
FORUM

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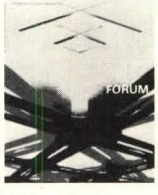

Cover: From a photograph of a ceiling grid at St. Andrews University (p. 50).

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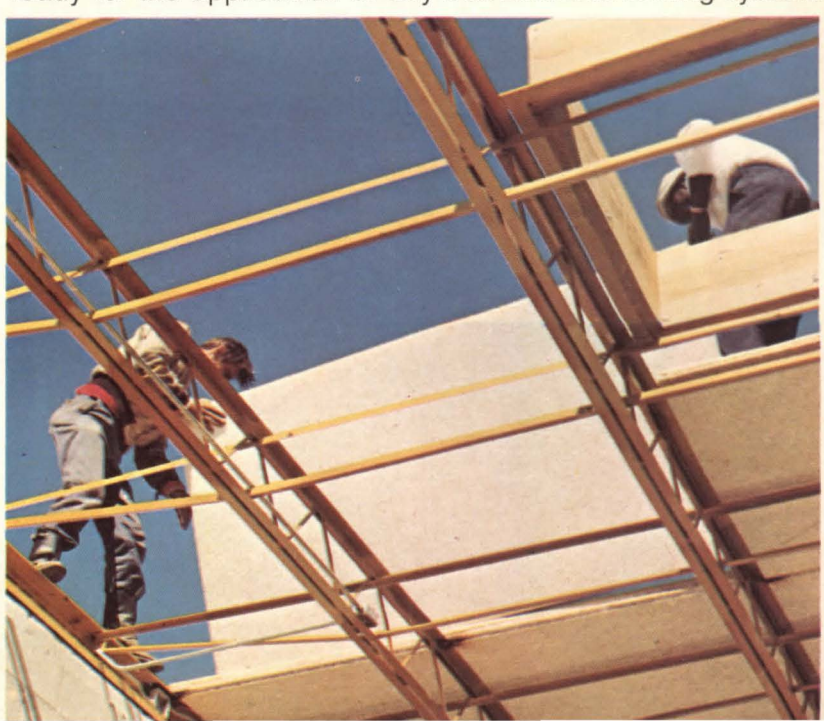

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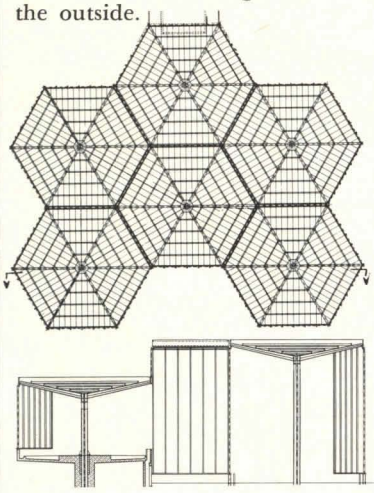
FOCUS

HEXAGONS FOR PLANTS

A complete departure from the usual domed or gabled roof for a greenhouse is that of the Tropicarium at the University of Tubingen in West Germany. Here, Architect Hermann Blomeier and Engineer Hugo Gall designed a cluster of six hexagonal inverted "umbrellas" of various heights to roof over the university's collection of plants from tropical rainforests. The variety of heights of the hexagonal units insures perfect conditions for plants of every height.

The center columns of the umbrellas and columns at the angles of the hexagons support the glass roofs and walls. These center columns also function as ducts for the heating, cooling and ventilating systems; the greenhouse, therefore, can program any desired climatic condition, and have complete climate control, while remaining sealed to the outside.



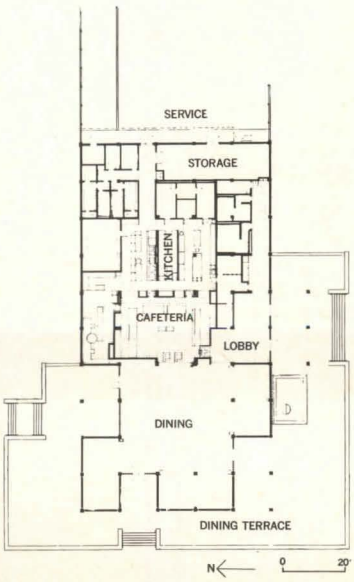
EGYPTIAN EATERY

The Cleopatra Restaurant on Manhattan's Upper West Side is a cut above the local dining spots. Architect Gamal El Zoghby designed the interior to step back from the entrance to a mirrored back wall. On either side of the steps are built-in booths, their walls sculpted to effect a series of arrow-arches above the steps. *Murals* accentuate each booth. The exterior is blue-glazed brick with 3 ft.-6-in.-high letters in reddish brown.

NOT FOR BREAD ALONE

The cafeteria building at Sonoma State College in Rohnert Park, Calif., serves a variety of functions, not only as an eating place for 300 faculty and students (which will expand to 750 eventually). The building also acts as a student union and general meeting place: the dining area can be sealed off from the serving and kitchen facilities for dances and assemblies; individual dining alcoves can be screened off and used for seminars and club gatherings.

The cafeteria is constructed of reinforced concrete with sand mold brick infill panels left exposed inside and out. The roof of the dining area is a series of triangular light-gathering monitors, glazed on the north side and supported on a diagonal beam system. *Architects: Marquis & Stoller.*

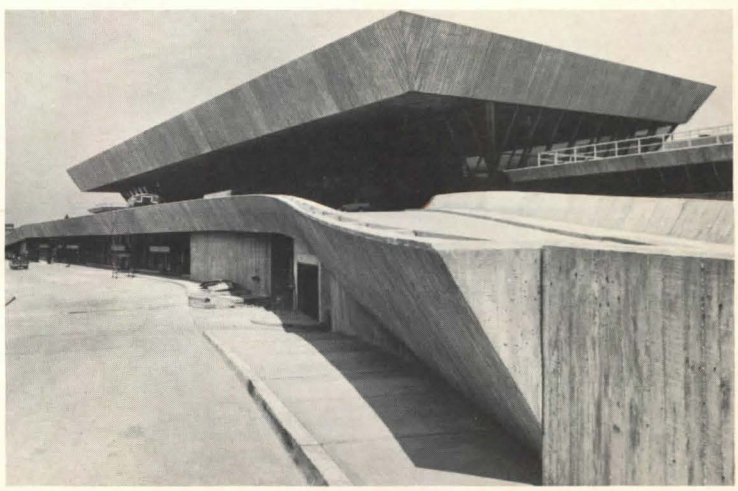


RAISING RIP VAN WINKLE

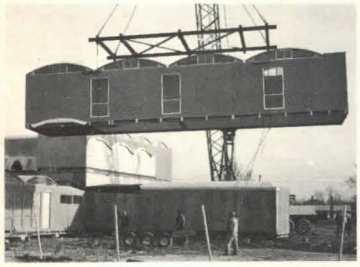
A 75-acre decaying site along the Hudson River near Poughkeepsie, N. Y., is slated for redevelopment. As the first phase of reconstruction, Architects Herbert Fleisher Associates and Associates Speyer and Dworkin have designed an 18-story low-cost, low-rent apartment called the Rip Van Winkle House; they are employing industrialized building methods. Ten-in.-thick load-bearing concrete cross walls support hollow core concrete slabs. The facade is of precast concrete panels supported on the cross walls; these are shaped like boxes to afford more space within.

BRITISH AIR TERMINAL

The first passenger terminal built by a foreign-flag carrier in the U.S. is the BOAC facility at New York's Kennedy Airport. The $44-million structure was designed by British Architects Collins, Melvin, Ward and Partners, with engineering consultants Ammann & Whitney. Air Canada shares the three-tiered building: both hope to accommodate up to 3 million passengers, for regular and jumbo jets. The terminal is self-contained with its own health, immigration and customs controls. It has, too, the usual eating facilities, shops, etc. and administration area. A heliport is on the roof.



PHOTOGRAPHS: Page 5 (top) courtesy **Baumeister;** (bottom), George Cserna; page 6 (top left), Ernest Braun; page 7 (top right), Northway Studio; (bottom left), Loomis-Shade.



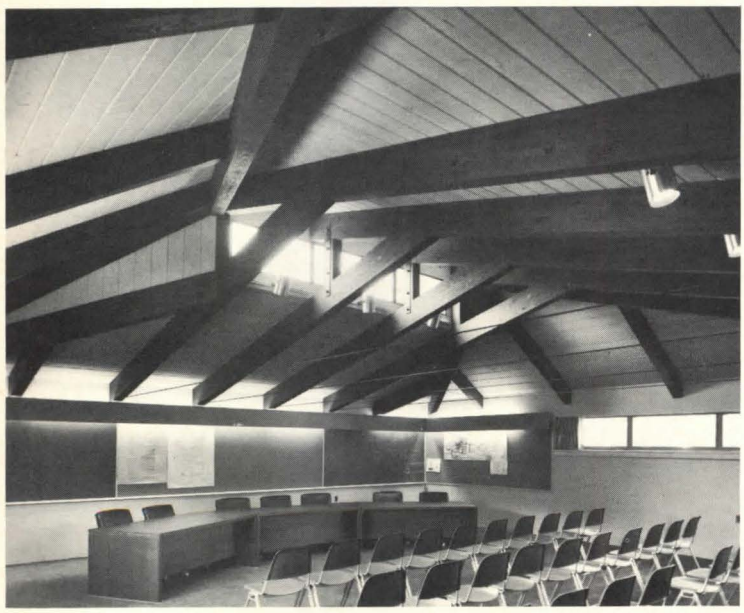
MODULAR DEVELOPMENT

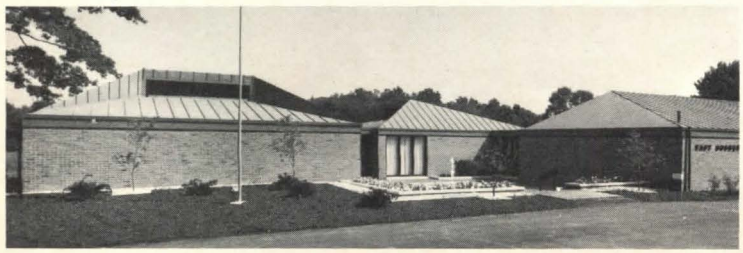
Architect Paul Rudolph will air one of his designs for modular housing this fall with the production of units for a low- and moderate-income cooperative townhouse development in New Haven, Conn., called Oriental Gardens. Clusters of duplex units, from two to five bedrooms, will occupy a 15-acre site. Each unit will be composed of two to five modules; 1,300 modules in all will make 148 two-story apartments. The units will be prefabricated in Maryland and then transported to New Haven. Each apartment has a vaulted ceiling made of $\frac{3}{8}$-in. plywood, and each has a private yard.

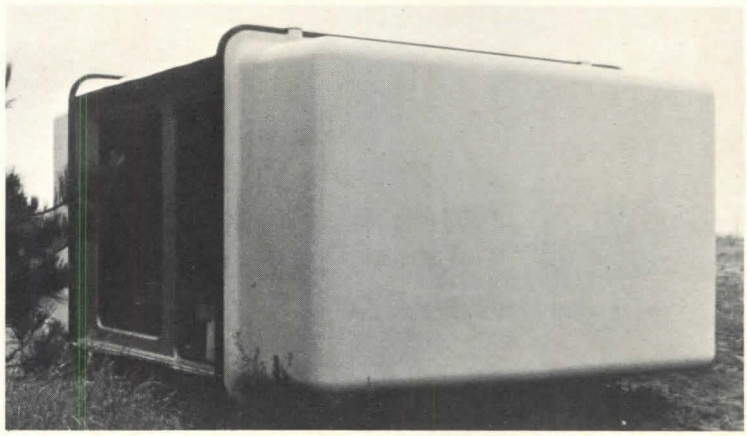
Financing is being provided in the form of a 236 mortgage assistance agreement from FHA through HUD. Down payment is $325 per apartment, and carrying charges will range from $111 to $258 per month.

TOWN HALL AROUND A COURT

When the rural community of East Goshen, Pa., decided to build a new municipal town hall, three separate requirements were satisfied: an area for large meetings, an administrative area, and a garage facility for township equipment. Architects Philip Steel & Associates kept the three separate; the different areas are connected by enclosed corridors which act as entries, and the three blocks are grouped around a brick-paved courtyard, which can also be used for gatherings.

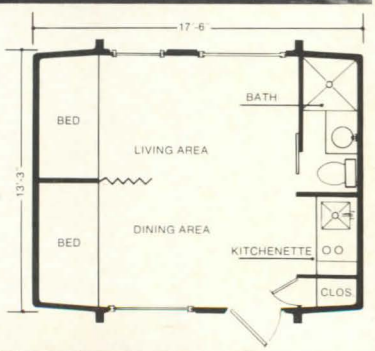


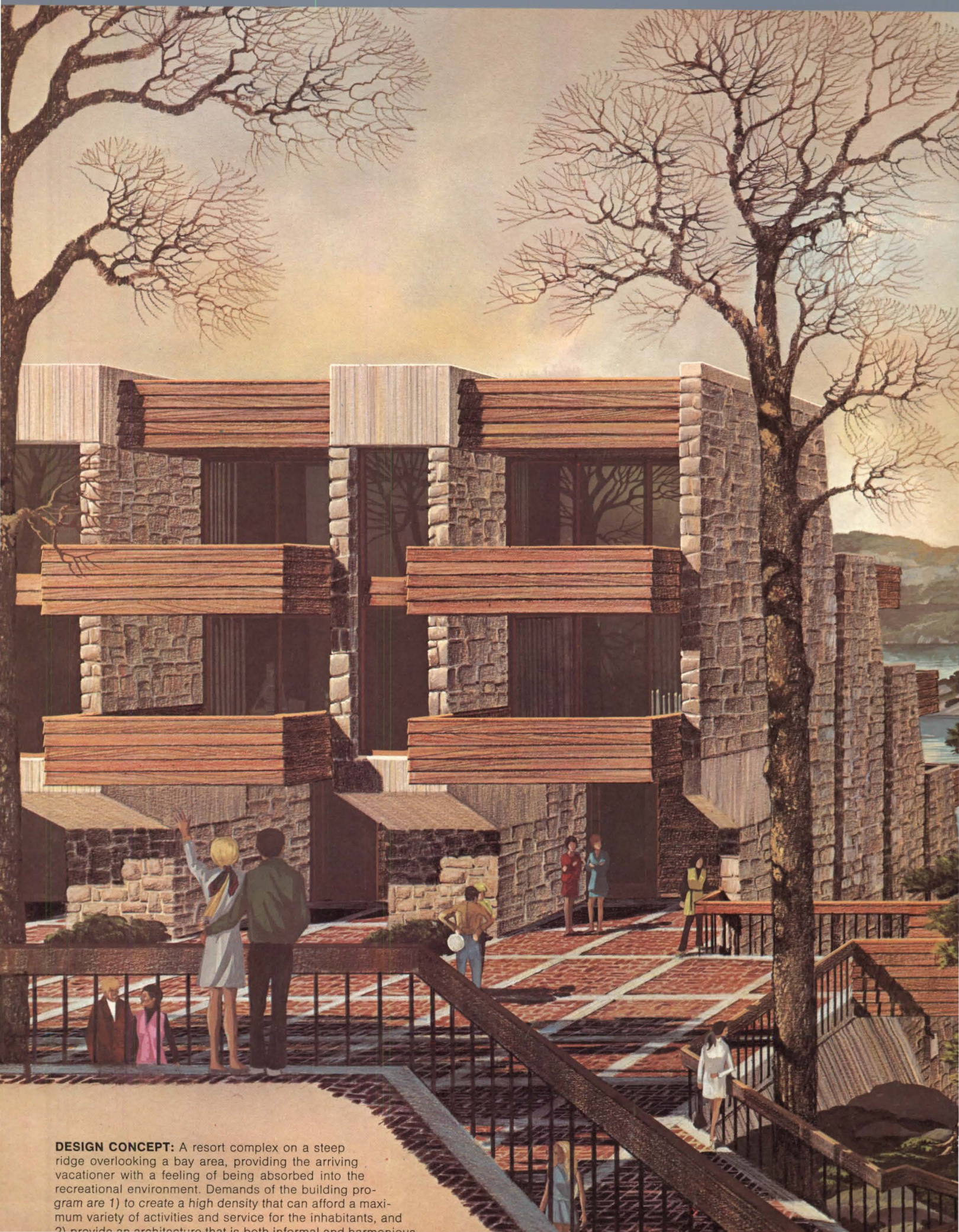




INSTANT HOUSE

An extremely simple instant vacation house, which can be assembled in less than a day and which costs under $6000 complete, is LIVE-IN designed by Steve Kimmel for Avtech Inc. Each 231-sq.-ft. LIVE-IN is composed of eight molded fiberglass-urethane foam sandwich shell segments that are $2\frac{1}{2}$-in. thick. Assembled with stainless steel hardware throughout, the house is fire-resistant, waterproof, soundproof and virtually maintenance-free. LIVE-IN sleeps six, and has a full kitchenette and bath. The unit is modular and can be added to in a variety of ways—stacked or side by side. The manufacturers hope, too, that LIVE-IN might be used for short-term or emergency housings—eg: for those displaced by flood or fire, or by urban renewal —as well as for vacationers.





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

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PREVIEW

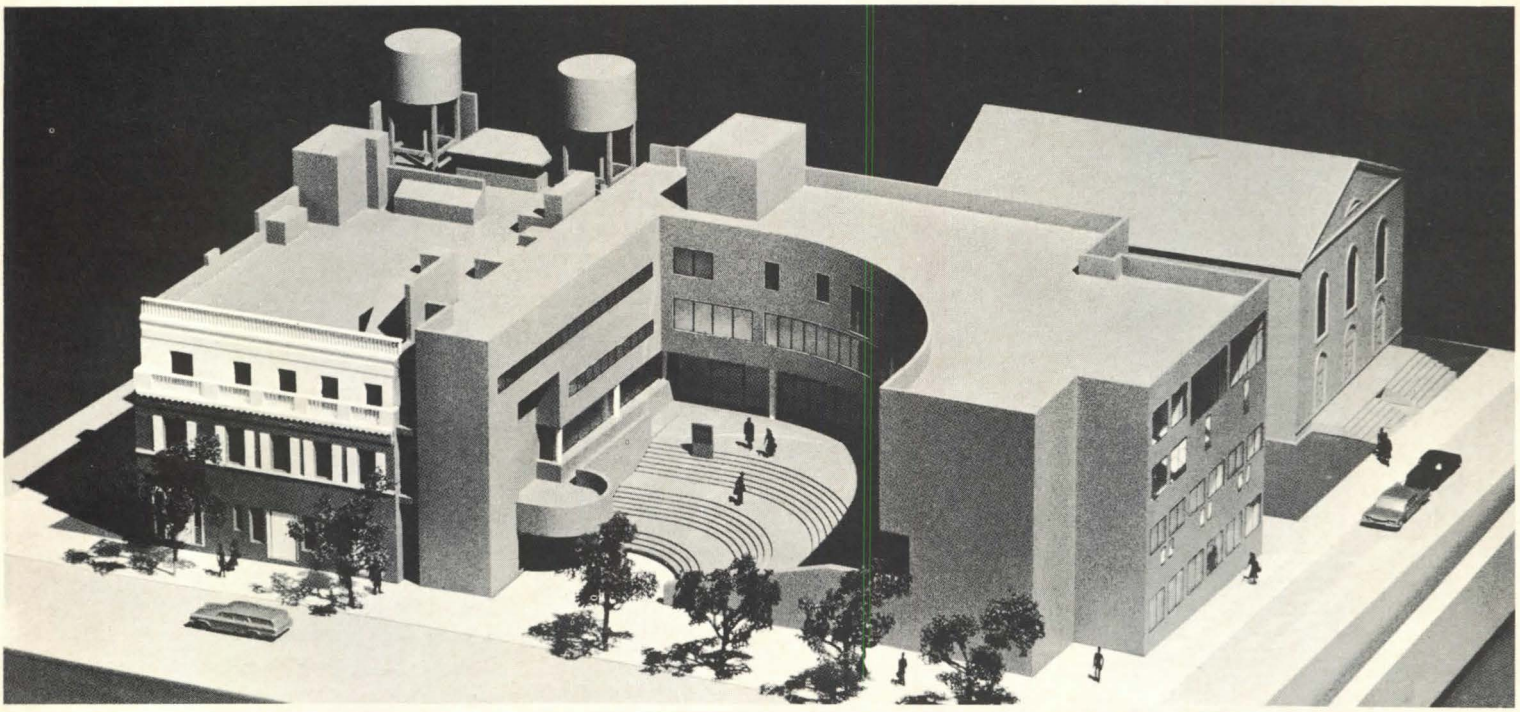
ARENA FOR THE ARTS

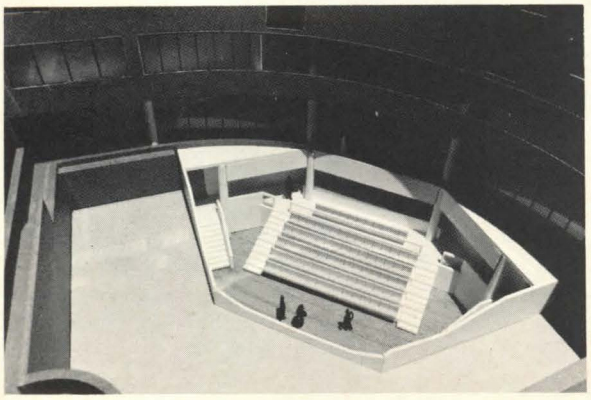
The Henry Street Settlement has been offering social counseling and arts programs in Manhattan's poor and colorful Lower East Side for 93 years. Over the years, programs in such subjects as ballet, violin, and painting have been joined by modern dance, bongo drums, and film.

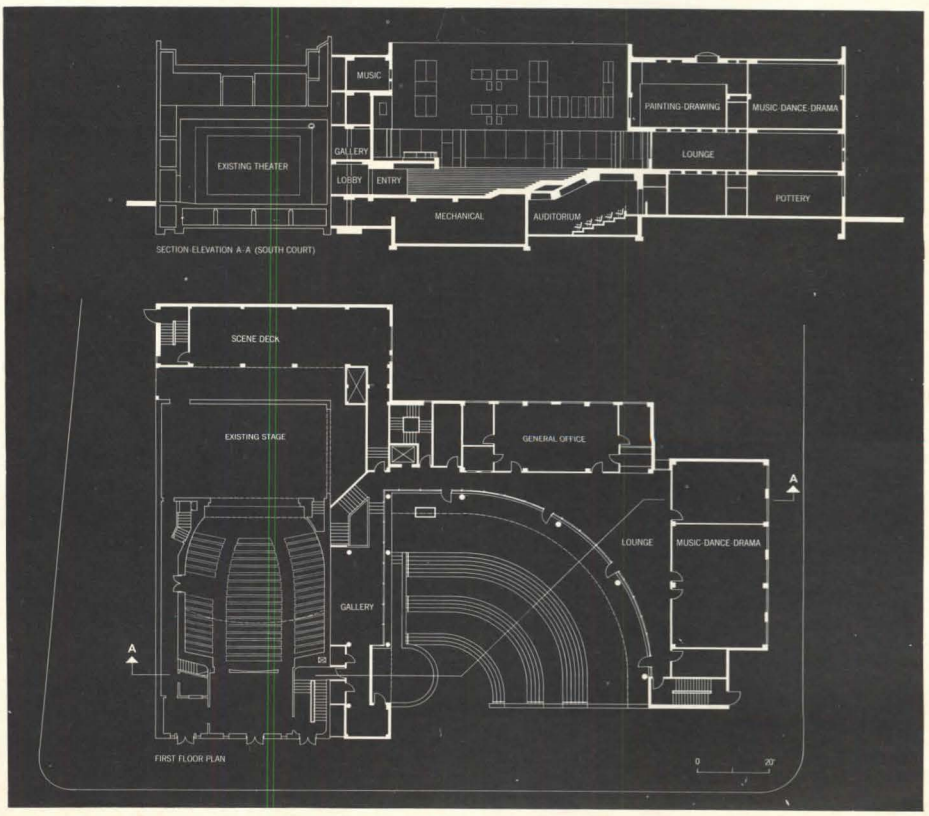
The Settlement's new $3-million arts center, designed by Architects Prentice & Chan, Ohlhausen, will not only provide ample studio space, but give the neighborhood a vest-pocket plaza —a terraced court rising from the street-level lobby entrance (middle photo) to the glass walls of the first-floor lounge. For street festivals, the court can double as a theater.

Wrapping the building around the court will make its diverse activities apparent to people sitting there. And musicians in practice rooms above one side of the court will be aware of painters on the other side, in two-story studios above the lounge.

Within the building's complex form will be new backstage facilities for the Settlement's existing playhouse (left, below), an 80-seat recital hall under the court (bottom photo), and a child care center. Play yards for this center open up space around Bialystoker Synagogue (right, below), an 1826 landmark.







(continued on page 13)

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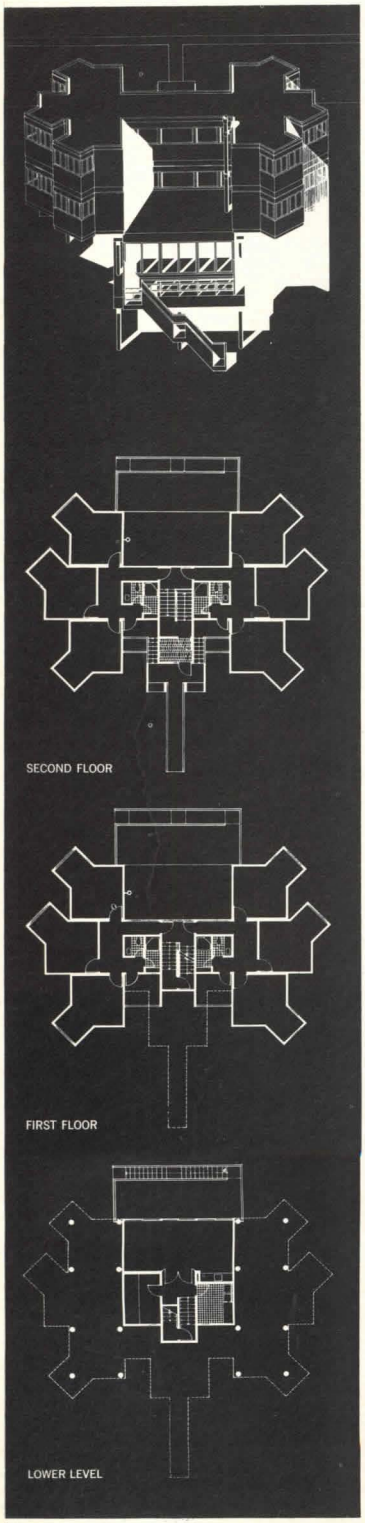
PREVIEW

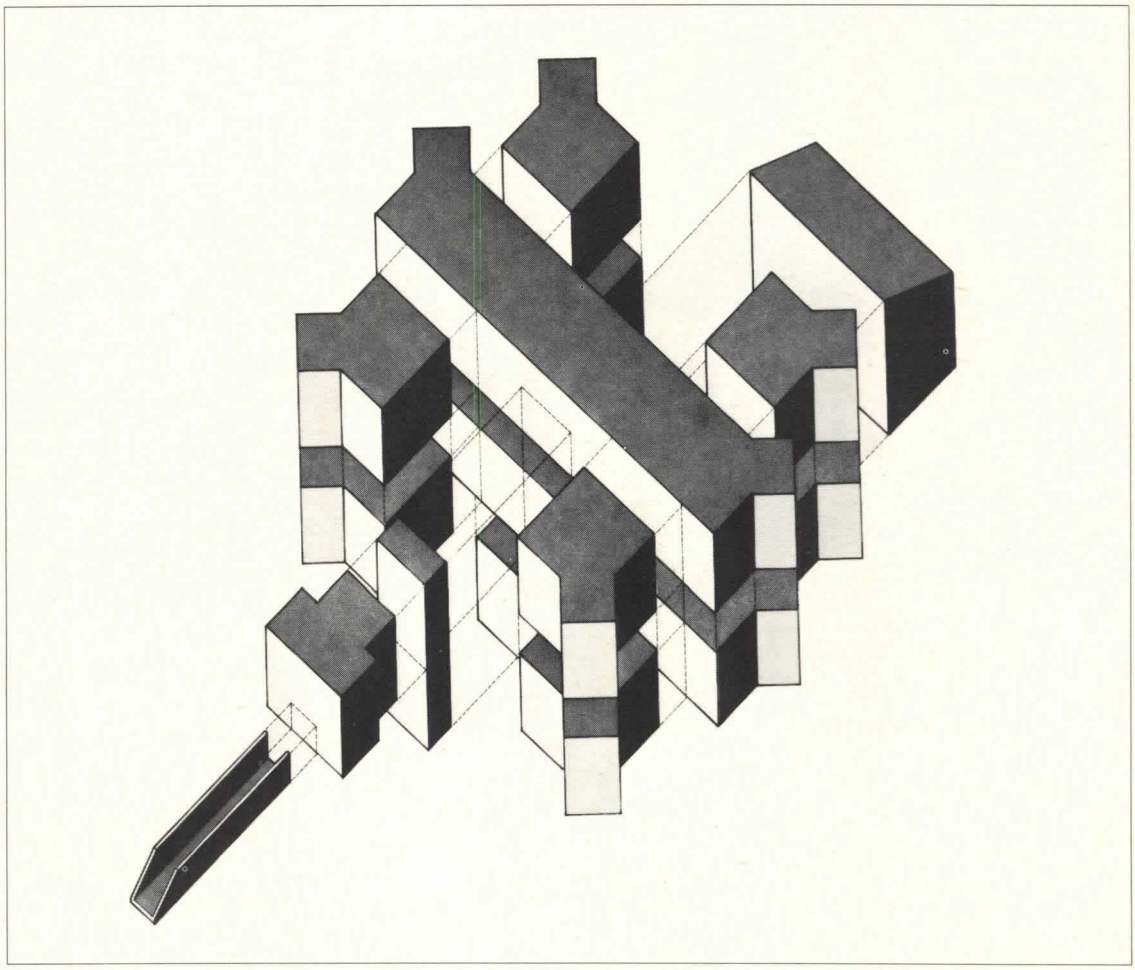
BOX ASSEMBLIES FOR STUDENT DORMS

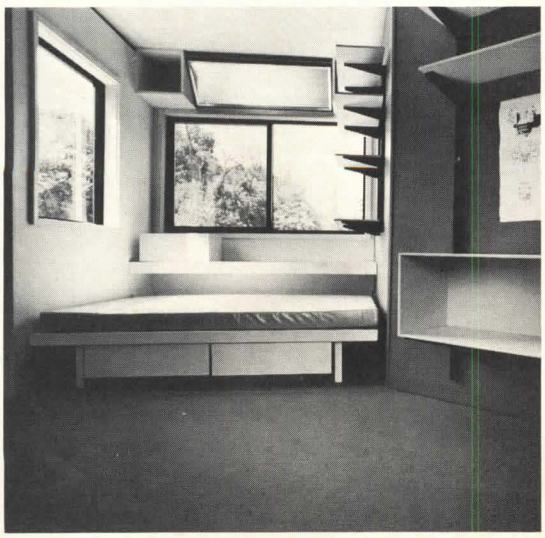
Bard College, in Annandale-on-Hudson, N.Y., is planning to build eight clusters of student dormitories that will be completely prefabricated in large box-type units in a plant 120 miles away, trucked to the site, and assembled like giant Chinese puzzles.

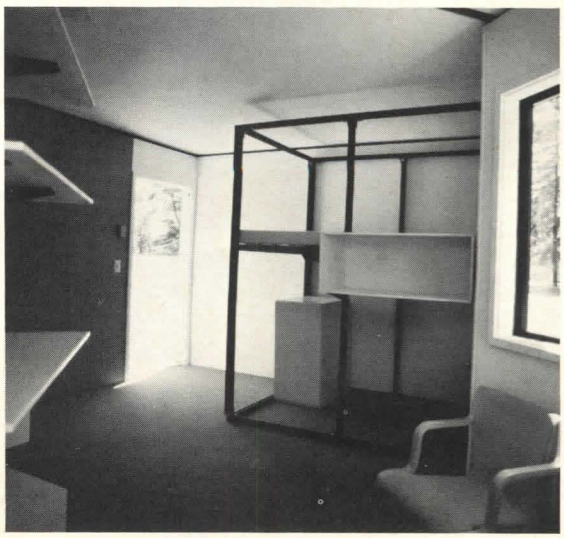
The architects, James Baker & Peter Blake, chose this system both to speed construction and to reduce costs. All on-site work (which includes the construction of pile-supported platforms on a steep slope) will be completed in three months; the unit cost will be $17 per sq. ft.

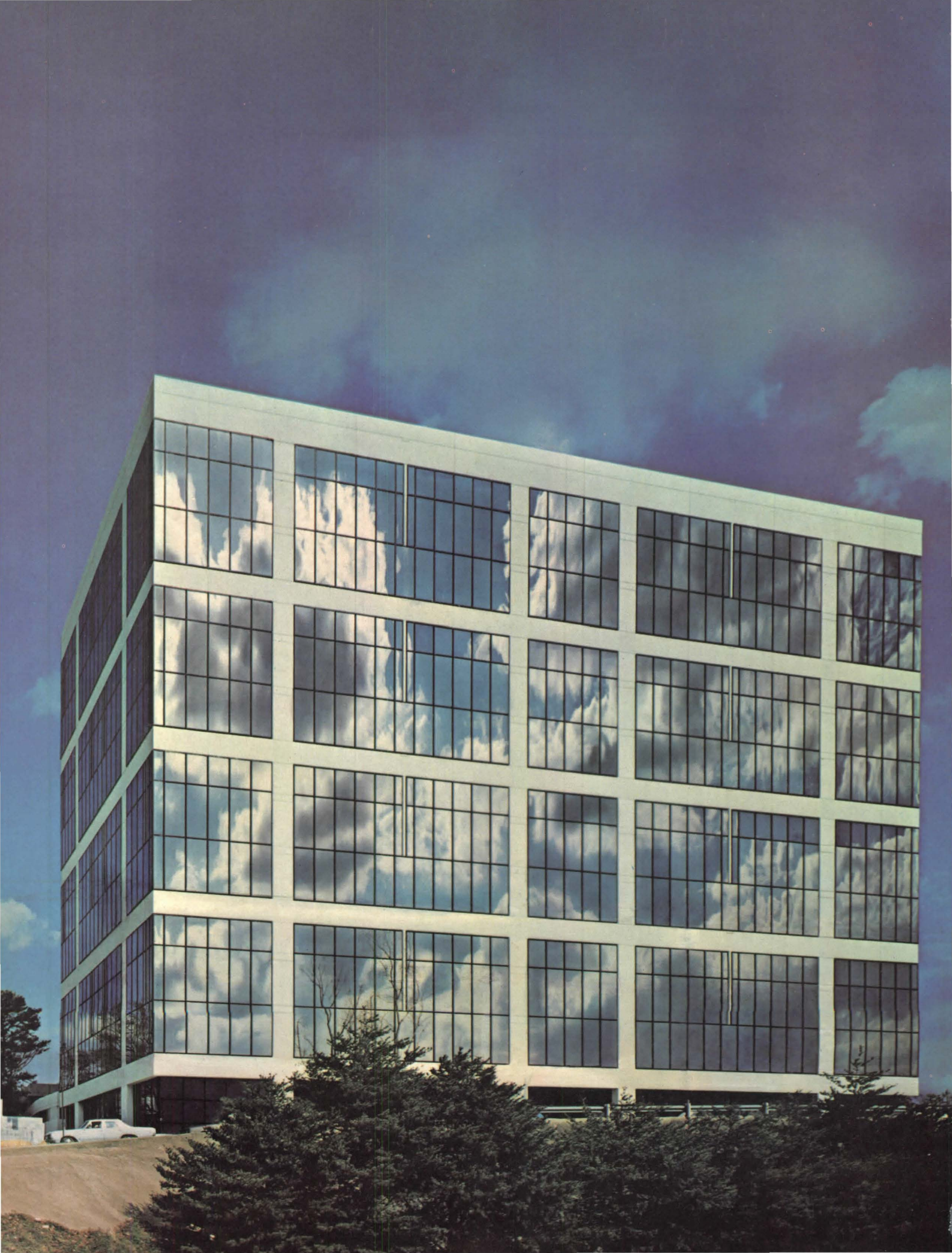
The boxes vary in size from 12 ft. by 12 ft. by 8 ft., to 12 ft. by 60 ft. by 8 ft. One of the clients' requirements was to permit maximum variety in room shapes and greatest possible flexibility in furniture arrangements. To meet these requirements, the architects designed a rectangular "bay window" that can be attached to the corners of boxes to form odd-shaped alcoves in each of the student rooms. Drawings below show one typical cluster containing 12 student rooms, a common room, and related services. Photos at bottom of page are of a full-size mock-up built by the prefabricator (Arbor Homes in Waterbury, Conn.), showing different furniture arrangements.











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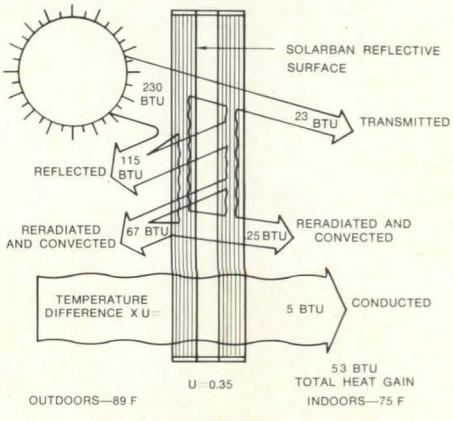

This diagram is illustrative of relationships for a given specific set of conditions.

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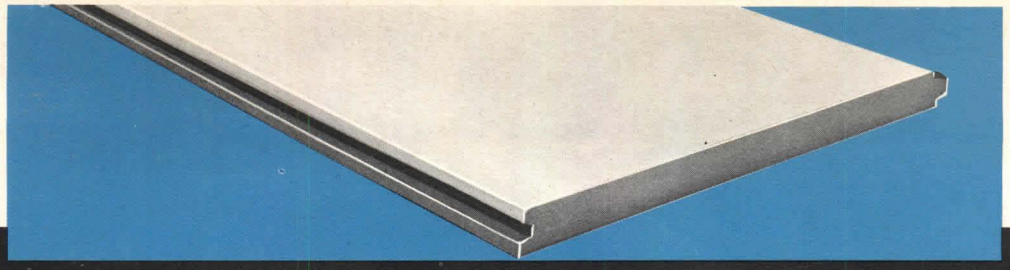

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FORUM

THE ECONOMY . . .

While the economic slump may not be what is wrong with the war, it is an undeniable fact *of* the war. In off-the-record telephone conversations with AIA chapter officers across the country, we found the story—even the phraseology—remarkably the same:

"A very definite slowdown, especially in the smaller offices, which are operating on an absolute minimum staff."

"Two of our finest smaller offices are giving up."

"When the larger offices start hurting you know we're in trouble, and some of them have been laying off people by the dozens."

"Money got tight or owners backed off in mid-stream"; "There's no backlog as there was a year ago. Meanwhile, we're spinning our wheels."

"We thought the bottom had been reached, but we haven't seen it yet"; "It's not necessarily so terrible at the moment, but the next six months look bad."

Etc.

The Los Angeles chapter, which operates a service for unemployed architects, lists over 200 applicants for a total of 12 job openings. The lady who handles architectural office employees for the New York State Employment Service—a category she describes as "stagnant"—said: "The demand always rises at this time of year, but in past years it has been nothing like this. It's frightening, really." Of the people she is presently handling, about 20 per cent "are in the higher income-bracket jobs—project managers, administrators, etc."

One dean of a university architecture department reports that demand for teaching jobs has shot up 200 per cent. "Graduate students are going into ancillary professions, like industrial design or working for government agencies. I expect it to have a permanent effect on the labor pool," he says. "When and if the jobs come back, many will have been lured away from the profession."

AND THE WAR . . .

Two groups of building professionals have lobbied in Washington in recent months against the war in Vietnam and for a reordering of national priorities. Both groups—100 Designers for Peace, and the Committee of the Planning Professions to End the War in Vietnam—denounced the war as "unjust" and "immoral," and supported the Hatfield-McGovern Amendment that would withdraw all U.S. troops from Vietnam by the middle of 1971.

The latter group—over 150 architects, builders, engineers, planners, educators, and contractors (below)—lobbied on July 22. Their day began in the Senate Appropriations Committee hearing room, where they held a briefing session before splitting up to visit with senators and representatives who were either antipathetic to their cause or uncommitted. The briefing was covered by the press.

Because the committee was, as one spokesman put it, "limited by what it could put into graphic terms within its own professional competence," it had assembled an exhibit of building projects cancelled or deferred because of the war. On TV, the exhibit tended to give the impression—undeserved—of a group protesting a slump in profits.

If no minds were swayed, the lobbying at least demonstrated that hard hats—who are received in grander style at the White House—are not the only ones who speak for the construction industry.

YOUTH

SERVICE TO AMERICA

The war came home in a new way to a group of young architecture students and recent graduates just recruited by VISTA (Volunteers in Service to America, sometimes called the Domestic Peace Corps). When occupational draft deferments were discontinued earlier this year, all but 30 of the 160 recruits in architecture and planning were lost.

As explained by Steve Cram (VISTA Coordinator at national AIA headquarters, and himself a former VISTA worker), when the deferment system changed VISTA asked the draft boards to make no deferments for VISTA persons, and asked the volunteers in effect to withdraw themselves as volunteers. Since the young people live in the communities where they work, their impact would be marred by special privilege. The policy has since been modified—anyone signing on with VISTA before the April 23 change in policy could proceed; but this applies only to three out of the 160.

VISTA workers receive six weeks of intensive training—in poverty problems, community development techniques, and application of their skills to people in need—then they spend the next year living among the people whom they serve. Poverty-level living expenses are paid by the Office of Economic Opportunity. Sponsorship (which involves the paperwork of reporting and financial monitoring, and also the ultimate legal responsibility) can be undertaken by a community organization, a community design/development center, or an independent agency (antipoverty, university, etc.)

Seventeen VISTA's in architecture and planning are already

out in the field, in such diverse places as Boston, The Bronx, Kentucky and Oklahoma. The National Council of Architectural Registration Boards is recommending to each state board that the year of VISTA work be counted toward the internship required for state licensing exams, but the move is irrelevant to those who would have become Volunteers in Service to America—and who will now be doing their service elsewhere.

ARTS

SCULPTURE FROM WATER . . .

A long hot summer was made considerably cooler in New York City by the sprouting up of water sculptures which plug into fire hydrants and blow a cool spray over willing passersby. The great 10-ft.-high circles-within-squares (below) were designed

by Artist Anita Margrill out of ordinary 6-in. copper plumbing tubing. A local plumbing union and the Copper Development Association lent materials and talent for seven units.

They were baptised early in July by Mayor John V. Lindsay, assorted press types and lots of exuberant youngsters on Manhattan's Lower East Side. Since then, all seven sculptures have been in constant circulation throughout the city. As they utilize only 1/30th the amount of water usually emitted by an open hydrant, they are no serious drain on the water supply; at $600 each, they are not a great drain on funds either.

. . . AND FOAM

Not only ordinary plumbing tubing has been granted artistic merit this summer: crankshafts, propellers, insulators, windshields and the like were the focus of a recent exhibition in Pittsburgh, Pa., called "The Artist Looks at Industry."

The industrial products, as

part of the larger Three Rivers Arts Festival, were housed in what looked like a moon village (above), but which was, in fact, simply an industrial product itself. The group of interconnected "huts" which made up the village were seven 13-ft.-high paper forms sprayed with polyurethane foam. After hardening, these forms were cut into sections and floated down the Allegheny River to the festival site where they were reassembled.

Officials chose foam "because it is a dramatic material, flexible enough to create shapes and textures to complement the industrial objects on display in and near it." They chose, too, Foam Specialist Felix Drury who, when at the Yale Architecture School, had had a hand in the first freeform foam houses ever to be built (see July/Aug. '68 issue, page 111). Drury designed the huts and supervised the spraying.

AHEAD WITH SOLERI

On the occasion of the opening of Paolo Soleri's exhibition of "arcologies" at New York City's Whitney Museum—the earlier works are downtown at the Reese Palley Gallery—the *New York Times'* Sunday Magazine published a detailed cover story by Sherwood Davidson-Kohn on Soleri's work. The story quoted the *Architectural Forum* and its editors—who had already written up the exhibition when it was at the Corcoran Gallery in Washington, D.C. (May '70 issue)—at considerable length and on six separate occasions. Moreover, the *Times* quoted Soleri as saying that "most of the architecture magazines, with the exception of *Architectural Forum*, have treated (me) poorly."

We agree, and we are grateful for the compliment. The *Forum* has, of course, published Soleri's work regularly since 1951, when one of his houses appeared in a so-called "new talent" issue, together with the work of such other, then little-known architects as Ed Barnes, Ulrich Franzen, Paul Rudolph, and Harry Weese (see pages 20-27). Most of them became well known before the 1950s were out; Paolo Soleri has only recently surfaced on the public scene, and the impact has been something to observe. We can't promise to stay 20 years ahead of our time, *all* the time, but we'll keep on trying.

Meanwhile, the show at the Whitney is causing a greater stir than any architecture exhibit in recent memory. It will stay at that museum until September 20, and then it will travel to: the University of North Carolina at Chapel Hill, October 21 through November 18; the Museum of Contemporary Art, Chicago, Ill., December 19, 1970 through January 31, 1971; and the University Art Museum, Berkeley, Calif., April 25 through June 13, 1971.

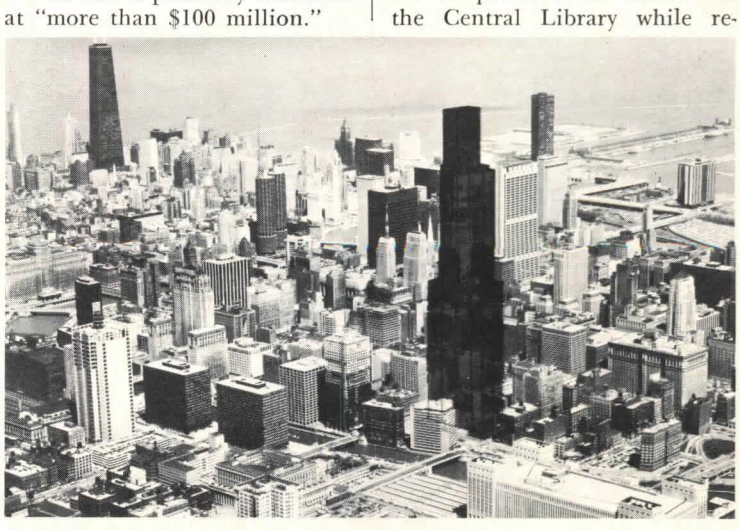
BIG PLANS

RECORD BREAKER

Sears, Roebuck and Co. have announced that they will build the world's tallest building in Chicago's Loop. It will be 100 ft. taller than the twin towers of the World Trade Center now rising in downtown Manhattan.

Designed by the Chicago office of Skidmore, Owings & Merrill, "Sears Tower" will be 109 stories tall; it will have setbacks at the 50th, 66th and 90th stories; it will contain 3.7 million sq. ft. of net office and commercial space; and it will be sheathed in black duranodic aluminum, with bronze-tinted windows. The site faces on Wacker Drive, just across the Chicago River from Union Station (below).

The cost is presently estimated at "more than $100 million."



COMPETITIONS

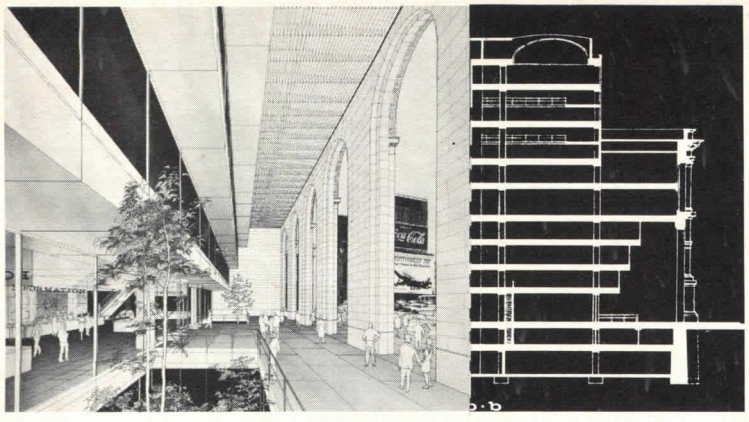
ITALIAN COMPETITION

The small hill town of Perugia, north of Rome, is the center for a sophisticated university system, has lovely Etruscan ruin-walls, and makes yummy chocolate. As part of a General Town Plan to swing business away from the historic and cultural center of the city, Perugia, through Industrie Buitoni Perugia [IBP], is sponsoring an international design competition for a new municipal and business district to be located at the foot of the hill. The competition, it is felt, would insure a sound "cultural contribution to the definition of the area"—in keeping with the overall cultural *ambiance* of the city.

Interested architects and engineers are invited to apply before the deadline date of September 19; applications must be followed by the payment of 25,000 lire (about $40) for a competition kit containing all documents necessary. This payment must be sent by October 5; it will be refunded to those whose designs are accepted in the competition. The winner will receive 12 million lire (about $19,350) and will supervise implementation of his plan. There will be three other prizes as well.

SAVING THE WRAPPINGS

The combined firms of Siberz, Purcell & Cuthbert and Sample & Potter of Madison, Wisc., have won an architectural competition—prize: $20,000—sponsored by the Board of Directors of the Chicago Public Library. The board held the competition to determine whether it was possible to preserve the facades of the Central Library while re-



structuring its interiors and providing a substantial addition of space. Preservationists—primarily the Chicago Chapter of the AIA—had been urging this solution.

But the board, heavily in favor of tearing the old building down, stated clearly in its program that the winning proposal might never get built.

While the library was built in 1897, during the heyday of the "Chicago School," it was designed in the classic revival style by Shepley, Rutan & Coolidge.

The monumental facades on the north, south, and east; a grand staircase in the south entrance lobby; and a number of ornate wall and ceiling mosaics would be retained in the winning scheme. The present bearing wall construction would be replaced by a new structural skeleton which would extend into the expansion area above and to the west of the present structure, utilizing air rights over an adjoining street.

A major new entrance on the Michigan Avenue (east) side would be accomplished by opening up a series of the present third-story window arches and extending them down to grade level. Inside the arches (top), a grand arcade would lead to what is, essentially, a new building inside the old walls.

AUTOLAND

BONUS IN THE GROUND . . .

At the suggestion of conservationists and the U.S. Geological Survey, Interstate 70 west of Denver (right) now also creates an outdoor geology museum where the road cuts through Hogback Ridge. As work progressed, it was seen that careful terracing of the cut would reveal to motorists a colorful cross-section of the 130-million-year history of the terrain, from the dinosaur era, when it was a flood plain; to light-colored volcanic ash; to dark red layers that were once soils; to coal-like material suggesting the plant life of the past.

This project, which is being expanded to include turnoffs and parking areas, will cost the Highway Department more money, but motorists will profit doubly from it.

. . . PIE IN THE SKY

Senator Jennings Randolph (D., W. Va.), speaking from the Senate floor: "State highway officials, through their nationwide organization, estimate that the national highway needs for the next 15 years will cost $320 billion."

To put that figure into perspective, the Washington Post commented editorially: "That is enough money for the government to buy all the railroads in the country, repair their roadbeds, fill all of their needs for new equipment, operate their passenger and commuter trains without charge to the riders for the next 15 years, and still have a big kitty left over."

COMMUNITIES

WOMEN AND THE WORKSHOP

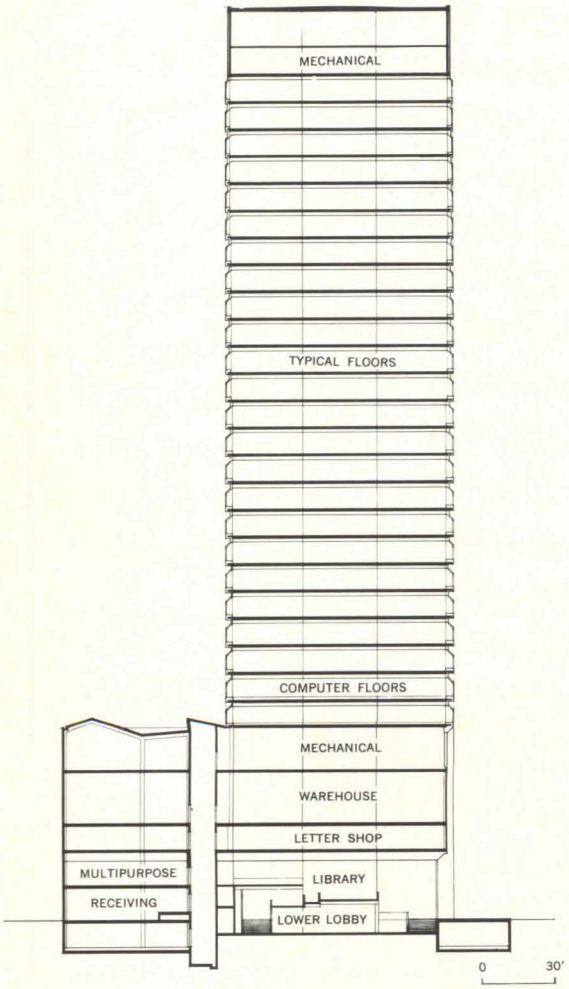
The Architects Workshop in Philadelphia, after guiding a group of women from Main Line suburbs through its premises and on a tour of its projects, is about to launch an unusual interaction between suburb and inner city. The day-long tour was in April, a willing response from the ladies came soon afterward, and now in September this study-group from a local chapter of the American Association of University Women is moving out into the community.

"The community," in this case, is a poor black church that is rehabilitating five houses with help from the Architects Workshop. As explained by Augustus Baxter, executive director of the Workshop, the suburban group will aid the five families of Holy Trinity Church with their $200 down payments, and together they will set up a tutorial program involving church and school, and a joint program for Boy Scouts from inner city and suburbs. Baxter's hope is that six or seven such groups will become identified with other community organizations, providing help and at the same time creating a better understanding (both ways) through the involvement.

In two-and-a-half years of operation, the record of the Workshop on more traditional architectural undertakings is impressive. It has been called upon by clients black, white and yellow for more than 90 projects—housing, youth centers, parks, commercial complexes, neighborhood centers, development plans.

(continued on page 60)


BANK
PARK



Seen from Michigan Avenue (left), Time-Life's ribbons of gold-colored mirrored glass seem to hover above its dowdy neighbors. At the base of the 30-story tower is a large windowless volume full of mechanical and mail-handling facilities (section and photo above). At either end of the split-level lobby is a 22-ft.-high entrance portico (top right).

30-STORY SLAB OF INGENUITY

The impenetrable walls of the Time-Life Building in Chicago—with their bands of gold-colored glass mirroring the skyline—are not just provocative wrappings on an ordinary office building. They are the external evidence of a design by Architects Harry Weese & Associates in which virtually every element that goes into an office building has been reexamined.

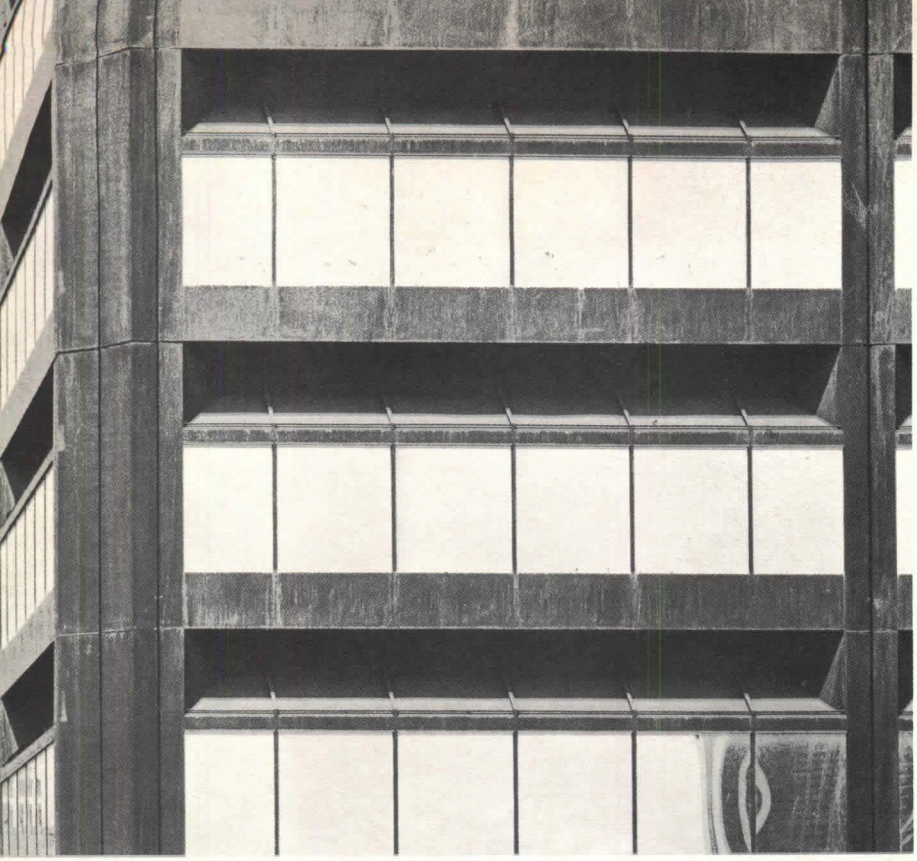
The structure's individuality is proclaimed on the outside by those strips of mirrored glass and the deeply folded panels of weathering steel between them. The inside, where two-story elevators take off from a split-level lobby, is even more unconventional.

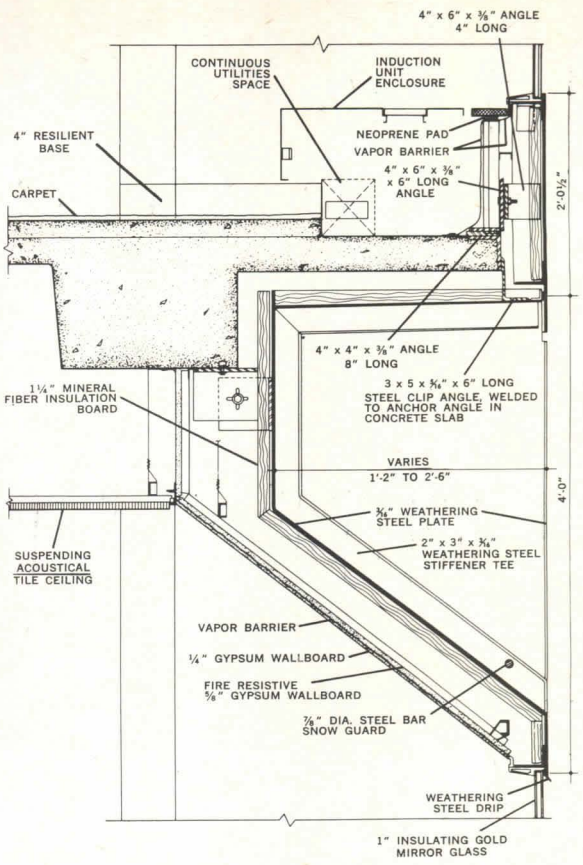
Behind the unique design of the building is a highly specialized purpose. The Chicago headquarters of Time Incorporated is the home of its subscription services, an operation so big that it accounts for about one per cent of all U.S. mail.

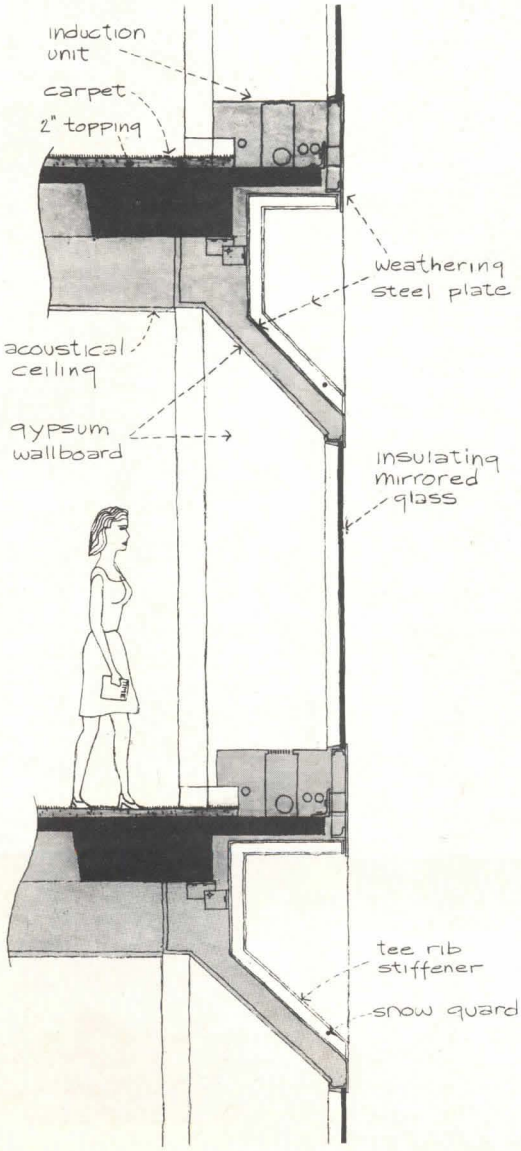
In the windowless portions of the lower stories are facilities to handle the immense volume of paper moving in and out of the building—renewal forms, promotional material, bills, and mailing labels sent off to printing plants around the world. A drive-through receiving dock in the low wing to one side of the tower (section left) is the building's indispensable link to the world. From there, a system of automatic conveyors extends to every floor.

Time Incorporated's subscription service has been located in Chicago for decades—since 1946 at 540 North Michigan Avenue, where millions of Americans have mailed their subscription forms. The new location—only two blocks east of there—was chosen mainly so that the 2,500 employees could follow familiar travel routes to work.

The staff has had to trade the urbanity of Michigan Avenue for a fringe area of parking lots and loft buildings (an area obviously ripe for development, however). In return, they have been given office space that starts 87 ft. above the street, on small floors where nobody sits more than 30 ft. from the windows. Except for the very




4" x 6" x ⅜" ANGLE
4" LONG
CONTINUOUS UTILITIES SPACE
INDUCTION UNIT ENCLOSURE
4" RESILIENT BASE
NEOPRENE PAD
VAPOR BARRIER
4" x 6" x ⅜" x 6" LONG ANGLE
CARPET
2'-0½"
4" x 4" x ⅜" ANGLE 8" LONG
3 x 5 x ¾" x 6" LONG STEEL CLIP ANGLE, WELDED TO ANCHOR ANGLE IN CONCRETE SLAB
1¼" MINERAL FIBER INSULATION BOARD
VARIES 1'-2" TO 2'-6"
4'-0"
¾" WEATHERING STEEL PLATE
2" x 3" x ¾" WEATHERING STEEL STIFFENER TEE
SUSPENDING ACOUSTICAL TILE CEILING
VAPOR BARRIER
¼" GYPSUM WALLBOARD
FIRE RESISTIVE ⅝" GYPSUM WALLBOARD
⅞" DIA. STEEL BAR SNOW GUARD
WEATHERING STEEL DRIP
1" INSULATING GOLD MIRROR GLASS


induction unit
carpet
2" topping
weathering steel plate
acoustical ceiling
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insulating mirrored glass
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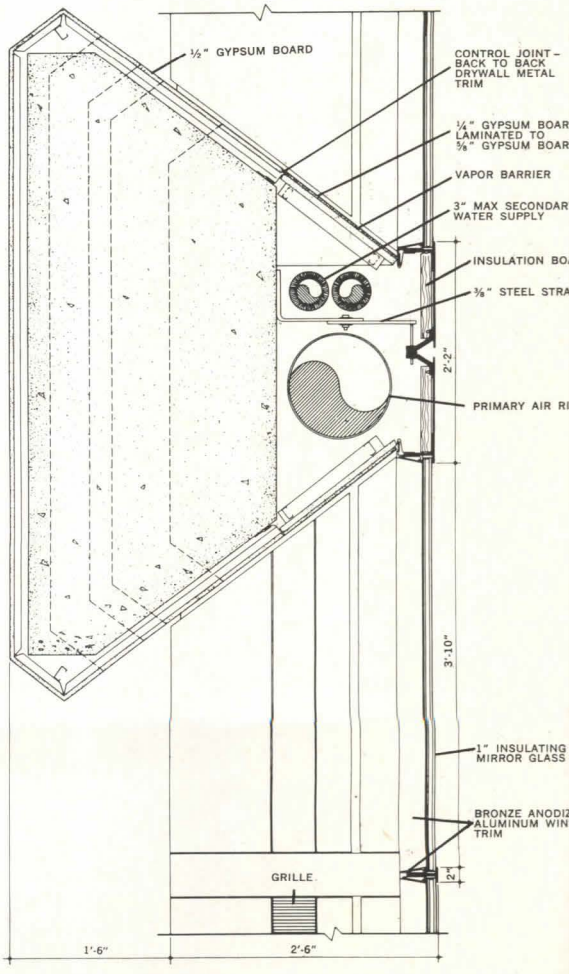
½" GYPSUM BOARD
CONTROL JOINT – BACK TO BACK DRYWALL METAL TRIM
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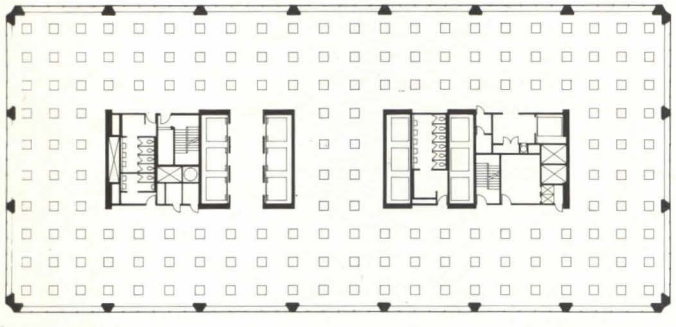
LAMINATED TO
⅝" GYPSUM BOAR
VAPOR BARRIER
3" MAX SECONDAR
WATER SUPPLY
INSULATION BO
⅜" STEEL STRA
2'-2"
PRIMARY AIR RI
3'-10"
1" INSULATING
MIRROR GLASS
BRONZE ANODIZ
ALUMINUM WIN
TRIM
GRILLE
2"
1'-6"
2'-6"



TYPICAL FLOOR PLAN

0 30′

The unusual profile of the weathering steel wall panels (top left) protects the offices from direct sunlight and sky glare (section, far left). Angled soffits and splayed columns (details, left) produce unusual angular window recesses on the interior (above). Air outlets in the low sill serve the outer 15-ft. ring of office space; outlets from the core serve the inner 15 ft. Square recessed light fixtures at 10-ft. intervals (top right) can be divided in half by partitions located on the 5-ft. module of the windows.

few executive offices, the space is not partitioned, but divided with low storage units into spaces for 20 clerks or so.

Initially, Time Incorporated is occupying 14 of the 24 office floors, plus the specialized spaces at the base. The rest of the space, enough to fill the subscription service's foreseeable needs, is now rented.

Deeply furrowed walls

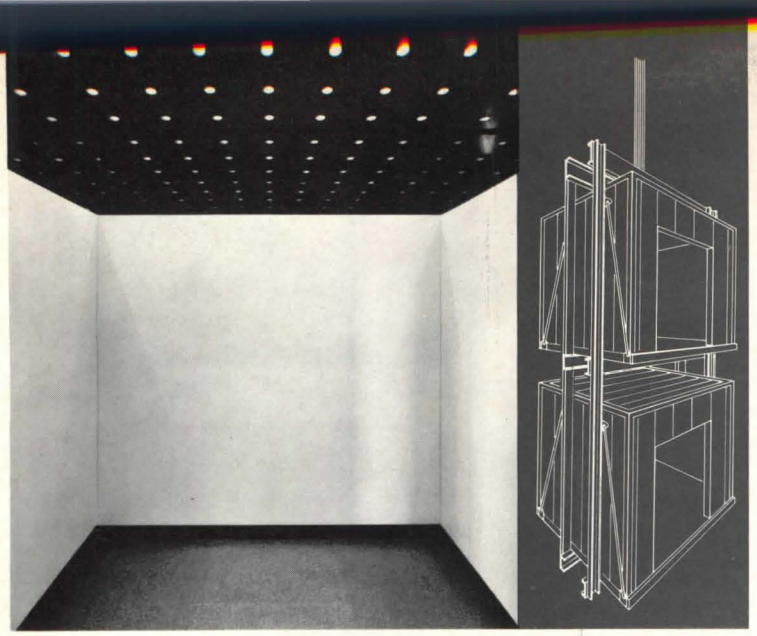
The dramatic modeling of the wall grew out of interior needs. The architects wanted the bands of window to be interrupted as little as possible, so they designed a wall with minimal mullions and splayed the columns so that employees could look out *around* them. They also wanted to eliminate blinds, which would have obstructed everyone's view just to keep sunlight off a few desks. So they used the mirrored glass, which reduces light transmission by as much as 70 per cent, then set the glass out at the exterior face of the columns and dropped the window heads down to 6 ft. 8 in. above the floor. Besides cutting out direct sunlight and sky glare, the low window heads and angled soffits give the offices an unexpected domestic scale. And somehow, the low scale makes the office space seem broad and serene, rather than big and busy. Clean-surfaced, neutral colored furnishings reinforce this effect.

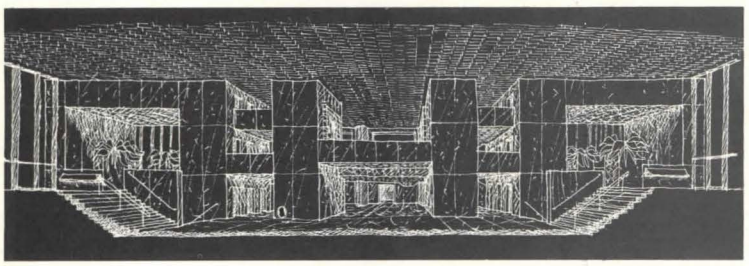
The walls were prefabricated in panels one story high and the full 30-ft. width of a structural bay. The all-welded panels arrived at the site complete except for insulation and glazing, both installed from the interior after the panels were set in place. Tub-like recesses running across the panels stiffen them without adding weight. Vertical ribs at 5-ft. intervals reinforce the folded steel plate and take up bending stresses imposed on the thin window mullions.

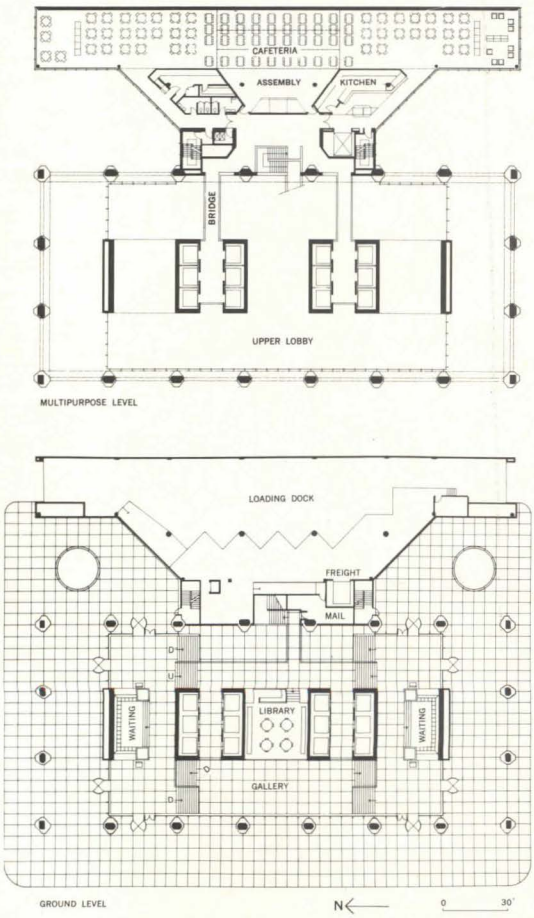
The entire wall system was detailed for two alternative materials, weathering steel and aluminum, and prices were obtained for both. The architects decided that the steel was worth its surprisingly small additional cost, since it required no expansion joints within the 30-ft. bay width, and allowed all on-site connections to be made by simple welding.

The structural frame behind the wall was also designed for alternative materials—steel or concrete. Despite spirited bidding among four steel companies, a structure of concrete columns and waffle slabs could be put up for $900,000 less than a steel frame.

The most remarkable innovation in the Time-Life Building is the system of tandem elevators—the bottom cabs serving odd-numbered floors and the top cabs stopping at even ones. The system has







Just inside an entrance (left), illuminated signs direct visitors to the lower level for elevators to odd-numbered floors, the upper level for those to even ones (lobby section above). At either level, there is the customary choice of highrise or lowrise elevator banks. The elevator cabs themselves (top photo) are visually intriguing; mirrored surfaces above eye level make the pin-point lights in the black ceiling appear to extend out indefinitely beyond the walls. Two cabs, hitched in tandem, open simultaneously at the two boarding levels of the lobby (top right).

the obvious advantage of moving twice as many people up and down a single elevator shaft—and moving them faster, since it makes only half as many stops. Now that the tandem system has been proved workable here, its performance is being watched by engineers who are already designing similar systems for other buildings.

Revolution in elevators

The tandem elevator idea is not totally new, but it has been tried only once before, in the Cities Service Building in New York (1932). And there the lower cab was just an auxiliary one to serve a subway entrance that was never actually opened up. After that abortive trial, the idea was never seriously considered until Weese and his engineers, Cosentini Associates revived it and discovered that it would solve the serious circulation problem presented by the Time-Life program.

Because the subscription service could work efficiently only if all employees adhered to the same strict schedule, the building program called for an extremely high elevator capacity for a building of this size. The system had to move 25 per cent of the building's occupants within five minutes at peak periods. (The usual range for office buildings is 10 to 15 per cent.) Using the tandem system, this capacity could be attained with 12 double-deck elevators, where 18 conventional ones would have been needed.

One third of the floor area that would otherwise have gone into elevator shafts and corridors was thus regained for office use, at a very small cost. The tandem system itself costs slightly more than a conventional one; although there are fewer shafts, each one requires a more powerful motor, and the number of elevator cabs (24) is actually greater. It was only by coincidence that motors powerful enough to lift the tandem elevators at high speed were available; one manufacturer had developed the equipment to handle 50-passenger cabs that will run as shuttles to the sky lobbies in New York's World Trade Center towers.

When Time-Life's tandem elevators were installed, provisions were made for three methods of operation. For times of peak load, the top and bottom cabs could be programmed to stop *only* at even- and odd-numbered floors (lighted buttons in each cab showing the boarding passenger his limited choice of destinations). For off-peak periods, the system could be switched to a second method, with the top cabs alone used as conventional elevators.

The third method is a modified version of the first: passengers boarding at the lobby must still choose upper or lower cabs, de-

pending on their destination, but when someone boards at an upper floor he is offered a choice of any other upper floor (that is, the rest of the buttons on the panel are activated). This last method of operation has turned out (as the architects and engineers hoped) to be effective at any time of day. During arrival and departure peaks, there is little interfloor traffic to disrupt the strict odd-even sequence, and during the rest of the day, delays for out-of-sequence stops are inconsequential. They occur only when somebody boarding at an even floor wants to go to an odd floor—or vice versa. Since the elevators normally make only one stop for every two floors, the trip is still faster than in a conventional elevator.

Piranesian lobby

It was obvious that a tandem elevator system had to start from a lobby that offered a clear-cut choice between two boarding levels—and made both equally accessible. The architects have taken advantage of this need by creating a lobby that is spatially spectacular. Broad stairs lead up and down from equal entrances at either end. (The streets to both north and south are heavily traveled.) The lobby has been extended up through the third story, at which bridges cross the gap between the elevator banks and the cafeteria-lounge in the low east wing.

The building does house some functions besides subscription services (a local advertising office, for instance). And right in this lobby are the public functions—a reference library of the company's publications and a large exhibition area.

The whole space has been given a massive, Piranesian quality by covering all surfaces—floors, walls, and balustrades—with large slabs of red-brown granite. The stone was selected first for the paving outside, as the best material to resist stains from the weathering steel. It was only logical to carry the paving into the lobby, but carrying it up onto vertical planes was a more deliberate design step. The effect is impressive for sheer architectural virtuosity, but too monumental for the mundane functions of this building.

The exterior, on the other hand, is an ideal symbol for the company; it looks—and is—tough, honest, and technically up-to-the-minute. Weese has given his clients what the best of the old Chicago School architects put into their office buildings—a structurally expressive exterior, efficient working space inside, and the most advanced internal services. Who can begrudge them their magnificent lobby?

—John Morris Dixon

At either end of the all-granite lobby is a carpeted sanctuary (top left) for waiting visitors. The east and west sides of the lobby (above and right) are quite different spatially—one side dimly lighted and crossed at two levels by bridges between elevators and cafeteria, the other side unobstructed for its full 27-ft. height and lighted through a west wall of clear glass. The lobby ceiling is not the actual waffle slab, but a stamped-metal facsimile suspended below it, a deceit that leaves space for indispensable ducts and conduits.

FACTS AND FIGURES

Time-Life Building, Chicago, Ill. Owner: Time Incorporated. Architect: Harry Weese & Associates (John F. Hartray Jr., 1st project manager; Robert E. Bell, 2nd project manager; Tom Devine, 3rd project manager). Engineers: Office of James Ruderman (structural), Cosentini Associates (mechanical and electrical). Interior design consultant: Dolores Miller & Associates. General contractor: Turner Construction Co. Building area: 700,000 sq. ft. Cost: $24,000,000. PHOTOS: Balthazar Korab.

THE CONNECTICUT: PRIORITIES IN CONFLICT

A river can serve many purposes. Its waters can be a canal for waterborne wastes, a scenic retreat for sportsmen and vacationers, an oil-slicked navigation channel, a habitat for fish and other wildlife, a processing material (and sewer) for industry, a source of drinking water, and a means of flood control and power production. Contentions over the development (or nondevelopment) of a waterway are as intense as any struggles over land use, and the decisions often as irrevocable.

The Connecticut is typical, with its conflicts of economy vs. amenity, private vs. public, local vs. regional, man-made vs. natural, short-term vs. long-term. With pollution one of its major problems, inextricably linked to every other problem of development, the Connecticut is lamentably typical. But for some reason (perhaps pollution) the land bordering on this river is not as intensively used as the banks of many others. If and when pollution is diminished, the area may be in for what some consider an even bigger threat: development. Economic and population pressures are already building.

Responding to these pressures are two unusual federal studies. One, from the Bureau of Outdoor Recreation, is for a National Recreation Area the full length of the 400-mile river. The plan is unique in proposing public acquisition of only a fraction of the land; the rest is to be protected in other ways.

The other study, from the U.S. Army Corps of Engineers, is a six-year comprehensive analysis of the basin's interrelated needs up to the year 2020. Set up as a joint search among federal and state agencies, for a proposal to be submitted to the public, the study may well be a high-water mark for an agency that has drawn much animosity for looking mainly to its dam-building.

Pollution: how bad?

Any future for the Connecticut, however, begins with its pollution and is predicated on the control of that pollution. How bad *is* it?

Only the first 7 per cent is suitable for swimming—28 miles along the crystal-clear lakes near the Canadian border; from these heights it is literally all downhill. A booklet for canoeists cautions against drinking the water: "Nowhere along the great expanse of the river does the water meet

public health standards." In late summer, when the flow is reduced, the river smells so bad that some picnic spots are deserted.

Gut-level "experts" on the river's pollution are the teachers and teen-age boys of Becket

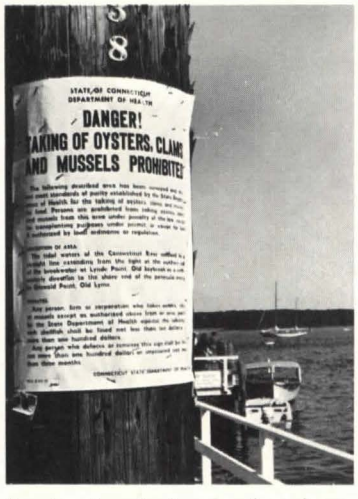
Academy in East Haddam, Conn., who for three summers have paddled and portaged the full length of the river. Their logs cite a dead cow floating in the river, and two cars embedded in midstream; their water samples include one brownish specimen they call "Groveton cola," which "would clear the room out if I opened it," says Sidney duPont, originator of the five-year project.

Three-quarters of the New Hampshire contribution to the river's pollution is from the Groveton Paper Company—all the rejected parts of the wood from its pulp and paper mill, plus all the chemicals needed for extraction. "Nothing lives here, not even mosquitos," says duPont; "it's like a ghost town; just wads of dried refuse clinging to every low-hanging limb, and toilet paper clinging to the paddles." Moore Reservoir, 40 miles downstream, acts as a settling basin for Groveton; its bottom is an aquatic desert.

Massachusetts also has its paper mills, adding each day at least 23,000 lbs. of fiber to the "suspended solids" in the river. But industrial pollution is more diverse here than from the tanneries and mills upriver. Richard LeBoeuf, head of the area's Izaak Walton League, got a second degree burn where Monsanto unloads phenol. "They've put in new cement pipes, but they're dumping the same old stuff into the river." In Deerfield ("pickle city of the world"), the stench of vinegar plus human waste at their campsite caused one of the Becket Academy lads to vomit 14 times, establishing a school record. At Holyoke, the water turns green from the manufacture of bank checks, yellow from other dyes.

Sludge worms, which can live on human excrement and need almost no oxygen, find the conditions so foul just below Holyoke that even they cannot survive. At the Massachusetts-Connecticut line, the coliform bacteria count has registered 315 times the Connecticut standard for swimmers. (Found in human waste, coliform bacteria are harmless themselves but indicate the probable presence of pathogenic material.)

Ships can navigate to Hartford; an oil tanker ran aground recently and dumped 13,000 gallons of gasoline. Boats moored in small marinas have a green scum at the water line, a product of algae, oil and whatever else comes



floating by. A sign in the picturesque marina at Essex warns not to eat the shellfish.

Wildlife doesn't have an easy time. The declining osprey actually have enough food, says duPont, but they can't see into the murky water to get the fish. At Holyoke his group found many dead shad on the banks ("What's the purpose of lifting them over the dam if they die in the pollution?"), and rats living on the remains. The only improvement is a 20 per cent lower DDT content in the fish since aerial spraying of woodlands was halted. But now the official advice is not to eat Connecticut River fish more than twice a week because of the mercury they ingest, and Vermont is one of three states in the country where commercial fishing is banned because of mercury pollution. (Many years ago, salmon were so plentiful that a Connecticut law forbade serving them to indentured servants more than three times a week.)

Also tough on aquatic life is thermal pollution, a product of

all power plants but especially severe from the nuclear plants. The nation's largest "nuke" is on this river at Haddam Neck, Conn. (above, and left; note thermal pollution appearing as white stream in aerial photograph). A larger one being built at Vernon, Vt., will have cooling towers as a result of public protest, but at Haddam Neck there are none, and the Becket students felt the temperature—an incredible 100 F.—through their canoes. Lake Chad in the Sahara, they found, is only 88 F. The normal temperature of the Connecticut, at its highest, is 72 F. Thermal pollution (or "thermal effect" as the power companies call it) can be disastrous for fish, but does other damage as well, increasing the growth of algae (already a galloping problem in most waters), and decreasing the water's oxygen content and with it the water's natural ability to assimilate waste.

"And yet the Connecticut is clean, compared to other rivers," says Sidney duPont. Actually, any river not grossly overloaded and not held back by dams will regularly flush itself clean. (The Connecticut has 16 dams, many owned by the power companies and thus operated to meet power demands.) If you don't get too close —and the public has very limited access—it is a beautiful river, from the rushing "white water" in the north to the broad expanse of the estuary.

Pollution control: state by state

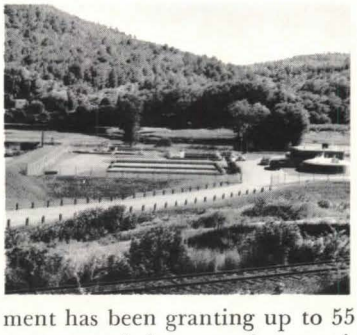
Pollution isn't new, of course, and the mechanisms to control it have been developing for some years. The state of Connecticut had its first antipollution law in 1925. But by federal law, in 1965, all states had to classify their interstate waters according to use (A for drinking, down to D, for navigation and power) and set precise timetables for building treatment plants and reaching the desired levels.

Public hearings, state by state, brought out the opposing groups —those who urged C classification to lure industry and money, those who urged B to lure tourists and money, industries who wanted B water delivered *to* them but only C required *of* them for delivery downstream, conservationists who wanted to clamp down on anyone's "right to pollute." The result was the planned upgrading of a D river to C with long stretches of B (only reservoirs and tributaries are A).

But water doesn't recognize state boundaries. For 40 miles below Groveton, N.H., "the river is no good," says a pollution control official from Vermont. (The river provides their entire mutual boundary.) And the state of New Hampshire took the state of Vermont to court (and lost) over the potential pollution from the nuclear plant at Vernon.

A state can request an "enforcement conference" from the Secretary of the Interior, and Connecticut called for one in 1963 concerning pollution delivered to it on this river by Massachusetts, but a Connecticut official says "it only reached agreements already reached." An agency called the New England Interstate Water Pollution Control Commission, formed in 1947, is charged with coordinating efforts of the various states, but it is only now getting enforcement powers from the states.

Another problem is money. Since 1966, the federal govern-



ment has been granting up to 55 per cent of the cost of a municipal sewage plant (nothing for an industrial treatment plant) and the states give up to 40 per cent more. But last year, the feds appropriated only $1.4 million each for New Hampshire and Vermont (one-third the authorized amounts). Even $4 million isn't much, when the total that New Hampshire says it needs for cleaning up the state's share of the Connecticut River (and tributaries) is $50 million. And despite much rhetoric, the Administration's proposal for a long-term $10 billion program for clean water turns out to provide *less* federal money, year by year, than is currently authorized. All four states have "prefinancing," giving a town the federal share of a plant and hoping to get it back later. Suspicions are rising that they may not.

All four states say they are making progress, or at least keeping up with the problem. (Perhaps so, although one pollution control official from Massachusetts pleaded with the Izaak Walton League not to publicize the crucial timetable.) Estimates vary as to when most of the needed plants will be completed—1971, 1972, and beyond. Even then, it will take some time to flush out the sludge and the decomposing vegetation. The Corps of Engineers says it will take 40 years "to return Moore Reservoir to its original environment."

Some say that more federal money is no answer. A study from the General Accounting Office takes a dim view of the $1.2 billion spent nationally by the feds on some 9,400 municipal plants, claiming that the nation's rivers are as foul as ever—or worse. On one river, municipal plants had decreased pollution by 3 per cent, while industrial wastes increased it by 350 per cent.

Charging the polluters

Recognizing that few enforcement actions are taken against individual polluters "because of their substantial economic and political power," Senator William Proxmire (D., Wisc.) proposes *charging* industry for what it dumps into the water. He believes this would provide an incentive to cut waste (and ultimately to "loop the system" and have *no* waste), and would make business pay for its use of waterways, just as the public now pays. The revenue would pay for municipal treatment facilities, conservatively bringing in double what Congress now authorizes. Critics of the Proxmire bill say it sanctions a "right to pollute."

Does industry believe it has this "right"? According to one Connecticut conservationist, "Groveton Paper says it can't afford to build a treatment plant. But they can't afford *not* to." In fact the company is joining with the town on a treatment plant for some of the mill's waste, but will be solely responsible for its heavy pollutants, with its own treatment plant on the way by next sum-

mer. "It wouldn't be fair to the taxpayers, to have us go into their system," says an officer of the company, "even if we *are* the biggest taxpayer in town." (In Massachusetts, Monsanto will join with five cities, including Springfield, in one large plant.)

"Our industry has been quite cooperative," says an official from Vermont, "except for the paper company in Putney—they do just enough to be able to cry to the courts 'we're trying.'"

In Connecticut, the vice chairman of the Governor's Task Force on Clean Water, himself a businessman, believes that "industry has come to recognize pollution control as a cost of doing business." Nevertheless, the lack of uniform state standards, timetables and financial incentives causes some bitterness. And pollution control agencies are generally both fearful of strong action (the company may depart) and sympathetic ("You can't close a plant").

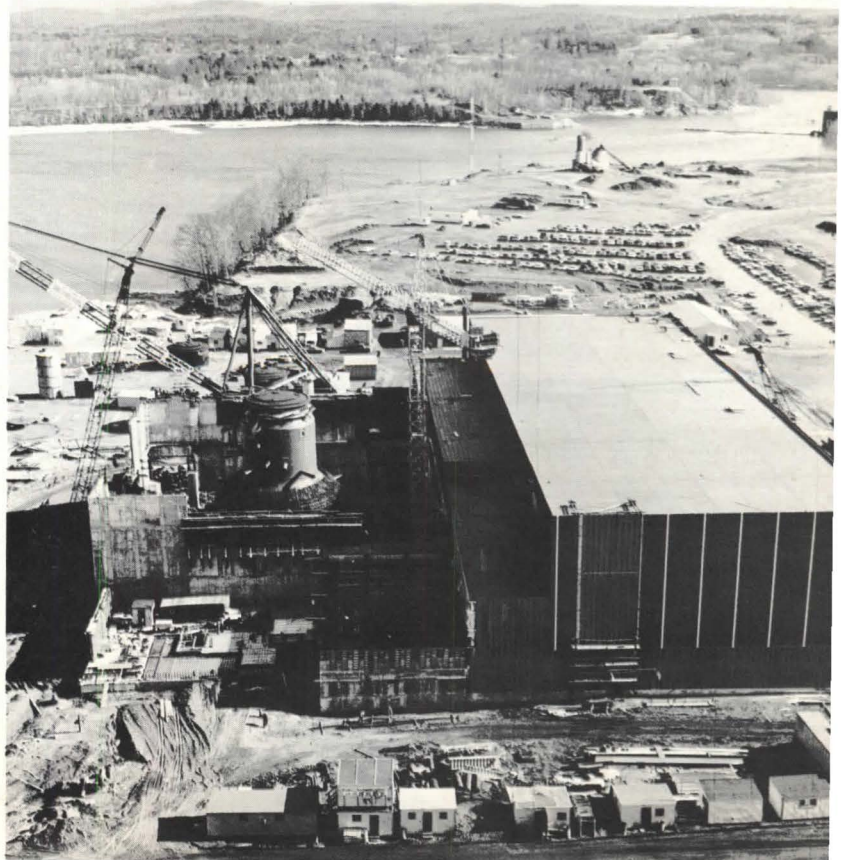
It isn't easy for a small town, either, especially a poor one. Even with outside money, the town is left with a sizable tab considering that all the benefits go downstream. As pointed out by the League of Women Voters Committee for the Connecticut River Basin (one of a dozen or so around the country), "water pollution will be overcome when all municipal and industrial water intakes are required to be located *below* their own outfalls.

"What price environment?" ask some New Englanders. Pointing with pride to the concern shown by several Vermont governors for the natural environment, Forrest Orr, vice chairman of the Governor's Commission on Environmental Control, nevertheless says, "You can't embalm the state; *everything* alters the environment."

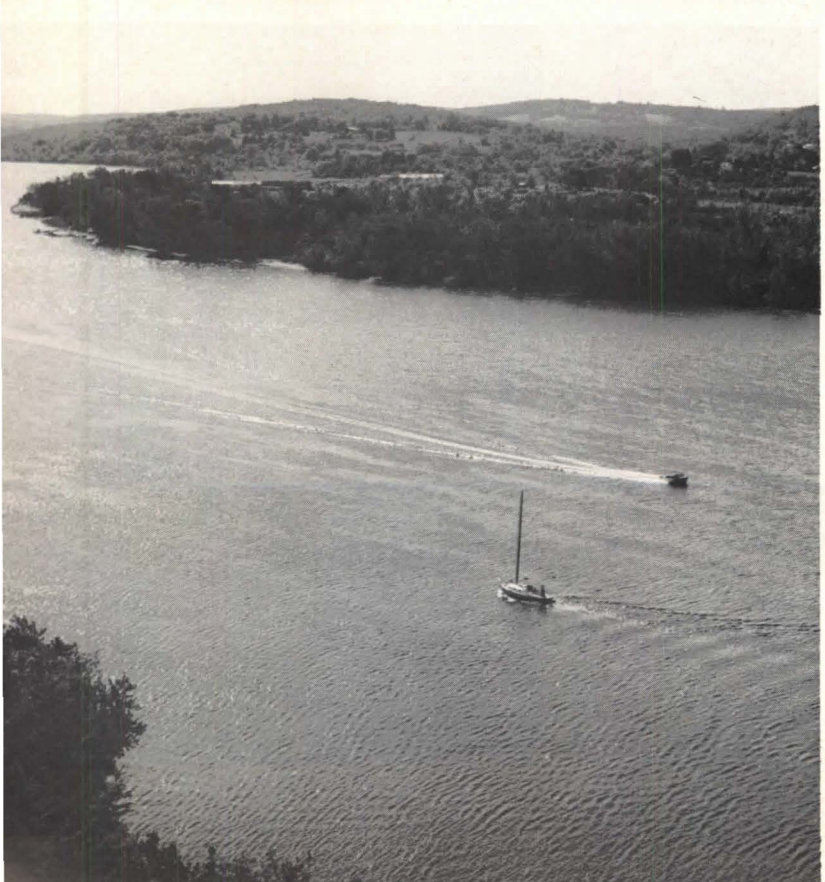
"What price progress?" ask conservationists. The Corps of Engineers predicts that the electric power needed in the Connecticut River Basin by the year 2020 will be *28 times* what it is today, most of it supplied by the huge nuclear plants that are, of necessity, located on—and polluters of—major waterways. The Sierra Club has taken a national position opposing "the inevitability of continued escalation of power needs."

But technological progress will also help fight pollution:

- A five-year experiment in Pennsylvania successfully reuses



On the Upper Connecticut River, chemicals and other material from the pulp and paper mills are a major source of industrial pollution. Right, top: the mill at Groveton, N.H., which ruins the river for 40 miles downstream. Middle: debris from the mill at Putney, Vt. Bottom: the huge nuclear power plant at Vernon, Vt., which—even with built-in cooling towers—will add thermal pollution to the river.



sewage water as fertilizer and irrigation (a system well suited to cities with open land nearby).

- A town in Southwest Africa recycles, for drinking, a million gallons of sewage a day. Residents say it tastes "more like water" than their usual.
- Research financed by the U.S. government is investigating the use of fibrous wastes from papermaking to filter all pollutants out of the water *used* in paper manufacture.
- An official of the Federal Water Quality Administration sees the possibility, within 30 to 40 years, of a sewage treatment plant in every home.
- MHD, or magnetohydrodynamics, is considered only one possible source of power with less pollution than the "nukes"; others are solar energy, and an individual fuel cell for each home. One industrialist estimates that $100 million could build our first MHD plant, placing us in the running with Japan, West Germany and the USSR, where projects are underway.
- Huge retaining bags of watertight fabric are a possible answer to the common situation of storm and sanitary sewers being linked. In a heavy storm, when the sewage plant can't handle the load, it is all shunted off, untreated, to the river. (The cost of separating storm and sanitary sewers along the Connecticut is estimated at $490 million.)
- And not the least hopeful development, the U.S. Patent Office announces that processing time for antipollution patents is being reduced from 3 years to 6 or 8 months.

Pollution, then, is probably one of today's more soluble problems. The combination of changing attitudes, more money, and increased legal action (from local up to federal) could make the Connecticut—and all waters—sweet again. What then?

Development for recreation

Except for the two big cities (Springfield, Mass., and Hartford, Conn.) and a dozen smaller cities, *long stretches* of the Connecticut show no sign of the hand of man

Much of the Connecticut is relatively undeveloped; the steep banks and low flood plain have kept towns back from the edge. Left top: a typical landscape in the central portion of the river. Left bottom: the broad sweep of the river at the estuary. Many people believe that if and when pollution of the river is a thing of the past, development will pose an even bigger threat.

beyond what he has dumped into the water. Some say that the steep banks and low flood plain have kept towns back from the edge, or that the river is "unspoiled" because it has no great city at its mouth. Others say that as soon as the water ceases to repel people, it will attract them beyond any ability to handle them. The Connecticut is within 50 miles of 6 million people, and within a reasonable journey (250 miles) of some 40 million. A recreation-hungry population is looking at the Connecticut River and licking its lips.

In 1966, President Johnson recommended the study of a Connecticut River National Recreation Area. In 1968, the Bureau of Outdoor Recreation (BOR) came up with its plan, not "to bar future development, but rather to assure that it will be done in a way that respects and enhances" the area's beauty.

The BOR says it envisions "no radically new resource management techniques. It proposes the blending of a small amount of land acquisition with scenic easements, conservation zones, and cooperation at every level of government and private responsibility." This is precisely its uniqueness: the attempt to control a large piece of land by zoning rather than by outright federal purchase. The river that saw the nation's first steamboat, first ferry and first riverside canal may see a first in the management of a great natural resource.

A bill based on the BOR plan was introduced by Senator Abraham Ribicoff (D., Conn.) in 1969, proposing federal preserves in only three areas—two small sectors near the mouth and at Holyoke, and a long strip near Canada.

For the 11-mile Gateway Unit, the federal portion would be no more than 5,000 of the unit's 23,500 acres, the rest being protected by zoning ordinances approved by the Secretary of the Interior. The main purposes here are to protect the scenic qualities without interfering with the commercial and industrial development of the existing communities. In the Mt. Holyoke Unit, extending 4½ miles, the bill would create a 12,000-acre national park. In the 82-mile Coos Scenic River Unit, federal acquisition would be limited to 1,000 acres (divided equally between New Hampshire and Vermont), and the owners of an additional 20,200 acres would sell scenic and access easements while keeping their land still on the tax rolls.

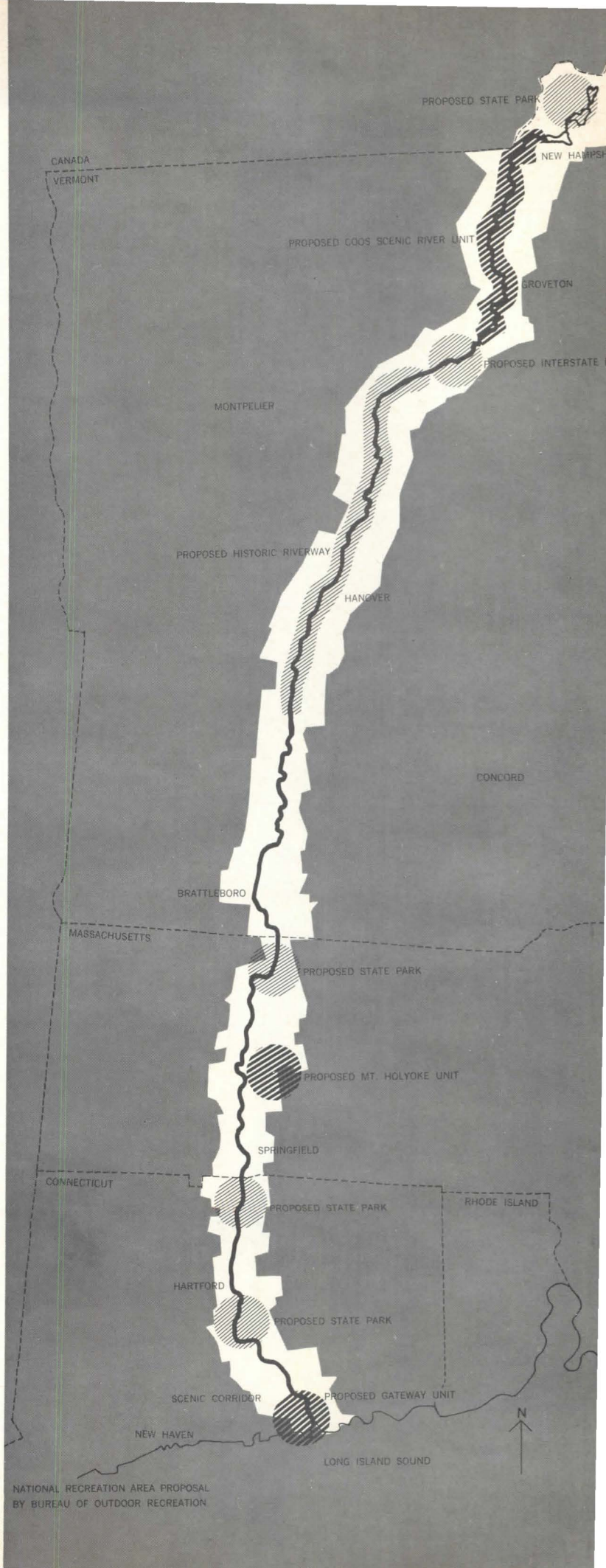
The bill also called for a short Scenic Trail, a 400-mile Tourway (using existing roads "to every extent practicable"), a Recreation Area Committee of local and state people for each of the three units, and $100,000 for technical assistance to local public and private groups. The federal legislation did not, of course, include the many BOR recommendations for state and local action, suggesting which areas should be acquired as state parks (putting another 125 miles of the river under protection) and which areas should be controlled by the 92 towns, either by acquisition or by maintaining scenic control.

Some cautious reaction

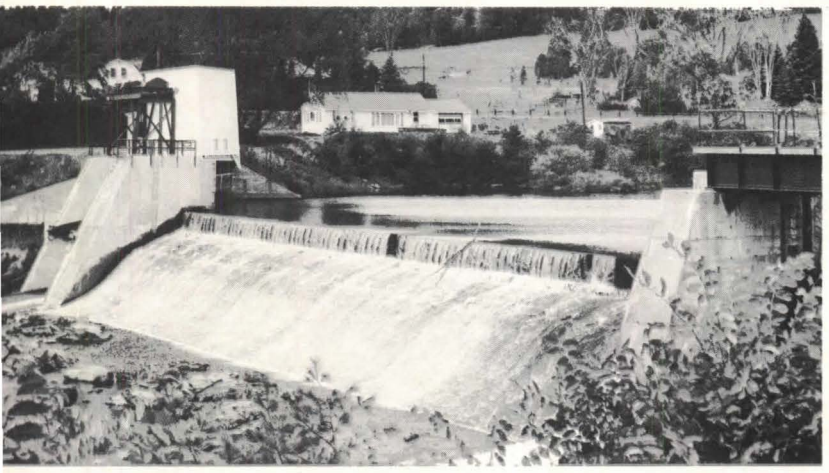
Although the $46-million Ribicoff bill was supported by senators from three of the states (all except Vermont), and by many of their constituents, action was suspended last fall when the Administration indicated little money available for new parks. Senator Ribicoff introduced a new bill, two months ago, for the Connecticut portion only—"the rest isn't dead by any means," says his office, "but we're going step by step."

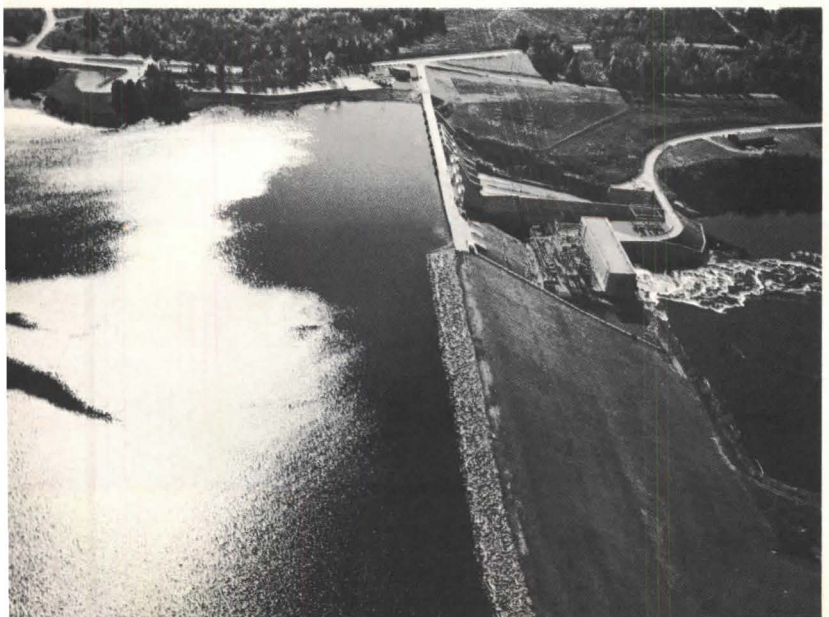
Opposition to the bill varies. The same man who worries about "people pollution" ruining the pristine northern area, also casts a skeptical eye on scenic easements. "These easements apparently preclude all commercial and industrial development," says Forrest Orr, an official of the Vermont government. "New Hampshire isn't as worried as we are, because they have the railroad on their side of the river and already have more industry. The BOR talks about support facilities, but how much does canoeing require?" Orr raises other questions about this bill—why doesn't it follow the precedent of the National Trails Act, giving state and local governments two years to acquire a right of way before the federal government steps in? Or the precedent of the Forest Service, giving a town some compensation for land taken for national forests?

To some extent these concerns are legitimate, although the northerners are accused of deliberately misunderstanding the BOR proposal. One observer says, "The plan is basically asking New Hampshire and Vermont to ac-



NATIONAL RECREATION AREA PROPOSAL
BY BUREAU OF OUTDOOR RECREATION





Above: Near Canada, the Connecticut is rushing "white water." Below: the river's first dam is also far north, at Pittsburg, N.H. Bottom: Altogether the river has 16 dams, many operated by the power companies solely to meet power demands. The Corps of Engineers study proposes no fewer than 78 new dams and 10 new impoundments by 1980, many of them multi-purpose.

knowledge responsibility to Connecticut and Massachusetts. It's a difficult struggle." Another observes, "Land ownership is sacred to a New Englander; sometimes it's all he can leave to his children."

In Massachusetts, the appointment of an advisory committee has eased much opposition. One proponent, who feels that the boundary lines were insensitively drawn (occasionally going through a man's property), hopes that "gerrymandering" will help. Perhaps, too, extending residence privileges to the children of present owners will increase support.

"We are cautiously in favor of the Gateway Unit," says Stanley Greimann, planning director of the Connecticut River Estuary Regional Planning Agency (one of the state's 13 regional agencies). "The BOR was fine," says Greimann, "but the National Parks Service came in without even *reading* the BOR report. They talked about putting 11,000 people a day onto the east bank, which has no good vehicular access. Now there's a modified version, with the major park facility on the west bank, next to existing interchanges, and only limited use of the east bank—perhaps boating people in."

Protecting by other means

Meanwhile, others are seeking to protect the riverfrontage that falls between the federal preserves. A unique private agency founded in 1952, the Connecticut River Watershed Council, began a "land conservancy" program last year, getting conservation easements and land with (hopefully) a $5-million revolving fund from which public and private groups can borrow. This is believed to be the first time such an approach has been applied within an entire major river valley.

The conservation commissions that are springing up in many small towns are another source of action. Getting free technical advice where they can find it, these appointed bodies identify key parcels and then try to persuade their towns to buy them.

An exceedingly promising project called "New Hampshire Tomorrow" will bring the message directly to landowners. One of the segments of this broad environmental inquiry is investigating the kind of private action mentioned in the BOR report. Information is being gathered on land ownership, zoning, flooding, and on legal and financial procedures —what scenic easement means, how to get tax benefits for land gifts, etc. "We'll give local people the information," says Lawrence Dingman, lecturer at Dartmouth and director of the project. "We will probably recommend a bi-state organization with strong local basis to continue the work," he says. As one part of the project, Dingman is mapping what can be seen from the water—"What *is* the scenic corridor we're talking about?"

Toward a comprehensive view

Use of the Connecticut for active recreation or passive enjoyment meets only one or two demands out of many. The forthcoming study chaired by the Corps of Engineers (which is officially called the Connecticut River Basin Comprehensive Study, and also goes by an even longer title) identifies no fewer than 16 needs, from preserving open space and increasing recreational opportunities, to action on pollution, flooding, historic sites, electric power, erosion, fisheries, water supply, wetlands, etc. And while some of the recommendations in the study are "nonstructural" (research into difficult pollution problems, land acquisition for fishing, flood plain zoning throughout the basin), the Corps of Engineers has certainly not retired from the dam-building business. Proposed for "early action" (by 1980) are 17 watershed projects on the river's tributaries, for a total of 78 dams. Many would be multiple use: for flood control, flow augmentation, and recreation. Also by 1980, says the plan, there should be 10 large new reservoirs.

The Connecticut River Watershed Council has responded to the Comprehensive Study with some concern, and with its own comprehensive view. Noting that the study claims to have simultaneously considered three objectives (National Efficiency, Regional Development and Environmental Quality), the Watershed Council questions whether the proper weight has been given to environmental quality, whether an agency proposing and constructing a project can fairly evaluate it, and whether four of the ten proposed impoundments aren't actually in violation of the plan's own criteria.

In its concern for the basin as

a whole, the Watershed Council proposes using land control as an alternative to large impoundments. There are no assurances in the plan, writes Ellsworth Grant, president of the Council, "that increased development in flood prone areas won't continue in the valley, thereby necessitating additional flood control projects at the expense of upstream valley lands." There are also, he says, no assurances given to lower valley communities "that land in the upper valley states will be developed according to soil and slope capabilities so that there will be minimum increase of water run-off into our upriver tributaries." Comment on these questions can be expected to increase when the plan is available to the public in December.

On one subject, many will agree —the plan suggests setting up a special Connecticut River Basin Program, with adequate staff, within the existing New England River Basins Commission. (The NERBC seeks to coordinate all projects undertaken by its eight federal agencies, six interstate agencies and seven states. Their recent report on priorities, however, by their own admission, is more of a "shopping list" than a tough analysis of what to do first, or how to divide limited funds.)

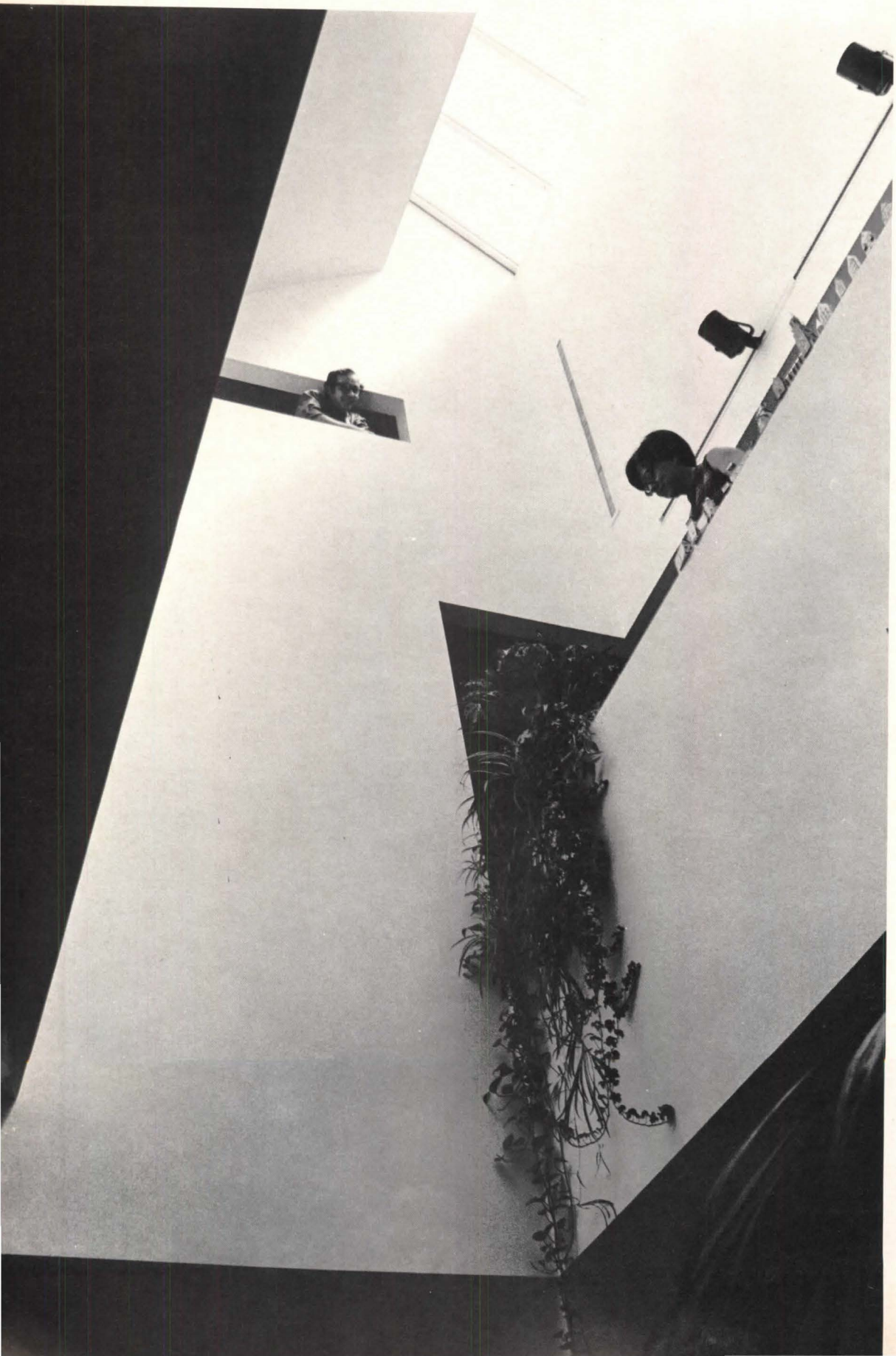
Christopher Percy, executive director of the Watershed Council, speaks strongly for this kind of "special program," able to deal with the most comprehensive problems on the most inclusive basis. Mentioning only one far-reaching proposal under consideration—diversion of Connecticut water to places as far away as New York City—Percy says, "citizen input is desperately important."

Comprehensive river basin planning has been urged for decades, and usually frustrated by narrow-minded jealousies at the agency level and unmitigated self-interest at the local level. A small but growing number of people at both levels may be ready to see this river as an entity, not only in its geography but also in its competing priorities.

—Ellen Perry Berkeley

PHOTOGRAPHS: Roy Berkeley, except: page 29, far right, page 32, top and bottom right, and page 35, Robert Perron; page 31, top, and page 34, bottom, Mario Marino; page 30, far left, Aerial Photos of New England Inc.; page 31, bottom, Central Vermont Public Service Corp.

A SURPRISING VICTORIAN



From the street, the Victorian townhouse owned by Architects Stanley and Laurie Maurer is a tasteful, though hardly unusual, renovation with three windows across each floor and an entrance without steps or stoop. It seems wholly appropriate to Brooklyn's Cobble Hill neighborhood.

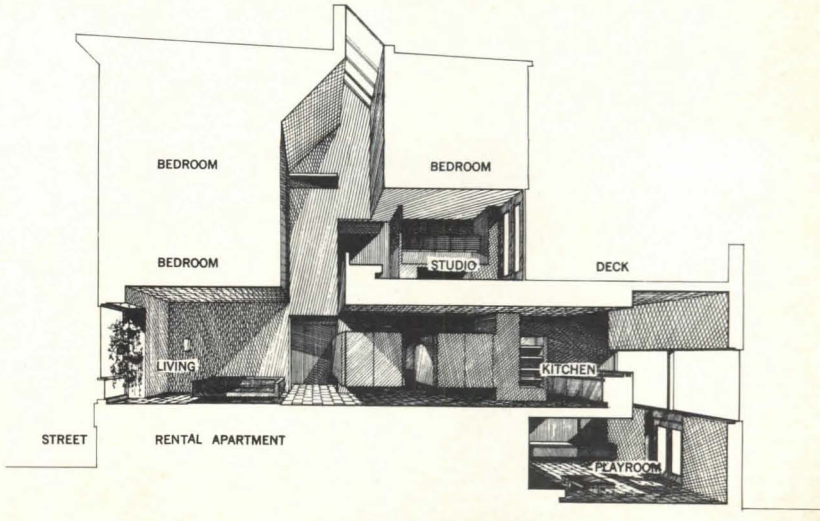
But the inside of the house is something entirely different—and decidedly not Victorian.

Built inside the condemned shell of a former brothel (with 24 bedrooms and 24 baths, no less), the existing interior is an unabashed celebration of light and space. The most remarkable feature is a skylight, placed in the middle of the roof, that brings sunlight down a well directly to the first floor living areas.

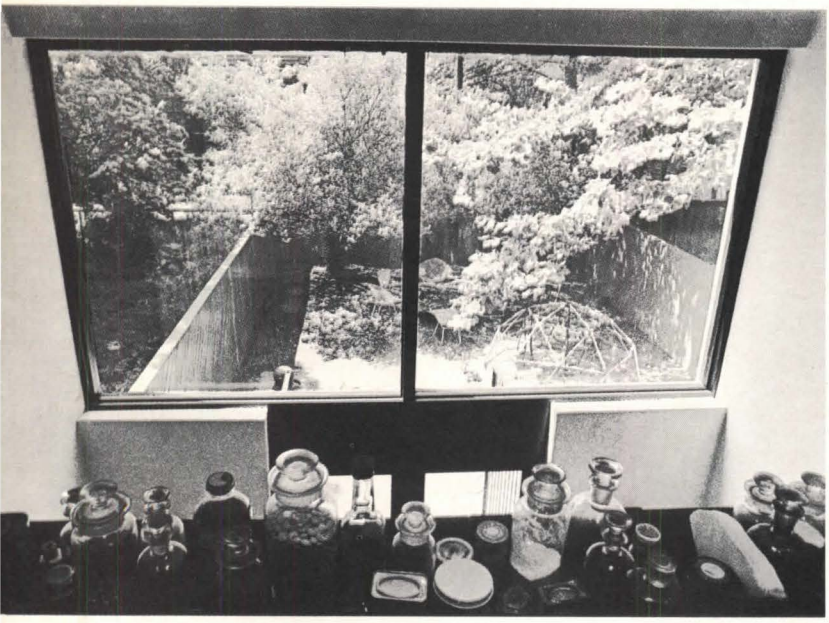
The plan is essentially a one-bedroom duplex, with bedrooms for the Maurers' children above, and a rental apartment (and a playroom) on the bottom floor. The dining, living and office spaces (right) are all open to the sunlight and to each other and wall cutouts provide token participation in the skylight well for the halls, staircases and top floor. The kitchen is built as a balcony over the playroom and these are the only rooms located away from the skylight well. But both have a full view of the sky and backyard patio instead.

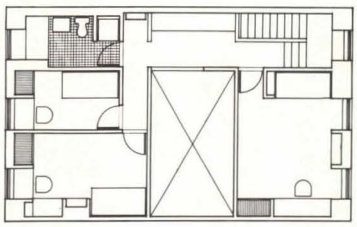
Architectural details were not lost to the grander scheme. The house displays myriad built-in nooks, corners and ledges for a constant interplay of light and form. A recess between two ducts, for example, is lined and shelved to create a built-in bookcase. Other details include piano hinges for the doors and flush pulls. Where the white walls meet the slate or carpeted floors, the materials are distinguished by a small ledge that replaces conventional molding.

Having lived in a townhouse and renovated 30 others, the Maurers knew only too well the small rooms where, as Laurie Maurer says, you have to turn on the light to get up in the morning. They wanted open space and country sunlight in the city and they have it.

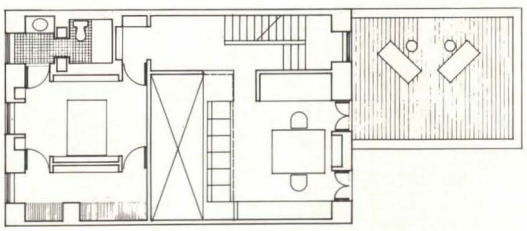


The living and dining areas, reached by an indoor stoop, are open to the skylight above and separated by planters. The ceiling is highest in the living room, making the dining area more intimate by comparison. The right rear window is in its original place, but the middle window has been replaced by an entry to a new kitchen and playroom. (The third window recess accommodates a powder-room sink beneath the stairs.)

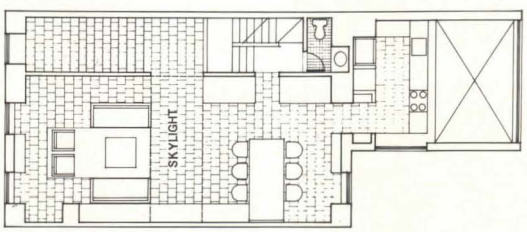




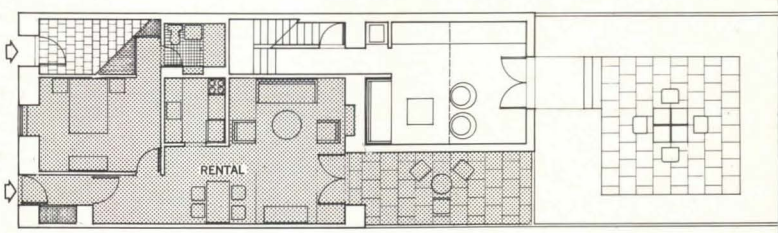
FOURTH FLOOR



THIRD FLOOR



SECOND FLOOR



GROUND FLOOR

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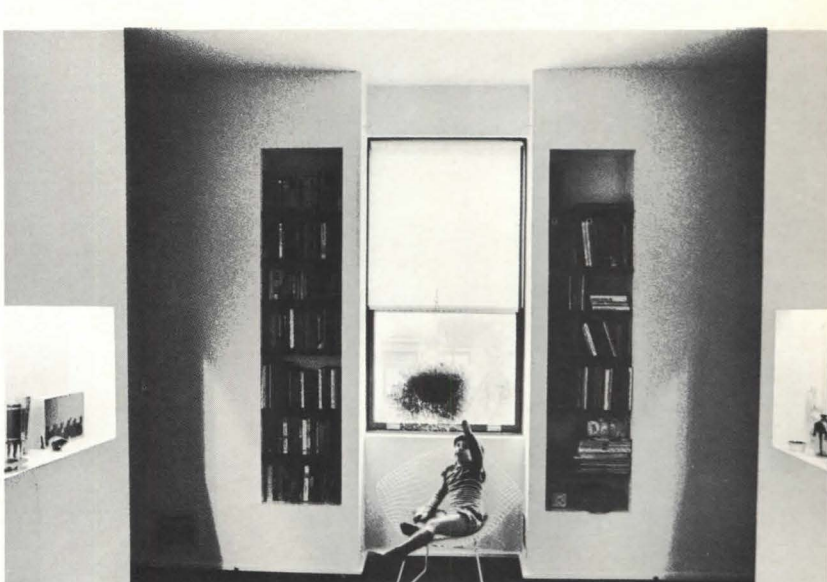
The kitchen and playroom enjoy a view of the outdoors and each other. On the second floor, the office opens out into the skylight as a balcony (left), with a built-in couch running along the waist-high wall. The office also has access to a roof patio and a full view of the main floor living areas. The master bedroom, across the skylight from the office, is enclosed, away from the sounds and views of the rest of the house and contains only a bed. The staircase down has a full view of the living area and entrance through a wall cutout at its foot.

FACTS AND FIGURES

Residence, Cobble Hill, Brooklyn, N.Y. Architects and owners: Stanley and Laurie Maurer. General contractor: Gulli Construction Co.

PHOTOGRAPHS: Tamas Breuer.



TECHNOLOGY

The infinitely expandable future of air structures

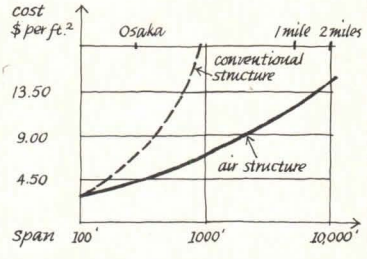
The U.S. pavilion at Expo 70, Osaka, Japan, is the subtlest and most surprising structure at the fair. It seems that visitors can walk right through the columns that support every square inch of its roof and never even notice.

The reason, of course, is that the columns are made of air. Though they quite properly do the job that columns were intended to do—carry the loads of the roof to the ground—they cannot be seen or felt.

Air structures are not new—either in concept or fact—but the Osaka version is quite unlike any other ever attempted (see Dec. '69 issue). It is the largest clear span, air-supported roof ever built, the lightest (1 psf) roof of any material with this span and the first roof with a superelliptical ring.

More important than the rightfully claimed firsts of this structure are the structural and planning concepts it makes possible.

The U.S. pavilion confirms the radical notion that the length and breadth of a roof enclosure can be increased almost indefinitely with only a small increase in the weight and cost per sq. ft. of its structural materials. The $2.6-million Osaka structure is 265 ft. wide and 465 ft. long, yet according to its engineer, David Geiger, of New York, the basic design could apply to a low-profile air structure of almost any shape with an average diameter of one mile or greater.



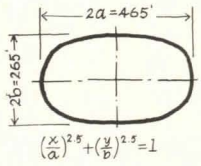
Earlier major structural innovations (such as the Galerie des Machines, the Eiffel Tower, Brooklyn Bridge, hyperbolic paraboloid and thin shell) have resulted in a highly visible and often startling change in physical form. This innovation is an exception. Like the sophisticated high-speed computer, its potential is not revealed by unusual physical form. It is a structural revolution barely visible to the professional and almost entirely invisible to the layman.

Its impact may nevertheless be extremely visible, for this structure makes such schemes as totally enclosed urban areas believable and feasible. Its architects, Davis, Brody & Associates, with designers Chermayeff, Geismar, de Harak & Associates, of New York, envision entire regions, states and even the lunar surface contained within low-profile air structures.

Concept and structure

The U.S. pavilion has five primary components. The roof is made of a translucent fiberglass *fabric*. The walls are formed by an earth *berm*, which supports a concrete *ring*. The ring balances the lateral loads of the *cables* that span the roof and is superelliptical in shape. A system of *blowers* maintains internal air pressure and so provides the air columns that support the roof.

The superelliptical shape of the pavilion represents a relatively new structural form. The super ellipse was formulated only 12 years ago and published for the first time in 1959. The Osaka pavilion is a super ellipse with an exponent of 2.5.



If the exponent were 2, the shape would be an ellipse. If it were to approach infinity, the shape would become rectangular.

The fabric

The 100,000-sq.-ft. roof of the pavilion is made of a translucent, closely woven fiberglass fabric that will withstand 700 lb. of stress per in. of width. Because it is translucent, it admits light to the pavilion interior by day and effects a luminous quality outdoors at night. The cost of the roof, including cables and ring, was $450,000, or $4.50 per sq. ft.

Fiberglass has long been recog-

nized for its great strength, but it has not been popular as a structural material because it is brittle and breaks easily. It works for the roof, however, because the designers used a special small-diameter yarn fiber that compares to conventional yarns as a sapling to an aging oak.

The National Aeronautics and Space Administration (NASA) sponsored the yarn's development after the 1967 deaths of three astronauts by fire demonstrated the need for a strong, flexible, fireproof material for spacesuits. The resulting fiberglass yarn has a melting point of 1,000 F.

The fiberglass fabric had to be coated to reduce porosity and keep air in, rain out. Also, fiberglass does not lend itself to sewing, so the coating was necessary as a joining system for the pieces of fabric (which were manufactured in the U.S., but assembled in Japan).

Vinyl was the coating selected for both sides of the fabric. It had to be thick enough to transfer the stresses of the roof across the fabric seams, so it and the fiberglass fabric are .03 in. thick. The seams were bonded by heat and pressure.

Coatings are a problem that future designers will have to face anew. Generally, a coating reduces the transparency of a fabric in proportion to its thickness. The Osaka designers wanted a coating that would not be opaque, yet offer longevity and high strength. Vinyl compromised the long life requirement.

The pavilion may need a new roof membrane within ten years, which could cost $300,000. The problem is that the vinyl deteriorates under ultraviolet light, so will last only seven to ten years. (Neoprene boasts a 20-year life, but is opaque.)

There are several possible solutions to the longevity problem. One method is to have the fabric woven wide enough to span between cables, perhaps 12 to 20 ft., and then joined to them by mechanical clamps. The coating would then be applied only to reduce porosity, not to transfer stress. Certain plastic films that will not deteriorate under ultraviolet light and can be bonded to fiberglass could then be used as a coating. This would allow a continuous maintenance program whereby sections of coating could be removed, perhaps by solvent, and replaced.

Another scheme, proposed for the roof of a chilled water plant, is a double skin system. The bottom layer, which would have cables attached, could maintain internal pressure while the top layer was repaired or replaced. The reverse is also true—the top layer could protect the structure while men worked on the bottom layer.

New roof fabrics and coatings will soon be available to complement such maintenance plans. For example, plastics are being improved so rapidly that by the time the Osaka roof has to be replaced, the new membrane may very likely be permanent.

The berm

The sides of the pavilion are a berm of earth scooped from inside the pavilion and other soil added to improve compaction. The sloped sides average about 20 ft. in height and are covered with paving tiles outside and with reflective plastic sheeting on the interior to mirror the roof and sunlight.

A berm, however, is not necessary in a low-profile, air-inflated roof. It nevertheless does its structural job very efficiently and economically. It supports the concrete ring and deflects wind loads upward so they create suction on the roof, thereby serving an aerodynamic function that a vertical wall, for example, could not.

The U.S. pavilion, in fact, is the only kind of large space structure that can be built on poor soil conditions, including fill, without pile or caisson support. It required only 500 psf soil resistance, while six to eight tons is normal. Even the 500 psf load resistance was required only before the roof was inflated. Afterward, the columns of air literally lift some of the weight of the concrete ring from the ground.

Davis, Brody already envisions a hollow, artificial berm system that allows cars to park within it. They and Engineer David Geiger also look to the time when our knowledge of thermal buoyancy (the principle that hot air rises with sufficient force to carry a load) will permit the walls to be removed altogether.

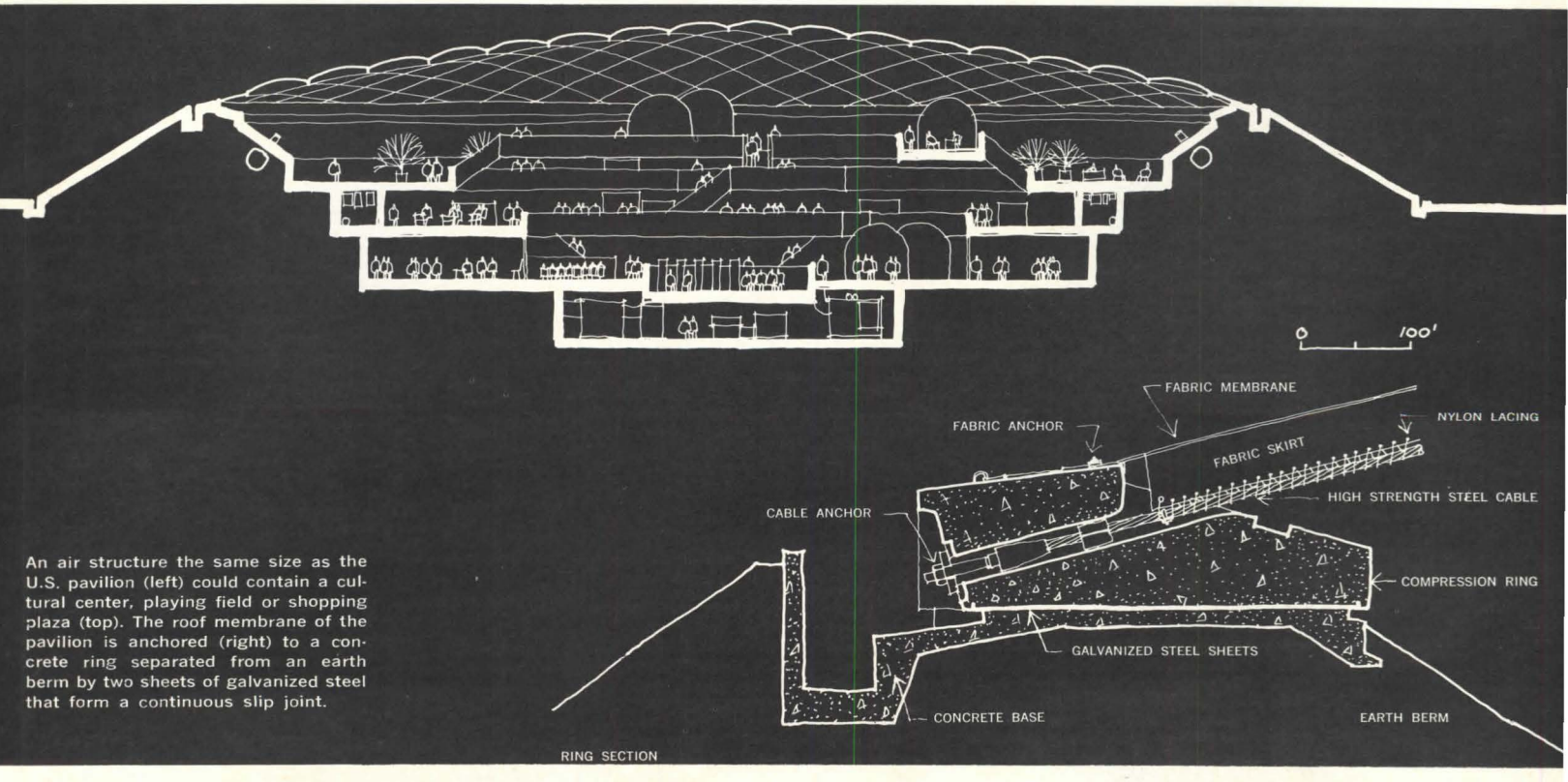
The ring

A concrete ring, 1,000 ft. long, 4 ft. high and 11.5 ft. wide, rests on top of the earth berm, but is not fastened to it. The ring will resist cable forces without bending under uniform loading of the roof. Internal pressure and the dead load of the roof are examples of such uniform loading.

Wind loading, however, comes from a single direction and is therefore assymetrical, so reinforcement against bending was necessary for this load case.

A continuous slip joint, lined with two sheets of galvanized steel (one bound to the ring, the other to the slab on the berm) separates the ring from the berm. When loads cause the ring to move, the steel sheets reduce friction enough so that the berm will not fail. Yet they provide enough friction to prevent the ring from sliding off the berm under seismic loading.

Such a slip joint may not be necessary in future applications, but it was for the unprecedented Osaka effort. David Geiger explains: "The prediction of the



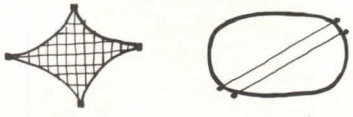
An air structure the same size as the U.S. pavilion (left) could contain a cultural center, playing field or shopping plaza (top). The roof membrane of the pavilion is anchored (right) to a concrete ring separated from an earth berm by two sheets of galvanized steel that form a continuous slip joint.

dynamic behavior of large, lightweight roofs is at the edge of man's scientific knowledge. This roof is so light and has such a large span that the damping mechanism was necessary as a safeguard. But tests on this structure allow us to predict dynamic behavior more accurately for future versions."

Wind tests conducted on a 1/100 dynamic model of the pavilion indicate that under a uniform flow at the normal internal pressure of .03 psi, there was no flutter under 200 mph winds. Under conditions of extreme wind turbulence, there was a slight flutter at 131 mph, but this could be controlled by increasing the air pressure inside. Thus the dynamic response of the structure is easily regulated by varying internal pressure.

Cable configuration

The ring is designed to take the place of concrete abutments and perimeter cables, such as Frei Otto used on the German pavilion at Expo 67 (see April '67



issue). Vertical loads carried over a large span will cause cable tensions, which increase with the shallowness of the roof profile. An abutment or perimeter cable system will resist such force through their mass, friction with the soil, or rock anchorage. (There is, however, a certain lack of economy in burying too much of a structure.)

A ring structure, on the other hand, balances those cable anchorage forces within a closed system. Consequently, the earth bears only vertical loads. The choice of a super ellipse for the Osaka pavilion was an architectural decision, based in part on the architects' desire to fully utilize the rectangular site.

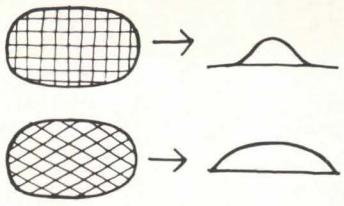
Architects, however, need not think of ring shapes strictly in terms of circles, ovals, ellipses or even super ellipses. While the choice cannot be arbitrary, it can be quite variable.

According to David Geiger, it is governed by precisely determined mathematical relationships between the ring configuration, cable directions, and roof loading and shape.

In general, where the ring is flat, little roof load can be transferred to it. Where the ring is more curved, it can carry more load.

The pavilion cables are common bridge strand, like that used in suspension bridges, in three sizes: from 1½ in. to 2¼ in. in diameter. They are set on 20-ft. centers in lengths ranging up to the structure's long span of 465 ft. (For future and larger structures, bridge strand can be obtained with a 4-in. diameter. Decreasing the cable spacing also will increase load resistance.)

The Osaka cable configuration was tried in several variations



before the design team decided to run the cables diagonally to the major axis of the super ellipse. This decision saved materials, improved drainage and also provided a better aerodynamic cross-section than alternative configurations, such as radial cables with a central tension ring and cables on a rectalinear grid, like a tennis racquet. The diagonal pattern also required one third less steel.

The tension ring system was rejected because it would have involved twice as many cable fittings, plus the cost of the ring itself. It would have involved using the fabric inefficiently since it would have to span wedge-shaped distances between the cables. The weight of the tension ring could also have caused drainage problems by dimpling the center of the roof.

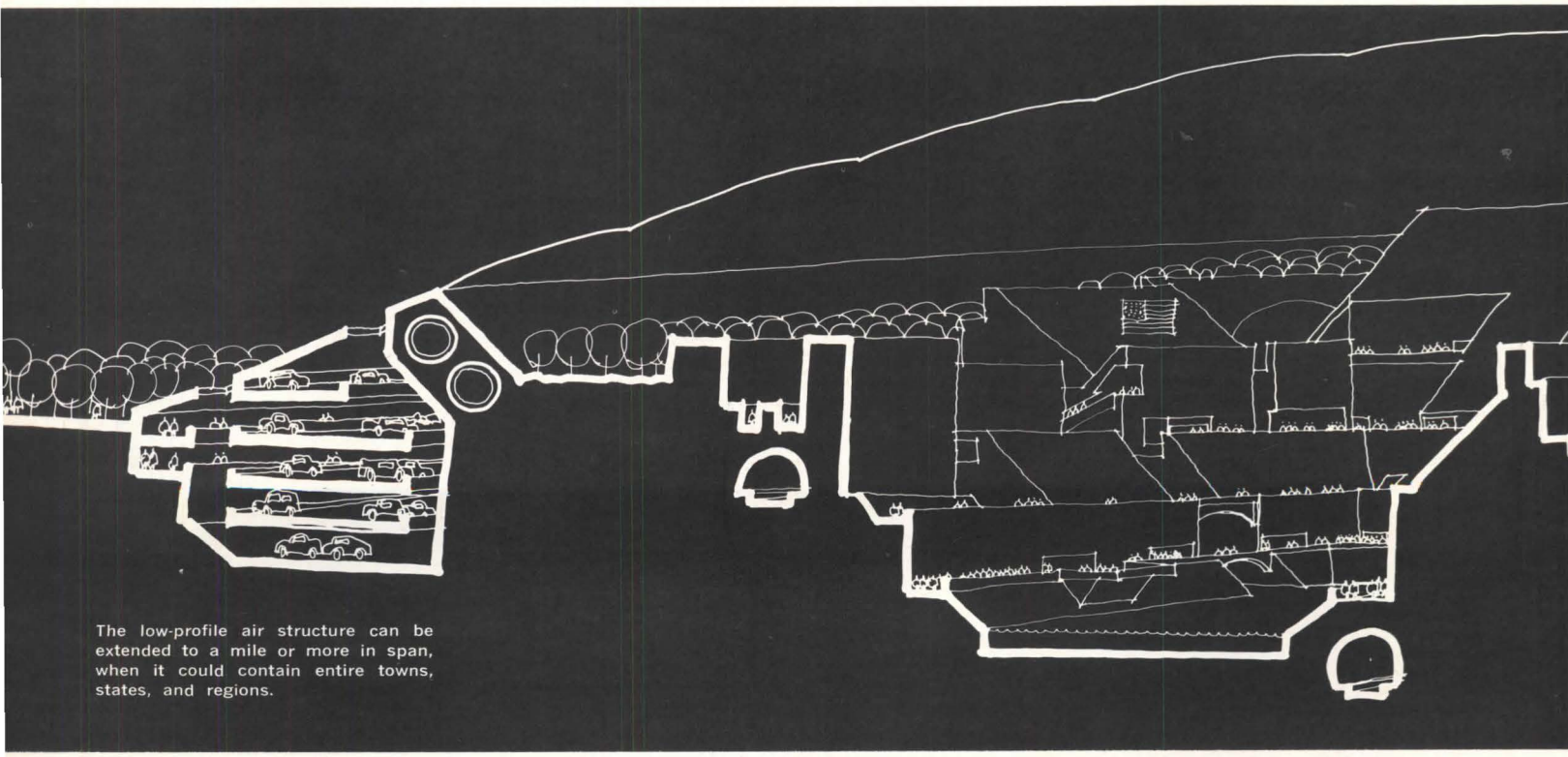
The cable ends are fixed into sockets with zinc alloy filler and anchored to the concrete ring. Their exact placement and points of intersection were predetermined by a computer, then marked on the individual cables. Details were developed at the ring and between the fabric membrane and the cables to assure a uniform load on the fabric and prevent concentrations of stress that could cause ripping. The skirts between the cables and fabric membrane were attached by heat seaming to the fabric, then laced to the cables.

When the roof was inflated, after all of the cable connections were made on site, it behaved almost exactly as the engineers' calculations had indicated it would. There was no need to make any adjustments in either the cable tensions or intersection points after inflation.

Air pressure system

The difference between the interior and exterior pressure of the pavilion is .03 psi, or 1/500th of an atmosphere. This differential is only equivalent to that between the first and sixth floor of a building. If the span of the structure were increased, this pressure might have to increase slightly, perhaps to .06 psi, but this too would be barely noticeable.

The U.S. pavilion has six 5.5-kw blowers, each with an 8,000 cfm capacity, to keep the roof inflated. Safeguards include an emergency generator system. If the roof did collapse, the steel frame of the exhibits would keep the roof above people's heads;



The low-profile air structure can be extended to a mile or more in span, when it could contain entire towns, states, and regions.

the cables would also prevent complete collapse.

Two of these blowers are sufficient to hold the roof up and compensate for the pavilion's vent system for air exchange. Entry and exit is through revolving doors, which provide a kind of air lock (as would standard doors at either end of corridors).

If all six of the blowers were operating, they would compensate for a 30-ft.-square opening in the middle of the roof. If a larger hole were desired, more blowers could easily handle the job. (Such open spaces in the roof have particular interest because nothing—not even rain or snow—can fall through. The outblast is too strong—often 20 to 30 mph.)

The quantity of air required to support the roof is therefore independent of volume and calculated only to compensate for air leakage. Given normal air leakage and openings, such as vents and doors, the operating costs of a blower system are comparable to air conditioning costs.

Problem areas

When the Expo 70 design team began working on the pavilion, they soon discovered that none of the basic assumptions that guide designers in conventional building projects would apply to this one. No one had ever built a cable net system like this one before.

In every case, the building's performance has confirmed their basic theories. Nevertheless, there remains a general prejudice against using air structures as permanent buildings and the doubts generally are concerned with problems of longevity, vandalism and snow loading.

The question of longevity primarily concerns the roof fabric and coating as discussed earlier. Vandalism, however, is a potential problem as people obviously fear that someone could slit the roof and enter or collapse it. One way of solving this would be to weave loose wire strands into the roof fabric. Unstressed wires are difficult to cut—they will bend around scissors, for example. The same wires could help prevent accidental rips and be heated to melt snow. Further, a slit would have to be tremendous to collapse the roof since tension tends to pull it closed and blowers can compensate for large openings.

Wires are not the only solution to snow loading. The normal rise of hot air in the pavilion is probably enough to melt all but very heavy snowfalls and more heaters could be added. A roof held up by thermal buoyancy would obviously already have a high concentration of heat just under the roof. Snow could even be blown away through holes in the roof.

The low profile of the structure is a good solution to some other problems. Economically, it saves on vertical transportation systems, wind loading and foundation costs. In Japan, where structures are commonly designed to resist 150-mph winds, the low profile is important in removing the mass of the structure from the wind. In the case of Osaka, the low silhouette even prompted officials to relax the 150 mph requirement and specify only 125-mph wind resistance. A cable roof of any kind can have a low profile, but an air-supported version has a better aerodynamic cross-section.

The only limit to the low profile is that a minimum curvature is necessary for drainage. The Osaka building has a 23-ft.-high curve over a 265-ft. short span and it would be difficult to reduce this and maintain proper drainage.

Planning frontiers

The city planning implications of an almost infinite structural enclosure have been talked about by Buckminster Fuller and others for years. But, unlike Fuller's domes, the Osaka structure uses air column support and it alone can escape the physical law that as a span increases linearly, strength must increase geometrically. In this sense, the Osaka structure, for gravity loads, is really a no-span phenomenon—each square inch of the roof has air column support, which can be extended almost infinitely. The pavilion, therefore, brings us close to the human dream of the city-scale enclosed environment for the first time.

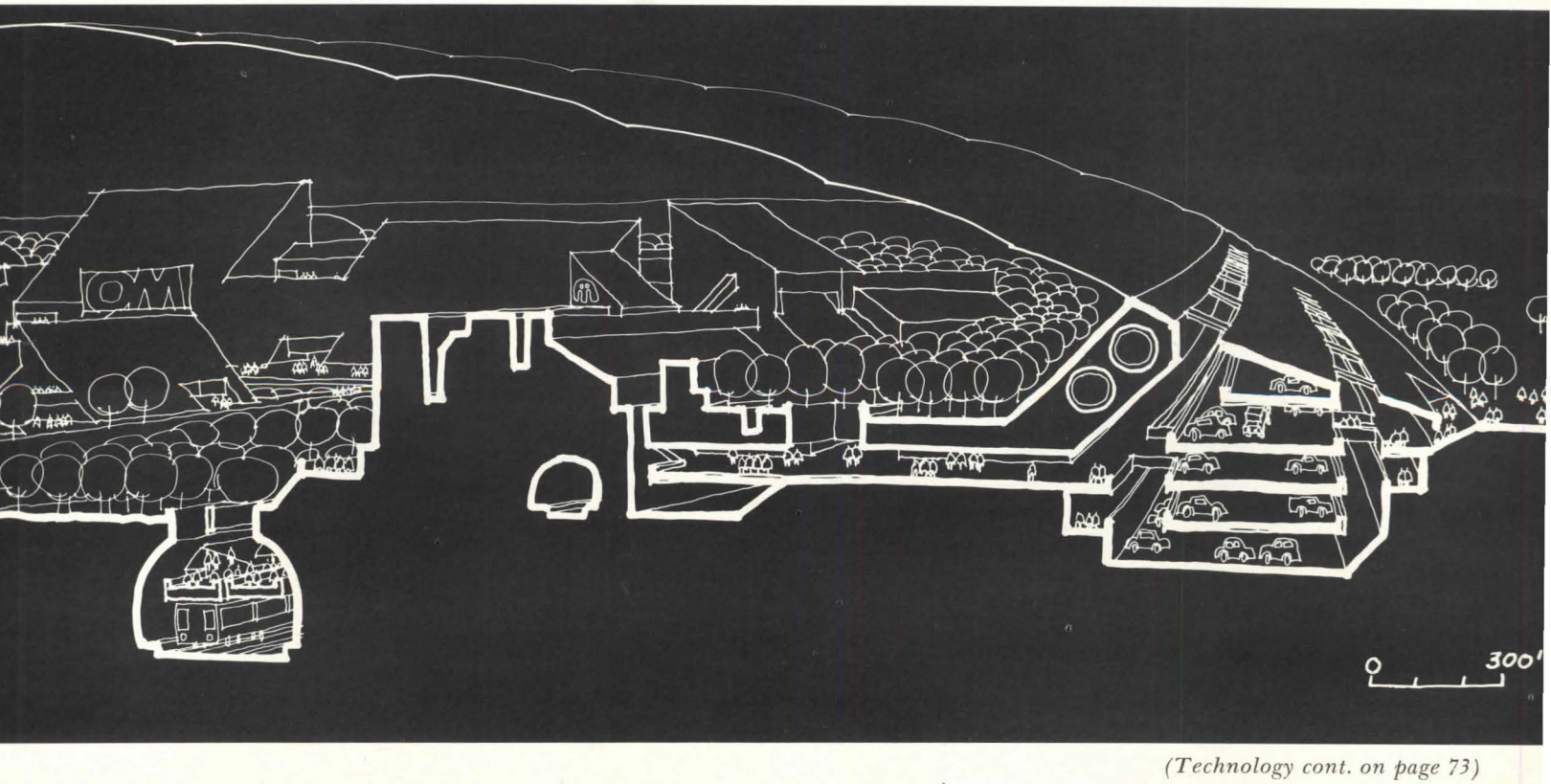
Air inflated structures are already used as greenhouses, sports arenas, warehouses, tennis court and swimming pool covers, exhibit areas, silos and to protect construction sites. Air structures may soon be used for factories, schools, air terminals, theaters and hospitals.

Davis, Brody sees the air-inflated structure as a translucent lid that could enclose an entire town or business center or cultural center. And the dreams go much further than that. A mile square building could even enclose a 40-story office skyscraper, though the architects prefer a scheme of placing highrise buildings outside the perimeter of a mammoth terrarium. The structure makes this possible because it creates an outdoor daylight effect inside, yet can boast indoor climate control.

The air structure need not be constructed as a new building, but may be installed on existing ones, such as stadiums, provided they can be pressurized.

Davis, Brody notes that the open, relaxed, sheltered environments created by a climate-controlling, light-transmitting dome might encourage the virtues of small lively towns, which they feel have so conspicuously ceased to exist. Not only towns, but civilizations.

—MARGUERITE VILLECCO



(Technology cont. on page 73)

PUEBLOS OF THE FOUR CORNERS

A GALLERY OF PHOTOGRAPHS BY WILLIAM R. CURRENT

Kayenta, Mesa Verde, Chaco, Canyon de Chelly
names, but what do they tell of the Indians
who came and clung to these cliffs before history began
Anasazi, communal dwellers
who created these pueblos, talus houses, kivas
from stone and from wood—
conifer, juniper, pinon and pine—
nine hundred years have past and Betatakin stands
no less scarred than the towering eroding canyon
protecting it still against history and our time

Betatakin Pueblo, Kayenta, Northern Arizona

Anasazi of Four Corners—
Utah, Colorado, Arizona, New Mexico—
makers of baskets, of pottery and cloth
a culture without metal
their greatest pueblo is Mesa Verde
cliff palace, citadel of many walls
two hundred rooms, towers, chambers—
for grains and corn, for yucca and pinyon—
and 23 kivas for dances to the rains
that did not come

Cliff Palace, Mesa Verde, Southern Colorado

Monumental, yet dwarfed
by the broad wind-whipped walls of Chelly
white house
a legacy of the Anasazi
who fled from the drought
from a nature more powerful than they—
the walls remain
staccato counterpoint to the rock
and their silence echoes
with a wild bird's cry—BO THORNE NILES

White House, Canyon De Chelly, Northern Arizona

THE CITY AS A THREATENED ECOSYSTEM

BY STEPHEN F. WILLIAMS

Is environmentalism a cop-out? Is ecology a middle-class luxury? Do such concerns imply a diversion of resources from more vital causes?

Such, quite clearly, is the fear of many who are principally concerned with the core cities, the welfare of their residents, and problems of race and poverty. At the same time, many environmentalists seem to speak as if large or dense concentrations of humans are necessarily destructive of the environment. The whole new-towns idea, so popular with the Vice President and the Secretary of Commerce, has a ring of "let's get back to small-town, rural America."

Further, environmentalists who speak enthusiastically of "zero economic growth" often seem to imply that they welcome a freezing of the economic status quo. For core city residents, who get relatively few of the benefits of the present system of environmental plunder, and whose welfare is not mentioned by the zero-growth advocates, that must appear a dismal goal indeed.

To put the dilemma slightly differently: as students of the environment, we know that continued expansion of the present economy means ecological disaster. As observers of the economic scene, we know that stabilization of the present economy would condemn millions to perpetual poverty, through unemployment and underemployment. Is there no way out?

Only economic and social innovation can resolve the dilemma. We need innovations so that raw materials are recycled instead of being wasted; we need innovations that will reduce our present rate of energy consumption; we need new residential patterns and life styles that will, without ravaging the land, provide people with shelter and the possibility of making a community life for themselves.

We need, in short, evolutionary economic growth, not elephantiasis. It is as essential to urban progress as it is to preservation of the environment.

The place to look for such evolutionary growth is in the cities. The forces destroying the environment so energetically in the past 20 years are precisely the forces that have interfered with this function of the cities; and, far from taking a stance antagonistic to cities, the environment movement would do well to put cities on its list of threatened ecosystems, for study of how they work and how they may be restored to functioning condition.

Cities must be viewed as a complex web of living organisms. Once we adopt an approach toward cities similar to the ecological approach toward the natural environment, we should find critical insights into the health, the evolution, the growth and the decay of cities. As the process of evolution through natural selection is at the heart of our understanding of organic nature, it may be useful to compare a number of Darwin's observations in *The Origin of Species* with related problems of evolution in cities.

Darwin's natural selection

In terms of human evolution, the city bears to the small town the same relationship that, in the evolution of species, continents bear to islands. In speaking of that relationship, Darwin said:

... Throughout a great and open area, not only will there be a better chance of favourable variations arising from the large number of individuals of the same species there supported, but the conditions of life are infinitely complex from the large number of already existing species; and if some of these many species become modified and improved, others will have to be improved in a corresponding degree or they will be exterminated. Each new form, also, as soon as it has been much improved, will be able to spread over the open and continuous area, and will thus come into competition with many others. Hence more new places will be formed, and the competition to fill them will be more severe, on a large [rather] than on a small and isolated area.

How do cities offer special opportunities for "favorable variations" to occur and to flourish? What can urban complexity and diversity do for human responsiveness that continental complexity and diversity do for evolution in nature?

The great diversity of a continental ecosystem offers a multitude of habitats in which genetic variations may lodge. Its range of climates, altitudes, sizes and types of bodies of water, and, perhaps most important, other flora and

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fauna, offers the widest possible range of niches into which a new form may fit. The city's role in human economic development is similar. But instead of the varied sorts of nutrition and shelter that a continental ecosystem provides a new plant or animal, the city offers variety in raw materials, components and labor, and in markets.

Specialization and skills

A new, small enterprise in a city is necessarily dependent upon diverse suppliers, each of which may be highly specialized. It may require a mix of varied labor skills. In the large city the entrepreneur can find and deal with the necessary suppliers face to face—and at tolerable cost. He can hire the necessary labor on the spot, without having to induce prospective employees to move as a prerequisite to employment.

The new enterprise's need for a market is also more readily met in a large city. For those manufacturing consumer products, there is simply a larger quantity of accessible people—and in a city, where a larger proportion of people are attuned to novelty, more of them will try a new product.

For innovators trying to sell components or services to other enterprises, the city alone provides a large and diverse potential market. And again, the city-dwelling enterprises will be far more likely to be flexible—to be able to accept a new supplier—than their non-urban counterparts. Because of the difficulties of starting a new service or industry outside a large city, a non-urban enterprise will, more frequently than is the case for urban businesses, be part of a nationwide business that owns or controls its own suppliers. As such, the non-urban enterprise cannot shift to a new supplier, outside its corporate structure, without atrophying one of its own limbs. It will therefore be a most unpromising market for the innovative, independent, would-be supplier.

Capacity to survive failures

Evolution is built on failures. For every genetic variation that pans out, uncounted numbers fail, leaving little or no trace in the geologic record. And even when a variation succeeds for a time, the process of evolution requires, when a superior variant develops, that its predecessors recede. Only thus can the Age of Mammals succeed the Age of Reptiles. Not merely failure, but myriads of failures, and failure on a grand scale, are at the heart of the evolutionary process.

What sort of ecosystem can best handle the process of failure? At one end of the spectrum is the one-crop system. Along comes a new pest, and the single crop is wiped out, as are the species that have depended upon it. The region may revert to desert. At the other end is the richly varied system, where the extinction of one species leaves no others wholly without nutrition or shelter. The complex system absorbs the failure and moves on.

The same is quite obviously true of the capacity of human settlements to respond to economic development. The textile town of New England, for example, when confronted with competition from southern textiles, goes into the sad, familiar cycle of decline: rising unemployment, falling tax base, threadbare municipal services, emigration of the young and vigorous. And the textile town of the South will ultimately face the same fate.

Contrast the condition of a large, diversified city, when abandoned by the textile industry. Workers are needed for the struggling infant enterprises that have found the city a healthy place for innovation; investment opportunities abound. The shock requires a brief adjustment, but the city continues to prosper.

In human economic affairs, the cycle of decline of course provokes political reactions. While Los Angeles is absorbing the decline of its aerospace industry, one-crop Seattle could not readily survive the decline of Boeing. And so the politicians rush in with a remedy—the supersonic transport [SST], to provide substitute employment for the workers and capital otherwise left unused. A completely uncompetitive product, a born failure, is thus foisted upon the public at the taxpayers' expense. Seattle may be saved—temporarily—from the perils of its one-crop system, but only at the cost of appalling environmental risks. Instead of creating jobs by the spontaneous development of responses to genuine human problems, the one-crop system preserves them by deleterious political makeshifts.

A core ingredient of evolution is the occasional cross-breeding of varieties within a species. Darwin collected

...so large a body of facts, showing, in accordance with the almost universal belief of breeders, that with animals and plants a cross between different varieties, or between individuals of the same variety but of another strain, gives vigor and fertility to the offspring; and on the other hand, that close *interbreeding diminishes vigor and fertility; that these facts alone incline me to believe that it is a general law of nature (utterly ignorant though we be of the meaning of the law) that no organic being self-fertilises itself for an eternity of generations; but that a cross with another individual is occasionally—perhaps at very long intervals—indispensable.*

The process of hybridism has now been professionalized in laboratories that systematically cross-breed to develop plants specially suited to human needs.

For comparable, though not identical, reasons, human society tends to evolve more responsively in a vital city than in a small town. In a vital city, disparate elements rub shoulders. The cross-breeding that Darwin thought valuable for the evolution of species can take place—whether in form of ideas (economic, scientific, social, cultural, political) or the more earthy sort with which Darwin was dealing.

The city in trouble

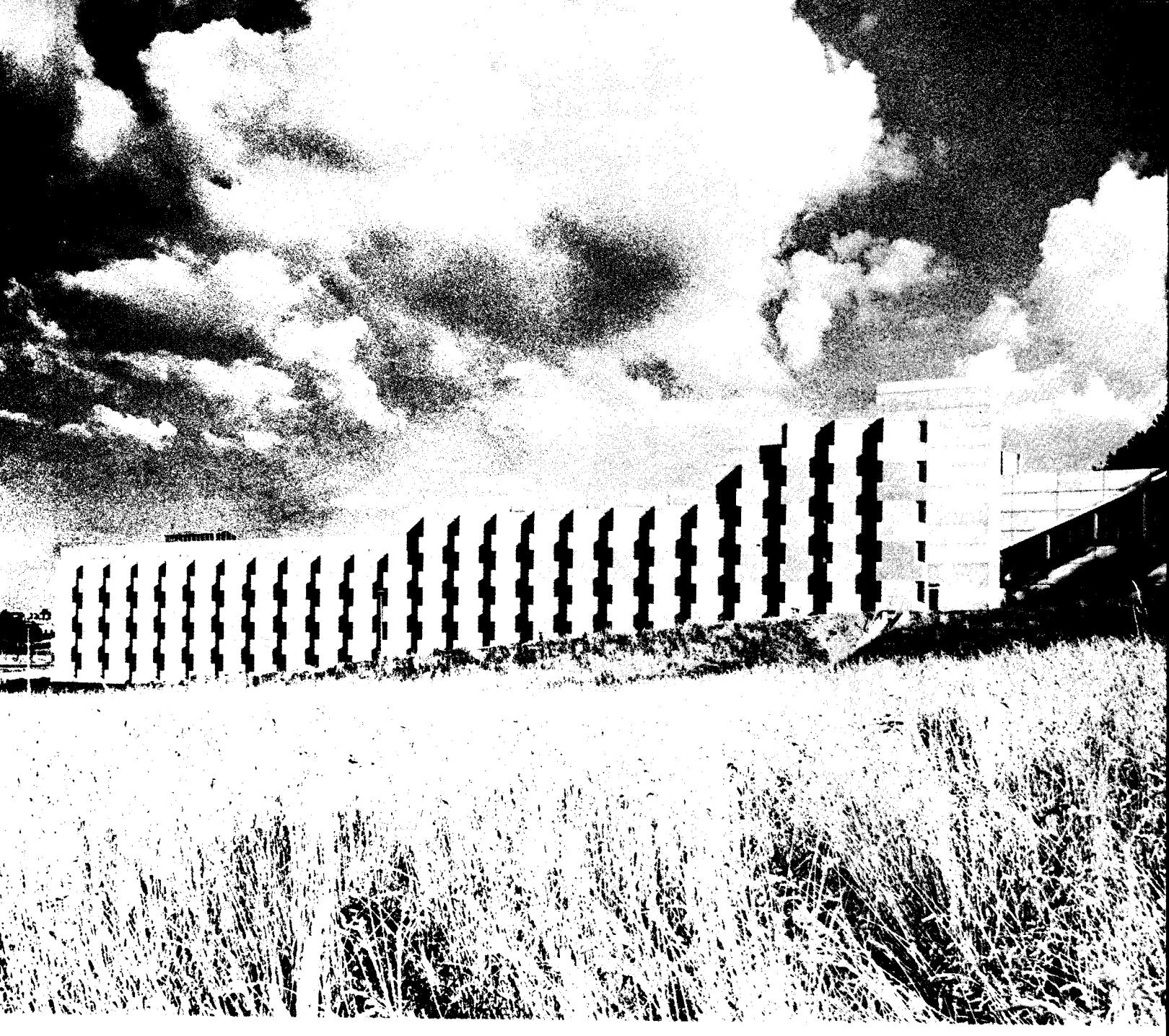
If cities are inherently incubators of new responses to human needs, why are they in such trouble? In the first place, the trouble is in some senses exaggerated. Such progress as blacks have made in this century, for instance, has occurred almost exclusively in cities; it is when statistics on black income, education, etc., in the rural South, are added, that disparities with whites become enormous. In fact, the cities, to which not only blacks but millions of rural whites have migrated, have performed a prodigious task: they have, by continual economic development, provided jobs for millions of immigrants without displacing indigenous workers.

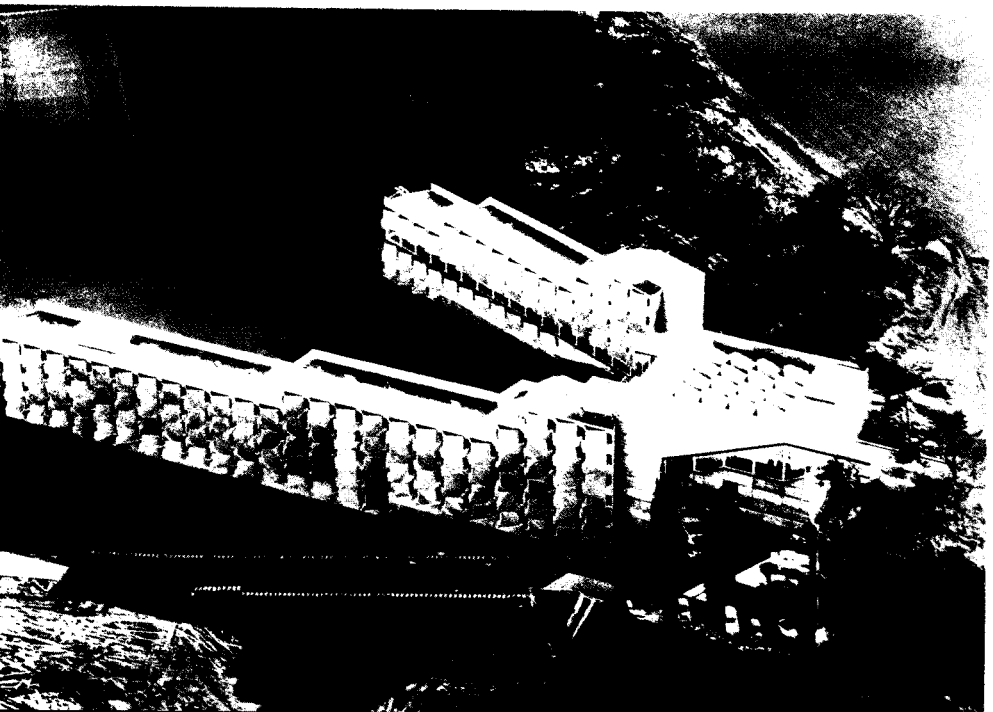
In the second place, the functioning of cities has been interfered with as inanely, as ruthlessly, and with as devastating effect as has the functioning of the natural environment. Government policy toward cities since 1949 has tended to wipe out areas with a large proportion of old buildings—the only buildings that marginal new enterprises can possibly afford. Government has swept, like Sherman's march to the sea, through areas where small-scale individual initiative was actively shaping up housing—the classic example being Boston's West End. The same government policy has replaced these regions of potential development with massive monolithic structures of various types: housing projects that ghettoize the poor, and, in most cases, the blacks (see *Gautreaux* v. *Chicago Housing Authority,* 296 F. Supp. 907 (N.D. Ill. 1969), for a typical horror story); urban renewal projects that subsidize construction by large, established enterprises instead of new and marginal ones of the sort that were razed to provide the land (such as one in Denver, where dozens of old buildings have been razed by urban renewal, so that the land could be sold at a massive discount to Prudential Life Insurance Co., a typical urban renewal beneficiary); and massive highway systems that undercut the only form of transportation—public—that the old, the young, the poor or the handicapped can afford, and that create impenetrable barriers to the kind of interaction of diverse forms that is absolutely essential to cities.

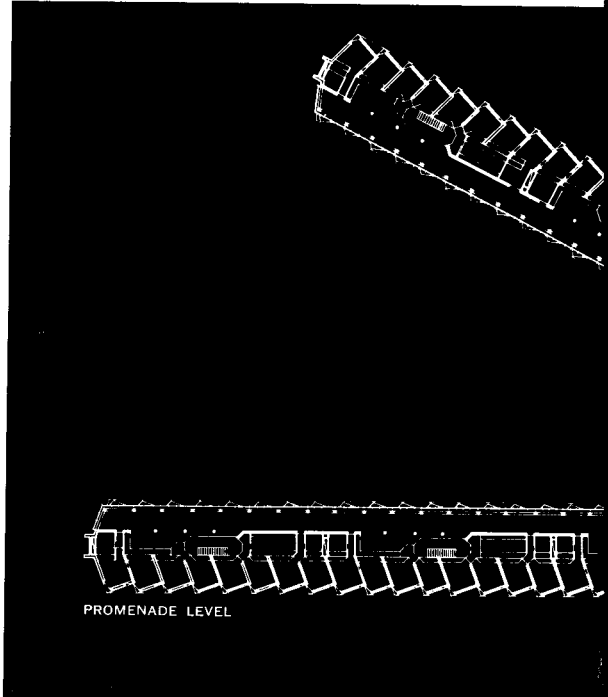
Thus the federal government has, since 1949, wiped out more housing than it built—and, of course, what it built was ghettoized. I have never seen comprehensive figures for the new business enterprises destroyed by the government since 1949, but since the government invariably resells urban renewal land to established enterprises, it is clear that precisely those businesses—marginal, incipient—that are best nurtured by a city have suffered badly.

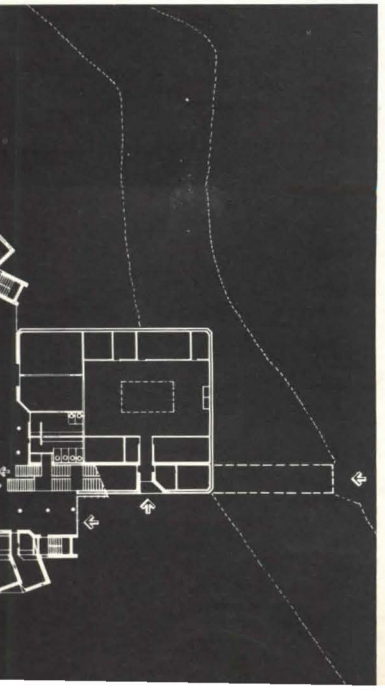
One must not blame the bureaucrats for their persistent sponsorship of Establishment businesses. It is in the nature of things for government to back the obvious. The bureaucrat, when doling out the taxpayers' funds, cannot be expected to hand it over to struggling innovative businesses. The overwhelming majority of them will fail—that is the price of evolutionary success—and no bureaucrat will want those failures on his record. Indeed, the places where new enterprises are most likely to be hatching are the very ones that will catch his relentless, ever-tidying eye as the ideal spot for his next intervention. "With such

(Continued on page 71)






PROMENADE LEVEL

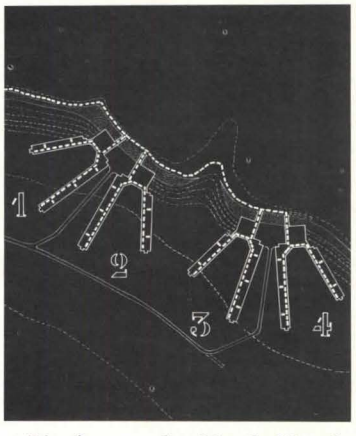


Views at left show the first of four projected residential groups—the only one built to date. The fingers contain the dormitory rooms, and the central block that connects them contains dining room, common room, kitchen, and other, non-repetitive spaces. The fingers, with their repetitive plans, are precast concrete; the central block was cast in place.

STUDENT DORMS ON A SCOTTISH COAST

THE ARCHITECT, JAMES STIRLING, WRITES:

"St. Andrews University in Scotland decided several years ago to greatly increase its student population; to accommodate these students they required four separate new residences, each for approximately 250 students of both sexes. It was hoped to start a new building every year, and thought essential to plan each residence as an independent building to allow for halt or pause in the construction sequence. To date only the first of the four has been built.



"A site on the North Haugh, about half a mile of the town [of St. Andrews], was chosen and the buildings were positioned along the edge of a ridge at the top of an escarpment. The view across the Scottish mountains and the North Sea is spectacular, and all student rooms in the residence are focused towards this view.

"The main approach from the town is by a footpath/bicycle track running along the top of the ridge. Entry into each of the halls is down an enclosed stair.

"This stair [with a rail separating the two-way traffic] has wide landings from which entry is made at different levels to the special rooms in the central block. The staircase terminates at a promenade level coinciding with a secondary entrance from the service road. The promenade gallery runs around the length of both wings; from this gallery are five internal staircases up or down to the student study/bedrooms. As the promenade level is midway up the building, there is no necessity for elevators. Besides being the main circulation route, the gallery is also the major socializing element. Integral to the gallery and adjacent to the stairs are "lay-bys" with fixed seating, small tables and stools. Within the internal stairs the level of the promenade gallery is identified by circular see-through windows indicating where to get on and off the circulation system.

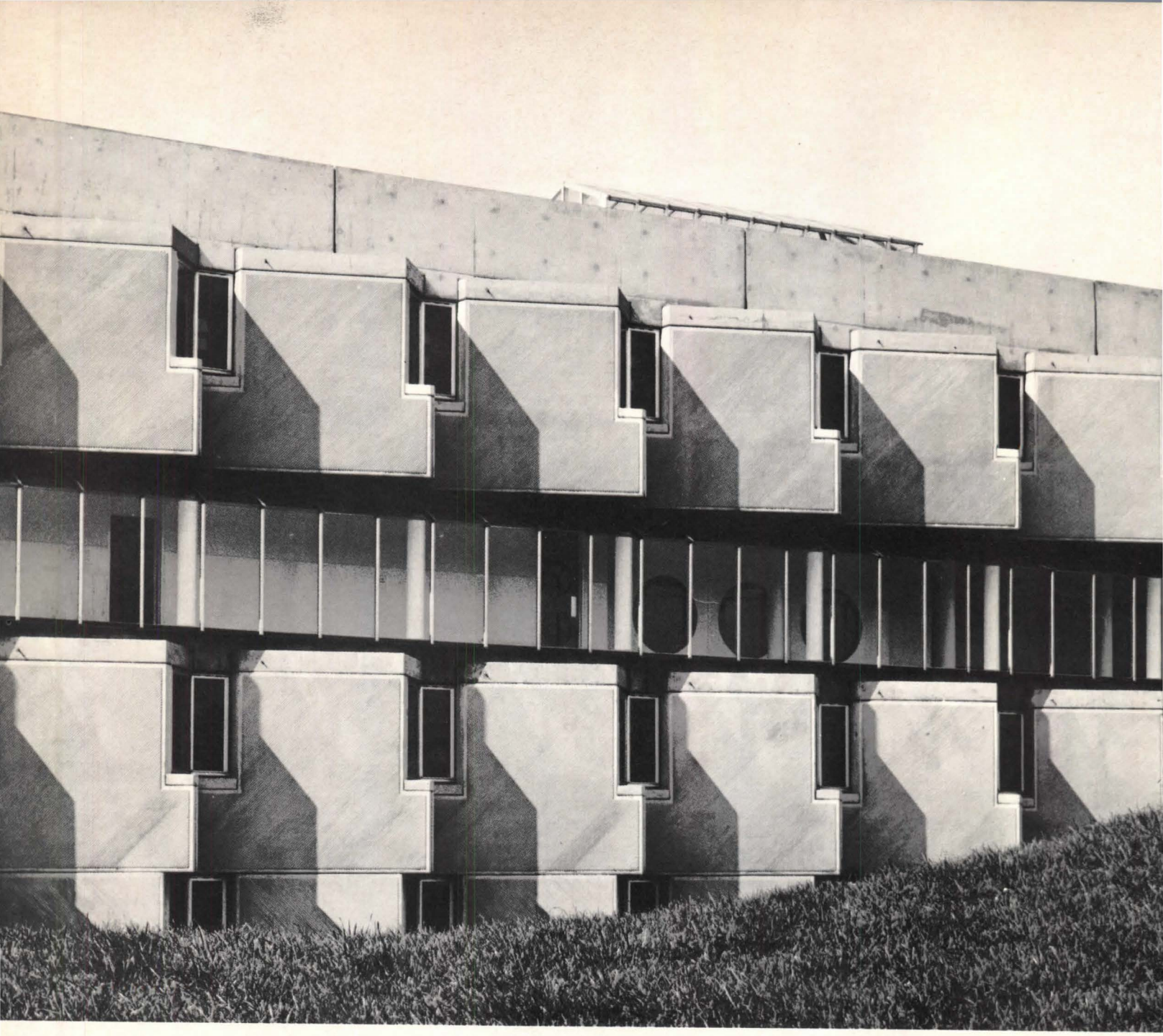
"From the staircase, the study/bedrooms are reached by internal corridors. Service facilities are positioned at the ends and sides of these corridors. All study/bedrooms—which accommodate one student each—are 112 ft. square and have washing and storage units. There are two windows to each room; the larger of the two is angled from the building so that all rooms are oriented to the view.

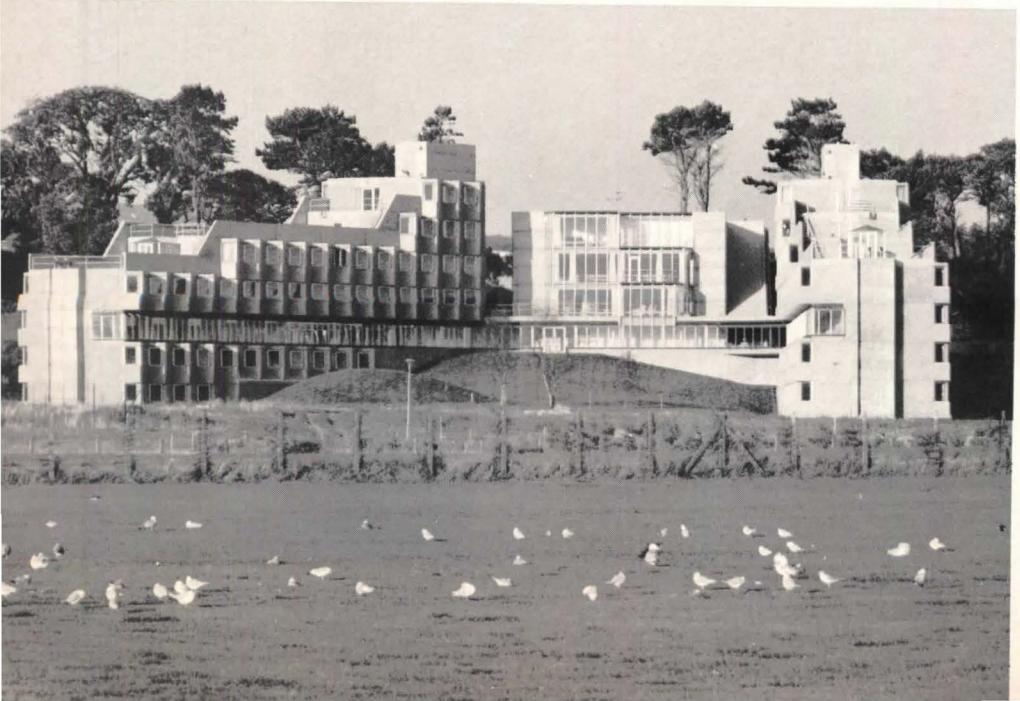
"Similarly, the study/bedroom *wings* of each residence have been angled to allow unobstructed views. These wings are constructed of large precast concrete wall and floor units and, although future residences could vary in length, they would all be constructed from the same assemblage of structural units. These units were factory-cast in Edinburgh 70 miles away and transported to the site.

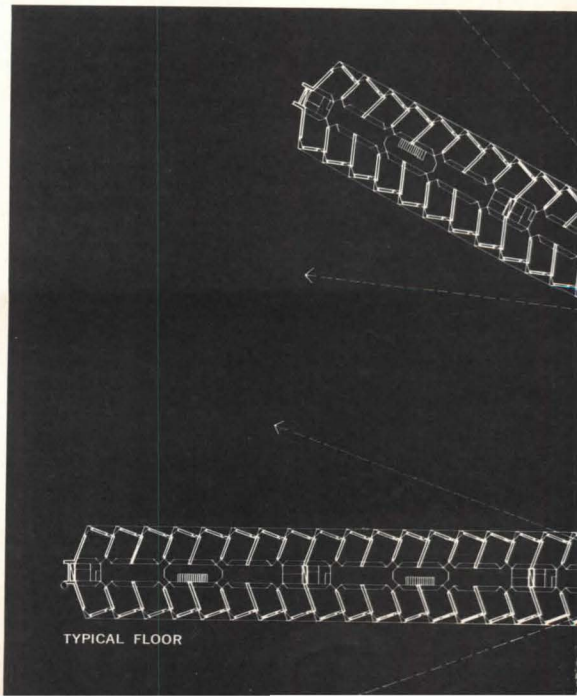
"The external finish of the precast units is ribbed concrete formed by placing aluminum liners within the molds. The appearance is mechanical and it is a way of obtaining a satisfactory finish with an ordinary concrete mix that is integral to precasting techniques. The ribbing is diagonal on all wall units, but running in opposite directions on adjoining units in order to visually articulate the entity of each structural element and also to effect controlled weather staining. A 3-in. unribbed margin is left around the edge of the unit—for safety from damage in handling and erection. At a distance the building appears as a contiguous mass, but close-to the articulation of each structural element explains that it is an assemblage of pieces.

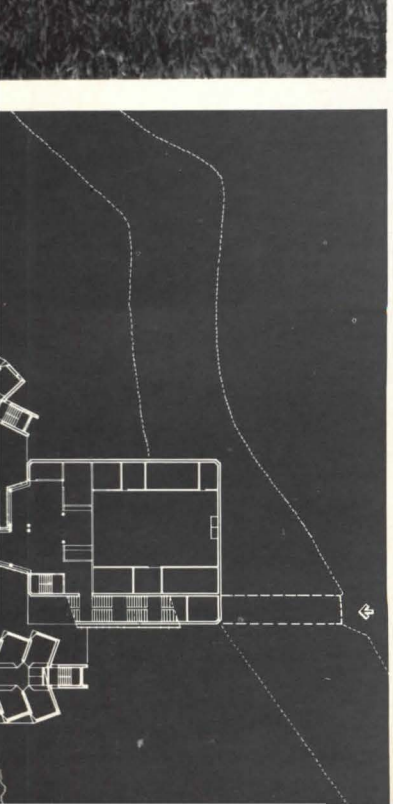
"The top floors on both wings are constructed with modified structural units to provide apartments for the warden, deputy-warden, bursar and live-in staff. Adjoining these apartments are roof terraces in lieu of gardens.

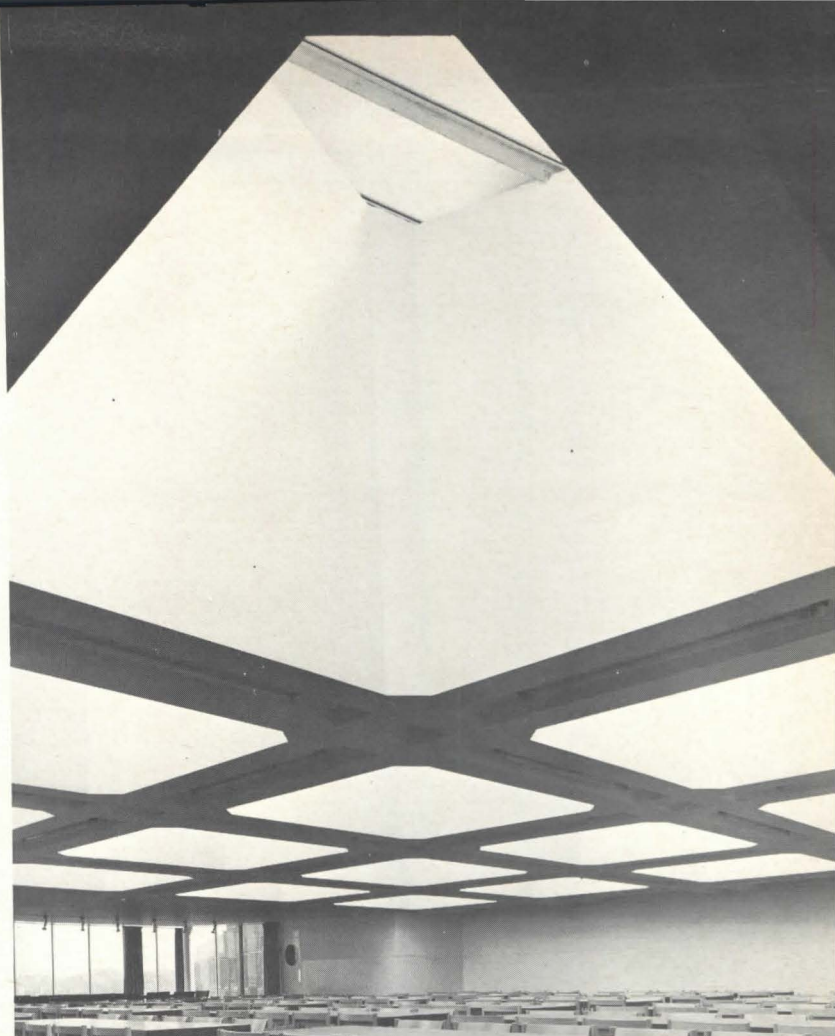
"At the ridge end of the wings, and joining them at the web, is the central block containing all the non-repetitive rooms—the dining room, kitchens, common rooms and TV area. The planning of the block, which is of *in-situ* concrete, will vary in future residences. This block has a full-width bay window running up through all floors, and views from the rooms are down the valley formed by the long wings."



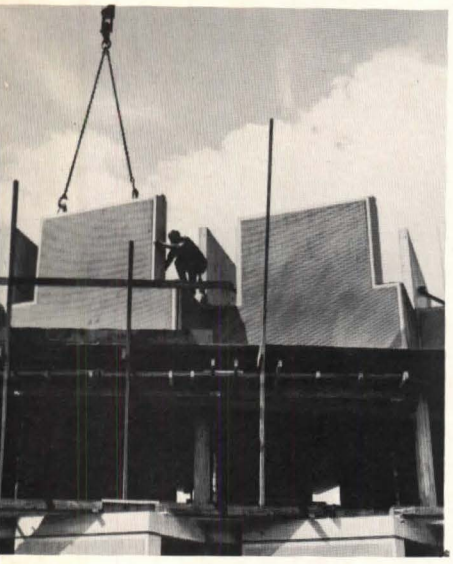


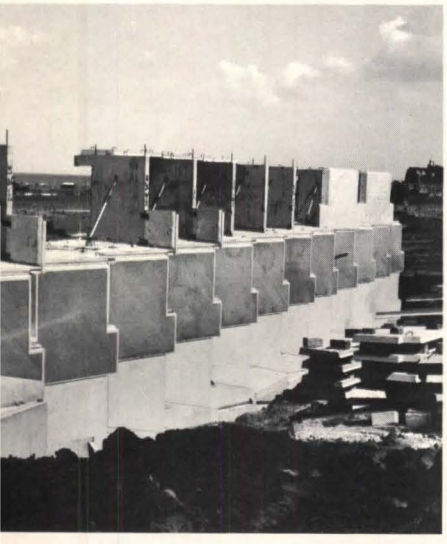

TYPICAL FLOOR

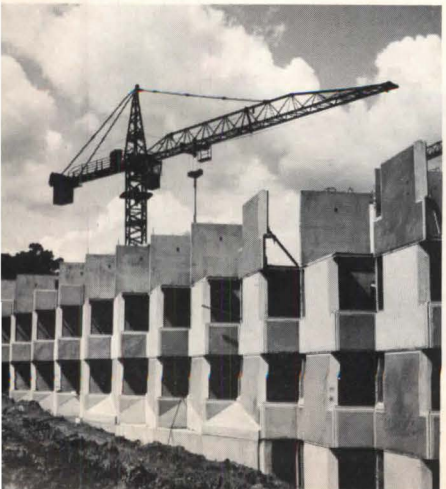


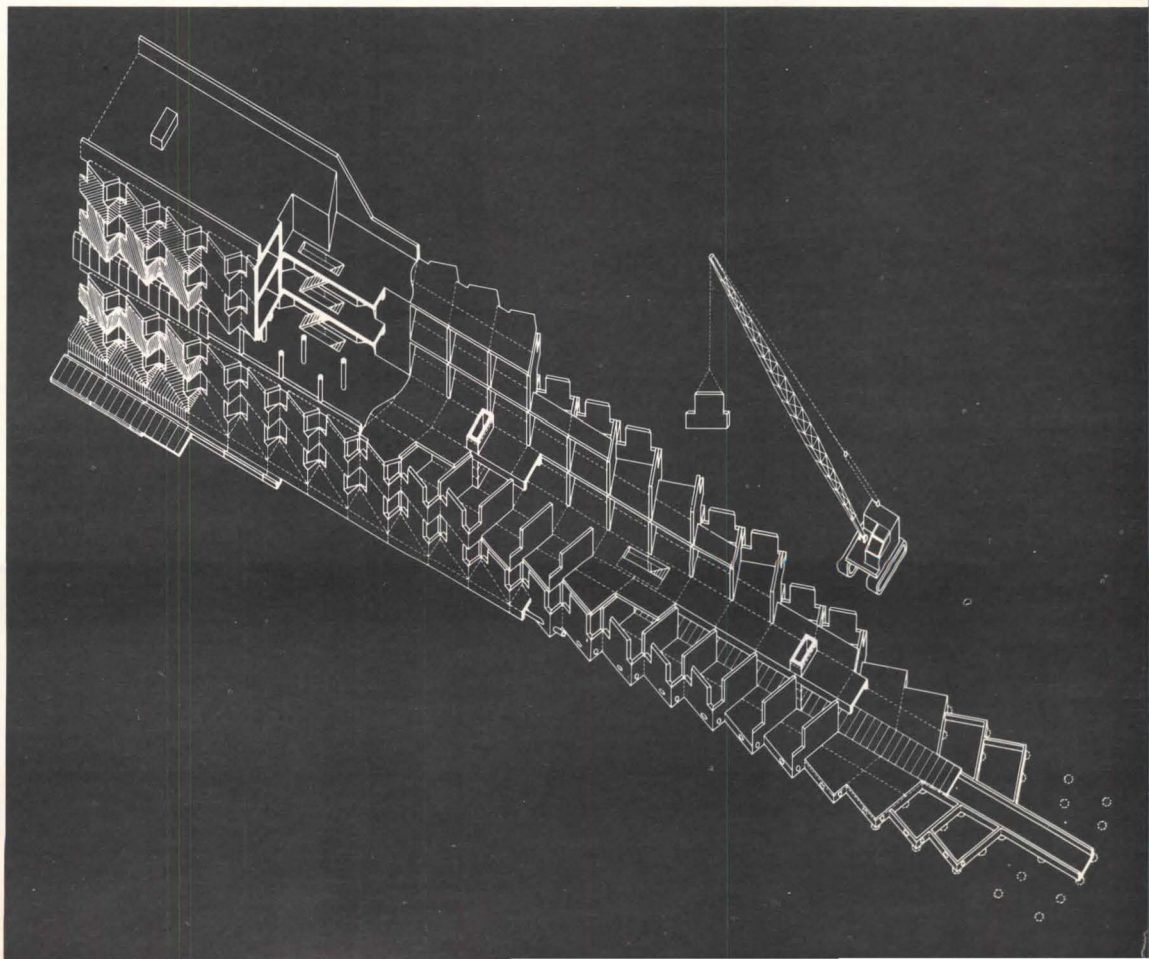


Left: Close-up of ribbed concrete panels that were precast to form walls of dormitories. Overall view at far left shows first residential group from downhill side; to its right is a plan of typical, double-loaded dormitory wings. Right: Dining room with ceiling, formed by skylights; the two-way stair that links the various levels; and, at bottom of page, the "promenade level" of the building, which Stirling calls its "major socializing element."









CHARLES JENCKS OFFERS A SEMIOLOGICAL ANALYSIS

"It looks like a great grey battleship". . ."it looks like a split-level aircraft carrier". . ."it looks like a concrete IBM card". . ."it looks like Op Art sugar cubes stacked at an angle". . ."in plan it looks like two power saws kissing (yes it does)". . . IT LOOKS LIKE . . . Why does a Stirling building always have to look like something else than what it "really" is? Why can't journalists (and even real people) just say: "It looks like Andrew Melville Hall, a prefabricated concrete residence for 250 students at St. Andrews University in Scotland?" Why must any building always be seen in terms of metaphors that refer to additional things which are, by definition, alien to the "real" building?

In trying to clarify several such issues of significance in architecture, I will make use of concepts developed in semiology—the theory of signs—and apply them to Stirling's Melville Hall.

The first concept—metaphor/context—concerns the two complementary ways a form gains meaning: either by being associated with other metaphors, e.g.: battleship, aircraft carrier etc., or by being in direct contrast to the surrounding context.

In trying to work out the most plausible meanings of Melville Hall, we would look for corresponding relations between the metaphors and context. Thus, in addition to the metaphors listed at the beginning, we might find further associations—the concrete setbacks of each room bear a vague resemblance to the crenellations of Scottish baronial castles while the orientation of every element toward the North Sea, including the gun-like extract hoods, reinforces the idea of military defence (photo above).

However, what about the more purely architectural metaphors? The building has been compared to the sloping underbelly of Le Corbusier's La Tourette, the collective housing schemes of Constructivists such as Ginzburg, and a skyscraper which has tipped on its side, a "groundscraper," that is: a skyscraper which has met a "fate worse than death."

As in most of Stirling's recent work, people see the Hall as some kind of nautical image, even though Stirling denies that metaphors, any metaphors, play a role in his design—which is more concerned with just technical and functional aspects. "Ships don't interest me much, nor am I very influenced by particular buildings of other architects, or associations." The fact that people continually find marine metaphors where they were never explicitly intended is probably due to Stirling's consistent use of steel railings and concrete decks; in any case his buildings are highly expressive of various things.

The particular question for the whole building is "how plausible are the various marine metaphors?" Certainly they gain strength by their interrelation—deck with railing, porthole and exhaust stacks—and by their placement in the context—over a *sea* of grass, moored to the *dock* of the hill, looking out over the North Sea. So one may claim their priority over the competing metaphors of "groundscraper" and "Op Art sugar cubes," etc. without however, excluding the latter.

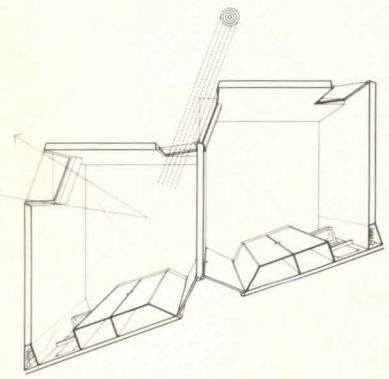
The general question we might ask of any architecture is whether every form has a content and function and vice-versa. By carrying out a quite laborious and detailed analysis ("the lemon-squeezer school of criticism"), we may determine how articulate the architecture is and what meanings are either acknowledged, suppressed or redundant. Perhaps it should be emphasized here that complete equality between form, content and function does not imply anything more than an utterly straightforward building. On the contrary, as we shall see, evaluation consists in determining the *appropriateness* and *expressiveness* of the meanings as well as the *choice* of whether relations between areas should be shown or denied.

One further point to be emphasized: I have divided up the analysis into three distinct parts because these seem to correspond to an experience of approaching the complex from the side. Other approaches would yield other subdivisions, but the relations would probably be much the same. In the tables that follow, a *contradiction* is indicated by an $(\neq)$, and *imbalance* by a $(+)$, and an *equality* by no sign. The further relations to form are, it must be noted, *not* indicated.

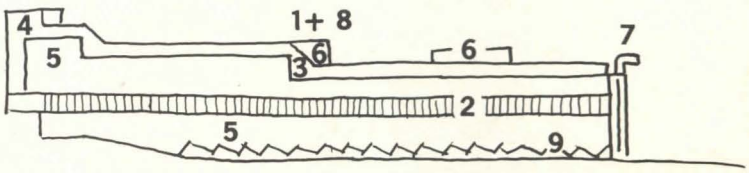
The first unit of analysis is the right, inside wing of the building (drawing and table below):

Several conclusions can be seen from this table. First, as in **9**, when there is an equality between content and function, we can say that the form *denotes* this function without any ambiguity. Second, the actual functions usually tend to be greater than both the forms and their connotations. This is to be expected since forms often work in more ways than are immediately apprehensible.

Last, we see in some of the contradictions and imbalances the way in which the building sometimes does not communicate the actual functions. For instance, in **5**, the identical precast walls suggest that all the spaces behind are the same, whereas in fact they contain different functions in terms of use and sex (of the students). No doubt Stirling felt that a common exterior was more economical and egalitarian.

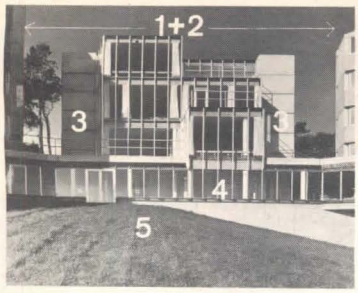


Photographs and drawings on facing page show assembly of prebabricated elements that make up the walls and floors of the two fingers containing the student dorms. Large photo is a close-up of the juncture between two student rooms. (Each room has two windows, each angled differently so as to get the best light as well as the best view. The plan, above, shows two of the dormitory rooms.) Visible in the large photo is the glass-walled promenade level half way up the building.



FORM	CONTENT	ACTUAL FUNCTION
1. Linear form	1. Mass-production line, circulation, orientation, open society (+)	1. Mass-production units, circulation, orientation
2. Linear glass wall	2. Walkway, communal area	2. Walkway, communal area, snack area (+)
3. Linear concrete wall	3. Parapet, transition to sky (+)	3. Parapet, windshield (+)
4. Concrete volume	4. Stairway, structure	4. Stairway, structure, mechanical (+)
5. Pre-cast walls	5. Bedrooms, "all the same" (#)	5. Bedrooms, different interiors (#)
6. Glass sheds	6. ? greenhouses? (#)	6. Stairway exits (+)
7. Metal funnel	7. Extract, gun (+)	7. Extract
8. Descending shape	8. View, terrace	8. View, terrace, site economy (+)
9. Canted base	9. Basement, transition to ground	9. Basement, transition to ground
10.	10.	10. Actual organization into staff, student groups (+)

Mr. Jencks, who is co-editor with George Baird of the recently published *Meaning in Architecture,* teaches at the Architectural Association in London.



FORM	CONTENT	ACTUAL FUNCTION
1. Central element	1. The symbolic "heart"	1. Dining rooms (+), 2 common rooms (+), walkway (+)
2. Low center, high wings	2. Insignificant (#) mannerist (#)	2. Formal community (#)
3. Concrete volumes	3. Rooms, stairway	3. Rooms, stairway
4. Linear glass walls	4. Walkway communal area	4. Walkway, communal area, an entrance (+), display area (+)
5. Green slope	5. Sitting, sunning	5. Sitting, sunning, games (+), display (+)

The same is true of **10** where the official and *ad hoc* organization of the residence is not expressed (beyond the fact that the wardens occupy the "highest points" with their terraces). On the interior, each room is more personalized in ways which do reflect the different life styles of the transient residents.

Thus if we can see here good reason for some of the suppression and contradiction in meaning, the same is not so true of the central element of the building (photo and table above):

What I find questionable here **1, 2** is that the center and symbolic "heart" of the whole scheme, the more formal communal area, is low in *gestalt* and much less expressive than the wings. It is rather as if Stirling had no great interest or faith in the traditional, formal rooms of the community —such as the dining room on the second floor—so that he merely packaged them in a prosaic outline of ambiguous glass (ambiguous in the sense that the uniform glass plane equates functions of different importance and partially allows the functions to be seen). This interpretation is reinforced by **2**, the low level of the central element in comparison to the higher wings.

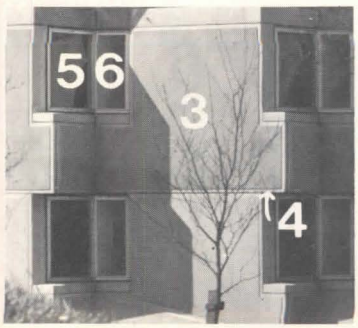
On the other hand, the suppression of this element in favor of the linear promenade deck **4, 5** turns out to be a particularly brilliant inversion, because the real life of the community goes on between this promenade deck and the outside surrounded green slope. The amount of actual functions which occur here—varying from football to guitar playing and most important, let us admit, "display and courting between students"—completely outdistances the visible meanings. One really has to see these various activities burgeoning on a warm spring day to fully appreciate the success of this "major socializing element"—students are forever looking back and forth from deck to slope and adopting all sorts of familiar poses for those down below on the ground.

If the central element shows both an inversion of expected meaning and the presence of unexpected functions, the bedroom units carry through this same imbalance and contradiction except without any of the drawbacks (photo and table below):

I have already mentioned the contradiction between a repeated, "democratic" unit and the variety of social structures behind it **1**, but perhaps the greater surprise is the way in which the precast unit carries all sorts of connotations and actual functions beyond the immediately obvious ones (indicated by the large amount of + signs). Thus the inverted T shape with its ribbed diagonals and smooth edges **2, 3, 4** suggests the individualization of each room marked also by an elegant border, but in fact the inverted T was also created for purely functional reasons.

First of all, it is a structural wall system, rare in England, but common in Russia, which achieves great economies and precision because it is manufactured in a factory; second, its edges are smooth so that the walls can be handled without chipping the ribs. Thus we find that delightful ambiguity common to architecture which has been worked through on so many levels of meaning that we are led from one interpretation to the next without apparent end.

The St. Andrews residence shows an attention to significance on all its different levels which goes far beyond the usual oversimplifications of today. In fact it seems to me reminiscent of the Heroic Period of the 20s when form had a functional and social intention indicative of a new society to come, except, alas, it is here without the faith in the formal institutions of men that inspired the 20s. We can find this social pessimism explicitly stated in Stirling's writing and it no doubt helps to explain his curious inversion of the private sphere over the public, of making the informal activities twice as significant as the formal. But as far as the other internal meanings are concerned, St. Andrews shows a high degree of relations between the three areas, whether they are equalities or contradictions, as well as a high degree of coherent, metaphorical expressiveness.



FORM	CONTENT	ACTUAL FUNCTION
1. Repeated units	1. "All the same," (democratic) (#)	1. Different life styles, etc. (#)
2. Shape (invert. T)	2. One room	2. One room, innovating precast structure (+)
3. Ribbed concrete	3. Scale, identity of room, corduroy (+)	3. Scale, identity of room
4. Smooth edges	4. Elegant transition (+)	4. Actual handling of concrete (+)
5. Big windows	5. View	5. Fantastic view (+)
6. Small windows	6. View	6. Sun (+), view blocked to next window (#)
7. Setbacks	7. View, crenellations (+) saw teeth (+), nervous (+)	7. Fantastic view (+)

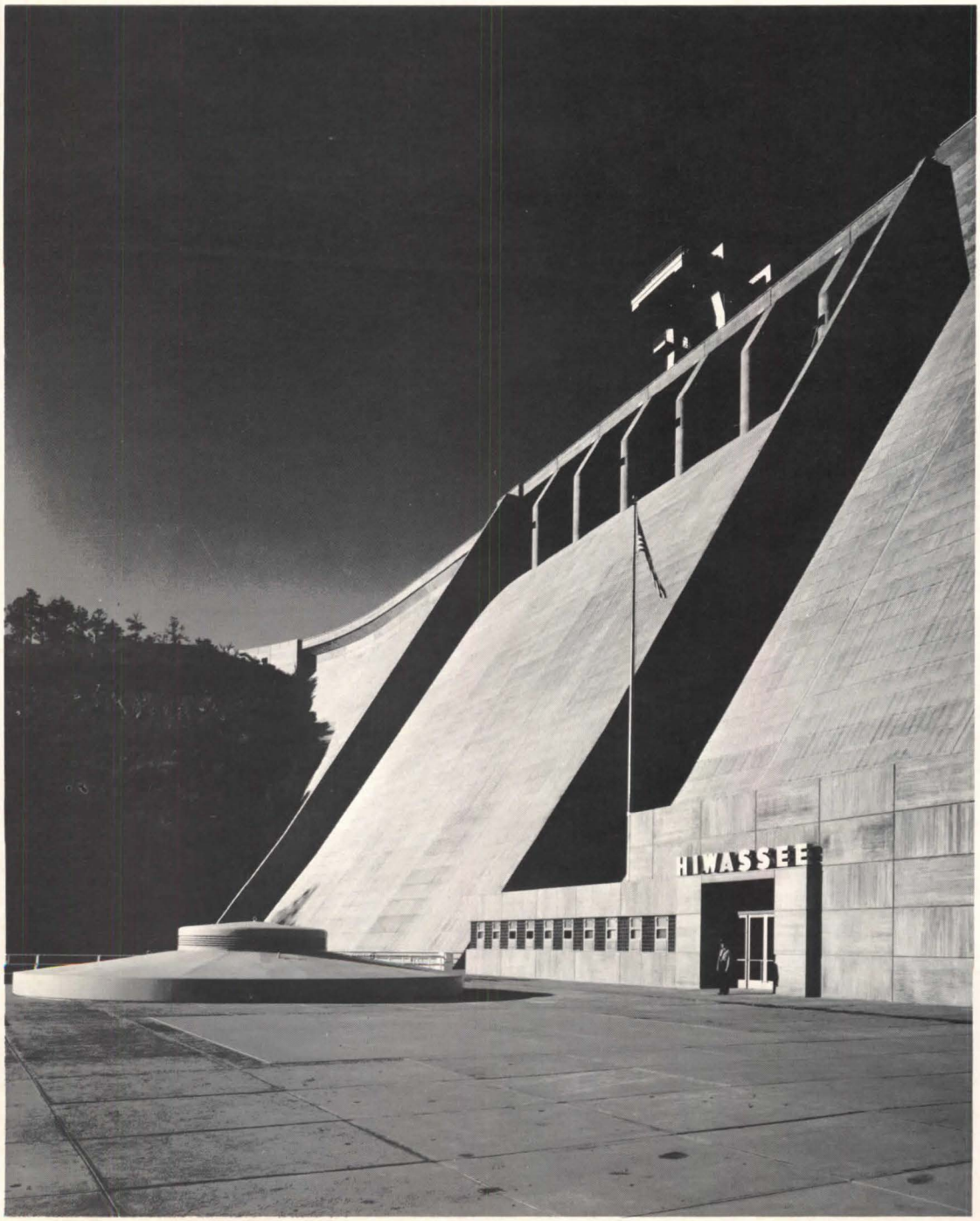
Although the two fingers of the dormitory complex are connected to the central block at lower levels, they stand free of it above grade. View at right shows one of the fingers with its stair tower at the near end. The central block with communal facilities is barely visible to the left.

FACTS AND FIGURES

Andrew Melville Hall, St. Andrews University, St. Andrews, Scotland. Architect: James Stirling (assistants: A. Bews, D. Bartlett, B. Frost). Engineers: Felix J. Samuely & Partners (structural); Ewbank & Partners (mechanical, electrical). General contractor: Thaw & Campbell Ltd.; Precast concrete contractor: Scottish Construction Co. Ltd. PHOTOGRAPHS: Richard Einzig, except aerial and construction sequence.

ROLAND WANK
1898-1970

BY FREDERICK GUTHEIM



Near the news of Roland Wank's death I found the advertisement of a scholarly reprinting of the *Annual Reports of the Tennessee Valley Authority 1934-1967;* it is offered today as a successful illustration of man's effort to control his environment, the price for the 33 volumes being $415.00. I commence this brief, hasty and necessarily inadequate memoir with the assurance, therefore, that its subject is squarely in the middle of contemporary interests, and no excuses need be offered for some reflections on the architect's part in environmental planning and conservation, and his relationship particularly to engineering and technology.

Wank's accomplishment was to make the TVA and its works look as important as they are accepted as being today. When he joined the staff of the TVA at the beginning of its program in 1933, the job of Chief Architect was about what he wanted to make of it. This was not far from the point in historical time when the sculptor Jo Davidson could seriously propose to President Roosevelt that he design the massive downstream faces of TVA dams along the lines of the heroic sculptures of Gutzon Borglum. Wank could have contented himself with such a frankly decorative approach to engineering works. Ample precedents existed then in the design of bridges, and also in a line of work with which Wank was much more familiar, the design of railroad depots. He chose instead the teamwork approach, and created instead the architecture of engineering.

Raised and educated in the European traditions of profes-

Mr. Gutheim is an architecture critic and consultant on urban affairs.

sional practice, Wank had come to the United States and established himself in the firm of Fellheimer and Wagner, much of whose practice was in heavy construction. As a member of that firm he designed the Cincinnati union station, the last of the major railroad depots and a major element in the city's downtown plan. This was probably the decisive work in which Wank formulated his philosophy of architectural design, its relation to engineering, and to planning.

Certainly he came to the TVA's work with a mature conception of how it should be done. There was nothing experimental in Wank's approach. What he did at the start was about the same as he was doing a decade later when he left the TVA.

In this approach two elements stand out. The first was Wank's expectation that the architect had an important and distinctive contribution to make, and his ability to make it prevail. To an unrecognized degree, the TVA was dominated by engineers raised in the European tradition: Norwegians, Germans and even Russians. It was among these that Wank found a firm position. They accepted him at his own value. But he did not shrink from the higher politics of the TVA, and he was strongly assisted by the professional varnishing provided by Harry B. Tour as his principal architectural assistant and successor. A detailed examination of the office procedures, the approvals of designs, the small number of revisions leaves little doubt that from the start Wank was in full control of the architectural decisions of the TVA.

The second was Wank's sure identification of the elements of the TVA program that had architectural significance. It is significant that he did not allow himself to be diverted from the main job, the construction of dams and engineering works, to such trifles as the design of the town of Norris and its housing, most of which fell to Earle Draper, a conservative landscape architect and designer of proprietary textile towns, later to become an FHA commissioner. Nor did he engage much in the continuing battles over TVA long-range and comprehensive planning, never to achieve as much as its supporters hoped and claimed for it. For Wank the main chance ws to influence the engineering projects of TVA—and he made the most of it.

His method was to identify those parts of the project where the impact of architecture and the contribution of architectural design would concentrate most heavily. Thus he found in the design of generator halls a really significant opportunity to move a generation that had been told by Henry Adams about "The Virgin and the Dynamo," and led to rank it with Chartres cathedral. But he reached back into the actual siting of dams and the relationship of the related structures to the entire composition as it lay in the landscape, whether as at Fontana where a high dam wedged itself spectacularly into a narrow Appalachian pass, or at such a low, long run-of-the-river dam as Chickamauga.

But the glorification of these works extended beyond the engineering elements. Wank saw to it that they were approached as one would the Acropolis, seen suddenly as one came around the wooded flank of a mountainside, and presented with a heightened appreciation of scale. He led one up to the best view. There he provided a "lookout" where a subtle combination of technical information and TVA philosophy was offered. He directed one to the base of the dam and to its heart, the generator hall where the hum of machinery was heard in a beautifully proportioned room finished in well-chosen ceramic tile, an ultimate functional material. In short, he made engineering into an architectural event. What had been designed by the Army Engineers or the Bureau of Reclamation, not to mention numerous private utilities, was here raised to the level of a great and significant human experience, not left as a mere work of technology. At Hoover Dam (which in those years was called Boulder Dam) one was impressed by the sheer size, the cost or the acre feet of water and the kilowatts of power; but at a TVA dam one was reminded of humanistic values, of power serving man, of regional development goals, of the conservation of natural resources, or man's relation to the landscape—and most of all, of the virtues of public ownership of hydro-electric power.

Wank also put the distinctive works of the TVA into a family relationship. With each additional work the concept of a river basin-wide planned system of power development was more strongly expressed. Strength led on to strength. As the volume of tourists from abroad as well as home increased, people found it a significant and pleasant experience to tour the entire valley and visit all of its major engineering works. Like Haussmann's sewers of Paris, or the Eiffel Tower (but on a vaster scale), the TVA formed a landmark of contemporary political significance that was recognized for its architecture as well. Not until Saarinen's General Motors Technical Center was there anything of comparable *valeur,* and not until the University of Mexico anything of palpably New World scale that one could set beside Versailles or the great urban composition from the Louvre to the Arc de Triomphe. Its photogenic splendors sent visitors into raptures. Films, books, and innumerable magazine articles struggled to express its distinctive qualities.

In considerably less than a decade Wank's accomplishment was complete. It was significant that he attempted to continue his career into what might have proved another great area of architectural opportunity as architect of the New Jersey Turnpike. But tollgates and portals, rest stops and the minutia of service and administrative buildings are not the elements of architectural greatness. Nor, as later architects of ability like Rudolph Mock and Joseph Passonneau who succeeded Wank found out, were the post-war years filled with idealism and challenge. Instead, the TVA had turned to the construction of steam plants, the strip-mining of West Virginia mountains, and an economic philosophy so oriented to its bondholders it was scarcely to be distinguished from such an agency as the Port of New York Authority. Not for a quarter century would the time come when a Marcel Breuer could design the generator house of Grand Coulee or a Paul Thiry prepare the master plan for Chief Joseph dam. And today these are still isolated examples devoid of the cohesive social philosophy and continuous architectural design effort which distinguished Roland Wank's accomplishment of the ten years from 1933 to 1943.

FORUM

(continued from page 19)

Many smaller projects are complete and in use. A major battle with the city, to rehabilitate the abandoned Ridgeway Library as a community center, was won by the Workshop. Other big battles —involving Chinatown and the South Street Expressway—are in doubt. The Workshop was instrumental in decentralizing the City Planning Department (eight planners now work in eight areas of the city) and hopes to do its own decentralizing with six mini-workshops throughout Philadelphia.

The long roster of volunteers includes 75 full architects, an equal number of architectural interns and a smaller number of engineers, landscape architects and planners. No one goes to work without sensitivity training by Gus Baxter. The only real problem, says Baxter, is money. On this year's budget of $75,000, some $36,000 is still to be raised.

PEOPLE

GERMAN INNOVATOR

Egon Eiermann died in Baden-Baden, West Germany, on July 20. He was 65.

A professor at the Technical University in Karlsruhe since 1946, he had established an architectural practice in Berlin where he had "had the good fortune to grow up in the twenties." And it was in West Berlin, after the war, where Eiermann's best-known—certainly his most controversial—building, the rebuilt Kaiser Wilhelm Memorial Church, was erected around the bombed-out ruins of the old, Neo-Romanesque church tower (March '66 issue). The competition-winning, octagon-shaped church, in glass, steel and concrete, came as a shock to Berliners, even though they had demanded that the old ruin be incorporated into the design as a symbol of the city's fate. The church is now a familiar landmark. "The Berliners," said Eiermann, "always applaud courage."

Eiermann also designed the German Embassy in Washington (above) and the German Pavilion at the 1958 World Exhibition in Brussels (June '58 issue).

LIKE DOOR STOOPS

At the AIA convention in Boston this June (see July/Aug. issue, page 35), a group of some 20 to 30 young architects walked out, caucussed for two days, and formed a new national group called "Serve The People" (STP). Troy West (below) who

teaches architecture at Carnegie-Mellon University in Pittsburgh denies being the leader of this people's movement, but has provided us with some of his thoughts on it.

"When communities are able to have and control services, they need the architect and other professionals in touch with institutions they believe in, like door stoops . . . men who work very hard to make art out of presence and moment and don't need a lot of technical romanticism to do it with. Men who don't have to destroy to achieve order or beauty or whatever the Prudential Center and the Boston City Hall and the Gateway Centers across our vacant, neighborhoodless cities are. We ask more than professional responsibility, we ask personal involvement."

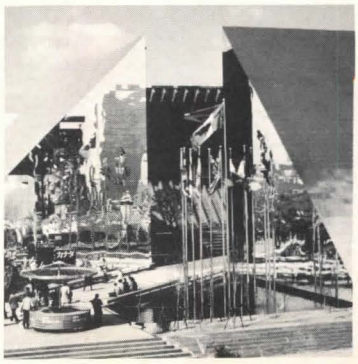
West, with about 20 others, are setting up an STP Center in Oakland, a suburb of Pittsburgh, which he describes as "a mixed student, working, black, white community." The center will have a free medical clinic, a law commune, a co-op store, a newspaper, and an information center for architecture and planning, draft resistance, etc.

STP held its own first convention, of sorts, August 28-30, on a farm in Wisconsin belonging to Rodney Wright, an architect with the Chicago Uptown Coalition. The idea was "to find out where everybody's at," to rap a lot about things like changing the structure of architectural education, maybe even starting schools of their own. One good possibility was to start a magazine; another, less likely perhaps, to choose a leader.

FOOTNOTE

GOOD NEIGHBORS, BUT DULL

The spectacular, sloping glass walls of the Canadian Pavilion at Expo 70 in Osaka, Japan (below, and April issue)—an architectural highlight of the fair—are, apparently, too much of a good thing. With the passing of the rainy season, the heat generated by the sun reflecting off the mirrored-glass prisms has proven so discomforting to pedestrians and neighboring pavilion-keepers, that the Canadian people and EXPO Association officials have had the offending surfaces painted a dull gray. Said Deputy Commissioner General J. Vaast: "The good neighbor policy comes first, rather than the architectural beauty of our pavilion."



PHOTOGRAPHS: Page 60, George Cserna (top); John Nackles (middle).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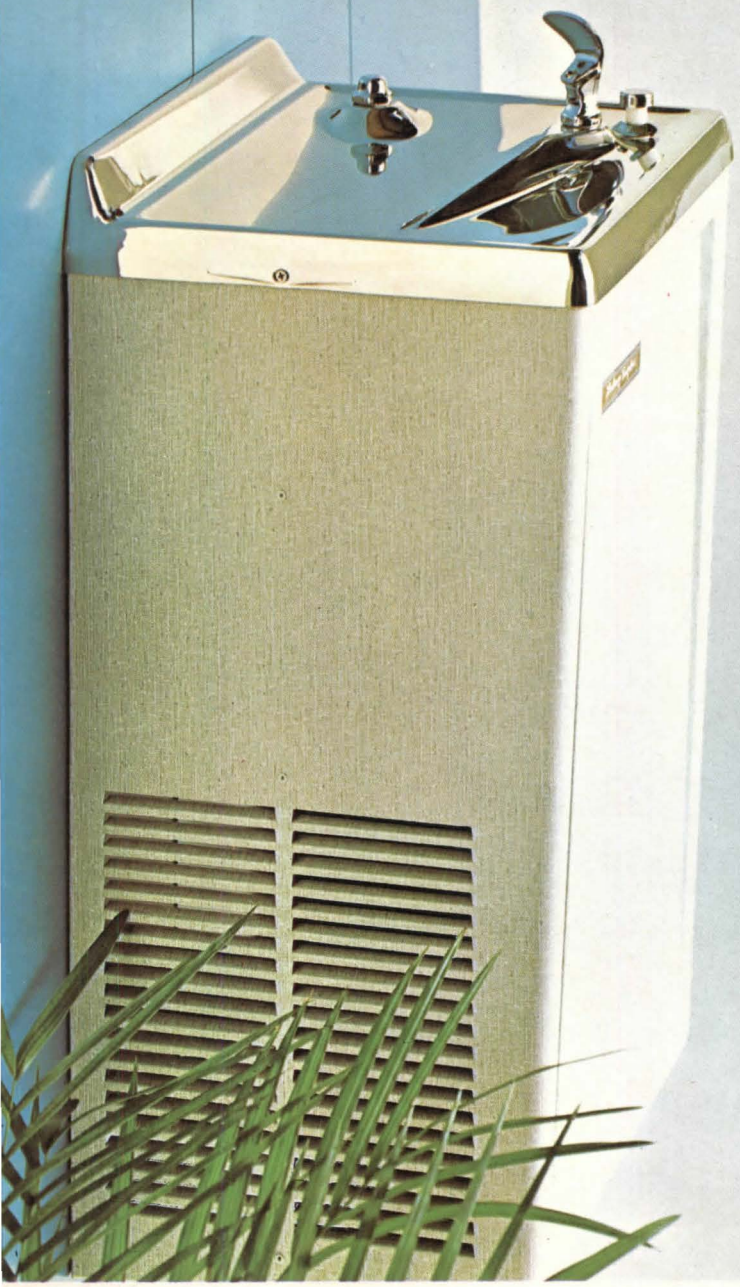

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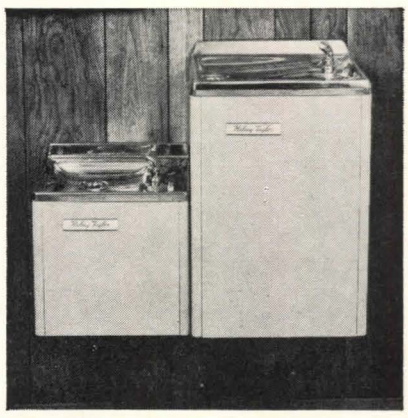

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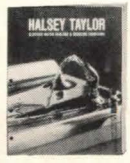

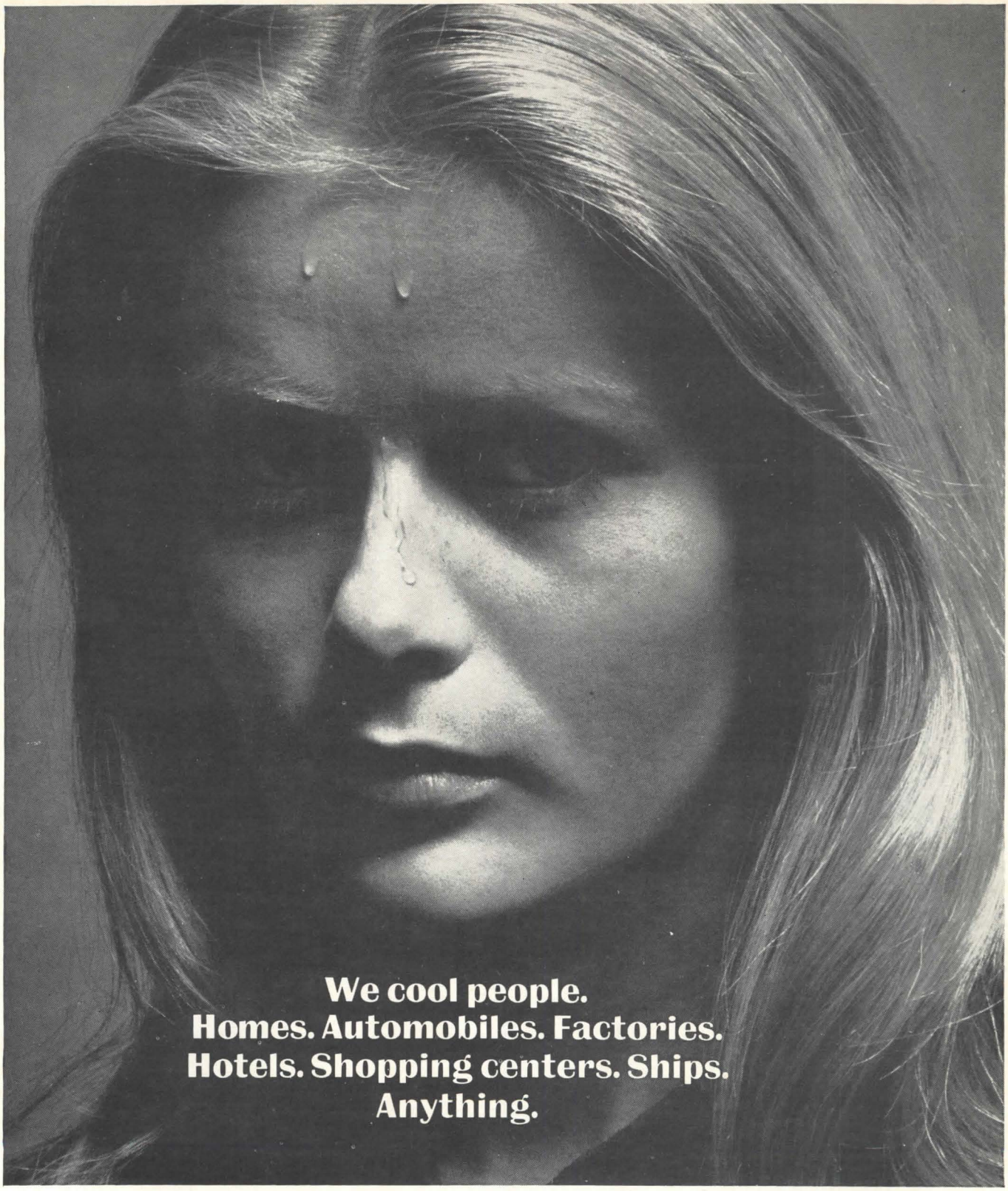

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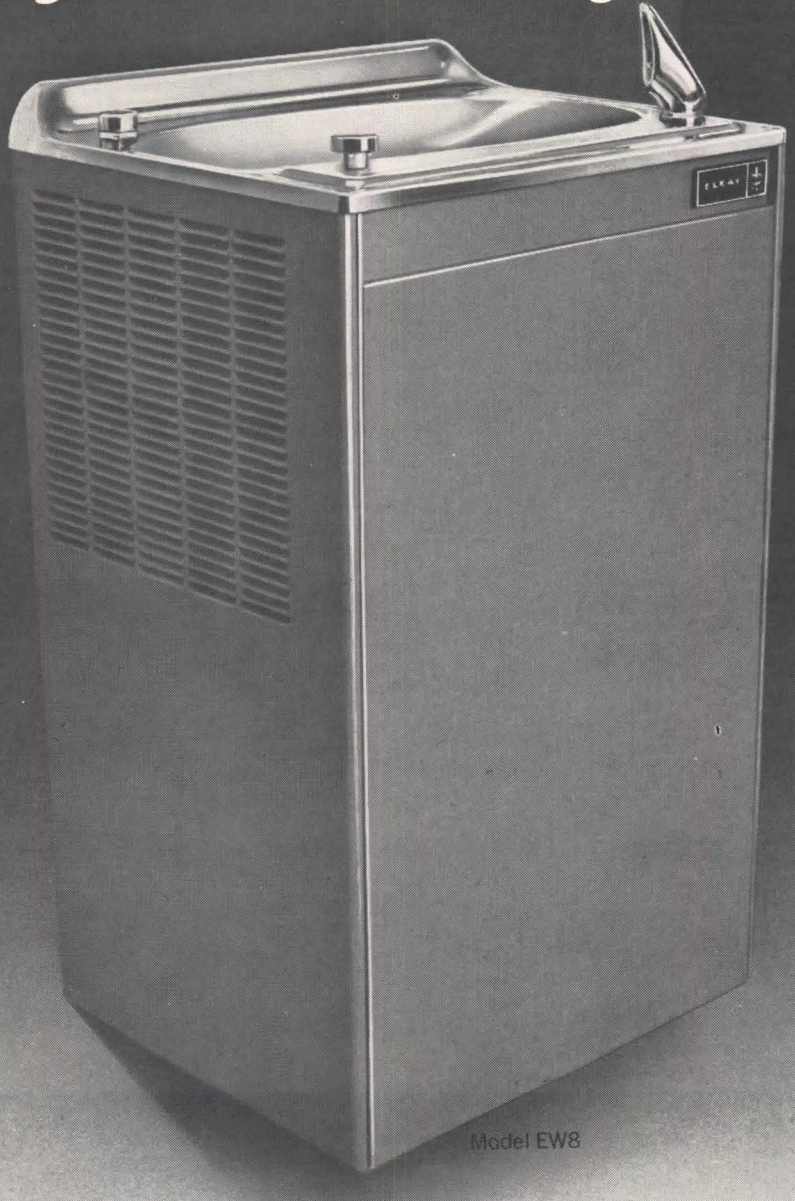

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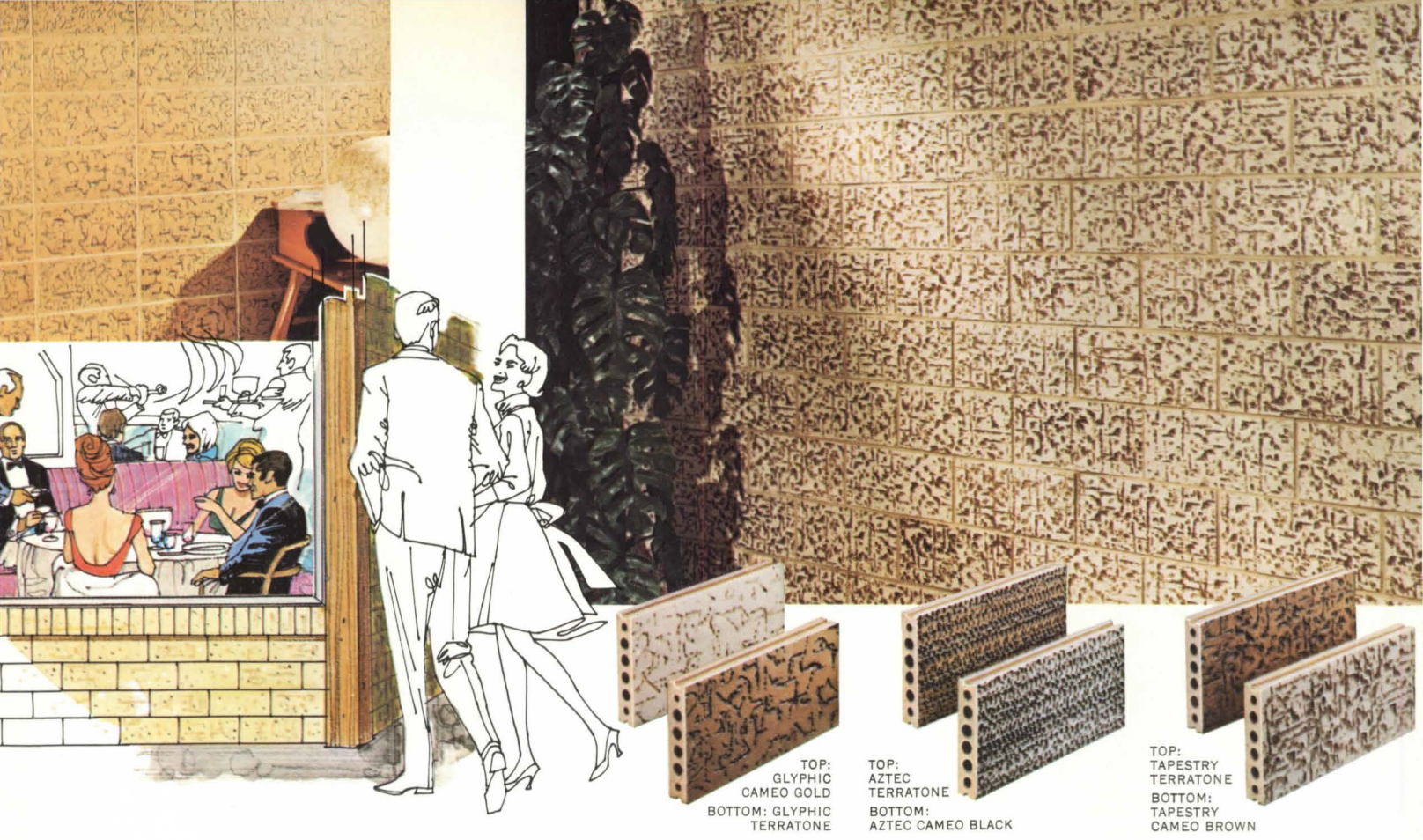

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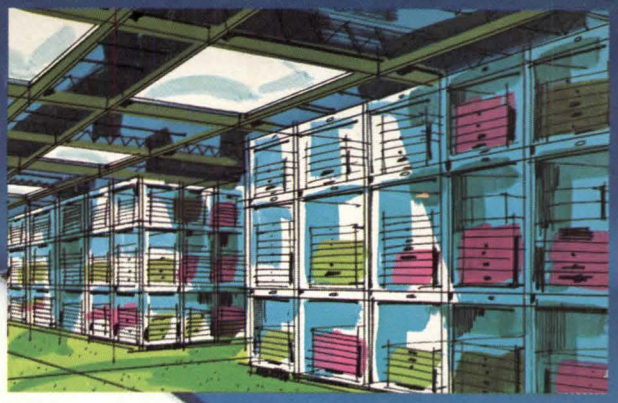

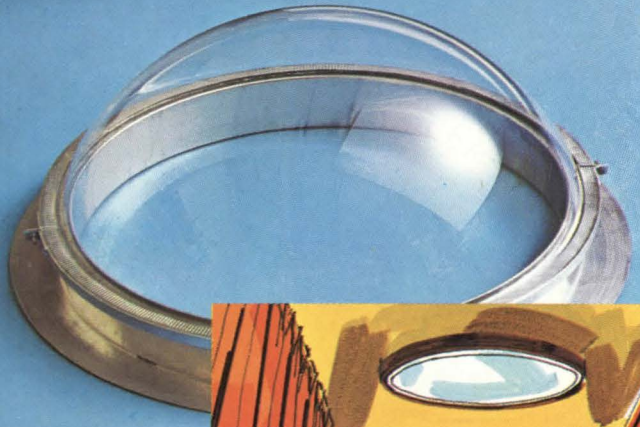

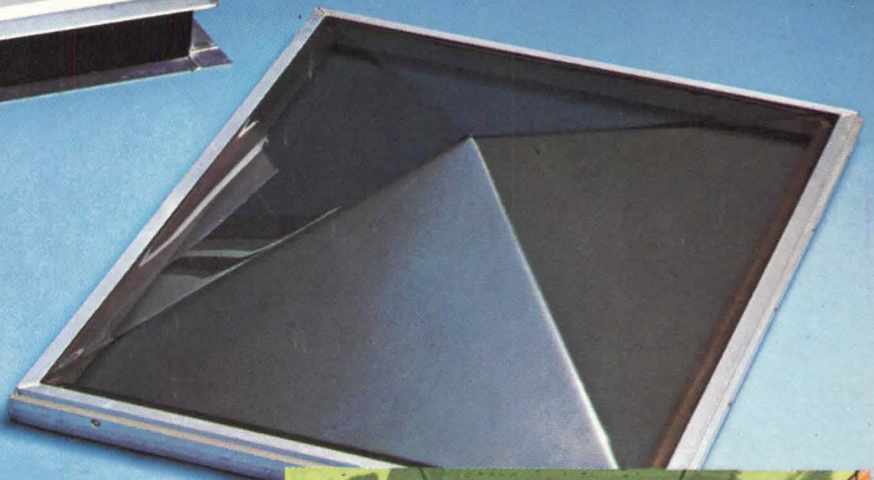

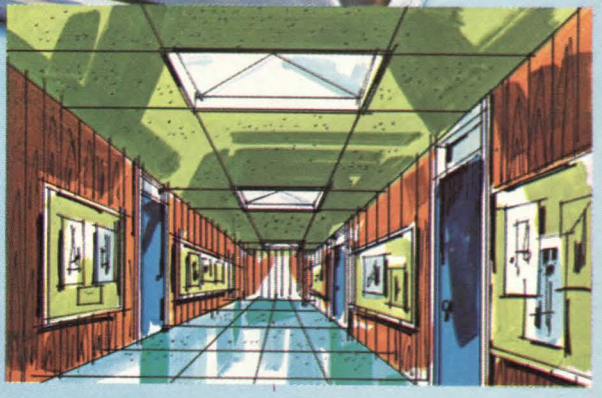

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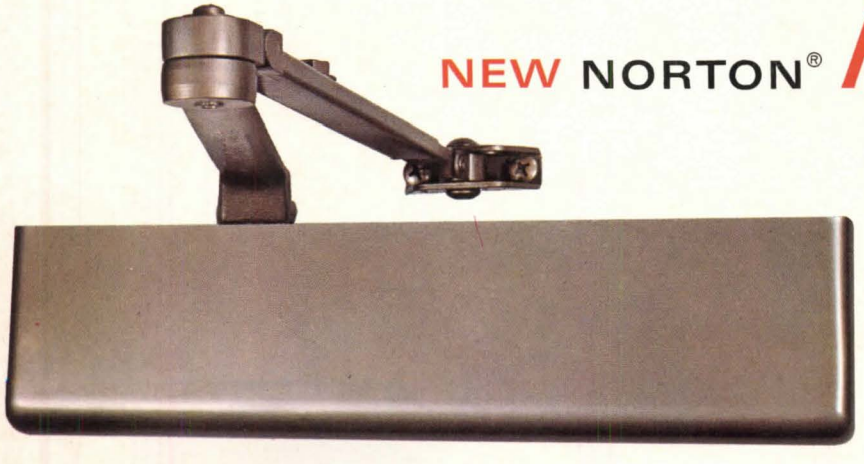

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Reznor Infra-Red Thermo-Flector. 4-page booklet shows sizes, typical uses, contains specs, dimensions. Bulletin 203. 1E. ITT Reznor, Environmental Prod. Div. On Reader's Service Card, circle 112.

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8-page 4-color brochure contains illustrations, applications, specs and roughing in diagrams with dimensions of Westinghouse water coolers. Westinghouse Electric Corp., Water Cooler Dept. On Reader's Service Card, circle 123.

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Brochure called Architecture and Art contains book title of current publications from Columbia University Press. On Reader's Service Card, circle 129.

1970-71 catalog of books on graphics, planning, perspective drawing, computer applications, etc. for architects and designers. Contract Books, Inc. On Reader's Service Card, circle 130.

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THE CITY AS A THREATENED ECOSYSTEM

(continued from page 49)

old, rundown, cheap buildings and so many failing enterprises," the bureaucrat thinks, "surely this place needs my helping hand." He sees only the failures, and, not recognizing them as the price of innovative success, roots out one and all. He replaces them with, say a General Motors automobile dealership.

Not only has government disrupted the innovation-incubating functions of cities, it has failed to play the role for which it is best suited in the urban process: that of assuring the proper allocation of real costs. Accurate cost allocation is obviously a *sine qua non* of natural selection in the economic world: in its absence, technologies that are environmentally costly appear cheap, and are thus able to prevent the emergence of competitors that would meet similar needs at less environmental cost. Instead of assuring true cost allocation, government has permitted established technologies to externalize their costs: by failing to require compensation for the victims of air, water, noise and visual pollution; by using the law of eminent domain, which in many instances fails to compensate for destruction of business good will, of natural amenities, or of neighborhood values, and by using it in support of existing technology; and in many instances, such as that of the automobile and the aircraft, by heavily subsidizing the existing system.

The behavior of the government towards the automobile in the past 20 years has been as if God had intervened on behalf of dinosaurs. Evolution would thus have been permanently fixated at the Jurassic period. Indeed, worse than fixated—plagued by a cancerous profusion of obsolete forms. And this ballooning of anachronisms, in the American city, has been at the expense of genuine technological response to human needs.

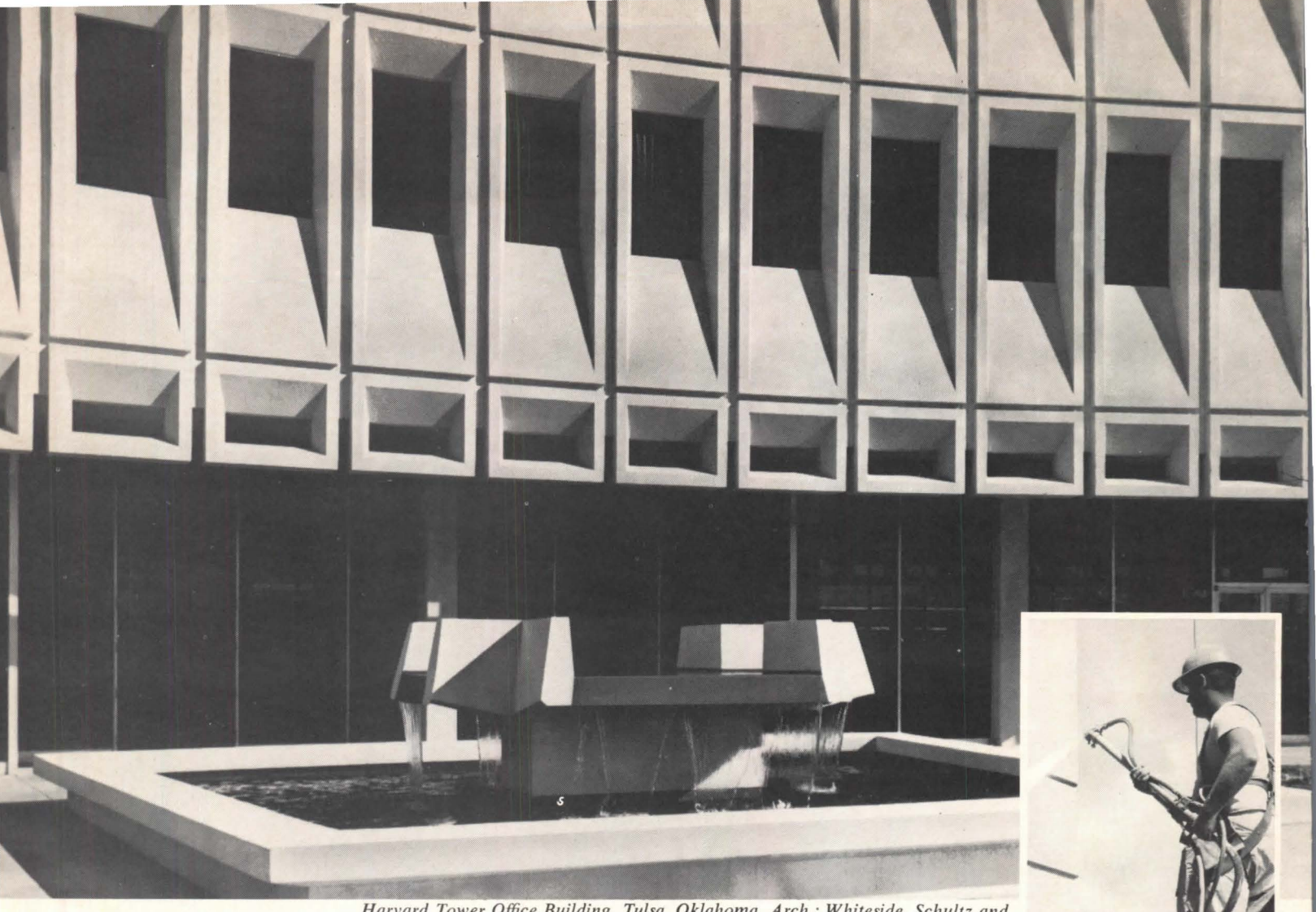
Of course government's foolish interventions—and equally foolish non-interventions—are not the only sources of peril that cities and natural ecosystems have in common. Here are a few more: a readiness to adopt simplistic, monolithic solutions, put into practice before any study is made of the probable consequences; a lifestyle based on conspicuous consumption and conspicuous waste, where men are valued, in William James's words, for what they have and not for what they are; a mania for speed, power, and the illusion of mobility, so that, in the name of transporting people rapidly, we effectively eliminate such diversities and amenities as might make a rational person *want* to travel; a passion for "style," which means that whatever is "in" is endlessly duplicated, and the rich diversities of any ecosystem, urban or natural, are at a discount.

We are horribly ignorant of the city's functions. Virtually the only person, in my opinion, to examine the matter—to recognize the city as an ecosystem—is Jane Jacobs, in *The Death and Life of Great American Cities* and *The Economy of Cities*. But as Darwin says, urging his reader to conceive of things that might give one variety the advantage in the struggle for existence:

"Probably in no single instance should we know what to do, so as to succeed. It [the thought process itself] will convince us of our ignorance on the mutual relations of all organic beings; a conviction as necessary, as it seems to be difficult to acquire."

We are beginning to learn that in dealing with the natural environment we must "work with nature"; that when we act without an understanding of "the mutual relations of all organic beings" our efforts will come to naught—or worse. If we are to reconcile environmental concern with an economy that produces for all members of society, we must apply that fundamental ecological lesson to the cities. We must understand that an ancient building in which a young black starts a small business is as vital to city ecology as salt marshes—so long scorned by the "realists" in our society—are to the aquatic life on which our fishing industry is built.

The need to stop and learn is just as urgent in city ecology as in natural ecology; the peril is greater because the need is still largely unrecognized.



Harvard Tower Office Building, Tulsa, Oklahoma. Arch.: Whiteside, Schultz and Chadsey. General Contr.: Frazier-Baker Properties, Inc. Appli.: The Vogel Co.

*Trademark National Gypsum Co.

This dramatic new office building boasts a stay-white completely waterproofed finish. All surfaces (including the fountain) of block, precast concrete and Woodrock,* inside and out, were sprayed with cement-base THOROSEAL PLASTER MIX plus ACRYL 60 which insures a tough bond. Time-and-money saving application finished Harvard Tower for occupancy without lingering labor costs.

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TECHNOLOGY

First plastic elevators are installed commercially

The first structural plastic elevator cabs have been installed and are operating in New York City. The first, a small demonstration version, was installed last spring in Automation House (see July/Aug. issue). The second installation consists of two 3,500-lb-capacity cabs, each holding 25 persons, in the new Georg Jensen store, where they serve seven floors.

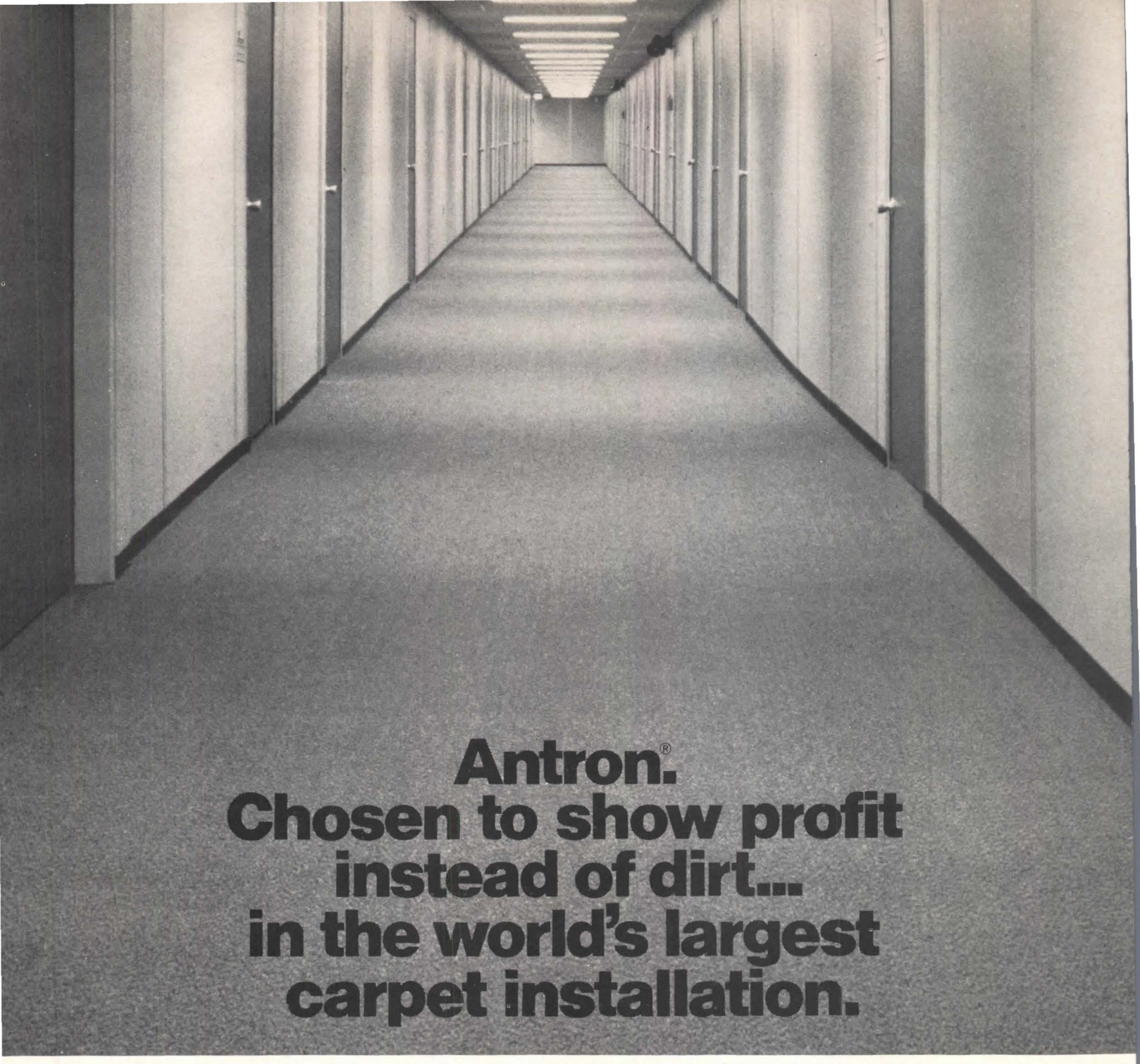
The plastic used in the elevators is light, easy to assemble, and offers easy maintenance say the manufacturers. It is a composite fiberglass and resin, trademarked Nalite, which is a laminated sheet about 3/16th in. thick, reinforced with a chopped fiberglass material that is sprayed on behind a gel coat. Insulation is of polyurethane foam.

The material features bright colors and is easily molded into a variety of designs. It is also fire-retardant and, with glass and fillers, the cab will not reach the point of heat distortion until 250 F.

Previously, plastic had been used only for the decorative panels in elevators. According to the manufacturers, this composite is the first structural plastic approved under the new New York City building code, as well as in Massachusetts, Connecticut and Pennsylvania.

The manufacturers expect that the elevators will lead to further applications of the plastic, such as modular housing, telephone booths and accessory buildings.

The elevators are molded in parts which can be easily replaced. They are manufactured by the National Elevator Cab & Door Corp. of Woodside, N. Y., of material developed by Reichold Chemical Inc. of White Plains, N. Y. Future installations are planned for the Yale Medical Center in New Haven, Conn., and the South Beach Hospital complex in Staten Island, N. Y.



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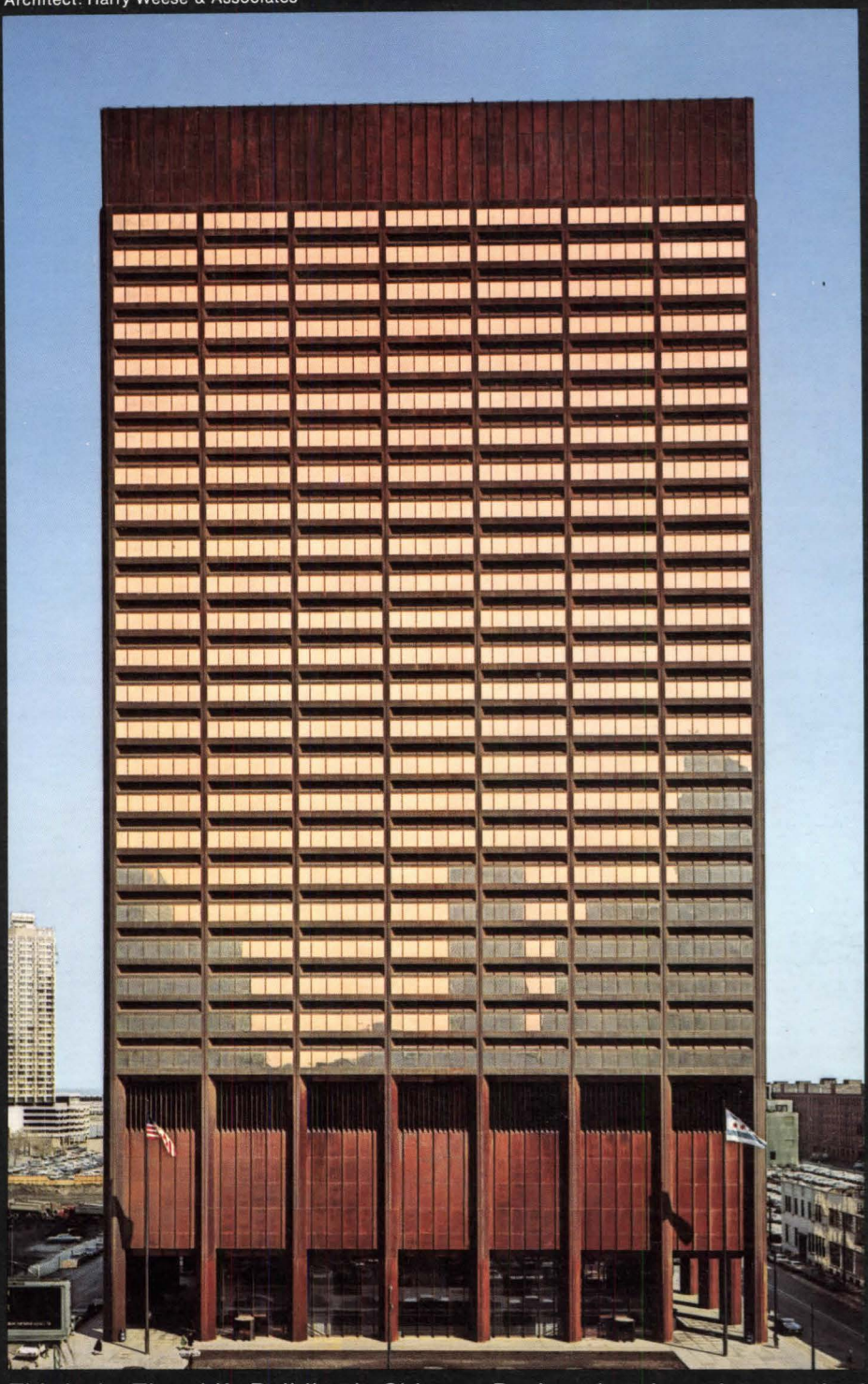

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Time-Life Chicago is one of the latest in a number of structures that feature Kinney Architectural Glass. Our booklet "Architectural Reflections" describes some of them. Please write for it. Kinney Vacuum Coatings, 7030 Colonial Highway, Pennsauken, New Jersey 08109.

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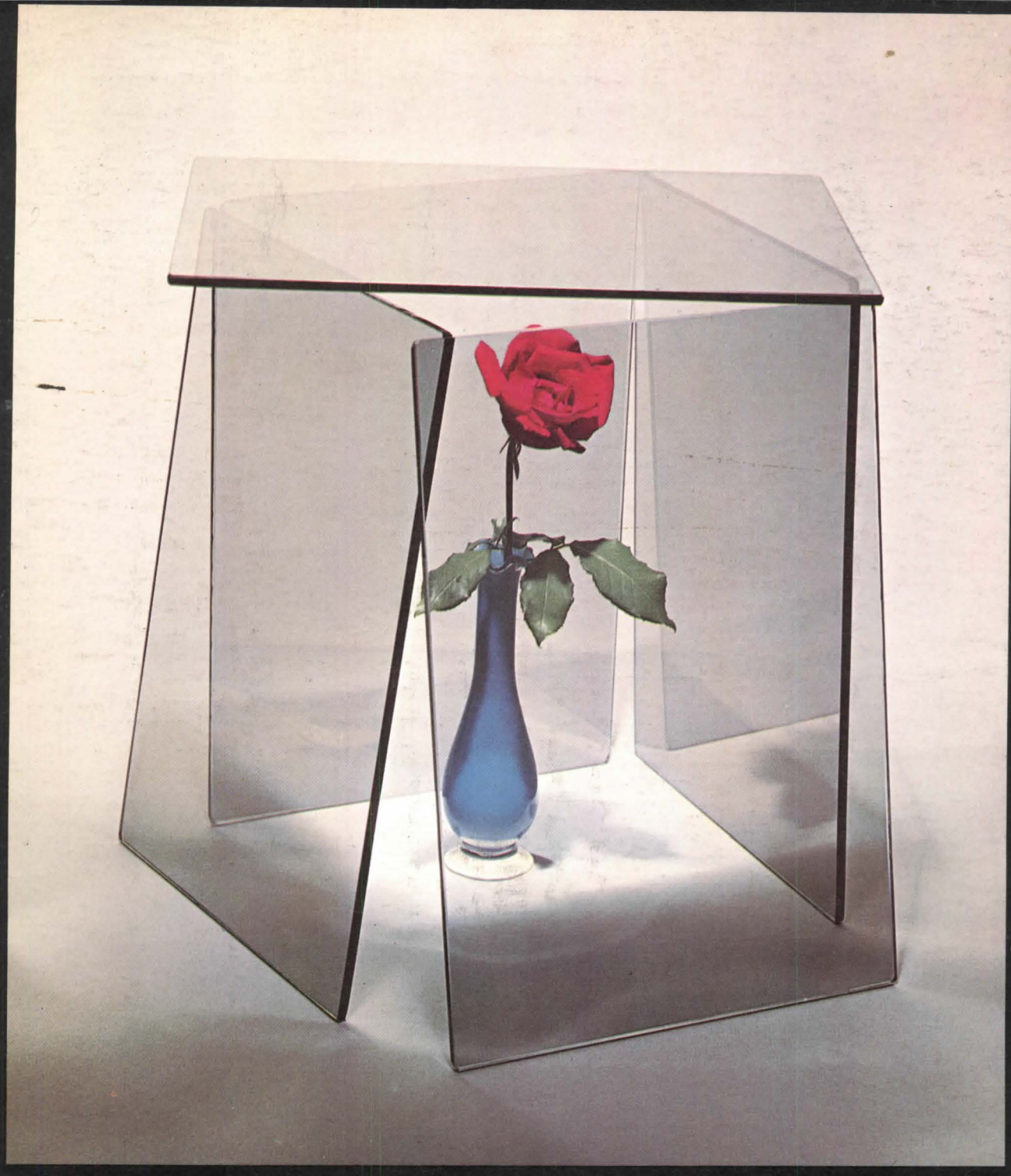

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