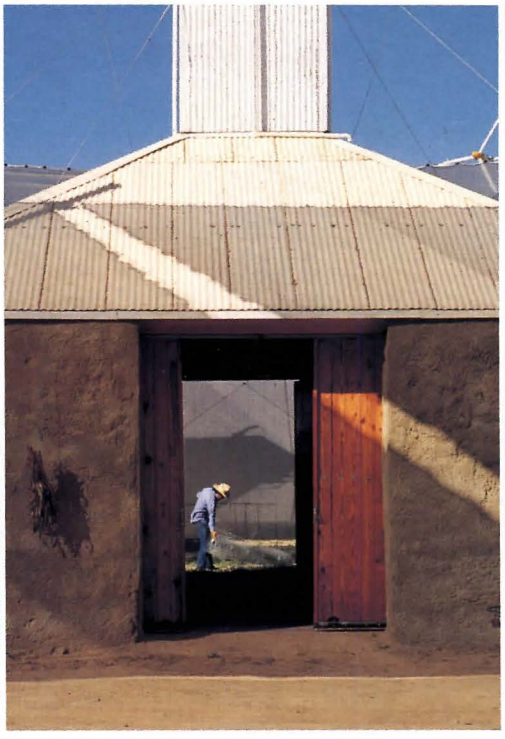
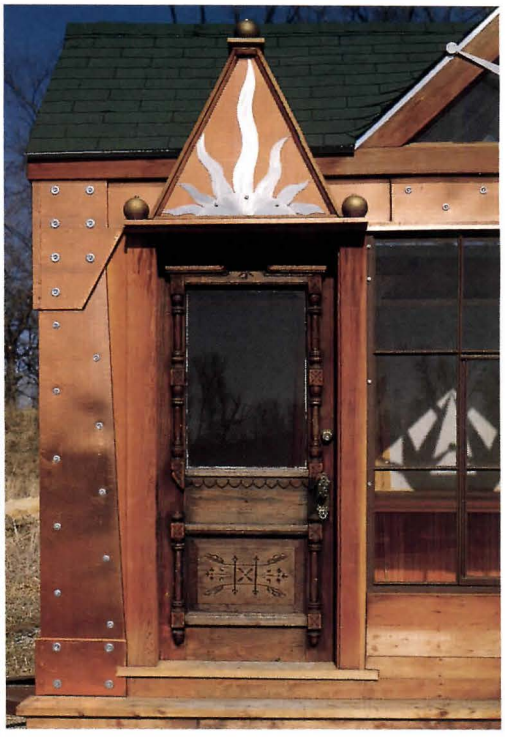
ARCHITECTURE

MAY 1991

PAGE 82



PAGE 64

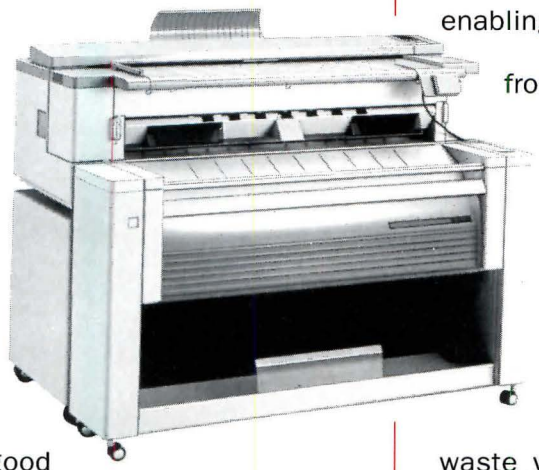


PAGE 90

DESIGN

CONVINCING YOU TO OWN OUR LARGE COPIER SHOULDN'T BE TOO DIFFICULT. AFTER ALL, YOU HELPED DESIGN IT.

Honestly, we couldn't have done it without you. Because before building the DC-3648, you told us the problems you had with other large copiers, even the leading one. So ours was designed with their shortcomings in mind.



You told us how frustrating it is to have to make up to 10 copies just to get one good one. So to help increase your productivity and save you time, we built a large copier that makes a good copy every time. We made our fixing section operate 50 degrees lower than other large copiers, and with less pressure. This way, the toner is exposed to less heat, for a longer period of time, giving the copier more time to "iron" out any creases or wrinkles that could develop.

And you said sometimes it's not creases and wrinkles, but slants and smears. So we made our cassette and optional roll cutter unit to eliminate skewing. Now, whether your copy medium is fed manually or through the cassette, it's perfect.

And remember how much paper you said you wasted because of void areas (i.e., areas that that don't copy well)? Well, we've built a large copier that won't waste your paper and gives you a good clean copy the first time. You see, when paper gets damp, it becomes more difficult for it to hold toner. So, we've insulated the transfer guide plates from ground, using a 600V varistor. This process electrostatically charges the paper, enabling the charged paper to easily attract the toner from the drum, no matter how moist.

And everyone's biggest complaint is the amount of time spent at the copier. The more buttons you have to press to reset, resize and recopy, the longer it takes to complete the job. So, we built a large copier that won't waste your time and gives you as many copies as you need as quickly as possible. We've given it the capability to make up to 19 consecutive copies from originals as large as 36" x 48". It's able to remember exposure and density settings for most commonly used originals. And its output speed is 15.7 linear feet per minute.

To find out more about the only large copier built from the ground up, for engineers by engineers, call Mark Coutts at 201-288-6900. We think it's everything you could want in a large copier.

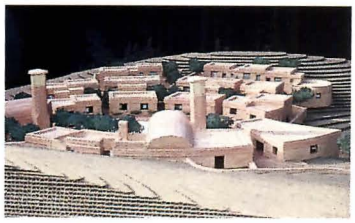
But that was your plan all along, wasn't it?

Circle 10 on information card

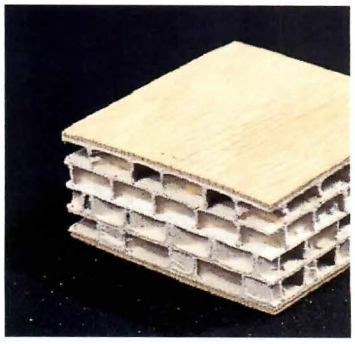
mita
the image specialist

TECHNOLOGY & PRACTICE

DEPARTMENTS

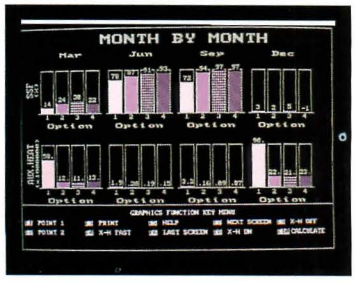


PAGE 101

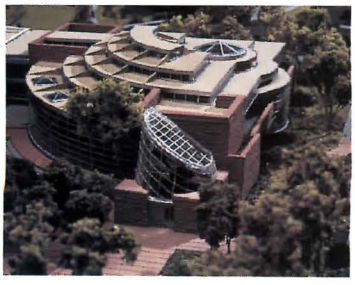


PAGE 113

PAGE 121



PAGE 127

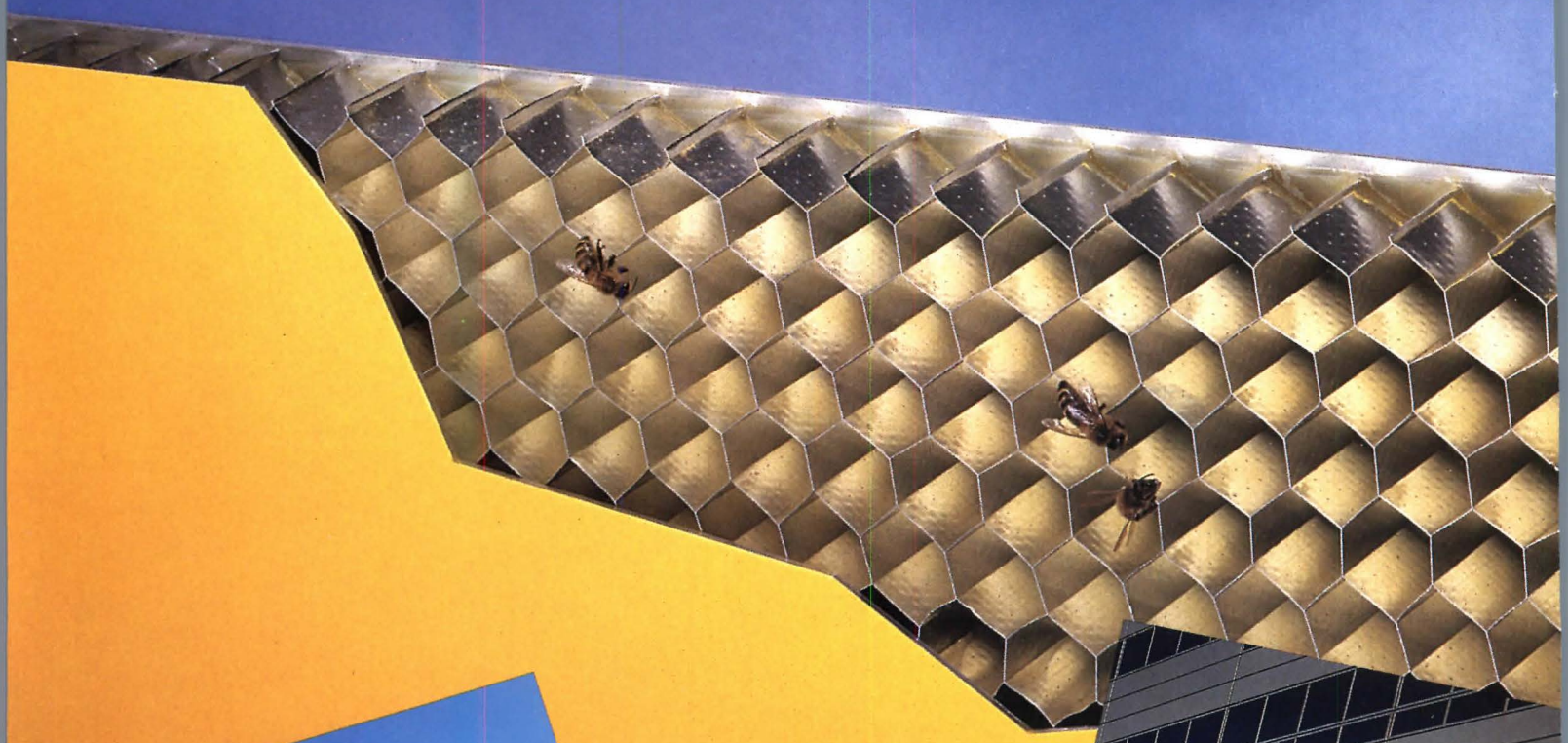


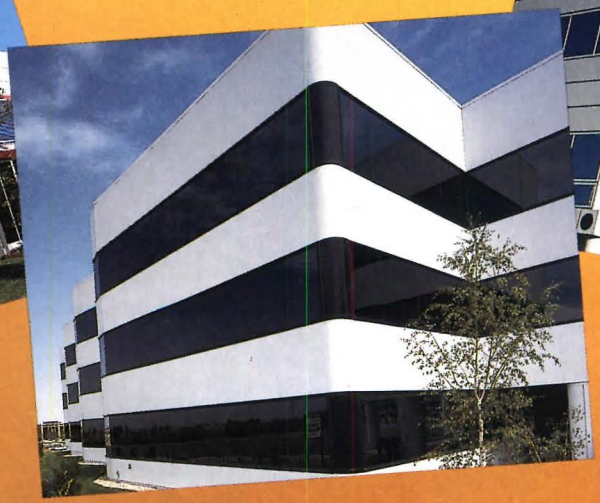
PAGE 48

COVER:
Biosphere II, Oracle, Arizona, designed by Sarbid Corporation (page 76). Photograph by Timothy Hursley

NEXT MONTH'S ISSUE:
Corporate environments
Disney at work and play
Office lighting
Facilities management software

We borrowed one of
from some very





Endangered Species

AS DEMONSTRATED BY THE DIVERSE PROJECTS AND TOPICS covered on our pages this month, environmental conservation in the 1990s means more than erecting energy-saving solar panels or planting trees. Truly "green" architecture is a holistic approach to design that engages a complex relationship between a building and its materials, systems, occupants, and surroundings. Achieving such an ideal is a daunting task, requiring architects to consider factors such as site orientation, toxic emissions, and "embodied" energy of materials. As contributing editor Alex Wilson points out in his article on nontoxic and resource-efficient building products (pages 113-118): "Until significant changes in the building industry take effect, architects must seize the initiative in constructing environmentally sensitive buildings."

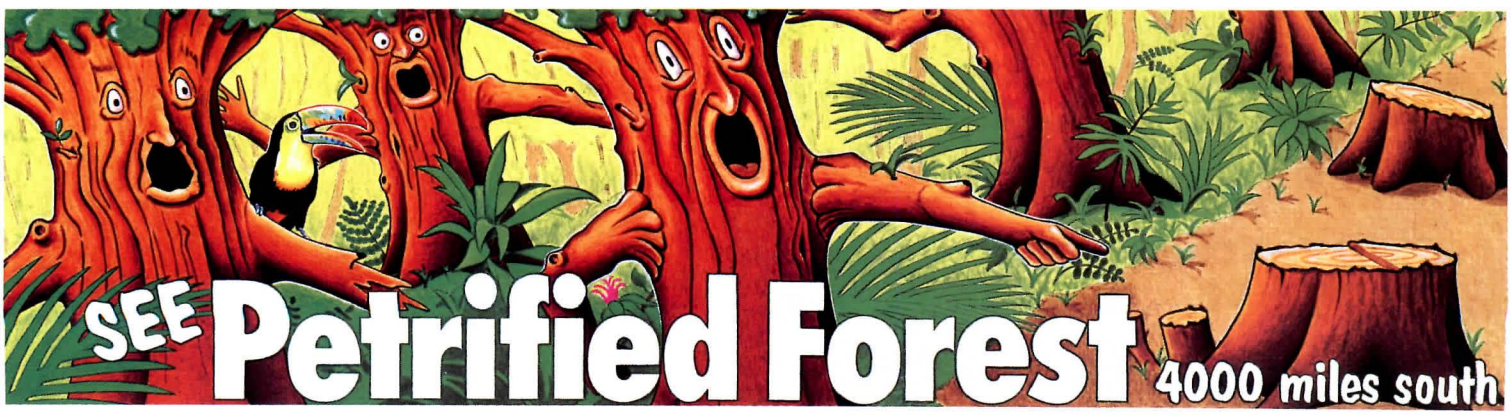
Some changes in building and design-related industries, however, are already taking place. Spurred by an increasingly environmentally aware public and regulatory legislation, including the 1980 Superfund liability statute and its 1986 amendments, manufacturers are reducing toxic wastes, increasing recycling, and turning to renewable resources from which to produce their goods.

A corporate model of such environmentally responsible practices is Herman Miller of Zeeland, Michigan. One of the most visible signs of the company's eco-consciousness is its sponsorship of save-the-planet billboards, created by Grand Rapids artist Mark Heckman (below), which have been displayed at furniture markets around the country. These artworks, however, are only one small part of the company's environmental initiatives. Two years ago, Herman Miller discovered that some of its timbers and veneers were cut from tropical rain forests threatened by deforestation. As a result, the company has stopped producing the Eames-designed lounge chair and ottoman in Brazilian rosewood and now only uses wood from sources that can verify sustainable forest management. Other manufacturers of wood furniture and products, such as Kimball International, Geiger International, and Nienkämper, have similarly stopped buying tropical hardwoods in favor of domestic species from less threatened forests (for more information on green products see pages 133-137).

Meanwhile, industry organizations such as the International Hardwood Products Association and the AIA have joined the Tropical Forest Foundation to urge building products manufacturers to institute environmentally responsible policies. Congress may also take up the green banner in introducing legislation related to rain forest preservation. U.S. Representative Peter Kostmayer (D-Pennsylvania), for example, is currently drafting a bill that would require all imported tropical wood products to be labeled according to species and country of origin.

While such action on the part of manufacturers and legislators is a step in the green direction, it is only a small beginning in helping practitioners create ecologically sound environments. Until corporations and the federal government set standards for environmentally safe materials and practices, researching and synthesizing green building elements will continue to be the responsibility of the architect. ■

—DEBORAH K. DIETSCH



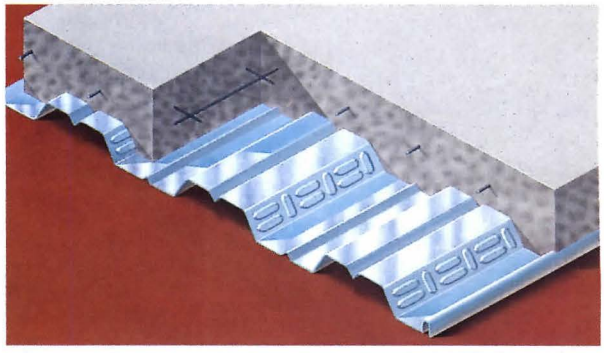
MARK HECKMAN

The $40 million 312 Walnut Building overlooks the Ohio River in downtown Cincinnati.

WITH OUR COMPOSITE DECK, THE BUILDERS POURED LESS MONEY INTO 312 WALNUT.

Compared with the cost of poured-in-place concrete, our composite deck was far more economical in Cincinnati's 312 Walnut Building. Because it saved time and was less labor intensive to install. Plus it was easier to put in place since it didn't require the installation and subsequent removal of cumbersome forms needed for pouring concrete.

In addition, our deck saved the builders $35,000. That's because we showed them the option of using painted deck that met UL fireproofing requirements instead of using the more expensive galvanized deck originally specified. Yet for all our economy, our decking offered more than enough strength to satisfy the builders. In fact, it's so strong it can allow for fewer steel beams in many applications.



Our 18-gauge composite deck in combination with 4-1/2" of normal weight concrete.

When all was said and done, we furnished 556,700 square feet of 18-gauge composite metal deck used with 4-1/2" of normal weight concrete. And the 35-story office building became a striking addition to the Cincinnati skyline.

Find out how Vulcraft composite deck and our complete range of steel decking can help with your next project. Contact any of the Vulcraft plants listed below. Or see Sweet's 05300/VUL.

VULCRAFT
A Division of Nucor Corporation

*PO Box 637, Brigham City, UT 84302 801/734-9433, *PO Box 100520, Florence, SC 29501 803/662-0381, PO Box 169, Fort Payne, AL 35967 205/845-2460, *PO Box 186, Grapeland, TX 75844 409/687-4665, *PO Box 59, Norfolk, NE 68702 402/644-8500, *PO Box 1000, St. Joe, IN 46785 219/337-5411. *Deck manufacturing locations.*
Construction Manager: Duke Construction Management, Inc.; Project Architect: Glaser Associates; Design Architect: Hoover & Furr; Structural Engineer: Walter P. Moore and Associates, Inc.; Structural Steel Fabricator: Ferguson Steel Co., Inc.; Structural Steel Erector: Ben Hur Construction Co.; Owner: Duke Associates and The Mayerson Co.

Coke Puzzle Solved

It is with mixed emotions that we read the comments in the letter from Paul A. Rosas, AIA, entitled "Coke Puzzle" (February 1991, page 14). For our design of The World of Coca-Cola (December 1990, pages 74-79), we are delighted to acknowledge our indebtedness to James Stirling. So much so that when we first presented our preliminary design to architects in Atlanta, we showed slides of the Tate Gallery addition (as well as a Philip Schutze-designed building at Emory University) to provoke comparison and discussion.

Stirling's concept of combining the "abstract" rationalism of the superscale grid with the "humanist" rationalism of Classical architecture is a wildly stimulating compositional device, both visually and intellectually. Our version of this concept used this combination on one quadrant to provide a transition between an almost purely "abstract" quadrant (with the gyroscope sign) to the almost purely "Classical" quadrant (with the grid infilled with running bond stone). We hope Mr. Stirling is flattered.

H. Preston Crum, AIA
Thompson, Ventulett, Stainback & Associates
Atlanta, Georgia

Not So Neat

I am concerned that the details published in the Neat File might be automatically taken as recommended practice. Michael O'Brien's "leak-proof" sills on roof-deck doors (January 1991, page 120) may present problems:

–Shrinkage of rough wood backing that forms the sill will be greater than that of finished facings. Such shrinkage could result in a sill that is unsupported by the rough backing;

–A fully adhered, waterproof membrane might be overstressed at the corner if the joint in the sheathing below opens up;

–In some climates other than San Francisco's, a vapor retarder might be desirable;

–Lack of a sill stop on the interior side of the door will probably result in leakage;

–The extruded lip that forms the counterflashing is probably inadequate in its overlap of the base flashing;

–The threshold well for the plastic insert will collect water, which will penetrate below at each end of the threshold.

Kenneth Kruger, AIA
Kruger Kruger Albenberg
Cambridge, Massachusetts

While stainless steel connector plates would seem to be precautionary (Neat File, December 1990, page 140), they could, if in tension, prove dangerous. Stainless steel in chloride environments, such as indoor swimming pools, may be subject to stress corrosion cracking, which can lead to catastrophic failure. According to "Design Guidelines for the Selection and Use of Stainless Steel" by the Committee of Stainless Steel Producers of the American Iron and Steel Institute, "It is necessary for tensile stress, chlorides, and elevated temperature all to be present for stress-corrosion cracking to occur."

Susan Greenwald
Editor, Construction Index
Chicago, Illinois

More on Monaghan

I take humble exception to Catherine A. Finn's letter (March 1991, page 16) castigating Tom Monaghan for what she claims are his misogynist tendencies, as purportedly revealed by his support of Operation Rescue's pro-life efforts. Her argument seems to suggest that since Monaghan has taken a nonelitist, broad-based stance for equal access to a quality life, he should not be recognized for his philanthropic patronage of architects and architecture in general. Perhaps Ms. Finn has done us all a valuable service by inventing a new litmus test by which we might easily judge what is socially redeeming architecture: run it up the Molly Yard-arm and see if N.O.W. salutes it.

Greg McKee, AIA
The McKee Architects
Kirkland, Washington

Corrections

The project shown on the contents page of the January issue (page 9, bottom right), was designed by Carnegie-Mellon University professor Antonini Saggio and architects R. Lenci and N. Valentin.

The correct title of the AIA award program recognizing design excellence in government architecture (March 1991, page 13) is the AIA Thomas Jefferson Award for Public Architecture.

The height of the Four Seasons Hotel in Philadelphia by Kohn Pedersen Fox Associates (March 1991, page 105) is 99 feet, not 396 feet.

May 17-20: "199Issues," the AIA's national convention and design exposition in Washington, D.C. Contact: AIA, (202) 626-7300.

Through May 24: "American Architecture of the 1950s," an exhibition at Harvard University Graduate School of Design, Gund Hall Gallery. Contact: Darell Fields, (617) 495-9346.

Through June 2: "Future Directions in American Urbanism: An Academic Perspective," an exhibition at Second Street Gallery in Charlottesville, Virginia. Contact: (804) 977-7284.

June 2-8: "Building Systems Automation," a symposium offered by the University of Wisconsin-Madison, Department of Engineering. Contact: Karen Collins, (800) 462-0876.

June 3-5: "MacBuild," a conference outlining the uses of the Macintosh for design professionals, in Los Angeles. Contact: Robert W. Berkowitz, (617) 965-0055.

June 4: "The Hazards of Facility and Resource Management," seminars on corporate environmental issues, at the IDCNY, Long Island City, New York. Contact: Joanne Markowitz, (718) 937-7474.

June 7: Entry forms due for the Cedar Shake & Shingle Bureau/AIA Architectural Awards (submissions due July 12). Contact: Cedar Shake & Shingle Bureau, 515 116th Avenue, N.E., Suite 275, Bellevue, Washington 98004.

June 11-14: 1991 World Congress of the International Federation of Interior Architects/Designers, held in Chicago. Contact: (312) 527-7882.

Through June 14: An exhibition of the architectural photography of Judith Turner at the National Institute for Architectural Education in New York City. Contact: Lauren Yessayan, (212) 924-7000.

Through June 23: "Edge of a City," the sixth and final series in the Walker Art Center's Architecture Tomorrow series, exhibiting work of Steven Holl. Contact: John Hall, (612) 375-7650.

June 24: Deadline for entries to the Presidential Design Awards. For entry information, contact: Presidential Design Awards, NEA, Design Arts Program, Room 625, Washington, D.C.0 20506, (202) 682-5437.

NEWS

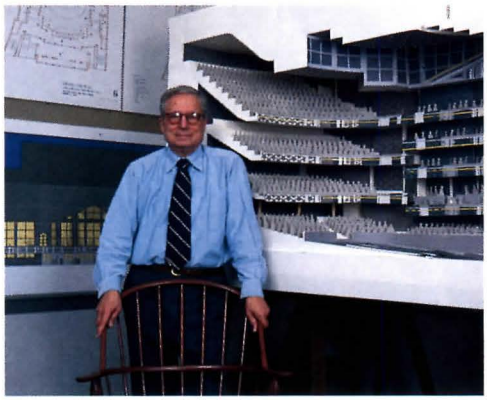
Monterey Design Conference ▪ Isozaki at MOCA ▪ Pope and Rockefeller in Washington

Robert Venturi Awarded Pritzker Prize

ROBERT VENTURI, PRINCIPAL OF THE PHILadelphia-based firm Venturi, Scott Brown and Associates, is the recipient of this year's Pritzker Architecture Prize. "Venturi has expanded and redefined the limits of the art of architecture in this century through his theories and built works," noted the Pritzker jury. Venturi's pivotal 1966 book, *Complexity and Contradiction in Architecture*, was cited by the jury for directing the mainstream of architecture away from Modernism. The 65-year-old Philadelphia architect was lauded for his "understanding of the urban context of architecture," which, the award citation continues, "has resulted in changing the course of architecture in this century."

The Pritzker, which was established in 1979 by the Hyatt Foundation and is named for foundation president Jay A. Pritzker, is considered architecture's equivalent to the Nobel Prize. Among past recipients are Philip Johnson, James Stirling, Kevin Roche, I.M. Pei, Richard Meier, and Frank Gehry. Last year's prize was awarded to Aldo Rossi. The prize includes a $100,000 grant, a bronze medallion, and a formal certificate.

Venturi is the first Pritzker Prize winner recognized for his theoretical writing in addition to his architecture, and also the first recipient closely identified with Postmodernism, a label he finds irksome. "I don't like the tag," says Venturi, "and if I am the father of Postmodernism, I consider it one of my illegitimate offspring. On the other hand, a lot of Postmodernism's basis corresponds to what I've been thinking and doing." Venturi says that he pursued writing about architecture early in his career "essentially to diminish the frustration of not being able to work enough when I was younger. I wrote my ideas because I couldn't produce them by means of a client."



MATT WARGO

Acknowledging that no architect designs in a vacuum, Venturi laments the fact that the Pritzker singles out an individual for recognition. "It's a bit of a disappointment that the Prize didn't go to me and Denise Scott Brown," observes Venturi, "because we are married not only as individuals, but as designers and architects. She's very much a critic, in architecture and urban design, and being a critic is part of being a creative artist." Venturi also recognizes his associates within the firm. "The caliber of people here is very high," he claims, "and architecture is a collaborative effort. So, in a way, this prize should go to the firm."

The jury included J. Carter Brown, director of the National Gallery of Art; Giovanni Agnelli, chairman of Fiat; critic Ada Louise Huxtable; Mexican architect Ricardo Legorreta; Toshio Nakamura, editor of *A+U* magazine; Kevin Roche of New Haven-based Roche Dinkeloo; and Lord Rothschild, chairman of the board of trustees of the National Gallery of Art in London. —M.J.C.

Venturi, Scott Brown and Associates' Sainsbury Wing for the National Gallery of Art in London (above) will be dedicated by Queen Elizabeth II next month.

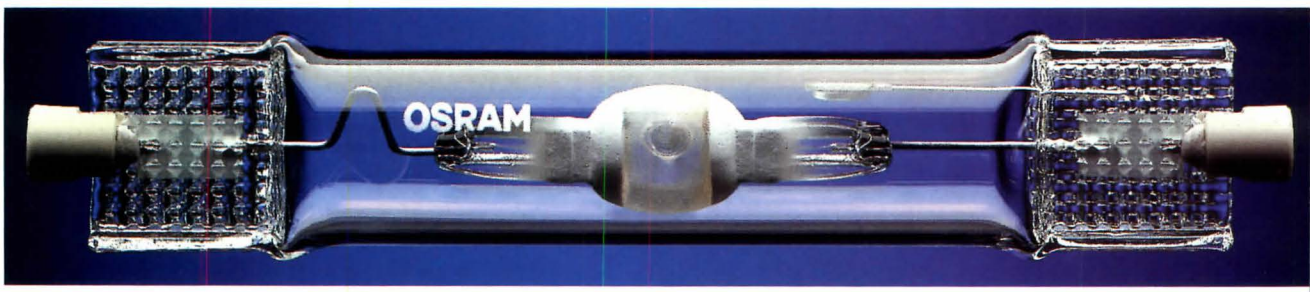
AIA BRIEFS

In mid-March, the Environmental Resource Guide (ERG) project committee held a meeting in Washington, D.C., to discuss the progress and final format of the ERG. The first materials assessment, for aluminum, is nearly complete and will be available in August through an ERG subscription service. Over the next year, the ERG committee anticipates compiling data on carpeting, wallcoverings, windows, ceiling tiles, sealants, paints, vinyl flooring, insulation, drywall, and particle board.

Organized in a notebook format and printed on both sides of recycled paper, the Environmental Resource Guide will include three "layers," or sections, for each building *material* assessed: an at-a-glance encapsulation of relevant information comparing conventional and alternative material choices; a more detailed, 3-to-10-page analysis including updates on local, state, and federal environmental legislation as well as statements from environmental organizations and industries, and a bibliography; and a more complete file of all the collected data, expected to be available on a computer data base in approximately three years to help eliminate paper consumption.

The next ERG project meeting will be held June 10, focusing on the topic of material life-cycle analysis. In the third week of September, the AIA Committee on The Environment will hold its second open symposium on energy conservation, following the "Crossroads: Architects and the Environment" conference held last November (ARCHITECTURE, January 1991, page 73). For more information concerning committee activities, *contact Patrick Lally:* (202) 626-7449. For information on the ERG, contact Doug Greenwood: (202) 626-7463.

AT THE BASEBALL HALL OF FAME, ONE NAME OUTSHINES ALL OTHERS IN SAVES.



With the OSRAM HQI®-DE lamp, the new, modern addition to the National Baseball Hall of Fame in Cooperstown N.Y. has made a grand slam home run in energy cost savings.

This recently completed 25,000 square-foot addition not only celebrates the Hall of Fame's 50th anniversary, it also offers a modern showcase for today's game.

And to give it a more youthful, upbeat environment, the designers specified the OSRAM HQI-DE lamp.

World Series performance. Bigger savings.

The OSRAM HQI-DE metal halide lamp far outshines all other PAR incandescents and metal halides. It provides extraordinary color rendition and luminous efficacy for accent and display lighting. And when used together with the new OSRAM POWERTRONIC electronic ballast, the already energy efficient HQI-DE lamp delivers even greater performance, a 20% longer life and increased savings.

Producing more light than PAR lamps while using less wattage and emitting less heat, the new OSRAM HQI-DE lamp offers a service life that is five times that of PAR incandescents. This means big reductions on energy and maintenance—and a fast return on your investment—usually within the first year of use.

A winning combination.

The OSRAM HQI-DE lamp is available in compact and versatile 70 and 150 watt sizes, and in two color temperatures. Today, you really can't afford to stay in the dark about the brightest choice. The OSRAM HQI-DE lamp and the new POWERTRONIC electronic ballast.

For more information call **1-800-338-2542.**

DETAILS

Eisenman Architects has been awarded a commission for a new performing arts center at Emory University in Atlanta, Georgia. Although the final program has not been determined, the facility will house three performance halls of varying sizes for music and drama as well as art history studios.

Seven finalists have been selected for the second stage of an international design competition for the New England Holocaust Memorial to be built in Boston. They are: Nancy Locke of Ithaca, New York; Lan Nguyen of Stafford, Texas; Stanley Saitowitz of San Francisco, California; Cissy Schmidt of Brooklyn, New York; Robert Stein of Boston, Massachusetts; Hali West of New York City; and Troy West of Wakefield, Rhode Island.

Aldo Rossi has been selected to design the South Bronx Academy of Art. Negotiations are under way for a site.

Kenneth Frampton, a professor of architecture at Columbia University since 1972 and chairman of the graduate school of architecture from 1986-1989, has been named winner of the 1991 AIA/ACSA Topaz Medallion for Excellence in Architectural Education.

Nimrod Long & Associates of Birmingham, Alabama, and Jack Patrick & Associates of Boston were selected as first-prize winners in a national, two-stage design competition for the redevelopment of Peachtree Street and Auburn Avenue in Atlanta. Nimrod Long's Peachtree corridor (below) will incorporate a pedestrian zone and a landscaped park spanning a freeway.

Frank Israel's Lamy/Newton Pavilion (above left), a house and studio for a Los Angeles fashion designer and filmmaker.

Laguna Creek Ranch (above), master planned by Peter Calthorpe, will be linked with nearby Sacramento by light rail.

Standing up for California in Monterey

THE COASTAL FOREST AT THE ASILOMAR Conference Center furnished the backdrop for the 10th Annual Monterey Design Conference last March, sponsored by the California Council of the AIA and entitled "Will the Real California Architecture Please Stand Up?" Recognizing the contribution of ELS/Elbasani & Logan to the advancement of urbanism, the Berkeley firm was named California AIA Firm of the Year at the conference for its efforts to create innovative public spaces.

Given the profound physical and cultural diversity of the state, the key to understanding California architecture was found not in stylistic explorations or innovations, but in the attitude with which architectural ideas are pursued. "'Real' architecture has an attachment to a larger reality that goes beyond architecture itself," claimed Joseph Esherick, FAIA, of Esherick Homsey Dodge and Davis in San Francisco. "Characteristics of the land, the attributes of the people, the economic basis of the building environment, range of uses, climate, culture—all are the real determinants of form."

Reflecting on the relationship of architecture to time and place, AIA president C. James Lawler, FAIA, observed that the accelerating pace of change makes it difficult for architects to respond in an appropriate way. He noted that architecture, once discussed in the time frame of "periods," became categorized by style as the pace of change grew more rapid. "Now that change occurs even faster, we talk in terms of 'isms,'" Lawler lamented.

Craig Hodgetts of Hodgetts & Fung Design Associates in Santa Monica placed particular value on early California architects' understanding of nature and on their faith in the individual. "Those architects didn't feel the arrogance to impose a style on the individual who had his own imperatives," he said. Now that architecture is a market-driven product for a generic consumer, Hodgetts charged that architects "simply accessorize our environment."

Bombarded with diversity, architects practicing in California are challenged to develop a meaningful vocabulary. The pursuit of a personal language within this diversity, however, can be a tricky matter, as shown in presentations by Franklin D. Israel of Beverly Hills and Michael Graves of Princeton, New Jersey. Graves maintained that relevance in architecture is achieved "not through style, but in how we employ dimension, surface, texture and color, and respond to climate." Yet the tortured Tuscan cartoon buildings that he uniformly perpetrates upon environments as disparate as La Jolla and the Napa Valley offer little assurance that he understands his own argument.

The architecture of Frank Israel, on the other hand, is expressed in a personal language that synthesizes a wealth of influences that adapt to program and place. Israel's production offices for video and record companies, for example, explore the notion that the building is a separate city within a city, yet responsible to its external context. Dealing with the neighbors in a coherent fashion is a

Continued on page 27

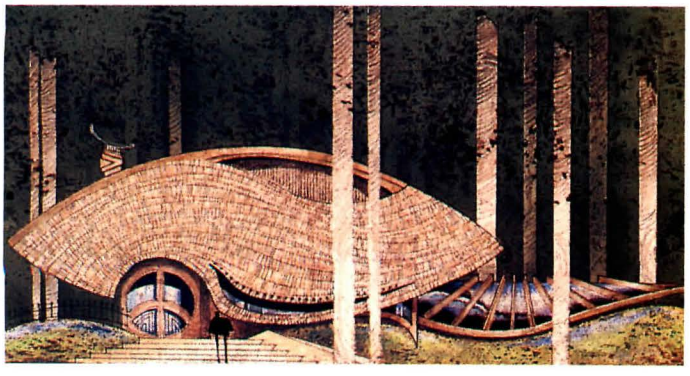
Monterey Conference *Continued from page 24*

challenge made more difficult by the fragmented nature of Los Angeles, but Israel's distinctive work manages to calm the chaos rather than exacerbate it.

The impulse to create more livable environments is gaining strength as Californians realize that an automobile-oriented lifestyle is financially and environmentally unaffordable. William H. Fain, Jr., FAIA, of Los Angeles-based Johnson Fain and Pereira Associates, unveiled plans to insert a pedestrian main street into the University of California at Irvine to supplement the formal vehicular circulation ring, designed by Pereira Associates, around which the campus is organized. Douglas J. Gardner, vice president of Maguire Thomas Partners in Santa Monica, revealed a master plan for 1,000 acres of land between Marina del Rey and the Los Angeles International Airport that incorporates 25 million square feet of mixed-use development.

Ironically, the impetus toward pedestrian-oriented development is finding its strongest expression in the edge cities, which Peter Calthorpe, AIA, of Calthorpe Associates in San Francisco calls "the landscape of ultimate segregation." Calthorpe, whose ideas for reforming the suburbs into pedestrian villages enjoy considerable influence, called for a "transformation of an American Dream built on too much fantasy and not enough reality." Calthorpe's master plan for Laguna Creek Ranch, an 800-acre community south of Sacramento, contains a commercial town center and village green within easy walking distance. The community will be serviced by trunk-line transit and feeder buses until the regional light-rail system is extended to the area.

Thanks to the earthquake of 1989, San Francisco has a rare chance to do just that. One victim of the shake that no one mourns in the Embarcadero Freeway, which severed the city from its waterfront. The quake inflicted such severe structural damage that the freeway is being torn down, to universal delight. Vernon DeMars, FAIA, a professor emeritus at the University of California, Berkeley, presented an elegant plan to convert the area in front of the Ferry Building into a formal plaza and transit connector.



SCOT ZIMMERMAN

Vernon DeMars's scheme for replacing Embarcadero Freeway includes plaza and transit connection (above). Lencioni Residence (below) by Arthur Dyson reveals California's breadth of design variety.

"The question of what is 'real' architecture is central to regionalism," observed McGill University professor of architecture Witold Rybczynski. In a closely-reasoned thesis, Rybczynski argued that regionalism is a reaction to cultural colonialism, to the imposition of architecture from without, which is perceived as foreign and artificial. Noting that regionalism is a static idea, Rybczynski said, "Most distinctive regional styles are from cultures where the pace of change is extremely slow." He suggested that the solution is to define regional architecture in a way that guarantees it will change. The extraordinary display of design talent at the Monterey Design Conference suggests that California's architects are in active pursuit of that goal.

—JANICE FILLIP

Janice Fillip is the architecture critic for the Sacramento Union.

With an HP pen plotter, your firm

*Suggested U.S. list price.

Isozaki Exhibition in Los Angeles

DESIGN COGNOSCENTI TURNED OUT IN droves for the March opening of "Arata Isozaki 1960/1990 Architecture" in Los Angeles. Among those on hand to honor the architect at the Museum of Contemporary Art (MOCA) gala were Frank Gehry, Robert Venturi, Charles Gwathmey, Moshe Safdie, Richard Meier, Arthur Erickson, Frederick Fisher, and Craig Hodgetts. The crush of Isozaki faithful was testimony to the Japanese architect's late 1980s arrival as a genuine global architect, and to a career that has progressed gracefully from the austere concrete buildings of the 1960s to a richer language of colliding geometries rendered in surprising combinations of materials.

The show fills three rooms inside the museum (completed in 1986, Isozaki's first major commission outside Japan), with 35 models and 200 drawings and sketches. Its entrance is celebrated by Isozaki's "Thatched Hut Folly," a teahouse takeoff conceptually designed for a 1983 show at Leo Castelli Gallery in New York and actually constructed for this exhibit.

Isozaki's career is divided into five themes, beginning with "Genesis of Imagination," including a collection of early, youthfully ebullient fantasies such as "Clusters in the Air" and "Computer Aided City"; and ending with "Hyper-Technology," his recent never-to-be-built or as yet unbuilt works, including Tokyo City Hall and the Ueno Railway Station Redevelopment in Tokyo.

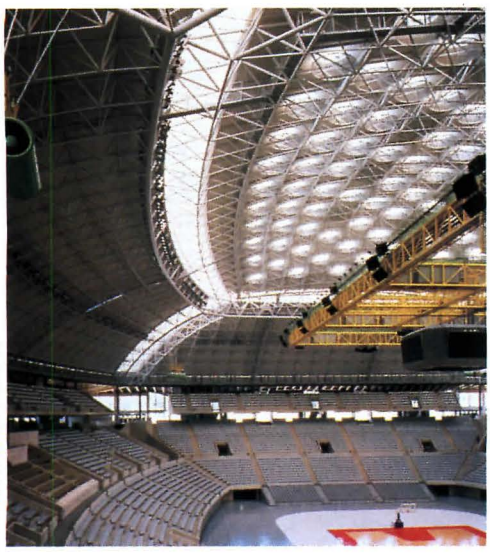
Sandwiched in between are Isozaki's early concrete buildings in Japan, including the Kitakyushu Central Library and the Kitakyushu Municipal Art Museum; his more eclectic, late 1970s work, such as Kamioka Town Hall, Tsukuba Center, Art Tower Mito, and Musashi-kyuryo Country Clubhouse; and his 1980s designs outside Japan, such as MOCA, the Brooklyn Museum of Art expansion, Sant Jordi Sports Hall in Barcelona, and the new Disney offices in Orlando, Florida (ARCHITECTURE, April 1991, page 30). Along with models and drawings, the show includes poetic texts by the architect on wall panels, and crisp, color photos displayed on four 50-inch television monitors.

Surprisingly, the design of the exhibit—also by Isozaki—packs none of the power of his architecture. The layout does little to reinforce the themes. Projects are not clearly grouped, nor are various sections concisely delineated. This arrangement is especially disconcerting in the main exhibit room, where visitors wander rather aimlessly through the undefined space.

Accompanying the exhibit is a new documentary film by Michael Blackwood, who produced the 1985 film on Isozaki, also on view at the exhibit. Isozaki's own written words weren't finished in time to make the 304-page catalog (published by Rizzoli), and the published project descriptions are mundane. Of two catalog essays, Japanese critic Hajime Yatsuka's writing is far more readable than the prose of architectural historian David Steward, who makes intriguing connections between Isozaki, Schinkel, and others, but obscures them in academese.

After the show closes on June 30, it heads for several destinations in Japan, a stop next year at Centre Georges Pompidou in Paris, and a return U.S. engagement at the Brooklyn Museum of Art in 1994. —DIRK SUTRO

Dirk Sutro is the architecture critic for the San Diego edition of the Los Angeles Times.



YASUHIRO ISHIMOTO PHOTOS

Natural light streams through skylights set in the double-layer space-frame roof over the Sant Jordi Sports Hall (above), one of several new athletic facilities built in Barcelona, Spain, for the 1992 Olympics. Folded sections of the Pantadome roof, which mimics rolling foothills nearby, were assembled on the ground and then lifted into place (148 feet high) with cranes and hydraulic jacks.

The wavy roof and tilted tower of the Kitakyushu International Conference Center (top and center), completed last year in Fukuoka, Japan, are intended as metaphors for the ocean and sailing vessels. Constructed of 5-inch-thick reinforced concrete, the wave-form roof reaches a maximum span of 85 feet over the exhibition hall (top). At Isozaki's Art Tower Mito project (above)—a *cultural center including a theater, concert* hall, and gallery in Mito, Japan—buildings are arranged around a large square that serves as a public gathering space.

Tack on another reason to choose Homasote:

New, elegant DesignWall™ Interior Panels.

You've always known Homasote for its great tackability. Now you can choose it for its beauty, too. Because new DesignWall panels combine superior tackability with the elegant appearance of textured fabric.

With DesignWall panels, you can create attractive, tackable walls for even the most prestigious offices and conference rooms. The panels also have sound-deadening properties. They're completely finished, ready to apply with fasteners and adhesive.

DesignWall panels come in four handsome colors: Rose, Grey, Twilight and Burlap.

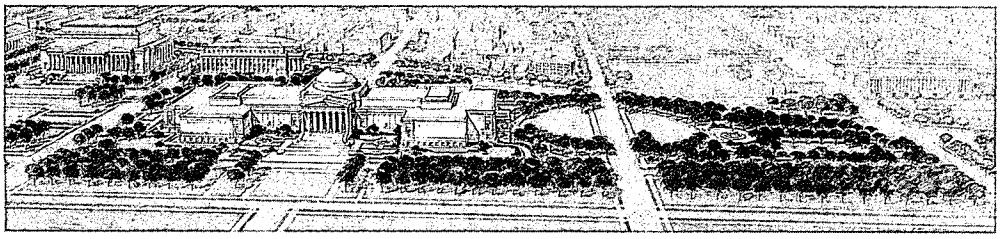
For a free sample and more information, call 800-257-9491, ext. 118.

homasote
COMPANY

RECYCLING · YESTERDAY · TODAY · TOMORROW

P.O. Box 7240, West Trenton, New Jersey 08628-0240
609-883-3300 FAX #609-530-1584

Circle 34 on information card



Bird's-eye perspective of the National Gallery of Art (above), 1936, by Otto Eggers.

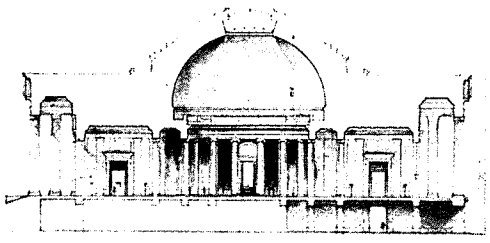
The National Gallery of Art at 50

IN 1936, WHEN FRANK LLOYD WRIGHT WAS designing Fallingwater and Mies van der Rohe was on his way to America, the financier Andrew Mellon commissioned John Russell Pope to design the National Gallery of Art in Washington, D.C. That Modernism was well established in Europe and about to be embraced by the United States made little difference to Mellon, who had just donated his collection of old masters to the nation—an unusual gift for a people emerging from a Depression. Seeking to uplift bereft America with the grandeur of the galleries of London and Berlin, Mellon chose the Beaux-Arts-trained Pope, who regarded Classicism as the only architectural style worthy of a democracy.

Today, the National Gallery celebrates its 50th anniversary with "John Russell Pope and the Building of the National Gallery," an exhibition of drawings by Pope and members of his office, on display until July 7. The exhibit traces the intriguing design process, in which three connected galleries, three separate galleries, and finally one large gallery were explored. The Commission on Fine Arts, believing that buildings on the mall should step down in deference to the U.S. Capitol, tried in vain to persuade Pope to eliminate the gallery's dome, to which the architect replied, "The building will not go on the lot unless it has a proper elevation." No doubt today's designers of uncertain projects for the mall wish for a glimmer of Pope's authority, but it must be remembered that the architect had the founder of ALCOA and Gulf Oil financing his building.

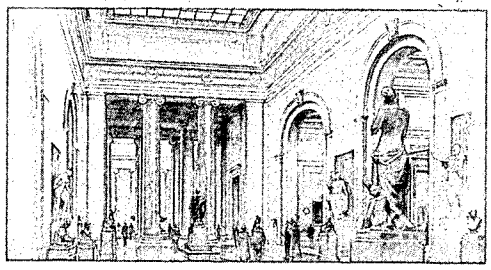
Mellon and Pope both died just after ground was broken in 1937, and the skilled renderer Otto Eggers took over Pope's practice and the gallery. Black and white photographs chronicle construction, revealing that the museum, with its Ionic porticoes and interior based on the Pantheon, is supported by modern steel piles in a concrete foundation.

But when the museum opened in 1941, its traditional appearance generated scant praise. "A costly mummy," one critic disparaged the National Gallery upon its dedication—but an influential edifice, nevertheless. As Washington returns to Neoclassical architecture with such buildings as Hartman-Cox's scheme for Market Square (ARCHITECTURE, April 1991, pages 58-63), John Russell Pope deserves renewed appreciation. —H.L.



NATIONAL GALLERY OF ART

Transverse section through proposed National Gallery of Art (above), undated (probably 1936), reveals controversial dome.



Proposed sculpture gallery (above), 1936. The shape of the ceiling and openings were subsequently changed by Pope's office.

ENERGY ADVANTAGE™ LOW-E

Combined performance

GLASS + EVERGREEN™ GLASS

n a whole new light.

It starts with two revolutionary glass products. Energy Advantage™ Low-E Glass, LOF's color neutral, pyrolytic Low-E glass. And EverGreen™ Float Glass, the industry's highest performing tinted glass.

Put the two together and you get exceptional performance values, unsurpassed year-round comfort, and no color shift to the outboard lite.

Look at the numbers, then decide. You get an extremely low shading coefficient with high daylight transmittance. Excellent year-round U-values. Exceptional UV energy reduction. Low exterior reflectance. Plus, easy handling and reduced lead times.

Imagine your next project in a whole new light. Add Energy Advantage Low-E Glass to EverGreen Glass, other tints or ECLIPSE® Reflective Glass.

From LOF. Makers of the new first family of glass.

LOF Libbey Owens Ford
A member of the Pilkington Group

light years ahead

Circle 36 on information card

National Building Museum Honors Rockefeller Family

WASHINGTON WATCH

WHAT WOULD THIS COUNTRY HAVE LOOKED like without the Rockefeller family's efforts to preserve and create public spaces? The National Building Museum's fifth annual Honor Award and newest exhibit challenge the viewer to imagine an America without some of of its prized domains. "Ideal Places: Rockefeller Visions for America" provides a solid glimpse of four generations' contribution to both the built and unbuilt environment.

During his lifetime, John D. Rockefeller donated half a billion dollars to public concerns. In 1901, the oil magnate purchased riverfront along the Hudson to preserve its steep banks from stone excavation—one of several projects that instilled his children with a commitment to philanthropy. Twenty-five years later, John D. Rockefeller, Jr., conceived three projects—Grand Teton National Park, Colonial Williamsburg, and Rockefeller Center—which would significantly shape the American landscape while providing lasting models for today's architects, conservationists, and planners in the creation and manipulation of space.

Dismayed by the sight of hot dog stands and dance halls in the Wyoming wilderness, John Jr. began purchasing the entire Jackson Hole Valley in 1927. Despite opposition from ranchers, residents, and local politicians, he turned the land over to the Federal government to form Grand Teton National Park. In light of this example, the exhibit asks: How do we make the American wilderness accessible and yet protect it?

When asked to help preserve Williamsburg, Virginia, John Jr. hired a team of architects to undertake complete renovation of the 18th-century colonial capitol. The project called for reconstructing 88 buildings, including the original capitol and the governor's palace, the restoration of 300 buildings, and dismantling 720 post-18th-century structures. Colonial Williamsburg sparked a

COLONIAL WILLIAMSBURG FOUNDATION

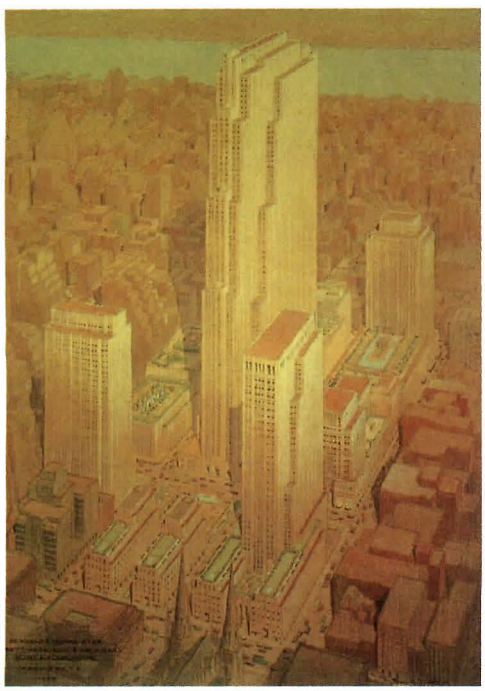
John D. Rockefeller, Jr., closely monitored reconstruction of the country's first capitol in Colonial Williamsburg, Virginia (above), which began in October 1931. Architects Perry, Shaw, Hepburn of Boston derived the footprint of the building from archaeological remains. To recreate the elevations, the architects copied images from a period engraving found by historians in Oxford, England.

preservation movement nationwide, establishing precedents in restoration, archaeological survey, and the decorative arts. In attempting to recreate the 18th-century vernacular, the restoration architects captured a Beaux-Arts idealization with an emphasis on the social elite.

In 1931, in the face of a climbing vacancy rate during New York's worst financial crisis, John D. Rockefeller, Jr., went ahead with plans to create a three-block development combining commerce, culture, and street life in midtown Manhattan. Rockefeller Center's naturally lit offices and original artwork became key selling points. Acutely interested in bringing a human scale to the 70-story central tower, Rockefeller introduced 2 acres of roof gardens on all setbacks below the 16th story. What Lewis Mumford had called "a masterful clot of congestion" became an example to urban development schemes across the continent, including I.M. Pei's Place Ville Marie in Montreal, the Urban Design Group's Taber Center in Denver, and John Portman and Associates' Peachtree Center in Atlanta. Initially a failure in planning, the inner courtyard has continued to draw huge crowds since it was converted into a skating rink in 1936.

Additional Rockefeller family projects in Manhattan include Lincoln Center (1966), the Chase Manhattan Bank headquarters (1960), the United Nations building (1953), the Museum of Modern Art (1939), and Riverside Church in Morningside Heights (1930).

The exhibit, part of the National Building Museum's efforts to recognize individuals or organizations for enhancing the American environment, will be on display through September 1991. —KAREN SALMON



THE ROCKEFELLER GRUOP

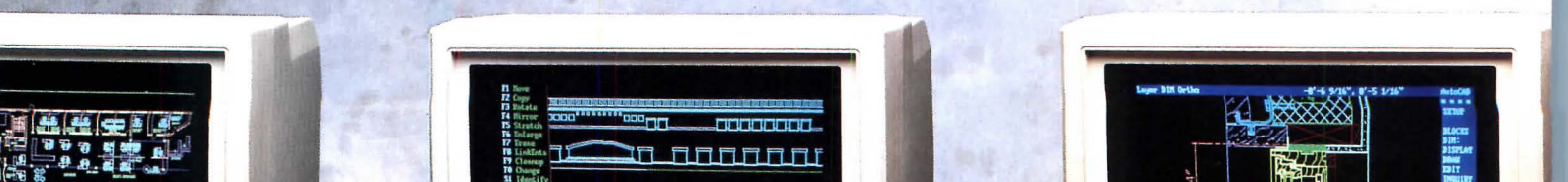
Despite Manhattan's increasing vacancy rate during the Depression, ground was broken for Rockefeller Center (above) in July 1931. The original 14-building complex, designed by Hood & Fouilhoux, Reinhard and Hofmeister, and Corbett, Harrison and MacMurray, housed 5 million square feet of rentable space over 12 acres of land. The initial phase was completed in 1940.

HOW WE'RE HELPING ARCHITECT

Thanks to Andersen CADD-I™ technology, architects are suddenly able to express themselves like never before. With more elaborate and detailed designs. 3-D perspectives. And comprehensive window details.

You see, the Andersen CADD-I™ program is IBM PC compatible and now runs with dozens of different computer-aided design packages. What's more, parametric programs are available for use with AutoCAD®* and DataCAD®† software. And the DXF symbol library allows Andersen CADD-I™ to run with most other CAD packages.

Whether you use AutoCAD,® DataCAD® software, or any program which can import a DXF file, you'll find that the more complicated the project, the more you'll really appreciate the power and



XPRESS THEMSELVES. BRILLIANTLY.

speed of the Andersen CADD-I™ program.

After all, it allows you to draw, move and duplicate window elevations, plans and details. All with the use of a few simple keystrokes.

You can choose options instantly, too. Because virtually every Andersen® product and option (over 200,000 windows and patio door variations) are on 3½″ or 5¼″ diskettes.

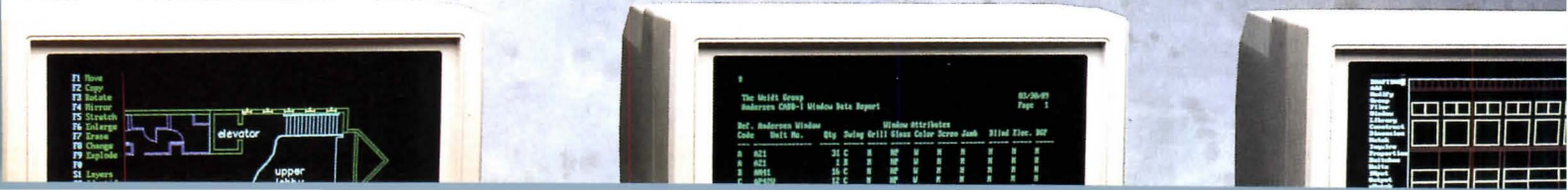
*AutoCAD® is a registered trademark of Autodesk, Inc.
†DataCAD® is a registered trademark of Microtecture Corp.

To find out how you can be brilliantly expressive, call 1-800-426-7691 for the name of your Andersen commercial representative. He can qualify you for your free Andersen CADD-I™ software.

ANDERSEN COMMERCIAL GROUP℠

Andersen AW Windows Patio Doors

Circle 1 on information card



New York Conference Encourages Soviet Construction

SOVUS, A NEW YORK-BASED CONSULTING firm dedicated to fostering U.S.-Soviet business relations, held a conference entitled "Real Estate and Construction Opportunities in the U.S.S.R." in March. Panelists from the U.S. and the U.S.S.R. discussed the current state of joint-venture development in the Soviet Union and spoke on topics such as "Real Estate Markets," "Finding the Right Soviet Partner," and "Preservation Considerations: The Importance of Contextual Design." All panels concurred on one point: building in the Soviet Union is a fascinating, difficult, and constantly evolving process.

The U.S.S.R. is a country with an enormous gap between its demand for construction and development and its ability to supply the necessary materials and technology for those activities. *Perestroika* has made it possible for Western businesses working in association with Soviet partners to feed the nation's voracious appetite for investment capital. In order to attract foreign businesses, the Soviet Union desperately needs modern facilities to accommodate their operations.

The "Preservation Considerations" session stressed the proud national architectural tradition that plays a central role in almost any project in a major Soviet city. "New buildings in the historic areas are met with a great deal of resistance," stated Sergei Sokolov, chief architect of Leningrad. The panel's three American architects agreed. For example, preservation issues were of primary importance in Brennan Beer Gorman's design for the Moscow mixed-use project, according to Partner Ted Brumleve, AIA. Accordingly, the complex, located a few blocks from the Kremlin, has been designed to maintain the neighborhood's regal qualities.

According to SOVUS, many regions within the U.S.S.R. have ambitious plans for luring business, including free-trade zones and major infrastructural rehabilitations. Without distinguishing his staunchly separatist politics, Estonian architect Ignar Fjuk spoke of Tallinn, his native city and the Baltic state's capital, as a point of entry for Western firms interested in penetrating the Soviet market. Fjuk's claim that the city's Estonian character is more European than Soviet was illustrated with slides of the work of the "Tallinn School" of architects. Working in a

A mixed-use project in Moscow, conceived by Brennan Beer Gorman of New York City, was designed to fit into the neighborhood of the Kremlin, which includes 15th-century palaces, three cathedrals, and a bell tower. Its contextualism is intended to meet the approval of local preservationists.

regionalist vein, this group seems to have learned more from Finland's Alvar Aalto and other Western Modernists than from Soviet architects. Fjuk would like to see more Americans doing business in Tallinn; a stronger economy would also help Estonia's quest for independence.

Certain aspects of doing business in a changing Soviet Union present logistical difficulties. Because the ruble is not yet fully convertible to Western currency, profits may not be recovered by conventional means. One way around this problem (often used by Western developers) is to lease land from the Soviet government, build on it, and rent the space to other Western firms, which pay in hard currency. Many architects work in a variation of the latter arrangement; they are contracted by a developer and paid on a normal fee basis.

More direct approaches by American architects may require contact with local architectural officials. Soviet bureaucrat-architects have geographic areas of responsibility for which they make all architectural assignments. They are able to arrange joint venture marriages between American and local firms. "We are anxious to make contacts with architects in your country," says Leningrad's Sokolov. Assuming the role as a principal in a joint venture, however, entails financial risk. Yet for some architects, the dim prospect of profitability is outweighed by the great professional challenge and the Soviet people's almost magical charm, to which so many American practitioners with experience in the country testify.

Donald MacDonald, FAIA, is one architect who has caught the Soviet bug. In addition to his renovation of a 17th-century Kiev building for Greenpeace's Ukraine headquarters, he is helping to introduce energy efficient, wood-frame housing to a nation built mostly of precast concrete. The progress of his energy-house prototype is being viewed across the country on a one-hour-a-week television series. In a nation with tremendous timber resources and an acute housing shortage, MacDonald's ideas could be the seeds of major change in Soviet housing construction.

The greatest hurdle confronting American architects wishing to work in the Soviet Union lies in making initial contacts. The present situation is like a high school dance of international trade—there is plenty of interest in getting to know those on the other side of the gym, but few advances are made. For their part, the Soviets promise that Western approaches would be warmly welcomed. American architects interested in potential Soviet partners might enlist the services of an organization like SOVUS. Others will simply cross the dance floor and pick a partner. ■

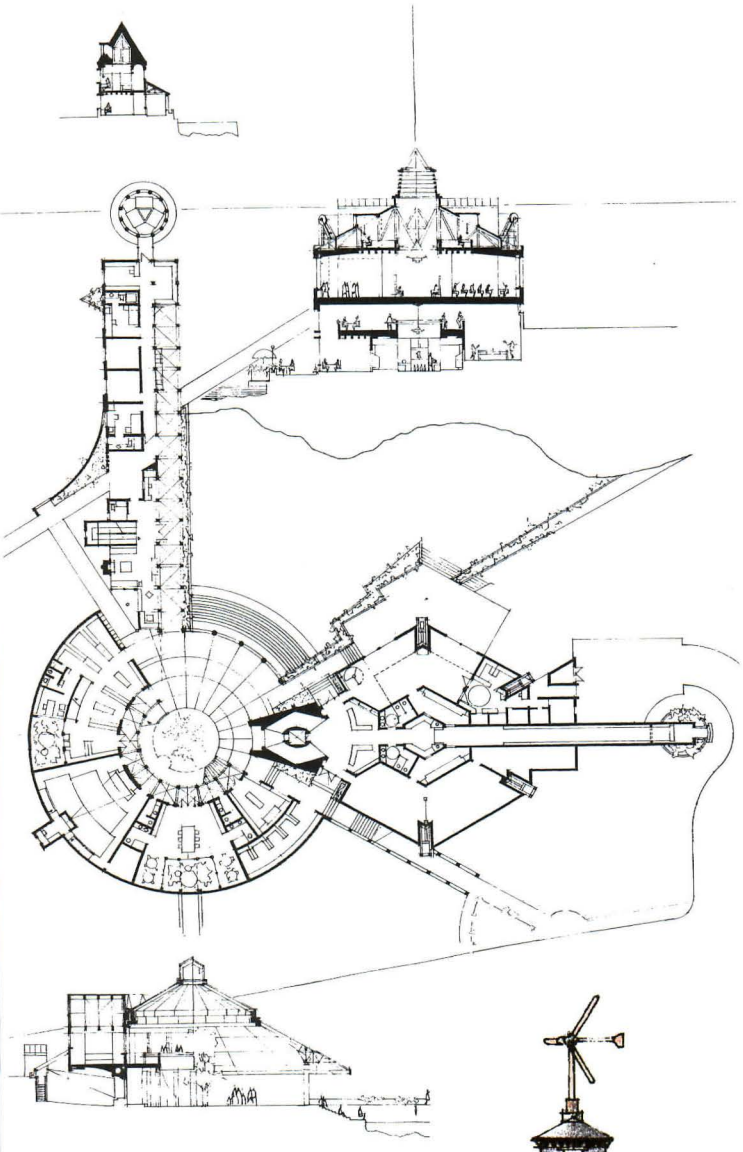
—STEVEN BODOW

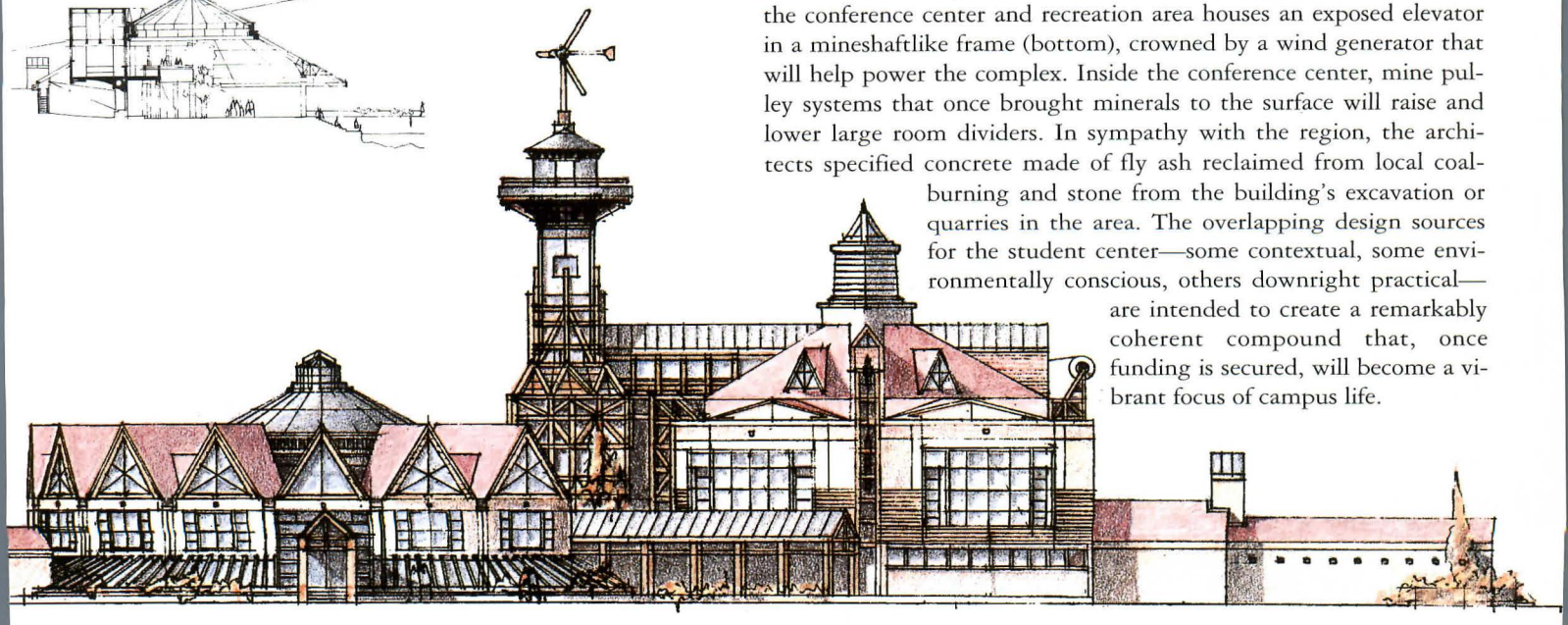
Steven Bodow is a New York-based writer.

Contact Kawneer, Department C, Technology Park – Atlanta, 555 Guthridge Court, Norcross, GA 30092. 404-449-5555.

Carroll College Student Center
Helena, Montana
Center for Maximum Potential Building Systems
and Milosav Cekic Architects

PLANNED FOR A TWO-YEAR COLLEGE, THE STUDENT CENTER (ABOVE) is a reflection of Maximum Potential's environmental "process framework" (see pages 64-71), and architect Milosav Cekic's complementary design stance. The architects sunk the center into a sloping site at the crossing of the campus' most-used pedestrian paths. They designed massing and details to echo the low, rambling mining structures in the region and to respond to the predominantly Collegiate Gothic context. The plan hinges on a sheltered central plaza and conference center that opens onto a manmade skating pond. A hexagonal dining and entertainment structure (site plan, left) adjoins the circular conference center and features a one-lane bowling alley that extends into the landscape. Guest quarters and small meeting rooms occupy the other leg of the L-shaped plan, which terminates in a cylindrical stair and water tower that will collect runoff for reuse in the building's water system. Cekic and Max Pot's Pliny Fisk intended the forms of the student center to reflect actual programmatic services. For instance, an observation tower marking the intersection of the conference center and recreation area houses an exposed elevator in a mineshaftlike frame (bottom), crowned by a wind generator that will help power the complex. Inside the conference center, mine pulley systems that once brought minerals to the surface will raise and lower large room dividers. In sympathy with the region, the architects specified concrete made of fly ash reclaimed from local coal-burning and stone from the building's excavation or quarries in the area. The overlapping design sources for the student center—some contextual, some environmentally conscious, others downright practical—are intended to create a remarkably coherent compound that, once funding is secured, will become a vibrant focus of campus life.





"Carolyn's been w

Gordon Chong is the owner of Gordon H. Chong + Associates, a 45-person architectural practice located in San Francisco, California. He is president of the San Francisco Chapter of the AIA for 1991, and has been a director of the California Council of the AIA and president of Asian American Architects and Engineers.

Carolyn Isseks is vice president of Dealey, Renton & Associates, an independent insurance agency based in Oakland, California. She has represented DPIC's unique insurance program of education and loss prevention services for over thirteen years. She is also a member of the Professional Liability Agents Network (PLAN), a nationwide group that specializes in serving the risk management needs of design professionals.

Carolyn and Gordon met in 1977. "I was new and he was new," she says, "and we sort of grew together." Perhaps all clients don't take advantage of Carolyn's brand of thorough service, but Gordon does. "He's cautious," she says. "He tends to call us before he starts a project or gets into certain areas. He might say, 'We're thinking about a joint venture with another firm. How will that impact our insurance?' Then our contract analyst and I work together to give him some advice on short and long-term consequences."

On the account management side, Carolyn doesn't just wait for the renewal quote to come in. She's on the phone with DPIC—dealing with the underwriters, pointing out her clients' strengths, negotiating for the terms she needs. And she's persuasive.

"I expect a high quality of service for him—I want to be as professional as Gordon is. He emphasizes high standards in serving his clients. And we feel the same way." Carolyn also works hard to keep Gordon H. Chong + Associates informed about the many premium reduction opportunities available from the DPIC program.

Carolyn has a master's degree in education and began her working life as a teacher. The teacher in her still comes out when she's conducting a workshop panel on liability issues for one of the Bay Area AIA chapters or a brownbag seminar for one of her clients. "I love to see the light bulb go on in someone's head," she says. "The 'oh, now I know what you're talking about.' I think that's what I like about this job: I'm always teaching and getting close to people who, I think, appreciate what I have to tell them. They all have the same interests—they want to better their practice in a professional way."

us since the beginning.

Today, 15 years later, with a staff of 45, our firm and its needs have changed and the relationship has changed. In the early years our primary focus was getting work in, making ends meet. We were required by our clients to have insurance and had to struggle to find a million dollars in coverage. Carolyn did a great job of finding alternative proposals for a small firm—she brought us the best of a terrible situation in terms of cost.

Today our projects and contracts are bigger and more complex. Now we use Carolyn's agency, Dealey Renton, a lot for contract review and assistance. Our prospective client may be saying 'it's an unalterable contract—if you don't sign it in the next two days we're going to go to the next architect on the list.' But the agency can call our client's contract manager and say 'it's not in the best interests of either party to do this.' Then the feedback isn't coming from me, which would be totally self-serving. It's coming from Dealey Renton's contract review specialists who know industry standards. They've made little word changes which I think have made the difference, not only in terms of the insurability of the contract, but also from a business perspective.

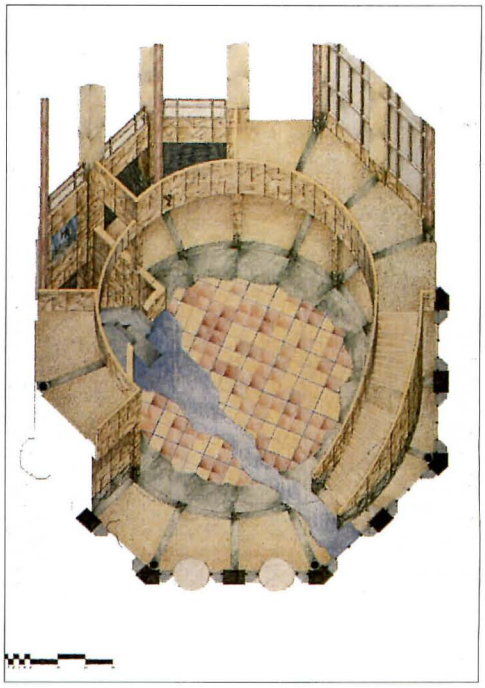
For us the whole idea of service and quality assurance is key. It's been the focus of our firm since we started and it's very characteristic of what our clients demand. Our firm has never had a claim in its 15-year life. I believe that this is in part due to the preventative approaches to professional liability which DPIC and Dealey Renton advocate."

The independent agents who work with DPIC Companies work even harder for you.

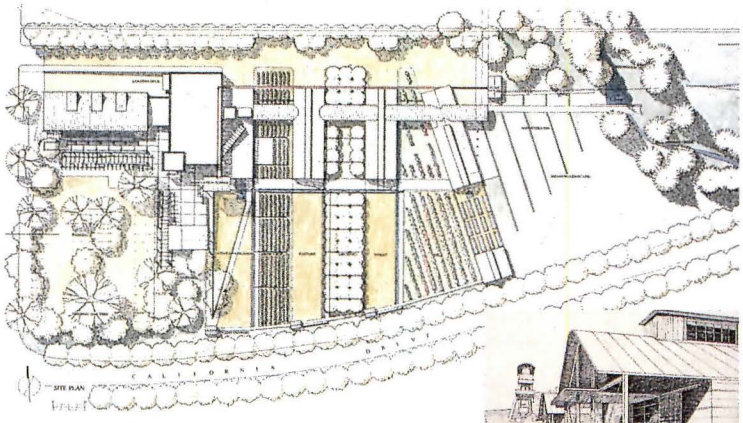
Circle 54 on information card

Natural Resources Building
Olympia, Washington
C.W. Fentress J.H Bradburn and Associates

A 675-FOOT, CURVED FACADE DISTINGUISHES this civic structure from the orthogonal state capitol, providing a sweeping eastern cornerstone for the vast civic campus. The building will house three government departments: natural resources, fisheries, and agriculture in 325,000 square feet of office space and laboratories. The scheme includes a 1,360-vehicle parking garage, 400-seat cafeteria, health club, public reception, public over-counter areas, training rooms, and audio-visual areas. According to the architects, the curved design is drawn from the "geometry of the entire civic-center campus emanating from the state capitol." An off-center rotunda relates visually to the capitol dome while anchoring the new structure within the existing urban grid. Three discrete landscaped zones, which include ferns, mosses, evergreens, an apple orchard, and a horizontal rock and cobble stone sculpture of shorelines and stream edges, symbolically represent the jurisdictions of the natural resource administration. The $55 million scheme, winner of a national design competition, will be completed in July 1992.



Natural Resources Building's curved north facade (above) addresses a public plaza allowing access to a landscaped park. The rotunda's terrazzo floor pattern (right) includes abstract images of the natural environment.

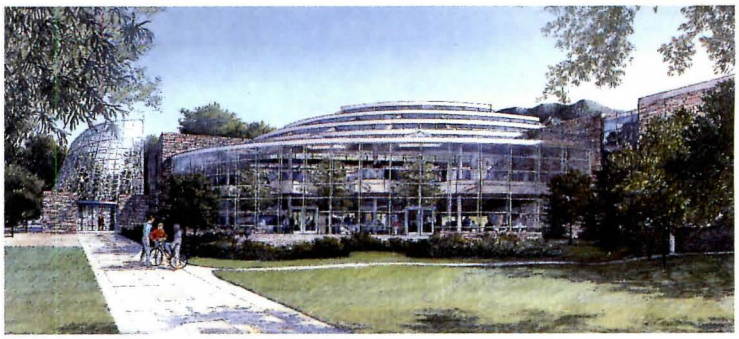


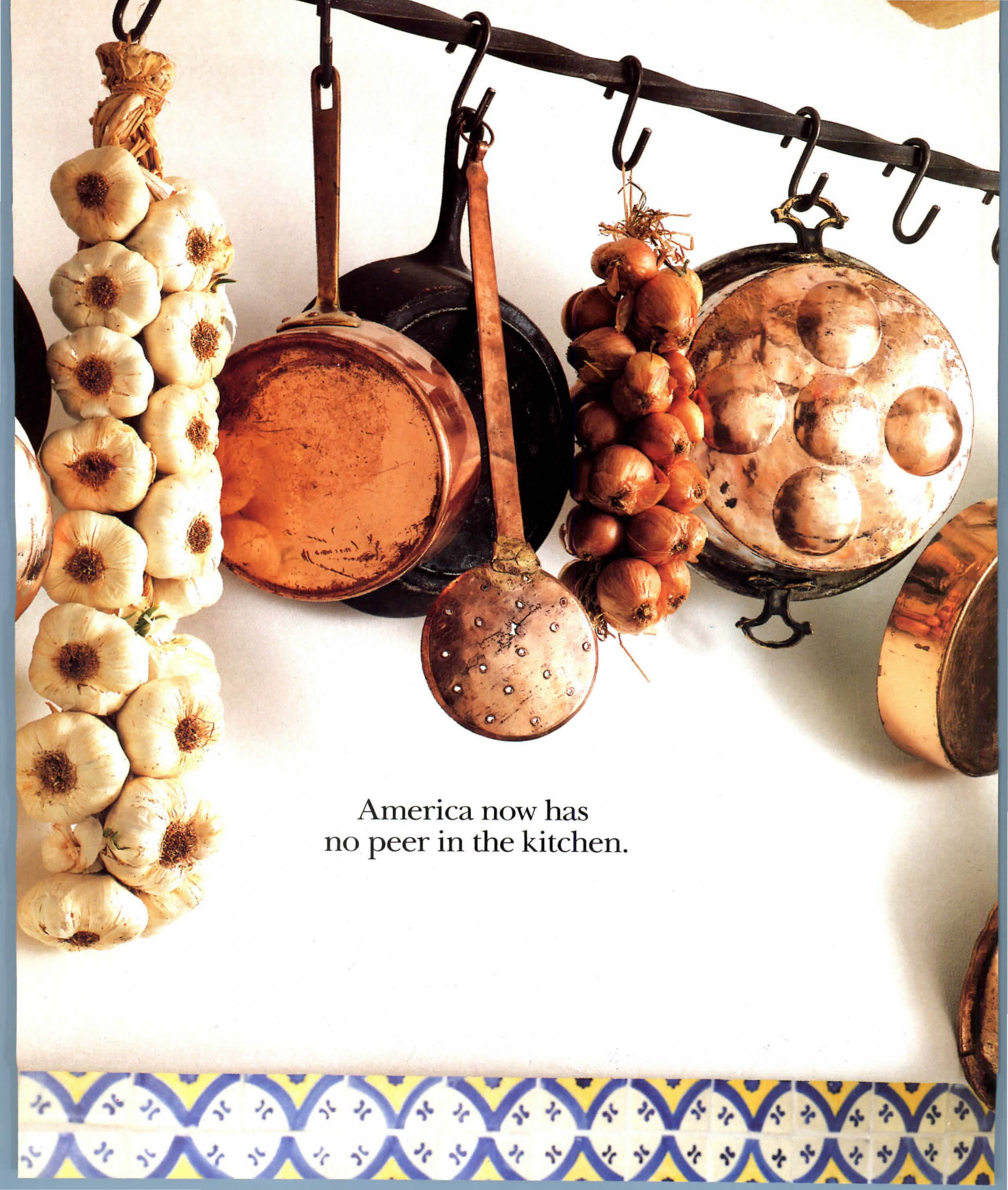
Napa Valley Museum and Cultural Center
Yountville, California
Fernau & Hartman Architects

THE ARCHITECTS DESIGNED GALLERY SPACES FOR THE 33,000-SQUARE-foot museum that interlock with the irrigated landscape (site plan above), thus minimizing separation between indoor and outdoor displays while celebrating the region's close relationship with nature. A system of irrigation canals (above, inset) will not only demonstrate the Napa Valley's water distribution system but will guide the visitor through linear exhibition space, which traces the history of agricultural techniques in the nation's viticultural mecca. Diverted from a nearby creek, the water travels to an observation tower, flows along the display beds, and then returns to the landscape. The architects and sponsors hope to complete the project within five years.

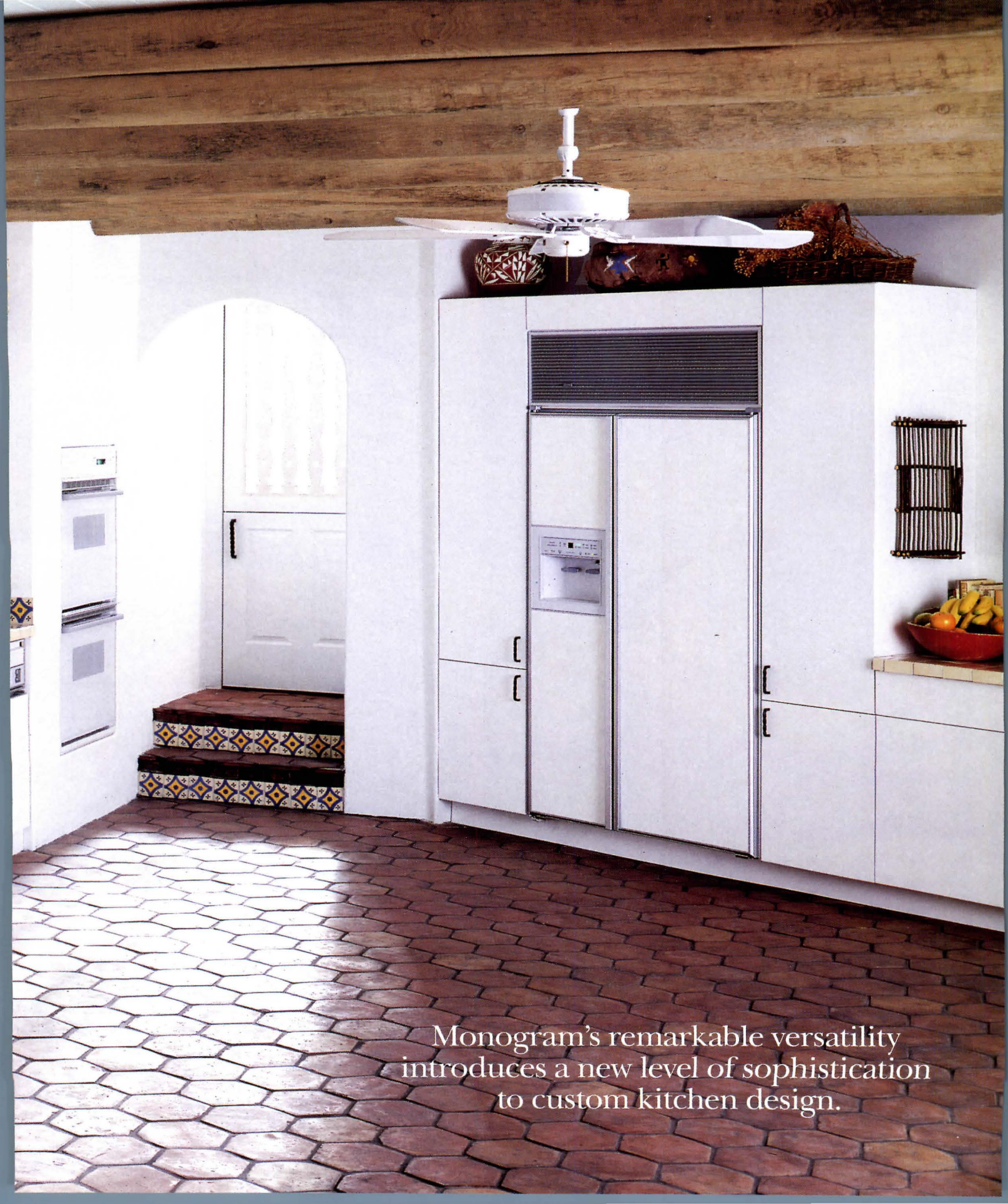
Boulder Public Library
Boulder, Colorado
Midyette/Seieroe & Associates

RESPONDING TO THE BOULDER COMMUNITY'S ENVIRONMENTAL concerns, Midyette/Seieroe & Associates designed an elaborate natural lighting system to minimize energy consumption for a 53,585-square-foot library addition. Light shelves over the northeast reading room, stepped clerestory roof monitors (below), and deep overhangs on the south and west exposures reflect sunlight deep into the building's interior, nearly eliminating the need for artificial lighting during the day. An evaporative cooling system efficiently controls the interior climate without the use of fluorocarbons. In addition, Midyette/ Seieroe integrated a system of catch basins into the landscape to prevent impurities in water runoff collected in parking areas from entering a creek that runs through the site. Phase I of the $9.4 million project is now under construction. Phase II, a 38,507-square-foot renovation of the original 1961 building, will be completed in the fall of 1992. ■





America now has
no peer in the kitchen.


Monogram's remarkable versatility
introduces a new level of sophistication
to custom kitchen design.

No matter what kitchen style you are designing, one of Monogram's biggest contributions is that you can practically forget about the appliances!

The Monogram™ line is now s complete that it literally sets your imagination free. You design the kitchen you want. Monogram will supply the appliances to fit right in.

For example, you probably looked to Europe when you wante a flush-design wall oven. Now Monogram offers one with the advantage of self cleaning and electronic controls for precise cooking temperatures.

Monogram™ Component Cooktops offer combinations of g electric, updraft, downdraft, grill and griddle elements that can be arranged in unique configuratio with workspaces in between. No other manufacturer offers such a li

Add to this an Induction Cooktop and a Five Burner Gas Downdraft Cooktop that can actually vent cooking odors at *par lid* height, and the choices you ma offer your clients become truly eclectic.

The refrigerator's electronic monitoring system provides not j water and cubed ice but also crushed ice through the door.

The electronic dishwasher ca be completely integrated with the cabinetry.

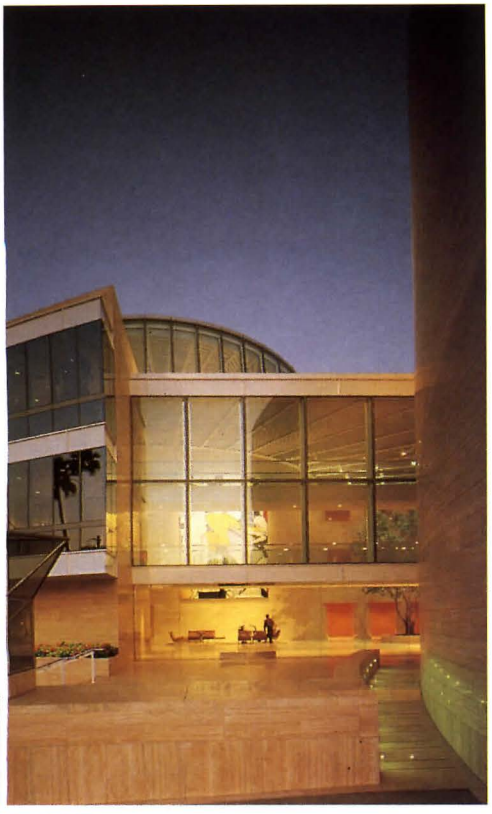
Being able to order *all* your built-ins from one manufacturer has the obvious advantage of *one* delivery date. And your clients enjoy the benefits of the industry most extensive network of factory service professionals, as well as th GE Answer Center® service, whic stands ready at 800.626.2000 to answer questions any time of the day or night every day of the year

We simply strive to make Monogram a synonym for the be in built-in appliances.

Monogram.™

Circle 56 on information card

International Marble Competition



PAUL WARCHOL

First Prize
Creative Artists' Agency
Beverly Hills, California
Pei Cobb Freed & Partners

THE CREATIVE ARTISTS' AGENCY IN BEVERLY Hills, California, designed by Pei Cobb Freed & Partners, won top honors in this year's international marble awards program. Established in 1985 by the International Marble and Machinist Association of Carrara, the awards program recognizes excellence in applications of Italian marbles, granites, and travertines in regions around the world.

Honoring projects in North America, this year's jury also presented five honorable mentions: the Bell Atlantic Tower in Philadelphia by The Kling-Lindquist Partnership, which was honored for both exterior facing and interior application; and a trio of interiors—The Paramount Hotel by Haigh Studio with Philippe Starck; World Financial Center Wintergarden by Cesar Pelli & Associates; and the International Holding Company by Kohn Pedersen Fox Conway Associates.

The jury members included AIA president C. James Lawler, FAIA (chair); Gianni Boeri, President of the Italian Council of Architects; Leonardo Fiori, director of the Italian magazine *Costruire per Abitare*; Los Angeles architect Buzz Yudell of Moore Ruble Yudell; Dallas architect Frank Welch; and ARCHITECTURE senior editor Lynn Nesmith. The five premiated projects will be exhibited through June 2 at the 12th annual international marble and machine fair in Carrara, Italy.

ELIZABETH FEELEY

World Trade Center Wintergarden
New York City
Cesar Pelli & Associates

The Paramount Hotel
New York City
Haigh Studio with Philippe Starck

PAUL WARCHOL

International Holding Company
New York City
Kohn Pedersen Fox Conway Associates

ROBERT GOLDING JR.

Bell Atlantic Tower
Philadelphia, Pennsylvania
The Kling-Lindquist Partnership

Bell Atlantic Tower
Philadelphia, Pennsylvania
The Kling-Lindquist Partnership

THIS HOUSE HAS A DEEP SECRET.

You probably think you're looking at solid sawn lumber siding. Even up close you still can't tell—it's warm to the touch and has that familiar density of wood. And the people who bought this home could probably afford the real thing.

But their builder knew how to get the look without spending the money. He used Inner-Seal® smooth lap siding from Louisiana-Pacific Corporation. It's the industry's leading OSB siding, made with our special binder and special overlay to withstand the elements better than anything else on the market.

You can afford to put Inner-Seal smooth lap siding on every side of every house you build. Not only does it cost considerably less than sawn lumber, but it keeps on saving you time and money as you go. Because it starts out without defects, and stays in good shape on the job site, you can use everything you paid for, with no expensive waste to worry about.

The material has such integrity, you can top nail only, making the job go quickly and making a better-looking finished product. And because we prime it, you don't have to.

After a few years, sawn wood sidings would warp, split, discolor. But Inner-Seal smooth lap siding just lies there—holding its finish and keeping its dimensions. So it'll be years before anyone will catch on to your secret.

Perhaps most importantly, we use primarily small-diameter, fast-growing trees to make Inner-Seal lap siding. Its strength comes from our innovations, not from the size and kind of trees we use. So when you use

Builder: Walker Construction Company

Inner-Seal lap siding in place of lumber, you're reducing the industry's dependence on our old-growth forests.

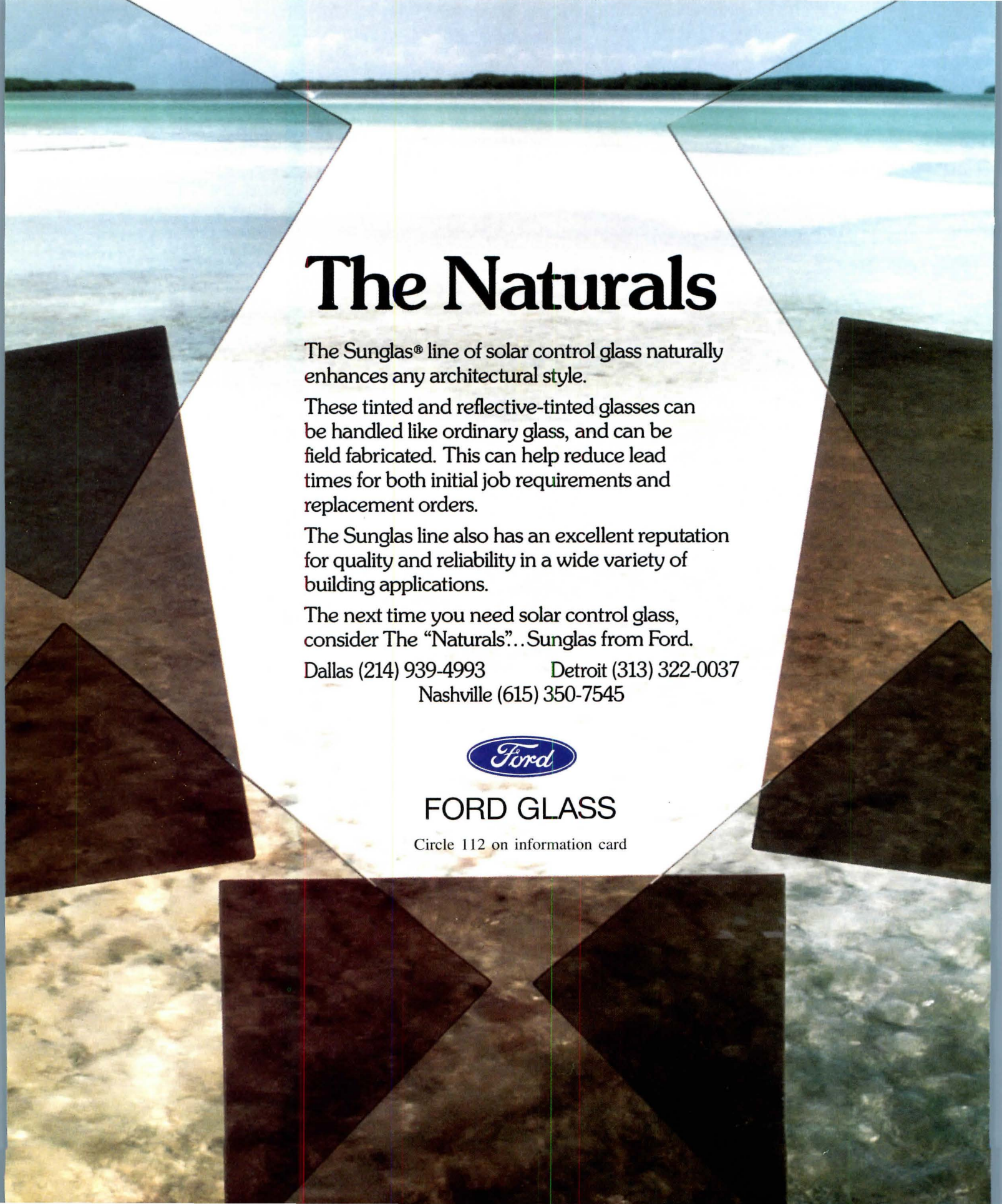
Knowing all this, why would anyone still choose to pay for sawn lumber? On the other hand, if you'd like your customers to think you spent a fortune on their siding, we'll never tell.

Inner-Seal lap siding is also available textured, and there's cedar-textured panel siding, too. For more information, specifications, and samples, call us today in Houston at **(409) 756-0541.**

Louisiana-Pacific

INNER-SEAL® LAP SIDING

Circle 60 on information card



The Naturals

The Sunglas® line of solar control glass naturally enhances any architectural style.

These tinted and reflective-tinted glasses can be handled like ordinary glass, and can be field fabricated. This can help reduce lead times for both initial job requirements and replacement orders.

The Sunglas line also has an excellent reputation for quality and reliability in a wide variety of building applications.

The next time you need solar control glass, consider The "Naturals"...Sunglas from Ford.

Dallas (214) 939-4993 Detroit (313) 322-0037
Nashville (615) 350-7545

Ford

FORD GLASS

Circle 112 on information card

Kentucky Society of Architects

RANGING FROM A PARKING GARAGE TO A correctional facility, eight commercial projects received design awards from the Kentucky Society during its annual convention in November. The program recognized not only the talent of local architects, but the quality and diversity of built works throughout the state. The Denver-based jury of three prominent architects presented honor awards to a public library with a strong civic presence; a Center for Robotics and Manufacturing; the renovation of a high school; the renovation of a retreat house located within an abbey; a parking garage described as "sculptural"; a remodeled auto dealership; a family care center the jurors described as "playful"; and a correctional facility. ■

JASPER WARD

Louisville Gardens Parking Garage
Louisville, Kentucky
Jasper Ward Architects

CORPORATE PHOTO GROUP

Renovation of Holmes High School
Covington, Kentucky
Burgess & Niple Limited, Architects

LARRY A. BENDER

Family Care Center
Lexington, Kentucky
Pearson+Bender+Jolly, Architects

WALT ROYCRAFT

Center for Robotics and Manufacturing
Lexington, Kentucky
Sherman/Carter/Barnhart Architects

WALT ROYCRAFT

Lexington Public Library
Lexington, Kentucky
Sherman/Carter/Barnhart Architects

BO PARKER

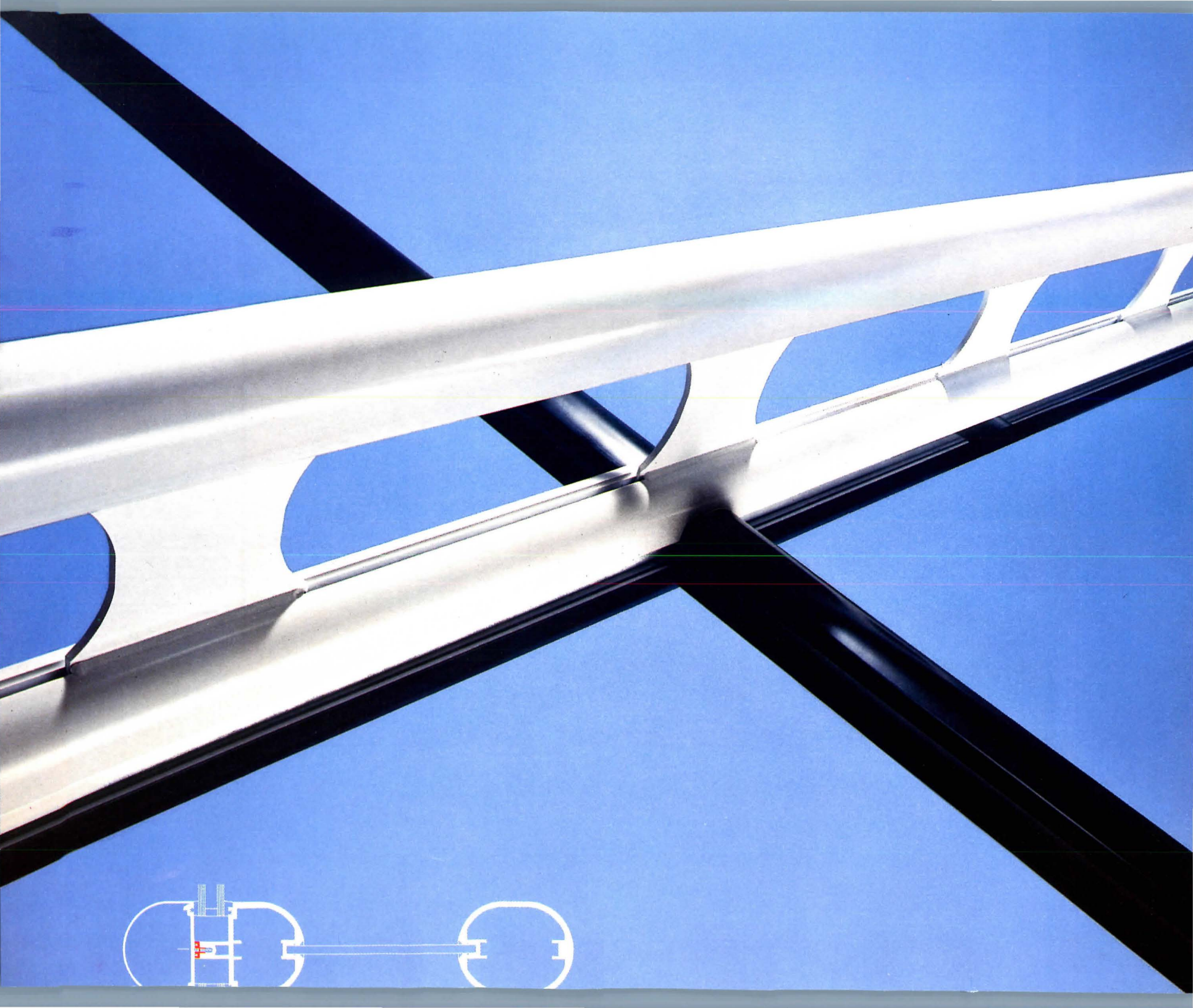
Correctional Facility
Morgan County, Kentucky
GRW, and DMJM, Architects

DOUG HEDRICH

Blackhorse Motorworks, Ltd.
Lexington, Kentucky
Sullivan Design Associates/Stanley W. Hensley

JOHN NATION

Abbey of Our Lady of Gethsemani
Trappist, Kentucky
Potter and Cox Architects



ARCHITECTURE

The Greening of Architecture

IT LOOKED LIKE A MESSIANIC ERA: THE 1970s SOUNDED A hallelujah chorus for the first Earth Day, inspired by the gospels according to Rachel Carson's *Silent Spring* and Ian McHarg's *Design With Nature*. Then there was the Arab oil embargo of 1973 that made Buicks look like dinosaurs guzzling their last at the endless gas lines.

In response to the 55-mile-an-hour era, architects tilted solar collectors atop houses and proclaimed the spirit of change. In Yankeeland, use-it-up-wear-it-out-make-it-do-or-do-without architects added greenhouses and set up solar energy companies in warehouses down by the old mill stream. In California, Sierra Club clients solarized their glass boxes, and, in Arizona, Whole Earth architects studied Arcosanti, built by students and financed by Paolo Soleri's bells.

IVAN PINTAR

THEN: ARCOSANTI

Begun in 1970, Paolo Soleri's hand-built utopian vision for ecological sustainability is still active in the Arizona desert (above).

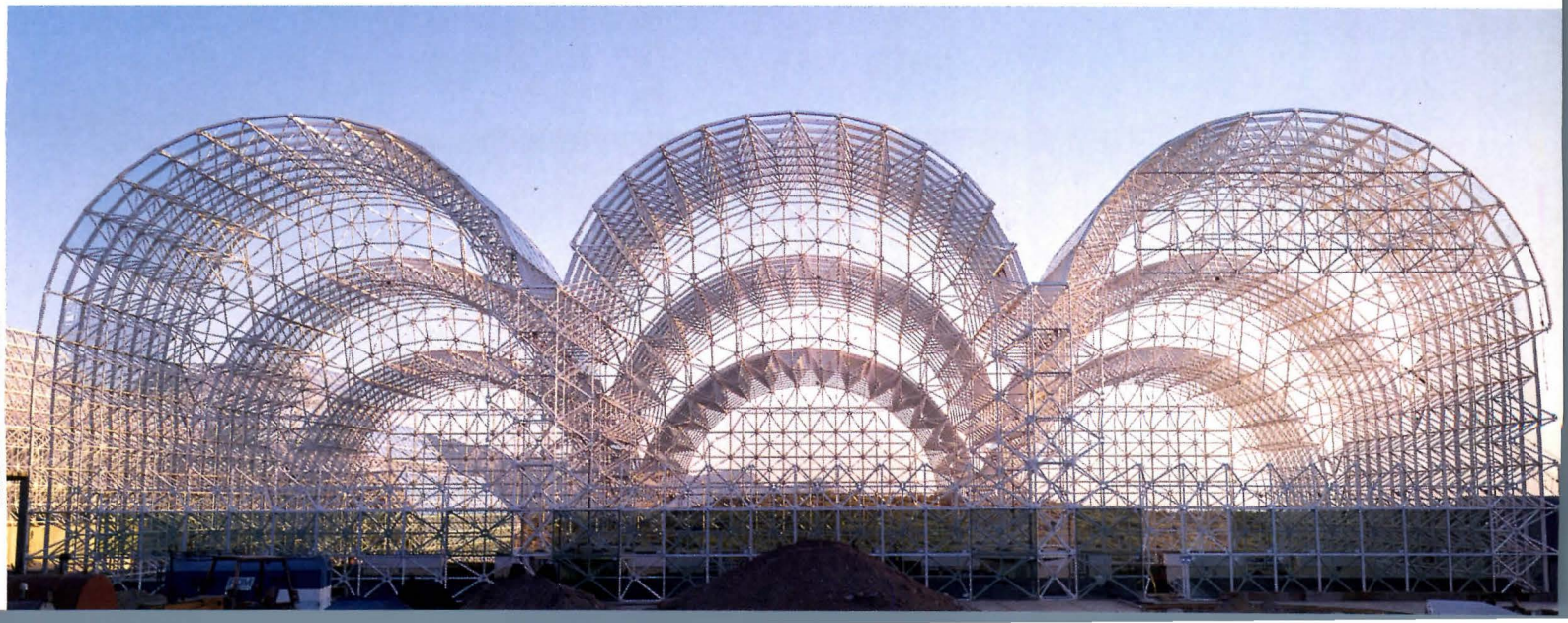
Two decades closer to the Postpetroleum Age, Soleri bells ring like a thousand points of sound in New Age gift shops, and conservation catalogs litter the Earth. But observers in this season after Earth Day and an oil-land war might well wonder: is the gas mask the most visible "environmental" artifact of 1990? Will cheap oil be the major product of an energy program backed by military hardware? In short, has environmental, sustainable, "green" architecture made any advances since the 1970s?

The quick answer might seem to be "no." If it were "yes," then "sustainable architecture" would be a tautology, redundant in an environmental utopia in which the words *toxic*, *hazardous*, *pollution*, and *sick-building syndrome* would not figure into the emerging dictionary of design.

And yet, the longer answer is more tentative. At a basic level, we do recognize the problem. "Green" has leapt from

NOW: BIOSPHERE II

Arcosanti's high-tech heir is an environmental laboratory offering a highly debated prototype for self-sustaining ecosystems (below).



THOMAS HART/SWA GROUP

THEN

the environmental vocabulary to the architectural one, despite those who dread the word. Conscientious design encompasses both healthy houses and a healthy planet, both the microscale of toxic indoor materials and the macroscale of global disaster.

In fact, the very invisibility of recent ecodesign may be one of its most important signs. Talk to eco-minded architects and they explain the irony: In the early days of the energy alert, concerned designers were a breed apart, scrambling to pull solar solutions out of a very empty hat. And like pinwheels on that hat, their strange whirlygigs twirled aloft. "You could spot solar a mile away," says Harry Gordon, steering committee member of AIA's Committee on The Environment (COTE). Today, design and climate-control solutions are integrated, internalized.

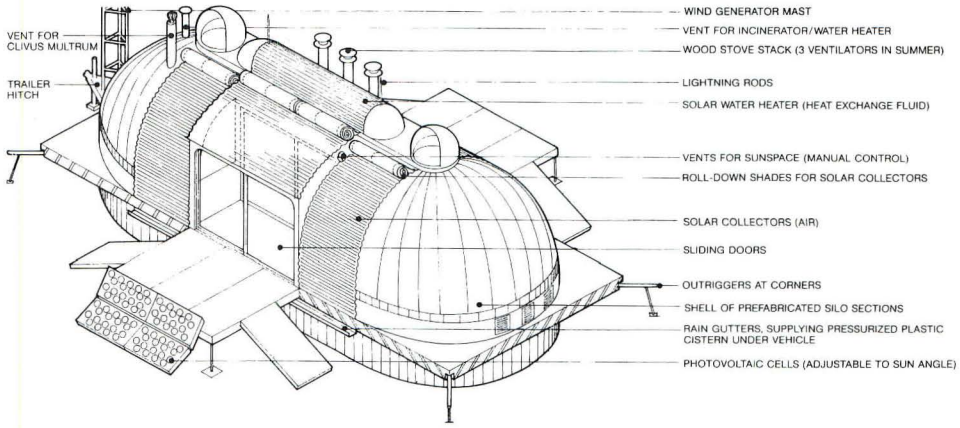
Moreover, environmentalists have multiplied. A cadre of energy-adroit architects have visible signs of their eco-mindset. They range from the hands-on houses of Dan Rockhill (pages 90-95) to the Brave New World of Biosphere II (pages 76-81). Though a small elite, the number of green architects grows, and they exude a pioneer zeal.

More architects will attend this August's meeting of the American Solar Energy Society in Colorado; meanwhile, towns design "sustainable city" programs to manage growth. And AIA's environment committee, spawned by Earth Day 1990, sponsors studies from energy to sustainable resources.

The sun-worshipping, Earth-hugging '70s produced more than a feelgood movement. With knowledge came planetary fear, but the work of early eco-architects has spread: the "green" buildings and the body of information multiply. Environmental enclaves endure, blending a sense of community with ecology. Simultaneously, scientists are busy reducing the cost of photovoltaics to parallel nuclear energy.

Today, deep green clients have developed an eco-palette based on 20 years of research. With its new headquarters, the Natural Resources Defense Council (NRDC) made sustainable architecture more than a one-time project (page 88). "The last thing the NRDC wanted was the latest set of bells and whistles," explains architect Randy Croxton of the Croxton Collaborative. "They wanted to use their headquarters as a teaching tool."

Nonetheless, the 1970s desire to coddle the Earth has heirs who express that reverence, recognizing that "regionalism is above all natural," in the words of Pliny Fisk, whose work grows out of a literal and metaphorical



1980: AUTONOMOUS DWELLING VEHICLE

Designed by "home mechanics" Ted Blackwell and Michael Jantzen, the energy-conserving mobile home (above) typified the solar gadgets of the early phase of green architecture, which failed to integrate technology and design.

1970s: UNDERGROUND HOUSES

As symbolized by Malcolm Wells's 1974 office (above), underground structures were a popular '70s approach to limiting a building's impact on the landscape and conserving energy by using earth as a natural insulator.

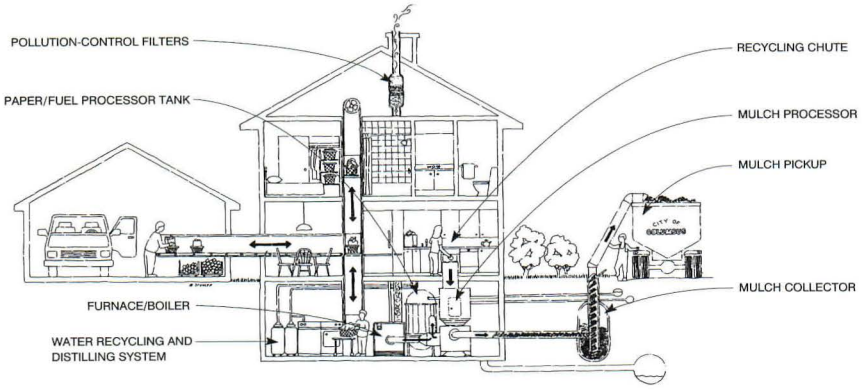
BETTMAN NEWSPHOTOS

1970s: SOLAR PANELS

The Arab oil embargo fueled the creation of government tax incentives championed by Jimmy Carter in the '70s (above) to encourage the use of solar panels on buildings—even the White House—as a technical solution to fossil fuel consumption.

1977: CITICORP CENTER

Solar panels were never installed on its top—which was angled to capture sunlight—but Stubbins Associates' Citicorp building in Manhattan was offered as a shining example of energy efficient skyscraper design.

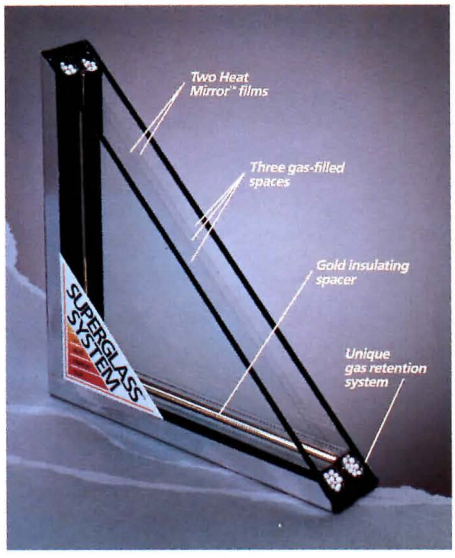


1989: METABOLIC HOUSE

Industrial designer William Stumpf's proposal for reducing waste created at home (above), internalizes technology to encourage recycling by digesting garbage and trash into a "techno-mulch" that provides the house with heating fuel.

1990s: HEALTHY HOUSES

Baubiologie, a popular German design and construction movement now crossing the Atlantic, advocates building with natural materials such as sod to achieve ecologically balanced houses (above) and workplaces.



1990s: SUPERGLASS

Although left in the hands of private industry in an era of government deregulation, energy-conserving technologies such as insulated windows and heat-reflecting films for glass (above) have continued to advance rapidly.

1989: WARSAW TRADE TOWER

Carbon dioxide emissions produced by building William McDonough's ecological skyscraper (left), to be constructed of recycled materials, will be offset by planting a proposed 10-square-mile forest.

map of the ecology and resources of a region (pages 64-71). "The material flows, the energy cycles, the water in a region is really what it's about," Fisk says. "I thought by this time everyone would be out there doing it."

In the 1990s, good regionalism is good environmentalism. And it is a native art. Albuquerque architect Antoine Predock recalls the energy-avid '70s when he established his practice. La Luz, his adobe townhouses clustered in a 500-acre plan, preserved wetlands, preserved flood plain zones, and took a basic attitude toward the land. As Predock notes, "I wasn't leaning on passive measures at the expense of making good architecture." This blending of context and biology, more than the search for the Holy Grail of hardware, marks the advance from the '70s to the '90s.

Despite the eco-hooplah, an inherent conflict exists between conservation and consumption. "Check out Art and Activism," one shelter magazine chirps. Waving the commercial green flag, it raves about transforming compost, light bulbs, or cotton towels into "objects of desire."

Green architecture, then, should not be just a soap commercial to scrub up the facade-first '80s. Above all, it should not forget the '70s axioms lost in the privatist '80s. That energy-conscious era gave us a notion of "limits to growth," of "small is beautiful," of "appropriate technology." Activists of the period shared a mandate to change public policy. They also, lest we forget, enlisted an impassioned public and a sympathetic government to listen to their alarms.

Can environmentalists spread their zeal for a sustainable architecture in the '90s? Can they transform a decade that followed Tom Wolfe-style "Masters of the Universe" developers; push the privatist era back into the save-the-environment business; and renounce the Bush Administration's energy unpolicy? Users of 40 percent of the world's energy in fueling and building, U.S. architects have a public as well as a personal responsibility to advocate within and lobby without.

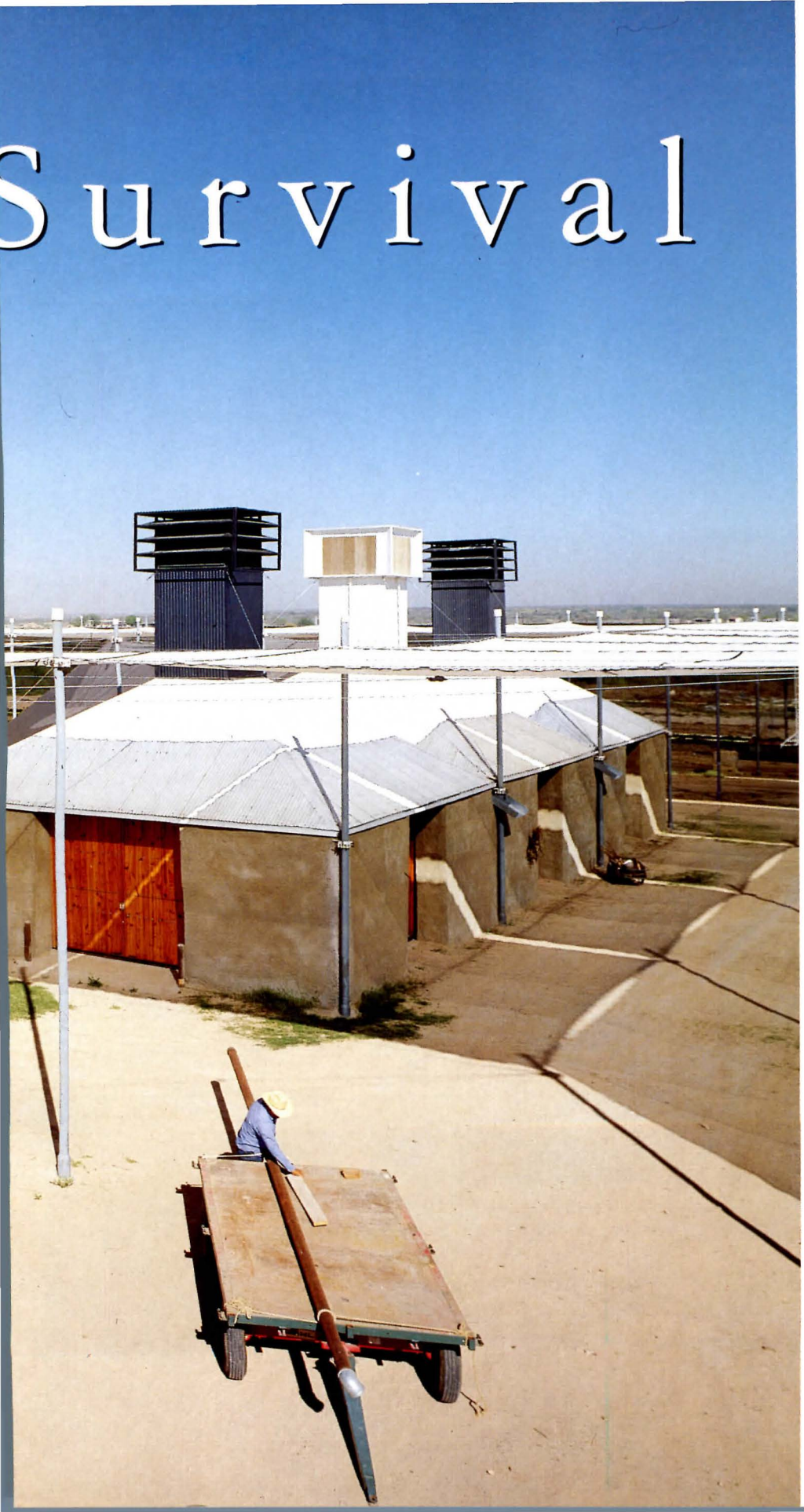
In the midst of global degradation, "it is becoming more and more obvious that humanity's condition is 'sustainability or bust'," asserts Max Pot's Fisk and his colleagues. Others echo that holistic thought, to use a buzzword of their eco-ancestors. The planetary Mission Impossible articulated in the '70s may seem more so in the '90s. But the green craze has become a crusade for those who hope their labors will convert federal wrongdoers and restore the Whole Earth. ■

—JANE HOLTZ KAY

GREEN ARCHITECTURE

Blueprint for

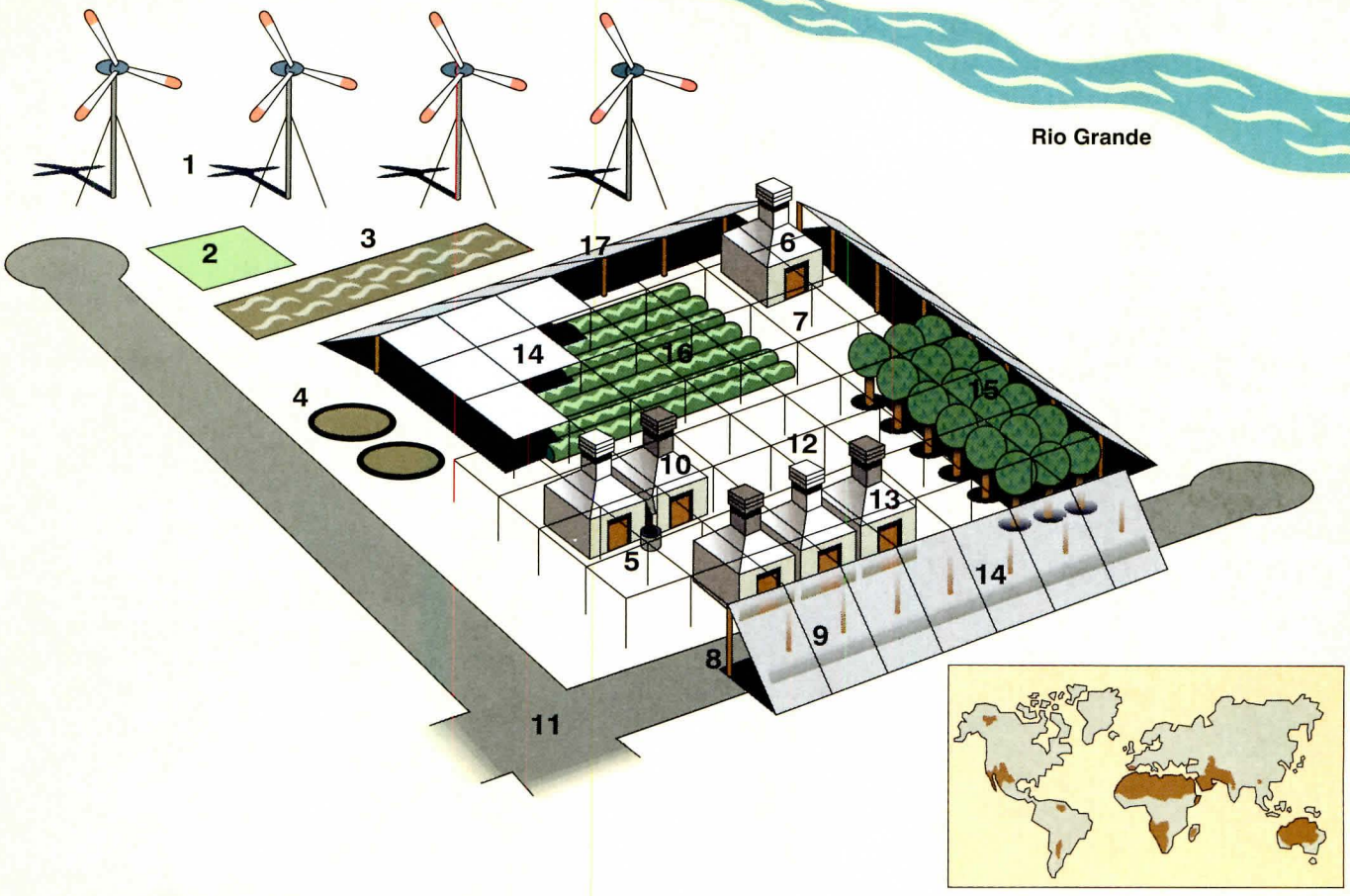
Survival



LAREDO, TEXAS, HARDLY SEEMS THE PLACE to find visionary architecture. Anchored to signs of the past, the city is lined with low-scale, European-inspired streetscapes and modest plazas downtown, and a faux-Santa Fe adobe airport terminal on the city's outskirts. On Laredo's northwest edge, however, four gleaming wind generators rise up next to a junior college and former Army post, alien beacons marking an odd experiment. In the shadow of these propellered towers, researchers and laborers marry limited local resources and high technology to forge a prototype for farming in this flat Southwest Texas border town. Utopian in spirit, the farm is a vivid example of the architectural and ecological theories of the Center for Maximum Potential Building Systems.

Known simply as "Max Pot," the Austin-based firm is a seemingly quixotic workplace, studio, and informal lab attached to the home of its codirectors, Pliny Fisk III and Gail D.A. Vittori. The Laredo Demonstration Blueprint Farm is Max Pot's most fully realized venture to date, born of the experience of two dozen building and research projects undertaken since the center's founding in 1974. At the same time, Blueprint Farm is only the beginning of community-scale application of Max Pot's philosophy.

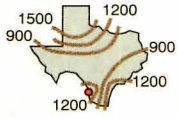
Studying the interrelationships that determine patterns of building and habitation around the world, architect Fisk and generalist Vittori approach each problem—a house, a city plan, or, as in Laredo, a demonstration farm and market—through a matrix of overlapping factors such as geological formations, climatic conditions, vegetation patterns, building precedents, waste streams, and useful technological innovations, beginning always from a global perspective and working toward a micro, project-specific level. Fisk, who learned this interdisciplinary approach from Ian McHarg at the University of Pennsylvania 20 years ago (he holds degrees in both architecture and landscape architecture), says this "process framework" addresses the time-honored environmentalist priority of preserving the air, land, and water of the planet. Maximim Potential also stakes out a strong social agenda, promoting the built environment, such as Blueprint Farm, as a locus for not just providing food, but recycling waste, redistributing wealth, and harnessing urban sprawl.



Waste Treatment and Water Replenishment

1. Wind turbines (water pumping)
2. Wetland marsh (hyacinth)
3. Sedimentation pond
4. Sludge thickening
5. Cisterns (water storage)
6. Compost for solid waste (in shed)
7. Organic solid waste

Wind Power



Cisterns

Hyacinth

Low-Energy Materials

8. Recycled oil-well drilling stems
9. Tensile steel cable structures
10. Packing shed (straw, lime, pozzolan, caliche, iron ore)
11. Permeable paving (mesquite)

Caliche

Straw

Pozzolan

Lime

Iron Ore

Mesquite

Cooling/Refrigeration

12. Downdraft cooling towers
13. Zeolite refrigeration (nonfreon-based)
14. Continuous shade (reduces open-space temperatures)

Downdraft Tower

Shade

Zeolite

Agricultural Systems

15. Agro-forestry area
16. Vegetable area
17. *Farm insectary*

By mapping available materials and technologies (facing page), Max Pot created a self-sustaining farm with symbiotic agricultural systems. Shaded areas of the world represent desert regions bordering grasslands, where climates are similar to that of Southwest Texas. Energy sources for refrigeration are wind generators (view from southwest, above left). Zinc-impregnated polyester awnings (view from northeast, above right) block wind and extend growing seasons.

It might seem like overkill to take the whole world into account just to plan a 2-acre farm. But because it is considered on a global scale, the Laredo project represents one biome, or a particular set of climatic conditions, within similar biomes scattered around the globe. Climatically, Laredo sits along a tenuous transition between the arid Southwest and the prairie grasslands. The same meeting of arid desert and temperate grassland also occurs in South America between Uraguay and Argentina, north and south Africa, and in southeastern Australia.

Each parallel location offers a set of climate-related responses that could be applied in Laredo, such as the mesquite flooring discovered to be widely used in Argentina. Farmers and oil speculators alike have cleared away the scrubby mesquite tree in South Texas by burning it or even using Agent Orange, all to create more usable land. Mesquite wood is harder than mahogany, however, and could easily catalyze a new industry in a region that has no other lumber resource. The sheds' wind towers were borrowed from models indigenous to Iran, which occupies a biome similar to the arid half of Laredo's. Fisk has created a farm that, once its divergent ideas and processes are integrated, will open up further options for design and living in the distant yet similar biomes that inspired its development. In sharing knowledge among biomes, Fisk says, each region can advance with its climatic partners, whether First or Third World.

As much as they look outward for inspiration, Fisk and Vittori also focus inward on a local community, linking businesses and creating new ones if needed, to replace imported technology and products with readily available substitutes. Rather than construct a superstructure for Blueprint Farm from trucked-in steel or wood, Max Pot salvaged steel oil-rig drilling stems from a nearby junkyard. Cut to 24-foot lengths, erected at 30-foot intervals, and held in place by cables, the pipes provide sturdy, flexible supports for zinc-impregnated polyester panels (Fisk had hoped to use cotton) stretched to form awnings across the structural grid. The resulting shade is expected to increase crop growth by up to 30 percent. Temperatures under the awning will be at least 10 or 15 degrees lower than ambient conditions—a third growing season during the summer swelter may be possible under the protective covering. Max Pot will replace some shade panels one at a time with experimental plastic tarps of pink, purple, and other colors whose light is expected to stimulate growth.

At the center of the agrarian development, Max Pot built five sheds—housing offices, classrooms, and storage—from stacked straw bales, products of the grassland side of Laredo's biome. The firm had three sheds faced in a sprayed-on cement finish supplied by a local swimming-pool builder; two sheds were hand-stuccoed. To support the roofs of the sheds, Fisk turned away from trusses conventionally constructed of aluminum, since its manufacturing consumes great energy and the material must be shipped. Instead, he specified folded, paper-thin steel trusses and decking fabricated locally. The interior concrete floor slabs, while prepared traditionally, could in the future be mixed on-site from indigenous pozzolan, lime, and caliche.

With the completion of Blueprint Farm, Max Pot will soon concentrate on integrating its various physical elements: wind generators, cisterns, wastewater treatment areas, farming plots, work spaces, and storage areas. The farm will serve two roles, growing fruits and vegetables for sale to the community and providing a market for local farmers. In practice, produce brought to the farm will be sorted, with ripe fruits and vegetables prepared for sale and damaged produce passed to the compost heap on-site or, if only bruised, to a canning area.

Refrigeration will be powered by four 10-kilowatt wind generators and will someday rely on the solar absorptive cooling promised by the common mineral zeolite. Today, zeolite is a largely discarded byproduct of mining for lignite coal near Laredo. As a consultant to the Lakota Sioux in South Dakota, Fisk first saw zeolite in use in 1987. The material absorbs moisture from the air when heated, providing refrigeration. A 10-square-foot solar collector, for example, can produce up to 15 pounds of ice per day, says Fisk. Absorbed heat can be removed by a heat exchanger to increase zeolite's cooling efficiency and to power slow cookers for the canning process. Although Max Pot understands the technology, its application at Blueprint Farm is still a few years away.

In an area on the edge of a desert, water takes on a sacred presence in the farm's operation. "*In a very real sense, it's a game of* how long you can hold water on the site," says Fisk. Two 2,000-gallon cisterns occupy primary positions amid the small building

cluster. They collect runoff from infrequent rains, channelling any excess to wells. The cisterns moisten porous pads at the intake of the downdraft wind tower atop two of the sheds, creating a self-regulating airflow, dictated by temperature and humidity. The airflow cools interior spaces before cycling through an updraft wind tower in an adjacent shed. The cisterns will also dissipate surplus heat from a future ground-source heat pump and the zeolite refrigeration.

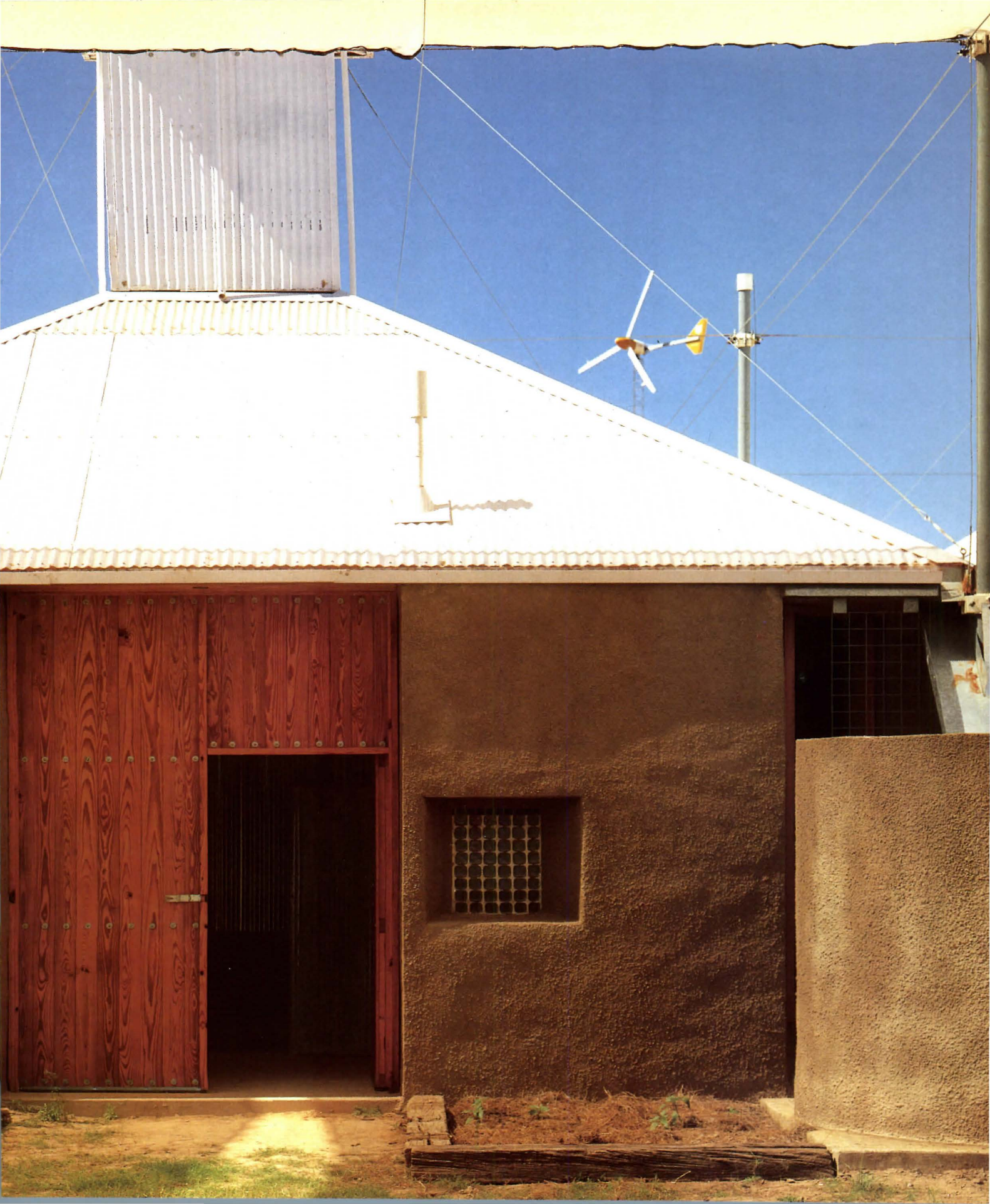
Water pumped from the Rio Grande will be used for treating the farm's waste in a sedimentation pond and marsh. Fisk argues that similar, larger scale efforts to clean the water that returns to the river could reverse years of chemical-fertilizer runoff that has polluted the Rio Grande.

About 50 groups of area growers have already visited Blueprint Farm. They expect to benefit from higher prices for their produce once the farmers' market is in place, and local residents will spend less there than they now spend in supermarkets. But the farmers are also sampling a radical new approach to agribusiness. The dense, protected Laredo farm resembles a giant greenhouse more than the wide-open farms it seeks to replace.

Because it makes cultivating a plot as small as 2 acres profitable, Max Pot's integrated farm may even interrupt urban sprawl. In all but the mature business districts across the country, urban and suburban real estate could be converted to viable agricultural uses, explains Fisk. The neighborhood farm or the agricultural "necklace" draped around urban fringes may become an alternative to ever-larger supermarkets and ever-greater trucking distances from warehouse distribution centers.

Like all utopias, however, Max Pot's Blueprint Farm requires faith in the philosophy that backs it up and the hope that fundamental change is still possible. Other voices, old and new, have offered support. Christopher Alexander's *A Pattern Language* echoes Max Pot's philosophy on a psychological, visceral, even common-sense level. Alexander discovers poetry in the densely overlapping patterns of a single physical space much the same way Fisk's designs evolve from mapping resources of a biome

Under the canopy that shades crops from the sun (top left), temperatures drop 10 to 15 degrees. Two prominent cisterns (left and facing page) collect infrequent rainfall for irrigation, natural cooling, and dissipating heat emitted by zeolite refrigeration.



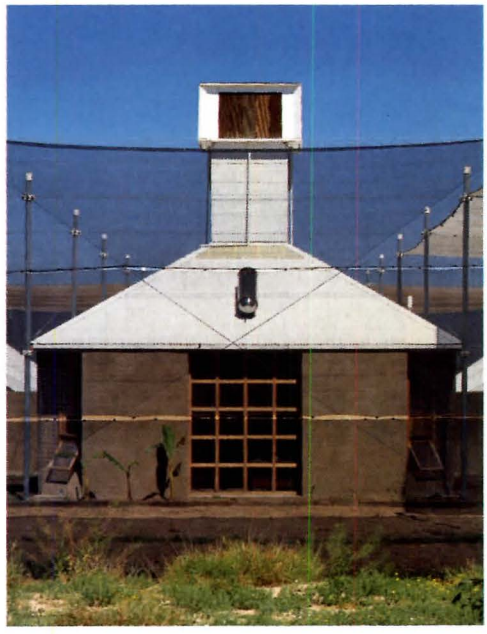
such as the one Blueprint Farm occupies.

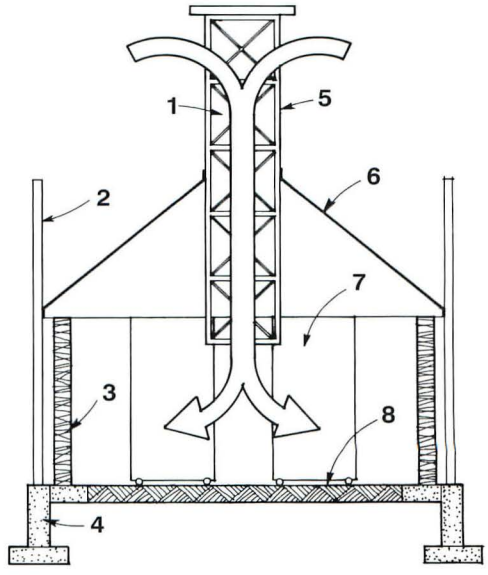
Max Pot assumes that all knowledge, no matter how seemingly unrelated, is worth applying. "Knowledge—in principle inexhaustible," writes *Powershift* author Alvin Toffler, "is the ultimate substitute [for other resources]...The only reason we now ship huge amounts of raw materials across the planet is that we lack the knowledge to convert local materials into substitutes." Fisk is mining for the knowledge to capitalize on local resources such as straw, mesquite, caliche, zeolite, and local farmers, metalworkers, and builders to sustain the small Blueprint Farm community and, by extension, dozens of such settlements on the peripheries of existing cities.

For all the heady ideas and radical exploration of Max Pot, however, Fisk has succeeded in designing a powerful image at Blueprint Farm. The Laredo buildings are a refreshing alternative to the amorphous, earth-sheltered cocoons and clumsy, reflector-laden passive-solar "machines" of the 1970s. They belie Fisk's architectural sensibility, shaped by the teachings of Louis Kahn at the University of Pennsylvania, whose work the architect admires for its simple and poetic forms. "Many of the students back then knew the ecological importance of architecture," Fisk says. "But once they got into ecology, it seems, they usually ditched architecture altogether. To me, concerns about conserving resources, promoting local economies, and integrating buildings into their surroundings need to be recycled back into architecture."

Embodying a Kahn-like inevitability, the Laredo farm's humble sheds take shape from the way they harness the elements and from the straw, steel, and wood used to build them. Regionalism—that misused, battered, and trivialized concept of contemporary architecture—never had a more profound model than Blueprint Farm. ■

—Ray Don Tilley





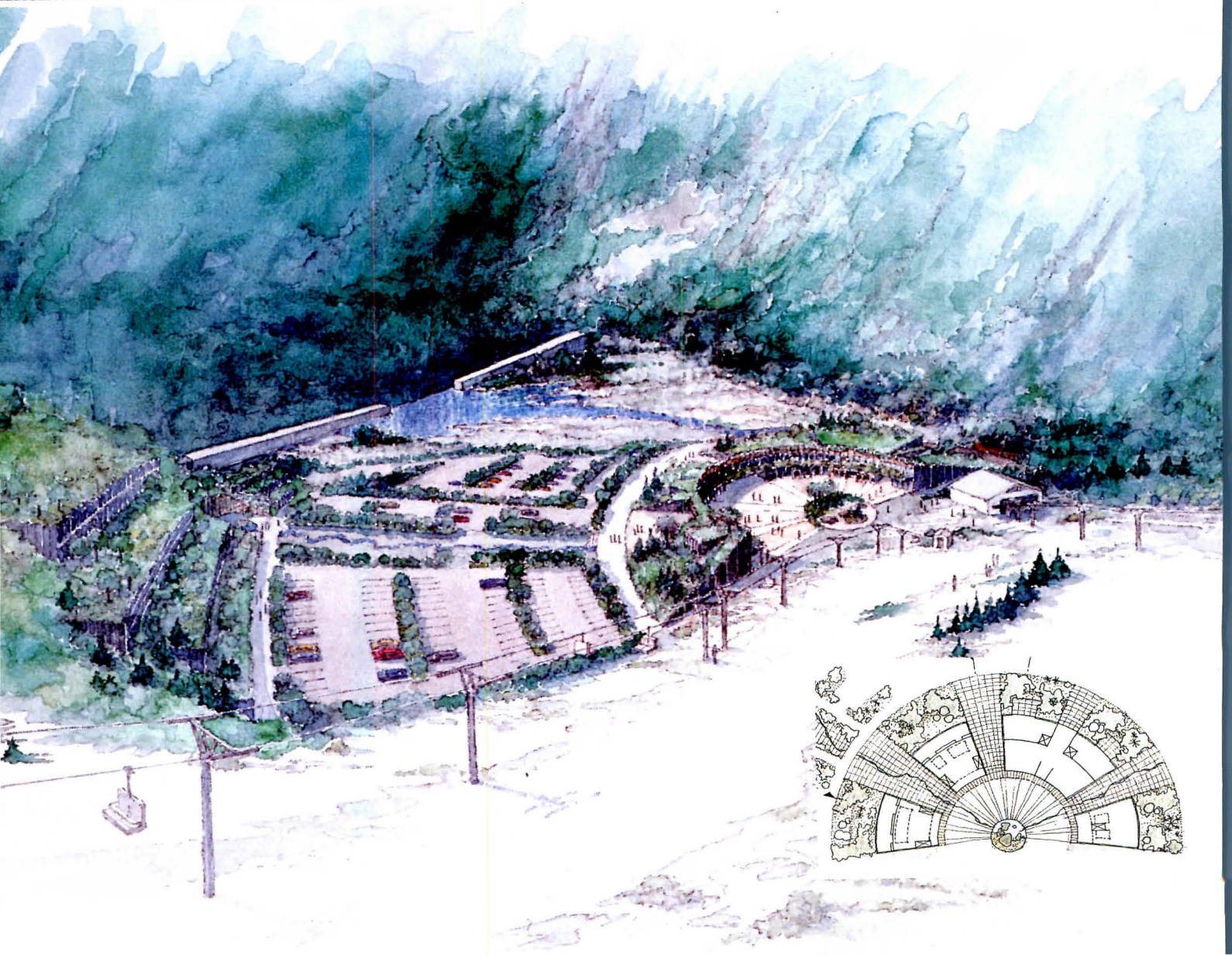
TYPICAL PACKING SHED

1 DOWNDRAFT EVAPORATIVE COOLING TOWER
2 RECYCLED OIL-DRILLING ROD POLES
3 STRAW BALE STUCCO WALLS
4 CONCRETE FOUNDATION (LIME, POZZOLAN)
5 LIGHTWEIGHT STEEL TRUSSES
6 CORRUGATED SHEET METAL ROOF (IRON)
7 SLIDING WOOD DOORS (MESQUITE)
8 STABILIZED EARTH FLOOR (CALICHE)

Adapted from structures found in Iran, the sheds' wind towers (top) circulate cool air. Porous, moistened intake pads atop a downdraft tower (section) draw in and cool outside air, which circulates through space below into an adjacent shed and up through an updraft tower. The air exchange rate is controlled by changing ambient temperature and humidity. Inside downdraft shed (facing page), delicate folded steel trusses, which attach to the building's superstructure, support a roof peeled away at the tower to let light filter in. Walls of straw bales covered in sprayed-on cement provide insulation.

LAREDO DEMONSTRATION BLUEPRINT FARM
LAREDO, TEXAS

ARCHITECT: The Center for Maximum Potential Building Systems, Austin, Texas—Pliny Fisk III
CLIENTS: Texas Department of Agriculture; Laredo Junior College
CONSULTANTS: Ronald Nigh, David Bainbridge (agricultural systems); The Environmental Research Lab (climatic); Sean Hoey (mechanical); Tony Ramirez (plant ecology); Joseph Farbiarz (structural/material mixes); Howard Reichmuth (thermodynamics); Bergy Wind (wind energy)
CONTRACTORS/SITE MANAGERS: Tom Glassford, Tom Morris, Tony Ramirez
COST: $473,000—$20 per square foot (building)
PHOTOGRAPHER: *R. Greg Hursley*



Nature's Revenge

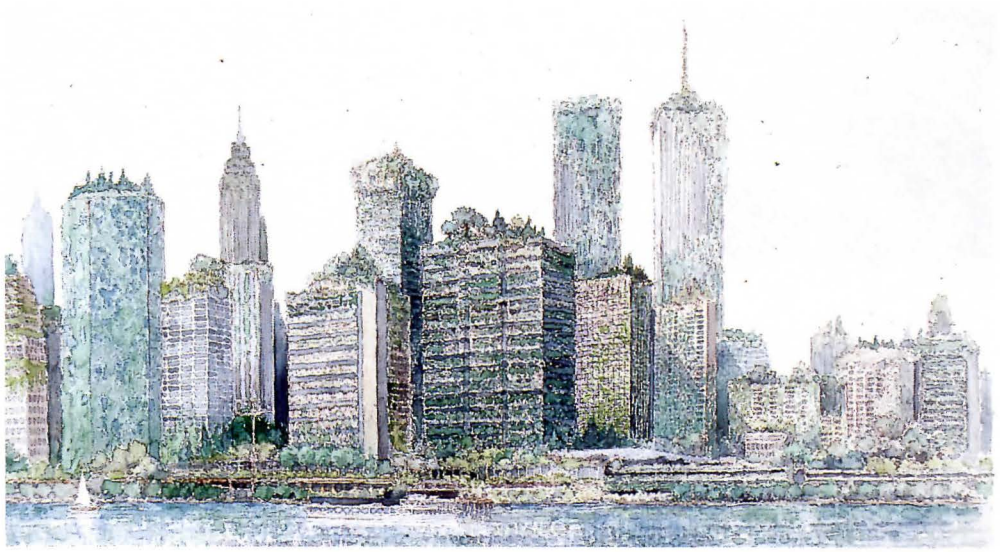
ALTHOUGH ARCHITECTS AND DESIGNERS ARE NOW SHOWING A BUDDING interest in green architecture, James Wines and his partners at SITE are anything but late bloomers. They even put the word *environment* in the name of their firm—Sculpture In The Environment—when they founded it 21 years ago. But if SITE first gained widespread recognition for its provocative, irreverent, and frequently apocalyptic roadside icons for Best Products, the firm is now placing more emphasis than ever on the environment itself.

Tapping into growing public concern about global ecology, the New York-based collaborative of architects, designers, and environmental artists has been exploring ways to integrate nature as an iconographic force that can both advance the language of architecture and provide a compelling symbol for the green movement. Four of SITE's current projects—a mountain resort in Japan and a series of pavilions and public spaces for the 1992 World Exposition in Seville—show the extent to which the designers are literally fusing architecture and ecology, building and nature, to create "living iconography" that can help raise public awareness of the fragile state of the environment and provide a rallying point for future action.

"We're trying to make an incredibly urgent issue interesting enough that people will want to do something about it," explains Wines. "The environmental design movement in the 1960s and 1970s failed because solar panels and earth shelters were all so ugly. That's why we're trying to give our work a strong profile, with the evolutionary process of nature as part of the esthetic."

From its beginnings, SITE has viewed architecture as a means of communication, a vehicle for social commentary, and its latest work is no exception. In many ways, the projects in Japan and Spain are an outgrowth of several Best Products showrooms that integrate nature and architecture. In 1980, for example, SITE created the Forest Building for Best in Richmond, Virginia, a project in which trees on the site were allowed to penetrate and envelop the showroom, as if nature had gained the upper hand. In projects such as this, nature appeared liberated, hyperbolized, and surreal, as opposed to its more common role in architecture of being suppressed, contained, and rational.

Unlike designers who treat vegetation and trees as decorative accessories to buildings, SITE joins them to architecture in a way that eliminates the distinction between landscape and buildings as separate entities. "The way most architects work is to put the park next to the building. We like to say that the park is the building," explains Wines. "If urban centers need more parks, why not make the buildings themselves into parks?" For example, the firm's design for a resort north of Osaka arranges a hotel, shops, and recreational buildings in a fan-shaped configuration around a central plaza, cuts them into the hillside, and covers them with vegetation to blend in with the landscape. For the World Exposition at Seville, Spain, SITE created a se-



SITE's "The Greening of Manhattan," (above) shows what could happen if nature took revenge on the New York City skyline. SITE's scheme for the Shinwa Resort in Japan (below and facing page) peacefully coexists with the mountainous landscape.

ries of "borrowed landscapes," or microcosms of other places.

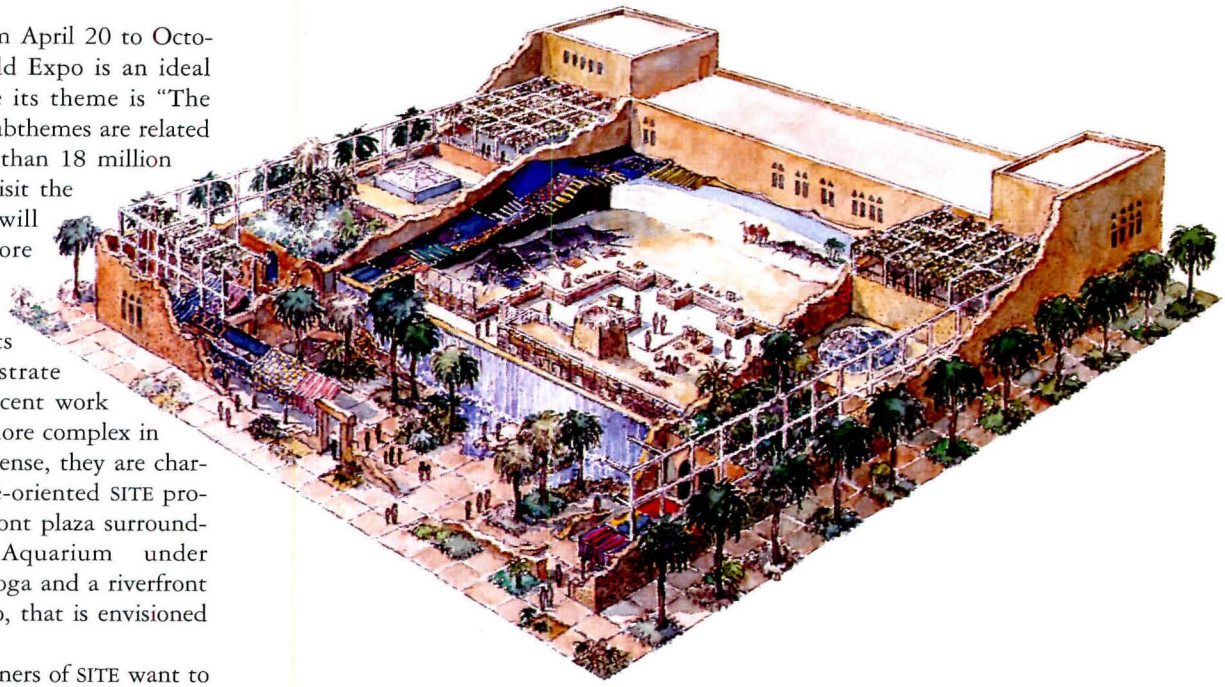
Scheduled to run from April 20 to October 12, 1992, the World Expo is an ideal showcase for SITE, since its theme is "The Age of Discovery" and subthemes are related to global ecology. More than 18 million people are expected to visit the fairgrounds, which will feature exhibits by more than 80 countries and a variety of corporate sponsors. SITE's projects for Seville also demonstrate how the group's most recent work is becoming larger and more complex in scale and scope. In that sense, they are characteristic of other nature-oriented SITE projects, including a waterfront plaza surrounding the Tennessee Aquarium under construction in Chattanooga and a riverfront park in Windsor, Ontario, that is envisioned as a gateway to Canada.

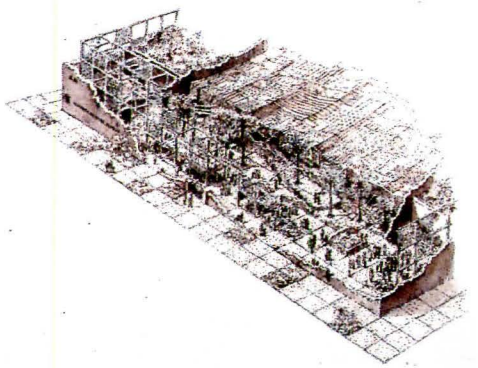
On one level, the partners of SITE want to show that their "bionomic buildings" are affordable and easy to maintain. Beyond logistics, they clearly delight in the idea of planting a building and watching it grow. They see the mutable and evolutionary imagery of their structures as the ultimate expression of organic architecture as espoused by Frank Lloyd Wright, whom Wines regards as a pioneer of the green architecture movement.

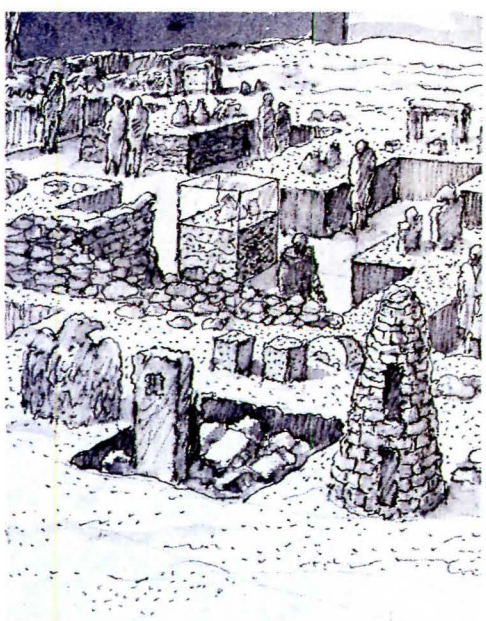
For a design team that has always operated outside the mainstream in a David Lynch sort of way—and has developed a reputation for tweaking the nose of the architectural establishment—these projects are like coming in from the cold. Does SITE's pro-nature stance put the firm in the mainstream? "If you mean, 'are we going to be boring?' No," asserts Wines. But, "if to be in the mainstream is to advocate vegetation, parks, gardens, more breathable air, then, sure, that's an establishment I wouldn't mind being a part of."

SITE's main objective, Wines maintains, is to capitalize on architecture's ability to inform and influence public opinion. "Watching buildings grow and acknowledging their subterranean life captures the spirit of the green revolution, without proclaiming its message in overt propaganda." Besides, he adds, "we like buildings that ask questions. I don't think you can ever solve the problems, but you can certainly influence people's opinions. Architecture is, after all, the ultimate public art." ■

—*Edward Gunts*

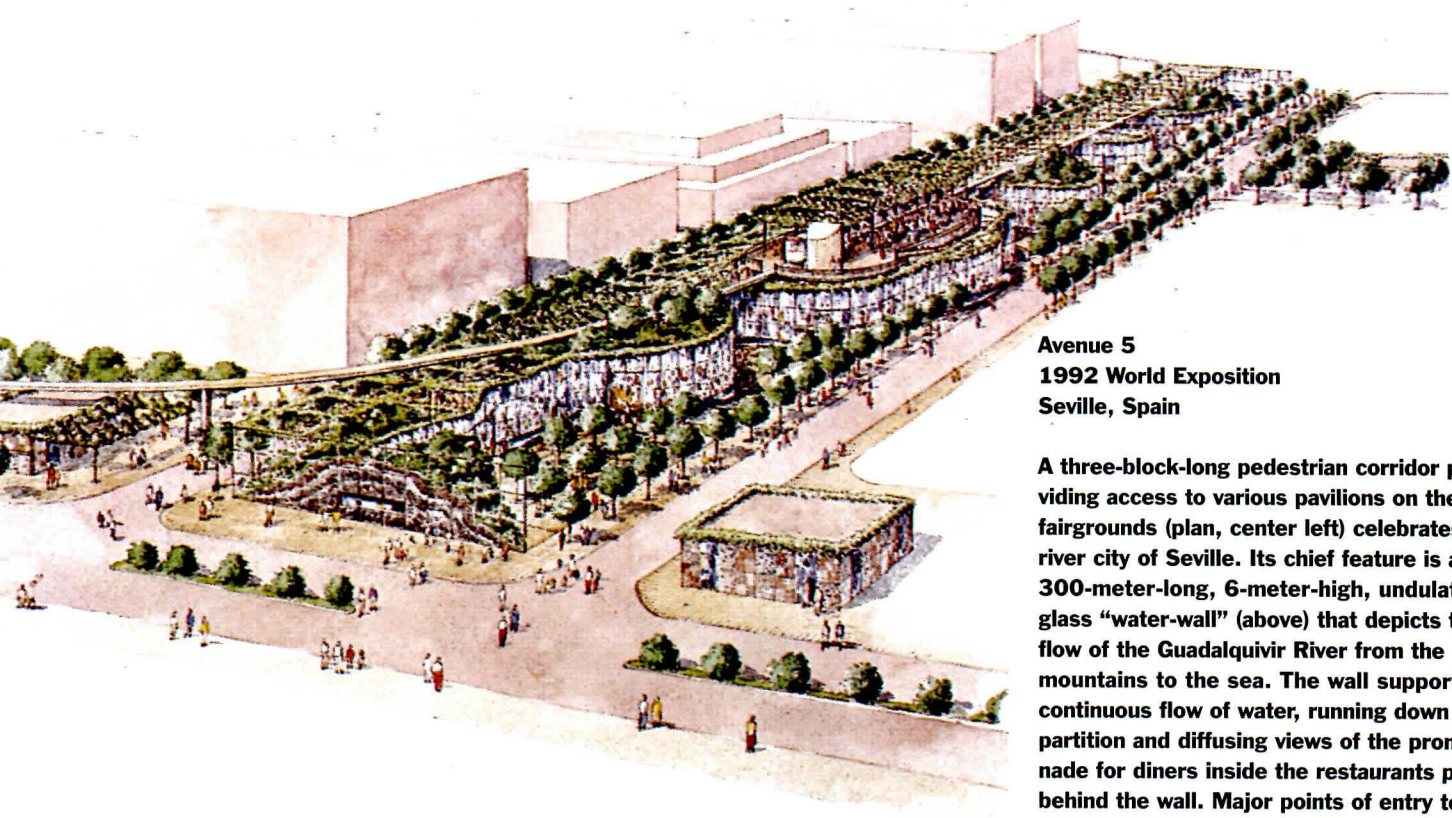


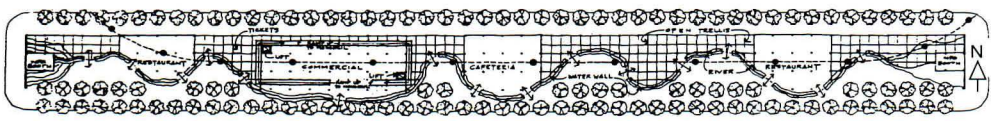




Saudi Arabian Pavilion
1992 World Exposition
Seville, Spain

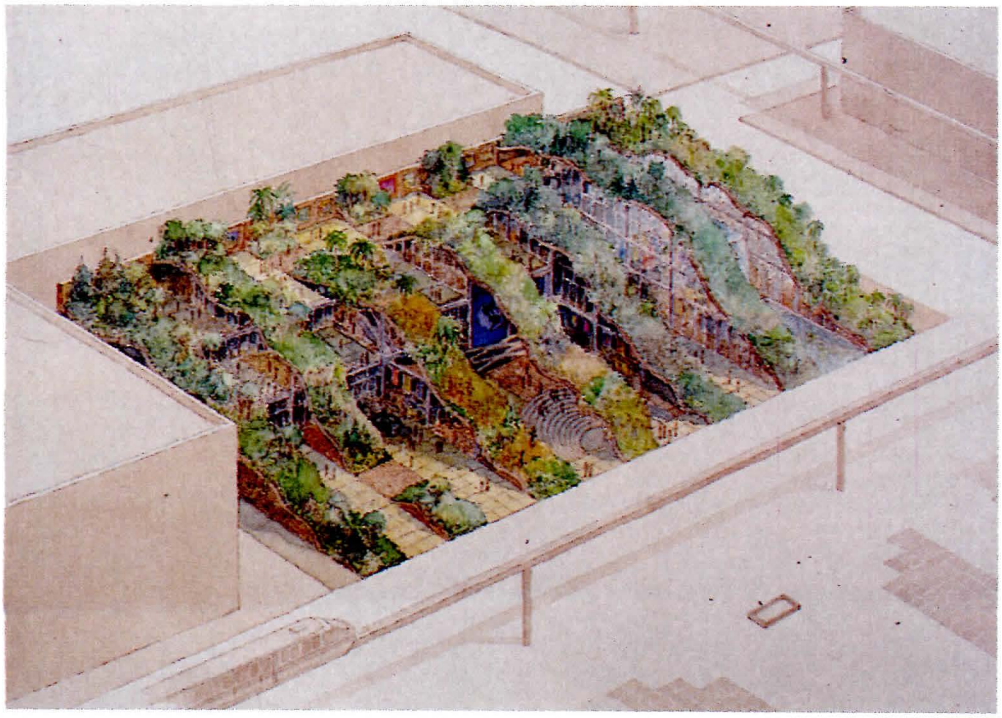
Conceived as a flexible matrix containing landscapes and sandscapes, the SITE-designed pavilion (above) demonstrates how Saudi Arabia has evolved from its nomadic origins to become the world's leading oil producer and sponsor of vast social and educational programs. The structure is defined by a rectangular steel grid enclosure (left), reflecting the geometric origins of Saudi arts, crafts, and astrological and Islamic symbolism. Within this grid, SITE inserted a multilevel exhibition structure built of mud-brick and stucco, then cut it away to reveal successive layers of structure, vegetation, and architectural artifacts. At the entrance, the designers inserted a microcosm of the Saudi kingdom, including a marketplace, an oasis, and a desert-plant botanical garden. The interior courtyard (bottom left) is literally a giant sand box and serves as a display area for archaeological objects. It will be covered by a massive tent assembled from hundreds of Bedouin blankets—a colorful fabric collage that reflects the region's diversity and rich crafts legacy. Aware that many of the Expo pavilions will confront visitors with a relatively blank wall, SITE's strategy was to create a more open and inviting alternative that makes human activity an integral part of the building's facade.





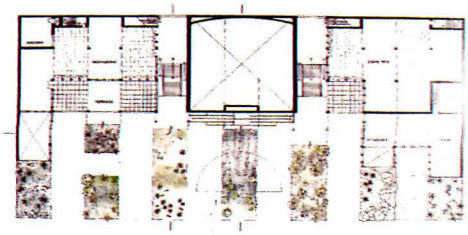
Avenue 5
1992 World Exposition
Seville, Spain

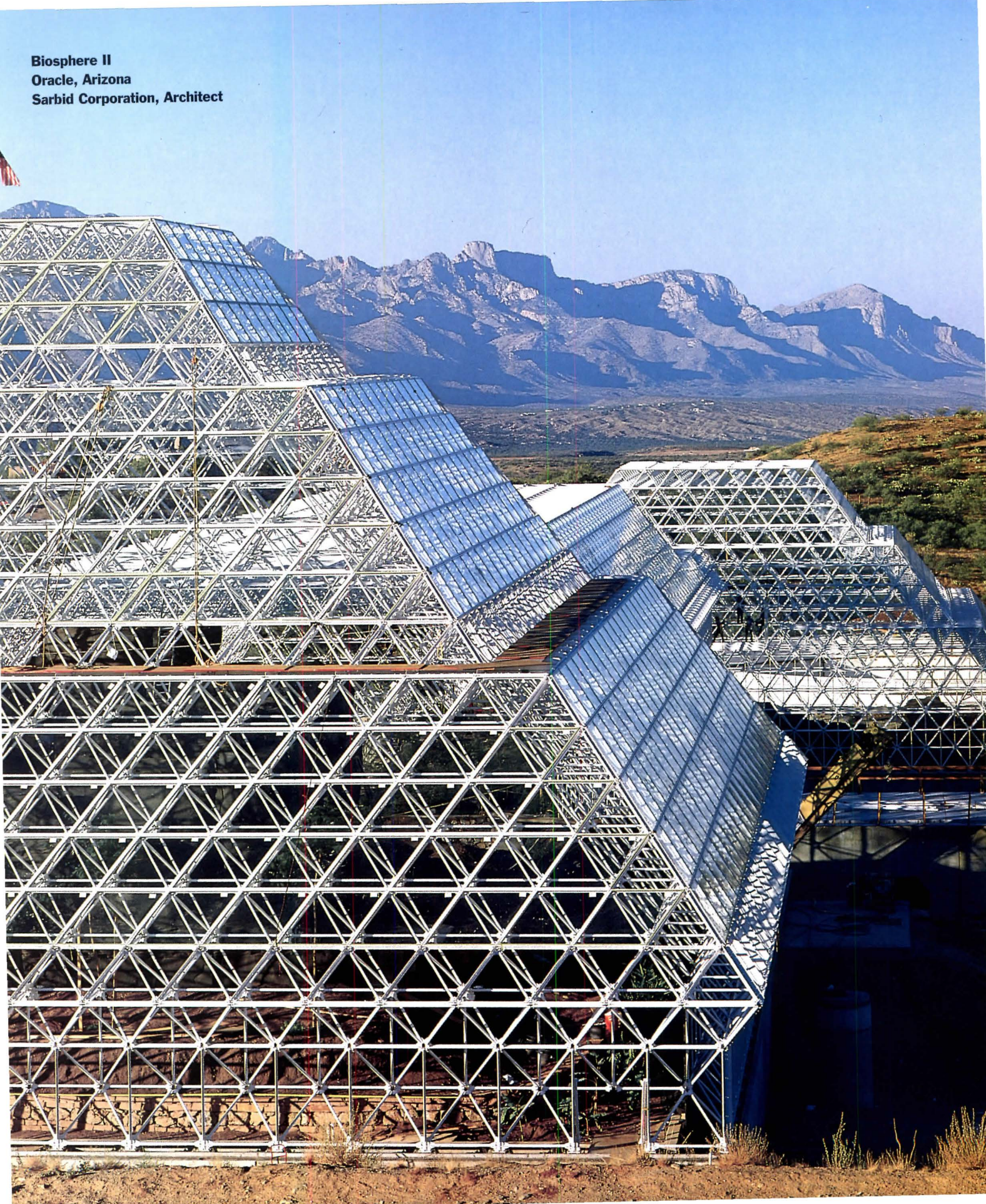
A three-block-long pedestrian corridor providing access to various pavilions on the fairgrounds (plan, center left) celebrates the river city of Seville. Its chief feature is a 300-meter-long, 6-meter-high, undulated glass "water-wall" (above) that depicts the flow of the Guadalquivir River from the mountains to the sea. The wall supports a continuous flow of water, running down the partition and diffusing views of the promenade for diners inside the restaurants placed behind the wall. Major points of entry to the complex are defined by information kiosks at the east and west ends. A terrarium on the west end represents a cross-section of Seville's rich mountain landscape, the source of the river. The eastern kiosk is enclosed on all sides by water.



World Ecology Pavilion
1992 World Exposition
Seville, Spain

Responding to the exposition's subtheme of global ecology, SITE proposed a 75,000-square-foot pavilion that encapsulates landscapes of the world's seven continents. The general configuration is defined by ribbonlike, concrete structures that support regional vegetation and terrain (left). Placed beneath these undulated canopies are exhibition areas featuring artifacts from different continents as well as a theater, art gallery, restaurant, and amphitheater (below).





Biosphere II
Oracle, Arizona
Sarbid Corporation, Architect

GREEN ARCHITECTURE

Desert Shield

AMONG THE FOOTHILLS OF THE CATALINA MOUNTAINS, 30 MILES NORTH OF TUCSON, Arizona, a steel and glass structure rises in the middle of the Sonoran Desert. Designed as a miniature model of Earth's ecosystems, Biosphere II is an ambitious effort to replicate the planet's complex environmental web within a controlled setting, contained by one of the most remarkable structures ever built.

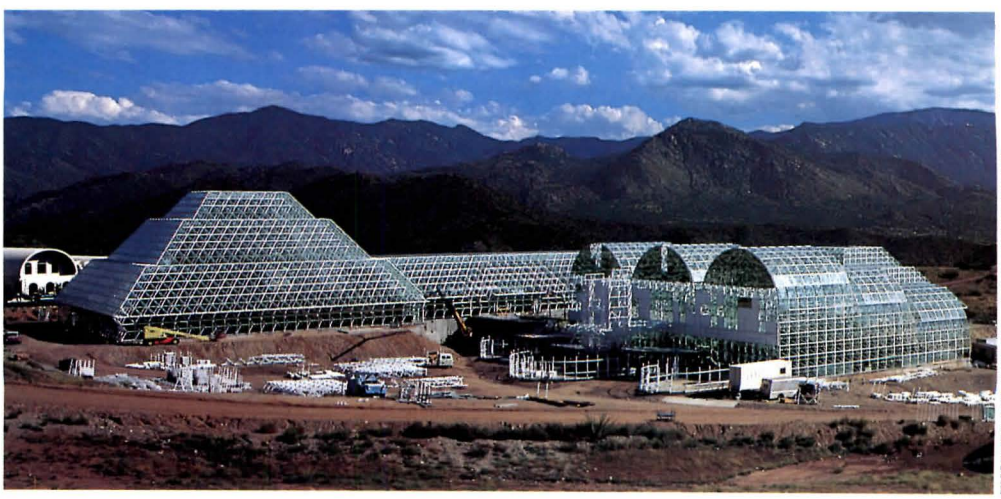
Some vital statistics: Biosphere II covers an area of 3.15 acres, enclosing 7 million cubic feet under a stainless steel and concrete hull, covered with a glazed space frame, and built to last 100 years. It is designed as an airtight container, completely sealed off from the outside world for two years, to be occupied by 3,800 species of plants and animals, including four men and four women. Thirty-five hundred electronic sensors linked to computers will monitor the concentration of each element of this environment, from temperature and humidity to more than a dozen gases. Computers collecting the information will activate ventilating, heating, cooling, and air, water, and waste recycling systems.

"Biosphere is not a 'back to nature' project," asserts Margret Augustine, President and CEO of Space Biospheres Ventures (SBV), a private company developing the project. Constructing a model of the Earth's environment within a single building in the middle of a desert "can't be done without computers and complex technology—all the technology makes it possible," she adds. In essence, Biosphere is a building-sized petri dish recreating nature with massive doses of technology.

One estimate pegs Biosphere's construction cost at $150 million, most of that financed by Texas millionaire Edward Bass. All of the funding is private. Construction of the vast complex began in January 1987, and its "closing" is planned late this month or early June, but that is probably optimistic, given the work yet to be completed. Nothing like Biosphere has ever been built before, so no one really knows how long construction will take.

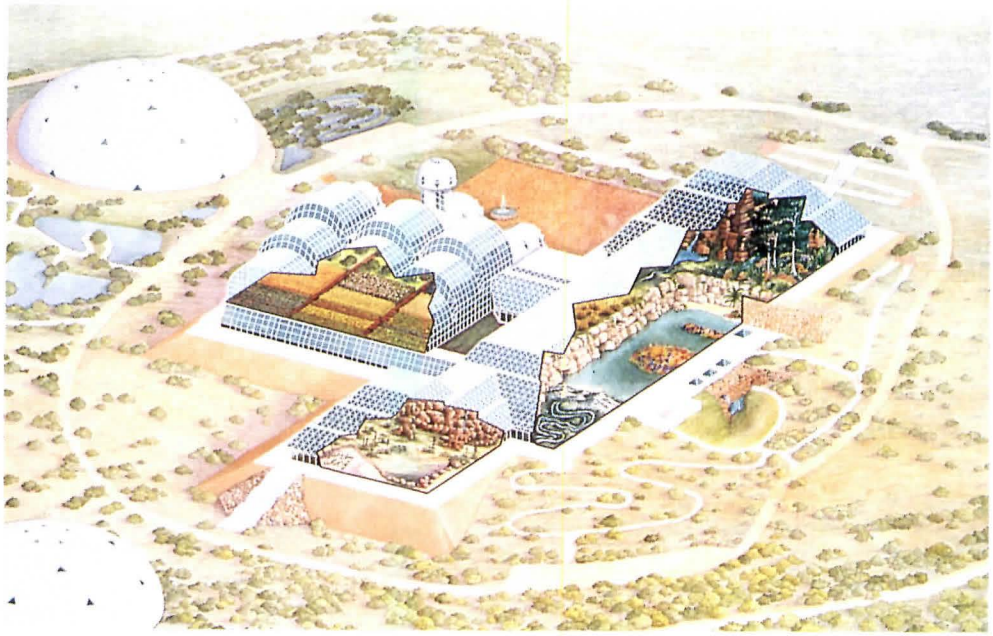
Those heading SBV, including John Allen (director of research and development), Mark Nelson (director of space applications), and Augustine, have consulted with several international environmental scientists and naturalists, including Smithsonian Institution marine biologist Walter Adey and Ghillean Prance, director of Britain's Kew Gardens. Biosphere's promoters believe that the experiment will offer a tool for understanding the cycle of life on Earth (Biosphere I) and serve as a testing ground for new water and air purification and recycling technologies—which may be applicable to some pollution problems or artificial environments such as future space stations. As such, Biosphere is a dress rehearsal for human colonies in outer space and on other planets, and SBV intends to market the data and new technology to universities, research institutes, and space programs.

While Biosphere's planners explain the project's value is understanding life on Earth,

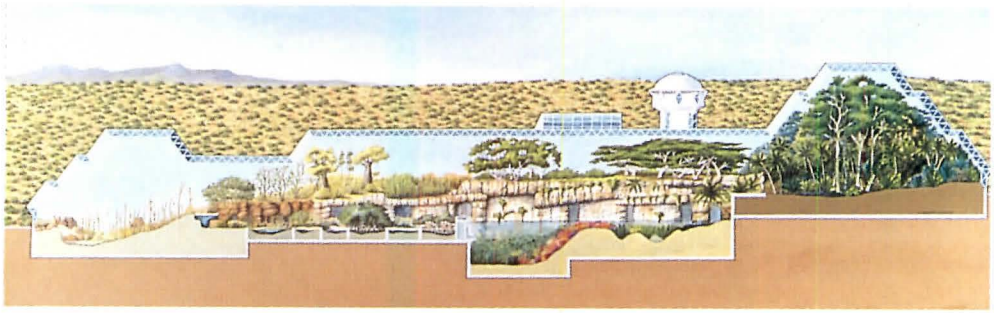


THOMAS LAMB / THE SWA GROUP (LEFT AND TOP)

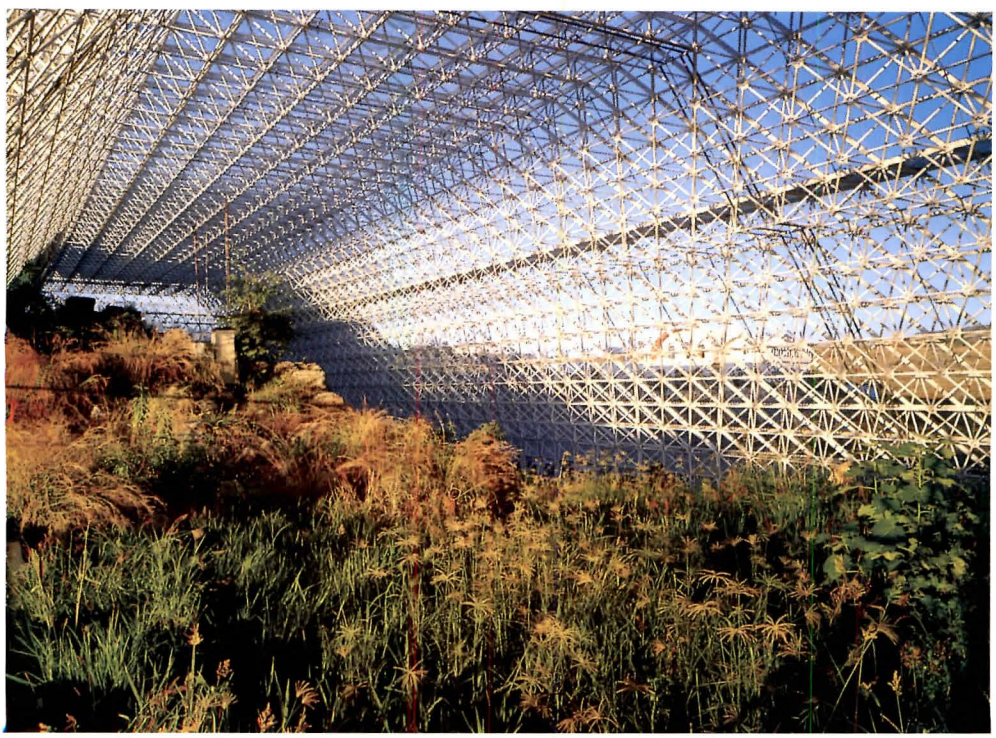
A green oasis in the desert, Biosphere II sports its own power plant (foreground, top) and a miniature farm under glass (vaulted structure at right), but its most dramatic element is the intricate space frame (facing page) that encloses more than three acres.



SITE PLAN



SECTION THROUGH WILDERNESS BIOMES

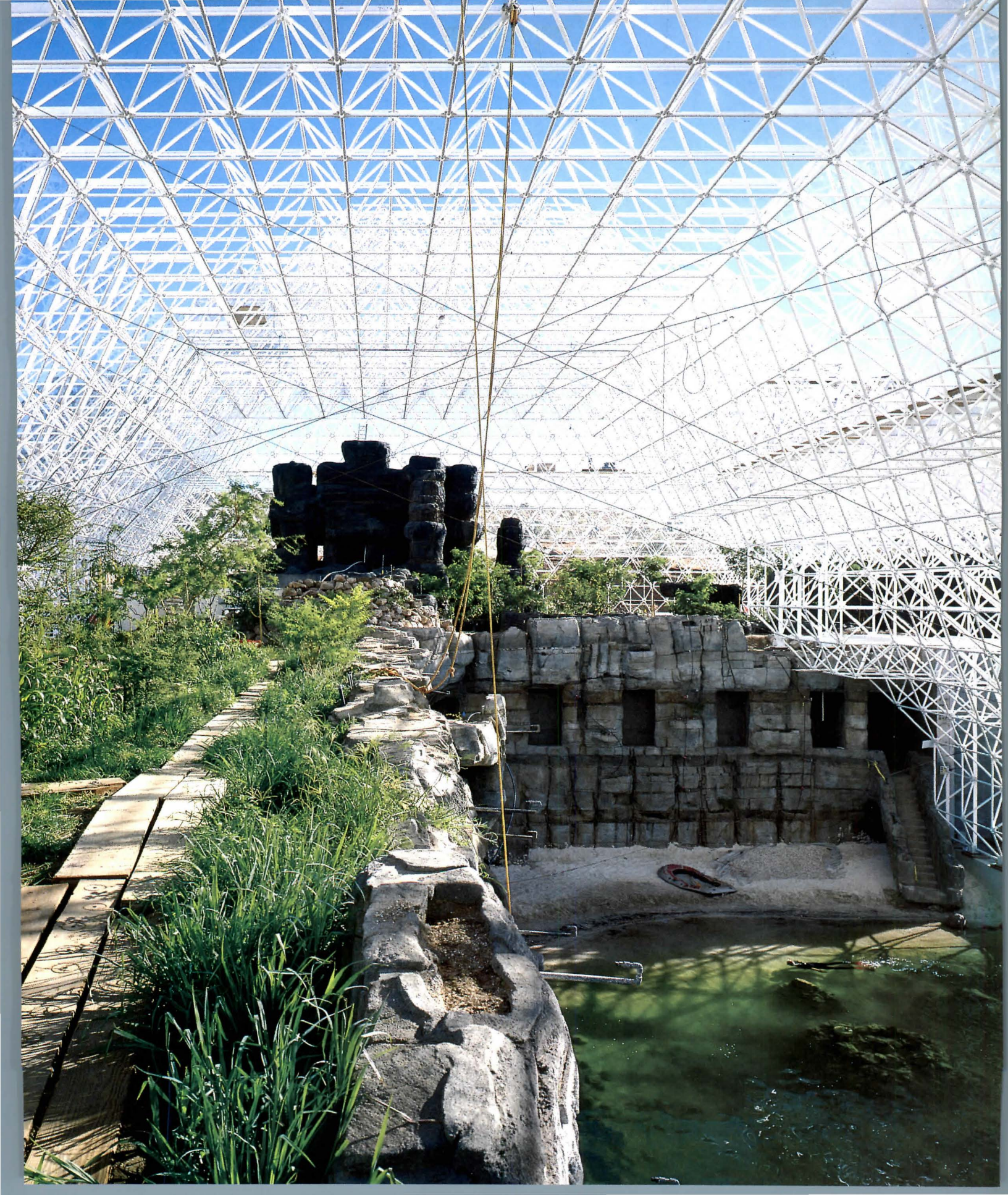


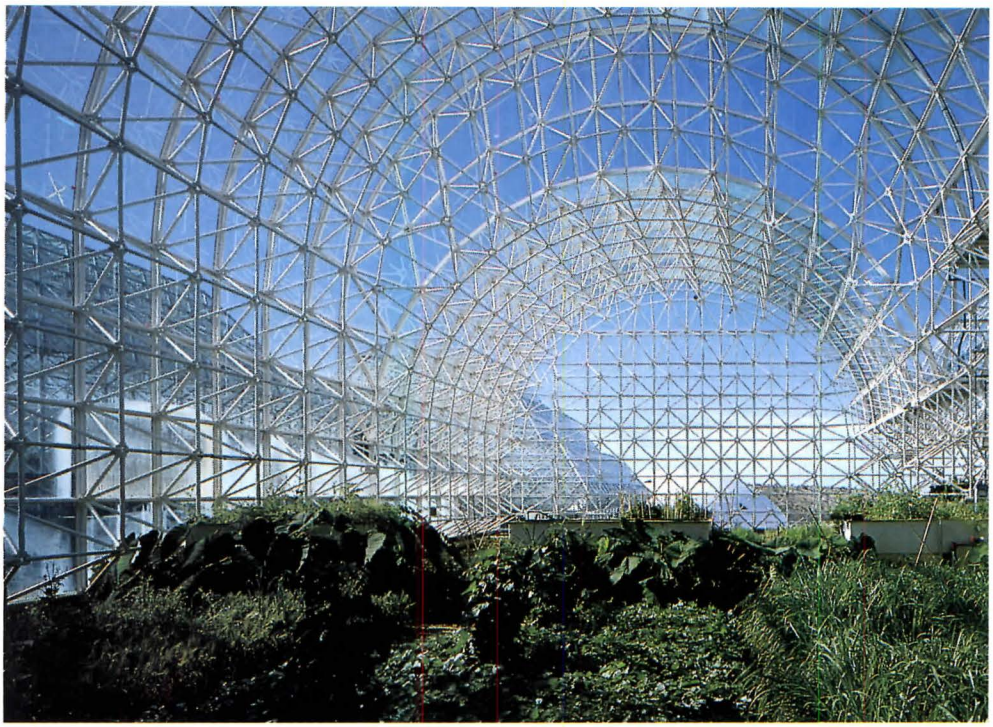
their long-term agenda seems more focused on creating a safe haven for eventual Armageddon. "Western civilization isn't simply dying. It's dead," John Allen is quoted in Laurence Veysey's book, *The Communal Experience,* a record of Veysey's five-week stay at Allen's New Mexico commune, Synergia Ranch, 20 years ago. "We are probing into its ruins to take whatever is useful for the building of a new civilization to replace it." Biosphere is a fulfillment of Allen's vision to recreate a hospitable environment for humans to live among the ruins, an environment sustained by technology. Environmentalists may criticize Biosphere's vast, air-conditioned complex for its consumption of natural resources, but they misinterpret its basic mission. Biosphere II isn't meant to live in harmony with nature, but to bottle it for export.

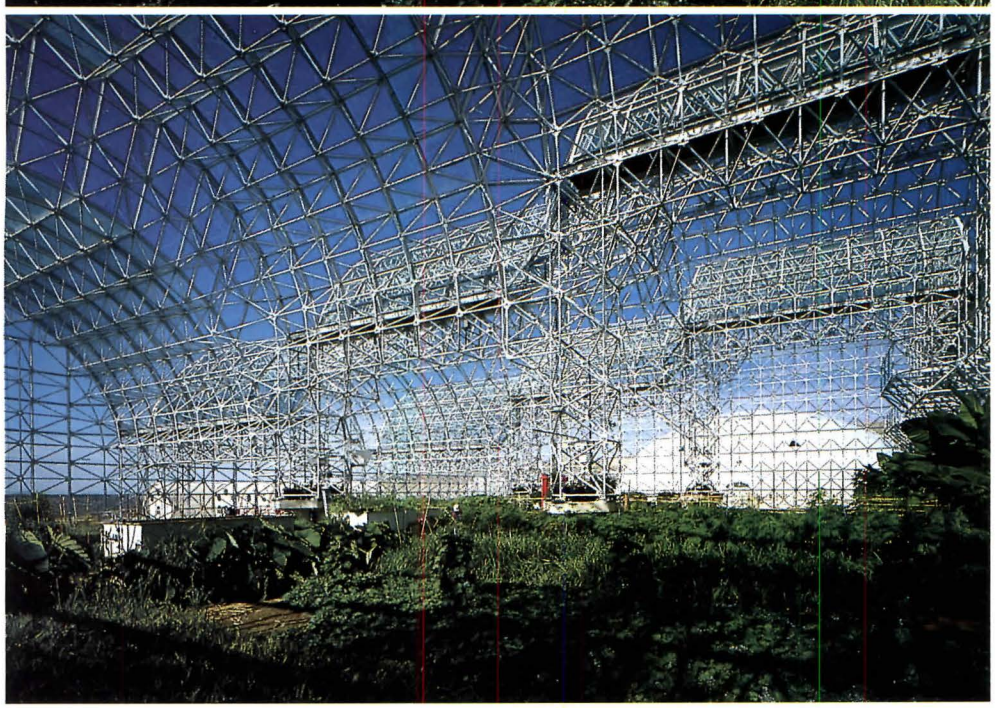
The number of variables involved in replicating a reliable model of Earth's complex ecosystems within Biosphere is so enormous that it is worth questioning the application of collected data to life on Earth. Observers may agree with Biosphere's fans, such as Thomas O. Paine, chairman of the National Commission on Space, who maintains that Biosphere is a "shining beacon pointing the way to an expanding future for humanity," or with its critics, such as scientists who claim that Biosphere's plants will shrivel due to plummeting carbon dioxide levels, or fall victim to rampant fungi, or that toxic trace gases will eventually force out the human inhabitants. But there is no doubt that Biosphere II has already earned its place in architectural history. Overshadowing its desert neighbors Taliesin West and Arcosanti, Biosphere is one of the most unprecedented structures ever built.

Biosphere was designed by architect Phil Hawes, who collaborated with Augustine (who is not an architect) and a few dozen consultants. Hawes seems a natural for designing in the Arizona desert: while an architecture student at the University of Illinois in 1955, he read Frank Lloyd Wright's *The Natural House*, and headed for Taliesin West to study under the master. He subsequently met Bruce Goff and completed his architecture degree at the University of Oklahoma. Biosphere's on-site architecture firm, Synergetic Architecture and Biotechnic Design

Cutaway drawings (top and center left) reveal natural environments created under the space frame: a savannah (left) that extends between a rain forest and a desert; and an "ocean" (facing page) with its own beach.







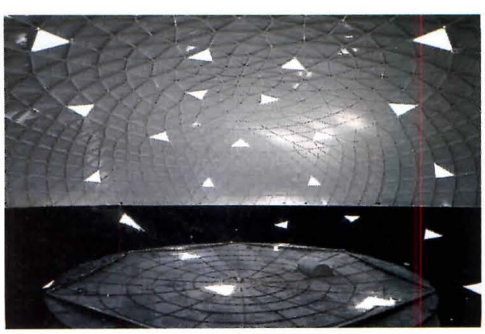
(simply known as Sarbid), has a staff of approximately 25.

Biosphere's design accommodates six ecological communities, or "biomes," in addition to staff quarters. Four biomes are housed in a long north-south wing: a rain forest in the 85-foot-high stepped pyramid to the north; a marine biome, which includes a 25-foot-deep "ocean" with saltwater and freshwater marshlands; a savannah, which runs along a man-made rock ledge; and a desert biome under the southern stepped pyramid. The wing to the west, distinguished by vaulted forms, contains an intensive agriculture biome where the staff will raise its own food, and, to the north, a "habitat" biome comprising 10 staff apartments, labs, offices, libraries, and recreation spaces. All six environments rest upon a subterranean world of pipes, cables, and perhaps the greatest assortment of mechanical equipment ever assembled in one place—a veritable machine for living.

Outbuildings include two rubber diaphragms known as "lungs," housed under white geodesic domes and connected to Biosphere by 150-foot-long tunnels. The diaphragms expand and contract according to air pressure changes in Biosphere during fluctuations in temperature. A five-vaulted, 5.5-megawatt power plant generates electricity and cools Biosphere, where interior temperatures could reach 150 degrees Fahrenheit in about 20 minutes without air-conditioning.

Hawes and Augustine determined that a space frame would be the best way to enclose Biosphere because it was the most flexible structure for meeting a varied program and admitting the most sunlight. The habitat wing employs the same technology for ease in joining with the rest of Biosphere and exemplifies the space frame's versatility: it is crowned by a number of compound curves, boasts a radial floor system designed for a 135-pound-per-square-foot load, and includes a tower with an integral stair that acts as the habitat's central support structure.

Continued on page 142



As air expands when heated within airtight Biosphere II, excess volume is routed to "lungs" housed under geodesic domes (left) to prevent windows from popping. The agriculture biome (above) will provide food for eight Biospherians for two years. Vaulted space-frame structures (facing page) are based on reed houses in Iraq, while the wilderness biomes recall the stepped pyramid of Zoser—a combination of ancient forms and high-tech construction.

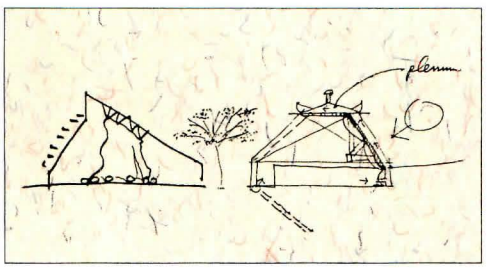
BIOSPHERE II
ORACLE, ARIZONA

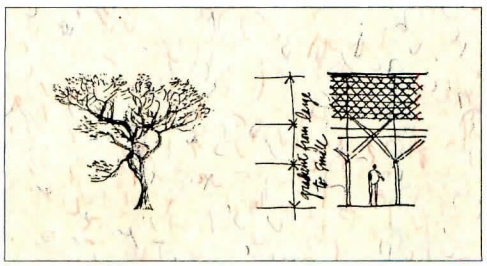
ARCHITECT: Sarbid Corporation, Oracle, Arizona
CONTRACTORS: Tesco (engineering); Diversified (construction); PDM (steelwork); Gamble Electric (electrical); Sun Plumbing (mechanical/plumbing); Gensym (expert systems); Pearce Structures (space frame)
CONSULTANTS: Institute of Ecotechnics (ecological management); Environmental Research Laboratory (engineering); Systems Integrated (systems)
PHOTOGRAPHER: Timothy Hursley, except as noted

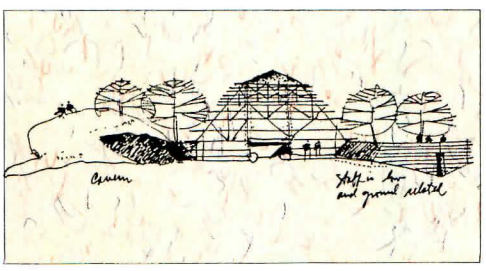
Making a Difference

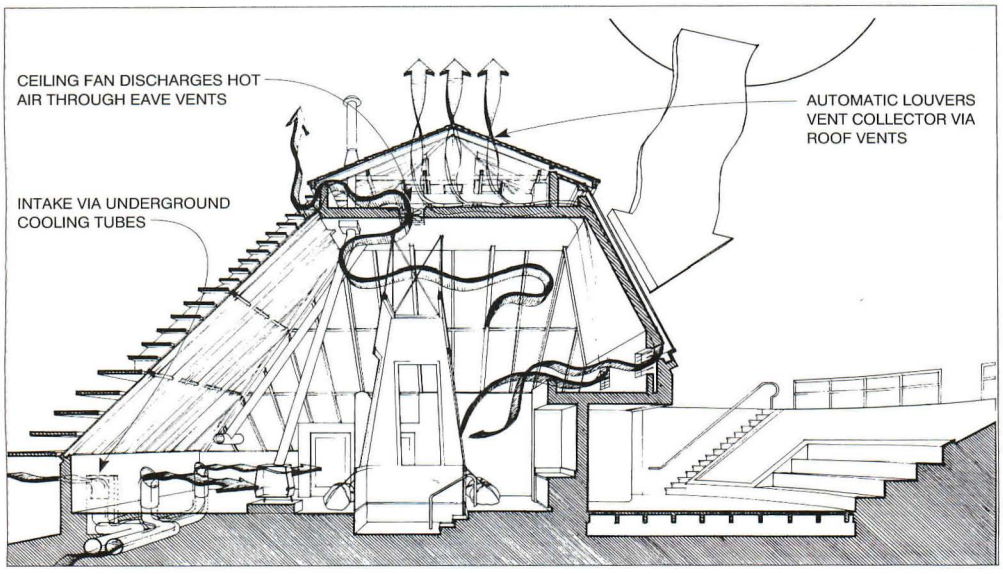
CITATIONS FOR ENVIRONMENTALLY CONSCIOUS ARCHITECTURE

LAST DECEMBER, THE AIA COMMITTEE ON THE ENVIRONMENT, AIA/ACSA Council on Architectural Research, and ARCHITECTURE announced "Making a Difference," a competition for environmentally conscious projects, supported by a grant from the Evergreen Fund, that will be exhibited at the AIA's national convention this month. Forty entries were submitted and reviewed in February by a jury consisting of Robert Berkebile, principal of Kansas City-based PBNI Architects and chairperson of the AIA Committee on The Environment; Cynthia Weese of the Chicago firm Weese Langley Weese Associates and chairperson of the ACSA Council on Architectural Research; Donald Watson, professor of architecture and dean of Rensselaer Polytechnic Institute's architecture school; and ARCHITECTURE editor-in-chief Deborah Dietsch. The projects, designed by architects from around the country, covered a broad spectrum of building types: houses, educational facilities, visitors centers, office buildings and interiors, labs, retail spaces, a prison, a resort, and a library. The jury evaluated how well each submission addressed site ecology, energy conservation, resource management, and nontoxic building materials within a framework of design excellence. "We cited environmentally conscious buildings that had architectural merit, not just energy-saving machinery," explains Berkebile. The jury voted against projects that used materials or powerful technology in "a greedy way." As Weese notes, "We weren't interested in projects that were high in the food chain," such as custom-designed houses with solar-heated garages. In general, the jurors felt most of the projects fell short of the current green ideal. Designed in the 1980s, many of the submitted buildings solved one environmental problem but ignored others; some were energy efficient but architecturally undistinguished; others were presented as environmentally sensitive but revealed little evidence to support the claim. After narrowing down the entries, the jurors agreed to recognize six projects—five built and one unbuilt—with citations (following pages) and to select seven more for the AIA exhibition and accompanying catalog. Representing a diversity of building types and geographical locations, the citations indicate that achieving environmental sensitivity is possible in any design, no matter the program or place. However, the jury felt that the architectural profession's newfound ecological consciousness is still in its formative stages, and it will take time before holistic solutions to environmental problems truly make a difference.

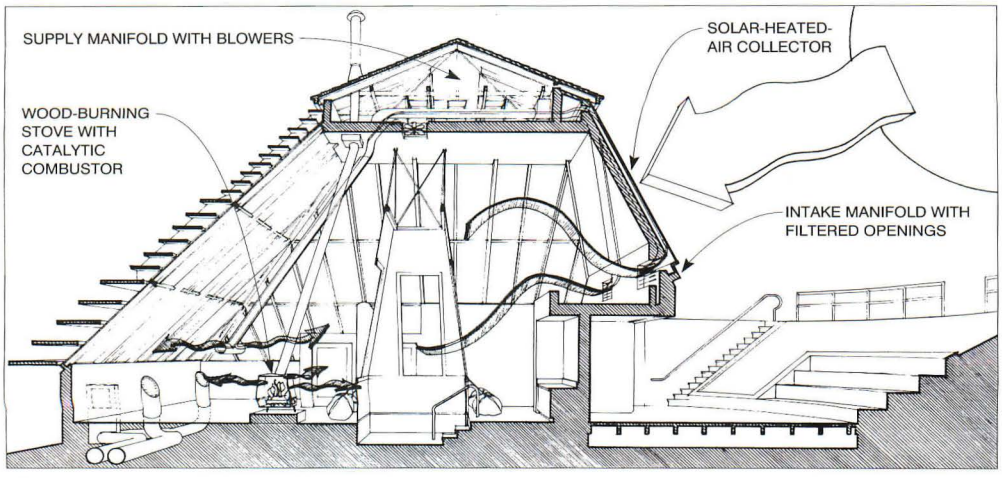








COOLING SECTION



HEATING SECTION

Spring Lake Park Visitors Center
Santa Rosa, California
Obie G. Bowman/Architect

THE ONLY UNBUILT PROJECT CITED BY THE jury is the Spring Lake Visitors Center (left) designed by California architect *Obie G.* Bowman. The 2,000-square-foot, pyramidal structure will house exhibition areas and administration space for the Sonoma County Parks Department.

The client's primary concern was that the building establish a sympathetic relationship to the environment. Accordingly, Bowman set the building down into the natural grade with concrete retaining walls and incorporated an amphitheater within the sloping site. To provide shading while creating a translucent enclosure with views to the surrounding landscape, the architect completely covered the glazed structure with wooden louvers and topped it with an attic housing a natural ventilation system. The jury honored the architect for "recognizing the California need for shading," and "integrating an appropriate energy conservation system within the building's architecture."

Solar collectors oriented to the southeast take advantage of heat gain and are augmented by a wood-burning stove and fans in the attic to recirculate warm air. For summer months, the architect developed a series of underground cooling tubes combined with an attic fan that sucks the cool air up through the visitors center.

The exhibit area is housed in a central tentlike structure within the main space, but the entire center is intended to be a environmental educational tool in itself, allowing visitors a behind-the-scenes look at the building's mechanical systems.

Pedestrian access with remote parking maintains the character of the site's oak and buckeye forest. To minimize damage to the sensitive site during construction, the area will be fenced off to protect its woodland, and a fine will be levied by the county for each tree damaged during the construction process. Trees and boulders removed from the site during construction will be reused to build a storyteller's cavern approximately 45 feet southeast of the main building. —L.N.

ARCHITECT: Obie G. Bowman/Architect, Sea Ranch, California
ENGINEERS: Dennis Fagent Associates (structural); Larkin & Associates (mechanical)
CONSULTANTS: John Britton Tree Service (arborist)
PHOTOGRAPHER: Obie G. Bowman

Brunsell Residence
Sea Ranch, California
Obie G. Bowman/Architect

LOCATED IN THE SEA RANCH DEVELOPMENT approximately 100 miles north of San Francisco along the Pacific Coast, the Brunsell house, like its well-known neighbors, strives for visual harmony within the sweep of the rugged landscape.

"Every setting has potential inspiration," says architect Obie G. Bowman, who was also honored by the awards jury for his Spring Lake Visitors Center (previous page), "and buildings should be a part of that setting—not an alien object nor a freestanding work of art."

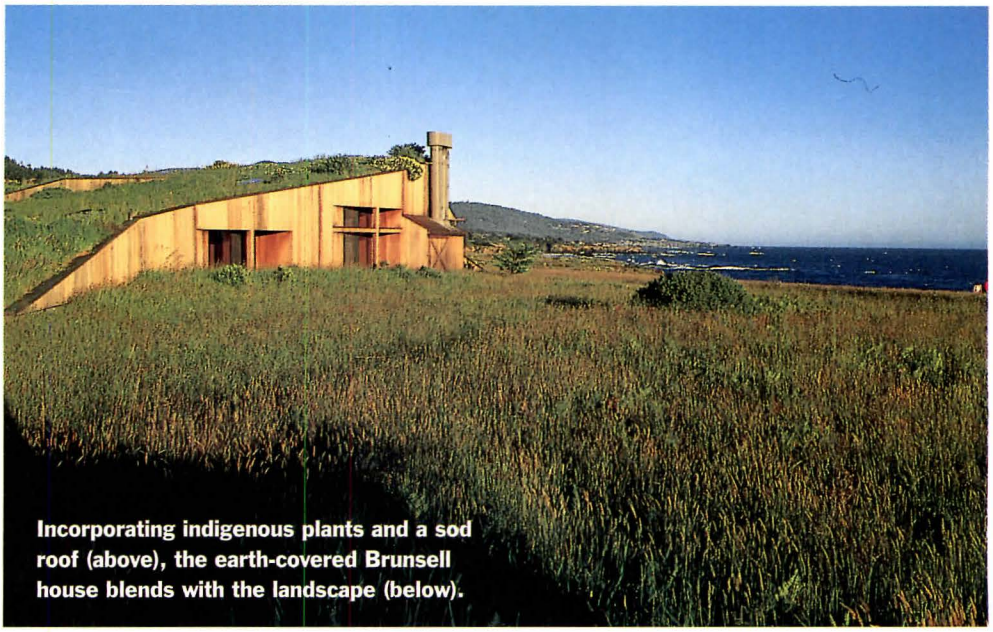
The 2,900-square-foot house hunkers down into its ¾-acre site with a sprawling, sod-roofed form that minimizes its visual impact on neighbors whose houses overlook moorlike meadows to the sea. Although the climate at Sea Ranch is cool, foggy, and almost always windy, the client requested a passive solar house that incorporates available natural technology for heating and cooling.

Responding to this request, Bowman designed a south-facing solarium with a brick floor over a concrete slab. While the building's irregular shape was influenced by setback requirements, the architect created an angled floor plan with a sloping roof line that deflects wind up and away from the south-facing decks. The meadow displaced by the building's footprint is reinstated in the form of an earth-covered roof, and although the house is at most only 4 feet below grade, earth berms at the ends of the house disguise that fact. A solar collector for a hot water heater is placed at the base of the south-facing elevation.

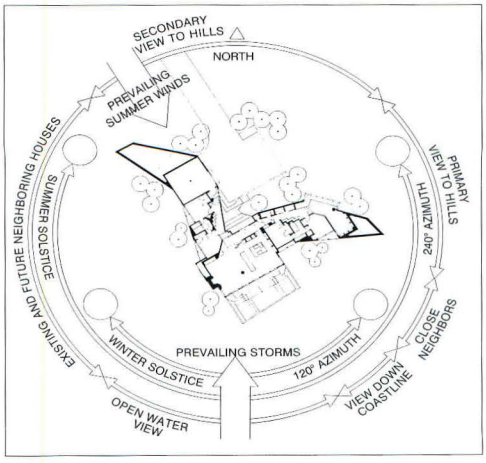
Throughout the house, Bowman specified predominantly indigenous and renewable materials, including columns obtained from a nearby stand of dead eucalyptus trees and massive, molded fireplace bricks from an abandoned grog pile.

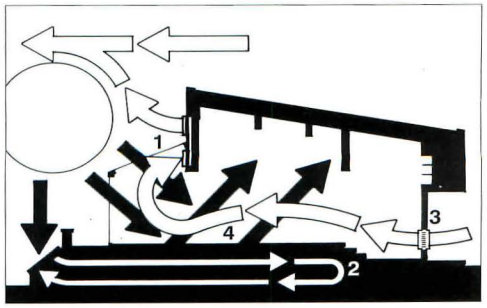
Sharing a respect for the environment with MLTW's Sea Ranch Condominium, the Brunsell house is "successfully integrated with the landscape," writes the jury, "and the energy system is efficient without interfering with the site or the architecture." —L. N.

ARCHITECT: Obie G. Bowman/Architect, Sea Ranch, California
ENGINEERS: Zucco Associates (structural); Murakami Engineers (mechanical)
GENERAL CONTRACTOR: Brian M. Dixon
PHOTOGRAPHER: Obie G. Bowman



Incorporating indigenous plants and a sod roof (above), the earth-covered Brunsell house blends with the landscape (below).





HEATING SECTION

1 CONTINUOUS DISCHARGE MANIFOLD
2 SOLAR-HOT-WATER COLLECTOR
3 AIR INTAKE LOUVERS
4 BRICK OVER FLOOR MASS

Bridge House
Bainbridge Island, Washington
James Cutler Architects

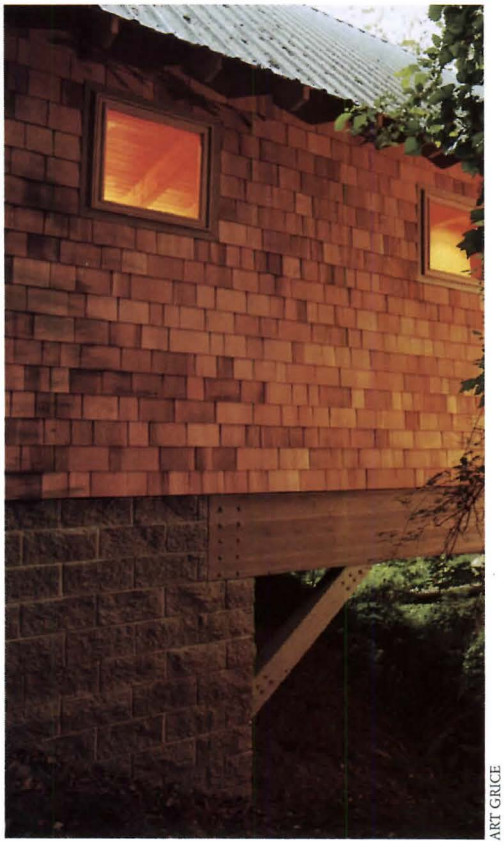
"ARCHITECTURE IS ALWAYS AN INSULT TO the environment," James Cutler readily admits. "It is therefore the responsibility of the architect to minimize the damage and set a precedent for others to follow." With that in mind, he teamed up with developer Gale Cool to design and construct the Bridge House as proof to more skeptical developers that an environmentally sound house could be built at a profit. The project, completed in 1988, represents one of Cutler's first opportunities to implement his heartfelt convictions into built form.

The site, a 1/3-acre, forested, waterfront property on Bainbridge Island, is carved in two by a seasonal stream that empties into Puget Sound. To establish a level grade on which to build, the owners applied for a permit to fill in the streambed and channel the water through an underground culvert. Cutler persuaded them against this imposition on the land, and proceeded to design a house that could be constructed without destroying the site's natural features.

The 2,200-square-foot house is supported by four 42-foot glulam beams that span the ravine and rest on two masonry abutments. Below, the stream flows unimpeded and vegetation grows undisturbed. Building materials for the project were carefully selected to minimize damage to the environment, the contractors, and the future tenants. Solid wood, for example, was selected instead of formaldehyde-containing plywood, and nontoxic paints and stains were specified. Applauding Cutler's regional sensibilities, the jurors commended the Bridge House's "simplicity of form, appropriateness of materials, and careful fit into nature."

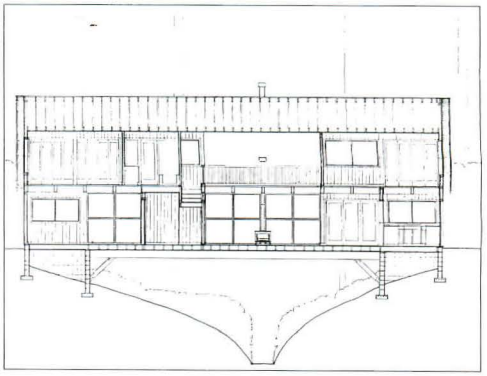
Before construction began, Cutler met with the entire building crew at the site to discuss the preservation of the property. Having alerted the workers to the project's environmental goals, the architect found them to be very responsive; "They became so protective of the site that they didn't even let me walk in certain places." —N.B.S.

ARCHITECT: James Cutler Architects, Winslow, Washington—James Cutler (project architect); Jeff Garlid (project coordinator)
ENGINEER: Greg Hiatt
GENERAL CONTRACTOR: James Kennedy & Partners
COST: $342,000—$158/square foot
PHOTOGRAPHER: Peter Aaron/Esto, except as noted

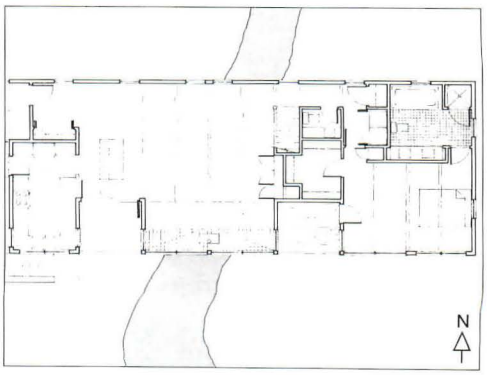


ART GRICE

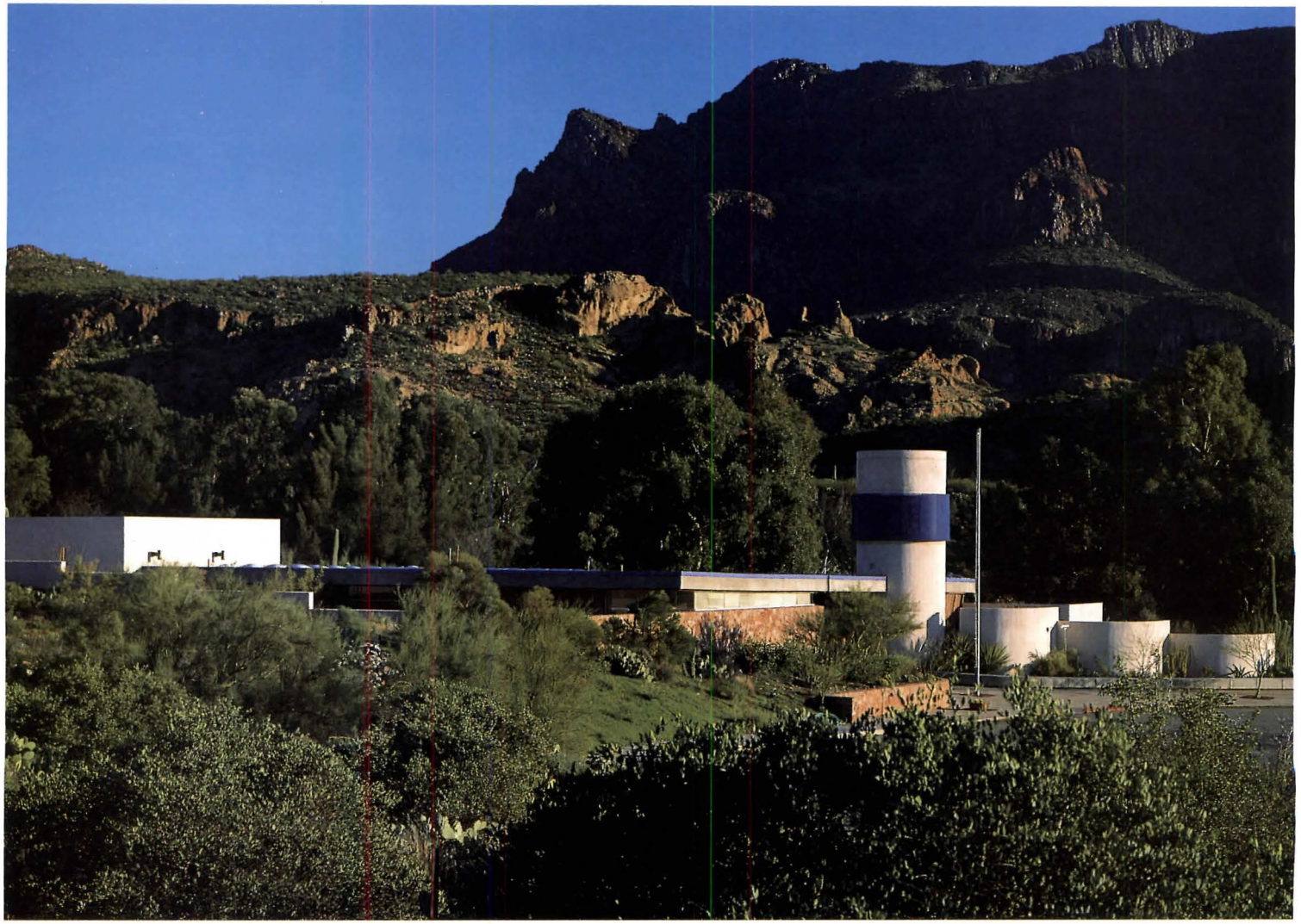
The three-bedroom dwelling straddles a streambed (bottom), which fills with water during winter months. Living spaces and master bedroom are located on the first floor; the second floor is hidden behind a steeply pitched metal roof (section below). The south elevation (above) overlooks a tidal estuary that leads into Puget Sound, with direct southern exposure warming the interior (bottom left). Natural materials such as solid pine were installed throughout the house. The exterior is clad with cedar shingles, and wooden knee braces (left) reduce by 8 feet the clear span between masonry piers.

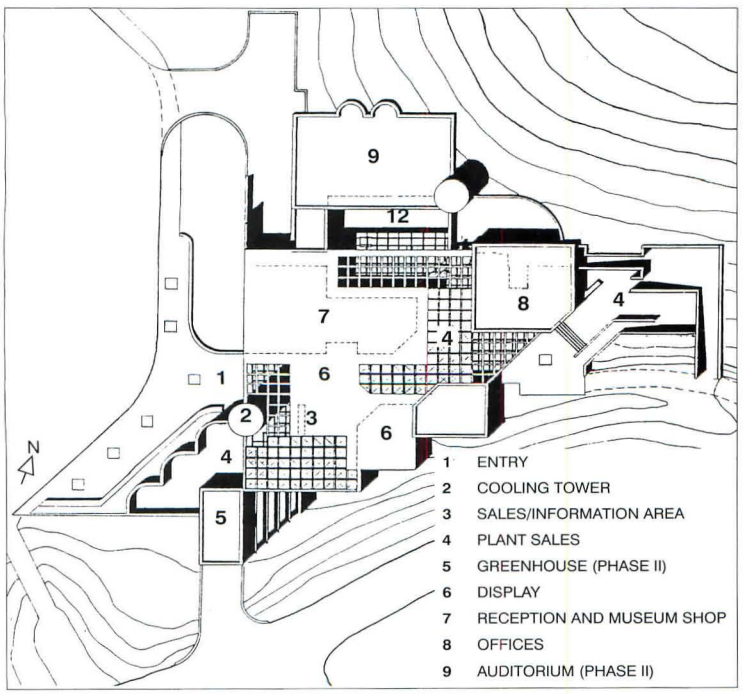


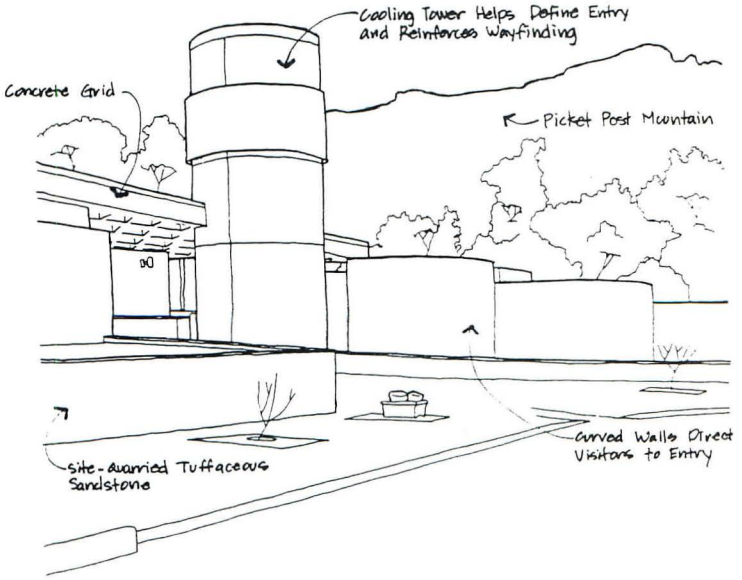
EAST-WEST SECTION



FIRST FLOOR PLAN




9
12
8
4
7
4
1
6
2
3
6
4
5
N
1 ENTRY
2 COOLING TOWER
3 SALES/INFORMATION AREA
4 PLANT SALES
5 GREENHOUSE (PHASE II)
6 DISPLAY
7 RECEPTION AND MUSEUM SHOP
8 OFFICES
9 AUDITORIUM (PHASE II)


Cooling Tower Helps Define Entry and Reinforces Wayfinding
Concrete Grid
Picket Post Mountain
Curved Walls Direct Visitors to Entry
Site-quarried Tuffaceous Sandstone

Boyce Thompson Southwest Arboretum Visitor Center
Superior, Arizona
Line and Space, Architect

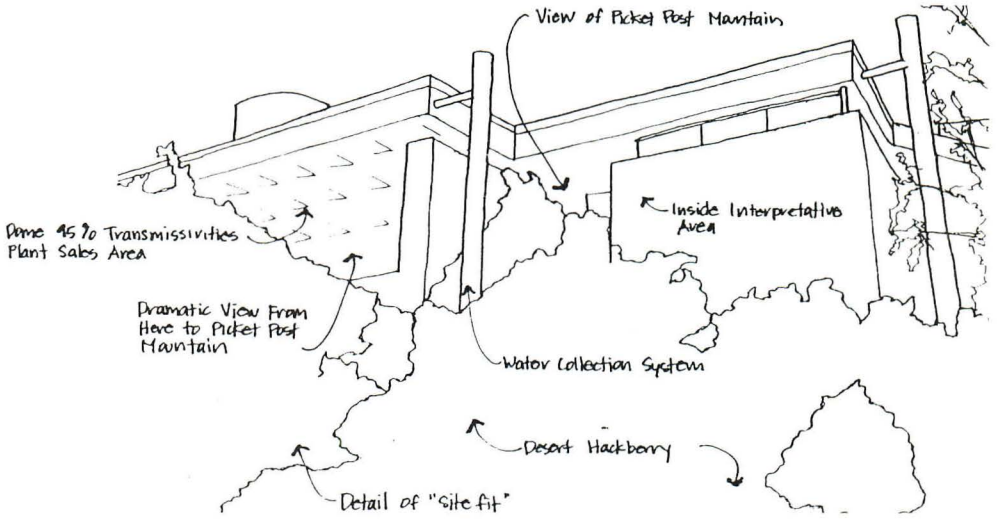
LOCATED IN THE FRAGILE ECOSYSTEM OF THE Sonoran Desert, the Boyce Thompson Arboretum, which was established in the 1920s, is one of the oldest botanical and research gardens in the Southwest. Tucson architect Les Wallach's new 10,000-square-foot visitors center, housing interpretive, administrative, and retail functions, serves as the gateway to the 300-acre complex.

To minimize the apparent mass of the building, the architect nestled the structure into the rugged landscape and created an interrelated sequence of indoor and outdoor spaces. A flexible roofing system composed of a concrete gridded canopy is designed to be left open to the sun, skylighted, or covered with acrylic domes of varying translucence. The funnel-shaped walls of the entry are designed to capture the wind and accelerate it from an open foyer through a central hallway to the rear of the building. A 30-foot-high evaporative cooling tower provides air circulation and lowers the temperature of some areas by as much as 30 degrees. A greenhouse, now under construction, will capture solar gain to heat all interior spaces during winter months.

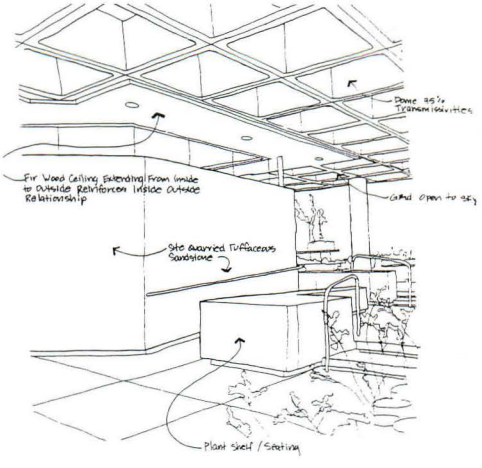
Appropriate to a desert climate where rain is precious, the building features a sophisticated water collecting and recycling system. Integral gutters along the roof and a series of vertical standpipes deliver rainwater to a central storage system used for watering plants. Rain that falls through the open roof grid and any overwatering of plants, as well as excess water from lavatories and drinking fountains, drains away to the same storage and recycling system.

The tuffaceous sandstone of the building's walls is site-quarried and blends into its rocky surroundings, and the cooling tower and standpipes create an architectural presence that, in the words of the jury, "demonstrate appropriate regional architecture without resorting to kitsch." —L.N.

ARCHITECT: Line and Space, Architect, Tucson, Arizona—Les Wallach, AIA
ENGINEERS: Turner Schaller Engineering Company (structural); F&D Associates (mechanical); Maurry Birkett (electrical)
CONSULTANTS: Jess Wyatt (concrete)
GENERAL CONTRACTOR: Hass Construction Co.
COST: $750,000—$75/square foot
PHOTOGRAPHER: Bob Freund



Responding to mountainous terrain (facing page, top) and existing site vegetation (above), Wallach inserted the visitors center as an entry to arboretum trails (plan, facing page). A concrete gridded roof (left) provides a flexible framework for skylights.



Natural Resources Defense Council
New York City
Croxton Collaborative, Architect

SCIENTISTS AT THE NATURAL RESOURCES DEfense Council (NRDC), a nonprofit environmental organization, had argued for years that ecologically sound design was not only possible but financially beneficial. After teaming up with the New York-based firm Croxton Collaborative, they finally proved their point in 1989 with the completion of the NRDC headquarters in lower Manhattan.

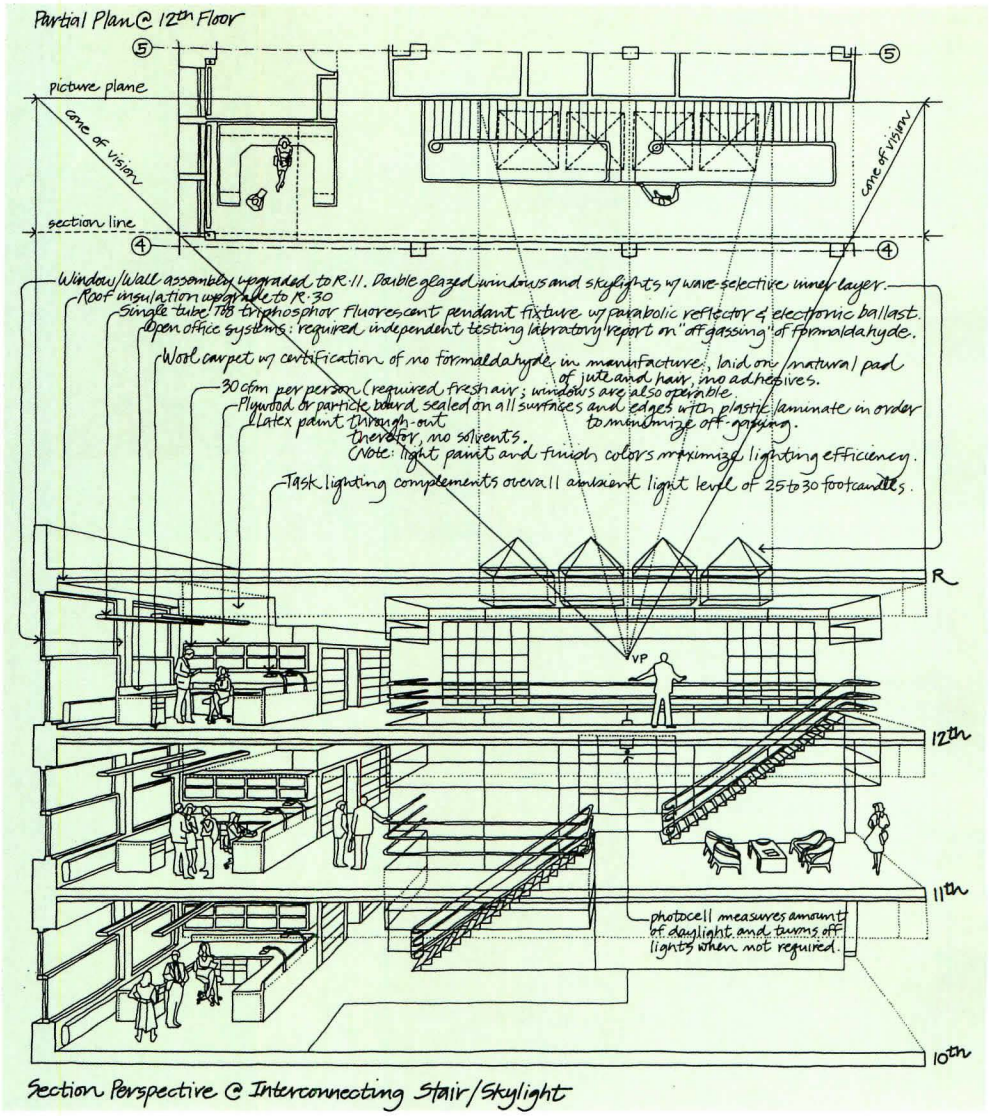
The organization joined forces with the architecture firm to ensure its new offices—three floors at the top of an existing 12-story building—would consume substantially less energy than standard installations and provide a healthy work environment without sacrificing quality design. To provide a convincing prototype, the client insisted that the project be constructed from building technologies and products that had been on the market for at least a year, and that the energy-related upgrades pay for themselves within three to five years.

The architects inserted skylights to maximize natural light, installed occupancy and daylight sensors to deactivate artificial lights when not in use, and specified energy efficient T-8 triphosphor lamps for the ambient lighting system. Their efforts were rewarded: NRDC offices expend only .55 watts per square foot for lighting, about one-quarter of the amount consumed in a comparable conventional workplace. Mechanical and insulation systems provide additional energy savings.

All materials were carefully examined by the architects and NRDC scientists to prevent an unhealthy buildup of volatile organic compounds, particulates, and formaldehyde fumes. For complex assemblies, test reports from independent laboratories were requested.

The jurors were pleased to cite "an office renovation in an existing building that demonstrates environmental sensitivity." They were also impressed by the complementary relationship that developed between architect and client. —N.B.S.

ARCHITECT: Croxton Collaborative, Architects, New York City—Randolph Croxton (director of architecture); Kirsten Childs (director of interior design); Charles Burleigh (project coordinator)
ENGINEERS: Office of James Ruderman (structural); Flack & Kurtz (mechanical/electrical/lighting)
GENERAL CONTRACTOR: SDR Construction
COST: $2.2 million—$69/gross square foot
PHOTOGRAPHER: Otto Baitz



NRDC's three levels (section, top) are linked by an open stair to encourage communication, reduce elevator usage, and introduce natural light to lower floors (above left). Only nonendangered species of wood were specified for the furnishings (above).

Independent Day School
Tampa, Florida
Curts Meares/The Architects Studio

REPLACING A HODGEPODGE OF TEMPORARY structures, the new Independent Day School is a colorful assemblage of small classroom buildings located within an 8-acre wildlife preserve in Tampa, Florida. The site, in the middle of a residential neighborhood, featured a stagnant, 45-year-old manmade pond, a stand of indigenous cypress trees, and various species of wetlands vegetation.

"When we first applied for the necessary building permits," recalls architect Gerald Curts, "environmental groups were resistant. But when they finally came out for a site visit and saw what we were proposing, everyone worked with us to make the project happen."

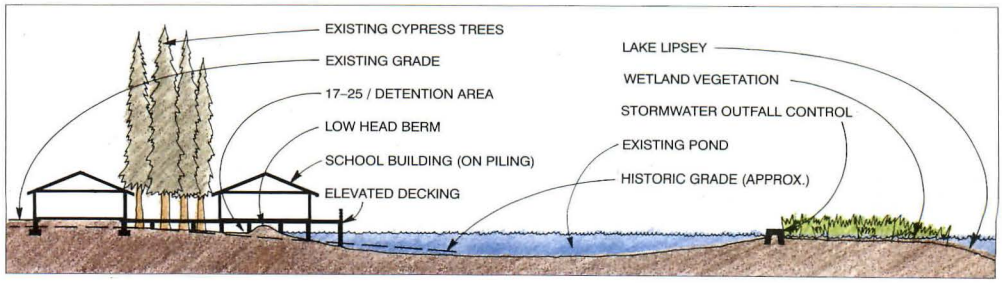
For the private school, which encompasses prekindergarten through eighth grade, Curts Meares created a series of wood-framed structures set on pilings and clad with prefinished metal siding. "Our color palette was a 24-box of Crayola crayons," explains Curts. The architects clustered freestanding components around the pond and connected them with elevated walkways that also function as small assembly areas.

The site previously had no pollution control for runoff into the pond. A sophisticated storm-water management plan incorporating water-detention areas was designed to enhance the pond's water quality. Now, two years after the completion of the first phase of the school, the once-stagnant pond is a vibrant ecosystem and a hands-on educational tool for the 250 students.

The project was praised by the jury for its construction methods. Building materials were hand-carried onto the site and installed without the use of heavy equipment. Jurors also lauded Curts Meares' colorful design: "This unusual collection of metal buildings doesn't recall the kind of touchy-feely images normally associated with environmentally conscious design." —L. N.

SITE PLAN

The Independent Day School is an unobtrusive addition to its site, a designated floodway. Standing between a pond and a grove of cypress tress, the arts center and a classroom building (top) rest atop wooden pilings and are connected by wooden decking (section). The ensemble is completed by other freestanding structures encircling the pond (site plan). Responding to a very low budget, the architects alternated gray and white prefinished metal siding (above right) and enlivened the composition with colorful columns, details, and canopies (above left), which were hand-carried to the site.



FLOODPLAIN SECTION

ARCHITECTS: Curts Meares/The Architects Studio, Tampa, Florida—Gerald G. Curts (principal in charge); Robert Hall (project architect); Keith Guidry (design team)
ENGINEERS: Jenkins & Charland (structural); O'Neal Engineering (electrical/mechanical); Florida Technical Services (civil)
CONSULTANTS: Ekistics Design Studio (environmental)
GENERAL CONTRACTOR: J.O. DeLotto & Sons
COST: $1.2 million—$51.27/square foot
PHOTOGRAPHER: George Cott

Recycling Redux

OU DON'T EXPECT TO FIND STEEL-CLAD RESIDENTIAL BUILDINGS IN LAWRENCE, KANSAS, A university town where clapboard, aluminum siding, and artificial stone are the norm. But on Tennessee Street, close enough to the University of Kansas to be student housing, stands a little enclave comprising three steel-clad cottages with a Queen Anne-style house in their midst. This novel juxtaposition of new and old is accentuated by salvaged elements: six wooden doors that once gave way to K.U. science classrooms provide access, and scavenged Virginia greenstone siding surrounds the base of the newer buildings. The historic centerpiece, built in 1868 and known as the Benedict House, is carefully restored, except for one party wall shared by a new house. The cottages are situated around a tiny courtyard, paved in brick salvaged from the remains of an original chimney on the site.

Although some Lawrence residents may disagree, this scene is not the result of an oversight by the local landmarks committee. The complex was, in fact, built under the jurisdiction of the Lawrence Preservation Alliance and with loans from the National Trust for Historic Preservation, which approved the new cottages. In a town where preserving an historic house in need of a new foundation would have priced it beyond the market, the five rental units created by the renovation represent innovation on the part of preservationists, investors, and Dan Rockhill, the architect who designed them.

Rockhill, a professor of architecture at the university and the owner of Dan Rockhill and Associates, a design-build firm, frequents salvage yards and wrecking companies because he likes to have a "smorgasbord of unusual materials to dig into." His fondness for used goods is based on a conviction that the quality of building materials has deteriorated over the last few decades, and that "anything in a salvage yard has endured for decades, and has more decades to go." Furthermore, he usually works with clients who can't afford new products, and salvaged doors, steel, and cladding are tremendously inexpensive when compared with new materials.

Rockhill concedes that incorporating these materials, which don't consume resources the way new products do, offers a positive environmental message. But he admits that the resulting sustainable architecture is a side effect, not a goal of his work. Rockhill likes to "awaken in people a little knowledge of the past," and he enjoys the challenge of integrating recycled elements into his designs; of cleaning, refashioning, and bringing old things back to life. "You have to be terribly discriminating," the architect contends, "and

The original Benedict house in Lawrence (facing page, right in photo) was moved while a new foundation was laid. Cottages (right and facing page), are clad in used greenstone and hand-cut steel shingles (top right), and have recycled doors (top left). The original Victorian-era house shares a party wall with one of the new buildings (bottom left), and interior staircases are constructed of salvaged steel (bottom right).

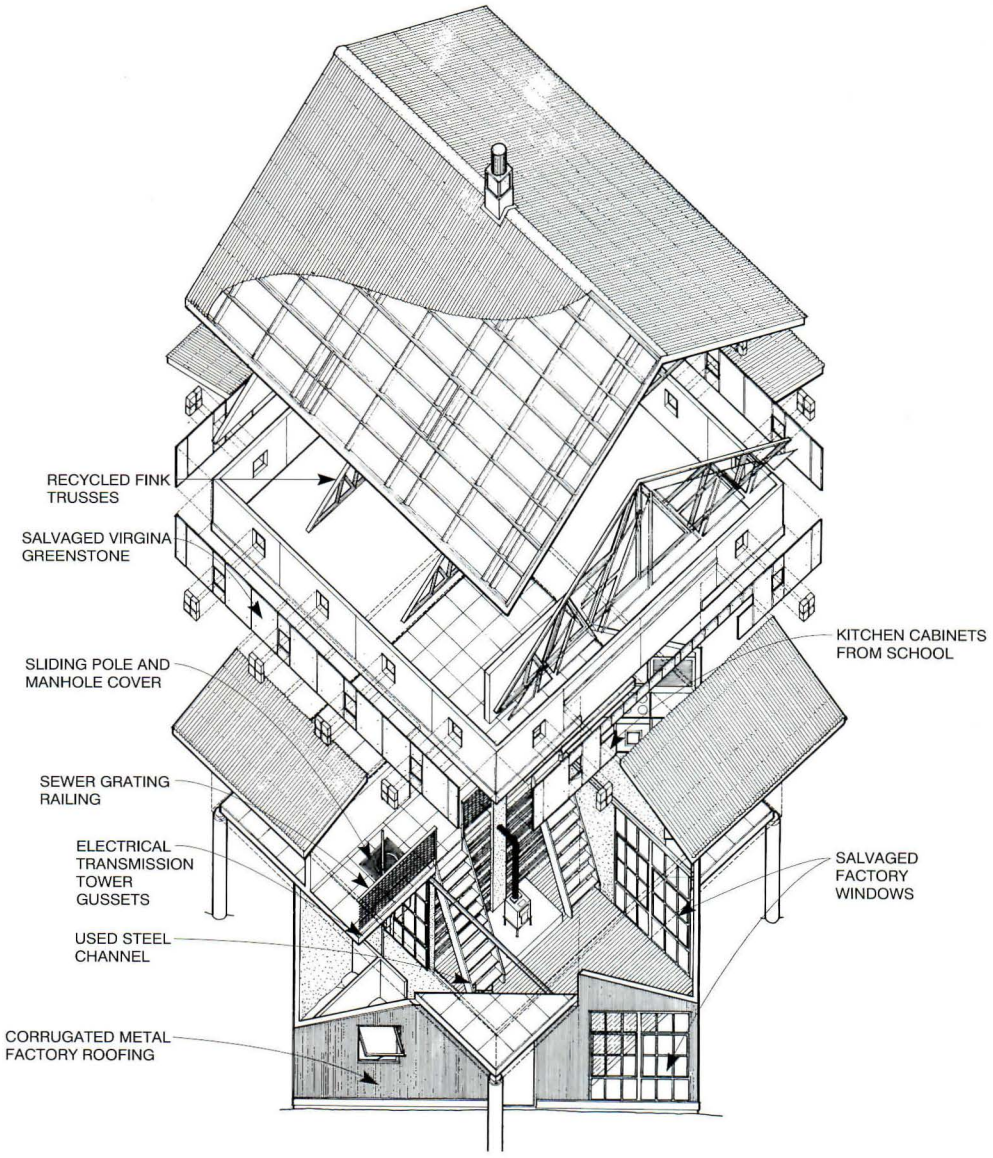
PHOTOGRAPHY BY HOBART JACKSON

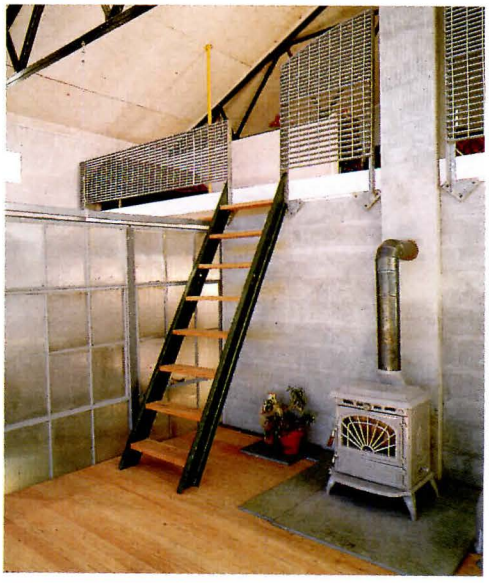
also know when *not* to use a material."

The architect's simple nine-square plan for the Benedict House and cottages offered the possibility of gables and overhangs that emulate the original Queen Anne structure. His choice of 26-gauge galvanized steel shingles—similar to what the Victorians might have chosen—was partly esthetic but also cost-conscious; where clapboard would have cost $1.30 per foot, Rockhill's shingles were 37½ cents. That cost does not include the amount of time Rockhill and his assistant spent cutting every 12-inch-square shingle by hand, then turning down the edges on a brake. The shingles number more than 2,000.

This time-consuming process is an example of the "presence of the hand," which Rockhill interprets as giving his buildings the distinguishing characteristics common to painting or sculpture; the sense of "everything having been touched in some way." He hires no subcontractors, preferring to undertake all engineering, construction, glazing, lighting, wiring, plumbing, and finishing himself, and he is delighted when clients are also willing to get involved. Willy Mackie, whose house for a family of four Rockhill designed and built for $50,000, worked with the architects on the job site every day.

To begin the Mackie house, Rockhill took his clients to a salvage yard where he inspired them with the satisfactory scale of four Fink trusses he knew he could buy for $60 each. The 30-foot trusses dictated the design: two 30-foot squares, one atop the other, the top one rotated 45 degrees. The simple geometry created alcoves within the open-plan house, into which the architect inserted bedrooms, kitchen, and bathroom. For the loft railing





The Mackie house was inspired by 30-foot Fink trusses (axonometric) that once supported a Santa Fe Rail warehouse in Kansas City. The architect welded two trusses together to create a glazed truss on the south facade (facing page, bottom). Used Virginia greenstone and corrugated steel from a factory roof clad the facade of the house (facing page, top). Elements such as the box beam that supports the trusses were constructed on the ground, then lifted into place with a fork-lift. Shoji screen of recycled factory window (right) divides living room from children's bedroom. Kitchen cabinets are from a high school home economics room, and ladder to second-story stereo niche (far right) is a used scaffolding ladder. Loft railings are sewer grates, supported by galvanized steel triangles from transmission towers.

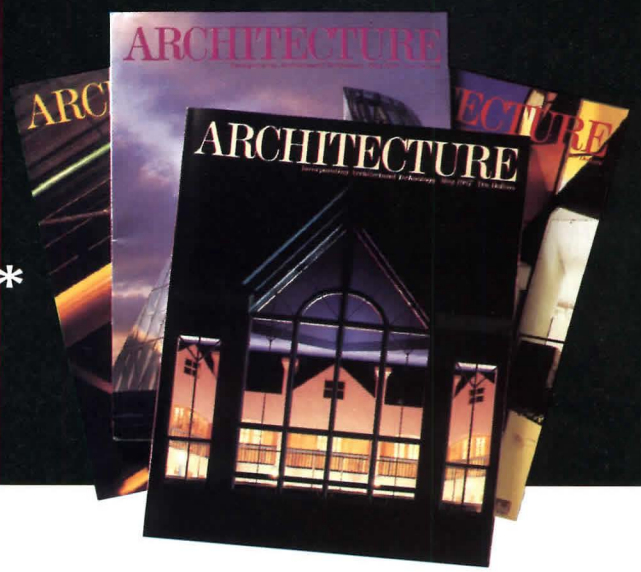
around the parents' bedroom, Rockhill found sewer grates, which he also positioned in the loft's floor to admit natural light to the bathroom and laundry area below. Factory windows, complete with metal sash and original frosted glass, create a kind of shoji screen, anchored along a barn-door track, that divides the living area from the children's room. Kitchen cabinets came from a high school home economics room—the architect had just acquired the contract to convert the school into offices—and a second-story reading niche is reached by a scavenged scaffolding ladder, which Rockhill painted bright yellow. A steel pole, for sliding fireman-style, reaches from loft to children's room through a manhole set into the floor.

The whimsy of Rockhill's approach to building is perhaps best revealed by the SEWS house, built for the city of Lawrence. The acronym stands for Summer Equinox, Winter Solstice, and the tiny "Santa Claus hut" (which serves as a ticket booth during summer festivities) was given the name by its designer, Steve Padget, an architect and member of Lawrence's active downtown improvement committee. Rockhill brought the concept to life with a trailer purchased from a local race-car driver, recycled factory windows, and nearly identical Victorian doors. For the merchant's symbol above the entrance, Rockhill purchased bocci balls—"croquet balls were a little too small." He clad the building in 16-ounce copper sheet and, using a band saw, cut the decorative symbols out of scrap aluminum. Both Rockhill and Padget received an award from the Lawrence Art Commission for the project. ■

—HEIDI LANDECKER

The SEWS house (Summer Equinox, Winter Solstice) was designed by Steve Padget; Dan Rockhill selected the materials and constructed the trailer hut, which is used by the city of Lawrence as a Christmas/Easter pavilion and a ticket booth. Symbols such as the phoenix (top left), the emblem of the city of Lawrence, were cut from used aluminum on a band saw. Reindeer's horns represent the tree of life, and three gold balls above the entrance symbolize St. Nicholas's three bags of gold (facing page), as well as good fortune for the merchants of Lawrence. The balls are painted bocci balls, and the twin Victorian doors (bottom left) were salvaged from two different wrecking companies at either end of the state. The house, clad in copper with a finely finished pine interior, is built on a used race-car trailer.

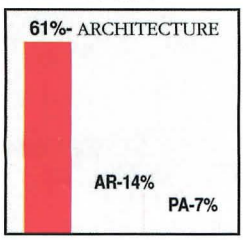
Architects Agree there's no Equal*



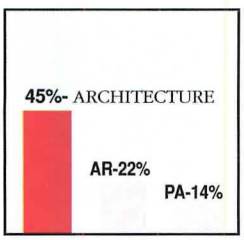
ARCHITECTURE is the profession's leading publication...and independent research proves it!*

The independent Readex® Survey of May, 1990 shows Architecture is the...

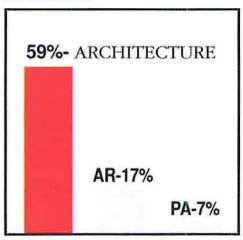
PREFERENCE...
of a vast majority of architects for useful technical information



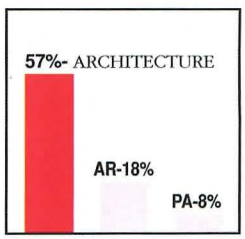
LEADER...
for useful design information



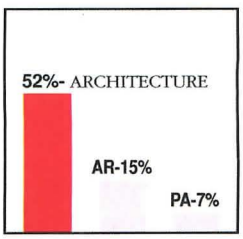
CHOICE...
of a majority of architects for useful professional practice information



MOST RESPECTED...
and valued magazine in the industry



MOST HELPFUL...
magazine to a majority of architects in their work



And that's exciting!

ARCHITECTURE continues to build excitement by providing editorial coverage of both the design and the technological aspects of architecture to a degree unmatched by any other magazine in the architectural field.

Discover The Excitement

*Based on the results of the Fifth Annual Study of U.S. Architects conducted by Readex®, Inc., an independent research company

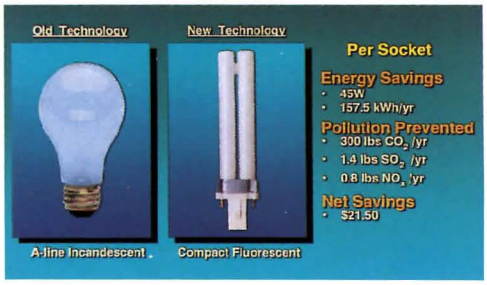
EPA Promotes Green Savings

RATHER THAN FINING COMPANIES TO CLEAN up environmental pollution they have already produced (as with existing Superfund and Resource Conservation and Recovery Act legislation), the Environmental Protection Agency initiated a proactive approach to environmental preservation in January. Green Lights, EPA's new, voluntary, nonregulatory compliance program, is aimed at achieving cleaner air by promoting cost-effective energy efficiency measures. Modern technologies, such as compact fluorescent fixtures and occupancy sensors in place of incandescent fixtures and manual switches, can cut the electrical needs of commercial lighting by 50 percent. They provide equal or improved illumination with a payback as short as three years, according to EPA statistics.

Between 20 to 25 percent of all electricity produced is for lighting, and 80 to 90 percent of that amount is consumed to illuminate industrial, office, and retail space. If commercial lighting consumption levels were cut in half, annual carbon dioxide emissions from utility plants would be reduced by 232 million tons—the equivalent of eliminating one third of all the cars in the U.S. Another contributor to the greenhouse effect, nitrogen oxide emissions, would be cut by 900,000 tons per year—4 percent of the nation's annual total. The production of 1.7 million tons of sulfur dioxide per year, 7 percent of the nation's annual emissions and the primary cause of acid rain, would be prevented. Reducing utility fuels would mean less environmental damage from strip mining, natural gas leakage, coal-fired boiler ash, flue-scrubber waste, and the disposal of radioactive byproducts from nuclear-powered facilities.

In order to meet those goals, Green Lights offers corporations several services: a survey of existing facilities to assess the best upgrading options; data bases of contractors, manufacturers and distributors to determine product availability; an independent, national product-testing program to validate manufacturer's claims; aid in obtaining financing for the initial installation costs; and public recognition of companies with efficient and profitable projects. In turn, corporations sign a "memorandum of understanding" with the EPA, agreeing to install lighting upgrades that are known to reduce electrical consumption and provide a return on their investment.

As of March 1991, 39 corporations have agreed to become partners in Green Lights, including many Fortune 500 companies. The EPA hopes the 1,000 largest U.S. corporations will sign Green Lights agreements by 1993. The EPA will then target smaller companies. Armed with EPA information, architects will be able to persuade corporate clients that renovating or building new facilities will result in cleaner air while making economic sense. For more information, contact: Bob Kwartin at the EPA (202) 382-4992. —M.S.H.



To reduce electricity consumption, the EPA's new Green Lights program encourages corporations to replace outdated incandescent light bulbs and lighting controls with modern, more efficient fluorescent fixtures (above) and occupancy sensors (below).

New York Updates Energy Conservation Code

BY ENACTING THE FIRST AMENDMENTS to its 1979 Energy Conservation Construction Code for new commercial and high-rise residential buildings, New York state is no longer waiting to see if business and industry voluntarily upgrade their energy conservation policies. The updated code—considered the strictest in the country—pays particular attention to lighting and sets more stringent performance requirements for building-envelope components such as insulation and glazing, and mechanical elements such as heating and air-conditioning equipment.

The new regulations, especially the amended lighting-performance standards, have resulted in burning debate. Controversy over revisions includes the elimination of an overall building-power-consumption level for lighting, previously limited by watts per square foot, in favor of tighter fixture-by-fixture analysis requirements. Critics of the new legislation, including the Illuminating Engineering Society of New York and the International Association of Lighting Designers, argue that the code is the only one in the country regulating the use of specific equipment, which limits design flexibility. Other state codes, such as California's, have successfully saved energy without such prescriptive measures.

The New York State Energy Office views the revisions as a precedent for a proposed national energy code and a means of reducing energy consumed by lighting. The energy office argues that the building-wide power-budget method rendered energy reduction for lighting unenforceable, and that energy use for illumination actually increased after the state's energy code was enacted a decade ago. As now amended, New York's energy conservation code will require further evaluation and promises continued controversy. ■

CONCEPT

Great bath enclosures begin with a great concept. All that remains is to convert that concept into reality. And that's where we come in. Alumax offers the largest selection of fine bath enclosure systems on the market. More custom StikStall componentry. More innovative glass. More framed and frameless shower doors. More Brite-Anodized finishes, including the Obsidian unit pictured.

If you have a concept that needs converting, send for our all new, full color bath brochure, Attention: Alumax Literature Department, P.O. Box 40, Magnolia, AR, 71753. Or call 800-643-1514.

ALUMAX

Circle 78 on information card

Ecological Principals

Architects from four diverse firms hold green precepts central to their practices.

"WE HAVE TO GET RID OF THE NOTION that architects involved in ecological issues are flower children of the 1990s," insists Kirsten Childs of the Croxton Collaborative. She need not worry: any preconceived images of love beads and sandals are quickly shattered by the practicality, technical sophistication, and reason of Childs and partner Randy Croxton, and the three other firms portrayed on the following pages.

Which is not to say that these architects fit a narrowly defined profile. On the contrary, their personal motivations, geographic locations, project types, and environmental concerns vary significantly. Seattle's James Cutler concentrates on placing single-family residences sensitively within undisturbed settings, while New York's Croxton Collaborative has refined ecologically sound office design in urban environments. As California State Architect during the late 1970s, Sim Van der Ryn developed prototypes to solve energy and water shortages; more recently, he integrates a full spectrum of green concepts in the design of educational centers and retreats. And Connecticut-based Paul Bierman-Lytle pioneers construction of houses and light commercial structures using toxin-free building materials.

These conservationists do not eschew modern technology, but attempt to use it appropriately and selectively. They may install a sophisticated electronic system, for example, if it promises significant energy savings. And, though not always motivated by money, they are certainly aware of the bottom line. In specifying an energy efficient lighting or heating system, Croxton Collaborative requires that the additional costs associated with it be recovered through lower utility bills over a reasonable period of time. Cutler explains to his clients that the preservation of a site—especially the trees—increases its property value. These architects take into account what many others have ignored: the long-term savings associated with green projects and the hidden costs, such as air pollution and overcrowded landfills, accompanying environmentally insensitive design. Speaking of the traditional practice of architecture, Croxton explains: "We as a profession have bad ways of calculating what the cost benefits are. Architects often do not see the extent of damage caused by some of their decisions. They only see part of the picture."

To form a bigger picture, Croxton recommends that architects develop a general understanding by reading some of the numerous books now available on environmental topics (see bibliography, below). "Then start to build your own body of knowledge through your own projects—where you have a real possibility for an application," he explains. "You must fold this knowledge into your standard office procedures." These general procedures should include gathering pertinent technical literature, discussing ecological issues with manufacturers, locating a reliable independent testing laboratory, and developing regional contacts for further information.

To the uninitiated, this additional technical research may seem a burden. But to those who embrace sustainable architecture, the tangible concerns of climate, resources, toxicity, and site-specific conditions are—unlike the fleeting stylistic trends of recent years—providing architects with lasting meaning and direction in their work.

—NANCY B. SOLOMON

Basic Reading on the Environment

Architects interested in developing an awareness of environmentally sound design will find the following books helpful:

Biologic
David Wann
Johnson Books, Boulder, Colorado, 1990

Blueprint for a Green Planet
John Seymour and Herbert Girardet
Prentice-Hall, Englewood Cliffs, New Jersey, 1987

Design for a Livable Planet
Jon Naar
Harper & Row, New York City, 1990

Design with Nature
Ian L. McHarg
Natural History Press, Garden City, New York, 1969

The Earth Report
Edward Goldsmith
Price Stern Sloan, Los Angeles, California, 1988

The End of Nature
Bill McKibben
Random House, New York City, 1989

50 Simple Things You Can Do To Save the Earth
Earthworks Group
Earthworks Press, Berkeley, California, 1989

Healthful Houses
Clint Good and Debra L. Dadd
Guaranty Press, Bethesda, Maryland, 1988

The Healthy House
John Bower
Carol Publication Group, New York City, 1989

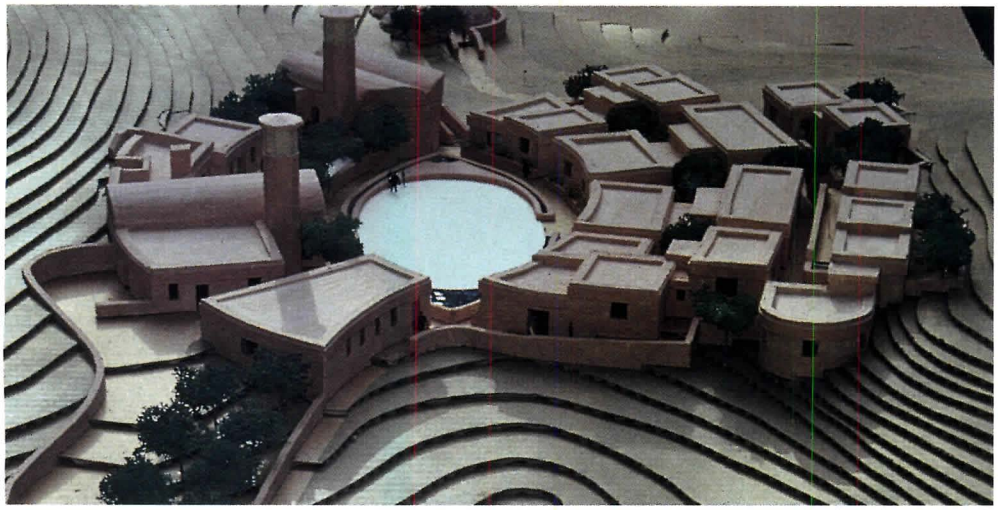
How to Make the World a Better Place
John A. Hollender
William Morrow, New York City, 1990

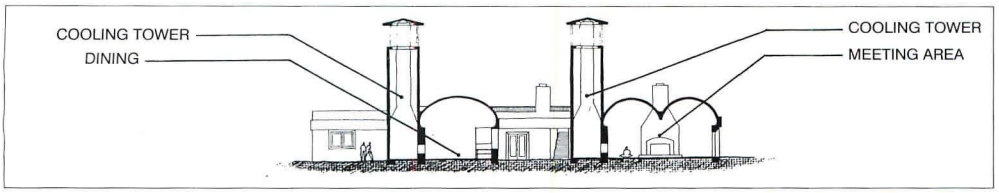
Respectful Rehabilitation
National Trust for Historic Preservation
Preservation Press, Washington, D.C., 1986

Restoring the Earth
John J. Berger
Alfred A. Knopf, New York City, 1985

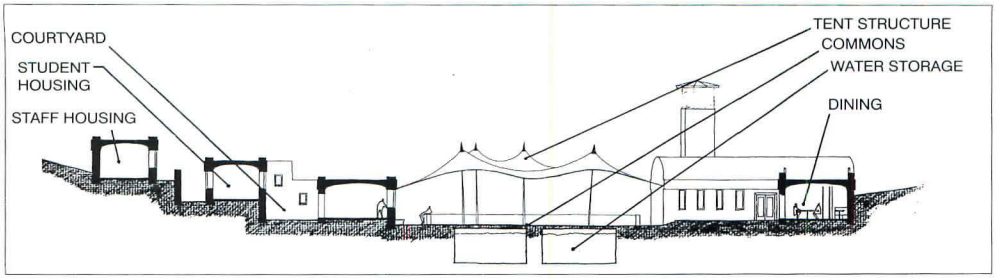
State of the World 1991
Lester R. Brown
Norton, New York City, 1991

Your Home, Your Health & Well Being
David Rousseau et al.
Ten Speed Press, Berkeley, California, 1988





EAST/WEST SECTION



NORTH/SOUTH SECTION

The Foundation School
Ojai, California

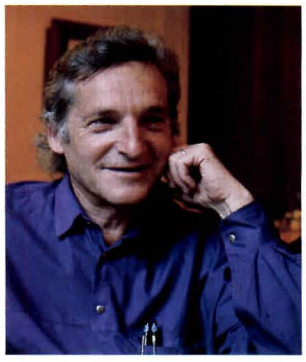
Van der Ryn's proposal for a private school represents a synthesis of his ideas about environmentally sustainable architecture. The 12,500-square-foot "village" (top left) is designed to encourage ecological awareness, continuing education, social interaction, and private contemplation through its applications of indigenous materials and appropriate technologies. Centered on a saddle between two hills to the north and south and two swales to the east and west (left center), the structures are designed to harmonize with the landscape. To create a healthy environment for spiritual retreats and educational programs, the architect arranged classroom, office, and dining facilities around a central, outdoor communal space, with a vertical hierarchy of more private courtyards for the 20 student and faculty housing units (sections). Diagrams and explanations about how the construction techniques and technologies create ecological sustainability will be posted at stations throughout the school (facing page). Combined with towers to control wind, thick walls constructed of rammed earth available from the site excavation will create thermal mass to heat and cool the complex passively. Southern California's climate of intense sun and scarce water will be addressed with graywater recycling and solar measures for energy conservation. The scheme will be exhibited at the AIA convention this month in Washington, D.C.

Sim Van der Ryn & Associates
Sausalito, California

TRYING TO RECYCLE GRAY WATER "PRACTICally got me arrested in the early '70s," admits Sim Van der Ryn, principal of the Sausalito, California-based firm, Sim Van Der Ryn & Associates. But today, when California residents are required to ration water, Van der Ryn's radical ideas about conservation are finding eager acceptance. As California State Architect from 1975 to 1978, he led the way in environmentally conscious public policy with such projects as the Bateson building in Sacramento, a state office building constructed as a model of energy-saving, climate-responsive design. As a cofounder and president of the Farallones Institute—a nonprofit research organization devoted to developing ecologically sustainable design and technologies—Van der Ryn guided construction of the Berkeley-based Integral Urban House in 1973, a prototype for a self-sustaining residential environment.

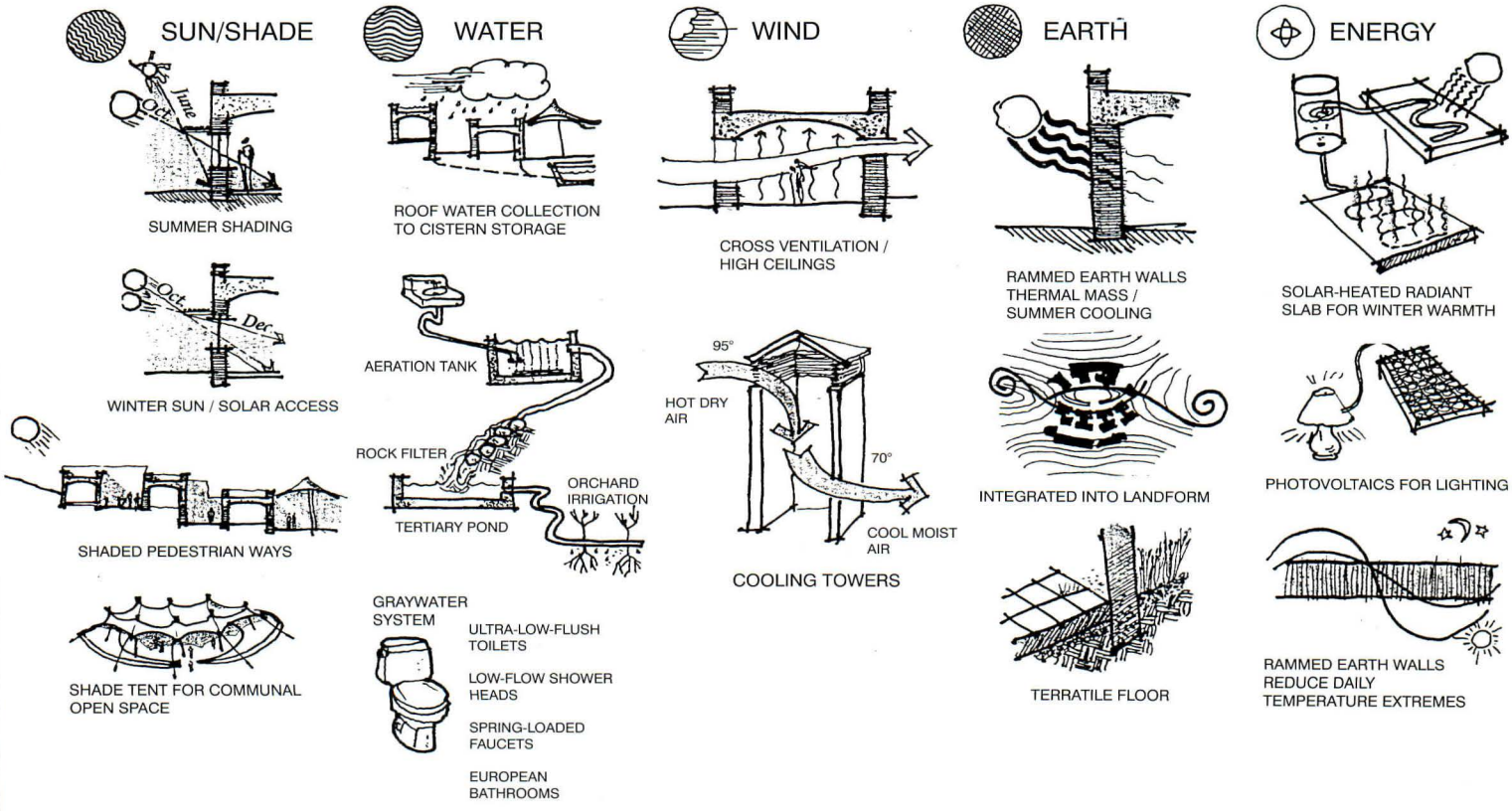
Although the last decade was a drought-stricken period for architects with such ecologically conscious values, Van der Ryn hopes that in the '90s "designers will become accountants, not for a building's financial cost but for its environmental toll." While architects should not neglect esthetics, according to Van der Ryn, the boundaries of designing a building do not stop at the facade, but extend to evaluating the flow of resources to and from the structure. But how does an environmentally conscious architect translate such ideals into built form?

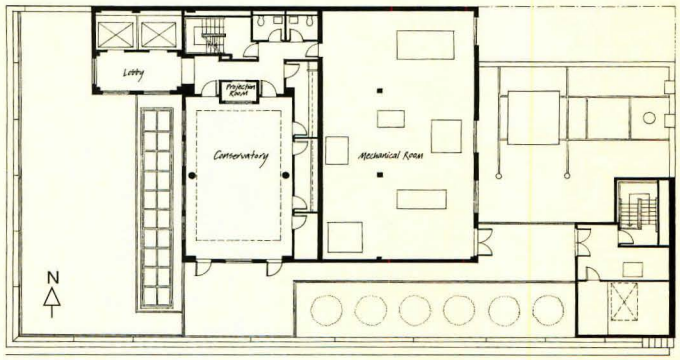
Van der Ryn's environmental prototypes are conceived through teaching architecture at the University of California at Berkeley, developed and nurtured at the Farallones Institute, and brought to fruition in his professional practice. He believes the best data on a proposed building site should be obtained from local residents, who are most familiar with the specifics of a region's microclimate. Van der Ryn also analyzes a site and program by the McHargian method of overlaying maps of topography, vegetation, soil type, geology, hydrology, and climate with maps depicting population density, economic development, and growth forecasts.



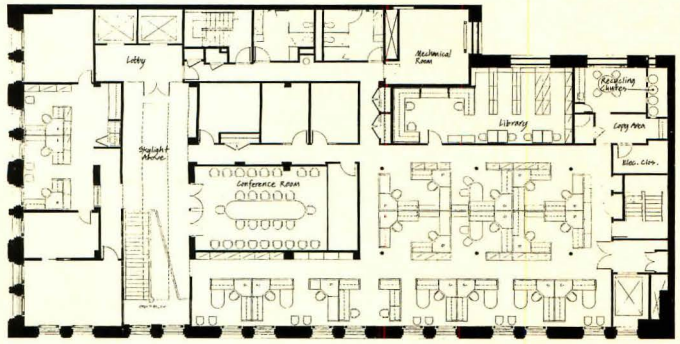
While many of the houses Van der Ryn designs employ simple rammed-earth construction and indigenous materials, he embraces contemporary technology. To improve company teamwork, Van der Ryn has designed corporate conference center rooms around multimedia hardware and software to display information as visual images on video and rear projection screens, providing a common reference point for discussion and encouraging better communication. These retreats, which Van der Ryn terms "Meta-Centers," are evolving into an ecological prototype in the Bay Area called an Environmental Planning Information Center. Currently in the programming stage of development, the facility is intended to encourage communities and local governments to establish ecologically sustainable public policy. Electronically generated maps will be displayed on video screens, and projected and overlapped on the walls of an "environmental situation room" to educate the public about their region's ecology and the consequences of development strategies.

But it is the most simple actions that provide Van der Ryn with the most inspiration for his continuing quest to achieve ecologically sustainable design. As he notes, "I get more ideas sitting quietly and listening to the land than from the narrow dialogue of the latest design 'ism'." —M.S.H.

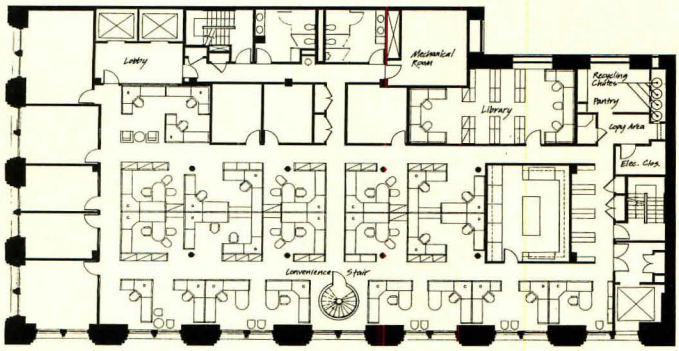




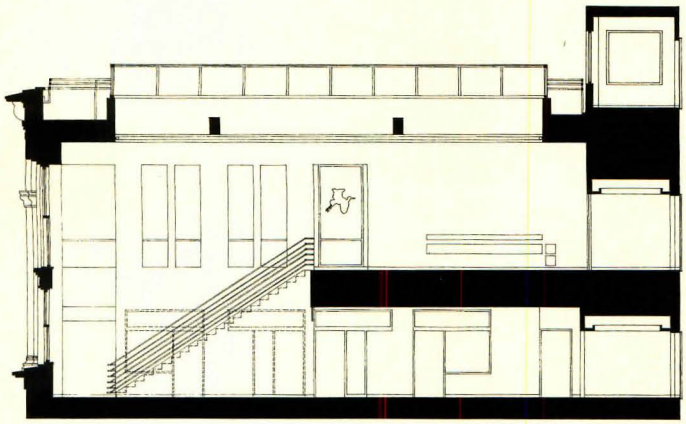
ROOF PLAN / CONSERVATORY LEVEL



EIGHTH-FLOOR PLAN

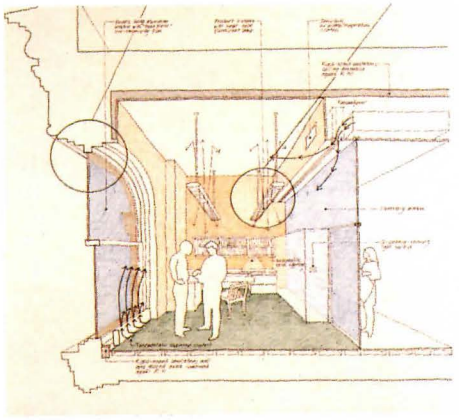


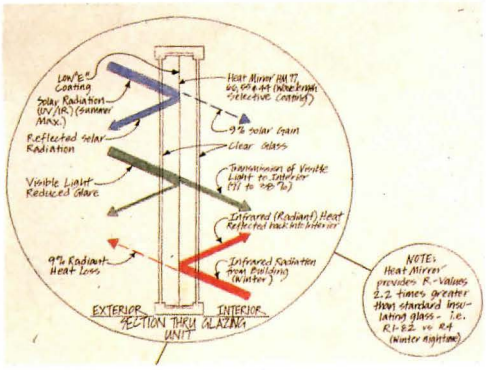
TYPICAL FLOOR PLAN

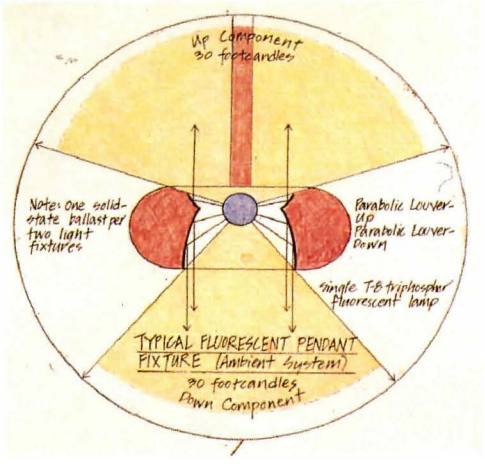


SECTION THROUGH 7TH AND 8TH FLOORS, AND CONSERVATORY LEVEL

OTTO BAITZ







National Audubon Society
New York City

An existing building (facing page, top right) is being renovated as the headquarters for the environmental society. The exterior includes rooftop garden (facing page, top plan) and skylight, which will light the top two floors (facing page, section). Four chutes in the northeast corner (facing page, center plans) will carry recyclable materials to the basement. To maximize energy efficiency, the architects analyzed every building system (top), including exterior glazing (above center) and ambient light sources (above).

Croxton Collaborative, Architects
New York City

WHILE ARCHITECT RANDOLPH CROXTON and interior designer Kirsten Childs had explored energy efficient components, it was not until they were commissioned in 1988 to design the New York headquarters of the Natural Resources Defense Council (NRDC) that the two principals of Croxton Collaborative considered integrating all aspects of green architecture under one roof.

The resulting project (page 88) was an enormous undertaking. Although NRDC scientists had developed many helpful prototypes and assisted the design team in its research, the architects quickly discovered that the holistic approach favored by their client led them into uncharted waters. One of the many difficulties Croxton and Childs encountered in their search for environmentally appropriate materials was misleading advertising. Many companies would boast that their products were environmentally friendly because, for instance, they were biodegradable, yet further questioning revealed that the same products contained ozone-damaging chlorofluorocarbons. And manufacturers who claimed their products were ecologically sound would often back off as soon as a written affidavit was requested.

WILLIAM WHITEHURST

Now engaged in renovating an entire building for the National Audubon Society's headquarters in New York, Croxton Collaborative is finding that designing green environments is easier and more affordable. "There's been an enormous difference in just three years," exclaims Childs. "Manufacturers are showing greater interest, more sound materials are on the market, and companies are supplying data with less reluctance."

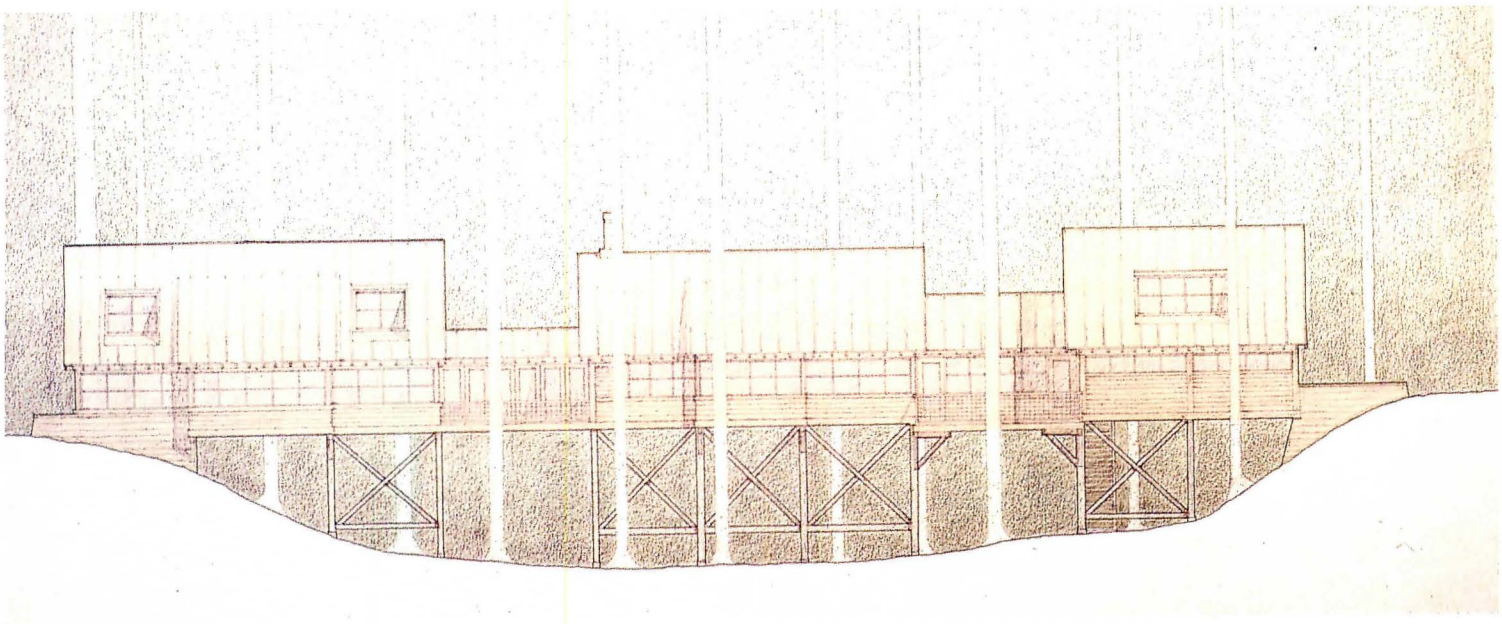
Childs' perception that designing environmentally sensitive interiors is easier now than three years ago is, of course, relative. As the two New York designers become more astute on the subject, further complexities emerge. For instance, in considering the recent claims that nylon carpeting may be implicated in global warming, Childs probes into the full consequences of wool applications (to both sheep and the land on which they graze), and weighs the ramifications of biocides and pesticides associated with natural carpet backings. Admirably, the firm mulls over subtleties that less informed practitioners are not even aware of.

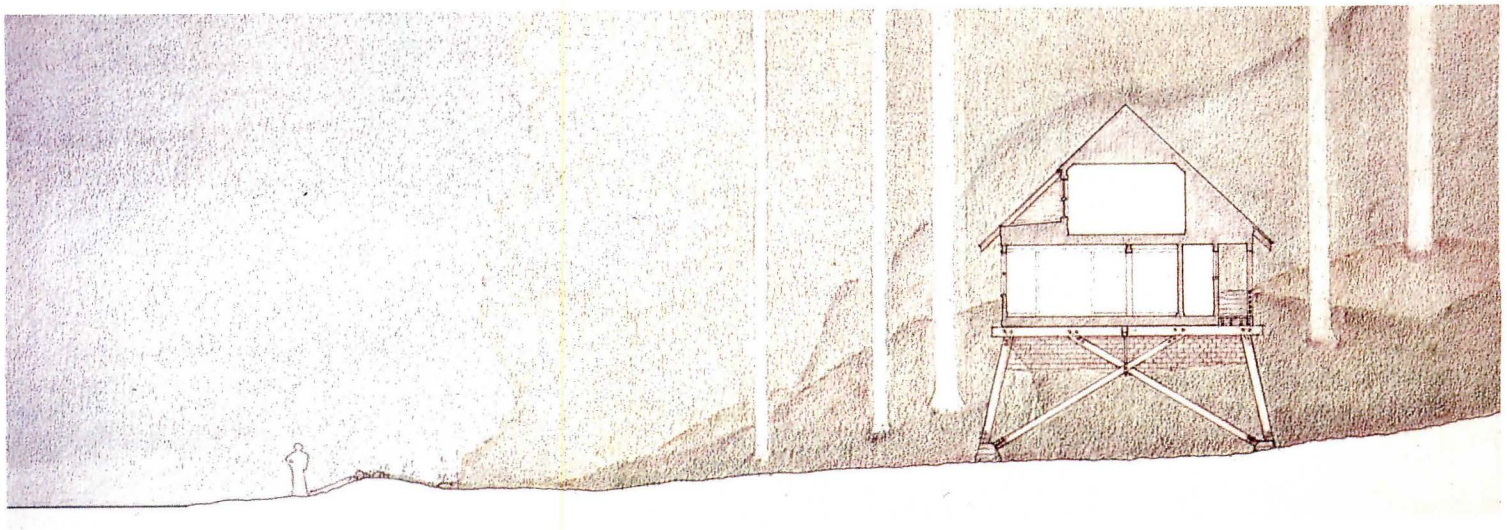
Environmental priorities for a project must be established. "You may have found three materials, all of which meet the budget, functional needs, performance, and specific environmental criteria," explains Croxton. "We could argue for weeks about which of these environmental benefits is the best." In these cases, the Collaborative defers to the priorities of the client—whether energy savings, for example, or recycling.

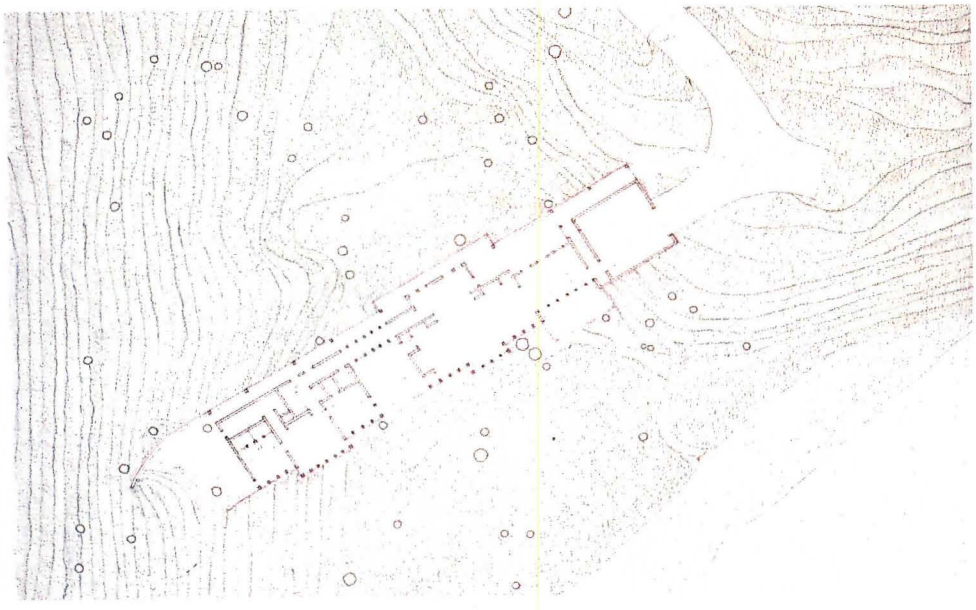
The Audubon Society's commitment to reusable resources is revealed in a five-tier recycling program that is being incorporated into its national headquarters, slated for completion in early 1992. The first is the recycling of the building itself—the renovation of a 100-year-old structure. The second step is the recycling of materials removed during renovation. Third, new building products to be specified are fabricated from waste materials. Once in the building, the Society will implement a purchasing program targeted to recyclable office products. Four internal chutes will funnel aluminium, high-quality office paper, organic waste, and other materials from every floor to a basement recycling center.

Croxton continuously draws upon the tremendous data base of information and resources that his firm has developed through NRDC and Audubon to inform their less ecologically aware clients of the long-term financial and health-related benefits of green design. And he is finding that more and more corporations are becoming interested in the environment for pragmatic reasons, if nothing else. "Many clients are concerned about how they are perceived on this issue," notes Croxton. "Is their workplace of a quality that will attract the best and the brightest? What is the impact of absenteeism on worker productivity?" Private companies also want to take advantage of local utilities' energy-saving incentives that have become common in large urban areas.

"It is important for architects to reach beyond conservation groups to private corporations," asserts Childs. Armed with statistics revealing the financial rewards of green design, *the Croxton Collaborative is currently* wooing two new corporate clients interested in embracing environmental sensitivity without losing a competitive edge. —N.B.S.

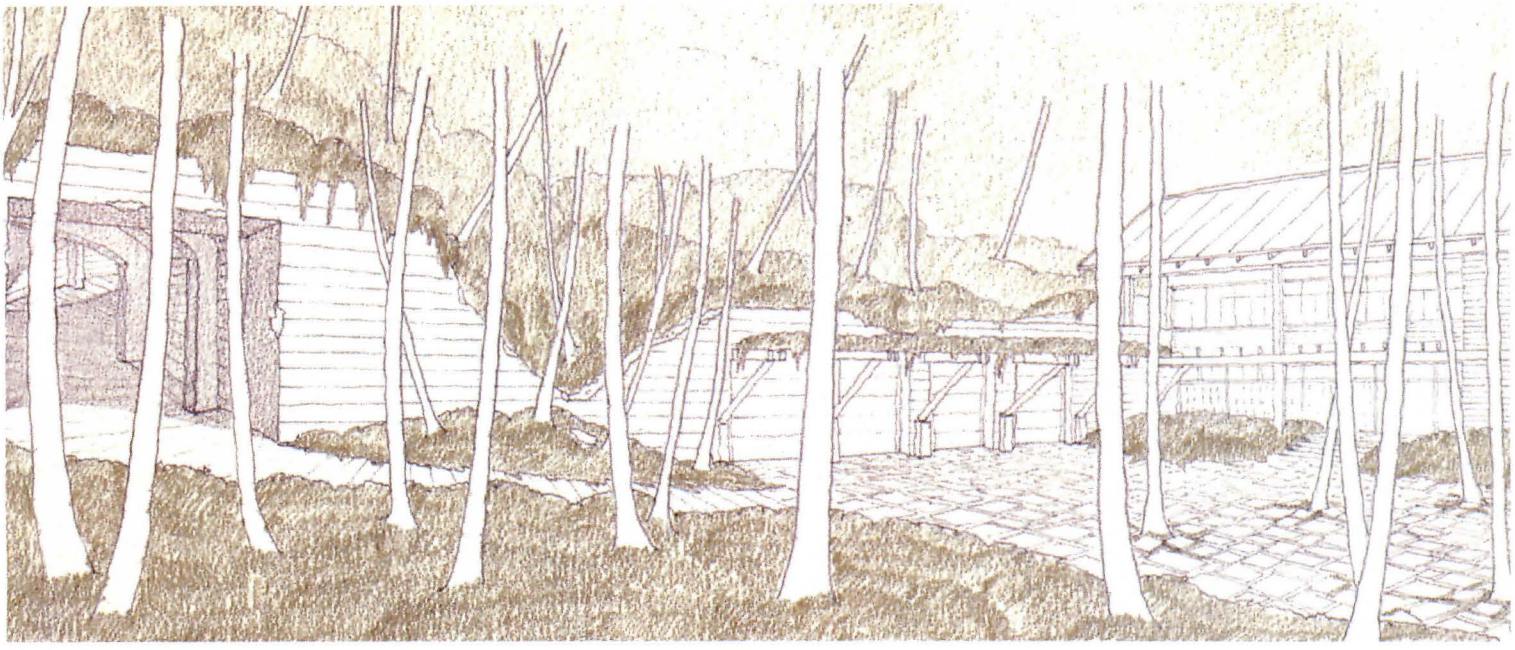






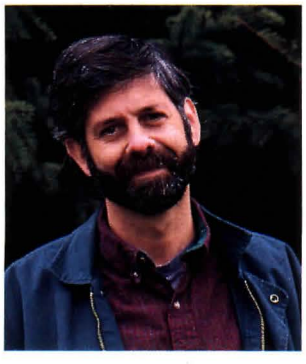
Houdek/Pope Residence
Seabeck, Washington

The Houdek/Pope Residence is planned for a site Cutler felt was too beautiful to touch (left). "Try getting heavy machinery into that area," muses Cutler, "and, before you know it, all the reasons why you decided to move there have been destroyed." To minimize destruction, he lifted the house onto wooden trestles (above). In the ravine below the house, a cedar tree grows out of a decaying, 6-foot-diameter "nurse log" on its side. The roots of the thriving tree branch out visibly in every direction. Eventually, the log will dissolve, leaving the cedar raised up 6 feet on its tendrii-like roots—not unlike the house itself. For Cutler, the nurse log, which both nurtures and warps, is a metaphor for influences that affect change in our lives.



James Cutler Architects
Winslow, Washington

IN ADDRESSING ENVIRONMENTALLY SENSITIVE design, James Cutler quickly shifts from outlining conservation techniques to discussing larger ideas that nourish his architecture. It is not that the 41-year-old architect dismisses the importance of technological expertise—his firm continually broadens its awareness of material toxicities and has experimented with passive solar techniques, composting toilets, and propane-fired mechanical systems—but he strives to develop what he describes as "a narrative of our relationship to our environment."



ART GRICE

Illustrating Cutler's green approach are the eroding concrete walls and errant trees that break through the paving in the exterior courtyard perspective of the Gates Residence (above), a project in Medina, Washington, that Cutler is currently designing in conjunction with Peter Bohlin of the Pennsylvania firm Bohlin Powell Larkin Cywinski for William Gates, chairman of Microsoft Corporation. "We express ambiguity as to whether the building was applied into nature or whether nature is reapplying itself over the building," explains Cutler. "It is a story of the passage of time, the cycles of life, and how everything you see around you grows out of the decay of something else."

Cutler hopes that such designs can begin to alter perceptions of the land and a sense of responsibility to it. Changing the public's attitude to the environment is as critical to the Washington architect as the specific decisions to select nontoxic paint or avoid cutting a tree, because, he asserts, "one house doesn't mean very much in the big picture. It's the whole culture that's the problem."

The Gates Residence presumes a world where resources are quite precious and living materials are used judiciously. Although the project will be built out of wood and concrete, not one tree will be cut down for it. Instead, all lumber will be recycled from Douglas fir timbers that have been salvaged from older, demolished structures throughout the country. These timbers will be replaned in a sawmill set up specifically for the job. The architects intend to keep the mill operational after the Gates project is completed in 1993 and will offer the recycled old-growth timber to other concerned practitioners. They are also examining ways of benefiting from the large quantity of underground water that will be displaced by the partially buried edifices on the site.

While Cutler clearly enjoys the exploration of ideas and technology that the scale of the Gates house affords, he does not dismiss his smaller, humbler work. He considers the Martino-Smith project—a vernacular house and studio in a rural farm community on Bainbridge Island, Washington—one of his best because of its simplicity. "Since I started taking these environmental issues to heart," Cutler admits, "my buildings have become more and more understated."

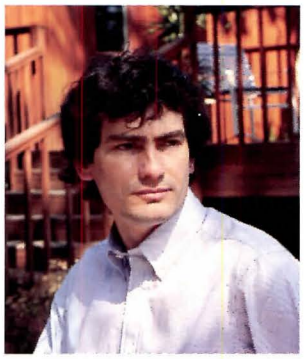
Gates Residence
Medina, Washington

The Gates residence (above), to be completed in 1993, promises to be an environmentally thoughtful project. Wood, for example, will not be hidden within the walls as studs because, Cutler maintains, doing so would be "treating a once-living organism as garbage." He and Bohlin detailed a timber curtain wall for the project so that this valuable commodity can be seen and appreciated. The architects are considering rechanneling the flow of displaced underground water into fountains on the site, in addition to tapping the water's latent and potential energy to heat the house. The runoff may also be used to reestablish a freshwater estuary on the property.

Cutler offers some practical suggestions to other architects, particularly for small residential firms, in designing green architecture. To avoid specifying toxic materials, he recommends architects poll the opinions of those who work with such substances. Painters, for instance, often become sensitive to allergenic finishes and are generally more than willing to provide this information to the architect. He also suggests the architect survey the site. "Physically engaging yourself in the site is essential if you really want to be responsive to the land." —N.B.S.

Paul Bierman-Lytle
New Canaan, Connecticut

CONNECTICUT-BASED ARCHITECT PAUL BIERman-Lytle is recognized as one of the leading pioneers in the area of nontoxic design and construction. His nine-person firm, The Masters Corporation, is an innovative design-build company based on the traditional concept of "Master Builder" as architect, contractor, and craftsman. When he started practicing in 1976 after graduating from Yale University, Bierman-Lytle used what were considered to be the best products available. But when one of his builders refused to work on a house because he considered the materials unhealthy, Bierman-Lytle began to further research the toxicity of building materials.



"What we found sent us looking for alternatives," the architect recalls. His research led from clinical studies by EPA and OSHA on formaldehyde outgassing and radon decay to discussions with NASA and the U.S. Navy about human performance in sealed environments. "Ultimately, we realized that there were healthier alternatives to many of the products commonly used in the building industry, but that these were largely unknown or ignored because they were not readily available," Bierman-Lytle explains. As the architects began to incorporate these materials into their projects, they found a gradual reduction in sickness and fatigue among their employees, and a general increase in motivation and energy on the job sites. There were fewer stinging eyes and headaches and less coughing and itchy skin. The company decided to build only healthy buildings from then on, and its reputation was born.

Many of Bierman-Lytle's clients have acute chemical sensitivities and are unable to live with standard building materials. The Masters Corporation avoids most laminated wood products, all insulation except cementitious foam (AirKrete), most conventional paints, synthetic carpeting, and a wide range of other commonly used materials. Some of his clients cannot even live with softwoods such as pine because of the chemicals emitted. Recently, the company has even begun to incorporate strategies for minimizing electromagnetic fields in buildings.

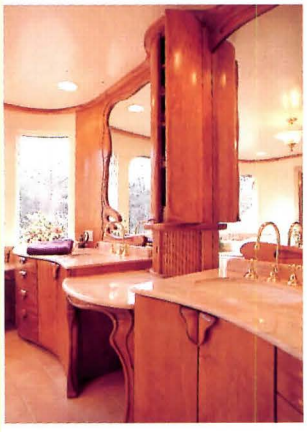
In the last few years, Bierman-Lytle has broadened his focus to include environmentally responsible design and material selection. While most of the products he has specified in the past have been considered "natural" (such as citrus oil and beeswax finishes), he had not factored in their embodied energy. Many oil finishes he has frequently specified are made of raw materials shipped from tropical countries to a processing plant in Germany, then delivered to him in the U.S. As a result of the handling and shipping, the product embodies tremendous energy, according to Bierman-Lytle, who is switching to more local products whenever they meet his requirements. To avoid the application of pressure-treated wood in outdoor decks and railings, he still uses exotic decay-resistant wood species, but he has switched to plantation-raised Pau Lope wood from Brazil and redwood recycled from building demolition in California. He is now designing graywater reclamation systems into most of his houses, and incorporating kitchen recycling centers. He tries to minimize energy use through passive solar design and very high insulation levels.

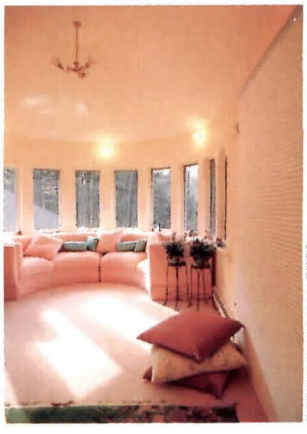
However, Bierman-Lytle has not limited his services to the approximately 50 percent of his clients who are chemically sensitive homeowners. The Masters Corporation is also looking toward commercial design and construction by building an environmental shopping mall in Los Angeles. The mall will be built with nontoxic and resource-conserving materials, and its future tenants will be small shops that sell environmentally conscious goods (including The Masters Corporation's subsidiary building supply company, Environmental Outfitters.) The first site, chosen this spring, fell through when the developer began to compromise Bierman-Lytle's tough ecological standards. An alternate location and client are currently being sought.

As a member of the AIA Committee on The Environment, Bierman-Lytle hopes to see his efforts extend well beyond the handful of houses and commercial buildings he builds each year and the several dozen on which he serves as consultant. "Environmental architecture will not become an isolated special style, practiced only by a small group," Bierman-Lytle asserts. "It will become the common denominator of all buildings and the common language of all architects and builders. Artistic expression will evolve around this language, but not exclude it. We must hope that this event occurs sooner rather than later; anything less would be postponing our responsibility as stewards of our home." ■

—A.W.

A Massachusetts house designed and built by The Masters Corporation (bottom left) exhibits material alternatives for clients with acute chemical sensitivity. Wood floors, cabinets, and trim (below center) are finished with beeswax and nonpetroleum-based tung and linseed oils. Natural wool carpeting and a jute underlayment (bottom right) substitute for toxic synthetics.





ROBERT PERRON PHOTOS

Materials Alternatives

A guide to selecting nontoxic and resource-efficient building products.

THE BUILDING INDUSTRY IN THE UNITED States accounts for 35 to 40 percent of ozone depletion by chlorofluorocarbons (CFCs). Furthermore, a full 30 percent of carbon dioxide emissions are caused by the built environment, as well as 20 to 30 percent of municipal solid waste, 35 percent of annual energy consumption, and vast quantities of natural resource consumption. To help architects limit the detrimental effects of buildings on the environment, the AIA is developing an Environmental Resource Guide that will compare the toxic consequences of common building materials (see page 21, AIA Briefs). More recently, an international agreement calls for total phase-out of ozone-depleting CFCs by the year 2000 (ARCHITECTURE, February 1991, page 77). But until significant changes in the building industry take effect, architects must seize the initiative in constructing environmentally sensitive buildings.

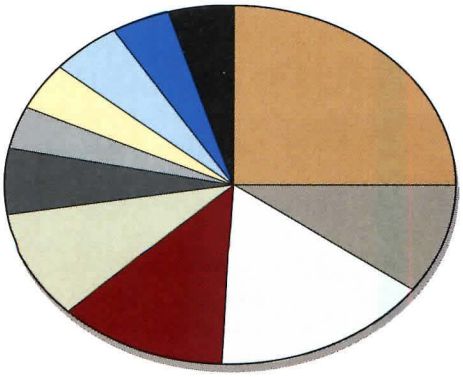
Already, architects can design construction systems that do not rely on rigid isocyanurate, urethane, or phenolic foam insulation, all of which contain CFCs. It may take some redesign and thicker wall sections in some cases, but substituting polystyrene, fiberglass, or cellulose insulation is relatively easy and far better for the environment. Architects can also specify paints, stains, urethane finishes, caulks, and adhesives with low volatile organic compound (VOC) outgassing. New VOC emission standards in several states, including New York and California, are forcing manufacturers to reformulate their products to reduce the reliance on VOC-containing solvents. In some cases, low-VOC products behave differently than their conventional counterparts, and it may take contractors a

Material Selection for a Safe Indoor Environment

	BUILDING MATERIALS AND PRODUCTS TO AVOID IF POSSIBLE	ACCEPTABLE ALTERNATIVES FOR MOST PEOPLE	GENERALLY ACCEPTABLE ALTERNATIVES FOR CHEMICALLY SENSITIVE PEOPLE
Woods	Interior-grade plywood and particleboard (urea formaldehyde resins), as used in cabinets	Exterior-grade laminated wood products (phenol formaldehyde resins)	Solid hardwood, or nonformaldehyde resin-laminated wood products
Insulation	Neoprene rubber weather stripping	Any other type of weather stripping (felt, hard vinyl, soft plastic, urethane foam)	Felt or hard vinyl weather stripping
	Urea formaldehyde foam insulation	Fiberglass, cellulose, and most rigid foam insulation (if isolated from living space with vapor barrier)	Cementitious foam insulation
Finishes	Wall-to-wall synthetic carpeting and underlayment	Wall-to-wall wool or cotton carpeting with jute underlayment (no adhesive)	Solid hardwood or tile flooring with untreated wool or cotton area rugs
	Vinyl and self-stick wallpaper	Standard wallpaper	Ceramic wall tile and grout, whitewash, and certain nontoxic paints
	Danish oil finish, epoxy paints and varnishes	Urethane varnish, natural shellac, mineral oil, linseed oil, and paste wax	Natural walnut and olive oil finishes, nontoxic oils and varnishes from specialty suppliers
Adhesives	Butyl rubber and polysulfide caulks	Silicone, acrylic, and latex caulks	Clear silicone caulk (without additives for mildew protection) or linseed oil putty
	Most standard construction adhesives (panel adhesive, plastic resin glue, epoxy, ABS and PVC solvent cement)	White/yellow glue, ceramic tile thin-set mortar adhesive, phenolic adhesive	Nontoxic adhesives available from specialty suppliers

Sources: Adapted from *Your Home, Your Health, Your Well Being* (Ten Speed Press, 1988); author's communication with manufacturers and industry experts.

Building Construction Waste



Waste Product	% Volume
Dimensional lumber	25%
Manufactured wood	10%
Drywall	15%
Masonry and tile	12%
Corrugated cardboard	10%
Asphalt	6%
Metal wastes	4%
Plastic and foam	4%
Fiberglass	5%
Other packaging	4%
Other wastes	5%

Source: Toronto Home Builders' Association

Chart (above) estimates building construction waste products by volume, based on observations of construction sites in the Toronto area between July and September 1989. Meanwhile, tropical rain forests are being destroyed at the rate of more than 100,000 acres per day (bottom, left to right). Protecting them depends upon adopting sustainable-yield forestry practices to maintain an economic base for landowners. Assuring that specified woods come from such forests, however, requires knowing their origin before they are shipped to lumberyards. Origin is currently difficult to trace without a globally accepted certification process.

while to get used to these alternatives. But architects who consider themselves environmentally responsible should begin specifying them now.

Adopting a preference for environmentally sensitive products requires a holistic approach, in which architects must consider factors such as "embodied energy," pollution, indoor-air-quality, resource depletion, and solid-waste disposal, along with such traditional components as materials' performance, durability, appearance, and cost. For example, the energy required to produce building materials may be greater than the energy consumed by the finished building during its entire life cycle. The energy required to produce the materials is referred to as embodied energy, and it includes the energy required to extract raw materials, manufacture products, transport raw materials and finished products, and the energy expended at the job site.

Because transportation accounts for a major portion of embodied energy, an environmentally responsible architect should seek out locally produced, indigenous materials. Locally milled pine siding, for example, is far less energy-intensive than plywood shipped from across the country. Architects should also look for materials that will require little maintenance and infrequent replacement, and keep the building design as compact and efficient as possible.

Protecting limited resources

MOST OF THE CURRENT INTEREST IN PRESERVING limited wood resources focuses on tropical hardwoods. An estimated 42 million acres of tropical forests—an area roughly the size of New England—are being depleted each year. These ecosystems boast tremendous diversity, with as many as several hundred tree species per acre. Some of the most valuable species, such as rosewood, African mahogany, padauk, and ebony, are endangered or threatened in some or all of their range, according to the Rainforest Alliance of New York, and architects should avoid specifying these woods. Some other species, however, are being produced in forests that are managed for sustainable yield.

However, a blanket boycott of tropical hardwood—currently a $7 billion a year industry—could actually produce more harm than good. If landowners cannot earn money from timber harvest on their land, they may clear the land of timber and raise cattle or some other ill-suited cash crop. The best solution is to specify tropical hardwoods that are raised through sustainable forestry practices. Efforts are under way to encourage tropical-hardwood-producing countries to adopt sustainable forest-management guidelines. The International Tropical Timber Organization (ITTO) began developing a model for sustainable forest management in 1983, and ITTO guidelines for Sustainable Management of Natural Tropical Forests were finalized in May 1990.

But the work has just begun. The first challenge is to ensure timber-producing countries, regions, or corporations adopt the guidelines. The second challenge is to establish a system whereby tropical timber products can be certified as originating from regions that practice sustainable forestry. Figuring out how to accomplish these tasks will be on the agenda of the newly formed, Alexandria, Virginia-based Tropical Forest Foundation, a nonprofit organization supported by corporations, timber industry associations, environmental organizations, and other groups, including the AIA.

When designing a project with tropical woods, architects should specify species that were grown in sustainable-yield forests. If your suppliers are uncertain where their wood comes from, contact the International Hardwood Products Association (P.O. Box 1308, Alexandria, VA. 22313).

Selecting safe lumber

IN THE UNITED STATES, TREE PRESERVATION is focused on the old-growth forests in the Pacific Northwest and Alaska. Old-growth forests of Douglas fir, western red cedar, redwood, and other species are rich ecosystems

CAMPBELL PLOWDEN / GREENPEACE PHOTOS

DAVE AUGERI / GREENPEACE

that fix three times as much carbon per acre as tropical hardwood forests—playing an important role in slowing global warming. Most old-growth forests were cut long ago on the private land of timber companies and replaced with short-rotation tree crops. Current debate focuses on whether the few remaining old-growth forests on public lands should be cut. Environmental organizations are opposed to such deforestation, but timber companies claim that the logging must continue to protect jobs.

Old-growth timber produces the finest lumber, with tight growth rings and high strength. Lumber from younger trees is prone to warping and twisting. In applications where long spans or high strength is required, lumber from young trees may be inadequate. Newly developed technology, however, partially eliminates reliance on precious lumber. Laminated wood timbers and dimension lumber, for example, can provide the structural and span properties once achievable only with old-growth timber. Products such as Parallam (MacMillan Bloedel; Vancouver, British Columbia) and Arrowood (Fibreboard Technologies; Roxboro, North Carolina) are manufactured with lower-grade wood fibers from younger trees. Not only have these new products enabled manufacturers to use wood that might otherwise have been burned as waste, but they are also helping reduce logging pressure on our remaining stands of old-growth timber.

Alternatives to lumber are produced from various types of recycled plastic. Plastic lumber is manufactured by such companies as Plastic Post, (Cairo, Georgia), Thornwood Products, (Pleasantville, New York), Dominion Plastics (Malone, New York), Environmental Plastics (Columbus, Ohio), Polyforms, Inc. (Ridgeway, Pennsylvania), Recycled Plastics Industries, (Green Bay, Wisconsin), and Superwood of Alabama, (Selma, Alabama). This material is thermally stable, weather resistant, and comparable to wood in strength. It is particularly appropriate as a substitute for pressure-treated wood and for landscaping timbers. These companies even produce recycled flexible plastic moldings for curved windows and other complex trim detailing—elements that when constructed of wood generate considerable waste. Some products are made from one type of plastic, such as high-density polyethylene (HDPE), making their properties more predictable, while others are composed from a mix of different types of plastic.

A blanket boycott of tropical hardwood—currently a $7 billion a year industry—could actually produce more harm than good.

A number of high-quality manufactured siding products, made of lower-grade or waste fiber, may be substituted for western red cedar siding. Inner-Seal lap and panel sidings from Louisiana-Pacific (Portland, Oregon) are among a number of new products made from oriented strand board. For siding that will be finished with paint or opaque stain, such products are almost indistinguishable from clear cedar siding.

Masonry alternatives

RECYCLED CONCRETE IS NOW WIDELY ACcepted as a backfilling material around building foundations and as underlayment in roadbed and parking lot construction. For most applications, such concrete is as satisfactory as crushed stone or gravel, and it is usually less expensive.

The masonry industry is also producing new recycled products. Maryland Clay Products, with help from the University of Maryland's Civil Engineering Department, has developed a brick made in part from sewage sludge. Called biobricks, these sludge bricks are being specified by the Washington, D.C., Suburban Sanitary Commission in the construction of its new $25 million office building in Laurel, Maryland.

Watkins Brick and Tile Corporation in Alabama has been collaborating with Phoenix Scientific Industries to develop another type of brick using a waste material. The Phoenix brick is principally composed of waste ash from solid waste incineration. Ash from the incineration is mixed with clay and other brick ingredients, and the material is fused into a solid ceramic, effectively sealing in toxic metals and other potential contaminants. The bricks are lighter in weight than standard brick, yet just as strong.

Concrete blocks constructed from waste ash are also on the market. North American Cellular Concrete (Chantilly, Virginia) and Florida Mining & Materials Corporation (Tampa, Florida) have recently introduced block made from fly ash. A number of companies also mix conventional cementitious material with recycled polystyrene, rubber, glass, or paper to produce blocks. Some companies featuring this recycled-materials block include Design Recycle (Temple Hills, Maryland), Good Hope Materials Research (Landenberg, Pennsylvania), and Rastra Building Systems (Riverside, California).

Rollin, a Stroudsburg, Pennsylvania, company has recently developed a product called Fibrick Sound Barrier System, which is being installed in the New York City subway system. The 29- or 58-inch-long, 9-inch-wide, and 4-inch-thick "planks" fit into channels and interlock to form sound-deadening structural walls. They are molded of cementitious material and recycled paper. While most paper-recycling companies avoid magazines with glossy pages, Rollin actually prefers them because of their clay content, which improves product performance.

Meanwhile, Summitville Tiles (Summitville, Ohio) has introduced a new tile made from feldspar slag left over from porcelain production. For decades, environmental offi-

cials in North Carolina, where the firm's plant is located, had been trying to decide what to do with mountains of accumulating waste; Summitville then discovered that the same waste produces tile with far superior wear characteristics than standard tile. Since fewer gases are released during the firing process, the finished glaze is also less porous.

Specifying solid-waste and recycled products

CONSTRUCTION AND demolition waste may constitute as much as 30 percent of the nation's municipal solid waste. Drywall alone accounts for up to 5 percent of waste, according to some estimates. By reusing building materials, recycling rather than discarding debris, and choosing building products made from recycled materials, architects are able to save tremendous quantities of energy as well as reduce the pollution associated with resource extraction, processing, and manufacturing.

Building products made from recycled materials have been available to architects for decades. Environmentally responsible architects should begin specifying them now.

Reusing old building materials, when feasible, saves significantly more energy and natural resources than other forms of recycling. Specialized salvage stores, found in many urban areas, buy and sell a wide range of discarded materials, and some landfill operations are entering into the salvaged building material business. Among the elements most commonly reclaimed from building demolition are doors, interior millwork, plumbing fixtures, architectural hardware, brick, concrete block, barnboard, wide plank flooring, wooden timbers, and in some cases, framing lumber. In choosing salvaged materials, however, care must be taken to avoid possible contamination from lead and asbestos. Any painted wood taken from older buildings should be stripped or tested for lead by a qualified laboratory before installation. Old cementitious shingles, tiles, fireproofing board, ducting, and other similar materials should be carefully checked for asbestos. When in doubt, architects should avoid questionable materials.

A new recycling concept involves designing materials specifically so that they can be reused. The National Concrete Masonry Association (NCMA) in Herndon, Virginia, is developing Formwall, a mortarless concrete masonry unit supported on a steel track and held together with vertical structural ties, permitting disassembly and reuse. Formwall should be available within the next year with a wide range of architectural finishes, according to Jorge Pardo, director of product research at NCMA.

A number of building products made from recycled materials have been available for decades, including cellulose insulation and various fiberboard products. What's new is that the incorporation of recycled materials now offers a strong marketing advantage. For years, the Homasote Company (West Trenton, New Jersey) seemed embarrassed by the fact that its carpet underlayment and sound-deadening boards were manufactured from recycled newspaper. But at the National Association of Home Builders annual trade show in Atlanta this past January, the company exhibited a bale of recycled newspaper in its booth, with brochures proclaiming the virtues of recycling.

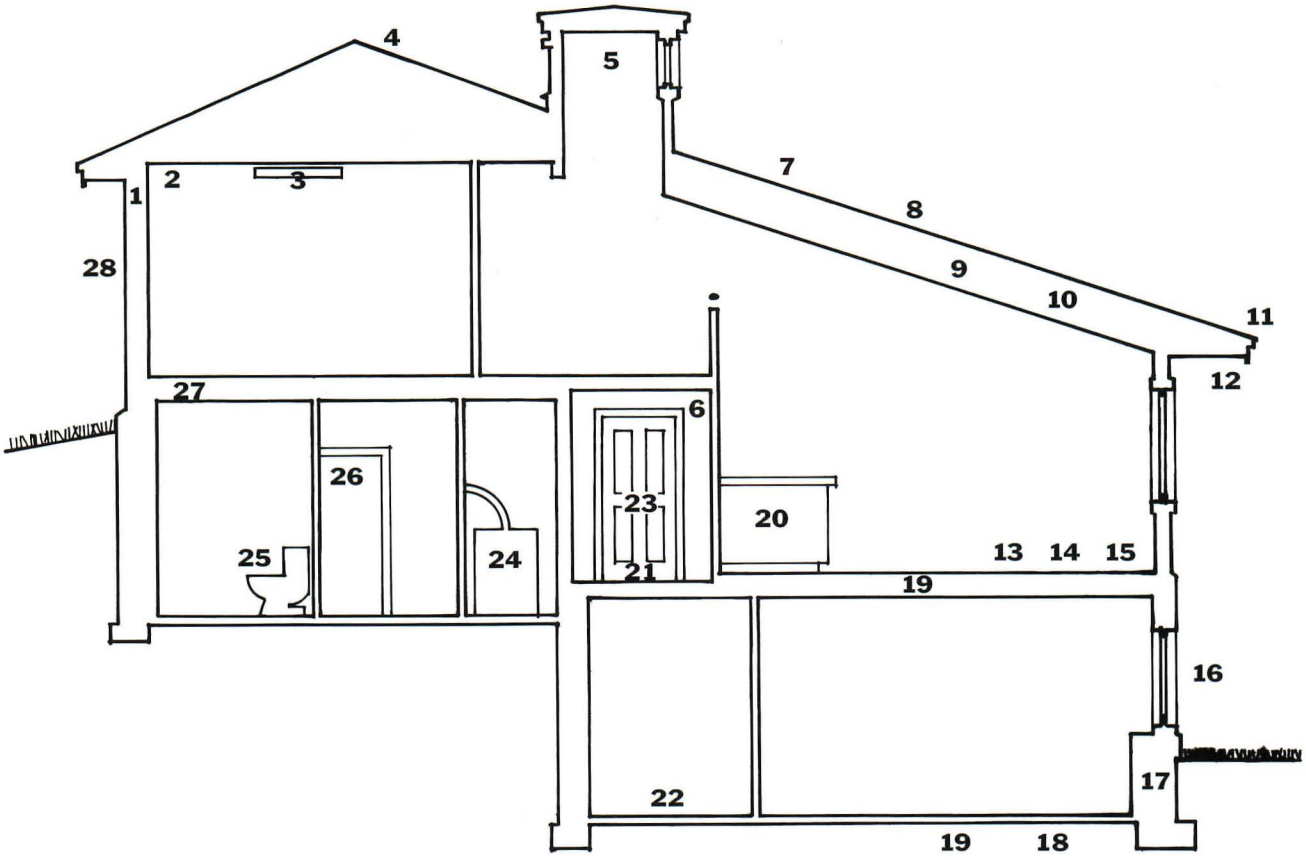
Cellulose insulation is experiencing a surge in popularity for the same reasons. It is an ideal application for recycled newspaper and cardboard because expensive de-inking and reprocessing are not necessary. Some 150,000 tons of recycled newsprint is used each year in the production of cellulose insulation. The newsprint is simply ground up, mixed with fire retardant chemicals (generally borate compounds), and blown or sprayed into ceiling or wall cavities. Recent improvements in wet-spray cellulose insulation technology are making this type of insulation a very attractive alternative to fiberglass for wall cavities in new construction (ARCHITECTURE, February 1991, pages 93-98).

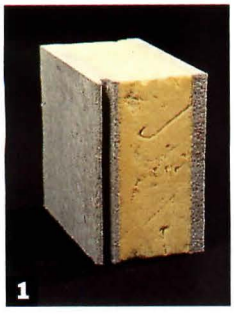
Along with these tried-and-true materials, dozens of new products are springing up that make use of recycled materials. Two new drywall products have just entered the market: Gypsonite, produced by Highland American Corporation (East Providence, Rhode Island), and FiberBond, produced by Louisiana-Pacific. Rather than being constructed of a gypsum core surrounded by two paper skins, these products incorporate cellulose fiber (from recycled newspaper) throughout the board. FiberBond and residential Gypsonite board have a lightweight core composed largely of perlite, surrounded by a uniform mixture of recycled fiber and gypsum. The commercial Gypsonite product is composed of only the fiber and gypsum with uniform density throughout (85 percent recycled fiber by volume; 15 percent by weight). Even more exciting than Gypsonite's recycled newsprint are the manufacturer's plans to begin incorporating recycled gypsum instead of virgin (mined) gypsum in their products. The company will begin using flue-gas gypsum, obtained from the stacks of coal-fired power plants, to manufacture Gypsonite once testing is completed and approvals are in place. This flue-gas gypsum has been used in making several wallboard products in Europe for the past 10 years.

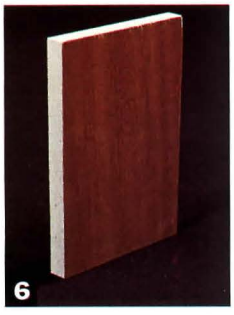
There are many other recycled products available, and hundreds more will be entering the market over the coming years. Information on such products will be available this spring from the Center for Resourceful Building Technology in Missoula, Montana. McDonalds Corporation also publishes a directory of recycled materials that complies with its McRecycle Program—an effort to incorporate recycled materials in the con-

For the past 10 years, Missoula, Montana, builder Steve Loken has integrated products that make efficient use of resources into his construction practice. This year his company, Southwall Builders, is completing a demonstration house he calls "ReCraft 90" (facing page) that incorporates a wide range of resource-efficient products. Some of the materials of ReCraft 90 have been around for years, while others are prototype products not yet available on the market. Last year, Loken started the Center for Resourceful Building Technology (CRBT), an organization to respond to the growing need for information on resource-efficient materials. Along with involvement in the ReCraft 90 house, CRBT is publishing a guide called "Resource-Efficient Building Materials." Loken considers the guide a starting point to help him respond to the flood of mail and phone calls he and his 22-person construction company receive. It will not be nearly as comprehensive as the AIA's Environmental Resource Guide but it should fill a temporary need. For more information, contact the Center for Resourceful Building Technology, P.O. Box 3413, Missoula, Montana, 59806; (406) 549-7678.

Resource-Efficient House







1 STRESS-SKIN STRUCTURAL WALL PANEL (SUPER-INSULATED)
2 GYPSONITE WALL BOARD
3 ENERGY EFFICIENT LIGHTING
4 STRUCTURAL FINGER-JOINTED TRUSS MEMBERS
5 LIGHTWELL FOR PASSIVE COOLING AND NATURAL DAYLIGHTING
6 WOOD VENEER TRIM WITH COMPOSITE BACKING
7 FIBER-REINFORCED ROOFING
8 ORIENTED STRAND BOARD SHEATHING
9 PARALLAM HIP RAFTERS
10 RECYCLED FIBERGLASS BLOWN-IN INSULATION
11 RECYCLED STEAMED WOOD FIBER FASCIA
12 CEMENTITIOUS SOFFIT BOARD
13 WOOD/PAPER FIBERBOARD UNDERLAYMENT
14 STRUCTURAL PARTICLEBOARD SUBFLOOR
15 STRUCTURAL POLE JOIST FLOOR
16 FIBERGLASS PULTRUSION WINDOW FRAMES WITH GAS-FILLED SUPER WINDOW GLAZING
17 POZZOLANIC FLY-ASH ADDITIVE TO STRENGTHEN CONCRETE
18 INSULATION/RADON MITIGATION SUB-SLAB MATERIAL
19 RADIANT HYDRONIC FLOOR HEAT
20 FORMALDEHYDE-FREE CABINET MATERIAL
21 NATURAL INTERIOR FINISHES/PAINTS
22 RECYCLED RUBBER PAVERS AT ENTRY
23 WOOD FIBER VENEER OR FIBERGLASS DOORS
24 EFFICIENT SEALED-COMBUSTION GAS WATER/SPACE HEATING SYSTEM
25 WATER-CONSERVING PLUMBING FIXTURES
26 WHOLE-HOUSE HEAT RECOVERY VENTILATION SYSTEM WITH FILTER
27 STRUCTURAL HONEYCOMB PANEL FLOOR SYSTEM
28 FIBER-REINFORCED CEMENTITIOUS LAP SIDING

struction of its restaurants (an estimated $100 million per year in material purchases). The National Association of Home Builders also plans to build a Resource Conservation Research House later this year to advance the use of recycled materials.

Finally, the federal government is actively promoting recycled products through federal procurement guidelines. The Environmental Protection Agency issued guidelines in 1989 (revised in 1990) requiring federal, state, and local agencies spending federal funds of more than $10,000 per year on insulation to purchase only those brands with an established minimum percentage of recycled material. That program could well be expanded into other product areas for building construction, including structural fiberboard, geotextiles (drainage fabrics), drain and sewer pipes, parking stops and speed bumps, solid plastic partition walls for locker rooms and bathrooms, and certain asphalt, concrete, and glass applications. Adherence to the EPA procurement guidelines rests, in large part, on the architect's shoulders.

Along with specifying building products made from recycled or waste materials (and even salvaged materials when practical), architects should encourage contractors to recycle construction and site demolition waste. It takes a little extra effort separating waste materials, but the extra time usually pays for itself through lower tipping fees at the landfill.

Preserving the great indoors

CONCERN OVER INDOOR AIR QUALITY HAS increased greatly over the past several years, in part because of the rising incidence of "acute chemical sensitivity" or "environmental hypersensitivity." Little is known about environmentally caused or exacerbated sickness, but few deny that indoor air quality affects our health. Some physicians, including Dr. Alfred Johnson, codirector of the Environmental Health Center in Dallas, Texas, argue that adverse indoor air quality may be causing increased susceptibility to colds, viruses, and respiratory diseases.

Controlling indoor air quality involves both providing adequate ventilation and keeping polluting materials out of the building. The architect bears responsibility for both of these strategies, although the number of building materials introduced each year is increasing rapidly, and their effects are largely unknown. To manufacturers' credit, however, many of the most harmful chemicals and materials incorporated into building products are being replaced with safer alternatives (see pages 133-137). Formaldehyde gas from most particleboard products, for example, has dropped considerably in recent years.

Of course, the level of susceptibility to indoor air pollutants varies tremendously from one individual to another. Some clients with acute chemical sensitivities cannot be near any materials made with organic solvents, or those that give off VOCs. For these individuals, conventional insulation materials, latex paints, urethane varnishes, laminated wood products and, in some cases, even softwood lumber are hazardous. For most clients, such extremes are unnecessary, but an architect should nonetheless consider general guidelines for protecting the indoor environment.

Laminated wood products made with inferior grade (urea formaldehyde) glues and construction systems that rely heavily on adhesives should be avoided. If they must be used, they should be nontoxic.

The architect's responsibility

THE FIRST AND MOST IMPORTANT STEP IN selecting environmentally sensitive materials is to ask questions. Ask manufacturers about the environmental effects of their building products. Ask where the materials come from and how much embodied energy is contained in them relative to alternatives. Ask consultants and contractors questions about the systems they prefer from an air quality and energy efficiency standpoint.

Architects have a vital role to play in producing buildings that are safer for the environment and safer for the people living and working in them. Manufacturers are finding creative ways to develop products that are more environmentally appropriate, challenging the architect to be equally creative in incorporating these materials into their design and construction. ■

—ALEX WILSON

Questions to Ask Suppliers About Green Materials

Until nationwide legislation or international agreements mandate that new construction be environmentally sound, it is up to the architect to design and build structures that are not detrimental to the environment. Green materials have been available for years, but architects must continue to gather information from manufacturers, suppliers, and builders to ensure that the products are environmentally sensitive. The following list of questions provides a framework for determining nontoxic and resource-efficient materials.

1. How much "embodied" energy does the building material create over its entire life?
2. How much energy is required to manufacture the material and related products?
3. How much energy is used in transporting the material from source to project site?
4. Are renewable or sustainable energy sources used in the manufacture of the material?
5. Are there less energy-consuming, longer-lived alternatives for the same application?
6. Are local sources for the material available?
7. Can the material be recycled or reused at the end of its useful life in a structure?
8. How easy or difficult is the material to recycle?
9. Do different construction systems offer better opportunities for resource recovery at the end of building life?
10. How much maintenance does the material require over its life in a structure?
11. How energy-intensive is the maintenance regimen?
12. Are waste byproducts produced during maintenance?
13. Does the material require special coatings or treatments that could present health or safety hazards?
14. If the material produces off-gasses during and after installation, how is indoor air quality affected?
15. Are hazardous solid, aqueous, or gaseous wastes produced during manufacturing process environmentally significant?
16. How do the amounts of waste resulting from manufacture, fabrication, and installation compare with alternative materials?

Adapted from the AIA's "Making A Difference: An Introduction To The Environmental Resource Guide."

Against the Tide

Architects designing for the waterfront must confront constantly eroding shorelines.

THE SEA IS RISING. THAT UNRELENTING fact has been charted by scientists since the 1930s, with profound implications for all who build, live, work, or play on our shorelines. While their warnings are beginning to be heeded by government and enlightened developers, most of the population, including architects, is blissfully unaware of the rising tide. Our continuing ignorance of the facts may prove lethal—both for the beaches that remain, and for those who inhabit them.

A melting polar ice cap, accelerated by global warming, is the culprit. Along the southeastern seaboard, for example, the rapidly melting ice has forced the Atlantic Ocean to rise at a rate of 1 vertical foot per century. While that number may seem innocuous, consider that 1 vertical foot of rise means 100 to 1,500 horizontal feet of water encroachment in the landscape. Along the south Atlantic, this century's 1-foot rise of ocean translates into an average inland erosion of 1 to 15 feet of shoreline annually. Other geographic areas offer even more compelling scenarios of disappearing coastlines.

Visit Morris Island, South Carolina, or what little remains of it: the shoreline of this barrier island just outside Charleston, a former Union fortification during the Civil War, has since retreated 4,350 feet. During the last century, its lighthouse, a coastal landmark, stood 2,750 feet inland; today the lighthouse stands a quarter mile offshore.

Consider parts of New England, which are witnessing a rise of 3 vertical feet per century, or sections of the Great Lakes, where as much as 6 feet of rising water has been recorded. Louisiana suffers from double immersion: its land surface is sinking into the Gulf of Mexico at the same time that the surrounding waters are rising around it; the combined effects equal 4 vertical feet of rise per 100 years and a large annual loss of land. As a result, "The shoreline is retreating, continuing to move inland," states Orrin Pilkey, Jr., a coastal geologist at Duke University and author, along with fellow professor Bill Neal and others, of a series of books entitled *Living with the Shore*. While contemporary architects tend to consider time in terms of centuries rather than eons, Pilkey and fellow coastal watchers ask us to take a longer view.

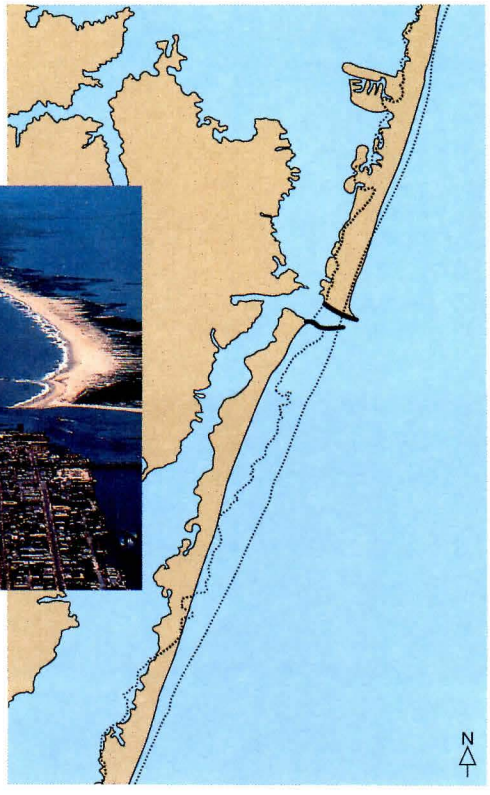
According to geologists, erosion is part of a natural process that we can understand and live with. Our worst sin as architects, according to the scientists, is to try to halt the natural forces; our well-intentioned tampering can only backfire.

Cape May, New Jersey, for example, was once known as America's premiere beach resort; its wide, sandy platform welcomed bathers and builders, including United States presidents and Henry Ford, who exhibited his new Model T on the shore. When rising seas foreshortened its beaches in the early part of the century, town fathers anxiously began to fight back, ultimately erecting an armored shoreline of seawalls, bulkheads, groins, and jetties. Higher water and beach erosion, abetted by seawall construction, forced the community to continually raise its seawall, causing the beach to disappear—a well-intentioned but short-sighted solution.

Building seawalls only hastens erosion, Pilkey and Neal discovered, for nature seeks an equilibrium at the shoreline that walls and jetties interrupt. Long, flat beaches receive the slaps from storms, reshape themselves, and ultimately dissipate the natural forces; hardened walls return the slaps, sending the waves' submerged forces back to sea, where they cut into the ocean floor. Such proud objects of human construction only hasten their own obsolescence.

The best seawalls, according to experts, are not manmade, but natural. Barrier islands,

JAMES BALOG



With rising seas and shrinking shorelines, building along the coastline can have disastrous consequences (above). To protect waterfront development from destruction by beach erosion and hurricanes, seawalls and jetties are often constructed at the water's edge. Such structures, however, can hasten the migration of barrier islands such as Assateague (map at left), which provide natural defenses against wind and wave forces. Originally one continuous land mass, the island has shifted toward the Maryland shore, hastened by the construction of jetties that formed an inlet after a hurricane divided the island in 1933 (inset, left).

ROBERT M. NORRIS PHOTOS

which line much of this country's eastern coastline, provide the best defense against wind and wave. Pilkey points out that "erosion" of barrier islands after storms such as Hurricane Hugo, which struck the South Carolina shore in 1989, is actually a natural process, more accurately described as "beach migration." The islands' landward or lateral movement is a physical response to the forces acting on them. As Ian McHarg pointed out in his classic book *Design with Nature*, such narrow sand spits are fragile eco-systems, where sea oats provide a tenuous stability quickly wrecked by human activity.

Construction costs of rebuilding areas affected by natural forces are extremely high. Miami Beach, which obviously relies on its shoreline for its livelihood, spent $65 million in 1977 to replenish sand eroded by winter storms along its waterfront. Other communities that have spent large sums to pump sand have seen it wash, immediately, out to sea.

Some structures, such as a beachfront resident in Santa Barbara County, California, can't last 10 years without collapsing (top, left to right: 1978, 1983, 1987). Building seawalls (below) can create a false sense of security and actually undermine the very beaches and structures they are built to protect. Wave forces redirected at the barrier's foundation and ocean floor create a vicious cycle of beach erosion and the need for continually higher seawalls (bottom, left to right).

But beaches are not all that are lost by shoreline development. Despite adequate warning in 1969, hundreds perished during Hurricane Camille and, more recently, Hugo lifted poorly constructed buildings off their foundations and tossed them, like toys, into neighboring yards. A recent Duke University study points out that during Hugo, the sea broached every protective manmade structure in the hurricane's path and, in many cases, hastened damage to the shoreline.

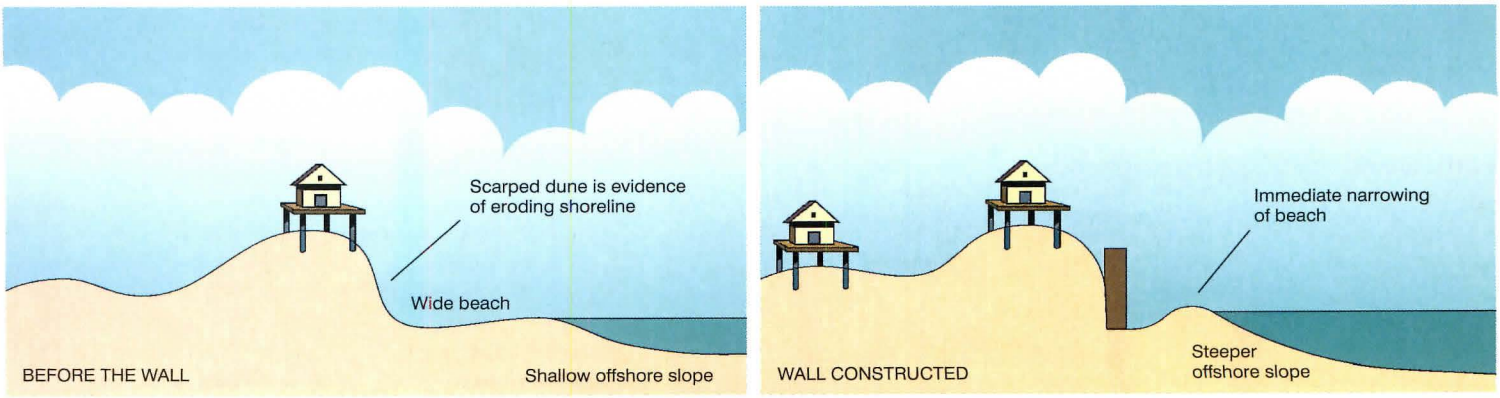
"The best solution is not to build [on beaches]," says Neal. As he points out, any building inevitably affects sea oats, dunes, and beaches; no amount of careful building can change man's impact on the delicate shore. We should be retreating from the shorelines rather than building upon them, according to the experts, relocating existing buildings and returning the shoreline to the public. So far, the federal government agrees.

National flood insurance, originally conceived to assist hard-pressed farmers, now pays a significant portion of its funds for the replacement of vacation homes. When the Federal Emergency Management Agency, which oversees aid for natural disasters, sought ways of cutting costs, research showed that moving houses would be more cost-effective than leaving them in highly dangerous areas. Today, under that agency's Upton-Jones amendment, owners of coastal buildings in "imminent danger" can receive up to 40 percent of a building's value if it is relocated; 110 percent of its value if demolished.

Nags Head, North Carolina, where a storm in 1989 brought beach houses close to the water's edge, is taking advantage of the new incentives. The community's planning department manages what Pilkey describes as a "dynamic process," monitoring shoreline encroachment, armed with the authority to halt all local construction after storms. Today, rows of pilings, which were originally the foundation members for vacation homes, stand as mute reminders of incoming surf. Some houses have been moved three times or more on Nags Head's deep lots, which may exceed 500 feet in depth.

Virtually any building, with the exception of slab-on-grade structures, can be moved. North Carolina architect Wesley McClure designed an entire hotel, the Sanderling Inn in Sanderling, North Carolina, with eventual relocation in mind. The building's integral structural system can be tugged landward as the Outer Banks shift to the west. McClure has also been involved in one of this country's most dramatic relocation studies: a proposal that the landmark Cape Hatteras lighthouse be moved 1,600 feet landward.

Hurricane Gilbert, with recorded winds in excess of 200 miles per hour in 1988, proved that current structural engineering techniques work when applied in concert with applicable building codes. Engineering for hurricanes stresses total building integrity to withstand extreme forces: 190 mph winds, for example, create forces of 144 pounds per square foot; most potential damage comes from uplift, suctional, and torsional forces,



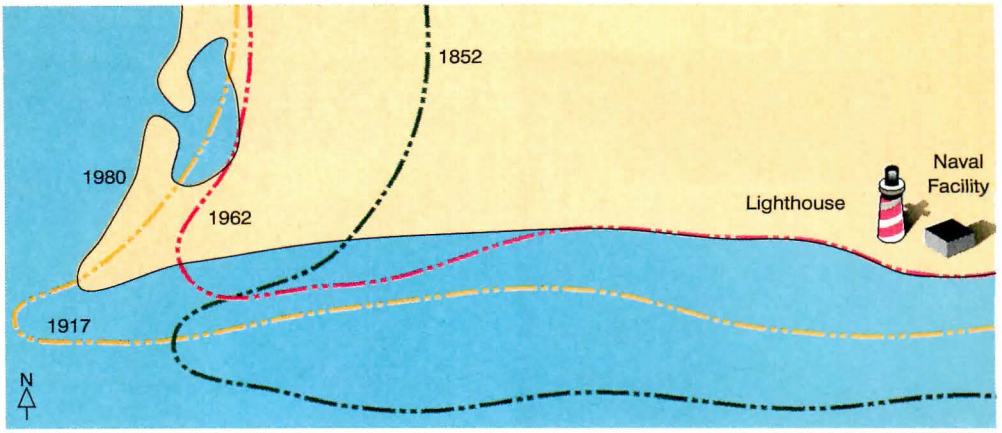
ILLUSTRATIONS BY PETER HOEY

not from lateral loads. Although reinforced concrete buildings lost glass walls and suffered internal water damage during the massive onslaught, most emerged from the hurricane structurally unscathed.

Recent investigation has shown us how to build more effectively with traditional materials. Pilings, for instance, should be firmly attached to buildings, ideally extending above the first floor to support roof construction; heavy bolts and fasteners should connect piling to roof. Space under buildings should be free from obstruction; any walls at ground level should be able to break away from the structure. Hip roofs seem to handle heavy winds better than fixed gables: buildings with nooks, crannies, and gingerbread-type detail fare poorly in northeasters.

How can architects least disrupt the environment? Our ancestors understood the forces present and approached the coastal United States with awe. If they built on barrier islands at all, their homes sat on the back (the marsh) side of the islands, away from the beaches. If they built near the water, high natural dunes and maritime forest provided protection from the elements. Few structures were considered permanent. As an example, historians point out that new Jersey's boardwalk was dismantled each winter.

Contemporary development has not been as sensitive, but individual states have recently established coastal management agencies with oversight authority for shorelines. Although each state's statutes differ, setback lines now commonly limit the proximity of new buildings to the water (or the primary dune line). Several states now support reclamation of private property into public hands. Their philosophies vary: while condemnation or lifetime tenancy along dangerously eroding beaches is more common, Florida, for example, has chosen to purchase land from property holders. The movement seems to be toward controlled, even limited growth.



PETER HOEY

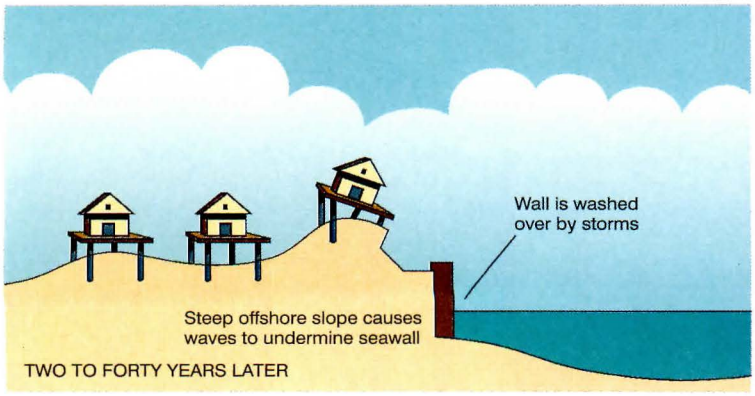
In the 1940s, South Carolina's Morris Island Lighthouse stood on land, but it is now located 400 yards offshore (above). North Carolina's Cape Hatteras shoreline (map, top) is undergoing similar fluctuations.

As more Americans gravitate toward warm sand and cool water, careful planning becomes paramount. Good examples speak louder than legislation. South Carolina produced an outstanding model at Hilton Head. Developer Charles Fraser assembled a team for Sea Pines Plantation, whose planning emphasized minimal impact on the barrier island landscape, with low-scale housing constructed of natural materials scattered among palmettos. Although intervening years have brought unexpected growth and density, the plan influenced a generation of architects, landscape architects, and developers.

Kiawah Island, located outside Charleston, may embody the country's most complete environmental plan for a barrier island, again with Fraser's management and coastal geologist Miles Hayes's expertise. Kiawah's plan included extensive ecological studies of existing island systems, strict construction setbacks which kept all new building well behind the dune line, architectural review, and tree-cutting limitations. Most encouragingly, smaller communities from Maine to Sanibel Island, Florida, have begun to realize the value of unspoiled shoreline.

What scientists like Orrin Pilkey have shown us is that even if we can "fool" Mother Nature, perhaps we shouldn't. They have pointed out that beaches are part of larger, sensitive ecosystems in which incoming waves bring nutrients to the marshes, where new sea life is formed. As the seas rise, they suggest, we should consider design "with" rather than "against" nature. Rather than build stiff concrete high rises straddling the dunes, our posture as architects should be like Ian McHarg's sea oats, in harmony with natural forces, flexible in the wind. The ultimate question, however, remains whether to build there at all. ■

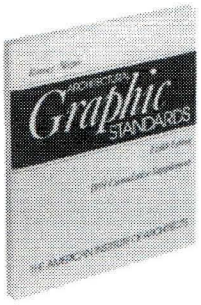
—Robert A. Ivy, Jr.



Bookstore Browsing...

Architectural Graphic Standards. The Tradition Continues.

Architectural standards reflect the changing and classic landmarks in the profession, from building design, to construction materials and systems, to the codes regulating the industry. This selection from The AIA Bookstore includes *current* and *classic* volumes and should be standards on your reference shelf.

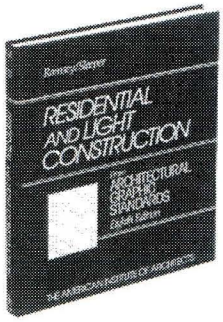


Architectural Graphic Standards Eighth Edition 1991 Cumulative Supplement (NEW)
Ramsey/Sleeper 104 pp R991 1991 pbk Wiley

Prompted by thousands of requests for more frequent updates of *Architectural Graphic Standards Eighth Edition* and the information crucial to success in the building design and construction professions, the *1991 Cumulative Supplement* contains 100 new or revised pages of data, standards, and other information that update, replace, or augment this preeminent reference book. $60.00 ($57.00 for AIA Mbrs.)

Architectural Graphic Standards, 8th Edition
Ramsey/Sleeper 864 pp M475 1988 Wiley

Five years in the making, the latest edition of this "must-have" reference for building design has been revised extensively, redrawn and updated with 65% of the material new or revised with more than 10,000 illustrations. $160.00 ($135.00 for AIA Mbrs.)



Residential and Light Construction (NEW)
Ramsey/Sleeper 400 pp R992 1991 Wiley

All information relevant to light construction—simple wood frames, masonry walls, short to medium span roof systems, select forms of electrical, mechanical, piping, and site development systems, and much more—has been extracted from the eighth edition of *Architectural Graphic Standards* to create this valuable working reference. $85.00 ($80.00 for AIA Mbrs.)

Architectural Graphic Standards, First Edition, Facsimile
Ramsey/Sleeper 233 pp R940 1932/1990 Wiley

The return of a classic! For the first time in 50 years, architects can once again turn to the profession's most sought-after reference book. This reprint is a virtual archive of data and details not available from any other source. It's a *must* for every architect engaged in historic preservation. $75.00 ($71.25 for AIA Mbrs.)

Traditional Details for Building, Rehabilitation, Renovation, & Reconstruction
Ramsey/Sleeper 350 pp R938 1990 Wiley

A variety of the best traditional details from the first four editions of *Architectural Graphic Standards (1932–1951)* has been compiled in this unique reference for historic preservation work or for new construction. $75.00 ($71.25 for AIA Mbrs.)

Architectural Graphic Standards, Student Edition
Ramsey/Sleeper 499 pp R868 1988 pbk Wiley

This abridged version of the seventh edition for students has the most frequently used information, including sitework, concrete, masonry, metals, wood, general planning, and site design data. $49.95 ($47.50 for AIA Mbrs.)

☐ **I Want My Standards To Be Current And Classic. Please send me these selections.**

☐ Check payable to AIA is enclosed. ☐ VISA ☐ MasterCard

ACCT. NO. Exp. Date

NAME AIA MBR. NO. SIGNATURE FIRM NAME

ADDRESS CITY, STATE, ZIP

☐ Please send a list of additional standards.

QTY	ORDER NO.	TITLE	PRICE	TOTAL
1	N711	Bookstore Catalog	-0-	-0-

AIA

MAIL TO:
AIA Order Dept.
9 Jay Gould Court
P.O. Box 753
Waldorf, MD 20604
1-800-242-4140

Shipping Charges

Pre-Tax Total	Shipping Charges	Pre-Tax Total	Shipping Charges
$0–5	$3	$51–150	$7
$6–50	$5	$151+	$8

Subtotal $	
Shipping $ (See Box)	
Sales Tax	
DC 6%, MD 5%	
Total	

A591

Energy Conservation Software

A new generation of software will help architects design more efficient buildings.

OVER THE LAST 10 YEARS, CONSERVATION research has suffered from sharp declines in federal funding and, thanks to relatively cheap fossil fuels, from professional indifference. But some energy software developers have survived this neglect and are promising new improved software for the 1990s.

The term "energy software" refers to a wide variety of computer tools that provide performance evaluations of buildings at various stages of design. These tools are especially important for nonintuitive design principles. Most architects understand that building insulation reduces heat loss, and the universal acceptance of insulation standards has accounted for a great deal of fuel savings in the last 20 years. By contrast, equally important conservation issues like building massing and window orientation are not as widely understood. Often, complicated trade-offs are required, as in designing a window for daylighting without introducing unwanted glare and heat gain. Such design problems do not have straightforward solutions because they depend on a combination of building geometry and continually changing climate and occupancy patterns.

To make energy efficient design still more difficult, modeling physical reality is time-consuming and requires detailed information about the building and its systems. But to take advantage of the greatest energy-saving opportunities, architects must deal with environmental issues early in design—before the building has taken form—when thought processes are not analytic but creative and visual.

Software development

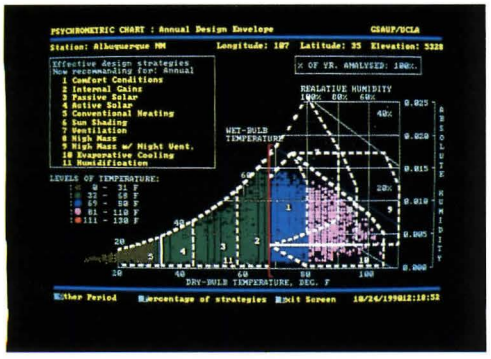
WHEN ALTERNATIVE ENERGY RECEIVED THE most attention, in the 1970s, computer enthusiasts created "number-crunching" mainframe programs to model the complex thermal performance of buildings. Simpler microcomputer programs of the 1980s were also numeric in approach. As motivated as architects may have been to take advantage of energy-saving design aids, these early programs were usually too cumbersome to apply.

Since then, microcomputers have grown in power and speed, and new software is more graphic in both input and output. With the proliferation of the Macintosh and, most recently, Windows 3.0, architects are less tolerant of difficult interfaces, and appreciation for visual-design software is growing.

According to Stephen Selkowitz, leader of the Windows and Daylighting Group at Lawrence Berkeley Laboratories (LBL), better software will attract more users. He maintains, "If you give architects software that works the way they do, many will adopt it and do things with it that they never would have before imagined." LBL's most recent software includes graphic interfaces to ensure a fit with design processes.

Harvey Bryan, AIA, associate professor of architecture at Harvard University and author of numerous 1980s-era energy programs for microcomputers, anticipates changes in energy software due to shifting priorities. "People today are more concerned with global warming," he claims. "Rather than limiting the quantity of fuel buildings consume, we may start limiting the cleanliness of that fuel."

Bryan's prediction may prove true when politicians catch up with environmentalists on these issues, but, in the meantime, the energy software currently available still focuses on the amount, rather than the type, of energy required for various design strategies. Such software can be divided into four categories: energy design tools that give architects fast feedback about a building's thermal environment; daylighting design tools that calculate the behavior of light in a building (and may overlap with energy tools in predicting the heat gain or loss of glazing); compliance tools, certified by state governments, which demonstrate how a proposed building complies with energy codes; and whole-building simu-



Students learn to design climate-responsive buildings using programs such as Climate Consultant. Each colored dot in a psychrometric chart (above) represents an hour of weather data. Clusters of hot hours (pink) fall within zones for cooling strategies; cold hours (green) in zones for heating strategies. Once designed, a building's energy efficiency can be assessed by CERENET, a program developed at Ball State University in Muncie, Indiana. Through computer-simulated trial and error, an efficient structure can be constructed (right and page 129).

JEFF GOLDBERG/ ESTO

lations—large software systems that evaluate the detailed performance and life-cycle costs of finished buildings and their mechanical systems. Most software is for MS-DOS computers and is available at little or no cost. (see page 131 for sources).

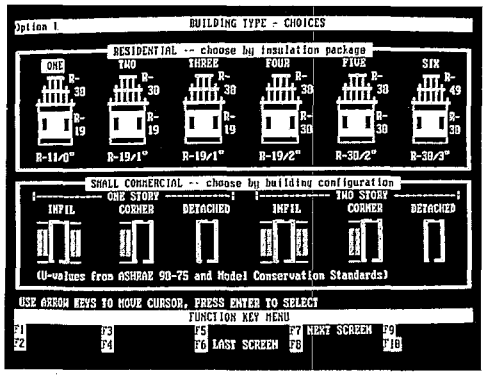
Energy design tools

MUCH OF THE DESIGN-TOOL SOFTWARE HAS been developed at universities, where faculty and student enthusiasm for energy issues has persevered through a period of low federal funding and lack of professional interest. For nearly two decades, architecture professor Murray Milne and his graduate students at UCLA have been building energy design aids. Two of these programs, Solar 5 (ARCHITECTURE, January 1991, page 104) and Climate Consultant, are now available to the public. Using weather data for every hour in a year, Climate Consultant graphs data for a specific location on a psychrometric chart and in other formats, demonstrating the relationship between climate and appropriate design strategies. Users can query the data base and develop a detailed understanding of the relationships between climate variables, which is essential for the design of climate-responsive, energy-conserving buildings.

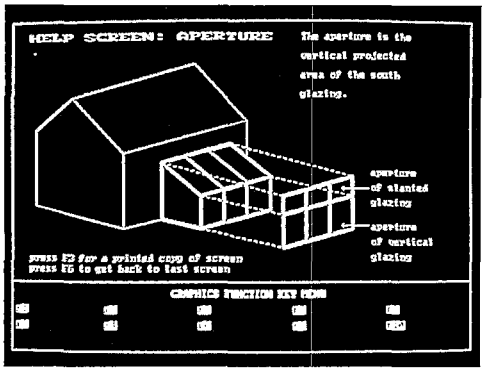
To appropriately locate thermal mass or design window-shading devices for a passive solar building, an architect must understand how sunlight enters the structure at various times of the day and year. But the effects of seasonal variations in the sun's path are difficult for many to visualize. To facilitate this, David Lord, at California Polytechnic San Luis Obispo, has developed Sunpatch. This program calculates and illustrates sun penetration through as many as 32 windows at a time for a given date and orientation.

Faculty and students at the University of Idaho have produced UISUN, an IBM-EGA/VGA-based program that also provides quick feedback for passive solar designers. It evaluates a variety of systems (direct gain, Trombe wall, and others) for a wide range of U.S. climates. The procedures facilitate the unwieldy Solar Load Ratio (SLR) method developed for the *Passive Solar Design Handbook, Volume 3*, the definitive text by J.D. Balcomb and others. In a bold departure from common practice, this software enables users to select building parameters without performing complicated heat-loss calculations. Thus, rule-of-thumb information is available early in design; later, more detailed input can deliver more precise evaluations.

When a design is far enough along to include tentative materials, areas, and window sizes, an architect can run these parameters through an energy analysis program to determine heating and cooling loads and costs. REM/Design, one such system from the Architectural Energy Corporation, provides rapid feedback on two design alternatives at a time, allowing users to test the effects of various glazing materials, for example, or solar hot-water-heating options.



UISUN, from the University of Idaho, provides rule-of-thumb information during preliminary passive solar design (above and below).



BuilderGuide is an evaluation system developed by the Solar Energy Research Institute in Golden, Colorado, and the Passive Solar Industries Council in Washington, D.C. Designed particularly for builders, this system is a combination of binder workbook and spreadsheetlike software. It evaluates passive solar design and conservation strategies, with data for 240 locations.

Although relatively easy to use, all of these systems require numeric input. In order to be thoroughly integrated into design, however, energy software should be linked to form-generating software. To this end, Francisco Arumi-Noe, a professor of architecture at the University of Texas at Austin, has been developing Muses for Unix workstations. He describes this system as a knowledge-based physical modeler, in which information about climate, materials, lighting, and so forth is connected to the designer's three-dimensional model. The computer provides ongoing feedback about the energy efficiency of the model under construction, with higher-level evaluations available as the model develops. "In the past," Arumi-Noe admits, "simulation programs failed because they were not integrated with creative processes. My ultimate objective is to integrate the entire spectrum of architectural design."

Daylighting tools

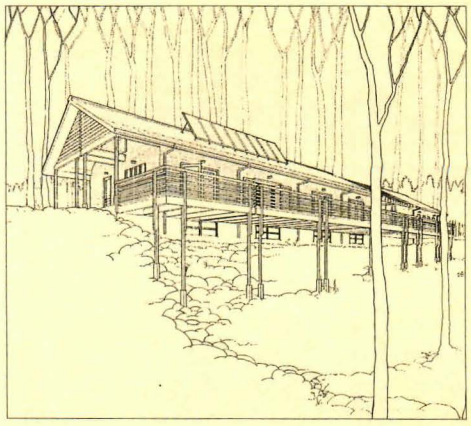
DAYLIGHTING IS AN IMPORTANT ELEMENT of energy-conscious design because carefully controlled daylight can minimize electric lighting, thereby reducing cooling loads. In the past decade, when other energy issues were neglected, daylighting continued to receive attention from researchers and practitioners because daylit buildings also have a tremendous esthetic appeal. But direct sunlight can produce glare and excessive heat gain, with higher cooling loads offsetting any benefits of reduced electric lighting. A thoughtfully daylit building will admit indirect light (usually light from the sky, rather than the sun) and distribute it effectively. Designers must understand sky conditions, the sun's position, its relation to the geometry of the building and windows, and how light will reflect once inside.

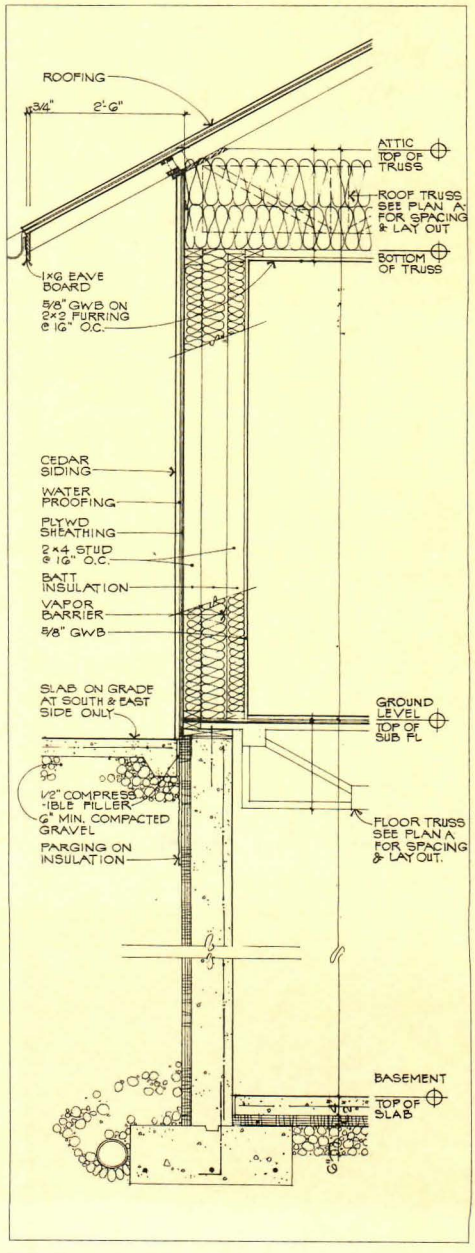
LBL's Superlite program models the behavior of light for complex interior and exterior building geometries. Analyzing detailed information about the geometrical and optical properties of building components, Superlite calculates interior light levels, including internally reflected daylight. Researchers Milne, Marc Schiler at the University of Southern California, and Jong-Jin Kim at the University of Michigan are developing graphic input procedures and electric-lighting-analysis capabilities.

Radiance, also from LBL, is a Unix-based rendering program that creates photo-realistic images. Unlike impressionistic rendering software, Radiance calculates exact lighting levels and can identify areas of over- and under-illumination. LBL researchers are now developing interface software so that three-dimensional models from AutoCad and Architrion can be imported for rendering.

PWCLite, a design tool commissioned by Public Works Canada and developed by LBL and Charles Eley Associates, will be available this summer. This software evaluates the potential for daylighting and its effect on various building systems. Its output is like

JEFF GOLDBERG/ ESTO





TYPICAL BUILDING SECTION

Design Benefits from Energy Program

EVEN FOR A SIMPLE, ONE-STORY HOUSE, the computer analysis of energy requirements is a feasible and valuable design tool. For a residence in rural Indiana (above left), New York architect Charles Griffith, who readily admits to being "computer illiterate," contracted the Center for Energy Research Education Service (CERES) at Ball State University to provide an energy efficiency assessment of his proposed scheme. Through CERENET, a copyrighted micro-computer software program developed by the university, the architect verified the success of some initial design and construction strategies and obtained valuable information to decrease the level of energy consumption. With the aid of photovoltaics and solar water heating (above right), the finished house is nearly self-sustainable.

The computer simulations were based on preliminary design parameters for the 1,445-square-foot, rectangular plan with a broad southern exposure, incorporating an R-70 ceiling assembly and superinsulated R-45 sandwich walls with low-E, double-glazed windows (section at right). Based on a list of questions provided by the architect, design variables created by wall and roofing construction systems, location and amount of glazing, and the amount of air infiltration were altered one at a time for computer simulations of 16 typical days throughout the year (chosen to represent 12 months of seasonal weather changes) in order to assess the impact of each variable on overall energy efficiency.

The simulations revealed that the more airtight the construction, the better its energy efficiency. As a result, an air-to-air heat exchanger was installed to ensure the frequent exchange of fresh air between the interior and exterior of the building envelope. Since heating and cooling the air drawn inside by the exchanger requires energy, the simulations determined the optimal air turnover rate to limit fuel consumption. Masonry interior partitions and floor slabs near doors, intended to provide thermal mass for heat storage, were found to be ineffective unless directly exposed to sunlight; therefore, they were eliminated during final construction. The results of the computer models also revealed that adding windows on the east and west elevations produced a trade-off between solar gains and conductive heat losses.

Through trial and error at a minimal cost, the energy analysis enabled Griffith to make better informed decisions regarding natural lighting, ventilation, and passive solar techniques during design development. For multiple analyses at even greater savings, CERES also markets the software, which requires only an IBM PC or compatible computer. For further information about CERES software and simulation services, contact: (317) 285-1135. —M.S.H.

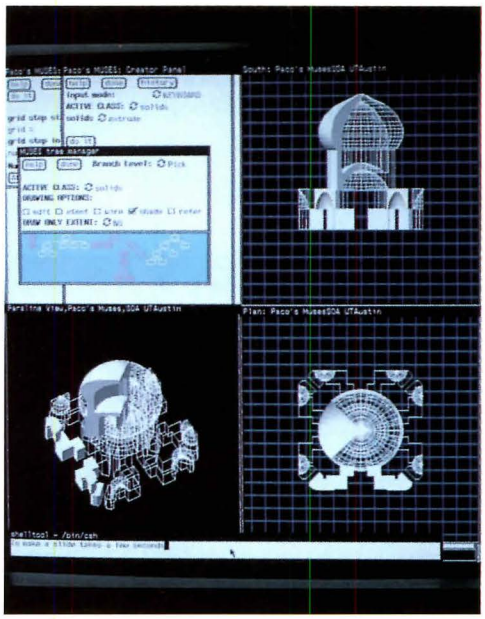
that of whole-building simulations without the tedium of detailed input. The architect provides information about the building's size and location and the windows' sizes, orientations, and materials. The system calculates a preliminary estimate of the building's performance and the costs and trade-offs associated with daylighting. With a minimum time investment, an architect can decide early in the design phase whether to further pursue a daylighting strategy.

Compliance tools

TO HELP ARCHITECTS AND BUILDERS DEmonstrate compliance with energy codes, a number of jurisdictions, including the states of Washington and California, have recently made easy-to-use evaluation software available. The output from this software is usually in the form of numeric evaluation and a printed document that building-permit applicants submit with construction documents. The evaluative portions can be appropriate for users in other regions.

WattSun 5, from the Washington State Energy Office, calculates compliance with residential energy codes and conservation program standards for nine jurisdictions in the Pacific Northwest. It calculates heat loss from menu-selected building-component descriptions and produces an annual space-heating energy budget based on information about heating-systems efficiency, window orientation, and heat storage.

The California Energy Commission (CEC) distributes CALRES for residential code compliance. It calculates the annual energy use for a proposed house so designers can demonstrate that it fits within a specified energy budget. CALRES can model heating and cooling loads, including the effects of solar gain and thermal mass. This allows passive solar designs to pass the energy code even if prescriptive limits (such as maximum glazing areas) are exceeded. MicroCheck, for residential projects, and SCM for commercial buildings, are also available from the CEC.



Muses (above), is a geometric modeler with an energy knowledge base. Southern California Edison's Energy Information Kiosk (bottom, left and center) is an interactive multimedia system that demonstrates conservation principles. Radiance (bottom right) simulates light, identifying misalignments between luminaires and furniture.

Whole-building simulations

WHOLE-BUILDING ENERGY SIMULATIONS differ from design and compliance tools in that they model the complete, hour-by-hour performance of a building over an entire year. These simulations take into account complex interactions of variables such as conductive heat flow, solar gain, daylighting, mechanical systems, and occupancy patterns. Because these models usually require detailed knowledge of the building's form and materials, they are possible only at an advanced stage of design development. They often require programming knowledge and an engineer's understanding of mechanical systems, so they are usually developed not by architects but by specially trained consultants.

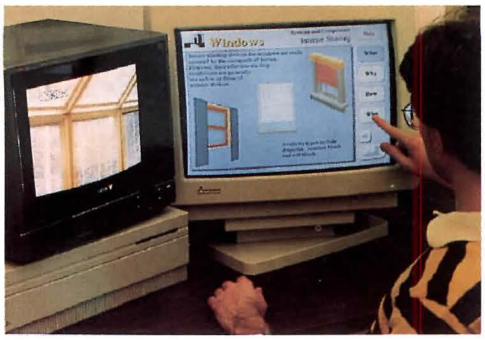
Perhaps the most widely used of the mainframe simulation systems is DOE-2.1D. This software, sponsored by the Department of Energy, has been continuously evolving since the mid-1970s with the help of several national laboratories. Its input consists of weather data, utility rate schedules, and the building's geometry, materials, equipment, and operation schedules. The output summarizes a building's loads and costs, as well as the performance of the mechanical systems and central plants.

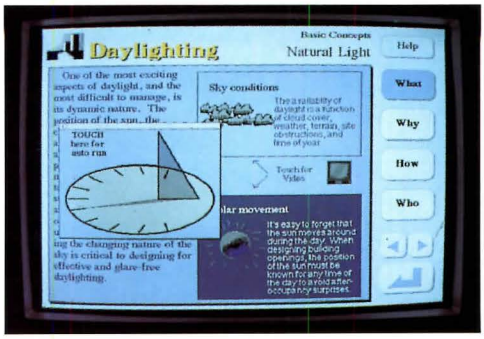
To make this program easier to implement and more accessible to architects, translations for PCs are available from Acrosoft International (MicroDOE-2), ADM Associates (ADM-DOE), and others. On 386 machines, these versions run nearly as fast as they do on minicomputers. Researchers at LBL are now working on DOE-3, which offers a graphic user interface that will free architects from having to program. The laboratory expects the first Unix-based modules to be ready in approximately two years.

What's next?

THE OPPORTUNITIES FOR ENERGY SOFTWARE in the 1990s are wide open. Increasingly powerful computers combined with a growing demand for graphic interfaces may bring the power of knowledge-based simulations to the architect's desktop. Numerous researchers are poised with good ideas, held back only by lack of financial support. Energy software development has traditionally been sponsored, if at all, by the federal government. But the disappointing lack of commitment to conservation from the White House may require a renewed cooperation between industry and state governments if development of these tools is to continue. No matter where this financial backing comes from, let's hope it happens soon, so better energy software will enable architects to pass a less energy-consumptive built environment on to the next generation. ■

—B.J. NOVITSKI





PHOTOS COURTESY OF LAWRENCE BERKELEY LABORATORIES

Resources for Energy Analysis Software

ADM-DOE
ADM Associates, Inc.
3299 Ramos Circle
Sacramento, California 95827
(916) 363-8383

BuilderGuide
Passive Solar Industries Council
1090 Vermont Avenue, N.W., Suite 1200
Washington, D.C. 20005

CALRES and MicroCheck
California Energy Commission
Publications Unit, 1516 9th Street
Sacramento, California 95814
(800) 772-3300
(916) 324-3376

Climate Consultant and Solar5
Murray Milne
Graduate School of Architecture
University of California at Los Angeles
405 Hilgard Avenue
Los Angeles, California 90024-1467

DOE-2 and Other Mainframe Software
National Energy Software Center
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439
(708) 972-7250

Micro-DOE2
Acrosoft International, Inc.
9745 East Hampden Avenue, Suite 230
Denver, Colorado 80231
(303) 368-9225

Muses
Francisco Arumi-Noe
School of Architecture
University of Texas at Austin
Austin, Texas 78712-1160
(512) 471-1922

PWCLite
Public Works Canada
Sir Charles Tupper Building
Riverside Drive at Herron
Ottawa, Ontario, K1A 0M2; Canada
(613) 736-2138

Radiance
Windows and Lighting Program
Lawrence Berkeley Laboratory
1 Cyclotron Road, Building 90-3111
Berkeley, California 94720

Sunpatch
P.O. Box 14523
San Luis Obispo, California 93406

Superlite
Jong-Jin Kim
College of Architecture, Univ. of Michigan
2000 Bonisteel Boulevard
Ann Arbor, Michigan 48109

UISUN
Bruce Haglund
Dept. of Architecture, University of Idaho
Moscow, Idaho 83843
(208) 885-6781

WattSun
Washington State Energy Office
809 Legion Way, S.E.
Olympia, Washington 98504-1211

INHERENT QUALITY

High I.Q. for TCS

TCS,® terne-coated stainless steel, has graduated Summa Cum Laude as a superbly functional roofing material for educational buildings.

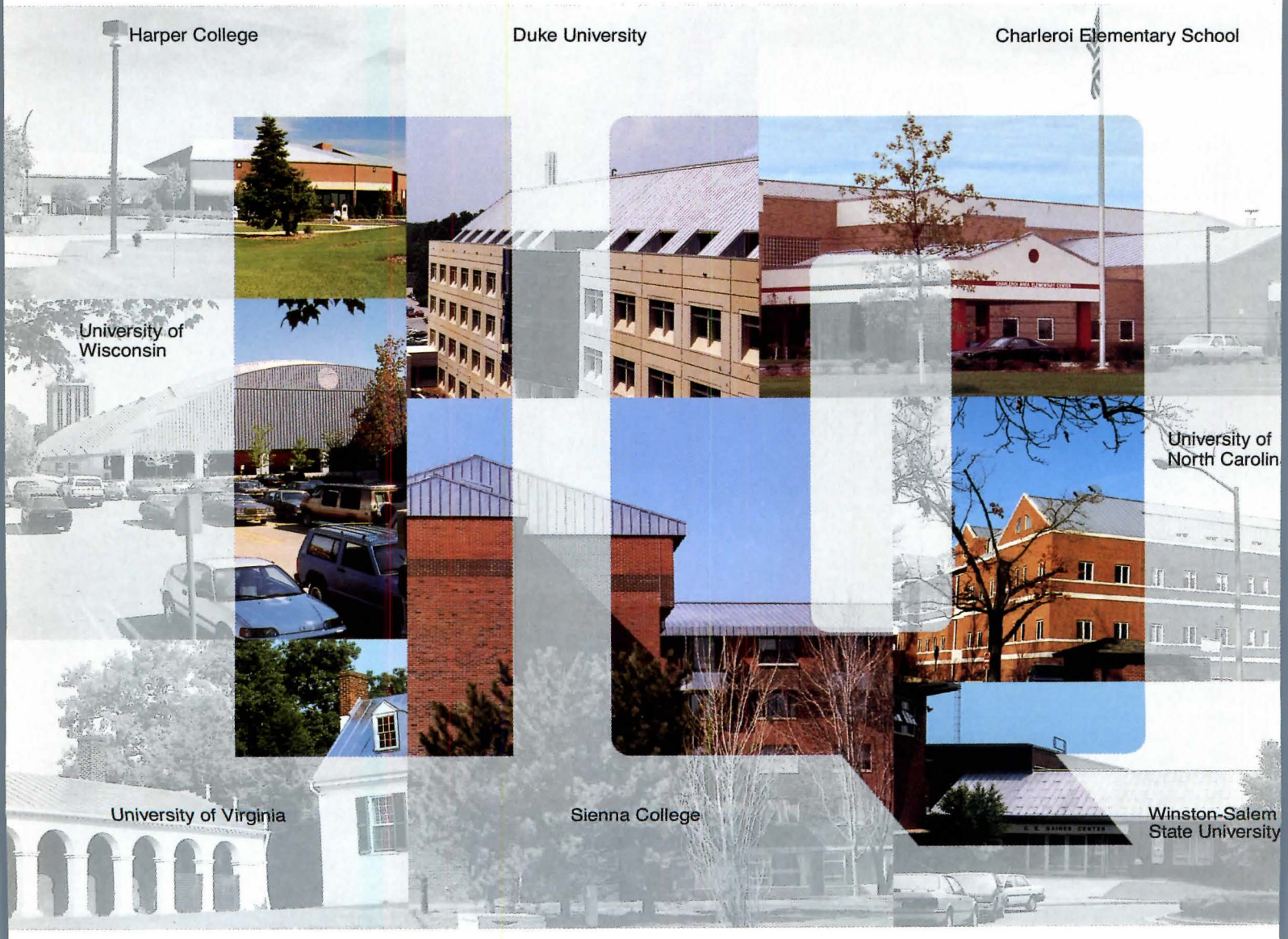
TCS has received an "A+" in the following subjects:

- Corrosion Resistance
- Freedom from Maintenance
- Life Cycle Cost Effectiveness
- Design Freedom
- Architectural Expression
- Predictable Performance

And because TCS weathers naturally to an attractive gray color, painting is eliminated and maintenance costs are reduced—allowing the school to budget money for the more important educational areas.

Follansbee is proud of TCS' performance in the educational field and would like to send you a substantiating transcript on this outstanding metal roof product.

Call us toll-free 800-624-6906.



CALL US TOLL-FREE • 800-624-6906

FOLLANSBEE

FOLLANSBEE STEEL • FOLLANSBEE, WV 26037
FAX (304) 527-1269

Circle 98 on information card

Green Furnishings

Manufacturers ease strain on the environment.

SOME OF THE LARGEST AND MOST INFLUENTIAL MANUFACTURERS IN the contract furnishings industry are joining the environmental movement in an effort to yield the most priceless commodity of all: saving the Earth's natural resources.

The furniture giant, Herman Miller, for example, is working with The Tropical Forest Foundation, a nonprofit, privately funded organization recently established in Washington, D.C., whose members include the AIA, the Architectural Woodwork Institute, the Smithsonian Institution, and the World Wildlife Fund. Formed to educate the public and promote the positive effects of proper management of endangered forests, the foundation is widely perceived among industry representatives and scientific and environmental communities as an enterprising part of the attempt to protect Earth's most threatened ecosystem.

The companies featured on this page are making earnest efforts not only to save tropical rain forests, but to become more environmentally sensitive by conserving water in their manufacturing processes; recycling plastics for myriad product applications; reducing air pollution by employing cleaner, less toxic manufacturing processes; and helping to eliminate waste materials by packaging their products in recyclable plastic.

—AMY GRAY LIGHT

1. Maharam/Vertical Surfaces, manufacturer of Celebration wool fabric, is sponsoring a series of organized 5-kilometer walks to benefit the Natural Resources Defense Council. The first such event was held during WestWeek in Los Angeles on March 22, and others are scheduled during trade shows throughout the year. Circle 401 on information card.

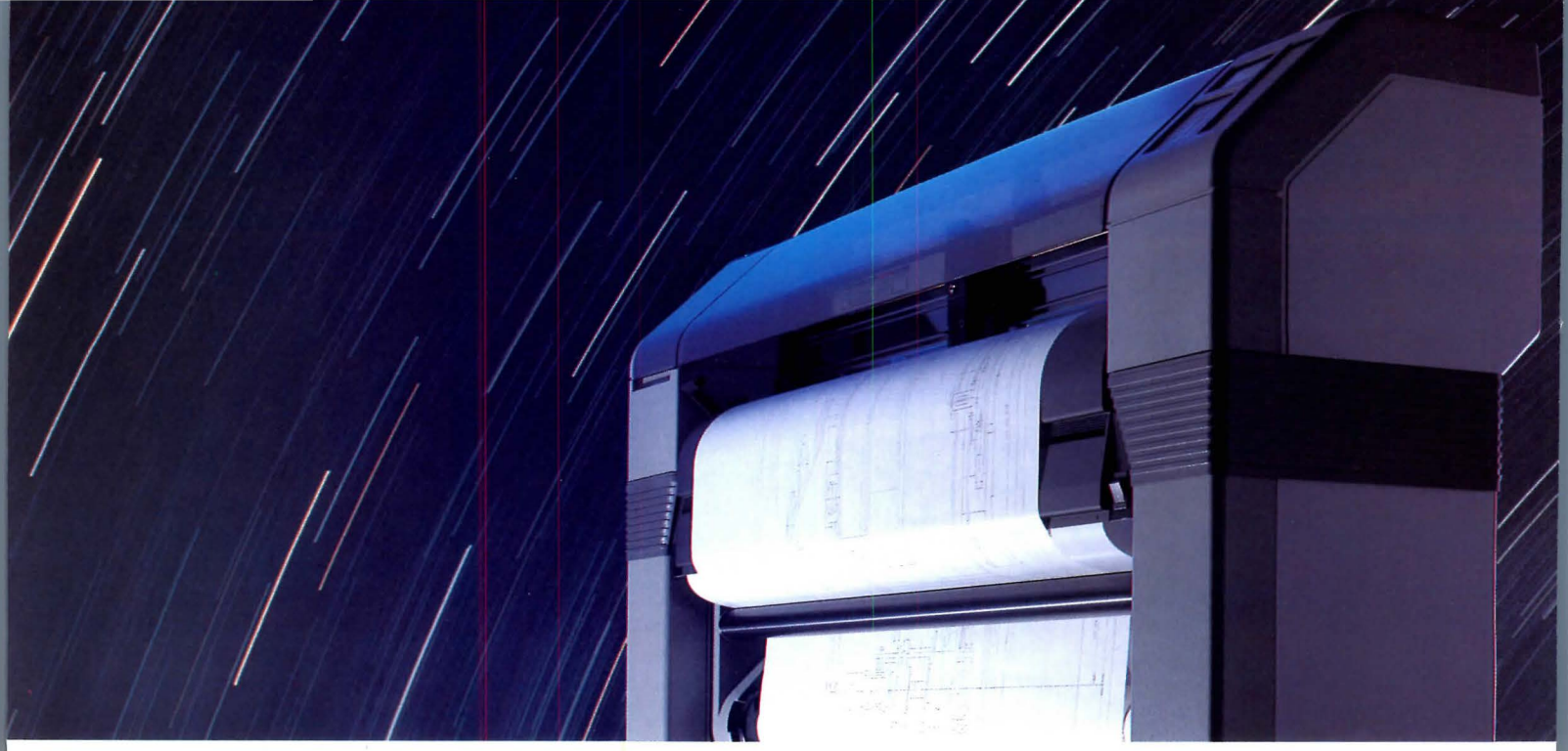
2. Nienkämper Furniture features a collection of furniture with a Lucent finish process that imitates the hues of tropical hardwoods but is made from recycled composition wood. Circle 402 on information card.

3. Geiger International applies natural wood finishes on its desks and casegoods, and orders only from lumber suppliers who replenish their sources. Circle 403 on information card.

4. Santana Products, a subsidiary of Laminations, manufactures its wide range of products from compression-molded plastic sheets of recycled, high-density polyethylene plastic. Circle 404 on information card.

5. A wood-finishing system at Herman Miller eliminates 95 percent of the volatile organic compounds emitted from spray booths and ovens and provides a wider range of finish capabilities than previous systems. Circle 405 on information card.

6. The autodeposition coating process employed by Steelcase is a water-based, dip process that is more environmentally sensitive than the zinc plating operation it replaces. A small treatment system (7) adjusts the pH balance of waste water it releases. Circle 406 on information card.



AROUND THE CLOCK PLOTTING WITH NO SKIPS, NO BLOTS, NO ERRORS. FOR THE DEMANDING PROFESSIONAL.

PROFESSIONAL PLOTTER **F-920AR**

The Mutoh F-920AR is the only plotter to satisfy professional demands for highly consistent line quality, thanks to Mutoh's advanced pencil plotting technology. Unlike ink, pencil doesn't skip or blot, for unattended operation without error.

Roll-media feed/take-up and an auto-feed 260-lead carousel let the F-920AR work all night long. Count on a good night's sleep, and rest assured that the F-920AR will keep working while other plotters sit on their down time.

Variable pressure adjustment assures consistent line quality without smearing. Mixing leads of varying size and hardness achieves complex plots with superb shading effects and astonishing detail. If desired, pens may be used instead of pencil. Best of all, its 44.5 ips top speed and 5.7G acceleration get the job done fast.

Speed. Convenience. Versatility. Consistent line quality.

The Mutoh F-920AR has it all for the demanding professional.

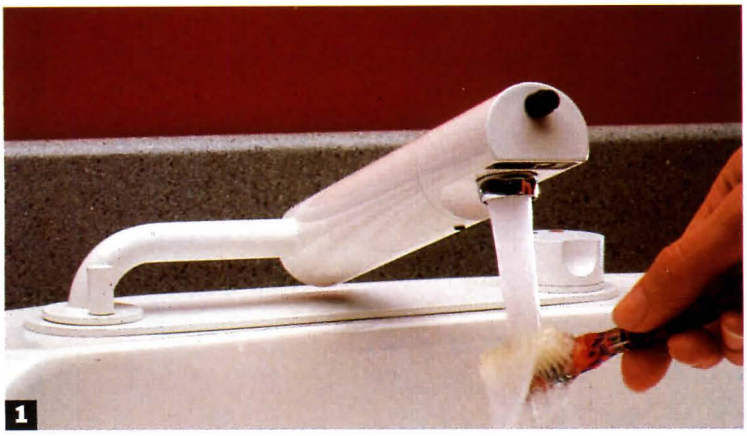
Find out more about plotter automation with the F-920 series from Mutoh or your Mutoh dealer.

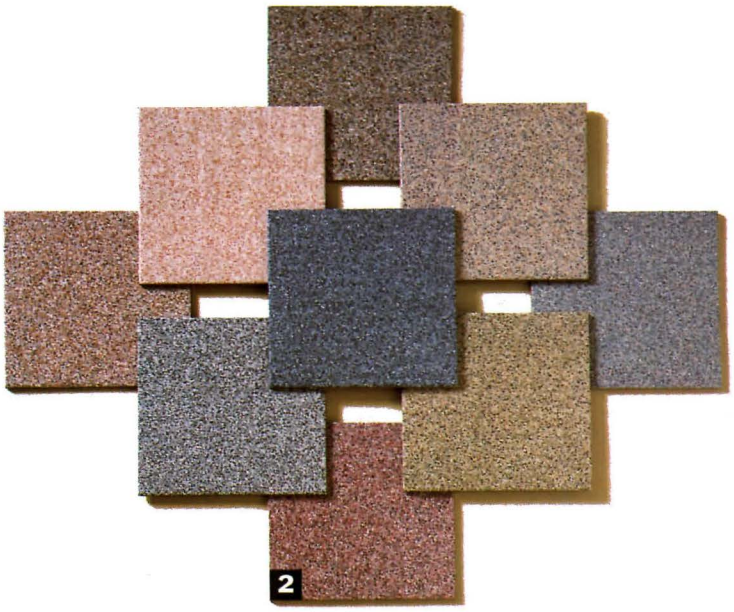
MUTOH AMERICA INC. 895 Cambridge Drive, Elk Grove Village, Illinois 60007 Tel: 708/952-8880.
Fax: 708/952-8808.
Western Office: 4883 East La Palma Avenue. Suite 505, Anaheim California 92807 Tel: 714/779-2326.
Fax: 714/779-0185.
Eastern Office: 23 Walkers Brook Drive, Reading. Massachusetts 01867 Tel: 617/942-2442
Southeastern Office: 2100 West Loop South, Suite 800, Houston, TX 77027. Tel: 713/850-7280. Fax: 713/621-4606.
Western Canada: Vancouver Tel: (604) 984-4171.
TOLL FREE (800) 663-6001.
Eastern Canada: Toronto Tel: (416) 513-7027.
TOLL FREE (800) 465-0164.
MUTOH EUROPE GmbH. Klosterstrasse 112, 4000 Düsseldorf 1 F.R. Germany Tel: 211-906940.
Fax: 211-362128.
MUTOH INDUSTRIES LTD. 1-3, Ikejiri 3-chome, Setagaya-ku, Tokyo 154 Japan. Tel: (03) 5486 -1111.
Telex: 2422575 DRAMUT J Fax: (03) 5486- 7163
Cable Add: DRAFTERMUTOH.

MUTOH

Japan's No.1 Name in Professional Plotters

Circle 100 on information card





Nontoxic Interiors

Natural products promote healthy environments.

ACCORDING TO A 1989 ENVIRONMENTAL PROTECTION REPORT FROM the EPA, indoor air pollution poses serious and acute health risks, and is responsible for more than $1 billion worth of medical costs per year. Although such studies have called attention to the need for cleaner air in the workplace and at home, they have focused only on pollutants such as radon, asbestos, tobacco smoke, and toxic chemicals found in common building materials. Biological pollutants such as molds, mildew, fungi, and bacteria commonly found in carpeting and draperies have received less attention, although they are now believed to be responsible for more than 80 percent of the serious indoor-air health problems. Recognizing the need for safer products, Dow Corning in Midland, Michigan, recently teamed up with AEGIS Environmental Management of Milford, Ohio, to treat and manage microbially related indoor-air-quality problems by providing protection and treatment of carpeting, drapes, and other products. Other progressive companies such as Masters Corporation in New Canaan, Connecticut, are springing up all over the country to provide environmentally sensitive products. Petrochemical-free paint, insulation produced from seawater minerals, untreated wood products, and natural stains made from citrus peel, linseed oil, and berries are just a few products these companies offer. Although natural and recycled products can add an estimated 35 percent to the construction costs of a home, these energy efficient, recyclable products yield long-term environmental and economic benefits. —A.G.L.

1. Automatic faucets by Water Facets, in which water flows upon demand, purportedly waste 80 percent less water than conventional faucets. Circle 407 on information card.

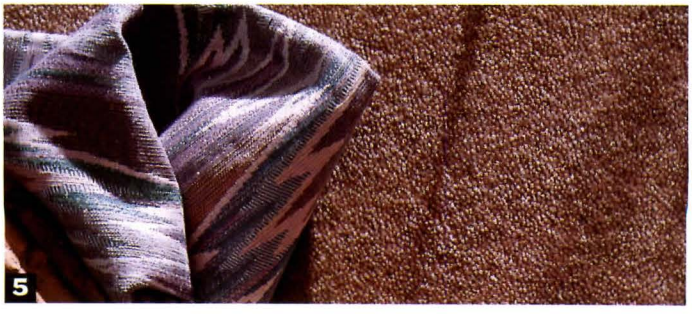
2. Summitville Tiles utilizes feldspar tailings as a primary raw material in its manufacturing process. The company's closed system for solid-waste accumulation allows it to reuse the tailings, which had previously been discharged into local rivers or landfills. Circle 408 on information card.

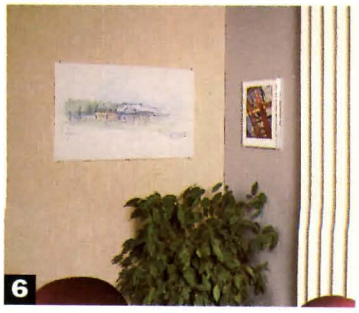
3. Bonakemi USA's finish for wood floors releases no harmful volatile organic compounds. Circle 409 on information card.

4. GTE's Prominence ceramic floor tile fuses recycled glass with clay and other materials. Circle 410 on information card.

5. BASF carpet fibers feature a one-step environmental finishing application. Circle 411 on information card.

6. Homasote's DesignWall interior panels are natural jute fabric laminated to an asbestos-free wood fiber board. Circle 412 on information card.

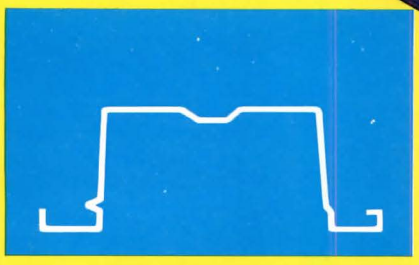


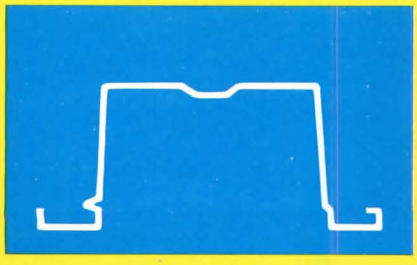


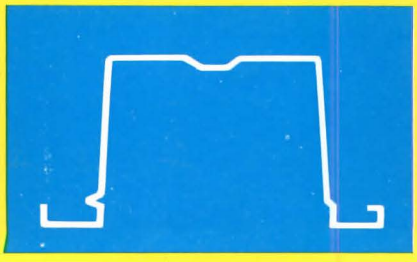
LONG-SPAN DECK

THERE'S AN EPIC DECK FOR EVERY SPAN

SCHOOLS
CANOPIES
AIRPORTS
CONVENTION CENTERS
STADIUMS
INSTITUTIONS
AUDITORIUMS
CHURCHES
SWIMMING POOLS
PRISONS
THEATRES







- Provide structural and ceiling material all in one architectural element
- Provides long spans without mid-span fastening
- Wide choice of depths and design thicknesses
- Ideally suited to any type construction
- Presents a uniform ceiling with no irregular gaps
- Design with our acoustical treatment to achieve state-of-the-art solutions to sound control
- Blend control—use acoustic and non-acoustic panels together

ECONOMY THROUGH SELECTION

- Roof Deck
- Plated Deck
- Composite Deck

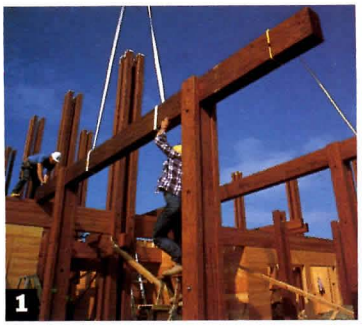
MINIMUM MAINTENANCE
FAST ERECTION
THE CHOICE IS YOURS!

FOR INFORMATION, CONTACT

EPIC® METALS CORPORATION
Eleven Talbot Avenue, Rankin PA 15104
PHONE: 412/351-3913
FAX: 412/351-2018

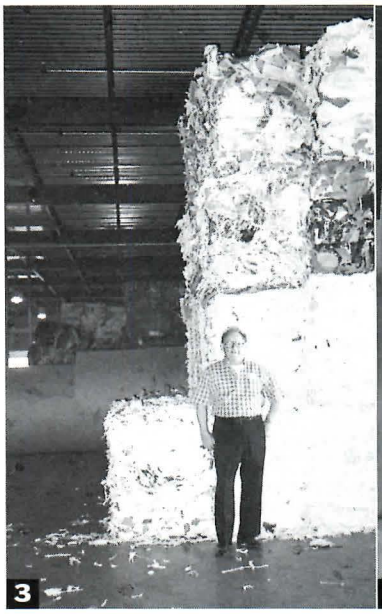
Booth 824 CSI Show, San Diego

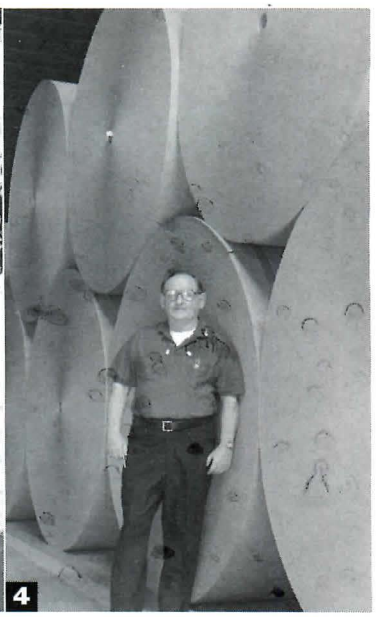
Circle 102 on information card



1. Vancouver architect Henry Hawthorne specified Parallam beams and columns manufactured of wood fiber and long strands of clipped veneer from MacMillian Bloedel Limited for a three-story, 20,000-square-foot research facility in British Columbia. Circle 413 on information card.

2. Louisiana-Pacific's FiberBond wallboard mixes gypsum with fiber from recycled newspaper to create a product that rivals conventional drywall. A new cellulose insulation called Weather Guard also incorporates recycled newspaper, and reportedly has a higher R-value than fiberglass and requires less energy to produce. Circle 414 on information card.





3. CertainTeed's Shakopee, Minnesota, plant manager, Clem Carfrey, stands in front of the before and after (4) stages of cardboard boxes and office paper at the roofing plant. Recycling the paper with ground wood chips produces an organic felt mat that is applied to organic-based asphalt shingles. Circle 415 on information card.

Recycled Resources

Reclaimed materials find new life in building elements.

THE *WALL STREET JOURNAL* PREDICTED LAST YEAR THAT RECYCLING will evolve into a multibillion-dollar industry by the next decade, as well as a fact of life. According to a research poll conducted late last year by the National Solid Waste Management Association, three out of four Americans believe they can more than double the amount of waste they presently recycle, and are also willing to pay more for goods made of recycled materials. But only 11 percent of this country's 160 million tons per year of municipal solid waste is recycled, according to the poll.

A 1989 report completed by EPA's task force on municipal solid waste points out that industry has a responsibility to consider source reduction, reuse, and recyclability in designing products and packaging, as well as to use secondary materials in their manufacturing. And citizens have a responsibility to learn about the products and packaging they buy and the waste they create. The EPA outlined four primary tactics for reaching its goal of managing and reducing 25 percent of the country's municipal solid waste by 1992: source reduction, recycling, waste combustion, and landfill controls.

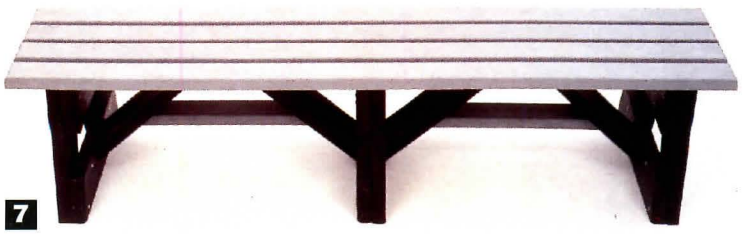
A number of recycled products have been available to architects for years (see pages 113-118), and many firms have already incorporated these materials into their designs. With so many environmental groups critical of manufacturing processes, it seems as if a second Industrial Revolution is warranted—one in which industry becomes more proactive and progressive in its R&D efforts. ■

—A.G.L.

4. Peachtree Door's new entry system is molded from real oak door castings to simulate wood grain. Its thermoplastic compound skin offers the appearance and texture of wood, but with a higher insulation value. Circle 416 on information card.

5. International Permalite products are composed of recycled, biodegradable materials that will not release CFCs into the atmosphere. Circle 417 on information card.

6. The Plastic Lumber Company manufactures park benches, picnic tables, mailbox posts, parking stops, and speed bumps from recycled plastic. According to the latest EPA waste report, plastics make up only 7 percent of most landfills by weight, yet 30 percent by volume. Circle 418 on information card.



ADVERTISERS INDEX

EDITORIAL OFFICE
1130 Connecticut Avenue, N.W., Suite 625
Washington, D.C. 20036
(202) 828-0993

EXECUTIVE OFFICE
994 Old Eagle School Road, Suite 1010
Wayne, Pa. 19087
(215) 254-9800

Robert Hoover
Production Director

H. Kratos Vos
Circulation Manager

Nancy A. Perri
Assistant to the Publisher

Robert G. Kliesch
Publisher

ADVERTISING SALES OFFICES
New York/Connecticut (215) 935-8522
D. Douglas Johnson
P.O. Box 199
Devon, Pa. 19333

New England (617) 242-3042
Joan Donahue
31 Shipway Place
Charlestown, Mass. 02129

Philadelphia/Pittsburgh (215) 254-9800
George T. Broskey, Eastern Sales Manager
994 Old Eagle School Rd., Suite 1010
Wayne, Pa. 19087

Southeast (215) 935-8522
D. Douglas Johnson
P.O. Box 199
Devon, Pa. 19333

Midwest (312) 527-1055
Jack E. Bergren
Robert G. Hatfield
1337 The Merchandise Mart
Chicago, Ill. 60654

Jack E. Bergren (414) 786-4286
2530 Coach House Dr.
Brookfield, (Milwaukee) Wi. 53005

Edward R. Novak (708) 658-7133
E.R. & J. Assoc., Inc.
P.O. Box 648
Algonquin, Ill. 60102

Southwest (314) 569-3210
Richard Grater
1466 Summerhaven
St. Louis, Mo. 63146

West/Northwest (619) 451-9782
James A. Anderson
Western Sales Manager
11858 Bernardo Plaza Court, Suite 240-C
San Diego, Calif. 92128

Canada (416) 833-6200
Donald C. Fenn
148 King Road E.
King City, Ontario L0G 1K0 CANADA

Italy 9-20135 Milano (02) 54.00.757
Cesare Fiorucci, Viale Sabotino
Telex: 326559 Timas; Fax: 5451526