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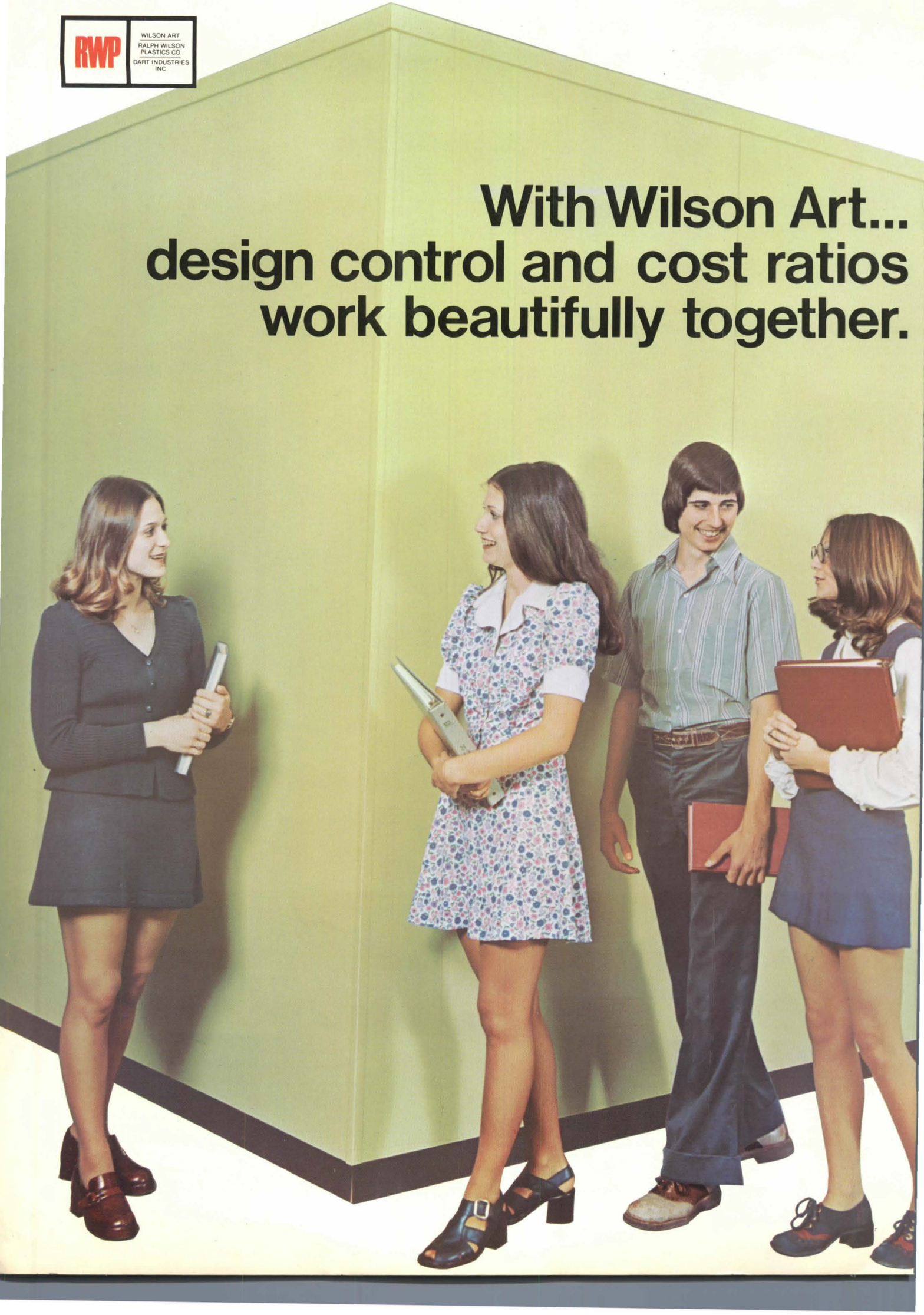

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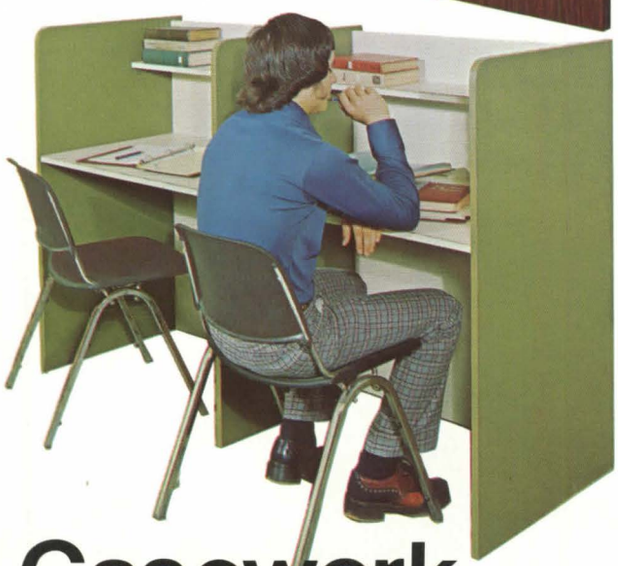

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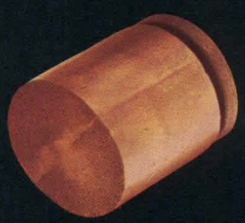

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ARCHITECTURE **plus**

THE INTERNATIONAL MAGAZINE OF ARCHITECTURE NOVEMBER/DECEMBER 1974

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Book Review

OPEN FOR INSPECTION

File under Architecture
by Herbert Muschamp
This provocative, passionate, informed, witty, and intensely serious critique of the idea of architecture begins as follows:
"I am an architect who has neither designed nor built any buildings nor has the inclination to do so. I call myself an architect purely out of the comic conceit which is all that remains of the Western architectural tradition . . . . Books last longer, take up less space, are easier to take care of, make better gifts than do most buildings. In the last analysis, architecture is not a very highly evolved state of mind."
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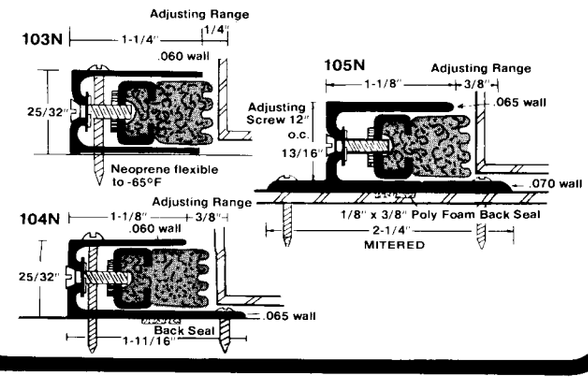

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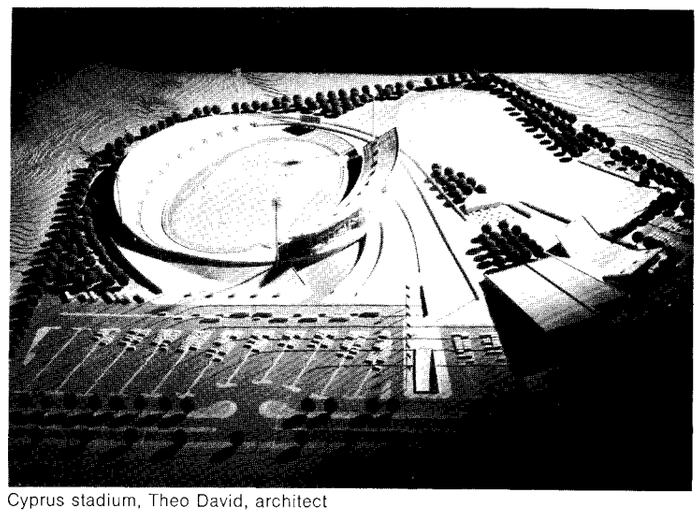


Cyprus stadium, Theo David, architect

Architectural elegy

The current tragedy of War in Cyprus has brought with all other disasters the elimination of a good portion of an outstanding contemporary architecture which until a few months ago, was flourishing on the island. The war atrocities will probably make it impossible for most of us to ever see and experience the work of our Cypriot colleagues.

Architectural activity on Cyprus was intense, fresh and innovative. The Cypriot architect, educated, as a rule, in Athens and in London, was able to function much more freely than his Greek counterpart, both in private and in public projects. The joy of prosperity of the years of Cypriot independence (1960-1974), the tourist trade and the international liberalism, permitted Cypriot architecture to break the chains of tradition and burst into the twentieth century. Formal expressions generally unthinkable in Greece due to religious and traditional restrictions, were taking place in Cyprus, producing works of magnificent excellence. Yet the greater part of Cypriot architecture was the promise for development that was there. The durable expressionism of reinforced concrete and masonry construction may perhaps mean that many of the works did not suffer total damage. One only wishes that they be restored and be brought to life under the most appropriate circumstances . . . And for all these Cypriot colleagues and School of Architecture classmates, that were recently working in Cyprus, that are still alive, may God give vigor to re-create what enthusiastically and consistently they were trying to do through their works of the years past.

ANTHONY C. ANTONIADES
Architect, Arlington, Texas

You are no doubt aware of the tragic events that have taken place on Cyprus. This invasion and continuing Turkish aggression and destruction has brought personal misery, and economic ruin to over 200,000 people of both communities on the island. This represents one-third of the total population of the Republic.

Not the least among the victims, are the members of the architectural profession, many who by armed terror and through military occupation have been forced to flee from their defenseless homes and offices with nothing but the shirts on their backs, not knowing what will happen next. Those whose homes and offices presently remain in Greek held territory, are faced with the problem of no work or income because of the economic ruin created by the occupation of over 40 percent of the area of the Republic, representing 80 percent of the productive land, by the Turkish invaders.

I myself am now a displaced person, that is my family and I have been dispossessed by Turkish military force of everything we own, everything except my office, which we are determined, must somehow survive.

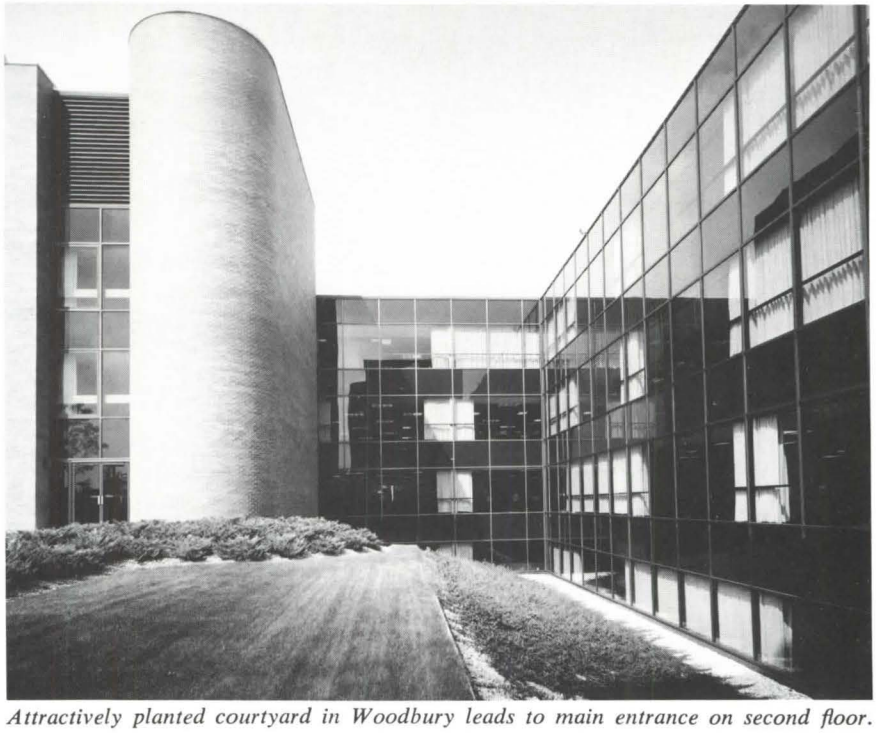
It must survive as must others, because the practice of an architect is more than a business, it is a necessary link between the past and future human environment, and the means through which a culture can survive and a people served. The practice of architecture on Cyprus, no matter how modest its

Continued on page 122

Case Study No. 11*

Owner Tests Heat Recovery Concepts for Five Similar Office Buildings in a $13.1-Million Prototype

It is rare indeed for designers of big commercial buildings to do more than one of a kind. Here is a case where the architects and engineers had the opportunity to prove their ideas in a working building before going on to four others just like it.



Attractively planted courtyard in Woodbury leads to main entrance on second floor.

Woodbury, N.Y. At the upcoming dedication ceremonies for the brand new GEICO office building in Macon, Georgia, some honored guests may be mildly troubled by sensations of déjà vu. The vague feeling will persist that they have seen the 250,000-square foot, five-level office structure with its three distinctive outrigger towers someplace before. But where?

The answer to that future enigma should it occur is right here on Long Island. Woodbury is the site of the first of five regional office buildings being erected by the company in major geographical sections of the U.S. Uniquely structured for the firm's special type of business and featuring an energy-conserving electric HVAC system, the Woodbury prototype is the work of the architects and engineers of The Kling Partnership. The same design team went on to do the Macon installation, putting them in the unusual position of being able to "second guess" their own work. While outwardly identical to the prototype, the second building includes beneath the surface some benefits stemming from experience with the first.

Serving the Civil Servant. Begun almost 40 years ago, GEICO (for Government Employees Insurance Company) originally limited its services to the select group for which it was named. Its special marketing plan was to keep premiums down by insuring only preferred risks and by selling through direct mail rather than commissioned agents. The firm has since broadened beyond its governmental orientation because it found that, thanks to computers, it can predict the risks inherent in insuring a particular driver on the basis of his own driving record. In the past, reliable driver data were lacking. Occupation was a handy criterion that usually correlated with potential risk.

Its broadened market enabled GEICO to hit the big time. It is now the fourth largest publicly held auto insurer with more than two million policy holders and $½-billion annually in premium income. Its growth rate has been about 16 percent yearly, roughly twice that of the rest of the industry.

By 1970 the press of increasing business began to strain GEICO's operational setup consisting of scores of local branches feeding record information back to a central data bank in the Chevy Chase, Md. home office. The mounting pressure prompted management to embark on a decentralization program, an essential part of which is the construction of the five regional buildings. Regionalization should also help the firm widen its geographical base. Nearly 80 percent of its business is currently east of the Mississippi.

Steady Employment. "The GEICO assignment is a designer's dream," says Robert Morrison of Kling's architectural division. "If he had a chance to start one of his buildings over again, every designer would do things at least a little differently. But when he specializes in big buildings his jobs are almost always one of a kind. With the opportunity to be involved in as many as five, we are fascinated to watch how the basic design evolves from job to job."

The Woodbury prototype is set on 21 acres amid a mix of farm properties and expensive suburban residences. Completed in late 1972 at a cost exceeding $13 million, the building is enclosed in earthy toned brick and bronze-tinted glass. There are four floors of office space plus a basement which houses all of the basic supporting services such as the employees' cafeteria and kitchen, mail and printing departments, storage spaces, and mechanical, electrical and telephone equipment rooms.

Inclined to Save. The building is presently L-shaped, partially enclosing the entrance court. A 150,000-square foot wing to be added in a second phase of construction will enclose the court on a third side and the building will take the

One of a series of reports giving recognition to the efforts of architects and engineers on behalf of resource conservation.

An idle chiller gives visible testimony to the effectiveness of conservation measures devised for the closed-loop HVAC system by the building's operating staff.

form of a U. The open end of the plaza leads directly to an employee parking lot for 1000 cars.

The center portion of the plaza has been graded to form a gentle slope between the second level of the building and the parking area. The mounded earth is well planted and appears to be a landscaper's ploy to relieve the otherwise flat terrain surrounding the building. Not entirely, says architect Morrison. "That gentle slope you see represents a considerable saving in elevator kilowatt hours. It enabled us to put the main entrance on the second floor midpoint and, thus, encourage people to use the stairs. Any level of the building can be reached easily by climbing at most two flights up or two flights down. If it had to, this building could survive as a 'walk-up'."

Shifted Shafts. In writing the design guidelines for the work environment, GEICO management showed commendable concern for the psychological well-being of rank and file employees. Most particularly, the departments where repetitive clerical routines are performed were to be as unconfining as possible. The architects responded with comfortable and spacious work areas having an open feeling created by the window walls. So-called general offices were run right out to these walls; only two private executive offices of modest size have favored window positions.

A major innovation made to achieve openness is the strategic breakup of those services that are usually concentrated in a solid core built dead center. Three curving brick towers extend out from the building at intervals along the perimeter. These outboard "cores" contain elevator shafts, stairwells, restrooms and telephone and electrical closets. Pay telephones and vending machines for cold drinks, candy, cigarettes, etc. are also located there. Penthouses above the towers are for miscellaneous mechanical equipment such as ventilation fans, heat recovery wheels and evaporative coolers. Two additional cores will be erected when expansion plans materialize.

Structurally the steel-framed building is made up of 24-foot modules to keep interior columns few in number. While openness was the objective, it was achieved without any suggestion of bareness. Color-coordinated furnishings and equipment, an occasional short length of seven-foot-high divider panel, a sprinkling of original works by local Long Island artists are some of the elements that draw attention from the dimensional vastness of the interiors.

Floor Flaws. In translating the Woodbury experience to Macon, the major architectural change found necessary was, surprisingly, in the floors. A completely different floor system was installed to accommodate some unanticipated shifts in operating methods.

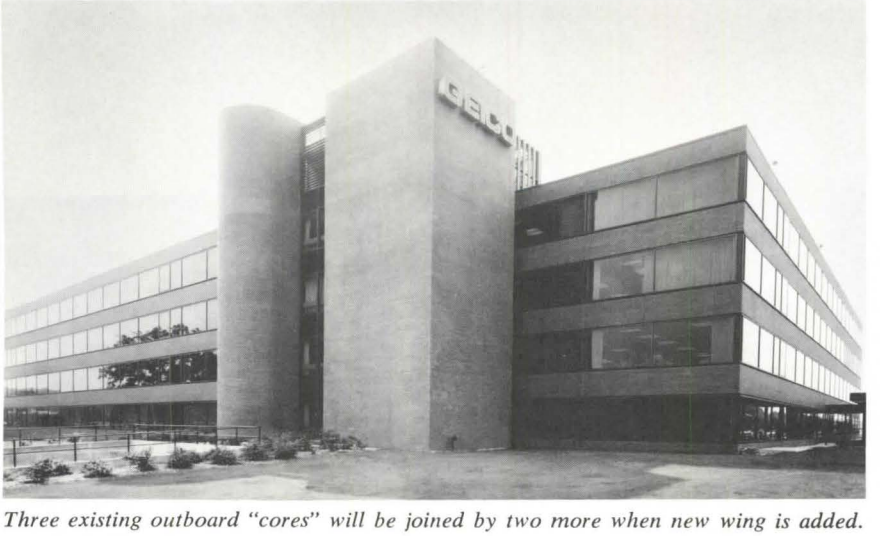
In the past decade or so the insurance industry, like some others, has become what has been described as "electronics-intensive." Telephone communications and, especially, electronic data processing have become so integrated with day-to-day operations that an insurance company of today would find it nearly impossible to function without them. In terms of building design this situation has put new emphasis on electrical wiring systems. For them, flexibility has become the essential specification.

Architect Robert Morrison found that even in duplicating a building design there is still plenty of room left for innovation.

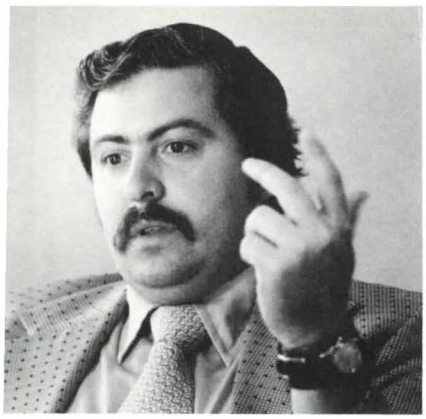
GEICO, because of its special marketing approach, may be even more electronics-intensive than others in its field. "We were aware of this, of course," says Kling electrical engineer Ronald L. Wilkins. "We knew we had to make provisions to permit wiring changes when work stations are moved, new equipment added, systems upgraded,etc. So we imbedded what we thought was a generous network of wire and cable ducts in the floor slabs. When a work station had to be added or relocated, for example, the building people could activate it handily by threading the ducts with the wires needed for telephones, electrical outlets, intercoms or whatever."

Santa's No Help. The designers' foresight worked out well in Woodbury—up to a point. But then the building's wiring requirements jumped suddenly beyond what had been anticipated. A number of factors contributed to the jump. On one end of the scale of events was the introduction of circuit chips and liquid crystals into the consumer electronics market a few Christmases ago. Soon after miniature calculators became a popular gift item, they began to appear on staffers' desks and are now regarded as an everyday office tool. "We have to activate (provide electric outlets for) 85 percent of the desks."

Further up the scale of importance was the decision to provide direct access to computer-stored policy information to the large group of employees who handle phone calls from customers. By means of a CRT screen (much like a portable TV set) installed on his desk a Woodbury staffer can in seconds query the central data bank in Chevy Chase



Three existing outboard "cores" will be joined by two more when new wing is added.



Electrical engineer Ronald L. Wilkins recommends a different kind of floor system when a business is electronics intensive.

HVAC engineer Howard Shaner prefers the sort of heat recovery system that lets a person keep his two feet on the ground.

GEICO administrative engineer Michael Lucas had some misgivings when he abandoned the financial district for suburbia.

for a visual display of the records of any policyholder. The CRT units involve extensive cabling.

Learning from the Woodbury experience, the designers went on to provide Macon with almost unlimited wiring capability. Their approach was to raise the finished floor surfaces five inches above the slabs. The result is that the entire space between floor and slab functions as a raceway. Floors are made up of two-by-two-foot steel plates, stiffened by a bridge-like under-structure and surfaced with carpet, which are supported by vertical pins. Floorplates can be lifted out for access to the raceway beneath them.

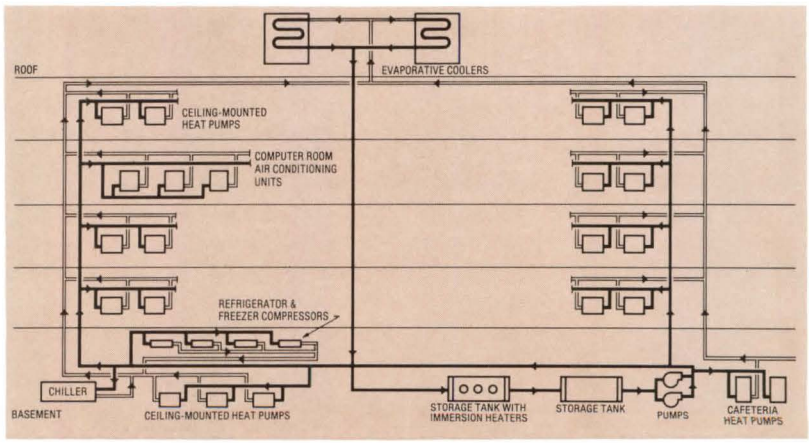
Energy Conservation. The engineers selected an electric heat recovery HVAC system to maintain a comfortable inside environment year around. A number of elements were considered in the choice including cost, ease of maintenance and adaptability for zoning. A primary aim was to optimize energy consumption. Another was to avoid the discharge of combustion products which might be objectionable to the surrounding residential communities.

The system employs electric water-to-air heat pumps working into a closed loop of circulating water, plus an arrangement of four heat wheels in the exhaust and inlet passages. In office buildings of this type, cooling of interior spaces and heating of perimeter spaces are often needed simultaneously. As in any heat recovery application the design objective here was to salvage heat that would normally be wasted and reuse it elsewhere.

The major portions of the building, both interior and perimeter, are served by a total of 185 ceiling-mounted heat pump units rated at three and four tons. Each operates independently of the others and can be on heating or cooling at any time regardless of what is happening in the rest of the system. In the cooler months the system removes excess heat from the interior zones and, by the medium of the water circulating in the pipes connecting the heat pumps, makes it immediately available for use at the perimeter.

Each heat pump unit is controlled from a space thermostat with automatic changeover from heating to cooling and vice versa. Interior zone thermostats are preset for a 68F to 76F deadband which permits reduced compressor operation without significantly affecting the comfort of the occupants. Had thermostats in these areas been set at a fixed 68F, compressors would be operated almost continuously—on heating or cooling—with higher energy consumption. The wide deadband also precludes the possibility of adjacent units "fighting" one another, e.g. one attempting to cool while its neighbor is trying to heat the same space.

During winter the heat wheels recover up to 80 percent of the heat content of the air exhausted from the building and use it to preheat the ventilation air being brought into the building. In summer, when the exhaust air is

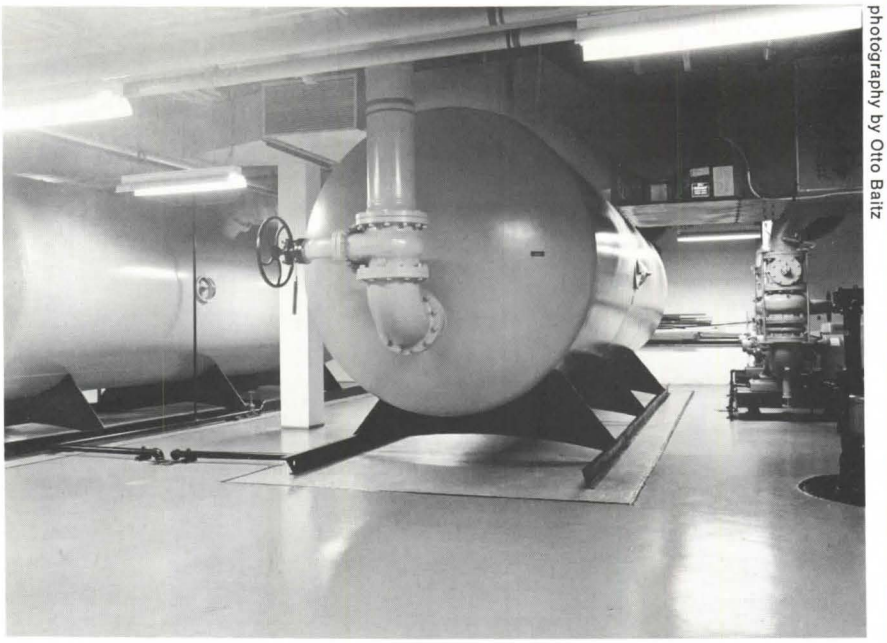


HEAT RECOVERY WATER LOOP

This flow diagram points up the wide extent to which the closed loop of circulating water is used for recovering heat from many sources in the GEICO building. The bulk of the connections are made, of course, to the 185 ceiling-mounted heat pump units distributed throughout the general office areas. Some other spaces require special refrigeration and air conditioning considerations. The equipment serving those areas was selected for compatibility with the overall energy conservation concept.

All units are water cooled and, as indicated, on the flow diagram, have their condensers connected into the heat pump water loop. The special areas and the equipment serving them are: computer room with three 16-ton packaged air conditioning units; kitchen/cafeteria with air handlers and a 125-ton centrifugal chiller; and the food storage area with five compressors for walk-in freezers and refrigerators.

Excess heat generated during the day is stored in the two 10,000-gallon tanks which are part of the loop. The stored heat is available for use at night, supplemented by three 90-kw immersion heaters installed in one of the tanks. The temperature of the condenser water loop is maintained between 70F (winter low) and 92F (summer high). Below 70F the immersion heaters are energized and above 92F the evaporative coolers are gradually phased into operation.



photography by Otto Baitz

Any recovered heat not needed immediately is stored in these tanks for use later.

cooler than the outside air, the wheels serve as precoolers.

Broadway Bound. In a theatrical sense the producers of the GEICO buildings had the chance to try the HVAC system out of town before bringing it into Macon for a long run. Did the script require any doctoring on the road? "We did indeed make a major change," replies Kling HVAC engineer Howard Shaner. "Not in concept, however. If anything, the closed loop system performed even beyond expectations and we are using it again. Sizings and ratings of components are about the same. Even the storage tanks are identical in capacity although we were able to install smaller immersion heaters because of the Macon climate. The important thing we did was to take the heat pump units out of the ceiling."

For their second effort the designers altered their specifications to call for floor-mounted heat pump units. In the peripheral zones these are of the cabinet type placed against the outside walls and delivering conditioned air directly into the office space. For the interior zones upflow units are installed in small closets and their output plenums connected to short runs of lateral distribution ducts above the ceiling.

"What we've done, in essence," says Shaner, "is simply to make the equipment easier to get at. The result is a dramatic improvement in the maintenance situation, although we do pay for the improvement because we lost some floor space. But it is, for example, much simpler to change an air filter standing on the floor rather than a ladder." Another benefit of the revised arrangement is that it ends the need for frequent removal of ceiling panels and resulting impairment of the flame-resistant membrane.

Building Tune-up. The man closest to the HVAC situation in Woodbury is GEICO administrative engineer Michael Lucas. Recruited from New York City's financial district where the systems are scaled for skyscrapers and supplied by steam-driven chillers, he came on the scene soon after ground was broken. Lucas admits to feeling less than enthusiastic at first, thinking that a collection of small heat pump units could hardly do the job of a big central system. No longer. He now identifies fully with the closed-loop approach.

"During the first few months, the modular layout of equipment," says Lucas, "gave us a great deal of flexibility in adjusting operation of the system—in tuning up the building, so to speak. There were so many variables —zone temperature, loop temperature, ventilation rates, etc.—that we could experiment with to control energy use."

Lucas boasts that his staff has found ways to cut electrical demand almost 40 percent below expected peaks.

Dramatic proof of the effectiveness of Lucas' conservation program is the 125-ton chiller which stands idle virtually all of the time in the machine room. Lowering of heat gains below calculated values and accepting some temperature increase in the cafeteria areas enable the unitary heat pumps to handle the entire cooling load. It appears now that consistent use of the big chiller can be deferred until the new wing is added.

DESIGN SUMMARY

GENERAL DESCRIPTION:

Area: 250,000 sq ft
Volume: 3,200,000 cu ft
Number of floors: four plus basement
Number of rooms: 300
Types of rooms: general offices, private offices, cafeteria, kitchen, lounges, mail-room, computer room, utility rooms, storage, equipment rooms, training center

CONSTRUCTION DETAILS:

Glass: single solar bronze
Exterior walls: 12″ brick and block; U-factor: 0.32
Roof and ceilings: built-up roof on 2″ rigid insulation (R-7) on concrete deck, suspended acoustical tile ceiling; U-factor: 0.1
Floors: concrete slab
Gross exposed wall area: 72,400 sq ft
Glass area: 25,000 sq ft

ENVIRONMENTAL DESIGN CONDITIONS

Heating:
- Heat loss Btuh: 8,632,096
- Normal degree days: 5280
- Ventilation requirements: 62,000 cfm
- Design conditions: 5F outdoors; 70F indoors

Cooling:
- Heat gain Btuh: 9,905,520
- Ventilation requirements: 62,000 cfm
- Design conditions: 93F dbt, 77F wbt outdoors; 76F, 50% rh indoors

LIGHTING:

Levels in footcandles: 50-100
Levels in watts/sq ft: 2-4
Type: fluorescent

CONNECTED LOADS:

Heating & Cooling (825 tons)	2866 kw
Lighting	936 kw
Cooking	300 kw
Other	1403 kw
TOTAL	5505 kw

PERSONNEL:

Owner: Government Employees Insurance Company
Architects: Vincent G. Kling & Partners
Consulting Engineers: Kling/Lindquist, Inc.
General Contractor: Turner Constr. Co.
Electrical Contractor: Fishbach & Moore
Mechanical Contractor: Kool Air Systems, Inc.
Utility: Long Island Lighting Company

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letter from CHANDIGARH

by Subhash Chakravarty

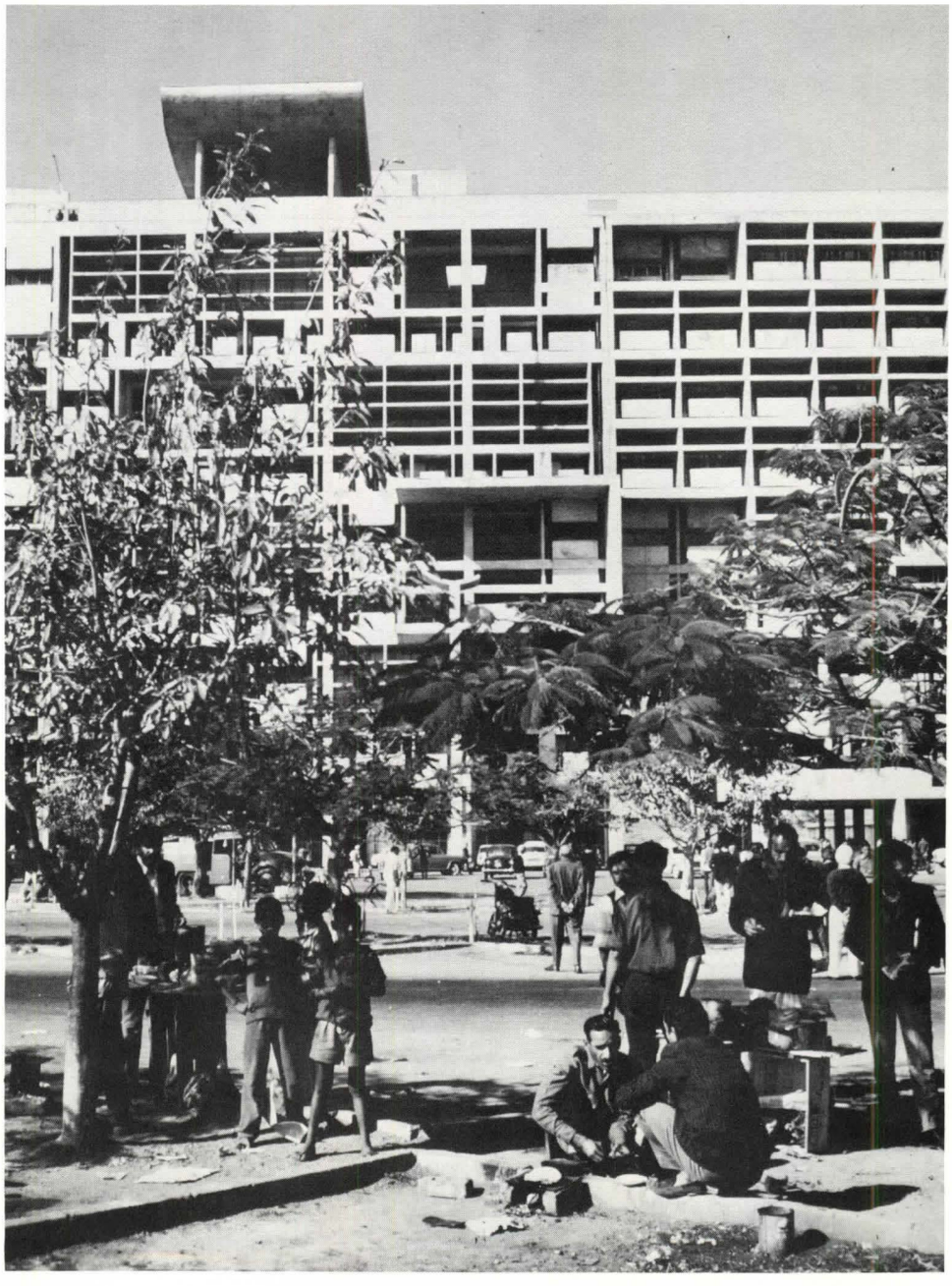
"Leave it to me, Sahib. I shall take you around all the good places for your photographs." Thus, the chauffeur of the Chief Architect's office had already taken me as one of those visitors who come with their cameras to capture Le Corbusier's dream city. He must have been rather puzzled by my interest in people rather than buildings.

The eight years which had passed since my last visit to Chandigarh had seen phenomenal changes in the city. The master architect Le Corbusier died, of course, in 1965. More recently, his cousin and principal collaborator Pierre Jeanneret died. And there were political changes as well: in 1966 the Act of Reorganization of States carved out a brand new Hindi-speaking state called Haryana, of which Chandigarh was designated the capital. In addition, the city was given a federally administered status as the Union Territory of Chandigarh. It remains, as well, the capital of the State of Punjab, and so is under the simultaneous jurisdiction of three political bodies.

The first phase of Chandigarh's building, now completed, included the famous monuments of the Capitol complex, 29 residential sectors, and an industrial area. Intended for a population of 150,000 people, the first phase now accommodates 250,000, and, at the present rate of growth, a population of almost 850,000 will occupy the city in its final phase (now planned to have 65 sectors rather than the original plan's 47).

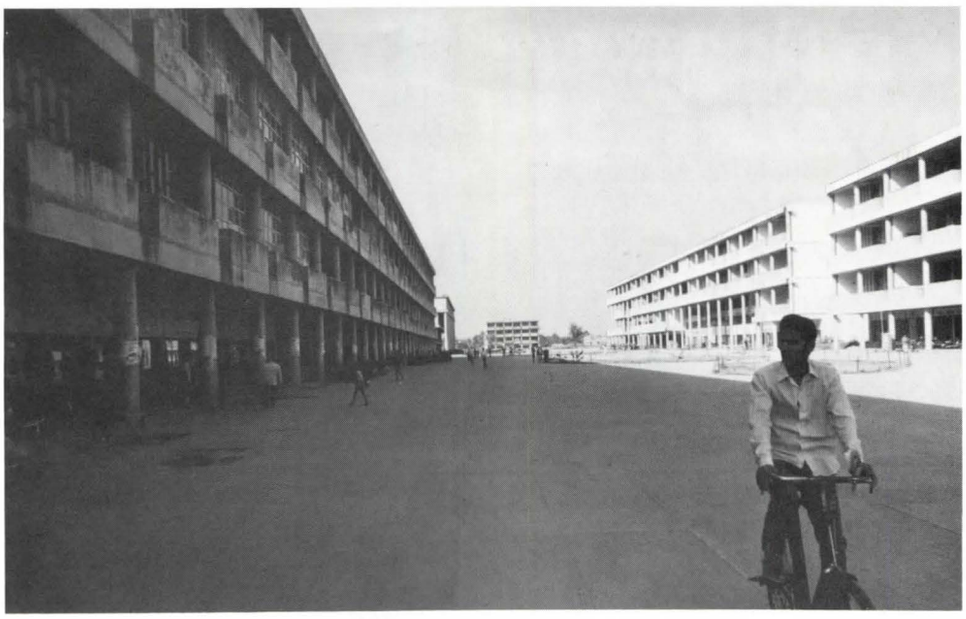
One physical effect of this unexpectedly large population is that the original concept of a five-mile-wide green belt preserved around the city has been abandoned. Different parts of this peripheral area are under the control of the Haryana, Union Territory, and Punjab power systems, and each system has planned its own industrial sector there, subject to no regional planning or coordination.

Another effect of the large population (a result of an increase in numbers of industrial workers as well as a burgeoning of administrative staffs of the new governments) is a shortage of housing for the poor. Like all other major cities in India, Chandigarh has slums. This is characteristic of urban centers where large numbers of unskilled migrant laborers move in for temporary employment associated with road or building construction projects. They move from one project to another almost like nomadic tribes, making their own shanty dwellings—with no sanitary facilities or sewer system—from the debris of building materials and city garbage. The most that may be provided them by the city authorities is a new community water tap for a cluster of 50 to 100 families. Economically and socially, these workers belong to the lowest stratum of urban society and are living in sub-human environmental conditions. They can never be integrated with the urban community because of the indifference of the city authorities to deal with their problems and because of the social attitudes of the people of higher economic classes. These are vestiges of the outlawed caste system, practiced in a subtle form.



Subhash Chakravarty is an Indian architect now practicing in New York. He studied at the University of Delhi and at Columbia University, and has visited Chandigarh several times since its construction.

Left, in front of Le Corbusier's Secretariat building, illegal food stands flourish. Below, a pedestrian boulevard virtually deserted between housing blocks, and an official commercial district overwhelmed with the disorder of private enterprise.



Government agencies are conducting studies for dealing with the physical problems that Chandigarh is facing today, but the pervasive sociological, cultural and economic problems of the city seem to have been ignored. The climate for the development of a viable urban community does not exist. For architects and planners once associated with the project, the city still holds nostalgic reminders of the architectural experimentation of the '50s and '60s. But for an average Indian, Chandigarh has no special significance. "It is just another town. . . ." And even a prominent city planner teaching and practicing in New Delhi, when asked about Chandigarh, said, "It is a dead city. . . . It can only be preserved as an historic monument."

Chandigarh was born as a symbolic capital for those millions of refugees torn apart by the civil war of 1947. Even before Le Corbusier stepped into the shoes of Albert Mayer and Matthew Nowicki, his planning predecessors at Chandigarh, the city's die was cast. The plan was made at a time when social order was given first priority. Le Corbusier's master plan, like Mayer's before it, had the grandiosity and formality of such order. Based on an organization of self-sufficient residential sectors through the segregation of high-speed, low-speed and pedestrian traffic, the plan took a bold step towards the establishment of a human scale.

On the other hand, disharmony and visual chaos prevail within the residential sectors and the commercial districts. The visitor, at first look, may be confused by these opposing moods. Looking more closely, one begins to identify overlapping images of formalism and realism. The reality represents a life style which, at every point of confrontation with the coercive discipline of orthogonality and anonymous regularity, has shown tremendous resistance.

Le Corbusier's enormous complex which houses the three components of the government symbolizes a democratic society with a reliance on science and technology. The only logical extension of this spirit should have led to the realization of closely knit residential communities and their supporting services, with the pedestrian autonomous. Presumably it was Le Corbusier's intent to achieve this quality. But the residential sectors succeed only in destroying such a spirit. Lack of a sense of cohesion is normal when a city is being developed in scattered instances and from its perimeter inwards. But now, when most of the residential sectors have been completely developed, the "open spaces" of the once promised "radiant city" have shrunk to hopeless voids. The dispersion of the residential units, although in the name of "access" and "open space," have failed to provide a feeling of warmth. Considerations of hygiene in the spacing of the dwelling units have been stretched to sterility.

Chandigarh's traffic pattern was a major concern in the city's planning. This concern has served only as a basic matrix for decision making. As a system, it has failed to effect the envisioned liberation of pedestrians from automobiles. The development of the city in scattered instances has created problems of concentration of traffic in the inner sector streets which have a finished street pattern. The motorists can relate to these streets better than to the

Continued on page 18

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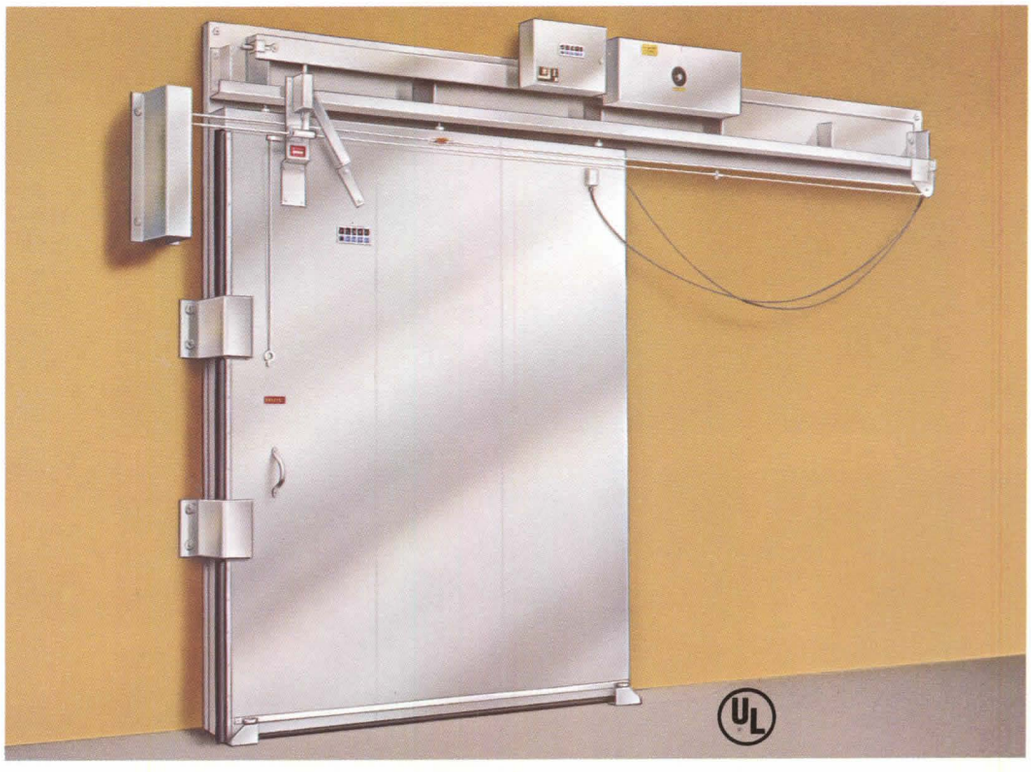

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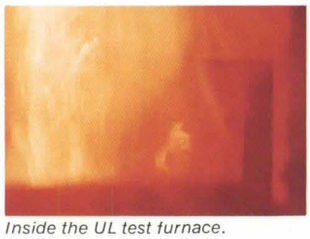

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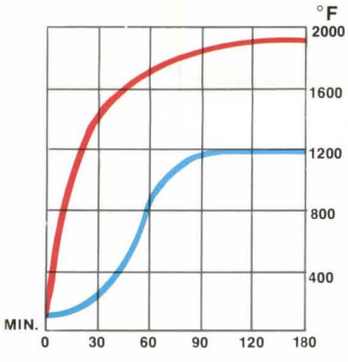

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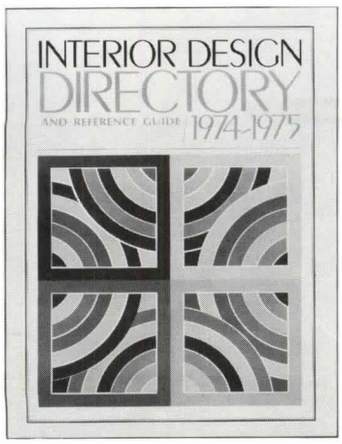

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Beyond a metal gate, one of the broad lawns and elaborate "bungalows" of Chandigarh's elitist civil service class.

speedy detours of the streets outside the sectors, which have little to offer for visual excitement. Here again, a delineated logic has yielded to an instinctive life style.

The failure to create pedestrian malls (not just barricaded streets) has to do with contradictions in Indian urban life style which the "pundits" are hesitant to deal with. The instinctive life style may have immediate association with human and atechnological values such as natural environment, landscape, and freedom from the intimidations of the automobile. Curiously enough, the social, economic and cultural conditions at Chandigarh are conducive in encouraging only an opposite set of values, in which progress is directly synonymous with the growth of technology irrespective of its adverse effect on the human environment. The question raised by this argument for a pedestrian's paradise is *precisely who would do the walking?* Certainly not the rich entrepreneur nor the relatively rich public servant who uses the automobile as his status symbol, nor the alienated intelligentsia who have no time or desire to rub shoulders with the "riff-raff." By elimination, it has to be the large numbers of middle-income and poor people, people who have tacitly endorsed the supremacy of the automobile and don't even fight for a pedestrian's right of way.

The traffic problem also points to a wider range of considerations which are cultural and peculiar to India. In rural Punjab, where the tractor is about to replace the traditional bullock cart and plowshare, the farmers dedicate the new machine with the rituals they have been practicing for centuries. The folk art decoration on trucks and scooter-cabs tells of the farmers' myths and fantasies in which chariots and flying horses rule. These values are beyond the rationale of pollution, and beyond the hazard and dignity of pedestrians.

On the other hand the possession of an automobile is a symbol of status and is often exhibited in a form of irrational arrogance. In the crowded bazaars of old Delhi, where the average speed of traffic is hardly five miles per hour, it is below the dignity of motorists to abandon the wheel. No alien school of thought, unless it be well adapted and conditioned to the old and complex value system, can establish its roots in India. (The two hundred years of British influence survived only by its adaptation of

the caste system in the form of colonial bureaucracy.)

Thus questions arise as to the vast discrepancy between the content and the ideology of the master plan. On the one hand the concept has a promise of a new social order, but on the other hand a subtle form of the old caste system prevails in the planning of the residential sectors. A sizable majority of the working population in Chandigarh are civil servants. They live in and identify themselves with their sectors which were allotted strictly according to civil service title and economic status. This rigid social stratification is evident in the programming and budgeting of thirteen categories of houses (which resemble the program of housing developed by Sir Edwin Lutyens in New Delhi in 1913). The housing ranged from House Type I (for the Chief Minister), of which one was to be built at a cost of 250,000 rupees (about $50,000 in 1950), to House Type XIII, of which 1,101 units were planned at 3,250 rupees each. This stratified system perfectly matched with the cross section of the community that constituted the population of Chandigarh. It consisted mainly of four distinct socio-economic groups: the civil service class, the refugees, the white collar workers, and the laborers.

The elitist civil service class of Lahore had migrated to India from Pakistan. Its life style had little in common with that of an average Indian. Although its members had an influential role in decision making processes in the city planning office, their idea of planning for a democratic society was very limited. They were accustomed to living in large "bungalows" in Lahore with a number of "servant quarters" in the rear. (Reports indicate their insistence on "dummy fire places" in their living rooms as status symbols.) In sectors 4 and 5 are these bungalows, with large lawns and driveways and with some domestic servant quarters at the rear—because of which this was fondly termed "mixed housing."

The second group of the population in Chandigarh consisted of a large section of uprooted refugees from West Pakistan. They were poor but strong and enterprising people with the traditions of rural society. Their natural associations were more with town "Mohallas" (organic neighborhood units based on a feudal model) than with the organized neighborhood sectors.

The third group, the white collar workers, consisted of a large section of lower administrative personnel of government offices. They were typical of their class in their complaisance. This urban intelligentsia, although trained at Indian Universities, exhibited a life style mixing both traditional and modern scientific value systems. For these people, the adaptation of western values of life is a matter of economic and pragmatic convenience. It is accepted only to a certain point, and only in order to be able to function properly in the given economic and social system. The planning and organization of this group's dwelling units have failed to provide the flexibility for its cultural needs.

The last group consists of the unskilled laborers who migrated from the country for cheap employment in the construction industry, and of whom we have already spoken. The physical conditions of their living quarters are remote from any standard of hygiene and human dignity. Curiously enough, the city has been constructed by a labor force whose housing accommodation has never been a part of its grand agenda!

When people from diverse social backgrounds interact through the processes of urban life, the heirs of this mingling often undergo a unique social and cultural experience. Twenty years of settlement of

Continued on page 20

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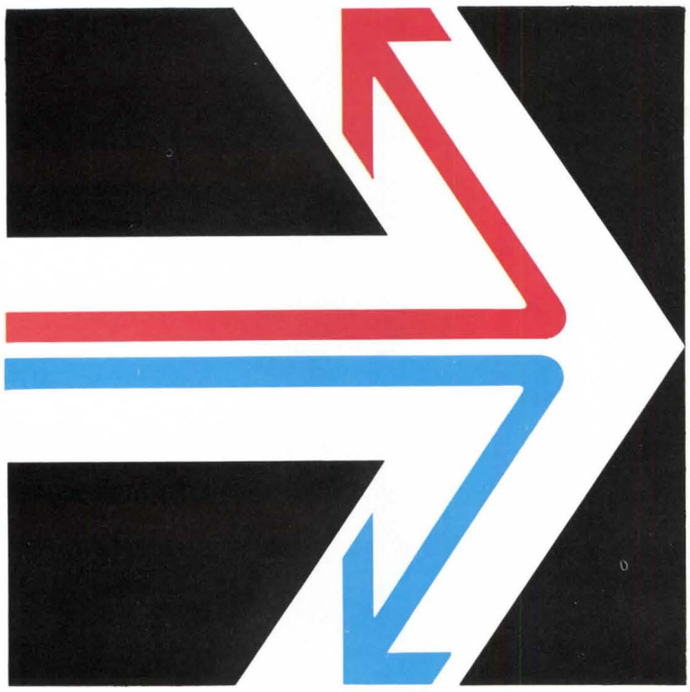

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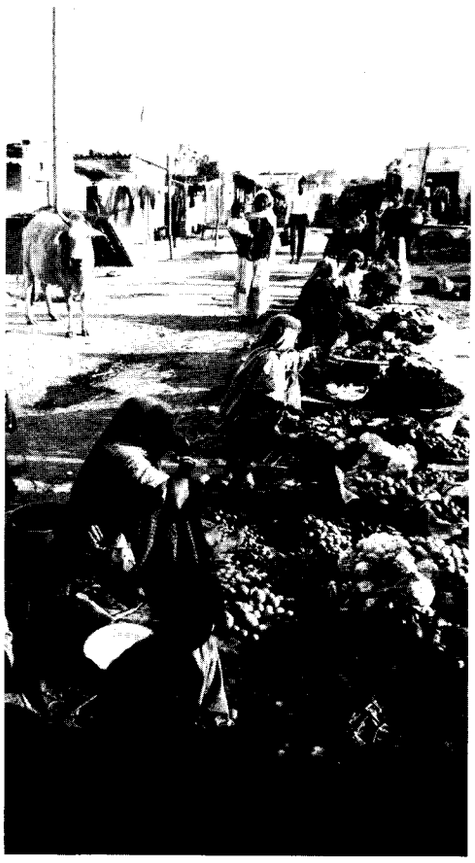
Right, one of the outlawed, but still prevalent, open markets. Below, the shanty of an unskilled migrant worker, "remote from any standard of hygiene and human dignity."

Chandigarh, however, has failed to develop any form of urban institutions. On the contrary, the city has successfully frozen the various economic and social groups in their well-guarded compartments. What is more painful is that there is no sign of the existence of any form of cultural and social activities even *within* these groups.

One of the major considerations in the concept of Chandigarh's plan was the provision of ample amenities for leisure activities. But the art galleries, museums and libraries are seldom used by the citizens, and the public places and parks do not offer the excitements of urban life.

From the prolific sketches of Matthew Nowicki to the precise delineation of Le Corbusier's master plan, the planning processes were marked by development of a system of hierarchical spaces. In both cases, this organization of spaces designed for ceremonial, public, communal and private functions was closely spelled out. With the best of democratic intentions, the planners wanted to introduce intermediary stages of spatial hierarchy to a society where, historically, the intensity of life polarized in the extremes—i.e., in the ceremonial places of temples and palaces and in the intimate sanctum of private dwelling. Between these two extremities lies the enormous flux of human activities in every conceivable form and scale which makes the Indian cities so Indian. Questions arise about the vast difference in the way the oriental and the occidental people relate to private and public spaces. There are complex cultural and climatological interactions which determine modes and attitudes of life. Privacy, for example, which is one of the determining factors in the western culture, has little importance in Indian life. For that matter, the concept of privacy for the poorer section of Indians is a matter of body language and has no spatial connotation. People of India, especially in the north, are used to performing a considerable amount of their daily chores outdoors. Here outdoor space is a mere extension of habitat. The ritual of using a public park has no significance. The dry logic of designations of living, working and recreational space has little relevance in a culture where life is a process of instinctual and spontaneous growth. The organically developed market spaces in Chandigarh exhibit spontaneity and a richness of texture and quality virtually non-existent in the planned environment. The abundance of the open space and the landscape is truly reflective of Le Corbusier's "Radiant City," but the idea of the city as a container of man's cultural dimensions seems to have been lost in the process of adaptation to the Indian system.



Today Chandigarh is passing through a critical period. Opinions about it are sharply divided among the architectural community in India. The professional body is raising a voice against the government's decision to build new industrial complexes in the peripheral zone once reserved as a "green belt." At the same time, the government agencies are in favor of revamping the industrial base for economic and political reasons. Both these ideas, if carried to the extreme, can bring disaster. The puritan attempt to preserve the sanctity of the master plan may rule out the possibility of any experiments and restudy. To freeze the master plan (especially when even Le Corbusier did not find the program exciting enough) could be a historic blunder. Chandigarh today is a valuable test tube for the study of future planning problems.

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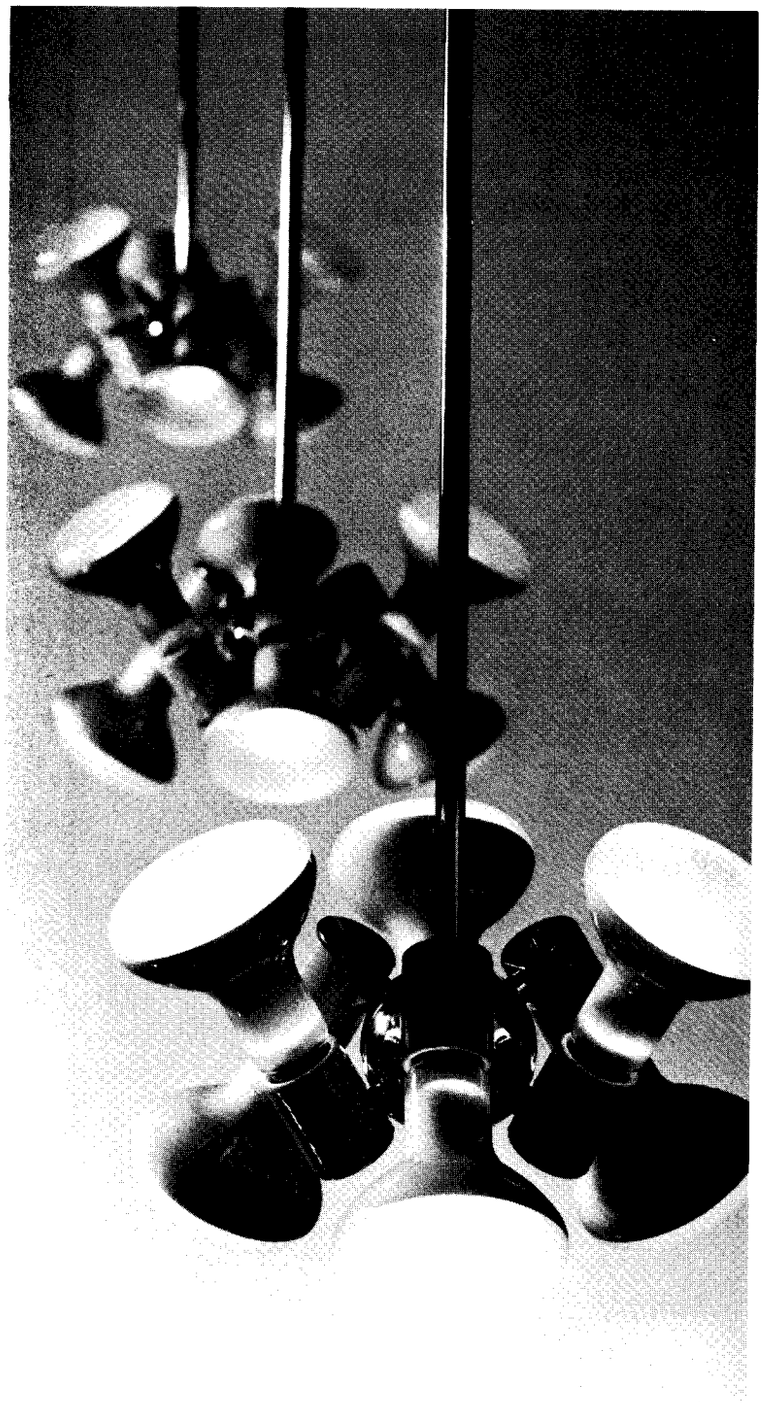

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Book Review

Continued from page 6

work compares unfavorably with Wright's. He concludes his discussion of both Greene and Greene and Maybeck with comparisons. About Maybeck's Christian Science Church Jordy concludes: "Wright's work (Unity Temple) is the greater achievement: the space is more abstractly and austerely controlled; ornamentation does not depend on sentimental recall, but exists as the integral elaboration of an original system of structural and spatial circulation. . . ." (p. 312).

The first part of this statement reflects Jordy's bias. What particular virtue is there in creating an austere, abstract space for a church? It might be more relevant to ask whether or not the space inspires, uplifts, or becalms. Can the preacher be heard? Is the building so designed that latecomers will not disturb the service? Secondly, what is integral about Wright's linear decoration? He places dark lines over plain, light colored, sharply defined rectangular units in an obvious attempt to join parts of an interior which might otherwise appear as disparate. Finally, Maybeck certainly cannot be accused of not having created an original system of structural and spatial articulation.

The growing interest in the architecture of Maybeck, Greene and Greene and Gill suggests to this reviewer that, wherever possible, the reader should have correct information before distortions are perpetuated. My research notes on Maybeck's career are at odds with the material presented in this book. Jordy ascribes certain attitudes and theories to Maybeck. He gleans these theories not from Maybeck's most significant work but rather from his pamphlet on the Palace of Fine Arts and from conversations he had at the ailing Maybeck's bedside when the architect was in his nineties (he died at age ninety-five). The result: a devastating attack on Maybeck's entire *oeuvre*.

Standing and open to the public today are at least two excellent examples of Maybeck's early work in Berkeley which Jordy need not have ignored: the Town and Gown Club and the Faculty Club. The former typifies the interiors of Maybeck's first houses: all redwood boards left unpainted, handcrafted and hand-carved detail underlining its simplicity, banks of tall casement windows flooding the rooms with light. If comparison with Wright must be made, it is time to ask whether Wright might not have found inspiration in Maybeck's simply designed, environmentally-blending, all-wood houses when developing the so-called Usonian house (compare the Pope-Leighey house of 1940 with any of Maybeck's wood houses from 1894 on).

The second objective of the book may be realized with as much difficulty as the first. One wonders whether straight, dry extensive visual analysis is the best way to provoke the reader's interest, or encourage the "novice" to the "actual experience of architecture." How important is the lack of originality of Sullivan's ornament? How necessary is a beam by beam description of wood members on Greene and Greene's Gamble house? Why must the garden elevation of Gill's Dodge house be dissected until the author can see little in it beyond "a happy incident" in a "provincial" environment (p. 266). Why must Jordy devote numerous paragraphs and precious illustrated material to proving the eclecticism of Maybeck's Palace of Fine Arts only to dismiss it as serving "little purpose beyond that of conditioning its environment" (p. 281). What more important contribution could a building possibly make? Might not a "novice with an interest in architecture" find that the Palace enhanced his love of architecture? Its imposing surfaces would force him to enjoy the materials with which it had been constructed. Its command of space and light could make a lasting impression. Indeed, Maybeck's design not only conditioned the San Francisco environment, but for those lucky enough to have enjoyed the original, it changed their attitude toward their own environment. And this, after all, is the stuff of which substantial architectural history is made.

Continued on page 27

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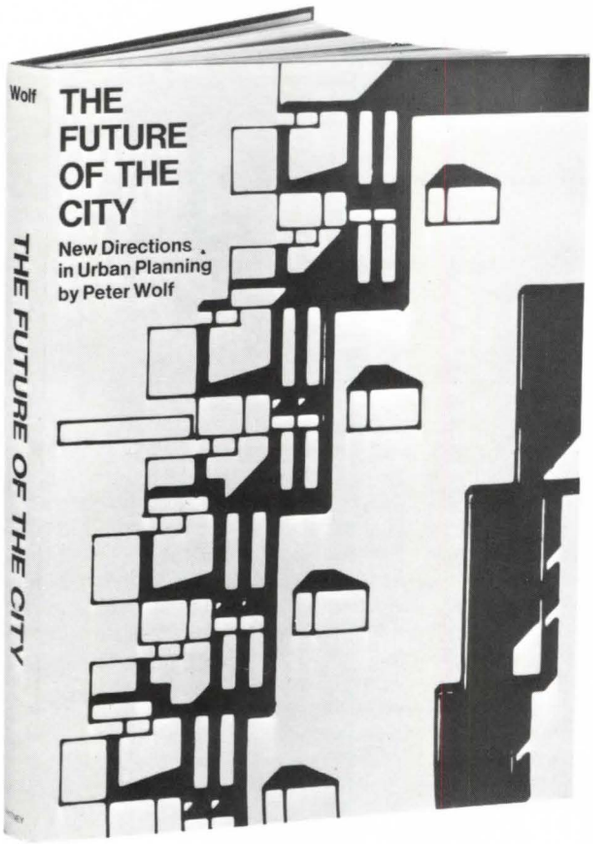

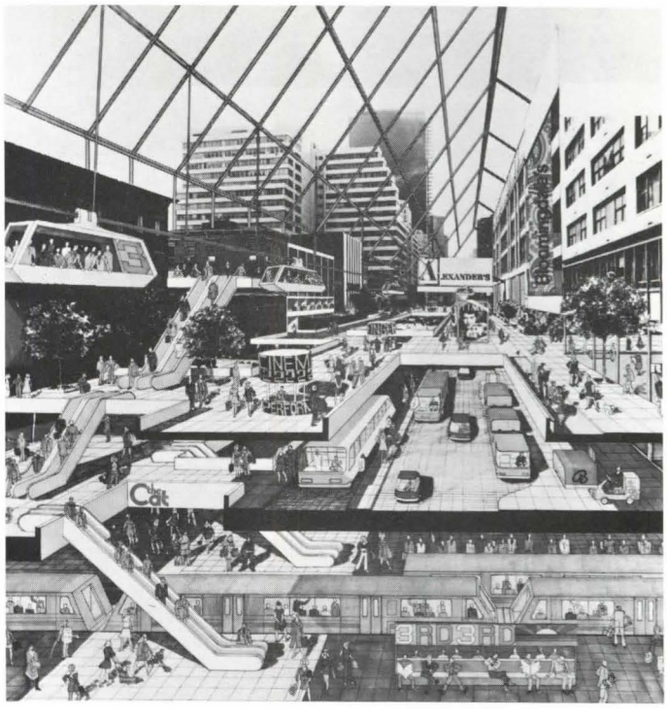

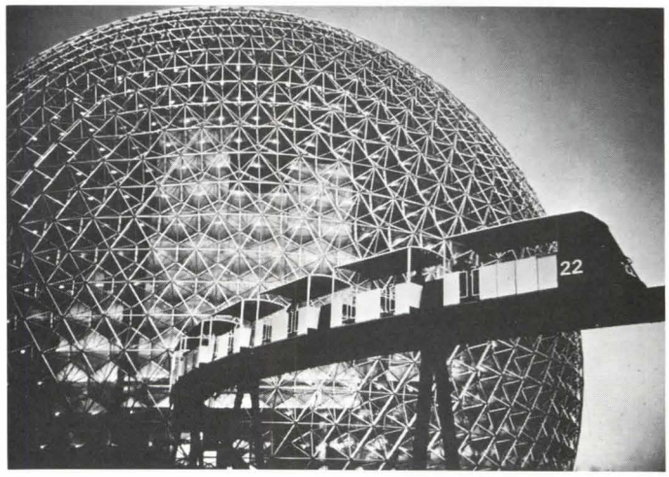

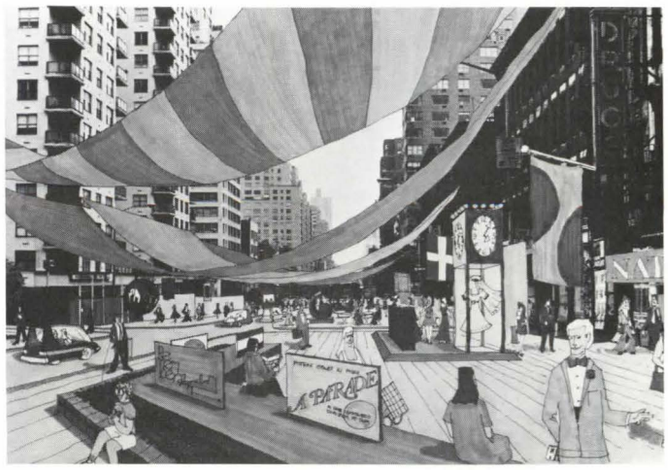

THE FUTURE OF THE CITY:
New Directions in Urban Planning

BY PETER WOLF. *The Future of the City* identifies the major trends that are transforming the shape of American cities. Written for everyone concerned with how cities are changing—not only architects and city planners but also concerned citizens, public officials, social scientists, and students—this is the first book that surveys American city planning and analyzes the interlocking social, economic, administrative, and design issues which critically affect the survival of cities. The author believes that the city will, in fact, survive and he explores recent urban history, describing significant urban planning ventures to identify urban problems and potential solutions for the strengthening of American cities over the next several decades. The author takes into account changes in social structure, changing urban and suburban population balances, shifting national policies and priorities, economic trends, and new methods of building. He stresses the critical role of transportation, particularly automobile traffic, in the redevelopment of city spaces and structures. Traffic and pedestrian circulation in cities are discussed in the chapters "Downtown" and "The Street." Following chapters deal with "The Urban Highway," "Public Transportation," "Housing," "The Urban Environment," "Historic Preservation/Urban Conservation," "Land Use Regulation," and "New Directions in Planning." The author presents over 80 American and European projects and proposals, past and present, to show possible directions for cities in the future.

208 pages. 9 × 12. 146 black and white illustrations. Appendix. Index. ISBN 0-8230-7182-0. **$20.50**

Contents: Downtown. The Street. The Urban Highway. Public Transportation. Housing. The Urban Environment. Historic Preservation/Urban Conservation. Land Use Regulation. New Directions in Planning. Conclusion. Recent Projects: Evolution and Application of Ideas.

LE CORBUSIER: MY WORK

TRANSLATED BY JAMES PALMES. INTRODUCTION BY MAURICE JARDOT. This book is not merely by and about Le Corbusier, it *is* Le Corbusier—written, designed, and supervised by him. Le Corbusier surveys his development from his early days as a student to the completion of his last building, the Priory at La Tourette, including the many and varied facets of his work. This is a complete, graphic self-portrait of the man and his work—describing the total creative process. Included are excerpts from his notes and sketchbooks; a wide range of photographs of his buildings, models, plans and paintings—highlighted by closeups of significant detail, covering all his major projects. To record and develop his ideas, the author expresses himself through drawing, and a wide selection of these drawings—each a work of art in itself—further enhance the text. In addition, he explains and illustrates the principals which determine his work and establishes the premise of his philosophy: that architecture, if it is to keep vitality, must be integrated with advances in all other fields of art.

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HANDBOOK OF URBAN LANDSCAPE

EDITED BY CLIFF TANDY. The nature of much of the development of the modern city means that the designer has to think in terms of a total environment rather than of individual structures. *Handbook of Urban Landscape*, a revised and updated version of what was originally a highly praised series in the British magazine *Architects' Journal*, is the first book to provide comprehensive guidance on the current trends and techniques in this field—covering housing, parks and open spaces, recreation, children's play areas, and gardens. Also included are detailed requirements for design and maintenance. Throughout, it is lavishly illustrated with internationally selected examples of the latest developments; and there are numerous charts, diagrams, and check lists. Written primarily as a sourcebook for and by architects and planners, this book is invaluable at several levels.

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DESIGNING COMMERCIAL FOOD SERVICE FACILITIES

BY FRED LAWSON Here is a comprehensive guide to the physical design of such commercial food service facilities as cafeterias (public and institutional), kitchens, company dining rooms, and storage areas. *Designing Commercial Food Service Facilities* is an essential reference for architects, interior designers, industrial designers, engineers, food technologists, manufacturers, and everyone who works in or is associated with the industry. This authoritative text is graphically supported by numerous photographs of equipment and facilities, plans, diagrams, and charts—providing statistical information in an easy-to-read fashion. The opening chapter deals with the influences on design—organization, services and contracts, and general characteristics of food service areas. A section on food storage covers such topics as space requirements, purchasing, packaging, access, ventilation, perishability, and hygiene. A chapter on food preparation discusses plans, flow routes, space requirements, equipment groupings, and the preparation sections for various foods. Food cooking and equipment are then considered, including selection of equipment, the various types and their layout, washing facilities, etc. The author covers the construction of these facilities and then continues to discuss the design of staff facilities. A concluding chapter on food service and distribution covers the various kinds of services: self-service, cafeteria, waiter and waitress service, automatic vending, dining areas, and counter service. Although the text employs the term "catering" (which means commercial food service) and other British terminology, the facts are of practical value to professional readers on both sides of the Atlantic.

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A Practical Guide

BY DONALD INSALL. Old buildings are as vulnerable as the people who built and used them and as liable to the process of decay and death. The developer's bulldozer is their most publicized enemy, but far more damage is done simply by neglect and ignorance. Thus, this book shows owners and architects how to dispel these threats. Although originally published in England, much of the material in this text is universally applicable, providing pointers particularly useful to the American architect. It provides sound administrative advise: the owner, architect, and contractor; the preservation plans; preservation and the public; new uses for old buildings; cost control; etc. The second part of this book deals with specific restoration techniques: repair or renewal; sheet roof coverings; timber structures, fungi and pests; stonework decay and repair; glass in old buildings; etc. The final section is devoted to a series of major restoration jobs done by the author and his associates, and provides a revealing picture of what can be achieved.

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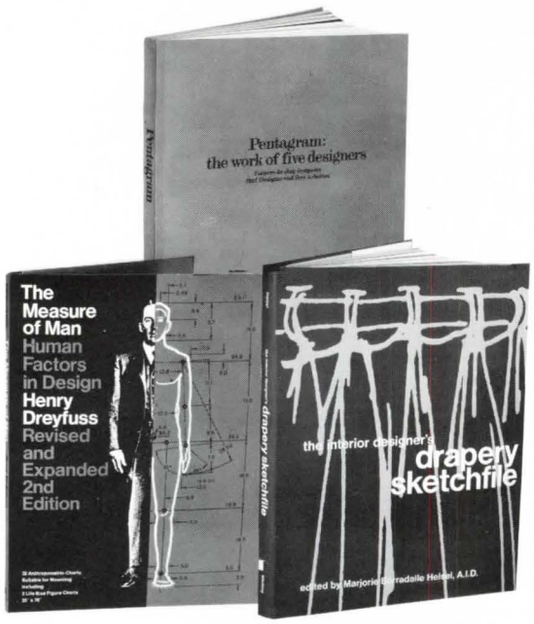

PENTAGRAM: THE WORK OF FIVE DESIGNERS DESIGNED BY PENTAGRAM. This handsome book is a representation of the architectural, graphic, and industrial designs of five top-notch professionals: Theo Crosby, architect; Alan Fletcher, Colin Forbes, and Mervyn Kurlansky, graphic designers; and Kenneth Grange, industrial designer. This book includes stunning examples of their designs, along with the strategy and methods they use in keeping up with the latest innovations in the field. Included in the section on architectural design are examples of their work for: Reuters, London; Cunard Steamship Company; Central Office of Information, British Pavilion, Expo '67 in Montreal. Graphic design examples include: British Petroleum; Olivetti; Rank Xerox; Roche; ICI Plastics Division. In the area of industrial design are their designs for: Kodak; Ronson Products; Standard Telephone and Cables; Wilkinson Sword.

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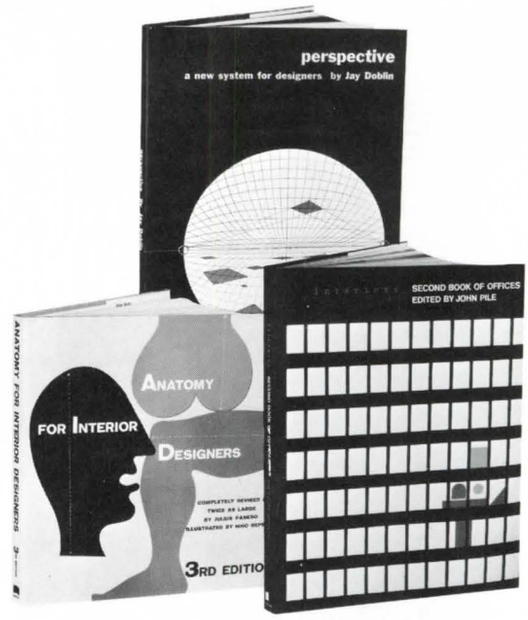

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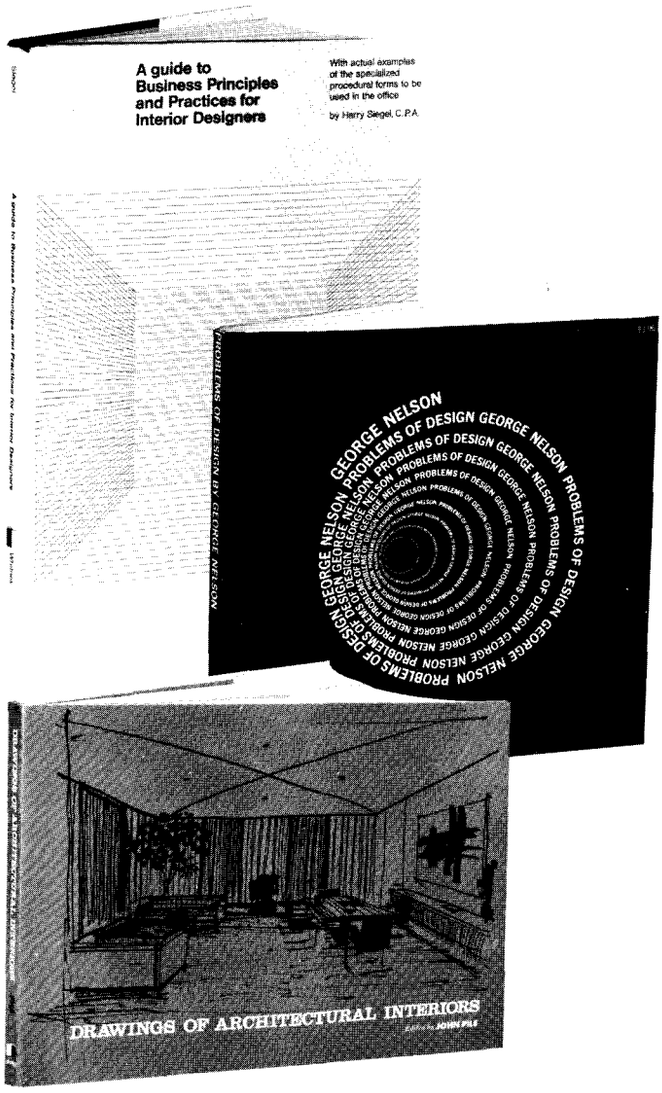

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Book Review

Continued from page 22

Raymond Hood, Architect by Walter Kilham, Jr. Architectural Book Publishing Co., New York, 1973. 200 pages. Illustrated. $10.

Reviewed by Douglas Haskell

Raymond Hood ("Ray") was a spunky little man with a straight-up black crew cut, whose major skyscraper works all rose up on the scene in the amazingly short spell between 1922 and 1933. By 1934, hounded by the Great Depression, he was dead, with only 57 years behind him.

His able and faithful major domo of those active years, Walter H. Kilham, Jr., has written a fascinating biography of Hood. It's concise, balanced, informed by research where not by direct observation; and Kilham has a happy gift with anecdote which makes the book fun reading.

Fortunately, a good deal is made of Hood's repartee and powers of persuasion. We are reminded that in those younger days Big Business Men were colorful individuals who directed their own affairs and dealt face to face on important matters. An able man who admired their business philosophy as much as Hood did and who served them as well, had access and could give them buildings not in uniform but in experimental variety. All of Hood's were different.

Already in youth, Ray had announced his intention of becoming "the greatest architect in New York", which in those days meant being tops in skyscrapers, of course —what else could compare with them? His preparation went beyond becoming skilled in forensics. A large design strategy grew upon him. It rested first on the infatuation of U.S. business leaders with picturesquely grandiose Roman art and with the Beaux Arts architectural school in Paris, following on the 1893 Chicago World's Fair (of Hood's adolescent years) which to them had been breathtaking. By 1922 when Hood bounced onto the world stage with his Beaux-Arts-picturesque Gothic tower, winning the famous Chicago Tribune competition against architects worldwide, there were reasons. Hood was a *diplômé* of the Beaux Arts, had also seen much of Rome, and before that had been apprenticed to Bertram Goodhue, who was supreme in Gothic impressionism. As urban scenery the Tribune was sure-fire with those in power. But Hood had *also* worked far below the fake flying buttresses supporting a couronne cresting, and had bested Eliel Saarinen's hot runner-up project with a better-planned ground-floor printing plant. —This combination of unstinted romance with good planning gave Hood a cachet with the American Business Man throughout the ensuing decade. With such credentials he was given freedom to move, step by step, into what then seemed bold, and were varied, experiments, always individual, on increasingly modern lines, as the general scene shifted and the cry became "functionalism." He *never* forgot to furnish a fresh and colorful scene.

Kilham also engages in knowledgeable advocacies of Hood on controversial matters. For instance against the accusation that the striking red-brown vertical stripes of the Daily News Building in New York only alternately mark structural columns, and accordingly that one-half are false and mere decoration: Kilham avers that every other stripe marks a shaft carrying quite as essential a service duct, and deserves equal honor, without interruption, thank you, of a good rhythm. That's hard to quarrel with. —In general, Hood's later tall towers seem to be rising in critical regard, especially Rockefeller Center, which Hood clearly dominated in planning and design, and which appears now to be, internationally, a top, rounded, masterpiece in the frame of this century, and likely for keeps.

Hood, said by his biographer to have been no theorist but a man of action, is reported nevertheless to have followed closely theorists like Le Corbusier; and this reviewer dares to suggest that the "non-theoretic" stance was adopted largely in protection of his chances with an "anti-theoretic" business clientele.

Rockefeller Center integrates Hood's manifold interests: it has

Continued on page 118

Douglas Haskell, a member of our Board of Contributors, is a former Editor of the Architectural Forum.

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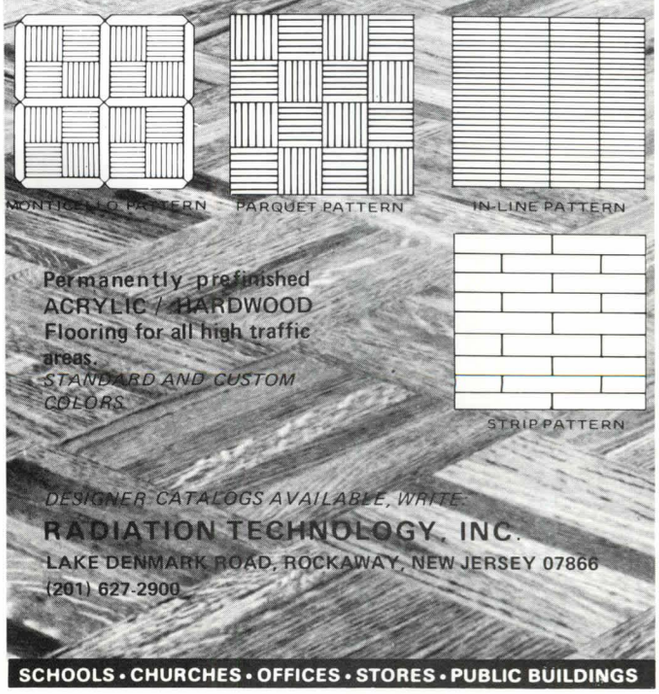

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news+

Pupils at Farnborough Grammar School, Hampshire, believe that this is the ideal urban car. They call it the Microbe and designed it for the BP Schools Build-a-Car Competit-

Each year, the American Institute of Architects awards a Gold Medal to a worthy recipient previously overlooked; and each year, as a public service, we have tried to come to the aid of the Institute with a constructive suggestion—but to no avail: some years ago, we nominated the pop singer, Petula Clark, for having recorded her exciting song, "Downtown;" more recently, we tossed in the name of Jacques Tati, for having successfully done in the Modern Movement in his film, "Playtime." Both suggestions went over like lead balloons.

I don't hold out much hope for our nomination for 1975, which happens, as a matter of fact, to be the Shah of Iran. But let me try to explain.

For the past fifty years or so, architects, urban designers, and theorists—from Lewis Mumford to Jane Jacobs to Robert Caro—have pointed out convincingly that the automobile was destroying our cities, and should be banished from them, or, at least, tamed. Well, architects, urban designers and theorists wield no clout; and so the automobile has just about won out, grinding pedestrians and their cities into the dust.

Almost—but not quite. What Lewis Mumford failed to achieve, His Imperial Majesty the Shah of Iran is about to accomplish: by raising the price of oil some 500 percent, the Shah and his friends in the oil-producing countries are in the process of knocking some sense into the heads of automobile manufacturers (and transportation commissioners) around the world.

In the course of the past year or so, the Shah has forced Detroit to concentrate on the production of cars that may, at long last, serve rather than smother us and our cities. In Japan, Italy, Germany, France, and in all other nations that manufacture automobiles, the Shah has initiated a revolution in urban transportation—a revolution long overdue. At the Paris Auto Show this fall, bicycles rubbed shoulders with cars for the first time—and the bicycle manufacturers' stands were mobbed on the opening day! And a few days after the opening of the Paris Auto Show, the pupils at Farnborough Grammar School, in Hampshire, England, unveiled their design for an "ideal urban car," which they had decided to name "Microbe." The Microbe will get 50 miles to the gallon, and it looks like fun to drive.

All of which suggests that the AIA ought to make its 1975 Gold Medal a joint award: to the Shah of Iran, for opening our eyes to the true value of our rapidly vanishing resources (and, possibly, for saving our cities); and to those kids at Farnborough Grammar School, for taking the hint.—PETER BLAKE

Going under—in Japan

Perhaps nowhere else in the world have cities gone quite as underground as in Japan. Various factors including the high price of land in urban areas and the volume of automobile traffic have led to the adoption of below-grade shopping streets. From simple pedestrian underpasses with a sprinkling of shops to vast networks

Many of the news reports and comments are from our regular field editors: John Donat (London), Gilles de Bure and Marc Emery (Paris), Robert Jensen (Rome), John Hadidian (Beirut), Charles Correa (Bombay), Patricia Boyd and Neil Clerehan (Melbourne), Hiroshi Watanabe (Tokyo), Edla van Steen (Sao Paulo), and Detlef Schreiber (Munich). Plus correspondents are identified by their initials; other contributors by their full names.

linking transportation centers and office buildings, they are a familiar phenomenon in the major cities of Japan.

There have been misgivings about them, however, and in late May of this year, a committee made up of the Police and Fire Departments, the Ministries of Transportation and Construction, and the National Railways decided not to permit in principle any new underground streets. The reasons given were that they represented health and safety hazards, generated too much unprepared-for traffic, and were obstacles to any future redevelopment plans in the area. Such streets might be permitted where they provided the only solution possible, but they would have to conform strictly to building, fire and traffic codes. Connections between the streets and basement level arcades of other buildings would not be allowed. Any new street must, it was stated, be adapted to the redevelopment plans for the district.

Tokyo and Osaka are the sites of the largest underground networks, and in November, 1973, a huge addition to the already extensive maze running south of Osaka Station, was completed—Umeda Terminal.

The Umeda Terminal Building for Hankyu Railways contains, besides the station, a shopping center, a theater, an office building, parking and a hotel. The office building is of steel and the rest is steel and reinforced concrete. The first and second floors are for shopping and form the concourse. Train platforms are on the third level, and parking is on the roof. The first and second basement levels are also for shopping.

This arcade is not, strictly speaking, the kind of uncontrolled growth to which the committee objects. Nevertheless, it illustrates the extent to which the Japanese have become accustomed to a below-grade environment.—H.W.

Umeda Terminal, Osaka Station—a city under a city

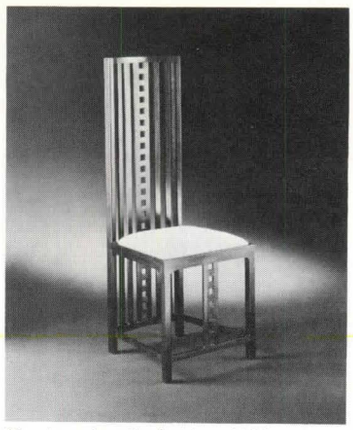
A first for Massachusetts

The first architectural competition for the design of state-subsidized public housing in Massachusetts drew no fewer than 52 entries, and drew undercover complaints from some of the architectural firms which had previously had little competition for this kind of design work.

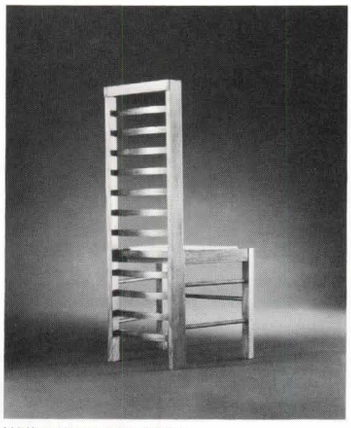
Despite discreet accusations made by some of these old-timers —that the competition was costly and unfair (to whom?)—most people were highly pleased with the new procedure. Of course, it isn't a new procedure elsewhere in the world; competitions are commonplace in many countries.

The Boston firm of Marvin E. Goody, John M. Clancy & Associates, Inc., who won the competition, received a contract to proceed with the design of these 100 units of housing for the elderly and handicapped. Eighteen other firms received certificates of merit. Judges were drawn from the state's Department of Community Affairs (DCA), which sponsored the competition; the Winthrop Housing Authority, which assembled the site and will build the units; and the Boston Society of Architects.

DCA Deputy Commissioner Tadhg Sweeney believes this has been the largest architectural competition in the history of state-subsidized housing. He hopes to continue with competitions—no more than five per year to be fair to competing architects, he suggests, but enough to build up a list of architects from which other agencies can draw.—E.P.B.



Checkered vertical strips, 1904



Willow tearoom, 1904

Mackintosh at the Modern

More than 15 chairs by Charles Rennie Mackintosh will be on display at New York's Museum of Modern Art until January 13, 1975. The chairs, carefully reconstructed from the originals by Professor Filippo Alison of the University of Naples, will be shown with 15 original drawings. The show will travel to the Indianapolis Museum of Art on May 13, 1975, to the Elvehjem Art Center in Madison, Wis. on August 17, 1975 and to the Virginia Museum of Fine Arts on January 11, 1976.

Argyle Street tearoom, 1897

Competitions

A Design in Steel Award Program, sponsored by the American Iron and Steel Institute, is inviting designers, architects, engineers and artists to enter designs in 13 categories, a few of which are appliances, housewares, environmental enhancement equipment, furniture, industrial products, transportation, housing and art. In each category except art, an award will be offered for best design in steel and another for best engineering in steel. A special Conservation of Materials Award will be given to one of the winners, if warranted. Deadline for entries is January 31, 1975. Write Design in Steel, 633 Third Ave., N.Y., N.Y. 10017.

• Design Methods Group has offered $1,000 for the best paper on the topic "Design Methods for Energy Conservation in Buildings." The papers will be read and judged at a three-day workshop beginning July 7, 1975 in Berkeley, California. The deadline is March 1, 1975. All papers must be accompanied by a $10 pre-registration fee for the workshop. Write Donald Grant, P.O. Box 5, San Luis Obispo, Calif. 93406.

• The Renwick Gallery of the Smithsonian Institution is planning an open competition for craftsmen in the U.S. who produce multiple objects—editions of at least ten of the same design. Between 50 and 100 works will be selected for a 7-month tour of small museums and libraries around the country. Objects entered must be produced by hand rather than by assembly-line techniques. Write Renwick Gallery, Smithsonian Institution, Washington, D.C. 20560. Selection will be made from slides in April 1975.

• MIVICO (Marché International des Villes de Congrès), the first annual international meeting-and-marketplace for those involved in the business of building convention facilities, will meet in Cannes on the French Riviera in February 1975. One of the purposes of the meeting will be to determine the rules of a competition, the theme of which will be "Conventions and the City." Sponsor of the competition will be the International Association for the Advancement of Urbanism and Architecture. The jury will be named in Cannes at the meeting, and the winner announced a year later, in February 1976.

In the meantime (no connection with next year's competition) architects who would like to send models, panels, or photographs of meeting rooms or convention halls they have designed for display at the meeting in February 1975, should write Sidney Shore Associates, 65 East 55th Street, New York, N.Y. 10022, describing what they would like to send to France for display. Sydney Shore Associates will also have information on the 1976 competition as the details are decided.

Assembling treasures

Fall is the season when leaves drop and squirrels rush to cache their treasures. This October three U.S. cities opened the doors of new museums built to house their paintings and sculptures:

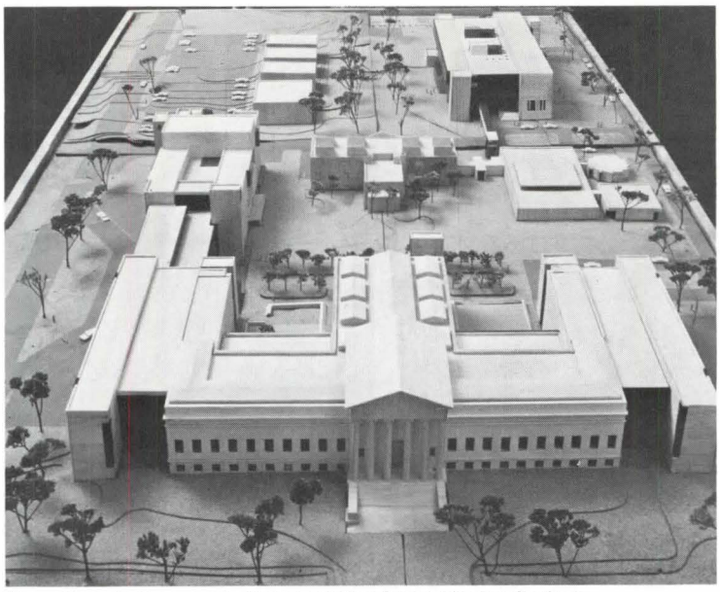
• Four square blocks of new buildings, surrounding an inner courtyard, make up the Minneapolis Society of Fine Arts. The complex is the first major commission in the U.S. for the Japanese office of Kenzo Tange and Urtec (Urbanists and Architects). The Associate Architects were Parker Klein Assocs., of Minneapolis. Interior design was by Vignelli Assocs. Ltd.

The whole package consists of a complete renovation of the Minneapolis Institute of Arts (a 58-year-old McKim, Mead & White building) and the addition of two wings which wrap around the White original; a four-story studio building for the College of Art & Design; The Childrens Theater Company & School; and a 400-car parking ramp. The inaugural celebration of the entire $26-million-Fine Arts Park took place this fall and lasted for a month.

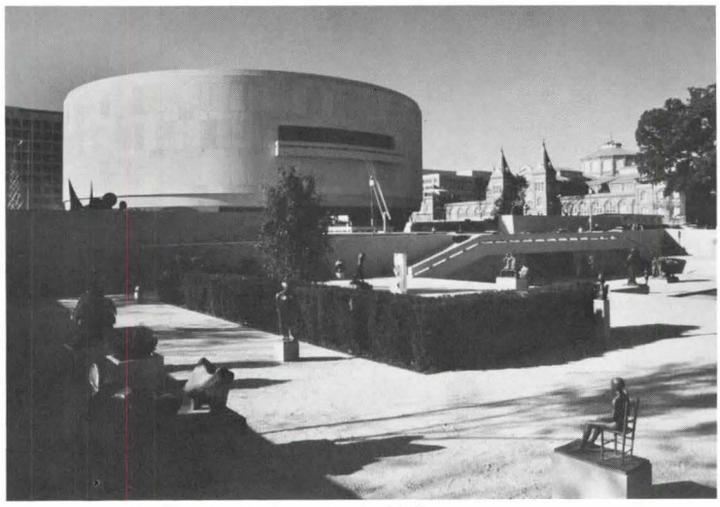
• Washington, D.C.'s circular Joseph H. Hirshhorn Museum and Sculpture Garden were built in spite of a furious controversy which raged for years, with loud complaints from many quarters about either the shape of the building (a doughnut) or the contents (Joseph Hirshhorn's 6,000 works of contemporary art). The art will form the nucleus of a collection, under the sponsorship of the Smithsonian Institution, that can be expanded and refined in the future.

The concrete cylinder, designed by Gordon Bunshaft of Skidmore, Owings & Merrill, which opened in October, has one of the world's most comprehensive collections of modern art: 4,000 paintings and 2,000 sculptures assembled by the Latvia-born uranium magnate Hirshhorn over a period of 40 years. The raw concrete fortress is 231 feet in diameter and 82 feet high, and is lifted 14 feet off the ground by four massive piers. The inside of the doughnut is a beautiful court with an immense (60 ft. in diameter) fountain, also designed by Bunshaft. The sculpture garden, reached through a tunnel, is dominated by Rodin's "Burghers of Calais," Henry Moore's "King and Queen," and Picasso's "Baby Carriage."

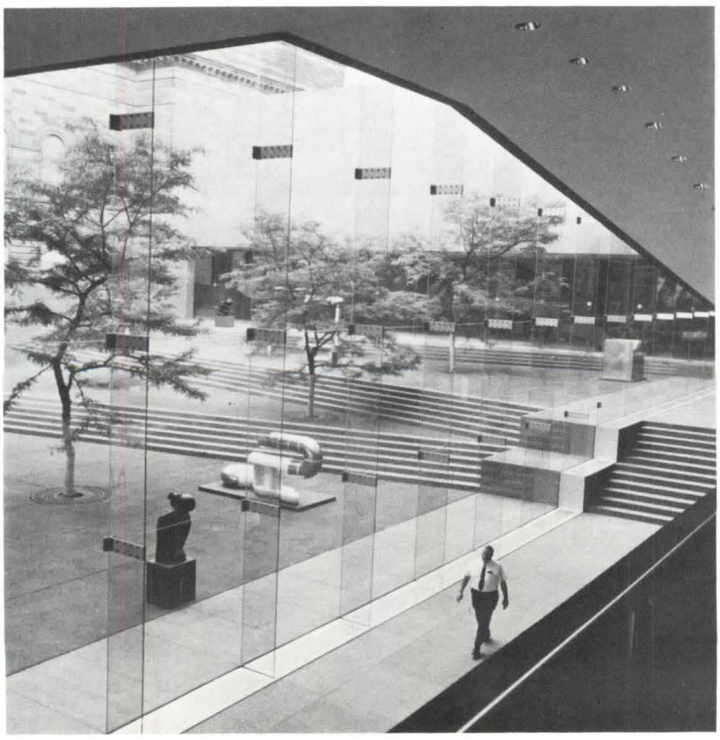
• The Sarah Scaife Gallery at the Museum of Art in the Carnegie Institute is the new setting for the Pittsburgh museum's permanent collection of Impressionist and Post-Impressionist paintings. The Gallery, designed by Edward Larrabee Barnes, is faced with Emerald Pearl granite, and covers 155,000 square feet with another 16,000 square feet outdoors for sculpture. Two enclosed bridges on the second floor connect the Gallery with the original Institute building, leading visitors into the new gallery without their being aware of the transition.



Kenzo Tange's Minneapolis Society of Fine Arts; a cluster of culture



A doughnut in the District; Hirshhorn on the Mall



Sarah Scaife Gallery; sculpture court seen from the lobby

Wanted—a couple of deans...

Professor John Wade is resigning as dean of the School of Architecture at the University of Wisconsin at Milwaukee as of June 1975, though he will continue to teach design courses there after that time. Professor Wade joined the faculty in 1968 as the first dean of the newly-established School of Architecture, the only one in Wisconsin. The search is on for someone to replace him as dean. If you have any suggestions, write to the School of Architecture, University of Wisconsin, Milwaukee, Wis. 53201.

• The Board of Regents of the State of Florida has authorized a six-year program in architecture to be installed at Florida A & M University in Tallahassee, and the position of dean is still open. Applicants are invited to write to Dr. Lawrence A. Tanzi, Florida A & M University, Tallahassee, Florida 32307.

...and a few teachers

There are three openings at the Harvard Graduate School of Design for the academic year 1975/76.

• Full-time senior architecture design teacher at the rank of professor.

• Teacher in the area of building processes, principles and methods at the level of Associate Professor.

• Studio design teacher at the level of Assistant Professor.

Write Professor George Anselevicius, Chairman, Department of Architecture, Graduate School of Design, Gund Hall, Cambridge, Mass. 02138.

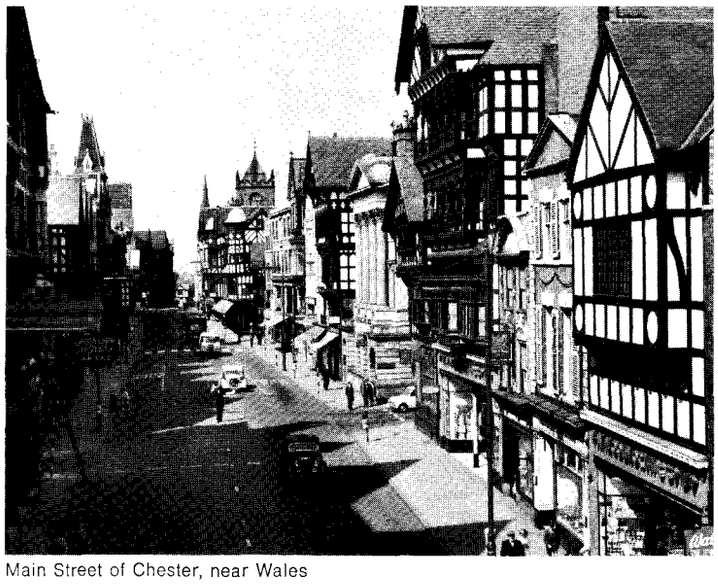
Restoring Britain

In July 1973, at a four-day conference in Zurich, 1975 was declared European Architectural Heritage Year. Britain, one of 31 countries participating in the restoration and preservation campaign, will focus on four major projects to reclaim their architectural heritage; and Prince Philip, president of the U.K. Council for Heritage Year, has announced that Her Majesty's Government will match, pound for pound, private contributions up to £500,000.

Britain's four selections are:

• Edinburgh, chosen because of its standing as a great but long-neglected piece of mid-Georgian town planning and architecture. A large part of the Scottish capital was built as a "new town" 200 years ago, though the original concept has been somewhat spoiled by the trappings of progress. The Government plans to restore and revitalize once-beautiful but decaying houses and streets.

• The County of Fife on the Firth



Main Street of Chester, near Wales

Culross Palace, 1598-1611, County of Fife on the Firth of Forth

of Forth, chosen, not because it has the most charming name-place in the world, but because another Scottish National Trust project, called "Little House," begun in 1960, had already made such progress in restoring exteriors of very old working-class houses.

• The towns of Chester (near the Welsh border) chosen because of such architectural treasures as lovely 18th-century Shipgate House and the very old Bridge Street with its traditional upper-level shopping gallery.

• Poole, a charming town in Dorset on England's south coast, in a possibly desperate move to save what is left of the old town, much of which was destroyed some years ago by commercial development interests. The old high street and the adjoining 15 acres known as "the precinct" are being carefully pruned of incongruities.

Scores of other conservation plans (architectural historian Sir John Summerson insists that *conservation,* the care of something alive, is the proper term, rather than the commonly used word *preservation,* which is the protection of something dead) are springing up all over Britain. In London's fashionable Mayfair district, in a tiny section known as Shepherd Market, citizens have produced proposals for improving their picturesque narrow streets and byways. They plan to replace the existing out-of-scale street lights with Victorian bracket lamps; to restore a number of buildings to Victorian purity; and to remove eyesores from view—e.g. telephone booths which are to be tucked out of sight; and parking meters, which will be banished altogether.

In Londonderry, Northern Ireland, the upper part of the old walled city will be renovated, one of several projects going ahead there.

The Duke of Gloucester, an architect, will judge a competition launched by *The Guardian* newspaper, in which young people submit schemes for redoing their favorite old buildings.

Japan announces winners

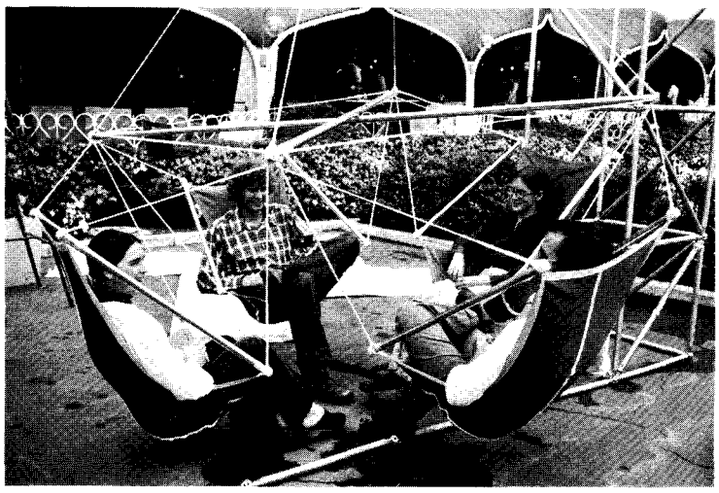
The International Canvas Furniture Design Competition, sponsored last year by the Taiyo Kogyo Co. Ltd. of Japan, has announced the winners. The jury, headed by architect Kiyonori Kikutake, received 467 entries, 216 of them from outside Japan. The winning designs:

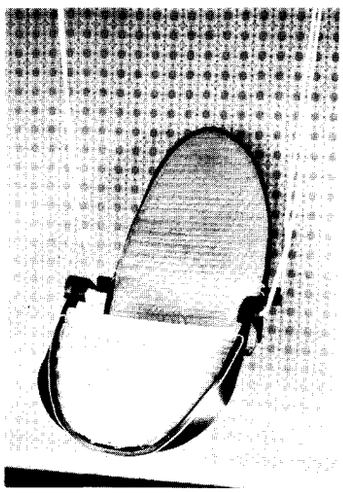
• First prize of $10,000 to Kurt James Buetow of the U.S. for an arrangement of *Canvas Tensile Seating,* in which four points of suspension are transformed into a group of comfortable chairs by the use of specific cutting and sewing techniques.

• Second prize to Kjeld Kahr of Denmark for his *Lightweight Hanging Easy Chair,* which is stable and balanced in all positions, distributing the weight of the body evenly—ideal for handicapped persons.

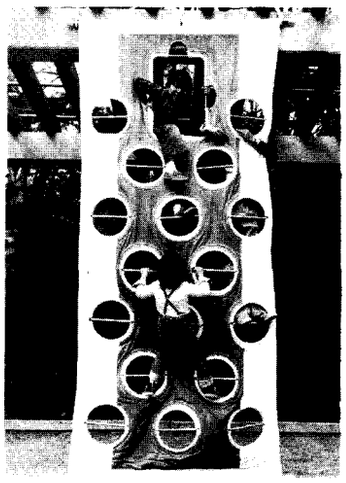
• Another second prize to Kizuki Toyama, Kanji Tanaka, and Masahiko Sakamoto of Japan, for a *Simple Chair*—a single canvas square placed over four legs of a chair, and folded.

• Third prize to Seiichiro Nagaoka of Japan for *Play Equipment* which can be climbed on, up, around, through, and over, and is obviously an immediate success with children who needed no instructions on its use.





• Another third prize to Tatsuo Kojima, Kaori Hayashi, Kenji Iyanagi, Toshiaki Toshikawa and Yoshio Ui, all members of the faculty of Education at Tokyo University of Education, for *Waving Rack,* a multiple-purpose item whose holding capacity can be changed by moving stoppers and adjusting the length of the canvas. —H.W.



Construction firm fails

In August one of Australia's biggest and brashest construction and development groups crashed. Mainline Corporation was started in Sydney in the recession of 1961 by a carpenter named Dick Baker, and by August of this year was handling A$300 million in contracts. Although based in Sydney, and currently building Australia's tallest (60 floors) building there, Mainline's troubles came from its distant operations: in Fiji, its Coral Gardens venture was bogged down, and in Squaw Valley, a vast resort project was above budget and behind schedule.

But it was on Melbourne's elegant Collins Street that Mainline met its end. At Collins Street's east end is I. M. Pei's twin-towered Collins Place, being built by Mainline. Last year, on no fewer than 158 days, work was stopped by union disputes. Collins Place was still building, but slowly, and its troubles highlighted Mainline's bad history of labor relations.

Four kilometers west an entire city block was empty, waiting for Mainline's Collins West project to begin. That parcel of land, assembled during the boom of the 1960s, was costing its owners A$3,000,000 a year in interest payments. And so, in August, after a month of rumors, Mainline announced that the company would go into receivership.

Mainline had paid A$17 million for its Collins Street site of 142,000 sq. ft., a very high price. The history of the company's land purchases has become a subject of conversation. A small company, Asmic, had bought, over the period 1970-71, a small piece of the parcel for A$5 million and sold it to Mainline last year for A$10 million.

The Mainline failure was announced late in the day after the Stock Exchange had closed. Earlier that day the company, after three years' urging, had begun remedial work on Canberra's Churchill House. It was architect Robin Boyd's last building, and the plans had been completed by honorary architects a few weeks after his death in 1971. The precast panel construction of Churchill House had been too advanced in design for Canberra's plodding building industry, and its three years' existence had been marred by water penetration on its top floor. August 18, Mainline's subcontractor stripped the roof and began to lay a new membrane. At 4 p.m. the announcement of the company's failure caused a shutdown of the work. With the spring rains coming, the situation appeared to be rapidly deteriorating; however, other arrangements were made, and the roof was completed in time to avoid a disaster.—N.C.

Living on poles

If you like to live naturally, and in California, perhaps a "pole house" would suit your fancy.

These houses are built upon poles on sites frequently too precipitous for any other type of building system, particularly mountain terrain. The object is to preserve the natural beauty of the site without so much as disturbing a branch or a tree root. Furthermore, the poles, which are an integral part of the interiors of the houses are very handy for hanging such things as pots and pans, towel racks, objects of art, etc. The poles are decorative by themselves too.

The poles are treated with a liquid butane solution to preserve them against decay and insects. All of these structures retain their natural wood finish although they may be painted if desired.

The idea is actually thousands of years old, originating from ancient Japanese temples, but the firm responsible for this modern rendition is Stone, Post and Flowers, builders located in Carmel Valley, Calif.

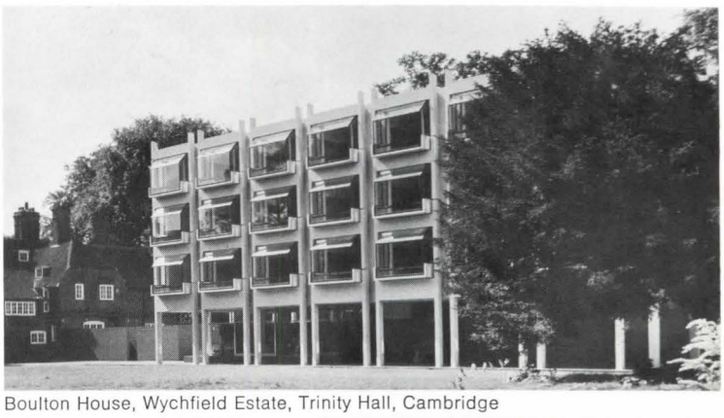
Arup's first ten years

For their ten-year celebration, Arup Associates, the design firm based in London, presented an exhibition of their work as a mirror of themselves to be shared with clients, friends and associates. Arup Associates is a multidisciplinary firm, an offshoot of Ove Arup & Partners (now an international engineering firm). This latter group was started in the 30s and until Arup Associates was formed, Ove Arup & Partners consisted of engineers and architects. Ten years ago, the architects of the group set up Arup Associates.

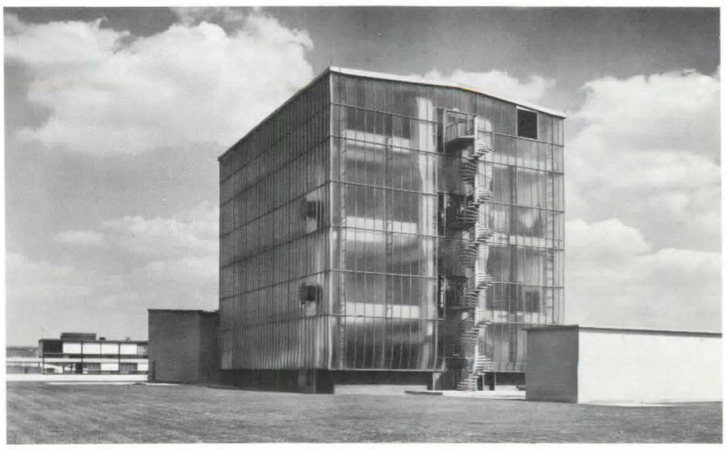
At a time when the nerve of designers is being eroded by unrelieved pessimism and gloom—and the public certainly won't get better design by eroding the nerve of its designers—at least one purpose of the exhibition was to boost morale and inject confidence within the firm.

As Arup Associates designed and presented their exhibition themselves, it was a necessarily private affair (to have opened it to the public would have infringed the ethical code of the profession). What a shame for that disillusioned public to be denied an opportunity to be positively cheered by the consistently high standard Arup Associates have maintained across a wide range of work. All of it displays a fastidious attention to structure, skin and services and, above all, to the process of putting them together. The growth and development of ideas can be traced through whole families of buildings across a number of years.

Derek Sugden, speaking to the several hundred guests invited to see the exhibition at the Architectural Association over three days, regretted a tendency he observed in their work from wealth-creating buildings to wealth-consuming buildings. Arup Associates have created a particular kind of wealth of experience that could inject us all with that much-needed nerve and confidence.—J.D.



Boulton House, Wychfield Estate, Trinity Hall, Cambridge



CIBA Ltd., Duxford, Cambridge, with startling outside stairwell

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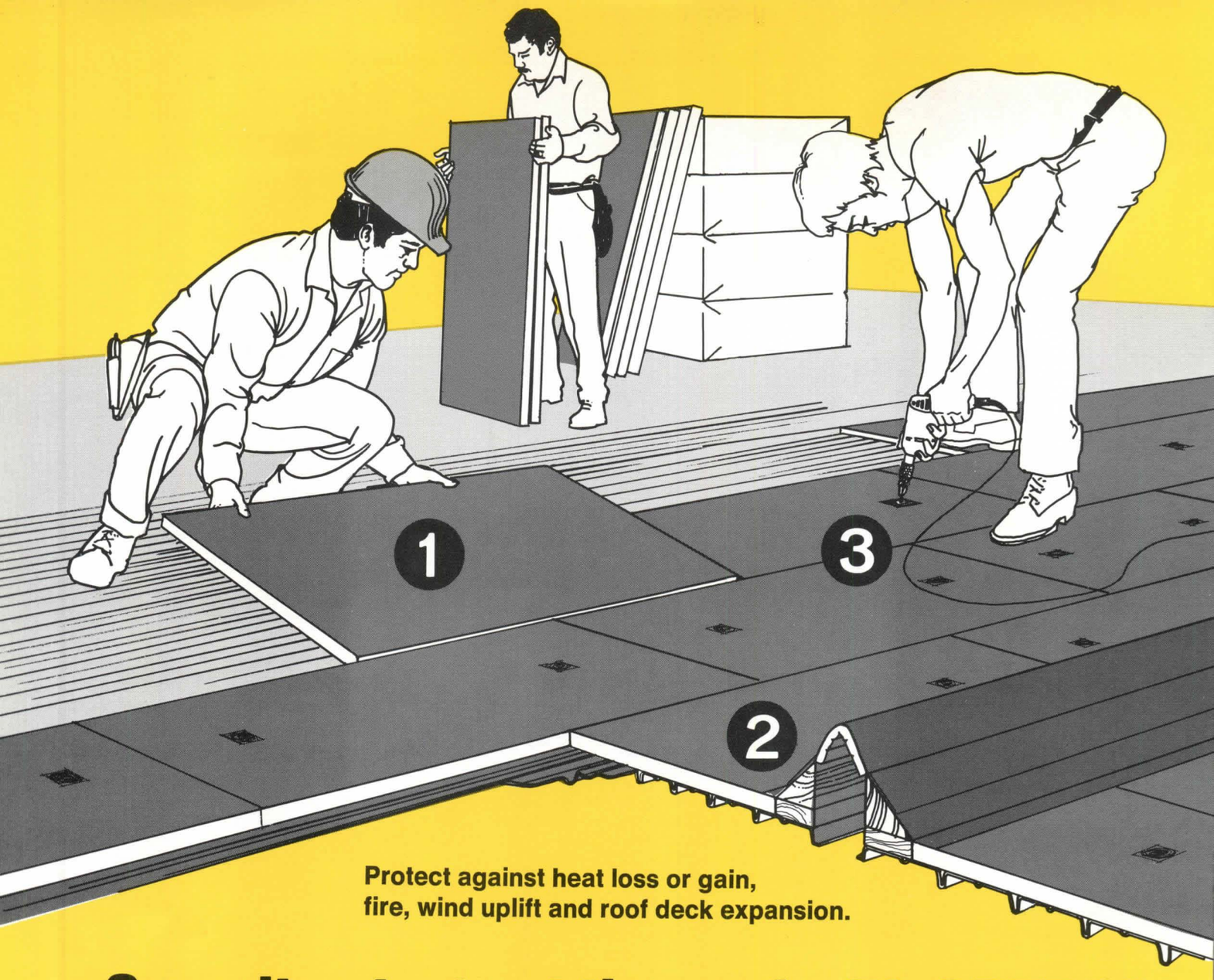

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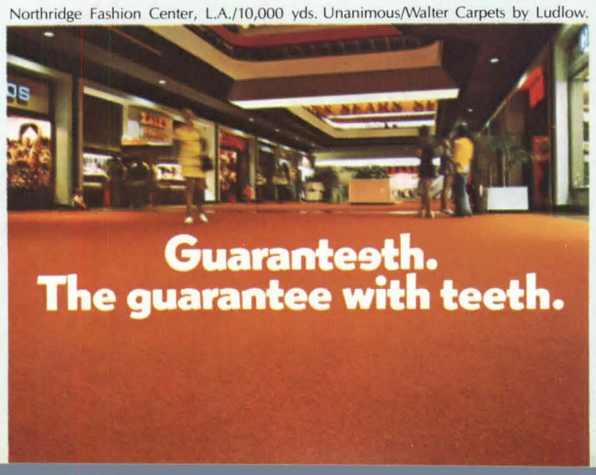

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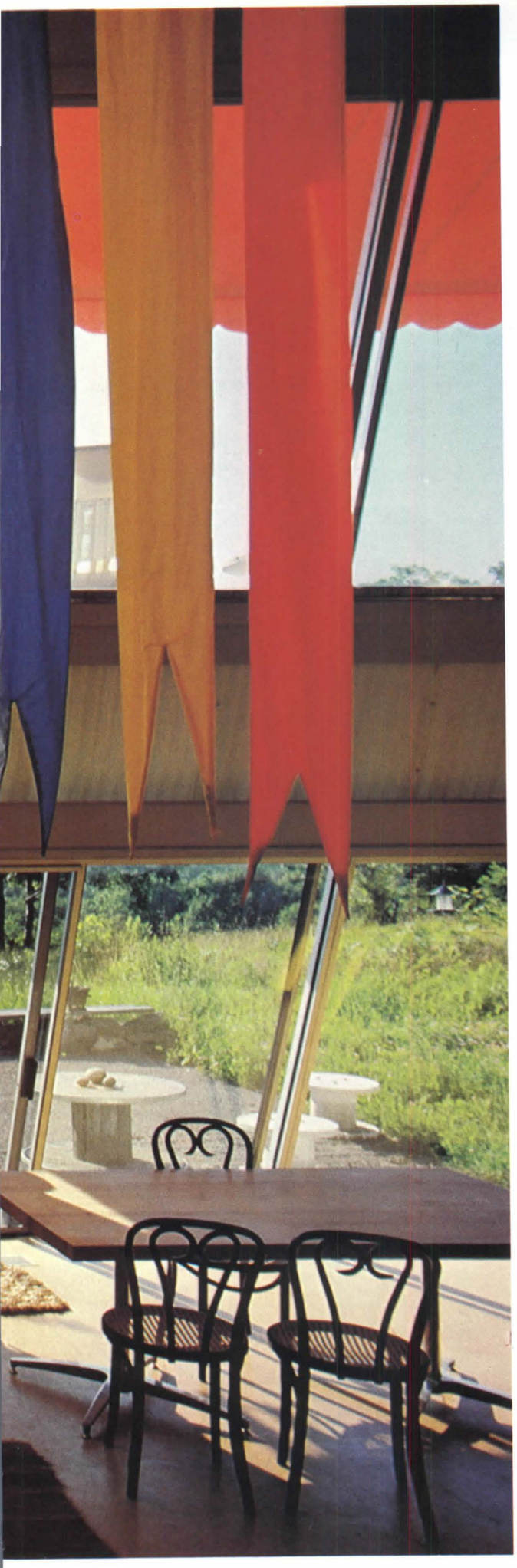


RIGGED HOUSE

John Johansen's house in the country looks like a plastic teepee, sounds like a ship in high seas, has an interior like a jungle gym, and is altogether as fresh and as fun as the woods surrounding it. It is hardly an ordinary house.

Among its eccentricities is its refusal to be a single house at all. Rather it is several all at once, satisfying urges both primitive and plastic, and families of any size. For its architect, builder and owner, John Johansen, the house fulfills technologies and lifestyles refined over a lifetime, and with obvious delight.

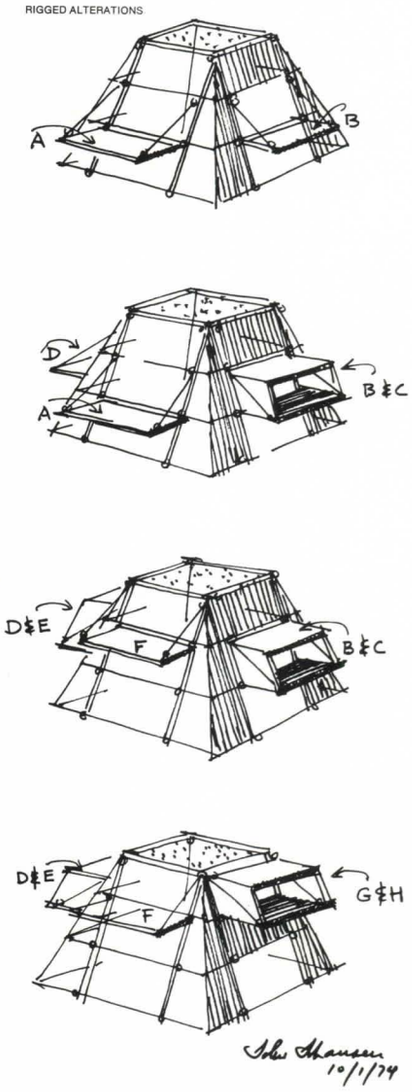
The house is essentially a sophisticated tent, rigged with cables that will support platforms hanging inside or outside, as balconies or enclosed as rooms. The structure is non-compositional in form and almost jury-rigged by conventional construction standards. The materials, which include corrugated fiber glass sheets normally used for siding henhouses, are lightweight. Leaves trace patterns on the walls and a sunset illumines them with new color; the house creaks in the wind and some of the rooms seem to move a bit. The house is somehow alive and Johansen planned it that way.

Change is the building's primary esthetic. Johansen notes that the house looks as well, or as badly, in any state of development, as does a sailboat on any tack. A man who loves to sail, he uses the nautical analogy freely in describing both the logic and appearance of his house. He refers to its construction as rigging and has even used fittings often found on a sailboat as part of his structural system.

The house is anchored in stone, hauled from the surrounding fields and stonewalls, and crafted by local masons with old world skills. Johansen's bedroom nestles in the stonework almost like a cave, providing total retreat from the rest of the house and its glossy materials and exposed atmosphere. Inside the cave, which includes a fireplace for extra warmth, the mood is traditional, secure and primitive.

By comparison, the rest of the house is an experimental highwire act, with open spaces, suspended

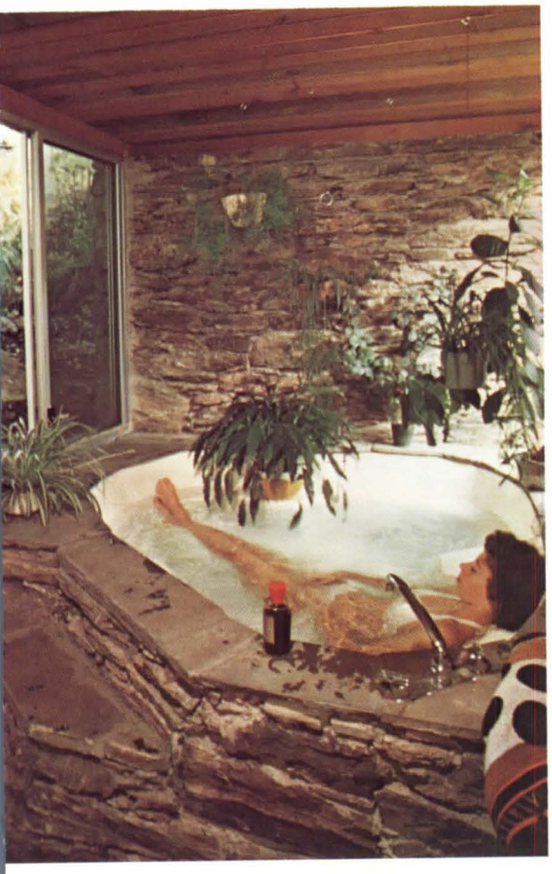
RIGGED ALTERATIONS



Movable ducts stand ready, if and when hanging platforms are enclosed as rooms.

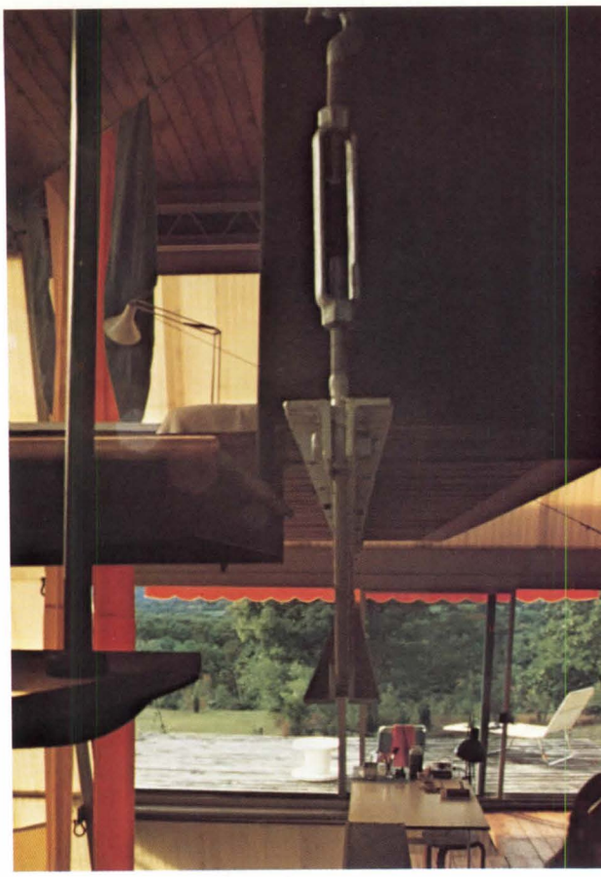
A view of the top, past structural collage of plastic, glass and cables along the way.

Living room bathing pool, with room for two, sits in an indoor rock garden.



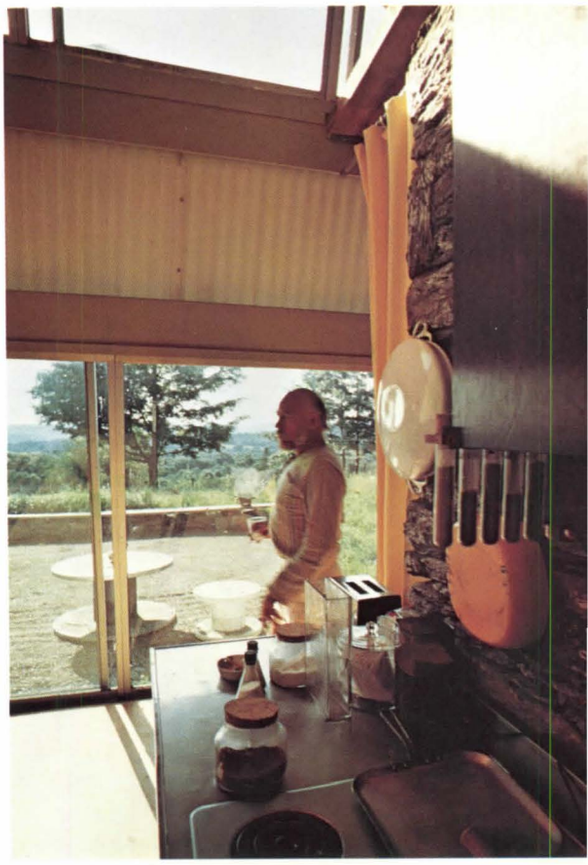
platforms and no safety nets below. Sleepwalkers beware. Not designed for small children in this version, the house is nonetheless entertainment for children of all ages, with plenty of places to perch, swing or dangle from. Sitting at one level and peering into another is part of the fun. Couches and beds provide the soft touch, and a place to curl up with a view. A living room bathing pool built for two adds to the spirit.

Above the rock foundation and terraced concrete floor slab, the building is made of steel, plastic and glass, with its structure exposed for an industrial appearance that is bright and honest. Order for the structural system is provided by eight rectangular tubes, two for each side of the building, that provide vertical support. Each has four connection points on the inside and outside for cables, and Johansen hangs huge, red industrial shackles (also familiar to sailors) at each of these 64 points as visual reminders of the building's potential for change. Exposed bar joists provide horizontal support, and crisscrossed cables on the inside of the opaque wall sections provide rigidity. The walls are either glass or two sheets of translucent, corrugated plastic, with styrofoam insulation sandwiched inside.

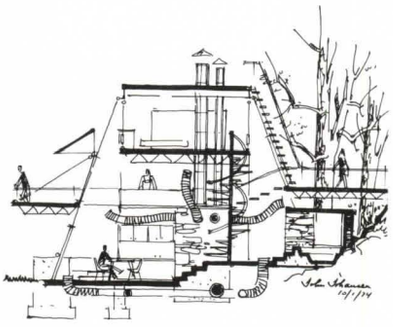


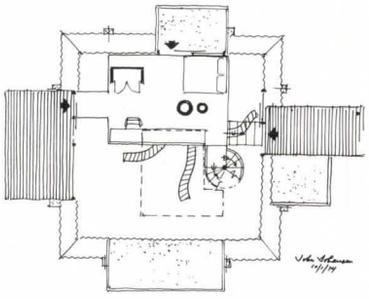
Platforms are hung from steel cable rigging, similar to a sailboat's shrouds.

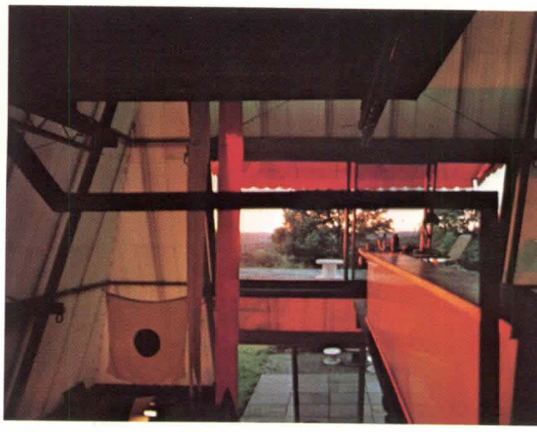
Kitchen area is not only part of the living area, but almost a part of the outdoors too.



Second-level sleeping platform is punctured by chimney and exhaust pipes.

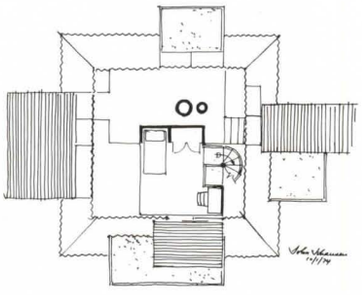


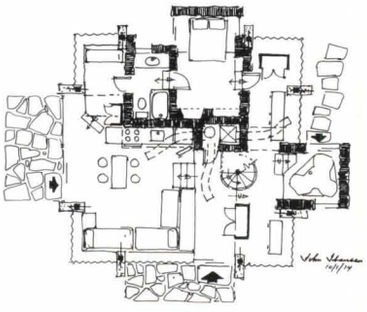




From the stairs, at second level, a view to the outdoor balcony, and living room.

Work room, with chairs overhead, sits under bridge from bedroom to balcony.





Stairs provide jungle gym seating for multi-level views, and counterpoint stone.

As constructed, the house has three outdoor balconies and two bedroom platforms, at different levels, inside. But this could change in a weekend. Johansen designed the mechanical system of the house to accept additional loads and installed flexible ducts that can be connected to new room enclosures, inside or outside the tent structure. He hasn't enclosed any rooms yet, but he may.

Johansen practically built the house himself, hauling rocks for the stonemasons and using carpentry skills learned as a boy. He left the plumbing, electrical and mechanical work to professionals, but took two years of weekends, with the help of his friends, to do the rest on his own.

Johansen already envisions the day when he can package the entire house (except for the optional stonework) as a giant game for homebuyers. The kit could be assembled in almost infinite variety, mostly by its owners, and its light weight and speedy construction could help keep costs low. Nor would the game end with occupancy. A homeowner could continue the process of building and change for the life of the house and the needs of his family. Johansen would like that.—Margot Villecco

Facts and Figures

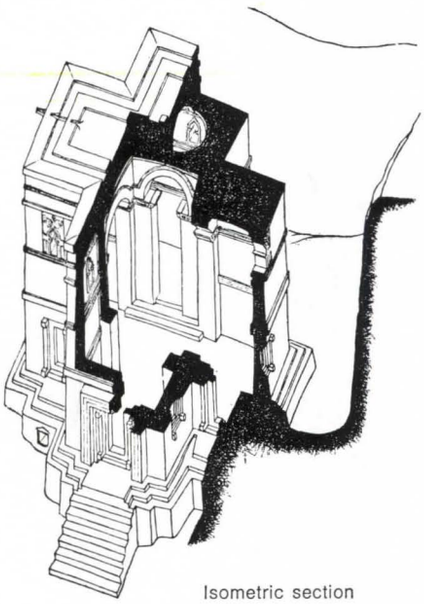
Residence, Stanfordville, New York. Owner, architect and general contractor: John M. Johansen. Engineers: KBNA/B Associates (structural); Williame Dunne (mechanical). Stone masons: Baldera Brothers. *Interiors:* Beate Gropius. Building area: 1,400 sq. ft. Construction cost: $60,000.
Photographs: John Veltri.
Building suppliers listed on p. 124.

Second and third-level bedrooms are separated visually by built-in storage unit.

LALIBALA

The rugged highlands of Ethiopia hold a cache of extraordinary rock-hewn churches

by Christopher H. L. Owen



Isometric section

The Church of St. George, built in the early 13th century, is cruciform in plan, and its roof, level with the surrounding ground, is decorated with a series of incised crosses.
It sits freestanding within an excavation 40 feet deep. Rectangular trenches around the main opening accommodate access passageways and stairs down to the church's entrance level.

New York architect Christopher Owen and his wife Sylvia, an interior designer, visited the Lalibala area last winter.

Churches hewn from solid rock, isolated on remote plateaus, and still used for worship with the same intensity as when they were carved eight hundred years ago, are among Ethiopia's largely unknown monuments.

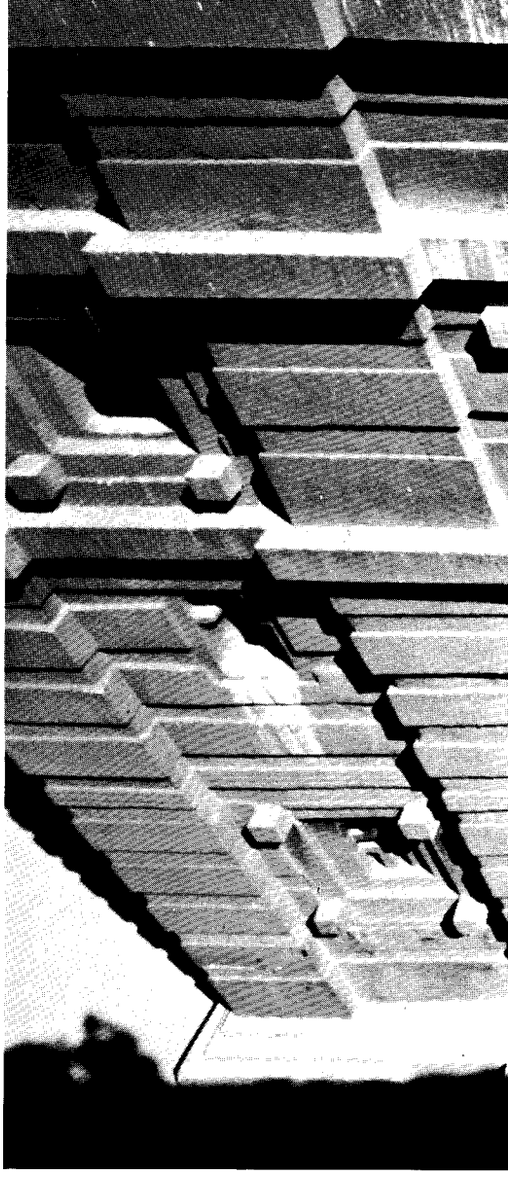
It is estimated that there may be as many as 2,500 of these churches. The majority are primitive, some being no more than crudely enlarged caves and cliff-side recesses, often lacking architectural or decorative refinement. There are, however, several score which are of exceptional interest. An impressive group of twelve of these is found in Lalibala, a monastic township of 9,000 inhabitants in the province of Wallo, at an altitude of 8,500 feet. Until seven years ago, Lalibala was virtually inaccessible, requiring of the visitor at least seven hard days on muleback.

Lalibala is named for a 12th century king, reputed by local legend to have carved the churches himself (with the aid of angels) in response to divine command. The complex of churches and chapels is cut into a mountain of andesitic tufa, a porous rock which is formed as a deposit from springs and streams and which hardens when exposed to air.

Generally, the churches have a basilican layout, characterized by three entrances, a chancel arch, upper galleries, and a domed sanctuary. There are variations on this theme, necessitated by the existing terrain from which they were excavated, and expressing the artistic liberty of their architects. Four of these shrines, buried in a maze of tunnels and alleys, are literally pure monoliths, carved from one block, worked inside and out, with their bases rooted in the mother rock.

The "construction" of a pure monolithic church, of course, really means its excavation. It is generally assumed that the method employed was to lay bare an oblong block of stone by excavating a rectangular trench in the tufa and by carving the block from the top downward, both inside and out, thus avoiding the need for scaf-

Four of Lalibala's dozen churches are shown here. At right and below left, the elaborately modeled Church of Emanuel. Below center, looking beyond the stepped plinth of the Church of Mount Sinai towards the entrance to the Church of Golgotha. Below right, the Church of the Redeemer, Lalibala's largest church, with a colonnaded exterior.

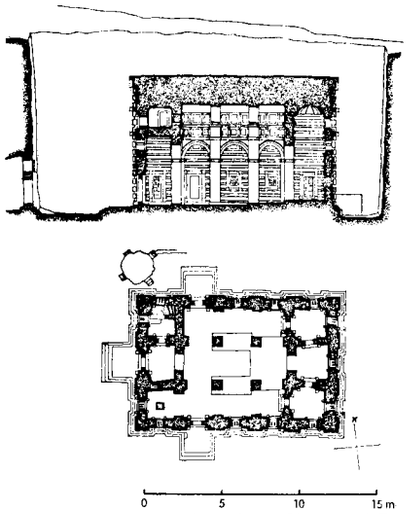


folding. To gain access to the interior, tracery was omitted from the uppermost tier of windows, and, for light while working, smokeless alcohol lamps and polished bronze sun reflectors were used. The masons carved from the stone, as they proceeded, the columns, pilasters, beams, arches, and all decoration. Their skill was so exact that there are virtually no signs of patching or reconstruction. They copied exactly the elements of built-up architecture, unconcerned that their copies' monolithic strength rendered much of the supporting structure redundant. The result is a duplication in solid rock of earlier wood and stone structures.

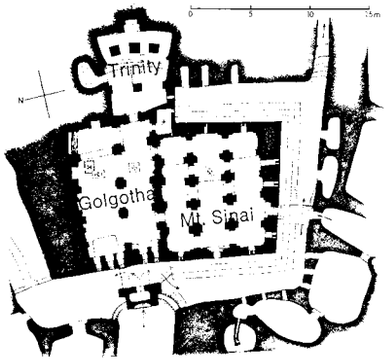
The builders' skills extend beyond the church structures themselves. In these massive excavations, severe drainage problems would have arisen had they not incorporated elaborate precautions for handling the heavy summer rains. The pit floors all slope, draining into alleys and subterranean channels which eventually lead out to the open terrain. As the pit floors slope, so do the churches themselves, lending a degree of visual plasticity to the whole—a plasticity made more emphatic by the stone from which they are carved.

To understand the origins of these churches, we must go back to the beginning of Ethiopia's Christian history in the fourth century, when Frumentius, a Syrian captured by pirates, was enslaved and brought to Aksum, then the capital of Ethiopia. Aksum, at that time, was a world power, on a par with Rome and Persia. Frumentius, aided by Byzantine merchants, who with other Mediterranean traders did business at Aksum, sowed the seeds of Christianity; and, in time, Ethiopia's Christians embraced a faith closely akin to that of Egypt's Coptic Church. Today Christianity in Ethiopia is an integral part of a culture in which state, society, and civilization are all based on religion.

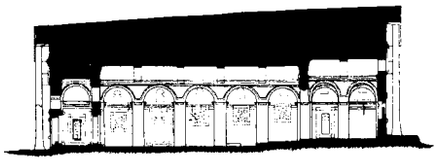
At the outset of this religious fervor, the Christians built in profusion, starting with forms with which their artisans were already familiar. The materials were wood and masonry, and the style is still to be found in southern Arabia (the source of migrations to Ethiopia centuries before). These early churches, of which perhaps two or three examples remain, were distinguished by monumental door and window frames, latticed stone windows, and



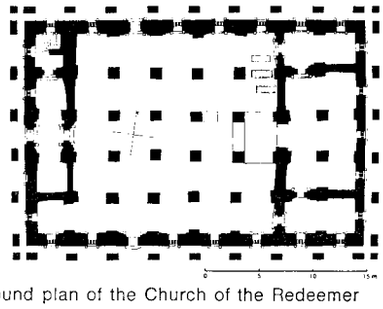
Section and ground plan of the Church of Emanuel



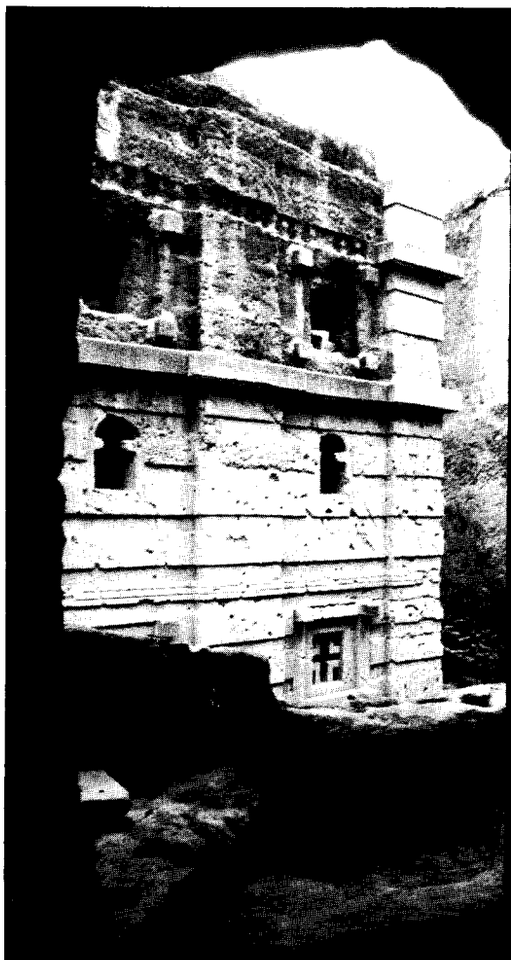
Ground plan

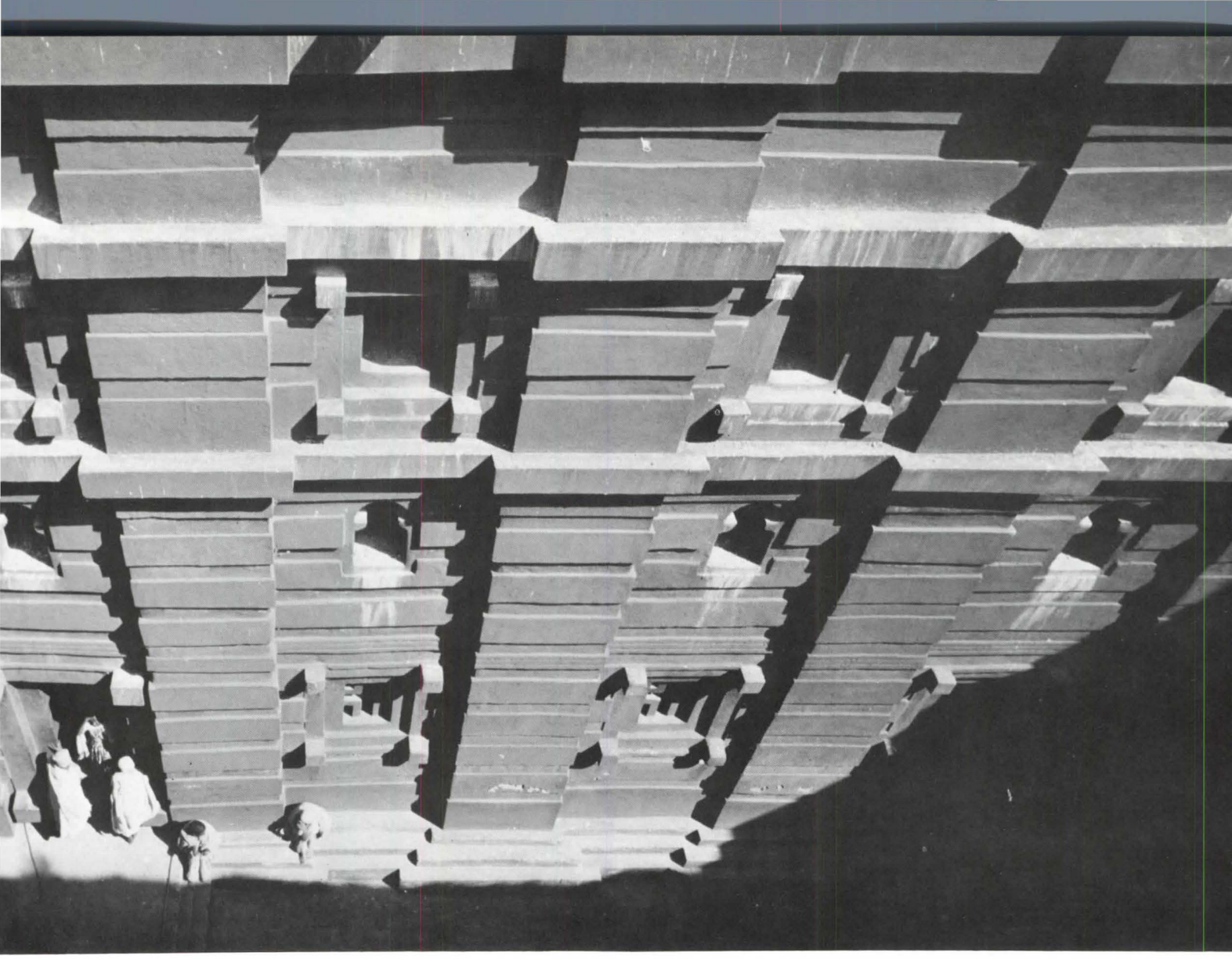


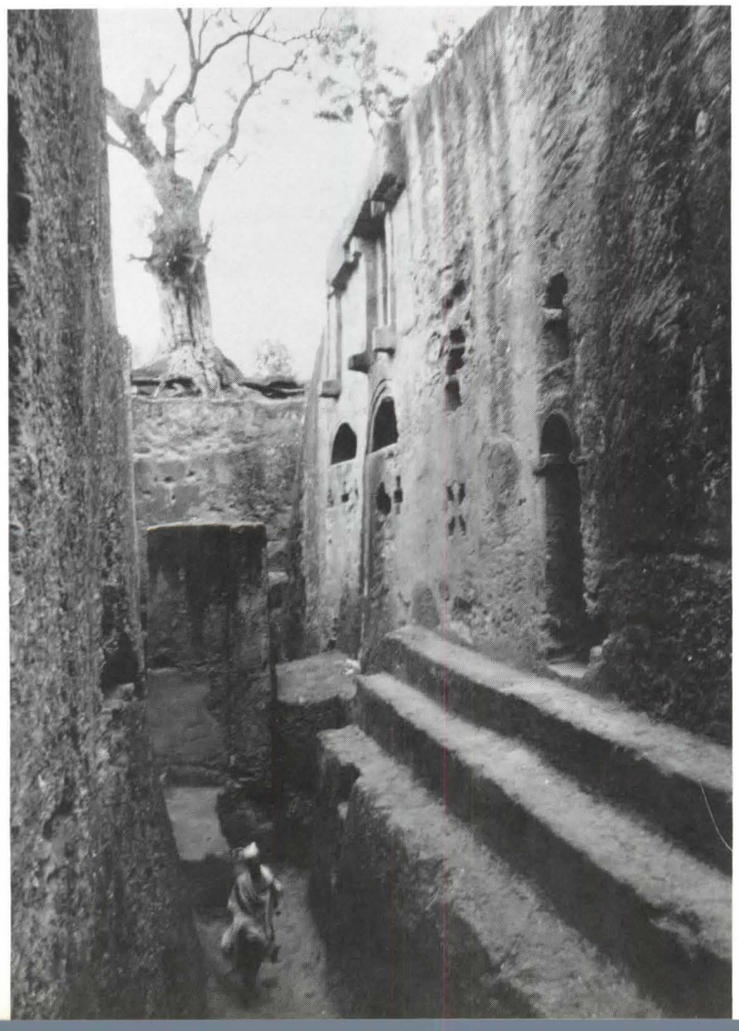
Longitudinal section

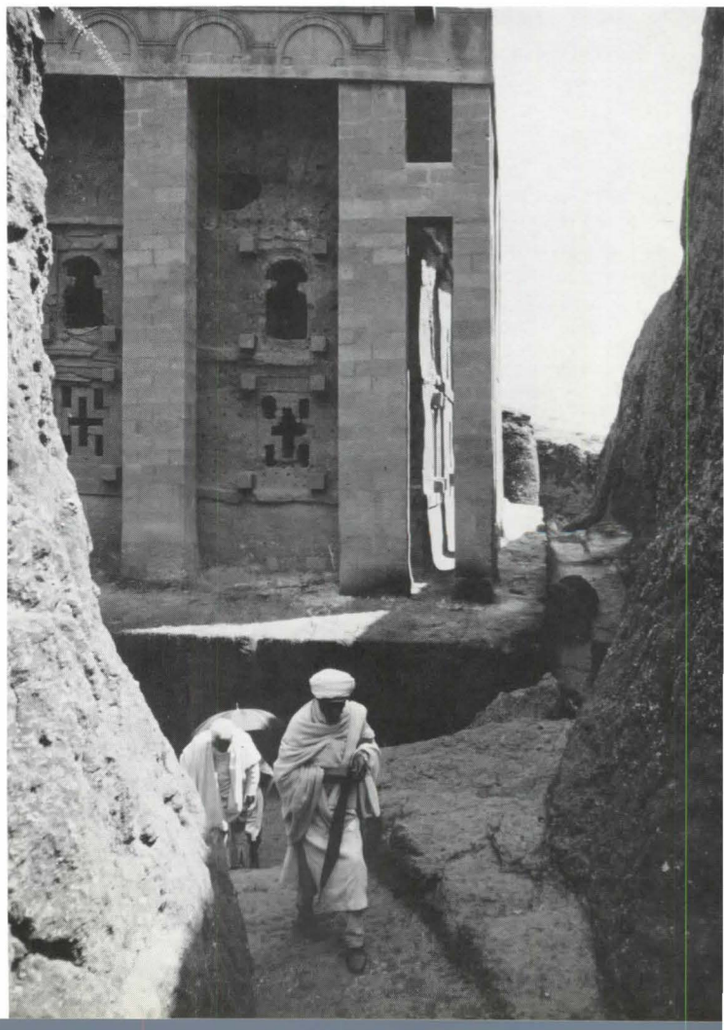


Ground plan of the Church of the Redeemer







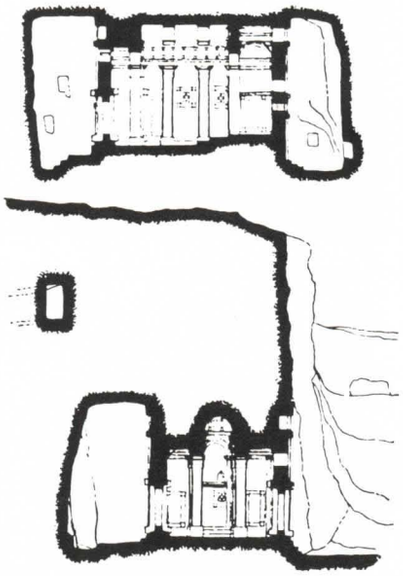


The rock-hewn churches are as remarkable in detail as they are in conception: 1. A carved window grille of the Church of Emanuel. 2. Interior, the Church of the Redeemer. 3. At Korara's Church of Abuna Gabra Mikael, a frieze of apostles in the cupola. 4. Clerics dancing at the edge of the excavation containing St. Mary's. 5. Interior painting, St. Mary's. 6. Window detail, the Church of the Redeemer. 7. North of Lalibala, near Weqro, a ceiling detail in the Church of Abreha Asbeha. 8. Bas relief, St. Mary's. 9. Window detail, the Church of Golgotha. 10. A cleric in the passageway near St. Mary's. 11. Inside the Church of Abuna Gabra Mikael.

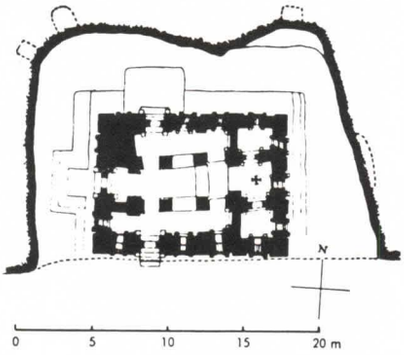
sandwich wall construction made up of alternate layers of wood logs and stucco-covered stone. The protruding ends of these logs were a dominant feature and became known as "monkeyheads." The builders used solid rock also, and erected huge stelæ, probably as memorials to particular sovereigns. The largest of these, which can be seen in Aksum today, stands 110 feet high and is reputed to weigh over five hundred tons, which ranks it as one of the largest monoliths of the ancient world. These stelæ, carved over 1600 years ago, are particularly significant in that they simulate in relief the layered wood and stone architecture of the time; and it is likely that it is from these that the Christians of the 13th century were inspired to carve their churches in rock. It could be assumed that the change from layered wood and stone to solid rock was a means of rendering the edifices immortal. If so, this change was fortunate, for when non-Christian enemies, such as the Moslem and the Turk, fell upon Ethiopia and destroyed all but a handful of the erected places of worship, those carved from stone could not be pulled down, and they remain today virtually intact.

Lalibala is a holy town, an undivided entity. In addition to the technical virtuosity displayed in each church, the relationships of one church to the others of the group demonstrate a sophisticated understanding of urban planning. The countless alleys and tunnels, the terraces and courts, the labyrinthine shafts and halls are part of an organization so complex that only repeated visits can make it comprehensible. The holy precinct of Lalibala stands as a tribute to the stamina and skill of its builders, who have created one of the least known, yet one of the most extraordinary wonders of the ancient world.

Photographs: pp. 44, 45, 47 (top), 48 (nos. 2 and 3), 49 (nos. 4, 6, 7, 9, 10, 11), Georg Gerster/Rapho Guillumette Pictures; all others, Christopher H. L. Owen. Drawings based on engravings by L. Bianchi Barriviera of Rome, as published in Georg Gerster's *Churches in Rock* (Phaidon, London, 1970, $29.50; distributed in the U.S. by Praeger, New York).



Longitudinal and transverse sections



Ground plan of the Church of Abba Libanos

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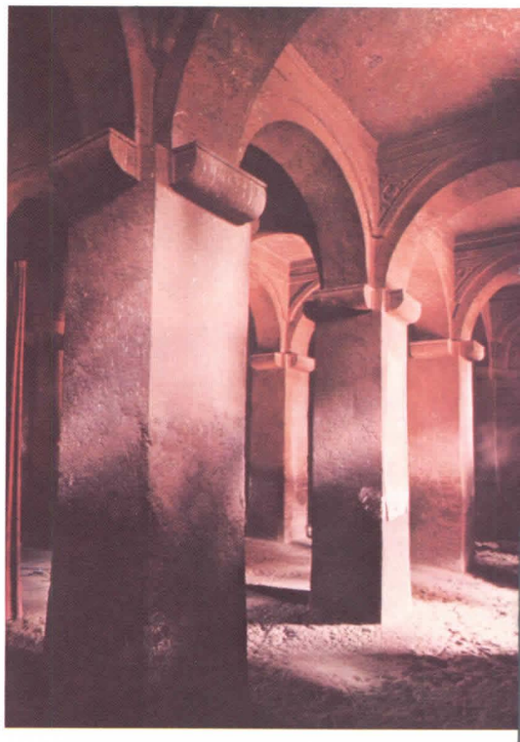

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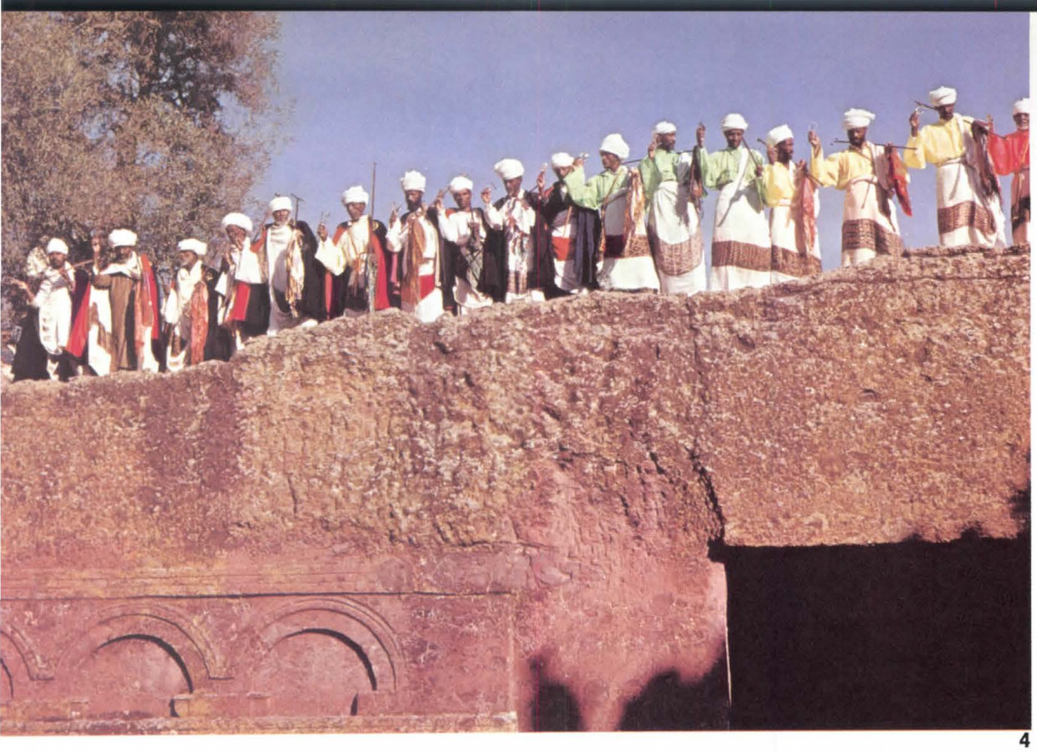

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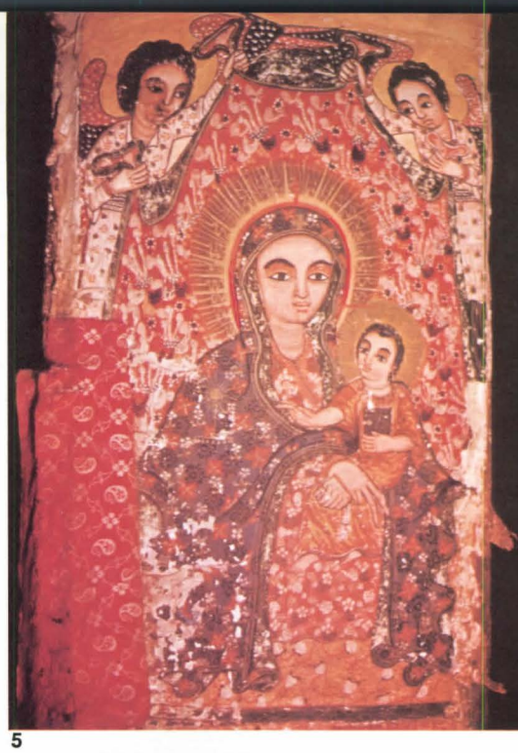

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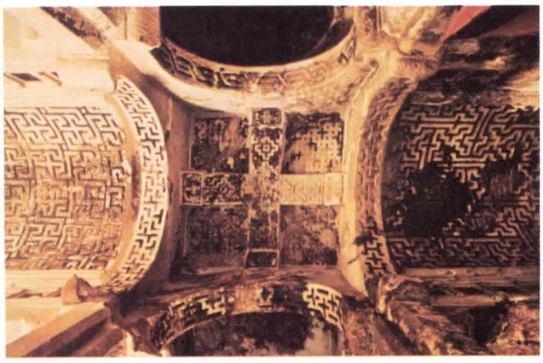

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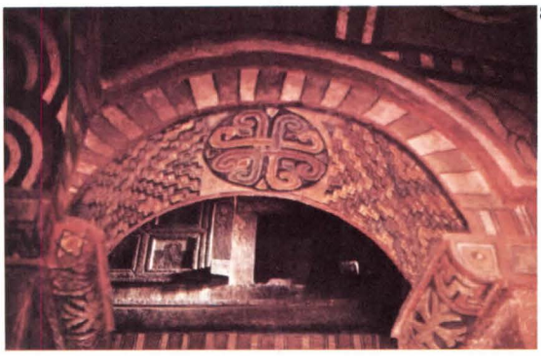

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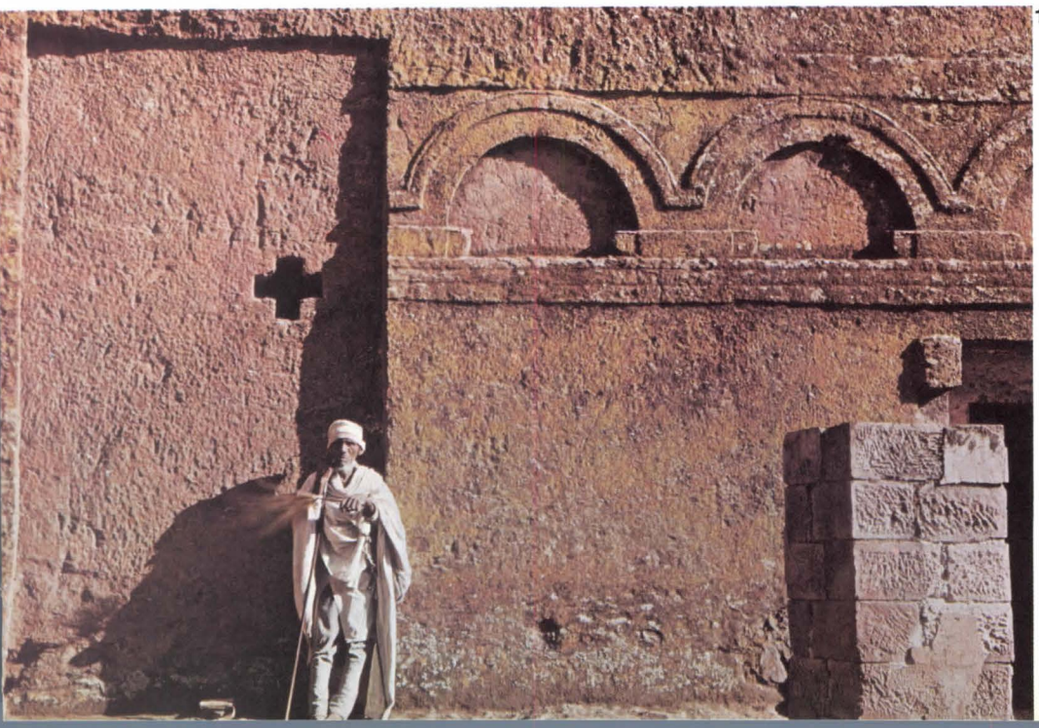

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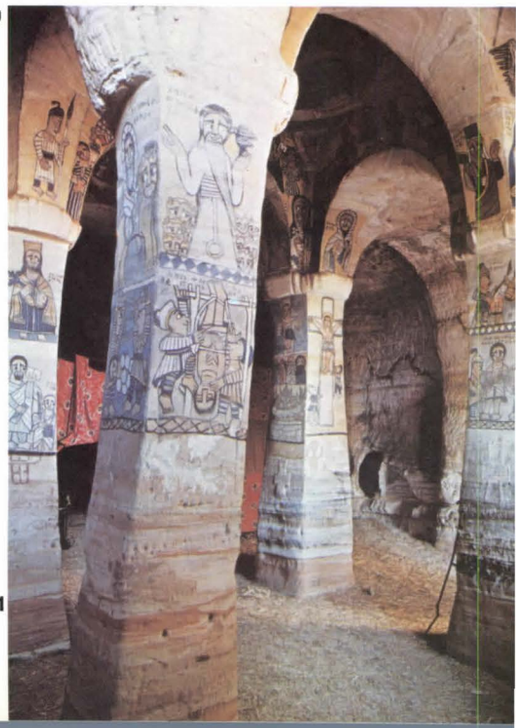

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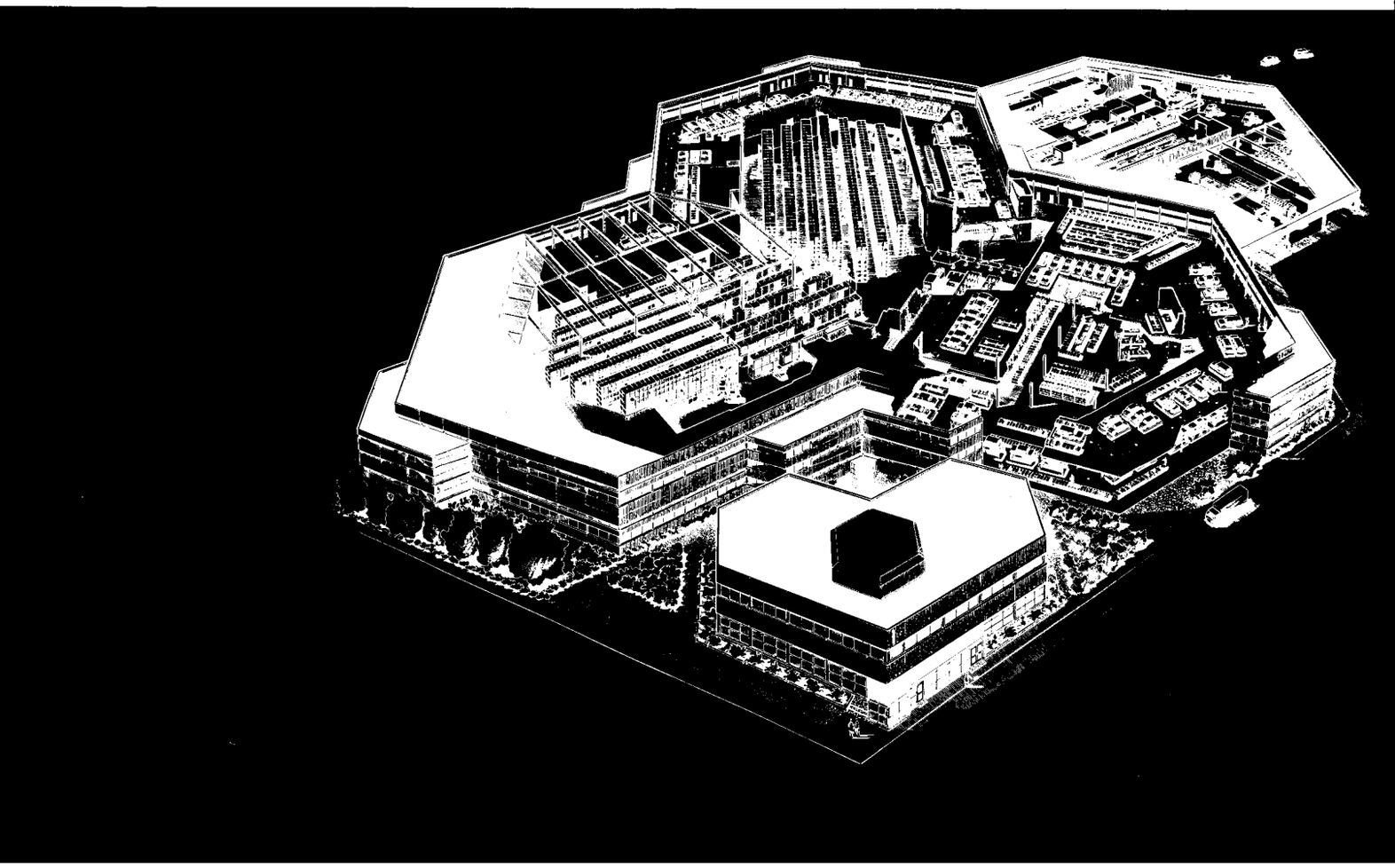
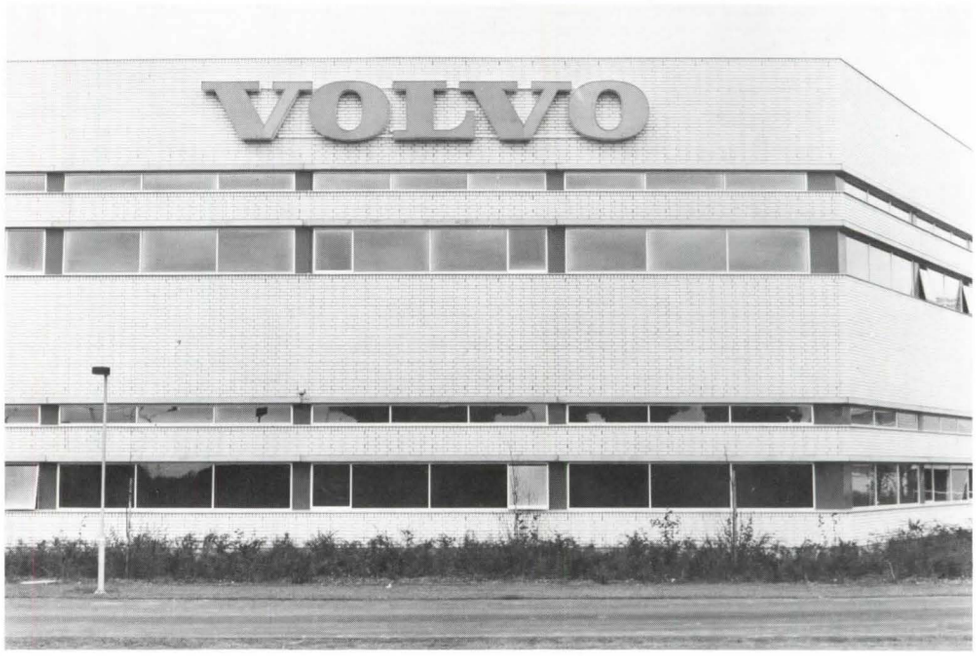
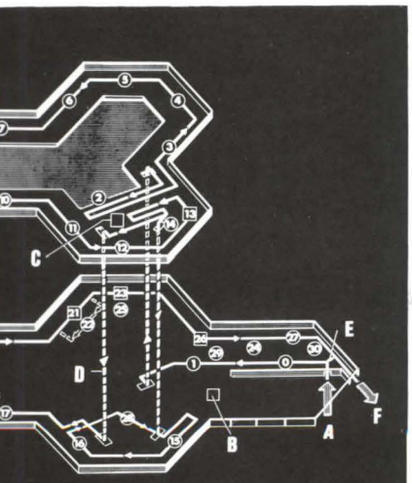


SWEDISH TEAMWORK

A new auto assembly plant replaces the assembly line with group effort

by Tom Wicker





e Volvo plant is composed of four hexagonal odules, three of them two floors high. Office ace is in a separate element linked to the nt by a glazed corridor. The diagram above ows the path of a car through the plant, the me entering at A and proceeding, in alphatical sequence, up to the second floor, then wn again, the finished car emerging at F.

In Sweden, an innovative factory designed for Volvo by architect Sar Owe V. Svärd and utilizing new assembly equipment devised by Volvo's managing director, Pehr Gyllenhammar, has attracted international attention. (An American version, designed by Mitchell Giurgola Associates and utilizing similar equipment, is also planned.)

The following appraisal of the building and its function is adapted from two articles by Tom Wicker, Associate Editor of The New York Times, and is reprinted by permission, © 1974 by The New York Times Company.—ED.

Henry Ford 2d was in Kalmar, Sweden, earlier this year to look over Volvo's new assembly plant. More Ford executives and other American automobile men are on the way, lured not only by reports that Volvo has found a different, perhaps better way to make automobiles but by the possibility that the Swedish firm also may have found a partial antidote to the worker alienation troubling industrial societies everywhere.

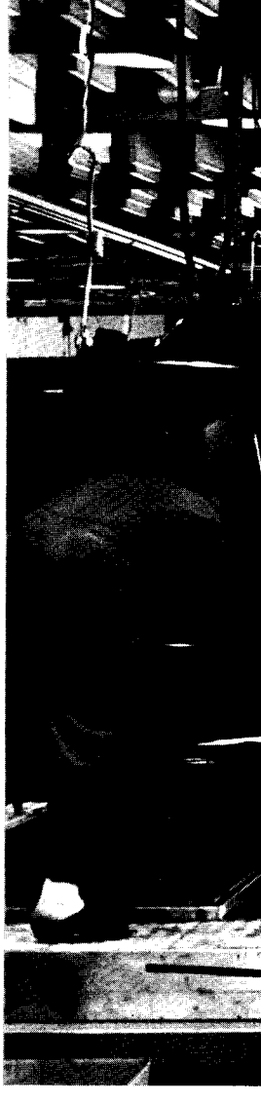
Volvo has at least made a major effort to adapt technology to human beings, rather than subordinating people to the dictates of the assembly line. The first thing that was eliminated in planning for the Kalmar plant, for instance, was the inexorably moving overhead conveyor belt of the usual assembly line; the second was the conventional method-time measurement technique of reducing every assembly line function to its smallest dimensions, so that the individual worker, too, played only the smallest role in the finished product.

The obvious consequences of those two decisions alone were to give workers some control over the pace of their work, and a greater share in—hence more responsibility for—production of each Volvo.

For such purposes, Volvo was willing to add ten percent—10 million Swedish crowns or about $2.5 million—to what would have been its investment in a conventional plant. The company is confident that it will recover that and more through reduced absenteeism, personnel turnover and worker discontent, with a consequent rise in the quality of the work being done.

The Kalmar plant is a remarkably technological response to the human problems of an advanced industrial society. To replace the overhead conveyor belt, for example, Volvo developed two ingenious

The assembly workers have been divided into 25 teams, each team consisting of about 15 people. Dropped from the ceiling of this typical work space are acoustic baffles which help lower noise levels. Below, automobiles nearing completion on a series of the special battery-driven carriers.



forms of "carriers," battery-powered and computer-guided, that creep silently about the factory bearing body assemblies and engine assemblies until at a prearranged point one of each is finally "married" into a full-fledged automobile.

These carriers enable auto bodies to be tilted 90 degrees, thus eliminating the difficult and tiring overhead work common to conveyor belt assembly lines. Since the carriers move separately, workers in different sections of the plant can vary the pace of production almost to suit themselves. These workers are divided into teams of about 15 men and women; each team has responsibility for one production phase—for instance, installing the electrical system, or interior upholstery, or underbody fittings.

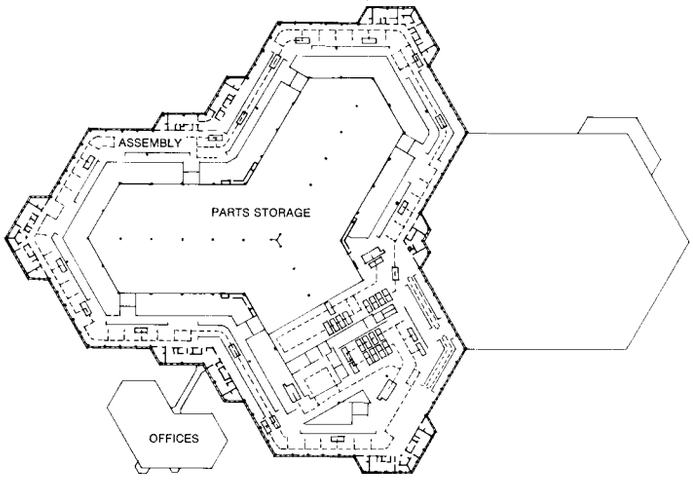
As long as the teams meet their production goal—about 13.7 installed systems an hour for the working day, producing 110 complete cars a day—they can go slow in the morning and faster in the afternoon, or at whatever pace they set for themselves.

Team members, moreover, can choose to form their own mini-assembly line, with each worker doing a different job in sequence on a number of cars; or, when possible, each worker or a group can do the complete installation on one car. The team system permits each worker to learn each job in the team's assigned function, so jobs can be rotated to avoid boredom and to equalize the distribution of good and bad jobs. From pay scales to job assignment, women are equal members of every team.

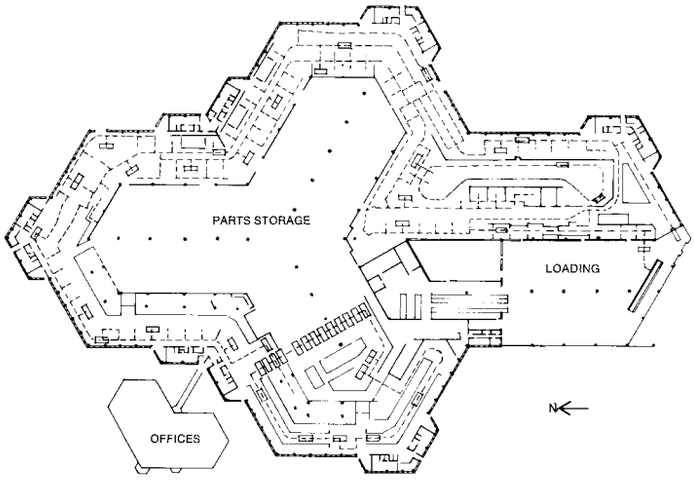
The plant's odd design—combining four six-sided shapes on one level and three six-sided shapes on a second level—gives each team its own exterior section with ample sunlight and views of the landscaped grounds. Sound buffers hold noise to conversation levels. Teams have their own entrances, locker and coffee-break rooms, and are encouraged to make collective decisions and suggestions about their own production practices and working conditions.

So far, about a thousand cars destined for the American market have been built. Volvo is pleased with both the quality of the cars and the attitudes of the Kalmar work force. But the company concedes that it is far too early to be sure that the Kalmar plant represents either a better way to make autos or an adequate response to worker discontent.

That discontent, after all, is common to

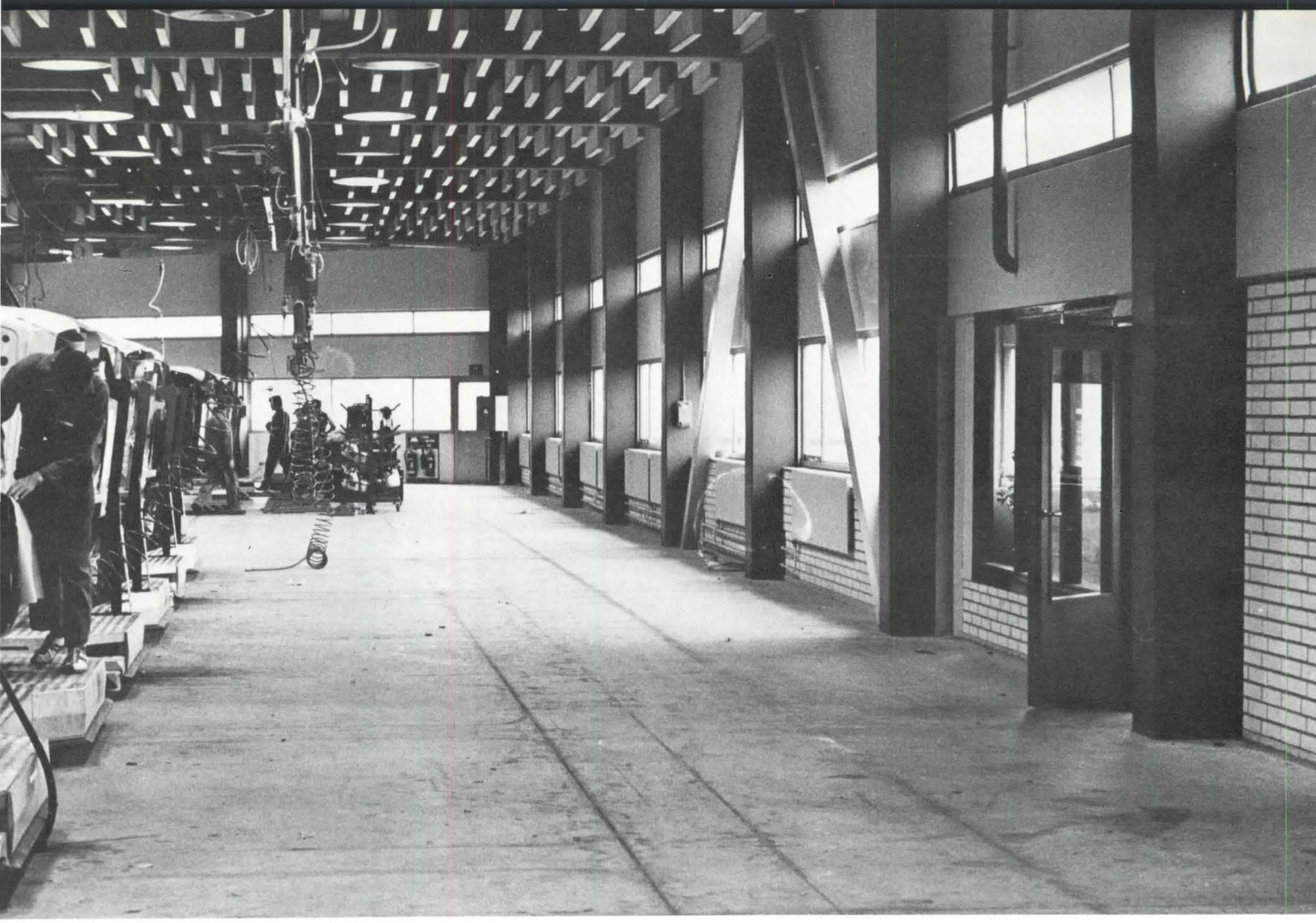


UPPER LEVEL



LOWER LEVEL

0 50 100'
0 15 30m

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Below, a basic car body, after cleaning and inspection, is being placed on one of the carriers. Opposite page, top left, one of the plant's teams assembling car doors separately from the bodies. Top center, the carrier can turn a car body onto its side, considerably facilitating assembly work. Top right and below, car bodies can be lifted or lowered automatically from one floor to another.

industrial societies. It surfaced in America in the Lordstown strike, and European industry is ruefully aware of it. It is by no means entirely economic, and it goes deeper than resistance to outmoded assembly-line techniques. Volvo's new plant is only part of Sweden's recognition that something is badly wrong in industrial society.

For many years, about 70 percent of the young people taking industrial jobs in Sweden had seven years or less of education. By the early seventies, when the Volvo Company began planning its new automobile assembly plant at Kalmar on Sweden's southeast coast, 70 percent of young people seeking industrial jobs had ten to twelve years of education, and another 20 percent had more than that.

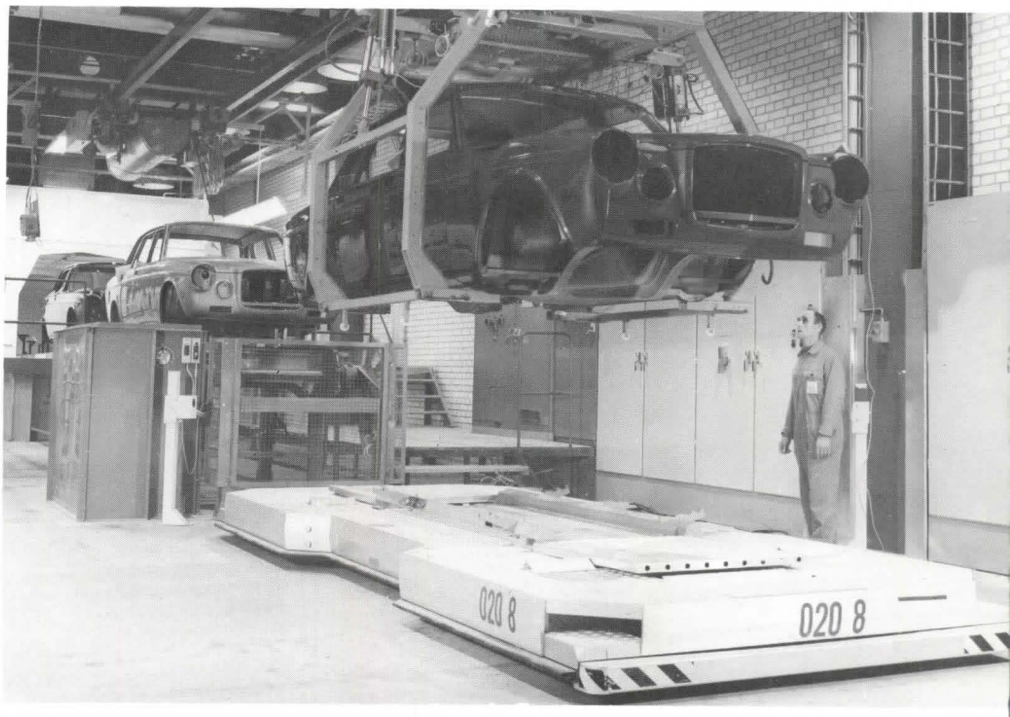
There was a growing shortage of people who wanted to work in such plants, particularly in a society that provides generous unemployment benefits; and there were new demands of women for equal status in industry as in society in general.

Volvo had discovered that Swedish workers no longer accepted the idea that their generally good wages paid them sufficiently for whatever work industry required. As Inge Janerus, the ombudsman of the Confederation of Trade Unions, put it, "Wages *and* a good job are now demanded."

That is a change in attitude that is being felt in industrial societies worldwide, not just in Sweden; perhaps because there is such a close working relationship between Government, industry and labor unions here, as well as a traditional regard for human needs, Swedish society appears to be making swifter response than others.

Mr. Janerus defines the "good job" that better-educated workers now demand as one in which "the intellectual and the manual" are not so sharply separated in the factory, so that workers can participate to a much greater degree in developing methods and equipment, planning production, administering the plant, setting and safeguarding their own conditions of work.

By that standard, he is not overly impressed by—although he approves—Volvo's Kalmar plant. Volvo, he believes, has gone to the great length of developing a whole new *technological* system to make what ultimately will be seen as a relatively

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Below, a corner of one of the carriers, fitted with an automatic collision-prevention device which can stop a carrier, moving at top speed, within 2 inches. The floor grooves shown below contain electric cables which send impulses to control the movement of the carriers. At top left, work on a tilted chassis. Top center, the assembly work ends in a function test on a roller installation in the carrier; the hood is open to cool the engine. Top right, final rust-proofing. In the large photograph, a typical team of workers, responsible for its own phase of the assembly.

small improvement in workers' lives and conditions. He thinks companies like Atlas Copco (compressed air), Swedish Tobacco, and Perstorp, the big chemical firm, will get better results from less technological innovations designed to provide greater worker self-government and to "press decision-making lower in the system."

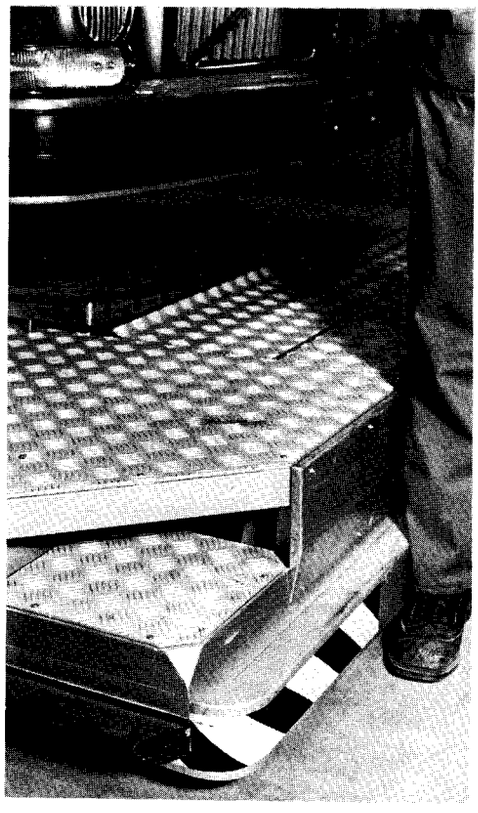
Labor and industry efforts of that kind have the enthusiastic backing of Olof Palme, the articulate intellectual who is Premier of Sweden and head of the Social Democratic party. The major task of industrial democracy in the last years of the century, he believes, is to "meet people's needs" not just economically and with material goods but by giving "meaning and dignity" to their work—for their work, he says, will remain the governing factor of most people's lives.

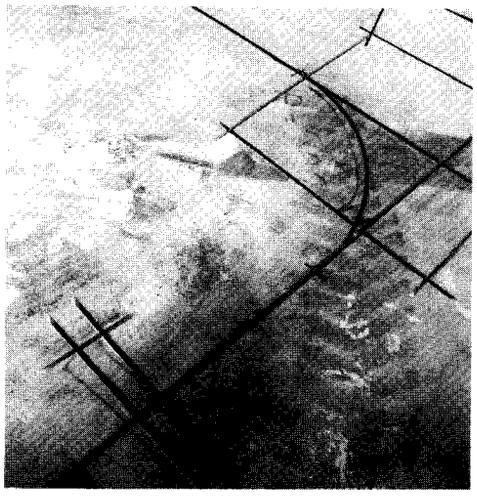
The way to meet that goal while maintaining the production on which modern society depends, Mr. Palme argues, is likely to be found in Sweden and elsewhere in Western Europe. The United States he sees as an "abberation of liberalism" unable to use its great power to solve its own problems and fearful of liberal movements abroad; the Soviet Union he sees as an "aberration of Marxism" equally unable to solve its domestic problems and just as fearful of liberal movements in its own sphere.

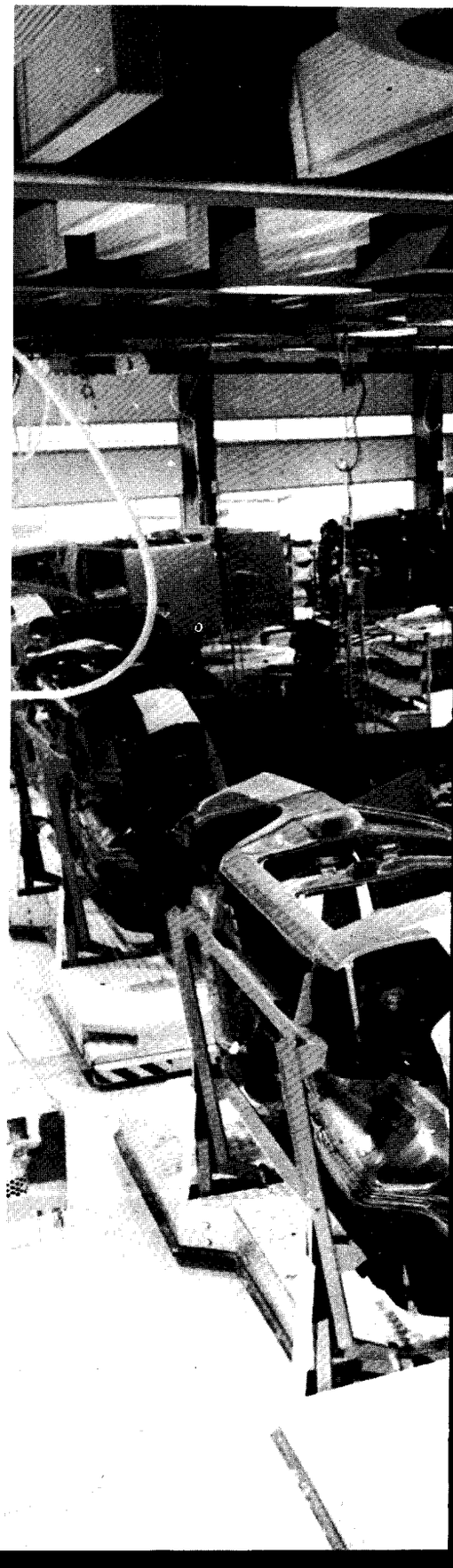
The result, Mr. Palme believes, is resources squandered on "going to the moon, Vietnam and Czechoslovakia," while the fundamental task of adapting industrial society to human needs has been "exported" to less powerful nations only recently freed by detente from cold war polarization.

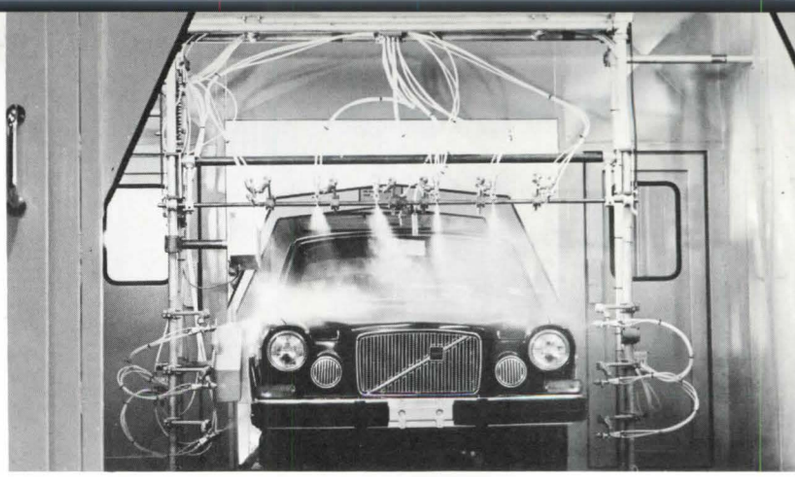
If so, it was a formidable export. What Olof Palme and Inge Janerus and even the Volvo Company really are talking about is the subordination of production and economic expansion to human intellectual and spiritual comfort; yet, all insist on the obvious, too, that production levels have to be maintained, perhaps even increased. If industrial society is not entirely happy with its material goods, it would almost certainly be unhappier without them; and there seems to be little that the underdeveloped nations want more.

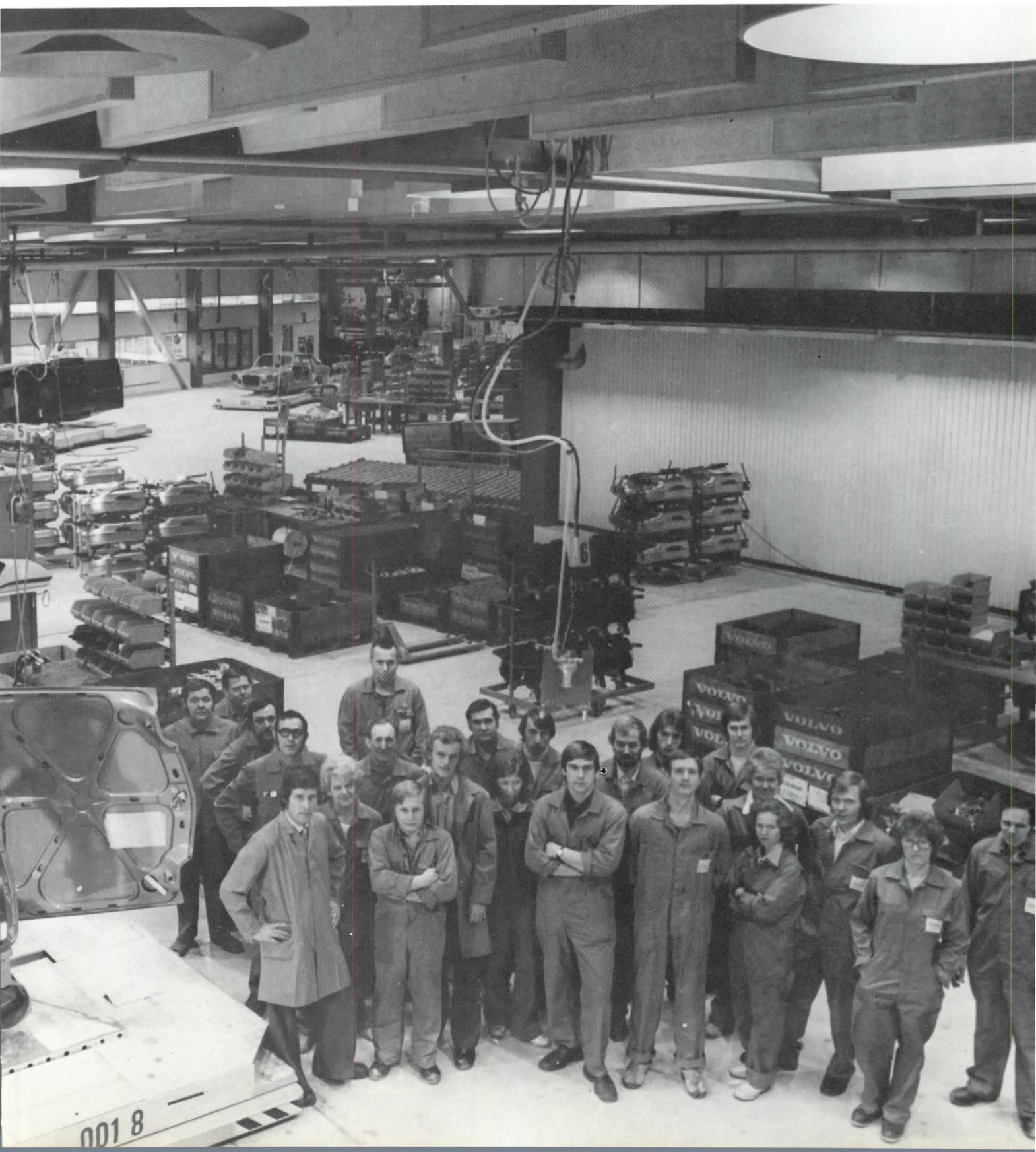
Even here in Sweden, Inge Janerus concedes, the response to this conundrum is "just beginning in a few plants." But of course "a few plants" is where the Industrial Revolution began, too.










VOLVO
001 8

LOG CABIN SCHOOL

New house for children uses an ancient building system to create modern spaces that are fun for learning in

Building with logs is rare in modern architecture. That is why the Aspen Community School designed by Harry Teague and Peter Stoner, recent Yale graduates, seems unusual yet so at home in its mountainous setting. Candida Harper's report of how the building came to be built is as interesting as the results themselves. She works for Grass-Roots Network, Aspen's community cable television station.

In the spring of 1972 the Aspen Community School was in its second year of existence. The Physics Institute in which it had been housed since its inception had to be vacated the following year. There had been talk of the need for a building; Harry Teague and Peter Stoner were working on the design as a thesis for the Yale School of Architecture, and a well-wisher had offered to donate a site that would be hard to turn down.

But free schools survive an average of two years, and near the end of its second year the Community School looked as if it might be nearing its demise. There was disagreement among parents and teachers about the nature of "free school" education. Personalities and egos had locked horns.

"We were really saints about not insisting on getting our building built," Harry Teague recalled the meeting at which he and Peter Stoner presented the first design to the parents and teachers. "We suggested that they could buy 10 new school buses with the same money and take the kids around the country for a year."

A few moments before the two architects were slated to present their design, the disagreements among parents and teachers culminated in the resignation of the director. Confusion reigned. Despite the chaotic atmosphere, Harry and Peter were asked to go ahead with the presentation. Afterwards there was some talk of dissolving the school. One question was unavoidable: "How can we afford a new building when we can barely pay the teachers?" But their commitment to preserving this particular experiment in alternate education proved so strong, that the parents decided to send Harry and Peter back to work on the final drawings while they raised the $90,000 necessary to erect a building.

Teague and Stoner knew from their very first conversations about the school that cost would be the overriding factor. The availability of logs at 27 cents a linear foot or 9 cents a board foot from the mill in Lenado, seven miles from the building site in Woody Creek, had first made the idea seem feasible. Because the design was to be submitted as a thesis, it cost the school nothing. After the parents gave the final go-ahead, the designers received a $3 to $1 matching work-study grant through Yale University to complete the drawings.

Three miles of logs, squared on three sides and separated by 1 in. by 3 in. spacers comprise the finished building. The logs are joined in a manner indigenous to the area: alternately overlapped on the corners and spiked. In order to keep the cost of labor down, the architects strove for a design rough and hearty enough to be constructed by unskilled labor. The digging, electrical system, heating, plumbing, and roofing were subcontracted, but the foundations, concrete and log construction were completed by parents, teachers, university students, Peter Stoner's three brothers, a childhood friend of Harry Teague's and the designers themselves. Most of the labor lived and ate together at the building site.

The land donor had offered 100 acres from which the school could choose 36 (the smallest allowable lot not subject to subdivision regulations). A spot on the edge of a mesa above a small gulley allowed for unobstrusive slab-on-grade construction with very little earth-moving. The driveway, sewer and well consumed $15,000 of the $90,000 budget, and the building itself was erected at a cost of $12.50 per sq. ft.

Colorado codes for school buildings are stringent, and there were questions about the appropriateness of having students design a school building. The architects, however, endeavored to meet all regulations, and local building officials agreed to approve their design if it met with approval from the Colorado Industrial Safety Board, and as long as some kind of professional seal were affixed. A local engineer, Charles Collins, modified the plans only slightly (adding steel reinforcements to the beams supporting the garage doors) and approved the design.

The Colorado Board of Registration might have called Teague's and Stoner's professional status into question and halted work in mid-construction. This possibility, if not taken completely seriously, was at

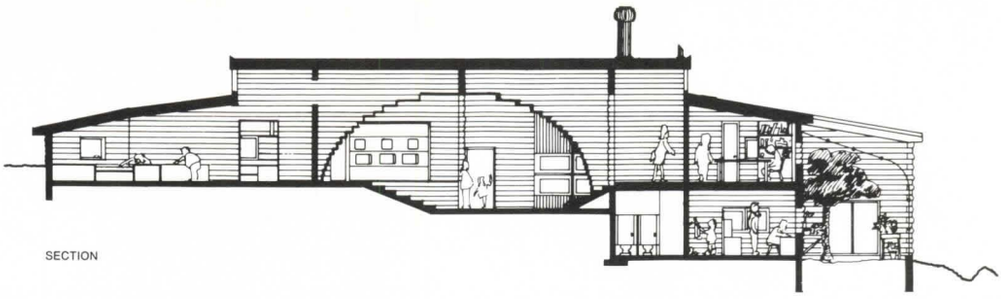
least recognized. But the advantages to the Community School of using untried talents far outweighed the disadvantages. First of all, the school could not have afforded a design by known professionals. Secondly, the designers shared with parents, teachers and children a youthfulness and a willingness to disregard standard school esthetics in favor of a building which reflected the unconventional educational experience that was to take place in it. And, third, their student status afforded Stoner and Teague the luxury of ample time to research and design the building.

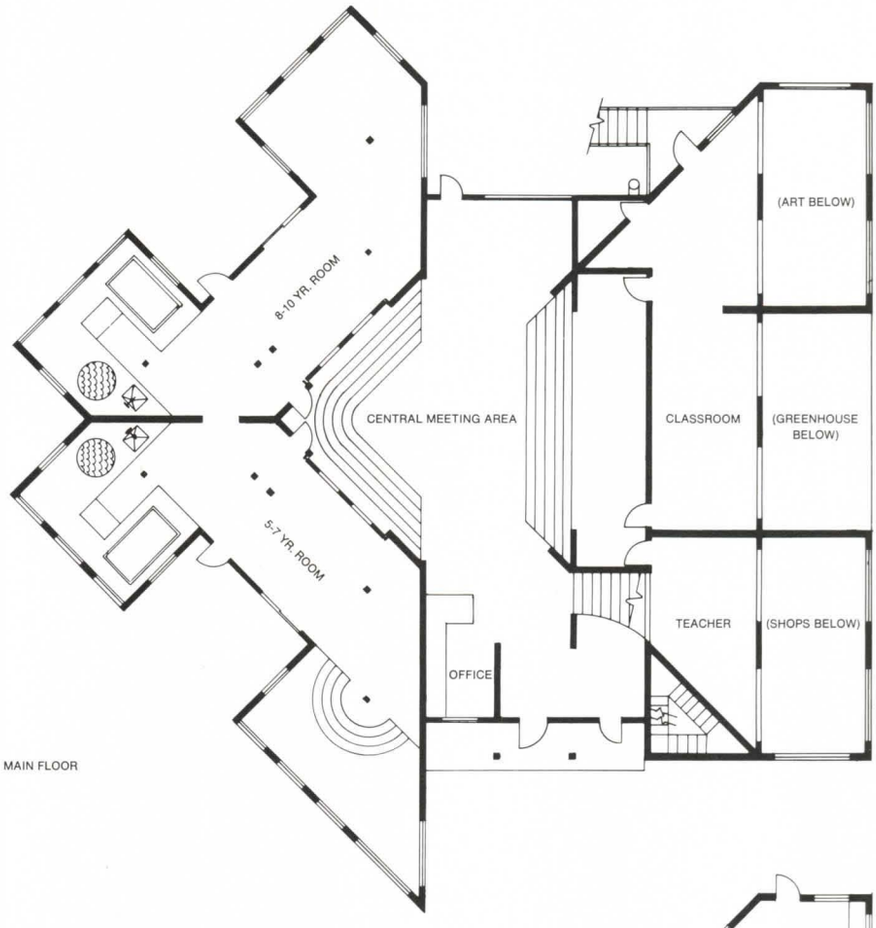
They began by visiting innovative schools along the East Coast and evaluating the successful and unsuccessful elements of each. Questionnaires were distributed to teachers, parents and children in the Community School asking them to describe or draw features and designs they would like to see in the building. Discussions were taped without the designers present. Unity, warmth, flexibility, and cohesiveness emerged as the major conceptual preoccupations of the adults. The children were bent on going to school in forts, castles, caves, tunnels, or at least in a building that had its fair share of dark and spooky as well as light and airy places.

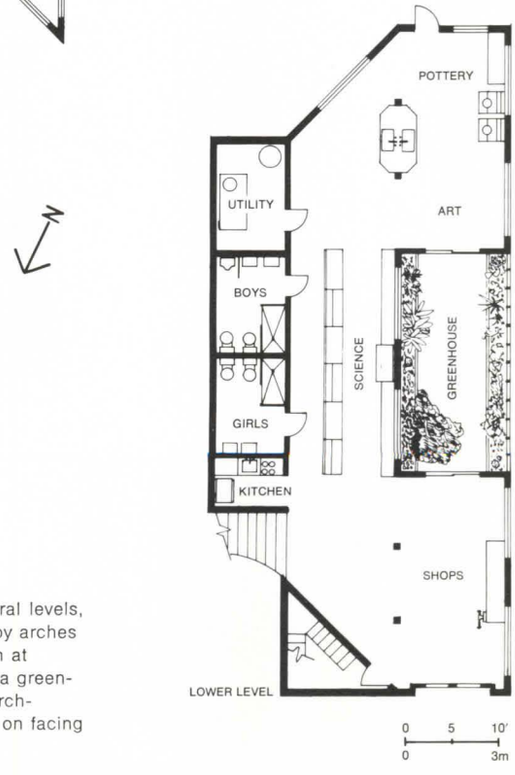
The decision was made that the school would be built to house a maximum of 100 students, and that it could not go beyond that number and still retain its intimacy.

In the resulting design, classrooms radiate from the arched central space which serves as an entrance, a meeting room, an auditorium, and neutral ground where all ages can meet and mingle. Circulation through the central room obviates the need for hallways altogether. The geometry of the plan is rigorously symmetrical, but the logs dispell any feeling of formality. The outside walls of the classrooms return every 16 feet strengthening the structure (the logs themselves are cut 16 feet long), providing direct access to the outside from each classroom in accordance with fire regulations, and also creating nooks and crannies.

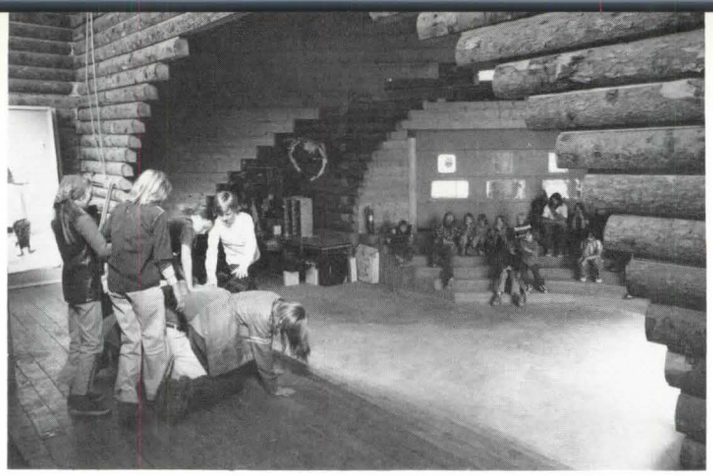
The effect from the outside of the log structure nestled on the side of the mesa is that of an inviting old fort. The tower was added partially as a romantic gesture in deference to the children's wishes, but it also serves the function of being the one place in the school where a child can go







Community school was planned on several levels, around a central meeting area spanned by arches formed out of corbelled logs (see section at top). Two-story wing faces west and has a greenhouse at its center (see plan at right). Arch-framed meeting area is shown in photos on facing page.




EXIT

Rough-and-ready detailing of log walls is shown in close-up photos below. The tower shown in the view on facing page is a lookout—a kind of "tree house" from which children get views of the spectacular panorama of the Rocky Mountains. Small photo (opposite) shows viewing slots in top of tower.

to be completely alone.

The science, pottery and shop areas are housed in a partial lower story on the downhill side of the building. The classrooms for kindergarten through second graders and for third through fifth graders can be shut off from the central area for quieter activities. Garage doors were chosen as the most inexpensive and at the same time easily movable partitions. With the doors raised, the central space expands into both classrooms creating an auditorium for school plays and large meetings. The classroom for the sixth through eighth graders, located behind the stage, can be used as an actors' dressing room.

The double log arch spanning the central room is the most unusual feature of the building, creating the feeling of a warm hollow or cave. In the original plan trusses supported the ceiling of the central room, and it was not until after they had built a model that the architects discovered they could continue five walls into an arch-like formation. Harry Teague explained that although the arch achieved the desired esthetic effect, it does not act as a support in exactly the way he and Stoner had anticipated. They had intended that the loads would be carried in a curve along the corbelling of the arch, but as the green logs dried out and shrank, the continuous members across the top of the arch assumed more and more of the support, thus acting as a beam.

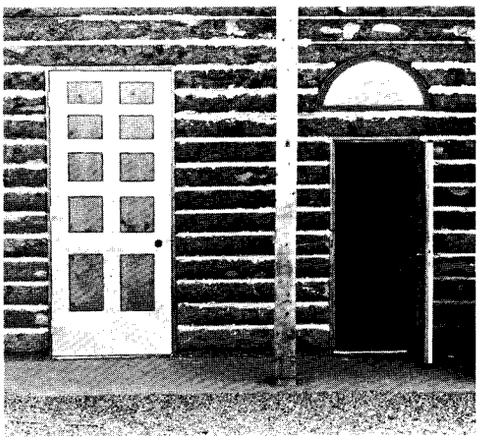
The abundance of windows and the clerestory above the classrooms diffuse and distribute enough light to make electrical lighting unnecessary anywhere in the building for most activities during the day. Greenhouse-grade corrugated fiber glass was chosen for the clerestory for its ease in handling, low cost and diffusion of light.

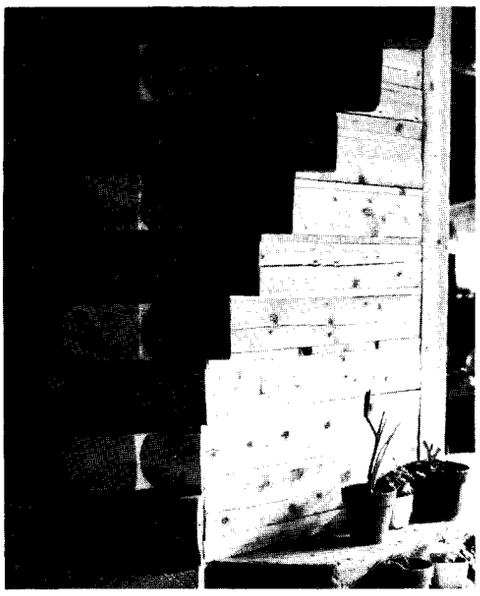
The designers were particularly interested in avoiding one characteristic common to most of the schools they visited before designing the Community School: most schools seemed to them to have been built for someone other than little people. Buildings of monumental proportions, windows above the eye level of a small child, hallways in which it is impossible to orient oneself, partitions too high to see over, all seemed to belie the idea that schools were after all for children. Teague and Stoner took care in their design to make as many elements as possible child-sized. The windows are at a child's eye level. The roof on the uphill side of the building slopes down to four feet above ground level, creating inside and out a child-sized space.

The classroom for the youngest children is divided into three areas: a raised quiet area with underground desks and a miniature-living-room appeal, a central area for instruction with tables and chairs and a raised noisy area with sandbox and water tank. The classroom for the third to fifth graders is similarly divided. The area across the building for the older children approaches adult proportions. Fire regulations require adult-sized entrances and exits to the building. In order to overcome the effect of the large entrance door, panels with a perspective distortion were added to make it seem even larger in comparision with the smaller door next to it. It is interesting to note that adults more often than not bend down to enter through the children's door.

A school building, the architects felt, should not only be a place in which learning takes place, but should be in and of itself in some way instructive. The relationship of adjoining rooms and spaces should be obvious from any space in the building, and the relationship of the building to the site and the entire valley should be easily comprehensible. The stairs to the tower, for example, show through in the library wall, and the continuation of a tower wall into the central arch is clearly visible through an opening on the inner library wall. There is no room in the building devoid of a view of the surrounding mountainous landscape.

The building was occupied in January of 1973. The architects attempted to provide the school with spaces that were flexible enough to change with the educational experiment it would house. The school was originally designed without a library in the belief that books appropriate for each age group should be shelved in the classrooms where they would be in easy reach of the children. As the school has acquired more and more volumes, however, the original idea has lost its practicality, and the space which last year served as an art room is this year's library. Whether or not the building can continue to change and grow along with the inevitable changes in educational thinking can only be measured by the test of time.

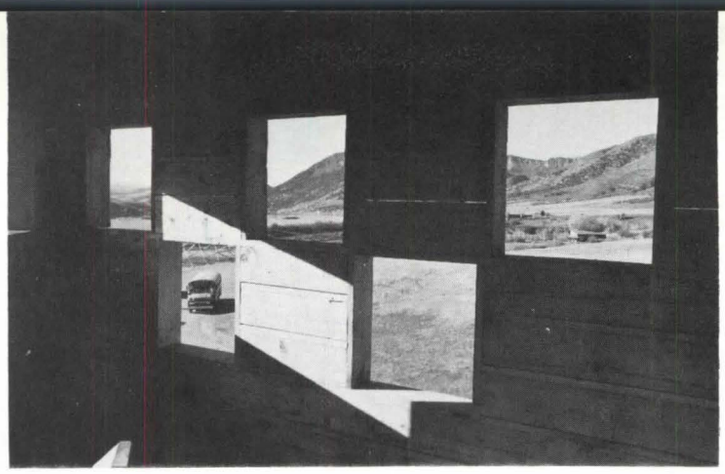


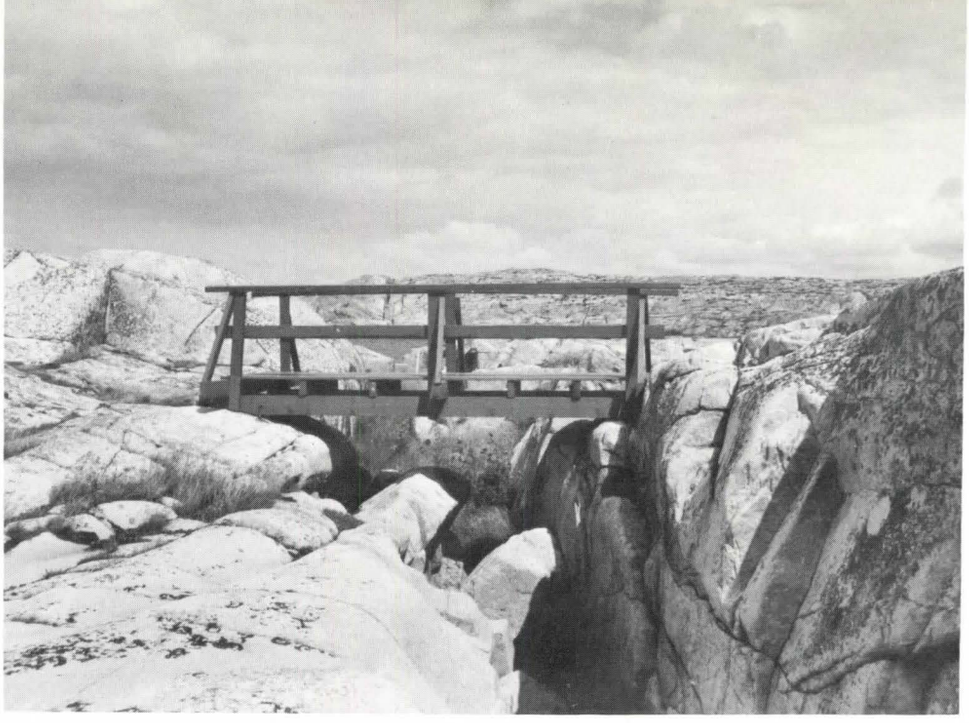


Facts and Figures

Aspen Community School, Lenado Road, Woody Creek, Colorado. Owner: Aspen Community School. Architects: Harry Teague, Peter Stoner. Engineers: Charles T. Collins, (structural). General Contractor: S.L.O.W. Construction Co. Building Area: 5,932 sq. ft. Construction Cost: $72,300.00

Photographs: Samina Quraeshi and Richard Shepard pp. 58, 61, 62 (bottom photos); Samina Quraeshi pp. 61, 63 (top photos); Andy Stone p. 62 (top), p. 63 (bottom). Building suppliers listed on p. 124.





BRIDGES OF SMÖGEN

A lyrical study of the bridges in a small Swedish fishing village

Text and photographs by Lars Lerup

I am about to take you for an imaginary swim. You have to dress for the occasion: wooden shoes, swim suit, and ankle-length bath robe. The location for the swim is in the western archipelago of Sweden. The place is Smögen, the time is summer. The sun is shining and it is almost warm in the water.

As the major summer activity here, lake and open-sea swimming is only about one hundred years old. But it has taken such dimensions and popularity that it seems ancient and deeply rooted in the national character. It is a ritual and a celebration.

The best swim is in the morning. You may then see rows of sleepy Swedes walking to the sea in their long bath robes. Upon arrival the bathers shed their robes, and jump or slowly crawl into the water for a couple of fast strokes. You can only appreciate and understand the pleasure of this activity through participation. Therefore, close your eyes and imagine. You have to remain in the mood for an early morning swim throughout this essay.

The focus is on the preambles of swimming as they are carried out in Smögen. Smögen is an old fishing village invaded during the summer by inlanders and urbanites. Our interest will be centered on the area between the village and the sea. This landscape is barren, shifting among many colors depending on light and climatic conditions. The ground is rock with little greenery; it domes into hundreds of islands divided by the delicious sea. The landscape was last shaped in the Ice Age and has since been polished by the constant wear and tear of the sea. It is most dramatic and lunar-like. For an explorer, the landscape is hard to cross in one direction and relatively easy in the other.

But as you will find, somebody has been there before you and bridged the gaps. These bridges were constructed in the early 1900s and have since been maintained by generations of village carpenters. The purpose is clear: to make accessible as many swimming places as possible.

I came upon the bridges last summer as a hunter would come upon some rare species of bird, leaving him breathless and profoundly moved. They sat, climbed, straddled, spanned, jumped and skipped in the grey sun-drenched landscape with occasional patches of blue sea, domed over by a liquid-colored sky. I came to wonder about the possible meanings of those unassuming human objects scattered throughout the landscape. It is as if the landscape and the bridges were a condensed world—man and his artifacts are stripped of all pretensions, and stand in their humanity in stark contrast to the natural.

Basically the bridge is a physical link. But within this unchanging function, it takes on many different shapes. And even when separated from its context, each bridge suggests by its shape the situation from which it comes. The obvious shape is the bridge-as-bridge. In Smögen this is the most common shape. It straddles from one side to the other.

In contrast to the flat bridge is the bridge-as-stair—essentially a folded bridge to reach a location on another elevation. It works simultaneously as a bench.

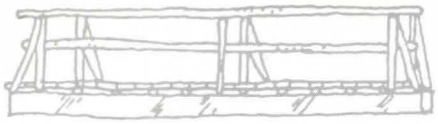
The first bridges straddled gaps, the bridge-as-catwalk goes along attached to the landscape, in order to provide a walkable surface.

An even further reduced version of the bridge-as-catwalk is the bridge-as-fence, where the surface is walkable but in need of a directional or stabilizing element.

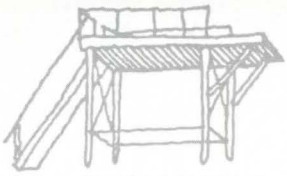
A more abstract version of the bridge is the bridge-as-highdive. Here it exaggerates the situation by extending up into the sky, using the air between it and the water as a bridge that is invisible and gratis.

The converse of the bridge-as-highdive is the bridge-as-raft. Here it comes as close as

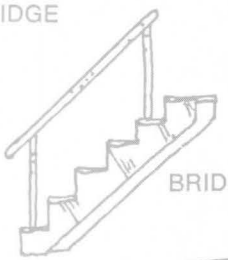
Lars Lerup, a Swedish architect, is currently doing research on and teaching urban design at the University of California, Berkeley.



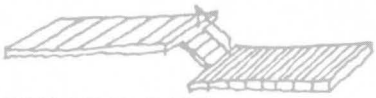
FLAT BRIDGE



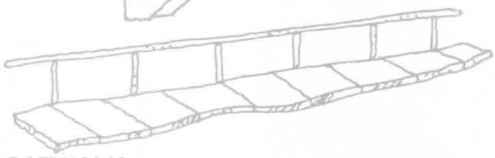
BRIDGE AS HIGHDIVE



BRIDGE AS STAIR

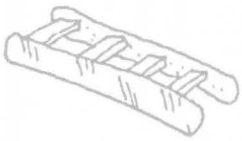


BRIDGE AS RAFT



CATWALK

BRIDGE AS FENCE



BRIDGE AS LADDER

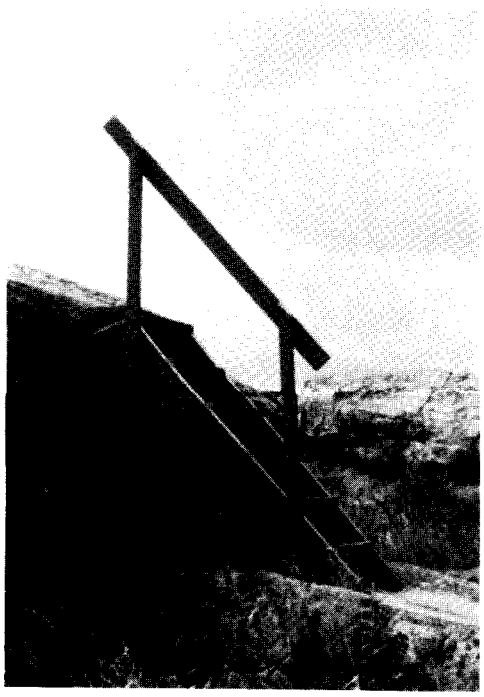
possible to an unwalkable medium; the distance between it and the water is zero.

The last form of bridge is the most unassuming—the bridge-as-ladder. It is the bridge-as-stair minimized, stripped of the hand rail, hinting to the user to bend over and use both hands and feet. But it too suggests all the myth and mystery of the bridge, linking it with the next section.

Beyond the physical lies layer-upon-layer of possible meanings. I shall touch upon some of them.

The bridge is memory—it leads from the past into the future. While upon the bridge we may turn and catch a glimpse of the past. The bridge is also metaphoric. Gangways from land to ship. Or ladders climbing the sides of the ship's hull to reach "the bridge" itself: the nautical term for the "driver's seat," a most poetic manifestation of the meaning of bridge as a link into the future. Or bridges as links inside the hull reaching deep down below the water line into the bilge.

The bridge is also a measurement of the landscape and of man in the landscape. Since anthropomorphically speaking the bridge is designed to fit man, it is the measure of man. And it becomes, as he uses it, a measurement of the world outside his body. It is like the *etalon,* the perfect meter, in Paris, a constant reliable reminder of the



exact measure of things. (As has been pointed out to me, etalon also means stallion —the reproducer—alluding to the bridge as a repetitive element and as an image of the ideal etalon-as-bridge.) The etalon is two-colored (black and white or maybe red and white); the bridges are red and green. The parts touched by feet are green as grass, while the parts touched by hands are red as blood.

After a couple of bridges, the bather can put an imaginary miniature version of "bridge" in his robe pocket—just like a replica of the Statue of Liberty—and bring it out whenever he is in doubt about some actual size in the landscape. For with experience the bridge becomes a *familiar* object, although at close scrutiny it is special and unique at each place. But it is as if the concept of bridge is much greater than its humble appearance or material existence.

With time the bather will have a set of miniature bridges in his mind to inform him about the width of gaps, the height of climbs, and the length of vertical shifts in the grey domes. But then the knowledge will dare his ability as a conqueror of the landscape. The bridge becomes a challenge: you may want to attempt gaps and canyons without it. Sometimes you will win, but most often you will lose. And the bridge will sit there, majestically, like a sphinx.

The grey domes are made accessible by the bridges. You come upon the rock by means of the bridges and you leave it in the same way. And in performing this function the bridge is a political statement: it treats us all alike, poor or rich, young or old. It can be possessed by all of us; it is a truly public object. It is undiscriminating with its helping hands that, side-ways, direct and safeguard our crossing, and, from below, support and lift us on to the next rock. Yet, too, it is more than security, it also contains the qualities of leading and seducing.

It is also a gate. Once you have crossed and put your feet on the rock, a feeling of exuberance and freedom bubbles over you. You start skip-hopping as if on the top of some ancient Athenian acropolis scarred by history and time, making it necessary to concentrate on the coordination of feet and mind. Occasionally you stop to correct course, in view of the location of the next bridge-as-temple: an intoxicating yet humbling experience. The bridge is then the evidence of the future—the sign of a new rock, a new landscape—that, with your foot's touch, you can reach and for a moment possess.

Finally you have reached the last dome and you stop—balancing on top of the rock-skull—and you see your swimming-place. You descend and disrobe, and after a moment's hesitation you make a choice between the ladder, the highdive, or simple abandonment by just jumping off the rock. The three ways are very different, suggestive of the magical suspense, loaded with mild terror, as, in no-state, you sway between the solid and the liquid.

The bridges at the edge of the water, where only one end is firmly positioned, are the ultimate bridges. The free end is either suspended in air, as in the high-dive, or suspended in the water, as in the ladder. The magic difference between the solid and the liquid—the ultimate reason for swimming—is seen most clearly in the ladder, which in the water, is malfigured, almost ephemeralized. The bridge between two solids is more understandable; the bridge between the solid and liquid is more like footsteps on the moon—awesome and suggestive of a new future.

My job is done, you are initiated. After a couple of vigorous strokes you submerge your head, come back to the surface, and start slowly to crawl back onto the safety of the rocks.

It is peculiar in retrospect that these highly functional, green and red bridges, simply but skillfully constructed by local carpenters, serve such an ephemeral purpose as swimming.

THE HIDDEN CITY

by George Nelson

Making our cities less boring by making them less visible

George Nelson is an industrial designer, architect, editor, writer and teacher. His article is illustrated with work done by his own and Assistant Professor Joan Goody's students at the Harvard Graduate School of Design. The work was done under an initiating grant from the Graham Foundation for Advanced Studies in the Fine Arts, made available through the interested efforts of John Entenza.

One day I had lunch with a friend, who went to a lot of trouble to explain to me what visual pollution was all about. As an inhabitant of New York, it didn't seem to me that there was much anyone could tell me, but my friend was from Ohio, where he works as a designer in a barn in the country, and he had concluded that visual pollution was caused by billboards, by telephone poles and wires and by gas stations.

It was a nice day and after lunch I walked back to my office, meditating on this information. It was a pretty neat formula he had worked out, and presumably if we got rid of these three blights, visual pollution would end. It was all so pat that I got uneasy. It was too much like politicians' talk: "Reelect me and I will give you a century of peace, but please don't get upset if I drop another half-million tons of bombs while we are waiting." That kind of thing.

It also struck me that walking in New York, where there are precious few sights that gladden the eye, reveals large quantities of visual pollution, but as it happens we do not have billboards to speak of (except in Times Square where they look rather nice and lively) and we have no telephone poles at all, since the wires have long since been put underground. As for gas stations, all you have to do on Manhattan is run out of gas and then try to find one. Apparently you don't need billboards, telephone wires or gas stations to pollute an urban environment, although, of course, they do help.

For a long time after that walk I found myself speculating on the sources of visual pollution from time to time, but without much in the way of results. One night when I had trouble getting to sleep I ran through a collection of private images of cities remembered—San Francisco, Zurich, Hong Kong, Rio, Paris, Helsinki—and before I fell asleep it seemed clear that the main source of pollution in New York had to be the architecture, but it seemed also clear that you couldn't say architecture equals urban ugliness, since there were so many examples to the contrary. Yet there are certain configurations of buildings and spaces which add up to hopelessly unattractive cityscapes and others which do not. Precisely what are the qualities which turn an environment one way or another?

As we scan our private lists of great and

"Venice stands out as the queen of cities."

not-so-great cities, Venice, for many people, stands out as the queen of cities. Even if some of us would not put it at the top of our list, it is always up there near the top. Why? The first thing that comes to mind is that Venice has canals instead of streets, and it is remarkable how much more pleasant in every way water is, compared with asphalt, or boats compared with cars. If anyone wanted to make a rule out of this: "cities with canals are easier on the eyes than cities with streets," I would not debate the issue. But Venice is more than canals.

You can walk your feet off in that compact city, going through alleys and squares and across bridges without ever coming across anything identifiable as visual pollution. In addition, movement through the city, whether by boat or foot, is exciting, for the variety of scale and the transitions from tight enclosures to great spaces are endless delights. The city "fits" the human occupant in a series of rich and dramatic ways. It is never dull.

Modern cities lack these qualities. They offer instead a kind of urban eczema composed of scattered high-rise offices and apartments, miles of four-story neighborhoods and more miles of bombed-out slums, the whole scene laced with traffic and parked cars everywhere. It is hard to get *inside* in a modern city. One is always jammed between hard building fronts and car-filled streets. Modern cities reject their inhabitants, which is logical enough, since they were never planned with people in mind, and the newest of them, like Brasilia and Chandigarh, don't seem a bit better. The proudest boast of the planners of Brasilia was that there would not be a single traffic light in the city. All this means to me is that the only way to live in such a place is to be permanently sealed in a bus or motor home which never stops moving. Venice doesn't have traffic lights either, of course, but the concept is different.

There are obviously exceptions to what I am saying: Chicago, for example, has many elements which can only be classed as amenities. But the point, nonetheless, has to be made: the contemporary city, lacking those monumental structures and open spaces which came into existence as expressions of faith and power, tends to be formless and lacking in enlivening changes of pace. One has only to think of a relatively minor city such as Guadalajara, with its four magnificent squares checkerboarded in the center of town and to compare it with its more up-to-date counterparts anywhere in the U.S.

All cities have expressive form. That is, their configurations reflect contemporary realities, whether religious beliefs or economic arrangements or opinions on the divine right of kings. One problem which plagues the modern city is that there is very little to express: the Church has lost its meaning and power, the men with great wealth have become uneasy about displaying it, and we can't even imitate those good-looking medieval walls, except perhaps in Disneyland. The most monumental structures we put up in cities, the high-rise buildings, have been boiled down to simplistic extrusions whose forms are determined by land prices and by the battle between entrepreneurs and building trade unions, neither of which is an exciting subject for glorification. In the Communist countries, where the entrepreneurs are replaced by public bureaucracies, things are no different: we see the same extruded slabs, with detailing still less sophisticated technically. The modern city, sprawling over miles of countryside, has thus become painfully familiar to us as a formless network of roads woven into great masses of building lots, spiced with roadside strips and automobile junk yards. We apparently have almost nothing to express, and we express it. No wonder there is so much vandalism.

Questions: Can we do anything, even theoretically, about the endless visual boredom so typical of the contemporary city? If architectural sprawl is a prime source of visual pollution, can anything be done about it? Are we capable of even conceiving a solution that might humanize the dying cities? Or are we moving into a kind of "Brave New World" where there will be no need to worry about such problems?

Given what has already been said, we might accept the proposition, if only for the sake of furthering the argument, that a city with a half or a third of its buildings discreetly eliminated, much as a dentist cleans out a cavity, would be a visual improvement over what we now have. But could we even imagine doing such a thing? Buildings are generally there because people need to use them. And yet, I am impressed by the possibility that less, in the case of cities, is better than more. Michigan Boulevard is Chicago's great street primarily because for much of its length some of the buildings are missing, replaced by parks and river crossings. Could any of us imagine this street improved by any architect alive, with buildings continuous on both sides? I doubt it.

It doesn't even matter whether the buildings which do fill one side are "great" or not: it is enough for us that half of them aren't there. If you run through your own memories of streets you like, whether from actual experience of cities or photographs, I strongly suspect that a good percentage of them will, like Michigan, be incompletely built. The quais in Paris and Moscow are one-sided streets. There is the Stockholm waterfront, Dutch towns like Delft, the Nevsky Prospekt in Leningrad, the Copacabana in Rio, the Rue de Rivoli in Paris and any number of great squares in London and Dublin. It always seems to work out, although the old-line architects may not like it: less architecture in all these examples seems to come out as less visual pollution, because there is more form, more variety, more urban richness, more contrast, more interesting rhythms.

But we can't tear down half the buildings. Not even the Communist countries, with none of our land acquisition problems, can tear down half the buildings. So we have to look for a compromise, and the one that suggests itself to me is that if we can't eliminate them, perhaps we can make them invisible. Is there any way to do this?

Actually, there are two possibilities. One is familiar to us: build underground. This is being done in many places. The other, not familiar, is to build above ground, using structures like low-profile Aztec or Mayan pyramids, covering them with topsoil and planting nasturtiums, poison ivy or whatever comes to mind. Such structures would of course be visible, *but not as architecture*, which I see as their great virtue. A facade-happy architect might see it differently. These earth-covered structures would look like artificial or natural hills, depending on how tricky we got with the interior planning and the landscaping.

Now we come to a very reasonable question: why should anyone build a building covered with earth? Esthetic considerations are out: we cannot say that the city would be more beautiful, or more suited to the sensory needs of urban people. A technological society cannot operate with values, like esthetics, which are not quantifiable. The same goes for humane considerations. Still, there are reasons which might register, even with a technological barbarian. This proposition has to do with windows.

Being creatures of habit, all of us, we have a stereotype view of the big city, which shows us a skyline made up of buildings perforated with windows. But the startling fact is that as we survey the services accommodated within cities, there is a very large number of building types which not only do not need windows, but *do not want them*. Here are a few: warehouses (both cold and warm storage), telephone exchanges, power sub-stations, data centers, opera houses, department stores, movie houses, concert halls, museums, convention centers, sports arenas, shopping malls . . . you can take the list from there.

Given this one hint based on windows, we can hope for a breakthrough in the monotonous urban scene. This is not Utopia, not a great big shiny dream city of some indefinite future. It is just one simple anti-architectural device which might give an urban environment the relief it desperately needs.

We can begin to imagine some forms this concept might take. The structures are not really true pyramids, for space requirements would tend to make them longer than they are wide. They are probably not very high, for you can't go much over a 30-degree slope and still hold the earth covering without retaining walls (not that these are out of the question). But if we go back to the incomplete list of building types, we find that these as a rule do not go very high. Buildings that do go high

generally need windows, anyway.

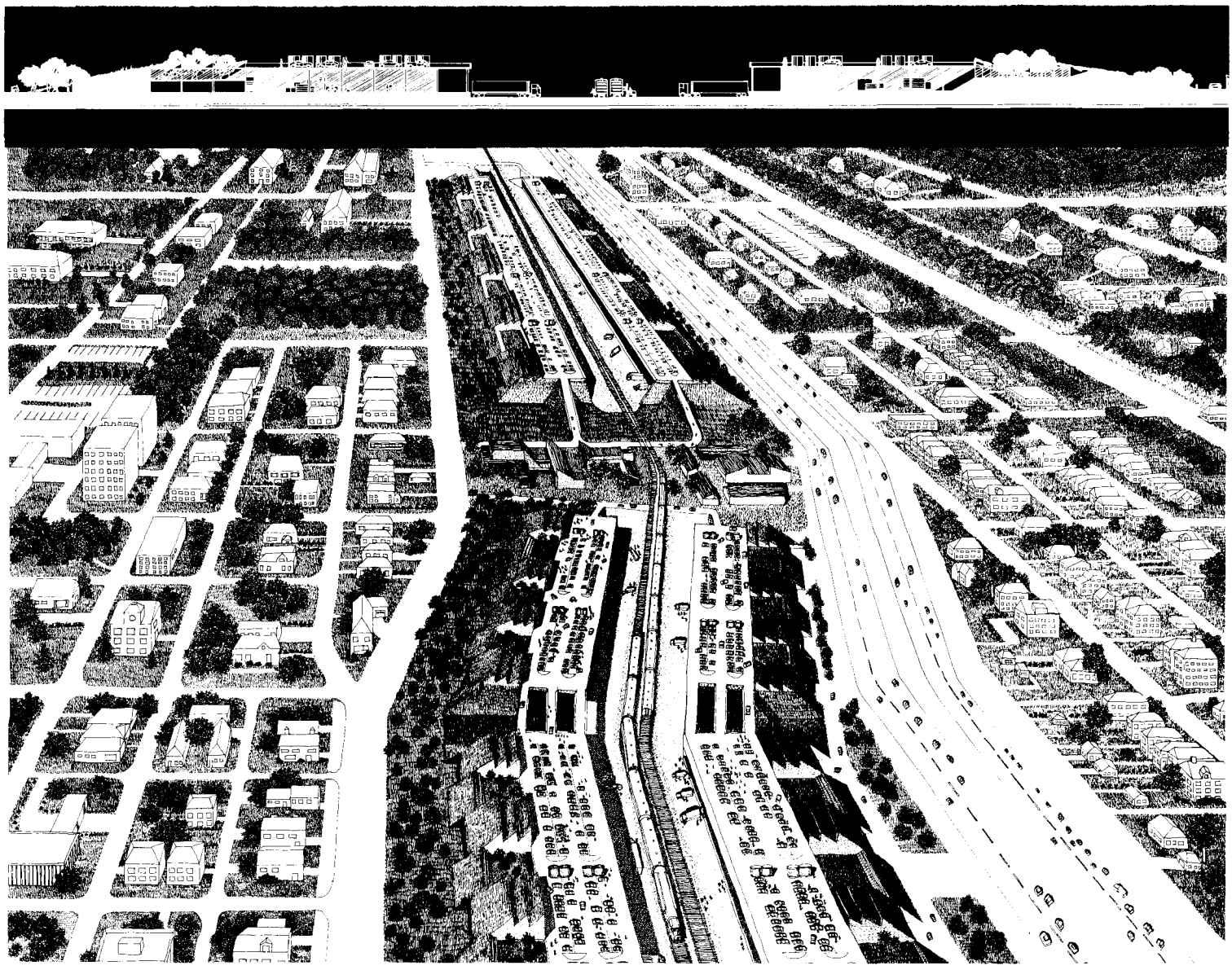
One of the interesting characteristics of pyramidal structures is that they are larger at the base, which suggests that roads could go through them and ample parking could be provided. If daylight is wanted inside, there is nothing to stop us from putting in a half-mile of skylights, very much like the galleria-type shopping malls. We can also attach small structures to the sides of our hills, like Mediterranean villas. These could be small office clusters related to activities inside, or perhaps restaurants, or even a few houses for the lucky owners. All this would be visually interesting and there would still be plenty of room for hillside parks, toboggan runs, waterfalls, or whatever else the ingenuity of owners and architects might come up with.

I do not see any very stringent limitations on the size or shape of these structures. They could be five or ten miles long if there were space needs on this scale, curved as well as straight, complex in their plans as well as simple.

If we imagine a city in which all of the major windowless services are clustered in hills, some unfamiliar images come to mind. For one thing, a city of one million population might give the impression of a city of 600,000 or 700,000. This would be an instant gain, for there would be a reduction of apparent bulk and congestion, an increase in elbow room. Equally important, I think, would be the creation of strong contrasts: a play between hard and soft, man-made and natural, large and small. Another contrast suggests itself: a new distinction between automobile and pedestrian. If the service mounds accommodated the main roads and facilities for parking, one could conceive of plans which would permit the development of adjacent pedestrian areas, possibly serviced by monorails, subways, electric minibuses and moving sidewalks. A vivid illustration of existing possibilities of this sort is to be found in the air terminal in Tampa, where little electric shuttles free of noise and pollution move hundreds of thousands of people in a pleasant, comfortable fashion.

The most interesting design problem is not the artificial hills themselves, but the relationship between these soft swellings in the urban landscape and the more traditional building types that go with them. One could imagine pedestrian valleys formed by these planted structures, combinations of very large and very small open spaces, visual experiences at a variety of levels. One might object that such structures would waste a great deal of valuable land. This might be true, but we would first have to define what we mean by "waste." A typical shopping center is never thought of as waste by developers, but most of the land involved is covered with asphalt for parking. A civilized society might consider this something of a waste, too, since the land under the asphalt is permanently destroyed as far as life support is concerned.

If such a shopping facility were built in the fashion I have been describing, however, it might take less space, since the parking is under the shopping (where it belongs anyway). An eyesore could become an amenity, and this might have an effect on the uses and the money value of the surrounding area. Given the shopping center of today, there are few people who would want to live next to one, and as a result the adjoining properties are generally given over to parasitic marginal uses. But if one were to sweep the prevailing mess under one or



more earth-covered mounds, the entire aspect and meaning of the area would change, presumably for the better. The same could be said, probably, even for light industrial and warehousing uses.

There is something else in the wind these days which may have an interesting effect on the acceptability of these hollow hills: this is the developing energy shortage. If you look at any chart of power consumption for the past thirty or forty years, you see a line which rises faster and faster each year until it now approaches the vertical. In other words, there seems to be no visible limit to our demand for energy. But if you compare this with a chart of energy *production*, the line doesn't go up as fast. The difference between the two lines is the energy gap, and the gap is due to become a crisis.

Under such conditions, our invisible city components should come off very well indeed. Wind drag is minimized by the low mounds, and the structures themselves could approach the insulation values of a cold-storage warehouse. Solar energy could be tapped through skylight design for the cold season, and bounced off in hot weather. The more we look at these earth-covered shells, the more interesting the design problems and possibilities. The mere fact that services associated with urban blight can be so enclosed that they become civic amenities could change many of our notions about urban planning and redevelopment.

Some years back something was done in New Haven which suggests the kind of thing which might happen. At the east end of the center city there is an old square, full of elms and surrounded by interesting buildings, mostly residential. Nearby, a light industry area had had a blighting effect on the square and it had begun to decay. Then an express highway was built in between the two, with the road set high up on a landscaped earth base which effectively isolated the two areas from each other, and the square's prestige returned rapidly. We may anticipate similar results from our synthetic hills.

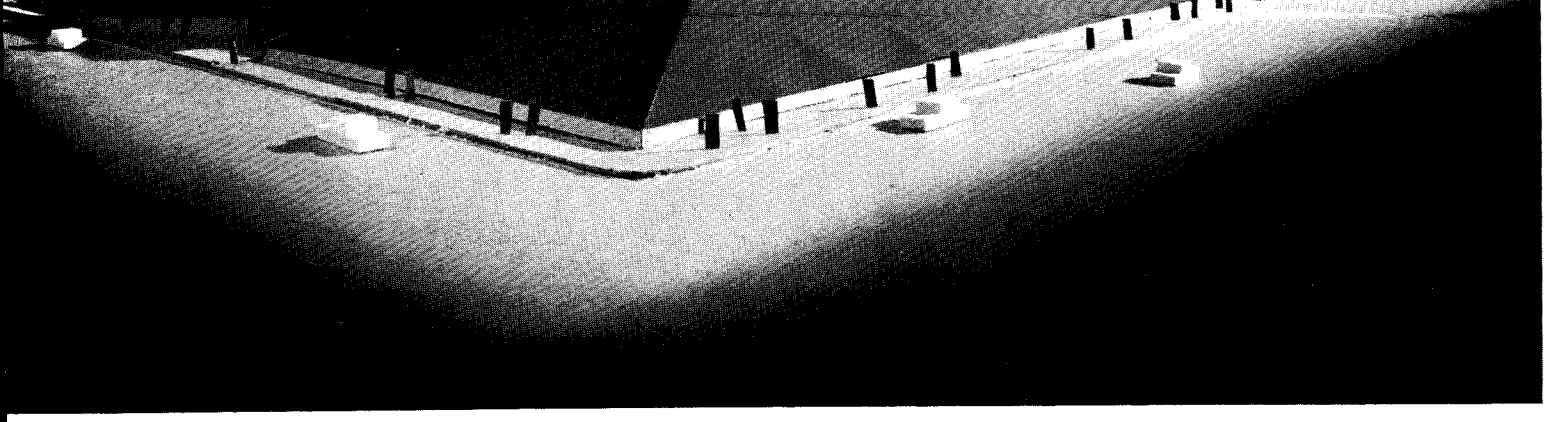
The real value I can see here, aside from the advantages already mentioned, is that we can introduce new elements of scale, contrast and spatial rhythm which are sorely needed. And I can't imagine anything nicer happening to those pool-table towns all over the Midwest, where a few hills could work wonders in the flat landscape.

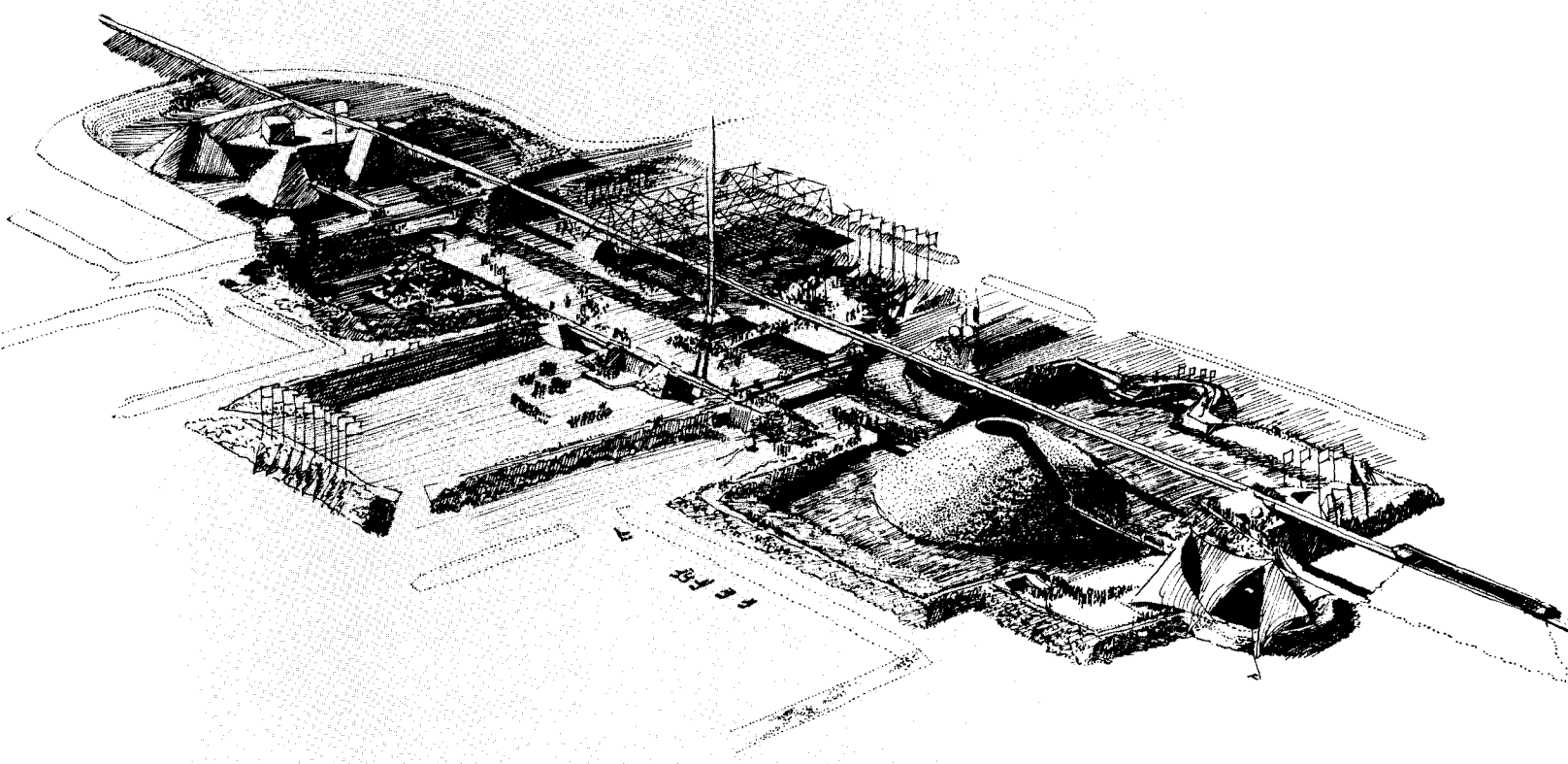
At the Graduate School of Design at Harvard, this past year, we have been tackling the problem of the invisible city, exploring some of the possible uses of artificial hills and trying to see how these might relate to the more familiar kinds of buildings. The results may not make sense, you know. We may find that they present short term financial problems at the outset. Or that they would work effectively only in new towns. Or that there is a national shortage of topsoil to cover them. We have to realize that the right to experiment includes the right to fail. But in one sense, ventures of this kind cannot fail, because the exercise alone is bound to deepen the discussion about cities. Merely trying something of this kind modifies our established attitudes about what a modern city really is and could be. Exercises of this type do not revolutionize cities: they broaden and enrich our view of the problem.

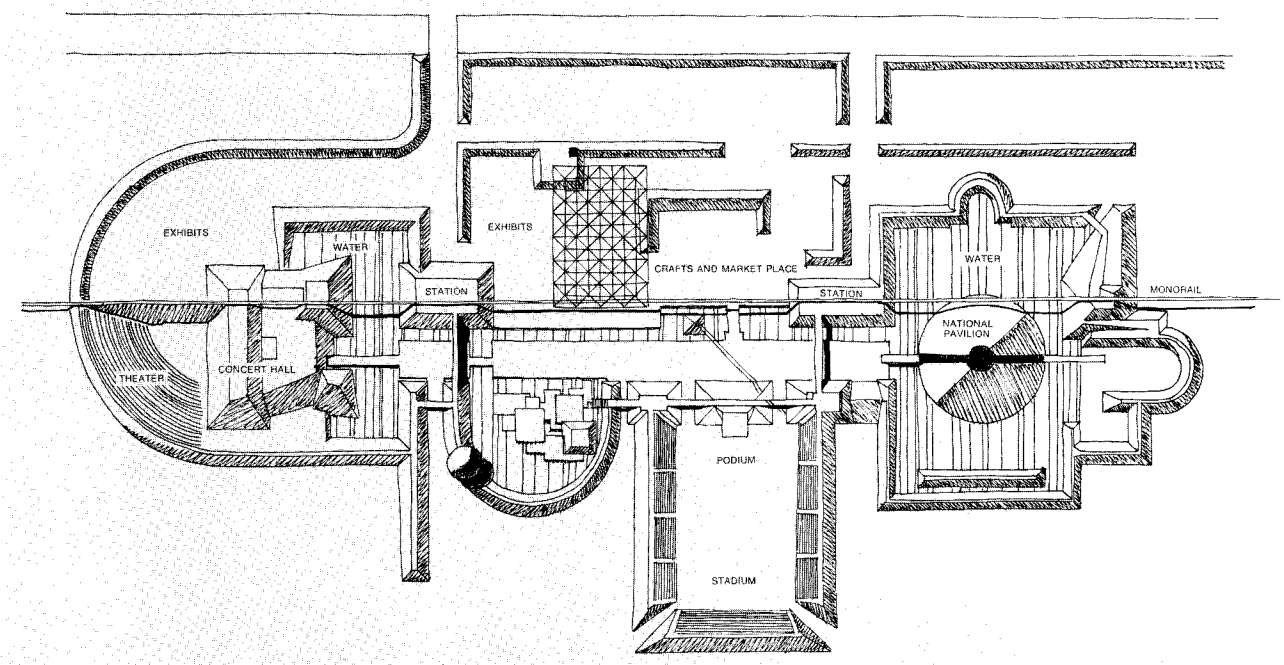
Let me recapitulate, briefly: First, we have the observation that a substantial degree of visual pollution in cities is created by the buildings themselves. Second, we

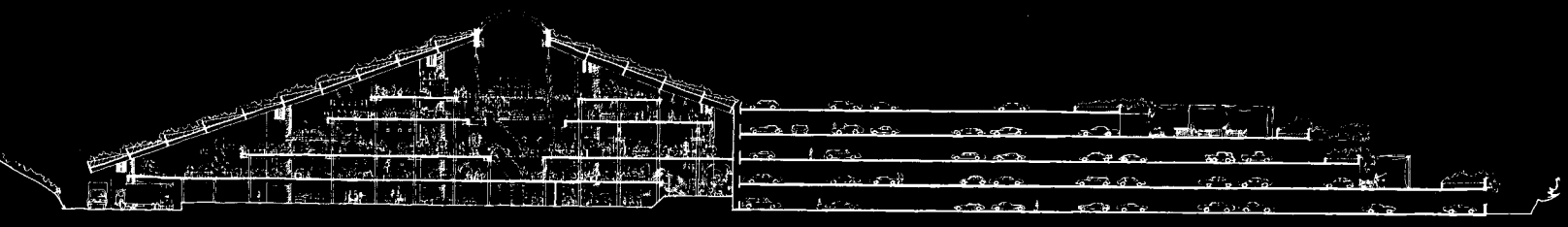
continued on p. 76

Left, a linear industrial park by Harvard student John Berchert. Earth berms, facing a highway and a residential neighborhood, conceal a strip of rail lines, warehouses and light manufacturing.
On this page, Stephen Diskin's design for a cultural center is surrounded by slopes of planted earth.









SECTION A-A

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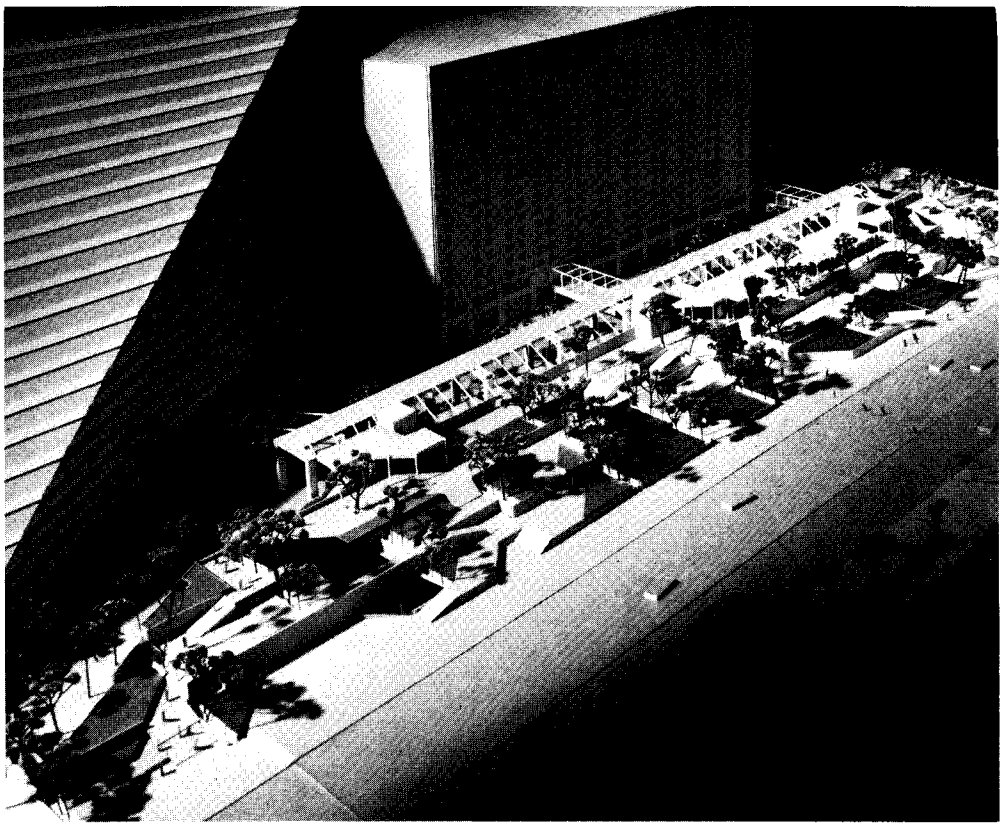
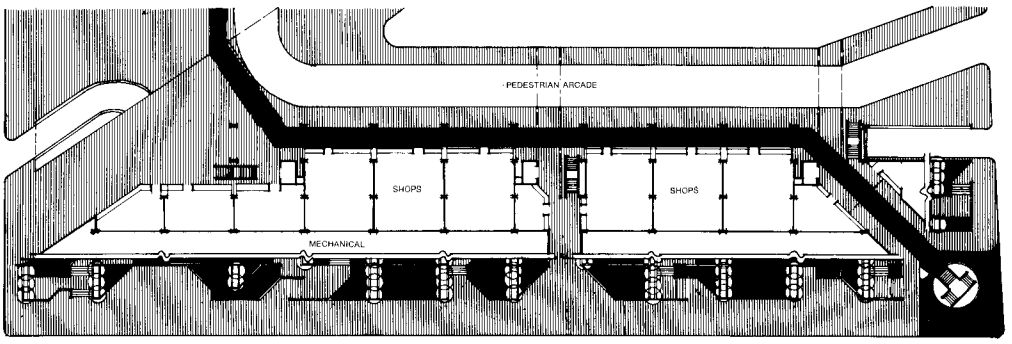
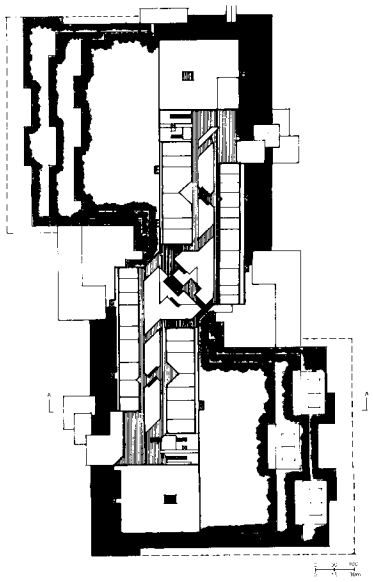
Left, John Becker's design for a Bicentennial Park in the farmlands of a midwestern state. Vegetation from the surrounding fields continues over the earth berms which enclose the exhibits and which also support elevated pedestrian walkways and rapid transit routes.

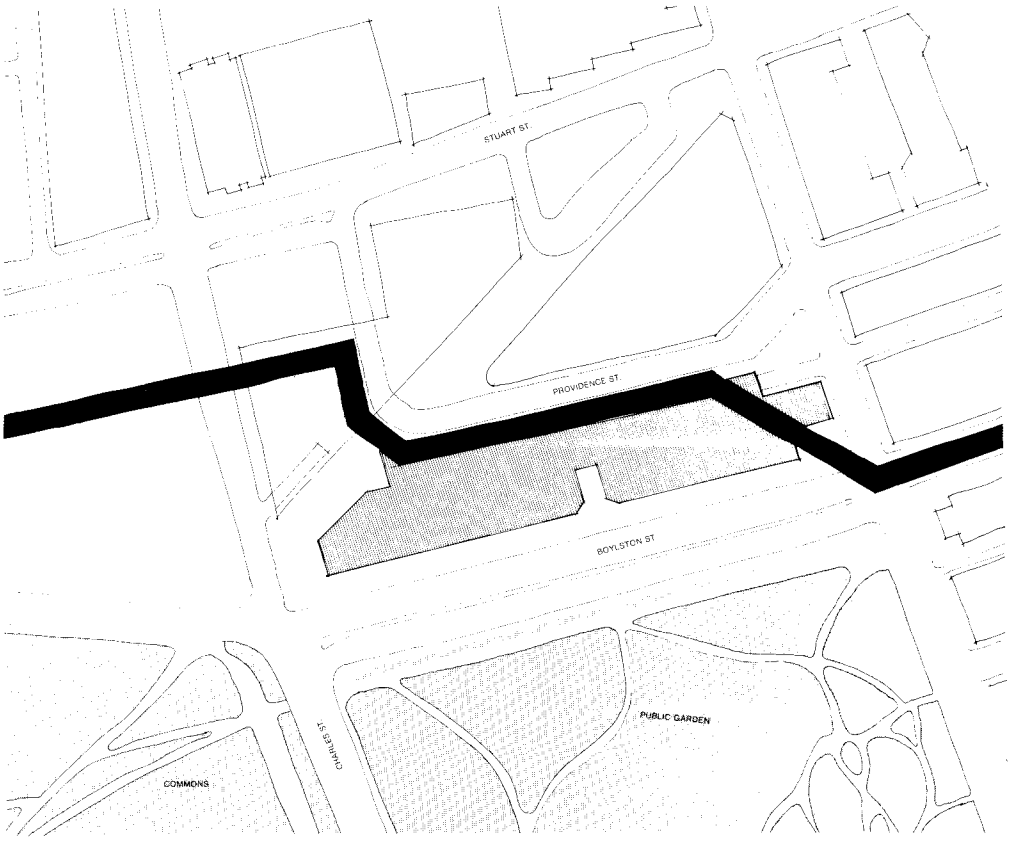


Right, a strip of parking and commercial facilities, largely underground, borders the Boston Public Garden in this scheme by Tom Applequist. Between Boylston Street and Providence Street, it would adjoin a below-grade link to the city's rapid transit system.



Section, left, and plan, below, of a shopping mall proposal by Tom Canfield. The multi-level retail area is abutted by parking trays and several tiers of tennis courts and terraces. From its exterior, the entire complex presents a pleasantly green aspect.





have the proposition that if offending buildings cannot be removed, many services can be so housed that the buildings become invisible as buildings. Third, this possibility of the visual elimination of architecture exists because so many facilities have no need for windows. Fourth, the community could acquire many amenities and benefits through the procedure described.

If we were scientists rather than architects and designers, what I have been doing would be described as the presentation of a series of related hypotheses. Progress in science is closely connected with such presentations, for it is taken for granted that it is the right and the obligation of the scientific community to attack such presentations in every possible way so that the hypothesis is established as valid, or is modified to meet objections, or is demolished. Whatever the outcome, the community benefits. We could use a lot more of this in architecture. The only such example that comes to my mind at the moment is the published work of Paolo Soleri.

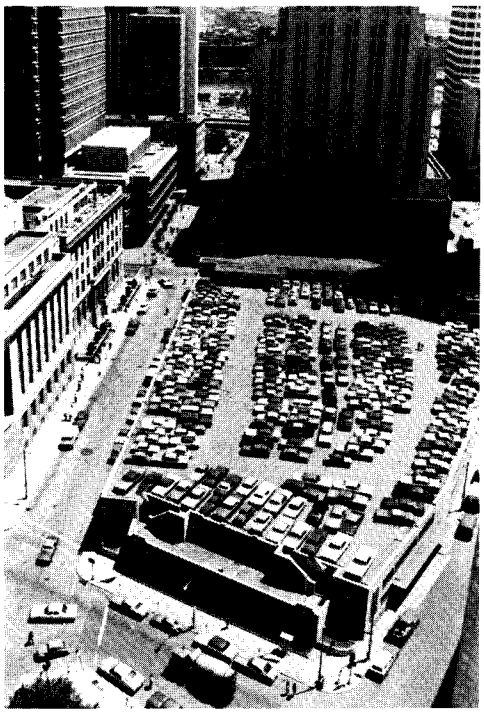
One of the real difficulties in dealing with urban problems is that they have a very low social priority, which in turn means that the money they need is spent elsewhere. As a broad generalization, one can say that any problem intimately related to people gets a relatively low priority in any of the advanced industrial societies, which are much better at dealing with physical things than with living organisms. One result of all this is that we tend to see city problems as operational rather than human. And yet any city, whatever its physical plant, consists essentially of living, interacting organisms. The central cities all over the country are dying, not because the power has been shut off or the buildings are falling apart, but because those people who can afford to do so are running away from them.

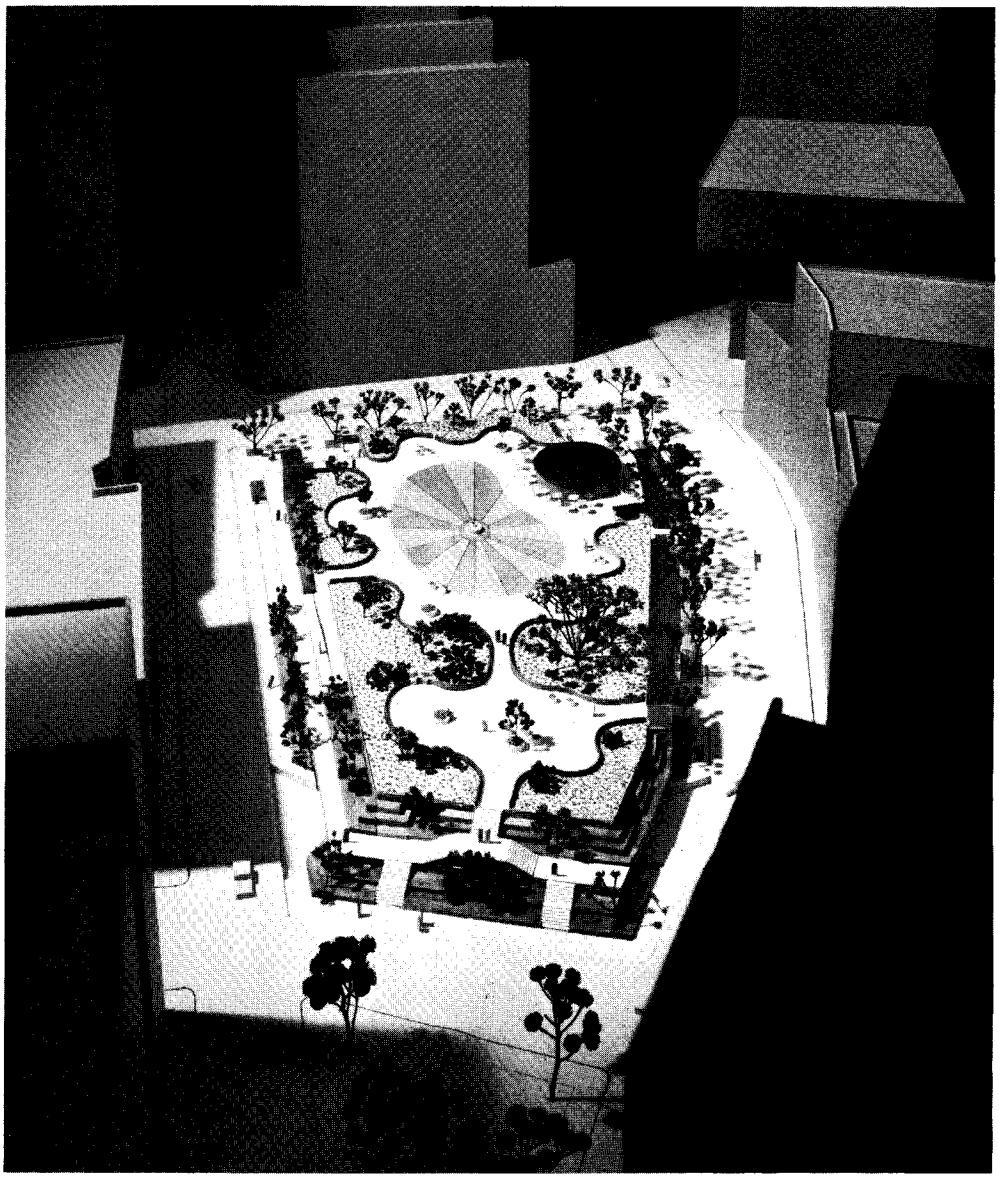
Paris, in the time of François Villon, was a stinking medieval pesthole, crawling with pimps, whores, thieves, con men and murderers. And yet this drunken rascal produced some unforgettable poems about the city he loved, and especially about the women of the city. Have you read any poems lately about the women of Chicago?

Cities can kill their inhabitants with rat bites, malnutrition, drugs, disease, violence and slum fires. (A lot of this can happen in the country, too.) Cities can also kill by starvation of the spirit. If there are things the modern city can do better than the old ones, it is to cripple the spirit, beat the essential humanity in man to its knees, blind those who can still see, and lobotomize the survivors who can still think and feel.

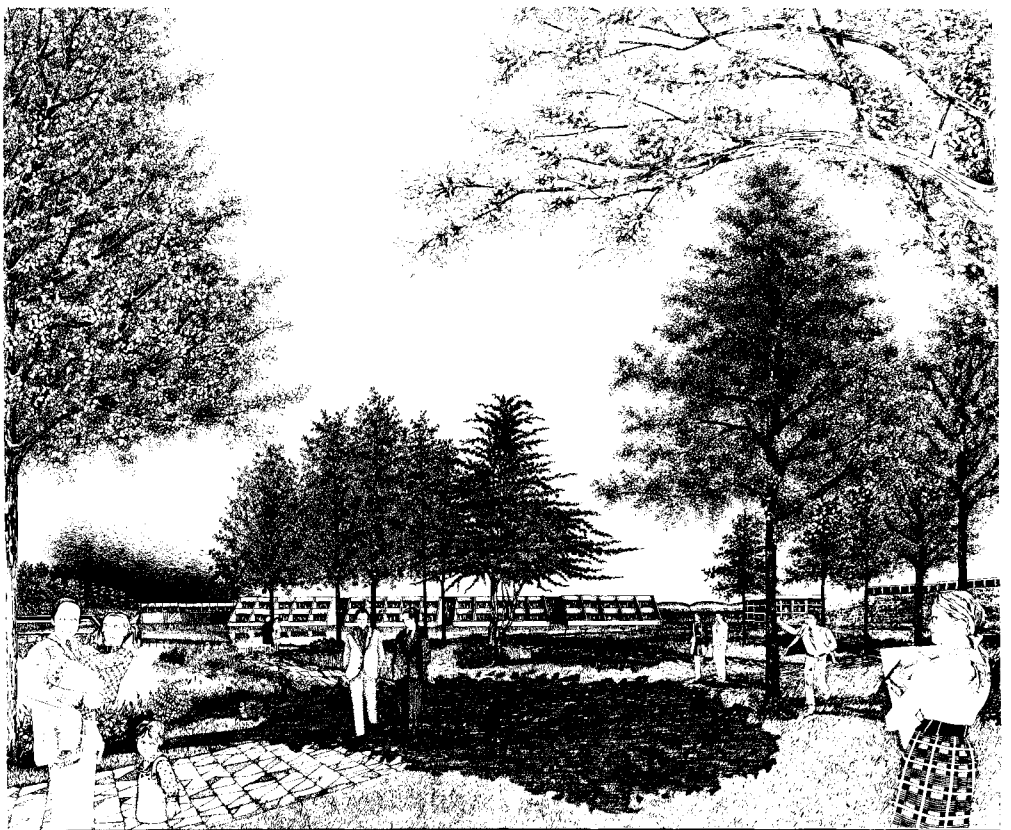
I am not about to suggest that these maladies can be cured by putting up some earth-covered structures. That would be arrogance carried to the point of insanity. These hypotheses indicate some possible physical improvements, but they are also symbols. As symbols they stand for the belief that vision, at this point in time, is more important than new technology, for technology has reached the stage at which efforts to remedy its own mistakes seem to take us closer to disaster. The vision needed is nothing more nor less than a series of images of physical realities so conceived that one could hope for an improvement of the human conditions.

This is what I am asking you to think about. It is the most intelligent and constructive thing a designer can do in a time of global crisis, and of social and moral transformation.

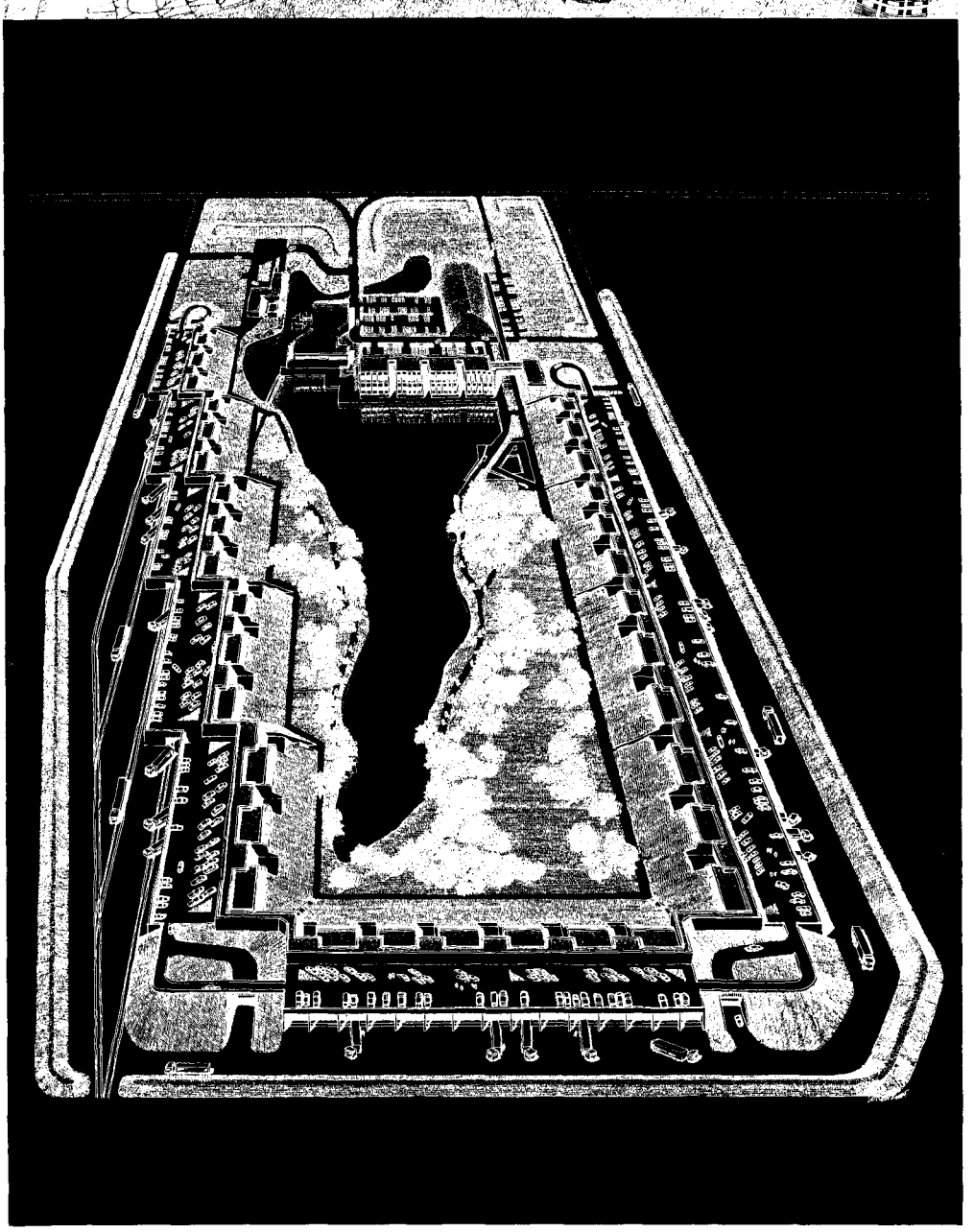




Right, another proposal by Becker is for an industrial park, 500,000 sq. ft. of factory and warehouse space surrounding a quiet inner area with motel, pond, day care center and workers' recreation facilities. The industrial perimeter is concealed, by planted earth berms, from this inner oasis.



Left, student Andy Lee proposes that an existing garage near Boston's Post Office Square be bordered with street-level shops and covered with green space and an outdoor cafe, visible from surrounding towers.



Photographs: p. 70 Jim Lukas (top), J. Allan Cash (bottom); pp. 72 and 77, Gil Amiaga; pp. 73, 75 (top), 76 (right), Steve Rosenthal.
Drawings: pp. 72 and 77, by Al Lorenz.

HALLER'S UNIVERSE

A Swiss architect designs his vision of a perfect world

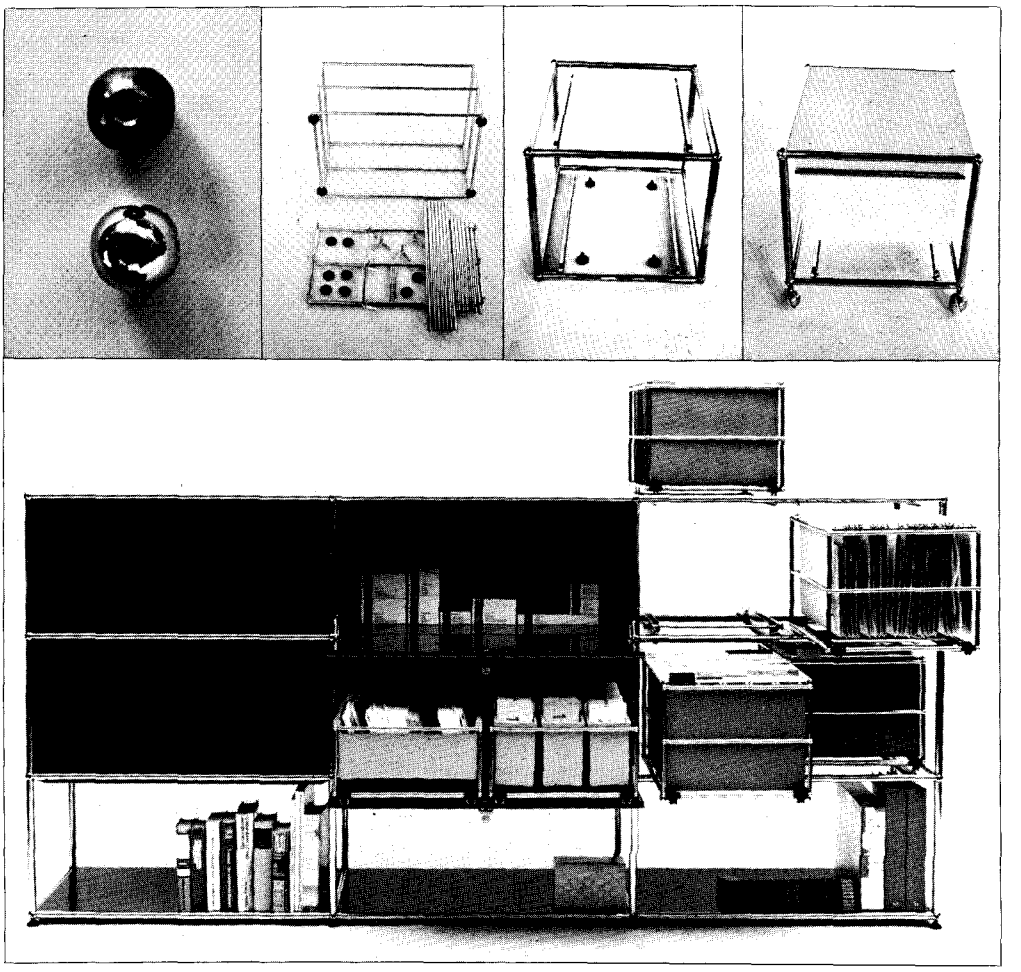
Switzerland, with a total population considerably below that of New York City, has made a disproportionately large contribution to 20th century art, design, architecture and related disciplines. Maillart, Le Corbusier, A. & E. Roth, Giedion, Matter, *Graphis,* Giacometti, Bill, Schnebli, precision instruments, *Werk*—the list is endless, and endlessly impressive: no country has maintained a consistently higher standard of excellence in these and other areas; no community of comparable size has produced more accomplished technicians, more assured designers, in this century.

To this distinguished list one should now add the name of Fritz Haller, an architect whose practice (in partnership with his father, Bruno, until 1962) is in the town Solothurn, about halfway between Bern and Basel. "God is in the details," Mies van der Rohe used to say. Well, God may or may not be in Fritz Haller's details—but intelligence certainly is: his structures, from desks to factories, have the cool precision of Swiss timepieces, and the neat logic of a molecular model.

Haller's elegant steel struts and joints obviously owe a great deal to a long roster of pioneers, from Alexander Graham Bell, whose space frames of almost 75 years ago formed air- as well as land-borne structures of surprising confidence; to the beautiful experiments of Haller's friend and mentor, Konrad Wachsmann. But Haller's structural systems differ from those of earlier perfectionists in that they have been and are being translated into mass-produced furniture and mass-produced buildings. "What gives our dreams their daring," Le Corbusier once wrote, "is that they can be realized." Fritz Haller has realized his dreams, and those of others, on an impressive scale.

The story on these pages documents this fact. Haller's structural system of chromium-plated struts and ball joints has been in production, for close to three years, to form an almost infinitely flexible office furniture system, manufactured in Europe by U. Schärer Söhne AG, and in the U.S. by Herman Miller; and his closely related building system for industrial, commercial, residential and institutional structures has been in production in Switzerland for close to 15 years, the components being currently manufactured by Schärer also.

Although these systems differ from earlier developments in this field in significant details, the basic principle is familiar: there are structural elements of steel or sheet metal, slotted, bolted, or clipped together to form



Left: A single steel column, shielded by curved glass and steel, distinguishes the corner construction of Höhere Technische Lehranstalt, a technical college in Brugg-Windisch, Switzerland. Right: From a simple ball joint and steel tube system, Haller is able to create a complete office environment.

Haller's several building systems use erector set logic, but are distinguished by fine detailing.
A factory and office in Münsingen (left) shows his Maxi system of steel columns and open web joists, designed for flexibility in mechanical and electrical runs. The construction is designed to expand vertically and horizontally, as demonstrated below. Brochures (right) detail component and erection schemes for the Maxi system and Mini, a version designed exclusively for one and two stories.

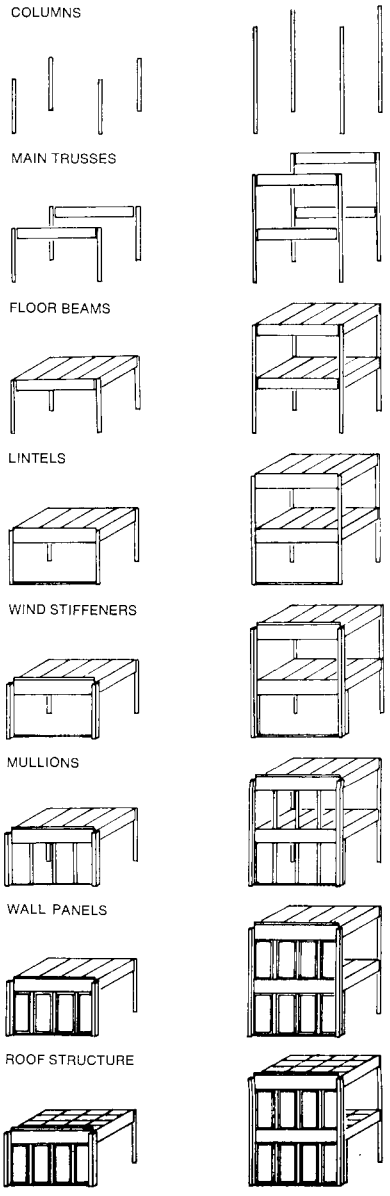
a modular, three-dimensional grid. This grid, or cage, is then completed with infill panels—glass, metal, synthetics, or whatever, depending upon the function of the end product. The simple instructions, printed on 4-page pamphlets, suggest as rational and uncomplicated a system as a toy erector set—which, in fact, Haller's building system closely resembles.

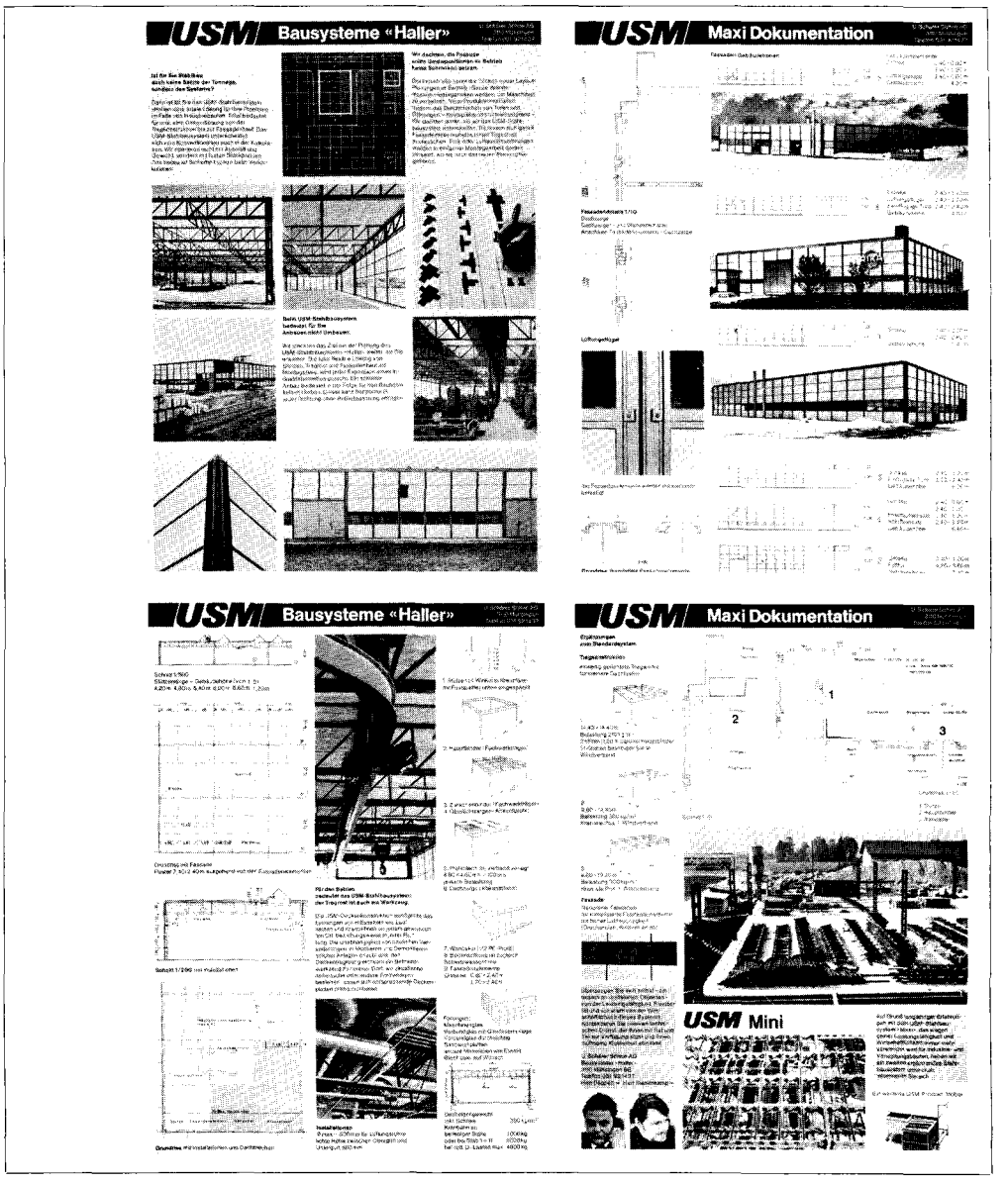
But Haller's building system differs from a child's erector set in one all-important respect: it is closely integrated with the mechanical and electrical services that play an increasingly important part in 20th century building. The lightness of his structural members—open web joists, or joists of perforated sheet steel—permits him to snake ducts and wires through his structural cages pretty much at will; and the separation of certain mechanical equipment (like modular airconditioning units placed around the perimeter of his spaces) permits their plug-in installation after the structural trades have completed their work.

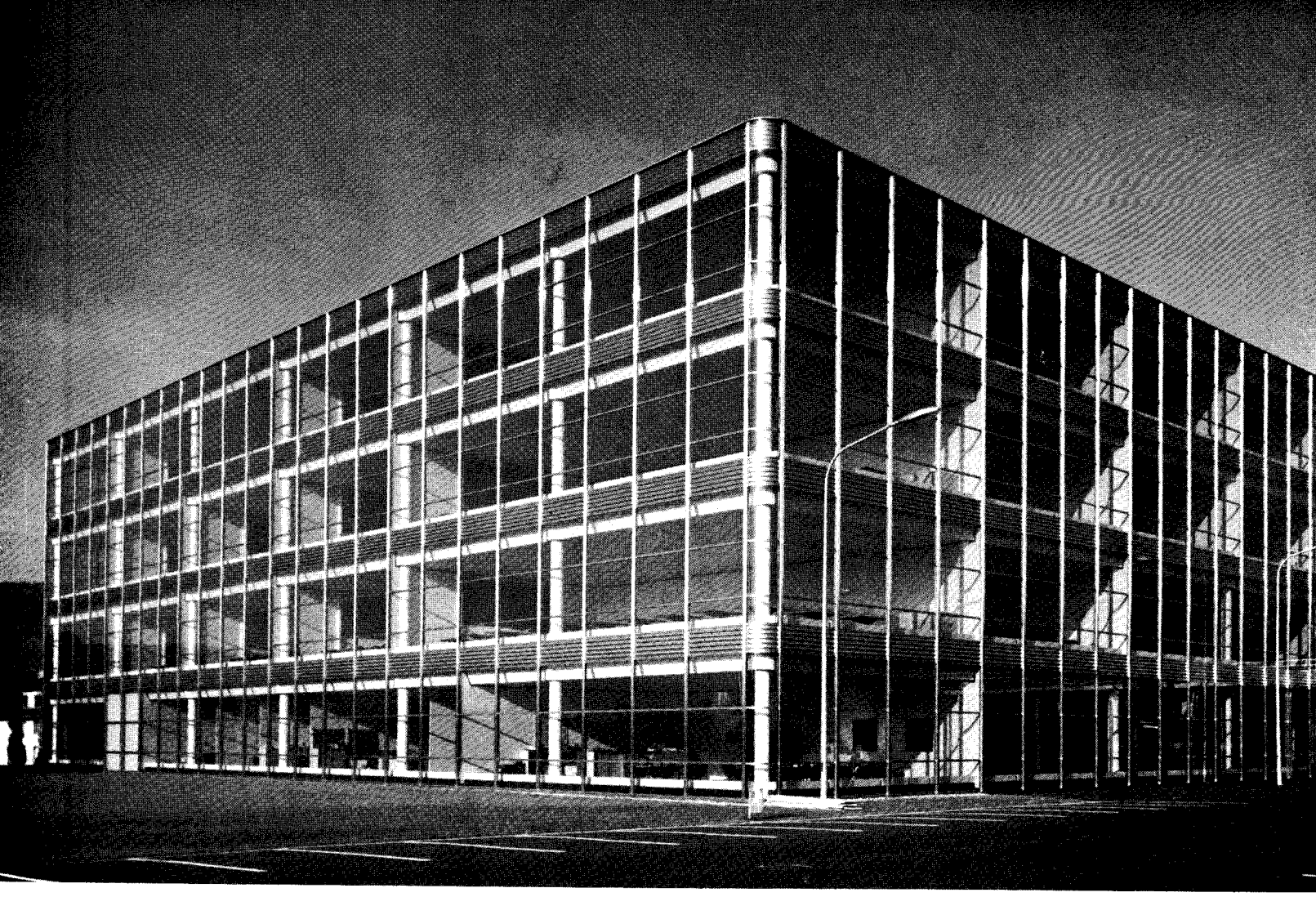
Admittedly, the erector set approach to real building depends for its success upon the availability of excellent, on-site building labor. Haller is quite aware of this, and his system has been designed to be assembled by workmen of varying skills. (Some of his recent buildings were, in fact, assembled by so-called "guest workers"—foreign, transient workmen temporarily employed in Switzerland.) Still, in many developed and under-developed nations, the trend is away from modular components that are assembled, however rapidly, with on-site labor—and toward the prefabrication of large, modular "boxes" that are then trucked or helicoptored to the site.

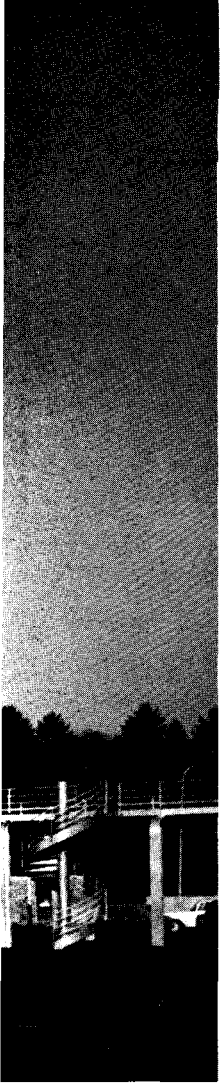
For the present, both approaches offer promise of better and faster building—but perhaps in different areas of construction: the box-builders have been most successful in the area of housing (including hotels and motels); whereas the component builders have been most active in industrial construction, as well as the construction of any other building types that call for large, open spaces within, and maximum spatial flexibility for future uses.

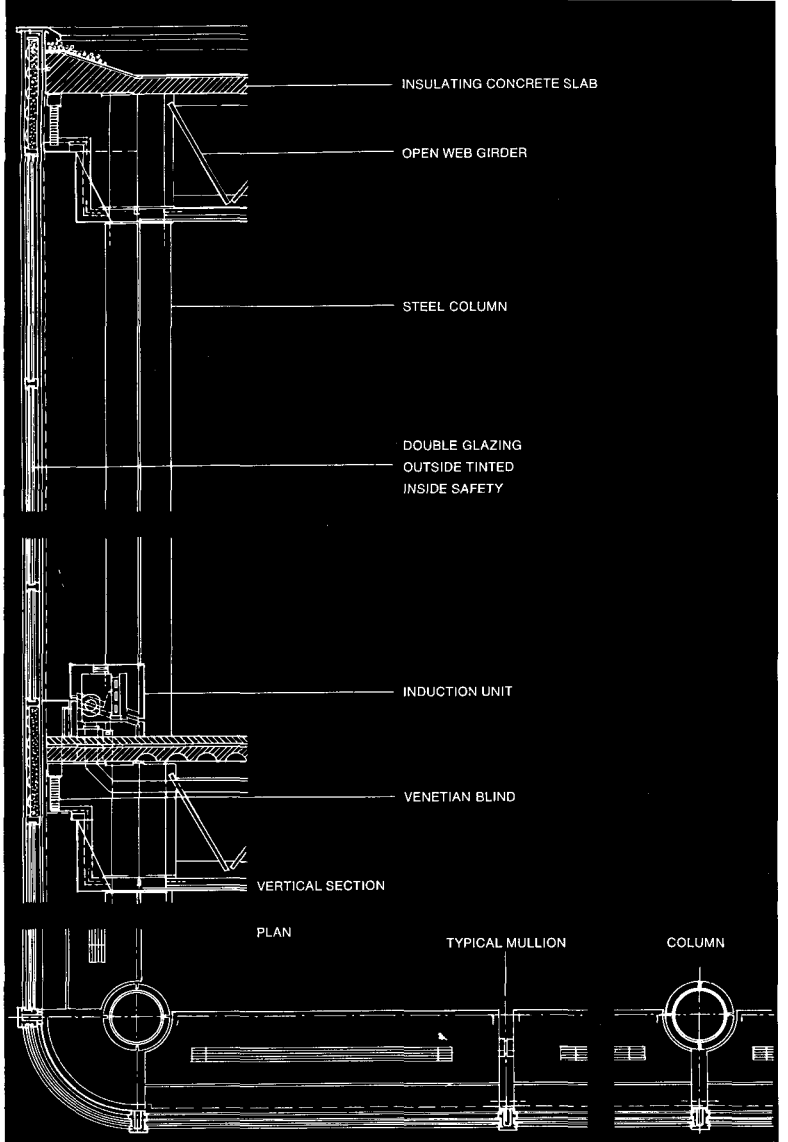
In this second area of prefabrication—the design and production of beautifully finished, modular components, capable of highly flexible use and re-use, Fritz Haller has created systems that are second to none.

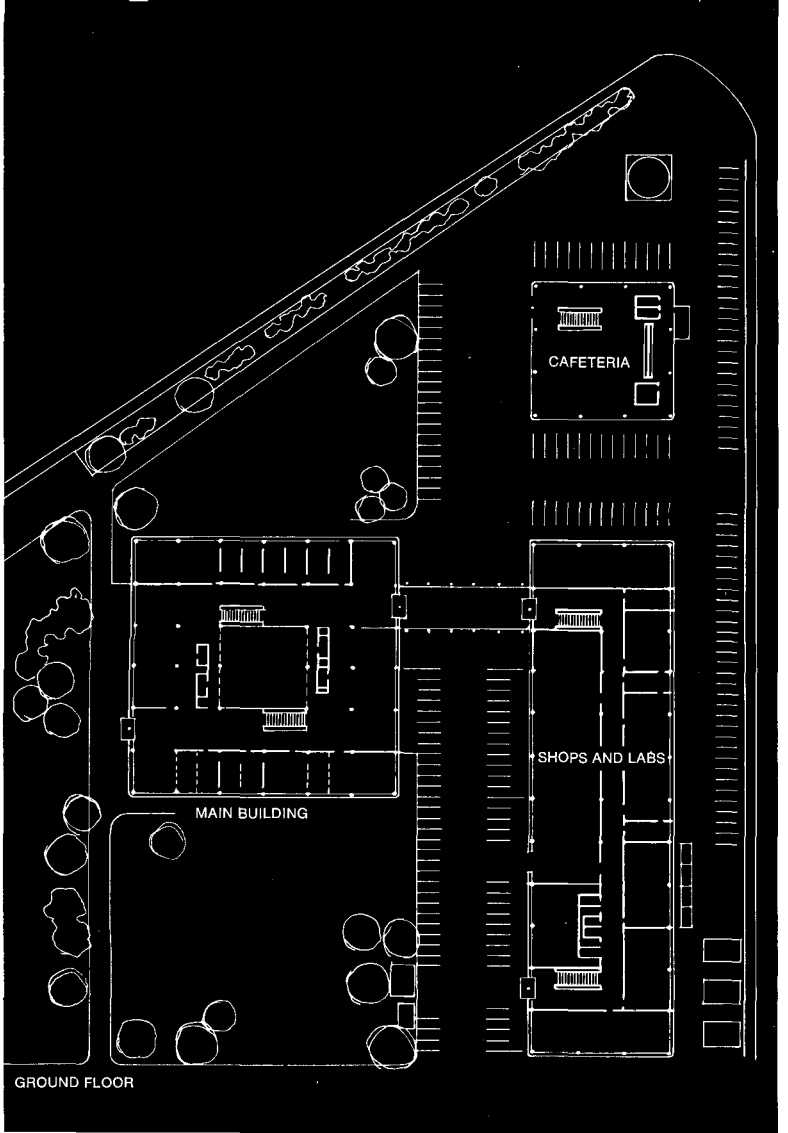






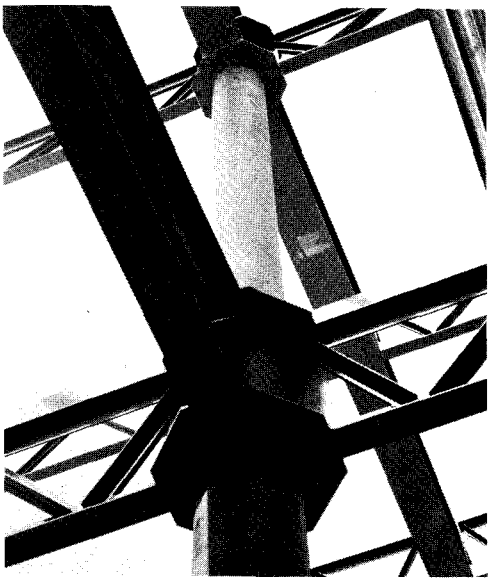


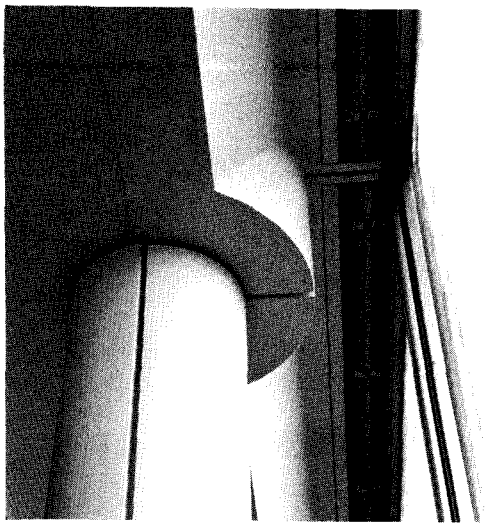




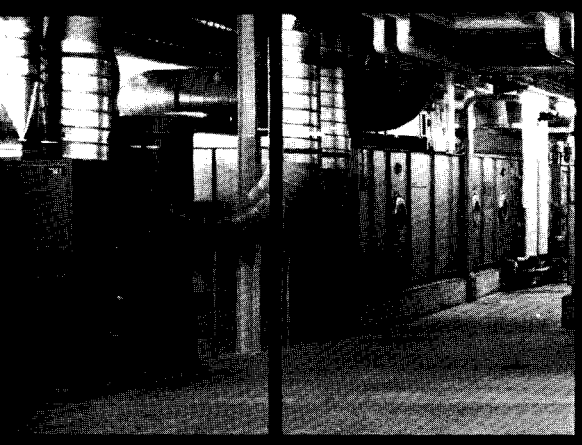
Brugg-Windisch

This technical college uses the Maxi building system to create very different classroom and industrial workshop environments. The column detail on the first page of this story is the structural key to both buildings, as are the open web joists, which allow great flexibility in running utilities through structural elements. The columns are sculpturally encased (below) by rigid and lacquered quarter sections of fireproofing materials. The



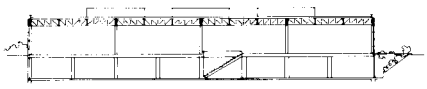


classroom building (top left and top of next page) uses a modular grid designed for convenient partitioning patterns. The factory, or workshop, portion has a double-height version of this module that allows larger, open working areas. The basement of the industrial building (bottom of next page) illustrates the structure's ability to integrate even the most complex utility runs. The two buildings are linked by a pedestrian bridge (right, next spread), with outside access by a curved stair.

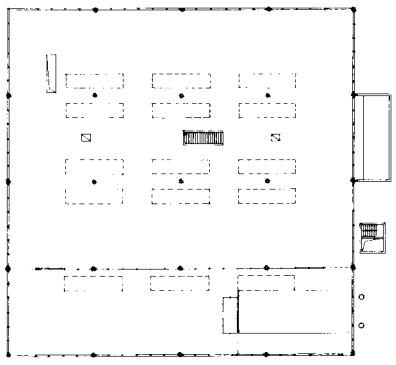


Münsingen

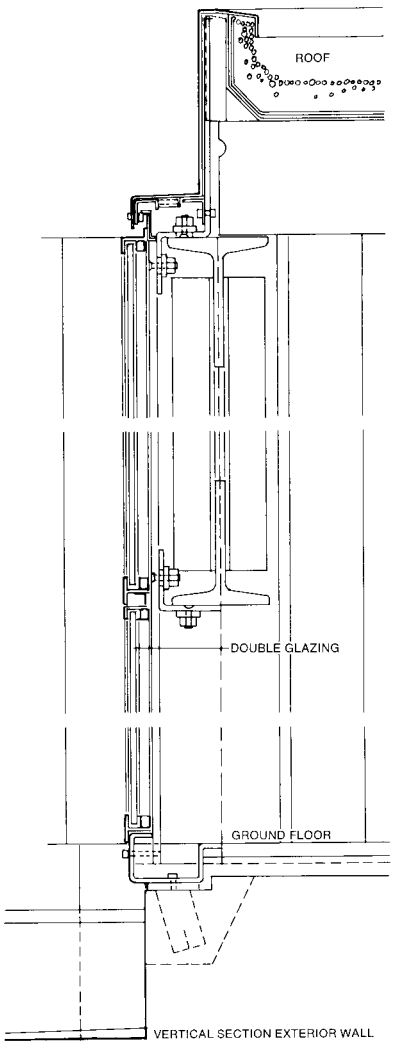
This industrial complex consists of a factory and office building, each using the Maxi system and each designed for horizontal expansion in the future. The office building (shown on a previous page under construction) is similar to the factory, but is built on a module one half the size, better suited to provide flexible office space and partitioning. The building facades (shown on the factory, top right) are simple and geometric; the factory interior (lower right) is a barebones industrial environment. The structural system of the factory includes double columns and open web joists, which are prefabricated with connections for the roofing elements (lower left). (The perimeter joist is complemented by a transport rail in the lower right photo.) Infill panels are translucent, with one line of clear glazing at eye level, to enhance natural lighting.



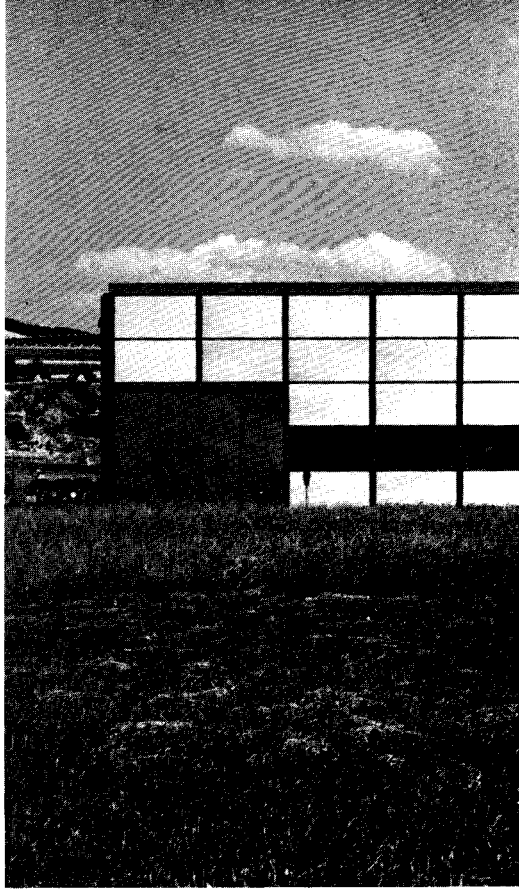
SECTION

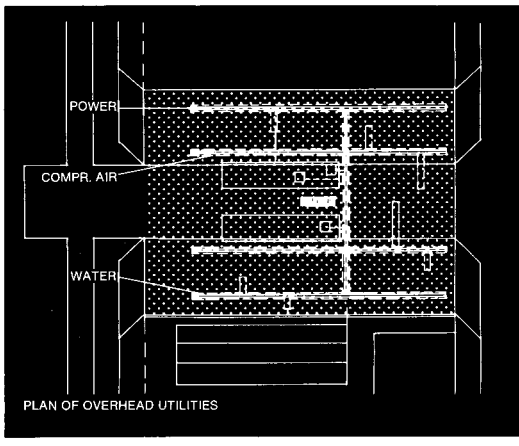


REFLECTED PLAN

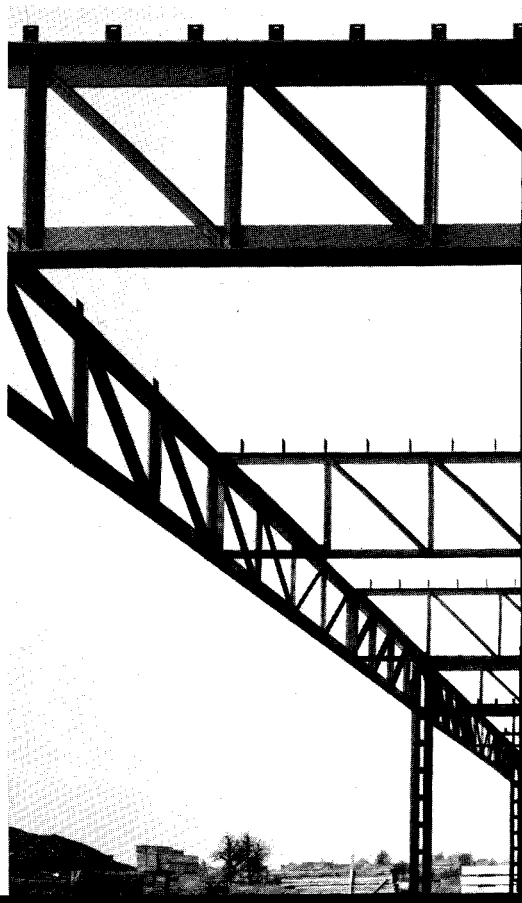


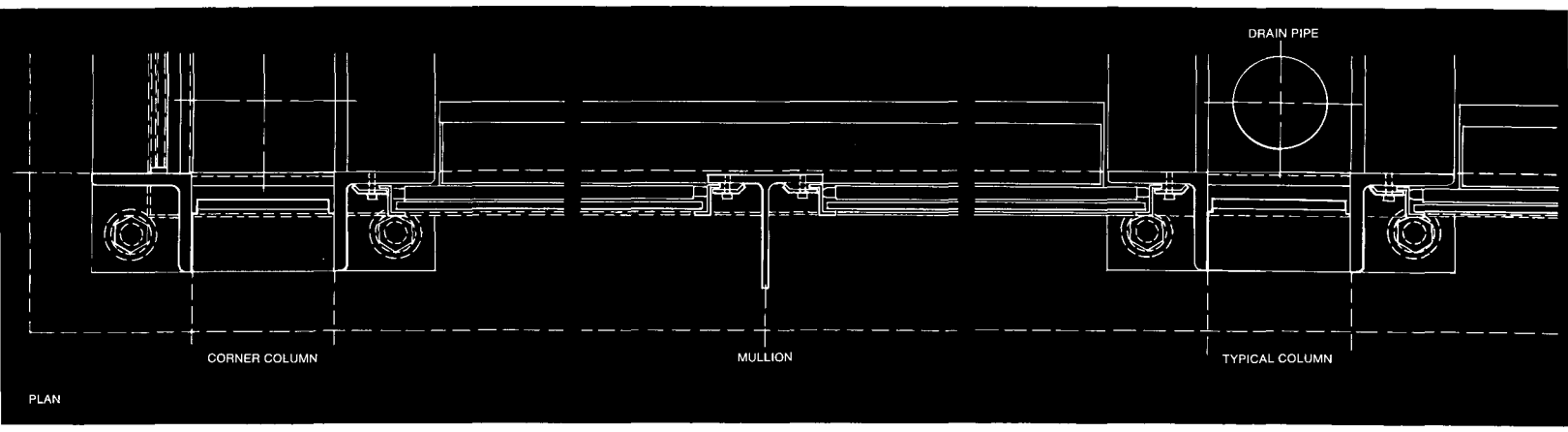
VERTICAL SECTION EXTERIOR WALL

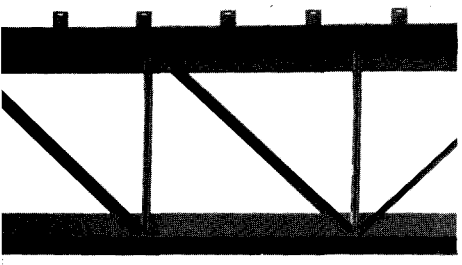


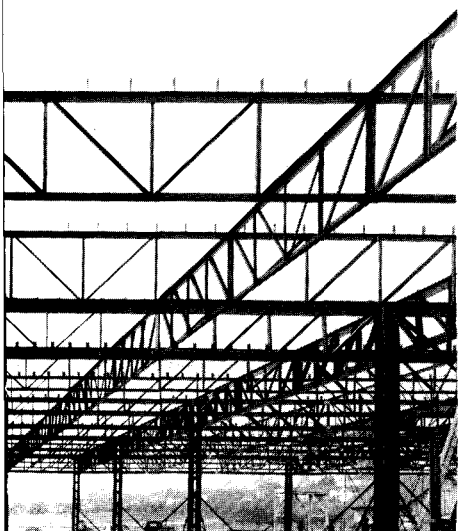


PLAN OF OVERHEAD UTILITIES

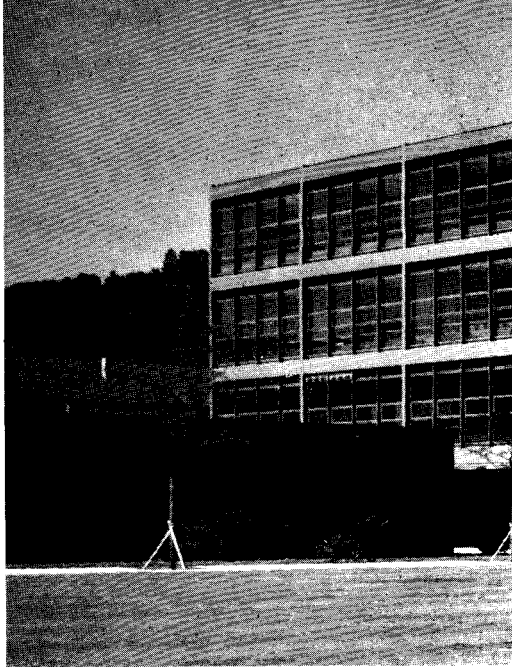



DRAIN PIPE
CORNER COLUMN
MULLION
TYPICAL COLUMN
PLAN



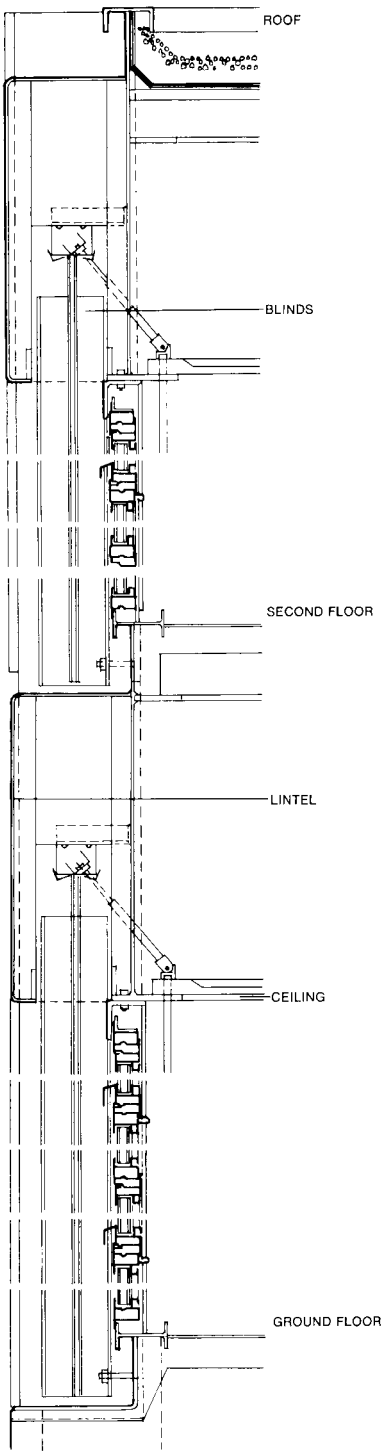


Baden

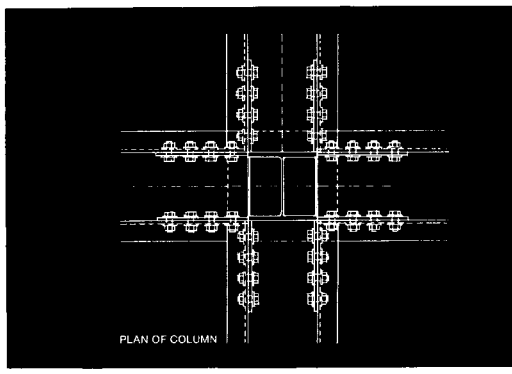


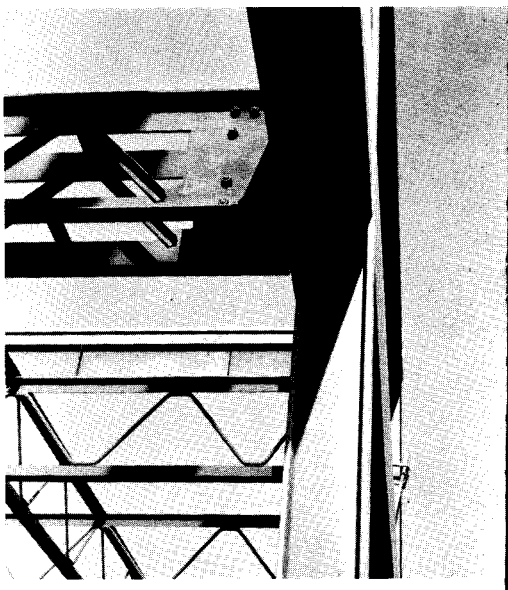
The Maxi system becomes three buildings at Kantonschule, a high school that includes a gymnasium, classroom and student center, and laboratories (see plan). All are built with a 25-ft. module, defined by a system of double beams (lower left) that spread the static loads horizontally to the end walls, where there are additional supports to resist the load. A system of secondary open web joists completes the structural lattice. The outer walls are covered with exposed brick, which insulates against fire and noise. The ground floors of each building are recessed by one module, forming a covered walkway (lower right).

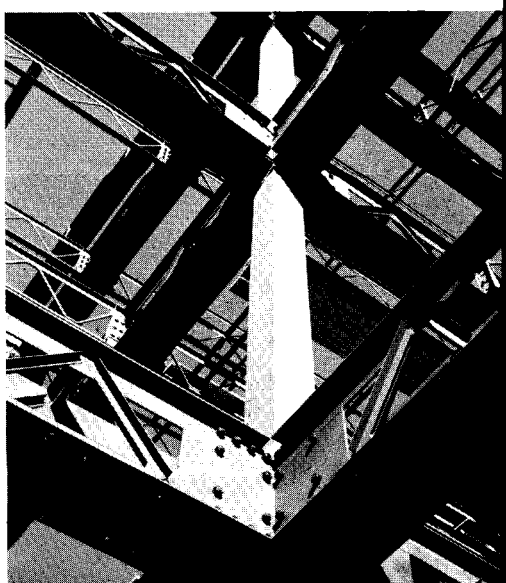
Photographs: Bernhard Moosbrugger, except p. 80 and p. 86 (top & bottom), by Christian Moser.

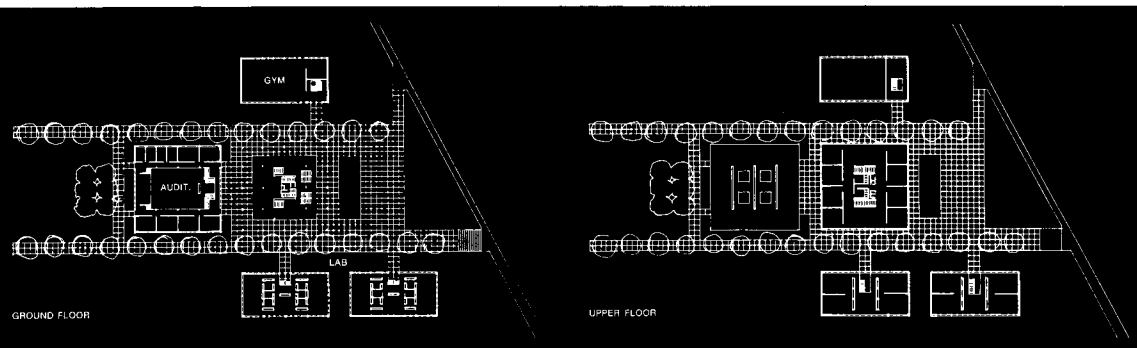


VERTICAL SECTION EXTERIOR WALL



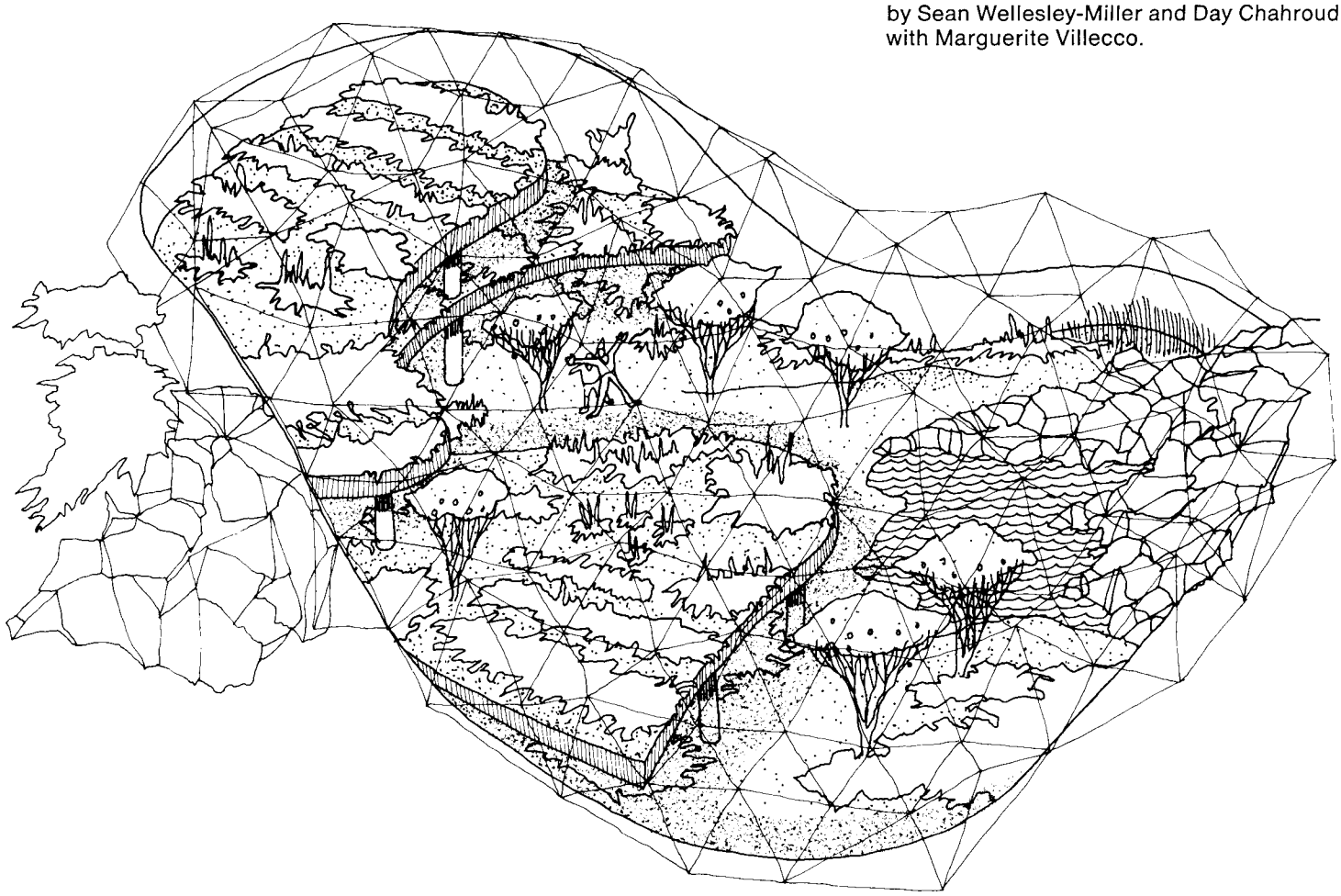


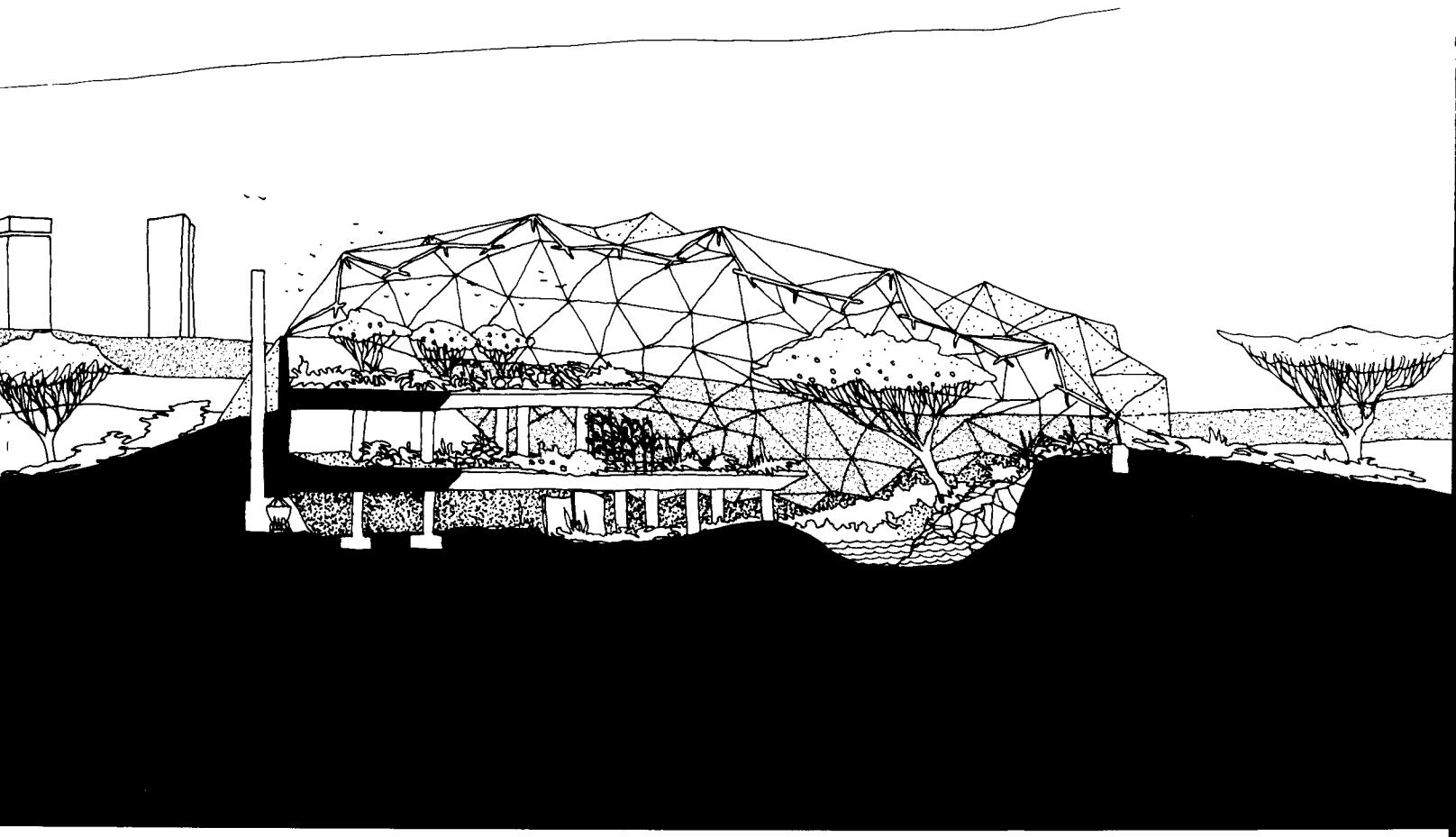



GYM
AUDIT.
LAB
GROUND FLOOR
UPPER FLOOR

BIO SHELTER

by Sean Wellesley-Miller and Day Chahroudi,
with Marguerite Villecco.





Let us imagine an enclosure of virtually any scale that lets sunlight into itself and that prevents heat from escaping when the interior microclimate is too cool. It also reflects sunlight, and it dumps heat out into the night sky when its interior is too warm. Let us further conceive that, within this enclosure, sufficient heat could be stored in the ground to provide several days' warmth, even if the sun did not shine. We would then have a system that could maintain a very stable interior microclimate without requiring mechanical heating or cooling.

Let us then also imagine a building that is designed not only to provide shelter from the weather, but also to provide some food; fresh water; liquid and solid waste disposal; space heating and cooling; power for cooking and refrigeration; and electricity for communications, lighting and household appliances.

The two ideas are different, but both are inspired by our own biological systems. The first shelters man from temperature extremes, as does his skin. The second building type emulates natural body processes and behaves as a total, almost self-sufficient system. Both schemes are possible; neither is a Utopian dream.

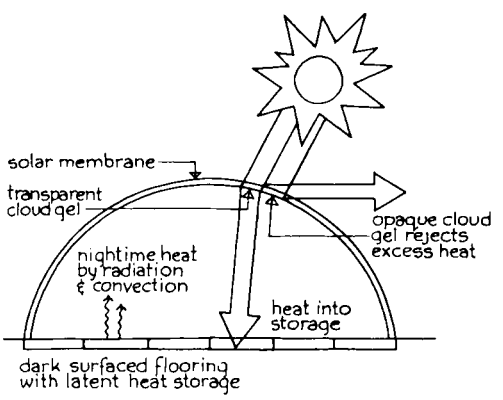
There have been technological limitations, however, that needed resolution before the full sociological impact of those ideas could be realized. At least one technological deficiency was the architect's lack of a long-lived, transparent insulating material that could control thermal fluxes from the outdoor environment enough to maintain stable interior temperatures, and admit light. Ideally, this material would be flexible enough to adapt to any architectural requirements for scale or form.

Such a material could lead to the development of a climatic envelope (right) that separated the architectural functions of shelter from the weather, and separated the control of the microclimate from all other functions of a building. A climatic envelope is a homeostatic (tending to maintain a state of equilibrium between different, but interdependent elements) membrane that regulates environmental energy fluxes thermostatically, despite short-term changes outside. The idea is not new. It dates back to Joseph Paxton's mid-19th century Kew Gardens conservatories, if not before.

During the 1960s, Nicholas Laing, a German physicist and inventor, made a concerted attack on the problem, but could not find materials with a long enough life to make his designs economically feasible. Buckminster Fuller tackled the problem unsuccessfully in his Climatron and, later, in the Montreal Expo '67 geodesic dome.

A review of this history made it obvious to us that regulating environmental fluxes would require research in the area of polymer physics. During the late 1960s, independent from Laing, Day Chahroudi had been tackling the same problem on exactly this level. We teamed up, and, by the early 1970s, we were able to apply for a patent on a multi-layer solar membrane that transmits 76 percent of short-wave solar radiation, yet is virtually opaque to long-wave thermal radiation (reradiation from inside the solar-heated membrane). It has a U-value of 0.20. (U-value is a measure of energy, in Btus, that passes through a square foot of structure for every degree of difference between the indoor and outdoor temperatures.)

Currently, we are working on a thermostatic "cloud gel" backing for the membrane that turns opaque white when the interior air exceeds a preset temperature level, effectively rejecting unwanted solar radiation and heat. Its behavior is regulated by two variables introduced during the manufacturing process: the thickness of the gel and the temperature level that activates it. It is, for example, possible to manufacture a square foot of this material that turns opaque at 75 degrees F. and transmits 4 percent of incident sunlight. Or a section may turn white at 85 degrees F. and transmit 10 percent light. Combining panels of different thicknesses and temperature settings will allow very sensitive climatic control, without (or with minimum) mechanical intervention. Using a material such as fluoroplastics, which are the least flammable and most durable of plastics, would produce a membrane lasting 30 years.



CLIMATIC ENVELOPE

The solar membrane is a passive solar system, a contrast to the largely mechanical, or collector systems, discussed in the last issue of PLUS. A passive system relies on direct insolation, or radiation, for thermal control in a building. Collector systems use solar heat indirectly to run essentially conventional heating and cooling equipment. Direct insolation systems tend to be more efficient than collector systems because the heat transport path is shorter and fewer heat exchanges are involved. On the other hand, operating temperatures are much lower. Passive systems also require a great amount of architectural ingenuity because they are so intimately integrated with a building. A definite advantage they possess is that they can be built by a contractor with off-the-shelf materials and are not dependent on specially manufactured components designed to do all things for all buildings. There is also very little that can go wrong with them because very few moving parts are involved.

Examples of direct insolation systems already built are Steve Baer's drum wall house, in Albuquerque; Harold Hays' roof pond and movable insulation system used on houses in Arizona and California; and St. George's School, in Wallassey, England, which uses solar heat in combination with the heat of people, lights and equipment to provide 100 percent of its space heating requirements. The school collects heat through its south windows and stores it in its walls and floor slabs. Jean Michel, the French architect, has designed a thermosiphoning wall system called the Trombé method of solar heating; this system has been used in several buildings in France and there are plans for more, including versions in the U.S. by other designers.

Synthesis

For the present work of our own firm, three trends of the past 15 years have been particularly important. Our research and development efforts have been essentially an extension of our own involvement and interest in these earlier efforts. We hope that the innovations we propose will add new capability, socially and technologically, to these precedent concerns.

The first influence was the development of the self-sufficient, or autonomous, home. The rationale for such buildings is that man can change his lifestyles and buildings to conform to nature and therefore curb his traditional destruction of the natural world. Man's activities can then merge into the ecological systems; his architecture can become complementary, rather than parasitic, toward natural resources, and be powered by the same forces that drive the biosphere. The practical result is largely small, rural houses that rely primarily on passive energy systems for their own power and operation. The impact of such lifestyles is therefore limited by the scale of community appropriate to it.

The second trend of importance is the development of large-span structures that could theoretically enclose almost infinite amounts of space economically and reliably. Such structures can often be erected and removed with minimum disruption of the natural environment, but they also introduce another way to make man and nature compatible. In contrast to ecological houses, large span structures attempt to *free* man and his architecture from climate, enclosing and changing the environment to conform with his wants and needs. The idea, however, has been limited by the longevity of materials available for the envelope and by inadequate regulatory controls for the interior climate. A transparent solar membrane

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is an important step towards resolving some of these problems, we think. And solving the technological problems is an important step in extending the sociological implications of such structures, which may ultimately be used to enclose large portions of human settlements, as suggested by some of the drawings accompanying this article.

The third impetus is the recent energy crisis. One Btu in twelve of the global energy production is used to heat or cool an American building. The average home uses 100 gallons of water each day and generates more than 10 lbs. of solid waste. Environmental design is no longer an ideal for the few, but a practical necessity for all.

Energy conservation in the design and operation of buildings is now essential. For example, Victor Olgvay, in his book *Design with Climate*, has shown that optimized climatic building design would reduce the cooling load of an average house in the New York area by as much as 70 percent.

Where fuel is required to run mechanical equipment, it seems only logical to design systems that run on renewable or inexhaustible fuels, such as the sun, instead of on easily depleted capital resources, such as oil or gas. Going a step further by using passive energy systems wherever possible is even more efficient use of energy. This logic is implicit in our current work.

Self-sufficient homes

The autonomous house is an idea whose origin is difficult to find. The idea of the self-sustaining environment was in the air before the 1960s, when the ecological imperative started to become more obvious. People then began seriously to investigate designing buildings, and even their lifestyles, to conform with nature's rules.

A number of such houses were built and the idea is no longer considered exotic. The "Biosphere" proposed by Day Chahroudi in the *Dome Cookbook* was one of the early attempts. It integrated a greenhouse with the living space in such a way that they provided heating, fresh produce and distilled water for a family living there. The biological analogy is clear: The home is to become an artificial eco-system that can recycle its own water and wastes, heat or cool itself using natural energy, generate its own power and even provide a large part of the occupants' food supplies. The umbilical cord to the utility networks is cut. Nothing is wasted. The system, if not completely closed, is at least tightly looped. For example, produce from the greenhouse provides food, food wastes enter a methane generator, the methane generator provides gas for cooking and fertilizes plant growth, the plants . . . and so forth.

The concept of the autonomous home, however, has limitations. It smacks a little of the ecological bomb shelter; as an insurance policy, it fails to recognize our collective responsibility for the natural environment. Many of its functions could be more efficiently met at a community scale. Its frequent insistence on low-technology solutions is a little suspect when *any* solution, high- or low-technology, should be pursued. Its (for the most part) studied pastoral setting and relatively high capital cost limit its plausibility.

In fairness, some of these limitations are more an indication of practicality than of philosophy. It is considerably easier to build an energy-integrated home in the woods than to convince a developer to construct a community along similar lines in the Boston suburbs. The concept is still very young, still very experimental, and obviously has a long way to go before it could ever become widespread. Even so, it constitutes the most radical and potent change in the concept of a dwelling since LeCorbusier's "machine for living in"—to which, in many ways, it is diametrically opposed.

Recent work on autonomous housing led the two of us and others, to the same basic concept, and we have tried to extend it experimentally and theoretically to include community development, personal transport, protein production, communications and information processing, the manufacture of building materials, solid and liquid waste recycling and even health care. Thring and Vale, a man and woman research team at the University of Cambridge, have done very thorough work on analyzing the real costs (financial and environmental) of providing water and electrical power to individual dwelling units. John Todd, at the New Alchemy Institute, has concentrated primarily on integrating the function of food production into building design.

What the self-sufficient home recognizes, as we see it, is interconnectedness. Currently, the ability of the natural environment to absorb the drains and loads imposed by central utility networks serving the residential sector is fast approaching the limit in many parts of the country. Fossil fuel and electrical power shortages are not the only pressures on residential construction. Southern California, for example, is plagued with water shortages, overloaded sewage networks, and solid waste disposal problems.

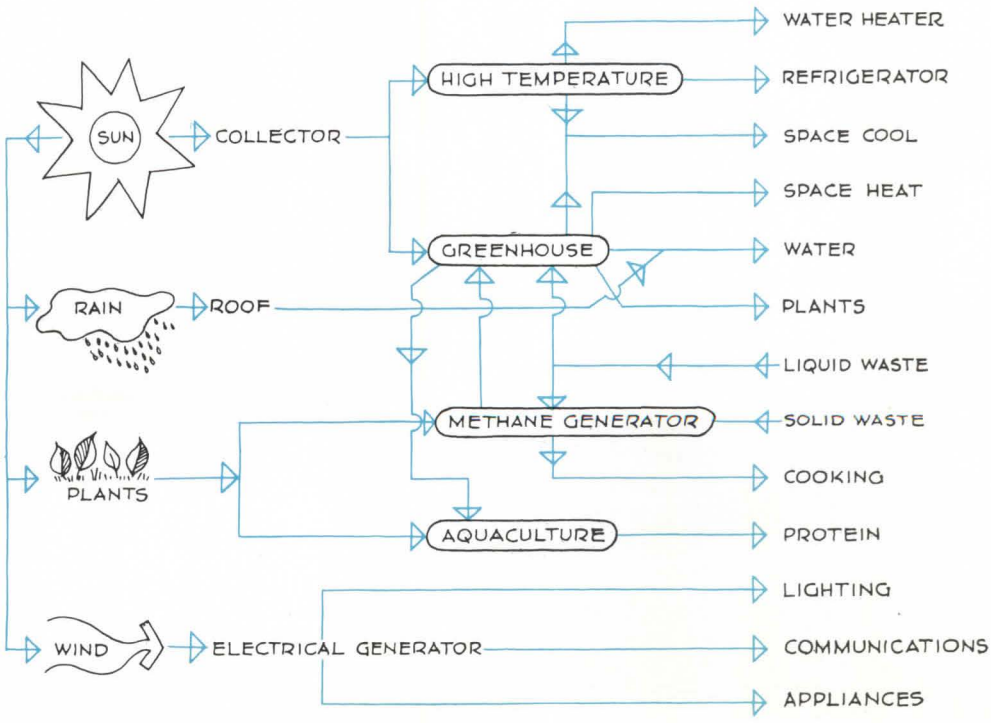
The problems are interconnected, yet, historically, the various utility systems and services that go to make up a home have been developed in a piecemeal manner and in isolation from each other, both in the home and outside of it. Consequently, while some components or independent subsystems may be designed and working near optimum efficiency, the total system is seriously inefficient. It is this we seek to correct.

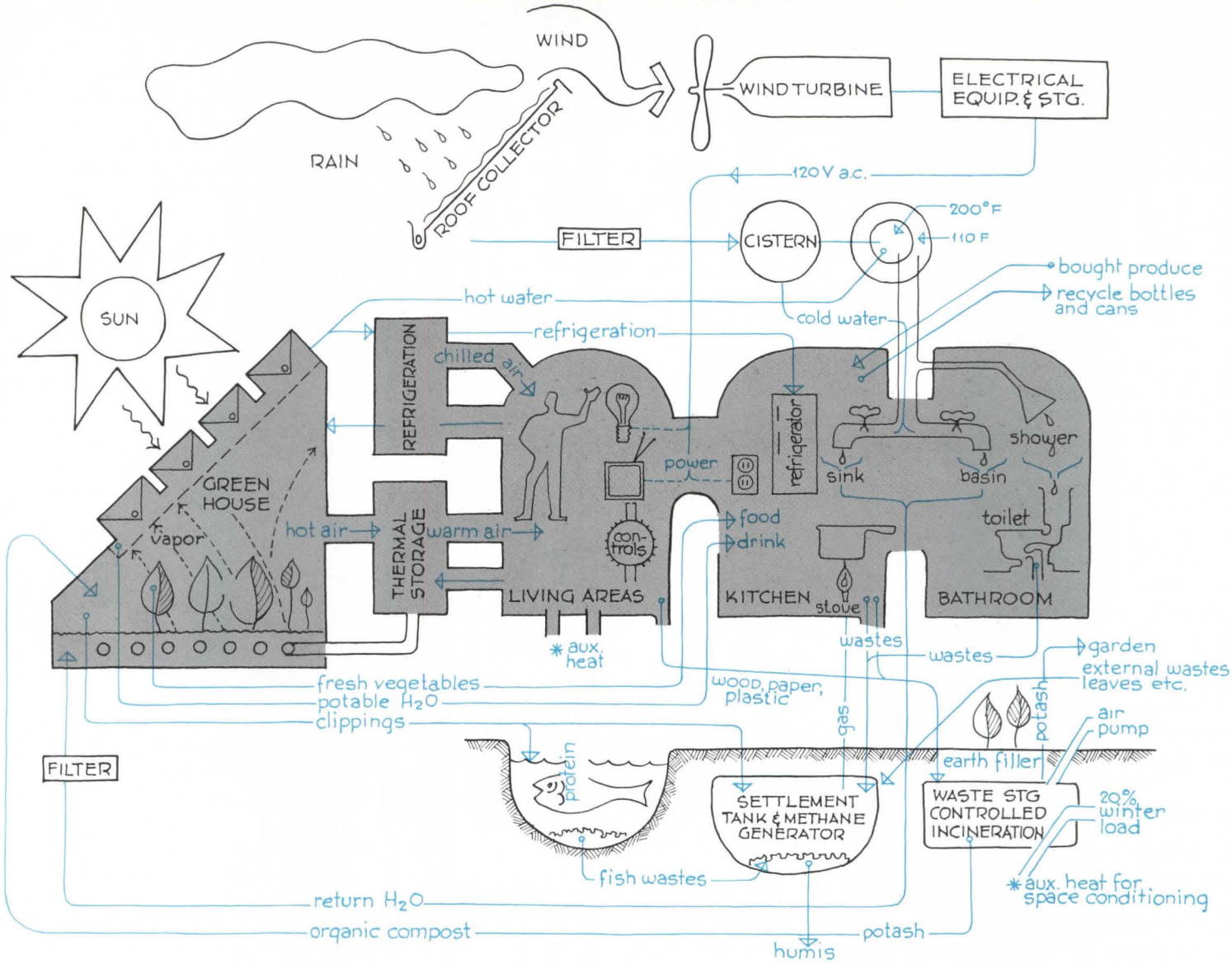
Model simulation

A typical flow pattern of integrated domestic utility systems (illustrated below) explains our concept. Using available hardware systems, the model is being developed at MIT for a systems dynamics computer simulation, designed to show the interdependencies of various processes. The various storage systems, control points and systems, waste heat disposal, and backup external inputs are, for the sake of simplicity, not shown here. The functions of space heating and cooling, water heating, year-round plant and protein production, water purification, and liquid waste and heat disposal are all superimposed on a modified greenhouse.

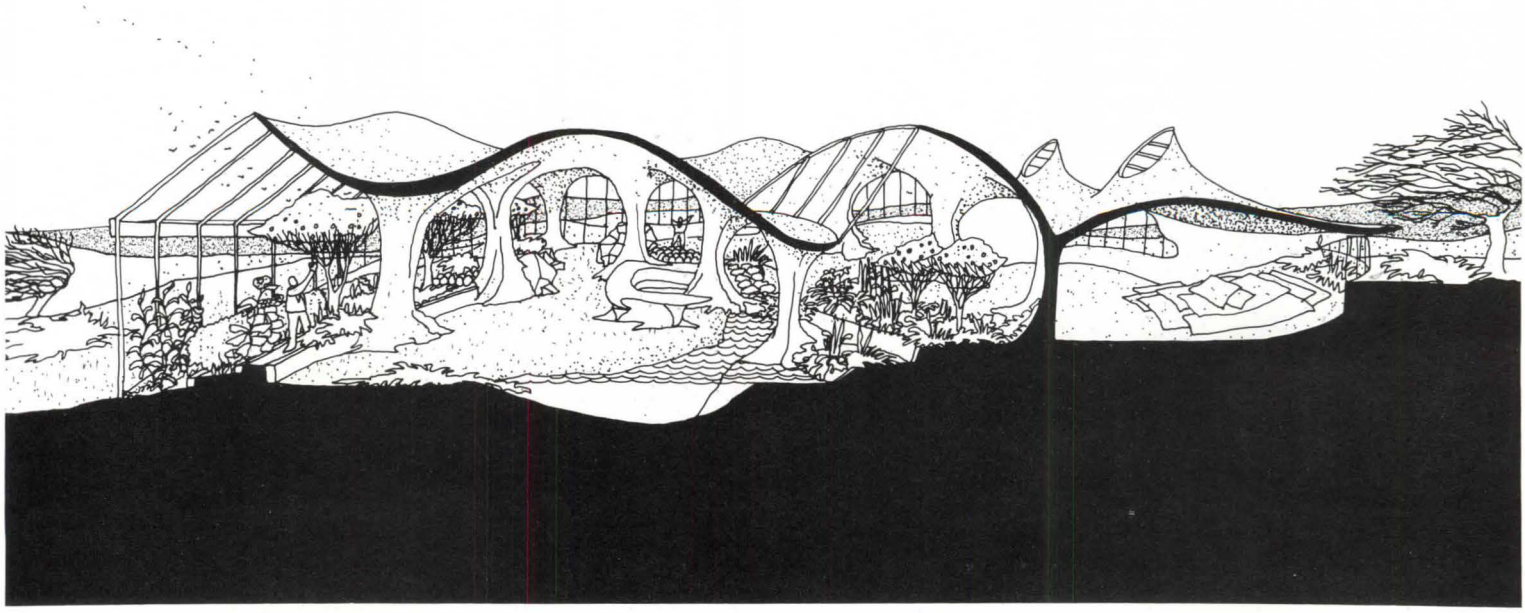
Sunlight enters the system through the greenhouse by passing through a solar membrane. This can be either transparent insulation or movable insulation that covers the transparent portions of the greenhouse.

Like a cell wall, the solar membrane relates its internal environment (a living space for people and plants) to the changing external environment through selective permeability in a manner that keeps the inter-





Chahroudi hopes he'll eventually live in this version of his Biosphere (below), which uses the solar membrane for glazing. The (above) hardware integration scheme could be adapted to such a dwelling. The table (left), used for a model simulation, defines the basic interrelationships of bio shelters.



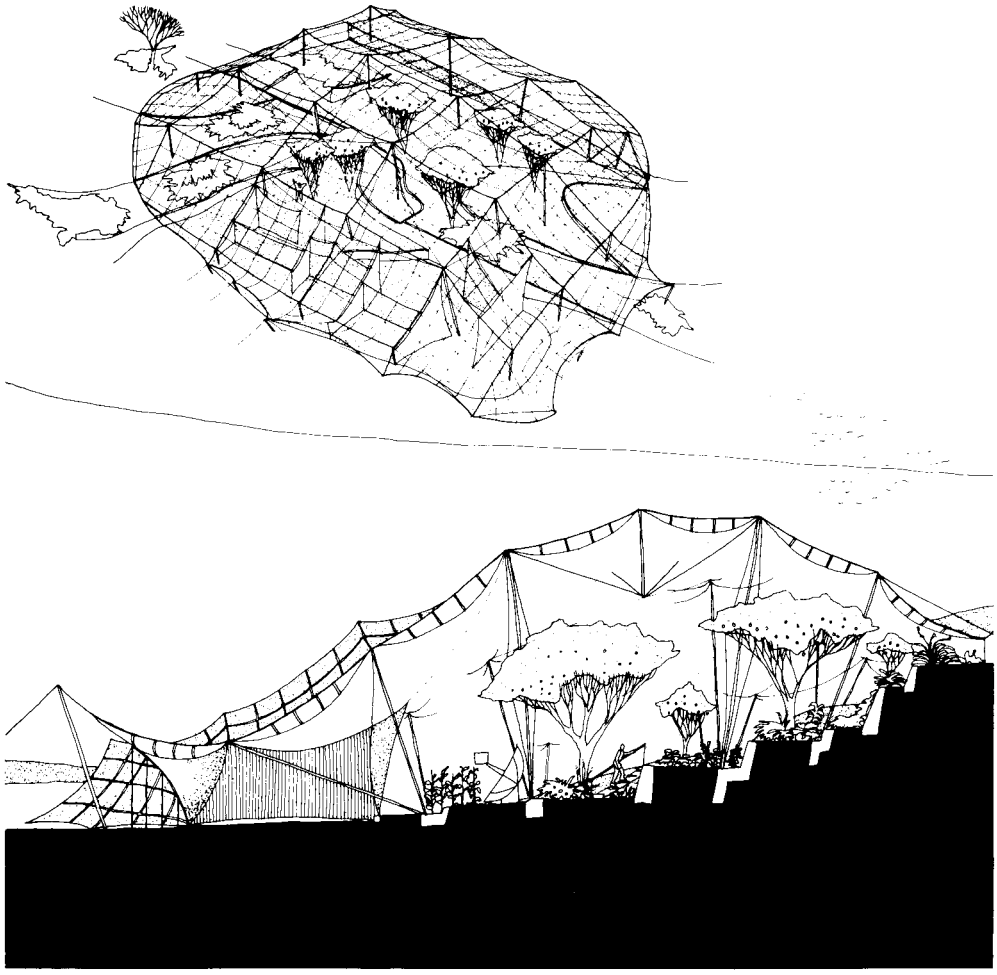
nal environment constant. (This is, of course, the principle of our own solar membrane and cloud gel combination.) It lets in energy in the form of light and prevents its escape in the form of heat. But before it degrades to heat, some of the sunlight entering the model greenhouse is converted to food and fresh water.

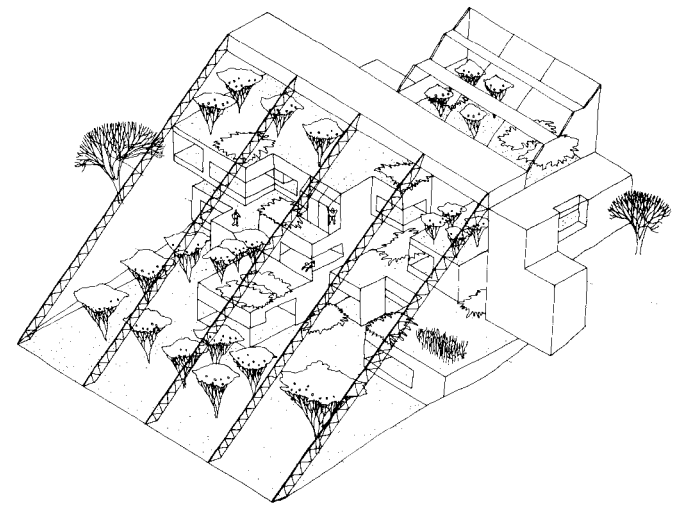
After passing through the membrane, sunlight is absorbed by the plants in the greenhouse. The plants heat up the air surrounding them, and this hot air is blown through the heat storage battery by a fan. The area of the heat storage unit must be larger than the floor area in order to get heat into and out of it easily. It is thus best incorporated into the building in the form of walls, ceilings, or under the floor. Heat is transferred from the storage material to the living space by circulating room air through storage.

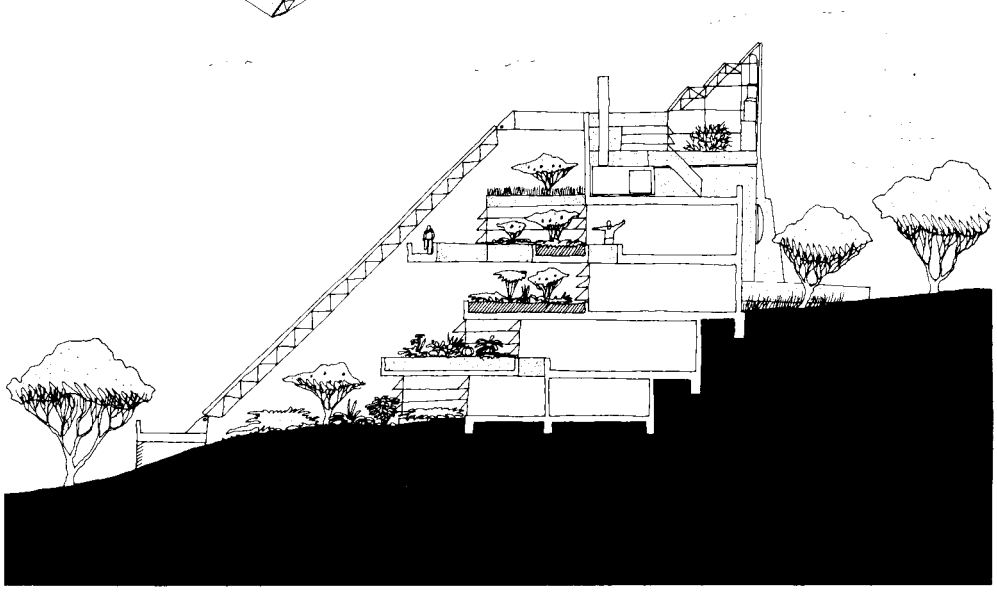
The greenhouse helps cool the living space during the summer by admitting only the minimum amount of light needed by the plants and by venting with outside air the heat storage unit, living space, and greenhouse, whenever outdoor temperatures are below indoor temperatures. When it's cooler inside, heat (actually cold) storage and the living area are kept as thermally isolated as possible from the environment.

Since the produce from the greenhouse is fresh, it has about twice the nutritive value of produce that has been stored near freezing for months and shipped long distances. (Grains store well and are produced in a highly mechanized manner, so they are cheap and there is no point in growing them in greenhouses.) Each person requires about 200 sq. ft. of garden for fresh fruit and vegetables year round. Each square foot of garden produces about $6.00 worth of tomatoes or berries a year, or $1.00 worth of mixed vegetables at retail prices. The parts of the plants not used by the occupants can be fed to chickens in a separate building or to fish to produce protein. The aquaculture ponds are in the greenhouse. Fish and chickens are favored because of their extremely high plant-to-protein conversion ratio.

The organic wastes from the people, fish and chickens are disposed of and sterilized by decomposition in a methane generator. This can be supplemented with organic matter such as dead leaves from outside the building. The sterile byproducts of decomposition are used as fertilizer for the plants







The tent structure (top) uses the solar membrane and cloud gel for its skin and is a simple structure expandable to virtually any size. (The triangular configuration on the first page of the article is similar to that proposed for the Aspen conference and allows clear spans within.) The tiered structure (right) is still another architectural configuration envisioned for the solar membrane skin.
Drawings by Michael Epp.

in the greenhouse. The methane produced is used for cooking, as is waste paper.

The greenhouse also acts as a solar still. It is divided into three sections, only one of which operates as a still at a time. Cycling the humidity conditions in each section prevents fungus growth on the plants and discourages aphids (a kind of insect). Secondary waste water is poured into the soil, from which it evaporates. The humidity reaches saturation, and moisture condenses wherever heat leaves this section of the greenhouse. The condensation drips down into troughs where it is collected and stored for reuse. Losses are replaced with rainwater collected from the roof.

A high-temperature solar collector is mounted behind part of the solar membrane. Used as a cover window on a collector, the transparent insulation permits high efficiencies at high temperatures without mirrors. A brine solution is heated in the collector and the hot brine used to drive the water heater, the refrigerator, and in hot, humid areas, the space cooling or dehumidifying systems.

Wind generated electricity is used for communications, lighting and appliances. The direct current energy is stored in batteries and converted to alternating current with an inverter. In the near future, we hope, hydrolysis of water (separation into its component parts of hydrogen and oxygen), storage of the hydrogen and conversion to electricity in a carbon element fuel cell will become more economical than a battery.

Instrumentation will be part of the sensory-control loops that allow the building to function viably as an organism regulating internal energy flows and exchanges of energy and matter with the external environment, with the emphasis on local feedback.

Integrated domestic energy and information systems can take the form of single, conventional apartment complexes, single-family or large-span climatic envelopes. A schematic hardware configuration (previous spread) can be adapted to most buildings. Development of the solar membrane, with its emphasis on passive energy utilization, has helped further our research in self-sufficient environments, making some of the above relationships possible.

Large span structures

Applied to large-span structures, the solar membrane can extend the concept into the notion of a "climatic envelope." A climatic envelope is not only a large-span structure, such as those developed by Frei Otto, in Germany; N. Markovsky, at the University of Surrey; Walter Bird and Buckminster Fuller, in the U.S. As described in the first paragraph of this paper, a climatic envelope is a space enclosure that regulates the internal environment in response to fluctuations in the external environment.

The solar membrane system accomplishes thermal regulation. Another problem, that of improving material longevity, yet maintaining transparency, is being researched by the E. I. DuPont de Nemours Co., Inc.

The simplest climatic envelope would be an inflated bubble of flexible solar membrane fabricated from transparent film. The dome, say, could come in a box, ready for inflation, heat storage and/or backup heating and cooling systems.

Such structures, however, can be of any scale. Climatic envelopes enable us to air-condition a whole building complex, or even a city. An agglomeration of variously shaped and sized envelopes that include both open and closed spaces is possible. The articulation of the envelope can avail itself of the full range of wide-span structural vocabulary that has emerged in the last three decades, ranging through inflated and tensile structures, thin shells, folded plates, space frames and geodesic structures.

Activities which are at present housed only for climatic reasons could take place in the "open air" under a large-scale climatic envelope. An interconnected assembly of variously shaped and sized envelopes would revolutionize urban design and have a large impact on social forms and life styles.

The "internal" architecture would be relieved of some structural demands and could be as sculptural or as unassuming as the situation calls for. They would not be subject to wind and snow loads, or to large thermal variations. New materials and construction techniques could be used to provide interior architecture that perhaps consists of movable partitions.

One can imagine tropical parks in Illinois, covered campuses, or enclosed garden residences under a climatic envelope. Some of these have, of course, already been tried (see Oct. '73 issue of PLUS), but without the insulating control provided by a climatic envelope.

Membrane projects

As it is just emerging from the research and development stages, the solar membrane system has not yet been used in a finished building, but several projects have been designed, and one is already under construction. We proposed a small, climatic envelope for the Aspen International Design Conference this June, based on a demountable, modular space frame that could be assembled to accommodate practically any site layout. It would maintain a steady 70 degrees F. in the lower three-fourths of the United States. The pavilion was not erected, but we now plan a similar structure for MIT. The MIT building will be our house, and we hope to live in it to test the membrane's suitability for domestic use.

The first commercial application of the solar membrane is as transparent insulation for a greenhouse built by Weyerhaeuser Co., near Tacoma, Wash. Now under construction, the greenhouse combines many environmental controls with the membrane, with the result that the greenhouse will do for seedlings in one year what nature does in three years. The other controls include an adaptive computer system; evaporative cooling integrated with a water spray system; night air circulation through periods of high humidity; and a traveling gantry to automate and rationalize work along the plant beds.

Other commercial applications include energy conserving storm windows and skylights. The membrane may also be used as a cover window for conventional high performance solar collectors.

The largest project yet designed is a solar-heated community center for Amherst, Mass. Phil Lehn Associates were the architects; Suntek designed and produced the solar systems. The project is already in working drawings, and financing is being sought. The building combines a passive, direct insolation system, based on the solar membrane and cloud gel, with a more conventional solar collector system that uses hot air as a heat transfer medium. The passive portion of the system will be used over an enclosed garden in the building; orange trees will be able to grow in the covered mall.

The conventional portion of the Amherst solar system is designed with off-the-shelf-components, integrated into the fabric of the building, and ready for assembly by a contractor. Air was selected as a transfer medium because it offers no problems of boiling, freezing, clogging or corroding; it does, however, have a limited thermal capacity, compared to water solutions. Air collectors also suffer from the formation of still air films that decrease thermal contact with a collector and so reduce the amount of heat that the air can take away from the collector (heat moves by molecular diffusion and the still air film prevents or inhibits this process). Our design calls for a sandblasted epoxy surface on the back of the solar collector, which creates a rough enough surface to break up the still air film and so increase thermal contact between the hot absorber plate and the air transfer system.

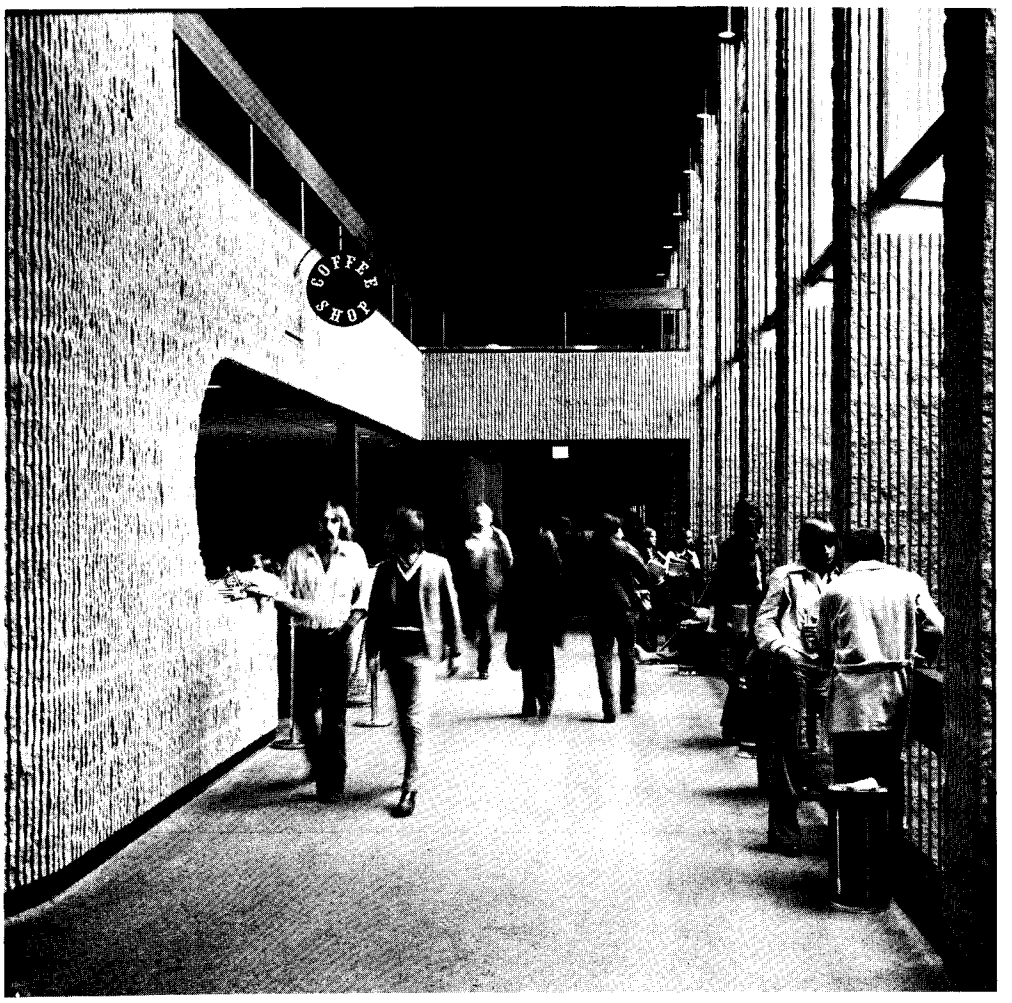
As more effort is expended researching possible solar climate control systems, so it becomes obvious that there is not going to be one system capable of meeting all requirements.

Perhaps we will see the emergence of a new regional vernacular based on local climate and materials and so possessing distinct structural characteristics, style and layout. A solar architecture, with genuine roots, that knows where it is; that does not assume that, given a bulldozer and an adequate supply of mechanical air conditioning equipment, any one site can be reduced to the equivalent of any other; that does not need to pilfer the past for stylistic certainty, nor preempt the future for power.

In any case, it is not too much to say that the new technologies of solar climate control, energy conservation and environmental protection are likely to have as much impact on the way architecture looks and functions in the future as the development of steel, glass and concrete technologies did on the architecture of the 1920s.

HILLWOOD COMMONS

A new student union building revitalizes a Long Island campus



The Commons' organizing spine is a double height corridor called "Main Street". Left, a view from the corridor down into the lower level game room and up to an outside roof terrace. Above, the game room is between the ribbed block columns at right, a snack bar on the left.

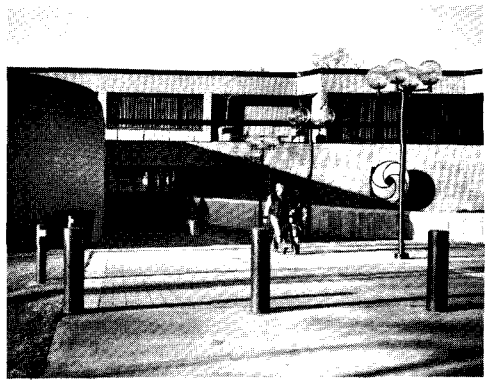
Hillwood Commons, by architects Bentel and Bentel, is a modest building, but much more than a modest success. It is a badly needed physical focus for campus spirit, the campus being that of C. W. Post College, one of the many branches of New York State's Long Island University.

The school was established just twenty years ago on the Brookville, New York, estate (then called "Hillwood") of Marjorie Merriweather Post. Mrs. Post, very likely the wealthiest woman in the United States when she died in 1973, was the granddaughter of Charles William Post, for whom the college is named and whose invention of Postum beverage, followed by Post Toasties, led to the formation of the gargantuan General Foods Corporation.

C. W. Post now serves a community of over 12,000 students and faculty members. In the 1960s the campus consisted of the Post mansion, a rambling "Tudor" affair with a great lawn spreading before it, a small "Tudor" edifice (once actress Dina Merrill's childhood dollhouse, now recycled as the school's Financial Aid Office), and a dozen or more newer academic buildings and dormitories, all in the most tepid "Georgian" imaginable. The social facilities available were few and scattered, so that the students were on campus only for classes, studying and sleeping (many of them only for classes), and left the campus for everything else. Sounds of textbooks being closed were followed immediately by sounds of cars being started.

Now the students stay. The first new extracurricular facility on campus had been a 3,000-seat theater ("The Dome") designed in 1970 by Frederick and Maria Bentel, an unusually bright and serious husband-and-wife team of architects from nearby Locust Valley. "The Dome" was a low-cost no-nonsense circular auditorium which brought in many outsiders (and sometimes kept students on campus) for occasional theatrical events, but it was hardly a center for daily activity. Attempts, with other architects, at building a real student union building had resulted only in abortive ground-breakings and over-the-budget bids. The Bentels were given the job and did it.

Hillwood Commons combines in a single building (adjacent to "The Dome") an information desk and ticket office, a book shop, a 300-seat cinema and 500-seat lec-

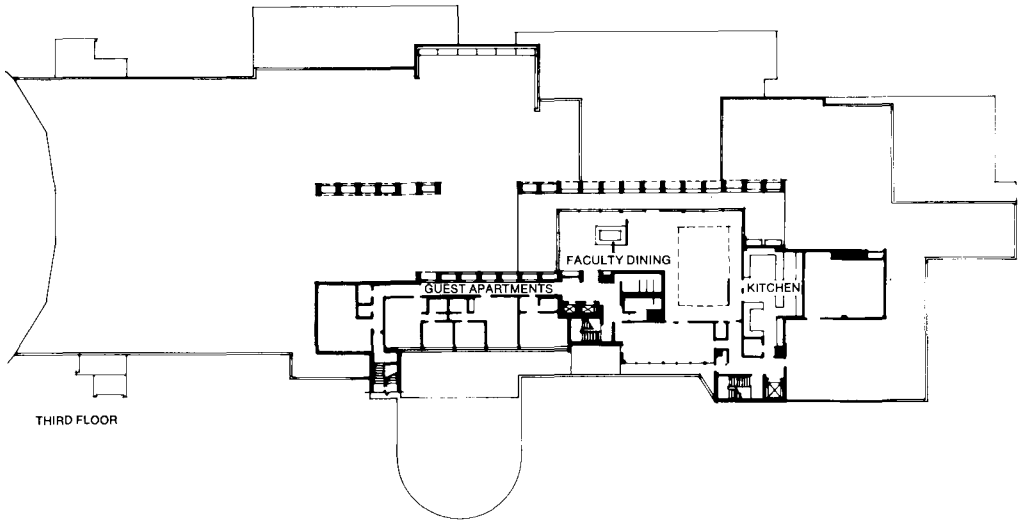


ture hall, an art gallery, spaces for pinball, pool, television, and a variety of eating and drinking experiences: an ice cream parlor (also serving pizza); a cafeteria with dining tables in a rather dramatic series of spaces, some of them double height with clerestory windows; a rathskeller (beer, delicatessen sandwiches and folksingers); and a somewhat more fancy faculty-meet-the-students dining room with steaks and a real liquor bar. There are bedrooms for visiting faculty, offices for student organizations, and even a branch of a local bank.

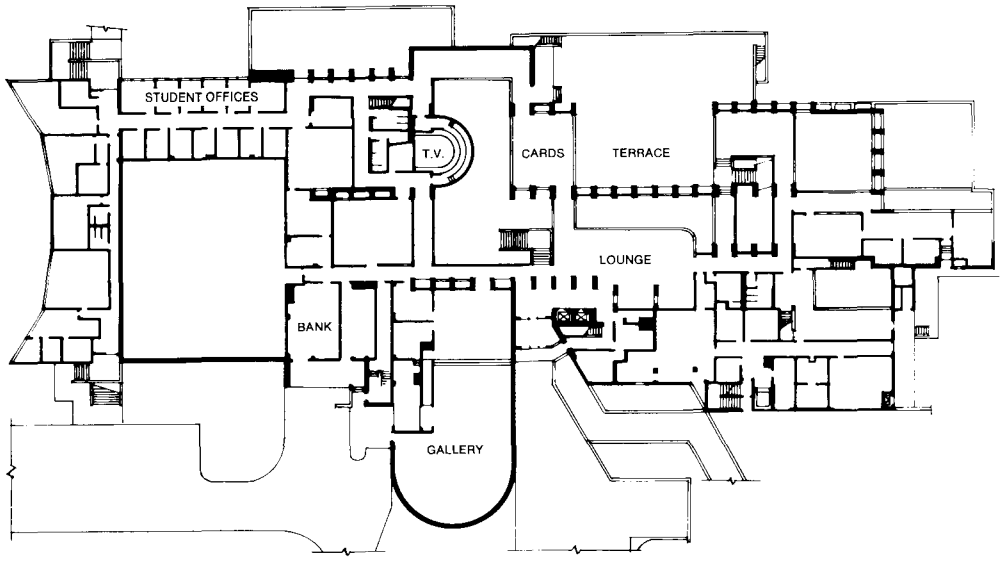
The activities sheltered here represent much of the fun and some of the value of college life, but they are not its main function. The building, although one of the largest on the campus, is therefore appropriately unostentatious. Faced with a realization of the building's vital but secondary functions, and also with the impossibility of relating any sensible new building to the tired architectural affectations around it, the Bentels have gone their own way, stylistically, and have avoided conflicts by almost completely concealing their building from the heart of the campus. Its south side, two floors above grade, is entered directly from one of the many perimeter parking lots; but its north side, three floors above grade and facing towards the rest of the school, is almost totally hidden by groves of trees. From the great central lawn, the approach to Hillwood Commons is signalled only by a kiosk for posters.

On its exterior, the building is monumentally anti-monumental, fractured into a number of elements pushing and sliding about each other, unified only by the use of a warm gray split-rib concrete block for almost all solid vertical surfaces. This quiet humility hardly prepares one for the building interior, where there seems to have been an all-out effort for dramatic effect. Entering from the lawn, the first arresting feature in a double-height lobby is a circular information desk. A half cylinder of ribbed block hanging heavily over the desk contains a tiny, luxuriously upholstered amphitheater for watching television, sometimes used, I suspect (because, on several recent visits, it has been dark as pitch) for more direct forms of entertainment.

Beyond these curved elements, one turns into the long, straight "Main Street" into which open, at one level or another, almost all the building's other facilities. "Main



THIRD FLOOR



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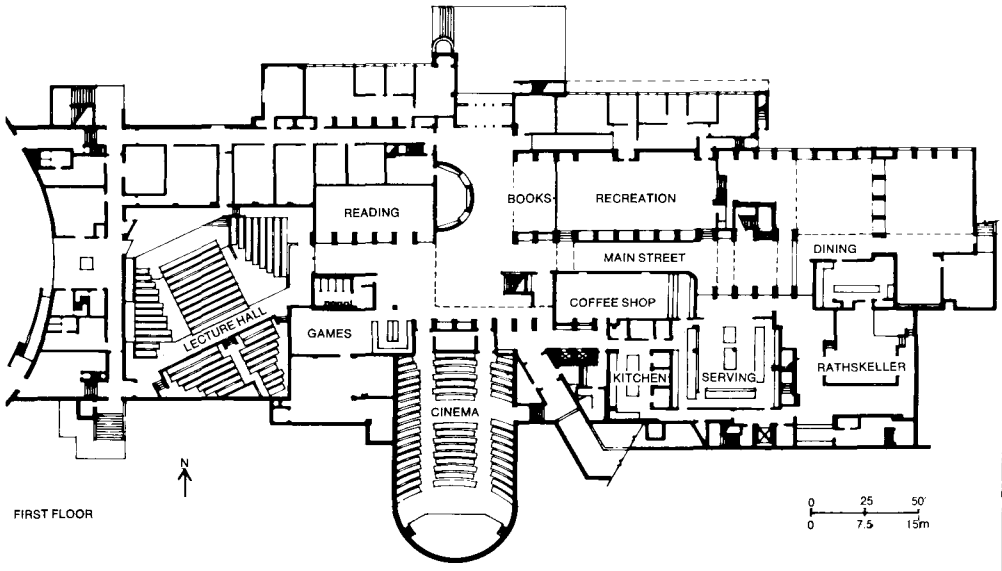
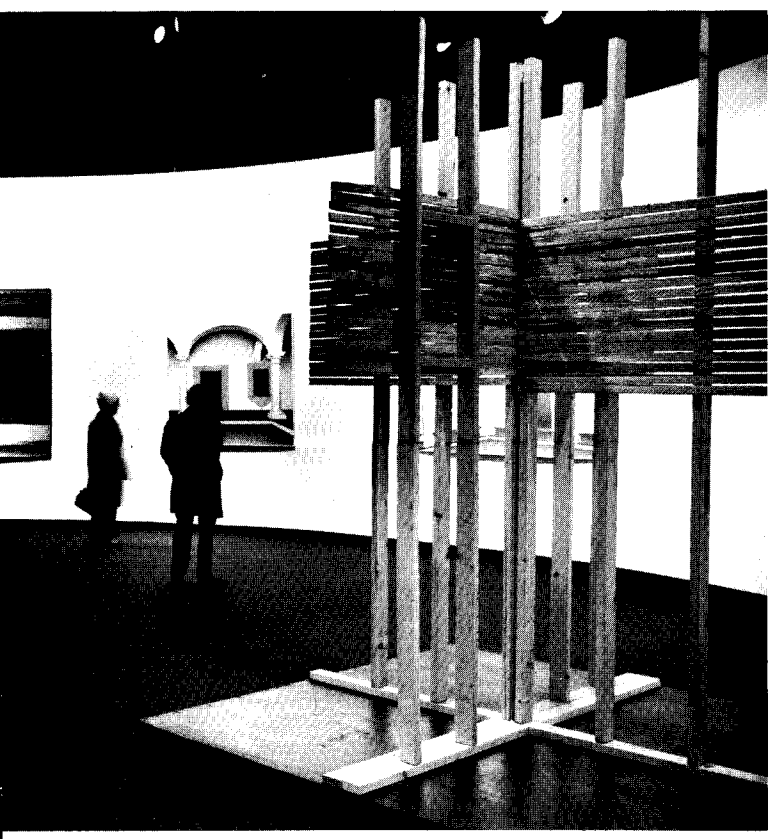
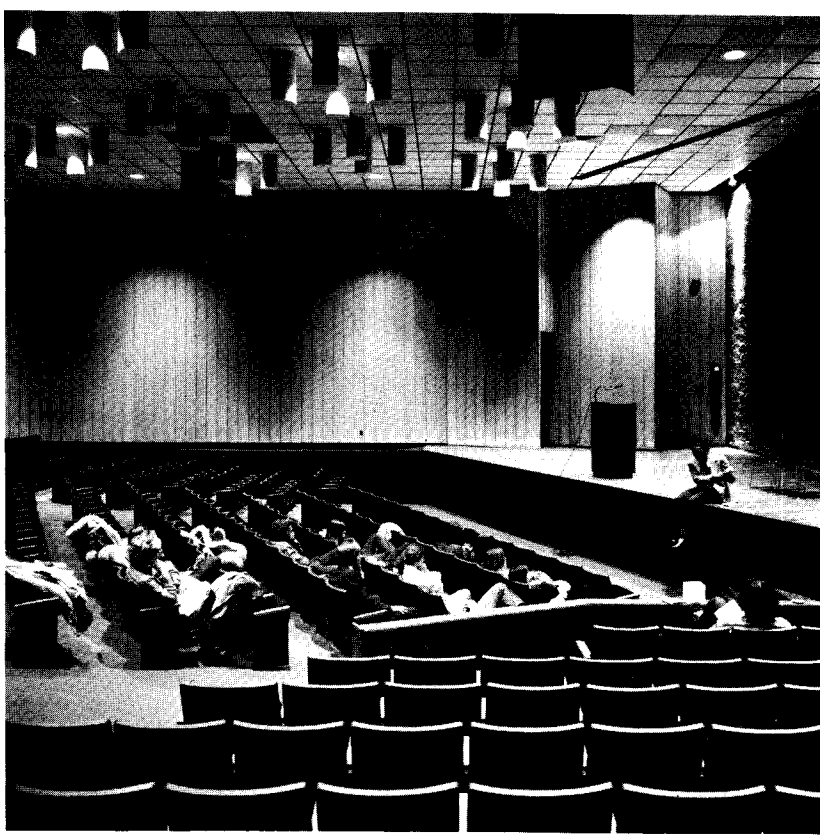


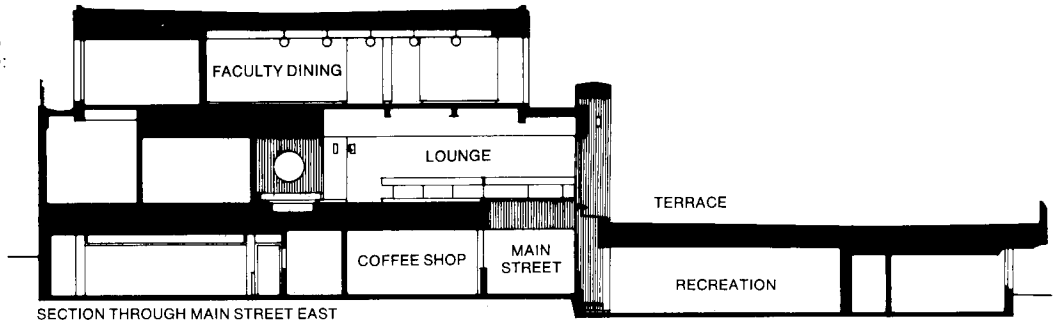
FIRST FLOOR

Left, two exterior views: the first, looking from the campus' central lawn, with the Commons' north entrance largely hidden by trees and earth mounds; the second, the south entrance opening directly from a parking area. Below, four interior views: top row, the main dining hall and the student rathskeller; below, the art gallery and a 500-seat lecture hall.





The second floor lounge, furnished with upholstered cubes and overlooking part of "Main Street." Below, stairs connecting the two main levels. Opposite page: at the beginning of "Main Street", an information and ticket sales desk, with the second floor's small, half-cylindrical television lounge suspended above it.



SECTION THROUGH MAIN STREET EAST

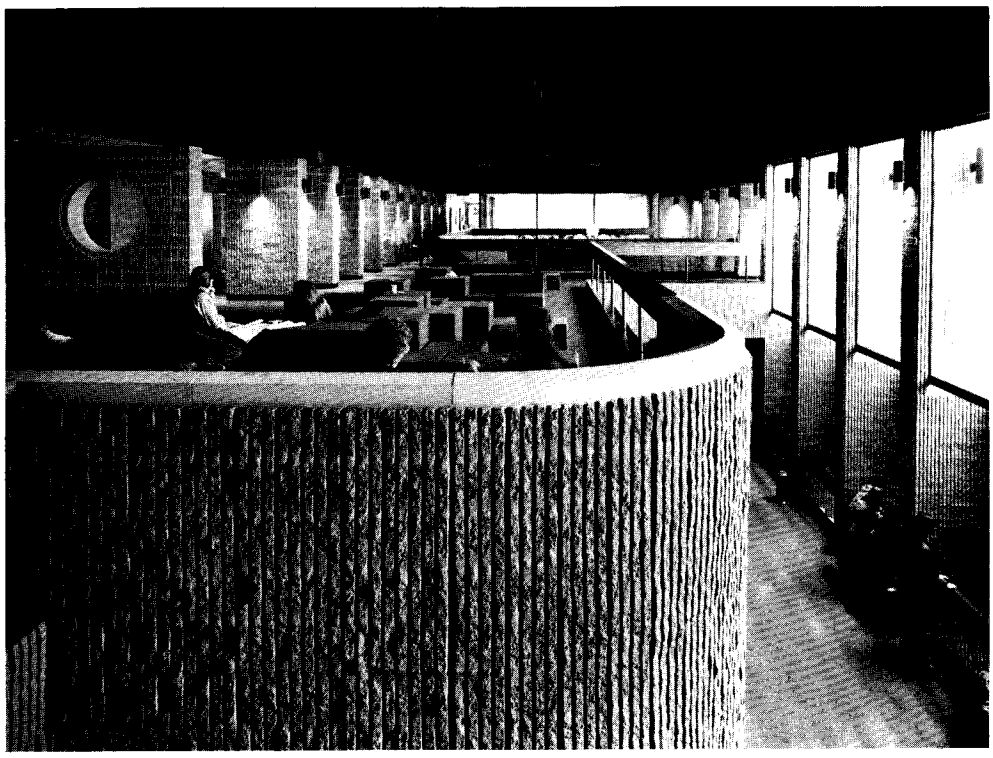
Street" has a black ceiling, giving it something of a nighttime air even at noon, despite some pleasant clerestory windows along its north wall. It is high; overlooked from the upper level lounges; it is occasionally crossed by bridges; and it has a view, for some of its length, into an even lower level, a game room with a row of vivid green pool tables. Despite its graphics, which are a bit cute, "Main Street" is a space of considerable impact, a valuable spine for the diversity of spaces around it.

The stringent budget within which the Bentels worked called for, and got, some clever solutions. The building's generous lounge areas, for example, are furnished solely with carpeted rectangular solids of many shapes and sizes, all moveable and susceptible to an infinite variety of seating arrangements and rearrangements.

The uses of adversity aren't *always* sweet, of course, and there are a few awkward incidents (such as an inconsistent switch to inexpensive shingles on the pitched roof of a projecting stair tower) that could obviously have been avoided with a bit more cash. Also, the architects' deliberately mixed intentions—a Superman space in a Clark Kent shell—have necessarily taken their toll in architectural unity.

But most of the architects' and the school's hopes for Hillwood Commons have been admirably well met. The building gracefully retires from a confrontation with the rest of the campus; it comfortably accommodates many different functions; it has, on the interior, a dash of architectural drama; it's fun; and, as a magnet and meeting place for students, it works.

The power of architecture to effect healthy social change can easily be exaggerated, but, within the context of a small campus, Hillwood Commons seems to have done just that.—STANLEY ABERCROMBIE



Facts and Figures

Hillwood Commons, C. W. Post Center, Long Island University, Northern Boulevard, Brookville, New York. Owner: Dormitory Authority of the State of New York. Architects: Bentel and Bentel. Associate-in-Charge: Michael J. Kranyak, Jr. Engineers: Seelye Stevenson *Value and Knecht* (structural); Robert Coleman (mechanical); Morris Lovett (electrical). Landscape architects: Bentel and Bentel. Interior designers: Bentel and Bentel. Consultants: Christopher Jaffe (acoustics); Harry Skolodz (kitchen). General contractor: Bingham and Henn, Inc. Building area: 82,000 sq. ft. Construction cost: $3,815,479.
Photographs: Cervin Robinson. Suppliers list p. 124.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Thirty-five hospitals and clinics are using a revolutionary new structural framing system. It's called Interstitial Space Design and it can be most effective in reducing maintenance and operating costs.

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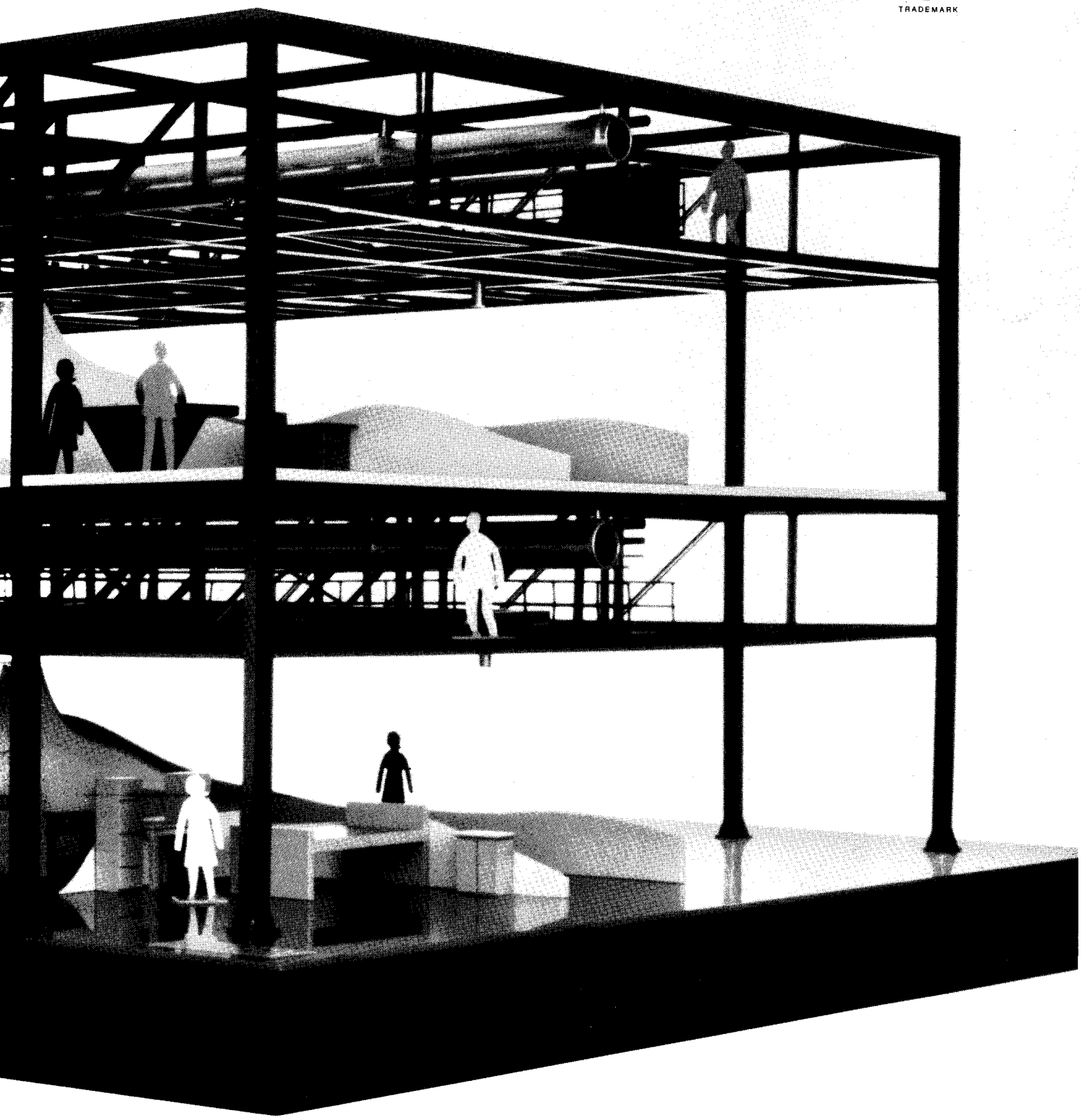


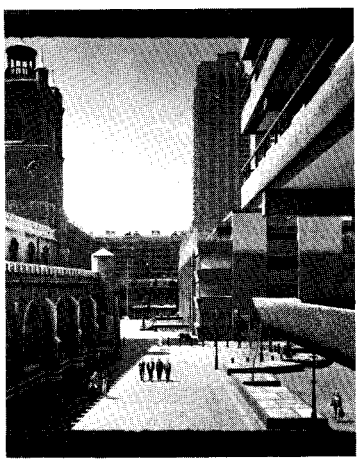
news+

continued from page 35

1974 RIBA Awards

The Royal Institute of British Architects has given awards to seven buildings and commendations to 11 others. In his introduction to this year's report, Sir Hugh Casson, Chairman of the RIBA awards committee, said, "To some people, the spectacle of architects awarding each other good conduct medals at a time of rising costs and falling standards may seem inopportune—not to say impertinent. Architecture can only flourish if people care, and people can only care if their interest is aroused and their attention drawn not only to our mistakes, but also to our successes . . ." The seven awards went to:

1. St. Giles Churchyard, Barbican; Chamberlin, Powell & Bon, archts.
2. Commonwealth War Graves Commission Headquarters, Maidenhead; GLM Rainbird of Fitzroy, Robinson & Partners, archts.
3. Clifton Cathedral Church of SS Peter & Paul, Bristol; Percy Thomas Partnership, archts.
4. Collingwood College, Univ. of Durham; Richard Sheppard, Robson & Partners, archts.
5. Architects' Studio, South Milford; Goad Burton Partnership, archts.
6. Nottingham Univ. Library; Faulkner-Brown, Hendy, Watkinson, Stoner, archts.
7. Countryside Display & Interpretation Training Centre, Battleby, Redgorton, Perthshire; Morris & Steedman, archts.



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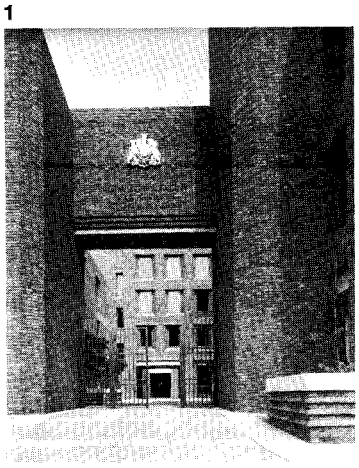

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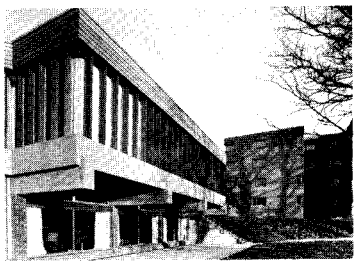

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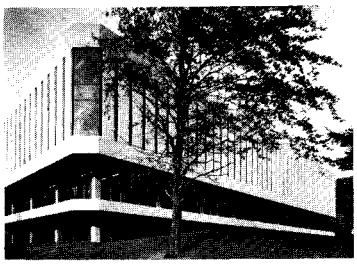

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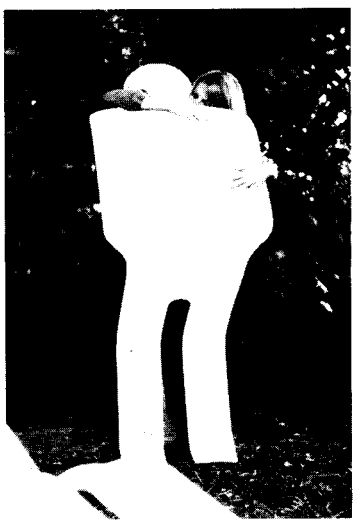
Flowers are better

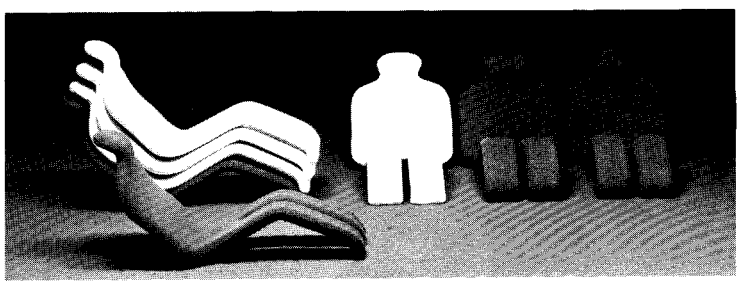
Residents of public housing projects in Chicago were given land, seeds, plants and gardening equipment last spring and taught how to grow vegetables and flowers. About 250,000 sq. ft. of land in 499 parcels belonging to the city were cultivated, partly to offset the rising cost of food, and partly for fun. It was estimated that a family working with a 15 ft. by 20 ft. plot could grow crops worth $150, or 11 percent of its annual food bill. A touching note in the statistics is that 856 participants (42 percent) bypassed the chance to save on the family's food budget and grew flowers instead.

For the reason why, we quote from Charles Lewis of the Morton Arboretum in Chicago: *The introduction of gardening into an existing people-building environment stimulates a change in people, who, in turn, improve their physical surroundings. . . . Plants are nonthreatening in a hostile world; they respond equally to all, without reference to age, race, social class. In an ambience of failure, they offer paths of conspicuous success.*

Reclining man

"Les Bouloms," a whimsical concept in seating, are two-dimensional human silhouettes resembling oversize paper dolls. Each chaise is 64″ long and 25″ wide, and is plushly upholstered on foam-covered fiber glass frames. There is a plain white fiber glass version for outdoor use. Their creator is Olivier Morgue, whose "Djinn" collection (1959) of sinuous steel-framed upholstery designs, are in the Museum of Modern Art's permanent design collection. "Les Bouloms" are manufactured by Airborne of France. A boulom is "the scale man" on architectural drawings.



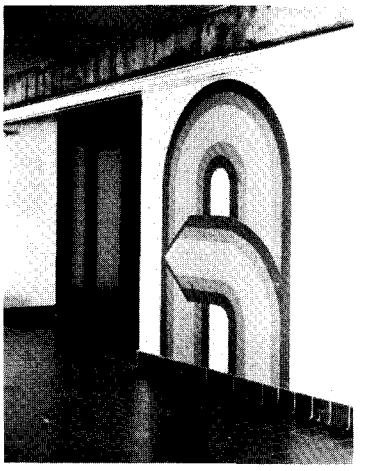


A clue to the labyrinth

After one of our editors was hopelessly lost, without cigarettes or a change of underwear, at the Old Westbury campus of the State University of New York, he complained (in our December, 1973, issue) of the school's lack of signs, saying that "there never was a campus that needed them more."

Now it has them. Professor Susanna Torre of Old Westbury assigned her design studio the project of campus signage, and four of her students (Carolyn Dodge, Dennis Madison, David Mieger, and Patricia Velazquez) worked on it throughout the summer, coping bravely with the complex sprawl of corridors, roof terraces, and underground passages.

The color-coded graphics system now put into use is based on David Mieger's suggestions. It brings to the buildings some welcome color as well as clues to circulation, and



—in the spirit of advocacy to which the school's philosophy was originally dedicated—only the basic framework of the signage system is now imposed; the details will be determined in a competition established by the art and design students and open to the entire student body.—S.A.

Feds meet the arts (round 2)

Yes, the Federal government, the United States' largest client for architecture, *does* care about design! To prove it, the Second Federal Design Assembly was held in Washington (in Harry Weese's handsome Arena Theater) September 11 and 12.

The first such assembly, with the theme "The Design Necessity," had attracted over 1,000 people (see PLUS, May, 1973); for this second one, its theme "The Design Reality," only about 550 were present. If some of the steam seemed to have gone out of the idea, there still was plenty of hot air remaining.

Employees of various Federal agencies, bused to and from the conference from their regular offices, were fed some unfortunate nonsense. For example, a film (which, the conference was told, had been shown at the White House in July) promoted the bald-faced lie that good design saves both time and money. Oh, if only it did!

There were, certainly, some bright spots: in the architecture workshop led by Bill N. Lacy, for example, two thoroughly entertaining monologues by *New Yorker* drama critic Brendan Gill, and a lovely, brief, amusing slide show by Charles Eames which suggested that the artistic efforts of bureaucracy were just as cumbersome in ancient Rome as they are now.

There were even some sensible suggestions for Federal work in the arts, principally from Sir Paul Reilly, visiting from England, where he administers the Council of Industrial Design and the influential Design Centre.

But the general tone was ponderously hortatory: Secretary of the Interior Rogers Morton called for "courage"; former Ambassador to the U.N. Arthur Goldberg called for "more than deliberate speed" in effecting design improvements; and almost everyone present favored "commitment," "the participatory process," and "post-construction evaluation."

Only in the second day's discussion on "Landscape and the Environment" did the official fog lift a bit. Landscape architect Edward D. Stone, Jr., reported that his firm, in work for The World Bank, had actually been given a fee to perform three "post-construction evaluations," thus implying that such was not always the case; and Raymond L. Freeman, Assistant Director for Development for the National Park Service, admitted that slowing the design process in order to incorporate user participation often meant incurring such increases in construction cost that the entire project had to be abandoned. Forgetting—or just plain disbelieving—the opening film's injunction about saving time and money, these gentlemen seemed to come dangerously close to exposing "The Design Reality."

The conference was closed by Nancy Hanks, Chairman of the National Endowment for the Arts (which administered the assembly) and also Chairman of the Federal Council on the Arts and Humanities. Bathing the group in persuasive charm, she declared the second Federal Design Assembly to have been better than the first, and predicted that the third—to be held in 1976—will be even better.—S.A.

Art vs. nature

Late last summer, against the stunning backdrop of Newport, Rhode Island, an enthusiastic band of art historians, art lovers, sculptors and other non-residents put on an exhibition of 54 large works of modern (largely U.S.) sculpture—including the works of such superstars as the late David Smith, Louise Nevelson, Tony Rosenthal and Alexander Calder. The lesson: you can't fool around with Mother Nature, but it doesn't hurt to try.

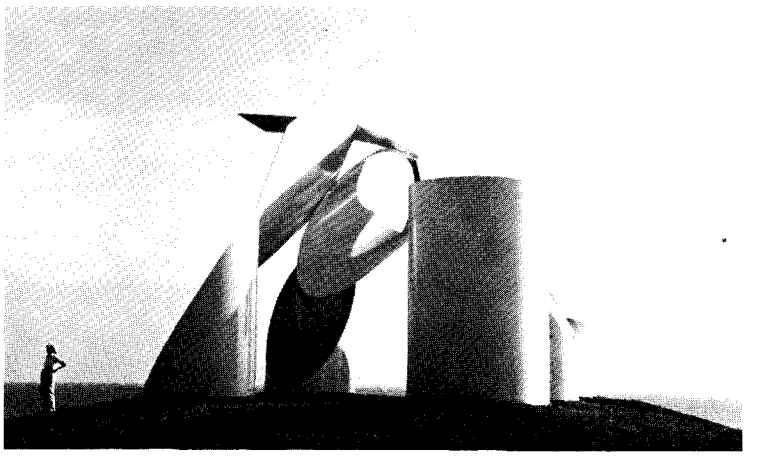
The 54 pieces, selected by Princeton Art Historian Sam Hunter and his students, stood on bluffs, dunes, in splendid 19th century gardens and/or floated, fluttered, bounced or rippled in the environment. Some of the pieces were briefly vandalized by fun-loving locals; most were politely admired (or, at least, observed) by the majority of the residents, whose off-season tastes run to something less unnerving.

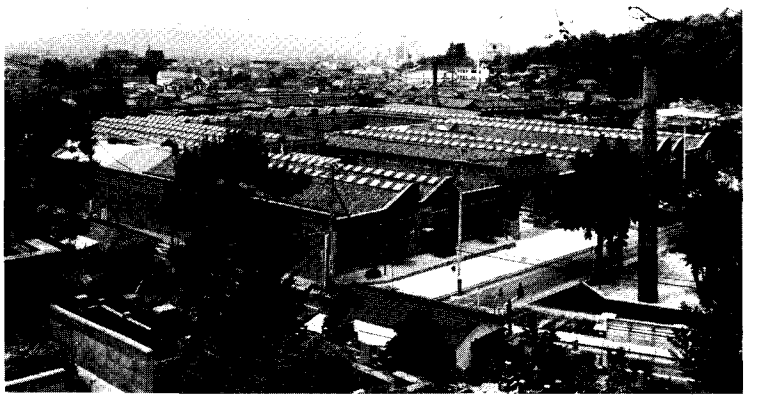
Although "Monumenta" — the name of the game—was generously endowed by Newporter William Crimmins, few of the works were specially commissioned. Most were, in fact, selected from nearby collections, and placed against the skyline by Hunter & Co.

Most were, therefore, simply too small when seen against a vast seascape animated by distant regattas, or against the sweep of the dunes and the sky. A man-sized Calder in that sort of setting looks like a door stop, and a beautiful string of kites, by Anne Healy, looks like a string of pennants fluttering on a Gulf gas station. Too bad for Healy's kites; too bad for us.

The most successful works at "Monumenta" were, quite simply, those that were large enough and dramatic enough to compete with the passing parade of billowing sails and drifting clouds. One of these was Alexander Liberman's *Argo,* shown here. Hard-edged white, against a brilliant blue sky, *Argo* looked ready to join the splendid yachts on the Atlantic horizon.—P.B.

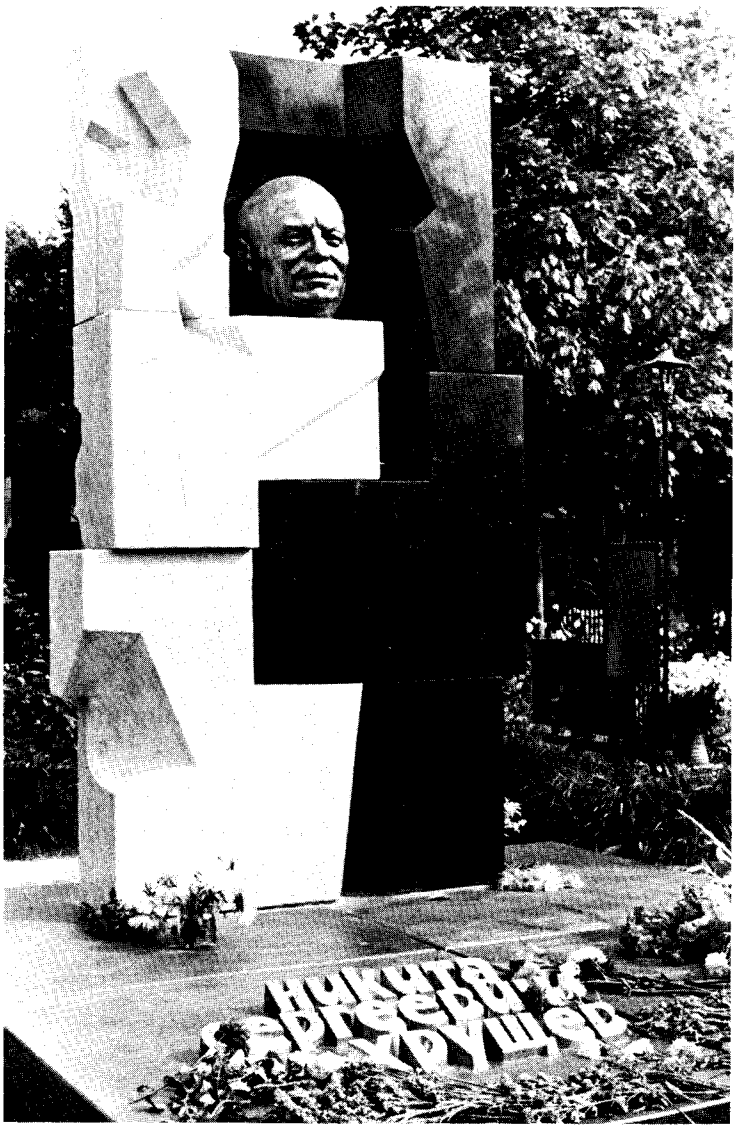
Argo by Alexander Liberman; competition for the clouds





Factory reborn as hotel

A textile factory in Kurashiki, Japan, has been converted into a hotel. The original building, dating from 1890, was rebuilt in 1916. A part of that early industrialization period that marked Japan's entry into the modern world, the brick building is a familiar landmark in the city. Despite some obvious references to precedents elsewhere (notably San Francisco), the conversion, by architect Chintaro Urabe, seems to have been a happy one. Together with some other examples (for example, the restored Akasaka Palace, Sept/Oct issue), it becomes evident the Japanese are reflecting on and finding some value in their more recent past. —H.W.



Cubism and Khrushchev

Nikita Khrushchev is resting, his head cast just the way he might have wanted it, in the traditional bronze of deceased heroes, though largely ignored by the nation he led, and completely surrounded by the modern forms he could not accept or understand. There is an irony in having the two radically different art styles joined in one monument, which might account for the smile on Khrushchev's face.

The monument on Khrushchev's grave, put there three years after his death, is the only public mention of him in the country he ruled for six years until he was ousted in 1964. The monument is the work of a leading Soviet sculptor, Ernst Neizvestny, whom Khrushchev once publicly ridiculed at an exhibition of relatively modern Soviet art in 1962. He scoffed at his work and said, "it could have been done by the tail of an ass." The two men then had a heated argument, which ended with Khrushchev declaring, "You are the kind of man I like." In his memoirs, written after he was deposed, a more subdued Khrushchev wrote, "If I met Neizvestny now I would apologize."

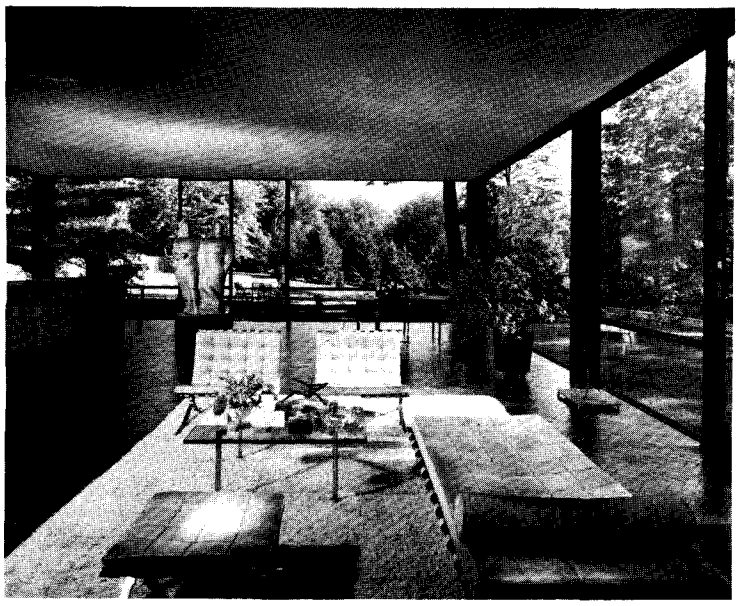
Khrushchev is buried in a far corner of the Novidevichy Cemetery along the Moscow River, and not beneath the Kremlin wall with other Soviet political figures of his rank. Three years ago, no Soviet leaders attended his funeral, and none were present at the unveiling of the sculpture in September, though the Government did quietly pay about 10 percent of the cost of the sculpture; the rest was paid by relatives.

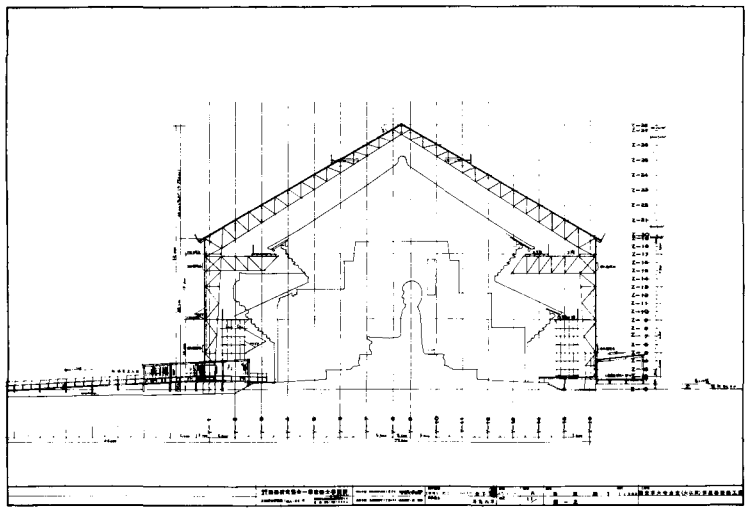
The bust and grave cover are made of bronze, "the metal representing Khrushchev's peasant origins and the earthiness of his character." Approval for use of the bronze, a strategic material, had to come from the Government. The sculptor says the symbolism of the equal number of black granite and white marble blocks was intentional: "black and white is mixed in everybody." He pointed out that the head is resting on a white block. "The combination of white and black also represents the fact that he stood at the point where, thanks largely to him, one epoch in our history ended and another began."

The commission to Neizvestny came from Khrushchev's family, shortly after his death, when the sculptor was visited at his studio by the son of Anastas Mikoyan, former president of the Supreme Soviet and a close friend of Khrushchev. Says Neizvestny, "He stood for some time in silence, almost speechless with embarrassment. I told him 'I know why you've come and I agree. An artist cannot let himself be angered by politics.'" "We chose Ernst because my father had great respect for him," said Sergei N. Khrushchev, son of the late leader.

Birthday

Philip Johnson's famous Glass House in New Canaan, Connecticut, was built 25 years ago and, surrounded by its younger siblings —a lake pavilion and painting and sculpture galleries—is celebrating a very happy birthday indeed. With the possible exception of Mies van der Rohe's Farnsworth house, which was designed several years earlier but not built until a year after the Glass House, no residential building in the intervening quarter century has surpassed it in purity of conception, in integrity of execution, or—to use a word unfortunately less fashionable than it used to be—in beauty.—S.A.





Buddha of Nara

The Daibutsuden (Great Buddha Hall) of the Todaiji Temple in Nara, Japan, has long been plagued by a leaking roof, and at last plans have been made to retile the whole temple. The building (1709) is believed to be the largest wooden structure in the world; its height is 48 meters.

Kiyoshi Kaneta, a professor in the architecture department of Kyoto University, has spent four years designing a structure that would completely envelope the hall and serve as a shelter for the Buddha during the long process of retiling.

Fear of fire precluded the use of on-site welding, and no piling could be used. The entire structure sits on an exposed concrete base. The cover, spanning a space 80 by 86 meters, and 55 meters high, is of steel and steel sheeting, and will

be assembled from prefabricated sections (measuring up to 4 by 18 meters) bolted together. Inside, provisions have been made for constant air circulation, because the bronze Buddha tends to "perspire" in a wet, warm atmosphere.

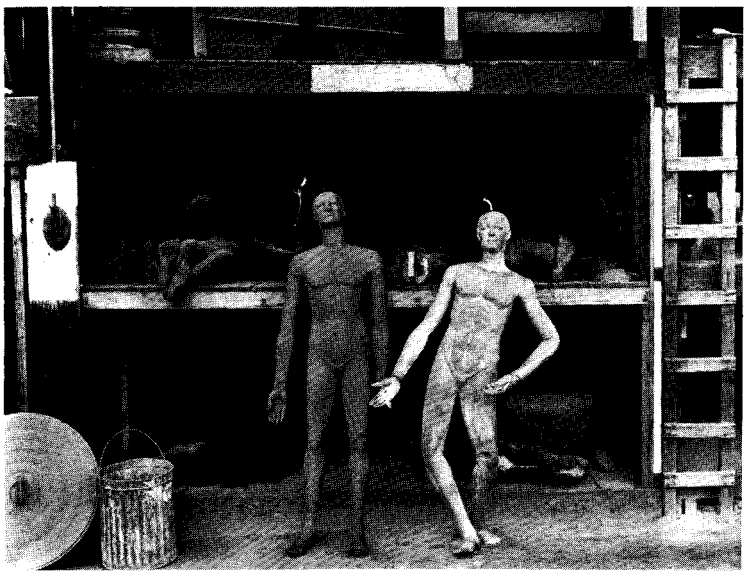
Conveyor belts are to be used to carry the tiles, each one weighing 15 kilos, or 33 lbs. Construction of the enormous space frame, which began this fall, will take 16 months. The entire re-roofing project may last from five to ten years. Religious services will continue during this time.—H.W.

Weston revisited

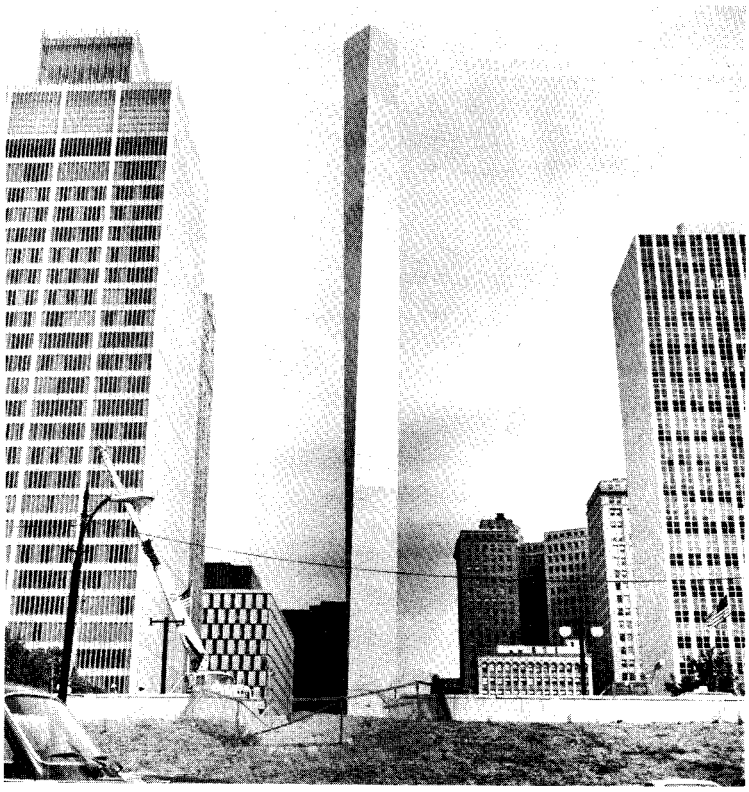
The first major retrospective of photographs by Edward Weston since his death in 1958 will take place at the Museum of Modern Art in New York from January 29 1975 to March 31. Willard Van Dyke, well-known photographer, filmmaker, critic, and Weston's colleague for many years, is the guest director of the exhibition.

Edward Weston was as fascinated by the sensual texture of nature as by the human body. His photographs of windswept sand dunes and trees in any form, often lifeless driftwood, and close-ups of vegetables, demonstrated his forceful move away from the romantic, soft-focus style of the turn-of-the-century photography, much of which was simply imitation of the current painting fashion.

A definitive volume of his work, *Edward Weston: Fifty Years*, was published earlier this year by Aperture, Inc. The biography by Ben Maddow, with page after page of breathtaking photographs, will be available at the Museum during the show.



Rubber Dummies, MGM Studios, 1938; Edward Weston 1886-1958



Sculpture with a twist

The Dodge Plaza Pylon in Detroit by Isamu Noguchi (of Noguchi Fountain & Plaza, Inc.) is 120 ft. high and seven ft. on edge. The structure is steel sheathed in ¼″ clear anodized aluminum plate; the first of several pieces that Noguchi will do for Dodge Plaza. (The next is a fountain.)

The pylon, the height of a 12-story building, went up in four days; six separate pieces in 20-ft. sections were stacked and bolted, and then sheathed. It spirals gently, in a helical fashion, as it rises. The people of Detroit seem to regard it with affection. The most common type of response is a friendly "when are they going to straighten that thing out?"

Noguchi's pylon, with 120 spotlights at the base, marks the entrance to the Detroit Civic Center Plaza, which he also designed. Completion of the entire plaza, including skating rink and performance area and other sculptures, is planned for 1976. The plaza will have pedestrian and vehicular links with the $500-million Renaissance Center, now under construction immediately to the east.

The $401,000-pylon was financed by the Capital Gifts Committee of Detroit and the D. M. Ferry Jr. Trustee Corporation.

Britain's bubble

The Bubble Theater travels around London bringing plays to people who would otherwise not see them, an idea dating back to Shakespearian times. Two years ago, Glen Walford, artistic director of the group, started the mobile theater, using a geodesic dome which was very difficult to assemble and which wore out quickly. Castle Park Dean and Hook, London architects, were then hired to design a new mobile unit.

The solution was a tent, held in tension by two 4½ in. tubular arches. The skin is p.v.c. coated polyester fabric mesh, green on the inside and bright yellow on the outside. In case of fire the self-extinguishing fabric carbonizes and does not drip, an important stipulation made by the Greater London Council. The two arches which support the skin each have five sections 4½ meters long. They are held to the ground by two pivot plates each with four anchor screws dug into the earth by a machine. The skin is then placed over and tied to the arches, and the whole thing is pulled up by a powerful French Tirfor winch and the dead weight of a Mercedes bus. A Land Rover was originally used for dead weight but was not powerful enough to raise the tent, and the Land Rover was raised instead. The tension of the cloth holds the structure in balance. However, safety tension wires connect the two arches in case of emergency. There is no need for a platform, and chairs are put on the grass. The tent was made by Baracudaverken, a Swedish firm.

All this equipment is neatly packed into trucks. The 200 stacking chairs and light and sound equipment each need a van. The tent fits on a trailer truck.—J.D.

Pevsner and paperbacks

Nikolaus Pevsner and a few of his books

In what ways could a historian of art of German upbringing and nationality be useful to England? The Pevsners had settled in England in 1934. In 1949 after other publishers had turned him down, Pevsner found a man who welcomed his scheme—Allen Lane, founder of Penguin Books. Their project was nothing less than a 20th Century architectural Domesday Book—a county-by-county analysis of the Buildings of England. "Every building—exceptions excepted—should be seen and described and analyzed on the spot." The series has taken 25 years to complete and consists of 46 volumes, a total of more than 20,000 pages and 8½ million words.

So began the introduction to a small exhibition held at the RIBA in London to celebrate the completion of one of the most remarkable ventures in architectural publishing ever undertaken—Nikolaus Pevsner's *Buildings of England*.

Sir Allen Lane (the man who invented the paperback) had great difficulty keeping such a mammoth project alive. At one time the series was £30,000 in the red in spite of the critical acclaim each successive volume received. Allen Lane had once introduced Prof. Pevsner as "my best losing author." However, financial support came from the Guiness Trust, from ABC Television (a group in North England) and from the Leverhulme Trust. Pevsner refused any increase in his modest salary and the series survived.

Pevsner is hopeful, now that the *Buildings of England* are complete, that those of Wales, Scotland and Ireland will follow—and one day America "if there is someone insane enough to do it."

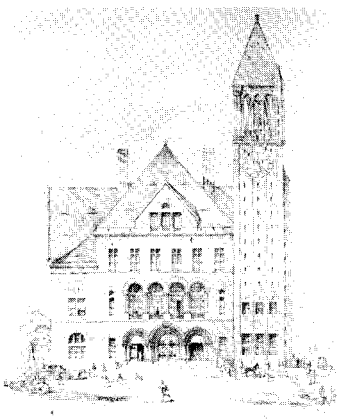
He modestly suggests that his 25-year masterwork will last for another 50, but that it had to be done because the Royal Commission on Historical Monuments will not be complete for 400 years—by which time Ronchamps will be as old as the Henry VII chapel is now!—J.D.

Richardson in the Fogg

The Fogg Art Museum of Harvard University is paying tribute to the genius of Henry Hobson Richardson (1838-1886) in an exhibition celebrating the beginning, 100 years ago, of his most productive period. The Houghton Library at Harvard, which owns several thousand Richardson drawings, has organized the show, with the Boston firm of Shepley, Bulfinch, Richardson and Abbott, heirs and successors to Richardson's original office. The extensively illustrated catalog for the show has a piece by the Richardson scholar James F. O'Gorman, editor of the *Journal of the Society of Architectural Historians*. The catalog also contains detailed entries for 42 architectural commissions from the years 1874-1886, with discussions of each project.

The show will travel to the Albany Institute of History and Art in January 1975 and will go on to the Renwick Gallery in Washington, D.C. in March 1975.

Albany City Hall, 1880-1882



Women's work

It took four long years, but the sex-discrimination case against the Boston Redevelopment Authority in Massachusetts has ended in a landmark victory for the eleven women who brought suit against the BRA. An out-of-court settlement awarded the eleven women a total of $55,000 in damages and back pay, plus retroactive title upgradings, plus adoption of an outstanding Affirmative Action plan drawn up by the women themselves.

The action began in 1970 when several women in the BRA began to suspect serious discrimination against women in Boston's large city planning and redevelopment agency. The full details were soon gathered by an informal survey, and showed patterns of discrimination affecting every aspect of women's employment at the BRA—hiring, promotion, salary, job opportunity, title, supervisory responsibility, recruitment, training, and work-study programs. A more detailed documentation was made, illustrating quite plainly the gross inequities between men and women of similar education and experience. When the BRA's top management failed to take this documentation seriously, the "BRA Eleven" went to the Massachusetts Commission Against Discrimination (MCAD) and began what became 3½ years of investigation and public hearings.

During MCAD's 31 public hearings, the BRA remained adamant, refusing to admit its part in the most blatantly discriminatory practices. In the end, only when the women filed a complaint with HUD, and got HUD to withhold federal funds from the BRA, was the case settled at all. Without this move, public hearings might still be going on.

What is the meaning of this landmark case? To some local observers, getting anything at all out of the BRA is a major triumph. Any attempt to open up the existing structure will be—and was—bitterly fought. To other observers, the excellent Affirmative Action plan that was adopted is a major step forward for a public agency. (Ann J. Wolpert, Librarian of the BRA and one of the eleven complainants, is head of the BRA's Affirmative Action Council.)

But Rome wasn't burned in a day, as a well-known humorist has pointed out. The disparity in median salary between men and women at the BRA is greater now than it was in 1970; there are more professional women at the BRA, but they are still not being hired for the top jobs and at the top salaries. Or where women *are* hired for high-level jobs, they are given routine work—no staff to supervise, no budgetary responsibility, no so-called "hazardous" duty. And there are still no women District Planners (at the neighborhood level). To a large extent, women are still doing "women's work" at the BRA.—E.P.B.

People

• Philippe Petit, tightrope-walker of World Trade Center fame and subject of a PLUS editorial (Sept/Oct '74), was given the first annual Sir Isaac Newton Award for Defying Gravity by students at the Polytechnic Institute of New York. Mr. Petit frightened crowds half out of their wits with his early-morning antics on a wire stretched between the WTC towers in August, was arrested, and sentenced to give a performance on the tightrope (not very high off the ground) in Central Park. New Yorkers and Mr. Petit were delighted with the punishment.

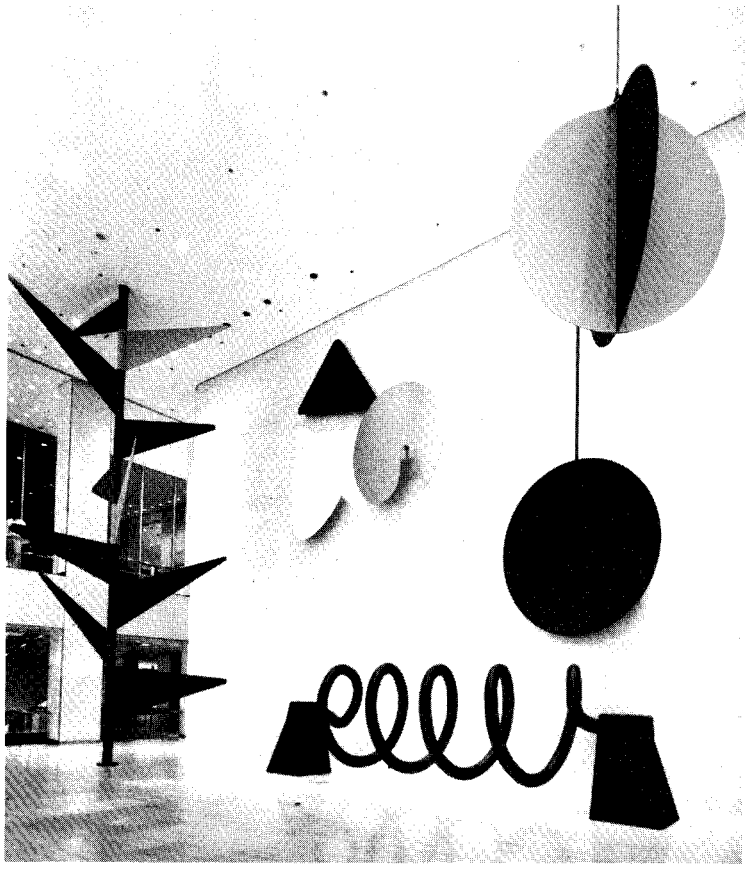
• Cesar Pelli, Argentinian architect and design director since 1968 for Gruen Associates, has been named William Henry Bishop Visiting Professor of Architecture at Yale University in New Haven, Conn. He has won numerous competitions and awards, and should feel quite at home at Yale, having served as designer-in-charge of several of the colleges on that campus, and a high school in New Haven. In 1972 Pelli held the Charlotte Shepherd Davenport Chair at Yale, making him the first person to have been appointed to the two highest chairs in the School of Architecture at Yale.

• Mario J. Ciampi, architect/urban designer, was given an Honor Award Exhibition at the San Francisco Art Commission's Capricorn Asunder Gallery. One hundred large photomural panels depicted highlights of his work over a 30-year period. Ciampi, 67, is a native San Franciscan who, since the appearance of his comprehensive Ferry Park plan in the '50s, has worked consistently to enhance, protect and upgrade the environmental quality of San Francisco.

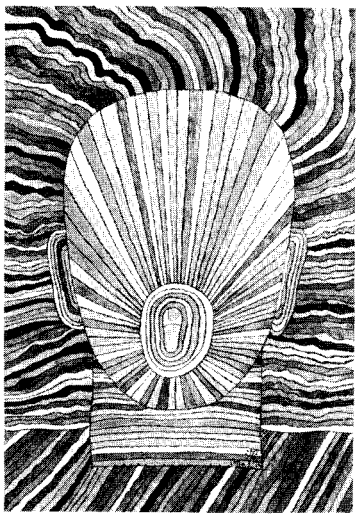
• Nikolaas John Habraken, Dutch-born architectural innovator, author, critic and theorist, will become head of MIT's Department of Architecture in August 1975, succeeding Donlyn Lyndon who announced his intention of resigning at that time. Professor Lyndon will continue teaching in the Department. Professor Habraken served as chairman of the Department of Architecture and Building Technology at the Technical University of Eindhoven, The Netherlands, from 1967-70, and is presently teaching architecture and urban design there.

• Alexander Calder, creator of the mobile, the stabile, and the plane of many colors, was honored with a six-week festival in Chicago that began October 25 with an old-fashioned circus parade, included dedications of several massive sculptures at the Federal Center Plaza and the Sears lobby, and a retrospective at the Museum of Contemporary Art. Calder, 76, began his career as a sculptor 50 years ago with his miniature wire *Circus* pieces, now on extended loan at the Whitney Museum of American Art in New York.

Calder and the Sears lobby "moving mural," as yet unnamed

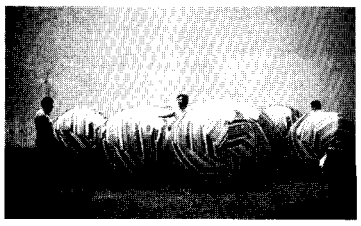


• Kiyoshi Awazu, graphic designer, sometime movie-maker, and recent first-novelist, was given an exhibition in September at the Galerie Watari in Tokyo. The show covers his illustrations of the last five years.

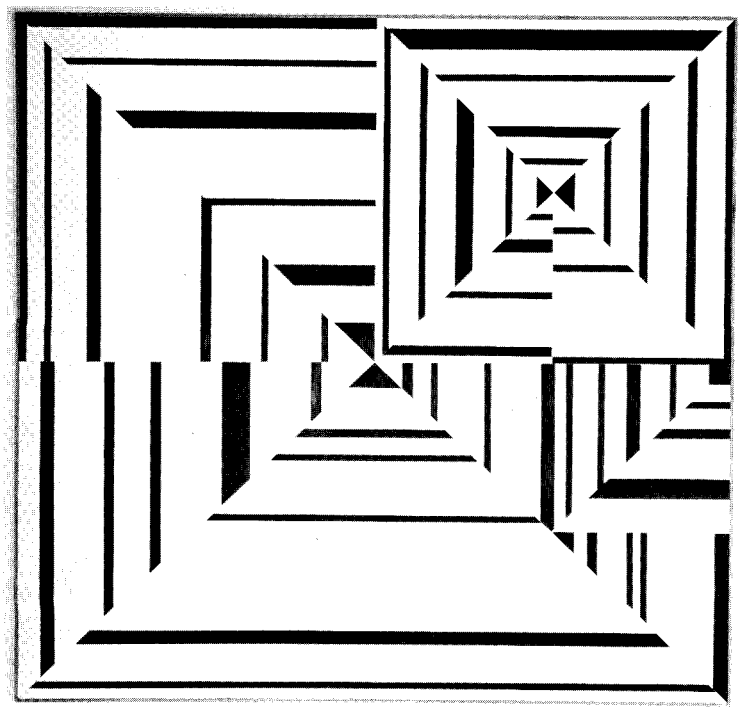


Kiyoshi Awazu; *Mother and Child* and a head of many colors

• Eduardo Terrazas, Mexican artist / architect / designer / urbanist, had a show of his paintings in October at New York's Tunnel Gallery. Terrazas, who was in charge of graphics for the Olympic games in Mexico, 1968, works with traditional Indian art forms, such as *tablas* (yarn applied to wood), converting its emotional content into an intellectual achievement. The artist is shown standing among some of his immense balloons, which are vinyl, and painted with bright colors. He calls them "celebrations."



The vinyl balloons filled with helium become ceiling sculpture



• Neil Clerehan, an architect and one of PLUS' Field Editors in Australia, has been appointed to a three-year term on the Visual Arts Board of the Australian Council. The VAB was established by a previous (Conservative) government, and the present Labor administration has given it greater influence with a massive injection of talent and money. In the same month, Clerehan was named President of the Victorian chapter of the RAIA.

Obit

• Dr. Ernest Pickering, architect/author/urban planner and Dean Emeritus of the University of Cincinnati's College of Design, Architecture and Art, died in September at the age of 81. Several of his books, including *Architectural Design, Shelter for Living*, and *The Homes of America*, have been used as textbooks by schools of architecture around the world for many years. Dr. Pickering was on the University's faculty for 40 years, and had been dean for 17 years before his retirement.

• Barnett (Barney) Sumner Gruzen, founder of the architecture/planning/engineering firm of Gruzen & Partners, died in September at the age of 71 in New York. The Latvia-born architect was raised in the U.S. He won the Rotch Traveling Scholarship in 1930 and later studied at L'Ecole des Beaux Arts in Paris. Gruzen & Partners have long been important leaders in the fields of public housing and schools.

Photographs: Page 32 (left) Mitsuo Matsuoka; (right) Museum of Modern Art. Page 34 (top) British Tourist Authority. Page 35 (bottom) Colin Westwood. Page 104 (sketch) Amy Leung. Page 105 (middle, right) Andre Emmerich; (bottom, right) Taisuke Ogawa. Page 106 (top, left) Tass from Sovfoto; (lower left) Maris-Ezra Stoller Assocs. Page 107 (middle, left) Edward Weston.

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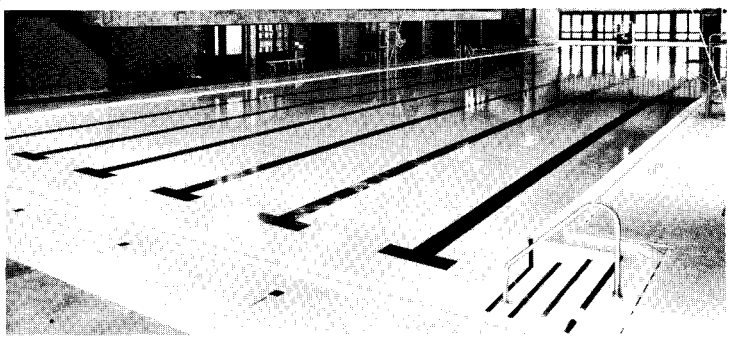

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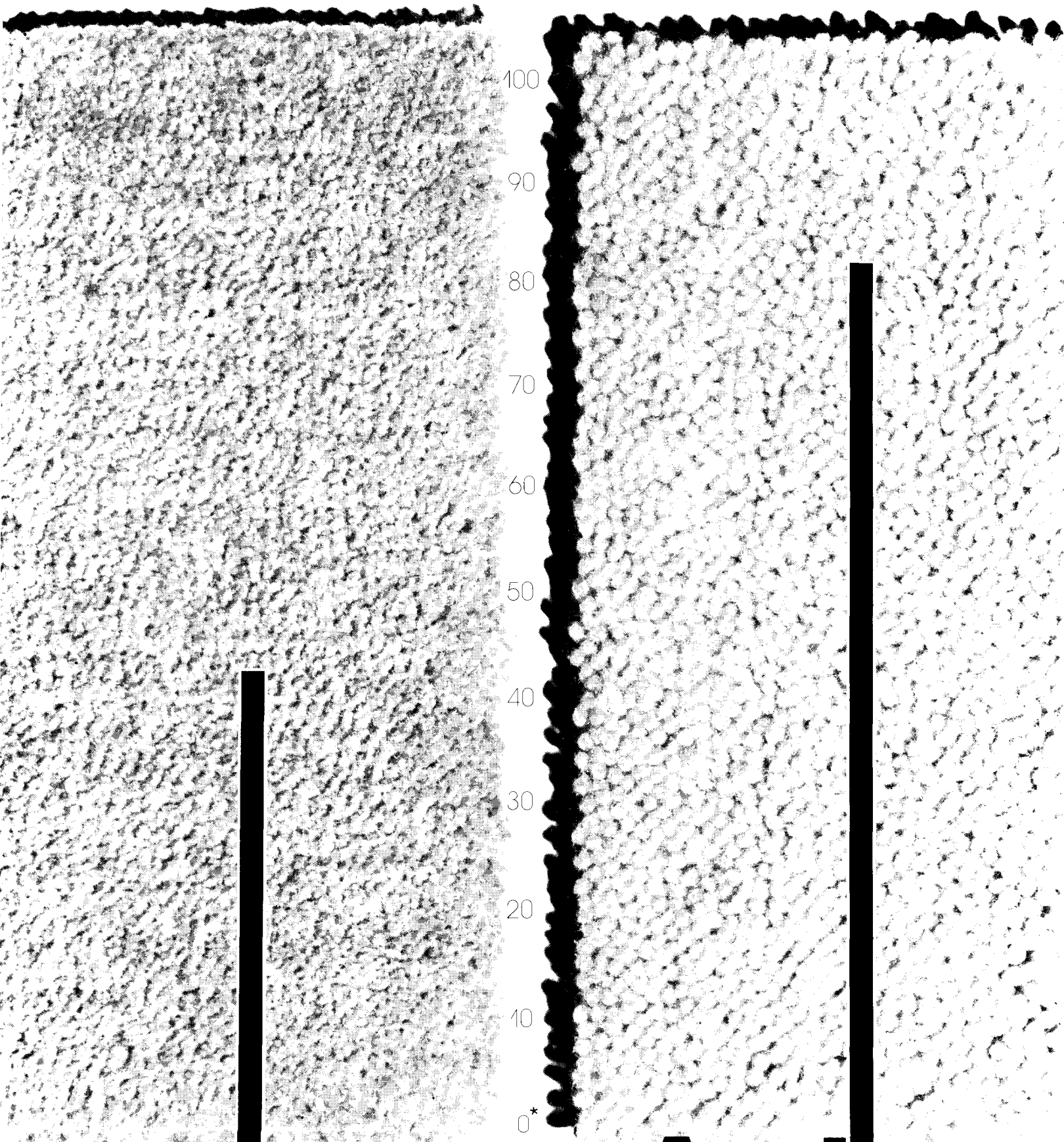

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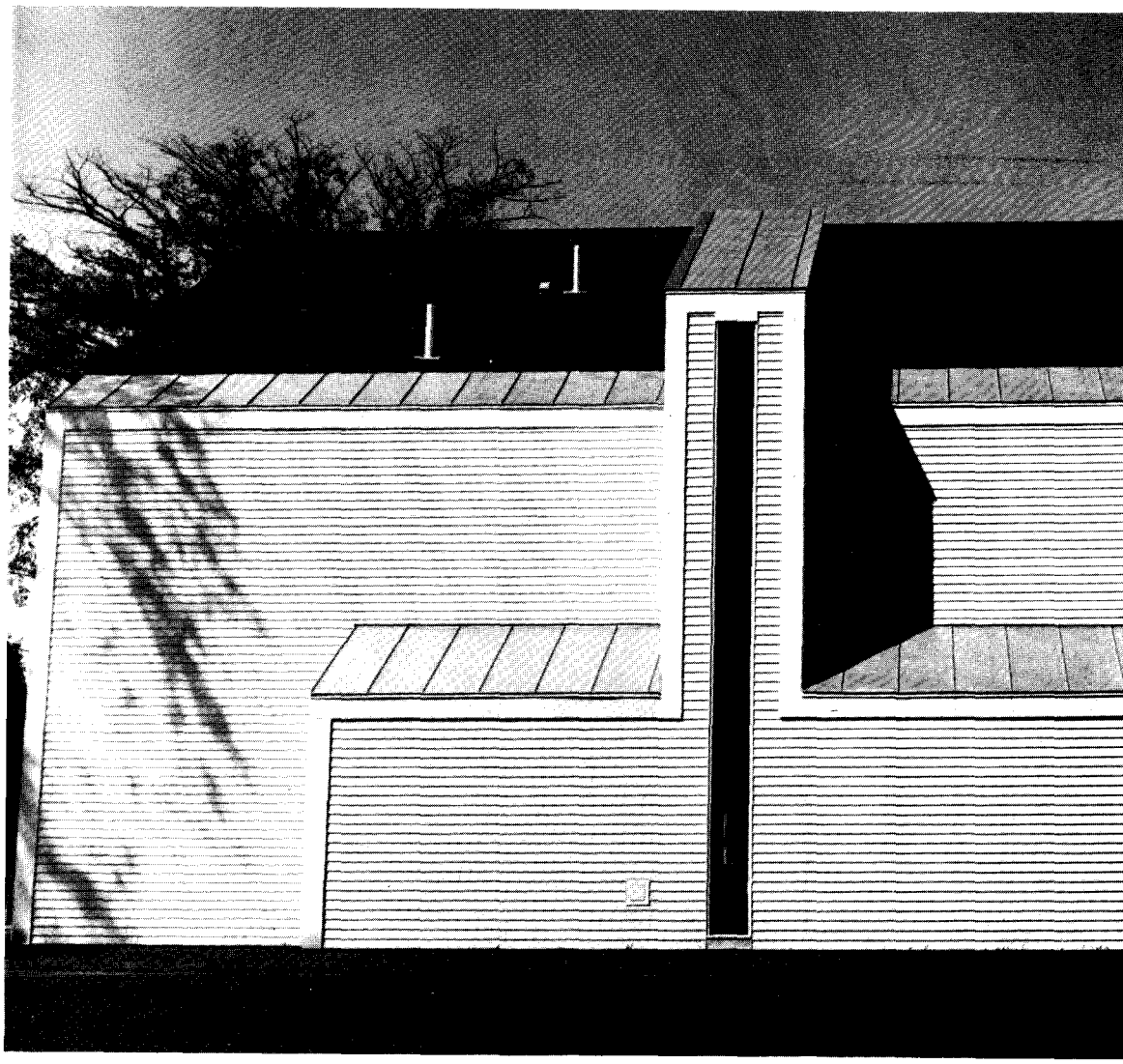
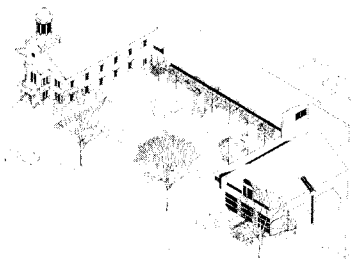
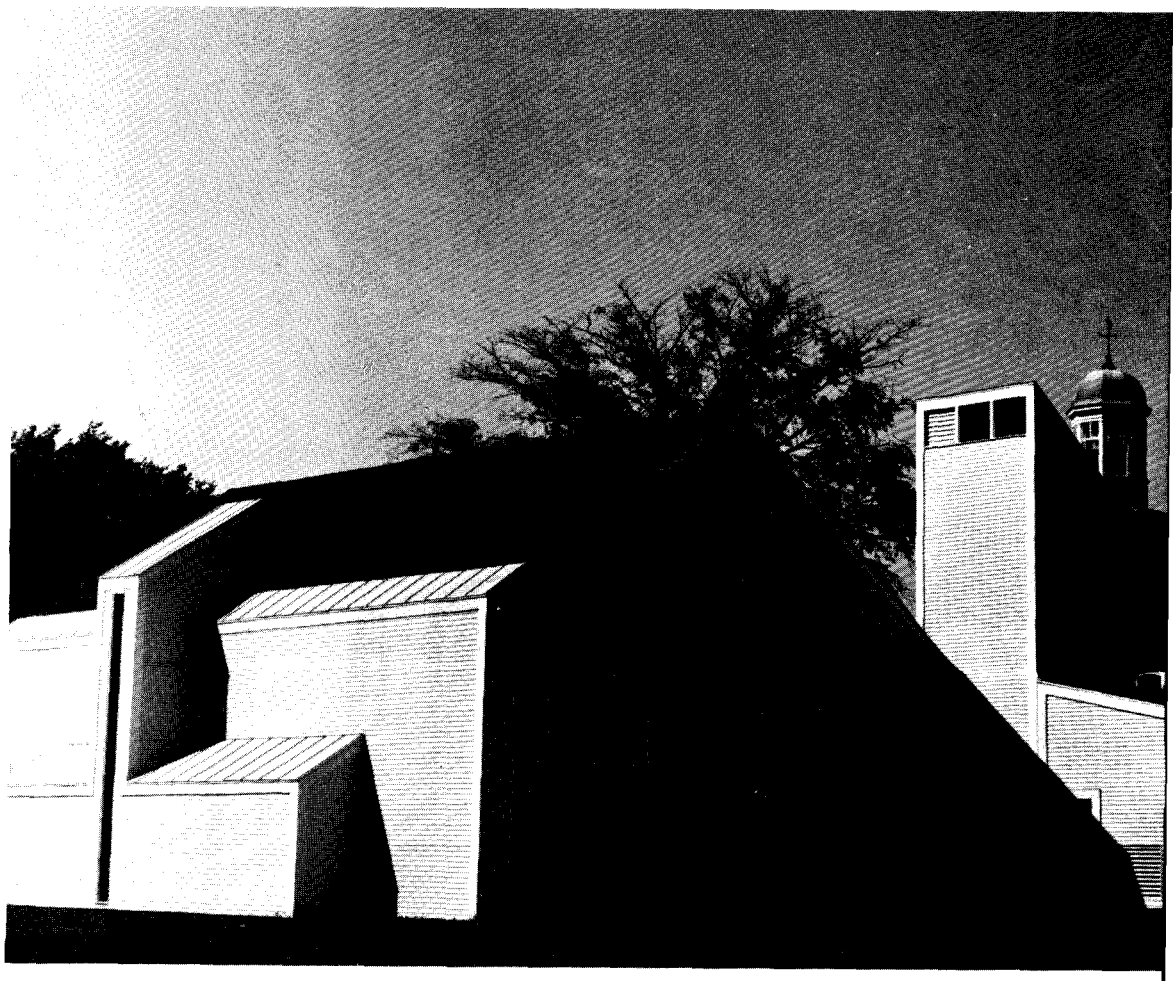


New England pure

WESTFORD, MASS.—The town fathers described one major design parameter in asking for a new Fire/Police complex: respect for Westford's unmatched Early American architectural heritage, without forcing them to live with cute "Disneyland Colonial." Ecodesign, an architecture and urban design firm in Cambridge, gave them what they wanted.

The two new buildings connect with the old town hall (visible in the background of the photo, bottom, right); together they form three sides of a square around a green (sketch, below). The police station, a long, low structure, meets at right angles with the town hall and the new fire station. The fire pole, painted bright green and usually spotlighted so as to be visible from the street, is just behind a narrow vertical window that rises above the roof line (right). The window is flanked by housing for the water hoses. The composition, an aggregation of separate but attached elements, is compatible with typical New England architecture. The white vinyl facing is in 4-inch configurations, to blend in near-perfect harmony with the old town hall's exterior of 4-inch wood siding. Wood trim was used on all corners to give a crisp edge.

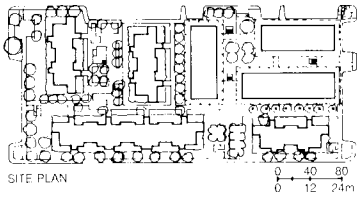




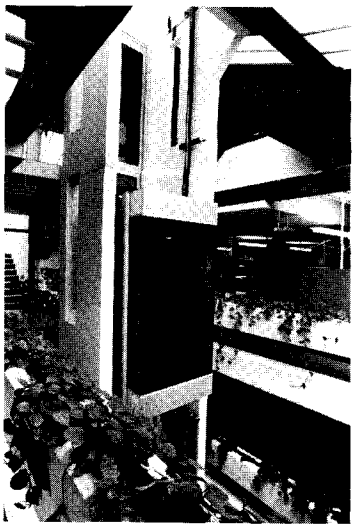
Virgin Islands breezy

ST. CROIX—In the old and quiet West Indian town of Frederiksted, a site consisting of two square blocks near the island's port was cleared for a commercial/residential development called the Lagoon Street Urban Renewal Project. A former through-street was closed and absorbed within the site. Of the seven buildings in the superblock, four are residential and three are commercial (site plan below). The street, now a plaza, is surrounded by the two-story commercial buildings which will house government offices and shops. The offices, on the second-story level, are louvered, and are reached through exterior stairs leading to open bridges which connect the three buildings. The shops below are recessed, forming pedestrian arcades.

The exterior walls of the three-story apartment blocks are also entirely louvered, providing maximum ventilation and view even during periods of rain. All apartments are floor-through, permitting excellent cross breezes. Random patterns created by alternately open or closed louvers animate the exterior surfaces of the apartment buildings. The architects of the entire project are Kramer & Kramer.



SITE PLAN

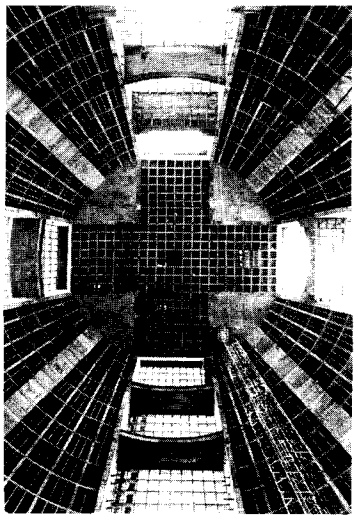


Chapel into office

DUBLIN—Architects Stephenson and Gibney purchased a 19th-century chapel for their own offices in a relatively seedy and run down part of the city, though not so very far from Stephens Green and the center of town. They gutted the interior and built a reinforced concrete structure of three floors inside the shell, linked by a splendid hydraulic lift up through the center. The road facade was completely remade with characteristic, strongly modeled brick. The partners' attic rooms in the roofspace contain the blackened timbers of the old roof trusses and must surely be the most sumptuous garrets in the city.—J. D.

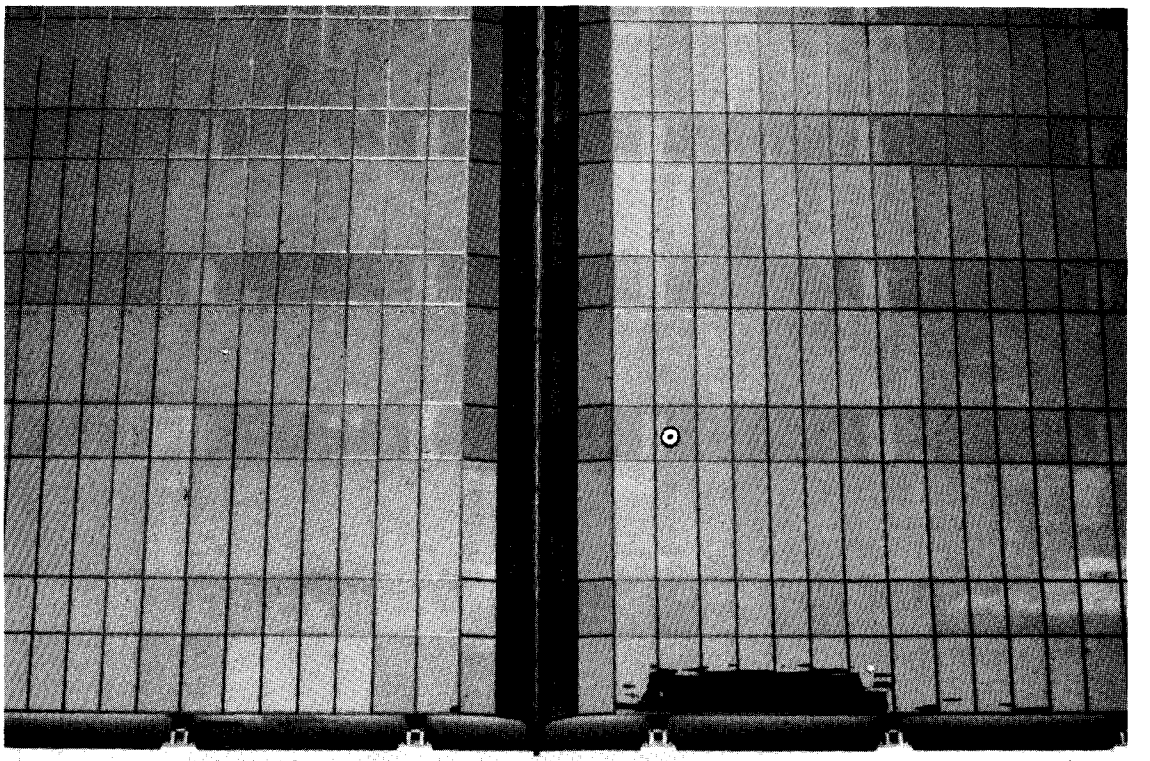
South American sugarloaf

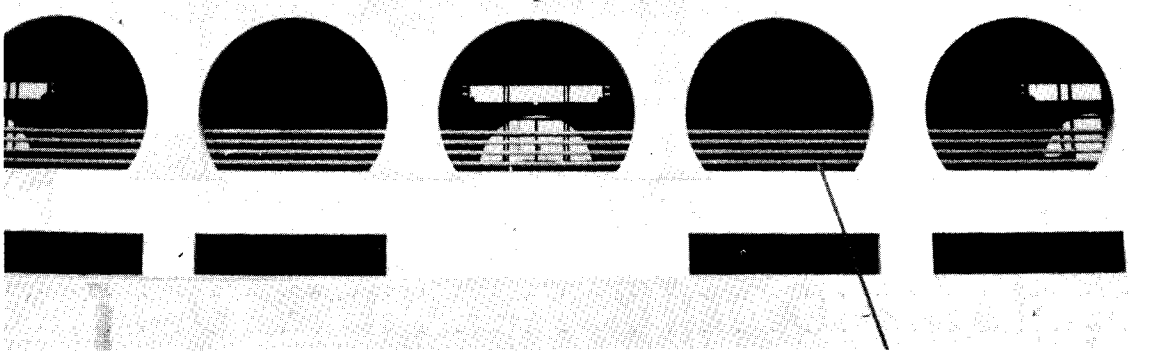
BRAZIL—Construction on the Cathedral of Saint Sebastian in the center of Rio de Janeiro began in 1966 and is now close to being finished. Stained glass is now being installed in the concrete frames. The structure, built completely of reinforced concrete, is 270 feet high; and the diameter of the base is 327 feet. Total cost is expected to reach $1½ million. The architects of the cathedral are Edgar Fonjeca, Fabricio Menescal and Helmut Brauschweiger.

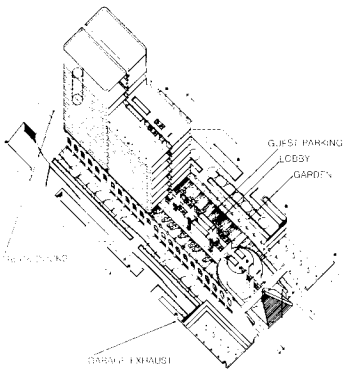


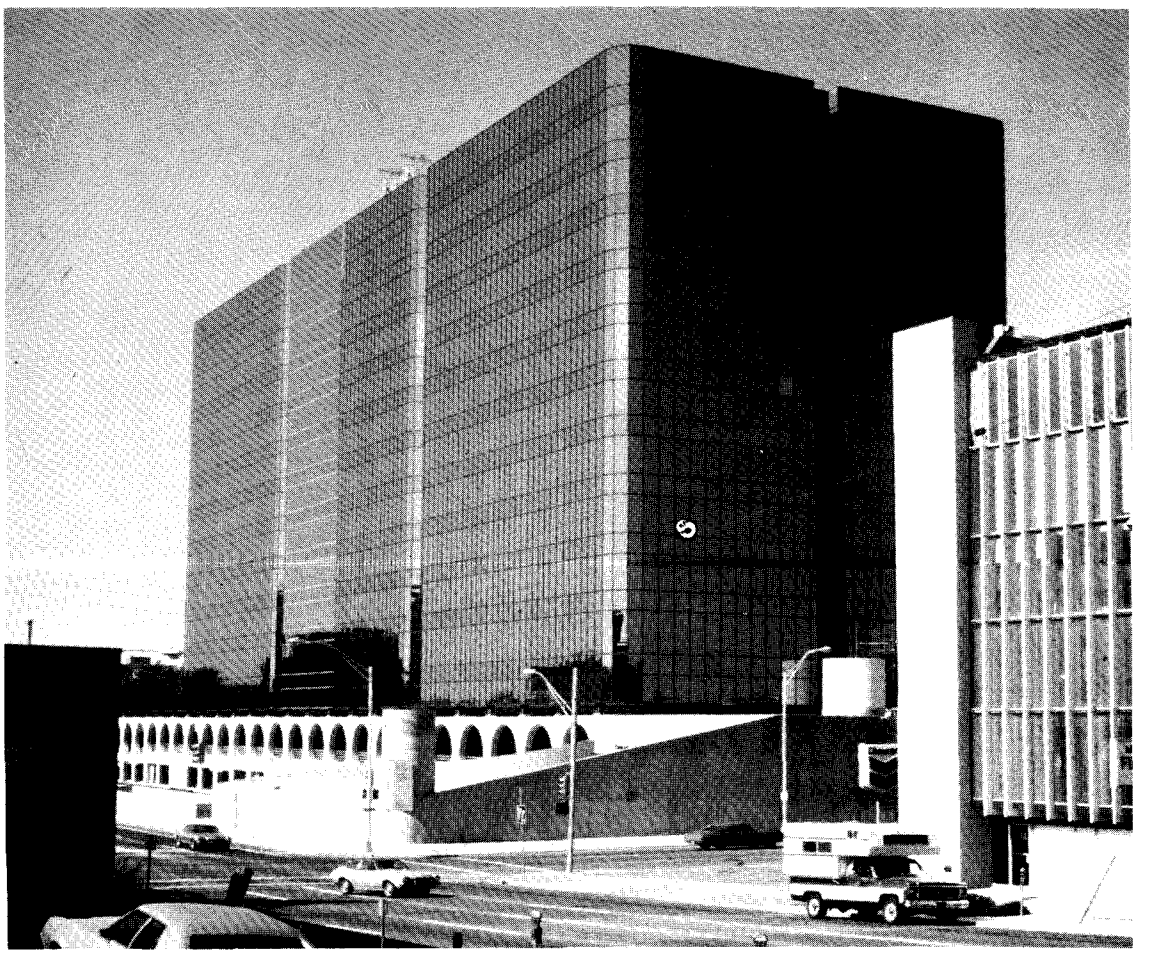
Red striped Blue Cross

DENVER—A striking new building nearing completion is the headquarters of Colorado Blue Cross/Blue Shield, designed by Muchow Associates in a joint venture with the Ken R. White Company. The building's three modules (and a fourth to be added in the future) share a central spine of structure, circulation, and services which runs the length of the building and which is expressed on the exterior by a vertical panel, painted a brilliant red, interrupting the mirror glass facade. The building's concrete base houses lobby and service areas as well as parking for 1,200 cars. The contrast between this base and the glassy office modules above, the row of circular cutouts in the base, and, particularly, the great red stripe combine to make the building by far the cheeriest feature of the Denver skyline. Its area is 1,100,000 sq. ft.; its cost $26,000,000. Project architect was George Hoover.—S. A.









Photographs: Page 112 Gunars Viksnins. Page 114 (top) John Donat; (bottom) Pascal Perquis. Page 115 Stanley Abercrombie.

Footnote

Cadillac Ranch, commissioned by Stanley Marsh of Amarillo, Texas, as a testament to the rise and fall of the tail fin, represents (from right) the model years '49, '51, '54, '56, '57, '58, '59, '60, '62, and '63. The cars are imbedded in a cement base. The wheat field in the foreground should half conceal the cars by harvest time. Cadillac Ranch, executed by the Ant Farm group of Lord, Michels and Marquez, is visible from Route 66 as you pass through Amarillo. The lady (photo, top) in an old General Motors publicity release is demonstrating the change from 1949 to 1959.
Photo: Wyatt McSpadden

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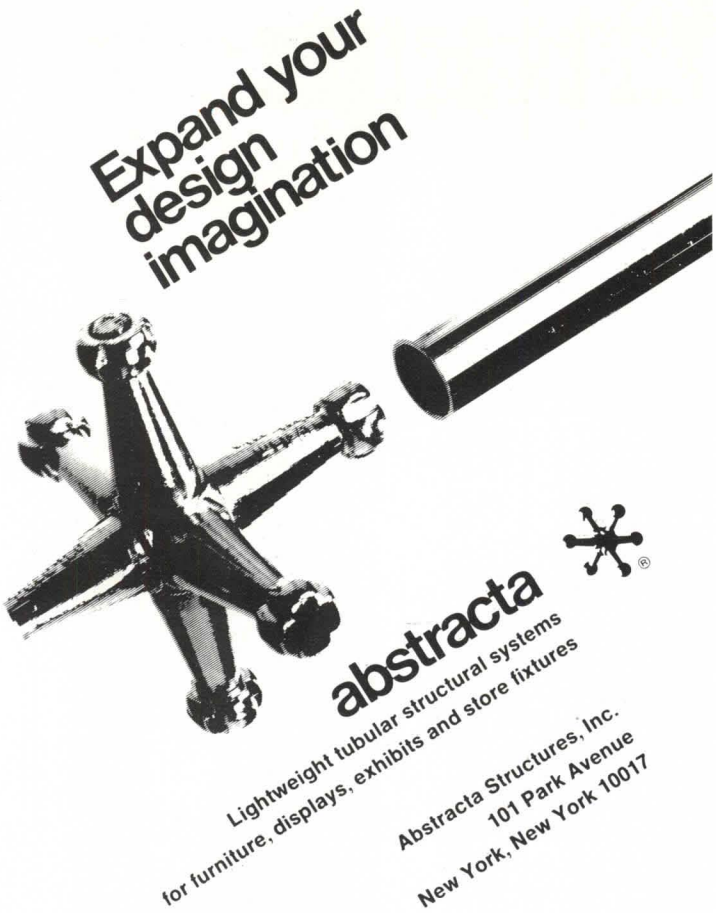

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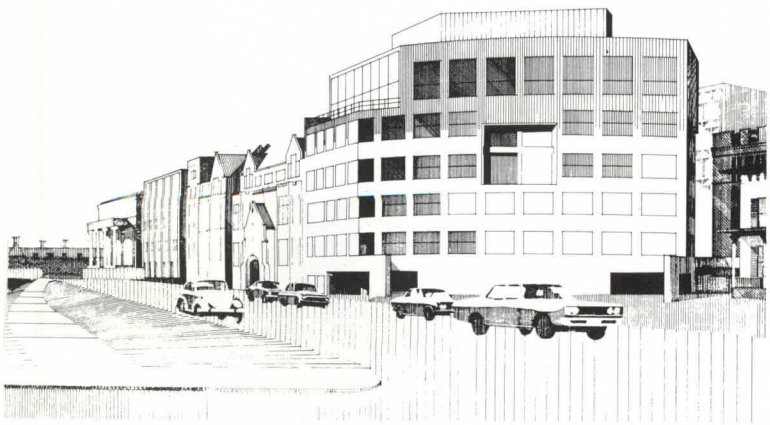
The Yale Mathematics Building Competition

Architecture for a Time of Questioning

Charles W. Moore and Nicholas Pyle, editors

This illustrated chronicle of the 1969 Yale mathematics building competition provides an illuminating look at the state of American architecture fifty years after the start of the Modern Movement. The editors examine not only the winning design but a cross section of the other entries, which show a broad and vivid array of serious solutions to a complex design problem. 207 illus. $15.00



Yale University Press New Haven and London

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Book Review

Continued from page 27

the easy legibility of plan that is drilled in by the Beaux-Arts; it adopts Le Corbusier's open planning but revolutionized esthetically by enforced tightness; it bends an attention to texture, like Goodhue's, to big surfaces; there is a love of high terraced views which, planted, improves on Hood's friend Hugh Ferriss; there is Hood's resourcefulness underground; there's an exuberant love of color and golden corn that he shared with his contemporaries and that is endearing. That Hood never spread his efforts far outside his chosen skyscraper specialty has to be forgiven: it was what he concentrated on with all his will.*

*On page 110 of his book the usually courtly and equable Kilham speaks of an episode that still seems to leave traces of rage. It was a protest meeting over the leaving out of Frank Lloyd Wright from the 1933 Chicago Fair, arranged by "literary organizers," whom Kilham blames because Hood, who defended the action, got treated rough. On this matter we now have Wright's version (in his *Autobiography*, first edition only) and Hood's (through Mr. Kilham); should anyone care to get the story from the "literary" initiator of the meeting, a brief memo can be procured by sending a self-addressed stamped envelope to Architecture PLUS. For as long as the small supply holds out.

Great Houses of San Francisco by Thomas Aidala and Curt Bruce. Alfred A. Knopf, New York, 1974. 200 pages, illustrated. $12.95.

Reviewed by Allan B. Jacobs

As "an attempt to freeze the flow of time, if only for a moment," and to experience what Victorian San Francisco was like in the eighteen and early nineteen hundreds, this book is partially successful. It is more like two half-finished books that come together as one, briefly, at the end.

Mr. Bruce would appear to be a photographer with an understanding and feeling for Victorians. But the cropping, printing and sequence of his photographs is mysterious at best. Few buildings come to the ground, as if they begin or end somewhere between the sidewalk and the first floor—like cropping a picture of a person somewhere between knee and ankle. The printing is flat and without the sparkle or contrast that is so much a part of San Francisco's light quality. There is no readily apparent explanation for the sequence of the pictures. It is as though many fine photographs of San Francisco's buildings—too bad there are none of their environment, the streets—have been altered and poorly presented.

Tom Aidala's text, a long essay, is outstanding. Few writers, let alone architects, have so thorough an understanding of the architecture of a time and place in relation to the immediate and larger society that produced it, in relation to an emerging technology and available materials, and in relation to evolving architectural theory and practice. And, for much of the essay, few writers could integrate and express this material so well. The language is rich, full and lighthearted; a joy to read just as the Victorians that Aidala is speaking of are a joy to see. Toward the end of the main body of text, however, the ideas come with a disjointed rush—from San Francisco to Berlage, to Chicago, to the internationalists and back again.

One has the feeling reading and looking at this book that two very talented people, Aidala and Bruce, overly eager to get into print, were worked over by the publisher and editor. This reviewer looks eagerly to more from Aidala under better circumstances.

In the last few pages, the epilogue, text and photographs come together as one. Here writer and photographer, observe, too briefly, the partial razing of our architectural heritage and the often senseless political and economic reasons for that destruction.

Allan B. Jacobs is the Director of the Department of City Planning for San Francisco, California.

Art: The Way it is by John Adkins Richardson. Harry N. Abrams, Inc., New York, 1974. 350 pp., illustrated. $15.

In a new approach to art appreciation, the author rejects standard methods and contrasts such apparent "opposites" as the Renaissance with the twentieth century; religious art with Dada, and so on. The emphasis is on broadening the vision of the reader by separating the incidental from the essential.

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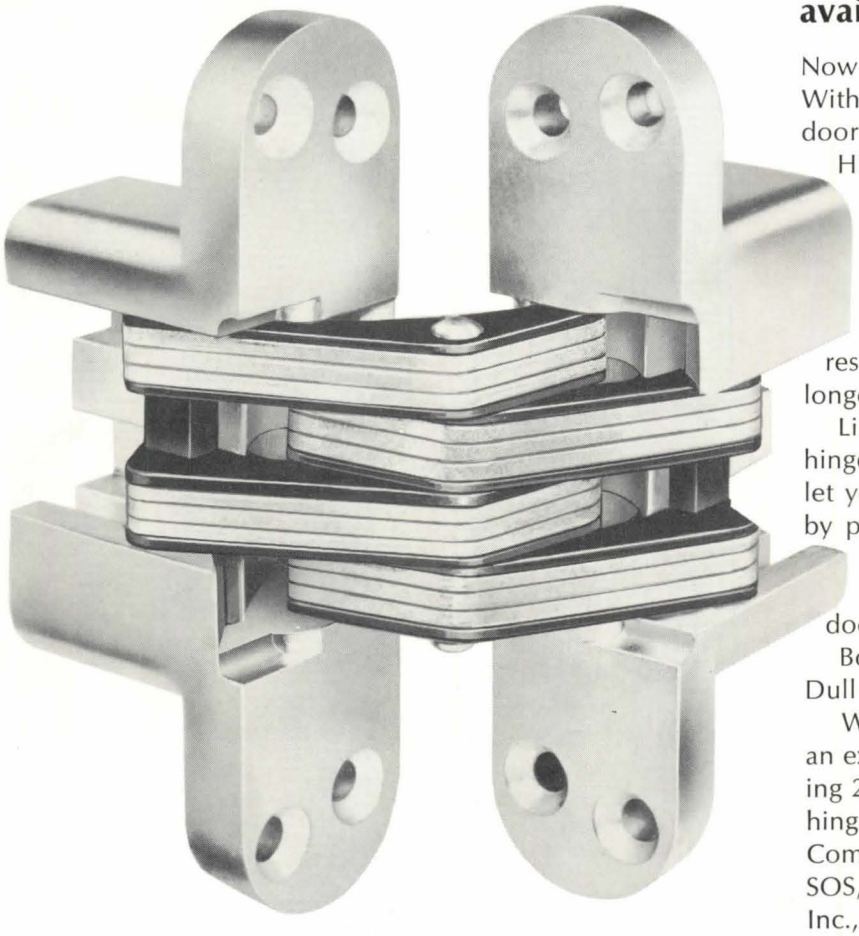

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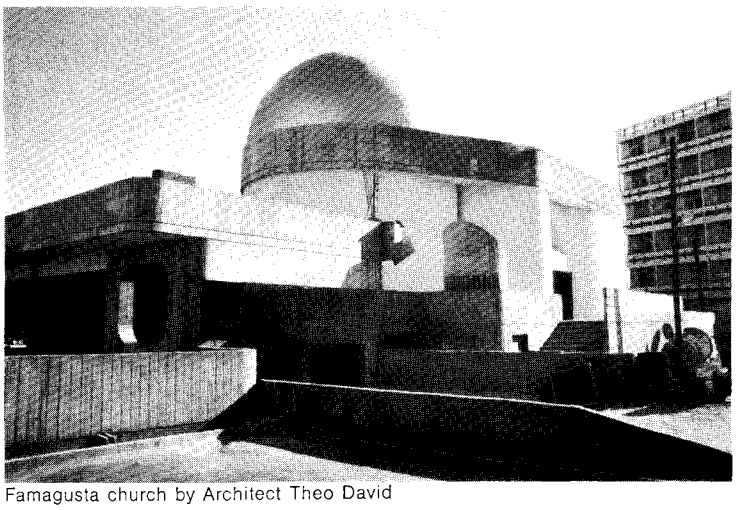
Letters

Continued from page 8



Famagusta church by Architect Theo David

accomplishments, must not be allowed to be wiped out by war and oppression.

I appeal to you at Architecture Plus to support us any way you feel appropriate so that my colleagues and the practice of architecture here will thrive once again.

THEO DAVID
Architect, Nicosia, Cyprus

Albany Mall

It is with great relief that I note that our next Vice President's . . . fortune has not insulated him from his American soul. The random collection of gargantuan juke boxes in a veritable Sahara of a parking lot could only be American.

Buckled over in gales of hilarity, I remain sincerely yours,

TOM MORRIS
Architect, Denver, Colorado

Your coverage of the Albany Mall in the July/August issue of PLUS was a great disappointment. This poorly conceived project with its tremendous scope, scale and price tag should have been presented by you with a critical architectural analysis. Although the project was presented without comment, it could be interpreted that your fine magazine was giving approval to the project's architectural merits.

As a former long time resident of Albany (I was raised on the site of the Mall), and as a student of architecture when the project was announced in 1962, I feel I can criticize the project with a knowledge of its history, and an awareness of its architectural vocabulary.

The project as conceived and built, is extremely insensitive to the site and to the surrounding residential and governmental developments. The original 98 acre site was stripped of all buildings, regardless of architectural character or functional value. A one million dollar high school built in 1957 was demolished after graduating only nine classes. The old Cathedral shown in your article, which was built in 1852, just missed the bulldozer's path.

This monumental development lacks sensitivity by ignoring the unique rolling site by simply connecting the tops to two hills with a large flat plaza, more than six blocks long. The scale of the project set in the midst of a 100-year-old brownstone residential area three stories high is another disappointment.

Many who have seen or knew Albany before 1962 would say the project will help Albany, and in many ways it will. However, the needs of the state and the people of Albany could have been better served if the architects, planners, and state related this project more closely to what was on and around the site. I hope your staff will revisit the project upon completion and tell readers what *you* think.

TERENCE J. COX
Architect, Fairfield, California

We assumed that our deadpan presentation of Nelson Rockefeller's eulogy (or elegy?) on the Mall conveyed our own thoughts more effectively than we could have done in our own words. Sorry if some readers missed the point.—Ed.

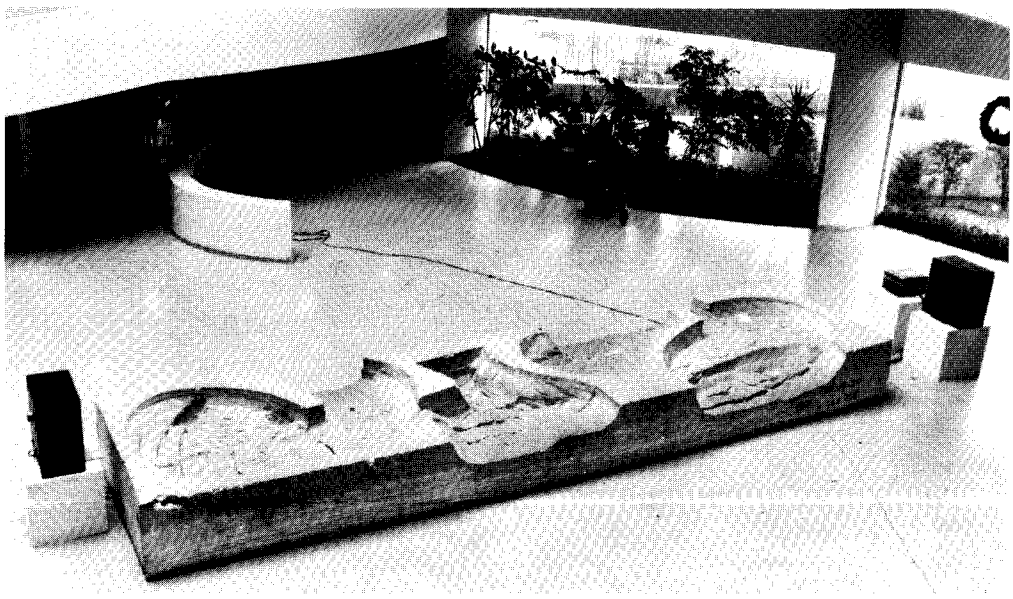
Systems: Myth or Reality?

I read with interest the Systems article in your July/August issue. It is true that there are widely divergent definitions of "Systems

Continued on page 124

JOHN CHAMBERLAIN

COUCHES



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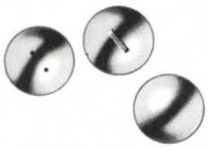

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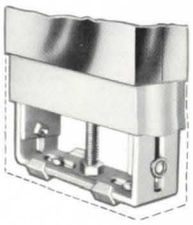

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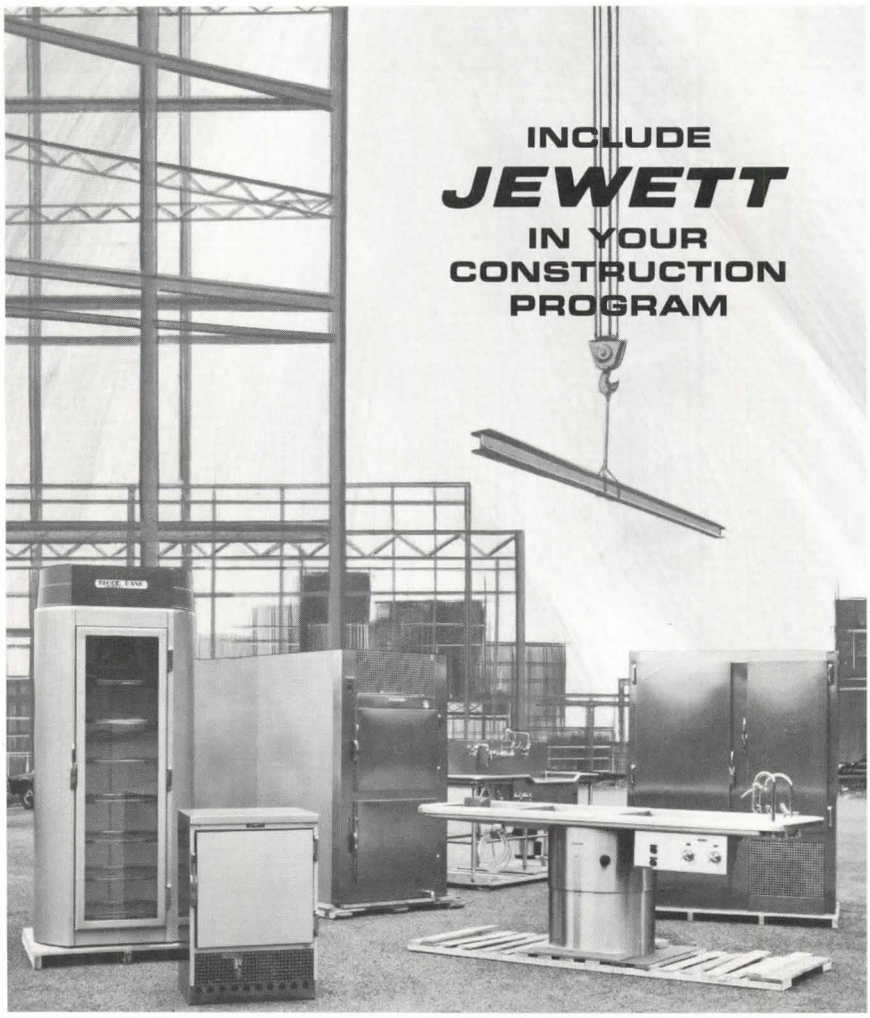

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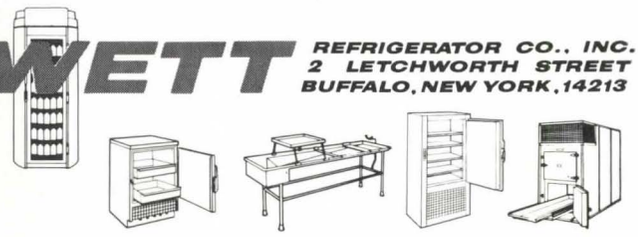

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Letters

Continued from page 122

Building," but it is curious that your article, in a historical review of the subject, excludes from it a vast majority of building types that rightfully belong there. The building types discussed in the three essays represent less than 5 percent of the Systems Building industry. Between modular housing, panelized housing (prefab wall and roof panels), pre-cut homes, and mobile homes, about 90 percent of the housing alone is Systems Built.

So what if they are architecturally drab or offensive? They are real and you must not ignore them. You know what happens when you ignore the silent majority!

Systems are *A Reality* even if they are Architecture Minus.

STEVEN WINTER
New York, New York

The case of the "9"

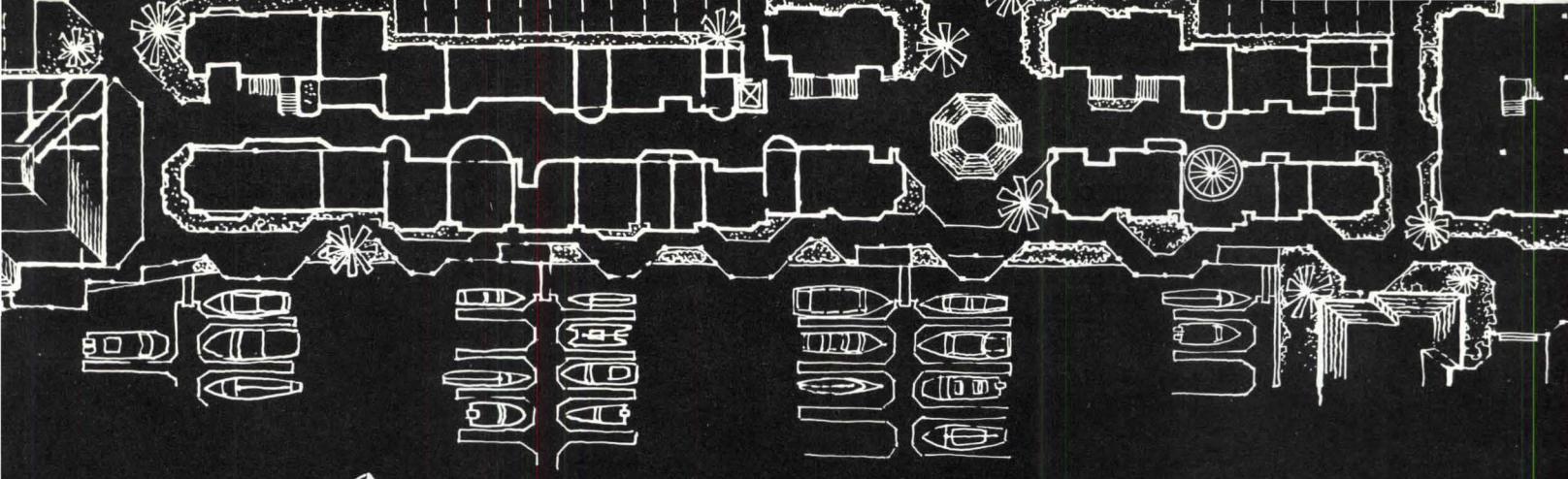
Ivan Chermayeff's "red-orange nine"—page 109, March/April Architecture PLUS—does not add serenity to its environment! It blocks the sidewalk, "shouts" at passersby and disturbs pedestrians and drivers alike, except for dogs—who consider it a great boon and an improvement on lampposts.

ROBEY LAL
Architect, New Delhi, India

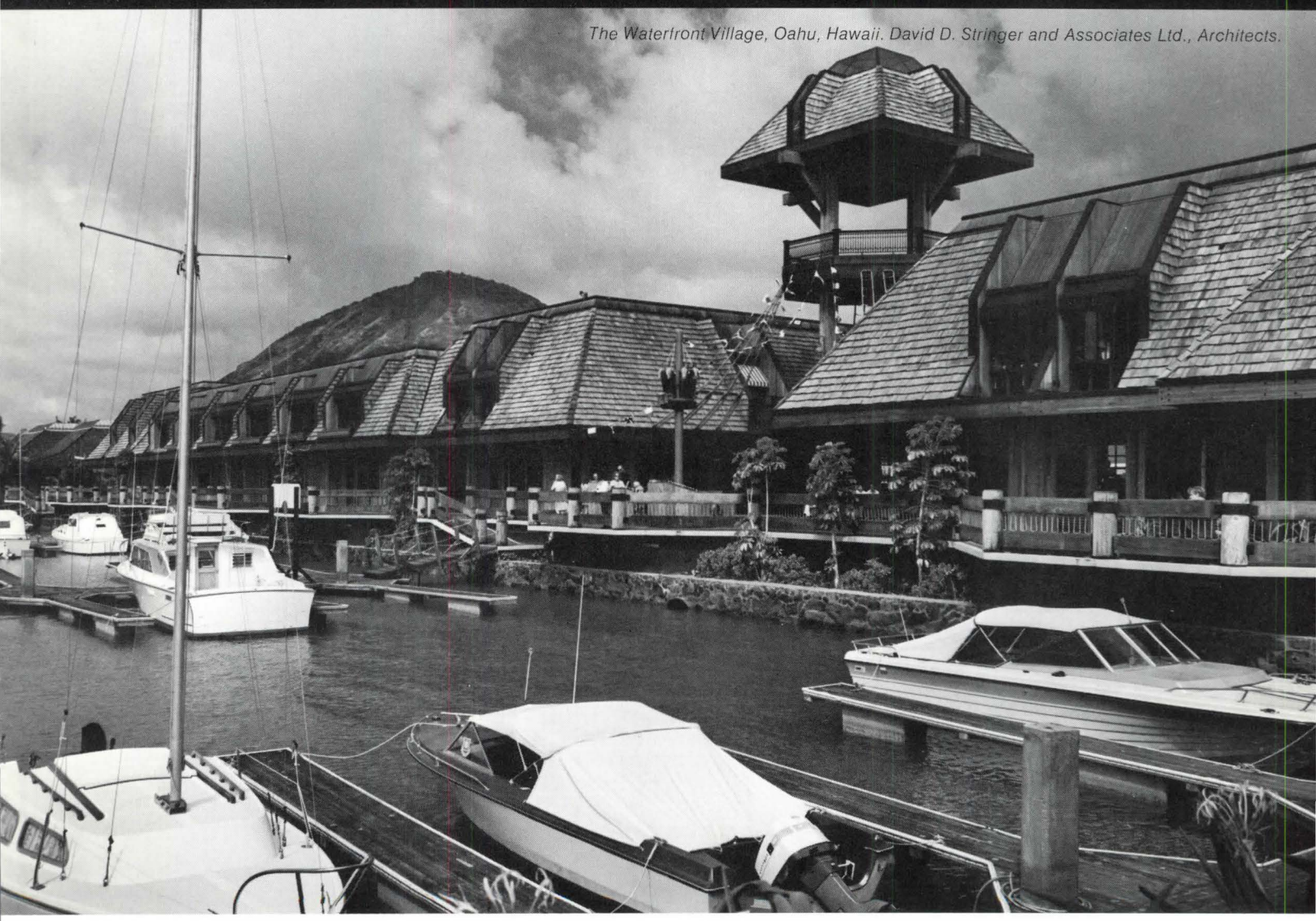
Credit due

The photograph on the right of page 75 in the July/August issue should have been identified as a 1974 building in Brooklyn, N.Y., erected by C. W. Blakeslee & Sons, Inc of New Haven, Conn., using the Bison system.

Unfortunately the following credit line was omitted in the Getty Museum article (Sept/Oct): Color photos: Richard Gross; others; David Gebhard.



Red cedar helps make a shopping center seaworthy.



The Waterfront Village, Oahu, Hawaii. David D. Stringer and Associates Ltd., Architects.

At Kaiser-Aetna's $5 million dollar Waterfront lage near Diamond Head, two decks of shops d offices have been infused with the warmth d texture of red cedar. (2,600 squares of d cedar handsplit shakes.)

The architect's unique nautical themes are ated in crow's nests, rigging, lifeboats and a nooth, informal transition from marina to shore. hat other material could offer red cedar's range design applications? From the "thatched" ansards to intimate interior mall spaces, red cedar has combined distinction with quiet, island informality.

And red cedar shakes will weather anything the tropical skies can bring. From heat waves to hurricanes. Red cedar's unique insulative properties make it an efficient as well as beautiful building covering.

Next time you're launching a project, consider the building material with warmth, durability and almost infinite design possibilities: Red Cedar Certi-Split Shakes and Certigrade Shingles.

For more details, write Red Cedar Shingle & Handsplit Shake Bureau, 5510 White Building, Seattle, Washington 98101. (In Canada: 1055 West Hastings St., Vancouver 1, B.C.)

These labels on bundles of red cedar shingles or handsplit shakes are your guarantee of Bureau-graded quality. Insist on them.

Red Cedar Shingle & Handsplit Shake Bureau

One of a series presented by members of the American Wood Council.

Circle Reader Service Card Number 130

DISSECTING THE MIND OF THE MASTERBUILDER

Mies van der Rohe at work

by Peter Carter

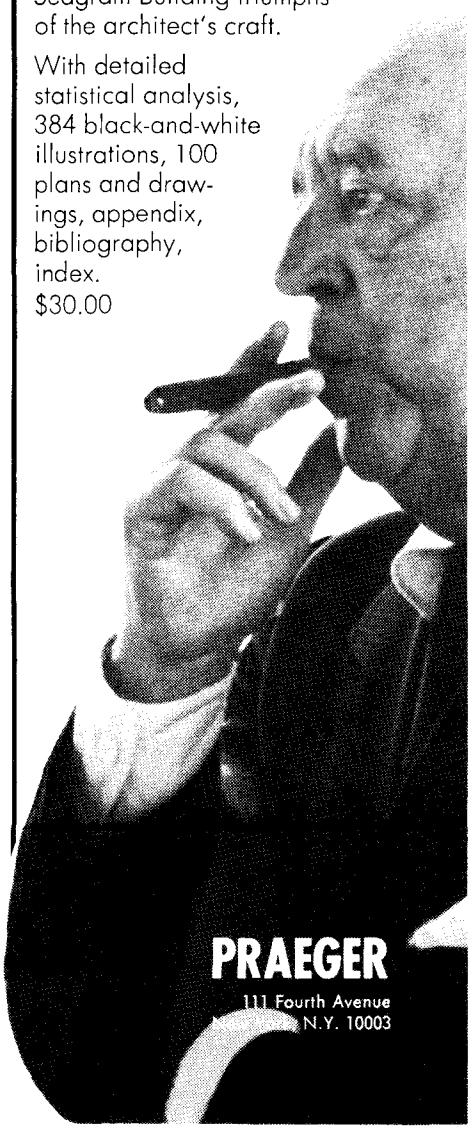
Mies van der Rohe

Never before has the contribution of this great architect been so meticulously and handsomely documented than in this volume. The first to fully describe both the thought process and the technical means by which he achieved his mastery of structure.

Peter Carter

Scrupulously analyzing every project Mies undertook, the author (a former student, then associate and friend of Van der Rohe) isolates the problems and solutions that make such buildings as the Barcelona Pavilion, Chicago's Lake Shore Drive Apartments, and New York's Seagram Building triumphs of the architect's craft.

With detailed statistical analysis, 384 black-and-white illustrations, 100 plans and drawings, appendix, bibliography, index.
$30.00



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Product Literature

To obtain the literature described below, circle the corresponding number on the Reader Service Card in the back of this issue, print your name and address and mail. It is necessary to affix proper postage if the card is mailed outside the United States.

AIR CONDITIONERS
A new line of packaged air conditioners is now available from Lennox Industries. Ranging in size from two to five tons, the units have been designed with major consideration for the residential replacement market.
Reader Service Number 200.

BUILDING SYSTEMS
Butler Manufacturing Company has prepared color brochures on their unique structural systems featuring multi-story capability that can be integrated with interior and/or exterior componentry.
Reader Service Number 201.

Money saving construction systems are illustrated in a new cost cutter kit from the American Plywood Association. Ideas ranging from concrete forming to long span roof systems are included.
Reader Service Number 202.

A new booklet from Stran-Steel Corp. details how builders can apply the concepts, materials, and techniques of metal building systems to specific building needs.
Reader Service Number 203.

CARPETING
International Rubber Corp. has introduced Futurus Carpetile, a new concept in rugged tiling with a surface appearance much like chenille carpet texture.
Reader Service Number 204.

Cabin Crafts Carpets introduces their Points East collection of four carpet patterns adaptable to a wide variety of residential and commercial applications in literature now offered.
Reader Service Number 205.

The Jute Carpet Backing Council has published the latest version of its architectural guide specification for glue-down installation of double jute-backed carpet.
Reader Service Number 206.

CEILINGS
A brochure from United States Gypsum Company describes a new lightweight, noncombustible ceiling mezzanine that solves between-floor space problems for mechanical equipment in multi-story buildings. The concept provides unlimited walk-around maintenance access and complete partition flexibility.
Reader Service Number 207.

COATINGS
Three new one-part color top coatings for pedestrian and vehicular traffic areas are now available from the Adhesives, Coatings and Sealers Division, 3M Company.
Reader Service Number 208.

Tnemec's new bulletin featuring painting systems for exposed structural steel includes general construction, heavy industrial, chemical and coastal exposures, and solvent restricted areas. Information about surface preparation, application, cost, and life expectancy is given.
Reader Service Number 209.

DOORS
"The King of Doors" by Republic Steel Corporation is one of three playing card door designs featured in their new literature. Details concerning availability of sizes, styles and colors are included.
Reader Service Number 210.

Kawneer Company recently introduced i-Line® Series 4000 doors, a selection of luxury doors designed as exterior grade aluminum entrances but also ideal for interior applications.
Reader Service Number 211.

An extra degree of protection is the theme of a new brochure from U.S. Plywood which compares wood and metal fire doors. Charts, photos and test situations are included.
Reader Service Number 212.

A new brochure covering the entire line of Norton automatic door operator systems has been released by Eaton Corporation's Lock and Hardware Division.
Reader Service Number 213.

DRAFTING EQUIPMENT
Michael Anthony & Company introduces Multidraft, a new compact drafting device which performs the same functions as full-size drafting machines. It also replaces T-square, triangles, protractors and works without a drafting board.
Reader Service Number 214.

A full-color booklet is available from Teledyne Rotolite describing the company's new whiteprinter/blueprinter. Features of the machine and complete mechanical and electrical specifications are included.
Reader Service Number 215.

An engineering reproduction machine that produces large-size prints from sheets or roll stock, and requires no outside venting or warm-up period, has been introduced by the Bruning Division of Addressograph Multigraph Corp.
Reader Service Number 216.

Stacor Corporation has just pre-

pared a full product line catalog of drafting furniture and equipment featuring a quick-reference table of contents with photos of all product categories.
Reader Service Number 217.

FLOORING
A full-color brochure describing tough, durable flooring systems for sports and recreation, and for business and industrial use, is available from 3M Company.
Reader Service Number 218.

Two systems for installing static conductive flooring in hospital operating rooms are featured in information pamphlet prepared by Vinyl Plastics, Inc.
Reader Service Number 219.

Donn Products, Inc. has prepared an eight-page pamphlet detailing their Concept 2000 Access Floor Systems. Each installation is precisely tailored to the mechanical and esthetic requirements of the individual application.
Reader Service Number 220.

FURNITURE
Environ One, a new concept in seating consisting of eight basic seat and back units with which numerous combinations can be created, is featured in pamphlet now available from Stendig, Inc.
Reader Service Number 221.

Glassform's new, more comprehensive catalog features a group of furniture called the Public Seating group. Consisting of two modules that can be combined in various ways to expand seating arrangements, it is available in ten standard colors in a matte finish.
Reader Service Number 222.

An information folder on Ion seating, featuring photographs and specifications, is offered by American Desk Manufacturing Company.
Reader Service Number 223.

A new 36-page catalog illustrating a complete line of hospital furniture and equipment has been published by InterRoyal Corporation.
Reader Service Number 224.

Steelcase's modular Series 9000 chair, particularly suited to conference rooms and workstations where space is limited, is presented in color folder now being offered.
Reader Service Number 225.

HARDWARE
A combination door holder-release and heavy duty rack and pinion hydraulic closer, with integral smoke detector, has been announced by Rixson-Firemark, Inc. Mounted on the door frame to detect smoke from any direction, the fire safety device provides protection equivalent to two ceiling-mounted smoke detectors.
Reader Service Number 226.

The new Yale 33 master catalog, encompassing all product line categories of Eaton Corporation's Lock and Hardware Division, is now available.
Reader Service Number 227.

LIGHTING
A six-page, illustrated brochure on its wall-mounted hospital patient room lighting system has been published by the Sunbeam Lighting Division of Keene Corporation.
Reader Service Number 228.

The Prestigeline division of Weiman Co., Inc. is now producing a new line of planter swag lights and table lamps designed to serve two purposes: terrariums for live plants and decorative mood lights.
Reader Service Number 229.

A 24-page brochure which discusses how energy can be reduced in industrial, commercial, and recreational lighting installations while retaining safe existing lighting levels has been published by the Outdoor Lighting Operation of GTE Sylvania Incorporated.
Reader Service Number 230.

NOISE CONTROL
Allforce Acoustics, a newly-formed operating unit of Lord Corporation, has prepared a data folder on their line of noise control products. The folder details product descriptions, function, application, installation and order information.
Reader Service Number 231.

PANELING
Bobrick Washroom Equipment has developed a new inter-lock wall paneling system—a durable, decorative wall covering that can be coordinated with their other laminated plastic products or used in new buildings and remodeling projects.
Reader Service Number 232.

PLUMBING PRODUCTS
From an idea that originated in the Far East centuries ago comes Kohler's steeping bath, an extra deep, extra wide bathtub that permits near total immersion. Full color literature is available.
Reader Service Number 233.

A 28-page, full-color brochure covering complete specification information on its entire line of plumbing fixtures and water heaters has just been produced by Briggs.
Reader Service Number 234.

An information folder featuring its plumbing fixtures and trim lines for institutional, industrial and commercial use has been issued by Bradley Corp.
Reader Service Number 235.

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Primitive has an earthy, variegated texture that looks hand-crafted, and catches the light...softly. It comes in six shapes. It provides the ease of maintenance and durability your clients want.

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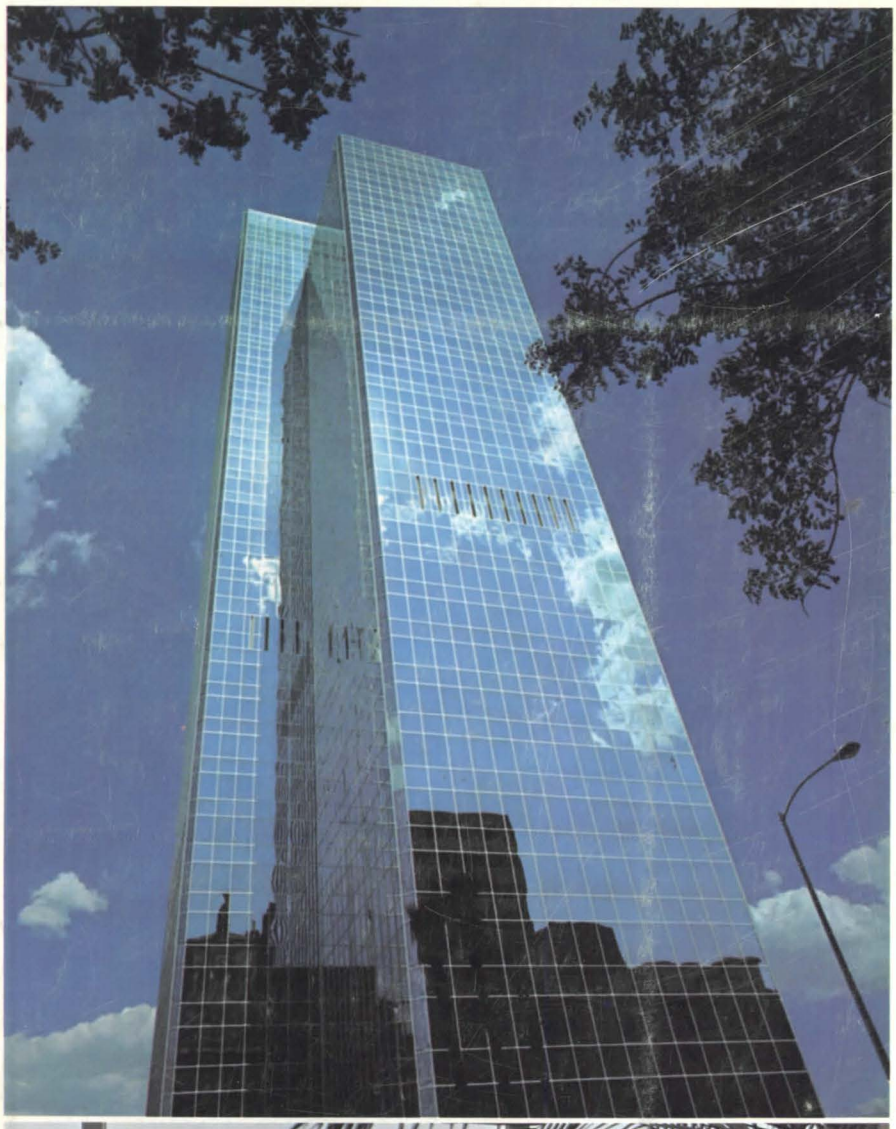
INSULATION YOU CAN SEE THROUGH, FROM LOF

Valley Center, Phoenix, Arizona. Owner: Valley National Bank.
Architects and engineers: Welton Becket & Associates, Los Angeles.



HOW THE RIGHT GLASS CAN SAVE YOU MONEY.

It was 114 degrees in Phoenix when the lower left photograph was taken from the Golden Eagle Restaurant in towering Valley Center. Patrons dine in air-conditioned comfort enjoying the aesthetic benefits of LOF Thermopane® insulating units of reflective Vari-Tran® glass. Valley Center's owners enjoy the practical benefits—reduced energy consumption and reduced air-conditioning costs.

Compared to ordinary tinted glass, LOF high-performance glass permitted Valley Center an estimated annual savings of $27,500 in air-conditioning operating costs. And added efficiencies in controlling solar heat gain enabled substantial reductions in cooling equipment capacity. Initial savings, in this case, were estimated to be $480,000. Overall, Valley Center's calculated annual energy need for heating and cooling was cut by almost 2.4-million kilowatts.

With Thermopane and Vari-Tran, annual fuel savings and cooling load reduction are precisely calculable and convincingly impressive. One of our architectural representatives will be glad to work with you on your particular design/energy problem. Contact Libbey-Owens-Ford Company, 811 Madison Ave., Toledo, Ohio 43695.

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