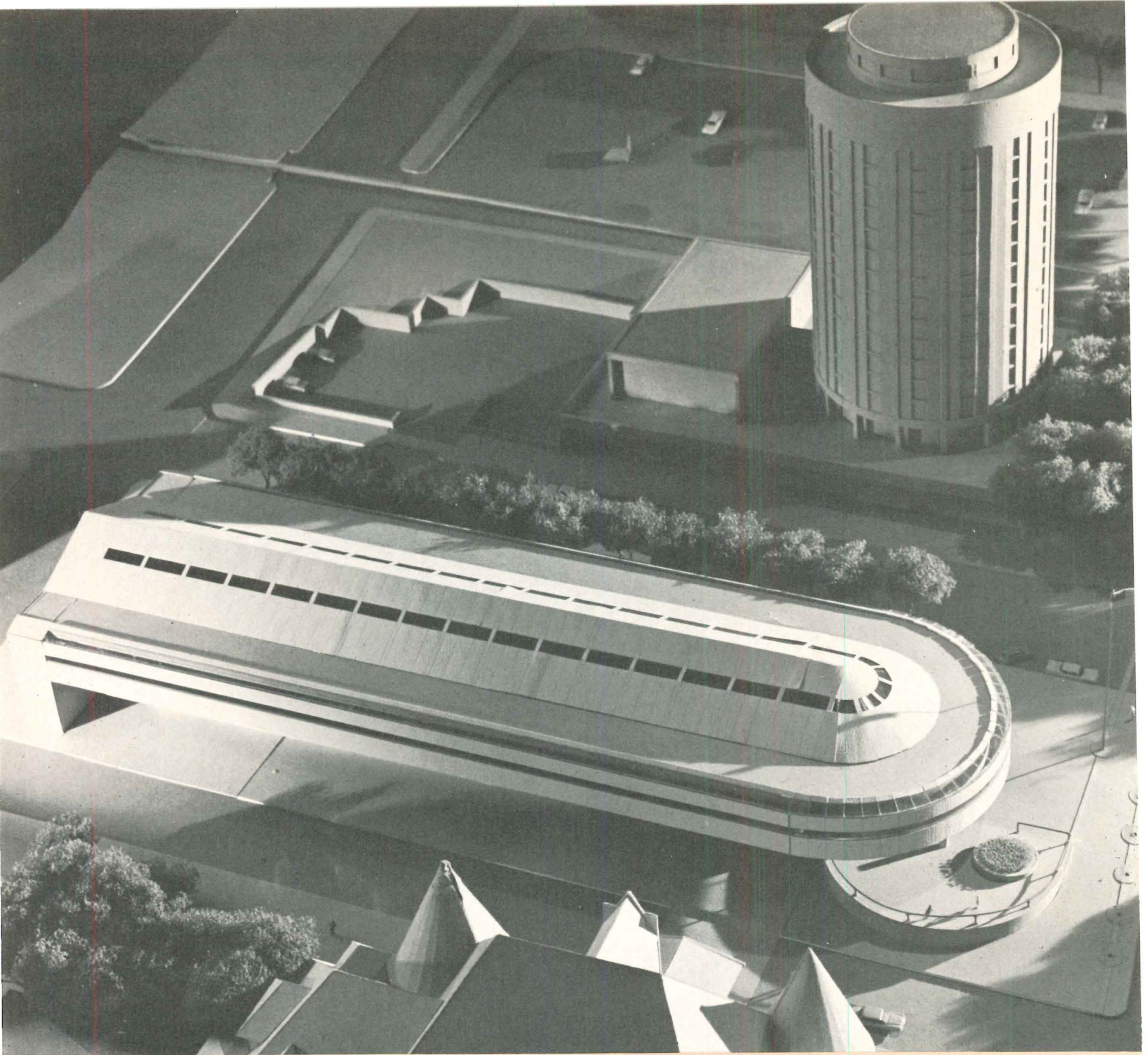
**The Metropolitan
Savings & Loan Bank,
Southfield, Michigan**

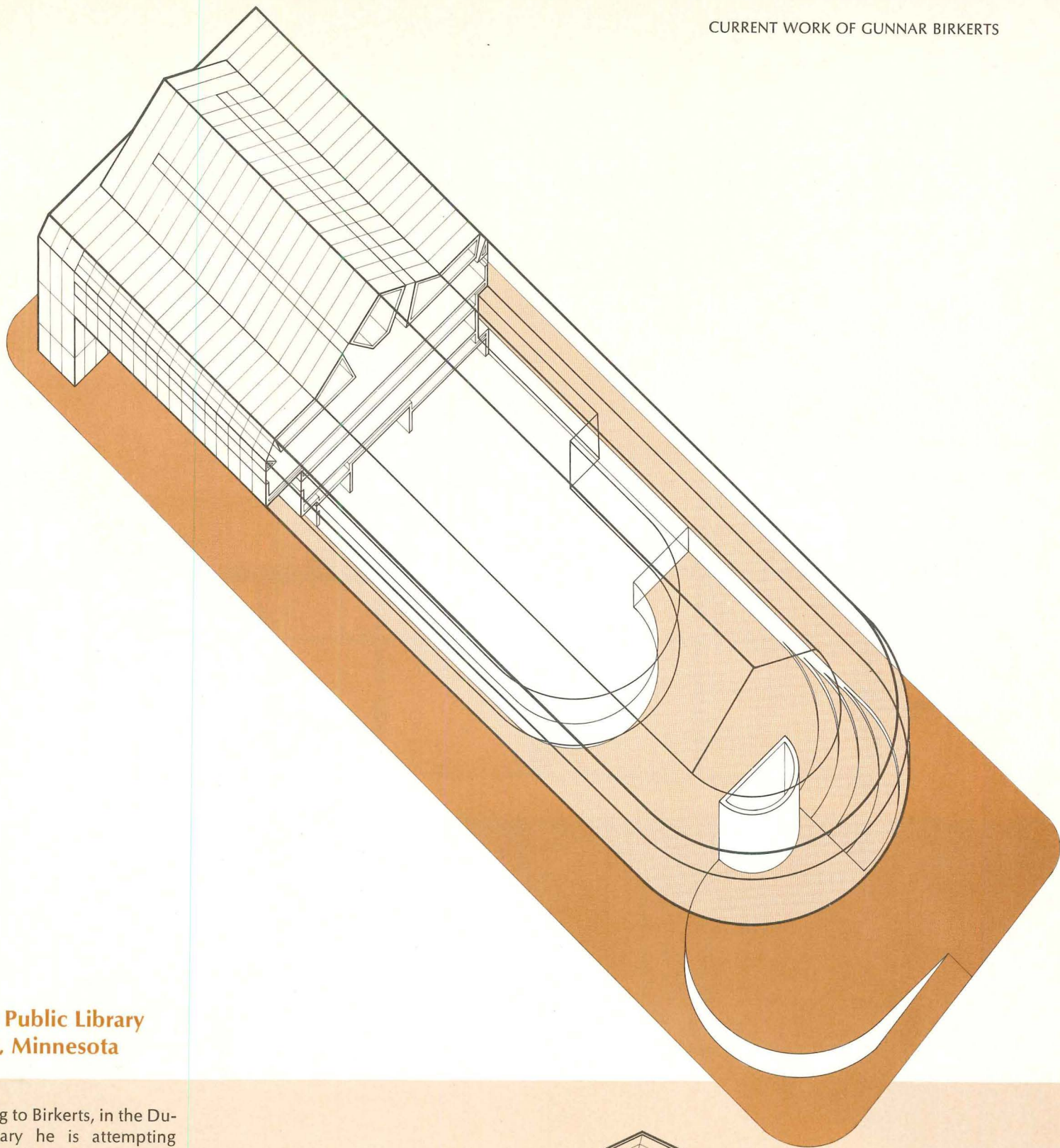
Birkerts is currently designing skin buildings in simple geometric forms which have been carved away. This little drive-in bank, still in project stage, is a cube from which a segment of a cylinder has been subtracted. The obelisk forms the core of the implied cylinder and the corner of the implied cube.

The isometric drawing above combines both the first and second phases of construction, showing each in an abstract way with certain opaque walls made transparent to reveal the design concept. The bank will have four office floors in addition to the main banking floor.

Pedestrian access is from the parking lot. Cashiers' windows parallel the curve.



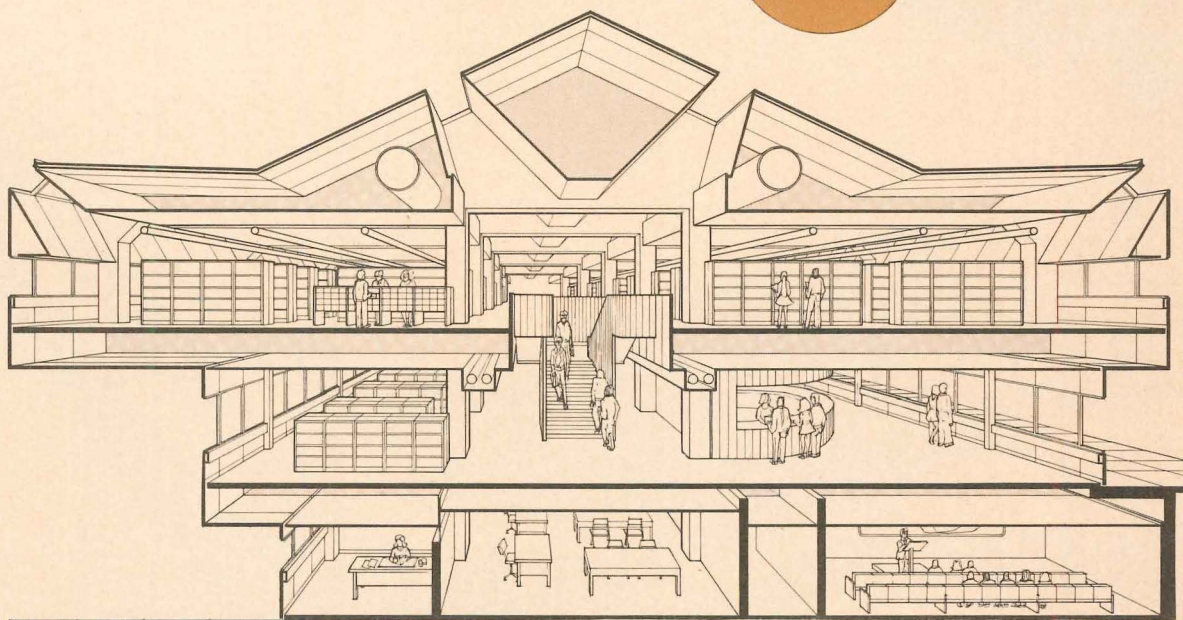


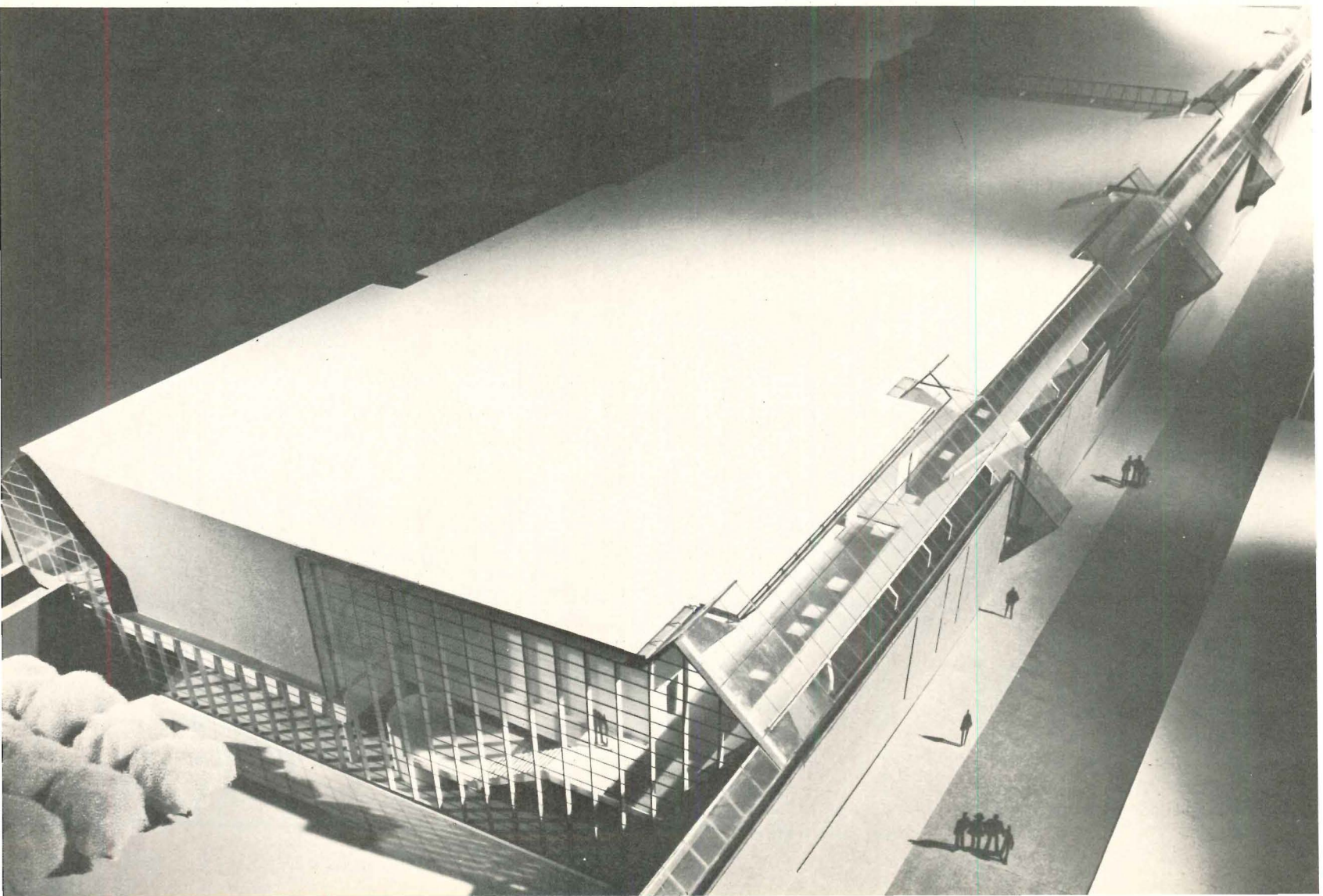
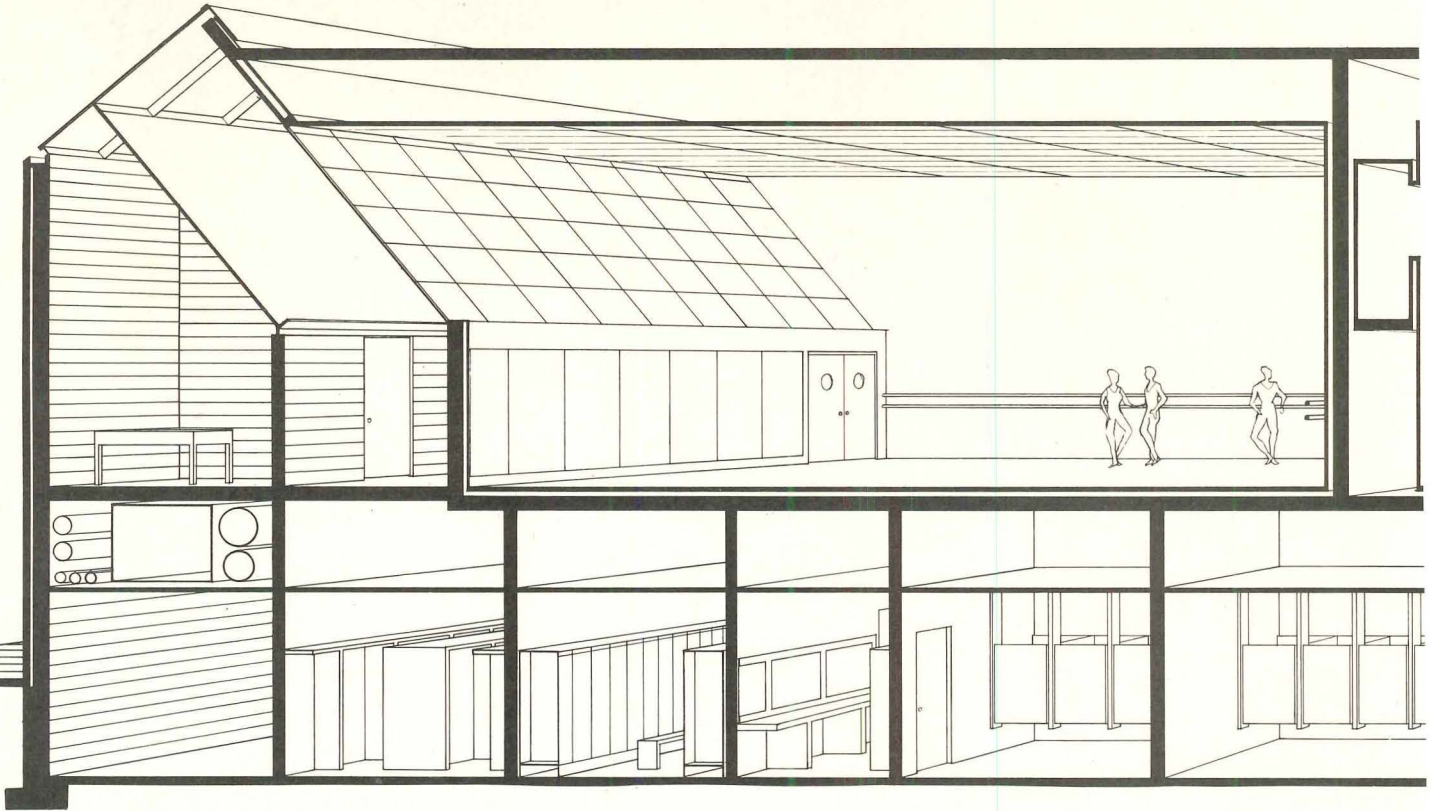
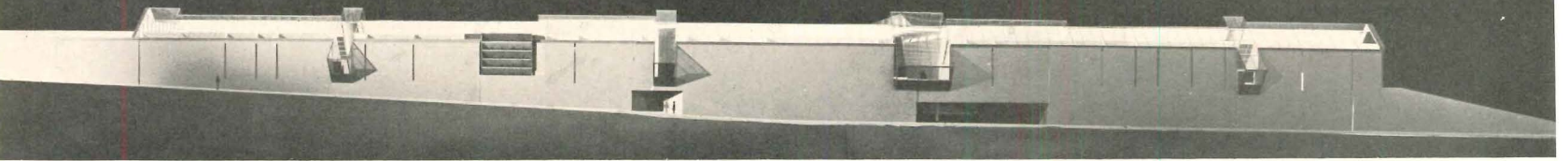


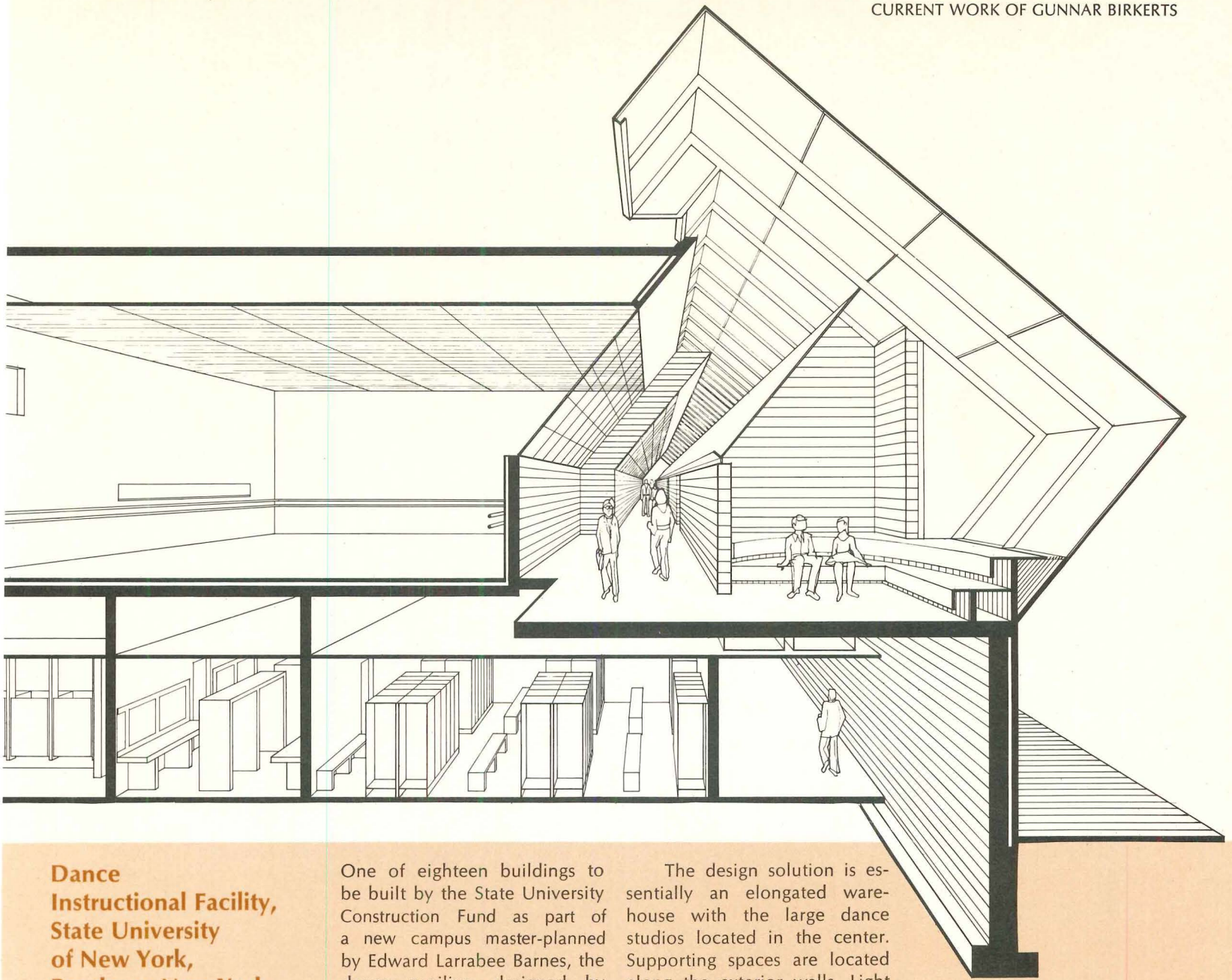
Duluth Public Library Duluth, Minnesota

According to Birkerts, in the Duluth Library he is attempting "... a dynamic architecture, suggestive of movement. All the blocks are narrow and long and so is the building. The prow points in the direction in which the city is expanding. The library itself points like a ship or a Greyhound bus. All its analogies are to moving objects. It is on its way in the direction of the linear city."

The library is essentially an object in space and complements the nearby open square to the north designed by Daniel Burnham. The overhanging top floor houses the main adult collection. The first floor, in addition to the circulation desk, contains the children's area.



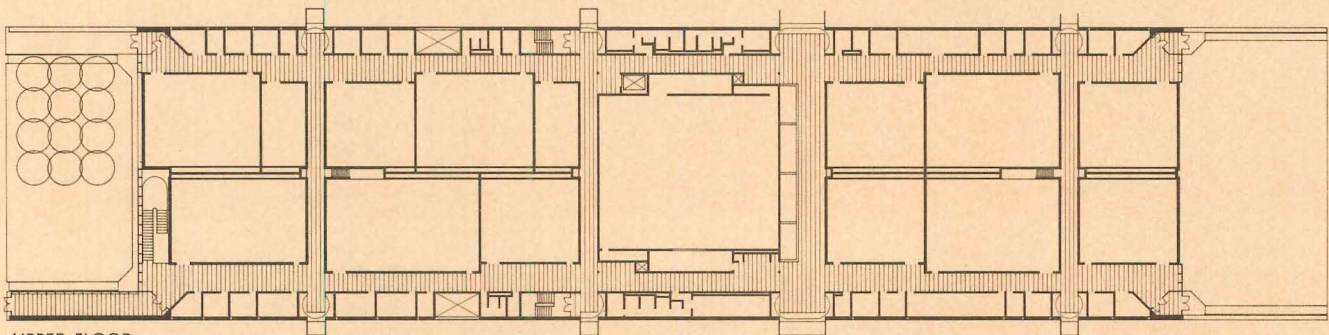




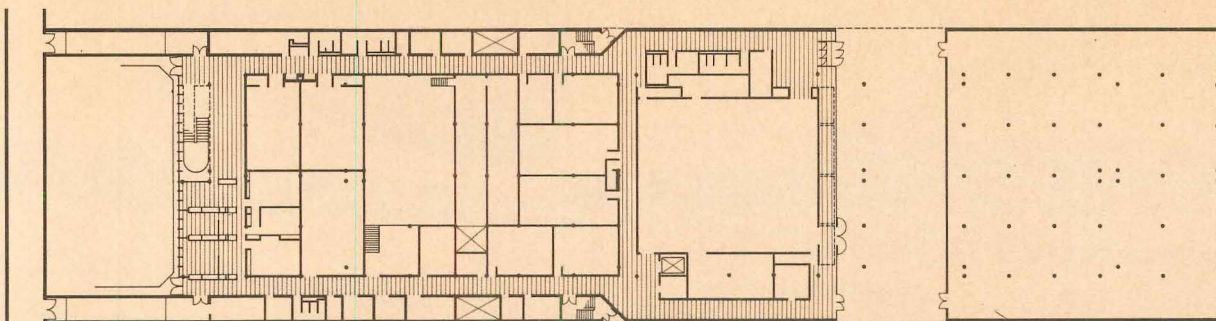
**Dance
Instructional Facility,
State University
of New York,
Purchase, New York**

One of eighteen buildings to be built by the State University Construction Fund as part of a new campus master-planned by Edward Larrabee Barnes, the dance pavilion designed by Birkerts has a linear quality imposed by the Barnes campus plan. The program called for a facility with workrooms, storage, dance studios, lounges, and practice and study areas.

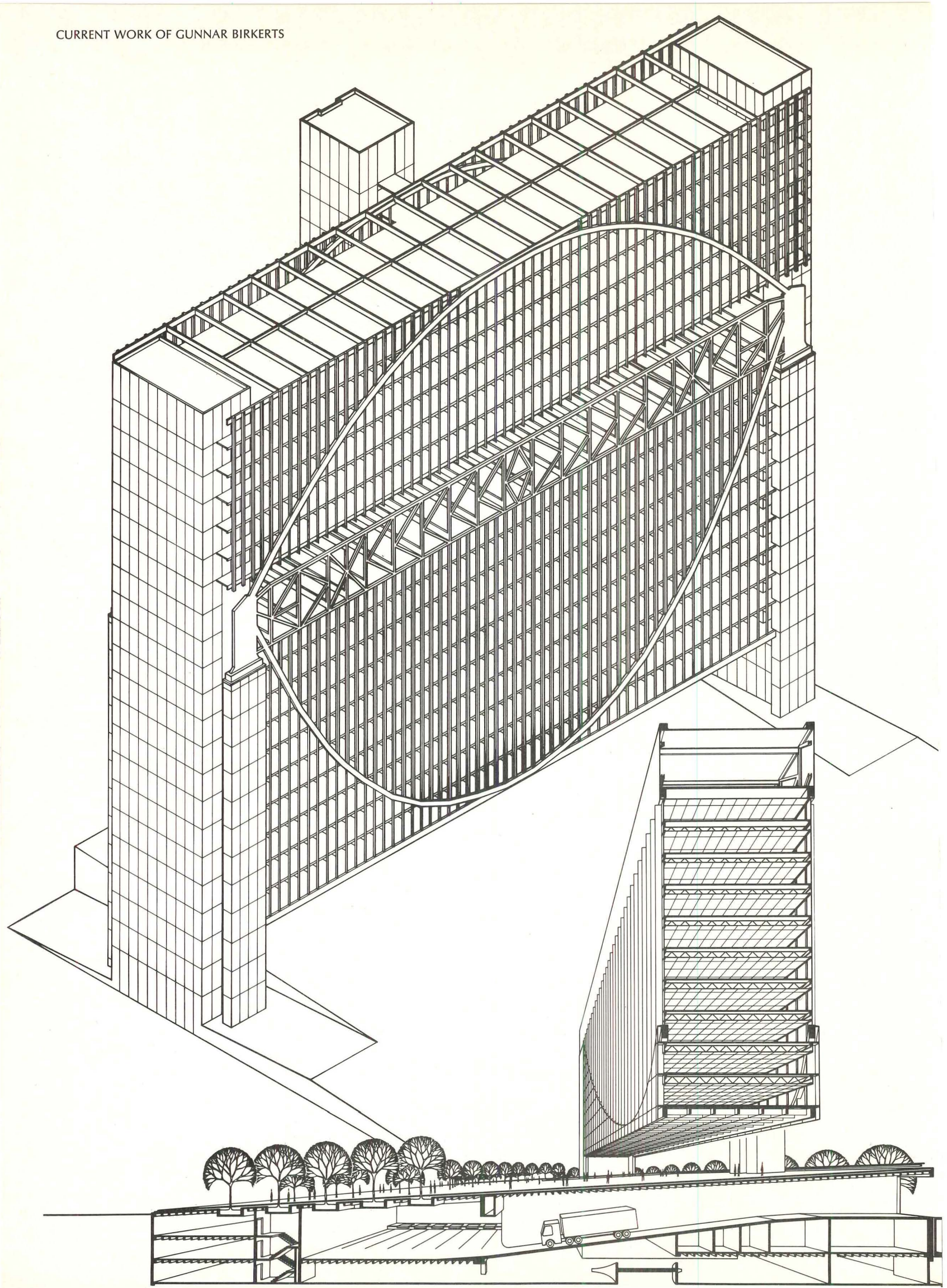
The design solution is essentially an elongated warehouse with the large dance studios located in the center. Supporting spaces are located along the exterior walls. Light enters the studios and corridors by means of an intricate system of clerestories. In the corridor lounge areas these are extended beyond the wall to become bay windows.

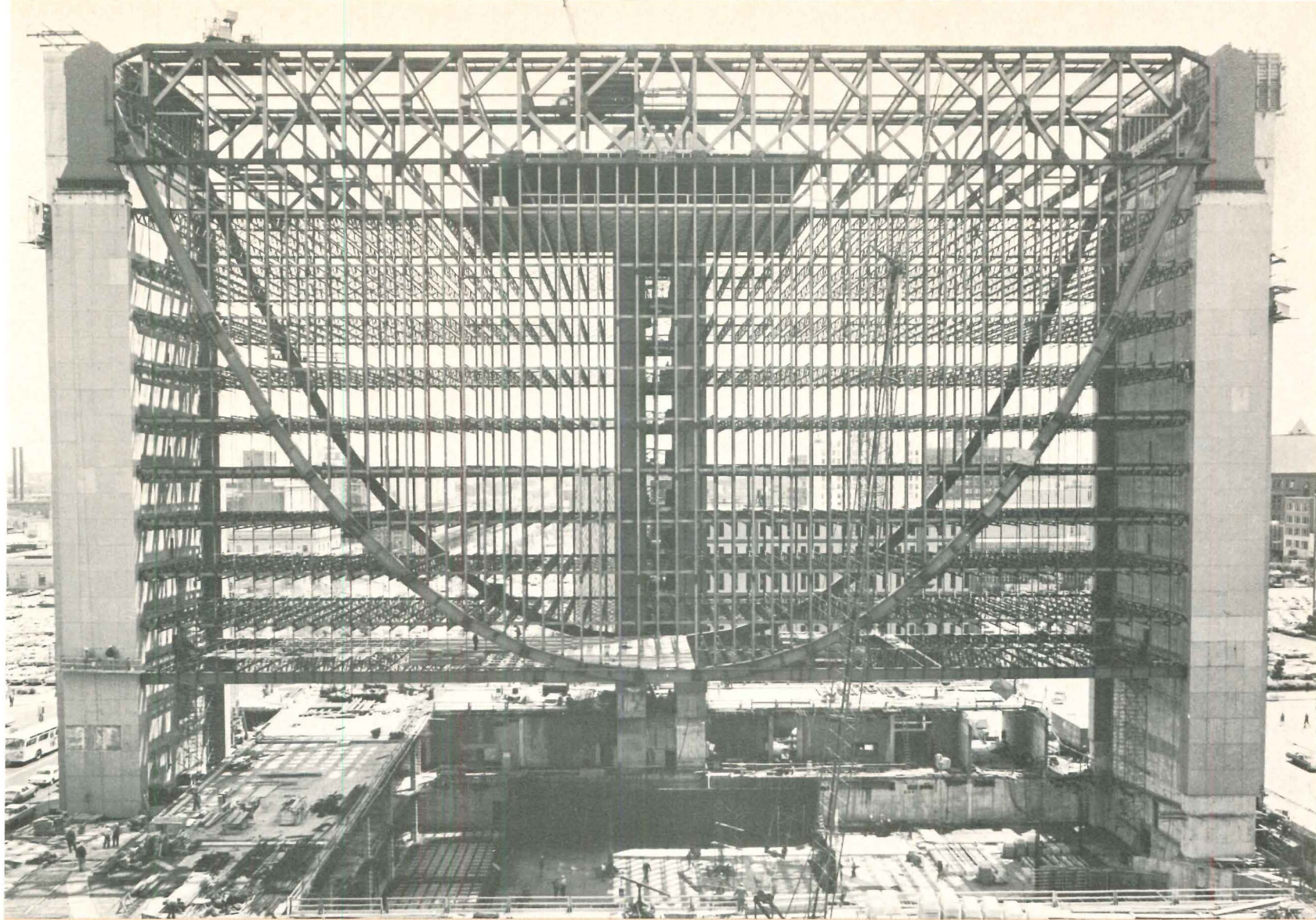


UPPER FLOOR



LOWER FLOOR

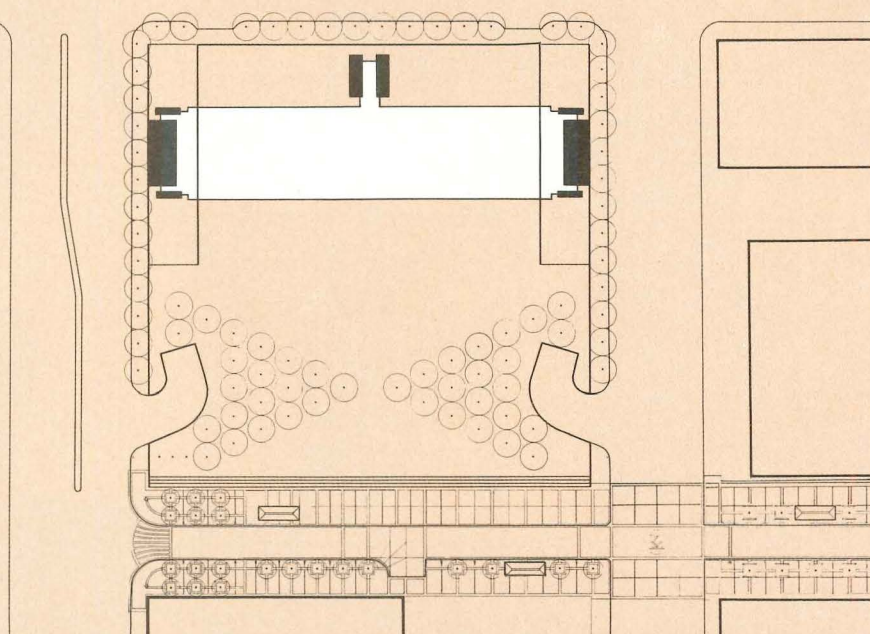
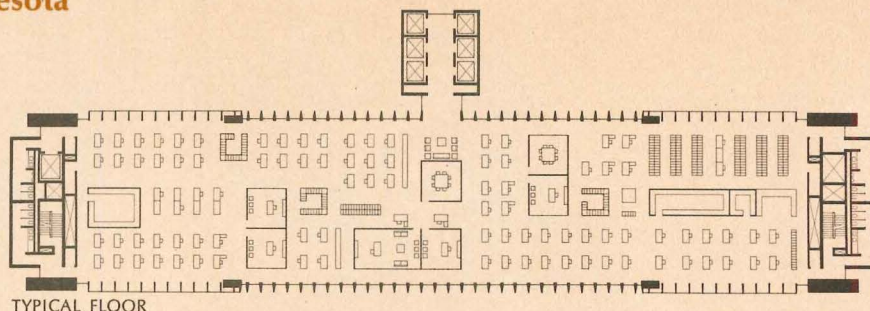




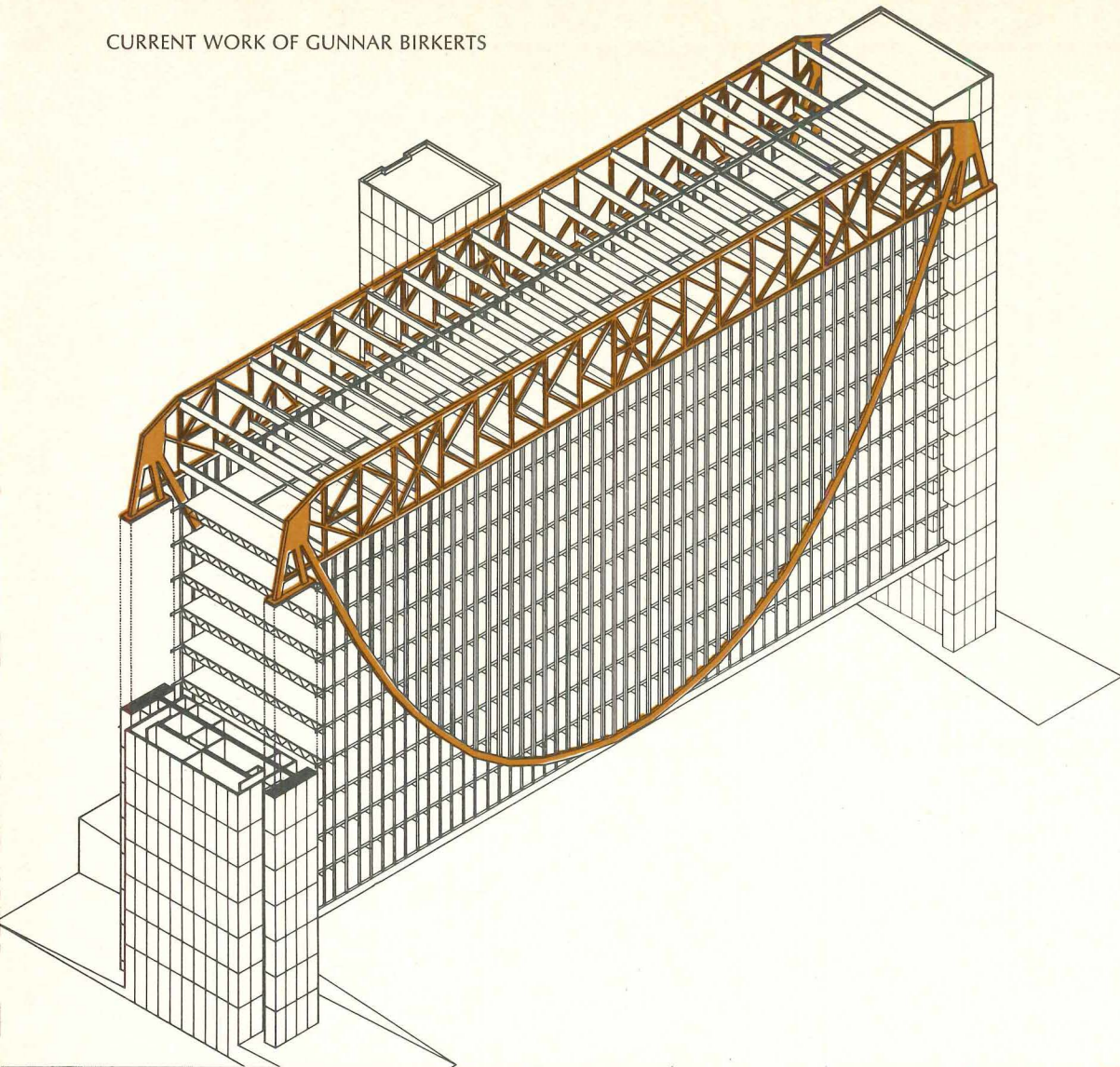
Schawang Studio

Federal Reserve Bank of Minneapolis, Minnesota

The 330-foot span which supports this bank office tower, now almost 60 per cent complete, is more than an amazing structural *tour de force*. "People love to take a boat under a bridge," says Birkerts, and a similar pleasure awaits those who will cross the broad inclined plane of the plaza, walk underneath the great structure and gaze up at its underside. While thus acknowledging the excitement his structural gymnastics will generate, Birkerts denies that he was merely trying to be the first architect to integrate a suspension bridge with a multi-story office building. He supports his structural concept with a convincing programmatic rationale which points out that because the high security portions of the bank are under the plaza and call for a complex system of truck access and turnarounds, as well as other specialized spaces, it was difficult to work out a conventional system of column spacing to support the office tower above.



PLOT PLAN

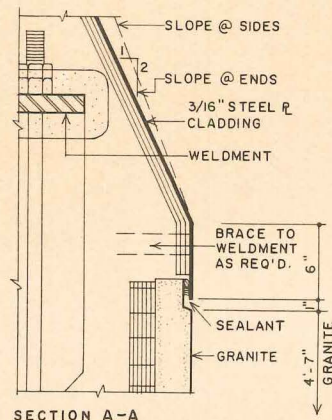
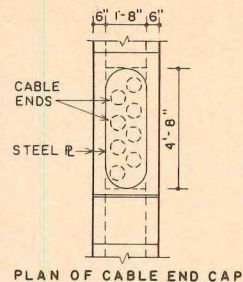


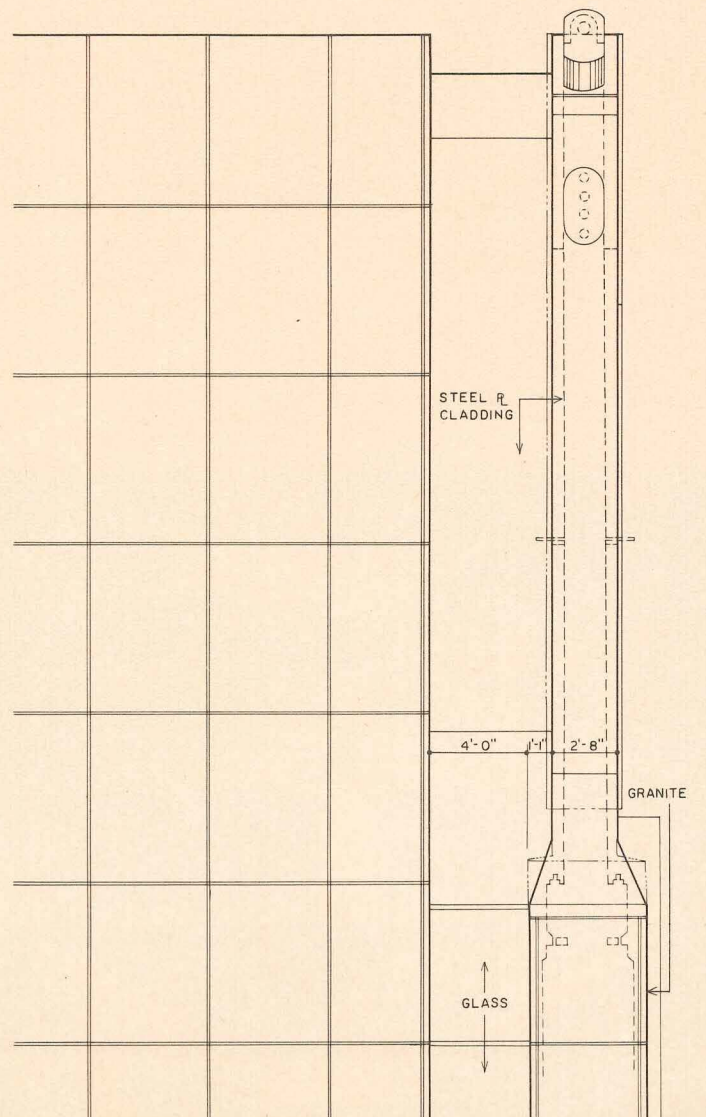
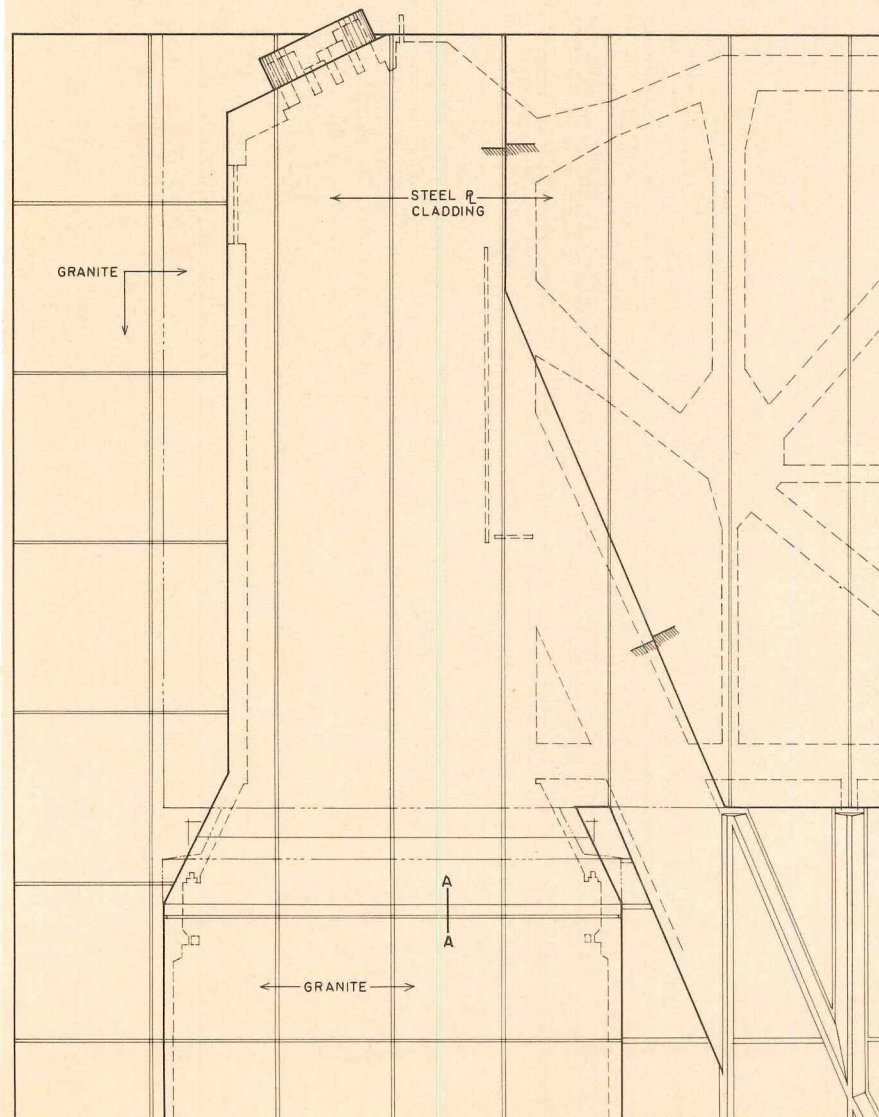
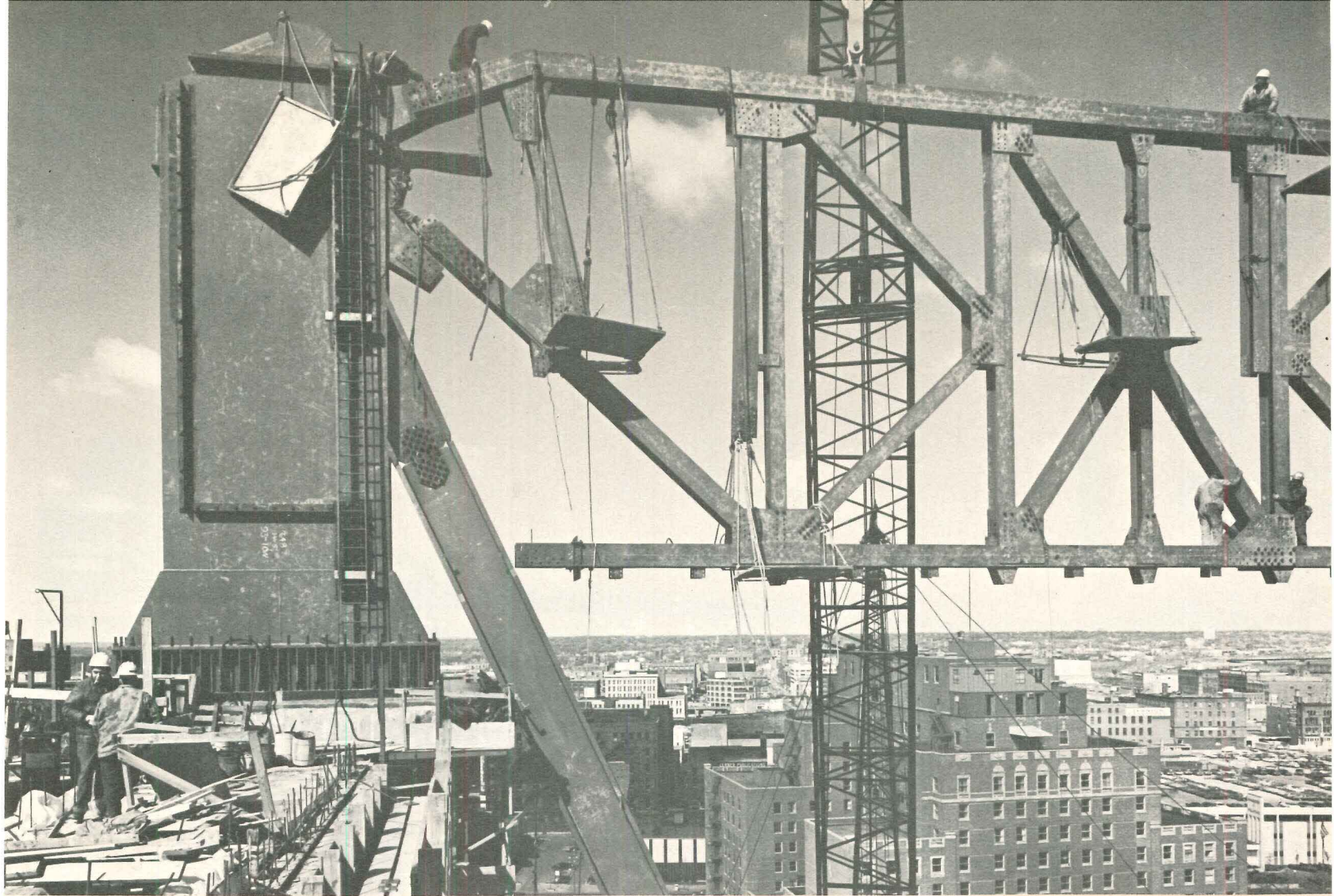
Birkerts has conceived this building as having three layers each of which he has strongly articulated. In addition to the vast underground area is the site itself—a full city block of 108 thousand square feet which, except for access ramps, the two great pylons, and the elevator core, will be uninterrupted by permanent structures.

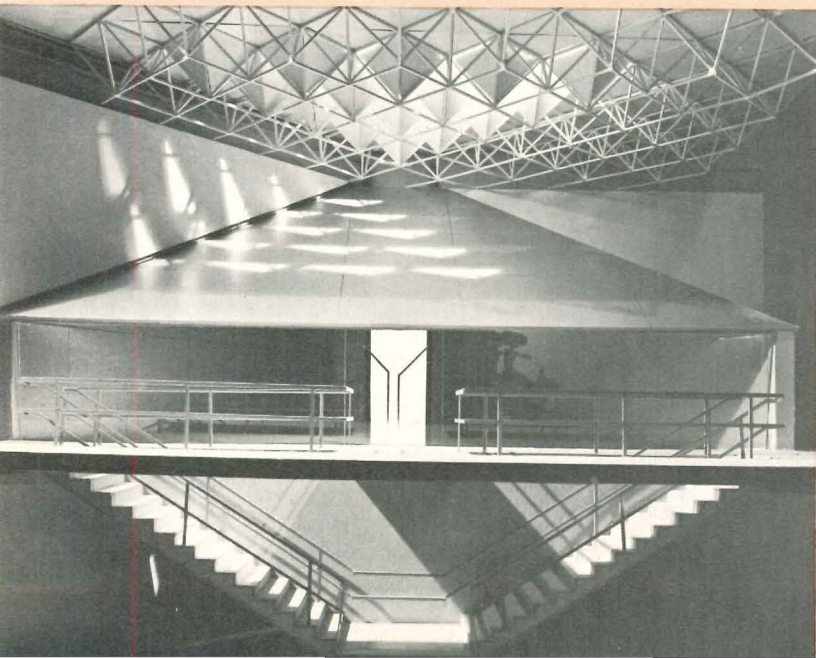
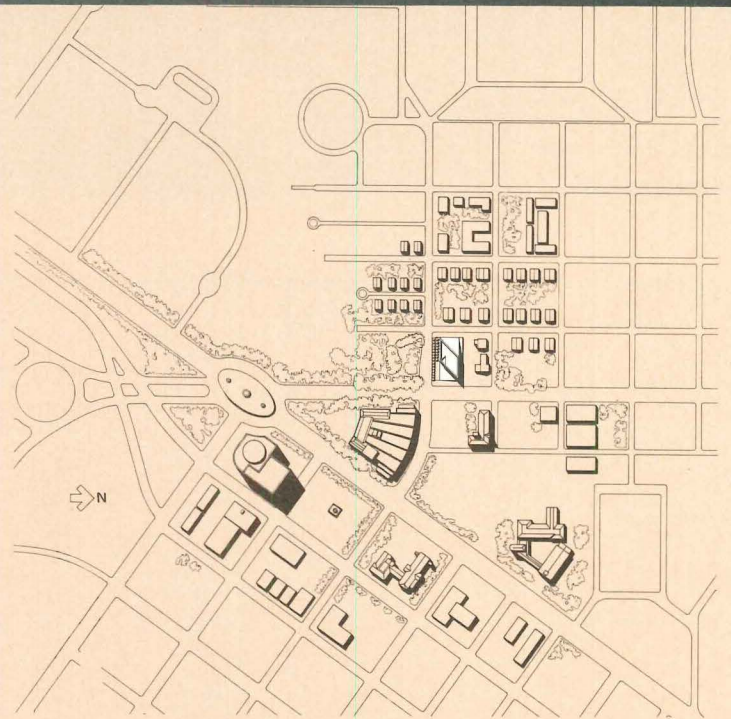
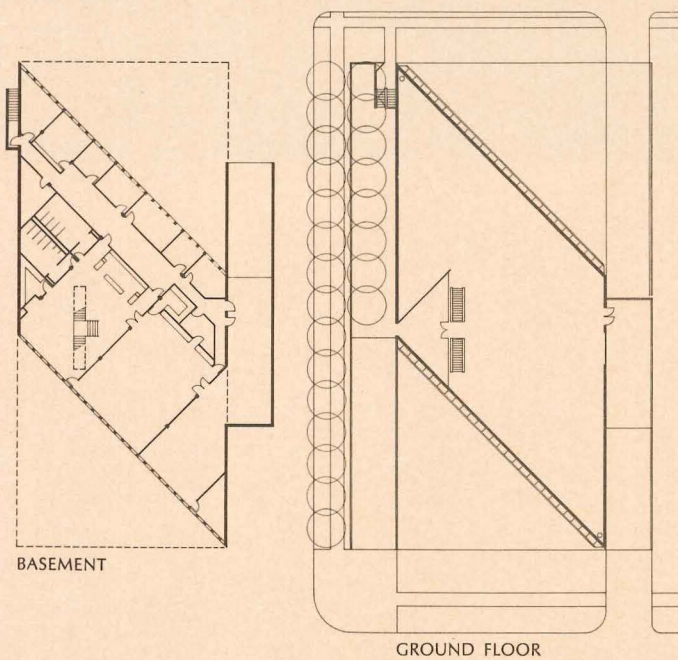
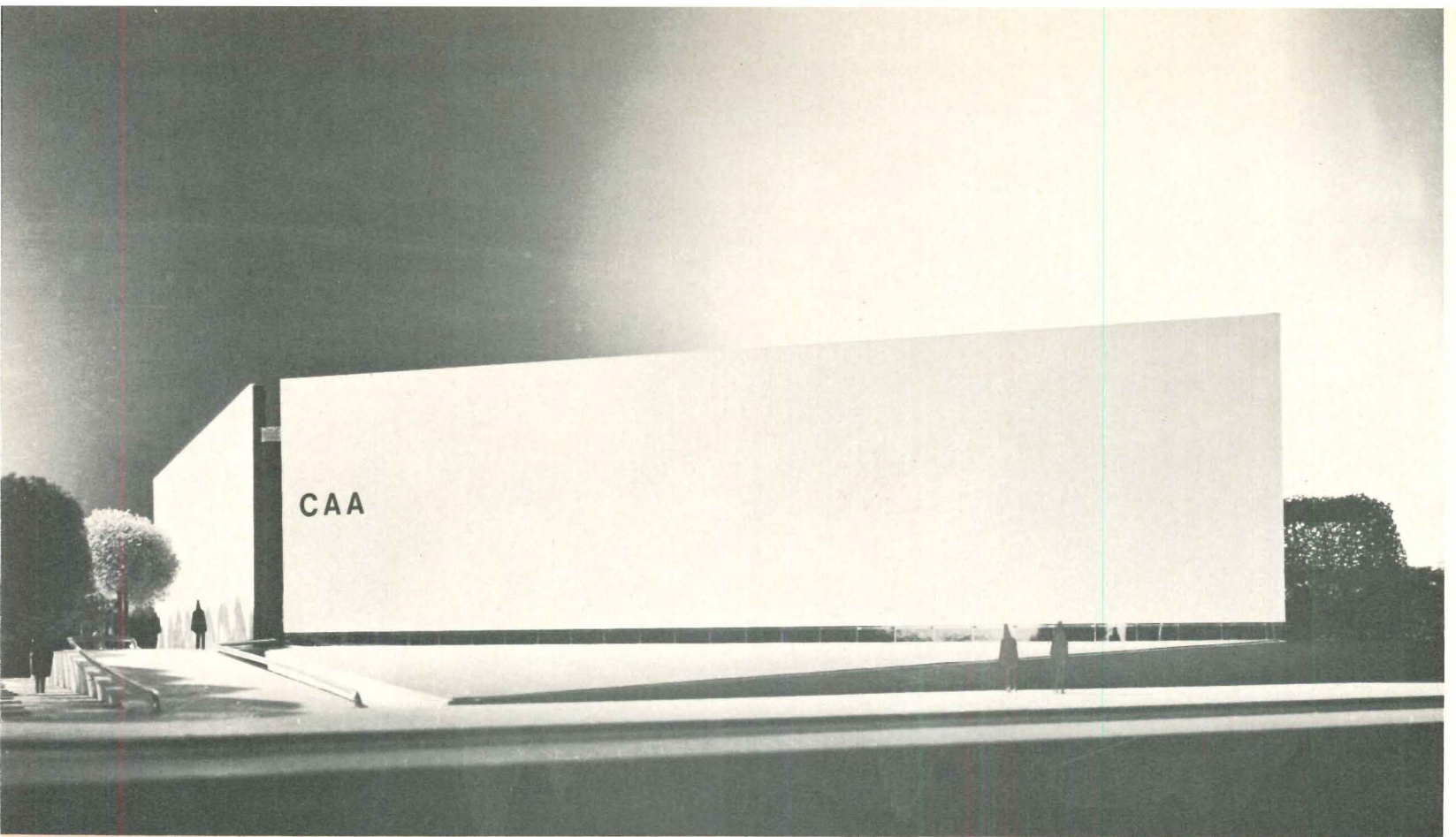
In a sense Birkerts' scheme gives this open space back to the city. The office tower can be said to occupy the bank's own air rights.

Birkerts hopes that this building will become a prototype for large scale interconnected urban structures of the future which will conserve open space in two ways: by spanning it far above the ground plane and by relegating all support facilities to subterranean levels.

FEDERAL RESERVE BANK OF MINNEAPOLIS, Minnesota. Architects: Gunnar Birkerts and Associates—principal-in-charge: Charles F. Fleckenstein, Jr.; structural engineers: Skilling, Helle, Christiansen, Robertson; mechanical engineers: Jaros, Baum & Bolles; general contractor: Knutson Construction Company.







Contemporary Arts Museum, Houston, Texas

This museum, now 50 per cent complete, is a parallelogram in plan which is clad in polished stainless steel with a space frame roof. As the site plan indicates, the building is shaped in deference to the fan-shaped Cullinan Hall, a fine arts museum by Mies van der Rohe in an adjacent block. From various secondary approaches,

the sharply angled planes of Birkerts' building both reflect and deflect traffic. Along the principal approach, however, the elongated diamond shape opens the corner and forms a triangular plaza.

From within, the parallelogram provides an extended diagonal dimension to accommodate large-scale art.

PLANNING CONCEPTS IN THE SOVIET UNION

THE IDEAL COMMUNIST CITY, by Alexei Gutnovetal, A. Baburov, G. Djumenton, S. Khari-tonova, I. Lezava, and S. Sadovskij, translated by Renee Watkins.

George Braziller, New York, 1970. 166 pp., \$2.95

Reviewed by Frants Albert. Frants Albert is currently Visiting Professor of Architecture at Washington University, St. Louis. His work has included town planning for the Navajo Indians and for California farm workers, and he is currently doing research on planning for the Government of Ghana, on behalf of the UN Economic Commission for Africa.

The Ideal Communist City is not at all an important book *per se*. It ranges from the particular to the general with the enraging naiveté of manifestos. It comes half a century after Clarence Perry's definition of the neighborhood concept and Le Corbusier's *Ville Radieuse*. One wants to read with an open mind but dialectic wordgames do not satisfy. The seemingly irrelevant illustrations which occasionally stare at you make you wonder if the Emperor is really wearing pants. The faces of the crowd look up but are not uplifted. One sees the weariness and drabness of the Potato Eaters.

But the usefulness of the book to a Western reader lies in its capacity to jolt—for it is a serious work. The authors postulate that social relationships are the basis for the man-made environment and analyze the history of settlements from this point of view, including the tribal village through the periods of slavery, capitalism in the era of a free competition down to what they call monopoly capitalism and communism. The period we are now living through is—in their view, predictably—the transition to communism. Such ideas spring from social foundations that are diametri-

cally opposite of the West's, but one needs to pay attention when new information about them is published, especially when presented as ideals for an urban life—as prescriptions for possible goals.

The authors, all members of the architecture faculty at the University of Moscow, state that, pursuant to Marx and Engels, their ". . . premises are not assumptions or dryness but concrete facts (which) can be established empirically." However, they go right on to say that, ". . . recent achievements of certain sciences . . . not only enable us to gain a picture of demography and population movements . . . but also to shape and control social processes." Social relationships are viewed, simply, as information exchange.

Three systems of social interaction are proposed: The research complex, the residential complex, and the industrial complex, which will include a fixed zone for agriculture, no longer dependent on the day-night cycle. The nature of the proposed urban environment reflects social groupings, creative activity, and the participation in the production process which is integral to individual identity in a classless communist society. We are on the verge, the authors believe, of a life where production will be automated and man's primary role will be to sit, briefly, at the instrument panel.

Planning for leisure leads the authors to a single, central club which will have space for meetings, lectures, art exhibits, seminars, and for core groups of five to nine members, enthusiasts exploring the eight basic fields of knowledge in Soviet society, plus a section for coin and stamp collectors, and one for sports. The central club is calculated to be workable when drawing on a general population of 100,-

000. The "masses" will spend as much time here as at home or at work.

Accordingly, to have a comprehensible community with a single focus, the authors have defined the main contribution of their work: *The New Unit of Settlement*, or NUS, a high-density, autonomous residential center with a fixed population or "quantum" of 100,000, without growth. Rapid transportation will connect the NUS with the industrial area and research center to form the urban region. Moreover, the concept is intended for global application, with systems of related nuclei throughout the landscape. The authors do not address themselves to the development problem or phasing, so—presumably—a NUS will be instant. They do suggest that existing cities through gradual redevelopment be carved into NUS.

Even as an idea, the concept could probably only have been formulated, at this time, in the Soviet Union. One is reminded of the ease with which central planning can deal with issues that constantly frustrate planning in the West. In principle, the NUS seems not too different from an amalgamation of Britain's Mark I new towns and Cumbernauld of the 1940's and 50's. But it is part of the planning hierarchy within the Soviet Union that is advocating the concept now, and herein lies its new importance, of course, and the significance of the book.

While a higher level of social consciousness is desperately needed in the West—in the realm of human relations and for the sake of our physical environment—a decent measure of frustration, i.e. a margin for disagreement, is no doubt the most important element to preserve as a safeguard against planners and the totally planned existence.

A CHRONICAL OF MISSED OPPORTUNITIES

GERMAN ARCHITECTURE 1960-70, by Wolfgang Pehnt.

Praeger Publishers, Inc., New York. 240 pp., hardcover, \$20.00

Reviewed by Wojciech Lesnikowski. Mr. Lesnikowski is currently a professor in the School of Architecture, Yale University. He practiced architecture in Europe before coming to this

country, and his primary work has been in the field of modular and industrialized buildings.

The following few sentences are a general characterization of Wolfgang Pehnt's Introduction, and they describe the attitude of much of the book as a whole. To Pehnt, German architecture of the last 25 years is a chronical of missed opportunities. But

the failure of Germany's post-war architecture cannot be ascribed to any single professional group. Where its architects have sinned, they have done so with the tacit acceptance of society. Each of the numerous reasons which might be adduced for the poor standard of German building and planning activities can be traced back to a decision made by society

at large, or rather to its decision to avoid decisions and to take the line of least resistance. Taboos to which the nation has become accustomed are accepted without opposition. In the Federal Republic of Germany no taboo has had a greater influence than that of the almost unbridled reign of the land and property owners.

In my view, how much this characterization reminds us of the state of architecture in this country. Indeed, a crisis of architectural creativity, the profession's lack of clear goals, and the internal contradictions in architectural education are similar in all developed countries. What is in fact left from the conceptual efforts of before World War II and the years which

followed it? What happened to the wave of research from the early '60s? Growing formalism, frustration and lack of creative power are the symbols of our profession today. We produce a few good buildings, but for a keen student of international architecture it is obvious that achievements cannot be measured by the value of isolated monuments or particular philosophies.

Yet this book records not only the missed opportunities but also those which have been seized. The book correctly emphasizes that post-war German architecture is unique; during much of the period it seemed to be under the influence of Mies van der Rohe and the large American

professional firms designing in his idiom. Then came a counter-reaction, similar to those who earlier reacted against Le Corbusier's dogmas. Buildings start to be more personalized, increasingly free in their plastic language, and sensitive. As similar counter-reactions in this country have produced such architects as Robert Venturi, Charles Moore and John Johansen, Germany has produced Hans Acharoun, Gottfried Bohm, Matias Ungers and Egon Eierman.

The book is an excellent one. The quality of the projects and photos selected is high. The whole edition is typically in superior Praeger spirit and quality. A good book with much to teach.

STATUTES, COURT DECISIONS, AND THEIR EFFECT ON PRACTICE

THE LEGAL ASPECTS OF ARCHITECTURE, ENGINEERING AND THE CONSTRUCTION PROCESS, by Justin Sweet.

West Publishing Company, St. Paul. 953 pp., hardcover, \$13.50

Reviewed by George P. Simonds, FAIA. Mr. Simonds is Assistant Dean, College of Environmental Design, and Professor of Architecture, Department of Architecture, University of California, Berkeley.

The professional practice of architecture and engineering as well as the shape of the construction industry in the United States is undergoing change. However, there may be as many opinions about the proper direction of change as there are individuals engaged in the construction process. Some see the professional role of the architect as a student and advocate of social change, as a programmer of facil-

ties, or as a developer, and others see the architect in his traditional role of skilled professional advisor to the client who coordinates the advice of the several specialist-consultants in the design-supervision process. My opinions may well differ from those of many of my colleagues. I see the practice of the profession as being influenced by the checks and balances of legal custom, statutes and court decisions, and that is why I find this book so useful.

Its author, Justin Sweet, is a member of the Faculty of the School of Law at the University of California, Berkeley where his special area of interest is contract law, and for the past three years he has offered a course in Construction Law in the Department of Architecture.

It is Professor Sweet's opinion that exercise of responsible care in the practice of architecture and engineering should not inhibit the creative process, but rather

will help develop a necessary sense of responsibility in the preparation of contract documents and interpretation of those documents for the purpose of protecting the social and physical well-being of the public, who are the clients and users of architectural works. Professor Sweet is of the opinion that law changes to meet the needs of society. Such changes follow and adjust to social and cultural change. To the legal layman, i.e., the student and professional in the construction industry, perhaps the most convincing aspect of the book is the use of court decisions to illustrate principles. The architect or the contractor tends to think "you can't do that to me." To read a case on a given problem and to see the logic of the finding coming through the mass of material cannot fail to impress said architect or contractor with the importance of a minimal basic understanding of the legal aspects of his work.

ADDITIONAL BOOKS

ARCHITECTURE 2000: PREDICTIONS AND METHODS, by Charles Jencks. Literate speculation on the future of Western architecture occupies a large portion of this book, and it is certainly the realm of ideas Mr. Jencks intended to emphasize. But equally important is his system of architectural classification—his framework for organizing current formal tendencies in architecture and past and present architectural ideas. One might guess that Mr. Jencks did not want to emphasize architectural classifications at all—his earlier book with George Baird was in part an attack on many of the older systems we use—but he has his own, nonetheless, and it is an original format. The first chapters talk about various rules for self-discipline that are necessary when thinking about the future, and explain why it is useful to attempt predictions at all. These issues established, Jencks presents the predictions within the framework of his classifications,

each of these getting a chapter. Jencks talks about the unselfconscious tradition, the selfconscious tradition, the activist tradition, the intuitive tradition, the logical tradition, and the idealist tradition in architecture. Jencks has made these six groupings overlapping, and they describe the polarities within architecture between which individual designers and theorists tend to oscillate; mostly, any single designer is a combination of each. Classifications by period or by style have not seemed very useful recently (perhaps they are merely out of fashion) so Jencks' emphasis on the ways we think about architecture is current and necessary; he shows us the similarities in different architects' conceptions. It is pointless to call for the end of all such systems, of course; if any can be commonly agreed upon, they have the power to greatly expand our ability to communicate.

Through the predictions and the classifications, the value of the book lies in

the clear connections between architecture and society that Jencks shows us. Modern buildings are guided by the same quasi-scientific rationality as the institutions that commission them; they are rooted in the marketplace. They must deal with such technical problems as our exploding need for mobility, and with the broadest personal and psychological issues, like an individual's simultaneous longing for freedom and order. Architectural forms can be successfully interpreted as an artistic synthesis between such contradictory forces as these, and the interpretation can tell us new things about what we are as a culture. The interpretation may even be able to broadly outline what we hope to become. Jencks does have the ability to describe architecture for us in this way, and to be plausible about it.

—R. J.

Praeger Publishers, Inc., New York. 128 pp., illus., \$3.95

Continued on page 214

A TIMELESS MODERN HOUSE

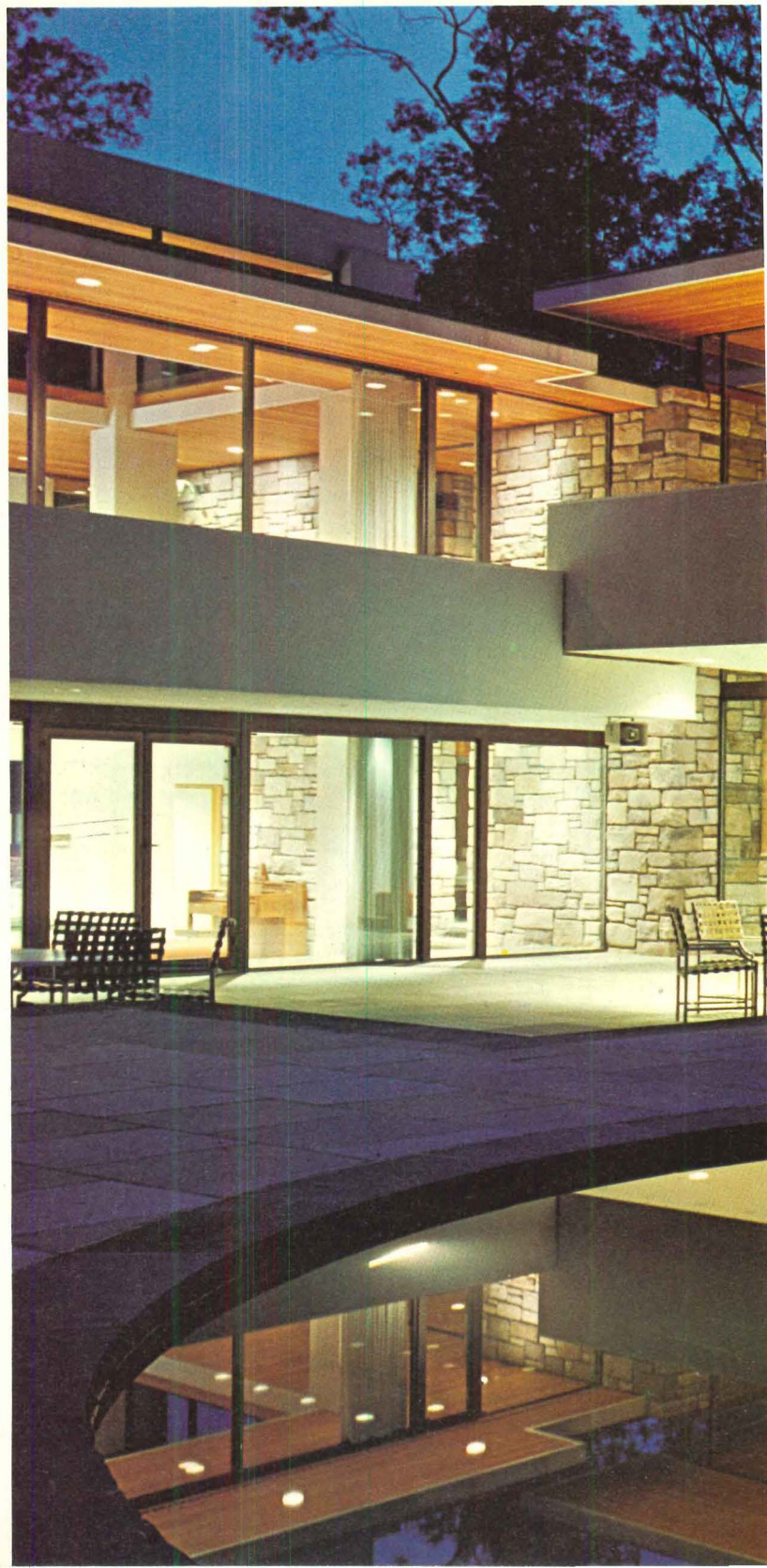


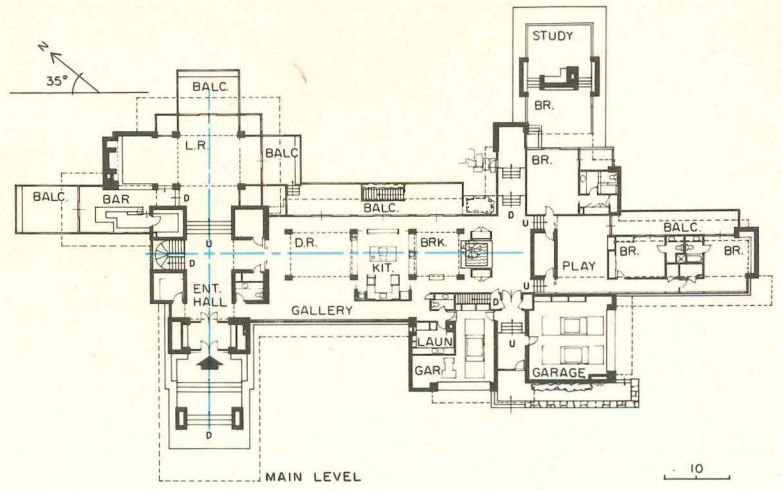
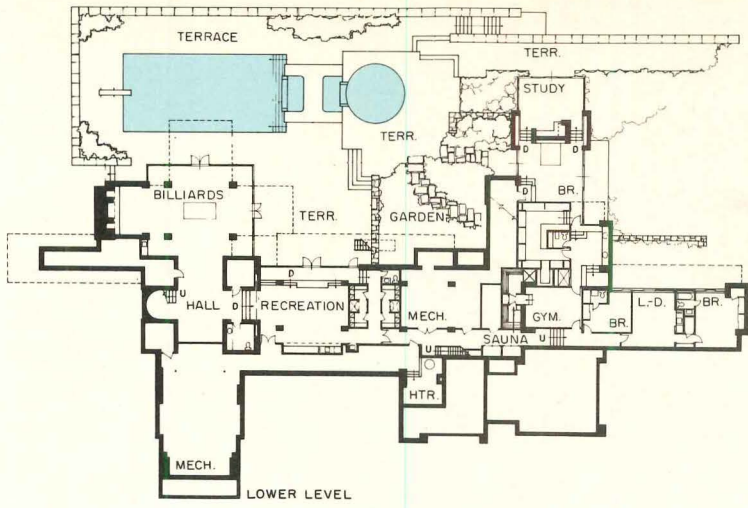
Norman C. McGrath photos

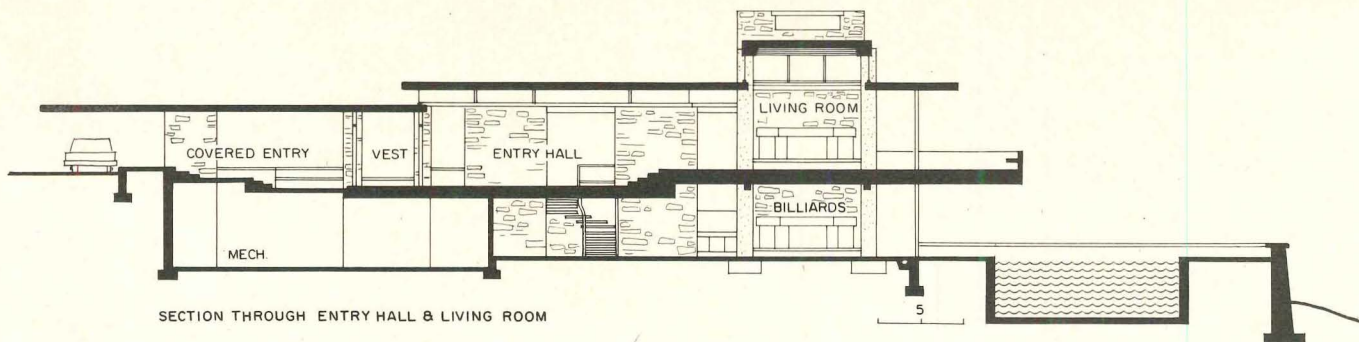
Many architects today feel that low-income housing is far more important than the design of single-family houses, especially on the grand scale of this one in Lakewood, New Jersey by Donald C. Mallow. Those people may turn immediately to the Building Types Study on Low-income Housing, page 123. Architects who feel, however, that architecture must always balance delight with utility, will find these six pages immensely stimulating. There are those who will say that the owner, Robert Schmertz, who has built several "Leisure Village" retirement communities across the United States, has not cared to endow those projects, a variety of low-income housing, with architectural grace. But Schmertz is secure in the knowledge that he has given the people what they want, something architects themselves do not always do, says Martin Pawley in "Architecture versus Housing," a new book discussed on page 124. What most architects will agree on, however, is that the realization of this house has demanded as much restraint and taste from the client and his wife as from the designer. It is a building, one of Mallow's first as an independent practitioner, that does not rely upon innovation or design tricks for its impact. Rather it is impressive as an example of thorough mastery of a wide range of architectural ideas synthesized with clarity and intellectual economy. As any architect who has designed a large house knows, realization of the complex program can be infinitely more difficult than that for smaller houses. Traps such as misunderstood scale, much-too-complicated plan relationships, overly-elaborate materials and finishes all can destroy the esthetic validity of the architect's intent. Mallow has avoided all of them. Designer of the interiors, furniture and landscaping as well as the building, he has produced a timeless modern house. —James D. Morgan



In the design of any house, as important as the solution of the program is the way in which the architectural forms relate to the site. Instead of placing the long axis parallel to the contours of the hillside, Mallow has tucked the private end of the house, above, with its many small rooms, into the grade and allowed the living room pavilion to stand free. A steel structural system, using 110 tons in all, not only permitted the cantilevered balconies and mitred glass corners of the pavilion, right, but on the entrance side, using an 8-inch car channel, permitted crisp fascias which clearly articulate the several changes in roof planes and which contrast with the Delaware Valley sandstone walls. Nowhere is the subtle scale, one of the most evasive architectural qualities, more obvious than on the terrace around which the house wraps. On one side the pavilion, seen at its crystalline best in the twilight. On the other, above, the master bedroom suite which gently steps down the natural grade, conveying its intimate quality. In front of the pavilion, a carp pool and a swimming pool, which seem to flow together, lie on axis with various parts of the house. These relationships, not obvious at first, tie the whole composition together in ordered serenity.







SECTION THROUGH ENTRY HALL & LIVING ROOM



Perhaps the single most interesting architectural event of the Schmertz house is the 127-foot-long axis from the porte-cochere to the balcony overlooking the swimming pool. The section above illustrates one of architect Mallow's rules for assuring a sense of order as one moves through the house: When the floor plane changes levels, the ceiling plane remains constant; the ceiling plane changes only when the floor plane is constant. From the 7-foot 6-inch ceiling at the landing, right, to the high degree of enclosure within the vestibule, there is an increasing sense of compression, far right. Then, when one reaches the base of the steps up to the living room, right above, he not only sees the clerestory for the first time, but to his right can see the dining room-kitchen axis, page 118. Yet the explosion of space that occurs when one enters the living room, above, is unexpected nonetheless. Scale, enclosure, texture of materials, careful detailing and most important, light, have been used to create a powerful example of axial composition.







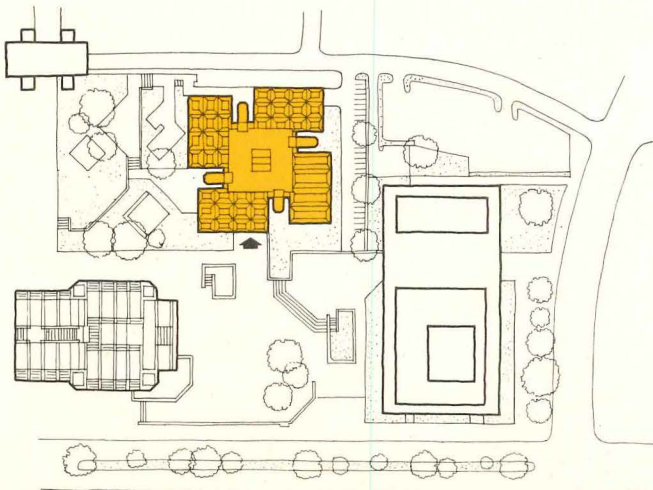
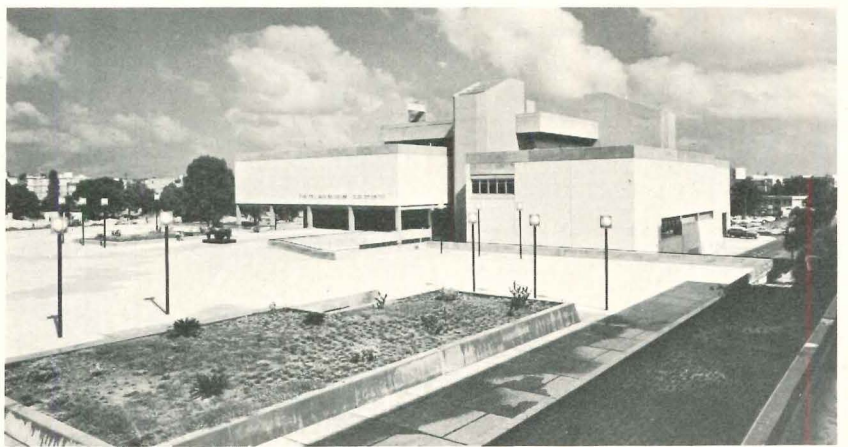
The dining room, kitchen and breakfast room form the link between the public and private segments of the house (see plan, page 115). Clerestory windows around raised roof section fill the dining and breakfast room pavilions with sunlight all day long. The dining table as well as most other pieces of furniture were designed by the architect. The kitchen, looking toward the dining room, below, is equipped to handle large dinners as well as daily needs. Facing the pools and the lake, a glazed arcade connects the dining room and the daily entrance, below left. Sliding glass doors allow easy access to the adjacent balcony with its stair down to the multi-level terrace.



RESIDENCE FOR MR. AND MRS. ROBERT J. SCHMERTZ, Lakewood, New Jersey. Architect: *Donald C. Mallow*; engineers: *Sadler Associates (structural)*, *Peter Bruder (mechanical)*; lighting consultant: *Donald Bliss*; interior design and landscaping: *Donald C. Mallow*; general contractor: *Robbilt, Inc.*



*Israel's
newest museum*



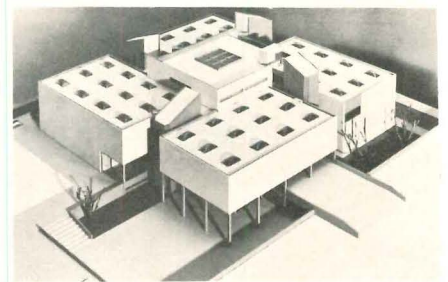
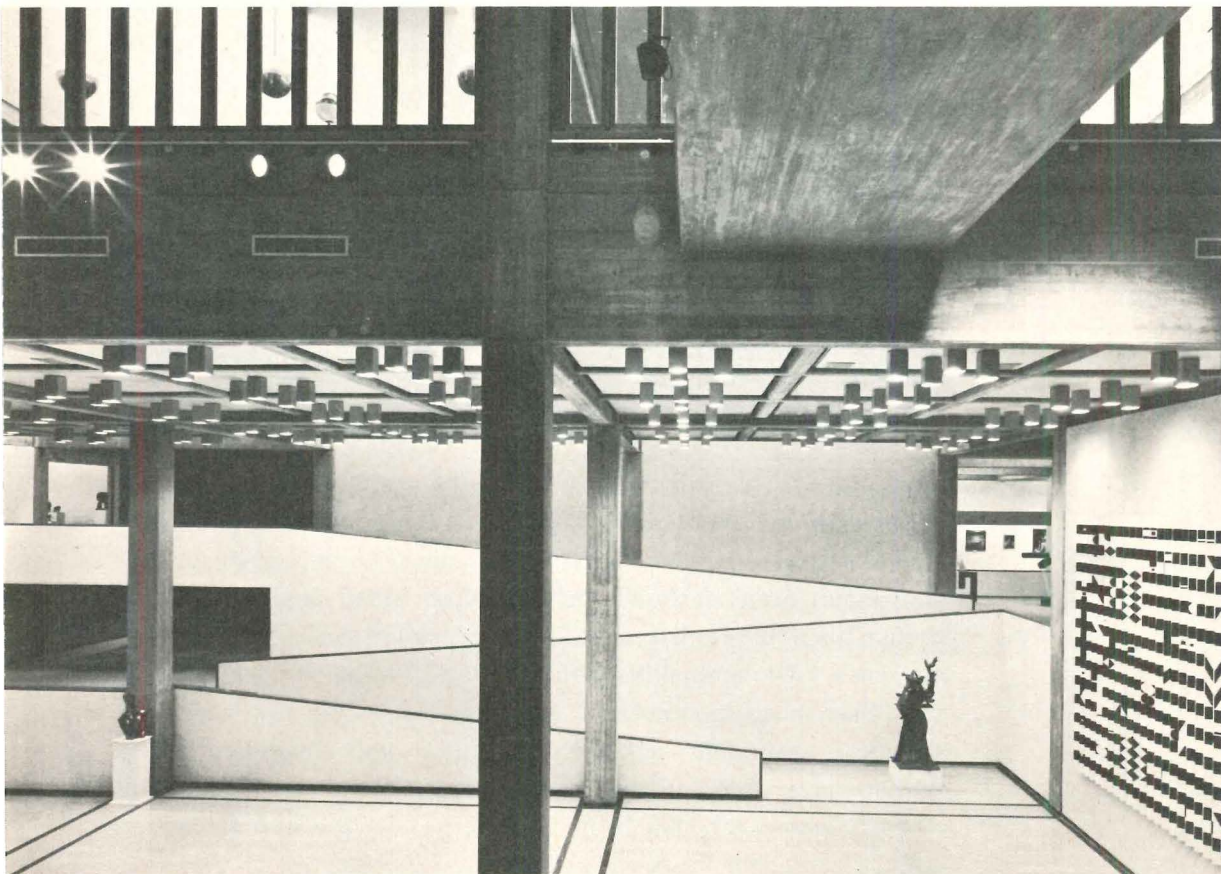
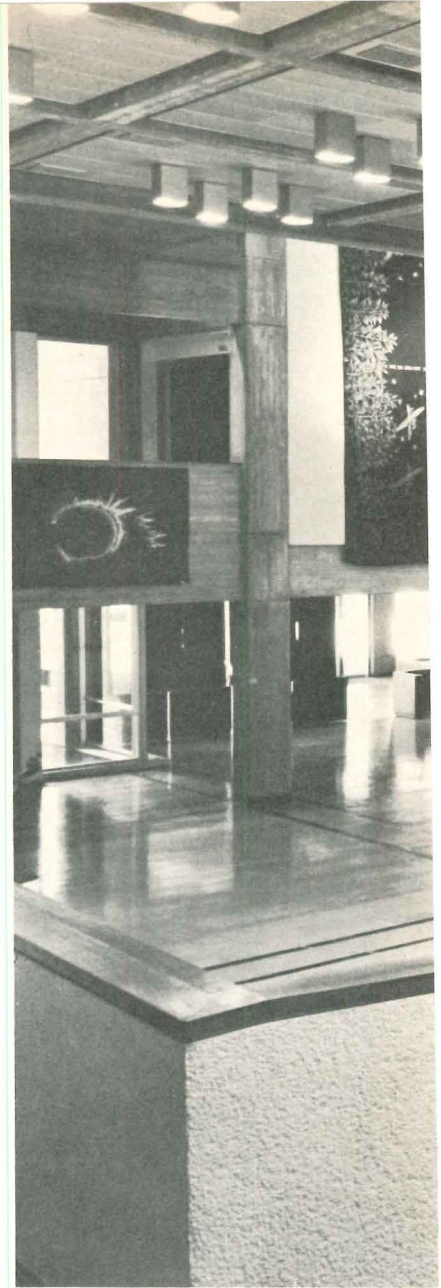
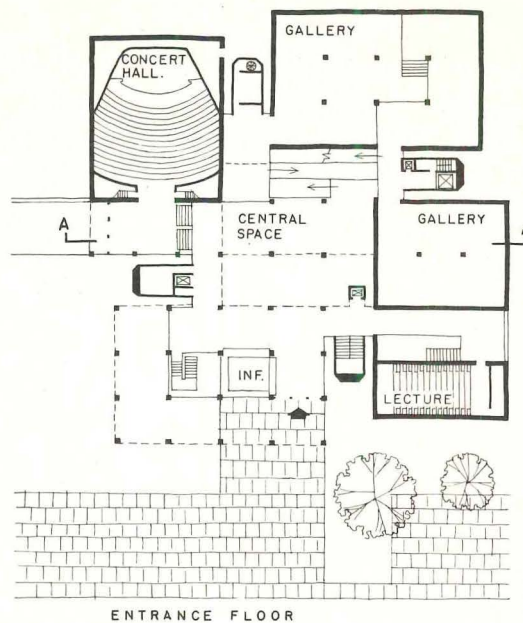
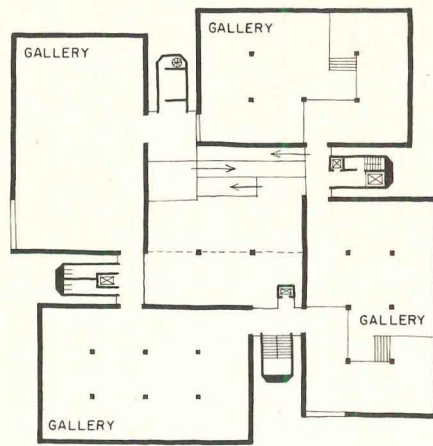
The building itself was the best exhibition at the festive opening of the new Tel Aviv Museum last April. In a city necessarily built largely for commodity, the new structure indicates a turning point towards a stronger, more dynamic and individual Israeli architecture. The design, by architects Itzhak Yashar and Dan Eitan, was awarded first place in a 1964 national competition; Italy's Bruno Zevi, who headed the international architectural jury, especially cited the building's simplicity, tranquility and the organization and circulation of the spiraling plan. And laudably it has been built, with few exceptions, in accordance with that original design to be the hub for a new cultural center for Tel Aviv. — *Herbert L. Smith, Jr.*

With over 3,000 people from Israel and abroad in attendance (including Israel's President Zalman Shazar, Prime Minister Golda Meir, and Minister of Foreign Affairs Abba Eban), the gala opening of the new Tel Aviv Museum more than proved the contention of architects Yashar and Eitan that their winning design would provide easy circulation for such crowds and comfortable display of a variety of exhibitions.

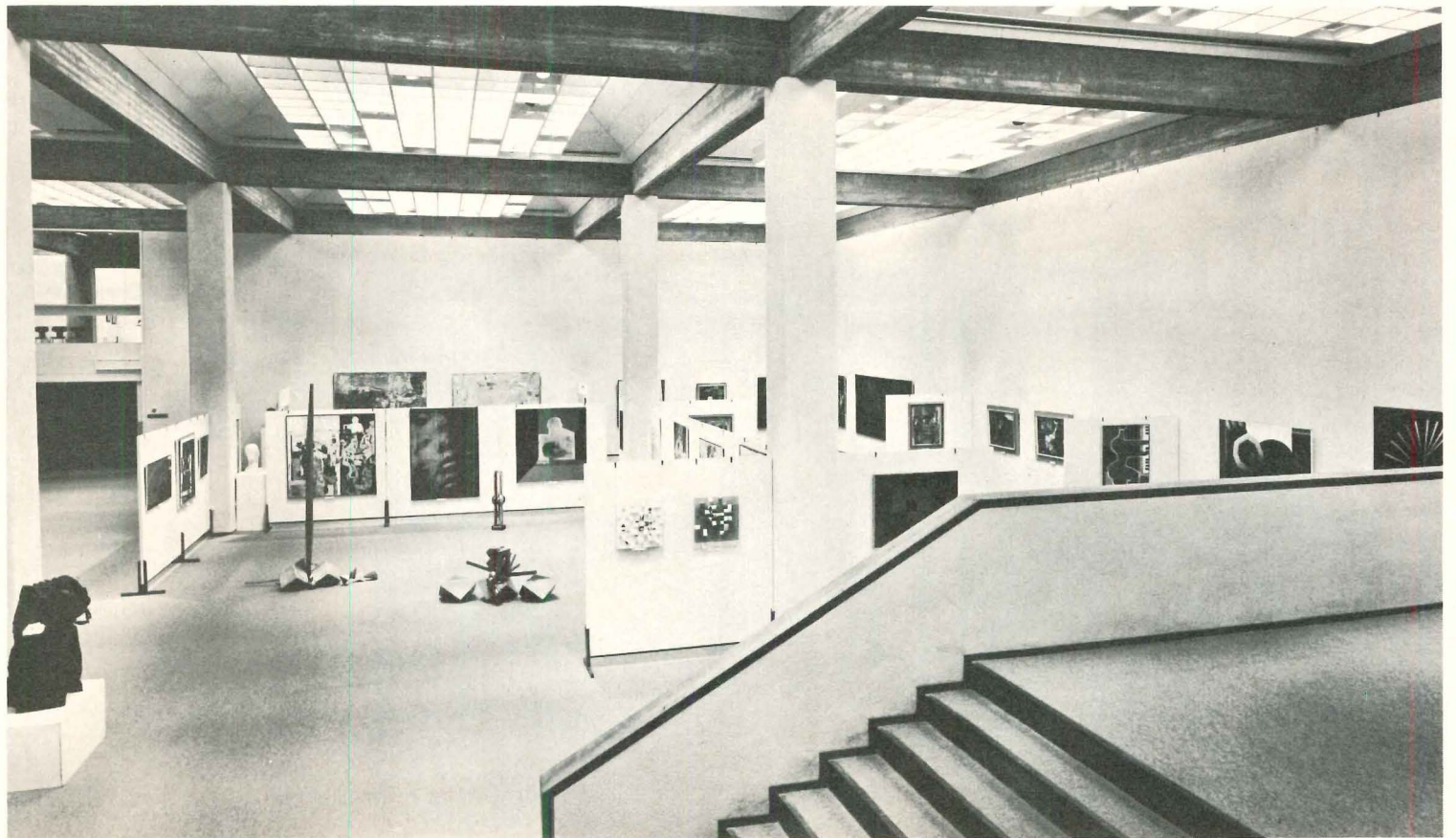
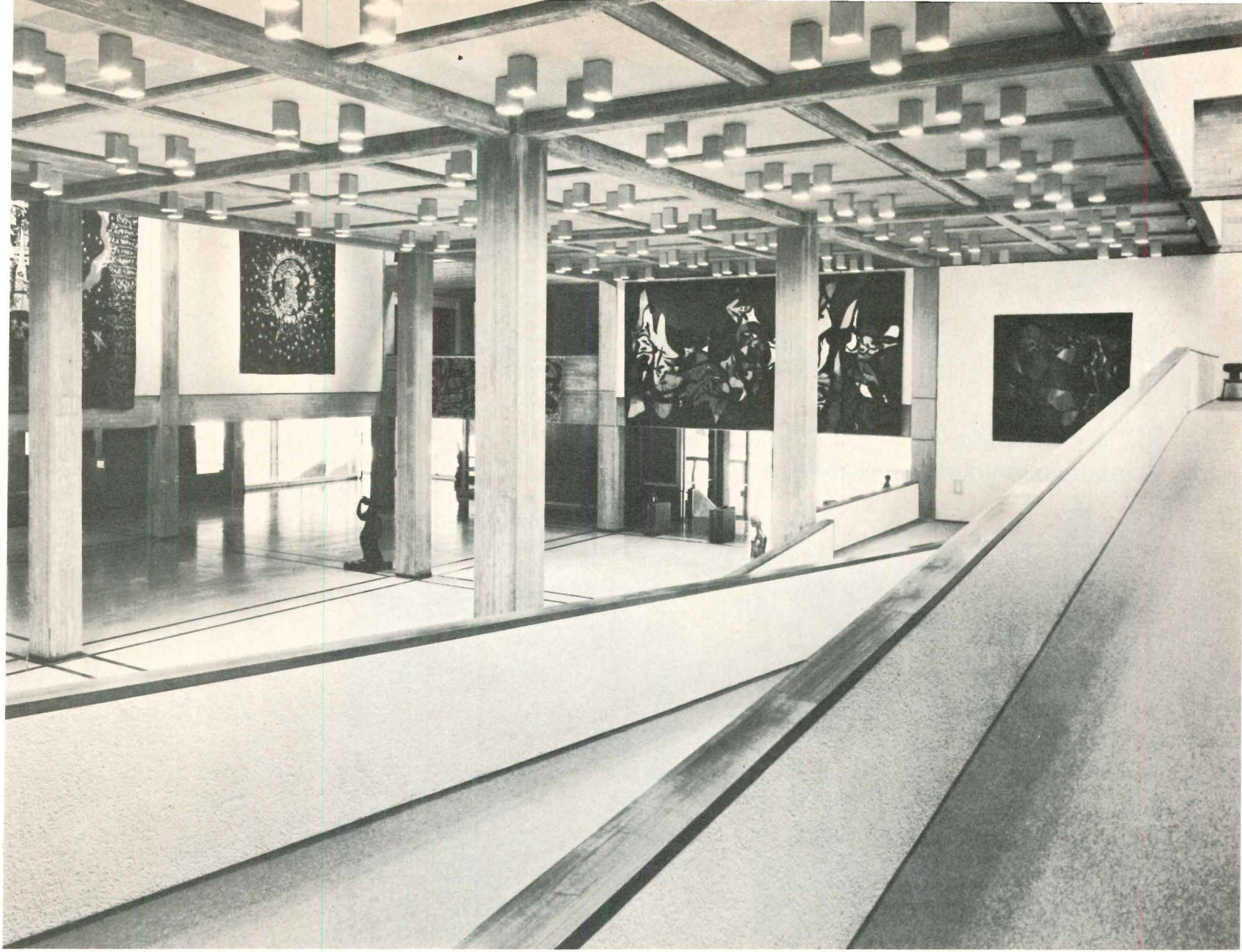
The plan compactly spirals four big galleries around a huge central "festival opening hall," each gallery being a half-level above the other. These are interspersed with stair and elevator towers which, with the dramatic lacing of ramps in the big hall, offer a variety of access in addition to the progress up through the galleries themselves. Each of these elements is expressed with great simplicity and clarity both inside and out, and their almost sculptural interplay gives a vigorous silhouette to the exterior; subtle variations in color and texture of the building materials make each of the elements unmistakable and refreshingly easy to comprehend.

It is not a "grand" museum, in spite of the size of the hall and galleries. In fact, being set into a drop in grade level, it seems much smaller than it is when seen from the outside. Its appearance of having few windows is also belied inside: there is practically no space—including the links between galleries—where one cannot look across and up to the outdoors.

It is instead a strong and articulate, but, in Bruno Zevi's words, "tranquil" setting for people to see and appreciate art with ease and comfort—which is, after all, what a museum is for.



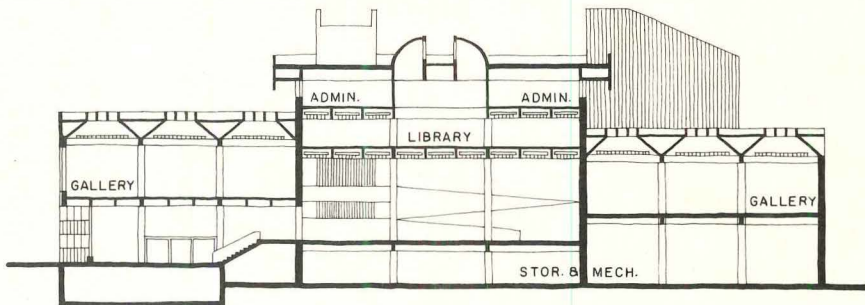
The model of the museum (above) shows the simple, clear organization of galleries and stair towers around the central block which contains the central hall (top) and library and offices above it. The library has balcony-like openings into the central hall (left). All the major spaces have skylights and toplighting, with suspended baffles to screen the glare. All materials are forthrightly handled, and the concrete frame left exposed. The stair towers are surfaced with rough, ribbed concrete which gives a distinguishing contrast to the exterior marble panels. The latter are perhaps the one finicky bit of detailing in the building, but caused, one was told, by a tardy substitution of the small donated stones for big precast panels.



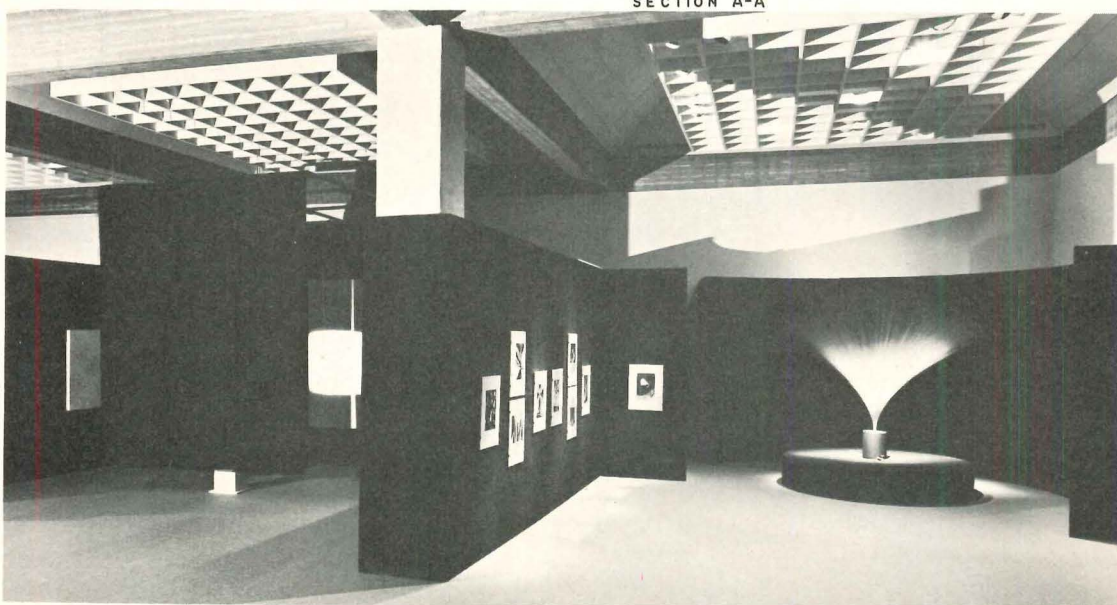


The four main galleries contain 8,500 sq ft each, with the top one (left) free of columns for the display of sculpture. Skylights can be baffled (bottom) for special lighting of exhibits. The building cost about \$4 million and contains a total of about 130,000 sq ft. In addition to spaces indicated on the plans and section shown, the building contains two smaller exhibition halls, a cafeteria and an outdoor sculpture garden.

The mounting of the opening exhibits was handled by the museum's director, Dr. Haim Gamzu, with appropriate restraint to let the building be the star—but the big, nicely proportioned spaces, multi-levels and unexpected openings should provide for some powerful, imaginative stagings for the future. One of them should be on what many consider to be the best of Israel's contemporary arts—the fine, dynamic architecture that is being built throughout the country.



SECTION A-A



THE TEL AVIV MUSEUM, ISRAEL. Architects: Itzhak Yashar and Dan Eitan, assisted by Dany Raz and Moshe Ashkenazi; engineers: Yaron and Shimon; supervisory engineer: Moshe Kogan; consultants: David De Mayo (interiors), Arnon Adar (lighting), Yahlom and Tsur (landscaping); contractors: Ramir Contractors Co. Ltd., J. Udassin.

Low-income Housing



Banneker Homes in San Francisco's Western Addition, above and pages 130-131, won an Honor Award in HUD's fourth biennial Awards for Design Excellence for government-insured low and moderate-income housing. With extremely limited means, Joseph Esherick and Associates has produced low-income housing with **style**. That's important to emphasize because this Building Types Study is not as concerned with the esthetics of the buildings as how they got built and how people use them. Yet as architects, we must never forget that if we don't care about quality design, no one else will. There are three parts to the Study: the first is a look, beginning on the next page, at the architect's involvement in low-income housing; the second, on pages 128 and 129, a survey of some CDC accomplishments in housing and a report on the general status of CDCs at the moment; finally, four low-income housing projects, each with an interesting story behind its development.

HUD has announced that production of government subsidized low- and moderate-income housing more than doubled in 1970 to 470,000 units. HUD predicts 585,000 units in 1971, another 25 per cent increase. Three factors are cited for these dramatic increases: First, funding is now coming from Congress; second, HUD claims it has made great progress in reducing processing time and other red tape; and third, many builders who avoided government housing programs during the fatter years have shifted to keep their organizations alive during the over-all housing production decline. It is ironic to think that it has taken a recession to focus the building industry's attention and interest upon a problem that has seemed so important to architects for so long.—James D. Morgan

**“How can architects help produce housing people really want?”
—some new points of view on an old question**

The blame for our society's failure to deal adequately with the need for low- and moderate-income housing lies no more with architects than with any other group of citizens. But since the attempts architects have made to improve such housing over the past half-century have not helped significantly, perhaps it is time to listen to a point of view held by some younger architects. To them, there seem to be three ways that architects can begin to help produce housing that people will really want: First, by looking at society as it really is; second, by becoming political activists; and third, by reconsidering esthetic realities in terms of our society's actual visual preferences.

These architects, who realize that older colleagues have pondered these questions in their time, have nonetheless come to the conclusion that, far from being the savior of society through good design as the Bauhaus implied, the architect must truly be society's servant if his work is to have any relevance. Thus, some of the brightest architectural graduates today flock not to prestigious big city offices, but as VISTA volunteers to the CDCs in the big city ghettos. There they learn about the life-styles of people often very unlike themselves, with all the intangibles so difficult to fit into an architectural program. They learn not to make assumptions about social patterns; they learn not to “design for” but to “design with” their clients. They have come to believe deeply that change occurring on all levels of society no longer permits monumentality in buildings—not even when cloaked in the latest mode of design.

The experiences gained in such situations consistently lead to new political awareness. It is no wonder that many trained in archi-

ecture find politics so unsettling. Consider a brief list of their comparable qualities:

<i>Politics</i>	<i>Architecture</i>
Pragmatic	Idealistic
Emotional	Rational
Short-term	Long-term
Chaotic	Orderly
Power-oriented	Professional

To young architects, “politics” does not mean “corruption,” but rather all human interaction. Yet, much that architects are taught seems at odds with the spirit of pragmatism that makes society work—the compromises that are necessary in normal daily human affairs. But more and more architects are balancing their professional inhibitions with the conviction that they must actively help improve society if it is to change at all. Many have flocked to *Common Cause*, for instance. A few are even venturing beyond zoning board membership in their communities to positions with actual legislative power. More and more are assuming positions of active political importance in the shaping of the urban structure—as did the founders of New York City's Urban Design Group (RECORD January, 1970). If there were 1,000 architects in active political life (out of 30,000), it would make a significant difference in the quality and quantity of the low-income housing—to name just one aspect of the built environment—that our society produces.

Finally, there are some serious observers of architecture in our society who say it is time that architects reconsider their esthetic predilections. In the light of broad public indifference to the visual concepts the profession has been pushing for the past 40 years, critics such as Tom Wolfe and Robert Venturi have called for new approaches. In-

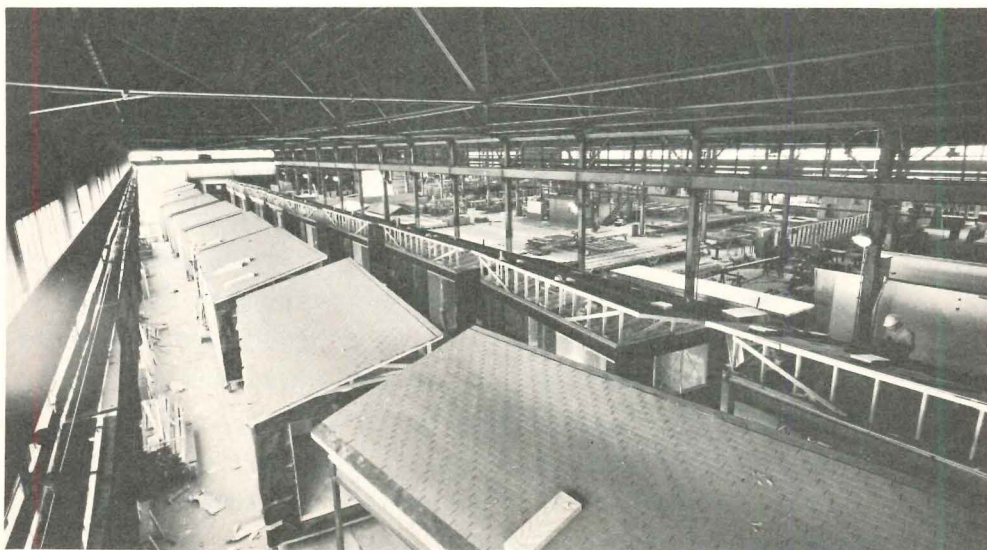
stead of the fruit of Mies' thought, which is simple-looking buildings that are complicated to build, what seems to turn most people on are complicated-looking buildings, often very simple to build. That means detailing for builders, not against them.

In short, the argument goes that the architect can help produce housing people really want by considering what they really want buildings to say. In the end, it is not adherence to esthetic theory that matters, but how well the building performs its social and environmental functions.

“Architecture versus Housing”

One of the most devastating attacks on the architect's role in producing low-income housing yet published is a book by an English architect and critic, Martin Pawley. In his book, “Architecture versus Housing” (Praeger), he argues that production of government-sponsored housing in the United States has lagged disastrously since the Second World War, and pointing to an example of high-rise housing for the elderly similar to that shown below, says, “what has been produced is sometimes remarkable for an incongruity and dehumanization scarcely less glaring than in Europe. . . . It exemplifies a marriage of the worst tendencies of both continents.”

Pawley begins his study by tracing the development of public housing from its appearance around 1914 as a result of the First World War. Along the way he discusses the relationship of war-time destruction to planning and finds that many planners saw the blitz as an opportunity. The post-World War II appearance of nuclear weapons ended two decades in which anti-bomber defense preparations gave a boost to the



Sectional houses like these being built in a California factory, left, offend most architects because when assembled on their foundation, they look no different than houses built entirely on the site. Nonetheless, in the ten years they have been on the market, sectionals have become a sizeable proportion of the new housing starts each year, partly because they are relatively inexpensive and partly because they appeal to popular taste. On the other hand, the boldly-structured, carefully detailed high-rise building for the elderly, right, near Cleveland by Weinberg, Teare, Fischer and Herman, which most architects would be comfortable with, is an example of what Pawley calls “incongruous and dehumanizing” public housing in his book, “Architecture versus Housing.”

"new towns" theorists who endorsed urban decentralization. He also traces the development of industrialized housing from the early, elegant schemes of Bucky Fuller and Le Corbusier to the present-day sectionals, below, which manage, when placed on their foundation, to obscure all evidence of their birth in a factory—which pleases their owners but offends most architects.

It is Pawley's chapter, "Breakdown of a theory," which attacks "the architectural belief system," that is, functionalist design, most vigorously. Beginning with evidence of the social failure of the massive super-blocks in Caracas built between 1954 and 1958, he examines the motives of those architects who placed disadvantaged and disoriented people in high-rise apartment buildings. He argues that most architects went to high-rise not because they had to, but because they wanted to—and that concern for purity of structure usually far outweighed concern for provision of the social services system that anyone living more than three floors above ground needs. While Pawley points to the explosion at the Ronan Point flats in 1968 (which collapsed one end of a 30-story prefab concrete building) as the point at which British sentiment turned against high-rise public housing, he might have mentioned the oft-cited social failure of the huge Pruitt-Igoe project in St. Louis as having a similar effect in America.

The demise of the "functionalists," says Pawley, ushered in the era of the "behaviorists." Architects have always responded enthusiastically to the idea that their designs could influence human behavior. To the author, they seemed to assume—as naively as they had once accepted functionalism—that they could make the decisions which

would shape the public housing tenant's life based upon very inadequate data and certainly without ever talking to him.

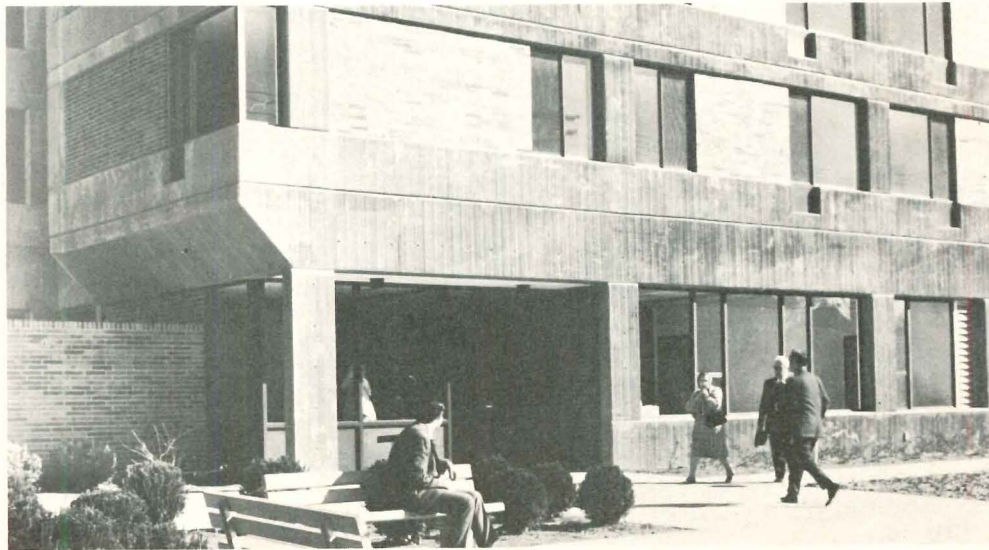
An opposite position—"personalization"—is introduced to point up the inadequacies of behaviorist theory. Photographs of Le Corbusier's housing at Pessac (1926) are contrasted with some of 40 years later. The tenants have remodeled the buildings so thoroughly that they are almost unrecognizable. People want a dwelling, Pawley says, small enough that they can comprehend its uniqueness and with opportunities for self-expression that most high-rise buildings do not afford. He concludes the book by suggesting that since land costs are rising much faster than building costs, perhaps we should separate land from house and have only mobile houses.

"Most People Don't Want What Architects Want" is the title of an article by William Michelson that appeared in *Trans-Action* magazine in 1968. Based upon a survey conducted by John B. Lansing under a grant from the U.S. Bureau of Public Roads (sponsorship which somewhat weakens the credibility of the conclusions), the results showed that most people wanted a single-family house well away from the center of the city and that 80 per cent used a car to go to work even when public transportation is available. These choices, says Michelson, are in stark contrast to the centralized high-rise cities that architects conceive. While he admits that in large metropolitan areas many people seem willing to live in apartments, still he believes the demand for single-family houses will continue, especially as income levels rise, making this goal possible. That most people who live in urban districts dream of a single-family house surprises no one; but

Michelson's study is useful insofar as it quantifies data that were unorganized.

Under the direction of Robert Venturi, some Yale architectural students have been pursuing the question of what people really want in housing. One studio under Raymond Gindroz studied New York's Co-Op City from the standpoint of the people who live there. Another group of students explored the "personalization" of suburban American houses and documented the enormous variety of changes people make to their houses over the years in order to express their own needs and preferences. While they drew no conclusions, the fact of making the study is clearly a step to understanding.

The argument that high-rise housing is the only possible way to achieve sufficient densities on expensive land will continue to be made by architects who honestly believe that the image of Le Corbusier's "La Ville Radieuse" is the only legitimate urban form for our time. Eneas J. Kane, Public Housing Director of San Francisco, is one client, however, who will not buy that idea. Working with a Dutch planner, Evert Heyneman, he has developed a system of small-scale, well-designed scattered site public housing that will blend quietly into San Francisco's Sunset District. (See page 132 for a similar example in Philadelphia). Kane's policy is no more high-rises for families with children, a maximum of two dozen apartments in any project, and only one project per block. There may be a long way to go before the people Michelson interviewed are satisfied but this approach (and those described by the projects which follow) seems to be a good compromise between what people want and what they can have today.



Architects as rehabilitators and as project developers —new roles for many in the business of producing low- and moderate-income housing

The Architect as Developer

There are some very real constraints upon the production of low-income housing that no single approach will remove. In fact, until public opinion is outraged by the inadequacies that exist, not even a combination of all the approaches that are being tried will make much headway. But in an essay on the architect's involvement in low-income housing it is worthwhile to ask how the architect himself might make progress against those constraints. One answer may be in the architect becoming a developer, or at the very least, more architects learning to work closely with developers on the production of such housing.

The major constraints are generally agreed to be these: 1. financing; 2. land cost and availability (which includes zoning); 3. codes; and 4. trade unions. The fact is that far from having dissolved these constraints, technological and other large-scale approaches have failed to make a dent in the housing problem. "Breakthrough"—meant to remove or reduce those constraints—has clearly produced no breakthroughs and has yet to produce any houses. There is evidence that the constraints can be attacked from the other side; from the small-scale individualized efforts within the communities where the housing need exists. For example:

Building finance (and that includes FHA approvals) can often be speedily arranged on a local basis when people who are well-acquainted with each other are doing the negotiating. The Louisville situation (page 137) is an example: for almost four years the local FHA refused to accept the credit of a New York City developer. But when he was unavoidably replaced by a group of

Louisville business leaders, the 221d3 project was approved very quickly.

Land cost and availability is an area where the architect can definitely help. Who else can see the potential of those unused bits of "unbuildable" land that are scattered around every city? Furthermore, although the political clout of San Francisco's Public Housing Director got the projects in Sunset started, it was sensitive design by the architects involved that soothed the nerves of the public housing's future neighbors. The zoning problem that is keeping low-income housing out of the suburbs will never be solved by high-rise, high-density projects. Small-scale projects whose design takes into account the feelings of the established neighborhood may well, therefore, be at least a partial answer.

Today's building codes—increasingly performance-rather than product-oriented—are full of opportunity for the imaginative designer. Addressing an urban transit conference recently, J. Herbert Holloman of MIT spoke of "pushed innovation" and "pulled innovation." There are some ideas, he said, such as atomic power, which the public refuses to accept easily and others, such as railroads in the 19th century, which spread like wildfire. The difference is, to Holloman, that no matter how hard an innovation is pushed by its backers, it will not be accepted by the public until there is a desire for it. Large-scale housing technology seems to be such an innovation. Building codes have been seen as barriers by the technologists and those barriers continue to hold. Small-scale housing technology, however, improvements on the way Americans have always built, has been soaked up by the building industry over the

past twenty years with ease. Consider how the studies of the Small Homes Council of the University of Illinois have revolutionized domestic construction—prefab roof trusses, concrete slab floors, perimeter heating, insulation are all used everywhere now without a second thought. It may just be that building codes are quite transparent to innovations which are based upon building housing in a way that really fills people's needs.

Dealing with the constraints that the building trades unions have imposed a low-income housing is the most difficult problem of the four. Seldom does the architect, even as a developer, come into direct contact with the unions. There are certain legitimate complaints among the different trades. Unnecessary exposure to bad weather, personal risk and unsteady employment are three that the architect could conceivably influence through more careful planning or scheduling. One would hope the architect would not knowingly jeopardize another's safety but beyond that he has little influence. Until circumstances in the building industry deteriorate so much due to the trades unions' stranglehold on the labor market that public opinion forces a change, nothing much will happen.

But for the architect truly interested in producing low-income housing, there are great opportunities to develop one's own projects. For one thing, the architect is the client and—in these days when there are more idle drawing boards than usual—the organization of the land, financing and design package by the principals themselves is entirely reasonable. Those who in busier times might never have bothered



with the paperwork needed for the Turnkey program or for setting up a non-profit sponsoring group under Section 236, might have second thoughts now.

It is true, of course, that most architects prefer to work with developers, if only because they haven't the capital necessary to keep the project afloat until permanent financing is approved. But many young offices today are extremely busy working on housing that more established offices turned down a couple of years ago. Part of the reason may be that the younger architects are more ready to accept the developer's pragmatism than older colleagues who have gotten used to institutional clients. The road is not easy, to be sure, but it is an education in the realities of finance and construction that can be gotten no other way.

Rehabilitation

Another education in the realities of finance and especially construction is the renovation of existing buildings. Many young architects, of course, have begun their practices with remodelings and additions. And as the CDC architects (overleaf) have learned, rehabilitation is one of the best sources of good-quality low-income housing. There is plenty of under-utilized housing everywhere—in the city and in the country. Renovating it not only gives people comfortable places to live but it preserves neighborhoods and communities as well.

As the Instant Rehab experiment in New York (*RECORD* January 1967) proved, (prefab utility cores were dropped into New York City brownstones through a hole in the roof) technology is of little help in

rehabilitating housing. The construction, although complicated, is strictly standard. The more remodeling an architect does, the more tricks he learns about saving money and at the same time, the more he learns about how to get the most out of the existing building. And if he lives in a city like New York, rehabilitations are an opportunity to learn building codes and inspection procedures in a way that no textbook could begin to describe. Although recent financial developments have caused a severe reduction in such work, there were many small firms in New York, for example, that did nothing but prepare the drawings and secure official approvals for brownstone remodeling on the upper West Side, in Chelsea and in Brooklyn Heights.

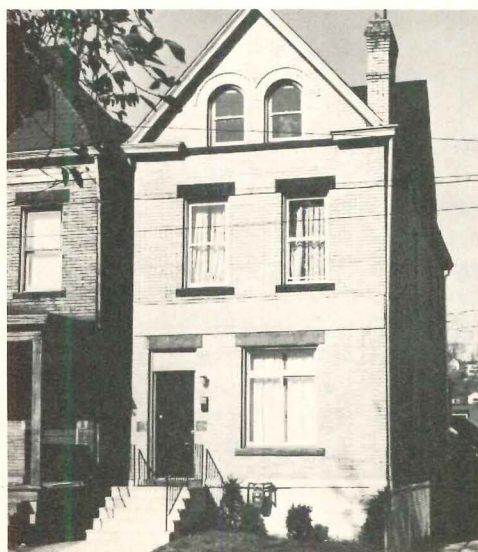
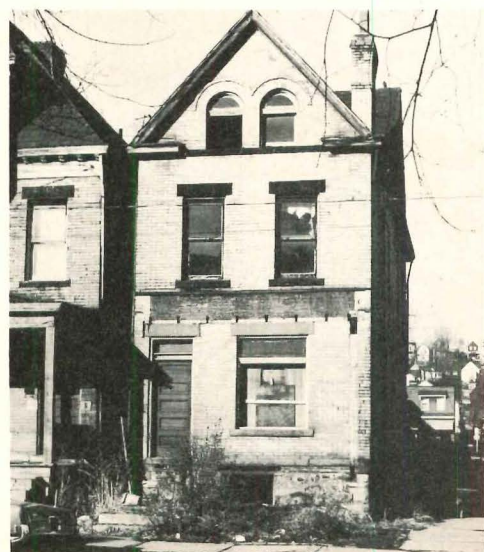
These projects were not, of course, low-income housing by any means; and there are those who would say that, except to satisfy building department regulations, there is no need to have an architect when low-income housing rehabilitation is being done. That of course depends on the size of the building and the degree of rehabilitation. One- to four-family houses will almost certainly not have an architect except in cases where the owner might have the services of a volunteer architect through a local Community Design Center. Buildings with between five and 20 families may require complete rehabilitation or gutting and surely benefit from architectural services. In larger projects which are to be gutted or to have major repairs to the mechanical systems, architect involvement is of course essential.

Rehabilitation thoroughness and techniques usually are determined by the amount of rent per room that will be re-

quired after renovation in order to meet mortgage payments. Although modest rehabilitation can sometimes be done to low-income housing and still permit the original families to afford it, usually the expense is great enough that rent supplements are necessary if families of similar economic level reoccupy the renovated building.

Although some cities and states have special subsidy programs, the principal source at the moment is Section 236 of the 1968 Housing and Urban Development Act. Interest subsidies are provided to projects sponsored by non-profit groups on 40-year mortgages so that the effective interest rate is reduced to one per cent. That is the basis on which AHRCO in Pittsburgh, (below), has been able to accomplish substantial renovation. It also can be used for new construction, as in the case of their modular housing project (shown on page 134).

In most cities, the architect's role in rehabilitation of low-income housing will be as part of a CDC or as consultant to a neighborhood group which is using Section 236 funds for its work. That means that his interest will be less in the rehabilitation of individual buildings than in devising a strategy for limiting deterioration in the area by applying various techniques depending on the problems he finds. The work of architect Joe J. Jordan in Philadelphia (page 132) which involved coordinating rehabilitation, new construction, new recreational areas and traffic pattern revisions is an example of such comprehensive planning. Since the scale ranges from interior design to urban design, it seems an entirely appropriate project for the architect who would help produce housing that people really want.



The Allegheny Housing Rehabilitation Corporation (AHRCO) is making money at the rehabilitation of deteriorated housing in Pittsburgh. A company owned jointly by the 40 of the city's largest businesses, AHRCO has put 800 units of housing—two examples of which are shown at left—back on the rental market in its first three years of operation. Another 470 units await rehabilitation. All buildings are then managed by non-profit neighborhood organizations. In addition to producing renovated housing and the Reed-Roberts Streets modular housing, page 134, AHRCO has initiated training programs in several important areas related to its work. Subcontractors, newly bondable because of their AHRCO experience, are bidding on other Pittsburgh work. An apprenticeship training program is developing skilled building tradesmen from previously unemployed or underemployed men.

Dedication to the belief that housing should be designed with its actual users has brought extra complications to CDCs—but also some real accomplishment

Community Design/Development Centers, are now operating in more than sixty cities. In the twenty months since the AIA became associated with the program, some progress has been made toward establishing a properly-financed national program. Through the efforts of SOM's Nat Owings and AIA vice president Bob Nash, the Human Resources Council was formed early this year and five or six large firms have given \$100,000 each over four years to further the national work of CDCs. HRC also includes the AIA minority education programs and a committee studying constraints against low-income housing. At present, vigorous efforts are being made to secure long-term Federal support through OEO and HUD. Unfortunately, the activities of CDCs and HRC were kept in the background at the Detroit convention and no mention was made of the \$15 million commitment made by the AIA in 1969. Nonetheless the National Community Development Center, with an executive board of seven leaders from CDCs around the country, is pursuing a number of projects, including a film to describe their work.

Although efforts to develop a strong well-financed national program have been only marginally successful, it doesn't mean the local centers have not been busy making contributions in their own communities. And there the problem is not money so much as finding enough qualified people to provide service to the community. Many of the CDCs are administered by universities as adjuncts to the school of architecture. These have been valuable in bringing students into confrontation with the real problems of the community but very often little is accomplished beyond studies that end when school closes for the summer.

The fact is, however, that the work of CDCs has become intensely political. They can only make an impact on the local government when the people in charge are willing to get involved in the drawn-out, often frustrating politics and to forego a need for the immediate gratification that a well-presented architectural proposal gives. That is why the architects most closely connected to CDCs are getting an education in the realities of give-and-take that is at least as valuable as the services they are rendering. Here is a brief look at four of the most active CDCs:

Philadelphia

That is also why the most successful CDC does not have an architect as executive director but rather a professional community organizer. Sponsored since 1968 by

the Philadelphia AIA chapter, the Architects Workshop under Gus Baxter, right, handled more than 200 projects in the last three years. In addition to the central workshop there are now seven branches around Philadelphia. Even though many of the projects initiated do not reach the funding stage, an experience not uncommon to architectural practice everywhere, the fact that almost all the proposals are for neighborhood groups and even individuals who would never otherwise have access to architectural services is impressive. Two other full-time staff members—Gray Smith as architectural director and John Gane as supervisor of VISTA volunteers (there are ten in Philadelphia alone)—both architects, have been instrumental in directing more than 200 volunteer professionals and students in the work so far accomplished.

Cleveland

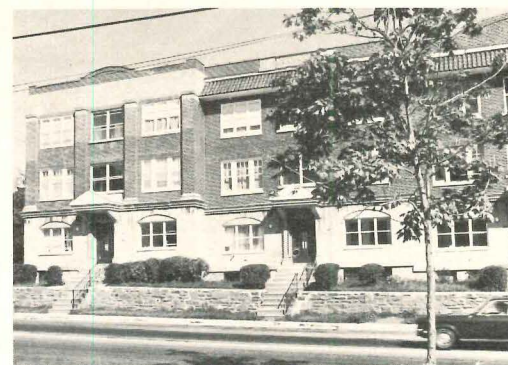
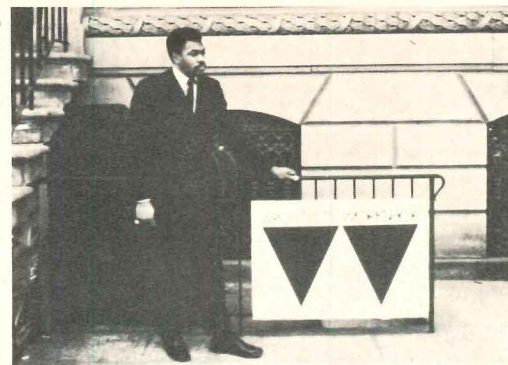
Another vigorous organization is the Cleveland Design Center, not yet two years old. Under its director, graduate architect Paul Cheeks, the Center's financing has come from several foundations and civic groups with the first commitment by the Cleveland AIA. The board of directors has six members from the community and three from the AIA and AIP. In its first year the Center handled 45 projects, mostly in housing. Much of the completed work of the Center is rehabilitated housing, an area with which Cleveland architects would not have become significantly involved had no community-oriented framework existed. At present there are seventeen community-based development groups with which the Center is working.

Los Angeles

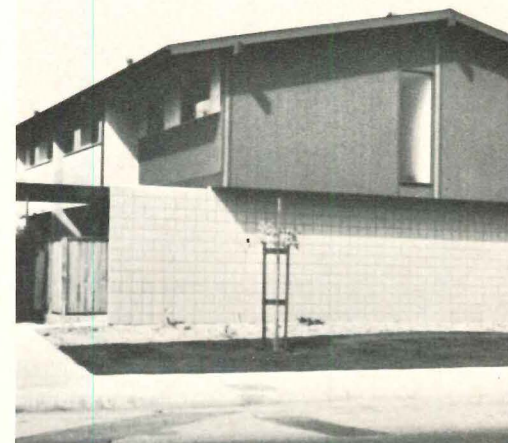
The Watts Urban Workshop operates out of renovated lumberyard buildings under Eugene Brooks, AIA, who is also chairman of the NCDC executive board. Although most of the accomplished projects of the Workshop are non-housing rehabilitations and playgrounds, it is the first CDC to actually build new housing. A group of six, six-family buildings, Wadsworth Square, right, in Watts has been completed for more than six months. Ironically, it is still vacant. Financed under HUD's 236 program, it has been awaiting final clearance from the local FHA office.

New Orleans

Metro Link is a CDC funded by the Model Cities Program. It operates in a region that includes Southeastern Louisiana and nearby Mississippi but does most of its work in New Orleans itself. Under Robin Riley, its director, and Zachary Weiss, a VISTA volunteer who serves as Director of Planning, Metro Link has worked mainly on Model Cities neighborhood planning and other housing studies. Much of its work has been in advocacy planning where the process of planning in a given situation is examined and improved due to Metro Link.



New Orleans In addition to its planning work, Metro Link has been involved in several housing rehabilitation projects. Working with the Archdiocese of New Orleans, the CDC has assisted in the renovation of seven "shotgun" houses in the Irish Channel area, above. Their sturdy cypress structures made them good candidates for rehabilitation. Brother Dan, one of the monks assigned to the project, completes the painting.

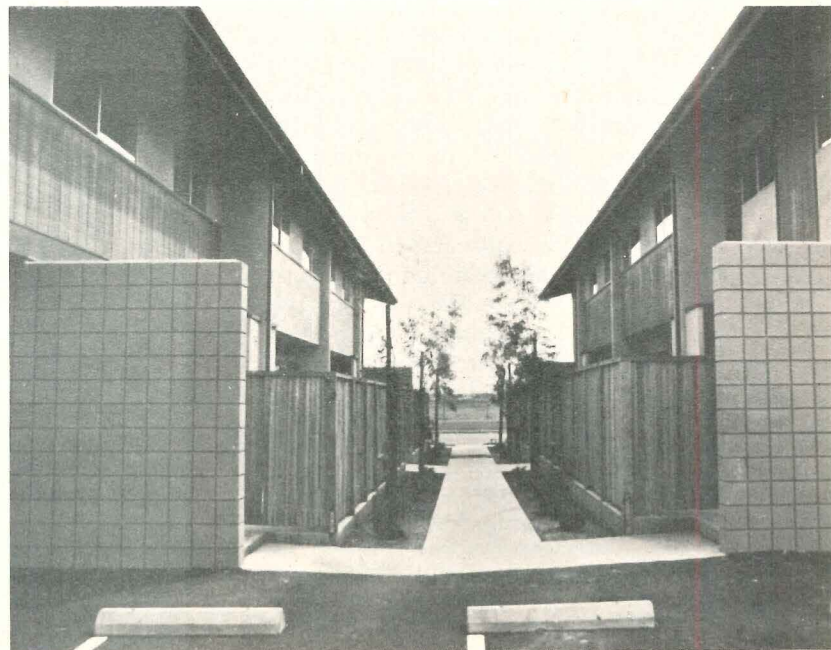
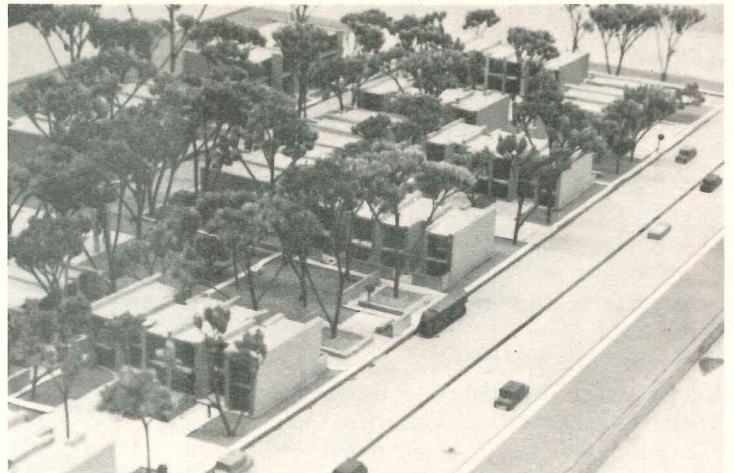




Philadelphia Gus Baxter, Executive Director of the Architects Workshop, is shown above left, outside the renovated main office in central Philadelphia. The Wayneview Apartments, left, is a forty-unit building being rehabilitated under FHA 236. Under the supervision of Workshop architects E. J. Messersmith, W. Gray Smith and W. E. Kramer, half of the units have been completed. Two of the five Holy Trinity Baptist Church duplexes renovated by the Workshop and architect John Fatula under FHA 235 are shown above.

Los Angeles The Wadsworth Square, completed FHA 236 housing by Eugene Brooks and the Watts Urban Workshop in that devastated district, has stood empty because the local FHA office has failed to give the final clearance. Six buildings constructed of concrete block and wood, the complex will house 36 families when finally occupied.

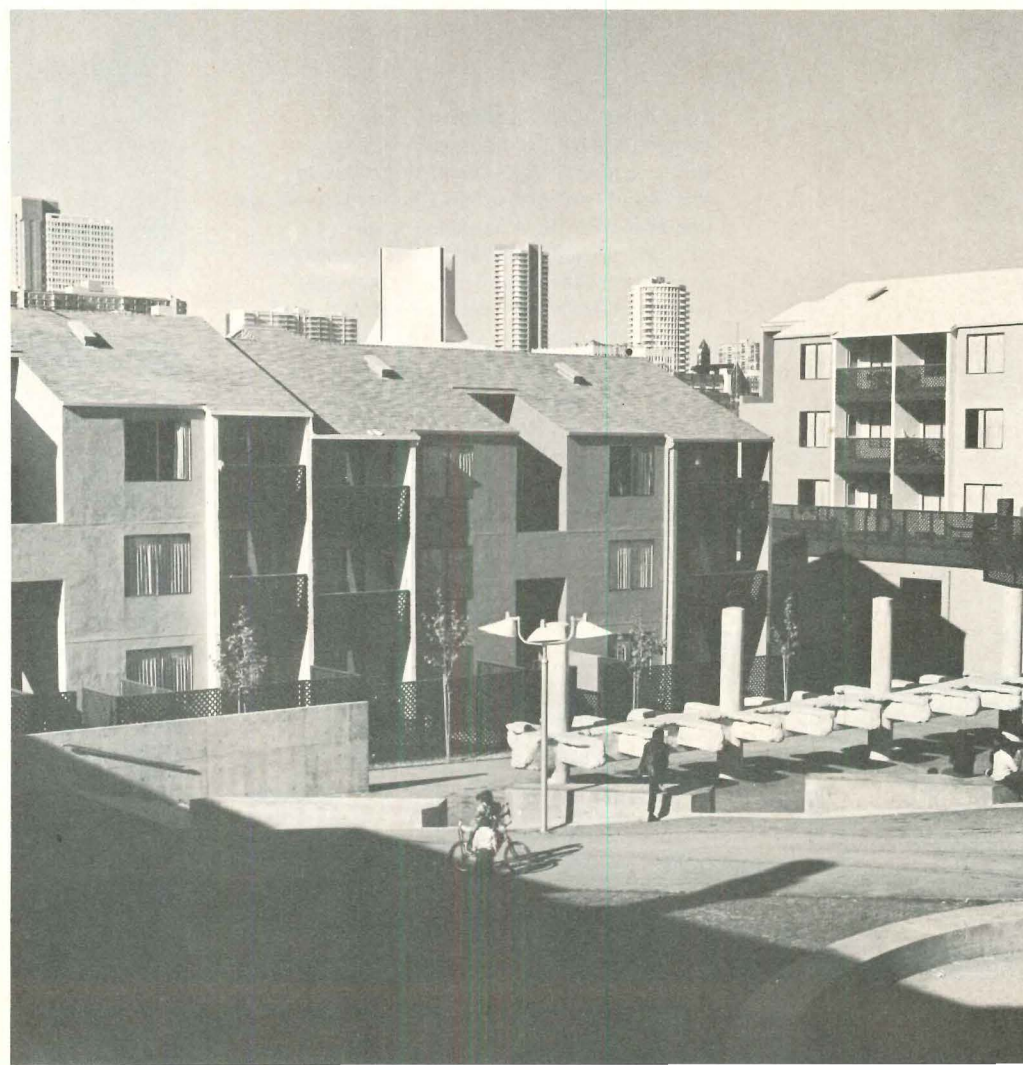
Cleveland In addition to a unique working arrangement with Kent State University which provides student architects with a productive experience in urban problems, the Cleveland Design Center has produced a number of housing proposals. A typical one, Utica Courts done for H.O.P.E., Inc. (Housing Our People Economically) is shown below. Five hundred units, of masonry and wood construction will be built around green spaces and recreational areas. A rehabilitation project for HUD, 118 units, has been in bureaucratic limbo for almost two years. But the rehabilitation of four old-style Cleveland double houses into more spacious duplexes is complete. Both the existing and renovated units appear in the center photograph below.

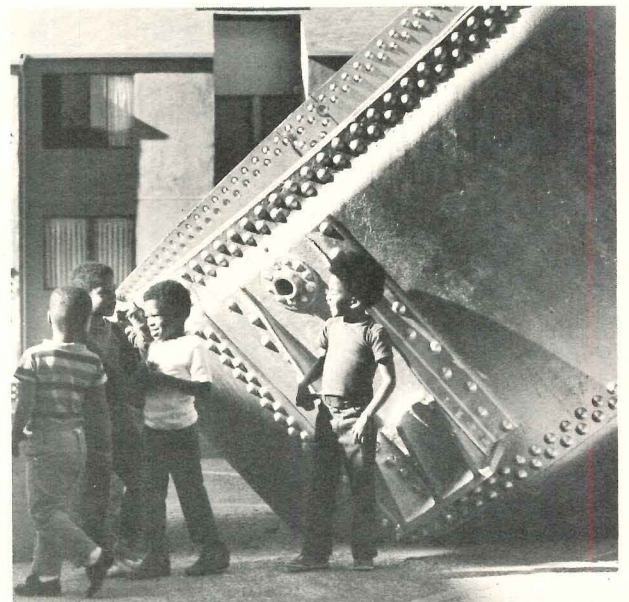
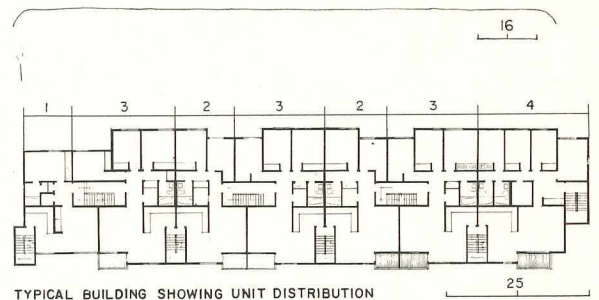
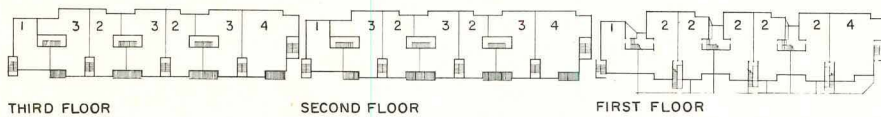
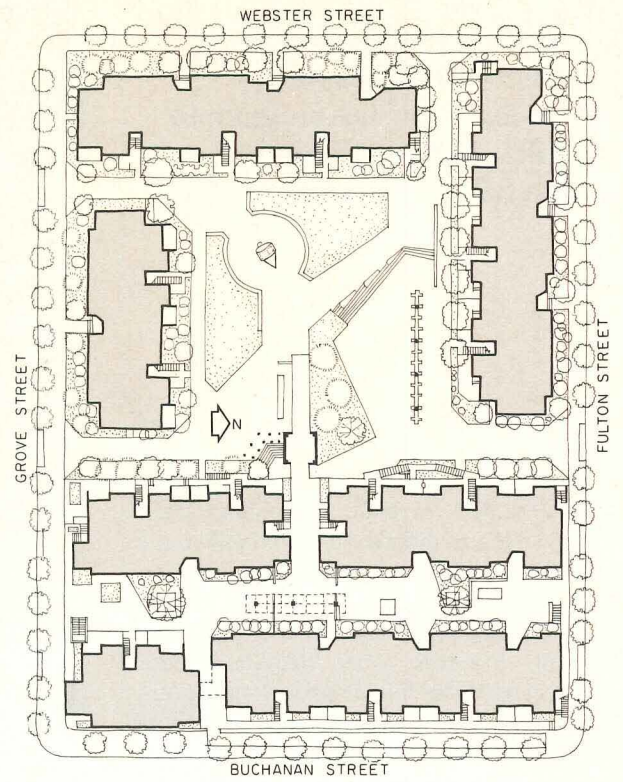
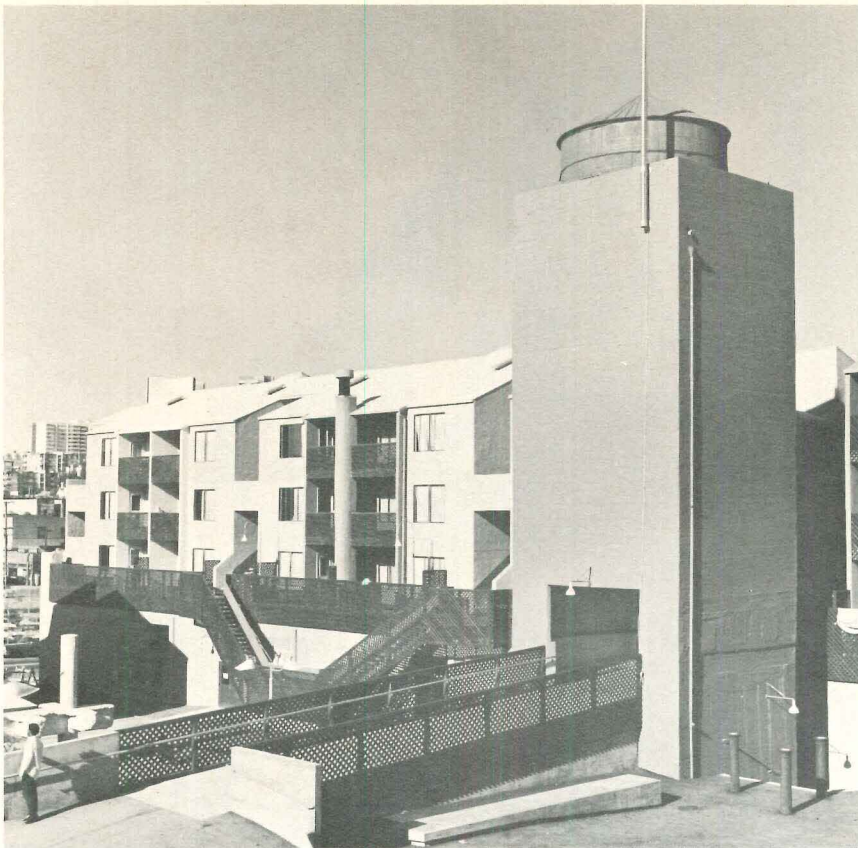


Imaginative use of a cramped, complicated site has provided these San Francisco apartments with unexpected amenities and made a lively neighborhood

By retaining elements of the brewery which formerly occupied this site in San Francisco's Western Addition, Joseph Esherick and Associates have been able to provide the 108 apartments in the Banneker Homes project with interesting features. Given a density of fifty units per acre on the slightly more than two acre site, the development of spaces between the building became the most difficult design problem. One major advantage is that two floors of the original building were retained and the lowest one, formerly used for trucking, now provides ample parking for everyone. Thus the three-story frame apartment buildings are sitting on an immense pre-existing platform. The several levels are especially apparent near the concrete water tower which was retained, opposite page upper left. From the garage level, public stairs ascend to the promenade level. The apartments themselves are, say the architects, "modular and repetitive, of conventional plan that conforms to FHA requirements," in this case the 221d3 program. Fifty-six of the units, more than half the total, have three or four bedrooms and the plans, opposite page, indicate that although repetitive, the combination of different sized units is cleverly done. In effect, each apartment shares its interior stairway from the front or street entrance with one of its neighbors and its back entrance with its neighbor on the other side. Since the buildings are built entirely of wood, including plywood structural sheathing, ample provision for fire exits was essential. Extremely simple materials were used throughout including an exterior finish of cement plaster with a coat of latex paint. While future maintenance problems would seem inevitable, the bright colors chosen by the designers (color photograph, page 123), have made the entire group very cheerful and attractive. Frequent touching up of the graffiti will also help retain the freshness of the color. Esherick has also retained, in anecdotal fashion, several other vestiges of the brewery. The shiny metal vat which resembles a space vehicle come to rest nose first is half an old steel rice cooker. The steel and concrete grid on four columns, right, is part of the original structure.

BANNEKER HOMES, San Francisco, California. Sponsors: Macedonia Missionary Baptist Church; architects: Joseph Esherick and Associates; engineers: Rutherford and Chekene; landscape architects: Lawrence Halprin and Associates; project co-ordinator; Walter C. Lampe and Associates; contractor: Williams and Burrows, Inc.





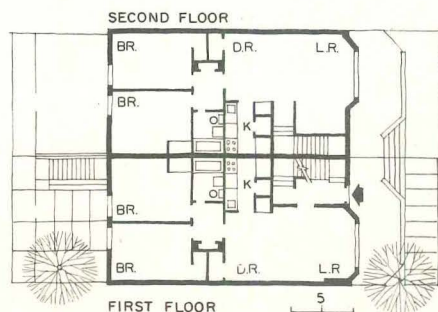
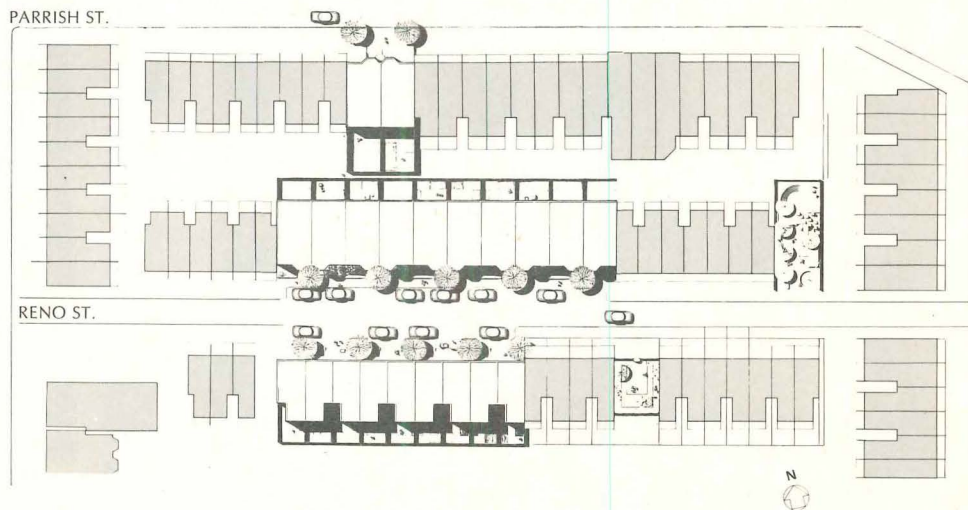
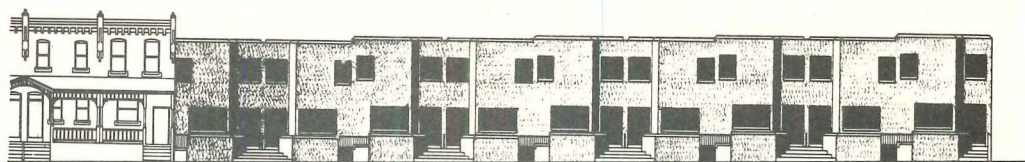
The highly articulated units of the apartment buildings, accented by harmonious but lively colors, step jauntily down the sloping site. The landscaped central plaza and children's play area, site plan above, built on several levels, gives local children a wealth of possibility for adventure while still under their mother's watchful eye. Located near a number of other new buildings in San Francisco (Saint Mary's Cathedral, RECORD, September, is visible in the photo far left) it continues the tradition of human-scale housing there.

George Homsey, Kathleen Kershaw photos

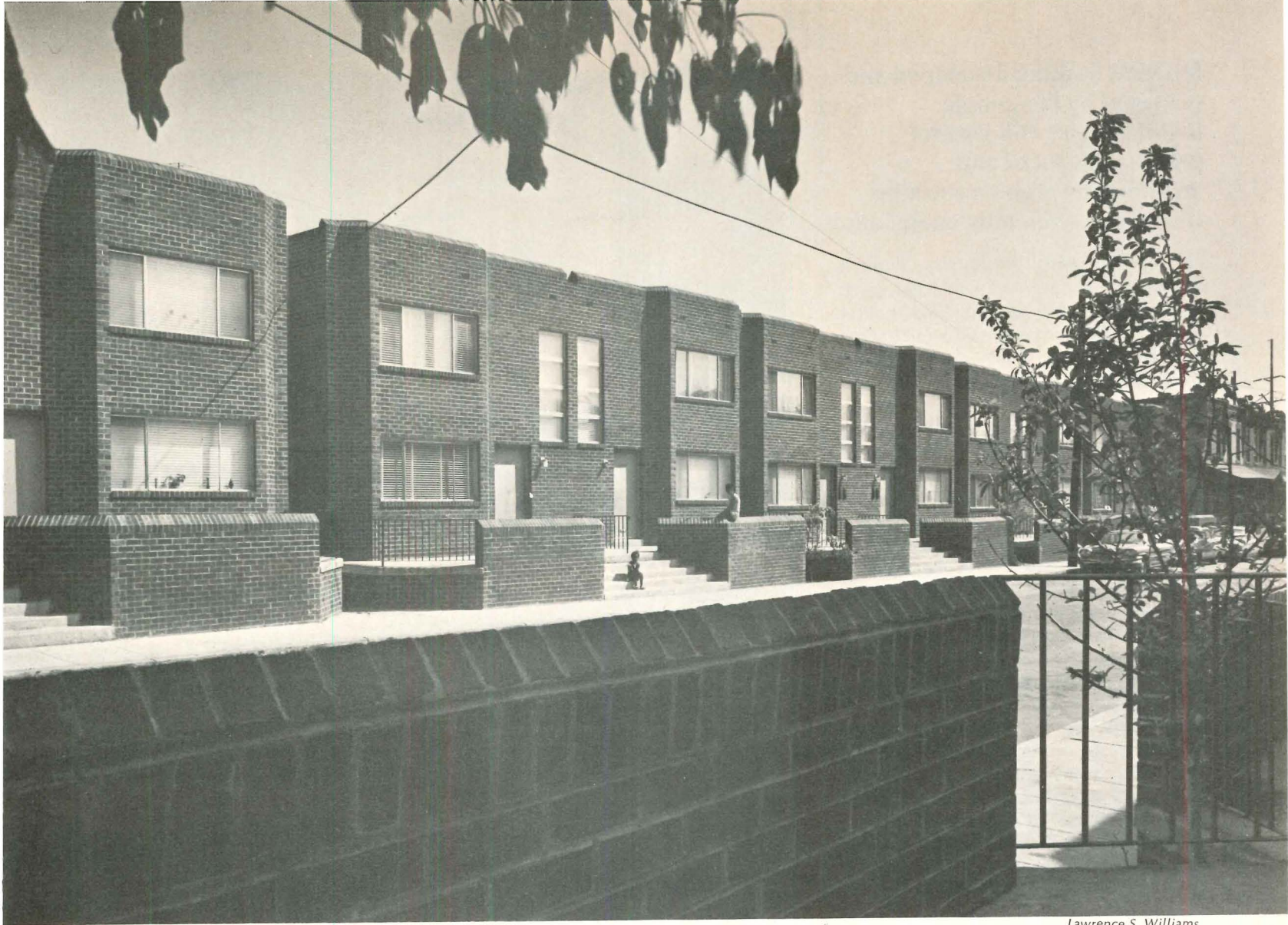
New construction and rehabilitation were combined on this Philadelphia block in a comprehensive program to revitalize the neighborhood and to halt its deterioration

To a concentrated effort to upgrade one Philadelphia city block, architect Joe J. Jordan has contributed 33 new units that were designed to reinforce existing street patterns. The combination of rehabilitation and new construction, used here perhaps for the first time, is meant to demonstrate a broad-gauge approach that could be used in many marginal urban neighborhoods. Working with the Philadelphia Housing Authority and developers Sol Tollin and Leon Graboyes, Jordan has designed nine single family houses and twelve duplexes that, he says, "reinforce the pattern of living convenience offered by the existing row houses which were being rehabilitated." While they relate well to the scale of the existing houses, Jordan has attempted to give them a distinctive look with projecting bays and pairs of raised terraces that are similar to the front porches of the older houses. By integrating the stairs into the terrace structures, however, he has been able to widen the street in front of the new houses enough to provide two rows of parallel parking while the net traffic width remains the same (site plan, right). The unit plans, 1200 square feet in the three-bedroom single-family houses and 880 square feet in the two-bedroom duplex apartments (shown right), are derived to a certain extent from the plans of the existing houses. The architect began by studying schemes that departed considerably from the existing pattern but returned to it in order to maximize a harmonious relationship. The new houses, however, have large sliding windows that look out to the street terraces or into the rear gardens. An important point, says the developer, "is that there has been no displacement whatever of families for the construction of these new houses; but rather that we are providing comfortable houses for 33 new families on previously unused land that had been creating a deteriorating influence on the neighborhood." Tollin-Graboyes Co. also was responsible for the rehabilitation of existing houses which were sold to the PHA under their Used House Program, and like the new construction, will be rented to the tenants. As an adjunct to the housing program, two vest pocket playgrounds on Reno Street (site plan) were also provided.

RENO STREET HOUSING, Philadelphia, Pennsylvania. Owner: The Philadelphia Housing Authority; architect: Joe J. Jordan



The nine single family houses, elevation and photo above, face ten duplexes, elevation and photo across page. Two more duplexes were built on Parrish Street. The use of one special brick (a 45-degree unit) with standard masonry has allowed detailing of the projecting bays, terrace walls and cornice caps to be clean and unobtrusive.



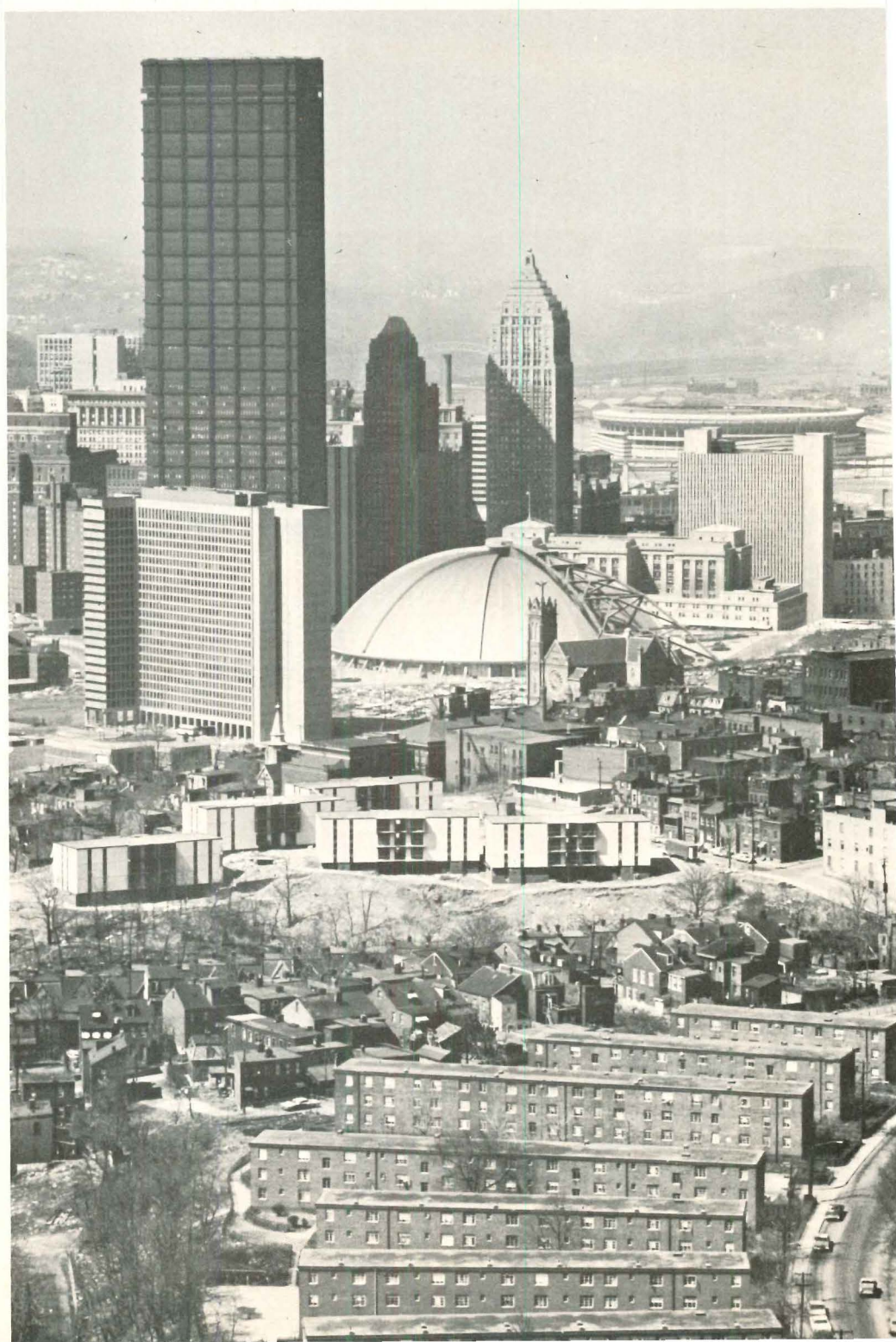
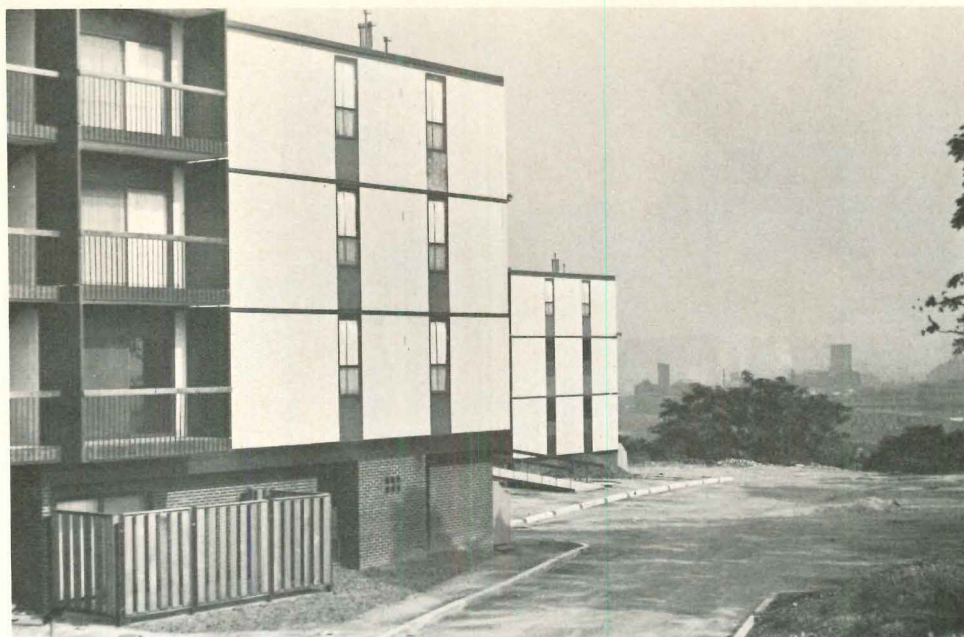
Lawrence S. Williams

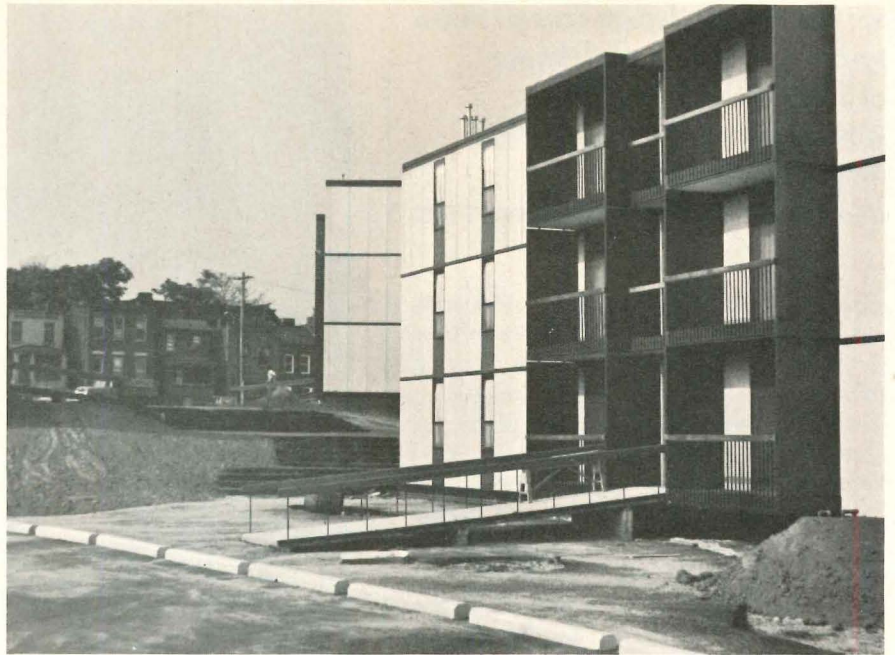
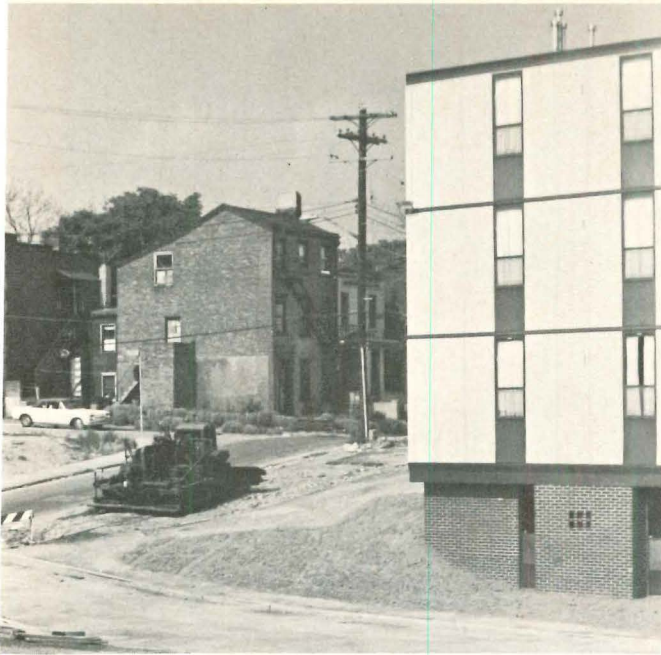


Modular housing developed and managed by the people in Pittsburgh's Hill District proves both social and architectural problems can be solved by community cooperation

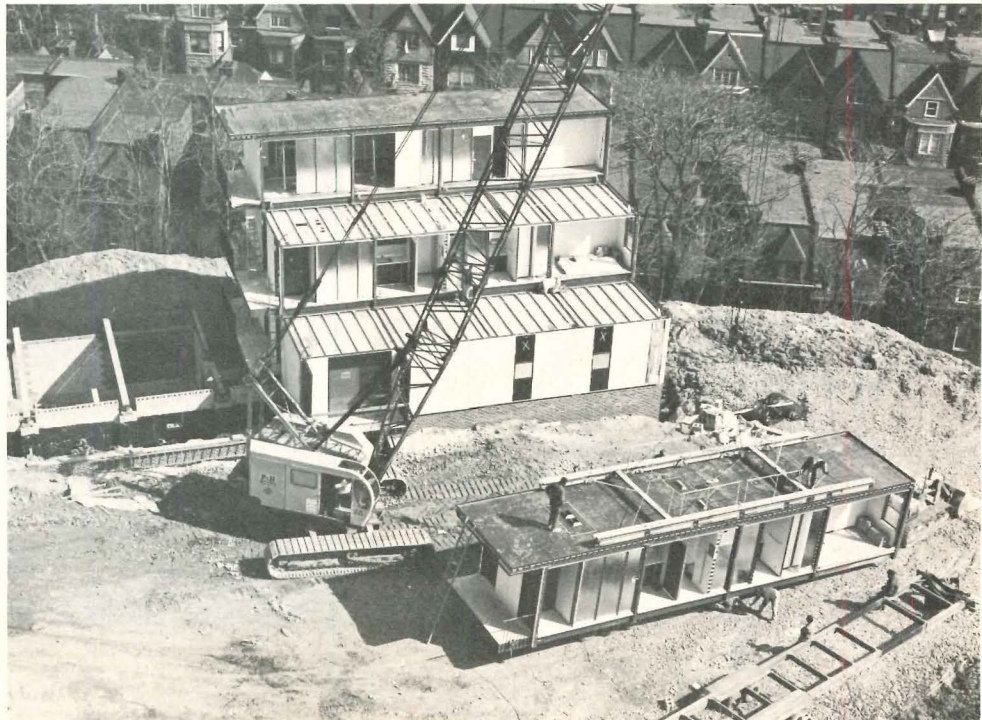
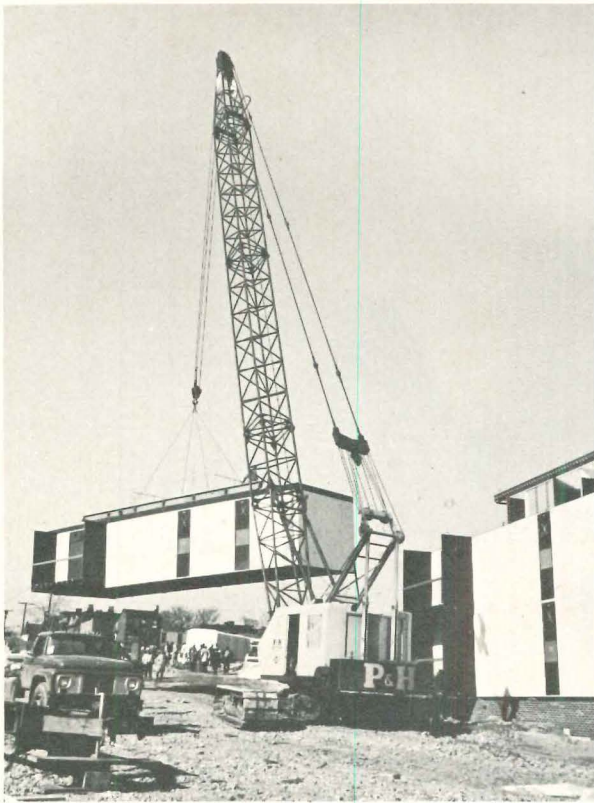
For twenty years, Pittsburgh's business leaders proved that they could get things accomplished and get buildings built—except housing for people who can't afford to build their own. While corporate profits were poured into office towers and taxes into sports facilities in the Golden Triangle, the Hill, a ghetto district just behind it languished and deteriorated. When clearance for urban renewal took place there, the first space was filled with a high-rise, high-income apartment building and a civic arena with movable roof; both received extensive coverage in the architectural press. Since the urban crises of 1967 and 1968, however, there has been some stirring of civic concern for the neighbors of these lauded structures. The five buildings (right) standing between them and the unimaginative public housing in the foreground, are the first privately-sponsored housing to be built in the Hill for fifty years. And to the credit of corporate Pittsburgh, they exist because of the Allegheny Housing Rehabilitation Corporation (AHRCO), an organization owned by forty of the city's businesses. ACTION-Housing, Inc., a non-profit group has served as an interium sponsor for this, the 70-unit Reed Roberts Streets housing, and AHRCO's five other projects (see page 127 for a discussion of its rehabilitation efforts). In the meantime, the neighborhood sponsoring groups were formed, in this case the Hill House Housing Development Corporation, that will actually own and operate the building under Section 236. Some units will be rented to low-income families (under \$3600) on a rent-supplement basis at \$73 per month including utilities, while others will be available to moderate-income families (\$7400 to \$8100) at about \$150 per month, including utilities. In addition to this sound management and rental procedure, it is to AHRCO's credit that its first venture into new construction is an especially intriguing example of modular construction. Walter Roberts, architect for the project, credits much of its success to Lewis Downing, an architect who is executive vice president of Jal-Donn Modular Buildings (associated with Jones and Laughlin Steel Corporation), the supplier of the modules. The 20,000 pound units were delivered to the site with kitchen, baths, carpeting and mechanical equipment installed.

REED-ROBERTS STREET HOUSING, Pittsburgh, Pennsylvania. Owner: Hill House Housing Development Corporation; architects: Walter Roberts Associates; engineers: Richard Gensert (structural); Arthur Schock (mechanical); Raymond Why (electrical); landscape architect: M. Robert Fenton.





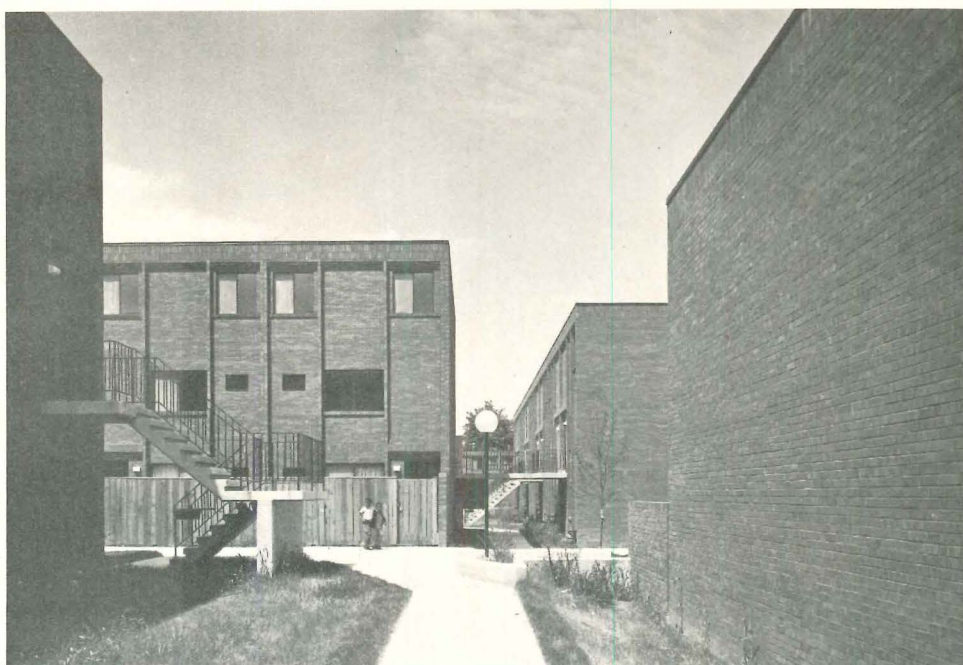
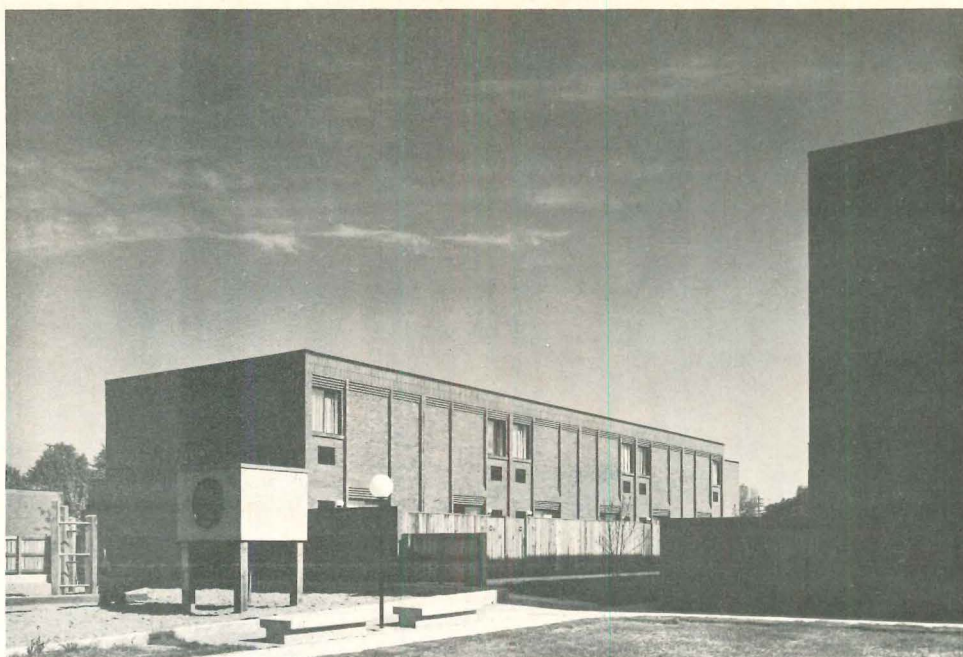
Nine modules are stacked longitudinally to form six apartments at each end of a building. Each three-bedroom unit has an outside module and shares an inside wet module (one is about to be lifted into place, bottom) with its neighbor. The space between the two stacks becomes a stairway shared by both. Two two-bedroom apartments of masonry construction form the base for the modules, making a total of 14 units per building.

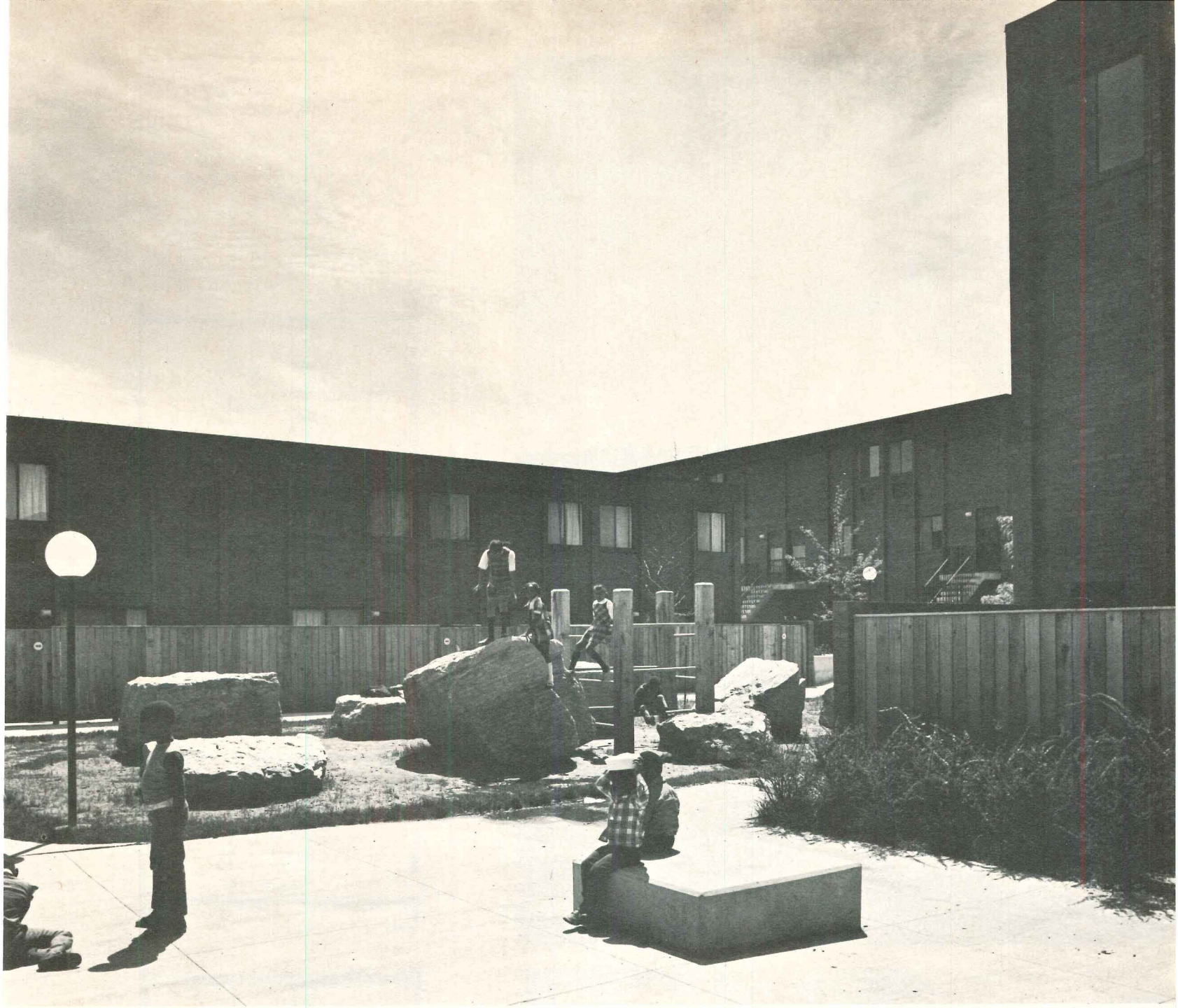


Six years from design competition to completion: a nightmare of bureaucratic haggling was overcome by Louisville's determination to get this urban renewal housing built

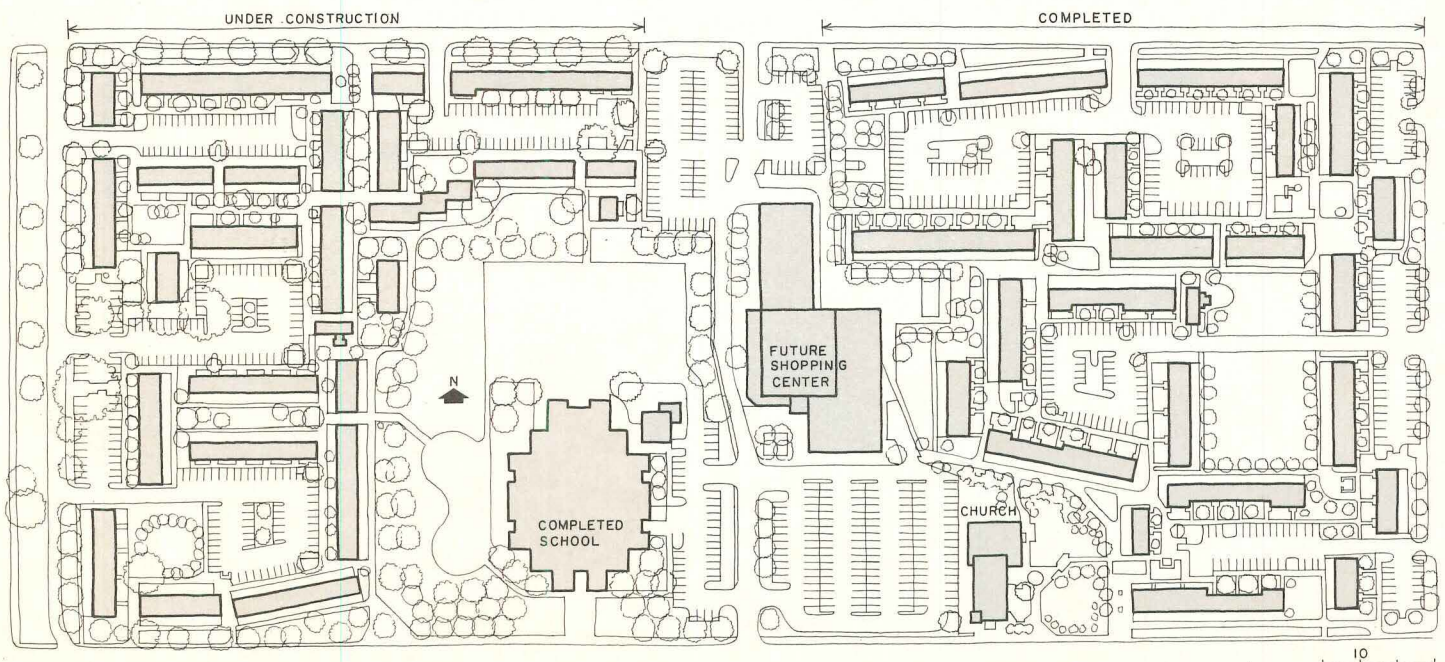
Village West, a 221d3 project of 513 units in Louisville, is a textbook example of why so little government-sponsored housing actually gets built. The project began in the most exemplary way: a two-stage national design competition in October, 1964 for architect-developer teams. Won by the Louisville firm of McCulloch and Bickel (now Design Environment Group Architects) in association with architect/developer David Rosen of New York City, the design chosen was praised by the jury for its careful integration into the existing neighborhood and for its generous treatment of the spaces between buildings. That was in May 1965. Four years of debate between the FHA and Developer Rosen followed. Rentals and the developer's financial capabilities were the main concerns. The original rental allowed in the competition program was to be \$65.00 for a one-bedroom unit, for example. The winning team soon announced they would have to charge \$70.00 for such an apartment (with utilities about \$77.00); a public outcry followed. During the period that the FHA debated Rosen's ability to do the job, construction costs were increasing and so proposed rents had jumped to \$84.50 for a one-bedroom unit by mid-1968. When bids came in, the lowest was \$16.00 per sq. ft., five dollars more than expected. That's when the austere design of the units as built replaced a series of handsome passages that tied the project together on various levels (final cost for first phase: \$13.65 per sq. ft.). The coup de grace for Rosen was a disastrous fire in his Fifth Avenue, New York office in February, 1969 which killed eight members of his staff. Housing Now, Inc., a non-profit group of Louisvillians deeply interested in seeing Village West realized, then stepped in as developer. Their application for a \$3.9 million loan was quickly processed and by September, 1969, ground was broken. Troubles were not over however. About the same time, a coalition of black groups charged Housing Now with discriminatory practices. Differences were settled by adding several black leaders to the organization's board. Residents moved in October 1970, six years after the design competition began.

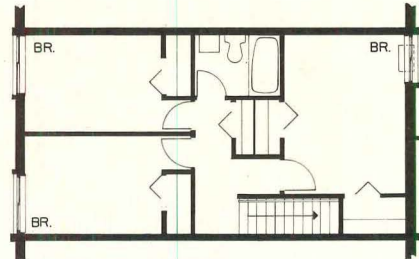
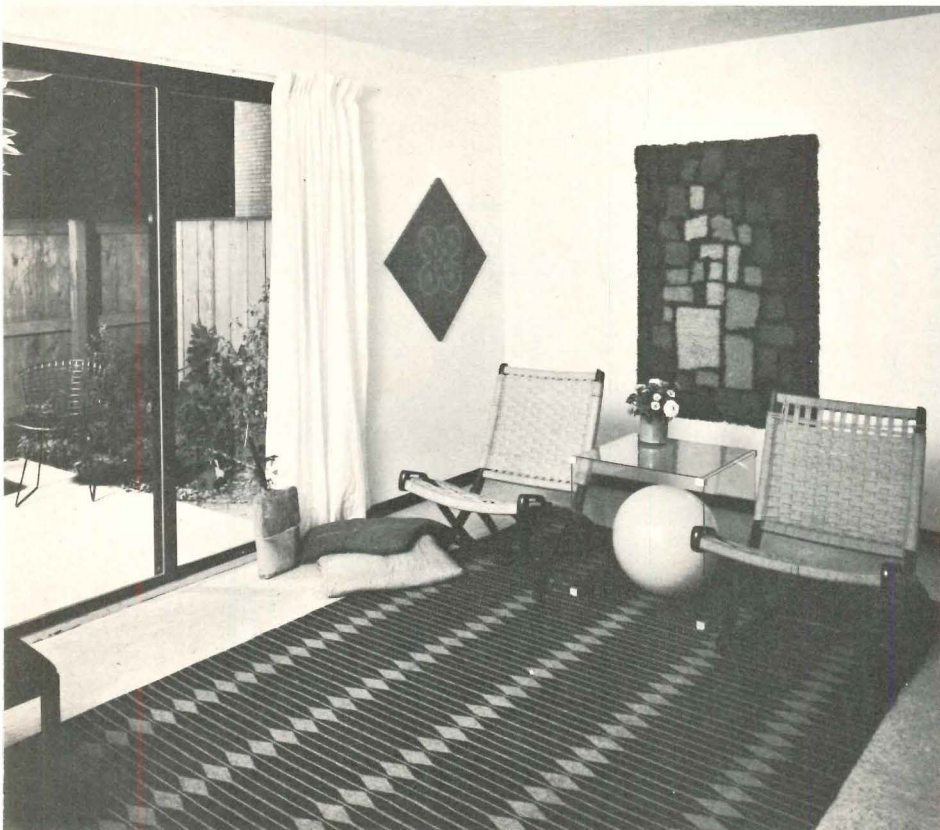
VILLAGE WEST HOUSING, PHASE 1, Louisville, Kentucky. Owner and developer: *Housing Now, Inc.*; architects: *Design Environment Group Architects* (Design team, *Donald L. Williams*, principal, *James Gibson*, *George R. Rolfe*, *Jon Hollmann* and *Harold Cox*); engineers: *Hummel, George & Kleine-Kracht* (structural); *Kenneth J. Roy & Associates* (mechanical); contractor: *Cox & Crawley, Inc.*



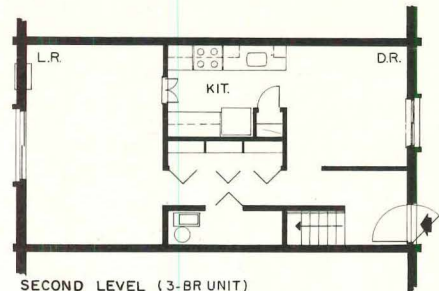


Day Johnston photos

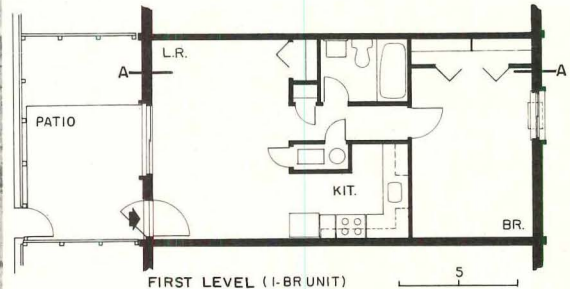




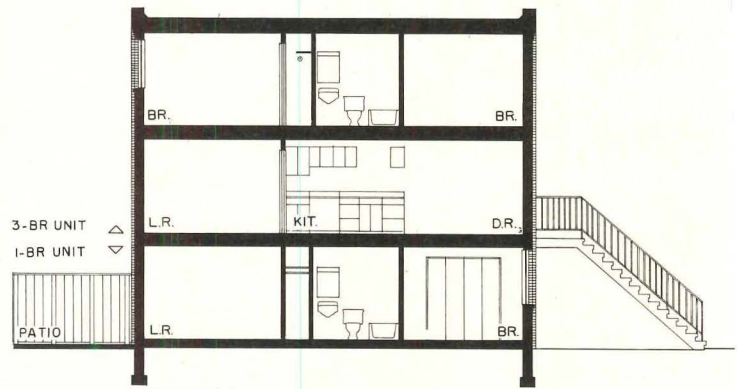
THIRD LEVEL (3-BR UNIT)



SECOND LEVEL (3-BR UNIT)



FIRST LEVEL (1-BR UNIT)



SECTION A-A

The formal austerity of Village West's buildings is mitigated by patios for the first floor units (above and left) and by extensive playground and landscaping provisions included in the competition-winning design. The brick masonry, chosen because it is Louisville's dominant building material, has been articulated with pilasters and corbelled fascia. Thus the monotony of flat masonry planes often found in low-income housing is neatly relieved.

James Kaloudis

New methods for evaluating lighting systems



Deciding what the best lighting system is for a given situation involves consideration of a large number of factors—physiological, psychological and economic. In any design, the architect and lighting designer must determine, first of all, what sort of luminous environment is called for, taking into account how the space is to be used and who the occupants will be. Only then can the various systems—and the hardware that comprises these systems—be properly evaluated.

That much more attention is being paid these days to lighting for architecture is obvious. Furthermore, evaluation of design approaches and systems is developing into a more rational procedure. This rationality is coming about for two main reasons: First, results of ongoing research on visual comfort and visual performance are at a stage where they can be put to practical use. Second, clients—rightly or wrongly—are demanding more quantitative measurements or indices from their design consultants with respect to equipment and systems. Also a factor is the growing use of performance specifications that many times include quantitative indices.

A more rational approach is being sought, as well, in the area of subjective assessment of architectural environments. Techniques are being developed and assessed for the psychological appraisal of

simulated buildings (models, drawings, mock-ups, etc.) and finished buildings. The aim of such techniques would be to evaluate, for example, the degree of success of the luminous environment in terms of such factors as: acquisition of meaningful information; avoidance of discomfort, distraction and gloom; proper rendition of color; and creation of a comfortable, pleasing environment.

The danger of the quantitative approach, of course, is that the “numbers” may be taken as absolutes without their true context being understood. Quantitative indices for visual comfort and visual performance are, nonetheless, tangible; and, put into proper perspective, can be helpful in comparing a variety of lighting systems, fixtures and fixture layouts being considered for a particular situation. Questions that should be asked during the design process are: How limiting a factor is visibility with respect to performance? What are the tasks to be performed in the space, and how frequently are they to be done?

Visual Comfort Probability is the new method to assess comfort of lighting

A major portion of the research in the area of functional illumination of building interiors has been devoted to: 1) visual comfort, and 2) visual performance. Discomfort glare from lighting equipment has been the

subject of investigation for at least 50 years. The investigations have been concerned with the effect of the brightness of the light source (luminaires) in relations to the brightness of the surround (room surfaces). Brightness is called *luminance* (footlamberts), and illumination is called *illuminance* (footcandles), so these terms will be used in this article.

A basic glare formula was introduced early in the research studies, and over the years this “classical” glare formula has been modified and factors adjusted empirically by various investigators. Basically, the glare formula involves these variables: a) luminance of the source, b) apparent size of the source, c) location of the source in the field of view, and d) the luminance of the surround. What the formula says is that discomfort glare is a function of the balance between the luminance of the glare source(s) and the surroundings.

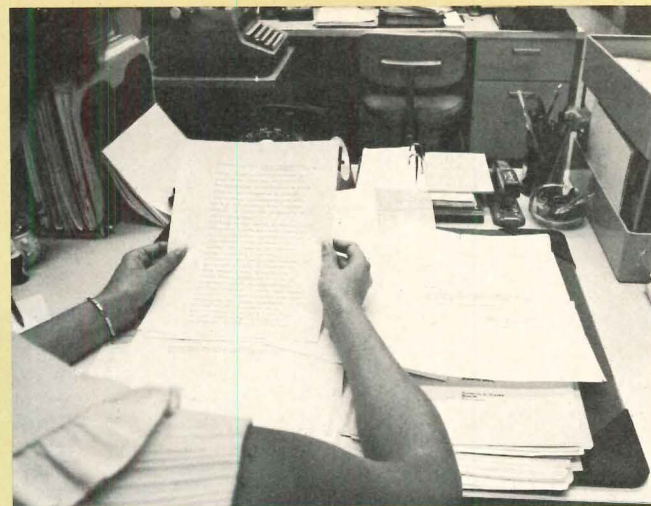
Because determination of degree of discomfort glare by the glare formula is very time-consuming, and because various investigators in the field were not in common agreement as to the applicability of existing subjective data to numerical constants in the glare equation, the Illuminating Engineering Society in 1956 introduced a simplified glare rating system called the “scissors curve.” The scissors curve (two intersecting straight lines on a graph, thus the name) was intended to give a measure



Much of the emphasis of lighting research in recent years has been on developing quantitative methods for evaluating the *visual comfort* of lighting systems (as one looks at them), and the potential *visual performance* of the people who use these systems.

Discomfort glare (with respect to the lighting system) is a function of the brightness of the luminaires, the apparent area of the luminaires, the brightness of the surround, and the position of the viewer with respect to the lighting.

Visual performance is mainly affected by the contrast between the task (typewriter characters, for example) and the background (paper, in this case). Contrast, in turn, is affected by how much light is reflected diffusely and how much specularly from the task, and this is governed by the nature of the task, size and light distribution of luminaires, luminaire layout, room surface reflectances, presumed occupant locations, and—importantly—viewing angles. Light that is reflected specularly from task to the viewer's eyes deteriorates task contrast. Light that comes from the sides and the back of the viewer, generally, is beneficial from the standpoint of contrast. Further vertically plane-polarized light benefits task contrast.



of whether or not a fluorescent luminaire installation was within the limits of acceptable comfort with respect to direct glare. It was a "go or no go" method, and it admittedly lacks precision, and is based on the luminance of only a single fixture. It is even possible for results to be misleading, when compared with the much more precise method available now called Visual Comfort Probability (VCP) which makes use of the classical glare formula. This new discomfort glare rating method was adopted by the Illuminating Engineering Society in 1966. The reason it became possible to take this approach was that new data (particularly more complete data in the area of subjective reactions) and analyses showed that the glare formula could provide logical discomfort glare ratings, and could be applied to lighting systems ranging from a few luminaires to a luminous ceiling—and the various investigators in this field concurred. This new data and the mathematical procedure for making VCP calculations were developed by Sylvester K. Guth, Lamp Division, General Electric Company.

The VCP formula looks simple enough at first glance. It states that:

$$M = \frac{L_s Q}{PF^{0.44}} \text{ where,}$$

M = the index of sensation of glare; L_s =

average luminance of the luminaire; Q = function of the visual size of the luminaire; P = function of the location of the luminaire in the field of view; F = average luminance of the entire field of view.

While the equation looks simple enough, calculation of the various factors by hand is a lengthy procedure because they involve many terms and many steps. Of course, the answers can be obtained simply and quickly by computer for any lighting installation and any room—and computer programs are available.

To arrive at a value for Visual Comfort Probability (VCP), the index of sensation, M, must be obtained for each individual luminaire, and these indices totaled to give a Discomfort Glare Index, M_t . From M_t , a Discomfort Glare Rating can be computed, which, in turn, can be converted to the more meaningful index, Visual Comfort Probability. The VCP index is the percentage of people who will probably find a given lighting installation comfortable from a direct glare standpoint. The Illuminating Engineering Society has recommended a minimum value of 70 for VCP.

Many lighting fixture manufacturers publish VCP data in their literature. But, obviously, because VCP varies not only for luminaire types, but also with room reflectances and sizes and with luminaire layout, VCP values can be given by manufacturers only for so-called "standard conditions."

Other factors affect visual comfort besides the brightness of luminaires

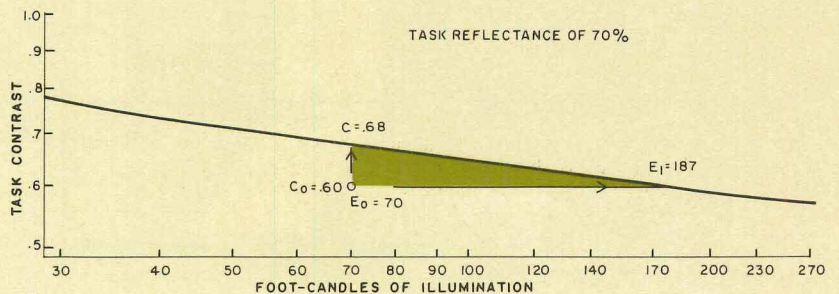
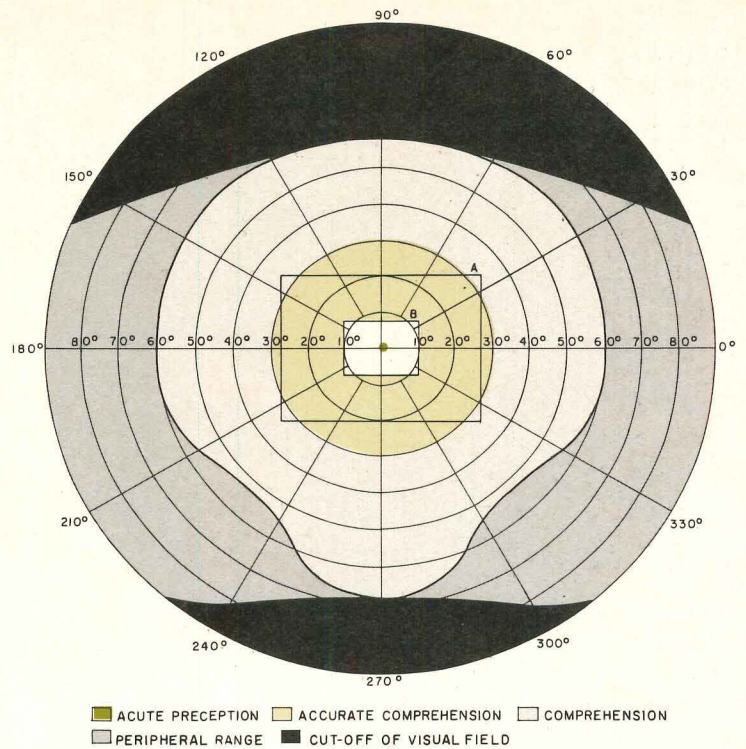
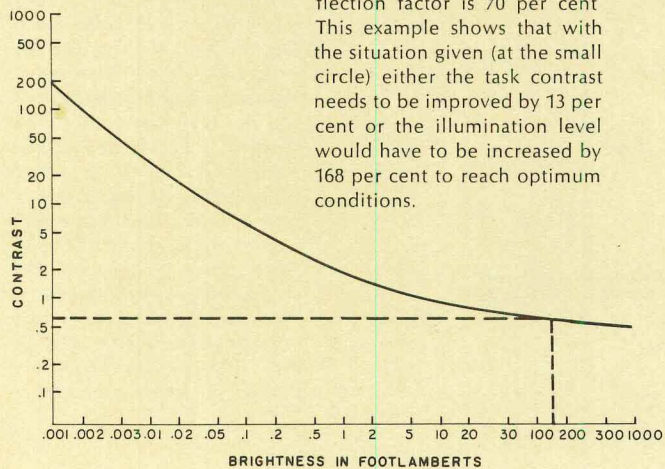
The VCP rating does not tell everything regarding visual comfort. In a document prepared for the Bureau of School Planning, State of California ("Prediction, Evaluation, and Specification of Visual Comfort and Performance in Classrooms," by Foster K. Sampson and Bill F. Jones) modifiers are applied to a base value of VCP to account for several other factors besides the luminance of the luminaires with respect to their surroundings. One modifier covers wall luminance: a limit of five times task luminance is used, and a negative multiplier is applied for wall luminances over this value. For small areas, a top limit of 10 times task luminance is used. A second modifier applies a penalty for windows with luminances more than five times task luminance. A third modifier is used if the task luminance anywhere in a room is less than 70 per cent of the value at the point where visual comfort is determined, to account for non-uniformity of illumination. And a fourth modifier is applied if the maximum to average luminance ratio of the luminaire exceeds 5:1 in the direct glare zone. These modifiers all subtract from the base value of VCP.

The Sampson-Jones document then assigns letter grades from A to F for luminaire installations. These letter grades are used both for ranges of visual comfort and for

The reference bases for quantitative evaluation

The field of view of the eyes is diagrammed at right. The large rectangle corresponds to a book at normal reading distance. But, because the seeing activity is dynamic, other areas will be viewed. Sensitivity of the eyes is greatest when the brightness of the task and the surroundings are the same. Brightness of luminaires often is a source of discomfort because they occupy a relatively large portion of the visual field when a person looks directly ahead.

Below is the standard visual performance curve developed by Blackwell, relating task contrast and required task brightness. At right is a small section of the curve, with the assumption being made that task reflection factor is 70 per cent. This example shows that with the situation given (at the small circle) either the task contrast needs to be improved by 13 per cent or the illumination level would have to be increased by 168 per cent to reach optimum conditions.



ranges of task contrast rendition which provide a measure of visual performance potential (this subject will be discussed shortly). The document has not yet been adopted by the State of California.

Numbers-based criteria are put into broad context in SUCF specification

In a lighting research project for the State University Construction Fund of the State University of New York, consultant William M. C. Lam has taken a broader approach to the development of performance criteria, placing the main emphasis on the use of judgment-based criteria. Lam states that, "... many factors influence and determine biological and activity needs, and these needs, in turn, influence and determine the design process. It follows that a process as complicated as designing a successful luminous environment cannot be filtered down to one simple formula. Designers need more than a few hard numbers as criteria; they must be able to use their judgment, since most criteria on which they base designs are themselves judgment-based."

He has developed a Space Program Chart which is a comprehensive summary of all relevant criteria (except cost) that a designer would need in order to begin preliminary planning of the lighting for a particular space. It is intended to serve as a means of communication among the de-

signers, SUCF, and the particular University administration unit involved, and to be the basis for developing and evaluating design alternatives. Basically the chart is divided into three main parts: 1) biological and activity needs; 2) information needs, and 3) hardware system. Numerical criteria are applied for partial evaluation of the hardware system.

No illumination levels are prescribed, as such. Rather, the designer is given a lighting budget system in which the measurement is in terms of an amount of generated light (in lumens) which is proportionate to room surface area and reflectances and to different degrees of task difficulty. It is up to the lighting designer, then, to utilize the total lumens available in the best way to meet the objectives set down in the Space Program Chart. The performance criteria are not yet in use by SUCF, but it is anticipated that they will be in print in the near future.

Visual performance depends to a large extent upon task contrast

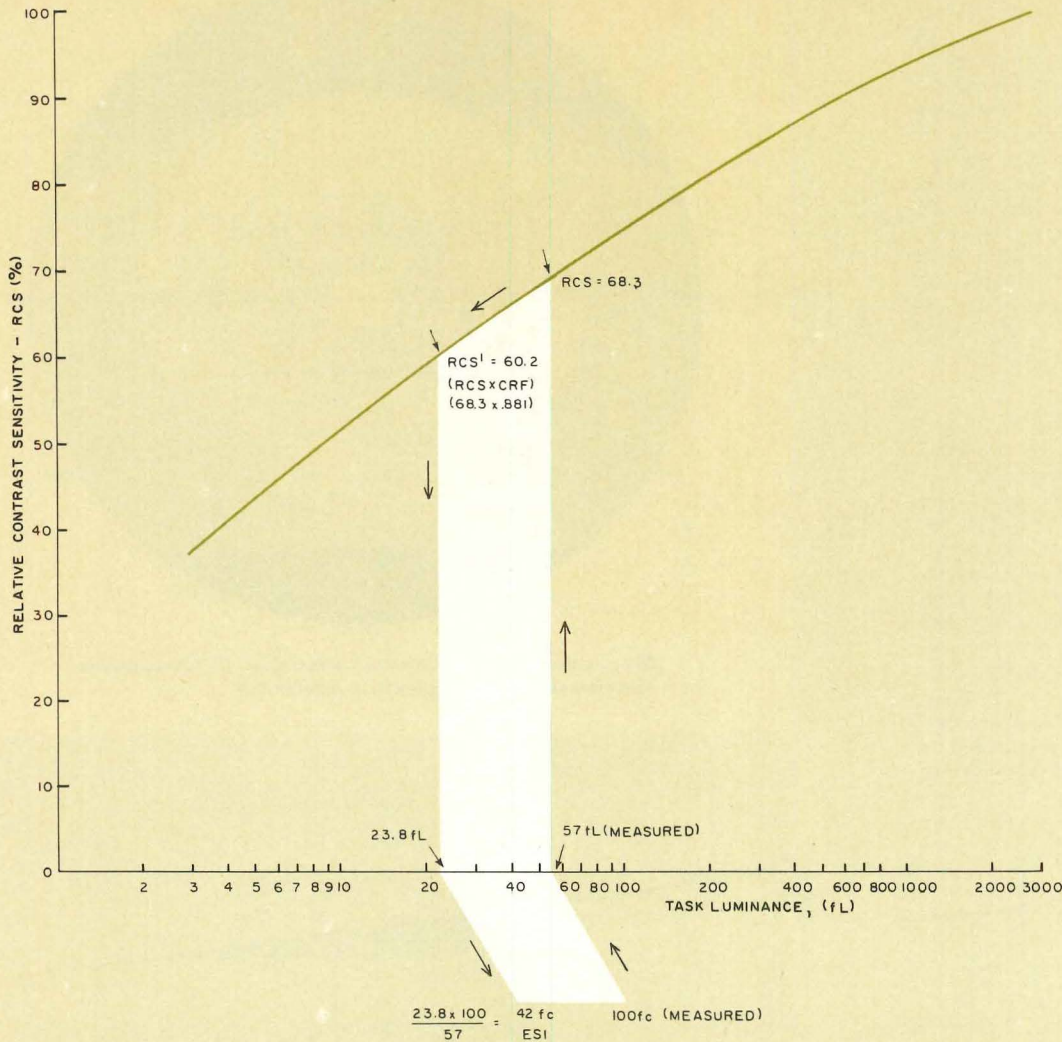
It has long been known that one's ability to see a task accurately is primarily dependent upon the contrast between the task and its background—for example, between the pencil line and the paper it is written on. Visibility, first of all, depends upon the characteristics of the task, itself—size of task detail in relation to the back-

ground; and contrast, first of all, depends upon specularly of the task and the background (shiny or matte), etc. But with any given task, contrast depends upon: 1) the level of illuminance (footcandles); 2) the lighting layout and the candlepower distribution of the luminaires; 3) the polarization and spectral composition of the illuminance. Visual performance is further affected by: 1) disability glare caused by luminance (brightness) patterns near the task; 2) transient adaptation caused by non-uniform luminance away from the task that may be viewed during eye movements around the space; 3) psychological variables such as informational requirements (e.g. familiarity or non-familiarity with the task); 4) the angle at which the task is viewed. Visual performance also varies among different members of the same age group as well as between different age groups.

Early studies of visual performance emphasized the relationship between vision and light in terms of the level of illuminance (footcandles). But contrast between the detail of the task and its background is not determined just by how much illumination there is. It also depends upon how effective the illumination is in producing contrast—leading to use of the terms "good footcandles" and "bad footcandles."

Common reading task details (pencil

Determining how well a lighting system aids visibility



This graph illustrates the principles behind the new method reported by the Illuminating Engineering Society for evaluating lighting systems with respect to veiling reflections (formerly called "reflected glare"). The effectiveness of a lighting system suffers if it produces reflections that reduces contrast of the task.

The example assumes a system produces 100 footcandles; the brightness of the task is measured at 57 footlamberts (meaning that task reflectance is 57 per cent). At 57 footlamberts, the Relative Contrast Sensitivity (RCS), with respect to maximum attainable, is 68.2 per cent. But the illumination produced is only 0.881 times as effective in producing contrast had the illumination been produced by a uniformly lighted sphere (which is the meaning of Contrast Rendition Factor, CRF). Thus spherical illumination producing 23.8 fL on the task would be equivalent to 57 fL of the specimen system. Or, 42 fc of sphere illumination is equivalent to 100 fc of the specimen system (this is the meaning of Equivalent Sphere Illumination, ESI).

Because a small change in contrast means a very large change in ESI, a table of values for RCS versus brightness would be used in practice.

lines, ink lines, printed type, etc.) are specular to varying extents, as are their backgrounds — different types of paper, matte to shiny. Illuminance (non-polarized) that strikes the task at the viewing angle of the observer is specularly reflected back to the observer's eye, rather than being absorbed and diffusely re-reflected. Such specularly reflected light creates a veiled effect, hence is known as "veiling reflections." If the illuminance is vertically plane-polarized, the rays of light, even at the viewing angle, are refracted and returned diffusely to the eye.

All light-control media polarize the light output to some extent, both horizontally and vertically. And polarizing panels called multi-layer polarizers have been developed with the purpose of increasing the amount of vertically plane-polarized illuminance.

It can be seen that there are two ways of getting "good footcandles": 1) controlling the distribution of the light output so that as little as possible comes at viewing angles; this can be done through design of the luminaire and through the geometry of the luminaire layout; 2) providing vertically plane-polarized light.

Light from a hemisphere having uniform luminance comes to the task from all directions—only a small fraction coming in at the viewing angle. This type of illumination, obviously, is very good, and has

come to be the reference by which contrast rendition of lighting systems is assessed. Of course, not many rooms come in the shape of hemispheres, but luminous ceilings, coffers, and indirect lighting approach this type of distribution.

It is possible to obtain better contrast rendition than that from spherical illumination. This can be done by controlling the geometry of the lighting layout and/or the candlepower distribution of the luminaires. The latter approach has led to the development of luminaire reflectors and lenses that produce what is called twin-beam or batwing distribution. Provided that occupants can be faced with their lines of sight parallel to the rows of luminaires, twin-beam luminaires can provide very good contrast rendition, often better than that of a sphere. If occupants face perpendicular to the rows, the illuminance coming sidelong is more like that of conventional luminaires (like a diffuser), and the illuminance coming straight at them is that from one of the "accentuated" halves of the twin-beam. Whatever portion of this comes at the viewing angle of course reduces contrast rendition.

A type of geometry that appears to work well is obtained with peripheral luminaire layouts, whether this be with rows of luminaires that form the outline of a square or a rectangle, or with wall-mounted valance type luminaires. Furthermore, light

reflected diffusely from walls can aid contrast rendition of tasks.

Where the visual performance criteria now in use got started

In 1959, Dr. H. Richard Blackwell introduced a "Quantitative Method for Specification of Interior Illumination Levels." These recommended levels were based upon a visual performance of 99 per cent accuracy and assumed the source of the illuminance to be completely diffuse. Thus, under spherical illumination No. 2 pencil writing of 6th grade students (reading while writing) required 63 footcandles; 8-point Bodoni type required 1.87 fc; typed carbon, fifth copy, required 133 fc.

In recent years, only occasionally have lighting systems been used that produce diffuse illumination (luminous ceilings, indirectly lighted coffers and ceilings). So, with direct troffer type systems, any illuminance coming to the task at the viewing angle acted to reduce contrast rendition. Investigators J. M. Chortlon and H. F. Davidson and D. M. Finch were the first to show the relationship between task contrast and the geometry of the illuminance reaching the task. Blackwell concurred with these findings and also showed that the plane of polarization of illuminance affects the physical changes in the task contrast. Earlier, Blackwell had shown that a 1 per cent loss of contrast requires a 10

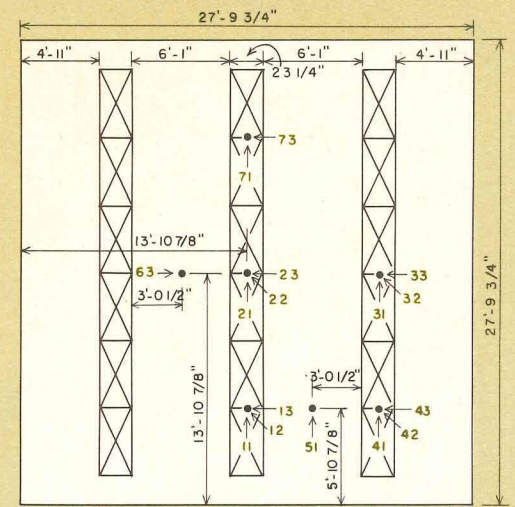
Measured comparative data on lighting systems

RELATIVE RANKING OF FIVE LUMINAIRE SYSTEMS*

(In terms of Contrast Rendition Factor and Equivalent Sphere Illumination)

Position	CRF					ESI				
	1	2	3	4	5	1	2	3	4	5
11	BW	DP	MPI	MPII	PP	BW	MPI	MPII	PP	DP
	.923	.842	.841	.834	.799	36.0	28.8	26.5	22.7	21.1
12	BW	DP	MPI	MPII	PP	MPI	PP	MPII	BW	DP
	.970	.933	.923	.917	.903	63.1	58.8	57.6	53.8	44.3
13	BW	DP	MPI	MPII	PP	PP	MPI	MPII	DP	BW
	.979	.966	.955	.949	.949	83.9	79.7	72.6	55.6	52.1
21	BW	DP	MPI	MPII	PP	BW	MPI	MPII	PP	DP
	.942	.851	.843	.839	.804	44.9	30.5	29.2	24.3	23.6
22	BW	DP	MPII	MPI	PP	MPII	MPI	PP	BW	DP
	.983	.947	.941	.939	.925	79.0	78.9	77.5	65.1	56.3
23	BW	DP	MPI	MPII	PP	PP	MPI	MPII	DP	BW
	.995	.983	.964	.966	.961	101.4	95.5	92.1	74.0	67.4
31	BW	DP	MPI	MPII	PP	BW	MPI	MPII	PP	DP
	.899	.819	.813	.808	.778	27.2	22.7	21.2	18.8	17.0
32	BW	DP	MPI	MPII	PP	MPI	PP	MPII	DP	BW
	.969	.943	.933	.930	.919	71.2	71.1	68.8	51.3	50.4
33	BW	DP	MPI	MPII	PP	PP	MPI	MPII	DP	BW
	.988	.962	.958	.956	.945	87.8	85.9	81.3	58.5	58.2
41	BW	DP	MPI	MPII	PP	BW	PP	MPI	MPII	DP
	.882	.818	.805	.804	.780	22.9	22.7	20.8	20.3	16.5
42	BW	DP	MPII	MPI	PP	PP	MPII	MPI	BW	DP
	.950	.916	.906	.903	.896	51.6	50.0	49.1	39.5	36.9
43	BW	DP	MPI	MPII	PP	MPI	MPII	PP	DP	BW
	.973	.956	.943	.941	.937	68.4	66.9	61.3	49.5	47.2
51	BW	DP	MPII	PP	MPI	PP	BW	MPI	MPII	DP
	1.027	1.022	1.016	1.016	1.014	138.0	132.6	108.0	103.6	73.2
63	DP	MPI	MPII	BW	PP	PP	BW	MPI	MPII	DP
	.957	.941	.939	.934	.927	65.8	63.5	60.9	56.9	45.8

*Code: BW — Batwing, DP — Diffuser, MPI — Multilayer Polarizer I, MPII — Multilayer Polarizer II, PP — Prismatic



TEST ROOM PLAN FOR LUMINAIRE SYSTEMS

There is no single index for the contrast-producing efficacy of a particular lighting system. Task contrast—a measure of visibility—varies with the light distribution pattern of the luminaire and with luminaire layout; with room size, shape and reflectances; and with viewing location and viewing angle. Thus, there is a “map” of values to be examined.

Contrast Rendition Factors (CRF) and values for Equivalent Sphere Illumination (ESI)—the real comparative index of system efficacies for task visibility—are given here for five different luminaire systems, all of which use the same 2-lamp troffers.

The data were taken by Ronald Helms the past year when he was a doctoral graduate student under Dr. Blackwell. Helms used an improved version of Dr. Blackwell's Visual Task Photometer. The viewing angle was 25°, and measurements were obtained for the points shown on the plan using a standard pencil target developed by Blackwell.

to 15 per cent increase in illuminance to maintain the same visual performance, and also that with more light, the eye is more sensitive and requires less contrast.

The new method of specifying quantity of illumination is ESI

Now the Illuminating Engineering Society has adopted “A Method of Evaluating the Visual Effectiveness of Lighting Systems,” (RQQ Report No. 4) which gives a quantitative method for evaluating the visual significance of contrast losses that occur in real lighting situations.

It uses as its basis a relative contrast sensitivity (RCS) curve which plots this value in per cent against luminance in footlamberts (or candela/meter² in the metric system). This RCS curve is the reciprocal of the IES Performance Curve developed by Blackwell. It is used to determine how significant losses in contrast are, whether these losses be measured by instrument in the field, or predetermined mathematically for a hypothetical or proposed lighting system.

The index of how well a lighting system produces contrast rendition is the Contrast Rendition Factor. Blackwell has made contrast rendition measurements in the laboratory for a “standard” No. 2 pencil target using an instrument called the Visual Task Photometer. Luminance readings are taken under a given lighting sys-

tem, first of the target (lines plus background), and, second of the background by itself. This gives a value for task contrast under the “real” system. Then task contrast is determined by positioning a portable sphere over the target, and a value of task contrast is determined under sphere illuminance. The CRF is calculated by dividing the task contrast under the lighting system by the task contrast under the reference conditions of a photometric sphere. It can be understood, then, that “raw” footcandles can be converted to Equivalent Spherical Illumination footcandles by employing the CRF index. And ESI is the true measure of the effectiveness of one lighting system compared with others.

It is possible to have a CRF higher than 1.0 because, as already mentioned, some systems are better with regard to veiling reflections than a sphere. Further it is possible for a lighting system to have a better CRF at some point in the room than another system, but have a lower ESI, simply because it produces fewer “raw” footcandles.

In practice there is no single CRF or ESI for a lighting system, simply because light comes from different directions for different locations of the task in a room. Generally speaking, CRF's are the lowest along walls and in the corners because at these locations there is less light reflected from the walls, and light from the lumi-

naires comes from fewer directions.

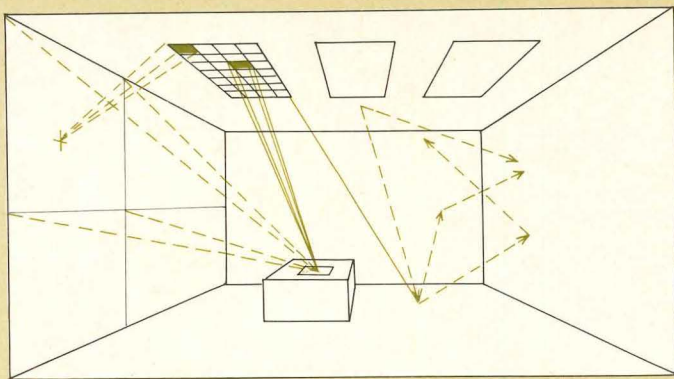
Because CRF's and ESI's vary throughout a room, the lighting designer really needs to examine them at a number of locations to make fair comparisons.

A third index is Lighting Effectiveness Factor (LEF) which is a ratio of total illuminance (raw footcandles) to ESI; in other words a ratio of total footcandles to “good” footcandles. An LEF value, in other words, tells how efficiently a given system uses its energy in terms of producing contrast. LEF values cannot be used, however, for comparing different types of lighting systems that have different footcandle outputs; nor can LEF of an individual system be used to predict ESI directly by a multiplication factor when the “raw” footcandles are increased or decreased. The reason is that the eye's sensitivity is not the same for different levels of light on the task.

Comparisons should be made only on the basis of ESI values when the input lumens to each system are the same.

Various methods for determining CRF values—including a computer program

Blackwell employs a Visual Task Photometer for obtaining CRF values, and this device is also being used by some lighting equipment manufacturers and other lighting researchers. The CIE (Commission International de l'Eclairage) has chosen to



Obtaining Contrast Rendition Factor measurements in the field is difficult and time-consuming. Thus, the search for a predetermination method with the requisite accuracy.

Stephen S. Squillace and David L. DiLaura of Hyde & Bobbio, Consulting Engineers, Detroit, have developed a computerized system that gives not only Equivalent Sphere Illumination (ESI), but also footcandle levels based upon direct and interreflected components, and, finally, a complete picture of room surface luminances.

For the computations, the room surfaces are divided into zones, each of which produces illumination on the task.

More complete candlepower distribution data are required than before—five planes rather than three—and measurements for horizontally and vertically plane-polarized light.

ZONE NUMBER	ZONE AREA	RELATIVE X-COORDINATES	RELATIVE Y-COORDINATES	DIFFUSE REFLECTANCE	AREA IN SQUARE FEET	INITIAL LUMINANCE, FOOTLAMBERTS	FINAL LUMINANCE, FOOTLAMBERTS
37	1.00	0.00	-1.00	0.17	19.26	12.11	22.06
38	1.00	0.00	0.17	0.33	19.26	7.06	16.49
39	1.00	0.00	-0.17	0.17	19.26	18.91	28.99
40	1.00	0.00	0.17	0.33	19.26	19.61	24.71
41	1.00	0.00	-0.17	0.17	19.26	20.35	31.11
42	1.00	0.00	0.17	0.33	19.26	15.03	23.60
43	1.00	0.00	-0.17	0.17	19.26	20.35	31.11

ZONE	AREA	RELATIVE X-COORDINATES	RELATIVE Y-COORDINATES	TARGET LUMINANCE, FOOTLAMBERTS	BACKGROUND LUMINANCE, FOOTLAMBERTS	RCS	CRF	RCF*	EQUIVALENT LUMINANCE, FOOTLAMBERTS	ESI	LEF
1	12.00	0.00	0.00	109.67	127.40	76.98	0.86	65.16	33.98	95.30	0.267
				109.00	117.47	76.30	0.91	75.67	105.42	151.72	0.897
				109.91	130.00	75.11	0.94	67.87	86.09	64.75	0.435
				109.83	117.40	76.33	0.95	75.04	105.05	151.25	0.895
2	17.00	0.00	0.00	103.17	115.00	75.70	1.017	76.95	120.20	170.55	1.045
				102.83	110.75	75.90	0.977	66.68	89.79	52.89	0.359

CONTRAST LOSSES
ANALYSIS PROVIDED AT 6 POINTS IN FOUR VIEWING DIRECTIONS (N, S, E, W) FOR 25 DEGREE VIEWING ANGLE

use contrast-reducing visibility meters. Sampson and Jones in their attempt to derive a simple system for predicting CRF employed a light meter and used footcandle readings taken 1) vertically facing forward in the direction of viewing 2) vertically, 90 degrees to the left and right of the direction of viewing, and 3) tipped forward to the viewing angle. From these measurements they developed an empirical relationship for CRF. Such an approach does not measure the vertical polarization of the source, so a multiplying factor was included to compensate for the beneficial effect of vertical polarization with respect to contrast rendition.

Any type of precise field measurements of Contrast Rendition Factor are very time consuming and would be impractical for checking or certifying an installation in the field.

The development of a simple visual effectiveness indicator has been reported which utilizes a semi-glossy background for a mask and a series of gray, matte patches that vary in reflectance. The idea is for the background to be matched with a gray patch. The poorer the lighting installation from a contrast rendition factor standpoint, the lighter would be the patch to match with the background. Careful standardization of the reflectance characteristics for various viewing angles is, of course, required.

Because precise CRF values are so time-consuming to achieve in the field, the Illuminating Engineering Society has encouraged the development of predetermination methods which could predict the CRF values for any lighting system, at any task location in a room.

A computer program for determining CRF values and illuminances (footcandles) or luminances (footlambers) anywhere in a room has been developed by Stephen S. Squillace and David DiLaura of the Detroit consulting engineering firm, Hyde & Bobbio, Inc. At considerable expense to the firm, they have come up with what mathematicians would call a very "elegant" program that accounts not only for direct illumination from the luminaires to the task, but also for all the interreflected components from all room surfaces which are directed to the task. In this program room surfaces—walls, ceiling, floor—are divided into 84 discrete areas. Further, luminaire surfaces are divided into small enough segments so that they can be considered point sources. Then direct illuminance components from every luminaire in the space to a specific task can be obtained as well as interreflected components from the discrete areas of room surfaces. The beauty of such a program is that not only can it determine CRF values, but it can predict the luminances (brightness) of the 84 discrete areas of the room. In other words it can give a

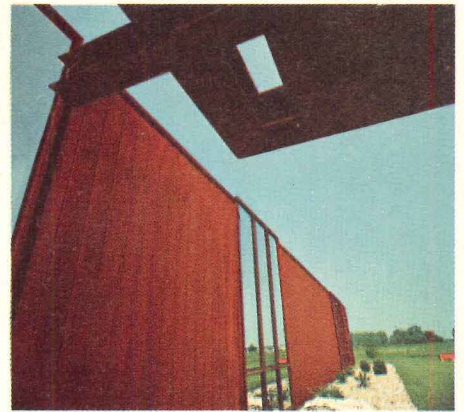
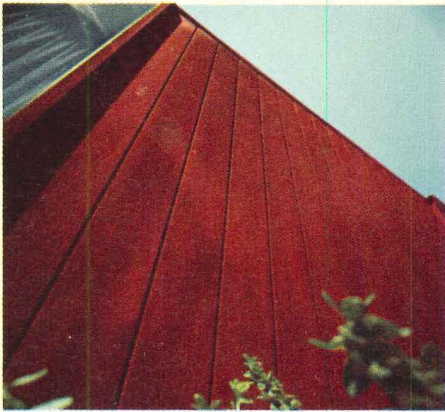
picture of what the room would look like, illuminated.

In order to predict Contrast Rendition Factors for a specific task, the reflectance characteristics of the task for a wide range of "viewing" elevations and azimuths must be available. These are called the gonio distribution characteristics of the task. The only task that has been evaluated so far is the No. 2 pencil target of Dr. Blackwell. He has standardized six of these targets which consist of concentric rings of pencil mark on the ridges of a white target that has annular depressions. The gonio data were obtained on this target for five degree steps in elevation up to 90° and for 10 degree steps in azimuth up to 180°. This work was performed by Ronald N. Helms as part of his doctoral work at the Ohio State University under Dr. Blackwell. Dr. Helms is now teaching in the architectural-engineering department of the University of Colorado, Boulder.

Standardizing targets is difficult, and obtaining the gonio distribution data on even one target is a long, tedious process. Blackwell states that the Committee on Office Lighting of the CIE will be selecting representative tasks and will have him standardize them. But, for the time being, contrast rendition evaluations of various lighting systems are being measured for a task assumed to be No. 2 pencil handwriting (a classroom or office task).



Natural beauty.



This audio-tape manufacturing plant for Columbia Broadcasting System, Inc. in Terre Haute, Indiana, owes its natural beauty to an exterior of bare USS COR-TEN Steel.

A costly choice? Definitely not. USS COR-TEN Steel is one of the more economical materials you can use for industrial exteriors. Maintenance? COR-TEN takes care of itself. No painting, no cleaning...and if it's scratched or marred, it heals itself.

Take a hard look at USS COR-TEN Steel for your next project. For more information, contact a USS Construction Marketing Representative through the nearest USS sales office or write: United States Steel, 600 Grant Street, Pittsburgh, Pa. 15230.

USS and COR-TEN are registered trademarks

Architect & Engineer:
Ewing Miller Partnerships,
Terre Haute, Indiana.
General Contractor:
F. A. Wilhelm Construction Co., Inc.,
Indianapolis, Indiana.
Panel Erector:
Hugh J. Baker Company,
Indianapolis, Indiana.
Panel Fabricator:
H. H. Robertson Company,
Pittsburgh, Pa.

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and brings functional components
together elegantly.

Here, Palestra Vinyl Corlon
provides a base for relaxation,
a base for concentration.
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It adds dimension
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For assistance or the
flooring information you may need,
please write us.
Armstrong, 307 Rock St.,
Lancaster, Pa. 17604.

**Armstrong**

For more data, circle 62 on inquiry card

This pioneering lighting/ceiling installation in Tacoma is an 11-month wonder.

Barely 11 months from the day Keene's Sechrist Lighting division received preliminary drawings from Skidmore, Owings & Merrill, this remarkable concept in fluorescent downlighting was a reality.

Sechrist had manufactured and delivered the last of 1,889 custom lighting fixtures. Each is a 22-inch cube with an acrylic lens deeply recessed in the housing, and every other one is equipped with a tulamp ballast. All were installed in perfect alignment, their white "U" lamps diffusing a warm glow within a geometric pattern of dark reveals.

How did Sechrist meet a tight deadline with a large order of fixtures no one had ever seen before? By smoothly meshing engineering and production know-how. Sechrist lighting experts worked long and hard with the architectural engineers and electrical contractors to design and fabricate the special fixtures.

In the words of the architect's project manager, "The project required fast action, and Keene was responsive to our needs."

If you create unusual lighting designs, let us show you a brief slide

presentation documenting this project. You'll see why you can count on Sechrist's special projects team to execute your ideas successfully—on time and on budget. Call us at (303) 534-0141, or write Keene Corporation, Sechrist Lighting, 4990 Acoma St., Denver, Colo. 80216.

KEENE
CORPORATION

SECHRIST LIGHTING

We've just begun to grow.

For more data, circle 63 on inquiry card

PHOTOGRAPH: TOM UPPER



*Main banking floor of the Bank of Washington Plaza, Tacoma, Washington.
Design concept developed by Skidmore, Owings & Merrill,
Architects, Engineers, Portland, Oregon.
General Contractor: Donald N. Drake Co., Portland, Oregon.
Electrical Contractor: Carl T. Madsen, Inc., Tacoma, Washington.*

For more information circle item numbers on Readers Service Inquiry Card, pages 225-226

CERAMIC TILE SYSTEM / Two-square-foot sheets of glazed tile available in three sizes held together by a flexible, waterproof silicone rubber grouting, plus caulking-gun cartridges of the silicone compound for grouting the perimeters of the sheets comprise the system.

The sheets are installed quickly and will conform to slight irregularities in the wall with tiles remaining perfectly aligned.

On-the-job grouting is limited to seams between sheets and top and bottom edges, and is done with a hand or air gun loaded with cartridges of the silicone material.

The silicone rubber grout material is reported to be mildew-proof and highly stain-resistant, and will not split or crumble due to building movement or temperature fluctuations. These properties are said to be permanent over temperatures ranging from far below freezing to well over 100 degrees.

The system, according to the manufacturer, is especially appropriate for installation over gypsum wallboard. It can be set over masonry or even existing tile. Presently, the system is recommended for wall use only. ■ American Olean Tile Co., Lansdale, Pa.

Circle 300 on inquiry card



MEMBRANE ROOFING SYSTEM / Sequence of assembly differs from that of conventional systems: First, a built-up waterproof membrane is applied to the flat roof deck, then plastic foam insulation boards are installed on top of the membrane. Finally, the roof is finished with a layer of loose crushed stone, paving blocks, or structural concrete. The position of the boards protects the membrane itself from the harmful effects of thermal cycling, exposure, and roof traffic and insulates the building, the company reports. The membrane acts as a vapor barrier. ■ Amspec Inc., Columbus, Ohio.

Circle 301 on inquiry card

More products on page 150

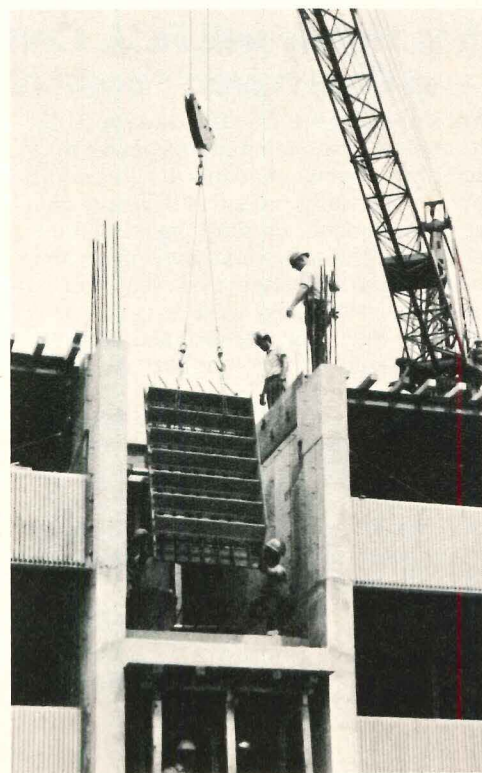
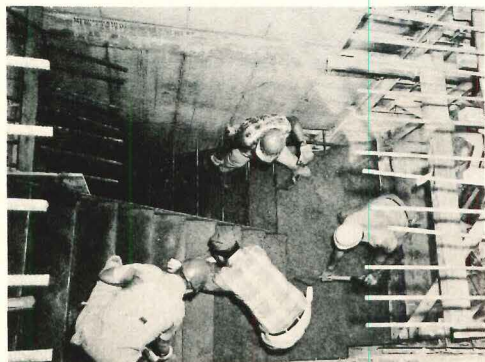
PREFABRICATED METAL FORMS / A welded one-piece unit consisting of metal riser fronts, reinforcing and temperature rods, and plate, channel or exposed stringers provides permanent reinforcement for concrete stairs. Because the steel risers and stringers are non-structural, the system can be built to virtually any design. All units are custom manufactured to meet the specific requirements of each installation. Width, length and configuration are determined by the architect.

To install the system, landing forms are set (photo, left), forms are set in place (photo, right), and, if necessary, shoring is installed

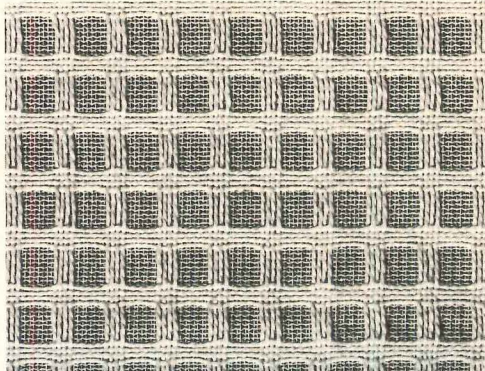
(center photo), to prepare the forms for concrete pouring. The stairs are tied into the surrounding structure using conventional tie methods and are usable as soon as the concrete hardens. Steel surfaces and nosings permanently protect the riser faces and edges from damage or staining by on-site labor.

The design, fabrication and strength of the finished stairs meet or exceed a 100 lb live load per sq ft. All exposed metal surfaces of the finished stair are coated with a rust inhibitive primer applied at the factory. ■ American Stair Corp., Inc., McCook, Ill.

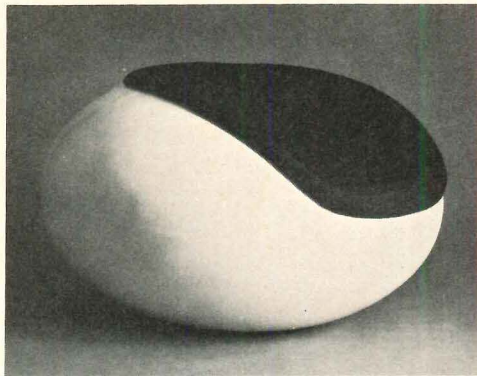
Circle 302 on inquiry card



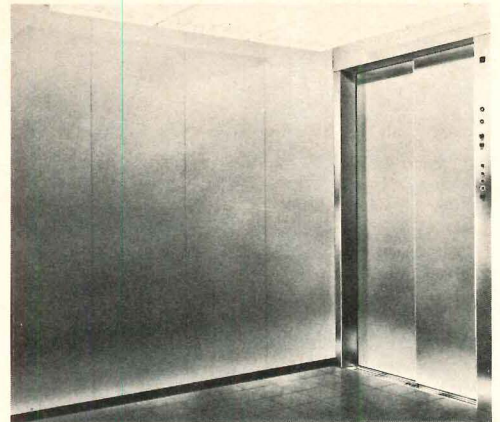
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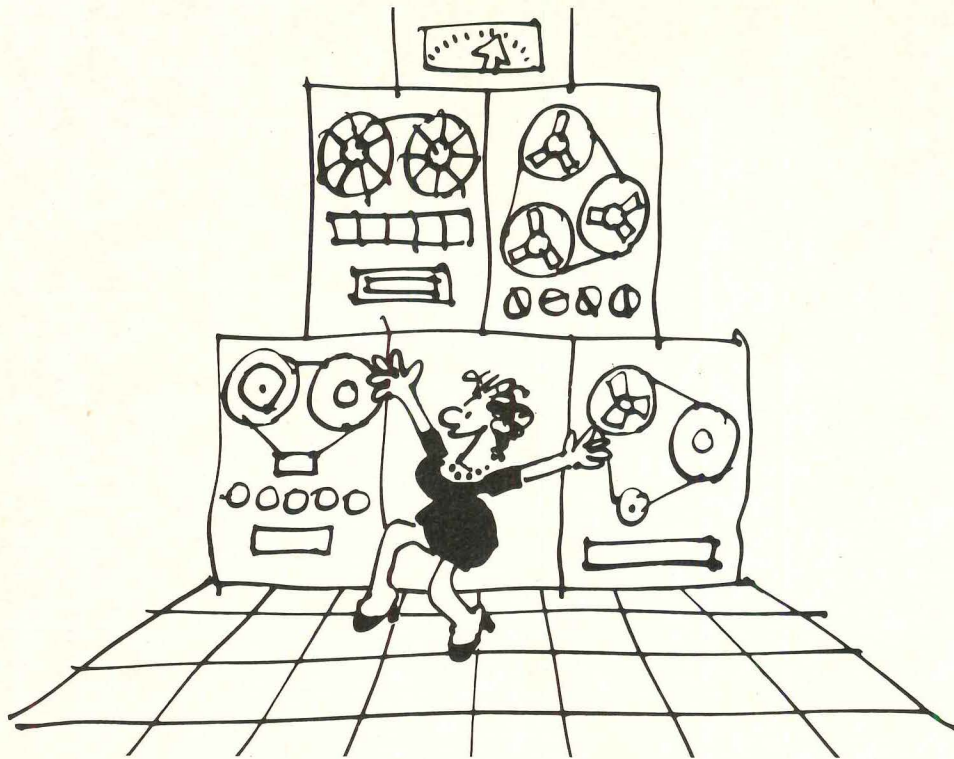
WINDOW CASEMENTS / Double-woven, open-weave designs are transparent throughout and need no lining. ■ Isabel Scott, New York City. Circle 303 on inquiry card



FIBERGLASS CHAIR / Both round and flat pedestal bases are available. Upholstery is optional. ■ Cramer Industries Inc., Kansas City, Kan. Circle 304 on inquiry card



HOSPITAL ELEVATORS / Interior photo depicts the greater depth of the car in relation to car and entrance width. Platform is deep enough for stretcher beds as well as standing passengers. ■ Otis Elevator Co., New York City. Circle 305 on inquiry card



IBM, Honeywell, RCA, Control Data, NCR, Burroughs and Olga haven't been able to put a dent in us yet.

Ever since General Electric developed the first computer room laminated plastic floor surfacing—Perma-Kleen—it's been subjected to the daily pressures of heavy computer equipment, burning cigarette butts, spilled inks and soft drinks, and Olga's high-heeled shoes. And after seven years Perma-Kleen floor surfacings look as good today as the day they were first installed. Because Perma-Kleen is the toughest computer room floor surfacing.

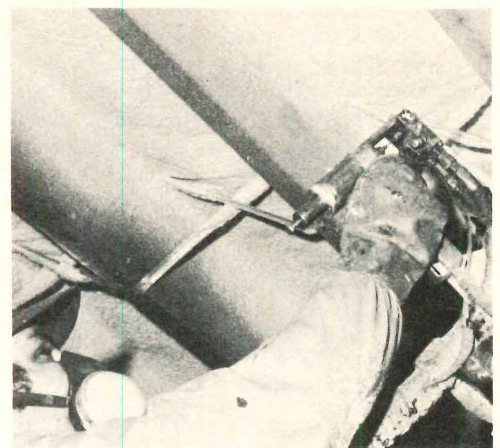
But toughness and durability are only two reasons why Perma-Kleen is Number One. Ease of maintenance, decorator patterns, excellent color stability and glare control make Perma-Kleen the natural choice for computer rooms and general office areas employing access floor systems.

To find out just how hard it is to put a dent in a Perma-Kleen floor, and to get a good look at Perma-Kleen's five contemporary patterns, write to General Electric, Laminated Products Business Department, Dept. PK, Coshocton, Ohio 43812.

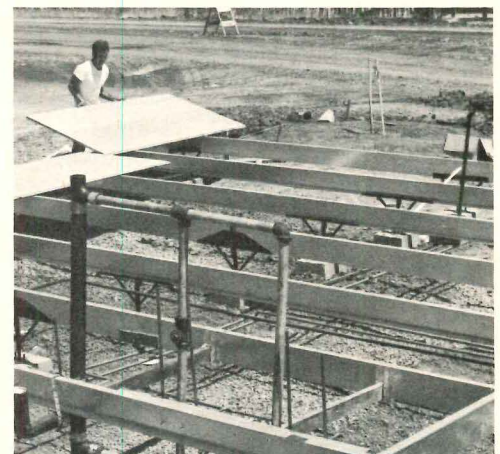
Name _____
 Firm _____
 Address _____
 City _____
 State _____ Zip _____
 Position _____

Perma-Kleen[®]
 Laminated Plastic Floor Tile
GENERAL ELECTRIC

For more data, circle 64 on inquiry card



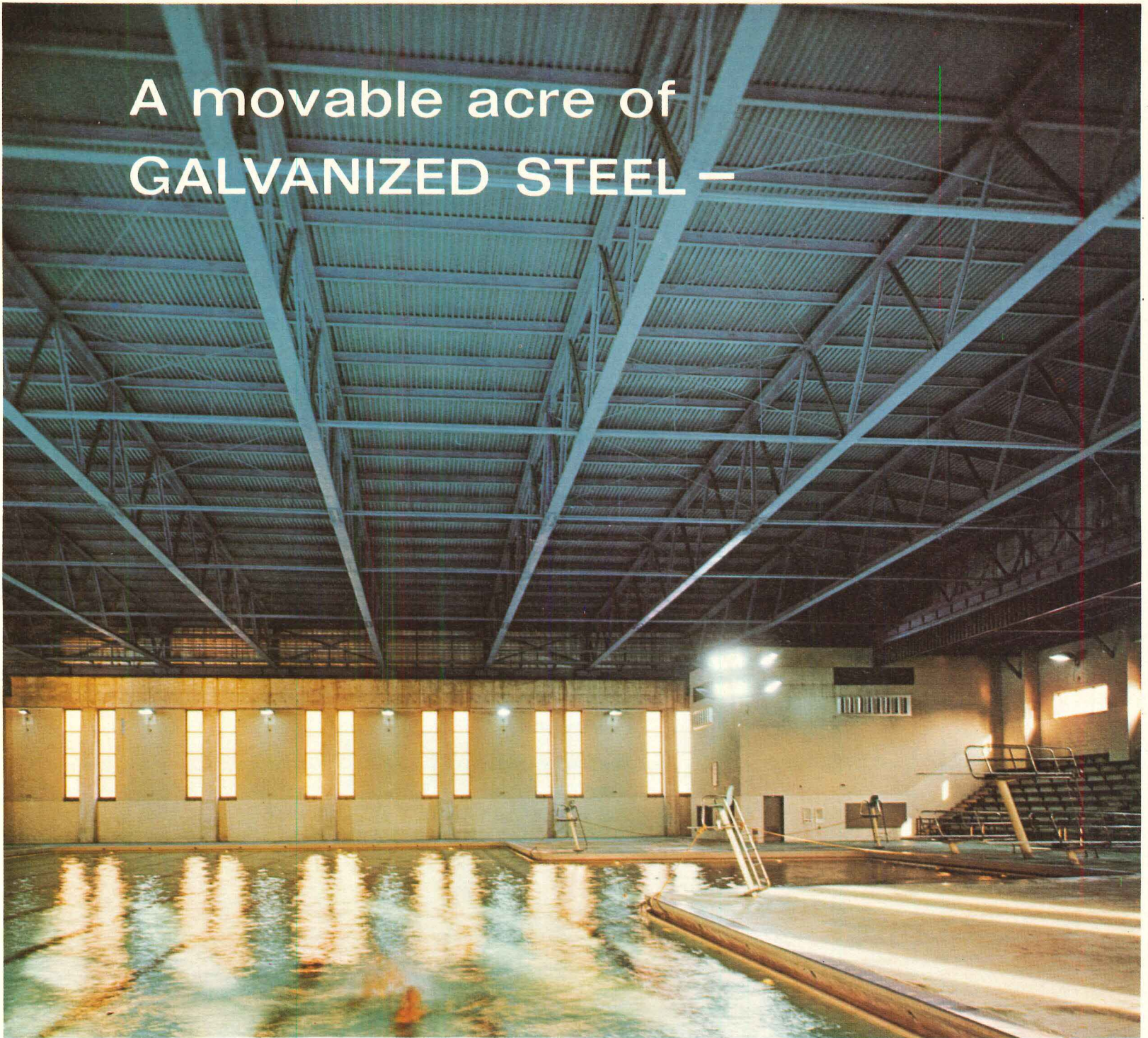
RIGID POLYURETHANE FOAM / Designed for cold-weather use, sprayable foam can be applied in freezing weather. Company reports to date show excellent adhesion, no thermal cracking and good coverage when applied on substrates as cold as 28 degrees F. ■ Reichhold Chemicals, Inc., White Plains, New York. Circle 306 on inquiry card



STEEL FOUNDATION AND FLOOR-FRAMING SYSTEM / All steel elements are pre-fabricated to specification and ready for on-site installation. Designed for crawl space construction, the system can meet requirements for single-family homes and apartments. ■ U.S. Steel, Pittsburgh.

Circle 307 on inquiry card
 more products on page 170

A movable acre of GALVANIZED STEEL —



Best answer to this corrosion problem

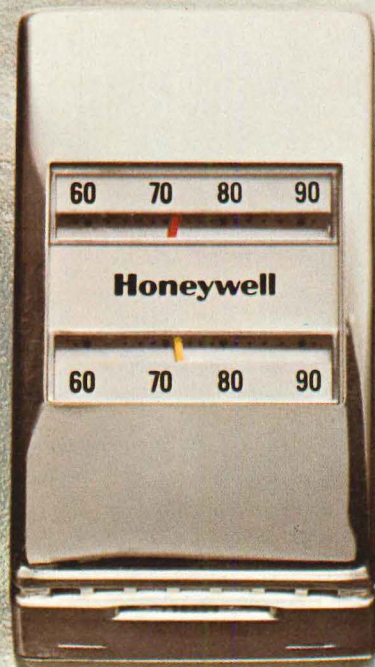
The problem was to design a movable roof that would take the constant exposure to moisture and chlorine from the swimming pool at the new John F. Kennedy Recreation Center in Newark, N. J. □ After extensive evaluation of various materials, the engineers, Barnett & Herenchak chose galvanized steel as the most reliable answer to all requirements. □ No other material gives you the combination of corrosion resistance, strength and economy you get from galvanized steel. □ **St. Joe supplies quality zinc—American industry puts it to work.**

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New... and blends in beautifully.



Our new thermostat
(shown actual size)—
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Meet the architect's thermostat by Honeywell. Clean, simple lines. Harmonious finishes. And so small, so subtle, it nearly fades out of sight.

One glance tells you Honeywell created this pneumatic thermostat with your building designs in mind.

Deliberately unobtrusive. With sleek, contemporary lines. Horizontal, vertical shapes.

A choice of durable metal covers... setpoint indicator and thermometer; thermometer only; or starkly plain.

A choice of finishes. Aluminum or brass, in brushed or mirror finish to match

architectural hardware. Or primed and paintable to harmonize with any color scheme.

And it's designed to be where a thermostat should be... on the wall or moveable mullions, for accurate responsive temperature control.

The perfect blend of aesthetics and function, in a new 'stat from an old friend. Honeywell.

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**WHAT
MAKES A
2 BILLION
DOLLAR
CARPET
MARKET
THINK ONE
FIBER BRAND
SHOULD
BE THE
LEADER?...**

proven performance

For the past 14 years—ever since it was introduced in carpeting—Acrilan® acrylic has been demonstrating that it can do the job in the two-billion dollar carpet market like no other fiber can.

That's why it has been picked by most of America's major carpet mills for the top of their contract lines.

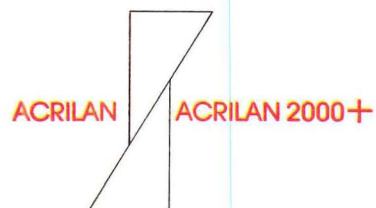
Acrilan is offered in more styles in more lines than any other branded fiber, natural or man made. There are over 100 different types of Acrilan contract carpet to choose from this year.

That's a leader.

And in the time Acrilan has been achieving this leadership, it has been constantly refined and improved. The latest breakthrough is Acrilan 2000+, the solution-dyed acrylic with remarkable color fastness qualities.

Acrilan provides a new standard for contract carpet. By offering a unique combination of properties. The total of these qualities, the summing up of its features, makes it a logical choice for contract installations.

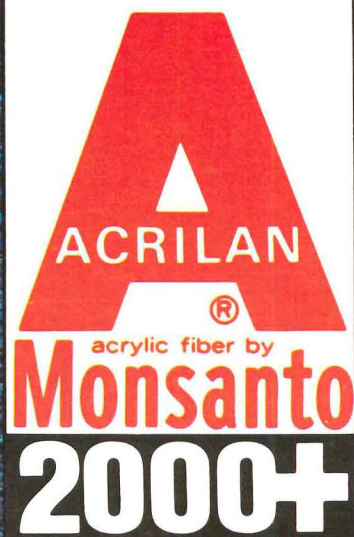
On the following pages we have explored in detail six of the areas in which Acrilan offers excellent performance. Together, these six points give you a carefully documented rationale to support your specification of Acrilan or Acrilan 2000+.



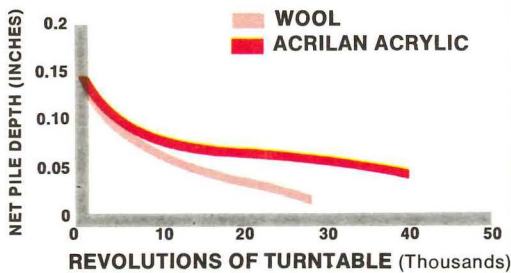
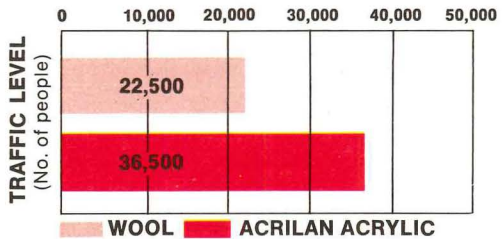
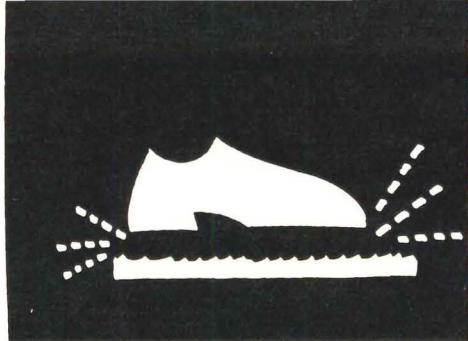


Acrilan has special properties that make it beautifully adaptable to contract carpet construction — durability, resilience, low static levels, flame resistance, color fastness and ease of maintenance. Carpets made with Acrilan® acrylic are mothproof, mildew-resistant and non-allergenic, too. Acrilan lends itself to tufting, weaving or knitting with equal success. And because it is a uniformly pure white fiber, it can be dyed in colors of superb fidelity. Great styling possibilities! Plus the strength and wear-resistance to make sure the carpets you specify maintain their beauty over the years.

Now the new Acrilan 2000 means that each color has been rated 2000 or more in the standard weatherometer test method, with no important loss of color. Solution dyeing is the reason for this fabulous performance — color is actually part of the solution which is extruded to form the fiber. So each individual fiber is solid color all the way through. Which makes it 20 times more resistant to sun fading than wool. In fact, we know of no more colorfast carpet fiber in the world! It can stand up against the harshest bleaches and cleaning agents without losing its beauty—a vital point in many contract installations such as hospitals. It makes possible the use of carpet where wool could never be used. And it adds whole new areas that carpet can go—outside stairwells, exposed corridors and the like. It has, of course, all the other outstanding features of Acrilan described at left.



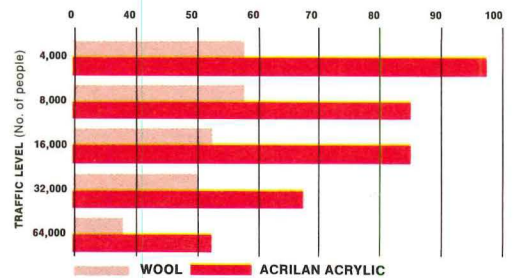
durability



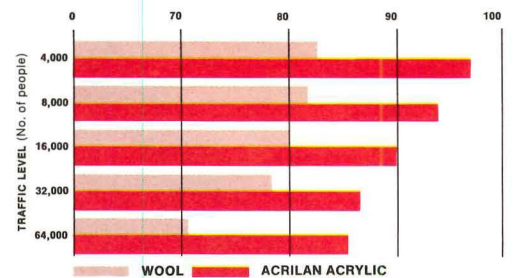
There are many tests which measure the indicators of durability. Such things as abrasion resistance and stair wear. As the charts show, Acrilan conclusively outperforms wool by at least 30% in these tests. It also has much greater elongation, tenacity and breaking toughness. More indicators of greater durability. But durability really means the ability to keep a rich, new look for a long period of difficult traffic and soiling conditions. Acrilan was first introduced in carpeting 14 years ago. Many of the installations are still in place ...and still look young and beautiful. That's the best proof of durability.

Resilience in carpet is "memory." How do you teach a carpet to remember how it looked before it was stepped on, so it can bounce back fresh as new? Acrilan makes carpet memorable. Here's proof. These charts show you why Acrilan can maintain its beauty and its soft, luxurious feel through years of heavy traffic. With thousands and thousands of footsteps, it retained its thickness appreciably better and showed consistently higher residual compression (resilience) than wool. Wool is good...Acrilan® acrylic is better.

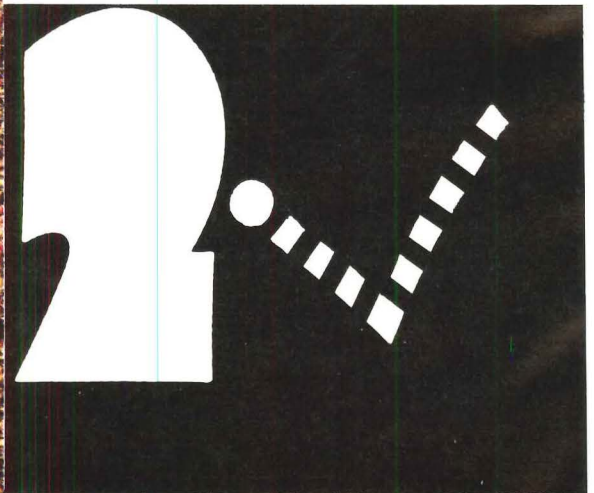
PERCENT RESIDUAL COMPRESSION



PERCENT THICKNESS RETAINED

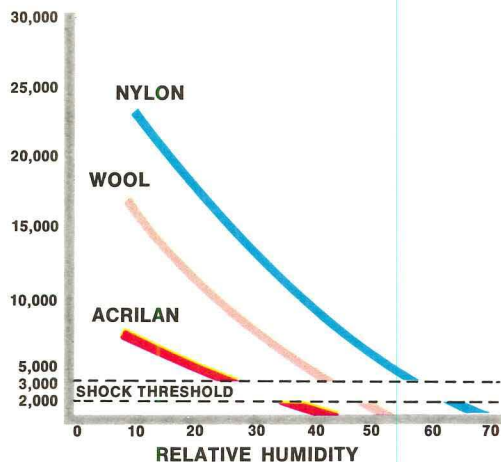


resilience



static resistance

BODY VOLTAGE



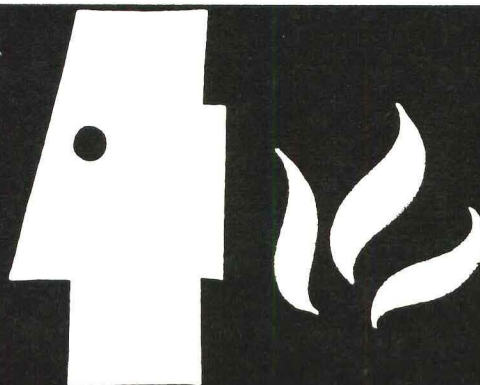
Many factors are involved in the build-up of static electricity on your body as you walk across a carpet. Temperature and humidity, the fiber, the backing, the pile height and density of the carpet all play important roles. We know of no other carpet fiber on the market today claiming a lower static propensity than Acrilan® acrylic. In fact, under normal conditions, carpets of Acrilan 2000+ are virtually static-free. As the chart shows, carpets of Acrilan are far less prone to cause uncomfortable static build-up than are those of nylon or wool in the same construction.

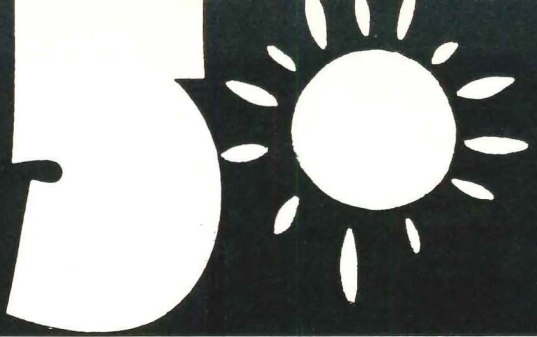
Government standards for flame resistance are currently being re-evaluated. But for now, stringent requirements are still in effect. Hospitals that receive any kind of federal assistance must comply. Jet aircraft carpeting must meet stiff F.A.A. regulations. Many states and localities have their own requirements for schools, nursing homes and college dormitories. Acrilan now has built-in fire retarders that give carpet manufacturers the capability of meeting all government requirements. A vital comparison is seen in the accompanying chart.

DEGREES SOFTENING POINT DEGRADATION POINT

DEGREES	SOFTENING POINT	DEGRADATION POINT
473-490F	ACRYLICS	—
445-490F	POLYESTER	—
400-445F	NYLON	—
305-315F	POLYPROPYLENE	—
270F	—	WOOL

flame resistance





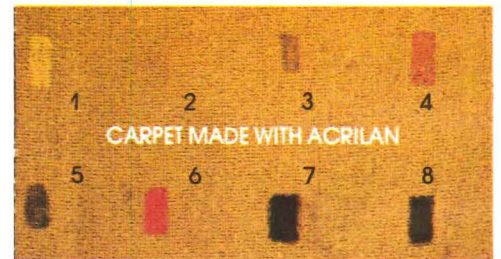
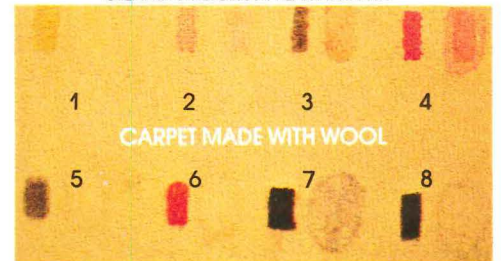
color fastness

Colors that stay bright, don't fade under tough conditions. That's what you need in contract carpeting. Acrilan gives you two ways to get it. For normal situations, Acrilan itself is designed for color fidelity. But where large areas of glass in sunny locations, for example, create a problem, or where food, drug or chemical spills call for harsh treatments, specify Acrilan 2000+. In fact, we know of no more colorfast carpet fiber in the world. Unruffled by burning mid-day sun for over 2000 hours. Acrilan puts the color where you want it—and keeps it beautifully there for years.

Carpets get dirty and stained in many ways. Soil tracks on them from adjoining areas. Spills, dust and soot give carpets headaches. Acrilan, by its physical properties, solves many of these problems. And by its chemical properties solves others.

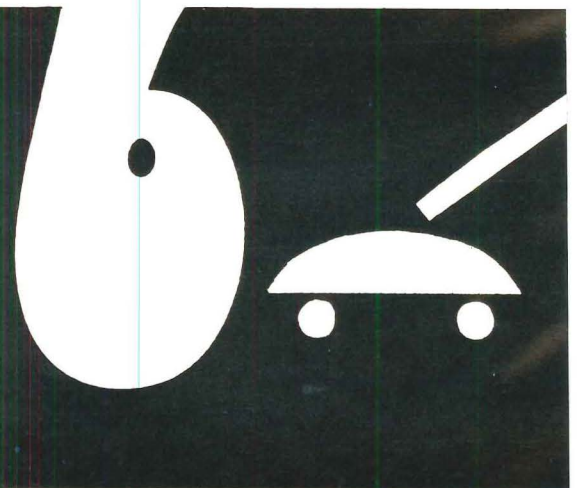
It has a smooth, hard surface that gives dirt particles no place to cling—vacuums easily and beautifully. It is non-porous and hydrophobic—resists moisture absorption. Many spills wipe up without a trace. Chemically it has good resistance to both acids and alkalis. Any ordinary kind of cleaning agent can safely be used. Acrilan responds to ordinary care by returning extraordinary aesthetics. The photos below show before-and-after spot-cleaning comparisons between Acrilan® acrylic and wool.

ORIGINAL STAIN APPEARS AT LEFT IN EACH CASE. CLEANING RESULTS APPEAR AT RIGHT.



1. MUSTARD 2. FINGER PAINT 3. GRAPE JUICE 4. MERTHIOLATE
5. BALL POINT INK 6. CRAYON 7. SHOE POLISH 8. ASPHALT

ease of maintenance





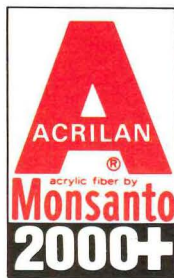
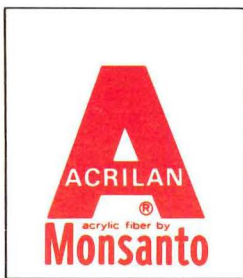
Now you've seen the superiority of Acrilan proven by laboratory tests. But look at the beautiful proof of the way it wins the toughest test of all—actual installations. Here are some typical contract installations that show the prestige level of assignment top designers and architects give Acrilan® acrylic. From top to bottom: Sheraton-Boston Hotel, Boston, Massachusetts; San Jose Airport, San Jose, California; Mayfield Mall, Mountain View, California; First National Bank of Chicago, Chicago, Illinois; Shaker High, Latham, New York; Barnes Hospital, St. Louis, Missouri; John Wanamaker's Men's Cafe, Philadelphia, Pennsylvania.



As a dedicated professional, your job is to specify the best floor covering from every point of view — aesthetics, maintenance, wear life, suitability to the geographic location. Both theory and experience indicate carpet as the best response to the problem in more and more installations. It adds color, controls acoustics, is an important safety factor, provides a thermal barrier and can substantially reduce maintenance costs. Having settled on carpeting as the best possible solution, your next decision must be what kind of carpeting will most effectively answer the requirements of the area. We believe the preceding pages give you all the documentation you need to specify Acrilan® acrylic. Specifying acrylic is not enough. There are many acrylics, and they are not all the same. Unbranded products are often not engineered for carpets or are off quality.

Be sure to specify performance-proved Acrilan. We'd be happy to give you more support for your specification. Just send us the enclosed reply card.

We'll respond with enthusiasm.



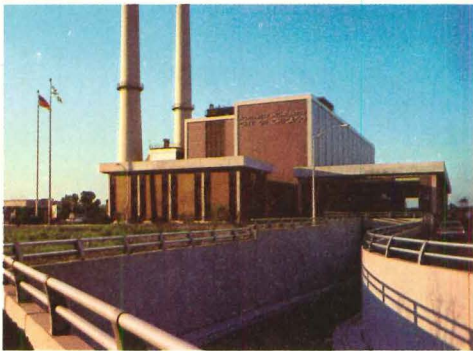
MONSANTO, 350 FIFTH AVENUE, NEW YORK, N.Y. 10001

For additional information circle  on Readers Service Card or write Monsanto.

City of Chicago Northwest Incinerator

Louver Manufacturer, Air Balance, Inc.

Extrusions and Coating Application, Howmet Corp., Air Master Div.

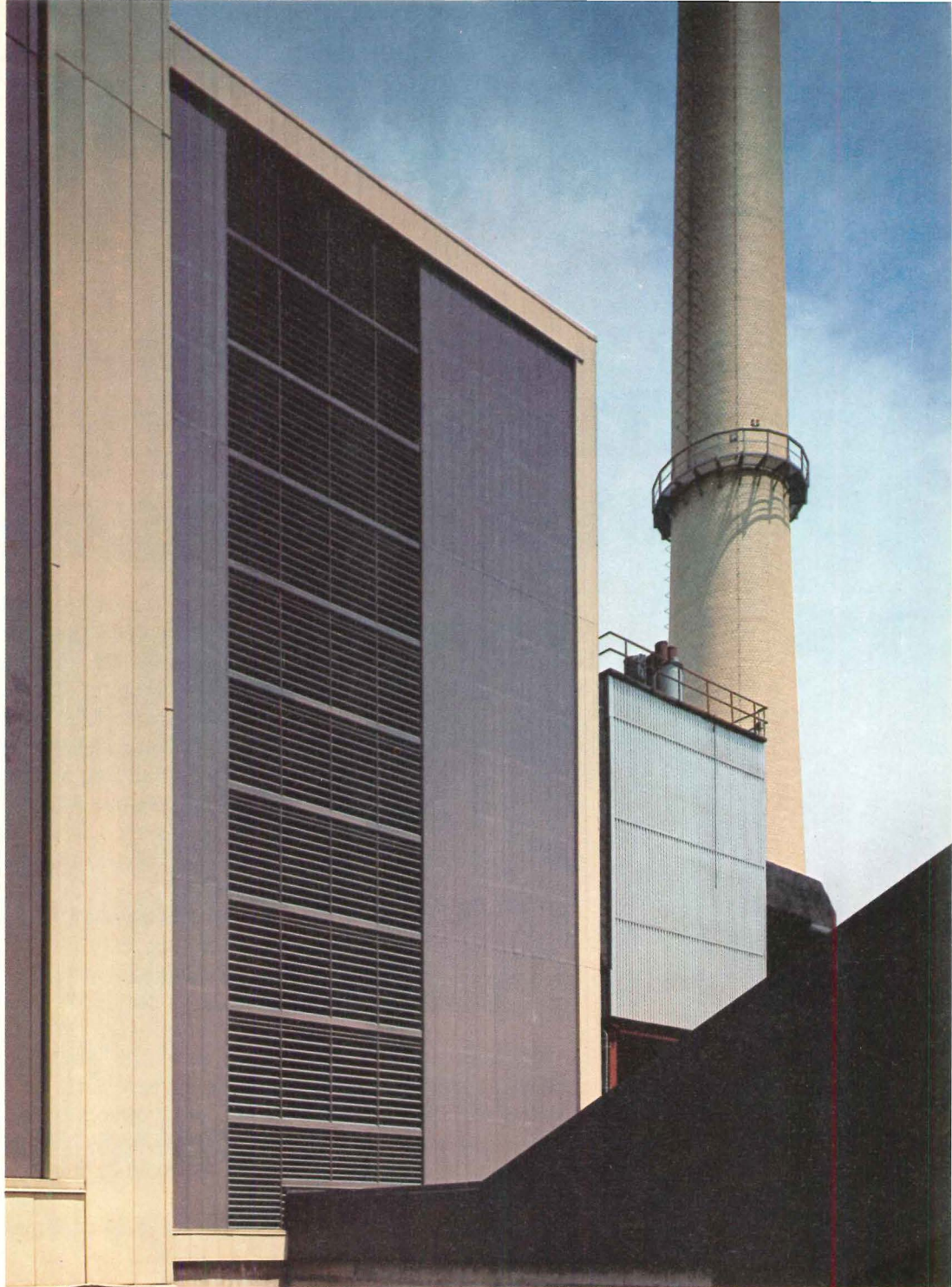


The specifications called for a coating that would last 20 years. That's why the 80 foot-high extruded aluminum louver assemblies on this incinerator plant were factory finished with long-life DURANAR 200 fluoropolymer coatings from PPG.

DURANAR 200 color coatings combine rich architectural beauty with maintenance-free surface protection rated at 20 years. They resist ultra-violet deterioration, weathering and attack by airborne chemicals and dirt. Color integrity and color life match the film stability of the fluoropolymer base.

Moderately-priced DURANAR 200 coatings offer a cost/performance advantage that is unequalled today in architectural color coatings. For spec data, see Sweet's Architectural and Industrial Construction Files, or write Product Manager, Extrusion Coatings, PPG Industries, Inc., Dept. 16W, One Gateway Center, Pittsburgh, Pa. 15222.

PPG: a Concern for the Future

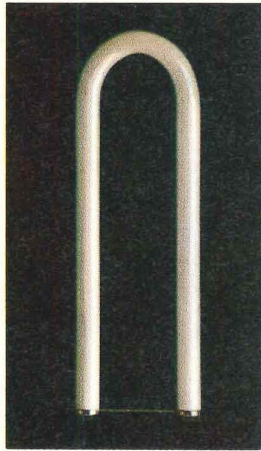


20-year finish specs on giant incinerator plant met with DURANAR[®] 200 coatings

Extrusion
Coatings 
INDUSTRIES

For more data, circle 66 on inquiry card

They're laughing on the inside when it's crying on the outside.



Gloomy days can make gloomy employees.

That's one of the reasons why Georgia-Pacific Corp. used our warm-white Curvalume fluorescents in their brand new headquarters office building in Portland, Oregon.

In fact, they use 35,000 U-Shaped Curvalume lamps in the 30-story building to create a cheerful atmosphere inside, no matter what it's doing outside.

But atmosphere was not the only reason for picking our Curvalume. There are a lot of practical and economic reasons as well.

Two six-inch-wide Curvalume lamps fit neatly into 2 by 2-foot lighting fixtures that are an integral part of the building's distinctive modular ceiling design. Each Curvalume puts out 3025 initial lumens to give minimum lighting levels of 90 foot-candles throughout the building.

On the economic side, two Curvalume lamps save money over four standard linear lamps in a 24-inch-square fixture. First of all, for Georgia-Pacific, that means 35,000 fewer lamps to maintain. Secondly, with only two lamps per fixture, there's less hardware involved. And less hardware means less cost.

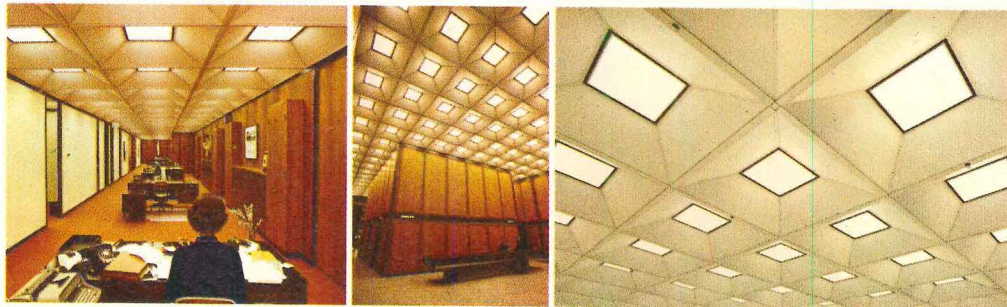
Finally, Curvalume delivers 23% more light output per fixture at no increase in power consumption.

Curvalume helps make Georgia-Pacific happy, and its warm-white light helps keep their employees happy.

Even on a rainy day in Portland.

Sylvania Lighting Center, Danvers, Mass. 01923

"Laughing On The Outside (Crying On the Inside)," Copyright 1946 by Gower Music, Inc.



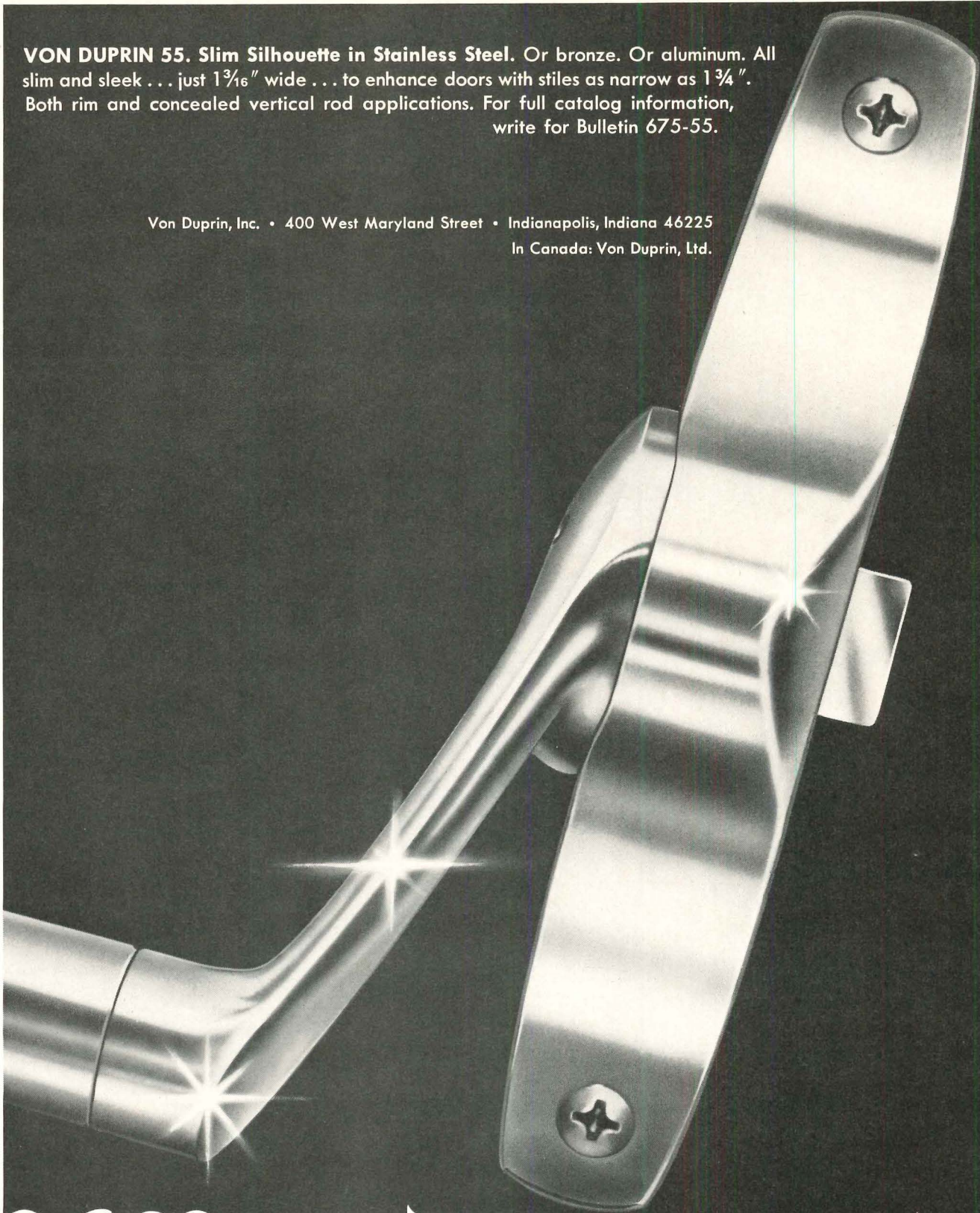
GTE SYLVANIA

For more data, circle 67 on inquiry card



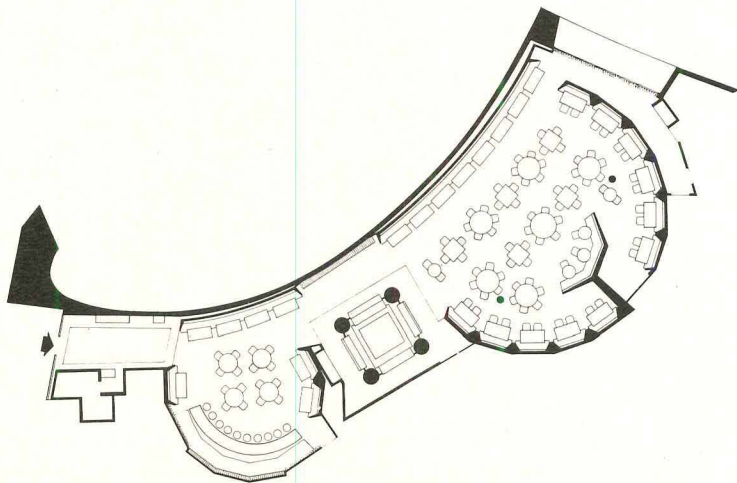
VON DUPRIN 55. Slim Silhouette in Stainless Steel. Or bronze. Or aluminum. All slim and sleek . . . just $1\frac{3}{16}$ " wide . . . to enhance doors with stiles as narrow as $1\frac{3}{4}$ ". Both rim and concealed vertical rod applications. For full catalog information, write for Bulletin 675-55.

Von Duprin, Inc. • 400 West Maryland Street • Indianapolis, Indiana 46225
In Canada: Von Duprin, Ltd.



Von Duprin®

For more data, circle 135 on inquiry card



(Top) Valley General Hospital, Renton, Wash. Architect: Edward Durell Stone. Photographer: Morley Baer. (Bottom) "Le Monde" Restaurant. New York, N.Y. Architect: Warren Platner. Photographer: Alexandre Georges.

THE EDITORS OF ARCHITECTURAL RECORD
INVITE SUBMISSIONS FOR

RECORD INTERIORS

to be featured in the
January 1972 issue

... a program to recognize outstanding interiors designed by architects.

In 1970, in response to the upsurge of activity and interest in design of interiors by architects, Architectural Record established a new editorial program—RECORD INTERIORS.

It is clear that the interest of the profession in interiors is growing and strengthening. And thus the interiors program—with citations to document and stimulate this significant area of expanded practice—will be continued. Recently completed architect-designed interiors of all building types will be considered—remodelings and renovations as well as new structures—anywhere in the United States. Selections will be made by the editors on the basis of the excellence of the design solution for the particular client's individual program. Submissions from architects of new, unpublished work will be welcomed through November 1, 1971. No formal presentations are required, though materials submitted should include plan, photographs or snapshots, and brief description and program.

RECORD INTERIORS of 1972 will be published in the January 1972 issue of Architectural Record.

Write or telephone:

Barclay Gordon, Editor in Charge
Interior Design Awards Program
Architectural Record



Building: GENEVE TOWER
Cedar Rapids, Iowa

Architects: Smith, Voorhees, Jensen Associates
Des Moines, Iowa
(These gentlemen have found Glaros
panels so successful that they have also
specified them for a \$4,300,000 high
school complex in Des Moines.)

General Contractors: Rinderknecht Construction Co.
Cedar Rapids, Iowa

We'll send you a piece of this apartment building. Free.

To introduce you to the Glaros Insulated Metal Panel system.

If the name Glaros sounds Greek to you, it's okay. Not too many architects have heard of us.

But we're convinced once you look at our insulated metal panel system, you'll never use our competition.

And, you'll be as eager to specify our panels as the architects who designed the apartment house on the left.

Our panels are solid insulated building panels, 16" cover width, with rigid, foam-in-place urethane insulation bonded to two metal skins.

But there, all similarity with other urethane or fiber glass insulated metal panels ends.

The exclusive, patented* Glaros interlocking joint is a *true interlocking joint* that has *no thermal conductance at the joint*. (See the small photo and note what other benefits it offers to architects.) This means absolutely minimum penetration of air or moisture, with uninterrupted insulating effectiveness at the joint.

But there's more to the Glaros story.

1. Better insulation with a .061 "U" factor. The only 2" panel with this insulating value. It would take three 2" fiber glass panels

*U S. Patent No. 3,535,844

combined to match it...or six 8" stucco-covered cement block walls with dry wall interior.

2. Longer spans. In fact, up to 16.4' clear span, longest span of any 2" foam insulated panels. Eliminates unsightly girts.

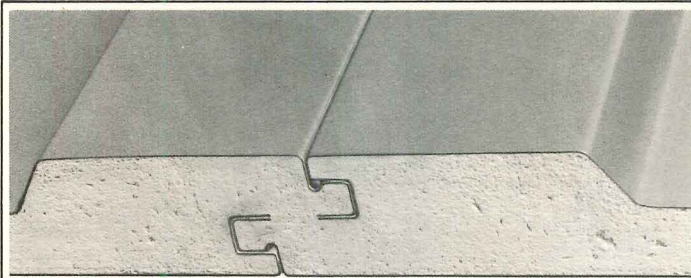
3. Surface designs and colors. Your choice of four different panel designs in either smooth or stucco embossed surfaces (and matching flashings). Many standard or custom colors in long-life paints, laminates, or vitreous finishes. And either high-strength steel or Cor-Ten in lengths up to 30' or aluminum in lengths up to 18'.

4. Finally, the Underwriters Laboratories, Inc. Label for 25 Flame Spread or less classification, plus Factory Mutual acceptance.

All of this makes Glaros panels perfect for schools, high rises, and every other kind of residential, commercial, institutional, or industrial building.

The next step is to send for a sample and see for yourself. Write Mitch Souligney, V.P. Sales, or call him at 412-351-4117.

If you don't agree they're everything we say they are, give us a piece of your mind.



The exclusive Glaros interlocking joint means no through thermal conductance. No exposed fasteners. No field caulking. No wind vibration problems. No water or air infiltration. No loss of joint seal due to expansion or contraction. And, no expensive erection costs. Send for this sample.



GLAROS
Products, Inc.

Clara Street, Rankin (Pittsburgh), Penna. 5104

For more data, circle 68 on inquiry card

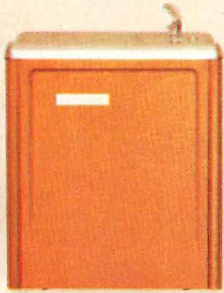
ARCHITECTURAL RECORD October 1971 169

POLYCHROME

COORDINATES



MONTEGO BLUE



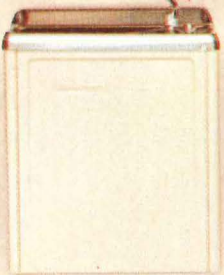
BITTER ORANGE



CYPRUS GREEN



PAGODA RED



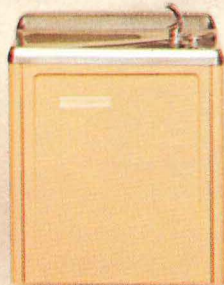
CAMEO WHITE



CHARCOAL BLACK



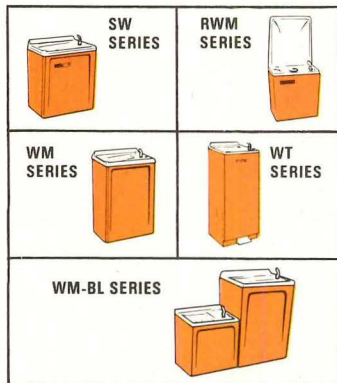
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Take your choice. Halsey Taylor water coolers are now available in 8 NEW decorator colors. Price is the same as standard . . . and only 3-week delivery. Special baked-on enamel finish is heat, sunlight, wear, and perspiration-resistant. Available in wall-mounted models, semi-recessed, bi-levels, and wall-tite floor models. Color sample chart available — write today.



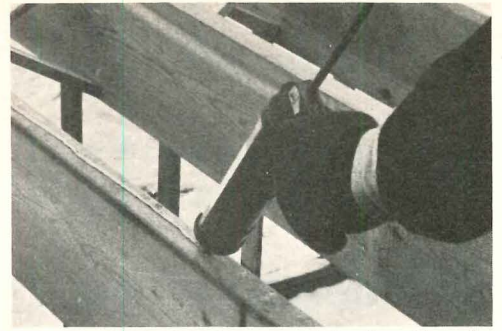
THE HALSEY W. TAYLOR COMPANY • 1560 Thomas Road, Warren, Ohio 44481

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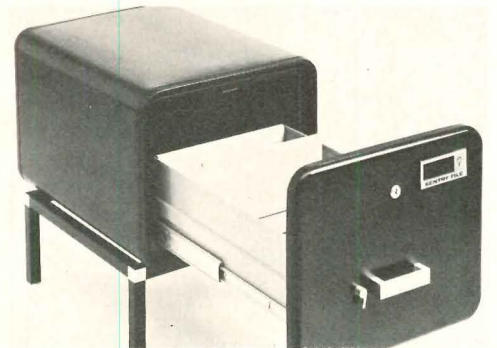
PRODUCT REPORTS

continued from page 150



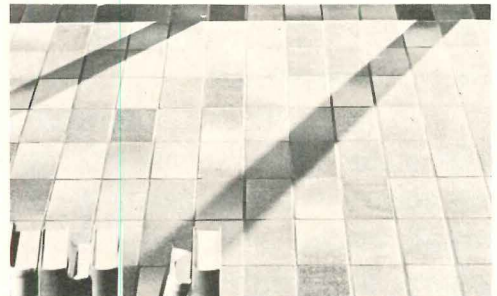
WOOD ADHESIVE / Designed for bonding plywood directly to joists in single-layer field-glued floor systems, adhesive reportedly reduces labor and material costs while providing stiffer floors. ■ 3M Company, St. Paul.

Circle 308 on inquiry card



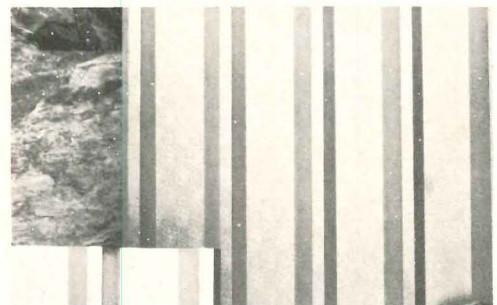
FILING CABINETS / Modular design allows stacking of up to four units. Drawers can handle letter and legal-size records. ■ John D. Brush & Co., Inc., Rochester, N.Y.

Circle 309 on inquiry card



CERAMIC TILE / A slotted, back design for good adhesion during cold weather months is featured. Tiles are suitable for indoor and outdoor use. ■ Amsterdam Corp., New York City.

Circle 310 on inquiry card



ALUMINUM SIDING / Deep, decisive corrugation gives strength while maintaining an esthetically pleasing appearance. ■ Aluminum Company of America, Pittsburgh.

Circle 311 on inquiry card
more products on page 180

New! The American Olean ceramic tile system.

Redi-Set pregrouted ceramic tile sheets are uniformly grouted, perfectly aligned—for beautiful jobs every time. Only joints between sheets are grouted on the job, with the same grout we use in the system.

Flexible grout. Will bend and stretch with building movement.

Waterproof system for waterproof installations. Redi-Set goes up over almost any interior wall—concrete masonry, gypsum wallboard, even existing ceramic tile.

Easy-cleaning grout. Resists stains. Won't mildew. Stays white. Cleans with a damp cloth.

Crystalline, Bright and Matte glazes. There are up to 16 Standard Grade tiles to a Redi-Set® sheet. With 4¼" x 4¼", 6" x 4¼" or 8½" x 4¼" tiles.

American Olean Tile Company, 1570 Cannon Ave., Lansdale, Pa. 19446. Send me literature.

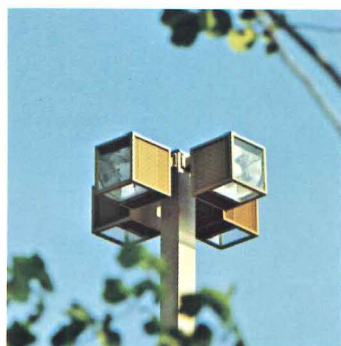
Name _____
Firm _____
Street _____
City _____ State _____ Zip _____

American Olean
A Division of National Gypsum Company

Redi-Set pregrouted tile. It's the natural thing to use.™

For more data, circle 70 on inquiry card

Tigers, temples, pachyderms, pagodas, parrots, and great looking Spectras by Wide-Lite.



SPECTRA III AT THE PETTING ZOO.

Versatile IIIs, this time pole-mounted in a four-cube arrangement. Twenty-four "Wide-Lite" fixtures here are equipped with 1000 watt lamps.

Spectra III also available in ground-mounted models.

A famous brewer just opened a multi-million dollar family fun park in Texas. Houston's new Busch Gardens comes complete with exciting rides, oriental splendors, a menagerie of birds and beasts.

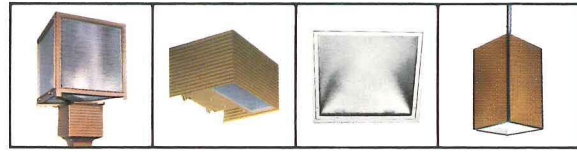
And 93 Spectra luminaires from Wide-Lite. Which are pretty splendid themselves.

From parking lot to petting zoo, dramatic Wide-Lite* Spectras provide good looks and good

lighting at Busch Gardens. (Spectra's geometric cube design projects remarkably uniform illumination with a minimum number of these handsome fixtures.)

Join us now for a tour of Houston's newest entertainment attraction. "Wide-Lite" Spectras will light the way. Then, when you're done, give your "Wide-Lite" representative a call. He's in the Yellow Pages under Lighting, and he has the complete Spectra story.

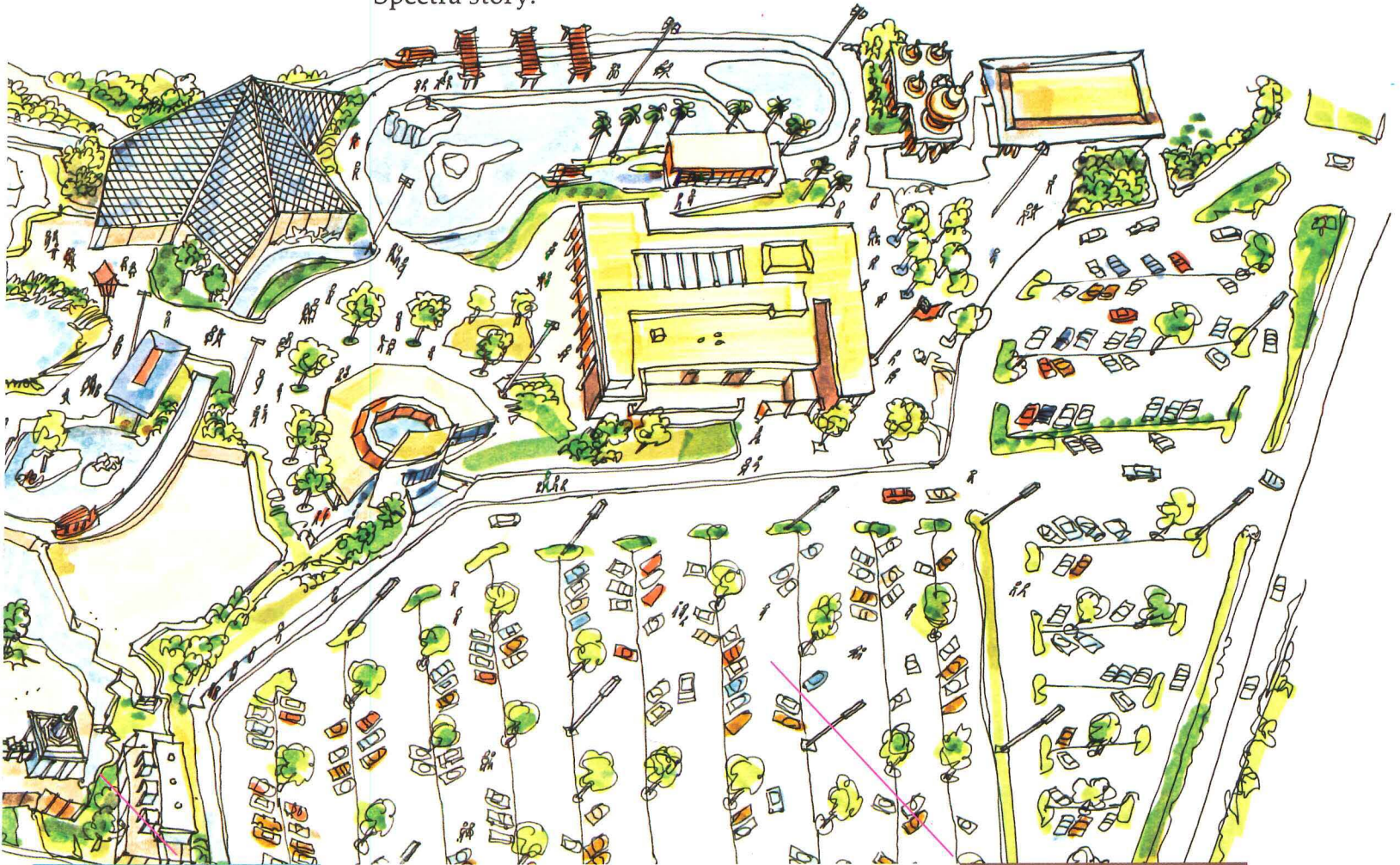
The Spectra Series for Mercury Vapor, Metal Halide, and High Pressure Sodium lamps also includes



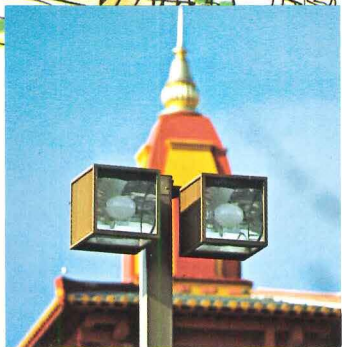
SPECTRA II 100 to 1000 watt post-top and roadway fixtures	SPECTRA IV 175 to 250 watt wall washers	SPECTRA V 100 to 1000 watt indoor luminaires	SPECTRA VI 400 to 1000 pendent indoor luminaires
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WideLite®

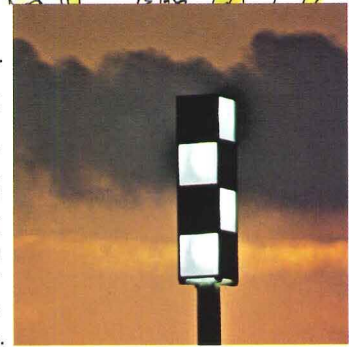
P. O. Box 191, Dept. AR-1059-10/71
Houston, Texas 77001
Also manufactured in Australia, Belgium,
Canada, Mexico and Great Britain
A division of Esquire, Inc.
*Trademark of Wide-Lite Corporation



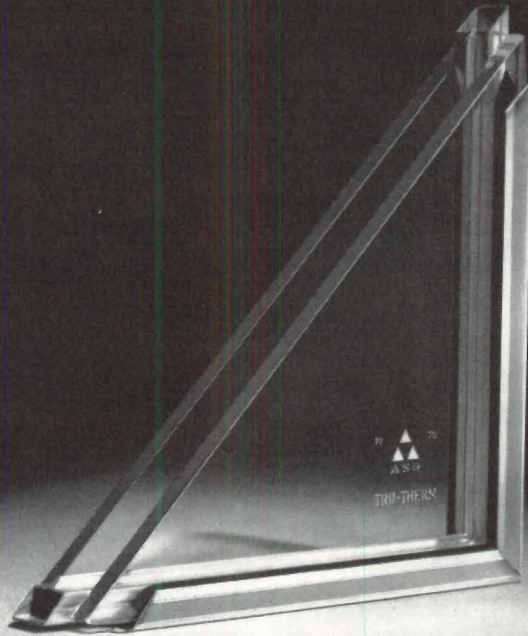
SPECTRA III FOR THE TIGER TEMPLE.
And the polar bear enclosure. Mounted two cubes to a pole, Spectra floodlights handle two lighting jobs at once. These are 400 watt Spectra IIIs with Deluxe White lamps. Similar fixtures handle general floodlighting for most of the Gardens grounds.



SPECTRA I FOR THE PARKING AREA.
Eleven "Wide-Lite" area lights here, mounted on 40' poles. Each equipped with four 1000 watt lamps; each producing over an acre of smooth lighting. Spectra I is available in 400 and 1000 watt models. "Two-cube" Spectra area lights also available.



In insulating glass, too . . .
the difference is made by ASG.
We call it Tru-Therm®



Tru-Therm sells better because it performs better. And it performs better because no other thermal glass in the country gives you all five of these advantages:

1. A choice of glasses.

Choose from Starlux® twin-ground, polished plate in combinations of clear, bronze and gray, or fire-polished Lustraglass® sheet. They give superb transparency and clarity, free of distortion.

2. A sealant that stays flexible permanently.

Tru-Therm is sealed with polyisobutylene, the sealant with the lowest moisture barrier transmission rate in the industry. It stands up to year after year of ultra-violet radiation, stays permanently flexible wherever it's installed.

3. The best lock-seam spacer.

To make Tru-Therm work even better, ASG delivers the best lock-seam spacer made to provide added strength and eliminate squeaks under high wind load. Its special shape locks the sealant permanently in place and keeps the interglazial area pure and dry. Joints are silver-soldered for maximum strength.

4. A superior desiccant.

ASG removes all moisture between the lites with a superior desiccant, and provides vapor-free performance for the life of the unit. It works together with the polyisobutylene sealant and

lock-seam spacer to insure a care-free window with no costly call-backs.

5. A stainless steel edge protector.

ASG gives you an extra edge with this stainless steel band around each Tru-Therm unit. It protects the unit during installation and exerts a continuous pressure to assure a permanent seal regardless of temperature or atmospheric conditions. ASG places an extra barrier of sealant around all edges for further protection.

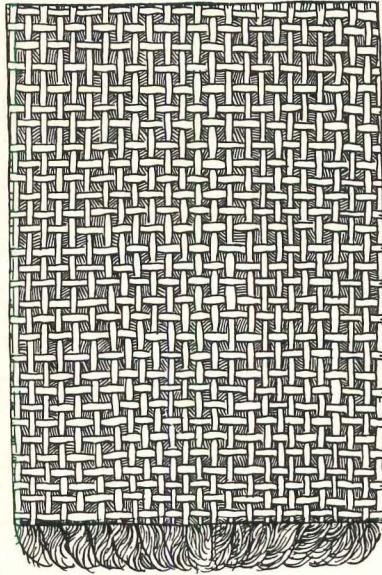
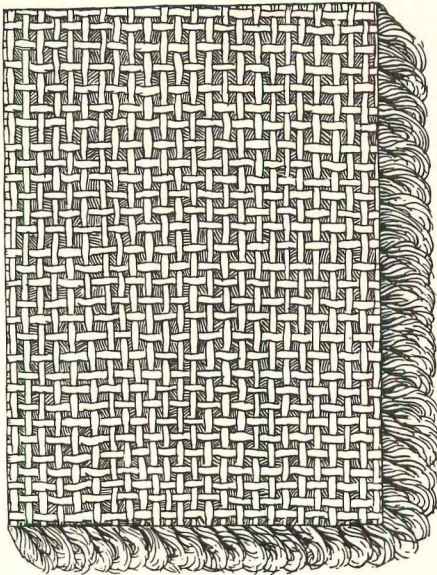
And we warrant every Tru-Therm unit for 20 years. You can't do better. Send for complete specs.



ASG Industries Inc.

Post Office Box 929, Kingsport, Tennessee 37662

Only one anti-static carpet yarn is backed by a guarantee.



We guarantee that a carpet made with Zefstat® will reduce static below the level of human sensitivity for the useful life of the carpet or five years. Or else: we replace the entire carpet, free of all charges, including the cost of installation.

Dow Badische is the only carpet fiber producer to guarantee its product in end use. If anyone else could solve the problem of static as effectively as Dow Badische, how come they're not willing to put it into a written guarantee?

Maybe they're not as confident about theirs as we are of ours. And for good reason.

We originated and developed the concept of turning metal into soft textile yarns more than twenty years ago. And when the need for some form of anti-static control device for carpeting became evident, we applied our knowledge into making an anti-static fiber for carpets.

The result was Zefstat, a specially treated strip of aluminum we turned into a fine, soft textile yarn with the strength and other physical properties necessary for processing, wearability and cleaning.

It seems almost a shame that after we spent so much time and effort developing Zefstat, it should remain hidden. Because you can't see Zefstat in the finished product. Acrylic with modacrylic or nylon is blended with Zefstat anti-static metallic yarn during yarn production. Blended either by us or by you with our assistance. As little as two-percent of Zefstat, properly blended, can dissipate static electricity, almost as fast as it is generated, over an entire carpet.

Can we guarantee Zefstat for you?

Dow Badische Company, 350 Fifth Avenue, N.Y., N.Y. 10001.



Zefstat is a registered trademark of Dow Badische Company.

For more data, circle 75 on inquiry card

◆ For more data, circle 74 on inquiry card

How to keep things cool while saving energy.

That's what the Harrisburg East Shopping Mall does. In fact, it's the first mall with an underground Total Energy plant.

In the plant, six gas engine-generators produce all the electricity the shopping mall needs. These engines give off heat. The Gas Total Energy system captures this heat and uses it to provide a perfect climate for shopping. No matter what the season.

So, the totally enclosed mall's climate control comes from energy that's usually wasted. This efficient operation drastically cuts the cost of providing essential services.

And it uses gas efficiently. With the country's rapidly increasing energy needs, that's pretty important.



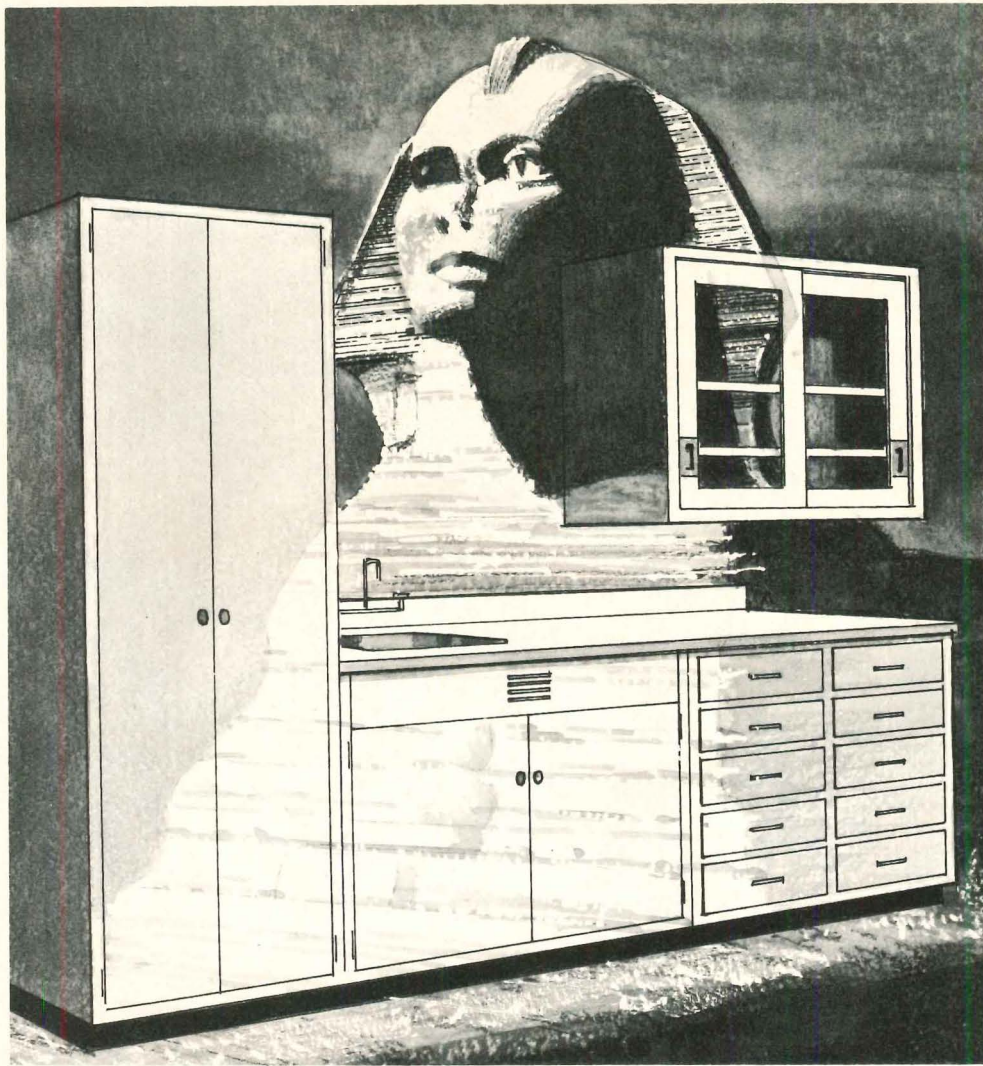
AMERICAN GAS ASSOCIATION

Owner: Swatara Associates and the M. A. Kravitz Co., Inc.
Architect: Evantash-Friedman Architects, Philadelphia, Pa.
Consulting Engineer: Hattis Service Company, Inc.,
Division of REH Corp., Deerfield, Illinois

Conserve natural gas. It's pure energy.

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BUILT TO LAST

Watson Hospital Casework is built to stand the test of time. The materials and techniques used in manufacture insure durability, ease of maintenance, and sanitation, along with efficient and eye-pleasing style. To underscore that Watson cabinetry will truly last, we point out that all moving parts and hardware are removable and replaceable . . . any part can always be obtained. Years from now drawers will open with the same sureness and ease that marks the quality of all Watson cabinetry.

Our best advertisement is the work we do. Any completed job can be used for customer reference. We are confident it will reflect the functional design, durability, and beauty inherent in all our products. Today's hospitals demand the best. They expect Watson.

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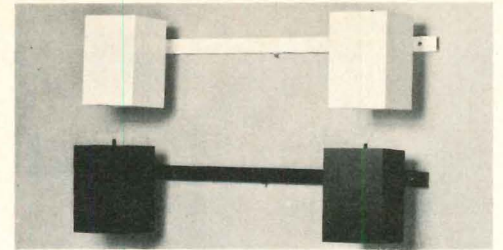
City _____ State _____ Zip _____



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PRODUCT REPORTS

continued from page 170



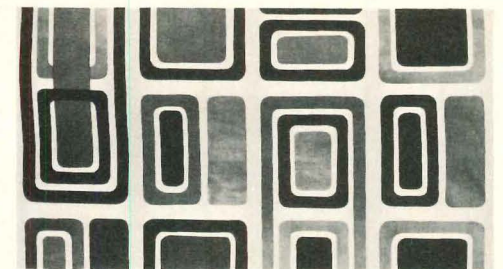
LAMPS / Designed for placement over a full-size bed, each lamp has a separate switch. The box-like shades are set on strips to be mounted on the wall. ■ George Kovacs Lighting, Inc., New York City.

Circle 312 on inquiry card



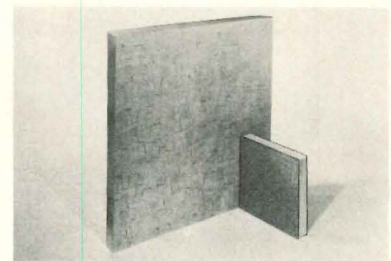
MICROFILM DATA BANK / Product information from leading building supply manufacturers is indexed by manufacturer's name, brand name, and product description. ■ Information Handling Services, Inc., Englewood, Colo.

Circle 313 on inquiry card



CONTRACT DRAPERIES / This screen print is available in five base cloths: a cotton, a soft polyester blend, a Verel casement, a Fiberglass mohair and a fire-retardant sheer. ■ Burlington Industries, Inc., New York City.

Circle 314 on inquiry card



ACOUSTICAL PANELS / Three basic construction types are available, all based on a fiberglass system. Two types are for exterior walls; the third is for partition or room divider use. All panels are faced with vinyl wallcoverings. ■ L.E. Carpenter & Co., New York City.

Circle 315 on inquiry card

more products on page 188