Progressive Architecture

December 1977 A Penton/IPC Reinhold Publication


ROAD DESIGN MANUAL
BRIDGE DESIGN MANUAL

December 1977

Progressive Architecture

Penton/IPC

Progressive Architecture is published monthly by Reinhold Publishing Company, Inc., a subsidiary of Penton/IPC. Philip H. Hubbard, Jr., President; Harry I. Martin, Vice-President. Penton/IPC: Thomas L. Dempsey, Chairman; Sal F. Marino, President; N.N. Goodman, Jr., Benjamin L. Hummel, Joseph P. Lipka, Paul Rolnick, Executive Vice-Presidents.

Executive and editorial offices, 600 Summer St., Stamford, Conn. 06904 (203-348-7531).

Subscription information: When filing a change of address, give former as well as new address, zip codes, and include recent address label if possible. Allow two months for change. Subscriptions payable in advance. Publisher reserves right to refuse unqualified subscriptions. Professional rate of $8.50 per year is available to architectural and architectural-engineering firm personnel and architects, designers, engineers, and draftsmen employed in allied fields. Professionals outside U.S., U.S. possessions, and Canada: $20 per year. Nonprofessional domestic rate: $17 per year. Nonprofessionals outside U.S., U.S. Possessions, and Canada: $30 per year. Single copy $4, payable in advance. Send all orders and payments to Progressive Architecture, P.O. Box 95759, Cleveland, Oh 44101. Send all claims to Progressive Architecture, P.O. Box 6192, Cleveland, Oh 44101.

Indexed in Art Index, Architectural Index, Engineering Index. Publication No. 850700. Second-class postage paid at Cleveland, Oh and additional offices. Volume LVIII, No. 12. Printed in U.S.A.

Cover: The Architects Collaborative solved space problems at Josiah Quincy School in Boston's South Cove by putting the play area on the roof, which then cascades to street (p. 34). Photo: Steve Rosenthal.

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Architect: Neuhaus & Taylor, Houston, Texas.

Buildings, bbls, and Btus

December 1977

As you receive this issue, the Northern hemisphere will be at the annual low point in its cyclical supply of natural heat and light. We'll be about to celebrate the holidays that coincide with the sun's first signs of recovery from the winter depths.

But the energy we've come to depend on so abjectly—the energy of burning—is not going to be coaxed back by the lighting of Yule logs or Hanukkah candles. The supply of the fuels we use is running down all year long, and every day that our consumption runs *up* brings us another day closer to disaster.

Nor will science and technology, our latter-day deities, come through with instant salvation—or much help at all until we make greater sacrifices to them. Abundant nuclear energy seems as distant now as ever. As for "harnessing" power from the sun, we know it can be done (see pages 70–79), but the effort is not yet self-supporting except under favorable Sun Belt circumstances.

By the time you receive this issue, President Carter and the Congress may have agreed on an "energy plan" to decelerate consumption. If they have, it will probably include a few rather simplistic incentives for energy conservation in buildings: a tax credit of up to a few hundred dollars to offset some of the cost of additional home insulation; a similar credit—smaller in percentage, but without a ceiling—for businesses; some kind of credit for installation of solar energy systems.

These tax policies don't seem to have enough leverage to alter the amount of energy consumed in buildings appreciably—only enough to generate a short-term, counter-productive shortage of insulation materials. Of course their provisions will remain uncertain—and beneficiaries remain hesitant—until numerous details are interpreted: just what kind of insulation work will qualify, for whom, by whom, etc. Speaking at the annual Building and Construction Exposition and Conference in Chicago in November, Samuel L. Hack of the Department of Energy stated that "the President's program seeks to keep governmental intrusion and red tape to a minimum" by relying on "voluntary measures and marketplace incentives" as against "complex regulations and requirements." Tax incentive programs, however, can be as complex to administer—and as exasperating for private interests—as direct regulations and prohibitions.

Installing insulation and solar collectors, in any case, can account for only a fraction of the energy saving we must accomplish. Among small-scaled alternatives, many home-owners will find it more cost effective to invest in storm windows, caulking, weatherstripping, and more efficient fuel burners, before adding insulation. (So reports the Center for Energy Policy and Research at the New York Institute of Technology.) Among large-scale efforts, no federal legislation even takes up the energy implications of development patterns; increasing miles per gallon will accomplish little if the dispersal of population and employment places causes more drivers to drive more miles every working day.

In fairness, the Administration does have further energy-conserving programs under study. Paul London of the Energy Department spoke, for instance (at that same meeting in Chicago) of the possibility of mandatory "time-of-transfer" standards for buildings—to be met at the cost of either the buyer or the seller. As he points out, the "marketplace" of lending institutions may begin to insist on certain standards, anyway. And government officials responsible for building energy policy now seem fully in support of *performance standards* (as against prescriptive regulations) as the only valid criteria to apply.

Given performance objectives, architects and their fellow professionals can apply their full skills and imagination to meeting them by methods, traditional or revolutionary. "Energy conscious design," says John Eberhard, President of the AIA Research Corporation (another speaker at BCEC), "is not going to be a burden; it will not have to cost any more." Instead, it will lead to a renewal of regionalism, to more thoughtful relationships of building to sun, to deeper examination of initial program. This is one of those rare instances, he feels, when a national problem represents an exciting professional challenge. "It's going to be an exciting time for architecture."

John Morris Dixon

Letters from readers

Views

The Venturi & Rauch club

In reference to your October article "Penn State Faculty Club," second sentence, second paragraph, page 56—the Pennsylvania State University is correctly written *The* Pennsylvania State University.

Your reference to interior color choice was well taken. Venturi chose the institutional green many of us detest. Furthermore the overall interior space of the main dining room does nothing to enhance the green atmosphere.

The exterior architecture, however, is striking and fits well on the building's small wooded lot.
Gary R. Steffy
Interior Products
Owens-Corning Fiberglas Corporation
Granville, Oh

The article on the Penn State Faculty Club (P/A 10/77) seems to be written by a pretentious young man full of great knowledge and little understanding, as Frank Lloyd Wright would have put it. The literary style is frivolous about a building that is taken very seriously by the client and the architect.

Symbolism is overly stressed in the article. The writer must have learned something about symbolism from Robert Venturi and Denise Scott Brown, but they would never emphasize symbolism over form, space, and light in architecture. Why doesn't the writer consider the exquisite light in the dining room; the proportions and the sense of space in the building?

The interior is a sophisticated space, of light, color, and pattern. The changes of light during the day and the changing seasons are one of the delights of the club. The light green is reminiscent of the pastel hues of 18th-Century Rococo and Neo-Classical interiors, and of course, it is very effective in creating an atmosphere analogous to the forest outside. One cannot separate the color from the quality of the space and from the "uniformly surprising and delightful choice of furniture and fabrics."

The interior is delicate. Unfortunately, out-of-scale potted plants and other elements of bad taste that have been added adversely affect this balance as does the existing haphazard layout of dining seating. The dining room, inspired by the wonderful English university dining halls, had with the architect's seating plan a great deal of variation; round tables in niches, intimate tables for two at the side under lower ceilings; all to give different degrees of privacy yet to maintain the sense of the room as a whole.

As an architectural critic should know, function is subjective. The exclusive quotes from a former manager are irresponsible without further investigation into the building design process. The club's building committee directed the design of the kitchen from the small warming and serving area in the earlier programs to the present kitchen size. The architectural design does permit kitchen expansion, if needed, into the adjacent private dining room. The very successful siting of the building is the result of major spaces sharing the forest, with the secondary spaces placed in the basement where the toilets are conventionally located. This was a cost savings and was fully sponsored by the faculty committee. An elevator is provided for the handicapped and the aged.

The basement bar is cozy and warm in contrast to the formal open spaces above, to compare the bar to "the proverbial one-story whore house," [*sic*] is sophomoric, irresponsible, and in poor taste.

Venturi & Rauch's architecture, like all good art, forces us to question our prejudices, our sacred traditions, our good taste, and our sense of beauty, and that is certainly appropriate in a university building.
Louis Inserra
Associate Professor of Architecture
The Pennsylvania State University
University Park, Pa

[If "Venturi & Rauch's architecture . . . forces us to question our prejudices," then it must be noted that Mr. Inserra's role as chairman of the building committee that hired that firm does not leave him free of prejudices, either.

His understandably self-serving apologia is riddled with misreadings of the article, none so serious as his assertion regarding the writer being "irresponsible without further investigation into the building design process." This is patently untrue. Interviews were conducted with the architect, with the president of the Faculty Club at the time of the commission, with university officials, and with members of the Faculty Club, as well as with its then-manager. There is considerable and undeniable user dissatisfaction with some aspects of the club's interior design, and we feel that the points raised about it are an accurate reflection of that feeling.

We have been, and remain, great admirers of the works of Venturi & Rauch, but feel that it is entirely within our critical role to examine their executed architecture in the light of their theoretical writings: in fact, not to do so would be a serious omission. The inconsistency the writer perceived between the firm's theories and how those theories are implemented at Penn State was the point of the piece. We regret that Mr. Inserra did not understand that. Yet the clearly *ad hominem* tone of his remarks exposes an attitude that makes his selective interpretation of the article as revealing as it is mistaken.—Editors]

Museum appendage

In the '50s a lot of architects covered a lot of buildings with aluminum panels and grilles and would have used plastics if available or bottle tops if they had the imagination.

Now I see that there is a proposal for an addition to the Museum of Modern Art which includes a new canopy in front of the original building [P/A, Nov. 1977, p. 21; Sept. 1977, p. 7]. I got out my musty copy of *Built in USA* to remind me of what it looked like and confirm its inclusion in the Museum's own book. It looked great.

I want to confess that I, too, covered old buildings without even looking at them. But I have repented and have taken similar junk from the faces of old buildings—and I was pleased.

Let's not put a canopy or anything in front of this building. We will just have to come back later and remove it once the building is rediscovered.
Jasper D. Ward, AIA
Architect
Prospect, Ky

Minimal approval

Your writing about the Klein Showroom and apartment [P/A, Sept. 1977, p. 60] was very incisive as it explored the contrasts and comparisons between architecture and fashion.

However, your credibility was severely strained when you referred to the "jams for the rotating partitions."
Roy E. Lundgren, AIA
Street & Lundgren
Aberdeen Wa
[Jambed if we do, jammed if we don't—Editors]

Competition correction

The winner of the 1977 Special Competition sponsored by the National Building Granite Quarries Association (P/A, Sept. 1977, p. 23) was not Irene Fernandez-Fraga, who was disqualified as not technically eligible to enter. Other winners were advanced in order, first prize going to Paul Anderson of Georgia Tech. [Editors]

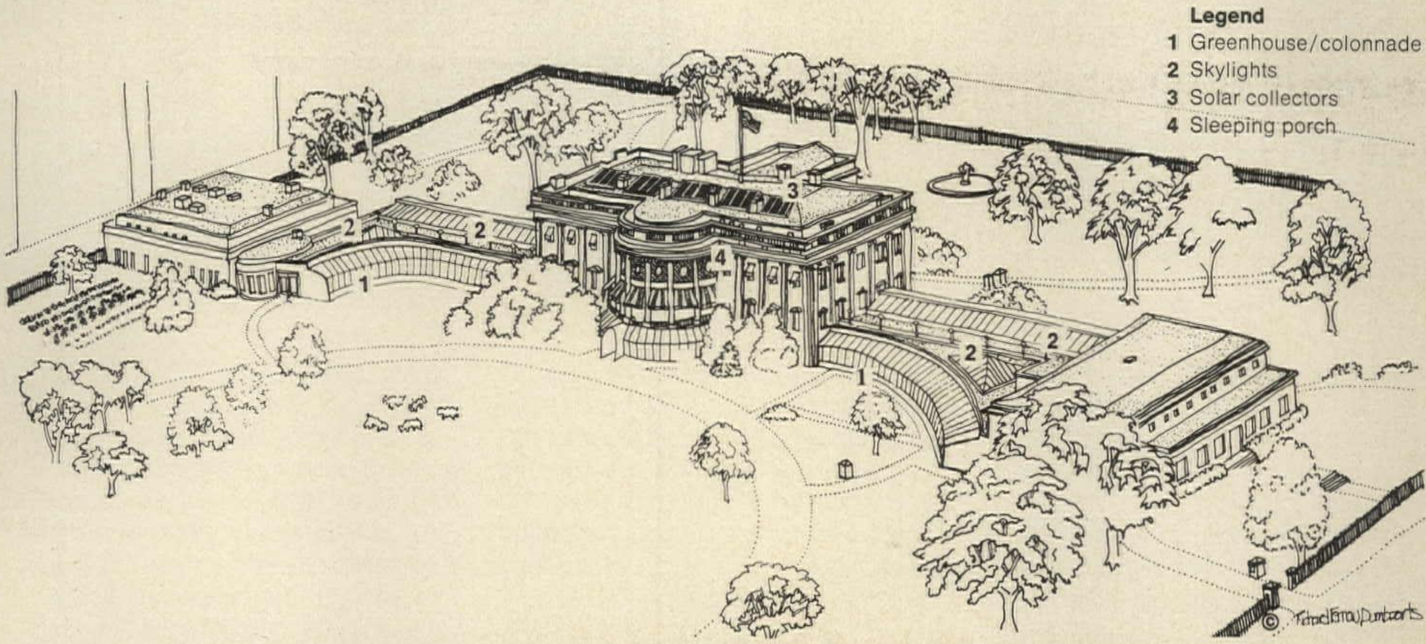
Building materials

Major materials suppliers for buildings that are featured this month, as they were furnished to P/A by the architects.

Josiah Quincy School, Boston, Ma (p. 34). *Architects: The Architects Collaborative, Boston, Ma.* Steel frame: Antonelli Iron Works. Metal deck: Bowman Const. Products. Tees: San-Vel Concrete Products. Concrete block: Camosse Bros. Precast concrete: Cambridge Cement Stone Co. Porcelain panels: Wolverine Co. Vinyl asbestos tile: G.A.F. Carpet, Mohawk Carpet. Tile: U.S. Ceramic Tile Co. Ceiling system: Johns-Manville. Aluminum slat: Alcan. Insulation: Dow. Windows: Hope's Window Co., Shatterproof Glass Co. Doors: Superior Fireproof Door, Kinnear Door Co., Elison Bronze Co. Paint: Pittsburgh Paint Co. Public address: Rauland-Borg Corp. Seating: Public Seating Inc. Lighting: Sterner, Prescolite. Plumbing and sanitary: American Standard, Sloan, Halsey Taylor. Heating: Standard Fin-Pipe Radiator Corp., TACO. Air conditioning: Burgess Ind., Trane Co.

Harriet Tubman House, Boston (p. 46). *Architect: Stull Associates, Boston.* Masonry cavity wall: Glen-Gery. Steel deck: Bowman Metal Products. Exterior brick: Glen-Gery. Gypsum wallboard: National Gypsum. Tar and gravel roof: G.A.F. Skylights: Kalwall, Structures Unlimited. Urethane insulation: Upjohn. Reversible steel windows: Hopes, Window Co. Doors: Lifetime Doors, Kinnear, Kawneer. Locksets: Corbin. Door closers: L.C.N. Kitchen equipment: Peters. Communication system: Strom. Heating and cooling units: Mueller-Climatrol.
[continued on page 103]

News report



White House retrofit: 'Cartervation'

Friends of the Earth, with assistance from several sources including Bruce Corson of the California State Architect's office, has prepared an energy retrofit for the White House dramatizing the need for energy conservation ("Cartervation") and how to apply existing solar technology to a historic structure. The FOE plan was researched by Richard Fernau of Dumbparts and members of the Berkeley Solar Group, both consulting firms. Since rows of roof collectors would destroy the integrity of the executive mansion, a solution of a greenhouse colonnade in Palladian style was conceived. Water-filled columns in the greenhouses would collect and distribute heat. Sun shades in the summer would prevent overheating. A simple collector panel on the roof would heat 550 gallons of water—enough for the family and staff; in warm weather, a typical Southern sleeping porch would provide natural cooling. FOE calculates the energy saving would be half a reported $61,000 heating bill—with proper insulation. Other environmental measures would include sheep to keep the lawn trim and provide fertilizer and a garden where garbage could be recycled as compost.


Jay Janis, Undersecretary of HUD.

HUD/77 housing act: powerful tools

The 1977 Housing and Community Development Act recently signed by the President creates new tools to spur building; establishes a firm policy of aid to big cities—especially those of the Northeast and Midwest; and includes budget authorizations of $10.95 billion over the next three years in HUD's Community Development Block Grant Program. HUD's fiscal 1978 budget alone is $9 billion.

This impetus coupled with a just-announced reorganization of the US Department of Housing and Urban Development (HUD) which promises speedier action on grant applications may propel the building industry into a solid year of construction in 1978 and brighten the outlook of the business establishment, whose confidence in the economy will play a big role in whether 1978 is a year of spending or caution.

These and other important developments at the federal level were discussed with HUD Undersecretary Jay Janis in a special interview; not covered was the proposed, potentially far-reaching Sec. 248 dealing with multi-family housing aimed at the middle-income market. Since the proposal was then under study at the Office of Management and Budget, Janis was prevented from commenting on it.

What gives teeth to the government's renewed policy of preservation —begun under former Secretary Carla

Timely signs: protestors against repeal of rent control in front of HUD . . .

. . . and Federal Home Loan Bank Board Building: mixed use for Uncle Sam.

Hills—is a dual grant formula weighted in favor of older, central cities; a new requirement that grant applications include programs improving low and moderate income neighborhoods; specific allowances of direct grants to private entities to rehabilitate private property; incentives to the formation of revolving funds which finance rehabilitation; an increase from $14,700 to $27,000 in the housing rehab loan program (Sec. 312).

A major program launched by the Carter administration is the Urban Development Action Grants authorized to spend up to $1.2 billion over the next three years. Rep. Garry Brown (R-Mi) says Action Grants "Look, sound and act like Urban Renewal." Brown is a member of the Housing and Community Development subcommittee of the House and delivered his comment at a conference for building products executives (p. 22).

Janis, who was executive assistant at HUD from 1966 to 1969 under the department's first Secretary, is a key figure in the recent HUD managerial changes promising to cut red tape. Among the changes are elimination of regional offices; assignment of multifamily housing operations to area offices for "one-stop" service to builders and developers; allowing the Assistant Secretaries to deal directly with the field; and working with Jack Watson of the White House staff to develop a mechanism that would make coordinating with the various federal departments easier.

Janis, perhaps remembering Carter's promise to streamline the government operations, told the building products executives conference that HUD employs 15,200—fewer than the actual approved number allowed—and the department is about equal in personnel to the office of Indian Affairs or the Panama Canal agency.

Reuse is 'in' says GSA's Solomon

What has been hoped for (in some quarters) and suspected at large was confirmed by General Services Administration head Jay Solomon at a conference for executives in the building industry. The new federal policy is a change of emphasis from new construction to reuse of existing buildings. Reasons he gave: remodeling requires less energy, and older buildings are in the central cities which need support—as do their mass transit systems—and are more accessible to minority groups.

Solomon was quick to add that government is not abandoning new construction, citing $1 billion in projects underway and 16 new buildings just completed, for a total $226 million. In fiscal 1978, 20 projects have been scheduled, representing a construction value total of $890 million.

Solomon, like most administration officials, spoke of energy, and in this area great opportunities await the inventive designer and manufacturer. "The person who comes up with a way to insulate an existing masonry building probably will be very rich in years to come," said Solomon.

A second important trend in government building is the concept of mixed use. New federal buildings will include retail establishments and are designed to be convertible to private use when no longer needed by the government. To illustrate these directions Solomon spoke of the $3.6 million Federal Home Loan Bank Building, designed by Max O. Urbahn Associates of New York, nearing completion in Washington, DC. The value management techniques applied in this project represent a "trend for the future," declared Solomon. The six-story building has three computer-controlled air-handling systems, no overhead lighting (lighting is built into the furniture system), retail shops at the street level, a public plaza with a pool/waterfall and ice skating rink, and public restaurants.

Sunlight to electric study underway

The Energy Research and Development Administration (ERDA) has awarded a $330,000 contract to the General Electric Space Division to study the use of photovoltaic solar systems for American homes. These systems directly convert sunlight into electrical energy. In the evaluation, GE will divide the United States into climatic regions; a later part of the study will involve detailed designs for single-family dwellings for the mid-1980s.

19th Street Solar Housing for students, Denver.

Solar student units at $22 per sq ft

A student apartment building in Boulder, Co., by Joint Venture Inc. has been completed at a cost of $22 per sq ft including land acquisition. The project also received a HUD grant of $22,450 for a demonstration solar system consisting of 800 sq ft of collectors from KTA Corporation by Environmental Consulting Services. The solar system will provide 10 percent of the total heating and hot water requirements. The building is a three and a half story wood frame structure containing 8 four-bedroom split-level units. The $250,000 project is owned by Donald and Dorothy Stonebraker.

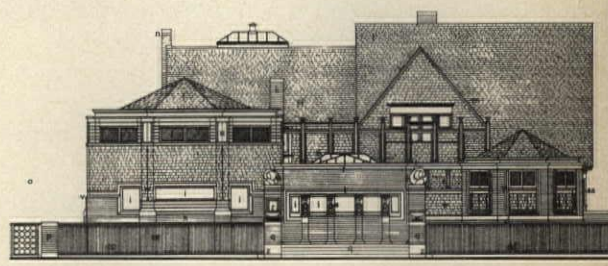
Wright house/studio plans unveiled

A plan for the restoration of Frank Lloyd Wright's own complex of buildings in Oak Park, Ill, was unveiled in late October by the Frank Lloyd Wright Home and Studio Foundation. Prepared by professionally qualified volunteer members of the foundation, the plan sets forth with remarkable clarity the unique history of this building—transformed repeatedly over a period of 68 years by its owner-creator. It also presents a simple, straightforward solution to a restoration problem that could have kept scholars arguing for decades.

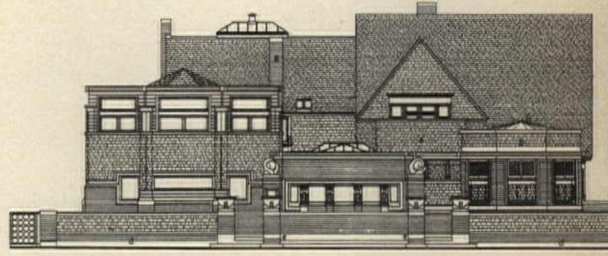
Recognizing the inherently controversial aspects of their subject, the foundation officers presented their plan for discussion before a group of invited historians and architects at the studio itself. So convincing was their report of research, statement of goals, and analysis of alternatives that the invited guests could do little but praise the effort. The venerable Lloyd Wright, who grew up in these buildings, was among those who questioned the removal of a canopy at the studio entrance, but he was willing to accept the decision, and he congratulated the drafters of the plan for a job well done. Historian Vincent Scully is reported to have challenged the same canopy decision, but accepted it after an on-site reconnaissance.

Simply summarized, the plan calls for restoration of the entire complex to its condition as of 1909, when the studio was still operating here and the family was still occupying the house. Alterations from 1911 on, which converted the studio to an apartment—later two apartments—would be stripped away and all critical architectural elements—including landscape elements—restored to that period. Useful spaces later developed in the basement, above the garage, etc. would be kept intact for operations of the foundation.

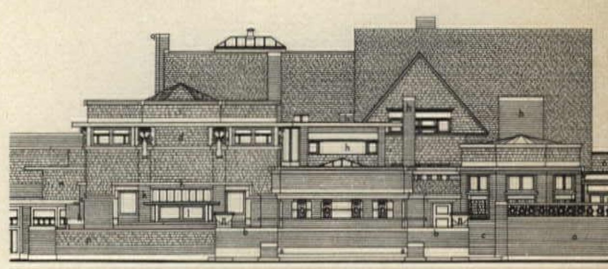
For a structure that dates back only to 1889, the research involved has been remarkably archaeological, involving as many layers as the excavations at Troy. Wright altered these buildings frequently—for reasons both practical and aesthetic—and not always according to drawings. A collection of photos from many sources, including family members, has gone far to explain the numerous changes. Probes behind present walls and ceilings have verified some expectations and revealed some hidden elements—the original studio ceiling and the chain suspension of its balcony, for instance—that will add substantially to our appreciation of Wright. Already restored through the foundation's efforts is the dining room of the house, brought to completion by installation of the original chairs, donated by Wright's widow, Olgivanna. [JMD]



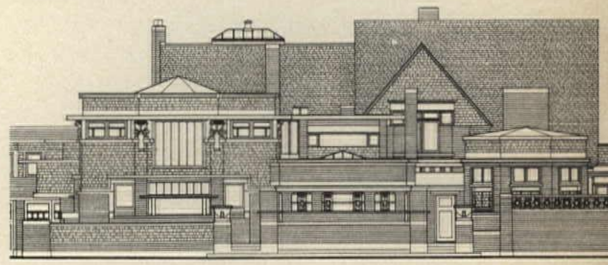
NORTH ELEVATION 1898



NORTH ELEVATION 1909



NORTH ELEVATION 1911



NORTH ELEVATION 1977

Drawings showing evolution of the studio side of Wright's Oak Park complex from *The Plan for Restoration and Adaptive Use of the Frank Lloyd Wright Home and Studio* prepared by William Dring, Thomas Heinz, Carl Hunter, Donald Kalec, and John Thorpe.

News report

Whither architecture? design conference

Indicative of the unrest in the arts is the number of conferences scheduled to discuss design—as if nothing better could be done with available resources than to invest them into talks about the state of the art. This has nothing to do with a statement of architect George Nelson's at one of these very conferences, in which he declared that today we're anti-intellectual and anti-philosophical, and instead action-oriented, restless, and impatient. Nelson, head of his own design firm in New York and once an editor of the defunct *Architectural Forum,* was moderator at a two-day design conference in Washington sponsored by the American Institute of Architects. The theme was "Design: work of art? working object?" Nelson declared at the outset that the objective of the conference should be entertainment. He made the distinction between architecture and building by asserting that architecture is a celebration. Later panelist Philip Johnson of New York concurred, choosing "exuberance" as the work for architecture. A certain sobriety among design professionals—a lack of joy and humor—was mentioned several times during the talks as an unhappy common ingredient.

Centre Pompidou in Paris, the recently opened cultural museum designed by Piano & Rogers of England (P/A, May 1977, p. 84), dominated much of the conference as illustration for the comments and remarks. Nelson started the Pompidou controversy by revealing his first reaction to it: "My God, how are they going to keep this dusted?" A speaker in the audience, Jean Paul Carlhian—of Boston, said Pompidou was entirely appropriate for the French people, "the big final gesture" which is the great equalizer in a highly stratified French society. "A taxi driver will go there but not to the Louvre." Johnson praised and leveled the center by saying the museum was in "the great tradition of French iron building . . . a very fun expensive place. Art looks simply horrible in it."

The voice of doom at the conference was that of Joseph Esherick, head of architecture at the University of California, Berkeley. In resigned phrases he spoke of dissatisfaction with the technological society. He said architects must realize they can't do everything or be leader of the team, and that others need to be given more room for expression. Not being able to sit any longer after that, Norman Foster of London jumped to his feet apologizing in not very apologetic tones that "I'm not going to fit comfortably in the sackcloth and ashes brigade." Referring to Esherick's put-down of "energy freaks," Foster said "I think that's arrogant and aggressive."

Sociologist Robert Gutman spent a lot of time evaluating Louis Kahn's Richards Building, University of Pennsylvania, Philadelphia, and how the medical researchers for whom it was designed railed against the impractical aspects of the building. When the scientists finally got their way—a boxy, drop-ceilinged, ordinary building—"they missed the attention they used to receive when they were in the old building" from visitors there to admire the Kahn masterpiece. Gutman finds the 1977 architectural scene more polarized than in the past, the opposites being skills vs design.

One of the most intriguing and surprising observations of the conference was by Arata Isozaki of Japan. Contrasting slides of Japanese picture post cards with slides of modern Japan, he showed numerous examples of unexpected clutter—bicycles, televisions, refrigerators all jammed together in small spaces. "The Japanese," Isozaki said, "don't know how to layer or store the new technology, so they keep it, along with the more traditional objects, in corners."

Several indicators surfaced at the conference. People seem to be in a jaded, pessimistic mood which is an unlikely mental atmosphere in which to see one's way when a new direction does appear. Also, it seems as if everyone is uncomfortable with the eclectic, anything goes permissiveness. The profession is yearning to find a style or philosophy which can be either championed or spurned, but in either case acted on with a clarity that is unmistakable as to where the lines are drawn. [AC]

T.R.A.C. meet in New Orleans

It's rare for three generations of architects who have both praiticed and taught to come together in a common context. Thus, into this realm of *ideas* about architecture, the architecture schools of Tulane University (New Orleans) and Rice University (Houston) were led by their respective teachers Brand Griffin and Bill Cannady. The event was the Tulane-Rice Architectural Competition (T.R.A.C.).

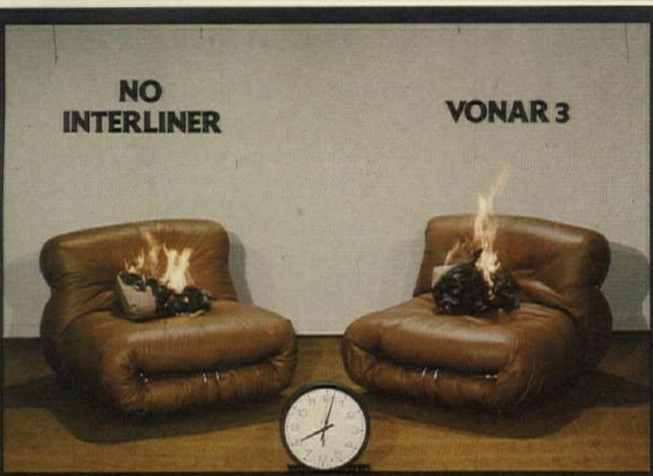
As a project, Griffin and Cannady created a hypothetical Museum of Petroleum for a site in Houston. Overlaid with imagery ranging from dinosaurs to OPEC, the program provided a ve-

[News report continued on page 22]

Francisco Alecha

T.R.A.C. jurors Paul Rudolph, Craig Hodgetts, and Michael Graves discuss student projects.

The ai chair with VONAR 3 interliner did not burn up in this limited ignition fire.



Time: 2 minutes into the test.
Identical ignition sources nearly consumed.

Time: 5 minutes.
Standard chair (left) involved.

Time: 11 minutes.
Standard chair, walls, floor (left) involved.
Chair with VONAR 3 (right) is out.

Chairs for this test provided by and available from Atelier International, Ltd.

Atelier International, Ltd., continually searches for ways to improve the performance of **ai** furniture. So when the company heard about VONAR* interliner, they were eager to test it.

At the start of this test, these chairs were identical in every way but one. Both were made with identical top grain leather upholstery, polyester fiberfill and polyurethane foam with flame retardants (fabric and cushioning materials meet specifications for California). But the chair on the right had a layer of VONAR 3 (3/16" thickness) added as a separate layer between the fabric and the cushioning materials.

Test Results

Six 24" x 30" sheets of newspaper crumpled in a paper bag were placed on each seat cushion touching the back cushion, then ignited.

After five minutes, the paper fire on the right chair was nearly out. The cushioning material was not involved. But the standard chair (left) continued to burn, producing large quantities of flame, heat and smoke.

At 11 minutes, the chair with VONAR 3 was out. But the heat and flame from the standard chair had caused the back and side gypsum board walls to burst into flame. The stream of water coming in from the right was necessary at this point to control the fire and save the test facility.**

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**The test described here does not demonstrate that all furniture using VONAR interliner will perform in this manner or will not burn under all actual fire conditions. The test was not conducted to assign "numerical flame spread ratings" to any materials involved. The results show only that specific types of chairs, which used VONAR interliner properly, performed as indicated under the test conditions. Since DuPont does not make furniture or make or install interliner, we assume no responsibility for furniture performance. Consult your furniture supplier for flammability information on a specific furniture style.

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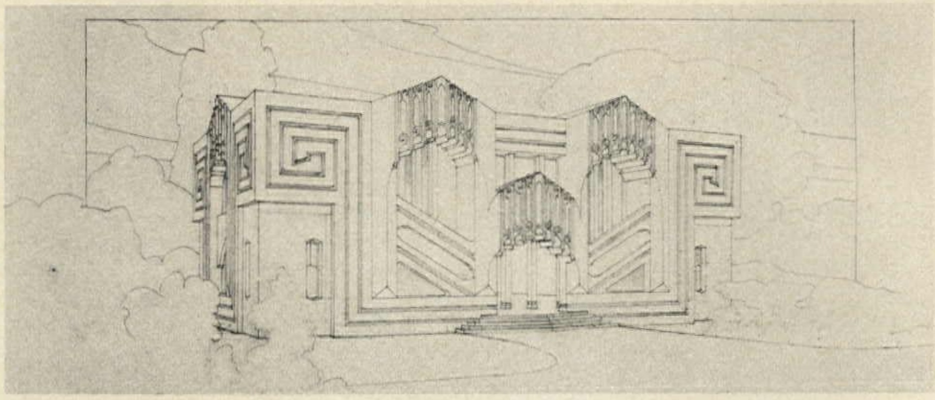
News report continued from page 20

hicle for the expression of experiences of sequence, information, symbolism, education, technology, energy issues, and the politics of petrodollars.

In the review held at Tulane in early 1977, the occasion allowed guest jurors Paul Rudolph of New York, Michael Graves of Princeton, and Craig Hodgetts of Los Angeles, to present their own relative positions through public lectures and interaction over the student projects. What the students saw was the variety of criteria used in evaluating work today, and a certain incompatibility of positions held by architects separated in their careers by only a decade.

Rudolph, ever the master of a public appearance, was the redoubtable professional, knowing how to command attention even as others spoke; Graves was the teacher, the one whose own position was established while still being close to the struggles of the students; Hodgetts, perhaps closest to the students, unsure about what "architecture" is and less able to categorize individual gestures. Hodgetts was of the generation at Yale immediately after Rudolph, and Graves was of the generation of young architects confronted by the milestone Rudolph projects of the mid-1960s. Rudolph himself was a kind of litmus. He observed: "I'm from another time," and he hadn't been in schools in a decade. Concluding his remarks, he said there is a severe generation gap, that students aren't interested in the process of building, and that their images were a rejection of his generation's concerns. The value of the T.R.A.C. meet lies in these revelations and the dialogue among generations—perhaps only possible today in the schools of architecture.
[Peter Papademetriou]

Treasures of the Prairies



Walter Burley Griffin's Student Union Building, Lucknow University, India, 1937.

Courtesy of The Art Institute of Chicago.

An opulent bank teller's grille by Sullivan? A luminous pastel of an interior by Wright? A monumental light standard by Purcell & Elmslie? Which of the 250 richly assorted Prairie School items would you most want to steal from the current exhibition at the Milwaukee Art Center? Among all the architectural exhibitions unfurling from coast to coast, this one probably ranks first in numbers of beautiful artifacts.

On view until January 8, the exhibit is a project of the Art Center's newly established Prairie Archives, Brian A. Spencer, AIA, curator, with support from the National Endowment for the Arts, the Wisconsin Arts Board, and the Affiliated State Art Agencies of the Upper Midwest, and several private benefactors. Its ponderous title—"An American Architecture: Its Roots, Growth and Horizons"—betrays a high-minded intention to trace the course of the "democratic" indigenous style that flourished in the Midwest from the 1880s through the early decades of this century and ultimately affected the world.

In fact, the show dismisses the "roots" with only a few photos of works by Richardson and Furness and presents very uneven "horizons," including the predictable self-imitation of Taliesin Associated Architects, some good drawings by Bruce Goff that merely hint at his production, some Lloyd Wright *(fils)* drawings that seem pallid compared to his work, and a mixed bag by lesser known architects whose relation to the Prairie School ranges from too close to too remote.

The central, "growth" portion of the show is what really matters, and for this an extraordinary variety of items has been gathered from dozens of collections all over the nation. There are clusters of related elements, such as windows, terra cotta ornament, chinaware, and a chair from the Imperial Hotel in Tokyo by Wright—or his drawings for various interior aspects of the Dana House. Vibrant theater posters by Alphonso Iannelli reveal a talent that was not limited just to sculpture for Wright buildings. A purely decorative painting on silk by Marion Mahoney Griffin sheds new light on her talents. Numerous drawings of furniture, light fixtures, and wall treatments by George M. Niedecken (and the subsequent firm of Niedecken-Walbridge) show a full-blown Prairie Style for interiors. Many of the major buildings of the movement are ignored—or alluded to only in photos—but the drawings and objects that *are* here vividly represent this band of Midwest creators.

In connection with the exhibition, a conference was held in Milwaukee October 28–30, cosponsored by the Northwest Architectural Archives of the University of Minnesota. Some 25 architects, historians, and owner-patrons of the Prairie School gathered to exchange views, before an audience of 350 architects, historians, students, and laymen. A manageable portion of the show is scheduled to travel to other cities in the Upper Midwest, where institutions will be encouraged to add local items. [JMD]

Recovery continues through next year

The phenomenal building of single-family homes, which for over two years has led the construction recovery, will lessen, and the commercial/industrial segment of the industry and multifamily housing will assume the lead in 1978. This is the forecast of economist George Christie, vice president of the McGraw-Hill Information Systems Company, at the organization's annual Building Products Executives Conference in Washington, DC. Christie made a similar forecast a year ago, predicting that multifamily housing

[News report continued on page 24]

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News report continued from page 22

would be strong in 1977, but instead one- and two-family-home building continued at a rate more than double that of early 1975. Residential building in 1977 is expected to account for 1.8 million units; the all-time high was in 1972 when more than two million units were produced.

Total construction in 1978 will be $147 billion, an increase of $11 billion (up eight percent) over the current year. Construction in 1977 is estimated around $136 billion—far ahead of Christie's forecast of $114.3 billion. Because new federal policy is geared toward assisting the central city, Christie predicts the Northeast and Midwest will pull ahead firmly with multifamily housing in 1978. The South will hold steady, and the West will slacken somewhat, Christie said.

Speaking for his third time at the conference, demographer George Sternlieb, director of Urban Policy Research Center, Rutgers University, talked about population growth (or lack of it), saying that the drop in the birth rate is going to have a tremendous impact on business: elderly housing and nursing homes will increase; buildings for youth, such as schools, will decrease. "We're just at the beginning of the biggest housing boom this country has ever seen," Sternlieb said, noting that by 1985 those in the age bracket of 25 to 44 years will increase by 16 million. Moreover, the reduction of people in the 18 to 24 age bracket during the same period will produce a "labor hungry" market. The present home-buying trend reflects what Sternlieb calls a panic in which people are buying homes as investment—a trend that will continue, he said. Two-thirds of recent new home sales have been trade-ins whereas traditionally the percentage has been one-third.

George Sternlieb speaking on population growth.

As for multifamily housing, Sternlieb questions why no systematic analysis has been conducted to discover why we're not in a multifamily housing boom and no developers are being attracted to this market. One in six of the federally-insured multifamily housing projects is in default, he said, and across the country there's a "great drive" for rent control which surely will scare away development money.

Other speakers included John O'Leary, head of the Federal Energy Administration, who predicted that by [News report continued on page 26]

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1985 the price of oil will "bring about significant reductions in real disposable income," and concluded, "Energy, if not dealt with, will ruin us." Carter administration officials giving talks this fall were supporting the President's energy program like a Greek chorus.

On the same issue, the Under Secretary of the Department of Commerce, Sidney Harman, said the President is concerned over the intense international competition that will mount over sharp bidding for oil. The President's goal is for solar energy use in homes, schools, and hospitals, and federal buildings, which will mean a billion dollar business for the construction industry, the Under Secretary said.

From the private sector, lawyer Malcolm Prine, head of Ryan Homes Inc., said the energy question as well as consumerism will force builders to select products and materials on the basis of evaluation—not trial and error. This means securing data on man-hours needed for installation, tools and fasteners required, theft damage, and weather characteristics. He also praised prefabrication as "a major contributor to our ability to continue in business in all areas." Ninety-nine percent of everything built is manufactured, to some degree, he said.

Joseph Newman, senior vice president of Tishman Construction and Research Company, agreed that energy is the factor to consider in today's construction market. The marketability of a structure requiring 65,000 Btus per sq ft is better than that of a building requiring 220,000 Btus.

Personalities

Robert Mittelstadt has been named chairman of the California State Polytechnic University, Pomona, school of environmental design, department of architecture.

Peter F. Arfaa has been appointed head of the architecture department of the Evening College, Drexel University, Philadelphia.

Calendar

Dec. 1–23. Exhibit of Charles Pollock sculptures and drawings sponsored by Thonet Industries, at their New York showroom in the Decorative Arts Center. Subsequent exhibits: **Jan. 18–31.** Thonet showroom, Dallas World Trade Center; **Mar. 16–31.** Thonet, Merchandise Mart, Chicago.
Through Jan. 8. "An American Architecture: Its Roots, Growth and Horizons" exhibit, Milwaukee Art Center.
Through Jan. 29. "Dolley and 'The Great Little Madison' " exhibit, The Octagon, Washington, DC.
Dec. 12–13. Program on building energy standards and codes, University of Wisconsin-Madison.
Dec. 12–16. Built-up roofing design workshop, University of Wisconsin-Madison.
Dec. 13–16. "Toward Arcology-Works in Progress," Cosanti Foundation, Paolo Soleri, at Lawrence Institute of Technology, Southfield, Mi.
Dec. 15–Jan. 15. "Gwathmey/Siegel, 24 houses, 1966–77" exhibit, The Institute for Architecture and Urban Studies, New York.
Dec. 16–July 30. "The Decorative Designs of Frank Lloyd Wright" exhibit, The National Collection of Fine Arts, Washington, DC.

[News report continued on page 29]

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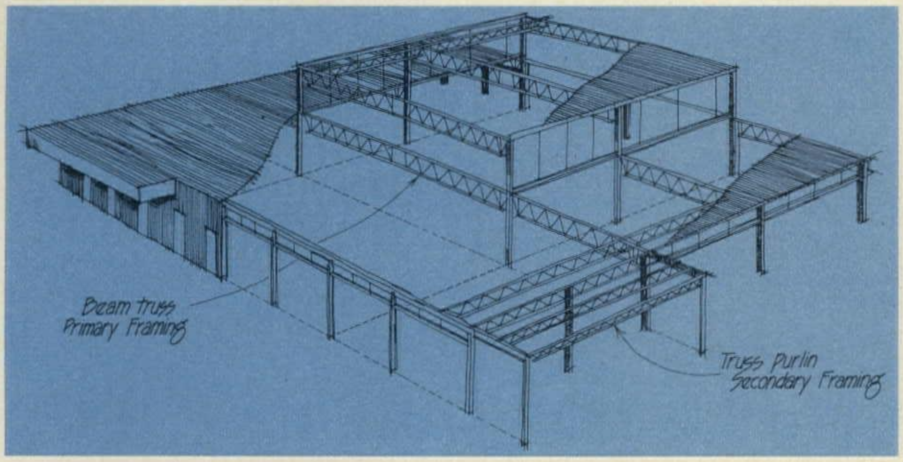

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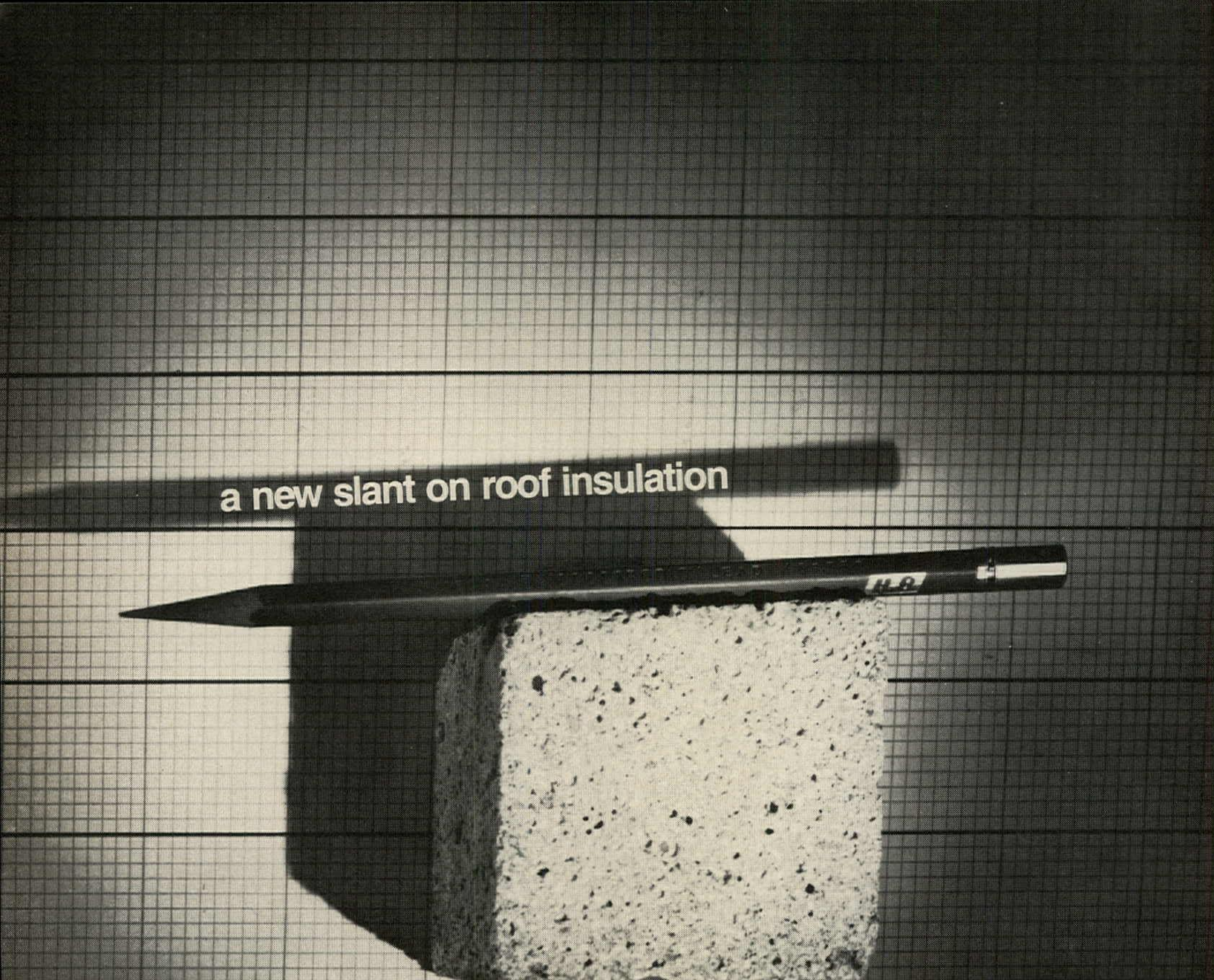

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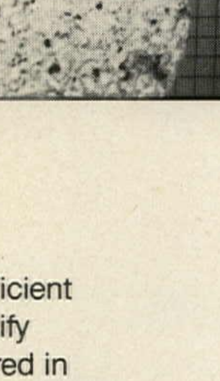

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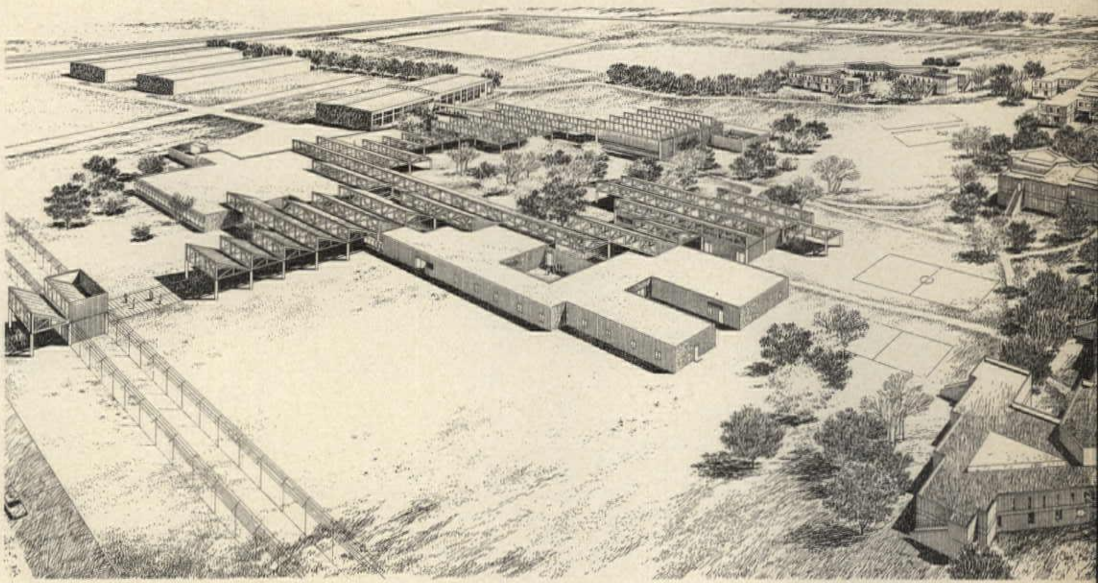
News report

In progress: solar systems



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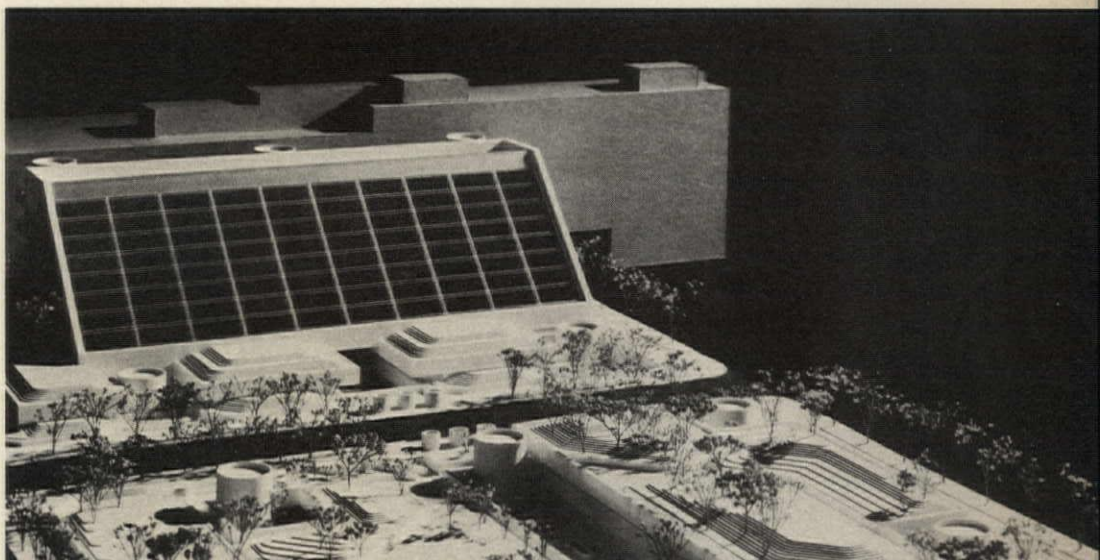

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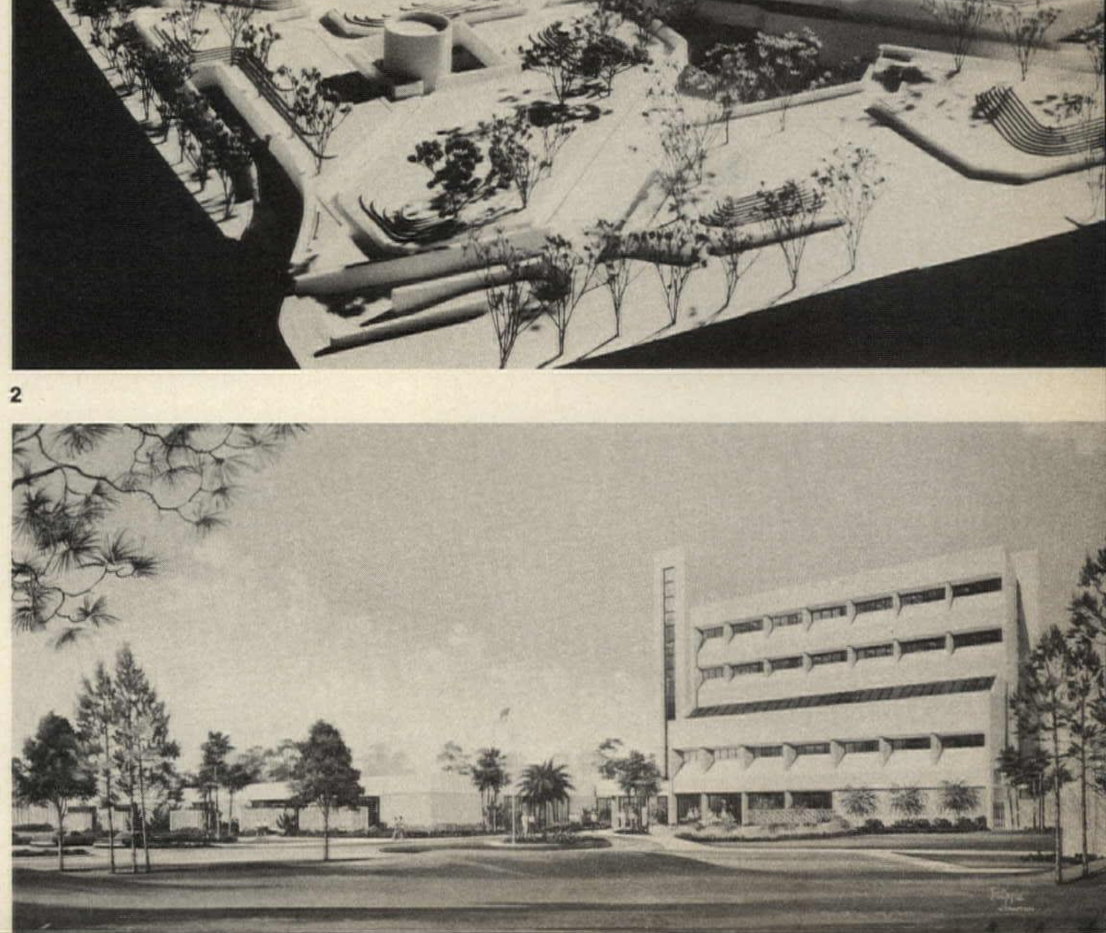

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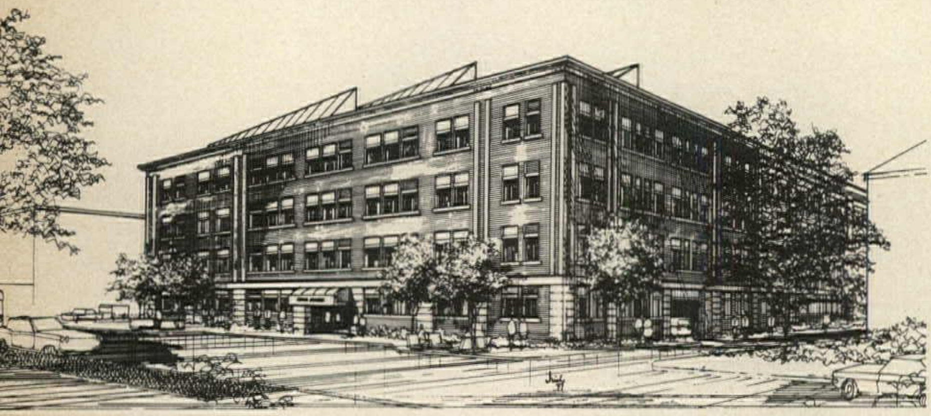
1 Solar correctional community—Caudill Rowlett Scott of Houston is the architectural firm for the Federal Youth Correctional Center, Bastrop, Tx, where a $1.6-million ERDA (Energy Research and Development Administration) grant is paying for a flat-plate solar collector system to heat water, provide heating, and power an absorption type air-conditioning system. Estimates of annual fuel cost savings are $14,000. The complex will be completed in early 1978. Solar consultants are Inter-Technology Corporation of Warrenton, Va.

2 Underground office building—A new $12.7-million state office building for California will be an energy-efficient underground structure designed by Benham-Blair & Affiliates, an Oklahoma City-based firm with offices in California. The design was picked in a competition co-sponsored by the State Architect's office and the State Energy Commission. It also provides for the future building of 40 to 55 dwellings to meet state objectives of a diversity of activities in the Capitol area. The office design reduces energy requirements to less than half the federally prescribed standard. Daylight is achieved through light courts open to the sun.

3 Solar air conditioning—The long-planned $23.8-million Naval Regional Medical Center in Winter Park, Fl, near Olando, will have a solar air-conditioning booster system capable of supplying nearly one-fifth of the peak cooling demand of the facility. The project is a joint venture of Rogers, Lovelock, Fritz, Rogers & Butler; Lopatka, McQuaig & Wall Corporation. The building also will have a solar system to provide up to 95 percent of the hot water supply.



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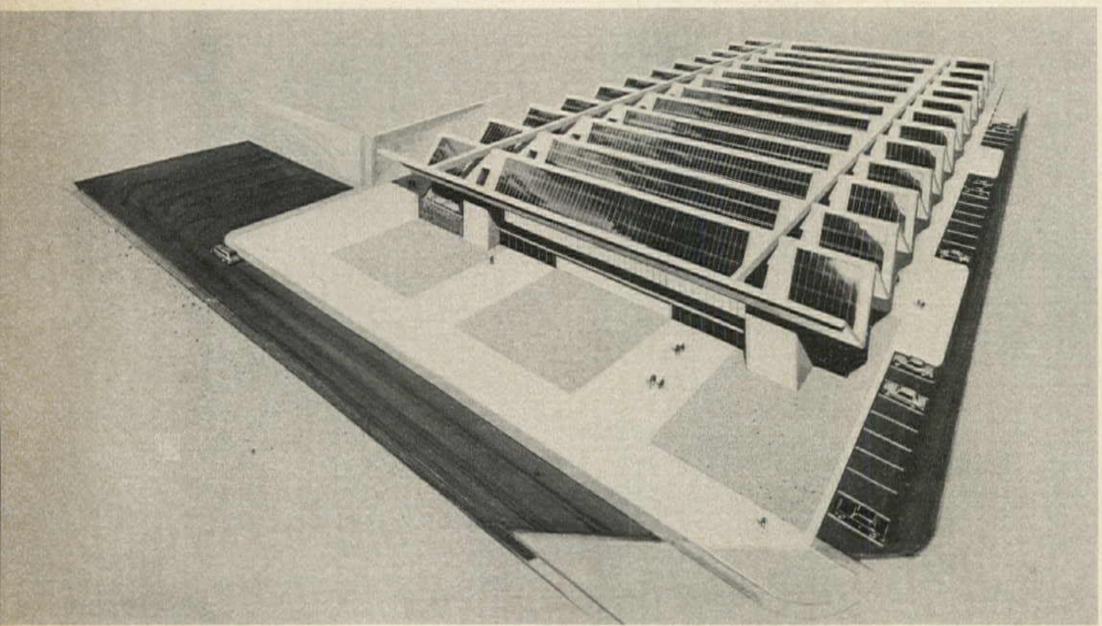

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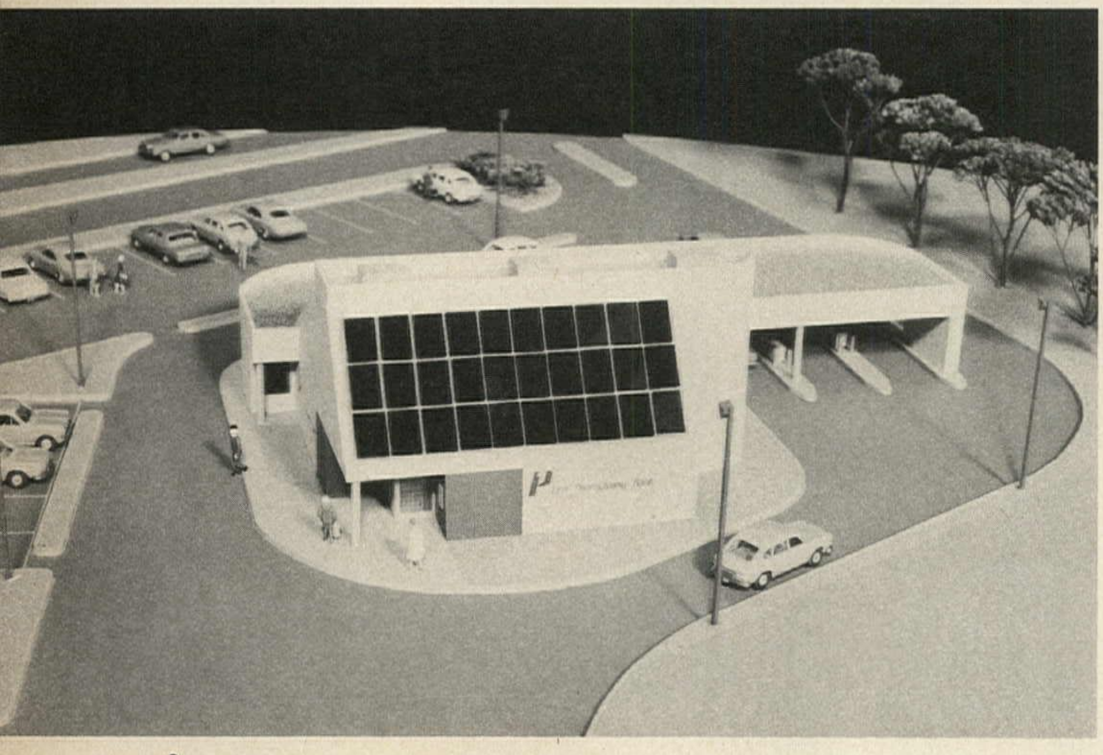

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4 Senior housing/solar project—Going into construction this fall in the 91-unit Oak Park Apartments project for senior citizens in Lewiston, Me. The project, by architects Steffian-Bradley Associates of Boston, is being financed by the State Housing Authority and utilizes a 50-year-old commercial building covering half a city block. Leftover interior space in the building was converted into a central court, and some of the units overlook the parklike setting. A $99,400 grant from HUD will be used to fit the building with solar collectors from Sunworks that will provide up to 84 percent of the building's hot water and some space heating. Solar consultant is Massdesign of Cambridge. The $2.6 residential project will be finished in late 1978.

5 Commercial solar application—A US Army Corps of Engineers project for the Saudi Arabian government will include a solar system said to be the largest commercial application of solar heating in the world to date—a cost-effective system, not a demonstration project. Architects for the campus of buildings is Sverdrup & Parcel of St. Louis. Construction is scheduled to begin in January. The system will heat 36,000 gal of water per day. All the collectors will be on a large field house; pylons supporting the roof will conceal the water storage tanks.

6 Branch bank—The branch of the First Pennsylvania Bank under construction at East Norriton Township, Pa, will be equipped with 27 solar collectors that will provide 60 percent of the heating requirements of the 3200-sq-ft building. Architects Goldfarb & Associates of Philadelphia specified collectors by the Daystar Corporation. The building structure is steel frame clad with insulated metal panels painted on the interior as finished wall surface.


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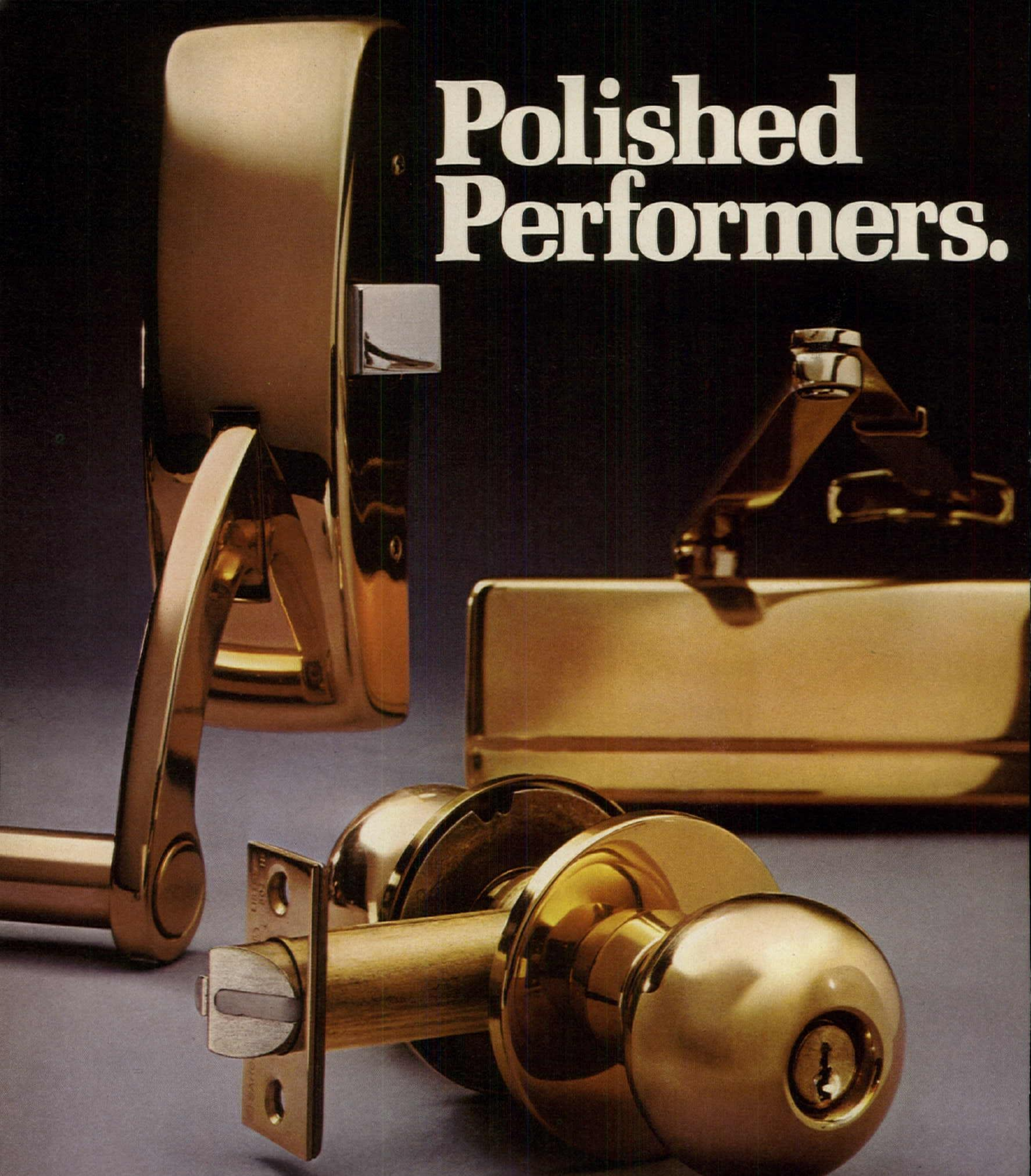


Introduction

Common grounds

Three straightforward realistic schemes, one a school, another infill housing, the third a community center reflect architects' commitment to working with various community groups to create a responsive architecture with urbanistic, economic, and social implications.

History has not yet confirmed the Modern Movement's conviction that the new architecture would transform society. Indeed few architects today would argue a causality theory between good architecture and good behavior. Nevertheless architecture does play a recognizable role in the process of social interaction—the nature and quality of which interaction architectural variables clearly affect, and even determine. On the following pages *Progressive Architecture* presents three projects, one a school, another a low-rise high-density infill housing scheme, another a community center, that all are physical forms operating influentially within a matrix of socially based conditions.

As designed objects they have become vehicles through which activities are encouraged that bring people together, reinforce community spirit and pride, and generate a commonly shared sense of urban life. These architectural entities contribute to the social and physical milieu by such direct gestures as linking one event to another with the design of a passage or spine, or by creating a particular kind of urban space or place—such as a plaza or court—that attracts a public and makes it pause. They in turn make gestures to spaces and places outside their perimeters. In so doing these buildings foster a sense of community that could affect the economic well-being of the neighborhood. The manner in which they anchor the neighborhood with a felt physical presence and particular focus presents the possibility of spurring new development, new interaction, other physical manifestations, and so on.

Not surprisingly in each case, whether Boston's South End or residential downtown Toronto, all projects involved the participation of the community in their planning and design. These buildings are not space ships landing in a certain setting with little or no attachment to an existing framework of meaning. They all respond to explicitly stated realistic needs, desires, values—and constraints.

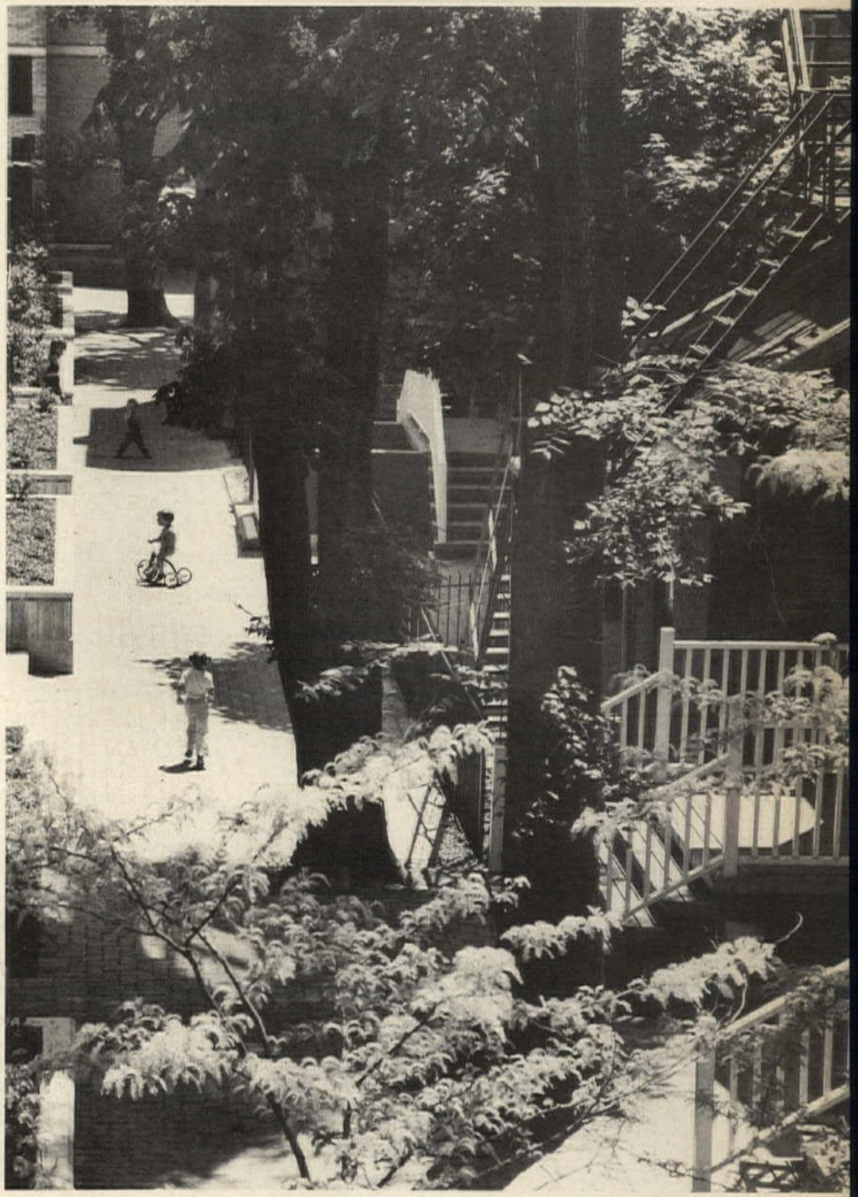


Photo: Ian Samson

Public spaces, private places at Dundas-Sherbourne housing.

The buildings may lack perfection in their sociologically based problem solving. Absent here is that singularity that would qualify them as works of art or landmarks in architectural history books. They in fact betray a now conventional formalistic thinking of a brutalist aesthetic, softened in one or two instances by the influence of Louis Kahn's thought. Their masonry and concrete forms represent the straight stuff of architectural effort, as "designed" as a good pair of walking shoes. Obviously they do not comprise the entire range of this kind of effort, but they do stand as exemplary straightforward efforts on the part of their architects to respond to multiple needs in a pragmatic but humanistic way. The leading question one would raise about the solutions concerns just how specifically they employ the historical/vernacular design codes familiar to their users. Other buildings explore this issue more directly. Still these deserve attention for their empathetic endeavors. Because of the political, economic, and social context within which they were conceived, designed, and executed, P/A's presentations stress those facts in particular. The buildings' *physicality* has to be understood and appreciated within the larger network of interacting forces. [Suzanne Stephens]

Josiah Quincy School, Boston, Ma.

Making place

In Boston's South Cove area, The Architects Collaborative, along with Tufts New England Medical Center and local communities, have cooperated to create an unusual and special school.

The Josiah Quincy Community School in downtown Boston's South Cove section is the result of one of the longest and most complicated planning processes in the history of an elementary school. But looking at the finished 820-student kindergarten-through-fifth-grade facility today one would hardly be aware of that. What one would see is one of the most innovative schools in recent years—a school so responsive to its students and its community, so well organized and so vigorous in expression, that it is hard to believe that it was first conceived in the early 1960s and developed since that time with the involvement of a number of different—and sometimes opposing—groups.

Quincy School does not look or perform like the standard, watered-down version that normally results when many groups and organizations are involved in a project over a long period of time. In fact, this school could be seen as a model of how a broad collaboration of groups can achieve something that might not have been possible in the usual, fragmented way. Credit for this must obviously go to The Architects Collaborative, which transformed years of complex planning concepts and studies into the final design of the building. But in its long and complicated planning stages, credit must also go to Tufts New England Medical Center planning office and to its director Hermann Field who, independent of that office, also directed the Quincy School Project for eight years. Finally, the Quincy School Community Council, composed of the three neighborhood groups that would use the school, was intensely involved over the years; the Council heavily influenced the program's philosophy and participated in the architect selection process and in the subsequent design sessions (and it still maintains an office in the school today).

Long-range planning

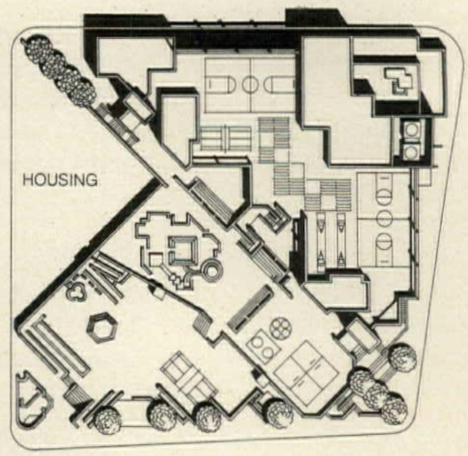
Physical planning for Quincy School actually began back in 1961 when Hermann Field, as director of Tufts Medical Center planning office, was commissioned to study whether the Center should remain in the city or move to a more spacious location outside. He determined that the Center should stay; that it would be uneconomical to abandon the existing plant and other land already acquired, and that a move would have an adverse effect on community health programs the Center had already planned. In addition, the concurrent completion of the Massachusetts Turnpike almost next to the Center made it easily accessible from all of New England.

If the Center remained in the South Cove, though, in addition to its own expansion, it would have to involve itself in the area's renewal. Because of the area's strategic location and the extent of large-scale building that would have to take place, government agencies would also have to be involved. Although the Boston Redevelopment Authority had no immediate plans for the area, since it was not critically blighted, the BRA was nonetheless willing to cooperate with the Center, which could offer the city $2 million in federal renewal credits as a result of its recent land acquisitions. A renewal program was drawn up, assuring local residents that the Center would not expand at their expense. BRA submitted the program to the federal government, which approved it in 1964.

The overall plan called for replacing an elevated rapid transit line with a new subway with a stop in South Cove (which is almost completed). The plan also called for reshaping the poor street pattern, and for replacing the Medical Center facilities and expanding them over a several-block area organized in horizontal layers. When this plan is implemented, it will require that part of the ground level of the medical complex be devoted to taxable commercial uses and other community facilities.

The key element

In 1965 The Architects Collaborative was chosen as the firm to carry out the building



SITE PLAN ↔N 50'/15m

A northeast-southwest pedestrian spine interrelates academic and community facilities within the building and also forms strong connectors to the communities the school serves.

plan. The key element in the whole scheme was the new community school, which was to replace the old Quincy School that dated from 1847, and which was completely inadequate for innovative educational programs. The school was the key element because, as Hermann Field explains, "When you're putting a neighborhood back together the first thing you ask is how do you get the people back. The answer to that is with a school, and then you must ask what is an urban school in a down and out neighborhood, and what should be in it."

What began to evolve was a new concept for an inner-urban school in which the educational component became merged into a total resources center for the medical center community and the multi-ethnic residential neighborhood. Physically, the school took the form of a multi-use facility which, in addition to providing a setting for teaching, also became the site for community recreation, which had been completely lacking, for a neighborhood "little city hall" (a venerable Boston institution), a day-care center, community activity and agency spaces, a school, and a neighbor-

One entrance to pedestrian spine is at southwest corner (above) under play area (below), where school building cascades down to the street.

At the southeast corner (above), are kindergarten play space, entrances to the community health clinic and entrance for handicapped.

Josiah Quincy School

hood health clinic operated under the auspices of the Medical Center. Within the school, four parallel sub-schools were conceived as settings where exceptional children, whether physically, emotionally, or mentally handicapped, would be integrated as much as possible into the normal life of the school.

Quincy, then, would not be an ordinary school, and it would certainly not be the type usually built in Boston, but the city's School Department, Public Facilities Department, and Department of Health and Hospitals all agreed to go along with it. Funds to study what this complex building might be came from a grant for innovative school planning through Title III of the Elementary and Secondary Education Act. And also, because of their interest in the project, further grants were supplied by the Ford Foundation's Educational Facilities Laboratory and the Carnegie Foundation. And over the eight year development period, other grants were given by other funding organizations.

The original scheme

After several years of study and planning and countless intensive sessions with community groups, a scheme for the school finally emerged in the form of a podium with a mid-rise and two low-rise housing towers on top. Community facilities would occupy the first floor of the three-story podium and the school would be in the top two floors, with its outdoor play space on the podium roof. The mid-rise housing tower was placed at the northeast side of the podium, where it would not cast shadows onto the play area. Original plans called for the towers to comprise 150 units for the Tufts Medical Center's married students, but the Chinese community opposed this scheme, threatening to block the whole project if it could not have the housing for itself. But for its own reasons, Tufts determined it could not go ahead with the housing.

During this time the design of the school was progressing, and eventually a time came when the school would have to go ahead without the housing. At that time the decision was made to separate the two, and leave a parcel of vacant land on the northeast corner of the site that could be developed by a private developer later. The seemingly strange shape of this triangular plot was determined by three factors: its northeast location, the new subway under the northwest corner, and the fact that the community-oriented pedestrian street that runs diagonally through the building at ground level was already fixed. The housing that occupies the site today turned out to be an agreeable solution for all of the parties concerned. It helps to remedy a serious housing need for the Chinese elderly, whose numbers grew more than had been anticipated. The housing tower designed by the Boston firm of Jung Brannen Associates to fill this odd-shaped plot is finished in the same buff-

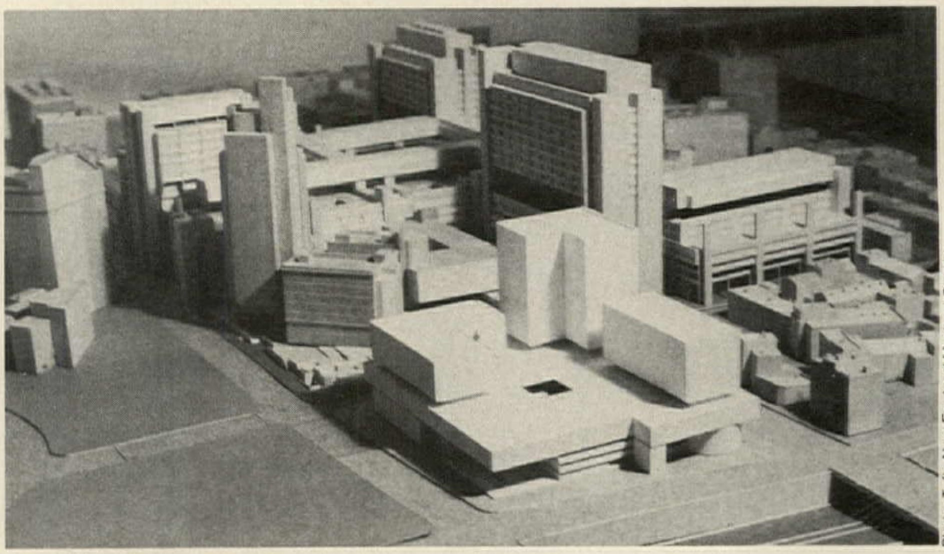
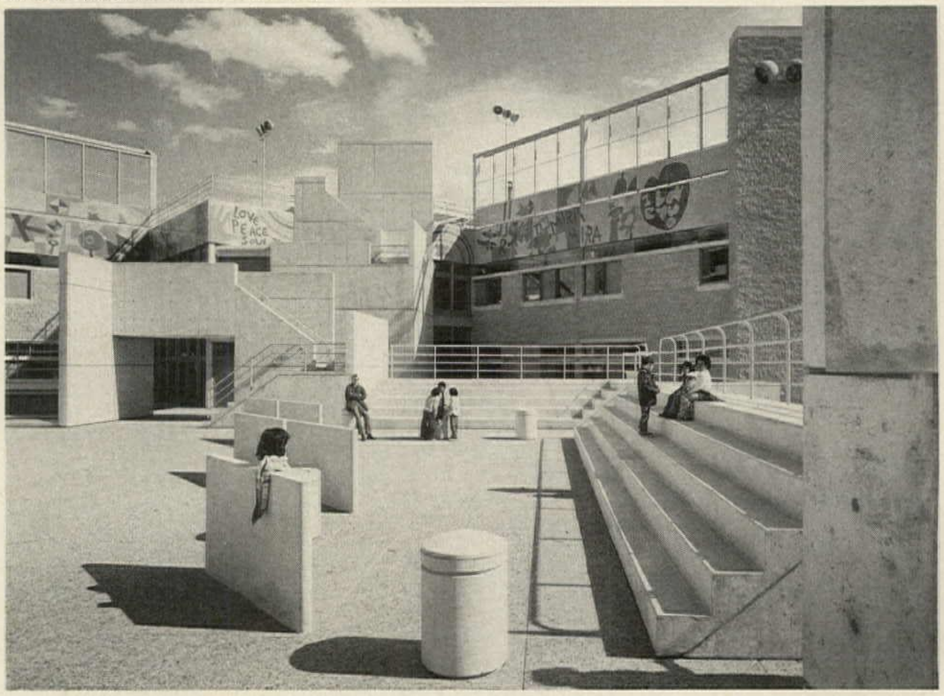


Photo: Tufts New England Medical Center.

In original model for Quincy School (above), housing was to be atop flat rooftop play area.
As built, play area is still on rooftop (below), but in levels above nonacademic area.



colored split-face concrete block as used for walls of the school.

The final scheme

After the school and tower were separated, it was no longer necessary to maintain the tower and podium scheme, and it was at this time that TAC developed the four-level terraced design that was finally constructed. The school occupies a 62,000-sq-ft plot on a square, flat, 2.3-acre site in a neighborhood where run-down, small-scale residential and scattered commercial structures have largely been replaced by mid-rise housing and some institutional facilities. The three racially and economically mixed communities that use the school are Chinatown to the northeast, Bay Village to the northwest, and Castle Square to the southwest across the Massachusetts Turnpike.

In the intense and direct response to its setting, the Quincy School becomes an especially good neighbor, and in doing so it radically breaks with the traditional, institutional form of the school. Inside, the pedestrian spine runs diagonally across the square site from the southwest corner to the northeast corner to form a strong connecting link between the communities in those directions. On the northwest side of the spine, opposite the academic portion of the building, the multi-level terraced playground spills down to the street in the direction of the third community.

All of the community and shared facilities are along the pedestrian spine under the play area and academic portion, but the community and school health clinics and the special education department all have auto drop-off entrances at the east side of the building. The two top levels southeast of the spine form a triangular structure where the four open-plan sub-schools occupy two ends of the triangle at each level, with the media center between them. The kindergarten is on the same levels at the other point of the triangle, where it has been given two levels of private play space at the rear of the building.

Mixed-use control
Access to the sub-schools is through their individual "house" stairs, which can be entered at the pedestrian street or from the schoolyard play space. Each stair and house is identified by a different color and symbol incorporated into a general system of graphics displayed initially at street level and then again at each sub-school entry. Throughout the building, a well-planned entry and exit control system allows a great variety of use of the facilities by the school or community groups, together or not at different times of the day or night. When the students take swimming class, for instance, the pool area cannot be entered other than through the school portion of the building; at other times the pool would be accessible from the pedestrian spine. Essentially, this variety of control is achieved by having the school spaces vertically zoned and the community spaces horizontally zoned, so that opening or closing off a staircase on the spine usually accomplishes the task.

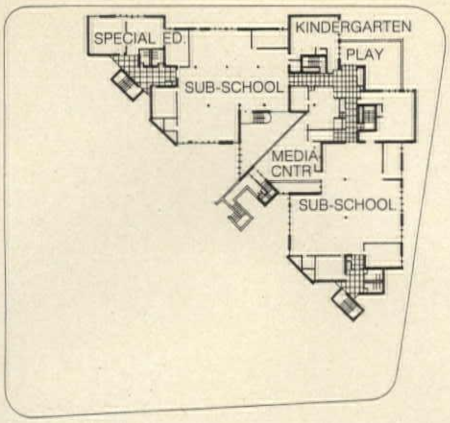
The idea of roof-top play surfaces, parts of which are also designed for controlled access, was incorporated because of the lack of open land. But to make this resource available to the public, and to make the public aware of it, it was critical that the roof surfaces be brought down to the street level. In this sense, notes project architect Martin Sokoloff, the building was envisioned as a terraced cityscape where movement would be encouraged up from the street at all times of day.

Structure and materials
The structural system for the academic portion of the building follows the Bostco (Boston Standard Components) system, which has been adopted by the city of Boston for the construction of its new schools. This approach establishes relationships between academic requirements, structural spans, and mechanical zoning that bring the benefits of mass technology, control and contain costs, and also provide for flexible spaces.

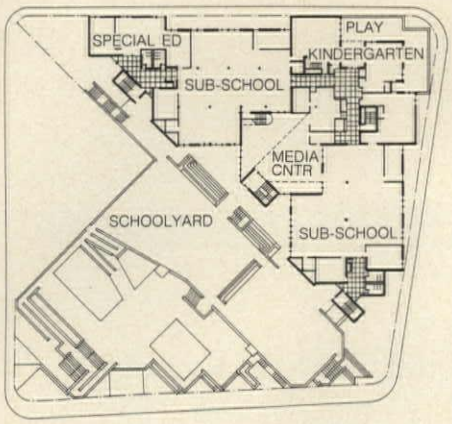
In the academic part of Quincy School, the structural system consists of uniform-depth wide-flange beams and purlins; the beam spans are multiples of a basic 5-ft planning module, up to a maximum of 30 ft. Floors are steel deck with concrete topping; concrete-filled (for fireproofing) steel-tube columns are exposed and painted. On the opposite side of the pedestrian spine, long-span, precast, prestressed tees form the play deck roof over the gym, lecture hall, and garage, where the columns, beams, and walls are poured-in-place concrete. Exterior walls of the academic portion are buff colored split-face concrete block. Elsewhere, the masonry, poured and pre-cast concrete have been color-controlled to make a uniform background for the high frieze of intensely colored porcelain-enameled panels that Boston artist and printmaker Maria Termini designed from drawings and paintings made by children at the old Quincy school. Inside, typical school drabness also vanishes. In addition to the

In the open-plan sub-schools (above), movable partitions allow for great flexibility of space. School is not always used according to open-plan methodology, but it has that potential.

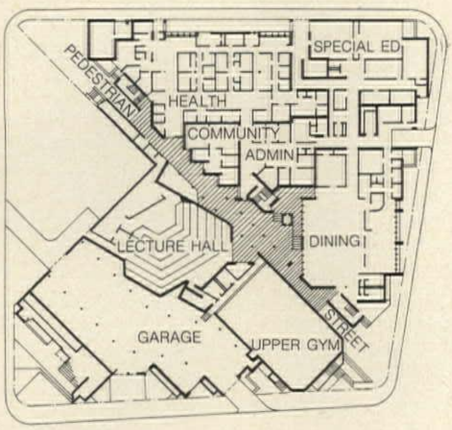
Colorful graphics brighten the long, interior pedestrian spine (above), which leads to all the academic spaces, shared and community spaces, such as the community clinic (below).



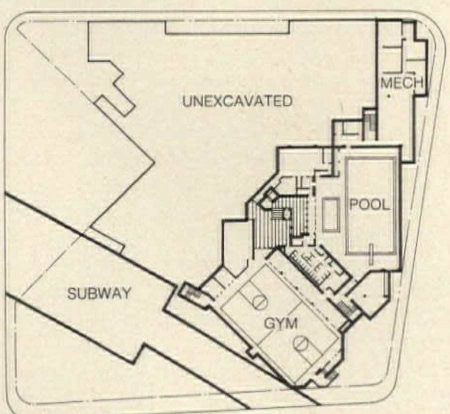
FOURTH LEVEL



THIRD LEVEL

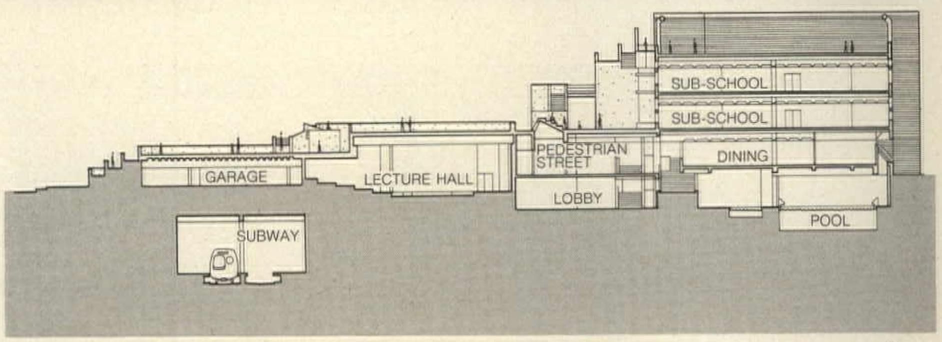


SECOND LEVEL



FIRST LEVEL ←N 50' 15m

The media center (facing page) is a brightly colored two-level space dressed up with playful graphics; two levels of four sub-schools flank it. The kindergarten is on two levels at the back corner of the school, where it is given two levels of outdoor play space (above right).



SECTION 40' 12m

spritely colored graphics in the sub-schools, the thematic use of color, symbol, and image is seen throughout the rest of the building in the form of graphics, banners, and murals.

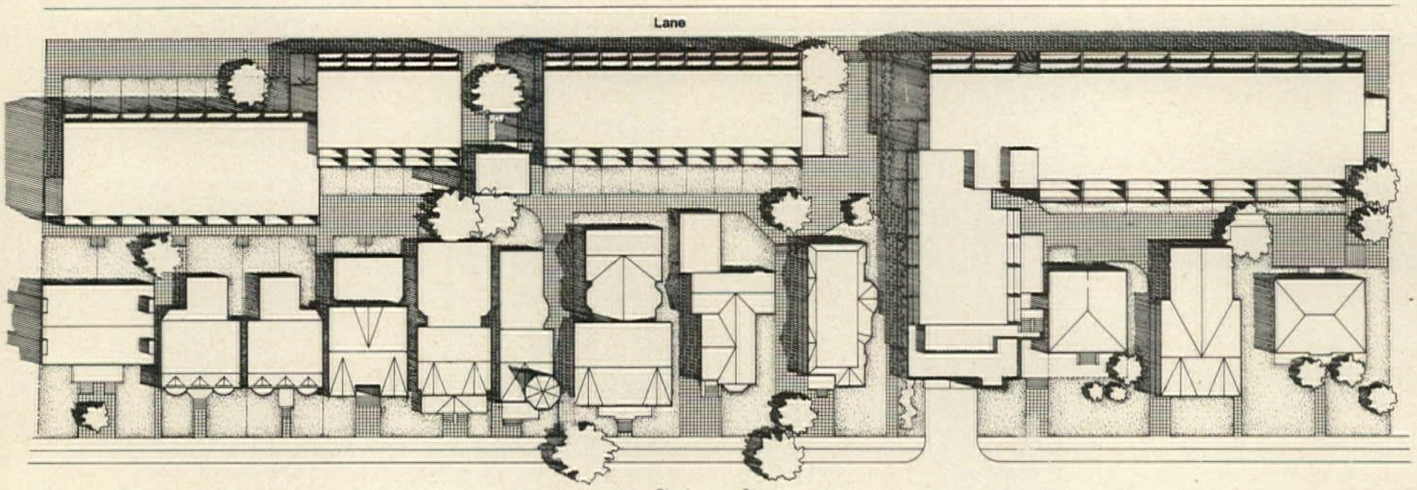
Although Quincy School is not being used today according to the strictest open-plan methodology (sometimes rows of chairs are lined up in one-room schoolhouse fashion), the fact that the design has not locked teaching methods into one system is even one more plus for the school. If Quincy was a long time in coming, there seems to be little question now that it was well worth waiting for. When any building responds to its surroundings to the degree that this one does, and then becomes such a special place in its own right in that setting, it is indeed rare. When that building is allowed to grow out of a naturally bureaucratic large city school system, it is even rarer. [David Morton]

Data

Project: Josiah Quincy Community School, South Cove, Boston, Ma.
Architects: The Architects Collaborative; H. Morse Payne, David G. Sheffield, principals in charge; Martin Sokoloff, project architect; Larry Schwirian, Gary Moneyhun, Dorte Kaufmann, Bill Feldkamp, Bill Higgins, team members. Concept planning and project development: Hermann H. Field, planning director, Tufts New England Medical Center (1961–72).
Program: K-5 community school incorporating extensive and shared facilities.
Site: inner-urban, flat 2.3 acres with buildable area of 62,000 sq ft in renewal area of scattered commercial, residential, and institutional uses.
Structural system: Bostco (Boston Standard Components) system: academic portion: steel frame with metal deck and concrete topping; non-academic portion: pre-cast pre-stressed tees with poured-in-place concrete beams.
Mechanical system: heating, ventilation, and air conditioning by single duct variable volume induction system; variable volume induction reheat units at perimeter areas and top floor; each unit provided with energy-saving economizer system of control. Cafeteria and auditorium have low-velocity constant-volume single-duct systems. Gym and lockers have low-velocity multizone provisions for future air conditioning. Pool is heated and ventilated by single-duct constant-volume system with energy conservation heat exchanger.
Major materials: exposed structural frame; split-face concrete block with precast lintels and sills; concrete block (see Building materials, p. 102).
Consultants: Gary Freiburg, TAC, landscape; Sherrye Caplan, TAC Interiors; Valerie Pettis, TAC Graphics; Tom Murphy, TAC Supervision; R.G. Vanderweil, mechanical engineers; Souza and True, structural engineers; Bolt, Beranek & Newman, acoustical; Intermedia Systems Inc., Maria Termini, exterior artwork.
General contractor: Franchi Construction Co.
Client: Public Facilities Dept., City of Boston.
Cost: $8,825,000; $60 per sq ft including site and rooftop play development.
Photography: Steve Rosenthal, except as noted.

Dundas-Sherbourne Housing (Sherbourne Lanes) Toronto

Housing as matrix



Housing, architecture, space, place are all variables that coalesce with varying degrees of success in this project by Diamond & Myers.

Compelling arguments about the advantage of low-rise housing to the contrary, it appears that towers have maintained a too visible lead. P/A has argued before (March 1976 issue on housing) that both high-rise and low-rise housing have their places depending on context, occupant type and, of course, design execution. The problem remains that one solution—the tower—is often blindly adopted regardless of circumstances. For this reason Dundas-Sherbourne housing in Toronto represents a significant move. It is the sort of response that is absolutely appropriate to its circumstances—an infill scheme of 381 units averaging 300 persons per acre, integrated with a row of 19th-Century houses.

Yet a high-rise project was slated for the site. A series of dramatic events involving the residents of the stable low-rise neighborhood, a developer who fully intended to bulldoze the block, and a reform-minded city brought about the low-rise alternative.

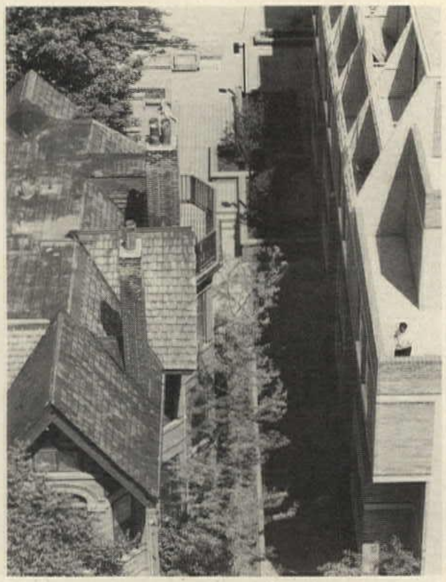
In this low-scale residential area, slowly being encroached upon by high-rises, the scheme by Diamond & Myers not only maintains a social matrix, but anchors the physical fabric of the neighborhood. Urbanistically, the scheme also illustrates the kinds of spatial relationships that can be created between new and old architecture. In this case the new architecture serves literally as a backdrop for the old houses facing onto Sherbourne Street, the major boundary. The new housing edges a back alley parallel to Sherbourne, yet can be entered via paths and alleys from the street. The existing housing, gardens, and trees thus act as a semi-permeable entrance screen to reduce perception of the larger-scaled mass behind the older row.

Urbanistic strengths

The very articulated and intricate massing, detail, and texture of the older houses offer a visually rich boundary that constantly refers the user of those spaces to Toronto's urban residential past. It also interacts with the new architecture to soften it visually. The open space existing between and around the old houses—small front yards, narrow side yards, deep gardens—helps reinforce that scale and articulation. The architects capitalized on that variety of gardens and paths by creating a slightly larger version of open space 35- to 48-ft wide between existing housing and infill housing. The compactness and variation of this meandering linear space, differentiated with existing trees, abundant planting, and older architecture, create a special sense of place.

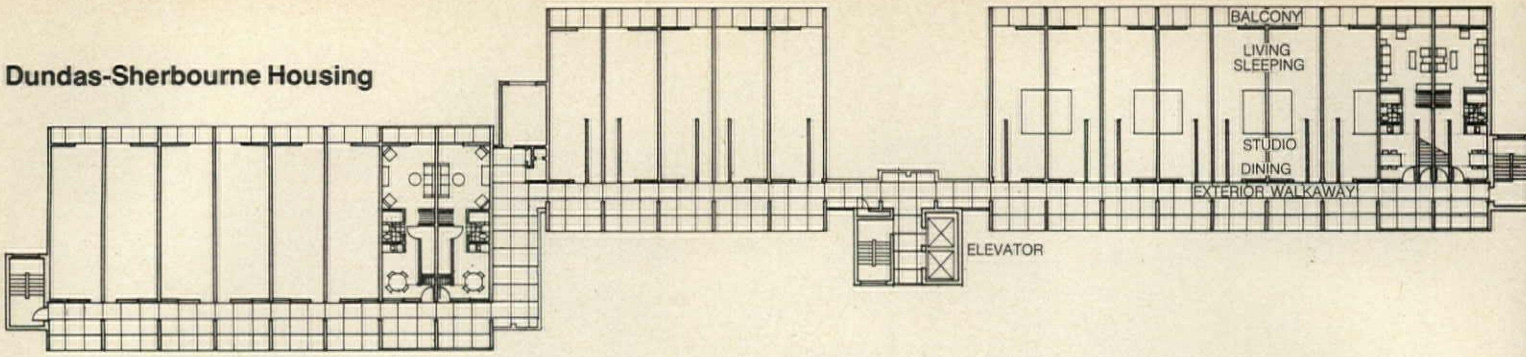
This interaction is enriched surprisingly by streets in the air—that old Modern Movement standby that has often been applied with unsettling results in large-scale housing projects. But the Dundas-Sherbourne application avoids some common pitfalls. Decks are only ten-ft-wide and continually relate to the closely knit linear open space. In fact the walkways enhance the experience of the mewslike space below by bringing the resident out again into this zone between old and new housing. Above the ground, residents move along paths that look into tree branches and older rooftops, in a confrontation much like the compact residential roofscapes of French and Italian residential quarters. Thus the scale probably approximates more closely the earlier Modern deck schemes designed for low-rise units than the later transmogrified versions. The only real question these decks raise is their desirability on a snowy day when the temperature is 10F below. Nevertheless in nice weather the advantages are convincing, not only spatially but in terms of the sense of turf that occupants can exercise over this semiprivate domain.

In a sociological sense, the differentia-

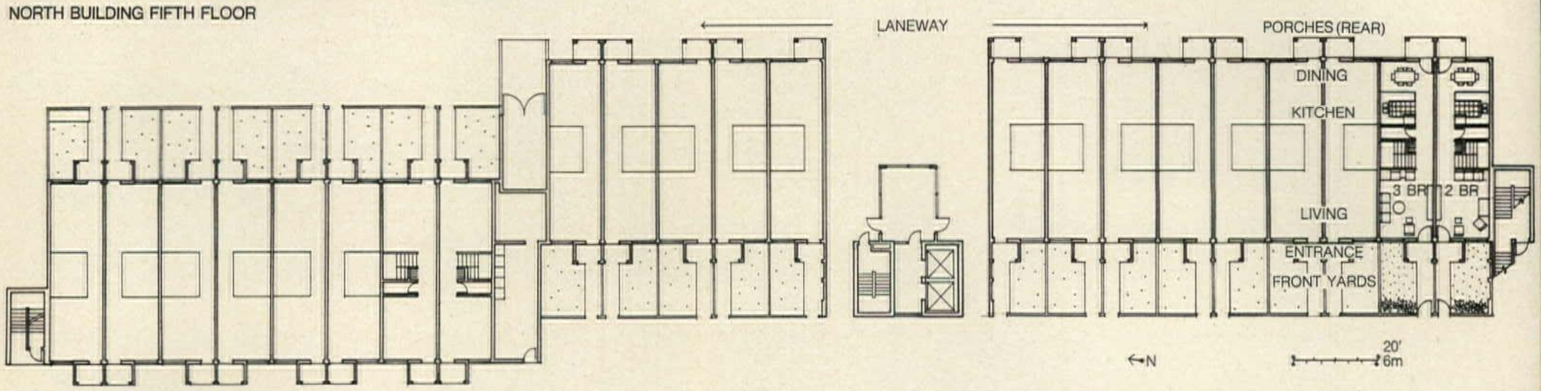


Pedestrian path feeds through site between backs of old houses and yards of new infill housing.

Dundas-Sherbourne Housing



NORTH BUILDING FIFTH FLOOR



NORTH BUILDING FIRST FLOOR

tion of space, from the most public (the main street) to semipublic (the linear open space) to semiprivate (gardens, balconies, decks) to private (apartments) gives evidence of the experiments undertaken by Diamond & Myers with various low-rise schemes. While this particular solution answers a sociologically based hierarchy of spaces, it also translates that hierarchy into a consistently varied architectural solution that works in terms of horizontal movement on several planes (ground, third, and fifth levels). Vertical movement by elevators and stairs is much more perfunctory, although the glimpses of trees and landscape introduced into the stair towers through large windows enhances that experience too.

If the outdoor spaces and circulation promote a sense of architectural place, much of the credit must of course be given to what was existing—houses and trees—and the wisdom of Diamond & Myers in leaving well enough alone. One house, evidently in bad condition, was torn down, but the remaining 17 were saved without being "white-painted" or renovated into the super-chic. They were subdivided into 74 flats and duplexes. Only 16 trees out of 45 were removed for construction.

Architectural questions

As an entity the new building acknowledges and reinforces the perceptual experience of this space through such devices as staggering the massing of the blocks, articulating the units through the expression of the plan on the elevation, pulling one wing perpendicular to the rest through to the street, stepping back top floors to reduce the scale.

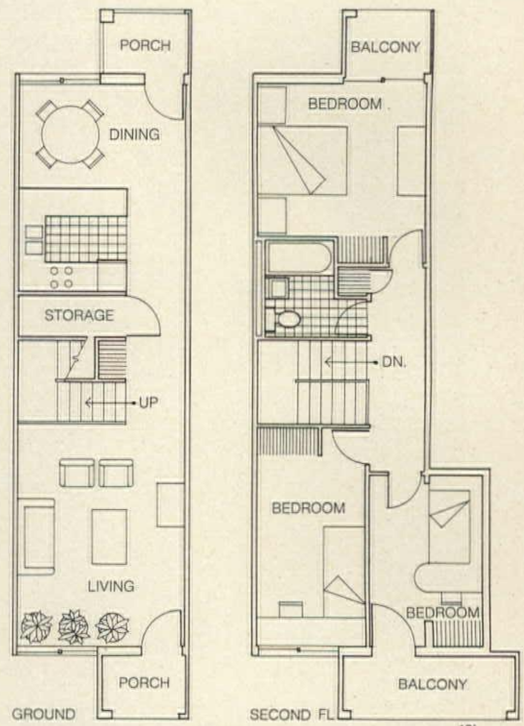
The exposure of the edge of the concrete floor slab and the canting of concrete partitions on the elevated walkway and balconies further diminishes the sense of bulk. A mottled buff brick with flecks of reddish hue and red brick trim at the floor lines, railings, and window sills, relates visually to the Victorian buff and red brick architecture of houses and churches nearby.

Yet the housing could actually have been much more *contextual* in its formal treatment. Its rigorous geometry, its brutalist no-frills aesthetic do not respond as closely to the 19th-Century architectural assemblage in front as they should for its size. Other architects are bravely and brazenly experimenting with devices alluding to past architecture that no longer stop with the color of the brick or volumetric massing. Arches, gables, finials, bowed windows, moldings, and other ornamental devices can scale and mesh new architecture to old without plunging into the *retardataire*. Recent projects by Barton Myers, who has established his own practice since the project was designed, illustrate an attitude more in line with this thinking. In that respect, this housing appears to be the victim of a time lag.

At any rate, the elevation facing the mewslike open spaces is best. Where the new structure obtrudes directly on one's perception, at the parking garage and at the entry between two old houses on the Sherbourne Street, the juxtaposition is harsh. The plain architecture appears even clunkier in contrast with the housing than if it were elsewhere. Similarly, the elevation facing the back alley assumes a ponderousness not adequately toned down by the volumetric massing. Here the density of the complex becomes assertive.

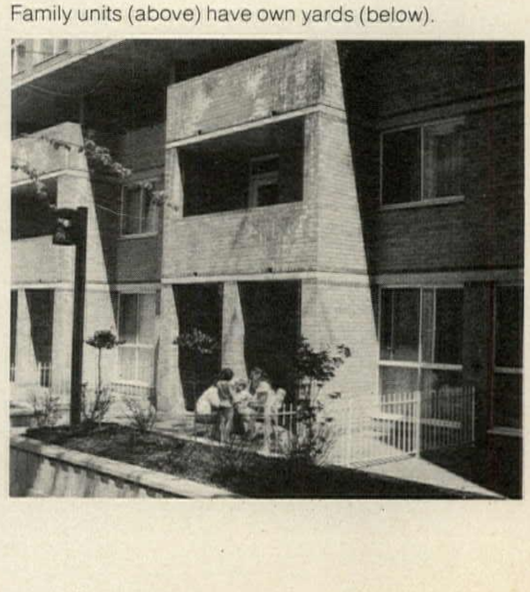
Programmatic concerns

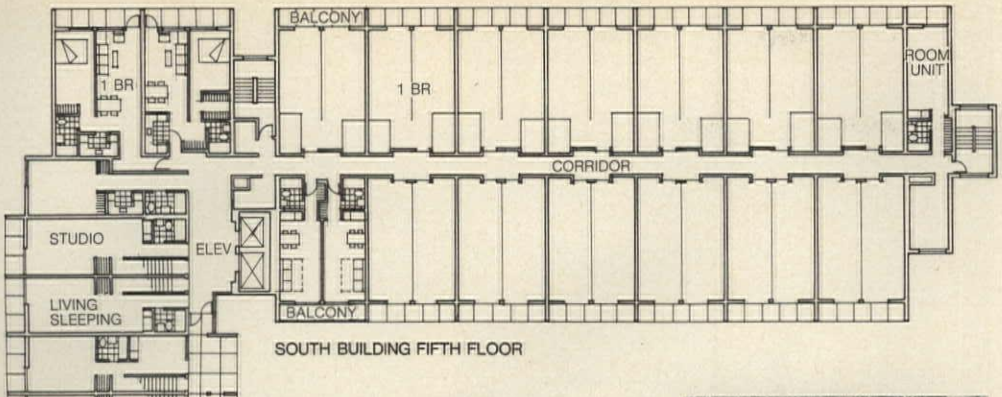
In terms of program, Diamond & Myers had to contend with high density of a mixed income and stages of life. Not only were families, couples, and elderly to be accommodated but also a population of "roomers," indigent single people who rented rooms in the area. With the help of



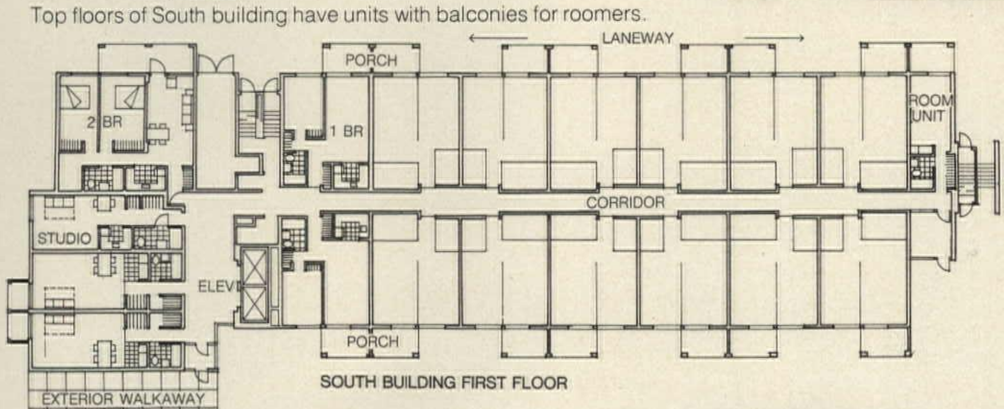
INDIVIDUAL UNIT PLAN 3 BR

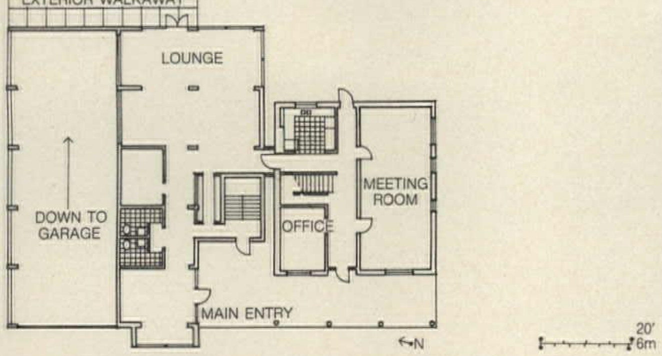
Family units (above) have own yards (below).



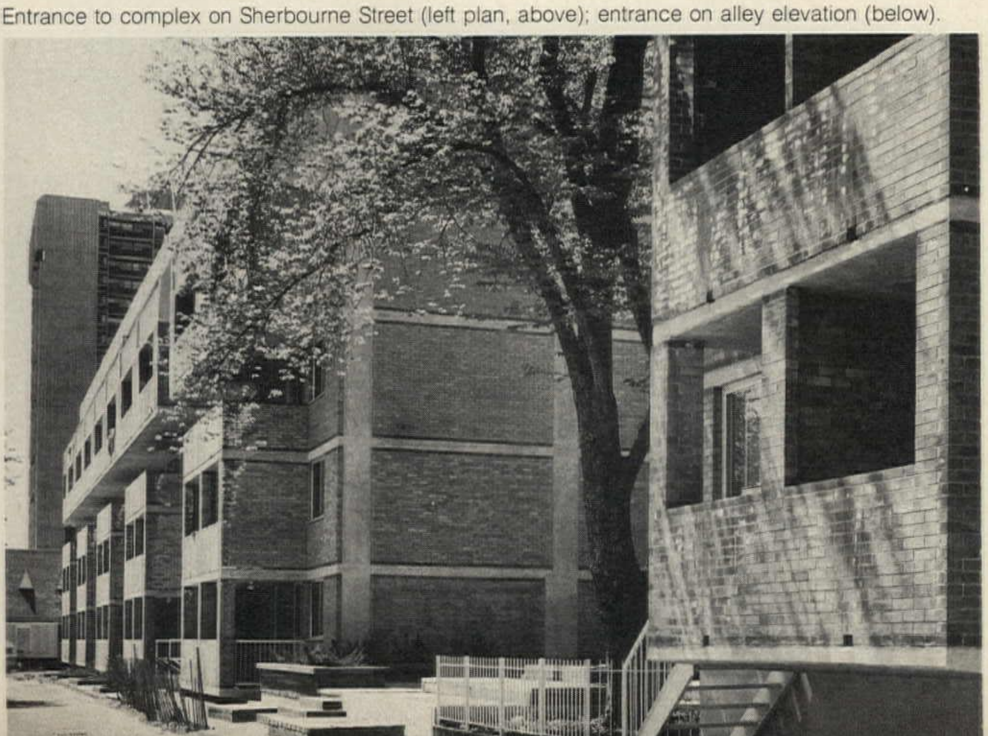


Top floors of South building have units with balconies for roomers.





Entrance to complex on Sherbourne Street (left plan, above); entrance on alley elevation (below).



sociologist William Michelson (author of *Man and His Urban Environment,* 1970) it was decided that no more than 53 family units should be included in order to maintain an easy-to-cope-with density of children. Actually the project includes only 49 two- to five-bedroom units. The larger apartments therefore are concentrated on the lower floors of the northern block where families have direct access to outside gardens and street. Studios and one-bedroom apartments are located on the top floors, while buildings along the southerly portion contain roomer units, studios, and one-bedroom apartments. All units conceivably could be converted to another size if need arises.

The apartment plans themselves are predictable. While not palatial or notably "architectural," most are floor-through apartments with exposures facing east and west. But many of the living rooms face east, bedrooms west, a turnaround of the expected pattern. And ground floor spaces, because of their depth, receive less natural light for the long narrow interiors than would be desired. Meanwhile, the view west looks across a back alley toward crumbling garages on neighboring properties.

Many of these points have to be seen against the larger context of the history of the project. The architects had severe budgetary constraints and density requirements as givens in the whole network of circumstances surrounding the project, not to mention time spent in negotiating it.

Community activism

The slightly shabby middle class neighborhood, about ten minutes from downtown Toronto, had been feeling the squeeze of big development for several years. Zoning was on the side of the high-rise developer. Even though the floor area ratio was low—only 2.5 to 3.125 depending on bonuses—a developer assembled the land on this site and asked the city to allow two 24-story Y-shaped apartments. He obtained the needed bylaw from the city of Toronto. However a local zoning agency, the Ontario Municipal Board, refused to approve the bylaw on technicalities. At the same time it noted that certain aspects of the plan did not fall within its jurisdiction—such as questions concerning resident relocation to the new housing, particularly the existing roomer population, plus the demolition of the very nice streetscape.

By this time the community was actively organized, and urging the city to investigate alternate types of development. The city, particularly the mayor, David Crombie, an advocate of integrated development on a low scale throughout the city, found a test situation at hand.

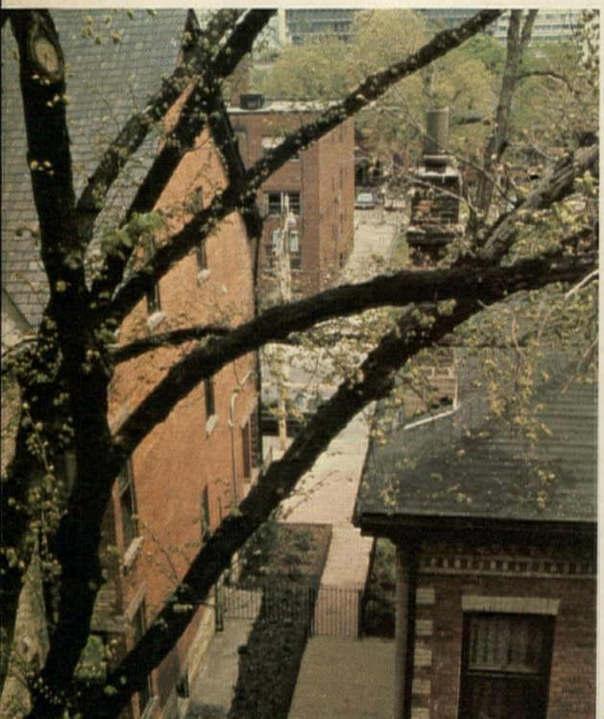
When the developer proposed another high-rise scheme, a single tower, the Mayor authorized Diamond & Myers to examine housing alternatives. With the help of financial consultants and discussion with neighborhood residents, the architects came up with low-rise proposals replete with program, construction costs,

Dundas-Sherbourne Housing

Photos: John M. Dixon

Roofscapes of older houses are very much part of the immediate view from new housing.

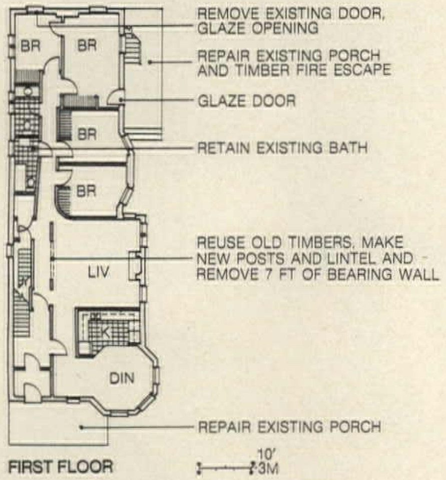
Alleys, paths and plazas all form network of open spaces where new and old architecture are in constant interaction.



Bart Myers

John M. Dixon

All but one of the 18 existing houses along Sherbourne were saved and renovated into 74 apartments with varied layouts: one such apartment below.



operating expenses, and rental levels. Basically they proved that moderate-income rental levels could be kept low because operating costs for new construction and renovation could be held under that of new high-rises.

The developer didn't feel amenable to their proposals and, arguing it was his legal right to build, sent in the bulldozers. While the city and A.J. Diamond were trying to talk to the developer, preservationists and interested community people, led by Alderman John Sewell and including Jane Jacobs, marched out to the site to stop demolition. Their final-hour ploy to wrest the grouping of houses away from the developer's clutches was simply to remove the surrounding fencing that was legally required for demolition. The delay allowed Crombie time enough to work out a deal with the developer the next day. Basically the deal was the sort that a city couldn't make too often: The developer sold his land to the government, both province and city, for a hefty $1.5 million, a price based on its market value for high-rise development.

The architects thus had more of a challenge than they initially bargained for: They had to get as high a density on the site as possible to keep rents from escalating further because of the high land cost. And that density had to be worked into a very constricted space, to satisfy the urban design and preservation objectives. Requirements regarding footage between buildings, parking slots, height limits, and new housing behind old had to be modified.

Implementing the scheme carried with it more complications. A project team of representatives of the community and various city agencies recommended the establishment of a nonprofit corporation using Section 15 of the National Housing Act's nonprofit financing and rent supplements. The City of Toronto Housing Department was then formed (no such department existed), along with a Non-Profit Housing Corporation under its aegis. Fifty percent of the rents are supplemented by the government for lower-income households. The rest are established at the same level as market rents in the area, but are expected to increase at a slower rate than other housing due to the operating-cost formula. Whether or not operating costs will rise as little as initially expected is still in question.

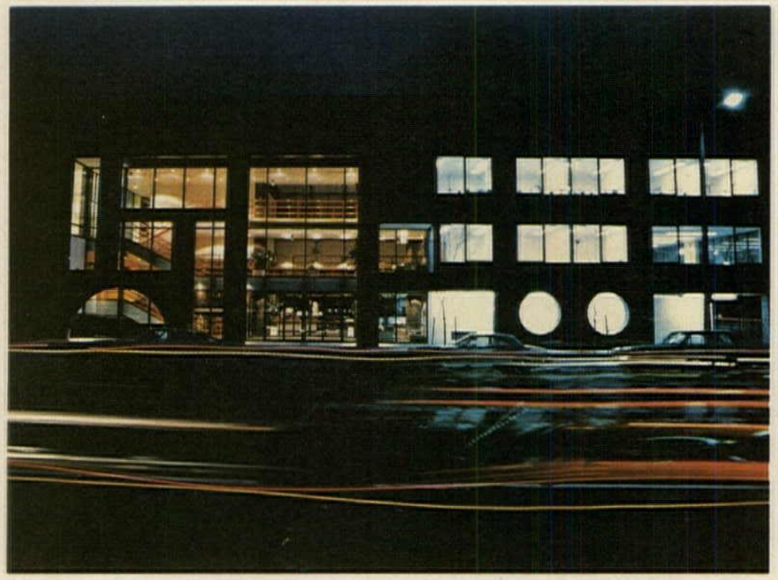
Inherent possibilities

While Dundas-Sherbourne may not solve all the problems of an infill prototype, it is a significant step. When Diamond & Myers dissolved their partnership, Myers took on the completion of Dundas-Sherbourne. A.J. Diamond assumed responsibility for another infill housing scheme, called Hydro Block, just west of downtown, which will soon be ready for occupancy. The city claims to be encouraging only this type of low-rise housing, and has other projects in the works.

Dundas-Sherbourne in particular makes a successful point about the value of working with the existing fabric, and the way that new construction can play off that milieu to create a closely knit interactive social and physical matrix. Unfortunately the architectural treatment of the new construction doesn't push that interaction or that dialogue as far as it might on the level of cultural reference and architectural allusion. It does certainly go far in solving the fundamental problems of low-rise high-density housing. But the scheme is even more important for what it adds to the understanding of sense of place, while optimistically pointing to the possibilities of merging housing and "architecture." [Suzanne Stephens]

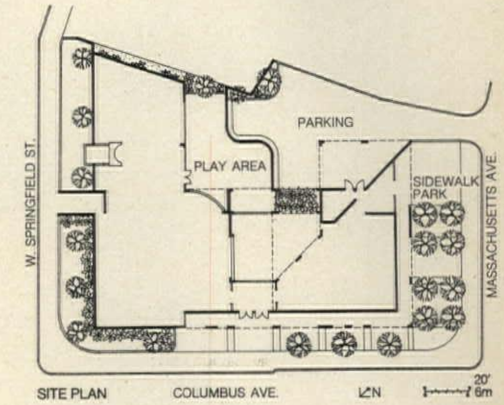
Data

Project: Dundas-Sherbourne Housing (Sherbourne Lanes), Toronto, Ontario.
Architect: Diamond & Myers; Barton Myers, partner-in-charge of design; implemented by Barton Myers Associates, Architects Planners; David Oleson, project architect.
Program: to save existing houses totaling 63,944 sq ft in floor area, and renovate into 74 apartments, then construct five- to seven-story housing totaling 207,547 sq ft for remainder. Total project contains 376 units, including 49 for families, 121 one-bedroom and 103 studios plus 103 rooms for poor "roomer" population in area. Families would have private open space and direct access to ground level, the density of children would be kept to about 60 persons an acre in an overall population density of approximately 300 persons per acre. Parking was restricted to 80 slots in underground garage.
Site: 2.5 acres of low-scale residential neighborhood on eastern edge of downtown core; site contained 18 two- and three-story houses along Sherbourne dating from 19th Century.
Structural system: flat slab cast-in-place structure with masonry infill party and exterior walls.
Major materials: masonry, including two-tone facing brick of buff and red colors; concrete, drywall, carpeting, quarry tile, v.a.t. (See Building materials, p. 102.)
Mechanical system: electric heating through baseboard heaters, no air conditioning.
Consultants: Read Jones Christoffersen Ltd., structural; John Garay and Associates Ltd., mechanical and electrical; A.J. Vermeulen, quantity surveyor; Joseph Cadloff, specification consultant.
General contractor: West York Construction Ltd.
Client: City of Toronto Non-Profit Housing Corporation, Michael Dennis, general manager.
Cost: $7 million; $1.5 million renovation, $5.5 million new construction, or $21.50 per sq ft renovation, $26.50 per sq ft new construction.
Photography: Ian Samson, except as noted.



Harriet Tubman House, Boston, Ma.

South End sophistication



SITE PLAN

Stull Associates brings high design to a community center in the historic, racially mixed South End of Boston.

It's uncommon to be critically objective when results fall short of intent, but Boston architect Don Stull, ever hopeful of perfection, frankly lists the shortcomings of a community center he designed even though the building is a long stride ahead of others of its kind. The Harriet Tubman House at the busy corner of Massachusetts and Columbus avenues in the South End of Boston was programmed by Fern Colbern, an active consultant in the social welfare field, to combine various welfare programs operating from scattered locations but run by the United South End Settlements Organization.

Ms. Colbern held meetings with staff members of the agencies involved, professionals that worked for them, and also with the residents who used the services. She devised questionnaires to elicit responses and initiate discussion in certain directions. Her job as a professional was to discover the real, not the superficial, needs. For example, in the first rounds of talks—not just for Tubman but with the dozen or more other centers she has assisted—people ask for more recreational facilities "for the young people," probably because it's an easy subject to talk about. Her task was to make them talk about their own needs; when they did, she found they were most interested in health care. "This emphasis on health interested me in view of the number of hospitals in the South End. People didn't use the services they had. Consequently, one hospital changed its approach: from that of appointments to drop in."

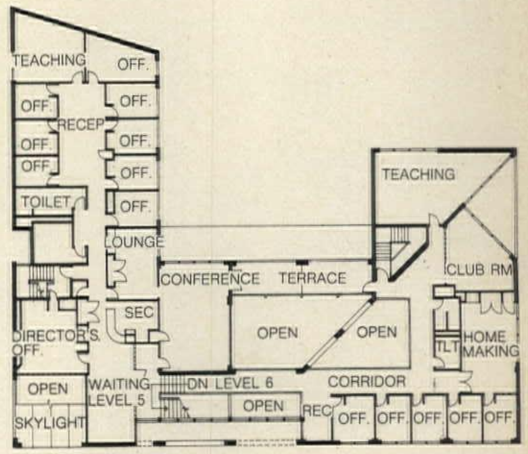
Budget, not surprisingly, was a prime consideration, and the building had to be redesigned several times as bids came in high. At first it was impossible to obtain competitive bids because the site was considered high risk in a potentially hostile neighborhood. Ms. Colbern said the Tubman House had more problems than any other center she has worked on—all the result of financing delays and complications; completion took more than five years instead of the anticipated two, she said, attributing much of the blame to Nixon's construction freeze. Stull said price increases in steel inflated the costs as well.

A major element in the design concept, the skylights which would enhance indoor/outdoor contact, had to be eliminated for cost considerations and a less expensive, translucent material substituted for the glass. Stull judges this one of the most regrettable sacrifices that detracts from his objectives for the building: positive interaction and all around visibility for security control. Notwithstanding Stull's misgivings, the building has ample windows, and the soft white translucency of the skylights in fact yields an attractive contrast to the open views.

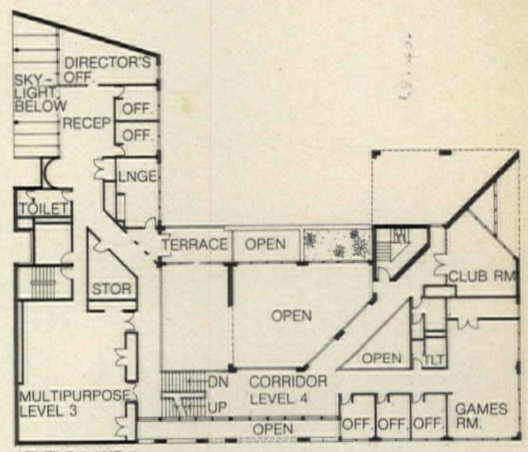
The performance of the center as a people place is rated reasonably well by its executive director Kenneth Brown. One problem has been the leasing of space; some of the agencies originally slated to be in the center chose not to locate there—partly as a result of the numerous construction delays—and at least one, a home economics teaching program, moved after a year's trial; rents, although based on an approved formula, are not as low as can be found elsewhere; and some organizations simply went out of existence before the building was finished.

Stull's greatest disappointment in his building is the more formal consideration of fitting the structure into the neighborhood. His desire was to complement rather than counterpoint the existing urban environment. He used the 9 square as a horizontal organization in plan to achieve the strong but simple exterior characteristics he wanted. In retrospect, Stull said the correctness of the goal is reaffirmed more by the building's "failures" than by its successes—failures which, he added, could not be resolved even when apparent

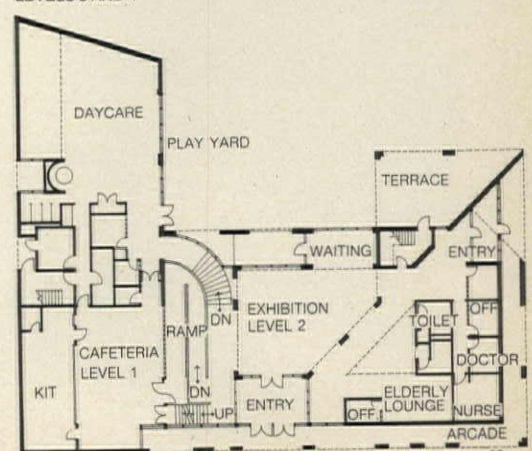
Main entrance on Columbus Avenue (opposite page, above). Interior brick wall on a diagonal (below) bounds the central space.



LEVELS 5 AND 6

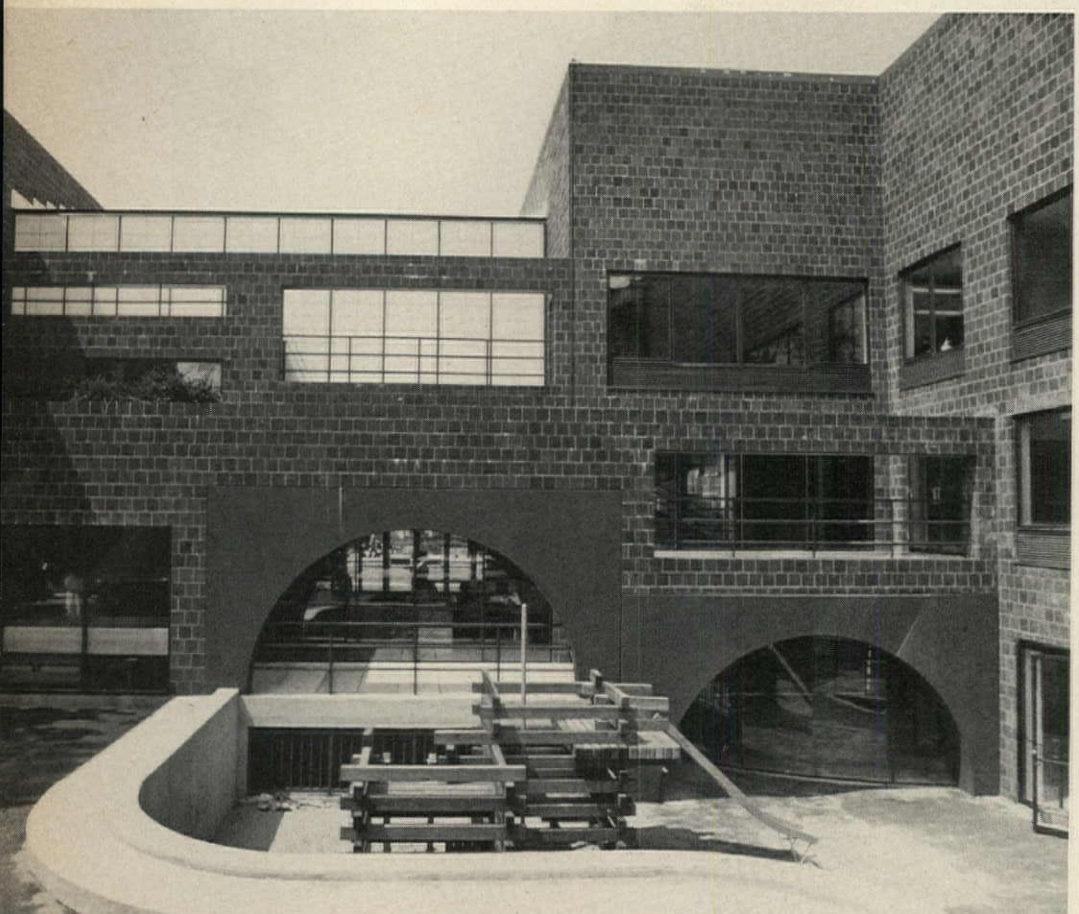


LEVELS 3 AND 4



LEVELS 1 AND 2

Entry lobby (above); diagonal ramp across central space (left, above); play yard and view through arch of lobby and main entry (left, below); sidewalk park along Massachusetts Ave (below), north elevation (opposite page).



during the design phase.

Massing, he said, was the most distressing unsolved problem. Since the quantity of the program was not sufficient to allow both vertical and horizontal alignments with surrounding buildings, Stull decided to compromise both by stepping back from the building line on Massachusetts Avenue to create a small sidewalk park, whereas, he later concluded, he should have maintained the line on that block and put the sidewalk park on the Columbus Avenue side. This change would have eliminated the necessity of a costly party wall between the community center and rowhouses next door and allowed a structure of four rather than three stories to be built, a massing Stull would have found more pleasing.

The center contains six half-story levels beginning about 4½ ft below grade. A criss-crossed stair is a highly visible, unifying element in front of the central court and serves as the main circulation system. Elevators were eliminated, due to spending cuts. This particular decision is unfortunate since the thrust of public policy

today is to make such buildings barrier free to the handicapped and the elderly.

The entry lobby is the full height of the building and was designed to be multifunctional as a reception area and also a space for events with large numbers of people. From here most public parts of the building are visible, as are outside areas in the front and back. A half-level down from the entry is a 32-seat cafeteria accessible by a ramp where senior citizens gather for hot lunches. Nearby on the same level is the wing containing a day care program. The play yard nestled in the inner corner of the roughly L-shaped complex is prominently visible to maximize the feelings of goodwill and universality derived from seeing children at play.

On each level are small, cubicle-like offices in sets of three to accommodate counseling or administrative activities. Function rooms are adaptable for such programs as arts and crafts. Three levels have pentagonal rooms with outdoor terraces—ideal for reading rooms, executive offices, or lounges.

A double-height, windowless but skylit room with a mezzanine is available for meetings and socials. Originally the mezzanine was to have been the administrator's office, but the executive asked to be moved into a suite converted by combining several small offices. There, with windows on two sides, he has greater visual supervision of center activities.

Though the center was designed in pre-energy conservation days and is all-electric, individual rooms have independent heating/cooling units, and all windows are operable—and reversible for cleaning.

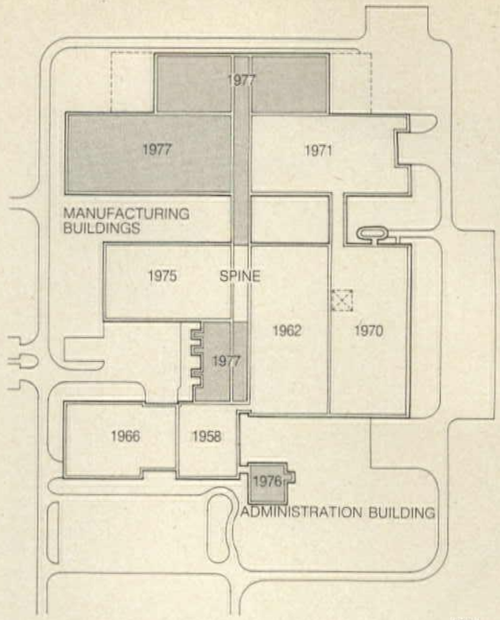
Significant of the project, Stull recalls, is that during construction not one incident of vandalism occurred and extra protection was not required. Kenneth Brown said he has found that people respect both the building and its name; Harriet Tubman, born in 1821 of slave parents, lived to become a noted reformer in the area of Negro and women's rights. [Ann Carter]

Data

Project: Harriet Tubman House, Boston, Ma.
Architect: Stull Associates, Boston. Don Stull, design director; Roland Bedford, job captain; Charles Perez, construction administrator.
Program: facility to house various South End social welfare agencies.
Site: corner of Massachusetts and Columbus avenues, a busy intersection in Boston's racially mixed South End neighborhood.
Structural system: steel and steel deck on caissons with masonry cavity wall.
Major materials: 8" x 8" brick exterior walls; gypsum wallboard; brick pavers, interior court, resilient tile elsewhere; translucent plastic skylight panels (see Building materials, p. 102).
Mechanical system: all-electric forced air heating and cooling, individual units.
Consultants: Richard Lakutis, Land Tech Associates, landscape. Stull Associates, interior design. Massachusetts Associated Consulting Engineers, mechanical; Arthur Choo Associates, structural; Richard Derany, food service; Goodall Shapiro Associates, electrical; Fern Colbern, programming.
General contractor: Sciaba and Company, Boston.
Client: United South End Settlements.
Cost: $1,860,000, with furnishings; $50 sq ft.
Photography: Jim Raycroft.

Herman Miller administration and manufacturing buildings, Zeeland, Mi

Getting it all together



SITE PLAN (NEWEST BUILDINGS SHADED) N 100′ 30m

New additions to the Herman Miller headquarters continue a local tradition of humane planning while uniting existing buildings on a rural site into an ensemble that is logical and coherent.

If you live in Zeeland—a town of some 5000 souls tucked away in the featureless landscape of Western Michigan—you are more than likely to be of Dutch ancestry, to go to one of 52 Reformed churches listed in the local phone book, and to work for Herman Miller, Inc. The company that makes some of the most famous modern furniture classics has an attitude toward those employees that is no less enlightened than its attitude toward the design of its products. The most recent additions to its Zeeland headquarters show a degree of social responsiveness that is ultimately more uplifting than any piece of pure design is likely to be. They continue the long tradition of benevolent proprietorship shared among the furniture manufacturers of the region and indicate an important sense of priorities especially significant in a company that has been for 40 years a pioneer in the promotion of good design.

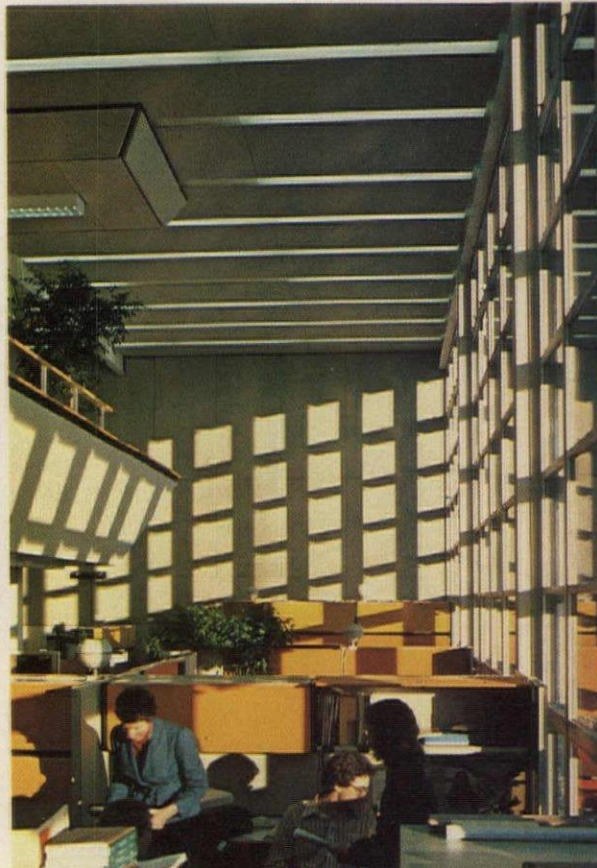
George Nelson, the architect and designer who was for 20 years director of design at Herman Miller, was responsible for the first buildings on the 100-acre rural property, and in 1971 the Los Angeles firm of A. Quincy Jones & Associates was retained to prepare a long-range master plan for the ultimate development of the site. As was to be expected of a firm deeply involved in the promotion of good design, Herman Miller provided its new architect with a detailed "Direction Statement" of its programmatic requirements. Those included the company's desire to *"create an environment that . . . encourages open community and fortuitous encounter,* [and which] *welcomes all, is kind to the user . . . is person scaled, is subservient to human activity . . . enables this community (in the sense that an environment can) to continually reach toward its potential . . ."*

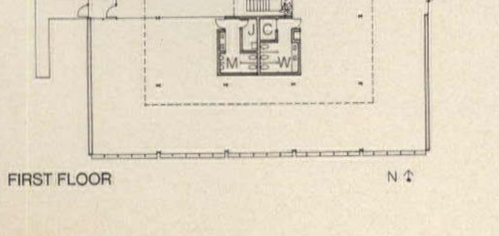
For the most part, the buildings now do most of those things, despite some serious flaws in the architects' implementation of the client's wishes. For Herman Miller's Direction Statement also called for a building that would be *"a contribution to the landscape as an aesthetic and human value,"* and (at least in aesthetic terms) Herman Miller did not receive that. The Jones office decided to continue along the lines of George Nelson's original designs, but departed significantly in the site planning: Jones joined the original free-standing buildings together into a coherent, interconnected grouping. Although the results are far better than the grim industrial "parks" that mar the landscape from coast to coast, this complex is no more architecturally distinguished than—and in fact rather resembles—the average 1950s suburban high school.

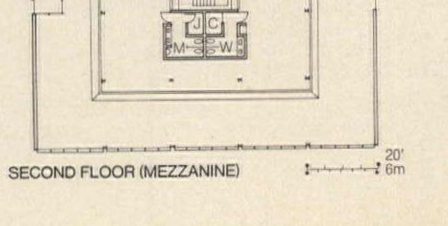
Winter light

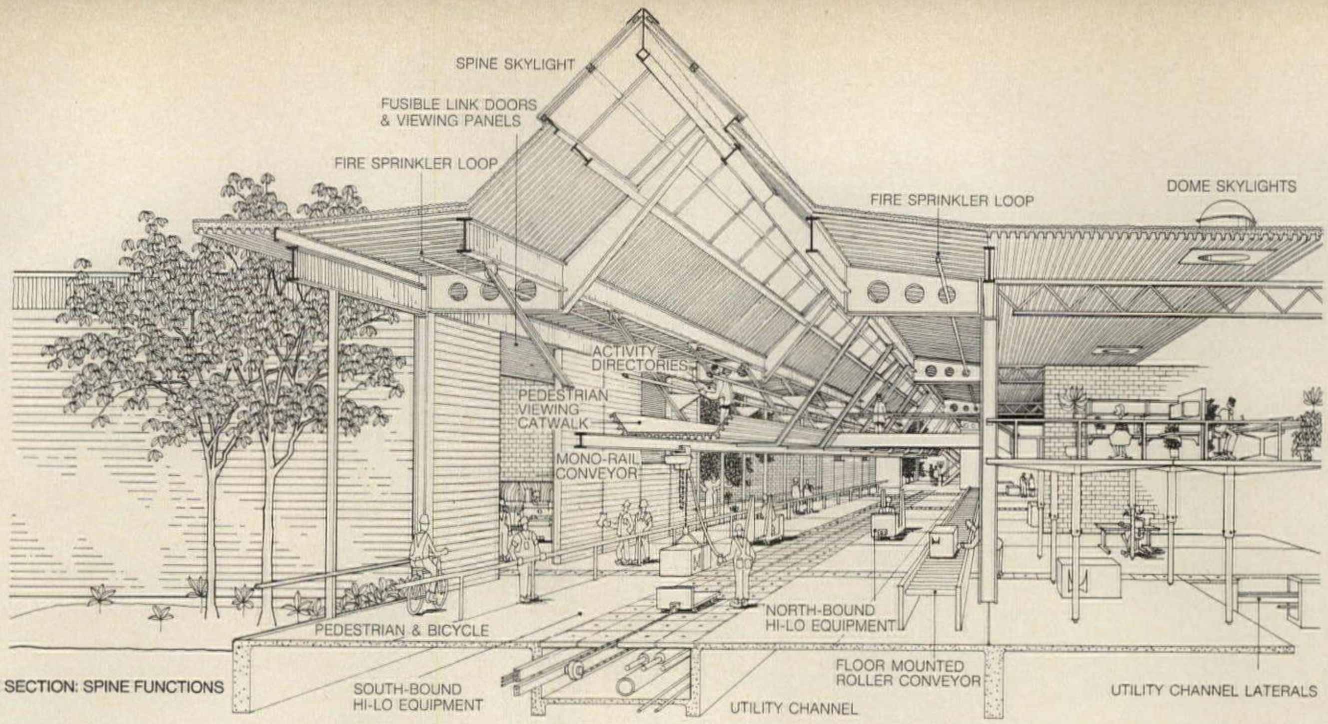
More disturbing were mistakes made in the design of the administration building, since corrected by the client. Despite preliminary sunlight studies made by the architect, the large expanse of south-facing window wall in the administration building allowed far too much glare, especially in the winter, when the low-lying sun shines blindingly across snow-covered fields. Newly installed blinds now help alleviate that problem, and Herman Miller is now considering the installation of solar reflector blinds to reduce the energy loss (and periodic heat build-up) that the

Administration building at night (above) reveals interior that includes reception lounge (below left) and office areas (below right).









PERSPECTIVE SECTION: SPINE FUNCTIONS

window wall did not sufficiently account for.

Acoustics were a problem as well, making it necessary literally to upholster the interior walls of the administration building with the same acoustic absorption panels used in Herman Miller's extensive line of open office components. The interior design of the administration building is just not up to the design of the Herman Miller furniture and open office systems which are displayed—while they are being used—within it. A bulky, aggressively massed loft arrangement reduces the spatial openness gained from the window wall, and the stairway with inappropriate brick treads is no better than the one in the nearby Grand Rapids airport.

The spine that ties

It is in the factory areas of the ten-building complex that a much more successful realization of the client's wishes takes place, for those areas are an example of humane planning in a building type more often designed with an eye toward profits, not people. Among the things that make this a successful environment for factory workers are floor-to-ceiling windows (with fewer and smaller southern exposures than in the administration building) that punctuate the massive brick-faced walls to let natural light in and permit the workers to look out: without the fishbowl effect of such places as SOM's glass-walled newspaper plant for *The Republic* of 1971 in Columbus, Indiana. There is an 80,000-sq-ft limit on each component building at the Herman Miller headquarters, which prevents the interiors from appearing too vast. At a point where two such buildings meet laterally, a raised atrium lounge (with a pyramidal skylight) was added to give the feeling of light and openness that were foremost in the client's mind.

Traffic flow patterns within the factory complex were given a great deal of thought, resulting in the "spine," a central internal transportation artery on two levels: a lower one for small vehicular traffic, with protected side paths for pedestrians, and an upper catwalk for pedestrians alone. While once again no paradigm of timeless design, the spine (now only about one-third completed) seems likely to function as well as was intended. It will provide orderly, safe circulation, will admit (via its pitched skylights) more natural light into the interior of the complex, and will

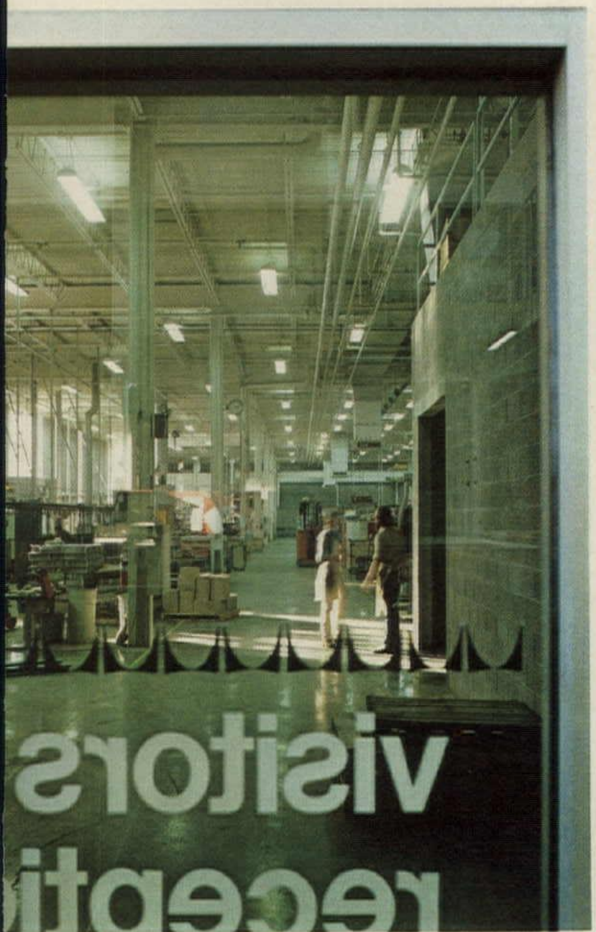
Data

Project: Herman Miller, Inc. administration and manufacturing buildings, Zeeland, Mi.
Architects: A. Quincy Jones, FAIA & Associates, Los Angeles.
Program: administration and factory buildings with combined area of 245,000 sq ft, as part of a comprehensive master plan for the development of the headquarters of a major furniture and office systems manufacturer.
Site: 100 acres of flat farmland in rural Western Michigan.
Structural system: structural steel faced with masonry and brick.
Mechanical system: combination radiant floor heating and perimeter air supply.
Major materials: steel, brick, glass (exterior); brick porcelain enamel steel, concrete block, gypsum wall board and acoustical wall panel walls; ceramic tile, carpet and concrete floors, acoustic panel ceilings (interior). (See Building materials, p. 102.)
Consultants: Newof & Winer, Inc., structural, electrical, and mechanical engineers; Brandow & Johnston Associates, structural engineers; Hayakawa Associates, mechanical and electrical engineers. Herman Miller Facilities Design Group, interior design.
General contractor: Erhardt Construction Co.; Owen-Ames-Kimball Co.
Client: Herman Miller, Inc.
Costs: incomplete.
Photography: Balthazar Korab except as noted.

perhaps even continue to provide a home for the birds that have come to live inside during construction and which feed off lunch scraps left by the workers.

What is a man profited?
Evidence of the management's concern for its employees is evident in many ways at Herman Miller, and in some ways the company's attitudes seem more typical of some northern European countries than other parts of the United States. For example, Herman Miller's highly successful Ergon chairs are completely assembled by individual workers (in the so-called "Swedish" method), not put together on an assembly line in a numbing division of labor. And while Herman Miller is a benevolent employer, it is no privately run welfare state: reward (most notably in the form of a profit sharing program) is given only for hard work, and the enlightened self-interest of the company reflects the Calvinist values that are still very much held by the people of Zeeland.

What distinguishes the way Herman Miller has accommodated its workers, as opposed to the conditions in the garment lofts of New York, or the assembly lines of Detroit, or the textile mills of South Carolina, is that this company (like its fellow furniture manufacturers nearby) does not consider its workers to be faceless drones, exploitable at the expense of decent working conditions. These are their neighbors, their friends, their church brethren, and the recognition of that fact is the first step toward sound planning principles. An immortal architectural design was not achieved here: that is the province of the architect, who need not know the things a client must. But a responsive working environment has been achieved, and who is to say that, for the needs of those most directly involved, more was either required or sought? [Martin Filler]



Skylighted employees lounge (opposite page) in factory is but one of many amenities provided for its workers by Herman Miller. Factory interiors (above) are designed to admit large quantities of natural light. Sign on glass panel points way toward visitors' reception area. The "spine," seen in perspective section on opposite page, has been used as temporary office space during construction of the remaining two-thirds of the structure, which internally unites several factory buildings while providing central circulation. Glass panels (right) will be removed to open spine to its full length upon completion of connecting segments.

National Permanent Building is not just another bland Washington box; it is sensitive to surroundings, but becomes strong focal point at same time.

National Permanent Building

Hanging out

In Washington, DC, a speculative office building by Hartman-Cox exposes ducts and structure, breaking local tradition.

"I wanted to prove that within reasonable limits you could put up a well-designed office building," says Melvin Lenkin, the developer of a new speculative building at 1775 Pennsylvania Avenue, two blocks from the White House in Washington.

A quick look shows that the 12-story poured concrete structure designed by Hartman-Cox Architects is indeed well-designed. In fact, it is the best looking office building in Washington in years.

No wonder. The firm of Hartman-Cox has done some of Washington's finest designing in its 11 years of collaboration. The work has ranged from office buildings to houses, and from educational facilities to playgrounds—all in the modern idiom, and always with a great respect for the past. In this small firm of less than a dozen employees, the work is imbued with a keen sense of the importance of each structure on its site.

"The thread through all our work is the site," says Cox. "All our buildings are site-derived. The context is very important and while there may be some universal ideas, they are not prototypes." This can be seen in their horseshoe-shaped Euram Building on Dupont Circle, the stepped-pyramid design for the Dodge Center at the foot of a hill on the Georgetown waterfront, and in the national Permanent Building at 1775 Pennsylvania Avenue.

Washington's unusual street pattern makes the National Permanent site one of the city's very best. The trapezoidal lot faces two small triangular parks on either side of Pennsylvania Avenue at the intersection of 18th and H Sts. Because of the open space around the site, the building is visible on the avenue almost all the way to Georgetown. Just beyond it in the other direction are the White House and Alfred B. Mullett's Old Executive Office Building. It is, as Warren Cox is fond of saying, "a foreground site," and this is one reason the building, which has three major façades, works so well.

Developer Lenkin acquired the site—the previous occupant was the Roger Smith Hotel—and asked Hartman-Cox to design a 240,000-sq-ft speculative office building. Lenkin had seen and liked the architects' work and had wanted to commission them for an earlier project, but it did not work out. He has developed many "ordinary buildings" (his words), and believes that within a range of 5 to 10 percent of the base, "you could build a well-designed building," which, he adds, "will bring in more rent."

While the economics were an important concern, it is fair to say that design of the $6 million National Permanent Building was treated as an equal. Says Cox, "If cost is the primary factor, you cannot get good design. You have to have some leeway to make decisions based on design, not economics." In this case, there seems to have been a close melding of the two, perhaps even closer than usual since the owner/developer was also the builder.

The architects were well aware of the design limitations in such a speculative office building. The overall size and bulk had been dictated by zoning (it is the maximum FAR permitted). "It is basically an air conditioned loft," says Cox. "The only thing we could do was the core and the façade; the inside and back wall are pretty standard."

That left Hartman-Cox with an important site and a limited budget, but a desire to do something different to help prove Lenkin's assertion about good design. They decided to use the simplest of materials—concrete, metal, and glass—and created a building within a building. On the south and west façades the structural concrete frame of columns and edge beam is pulled out 6 ft from the building envelope, which is walled in gray glass. Subway grating covers the void between the glass and edge beam at each floor.

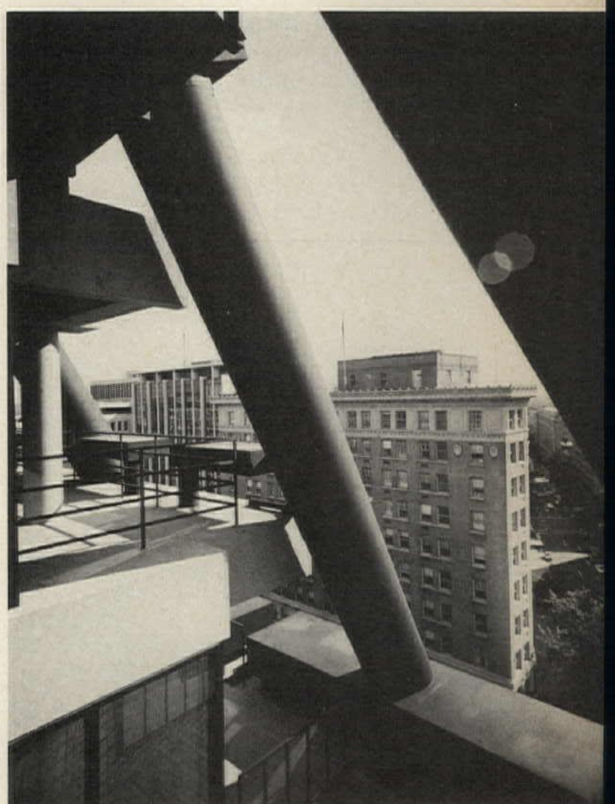
The recessed windows reduce the sun load on the air conditioning equipment by as much as 40 percent, but on the north façade the clear glass wall is flush with the concrete frame. Floor-to-ceiling glass is set into metal frames throughout.

The painted concrete frame is notched, producing a pattern of great interest with marvelous light and shadow areas. But the architects thought something else was needed. Cox had long wanted to do a building with exposed air conditioning ducts, but he wanted to "domesticate" them. "The brightly colored ducts at Centre Pompidou in Paris have shock value," he says. Making them "civilized," Cox believed, would make their expression acceptable.

The flat-black metal ducts run in pairs on either side of each bay next to the columns, but not attached to them. They start in huge tubes on the roof and slant to follow the setback of the upper two floors of the building. When they were being hoisted into place, some passersby said they looked like rockets. The ducts are clearly in view on the south and west façades and they are in the same location on the north, but behind the glass wall.

In economic terms, much time was spent to see how to make the ducts cheaply, but, says Cox, "ultimately they were built as we originally designed them." They are simply factory-made steel tubes with metal covers and insulation in between. Lenkin also reports that placing the ducts outside instead of inside and attached to building columns resulted in a 3 to 5 percent gain in usable floor space.

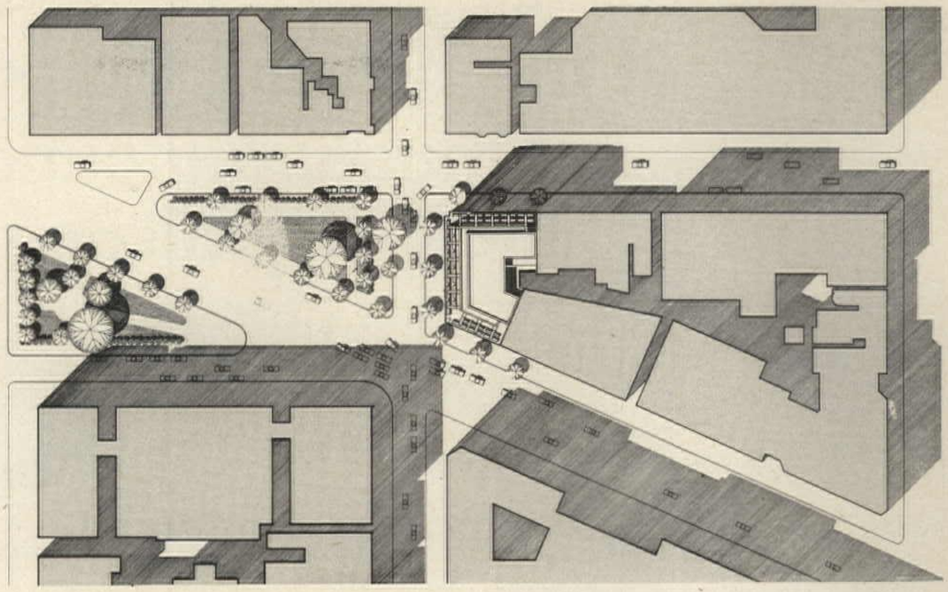
The deceptively simple façade offers proof that with only a little more money (and an imaginative architect) you can get an interesting design. Cox says that the ducts and expressive quality of the concrete were "a way of getting complexity into the building without the need for ornamentation." And unlike many structures today, National Permanent clearly has a top and a bottom. The huge ducts terminate at a penthouse and their dark color combined with the light buff-colored concrete creates a very visible profile against the sky. At the bottom, Hartman-Cox wanted some way to express the ground floor; they chose clear glass bays that project between the columns.



Air conditioning ducts get smaller from top to bottom, in contrast to structure. On north side (facing page top right), glazing is flush with structure, enclosing otherwise exposed elements.

One additional element of the façade deserves comment, in part because it may not be visible at first, and in part because it is a kind of trick. But it is a trick that works. The concrete columns get smaller as they progress up the façade—a natural function of their lessening load. The air condi-

Main entry at west side (facing page top left) leads to slate-walled entry lobby (facing page bottom) where elevators are set at 45 degrees to create triangular waiting area (see plans, below right). Top floor offices (left), such as that designed by Leeds & Assocs., of New York for Sullivan and Cromwell law firm, have spectacular city views. "Clunky" door leading to terrace was choice of builder, not architects.



tioning ducts, on the other hand, get progressively smaller as they go down the facade from the mechanical penthouse. It is an interesting effect and a visual treat.

Cox speaks openly about the historical design sources in the building. The round columns echo the column-festooned French Second Empire Old Executive Office Building down the street. Louis Sullivan's 1894 Guaranty Trust building (now Prudential Building) in Buffalo is the father of the glass bay on the building.

About the interior, little need be said. The slate-walled entry lobby is attractive enough and the elevators, set up at 45 degrees, create a triangular waiting area that creates some interest. As to most of the remaining space, Hartman-Cox was not involved—and it looks it. Even the developer agrees that most of the interiors leave something to be desired.

It seems hard to believe that the bank after whom the building is named (it has space on five floors) would not have taken greater care to see that the quality of their interiors matched that of the exterior. The columns in the banking lobby are covered with a drippy stucco that resembles hardened cake icing. The 17-ft-high space has a dropped ceiling that reduces the height to about 13 ft. The colors are gaudy.

The views on the office floors are, as developer Lenkin puts it, "as though you were looking out on the back porch." The pulled-out structure frames a magnificent view of the city, up and down Pennsylvania Avenue. The views are even more spectacular on the top two floors, where each is set back from the floor below, and where balconies overlook the city between the angled air conditioning ducts.

The leased-out office floors (occupied mostly by law firms) are quite pedestrian except for the entire floor leased by the New York law firm of Sullivan and Cromwell for their Washington office. It was designed by Leeds Associates of New York and is a class act. The lobby is painted a pleasant beige with rust-colored doors to the elevators and lavatories. An angled wall, reflecting the design of the elevator lobby, leads to the reception area. The standard square interior columns have been encased in plaster to make them circular, like the exterior ones. The full ceiling height doors to the offices on the perimeter are Australian walnut. In short, a great deal of effort was made to make these offices complement the building.

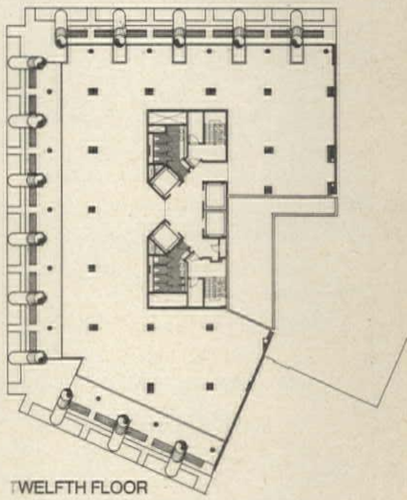
But what about the bottom line? The economics. Was it worth the extra cost? Developer Lenkins says yes without reservation. He also says that while he would handle the rentals differently next time (it was almost entirely pre-leased and Lenkin now believes that he could have gotten higher rentals had he waited, but the complicated financing would not permit that). "This has proved that good design pays off," says Lenkin. To prove his point, he notes that subleases of space are as much as 20 percent higher than original leases.

While Lenkin deserves the credit for getting National Permanent built, and for hiring a good architect in the first place, it was Hartman-Cox that was able to prove Lenkin's thesis that a good speculative building can be built on a tight budget, in this case approximately $25 per sq ft.

As Warren Cox says, "Speculative building is interesting. It's nice that it is cheap, but you can't brag if it is not attractive." [Carleton Knight III]

Data

Project: National Permanent Building, Washington, DC.
Architects: Hartman-Cox, Mario Bioardi, David Jones, project assistants.
Program: A 12-story, 240,000-sq-ft speculative office building.
Site: a trapezoidal lot at 18th and H Sts.
Structural system: all reinforced concrete.
Mechanical system: baseboard heating; variable air volume air conditioning, with ducts exposed on outside of building.
Major materials: Reinforced concrete, aluminum frames and glass, brick, drywall over concrete block (see Building materials, p. 102).
Consultants: General Engineering, mechanical, K.C.E. Structural Engineers, structural.
General contractor: The Lenkin Company.
Costs: $25 per sq ft.
Photography: Robert C. Lautman.



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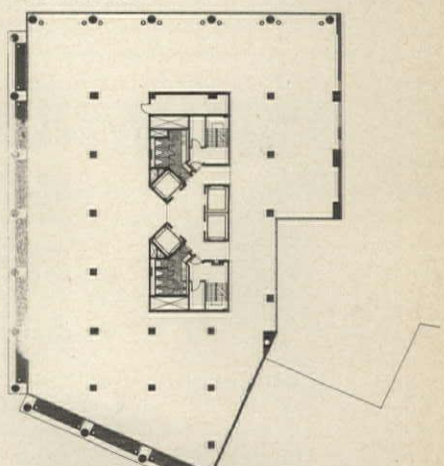

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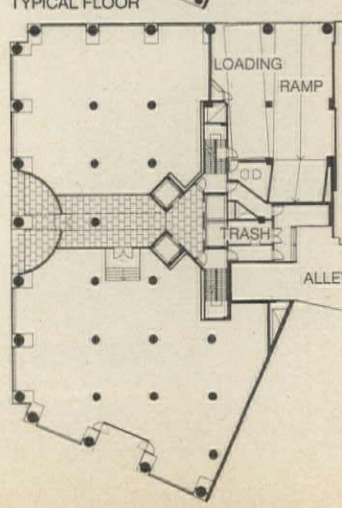

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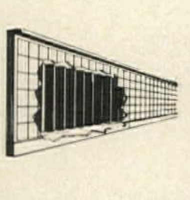

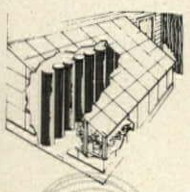

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relax

tilt forward

More than half of our active lives is spent in a work environment . . . seated in offices, classrooms, meeting rooms, reception areas, etc. . . . working, studying, waiting. Until now, few chair designs have attempted to deal scientifically and aesthetically with the special requirements of the working person. OPEN AfK B.V. is professionally and socially committed to the design and production of advanced furniture concepts which make a contribution toward fulfilling the working person's psychological, behavioral, functional, and aesthetic needs. And Vertebra, a new OPEN AfK concept, is the first total seating system designed specifically to fill that need.

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The anatomic configurations of seats and backrests on all models result from careful design application of extensive orthopedic and vascular research. Optimal body weight distribution and unexcelled sacro-lumbar support are assured without inhibiting blood circulation. Vertebra's support and response to activity are so natural and automatic, that the user loses the awareness of being seated. It insures the user's comfort, efficiency, and sense of well being.

The Construction Research Council —Part II

Alvin D. Skolnik

October's Construction Research Council report concludes with the author's outline of the working structure of the organization and a discussion of the format and terminology which they have adopted.

The October 1977 issue of *Progressive Architecture,* (Specifications clinic, p. 89) reported on the Construction Research Council, presenting an encapsulated "perspectus" of that organization. Since its formation, the CRC has worked vigorously towards achieving its objectives.

The Council, governed by a Board of Directors, is divided into three primary panels; Panel I, "User Needs," Panel II, "Specifications," and Panel III, "Procurement." Each panel is then divided into task groups. All panels work through a Coordinating Committee which reports to the Board.

Panel I task groups are concerned with evaluating market potential of building elements such as systems, programming, and defining user needs in terms of attributes and determinants. Panel II task groups are concerned with establishing specifications format, preparation of "up-front" contract documents, specification production and procedures, and establishment of a library. Panel III is concerned with defining the basis for prequalification of subsystems and of offerors, development of a subsystem catalog, defining criteria to allow consultants and reviewers to evaluate offerors, and determining laboratory test prequalifications.

Format and Terminology. In order that all members of the Council begin by "speaking the same language," a task group prepared a document to establish *uniform terminology* and provide a *format* that will permit flexibility within a standard framework for preparation of performance specifications. The format represents a consensus based on available previous work in this area, future trends in the building construction industry, and the broad spectrum of needs of the Construction Research Council.

In developing recommendations for performance specification format, two general approaches were possible. One demanding extensive research on the part of CRC and the other involving the use of previous exploration that has gained acceptance within the specifications profession. A consensus of the latter approach was adopted with modifications to accommodate the needs within CRC.

The Construction Specifications Institute's "Manual of Practice" documents contain a comprehensive summary of the current state-of-the-art and offers the best guidelines for developing a performance specifications format. CSI recommendations for Section format generally offer flexibility and continuity of specifications for the entire

[continued on page 97]

The Language of Performance

Definitions related to the contract documents

CRC terminology	Definitions
Contract documents	The total set of documents
Parts	Major topics in the contract documents
Section	The text heading for each major element

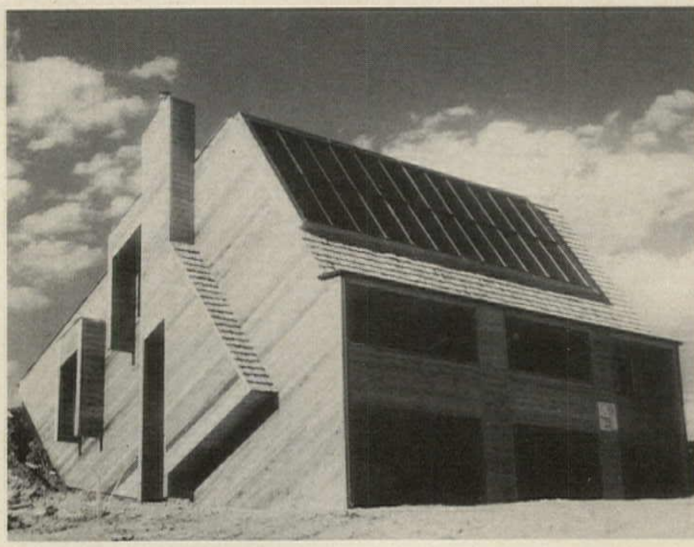
Definitions related to the building elements

CRC terminology	Definitions
Project	The total project (to include in-system and out-of-system elements)
System	An entity comprising fully coordinated and interrelated subsystems
Subsystem	The major components of the system
Assembly, component or unit	Levels of organization lower than a subsystem

Definitions related to the elements of performance

CRC terminology	Definitions
Attribute	The qualities to be specified 1 Requirement 2 Criterion 3 Test method 4 Evaluation (Steps in actual specifying)
Determinant	Broad, nontechnical statements of needs
Interface	The common boundary or area of connection between two or more building elements, including relationship of physical fit and performance characteristics.

Rays of hope


Peter Hollander

Allen house in Cheyenne (above) by Richard Crowther faces collectors to the south, is deeply bermed on the north to insulate, deflect winds.

While solar energy has been harnessed for domestic water heating for years, the market for solar space heat has boomed; P/A continues to watch the activity


Peter Hollander

House in New Jersey by Jersey Devil, 3 silos and a collector bridge.


Copper Development Association

"Decade 80" house, Tucson, totally solar heated in 1976–77 heat season.

What is all this noise about solar energy? It is possible, even probable, that a design professional, looking to answer that question or others, will find a confusing range of opinions. From proponents, a rose garden; from antagonists, it's going to rain on your parade; and everything in between. First, a few facts. There are few, if any, "solar experts," there are only those who have had more experience than others. At least for the present, neither solar energy nor any other system can do the job alone. Heat from the sun has warmed domestic water for years, and spotty experience with solar space heating can be traced back a while, too. However, not until relatively recently has serious attention been focused on both the hardware and the result. Despite the many words written on virtually every aspect of the subject, there is no definitive source, but some good attempts are being made. Even if there were such a work, it would require frequent revision, as our efforts mature and experience is gained. We will attempt to present an update on *some* of the emerging attitudes, hardware, and successes or failures.

From the skeptic's point of view, the easiest target, at least in active systems, is cost of hardware and installation. These items are admittedly high, and show few signs of coming down. Materials that make up many collectors, for instance, are not inexpensive—copper, stainless steel, glass plate, etc.—and there is no reason to expect manufacturers to lose money to supply the market. These initial costs are over and above the necessary "conventional" backup system, and therefore are immediately suspect to the owner in terms of payback on investment. It is interesting to note, however, that the same owner would not normally ask what the payback is for a conventional boiler. New York engineer Fred Dubin, one of those with more experience, urges architects and owners to look at monthly and annual cash flow, not payback. He also emphasizes the need to evaluate buildings from the standpoint of energy conservation, as well as conversion. If a design calls for tighter control of heat gain and loss, obviously the demands on any heating/cooling system will be lower.

There are other more detailed points, both pitfalls and pluses, with each system, which would be discussed more appropriately later. Before going into them, we should note some of the wide range of solar options. Out of the hundreds of commercially available systems, those discussed or shown here are only a representative sample. For information on virtually any aspect of solar heating/cooling, designers may contact the National Solar Heating and Cooling Information Center, P.O. Box 1607, Rockville, Md, 20850, or the manufacturer of specific systems.

Which way?

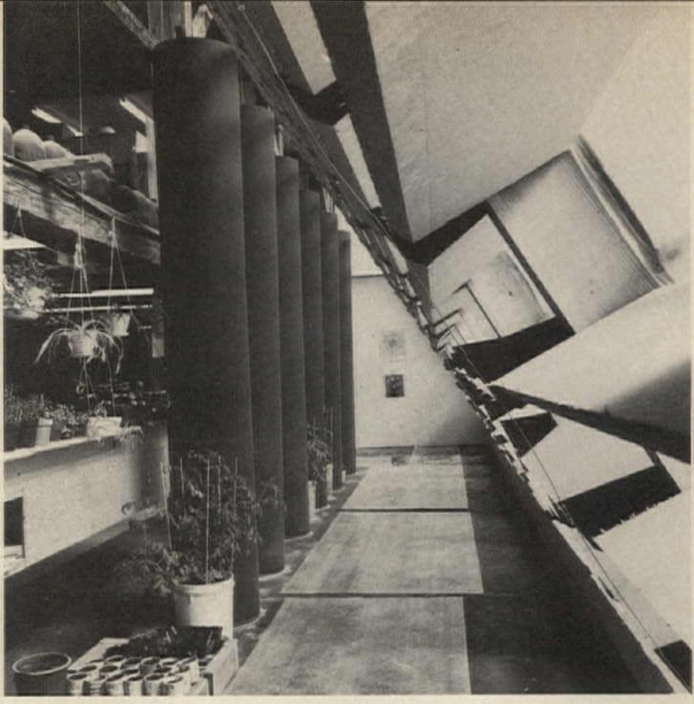
The answer, unfortunately, is evasive—it depends. As Fred Dubin points out, all designs should begin with the notion of developing the most energy-efficient approach. That obviously includes careful orientation studies to take advantage of both sun and prevailing winds, thorough evaluation of insulation needs, and attention to weather-stripping characteristics of window and door assemblies. Only then is the question of what kind of system appropriate. Generally, solar systems are either passive, active, or a combination of the two.

Passive systems usually involve no collectors, as the term is normally defined, and no pumps or fans. After determining the applicable sun angles for a given site, care is taken to minimize glazed areas in north-facing walls. In its simplest form passive heating involves allowing the sun to enter the building, heating a material inside which will reradiate the heat after the sun goes down. As with any of the systems, many degrees of sophistication are possible.

Beginning with individual elements as simple as skylights or windows and glazing, it is important not to overlook their contribution. Rather than thinking of these particular areas as providing potential heat losses, designers should note the benefits. Consider the light and heat that may be viewed as a passive solar resource. Both light and heat gained are commodities that don't have to be generated some other way. Properly located, for instance, skylights could begin gathering light and heat early in the day, and continue throughout the sun's trip across the sky. The exact amount of energy brought into a given space obviously depends on numerous parameters. Since the calculations can easily get too cumbersome for the typical person on the design staff, a manufacturer of acrylic plastic for skylights has set up a free computer program. It analyzes a design scheme's proposed skylights for overall and net energy balances, illumination gained on clear or overcast days, and averages weighted for weather conditions for both types of day. The program is supported by several major skylight manufacturers, and the Architectural Aluminum Manufacturers Association.

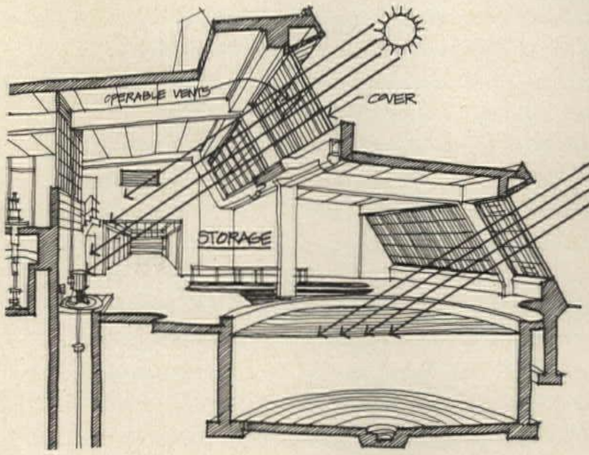
Possibly the best way to illustrate some of the other principles of passive solar energy use is to analyze the Arkansas cabin designed by James Lambeth shown on page 72. First, in plan, the north wall is minimized by the shape, "east" and "west" walls are windowless, and the south wall fans out to catch the sun. Other plan features, at least as designed, were calculated to take maximum advantage of some natural phenomena, and to limit others. On the northwest and northeast, heavy stone exterior walls (12 in.) were to have been backed by an insulating air space and a 2-in.-thick wood interior wall. The south fan-shaped wall was actually to have been a double one, with glazing about 1'-6" apart, except for the double-paned glass sliding door area. Adjustable panels at each end could be reflective to gather winter sun or could be closed for summer shading. Various alternatives to this have been used, up to and including movable panels, blinds and "beadwalls" which may be opened to gain heat, closed to exclude or retain it. In section, the south roof overhang cuts out high summer sun, encourages low winter solar penetration.

For storage of heat, Lambeth began with research



Kalwall Corp.

Passive solar energy is absorbed through fiberglass wall panels by tubes filled with water (above), heats air and water in treatment plant (below).



Kalwall Corp.

Peter Hollander

Maine Audubon Society, engineered by Richard Hill.

which concluded that, *for this Arkansas location,* a ratio of 1 sq yd of insulated south glass to 10 cu yds of interior volume would give about a 75 percent efficiency balance. One cubic foot of interior masonry mass for each square foot of south glass, he says, is enough to store the sun's energy for three or four days. Lambeth's design included heavy stone benches and stone floor along the south wall for heat storage. None of the stonework was actually incorporated, nor were the fireplace or the spaced glass wall segments. Still, the occupants report very comfortable living conditions. Lambeth has continued his storage concepts into later works, but the Arkansas cabin (owner-built, but not by the original clients) was chosen for its clarity of form and purpose.

Another storage medium for passive solar heat collection is, of course, water in various containers. Steve Baer's house in New Mexico uses large steel drums, filled with water and heated directly by the sun. Also commercially available are fiberglass-reinforced plastic tubes which may be used freestanding in a space or in an enclosed assembly. The assembly can include roll-up or movable insulation between the outside source wall and the water tubes and/or the same inside the tubes. By enclosing the tubes, constructing room inlet and outlet openings, and adding small blower fans, the passive tubes move one step toward becoming an active "furnace."

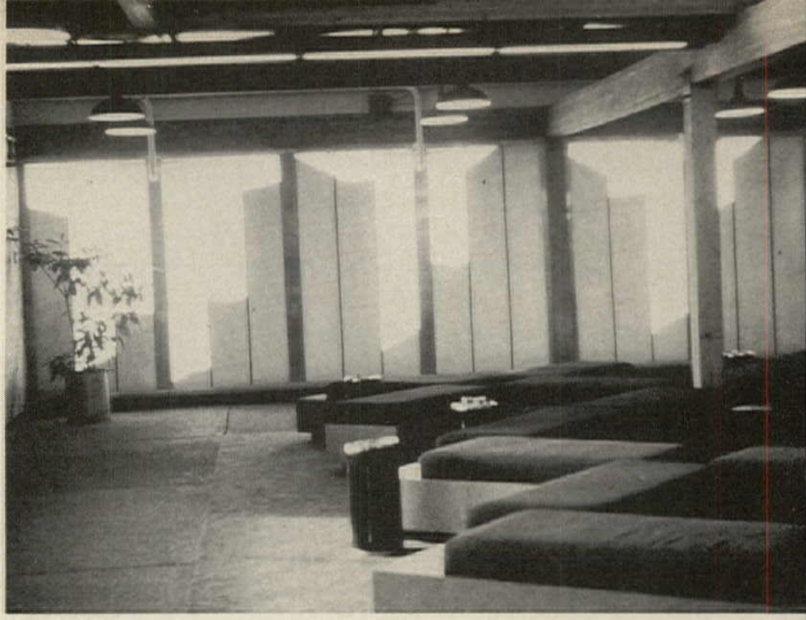
Air, through the natural tendency to rise when heated, can also be used in a sandwich panel system with one side exposed to sunlight. With a bottom inlet for cool room air and a top one for solar-heated air, the panel becomes a heater by day. Inlet and outlet orifices may be closed at night, and the panel and air space form the insulation. Small fans can turn this system active, as well.

Other devices, such as Baer's beadwall, manually operated wall segments, and water bag ceiling installations with movable closure panels, are among the many ways to capture solar heat without truly active systems. Controls are kept to a minimum. If passive approaches have any weak points, they are apt to be found in the area of control. The more mechanized the controls, the more the system costs, and the closer it comes to active in terms of operation and budget.

Active solar systems run the gamut from backyard to high tech. In their simplest form, they are almost passive, but they officially employ collectors, as normally defined. Again, the least complicated ones may serve particular needs well at low relative cost, but each project must be evaluated for system type. It would take much more space to describe the various system combinations in depth than this article permits. But in general, the differences in active systems break down into collector type, heat collection medium (fluid), and consequent heat storage material.

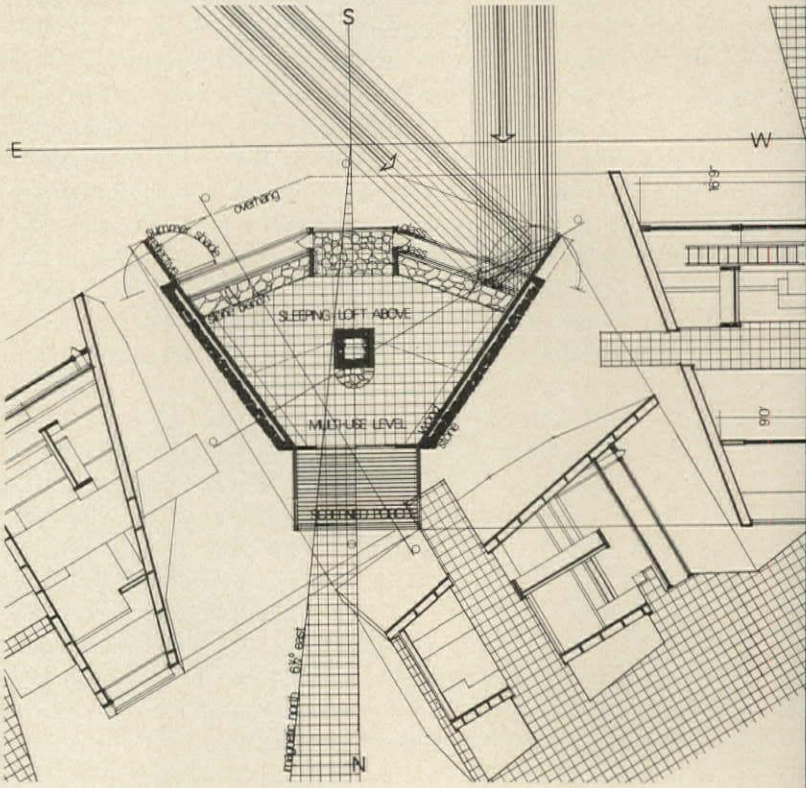
If we again begin with the least sophisticated system, it would probably include a flat plate collector, in which the sun passes through a face sheet of glass, acrylic, or fiberglass to strike a blackened absorber panel. The face sheet, with varying degrees of efficiency, traps heat energy reradiated by the absorber. Here the first type of division occurs. The heat transfer medium may be either air or liquid, and in the most basic systems, the medium may be moved by simple convection—no pumps. Heated air or liquid will move up through the collector, through manifolds, through ducts or piping, to storage or to heat space. Different liquids and storage methods will be covered later, but air systems use rock bed storage, while simple liquid systems commonly use tanks or sometimes rocks and water.

From basic on up, collector, medium, storage, and control can be varied many ways. In collectors, the spectrum includes, but is not necessarily limited to, some general types. Air collectors of varying sophistication warm air



Kalwall Corp.

Aspen, Colorado air terminal (above) has beadwall by Zomeworks, shown partially full. Passive solar cabin, Arkansas (below), by James Lambeth.



which is drawn off through ducts by either natural convection or mechanical means. While air system leaks must be kept to a minimum, and ducts require more space than piping, there are advantages. Air leaks from the system are less critical than liquid system leaks. Air solar collectors are less subject to corrosion, clearly, and air can't freeze. Maintenance, at least inside the collector and in the system, is simpler. More mechanical energy is needed, however, to move the air, and rock storage requires more volume than liquid. Air collectors include flat plate and tube types.

Tube collectors may use various devices such as concave reflector plates behind the tubes to focus energy on the tube itself. Another approach is to silver a back portion of the outer tube, for the same reason. These collectors can pick up both direct and diffuse radiation. Some tube collectors use an evacuated tube to house the collector tube, minimizing heat loss. Tube collectors can heat water to temperatures required for solar air conditioning applications, as well.

Standard flat plate collectors are available with relatively simple absorber plate tubing layouts and connections. From the common serpentine pattern of surface tubing, through tubing integrated within the absorber plate, to plates with complex integrated passages, many options exist. Depending on desired surface area and tolerable pressure drop, the engineering specifications must be chosen and balanced against cost. Some liquid collectors don't use absorber tubes at all, but spray a water mist over the absorber surface, collecting it into a manifold below. Others place additional clear baffles, either flat or accordion-fold, to further reduce reradiation.

Surfaces of absorptive elements may look the same, but behave very differently. But some blacks are blacker than others. Options include everything from black paint to black fiberglass reinforced plastic to black chrome to coatings with mysterious numbers. The key to relative effectiveness is the absorptivity vs the emissivity. In other words, highly selective surfaces absorb a lot of the incoming heat and emit very little. Nonselective blacks may absorb as much, but give it up much more easily.

Collector covers are another important component. Excellent solar transmission percentages are obviously of prime consideration. Fiberglass reinforced polymers are available with up to 82 percent transmission, and very light weight. Rolled "water white" glass (0.01 percent iron oxide content) reaches up to 91.6 percent solar transmission. One such product is tempered, and has a light-diffusing outer surface transmitting light efficiently across the absorbing surface, and partially obscuring the absorber. It is also important to keep collector covers clean, both outside and inside. Some instances of ice and snow outside or inside film accumulation have been known to occur. Inside hazing could be either condensation or outgassing of internal insulation. *Insolation* suffers, so consult the major manufacturers.

Collector efficiency varies with the temperature of the circulating liquid. The efficiency is measured by a formula in which average collector liquid temperature (T.outlet + t.inlet/2) minus ambient temperature (t.a) are divided by the Btu/hr/sq ft insolation (I):

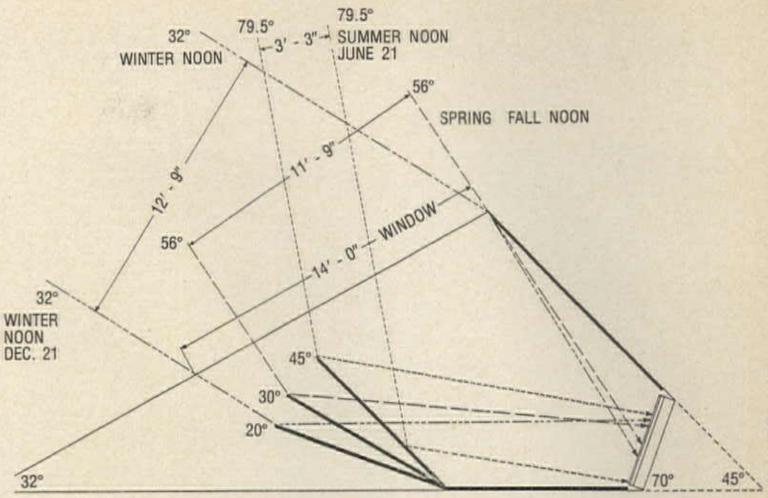
$$\frac{\dfrac{To + Ti}{2} - Ta}{I}$$

Very high temperatures increase pressure and decrease the flow through the collector until stagnation can occur. Prolonged stagnation can damage the collector. Most collectors, therefore, have an upper limit, and many use a drain-down option in case of stagnation or freezing ambient temperatures.

Heat pumps are a whole subject in themselves. However, combined with solar collecting systems, they are a fine way to make cost-efficient packages in cold climatic zones. According to engineer Dubin, solar-assisted heat pumps can use less expensive collectors and possibly reduce storage capacity needs as well. This is because in colder climates, collector conduction and convection losses increase as outside temperatures decrease, and wind velocity increases (except for evacuated collectors). This would increase needed collector area, or demand higher efficiency collectors—both adding cost. We can not deal effectively here with heat pumps, but would emphasize their importance as an adjunct to solar collectors.

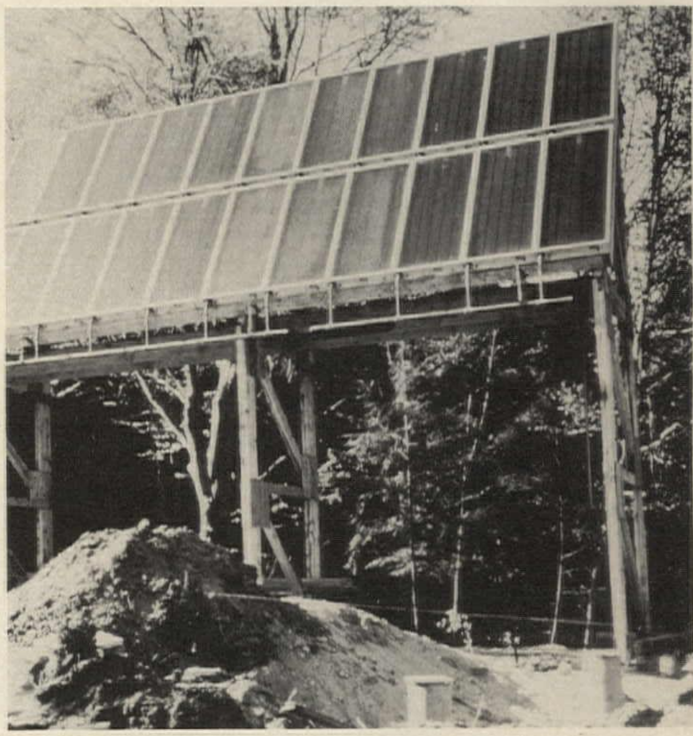
Combinations of passive, active, and heat pump systems are sometimes very effective. Often the "greenhouse" effect, prevailing winds, and shading can supplement active. Dubin feels, also, that photovoltaic cells to convert solar energy directly into electricity are nearing some breakthroughs which would decrease their current prohibitive costs.

Storage of heat takes, as we said, roughly two forms (with variations), rock bed and contained liquid. Rock bed storage bins should be sized about 1 cu ft per sq ft of collector, and contain uniform—¾ in. to 2 in. diameter—rocks. For air systems only, rock bed should be ducted for a lineal flow of about 10 fps, total flow of about 2–3 standard cfm per sq ft of collector. Special care must be taken to insure that uncontaminated rock is used, and that mold, mildew, or insects cannot inhabit the rock-storage bin. Stacking should begin above a plenum, with small vertical channels for rising air, and another mixing plenum above.

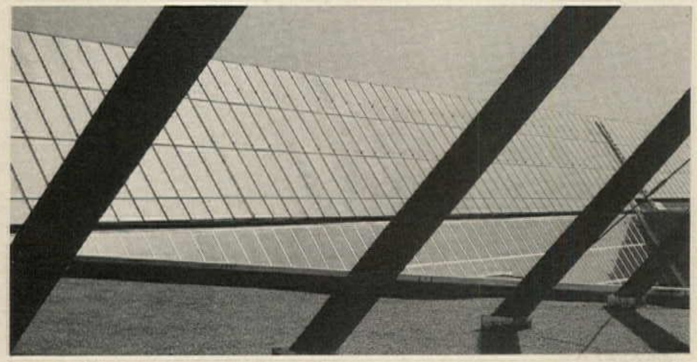


Wormser Scientific

Among the variations available in collectors, principles of pyramidal optics (above) offer an option. Reflective movable flap focuses rays. Collectors (below), Grassy Brook Village, Vermont, by People Space Co.



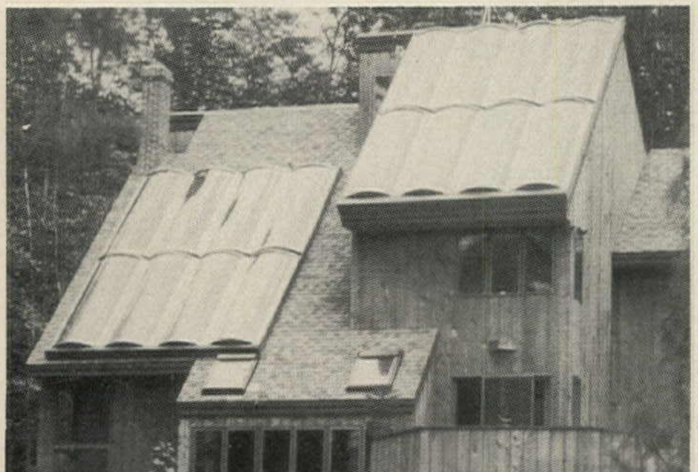
People Space Co.


ASG Industries

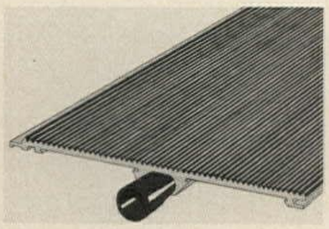
Light-diffusing glass on solar collector array.


Northrup, Inc.

Focusing and tracking collectors.


Grumman Energy Systems

Arched acrylic cover (above) helps keep surface clean, and may allow collector longer hours of operation by picking up sunlight earlier and later in the day. Two different methods of incorporating the absorber plate and tube (below) are examples; many exist, some more complex.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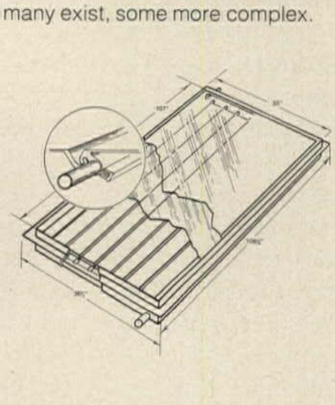
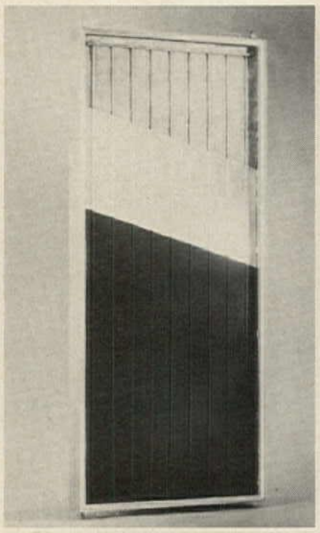
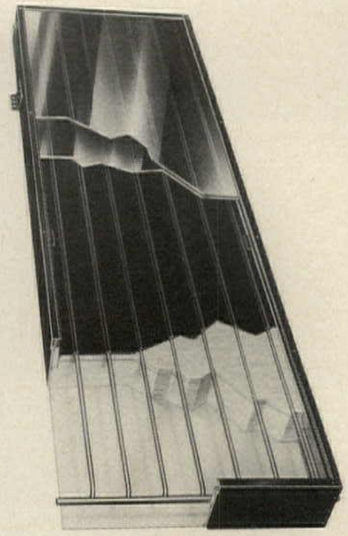

Fedders


LOF Solar


PPG Industries

Two typical flat plate collector modules.

Water has the highest heat capacity per pound of any ordinary material. For normal residential use, a square foot of collector requires storage for about 1½–2 gal of water. Often, antifreeze solutions or organic oils are used to carry collector heat. These require heat exchanger loops in a water tank that is stratified for different water temperatures. Whole articles have been written on other liquid heat transfer mediums. Again, the National Center mentioned above has more information.

Phase change materials can store heat by changing from liquid to solid and vice versa. Heat from collectors changes the materials from solid to liquid. As they cool, they solidify again, releasing heat. Storage bins for these would be one-quarter to one-half the comparable water storage volume. Such products are still undergoing lab testing, however.

Next?

Dubin sees changes in architecture beginning to happen because of solar applications. He also sees improved glazing, better insulation and thermal storage, more focusing collectors, and lots of passive solar possibilities. Among his many interesting jobs are several proposals in which heat pumps would produce ice in winter for chilling in summer, heat in summer for winter use.

Due to constraints, this has been a brief overview, vastly simplifying a fascinating subject. We'll be back to it; we've only just begun. [Jim Murphy]

Acknowledgments

We wish to thank the following companies for their help in preparing this article: Aluminum Company of America; American Air Filter; American Plywood Assoc.; American Solar King (Southwest Advertising); ASG Industries Inc.; Arkla Industries (The ICON Group); Berry Solar Products; Carrier Corp.; Chamberlain Manufacturing Corp.; Copper Development Assoc.; Fedders Corp., Energy Systems Division; General Electric Co.; Grumman Energy Systems; International Environment Corp.; Johns-Manville Sales Corp.; Koolshade Corp.; Lennox Industries Inc. (Post-Keyes-Gardner Inc.); LOF Solar Energy Systems; National Solar Heating and Cooling Information Center; Northrup, Inc.; Overly Manufacturing Co. (Creamer Dickson Basford); Owens-Illinois; Piper Hydro Inc.; PPG Industries; Revere Copper and Brass Inc.; Rho Sigma Inc.; Solar Development Inc.; Solar Energy Digest; Solar Energy Products Co.; Solar Energy Research Corp.; Solaron Corp.; Solar Research; Solar Usage Now, Inc.; Southern California Gas Co.; Sunworks (Kupper Advertising, Inc.); Unit Electric Control, Inc.; Wormser Scientific Corp.

Distilling Detroit sunshine

Solar collector on roof of architects' office.

A solar collector supplying energy to the architects' own building in Detroit gives Smith Hinchman & Grylls Associates experience to be applied by their Energy Conservation and Research Division.

Even before the oil crisis of 1973, Smith Hinchman & Grylls had been working to integrate solar energy collection into buildings larger than the individual house. Their design for a Federal Office Building at Saginaw, Mi, won a P/A Citation (Jan. 1964, p. 64) for its design treatment of an 8000-sq-ft solar collector, along with its innovative approach to energy conservation and its provisions for community recreation.

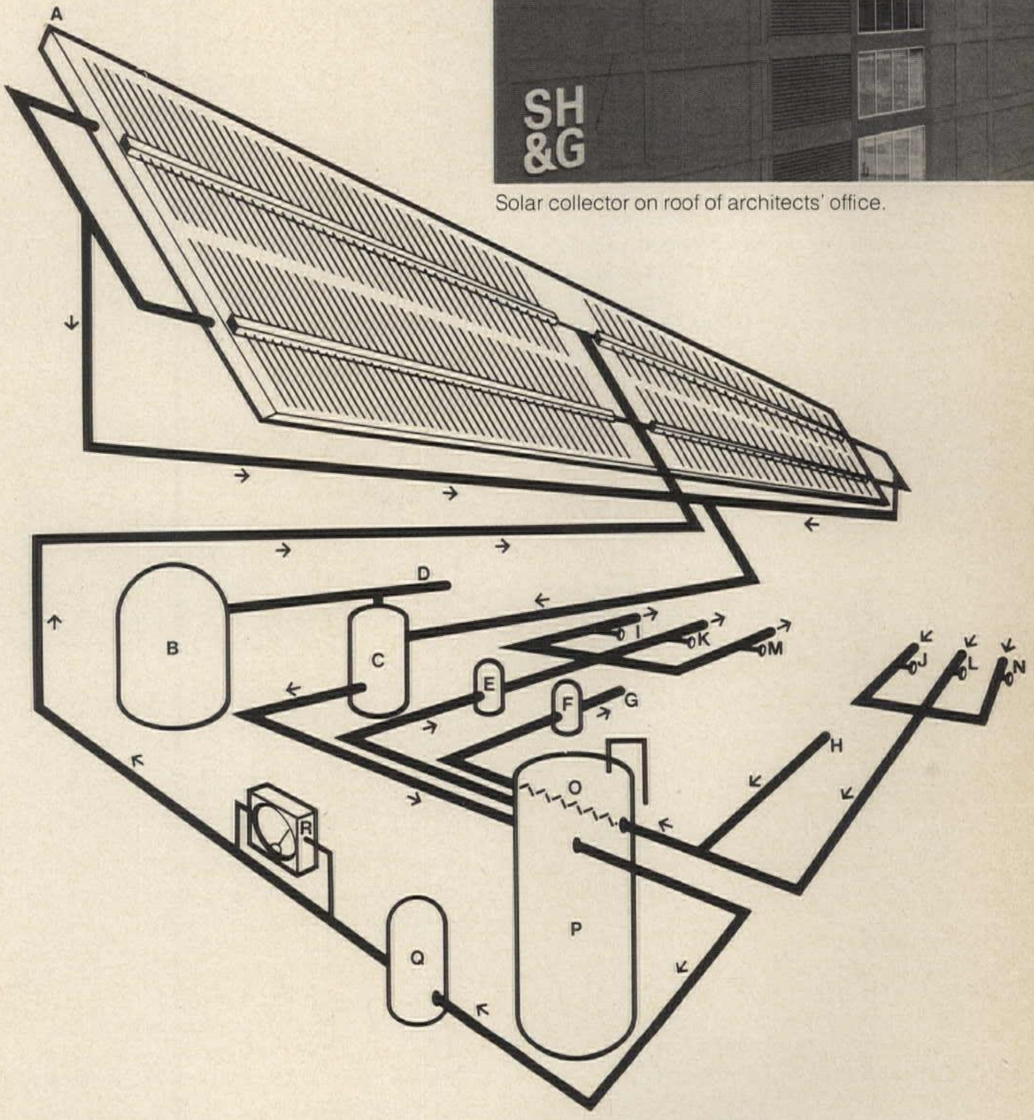
The firm has since lost control over execution of the Saginaw building, now nearing completion in the client's revised version. But the expertise and momentum developed on that commission were not allowed to dissipate. Early in 1975, the firm decided to make a visible commitment to solar energy and to investigate its use at first hand by installing a 1000-sq-ft collector on its own building, a renovated downtown Detroit structure already notable for its unique glazing (P/A, July 1976, p. 57).

The solar energy system, completed and operating by May 1976, serves the building in four ways: heating of water for lavatories serving 500 employees (all year); perimeter finned-tube radiation in one bay of south wall (mainly in spring and fall); heating for a rooftop cooling tower basin (to prevent overnight freezing during spring and fall, when daytime air conditioning is needed); heated water (with "steam assist") for a high-temperature absorption refrigeration that cools the firm's computer room.

The more fundamental purpose of the installation, however, was to accumulate experience. SH&G's staff members wanted to find out just how much solar energy could be collected—in practice—at this admittedly less-than-ideal location. They also wanted to document the maintenance and reliability factors in the system—not just the collector, but the application side of the system as well.

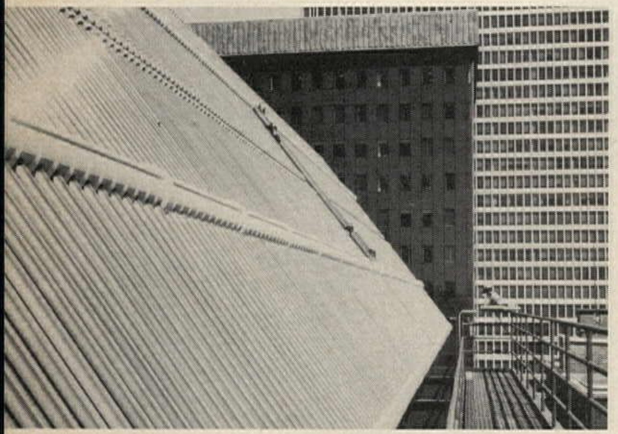
A rack of tubes

Although most of the available collectors in 1975 were of the flat plate type, the firm selected a new evacuated-tube "Sunpak" collector, made by Owens-Illinois. This installation comprises 864 tubes, each about 4 ft long, arranged in 36 "modules" 4′ x 8′ in area. Each tube actually consists of three concentric glass tubes: an outer clear tube about 2 in. in diameter; an inner tube with a selective metallic coating, sealed to the outer one to leave an evacuated gap between as in a thermos bottle; at the core, an open-ended circulation tube that fills the second tube with water flowing

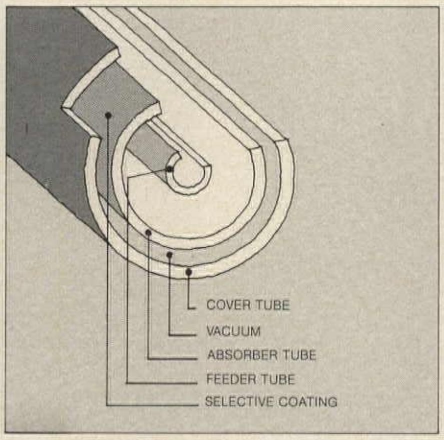


Solar collector system

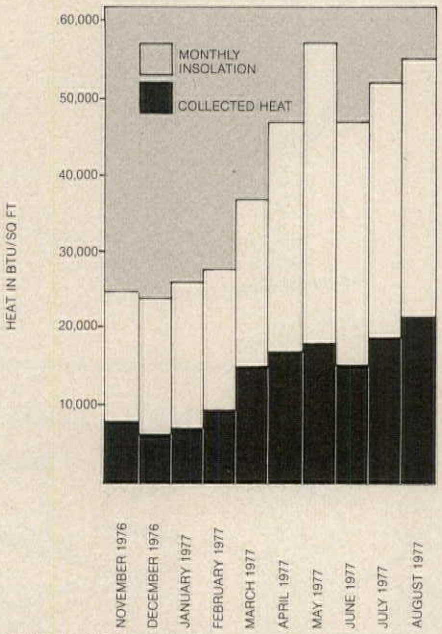
A Solar collector
B Compression tank
C Air separator
D City water
E Energy circulating pump
F Domestic hot water pump
G To domestic hot water system
H From domestic hot water system
I To perimeter finned-tube radiation
J From perimeter finned-tube radiation
K To hi-temp water absorption refrigeration
L From hi-temp water absorption refrigeration
M To cooling tower basin heating system
N From cooling tower basin heating system
O Domestic hot water heat exchanger
P Thermal storage tank
Q Collector pump
R Flow meter



Tube array seen from catwalk.



Owens-Illinois "Sunpak" collector tube.



MONTHLY INSOLATION AND COLLECTED SOLAR HEAT

at a predetermined rate.

The tubes of each module are connected to a manifold designed so that water flows through all 24 tubes in series. Under normal operating conditions, water would flow through the tubes at about 0.25 gallons per minute, rising 20–30F in temperature en route. The modules are hooked up in parallel, returning heated water to a 1500-gallon storage tank in the mechanical penthouse just below the collector. No antifreeze additives are needed, since the evacuated tube will keep the water inside from freezing for days, with no circulation at all.

The entire array of tubes—with a surface area about 16′ x 72′—is mounted on a rooftop steel frame that allows the collector to be tilted at 52 degrees from horizontal in winter and adjusted to 32 degrees for summer.

Findings and feedback

SH&G's solar system is monitored by measuring 27 items involving weather insolation, and temperatures in various parts of the collection and delivery system. Every 15 minutes, a Honeywell Delta 1000 unit logs all of this data for subsequent retrieval and analysis. Any item can be read from the control room on request. Two instruments measure available sun: a tracking pyrheliometer which points at the sun to measure direct beam radiation, and a pyranometer that measures total radiation received on a horizontal surface—the combination yielding solar data about Detroit that can be correlated with weather data from conventional sources.

Data collected in the first ten months has led to some changes in the system itself and to some reconsideration of how to evaluate performance of such systems. The principal change, an apparently simple one, has been to increase the insulation on the storage tank from 2 in. to 4 in. in thickness, to overcome more serious heat losses than anticipated. Meanwhile, Owens-Corning has come up with improved connections between tubes and manifold and improved support brackets that accept the stresses induced by temperatures and pressures in the collector and simplify installation.

Other alterations to the collector, now being tested out in separate quadrants of the device, include the use of larger circulations tubes (⅝ in. vs ⅜ in.) and the addition of focusing reflectors behind the tubes—originally backed only with white panels. The reflectors definitely increase the efficiency of the tubes—by about 30 percent—but they retain snow, which can then stay on the well-insulated tubes for long periods.

Members of the firm's Energy Conservation and Research Division report that collector efficiency has varied from 26 percent (for Dec. 1976) to 39 percent (for Mar. and Aug. 1977)—considerably greater, they are certain, than they could have obtained from flat plate collectors. Of course, the evacuated tube system is more expensive, but they point out that the collector represents, in any case, less than half of the cost of a complete system.

They are measuring efficiency in terms of heat gain vs total insolation for the month, and they raise questions about the measurement of collector efficiency. So far, efforts to standardize evaluation methods have produced ASHRAE Standard 93-77 ("Methods of Testing to Determine the Thermal Performance of Solar Collectors"), which specifies a minimum level of insolation and a minimum angle of incidence of the sun on the collector. Since collectors in actual use will have to function under less than optimal conditions, such a standard may not yield a meaningful comparison of performance.

According to Dr. David Miller of SH&G, major opportunities for improved performance at this point are not in the collectors, but in the controls and other system elements. As a case in point, the controls for the firm's own system are set to start circulation whenever the water in the collector is 1.5F warmer than that in the storage tank, then to shut down if the temperatures become equal. This means that if favorable conditions have yielded a high tank temperature, the system will not begin operating until still higher temperatures are reached in the tubes, thus passing up much potential energy in the morning, and it will shut down early in the afternoon. One solution would be to install a second tank, at lower temperature, which could benefit from this marginal insolation. The system would, of course, have to be redesigned to make use of this lower-temperature reservoir. Another control refinement would be computer-activated systems for *anticipating* favorable radiation, thus taking into account in this instance the 30-minute circuit of water through the collector.

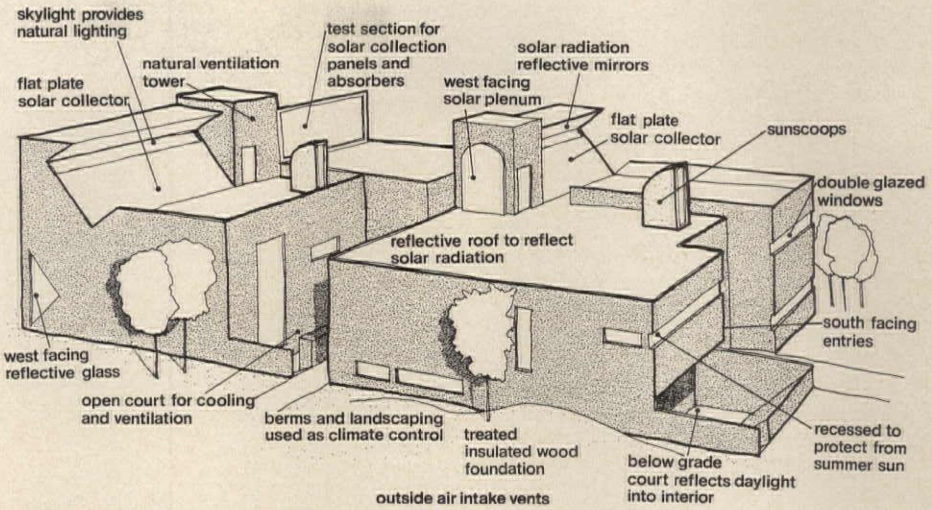
Division mission

This SH&G division has completed work on the Terraset Elementary School in Reston, Va (Davis, Smith & Carter, architects), where Sunpak collectors began to operate in the summer of 1977 (see P/A, May 1975, p. 22). Current commissions include an engineering building for Michigan Bell on which five different types of solar collectors will be installed for comparison: an evacuated tube system like SH&G's own; a "concentrate-and-track" system; two different flat plate collectors; and a simple black-plastic-and-air system.

Speculating on the future of solar collectors, members of the division foresee little improvement in collector efficiency beyond about 50 percent. They see room for improvement in the use of solar energy for cooling systems where about one-third of the solar energy supplied to the refrigeration equipment is now wasted. The economically successful solar system of the future, they point out, must be modular—as boilers or air conditioners now are—and relatively maintenance-free.

When mass production of modular systems for homes begins, Dr. Miller ventures, they are likely to be air systems, which may not have the efficiency of systems such as the firm's own, but will have the advantages of economical installation, light weight, quick start-up operation, and little risk if some portion should begin to leak.
[John Morris Dixon]

Architecture as energy system



In a pair of small professional buildings, structural form, materials, and surfaces are integral parts of a system including solar collectors and electrical back-up.

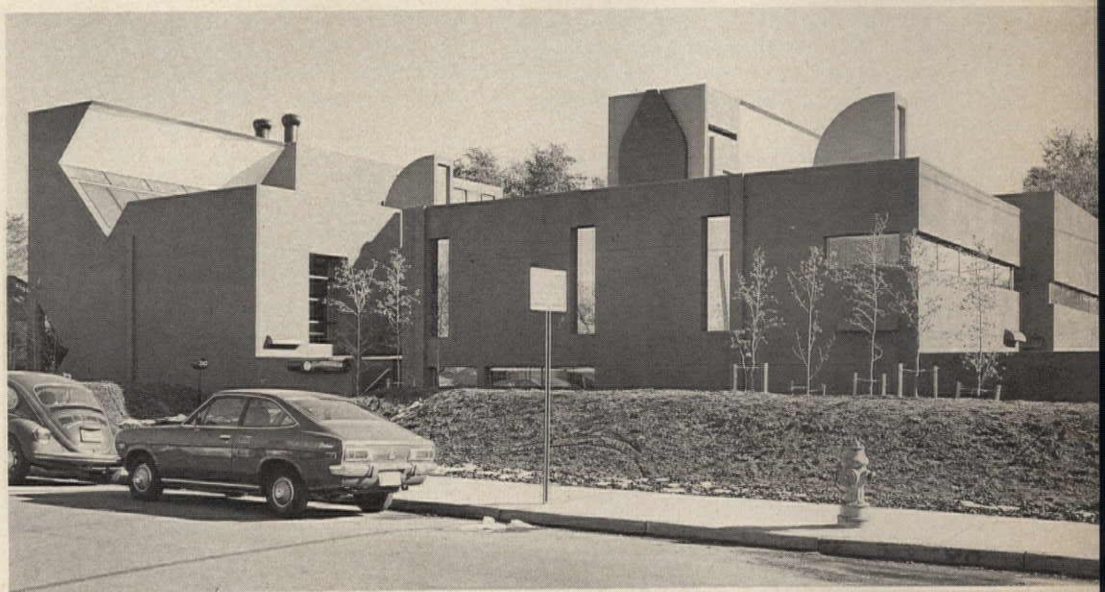
Architecture is a major part of the energy solution in a pair of office buildings designed by architect Richard L. Crowther, who won a P/A Citation for his *Sun/Earth* book (P/A, Jan. 1977, p. 72). The two structures, one for his own dual office —Crowther/Architects Group and Crowther/Solar Group—the other for a graphic design firm, are equal in size (4500 sq ft gross) and similar in design, suggesting a prototype for low-density urban development.

The architectural strategies are simple: each two-story structure is recessed one-half story into the ground: glass area is limited to ten percent of floor area; most of the glass and the major entrances are in south-facing walls; openings are recessed to fend off much summer sun; skylights along north sides of buildings illuminate windowless area, balancing interior light and heat loads; berms at the perimeter of the site deflect winds.

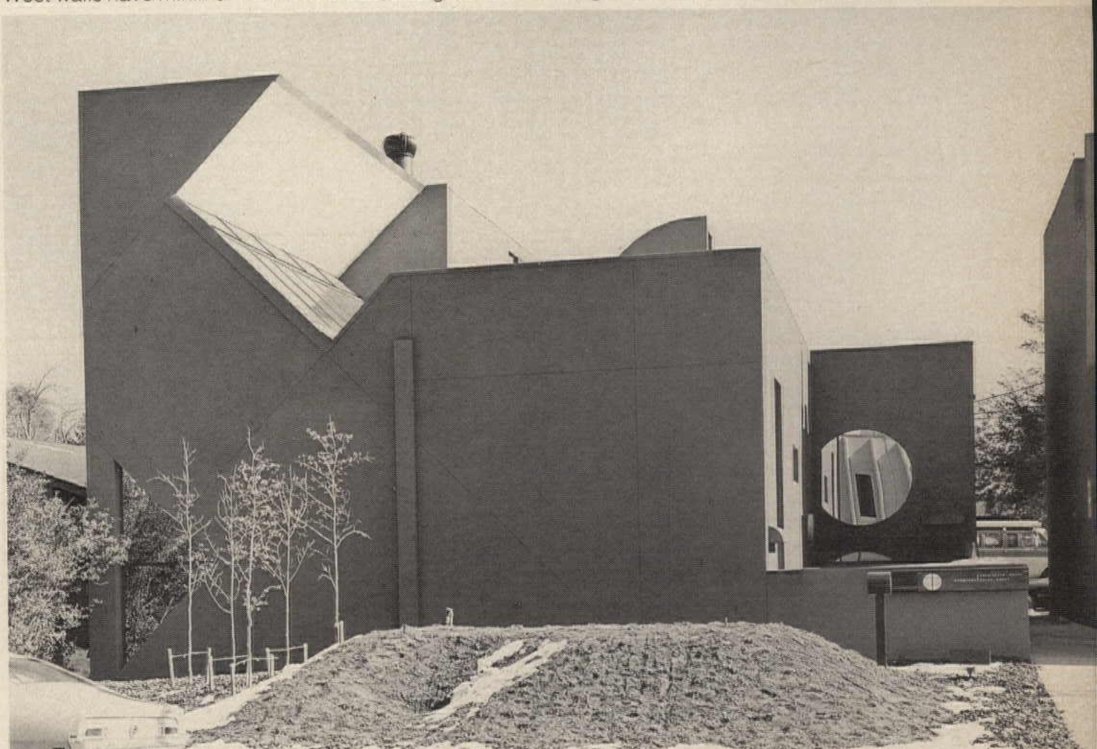
The energy-conserving structural system begins with treated wood foundations (following American Plywood Association recommendations). A continuous wood structural system from foundation to parapet—using 6-in. studs—allows uninterrupted mineral wool batt insulation the entire height. On the exterior, walls are finished with ¾ in. of stucco on ½-in. plywood, finished with "Trilite" exterior acrylic. The roof structure has 16 in. of mineral wool fill insulation between wood trusses; the roof is surfaced with white marble chips. All windows are of double insulating glass in wood frames—fixed, to reduce infiltration.

Design married to hardware

The most visible and distinctive energy-related elements of the buildings are the superstructures on their roofs which combine the functions of light scoops and solar collectors. Each one has a south-facing



West walls have minimum window areas, designed to seem larger, with reflective insulating glass.



Technics: Cherry Creek Solar Office Buildings

flat-plate collector tilted at 45 degrees, with a skylight strip along its upper edge; a reflecting surface projecting over the collector at a perpendicular 45-degree angle performs various functions, depending on sun angle: when the sun is highest, it shades the skylight; at lower sun angles, it reflects light into both skylight and collector. The white, reflective roof surface below the collector also helps reinforce the low winter sun by reflection into the light scoop (whereas it bounces summer sun mainly back toward the sky). The architects estimate that these reflections increase the effective area of the collector 15–20 percent.

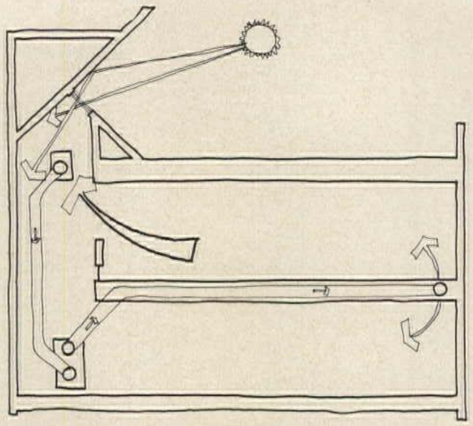
The operation of the heating and ventilation systems in these buildings, described in more detail below, depends in part on air circulation through openings between floors and up into the skylight. Architecturally, the effect of these penetrations is to make the interiors seem remarkably spacious and unconfined, despite their small volumes and limited glass areas.

Systems for all seasons

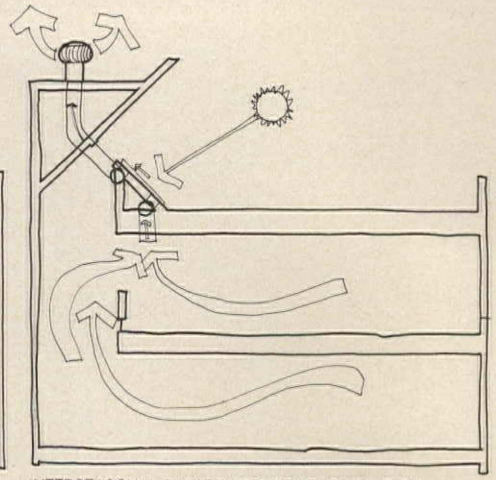
The buildings are designed and equipped to operate in three distinct modes: winter heating, summer cooling, and between-seasons ventilation. The hardware involved includes a 136.5-sq-ft flat plate collector and a thermal storage bin filled with 70 cu ft of river gravel. In addition, each building is equipped with two three-ton rotary heat pumps, serving two distinct zones—each pump containing a 5-kw resistance heating unit. Another key element is the configuration of the interior, which allows the natural rising tendency of warm air to contribute to the system. The phases of operation under varying conditions are identified at right.

Utility bills were originally projected to be about $.50 per sq ft per year, but in actual operation they have amounted to only about $.40. For one thing, peak demand (which affects utility rates) has turned out to be lower than the estimated 27 kw in summer and 37 kw in winter; actual maximum demand has been under 20 kw during the first 14 months occupancy, except when equipment repair required higher loads.

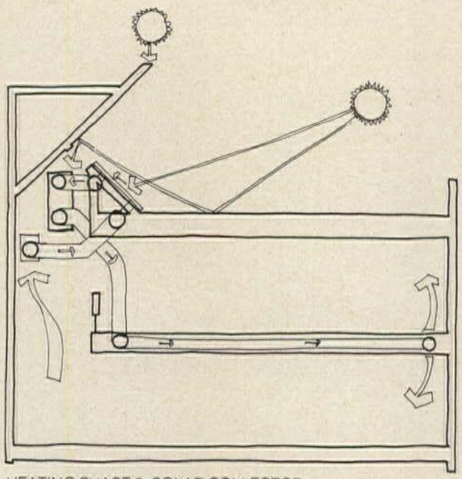
Originally, the local utility planned to impose a 50 percent penalty on the demand factor in establishing rates for solar buildings, treating them as standby customers. Payment of such a penalty would, of course, have negated much of the inherent economy of the system, and discouraged others from investing in energy-conscious design. A letter from Donald J. Frey, an engineer with the Crowther firm pointed out that electrical energy demand throughout the year—including a norm of about 1600 kwh per month for lighting and other equipment—would in fact be quite uniform. The utility company apparently accepted Frey's contention that the buildings represented model customers—rather than erratic ones—and waived the penalty. To date, demand has caused little



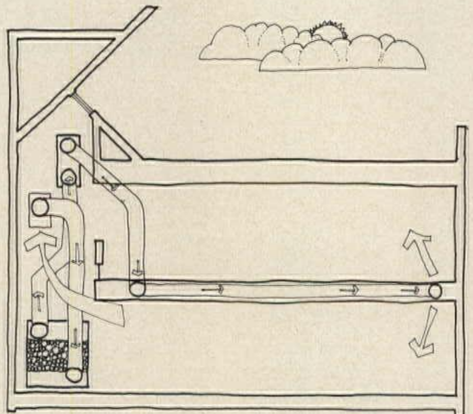
HEATING PHASE 1: FROM HIGH RETURN



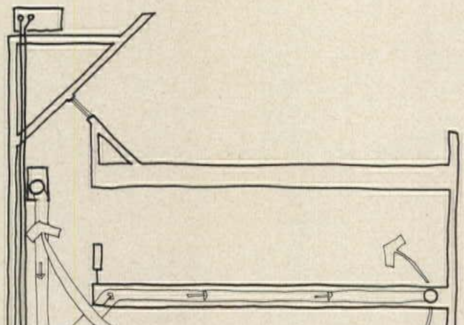
INTERSEASONAL PHASE 2: INDUCTIVE VENTILATION



HEATING PHASE 3: SOLAR COLLECTOR



HEATING PHASE 4: FROM STORAGE BIN



HEATING PHASE 5: HEAT PUMP

Heating mode

Phase 1: Rising warm air is channeled into return grilles at high points, passed through electrostatic, charcoal, and fiber filters and reintroduced to space, one return is just below skylight to make best use of solar gain.

Phase 2: Test section for solar experiments on architects' own building has large areas with sliding glass doors; blinds behind doors are black on one side to absorb heat in winter, white on the other to reflect it in summer; air warmed in this section is pumped into building by small fan; section can collect solar heat equal to that from flat plate collector, can also be used for convective ventilation, air tempering and/or humidification.

Phase 3: Heat from solar collector can be delivered directly to interior or stored in bin in lower-floor mechanical room.

Phase 4: Heat from storage bin can be distributed to building; 70 cu ft of gravel satisfies overnight demand on average winter days.

Phase 5: When necessary, heat pumps supply heat to interior; warmed air rises to high point of space, where it enters returns and is recirculated.

Phase 6: During periods of extreme cold and limited sunshine, heat pump capacity must be supplemented by resistance coils.

Interseasonal mode

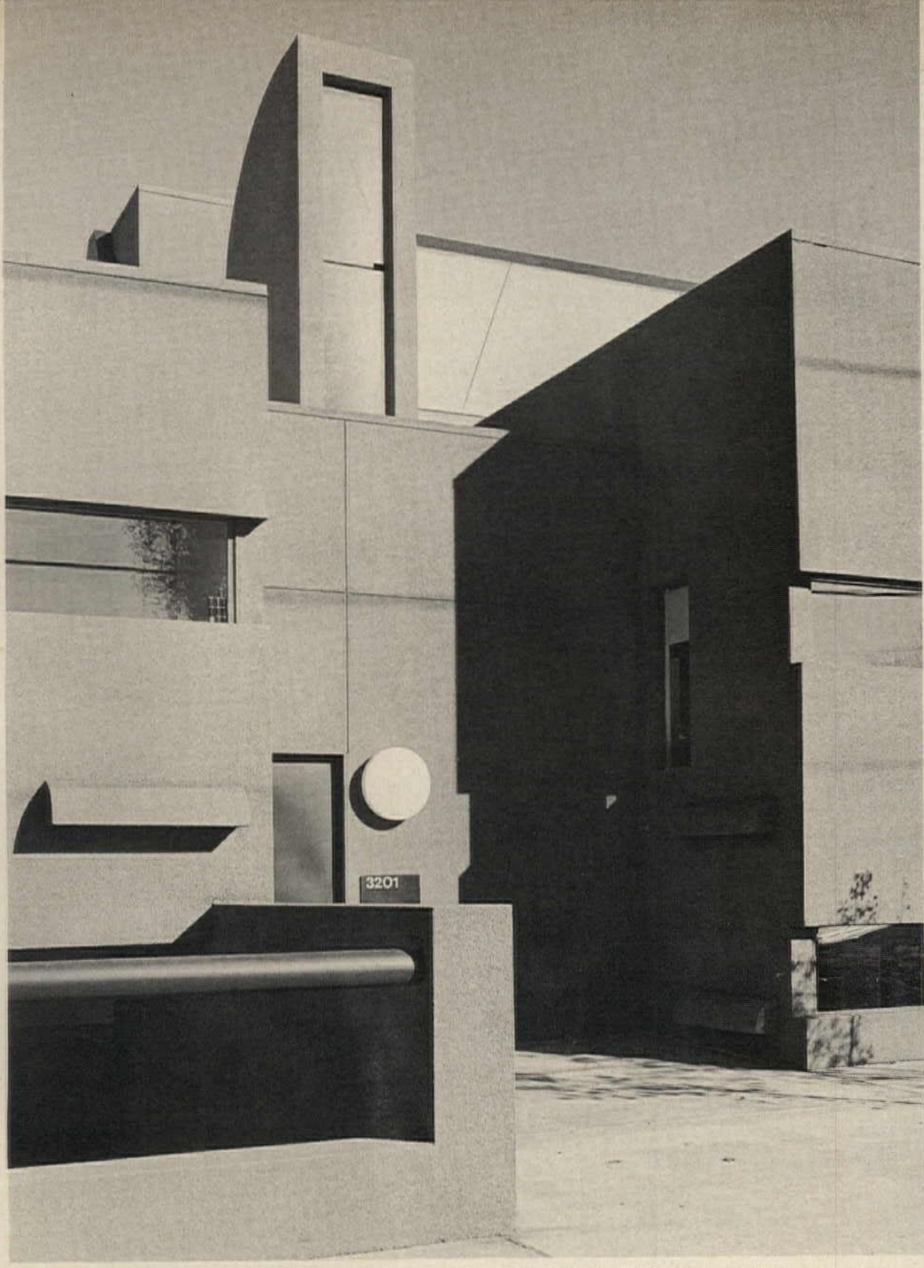
Phase 1: When warm air at high point is not needed for heating, it is exhausted through wind-powered turbines on roof and outside air drawn in through vents at ground level; cool night and morning air can be introduced, then circulation stopped as outside temperature rises; south building also has a west-facing heat plenum, with a gravel lining, which uses afternoon heat gain to induce natural ventilation and maintains it after sunset.

Phase 2: Warm air at peak can be exhausted through solar collector, cooling it to extend its life and inducing more rapid ventilation.

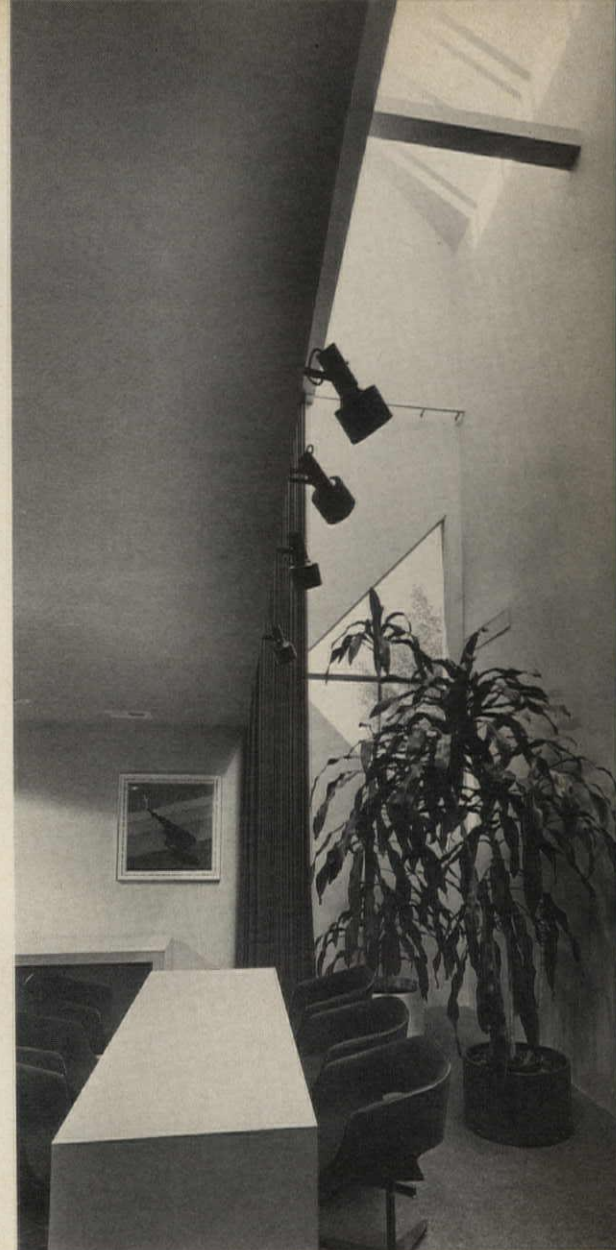
Cooling modes

Phase 1: Cool air from lowest levels of building—mechanically cooled or drawn from outside—is picked up, filtered, and redistributed.

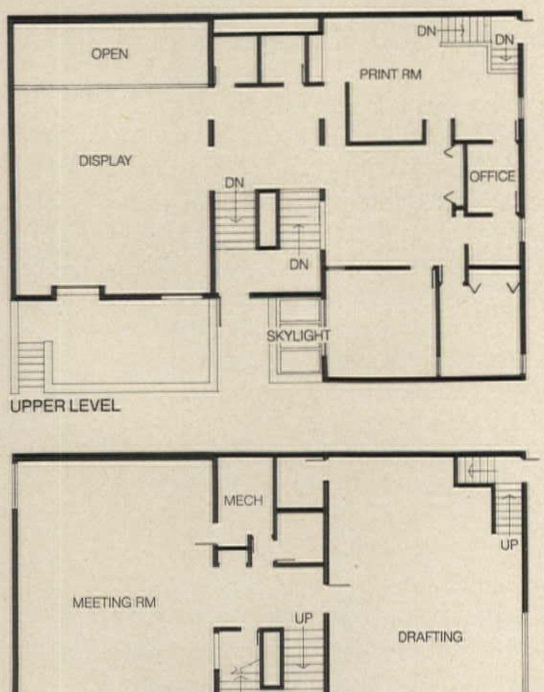
Phase 2: Air from returns at lower levels is directed through rooftop heat pumps, which exhaust heat to outside air.



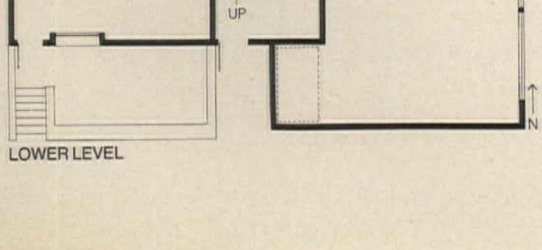
Entrances are in sun pockets facing south; sunken court reflects light into lower floor.



Skylight illuminates full height of north wall.



UPPER LEVEL



LOWER LEVEL

fluctuation in rates—from about $.065 per kw during a month when repairs caused a peak demand to less than $.05 in a more typical month. Actual costs per month (excluding taxes and fuel adjustments) have varied from winter and summer highs of $179 and $141 (in January and July 1977) to a between-season low of $99 (May 1977).

In its first 14 months of operation, the architect's building has operated very close to its projected energy budget. Definitive statistics on the performance of the solar collector—or any other system components—have not been obtained, since the elaborate instrumentation required was considered too expensive. Temperature sensors at all key points are used to determine what mode the system should be in at any given time and also permit occupants to study behavior of such systems. Judging by power consumed, which has varied either way from budget depending on weather, the architects have gotten anticipated performance from the combination of solar collector and passive architectural features such as insulation. Experience has shown the building, as systems, to be justified both in terms of current dollar costs and in their implications for energy-conserving architecture. [John Morris Dixon]

Data

Project: Cherry Creek Solar Office Buildings, Denver, Co.
Architect: Richard L. Crowther, AIA; Crowther/Architects Group, Denver, Co.
Clients: Glenn Monigle (south building); Richard L. Crowther (north building).
Site: flat, rectangular streetcorner site, about 120′ x 140′ in old urban neighborhood, transitional residential/business; north side of street to ensure sun access.
Program: two separate professional offices, for architects and graphic designers, of about 4500 sq ft each, on two levels.
Structural system: wood frame on treated wood foundation.
Major materials: acrylic stucco exterior wall surfacing; gypsum board interior walls; carpet on plywood subfloor; built-up roof with white marble chips; mineral wool insulation.
Mechanical system: solar heating system (see text); heat pump for supplementary heating and air conditioning.
Consultants: James R. Borman & Associates, structural; Walton/Abeyta Associates, mechanical; Solaron Corporation, solar system.
General contractor: Shaw Construction Company.
Cost: $130,000 per building (excluding land, landscaping, and fees); completed Aug. 1976.
Photography: Karl H. Riek.

Disclaimers increase architect's risks

Bernard Tomson and Norman Coplan

Self-protective disclaimers in suppliers' contracts and how they subvert the owner's protection and increase the architect's risk are discussed here.

In general, a court may find an architect liable for negligence if he has specified unsuitable material or equipment with which he is not familiar and with which he has had no experience, particularly if it is a new or untested material. Reliance by the architect upon the representations of the manufacturer or supplier as to the quality and suitability of its products or equipment may not necessarily exculpate the architect from a claim asserted by the owner against him in situations where those representations turn out to be untrue. Typical of the risk incurred by the architect when he specifies in reliance upon the manufacturer's or supplier's literature is the Pennsylvania case of *Bloomsburg Mills, Inc.* v. *Sordoni Construction Co.* (401 Pa. 358) in which the Court held that whether or not the architect fulfilled his responsibility to the owner by relying upon the representations of the supplier was a question to be determined by the jury.

Many manufacturers and suppliers seek to avoid or limit their liability by incorporating in their contracts disclaimers of express or implied warranties. Such disclaimers not only subvert the owner's protection, but increase the potential liability of the architect. Since such a disclaimer may be legally enforceable unless it is deemed to be unconscionable, the development of the doctrine of unconscionability, in this context, is of great importance to both owners and architects.

In a recent significant case in New York *(Industrial-ease Automated & Scientific Equipment Corporation* v. *R. M. E. Enterprises, Inc.*, 178 NYLJ No. 34, p. 1) the Appellate Division of the Supreme Court was presented with the issue whether the manufacturer's disclaimers of express or implied warranties in a lease of industrial equipment was unconscionable in view of the fact that the equipment never operated. The defendant in that case owned a 40-acre picnic grove which generated considerable refuse during the season. The defendant sought to dispose of the rubbish through nonpollutant burning on the premises, and to this end, leased from the plaintiff certain incinerating equipment which was represented to him as meeting his requirements. The lease, however, contained a clause generally disclaiming any warranties. The incinerators were delivered and installed, but they did not then or thereafter work, although the manufacturer attempted many times, in vain, to make the equipment operative. During this period, the defendant made rental payments to the plaintiff, but after a period of time, ceased making the payments and demanded that the plaintiff remove the incinerators from his premises. In the litigation that ensued, the defendant counterclaimed for damages based upon the alleged breach of warranties on the part of the plaintiff.

The major question to be determined was whether the manufacturer's disclaimer of any warranty prevented the defendant from relying upon the warranties otherwise provided under the Uniform Commercial Code. In this respect, the Court said:

"The UCC plainly recognizes the validity of disclaimers of warranties in sales agreements under certain circumstances. . . . Here, pursuant to the statute, the exclusion of warranties was accomplished by conspicuous and bold print and thus complied with the statute in that respect. The question whether in this case the disclaimer is unconscionable remains.

"Section 2–302 of the UCC provides that the court may refuse to enforce a contract clause once it finds the clause to have been unconscionable at the time it was made. The determination of unconscionability is a matter of law for the court to decide.

"The original concept was broad: An unconscionable contract was one 'such as no man in his senses and not under delusion would make on the one hand, and as no honest and fair man would accept on the other' . . . The test has been more sharply defined 'to include an absence of meaningful choice on the part of one of the parties together with contract terms which are unreasonably favorable to the other party,' and characterized 'by a gross inequality of bargaining power.' "

The Court then considered whether in fact the lease contract fell within the criteria which would mandate a finding of unconscionability. The Court pointed out that the contract had been made in an atmosphere of haste and pressure. Since the beginning of the season for the defendant's operations was at hand, the defendant was clearly at a disadvantage to bargain at length and he did not profess to understand the size and mechanism of the equipment which would satisfy his needs. The evidence plainly established, said the Court, that the equipment did not work at all and that it achieved none of the purposes of the parties. This is a result, concluded the Court, "so one-sided . . . that the disclaimer in good conscience should not be enforced. In effect, the equipment was worthless."

The willingness of courts to apply the doctrine of unconscionability to manufacturers and suppliers, who seek to isolate themselves from liability through disclaimer of warranties, or otherwise, in connection with their products or equipment, is an encouraging trend from the viewpoint of both architect and owner. There is obviously a direct relationship between the quality of a product and the legal responsibility of its producer. □

Martin Luther King, Jr. Vocational High School, Cleveland, Ohio
Architects: Madison•Madison International, Cleveland
Roofer: Korner Roofing & Sheet Metal Company, Cleveland

Photos by Abel Photographics

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TCS is reasonably priced and requires no maintenance.

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FOLLANSBEE STEEL CORPORATION
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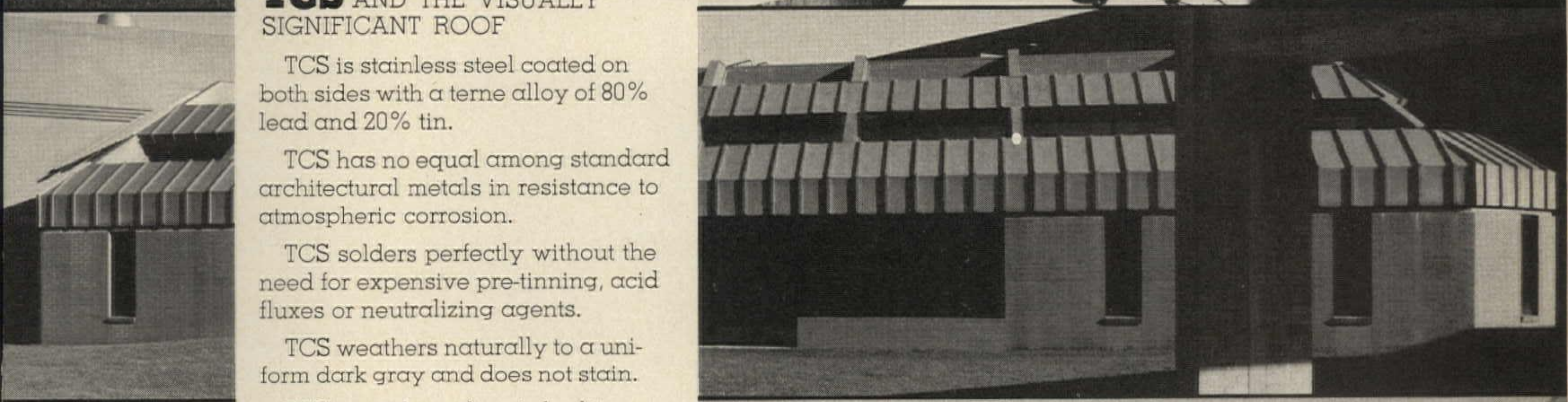

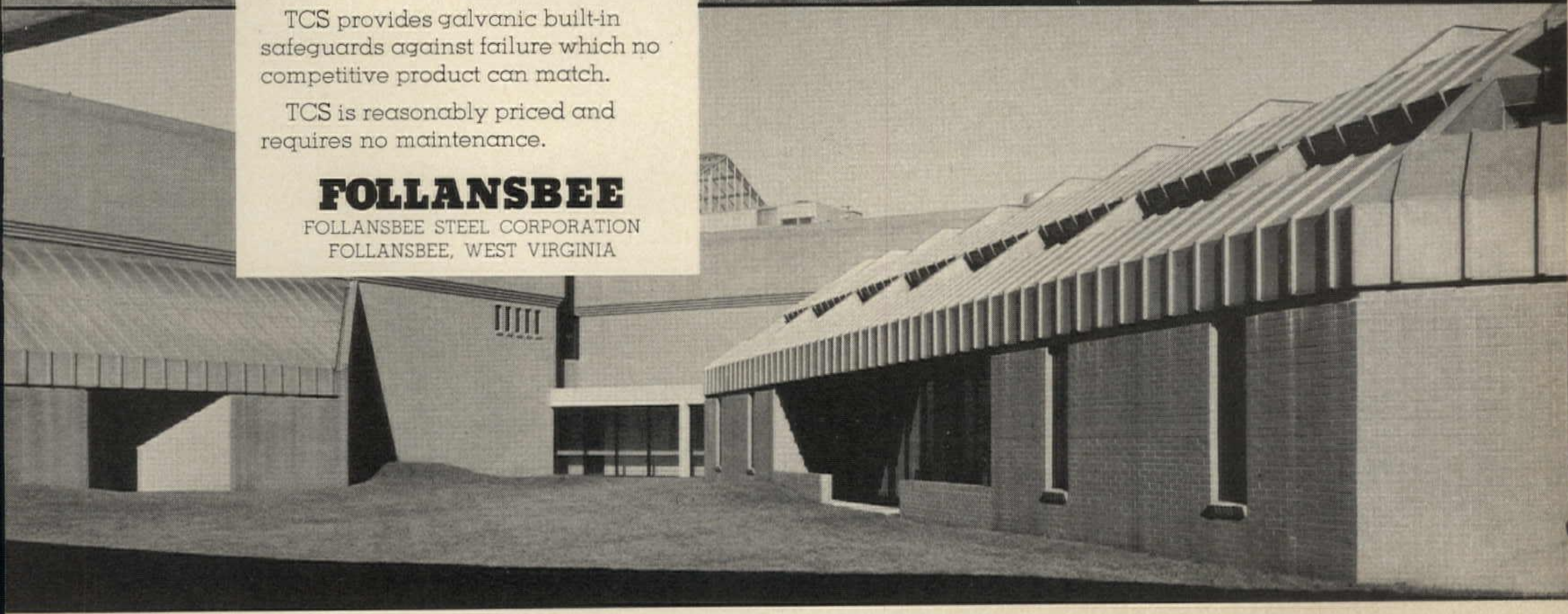

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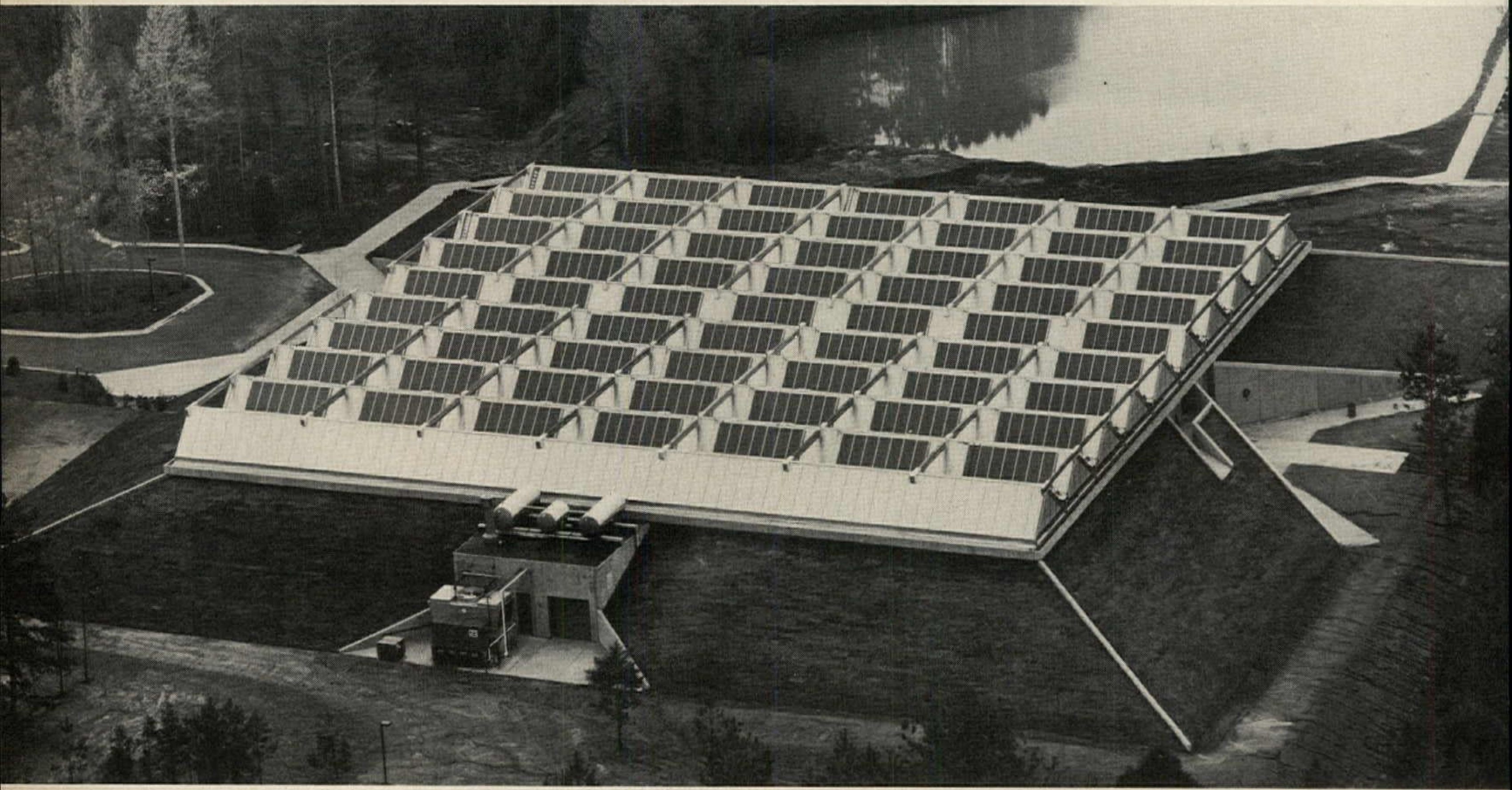
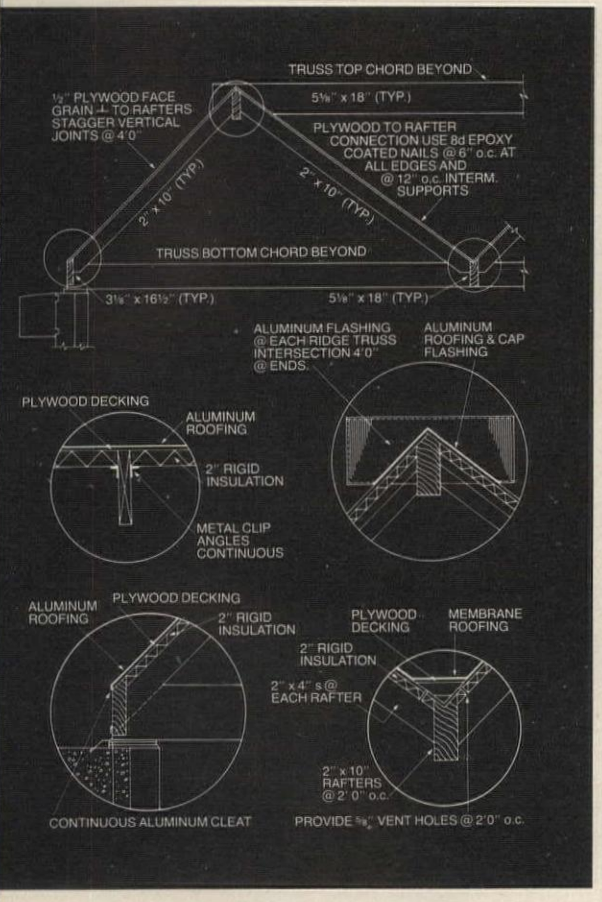
Plywood Design Series - 2



Shenandoah Solar Recreation Center: Shenandoah Development, Inc., owner; Taylor and Collum Architects, Atlanta, Georgia.



Solar design. The large economy size.

When architects Richard Taylor and Tom Collum designed the roof of this 59,000-square-foot community center as one giant solar collector, there was only one decking material that made sense at all.

Plywood.

The roof is a folded plate system of wood trusses and ½" CDX 32/16 APA grade-trademarked plywood attached to diagonal truss members and rafters at the same slope. The plywood is sheathed with reflective aluminum, and collector panels are mounted on the south slopes.

Besides being the most economical material, plywood provides extra stiffness, in-plane wind load resistance and out-of-plane dead and live load resistance.

The solar system produces 95 percent of the heat for the building, two-thirds of the cooling, and heats an outdoor swimming pool, too.

And saves about $77,000 a year in utility costs.

For plywood design data, write American Plywood Association, Dept. PA-088, P.O. Box 2277, Tacoma, WA 98401.

AMERICAN PLYWOOD ASSOCIATION

Plywood. The Performer.

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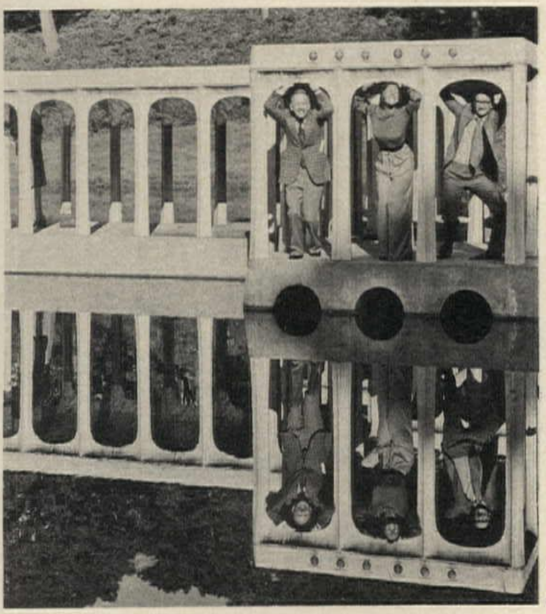
After the fall


Stan Ries

Human gargoyles at Philip Johnson's underscaled Folly.

This book review is the second in a monthly series of commentaries about the 'death' of modern architecture and the rise of a post-modern architecture.

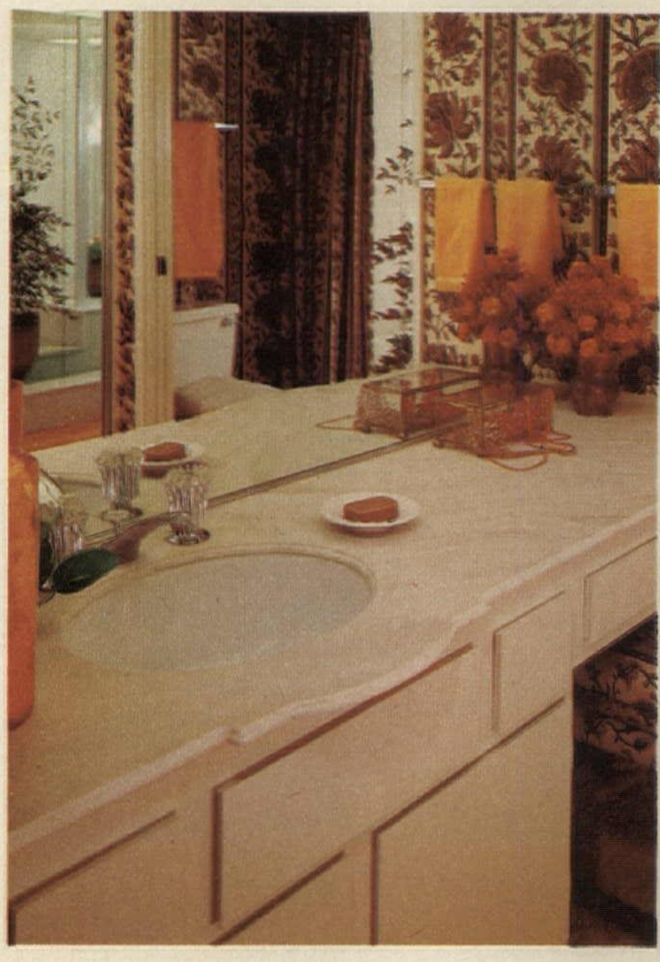
Supermannerism *by C.R. Smith. New York, E.P. Dutton, 354 pp. illus., $9.95.*

Reviewed by David Dunster, an English architect who teaches history and theory at Kingston Polytechnic and frequently writes on architecture.

The explosion of work and talent which has made the US such a vital force in architecture today needs some account of the various shades of opinion, of the multiplicity of ideas, and of its brief history. From the other side of the Atlantic it was difficult to believe that Venturi & Rauch, Charles Moore and his numerous partners and the New York Five were totally alone in their endeavors. Robert A.M. Stern's book *New Directions in American Architecture* hinted at the richness to come, but now we have an eye-witness account of roughly a decade. The author of *Supermannerism*, C. Ray Smith, was for most of that time on the staff of P/A, and therefore in a position of some vantage to observe and report on the goings on. This book is the condensation of his knowledge and experience.

First of all, the author must be congratulated for getting so much in. The scope appears encyclopedic, even if it is dominated by the East Coast schools, their staff and students. But of more importance is the fact that this book is a genuine and largely successful attempt to write a popular introduction to current architecture. Heavy with illustration and quotation, it is written in such a way that the general

[continued on page 87]



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SunPanel solar collectors are the product of 40 years of LOF research in controlling solar heat. And that experience is paying off for people like the Wally Campbells, owners of this Boulder, Colorado, residence.

Installed in the spring of 1977, the Campbells' three SunPanels are used to heat water. The Campbells report they couldn't be more pleased with the units' performance—or with the value they believe our solar collectors may have added to their home.

Our experience pays off in other ways, too. Designed for easy installation, SunPanels can be put in place with the same skills plumbing and heating contractors use every day.

For more information on LOF SunPanels—including additional system components being tested right now—send for our free, colorful brochure. Write Martin Wenzler, Solar Energy Systems, Libbey-Owens-Ford Company, 1701 E. Broadway, Toledo, Ohio 43605.

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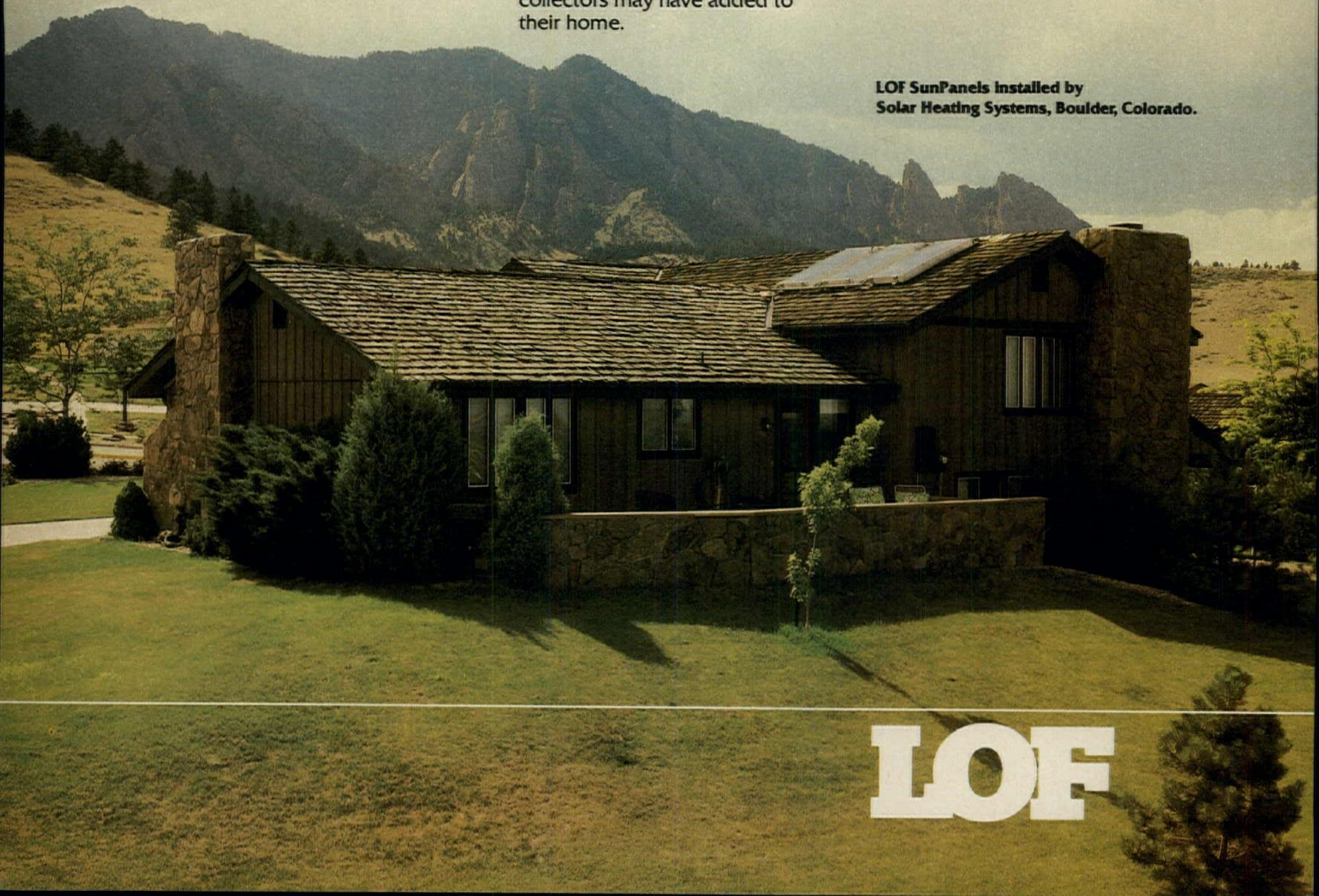


LOF SunPanels installed by Solar Heating Systems, Boulder, Colorado.

Books continued from page 85

public has access to some very sophisticated and complex ideas. This quality seems to me to be entirely in line with the drift of the work that is discussed.

A second quality is the author's courage in braving the pitfalls of methodology in cultural history. At the start of many chapters the reader is treated to an all-too-brief but fascinating resumé of parallel work in the other liberal arts. While the inherent tendency to glibness of this approach could hardly be avoided, the clarity of exposition and humility of the author overcome the culturalist dangers of seeing everything as a reflection of everything else, and he enables us to read, for example, the mood of 1968 in the context of the architecture of that year rather than vice versa.

At such close quarters, cultural causality is perhaps best left to anecdote or, to put it another way, the really gripping parts of this text are the gossipy ones. The chapter "Genealogy of the New Design" will take some beating, and elucidates the relations between the protagonists very clearly. The story of the Yale Art and Architecture building, for example, and "Project Argus" is told with compassion and understanding for Paul Rudolph and his successor as head of the school, Charles Moore, and the students.

While the author's objectivity sometimes slips—all those long chains of go-getting adjectives can be wearing—his ability to rephrase architects' jargon into common parlance is remarkable. In fact throughout the whole book one has the feeling that it was written by a very nice chap indeed who only rarely gets caught bending over backwards to be fair. Of one architect he writes that "His spatial ambiguities are a new, foreign, and to those in tune with the new generation, an exhilarating experience." This kind of double-take is really masterful.

In criticizing the book I must temper what I have to say with admiration for the inclusiveness and generosity that permeate nearly every page. However there were times in reading the book when visions were conjured up that all American architectural schools are full of avid, experimenting, keen students just eagerly waiting for the next breeze of architectural *zeitgeist* to waft through from the staff bar. Perhaps the electric simultaneity of Instant History is too heady a brew. Perhaps that authentic reporter's touch, when spread out over book length, just leaves one feeling that it's all a little too good to be true. One of the author's favorite sources for quotations seems indeed to have swallowed and gagged on an early Tom Wolfe article.

A more important reservation, however, springing from the style of writing, is that—more by default than intention, I think—the book presents a view of architectural history that makes architecture understandable but toothless. The very title of course refers to this cyclic view of change. But nowhere does that real edge found in some of Venturi and Scott Brown's writing come through. For if—and who could disagree now—ambiguity is an important characteristic of architectural production in the United States, what could the reasons for this be? The soft-core lefties can come back with the essential-contradictions-of-capitalism routine, or easier, and more wearable, existential *ängst;* but Smith leaves us thinking when he has found a reason [continued on page 88]

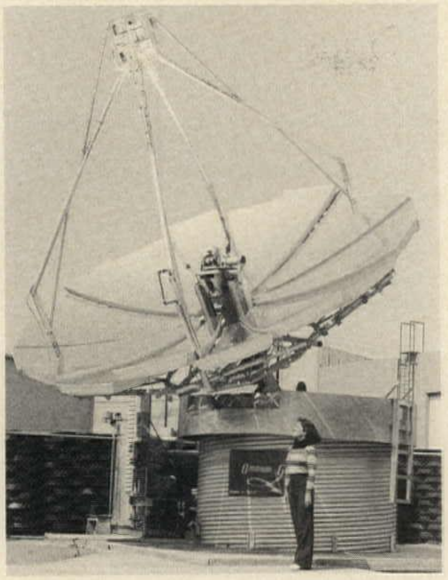
Books continued from page 87

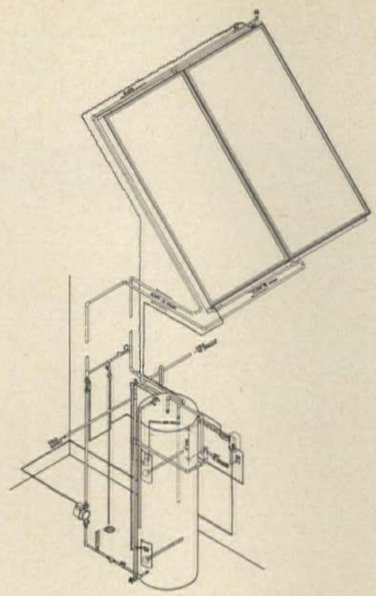
that is "fun" that we have arrived at the ultimate conclusion. I don't really think that American architecture of this period can be written down to *double entendres* and the surprise of inversion. Nor could Venturi be layered Gropius with a diagonal or two. In a brief passage in the book, the reader is offered certain art-historical precedents—notably the Laurentian Library of Michelangelo—as precursors and antecedents. Without having the author's breadth of knowledge of American architecture, it would nevertheless seem to me that the essential factor is the rehabilitation of architectural history and the implied possibilities offered by a close reading such as Venturi's in *Complexity and Contradiction in Architecture.*

For the only alternative, and is this not really what the text offers, is to see changes in architecture as fashion—as, that is, changes in taste. Interestingly, little space proportionally is offered to consideration of the New York group of architects, and none at all to their house magazine *Oppositions*. While it may be difficult to swallow, *tout court,* all of the ramblings emanating from the little red books, there can be little doubt that theirs is the most serious English language magazine operating at the time, as was *Perspecta* before. Their central concern seems to be the re-establishment of literacy, in every sense of the word, in architecture. This desire must have had antecedents and I for one would be extremely interested to know what they might be. Did the expatriate European architectural historians play as small a part in the current developments as the book would lead us to believe? And surely Scully's role is too played down to be true.

My major criticism is more, therefore, of the mode of presentation of the material, than of the material itself. If designing is really as easy and responsive as it is presented, an outside observer would be entitled to ask what all the fuss was about. In fact the past decade and a half have seen nothing less than a total reappraisal of the ambit of architecture, leaving us in a querulous position. For now there is neither certainty of style, nor justifiable reliance on working method; nor can we retreat into the ivory tower of the artist as the free creative individual. Attempts at consensus would appear doomed, because—if the path which the fine arts have taken is any model to go by—architecture will become more and more diverse, more and more individualistic. This makes any form of general design theory—syntactic, semantic, or semiotic—appear footling and retrogressive. Whether the U.S. is in the grip of Supermanner or Superbarock, is rather irrelevant in view of the vast amount of formal experimentation, and technical re-evaluation which seems the architect's lot for a few years to come. Nonetheless, from time to time attempts must be made to take a synoptic view. If the attempt made by *Supermannerism* is less than totally successful, I think that grateful thanks are due to its author for trying. He won't be the last, because one of the effects of the growth of literacy amongst architects is that publishers will discover a rather larger market for wares such as this. In fact, arguing against what I have written above, had C. Ray Smith adopted a critical position, the reader would not have the confidence that he was actually being as inclusive as I feel he has been.

Products and literature


Solar powered electrical generating plant

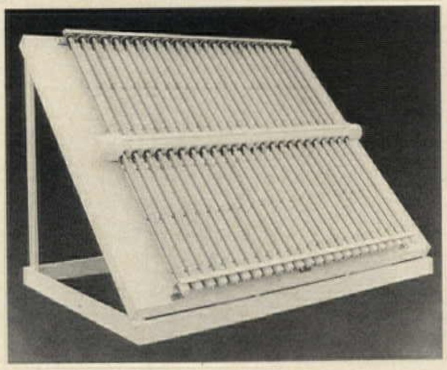

Solar Solector Pak hot water system

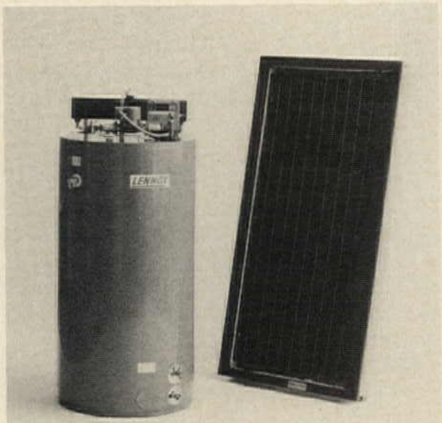
Solar energy products

The items below specifically relate to the technics article beginning on p. 70 and are grouped here for the reader's convenience.

Solar powered electrical generating plant. The Heliodyne™ decentralized power plant is said to provide a completely self-contained source of electrical and heat energy for household, agricultural, commercial, or industrial applications. According to manufacturer, each unit produces up to 75 kwhr of electricity per day. In addition to electricity it also produces 600,000 Btus of heat per day. Energy is stored in the form of compressed air. Omnium-G.
Circle 100 on reader service card

Sunpak™ solar energy collectors, under development, now are available in test modules for use by colleges and universities, laboratories, and other institutions working on solar energy research. The package consists of a test array, measuring 8′ x 8′ and includes 48 evacuated glass tubes, key component of the Sunpak system. An aluminum reflector, especially designed to increase the efficiency of the Sunpak collector, also may be obtained. The collector operates by using water pumped through the tubes to absorb solar energy in the form of heat, which then can be used for water and space heating and air conditioning. Owens-Illinois, Inc.
Circle 101 on reader service card


Sunpak solar energy collector


Solar domestic hot water system

Solar domestic hot water system. Known as the LSHW1 series, it comprises flat-plate solar collectors and a solar hot water module, which combine with a hot water heater. It is designed for residential or light commercial applications. The hot water module acts as a solar heat storage tank, a heat exchanger, and a control center. The system's controls, pump, valves, and plumbing connections are factory mounted on top of the module. A heat transfer fluid is circulated through the collectors where it absorbs heat. Fluid is then piped to the built-in heat exchanger in the solar hot water module where it heats the water within the storage tank. The cooled transfer fluid is then pumped back to the collectors to continue the cycle. Five basic systems are available. Lennox Industries Inc.
Circle 102 on reader service card

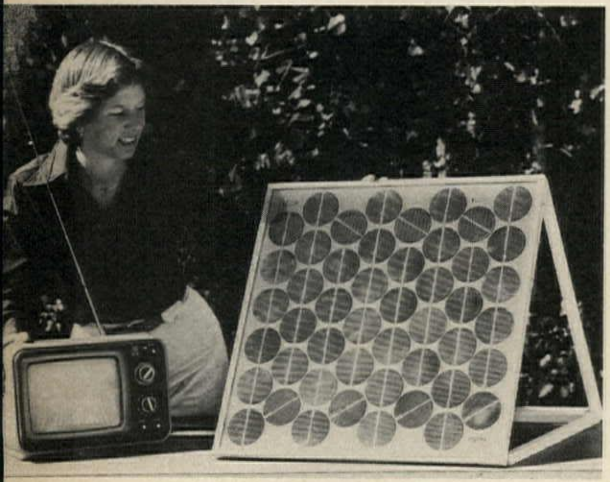
Solar-absorbing porcelain enamels. According to manufacturer, the ceramic coatings can withstand the temperatures and thermal cycling conditions encountered by typical solar collectors. They are available for use on steel, aluminum, or copper. Permanently fused to the collector plate, the coatings are said to have high solar absorption. Other porcelain enamels are used as the interior coatings in "glass-lined" tanks for solar hot water systems. Ferro Corp.
Circle 103 on reader service card

Solar intensity meter

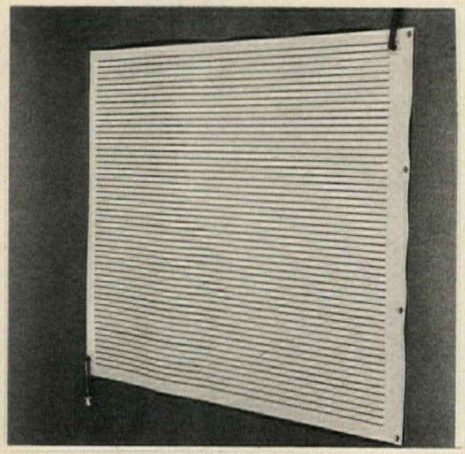
Solar domestic hot water systems. The Solector® Pak 2100 System is intended for summer or year-round use in regions where the outside temperature seldom drops below freezing and where acceptable water conditions prevail. The Solector® Pak 2200 System is designed for use in regions with acceptable water conditions and where outside temperatures frequently fall below freezing. Sunworks.
Circle 104 on reader service card

Solar intensity meter. Compact device measures 2½″ x 3½″ x 1½″ and weighs 4 oz. It is a two-jewelled bearing microammeter calibrated to read direct and diffused solar radiation up to 400 Btuh/ft². Solar heat transmission is read directly from the dial in Btuh/ft². The meter was designed to measure the solar radiation passing through window glass and to calculate the energy savings to be realized with the use of glass shading devices such as solar control films, screens, window shades, etc. It is also said to be useful in estimating performance of concentrator systems, lenses, mirrors. Metallized Products.
Circle 105 on reader service card
[continued on page 94]

Products continued from page 93



Solar electric module



Flexible solar component

Solar electric module converts sunlight directly into electricity. Here it is shown powering a television set. Spire Corporation.
Circle 106 on reader service card

Flexible solar components. Collectors, storage tanks, ducting condensate containers, and heat exchangers from reinforced elastomers and thermoplastics are offered as custom and confidential fabrications for engineers, designers, and manufacturers of solar systems. The flexible components are said to be light, tough, and offer total collapsibility. Aero Tec Labs.
Circle 107 on reader service card

Heat trap solar window. A composite sandwich panel composed of Kalwall's Sun-Lite Premium II glass fiber reinforced sheet and Teflon® film are called Custom Sunwall®. Available in up to six layered configurations, the panels measure only 2¾-in. thick. Panel sizes range up to 5' x 10'. Kalwall Corporation.
Circle 108 on reader service card

Nextel flat black velvet coating is an optical black enamel. At 25C, its solar absorption rate is 0.98, and its infrared emittance is 0.89. Coating can be applied to almost any firm, clean substrate, including aluminum, copper, or steel. 3M Company.
Circle 109 on reader service card

'Sun Set' solar water heating system consists of two solar collectors, mounting hardware, tubing, a solar water heater, and a conventional water heater. The solar collector is a 4' x 8' x 3⅝" panel housing integrally finned aluminum tubing, serpentined into the configuration of a flat-plate collector. Sensors in the collector and the storage tank interact so that when the temperature in the collector is at 15F hotter than water in the storage tank, a cast iron turbine pump begins circulating the transfer fluid. Rheem/Ruud Water Heater Divisions.
Circle 110 on reader service card

Controllers for solar heating/cooling applications can be wired for either 120 VAC or 24 VAC. The basic module, Model 77-171 is a differential thermostat with up to three s.p.d.t. relay contacts. Inputs for collector and storage probes and an auxiliary freeze and boil protect output are provided. Freeze and boil shut-off protection automatically cuts off the pump or blower motor at +38F and +188F respectively. The unit is housed in a 4" x 4" x 3½" enclosure and mounts directly on a standard 4" x 4" junction box. Solar Control Corp.
Circle 111 on reader service card

Insulated solar windows. Series of sandwich glazing panels are available in three sizes: 2' x 8' x ½"; 34" x 72" x ½"; and 4' x 8' x 1½". Panels are available with an aluminum framing system. Solar Components Division. Kalwall Corporation.
Circle 112 on reader service card

Solar-Bond® absorber panels provide integral tubes and headers within a metal-plate—either aluminum or copper. They are produced by metallurgically bonding two sheets of metal together and then expanding them in selected unbonded areas to form integral flow passages. The heat transfer medium, either liquid or air, flows through the passages. Products are used as absorbers in flat plate and concentrating collectors and as secondary heat exchangers. Olin Brass.
Circle 113 on reader service card

Modular solar 'tap water' system for homes and light commercial buildings includes flat plate solar collectors and a hot water storage tank complete with controls, valves, and pumps. It requires no special fluids. PPG Industries.
Circle 114 on reader service card

Solar-based heat pump system. According to the manufacturer, the heart of the system is a unique heat storage subsystem that uses a phase-change material (PCM), which will store almost 10,000 Btu's per cu ft of PCM at about 87F. When the PCM is melted, the heat pump will be reversed to the heating mode and extract the heat from the PCM. Solarmatic.
Circle 115 on reader service card

Parabolic collector is powered by a 10 w, 120 VAC 60 Hz synchronous motor that turns the unit at one revolution per day to follow sun, plus a 32-sq-ft parabolic mylar-coated mirror reflector which concentrates the sun's energy. The unit is said to be suitable for heating water or as a space heater for a one family house up to a large apartment house. Z Z Corporation.
Circle 116 on reader service card

Solar fiberglass. Made of hundreds of fiberglass filaments cabled together to form single strands which are coated with vinyl, then woven into a mesh having wide vertical ribs. When installed under tension one-half in. or more from the outside surface of a window, the screen works by absorbing, then dissipating most of the sun's heat before it reaches the glass, according to maker. PPG Industries, Inc.
Circle 117 on reader service card

Solar water heating system. Components of the prepackaged residential system include two solar collector modules, each 36" x 98"; one 80-gal, insulated, glass-lined, jacketed storage tank with surge tank and heat exchangers; one 110 v, magnetically driven circulating pump; one differential thermostat; one pint of inhibitor, a liquid added to the "Solar Loop" fluid that prevents corrosion of the loop; and the electronic harness necessary to monitor the system. Packaged system is ready for contractor installation. Jackson Water Heater Division, W.L. Jackson Manufacturing Co., Inc.
Circle 118 on reader service card

Solar energy measurement is added to mechanical weather station. It measures and records wind speed, wind direction, and air temperature at remote, unattended sites. A rain gauge can be added. The radiation unit can be used wherever it is necessary to measure radiation at a site over periods up to six months. Typical applications are solar energy feasibility studies for schools, industrial plants, commercial buildings, or agricultural uses. Meteorology Research, Inc.
Circle 119 on reader service card

Thruflo™ Solar Heat collector for residential or industrial heating applications uses a black perforated aluminum collector sheet under a double transparent polycarbonate cover. Both the collector sheet sections and the cover panels join together with no connecting frames. The sheet heats up immediately and transfers its heat to air passing through its perforations. Sheets come in 22' x 24' sections or in rolls, and the cover panels in 1-ft widths and varying lengths. Brackets, gaskets, bonding liquid, sealant, screws, and a complete installation kit are available. Park Energy Company.
Circle 120 on reader service card

Literature

SunPanel™ solar collector. Illustrated brochure includes descriptive and technical data, dimensions, specifications, and typical applications. Additional available literature is also listed. Libbey-Owens-Ford Company.
Circle 200 on reader service card

Solar collector for hydronic systems. Four-page brochure illustrates and describes collector that is manufactured with a stainless steel absorber plate clad with a black chrome coating. Text describes details of construction and gives suggested specifications. Overly Manufacturing Company.
Circle 201 on reader service card
[continued on page 96]

Literature continued from page 94

Solaron air heating system. Commercial, industrial, and residential applications include forced air heating, hydronic space heating, domestic hot water heating, hot air drying applications. Literature illustrates and describes system. Drawings show typical systems in operation. Solaron Corporation.
Circle 202 on reader service card

Solar energy glass products. Four-color brochure features Sunadex®, a "water-white" glass said to have virtually no iron-oxide; Lo-Iron™, the product with a very low iron-oxide content; and Starlux®, a regular float glass. Physical properties and transmittance curves charts are included. ASG Industries, Inc.
Circle 203 on reader service card

Solar pool heating system. Components include black plastic collector panels, valves, piping, and either a manual or automatic control system, and can be attached to new or existing pools. Electronic controls automatically compare pool water temperature with that of the solar panels. Brochure. Aluminum Company of America.
Circle 204 on reader service card

Solar collector panel is designed to capture the sun's heat energy with a fluid medium that can be used to heat or cool homes or commercial buildings or supply domestic hot water. The 3' x 7' panel, designed for modular installation, is compatible with other solar energy components and comes factory assembled. Literature illustrates and gives details and specifications. Chamberlain Manufacturing Corp.
Circle 205 on reader service card

Solar energy engineering, research, and test operations for heating, cooling, and power generation are described in a four-page illustrated brochure. Design, analytical, and test services as applied both to components and to complete systems are discussed. Wyle Laboratories.
Circle 206 on reader service card

Porcelain enamels. Pamphlet discusses the applications of porcelain enamel on solar energy components and systems and emphasizes how the coatings can be formulated in a wide range of compositions, colors, and textures. Typical examples of porcelain enamel applications on solar energy components and systems are illustrated. Ferro Corporation.
Circle 207 on reader service card

Solar heating guide and directory. The 57-page handbook explains the basic principles of solar energy and its potential for meeting the heating requirements of residents of the Greater San Francisco Bay Area. Although focused on that area, most of the information is said to apply to other climates. It outlines the basic considerations in using solar energy for heating swimming pools, providing domestic hot water, and for space heating. It also provides names of additional solar energy information resources. Solar Energy Information Services.
Circle 208 on reader service card

systems used for heating domestic water supplies by using solar energy. A list of distributors for these systems in each state can also be supplied by National Solar Heating and Cooling information Center.
Circle 209 on reader service card

Fresnel lenses. The lens, of cast crosslinked acrylic, refracts the sun's rays through a series of precisely angled grooves that vary slightly with respect to the optical axis. Brochure illustrates usage, gives technical data and capabilities. Swedlow, Inc.
Circle 210 on reader service card

Other literature

'Upgraded Thermal Insulation,' explains how new computer program can be used for determining the economic thickness of insulation for new construction or retrofit, and for elevated-temperature or refrigeration piping and equipment. The TIMA computer program, is endorsed by the Federal Energy Administration and National Insulation Contractors Association. Thermal Insulation Manufacturers Association.
Circle 211 on reader service card

'The Disabled Need Not Be Handicapped . . .' is two-color brochure describing elements of barrier-free design of washrooms and shower rooms, for both new construction and remodeling. It includes recommendations on washroom entrances, toilet stalls, accessories, and lavatories. Newly designed washfountains, showers, wash centers, grab bars and other products are illustrated and described. Bradley Corporation.
Circle 212 on reader service card

Interior wall panels. Glasweld® mineral fiber panels have a mineral enamel finish. They are completely inorganic and totally incombustible and can be specified for high-hazard areas, states maker. Mirawal® panels are porcelain enamel on steel units that can double as chalkboards or markerboards. Brochure illustrates and gives product data. Glasweld International.
Circle 213 on reader service card

'Fire Resistance Design Manual.' The 1978 edition is referenced by the BOCA Basic Building Code; the Uniform Building Code, published by ICBO, and the Standard Building Code, published by the Southern Building Code Congress. It is also referenced in HUD's minimum property standards as well as codes of major cities such as New York, Los Angeles, and Denver. Single copies are available at no charge. Gypsum Association.
Circle 214 on reader service card

Everywhere Series of tables, chairs, and lounge seating. Solid oak series features a variety of general purpose seating including an all-wood stacking arm chair, and wood base and trestle tables. Furniture line is illustrated in four-color brochure. Adden Furniture.
Circle 215 on reader service card

vidual lighting unit provides a choice of ten different lighting configurations. Designers may combine configurations for a variety of lighting tasks, and may coordinate the entire system with interior design plans by using any of four standard finishes, or by choosing from a selection of custom baked-on enamel colors. Individual quads lock together. Runs may be almost any length, with special joiner units making possible intersections in "L," "T," or "X" configurations. The system accommodates plans for ceiling and wall illumination and also includes a choice of a low-brightness parabolic louver or a prismatic lens to provide complete lamp shielding. Four-color brochure illustrates typical and custom configurations, gives technical information. Lightolier.
Circle 216 on reader service card

Acousta-screens® are totally upholstered and meet fire codes. The Noise Reduction Coefficient is .95. The steel feet are welded and have an internal leg extension for stability. Open and closed bases as well as straight and curved styles of screens are available in various edgings, feet, and fabric combinations. Fabric is polyester and comes in 19 colors or COM with factory permission. Inner construction consists of flame-treated heavy-duty particle board with horizontal and vertical reinforcement members and layers of fiberglass with a foil septum for sound control. Expanded metal is on both sides of the fiberglass reinforcement members. A sheet of acoustical batten is then placed over the expanded metal. Finally, the entire unit is completely upholstered. All feet are of cold-rolled steel and plated to a mirror-chrome finish with welded construction. Color brochure includes specifications. Acoustical Screens Corp.
Circle 217 on reader service card

5200 Series 'cube' style desks, returns, and credenzas are illustrated and described in brochure. Series features one-piece reinforced steel tops, double-wall pedestal and back panel construction, flush drawer fronts, double wall box drawers, suspension file drawers, and leveling glides. Steelcase.
Circle 218 on reader service card

Acoustilead lead sheet can be worked around pipes and ducts. It forms and cuts easily and bonds well, states maker, and has wide application as a sound barrier. The product is supplied in standard rolls 4' x 25' or 3' x 36'. Asarco Inc.
Circle 219 on reader service card

Silicones. Included in this brochure is information about construction sealants, a silicone glazing system for interior glazing, which consists of a sealant and glazing tape; a roofing system; a sealant for glass/metal/plastic glazing; and waterproofing sealants. General Electric Co.
Circle 220 on reader service card

Controlled release wall system, designed to help protect industrial structures and power generating facilities from structural failure caused by severe storms, hurricanes, tornadoes, as well as explosions, is described in an eight-page technical publication. H.H. Robertson Company.
Circle 221 on reader service card

Bruning's PD80 engineering copier lets you breathe a lot easier.

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Circle No. 351, on Reader Service Card

*Rate subject to change.

Annual index January-December 1977

Articles are listed chronologically by subject matter, followed by an alphabetical list of contributors and architects.

Technics

Technics (Specifications clinic)

Contributors

Architects, designers, engineers, planners

Bldg. materials cont'd from page 8

Dundas-Sherbourne Housing, Toronto, Ontario, p. 40. *Architects: Diamond & Myers, Toronto.* Reinforced concrete: Portland Cement, Stelco (for reinforcement). Brick: Toronto Brick Co. Concrete block: Primeau Argo Block. Drywall: Domtar Ltd. Carpet: Celanese. VAT: Domco Industries. Quarry tile: Olympia Floor Tile, Ltd. Sprayed plaster ceiling and built-up roofing on sloped concrete fill: Domtar Ltd. Exterior walkways waterproofing: Tremco. Fiberfilm flashing: Domtar. Polystyrene insulation: Dow Canada. Glass fiber insulation: Fiberglas Canada. Cast-iron roof drains and leaders: Environmental Protection Co. Drywall partitions: Canadian Gypsum. Aluminum sliding windows: Custom Glass. Wood hollow and solid core doors: Premium Door, Paznar Door. Elevators: Otis Elevator Co. Aluminum and glass entrance doors: Zimcor. Hardware: Architectural Hardware. Rolling doors: Von Duprin. Paints and stains: Glidden. Kitchen equipment: Canadian Admiral, Wesson, Danway Cabinet. Emergency generator: Onan. Refuse compactor: Belgium Standard. Lighting fixtures: Rab, Skyline, CEB, Halo, Seka, Smith & Stone. Steel conduit: Canadian General. Vitreous china tubs, sinks, lavatories: American Standard. Cast-iron sprinklers: Emco, Canron. Electric baseboard heaters: Federal Pioneer. Fresh air supply and exhaust fans: E.D. Wait Co.

Herman Miller administration and manufacturing buildings, Zeeland, Mi (p. 50). *Architects: A. Quincy Jones, FAIA & Associates, Los Angeles.* Brick and concrete block: Belden Brick Co. Roof deck: H.H. Robertson Co. Porcelain enamel steel wall panels: Alliancewall. Gypsum wallboard: U.S. Gypsum. Acoustic wall panels: Herman Miller, Inc. Built-up roof: Johns-Manville. Hydrocide mastic waterproofing: Wolverine. Rigid board insulation: Johns-Manville. Cast iron roof drains and pipe: Wade Div., Tyler Pipe Ind. Partitions: Action Office 2, Herman Miller, Inc. Windows: Wausau Metals Corp. Interior wood doors: Weyerhaeuser. Interior metal doors: Steelcraft. Unit locks: Russwin. Door closers: Lawrence Mfg. Paint: Pittsburgh Paint Co. Brick sealer: Sonneborn. Wood finish: Sherwin-Williams. Seating: Herman Miller, Inc. Exterior lighting fixtures: Prescolite. Interior lighting fixtures: Lightolier. Electric distribution: General Electric. Underfloor duct: Walkerduct. Plumbing: American Standard, Sloan. Air conditioning: Trane. Temperature controls: Powers Regulator Co. Chiller: Carrier. Steam boiler: Rite Eng. & Mfg. Filters: Cambridge.

National Permanent Bldg, Washington, DC (p. 54). *Architects: Hartman-Cox, Washington, DC.* Steel: Bowie Steel. Concrete: Alpha. Aluminum wall frames: W.T. Ind., Inc. Glass brick: LOF. Drywall: U.S. Gypsum. Ceiling system: U.S. Gypsum, Armstrong. Insulation, partitions: U.S. Gypsum. Windows: W.T. Ind., Inc., LOF, Conalco, Tubelite. Doors: Weyerhaeuser, Door Systems, Inc., Williamsburg, Armour Worldwide Glass. Hardware: Sargent, McKinney. Paint: Glidden, Duron. Elevator cabs: Parkline Corp. Lighting: Prescolite, Lightolier, Westinghouse. Plumbing and sanitary: American Standard, Delaney. Heating: Vulcan. Air conditioning: Trane.

Cherry Creek Solar Office Buildings, Denver, Co (p. 78). *Architects: Richard L. Crowther, AIA; Crowther/Architects Group, Denver.* Acrylic stucco: Clarks Products. Built-up roof with white marble chips: Silvercool Service. Paint: Benjamin Moore. Exterior lighting: Keene. Plumbing fixtures: American Standard. Solar heating system: Solaron Corporation. Heat pump: Fedders.

Notices

New firms

Thomas Hansz and Joseph M. Stout have formed **Hansz/Stout Architects Inc.**, 237 N. Woodward Ave, Birmingham, Mi 48011.

William J. Voelker, III has established **Voelker Enterprises,** offering architectural and related services, 1614 Parkside Dr, Peoria, Il 61606.

R. Wayne Burford, AIA has formed **Medical Planning Consultants, USA,** 3333 Eastside St, Houston 77098.

Kenneth J. Barlow and Gerre Jones have opened an office at 1629 K St, NW, Washington, DC 20006, to provide management/marketing services.

Tyler Smith and Jared Edwards have formed **Smith Edwards Architects,** 331Wethersfield Ave, Hartford, Ct 06114.

Joe M. Powell has established **Planning, Design Research Corporation,** 3433 W. Alabama, Houston, Tx 77027.

Laurence D. Bronson and David A. Lemons have formed **Bronson/Lemons Architects,** Suite 228, 4646 Poplar Ave, Memphis, Tn 38117.

Arne W. Garfield, AIA and Arnold A. Aveis, AIA have formed **Garfield & Aveis, AIA,** 11620 Wilshire Blvd, Los Angeles, Ca 90025.

Barry L. Rafter, Architect, 307 S. B St, San Mateo, Ca.

New addresses

O'Brien/Atkins Associates, 300 Eastowne Dr, Suite 201, Eastowne Office Park, Chapel Hill, NC 27514.

The Axton/Foster Partnership, Architecture-Planning, 15010 Ventura Blvd, Suite 326, Sherman Oaks, Ca 91403.

Colin P. Lindberg, Architect, 209 Battery St, Burlington, Vt 05401.

Lester C. Tichy Architects, 1837 Ponus Ridge Rd, New Canaan, Ct 06840.

Specifications clinic continued from page 69

building project; allowing the interchangeability of pre-bid and conventional bid specifications without laborious reorganization and rewriting. Performance, Prescriptive, and proprietary specifications are accommodated under the format which encourages the use of identical language and nomenclature in all specifications of a project. The document encourages the establishment of a direct relationship between subsystem specifications.

The CSI Manual of Practice, Vol. I, Chapter 11, provides a broad discussion of the performance concept. Vol. II, Chapter 5, is a basic "guide to format." Chapter 5 identifies the following constraints that influence the preparation of logical performance specifications and thereby affect the format: 1) the specifier must decide the amount of specification detail needed to achieve the desired results; 2) most performance dominated specifications will also include prescriptive and proprietary specifications and must be planned with this in mind; 3) systems specifications for the largest convenient assembly of products for which tests and standards exist or can be devised are more practical; 4) adequate testing of systems requires considerable additional development.

The development of attributes and the steps in specifying subsystems are major considerations in performance specification writing. *Attributes are not elements of format. They are the qualities to be specified and a device for analysis and organization of performance determinants.*

Performance specifications format. The CRC format was developed to include the following headings for specifying attributes: 1) requirements (defined as the statement of a specific output desired of the subsystem in question); 2) criteria (defined as the absolute or relative quantification of the requirement in question); 3) test methods to verify the criteria; 4) the evaluation of tests.

The format does not involve itself with subsystem identification, but is arranged to provide flexibility to accommodate any of the extant subsystems. The relationship of performance specifications with other essential parts of a project specification is discussed in CSI's Vol. II, Chapter 5. Fixed numbering for broad scope and narrow scope subsystem specifications is recommended. An interfacing with the CSI Division and Section numbers is appropriate. When CRC reaches agreement on the identification of subsystems, a fixed numbering will be possible.

Terminology. For those developing performance specifications there is a need for clear and consistent terminology. Having reviewed the work of eight separate interest groups that had previously attempted to promulgate performance specifications, CRC agreed upon the definitions which represent a reasonable consensus and provide terminology which will best suit the objectives of the Council. CRC's "Language of Performance" appears on p. 69.

Author: Alvin D. Skolnik, FCSI, is Director of Research and Specifications for Skidmore, Owings & Merrill, New York.

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