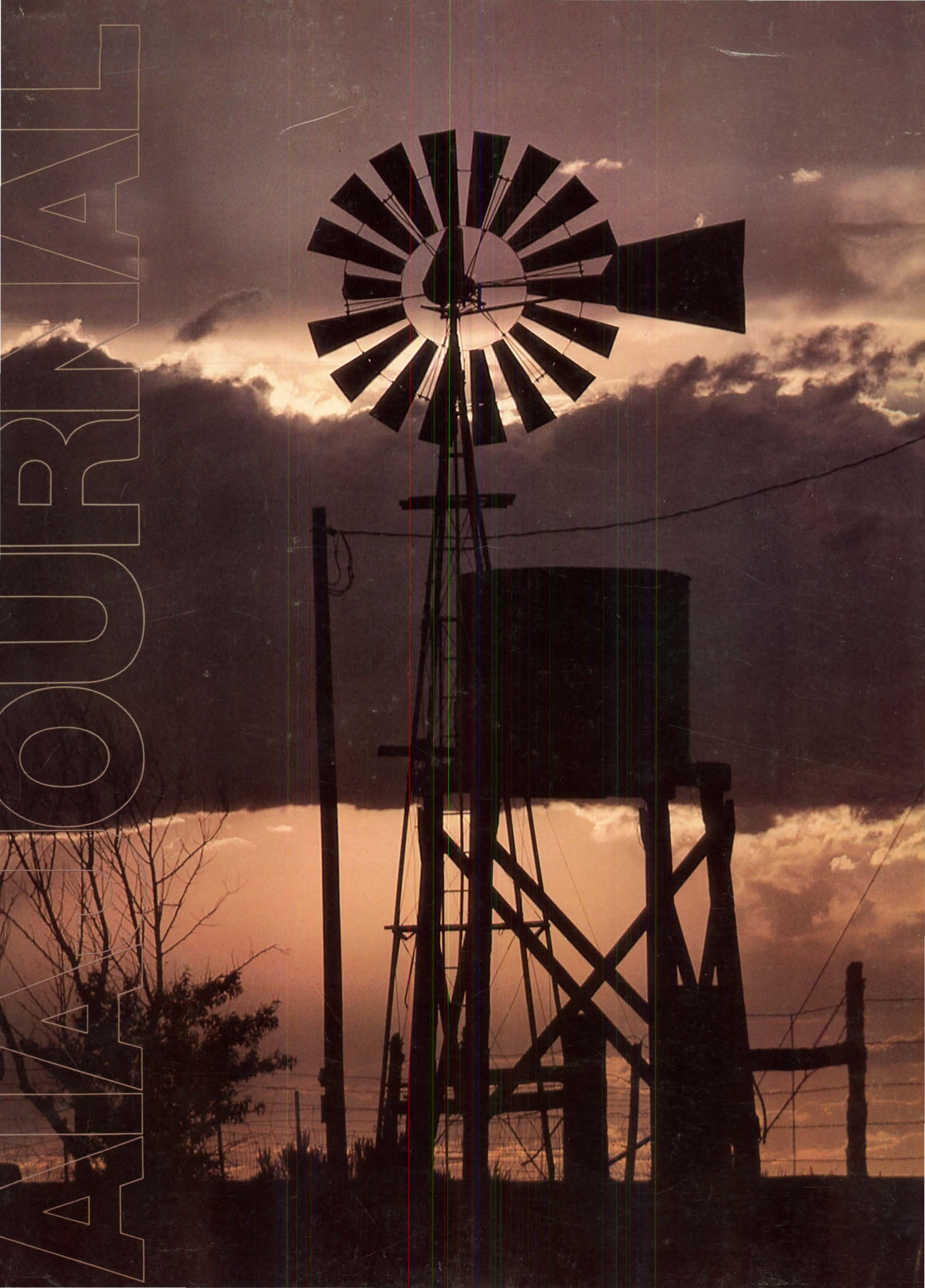
AIA JOURNAL

EVENTS

Jan. 2-6: Spotlight on Energy, mid-winter meeting, Building Officials and Code Administrators International, Inc., Fort Lauderdale Hilton, Fort Lauderdale, Fla. Contact: BOCA, 1313 E. 60th St., Chicago, Ill. 60637.
Jan. 3: Mailing of program, LeBrun Traveling Fellowship competition. Contact: LeBrun Traveling Fellowship Committee, New York Chapter/AIA, 20 W. 40th St., New York, N.Y. 10018.
Jan. 12-14: AIA Grassroots East, Washington, D.C. Contact: J. R. Kirkland, AIA Headquarters, (202) 785-7376.
Jan. 19-20: Energy Conservation in Industrial Plants seminar, Boston, sponsored by New York University, (repeat seminars on Feb. 2-3, Los Angeles; Mar. 30-31, Atlanta; April. 6-7, Toronto; May 4-5, New York City; June 15-16, Chicago). Contact: New York Management Center, 360 Lexington Ave., New York, N.Y. 10017.
Jan. 19-21: AIA Grassroots Central, Memphis. Contact: J. R. Kirkland, AIA Headquarters, (202) 785-7376.
Jan. 22-25: National Association of Home Builders convention and exposition, Dallas. Contact: NAHB, 15th & M Sts. N.W., Washington, D.C. 20005.
Jan. 23-25: AIA Grassroots West, Seattle. Contact: J. R. Kirkland, AIA Headquarters (202) 785-7376.
Jan. 26-28: South Carolina chapter/AIA annual meeting, Sheraton Motor Inn, Greenville, S.C.
Jan. 30-31: Construction Industry National Legislative Conference, Hyatt Regency, Washington, D.C. Contact: CINLC, 815 15th St. N.W., Washington, D.C. 20005.
Jan. 30-Feb. 1: Project Management for Computer Systems seminar, New York City, sponsored by the University of Chicago. Contact: New York Management Center, 360 Lexington Ave., New York, N.Y. 10017.
Jan. 31: Call for papers, international conference on users' experiences with high strength low alloy steels, sponsored jointly by the Metallurgical Society of AIME and the Société Française de Métallurgie, at Versailles, France, in Jan. 1979. Contact: Konrad J. A. Kundig, Editor, *Journal of Metals,* 345 E. 47th St., New York, N.Y. 10017.
Feb. 2-3: Conference on Solar Energy Business: Opportunities and Outlook, Adams Hotel, Phoenix. Contact: Energy Bureau, Inc., 101 Park Ave., New York, N.Y. 10017.
Feb. 6-8: Seminar on Solar Energy, Chicago, sponsored by New York University (repeat seminars on Mar. 6-8, New York City; Apr. 24-26, San Francisco; May 15-17, Dallas; June 19-21, Washington, D.C.). Contact: New York Management Center, 360 Lexington Ave., New York, N.Y. 10017.
Feb. 6-11: Course on a Systematic Approach to Building Material Evaluation and Selection, University of Wisconsin, Madison.
Feb. 13: Applications deadline, American Institute of Steel Construction graduate study fellowships. Contact: AISC Committee on Education, 1221 Avenue of the Americas, New York, N.Y. 10020.
Feb. 13-16: Course on Summer/Winter Air Conditioning, Oklahoma State University, Stillwater.
Feb. 14-15: Energy Management in Buildings seminar, Atlanta, sponsored by New York University (repeat seminars on Mar. 14-15, New York City; Mar. 28-29, Chicago; April 18-19, San Francisco; May 2-3, Washington, D.C.; May 23-24, Denver; June 20-21, Boston). Contact: New York Management Center, 360 Lexington Ave., New York, N.Y. 10017.
Feb. 14-15: Construction Coordination Workshop, Iowa State University, Ames.
May 21-24: AIA annual convention, Dallas.

LETTERS

No Advertising Ban in California: The article on page eight of the Sept. issue, as well as an article in the Sept. 15 *Memo,* states that the New York State Board of Regents is the first state board to allow advertising by architects. This is not true. The California State Practice Act does not containing any advertising prohibition.

As far as I know, there never has been any legal reason why California architects do not advertise. Non-AIA architects in California have always had the right to advertise. The fact that non-AIA architects do not usually advertise may be an indication that AIA members would not do much advertising if the ethical standards were revised to eliminate the prohibition. *Arthur F. O'Leary, FAIA*
Beverly Hills, Calif.

Ramps versus Stairs: I was pleased to see the article entitled "Recognizing and Designing for the Special Needs of the Elderly" by Joe J. Jordan, FAIA, in the September issue. I found the article both provocative and supportive of humane architecture. It is hoped that the goal statements cited by Jordan will be applied by architects to all buildings and facilities, not solely to those facilities designed for the elderly.

I was somewhat disturbed to note Jordan's statement that "ramps are generally more difficult for everyone except those in wheelchairs." It is true that ramps which approach or exceed the maximum allowable grade of 8.3 percent are difficult to use for many people. However, the general public, even those who are not handicapped, will tend to use the steepest ramps in preference to stairs. The steep ramps do provide some difficulty for the frail, elderly, high-level leg amputees and quadriplegics. Well-designed ramps, however, those with a slope of 5 percent or less, are very convenient for most people, including the elderly.

I was heartened to read Jordan's comment, "It is safe to say that good design for the elderly is good design for everyone. . . ." Of course, Jordan should realize that "everyone" must include, and not "except," the very young.

Despite the negative observations I have made, I enjoyed Jordan's article and hope the JOURNAL will continue to publish material with the basic premise that good design for special groups is good design for everyone. *Peter L. Lassen*
Director, Compliance Division
Architectural and Transportation
Barriers Compliance Board
Washington, D.C.

A Distressed Eagle: We have just received our copy of AIA document A521, Uniform Location of Subject Matter. As evidenced by the orientation of the AIA logo on the cover, it is apparent that the Institute has jumped head first into this task.

The suggestion that the upside-down eagle (on the cover) symbolized distress at having to work with the engineering and specifications groups had some following in our office. Most of us, however, believe it indicated that AIA will leave no stone (or column) unturned in its efforts to provide this document that clearly delineates the correct location of subject matter endorsed by AIA.
Billie B. Williams
Wooten & Bogard
Fort Worth, Tex.

Penn State's AE Program: The October issue carried an article entitled "The Pros and Cons of Affixing Lighting to Furniture," in which John Flynn of the Pennsylvania State University made several comments. I want to emphasize that Flynn is professor of architectural engineering and is not from the university's school of architecture and engineering as reported.

The Penn State architectural engineering (AE) program is not an architectural or an engineering curriculum only. Rather, the ECPD accredited program requires architectural courses and HVAC, acoustics, lighting, steel, concrete and wood design courses for all AE students. The five-year program culminates with the only bachelor of architectural engineering (BAE) degree offered in the U.S.
Gary R. Steffy (PSU-BAE '77)
Interiors Products
Owens-Corning Fiberglas Corporation
Granville, Ohio

AIA JOURNAL

Cover: Photo by Freeman Patterson (DPI) of a windmill in Alberta, Canada

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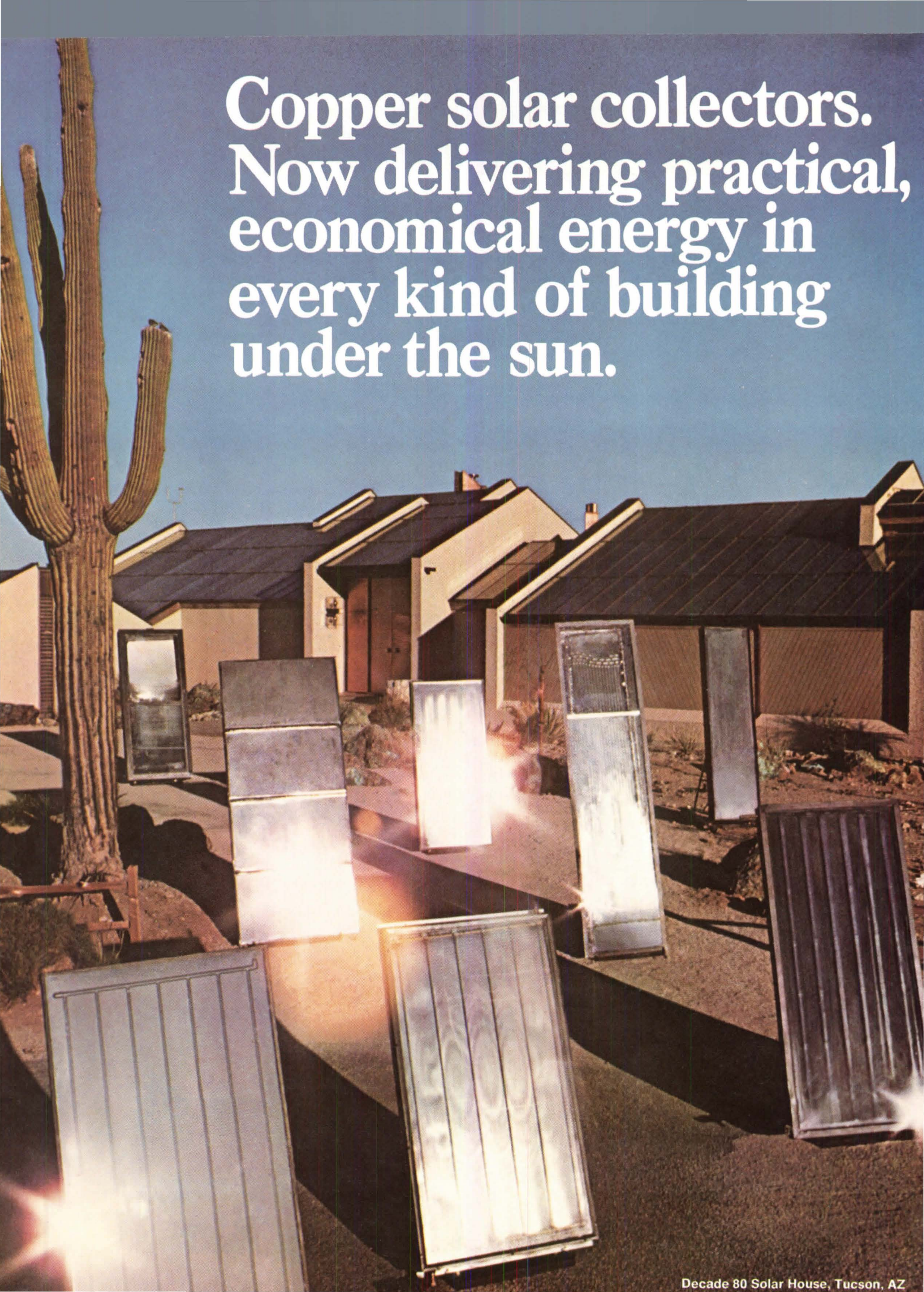
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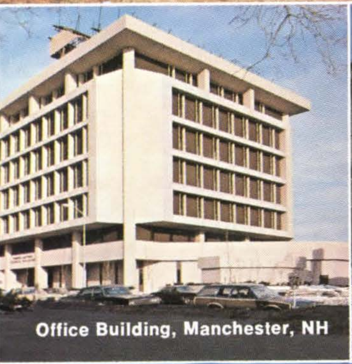
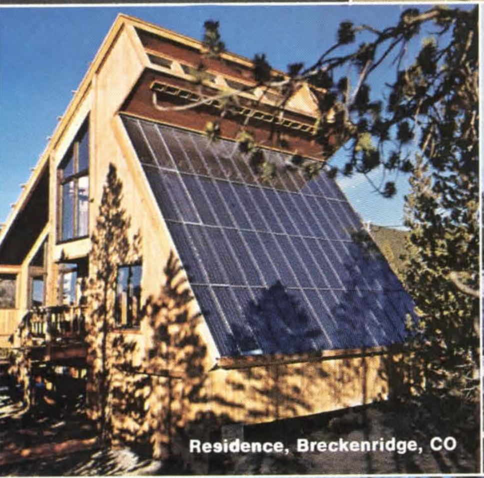
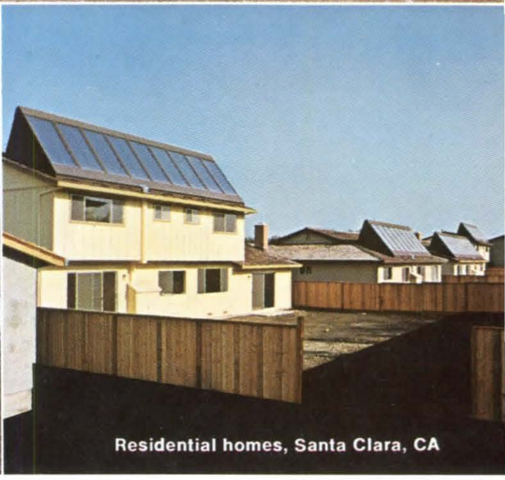

Office Building, Manchester, NH

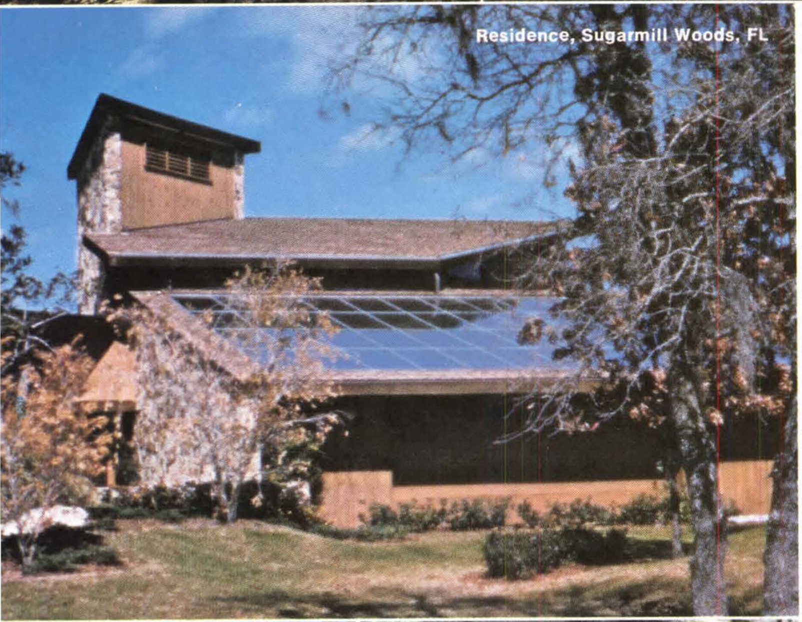

Motel, Temple, TX

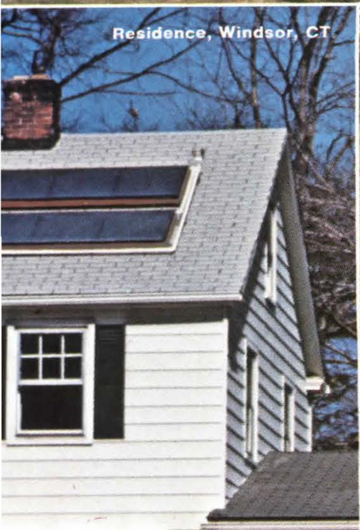

Church, Denver, CO


Residence, Breckenridge, CO


Bank, Concord, NH


Residential homes, Santa Clara, CA


Residence, Sugarmill Woods, FL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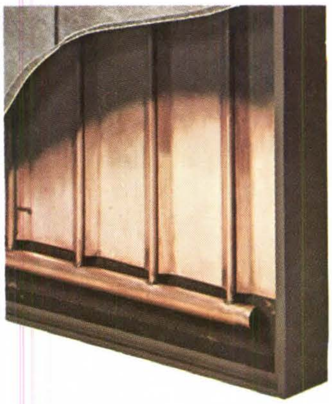
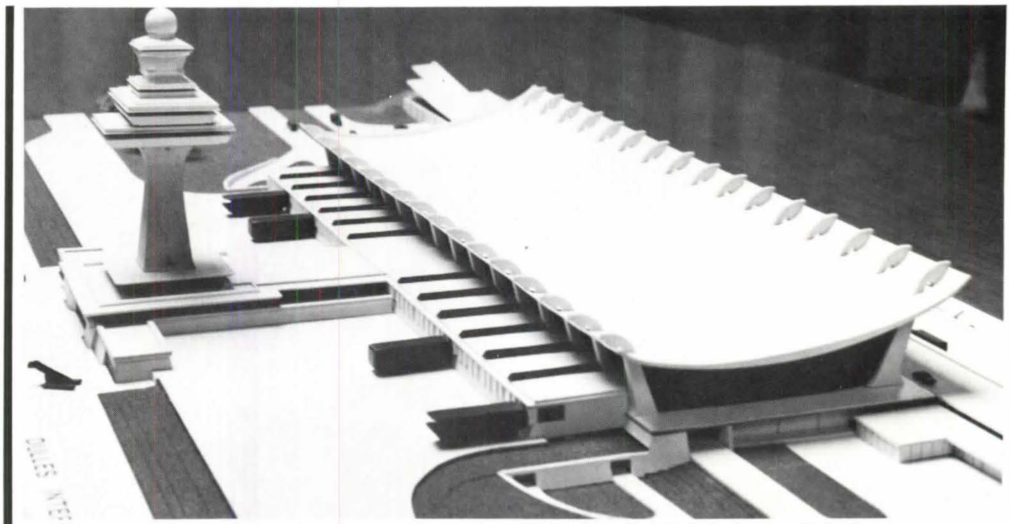

Typical copper solar collector showing copper tube and sheet construction.

Count on Copper

Circle 5 on information card

Dulles Terminal Building To Be Extended; Listing in Historic Register Sought



Addition projects from lower portion of wall facing field, left in model photo.

Bids are due from contractors on Dec. 15 for the expansion of Eero Saarinen's Dulles International Airport at Chantilly, Va., near Washington, D.C. The plan would widen the building by 50 feet at the terminal level, says a spokesman for Hellmuth, Obata & Kassabaum, the firm engaged several years ago by the Federal Aviation Administration to prepare a design analysis and updated master plan for the airport and its surrounding area. Various lower level facilities would also be supplied. Congress has appropriated $7 million for the expansion of the federally owned and operated Dulles.

Saarinen himself realized that the airport would probably have to be extended at some future time, and he developed a master plan to guide future development, accommodating expansion by linear additions east and west. He wrote: "There was the crucial problem of disciplined, long-term and imaginative zoning. Of special importance was the problem of some kind of continuing control in the terminal and its surroundings. We made proposals about these things which I hope will be carried out." (*Eero Saarinen on His Work,* edited by Aline Saarinen, Yale University Press, 1968.)

Saarinen, however, did not envision the extensive security precautions required in today's world. The new space will provide passenger hold rooms and centralize security functions on the terminal floor level, with baggage handling facilities located below. This lower level will extend 26 additional feet toward the control tower.

An FAA spokesman says that future expansion will follow Saarinen's proposals. What he calls the current "fattening" of the terminal will not be visible from the access road nor from the large public space inside the terminal, he says.

Changes in the airport's design are subject to review only by the officials of the Department of Transportation and by the National Capital Planning Commission. An editorial in the November issue of *Preservation News,* published by the National Trust for Historic Preservation, urges that Dulles be listed in the National Register of Historic Places, an "obvious advantage" being that design changes would then be subject to review by the Advisory Council on Historic Preservation, an independent unit of the executive branch of the federal government charged with advising the President and Congress on matters of historic preservation. The editorial says that the "soaring structure" is "eminently worthy" of inclusion on the national register.

AIA also has urged the DOT to submit the airport for inclusion on the register. A letter to this effect in 1976 from Louis de Moll, FAIA, then president of the Institute, elicited a response from William T. Coleman Jr., then secretary of transportation. The secretary wrote that the "facilities which exist today at Dulles were intended to be adequate only through the initial years of the airport's life." He said further that "adequate safeguards already exist to ensure that Dulles continues in the future to live up to our expectations. I do not feel it would be wise, at least not at this time, to nominate the airport for inclusion in the National Register of Historic Places."

At the meeting of the AIA historic resources committee in November, it was voted to have AIA's president write Secretary Brock Adams, current head of the DOT, to remind him of the exchange between Secretary Coleman and President de Moll and "again urge the nomination of Dulles to the national register and express concern that any expansion not violate the original Saarinen plan and design."

Nomination of Dulles to the national register has also been requested by the Advisory Council on Historic Preservation and by the Virginia Historic Landmarks Commission, but all such requests to date have fallen on deaf ears. The Secretary of the Interior has authority under the regulations for executive order 11593 to declare the airport eligible for the register, but as *Preservation News* says, "that authority has not been exercised."

In July 1976 when the JOURNAL conducted a poll of the most significant structures and complexes in the nation's 200 years of history for its bicentennial issue, Dulles airport ranked third (with Frank Lloyd Wright's Falling Water), after the University of Virginia campus and Rockefeller Center. At that time, one critic commented: "No airport in the world comes close to the elegant clarity of this great concept."

Going On continued on page 13

THE PINK STUFF.

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costs less per application than conventional, lower-efficiency mate- als. And not just because of the lighter weight. Tempchek boards ieasure 3′ x 4′, so more roof area can be covered in less time than ith normal 2′ x 4′ cuts.

R FACTOR COMPARISON (Typical Thicknesses)

"R"	Thermax Roof Insulation†	Tempchek Roof Insulation†	Perlite & Urethane Composite Board	Fibrous Glass	Perlite & Fiberboard
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11.1	1.6″	1.6″		2-7/16″	
12.5	1.8″		2.2″		
14.3	2.0″	2.0″	2.5″		
16.7	2.3″	2.3″	2.8″		
20.0		2.8″	3.2″		
25.0		3.0″			

*In two layers.
†NOTE: Under normal use, Thermax and Tempchek Roof Insulations will retain an average of 80% of their thermal resistance (R factor) values.

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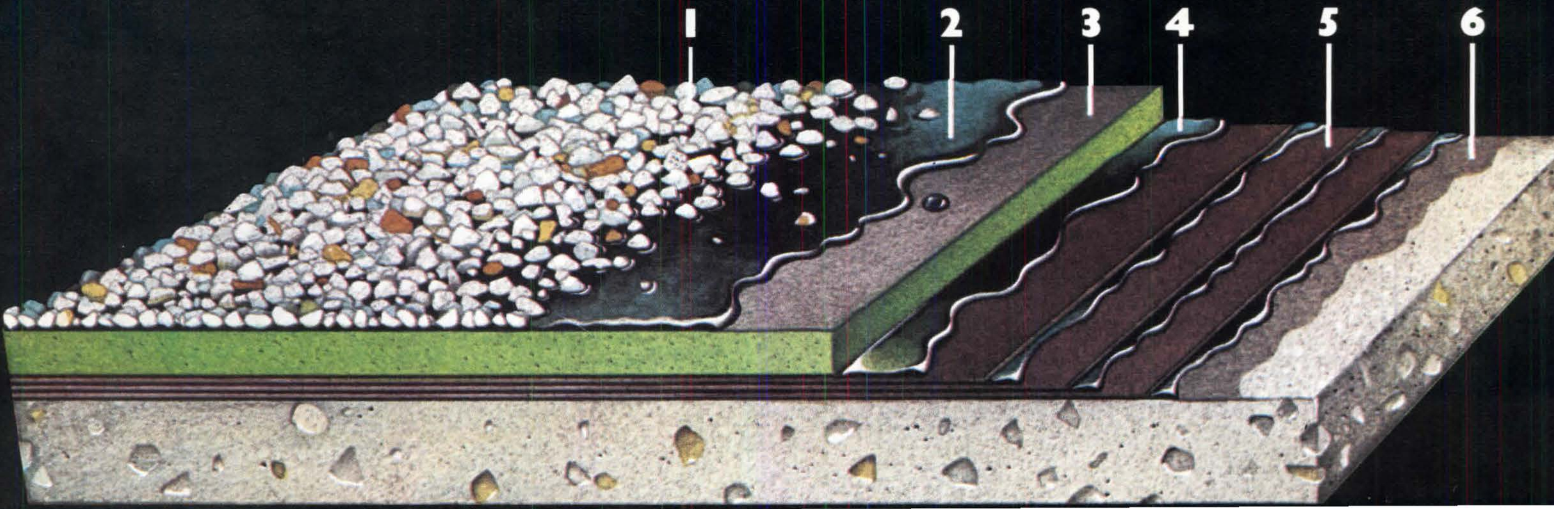


Going On from page 8

State Energy Legislation 'Vigorous' Across Nation

Legislative activities relating to energy in building design and use at the state level is "quite vigorous," reports the *AIA Energy Notebook*. A July 1977 update on laws state by state emphasizes that there are many factors which influence the efficient use of energy by state and by region; hence, state responses "have been anything but similar." Certain general categories of response, however, do emerge. (For California's energy conservation legislation, *see* p. 57.) They are summarized as follows:

• **Standards:** The major emphasis by states has been placed on mandatory standards, with the majority being prescriptive or component performance. Among the 17 states which have mandatory standards in effect are Connecticut, Illinois, Maine and Nevada. There are also 16 other states with enabling legislation. Some states are moving toward performance-oriented approaches, including California, Florida and Texas.

• **Incentives:** These include tax credits, tax deductions, low interest loans, reduced or complete exemptions from increased property taxes and exemption from sales taxes. As of July '77, 26 states had enacted incentive measures, and 19 others had bills before legislative bodies.

For example, Arizona provides that home assessments will not increase with the installation of solar energy equipment and allows a tax credit of up to $1,000. Arkansas permits the homeowner taxpayer to deduct from gross income the entire cost of purchasing and installing energy-saving equipment.

Kansas allows a 25 percent income tax credit up to $1,000 for solar energy systems in residences, including wind systems, and a 25 percent income tax credit up to $3,000 for commercial buildings. Massachusetts provides for a 10-year property tax exemption for solar or windpower systems. Michigan permits a sales tax exemption to the buyer of solar wind or water conversion devices installed in a new or existing residential or commercial building.

New York grants a 15-year exemption from property taxes on the value of solar or wind energy systems installed for heating or cooling. Oklahoma gives an income tax credit up to $2,000 for installation of solar devices in buildings. South Dakota allows the owner of residential real property an annual deduction from the assessed value of the installation of solar devices. Texas provides for business franchise tax exemption for corporations that exclusively manufacture, install or sell solar devices.

• **Energy consumption analysis:** Eight states have passed bills and 13 others are considering legislation for energy consumption analyses or energy feasibility studies. Four states now require life cycle costing as part of the energy evaluation: Connecticut, Florida, North Carolina and Washington.

In Florida, for example, the law requires life cycle cost analysis on all new construction of state owned (5,000 square feet) or leased facilities (20,000 square feet). In North Carolina, a life cycle cost analysis is required for all major new state owned or state assisted construction. New Mexico provides that a feasibility study on the use of energy sources other than fossil fuels for heating and cooling must be made prior to the execution of a contract for construction or major alterations of any state owned building. Rhode Island requires life cycle cost analysis and energy consumption analysis in state facilities having 25,000 square feet or more of space, and the ruling applies to both new and renovated buildings.

• **Energy disclosure:** A requirement that building owners and realtors make a full disclosure of data on energy consumption and energy costs to potential purchasers of buildings is in effect in Oregon and Utah, and three other states have similar legislation underway.

Several states require utility companies to give customers complete information on energy-saving devices and to help them in gaining low-interest loans for the installation of various energy-saving devices.

Oregon law says that investor owned gas and electric utilities which provide services to residential space heating customers must give the customers energy efficiency information, provide on-site inspections resulting in cost estimates, provide for arrangements for the installation of insulation and provide financing arrangements for customers. Also, publicly owned utilities and fuel oil dealers who supply residential space heating services must give their customers similar information, as well as a list of registered contractors who install weatherization services and information about low-interest loans.

New York's governor recently signed a bill which would require the state's utilities to either arrange for or provide low-cost financing for the installation of such energy-saving devices as storm windows in single-, two- and three-family homes. Maximum interest for the loans, of up to seven years, would be tied to the overall rate of return for New York utilities, or about 9½ percent. The measure also would require utilities to respond to customer requests for energy audits for a maximum fee of $10. The program is scheduled to begin in mid-January.

• **Solar rights:** Measures passed in at least four states and under consideration in seven others are aimed at safeguarding a solar system user's access to sunlight either through the creation of voluntary solar easements or by the requirement that solar energy considerations be taken into account in zoning and land use planning. Oregon, for example, adds solar energy considerations and comprehensive planning and permits local planning commissions to recommended ordinances relating to access to solar energy. New Mexico's law defines solar rights to become effective next July. Colorado and Maryland both provide for the creation and conveyance of certain solar easements.

Ohioans Oppose Mandatory Continuing Education

At the annual business meeting of the Architects Society of Ohio (ASO), some 200 delegates, representing the society's 1,300 members, approved a resolution which calls for AIA and the National Council of Architectural Registraion Boards to "not actively promote and/or advocate their currently published concepts of mandatory continuing education" either as a condition for AIA membership or for maintenance of a license to practice architecture. (*See* Oct., p. 44, for proposals by AIA and NCARB.)

The resolution commended AIA and NCARB for their "efforts and interests in continuing education," but the three-hour debate, according to a press release issued by ASO, "left no doubt that existing proposals for mandatory programs and retesting for relicensure did not meet with the group's approval." The business session was witnessed by the largest gathering of ASO members in the society's 44-year history.

A majority agreed that existing Ohio regulations as well as professional competition "police the profession effectively." Raymond M. Harpham, AIA, a member of the Columbus chapter/AIA and of the ASO legislative committee, said: "We believe that a well-protected system of free enterprise adequately rewards the informed and competent professional and tends to ensure the attrition rate of the less sincere and less dedicated." In reference to existing Ohio legislation, he said: "We are under mandate to protect the health, safety and welfare of the public. The Ohio Registration Board is already legally authorized to revoke the license of an architect adjudicated to be incompetent."

According to the ASO press release, delegates also "expressed dismay at the apparent AIA and NCARB recommendations of legislation recently passed by

continued on page 16

At home with Mies and Knoll

For the "Mies van der Rohe: Furniture and Drawings" exhibition at the Museu of Modern Art last Spring, we made eight furniture prototypes for the exhibit—are proud to have shared in this important moment in design.

Going On from page 13
the State of Iowa as a model bill to be used by other state organizations which might be interested in seeking mandatory continuing education requirements for license renewal in their own states."

"Sample provisions of the Iowa law," John P. Albert, AIA, president of ASO, told the assembly, "provide that all judgments and settlements between a licensed architect and his client shall be investigated by the licensing board. . . . While it is inconceivable that this legislation was passed in Iowa, it is absolutely preposterous that AIA or NCARB would use or recommend as an example for mandatory continuing education and relicensure this particular bill."

Harpham said that after investigating and analyzing the Iowa law he believed the legislation to be "unconstitutional, removing the rights of licensee to democratic processes, and would ultimately provide destruction to the very competence it purports to uphold."

Army Corps of Engineers Announces Design Awards

The Lost Creek Powerhouse and Service Building at Rogue River, near Medford, Ore., received top honors in the U.S. Chief of Engineers' 1977 design awards program. Agencies responsible for the design of the honor award winner were the U.S. Army Corps of Engineers District, Portland, Ore., and the North Pacific Division, U.S. Army Corps of Engineers.

The jury called the winning design, which consists of two buildings, a "rare instance of landscape that is actually improved by the presence of architecture" (photo below). A departure from standard powerhouse configurations, the structures blend into the surrounding environment.

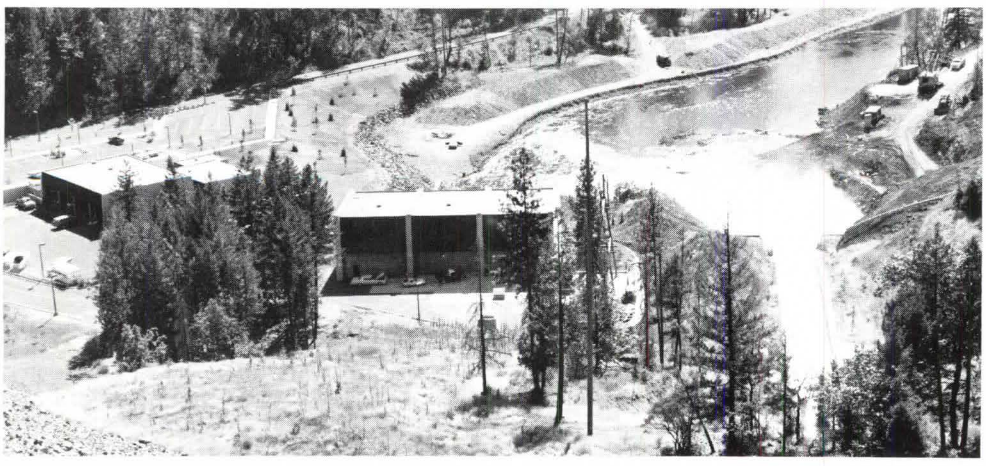
Three complexes won awards of merit:

- Visitor Center, Lewis & Clark Lake, Neb. (Design firm: Clark & Enersen, Hamersky, Schlaebitz, Burroughs & Thomsen.)
- Leech Lake Comfort Station, Cass County, Minn. (Principal design agency: U.S. Army Engineer District, St. Paul, Minn.)
- Dwight David Eisenhower Hospital, Fort Gordon, Ga. (Design firms: Lyles, Bissett, Carlisle & Wolff, architects, and Patchen, Mingledorff & Associates, engineers.)

Three projects won honorable mention:

- Table Rock Resident Office and Visitor Center, Taney County, Mo. (Design firm: Cromwell, Neyland, Truemper, Millett & Gatchell.)
- Consolidated Base Personnel Office, Davis-Monthan Air Force Base, Ariz. (Design firm: Nicholas Sakellar & Associates.)
- Mill Springs Mill, Lake Cumberland, Wayne County, Ky. (Design agency: U.S. Army Engineer District, Nashville, Tenn.)

The jury panel was chaired by John M. McGinty, FAIA, president of the Institute. Other members of the jury were Frank L. Hope, FAIA, of San Diego, and Douglas N. Carter, AIA, of Reston, Va. The awards program was initiated in 1965 "to recognize excellence in the design of structures of area developments by the Corps of Engineers' designing division or district offices and their consulting firms."



Agenda Outlined for White House Growth Conference

The White House Conference on Balanced National Growth and Economic Development will take place on Jan. 29 through Feb. 2 at the Sheraton Park Hotel in Washington, D.C. Approximately 500 persons will participate in three days of workshop sessions of 20 to 30 persons each to consider six conference themes:

- Strengthening local economies. (How can we structure a realistic economic development strategy toward cities, suburbs, rural areas and regions?)
- People and jobs. (How can public policy improve chronic unemployment and underemployment, and what are the roles of the private and public sectors?)
- Government and budgets. (How can public policy aid local governments with inadequate fiscal capacity and levels of public service?)
- Geography of growth. (What role should the public sector play in influencing the geographic distribution of private sector economic activity and in population settlement?)
- Government and the management of growth. (How can we make better choices in such areas as environmental quality, rational land use, etc., in an era of resource constraints, anticipating change and reconciling conflicts?)
- Streamlining government. (How can government institutions and processes better address problems of growth and development which cut across jurisdictional boundaries, and should the federal government institutionalize a process for the formulation and implementation of a national growth policy?)

President Carter has said that the conference is a "national forum through which our concern about critical national issues and our determination to seek solutions can be expressed." He called the conference an "important opportunity for citizens' groups, labor and business representatives and state and local officials to recommend ways in which my Administration can work toward balanced economic growth and development in the years ahead."

Under the authorizing legislation, the states have a major role in activities leading up to the conference and in the conference itself. Cooperating states have held workshops under the auspices of individual governors, and several multistate regional meetings have taken place.

State governors also have a key part in identifying conference participants; 75 percent of the 500 delegates will be selected by individual governors.

On the final day of the conference, findings of the conference workshop sessions will be presented at a plenary session and to President Carter. At this time also, panels of appropriate groups and interests and government, business and labor leaders will be given the opportunity to react to the workshop findings.

AIA Staff Appointments

Nora Richter has joined the JOURNAL as editorial assistant. She recently received a master's degree in journalism from Northwestern University and also has a solid background of editorial experience. She will function as both researcher-writer and administrative assistant.

John Devaney, who worked in the summer of 1976 as a legal intern in the AIA documents division, has been appointed assistant director of Congressional liaison at the Institute. He recently passed the

continued on page 84

Circle 8 on information card

Many great designs are

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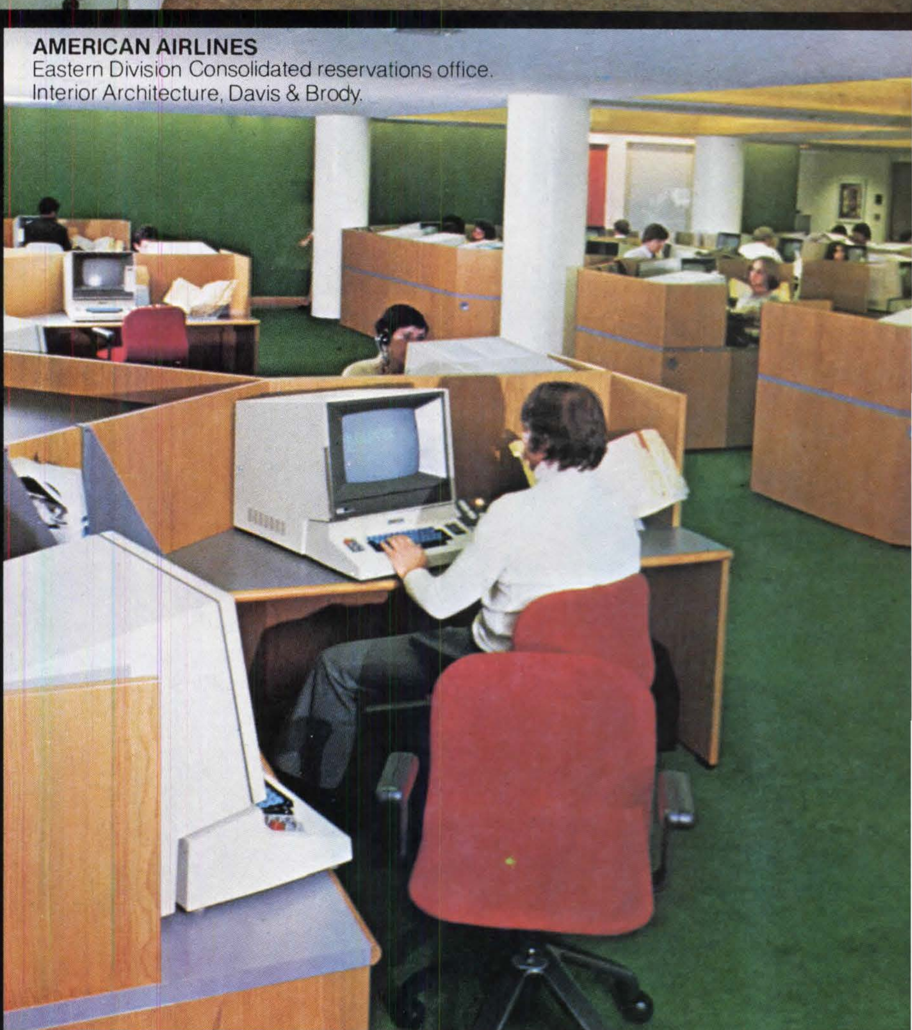
Design Services NYC
Interior Designers Judith Stockman and Lee Manners of Stockman & Manners, discuss recent ai installation with their client, Paul Miller (center) Manager Design Services.

E.F. HUTTON
Corporate Headquarters NYC
Vice President, Hoyt Ammidon, Jr. views general partners office with Interior Designer Ronald Brick of Ronald Brick Associates.

E.F. HUTTON—Senior Vice Presidents Office

possible with ai's bottom line.

GAF—Secretarial and administrative space



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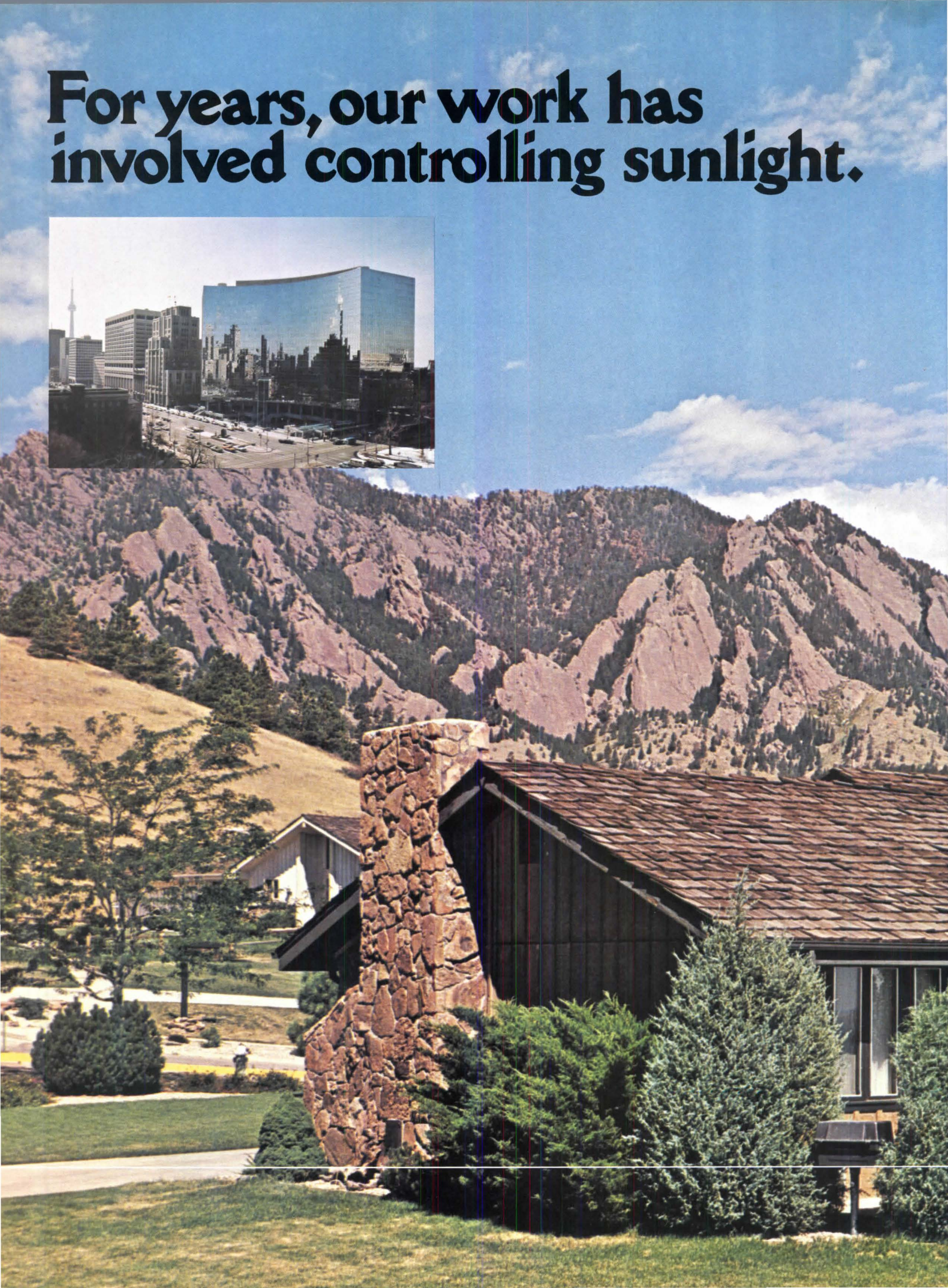

For years, our work has involved controlling sunlight.

AIA JOURNAL

‘A great building, in the center of the nation’s capital, awaits a great purpose.’

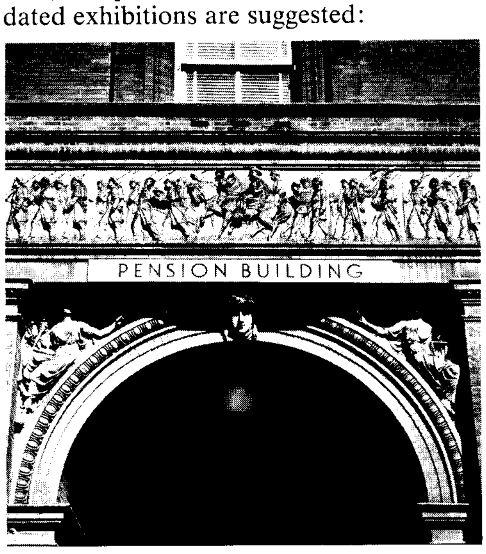
Next month, Congress and the rest of us get a look at the proposal for a national museum of the building arts (*see* Feb., p. 8) planned for the Pension Building in Washington, D.C.

Robert Lautman’s photographs on these pages tell why the Pension Building should be put to the highest possible use; the proposal points the way.

“In the next quarter century,” states the proposal, “we must build, rebuild and restore more of our environment than we have built in 200 years of the Republic. Yet, nowhere in this country do we have a comprehensive showcase, a forum for discussion and an extensive historic record of American building.”

The plans have been shaped by a distinguished committee headed by a board of directors consisting of Cynthia R. Field, president; Chloethiel Woodard Smith, FAIA, vice president; Herbert M. Franklin, secretary/counsel; Beverly Willis, AIA; James W. Rouse, Hon. AIA, and Wolf Von Eckardt, Hon. AIA, program director.

For the museum’s function as a showcase, two permanent, continuously updated exhibitions are suggested:



• “Building America” would trace the log-cabin-to-skyscraper sequence, telling how buildings were influenced by changing styles, social needs and economic conditions; imported traditions and domestic materials, and technology, climate and terrain.

To illustrate this emphasis on context, one display might show how Indian artisans modified Spanish art in mission churches of the Southwest. Another might present the federal style of the North and the Jeffersonian classicism of the South in the context of the philosophy, commerce and science of the time. The possibilities seem limitless.

• “People and building” would be a smaller display designed to involve visitors in mechanized exhibits that teach by experience. One such exhibit might let people design their own neighborhood by arranging models of buildings of various types, transportation systems and the natural elements of landscape.
Another might be a computer game designed to demonstrate community living trade-offs such as larger lots at the expense of longer commuting.

Other exhibit ideas include a rotating “city progress” series to show recent design or architectural accomplishments city by city; a display showing the architecture and planning of the city of Washington; changing exhibits on such topics as historic architecture, the work of individual architects, the evolution of building types, efforts in neighborhood preservation and energy conservation, etc.; an exposition on the state of the building arts held every third year to show the best that American industry is capable of; demonstrations of the building trades by bricklayers, electricians, crane operators and others, and exhibits on the Pension Building lawns of landscape architecture and demonstrations of the process of building such things as geodesic domes, cable-

supported structures and towers.

In its function as a forum for the building arts, the museum could provide a national clearinghouse for data on architecture, building technology, landscape architecture, urban and community design, city and regional planning and the history of all these disciplines. This forum could also be a place where people with divergent interests meet to resolve problems and work out compromises in design and environment. Examples of possible conflicts range from removal of a single tree to make room for mail trucks to proposals for large-scale developments on undeveloped land. The forum also is seen as a logical home for coordination of efforts to improve the design of federal buildings and graphics, for child and adult education programs and for the U.S. headquarters in the international exchange of information, expertise and people.

The museum's third major function would be as a building arts library and archives. An entirely new comprehensive library would be unnecessarily expensive to organize and to staff, says the proposal, so responsibility for the required library services should be placed with the Library of Congress or another pre-existing resource. Suggested is a specialized library of basic reference works supplemented by an extensive reference system to other sources. The museum's document center —a national inventory of historic and technical building arts records—also would be run by an existing resource, preferably the Library of Congress.

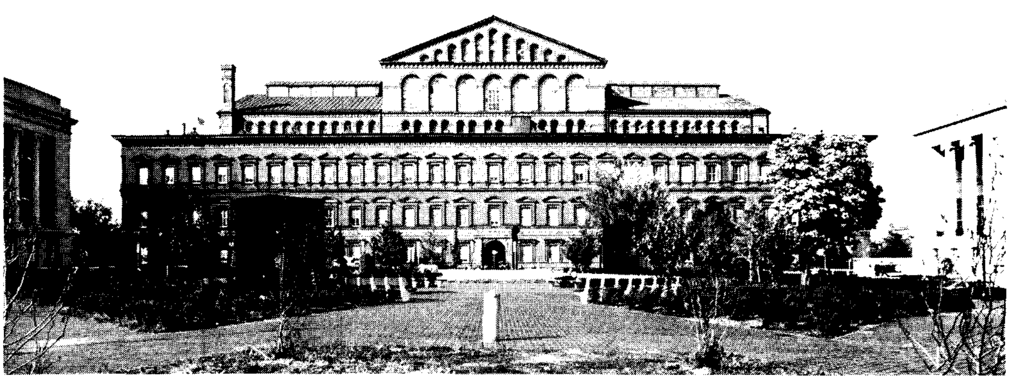
As with any good proposal, this one offers something for many individual interests:

• For Congress and the President, a forum to promote such issues as energy conservation and regional planning and to discourage things like urban sprawl.
• For industry and labor, a way of forging "the entire industry into a dynamic, unified group it must be if our national goals for the future are to be achieved."
• For Washington, D.C., a major attraction which would pull tourists from the Mall into the central business district.

To meet the costs—$21 million to get the building in shape and to set up permanent exhibits, and $3 million annually to run the programs and maintain the building and grounds—Congress is being asked to adopt a national building arts educational foundation act. The foundation would become the museum's sponsor and seek private sector support.

Von Eckardt, architectural critic and editor of the proposal, offers this appraisal of the museum's ultimate goal: "It should help raise our national consciousness of potential waste of people and natural resources, and help us to command as much delight in our cityscapes as our landscapes."

Designed by Gen. Montgomery C. Meigs and built in 1883, the Pension Building encloses what has been called 'the most astonishing room in Washington, D.C.'



Others on the Committee for a National Museum of the Building Arts, Inc., are: James Biddle, Hon. AIA; Albert Bush-Brown, Hon. AIA; Carl W. Condit; James Marston Fitch; Arthur J. Fox Jr.; R. Buckminster Fuller, FAIA; Robert A. Georgine; Frederick Gutheim, Hon. AIA; Philip Hammer, Hon. AIA; Blake Hughes; Bates Lowry; William Marlin; Mrs. Eric Mendelsohn; Martin Meyerson; Dan E. Morgenroth; Howard E. Paine; Flaxie M. Pinkett; Adolf K. Placzek; Kevin Roche, AIA; William L. Slayton, Hon. AIA; Marietta Tree; David A. Wallace, FAIA; Bernard Weissbourd, Hon. AIA, and William L. C. Wheaton.

Allen Freeman

Energy & Design

In its responses to the energy crisis, the architectural profession is, we are happy to observe, moving from a period of exhortation into one of execution. After several years of professional breast-beating, speech-making and policy-pronouncing, things are actually beginning to be built or rebuilt at significant scale with energy conservation in mind.

In this issue we look at both federal and state energy policies, but we also look at buildings. Among them are the first all-out federal energy conservation demonstration project, three even more venturesome designs for the state of California and the latest additions to New Mexico's heritage of solar design, which far preceded the proclamations of crisis.

We review the promise—and the pitfalls—found in energy-related work by some architectural firms who are specializing in it, to a greater or lesser degree. And finally, we look at the past, present and near future of wind as an energy source.

Pervading the widely differing approaches being taken to energy-conscious design is a sense of optimism that the new concern with limited resources is giving birth to an architecture that will be far more responsive to climatic and human needs—and much richer—than much of what we see around us today. As William Caudill, FAIA, said at an energy design conference held almost two years ago: "Energy conservation as a design determinant will be the name of the game these next five years. Energy conservation could have much more impact on building design than the great 'form givers' of the last three decades—architects like Frank Lloyd Wright, Le Corbusier, Mies van der Rohe, Walter Gropius and Louis Kahn. Energy will be the new form giver. . . .

"The energy crisis has changed the notion of beauty. It's difficult to see beauty in buildings that have an inherent craving for energy. The beautiful glass boxes, the highly admired complex forms with the juts and zigzags of the '60s don't look so pretty today.

"A new morality of form is emerging.

"The next five years will bring new forms based on this new morality. An indignant public will see to that. People won't tolerate buildings that leak energy. They will demand efficiencies in their buildings just as they have demanded efficiencies in their cars. . . .

"We are in for a change. No glacial change either. It'll be fast and far-reaching."

The forms that some of these changes are already taking are shown in the pages that follow. *Andrea O. Dean*

The Evolving Federal Approach to Energy Conservation in Buildings

An interview with John Ahearne, special assistant to the secretary of the new U.S. Department of Energy. By Andrea O. Dean

At this writing, the Department of Energy (DOE) is still in the process of organizing. The man who has been most directly involved with energy as it relates to buildings since President Carter assumed office is John Ahearne, an engineer and physicist by training who worked as an analyst for the Department of Defense before becoming a special assistant to DOE Secretary James Schlesinger for conservation and nuclear energy. In late October, in an interview with the JOURNAL, Ahearne explained how previously fragmented energy programs would be brought under one roof and reorganized in DOE, and what some of the Administration's views are on energy standards for buildings, on the future of solar as opposed to coal conversion and nuclear energy, among other matters of interest to architects. Most important, perhaps was Ahearne's (and therefore the Administration's) conviction that the energy problem can be solved only through a holistic approach that embraces all sectors of society and is "receptive" even to ideas such as those of scientist Amory Lovens. Lovens' claim that our present emphasis on "hard technologies" will lead to disastrous results, has fomented a major debate. The following are excerpts from our interview:

Q: Will the Department of Energy view energy use in buildings mainly as a problem for professionals or as one for industry and manufacturers?

A: I would say, first, that I think we don't view it as a problem, but rather as a challenge. I think—and I'm not just trying to use sophistry—it's a challenge to everybody: to the consuming public, to builders, to manufacturers, to architects. If, for example, the general public concludes that they don't have to worry about it, that eventually builders will take care of it, or if manufacturers conclude that they'll just wait for people to ask for improvements, then we can't get very far.

We will be trying to put a lot more effort on working closely with both building and architectural groups and with large offices, such as insurance companies, that do a lot of commercial buildings.

Q: What do you see as the principal trends in the Administration's energy policy and programs that are likely to affect architects and the building industry?

A: I think many of these are already apparent. We will probably be pushing even harder to get national acceptance of building standards oriented toward the most efficient use of energy. Part of that will be an acceleration of the mandatory standards, and as I'm sure you recognize, being performance standards these are much more geared to the approach that an architect would take than prescriptive standards.

Q: Who will be responsible for establishing standards?

A: There are many types. For buildings, the way the law has now been established, the Department of Energy is responsible for developing the standards and promulgating them and HUD is responsible for carrying through the process, receiving the comments and putting them into effect. We'll be working very closely with HUD in developing the standards.

Now, there's a second set of standards which we will in a way be responsible for and which I think architects are going to have to become familiar with. These are the major equipment standards for devices which are going to be available for use in buildings.

Q: Standards don't seem to address the questions of "what do I do" and "how do I go about doing it" for the architect.

A: That's true. As far as architects and designers are concerned, I'm sure that as the process of standards development goes through—and the AIA is a very heavy participant in the development of those standards—that there will be a lot of materials developed on how best to go about the process, doing the calculations, thinking about the problems. But we're obviously hoping for creative ingenuity to be applied to come up with approaches which, after they're tested, can be distributed throughout the country and more people can understand how they are to be used. For example, there are some steps that GSA has taken for its building designs that we're evaluating, and if these turn out to be extremely useful, we'll try to get that information out to the rest of the country for other designers to consider.

Q: That's the reduction of BTUs?

A: Yes, but performance standards approach. So many BTUs per 1,000 square feet per year.

Q: So far, conservation programs haven't really addressed the commercial sector, have they?

A: There's less of an emphasis there. We've got business tax credits that are oriented toward the commercial sector for load management measures and all those kinds of things. But we did find more difficulty trying to address the commercial sector than the residential sector. I think this is primarily because the amount of research and development that we've managed to tap had really been focused much more on the residential sector than on the commercial. The commercial sector doesn't use as much energy as the residential, so when we were trying to see which one we should be concentrating on, we concentrated on the residential. We will undoubtedly be putting a lot more effort over the next year on the commercial area.

But there are steps being taken now. The President has signed an executive order directing all the federal agencies to aim at a 20 percent reduction of energy usage in the buildings they already lease or own, and a 45 percent reduction compared to 1975 levels for new buildings. Part of the executive order tells the federal government it must use life cycle costing, and I think that since we either own or lease large numbers of large buildings, as life cycle costing becomes a well-developed standard practice on the government side, that we hope to see an increasing use of it in the private sector.

Q: My understanding is that there is a 20 percent tax incentive for coal conversion, but only 10 percent for conversion to solar. Is that right?

A: You're looking at residential versus business. Coal conversion is in the business tax credit. The solar is in the residential tax credit. But that's right, that's 10 percent [the tax credit for commercial conversion to solar]. Except, and now we're getting into an area where I'm on a little shaky ground because of the legal intricacies of the tax code. So, I'll just comment, but you'd have to check with the IRS to be sure. As I understand it, depending upon the type of equipment that's involved, it may be available for the 20 percent tax credit.

Tax incentives 'to develop enough of a solar market to bring the technology along fast enough.'

Q: Do you know the reasons for the discrepancy between tax incentives for solar and coal conversion?

A: Well, remember that most of the incentives are for energy conservation. Coal conversion and co-generation in the near term have vastly more potential for conserving energy than solar. Coal conversion and co-generation are technologies which are well in hand, and so the issue was to try to get—in some cases by mandating and in other cases by incentives—to get that shift needed to save the energy. In the case of solar, the technology is not quite there yet. It's a market problem, to develop enough of a solar market to bring the technology along fast enough. A lot of that technology and market pull is going to be done from the residential program in which we do have very large incentives. We also have a $100 million program on solar for commercial buildings, in which the government will buy and install solar to try to pull the market.

Q: With solar technology not being sufficiently advanced and cost effective, do you think a 20 percent tax credit is enough?

A: In the first place, when you say solar is not cost effective yet, that's not quite true. For example, for hot water heaters solar is cost effective. In some regions of the country, solar heating can be cost effective. So, it's really a mixture. And yes, the studies we have—studies that both ERDA [the Energy Research and Development Administration, predecessor of DOE] and HUD have done—indicate that 20 percent should be quite adequate tax incentive.

Q: Will conservation and solar energy programs be consolidated in one office rather than scattered as they were in ERDA? [There will be an assistant secretary for solar energy and conservation in DOE.]

A: Yes. I gather you're in favor of that.

Q: It seems to make more sense; don't you think?

A: Yes, we wouldn't have done it if we didn't think so. It appeared to us that as we looked into the future, trying to do long-range planning for the department, that the conservation area should be the one to get across the sort of initiatives for both getting more efficient utilization of energy and getting into the soft technology and distributive [decentralized] sources areas—the shifting of the mechanisms by which we generate and use energy. Solar seems to be the most near term of the technologies. We see then the conservation and solar office as being the one that will be responsible for actually getting solar technologies to the point where they can be widely used.

Q: Among the criticisms of the federal approach to solar is that although it is safe and produces no harmful wastes, etc., it has been given scant attention, compared to nuclear. Do you think this is valid?

A: I don't think we're necessarily satisfied with the pace of [solar energy] development, and we are trying to re-examine whether or not the programs can't be put on a more coherent basis. One of the difficulties was there were so many different agencies doing bits and pieces and we believe that if we can try to coordinate those pieces that we can probably get a much more efficient use of the funds. We found what we thought was a lack of focus on what were the long-range objectives. What were the goals? What were we trying to accomplish? We are trying to concentrate more on getting the commercial market developed. In many cases there are technologies that we think can be used in the marketplace now, and to develop that commercial market is what we should concentrate on.

Q: What kinds of technologies do you have in mind?

A: Most of the heating systems are really quite marketable right now. More effort, we think, has to be put into solar cooling. That's far behind solar heating. On the next step further behind is the photovoltaic, but there are a lot of interesting approaches that we think with enough seed money we can probably get to the point where they will also be quite useful, certainly on a distributive basis. I think we're further down the line from having any kind of central systems.

Q: Yet, a main criticism, again, has been that the federal government has been concentrating on large-scale, central stations, rather than smaller, intermediate temperature systems, which might be more immediately promising.

A: I have to pass. I've spent most of my time on conservation and on nuclear and not that much on solar. I'm more familiar with our review of what we're intending to do than I am with a review of the criticism of what used to be done.

Q: It's been said that solar programs have been carried out on the model of the nuclear—again, large-scale, centralized systems. Is the intention to continue with this approach?

A: As far as the future, no, we don't intend to concentrate on central power use, although obviously there will be research done on the feasibility of those. But, we'll be putting a lot more on the distributive. Many of the electric power techniques have to be concentrated just for economic reasons. Solar turns out to be one of those that doesn't have to be, and so it's worthwhile trying to put effort into it just because of that.

Q: What kind of emphasis will you be giving to wind power and biomass—which again haven't received a lot of stress in the past?

A: Now you're really out of my area.

Q: Do you know anything about how much attention is going to be paid to passive solar systems, which again ERDA seemed little interested in in the past, as opposed to high technology systems?

A: Since passive design is clearly a part of the way you can achieve low performance standards, lower numbers, there will be a lot of interest—there already is. There's a lot of interest in trying to incorporate those kinds of ideas in anything we're doing.

Q: Are you familiar with Amory Lovens' ideas? Of course you are. Mr. Schlesinger and the rest of you—are you receptive to Lovens' way of thinking?

A: When you say receptive, about the best I can say is I have very high regard for Amory Lovens. I have spent about an hour and a half here talking with him and I've been in another meeting with him, with a couple of others, where we spent about two hours. So, yes, we're certainly receptive to talking to him.

Q: What about accepting some of his ideas?

A: I think a number of his ideas are very good. I think his emphasis—that you've got to consider distributive use, that there is a large potential for distributive application of power that hasn't been adequately addressed—certainly I agree with that. I think his fundamental—or one of his fundamental arguments—that it requires a major shift in the cultural understanding of the use of energy, we're totally in agreement with. That's the fundamental thesis of both the President and Schlesinger.

I believe that there certainly are points on how far you can go and how rapidly you can go on that shift on which we are not in complete agreement with Lovens.

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Evaluation: Living Experiment In Energy Conservation Systems

A new federal office building in Manchester, N.H., is less a design model than a laboratory. By Marguerite N. Villecco

The long gas lines of the Arab oil embargo hadn't happened when New England architects Nicholas Isaak and Andrew C. Isaak accepted a commission from GSA to design a new office building in Manchester, N.H. There was no indication at the time, or for several months thereafter, that this building would eventually become a living laboratory of energy conserving building systems, and one of the most studied projects ever built.

The time was 1972 and the most pressing design issues centered on site and program. The original building plans called for a combined GSA and postal facility on a site in the southern part of the city. The post office became regional, however, and needed more space; the GSA offices split off and looked for a new site. The site eventually chosen was an urban renewal area several blocks northeast of the original. The architects urged that the whole block be purchased, but half was not and remains a parking lot for the city today. Two other smaller portions of the site had been designated as miniparks by the housing authority (although they still remain parking lots as well) and so the architects were left with a very constrained site with a long east/west axis surrounded by cars. The site and program finalized, the design team started to evolve a design. Besides the architects, they included Richard B. Kimball Co. as mechanical, and Rose, Goldberg Associates, as structural engineers.

The preliminary designs demonstrated the concerns for program, site and esthetics that define good architectural practice. Most were rectangular to conform to the site; they featured a traditional center core plan, with office space distributed around the perimeter, which provided large areas of glazing for people to see the mountain views from inside. In one version, the building's parking was above ground, separating ground floor, public activities from regular office spaces and allowing the eye and air to move freely through the building.

Ms. Villecco is senior research associate, AIA Research Corporation, and former senior editor of *Architectural Forum* and *Architecture Plus.*

Then, suddenly, GSA told the architects to stop work. Early client relations had been good, but there was a lot of talk of energy in Washington and the regional office in Boston had been told to expect some changes.

And there were many changes.

Earlier in 1972, GSA had held an interdisciplinary International Conference on the Environment to evaluate and recommend policy priorities for government in the future. The session resulted in a strong call for energy conservation, as well as a concern over possible conflicts between energy conservation and environmental quality. A followup to the conference further recommended that GSA not just talk about energy conservation, but practice it.

GSA had two buildings under contract: one in Saginaw, Mich., the other in Manchester. Arthur Sampson, then administrator of GSA, designated Saginaw a demonstration of environmentally sensitive design. Manchester was selected to demonstrate energy conservation in building design. GSA planned to see if conflicts would result from these two sets of design values and test the limits of each.

Isaak & Isaak had proceeded with design development despite the hiatus on the assumption that changes could be accommodated later. They did not envision the scope of the changes.

When the authorization to proceed came, it was clear that design criteria had changed dramatically. The architects, who had no previous energy conservation experience (who had in 1972?) were told that the Manchester project was going to demonstrate the state of the art in energy conservation and that the design team would now include Dubin-Mindell-Bloome, consulting engineers and energy experts, who would determine the scope and nature of the new design criteria for energy conservation. In addition, the National Bureau of Standards would become involved in energy performance analyses during the building's design and for three years after its completion. GSA asked Isaak & Isaak if they wanted to continue. There were "a few anxious moments," according to Ray Whitley, then chief of the environmental and energy branch of GSA and now director of energy programs for GSA's public building service.

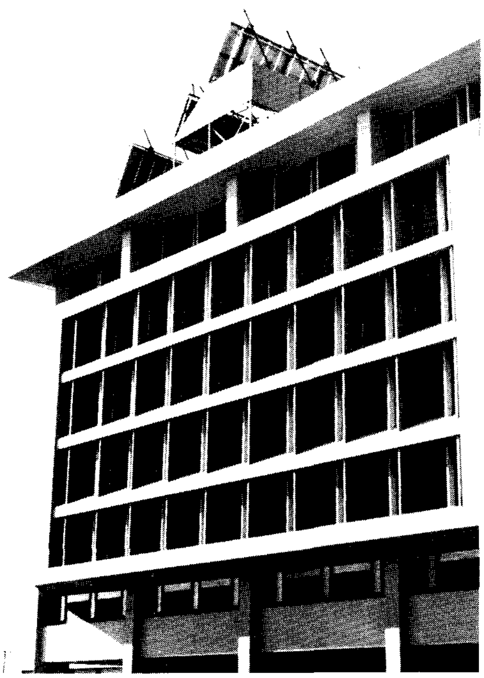
Dubin-Mindell-Bloome started the transformation of the structure into a demonstration energy conservation building with extensive analyses of building elements in relation to energy. They worked with GSA and NBS to find a conventional office building in New England that they could use as the basis for comparison in analyzing energy conservation measures, but could not find one. Instead, combining their best professional judgment, they described a typical office building representative of current design practice and used it as a baseline.

The "typical" building had U values of 0.15 in its roof, 0.16 in its walls, and 1.13 in its glazing, hypothesized to be ¼-inch plate glass. It was designed for −10-degree outdoor design conditions in winter, with 75-degree interior temperatures. In summer, it was designed for 90-degree dry bulb and 73-degree wet bulb temperatures, with interior requirements of 75-degree dry bulb and 5 percent relative humidity. It used Venetian blinds for solar control and had lighting levels varying between 3 watts per square foot in the toilet and storage areas and 6 watts per square foot in office spaces.

The building's size and function were consistent with the GSA program for the new building: 126,000 net square feet with office space for six major agency tenants and a variety of smaller ones. Its simulated energy performance indicated it would need an energy input of 116,000 BTUs per square foot at the building, or 216,000 BTUs per square foot per year of primary source energy.

Analyses indicated that the new building could use existing technology to reduce energy requirements by about one half. Since then, GSA has required that its buildings not exceed 55,000 BTUs per square foot per year, based on an estimated allocation of electrical and fossil fuel requirements and operating hours. The DMB Manchester studies help prove the feasibility of this figure as an energy budget.

According to Walter Meisen, AIA, then assistant commissioner for construction management at PBS, the Manchester building was crucial to the overall GSA efforts "to make BTUs per square foot as familiar for buildings as miles per gallon for cars." The level of performance was a less precise concern than that building owners and designers think of energy performance goals in buildings. Meisen wanted to set a number; he selected it quickly and could retreat from it quickly as long as it was not too high. The number was a challenge: "Prove me wrong, but if you can't meet it, tell me why." As it happens, the 55,000 BTUs per square foot has proven reasonable. And the BTUs



Below, the bristling facade of the building, with its narrow slit windows. Top, the shaded east wall. Above, the blank granite 'billboard' on the north side.

per square foot concept has entered into the design process of buildings much more than it would have otherwise, and with it has come increased responsiveness to energy concerns in design decisions.

The irony is that the building that initiated the concepts and methods for that performance standard probably won't meet the standard itself. Unofficial estimates of the building's performance now run around 75,000 BTUs per square foot per year.

The energy performance is not, however, a major shock. The building's systems are still being tuned and its instrumentation refined. It was occupied one year ago and so has been through only one seasonal cycle. The NBS evaluation will take three years.

More important is GSA's perception of the Manchester building as the "keystone of a whole new generation of building and as a way to draw attention to energy conservation in building design." Whitley notes that GSA did not see Manchester itself as a model energy conservation building in the sense that other buildings should be like it, but wanted to encourage the integration of energy into building criteria. For this reason, the building, later named for former U.S. Sen. Norris Cotton, became a living experiment that could provide feedback for years to come on the pieces and performance of energy conservation systems. It also became more than one building.

Although it looks like a single building from the outside, inside, it is seven buildings in one. Every floor is different, with each testing a different system or concept of energy conservation. The building as a whole suffers from the diversity and is less energy conserving than it would be if the designers had simply chosen the most energy conserving systems and gone with them.

The DMB analysis had included over 500 design options. Each had been evaluated by its contribution to energy savings, its cost effectiveness, its compatibility with the overall design objectives and functions, its technological reliability and availability. The state of the art at that time determined many of the design options included. The final design had to represent off-the-shelf technology, and solar collectors were ruled out early as being still experimental. By the time the building was under construction, however, solar was considered commercially viable. The building had been designed to accommodate future solar installation; so its inclusion at the last minute posed no major functional problems although design integration was minimal.

Isaak & Isaak meanwhile had to redesign their building to conform to the energy criteria. Ideally, an architect and engineer would work together from the beginning to design an integrated energy-conscious building. In Manchester, the relationship was out of synch; the architects had to start and stop and start again with design criteria with which they were unfamiliar. The energy consultants had the edge because they knew more about energy and because they had a clear mandate from GSA. Isaak & Isaak sought to preserve architectural integrity while DMB sought to integrate energy. The results are more compromise than synergy.

The building itself is an imposing structure, monumental in scale and provocative for its arrays of solar collectors on the roof. As one drives into Manchester, the building is easy to spot over lowrise, aging shopping areas. The collectors look especially rakish because their jacks, which adjust their tilt to the sun, rise into the skyline like so many spears.

From a distance, the building otherwise looks fairly conventional, with a native granite facade perforated by dark rectangles, presumably windows. But a closer look reveals its uniqueness. The dark areas are not windows, but broad mullions between columns, in which narrow window slits are hidden.

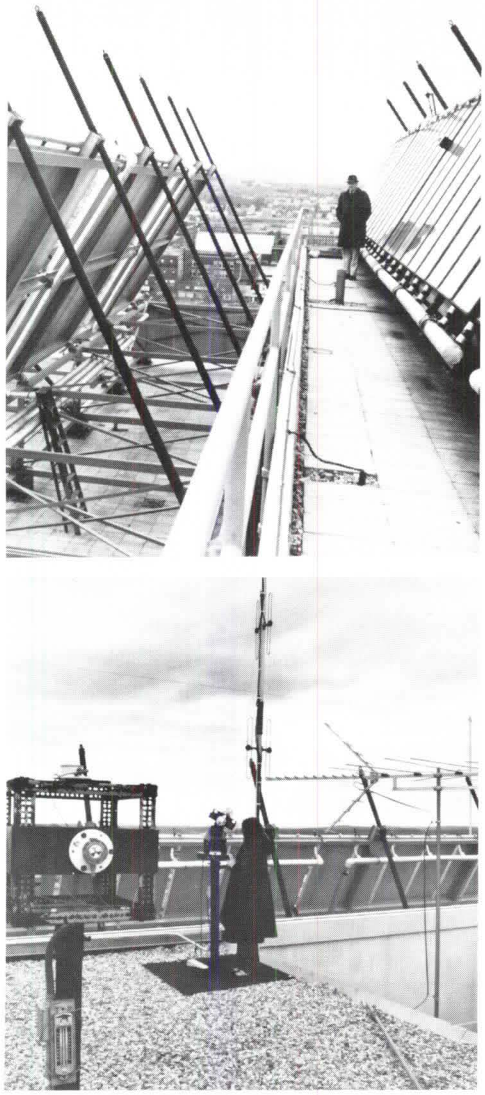
The windows, in fact, represent only 12 percent of the east; west and south facades, and they are nestled deep into the structure to protect them from the ill effects of wind and sun. The north facade has none at all. It presents a bold granite billboard to the city that this is an energy conserving building. (There is some talk about putting a sculpture on the north face, but Andrew Isaak, AIA, strongly opposes it, saying that the bare facade is the most symbolic sculpture possible there.)

Very close examination reveals that not only the north facade is different from the others, but that all four facades are unique. The climate of each building facade is different in relation to wind and sun, and the design includes a carefully calculated response to this, particularly in the angles and dimensions of the shade controls. The structure is designed to be 80-100 percent efficient in prohibiting summer solar loads and 80-90 percent efficient in permitting the lower winter sun to penetrate.

In comparison to the "typical" baseline building, the Manchester building has U values of 0.06 for its roof and walls and its windows, which are double-glazed with built-in shades between the panes, and have a U value of 0.55. The structure is massive, with 12-inch-thick masonry backup walls on the building's perimeter. The roof, which is surfaced with crushed white marble to reflect solar heat, is thicker than structural considerations required. Initial design criteria called for the floors to be thicker as well, although this was a trade off made for economic reasons. The insulation is applied to the outside of the structure, including the overhangs, so that the walls can be used as a heat sink that absorbs interior heat, then reradiates it to the interior to take the edge off of peak loads.

The rectangular shape of the early designs has been replaced by a cube to reduce the surface to volume ratio of the structure. The first floor is larger to accommodate activities dealing with large numbers of the public and it measures 75 x200 feet. The second and seventh floors are the smallest, 100x120 feet, and the overhang provided by floors three through six provides the opportunity for an experiment in daylighting on the second floor by sheltering the greater amount of glazing there. Floors three through six are 118x138 feet, or nearly a perfect square. The site was the greatest constraint on the building's configuration and orientation, allowing little room for maneuvering. The cube is an improvement over the east/west rectangle originally proposed, but more creative alternatives were restricted. The two parking levels have been buried, with the proposed midlevel garage set aside because it would increase the building's exposure to the elements.

The interior design conditions were also more stringent than was conventional. The new building was built for +5-degree winter weather conditions (not geared for last year's very severe winter) and to provide 68 degrees inside. Its summer design conditions were for 86-degree dry bulb and 73-degree wet bulb temperatures outside, with interior temperatures set for 78-degree dry bulb and 60 percent humidity. Temperatures in corridors, toilet rooms (which use activated charcoal filters to halve air exhaust requirements), and storage areas may drop to 65 degrees or rise to 80 degrees. It has .06 cfm of outside air per square foot versus .25 for a conventional building. Its calculated winter heat loss for the second through the seventh floors was 45,000 to 77,000 BTU versus 278,000 to 684,000 BTU for its conventional counterpart.



Rooftop appurtenances: solar collectors and a weather-monitoring 'sentinel.'

The building has two mechanical systems, with variations on each floor. In addition, the solar system is designed to assume 20 to 30 percent of the water heating, space heating and cooling loads on one floor.

The lower three floors of the building are cooled and heated by unitary closed loop water-to-air heat pumps, which are essentially refrigeration machines with a reverse cycle that deliver several times more energy than they consume. The heat pumps are used on the exterior portions of the floor. Variable volume boxes are used in branches from the main distribution supply ducts.

A similar system of heat pumps with variable volume controls is used for the floors' interior zones, primarily for year-around cooling. The variable volume systems are "bypass to return" versions so that there is a full flow of air across the refrigerant coils at all times. When the heat pumps are in the cooling mode, the rejected heat will be piped into the insulated hot water tanks, where it can be used as a heat source for the heat pumps working in the heating mode at night. The floors can also operate on an economizer cycle, with outdoor air supplies determined by an enthalpy controller that senses both temperature and humidity.

The interiors of the upper four floors of the building all operate from a variable volume system on the roof. Floors four and five have separate air handling units for perimeter zones, arranged for variable volume, with vaned inlet fan control. Floors six and seven have four-pipe perimeter units that are designed to operate either on a four- or two-pipe basis. The units draw air from the ceiling plenum to make use of heat from the lighting during occupied hours. This has not been a very effective system for heating, in part because lighting levels are low, but pulling the air back through the ceiling helps to cool the fluorescent tubes and helps cut down the sensible heat in the space, directly saving energy by minimizing air and fan requirements.

The building has two sets of boilers to provide heat to these floors. The gas-fired boilers were designed as the primary system and were used last year. This year, however, there is a natural gas shortage in New England and the oil-fired boilers will be used instead. Both boiler systems are modular.

The cooling load on floors four through seven is handled by a central chiller normally driven by a gas-engine generator. Waste heat from the generator is used to operate an absorption chiller, with condenser water from both chillers piped to a heat storage tank and to the cooling towers on the roof. The heat will be used where possible; what cannot be used will be piped to the cooling tower. Waste heat helps to heat the building at night, supply domestic hot water and provide morning pick-up.

The generator is sized according to the building's emergency power requirements, with the chiller's operation a side benefit. So far, the system has not operated consistently and the chillers have operated with purchased electricity. In one instance, a building operator turned off the generator to save energy, apparently unaware of its integration into various system operations. The chillers themselves are undersized in relation to peak loads.

Lighting and mechanical systems are in different combinations on each floor of the building.

They are operated at night and the chilled water is stored for the next day.

The operation of the mechanical systems is still being refined. The building's engineers are experimenting with such things as night setbacks, delayed startup times and off peak storage strategies.

The solar energy system, designed by DMB, is not yet in stride and its eventual contribution to the building's thermal performance is not yet known, although it is minimal so far. The collectors are only now being metered to record the amount of water flowing through them and so make calculations of their BTU output.

The appearance of the solar system reflects its last minute installation. But there is a certain raw honesty to the way the collectors perch up there. They seem to say this is an experiment that may or may not work. The building has about 3,800 square feet of flat plate collectors, which are expected to contribute to cooling as well as hot water and space heating loads. Three 10,000-gallon storage tanks allow water to be stored at different temperature levels. All three store hot water in winter, with the third storing chilled water in summer.

Solar cooling, in particular, is rarely considered economical or technically reliable with flat plate collectors and, in fact, these have not yet produced sufficient high temperature water to operate the building's absorption unit. But GSA thought that it was important to include cooling in the solar system image "even though we know its current performance may be marginal," notes Gary Wells, an architect and now chief of the environmental and energy branch in GSA's office of construction management, where he is responsible for the development and reevaluation of energy conserving design guidelines.

The flat plate collectors, arranged in four tiers, each represent a different solar manufacturer and different type of collector assembly. One is a copper collector with a double-paned glass cover; another a roll bond absorber with a single glass cover and proprietary heat trap; another of weathering steel. The collectors are mounted so that they can be tilted up in winter to catch the low path of the sun, or down for full exposure to the high summer sun. Originally, there were plans to change the tilt weekly, but the jacking system is not only costly, but cumbersome, and tilt changes are now scheduled only twice a year. All of the collectors use water as a transfer medium; ethylene glycol is added in October to prevent winter freezing.

Also on the roof is a complete weather station that informs the computer monitoring system of changes and patterns in temperatures, wind direction and velocity, humidity, precipitation and other climatic variables. A pair of sentries, in the form of exotic black boxes, trace the path of the sun and record insolation in five directions.

The roof's preoccupation with the sun, however, does not extend to the building's interior, which is largely isolated from it. The subject of illumination is particularly important to the energy profile of a building and, according to Walter Meisen, one of GSA's greatest concerns in energy conservation. Many office buildings consume half of their energy with lighting systems, some much more.

The design conditions for lighting levels at Manchester were significantly lower than those for the "typical" building used as a baseline. Offices were designed for 2 watts per square foot on the average; lobbies for 2.5 watts; toilet and storage areas for 1 watt; and parking for .5 watts. Since the building has been completed, GSA has worked to lower lighting standards further still.

Unlike mechanical systems, however, which are largely out of sight and mind of building users unless they don't work, lighting characteristics produce strong reactions from building occupants. Asked about heating, cooling or air systems, people commented on the design conditions, not the systems, saying that 68 degrees was cold and 78 degrees hot. But when asked about lighting, their comments were much more pointed. NBS is doing a series of user surveys on the building, including questionnaires to everyone and hour-by-hour comment boxes for a few. NBS has also installed over 700 sensors around the building and some measure contrast rendition factors (CRF) to evaluate how well lights render things visible.

Each floor of the building has a different combination of lighting elements. Most are in the ceiling, but one floor has task ambient lighting and another integrates daylight. The overall lighting concept was intended to be sensitive to task lighting requirements, but the tenant uses of the building do not reflect this.

The seventh floor has mercury vapor lights in the lobby (which is fairly consistent throughout the building) and fluorescent lights elsewhere. The fluores-

Lighting systems, clockwise from lower left: flush ceiling fixtures on the first floor; coffers on the sixth; task/ambient lighting on the open landscaped fifth, and a sodium vapor fixture on the fourth.

cents are arranged in four-tube cross-lamp patterns with prismatic refractive acrylic lenses. The building operator's office is on this floor and so is the New Hampshire congressional delegation. Here people generally liked the building, but some complained of harsh lights, headaches when they first moved in and "freezing in the winter."

The sixth floor has the most popular lighting system, according to Dick Low, resident engineer for GSA in Boston, who spends much of his time tuning and troubleshooting in the building. Here there is a coffered ceiling with a single "cool white" fluorescent tube for each 5-foot bay in the offices, and in every other bay in the halls. This seems to provide a good uniform light and the ceiling coffers lend some diversity and spaciousness to the floor's appearance. One office there is occupied by a refugee from the fifth floor, where he found general office conditions "terrible."

The fifth floor is one of the most talked about in the building. It alone tests task lighting and open landscape planning. The two elements are integral. The lighting includes halide lamps contained in bookshelf cabinets that shine onto the ceiling, providing indirect lighting to the work surfaces below. In addition, there are fluorescent tube lights mounted under the cabinet, about 18 inches above a small work surface underneath.

There are a lot of complaints on the fifth floor which is occupied by HUD. The furniture system itself is somewhat elegant in appearance, of natural wood, and with multiple combinations of storage and work surfaces. A similar combination of elements is used in the few private offices on the floor, where wall shelf and storage areas are complemented by round tables as desks. The sixth floor refugee complained that when he was on the fifth floor he was "always working away from myself" on the round table; a typical current resident said he liked it "very much in here, but I don't think I'd like it very much out there."

Out there means in the open plan area itself. The wood system that looks so nice is noisy; the floor's white noise system fails to obscure distracting sounds. The partitions are high and one cannot see over them, making the unseen sources of noise even more bothersome.

The lights take a while to come up to full power. Coming on the floor alone in the dark can be uncomfortable. One lighting expert, Harry Lobdell, vice president of research and engineering for Columbia Co., visited the fifth floor in the course of a national survey of task lighting. He compared the "bare 20-watt strip lights to kitchen lights of 20 years ago" and found the floor's highest footcandles in the wrong places. There have been employee complaints as well. One employee reported that when people moved onto the floor, "everyone's eyes burned—it had to be the building."

The unfortunate thing about the fifth floor is that it is the building's only test of task lighting and open landscape planning. Yet both of these are very important energy conservation strategies that may be poorly judged on the basis of a bad example. The most pejorative comments about the floor systems came from a person who dismissed the subject with "Washington designed this."

The fourth floor, however, is by far the most startling. Here, high-pressure, 150-watt sodium lights blend virtually everything and everyone into a strange honey glow. The floor is used as a regional induction center by the military and the young recruits appeared to have a high incidence of jaundice until the lights were changed in the medical examination rooms. Some laboratory work was also jeopardized by the sodium lights; doctors working with plasma and other color sensitive areas had the lights changed.

If designed today, its 'relation to ambient resources would be more metabolic, less defensive.'

The lights have, in fact, given rise to a variety of anecdotes. One tells of the women on the floor who would dress and put on makeup at home, then come to work, where their suddenly garish color combinations of skin, dress and lipstick would elicit a few quiet giggles before the lights were identified as the culprit.

Walking between sodium-lit offices and mercury corridors produced the kaleidescope effect of warm apricot skin tones changing to chilly splotches of white and purple. Eventually, the mercury lights were replaced by sodium lights for consistency.

The sodium lights' efficiency over fluorescent has been compared to that of fluorescent over incandescent. But at least one characteristic of the sodium lights mitigates against optimum energy savings —the lights take over five minutes to fully turn on. And, if the lights have just been turned off, they must cool before the process can start again. The result is that people turn on the lights when they arrive and never turn them off, even in unoccupied spaces.

Many people, however, said they had grown accustomed to the golden glow and even preferred it to the harsh white lights of more typical offices. A naval lieutenant commander even had some kind words for sodium lights. His own office has wood paneling color-coordinated with carpeting and the colors are almost wholly obscured by the lights (a gray and green classroom down the hall fares better). His ceiling lights illuminate his credenza and rug, but are careful to avoid his desk top. But, looking for something positive to say, he noted that the sodium lights probably helped to humanize the induction experience by giving recruits an aura of warmth and reassurance. He was less kind about the designed temperature conditions, which force these same young recruits to strip for examination in 65-degree rooms in winter, or 78-degree rooms in summer, where the minimal ventilation and body heat conspire to make the whole experience a bit gamey.

Clearly, the fourth floor has special needs unforeseen by the building's design. The program called for an office building and here is a floor with classrooms, medical laboratories, examination and changing rooms and even a recreation room replete with a tassled pool table. The sodium lights were an experiment that did not work; DMB would not use them in offices again.

The third floor is less exotic. A typical office floor, it includes hearing rooms for the Department of Health, Education and Welfare and is occupied mostly by the Veterans Administration. It features two fluorescent tubes, crossed in 36-inch lengths with lenses that give a radially symmetrical distribution of vertically polarized light. There are plans to interchange lights and/or lenses with those on the seventh floor to see if worker productivity is affected. (One remembers the famous Hawthorne study that demonstrated the change itself, rather than the lighting system, could increase productivity.)

The lighting system on the second floor is the same as on the sixth, but here it is combined with daylighting. The three perimeter rows of lights have photocell controls that are supposed to turn them on or off according to natural daylight level. Such systems have worked well in Europe, but this one has not worked, perhaps because the exterior overhangs of the building keep daylight levels too low to activate the photocells. The result is that the perimeter rows of light are always on, as on the other floors, and any daylight contribution is independent of the lighting system's operation.

The VA employees who work on the second floor nonetheless consider the floor better than most because they have more windows. The additional windows here are actually horizontal strips that bridge the standard vertical windows at ceiling height to take advantage of the ceiling as a reflector. But their visual and psychological impact is higher than this would imply.

The vertical windows measure only 2x5 feet and are so buried in the structure of the building, which shades them, that one's view is very narrow. They cannot be opened and they contain dark blinds between their two panes that building users cannot raise or lower. People can change the tilt of the blind slats if they use a special key, but few have such a key and the blinds for the most part remain semiclosed.

In general, the indoor impression is that this is a windowless building and people uniformly react against it. Many complain of claustrophobia, of not knowing whether it's day or night outside, of having no light inside. One simply looked out the window and said they "depress me." And a more outspoken man blurted, "I hate these things. They're not airtight; they leak around the frames; and I can't see out at all. I *like* to communicate with nature; I *need* to at least know it's there." DMB had originally planned "refuge areas" at corridor ends for people to look out, but interiors are not laid out that way.

The first floor, which is also the street entrance and lobby, has Social Security as a major tenant. The lack of windows is especially noticeable here because the employees, mostly women, are all seated at neatly spaced desks in a huge room, where the few glazed slits in the wall seem almost insulting to the room's proportions. The lights here are three crossed fluorescent tubes with a cool white color. Their even spacing somehow mirrors the arrangement of the desks and people, although there is no direct correlation. The room has a mist green carpet, cream walls and the desks face a glass door to the lobby and a large wall mural of a rural countryside with a lake.

The lobby itself is a homely blend of government issue patriotism, practicality and sophistication. The walls are decorated with a series of small, colored reproductions of naval and colonial history. Waiting for the elevator, one can learn about George Washington at the Battle of Virginia, or muster the courage to enlist with John Paul Jones, who has "not yet begun to fight." On another wall, an eagle spreads its wings over a glass display case containing the Bill of Rights, Declaration of Independence and Constitution.

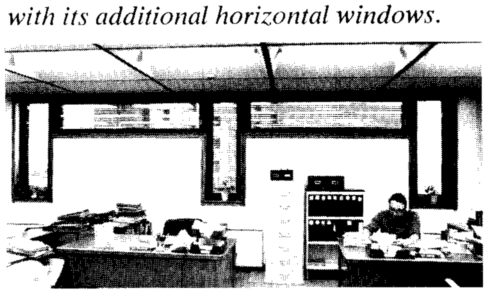
In contrast to the diminutive glory of the sailing ships are the more mundane and functional items that distinguish this as a GSA building. In front of George Washington and John Paul Jones stand several large trash cans, with bright orange tops, and a newspaper machine. A telephone wall booth boasts colonial wood motifs and a canteen room is opposite the elevators. An administrative and guard office stands to one side of the main entrance, which features red rosette decals on its glass doors so people will open them before walking through (no mean feat when winter winds blow).

The pride of the lobby, however, is a display about the building itself. The show includes a half-hour slide presentation, narrated through a small speaker and coordinated with a large model of the building that lights up appropriately as its systems and operations are described.

The slide show is about the origins of energy and the design of the Manchester building. The model illustrates solar energy moving from roof collectors to storage or distribution; how heat pumps cool in the summer and heat in the winter; how one building system uses the waste heat of another, and the differences and variety between each floor. A large, windowed computer room is constantly attended and provides a reminder of the building's laboratory status.

Few of the people working in the building stop to see the show. Surely they have seen it before, when the building was new, and perhaps the whole subject has lost its fascination. Few said they followed the experiments in the building or made a point of reading the stories about it. Most of them have been interrupted in their work, posed for photographs, laden with government survey forms, and interviewed by the press. For them, energy conservation has settled into a way of life. They are a little too cold in the winter, a bit too warm in the summer and more isolated from the outdoors and daylight than they would like.

Blinds are encased between two panels of glass and thus inaccessible in case of malfunction. Below, the second floor with its additional horizontal windows.



But what the building's users perceive as energy-conscious design is not necessarily intrinsic to it. What was perceived as a severe constraint to design is becoming an element of design. Buildings that needlessly consume energy "should be as unthinkable as nine-foot stair risers," concludes Walter Meisen.

Energy-conscious design is an attitude that must infuse the entire design process, from the first conceptualization of a project through its occupancy. It is an attitude toward people as much as buildings. Buildings don't need energy. People do.

It is this understanding that lends humanity to energy-conscious design. When the GSA Manchester building was built, the state of the art in energy conservation dictated that the energy-consuming portions of a building be made more efficient. The relationship between the building and its climate was held suspicious where severe weather conditions exist and the conclusion was to protect the building as much as possible.

Energy-conscious design is now better understood. The energy implications of design decisions are becoming clearer, as are the opportunities. Even severe climates can be used beneficially for building users and more recent work in this area is starting to define specific design strategies to incorporate natural elements into the concept, as well as the mechanics.

A greater variety of energy-conscious design methods is emerging. Instead of reducing window areas, many buildings save energy by enlarging them to capture the sun's energy for heat and light and by controlling their energy dissipation by thermal and shading design responsive to time as well as climate. Instead of a static structure, a building becomes a living organism by the nature of its design. What were seen as problems with lighting systems are now seen as illumination issues in which trade offs between natural daylight and artificial lighting are explored more thoroughly. Natural ventilation, induced by design, can reduce the need for airconditioning systems. Energy-conscious design becomes sensible design in the sense of awareness and response. Time becomes a conscious medium of design.

The Manchester building would be different if designed today; its relation with ambient resources more metabolic and less defensive. Both engineer and architect are eloquent in assessing their own changing concepts. Dubin in particular would emphasize more sensitive integration of design and energy, not only between designers, but with the users of the building.

The building is important because it introduced energy as a design element before many people were aware of it. It is less important in its combination of systems and their individual evaluation. It is a point in time. □

New Mexico Continues to Build on A Rich Heritage of Solar Design

Recent works that evidence 'a realignment of architectural values based on energy considerations.' By Jeffrey Cook, AIA

The old architecture of New Mexico has always held a special fascination. The prehistoric ruins of Chaco Canyon are among the great prototypical settlement structures of indigenous peoples. The continuation from prehistoric times to the present of thriving pueblos, such as Taos or Acoma, is a living extension of the land-based values of native cultures.

In spite of its noble antecedents, the 20th century architecture of New Mexico has not always been convincing. The successful synthesis of old ideas by a Schindler or a Soleri was more likely to be found elsewhere. At home, New Mexican architecture has often been a mutant of styles and ideas imported from elsewhere.

It took the solar revolution of the early 1970s to produce a series of buildings and a body of philosophic concepts in New Mexico that have gained national and international recognition. Activities since that promising beginning offer an advanced prototype of how solar applications can influence building design. They also suggest the degree to which professional involvement might affect a realignment of architectural values based on energy considerations as well as some insight into future paradigms for professional building designers.

The Southwest is generously blessed with available sunshine. However, the higher altitudes have severe winters with violent storms. A recent full-page advertisement in an international solar magazine featured a picture of the Pueblo Bonito ruin and the implication that the climate both socially and economically has long been beneficent in New Mexico. Indeed, there is the popular belief elsewhere that the weather patterns in New Mexico are so benign that building for solar energy is so easy it proves nothing.

Unfortunately, at least the geographic climate has become harsher in the 1,000 years since Chaco Canyon was loaded with trees. In fact, the continental climate of the northern uplands includes winter conditions whose severe heating requirements match those of the more demanding parts of the northern states. There, the fauna and life-crop zones include "Canadian," "Hudsonian" and "Arctic." In spite of the intense winters in the northern parts of the state with their brief summer growing period, in the popular imagination the northern area is often confused with southern parts with their intensely hot summers. Yet, in both climatic regions solar building has continued to increase in importance. This is particularly noteworthy in a state that has resisted growth and where many areas are identified as underdeveloped.

The earliest solar buildings in New Mexico gained prominence, not only by demonstrating their possibility, but by illustrating solar applications in diverse and artistic ways. Moreover, these stimulating examples were derived from land-based life style concepts that reinforced the local economy and conservation.

The strong association of solar success with the adobe construction that is locally preferred has suggested to many elsewhere that adobe is a compulsory component of solar building.

Obviously, such principles of sound construction as the use of native and renewable materials and integral thermal storage are transferable to other contexts. Tempering extreme daily climatic ranges by the aid of massive building construction is universal. But the traditions of adobe construction are limited by the availability of particular soils and experienced craftsmen.

Within New Mexico, the happy marriage of solar and adobe is continuously celebrated both in buildings and books. The newest and most prominent publication is *Adobe News*, a handsome bimonthly that is expanding the theory and practice of adobe and solar. Its pages, together with explorations along the backroads of the Southwest, prove that solar is already a lively part of the practices of owner-builders. It is principally the easily accessible solar structures nearer urban centers that, through publication and publicity, have influenced both public policy and folk practices.

Mr. Cook, a frequent contributor to this magazine, is a professor at the Arizona State University's college of architecture. He reviews four recent books about energy and design beginning on page 62 of this issue.

The adobe house that architect David Wright designed and built with his wife Barbara is generally recognized as one of the milestones in passive solar design. Completed in the fall of 1974 at 960 Camino Santander in Santa Fe, the house has successfully weathered several winters. A new owner, Clark Kimball, has doubled the image by building a smaller replica beside the original.

The plan of the David Wright house is in the shape of a cup facing south. The handle of this solar scoop is the airlock entrance. The complete south wall is fixed double glass. The thermal control for the house is provided by a homemade shutter system of two-inch polyurethane foam slabs hinged together with cotton duck which drops accordian style from a ceiling position to cover the windows. It is typically used only at night in the middle of winter to reduce nocturnal re-radiation and to discourage convective drafts.

Downstairs, the kitchen, dining and living activities are in the open, together with a space for growing potted plants. The pantry on the north side provides cool food storage like a root cellar. Here, the insulation is on the interior walls with the exterior walls uninsulated. The exhaust heat from a freezer is removed so it does not dilute the inherent coolness. Upstairs, both the sleeping and study areas are on a balcony open to the rest of the house.

In addition to the 14-inch-thick adobe walls, with their two inches of exterior polyurethane foam insulation, there is a brick floor over 24 inches of adobe soil. The adobe *banco*, or built-in bench which is a traditional element of the Santa Fe style, is here a continuous window seat whose heat absorption capacity is reinforced by buried 55-gallon drums of water. These passive techniques of thermal tempering have proved exemplary in such an open plan. Admittedly, during the middle of a sunny, fall day, some thermal unevenness can be expected, including localized overheating and stratification.

However, especially after several cloudy or overcast days, the house is not only comfortable, but is thermally exceptionally even. It is characteristic of passive solar interiors that temperature differences tend to be flattened. Human comfort is exceptional in a space surrounded by a radiative thermal mass of 310,000 pounds of adobe.

Esthetically, the David Wright house is unassuming. Located in a yard behind an earlier house, it cannot be seen from the street. It is approached from the north where small ventilation windows and a deliberately closed wall are screened by evergreens. But once inside, one overlooks an arroyo and a rolling hillside of stunted pinon pine. The open and comfortable interior of rustic textures is compatible with the informal life style of Santa Fe.

A similar concept is the 864-square-foot house that Karen Terry built for herself in 1975 in Santa Fe, with David Wright as architect. It is equally well-known as a totally passive solar design with no pumps, fans, ducts or even shutters. Fundamentally, it is a lineal scheme facing south. But rather than exposing a long side to the north, the functional areas are stacked and the house steps back into the hillside exposing successive levels of sloped, south-facing, clerestory, double-glazed windows for direct thermal gain. Heavy adobe walls with exterior foam insulation provide the thermal sponge that tempers the interior. Such massive thermal effect is augmented by 1,100 gallons of water buried in 55-gallon drums within the walls and floor of the building to reinforce thermal capacity at precisely those locations where direct solar gain needs to be absorbed.

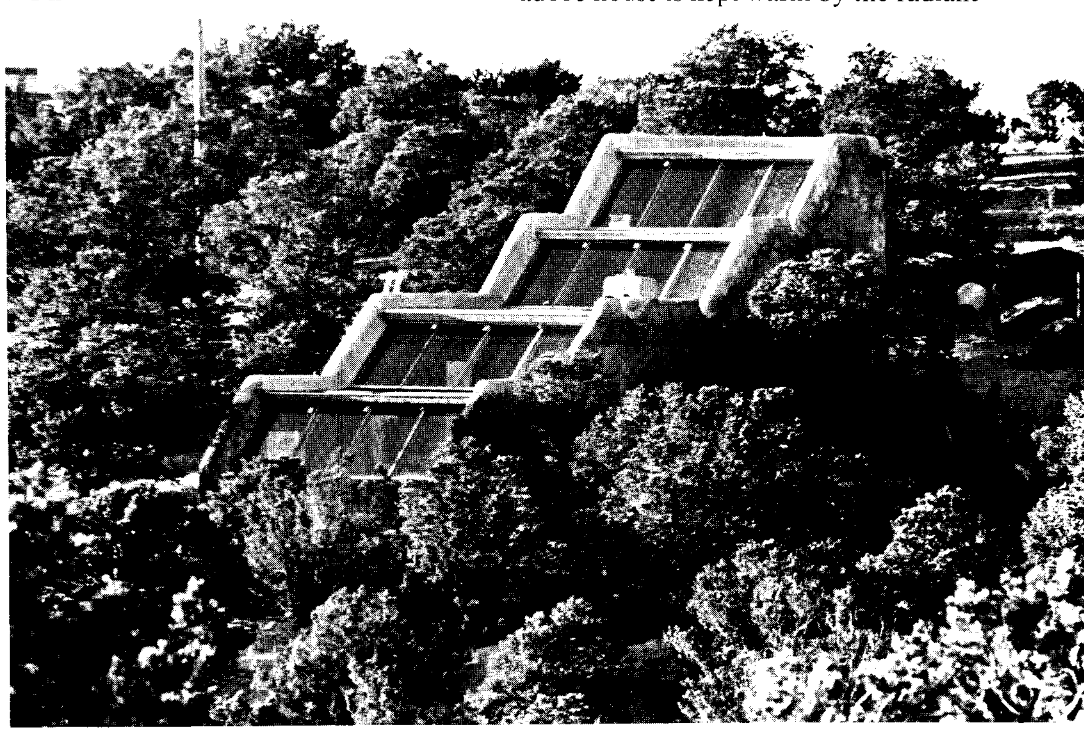
The only auxiliary heating is from a small fireplace and a stove which to date have only been used for esthetic reasons. The control of interior comfort is an automatic subtlety of the building's enclosing fabric. Excessive heat can be drawn away by cross ventilation, or seasonally, by placing shade screens of latticed saplings on the outside of the windows. The proposed insulated shutters for the interior of the windows have not been installed and are now considered unnecessary.

Most partitions do not go to the ceiling, so thermally it is one continuous volume. The workshop-studio is on the lowest and coolest level. The sleeping area is up at the highest and warmest level with gradients of warmth and activity in between. This solution is completely in tune with the land and the Santa Fe style.

Also completed in 1975 is the architecturally more adventurous owner-built solar adobe house of Hal Migel at Tesuque near Santa Fe. Its 2,100 square feet of sculptured forms reflect the academic background of its owner-designer. The Migel house has been called the "Sun Pillow" house because of the sloped, inflated polyethylene pillow-shaped solar wall of the greenhouse which provides all the heat for the house. Purists are uneasy about the Sun Pillow because an electric fan must work constantly to maintain the pneumatic solar cushion. But only very modest quantities of continuous electricity and an inexpensive plastic film are used instead of a more resource costly alternative, such as double glazing.

Hal Migel's greenhouse is a solar collector that you can live in. It also produces food. By day, the greenhouse is a cosy, bright conservatory with its own "portals" along the brightly colored adobe wall of the house. Solar hot air is pulled off the top of the space by fans that transfer the heat to thermal bins of three-inch river rocks under the floors of the house. At night, the greenhouse is allowed to cool off—the plants sleep better—and the adobe house is kept warm by the radiant

The David Wright house (below) is like a cup facing south; the 1975 Karen Terry house (bottom) steps back into a hillside.



heat drifting up from the thermal storage subfloor. During excessively cold periods, this heat flow is augmented by fans and grilles that accelerate transfer to the living space.

Again, adobe walls are a critical part of the thermal storage design. There was considerable constructional experimentation using wall puddling processes—several mixes that included earth cement—and pumice 24 inches thick. These were cast using slip forms. The varying textures are hidden behind the two inches of exterior foam insulation with its stucco skin. On the interior, the painted, plastered walls enhance appearance and lessen the thermal vagaries of the fundamentally adobe walls. Exposed log beams, rough-sawn decks and trim and brick floors provide a strong, tactile interior which is dramatized by skylights.

The large, horseshoe-framed fireplace in the living room is based in part on the 1795 recommendations of that displaced Royalist and fireplace scientist, Benjamin Thompson, Count of Rumford. It includes a direct air supply to the firebox from outside. Its height and curved back wall maximize the radiant heat gained by the room from the fire.

'In New Mexico, the solar greenhouse has emerged as a major component of solar buildings.'

In New Mexico, the solar greenhouse has emerged as a major component of solar buildings. The typical solar greenhouse is completely climate dependent, using no fossil-based heating or lighting. The sun's light and heat are converted to food energy. When attached to a building, the solar greenhouse contributes to thermal tempering providing solar warmth and lessening losses to the outdoors.

Among the contributors to the solar greenhouse evolution has been Jim DeKorne whose Survival Greenhouse is both the subject of a book and an architectural reality 7,000 feet above sea level. His ecosystem approach to home food production is a "grow hole" on marginal land. It maximizes sun, water and seasonal benefits, and both vegetables and fish are raised there. "Fed up with high technical city living," Jim DeKorne believes that "if you want to change the world, change your own life."

Another greenhouse leader is Bill Yanda whose solar sustenance program includes workshops, contracts, demonstrations and publications. His barnstorming has resulted in literally hundreds of food productive greenhouses throughout the Southwest, producing substantial improvements in existing buildings and life standards with nonprofessional, nontechnical skills using the most ordinary, immediately available materials.

These solar, homemade and home-support structures are now becoming a part of the marketplace in speculative activities. Wayne Nichols of Santa Fe, who has roots in Kansas City and California, has made solar houses commercially available. He, his wife and children have built a series of structures that fulfill some of the earlier intentions of the Sun Mountain Design Consortium. The first, a modest 340-square-foot addition to an existing adobe (*see* Aug. '74) may be the first solar building sold in the real estate market. It provided capital for Nichols' own family solar house, completed in spring 1975, at historic Seton Village. That, in turn, was precursor for First Village, six miles south of Santa Fe, where two speculative solar houses have already been completed under the HUD solar demonstration program. The first one completed was sold immediately in the fall of 1976, and was the first sold under the HUD program. It is now the home of Doug Balcomb—the leader of the Solar Group at the Los Alamos labs and an active contributor to the science of passive solar design.

This 2,300-square-foot house is a hybrid passive design with a greenhouse spanning across the "V" between two adobe wings. The dark adobe walls facing the greenhouse absorb daytime solar heat, which gets transferred through the wall to the interior. Hot air is produced only by the greenhouse and it is led by fans and vertical ducts into two insulated rock bins each containing 24 yards of 4-6-inch stones located under the house. These

The speculative house 'Solar One' (below) has an 'anonymous-looking' solar yard.

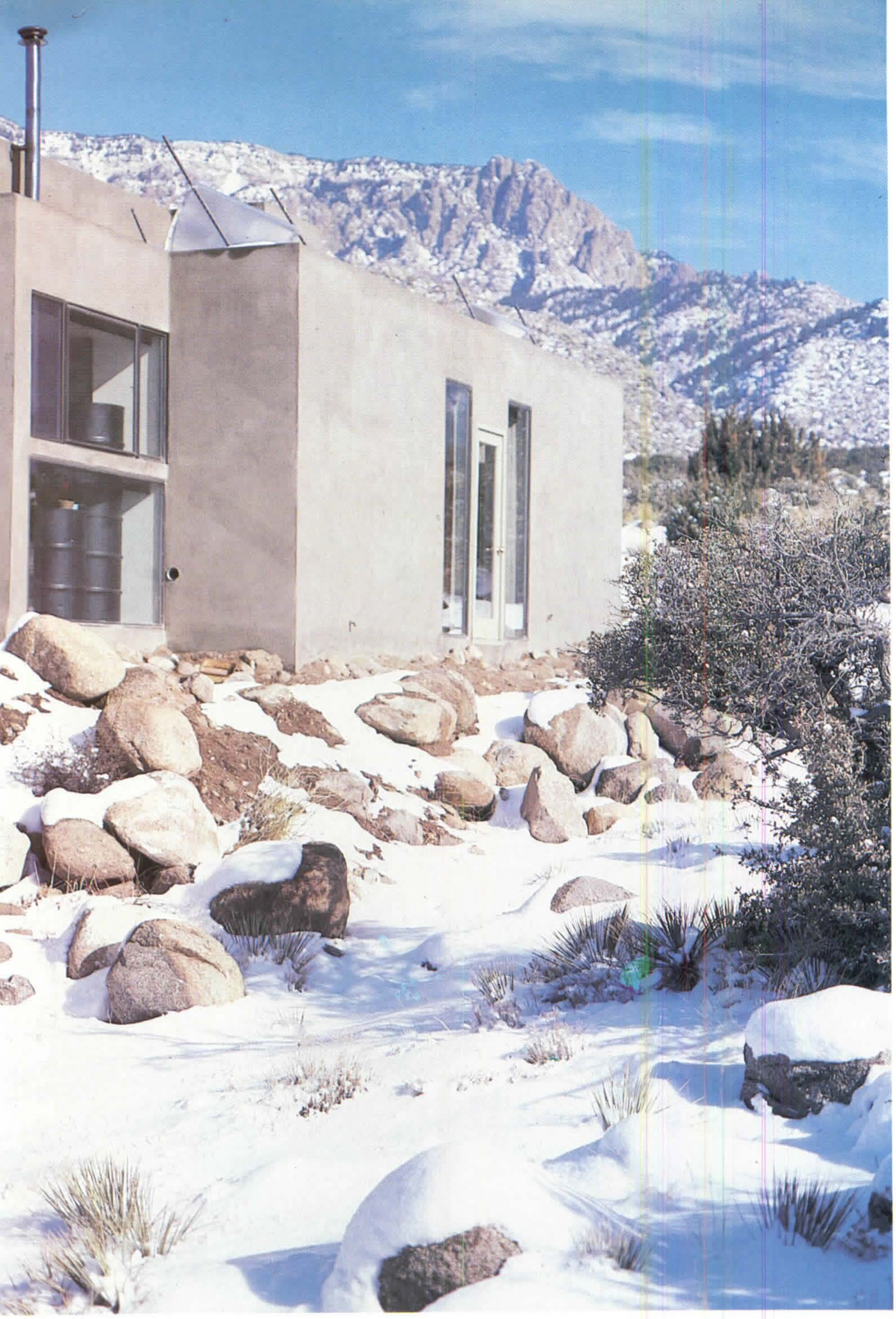
deliver auxiliary heat through the use of thermostats and blowers. In addition to the thermal and esthetic success of these ventures, there has been enthusiastic public response. A stormy November open-house afternoon brought 1,500 people out from a community of 50,000.

Another speculative passive solar house, on a 5,900 Fahrenheit yearly total heating degree days site near Santa Fe, was built by Karen Terry and partner, with David Wright as architect. Completed in the winter of 1977, it sold immediately. It is completely buried on its north side with grass running up over the roof to the south overhangs. The interior takes advantage of the sculptural, architectural potentials of adobe, as well as its thermal advantages. Rough wood textures and hand-crafted details in the folk tradition of Santa Fe complement the return to the earth, celebrated in the design.

The manufactured, commercial counterpoint to the homemade quality of the Santa Fe solar marketplace has been the Albuquerque area. "Solar One," a 2,200-square-foot speculative house at 660 Roadrunner Lane in Sandia Heights, was completed in September 1976. Architects for the house were Burns/Peters, but the solar aspect was handled completely separately from the building design. Two rows of tracking Solcan trough collectors are mounted on the ground away from the house and are screened by a cedar fence. The enclosed solar yard is an anonymous-looking element sitting beside an equally anonymous-looking rectangular wood frame International Style house.

A more direct application of solar hardware is the 2,800-square-foot John Kusianovich house on Indian School Road in Albuquerque, completed in July 1976. The owner is a mechanical engineer who works as a real estate broker. Kusianovich admits his solar house is the result of "an irrational obsession with solar energy." Here, 20 tracking Solcan trough collectors, mounted directly on the roof of a factory-fabricated house, are the epitome of rationality. The rhythm of identical collectors mounted and rotating uniformly has an obvious, but not totally destructive appearance. Unlike the scattering discord of soil vents, exhaust jacks, flues and aerials on most domestic roofs, these tracking systems, by their sheer numbers and harmonious orientations, imply their own convincing visual integrity.

The basement includes two 1,000-gallon hot water tanks. Heat is delivered using conventional baseboard radiators. Because of the cost savings of the factory-built, wood frame modules, the owner was able to finance the house conventionally without grants. A normal, custom-built house in Albuquerque, without solar, would have cost at least as much, and the



savings in modular construction paid for the solar.

Another solar house conventionally financed, but custom-built, is the Herzon residence at 345 Big Horn Ridge N.E., in Sandia Heights. It typifies some architectural aspects of solar energy concerns. The somewhat fragmented design by builder-contractor Steve Earnest, of the Architectural Design Group in Albuquerque, was given climatic integrity by solar consultant Steve Baer of Zomeworks. All of the solar applications are passive.

Thus, openings and orientation emphasize the penetration of southerly sun through skylights via reflectors, and through clerestories and windows. Preheat water tanks painted black are hung in skylight spaces, making more attractive the laundry and bathroom operations.

Indeed, in Sandia Heights having a passive solar house has lately been considered socially desirable. Coffee pot wisdom understands that large windows with lots of sun are the trademark. But the subtle ties of orientation and overhangs as seasonal solar heat selectors are missing in many popular versions.

New Mexico now has a policy that all new state buildings, including college structures, be designed for solar heating and cooling. Because of the extra cost, not all are being built with solar components in place, but all allow the addition of collectors and other components. The costs of such systems now may run from \$9 to \$12 per square foot, with as much as \$5 per square foot being identified as the premium for solar.

Solar energy has been a particular focus of state-supported activities on the campus of New Mexico State University at Las Cruces. There, a new building costing \$1.5 million, constructed for the state's department of agriculture, opened in September 1975, the first large building in the world to be both solar heated and cooled. In the winter of 1975-76, it was heated 100 percent by the sun and with very low operating costs.

As a 25,000-square-foot office and laboratory facility, it was the first in a new generation of large-scale solar applications. The building had been designed before the solar directive was established by special legislative appropriation. It was thus a solar retrofit design.

A competition to select the collector manufacturer was concluded after the building had been enclosed and roofed. As a result, there were no illusions about

The Herzon house (left) is one of Sandia Heights' 'socially desirable' passive solar houses. Another passive dwelling near Santa Fe, completed this year, was built by Karen Terry and partner, with David Wright as architect (below).

integrating the roof-mounted collectors with the rest of the building.

This lack of early decision making resulted in the use of two different types of collectors placed at different angles on the roof. Nevertheless, the horizontality of the building and high parapet provide a visual base for the 6,700 square feet of tilted collectors. The closed system of heat collection circulates antifreeze from the collectors through heat exchangers to two 15,000-gallon underground water tanks.

There are no passive considerations in the design and the interior gives no hint of the source of heat. The most interesting visual aspects of the department of agriculture building is the generously sized mechanical room on several lower levels, with color-coded, insulated pipes tracing the complexity of the absorption cooling and heating system.

Bridgers & Paxton, the pioneering mechanical engineers whose 1956 solar building in Albuquerque was the first solar office in the world, were the designers of the mechanical system for the building at Las Cruces. Their practice has developed an economic solar approach for larger commercial and institutional buildings. It recognizes the need for cooling in such buildings because of internal heat load, and the adaptability of heat pumps to recover and store it. Their system is an integrated network of alternative modes which maximize the use of various components. Solar refrigeration allows collectors to work the year round. Absorption cooling units for larger buildings are much more dependable than domestic-sized.

The system is neither simple nor cheap, but provides finely tuned and controlled interior comfort. It is totally mechanical and has provided a standard. Bridgers & Paxton have become the leading consulting engineers in the region for larger solar buildings.

New Mexico State University has also built a demonstration solar house named the Collins Casa del Sol, which collects solar heat using a water propylene glycol mixture. Both heating and absorption cooling are provided. The cinder block walls are concrete filled. The exterior walls have two inches of polyurethane insulation foamed on the outside. It is protected with a stucco finish. The sloped plane of the 750-square-feet of flat collectors, at a 30 degree angle, provides the principal exterior form of the house.

Unfortunately, in the interior there is little to suggest that this is a solar house. Because the collectors occupy virtually all of the south-facing surfaces, there is direct gain only into two bedrooms. Esthetically, the demonstration house has a certain institutional aspect.

A house which very consciously participates in regional preferences is the owner-designed and built home of Danny and

Renee Martinez, located close to the downtown area of Albuquerque. Danny is an architectural graduate who works on a construction crew of the family contracting business. In the Martinez house, real adobe, local timbers and carved lintels are combined with a corrugated metal roof in a direct expression of Southwestern folk house traditions. Passive features include direct gain through part of the roof, as well as a south facing glazed gallery. A *portales,* or porch, with grape vines, tempers direct summer heat gain. An active air collector roof provides heat to an underground 80-ton rock bed system. Both duct and heat leakage through the brick floor warms rooms by radiation and convection. The traditional thermal advantages of massive adobe walls have been reinforced in the Martinez house by a fusion of active and passive solar systems.

High performance is also the goal of an opposite tradition established by the national scientific laboratories located in New Mexico. The Sandia Laboratory in Albuquerque has developed and built a highly sophisticated total energy system. Architecturally, banks of shiny, trough collectors provide a space age appearance to this active solar research. Thermally, the operation is collecting and using 550 degrees Fahrenheit fluid. The goal is to use such high technology energy systems on a comprehensive basis for neighborhoods or large commercial or industrial applications.

A large new building at the Los Alamos scientific laboratory with a very visible use of solar energy is the National Security and Resource Study Center, completed in 1977. The $4.5 million library facility is distinguished by its 8,000-square-foot area of collectors as a single plane set at a 45-degree angle. Under the 100-foot tall and 80-foot wide collector roof is a gallery to view the integrated energy handling equipment—a kind of solar showpiece. The structural detail for the 400 collectors was developed at the Los Alamos laboratory in an attempt to integrate solar collectors with a prefab structural roof. Quilted steel plates are liquid collectors. Their rolled edges become the beams, and the back side is insulated. The design provides a permanent collector and roof assembly for the price of only a roof assembly.

Another experiment at Los Alamos has been the 1,050-square-foot mobile home now being tested there on a 6,500 Fahrenheit degree day site. The air collector is built up of interleaved, galvanized, corrugated steel roof decking; a ¾ horsepower blower directs heated air from the internal channels to a thermal bin of 1,600 cylindrical, one-pint glass jars filled with water that are stacked in the triangular space under the collector surface. On the exterior, the 60-degree slope of the south-facing collector surface provides a sculptural appearance to the typical, prefabricated house form known as a "trailer."

New Mexico State University's demonstration solar house (across page); Sandia Laboratory, Albuquerque (below); Los Alamos laboratory's library (bottom).

But the Los Alamos laboratory, with its reputation for high science, has increasingly directed its activities toward passive approaches to solar design and toward producing information appropriate for architects and engineers. Most prominent to date was the passive solar conference held in May 1976, in Albuquerque, where the building design implications of natural incipient energies were first explored in a national conference. A second national conference is now planned at the University of Pennsylvania, Mar. 16-18, 1978.

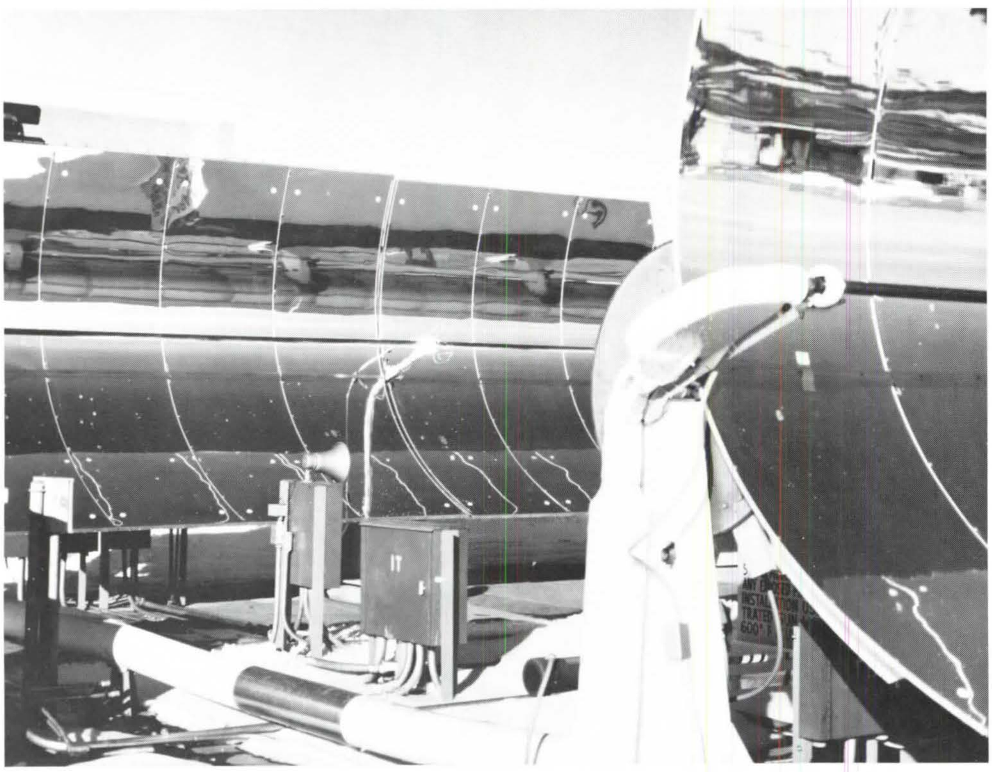
At the Nambe Pueblo, Los Alamos solar scientists are participating in the design of a modest community center built of traditional adobe and peeled log viga beams. This mud building would have styrene insulation on the exterior surface protected by earth-colored stucco. The air collector is mounted as a penthouse to take advantage of the reflection from the adjacent roof and architecturally conforms to the cubistic massing of the native style.

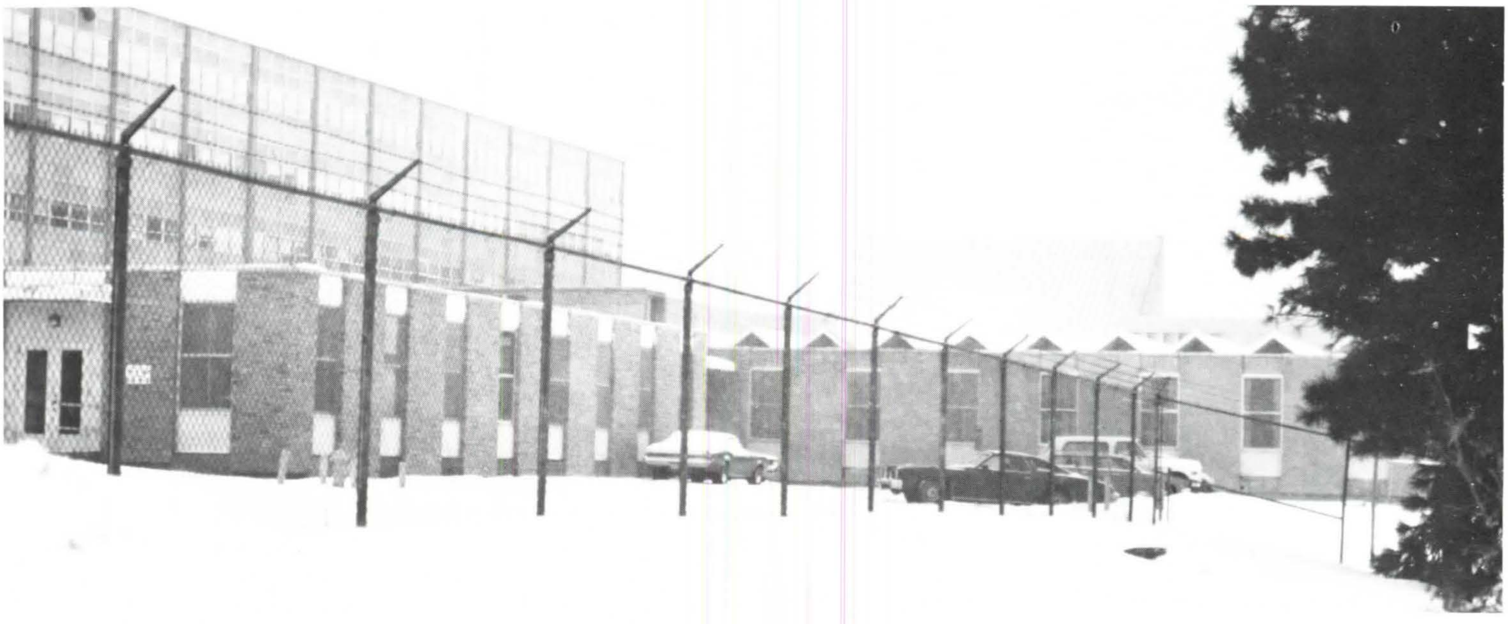
Perhaps the most notable attempt by an interdisciplinary team to combine traditional, regional practices and native materials and resources is the Sun Dwelling demonstration program located at the Ghost Ranch conference center in northern New Mexico. A series of four adobe duplex dormitory buildings have been constructed as permanent, comparative demonstrations of low-cost, passive techniques. Each building uses a different system. The simplest is a direct gain unit with large, double-glazed south windows, calculated overhang and heavy curtains to prevent nighttime heat loss. Another uses a trombe wall unit with a heavy masonry wall inside the south-facing glass. The ducted airspace between provides a natural convective air heater by day and the warm adobe becomes a radiant wall at night.

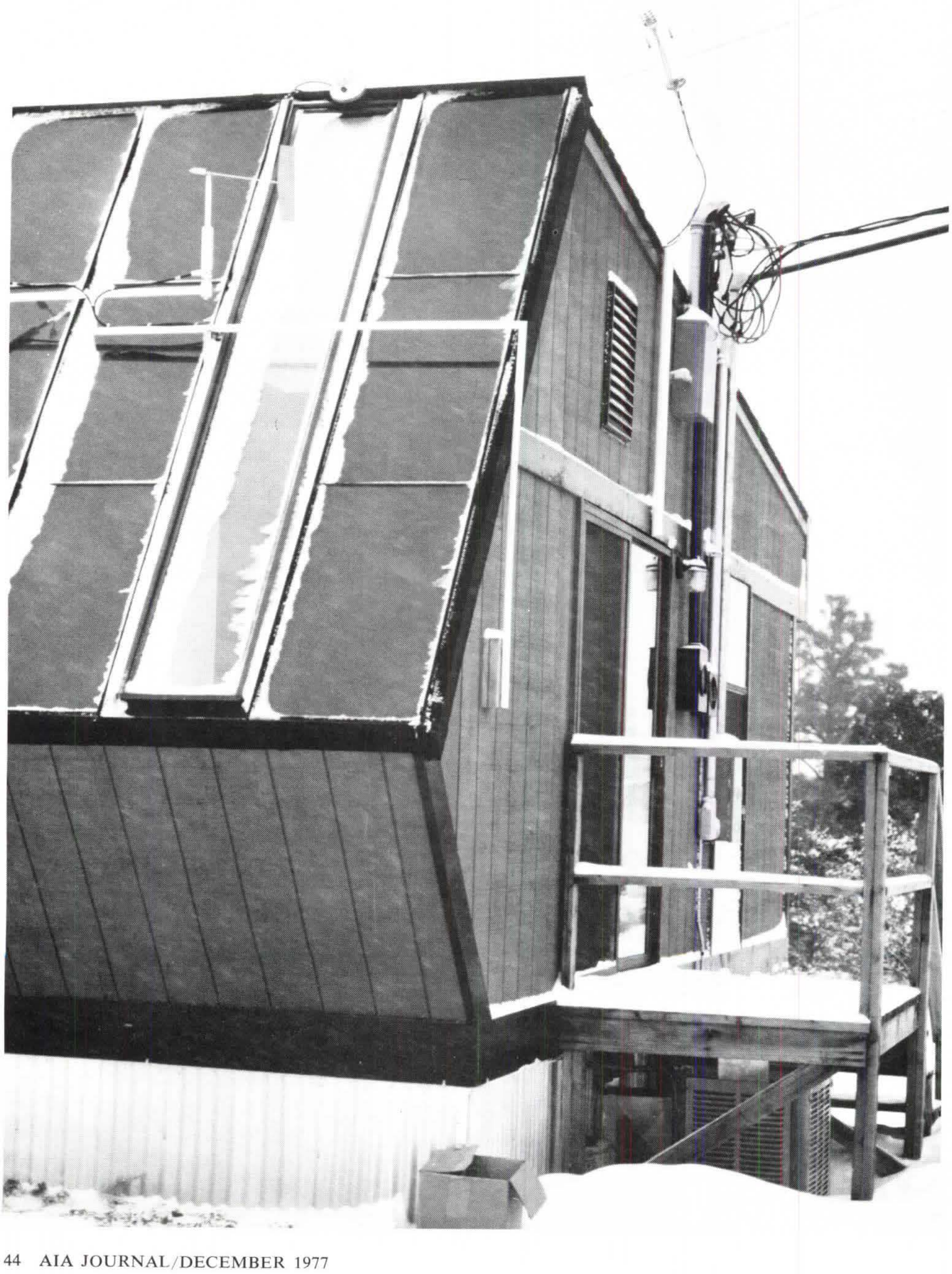
A third unit has a sunken greenhouse on the outside of the south wall which extends the growing season from four months to ten and provides heat to the interior.

A fourth, conventional design uses small windows and adobe in a traditional scheme that acts as a control unit for performance comparisons. These low-cost, low-technical and low-energy buildings made of local materials are being monitored by the Los Alamos laboratory.

Among the institutions that have supported and enhanced New Mexico's many solar accomplishments, the most effective







has been the New Mexico Solar Energy Association. This lively, thoroughly independent grassroots group is a model for regional solar energy associations. The first in the country, it has effectively promoted an exchange of information from diverse bases of interests. The association's annual Ghost Ranch life technics conferences are not only the oldest such forums for the exchange of ideas, but also among the liveliest. They increasingly attract leaders from other states, as well as converts from nuclear energy and entrenched "back-to-landers." The association has received support in the form of educational and public service grants from the state legislature in an unique marriage of legislative responsibility and citizen participation.

The reputation of New Mexico as a "hot bed" region in synthesizing the new and the old of solar energy has brought many curious visitors. The owners of solar buildings have been plagued with visitors to the degree that access to many of the finer solar houses of the state has become a test of local generosity.

The learning opportunity of these many solar activities in New Mexico have been explored by a variety of individuals and institutions. Pratt Institute, in the winter of 1976 and again during the summer of 1976, ran a series of field courses for architectural students using instructors from the region. They took back to the New York area an understanding of energy, not as hardware, but as an ethic.

But in New Mexico, architects have constituted only a modest fraction of participants in solar energy activities and few architects have actively made major contributions to the field. Among contributors to the art of solar building design, perhaps only one architect has achieved more than local reputation, namely David Wright whose broad practice began in Santa Fe and is now based in Sea Ranch, Calif.

Within the architectural profession, there are a number of both small and larger offices that have received solar commissions but have made little investment in the pioneering activities of the region, and, who, in some cases, have by their uninformed service depreciated the potential art of solar architecture. Alternatively, nonarchitects, mechanical engineers, inventors, social reformers and research engineers, have actively and successfully participated in the emerging disciplines of energy-conscious building.

As is demonstrated in New Mexico, innovative solar does not need to be adobe, and energy design is not the exclusive province of the present-day architects. □

Low-cost and low-energy buildings at Ghost Ranch (top) are made of local materials. The Los Alamos mobile home (left, p. 43) is being tested.

Architects' Involvement in Energy Work Is Taking a Variety of Forms

As illustrated by the experiences of five practitioners who have found both a market and a challenge in the field. A.O.D.

The growing number of architects who are becoming heavily involved in energy-related work tend to combine a healthy respect for science and technology with a sense of social purpose. They also show a willingness to take risks and make heavy investments of time and effort in pursuit of what is, for most, a new and challenging market.

Beyond these common characteristics, however, they vary widely in their approaches to energy-related work, as the following experiences of five practitioners illustrate.

Paul R. Rittlemann, AIA, joined Burt, Hill & Associates of Butler, Pa., ten years ago after completing his architectural training and five-year tour with the Navy as a mechanical engineer. The Navy, he found, places great emphasis on energy conservation in order to extend the range its vessels can travel. "So, looking at what we were doing in buildings," recalls Rittlemann, "I thought there were enormous opportunities and that energy was the place to be in the future."

He began tentatively exploring the field in the late 1960s, looking at solar energy and doing other research which further convinced him that energy management in buildings would soon be a significant market for architects.

Rittlemann emphasizes the fact that his firm "didn't back into the specialty," but rather made a distinct decision in late 1971-early 1972 to commit time and money—and risk losses—to develop an expertise. The largest risk Rittlemann thought the firm might be taking had to do with timing. As it turned out, "the timing was right on, and that's luck," he says.

After developing a capability and beginning to attract work, his firm began to staff its energy group in late 1972. "It wasn't easy," says Rittlemann. Today, Burt, Hill & Associates is a firm of some 50 people, seven of whom work exclusively on energy-related matters. But, the launching of a successful energy team was possible only because "we had—largely as a result of luck—a growing firm to support us," says Rittlemann. Burt, Hill was expanding in 1974-75 when other firms were sinking in the wake of a nationwide recession. During the past six months, according to Rittlemann, his team has had to turn away as much work as it has accepted, in part because of insufficient personnel.

"We've tried borrowing and integrating architects from our office who work on other aspects of practice," says Rittlemann, "but it hasn't worked well." Five of the seven members of the energy team are recent architectural school graduates who are being trained in-house. "We expect a guy to be around a year to 18 months before he's earning his own way," says Rittlemann. "What we need are very imaginative, creative architects who understand energy processes, heat transfer, physics and math. You can take a philosophical approach, but ultimately you have to put numbers to it to make it work."

Rittlemann's group is somewhat unusual in involving itself in all aspects of energy-conscious design. About half of its work is in research. "That keeps you on the cutting edge," says Rittlemann.

"Energy conservation is essentially a design problem," he says. "You can't just stick solar panels on buildings, because that violates many precepts of design—though people are doing it." He fears that we will be seeing more and more packaged systems that are applied to buildings rather than designed into them.

"In part," he says, "this is because the architect doesn't have a strong enough influence in solar activity right now, and it's too great an opportunity for manufacturers to pass up."

Burt, Hill's approach to solar energy use falls somewhere between notions advanced by *Mother Earth News* and *ASHRAE Journal*. "There are lots of good ideas in *Mother Earth News* that fall apart when you put figures to them, and a lot of interesting ideas in things like the *ASHRAE Journal* that are too 'high tech,' too sophisticated," says Rittlemann.

His firm has done some very "low tech," passive design solutions, which rely solely on design elements to capture and store sun, air and wind and use no pumps or other mechanical contraptions to distribute energy, as do the so-called active systems.

"There is a lot of interest in passive design but little activity," Rittlemann says. "The dearth of activity is due to not quite enthusiastic government support and difficulty in quantifying the process. But I think it's going to prove to be one of, if not the most, cost effective ways of handling energy in buildings in the future."

Still, there are certain functions, says Rittlemann, that cannot be performed without using active energy systems, so the question becomes one of wise usage. "You really have to massage the variables to come up with appropriate solutions. You make compromises, sometimes compromising an energy system for the sake of the building design. That's why we have architects doing this work, not engineers."

There is an assumption on the part of the public, says Rittlemann, that if you want to talk about energy, you talk to an engineer. "I really think it's partly an association of sounds. Unfortunately, a lot of architects think it isn't their purview." Burt, Hill uses engineering consultants and doesn't do any of its HVAC work in-house. "But when we start talking about annual energy analyses or annual energy consumption to our engineers, they don't know any more than we do."

What might be the effects of energy conservation on building design? According to Rittlemann, "We're going to have far more handsome buildings, which will be visually more responsive to climatic forces than the rather static buildings we have designed in the recent past, which overcome climatic conditions by brute force."

Rittlemann adds that designing buildings for minimal energy use has some interesting side effects, the principal one to date being improved acoustics. "Clients have noticed," he says, "that when you double glaze, weatherstrip and tighten everything up, you eliminate noise. But what value do you place on such side benefits? How do you crank that into life cycle costing?"

His firm has found that establishing fees for energy work poses a major problem. "Traditionally, we've been able to establish fees as a percentage of work and the only reason we could do this is because we had precedents to go on. There's no data base in this field, no precedents, and you don't know what you're going to get into when you do an energy study. It's a little bit like remodeling work: A lot of times you don't know how to solve a problem until you tear the thing open and take a look."

Richard Crowther, AIA, is almost a generation older than Dick Rittlemann, and his interest in conservation and solar energy in particular goes farther back—all the way to the 1930s—and has quite different roots. "I'm just frugal by nature," says Crowther, whose Denver firm bears his name. He started in architectural practice during the Depression, doing mainly remodeling work where thrift was a crucial matter. But even as a boy he was fascinated by, and experimented with, the sun and lenses, which may explain why he later specialized in lighting research for a time.

As early as the 1940s, Crowther was designing houses that derived energy from passive solar systems. Then during the '50s, solar received a certain amount of publicity and he thought the concept would take hold, but "the price of fossil fuels and natural gas was too low, and nobody was interested in pursuing solar since it wasn't going to pay out fast enough," he says.

Then seven years ago, "I became very enviromentally involved, very concerned about the future of energy," Crowther says. He began to try to structure energy conservation concepts into his 16-person firm, with little success. Most of the firm's work was commercial and commercial clients were not yet interested in energy conservation. Crowther nonetheless launched the Crowther Solar Group, to act as the research and consulting arm of his practice. That didn't work out either. The rest of the office "really didn't care that much," says Crowther. "Most of them were so grounded in their own ways of thinking, in an egocentric idea of what design should be that they thought a lot of the things I was proposing were just 'a bunch of stuff.' "

Three years ago, Crowther dissolved his original firm to concentrate on energy-conscious design and research, and not a single member of the old firm followed him. "They don't adapt," he says. "I have a very difficult time hiring people. I need someone who has a biophysicist's viewpoint, who understands the nature of light, the nature of the human health factors, who can put together the total concept of the building and can see the interrelationships between buildings and planning and energy. Generally I find that architects even when they say they want to go into solar, don't realize the mass of implications. It's very demanding and people as a whole, I find, don't like to be always under demand. This may be a very perfectionistic or idealistic way to work."

Crowther regards active solar systems as being "still at the stage of the model T Ford. The biggest problem I've found is the great energy demand on active systems," he says. "By the time you get all the horsepower going to run the pumps and conductors, you've run the electric bill way up. That's the beauty of the passive system."

A market study made by Crowther's firm showed that a full 83 percent of people preferred passive energy systems over any other kind, once they understood them. He has also found good acceptance for passive systems from mortgage investment people, "but they're very hesitant about the active systems, and most will not put one dime into them. They feel present systems might be outmoded by new ones, that they may not always work, that their longevity and durability remain unproven."

The process by which Crowther works reflects his generally holistic attitudes. He begins by profiling a building for its energy use, examining the internal energy sources—such as people and lighting—and trying to figure out how to use rather than waste them. The next step is to see how to use the natural energies available at the site. He studies prospective building material for their production and transportation energy costs. "The architect needs to address the problem of how he's using materials initially and how they may be recovered," he says.

Crowther concludes: "The reason at my age that I'm involved—because I'm not that young and don't need to work for

An energy design 'conglomerate' in a small community away from traffic and other distractions.

an income—is because I'm looking for societal change. I think we're going through a revolutionary, not evolutionary, period. We can't afford evolutions anymore."

Bruce Anderson is some 30 years younger than Richard Crowther, yet launched Total Environment Action (TEA) in Harrisville, N.H., out of similar motivations. His particular bent, however, reflects the values of his generation. As important to him as the kind of work his firm does is "the way we carry it out, the way we relate to each other and our clients," says Anderson. "We don't make decisions based on profit as long as we can stay in business."

He says that there are two main reasons he and his colleagues choose to stay in the business of energy-conscious design. One is to "mitigate the impact, to soften the blow of what I think are going to be some major disruptions in the next 10 or 20 years. I hope that doesn't happen, but I think it will." The second is to "improve the quality of peoples' lives, just in case it doesn't happen. We're not building survival shacks. We're trying to approach business as usual in the sense that architecture is meant to be socially and humanly uplifting," he says.

Anderson earned a master's degree in architecture (for which he wrote a thesis on solar energy and shelter design) and a bachelor's degree in engineering from the Massachusetts Institute of Technology. He then worked for an engineering firm in New York City, which specialized in energy conservation. "I started TEA not really knowing where it was going to go. The first job I had was work on the energy conservation guidelines for federal office buildings for the AIA Research Corporation."

That was four years ago, and since then Anderson has formed four separate companies that together employ 40 people, 90 percent of whom are under 35. The major company, TEA, does building research, design, engineering, consulting and educational work. The second company, TEA Foundation, is a nonprofit firm that assists low-income people with problems of shelter and gives technical assistance to church groups and conservation and third world organizations. A third company, Cheshire Books, publishes volumes on energy conservation and related matters. The fourth, Solar Vision, puts out the monthly magazine *Solar Age*.

Only one of the firm's 40 employees is a registered architect. But the 15-person professional staff includes 10 people with architectural backgrounds. Some have engineering backgrounds, but only one is a registered engineer. The remainder come from the physical sciences, geography, political science, education and allied fields. Together the four companies "try to find new solutions, implement them and then communicate them to a lot of people," according to Anderson.

He doesn't want to be classified as either "passive or active," because "what we try to do is find the most socially and cost effective methods possible." His predilection, however, is toward passive design, and TEA now has contracts to develop passive systems for Honeywell and Booz Allen Hamilton.

Anderson feels that the success of his firm is due in large part to luck, in timing, in having somewhat accidentally chosen Harrisville as headquarters. "People are sort of awed that we can do this in the woods and still make a go of it with 40 people working in a town of 300 voters," he says. He feels that Harrisville's non-urban way of life gives stability to the firm and the people who decide to involve themselves. "I make a commitment to the people I hire," he says, "rather than letting them go a month later when work stops coming in." There is also the advantage of being away from the flow of traffic and distracting influences.

The work of TEA and its affiliates requires communication, with the outside world and within the office. "Our people have to be able to communicate other than with drawing," says Anderson. "Also, everybody here, with very few exceptions, is not scared of technical issues." The inability or unwillingness of many designers to deal with thermodynamic issues puzzles Anderson. "Architects

don't seem to have problems with technical factors involving materials, and energy isn't complicated; it's a lot easier than working with materials," he says.

He sees the design of energy conserving buildings as an opportunity to create more fully integrated structures, "as an opportunity to start communicating and cooperating with engineers." He also feels building design will change very drastically because of increasing energy shortages. "I think it will actually get to the point where you won't want to build a structure unless it actually produces energy. Buildings can produce a cash crop. That's really going to happen some day," he says.

As its name would imply, the firm of Energy Management Consultants in Los Angeles in which Douglas Stenhouse, AIA, is a partner, is a very different type of venture from Anderson's, or for that matter from Crowther's and Rittlemann's. "The uniqueness of the firm," says Stenhouse, "is that we very rarely do any final design efforts. Most of our work is involved with economic analyses, feasibility

Goosebrook, the first speculative solar home in New Hampshire, was designed by TEA and uses one-fifth the usual energy.

studies, preliminary design, consultation with other architects, verification of energy consumption analyses, but not construction details or more conventional architectural activities." One of the main reasons for this is that Energy Management Consultants is a partnership, begun just a year and a half ago, between Stenhouse, a mechanical engineer and a physicist. To prevent conflict of interest problems, the firm generally subcontracts architectural work.

Stenhouse brought to his present work research and development experience first with HUD and then with TRW, which received one of the first major federal government contracts to develop solar components and conduct a state of the art study of solar heating and cooling systems.

After TRW withdrew from the energy business three years ago, Stenhouse worked as an individual consultant. His first major contract involved writing an energy element for the California coast commission. "Subsequently, I got involved in the whole activity in California, and with energy codes and regulations," he says. He was also designing solar energy systems for other architects. One such project, conducted with two other consultants, was a Navy dining facility at Camp Pendleton. With the success of this undertaking, the three consultants went into business together.

The small company prospered even the first year, the investment of the principals having been less than $20,000 apiece. They designed and built their own computer, became involved in the collection of unique kinds of data and in work that ranged from standards research to feasibility analyses for industry. The firm has also acted as a consultant to oil companies in possible acquisition ventures, has worked on commercial projects, has done energy audits and is now trying to expand into broad-scale municipal and regional energy planning.

For Stenhouse, as for others, the main

Exterior design as 'the first line of defense' in a firm's energy conservation efforts.

problem for his firm is finding the right kind of employees. "The conventional mechanical engineer is systems-oriented and the architect tends to be production- and esthetics-oriented," he says. "The planner is nontechnical, generally, or very technical in a particular area. The greatest problem is that you need a generalist who has specific knowledge of a number of different things, a good deal of analytical capability, a real understanding of how to perform research, how to recognize good information, how to sort it out, store it, retrieve it, manipulate it. It requires a unique ability to be imaginative."

Another major problem for Stenhouse and his partners is obtaining liability insurance. Initial efforts, he says, show that insurance companies have no experience with the problems of such an industry. So the risk is too big for them, he says. "The way we hope to solve the problem is for the firm of one of the partners to buy out a majority of our stock so that we can become a rider on their professional policy. After a few years, we may revert back to the original ownership."

A third problem for the firm is that "architects really don't know what we're capable of doing and engineers don't know why they couldn't do what we're doing," Stenhouse says. The firm helped a joint venture of two architectural firms obtain a contract for a very large state office building. "They knew they had to use us to get the contract," says Stenhouse. "But they didn't know how to put us to use once they got it."

At least one architect who would very probably have known how to put Stenhouse's knowledge to use is Gunnar Birkerts, FAIA, whose well-known Detroit architectural firm is becoming increasingly interested and involved in designing energy conserving buildings.

"I got into the field six, seven, eight years ago with my interest in subterranean structures," recounts Birkerts. "I realized that many problems are created by the fact that we don't have a unified way to run our utilities and balance power demand and supply; we waste heat and have no way of transferring it." Therefore, in a study conducted with University of Michigan students he proposed subterranean urban conduits, 100 to 200 feet deep, which would generate and distribute energy, provide basic storage and house certain manufacturing facilities.

"It became very clear to me," he says, "that a common distribution system would be a very efficient and organized way of doing things, consolidating services instead of fragmenting them house by house, building by building and project by project. Besides, the fact that the buildings were underground would make them very efficient in themselves. Because the earth's temperature is about 50 degrees Fahrenheit, there would be very minimal heat loss or heat gain."

Birkerts' interest in energy-conscious design derives also from an abiding interest in daylight. "I found out that if you know how to reflect, deflect and diffuse light, you don't really need too much light or large openings. I have learned this from the Finns, from Aalto." He believes, therefore, that the first line of defense in our energy conservation effort is exterior building design, which begins with the skin. "I like that notion also because you don't need enormous backup for it, enormous laboratories and whatnot. There is so much you can do based on logic alone."

Birkerts' firm now has under construction an energy conserving building for IBM in Birmingham, Mich., and an underground library for the University of Michigan at Ann Arbor which he says will use one-quarter the BTUs per year per square foot used by a typical office building.

A subterranean urban system by Birkerts and University of Michigan students integrates energy supply and distribution.

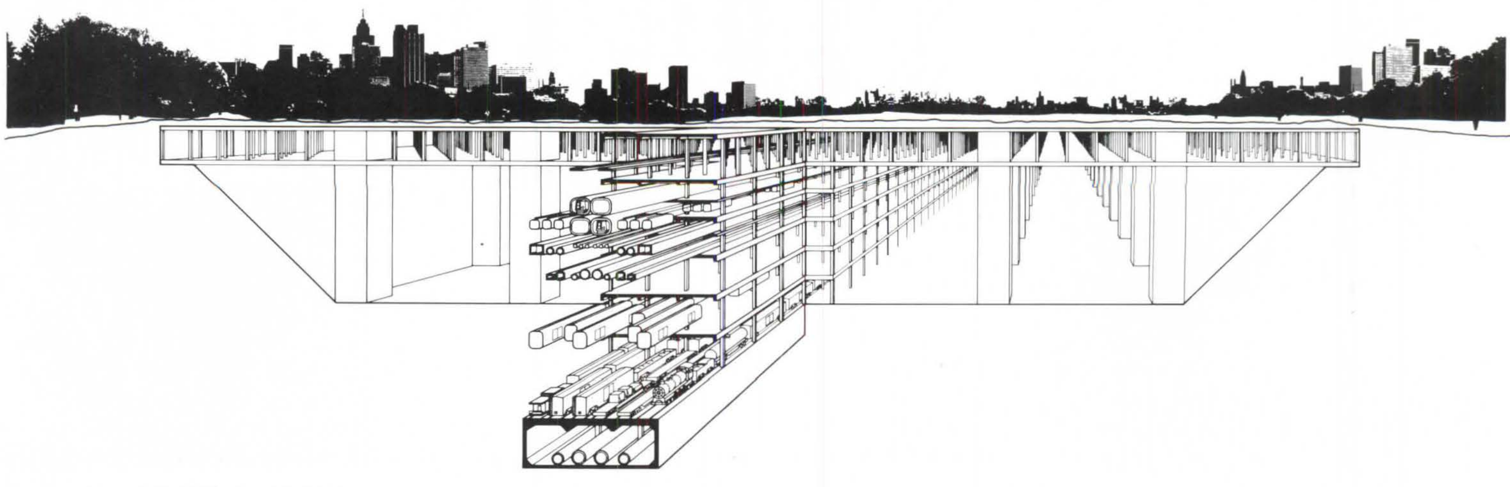
His firm has "not yet done anything with solar," he says, "because I'm not convinced that it is a way to go on a small scale." He believes that most architects are reluctant to get into energy-conscious design because they *think solar collection* is the answer to the energy problem and are not comfortable with the idea. To Birkerts, solar energy remains an underdeveloped technology, whose mass use has not been proved in terms of costs. "Not enough federal or state money has gone into it," he says.

"Ours is a more passive approach," says Birkerts. "There's so much you can do with design. That's my interest. I don't know if architects are aware what they can do just sitting there at their board." He feels that big corporations are very aware of the need to conserve energy in their buildings, and putting new skins on old buildings will soon provide a major opportunity for architects.

Birkerts' 22-person design office has no special group or organization for dealing with energy problems. "We are really dealing from project to project," he says, "with the best available mechanical, structural and electrical consultants. We work very closely with the consultant even in the conceptual stage. I would say many of the concepts are born during this interaction between engineers and architects."

Among the effects that energy conservation will have on design, thinks Birkerts, is that "we're going to close the apertures, the windows will become smaller. Instead of having the heat come in and then having airconditioning systems, we just won't let it come in. The interiors will also become lighter in color. As we use less footcandles in the ceiling, we will have to respond to light that is reflected and bounced around. And we are going to collect excess heat and reuse it."

But, he concludes, we must not lose sight of the need to "do beautiful buildings. The 1970s should not produce something which will always stick out saying, 'This is when we had the troubles.' We should not forget beauty in times of concern, frugality and restraint." □



Energy Analysis as Part of Architectural Practice: Some Caveats

It can take 'more time and money than a client can be expected to absorb.' By Henry Ogden Clark and Michael Sizemore, AIA

Analyzing how energy is used in existing buildings is a complex process. The way a building uses energy depends, among other things, on what the structure is used for, how it is used by its occupants, the machinery it contains and the environment in which it exists.

Any energy analysis must, therefore, be holistic in nature. It must integrate the effects of any one variable on all other variables. Simple assumptions made at the beginning may have far-reaching consequences whose effects will accumulate and multiply with each step of the process.

For instance, an assumption about a building's shading characteristics will affect not only thermal load calculations, HVAC response calculations and equipment selection, but also decisions about lighting and space planning. Similarly, a mistake early in the analysis can invalidate all subsequent calculations and necessitate a complete new analysis.

All of this takes time and money, which are hallmarks of most of the potential pitfalls in making energy analysis. Seminars are being conducted and publications are emerging from government agencies, professional organizations and the private sector on many phases of energy-conscious design. Our own firm is preparing an energy analysis workbooks system, which will be published early next year and provide a framework for project planning and discuss each step in the process.

Still, energy analysis is a new field, and the missing pieces must usually be supplied by experience. In many cases, this may require more time and effort than a client can be reasonably expected to absorb. The cost of analysis can exceed the client's budget for energy conservation, particularly for a small building.

Obviously then, an important first step is determining the project's scope and schedule. The client will probably have an upper limit for the fee, as determined by the size of his utility bills and his required rate of return on investment. He will, as a rule, be willing to spend more money for the analysis of a larger building, although the analysis of a small building may be more complicated and time-consuming.

Mr. Clark is an associate, **Mr. Sizemore** a partner in Sizemore & Associates, an Atlanta architectural firm specializing in energy design.

Since each project is unique, a careful site visit and walk-through of the building will be required before a cost estimate for a complete energy conservation study can be made and a proposal presented. It will often require more time and effort to land a job in energy analysis than in conventional practice, but the investment pays in eliminating later unbudgeted tasks.

Another problem that may be encountered during initial contract talks is that the client may want guarantees of savings. It is difficult, if not impossible, to provide such guarantees. First of all, the analysis must be well under way or completed before possible savings can be accurately projected. Second, the implementation of many energy saving recommendations are out of the energy analyst's control. You can recommend a control point or an operation schedule, but obviously cannot set the building's controls every day yourself.

Still another problem is that the client undoubtedly will have heard from any number of salesmen who are pushing products ranging from roof insulation to "black-box" control systems. Many will have made claims and many will have guaranteed a percentage savings. If you total the claims, you can often show that they promise to save the client from 100 to 200 percent of his utility bills. This is a good time to explain to the client that each building is unique, and that all future improvements are so interrelated that detailed analysis is required to provide an accurate cost/benefit picture.

Once the contract is signed and the project defined, data collection begins. If you have clearly planned your analysis scheme, you will know exactly what information you need. But assembling it is seldom a straightforward process. In our firm's experience, for instance, it is extremely rare to find any one person who really knows how the building is operated. You have to find out for yourself. In one case we discovered that the time clock on which the equipment operation depended had been installed with five "on" buttons and only one "off" button. The equipment was running 24 hours a day though everyone thought it was running just eight.

Almost every piece of data that you use is based on an assumption which will gain in importance as the analysis proceeds. You may have calculated U-factors on a steady state condition, which is adequate for many jobs, particularly if building sections are light or even medium weight. Further into the analysis, however, you may find that you need a more accurate picture of the flow of heat through the building's walls. Being able to anticipate the need for this level of detail can mean the difference between staying within the project budget or going over it.

Most of the data you will need is available, but has not yet been collected into a single source. You may find yourself spending days or even weeks trying to locate it. Fortunately, once it is found it will be useful for many future jobs.

Matching your analysis method to the project's requirements is another important part of the process. Energy analysis methods are emerging and many computer programs are now available. Our experience has taught us that each program has its own strengths and weaknesses depending on the project it is used for.

In our own office we have developed a manual method which we use for our base calculations and often for the entire analysis. It has the advantages of being flexible and "visible," that is, open to modifications and corrections at every step. It also provides accurate figures and a clear picture of energy flow.

Intuition can serve the energy analyst well, but only up to a certain point in the process.

The main dangers in any detailed analysis are spending too much time on the analysis itself and obtaining inaccurate results that require lengthy corrections.

Your analysis method should provide you with an accurate estimate of probable savings for each modification without requiring a great deal of time to change the base analysis. Many modifications are so interrelated that it will be impossible to adequately calculate their individual contributions to projected savings. Instead, you may have to concentrate on the combined effects of several modifications.

Reducing glare from windows is a good case in point. Shading devices may not be cost effective when considered solely from the point of view of reducing solar heat gain. However, if they also reduce glare, they may be a very important factor in allowing reduced lighting levels and consequent electrical and HVAC consumption.

Intuition may serve you well through most of the energy analysis process, but a

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California's New Generation of Energy Efficient State Buildings

The first three projects under the aegis of the new state architect's office break some significant new ground. By Allan Temko

Saving is the name of the political game in Sacramento, where it is no secret that Governor Jerry Brown hopes to dethrone Jimmy Carter in a campaign that may hinge on energy conservation. The austere governor (who has also been called a "phony Spartan") clearly believes that the surest approach to the White House is not by way of Middle Eastern oil fields, but by reversing the wasteful use of the U.S. environment. Hence his "small is beautiful" parsimony which, although widely publicized and apparently popular, at first consisted mainly of relaxed rural building codes and scrimping on existing social programs.

Lately, however, he has been willing to unbuckle $90 million for adventuresome office construction by the state; and if he does challenge Carter three years from now, he will be able to point proudly, on national TV, to a remarkable group of energy efficient public buildings which Sim Van de Ryn, his equally remarkable state architect (*see* June '76, p. 41), should have ready just in time for the primaries.

Van der Ryn and his staff have actually designed only one of the buildings. But he is responsible for the philosophy underlying all three, which rely heavily on passive technology, and are reckoned by Van der Ryn to need as little as 25 percent of the electricity and gas required by conventionally airconditioned structures in Sacramento's hot Central Valley climate.

Yet the new state buildings promise to be much more than technical feats—or rather antitechnocratic lessons. They also happen to be significant works of social architecture, which compare favorably with superior design in the private sector and are rare in governmental building. In strikingly different ways, for their concepts are not at all identical, the three buildings have been designed according to human needs, going far beyond mere temperature comfort, including the individual's need to be more than a bureaucratic cipher.

All of these unexpected developments, not on a "small is beautiful" scale, but in buildings ranging from 200,000 to 350,000 square feet, amount to a vindication of the unorthodox outlook of Van der Ryn, whose appointment as state architect two years ago at the age of 40 had generated mixed feelings among California architects.

Not only had he avowedly given up on architecture with a capital A, but he had ceased even to practice the modest humanistic architecture—notably housing for college students, the elderly and migrant farmworkers—which had given him and his partner Sanford Hirshen national reputations.

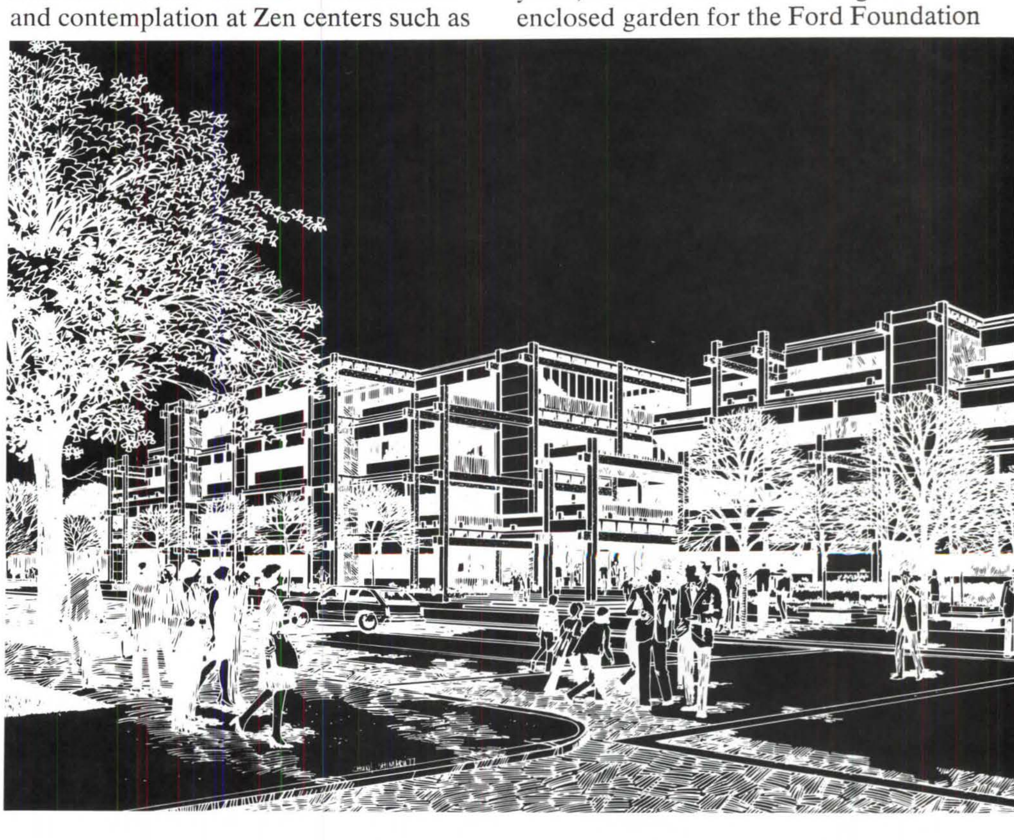
At the time of his appointment, Van der Ryn was a counterculture ecologist, far-out Berkeley professor, veteran of the battle for People's Park and founder of the communal Farallones Institute which sought to relate physical environment with "biological concerns." He was concentrating on recycling, frugal plumbing, bohemian "wood butcher" construction and contemplation at Zen centers such as Tassajara Hot Springs in the uppermost reaches of the Carmel Valley where he met Jerry Brown.

In the political infighting that followed his appointment, Van der Ryn showed himself more adroit than anyone expected and had the advantage of an acute shortage of office space in Sacramento, the result of a moratorium imposed on state construction by Brown's predecessor Ronald Reagan, who had adopted the financially and architecturally disastrous policy of leasing private real estate instead.

Therefore, the legislature gave almost routine approval to financing for three urgently needed buildings, together with two others that will follow soon, suggesting—at a cost of $90 million for the five—that "small is beautiful" is a relative term after all.

But the buildings were to be anything but ordinary. Rather nervily, Van der Ryn decided to do the first building himself, aided by a few top assistants brought in specially for the job. He thought he knew best what he hoped to achieve in new standards for both pleasant working conditions and economical energy consumption: objectives which he, of course, perceived as totally compatible. The block-square site near the capitol suited his intention to go lowrise, anticipating the four-story limit of his downtown plan, and allowed him to wrap a carefully shaded building around a great skylit court, which is the key to the whole concept.

Such courts, invented by the 19th century, have reappeared in many different kinds of buildings during the past 15 years, from Kevin Roche's magnificent enclosed garden for the Ford Foundation



Mr. Temko, an architectural historian, is critic for the *San Francisco Chronicle.* He is a frequent contributor to the JOURNAL.

to John Portman's festive and theatrical hotel atriums. But all of these spaces impose heavy loads on airconditioning systems. Van der Ryn, to the contrary, hoped to achieve just the reverse by taking advantage of a special condition of the Sacramento climate: the steep and rapid fall in temperature at night, when ocean breezes blow up from San Francisco Bay through the Carquinez Straits to cause a drop of 30, 35 or even 40 degrees after torrid summer days. Although winter presents no problem in Sacramento, since heating needs are scant, from June to September the thermometer often tops 100.

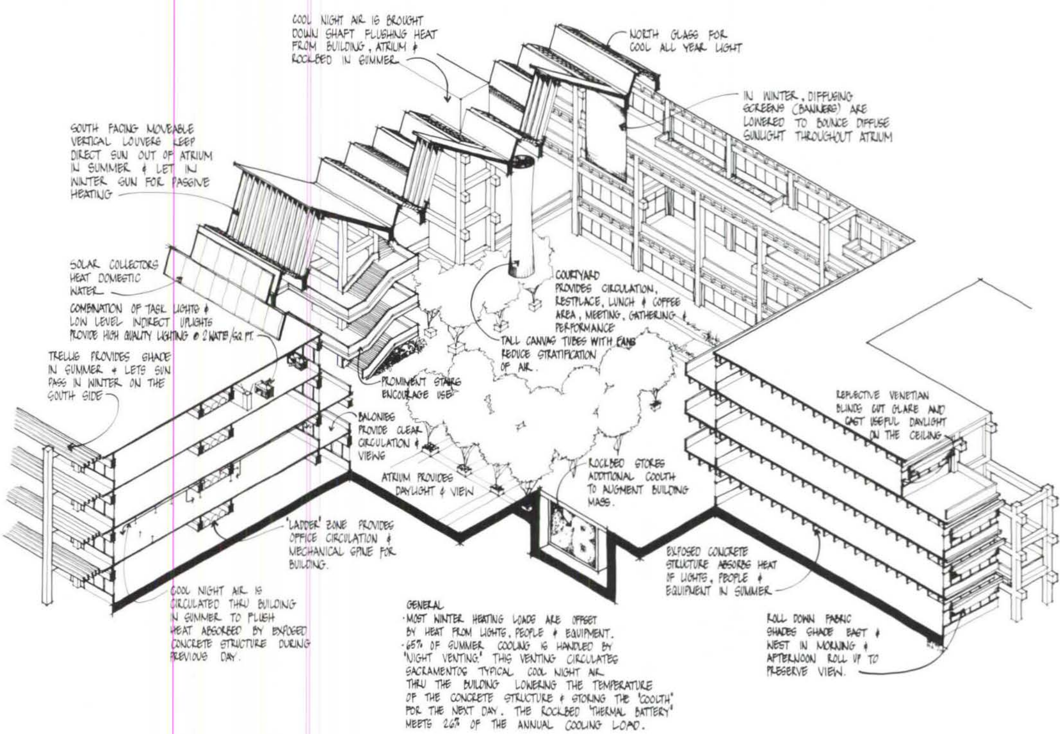
Consequently Van der Ryn and his gifted young architects and ecologists adopted a *regionalist* strategy of cooling the building at night by opening vents to trap the breezes, and drawing those through the structures during the day by fans of a fairly standard high-velocity airconditioning system. At the same time, hot daytime air is expelled; and the HVAC's full refrigerating capacity, intended merely as a back-up, will go into action only under extreme conditions.

In an added touch, the cooling process will be "supercharged" by an auxiliary battery: a 660-ton rock bed sunk in the landscaped court, which is also hooked up to the HVAC, and will assume 25 percent of the cooling job.

The spacious court, 92 feet square and nearly 60 feet high at the crests of the saw-tooth skylight, surrounded by ample balconies—actually, galleries which replace corridors that are the bane of bureaucratic buildings—is planned as a social center and informational focal point. It will have cafe-like dining and seating areas, banners hung from the hefty glu-lams spanning overhead, full-sized trees and luxuriant plants: quite an order for a state office building. The court, of course, will also act as a reservoir of cool night air which the architects hope will remain pleasant on very hot days, even though some skeptical engineers doubt it. Only the finished building—as in all of these frankly experimental projects—will prove who is right.

Whatever its energy conserving role, the success or failure of the central space—surely the most generous in a California public building since the magnificent rotunda of the San Francisco city hall was built half a century ago—will depend on its play of light. It cannot hope to equal the splendor and sensitivity of Arthur Brown's masterpiece, but nevertheless may be very impressive in its own right.

This is a far cry from wood-butchery—



The variegated facade, large interior court and energy related elements of the Van der Ryn-Calthorpe design, to be cooled by trapping night air and drawing it through the building during the day, without conventional airconditioning.

maybe too far for Van der Ryn and his chief designer Peter Calthorpe, neither of whom had previously tackled so ambitious a concept. In spite of a certain heavyhandedness that seems locked in the design, if the court becomes what they wish, it will be suffused by a dappled luminous softness, filtering downward through the operable shades of the southward-slanting skylights in summer, balanced by the unshaded northern lights. In winter, it will be flooded by sunlight that should keep the building warm until after dusk. These designers are not afraid of natural light. On the contrary, they object strenuously to excessive artificial light because of its burdensome heat load, high cost and glare.

What the Californians do want is to prevent direct sunlight from penetrating their buildings in hot weather. Here common sense prevailed, forgotten in the air-conditioned age, but long known to Central Valley residents who from pioneer times have blocked out the sun with thick construction (never better than in old adobes), and also by awnings and other external sunbreaks such as old farmhouse verandahs.

Such logic has inspired a vigorously indented, broken-up exterior, which will vary on all four elevations according to solar conditions and be fitted with cheerful-looking movable canvas sunshades—probably in orange or another bright color—that can be raised and lowered at will by the building's occupants. Therefore, the facades will be constantly changing in mood, but they are crudely drawn, and complicated by a constructivist esthetic, calling for bulky, coarsely jointed concrete sunbreaks and trellises. Some are cumbersome protrusions of the structure itself, meant to express the building's thermal properties, but which clamor unnecessarily for attention, and may end up simply looking a mess.

It can be argued that such fragmentation divides into intelligible human portions what otherwise might be the forbidding mass of the building. The sun-resistant devices shade informal terraces where, because of the overall disorder, it will not matter much if individuals "do their own thing," putting out porch furniture and art as they often do on the decks of California houses.

With 76-foot-wide office spaces, whose windows face the court, no desk is farther than 38 feet from natural light. This should make for a relaxed air, which will be enhanced by task lighting.

On balance, then, this structure which began primarily as a demonstration of low energy design, promises to be a very decent building, flawed as a formal work of architecture, but profoundly humane in other ways. It will be fascinating to see what Van der Ryn's office will do in a smaller office building, occupying only half a block, which they are designing for a nearby site.

Perhaps the latter will profit from the state capital's second and more elegant example of an energy efficient project. At 350,000 square feet and a budget of $17 million, it is the first major office building designed by Robert Marquis & Associates, hitherto chiefly known for exemplary housing such as St. Francis Square in San Francisco. The new building will be the headquarters of the state department of justice, headed by Attorney General Evelle Younger, a conservative Republican who may oppose Brown when he runs for re-election next year.

Interestingly enough, Younger had intended to buy canned architecture rather than go through a distressing experience with the state architect's office, with which he had become painfully familiar under its former regimes. It even made some sense to him to order prefabbed industrial structures because a big part of the justice facility would be only a shell for its giant computers.

Van der Ryn, given to wearing kerchiefs and country clothes from L. L. Bean, might seem to be the last person to carry weight with Younger, but he persuaded him to make a serious user-oriented architectural statement and also attempt to cut gas and electricity needs by 65 to 75 percent.

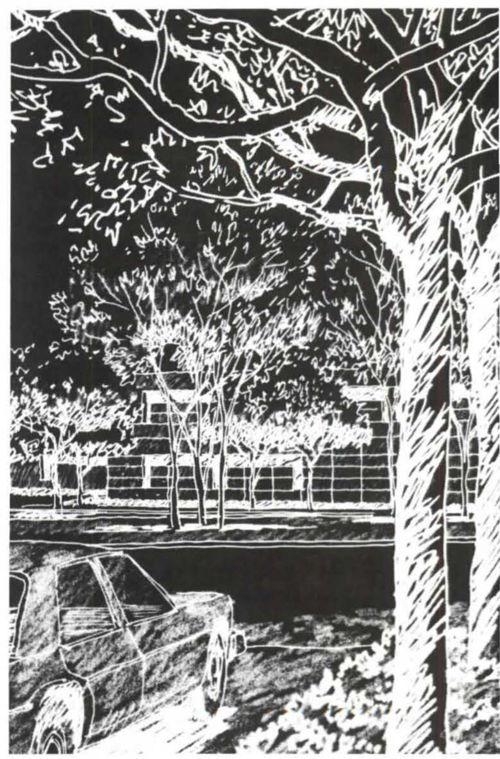
The investigation of user preferences in the justice department began in Van der Ryn's office, where a gifted young consultant, the architect-programmer Bobbie Sue Hood, undertook the monumental task of interviewing almost all the employees in what, so far as I know, was an unprecedented preliminary effort in the design of a government building.

The justice department building began with an elaborate program based on employee interviews.

From this research she came up with a schematic diagram, setting forth "required relationships between major components," which was not so much a program as a physical prescription for architecture which—because of her own inexperience in actual building—was in many respects naive.

In fact, by calling for a campus-like arrangement of square "doughnut" buildings surrounding courtyards, and—for no compelling reason—specifying the height of different elements, entrance locations and circulation patterns, she was over-prescribing architecture that needed much study by thoroughly professional designers.

The Marquis firm found many of her recommendations simply unworkable, such as her notions of future expansion



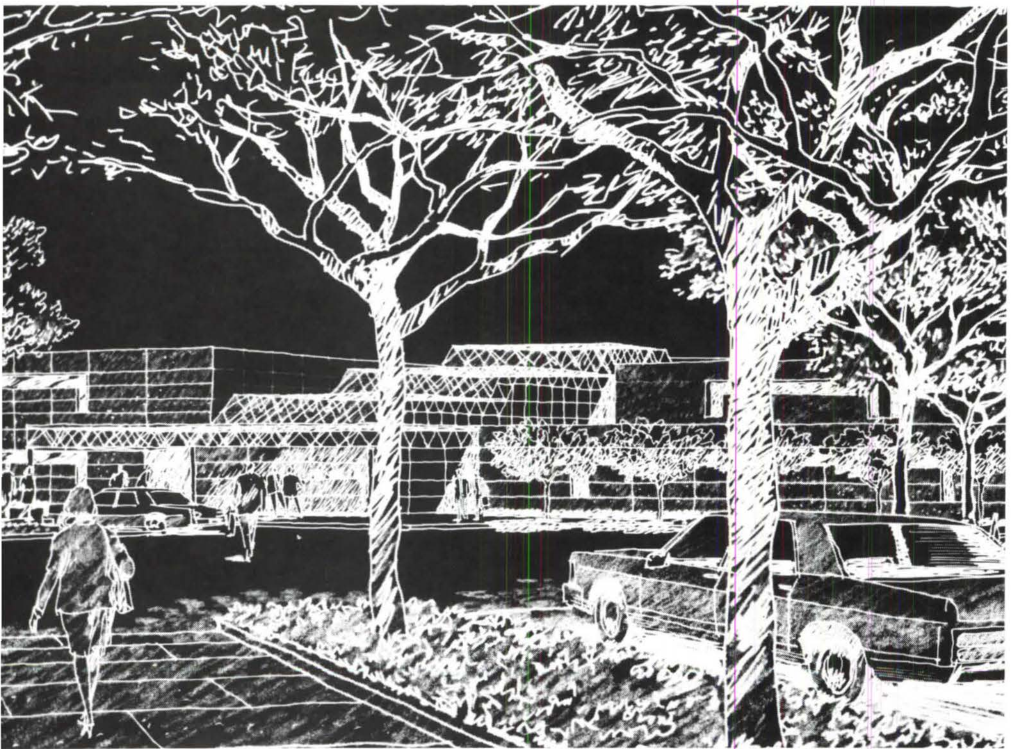
(which obviously couldn't take place on all four sides of each doughnut), as well as her inaccurate estimates of circulation square footage. All this had to be redone, and probably shouldn't have been done in such detail in the first place.

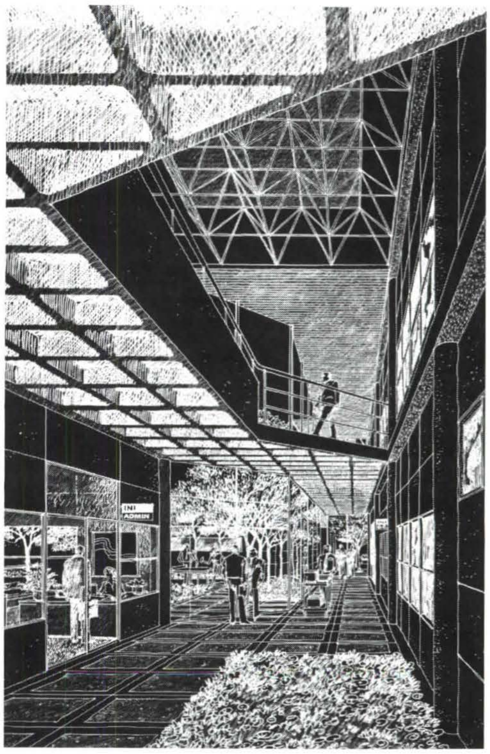
Furthermore, the concept had to be made architecture, with a capital A, something which had escaped Van der Ryn and Hood. And when Marquis and his senior designers Jim Caldwell and Jacques De Brer finally developed a plan for the large empty site on the old state fairgrounds, at the edge of town, it bore little resemblance to Hood's original scheme.

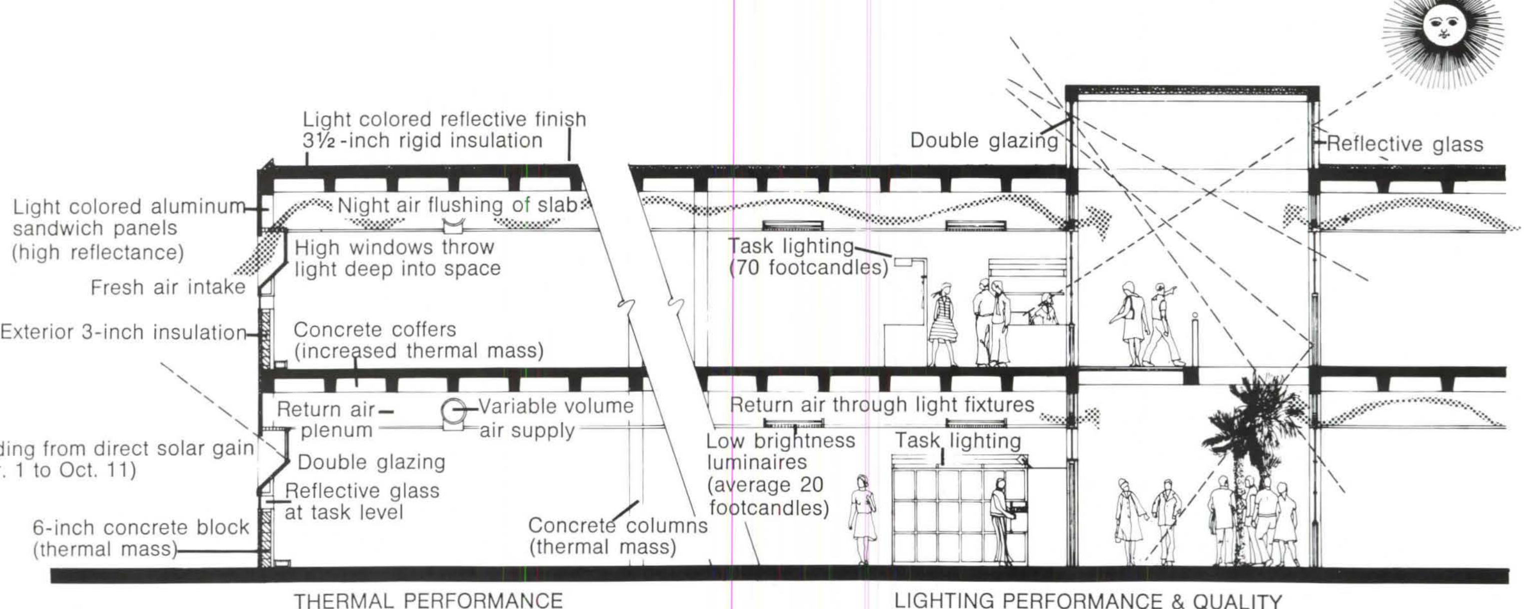
Instead, it was a richly urbane continuum of spaces that differed considerably in size and mood, deftly changing from one to two stories and organized around a variety of spaces that are attuned to both the working patterns and individual wishes of the department's several divisions. All this is connected internally by a lucidly planned grid of "streets"—really, lofty skylit corridors with cantilevered upper galleries—which pass through "neighborhoods." Their outdoor courts are the readily identifiable "turf" of the various agencies. These spaces can be used as volleyball courts, Ping-Pong areas, flower gardens, vegetable patches or simply quiet patios.

These "streets" converge at a large central court which Marquis chooses to call a "town center"; and although the nomenclature may seem pretentious, it may in the end accurately describe the social core of this immense legal and judicial operation which badly needs humanizing.

This, I'm happy to report, the Marquis firm is continuing to do in lively ways. It has continued interviewing users, and publishes some of the results in a newsletter which also reports on the design as







The state justice department building by Marquis Associates will be organized around a large skylit central space and cut through by lofty corridors (upper right). Energy elements are similar to those in the Van der Ryn design.

it develops. A cynical commentator—I, for instance—might note that some of this is little more than a sociological smoke screen, manipulating the collective client so that the architects merely are obtaining endorsements for what they intended to do in the first place; but some of the research has been undeniably helpful. The main point, perhaps, is that all the employees feel they have a stake in their environment, and are genuinely delighted that anyone noticed them at all.

This building is not yet fully designed; and I hope that it will have the dash, elegance and warmth that Marquis and his associates are striving to give it. The passive energy features are closely analogous to those in Van der Ryn's building, relying on night air for cooling. The system might be even more effective because the cold air will circulate through a plenum above a hung ceiling, thereby bringing it in closer contact with the structure; and there are many other refinements attributable to mechanical engineer Fred Dubin of New York City—one of the chief pioneers in the field.

It will also be fascinating to see if the building's fixed brise soleils in the courts are more successful, or less, than Van der Ryn's movable canvas shades, and if an almost windowless exterior (whose prefabricated metal curtain wall can be dismantled for expansion in almost every direction) will be decisively less acceptable than an outward-facing building. E. O. Tofflemire, a specialist in such enclosures, who has worked with designers as meticulous as Philip Johnson and Richard Meier, is the consultant for these facades.

One wonders how finely a humanistic Bay Area office will execute such rigorous technological ideas. For much, in the state buildings, will depend on fastidious details, good furnishings, sensitive use of color and above all a sense of architectonic command—not abstract control.

The third of the energy efficient California state office buildings could become a first genuine great ecological work of this new architectural era. It is the winner of a competition conducted by Van der Ryn—by all odds the most thoughtful

A competition yielded a pair of outstanding designs and a split over them on the jury.

ever held in the state—in which no fewer than 41 private firms entered, proving that energy efficiency is now a potentially lucrative business. Some of the contestants spent tens of thousands of dollars on their submissions.

The winning design, lo and behold, is by one of the biggest architectural and engineering conglomerates in the country, Benham-Blair & Associates, whose 550 employees are distributed in 11 regional offices, including Los Angeles and San Francisco.

The concept by Benham-Blair's chief designer, Buford Duke, calls for an immense solar collector—240 feet across and 60 feet high—as a superb symbolic touch for a building that otherwise is largely underground, somewhat reminiscent of the Oakland Museum. But it has a long way to go before it is in that class.

The intelligent process by which the competition was conceived deserves a word of explanation. The entrants were asked to meet energy performance standards, and were required to justify their designs by the same kind of thermal and light-metering model tests that Van der Ryn's staff had used in designing their prototypical first building. The six finalists in the two-stage competition were given the additional task of evaluating their results scientifically in complex computer print-outs that filled thick volumes.

These were scrutinized by a jury chaired by William Caudill, FAIA, of Houston, one of the chief begetters of the present concern with sun control problems. The jurors split three to two. Van der Ryn and Dubin cast the two negative votes, primarily because the design broke almost completely with the direction the state had been following in the other new buildings, which will use rooftop solar collectors only for heating water, and depend on night air for most of the cooling.

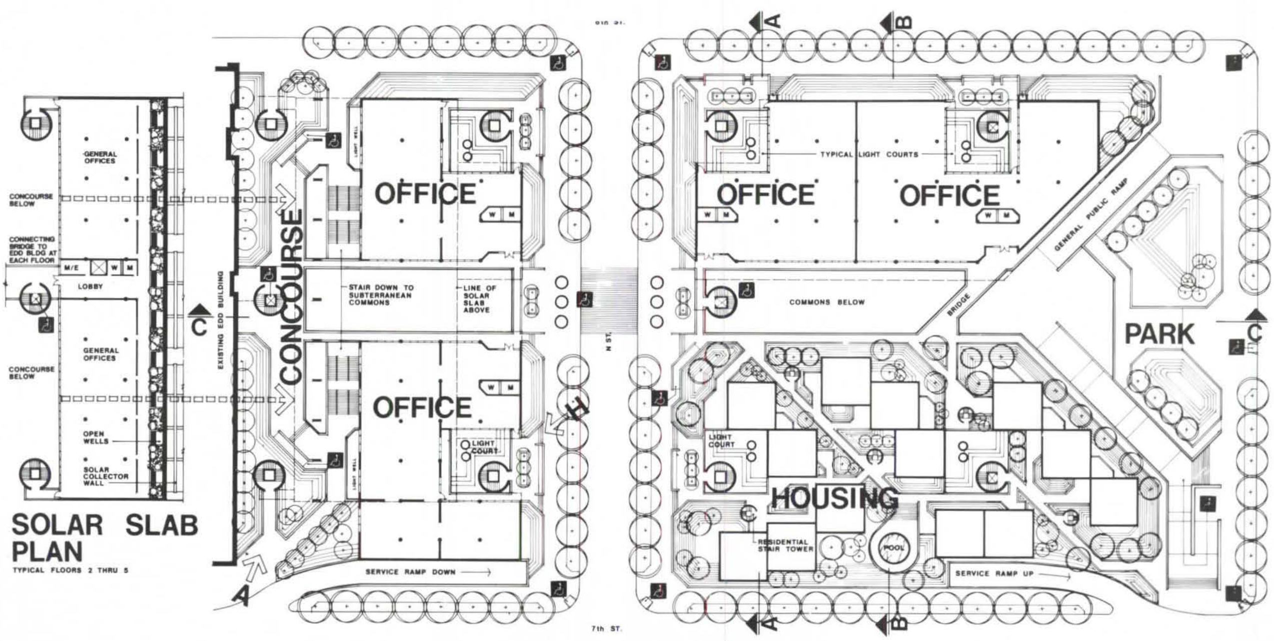
Forty of the 41 contestants, including the second prize winner, adopted a similar strategy, which seemed virtually imposed by the competition instructions. The winner is a passive earth-covered building whose surface would be an urban park, overlooked at its far end by a huge solar collector slanting upward at a 45-degree angle to be the principal external element of a six-story office building. The collector would provide the energy necessary to cool the entire complex.

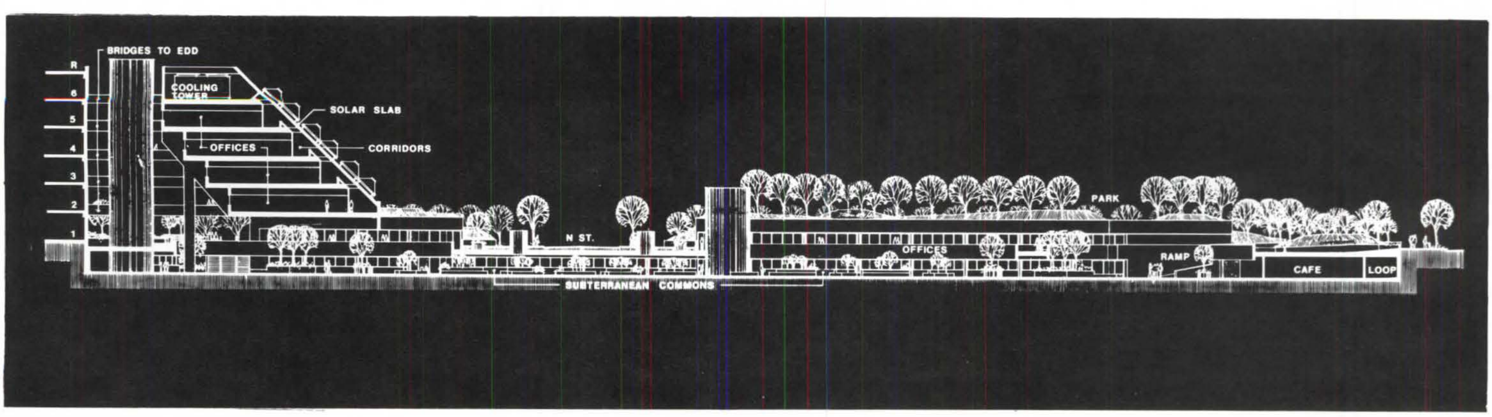
As a symbol, it should be one of the most powerful architectural proclamations of a new age. Yet at this stage there is much that is plainly wrong with the design. The collector, as proposed, seals the front of the above-grade structure which should be opened to overlook the park. The park itself, perforated by sunken courts, needs much more thought.

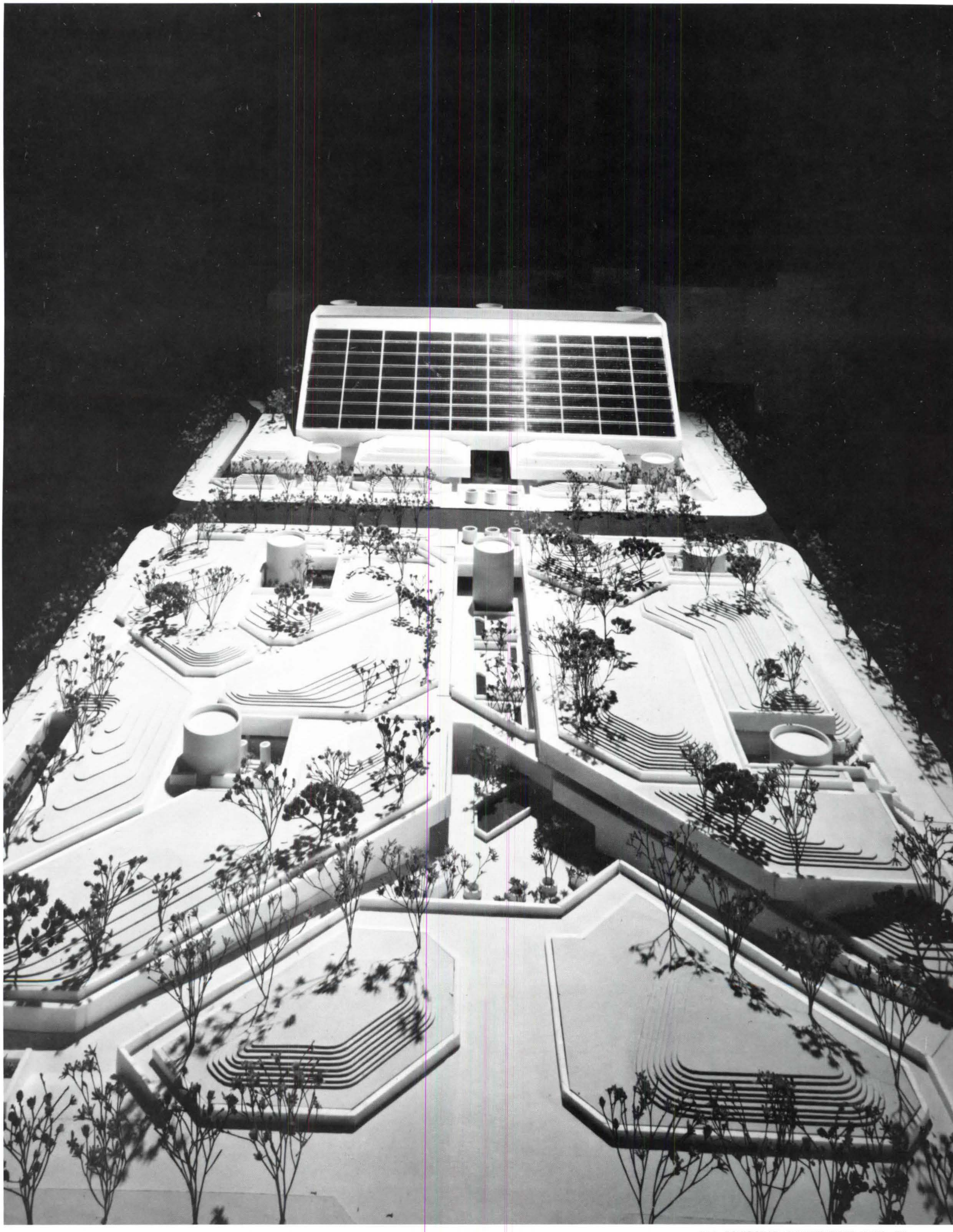
Nevertheless, these shortcomings may be rectified, although perhaps not at a cost the state is willing to pay. The project would give Sacramento a free inner city park which should be an oasis for thousands of state employees encased in mammoth surrounding structures, including a real brute that went up in the 1960s, which the solar collector will mercifully mask.

Unfavorable critics of the scheme, including Van der Ryn (even though he wants it built), also question its efficiency, for Benham-Blair and their consultants, Westinghouse Engineers, project savings of 50 percent, half of what Van der Ryn claims for his approach. He and his staff

Benham-Blair's competition winning design places most office space under a park, with light coming through a central mall and four courts. Above grade is a solar-walled structure and housing blocks will be added at a later stage (see plan).







—to whom the jury's decision almost amounted to religious heresy—point out, too, that the winner does not fully comply with the new capitol area plan, as stipulated in the competition. The plan indicated a design that could be built in quarter-block modules, 160 feet square, in accordance with a mixed use concept including 40 or 50 housing units on the site. Benham-Blair placed some unconvincing circular housing elements on the model, but the park looks far better without them.

Was not the state architect's opposition based, in part at least, on fear—even hatred—of a grand design? For he and the governor, reacting against the insensate architectural "mono-culture" that big government imposed on Sacramento in the last decade, leaving it virtually unpeopled after 5 P.M., now want to transform the dismembered cityscape into a closely-knit "village in the modern sense."

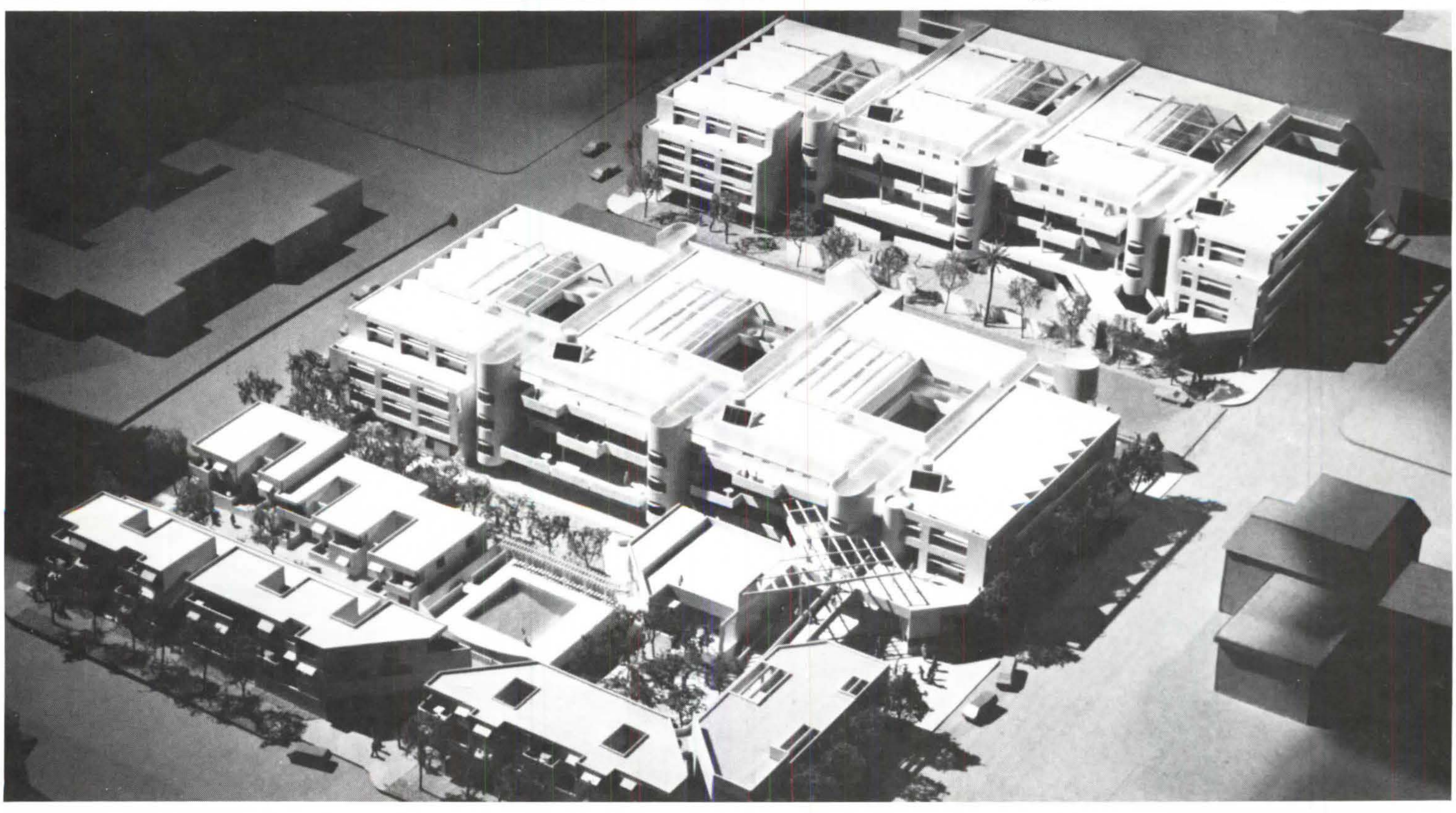
But great regional capitals—Edinburgh comes to mind, and Bordeaux—do not have a village air. They are nobly urbane centers of cultivated life which possess authentic grandeur that can lift up the hearts of people of all ages and backgrounds.

In fairness to Van der Ryn, however, the competition runner-up which he much prefers to the winner, might have accomplished something as valuable: a new kind of vernacular which could move across the city in a charming yet orderly way. For it did virtually everything he hoped for—indeed, everything he had done in his own building, only better, turning his coarser brand of design, so help me, into capital A architecture. Its exquisitely organized interior courts, meant as centers of exuberant social life as well as reservoirs of cooling air, covered with retractable skylights and splendidly surrounded by stepped-back balconies, show a direction that should also be followed.

Not surprisingly, the entry was signed by Elbasani, Logan, Severin, Freeman, an innovative firm which has won or done well in several notable competitions. But they were acting chiefly as licensed architects of record for three extraordinary talented students of Donn Logan at Berkeley: David Baker, Philip Banta and Anthony Cutri.

They are $7,500 richer today with their second prize money, but an even greater prize came to Elbasani, Logan, Severin, Freeman with the commission to design a new state office building in San Jose, giving them the chance to fully explore the possibilities of the competition entry. □

The competition runner-up by Elbasani, Logan, Severin, Freeman, organized around a series of handsome courts with retractable skylights, closely followed Van der Ryn's concepts in regard to both energy and the overall design of the capital.



California Tries Prescriptive and Performance Standards in Tandem

Its court-tested energy regulations 'may be a harbinger of the future for designers in other states.' By John Balzar

California's new energy standards and regulations are the most far-reaching and detailed of any in the nation. They are also the only ones to have been tested and upheld in a court of law. They may, therefore, be a harbinger of the future for designers in other states.

The new standards give designers a choice of two different approaches to make their structures energy efficient. The first is a set of hard-and-fast prescriptive standards for such building elements as insulation, heating equipment, ratios of floor space to walls and to windows.

The second is a set of building performance standards which allow overall design latitude so long as the finished product conforms to a state-mandated "energy budget," a maximum limit on energy consumption measured in annual BTUs consumed per square foot of space. The budgets differ depending upon use, location and size of the structure. Nonresidential buildings come under the new regulations Jan. 1, with residential standards scheduled to be phased in over the next 18 months.

The new standards are the product of the state energy resources conservation and development commission, commonly called the energy commission. Don Watson, manager of the commission's building and appliance office, says the standards should reduce energy consumption 20 to 25 percent or more for nonresidential buildings and 30 to 35 percent for residential.

Energy budgets are determined by overall energy consumption of a building's service systems. Consideration is given to the type of occupancy under the Uniform Building Code, 1976 edition, as well as whether it is to be heated and cooled, or just heated or just cooled. Also, consideration is given to climatic conditions at the construction site.

A state of enormous geographical diversity, California has been divided into 15 climatic zones for the purpose of determining energy need. These range from thin strips of land along the mild-weathered coast to one zone that encompasses the extremes of both Death Valley, the lowest spot in the continental U.S., and Mount Whitney, the highest.

Under the formula, a heated restaurant in San Francisco would have to be designed to consume no more than 126,000 BTUs per year per square foot of conditioned space. Built inland in the Sacramento Valley, the same structure if heated and airconditioned would be allowed to consume up to 132,000 BTUs. In the harsher desert and mountain regions, the energy budget for restaurants could go up to 148,000 BTUs.

Designers who opt for the energy budget alternative will have to submit an energy analysis report with the design when applying for a building permit. Local permit agents are charged with enforcing the regulations. But it will be up to the architect "to demonstrate that the design meets the requirements. . . ."

State energy commission engineers expect that only in advanced designs will the energy budget alternative be employed. For more conventional structures, they expect designers and builders to use the more routine component standards. State engineeers call them the energy "cookbook" for construction.

The lighting standards give an example of the detail of the prescriptive regulations. Employing the basic list of work tasks from the Illuminating Engineering Society, the state commission and the consulting firm of Lighting Research Laboratory, Los Angeles, established illumination maximums for various tasks and room configurations, expressed in watts per square foot. Commission engineers figure an average office building in California today is illuminated at about 6 to 6.5 watts per square foot. The new standards are designed to reduce that to an average of about 2.5 watts per square foot.

Using a formula to determine room cavity ratio (RCR), designers will refer to a chart for their illumination maximums for different tasks. RCR is figured from an equation which includes the length of the room, the width of the room and the vertical distance from work plane to lighting fixture.

These complex standards for nonresidential buildings were not adopted without controversy. Originally, the energy commission proposed exercising its power under law by imposing prescriptive standards first (they were supposed to take effect earlier this year) and then follow with the more creative performance standards later.

Builders, with the active support of the California council/AIA, won an injunction requiring that the two sets of standards be issued simultaneously. The ruling was upheld on appeal in the state courts, and the energy commission complied.

A similar challenge has not been mounted against the new residential building standards, which are planned to take effect in two stages. The first set of regulations are prescriptive standards, and were published in June and take force Mar. 11, 1978. Energy budget standards will not be formulated until next year and will not take effect for another 12 months.

That means for a year, at least, architects will have to work with fixed prescriptive standards that pose several design challenges. Most obvious is that glass generally will be limited to no more than 16 percent of floor space—subject to some exceptions. Some energy trade offs will be permitted with other design features to permit more glass. The amount of glass also can be increased with the use of passive solar systems. But for the first time, designers will have to calculate, not just for their clients but for the state, such things as how much sun south-facing windows will receive "for the hours of 9 A.M., noon and 3 P.M. solar time on Aug. 21, and . . . solar time on Dec. 21" if they want liberal use of glass.

An AIA task force that reviewed the state's new handbook found more than 30 'uncertainties.'

The new standards, for both residential and nonresidential construction, are projected to save Californians $1.076 billion dollars in energy bills by 1985, according to state energy commission engineers.

Added construction costs are expected to be a maximum of 1.5 percent for residential buildings, the commission says. For nonresidential structures, commission engineers figure that costs could rise in some cases but in other instances would be reduced because of "decreased lighting loads and more efficient, proper sized heating and cooling systems."

Architects in the state view the looming regulations with trepidation, to say the least. A special energy task force of the CCAIA has reviewed the regulations and a preliminary working handbook. The task force raised more than 30 points of uncertainty. For example, it questioned if

continued on page 72

Mr. Balzar is a correspondent covering politics and government for the *San Francisco Chronicle.*

New Attention to Wind Energy: Refining an Ancient Technology

Fueled in part by increased federal funding, windmill research and manufacturing experience a major boom. By Allen Freeman

Is the wind the once and future energy source? In the name of fickle progress, man has advanced and retarded his wind harvest over the centuries, the latest resurrection being merely a refinement of an ancient technology.

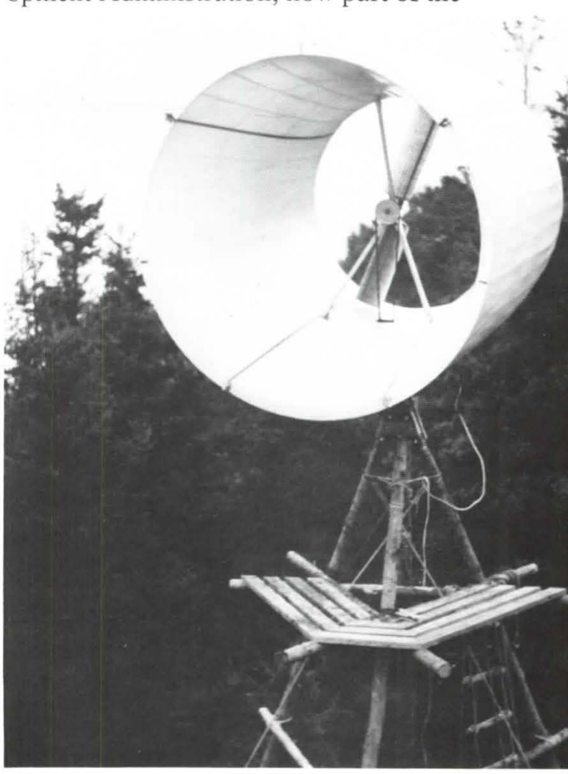
The earliest reference to wind machines dates to the pumping of water in about 400 B.C. Windmills were widely used in the Middle Ages in western Europe and Great Britain, and tiny Holland became an industrial leader of the 17th century thanks to its sailing fleet, grinding mills and pumps that reclaimed land from the sea. The U.S. experienced a couple of windmill revivals, in the mid-19th century for water pumping and sawmill operations and later to provide electricity on frontier farms and homesteads. But the steam engine and the Rural Electrical Administration reversed those trends, and by 1950 the U.S. windmill was an endangered species.

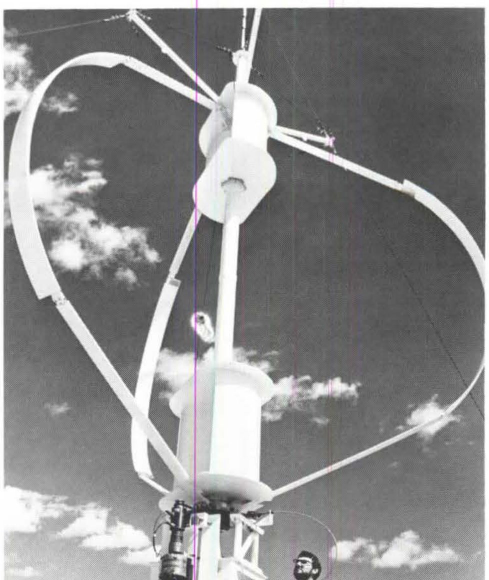
While practical application of wind energy diminished in the U.S. between 1920 and 1970, wind research and experimentation was carried out worldwide by manufacturers, universities and independent groups of engineers and designers. Here are some of their curious and wonderful achievements:

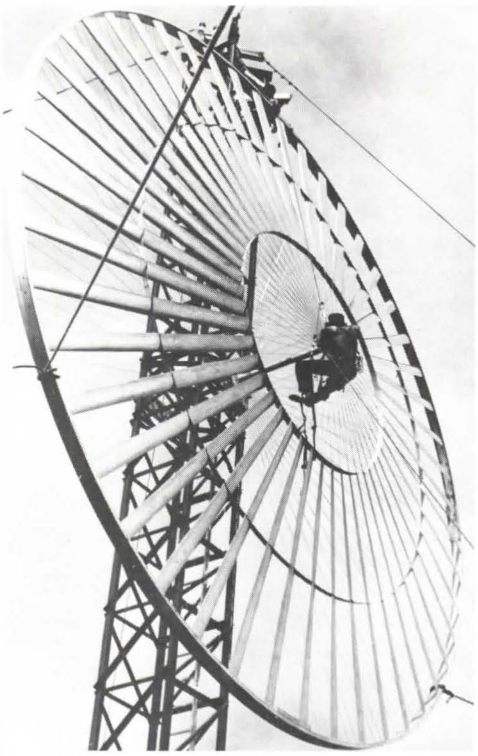
- Flettner rotor, a 1926 experiment of exotic design employing four tapered cylinders for blades which were rotated by motors to control their circulation. A 90-foot-high prototype, called the Madaras rotor, was built in New Jersey.
- Savonious rotor, named after the Finnish engineer S. J. Savonious. This vertical-axis design of 1929, because of its simplicity and economy, has found popularity in developing countries where it is employed to pump water and for other low velocity uses.
- Darrieus rotor, another vertical-axis system, looking like an egg beater. Patented in 1927 by French inventor G. J. M. Darrieus, the design is currently being refined by several groups and is considered a potential major competitor to horizontal-axis systems.
- Jacobs wind plant. From 1930 to 1956, Marcellus Jacobs of Fort Myers, Fla., sold over $50 million worth of windmills for generating electricity. His machines are universally respected for their design advances and reliability.
- Smith-Putnam wind turbine. In 1941, engineer Palmer Putnam and the Morgan-Smith Co., manufacturer of hydraulic turbines, teamed up to build the largest to date wind machine, a 175-foot diameter propeller on a 110-foot tower atop 2,000-foot-high Grandpa's Knob near Rutland, Vt. It successfully fed current directly into a utility company grid for three years until the main bearing burned out. The part was replaced in 1945, but weeks later a structural failure ended its operation permanently.
- Venturi shrouded wind generator. This machine, developed in 1950, is a horizontal-axis windmill enclosed by a lampshade-shaped (Venturi) shroud which provides the effective area of the Venturi outlet rather than the area actually swept by the blades. The shroud can increase the velocity by 20 to 60 percent.
- Enfield-Andreau wind turbine. Air, sucked in at the base of the hollow tower, drove a generator and then passed through the hollow rotor and out the tips in this unusual design by a Frenchman named Andreau. The largest machine was built in 1954 by the Enfield Cable Co. at St. Albans, England. The concept proved inefficient.
- Hutter wind turbine. Ulrich Hutter of the University of Stuttgart, Germany, designed and built one of the largest and most efficient windmills in 1961. He advanced aerodynamic design calculations and the use of Fiberglas.

In the last 10 years or so, the counterculture movement and the energy crisis have generated new interest in wind power. Individuals are restoring abandoned machines or buying one of the many commercial units available, while the federal government is investing millions. Funding through the Energy Research and Development Administration, now part of the

Across page, a quartet of water pumpers in Brazil. Venturi shrouded wind generator (right) was built by Windworks, Inc., for testing in Maine. Darrieus rotor (below) is mounted atop a building at Sandia Laboratories in New Mexico. Wood bladed, feathering windmill (bottom right) is of a type common in the West and Midwest until rural electrification.







Oklahoma State University's spoked wheel generator (top) is fine tuned before tests. An 80-foot diameter rotor is installed to supply electricity for Cuttyhunk Island, Mass. 'Dutch' mills (right) have gently rotated for centuries.

Department of Energy (DOE), has jumped from $1.8 million in 1973-74 to $24.5 million in fiscal year 1977, and is estimated to reach $33 million in 1978.

DOE is sponsoring design research and tests carried out by the National Aeronautics and Space Administration. At the NASA Lewis Research Center in Ohio, a 100-kilowatt, 125-foot diameter turbine generator, the Mod-O, was completed in 1975. Design improvements resulting from Mod-O tests are going into three other, more powerful versions (200 kilowatts) to be tested by utilities in New Mexico, Rhode Island and Puerto Rico. These will be the first large wind machines to produce electricity for U.S. utilities since the Smith-Putnam in the 1940s.

The record diameter of the Smith-Putnam rotor (175 feet) will be exceeded in the Mod-1, a 200-foot machine roughly the diameter of a Boeing 747's wingspan, to be installed next year near Boone, N.C. The 2-megawatt Mod-1 could supply about 500 households annually. In field applications, host utilities provide test data in return for the use of the machines and their power.

A 300-foot diameter, 2.5-megawatt machine is on the drawing boards for construction in late 1979. Boeing will build the system for NASA and DOE. Kaman Aerospace also will design and fabricate experimental Fiberglas rotor blades.

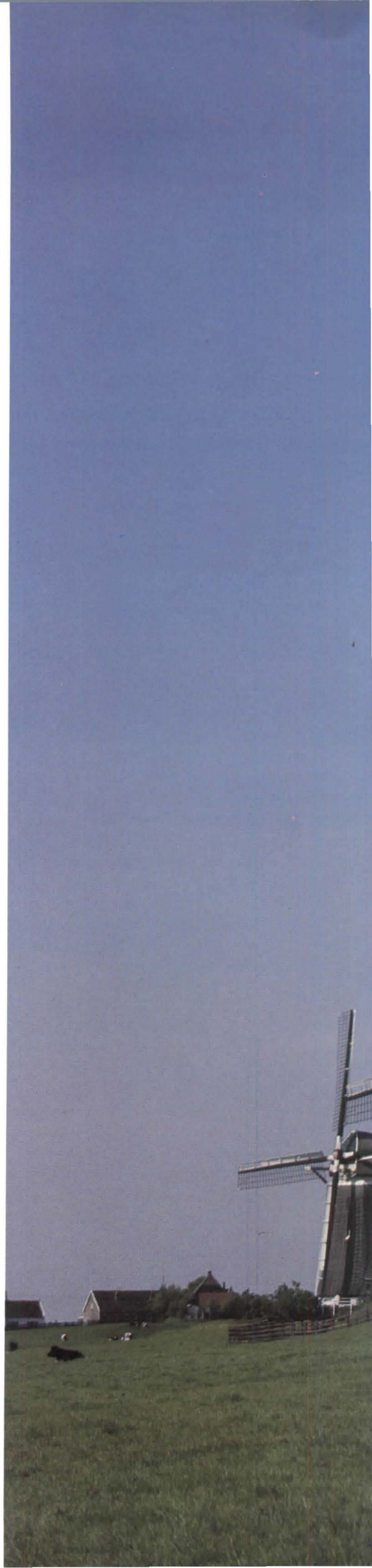
Meanwhile, DOE is testing two Darrieus rotors at its Sandia Laboratories in New Mexico. The newer one, completed this summer, is six stories high and can produce 30 kilowatts in a 22 m.p.h. wind.

DOE also is advancing small wind systems (under 100 kilowatts), and contracting for three prototypes: a 40 kilowatt model for agricultural uses such as supplemental irrigation and cooling for apple storage; a 1-kilowatt, high reliability generator for remote applications such as microwave relay stations and railway switching, and an 8-kilowatt design for home energy needs.

Windworks of Mukwonago, Wis., an engineering and consulting firm, is developing an 8-kilowatt system for DOE. Started in 1970 by areonautical engineer Hans Meyer, an associate of R. Buckminster Fuller, FAIA, Windworks first concentrated on home-built systems. But early on, the limited potential of that field was discovered. Says Meyer: "Only the amateurs with skills comparable to the home airplane builders who fly their crafts and live to tell about it are going to come out with viable, 20-year working life machines."

Meyer's firm also developed an octahedron tower which another firm is manufacturing, and synchronous inverter systems which convert DC from auxiliary sources like windmills and allow tie-ins to standard AC sources.

If you think a windmill is in your future, a list of suppliers of wind energy related equipment is available from the American Wind Energy Association, a nonprofit organization in Bristol, Ind. Otherwise, Neiman-Marcus of Dallas offers an "urban windmill" (his or hers) in its holiday catalog for $16,000 F.O.B. Dallas/Fort Worth, with batteries and alternator, but exclusive of installation. □



BOOKS

The four book reviews that follow were all written by Jeffrey Cook, AIA, who also contributed the article on page 38. Ed.

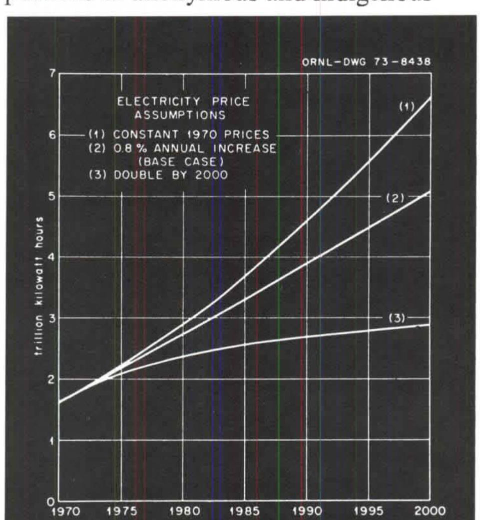
Architecture and Energy. Richard G. Stein. Garden City, N.Y.: Anchor Press/ Doubleday, 1977. 322 pp. $12.95. (Available for $11.65 from AIA's department of publications marketing.)

This significant book is about the most important architectural redirection since buildings recognized the Industrial Revolution. It is a manifesto, not about the architecture of "alternative" energy forms, such as solar or wind, but rather about designing buildings using "conventional" energy sources. Based on the immediate experience of structures that are consumptive of fossil fuels and precious materials, the author proposes how and why architects should design simultaneously in a more conservative and productive way. However reactionary it may appear to current practice, this is, in fact, a revisionist reappraisal of the products of postwar internationalism: an evolutionary post-modern proclamation which, unheeded, could trump the too-soon swan song of industrially produced environments and their attendent potential blessings.

The author is a highly regarded architect and educator of growing maturity who practices in the most industrially and economically advanced city of the world—New York—a place of increasingly exposed industrial and economic frailties. Stein writes from the urban experience of large buildings in a dense and intense energy setting, not from the virtuous frugality of small structures in rural locations.

Thus, in a capital of potentially advanced architectural and energy sclerosis, Stein sees a design test tube of faulty beliefs and practices which he proposes to direct toward a new-found integrity of "reasonable and reasoned building." His is not an instant conversion, but a long experiential quest based in the design of large and complex buildings; in the methodical analysis of a variety of modern buildings types designed by others, and in a continuing open debate with all building decision makers about the consequences of their decisions. Stein is concerned about the time span of those decisions. He also tangles with information-laden numbers—gross national products and other economic indices in which he questions the standards of information that he is forced to use in his arguments. Stein, the generalist, charges the specialists to fill in the blanks. Even he forgets, however, that no national statistics measure insolation, or even more importantly, human energy. In spite of these mammoth margins of error, he develops his thesis of the economic determination of modern buildings—it is an attack of substantial substance on the utilitarian building artifacts of an economically determined culture.

Inevitably, Stein attempts to define historical roots for his evolutionary stance in chapter two, called "A History of Comfort with Low Technology." It is a sensitive pastiche of anonymous and indigenous



examples following Sibyl Moholy-Nagy and Bernard Rudofsky. But it is neither definitive history nor exemplary comfort. There is exactly one reference note in the chapter. Selected fragments from a variety of traditions are, of course, convincing illustrations of moments of appropriate technology—especially of optimization design techniques in contexts of limited resources and lots of ingenuity.

To date, ours has been design with lots of resources and limited ingenuity. And the statement (p. 23) that "our building history is a history of solar architecture" is one of those generalizations made only by the myopic. Indeed, one has to be highly selective to discover an identifiable thread of dominant climatic determinism, let alone a more specifically solar one in the comprehensive embrace of man's building experience. Thus, the tiny slot windows in a symmetrical Italian Romanesque church in Torralba, Sardinia, shares a common climatic tradition in southern Europe of small openings in massive walls. But its importance is as a memorable architectural effect within an otherwise stylistically conforming design.

Chapter four on "The Tall Buildings" may be the most important essay on the skyscraper since Louis Sullivan's "The Tall Office Building Artistically Considered," published in March 1896. It is significant that Stein does not indulge in the mercantile romanticism of the term "skyscraper," but rather examines the subject primarily within the discipline of economic planning. His generic diagnosis is a perspective that attempts the broadest professional accountancy of that building type for bureaucracy that accommodates the paper-pushing plague of our times. He does not oil his analysis with selections from the variable human reactions to these spaces as stimulating or provocative man-work places. He sticks to dollar measurables, even though he once slips into rediscovering the window (p. 65).

Stein's deductive matrix provides no single conclusive formula, except that there is much more richness to viable architectural solutions than either promoters or critics have ever suggested. He is sufficiently well informed to imply that office buildings in Philadelphia might be radically different from those in Albany, N.Y., —simply because of climate. He may be less poetic than Sullivan, but he is more intellectually prepared. Stein's essay in its descriptive freshness has the polemic potential of Sullivan's most pivotal writing.

Stein's chapter on "Lights and Lighting" is similarly descriptive and generic, summarizing his continuing professional crusade against excessively high artificial illumination levels. Here again, examples are advanced from a diversity of applica-

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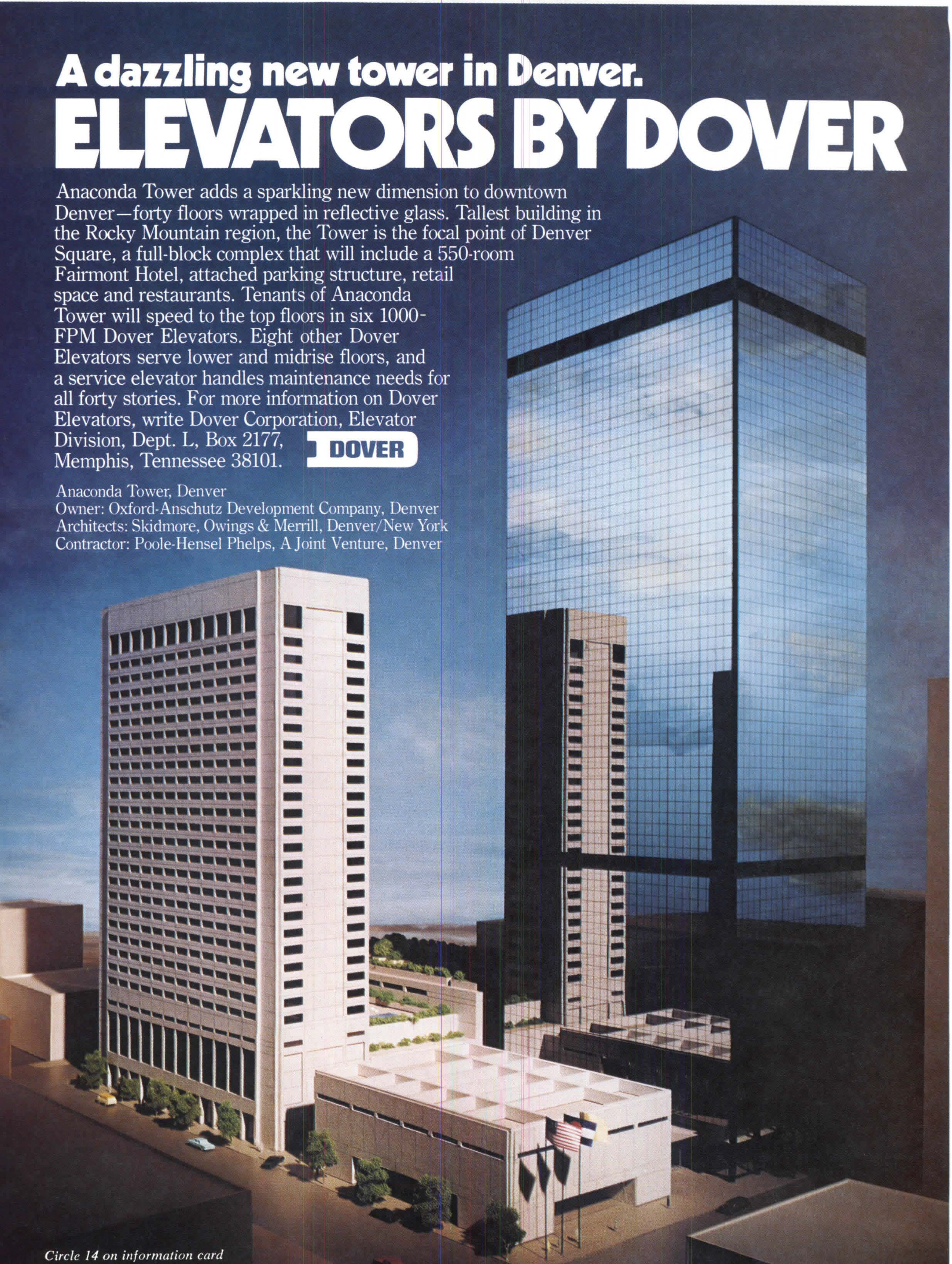
A dazzling new tower in Denver.
ELEVATORS BY DOVER
Anaconda Tower adds a sparkling new dimension to downtown Denver—forty floors wrapped in reflective glass. Tallest building in the Rocky Mountain region, the Tower is the focal point of Denver Square, a full-block complex that will include a 550-room Fairmont Hotel, attached parking structure, retail space and restaurants. Tenants of Anaconda Tower will speed to the top floors in six 1000-FPM Dover Elevators. Eight other Dover Elevators serve lower and midrise floors, and a service elevator handles maintenance needs for all forty stories. For more information on Dover Elevators, write Dover Corporation, Elevator Division, Dept. L, Box 2177, Memphis, Tennessee 38101.
DOVER
Anaconda Tower, Denver
Owner: Oxford-Anschutz Development Company, Denver
Architects: Skidmore, Owings & Merrill, Denver/New York
Contractor: Poole-Hensel Phelps, A Joint Venture, Denver
Circle 14 on information card

Ahearne: An impression that architects 'are far ahead' in understanding energy.

Continued from page 31

I don't think it's a question, for example, that you stop all nuclear and you only have distributive solar. That's not going to be, at least as far as I can see, what the future's going to be. We're going to have to, at least in the foreseeable future, have large baseload electrical generating plants and, given the demands that we see in the United States, a reasonable amount of that is going to have to be nuclear powered. At the same time there's a large potential for distributive use of energy generation, which we have to push.

Q: You can't really say at this point that there will be a larger emphasis on one than the other?

A: No, I think it's a little too early for us to really say that. We have spent the last eight months concentrating on how to address what we think is a very serious problem that the country's going to face by 1985. That's why most of our concentration has been on conservation, on trying to get the increased use of coal, utility rate reform—these are all actions that we believe can make substantial impact by 1985. The nuclear plants, for example, in 1985 will be the ones that are already being built. So, we're not really going to affect that one way or the other. The increased use of solar, we've got a big push to try to do that, and we have this goal that some people say is much too optimistic on how many homes we hope to have using solar by 1985—two and a half million. But, even with that, the amount of energy conserved by the use of solar will be very small. A lot of these other issues are ones that we'll begin to shift to and begin to think about over the next year, two years. But we have to solve the near term problem first, or we're not going to be in good enough economic shape to solve the long term problem.

Q: What do you think architects should be doing to promote this effort?

A: Obviously, trying to place energy conservation as one of the major factors in their approach to design. The impression I have from the architects I've spoken with is that they are probably far ahead of most people, most groups, in understanding what that demands. My sense is that many architects would already have gone much further than they have but that the market reception wasn't there. So, I think they have to do more talking. I hope they will be received much better. They must use the skills that are in many ways unique to them.

Q: What effects do you think energy conservation will have on planning?

A: There'll be an increased emphasis on trying to use mass transit, because it is more efficient utilization of petroleum for transporting people. Increased use of mass transit will tend to push for increased clustering of people. In some ways energy use for residential occupants can be improved by clustering. I believe that there will probably be better recognition of the necessity, just from an economic standpoint, of bringing up some of the rundown sections of cities into better condition. In addition to the social and moral reasons, one also is going to see that there are strict economic reasons for making improvements, because obviously a house that is in very poor shape is going to be a much bigger energy consumer than one which is in good shape. Along with the increased emphasis on energy, there'll be a continued emphasis on environmental standards, and I think this gets to your land use problem. There's an increased sensitivity to the necessity of considering how the land is used, and that applies not only to where you put highways, but where you put large generating plants—that's part of Amory's argument on soft technologies and distributive use. There'll be a number of changes in direction. It's a little too early to tell where it will lead us. □

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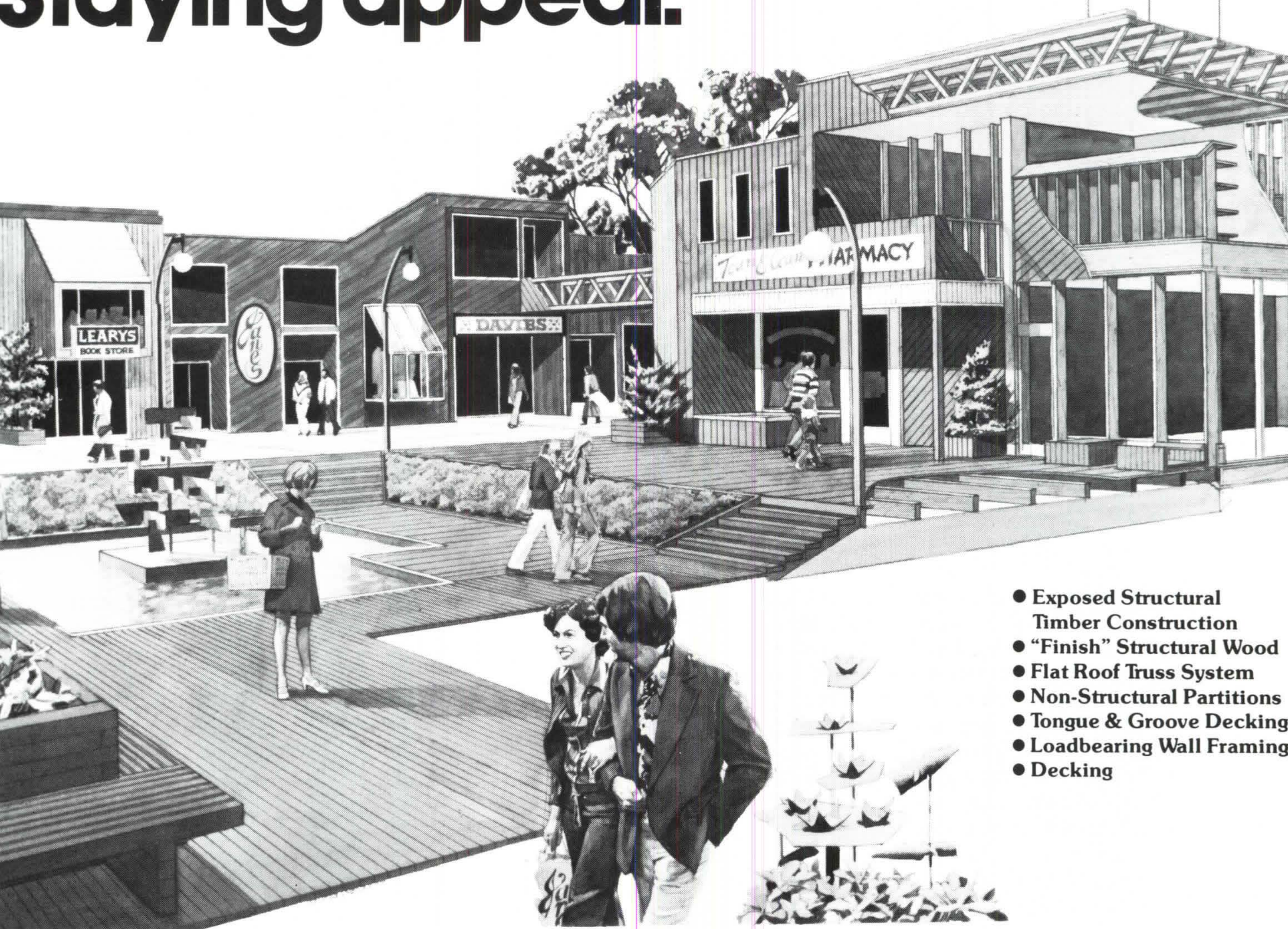

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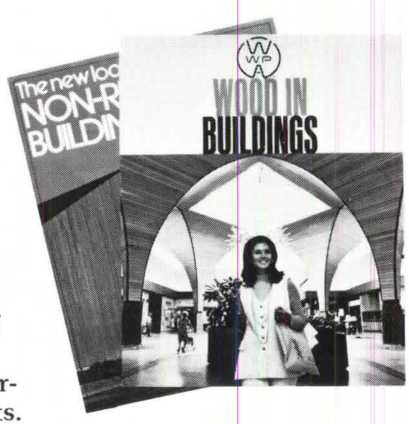

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tions, including high design and intuitive folk solutions. Both perceptive observations and scientific reports give credibility to the arguments, although more references here, as elsewhere, could substantially reinforce the presentation. Stein's own on-site research of the actual lighting conditions of New York City schools could have made this chapter significantly more definitive.

In particular, Stein challenges the standards of the Illuminating Engineering Society of the U.S., both in the type of tasks used to establish standards (such as "reading the fifth carbon") as well as the apparently pseudoscience of eye strain and fatigue (such as the VCP, the "visual comfort probability," and the ESI, "equivalent sphere illumination"). A disappointing omission is the lack of even a mention of daylight illumination techniques—a skill highly developed in British architectural schools and practice, as well as elsewhere in northern Europe, but almost unknown on this continent. Stein does repeatedly identify the desirability of natural lighting, but nowhere does he attach the scientific viability of its calculatable design.

Other chapters are simultaneously both challenging and unconvincing. The one on "Solar Heating versus Electric Heating" hardly faces that issue at all. The half about electric heating is thorough and a bit dry in revealing the dilemma now being encouraged by the utilities. The unrelated half on solar heating, while containing some valuable fragments, is extremely uneven. "A pioneering engineer in Arizona . . . Harold Hays" refers to the inventive chemist Harold Hay, who has lived in Los Angeles now for almost a decade. And the gossip about the heat reflected to neighbors from a new glass-sheated highrise "in a southern city" could refer to the Valley Bank Building experience in Phoenix. But without a substantiating note or reference, we shall never know the particulars. Stein abruptly presents a proposed federal program for the solar heating of houses. His average collector, sized at 50 percent of the served floor area, is extremely generous. And he never gets very far into the passive solar potential. At one stage he confuses high temperatures with efficiencies.

Most disappointing is the chapter on "The Aesthetics of Energy Producing Facilities." It is mostly about the appearance of electrical generating facilities and transmission lines. There are no references to the convincing British publications of the past generation on the same subject. Indeed, some of Stein's pictures could be used to argue an opposite point of view. In answer to the question, "Who sets esthetic criteria?" the whole core of bureaucratic and financial decision makers is missed and only the froth of art and architecture critics is identified.

Stein concludes that "the hope for the future lies in the fundamental reversal in our present commitment to the sealed building." For those of us who never had that commitment, it is a rather loose mandate "toward a natural architecture in peaceful coexistence with our natural universe."

This book will win no prize for design. It is sporadically illustrated by sometimes badly cropped reproductions that are mostly from slides of the author's extensive and inquisitive travels. Illustrations are minimally identified or described and have an uncertain relationship to the text.

Stein has attempted the impossible. He synthesizes significant conclusions that nevertheless fall far short of both his own visions and understanding. The pathos lies in the inadequacy of so well-informed and intentioned an author. In spite of its superficial attempts in such fundamental areas as the effective communication of scientific method and logical argument, this is an important book about the most critical of subjects for tomorrow's architects.

Sun Power: An Introduction to the Applications of Solar Energy. J. C. McVeigh. New York: Pergamon Press, 1977. 208 pp. $10.50 hardbound, $4.95 paperbound.

The flood of solar houses in the past two years has been matched by the tide of solar books. Every publisher seems to have at least one solar title—often rushed into print. At first glance, this book, among

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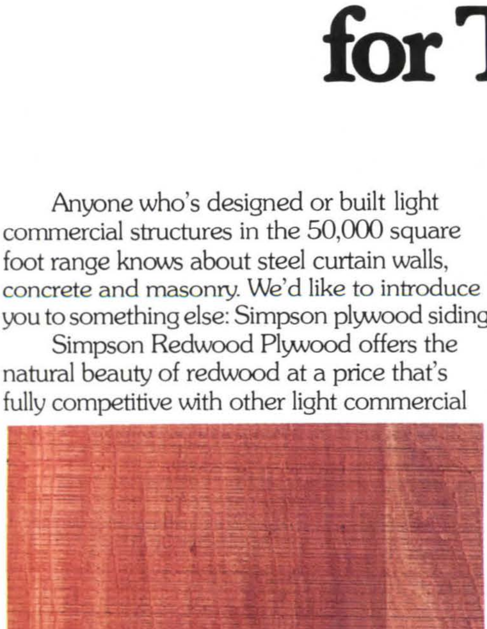

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The California energy program also includes liberal tax credits for solar features.

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weather data were adequate or more consideration should be given to microclimates within the state.

CCAIA President Howard R. Lane worries whether rank-and-file architects have more than passing understanding of the new world they face. "We don't know and we fear what impact this will have," says Lane. "We do not yet know if the expertise to take advantage of these standards is in the purview of an architect, or will it behoove us to hire a consultant? And, are there sufficient numbers of consultants available?" But Lane is not all downbeat. "To expect smooth entry into this new age of energy control would be to expect too much," he acknowledges. Lane agrees that with new contraints come new possibilities.

There's more happening on the energy front in California than just building standards, of course. The state has just launched a massive tax program that promises to make present solar energy technology a reality for thousands of California homeowners and businessmen.

The new solar tax credit, touted as the country's most liberal, makes solar energy for space and water heating almost too lucrative to pass up for many homeowners and businessmen. It is retroactive to Jan. 1977, and allows a credit directly off the bottom of state income taxes of 55 percent of the cost of installing solar equipment, up to a maximum of $3,000. For buildings other than single-family homes, where the cost of the solar system exceeds $6,000, the credit will be 25 percent of the cost or $3,000, whichever is greater. Credits will be permitted for installations completed by the end of 1980.

Under solar tax credit programs being considered at this writing by the federal government, the maximum amount of combined federal and state credits would be less in other states than what California allows. The energy commission has estimated that the tax incentive might prompt 170,000 Californians to install solar devices on their homes and businesses.

Currently, the program is limited mostly to active systems. But passive systems are intended for inclusion, and the energy commission soon will be adopting the first-ever exhaustive certification standards for solar equipment, based on performance. These standards are expected to play a role in the commission's current study of whether to *require* solar devices on some new construction. The commission is not expected to make any such ruling until sometime next year.

There are still other activities in California that open new vistas—and new dangers—for designers. The state public utilities commission is searching for workable designs and applications of "cogeneration," the use of industrial waste heat for beneficial purposes. With the backing of powerful leaders, the legislature next year will consider a $250 million public bond issue to finance the refurbishing of scores of state and local office buildings to make them more energy efficient. California has already enacted the nation's first efficiency standards for such appliances as refrigerators, freezers and room airconditioners. And other standards are on the way.

Then, too, you cannot ignore California's governor, whose long-range visions sometimes reach higher than the clouds, literally. Fascinated by the possibilities of exploring outer space for energy, Governor Edmund G. Brown Jr. scampers around the continent searching for new natural gas supplies. To the governments of Mexico and Canada, his message is the same: "You'd better sell us your gas now because in a few years we're going to have solar satellites and won't need it." □

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Energy

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the many solar alternatives, may be passed by. Its title is a term associated in this country with solar electrical generation, not building applications.

Electrical production is among the topics discussed, as well as solar radiation, methods of economic analysis, photovoltaic cells, wind power, water and air heating applications and space heating. The content is broad and not always logical in sequence.

The book might be dismissed for other reasons. Its text photographically reproduces the author's original typescript, to make the volume available economically and rapidly. Yet, it was published in the spring of 1977, although apparently written in the fall of 1975, with only a few notes from early 1976. The illustrations are inadequate in quantity and mixed in quality. The text could benefit from editing and proofreading.

But most troublesome to American and Canadian readers is the use of Systeme International Units (SI)—in keeping with the British conversion of metric units, as well as the prescribed use of that standard by the International Solar Energy Society. In such a quantifiable field as solar energy, this is appropriate. Yet, the courtesy of including British-American measures in parenthesis after the SI units is the acceptable practice in metric international use. It could have allowed the book some popular success on this continent. It is ironic, perhaps, that most of the data quoted were originally collected in British units which have had to be transposed to a system that many potential readers may find unintelligible. Only occasionally does the author lapse into old measures and familiar standards, as when, for example, discussing a "20,000 gallon pool."

In spite of these serious difficulties, *Sun Power* has much to recommend it, and one hopes it can survive the market to a second, revised edition. In general, it is thorough, accurate, scholarly and clear. The summary of the design of flat plate collectors, together with the discussion of the thermal and temporal qualities of materials, identifies all the critical issues, and is among the best. With more than 350 references, there is a great deal of depth suggested in short summary statements—exactly what an introduction should be. The author, who heads the department of mechanical production engineering at Brighton Polytechnic, is no solar novice. Soundly based in theory, he is also concerned with the practical concerns of solar applications. His balanced judgment has produced a highly informative guide, both for professional architects and engineers and beginning solar students.

The text is based heavily on the author's participation in the International Solar Energy Society's biannual international congress at UCLA in 1975 and his subsequent solar tour of the U.S. Thus, his sources reflect a strong U.S. solar leadership and the published ISES abstracts.

Because of his British base, the author has a particular interest in solar energy at high latitudes. But his inclusion of several British unbuilt solar proposals is disappointing because there are so many already operating buildings that could provide better illustrations of experience. Although "heating degree days" get little recognition as a measure of the climatic demand on buildings, McVeigh is ever conscious of his gray and misty home isles, and he underlines those experiences pertinent to northern Europe, such as the importance of diffuse radiation in overcast places.

Among the most serious omissions is any reference to passive solar as a concept. For instance, the fact that properly designed windows are far more efficient (however you describe that term) than any solar collector is ignored. The only window identified is Steve Baer's "bead wall" window.

Wind enthusiasts will note that the description of the ERDA model zero 100 KW wind generator (p. 157) does not describe the vibration difficulties caused by the downwind location of the blades and how model analysis pinpointed the removal of the stairs in the tower to correct its performance. Designers may critically respond to an illustration of a proposed cowled or ducted "wind-wall" for Sussex. It is shown as a low element beside an awkward five-story point block whose roof would enjoy much stronger wind potential than the roof of a low garage.

Reformers may appreciate McVeigh's developed political and social concepts. And surely some mechanical engineers will writhe at the liberties taken in "quoting" the laws of thermodynamics. Architects may wonder at a few of the esthetic pronouncements, such as French solar houses described as "esthetically unattractive because they were poorly insulated." The description then continues by commending a recent French solar house "as having the general appearance of a classical dwelling."

For those seriously interested in solar energy, the book's defects should not detract from the richness of what is presented. There is a catholic diversity of examples. Architects should be especially interested in McVeigh's critical analyses of the important contributions made by a several select solar buildings. For what it attempts—a global introduction to the present state of solar applications—the book is a worthy beginning and a most useful addition to the professional library.

Alternative Natural Energy Sources in Building Design. Albert J. Davis and Robert P. Schubert. New York: Van Nostrand Reinhold, 1977. 252 pp. $6.95.

During the academic year 1973/74, isolated architectural students, in a variety of unconnected places, psychically swelled the ranks of the energy conscious. Often without professional direction, they scrambled not with a fascination of solar hardware, but with the climatic and human responses of buildings as whole complex systems in which the sun was only the most obvious impact.

Their candid curiosity challenged not their design masters, nor their philosophical preceptors. Rather, it was the technical resources of architectural faculties that were tapped. Benefitting from recently relaxed academic reins of upper level curricula, where students were permitted and even encouraged to develop their own learning exercises, a few wandered into refreshingly unfamiliar waters to discover the Olgyays, Clivis Multrums, Skytherms, Bead Walls and methane gas generators of alternative vocabularies. These new media were seldom synthesized into idealized proposals for integrated life support systems. The inputs were too rich. Rather, they were assembled in notebooks, handsome graphic plates, presentation boards and occasionally in typescripts in Ozalid or Xerox copies to eager but less ambitious classmates.

From such a scenario came this book—the work of two graduates of Virginia Polytechnic Institute, generated in their senior year. When first published with borrowed cash under the authors' own company, "Passive Energy Systems" of Blacksburg, Va., it quickly became a recognized introductory text. Now, three years later, it has easily outlived its competitors to become a modest classic of alternatives in building design. It is now published internationally.

While the title page still reads *Alternative Natural Energy Sources in Building Design,* the new slick cover changes the first word to "Alternate." But it is not either the overlong title or the trim package of typed text and borrowed illustrations that make this the most worthwhile architect's introduction to the field. Rather, it is the simple, straight and solid approach. The easily read text is neither obtuse nor pedantic. Its well-chosen words are obviously the product of much hard work and sincere care. The thoroughness of the material is derived from broadly based sources. Each chapter is concluded with footnotes and extensive references that provide complete access for the reader who wants more.

The soundness of the text is best revealed by reading it three years later. Now in its third printing, the book is advertised as being "updated to include the very latest development." In fact, the updating

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is minute. Only a few recently built projects, such as the PEI Ark, Doug Kelbaugh's Princeton House, the rural Ouroboros house and the Maine Audubon headquarters, have substituted for several unbuilt projects. Otherwise, only the copious references have been modestly supplemented by recent publications. The easy absorption of these new materials and the continued soundness of the text reflect the integrity of the original.

The authors' dedication "goes far deeper than simply the depletion of fossil fuels" established in the first line. Their concern is with the quality of the built environment as it relates to the earth as a "holistic, nonseparate entity." They offer facts, not fantasy, and solutions that are practical now, not projects for the future.

They discuss regional and site adaption; energy conservation in buildings, including the calculation of the thermal load of buildings; natural cooling and ventilation; water and wind power, and solar energy; organic fuels, including gas digestions, fuel cells and wood burning, and integrated systems, illustrating how it has already been done.

Although a vehement piece by Malcolm B. Wells ends the appendix, Davis and Schubert are cool authors. They are well informed and straight. Their information is virtually unflawed; their balanced organization is solid. Their convictions are carried, not by the heat of rhetoric, but by intelligence.

Solar Energy: Technology & Applications. Revised edition. J. Richard Williams. Ann Arbor, Mich.: Ann Arbor Science, 1977. 184 pp. $9.95.

This popular little book for mechanical engineers is now in a revised edition, expanded by 50 percent from the original 1974 version. In spite of its apparent success, however, for less money one can find other books that offer more information, and more direction, for the solar novice.

As an introductory text, it should not be criticized for avoiding solar direct gain, passive solar and many other energy related issues more concerned with architectural design than the selection of mechanical hardware. The author is a mechanical engineer, and his vocation is appropriately reflected in the book's contents.

Even within its restricted field, however, there are disappointments. Terms are often used with a defining introduction. If one already has a high technical understanding, an introduction is not needed. The glossary has omitted such basic words as "emissivity," as well as "reemitting," both terms used in the text. Elsewhere there is no differentiation of "direct" versus "diffuse" radiation. In yet another section, the spectral reflectance of three selective coatings are shown in a graph without the corresponding disposition of the solar spectrum to show what it all means. In other words, the text is often fragmentary without developing a logical outlook from a well-understood base.

Solar Energy appears to repeat facts in a noncommittal way. Thus, the book seems to make no special contribution to the field, either in the timely perception of general themes or in the establishment or realignment of conventional wisdom. None of the information is new; all of the materials, including illustrations, are repeated from other sources, but without enough advantage of professional judgment or interpretation. For example, three typical flat plate collectors are described —one of steel, one of copper and one of aluminum. Their thermal performances are repeated, as well as delivery information, directly from manufacturers' literature. But there is no discussion of materials nor any comparative dialogue to indicate the particular qualities that identify each as being the most appropriate collector for a specific application.

Certainly, there is a need for a basic, but stimulating, introductory solar text from the mechanical equipment point of view. In a field exploding with new activity in which there is an impressive established core of fundamental data, one has to be a special kind of juggler to surpass what continues to be the cheapest and most informative solar introduction—that old (1964) $1.95, softback, chestnut written by Farrington Daniels: *Direct Use of the Sun's Energy.*

Architectural Working Drawings. Ralph W. Liebing and Mimi Ford Paul. New York: Wiley, 1977. 310 pp. $14.95.

Your draftspeople can make or break you, despite the good, bad or indifferent quality of your design. Of the substantial portion of the fee allotted to the drafting room, the lion's share goes into working drawings. Spending (and controlling) this share would challenge Solomon, yet the trickle of helpful literature compares unfavorably with the flood on loftier subjects.

Perhaps there is a message in this year's spate of how-to books on producing drawings, especially for those responsible for institutional inaction in professional societies. Too bad these offerings are more geared to the student and the intern than to the pro responsible for drafting room efficiency and economy. The message I get is that the available books help to fill a void in formal schooling, but that a very large void still exists in the in-depth reporting on the innovative array of time-saving systematic practice techniques and efficient management procedures for projects in the drafting room. Instead of large-scale knowledge sharing, we seem to have continuing small-scale wheel invention in private. Perhaps the heart of the problem is the unwillingness of design professionals to face up to the fact that by far the larger part of their eating money comes from the end of a hard drawing pencil rather than from farther up *la tour d'ivoire.* But enough editorializing on the authors of this book's time.

Works by such authors as Frank Ching, William O'Connell and George and Harry Stegman come to mind as representative of the earlier '70s. In addition to the Liebing and Paul book, which is the subject of this review, 1977 has brought us *Contemporary Architectural Drawing: Residential and Commercial* by Frank Dagostino and *Working Drawing Handbook* by Robert McHugh. Where the former probes the depths from drafting equipment to working drawings to materials and methods of construction, the latter in its terseness skims the top of the waves from standards to process to team drafting.

Architectural Working Drawings probably lies somewhere between these two extremes. Ralph Liebing and Mimi Paul, both adjunct assistant professors of architecture at the University of Cincinnati, confine themselves to the subject which they know well. While a bit loquacious for rapid comprehension, the work nonetheless accomplishes its stated purpose of providing a comprehensive frame of reference for understanding the nature of working drawings. It leans over backward to avoid a hint of standardization, rather suggesting that there is more than one way to a cat-skinning.

The authors are to be applauded for avoiding the trap of trying to impose their wills in proclaiming an architectural dogma. They state forthrightly that "the basic drawings and some of their inherent problems must be understood before a standard method of production can be accepted." I think what they are saying is take a close look at all the ways to do a thing before deciding on an office standard, and then keep looking at new ways so you can change your standards with progress. I also think they are saying that things may be done differently in the two Portlands, sometimes for a very good reason.

I found that I couldn't concentrate on very much of the book at one sitting, as it requires close attention to considerable technical detail and observations, as well as careful study of the copious illustrations. The subjects range widely within the book's fabric. After introductory material on tools, lettering, linework, geometry, symbols, dimensioning and codes, the main subject of working drawings is put into perspective and covered in detail.

There are chapters on the various types of plans, and on elevations, sections and details, many with checklists. Most deal

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with drafting techniques, but some, such as the one on foundation plans, include a short course on what foundations are all about. There are all too brief chapters on new drawing techniques and on reproduction systems. The book closes with a group of appendixes with some handy-dandy useful tables and geometric formulas. The material at the very end is unfortunate, especially a list of trade associations with out-of-date addresses, an inadequate glossary and a suggested reading list rife with errors. Your public library has much better material. But all in all, the book is good.

The authors make a very important point worth noting: "The more data shown on the drawing, the more knowledge and experience the architect must have." Think on it. *Robert Allan Class, AIA, Director, Practice Division, at AIA*

Soviet Architecture Today. Text by A. Ikonnikov; photographs by B. Fabritsky and I. Shmeliov; translated by B. Meerovich. Leningrad: Aurora Art Publishers, 1975. 190 pp. $35 (distributed by Four Continents Books, Inc., 149 Fifth Ave., New York, N.Y. 10010).

In spite of more cordial diplomatic relations between the U.S. and the Soviet Union and an increase in cultural exchanges, we have not seen much of the contemporary Soviet architecture in this country. This glossy picture album attempts to fill the gap.

It gives a clear picture of what the Soviets feel are their best efforts after they stopped trying to imitate historical models and returned to the modern movement.

The text is brief (22 pages) and wooden in translation, but admits to the errors of earlier years. It claims that the postwar years brought about a form of modern architecture more concerned with esthetic or "artistic problems." Nevertheless, solid faith is proclaimed in the "all conquering power of reason, embodied in modern technology."

There are more than 150 pictures in glowing color, most of them full-page. They are worth looking at. Unhappily for architect readers, there are no plans or other drawings. The overall impression is clear, however. In the '60s and '70s, the Soviet architects have been designing buildings that look like what was being built in the West in the late '40s and early '50s. *Bernard P. Spring, FAIA*

Problem Seeking: An Architectural Programming Primer. William Peña, with William Caudill and John Focke. Boston: Cahners Books, 1977. $14.95 (available to AIA members for $13.50 from the AIA department of publications marketing).

This book gives comprehensive coverage to the programming method in architectural design that has been practiced at CRS Design Associates in Houston for many years. "Don't look in this book for a cafeteria of methods from which to pick and choose," warns Peña. He advises picking only one method—this one or another—and mastering it through persistent practice.

Programming, says Peña, is a method in inquiry to assure a comprehensive approach toward the definition of the whole problem. The end product "is the statement of the problem which serves as the first step in design." Programming is an interrelated five-step process, as described in this book: goals, facts, concepts, needs and problem. These things interrelate with function, form, economy and time. Programming honors the client's "goals, aspirations, his ideas, his needs, his land and his money." In the decision-making process, it is the client who has major responsibility, and the programmer is there to help him in making decisions that will minimize the number of alternative design solutions, thus saving time and money, Peña says.

The method is presented simply and thoroughly, with case studies given to clarify certain points. Among other things, the book tells how to evaluate the programming package, how to decide on automated techniques, how to conduct work sessions.

Forrest Wilson, AIA, says that this "should be a bread-and-butter book," especially for the architect who works in a small firm. And in the foreword, John M. McGinty, FAIA, says that its "simplicity of statement and the clarity of language obscure the vast amount of thought and experience that went into the development of the process."

After Mies: Mies van der Rohe—Teaching and Principles. Werner Blaser. New York: Van Nostrand Reinhold, 1977. 291 pp. $19.95, paperbound.

The controversy over how to assess Ludwig Mies van der Rohe—let alone the movement for which he was partly responsible—has only started. Now almost a half-century since his emergence as an architect of international reputation and a decade after his death, critical examination of his career has largely been so far curiously shallow. Werner Blaser's *After Mies* should, therefore, be welcome. This brief presentation of teaching principles associated with Mies and their impact on "followers" goes far beyond picture-book literature. But, however promising, Blaser's effort remains an introduction—a somewhat flawed one at that.

Mies wrote little, a contrast to fellow giants such as Wright, Gropius or Le Corbusier. First, at Germany's Bauhaus and then at the Illinois Institute of Technology, Mies established a method of architectural instruction summarized in a sparse, sometimes laconic prose. With Mies, studio criticism, professional designs and educational organization were media sufficient to express his principles.

Blaser's solution to Mies's silence falls into two general categories. First, the handful of documents attributable directly to Mies are fleshed out with material from a few IIT colleagues. Some of this commentary—on programs like planning, history and visual training—is from sources contemporary to Mies; some is retrospective. Among contributors worth mentioning here are Bauhaus faculty member Walter Peterhans and Mies's successor at IIT, George Danforth. Some historical background is furnished by Blaser himself, and the author appends data such as an inventory of Mies's library.

But most interesting—and of some significance to architectural historiography—is the other side of Blaser's approach. A number of student projects are published, including theses, planning problems, drawings of historic buildings and completed post-IIT work, organized around the theme of what Blaser elects to call the Second School of Chicago Architecture.

Criticism of the "school" for its static handling of the glass and steel program is a preoccupation with Blaser and some other contributors. The range of the student work reproduced—from adaptive reuse of the Monadnock to elegant theses by Jacques Brownson and Myron Goldsmith—does much to refute that generalization. This reliance on IIT students' reactions to Mies' principles—a history from the bottom up—is an effective way of measuring architectural influence likely to gain more currency with historians. Critics who blame Mies for every glass box (like blaming Ruskin for polychromy and pointed arches) should pay close attention to *After Mies.*

Yet, Blaser misses a good deal. Aside from a minor clarification of the origins of Mies's seminal Armour Institute address and the assistance he got from Bauhaus colleagues in the transition to America, the whole matter of Mies's years in Germany is ignored. Surely, Blaser's paradigm is applicable to Mies's Dessau school. But what will concern many readers is Blaser's assumption that IIT students are the way they are just because of IIT. Students do not enter training *tabula rasa.* The backgrounds of the architecture students at IIT—places of birth and pre-IIT training, for example—are crucial to a complete portrait of Mies's impact. The role of an instructor, even one of the rank of Mies, is not readily inferred from students' projects.

Blaser further assumes that IIT is the way it is just because of Mies. Little effort

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WATTS NEW

ENERGY MANAGEMENT VIEWS FROM THE NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION VOL. 1 NO. 4

ENERGINEERS* FIND EFFICIENCIES IN RELIGHTING

The power to create all the lighting in the United States consumes only about 5 percent of all energy produced. And since about 68 percent of all electricity is generated from coal, nuclear, and hydro sources one can't really say that lighting provides a major opportunity for saving scarce oil and gas. But the cost of electricity is climbing, and lighting does utilize some fossil fuels, so it doesn't make sense to squander the lighting power we do use. Instead of emotionally pulling out lamps and darkening work areas to the point of reducing crucial productivity, energineers should be looking for ways to improve the energy efficiency of existing lighting systems. Fortunately, lighting modernization affords opportunities for saving both fuels and money. Here is what energineers need to know about it.

Traditionally, lighting users have concentrated on footcandle measurements as criteria for lighting design and specification. Recent new scientific developments indicate that there is a better way. Several, in fact. The idea now is to use the quantity of light as just one of several factors in designing for the quality of light. Quality lighting energineers now should consider undesirable veiling reflections, uncomfortable glare, and the selection of the proper amount of light for the task to be performed. New standards are available to the lighting designer such as visual comfort probability and equivalent sphere illumination. With these design tools, the user can obtain a much more pleasing work space, lighted for maximum tenant comfort and the highest operational productivity. It isn't so much that these design methods are revolutionary; but with the cost of electricity rising rapidly, it becomes more prudent to invest in the small additional design cost.

Energineers should also consider the source of light being specified. Selection of lamps which are most efficient as measured in terms of output lumens per watt is an effective means of conserving energy. It also saves money over the life of the lamps. As can be seen in Figure 1, fluorescent, metal halide, and sodium lamps—all high intensity

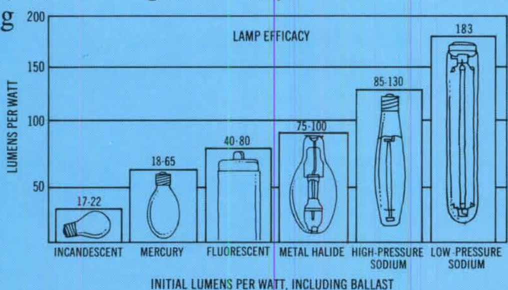

FIGURE 1. EFFICACIES OF LIGHT SOURCES

discharge (HID)—sources are the more efficient. This doesn't mean that all incandescent lamps should be automatically discarded. In fact some applications still are best achieved with Edison's "light in a bottle". The higher brightness and relative difficulty of distributing lumen output of HID sources has now been controlled by new fixtures. So it is not unusual to find them being aesthetically applied in many office and work areas that only recently would not have been recommended. Even the unique color qualities of HID sources are providing unexpected benefits when coordinated with appropriate interior decorations.

Also, energineers should consider the long range life cycle costs of lighting as well as the first installation cost. Figure 2 shows the total estimated 10-year costs

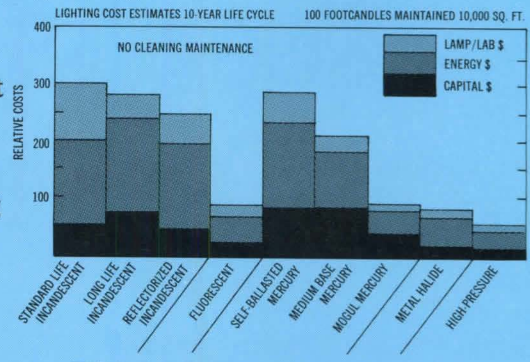

FIGURE 2. COMPARATIVE 10-YEAR LIGHTING COSTS

of producing one million lumens of usable light. This graph assumes no cleaning maintenance, a factor that no professional energineer should overlook. One of the primary considerations is the degree of lighting degradation occurring with the build-up of dust and the natural aging of the lamp. The maintenance philosophy has not changed in many years. It still centers on economic trade-offs between periodic cleaning and the group or spot replacement of older lamps. Fortunately, suppliers have developed elaborate decision models that are available to make life-cycle costing analysis easier.

Effective lighting controls can also have a beneficial effect on overall system costs. Selective switching, dimmers, and timed controls to automatically remove human judgement (or lack of it) should also be considered. Rising costs should convince energineers that these energy efficient relighting ideas are worth investigating. A qualified electrical contractor in your area will be glad to help. Just ask.

WHEN YOU PLAN FOR ELECTRICITY, PLAN WITH A PROFESSIONAL

*Energineers . . . designers, specifiers, users and installers of energy efficient building systems.

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is made to frame the full faculty's context. Why were they recruited and what sort of influence might have they exerted on the "school?" And what of indigenous American architectural forces and their significance in shaping Mies's legacy? The key to this may be in a larger treatment of the faculty surrounding him.

A word of warning about this book's production is warranted. Certainly, few books have been designed with so little regard for the reader. For example, chapter breaks and other graphic pacing are nonexistent and copy is confined to one side of the page. Supposedly evoking a purity akin to Mies's fondness for "clean" detail, this layout is actually a puerile nuisance. Libraries wishing to order this book should have generous budgets. Because it is softbound and the pages are so poorly glued, *After Mies* will not survive a single reading. Unfortunately, this book's low standard of production and high cost will inevitably limit its creditable contribution to the field.

Mies demands more firmness from both scholars and publishers. Werner Blaser, meanwhile, has kept the flame alive and provided valuable direction. *Douglas L. Stern, University of Virginia, Charlottesville*

Omaha City Architecture. Omaha: Landmarks, Inc., and the Junior League of Omaha, Inc., 1977. 204 pp. No price given.

With photographs and captions, this book surveys the architecture of Omaha. It documents a concern, says George Haecker, AIA, who represents Landmarks, Inc., in joint chairmanship for the preparation of the book, with Gretchen Reeder of the Junior League. The concern, he says, is Omaha's future. The people involved in this commendable effort want to keep some of the "rich tapestry" of the city's architecture—not all the old structures, but "just the best." They want to judge whether Omaha "would be greater or lesser without the structures represented in this book." Presented are about 300 buildings which cover an array of building types arranged by location in city neighborhoods. The year 1926 is the cut-off date. We think Omaha would surely be "lesser" without this evidence of growth and change.

The Aeolic Style in Architecture. Philip C. Betancourt. Princeton, N.J.: Princeton University Press, 1977. 169 pp. $25.

The Aeolic capital is a very early form of the Ionic capital, having paired vertically rising volutes. It has been almost a century since the first Aeolic capital was unearthed in modern times, but no comprehensive account of it has ever been undertaken, says Betancourt, whose book serves to remedy that lacuna. He protests that his study "makes no pretense at being the full treatment the style deserves," saying that information is still insufficient for a complete analysis. His book, however, is an authoritative study of an architectural style that flourished in the Greek region of Aeolis and "extended as far west as Spain and as far east as the limits of Alexander's empire."

Chronologically, the Aeolic style started in the bronze age, and Betancourt gives this background before moving on to consider its development in three geographical areas: Palestine, the Halikarnassos Peninsula and Greece. The architecture is considered against the historical background of each region, as well as in relationship to its architectural contexts. The final section summarizes the stylistic development of Aeolic elements in the Eastern Mediterranean and discusses the relationship between Aeolic and Ionic orders. There are maps and drawings throughout the book and at the end are 71 plates which show plaques with Aeolic balustrades, Attic vases with Aeolic representations and Northeast Aegean vases with Aeolic columns.

Metabolism in Architecture. Kisho Kurokawa. Boulder, Colo.: Westview Press, 1977. 208 pp. $22.50.

A group of young architects, led by Kisho Kurokawa, in 1960 gave the name "metabolism" to the design of plug-in buildings and "capsule" architecture. The philosophy "compared buildings and cities to an energy process found in all of life: the cycles of change, the constant renewal and destruction of organic tissue," explains Charles Jencks in the introduction to this book. "Metabolic theory distinguishes between different rates of obsolescence . . . so that one doesn't have to destroy a whole building, or part of a city, every time one part breaks down."

This book contains what Kurokawa considers to be his most important works (in both architecture and theoretical writing, he says) from 1960 to 1975. He has divided the book into four parts and considers the philosophy of metabolism, its origin and history; capsule architecture and prefabrication; architecture of the streets, and internal space, or "media space," which Kurokawa calls a "shadow of the substance."

This is a book to ponder over. As Jencks says, "Kurokawa forces us to reexamine stereotypes that go back at least 100 years, not only concerning Japan, but about what an individual can be."

Guidelines of Functional Programing, Equipping and Designing Hospital Outpatient & Emergency Activities. Washington, D.C.: Department of Health, Education and Welfare, 1977. 217 pp. $3.10 (For sale by the U.S. Government Printing Office, Washington, D.C. 20402.)

During the past decade, this book reports, emergency visits to hospitals increased by more than 260 percent and outpatient clinic attendance rose by nearly 80 percent. The expanded use of outpatient and emergency services brings special need for in-depth information about designing and equipping such medical facilities.

The book is also timely because of emphasis placed on outpatient facilities by the National Health Planning and Resources Development Act of 1974 (PL 93-641). This publication is an expanded version of a 1971 book entitled *Hospital Outpatient and Emergency Activities.* It updates worksheets, designed to assist planners, which appeared in the earlier document, and presents additional chapters on possible approaches to designing and equipping a hypothetical outpatient and emergency facility.

The book is not intended as applicable for every individual project; rather, principles are set forth for a "logical procedure and methodology."

Human Response to Tall Buildings. Edited by Donald J. Conway. Stroudsburg, Pa.: Dowden, Hutchinson & Ross, 1977. 362 pp. $25.

"Boston is not likely to have another skyscraper in the coming decade. New York seems to be overbuilt, as does Atlanta and Minneapolis. But Des Moines just opened a soaring structure that can be seen from the cornfields miles away, strongly marking central city." So writes Richard P. Dober, AIP, in a foreword to this book, edited by Donald J. Conway, AIA, formerly AIA's director of research. Dober says there is "no dearth of opportunities to do something better" in the way of highrises, and that advantage should be taken "of the insights and experiences" collected in this book.

In 1974, AIA and the Joint Committee on Tall Buildings jointly sponsored a conference on "Human Response to Tall Buildings." This book includes the multidisciplinary presentations by a variety of experts at the conference.

The book is divided into four topical sections. The first is an overview and commentary of social research on the psychological and sociological impact of tall habitats. The second section, in eight papers, concerns tall buildings and their neighborhoods—their social and visual impact. Part 3 contains 10 articles on housing and livability of tall buildings, and here are studies of how highrises affect children, the family, the elderly. Part 4 addresses in seven papers human and technical response to emergency situations when natural disasters occur. □


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examination to practice law and hopes to take the examination for architectural licensing soon. Devaney has worked in architectural offices, a community design center and a housing law clinic and as a judicial clerk.

Changes in Community Development Law Listed

The Housing and Community Development Act of 1977, signed into law in October, extends for another three years the community development block grants program first enacted in 1974 (*see* Sept., p. 48 and Nov., p. 11). The legislation, which is HUD's primary vehicle for the revitalization of American cities, authorizes $10.95 billion for the next three fiscal years: $3.5 billion in 1978, $3.65 billion in 1979 and $3.8 billion in 1980.

The new act makes a number of significant changes in housing and community development and related authorities. Among them:

• A major change from the 1974 act is that an alternative formula for the allocation of block grant funds can be used, thus permitting older cities to receive more funds. Under the 1974 act, population weighs at 25 percent, overcrowded housing at 25 percent and poverty at 50 percent. Now, metropolitan cities and urban counties may elect to use another formula that weighs population growth lag at 20 percent, poverty at 30 percent and housing age at 50 percent.

• Smaller cities are still eligible to receive single-purpose, multiyear grants, but the new act encourages them to approach housing and community development problems in a more comprehensive manner, thus assuring a more dependable source of funds commensurate with existing need. The secretary of HUD is directed under the law to conduct a study and report to the President and Congress within one year on recommendations for the formation of a national policy on the developmental needs in small cities.

• A major new initiative in the new law is for one-time urban development action grants to assist the nation's most distressed urban areas. These grants, which are given in addition to other federal assistance, are authorized at a $400 million level for each of the next three fiscal years. Aimed at attracting private investment, the grants will help alleviate physical deterioration and economic decline in two ways: through economic development in areas of population outmigration and stagnating or declining tax base and through reclamation projects in neighborhoods where there is excessive housing abandonment or deterioration. These grants are not limited to activities otherwise eligible under the block grant program and may include additional community development and conservation activities.

The primary criteria for eligibility for urban development action grants are age of housing, growth lag and extent of poverty, as well as extent of housing abandonment, outmigration, average income and declining tax base. The recipients must demonstrate that they have achieved results in providing jobs and equal opportunity in housing for low- and moderate-income people. Applications must also contain a comprehensive action plan and identify means to alleviate physical and economic distress.

• The new law includes a financial settlement fund, authorized at $100 million for each of the next three fiscal years, to give assistance to local governments in continuing efforts to close out such old categorical grants as urban renewal projects.

• Economic development activities under the new law have been clarified and expanded. Public and private nonprofit entities may now use block grant funds for such purposes as the acquisition, construction, reconstruction, rehabilitation or installation of public facilities, site improvements and utilities and commercial or industrial buildings and other commercial or industrial improvements. Cities may now fund local development corporations, neighborhood and nonprofit organizations or small business investment companies to carry out neighborhood revitalization or economic development projects that will aid block grant objectives.

• For the improvement of the nation's housing, the new law provides for two housing programs for low- and moderate-income people: the Section 8 rental assistance program and the traditional public housing program. The additional funding for Section 8 and public housing programs is expected to provide decent housing for about 344,000 low- and moderate-income people.

• The new law increases Federal Housing Authority maximum mortgage amounts on single-family homes from $45,000 to $60,000. It also lowers down payment requirements. It retains the requirement for a down payment of 3 percent of the first $25,000 on the appraised value of a home, but allows a down payment of only 5 percent above the first $25,000.

The new law has many other provisions. For example, it increases funds for urban homesteading from $5 to $15 million. Under this program, homes from HUD's inventory of foreclosed dwellings go to homesteaders for a nominal payment, with the homesteaders agreeing to fix them up and live in them a specified time.

The act also requires a biennial report

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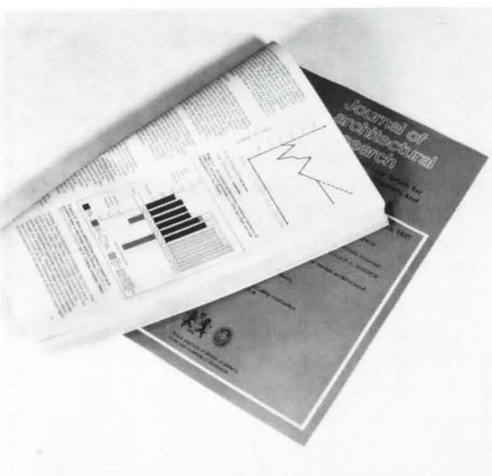
“A journal of contemporary architectural research which is relevant primarily to advanced practitioners and planners.”



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formulating a national urban policy of sound, orderly and more balanced development, replacing the urban growth report. The first report, due in February, must focus on significant trends over the previous two years in patterns of urban development and summarize problems facing the nation as a result of trends. The act also extends to Sept. 30, 1978, the authority of the HUD secretary to make financial assistance available to private new community developers and state land development agencies for planning new community development programs.

Experimental Solar House Built on the MIT Campus

An experimental, passive solar-heated building that collects, stores and radiates heat, without any special equipment and only through use of special building materials will be ready for occupancy in January on the campus of the Massachusetts Institute of Technology. The one-story, 900-square-foot building, expected to supply more than 85 percent of its own heat even in Northern climes, will be used as a classroom and studio by the department of architecture.

The new materials have been developed in recent years at MIT and by various industrial concerns. Among them:

- A new type of window with special coated plastic inserted between two sheets of glass, creating air space. The window loses one-fourth the amount of heat of ordinary double-pane glass, with only a 20 percent reduction in transparency.
- Ceiling tiles only one inch thick with heat-holding ability of six to seven inches of concrete. A chemical core (an inner layer) melts at room temperature, absorbing solar energy during the day and keeping a room at constant temperature to avoid wasted heat. When the room temperature starts to drop at night, the core returns to a solidified state and gives off heat stored during the day.
- Sunlight reflecting louvers, narrower than usual and mirrored on their top surfaces, bring as much sunlight as possible directly to the ceiling tiles. By aiming sunlight upward during the day, the blinds eliminate glare; at night, they can be closed for privacy. The angle of the blinds is adjusted once a month, according to the sun's position, to reflect the maximum amount of sunlight.

As additional heat retainers, some of the special tiles are used in settees beneath the windows.

According to Timothy E. Johnson, a research associate in the department of architecture, the experimental building is designed "to thermally mimic either a detached house or an apartment so that solar heating for highrise construction can also be studied. For this reason, neither the roof nor the east, west or north walls will be used for solar heating. A total of eight double-paned windows will be arrayed on the south side of the building."

He says that the passive approach advantage is that the "payback is expected to be three times faster than with the flat-plate collector method, with its costly pumps and fans and other equipment." The MIT materials are "a bit more expensive than present construction materials," but it "should take only nine or ten years to get your investment back when compared with oil heating, rather than 30 years. In addition, you can now apply the passive approach to apartment buildings as well as single-family homes."

The $100,000 project was funded by the U.S. Energy Research Development Administration (now the Department of Energy) and the MIT Godfrey L. Cabot research in solar energy fund.

Openings at Headquarters

Two positions are open at Institute headquarters: a deputy director of professional interest programs and an assistant director of continuing education programs.

The deputy director of professional interest programs will be responsible for the production of substantive reports as the basis for AIA initiatives in such areas as housing, architecture for health and interior architecture. The deputy director will work closely with various AIA committees. Applicants should have five years of broad architectural experience and the ability to investigate, write and edit; a professional license to practice is desirable. Résumés may be sent to Maurice Payne, AIA, director of professional interest programs, Institute headquarters.

The assistant director of continuing education programs will be responsible for the management of the educational products of the department. Applicants should have at minimum a bachelor's degree, preferably in architecture, and the ability to meet comfortably with diverse groups; prior teaching experience and knowledge of architectural education are considered helpful. Résumés may be sent to Peter Wood, director of continuing education programs, AIA headquarters.

Department of Energy Officials Appointed

The Department of Energy (DOE) has begun its operations with a budget of $10.4 billion and 20,000 employees. Eleven key officials were recently sworn in who will work directly under Energy Secretary James R. Schlesinger. Schlesinger has worked as secretary of Defense, chairman of the Atomic Energy Commission (AEC) and director of the Central Intelligence Agency.

The new department is composed of the Energy Research and Development Administration (ERDA) and the Federal Energy Administration (FEA). In addition, DOE has acquired the authority to set energy conservation standards for new buildings from HUD, functions related to industrial energy conservation from the Department of Commerce and various energy related sections from the Interstate Commerce Commission and the Departments of Interior and Defense.

DOE is organized into research, development and application divisions rather than strictly by fuel types such as solar, fossil, nuclear, etc. Under this system it is hoped that promising technologies will reach the commercial application stage more rapidly. To direct this effort, Secretary Schlesinger has appointed Dale D. Myers, formerly of Rockwell International Corp., who was an associate administrator in the Apollo space program, as undersecretary of energy.

Among other DOE appointees:

- John Ahearne, an engineer and physicist, assisted in the formulation of the Administration's energy plan and is now a special assistant to Secretary Schlesinger for conservation and nuclear energy (see p. 22). *continued on page 91*

Case Study No. 18*

Wind-Tunnel Tests and Electric Heat Recovery System Make Glass Curtain Walls a Practical Choice for Auto Maker's New Headquarters

Made wary by the poor experience of some all-glass skyscrapers, designers of the AMC corporate office tower devised a curtain wall system that can shrug off hurricane-force winds.

Truncated corners of tower add interest to square format chosen to conserve energy.

Southfield, Mich. Car buffs familiar with the sporty little Pacer manufactured by American Motors Corporation may see a family resemblance in the company's new office structure in this Detroit suburb. The Pacer is noted for its generous expanses of contoured safety glass that give the driver an extraordinary degree of visibility. Glass, too, is the most striking architectural feature of the office tower. Virtually the entire structure—even mullions and spandrels—is sheathed in a mirror-like skin of chrome reflective glass.

That its sponsors would want an all-glass building in the first place is not hard to understand. To cite just one reason, it provides an extremely pleasing work environment. The ever-changing panoramic views of the Michigan terrain are a delightful diversion during a routine workday.

In these days, however, the decision to actually build such a structure is not lightly made. For one thing, there is the matter of heat losses and gains and their effect on energy consumption. Then, there is the more dramatic, almost frightening problem of recurrent wind-shattered glass that has plagued some high rises recently. These are added concerns for the architectural and engineering sciences and beyond the state of the art of just a few years ago.

American Center may well be the first new project in which these concerns are fully met thanks to a double-thrust design strategy. The architects developed a window system with high structural integrity that keeps heat loss to a minimum. Then, the engineers followed up with a sophisticated electric HVAC system that largely offsets the reduced heat loss with "free" energy recovered from the building's core areas.

Different Model. Unlike the Pacer, which is classified as "subcompact", the American Center complex is full-size. Set on a 33-acre site, the office tower contains 440,000 square feet of floor space. A contiguous two-level retail shopping mall encloses an additional 70,000 square feet. The 25-story tower rises 338 feet above grade and is one of Michigan's tallest buildings outside of Detroit itself.

The top eight floors of the tower accommodate the executive headquarters of AMC. The remaining 15 levels are available for lease to outside firms. In anticipation of this joint tenancy, the entrance lobby was carefully planned to identify strongly with the business image of AMC while providing subtle, logical separation between corporate and tenant traffic.

Floors and walls of the lobby, which

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

Features such as heat recovery and "free" cooling in combination with glass that insulates and reflects enable this all-glass structure to minimize the use of energy.

Architect William Jarratt was convinced that the aesthetics of the building should be representative of his client's products.

occupies the entire ground level of the tower, are of dark gray natural cleft slate. This low-maintenance material serves as a purposely bland backdrop for the brightly hued assortment of new and antique cars on permanent display. The 23-foot high ceiling of highly polished near-black anodized aluminum sheets reflects the display and activities below. Elevators serving the lower tenant floors start at this level.

Overview. Two escalators lead to a 4000-square-foot mezzanine. This carpeted, richly furnished area is the reception and information center for American Motors. It is a vantage point for viewing the show cars and has comfortable seating groups for quiet talks between visitors and company personnel. The six elevators serving the ten highest floors leave from the mezzanine.

The gray slate of the lobby is carried through onto the outside walls of the shopping mall. There, the slate's contrasting color and texture provide a restrained accent that relieves the forceful brilliance of the gleaming tower.

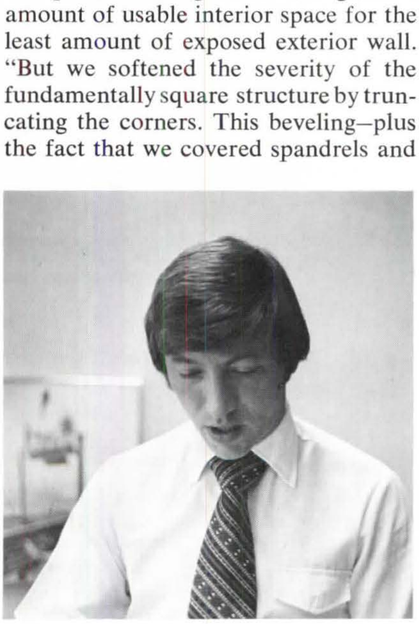
The retail mall houses a variety of stores and services including the main office of Detroit Bank—Southfield. Clustered on the mall's second level are the eating facilities: a Marriott restaurant and cocktail lounge, cafeteria and fast-food counter. Some other commercial tenants are specialty clothing stores, barber and beauty shops, a brokerage office and a gift shop.

All of the office tower services—elevators, washrooms, stairwells and utilities—are housed in the compact central core. The core structure and exterior steel frame provide all needed support for the rugged floor joists. Thus, office spaces are completely free of interior columns so there is complete flexibility in partition layout along the outlines of the standard five-foot by five-foot modules. Within each module there is easy access to connections for HVAC, electrical, telephone and lighting services.

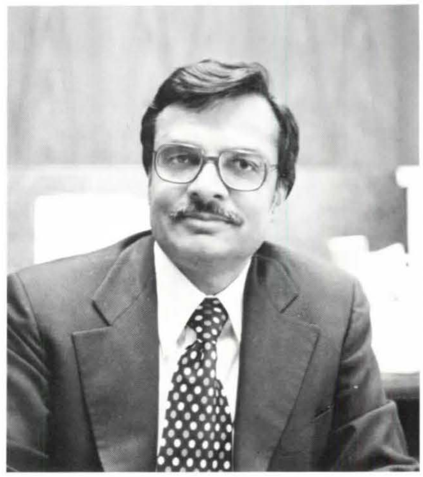
A Pretty Face. A fixed glass curtain was selected for the exterior of the building because of its aesthetic qualities, ease of construction, light weight (thus overall reduction in building costs), and the pleasant environment that visibility and dramatic views would bring to the building occupants.

"Aesthetics was possibly the most important reason," recalls project architect William Jarratt of Smith, Hinchman & Grylls Associates, Inc. "The building was to be the most prominent structure for miles around and, hopefully, would stand as a symbol of the beauty and quality the client puts into its products. And, once we opted for the glass curtain wall, other aspects of the project quickly fell into line. These were the basic features that would have to be provided to make the overall design consistent with today's energy conservation objectives."

To minimize heat loss and solar heat gains a square floor plan was selected. A square building offers the greatest amount of usable interior space for the least amount of exposed exterior wall. "But we softened the severity of the fundamentally square structure by truncating the corners. This beveling—plus the fact that we covered spandrels and mullions with reflective glass as well—moves the building's perspective away from that of a simple shaft and in the direction of a multi-faceted prism, which visually is a lot more interesting."



C&W's William Allen hoped to make the building manager's job a bit easier by writing some of the window specifications.



Engineer Hem Gupta helped make glass curtain wall construction a reasonable choice with energy-conserving HVAC system.

Glass Watchers. The tower's skin incorporates two types of reflective insulating glass which appear identical from the outside. The floor-to-ceiling "vision" sections consist of two ¼-inch thick layers separated by a ½-inch dead air space. One surface of the glass is coated and acts as a one-way mirror reflecting over 80 percent of the direct solar heat load. The double glass covering the steel beams, on the other hand, forms an opaque mirror and is backed by compressed mineral fiber insulation.

One firm having a great direct interest in all of this glass is Cushman & Wakefield, Inc. The company was retained by AMC as project consultants and given overall responsibility for developing American Center. Cushman & Wakefield participated in site acquisition, architect selection, evaluating bids and supervision of design and construction. They continue on today as managing agents.

"Looking ahead to the time when we'd assume the role of building managers," recalled C&W's Bill Allen recently, "we wrote into the window system specifications some provisions that would help us with the job. We asked, for example, that fixed glass be installed for a number of reasons. It would assure a minimum of air leakage and consequent energy loss. It would permit us to maintain a highly manageable inside environment, not subject to the vagaries of windows being opened and closed at random with the inevitable unbalanced air distribution problems that would result. Fixed sash would also facilitate efficient mechanical cleaning of the exterior by means of automatic equipment."

Perils of Panorama. "But our most vital responsibility concerning the window system was to make sure that it could stand up to wind conditions this area is noted for. We certainly wanted to avoid any of the serious mishaps that have occurred recently in some all-glass skyscrapers."

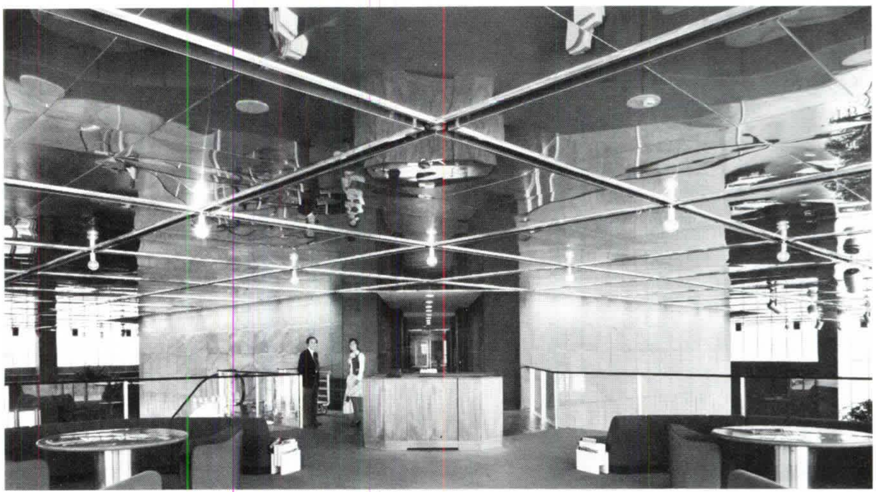
On the recommendation of the architects and C&W, Peter Corsell Associates, specialists in curtain wall troubleshooting, were called in to consult on the design of American Center. "The first thing we did," says Corsell's Russell Buczkowski, "was to determine exactly what wind velocity we could expect. By statistical analysis we extrapolated U.S. Weather Service data for the preceding 10-year period to predict the strongest winds that could be expected locally for the next 100 years.

"The peaks we were interested in are not those recorded during momentary gusts but those that will be sustained continuously for at least a minute. The one-minute maximum we computed for our tests was 95 mph at an elevation of 30 feet."

Not Just Any Tunnel. The next step was to build a 1 to 200 scale model of the American Center tower. The model was instrumented, then tested in a wind tunnel capable of simulating wind effects in the boundary layer (the layer of the earth's atmosphere extending to an altitude of 3000 feet).

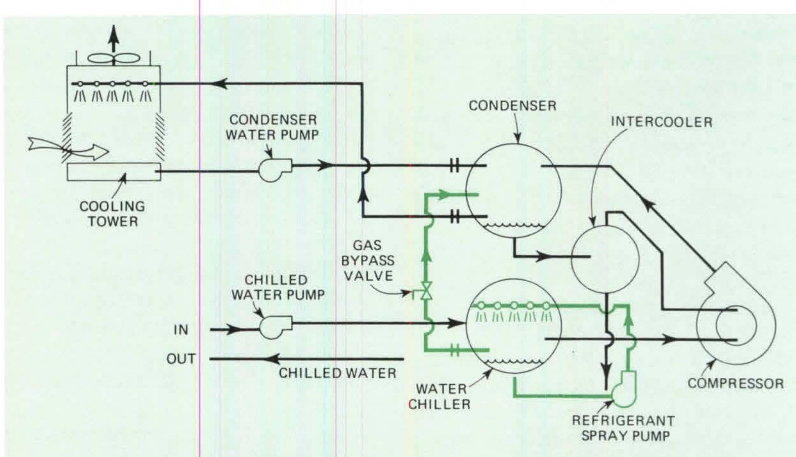
Currently there are few facilities suited for this type of work. Aerospace wind tunnels, which are designed for shear layer testing, aren't of much use. For one thing, the cross section of the usual aerospace wind tunnel isn't large enough to accommodate a scale model of a tall building and its surrounding terrain. And they aren't long enough. Boundary layer testing requires a considerable length of space both upstream and downstream of the model. Upstream space is needed for placing "roughness elements," devices that create three-dimensional turbulence simulating the type that will be caused in real life by the topography within a ¼-mile radius of the tower. Downstream the tunnel has to extend long enough to allow the airflow to resume a homogeneous pattern after buffeting the model.

With this phase of the testing process completed, Buczkowski prepared a table showing the various pressures that the tower surfaces will be subjected to by a 95-mph wind. These ranged from 10 to 85 pounds per square foot. The tabulated data were given to curtain wall manufacturers to use as the basis for appropriate designs and bids.



Mezzanine elevator lobby doubles as reception area and informal conference lounge.

As a final precaution the manufacturer who was awarded the contract submitted a prototype section of window wall for performance tests. For this procedure, the unit outfitted with strain gages was installed in one side of a sealed box-like chamber. When the chamber was evacuated, atmospheric pressure stressed the prototype to the specified values. When the design team was satisfied that the prototype met the specifications, it was tested to destruction. Breakage did not occur until pressures exceeded those that would be caused by a 180-mph wind.

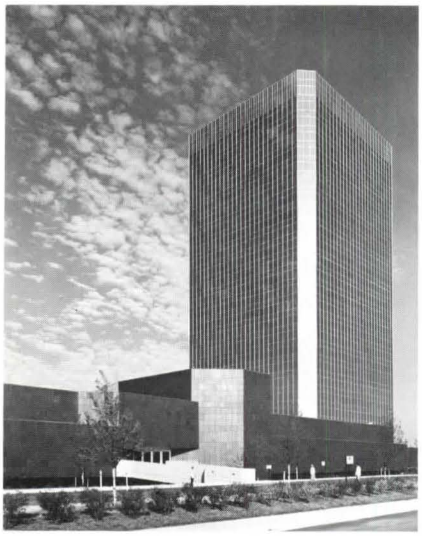


OPERATION OF THERMOCYCLE ECONOMIZER

Thermocycle is an energy-conserving feature that provides a means for reducing the cooling load on the central plant whenever outdoor wet bulb temperature is 5 to 10 deg F lower than the chilled water design temperature. In most areas of the country this situation exists on a great number of days during the year. Outdoor wet bulb temperatures are about 10 to 15 deg F lower than dry bulb temperatures.

The schematic diagram shows how the feature works. Assume that core areas are calling for cooling amounting to about 25 percent of rated chiller output, chilled water temperature of 55 F and an outdoor reading of 45 F wbt. Now, assume that the chiller compressor is shut down while chilled-water and condenser-water pumps continue to run. Operating under partial load, the cooling tower can cool condenser water to within a few degrees of wet bulb temperature. The relatively warmer chilled water causes the refrigerant to evaporate whereupon it migrates through the inoperative compressor to the lower-pressure area created by tower water in the condenser. There, the refrigerant condenses to a liquid and returns by gravity to the chiller to repeat the cycle.

In a conventional installation, this is a slow and inefficient process. Thermocycle speeds the process by adding a pipeline which allows the refrigerant gas to bypass the tight clearances of the compressor rotor. The other essentials are a refrigerant pump of 3 to 5 hp and an array of nozzles installed above the coils of the chiller. When the pump is activated, refrigerant liquid is foamed over the chiller coils in much the same manner as it would be were the compressor in operation. Cushman & Wakefield engineer Thomas Imperatore, who developed this feature, claims that with the right combinations of weather conditions and building cooling load, a 5-hp refrigerant pump can substitute for a 1000-hp compressor running at light load.



Enclosed two-level shopping mall in left foreground connects directly with both ground and mezzanine levels of tower lobby.

HVAC System. Two 150-hp air handling units deliver a total of 300,000 cfm to the ducted-air system that heats and cools the building. Interior and perimeter zones of the single-duct system are separate and treated somewhat differently.

The air delivered to the interior areas —which require cooling even in winter— remains a constant 55F year around. Two reheat coils within the ductwork on each floor temper this air as necessary to provide a comfortable environment. The reheat coils carry hot water from the heat pumps or boilers. Exposure-located thermostats operating in conjunction with flow-control valves in the reheat coils regulate zone temperature.

To provide ventilation as well as some conditioning effect, a limited quantity of air is supplied to the perimeter spaces. Air flow through a perimeter diffuser is about one-quarter that provided by an interior diffuser to the same amount of floor area. Heating and cooling coils in the main air handling units vary the temperature of the perimeter air supply in accordance with outdoor temperature.

The major part of the task of conditioning perimeter spaces is handled by a two-pipe fan-coil system. Individual fan-coil units mounted beneath the windows at 10-foot intervals are supplied hot or cold water depending on outdoor weather conditions. An independent thermostatic control valve in each unit regulates the flow of water as required by temperature conditions in the nearby space.

Heat Recovery. "Because we can regulate the temperatures of fan-coil water and perimeter air independently," says HVAC engineer Hem Gupta of Environmental Systems Design, Inc., "we get close to four-pipe control flexibility with the economy of a two-pipe system. We wanted some kind of fan-coil system because it would make direct use of the hot water (110F) generated by the heat recovery machines. At the same time we needed positive ventilation for perimeter spaces. The ducted-air and fan-coil systems proved to be an ideal combination."

Three 600-ton centrifugal chillers are located in the basement mechanical room. All three are capable of supplying hot and cold water simultaneously. In the heating season, these machines operate as heat pumps, recovering heat from the interior spaces which require constant cooling and transferring it to perimeter fan-coil units. In this way heat losses through the glass skin of the building are offset by "free" heat recovered from the interior.

When the building is occupied, lights on, and office equipment working, recovered heat is sufficient to handle heating requirements in all but the coldest weather. Two 2000-kw electric boilers supply supplementary heat during weather extremes and at night when the building is unoccupied.

In the interests of energy conservation, functioning of the entire HVAC system is optimized by means of a Johnson JC-80 computer installation. Among the many options in the computer program are those involving economizer features built into the system. At certain times the computer can elect to use cool outside air for conditioning the inside environment, thereby reducing the cooling load on the central plant. Or the computer could energize "Thermocycle" pumps (see box) installed on two of the refrigeration machines to obtain 25 percent of rated cooling effort from the chillers without having to run the compressors.

Falling Object. The performance specifications for American Center's window system are well ahead of building code requirements in most U.S. cities. Typically, these stipulate 45 psf or less as the design pressure for curtain walls. And, indeed, on a tranquil day in Southfield it is difficult to imagine the gleaming tower being assaulted by a 95-mph wind. In view of this, could we possibly have a case of overdesign here?

"Definitely not," says Bill Allen. "For one thing, building codes are gradually being revised upwards. And, as a matter of fact, during construction we did get a 95-mph wind—strong enough to topple a crane from the roof. But we didn't lose any windows!"

DESIGN SUMMARY

GENERAL DESCRIPTION:
Area: 510,000 sq ft
Volume: 7,150,000 cu ft
Number of floors: 25
Types of space: private and general offices, conference rooms, display lobby, mezzanine reception lobby, restaurants, cafeteria, kitchens, employee lounges, medical suite, computer rooms, retail shops, bank, mechanical rooms, storage

CONSTRUCTION DETAILS:
Glass: double chrome reflective
Exterior walls: mullions and spandrels faced with double opaque glass and backed with mineral fiber insulation (R-4); composite U-factor: 0.2
Roof and ceilings: built-up roof on 2" rigid insulation (R-7), concrete deck, suspended acoustical tile ceiling; U-factor: 0.12
Floors: concrete slab
Gross exposed wall area: 205,000 sq ft
Vision glass area: 120,000 sq ft

ENVIRONMENTAL DESIGN CONDITIONS:
Heating:
Heat loss Btuh: 13,500,000
Normal degree days: 6300
Ventilation requirements: 64,500 cfm
Design conditions: 0°F outdoors, 70F indoors
Cooling:
Heat gain Btuh: 21,000,000
Ventilation requirements: 64,500 cfm
Design conditions: 92F dbt, 76F wbt outdoors; 75F, 50% rh indoors

LIGHTING:
Levels in footcandles: 75-125
Levels in watts/sq ft: 3-5
Type: fluorescent

CONNECTED LOADS:

Heating and Cooling	4,800 kw
Lighting	2,400 kw
Air Handling	800 kw
Elevators	1,650 kw
Other	2,850 kw

PERSONNEL:
Owner: American Motors Realty Corp.
Architects and Engineers: Smith, Hinchman & Grylls Associates, Inc.
Consulting Engineers (curtain walls): Peter Corsell Associates, Inc.
Consulting Engineers (HVAC): Environmental Systems Design, Inc.
Project Consultant: Cushman & Wakefield, Inc.
General Contractor: R. E. Dailey & Co.
Electrical Contractor: John Miller Elec. Co.
Utility: Detroit Edison Company

Going On from page 86

• John F. O'Leary, recent head of the FEA, was sworn in as deputy secretary. O'Leary, an economist, has worked for the government since 1952.

• Robert D. Thorne has been nominated as secretary of energy in charge of technology and will handle the demonstration phase of development. Thorne, a chemist, worked for AEC, and then directed ERDA's San Francisco office until he recently became acting assistant administrator for nuclear energy. (Thorne's nomination has not been confirmed at this writing, primarily because of charges that he spent federal funds to lobby against an antinuclear ballot initiative in California.)

• Alvin L. Alm was sworn in as assistant secretary for policy and evaluation. Alm, a long-time government analyst, was with the AEC, the former Bureau of the Budget and the Council on Environmental Quality. He played a key role in the formulation of the Administration's energy plan.

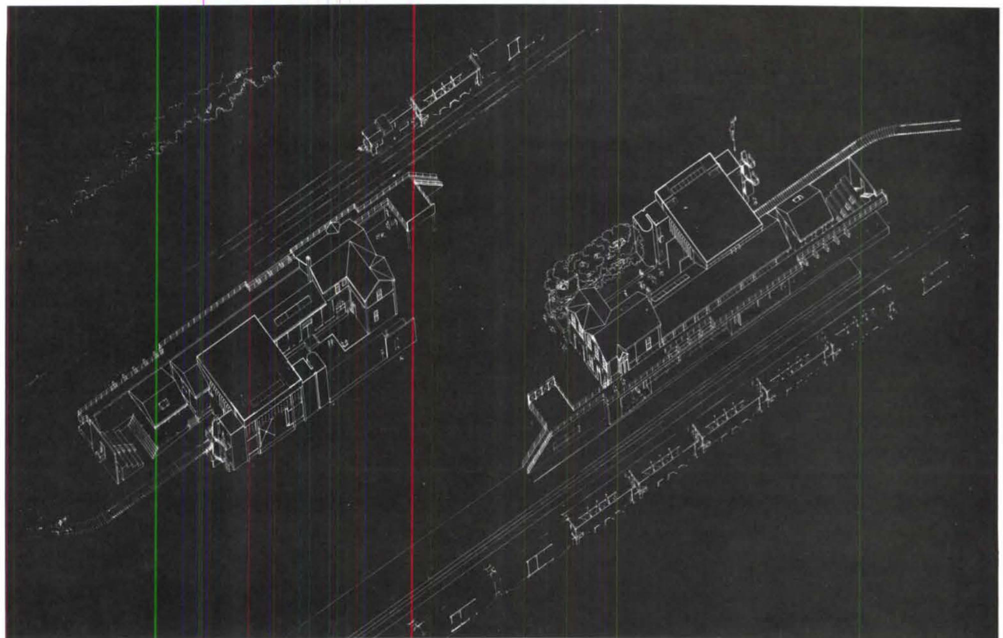
• John M. Deutch is the director of energy research. He was chairman of the chemistry department at the Massachusetts Institute of Technology.

Interprofessional Groups Urged at State Level

Institute President John M. McGinty, FAIA, has signed a statement which strongly encourages the establishment of an interprofessional coordinating council of societies representing architecture, engineering, landscape architecture and planning within each state. The statement was also signed by the presidents of the American Consulting Engineers Council, the American Institute of Planners, the American Society of Landscape Architects and the National Society of Professional Engineers, who with AIA make up the national Interprofessional Council on Environmental Design.

The statement says: "We urge the local and state organizations of the ICED member societies to establish and support such coordinating councils." Such "mini-ICED" groups, already formed in several states, "are working effectively on interprofessional matters, particularly those which involve legislation and government regulation," say the seven presidents. It is of increasing importance, the statement continues, "that professional design societies work to broaden public understanding of professional practice and harmonize their positions on legislative and regulatory matters."

The existence of such a communicating and coordinating mechanism "is of utmost importance," although details of organization, membership and structure of such groups must be tailored to the particular circumstances in each state.



Design of Renovation Chosen in Competition

The firm of Amatuzzo, Roccanova & Friedman of Lexington, Ky., has won a national competition for the renovation and adaption to new uses of an old railroad freight depot in Mount Sterling, Ky. The depot will serve as a community theater, meeting place and restaurant.

The competition, funded by a grant from the National Endowment for the Arts, drew 42 submissions, some from states as remote from Kentucky as Hawaii and Massachusetts. The CTC Partnership, Trenton, N.J., and Dale A. Durfee, AIA, Peoria, Ill., won honorable mentions.

The winning design (drawing above), said the jury, keeps the existing building fabric intact while achieving programmatic requirements with "social insight and functional and structural ingenuity as well as economy." The jury said that the "old structure is readily discerned, even in its modified and functionally transformed state" and that the additional components, such as entry promenades, theater and oudoor seating, attach themselves to the original building "with playfulness and joy in every facet."

A minority opinion was rendered by one jury member who said that the winning design went beyond the program "with a system of pedestrian walks, platforms and stairtowers which effectively camouflage any relationship to the past." A better solution, said the jury member, would be "to meld the past and the best of the present." The entries winning honorable mention, he said, "show a sensitivity to this design philosophy."

Members of the jury were John Bickel III, FAIA; Clyde R. Carpenter, college of architecture, University of Kentucky; Lorraine Clay, Mount Sterling, Ky.; Paul Cowden, attorney, Mount Sterling, Ky.; Billy Joe Hall, Mount Sterling National Bank; Guillermo Jullian de la Fuente, architect, Paris, France; Clyde E. Pennington, C.E. Pennington Co., Lexington, Ky., and Helm Roberts, AIA. Professional adviser was Dean Anthony Eardley, college of architecture, University of Kentucky.

First Craftsman Award Recipients Selected

Robert E. Zehner and Clement Kilia are winners of the first craftsman of the year award which is sponsored jointly by AIA and AFL/CIO's department of building and construction trades. The winners are honored for their plaster restoration of Iolani Palace in Honolulu. Said the jury: "The excellent results of the efforts of these men in solving the problems of layouts, castings, fastenings and installation is a tribute to their patience, skill and artistic abilities."

Two award of merit winners were also selected. They are Clyde Fujimoto for sheet metal work at the Naval facilities project in Honolulu, and Charles Coleman for work as foreman lather at St. George Ukrainian Catholic Church in New York City.

The joint craftsman award program was created by the two sponsors "to recognize and encourage outstanding workmanship and the display of ingenuity by tradesmen." The award winner is selected from among candidates nominated by AIA components and local trade unions. The jury consists of two architects appointed by AIA and one labor representative appointed by the building and construction trades department. The 1977 jury members were: Hilliard Smith Jr., FAIA (chairman), Harry Rutledge, AIA, and William Sidell, general president of the United Brotherhood of Carpenters and Joiners. *Going On continued on page 97*

Circle 29 on information card

MODULE 1

How to Find and Win New Business

Beginning with basics, as you would expect, Module 1 shows you how to develop an overall marketing plan which will dovetail with your firm's professional and financial goals, and then how to generate new prospects which match those goals.

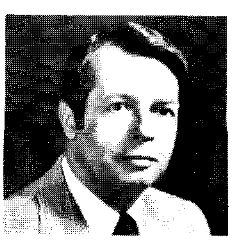
Section One identifies an extensive range of sources of information about prospective clients. It shows you how best to use each source, how to identify early trends, how to pursue leads—and even gives names, addresses and phone numbers which you can put to work for yourself.

Section Two shows you how to structure a record keeping system that *works,* so you know who to contact and when. And it teaches you to monitor your marketing system so that opportunities don't slip through your fingers.

Section Three provides an exhaustive list of DOs and DON'Ts that turns your phone into a powerful marketing tool. Coupled with the text is a pair of 90 minute cassettes with examples of Gerre Jones conducted cold calls, and a detailed analysis of each, plus other examples and demonstrations of effective and productive telephone techniques.

Section Four gives you guidelines for structuring your marketing plan. Ratios and formulas are provided which help you determine your annual project goals and set up the number and types of jobs you will need to achieve them. Section Four is the structure for "Winning", within which your other marketing activities fit.

Module 1: $40 postpaid. $36 pre-paid.



Gerre Jones is president of Gerre Jones Associates, a marketing consultant firm of Washington, D.C. Author of *How to Market Professional Design Services,* he developed the highly successful series of Professional Marketing Workshops, attended by over 500 leading design and consulting firms. He was director of communications of the architectural firm of Edward Durell Stone in New York City.

MODULE 2

The Mandeville Techniques

The aim of Module 1 is an appointment with a prospective client.

The Mandeville Techniques begin there.

The techniques are unique and powerful vehicles for you to use in gaining acceptance as a professional contributor to the client, rather than merely as someone looking for work. They build dependence—legitimate dependence—upon you as *the* problem solver for your prospective client. Section One details the "How" and "Why".

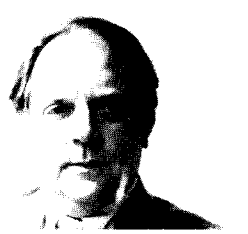
Section Two takes you through step-by-step actions which guide the dialogue between your prospective client and you—what to do; when to do it; and what *not* to do.

Because these techniques are radical departures from traditional client meetings, Section Three provides many practical guidelines to help you practice, refine and assess your progress. Special forms and evaluation instruments are included as additional guides to the process.

And, since the techniques are largely oral, Section Four outlines *nine* specific verbal methods, coordinated with nine segments on the accompanying 60 minute cassette, in which Richard E. Byrd, Ph.D., the originator of the Mandeville Techniques, demonstrates how they are to be applied.

The Mandeville Techniques are gaining increasingly widespread acceptance. As an example, they are now an integral part of the pre-registration course in the Ontario architectural registration program. You should find marked improvement in your own interviewing technique from the very first time you use the Mandeville Techniques.

Module 2: $34 postpaid. $30 pre-paid.



Richard E. Byrd, Ph.D., president of The Richard E. Byrd Company, management consultants in Organizational Development and the behavioral sciences. He is a consultant to a variety of organizations, including the American Institute of Architects, Honeywell, Inc., The U.S. State Department, and Weyerhaeuser Company. He authored the Mandeville Techniques.

Module 3

Closing the Sale

The third module in the *Encyclopedia* is a special set of guidelines developed to begin with the end of the initial (Mandeville) interview, and end with your (now) new client giving you "the nod."

It offers specific techniques for elevating your relationship with your new business source from prospect, to potential, to probable, to client.

The module is specific in the way that it guides your client meetings. In addition to text, it includes analysis forms and checklists which guide each response you plan and make to your client—including your formal presentations—to make sure that each is on target.

On the accompanying 90 minute cassette, Dr. Byrd discusses actual case situations with marketing consultant Gerre Jones and analyzes those situations in the light of the twelve succinct "Rules of Closing" which are set forth in the text.

Closing the Sale has been designed to fit into the Mandeville Techniques binder, as an add-on. Because it was developed expressly in response to requests from Mandeville alumni, it presumes knowledge of the concepts in Module 2.

IMPORTANT NOTE: Module 3 should not be ordered unless you already have or are now obtaining Module 2 (The Mandeville Techniques).

Module 3: $14 postpaid. $12.75 pre-paid.

Stuart W. Rose, Ph.D., executive director, Professional Development Resources Inc., Washington, D.C. Dr. Rose is a registered architect and formerly Director of Continuing Education of the American Institute of Architects. He has been a member of the faculties of the University of Nebraska, University of Cincinnati and North Carolina State University.

Module 4

How to Design and Conduct Winning Presentations

This module grew from the fact that it is increasingly difficult to go into a presentation or "client inteview," with the job completely locked up. When two or three other firms have done their homework as well as you, and all go in dead even, the contract is won or lost with the best presentation.

Included in the program are the answers to such tough questions as:

How many people should I take to the presentation? Who should they be?

What should I do with key professionals who are critical to the success of the project, but are poor presenters? What are some of the key pitfalls to avoid in using audio visuals?

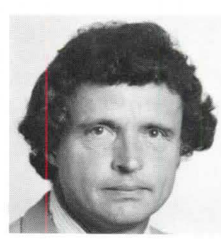
How can I be certain that what is presented will capture and hold the client's interest?

How long should the presentation be? Should I ever run overtime?

What are the most *pivotal* factors that make the difference between winning and that great "tie for second."

These and a host of other pertinent questions are answered by marketing professional Frank H. Smith, III. Out of Module 4 you will personally experience—before and after—the dramatic improvements these concepts can quickly bring you. Included in this module are copies of a special "Presentation Organizer," which helps you systematically translate these principles into specfic *action* for your next presentations.

Module 4: $17 postpaid. $15 pre-paid.



Frank H. Smith III is Associate Vice President of Reynolds, Smith and Hills, a Jacksonville based multi-disciplinary firm. Mr. Smith is a registered architect whose responsibilities lie in new business development, including development of marketing plans, client coordination, proposal and presentation management and preparation. He is also a State Director of the Florida Association, AIA.

Module 5

How to Market and Win Repeat Business

This module describes a carefully structured series of services and contracts which you use to forge strong and long-term associations between you and your clients. And the flow of this process also tends to lead you to *new* clients.

Developed by architect Robert H. Levison, FAIA, this program leads to 'automatic' winning of repeat contracts;
a continuing flow of income-producing work from both public and private clients;
a reduction of professional liability exposure;
conversion of down time to profitable use;
transformation of marketing time into *billable* time.

This module shows you how to use the forms and procedures to price and propose these services so that you can quickly incorporate this system into your own practice.

Like an unending chain, in this unique system each client contact and service links to the next. . . and the next.

Module 5: $17.50 postpaid. $16 pre-paid.

Robert H. Levison, FAIA, is the marketing principal of Mudano Associates, a multi-disciplinary firm in Clearwater, Fla. Mr. Levison has been president of the Florida Association of the American Institute of Architects, chairman of the Commission on the Professional Society of the National AIA, and advisor to the General Services Administration.

The PDR Workshops

All of the marketing materials packaged in the *Encyclopedia of Marketing of Professional Services* are also available in Workshop sessions. Dr. Rose and his colleagues tour the country constantly, putting on Workshops from coast to coast. To date more than 3,000 architects have personally benefitted from these "hands on" sessions and returned to their firms to pass the word on to their colleagues.

The cost and time duration of the Workshops vary. If you would like to have more information about the Workshops, including when they are scheduled to be held in your area, please check the appropriate space on the coupon. Meawhile, if you purchase module material now and then attend a Workshop later, the cost of your module material will be deducted from your Workshop registration fee.

"We plan to completely restructure our entire marketing approach along the guidelines which you have suggested.

Berger-Field-Hurley
St. Louis, Missouri

Great Program! We picked up one consulting commission *in the room*, two good association prospects and one probable. All of this and learning about the telephone, too!

Brock Mabrey & Partners
Corpus Christi, Texas

After reading the material just once, I had the opportunity to try the diagnostic technique on a prospective client. The response to my unskilled usage of the technique was stunning. The client responded exactly as you described.

We tried it again today with similar results. Now I would like to sharpen these skills.

Anthony A. Wegener, President
Design West, Logan, Utah

We consider the Mandeville Techniques the most effective way of contacting a client after you've tracked down a job lead. It's an ingenious way of taking assertive professional control from the outset of the client relationship.

Guidelines Architectural Newsletter
September, 1977"

Professional Development Resources Inc.
Suite 9, 1000 Connecticut Avenue N.W.
Washington, DC 20036

Please send me the following modules of the *Encyclopedia of Marketing of Professional Services:*

☐ Module 1: HOW TO FIND AND WIN NEW BUSINESS $36 ($40 if billed)
☐ Module 2: THE MANDEVILLE TECHNIQUES $30 ($34 if billed)
☐ Module 3: CLOSING THE SALE $12.75 ($14 if billed)
☐ Module 4: HOW TO DESIGN AND CONDUCT WINNING PRESENTATIONS $15 ($17 if billed)
☐ Module 5: HOW TO MARKET AND WIN REPEAT BUSINESS $16 ($17.50 if billed)

Name ______________________
Firm ______________________
Address ______________________
City & State ______________________ ZIP ________

☐ My check is enclosed* ☐ Bill me*
☐ Please send further details about your Workshops.
☐ I would like to be notified when Workshop sessions will be held in my area.

*I understand that if I am not, for whatever reason, fully satisfied with the modules I have received, I may return them

REMEMBER:

You may own, use and profit from any or all of the modules in the *Encyclopedia* (and share them with others in your office as well). Simply fill in and detach the order card and put it in the mail now, while the subject is fresh in your mind. We'll send your modules to you immediately.

If, for any reason, you decide within ten days that you don't wish to keep the modules you have ordered, simply return them and we'll refund your full

Going On from page 91

International Student 'Confrontation' Planned

An "international confrontation of students" will take place during the 13th world congress of the International Union of Architects in Mexico in Oct. 1978. As part of the program, schools of architecture are invited to present one or more student projects on the common theme of administrative space needs to meet the requirements of a community of 10,000 to 50,000 persons. The projects are to be carried out during the normal curriculum period with the aid of professors, and will be judged by an international jury.

A series of grants and prizes will be made to students to encourage their participation in the confrontation and "to come to Mexico to compare and reap the fruit of their work," says the UIA newsletter of Nov. '77. Registrations for the competition will be received until Dec. 31, 1977.

In a discussion of the student project, UIA says that "there are other solutions besides individual cells arranged to fit a traffic pattern, or communal working rooms for a large number of employees. The architect can contribute definitively to the implementation of new solutions, and help improve working conditions in private or public service administrations to the benefit of users and personnel. . . . New solutions may be born out of the international confrontation of students in architecture. . . ."

More complete information on the student project or the program may be obtained from: 13th UIA Congress, Melchor Ocampo 463-104, Mexico 5, D.F., Mexico.

Census Urges Response To Economic Survey

The Census Bureau has announced that its questionnaires for economic censuses taken every five years will be in the mails by the end of the year. Since 1810, the censuses have provided facts about the nation's business and industry, covering manufacturing, mineral industries, retail and wholesale trade, services, construction and transportation. The forms are to be returned by Feb. 15, and firms are encouraged to make returns earlier if possible to speed up processing and reduce follow-up costs.

After the forms are received, the data will be computerized, edited, tabulated and reviewed and prepared for publication. Each firm that receives a form will be asked for such information as location, type of ownership, dollar volume of business in 1977, number of employees and total payroll. Response is a legal requirement and there is also a requirement that information must be kept confidential.

Preservation Publishing

Preservation Press, National Trust for Historic Preservation, has awarded 21 preservation organizations and agencies its first publications grants. Grants of about $1,000 are made for a variety of preservation publishing activities, including research, writing, editing, graphic design, typesetting, printing and distribution. Such projects as newsletters and books, neighborhood rehabilitation guides and the redesign of an organization's graphic image are eligible.

Among the projects to receive recent awards are: a downtown walking tour brochure, a calendar and educational posters and a plan for the preservation of a historic rural town and its environment.

Applications for the next grants review period, ending Jan. 15, may be directed to Preservation Press, 740-748 Jackson Place N.W., Washington, D.C. 20006. Applicants must be members of the National Trust and match the grants with local funds.

Newslines on page 98

Statement Required by the Act of October 23, 1962. Section 4369, Title 39, United States Code, showing the ownership, management and circulation of:

AIA JOURNAL

Published monthly at 1735 New York Ave. N.W., Washington, D.C. 20006. Statement filed September 26, 1977.

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The owner is: The American Institute of Architects, a nonstock, nonprofit New York membership corporation, qualified in the District of Columbia, 1735 New York Ave. N.W., Washington, D.C. 20006. Stockholders holding 1 percent or more of the stock are: None.

The known bondholders, mortgages and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages or other securities are: None.

No person, corporation, partnership, trust or other entity beneficially owns an interest amounting to 1 percent or more.

	Average No. Copies Each Issue During Preceding 12 Months	Single Issue Nearest to Filing Date
Total number copies printed	35,522	36,228
Paid circulation		
Sales through dealers and carriers, street vendors and counter sales	None	None
Mail subscriptions	30,130	30,949
Total paid circulation	30,130	30,949
Free distribution by mail, carrier or other means	2,531	2,510
Total distribution	32,662	33,459
Office use, left-over, unaccounted, spoiled after printing	2,859	2,769
Total	35,522	36,228

I certify that the statements made by me above are correct and complete. (Signed) Richard H. Freeman, General Manager

Sizemore from page 49
word of caution here. To give an example, insulation is generally accepted as an energy saving device. When analyzing a five-story library at a large university, we did a detailed analysis of the heat flow through the walls and roof using a computer program that we had developed for an earlier project. Contrary to our instinctive expectations, we found that while adding insulation to the walls would help a little, adding it to the roof would have actually increased energy consumption. Mild climate and large amounts of heat gain from lights and equipment made cooling the major expense, and holding the heat in the building longer would have increased HVAC costs.

Planning the scope of the report is something that ideally begins when the initial proposal is put together. If you discover too late that your client requires an elaborate report, you may eat up your profits producing it. On the other hand, in your enthusiasm you may produce a report that is much more detailed than is required.

The energy analyst's role as an educator begins at the project's inception and will also require time and effort. The client will probably be full of questions and misinformation. He may hear something new about saving energy every week. Since energy conservation is a new field, he may require exhaustive explanation of each step of the process, especially since the project is likely to be a first for him, even if he has built a number of buildings. He may want to know why you can't give him answers immediately.

Perhaps your biggest job as an educator begins with the actual implementation of your recommendations. You may have prepared a detailed manual explaining how the building and its equipment should be operated for maximum efficiency only to find out that the building's operator is not enthusiastic about changing his ways. We always make it a point to bring the building operator into the project as a participant from its beginning because his cooperation is vital.

Energy conservation measures often involve subtle changes in life style which may turn into major points of contention when the time comes to implement them. Tenants may feel that they are entitled to 6 watts per square foot for lighting even though their visual comfort would improve with less lighting better positioned. Someone will have to explain the thinking behind each modification. Even if your client accepts this responsibility, he will rely on you to back him up, which will again require your time and effort.

Careful planning coupled with foresight that comes from experience will diminish the potential pitfalls of energy conservation work and put the emphasis on the opportunities, which is where it belongs. □

Deaths

Thomas Pym Cope, Lincoln Center, Mass.
Edward L. Frick, San Francisco
Norman L. Mann, Hutchinson, Kan.
Harold A. Oberg, Houston
Winston A. Schmidt, Hutchinson, Kan.
Dale Alfred White, Mount Vernon, Ohio

Newslines

State legislatures appropriated more than $61.5 million to the 50 art agencies to support the arts in fiscal 1978, according to a recent survey by the American Council for the Arts. This represents an increase of $4.3 million, or 7.5 percent, over the previous year. Based on per capita expenditures, Alaska led by expending $1.86 per citizen; lowest in per capita support was Texas, with an expenditure of 3 cents. The top increase was in Minnesota—254 percent.

The work of women architects will be featured in two exhibitions opening in Chicago in January. "Chicago Women Architects: Contemporary Directions" will be shown at the Artemesia Gallery from Jan. 4 through Feb. 4; "Women in American Architecture: A Historic and Contemporary Prespective" will be on display at the ArchiCenter from Jan. 10 through Feb 11.

Edward H. Noakes, AIA, principal in the Washington, D.C., firm of Noakes Associates, was the only American member of the jury for an international hospital design competition that met in September in the Emirate of Dubai. An entry by a West German firm won over entries submitted by firms in Sweden, France, England and Scotland for the design of a 300-bed maternity hospital in Dubai.

"Julia Morgan: Architect" is the title of a booklet by Richard W. Longstreth, published by the Berkeley Architectural Heritage Association. Its 36 pages are an essay on the influences which shaped the work of Morgan (1872-1957). There are also 30 photographs of her buildings and two reproductions of her drawings. A copy is obtainable for $4.70 postpaid from BAHA, P.O. Box 7066, Berkeley, Calif. 94707.

Architect Charles A. Gueli, director of the community design research program at HUD, will spend a year with Merrill Lynch, Pierce, Fenner & Smith, Inc., in New York City, as a participant in the President's executive interchange program. The program is designed to allow business and government to learn from each other, with the two swapping middle management executives for a year. Gueli will work on capital markets study projects related to housing programs and large-scale inner city redevelopment.

Product liability "is more than a buzz word; it's a serious problem in this country," says the Material Handling Institute which has issued a position paper on the subject calling for legislative reform. For a copy, write MHI, 1326 Freeport Road, Pittsburgh, Pa. 15238.

George Stephen Lewis, AIA, has received an award of the "president's certificate" by the Boston chapter of the Construction Specifications Institute for his "exemplary effort in promoting the objectives" of the CSI. He was cited for "bringing distinction and recognition" to his chapter and for his "notable contribution to the construction industry" over a 25-year period.

The Internal Revenue Service has indefinitely suspended a proposed ruling that would have required all employers to include payments for daily travel to temporary work sites as taxable income. The ruling was opposed by various construction trade associations.

John Gaw Meem, FAIA, of Santa Fe, N.M., donated his architectural records to the University of New Mexico. Appropriately, the collection is housed in the Zimmerman Library, which was designed by him some 40 years ago. The collection, now cataloged, includes data on the firm of Meem & Associates from its inception in 1924 to 1960, when Meem retired. In addition to drawings and perspectives, it includes diaries, ledgers, correspondence, books and periodicals and thousands of photographs by such renowned photographers as Ansel E. Adams.

William A. Barnes has been appointed executive director of the Pennsylvania Avenue Development Corp., Washington, D.C. As senior development director for the Rouse Co., he was responsible for many aspects of the development of the new town of Columbia, Md.

Cyril M. Harris, acoustical designer of more than 100 concert halls and auditoriums, has received the Franklin Institute's highest honor: the Franklin award. The award is made annually to a person who has "done most to advance a knowledge of physical science or its applications."

Two hundred bilingual welcome signs, designed by Peter Max, are to be installed along the Mexican and Canadian borders of the U.S., Jay Solomon, administrator of the General Services Administration, has announced. The artworks are weatherproof fiber glass copies of seven original paintings commissioned by GSA three years ago. □

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