

ARCHITECTURAL RECORD

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Charles D. Linn, RECORD LIGHTING*

On target

Your editorial in the December 1990 issue [RECORD, page 17], entitled "There's Honor in the Field," is right on target with respect to the need for architects to recapture the important role they have played on construction projects in generations past.

Significantly, it has been in the construction administration phase of every project that architects have abdicated the major share of responsibility to others who have stepped in to fill the ensuing vacuum.

In the downturn economy that will be with us for the next few years, architects should use this opportunity to hire experienced, construction-savvy employees who will garner the respect of owners, contractors, suppliers, and construction managers, and re-establish a much more important role for the design team in seeing that what is constructed is precisely that which the owner approved in the design documents.

As you so aptly phrased it in the editorial, "Someone must do the job—why not the architect?"

BARRY B. LEPATNER,
*Attorney
New York City*

Priorities

It's disappointing that RECORD gives such valuable space to projects as one-dimensional as the Bartholomew County Jail, which you praise in your November 1990 issue [RECORD, pages 66-71]. It grieves me to see a building that gives such importance to space, material, design, and presence for people who have no respect for society. Where are our social values?

It is ironic that I struggle to design a facility for the county school system, with 24- by 40-foot premanufactured modules, which will house programs for the mentally disadvantaged, senior mental-health cases, and delinquent children from grades 1-12. Maybe RECORD should have more of a moral and social responsibility to educate our profession in things other than the "everybody loves a pretty face" mentality.

MICHAEL PEACHEY,
*Architect
San Luis Obispo, California*

Design for keeping

As the first warden at the Federal Correctional Institution in Sheridan, Oregon, I read with great interest your story, "Frontier Justice Redefined" [RECORD, September 1990, pages 142-145]. It was an excellent, well-presented article.

As a recent member of the Sheridan community and as the "keeper" of the inmates housed at the FCI and supervisor of the dedicated staff who worked there during my tenure, I can attest to the fact that the prison is a "good neighbor" and that it provides a safe, livable, and functional environment for both staff and inmates.

Working in a correctional facility is probably one of the most stressful, demanding, and dangerous jobs of today. While the design may be bearable for an inmate serving a long sentence, it must also provide a safe and workable environment for staff. The greatest feature of the architectural design at Sheridan FCI is the total functionality of the facility as well as the pleasant atmosphere it provides staff in which to work.

The employees at Sheridan found the institution's design to be a valuable assistance in supervising the inmates. There are no dark areas or blind corners. The functional areas and units of the facility are open and bright, permitting a small number of staff to observe and supervise large numbers of inmates. Robert Frasca, principal design architect, worked closely with the Bureau of Prisons' architects to ensure that each building met sound correctional standards, and had a useful and important function.

During my 20 years of correctional work I have never seen nor worked in a facility that was able to blend in with the local community and also met the stringent requirement of a medium-security correctional facility. I congratulate the Zimmer Gunsul Frasca Partnership for a job well done.

GEORGE E. KILLINGER
*Senior Deputy
Assistant Director
Federal Bureau of Prisons
U. S. Department of Justice
Washington, D. C.*

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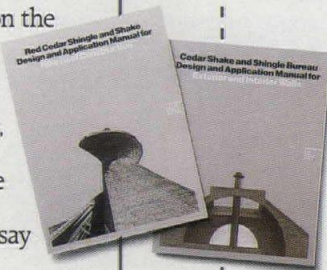
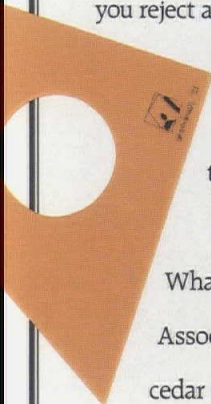
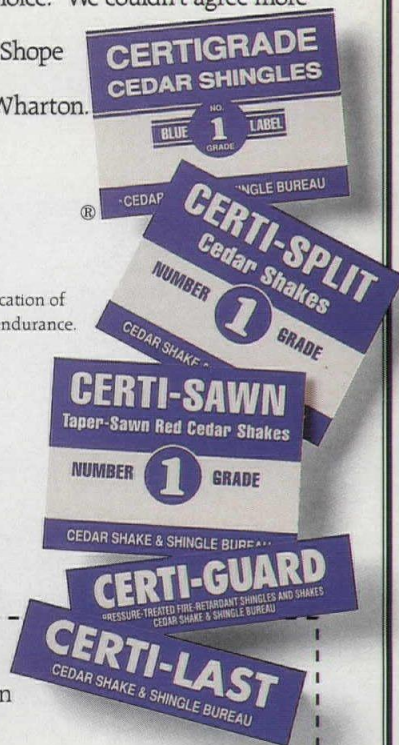
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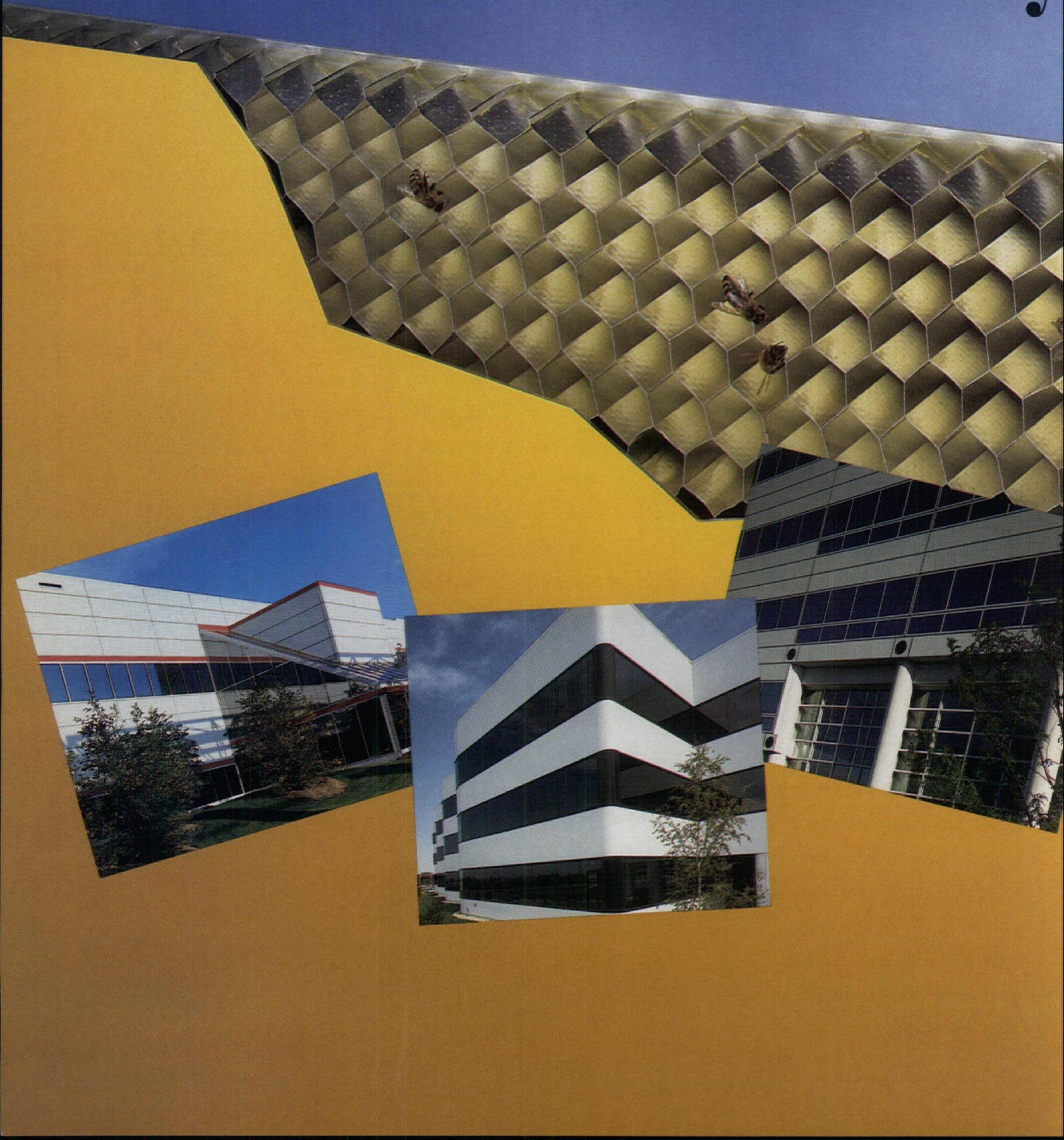
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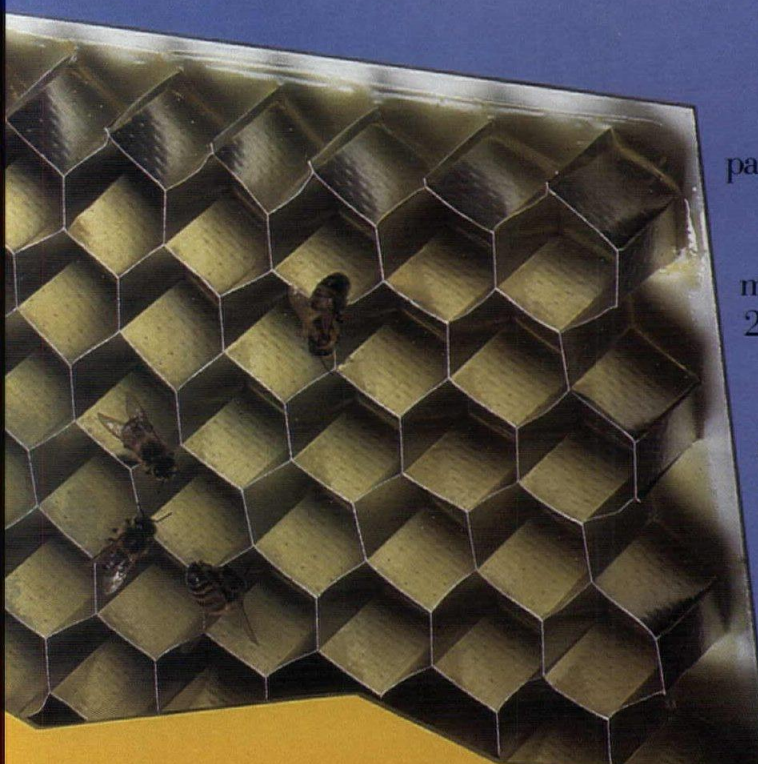
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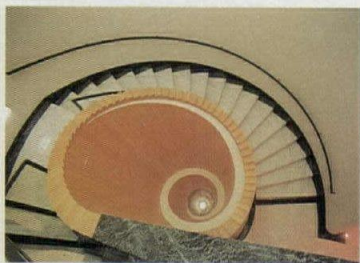
The ones with the honeycomb core. After all, four-hundred million bees can't be wrong.

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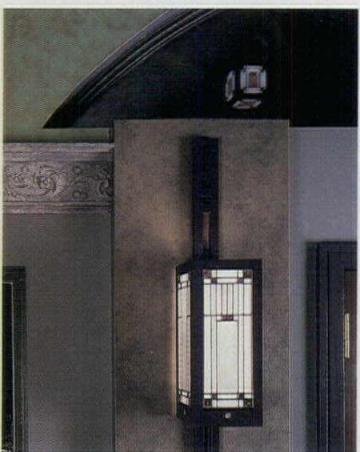
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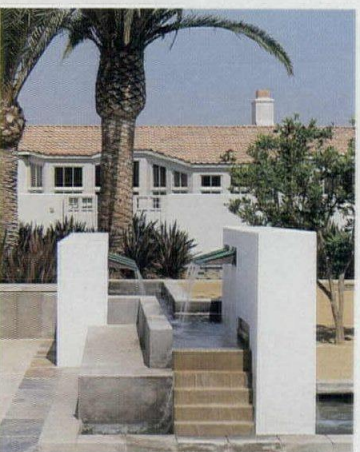
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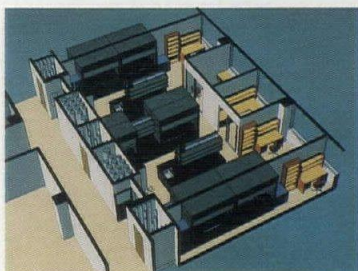
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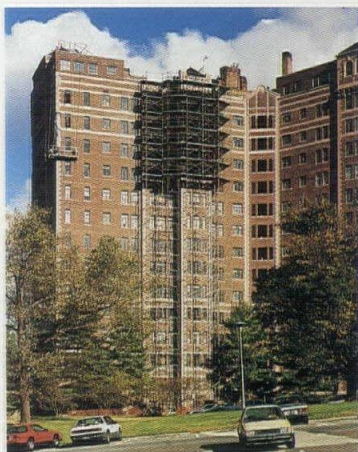
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COVER: Church of the Nativity, Rancho Santa Fe, California
The Austin Hansen Group, Architect; Moore Ruble Yudell, Design Architect
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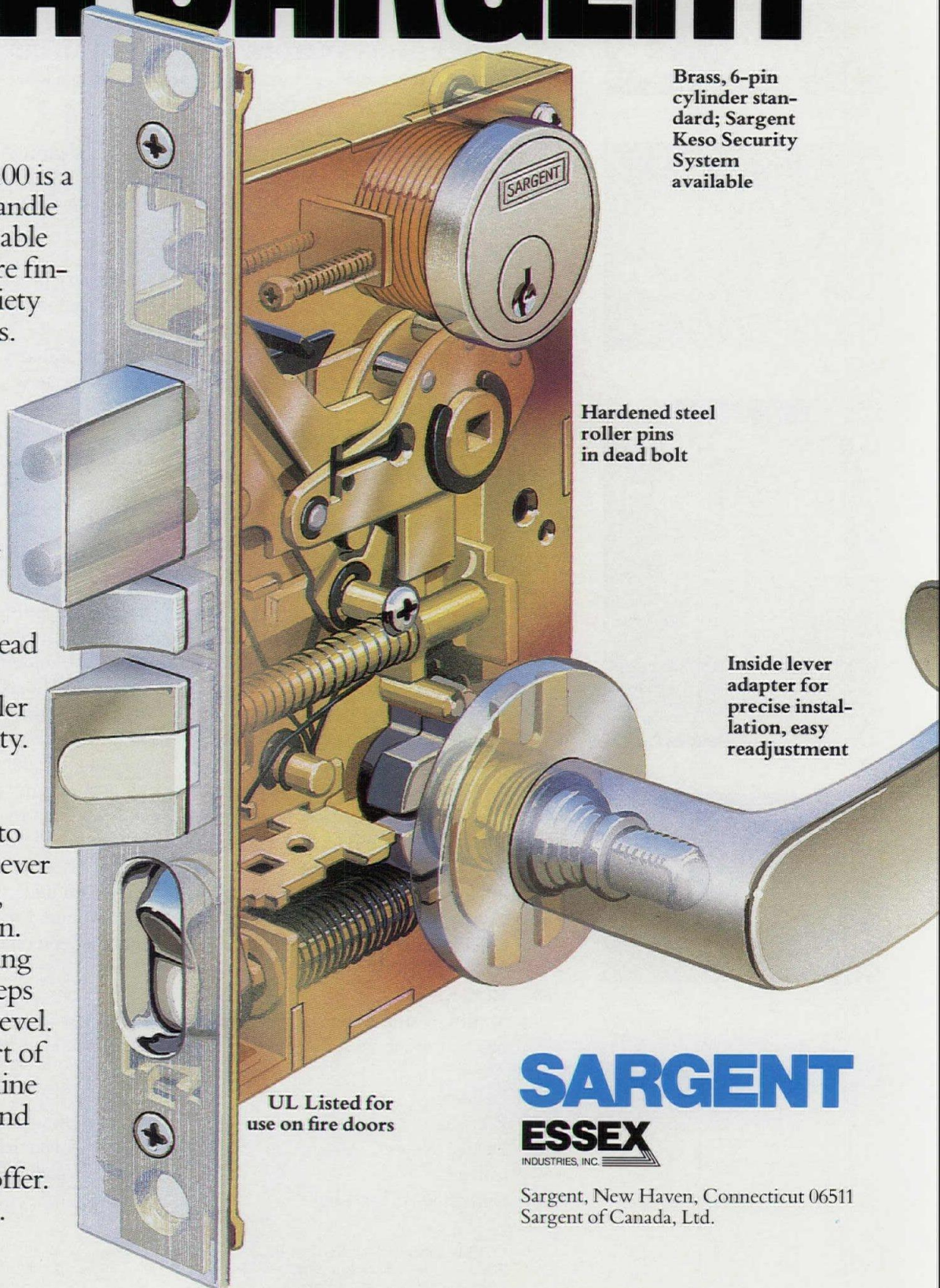
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MANAGING DIVERSITY

New ground rules for a changing workforce.

The facts are plain. The days of the homogeneous staff, mostly white, male, and upper middle class, are on their way out and by the end of the decade will be gone forever. The luxury of dealing with everyone on the staff in the same manner, employing the same kinds of motivation and reward systems, is fading fast.

Look at some projected end-of-decade demographics:

- Average age of the workforce will be up from 35 to 39, and rising. With an older staff, your firm must find ways to deal with older workers, their work habits, their readiness to keep abreast of new practices and technologies.
- Sixty-one percent of women will be working, up from 50 in 1985. Today, 29.9 percent of architectural students are women. How will you deal with such issues as continuing service and child care?
- The percentage of minorities in the workforce will be one in three. Today, 19.8 percent of architectural enrollments are minority students. How will they be trained? What credentials and attitudes will they bring to your firm's staff? Will you be prepared to deal in a constructive, fresh way with the cultural differences and working styles these varying backgrounds will bring to your practice in marketing, design, project management?

The rise of a socially diverse workforce raises some practical issues. Sociological research has shown, for example, that some groups react to public praise differently than others. The same carrot doesn't work for everybody—some high performers are embarrassed by public attention. Some groups hesitate to speak up at meetings, so their contributions are lost. Other groups feel uncomfortable in traditional superior-subordinate relationships. Still others reportedly are more skilled in design and technology than in management—this myth probably stems from the fact that these groups were asked to deal with the traditional white male staff power structure, whose attitudes too will alter as its composition changes.

If I may draw a parable from horticulture, your workforce is like a garden, with different types of plants, each contributing to the prestige of the garden but each needing to be uniquely fed and watered.

None of this will make life easier. But managing a diverse staff is fast becoming a fact of life, and if done right will help you better deal with the other big issues of this decade.

One last note. Perhaps the greatest danger in managing diversity is to typecast groups by race, gender, or some other yardstick. That surely is discrimination of the worst kind. What we need is the basic awareness, by managers and staff alike, that no two individuals are alike.

STEPHEN A. KLIMENT

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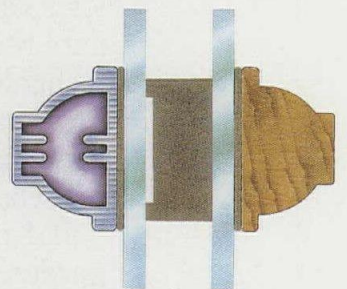
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 PAC-CLAD Metal Roofing Panels figure prominently on the recently completed Saddlewood Retail Center in Naperville, Illinois. The Architect, Healy Snyder Bender & Associates, selected Colonial Red PAC-CLAD for the roofing panels and Forest Green for the adjacent metal trim. Both colors serve to complement the extensive use of rough-hewn cedar on the project.

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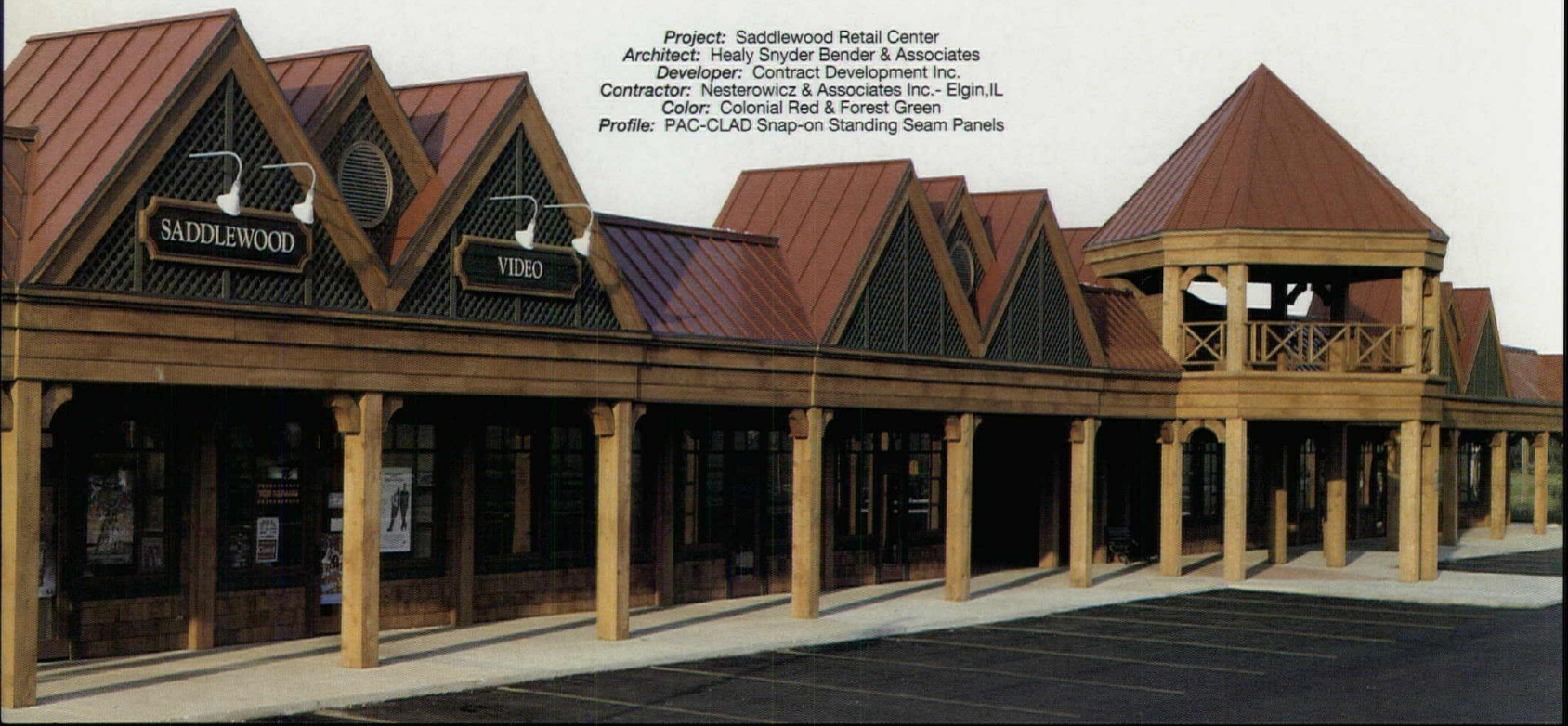


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Project: Saddlewood Retail Center
Architect: Healy Snyder Bender & Associates
Developer: Contract Development Inc.
Contractor: Nesterowicz & Associates Inc.- Elgin, IL
Color: Colonial Red & Forest Green
Profile: PAC-CLAD Snap-on Standing Seam Panels



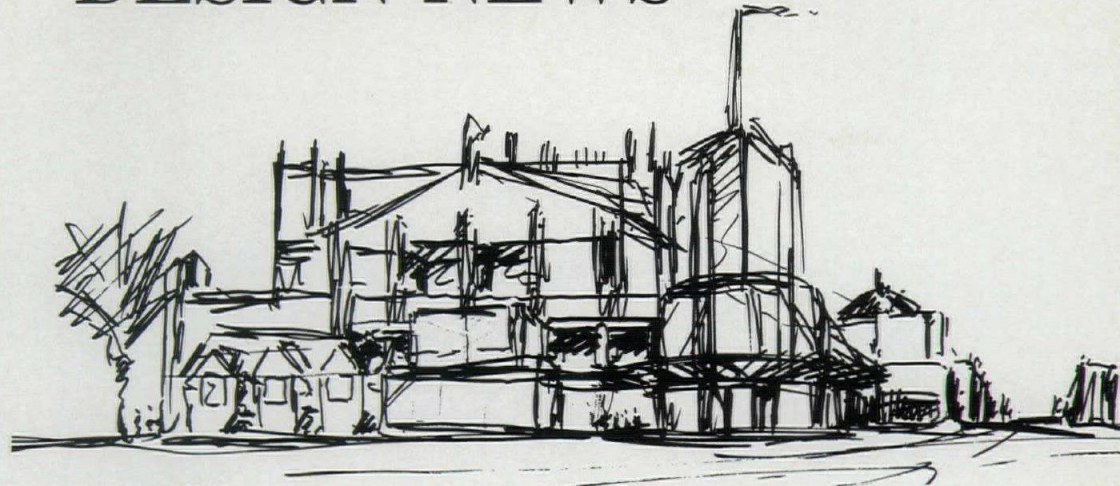
DESIGN NEWS

Toronto Firm Wins Queen's U. Library

The Toronto firm of Kuwabara Payne McKenna Blumberg Architects has won a design competition for the construction of a new library on the campus of Queen's University in Kingston, Ontario. Moffatt & Kinoshita are the associate architects.

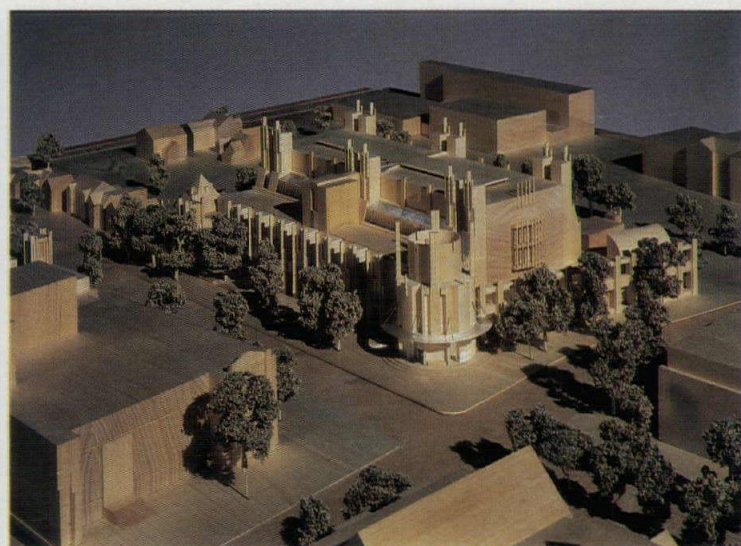
KPMB's design for the \$27-million project was chosen over proposals by Moshe Safdie, Raymond Moriyama, Diamond & Schmidt, and Perry, Dean, Rogers, in large part because of its sensitive materials and neighborly, low-scale silhouette. In keeping with the collegiate Gothic character of the campus, built in the late 19th and early 20th centuries, the architects specified the local limestone used in many of the existing buildings. Window frames are of natural wood.

Large gardens wrap around two sides of the building, and



CONCEPTUAL SKETCH BY TOM PAYNE

are overlooked by reading rooms and individual study rooms on the second floor of the four-story, 200,000-square-foot building. A skylit circulation spine spans the ground floor. The library is sited at an important campus crossing, with the primary entrance through a corner rotunda placed at the intersection of two busy streets. A covered arcade runs along the eastern elevation, providing shelter for students traveling between buildings. City planners have approved the plan, but construction is not expected to begin for another year. □



STEVEN EVANS

BP Plaza to Rise in Houston



Construction starts in April on BP Plaza, a 20-story tower that will be one of just two office highrises begun in Houston during the last five years. A subsidiary of British Petroleum will occupy three-quarters of the

550,000-square-foot tower, the construction of which may signal a revival in Houston's stagnant economy.

BP Plaza is the first project for former SOM partner Richard Keating's new Los Angeles-based firm, Keating, Mann, Jernigan and Rottet. The building will join several other Keating-designed towers from the early 1980s in WestLake Park, 15 miles west of downtown Houston. Associate architects on the project are Morris Architects of Houston.

Keating has dubbed his approach as "classical modernism," referring perhaps to his return to the basic box. The main facade contains a wide central band of vertical piers intersecting the dominant horizontals of the stone-and-glass curtainwall. An airplane-wing cornice caps the design's upward thrust, establishing a skyline presence for the tower.

GERALD MOORHEAD

Pelli Plan at Seattle Campus

Cesar Pelli's physics and astronomy complex will occupy an elevated site on a prominent corner of the University of Washington campus in Seattle. A tiered, square tower will anchor the corner of the 235,000-square-foot site, forming an L with a shorter rectangular building along one side of a raised courtyard that sits on axis with a major campus pathway.

The two main buildings will contain offices, classrooms, and laboratories. Additional laboratories will be located beneath the courtyard. Facing the courtyard across the way will be a small, colonnaded building containing four auditoriums. A ramp will extend from the courtyard, leading to a future pedestrian bridge that will provide the campus with its first real link to nearby Lake Union.

Pelli's complex is the initial building project in the universi-

ty's new ten-year general development plan. The design follows the plan's mandate that new work respect the flavor of the existing campus buildings. Like them, the Pelli design employs rich detail, patterned brick and, in the larger two buildings of the projected complex, strong vertical accents leading to copper fascias.

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Churches Versus Landmarks

Should religious institutions be protected by the Constitution from the strictures of landmark law? That's a question the Supreme Court has been asked to decide. Defeated parties on opposite sides of two recent cases have filed separate petitions asking the high court to review those decisions.

In the most celebrated case, lawyers for St. Bartholomew's Church on Manhattan's Park Avenue hope that two previous judgments in federal court against the church, upholding its landmark designation, will be overturned. Meanwhile, the city of Seattle has asked the justices to reinstate the designation of Covenant Church in Seattle. A Washington State Supreme Court case ruling overturned that designation last year.

Both churches argue that the landmark designations interfere with their right to the free exercise of religion, as guaranteed by the First Amendment to the Constitution. St. Bart's has fought for years to demolish its community house and erect a 47-story spec office tower in its stead, claiming it needs the income from such a venture, and that the loss of potential profit represented a curtailing of its religious expression. The church sought a court solution after the city's Landmarks Preservation Commission refused its claim for hardship status, which would have exempted it from landmark designation. But the court found no infringement.

In Seattle, the tables were turned. The State Supreme Court, voiding the landmark designation of the First Covenant Church, ruled against the Seattle Landmarks Preservation Board. It held that the city's landmark laws infringed the church's First Amendment right to free exercise of religion.

The Supreme Court is under no obligation to accept these cases, but lawyers involved in the St. Bartholomew's suit say there is a good chance they will choose to do so because of the timeliness of the conflicting rulings. Word of whether the court will hear the cases is expected this spring.

P. D. S.

Landmark Church in Air-Rights Swap

While conflicts between religious institutions and landmarking laws are drawing attention, at least one New York City church has manipulated its landmark status to great advantage. The neo-Baroque church of St. Jean Baptiste, designed by Nicholas Serracino and built in 1910-12, will soon undergo extensive restoration. Where will the money come from? The church, on Manhattan's Upper East Side, plans to sell the air rights for its rectory to a developer, who will transfer them to an adjacent parcel for the construction of a 31-story residential and office tower. The tower is designed by Hugh Hardy, of New York-

based Hardy Holzman Pfeiffer, which will also supervise the church restoration. The city's Landmarks Preservation Commission unanimously approved the project in early January.

Restoration of the church will involve extensive repairs to the limestone and brick facade, granite columns, copper domes and roofs, and architectural details. Handicapped-accessible entrances will be introduced to the sanctuary and basement, a center for community activities.

While establishing its own identity as a residential building, the tower recognizes the church's design through color, detail, faceting, and setback



CHRISTOPHER LOVI

placement; the height of a four-story base echoes the church cornice line. □



JOHN BURGEE ARCHITECTS

Takashimaya Unveils Burgee Tower Plan

Despite the current slowdown, commercial building has not disappeared from New York City. Midtown Manhattan will host John Burgee Architects' design for the North American flagship of Takashimaya, a Tokyo-based department-store chain. The 20-story, 100,000-square-foot tower will rise on Fifth Avenue, next to the recently restored St. Regis Hotel. The design of the Fifth Avenue building, kept under wraps for months, was un-

veiled at a groundbreaking just before Christmas.

The architects' design takes off from a three-story-high display-room entrance on Fifth. Above that, engaged granite columns rise in two-story increments, continuing past a setback at the ninth floor and emerging as corner turrets. A copper-clad, gabled roof tops off the building above a duplex penthouse, which is set in on either side and sits behind a low colonnade. The first five floors will be devoted to the retailer; the next four floors to a restaurant and club. The remaining floors contain office space. □

Building SITE: Theater for the New City

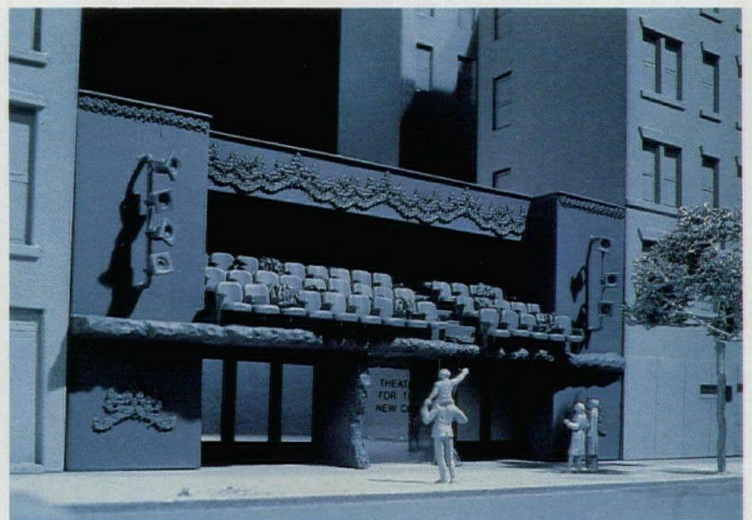
SITE Projects first proposed this intriguing facade for the pioneering drama company Theater for the New City in the mid-1980s. Now, after a long struggle with city bureaucracy for ownership of the WPA-built, steel-and-concrete market building, reconstruction of the theater is underway. Though work has still not begun on the facade, SITE will be wrapping up the project's first phase in the spring. This initial \$1.2-million effort entails raising the existing roof and creating a 240-seat theater, one of three eventual performing spaces. The company must find an additional \$3 million to complete its home.

The theater is on Manhattan's Lower East Side, a neighborhood that has proved resistant to gentrification and remains a

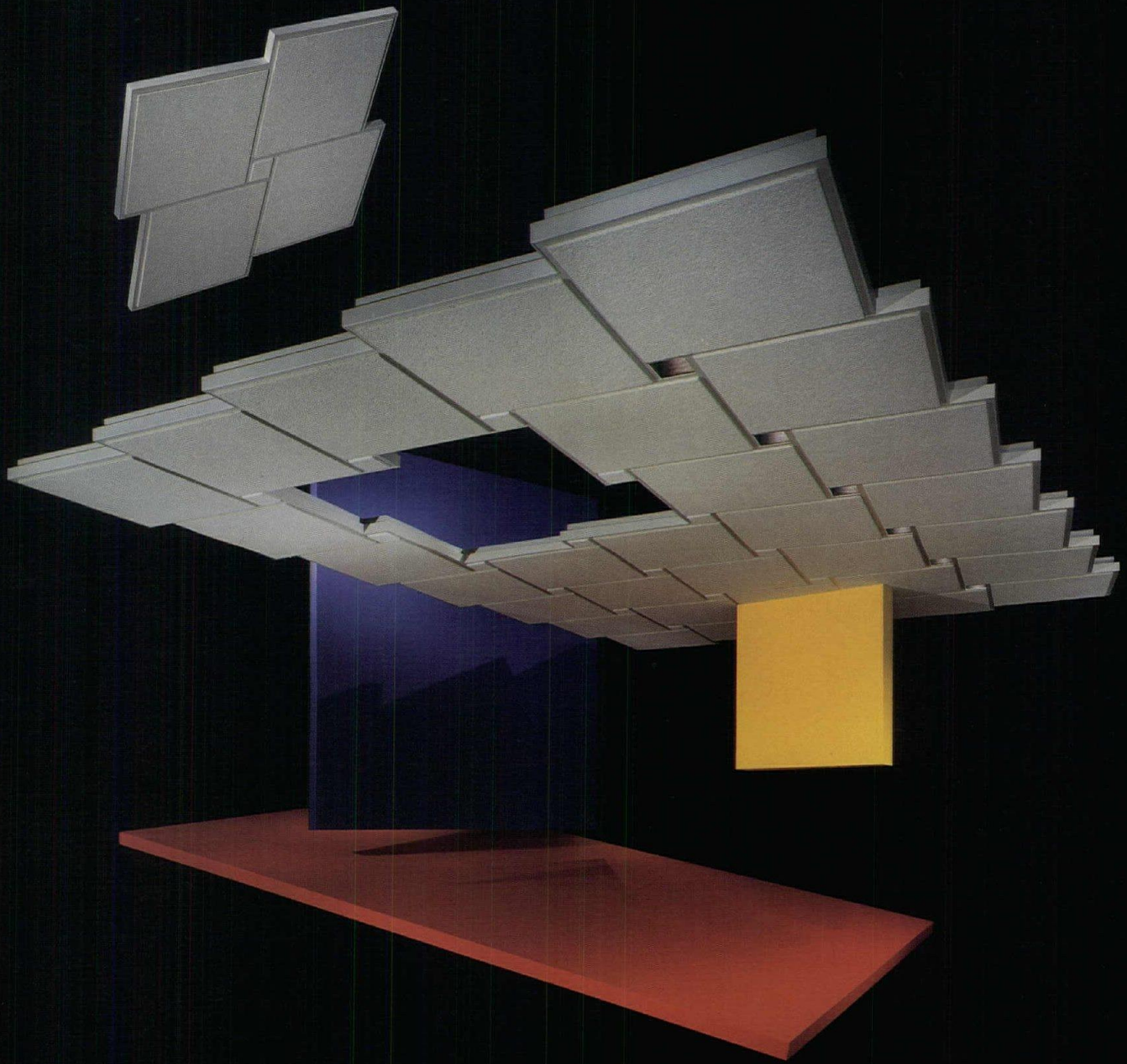
haven for working artists. On the facade, SITE formed an interior balcony, covering empty seats with hats, gloves, and programs. Louvered theatrical lights on flanking piers illumi-

nate the sidewalk, creating a stage on the street.

Will it be finished? SITE's James Wines is convinced that the tenacious theater group will prevail. "Normal people," he points out, "would have given up long ago." □



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Soviet Duo Drafted for Tacoma Bridge

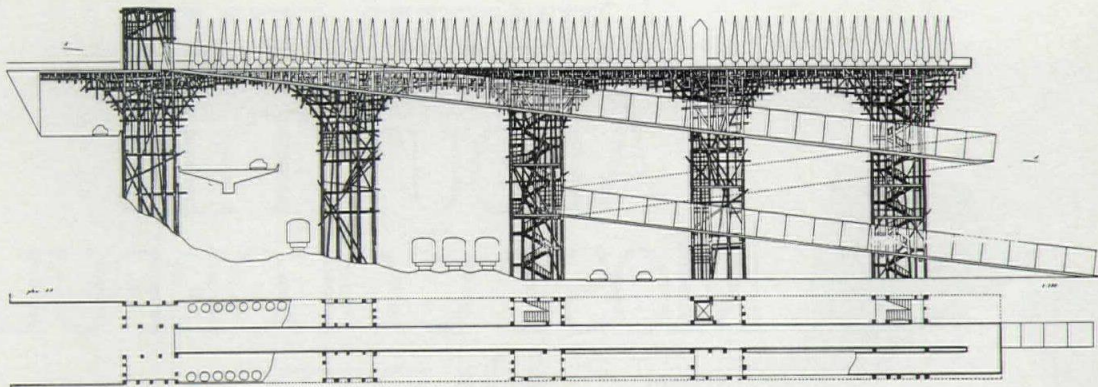
Tacoma, Washington, has given a green light to construction of a dramatic pedestrian bridge designed by the celebrated Soviet "paper architects" Alexander Brodsky and Ilyia Utkin. The two came to Tacoma last summer to take part in an exhibition of Soviet conceptual art, and were invited to participate in a charette to design a new link between downtown Tacoma and the Thea Foss Waterway. They returned to Moscow with a commission from the city to create a

pedestrian bridge that would also be public art.

Their design is for a bridge 300 feet by 70 feet. Five towers

form an understructure of criss-crossing timbers, recalling early Northwest railroad trestles, and contain an elevator and two

stairways. The towers support a pedestrian promenade, from which a glass and metal ramp descends to the water. **D. J. C.**



Williams-Tsien Dance Set



KORS VAN BENNEKOM

"The screen was choreographed as a dancer," says Tod Williams of the main element in the set and costumes he and partner Billie Tsien designed for *The World Upside Down*, a collaborative dance work with choreographer Elisa Monte. The piece, performed by the Elisa Monte Dance Company to a score by composer Glenn Branca, has its U. S. premiere February 12 and 15 at New York's City Center. It was first performed in Amsterdam last November.

The screen in question is a 40-by-13-foot backdrop, made of synthetic rear-projection materi-

al stretched on an aluminum frame and hinged in the center. Dancers move the screen from behind during the 45-minute performance, folding it and turning it inside out, while shadows of other dancers performing at the rear are projected on the screen, in counterpoint to dancers in stage view. Both the screen and the tuniclike, reversible costumes are coated with fluorescent paint, which is imprinted on a flash panel that descends during the performance. Craig Miller's lighting, says Williams, is the "spiritual glue" that holds it all together. **P. D. S.**

Briefs

- **Architect Charles Linn** joins RECORD as Editor at Large. His focus will be on the quarterly supplement, RECORD LIGHTING.
- **The Richard Rogers Partnership** has been commissioned to design a huge waterfront complex for Baltimore. The 500,000-sq-ft Christopher Columbus Center of Marine Research and Exploration will include facilities for research, education, and exhibition. A performance tent designed by FTL Associates of Baltimore will adjoin the site.
- **Benjamin Thompson & Associates** of Cambridge, Massachusetts, in association with Shun Kanda and the Japanese architecture firm Nikken Seikei, has won a design competition for a \$2-billion mixed-use development plan for Yokohama Harbor. The scheme incorporates four towers and a 1,000-foot-long pedestrian mall. The team has also won a smaller, retail project for Tokyo Bay. Ben

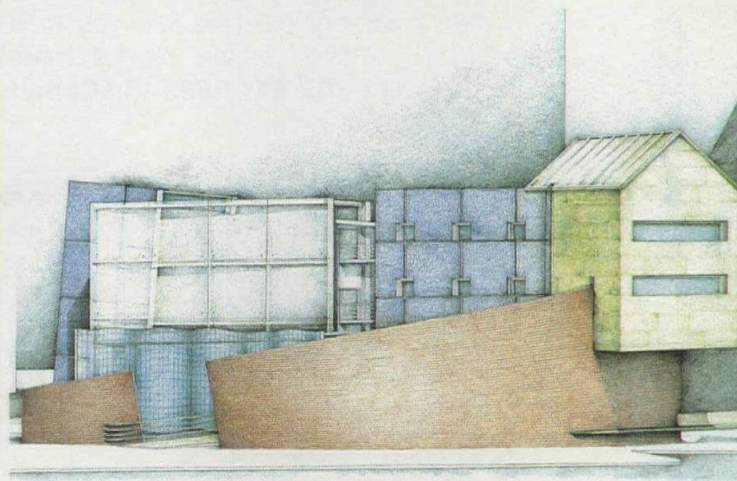
Thompson recently received the Boston Society of Architects' Award of Honor.

- **Rem Koolhaas** has been appointed the Arthur Rotch adjunct professor of architecture at Harvard's Graduate School of Design, through spring 1995.
- **The Aga Khan**, through the Aga Khan Trust for Culture, has pledged to build a \$5-million public park in Cairo, with construction to start later this year. The 75-acre Al-Azhar Park will be adjacent to the walls of the old city, and will include a formal Islamic garden, as well as water reservoirs for Cairo.
- **He who laughs last...** Roman architects Lucio Passarelli and Manfredi Nicoletti have been chosen to design the \$100-million, 350,000-sq-ft Acropolis Museum in Athens, to be built at the foot of the Acropolis.
- **Ada Louise Huxtable**, the respected architecture critic and MacArthur Fellow, has been elected to the American Academy of Arts and Letters. □

Center for Hoboken Housing Authority

This design for the administrative headquarters of the Hoboken, New Jersey, Housing Authority, by local architect Dean Marchetto & Associates, takes strong cues from its site on a full city block in the waterfront town. The building exploits its unused open lot between two seven-story housing projects that are rotated at 45 degrees

from the street. A curving brick wall reacts with the angled housing projects to unify the block. A pitched-roof house form containing the conference room juts over the wall at one end of the three-story, 9,000-square-foot building, which received a 1990 design award for a proposed project from the New Jersey AIA. □



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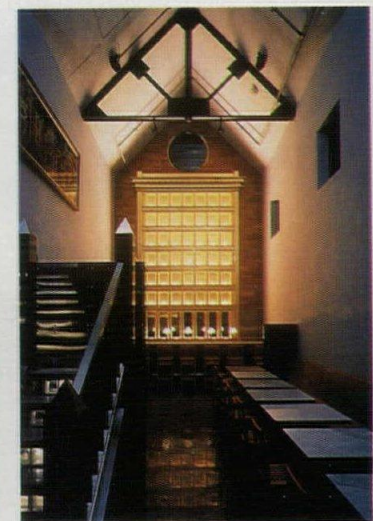
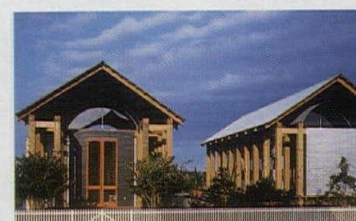
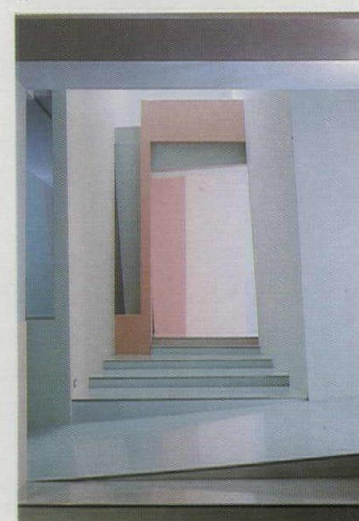
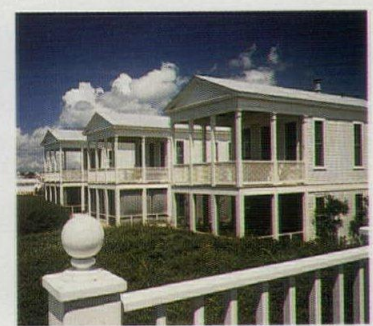
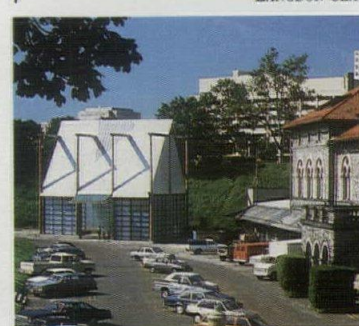
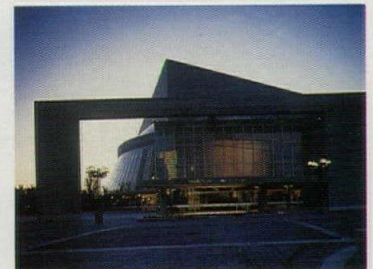
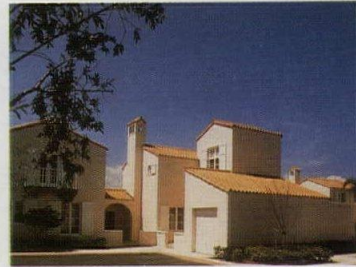
19 Projects Win AIA Honor Awards

The American Institute of Architects has chosen 19 projects to receive its 1991 Honor Awards. "Our choices reflect the particular architectural spirit of our time, its range, and its quality," said Robert Venturi, chairman of the 1991 jury.

1. 360 Newbury Street, Boston; Frank O. Gehry & Associates. 2. Rice Building, Art Institute of Chicago; Hammond, Beeby & Babka. 3. Mendelsohn House, San Francisco; Robert Herman Associates. 4. Dreamland Heights Hotel, Seaside, Fla.; Steven Holl Architects. 5. Courtyard Houses at Wood Duck Island, Vero Beach, Fla.; Robert A. M. Stern. 6. Charleston Cottages, Charleston, S. C.; Christopher A. Rose. 7. Private Residence, East Hampton, N. Y.; Cooper Robertson & Partners. 8. Glendale Heights Post Office, Glendale Heights, Ill.; Ross Barney & Jankowski. 9. Myerson Center, Dallas; Pei Cobb Freed & Partners. 10. Studio, Baltimore, Md.; RTKL Associates. 11. Fukuoka Mixed-Use Building, Fukuoka, Japan; Tigerman McCurry. 12. Honeymoon Cottages, Seaside, Fla.; Scott Merrill Architecture. 13. Koizumu Sangyo Building, Chiyoda-ku, Tokyo; Eisenman Architects. 14. Chatham House, Seaside, Fla.; Walter Chatham Associates [RECORD, Mid-April 1989, pages 100-105]. 15. Camp Tweedale, Lower Oxford Township, Pa.; Susan Maxman Architects [RECORD, July 1990, pages 64-67]. 16. Hotel Il Palazzo, Fukuoka, Japan; Aldo Rossi with Morris Adjmi, Studio di Architettura [RECORD, May 1990, pages 70-77].

Other award-winning buildings not pictured here that have been featured in RECORD include the following: Caribbean Marketplace, Miami, Charles Harrison Pawley Architects [RECORD, November 1990, pages 90-93]; the Royalton Hotel, New York City, Philippe Starck and Gruzen Samton Steinglass [RECORD, March 1989, pages 94-99]; Herman Miller, Inc., Rocklin, Calif., Frank O. Gehry & Associates, [RECORD, January 1990, pages 108-115].

P. D. S.



13 MASAO UEDA

14 MICHAEL MORAN

16

1

2

JON MILLER & HEDRICH/BLESSING

3

4

PAUL WARCHOL

5

6

R. CHRISTIAN SCHMITT, AIA

7

LANGDON CLAY

8

BARRY RUSTIN

9

10

11

PETER AARON/ESTO

12

STEVEN BROOKE

14

MICHAEL MORAN

15

TOM BERNARD PHOTOGRAPHERS

16

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"The World of Coca-Cola," Atlanta
Architect: Thompson, Ventulett,
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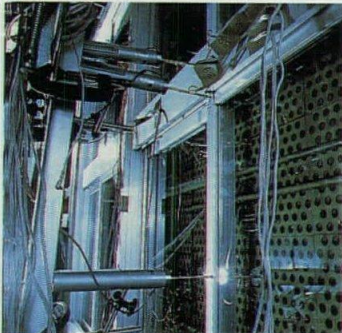
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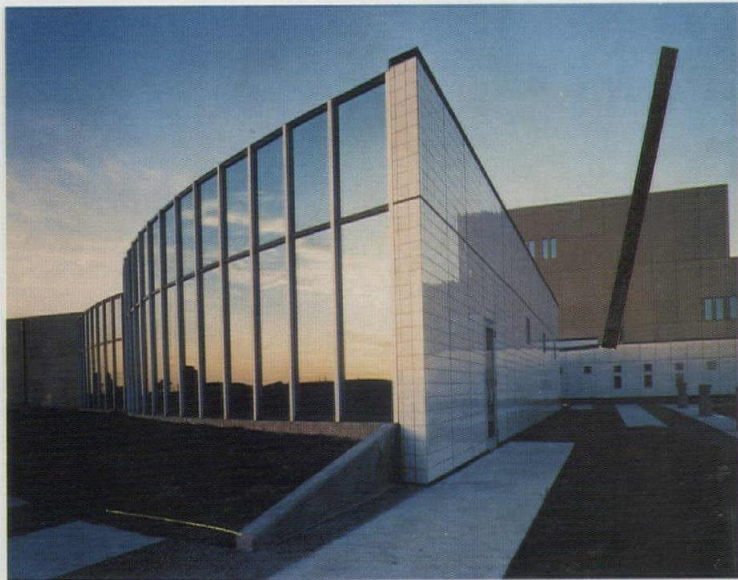
ter J. Shields Main Library (addition), University of California-Davis; Simon Martin-Vegue Winkelstein Moris. 4. Central Chiller Plant East, Miami International Airport, Dade County, Fla.; Wolfberg/Alvarez & Asso-

ciates. 5. Coit Tower (landmark restoration), San Francisco; Interactive Resources, Inc. 6. George W. and Edwina S. Tarry Research and Education Building, Northwestern University, Chicago; Perkins & Will [RE-

CORD, January 1991, pages 68-71]. 7. 225 West Wacker Drive (office building), Chicago; Kohn Pedersen Fox Associates with Perkins & Will. 8. Summit Green (offices and distribution center), Greensboro, N. C.; Gwathmey Siegel & Associates [RECORD, October 1988, pages 82-87]. □



1 RICHARD MANDELKORN



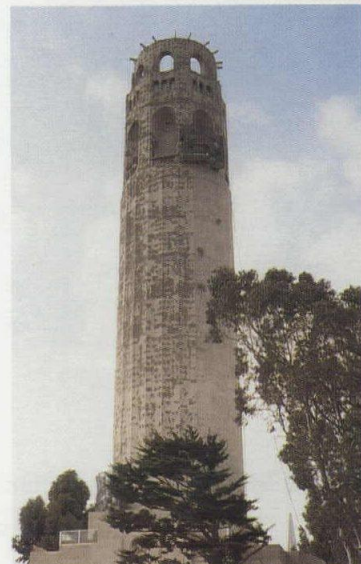
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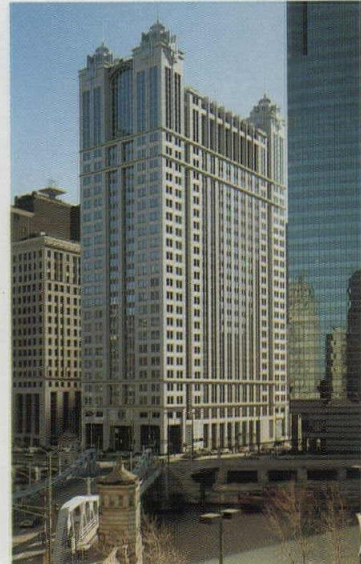
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8 RICHARD BRYANT



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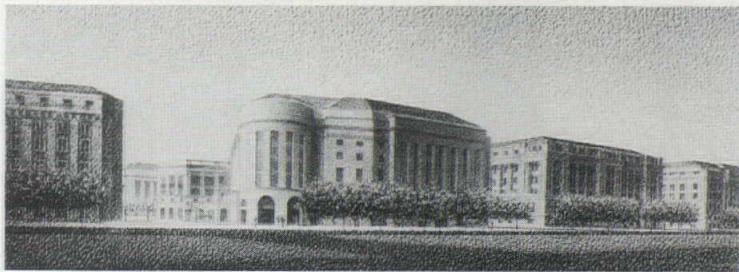


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PRACTICE NEWS



Pei Cobb Freed's massive Federal Triangle moves ahead.

Some Boost From the Military

The Pentagon says some 265 projects with a total price tag of more than \$1.6 billion are now exempt from the military-construction moratorium [RECORD, November 1990, page 23]. This brings an expectation of at least a modicum of new architectural and engineering contracts.

It is still far short of what the military used to build every year—some \$6-billion worth. Still stymied are what the Pentagon's assistant secretary for production and logistics reports as hundreds of anticipated projects—some described as "big-ticket." Among them:

- The \$31-million Lincoln Laboratory at Hanscom Air Force Base, Massachusetts.
- An \$18.5-million Navy combat-zone hospital on Adak Island, near the end of the Aleutians.
- A \$23-million Star Wars test facility in Falcon, Colorado.

The question of whether architectural and engineering services were included in the moratorium has been muddled by tortured Pentagonese in the series of memoranda out of the Defense Department last year. The first one, signed by Defense Secretary Richard Cheney January 24, 1990, said clearly that the services were included.

A second memo from Under Secretary for Acquisition Donald J. Atwood back-pedaled, saying: "Due to rules on the percentage of design completion necessary to include projects in the current budget, design contracts should, to some extent, be

granted an exemption from the moratorium." Another Cheney memo on April 30 said Military Department secretaries "shall not award an architectural or engineering contract, except with the approval of the Deputy Secretary of Defense."

A June 14 memo from Atwood in essence extended the moratorium. A final November 15 memo from Cheney again reaffirmed the moratorium except for Desert Shield projects in the Middle East and some other exceptions, such as locations outside Europe that are not military installations subject to a net reduction of personnel under the Base Closure and Realignment Act.

The bottom line, according to the AIA, is that its members have indeed noticed a definite drop in military work beginning last spring, despite contrary statements by Defense. **PETER HOFFMANN** *Washington, D.C.*

Sign of the Times: Hyping Housing

At least one man has a plan to get his state's housing industry moving again. Meet Maryland's real-estate salesman par excellence—none other than the governor himself.

A proclamation signed by Governor William Donald Schaefer January 1 declares January and February as "Buy a Maryland Home" months. "A wide inventory, steadily increas-

GSA Will Spend \$247 Million on Services

The General Services Administration will spend \$2.25 billion on sites and construction in fiscal year 1991—about three times the amount in 1990. Funding for architectural commissions—in-

cluded in a category called related services for design and construction—rises less dramatically, but, at \$247.7 million, is still way ahead of last year's funding of \$146.3 million. Despite budget problems, the federal government seems intent on fulfilling its traditional role, boosting construction when it falls off in other sectors. □

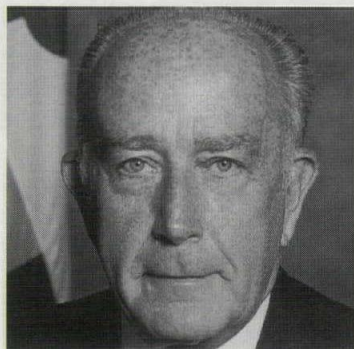
Report Card

Want to know the chances of passing the NCARB's architectural registration exam? Here are

the most recent results on the percentage of applicants who passed the various divisions: □

Pre-design	80%
Site design-written	95%
Site design-graphic.....	32%
Building design	45%
Structural technology-general	65%
Structural technology-lateral forces	81%
Mechanical, plumbing & electrical systems	85%
Materials and methods.....	81%
Construction documents	84%

ing values, lower interest rates, and willing sellers allow buyers an outstanding opportunity to achieve home ownership," said Schaefer. His message kicked off a two-month campaign of radio and newspaper advertising by the Maryland Association of Realtors intent on propping up sagging housing sales. Says a spokesman for the governor: "He's airing the possibilities." □



Schaefer: "Do it now."

Air-Travel Facilities Among Hot Markets

It is no secret that some markets for architects remain strong in general downturns. A conference presented by the A & E Management Academy and the Louis L. Marines Consulting Group pinpoints a few currently:

- Air travel and maintenance facilities—especially renovation and new secondary airports.
- Correctional facilities—especially women's prisons and juvenile-detention centers.
- University buildings—renovation, dormitories, branch campuses, and sports and evening-course facilities.
- Golf-course club houses for our fastest-growing sport.
- National Parks Service restorations of historic buildings. □



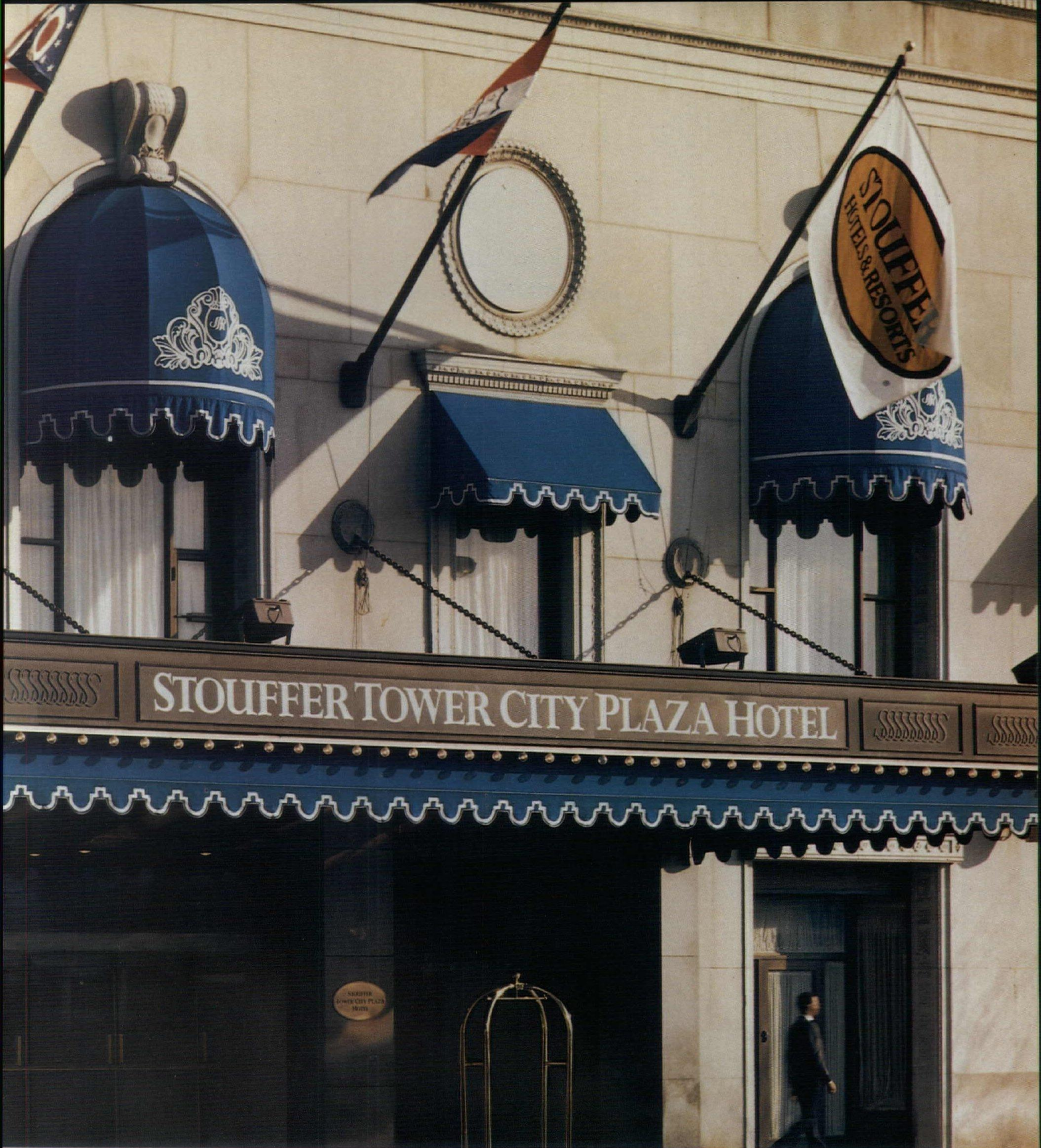
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GETTING CLIENTS' ATTENTION

Society for Marketing Professional Services awards, juried by clients, reveal the most effective communication materials. By Ernest Burden

ERNEST BURDEN



1



2

1990 SMPS AWARD WINNERS

Best of show/special markets brochure:

RTKL Associates

Company brochure

1. Schwartz Silver Architects
2. James M. Montgomery Consulting
3. Civale & Trovato

Special market brochure

1. RTKL, 2. Wimberly Allison Tong & Goo
3. Flynn-Heapes Consulting

Newsletter

1. RTKL, 2. RMT
3. Camp Dresser & McKee

Magazine/annual report

1. Dewberry & Davis, tied with Camp Dresser & McKee, 2. HNTB

Corporate identity

1. Cooper Carey Studio, 2. Wimberly Allison Tong & Goo, 3. Design Workshop

Mail campaign

1. David P. Monti Advertising/PR
2. Kojaian Properties, 3. Tarlton Corp.

Special events

1. The Turner Corporation
2. Kenneth Balk & Associates
3. Haines Lundberg Waehler

Advertising

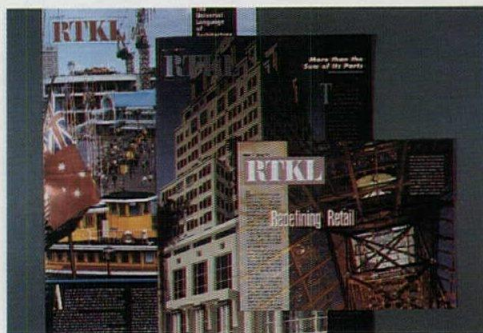
1. Fuessler Group
2. Sigal Construction Corporation
3. Rosser Fabrap International

Combined media

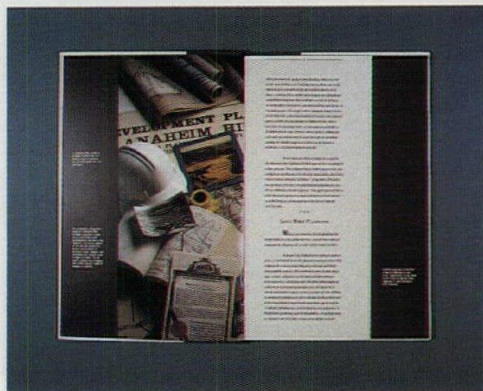
1. CH2M Hill, 2. Daroff Design
3. Sherertz Franklin Crawford

Audiovisual

1. Karlsberger Companies, 2. Urbanimage
3. Paoletti Associates



3



4

Awards for effective marketing materials have been a feature of the annual SMPS annual convention [See RECORD, November 1990, pages 23-25] for 11 years now. For the past two years, the awards have been given by all-client juries from organizations that solicit design services nationwide. They have expressed strong opinions and, usually, acted in consensus. The wisdom of the approach has been shown by

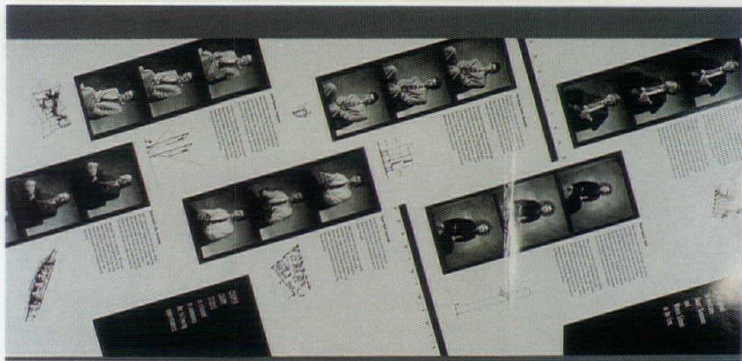
1. Best of show: RTKL's brochure of its architectural-graphics services. "Strong purpose and fun," said the jurors. 2. Covers of winning materials illustrating a preference for color and texture. 3. RTKL's first-place newsletter. "Punch and high quality." 4. Special-events honorable mention: engineers Wildan Associates' book on their 25th anniversary. 5. Corporate-identity first place: Cooper Carey Studio's mailer introducing new firm members. "Human-interest" decided many awards. 6. Dewberry & Davis's magazine tied for second place—

many differences between what the SMPS awards committee *thought* the jury would find effective and what it did.

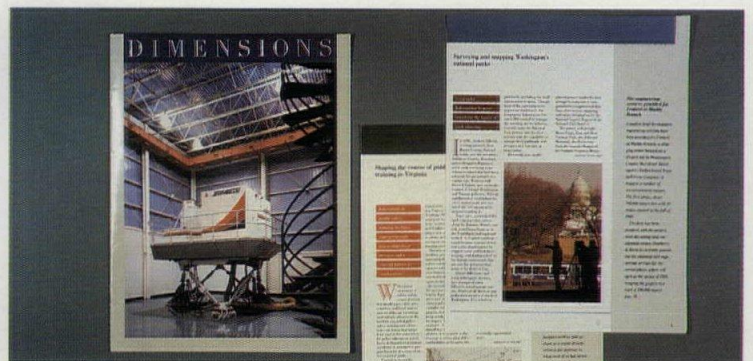
The committee's expectation, based on winning entries over prior years, was that what it would select was clearly destined to receive the accolades of the jurors. Not so. Not only did traditional high-style graphics—minimal text, carefully controlled typography, and lavish white space—not appeal to the clients, they preferred colored paper, textures, and graphics that more resembled popular than professional media.

Looking for the message

If material got the clients' attention, it had to have a message. They responded to targeting markets, research into what those



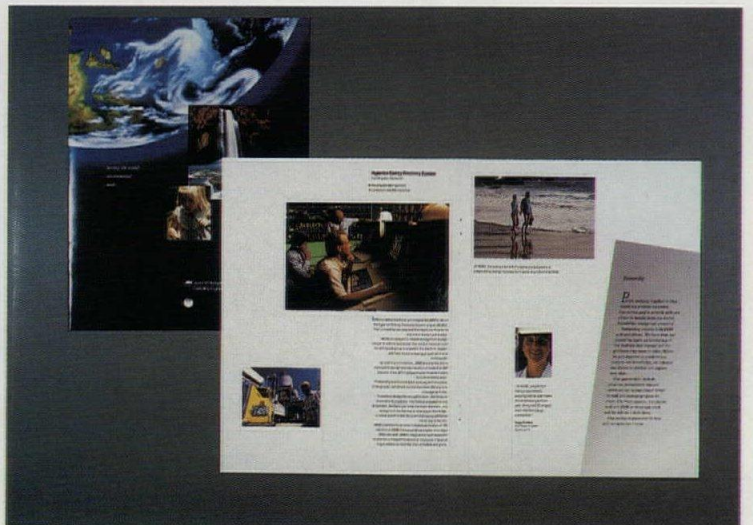
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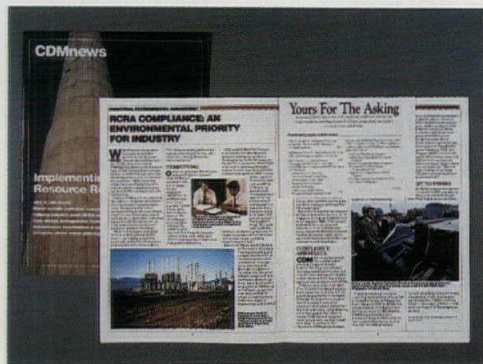
markets were, human interest, humor, and lots of information made interesting. It was: "This is who we are; this is our market; and this is what we can do for you."

Even when the jurors had a good first impression of the graphics, they often found that "the text wasn't saying anything." For instance: "Every firm asserts it provides design 'on time and within budget.' It's meaningless," said several panelists. What specifics appealed to them? They wanted to know "where the principals are coming from." They looked for repeat clients and their testimonials.

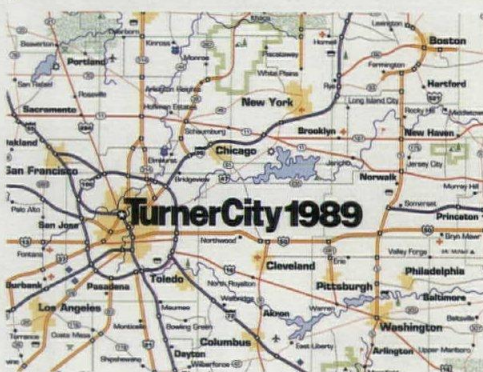
One of the most effective means to get across client testimonials is video. It adds an impact impossible to achieve with printed matter—especially when the client speaks directly and with spontaneity. Still, not all the jurors were convinced about video as an approach to individual clients. It makes a lot of sense at trade shows and a video for this purpose was chosen by the jurors for first prize in this category.

Lessons learned:

- The jury's advice on videos: "Keep them brief. If you can't strike oil in 10 minutes, stop drilling."
- Awards committee chair Dianne Ludman Frank: "In most successful material of all kinds, there was an obvious collaboration between graphic designers, writers, and marketing people."
- Frank: "Show maximum value for money spent. The jury shied at extravagance."



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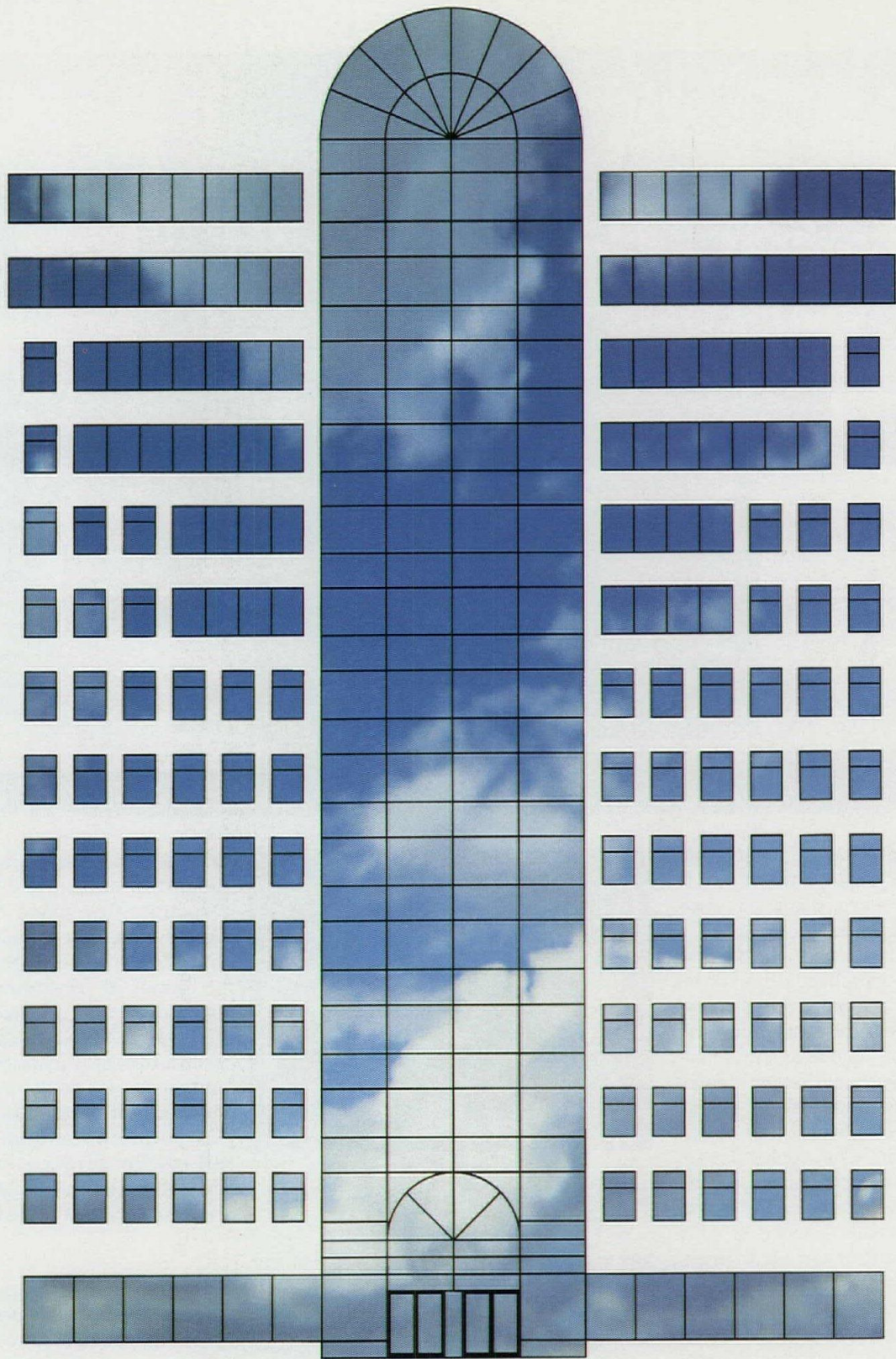
- What works in one category of materials does not in another. For example, firm brochures were chosen for strong philosophical statements, while direct-mail and special-events awards proved that humor and catchiness (but not gimmickry) still get clients' attention.
- One juror: "Get outside your own loop and listen to how clients talk among themselves."

partially because individual pages can be put to other uses. 7. Corporate-brochure first place: Schwartz Silver Architects. The jury liked seeing buildings in use. 8. Second place went to James M. Montgomery. "Well organized and not excessive." 9. Camp Dresser & McKee's magazine tied for second place. "Popular-magazine appearance and writing." 10. Special-events first place: The Turner Corporation's annual mailer showing all current projects in a composite city. The cover, left, shows how to find the nonexistent location. "Clever."

• Do not design for yourself. Said another juror: "The design aspect sometimes takes over and you don't get the message."

Judges

- John R. Berry, director corporate communications, Herman Miller, Zeeland, Mich.
- Pasquale Camuso, vice president, product development, architecture and construction, Marriott Corp., Washington, D. C.
- John Eichler, executive director, Cadwalader, Wickersham & Taft, New York City
- David Max-Muller, senior vice president and director of design development, Forest City Ratner Companies, New York City
- Ian C. Smith, AFCE-SAC/Deep, Offutt Air Force Base, Neb.
- Allen J. Stewart, university architect, Rutgers University, New Brunswick, N. J.



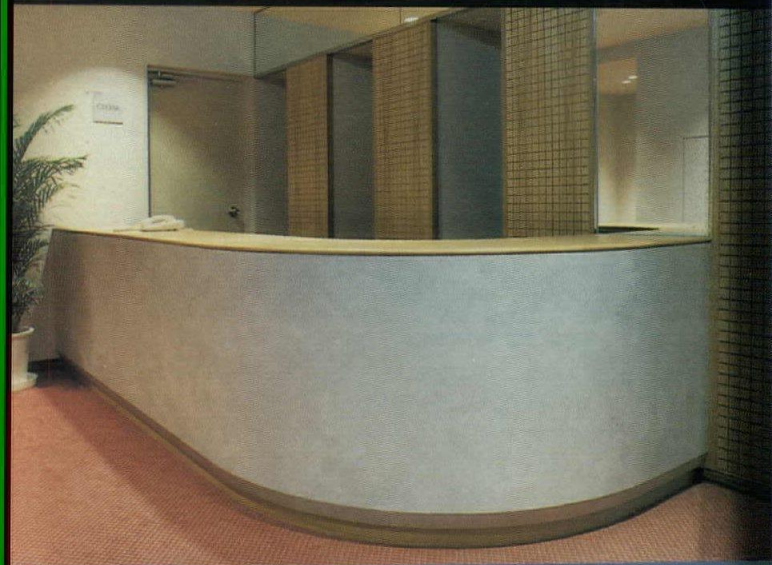
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OVERSEAS WORK: HOW TO MANAGE IT

A RECORD roundtable. Part two. How to get the work done after you get that commission abroad. The experts report their experiences.

There are a few givens in markets abroad. One of them, agreed to by experienced architects, is that, if you want to do work over there, you will have to set up an office there [RECORD October 1990, pages 23-25]. You do not set it up first, but you set it up when you get a commission—"to service a project," as SOM's Alan Hinklin puts it.

Setting up an office creates challenges. Once set up, there are many more obstacles to getting the work done. Here are insights in how to deal with them:

Staffing an office over there

One option is to have a staff of both U. S. and foreign nationals. The synergies may work, but the different expectations may offer problems. "Work conditions and habits, expectations, benefits, vacation time, and productivity are all different," said Fred Koetter. He spoke from his experience with his 25-person branch office in London with an indeed binational staff.

Do differences abroad mean more benefits to the employee and thus more cost to the employer? "Certainly in Western Europe," responded Kristine Fallon. "Especially vacation time and fringe benefits," clarified Koetter. "They work much harder in Hong Kong," observed Lo-Yi Chan. "They have 26 annual holidays," countered Alan Hinklin. "In some countries, it is almost impossible to dismiss people after you've hired them," said Robert Cooke.

But bringing over an all U. S. staff may offer problems as well, Koetter reported. It means local work permits, which may or may not be easy to get if a job can be equally well performed by a local.

Which U. S. staff will you want to send? "It's harder to send married people," said Robert Sobel. "They want to know about schools and houses. A single person with no family ties is much easier to export."

Cooke agreed: Especially for a first project, "it is far better normally to send a single person. It's easier to mobilize them quickly and relocation costs less. If the project doesn't work out, demobilizing is fairly simple. For the longer term, yes, you can send over married couples."

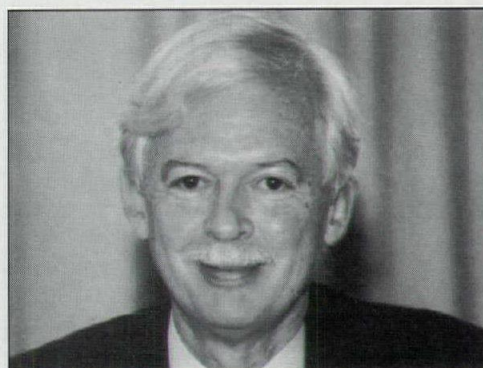
All of the panelists agreed that whoever is sent will have to be senior. The clients expect it; you need it to get the work done



Samuel T. Balen, executive vice president, NCARB



Lo-Yi Chan, partner, Prentice & Chan, Ohlhausen



Robert P. Cooke, president, Perkins & Will International

correctly. "It's one of the hidden costs of work abroad," said Bradford Perkins.

Fighting the perks problem

"It's a left-over expectation from the old days," said Cooke. "People used to go over and get a 30-to-40-percent adjustment in

salary, housing, a car, schooling for children, two or more roundtrip tickets home each year for all the family, servants. Those days are through."

"The once-generous perks in Saudi Arabia colored everyone's view of what international practice was," said Thomsen. "Probably no single thing restrained our ability to grow internationally more than that."

One solution: Do what the locals do

"To survive in Hong Kong," continued Thomsen, "we sold part of our company there to a local partnership that taught us a very simple attitude. Our people are local everywhere they are. They get the same salaries and working conditions as their peers. We can't compete in a local economy and spend on foreign-service premiums."

"That policy is becoming the only way," agreed Cooke.

Hinklin saw it as an inevitable evolution: "Because we are almost forced to be there, we naturally become part of that culture. U. S. staff people must commit to it before they go. London right now is the success story of all our offices abroad. It is a local office. It has its own personnel guidelines, own benefit programs, own administration, and own accounting."

Does Skidmore plan on hiring a larger percentage of locals in its foreign offices? "Yes," responded Hinklin. "We want it to be a London office. We want it to be a Hong Kong office. We have a few people there from the States who bring the firm's expertise and the firm's culture."

"When you decide you want to have a local practice and do lots of projects," said Thomsen, "then you need people who understand the culture."

What services foreign clients expect of us

In many foreign countries, architects have done their job when they produce design-development drawings. Do those countries want full U. S. services, including working drawings and construction administration?

"That may happen," said Thomsen. "But the real trend is probably going to be the Japanese and French style of design-build. Architects design a building and put it out for lump-sum bids after what we call design development with a good set of specs.

Working drawings and construction technology are the responsibility of the contractor. Architects solve the client's functional problem and produce a design. We're going to see more of that here."

"Quite often," said Cooke, "you research the fee you should charge—what the market allows—but you don't study what the product needs to be. You go back home and produce what you're used to in Chicago or Houston. But much of that work isn't done in Cairo, so why act as if it is? If we produce according to U.S. standards, we may have a very low profit and done unnecessary work. So get to know how other countries organize. For instance, in Britain, the bills of quantity, which we are not used to, become the real documents for bidding and, in law, are referred to much more than the drawings."

"We develop religious convictions about our methods in the U.S. that are not shared by other countries," said Thomsen. "You go over there, figure out how they do it and say: 'Boy, that really makes a lot of sense.' So one of the wonderful things about international practice is not only to export ideas, but import them too."

How new ways of working can benefit us

"What kind of control does the architect have when contractors develop construction details?" asked Samuel Balen.

"The answer to whether you should do design-development or schematic or full working drawings," said Sobel is: "Show me who's going to build the building. We thought we had died and gone to heaven the first time we worked with a Japanese contractor, which took a very nice set of design-development drawings and turned them into a very nice set of construction drawings, changing anything we didn't like—sometimes repeatedly. But I don't agree that this is going to be the coming thing in America. Most American contractors can't grasp the system. That makes them noncompetitive abroad."

Hinklin related a similar experience in Korea. "We only had to have a few people there to see that the design was carried out." Would people perceive that Skidmore did less than a full job? "They're going to perceive what the building is," said Hinklin, "not the set of drawings. You have to take each project on its own unique characteristics and then just service it."

"A lot of the U.S. jobs are done by smaller firms in association with other architects," pointed out Perkins. "This new system is much the same."

The importance of turn-key

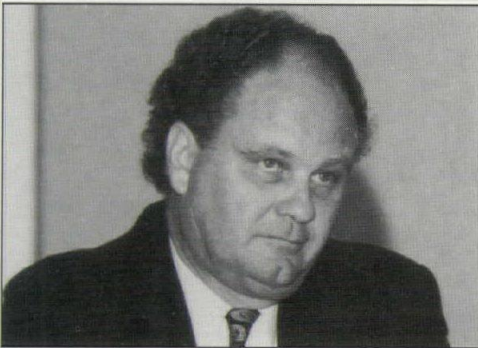
In the first part of this report, several panelists discussed the disadvantage that Americans have in competing with those countries—especially Japan—where contractors offer a total package of design and construction. Is this wide spread?

"That's coming on strong," answered Cooke. "The Japanese never talk about architectural fees because they deliver all aspects of a project." One source of help for such competitors is their governments. "The Japanese can get low, long-term financing. In Western Europe, risks can be mitigated by the government."

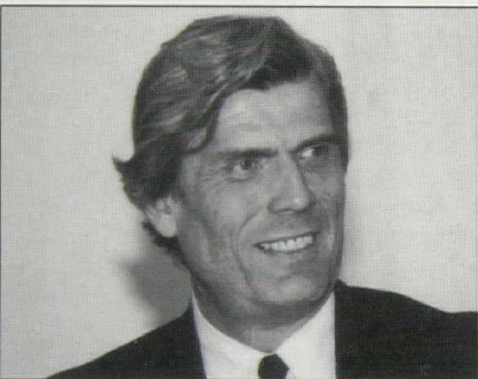
How do architects get the experience to put together design-build packages themselves? "The A. Epstein Companies started out with a small industrial project 25-to-30 years ago," said Fallon. "It gave us the



Kristine Fallon, president, Computer Technology Management, A. Epstein



Alan D. Hinklin, partner, Skidmore, Owings & Merrill



Fred Koetter, partner, Koetter, Kim & Associates

expertise to go into Poland in the early 1970s. We still find them the best approach in Poland. Our big public library in Chicago was a design-build project. So suddenly, our background abroad has put us into a whole new arena here."

"We just don't know about design-build," commented one of the panelists.

"That you don't know about it is one of our problems," retorted another.

Breaking through the language barrier

Are there countries it will be impossible to work in without speaking the language?

"When I was a consultant to British Petroleum," related Cooke, "my boss said to me: 'Isn't it amazing that we both speak the same language and we can't understand each other?' An absolutely key issue is language and the ability to communicate in it. None of us is going to take a crash course in Chinese or German and become conversant with the technical terms. We need conversant members of our team."

What about hiring an interpreter? "You can," responded Sobel, "but it's better to have your own instead of the client's."

Added Cooke: "Try to find one conversant with the building industry and practice of architecture. It's not easily done."

Are language and having a one-on-one rapport important to getting commissions? "I don't think so," replied Thomsen.

What languages do the people who are so successful abroad speak? On this panel, no one claimed to be fluent in a language other than his own—on technical matters. "I think the people of the next generation are going to be different," predicted Chan.

The cultural barriers may present the highest hurdle

"The biggest barrier—the countries we have the hardest time working in—are those countries that have corruption in their business practices—how you do business with the government, get materials imported, or order them. Anybody disagree with that?" No one did. "We don't know how to do business that way. Americans always get in trouble when they try business with corrupt countries."

"Language is only one piece of the problem," said Chan. "A much broader issue is understanding the culture of a country. The Chinese turn off air conditioning. You give it to them. They turn it off. They can't afford the energy. If you design a museum, that is a problem. It's also an example of the culture affecting the way you work."

"It's easy to forget that basic American planning parameters," said Perkins, "do not necessarily apply—even in building types imported from the U.S. The core of a highrise office building will not necessarily look like a U.S. core. In Spain, each office suite should have its own bathrooms."

"There's a difference between language and communication," concurred Hinklin. "Language is the simple part."

"I think about language as culture," said Cooke. "The way a Frenchman thinks or an Arab thinks is a direct derivative of his language. That person who speaks the language on my side of the table has to be able not only to translate, but to tell me 'this is what they mean.'"

"When I was in Hong Kong in the 1970s," related Hinklin, "I worked for a Chinese developer. I tried for three months to convince him to bring in caisson contractors because his site was on the sea. Instead, he put a family over each foundation site in a tent. The man dug the hole, and the wife cooked and pumped air into the hole. This kept 140 families in business. I thought I understood humility and communication. But you don't just take American technology into a country and impose it."

"There's going to be a great premium," said Koetter, "on architects who have experience in more than one culture."

Importance of nuances and semantics

Figures of speech can get you in trouble. "One of my colleagues was negotiating with a Saudi Arabian," related Cooke. "There was turmoil about the scope of the work, and finally the American said: 'Look, we can do it this way, this way, or this way. There are a number of ways to kill a horse.' 'Kill a horse?' the client replied, 'I'm not going to kill a horse.'"

Thomsen: "There was the time somebody said: 'As his eye fell on the page...'"

Even Chan, who speaks Cantonese (not official Chinese) and some Mandarin (which is), does not trust himself in negotiations. An added advantage to interpreters: "It gives time to think about what I'm going to say. You know how important face is in China. You have to find a way to say what you want that the client can accept. That's part of the culture, too."

"The English language in many instances is much more precise," said Cooke. "When I make a presentation in an Arabic country, for example, I need our work approved so that we can proceed. I get the translation. 'They see no objection to your proceeding into the next phase.' So I send an invoice quickly. If they pay, I know the last phase was approved—maybe."

"We got about half way through a job in China," recounted Sobel, "and the client said: 'We really have to get you under contract.' We responded: 'What do you call this document?' On the front page it said 'agreement.' So we had to change it."

The language of documents

"It's important to put in your contract that the documents you're given to work with are in English," said Sobel. "Although we designed a 5.7-million-square-foot project in China, we have no English copy of the Chinese building code. To get it translated

is a tremendous effort. An estimate on just the technical parts, thick as the New York City phone book, was \$800 a page."

Is that contract requirement acceptable in most countries?

"Usually," replied Sobel. "But, if it isn't, you need to know about it right away."

How do you deal with documents that are not in English?

"Fax machines help," said Chan. "We get documents that I can't read, but I insist our Hong Kong consultant gets them and translates them simultaneously."

LEONOR M. GLYNN

	Requirements for practice in each country, Roundtable Consensus				
	License in country	Knowledge of language	Local associate	Local office	Currency convertible
Austria	Y	Y	Y	N	Y
Belgium	Y	N	N	N	Y
China	N	Y	Y	N	Y
Egypt	Y	Y	N	Y	R
Finland	N	N	N	N	Y
France	Y	Y	Y	N	Y
Germany	N	Y	Y	N	Y
Hong Kong	Y	Y	N	Y	Y
India	Y	N	N	N	N
Italy	Y	N	Y	N	Y
Japan	Y	Y	Y	N	Y
Korea	N	Y	Y	N	Y
Netherlands	N	N	N	N	Y
Norway	N	N	N	N	Y
Saudi Arabia	Y	Y	Y	Y	Y
Singapore	Y	Y	N	Y	Y
Spain	Y	Y	Y	N	Y
Sweden	N	Y	N	N	Y
Switzerland	N	N	N	N	Y
Taiwan	Y	Y	N	Y	Y
United Arab Emirates	N	Y	Y	N	Y
United Kingdom	Y	Y	N	Y	Y
USSR	N	Y	Y	Y	Y

"We produce documents in a number of languages," said Fallon. "Our foreign offices are generally headed by a native."

"Language has never been a barrier except in the written form," said Sobel.

Thomsen: "It's a chore, not a barrier."

But translation can be ticklish. One way to be sure you get what you expect: reverse translation. "We are going to translate the NCARB exam into French," said Balen. "The only way we can be sure it's right is to translate back to English."

"Our recommendations to the Saudi Council of Ministers were translated into Arabic," said Thomsen. Our contact said: "They accepted your recommendations. Here's the translation." We couldn't recognize anything we recommended."

Perkins used an extreme example in Iran in the 1970s: "If you didn't have your own interpreter, you could count on the contract terms being purposely changed. If they weren't translated back, you could

find yourself in some very unpleasant situations."

How different are contracts abroad? "Even the English ones are quite different," said Koetter, "in interpretation and in the architect's legal role."

"The other technical problem," said Sobel is that you must sign the contracts in two languages. If you don't know one of them, you can't possibly read what you agreed to. Yet it's the only logical way. You must make the interpreters certify that the two versions both say the same thing and hope they do."

The interpreters' liability?

"Everything is so technical in our profession," said Sobel, "it's hardly reasonable to assume they know for sure."

Chan's approach: "Write the broadest memo of understanding and cross your fingers." His approach to construction contracts is an extreme of ingenuity: "We have the contractor build sample wall panel over and over until it meets our specification. Then we use that as the contract."

"My experience," said Thomsen, "is that it really doesn't much matter what's written down. What does matter is that we had a good understanding when we started."

"If it's a good relationship," seconded Perkins, "you don't need a contract. If it's a bad relationship, the contract doesn't protect you or save you."

A new importance for CAD

"Because we selected local architects and engineers using our CAD system," said Chan, "they simply manipulated our documents to take them to the next step."

Panelists found new importance for CAD inherent in the ways of working abroad. "When construction technology is so strongly in the hands of contractors," said Thomsen, "finding a process that integrates their knowledge into the design more effectively is important."

"Probably the major consideration in computer technology—and it goes beyond CAD per se—is its ability to move information more quickly," said Fallon, "which, of course, is essential in international work, if a distant party is carrying on the work your firm has started. But we haven't done much to maintain a flow into the construction process. That's our next step."

She addressed compatibility of systems: "Right now in Western Europe you will find that most of the systems are American. Only the French try to grow a lot of their own. But that may change. All Euro-

peans are rather annoyed that their systems are American and they may try to generate their own."

Our need to catch up on CAD

"What I have noticed in Western Europe," said Fallon, "is that architects are considerably more advanced in how they use CAD than Americans. This is a competitive disadvantage that will grow quickly as Europe's current high prices drop. U.S. CAD suppliers say that the clients who are currently driving their research and development are the Europeans. The Germans are demanding a very high-level capability in systems. The Americans don't even know what to do with those features."

"We are very heavy users in our London office," said Hinklin. "It's unbelievable that the young people from Europe come in, sit down, and just take off."

"It's not just training," said Fallon. "The basic deficiencies in the U.S. are math and science. Students don't comprehend the basics in computer technologies."

Others' need to catch up on CAD

"Eastern Europe is different," continued Fallon. "The NATO allied countries some time ago agreed not to ship high-tech resources to the eastern bloc. As a result, the highest level of computer you find today in a Polish office would be a 386 PC. So, if you're going to set up a computer operation there, your people are going to have to be very knowledgeable. There's no support, no dealer network, user groups."

"If you walk into even some of the larger Western European offices," said Perkins, "there may be a computer on every desk that, in some cases, is just a status symbol. It's a little like the U.S. offices that rushed into CAD before it was cost-effective to be able to say they were in it."

Chan: "The Chinese have a Great Wall computer, which is a PC clone. They make paper copies of everything in triplicate, which tells us their confidence level. But many use CAD with good results."

"There's a pretty broad spectrum of competence in China," agreed Sobel.

"China can be helped enormously by computer technology," observed Chan. "They do a lot of buildings over and over and over—housing, schools—they have such great needs for construction."

Knowing who makes the decisions

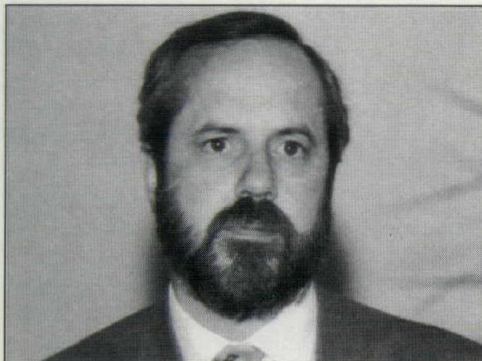
"In the U.S.," said Sobel, "there are three levels at which decisions are made—low, middle, and top. Abroad, the middle level is missing. You send a project manager to an overseas job and he can't find his opposite number. He can find the boss and he can find the guy at the bottom. In Asia, all decisions get pushed up to the top."

"There's another cultural barrier here," said Thomsen. "In the U.S., when somebody wants to talk business, we visit—

watch body gestures, talk about mutual friends, schools—and I know who I'm talking to. Abroad, all those subtle little cultural signals disappear."

Fallon pointed to blocked accessibility to top people as another problem. "For example, we tend in the U.S. to answer our own telephones. Abroad, you're so heavily screened, you just don't get through. You use the phone to make an appointment."

There are other barriers to reaching the top people. "I will be making a presentation and getting signs that the client is



**L. Bradford Perkins, principal,
Perkins Geddis Eastman**



**Robert Sobel, president,
Emery Roth & Sons**



**Charles Thomsen, president,
3D/International**

happy," said Hinklin, "and then realize I'm talking to people delegated by the leader because he doesn't speak English or know the business and would feel uncomfortable dealing directly. So make sure the decisions given you are the right ones."

"It certainly has been my experience overseas," said Perkins, "that personal re-

lationships are even more important in other cultures than they are here. And decisions on hiring an architect tend to be made at a much more senior level."

The importance of good relations with foreign partners

"I have found that local architects have a justified resentment that we're there," said Chan. "So we make efforts to soften this, such as asking our client for money to bring our partners here. They make a lot of decisions. Make sure they're happy."

"If we don't make our partners successful," seconded Thomsen, "we're not going to do well. Good foreign projects without a local partner are rare—in Europe, the Mid East, the Pacific, or Dallas or Denver."

Will a client abroad come up with funds for such perks as trips for local partners?

"Yes," responded Chan, "because the client realizes the quality of the project depends upon the partnership's success."

"On the scale of project costs," agreed Hinklin, "such perks are minute."

"Good relationships with partners certainly eliminate the sense you're a carpet-bagger," said Fallon. "You are establishing a relationship with a local firm."

Can you hand off a project to a partner at some point? "A recipe for disaster is to hand off after working drawings," said Thomsen. "If your local partner is doing the construction administration with your working drawings, every mistake on site will be explained to the client as *your* mistake. So either do administration or hand off after design development."

"If you hand off construction documents at the end of design development," said Cooke, "it is a reasonable separation of responsibilities. It works best if you can get some of your staff involved during the construction-document stage to monitor how your designs are interpreted."

"What we're all after is a finished product we're proud of," said Hinklin. "I don't think you can hand off. You may put more effort up front and then phase down."

What was learned from these experts?

- The more you pattern a local office on local practice—including hiring local staff and adhering to its working patterns and pay scales—the more productive, profitable, and long-lived your office will be.
- Do not do more than the client and local contractors want or will use.
- Let contractors who produce good working drawings do it where customary.
- You will probably want a local associate.
- CAD can help in both relationships.
- Get paid in dollars and work with English-language contracts and documents when possible.
- Know what clients are saying beyond the literal translation of their words.
- Good personal relationships may mean more than good contracts.

CHARLES K. HOYT



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MARVIN DOORS



Circle 17 on inquiry card

NEW KID ON THE BLOCK

Part two of a series on information management covers computer-based expert systems—knowing what they are, how best to use them, and their future potential. By David Kent Ballast

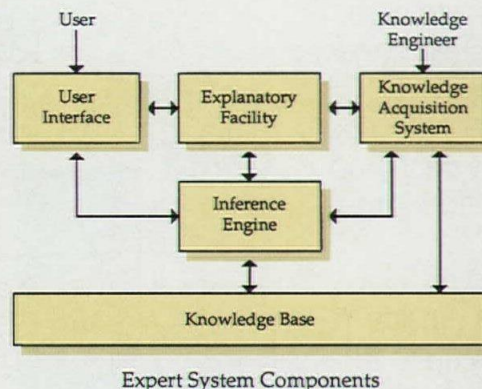
Although still in their infancy, expert systems on computers offer the potential for improved quality control, increased productivity, and better management of information. They are currently used for such diverse design tasks as product selection, exit-stairway design, solar-energy engineering, and production scheduling. Equally varied applications are being developed in research centers around the country. However, there are many questions to resolve before they become commonplace.

Knowing an expert system when you see one

An expert system, sometimes called a knowledge system, is a computer program that uses a knowledge base and inference procedures to solve problems within a specified application area. The knowledge base consists of facts and representations of the knowledge within the area. For example, the statement "if a door is less than three feet wide, then it does not qualify as a fire exit" is a piece of knowledge about a building code. This type of "if-then" rule is a common way of representing knowledge. Because of the complexity of representing human knowledge and developing valid rules for its application, expert systems are generally used on narrowly defined problems.

To understand the promise of these systems it is first necessary to know how they differ from other types of computer programs. Many of the products promoted as expert systems are not true expert systems, but parametric CAD or programs that link drawings with specifications or with other project information. Some are simply advanced algorithms that find information whether on drawings or alphanumeric documents. Although useful, they should not be confused with the real thing because the differences are important to the ultimate success of expert-system technology.

One of the unique characteristics of an expert system is its use of heuristics, a term most easily defined as rules of thumb. Heuristics can also be thought of as the art of good guessing because—in the absence of a reliable algorithm—an expert system will draw inferences that



Many of the products promoted as expert systems are not true expert systems, but parametric CAD or programs that link drawings with specs.

are based on certainties in the knowledge it has at its disposal.

How an expert system works

An expert system is composed of at least five major parts (see diagram above). These consist of an inference engine, a knowledge base, the user interface, an explanatory facility, and a knowledge-acquisition system. Other components may be present in more sophisticated systems.

1. The core of an expert system is the *inference engine* that controls how the knowledge base and input from the user are processed to arrive at a solution. It decides where to start the reasoning process and the order in which inferences are made. It is the logic that ties everything together.

2. The *knowledge base* contains the facts and relationships that are unique to the specific domain of the application. There are several ways to represent these,

but the most common is with "if-then" rules. The knowledge base contains unchanging facts as well as the heuristic rules that represent the knowledge of the expert.

3. The *user interface* consists of a video display terminal and keyboard, although other devices can be used.

4. Working with the user interface, the *explanatory facility* is a part of the system that shows the route used to make conclusions and the reason(s) why the system may be asking for a particular piece of information to complete a conclusion. This facility not only elaborates on the problem-solving methods employed, but also serves as a learning tool for novice users.

5. Finally, the *knowledge acquisition system* enters expert knowledge in the program and is used to modify it.

The process of translating facts and human expertise into computer language requires a so-called knowledge engineer whose work is vital because most human experts do not really know how to express the full extent of their knowledge in a manner the system can understand.

It is very likely that knowledge engineering will be the one weak link in the expert systems chain that will retard development because of the need for people trained in the discipline.

Most knowledge systems are created by using an expert-system shell. Typically, this includes the inference engine, the user interface, the explanatory facility, and the knowledge acquisition system. It is left to the user to develop the knowledge base unique to the application. With this approach, the same shell can be used to solve a wide variety of problems with different knowledge bases.

Expert systems used today

Currently, very few architectural firms use expert systems. However, those that do show their potential for professional practice.

Jung/Brannen Research and Development Corporation of Boston is one of the leaders in the field. It has developed 27 Artificial Intelligence Based Expert Systems (AIBES) modules to perform such tasks as designing toilet rooms, elevator cores, fire stairs, curtain walls, and atriums as well

as modules for various facilities management jobs.

Although these programs have been developed for in-house and corporate client use, Jung/Brannen anticipates offering at least one module for the architectural community, possibly as early as 1992. However, instead of selling a complete, ready-to-use package, Jung/Brannen plans to market its system without the knowledge base. This is to avoid liabilities of misapplied information and to allow purchasers to customize their systems. The product will probably be sold in conjunction with a workshop to teach buyers how to develop their own knowledge base and use the program effectively.

At Stone & Webster Engineering Corporation, expert systems are employed in a variety of applications including steel connection design, scheduling, and welding procedures. They have been developed for both clients and in-house use. The firm also sells software that links CAD with an expert system. Users are required to add their own knowledge base, but, once this is done, the system can be used for tasks such as material selection, advice on the practicality of designs, and on-line help while creating CAD drawings.

Architectural Synthesis of Nashville, Tennessee, takes a slightly different approach similar to McGraw-Hill's Electronic Sweet's systems. Its knowledge-based systems are designed to assist architects and contractors with selection of specific items from a manufacturer's product line. The system is similar to a dialog between an architect and a manufacturer's representative. It queries the design professional on the particular requirements of the project and produces specifications or drawings.

Each module for a manufacturer is a stand-alone system on disk independent of any particular CAD system. Instead, interfaces are available that link the program with one of several commonly used CAD programs if drawings are required. There are currently three completed systems and work on eight more has started.

Expert systems potential

Expert systems can be used to improve quality control, to increase productivity, to store and pass on the knowledge of the firm, and to handle more variables than humanly possible when solving complex problems. They can be configured to generate a design, evaluate a design, or interact with a human in solving a problem.

- To generate a design, the program accepts initial parameters and restrictions of the problem and develops the most reasonable solution. Many of the AIBES modules developed by Jung/Brannen are of this type. The Center for Integrated Facility Engineering at Stanford University is also working on several expert systems that aid in the design process.

- The second configuration compares a completed design against a given set of criteria such as building-code compliance. The *Exposure* program developed by the Center for Fire Research at the National Institute for Standards and Technology is an example of this type. It determines the exposure hazard of one building when an adjacent building is on fire.

- The third configuration is interactive. The user supplies initial input and the system prompts for more information to clarify the problem. Diagnostic programs for building failures and material selection systems follow this procedure.

- Expert systems can also be used to manage information from other sources. Instead of using the system for problem solving, the computer serves as an intermediary to gather and collate the growing amount of data available to architects. Currently, the Army's Construction Engineering Research Laboratory is using this approach to develop an expert system to

Someday expert systems
will be used by
architects to handle
more variables than
humanly possible when
solving complex
problems.

assist military-construction program managers retrieve and analyze data from the Construction Appropriations, Programming, Control, and Execution System database.

Realizing the potential

While expert systems are seductive, what does the technology mean for the average, practicing architect? Certainly, the computer programs that claim to have "intelligence," but are a step or two below a true expert system, are valuable. Today's parametric CAD, code-checking, and material-selection programs help improve quality and speed architects' work. However, before expert systems become commonplace, several questions must be answered.

1. Who is the expert? Systems that offer prepackaged knowledge may provide a quick, easy way to solve a problem, but the architect does not know whose knowledge is being used or may not agree with it. An even greater risk is the false sense of security an off-the-shelf system may give. A system with little knowledge can be dangerous.

2. Who develops the system? Ideally, each office should create its own, tailored for its particular needs, but developing an expert system takes a major commitment of time and money. Even expert system shells without the knowledge base must be "charged" by the user and this requires a competent knowledge engineer.

3. Who is responsible? If an expert system helps a professional make decisions who is liable? Who is responsible for the knowledge base? Even current limited warranties of software may not cover all the possible legal problems.

Regardless of how these questions are answered, it is likely we will see some or all of the following developments:

- Software developers and suppliers will continue to take liberties with the term "expert system." There is nothing wrong with a product being called intelligent or semi-expert as long as you understand that what you are buying may not be a true expert system.

- Most expert systems will, in some way, be integrated with CAD. Because architects' stock in trade is graphic information, the most productive applications of the technology will take this into account. Knowledge systems may help the profession ultimately achieve the integrated design and construction databases that many are currently working on.

- Expert systems will be marketed with the knowledge base separate from the shell. This will probably be the best way to balance the factors of cost, development time, and developers' liability and will allow the design professional to customize the system.


- In the distant future, some professionals may specialize in playing an intermediary role between human knowledge and the computer. Schools may even offer degrees in architectural-knowledge engineering.

- The best uses for expert systems for the largest number of firms will probably be in passing along corporate knowledge and in managing information. Other types of computer programs and products may do a better job of scheduling, product selection, and other common tasks.

However the architectural profession chooses to use expert-system technology, it is likely that expertise will not be abdicated to a prepacked software program. Expert systems will be valuable tools, but the preeminent inference engine will still be the competent architect and engineer. □

For more information:

- *Developing Expert Systems*. Edmund C. Payne, Robert C. McArthur. John Wiley & Sons, 1990.
- *Expert Systems*. Paul Harmon, David King. John Wiley & Sons, 1985.
- *Expert Systems-A Practical Introduction*. Peter S. Sell. MacMillan Publishers, Ltd., 1985.



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CONTEMPORARY DETAILS: A SAMPLER

New and old production techniques, often combined, are meeting the demands of complex design technology. By Norma Sklarek

Less is more" seems out and complexity in. Architects are reinstating or mimicking details of classical architecture, retrofitting two- and three-decade-old "modern" projects as well as older classical buildings, and designing more intricate and complex combinations of details. Along with this come the complexities of new construction technology.

To meet the new demands, appropriate drafting and detailing systems are evolving. The more automated of these are termed by architect Jon Jerde "wizz-bang." Current drafting techniques may be broken down into:

1. *CAD*

2. *Keynote systems* which use numbers to refer to notes and labels along an edge of the drawing and sometimes to specification numbers.

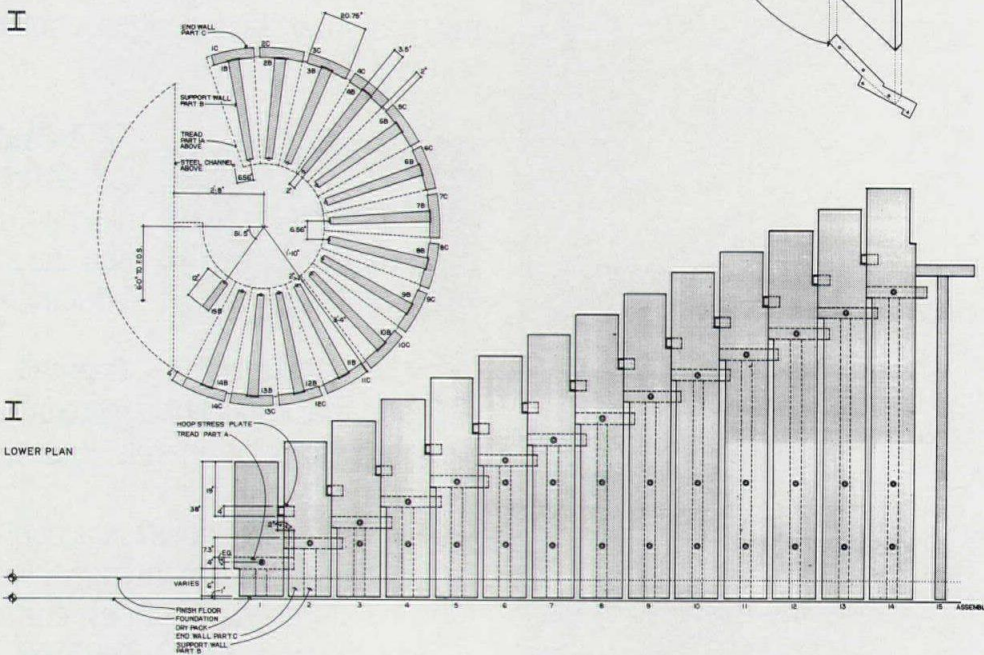
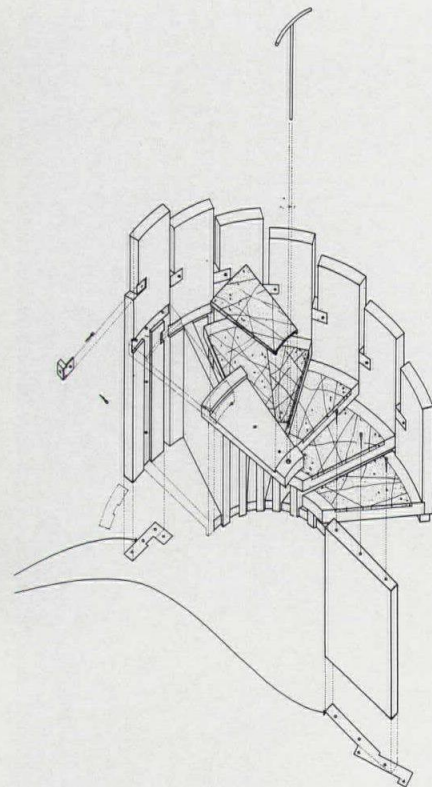
3. *Overlay drafting* in which a base plan is drafted on one sheet and dimensions, notes, furniture, and engineering drawings on separate sheets laid over the base and aligned by means of a pin bar.

4. *Paste-up details* in which details are drafted on small modular individual sheets, then assembled onto a full-size sheet, which is photocopied onto mylar or vellum to produce an "original." Details can be used repeatedly on subsequent projects.

5. *Screened polyester-film sheets* on which the base drawing is screened 50 or 60 percent and becomes the base for engineering and other consultant drawings.

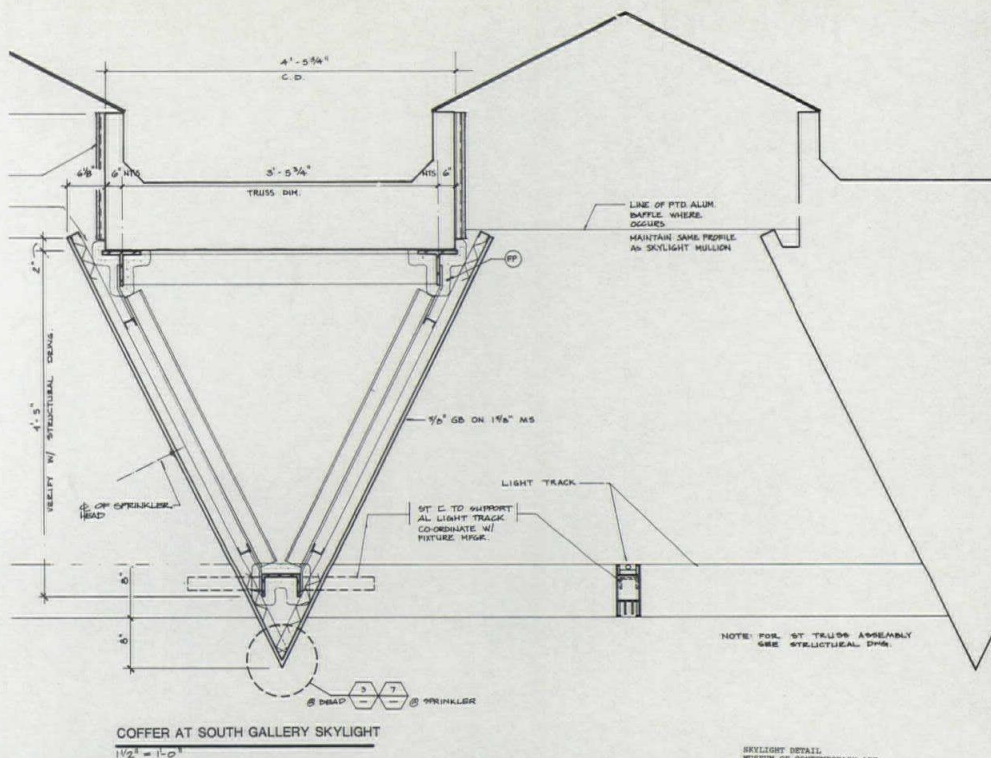
CAD, overlay drafting, and screened polyester-film sheets are widely utilized on projects with repetitive floor plans. Combinations of these systems are also frequently used. For instance, plans are pulled off the computer to be finished by traditional drafting and paste-up methods. This works well when architects are more knowledgeable about putting a building together than they are about computer operation. The number of CAD terminals available may also be a factor in finishing drawings by hand. CAD is also widely used on projects that may not be repetitious, but are complex, e.g., designed with many curvilinear and/or angular forms. □

Ms. Sklarek is a member of The Jerde Partnership in Venice, California.



Architect Lawrence Scarpa of Gwynne Pugh and Associates designed a spiral concrete stair as part of the remodeling of the Dektor Higgins Building, a 1930s masonry and wood production studio in Hollywood, Calif. His drawings included a three-dimensional assembly diagram as well as a two-dimensional elevation of the circular

exterior wall shown as if it had been lain flat. The stair is built of 72 prefabricated components. The wall was cast from four molds and extruded to varying heights. Wall sections and treads are bolted together with 3/8-in. epoxy bolts. Steel plates connect wall sections to transfer stresses uniformly to the assembly's foundation.

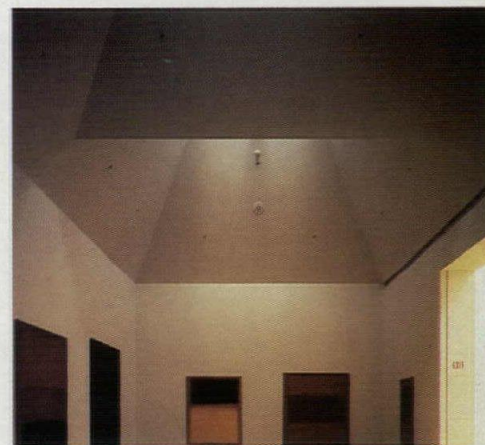
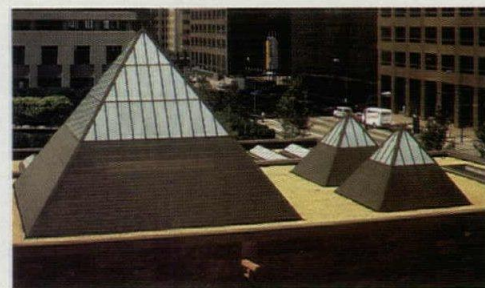


COFFER AT SOUTH GALLERY SKYLIGHT
1/2" = 1'-0"

SKYLIGHT DETAIL
MUSEUM OF CONTEMPORARY ART

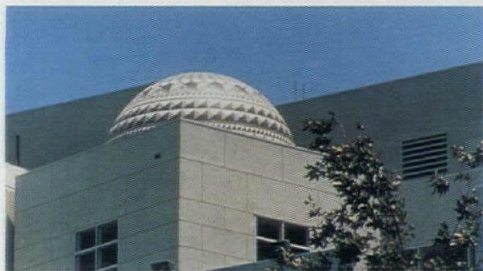
For the Museum of Contemporary Art in Los Angeles, designed by architect Arata Isozaki, associate architects Gruen Associates combined several drafting techniques including a keynote system to detail skylights and V-shaped coffers below them (section above). The coffers, built of gypsum board on a steel frame, diffuse both natural and artificial light sources

(bottom photo) and conceal construction trusses and copper-tube gutters that collect skylight condensation and/or possible leakage from the outside. They also give the visual perception of an uninterrupted transition from gypsum-board to glass surface by projecting beyond the sides of openings above. The exterior detailing of the skylights (top photo)

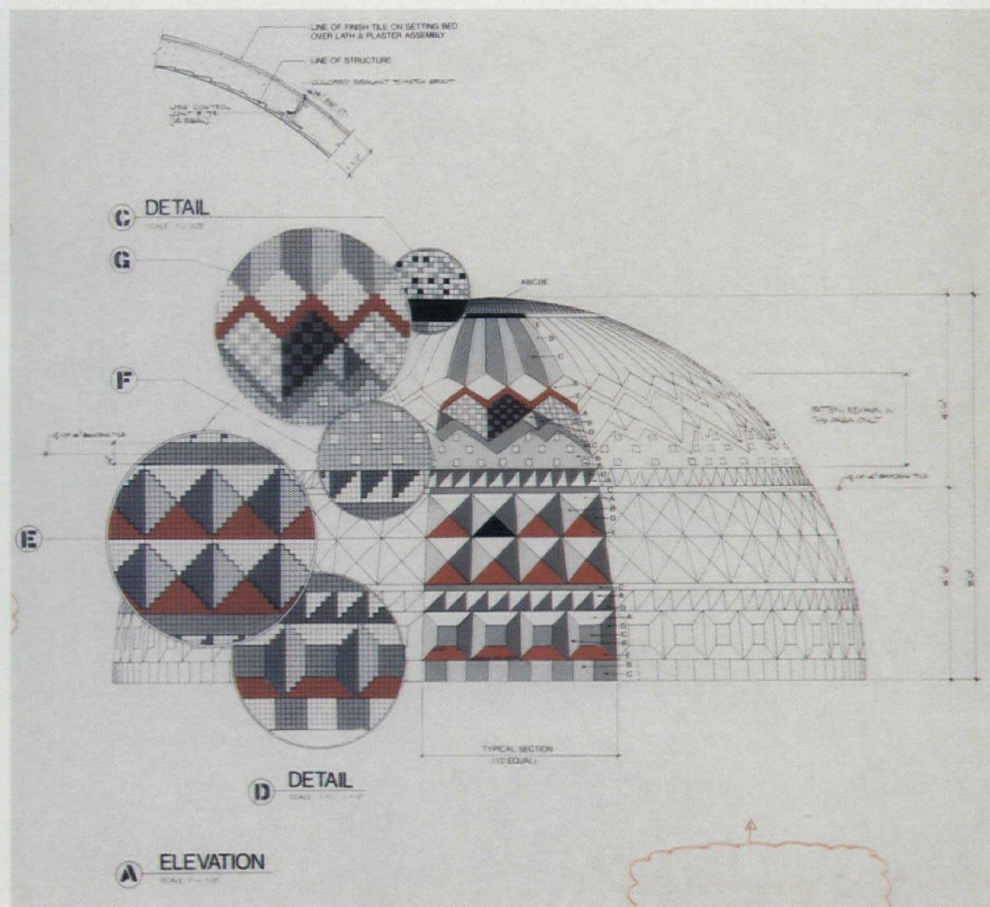


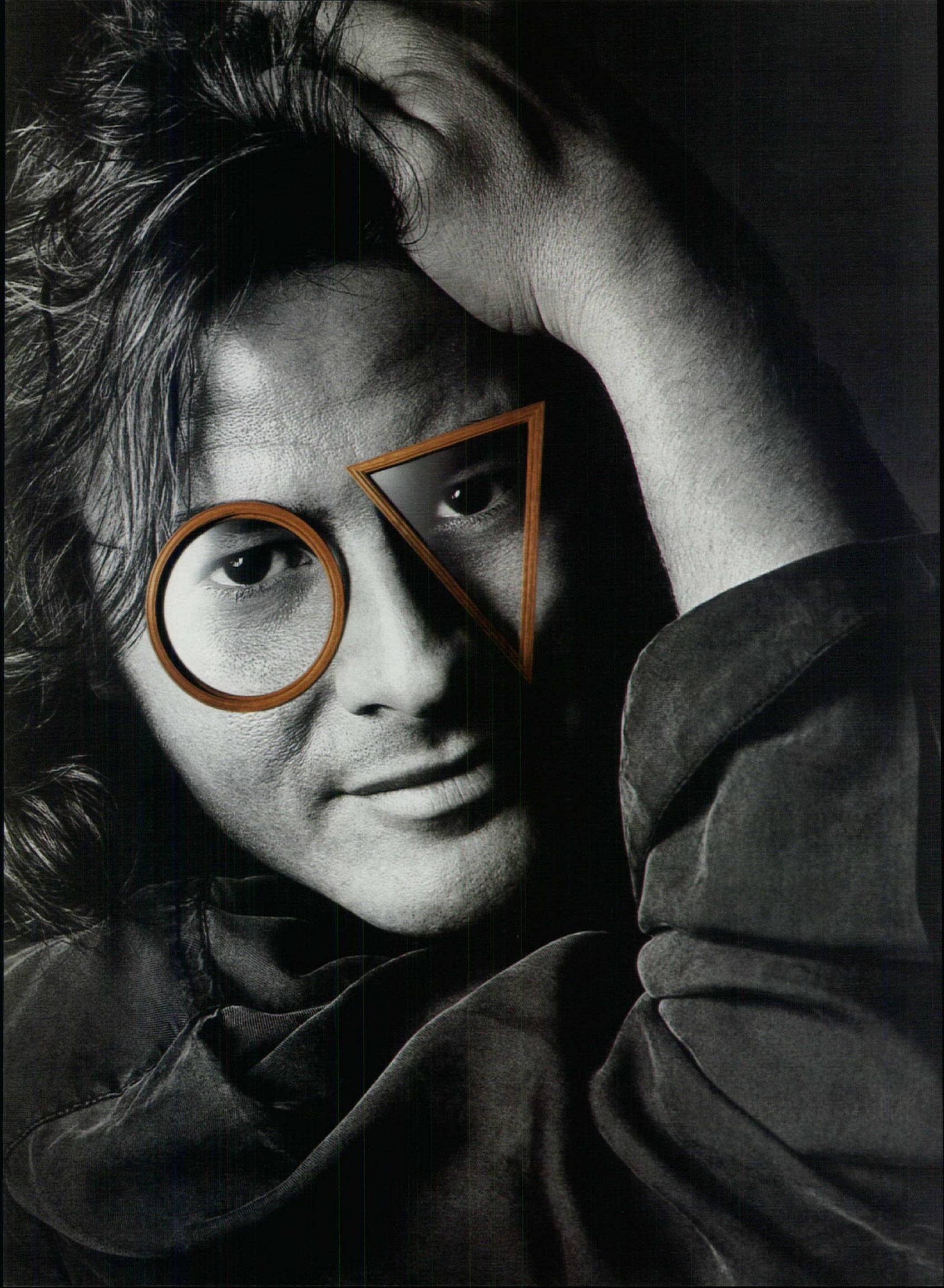
accomplishes a smooth watertight transition of metal to glass surfaces.

Detailing of the building's stone veneer (see RECORD, January 1988 pages 102-111) mimics rough, large blocks of sandstone using thin slabs individually supported on the building's steel frame that are light enough to withstand movement in the earthquake-prone area.



In the design of the new five-story Fashion Institute of Design and Merchandising in Los Angeles, The Jerde Partnership included a dome covered in patterned and shaped tile—the first such dome built in Los Angeles in the last 50 years. CAD was utilized for many color studies, electrostatically plotting variations, and in the layout of the changing shapes and sizes of tile. The design of the pattern was in two parts. The lower was regular and uniform. The upper allowed manipulation of tile spacing and took into account the decreasing horizontal circumference. Both allowed flexibility in the transition zone, reduced field cutting, and allowed tiles to be laid out in the factory in paper-backed segments.





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CONSTRUCTION FINANCE: BESTING THE DOWN SIDE

Factors conspire to push off the bottoming out of several building types to late in the year. By Phillip Kidd

Before a sustainable recovery occurs, commercial and residential construction will have to overcome a weakened economy and those long-term factors of changing demographics, overbuilding, troubled real-estate loans, and poor domestic savings.

In the mid 1980s, the demographics of the nation turned in a new direction. The average age of the population started rising. People over 55 became more numerous, steadily increasing the demand for retirement communities and health care facilities. Those two building markets will grow in the 1990s regardless of economic conditions.

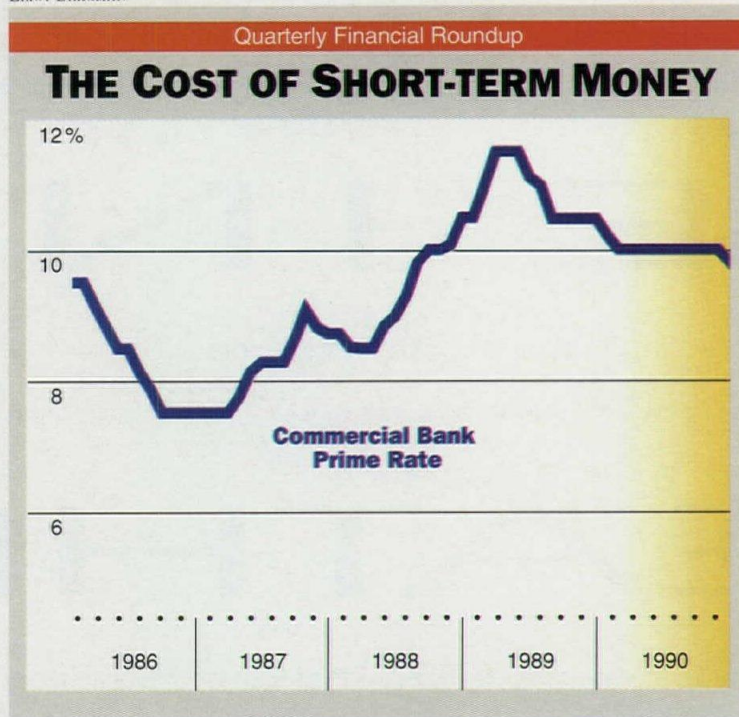
In the 1980s, first-time homebuyers from the huge Boomer group swarmed into the owner-occupied housing market. Many were able to purchase that first home, but many could not. Assuming upward mobility among those who could not, the pent-up demand is still large enough to support annual single-family housing starts of 1 to 1.2 million in the next few years.

During the 1980s, the number of people 18-30 years old began to decline. That trend will continue in the 1990s with negative implications for several building categories. This is the largest group of renters. As its numbers dwindle, so will the demand for new apartments. This group is also at the age when most people enter the job market. With women's labor participation rates already nearing their upper limits, the number of new employees demanding work space, especially office space, will fall throughout the 1990s.

The apartment and office-building markets have been overbuilt for some time, as lenders and developers failed to adjust to new realities emerging in the mid 1980s. Consequently, problem loans have been rising for several years.

Overbuilding and problem real-estate loans first appeared in the Southwest in the mid-to-late 1980s. In 1990, the Northeast experienced similar difficulties as that

ELLIOT BERGMAN



region's economy faltered. Now, the recession is spreading real-estate problems to other parts of the country.

To prevent a repeat of the savings-and-loan fiasco, federal regulators have insisted that commercial banks (in addition to thrift institutions) aggressively identify potential problem real-estate loans. Once uncovered, banks are urged to provide greater loan-loss reserves for such loans, or even write down their value.

Rising loan-loss reserves and larger write-offs are eroding the profitability of many banks. Deteriorating profits are occurring during a period when commercial banks and thrift institutions are already under regulatory pressure to increase their equity to meet higher mandated capital-to-asset ratios.

In computing those new capital standards, commercial banks and thrift institutions must set aside capital according to the riskiness of the investment. Not surprisingly, regulators view land acquisition, land development, and construction loans as very risky. Thus, banks and thrift institutions must hold more capital for those loans than for less-risky single-family first mortgages.

In response to these regulatory influences, financial institutions are tightening their credit standards for all loans, but especially for real estate. As a result, bank and thrift financing for land acquisition, land development, and construction will shrink in 1991. Only those projects with significant front-end cash from the developers and solid preleasing agreements will be financed. Instead, financial institutions will concentrate on eliminating troubled projects from their portfolios.

Worried about a resulting credit squeeze, the Federal Reserve acted late in 1990 to cut the cost and increase the availability of funds in the banking system. It forced the federal-funds rate down, reduced bank reserve requirements, and cut the discount rate on loans it makes to banks. Quickly, interest rates tumbled.

Basically, Americans do not save enough to finance domestic consumption, investment, and government deficits. Consequently, the U.S. must borrow substantial amounts from abroad. In 1990, interest rates in other countries rose in comparison to ours. Now many foreigners are pulling their funds out and investing in other nations. Without their money to augment the domestic supply of funds, U.S. interest rates may only inch downward, even while monetary policy eases and loan demand slumps. Into this situation, the Middle East Crisis is mixed. No matter the outcome, the U.S. will be diverting badly needed resources to this part of the world for a long time to come.

In this environment, single-family housing starts will stabilize and begin a shallow recovery in the second quarter, as interest rates drift lower. However, activity in multifamily and commercial building will focus mostly on completing, rehabilitating, and marketing existing projects. New construction of these structures will continue its slide with little prospect of bottoming out until much later this year. □

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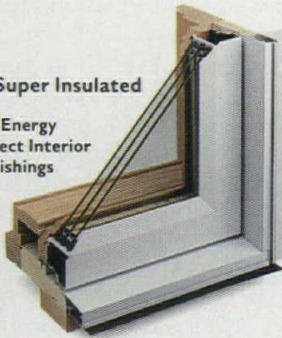


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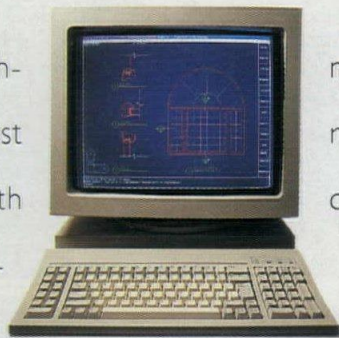
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BEYOND COMPUTERS AS PENCILS

Part two of a series reveals the latest techniques for integrating computers into your practice. By Kristine Fallon

While Nolan, Norton & Co. research indicates that improving the quality and flow of information on which critical esthetic, technical, and business decisions are made, can increase the return on technology investment by 300 to 1000 percent [RECORD, November 1990, pages 28-29], a critical condition is thinking about computers and automated communications for what they can do—not as tools for their own sake. Nevertheless, an understanding of this technology is important to a design firm that means to build a usable body of information. Basic tools include:

Networking

The ability to pass information electronically from one computer user to another is a basic requirement. If a firm has moved into automation with stand-alone personal computers, a local area network (LAN) is the first step.

• *Planning ahead.* LANs require careful planning. Computer-hardware advances are so rapid that it is impossible to predict what kinds of computers firms will be using in five years. Industry experts suggest considering hardware as an expense rather than depreciating it. This may sound like a ploy to sell more computers, but PCs and workstations typically used by design firms are obsolete within three years. And that pace is increasing.

The network is a considerably more difficult component to replace and must be designed for longevity. The network will become physically imbedded in your office space, with cables running underfloor, above ceilings, and in vertical risers. Some highrises inhabited by high-tech tenants have begun to encounter the problem of in-floor cable troughs and vertical risers that are filled to capacity. Recabling in these situations is not just expensive, it is also impossible.

• *Choosing the system.* Much greater than installation costs, however, will be the cost of learning—first to manage the physical components and the logic of the network, and then to reorganize work processes to take advantage of information technology. To protect investment, a chosen network must accommodate growth in number of workstations, and in the variety of hardware platforms and operating systems.

This capacity will be found in networks that conform to the communications standards of the Institute of Electrical and

Electronic Engineers and the International Standards Organization—particularly ISO's seven-layer reference model for Open Systems Interconnection network protocols. The ISO-OSI model provides for the full suite of hardware and software necessary for communication between unlike computer systems. Lower layers address the basics of sending electrical signals through wires—e.g., layers one and two cover Ethernet (IEEE 802.3). The top layers specify legal operating-system calls from application programs and define a

common user interface for those applications. Standards such as POSIX (IEEE 1003.X), which permit software to run on multiple hardware platforms, are in layer seven.

• *Learning new concepts.* The first concept to get used to is the server/client relationship. This is very different from concentrating all the computing resources, software, and data in the machine at your fingertips. Most network schemes encourage the concentration of data in one or a few servers. These do such functions as back-ups, file sharing, and data security. Processing continues to be performed by the PC (or client) and movement of data between the PC and the server is totally invisible to the user. Some networks provide the added benefit of allowing compute-intensive processes to be off-loaded to the server or another node on the network. Although normal PCs have frequently been used as servers in PC networks, there is a trend toward developing special computers as servers, such as the Compaq SystemPro.

• *Beyond PC-only LANs.* Unless you have already established network standards, the best way to select a LAN is from a major supplier which is committed to standards and which has a significant market share. I do not recommend the



New techniques allow moving video images to be combined with computer-generated images. Above: Matrox's ILLUMINATOR-16, compatible with PC-AT or PS/2.

popular PC-only LANs to design firms. DOS may continue to be the operating system of choice for office automation applications for quite some time, but Autodesk even now is developing the Sun Sparc platform that runs on UNIX. Firms serious about CAD should be getting ready for a more advanced operating system and implementing multi-operating-system networks. Three choices:

IBM. IBM has so many communications products it can be confusing. Offerings for both LANs and long-distance computer communications are extensive. Its communications products have traditionally worked better in all-IBM environments. This has changed recently, particularly with IBM's introduction of the RS-6000 and support of the industry-wide Ethernet and NFS communications standards. Nevertheless, an IBM solution makes sense primarily for firms in which IBM processors larger than PCs are used for applications like financial management, or by design groups within corporations that have already committed to an IBM communications approach.

DEC (Digital Equipment Corporation). DEC has a long-standing reputation for excellent networking products, for both local and wide-area networks. It accepted the need for multisupplier networks early and has developed a full range. DEC provides servers running both VMS, its proprietary operating system, and ULTRIX, their UNIX implementation. In late 1990, DEC introduced a third server option, a multiprocessing Intel 486 machine running the SCO UNIX operating system, a UNIX version that is widely supported. DEC's VMS servers have been managing multi-supplier and multioperating system networks for years. It handles PCs and Mac-intoshes on the network extremely well and even provides communications with IBM mainframes. Its newer Ultrix network servers are advertised as having the same capabilities. A DEC networking strategy is an easy next step for those firms accustomed to using DEC's VAX family of computers for CAD or engineering-analysis.

UNIX Products. UNIX network servers are becoming increasingly popular. One reason: Competition is keeping prices low. Many suppliers, including DEC, Hewlett Packard, IBM, Intergraph, and Sun offer UNIX servers. Standards for this operating system are not completely defined and there are two competing sources, UNIX International (UI) and the Open Software Foundation (OSF). The number of equivalent products and potential integration problems among them make this a slightly tricky buy. But tough competition means that pricing and function are good—as are flexibility and longevity. However, work with a reputable consultant or systems integrator for selection and installation of the product.

Scanning

Scanning instantaneously and inexpensively puts paper-based documentation of any kind into a computer. This process is essential to the information infrastructure within any business and should be used more extensively and creatively than it is.

The single greatest business application of scanning today is telefax transmission. We think of fax as a paper-based process. However, using inexpensive computer fax boards, telefaxes can be sent and received via computer modem. The initial printing and scanning of the document are eliminated on the sender's side, and printing out and hand delivering become unnecessary on the receiver's end.

**Why not experiment
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for client presentations.**

• *Why direct transmission is better.* The only problem with scanned data such as that coming across a fax line is that it has no intelligence whatsoever. It is an ordered collection of dots, whether text, a freehand sketch, or a CAD drawing. It is frequently referred to as bit-map, pixel, or raster data. It cannot be edited by a word processor without time-consuming and error-prone Optical Character Recognition. If many people contribute to a document, this is not a good approach to data sharing.

However, since the deciphering of dot patterns transmitted via fax is determined by international telecommunications standards, this format is universally accessible. No up-front coordination of software is required between sender and receiver, nor is a conversion processes needed for the document to be viewable. This can be a big advantage, particularly when communications between organizations may last for only a single phase of a single project. The fact that this fax data travels quickly and inexpensively anywhere in the world via standard telephone lines gives it special appeal. Bit-mapped images are a very appropriate way to maintain project correspondence on-line for rapid multi-user retrieval and review.

• *A problem of size.* Scanned images of drawings have some special quirks. Special scanning equipment and data-compression techniques are required to handle large documents. Prices for large-document scanners vary widely and, because quality of output depends on hardware, software, and operator expertise, it is difficult to as-

sess their worth. New products either automatically divide large-format scanned drawings into 8-1/2 inch by 11-inch segments for fax transmission or else compress data to transmit a full-size image.

One new development that makes scanning particularly attractive is software that permits scanned images to be introduced into CAD, edited, merged with "intelligent" CAD-generated graphics as composite images. This permits instantaneous integration of manually generated graphics and greatly cuts the cost of doing so.

• *Where scanning works—and does not.* The quality of scanned graphic data is limited primarily by the precision, clarity, and media stability of the original. In addition, the scanning process can introduce some distortion. Although most scanning systems provide rectification software to compensate for this, the scanner operator may not catch the problem. It is important, therefore, to determine where the use of scanned data is appropriate and where it is not. Scanned data should not be used in situations where it will be necessary to scale precise measurements or perform very accurate area calculations from the graphic data. It is extremely useful, however, for drawing distribution and review applications. If its limitations are well understood, it can also be used very effectively in applications such as renovations, space planning, interior layouts and computer-aided facility management.

• *Two caveats:*

1. Accessibility of scanned images will depend on adequacy of indexing techniques and retrieval systems. Both the AIA and CSI have recently launched inquiries into current classification systems, but neither has given these efforts high visibility or support, nor have they significantly expanded their thinking beyond current paper-based processes. It will be up to your firm to develop an adequate index.

Indexing and retrieval systems are most commonly implemented using relational database-management systems. For each scanned document, there is a database record that contains one or more index entries. There is also a pointer to the location and file name of that document. How fast a document can be retrieved will depend on number of documents in the database, hardware and software capabilities and performance, and traffic on the network, among other factors. Once the image is retrieved, the workstation's display-processing speed determines the speed of both viewing and manipulating the image.

2. Storing drawings and text as dot patterns is not the most compact use of storage space. There are compressed formats, like CCITT Group 4, that substantially reduce file size, but decompression software is needed to see the image. This adds complexity to storage and retrieval. Most de

Continued on page 56

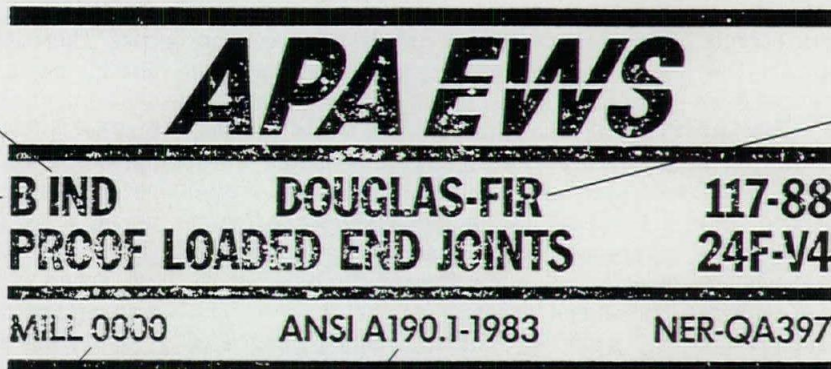
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SPECIFICATIONS SERIES

PART 2: ROOFING

New short forms may prove a better specifications method—even for this troublesome building component. By John A. Raeber

Writing a roofing specification is frequently accompanied by a twinge of anxiety for many specifiers, especially because "the broad category of 'roofing' has been the single identifiable item responsible for the highest number of professional liability claims," according to a 1989 evaluation by the AIA. Obviously, roofing specifications must be made clear, concise, and complete. Yet the variables possible to do that leave a lot of latitude to the specifier.

Just what information and requirements are necessary depends on the specific project. And, there will be nearly as many variations as there are specifiers. Some specifiers will base their specifications on AIA's Masterspec or CSI-sponsored Spectext. Others will use computer-generated sections with little change. Still others will develop their own specifications. Some specifiers will use almost every book, guide, and reference available and create specifications that cover almost every problem imaginable to make them "complete."

Some specifiers are beginning to question the value of long specifications

Lawyers are generally better with words than specifiers and lawyers have the ability to take our words and make them say things we never considered. The trend in the future may be toward concise specifications—concise while clear and complete.

These can be done by finding only those requirements necessary to be complete or, conversely, by eliminating redundancy, excess verbiage, and unnecessary conditions. Ultimately, both methods will probably be used. Assuming the guide specification is in standard CSI Three Part Format, decide which articles may be eliminated. A first review may suggest they are almost all important. Finding valid reasons to eliminate specific articles then becomes the key to making the section concise.

Pruning the section's scope

Specifying a low-slope roof begins by selecting the type of system—possibly built-up, single-ply, or modified bitumen. This takes into account the type of deck (generally nailable or non-nailable or, specifically, wood, metal, concrete, insulating concrete, or insulated), requirements for fire ratings, UL listings, or Factory Mutual ap-

A pre-installation conference can save more time, money, and liability exposure than any other requirement.

provals, and special considerations such as high-wind loads, glare, and foot traffic.

Next comes the organization of the specification. A systems roofing specification includes everything from the vapor retarder to wood edge stripping. It is also possible to limit the section. Wood edge stripping can be specified in Division 6—Wood and Plastics. Here are considerations for the CSI Section Format:

1. General—A. Summary

This indicates the scope of the section and can clarify the location of related work. This saves bidders' time reading the entire section and minimizes possible double bidding of items. Some will argue that the CSI article on references is mandatory. In most situations it's redundant. The first mention of a reference standard can include all of the necessary information and further references can be abbreviated.

1.—B. Submittals

Some offices consider submittals an unnecessary nuisance and a source of liability. Others believe the opposite. Some submittals are desirable. When a reference standard is used to describe a roofing system, manufacturers' product data gives the information that ensures compliance. Samples may be important when a roof will be visible, but details for submitting should be located in Division 1 and not here.

Submittal of manufacturer certifications is more subjective—especially on the acceptability of the installer. Each question needs to be answered based on the roofing system, the project, and manufacturers' willingness to provide certification.

Manufacturer certification that the materials are suitable for the specific application may be even harder to obtain. Enforcing the Uniform Commercial Code's im-

plied warranty of fitness for a particular purpose gives proof that the manufacturer knows how the materials are being used—as does requiring his representative's visit to the job site to certify that the materials are installed according to instructions.

1.—C. Quality Assurance

Quality-assurance requirements are more generally acceptable to most specifiers for even the most concise specification. Installer experience is one typical requirement. When there is no list of acceptable manufacturers, it would be reasonable to require a specific period of experience.

Product characteristics such as fire- and wind-resistance ratings would also be appropriate under quality assurance, although some specifiers prefer to list them with the systems and materials requirements. According to the AIA evaluation: "Roofing contractors are unanimously opposed to a roofing system that the wind blows away involving them in long-term responsibility." An option is to require assistance to the building owner in obtaining the appropriate wind-damage insurance.

Even the simplest roofing system justifies everyone involved spending at least an hour or two reviewing the procedures, coordination, and scheduling. A pre-installation conference can save more time, money, and liability exposure than any other single requirement in a specification.

1.—D. Project conditions

Normally included in referenced standards and manufacturers' recommendations, these seem redundant. Too often there is need to use specifications to show the roofers they aren't supposed to install roofing in the rain. Temporary roofing is often ignored. Temporary roofing should be clearly noted in the specifications and a unit price included in the contract to minimize potential conflicts over cost. If the cause is the contractor's scheduling, there should be no additional costs.

1.—E. Special Project Warranty

Roofing warranties vary in type and amount of protection. A long-term manufacturer's standard warranty probably takes more rights away from the owner than it gives. Yet it is not unreasonable to

require a special project warranty that includes correcting the failure of a roofing system beyond the correction-of-work period identified in AIA A201 General Conditions. Most roofing contractors accept some responsibility for correction within two years after substantial completion. Few are willing to go as far as three.

2. Products—A. Manufacturers

Most specifiers list acceptable manufacturers and note that others will be considered only after review of their formal request for substitution (covered in Division 1).

2.—B. Materials

In addition to naming acceptable manufacturers, the specifications must identify the desired roofing system. Identification can be based on a reference standard such as that listed in the National Roofing Contractors Association's *The NRCA Roofing and Waterproofing Manual*. It might also be specified by using one or more manufacturers' system designations. The most important considerations are that the system is clearly identified, easily understandable, and desired options are listed.

3. Execution—A. Preparation

Listing specific requirements for the preparation of the roofing system may be redundant to the referenced standards and manufacturer's literature. But, their value may justify some redundancy.

3.—B. Application

Application specifications can be limited to requiring compliance with the referenced standards and manufacturer's instructions. Some specifiers include additional requirements based on experience and concerns. They may highlight concerns to receive special attention in field visits.

3.—C. Cleaning and Protection

Cleaning and protection should be covered in Division 1, but potential for damage to other materials by improper handling of roofing or for damage to roofing by later construction may justify coverage.

Is a short-form specification complete?

It's probably more complete than necessary for a single-family residence and grossly inadequate for an open-bid government project. However, it might not need too much editing for the one and be a good outline for the other. There is growing interest in short-form specifications for either case. □

Mr. Raeber is an independent specification writer in San Francisco, an adjunct professor in the School of Architectural Studies of California College of Arts and Crafts, and president of the national Association of Specifications Consultants in Independent Practice.

Membrane Roofing

PART 1 GENERAL

- A. Summary: Provide complete weather tight membrane roofing system.
 - 1. Related Sections: Roofing insulation and metal flashing are specified elsewhere.
- B. Submittals: Provide product data for each material and samples of exposed materials.
 - 1. Manufacturer Certification: Indicate installer is acceptable and system is suitable for application indicated in Contract Documents.
- C. Quality Assurance:
 - 1. Installer Qualification: Installer approved by manufacturer and with minimum five years successful experience with similar projects.
 - 2. UL Listing: Provide system listed for roof materials covering with minimum Class A external fire and Class 60 wind resistance.
 - 3. Fire Performance: Provide system listed for minimum 1-hour fire resistance when tested for assemblies in Contract Documents.
 - 4. Pre-Installation Conference: Convene prior to commencing roofing work; require attendance of parties affecting roofing work; review installation procedures, coordination, and scheduling.
- D. Project Conditions: Do not apply roofing during inclement weather or when air temperature may fall below 40 degrees F.
 - 1. Temporary Roofing: Provide when adverse job or weather conditions prevent permanent roofing installation.
- E. Special Project Warranty: Provide for correcting failure of roofing system to resist water penetration and wind damage for two years.

PART 2 PRODUCTS

- A. Manufacturers: Celotex, Manville, or Owens-Corning.
- B. Materials: Manufacturer's standard roofing system conforming to *The NRCA Roofing and Waterproofing Manual*, 3rd Edition.
 - 1. System: NRCA Specification 42- NAGA; nailable deck, asphalt glass fiber felt roof membrane with aggregate surfacing; four ply-system; aggregate surface color as approved by Architect.
 - 2. Composition Flashing System: Provide roofing manufacturer's recommended modified bitumen sheet flashing system.

PART 3 EXECUTION

- A. Preparation: Install roofing over surfaces which are dry, free of ridges, protrusions, and voids; coordinate preparation with installation of roof drains and items projecting through roofing.
- B. Application: Apply roofing in accordance with manufacturer's instructions and NRCA recommendations for roof type specified.
 - 1. Coordination: Coordinate roofing system with installation of roof insulation and metal flashings.
- C. Cleaning and Protection: Clean or replace materials damaged by roofing installation and protect roofing from subsequent operations.

A short-form specification as urged by the author for projects of low-to-moderate complication. But this is only a model. As he warns, each specification is unique.

COMPUTER PRACTICE...

Continued from page 51

sign firms are more concerned with scanning drawings than text, so the scanning system and image-display software are selected for compatibility with the CAD system. But not all raster-display products provide conversion utilities to all possible compression formats. The obvious answer is lots of disk storage space. Increasingly, the trend is toward optical storage to handle large numbers of images. Although optical media are inexpensive and durable, the price of optical drives remains high compared to magnetic drives.

Multimedia

Affordable systems for multimedia uses are just entering the mainstream. In essence, multimedia means sound, motion, and video images combined with computer-generated text and graphics and with scanned images to form an integrated computer-based environment. Windows permit simultaneous display of multiple-information segments. Early pioneers were Commodore (Amiga computers) and Apple. Architects have experimented with video-frame capture and pixel manipulation on the PC using the precocious TARGA board.

The end product of multimedia is not a static document, but a production. The en-

abling software is called "authoring." This is exciting for architects because of potential for powerful and vivid communications. It is also a new art form and a challenging environment for experimentation. Multimedia computing is already being explored to provide customized and adaptive basic education and industrial training.

Full-blown multimedia will take a while to enter the mainstream. Obviously, it requires massive computation and data-storage resources. Much of the processing is being supplied by special-purpose add-on boards; prices are dropping rapidly. The stumbling block: to put the parts together in this almost over-rich environment.

Educational technologies

Rethinking the ways we work with new technologies is costly. This is a thorny problem, but with rapid changes, retraining is no longer avoidable. The trick is to make it nondisruptive. Training schedules must adapt to project schedules, travel requirements, and last-minute meetings.

New educational technologies can help. Video-training courses and computer-based instruction can be started and stopped at the learner's convenience. There are many videos available, particularly for commonly used PC-software packages. Increasingly, extremely techni-

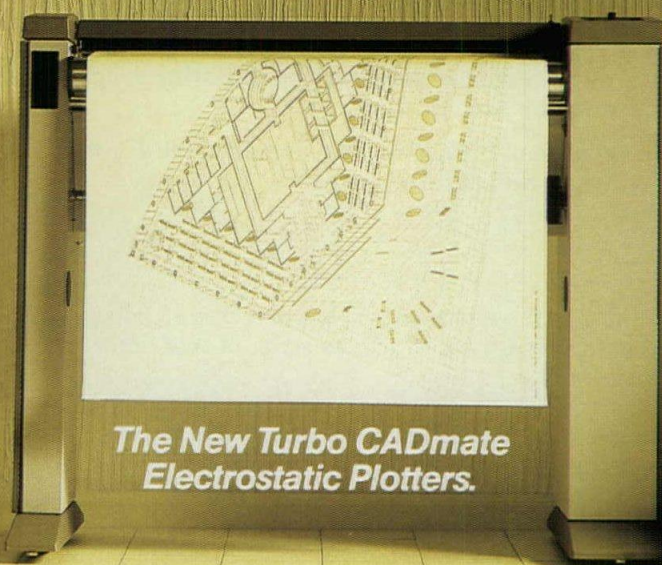
cal video courses are available—even for advanced programming. Some comprise multiple tapes and as many hours of instruction as a full semester course.

Computer-based instruction is even more effective because it forces the trainee to interact with the computer. The positive qualities that both techniques share include the ability to review material as many times as the trainee finds appropriate or to skip over familiar material. Techniques are generally more appropriate for professional and managerial staff. One reason: They avoid the potential embarrassment of seniors' looking inept in a group that includes juniors.

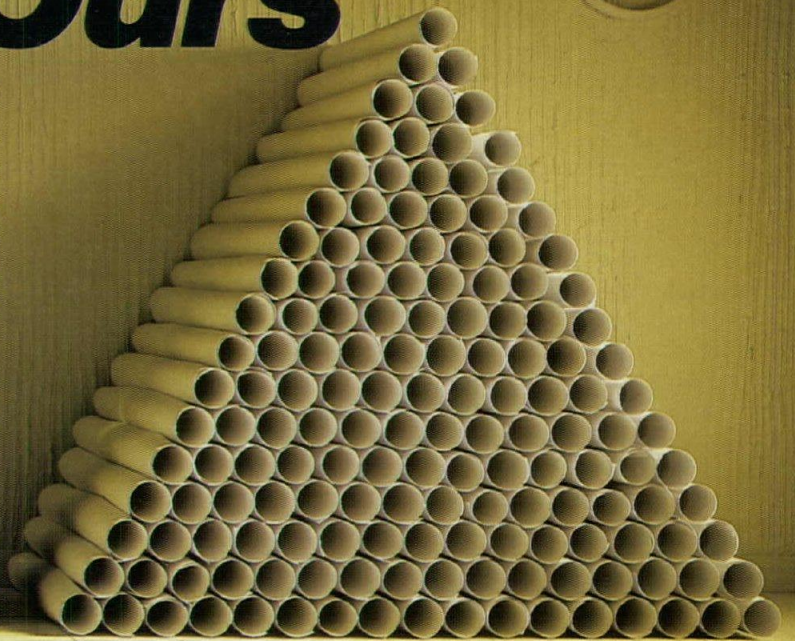
Computer-based and video instruction are available for many popular computer programs, including CAD packages such as AutoCAD and Intergraph's Microstation. For those unfamiliar with the computer keyboard, there are a number of excellent computer-based "typing tutors," many priced under \$50.

This leaves training in new office procedures and production techniques. These will be unique to each practice, not available off the shelf. What about experimenting with your own video-training productions? Your firm will need those video skills when it starts to write multimedia client presentations! □

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February 9-June 30

"James Turrell," an exhibit spanning the artist's 25-year study of light and perception, featuring an installation designed specifically for the exhibition galleries; Williams College Museum of Art, Williamstown, Mass.; for information: 413-597-2429.

February 21 and March 19

Two related symposia dealing with design and the environment, leading off with "Smart Bricks, Useful Trash and Elastic Chairs: Reinventing the Material World," 9:30 a. m.-4:30 p. m.; and in March, "Nature 2000," 6:30 p. m.-8:30 p. m.; at the Cooper-Hewitt Museum, 2 East 91 St., New York City; for information: 212/860-6899.

February 22

"ConDoc: The New System for Formatting and Integrating Construction Documentation"; the first of 11 similar daylong workshops sponsored by the AIA, to be held throughout 1991 in various U. S. cities, beginning in Orlando; for information: 202/636-7353.

February 26-April 27

"Design 1935-1965: What Modern Was," over 250 mass-produced and hand-crafted design objects, a traveling exhibit orga-

nized by the Montreal Museum of Decorative Arts, opening at the IBM Gallery of Science and Art, 590 Madison Ave., New York City; for information: 212/745-5500.

March 17-June 30

"Arata Isozaki: Architecture 1960-1990," inaugural show of a traveling retrospective exhibition of the Japanese architect's work, including a full-size reconstruction of a teahouse; at the Isozaki-designed Museum of Contemporary Art, Los Angeles, 250 South Grand Ave. at California Plaza; for information: 213/621-1748.

March 20

11th annual John Miles Rowlett lecture series at the College of Architecture, Texas A&M University, College Station, Tex.; 1:30 p. m.-4:30 p. m., in the James Earl Rudder auditorium; focusing on "Design and Practice/Education and Service"; speakers include 1990 AIA Gold Medalist E. Fay Jones, W. Cecil Steward, and Henry Schirmer; for information: 409/845-3161.

March 23-July 28

"Money Matters: A Critical Look at Bank Architecture," a photographic survey of American and Canadian bank architecture, offering photographs of 56 banks by 11 photographers, specially commissioned for

this exhibit; cosponsored by the Museum of Fine Arts, Houston, and the Parnassus Foundation; at the Chicago Historical Society, Clark St. at North Ave., Chicago; for information: 312-642-2400.

March 26 through Summer 1992

"The Cooper-Hewitt Collections: A Design Resource," an exhibit filling the entire Cooper-Hewitt Museum with some 700 objects culled from its Smithsonian Institution collection of nearly 250,000 pieces; 2 East 91 St., New York City; for information: 860-6919.

March 27

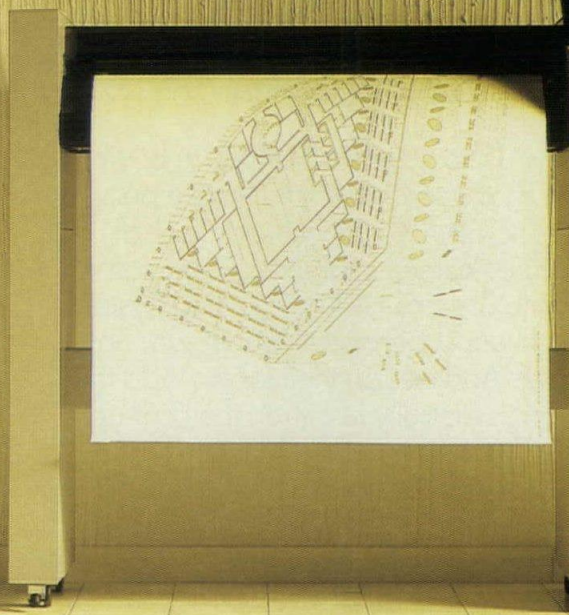
Annual CSI Products Fair and Show, sponsored by the Metropolitan New York chapter of the Construction Specifications Institute; 11 a. m.-6 p. m.; Center One atrium, International Design Center New York, 29-10 Thomson Ave., Long Island City, N. Y.; for information: 212/489-6900.

April 5-6

"Banff Session 1991," annual conference on contemporary architecture, sponsored by Alberta Association of Architects; speakers include Romaldo Giurgola, Antoine Predock, Wolf Prix; at the Banff Springs Hotel Conference Centre, in the Canadian Rockies; for information: 403/432-0224.

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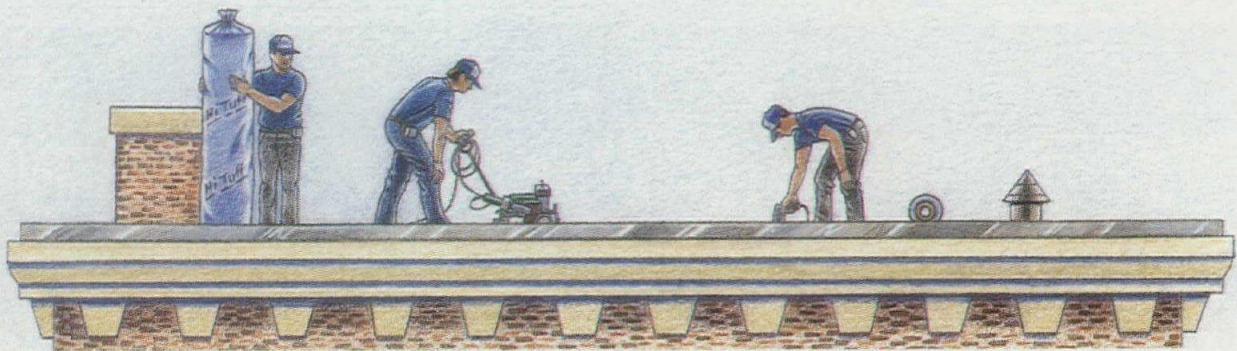


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*Hypalon is the registered tradename for DuPont's chlorosulfonated polyethylene (CSPE) synthetic rubber.

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MAKING CONNECTIONS

In his new book, Tony Hiss argues that contemporary society has lost touch with both the built and the natural environments. But good design can re-establish the ties between man and place.

COURTESY FRANK ENGLISH



Grand Central Station: one of America's great rooms.

The Experience of Place, by Tony Hiss. New York: Alfred A. Knopf, 1990, 233 pages, \$19.95.

Reviewed by Jonathan Hale

What sets *The Experience of Place* apart from so many other books on design is the idea that something can be done, that the decline of our countryside, towns, and cityscapes can be reversed. What most stands out about the book is its optimism.

Tony Hiss, an author who has written for publications such as *The New Yorker* and *The New York Times*, suggests we have unnecessarily sacrificed contact with our surroundings, and given up the beauty that was inherent in pre-industrial landscapes, the common-sense charm of old-town patterns, the energy of special city places. In his vision, it is possible to plan for working landscapes or cityscapes that will allow for development and growth and, at the same time, be inspiring. We can have our "connectedness," as people did in the days when landscapes and townscapes were routinely harmonious, and have electricity, cars, airplanes, too.

Hiss starts out in the middle of Manhattan, in Grand Central Station, and he

shows how the terminal's great ticketing concourse induces a state he calls "simultaneous perception"—relaxed, but wide-awake and stimulated at the same time. What can happen in the heart of New York City can also happen in Rhode Island's Blackstone Valley, in California's Silicon Valley, and even Germany's Ruhr Valley.

The book's subtitle is *A completely new way of looking at and dealing with our radically changing cities and countryside*. To architects it will seem less completely new than it may for the general reader. But architects do tend to believe that to keep or make a sense of place is an eternal uphill battle, while Hiss says it doesn't have to be. It can come from consensus; such experiences can and should be normal.

The book is eminently readable, and the illustrations convey their messages effectively. We know just what Hiss means when he shows us a photograph of a vista through a tunnel in Prospect Park, or the last working farm in Queens, or three drawings of a New England landscape—one a country scene, the next ruinously developed under present zoning, and the third built to the same density as the first but sensitively designed as a working land-

scape so it looks like the first picture.

Hiss has a surprisingly gentle way of looking at things—surprising because the stakes are so high and the problems so big.

Jonathan Hale is an architect and former RECORD editor, working in Watertown, Massachusetts.

Arts & Architecture, The Entenza Years, edited by Barbara Goldstein. Cambridge: The MIT Press, 1990, 248 pages, \$35.

Reviewed by Kenneth Caldwell

For the last generation of students and architects, many of them unfamiliar with *Arts & Architecture* and its longtime editor, John Entenza, this book provides access to the magazine that gave birth to the Case Study House program. In the recent catalog accompanying the exhibit "Blueprints for Modern Living: History and Legacy of the Case Study Houses," the late historian Esther McCoy described *Arts & Architecture* as "a magazine as flat as a tortilla and as sleek as a Bugatti."

Barbara Goldstein, who resurrected the magazine from 1981 to 1985, has culled through all the issues from 1943 to 1959,



The October 1948 cover reflects the modern spirit of the magazine.

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the years she feels that Entenza had the greatest influence, and selected "landmark" articles that illustrate the culture surrounding the Case Study era.

Goldstein's straightforward introduction and Esther McCoy's brief and personal reminiscence make up almost all the text not reproduced from the magazine. Goldstein did not include a critical essay about the magazine like the one Elizabeth Smith wrote for the "Blueprints for Modern Living" catalog, but her compilation of articles is not intended as a definitive scholarly work. It succeeds, though, as a valuable introduction to *Arts & Architecture*.

The sampling of articles on architecture, music, film, and art, along with Entenza's often political "Notes in Passing," illustrates the integration of disciplines in *Arts & Architecture*. The selection reveals that the publication was not about a Modern "style," but about an approach that grew out of technological, cultural, social, and esthetic concerns.

Kenneth Caldwell is marketing director for ELS/Elbasani & Logan Architects in Berkeley, California.

Postmodern Sophistications: Philosophy, Architecture and Tradition, by David Kolb. Chicago: University of Chicago Press, 1990, 216 pages, \$29.95.

The Modernist City: An Anthropological Critique of Brasilia, by James Holston. Chicago: University of Chicago Press, 1989, 368 pages, \$50.

Reviewed by Douglas Gantenbein

David Kolb, a professor of philosophy at Bates College, takes on the issue of tradition and architecture in *Postmodern Sophistications*, a thoughtful, if sometimes (okay, often) obtuse look at Postmodernism in architecture and philosophy.

In this book, Kolb builds a case for an architecture that accepts tradition yet retains a concern for creating new forms. His intent is not to create a single vision but to make people recognize there are several alternatives to the problems raised by planning and design. Simplifying the choice into one between chaos (strip shopping centers, for example) and the comfort of historical imitations fails to address the full spectrum of possibilities. Kolb's conclusion is a fairly neat and compact intellectual suitcase. Unfortunately, a great deal of additional baggage accompanies it—including discussions of Socrates, the Sophists, and metaphysical fear.

Although Kolb's reluctance to take sides may strike some as weak-kneed, it looks refreshingly liberal when compared to the rational terrorism that resulted in Brasilia, the subject of James Holston's *The Modernist City*. Holston describes the Orwellian effort to reshape an entire society

through ruthless application of principles developed during the 1930s and 1940s by CIAM (Congrès Internationaux d'Architecture Moderne) and its disciples such as Oscar Niemeyer, Brasilia's chief designer. The result was the soulless new Brazilian capital, the apotheosis of Modernist tenets.

Holston has studied architecture, but his main field is anthropology. With an anthropologist's eye he looks at how Brasilia's designers and its residents have fought for control of the city. Niemeyer envisioned a city that shaped its inhabitants; its residents have waged steady guerrilla warfare to recast the new city in the image of their urban traditions. Shop-owners, for example, have managed to get footholds on the street despite efforts to stop them, while the wealthy have fled the classless apartment blocks to build gaudy homes announcing their inhabitants' importance. Although written in rather arid academic prose, Holston's book illustrates the futility of imposing a single idea on a creature as complicated as a metropolis.

Douglas Gantenbein is a Seattle-based writer.

Briefly noted

Architect's Guide to European Cities Series (five books). Sevenoaks, England: Butterworth, 1990, \$16.95 each.

This series of guidebooks to five European cities (London, Paris, Rome, Florence, and Venice) serves as an easy-to-carry source of architectural information. Written by Renzo Salvadori (London, Paris, and

Rome), Antonio Salvadori (Venice), and Roberto Martucci (Florence), the books are organized by chronological period, rather than neighborhood—a device that emphasizes the stylistic development of each city but also makes touring the sites a logistical nightmare. Each entry is illustrated with a black-and-white photograph, drawing, or plan, and a short text. Introductions provide helpful overviews and maps.

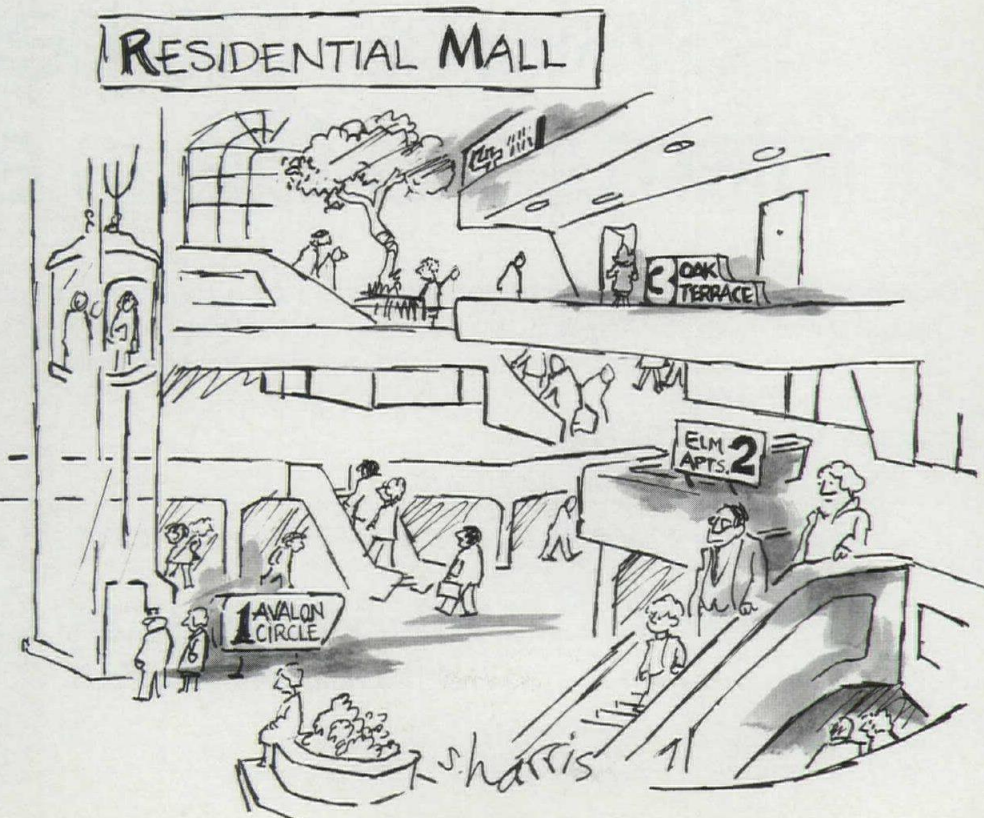
Architectural Guides for Travelers, (series of three books). San Francisco: Chronicle Books, 1990, \$14.95 each.

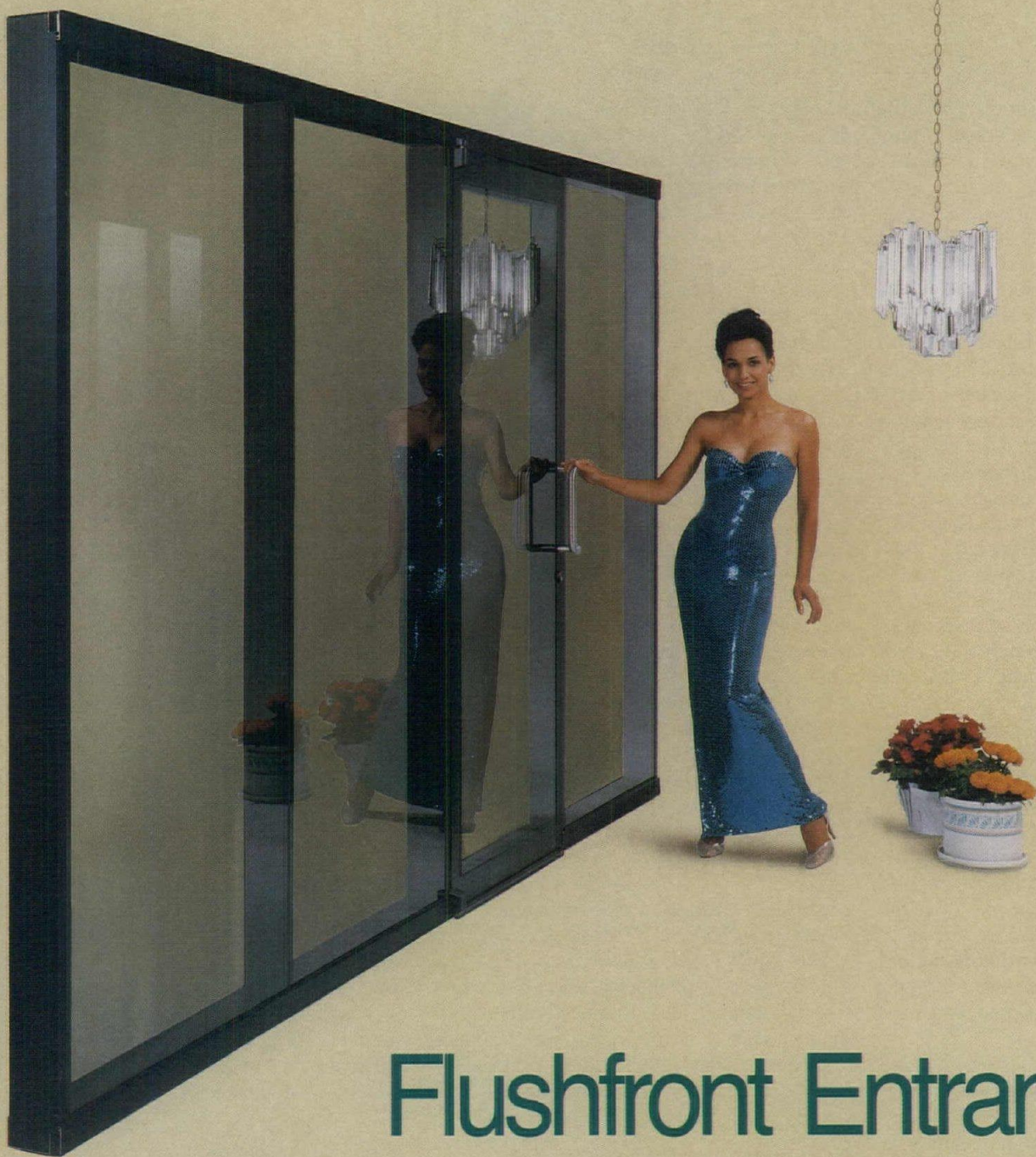
Written more for the layperson interested in architecture than specifically for architects, this series so far includes three titles: *Islamic Spain* (by Godfrey Goodwin), *Mughal India* (by G. H. R. Tillotson), and *Classical Turkey* (by John Freely). A fourth book on northern Spain will be published this spring. The guides break from the norm by focusing on particular regions and architectural periods rather than accepting the sometimes arbitrary boundaries of cities and nations.

Modern Architecture in Europe: A Guide to Buildings since the Industrial Revolution, by Dennis J. De Witt and Elizabeth R. De Witt. New York: Van Nostrand Reinhold, 1990, 335 pages, \$19.95.

Recently reissued, this book serves as a thinking-man's guide to Modernism in western Europe and Scandinavia. Good black-and-white photographs and maps supplement the sometimes opinionated but always intelligent text. Instead of being merely descriptive, each write-up is a short analysis of a building's place in the development of Modern architecture. □

Drawn for ARCHITECTURAL RECORD by Sidney Harris

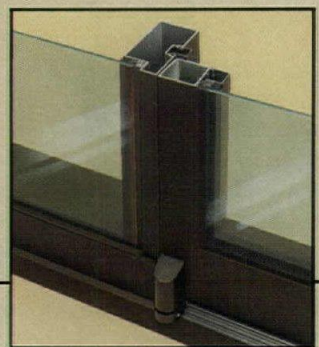




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In This Issue

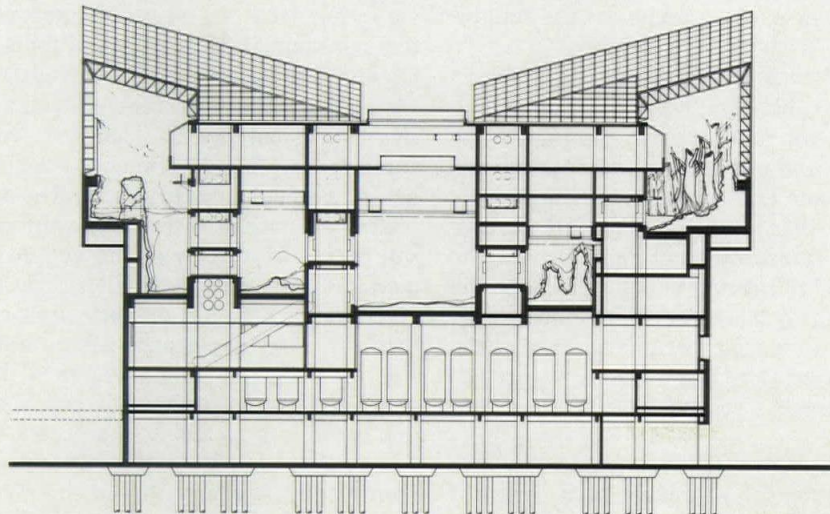
When RECORD's editors meet to plan each monthly issue, the word that frequently crops up in our deliberations is *balance*. Our goal is a deliberately eclectic magazine, carefully balanced in terms of commission size, building type, architectural style, and geography. Although some months turn out better than others, we modestly suggest that with the diverse slate of projects featured on the following pages, this month we got it right.

In the area of architecture as global art, Cambridge Seven Associates' striking new Osaka Aquarium combines a museum of Pacific aquatic life with a festival marketplace, giving Japan's second city an instantly recognizable waterfront landmark (below and pages 64-71). Closer to home, and on a considerably smaller scale, architect Jeffrey Hildner's dormitory and gardener's-cottage renovation for a Princeton, New Jersey, nursing home draws on a variety of classical sources of inspiration (pages 72-77).

Though Charles Moore was looking at the regional vernacular of Southern California's early missions for his design of Church of the Nativity near San Diego (cover and pages 78-81), the 1991 AIA Gold Medalist went beyond stylistic mimicry to produce a building of startling spatial ingenuity. Equally inventive are the five buildings by five small firms that make up our regional portfolio of Texas architecture (pages 82-93). These highly original structures—an artist's studio, a church, a branch bank, and two houses—all help dispel any lingering stereotypes of the Lone Star State as a source of faceless monoliths.

Finally, our Building Types Study examines the design and construction of industry- and university-sponsored research laboratories (pages 97-109). With their complex programs, strict environmental-control tolerances, flexibility requirements, and need to relate to existing buildings, lab commissions pose some of the profession's most daunting challenges. As the project shown here reveal, they can also produce some highly satisfying architecture.

P. M. S.



Osaka Aquarium, Osaka, Japan; Cambridge Seven Associates, Architects

Total Immersion

Osaka Aquarium visitors circumnavigate the Pacific Rim from the Aleutians to Antarctica, from mountain forest to ocean floor.



Perched at harbor's edge, Osaka's aquarium is the premier attraction of a waterfront development that also includes a major shopping mall (left above).

Even in Japan, an island nation inextricably linked to the sea, many coastal cities have followed their Western counterparts in allowing the unlovely artifacts of shipping and warehousing to barricade their shores against public use. But on Osaka's waterfront, shipping is giving way to shopping, and the stowing of goods to the capsulation of the ocean itself in a stunning dockside aquarium.

The spearhead of a \$148-million effort to reclaim Tempozan Harbor, the aquarium designed by Cambridge Seven Associates easily dominates a complex that also includes a "festival marketplace" by the same firm, a broad public plaza, and underground parking. Perched at water's edge on a spit of land thrusting into Osaka Bay, the four-square building is leavened with a hint of the ungainliness of sea creatures on land, and livened by vivid color—a marine-blue tile base aswim with cheerful mosaic fishes, a gridded belt of rich red spandrel glass, and a glinting "sky" of crystalline clear-glass pyramids. More important, the dynamic enclosure anticipates the aquarium's narrative theme.

Architect Peter Chermayeff was flying home from Japan after early talks with the client, he says, when the compelling presence of the boundless ocean miles below suggested the unifying concept he sought for the new aquarium: nothing less than the Pacific Ocean as a whole and (because it is not really boundless) the volcanic coasts that define its rim and nurture its greatest concentrations of terrestrial and aquatic life. The "Ring of Fire" thus became the informing spirit that drove the design, from the exterior's highly abstract representation of water, earth/fire, and sky/life to a microcosmic inner world in which the visitor journeys around the Pacific Rim and through the ocean depths along a seamless passage that brings coherence to broadly varied exhibits.

In replacing the usual aquarium's fish-in-a-frame displays with one-way linear routing through an orchestrated series of changing spaces and exhibits, the aquarium builds on design

ideas Cambridge Seven Associates first developed in the 1960s for Boston's innovative New England Aquarium, whose commission occasioned the firm's founding. The concept was then further refined and strengthened for the National Aquarium in Baltimore, which opened in 1981 [RECORD, May 1982, pages 83-91]. The lessons the Osaka Aquarium draws from these projects include not only its predetermined but nondictatorial sequencing, technically meticulous large-scale habitats, and exploitation of a full range of media, but its subtle yet efficient control of crowd flow—which was put to the test by throngs of up to 35,000 visitors per day in the early weeks after opening. (The number of visitors has since settled at about 20,000 a day.)

A key decision placed most ancillary functions in a separate entry and support building. The aquarium proper is reserved for an immense 2.9-million-gallon fish tank and essential life-support systems, thus preserving its evocative imagery and clarity of form. Drawn toward the building across the plaza (or emerging from an adjacent garage exit), visitors are diverted to a ceremonial flight of stairs topped by a bright-yellow metal-framed canopy that marks the entrance and serves as a queuing shelter. Above the entry level, a restaurant and administrative offices survey the harbor; from the floor below, which contains the museum shop, a ticket lounge for harbor cruise boats, a small auditorium, and a sidewalk café, visitors completing the circuit through the aquarium are guided back out to the plaza. At this level the support building also extends the pierside promenade established by the retail mall.

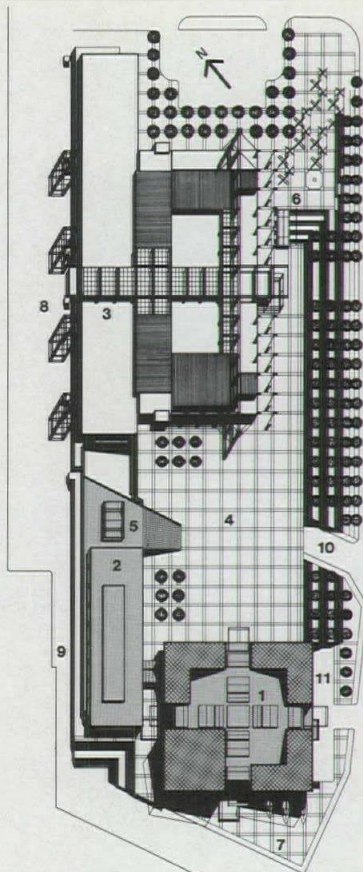
Although inbound visitors pass a gallery housing changing exhibits, their experience of the aquarium begins with a brief ride on a moving belt through a dark tunnel where they are enveloped by shifting projected images of erupting volcanoes and flowing lava, and a soundtrack that contrasts the explosive roars and quiet hisses of lava meeting the sea. They then travel from a bridge where life—a tiny plant bursting through cooled lava—re-emerges to a glass-sided escalator that travels up the

Ring of Fire Aquarium
Osaka, Japan
Cambridge Seven
Associates, Architects



YUKIO YOSHIMURA PHOTOS COURTESY OF TAKENAKA CORPORATION, EXCEPT AS NOTED

To ease orientation and circulation the aquarium is set apart from the low-key linked building (lower left in site plan) where visitors begin and end their tour. A canopied queueing terrace (opposite) offers a ceremonial entrance convenient to garage, plaza, and retail; transit to the exhibits is by bridge and outside escalator (photo below). Reflecting its internal organization, the aquarium's square blue-tiled base anchors a curtain wall of red and clear glass that culminates in pyramidal greenhouses. One of the yellow metal gantries is a real hoist, in addition to housing gas jets that create a "ring of fire."



- | | |
|-------------------------|------------------------|
| 1. Aquarium | 7. Marina |
| 2. Entry building | 8. Cruising ship wharf |
| 3. Tempozan Marketplace | 9. Water bus terminal |
| 4. Event plaza | 10. Parking entry |
| 5. Queueing terrace | 11. Service |
| 6. Entry plaza | |

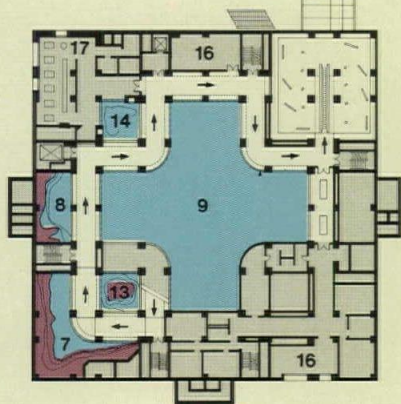
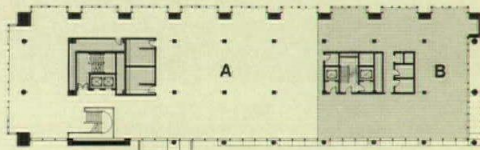
aquarium's outer wall, allowing them to overlook the harbor panorama to the sounds of chirruping insects, birds, and splashing water. The destination, a convincing segment of a Japanese mountain forest complete with rocks and flowing water, trees and plants, and a community of birds, mammals, and fishes beneath a greenhouse sky, also marks the departure point of the visitor's downward spiral through and around the Pacific Ocean.

The forest is the first of eight major and four secondary habitats housed in deep tanks clustered around a 1.4-million-gallon tank that represents the open expanse of the Pacific Ocean. Each re-creates a specific environment along the Pacific Rim and is positioned to reflect its true geographic location, beginning with Japan's forest in the northwest Pacific and moving clockwise to the Aleutian Islands, California's Monterey Bay, the Gulf of Panama, Ecuador and Chile, Antarctica, the Tasman Sea, and the Great Barrier Reef. The tour of these exhibits is two-tiered. Setting forth in daylight, the visitor follows a ramped passage that circles the world above water, taking in coastal fauna that range from the otters and sea lions of the northern Pacific to the monkeys and anaconda of the Ecuadorian rainforest to the Antarctic's colonies of penguins before plunging beneath the ocean to spiral past the same settings from "underwater."

The experience of tunneling through immense volumes of water is abetted by the illumination—or its lack. For both authenticity and the health of specimens, exhibit lighting combines sunlight and artificial sources to replicate natural conditions, including the winter-long night of the polar zones. On upper levels, the tanks' eerie glow provides the only light in passages where walls are obscured in near-invisible near-black purple paint; on lower levels, in air-space corridors between the central "ocean" and surrounding habitats, the dimness of the depths is all-pervasive. Contributing to the illusion of suspen-

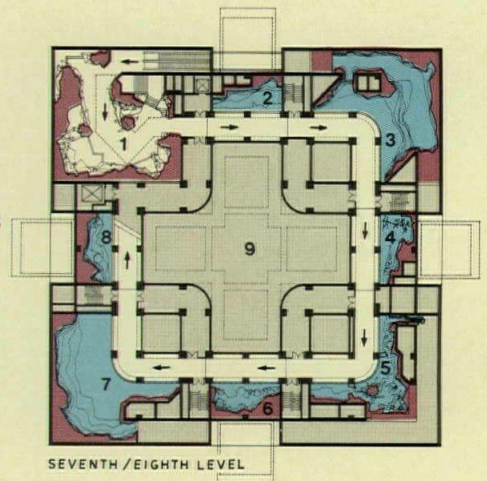




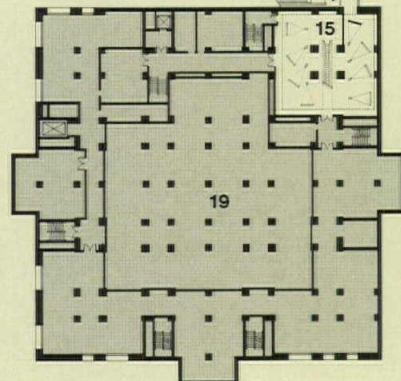
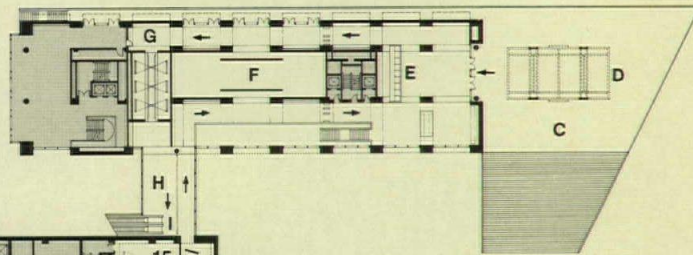


FOURTH LEVEL

- 1. Japan forest
- 2. Aleutian Islands
- 3. Monterey Bay
- 4. Gulf of Panama
- 5. Ecuador rainforest
- 6. Antarctica
- 7. Tasman Sea
- 8. Great Barrier Reef
- 9. Pacific Ocean
- 10. Seto Inland Sea
- 11. Kelp forest
- 12. Coast of Chile
- 13. Cook Strait
- 14. Japan Deep
- 15. Video exhibit
- 16. Curatorial
- 17. Lounge
- 18. Future exhibit
- 19. Life support

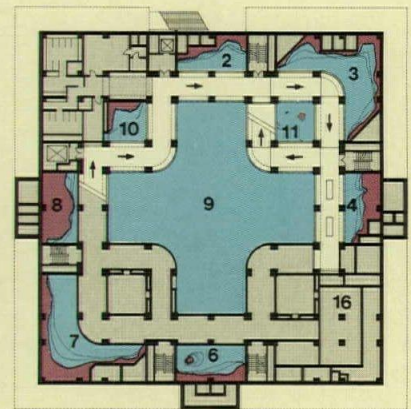


SEVENTH/EIGHTH LEVEL

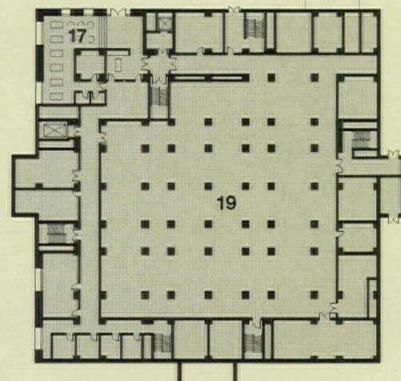
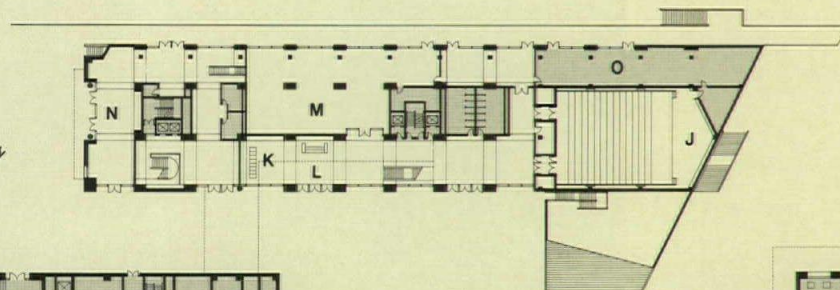


THIRD LEVEL

- A. Restaurant
- B. Office
- C. Queueing terrace
- D. Entrance canopy
- E. Ticketing/lobby
- F. Changing exhibit
- G. Video orientation
- H. Bridge
- I. Escalator
- J. Auditorium
- K. Advance reservations
- L. Information
- M. Museum shop
- N. Café
- O. Offices

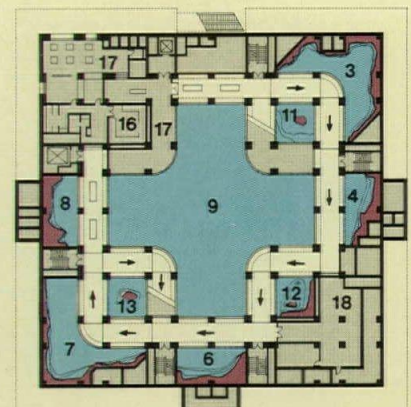


SIXTH LEVEL



SECOND LEVEL

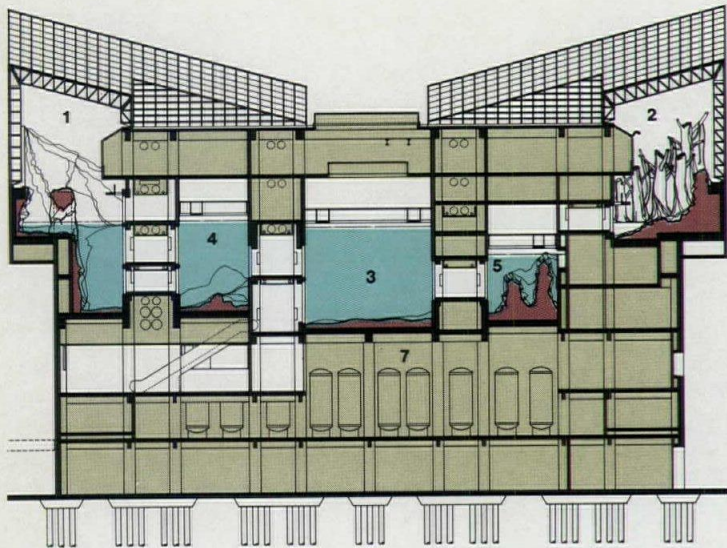
The airy brightness of the aquarium's entrance lobby (top opposite) and the introductory display of the rainforest contrast sharply with the darker drama of subsequent exhibits—e.g., the Aleutian coast shown bottom opposite—along the continuous passage.



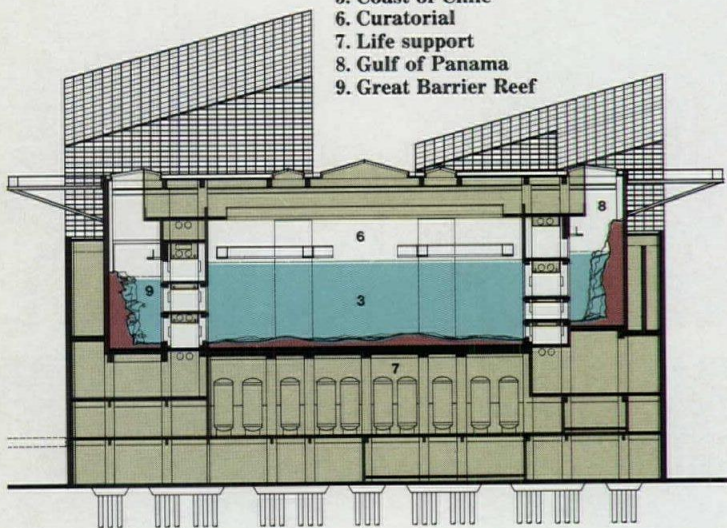
FIFTH LEVEL



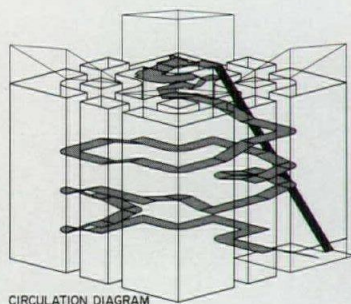




1. Monterey Bay
2. Ecuador rainforest
3. Pacific Ocean
4. Kelp forest
5. Coast of Chile
6. Curatorial
7. Life support
8. Gulf of Panama
9. Great Barrier Reef



Simply organizing its complex and interrelated structural and mechanical elements, the aquarium sandwiches a 30-foot-deep layer of public areas and exhibits between two basement levels dedicated to life-support systems and two upper levels housing husbandry and curatorial functions. To address tough seismic requirements, the structure's reinforced-concrete grid floats on shock-absorbing pads atop caissons that penetrate to bedrock. Containment structures for tanks fight corrosion with dense concrete heavily reinforced with deeply embedded epoxy-coated rebars and topped with sturdy fiberglass liners. The sensory impact of the



labyrinthine passage among the exhibits (axonometric above) is heightened by a blacked-out enclosure and the dim aqueous light borrowed from surrounding habitats (photos right). Advanced acrylics combine the strength for bigger-than-ever, 30-ft-deep tanks with visual clarity despite sheet thicknesses up to 1 ft.

sion, both the 30-foot-deep tanks, which are faced with acrylic sheets up to 12 inches thick, and the water they contain, which is ozonated to eliminate microscopic contaminants as well as pressure-filtered to remove visible particles, are so clear that travelers can see from tank to tank to the coastal backdrops beyond, glimpsing their fellows as they snake through the watery labyrinth. Since some find the resulting sense of immersion so intense as to be disorienting, the architects have thoughtfully provided several cul-de-sac retreats for confused or weary wayfarers—simple alcoves with benches overlooking exhibits on both sides, as well as lounges and restrooms.

The journey through the deep, in the company of rays, schooling fish, and a 14-foot-long whale shark, ends at the ocean floor with a ballet of giant Japanese spider crabs. But the return to reality as visitors again cross the bridge to leave through the support building is marked by a final video exhibit, "Man and the Ocean," which reprises all the marine environments as they affect and are affected by man—the recipient and custodian of the ocean's bounty.

MARGARET GASKIE

Ring of Fire Aquarium

Osaka, Japan

OWNER: Osaka Waterfront Development Co., Ltd.

ARCHITECT AND EXHIBIT DESIGNER: Cambridge Seven Associates—Peter Chermayeff, Ivan Chermayeff, Peter Sollogub, Bobby Poole, Richard Tuve, Christopher Choa, Louise Hara

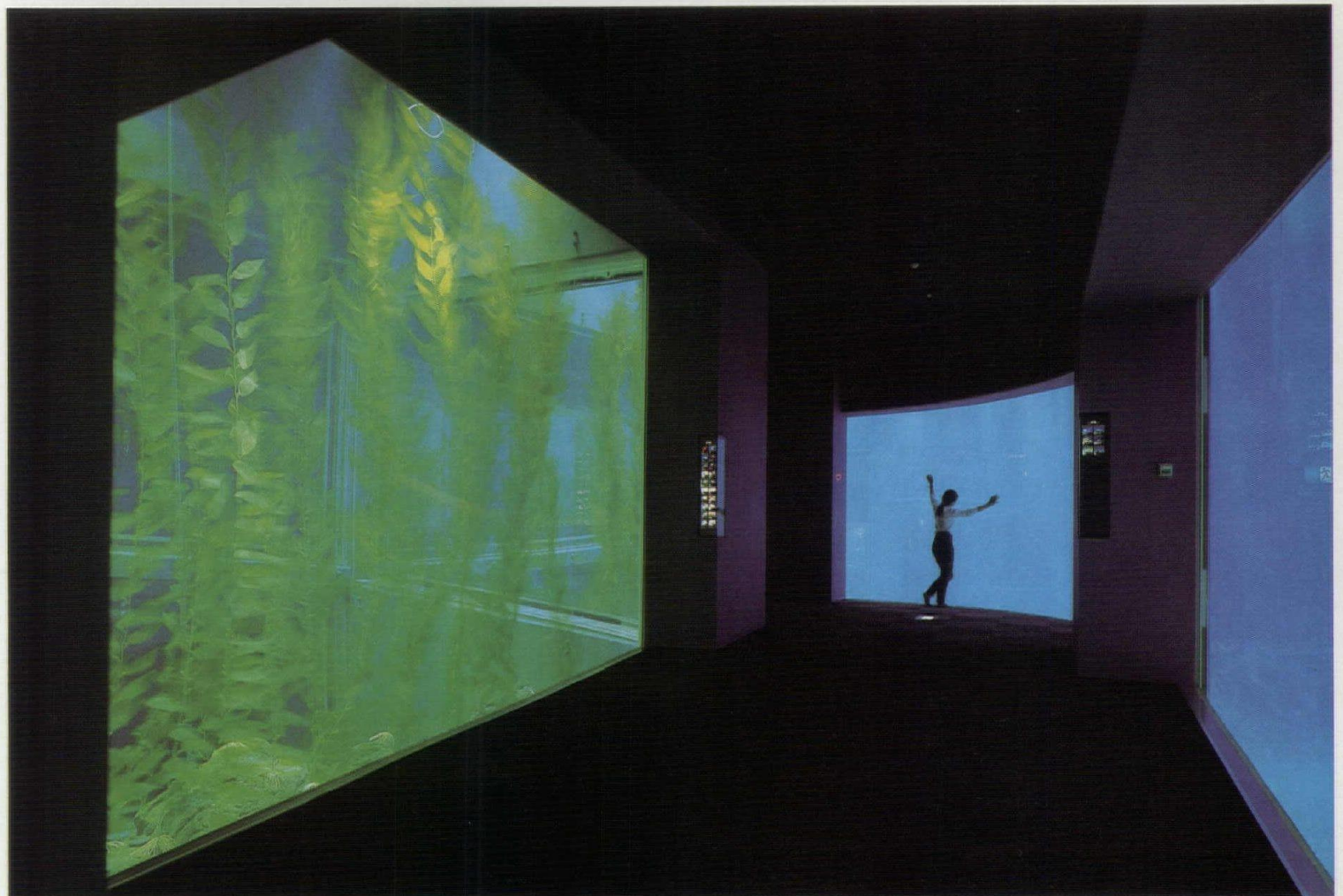
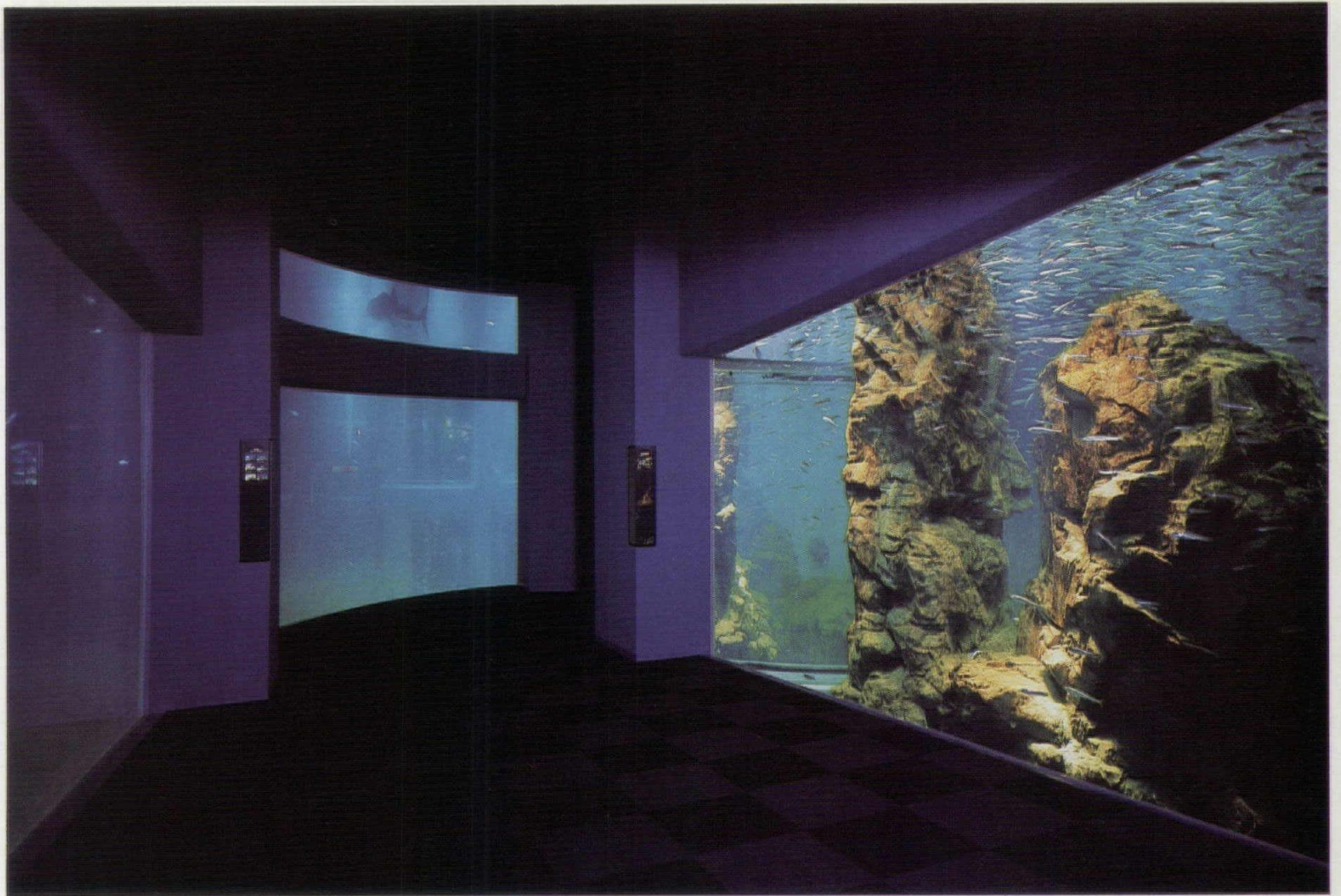
ASSOCIATE ARCHITECT AND ENGINEER: Environmental Development Research, Inc.—Masaaki Sugimoto

ENGINEERS: Weidlinger Associates (structural); John L. Altieri (mechanical/electrical/plumbing); Enartec (life support systems)

CONSULTANTS: Lyons/Zaremba Inc.—Frank Zaremba (exhibit design); The Larson Company—James Wertheimer (exhibit habitat design); Chermayeff & Geismar Associates—Ivan Chermayeff, Stephen Loges (graphics); H. M. Brandston & Partners—Gene Stival (lighting)

GENERAL CONTRACTOR AND CONSTRUCTION MANAGER: Takenaka/Obayashi/Onoike Joint Venture





Sources of Inspiration

Two recent projects by Jeffrey Hildner for a private nursing home in Princeton, New Jersey, reconcile the architect's interest in art and the client's emphasis on utility.

What happens when an architect well-versed in art history and architectural theory is lucky enough to find a patron, but that patron sees architecture as a purely utilitarian discipline? Jeffrey Hildner knows the answer. As the official architect of sorts for the Tenacre Foundation, a Christian Science nursing home that, contrary to its name, occupies some 40 acres of former farmland on the outskirts of Princeton, New Jersey, 35-year-old Hildner has had to balance what he characterizes as his "interest in the *art* of architecture" with the private institution's "interest in nature."

When Hildner began working at Tenacre seven years ago, he had just finished his graduate studies at Princeton University. Like most of his classmates, he was hoping to secure a position with a well-established New York City firm, until a member of Tenacre's board of directors called and offered to make the young architect the enclave's own resident designer. Recognizing that it was an unusual opportunity to oversee his *own* designs, Hildner accepted.

Hildner's first project at Tenacre was a dining-room addition to an existing food-service and housekeeping facility [RECORD, October 1985, pages 148-151]. What was initially a paint and wallpaper job eventually turned into a full-fledged architectural project, with Hildner adding an entrance portico and a modest rose-colored stucco appendage to an otherwise nondescript structure. For his scheme, Hildner drew on the forms of an old barn and adjacent horse stable, located across the street, which had been remodeled during the 1950s into a neo-Colonial nurses' dormitory. Ironically, just as the dining-room project reached completion, the dormitory burned down, and Hildner was faced with a second, more ambitious commission.

Remembrance of things past

Like its predecessor on the site, the new nurses' dormitory, dubbed The Center (pages 74-77), also contains a lounge and a library that are used both by the hundred people that reside permanently at Tenacre and by the public at occasional receptions.

Hildner encountered some neighborhood opposition to the new structure, which is located at the edge of Tenacre's property, next to a well-to-do residential area. Although the Foundation has been present in Princeton since before its incorporation in 1921, owners of sprawling nearby estates over the years have

expressed concern about the seeming encroachment of the institution's mixed-use campus.

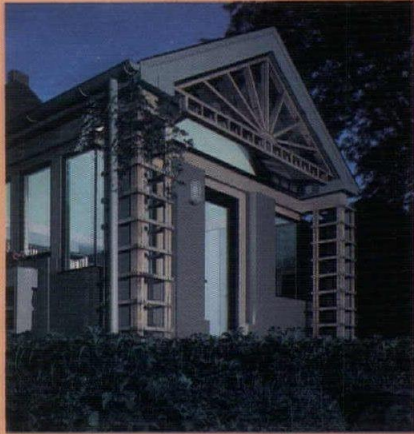
In his design for the dormitory, Hildner sought to express the essentially private, contemplative nature of Tenacre inhabitants by proposing a lush garden and a modest grove of trees that would screen his building from the adjoining road. So far, hungry neighborhood deer have prevented the garden from filling in.

The building contains 17 dormitory rooms, a kitchen, and communal areas, all within the linear footprint of the original library/dormitory. A south-facing library extends the reach of the facility (see plans page 74). The resulting design is more complex because Hildner saw the project as both a "remembrance" of the original structure and a much-anticipated chance to give three-dimensional form to a variety of historic sources of inspiration. So, while the cupola above the central foyer is an updated version of a similar element on the previous dorm, for the most part the building is a compendium of less local architectural references. A row of columns along the front facade, for example, was inspired by a trip the architect made to Thomas Jefferson's University of Virginia, and wood-lattice sun shades are meant to recall Stanford White's residential work in Newport, Rhode Island, according to Hildner. The trellises are also meant to further the image of a garden pavilion. In overall effect, however, the building seems to owe its greatest debt to one of Hildner's mentors at Princeton, Michael Graves.

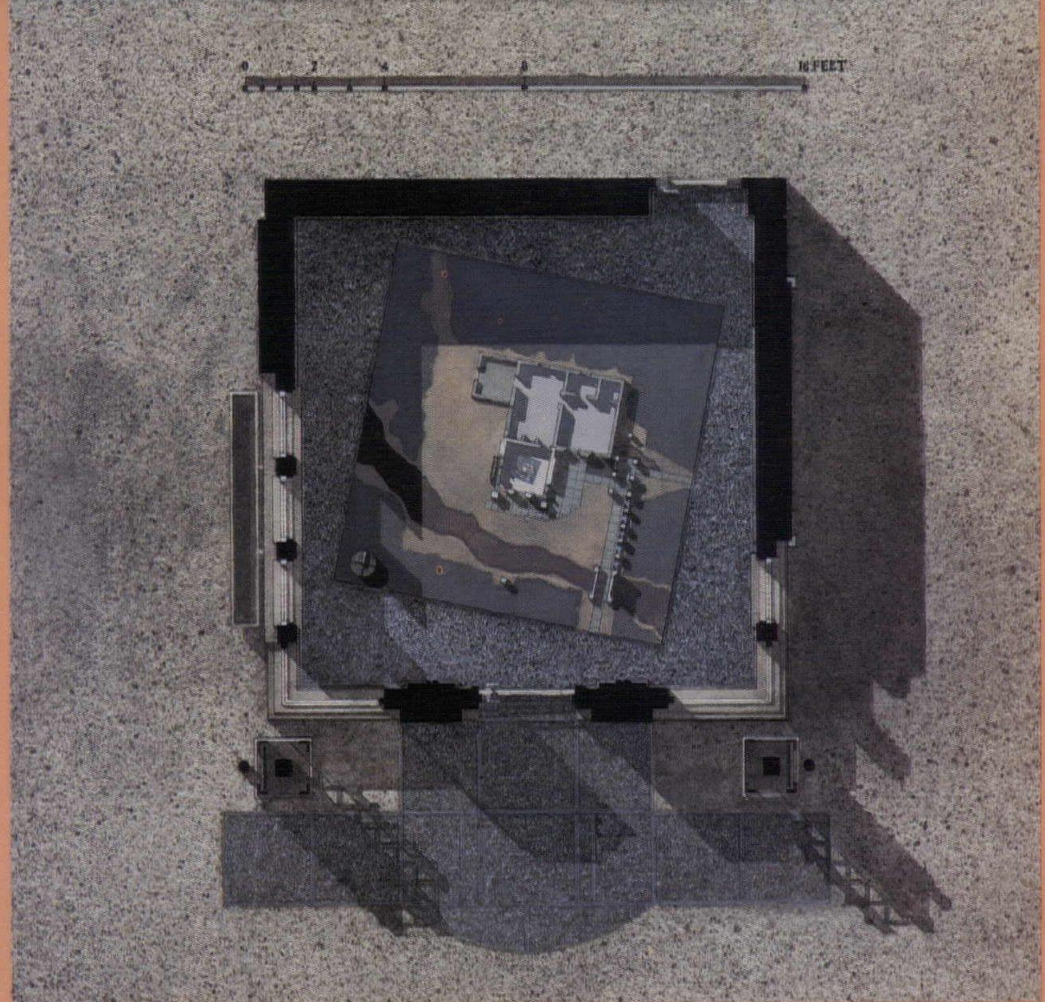
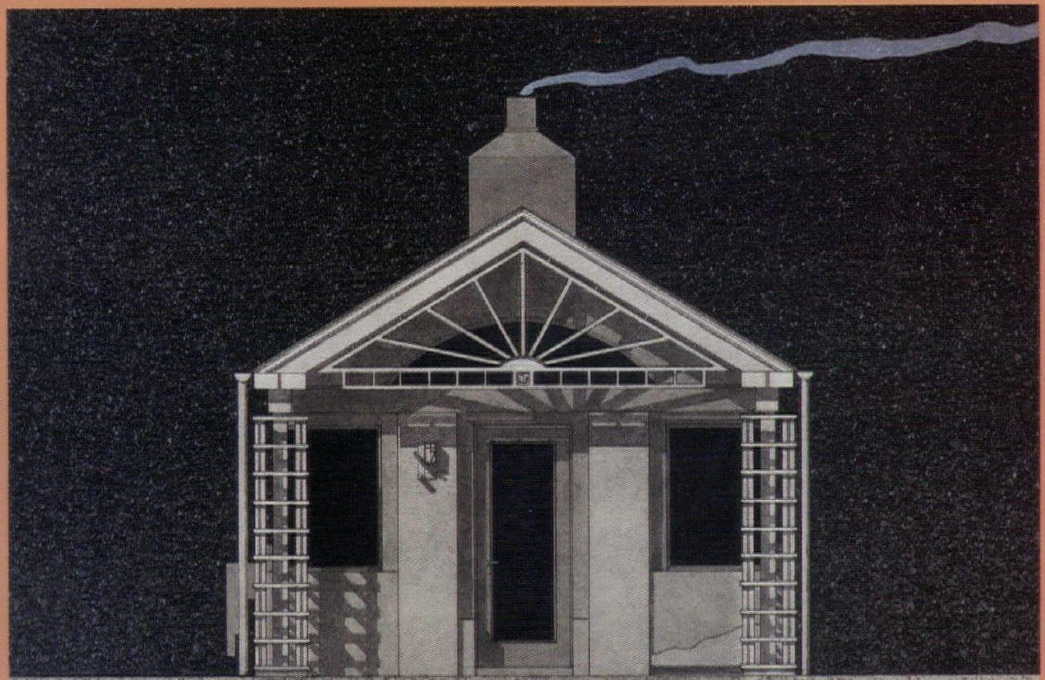
On the exterior, Hildner applied synthetic stucco over a wood-frame structure, as he had for the dining hall across the street. At the Center, however, muted shades are enlivened with turquoise ceramic-tile accents and medallions of blue-tinted stucco. Hildner sought to imbue the interior with a sense of handicraft by using reproduction Josef Hoffmann furniture and custom-made light fixtures constructed of stained glass, painted pine, and mother-of-pearl inlay. Painted pine and ebonized ash tables and study carrels were stained to resemble more serious-looking mahogany.

A primitive hut

Hildner has also made his mark on another Tenacre building, the former gardener's cottage, which he was asked to transform into a residence for a Foundation administrator (drawing and photos opposite). Though the project is no more than a simple one-room study addition to



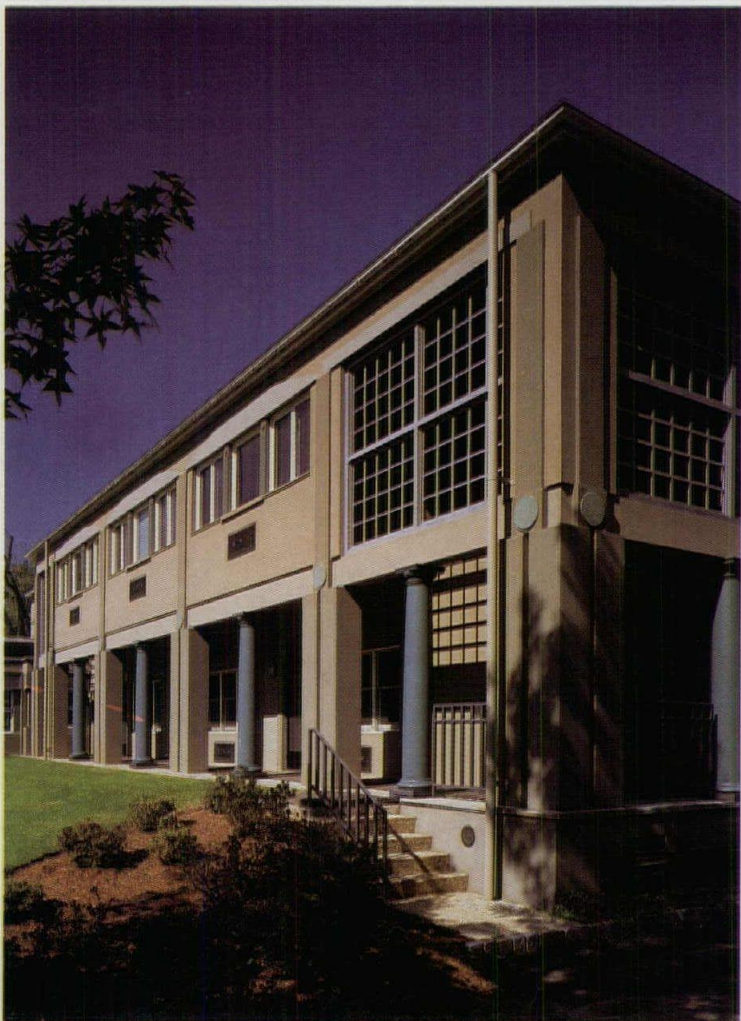
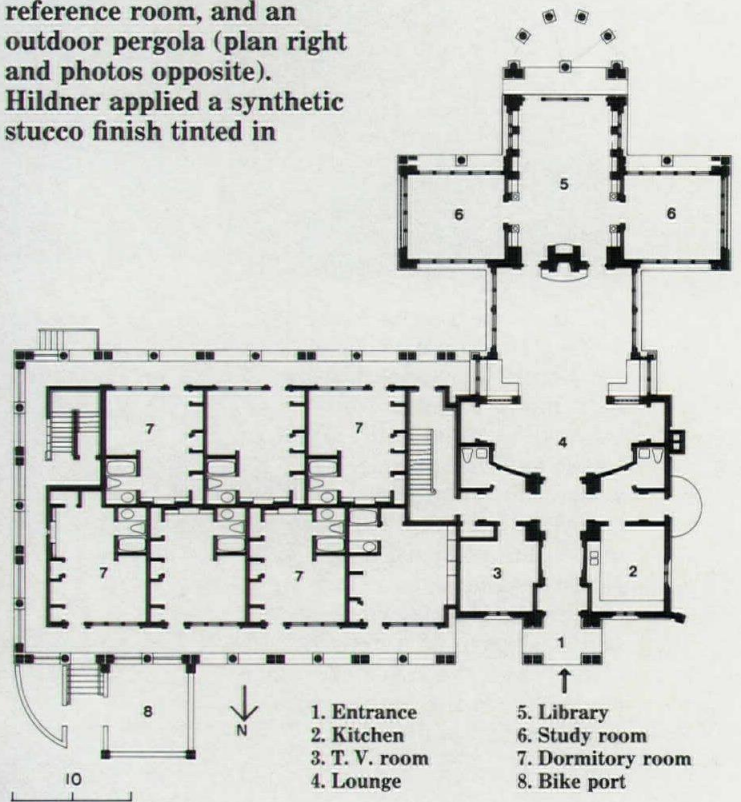
The wooden temple front of Jeffrey Hildner's gardener's-cottage addition at Tenacre Foundation (above) is remarkably true to the architect's watercolor rendering (right). Along one exterior wall (photo bottom), Hildner made a wavelike pattern in the stucco to echo the path of a nearby stream and the trace of smoke from the chimney as depicted in his drawing.



WILLIAM TAYLOR, PHOTOS EXCEPT AS NOTED

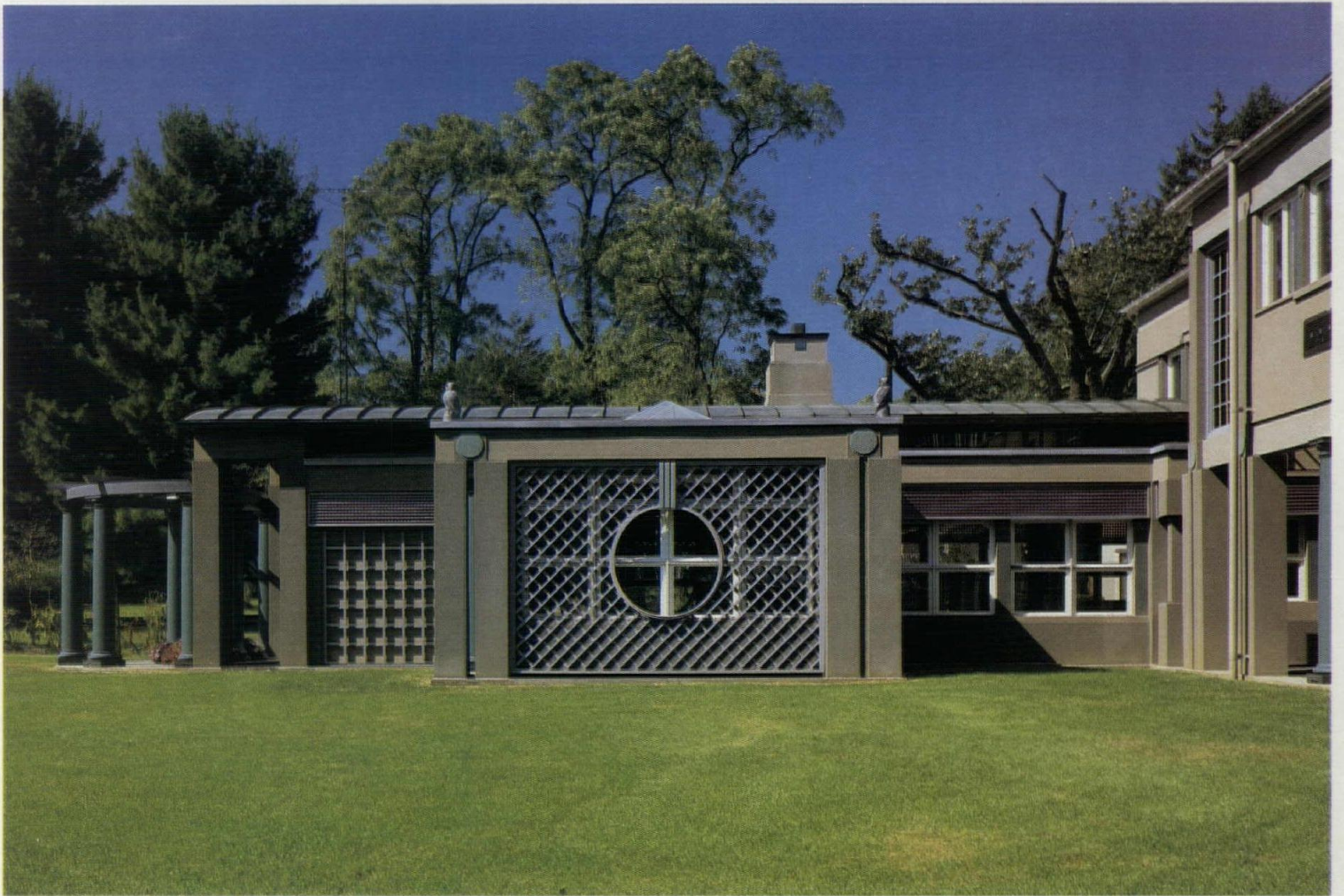


The footprint of the new library and dormitory is nearly identical to the plan of the original facility, a converted barn and stable destroyed by fire in 1985. The new building departs from the old with the addition of a south-facing wing, which contains a reference room, and an outdoor pergola (plan right and photos opposite). Hildner applied a synthetic stucco finish tinted in



somber shades of blue-gray to a wood-frame structure, melding his building with the mostly stucco buildings of the campus. Copper roofing, painted wood trellises, and ceramic-tile details complete the exterior material palette. Four owls made of lead along the perimeter of the library's roof are intended as "symbols of wisdom and protection," according to the architect.

PETER COWAN



PETER COWAN



a two-room bungalow, Hildner gladly accepted the commission as an opportunity to explore further the relationship of architecture and nature. The architect's inspiration for this scheme came from the 18th-century writings of Abbé Laugier on the primitive hut—weighty stuff for some 200 square feet. A new wooden temple front gives the modest structure presence on its heavily wooded site, while a pattern of waves in a stucco exterior side wall is meant to represent natural forms, like the winding path of a nearby stream.

Hildner clearly has developed a varied storehouse of references for his growing portfolio of Tenacre Foundation projects. He continues to face the challenge of reconciling his own interest in abstracted historic form with his client's institutionalized concern for utility.

KAREN D. STEIN

Gardener's Cottage Addition
Tenacre Foundation
Princeton, New Jersey

OWNER: Tenacre Foundation

ARCHITECT: Jeffrey Hildner, principal-in-charge; Catherine Dopkin, project assistant

ENGINEER: John Harrison (structural)

CONSULTANT: Ani Rosskam (interior finishes)

GENERAL CONTRACTOR: Robert Hutchinson



Library and Dormitory
Tenacre Foundation
Princeton, New Jersey

OWNER: Tenacre Foundation

ARCHITECT: Jeffrey Hildner, principal-in-charge; Catherine Dopkin, Carol Fieveson, Donald Spranza, Kim Stanton, John Wysocki, John Zeidonis, project team

ENGINEERS: Blackburn Engineering Associates (structural); T. A. Fitzpatrick Associates (mechanical); Van Note-Harvey Associates (civil); Joe Williamson (electrical)

CONSULTANTS: Ani Rosskam (interiors); Stuart Rosse, Country Cabinet (furniture); Leon Barth, Princeton Stained Glass (light fixtures)

GENERAL CONTRACTOR: Bowers Construction Company

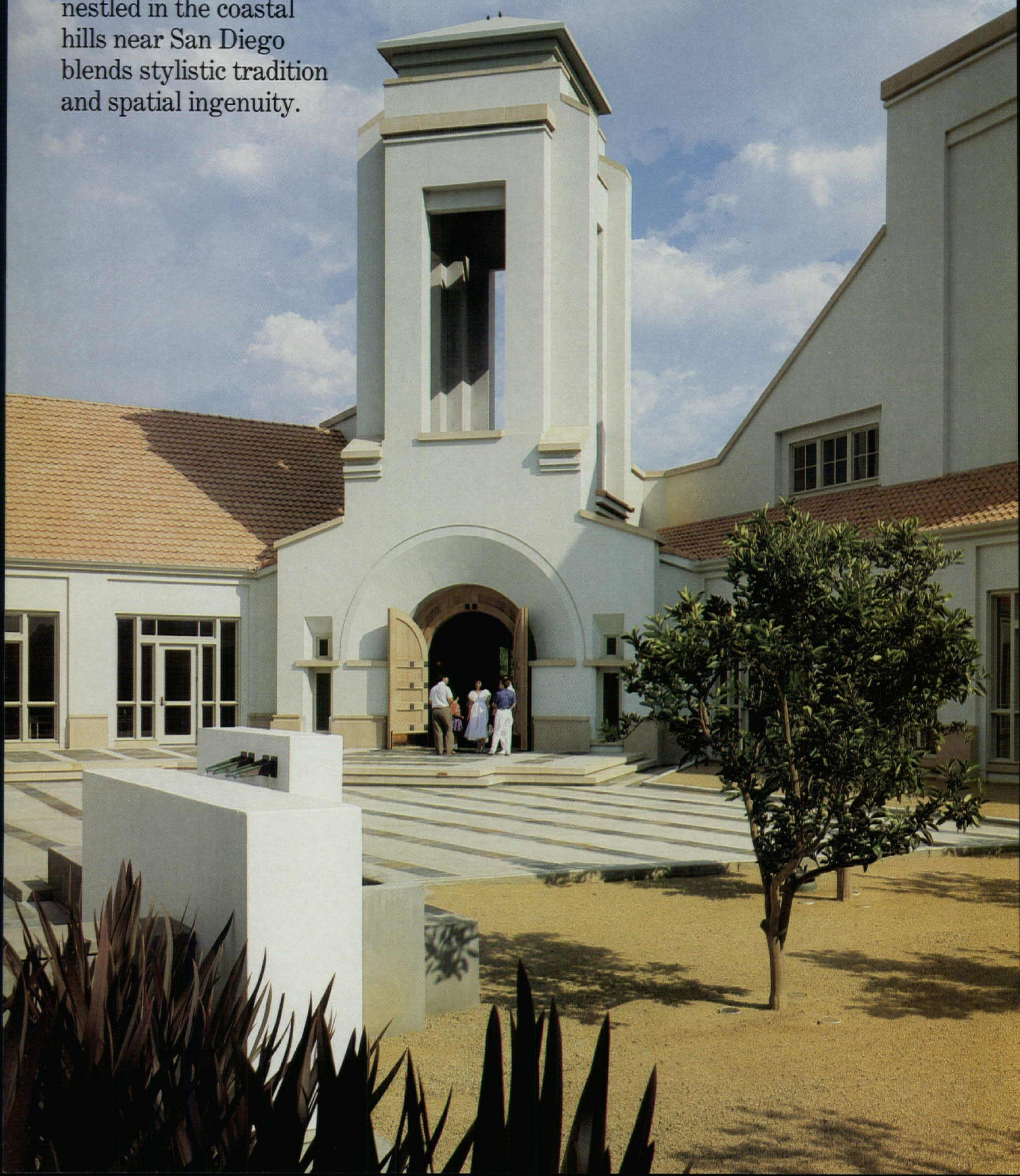
For the interior of the library (top and opposite), Hildner designed stained-glass light fixtures and side tables of pine, painted to look like mahogany, with mother-of-pearl inlay. For the reference room (above), Hildner designed a conference table of ebonized ash meant to complement chairs by Josef Hoffmann.





A Place Apart

A modern-day mission
nestled in the coastal
hills near San Diego
blends stylistic tradition
and spatial ingenuity.





Church of the Nativity
 Rancho Santa Fe, California
 The Austin Hansen Group,
 Architect
 Moore Ruble Yudell,
 Design Architect

Like so much of Charles Moore's best work, the Church of the Nativity's complex in the coastal hills of Southern California combines a keen sense of history and place with an astonishing, at times even disorienting, inventiveness.

The church is located in the wealthy San Diego suburb of Rancho Santa Fe, 10 miles northeast of the city. The congregation had for four years been meeting in a country club, and its pastor, Monsignor Dennis Clark, knew exactly what he wanted when it came time to build a new church: "a place of rest and repose . . . where people could think and be close to God."

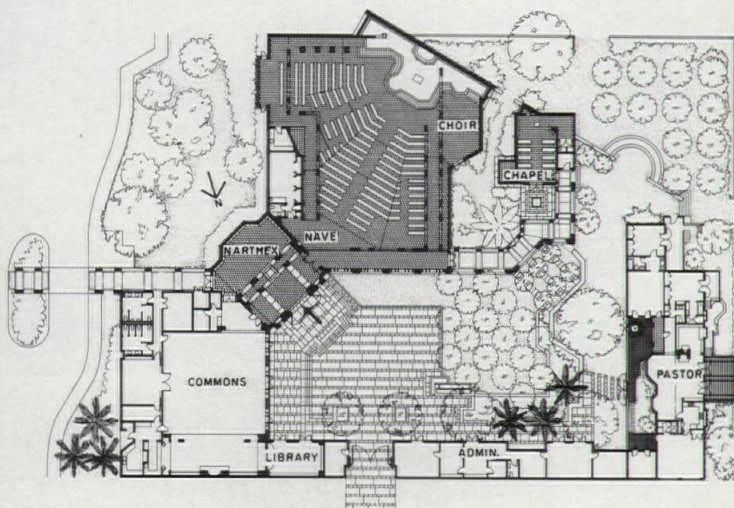
Monsignor Clark initially engaged the Austin Hansen Group of San Diego, which in turn suggested bringing in Moore Ruble Yudell. In his first meeting with Moore and the full architectural team, the pastor elaborated on his concept of apartness, which called for a processional entry through which parishioners would "shed [daily concerns] and come to their encounter with the transcendent."

Another key objective, he said, was to "bond the congregation in friendship." Toward that end, there needed to be a welcoming social space linked to the church in such a way that the congregation could naturally flow into it after worship. As for the church itself, he wanted it to convey a sense of gathering and say to all, "this is a holy space."

In addition to the church and social space, the program called for a number of ancillary facilities: small chapels, offices, a library, a pastor's residence. The architects configured the complex as a walled compound (plan below), with buildings joined around a central courtyard—the modern day equivalent of an early California mission. This layout, together with Monsignor Clark's fondness for the work of Barragán, has given the stucco-clad ensemble a Mexican cast. "It is Barraganesque," acknowledges Moore, "but the spaces are more complex."

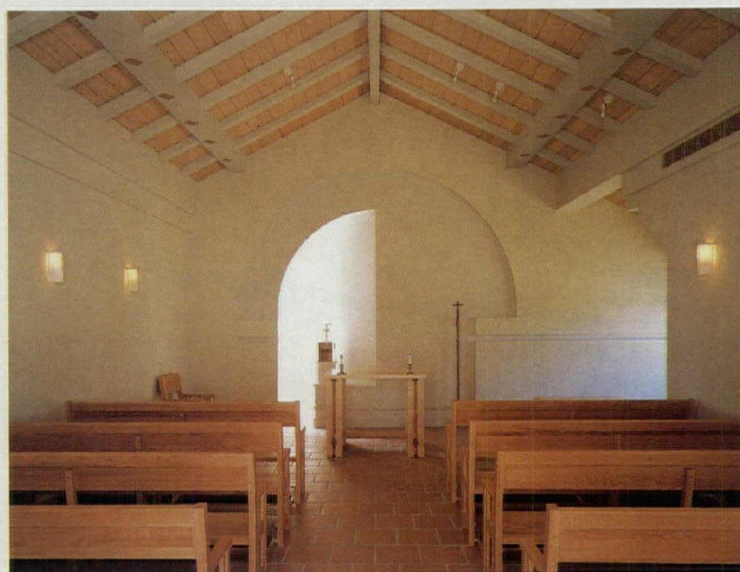
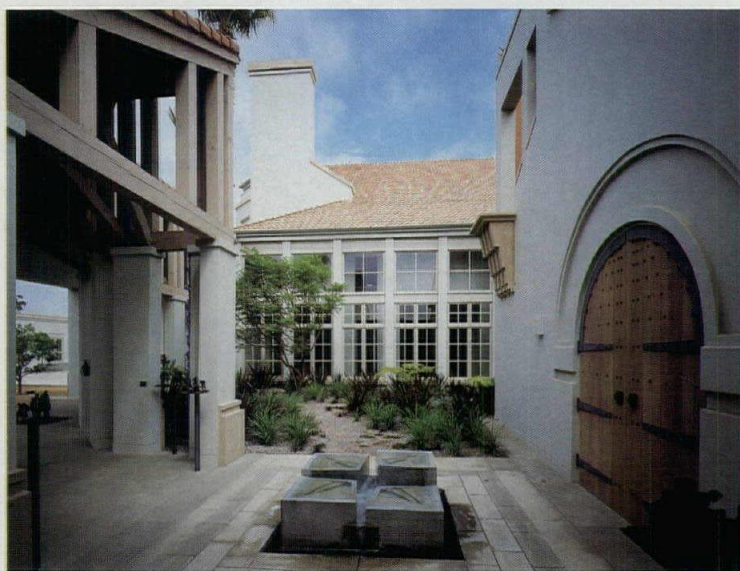
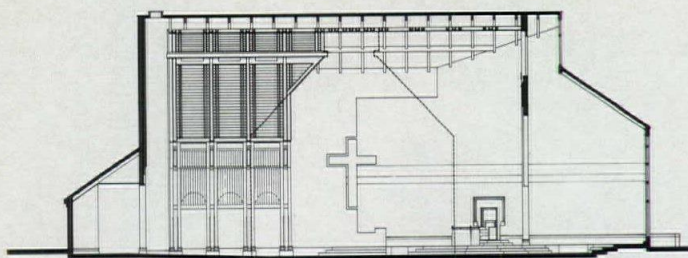
Within the courtyard the unexpected begins to happen. The entrance to the principal buildings, for example, is not straight ahead but diagonally to the left, where a belfry-like tower crowns the narthex that links church and commons. Gently competing with the thrust of the tower, an engaged vertical slab, or *espanada*, rises from the sanctuary, bearing a rustic wooden cross framed between the *espanada's* cornice and the church's tiled roof. The simple frame structures themselves gain substance from finely modeled stucco surfaces and contrasting precast-concrete bases, lintels, and copings.

From the narthex small painted doors open to the nave again unfold the unexpected. Although the sanctuary takes the familiar form of a long rectangular nave with a single transept on the east and traditional ambulatories separated from the nave by columns and screens, the entrance is at the corner, facing a canted altar reached by a diagonal aisle through a narrow fan of seating. The spirit of the space, however, lies less in its skewed geometry than in the *chiaroscuro* produced by the









Top: along an arcade leading from the church to a small confessional chapel are stations of the cross with animated three-dimensional figures by sculptor Max DeMoss. **Above:** the chapel interior. Confessionals are housed in finely crafted wood structures (not shown) to the right of the chapel. **Opposite and overleaf:** the

main sanctuary. Pews, lectern, and celebrant's chair are maple, accented with cherry. Upholstery is gray-green velvet. A bright-red runner widens as it travels down the nave to emphasize the altar's significance. The sanctuary's Douglas fir ceiling canopy is stained to retain its natural color and resist yellowing.

layered enclosure's discreet ordering of natural light from several carefully calculated sources.

The principal diffusers are a wood latticework canopy dropped from the gable over the nave (veiling a ceiling randomly patterned in enamel and gold and silver leaf) and the colonnades that screen the ambulatories. At the rear of the church, a single colonnade damps the light from French doors open to the courtyard. Inside the west wall, which is almost wholly glazed for views to a meditation garden, the ambulatory's arcade is doubled to provide additional baffling. Opposite it, skylights are covered with slat blinds tilted to divert a wash of light to the sacristy wall below.

Although the overhead canopy stops short of the altar, its latticework reappears in a continuation of the transept's ambulatory. The west wall peels away to form a choir behind the ambulatory, which extends a ceiling-high screen to penetrate the altar platform that intersects the axial crossing. In a culminating gesture, large openings at both the east and west ends of the altar bathe its uninterrupted white wall with indirect sunlight that changes in tone and direction through the day.

The sanctuary did not take its distinctive form spontaneously, but rather is the result of a tug-of-war over the relationship of congregation to celebrant. A liturgical consultant argued for the seating plan set forth by the Vatican II Council: i.e., a fan-shaped arrangement of congregation surrounding celebrant. Monsignor Clark, however, had two objections to this scheme: it pushed the lectern against the rear wall and took the preacher out of eye contact with the congregation. In addition, people seated at the ends of the fan faced each other and were frequently distracted. The pastor also rejected a traditional basilican plan, which to him suggested "the imperial priest," and likes the shallow arc for providing "a wonderful sense of closeness while preaching."

The architects designed all of the appointments in the church and narthex. Most striking is the large crucifix, a figure found by Moore and Renzo Zecchetto while on a trip to Mexico. The altar and baptismal font are simple, blocklike shapes of concrete and bronze. Other parts of the complex are similarly straightforward, even monastic. The commons is a big, plainspoken room, its only moment of drama a fireplace lit by a hidden skylight above. French doors open to the courtyard, which becomes an extension of the commons in good weather.

Monsignor Clark observes that the church has noticeably increased the congregation's sense of community. The new building has even acted as a magnet for new parishioners from outside the immediate area who are drawn to the complex not only as a place of spiritual repose, but also as a place of great architectural energy.

DONALD J. CANTY

*Church of the Nativity
Rancho Santa Fe, California*

OWNER: Diocese of California—Monsignor Dennis R. Clark
ARCHITECT: The Austin Hansen Group—Randy Robbins, principal-in-charge; Karl Ponath, project architect; Steve Hall, job captain

DESIGN ARCHITECT: Moore Ruble Yudell—Charles W. Moore, principal designer; John Ruble, principal-in-charge; Buzz Yudell, principal designer; Renzo Zecchetto, project designer; Al Diaz, senior architect; Patrick Ousey, Michael de Villiers, James O'Connor, Brian Tichenor, Hong Chen, Eric Mikiten, project team

ENGINEERS: The Austin Hansen Group (structural); O'Day Consultants (civil); Klepper Marshall King (acoustics)

LANDSCAPE ARCHITECTS: The Austin Hansen Group and Moore Ruble Yudell

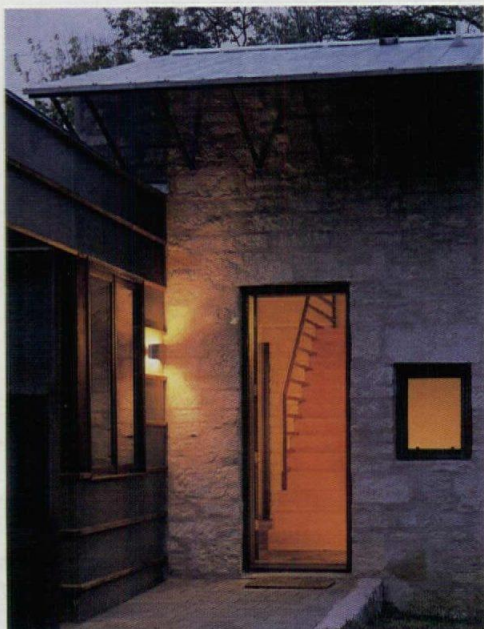
CONSULTANTS: Neal Matsuno, Richard C. Peters (lighting); Tina Beebe (colors); Peter Madsen (special woodworking); Renzo Zecchetto, Neal Matsuno, George Venini, Steve Gardner (artwork and sanctuary furniture)

GENERAL CONTRACTOR: Ninteman Construction



Lone Stars

RECORD's Houston correspondent Gerald Moorhead traveled across Texas in search of a modern-day regional vernacular. His findings, reported here, include five modest buildings by five small firms, all of which belie the state's stereotype of corporate bigness. With their unabashed references to climate, geography, and history, these buildings may suggest the beginnings of a distinctly Texan school of architecture.



© GREG HURSLEY

Athens, Berlin, Beverly Hills, China, Egypt, Heidelberg, London, Mecca, Milano, Moscow, Paris, Praha, New York, Scotland, Tivoli, Tokio.

Travel Texas and see the world. The great cities are all here, at least in memory. If these destinations seem too well-worn and predictable, head out for Alice, Ben Hur, Cereal, Climax, Dime Box, Gasoline, Golly, Magic City, Midway (15 locations between here and there), Necessity, North Zulch, Poetry, or Rainbow, that illusory place somewhere near Sunrise. Or is it closer to Sunset?

When all the options are tried, or eliminated, there's still refuge in Dreamland, Fate, Sanctuary, Shangri La, or Treasure Island. The final hope for traveler's rest may be Paradise, Utopia, or Eden. The imaginary possibilities of these place names were roused while studying a road map, in anticipation of several weekend drives to investigate the five completed projects that RECORD's editors had chosen for this portfolio of recent Texas architecture. Although the sites of the featured buildings—Austin, Dallas, Kerrville, San Antonio, and Houston—were familiar, it was the possibility of uncovering some out-of-the-way architectural gem that carried my wife and me—and our imaginations—across the state from our hometown of Houston.

A landmark of contextual expressionism

Our first quest, however, is within Houston. From our duplex on the flat swampland of the central city, we crossed Buffalo Bayou, Houston's major water feature, with its Olmsted-type garden parkway, to the higher ground immediately west of downtown. This area, known as the Brunner Addition, was the site of a World War I military post, Camp Logan, and was developed during the 1920s and '30s as a working-class neighborhood of bungalows and shotgun houses. Rising "like a temple amidst the village huts" of this Hispanic barrio is the painting studio of Frank Zeni, an Italian-born architect who lives a block away in a white bungalow.

The Tempietto Zeni is an industrial-quality, steel-framed shed with galvanized, corrugated steel roof and side walls. The studio's north- and south-facing ends, bracketed by nonstructural, oval Ionic columns, are open to the elements. Houston's weather—be it hot and muggy or cool and damp—constantly occupies the studio; only a downpour is kept out. Birds hover and cruise through the space to the wood houses that Zeni has inserted into the volutes of the column capitals, hoping (unsuccessfully, it turns out) to keep them from nesting in the steel rafters. Zeni can attain a modest degree of privacy by pulling shut the huge canvas draperies that are swagged to the steel columns with thick chains and buckles, mop heads serving as oversized tassels.

Two stories of wood framing divide the rear of the metal shed into levels containing a small kitchen, bath, and living and storage areas. Zeni plans to enclose the middle level with sliding patio doors to create a heatable space for the colder months. The studio's theatrical interior treatment contrasts sharply with the bright harshness of its exterior. A spiral stair casts a painted shadow on the also-painted courtyard tile pattern of the concrete slab. The primary interior finish is plastic-wrapped insulation batts.

Although the Tempietto Zeni is something of an architectural anachronism, a decade or more out of phase with the swings of fashion, the studio sits comfortably within the realm of artistic expressionism (this, despite the fact that its creator is a workaday architect). It has become a local curiosity—people drive by slowly and take pictures—and has joined company with a substantial number of "folk art" environments around Houston. In most neighborhoods, the scale and imagery of Zeni's temple to art would be a cruel disruption, but in the Brunner area, with its pockets of industrial squalor and several metal-clad townhouse projects, the studio is suitably contextual.

Tempietto Zeni
Houston, Texas
Frank Zeni, Architect

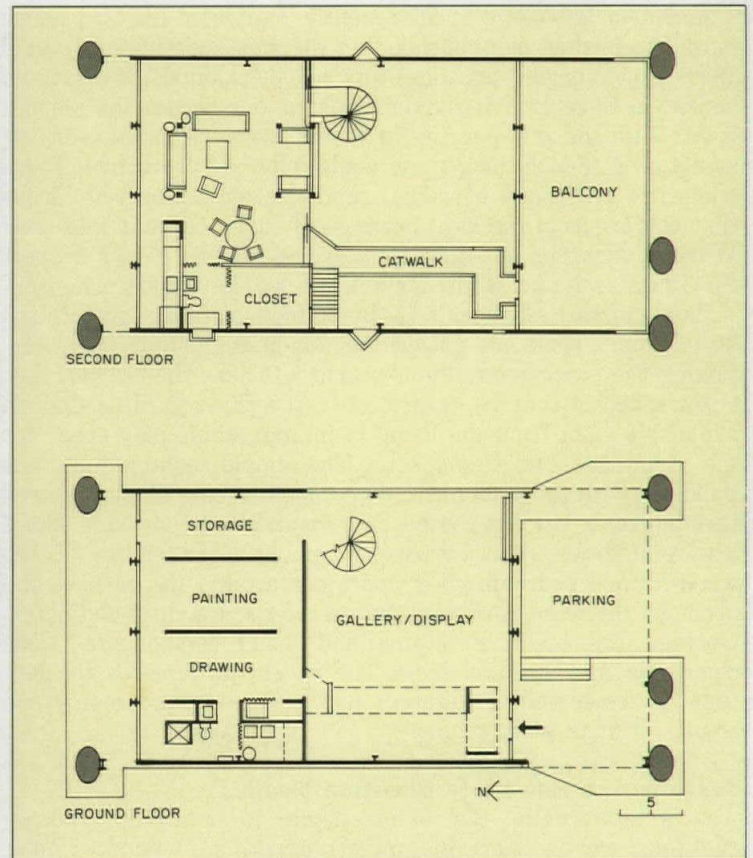
The asymmetrical, three-columned temple front of the 2,800-square-foot Houston studio that architect Frank Zeni built for his own use is crowned by garden-shop dragon acroteria breathing yellow cotton-mop flames (below).

Cutout plywood scenographic elements facing the high studio space (bottom) change constantly and compete with Zeni's paintings for one's attention. The architect utilized prefabricated wood trusses

for balcony railings, and he left all window openings unglazed.



© GERALD MOORHEAD PHOTOS



Continuing a stone heritage in central Texas

Leading west to Austin (160 miles) is a passage through a much different cultural and historic landscape than the urban eccentricity of Zeni's galvanized-metal Greek temple. The coastal plain extends 60 miles west from Houston. As we drive toward Austin early this November morning, the sun is warm but the air has a slight coolness, a hopeful sign that the especially long heat spell of the nine-month Gulf Coast summer may be broken. The rice fields have been harvested, their high-quality Texas long-grain sent around the world, and the stubbled fields now await the arrival of the flocks of white Canada geese that will winter to the west and south of Houston.

Before reaching Columbus, the plain rises into low rolling hills. This oak forest and grassland was the heart of the Anglo settlements of Texas in the 1820s and '30s (the Alamo, 1836; statehood, 1845). Slightly later, German and Czech immigrants arrived, filling the Hill Country with names from home: New Ulm, Weimar, Waelder, Schulenburg, Frelsburg. In the Czech communities of Dubina, Ammannsville, and Praha are substantial wood churches whose interiors are painted and stenciled in full Bohemian Baroque splendor.

But it was the Germans who left an architectural heritage throughout central Texas that is still influential, proving to be more adaptable than the older Spanish-based culture of the 18th-century missions. Unlike earlier settlers who brought the English/Appalachian skills of carpentry and who built log and wooden structures, the Germans built in stone. The hills provided a readily available, soft creamy limestone. Most attempts to define a Texas regionalism (or at least a central Texas regionalism, since Dallas, San Antonio, the Panhandle, the Gulf Coast, and the West Texas deserts have quite different heritages) work within this German stone background, with simple geometric volumes that are more abstract and less "stylish" than the Spanish Colonial Baroque.

As we closed in on Austin, the weather changed dramatically in response to a passing cold front. We crept through the capital city's soaked, deserted downtown along 6th Street, past handsome 19th-century stone and cast-iron fronts, neon signs for "Oriental Massage," and a warehouse advertising bull parts (thought they came as standard equipment).

Architect Lawrence Speck recently completed his own house in an established neighborhood on the west side of town, amid 1950s ranchburgers and one-story nearly-colonials. We sat and visited in Speck's living room, looking out across the sloping lawn. With the rain pouring in sheets from the metal roof, the structure's 18-inch-thick stone walls felt very protective. These walls are composed of large, random-sized uncoursed blocks that borrow from the local heritage of rustic German masonry. Without cliché or outright mimicry, Speck has shown respect for Texas tradition while designing a low-key modern house.

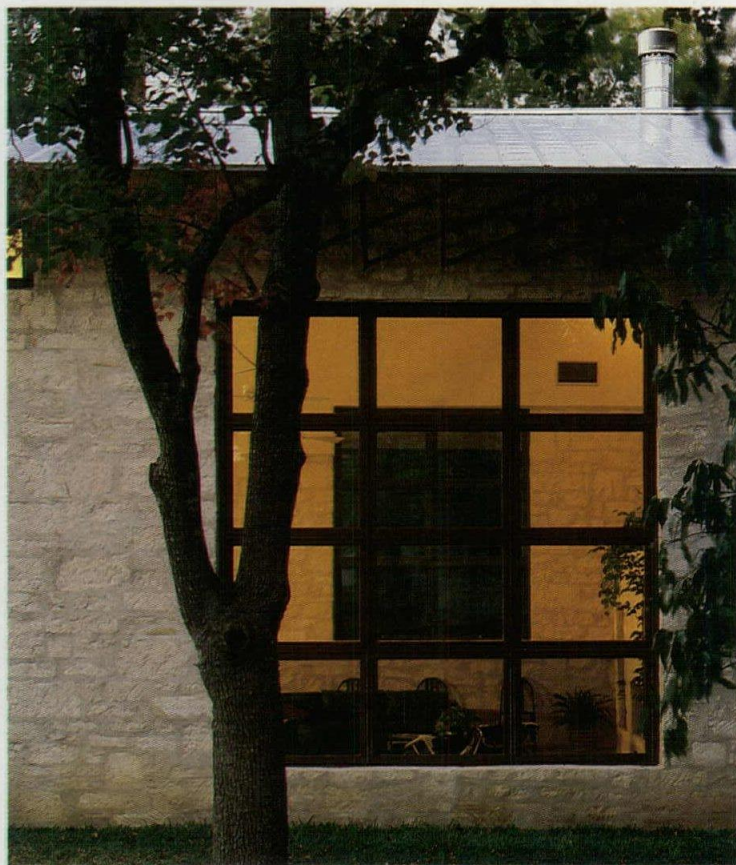
The long side of Speck's 75- by 90-foot lot faces south to the street, and Speck has placed the dominating stone wing containing the living room, kitchen, and loft near the rear lot line. Open space is thus concentrated in the front yard, giving an expansive vista from the living room and ample play space for the architect's two young sons. The simple rectangular stone building, with its random-sized openings, seems like a restored farmhouse, a low flat-roofed carport and bedroom wing like a lean-to addition. The horizontal cement-board siding of the wood-framed bedroom wing continues around the carport and becomes the front-yard wall. Speck intended a clear distinction between the building's stone and wood components. "The change in material and scale," he observes, "creates the latitude to accommodate different uses—large grand rooms and small, intimate plain rooms."

Texas barn meets Early Christian basilica

As we left Austin, the clouds began to break up, and we continued west to Kerrville under a crystalline blue sky. We're

House on Sunny Slope Drive
Austin, Texas
Lawrence W. Speck, Architect

The stone-clad main living wing of Lawrence Speck's 2,300-square-foot house in west Austin faces south, across a broad sloping lawn ringed with trees (top opposite). A carport, sheathed in cement board and trimmed with

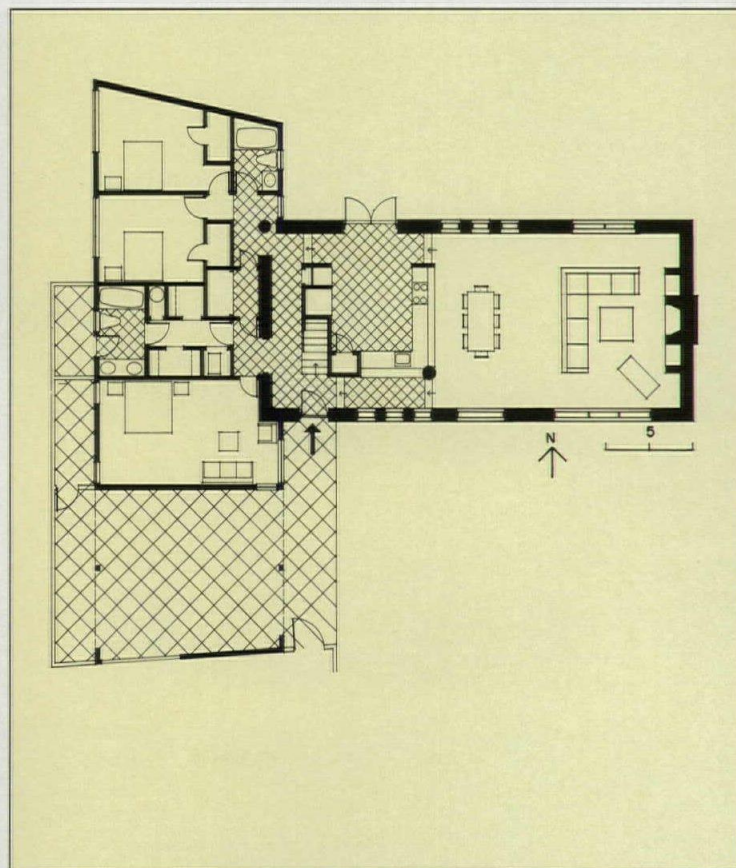
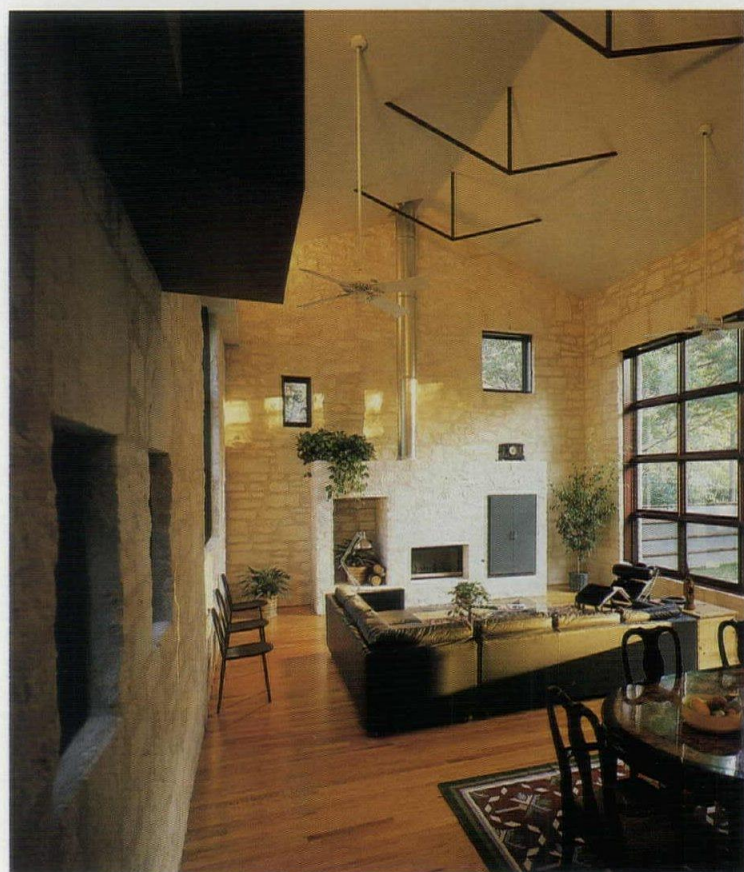


horizontal redwood battens (far left in photo below), shares the front-yard space and doubles as an open-air room for play and entertaining. Exposed steel roof elements in the living room (bottom), seemingly phantoms of a larger

concealed truss, are actually simple collar ties for the rafters. The building's four-foot-wide overhangs are supported by matching steel brackets. The gradually increasing size of window openings on the principal south

elevation gradually erodes the stone wall until it is virtually transparent at the living-room end (bottom opposite).

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Notre Dame Catholic Church
Kerrville, Texas
Tapley/Lunow Architects

The gabled facade of Notre Dame's 13,200-square-foot sanctuary recalls the image of the older church nearby. For the new building (below) Tapley/Lunow utilized local soft limestone, a material native to the Texas Hill Country.

A standing-seam metal roof is an element borrowed from nearby farm buildings. The longitudinal high central space and arched eastern walls of the main sanctuary (bottom) create a strong focus to the altar. The sacramental functions

of altar, tabernacle, and baptismal are given a unifying architectural expression in Notre Dame's triple apses (top and bottom opposite), which recall the multiple-apsed buildings of the Carolingian period.

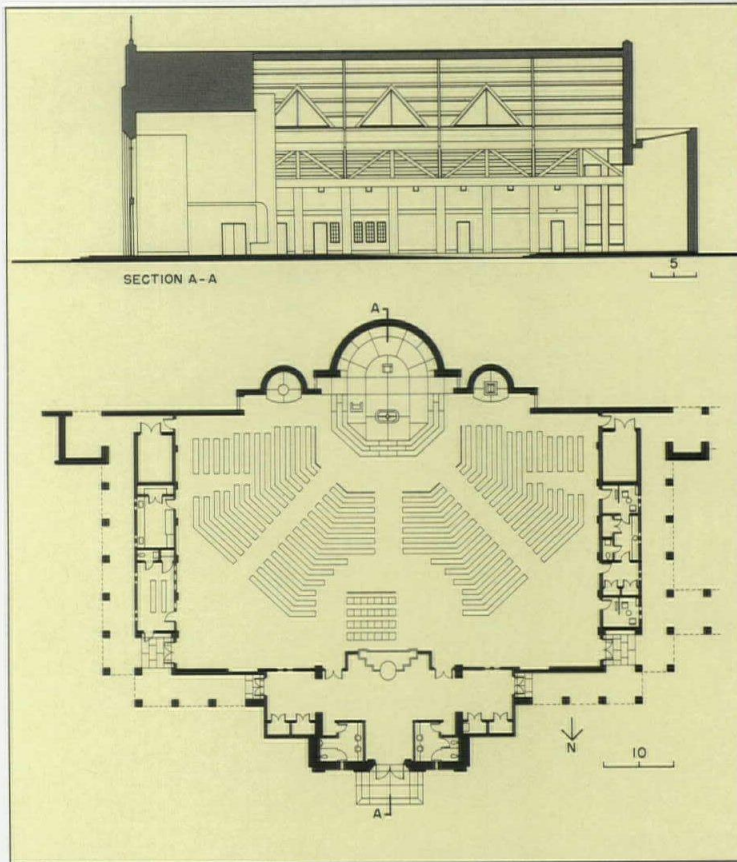


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© PAUL HESTER



still in German country—Blumenthal, Luckenbach, Fredericksburg, Meusebach—and, despite Fredericksburg's boutique-lined main street filled with busloads of day-trippers soaking in the quasi-German atmosphere, there is finally a feeling of being deep in the heart of Texas, out of megalopolis and away from the coastal urban zone that spreads inland to Austin and San Antonio. Unlike the interstates, the two-lane highways follow each rise and dip of the landscape, asphalt laid close against the earth.

Kerrville (population 15,000) rests against the north bank of the Guadalupe River. At the southern edge of the city's spottily historic downtown, the new Notre Dame Catholic Church by the Houston firm of Tapley/Lunow Architects faces liturgical west. The church is in the form of a large Texas barn, with a high gabled nave and sloping shed aisles. This essentially longitudinal, nearly basilican cross-section has been imposed over a centralized, fan-shaped seating plan. The uncommon grafting of the barn section onto the fan-shaped plan has formed a varied space where the congregation's 750 worshippers feel a strong sense of community and intimacy. On the facade of the nave and apse, the soft creams and oranges of local limestone are crisply edged by a harder Texas Luedders limestone, giving an appropriate scale and solemnity to the building's rustic forms. Receding wings and cloisters, by contrast, are sheathed in humbler stucco.

Notre Dame's entry sequence is surprisingly indirect given the formal portal and axis of the facade. The narthex is a tall volume, with a shrine to the Madonna facing the front door in place of the expected entry into the nave. To the left and right, off axis, the doors lead into the low-roofed aisles. Inside the main sanctuary, the choir faces the altar on axis, occupying the anticipated central aisle.

The uncontested focus of the church, however, is the layered stone planes of the east wall, separated by slots of colored light and punched with three arched openings backed by stone apses. Each apse is naturally illuminated from above, sunlight gently washing the rough-cut masonry. The stone walls support deep wood Pratt trusses, which span the length of the high central nave and permit a column-free interior.

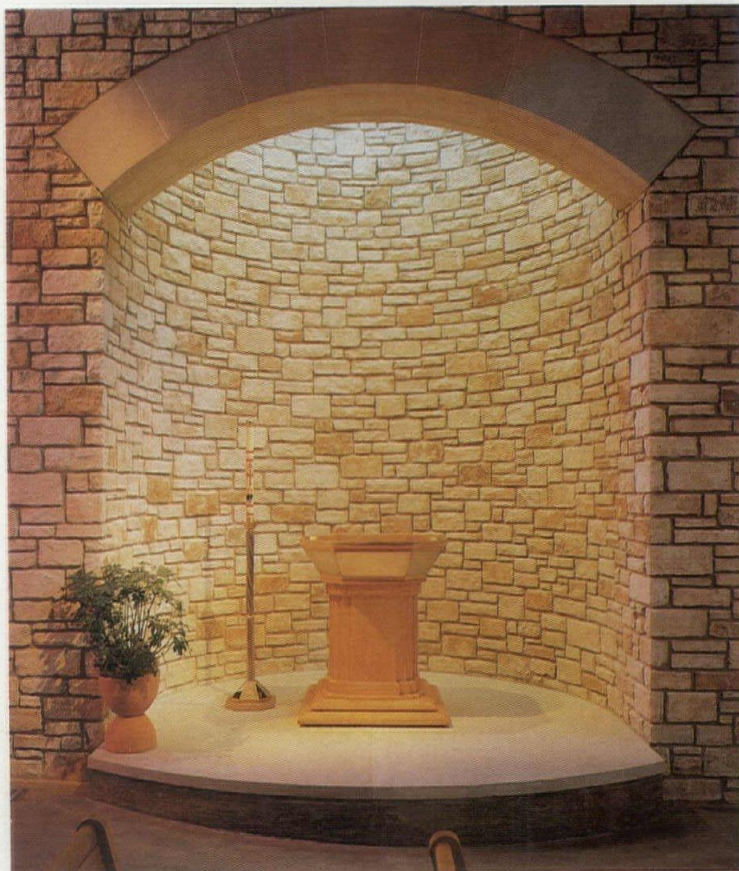
Colored light sparkles through the church from all directions. Narrow vertical slots between the stone planes are glazed in red and orange, while six triangular dormers in the high nave are primarily blue. The open trusswork acts like a lattice to diffuse and fracture the light. The lustrous red-orange tone of Texas pecan-wood sanctuary furnishings contrasts with the softer stone colors. The result is a place of peace and reverence.

Agrarian imagery for a small-town bank

There is one last stop on this trip. From Kerrville, we head south on I-10 toward San Antonio. The late afternoon sun is casting deep shadows into the creek bottoms, and the dark-olive leaves of the oaks are nearly black by the time we arrive at the Frost Bank by Lake/Flato Architects.

Although San Antonio lies just 20 miles south, we're still in the country. Buried in the trees beside the freeway feeder, the bank fronts the access road to a subdivision concealed by the woods. There is no other building around, except for the rusting skeleton of a 20-story star-shaped highrise, an airy memorial—and warning—to the underfinanced dreams of some short-sighted developer.

The four stone blocks that make up the bank's plan are sheltered from the freeway by leaning windblown oaks. Rough-cut masonry walls are like ruins infilled with glass and capped by shiny galvanized-metal pyramids that architect Ted Flato dubs silos. Flato labels the bank's stonework the "German smear technique," a system where the mortar between irregularly sized rocks is spread partially over the stone surface. A quick, somewhat crude method used locally for stock tanks and



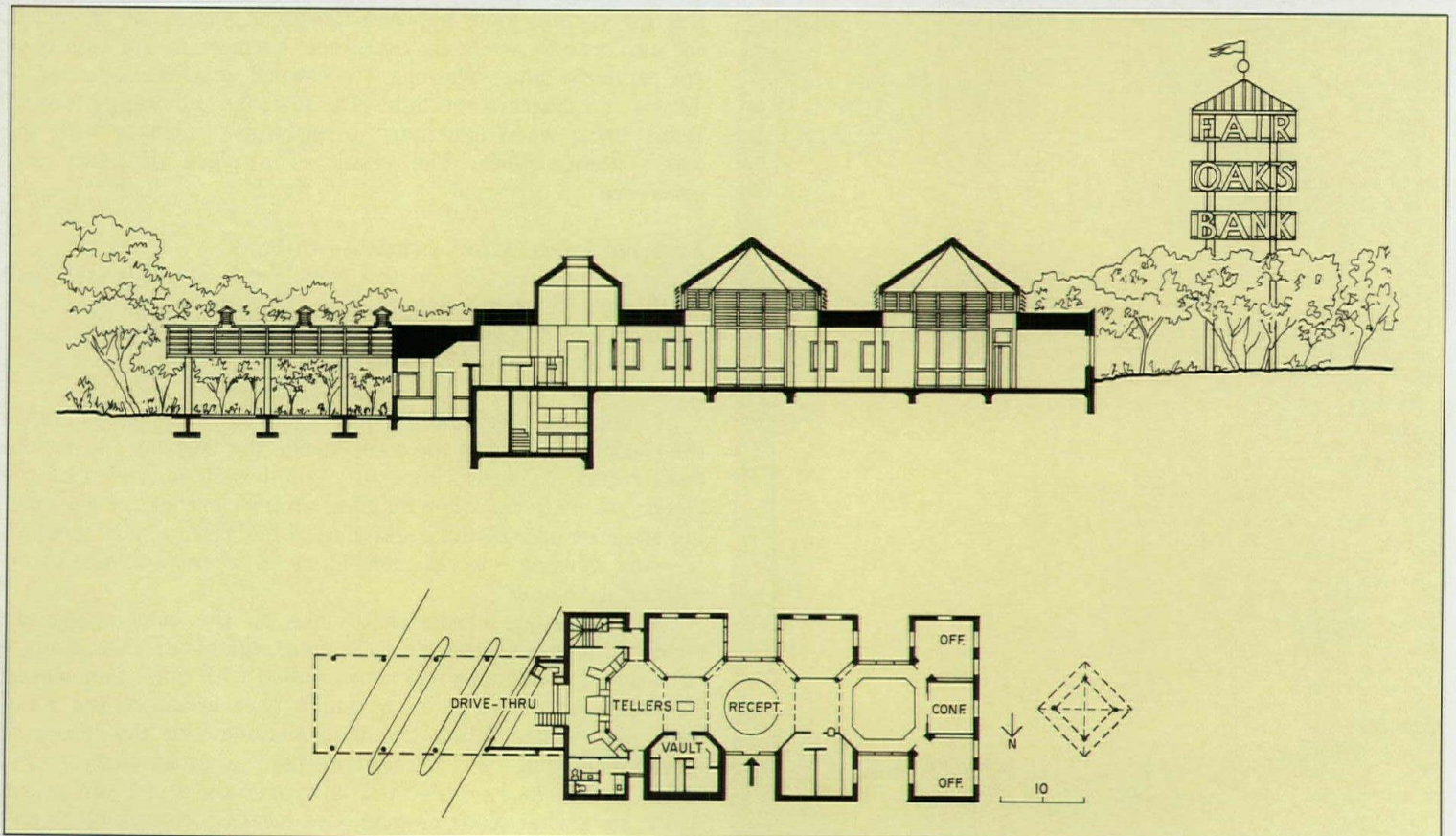
Frost Bank
Fair Oaks, Texas
Lake/Flato Architects

Frost Bank is located on a prominent hill near an interstate highway, in a dense stand of oak trees. An octagonal galvanized-metal silo between two stone banks "ruins" announces the bank's principal entry (below). The 5,000-square-

foot structure is set behind a curving driveway that preserves much of the existing oak grove. The double-height silos alternate with a series of single-story, flat-roofed office wings, together forming a sequence of

subtly modulated spaces that can be expanded as the bank's needs grow. Glass walls bridge the gaps between the stone blocks, framing vistas into the surrounding grove (top opposite). Operable louvers shield clerestory windows,

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helping deflect the strong Texas sun, while the stone walls' deep recesses reflect a softly colored light into the interior (bottom).



HICKEY ROBERTSON PHOTOS



farm buildings, the "smear" helps to make a smoother, more weather-resistant wall while minimizing the need to dress the stone. String courses and a cap course of darker stone give the walls a sense of order.

The three metal octagonal silos, used to denote interior functions, vary subtly in shape. The central silo serves as the entry lobby; the tellers are to the left under another silo and the bank officers to the right, grouped around a reception area under the third. Light filters in through the deep louvers shielding the silo clerestory windows, and views out toward the enclosing oaks are framed between thick stone walls or through openings punched in the walls.

It's gotten dark by now, and we've decided to find a place to stay for the night rather than drive back to Houston (about 220 miles from here). Avoiding the big-city lights of San Antonio, we headed on back roads to New Braunfels, which was something of the Hauptstadt for the wave of German immigrants in the late 1840s and today vies with Fredericksburg for its German festivals.

With our usual propensity for cheap motels, we found one on the edge of town, smelling of years of stale cigarettes and beer. The swimming pool was green and unused and the adjacent room occupied by uncounted college students with a boom box. After a lot of door banging by the manager and other tenants, the noise settled, but it was a sweaty night on polyester sheets and plastic-covered pillows. While checking out the next morning, we were amused to find a large slot in the parking lot occupied by one of those three-axle, ten-tire pickup trucks with a long, low wire-mesh trailer attached. The trailer was packed with pigs and dogs, oinking and barking. We were glad our room had faced the other direction.

Finding "stillness in a cacophonous world"

Our excursion to Dallas will be a different kind of trip. With the distance to cover—240 miles in four hours—there will be no time to linger along the side roads, just I-45 all the way.

It takes over an hour driving north from Houston to break free of the urban tangle—the airport traffic, the vacant strip centers and burned-out neighborhoods lining the freeway, and the suburban municipalities that take Houston into several adjacent counties. The piney woods of east Texas filter into the Houston's coastal plain and extend north past Huntsville, which many Texas felons call home. As the land rises into low hills, the pines gradually become mixed with hardwoods, which are beginning to show some fall color.

By Centerville, the trees have thinned, just scattered clumps and fence rows remaining in the still-green pastureland. Centerville is exactly that—120 miles north of Houston, 120 miles south of Dallas. Before we reach Corsicana, the larger trees are gone, replaced with scrub oak and mesquite: small-leaved, scratchy-looking growth. By Ennis, even the scrub is gone, leaving a mildly undulating horizon of tall grass and lots of sky. If you're going to Fort Worth, turn off at Ennis and head northwest through Waxahatchie, where J. Riley Gordon built the ultimate county courthouse in 1894.

At exit 251 just north of Ennis is Bubba's "Serious Bar-B-Q," and that's the truth. Friendly folks, good potato salad, and a great BBQ sauce. The sauce makes good BBQ, which basically is a process for making cheap, tough meat edible. Slow smoking and constant basting with an acidic marinade tenderizes and flavors the meat. The sauce, also used for serving, is a tomato-based sweet-and-sour combination of Southern, largely Black heritage.

Coming up from the south, as the freeway makes a rise over the I-20 interchange, the Dallas skyline appears, like Oz, a cluster of towers on the horizon apparently without a city around it. Dallas actually does spread, in the modern fashion, like any other city, but to the north and west. Downtown is contained on the south and west by the wide flood plain of the

Trinity River and by freeways north and east, tying the towers into a dense knot and holding lower growth at a distance.

We had lunch with architect Max Levy in his narrow Corbusian studio, located in a boomerang-shaped '50s tower, before driving out to visit the "House between a Creek and a Street." Fort Worth-born Levy has a strong interest in the Texas climate of sun, wind, and rain, and in the simple forms of rural structures insulated against the vast Great Plains sky. He is unsettled by what he calls the "anxiousness of disturbed forms" of much current design and chooses to "stay with calm complete shapes"—simple pavilions harboring "stillness in the midst of a cacophonous world."

The house we have come to see is a clear diagram of Levy's thoughts. Built on a long and narrow residual lot between a busy four-lane thoroughfare and the backyards of well-to-do homes, the house for a couple with one child shields itself from the street with a brick-walled spine and opens the attached pavilions inward to a spring-fed creek. The compound thus formed has the privacy of a courtyard house but with a suburban vista.

The clients had the simplest of requests: a screened porch and dance studio. The white geometric shapes along the north-south spine clearly separate each function: a flat-roofed garage, a large studio/living-room/kitchen building, a cubic screened porch, and a two-story bedroom building. All the elements are economically built of wood frame with synthetic stucco and composition shingle roofing. The brick wall satisfied the subdivision's deed restrictions.

The freestanding screened porch is the "hearth of the home," says Levy, its transparent space shared with the more enclosed forms to each side. The yellow awning above a central porch skylight acts as a "night light, giving a little something back" to the otherwise walled-off street.

While the composition of this house appears from the outside to be tight and enclosed, from within the window placement subtly frames vistas to the creek. Plans are afoot for the addition of a round stone tower to be placed south of the studio, which would add a vertical counterpoint to the essentially horizontal composition.

First steps toward a Texas regionalism?

You may have noticed that I have made little mention of "regionalism" in these perambulations. While we have seen considerable evidence of a respect for the traditions of various areas of the state, there is not what might be called a Texas or regional style. As large as it is, Texas has many regions with varying backgrounds, some similar and overlapping, others independent. From the examples we have seen here, "regionalism" means for Texas architects a respect for the heritage(s) and climate(s) of the state, a general attitude rather than a specific style.

Perhaps it is the nature of the indigenous architecture itself that resists the establishment of a formal vocabulary. The modular plans of one-room log cabins and two-room frame houses with dog runs and porches, and the simple masses of stone buildings with low pitched roofs, are conducive to an abstracting approach. It may be fortunate that Texas does not have a strong heritage in the codified styles like Georgian, Federal, or Greek Revival—modes that leave less latitude for interpretation or manipulation.

In a time of overly acute historical self-awareness, the term "regionalism" seems to connote predetermined typologies. The common threads in the five projects discussed here, which by no means represent the work of *all* Texas architects, seem to be preference for a palette of simple materials, distinct and pure geometric forms that clearly express functional units, and an unbragging sense of place. In short, not the big or boisterous image one might presume of the Lone Star State.

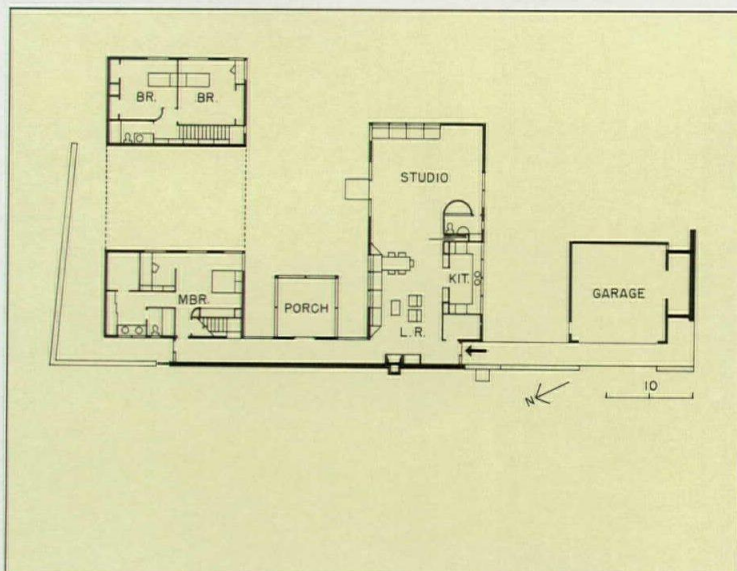
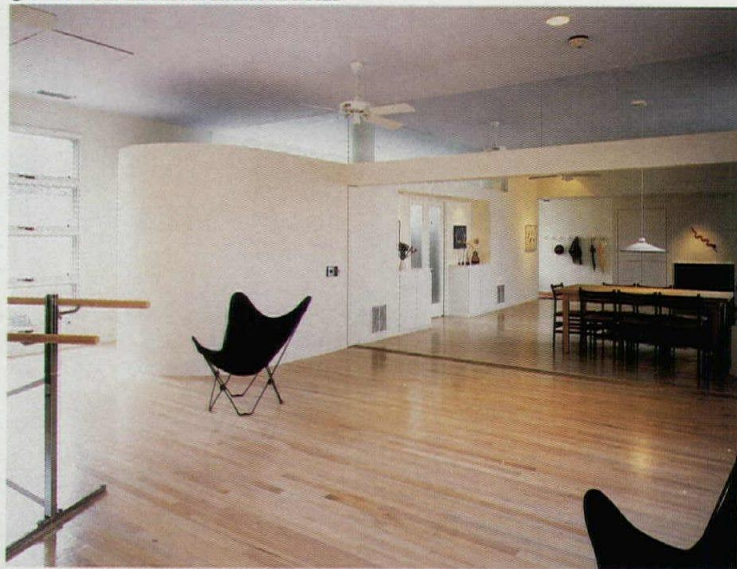
GERALD MOORHEAD

House Between a Creek and a Street

Dallas, Texas
Max Levy Architect

A 2,900-square-foot house for a doctor, a dancer, and their young son is organized as a series of four pavilions strung along a brick-walled spine (plan). The largest pavilion contains a combination of dance studio, living/dining

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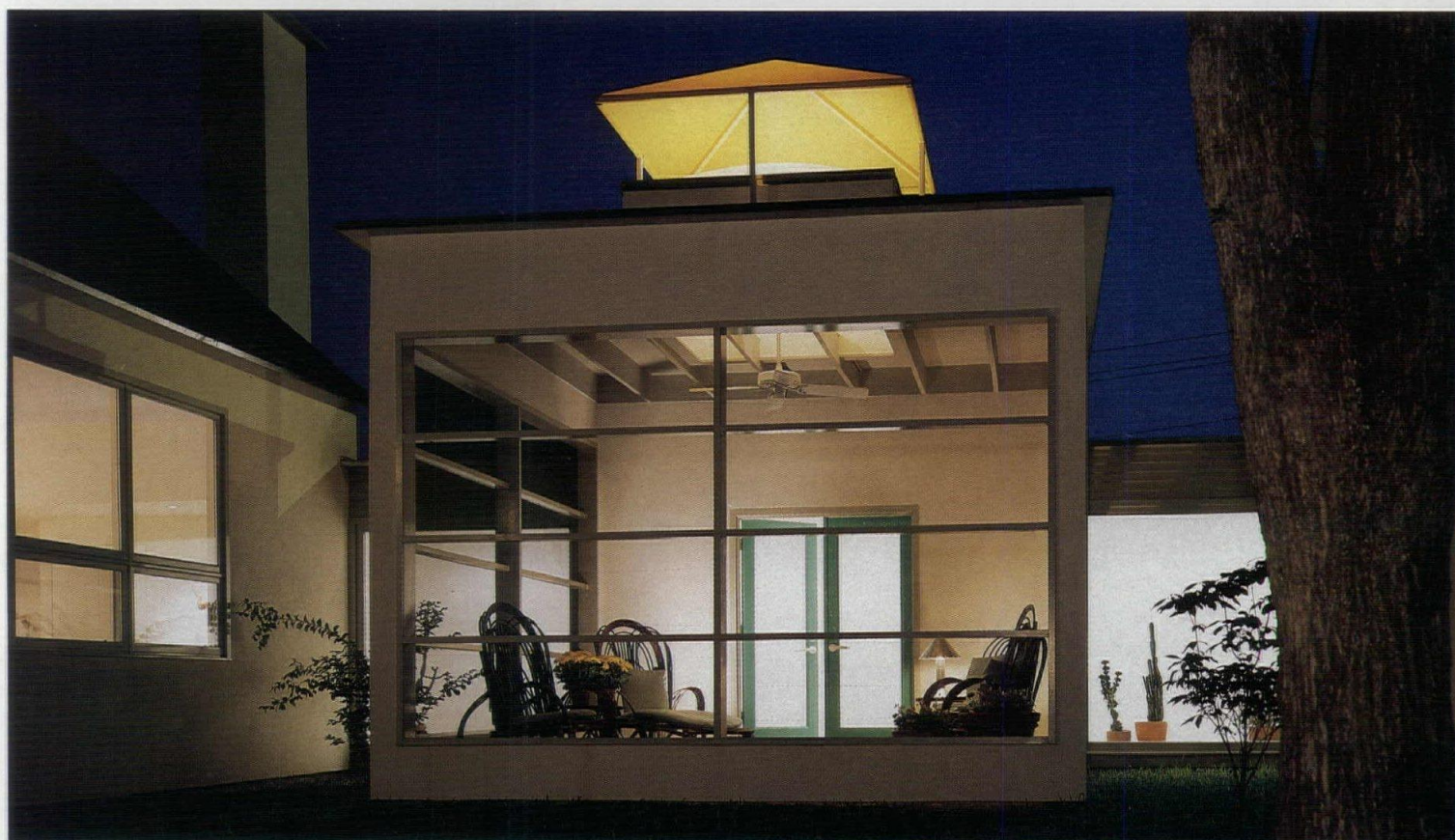


room, and kitchen (photos opposite). The main spaces may be separated or unified by glazed sliding doors concealed in a pocket between the kitchen and bath. From the street, the brick wall serves as a visual and acoustic barrier

between the house and a busy Dallas street (below). A transparent screened porch pavilion, with its "night light" lantern, is the symbolic heart of the house and a physical meeting place along the spine (bottom). Materials

throughout are modest: stucco on wood frame, composition shingles, inexpensive wood cabinets, and painted drywall.

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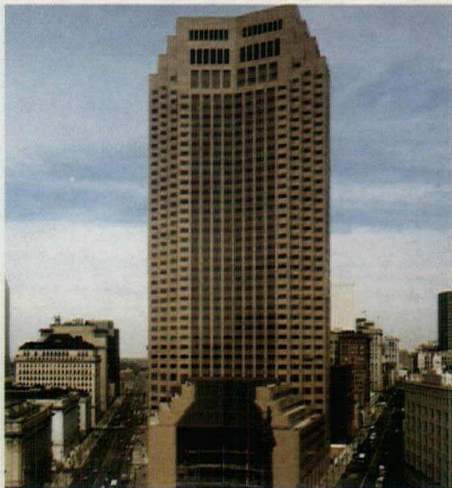
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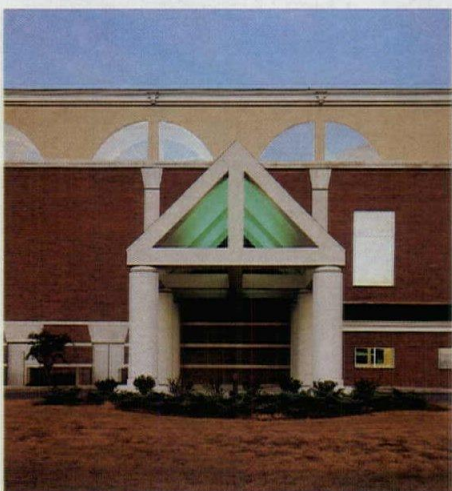
BP America Building, Cleveland, Ohio
Architect: Hellmuth, Obata & Kassabaum, Inc.
Photo: Bill Schuemann



Imperatore Library, Englewood, New Jersey
Architect: Bohlin Powell Larkin Cywinski
Photo: Christopher Barone



The Humana Building, Louisville, Kentucky
Architect: Michael Graves
Photo: Pashall/Taylor



Frank Moody Music Building, University of Alabama, Tuscaloosa, Alabama
Architect: Fitts & White
Photo: Balthazar Korab Ltd.



Unity of Dayton Church, Huber Heights, Ohio
Architect: Woolpert Consultants



Building Officials & Code Administrators International, Inc., Flossmoor, Illinois
Architect: Linden Group, Inc.
Photo: Linden Group, Inc.

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A Moving Target

With the goals and tools of research constantly changing, seven projects reflect strategies for keeping up.

As a building type, laboratory structures are among the most challenging. Their programs are complex, and structural and environmental-control tolerances are strict. The architect must anticipate constant refitting as research needs evolve and technology changes. Many facilities must respond architecturally to an existing context, and some are even physically linked to existing, related facilities. How do you set priorities among such a daunting set of issues? Which have been the toughest to solve? To find answers, RECORD turned to a number of firms with experience in a variety of laboratory projects and asked them about their recent experiences.

With government funding limited, much of the recent building activity is confined to a few kinds of research. Pharmaceutical and other medically related research predominates in the private sector, since one successful product can virtually guarantee a drug company's profitability for years. (Two examples are shown pages 98-99.) Biomedical research is taking place at every campus with a medical school, and many state-sponsored universities are building "incubators"—structures that support a variety of industry-related research. There are other research categories that have seen significant activity: computer components are developed and manufactured in rooms many thousands of times cleaner than ambient air, and foods are increasingly being studied for their health qualities.

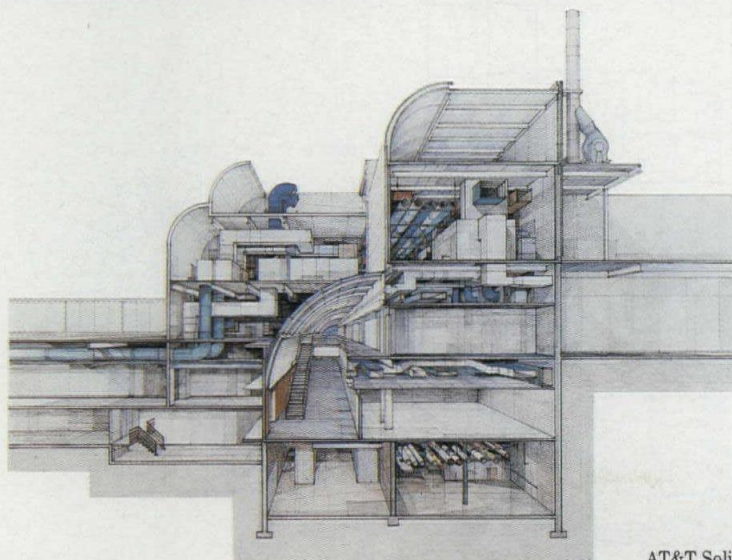
Public and private sectors: more and more alike

"Diminishing government funding for research has encouraged creative partnerships between pure and applied research," comments Dart Sageser, of Mitchell/Giurgola Architects in New York City. University research is increasingly driven by available grant money, a fact that has influenced the way facilities are being designed. Sageser elaborates: "The desire to increase the size of a science department may come from a thirst for knowledge, but more predictably it relates to the maintenance

and facility 'charge-backs' that can be reimbursed from research grants. Pre-med programs are considered moneymakers on campus, and expanded programs require undergraduate science labs, research faculty, and new research facilities." David Hoedemaker, of NBBJ architects' Seattle office, says, "Facilities are not driven so much by available grants as they are by the ability of a university to receive grants that can support the facility. Usually we are asked to design generic laboratories that can respond to a wide variety of grant needs rather than facilities for the initial user who may have a specific grant. [Attracting researchers] is almost always a critical element."

The scramble for grants has caused university researchers to move away from "pure" basic research to applied research of greater interest to grant-making bodies. In this way their mission has come to resemble more closely that of private-sector labs. Many states are encouraging both activities in a single campus facility. An example is the Center for Biotechnology, at Cornell University (pages 104-105). While some say this blurs the essential mission of universities, the rush to embrace public-private partnerships has not abated. "In past years," comments John Nunemaker of the Chicago office of Perkins & Will, "academic facilities were oriented mostly to teaching, with some small amount of private research occurring in the laboratory. Then there were real differences [between higher-education and corporate facilities]."

Important distinctions remain, however, spelled out for a client in a report by Princeton-based CUH2A: Typical *corporate* labs are bottom-line driven, follow a prescribed mission (to develop a product, say) in a lab occupied by from two to four persons, which is designed to meet well-defined functional needs. Corporations usually have higher capital and operating budgets, are more flexible about spending, have a hierarchical decision-making process, and build facilities on large suburban sites. *University* clients, being grant driven, must accommo-



AT&T Solid State Technology Center
Davis, Brody & Associates, Architects

date greater diversity within each facility in both the types of research and the number of users, must operate under a fixed capital-spending ceiling, and can spend far less on operation and maintenance. Researchers generally spend less time in the lab because of teaching and grant-application writing obligations. Decision-making is diffuse and by consensus, which can complicate design because facilities are typically built in dense urban campuses.

The research building in context

When as much as 60 percent of building volume is devoted to mechanical systems, it can be difficult to package the program in an architecturally pleasing way. The consensus among the architects surveyed, however, was that the "face" the building presents is extremely important to the client. John Nunemaker of Perkins & Will remarks, "One of the key elements of any research laboratory is its acceptance by users and potential recruits. Often the building will be used as a recruiting tool, and must reflect an esthetic that will attract the attention of potential recruits and appear to be a place at which they would enjoy working." Architects have found a high degree of support among users for an approach that goes beyond solving mere functional problems. "Scientific clients understand the need for structure and clear organizational logic in architectural design," comments David Fey, of Hammel Green and Abrahamson, in Minneapolis. And these high-technology structures are now rarely built on open, unencumbered sites. "Established science departments are often in the heart of the older campus and the collegial heart of the research activity demands proximity for its new laboratory needs," says Dart Sageser of Mitchell/Giurgola. In some cases the project is intended as a showcase (as at Oklahoma State University, page 106). Often they form architectural focuses or gateways to various parts of a college or corporate campus: Cornell's Center for Biotechnology completes a quadrangle; the Toronto Earth Sciences Center ties together six existing buildings (pages 108-109).

Making a good fit, however, is not always easy. "Contempo-

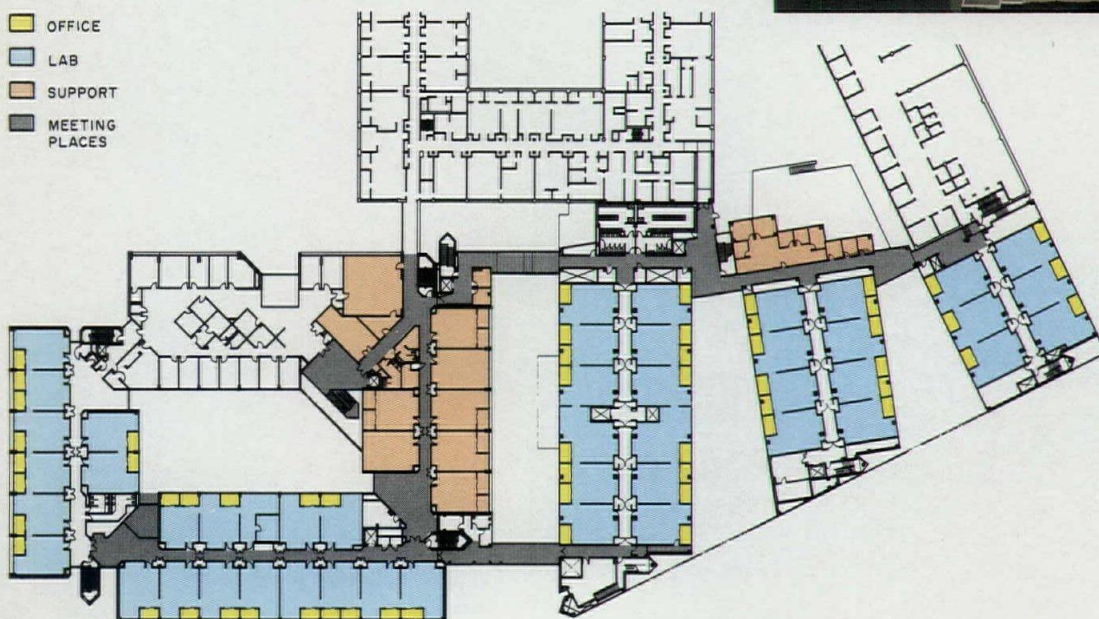
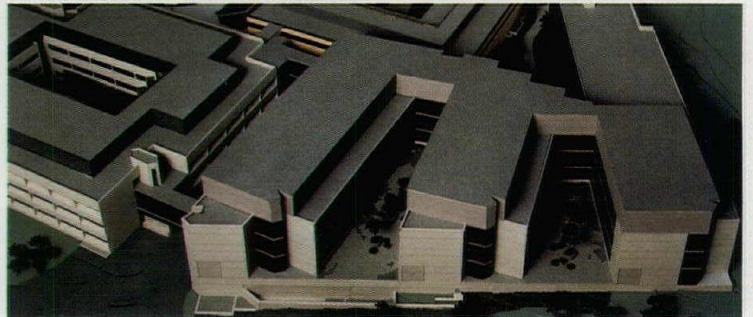
rary laboratory buildings tend to be dimensionally different from other building types," says Michael Reagan of Ellenzweig Associates in Boston. "When you line up shared equipment and instrument spaces, the laboratories, and spaces that increase opportunities for interaction, you end up with a plan where the width approaches 80, 90, and sometimes 100 ft." Philadelphia-based Venturi and Scott Brown, which has worked with Payette Associates, of Boston, on a number of projects, designs "in the tradition of the loft." Such a structure "can achieve nobility despite its boxy forms and simple, double-loaded layouts." The firm uses pattern on the elevations "to promote richness and scale." Directing laboratory effluent, which can be toxic, may also influence design. A curving setback in one of Ellenzweig's projects, located in a dense hospital campus, was devised to disperse its own exhaust and prevent downdrafts from pulling in smoke from a nearby power plant.

How flexible can a lab afford to be?

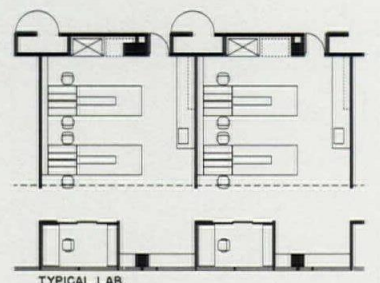
Architects who have done laboratories usually tell at least one story of a researcher who departed before his project was finished or of a specialized piece of equipment rendered obsolete. How can change be accommodated when it may outpace the time of construction? A "totally flexible" approach is unattainable (although the AT&T facility, pages 100-103, comes close). Generally, the more built-in flexibility, the more costly the project becomes. Brian Moore, of CUH2A, described the kinds of issues his firm discusses with owners: "You look at floor-to-floor height. Lab floors of 30 to 40 years ago were 13 to 14 ft high; now they average 16 ft. How much pipe and ductwork space is needed? How often is access to shafts needed for shutoffs and hookups? Do you have enough hvac capacity to accommodate future equipment loads? Is the casework easily modified? Can the structural system take holes poked through?" The consensus is to build in those items that would be disruptive to add later (such as mechanical-shaft space), leaving out readily altered fixtures (in-lab hookups).

Increasingly, the labs themselves are becoming standardized,

KENT A. SNELL/TOM CRANE PHOTOGRAPHERS



Pfizer asked CUH2A to provide windows for both lab and office in its 220,000-sq-ft drug-discovery lab. Below: a typical biology lab. In plan (left), chemistry labs, which involve heavy fume-hood use, are stacked over biology labs.



TYPICAL LAB

usually constructed on 10-ft modules that can accommodate a variety of laboratory furniture. The designer must also plan for changes of use. "If a pharmaceutical company goes biologic and moves away from chemistry, you might not have as high a need for air movement," notes Moore. "Chemistry labs are driven by fume-hood requirements, but this is not so true in biology labs, where the electrical load of equipment is more important." NBBJ's Hoedemaker reports, "There are enough common elements necessary to conduct research—in biochemistry, for instance—that some basic plan layouts begin to present themselves over and over again." In the Washington Technology Center, a university-industry incubator, "the design team had to envision an environment that could be wet or dry, large or small, simple or complex," recalls Hoedemaker. "The solution is like a three-dimensional game board that is wired, plumbed, and ducted to allow a maximum number of players to participate." While collecting background data for a facility at the Massachusetts Institute of Technology, Mitchell/Giurgola learned that "the most flexible buildings on campus, and, coincidentally, among the most productive in terms of prize-winning research achievements, were the wooden barracks built during World War II. Heavy structural capacity, recurring bay spacing, open access to the overhead structure, and a seemingly endless ability to accept the jerry-rigged additions of this week's hot idea made these venerable buildings popular and productive. Contemporary standards preclude such easy researcher do-it-yourself adaptation of the environment, but the fundamental lesson was incorporated into the design of new neurobiology labs."

Mechanical services: the tail that wags the dog

Certain fads in the delivery of mechanical services—full-floor interstitial spaces, huge exterior collector shafts, service walls between labs—have come but never entirely gone. Often central to the building's expression, such "sculptural articulations and expressionistic monumentality work against the functional and programmatic requirements of a research laboratory by

constricting them within a formal and rhetorical straitjacket," declares Ian Adamson of VSB. Today, there is no single answer; well-tested concepts are simply applied judiciously. With greater use of fume hoods, though, systems that emphasize vertical distribution have gained favor. (Toxic substances may precipitate out in long runs of horizontal ductwork or piping; exhaust is more readily dispersed when directed upward.)

Fume hoods cause prodigious consumption of energy since so much of the heated and cooled air delivered to the labs is exhausted. (Mechanical loads for lab buildings may be two to two-and-a-half times as great as for office space.) As a showcase for energy conservation, the Noble Research Center for Agriculture and Renewable Natural Resources, at Oklahoma State University, uses heat recovery, passive solar-energy collection, and energy derived from photovoltaic cells.

Michael Reagan commented on the other types of systems that labs may need: "Multiple types of water are often required, including laboratory-grade water, water for laboratory sinks (nonprotected), water for eye washes, emergency showers, and toilets (protected water). Gases can include steam, nitrogen, helium, compressed air, vacuum, argon, and any number of specialty gases. Ten separate electrical outlets on two separate circuits are common for each person at the bench."

A greater focus on safety and environmental issues

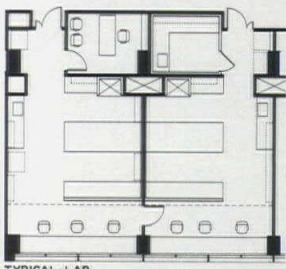
Kurt Anderson, president of CUH2A, says, "Safety is much on the minds of users of corporate and academic labs. For safety reasons, more procedures once conducted on open counters are now done under fume hoods." The consensus among architects surveyed is that the greater concern for safety stems both from fears of liability and from past experience. Michael Reagan of Ellenzweig noted a new trend to isolate the researchers from potentially harmful agents in the laboratory. "On some projects," he comments, "we have located the researcher's desks in adjacent rooms so that activities at the bench or fume hood can be separately monitored." Two means of egress are required for every lab.

Continued on page 127

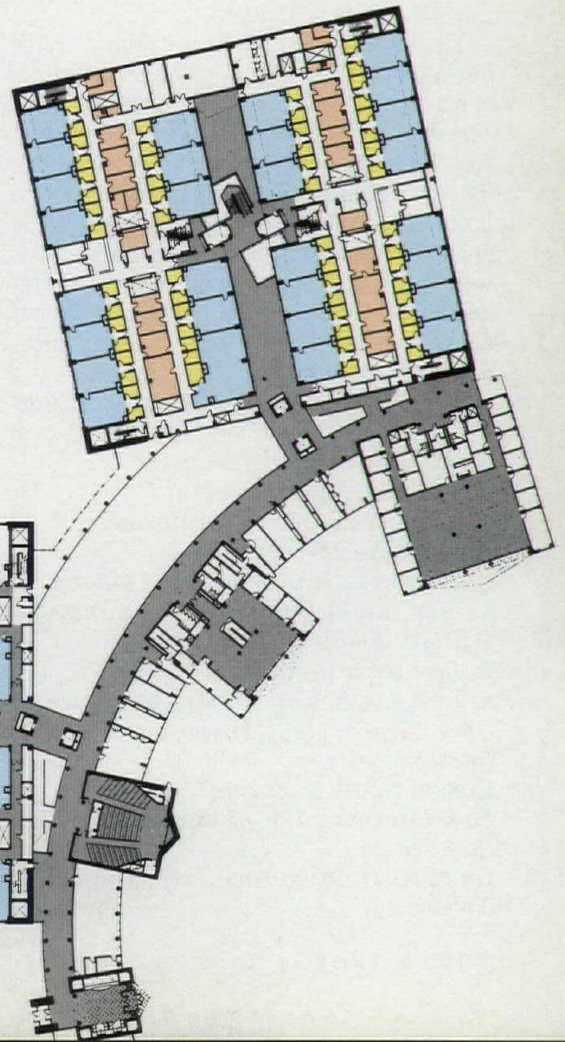
KENT A. SNELL/TOM CRANE PHOTOGRAPHERS



Drug-discovery labs are only part of a 1-million-sq-ft corporate center for Rhone-Poulenc-Rorer, also designed by CUH2A. Below: a typical biology lab. A curved band of auditoriums, offices, and seminar rooms (right) unites the complex.



TYPICAL LAB



FLEXIBLE SPINE

AT&T Solid State Technology Center
Breinigsville, Pennsylvania
Davis, Brody & Associates, Architects

Flexibility was the watchword for this facility, which has to adapt to an enormous range of potential research and development projects—from light electronics work, which makes few demands on structure or services, to heavy chemistry and clean rooms. Davis, Brody & Associates accomplished this aim by linking ten 10,000-square-foot, one-story open-plan laboratory “pods” to either side of a central, split-level service and circulation spine. Each level is built at grade on a rising site. The pods can be divided and fitted for different needs, and split lengthwise by a service corridor, with service tunnels below grade. Supplies are delivered and waste removed through these passageways, which also contain pipe and duct delivery systems. Steel armatures have been provided to accept rooftop equipment, concealed by high parapets.

The three westernmost pods on the upper level can be configured as clean rooms, in which the highest-technology hvac and filtration systems control temperature, humidity, and dust particles to microscopic tolerances. Support columns stub up through the roof of each pod, allowing for the quick construction of catwalks and shells housing gas distribution cylinders.

The bilevel, 500-foot spine funnels traffic between pods and from glass-enclosed perimeter walkways to the administrative center on the eastern end, setting the stage for informal professional conversations (photos overleaf). Trunk lines for air circulation and exhaust are also carried in the spine. Ground-level air intake plenums at either end bring fresh air up vertical shafts and draw it through a horizontal plenum above the pedestrian spine, where ducts distribute it throughout the complex.

PETER D. SLATIN

Solid State Technology Center
Breinigsville, Pennsylvania

OWNER: AT&T Bell Laboratories

ARCHITECTS: Davis, Brody & Associates—Samuel Brody, Anthony Louvis, Ian Ferguson, George Maness, William Jakabek, John Prospero, project team

ENGINEERS: Robert Silman Associates (structural); Joseph Loring Associates (mechanical/electrical)

CONSULTANTS: Anderson, DeBartolo, Pan, Inc. (laboratory); Hanna/Olin Ltd. (landscape)

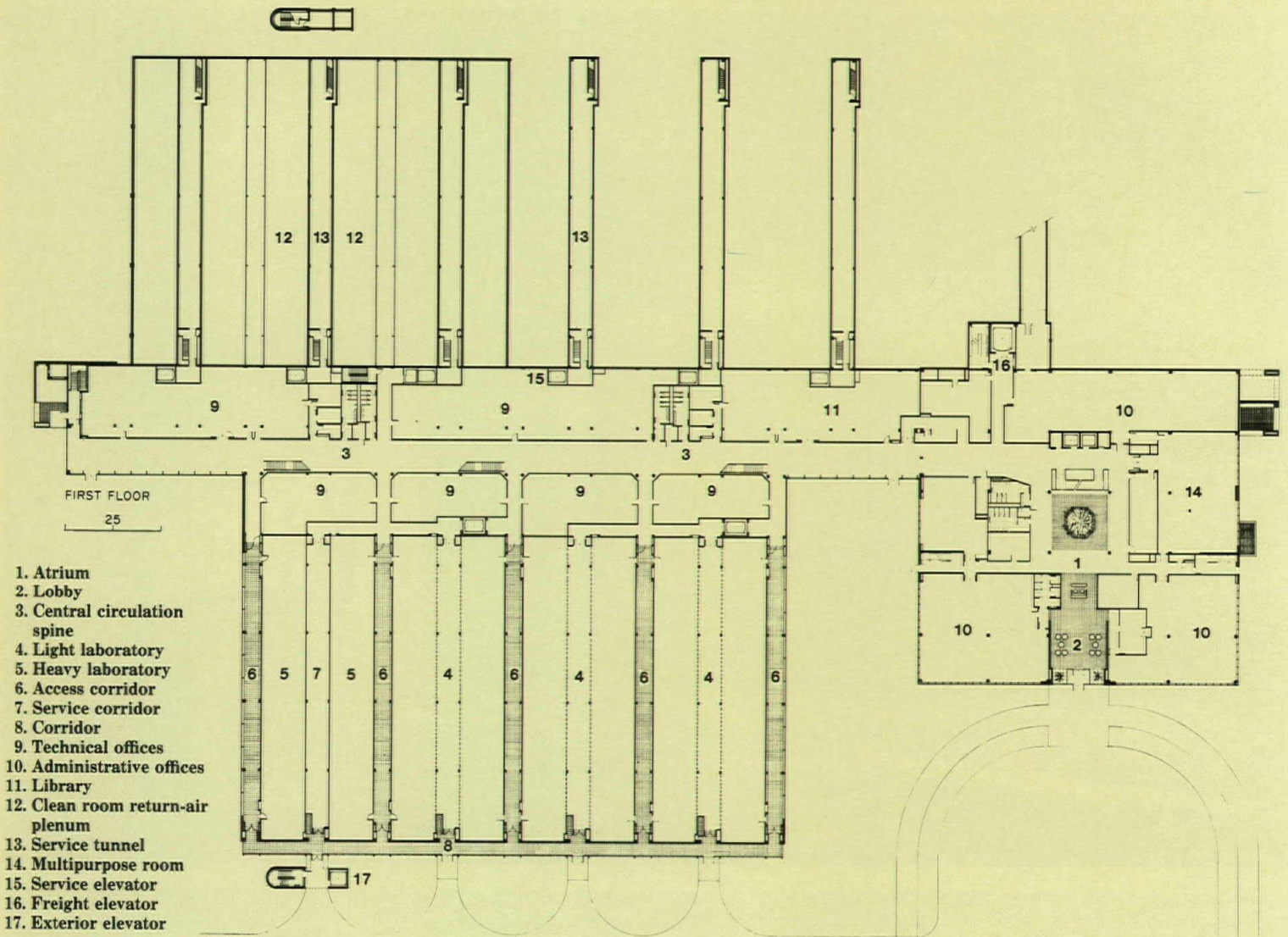
GENERAL CONTRACTOR: Huber Hunt & Nichols



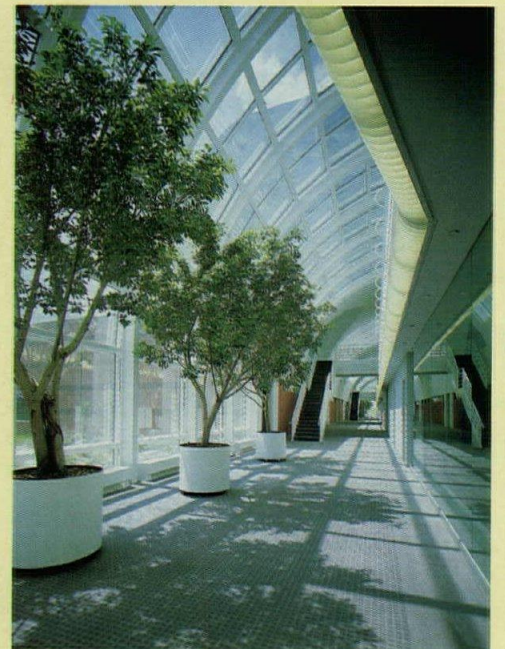
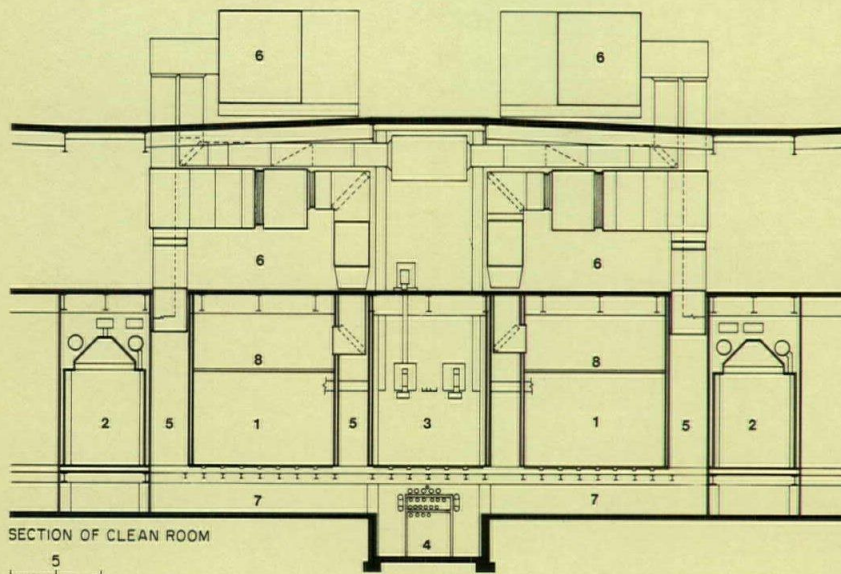
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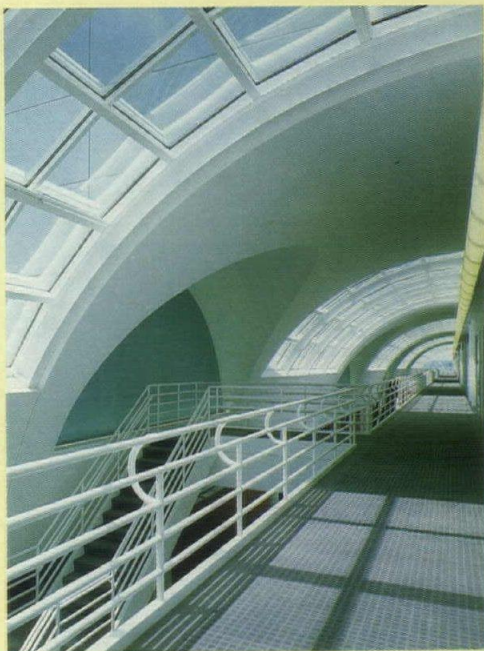
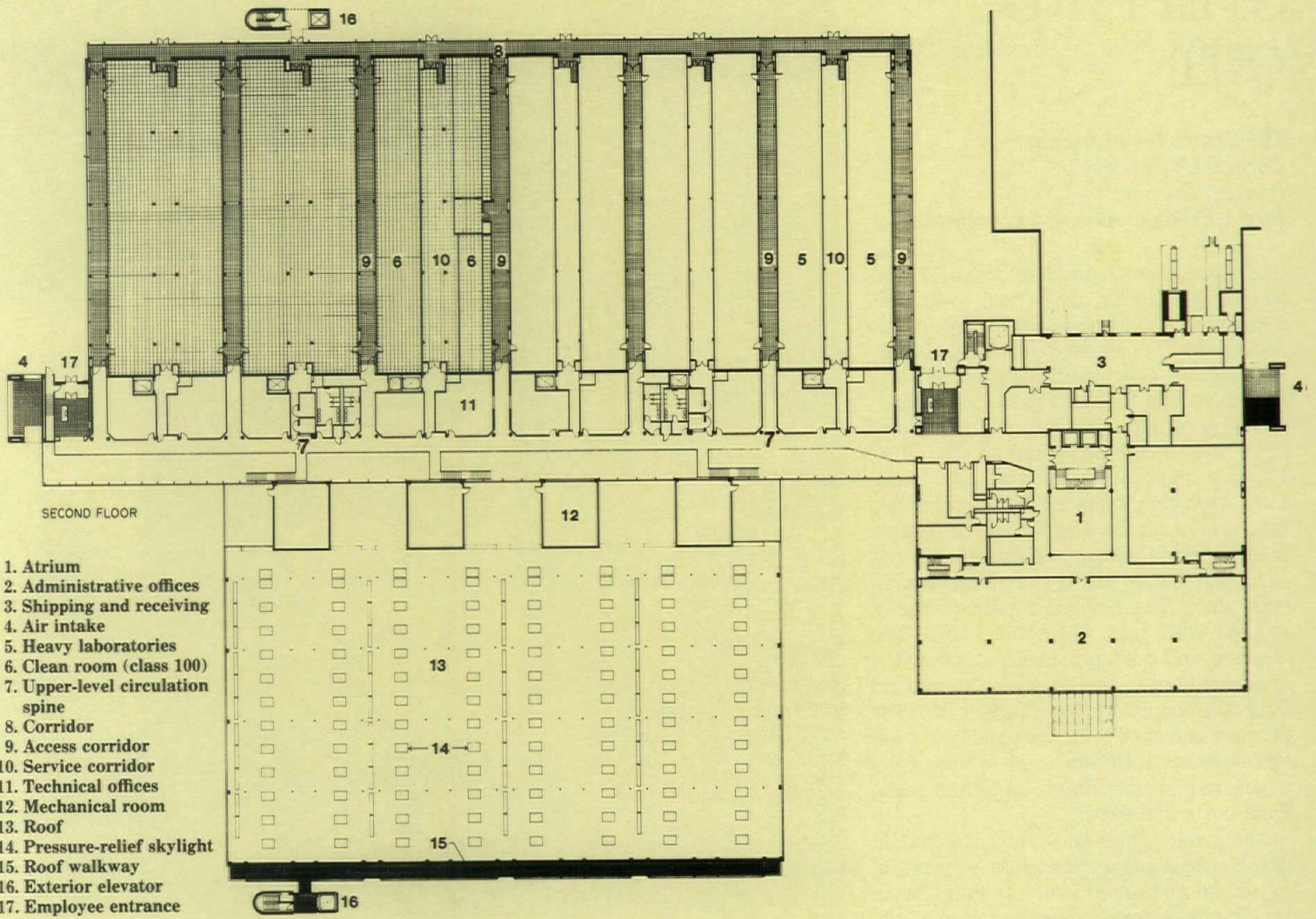




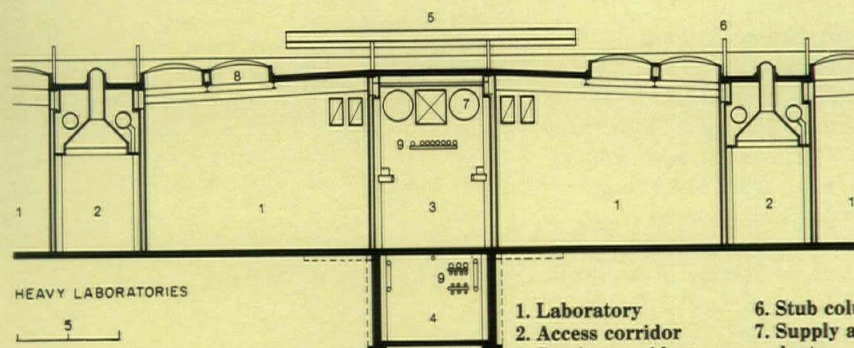
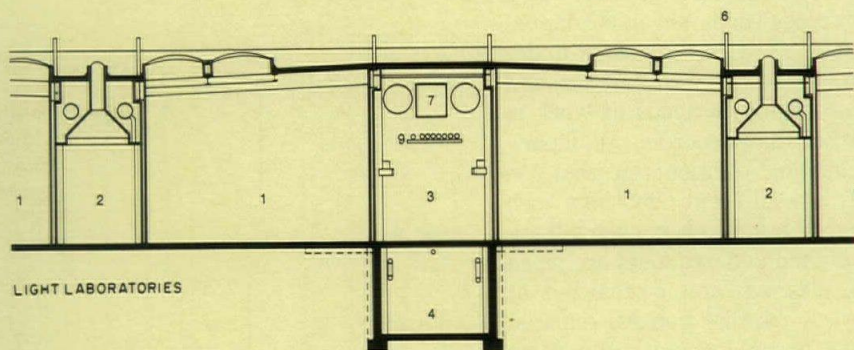
1. Clean room
2. Access corridor
3. Service corridor
4. Service tunnel
5. Return-air plenum
6. Mechanical equipment
7. Crawl space
8. HEPA filter



The enclosed glass-and-steel spine provides a sunny counterpoint to windowless labs, and offers ample opportunity for chance encounters as it unites the entire facility.



Views of rolling Pennsylvania farmland from the upper level of the circulation spine are unencumbered by the powerful exhaust fans and fresh-air distribution passage above it.



1. Laboratory
2. Access corridor
3. Service corridor
4. Service tunnel
5. Equipment platform
6. Stub columns
7. Supply and exhaust ducts
8. Pressure-relief skylight
9. Piped services

STEPPING OUT

The Center for Biotechnology
Cornell University
Ithaca, New York
Davis, Brody & Associates, Architects

Site played a dominant note in this 171,000-square-foot facility, which had to fit comfortably with existing buildings. The center houses two university divisions, biological sciences and biotechnology, and plays host to visiting researchers from industry.

The program also called for natural light in each laboratory and faculty office. Using a stepped-triangle plan, the architects were able to place faculty offices and laboratories on the exterior, in the process creating a viable campus quadrangle out of a perennially muddy, underused area (site plan). The building's cornice line is aligned with that of its neighbors. The western and northern facades facing the quadrangle open the deep plan to natural light (the largest windows face north). The primary entrance is on the building's eastern elevation at the end of an athletic field; a covered arcade draws together paths from north and south.

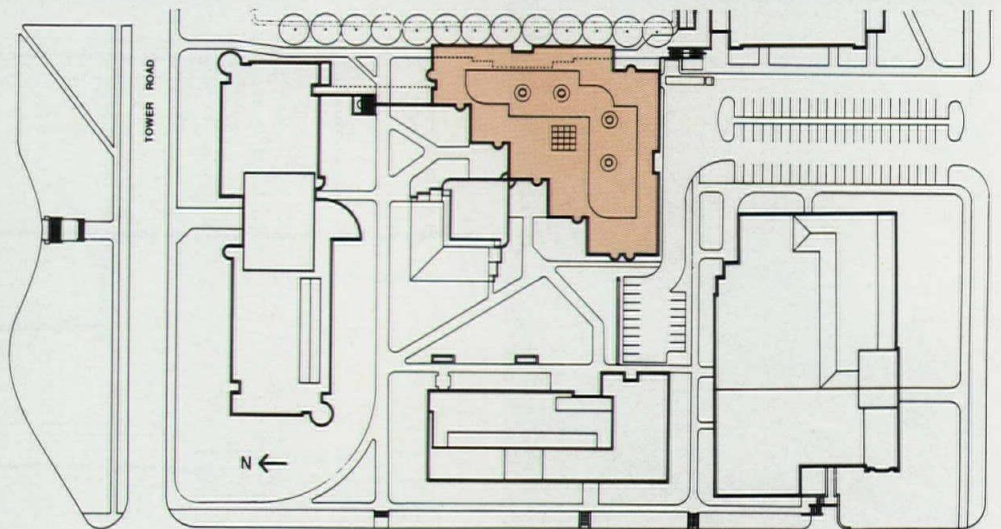
The ground floor and first level contain public spaces and work rooms. A three-story atrium and grand stairway rising from the first floor form a meeting place at the heart of the building. The three top floors are given over to 36 laboratories, 12 to a floor (typical plan opposite). These 10-by-25-foot lab modules are arranged in clusters of four labs and share an office and a small multipurpose room, which is adapted to suit each project. Each cluster is under the direction of a primary researcher, and is assigned according to needs of work in progress, rather than according to department or academic position, so that researchers from different divisions can work together. Fume hoods in each lab are individually ducted and exhausts are piped to the roof, cleaned, and discharged at high velocity. A parallel general exhaust system works in tandem with the fume hoods in each lab.

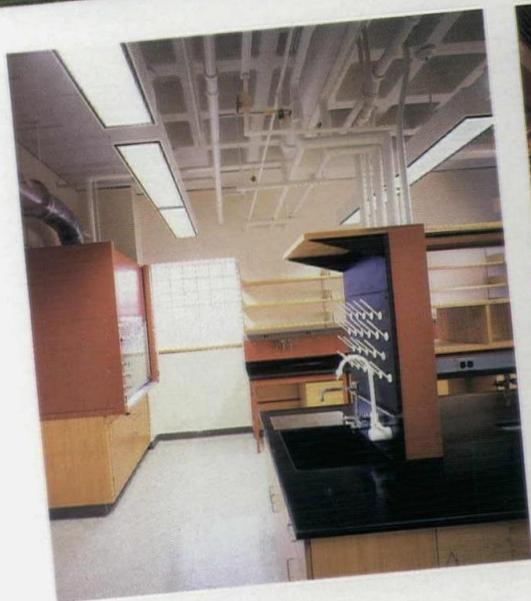
P. D. S.

The Center for Biotechnology
Ithaca, New York
OWNER: *Cornell University*
ARCHITECT: *Davis, Brody & Associates—*
Lewis Davis, William Paxson, Robert
Lubalin, Norman Dorf, Anthony
Louis, George Rehl, Nathan Hoyt,
project team
ENGINEERS: *Robert Silman Associates*
(structural); Jaros, Baum & Bolles
(mechanical/electrical)
GENERAL CONTRACTOR: *Lehrer,*
McGovern, Bovis

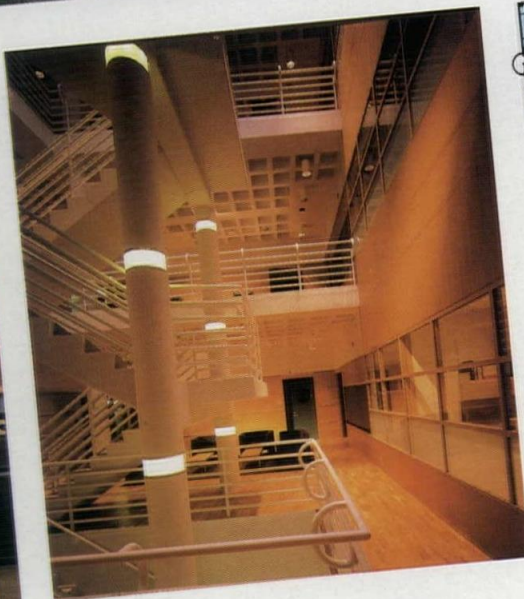


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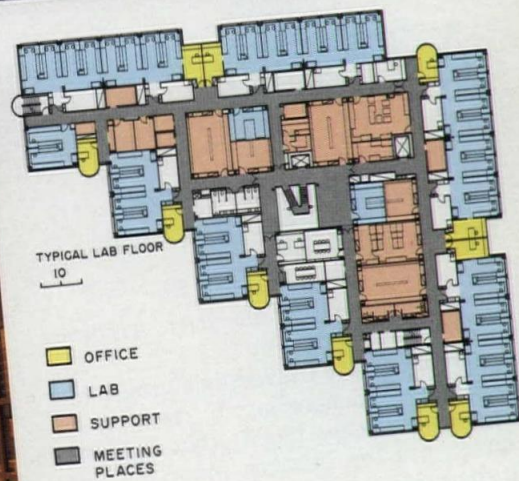


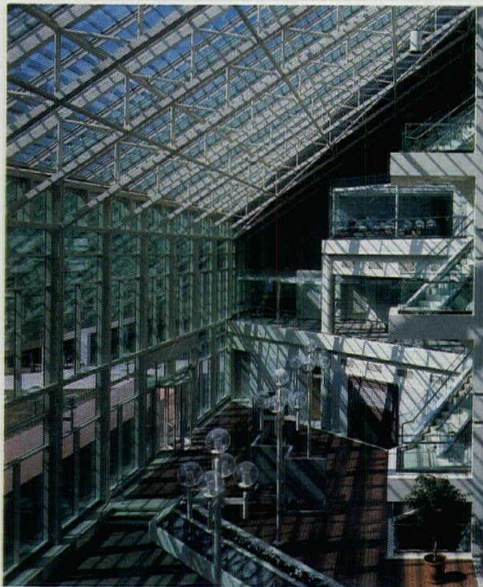


The 36 laboratories that occupy the top three floors are equipped with individual fume hoods, and can be converted to radio-isotope research. Lab walls can be removed or shifted to change size or configuration, depending on research requirements.



A three-story atrium (above) forms the heart of the building, tying together common meeting rooms on the first floor and drawing traffic from the upper lab floors. A new one-story, 200-seat conference room extends into the courtyard (top).

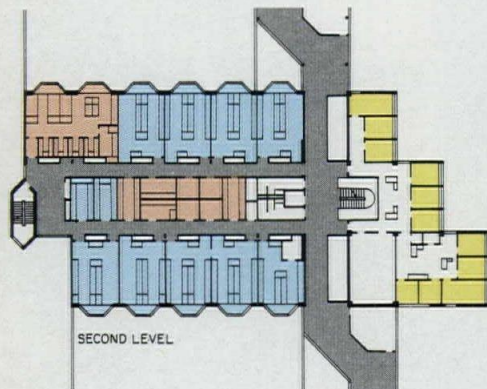




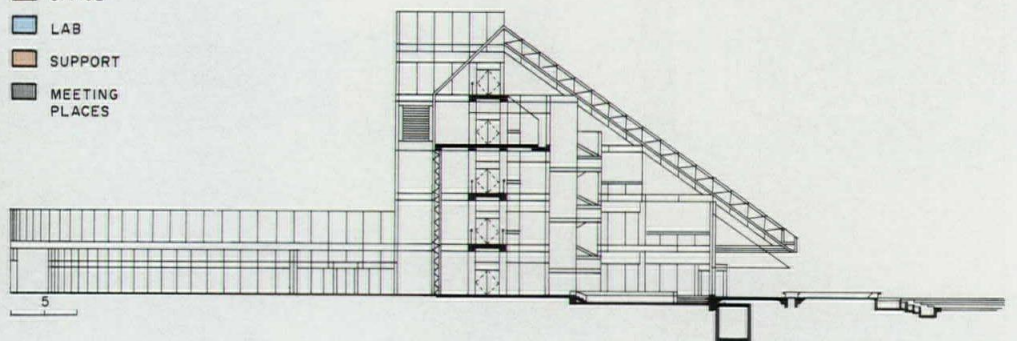
Rooftop motorized louvers (right) regulate solar gain for the Center's central public space (above). Laboratory and support spaces are separated from office areas that ring an open stairwell (plan).



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- OFFICE
- LAB
- SUPPORT
- MEETING PLACES



A PLACE IN THE SUN

Noble Research Center
Stillwater, Oklahoma
The Architects Collaborative, Architect

Oklahoma State University's program was exceedingly demanding: to create a state-of-the-art science facility that fit harmoniously into the existing context; to unify disparate disciplines while providing highly flexible internal lab space; and to construct a building so energy efficient that it would become a campus-wide—perhaps even state-wide—demonstration of the most advanced conservation technologies.

The solution is a two-part invention: a central gathering space, linked to a parallel series of nearly discrete laboratory wings. The grandly scaled atrium space (top left), called the "Resource Common," closes the

campus's central spine opposite the main library. Natural light and passive heat gain are regulated by motorized louvers. The south-facing sloped-glass roof supports an array of photovoltaic solar-energy collection cells (top right photo and section).

Modular laboratory wings stretch along a reflecting pool—an axial extension of the campus spine and a condenser-cooling source. The wings, and their respective academic departments, are linked by "solar courts," which provide daylighting and passive solar heat as well as visual relief for lab workers.

Individual labs can be configured to varied sizes from as small as one-half of a bay-windowed module to several ganged-together units for large, continuous research spaces. Fume hoods flank interior corridors. Their exhaust ducts are ganged as they rise to the roof to pass through a heat-recovery system and vent through high clusters of stacks at the center of each building. Solar collectors on these roofs add heat to makeup air.

To make best use of daylighting, hori-

zontal light shelves bounce sunlight off the ceiling, and fluorescent fixtures in the labs are fitted with fiber-optic sensors that dim lighting levels during daylight hours.

DONALD LONDON

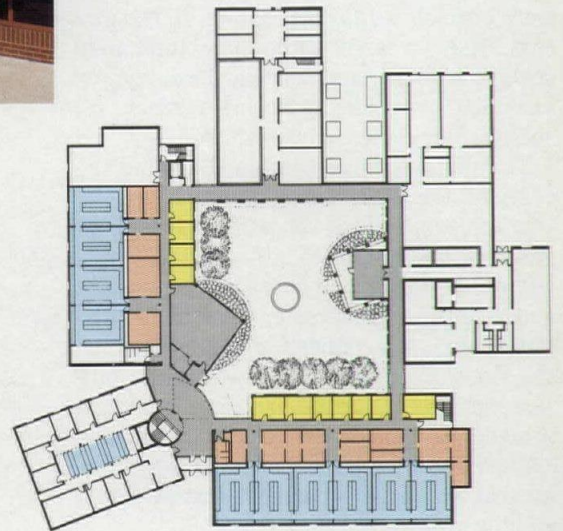
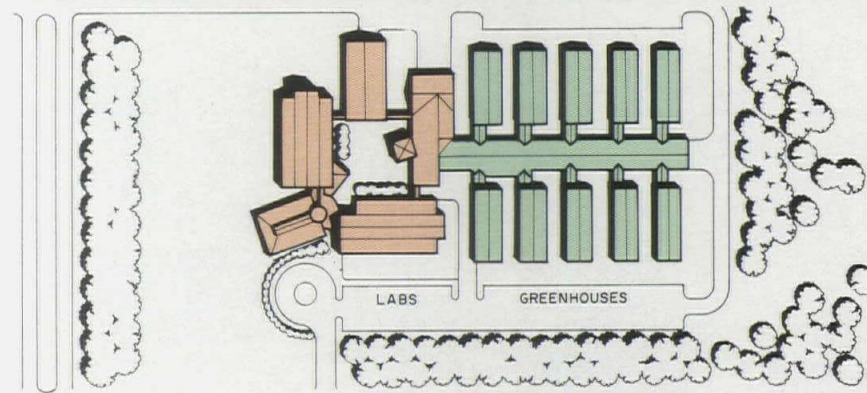
OWNER: Oklahoma State University
ARCHITECT: *The Architects Collaborative, Inc.*—Norman C. Fletcher, principal; William J. Higgins, Michael F. Gebhart, Allison P. Goodwin, Timothy Coppola, James D. Solverson, Jonathan Seely, project team
ASSOCIATE ARCHITECT: *Frankfurt-Short-Bruza Associates*—James W. Bruza, principal; Allen L. Brown, Jack Cummings, Ralph Kirkoff, Tom Moore, project team
ENGINEER: *Frankfurt-Short-Bruza Associates* (structural/mechanical/electrical)
CONSULTANT: *Dubin/Bloome Associates* (energy)
GENERAL CONTRACTOR: *Wynn Construction Co.*



TOM HLAVATY PHOTOS



The crop science complex heads a row of existing greenhouses (site plan). Electron microscopy is performed in the skewed structure (plan). Moving counterclockwise are sunflower research; seed cleaning, drying and storage; existing greenhouse; sugar, grain, and beet research.



AGRARIAN VILLAGE

Northern Crop Science Laboratory
Fargo, North Dakota
Hammel Green and Abrahamson, Inc.,
Architect

Located at the western edge of the North Dakota State University campus, this new laboratory houses U. S. Department of Agriculture scientists who study the cultivation of America's vital northern-plains crops: wheat, sunflowers, and sugar beets. "The contextual challenge was to create a sense of place for the people who will work there," states Loren Ahles, design principal at HGA. The architects established a courtyard defined by boxy, barnlike structures. Functions are housed in separate buildings to avoid operational conflicts. A building for seed cleaning and processing, for example, kicks up volumes of dust in-

compatible with laboratory spaces. And the vibration-sensitive electron-microscope facility would be out of sync with a nearby shed housing large farm equipment.

The familiar, even homely forms of the buildings are enriched (beyond minimal federal esthetic standards) by patterned brick that picks up the colors of existing NDSU architecture. Internal lab layouts, however, are based upon standard government lab specifications (plan). The labs utilize central chases for supply and return of all mechanical services. One departure from USDA convention is a heat-recovery system that reclaims exhaust-air heat to warm makeup air supplied in the labs.

In other locations, mechanical systems reflect specialized activities. In the seed processing building, where plant material may remain for 12 hours, drying chambers must maintain temperatures of up to 180F. In the electron-microscope building, all supply and return air is ducted in from an adjacent structure, since vibration of mechanical equipment is taboo.

On campus, the agricultural image was

controversial. Some administrators apparently want to move away from NDSU's roots. The architects' intention, however, was to pull these disparate uses together into a kind of research village. "The yard is the unifying element, the common ground," according to project designer Steven Miller. "It connects the people and diverse activities of the lab, creating a sense of place on the prairie." **D. L.**

OWNER: *U. S. Department of Agriculture*
ARCHITECT/ENGINEER: *Hammel Green and Abrahamson, Inc.—Loren Ahles, design principal; Steve Miller, project designer; Tony Staeger, engineer*
CONTRACT ARCHITECT: *Lightowler Johnson Associates, Inc.—Harlan Ormbeck, project manager, Neal Wieser, electrical engineer*
CONSULTANTS: *Dennis Martin (mechanical); Environmental Services (laboratories)*
GENERAL CONTRACTOR: *Meineke Johnson, Inc.*

URBAN ECOLOGY

Earth Sciences Centre

Toronto, Ontario

A. J. Diamond, Donald Schmitt and Company and Bregman + Hamann, Joint-Venture Architects

The architects of this University of Toronto facility did not feel at all constrained by the tendency of lab-building programs to suggest thick, blocky buildings. Instead, the firms embraced the project as a chance to inject a sensitively scaled, low-rise building ensemble onto a part of campus full of towers and plazas swept by icy winds off Lake Ontario. The architects have threaded facilities for forestry, botany, and geology around and between six existing buildings of highly varied pedigree, most of which were once slated for demolition. In the process, they created three new intimately scaled, arcaded, and tree-lined courtyards (including one made by closing a street that split the site) where none existed.

The lab spaces are wrapped around the edge of the site. Their different wall-to-window proportions reflect the density of gas and fluids piped to lab benches from a 4-ft wide outside-wall chase. To bring light and a sense of generosity into the circulation spaces, the connection points between the slabs are carved away, as are the outside corners of the 320,000-sq-ft complex. A wedge-shaped 85,000-volume library and classroom structure is linked to the geology teaching labs by an elliptical 400-seat auditorium.

To provide both offices and labs with windows, preparation rooms have been located in the middle of the floor, adjacent to vertical chases that carry supply air and exhaust from fume hoods within labs. J. S. R.

Earth Sciences Centre

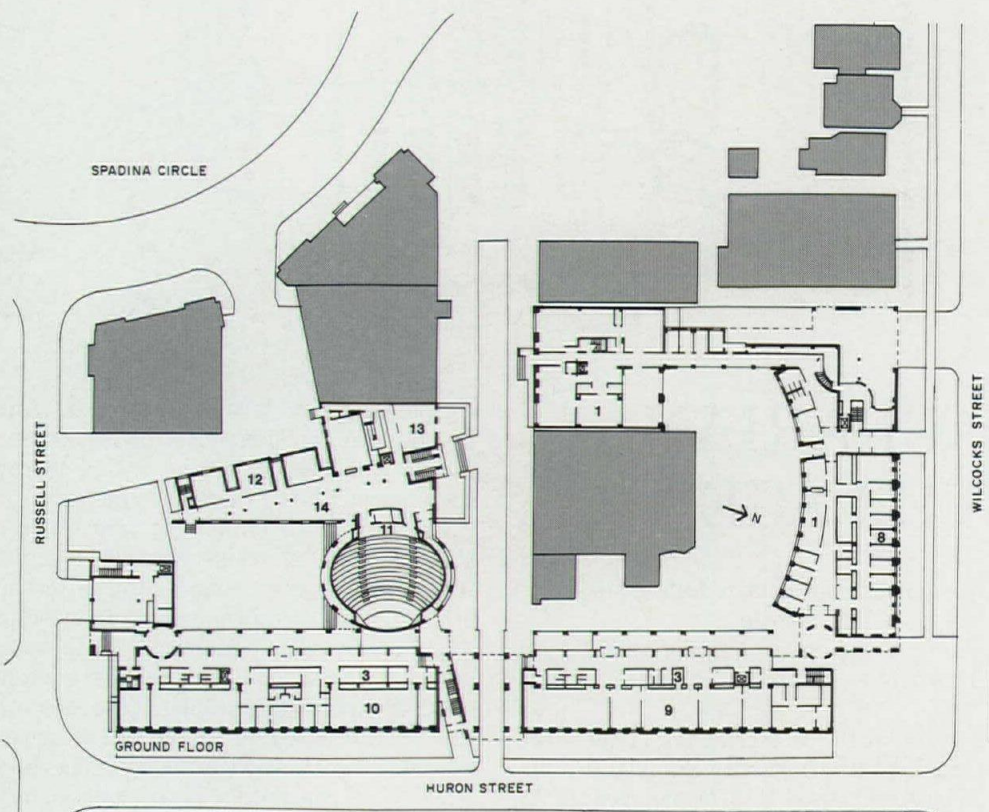
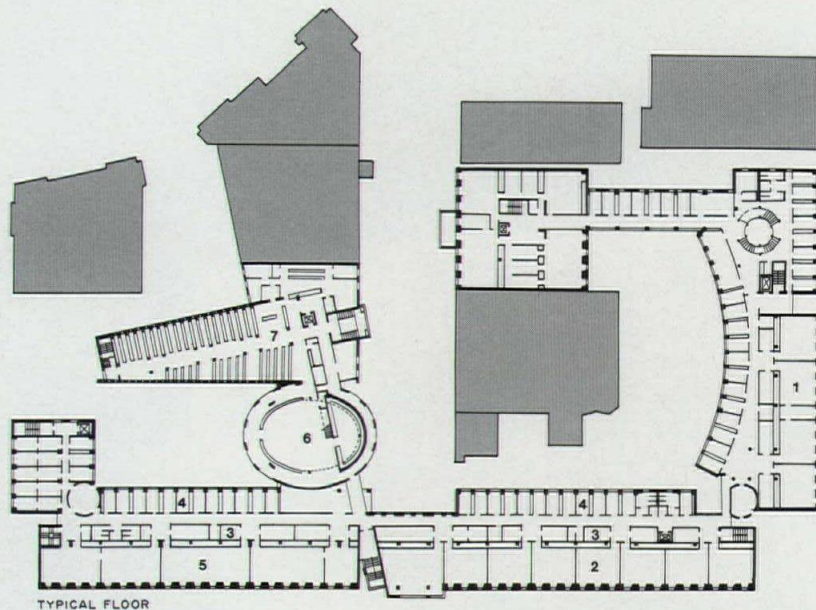
OWNER: University of Toronto

ARCHITECT: Bregman + Hamann in joint venture with A. J. Diamond, Donald Schmitt and Company—Vagn Houlbjerg, project director; Bill VanLoon, job captain; Owen Peat, Michael Waring (Bregman + Hamann); Donald Schmitt, Stewart Adams, Rick Andrighetti, John Chandler, Andrew Filarski, Alice Liang-Wallace, Breck MacFarlane, George Przybylski, Jon Soules, design and production team (Diamond, Schmitt)

ENGINEERS: M. S. Yolles and Partner, Ltd. (structural); The Mitchell Partnership (mechanical); Mulvey and Banani International (electrical)

CONSULTANT: John T. Williams (laboratory)

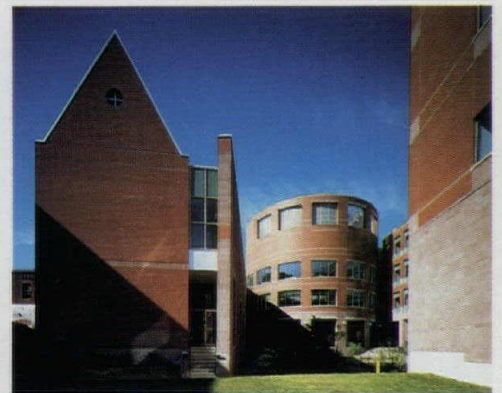
CONSTRUCTION MANAGER: UMA Spantec



- | | |
|----------------------------|---------------------------|
| 1. Forestry labs | 9. Botany teaching labs |
| 2. Botany labs | 10. Geology teaching labs |
| 3. Preparation room | 11. Auditorium |
| 4. Offices | 12. Classrooms |
| 5. Geology labs | 13. Cafeteria |
| 6. Library reading room | 14. Lounge |
| 7. Library stacks | |
| 8. Forestry administration | |



TOM TAYLOR PHOTOS



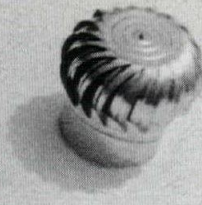
Yellow-brick structures house labs for geology (foreground top) and botany (background top), which are split at a former street by a skewed circulation spine. Two kinds of forestry labs are expressed on the Wilcocks Street elevation (left), big windows to small labs and vice-versa. The arched library frames a view to the auditorium and reading rooms (above).

Prolong the life of a roof. It's all here in black and



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ARCHITECTURAL RECORD FEBRUARY 1991 • 111

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WHAT'S ZAPPING YOU

We don't know how harmful electromagnetic-field radiation is, but some protective measures are available now.

Like so many environmental problems, electromagnetic-field radiation is exasperating because a certain not-yet-known exposure *could be* dangerous. For more than 15 years a few scientists have been trying to alert the public to hazards they see in the magnetic fields emitted by certain electrical devices. Though nearly everything electrical emits these fields (and the earth has its own), there is a gathering consensus that certain fields cause miscarriages and speed the development of some cancers.

There is not nearly enough information to know how much exposure is harmful, though Suffolk County, N. Y., and San Francisco have already attempted to regulate computer-monitor radiation exposure. Paul Brodeur, who has written on this subject over several years for *The New Yorker*, blames power companies and computer manufacturers, claiming they have stonewalled research efforts because of the potential liability burden. He decries "the presumption of innocence" granted radiation effects by government agencies, though a long-delayed EPA report released in January recognizes the body of evidence and calls for studies to determine safe levels of exposure. Though we are surrounded by electromagnetic fields, only certain kinds are thought to be harmful. Household devices (with the exception of electric blankets and radiant electric ceiling and floor heat) have not been seriously implicated.

• Power lines, transformers, substations: Power lines emit alternating-current magnetic fields. Much attention has been paid to high-voltage transmission lines, but scientists are also concerned about high-current lines that distribute power from transformers (such as the familiar pole-mounted models) to individual residences. While there is little as yet that can be done about neighborhood transmission wires, architects should be sensitive to the location of nearby substations, high-tension wires, or in-building transformers. (Many public schools are embroiled in controversy because they share power-company rights of way.) A gaussmeter, set to appropriate frequencies, can be used on the site to measure the strength of magnetic fields. Pioneering research by Nancy

Wertheimer and Ed Leeper showed elevated childhood leukemia outbreaks at as little as 1 milligauss. Some schools near high-voltage power lines have recorded emissions as high as 20 milligauss.

• Computer monitors: Though computer video displays give off a variety of radiation, scientists are concerned about emissions of pulsed, extra-low-frequency fields at 60 hertz, about the same frequency seen in power lines. Architects need to be specifically concerned since CAD operators typically work with more than one monitor, and most are exposed for many hours at a time. Since a safe exposure threshold has not yet been established, computer companies have been reluctant to test for emissions. *Macworld* magazine tested ten

monitors offered for Apple Macintosh computers, and found readings ranging from as low as 0.18 to as high as 70.88 milligauss. Until more definitive information comes along, the best way to reduce exposure to display-terminal emissions is keep your distance (below). Shielding technology exists but is not yet available in the U. S. market.

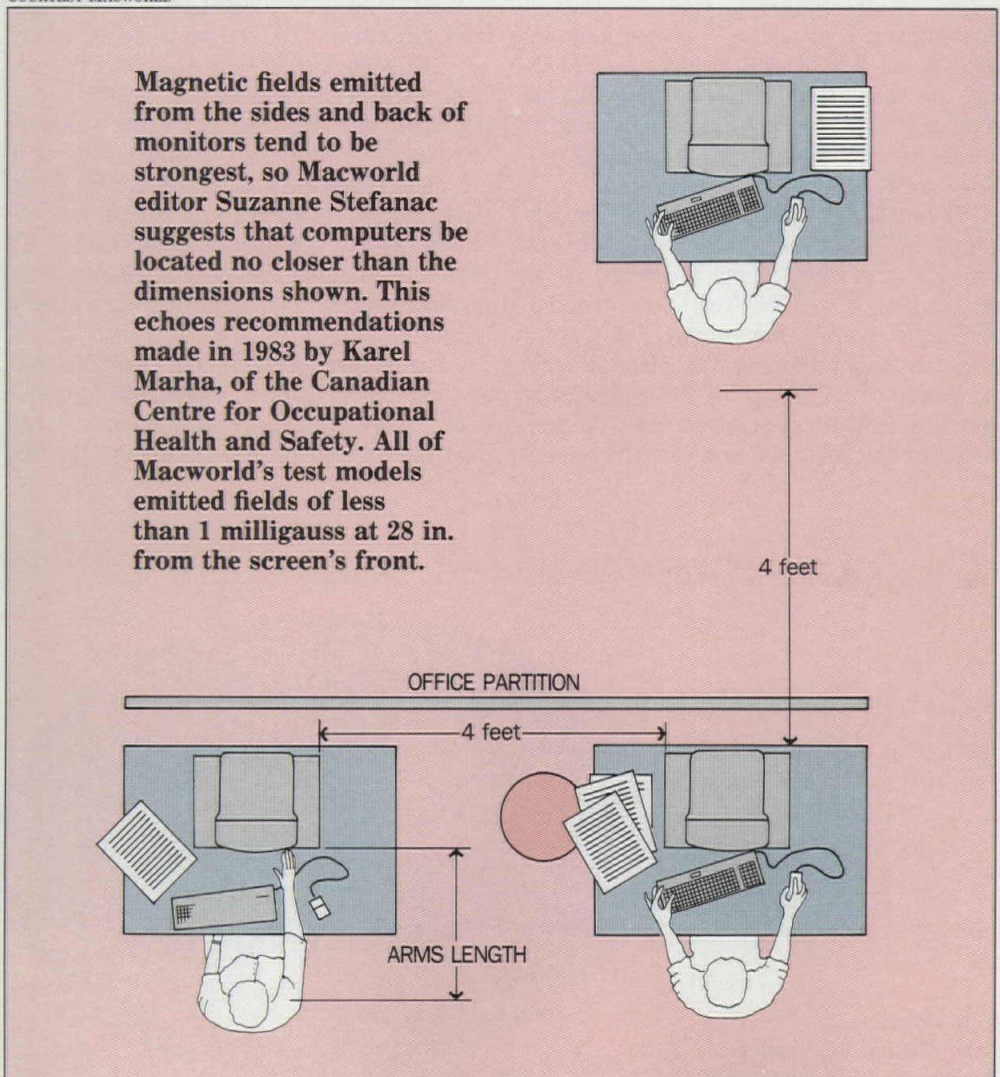
JAMES S. RUSSELL

Further information:

Brodeur, Paul. *Currents of Death: Power Lines, Computer Terminals, and the Attempt to Cover Up Their Threat To Your Health.* New York: Simon and Schuster, 1989.

"The Magnetic-Field Menace," *Macworld*, July 1990, pages 136-145.

COURTESY MACWORLD



ALDEN PARK: ANATOMY OF A WALL FAILURE

A huge Philadelphia restoration project shows you can't ignore materials' performance when you clad concrete with masonry.

Alden Park, a complex of three 9-to-14-story apartment towers set in rolling parklike grounds in Philadelphia, is an apparently solid, well-tended neo-Jacobean pile of the type that grandmothers seem to favor. According to David Hollenberg, a partner at John Milner Associates, architects in charge of the complex's \$38-million restoration, this sturdiness is an illusion. The concrete-framed structures, clad in variegated patterns of clinker brick and trimmed with cast stone, were erected "with total disregard or lack of knowledge about highrises." Built in stages from 1925 to 1929 by Detroit contractor Kenneth DeVos, Alden Park is now in the midst of the largest residential historic restoration ever undertaken.

The United States is full of similarly built structures, and age is catching up with them. For older buildings, establishing the feasibility of restoration and assembling financing can be as daunting as the technical problems. In both areas, Alden Park is breaking ground.

When Milner Associates was first engaged, in 1987, they found problems of the kind likely to afflict many buildings of the era, when new-at-the-time construction techniques were being employed without a complete understanding of their long-term performance. Today, we automatically take into account concrete creep—the tendency of the material to shrink incremen-

tally over many years under load—and we have also learned that brick undergoes inelastic expansion as it is exposed to repeated wetting over the years. To avoid stresses induced by these movements, horizontal "expansion" joints are detailed as a matter of course. Following a bearing-wall masonry tradition, the walls at Alden Park were detailed without them, and these opposite forces have taken their toll.

The architects estimate that the moisture-related expansion of the brick alone (which should have reached its limits by now) totaled as much as a full inch in 14 stories. As the wall lengthened relative to the frame, both its bottom and top have bulged outward (page 117 and opposite). Once the design team began probing walls it found more problems: only a few tie-backs link the brick veneer to its structural-clay-tile backup or to the building frame. There are no weepholes and no through-wall flashing. The original mortar was permeable, and water that penetrated the wall (as plenty did) ran back out again. Over time, though, moisture and lack of maintenance caused widespread deterioration of concrete columns (page 116), lintels over windows (page 118), and cast-stone trim (page 119).

After several development teams bowed out, Bennet E Kaplan, a developer experienced in restoration redevelopments, took over the project. He needed to move quick-

ly into construction to meet lending requirements, however, and the design team drew up biddable details and specifications in only three weeks. Rather than fully document every condition, the team divided problems into categories ranging from those posing an immediate danger to maintenance items that improve rentability, and drew a series of some 25 generic details. Predictably, actual conditions were more varied than the details could cover, but Kaplan has preferred bringing the architects and engineers on site as needed, and has established unit prices with a contractor for exterior repairs. As the work has progressed, Kaplan dispensed with the outside construction-management firm and has taken on these duties himself. He has maintained and gradually improved cash flow by doing the restorations in stages, shifting tenants from one building to another as work progresses.

Historic-preservation tax credits have been key to the project's success, though the work had to be approved by national, state, and city preservation agencies. The developers have also "donated" facade and open-space easements. In return for tax deductions matching these elements' appraised value, they must be maintained in perpetuity. The easements are administered by the nonprofit Philadelphia Historic Preservation Corporation.

JAMES S. RUSSELL



Alden Park
John Milner Associates,
Restoration Architects

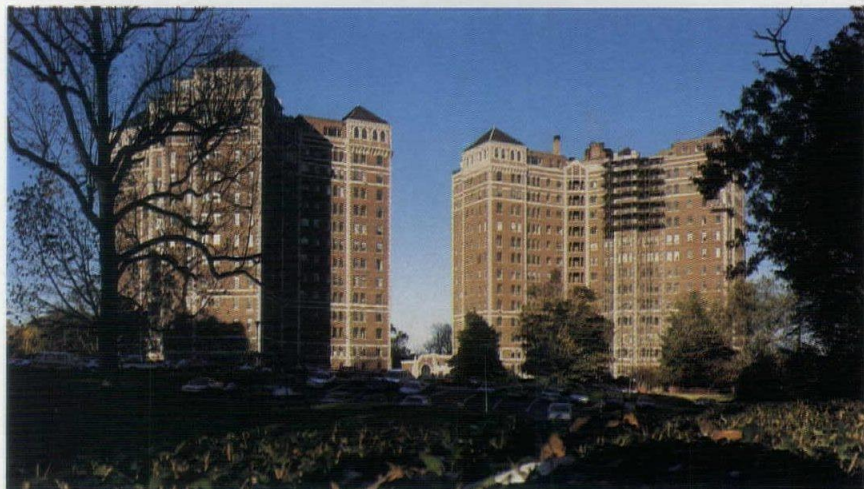
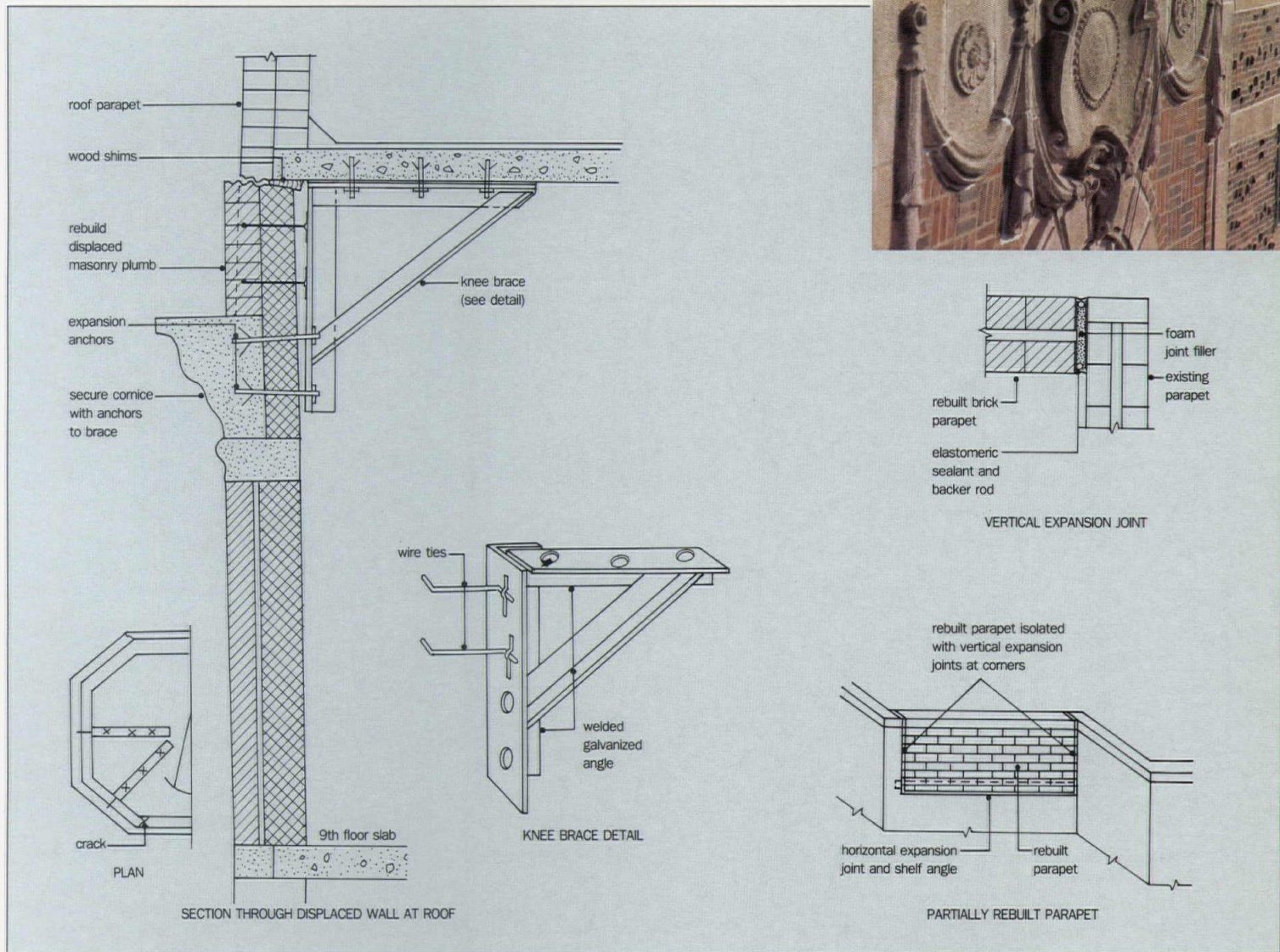
At 1.2 million sq ft on 38 acres, Alden Park is the largest residential property on the National Register of Historic Places. The Manor (foreground) comprises three cross-shaped towers set around a "great hall," fronting on a curved drive.

The twin-towered Kenilworth (background) was constructed in 1927. The Cambridge, not shown, was completed in 1929 after this vintage photo was taken.

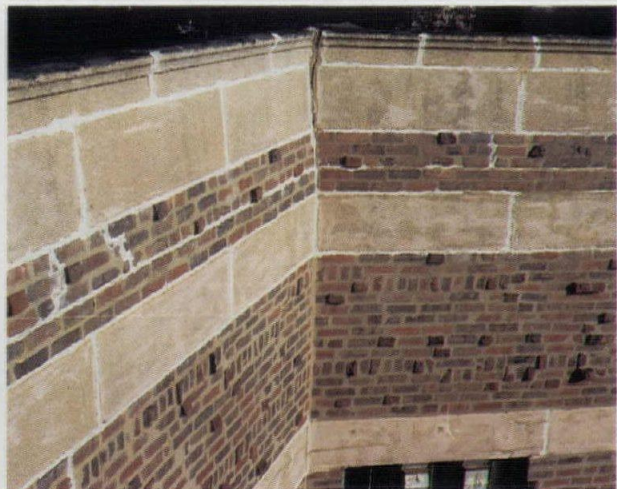
Restraining displaced walls; parapet restoration

As the exterior brick walls "grew" and the concrete frame shrank, the top story of the wall was pushed outward, a condition that was particularly severe at the Manor's windowed bays. New soft mortar joints were installed to absorb further movement, and knee braces were bolted on to lock the wall into the structure (drawings below). Despite the ravages of weather and pollution, much of the decorative cast stone remains in good condition (on the Cambridge, right).

due to the wall movement, and stabilizing these dangerous conditions was the design team's first order of business. Damage was exacerbated by previous repairs. "Repointing with very hard mortar [visible in photo bottom right] trapped moisture in many areas," reports Hollenberg. Isolation joints were added at changes of direction to prevent bowing due to lateral movement (drawings below right). Despite the ravages of weather and pollution, much of the decorative cast stone remains in good condition (on the Cambridge, right).



ALEXANDER NITSCH, SWALLOW'S STUDIO



ERNIE KOCH

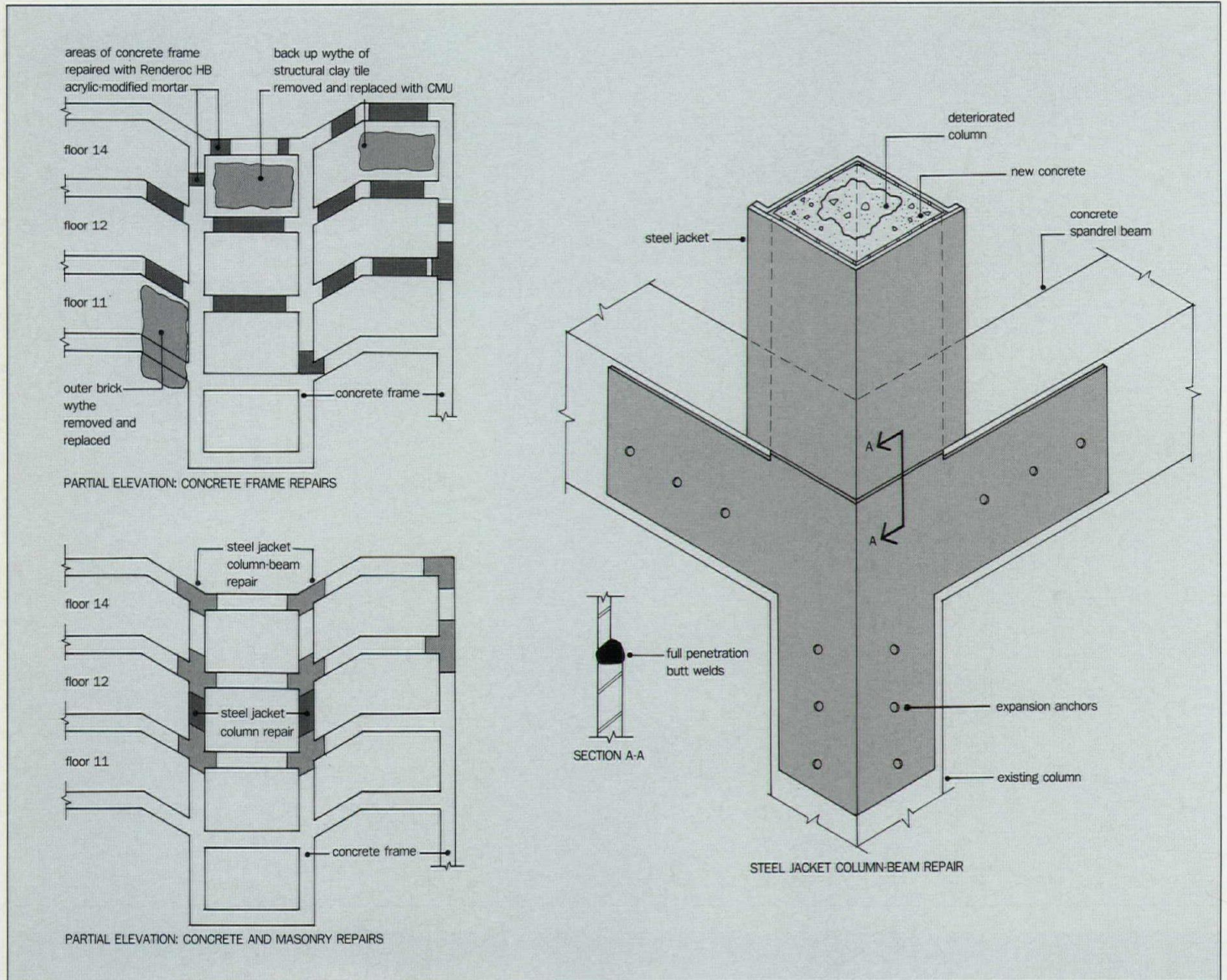
Concrete frame repairs; exterior wall restoration

Though the concrete frame was completely protected by masonry (the cast-stone string courses look from a distance like the framing concrete), the exterior wall averaged only 8-in. thick, and was highly water permeable. Parts of the concrete structure had deteriorated dramatically (bottom left drawing—showing the Manor—and bottom photos). This was a result of trapped

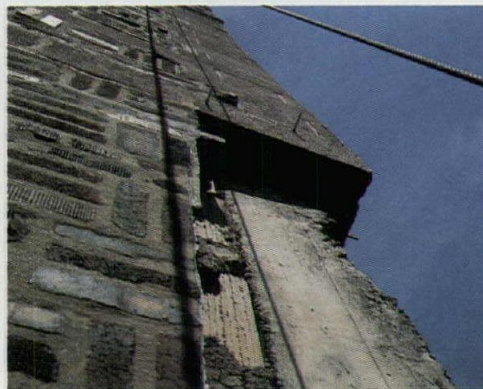
water's freezing and thawing and the chemical reaction between steel reinforcing and chlorides used in the concrete mix. Since the latter damage was not found consistently, it is suspected that salt was added to some concrete when poured during the winter. (The engineers report that while the structure is overbuilt, the strength of the concrete itself is relatively weak and inconsistent, averaging about 2,500 psi.) Once wet, the rusting of the reinforcing bars was accelerated, the bars expanded (exerting "rust jacking" forces

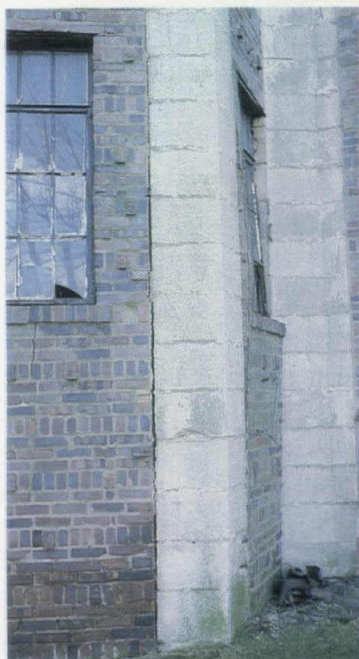
of perhaps 100,000 psi), spalling the covering concrete. One column was reduced from 14 in. by 14 in. to a load-bearing cross-section of only 6 by 6. To repair the damage, the structural engineers called for a welded-steel-jacket form, into which Renderoc HB, an acrylic-modified mortar, was injected in layers around the remaining sound concrete (bottom right photo).

At the bottom of the wall, brick expansion had caused dramatic bulges (opposite top), exacerbated by a casual use of exterior-wall attachment devices (opposite bot-



Outside corners of the concrete frame were particularly subject to deterioration (near right), remedied with steel jacketing (above). An opening was left in the form to permit injection of new mortar around the remaining sound concrete (far right).

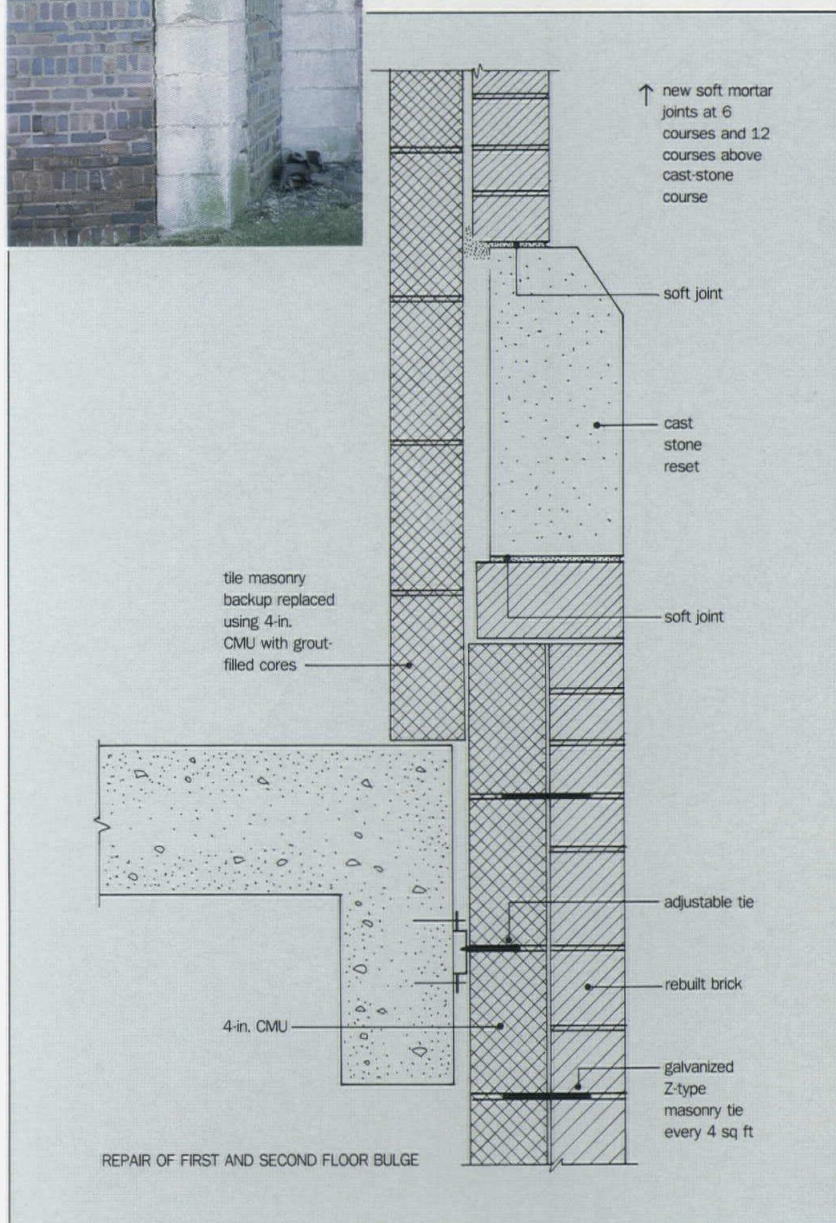




tom). An epoxy adhesive and stainless-steel dowel system was installed to correct minor displacements. Where damage was more severe, the masonry was removed, the backup replaced with concrete block, and a new exterior wythe installed, using brick anchors capable of absorbing wall movement (drawing below).

Beyond structural repairs, Kaplan made points with preservation agencies by filling in (with matching brick) air-conditioning sleeves installed over the years. This was no mean feat, since the original bricks

were placed semirandomly in an assortment of colors and patterns to evoke a countrified English mode. The patterns are so varied that sample wall areas had to be approved for each surface. "The bricklayers had to learn to loosen up," reports Kaplan. The Manor, restored, is shown below right.



ALEXANDER NITSCH, SWALLOW'S STUDIO



Few ties or other devices were used to fasten the walls to the building structure. Where they were used, "more problems occurred," says Wiss, Janney, Elstner's Kimball Beasley. Cracking took place where restrained walls met unrestrained ones. Left: wall movement has forced a corroded "Z" angle off its slab.

**Balcony replacement,
window renovation,
cast-stone restoration**

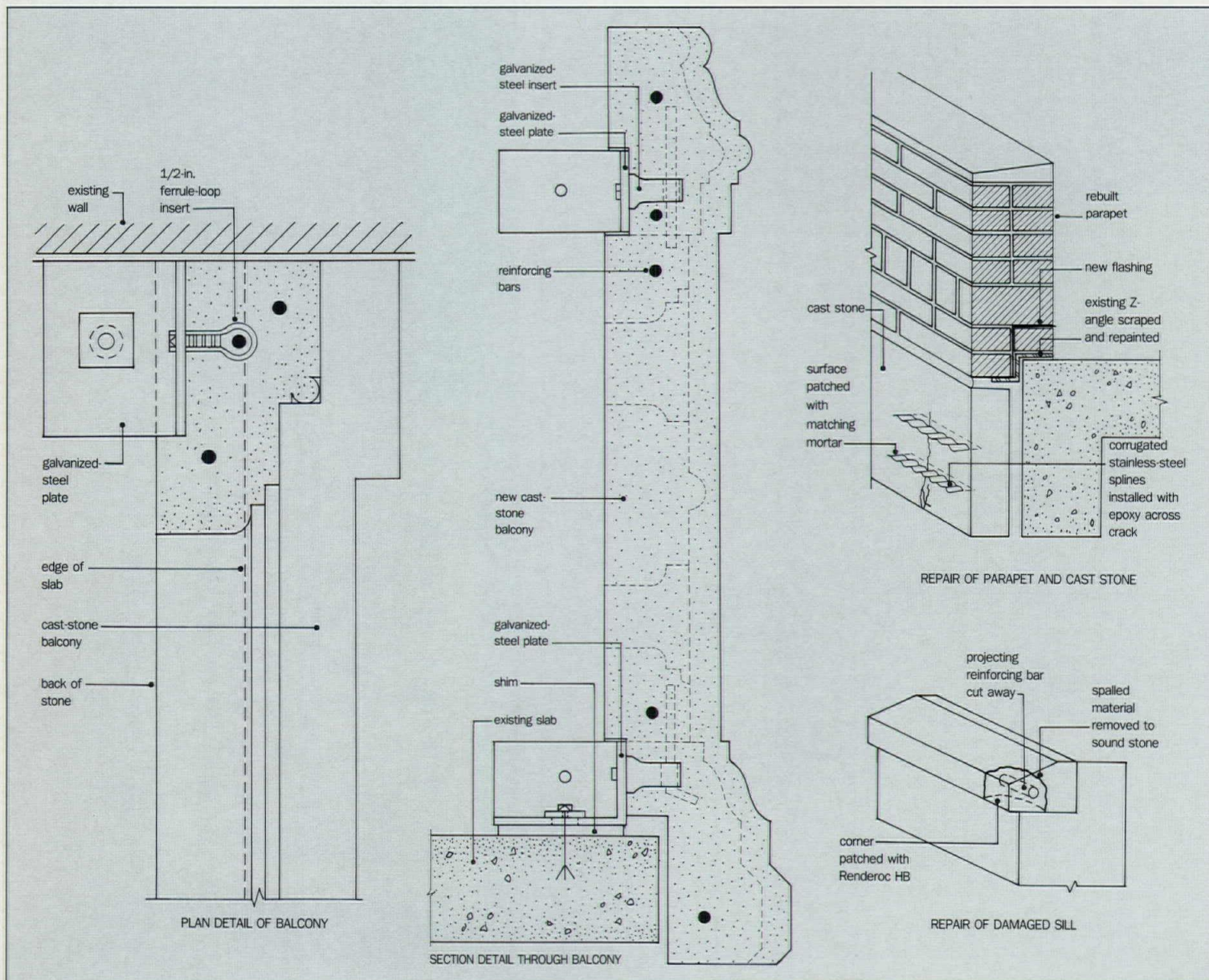
The Manor, apparently designed by architects on DeVos's own staff, has needed the most comprehensive restoration. Cast-stone balconies had deteriorated badly because reinforcing bars had been placed too close to the surface. When the bars rusted, they expanded, causing the surface coating to spall. Damaged mortar at the joints had also become a point of water entry.

Since the balconies could not be salvaged, the architects designed cast-stone replacements, which were made by the fabricator in three separate pieces instead of the 23 parts of the original. The balconies rested on cantilevered floor-slab projections, which required only minor repairs. Galvanized plates and stainless-steel ferrule-loop inserts attach the parts to the slab and each other (drawings below left).

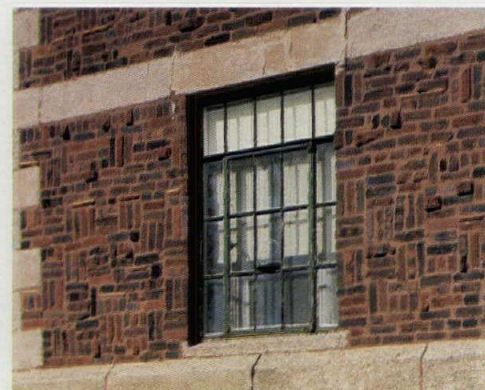
Since flashing was never installed over the windows, the lintels have gradually deteriorated (bottom right photo), damaging

the steel sash. Windows were cleaned, repaired, and reglazed. Kaplan has set up his own shop to restore and reinstall the original bronze hardware. Renderoc HB was used for structural repairs of cast-stone lintels and string courses. The patching technique for minor damage is shown in the drawings below right. For consistency, all of the cast stone was recoated with Thorocoat, a breathable acrylic masonry coating, in a color matching the stone's original pinkish cast (photos opposite).

Since air-conditioning-unit sleeves have



Near right: fastened together on the ground, new cast-stone balconies were hoisted into place onto existing slabs. Far right: deterioration is visible in the cast-stone lintels and sills. Under many windows, air-conditioning sleeves were replaced with brick to match the existing random pattern.



ALEXANDER NITSCH, SWALLOW'S STUDIO

been removed from the walls, and no window-mounted units will be permitted, Kaplan has replaced each building's aging steam radiators with a four-pipe hot and chilled water system to individual fan units. The structural-clay-tile interior walls have had new wiring run through, and have been replastered (rather than covered with drywall, the more common solution).

This project was the last of three Alden Parks; two earlier complexes remain in Brookline, Mass., and Detroit. Philadelphia's 700-apartment campus has contin-

ued to be a popular residential address. Its suburban amenities, including a pool, enclosed parking, and extensive landscaped grounds, were ahead of their time. The floor plans have required little alteration over the years, and Kaplan has confined his changes to updating kitchens, opening up obsolete maid's rooms, and replacing cork floors with wood. □

Corporation

RESTORATION ARCHITECT: *John Milner Associates—David Hollenberg, partner-in-charge; Irvin Garfield, III, Philip E. Scott, project architects*

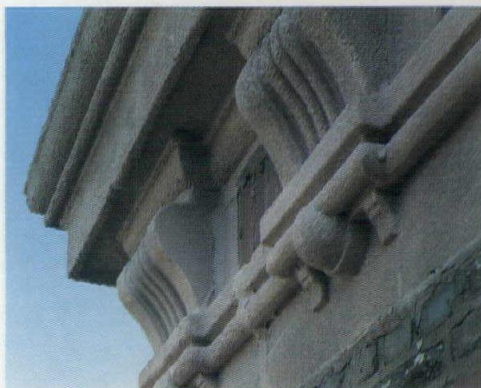
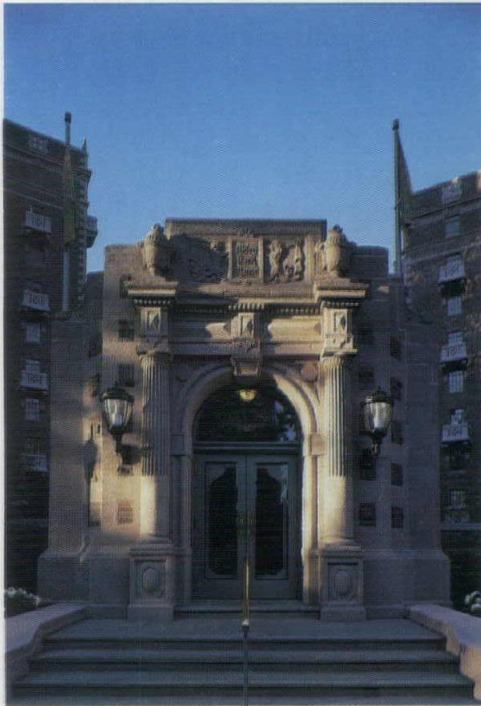
ENGINEER: *Wiss, Janney, Elstner Associates*

CONSTRUCTION MANAGER: *CYMA Corporation*

Alden Park

Philadelphia, Pennsylvania

OWNER: *Kaplan Development*



ALEXANDER NITSCH, SWALLOW'S STUDIO THIS PAGE

Full-height scaffolding was used so that masonry could be removed and the damaged concrete framing exposed for repair on several stories at once (the Kenilworth, above). While the cast stone at the Cambridge (middle left) has yet to be restored, the material has been recoated at the Manor (top and bottom left).

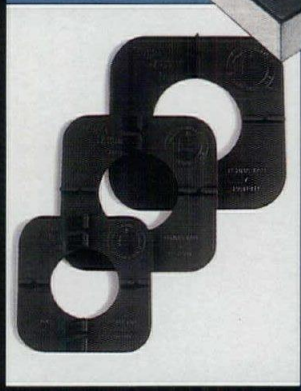
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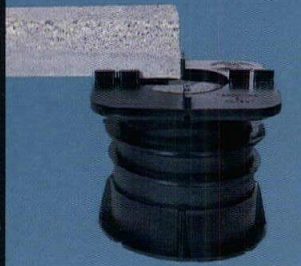
TERRA-PAVERS



TERRA-TAB

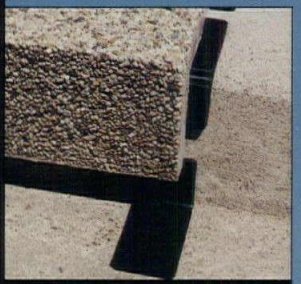


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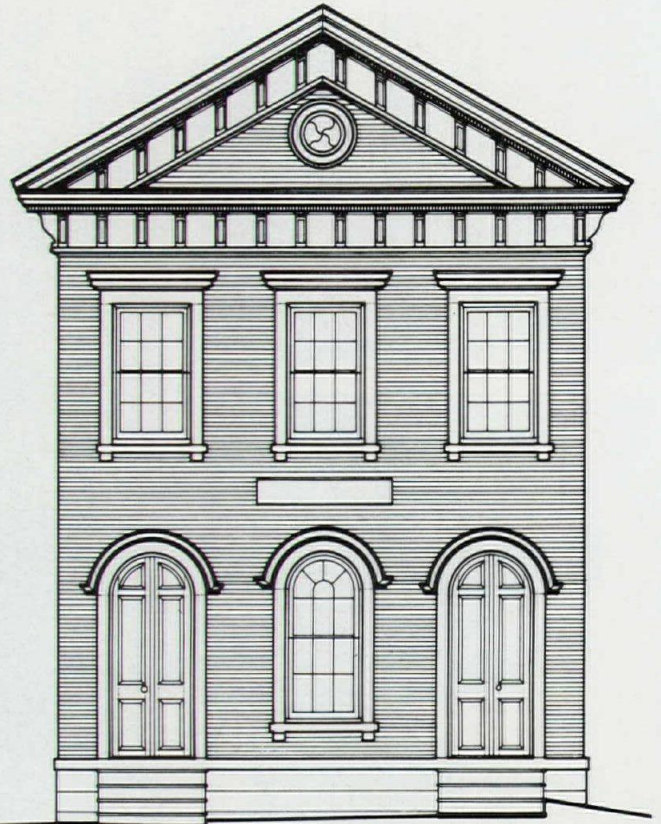
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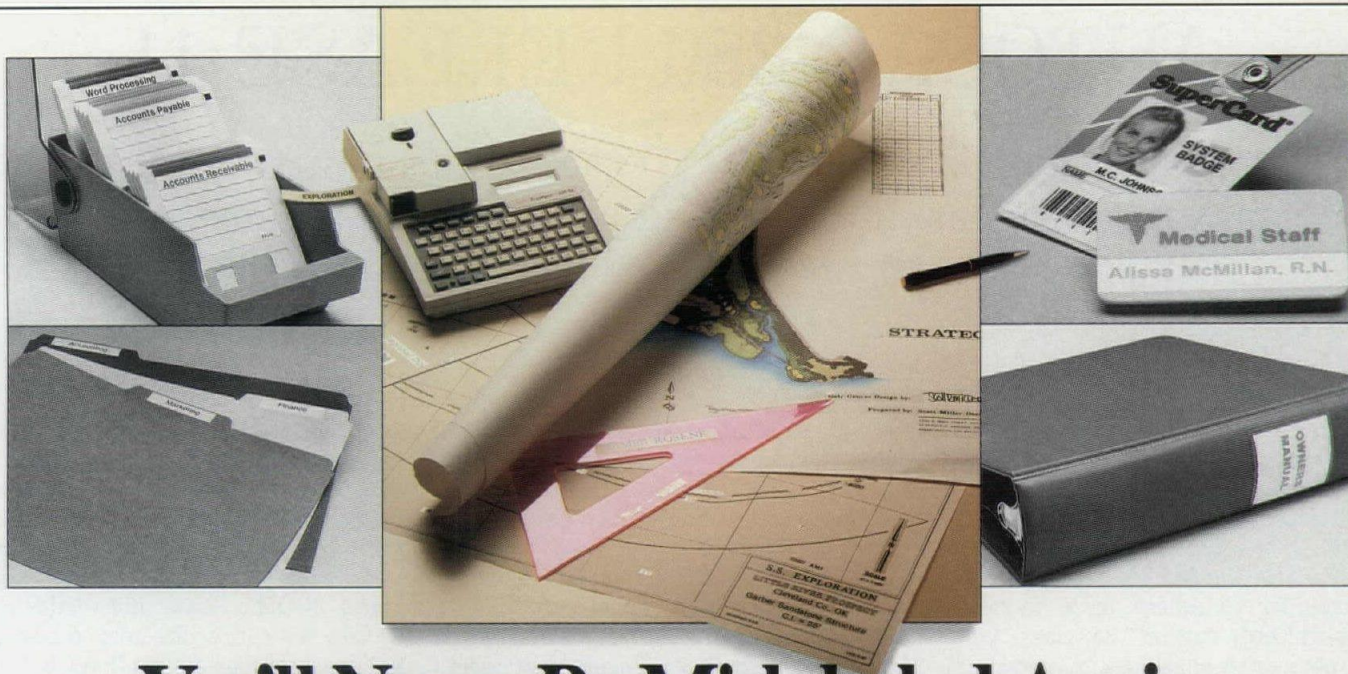
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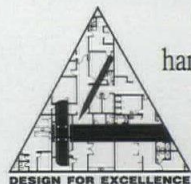
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AUTOCAD 386 RELEASE 11

This latest release is a full 3-D CAD package, more network-friendly than earlier versions. It allows multiple views on the same drawing (“paper space”), and has good links to external files.

By Steven S. Ross

Another year. Another new, full release of AutoCAD. Most users will find far fewer differences between Release 10 and Release 11 than there were between 9 and 10:

- Release 11 for the 386 uses the Phar Lap DOS extender to access more memory. Thus, it will only run on “386-class” computers, not earlier machines. A version is promised for 80286-equipped computers. It will not run the solids modeling extension, and it is sure to be quite a bit slower than the 386 version.

- Multiple views can be combined on one master drawing—“paper space.”

- There’s full support for external reference files. Drawings with external references load slowly, but respond quickly if you can get them all into memory at once. Otherwise, AutoCAD accesses your fixed disk automatically and stores the overflow there—with severe time penalties. If you use external references, consider installing 8 MB or more of RAM in each computer on your system. Any amount of data can be attached to any entity in your drawing.

- You can swap menu areas on the digitizing template, allowing access to an almost unlimited number of commands.

- The optional Advanced Modeling Extension allows modeling of objects as true so-

lids with physical properties, rather than as shapes defined by their external surfaces. Mixed-practice firms could find this useful, but purely architectural practices may not.

- You can substitute your own command names for AutoCAD commands—making it easier for third-party developers to write add-on software, and for users switching to AutoCAD to retrain employees (just substitute the command names of the old software).

- Dialog boxes are more Macintosh-like with scroll bars and other niceties.

There’s no room to describe all the features of AutoCAD. For that, see RECORD, March 1989, page 141; June 1989, page 153; April 1990, page 129. Here, we’ll discuss the major differences between this version and earlier ones.

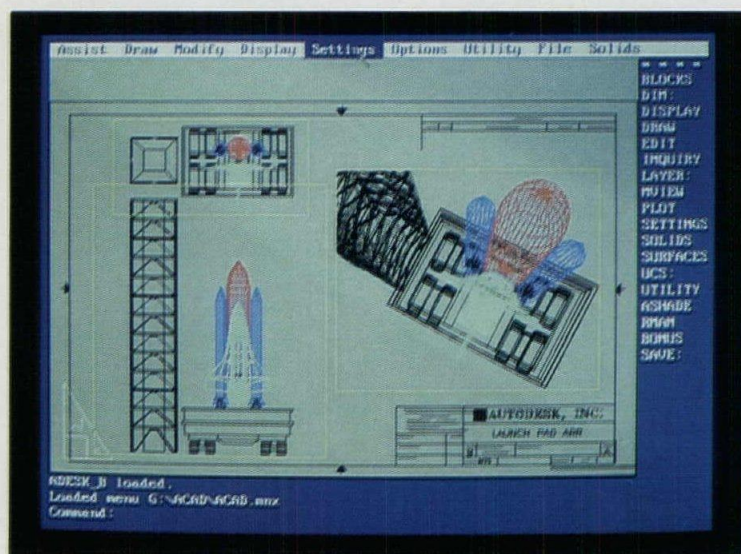
Because networking is becoming more important to many users of full-featured CAD software such as AutoCAD, we spent some time exploring the use of AutoCAD 11 on a Novell NetWare 386 network. There is some awkwardness, but there are no major problems.

Use of AutoCAD with other DOS-based networking software requires some care in setup, however. The AutoCAD manual concentrates on discussing 3COM, a popular choice in architectural offices, but the over-

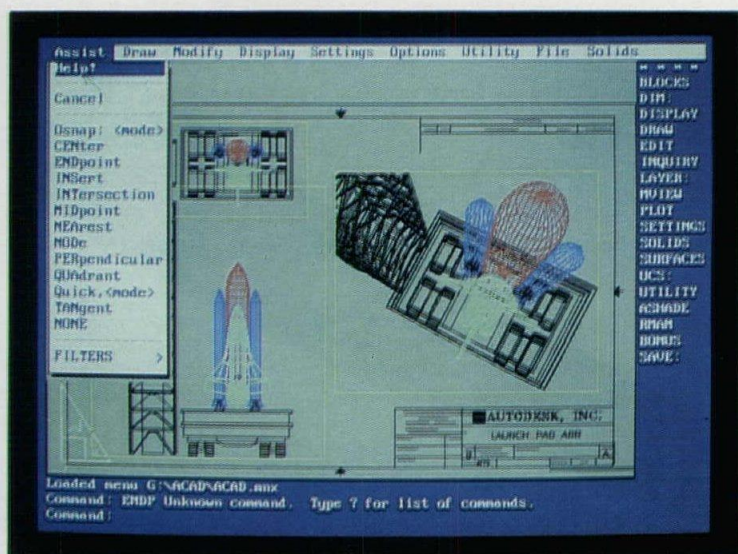
all problem is similar with some other systems as well: The executable files (the files that carry out AutoCAD’s functions) must be marked read-only. But AutoCAD also throws off two temporary files as you edit a drawing (AutoCAD add-ons may add more). 3COM’s Share utility allows you to declare an entire directory read-only, but not separate files. So you have to tell AutoCAD to store temporary files in another directory, or have other files declared read-only with the DOS ATTRIB utility. In fact, we used ATTRIB to play with files on the Novell network as well.

That’s not hard when you deal with AutoCAD alone. But many add-on programs—from which AutoCAD derives much of its power and flexibility—have executable files and create temporary files, too. You have to know in detail what is going on. This can make the setup quite tricky. It can also create excruciating problems restarting a network that shuts down by accident, because you may have to clean up many temporary files.

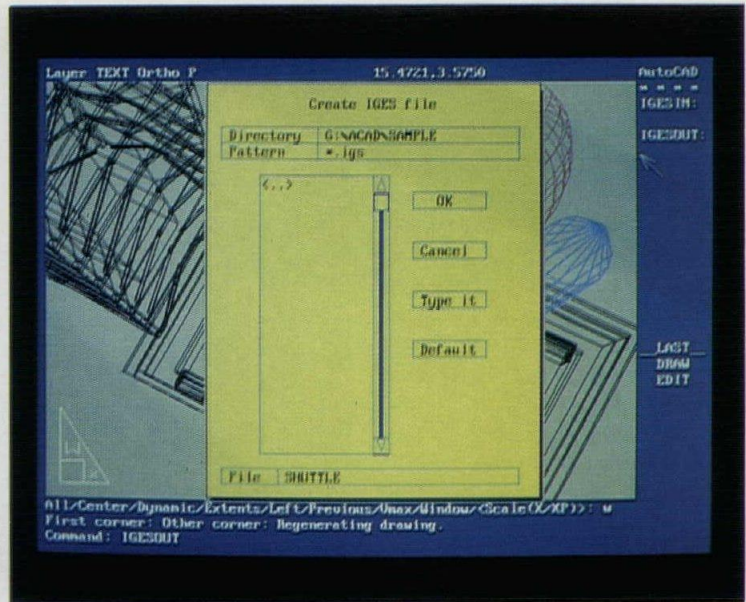
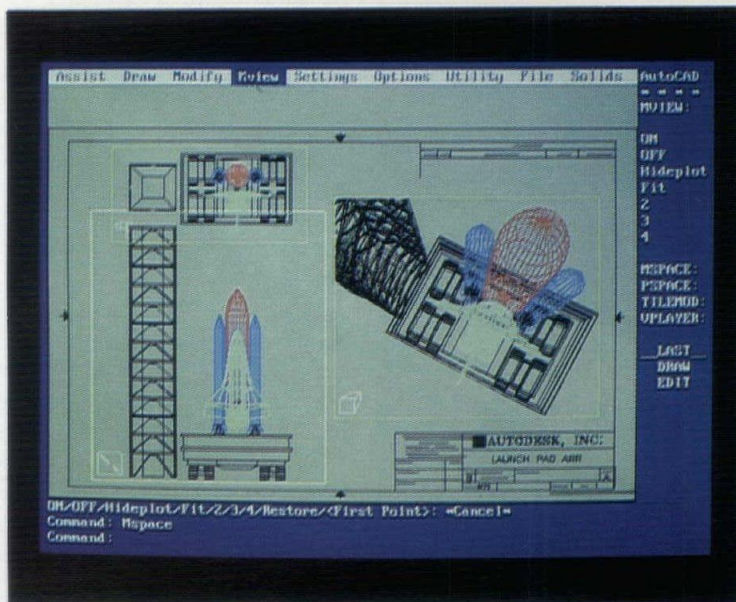
You cannot, through the network or through AutoCAD itself, lock files opened or written to by add-on ADS and AutoLISP programs. You must depend on the add-on’s developers to create ways of doing that for you.



An example of paper space and Xref, the two major new features of Release 11. These are three drawings laid out on one sheet for printing. Two of the drawings are external references.



The best help yet for AutoCAD itself (add-ons often have their own help). If you are in the middle of a command, AutoCAD will give you a few lines of information about the command’s purpose and syntax.



Viewport images can be edited in model space, indicated by coordinate arrows in lower left corners of each port. IGES files can be imported and exported from the menu. Slide files can be exported the same way (right).

AutoCAD 386 Release 11

AutoCAD is a full 3-D CAD package with excellent potential for links to external databases. This latest release is more network-friendly than earlier versions, allows multiple views on the same drawing ("paper space"), and has good links to external files.

Equipment required: MS-DOS or PC-DOS (that is, "IBM-compatible") computer with 80386 or 80486 microprocessor and DOS 3.3 or higher. Most 80386SX-equipped computers should also work, although some of the software's power will be wasted. The 80386SX and 80386 computers will need an 80387 (or 80387SX, sometimes an 80287) coprocessor. Also: At least 2 MB of random-access memory (and preferably 6 MB or more), along with a large fixed disk (files for AutoCAD, an add-on program such as ASG's or DCA's, and the solids modeling extension will take close to 20 MB). For optimum speed on 80386 and 80486 computers, all memory should be 32-bit access (either on the motherboard or on special boards supplied by the computer vendor) rather than connected through a 16-bit board on the bus.

Vendor: Autodesk, 2320 Marinship Way, Sausalito, CA 94965. 415/332-2344. \$3,500 (upgrades from Release 10 for DOS are \$500, Release 10 for 386 are \$200; \$495 to activate Advanced Modeling Extension. Versions are promised (to be released in this order) for 80286-equipped computers running under DOS, Sun SPARCstations, DECstation 3100 and 5000, and Macintosh II systems.

Manuals: The reference manual has been redone to include all AutoCAD 11

commands, for the UNIX as well as DOS versions. The tutorial includes 45 pages on using the new paper space and another 25 on external references. There's a separate manual and tutorial for the Advanced Modeling Extension (solids modeling).

Ease-of-use: Standard AutoCAD—lots of features, lots of commands. The new installation program is a breeze on single machines and on standard networks, particularly Novell NetWare 386. Installation of the network software is done separately with the network program's own installation program. The help is more "context sensitive"—you hit the ? key in response to a command prompt, or go to the "Assist" line and activate help.

Error-trapping: Network users can have troubles. There are simply so many files in use when AutoCAD has its typical number of add-ons that an ill-timed network upset can leave temporary and temporarily renamed files scattered all over your disks. Check carefully the behavior of add-on software that creates its own temporary files. Good commercial add-on programs in C (the AutoCAD ADS system) and AutoLISP come with their own file-checking routines—the excellent estimating software from Timberline is a good example. And new commands such as Xref for external references make it easier for third-party vendors to write software that will check to make sure all data associated with a drawing is the latest available. There is now a built-in file recovery system for damaged drawing files.

To speed things up on a network, and to allow more than one person to edit the same file at the same time, you would normally want to have AutoCAD create temporary drawing files on the local computer, and not on the central file server. That adds to the network management complexity. If a single terminal on a network (a "network node") goes down, you will have to log onto the network from it using the same log-in name as before the crash. Meanwhile, other users may not be able to get at the files the failed node was using at the time.

AutoCAD 11, as does AutoCAD 10, allows you to "plot" your output to a file, then spool the file for sending to a physical plotter later, through the network. This generally works fine, with no intervention on the part of users (and no rerouting from the pre-assigned device, either, unfortunately), as long as the network can handle it. Novell NetWare 386, for instance, allows a printer or plotter to be accessed from any point on the network. Older versions of Novell only allow the output device to be shared if it is attached to the server.

Printing and plotting on the network can still be a problem, unless your vendor of printers or plotters can supply a protected-mode ADI driver; older real-mode drivers will not work because AutoCAD itself wants to handle all the output control. It does that only through protected-mode drivers. Real-mode drivers are regular DOS .EXE files loaded ahead of AutoCAD itself. Vendors contacted in December said without exception that they would have drivers available by the time you read this.

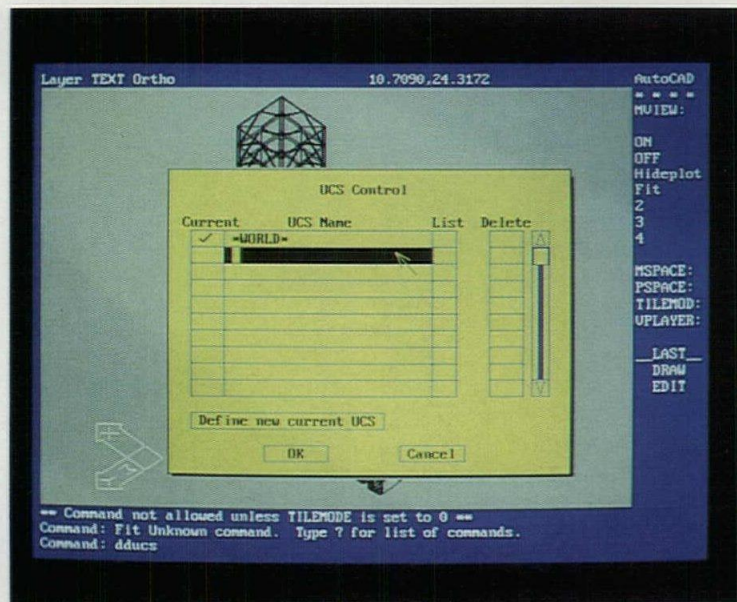
Until now, you combined drawings by inserting one into another. Now you can use the new Xref command to have one drawing reference any number of others. A referenced drawing can, itself, have refer-

enced drawings attached to it. The separate drawings do not combine to create a new one; only the instructions for doing the combining are saved. This cuts down on disk space. And, when a drawing used as an external reference is updated, the combined drawing is updated as well. Though not necessary, most architects will probably try to keep all drawings being referenced inside the same sub-directory as the parent drawing, so that everything can be easily found and backed up.

Should you upgrade from earlier versions? Yes, if you have the equipment (80386-class computers) to handle it. Running with 9 MB of 32-bit RAM (to minimize disk access and thus isolate AutoCAD's raw speed from equipment issues), Release 11 is as fast, and perhaps a bit faster, than the Phar Lap version of Release 10. In 2-D, it is about as fast as Release 9. This is the first time a new AutoCAD release has been as fast or faster than previous versions!

Why AutoCAD 11 over other full-featured DOS-based CAD software, especially CAD software that works more flexibly on networks Intergraph MicroStation and Isicad Cad-vance, for example? Easy exchange of files with other software and other operating systems, access to a wider range of special-purpose add-on software and hardware, and AutoCAD's market dominance.

As good as AutoCAD 11 is, though, open-minded prospective users may find other products as suitable for their needs. *Circle 300*



You will find that editing drawings in many views may require setting up numerous coordinate systems that you can switch to and bring a surface into the plane of the video monitor. Release 11 makes it easy.

Layer name	State	Color	Linetype
0	On	7 (white)	CONTINUOUS
BOOSTER	On	5 (blue)	CONTINUOUS
CORTANK	On	1 (red)	CONTINUOUS
GANTRY	On	7 (white)	CONTINUOUS
HIDDEN	On	7 (white)	CONTINUOUS
MAINTANK	On	1 (red)	CONTINUOUS
ORBITER	On	4 (cyan)	CONTINUOUS
SFNOZZEL	On	7 (white)	CONTINUOUS
TANKHARNES	On	7 (white)	CONTINUOUS
TEXT	On	7 (white)	CONTINUOUS
VEHICLE	On	7 (white)	CONTINUOUS
UPOINTS	On	2 (yellow)	CONTINUOUS

Current layer: TEXT

?/Make/Set/New/ON/OFF/Color/Ltype/Freeze/Thaw: _

Pressing ? as layer command response provides listing.

C-Line III Professional

An easy-to-use C and AutoLISP (extended AutoLISP if your AutoCAD version has it) utility for adding custom line types to AutoCAD drawing files.

Once the custom line type has been added to a drawing, it exists almost as if it had been drawn by hand. Thus, you do not need C-Line to view a drawing that has C-Line-generated entities inside it. Only the "professional" version allows mass conversion to one set of AutoCAD lines into C-Line patterns, and multiple offsets from existing AutoCAD lines as well.

C-Line got its start as a utility to insert text within lines in AutoCAD drawings. One nice touch: C-Line line types can "go around" corners and adjust themselves within short segments. Unadorned AutoCAD stops patterns at corners.

Among the uses aside from straight drawing: Editing drawings brought into AutoCAD via DXF from other CAD packages (other packages often have line types not supported by plain, out-of-the-box AutoCAD). The line types can be edited automatically from DOS if care is exercised in the original file with regard to separating entities into layers that the conversion program can focus upon.

Why use C-Line instead of the line editors included inside many comprehensive AutoCAD add-ons for architects? Speed, flexibility, and low cost. The downside: Here's yet another little piece of software to keep track of. □

Circle 301

C-Line III Professional

Equipment required: Any IBM-compatible computer that runs AutoCAD 2.6 or later. This is a small utility. C-Line can convert linetypes in batches, outside AutoCAD as well. That is, it can be invoked from the DOS prompt.

Vendor: M. Slinn Engineering, 3158 W. 32nd Ave., Vancouver, BC, Canada V6L 2C1. 604/266-5380. \$495 (U.S.).

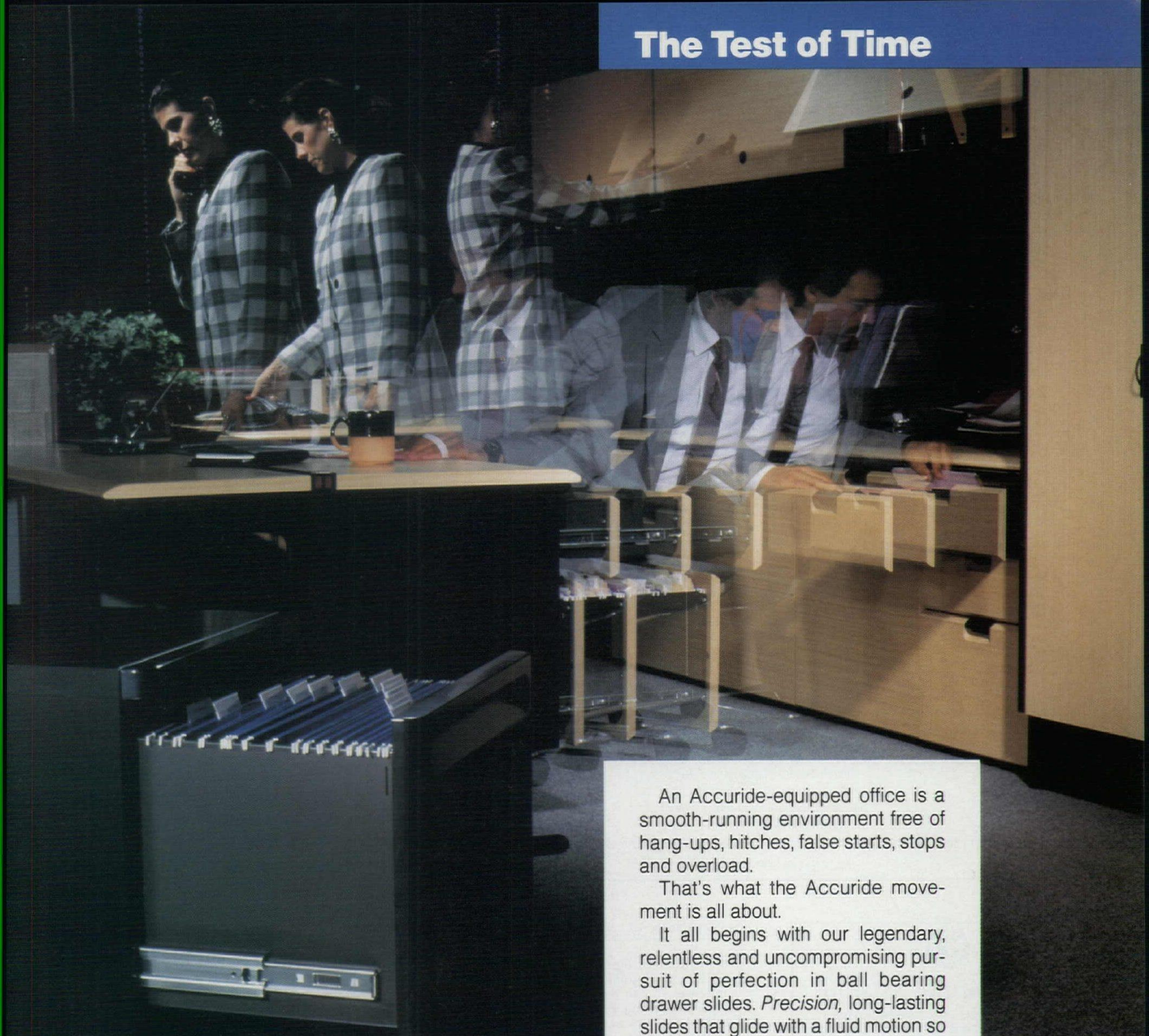
Manual: Experienced AutoCAD users will find it clear and straightforward. There's enough detail for those who

know their way around AutoLISP to install or customize the program.

Ease-of-use: Fine, within the limits of AutoCAD itself. In general, you may want to save conversions until near the end of your drawing process and then do them all at once, because the converted lines are harder to edit. You'll have to keep track of what lines you want converted (all yellow lines on layer 3 to dot-dashes, all lines on layer 7 to dashes with a specific text between them, and

so forth). Or, you can create icons for your own line types and call them as needed from within AutoCAD.

Error-trapping: An improperly created C-line command file will usually stop when an error is encountered. You should make sure you have a backup of any file that you are subjecting to a batch (automatic) conversion. Alternatively, draw the C-Line-generated line type on one layer, then delete or turn off the AutoCAD line it was based on.



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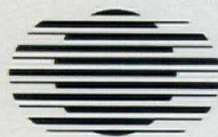
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Building Types Study . . .

Continued from page 99

Liability questions are not confined to users. Since researchers often work with a variety of toxic elements, their proper disposal has to be accounted for. Owners often will themselves contract for the required systems, but it is still prudent for the architect to seek indemnification from the client for damages that might arise should harmful substances escape. Hank Abernathy of the Hillier Group in Princeton, New Jersey, has found that "clients are reluctant to indemnify architects against potential hazards—explosions, toxic-fume buildup—to the same extent as they have for asbestos." Ellenzweig's Michael Reagan comments, "In some cases, clients are not able to provide this indemnification, which shifts an unfair amount of liability to the architect." To say no can present a dilemma, though. "A valued long-time client recently requested that we design a small hazardous-chemical storage facility," wrote NBBJ's Hoedemaker. "Because of the obvious liability, we contacted our insurance carrier, and were told that we would not be covered. Our client was frustrated by the delay, would not assume the liability, and threatened to hire another firm. We designed it."

Environmental fears can sometimes spur community opposition. Our respondents had had varied experiences, with most reporting few problems. Some communities are "more sophisticated," comments Reagan, "and routinely challenge R&D projects." Hoedemaker described protesters surrounding a building in which university regents were considering a project that would use animals in research. It was delayed.

Outlook

It seems every college campus is building new labs or adding to existing ones. Unfortunately the outlook for this type of project is distinctly mixed. On the one hand, researchers in some fields are in such short supply that institutions vie for the opportunity to put in made-to-order facilities. On the other, according to the American Association for the Advancement of Science (as reported in *The Wall Street Journal*), "the federal government, by far the leading supporter of university research, is spending 18 percent less for all research in real terms now than it did in 1967." Other governmental budgets are squeezed, and private-sector clients are increasingly tight-fisted due to the economic recession.

Nevertheless, competition remains keen among private companies that have invested heavily in research, chief among them the pharmaceutical industry. And universities, even in a period of static budgets, continue to see these facilities as critical to their long-term health. **JAMES S. RUSSELL**

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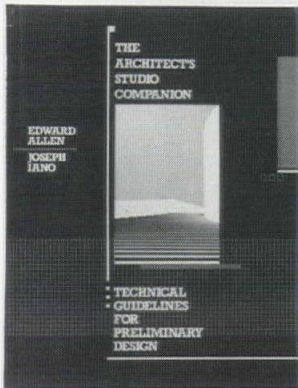
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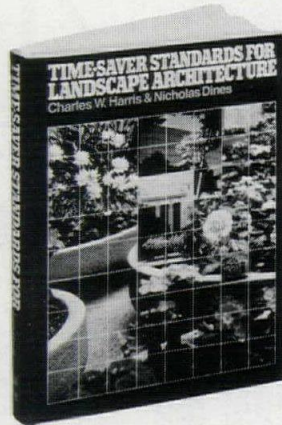
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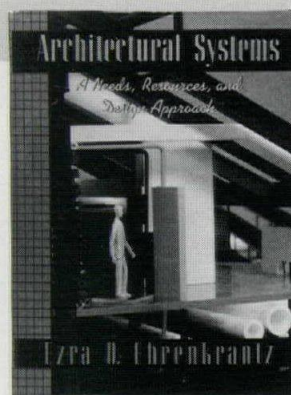
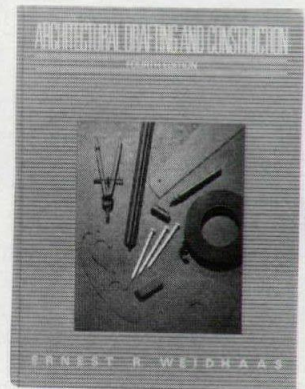
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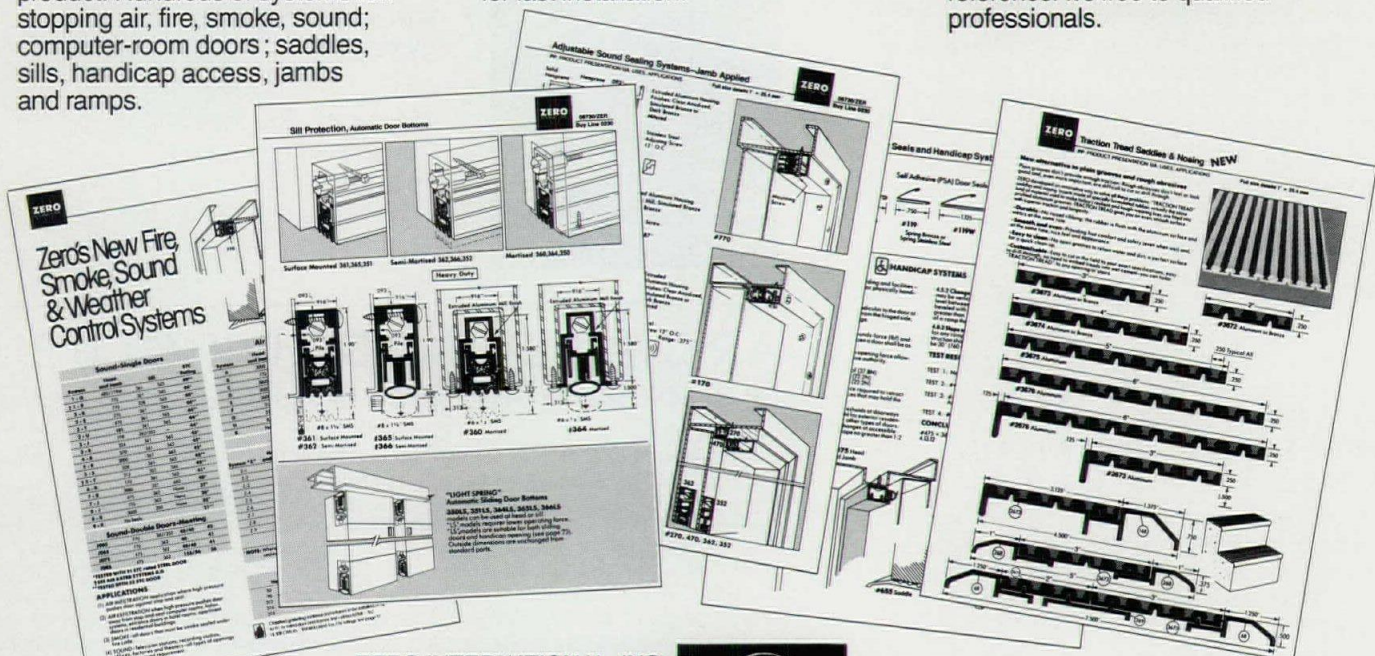
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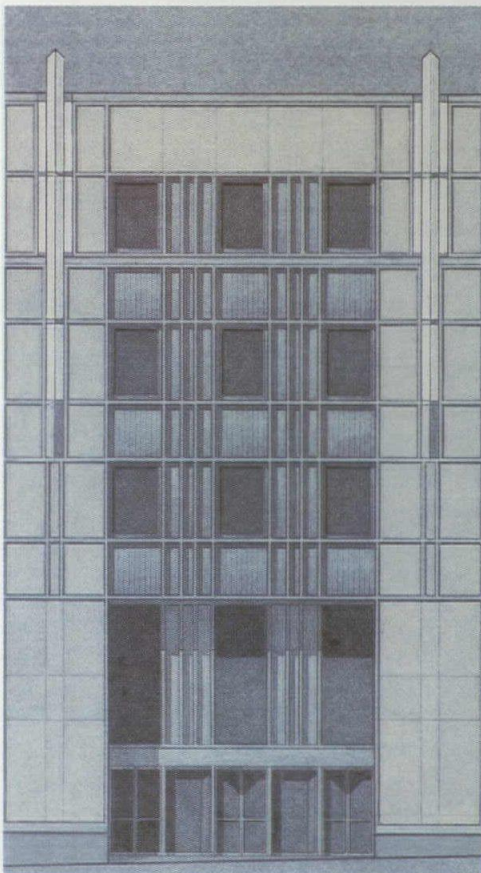
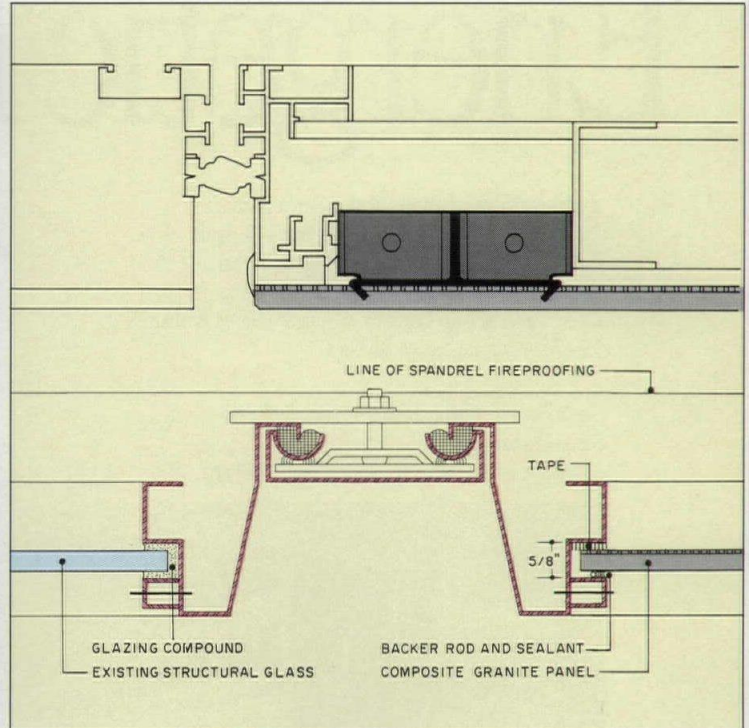


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REINFORCED STONE VENEER

New Italian technology produces panels of natural stone—marbles, granite, and limestone—as thin as a pane of glass.



A laminating process developed by the Turin-based firm of Tecnomaiera produces very thin yet very strong panels of natural stone. The composite assembly is created using epoxy and a unique vacuum chamber to bond a continuously reinforcing expanded-steel mesh across the entire back face of calibrated sawn-stone panels. While light, the panels have the structural strength of dimensional stone several times as thick. Seamless panels can be made as large as 4- by 9-ft in marble, and 5- by 10-ft in granite. Applications include exterior use in curtain walls, in strong-back and other panelizations, and as adhered veneer, as well as on interior walls and floors.

Reinforced stone panels (top left) come in 5/16-in. and 3/16-in. thicknesses. There is also a 3/4-in.-thick sandwich panel, made with two stone veneers separated by a double layer of steel mesh with a phenolic or cementitious core, all bonded by epoxy. This RS3 panel, with exceptional strength in both positive and negative directions and resistance to flexion in large slab dimensions, is particularly suited to some of the decorative but otherwise unsound colored marbles.

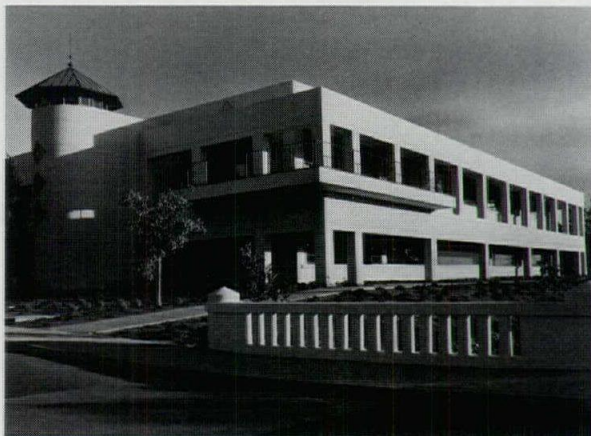
The stone can be attached in several ways for use as a cladding. The detail (above, top)

shows the panels fastened to a standard curtain-wall stick system, using a special clip that forms a positive mechanical attachment with the stone. The clips are installed on-site, with their opposing legs fit into kerfs cut through the mesh into the stone itself. The number and placement of the fasteners depends on anticipated loading. The lower drawing shows reinforced stone panels used as a direct replacement for glass lights. New York City architects Brennan Beer Gorman have specified Tecnomaiera panels for a proposed renovation of five floors of the facade of 150 East 42nd Street, shown in the drawing, left. Here, the thin granite will replace opaque-glass spandrels directly within existing mullions. While this installation is outside an existing fire-backup wall, the panels do have zero flame and smoke ratings per ASTM E-84-89a. Tecnomaiera panels have been used as an exterior cladding in Europe, and are undergoing full-scale wind-load, flammability, weathering, and anchor-pullout tests under ASTM criteria. The thinnest, 3/16-in.-thick panels weigh only about 2.7 psf, and can be treated as a decorative finish and glued directly to level walls, floors, and even ceilings. Marble Technics Ltd., New York City. *Circle 302*

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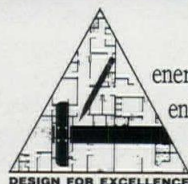
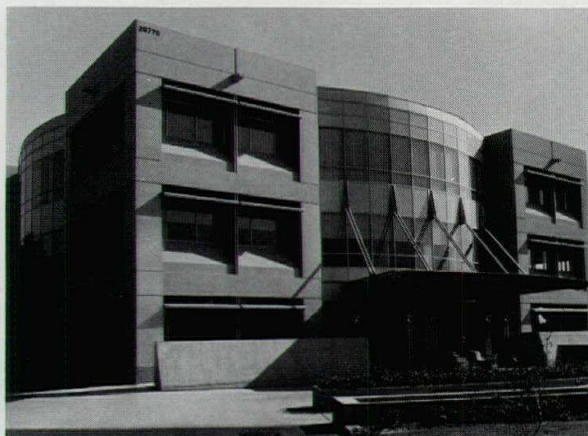
Architect: Kruger Bensen Ziemer, Santa Barbara
Engineers: Howard and Van Sande, Santa Barbara
Coast Village Engineering Corp., Santa Barbara
Winstrom and Associates, Santa Barbara
Consultants: Martin Northart & Spencer, Santa Barbara
John Montgomery, Santa Barbara

Santa Barbara County Social Services Building,
Santa Barbara
Developer: Santa Barbara County, Santa Barbara



Architect: Gensler & Associates, Los Angeles
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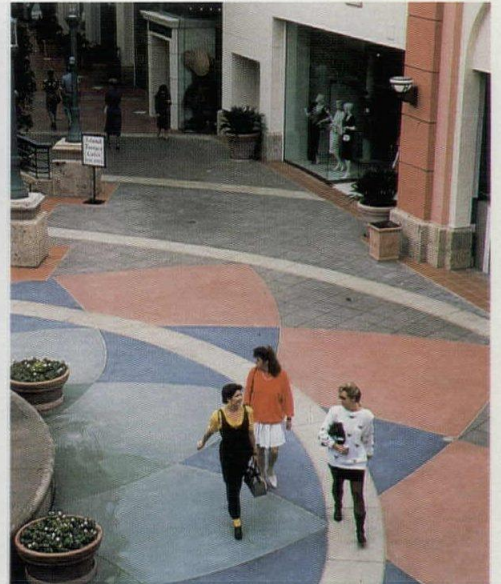
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COLOR IN CONCRETE

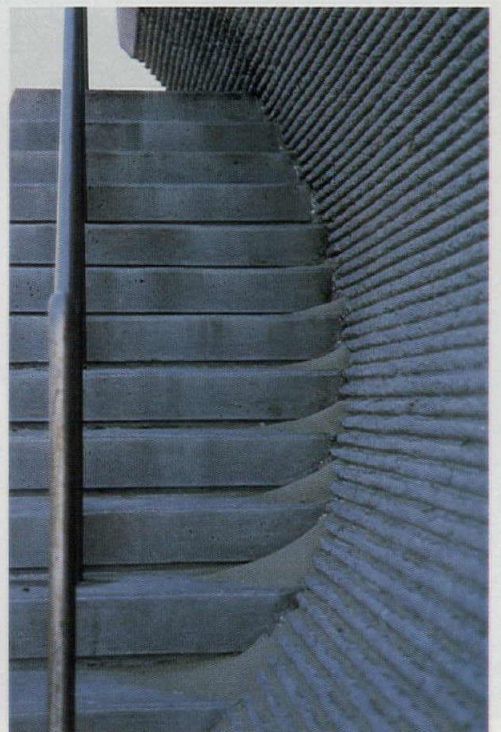
Chromatic materials, applied either as an integral colorant or as a surface finish, increase the decorative impact of concrete.



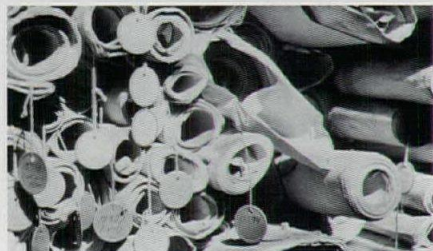
JOHN THOMAS

San Francisco's just-finished Ocean Beach seawall, shown above and bottom right, is an excellent example of well-done integrally colored concrete. The medium-gray shade chosen helps the massive wall seem to recede into the beach, and allows the various components of the seawall—exposed-aggregate promenade pavement, precast railings and benches, and beach access steps—to stand out yet blend with the fractured-fin formwork of the wall itself. The concrete is French Gray, one of 20 standard shades offered in the Chromix line of color-conditioning admixtures. The double-wave wall was designed by the Landscape Architecture section of the Bureau of Engineering, City of San Francisco.

Bright and deep colors for horizontal concrete surfaces can be achieved with Lithochrome color hardener, a dry-shake material tolerant of variations in the base cement color that is available in 24 shades, including new Venetian Pink, Teal, and Stone Blue. The shopping mall at top right has slip-resistant paving forming petals in vibrant shades of red and blue. Middle right, yellow-tile inserts are set off by teal-green concrete, an inexpensive but visually effective treatment. For uniform color and good finish in any concrete, care must be taken to handle the materials following the recommendations of the American Concrete Institute. L. M. Scofield Co., Los Angeles. *Circle 303*



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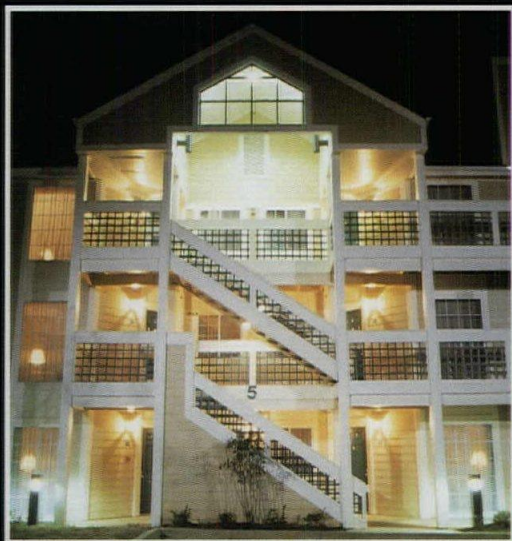


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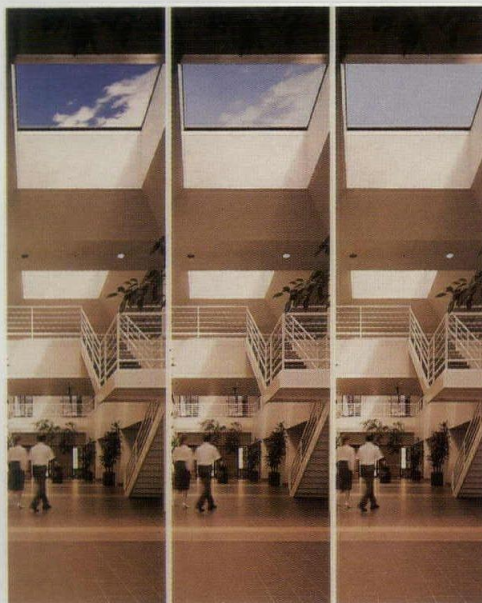
Clear acrylic panels

An 8-ft by 14-ft by 4 1/2-in. view panel, enclosing a pond habitat at the recently renovated Climatron in St. Louis, is made of Diakon, a new type of acrylic that allows the casting of large, monolithic, optically clear panels that are both lighter and stronger than glass. It contains no contaminants that might cause yellowing or create vision-distorting hot spots. ICI Americas, Inc., Wilmington, Del. *Circle 304*



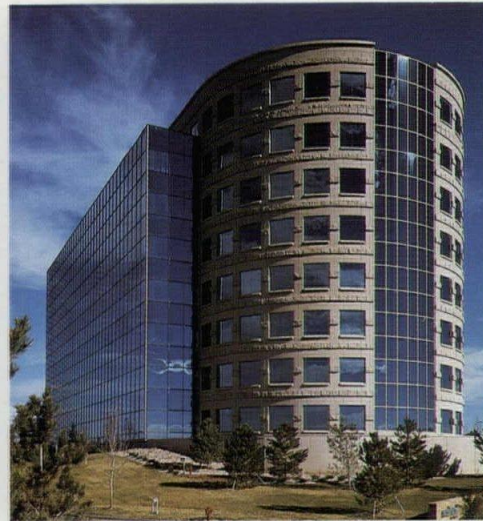
UV-resistant polycarbonate

For applications requiring break-resistant glazing, new Tuffak XL sheet is said to have superior weathering performance, with no yellowing, hazing, or reduction of impact properties over time. The polycarbonate itself is UV-resistant, and can be curved, formed, and fabricated conventionally. Rohm and Haas Co., Philadelphia. *Circle 305*



Thermochromic acrylic glazing

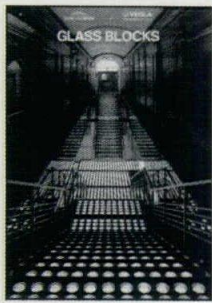
Skylights glazed with Chameleon acrylic will automatically adjust from clear to translucent white as the temperature increases, and back again as the surrounding air cools. This ability to produce a thermochromically induced change in light transmittance and shading values will not deteriorate over the life of the product. With six times the impact strength of standard acrylic, the material has a flame resistance equal to DR-type sheets. The acrylic panels are now available on most Bristolite metal-framed skylights and roof windows. Bristolite Skylights, Santa Ana, Calif. *Circle 306*



Float glass, with and without color

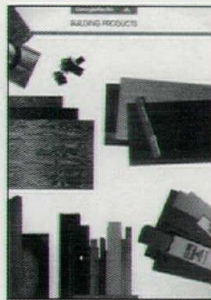
The building shown above uses Azurlite, a nonreflective aquamarine-tinted glass that combines a light transmission of 72 percent with a 0.61 shading coefficient. Described as an entirely new glass composition, it admits more daylight while transmitting less heat-producing infrared energy than standard tinted glasses. Starphire glass, shown below, has a minimal residual iron content and almost no color at all. The photo compares the significant greenish cast of standard float glass, near table, with the new clear product. PPG Industries, Glass Group, Pittsburgh. *Circle 307*

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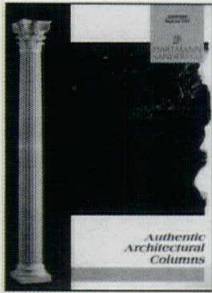
German-made glass block

Over two dozen Saint-Gobain block patterns and sizes shown. Applications include partitions, exterior walls, sky walks, and illuminated stairs. The Aghebo site-assembly system is illustrated. Euroglass Corp., White Plains, N. Y. *Circle 400*



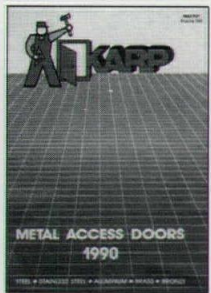
Building products

Construction materials, including engineered- and dimensional-wood board and lumber, paneling, millwork, composite-wood trim, roofing, drywall, and connectors, are shown in a full-line catalog. Georgia-Pacific Corp., Atlanta. *Circle 406*



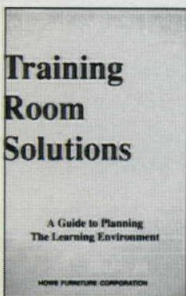
Columns

Everything a specifier might care to know about the design, correct proportion, manufacture, and installation of lock-joint stave-constructed wood columns. Illustrations include the White House and less-famous residences. Hartmann-Sanders Co., Atlanta. *Circle 401*



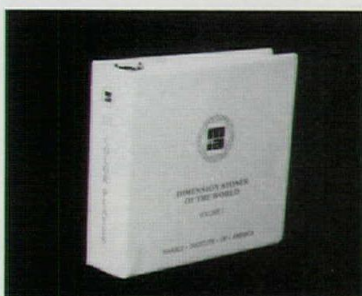
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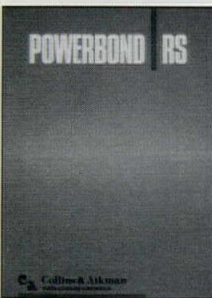
Ceramic tile

Five lines of commercial and residential tile, offered in 42 different colors, are shown in a 12-page architectural catalog. Technical data and trim options are included. Midland International Tileworks, Des Moines, Iowa. *Circle 403*



Narrow-frame windows

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Powerbond RS carpeting has a tackifier incorporated in the backing to permit fast installation with none of the VOCs of wet-adhesive systems. The vinyl backing also offers asbestos-abatement and radon-barrier capabilities. Collins & Aikman, Dalton, Ga. *Circle 404*



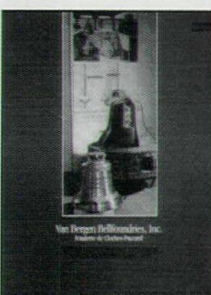
Flame-resistant upholstery

Flame Blocker Naugahyde fabric passes the most stringent fire tests, and is labeled for use in hospitality and other high fire-risk public places. Sample kit contains swatches of solid-color and patterned fabrics. Uniroyal Engineered Products, Inc., Mishawaka, Ind. *Circle 410*



Cedar shingles

Color brochures illustrate how Western red-cedar shingles and shakes work with a variety of architectural styles. Designer Cuts shingles come in acorn, arrow, diagonal, and seven other patterns. Stave Lake Cedar U. S. A., Inc., Sumas, Wash. *Circle 405*



Tower clocks and bells

Electronic controls can ensure on-time clocks and in-tune bells, and coordinate hvac and lighting functions. Brochure features clock faces, bells, and carillons from a firm established in 1795. Van Bergen Bellfoundries, Inc., Charleston, S. C. *Circle 411*

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For your convenience in locating building materials and other products shown in this month's feature articles, RECORD has asked the architects to identify the products specified.

Page 73

Gardener's Cottage, Tenacre Foundation
Jeffrey Hildner, Architect
Exterior stucco: Dryvit Systems, Inc. Roofing: Tamko Asphalt Products, Inc. Windows: Marvin. Wood-framed door: Morgan. Lockset: Baldwin Hardware. Exterior lighting: Lightolier, Inc.

Pages 74-77

Library and Dormitory, Tenacre Foundation
Jeffrey Hildner, Architect
Standing-seam roof: sheet copper, fabricated by Fell. Cementitious-slate shingles: Supradur Mfg. Corp. Exterior finish: Dryvit Systems, Inc. Exterior lighting: Bega/FS. Windows: Marvin. Custom entrance: Boyertown. Wood doors: Morgan. Locksets and door hardware: Schlage Lock Co. Sprinkler system: Viking. Paints and stains: Pratt & Lambert; Benjamin Moore & Co. Carpeting: Hugh McKay. Upholstered seating: ICF (Josef Hoffmann). Tables: custom by architect, fabricated by Country Cabinet. Tile fireplace surround: Buechtal Corp. USA. Sconces: custom by architect, fabricated by Leon Barth and Princeton Stain Glass.

Pages 78-83

Church of the Nativity
The Austin Hansen Group, Architect
Moore Ruble Yudell, Design Architect
Elastomeric coating: VIP (Elast-O-Coat). Terra-cotta tile roofing: Laminados de Barro. Windows: Windowmaster. Custom teak and painted-wood doors, cabinetry, and lattice ceiling: Finishworks. Cabinet hardware: Julius Blum, Inc. Locksets and exit devices: Yale. Custom door hardware: Thomas Marine. Enamel paints: Dunn Edwards. Laminates: Wilsonart. Concealed sprinklers: Star Corp. Unglazed terra-cotta tile: Emser. Matte glazed tile: Latco. Pews: Marshall Co. Chandelier: Custom by Tom Farrage.

Page 85

Zeni Studio
Frank Zeni, Architect
Metal building shell: Midwest Metallic Co.; Vulcan Steel Co., erector. Columns: Wyatt Metal Drainage Products.

Pages 88-89

Notre Dame Church
Tapley/Lunow Architects
Cut stone: Luedders Limestone, South Texas Stone. Beam truss: R. M. Rodgers. Pendant lights: Marco. Spotlights: Lightolier, Inc. Custom entrance door: Templeton Wood Mill. Windows: Wausau Metals Corp. Metal roof: Berridge Mfg. Co. Exterior floodlights: J. W. Lighting, Inc.

Pages 90-91

Frost Bank
Lake/Flato, Architects
Entrance, windows, and storefronts: Kawneer Co., Inc. Up-lighting: Eliptipar. Parabolic lights: Lightolier, Inc. Clerestory glazing: Airline.

Pages 92-93

House Between a Street and a Creek
Max Levy, Architect
Roof shingles: Georgia-Pacific. EIFS: Sto Industries, Inc. Windows: Marvin. Pendant lighting: Ron Rezek. Ceiling fans: Hunter. Paints: Glidden. Laminated surfaces: Nevamar. Cast-glass panels: Industrex.

Pages 100-103

Solid State Technology Center
Davis, Brody & Associates, Architect
Curtain wall and metal-panel cladding: Inryco. Brick: Taylor. Elastomeric roofing: Terstep. Aluminum-framed windows: Vistawall Architectural Products. Entrances and sliding doors: Stanley. Laminated interior wall panels: Wilsonart. Ceramic tile: American Olean.

Pages 104-105

The Center for Biotechnology
Davis, Brody & Associates, Architect
Brick: Interstate Brick Co. Curtain wall and aluminum windows: Wausau Metals Corp. Glazing: PPG, Glass Group (Solex). Precast: Beer Precast Concrete, Ltd. Built-up roofing: Carlisle. Entrance: Tubelite Div., Indal; Crane Fulview Door Co. Locksets: Sargent.

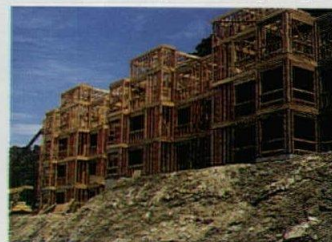


**WHEN YOU WERE TAUGHT
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SOME IMPORTANT MATERIAL
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Wood frame structures are cost-effective in high density areas and difficult terrain.

And not just in the West. Award-winning wood frame buildings are going up all over the country. In projects like malls, commercial and multi-family complexes, even hotels.

Page 106

Noble Research Center
The Architects Collaborative, Inc., Architect
Face brick: Acme Brick Co. Curtain wall: Vistawall Architectural Products; Amarlite Architectural Products. Aluminum solar-control louvers: Brown Mfg. Co. Modified bitumen roofing: Manville. Sloped-glazing system: EPI. Skylights: Fisher. Glazings: PPG, Glass Group (Solex); Interpane Coatings. Metal roofing: ASC Pacific, Inc.

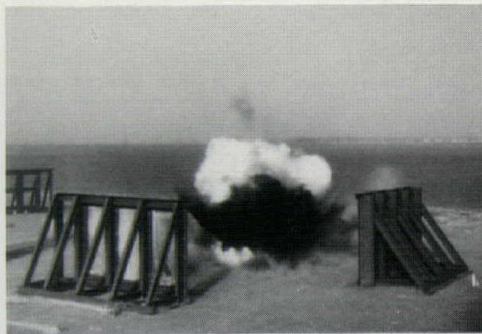
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Northern Crop Research Laboratory
Hammel Green and Abrahamson, Inc., Design Architect
Single-ply roof: Carlisle. Metal roofing: Vincent Metals, Inc. (Colorklad). Entrance and windows: Kawneer Co., Inc.

Page 109

Earth Sciences Centre
Bregman + Hamann and A.J. Diamond, Donald Schmitt and Co., Joint Venture Architects
Fabricated stone: Arriscraft Corp. Precast-concrete details: Maple Precast Ltd. Spandrels: Ford Motor Co., Glass Div. Exterior globe fixtures: Andron Mackie. Special lighting: Raak of Canada.

Continued from page 137



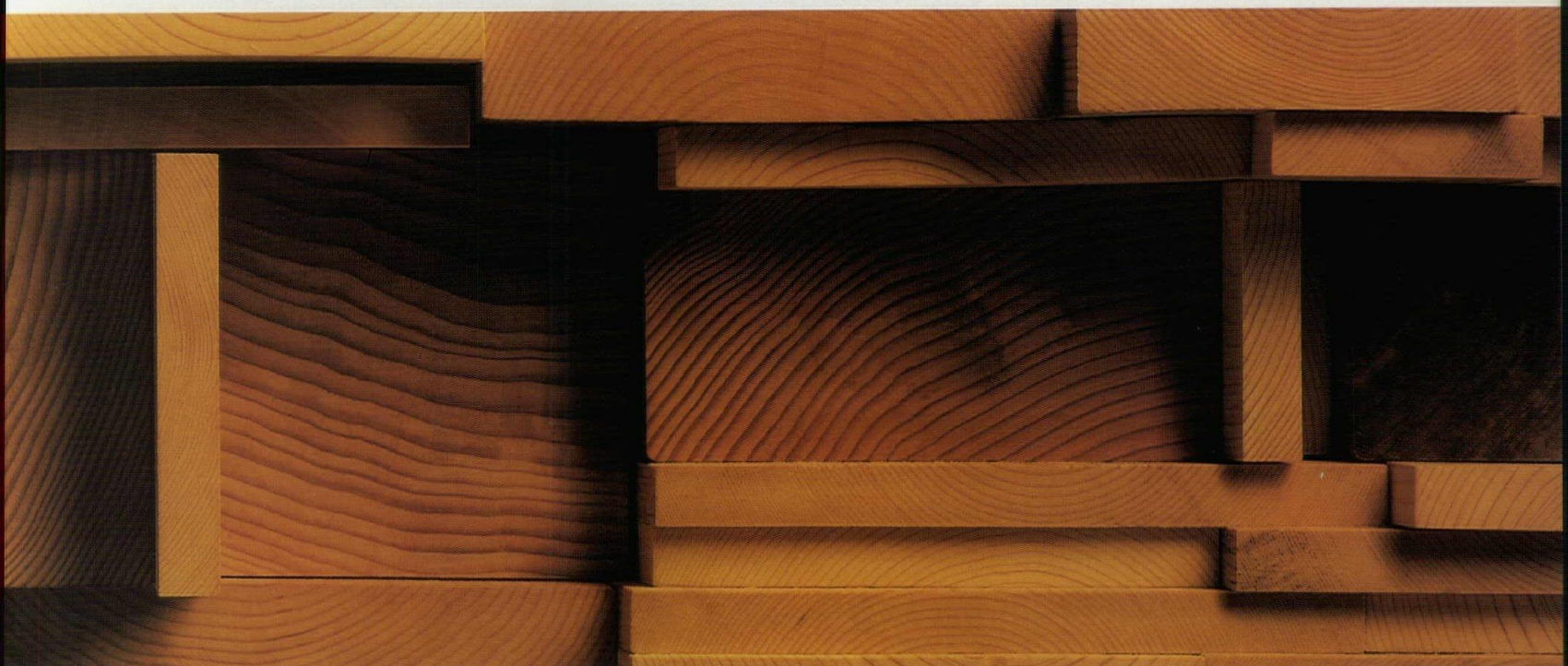
Blast-resistant laminated glass

An extensive multisite test program developed new design criteria for the specification of windows in buildings where blast, ballistic, and main-force security are—or could be—an issue. Pictured above is one of the tests conducted at the Glass Research and Testing Laboratory of Texas Tech University to determine the effect of different blast loads on various glazing configurations. A comprehensive Security Glazing Design Guide, a manual and IBM-compatible software, provides parameters for the use of Safflex-laminated glass in buildings with specific security requirements. No charge. Monsanto Co., St. Louis. *Circle 308*

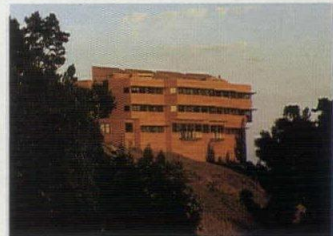


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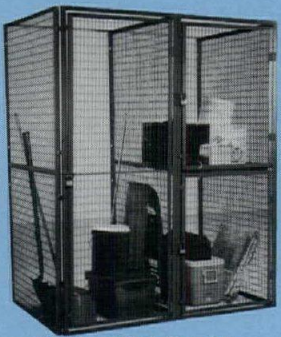
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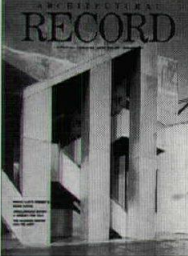
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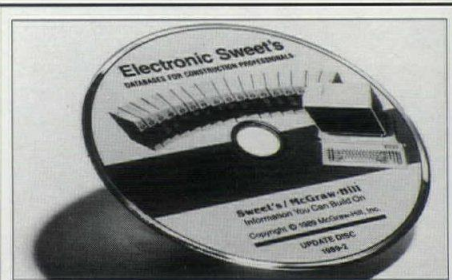
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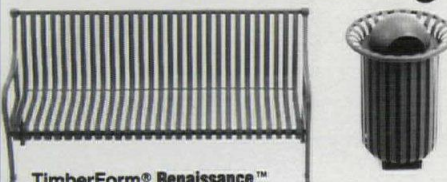
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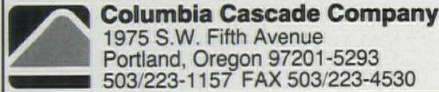
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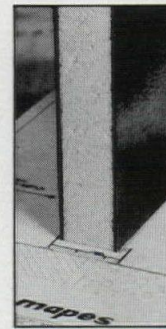


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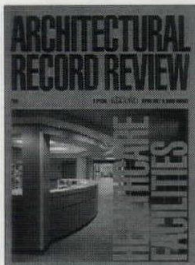
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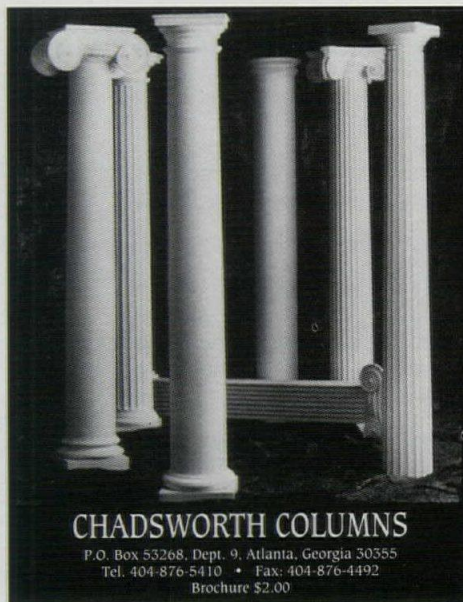
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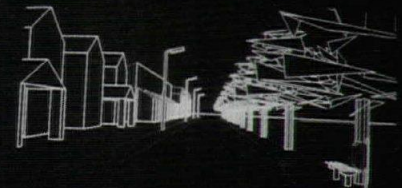
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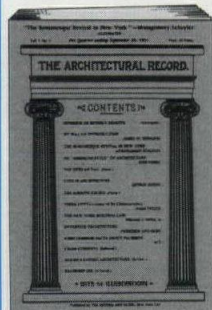
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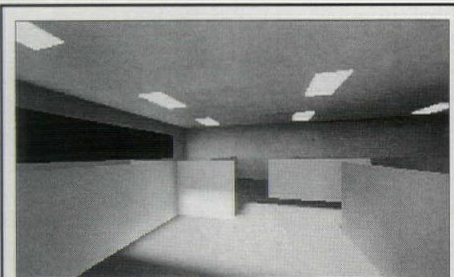
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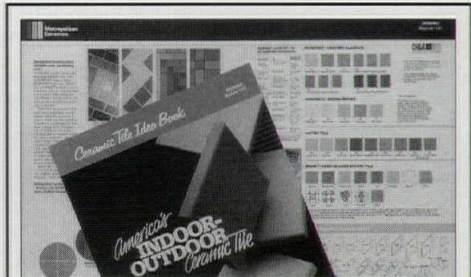
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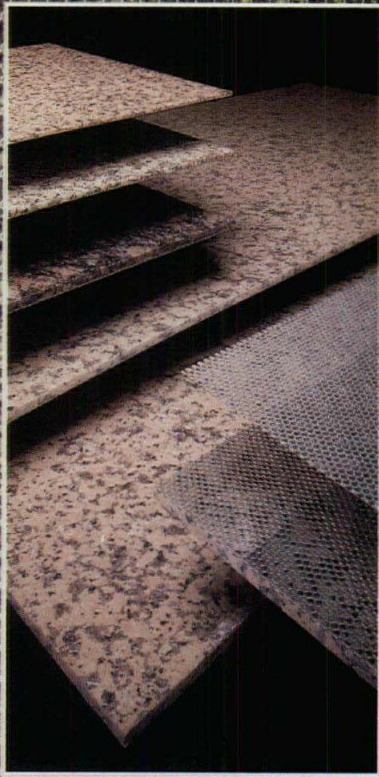
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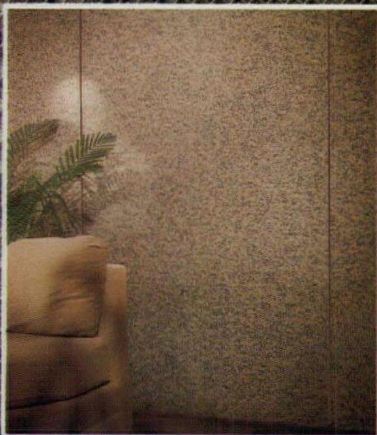
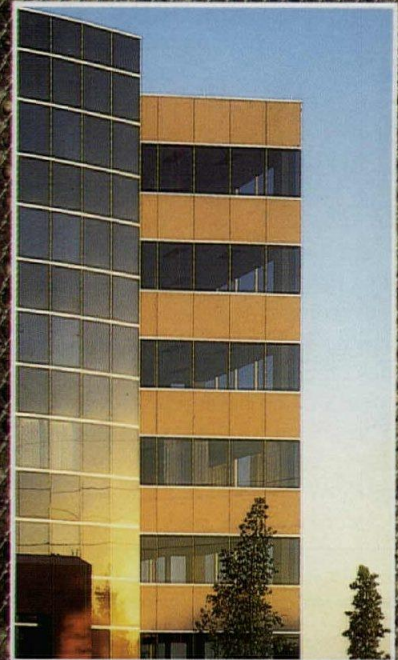
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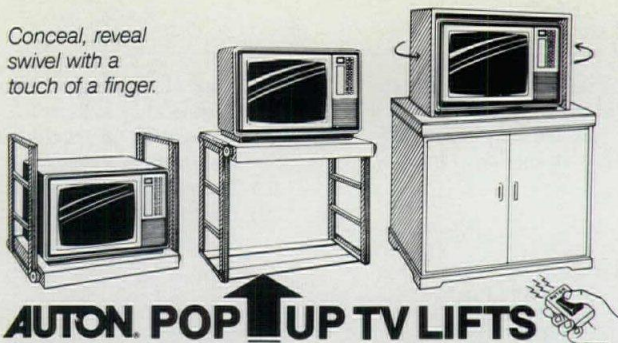
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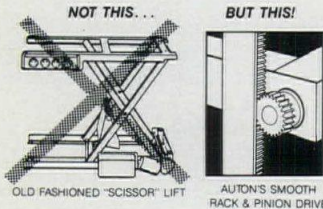
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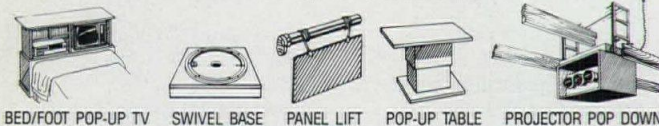
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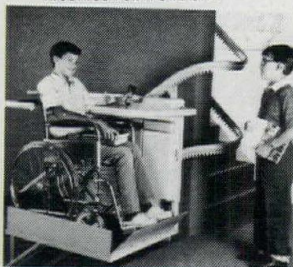
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