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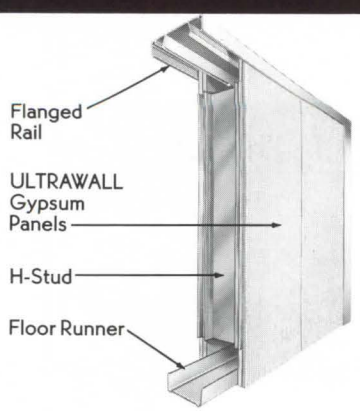

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Cityshape

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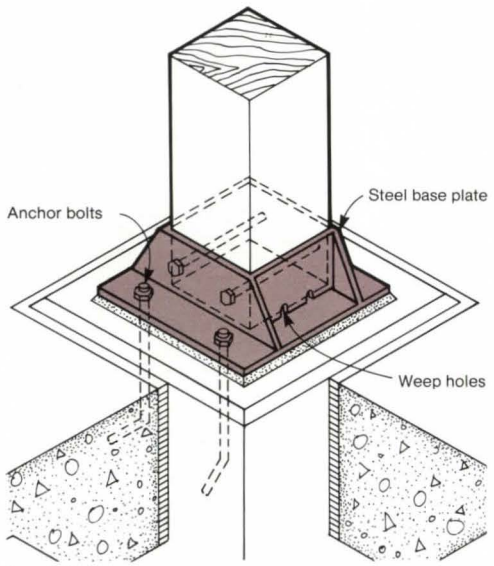

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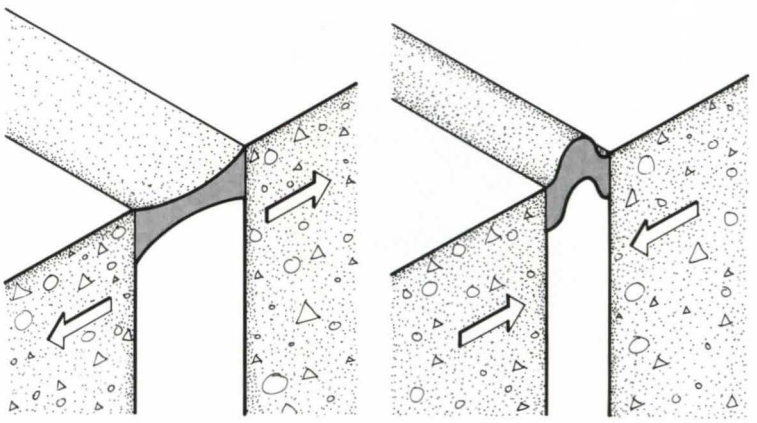
Cover
Photograph by Henry Plummer of the hilltown of Rocamadour in southern France. (see page 78).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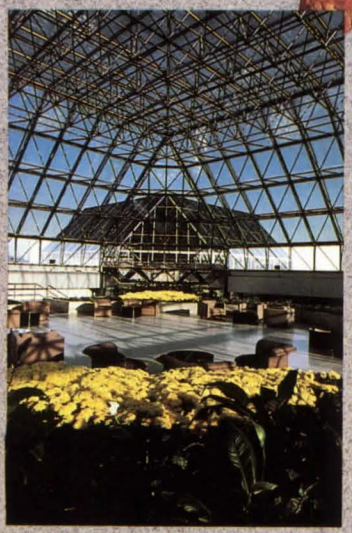
Queen Anne

550 B.C.



Atrium center of the Intelsat building in Washington, D.C.

Cosmeir Lipstick Plant in New Brunswick, New Jersey

Lobby of the Garden State Park Race Track in Cherry Hill, New Jersey

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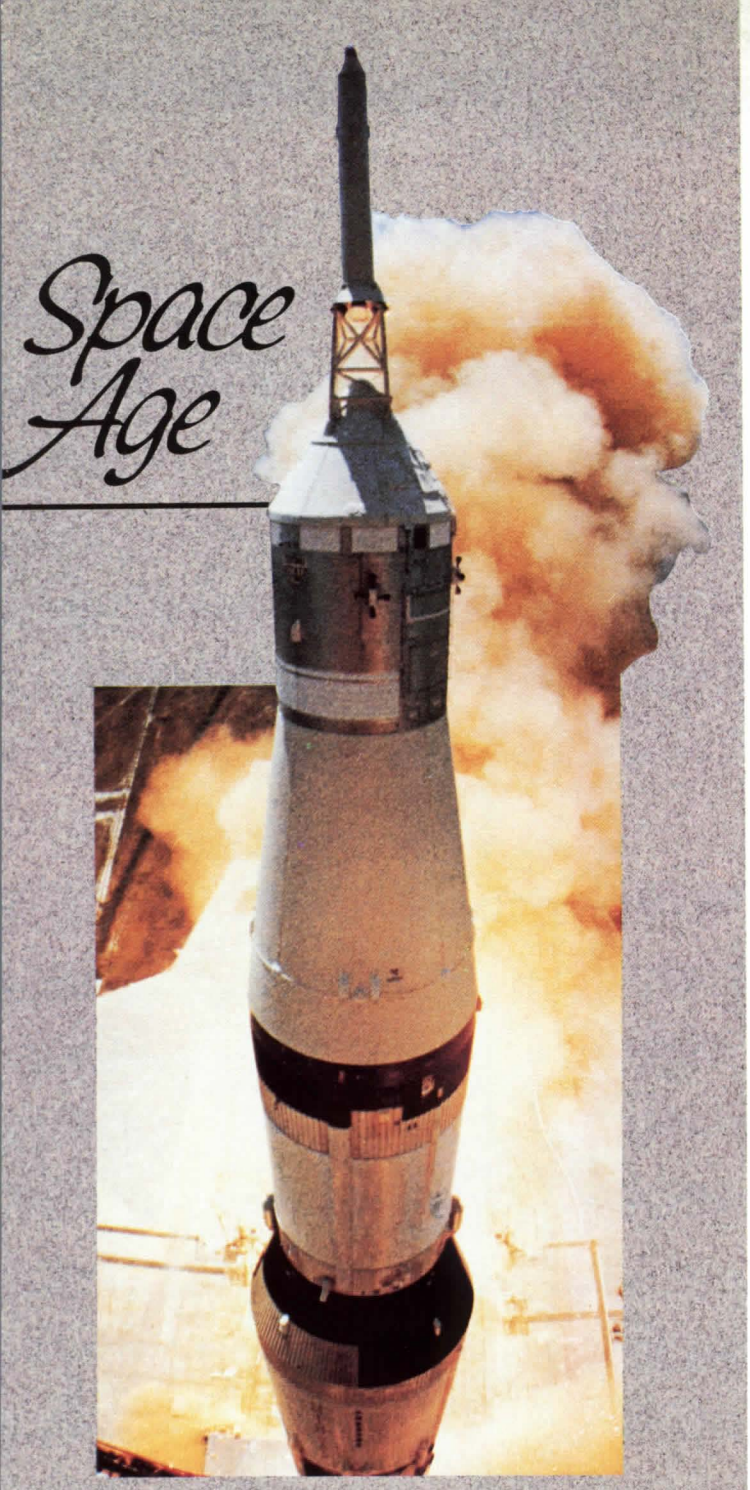
Photos courtesy of NASA and the St. Louis Art Museum



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EVENTS

Jan. 5-7: Course on Cooling Systems and Cooling Water Treatment, Madison, Wis. Contact: E.K. Greenwald, Engineering Professional Development, University of Wisconsin-Madison, 432 North Lake St., Madison, Wis. 53706.
Jan. 5-9: Course on HVAC Maintenance Fundamentals, La Crosse, Wis. Contact: Trane Co., 3600 Pammel Creek Rd., La Crosse, Wis. 54601.
Jan. 6-9: Seminar on Basic Roofing Technology, Tampa. Contact: Roofing Industry Educational Institute, 7006 S. Alton Way, Suite B, Englewood, Colo. 80112.
Jan. 14-20: Course on Design of Multi-Story Concrete Buildings for Wind and Earthquake Forces, Hawaii. Contact: James R. Sleeper, Center for Continuing Engineering Education, 929 N. Sixth St., Milwaukee, Wis. 53203.
Jan. 16-19: AIA Housing Committee Conference in conjunction with the National Association of Home Builders Annual Convention, Dallas. Contact: Ravi Waldon at Institute headquarters at (202) 626-7429.
Jan. 19: Review Courses for National Council of Architectural Registration Board Architect Registration Examination, Brooklyn, N.Y. Contact: John Anselmo, Institute of Design & Construction, 141 Willoughby St., Brooklyn, N.Y. 11201.
Jan. 19-22: Steel Structures Painting Council Annual Meeting and Technical Symposium, New Orleans. Contact: James G. Busse, Steel Structures Painting Council, 4400 Fifth Ave., Pittsburgh, Pa. 15213.
Jan. 19-22: International Air-Conditioning, Heating, Refrigerating Exposition, New York City. Contact: International Exposition Co., 200 Park Ave., New York, N.Y. 10166.
Jan. 20-23: Course on Basic Roofing Technology, Houston. Contact: Roofing Industry Educational Institute, 7006 S. Alton Way, #B, Englewood, Colo. 80112.
Jan. 22-23: Workshop on Preservation as a Tool For Revitalization, Savannah, Ga. Contact: Vicki Groat, American Institute of Certified Planners, 1313 E. 60th St., Chicago, Ill. 60637.
Jan. 23-24: Conference on Organizing for Productivity, New Orleans. Contact: Jan Thompson, National Roofing Contractors Association, 8600 Bryn Mawr Ave., Chicago, Ill. 60631.
Jan. 24-28: Fifth Annual Conference of the Single Ply Roofing Institute, San Diego. Contact: M. Sue Ciezadlo, SPRI, 104 Wilmot Rd., Suite 201, Deerfield, Ill. 60015.
Jan. 26-28: CALICON 4—The California Contract Show, San Francisco. Contact: Diane Scheiman, Western Merchandise Mart, 1355 Market St., San Francisco, Calif. 94103.
Jan. 26-28: Training Course on CenTraVac Chiller Operation and Maintenance, La Crosse, Wis. Contact: Trane Co., 3600 Pammel Creek Rd., La Crosse, Wis. 54601.
Jan. 26-30: Seminar on Value Engineering for Design and Construction, Madison, Wis. Contact: Thomas Snodgrass, Department of Engineering Professional Development, University of Wisconsin-Madison, 432 N. Lake St., Madison, Wis. 53706.
Feb. 2-5: Fundamentals of Energy Auditing Workshop, Madison, Wis. Contact: Donald Schramm, University of Wisconsin-Madison, 432 N. Lake St., Madison, Wis. 53706.
June 19-22: AIA Annual Convention, Orlando, Fla.

LETTERS

High-Tech Lloyds: I was delighted to see what is probably the most exciting building of the last 40 years gracing the cover of your September issue. The Lloyds of London headquarters by Richard Rogers Partnership is undoubtedly the finest example of high-tech design and, I hope, will set an example to all budding architects who are presently being led down the dead-end path of postmodernism. Boutique architecture will sooner or later have to give way to a true expression of the 20th century, and high-tech will lead the way into the 21st.

Reyner Banham's article [page 47] is a good beginning in describing the building. I take exception to one remark. No part of this magnificent structure can be termed postmodernistic. It is high-tech all the way. *Peter Whitney Webb, AIA*
Paris, Ky.

The September Issue: ARCHITECTURE (along with the old British *Architectural Review)* is one of the most readable magazines I have ever enjoyed. The September issue, however, tops everything. You really seem to sniff out the fascinating things that are happening. The Austrian public housing is miraculous. Could it ever happen here?

You make architecture exciting, as it should be. Thanks.
Barry Benepe, FAIA, AIP
New York City

The October Issue: Our new magazine, ARCHITECTURE, is not just a quality publication. It is a reflection of our profession at its best. The premiere issue [incorporating ARCHITECTURAL TECHNOLOGY] successfully captures the breadth of the architectural profession, while focusing on a single issue, housing. Congratulations on this great step forward.
Thomas E. Hansz, AIA
Houston

'Neoclassic Abyss': Your October issue, as well as others, are helping to spread a state of natural emotional and intellectual laziness, a disease exhibiting pediment*ia*, gable*itis*, and symmetry*osis*, causing an architecture of "painted corpses and toy town Palladio*ana* classicism," a direction out of step with the spirit of our time, the space age and the electronic revolution.

Our "genious loci" and "zietgeist" needs a dynamic expressive architecture, one of 20th century expressive space, shape, and spirit! Sometimes this does appear in your publication, with items such as Predock's Route 66 Apartments [page 78]. Please publish more like this and help to lead us out of the neoclassic abyss.
Martin Price
Arlington, Tex.

Magazine Merger: Congratulations on your merger of ARCHITECTURE and ARCHITECTURAL TECHNOLOGY. It is my fervent hope that we can succeed equally in merging architecture and technology in the practice of our profession. Without a doubt, the newly enriched ARCHITECTURE will be a valuable resource to all of us in this quest. *Thomas Martineau, AIA*
Tallahassee, Fla.

South Africa: I found the October cover story [page 42] on the Riviera Villas in Johannesburg, South Africa, by Ian and Lynn Bader to be in extremely bad taste. The majority of South Africans do not even enjoy adequate housing.

For ARCHITECTURE to feature a housing complex, which I can only assume is intended for a specific group of people to the exclusion of others, is to ignore a serious problem that should concern the profession.

As for the architecture, I find nothing enticing about "schizophrenia." The buildings of the N'debele were part of their culture. If the Baders feel no affinity to that culture, they should not borrow so freely from it. I do not understand the connection to the landscape that they speak about. I see walls and gates. A formal game isolated from the world that surrounds it. *Mary M. Bowman*
Norwalk, Conn.
For the record, this magazine abhors apartheid, as do the Baders.—Ed.

Visitors Center: Senior Editor Michael J. Crosbie grabbed the ball and ran with it in writing about the Point Reyes National Seashore visitors center by Bull Volkmann Stockwell [Aug., page 69]. The photographs were also great, as were the exhibits by Christopher Noll accompanying this excellent missive.
Craig B. Kelford Sr., AIA
Lomita, Calif.

Eric Lloyd Wright: While listing guest instructors of the architecture department at the University of North Carolina at Charlotte, you included "Wright's grandson" [Aug., page 45]. Does the architect not have a name, an identity of his own? As a reader, I would like to be informed. You owe it to the man and your audience to publish his name, Eric Lloyd Wright. *Elizabeth Kopplin*
Oklahoma City

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Lighting the Open Office

The traditional downlight isn't the answer. It was never meant for an office full of VDTs.

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Even the most sophisticated low-brightness downlights dictate the exact placement of computer terminals. If you rearrange the work stations, bright spots of glare appear on the screens.

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Keeping glare off the VDTs

There's been much talk about "ergonomic lighting" lately, especially for VDT installations.

Downlighting isn't the answer, even though over 90% of America's offices use it. Any down light puts a bright light source in an unlit ceiling. The resulting strong contrast produces glare on any reflective surface: the cover of a magazine, a polished desk top or, unfortunately, a VDT screen.

To correct the problem, you need an indirect system designed with exceptionally wide distribution. This produces an evenly-lit ceiling which reflects as a soft, barely-noticeable veil. Since the VDTs don't reflect hot spots from the fixtures, workers are more comfortable. And since the screens can face in any direction, the floor plan becomes flexible.

There's a research study from a major university that discusses this in depth. Ask us and we'll send you the results.

Getting good light on the work surfaces

Footcandle levels tell us how much light there is on the work surfaces, but they don't tell us how much light we think there is. And if we don't think there's enough light, there isn't.

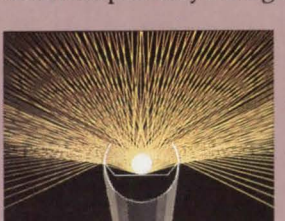
Another recent university study offered an important new insight: if you add a low-brightness visible source to an indirect fixture, you'll immediately perceive 10% to 25% more light.

We'll be happy to send you those results, too. They show how much the visible strip of low brightness lens on the fixture in this picture actually does. It spreads the light evenly over the ceiling and upper walls and, just because it's there, it creates a higher level of perceived illumination.

The fixtures in the photo are 6″ Round High Efficiency Softshine Indirect by Peerless. Under ceilings 8′6″ or higher, Softshine Indirect fixtures give more good light per watt than any other fixtures made. Research computers at Peerless generated this diagram to show how the fixture's lensed optics distribute the light facet by facet into precisely the right viewing areas.

The office at 10 p.m., done right: evenly-lit ceilings and upper walls keep the surroundings cheerful, minimize eyestrain by preventing bright glare spots that overpower VDT readouts.

Project: Green Tree Acceptance, Inc., St. Paul
Architect: Culver Adams Associates, Minneapolis
Electrical Engineer: Pace Engineering, Inc., Wilmington MN
Electrical Contractor: Sterling Electric Construction Company, Minneapolis



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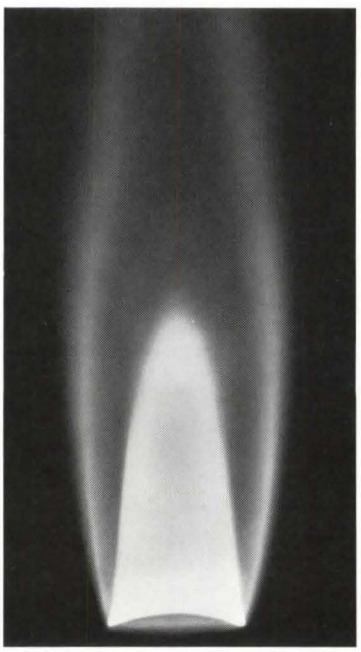

These new gas cooling technologies have become available through gas industry research and development supervised by the Gas Research Institute. For more information about GRI projects, contact: Dr. James E. Drewry, Vice President, Research & Development and Technology Transfer, Gas Research Institute, 8600 West Bryn Mawr Avenue, Chicago, IL 60631. Tel: (312) 399-8100.

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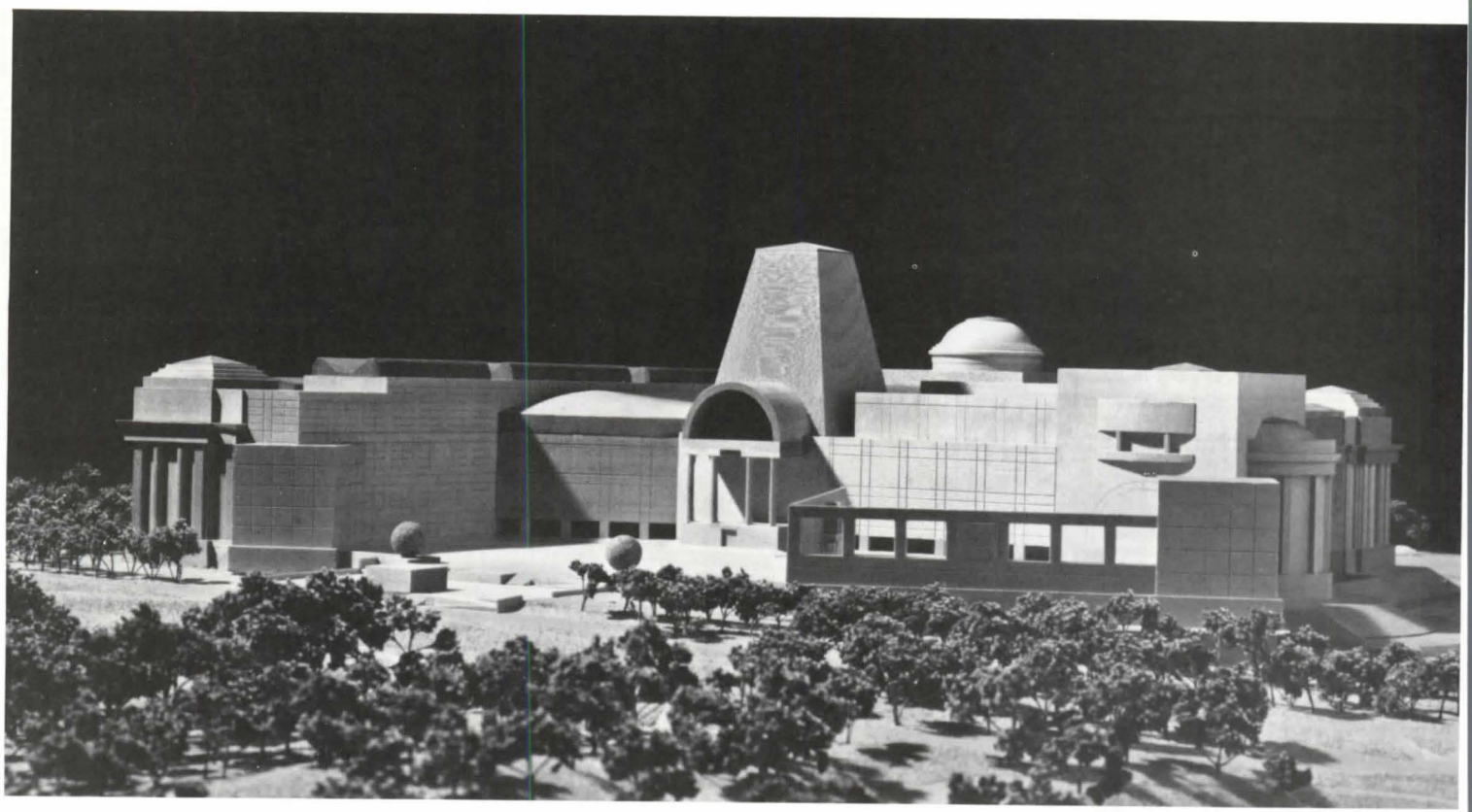


Awards and Competitions

Isozaki/Polshek Team Selected For Brooklyn Museum Addition

In 1893 McKim, Mead & White won a competition to design the Brooklyn Museum. Their Beaux-Arts design called for a square plan—500 feet on a side—with cross-axes, a quincunx of corner pavilions and central dome, and four interior courtyards. This grand scheme of 1.5 million square feet was to be built in six phases; had it been completed, the Brooklyn Museum would have been the world's largest museum.

Today, however, the Brooklyn Museum is but a fragment of that 1893 design. Only one-sixth of McKim, Mead & White's plan was ever realized: the main, northern facade, the adjoining half of the eastern wing, and the courtyard formed in the quadrant between them. In the 1930s, the original entrance staircase was removed from the front of the building. In the 1980s, a modern service extension was added to the rear.

This year the Brooklyn Museum sponsored a second competition, "for the design of a phased master plan to guide the institution's growth into the 21st century." In October it was announced that the architectural team of Arata Isozaki & Associates/James Stewart Polshek & Partners had won the competition. The jury's decision was unanimous; its verdict: "A scheme superior, if not in a class by itself."

Terrance R. Williams, FAIA, was the professional adviser for the international, invitational competition. Klaus Herdeg, professor of architecture at Columbia University, was the jury chair. Other jurors were four Brooklyn Museum representatives, Phyllis Lambert, who chairs the Canadian Center for Architecture in Montreal, and James Stirling, Hon. FAIA.

On March 17, requests for proposals were sent to 103 firms; 57 responded. A selection committee composed of critic Reyner Banham and museum and municipal officials first narrowed this field to 10 quarterfinalists, then on June 18 to five semifinalists. Each of these was paid a $50,000 stipend for a 10-week charrette.

Notable among the jury's reasons for selecting the Isozaki/Polshek scheme were that—uniquely among the five semifinalists—it formally acknowledged the primacy of center in the original McKim, Mead & White plan; that it provided "an appropriate scale of monumentality"; and that the winning scheme's parti was sufficiently strong and "malleable" as to maintain its integrity during subsequent design revisions and program refinements.

All five of the competition's semifinalists reinstated the original main entrance staircase; all five retained and rehabilitated the modern service extension.

The strength of the modernist scheme by Voorsanger & Mills Associates of New York City was its intention to integrate building and landscape. The scheme's weaknesses were its formal and stylistic disregard for the original design, the enforced progression of its enfilade galleries, and the circuitous, Louvre-like circulation obliged between its western and eastern arms. It lacked a symbolic center.

Similarly, Skidmore, Owings & Merrill/New York proposed integrating the museum and the garden by transplanting a garden cloister (with side stairs and escalators á la Beaubourg) into the heart of their scheme. Dissimilarly, this scheme acknowledged the 1893 design, both formally and stylistically: A new Cullin court symmetrically balanced the existing Beaux-Arts court, and the new western and extended eastern elevations utilized motifs and geometries abstracted and reduced from the original. The scheme's most imposing gesture was, however, an enormous garden ellipse intervening between the building and the landscape.

Atkin, Voith & Associates with Rothzeid Kaiserman Thomson & Bee was the com-

petition's young David. Their scheme not only balanced the Beaux-Arts court to the east with an open court to the west, but also balanced both of those with a pair of exhibition courts inside the southern quadrants. The scheme's southern elevation was derived from the *canopo* of Hadrian's villa at Tivoli.

In one sense, Kohn Pedersen Fox Associates proposed enlarging the existing fragment of McKim, Mead & White's plan; in another, their scheme lacked neither a sense of humor nor of history. The square, Beaux-Arts courtyard was transversely balanced by a circular, stone courtyard; this, in turn, was balanced by a polygonal, glass structure—a reference to the nearby greenhouses of the Brooklyn Botanical Gardens. At the eastern end of the central cross-axis, an interposed "roundhouse" accommodated changes of both scale and orientation between the old building and a new education wing. Nonetheless, even if—as an architectural analogue to a late-20th-century philosophy of fragmentation—one were to accept the lack of center in a classic enlargement that knowingly is more than the sum of less than all its parts, one still somehow felt that KPF failed the historical present by not actively engaging today's material and formal concerns as well as those of the Beaux-Arts. At such simultaneous engagement, the winning scheme succeeds, both programmatically and aesthetically.

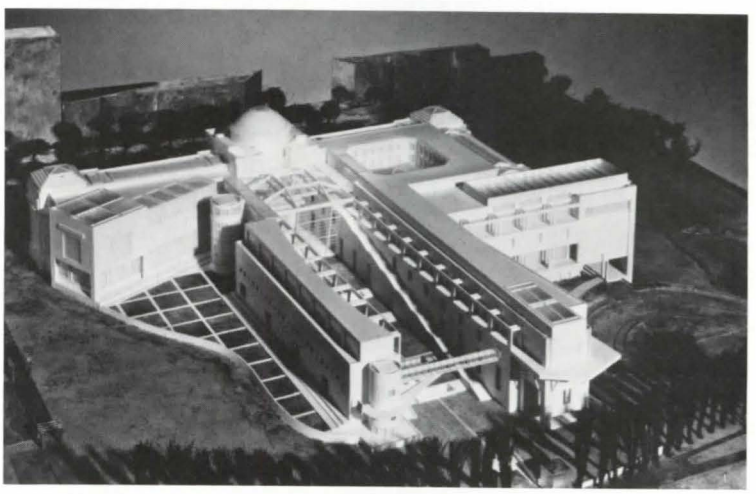
Both Isozaki and Polshek were among the 103 architects invited to enter the competition. They decided to join forces because the competition required affiliation with a firm licensed in New York State and to take mutual advantage of one another's relevant experience—Isozaki's with museums, Polshek's with restoration. As it happened, in designing the Brooklyn Museum each architect crossed over into the other's area of expertise.

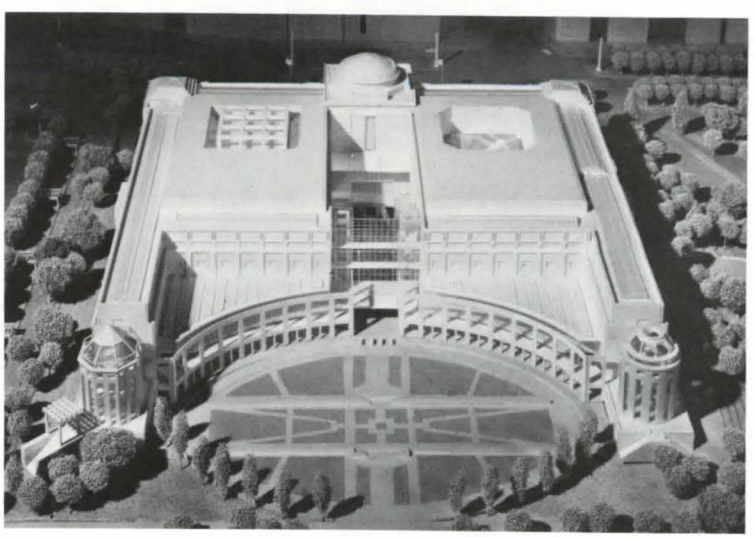
The Isozaki/Polshek scheme will reinstate the main entrance staircase to the museum's northern facade, thereby reestablishing the hierarchic primacy of the piano nobile. At the foot of the stairs, the scheme will add a curved berm, with steps to the east and a ramp to the west. Handicapped and staff entry will be at first floor level, with vehicular drop-off under the porte cochere. Terracing down the forecourt, eight symbolic sculptures will announce the museum's presence on Eastern Parkway.

The existing pavilion at the western corner of the northern facade is to be duplicated at the southern corner of the new western elevation, in the exact location indicated on the original plan. This is an example of what the architects call "literal reconstruction." Between the old and new pavilions, the western elevation has been designed as frames—with limestone cladding to match the facing on the 1893 building—and as flush, stainless steel panels. The new elevation will follow the same cornice line, intercolumniation, and fenestration as the original design. This is an example of what the architects call "syntactic reconstruction." It is also an

continued on page 16

Opposite page, Isozaki/Polshek winning scheme. Other finalists, clockwise from top left, Atkin Voith with Rothzeid Kaiserman Thomson & Bee; Voorsanger & Mills; SOM with Studio Four and The Vitetta Group; Kohn Pedersen Fox.





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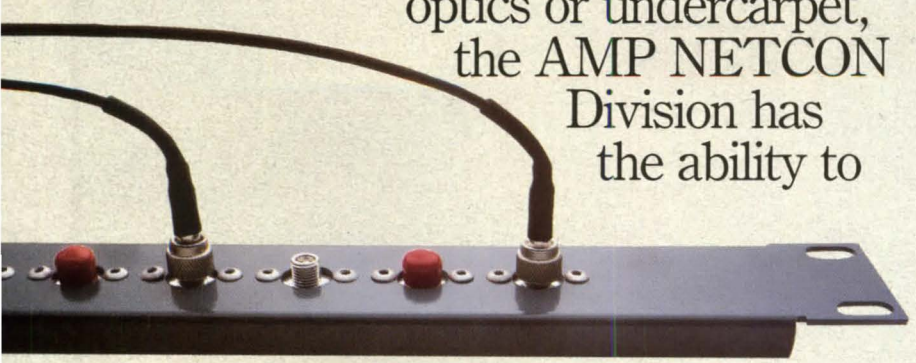

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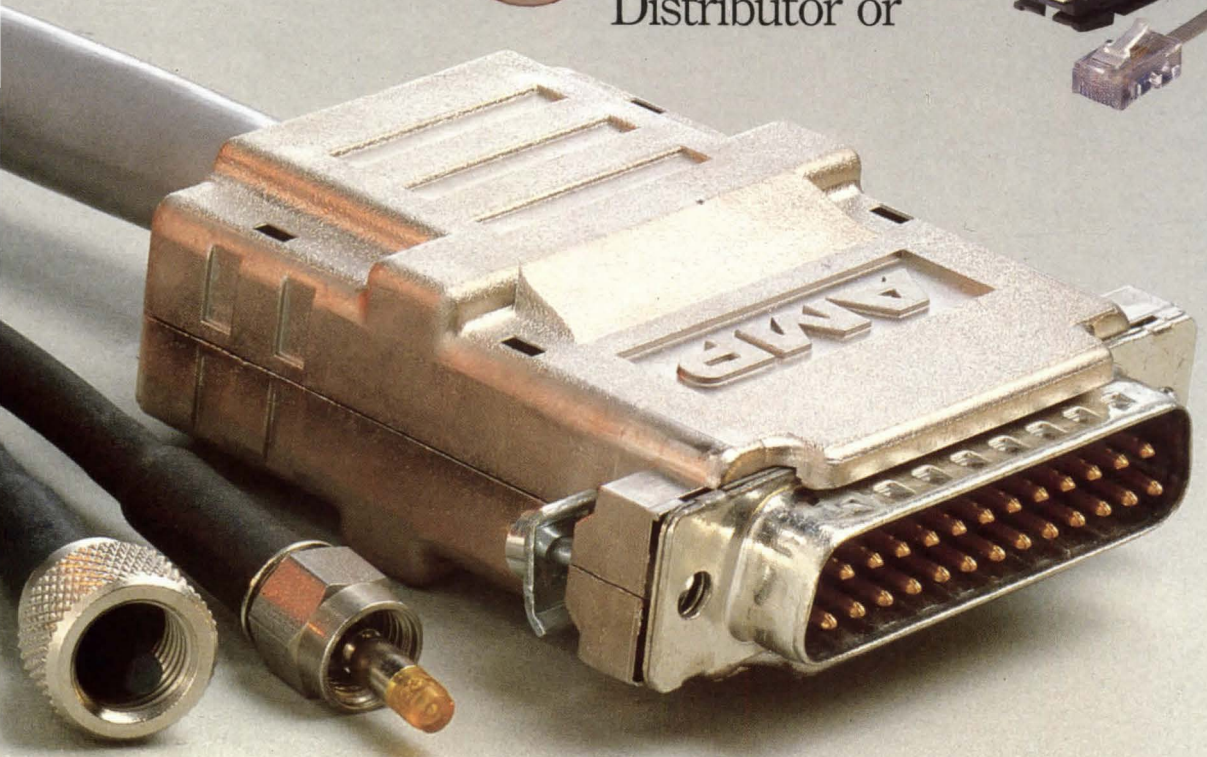

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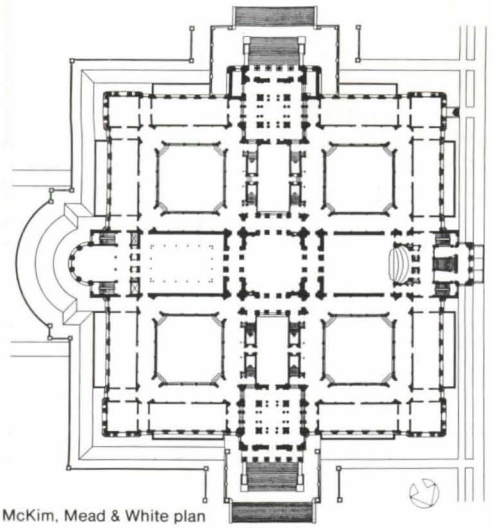
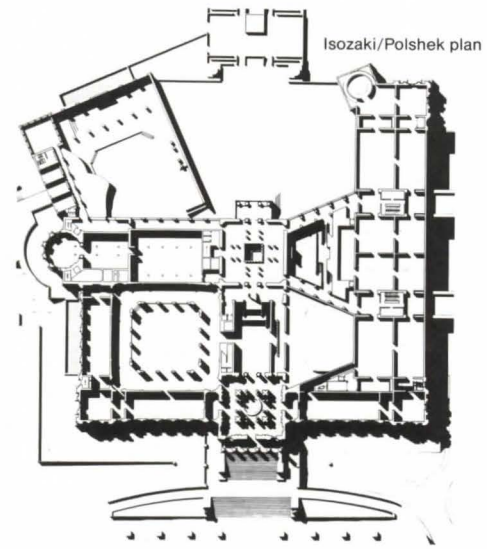


McKim, Mead & White plan



Isozaki/Polshek plan

example of how Isozaki and Polshek say their design "evolved" from McKim, Mead & White's.

At the eastern end of the central cross-axis an unexecuted apse is to be replicated. Around it, a semicircular berm will be rotated to align with the angled orientation of Washington Avenue. Polshek has emphasized that rotation was "the most important move" in the scheme's parti. The move is to be repeated in the rotation of the southeastern quadrant out of its original, orthogonal orientation into a new alignment with Washington Avenue. Aligning with the quadrant's transverse axis will be the center line of a gridded, titanium cube—itself rotated off the southeastern corner of the new western gallery wing. This first cube is to be paired with a second in the quadrant's southeastern corner. An expansive south terrace, opening to the botanic garden esplanade, will be formed in the space between the rotated quadrant and the western galleries; on the terrace's surface will be traced a palimpsest of the original McKim, Mead & White plan.

The Isozaki/Polshek master plan will increase the Brooklyn Museum's gross area from 450,000 to 1.4 million square feet. The estimated cost is $200 million. Completion of the entire master plan is expected to take at least 20 years. As a listed building, the museum will need approvals for alterations and additions from both the Landmarks Commission and the Fine Arts Commission.—L.S. Heck

Mr. Heck, a freelance architecture critic living in New York City, is a contributor to the Architectural Review, Architect's Journal, A+U, *and the New York* Times.

National Trust Honors 16 In Annual Awards Program

The National Trust for Historic Preservation has cited 16 individuals and organizations in its 1986 preservation honor awards program that recognizes "excellence in promoting our nation's architectural and cultural heritage."

The 11 honor award winners are:

- Architecture firm The Estes-Burgin Partnership and developers Joseph Cerilli and Joseph Mollicone Jr. of Providence, R.I., for the restoration of the 1906 Old Providence *Journal* building (below), which called for the removal of a green metal skin added during a '50s "modernization" and the repair of masonry and terra-cotta detailing.
- Historic Richmond Foundation of Richmond, Va., Cranston Development Co., Landmarks Design Associates, Morewood Interiors, and Navarro Corporation of Pittsburgh, for their collective efforts to save the Richmond's old city hall.
- Preservation Wayne in Detroit, a volunteer organization of Wayne State University students, who blocked the demolition of the Mackenzie house and raised $180,000 to restore the building as a cultural center.
- Upper Illinois Valley Association of Chicago, for the renewal of the Illinois and Michigan Canal National Heritage Corridor, a park that runs 120 miles through 41 communities and has sparked revitalization of the area including the preservation and redevelopment of a 170-acre historic steel mill in Joliet, Ill.
- Landmarks Preservation Council of Illinois for saving the Chicago Theater, which recently was reopened.
- Handler/Grosso of Rochester, N.Y., for the restoration of the Rochester city hall.
- Meredith & Grew, building managers of the deteriorated United Shoe Machinery Building in Boston, for establishing a development scheme that included the renovation of their 1929 art deco tower.
- Historic Boulder, Inc., of Boulder, Colo., for developing a handbook on restoration and establishing the ROAR program (Renovate Our Architectural Resources), which teaches homeowners renovation and rehabilitation.
- Hotel Bentley Partners of Alexandria, La., for investing $13 million to restore the 78-year-old Hotel Bentley.
- Authors Virginia and Lee McAlester of Dallas for their book, *A Field Guide to American Houses.*
- New York architecture firm Beyer Blinder Belle, for the restoration and landscaping of three historic bridges in Central Park.

In addition to the 11 honor awards, five certificates of commendation were presented. The recipients are:

- Anice Barber Read of Austin, Tex., the director of the Texas Historical Commission's Main Street Program.
- Howard Newlon, director of the Virginia Highway Transportation Research Council in Charlottesville, Va.
- City of Fort Worth, Tex., for restoring 494 original 1920s streetlights.
- Alexander Aldrich of Saratoga Springs, N.Y., former chairman of the President's Advisory Council on Historic Preservation.
- Federico Sisneros, 92, of Mountainair, N.M., the country's oldest park ranger.

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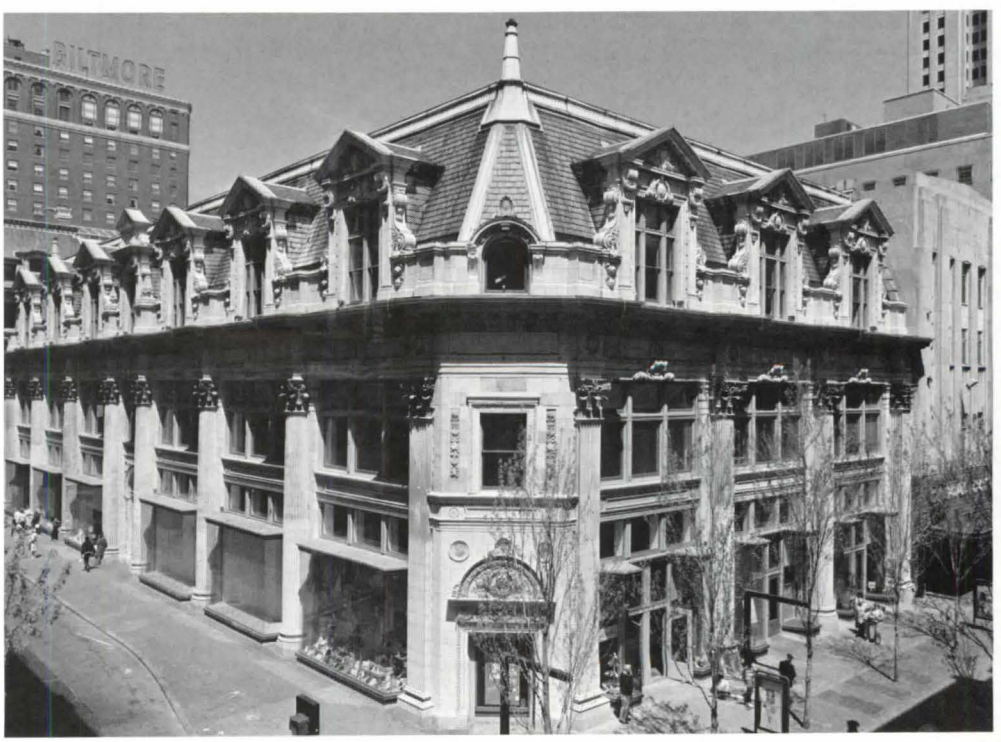

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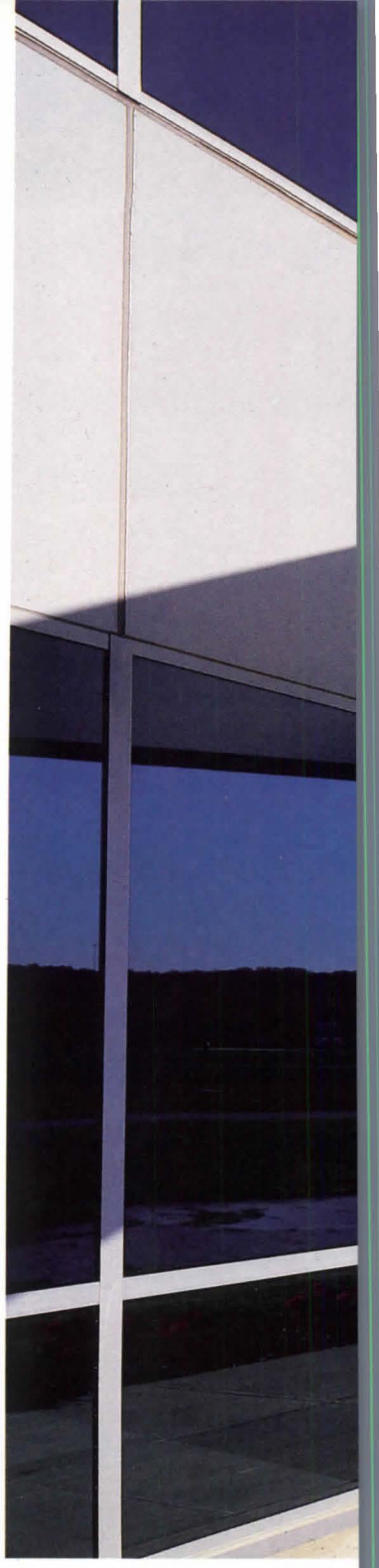

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AIA/NAVFAC Awards Program Cites Five Military Facilities

Five military facilities have been recognized in the 10th biennial awards program for distinguished architectural achievement sponsored by AIA and the Naval Facilities Engineering Command.

USS Nautilus Memorial and Submarine Force Museum in Groton, Conn., by Cambridge Seven Associates of Cambridge, Mass., received the first honor award. The 14,000-square-foot museum with a pier for a docked submarine was cited by the jury for the "imaginative design carefully executed to the last detail." The project is designed on a linear progression with the main circulation path leading to the pier and terminating at the conning tower of the submarine.

The Naval Medical Clinic of the Naval Construction Battalion Center in Port Hueneme, Calif., by Bobrow/Thomas & Associates of Los Angeles was presented a special award for energy conservation and an award of merit. The jury cited the central courtyard, which creates an "open and inviting healing environment," and the building's positioning to take advantage of passive solar energy and the prevailing sea breezes for natural ventilation.

Awards of merit were presented to the Aviation Electronics Applied Instruction Building at Moffet Field, Calif., by IDG Architects of Oakland, Calif.; Meteorological building at the Fleet Numerical Oceanography Center, Monterey, Calif., by Esherick Homsey Dodge & Davis of San Francisco; and the unaccompanied officer personel housing at the San Diego submarine base by Ralph Bradshaw/ Richard Bundy & Associates of San Diego.

The jurors were Thomas W. Ventulett III, FAIA, of Atlanta; Boone Powell, FAIA, of San Antonio; and Phil Arcidi, a student at Rice University in Houston.

Hillier Group to Design ASU Architecture School Addition

The Hillier Group of Princeton, N.J., has won first place in a design competition for an $11 million addition for the college of architecture and environmental design at Arizona State University. The winning scheme was one of three chosen from a total field of 26 submissions. The other finalists were Hammond Beeby & Babka Architects of Chicago and Coover Saemish Anderson Architects of Mesa, Ariz., in association with Hoover Berg Desmond of Denver.

The Hillier Group's winning proposal for the 100,000-square-foot addition calls for a three-story building with four levels. The architecture library, an auditorium, lecture halls, administrative offices, workrooms, community outreach areas, and a common meeting space will be located on the entry and lower levels. Design studios and faculty offices will be housed on the two upper levels.

A tower housing a research facility will serve as a connection between the existing architecture building and the addition and will "stand as a symbol of the uncommon aspiration of this school of architecture," according to the architect's statement.

The jury cited the proposal for the centrally located library, easy classroom access, and the chance for interaction between students, faculty, staff, and administrators. "Each space has been carefully considered for its quality and individuality," said the jury.

Joseph Esherick, FAIA, of San Francisco chaired the jury. Other jurors were Tim McGinty, assistant dean of ASU college of architecture and environmental design; Roger Schluntz, professor of architecture, ASU; Jack Kinsinger, vice president of academic affairs, ASU; and Lee Overmyer, assistant vice president of business affairs, ASU.

Practice

AIA to Publish New Edition Of A201 General Conditions

Within the next several weeks, AIA will publish the 1986 edition of its Document A201, General Conditions of the Contract for Construction. An eleventh-hour meeting between staff and officers of AIA and the Associated General Contractors (AGC) held November 14 resulted in AGC reconsidering an earlier decision not to endorse the document.

At the special meeting of the two organizations, held at AIA headquarters in Washington, D.C., AIA and AGC overcame differences concerning language in the general conditions. AIA President John Busby, President-Elect Don Hackl, AGC President Richard Hall and Past President Richard Pepper, as well as staff and legal counsel of both organizations attended the meeting.

Disagreement over the A201 document had centered on the provisions governing warranty, correction of work, and substantial completion. For AIA, the paramount concern is that these provisions afford the owner adequate protection against defective work, including defective work appearing after substantial completion, said AIA's senior director for documents Dale R. Ellickson, AIA.

The AGC, while sharing AIA's desire for owner satisfaction, has been concerned that the contractor not be unduly vulnerable for the duration of the statute of limitations, especially considering the many problems that lead to meritless claims in today's litigious atmosphere, said AGC building division director Christopher Monek.

Although the language under discussion was not fundamentally different from that of the 1976 edition, AGC perceived certain nuances of the text as laying the groundwork for disputes and putting the contractor in a situation of unwarranted risk, Ellickson said.

By mid-October it appeared that the AIA's and AGC's positions were too far apart to be reconciled before the December publication date of A201. Both organizations released statements to this effect. An announcement in the November issue of the AIA Memo indicated that the new general conditions would be published without AGC's endorsement. Articles in the October 2 issue of the AGC national newsletter and the November issue of *Building Design and Construction* also announced AGC's intention to oppose the use of the new general conditions. Since 1925 the general conditions have appeared only one other time without the endorsement of AGC.

At the November 14 meeting, representatives of the two organizations found they had more in common than they had anticipated. "We realized that we were all talking the same language," said AGC President Hall. "We were able to reach agreement on concepts and clear up some misunderstandings we had of each other's positions. Then we went to work on the draft, and we found it much easier to agree on what it would say."

The warranty, correction of work, and substantial completion provisions remain substantially the same as in the 1976 edition. "We just sat down and tried to understand each others' positions," said AIA President John Busby. "The AGC representatives offered some key words, and the language that was agreed upon affords clear and adequate protection of the owner's interests. We are very pleased," Busby said.

The general conditions are scheduled to be released before the end of 1986 as part of A201 family of documents.

Revisions to the general conditions include new shop-drawing procedures and provisions for drawing ownership, a new section clearly placing the responsibility of hazardous waste removal with the owner, and a consolidation of all claims under one heading.

—Joseph Dundin

Mr. Dundin is an AIA documents editor.

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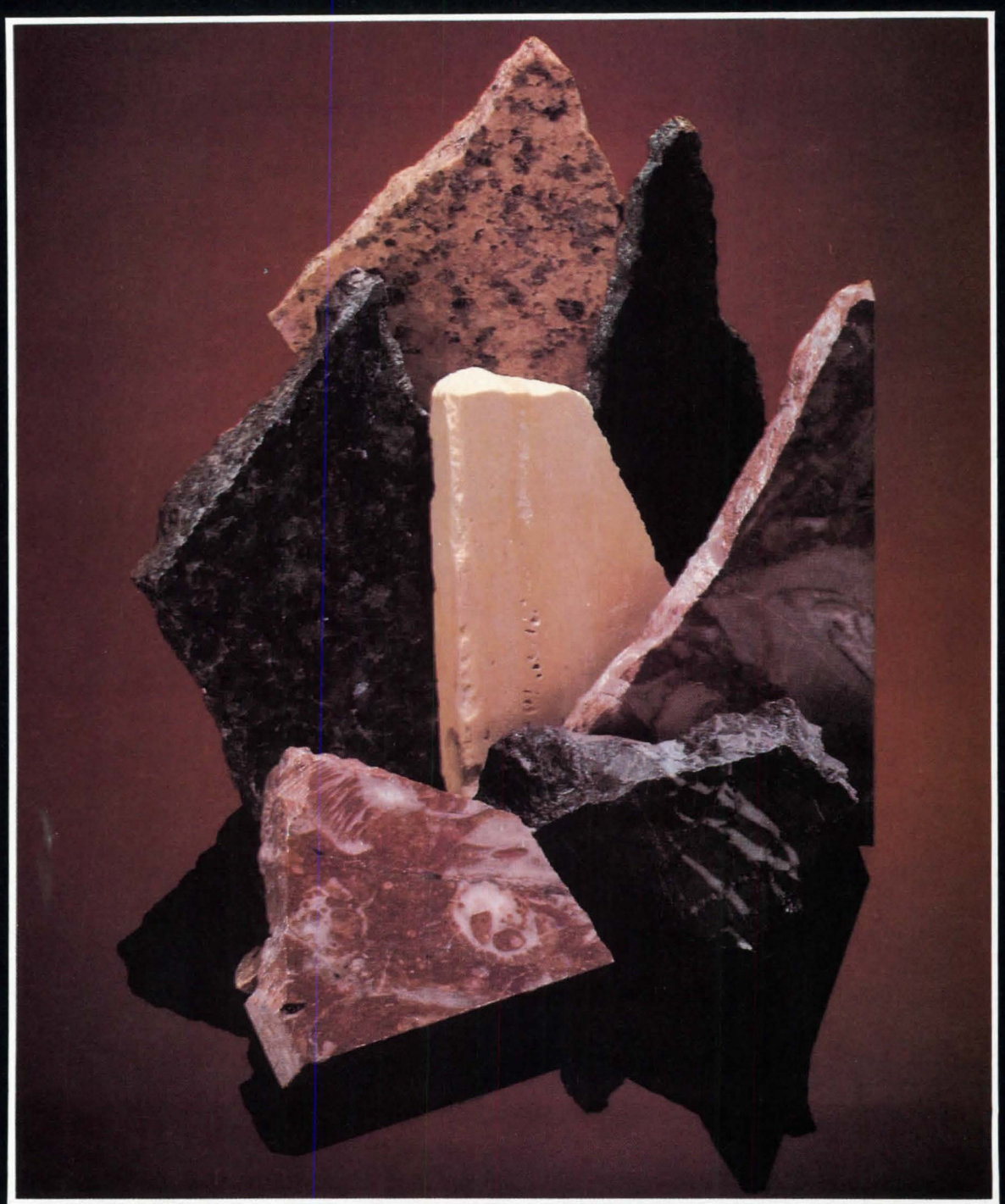

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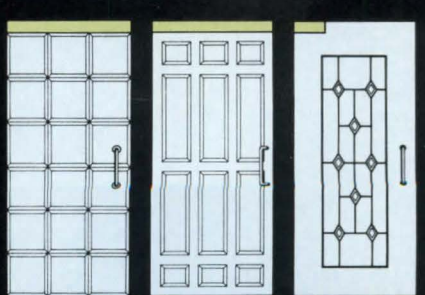

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SUNY/Buffalo to Establish Seismic Research Center

The State University of New York at Buffalo plans to establish a major seismic research center, supported by a five-year, $25 million grant from the National Science Foundation and matching funds from New York State and other sources. Plans for the center include expanding and improving the existing Earthquake and Systems Dynamics Laboratory, creating new faculty and administrative positions, and installing new equipment, such as computers and electronic testing devices, to upgrade the existing earthquake simulator.

Researchers at the center hope to develop methods for reasonable prediction of earthquakes; determine how buildings react to the variety of motions created by earthquakes and, in turn, recommend modifications to the building codes; and develop building evacuation procedures, including general public awareness to avoid panic during emergencies.

Researchers propose to explore the following areas of seismic design:

- *Ground motion.* Geologists, seismologists, engineers, and statisticians will analyze earthquake action with the goals of predicting seismic motions and creating a "supercomputer" databank.
- *Soil and soil-structure interaction:* Structural engineers will analyze forces causing and resisting failure of foundations in the soil, as well as soil action, such as liquefaction.
- *System response and serviceability.* Civil engineers will explore the response of structures to the physical stress of earthquakes. Analytical methods will be developed and tested for various seismic responses.
- *Reliability and risk assessment.* Structural engineers will investigate the reliability of structural analysis methodologies to minimize the uncertainty of their predictions.
- *Laboratory and field data.* Engineers will gather data from actual buildings, as well as from full-scale mockups and "shake table" models in the lab.
- *Innovative computing systems.* Researchers will investigate advanced computer systems that evaluate the seismic performance of building forms, the performance characteristics of materials and structures, and appropriate test models. The "expert" computers also review representations of buildings for potential problems.

The grant proposal encompasses work by a consortium of universities and laboratories, including Cornell University, Columbia University, Princeton University, Lehigh University, Rensselaer Polytechnic Institute, and Lamont-Doherty Geological Observatory.

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ASHRAE Drafts Standards on Air Quality and Ventilation

The American Society of Heating, Refrigerating and Air-Conditioning Engineers has released its draft air-quality standard for public review.

In a substantial revision of its 1981 standard "Ventilation for Acceptable Indoor Air Quality," ASHRAE issued a draft standard that specifies acceptable levels of indoor air quality balanced against energy conservation.

The revision, Standard 62-1981R, specifies minimum ventilation rates and air quality for all indoor or enclosed spaces that people may occupy.

As part of the review process, ASHRAE had accepted comments from the public through Dec. 19. In accordance with the consensus procedures recognized by the American National Standards Institute, ASHRAE acknowledges and attempts to incorporate into the standard all comments received.

ASHRAE has also recently published three new technical data bulletins on energy performance and ventilation rates.

"Energy Use in Commercial Buildings: Measurements and Models" is a 121-page technical data bulletin that includes a simplified energy audit method for generic buildings and introduces a graphic technique for cost estimating HVAC systems during preliminary construction planning. The bulletin includes nine papers presented at ASHRAE's 1986 annual meeting that analyze energy modeling techniques against actual performance, among other things.

In a second technical data bulletin "Thermal Performance of Building Components," ASHRAE releases measurements of energy-flow through commercial roof/ceiling insulation systems and summarizes thermal-resistance test results in well-insulated and superinsulated walls. The 180-page bulletin provides data on masonry-wall and metal-building systems, sheet-steel and wood-frame walls and windows, and movable insulations for use in load and energy calculations.

The third technical data bulletin, "Hospital and Operating Room Ventilation" (107 pages), contains research and technical information on ventilation rates for health care facilities, synopsizing the prevailing medical views on airborne infection and hospital ventilation rates. The bulletin includes five research papers presented at the ASHRAE meeting.

ASHRAE has also released its fall 1986-winter 1987 publications catalog, which contains descriptions of video tapes, software programs, standards, meeting notices, reports, proceedings, technical bulletins, and new publications. New books available from ASHRAE include *Managing Indoor Air for Health and Energy Conservation* and *Bibliography on Available Computer Programs in the General Area of Heating, Refrigerating, Air Conditioning and Ventilating.* The user may also order publications by the Sheet Metal and Air Conditioning Contractors' Association, McGraw-Hill Book Co., and John Wiley & Sons through ASHRAE. The catalog contains order forms and instructions.

All publications are available from ASHRAE Publication Sales, 1791 Tullie Circle N.E., Atlanta, Ga. 30329. Their telephone number is (404) 636-8400. Orders must be prepaid. Standard 62-1981R is $15; "Energy Use in Commercial Buildings: Measurements and Models" is $34 (ASHRAE member price is $23); "Thermal Performance of Building Components" is $45 (ASHRAE member price is $30); and "Hospital and Operating Room Ventilation" is $32 (ASHRAE member price is $21).

OTA Reports on Current State Of Manufactured Housing

Industrialized production of housing components holds tremendous potential for increasing the efficiency of the homebuilding industry but is hampered by a complex and often conflicting regulatory process, according to an Office of Technology Assessment report to Congress.

Homebuilding firms are becoming larger and national in scope, according to the report entitled "Technology, Trade and the U.S. Residential Construction Industry." But because the building regulatory process in the U.S. varies from one locality to the next, a national housing manufacturing effort is hampered, the OTA report states.

The current national regulatory system for mobile homes is a poor model for other factory-built housing, the OTA report claims. The national mobile-home regulations cloud responsibility for compliance, fail to ensure that each home complies with all national standards, and create the potential for a conflict of interest on the part of inspectors, according to the report.

The OTA prepared the report as a policy aid for the Subcommittee on Housing and Community Development of the House Committee on Banking, Finance, and Urban Affairs. Copies are available for $4.75 from the U.S. Government Printing Office, Superintendent of Documents, Washington, D.C. 20402.

AIA Practice Conference Addresses Economic Issues

One-third of today's architectural firms will go out of business within the next five years, according to financial consultant J. Chandler Peterson. Medium-sized firms will have the most trouble, Peterson told attendees of AIA's practice committee conference "What Makes Successful Firms Tick?" Success in the coming times of economic uncertainty will rest with large firms, which have the resources to pursue work nationwide, and small, specialized firms, he predicted.

Citing the effects of the new tax law, climate changes, and worldwide social, economic, and political unrest, Peterson predicted impending financial uncertainty in the U.S. His advice for firm planning over the next two years includes buying real estate and either getting big, strong, and vertically integrated (through firm growth or joint venturing) or getting small and nimble (specializing while keeping ready for quick changes). Intelligent planning requires an awareness of the market; it is more than calculating the previous year's figures and adding 5 percent for growth, Peterson said.

Architect/attorney Arthur T. Kornblut, AIA, analyzed upcoming revisions to AIA's owner/architect agreement B-141; William T. Nigro demonstrated his system for checking interdisciplinary working drawings (to be published in the January 1987 issue of ARCHITECTURE), and Hugh Hochberg presented his keys to ownership transition.

The newly revised B-141 document, which contains language allowing the architect to suspend services when timely payment is not received, will be released in December 1986 and available through distributors beginning in January 1987.

Also presented at the conference, which immediately preceded the Tennessee Society of Architects annual convention, was a roundtable on firm management that began a four-stage committee study. Three more roundtables are planned for February, June, and October 1987. The series will lead to practice aids published by the AIA Press.

Videotape Series from PCA

The Portland Cement Association is offering a 10-video-tape series on concrete technology training. Subjects offered include: field testing, lab testing, vibration of concrete, finishing concrete flatwork, physical testing of hydraulic cements (fineness, paste, and mortar tests), inspection of concrete (preplacement, placement, and postplacement).

The video tapes of field and lab tests show the testing procedures recommended by the American Society of Testing and Materials standards. The tapes of work procedures and inspection follow standard practice as recommended by Portland Cement.

Users may rent or purchase each tape; package and quantity discounts are available. For more detailed information, contact: the Registrar, Portland Cement Association, 5420 Old Orchard Road, Skokie, Ill. 60077. The telephone number is (312) 966-6200.

News continued on page 30

PRACTICE POINTERS: DOCUMENT CONSEQUENCES OF REDESIGNS

Requests to downgrade invite lawsuits.

Frequently, architects are required to revise designs to meet reduced budgets. But, revised designs can lead to costly lawsuits as the claim files of CNA Insurance and Victor O. Schinnerer & Company show.

One common example is a request to change the heating/ventilating/air conditioning system. When such changes are requested, you usually tell the owner that modifications may result in a less effective system. Generally, however, these warnings go unrecorded. Then, when there are complaints that the system does not function as expected, there is no proof that the architect acted responsibly.

We recommend that you give the owner a letter stating possible shortcomings of any downgraded design. Such documentation can be the key to successfully defending you in a lawsuit.

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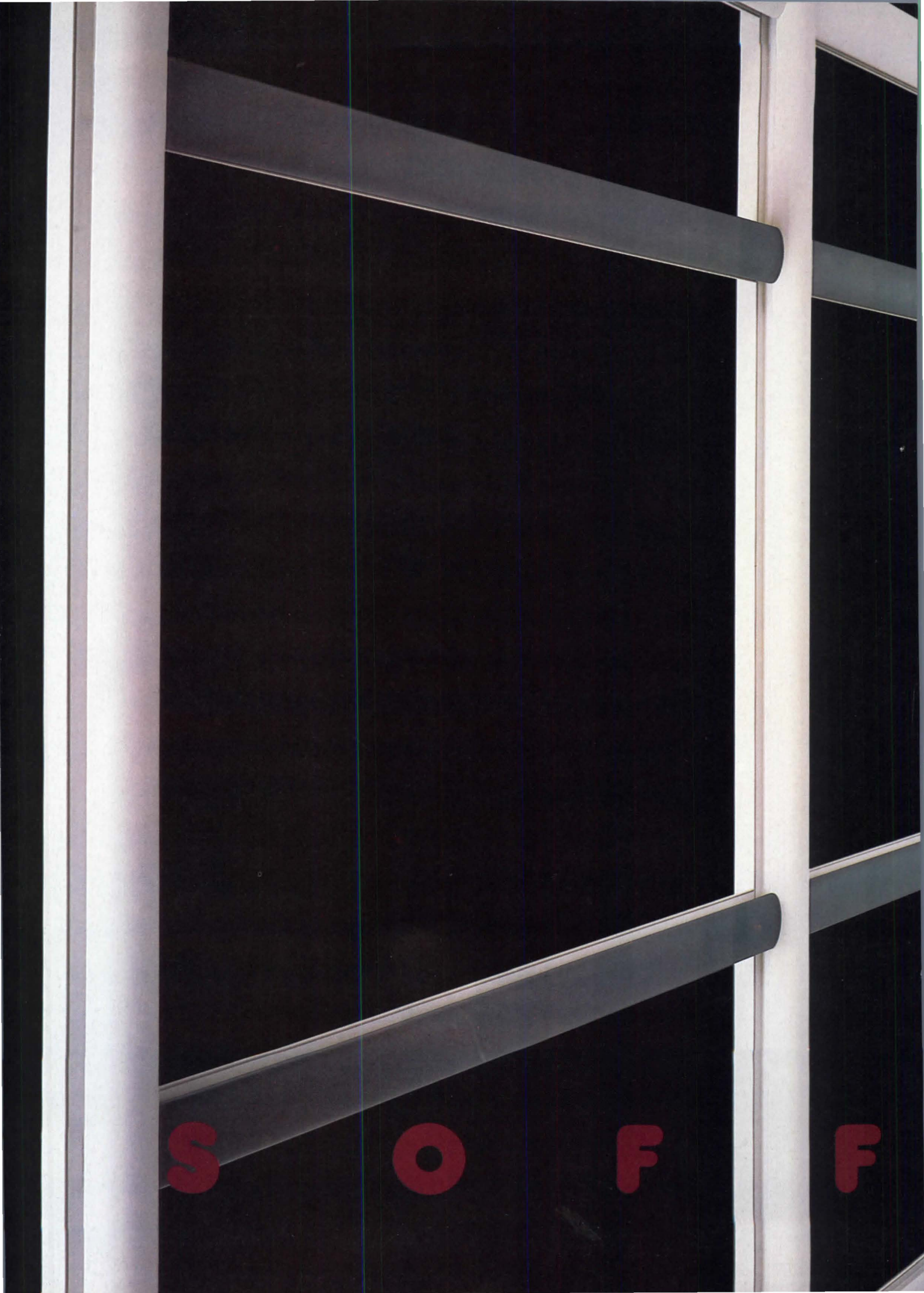
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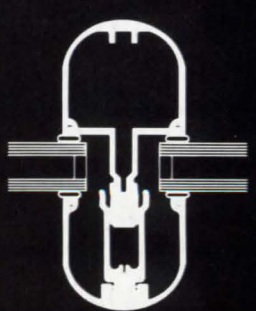

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Design

AIA Conference Explores Miami's 'Fantasy' Architecture

Over the years, Miami has looked good, and not so good, and better and worse again. In the 1920s, the luminous watercolor magazine advertisements for Coral Gables made it look like a storybook city, which in many ways it was. In the 1980s, news reports of Miami at riot made it look very bad.

But no medium has ever shown off any place the way "Miami Vice" depicts Miami; the show lifts the art of televising architecture to completely new heights. It started with a singular edict, told to location-scouters: "No earth tones." Stylistic judgments aside, the buildings on television could be Mediterranean, art deco, modern, postmodern; they just couldn't be drab.

The camera lens that so deplored earth tones in turn focused tremendous national attention on Miami's architecture, and last month the Institute's committee on design gathered 160 architects, designers, and writers to explore the fantasy of South Florida. This was the second such conference held by the design committee to look at a particular regional architectural tradition. The first was held in 1984 in San Diego.

The three-day session was organized by Robert Campbell, AIA, ARCHITECTURE contributing editor and critic for the Boston *Globe,* and by Richard S. Bundy, FAIA. In setting the theme for "No Earth Tones: The Fantasy Architecture of Miami," Campbell wanted to examine "the fiction of an inherited tradition," looking at historical styles drawn from other times and other places that were reinvented for Miami, a place with no history of its own.

To start with, this was a swamp, hot and muggy, sparsely inhabited. A century ago, the population of Dade County (and at the time the county took in all the land south and east of Lake Okeechobee) was 100; today, that same territory has more than four million residents.

So it began, Campbell said, as a "tabula rasa" upon which people were intent on creating Eden again. If anything, it was an empty tableau, and one that posed a host of picturesque possibilities. The land, often created by carving out canals and filling in the low-lying wetlands, was very flat. The sky was astonishingly big and strikingly blue.

Out of the muck and mangroves came Miami—Mediterranean, moderne, and modern. What was built was often utterly fantastical—a Venetian palazzo at the edge of Biscayne Bay, an Arabian nights dream town at the edge of the Everglades.

Coral Gables was to be "America's Riviera"—one not at the edge of the sea and built in a style that melded together Spain and Italy, essentially skipping over France as a source of inspiration despite the name.

In Miami Beach, the vacation dreams of multitudes of urban dwellers found cheery form in the art deco district, where the hotels looked like beached cruise ships or dollhouse-sized skyscrapers; later, Morris Lapidus found even fuller form for fantasy in his hotels—among them the Fontainebleau and the Eden Roc—that drew architectural inspiration from Busby Berkeley stage sets and visions of Versailles.

The conference began with a boat tour—and in keeping with the idea of recreated history the vehicle was a brand new paddlewheel boat—down Biscayne Bay to James Deering's Vizcaya, the Venetian-inspired house built by an American industrialist as his castle. There Charles Moore, FAIA, talked admiringly of the effort—that began before World War I—that went into the design and furnishing of the house, its gardens, and its numerous outbuildings. Less than admiringly, Moore deplored the new steel-and-glass roof that has covered Vizcaya's courtyard; this was one of the first major groups to see how the house looks with central airconditioning installed.

The conferees toured the Barnacle, the home of early settler Ralph Munroe, who built an elegant and graceful tropical house inspired triply by ship design, the vernacular of south seas architecture, and northern cottages. Later, by bus, tram, and on foot, they looked at Coral Gables, Miami Beach, Lapidus' Eden Roc (where many of the conferees stayed), and the recent works of Arquitectonica.

In that chronological sequence of development, said Harvard sociologist Nathan Glazer, there was a decreasing level of fantasy to the "living and working city" that is Miami today. The building of Vizcaya took on almost mythic proportions; kinglike, Deering employed 10 percent of the local population to do so.

"What's happened to the fantasy?" Glazer asked. "Maybe Miami is ready to say goodby fantasy."

Certainly, Miami hung onto it longer than many other places. Philadelphia *Inquirer* architecture critic Thomas Hine, who is the author of a new book on the "life and look of the 1950s" called *Populuxe,* pointed out that outside of Miami and Las Vegas only seven full-service hotels were built in America between 1954 and 1964. In Miami, those hotels were the embodiment of some rather grandiose decorating ideas, incorporating French provincial and Italian Renaissance with the rococco and Hollywood stage sets, among others.

But from the Eden Roc—tattered, smelly, and denuded of much of its former gilt and splendor—it became quite clear that fantasies can fade. Boston architect Jean-Paul Carlhian, FAIA, wondered aloud if some of what was built in Miami might have been intended as a giant fireworks display—flashy, glorious, and temporary.

"That depends," said University of Vermont architectural historian Chester Leibs. "Is the intention of the architect the only criteria for preservation? I think not."

At one point, *Village Voice* critic Michael Sorkin hypothesized that there might be three kinds of fantasy—imperial, personal, and collective; by conference end, the more general agreement was that a collective fantasy turns into reality, be it in the day-to-day suburban ritual of Coral Gables or the nitty-gritty effort of creating an appealing historic district out of the relics of art deco in Miami Beach.

"The Magic," said Ivan Rodriguez, director of Dade County's historic preservation division, "is not the fantasy. The magic is that we are creating a reality here."

—BETH DUNLOP

Ms. Dunlop, a former associate editor of this magazine, is architecture critic for the Miami Herald.

Whitney and Guggenheim: The Controversies Continue

For more than a year controversy has surrounded proposed expansion schemes for two New York City museums. Both Michael Graves' proposal for the Whitney Museum (see Aug. '85, page 11, and Sept. '85, page 58) and Gwathmey Siegel & Associates' scheme for the Guggenheim (see Dec. '85, page 11, and Aug. '86, page 10) have been the subject of public discussions with sometimes heated debates, intense lobbying (both pro and con) by the architecture community, vocal opposition by preservation groups, and numerous neighborhood and municipal hearings. The fight by each museum to obtain permission to build a major addition, which opponents argue will overshadow the architectural integrity of the original buildings, promises to continue well into 1987, if not longer.

In the latest turn of events, both the Guggenheim and the Whitney are expected to release revised expansion plans by early next year. Gwathmey Siegel is back at the drawing board developing a substantially modified plan for the Guggenheim, while the Whitney is not commenting on its program or the design. Whitney Director Tom Armstrong says, "We don't have anything to announce until January." *continued on page 32*

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Design *from page 30*

In early November, Guggenheim officials announced plans to develop a new expansion scheme to reduce the addition's visual impact on the original Frank Lloyd Wright 1959 building. The Guggenheim's announcement to significantly change the design of its addition comes after a six-month effort to obtain a zoning variance and special building permit from the city's board of standards and appeals.

Gwathmey Siegel's plan, which would consist of a seven-story rectangular box just north of the large spiral rotunda and directly above the four-story annex designed by Taliesin West and completed in 1966, was hotly debated at a public hearing before the board in June. After a series of hearings, the museum wrote to the board requesting the record be reopened so a revised scheme could be submitted.

Holly Evarts of the Guggenheim staff says the museum decided to ask Gwathmey Siegel to develop a new plan when at the latest hearing it became apparent that the zoning variance would not be approved. In agreeing to keep the record open, the board requested that the new design be "substantially different," according to Evarts.

The museum has argued that it has enough space to exhibit only 3 percent of its permanent collection that numbers approximately 5,000 works of art. Their program calls for doubling exhibition space for the permanent collection as well as increasing administrative space, enlarging the bookstore, and improving art storage and conservation.

Jacob Alspector of Gwathmey Siegel says that there were no changes in the museum's programmatic requirements. "Ideally, we would like to fulfill the existing program in a different way that would be acceptable to whomever has to approve it," he says.

The revised scheme is expected to be released sometime in early January. The board of standards and appeals has set March 3 as the date for its first hearing on the new proposal. However, the scheme must be first approved by the neighborhood community board, which can take a maximum of 60 days.

Although it is too early to say how the proposal will be different, Alspector says, the new design will be a total re-evaluation: "We are going to try to look at it completely fresh, bearing in mind some of the criticisms that have been leveled."

The most active opponents of the proposed addition, a group called Guggenheim Neighbors, have offered an underground scheme, which they contend would accommodate the needs of the museum. Alspector says his firm considered a number of underground schemes but that all of these were far too expensive, "especially the one proposed by the opposition."

Meanwhile, the Whitney Museum plans to make an announcement sometime in January regarding its agenda for future expansion. This announcement indicates that after a hiatus by the museum's planning committee the museum intends to actively pursue some type of development program.

The unveiling in the summer of 1985 of Graves' 10-story addition, which would be built beside and directly above Marcel Breuer's 1966 building, immediately sparked an emotional debate in the architecture community.

Graves' controversial scheme was never formally submitted to the rigorous review process of the New York Landmarks Preservation Commission. Neither the Breuer nor the Wright building is an official landmark—New York law requires any individual landmark to be at least 30 years old—but the Whitney is located within the upper east side historic district. The Guggenheim, 15 blocks to the north, is not within the boundaries of a city historic district.

Opponents of both schemes have argued that the architect for each addition was presented a difficult, if not impossible, program. Unless each museum significantly reduces its requirements for overall square footage, the upper east side museum battles will likely continue.—Lynn Nesmith

BRIEFS

Arts and Architecture Fellowships
Applications are being sought by the U.S. Capitol Society Fellowship to support research and publication on the art and architecture of the U.S. Capitol. Graduate students and scholars may apply for fellowships of one month to one year with a stipend of $1,250 per month. The deadline for application is Feb. 15, 1987. For more information, contact Barbara Wolanin, Curator, Architect of the Capitol, Washington, D.C. 20515.

Architectural Grants Awarded
Steven Gambino, Alexander Eng, Lucy Eichenwald, James Ermides, and Mitsuhiko Nishi, all students at the New York Institute of Technology, were awarded scholarship grants by Eleanor Allwork scholarship program.

Catholic University Names Chair
Stanley Ira Hallet, AIA, former professor of architecture at the University of Utah, will succeed Peter Blake, FAIA, as associate dean of Catholic University's school of engineering and architecture and chair of the school's department of architecture.

NAAB Elects Officers
The National Architectural Accrediting Board has elected Robert M. Lawrence, FAIA, Oklahoma City, as president; Lee G. Copeland, FAIA, Philadelphia, vice president/president elect; and Edgar C. Beery, Jr., AIA, Annandale, Va., secretary/treasurer for 1986-87.

Arts Program Seeks Applicants
The New York Foundation for the Arts is accepting applications from schools, cultural institutuions, and community organizations who are interested in participating in the foundation's artists-in-residence program. The program enables students and adults to learn more about the profession of a working artist. Applications will be available in January, and the deadline for submittals is March 20. For more information, contact the New York Foundation for the Arts, 5 Beekman St., New York, N.Y. 10038.

IFMA Conference Stresses Teamwork
That architects need to pay more attention to the way facility managers like to work and the statistics they live by was a message loudly spoken at the annual conference of the International Facility Management Association, held in Chicago in October.

In keeping with the pivotal role facility managers are playing in orchestrating large building projects for many major corporations, the educational component of the meeting focused on fostering allegiances between the various disciplines that work together during design and construction. One day was devoted to relationships between architects and facility managers.

For the architects in attendance—both those employed by corporations and traditional design consultants—one of the most important presentations came from Michael Bell, of LaSalle Partners, a New York-based real estate firm specializing in corporate asset management. Bell described four key categories of project performance measurements facility managers employ:

- Space utilization. Key statistics include rentable square feet per person, the ratio of usable square feet to rentable square feet, and the ratio of workstation space to common area space.
- User satisfaction. These clearly less quantifiable measures related not only to the physical qualities of a building (location, esthetics, functional response to program, etc.) but also to facility managers' level of satisfaction with the project delivery process.
- Financial performance. Critical ratios include cost through occupancy, annual escalation, rent, and book and market values of the facility.
- Performance of in-house facility management staff. Bell later showed how to assess the relative importance or applicability of each of these categories to any particular client and indicated the significance of this breakdown for architects seeking to do business with corporate facility managers.

Further information regarding the Houston-based International Facility Management Association can be obtained from Rita Mincavage of IFMA. Her telephone number is (713) 623-4362.

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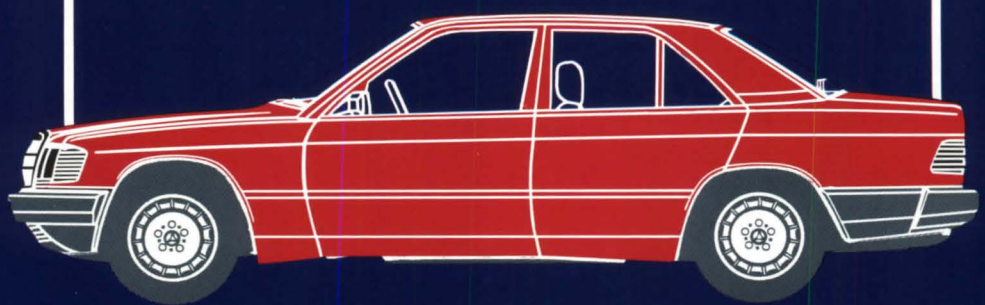

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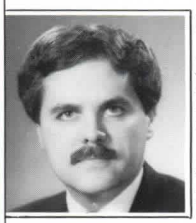


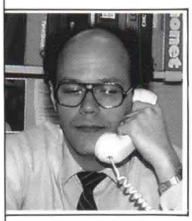
PANEL CHAIRMAN:

JOHN J. LABOSKY, PE, ESQ.
President/Chief Executive Officer
Ellerbe Associates, Inc.
Minneapolis, MN

John Labosky joined Ellerbe Associates, Inc. in 1982. He became president in 1985 and was named president and chief executive officer in September of 1986.

Mr. Labosky has a diverse educational background in architecture, engineering and law. In over fifteen years of professional architectural engineering practice, Labosky has been principal-in-charge, project manager or project designer for more than $750 million in construction.

He is a registered professional engineer and an attorney admitted to practice at both state and federal levels.



JEFFREY B. MILLER
Howard Needles Tammen
& Bergendoff
Kansas City, MO

As Director of Interior Architecture, Mr. Miller affords HNTB a diversified design background in architecture and interior design. He directs space planning, facility and organizational programming, graphic and information systems design, installation management, and contract administration for interior design commissions. He has been instrumental in furthering HTNB's applications of computerized technology resulting in cost effective facility management of furniture and fixture inventories.

He received his Bachelor of Architecture degree from Kansas State University and his professional affiliations include the American Institute of Architects, National AIA Committee on Interiors, Kansas City Chapter of the AIA, Chairman of the Kansas City AIA Interiors Committee, Missouri Council of Architects.

JAMES S. STERLING, AIA
Senior Vice President
Welton Becket Associates
Santa Monica, CA

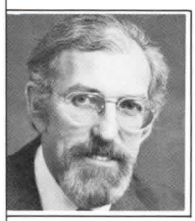
James Sterling joined Welton Becket Associates in 1982 and serves as Senior Vice President, Director of Business Development. A registered architect with more than 23 years of design experience, Mr. Sterling oversees all business development activities for the Los Angeles office of the firm. He is directly responsible for the initiation of new projects and has handled the initial meetings and proposals which led to many of Becket's major projects.

He received his Bachelor of Architecture degree from the University of Southern California and is certified by the National Council of Architectural Registration Boards. His organization affiliations include the American Institute of Architects, Los Angeles 5 Rotary, Urban Land Institute and Town Hall.

JOHN G. DEGENKOLB
Fire Protection Engineer
Code Consultant
Carson City, NV

A graduate of the University of Southern California, Mr. Degenkolb was employed by the Los Angeles City Fire Department for 22 years. He was a Battalion Chief in charge of the Public Safety Section of the Fire Prevention Bureau. He is co-author of the Florida Walt Disneyworld Project Building Code and served as Fire Protection Consultant on that project.

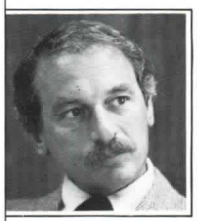
He is a Registered Fire Protection Engineer—California #177, and memberships include the National Fire Protection Association, Chairman of the Committee on Fire Doors and Windows; the International Conference of Building Officials—Uniform Building Code, Chairman of the Ad Hoc Committees on Malls, Elimination of Fire Zones, Air-Supported Structures, Grandstands, and Projection Booths; International Association of Fire Chiefs, Chairman of the Building Code Committee.



JACK R. YARDLEY, FAIA
Senior Vice President
Harwood K. Smith & Partners
Dallas, TX

As Senior Vice President and Director of Design for Harwood K. Smith & Partners, Jack Yardley is a design architect with experience in retail stores, shopping centers, office buildings, corporate buildings, hotels, housing, manufacturing, hospitals, and more than 30 schools. He spent 3 years in Bangladesh helping establish that country's first school of architecture.

Mr. Yardley is a registered architect, is certified by the National Council of Architectural Registration Board, and is a member of the American Institute of Architects and the Texas Society of Architects. He is a Cum Laude graduate in Architecture from Texas A&M University as well as a recipient of the School of Engineering's highest award, the Faculty Achievement Award. In 1981, he was elected to the College of the American Institute of Architects of Design.



PHILIP C. FAVRO
National Fire Code Consultant
Partner
Favro McLaughlin & Associates
Fair Oaks, California

Philip Favro is president of Favro McLaughlin & Associates, a fire safety management consulting firm he founded in January 1983. A graduate of the University of Santa Clara, he has 21 years of experience in the fire service. He was California State Fire Marshal from 1975 to 1983. During that time, he established new, effective training and educational programs.

Mr. Favro is past chairman of the State Board of Fire Services; executive board member, Fire Marshals Association of North America; treasurer, California Fire Fighter Joint Apprenticeship Committee; and corporate member, Underwriters Laboratories.

CONTEST RULES

1. Design entries need *not* be complicated or overly detailed. Simple drawings accompanied by a brief explanation of the application concept are sufficient.
2. The application design need *not* be an actual project. Existing, future or hypothetical buildings or projects are quite acceptable.
3. There are no specific size or format requirements for design entries. Any materials or techniques that you prefer will be acceptable.
4. Each design application solution must be for an actual code requirement, i.e., "occupancy separation," "area separation," "elevator, lobby separation," "corridor separation," "protection of vertical openings or atriums," etc. Since codes vary from state to state, simply use the compliance code requirements for your state.
5. The majority decision of the panel of judges will be final.
6. Won-Door employees, suppliers, agencies and their familes are *not* eligible.
7. All entries must be accompanied by a "Won-Door Design Contest" Official Entry Blank.
8. All entries must be post-marked no later than February 28, 1987.
9. You may enter as many times and in as many categories as you would like. There are *no* limitations on number of entries.
10. There are no limitations on the complexity of your entry. You can be as complex or detailed as you desire in order to best communicate your design application idea.
11. In case of a tie (exact duplicate solution to the same code requirement), entry with earliest postmark will prevail.

The Arts

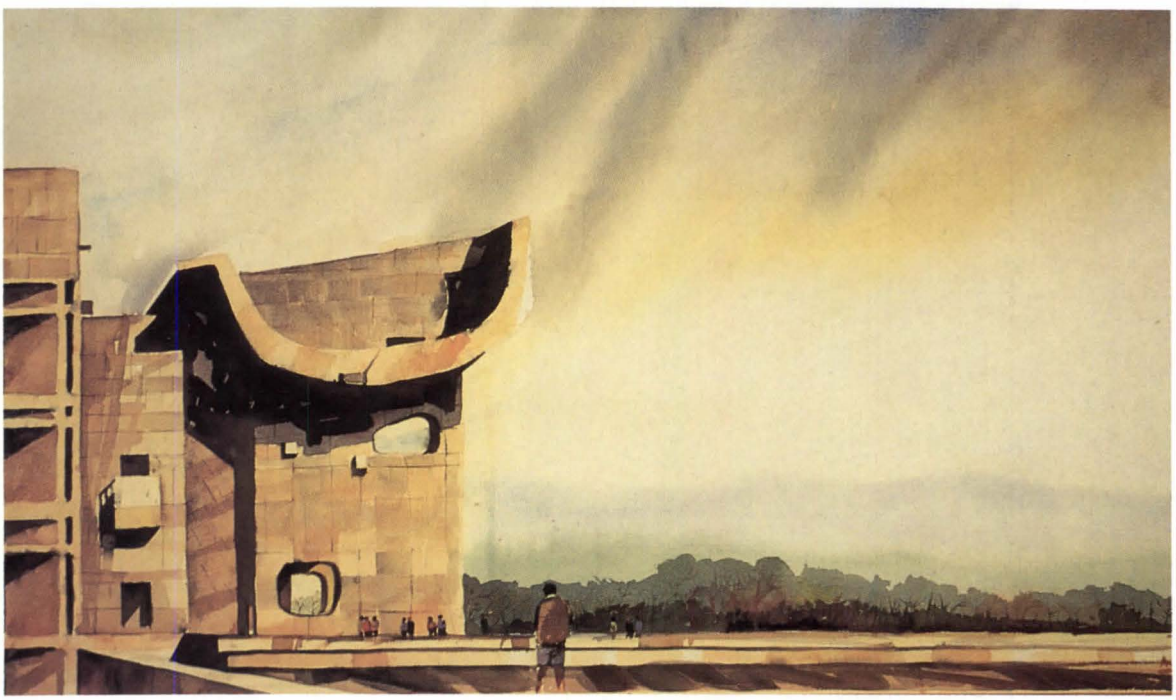
Kahn and Corbu in the East

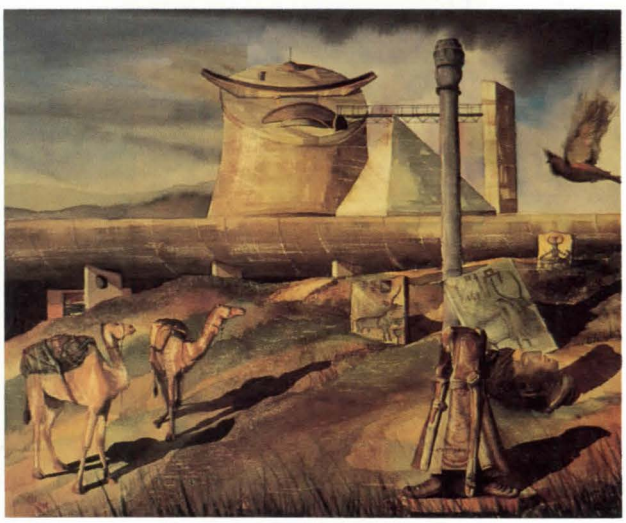
"The subcontinent work of Le Corbusier and Louis Kahn is matured, not beautiful or discursive. It expresses hence art," writes architect and painter Anupam Banerji. "The expressions are the denizens of the deep. They ponder renewed belief in man's institutions importing meaning from eons, enigmas, and echoes resident in the ancestral mind of man in India."

Banerji, who also teaches architecture at the University of Waterloo in Ontario, uses his paintings as probes into the timeless nature of Corbusier and Kahn's work at Chandigarh, Dacca, and Ahmedabad. He attempts to reconcile the work of these two Western architects with its Eastern context. Banerji's paintings juxtapose iconographic images from Eastern and Western art, philosophy, and religion as foreground to an architecture that attempts, in Banerji's view, to find their underlying, lasting unities.

—Michael J. Crosbie

Four of Anupam Banerji's paintings of Corbusier and Kahn's subcontinent work: Above, 'Intensity of the Vague,' right and below left, 'Apprehension of Form,' below right, 'Power of Primary.'





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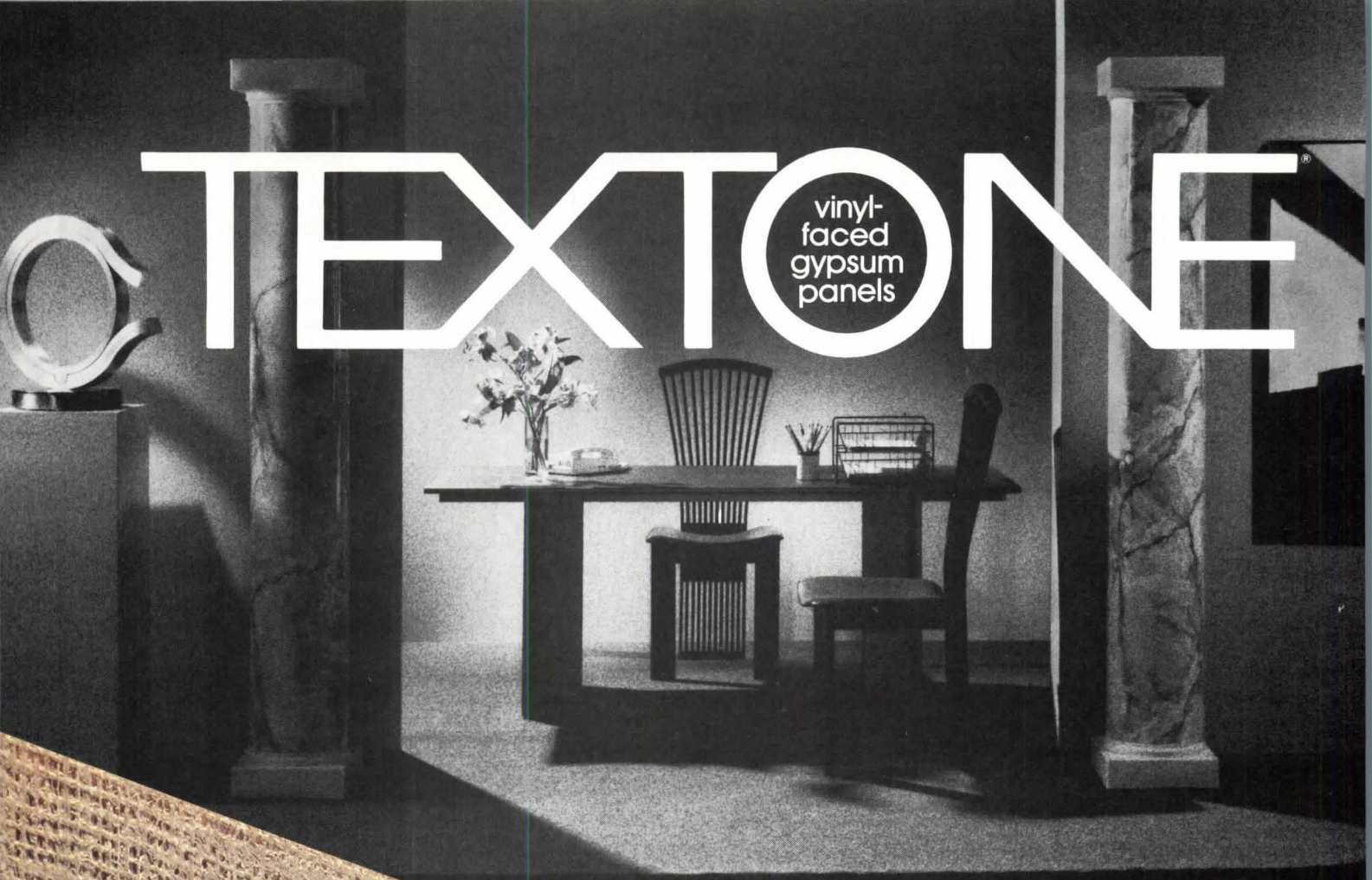

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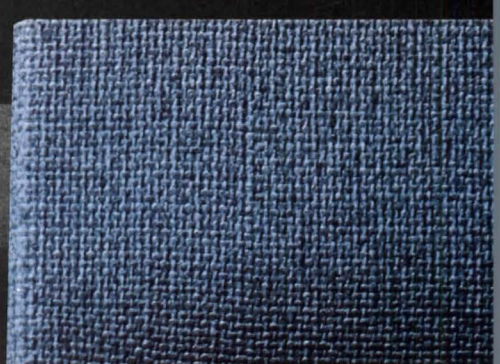
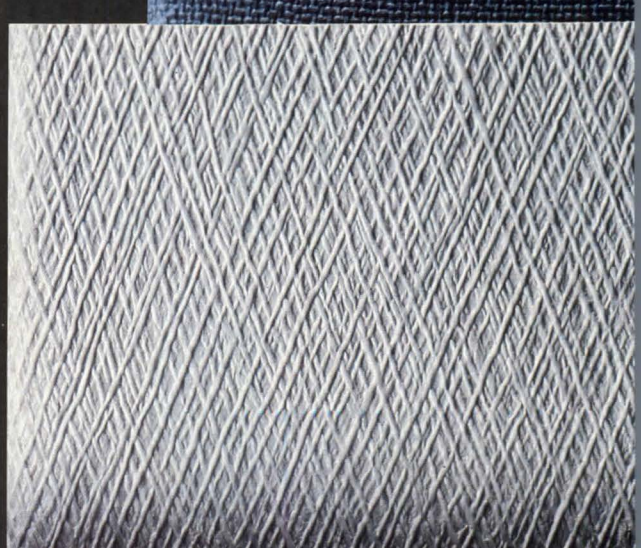
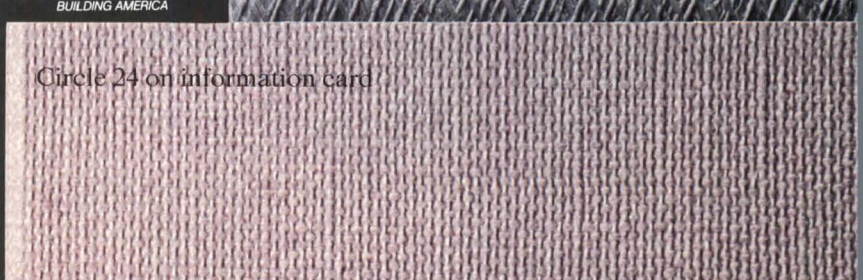






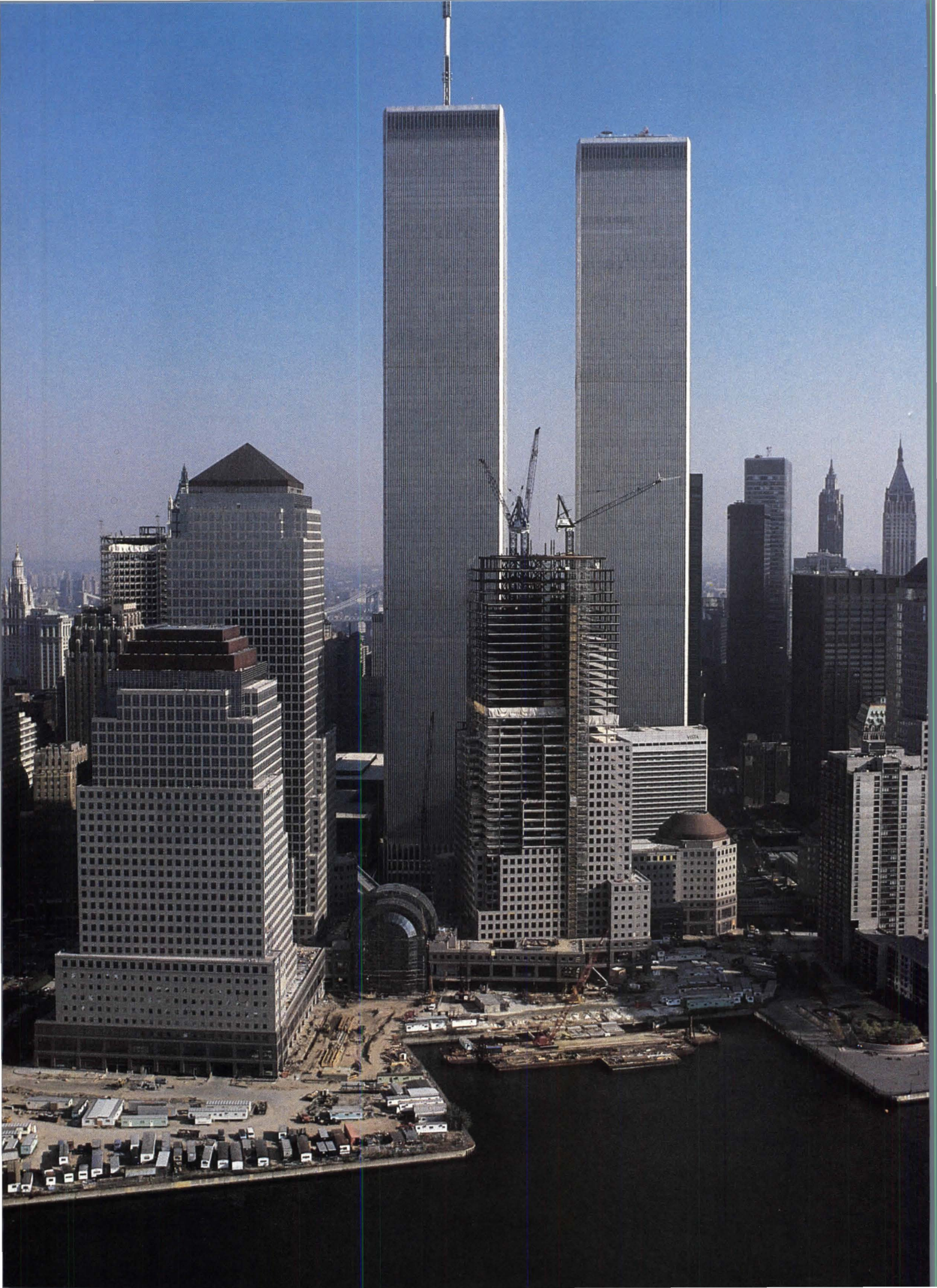
ARCHITECTURE

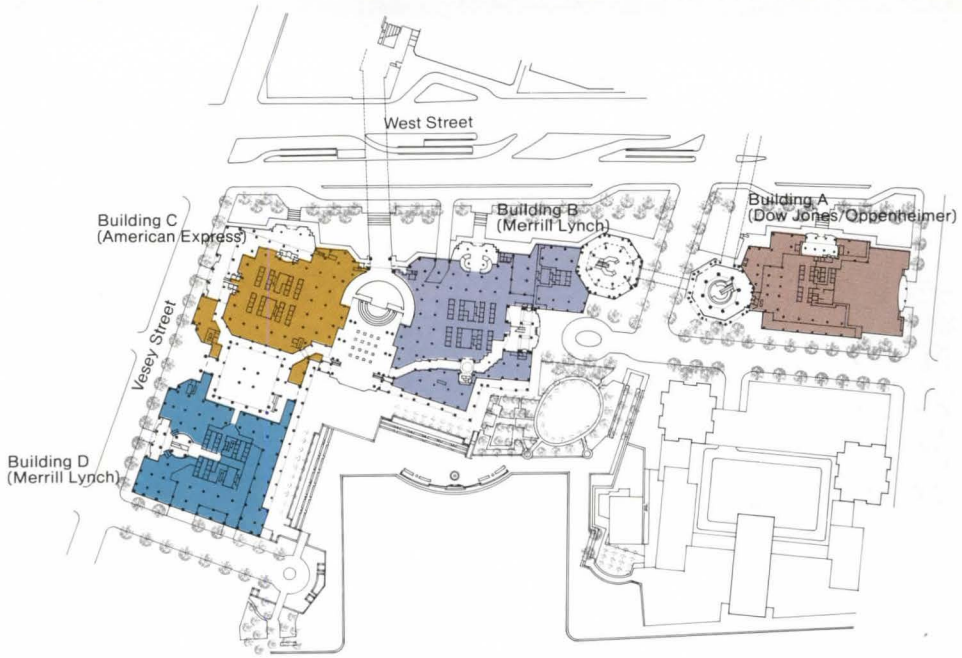
Cityshape, the newly coined word on the first contents page of this issue, refers to some of its major elements. On the pages immediately following this one is a progress report on the largest and most remarkable single work of urban design that this country has seen in a long time. It is followed by two towers that add new shapes and surfaces to two significant skylines. Some pages hence is a spectacular portrait of French hilltowns, lesser known than their Italian counterparts, but, if anything, even more dramatic in form.

In between these new and ancient urban phenomena are two corporate headquarters in the countryside, a Kaleidoscope consisting mainly of buildings modest in both size and demeanor, and an account of how a combination of design and showmanship revived a small town. All of this is followed by the Technology and Practice segment of the magazine, which seems to gain in strength each month. This month, among other things, it deals with two of the most formidable and inescapable facts of architectural life, taxes and costs, and deals with them with admirable realism, also a characteristic of several articles on technical subjects.

We are delighted to report some changes in the masthead. Michael J. Davin has become national sales manager, bringing great depth of experience to our advertising effort. Sharon Lee Ryder, former chief editor of the Whitney Library of Design and the New York tabloid magazine *Metropolis,* is now a senior editor of this magazine. She will work out of New York City and, as of this issue, has taken charge of our expanded interiors section.

Stephanie Stubbs, former contributing editor of ARCHITECTURAL TECHNOLOGY and ARCHITECTURE, becomes a full-time technical editor, sharing the title with former TECHNOLOGY and ARCHITECTURE associate editor Douglas Gordon. And associate editor Lynn Nesmith, whose many contributions to the magazine include putting together a very strong news section, becomes a senior editor.—*D.C.*





The Rockefeller Center of the '80s?

Battery Park City's core. By Andrea Oppenheimer Dean and Allen Freeman

Three of the World Financial Center's four towers at Battery Park City and its two "gateway" buildings are nearing completion, and its vast, enclosed winter garden is glazed. How does the complex look? What does it feel like to be there? Is it "a new Rockefeller Center," as some observers have claimed? Is it perhaps an embodiment of peculiarly 1980s ideas and attitudes toward urban design and architecture?

Approaching from the south, along West Street, the lower Manhattan towers look refined, wellspoken—downright eloquent next to the Le Frak housing to the south (an early phase of Battery Park City's housing program that will in time yield 14,000 luxury units).

The four new skyscrapers also do wonders for their neighbor to the east, the World Trade Center. Rising from 33 to 50 stories, the World Financial Center's towers, each with a different silhouette and geometric top, mediate between Yamasaki's flat topped shafts and those of the neighboring Wall Street area and mercifully transform the Trade Center into background.

Viewed individually the new complex's towers are neither breathtaking nor meant to be, though they put the new midtown Manhattan buildings to shame. The emphasis was on their grouping against the skyline and on their identical and extraordinary skins.

The skin show should come as no surprise with master architectural clothier Cesar Pelli, FAIA, as designer. In an effort to reduce the massive towers' bulk, he peeled the granite and glass cladding back a notch at each of four setbacks and made the buildings look increasingly immaterial as they rise—as though painted against the sky—by changing the relationship of glazing to stone from base to crown. He enlarged and elongated the windows at each setback, finally overlaying them with finely drawn mullions and tautly stretching them against a granite grid of similar color value. As Pelli says, "At the base these are skins of stone with windows in them; at the top they are skins of glass with a tracery of stone marking the modular system."

He adds, "I tried to design the buildings to be as intelligent and clear as a modern building but to also be responsible to the silhouette of the city, to the sidewalk, and the traditional buildings of downtown New York. The whole issue to me was to do a building that is of our time, responding to our sensitivities, our ideology, the history that exists behind us, but without historic borrowings."

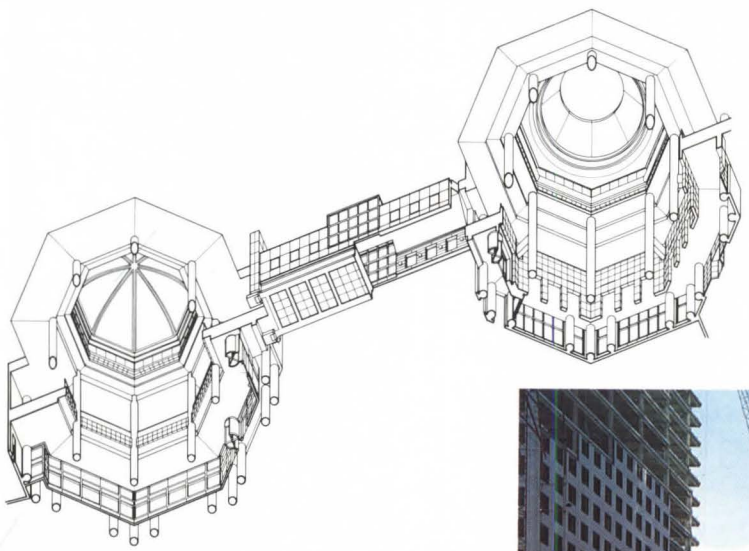
Left, in a helicopter view from over the Hudson River, the new towers cluster around a rectilinear cove. Behind are the World Trade Center twin towers and, beyond, Wall Street skyscrapers.

This characteristically 1980s attitude of accommodation marks one of several differences between the basically conservative World Financial Center and Rockefeller Center, a revolutionary urban design concept. For the latter, Raymond Hood's team of architects turned their backs on the lowrise tenements dominating the midtown neighborhood. Even Le Corbusier, while quarreling with its detailing, regarded Rockefeller Center as the harbinger of "a new age."

Pelli's subordination of his scheme to the existing city coincided with the guidelines spelled out by Battery Park City's master plan of 1979, which broke with canonic modernist thinking and succeeded a series of unbuildable schemes, two of them by Harrison & Abramovitz. The first, kindred in spirit to Albany Mall, dated back to 1966, the beginning of Battery Park City's rocky history.

The project's life as a combined effort of state and city management fueled by private investment began in 1979 when it was bailed out financially by the New York Urban Development Corporation. Before inviting developer bids, the UDC hired the firm of Cooper, Eckstut Associates to draft a master plan. Their work, based on rezoning that extends the grid of lower Manhattan and preserves view corridors to the water, is "a celebration of New York that recognized the city's strength, diversity, and existing architecture," in the words of Meyer Frucher, current president of the Battery Park City Authority.

Cooper, Eckstut's plan and guidelines defined, among other things, exact street patterns, the general location and massing of buildings, waterfront treatment, connections and circulation, and physical and visual relationships to the surrounding neighborhood, and set superior design standards. Shortly after accepting it, the UDC named Olympia & York as developer and gave the Toronto-based firm a 10-year tax deferral. The first $400 million in taxes will be used to finance low- and moderate-income housing elsewhere in Manhattan. Frucher says this will be the



Top, the complex along West Street from the platform of the World Trade Center. The tower in the distance, occupied by Dow Jones and Oppenheimer, was first to be completed. Between it and the unfinished Merrill Lynch building (right in photo) are the 'gate house' extensions, whose interior rotundas are shown above in axonometric. Right, another view across West Street, with the same Merrill Lynch tower above the north bridge, the vault of the winter garden, and the heroic entrance and shifting facade of the American Express tower. Opposite, the 40-foot-wide north bridge.

nation's largest housing trust "and its most significant linkage between market rate and low-cost housing." The UDC's deal with Olympia & York was in exchange for the developer's offer to build the project in half the expected time and to single-handedly develop the entire $1.5 billion, 14-acre site. It was to include six million square feet of commercial space, 100,000 square feet of retail, 150,000 square feet of recreation and exhibit space, and 3.5 acres of public parks and plazas.

It is the vast scope of its intentions that makes Battery Park City most unequivocably analogous to Rockefeller Center. A closer look, however, underscores the differences, the first having to do with location and site plan. While Rockefeller Center is in the middle of Manhattan and resembles a doughnut in plan, Battery Park City is at its edge, on landfill. It is configured as an L embracing a plaza facing the Hudson and away from the city from which it is separated by West Street, a 10-lane thoroughfare.

Absent also is the drama one feels approaching Rockefeller Center's vertically ribbed towers. The World Financial Center's buildings are not only fewer and stockier but somewhat bulky and anchored to the ground by a two-story, wall-like masonry base containing retail whose horizontality is underscored by carefully crafted banding and a continuous row of recessed square windows at the third level. What drama there is comes from the cladding, the tops (which are packed with mechanical equipment), and from Pelli's having rotated the axes of the two northernmost buildings above the ninth level. This twist makes their lower portions follow the proximate street grid while their upper sections align with Wall Street to the east.

Also different from Rockefeller Center is the lack of street activity at the World Financial Center. Shops, in the manner of the 1980s mall, will face inward, while the towers' West Street elevations are edged with grass—to a peculiarly non-urban effect—and each has only a single, albeit monumental, front door created of layers of marble cladding, colored glass, and a bronzed metal. The basic design elements are the same for each portal but variously sized, shaped, and colored.

They follow a principle applied throughout the complex: use of an overall language of elements with different "accents," as Pelli calls them, to give each building its own identity.

In image and detailing these entrances—and, for that matter, shapes and detailing throughout the project—bear resemblance to work of other architects (Graves, Kohn Pedersen Fox, Rossi). Pelli acknowledges this, explaining, "We are all affected by our times and many of our concerns are the same." Among these he stresses an attempt to find expression for current technologies, such as the ubiquitously used, many-layered, thin envelope.

The monumental street level entrances are largely symbolic. The estimate is that eventually they will be employed by up to 30 percent of the building's users. But now about 90 percent of the approximately 9,000 office workers already installed at the World Financial Center enter the complex in a singularly pedestrian manner, via two second-story enclosed bridges crossing West Street that resemble airport corridors. The north bridge, the larger of the two at 40 feet wide, connects buildings B, C, and D (respectively occupied by Merrill Lynch, American Express, and Merrill Lynch again) to the World Trade Center and its underground transportation hub. The towers are interconnected at the first two levels.

The south bridge leads directly to the octagonal domed atrium of the "gateway" building attached to building A (occupied by Oppenheimer & Co. and Dow Jones). This atrium is an airy, beautifully modulated space ringed by two balconies, capped by a stenciled ceiling, and terminated at ground level by two semicircular, almost baroque stairs flanking an escalator. An as yet unfinished bridge leads to a similar atrium in "gateway" B.

The lobbies of the office buildings are, again, all variations on a theme. In each, the elevator core is covered in a differently patterned damask "to avoid the typically unfriendly marble or granite elevator box and serve as an orientation point," in Pelli's words. A constant in all public interior spaces is painted black structural columns, which seem somewhat obtrusive at first. Pelli wanted them to be read as "serious things holding

Photographs by Allen Freeman

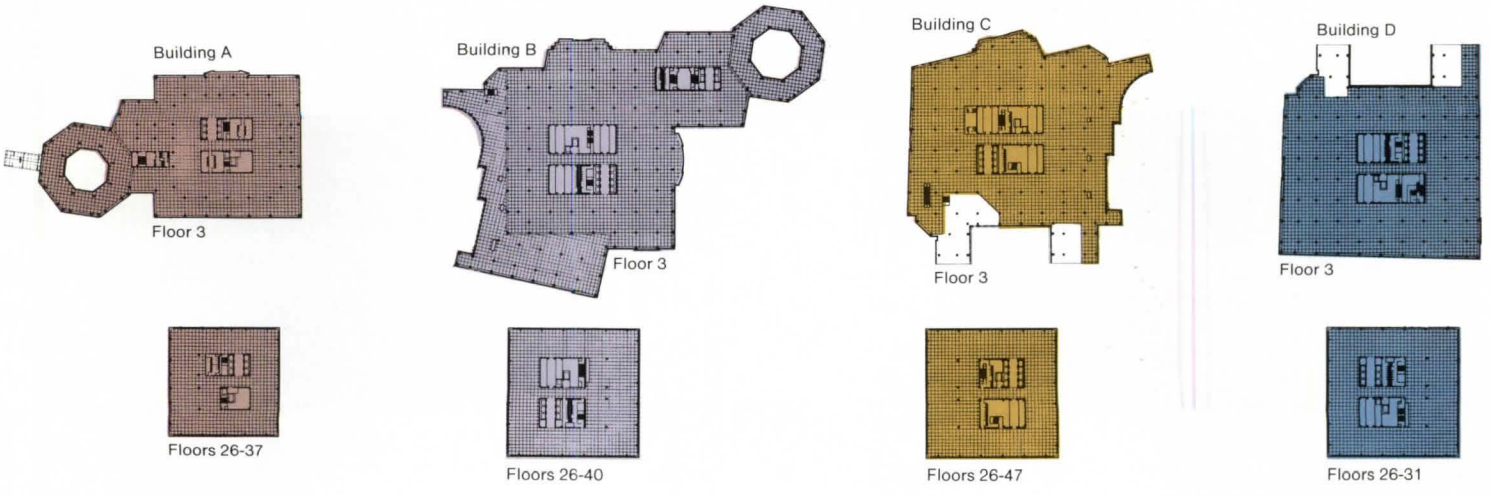
Left, the lower, West Street lobby of the Dow Jones-Oppenheimer building. Right, the three-story rotunda of the adjoining nine-story 'gate house' contains a broken curving stair with escalators up the center. Doors at second level connect to one of two bridges across West Street.

up the building," analogous to set changers in Kabuki plays who become almost invisible once you're accustomed to them.

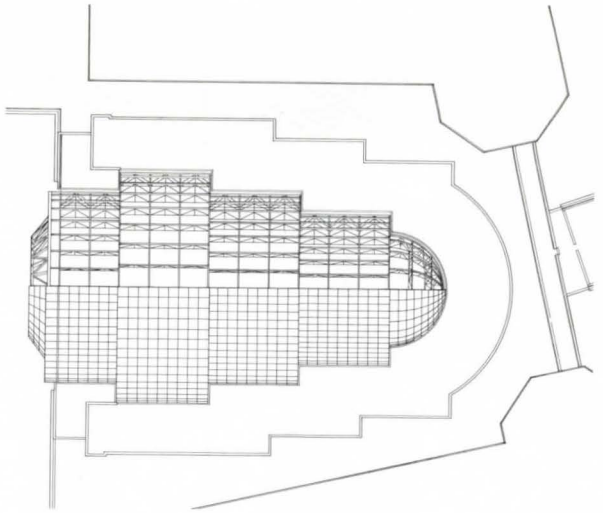
Each lobby has a dominant flecked gray marble with different accent colors: red in one, green in another, purplish in the third. Walls are white, ceilings a cool bluish white to give depth. Pelli explains, "We started with one color and chose others that would go well with it, sometimes complimentary, sometimes similar, to avoid a simplified or simplistic design decision." Most of the second story lobbies are ringed with retail space (still unoccupied) that is separated from the commercial space by free-standing marble screens—punctured walls, Pelli calls them.

In the lobbies generally, nothing is over-designed, overscaled, or less than gracefully proportioned. Most appealing are the Dow Jones-Oppenheimer building lobbies with their combinations of curved and rectilinear, symmetrical and irregular shapes. Least pleasing is the lower level of American Express's lobby whose retail spaces were removed to give it an open look from outside, leaving great expanses of arbitrary-looking glazing and a lot of vacant, leaky-looking space. Pelli has recommended plans for exhibits and demonstrations in these lobbies, but awaits American Express's decision.

The winter garden, the World Financial Center's pièce de resistance, and the waterfront plaza are intended as the principal destinations for the public at Battery Park City. Pelli, who designed the future plaza in collaboration with artists Scott Burton and Siah Armajani and landscape architect Paul Friedberg, says he hated the idea of the collaboration at first, fearing that "the artists would use the plaza as a canvas for personal expression."



Photographs by Allen Freeman



Above, winter garden roof plan, showing ribs and glazing pattern. Photos left indicate the room's grand scale. Right, a twilight view above the winter garden's glazed roof, with Merrill Lynch's building D beyond, now undergoing completion.

As it turned out, he says, both artists and architects agreed to discard anything that "smacked of an art statement and wasn't responsive to public use, and our different attitudes added vitality to the design." When we visited in late October the plaza was still mud-filled and covered with construction trailers.

The winter garden, a huge space the size of Grand Central Station's concourse, is framed by 120-foot-high arched steel vaults clad with clear glazing. These telescope from the east in increasing diameter, then bump back down "to contain the space," as Pelli says, before ending in a sheer wall at plaza's edge. In section, as he notes, the humped shape resembles an elephant.

This fall, the winter garden's interior characteristics were just beginning to become apparent—the marble flooring was still covered, the huge columns mostly unpainted, the retail and dining spaces undefined. It was far from ready for the 40-foot palm trees that will inhabit the space. But one could see how it might soon resemble an enclosed, small city square with the sun filtering in through its overarching filigree of steel trusses, and people dining, browsing, strolling. It is already the project's most dramatic space.

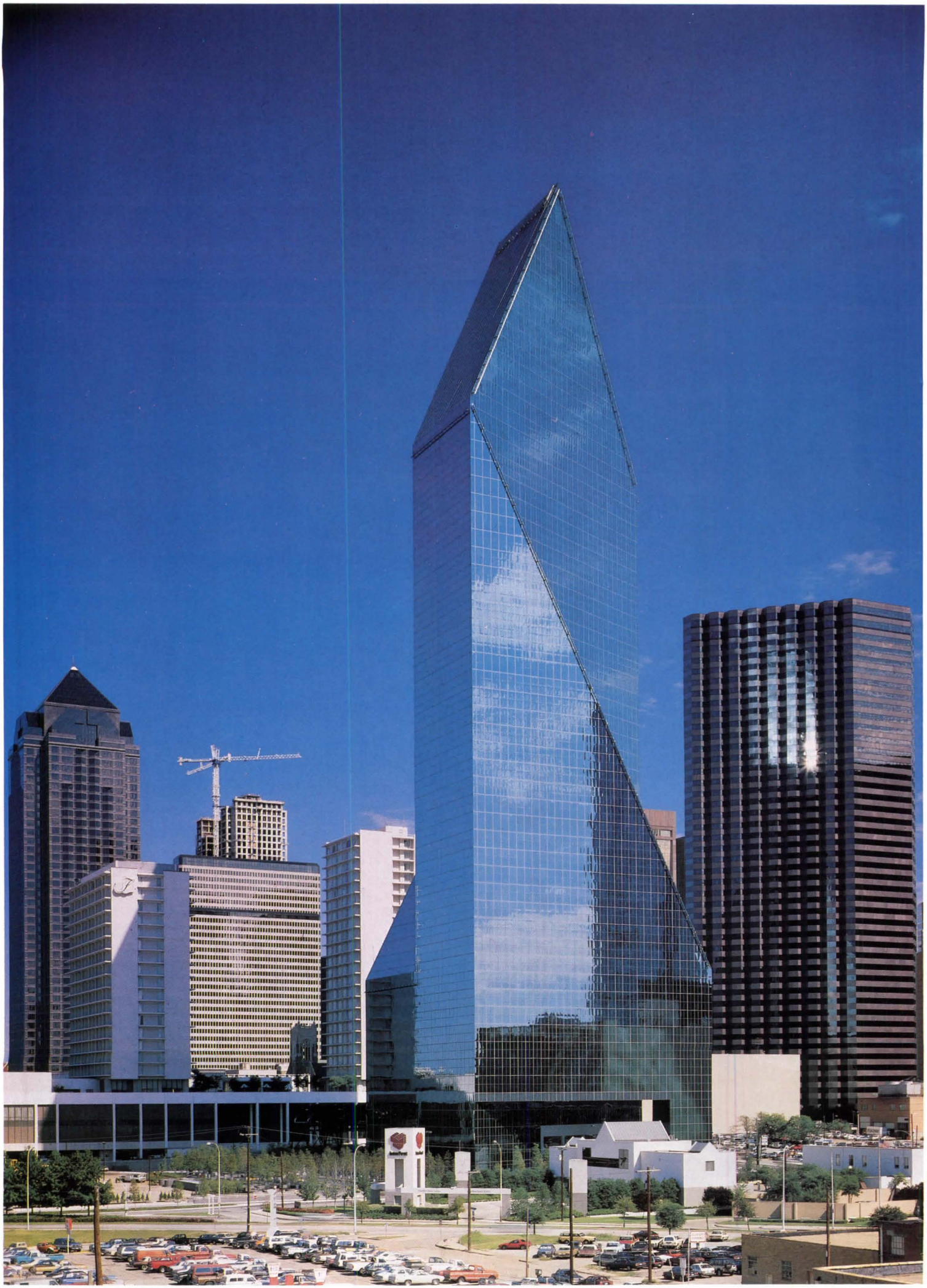
The winter garden's grand half-circle stair, with an hourglass-like tuck at its middle, will lead in from the north bridge and be a processional entryway—the only one in the complex. Planned by Pelli as a "hangout" as well as for circulation, he saw the stair as functioning like that outside New York's Metropolitan Museum of Art. At floor level will be two white tablecloth restaurants, according to Michael James, Olympia & York's vice president for retail development and leasing. The balcony ringing the second story will be mostly for circulation, and surrounding the space at grade will be upscale stores containing "antiques, collectibles, and things that appeal to the intellect," says James.

One expects to see a door or two leading from the winter garden out to the plaza. The reason for omitting openings here is obvious, once Pelli explains that "putting in doors would have made the whole space into circulation." In concept, however, one is reminded again of the 1980s shopping mall with its inward-looking, no-easy-exit orientation.

The World Financial Center is, as Pelli hoped it would be, "a complex of our time." In fact, it is almost a compendium of 1980s urban design ideas in accommodating existing city patterns, adjusting its scale, proportions, and shapes to people—rather than the other way around as in the International Style—in being the source of redemption for a neglected waterfront, focusing inward, and appealing to the affluent.

In 1969, AIA gave its 25-year award to Rockefeller Center, the jury calling it "a project so vital to the city and alive with its people that it remains as viable today as when it was built." Can we expect such a future for Battery Park City's World Financial Center? We think it likely. □

Photographs by Allen Freeman



Constantly Changing Minimalist Tower

Allied Bank building in Dallas; Henry Cobb of I. M. Pei & Partners. By David Dillon

Allied Bank Tower in Dallas is a virtuosic essay in the architecture of subtraction and easily the best minimalist skyscraper since the John Hancock Tower in Boston.

Hancock executives wanted to have the biggest building in town, yet also one that would be discreetly monumental. By using a lightly reflective glass and keeping windows and mullions in virtually the same plane, Henry Cobb, FAIA, of I.M. Pei & Partners effectively made a 60-story tower dematerialize on the skyline. Instead of a massive, three-dimensional volume, the Hancock is perceived as a shimmering plane, a gigantic suspended mirror, that provides a cool foil to the ornate masonry world of nearby Copley Square. Its drama derives from the play of light across its gridded planes and sharp end notches rather than from any elaboration of formal geometry.

Ten years later in Dallas Cobb refined the curtain wall technology of the Hancock and applied it to a dramatically different set of formal and programmatic requirements. Allied's owners, the Criswell Development Co. of Dallas, wanted their building to declaim on the skyline and at the same time provide a distinctive and welcoming space along the street. Since Dallas developers typically put the first objective before the second, the program alone represented a healthy shift in outlook. Criswell's favorite point of reference was the Eiffel Tower, which from a distance is a massive steel skeleton but up close is experienced as four lacey piers enclosing a tranquil urban park.

Allied Bank Tower at Fountain Place—to use the project's full name—is encased in a continuous surface of green glass, more taut and restrained than the Hancock's, which folds around the building's massive frame like a sheet of Saran Wrap. Neither mullions nor structure break the surface plane; it is flatness and smoothness themselves, with every fold and corner perceived as a single piece of glass. This is the Hancock Tower's technology turned on its head, with glass used to dramatize rather than conceal a three-dimensional form. So precise and rigorous was Cobb's scheme that the developers had to get a 10-foot height variance from the Federal Aviation Administration in order to preserve to the inch the 2-to-1 ratio of rise to slope that governs the entire building.

Left, the tower in context at the ragged fringe of downtown Dallas. Wrapped in green glass that photographs blue, its form seems to change as you move around it. Above, water garden.

"Nobody but Harry would have known if things were off by an inch or two," explained William Criswell. "But Harry knew, and that was enough."

The result is a glittering, 60-story glass prism, the office tower as laser-cut gem, that never looks the same twice. From one angle it is a gigantic rocket about to lift off its pad. From another it is a more prosaic tower with a soaring gabled roof, or an elaborate collage of slopes and planes intersecting at odd and unpredictable angles. Surfaces advance and recede as the viewer's position changes, making it Dallas' best freeway building, and—when the second tower is built—the fast-lane equal of Philip Johnson's Pennzoil Place in Houston.

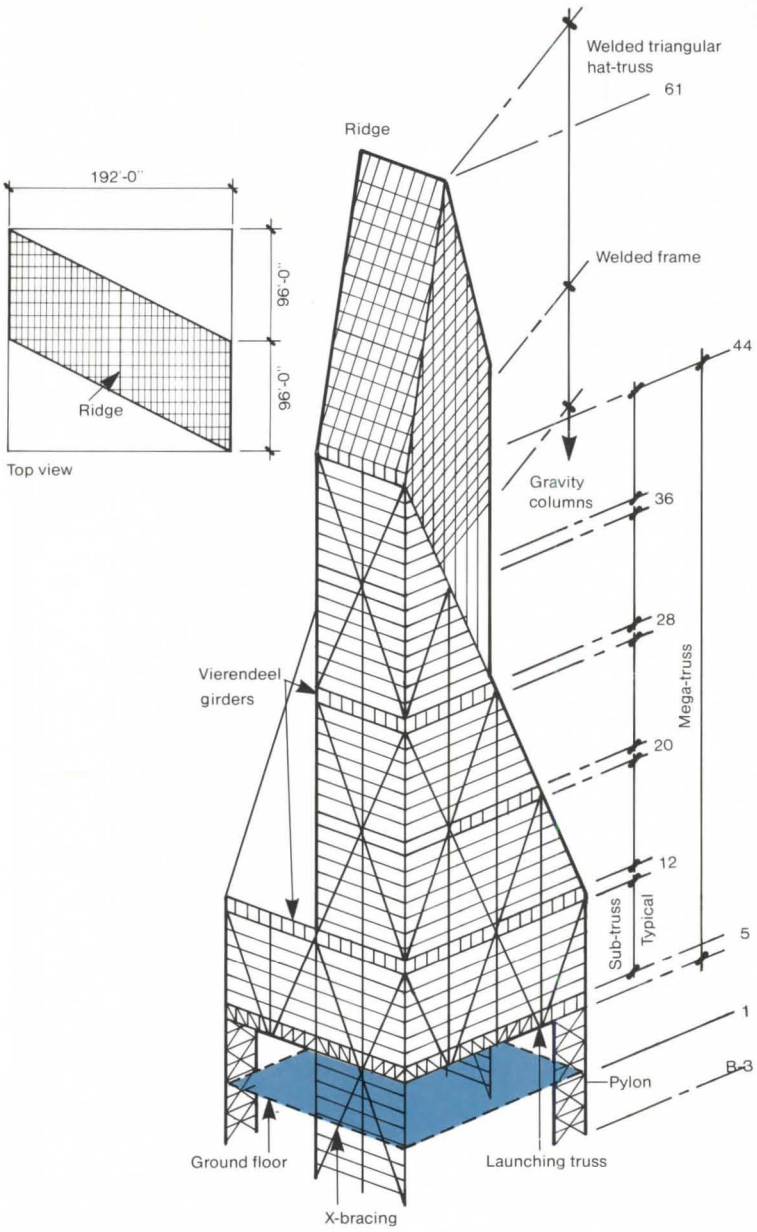
And unlike the spate of contemporary postmodern skyscrapers, with their fancy chapeaus and epaulets, Allied Bank Tower makes its statement by means of what is not there. What pierces the sky is what is left over from Cobb's deft whittling.

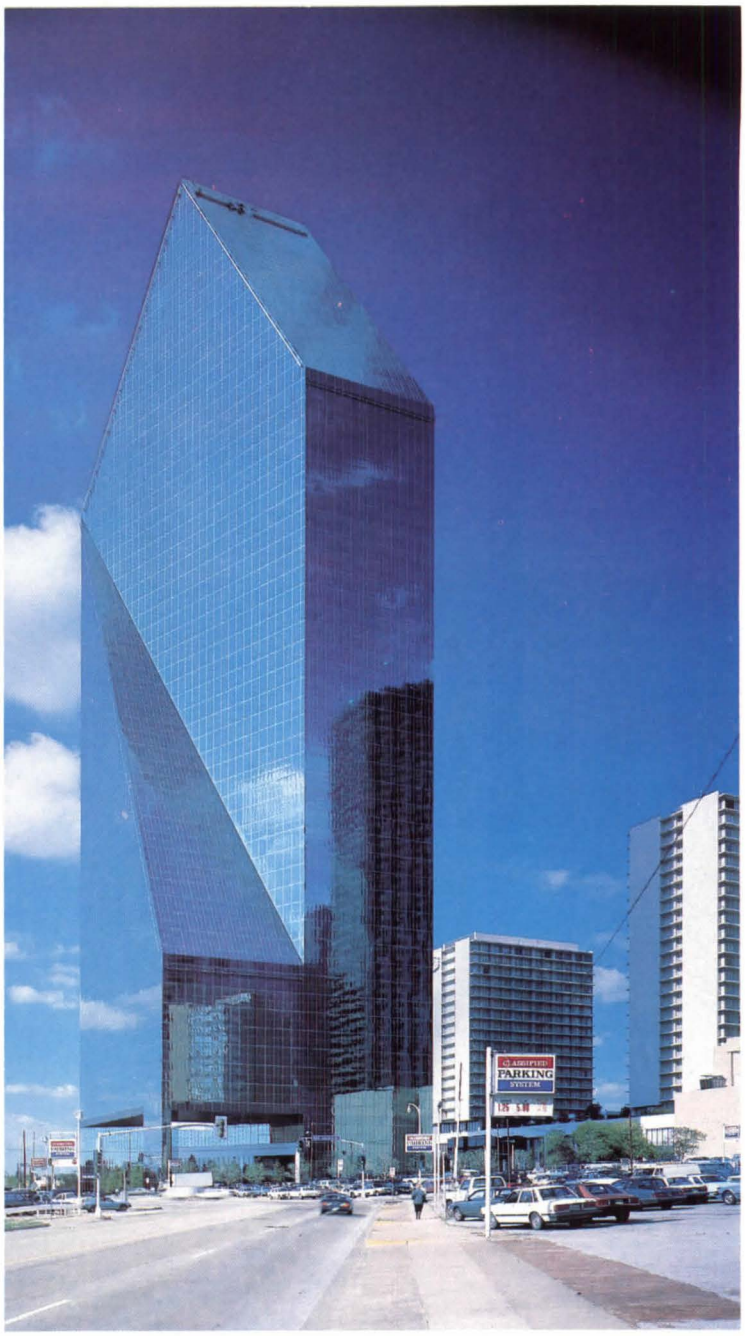
"I was determined to show that you can have a true skyscraper without all the figurative strategies of the New York skyscrapers," Cobb explains. "I didn't want a building with a hat. I'm just not interested in that kind of thing."

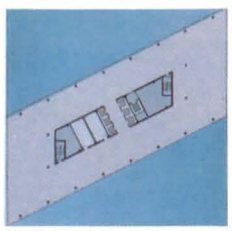
Allied rises to a graceful balletic point, 720 feet high, on a base that is 192 feet square, roughly the same size as one of the World Trade Center towers. Floor sizes range from 34,000 square feet at the bottom to 3,700 square feet at the top, with the average being around 21,000 square feet. While these variations offer considerable leasing flexibility, the gain is partially offset by the inefficiency of certain spaces, particularly those beneath the slopes and at the intersections of the building's structural systems. Here space planning borders on contortion.

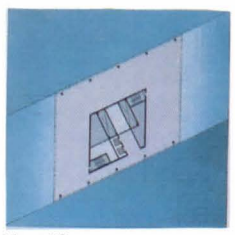
A building of such bulk could have been an urban nightmare—the spaceship victimizing hapless pedestrians—had not Cobb and associate architect Harry Weese, FAIA, carved a six-story chunk out of the base to accommodate a six-acre plaza and water garden. This is the kind of transformation from object to space that the Hancock Tower needed and didn't get. Hancock's curtain wall crashes icily into the sidewalk, mirroring but never really engaging its rich surroundings.

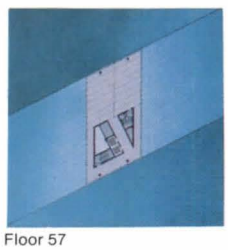
The Allied plaza, designed by landscape architect Dan Kiley, combines elements of a pond and a European public garden. Seventy percent of its surface is water, so that from above the office tower appears to be floating. Some areas are dark and tranquil, like the surface of a swamp, while others froth and

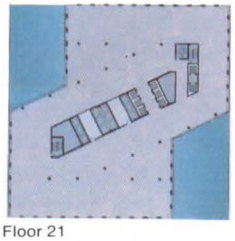





Floor 45


Floor 52


Floor 57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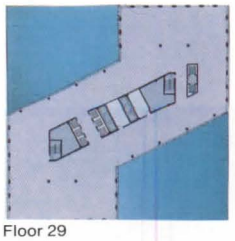
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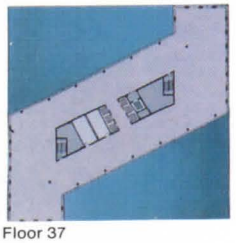
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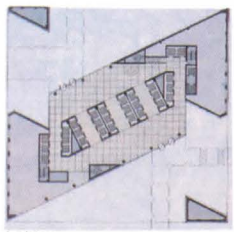
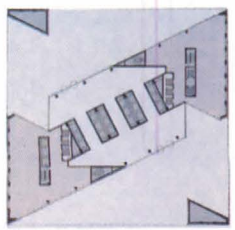
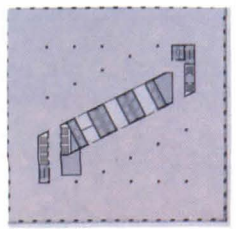
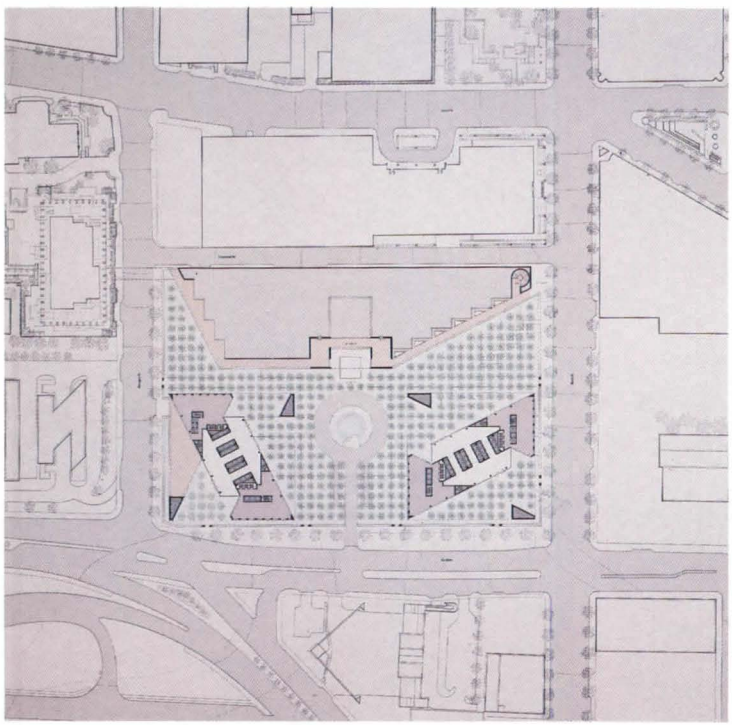
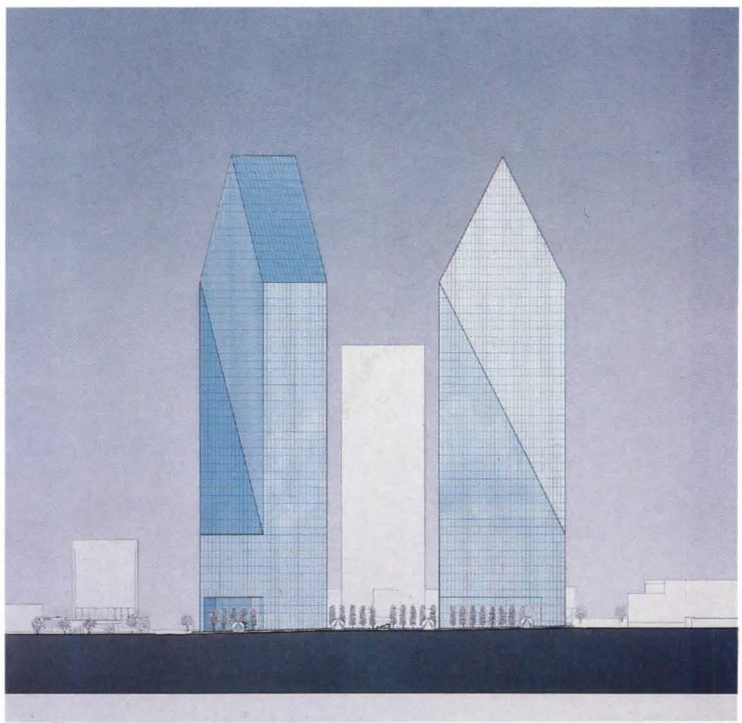

Lobby


Floors 2-4


Floors 5-12

Top, a system of mega-trusses and cross braces is part of the steel structure. Above, with a square footprint, the building rises from a base designed by landscape architect Dan Kiley that flows under the mass of the tower. Right, nine representative floor plans. Opposite page, Allied rises behind the 1984 Dallas Museum of Art by Edward Larrabee Barnes.





Above left, the site plan with unbuilt tower that mirrors Allied in form. White building between the towers in rendering above is an unbuilt hotel. Right, bubblers and gushers at the base.

roar with bubblers and cascading waterfalls, like miniature upland landscapes. A dramatic computerized fountain sits in the center of the plaza, surrounded by hundreds of bald cypress trees in soldierly rows and interlaced with a grid of walkways. It is a rigorous classical design, a downtown version of a Le Nôtre landscape, in which building and site come together as one. The plaza lures us in with a glimpse of water and trees, only to reveal something beyond, and then something beyond that. Our imagination doesn't stop at the edge of the site; the cypress trees, planted 15 feet on center, could go on forever, like the horse chestnut trees in the Tuileries. And as we walk among the trees and beneath the legs of the building—the Eiffel Tower again—interior and exterior spaces merge. The outdoor plaza *is* the real lobby of the building.

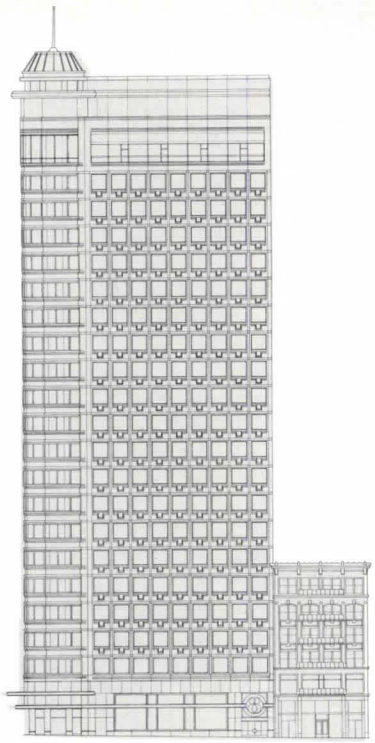
At one point Weese even proposed a "see-through" lobby, with no elevator core below the sixth floor and all traffic carried by large escalators. The idea was eventually scrapped because of cost ($4 million) and practicality (Who wants to ride a six-story escalator every day?). Also, the developers feared that such a pristine space would be too chilly for tenants. So instead of Cobb's black granite and stainless steel trim they introduced dark green marble, brass trim, and some curvilinear decoration around the elevator cabs cribbed from Louis Sullivan. Well-intentioned and by conventional standards well-executed, these details nevertheless introduced an interior decorator flourish in the meticulous orchestration of building and landscape that is one of Allied's major strengths. Sometimes less really is more, and this could have been one of those occasions.

From the outset, Allied Bank Tower has been plagued by rumors of its financial collapse and by attacks on its design. A second tower, in form a mirror image of the first turned 90 degrees, has been postponed, but leasing in the first tower has kept pace with the generally sluggish Dallas market. The criticisms, mainly from local architects, have focused on Allied's bulk, and on what some consider its unseemly pyrotechnics. If Allied were located in the heart of downtown, among venerable neighbors with clearly defined formal relationships to one another, such protests on behalf of urbanity might be justified. The building as solitary sculptural object is a constant source of urban misery, and nowhere more than in the cities of the Southwest. But Allied is located in a no man's land of parking lots and second-rate commercial buildings, adjacent to an elevated freeway but essentially without context. In such surroundings the bold architectural gesture is not only appropriate but perhaps imperative, if only to suggest new design possibilities for an otherwise characterless stretch of urban real estate.

Allied currently stands midway between a fledgling arts district and a revitalized warren of warehouses and commercial buildings known as the West End Historic District. Unrelated formally to either, it nevertheless acknowledges its urban responsibilities through its grand plaza, which may be the key to unifying this entire area as a kind of garden office district, unlike anything else in the city.

In the meantime, Allied balances skyline bravura with urban sensitivity. If it is unapologetically open to the future, it also provides an illustration of how to live civilly in the present. □


HASTINGS



Bright Streamlined Tower

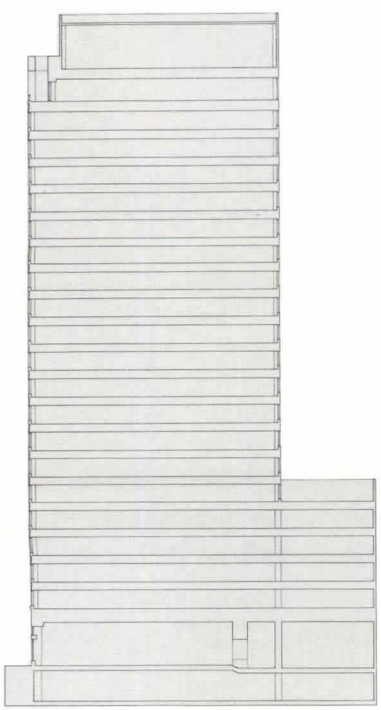
88 Kearny St., San Francisco; Skidmore, Owings & Merrill.
By Allen Freeman

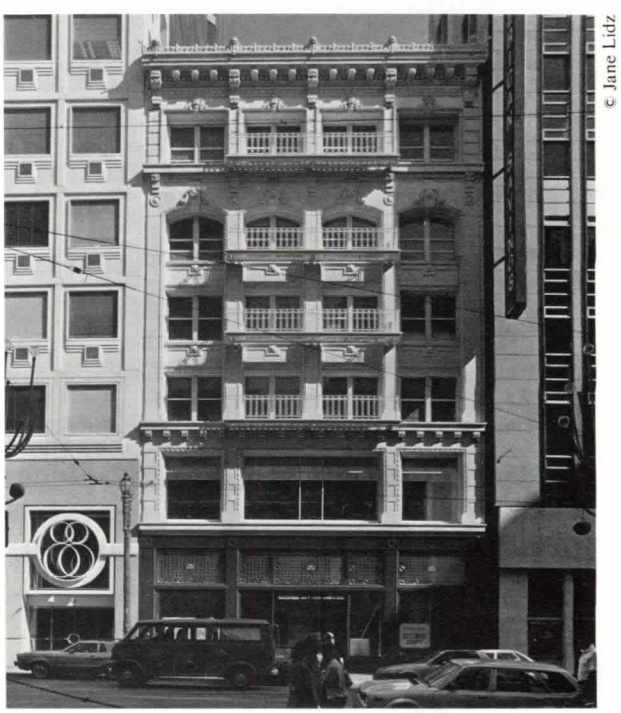
Recent downtown San Francisco skyscrapers seem more brooding than buoyant. When the fog lifts, their walls of dark, polished stone absorb and diminish the city's extraordinary sunlight. Such somber company makes the new 88 Kearny Street building by the local office of Skidmore, Owings & Merrill seem all the brighter. Its white turret distinguishes the corner of Post and Kearny in the long views that are characteristic of San Francisco. And at close range, the 22-story west elevation does justice to the light that Lewis Mumford called San Francisco's "torrid dazzle."

The street facades above a base of light granite are white precast panels with large windows. A little wider than they are high, the windows project slightly over sills that step down around small rectangles of blue tile, casting thin shadow lines. Horizontal ribbon windows wrap the corner turret, set off by white mullions and step sills, sans blue-tile inserts. Rings on spokes project from the top and bottom of the turret; when you walk around the lower ring, it almost seems to rotate, an illusion perhaps furthered by a likeness to the 1930s Universal Pictures logo encircling the globe (here the decoish block letters spell San Francisco Federal Savings). Less convincing is a silver hat capping the turret. Although it can't be seen when you are next to the building, in distant views it looks like a giant, upside-down kitchen bowl with a flagpole spiked through its center.

It is not clear to visitors that the little building beside these 22 stories facing west down Maiden Lane is a part of 88 Kearny. Known as the Maskey, the building was a six-story, six-bay-wide candy factory built after the 1906 earthquake. In preparation for construction of 88 Kearny, SOM dismantled the Maskey's terra-cotta facade tile by tile, tore down the struc-

Facing page, the view down Post Street toward Market, with afternoon sun reflecting off the Kearny Street facade. Below, the Maskey building facade affixed to a six-story extension of the 22-story structure in view from the end of Maiden Lane.





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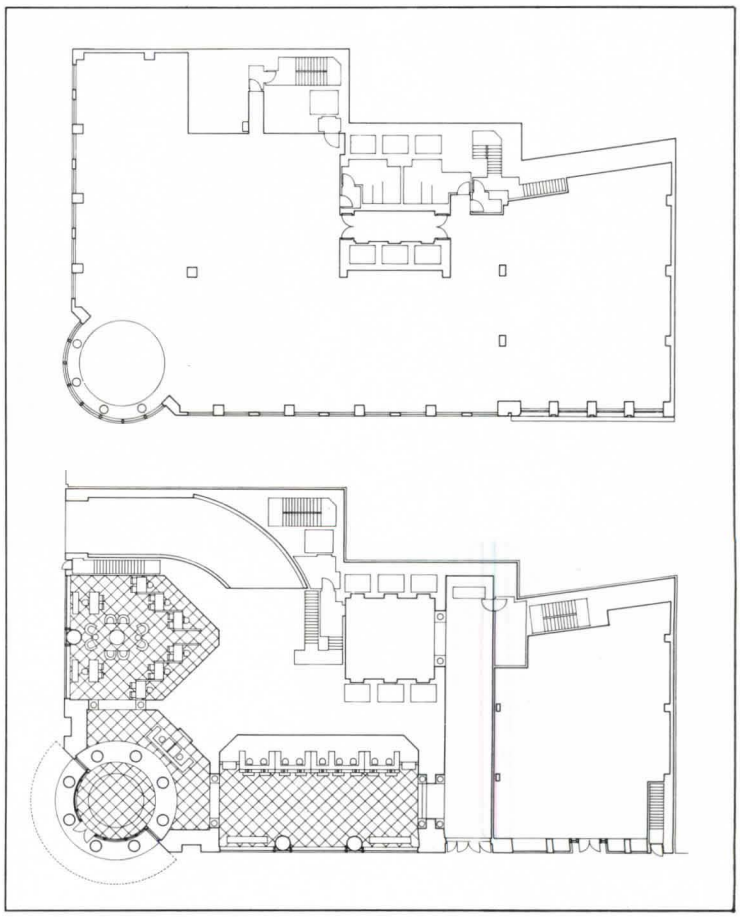
Left, the granite base along Kearny Street and, bottom, the foot of the turret, with spoked awning above columned entrance. Right, the rotunda entrance to the two banking rooms, where metallic dots shimmer on ceiling above translucent louvers.

ture, reduced the facade to four bays, assembled them on precast panels, and mounted the panels on a six-story midblock appendage to 88 Kearny. Now the width of and directly in line with Maiden Lane, the old elevation—moved some 60 feet south—reads as a separate building. In fact, its ground floor and mezzanine of leased shop space don't connect into the larger building, while its top four floors house office extensions of 88 Kearny.

With a new and appropriately scaled focus for the end of flavorful Maiden Lane where formerly there was none, the move was at least partially justified on urban design grounds. Larry Doane, AIA, SOM principal in charge, says convincingly that attempts to build around the Maskey would have humiliated the old building. But making stage sets of old facades must be among the lowiest of acceptable preservation tactics.

Inside 88 Kearny, there are no literal references to the 1930s, says Doane. But the ground floor interiors, especially, have the spirit of streamline design. The rotunda banking entrance in the turret sets the tone. Four exterior structural columns and four nonstructural interior ones rise to a sliver of a drum with eight custom sconces capped by green translucent disk shades, then to a clerestory with five horizontal louvers in the same green plastic, then to an interior dome studded with a sunburst design of gold and silver dots. In the two banking rooms off the rotunda, wood trim sets off polished stone, and green louvers soften bright sunlight. Understated and sleek but not cold, they seem like happy places to bank or work in.

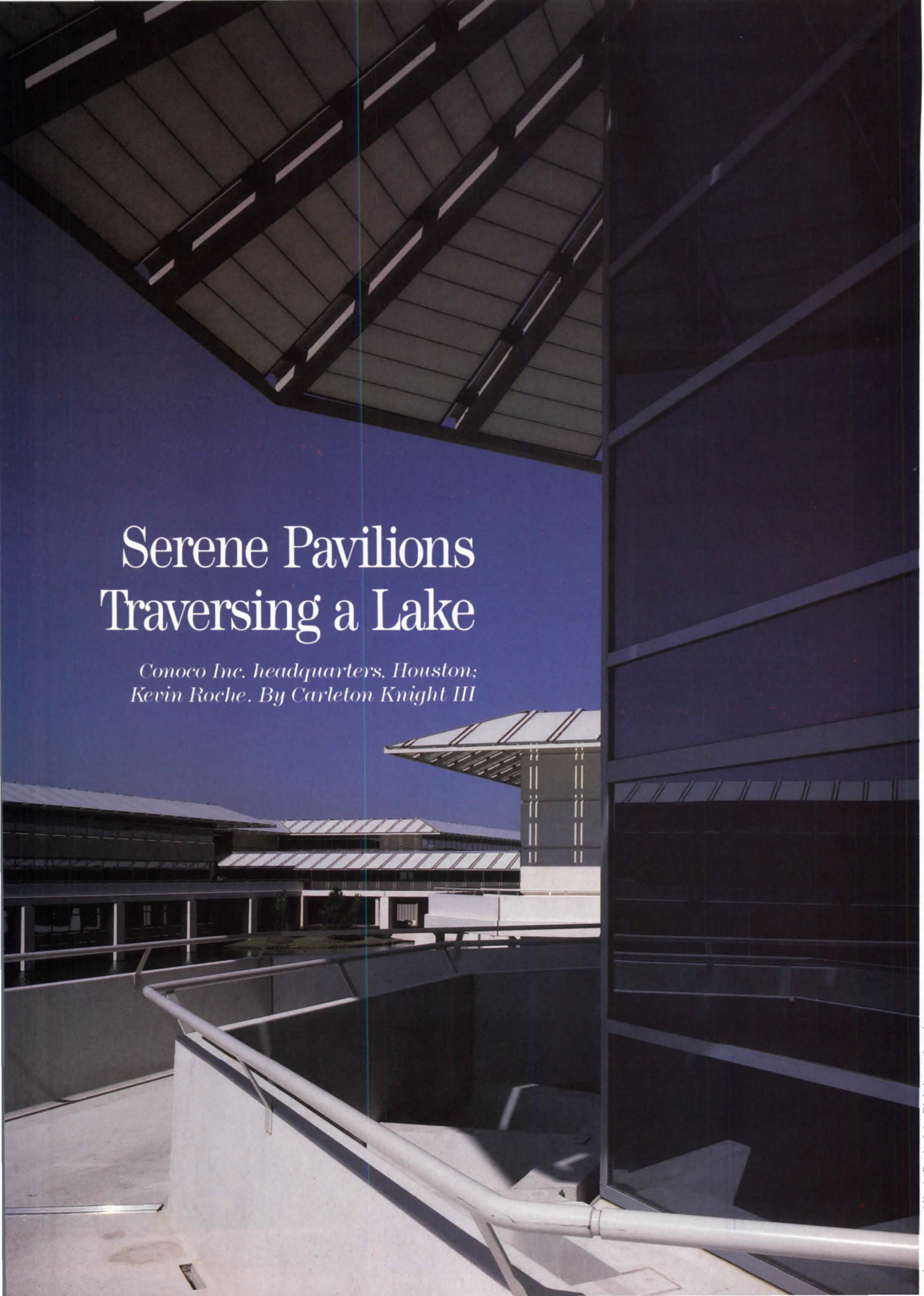


Above, the larger of the two banking rooms with teller stations facing Kearny Street. Louvers soften sunlight at clerestory line. Left, wood detailing on portals is lit by integrated up-lights. Right, wood screens are positioned behind teller stations. □

Photographs © Jane Lidz

Serene Pavilions Traversing a Lake

Conoco Inc. headquarters, Houston; Kevin Roche. By Carleton Knight III



graphs courtesy of Kevin Roche John Dinkeloo & Associates

In designing a new corporate headquarters for Conoco Inc. in a featureless Texas landscape off a busy freeway 17 miles west of downtown Houston, architect Kevin Roche evoked imagery of old plantation houses with their wide, overhanging eaves sheltering deep second-floor verandahs over colonnades. While Roche maintains that Conoco is not historicist, it is "very Southern, and very traditional," he says with a sly smile.

The complex includes 1.2 million square feet of office space in a collection of linked, three-story buildings that form an irregular grid over a nine-acre, man-made lake. It provides private offices for 2,000 employees, work stations for another 500, and parking for 2,000 vehicles.

In an intensive study, the kind for which the Kevin Roche John Dinkeloo & Associates is noted, the architects determined that a double-corridor building 60 feet wide would provide the most efficient layout, allowing private offices on either side divided by services and work stations in the center. Roche and his staff, who spent a warm summer in Houston interviewing more than 150 Conoco employees, discovered one of the biggest complaints about the company's previous quarters was the long wait for elevators. That and Conoco's desire for a campus-like setting led to the three-story scheme.

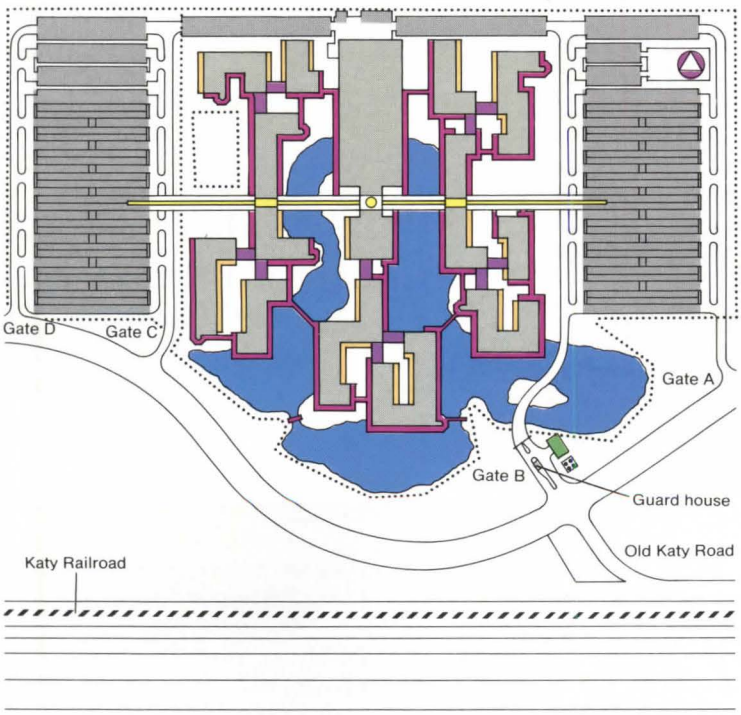
Accommodating the oil company's vast needs in a three-level, 60-foot-wide building would require that it be more than a mile long, however. Roche began to think in terms of a pattern, much like a tic-tac-toe grid, with offices looking to the perimeter and into a number of courtyards.

Concurrently, he examined the problem of parking. In earlier Roche Dinkeloo designs, the cars have gone in the center, as at Union Carbide; underneath, as at General Foods; or above and below, as at Richardson-Vicks. Because of Houston's high water table, underground parking was an impossibility, so he turned to surface parking with canopies to protect vehicles from both the blazing sun and torrential rains. To reduce the vastness, he split the parking in two, placing equal lots on either side of the building complex and linking them by a bridge-like, central spine through the office building grid. This axis, nearly a third of a mile long, became a major generating factor in the final design.

The formal grid pattern began gradually to "dematerialize," in Roche's words, and slowly evolved into a collection of 16 separate but linked buildings. The buildings are in five groupings plus a mammoth central services structure, considerably larger in footprint than a football field, that includes executive and visitor parking, loading docks, computer space, a fitness center, and food service facilities.

Surprisingly, the sizes of the various buildings—they range from approximately 33,000 square feet to nearly 100,000—were not based on programmatic factors. As with their placement, they are based almost entirely on esthetic judgments. Conoco, after Roche developed the plan, divided up its employees by major operating areas and fit them within the various buildings, each of which is named after an individual or location prominent in the company's history. As a general rule, the buildings to the east reflect "downstream" or refinery operations, while those on the west are "upstream" or exploration functions, and the center is reserved for general services. Roche made minor adjustments in building sizes to accommodate the varied operations, but the company handled space assignments. Says Ken

Conoco headquarters sits in a serene, water-filled landscape with outside walkways and bridges linking the 16 buildings in the complex. Awning-like sunshades, inspired by plantation houses, create visual interest in the facade and reduce energy costs.



Central reception
Visitors house phone parking
Jogging trail
Parking lots
Helistop
Redwood trellises
Pedestrian bridge
Walkways
Atria

R. Gerhart, general manager of Houston facilities and the client's representative, the architect would have had to have "known the total business picture. It would take Kevin a lifetime to understand."

The initial space planning task was made easier by an unusual alternative approach to office layout. Conoco's former headquarters had seven different-sized offices for the various levels of staff. Gerhart says that Conoco spent $1.5 million to $2 million annually altering offices for changing executives.

As Roche had done with Union Carbide, he established a single standard office size, roughly 12x15 feet (the 14 top executives get two modules). "This democratic approach was the most fought over" in the design, says Gerhart. For higher-level executives, the nonhierarchic plan is ameliorated somewhat by offering a choice of more elegant wall covering—mirror or wood (the panels are on tracks and easily demountable when personnel change).

As a counterpoint to the standardization of private offices, Roche's buildings often feature a rather grand public space—one thinks of the gardens at the Ford Foundation and Deere West or the huge, mirrored atrium of General Foods—but at Conoco, he changed direction somewhat. "We do not have a central community space; instead we turn the idea inside out and create a

In photo above left and plan at left, covered parking areas on either side of buildings are linked by central spine. Above, trellises, soon to be covered with vines, extend shading on lower level. Top and across page, facade combines white precast concrete panels and mirror glass with glass fiber shades in artful composition, reflected by lake.

Photographs courtesy of Kevin Roche John Dinkeloo & Associates

park into which the whole building is placed," he told Francesco Dal Co in the new Rizzoli monograph, *Kevin Roche.* "It is a campus and will have the same felicitious effect on the occupants as if they were working in a well-planned university campus."

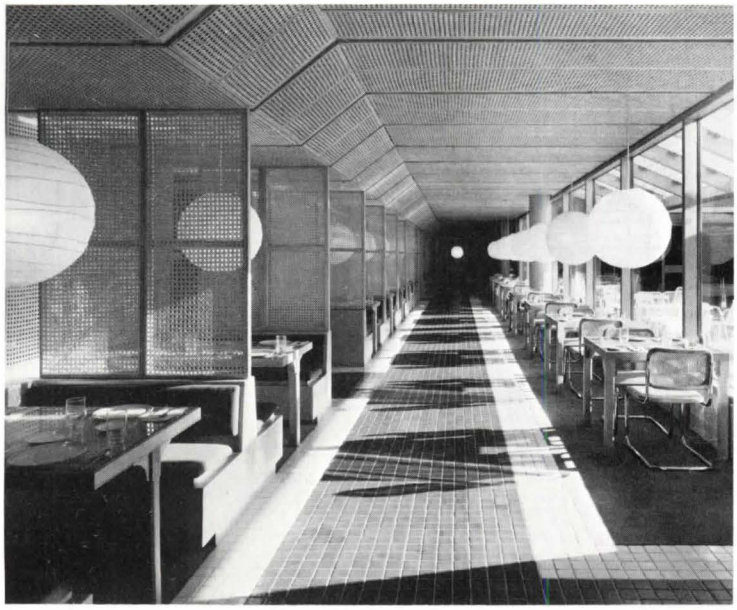
That said, Roche did include a collection of semi-public spaces linking the various individual buildings. He designed skylighted atria in pairs set at right angles to each other, an economical layout that enables three buildings to be served by a single elevator (most employees use the skylighted stairways). He treated these links as gardens. His original intent had been for the walls to be all glass, but energy considerations changed this, and the walls are an extension of the facade. While some of the individual elements in these atria are pleasing—the cane ceilings and deep, narrow skylights, especially—the spaces seem too enclosed, and the tiled benches surrounding the elongated planters, which need more greenery, seem afterthoughts.

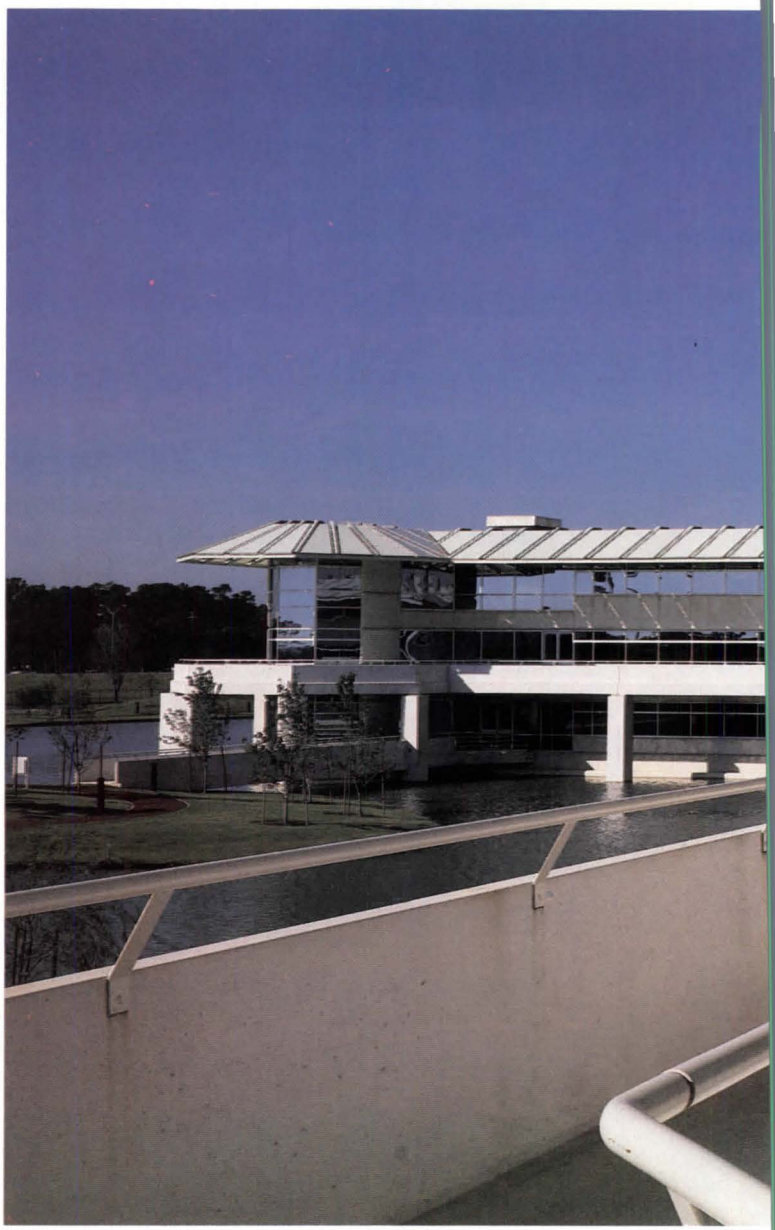
The most dramatic architectural feature at Conoco is the system of awnings that run around the buildings throughout the complex. Roche has employed similar devices before, notably at his Union Carbide office building. He says he thought placing awnings at each level for Conoco, as he had at Union Carbide, for example, would make the facade dull. Rather, at Conoco, he opted for a single shade projecting from the roof, but doubled in depth, to 13 feet long. Constructed of glass fiber panels over an aluminum frame to reduce the weight of the extended cantilever, they diffuse the semi-tropical direct sunlight and with the mirror glass walls significantly reduce the airconditioning load.

Then Roche added a walkway at the second floor—he calls it a "sunshade you can walk on"—which moves circulation outdoors and, additionally, creates an arcade for the ground level. The visual effect of all the very white, precast concrete panels, columns, and beams joining together is that of a concrete erector set, and a big one at that; there are more than 1.5 miles of exterior walkways. To alleviate the potential boxiness of the scheme, semi-hexagonal bays containing conference rooms were conceived late in the design. They make the roofline more complex and interesting.

Roche extended the arcade effect on the ground level by adding trellises. Carolina jasmine and fig ivy will cover nearly the entire lower level. Combined with 750 trees, including willows and indigenous live oaks, Roche, who was assisted in the landscaping by Stanger Associates of Houston, expects the complex eventually to have a "very much overgrown look." The site, appropriately enough for Houston, resembles a bayou. It is heavily bermed in front, a feature that successfully reduces noise from the adjacent freeway and railroad. Standing on a balcony overlooking the lake, one senses restfulness. Conoco is a place for quiet introspection as well as business.

The reception area offers hints of the overall interior design. Panels of webbed cane, which Roche first used at One Summit Square in Fort Wayne, Ind., cover the ceiling. Hangings from the company's collection of hand-crafted textiles from throughout the world, all of which were selected with the aid of the Roche Dinkeloo firm, grace the rear wall. The pieces range from 18th- and 19th-century Oriental screens and robes to an early 20th-century Navajo rug. Two delightful hangings enhance the executive offices: a multi-colored, 19th-century American quilt in a baby blocks pattern hangs near the dining room, and



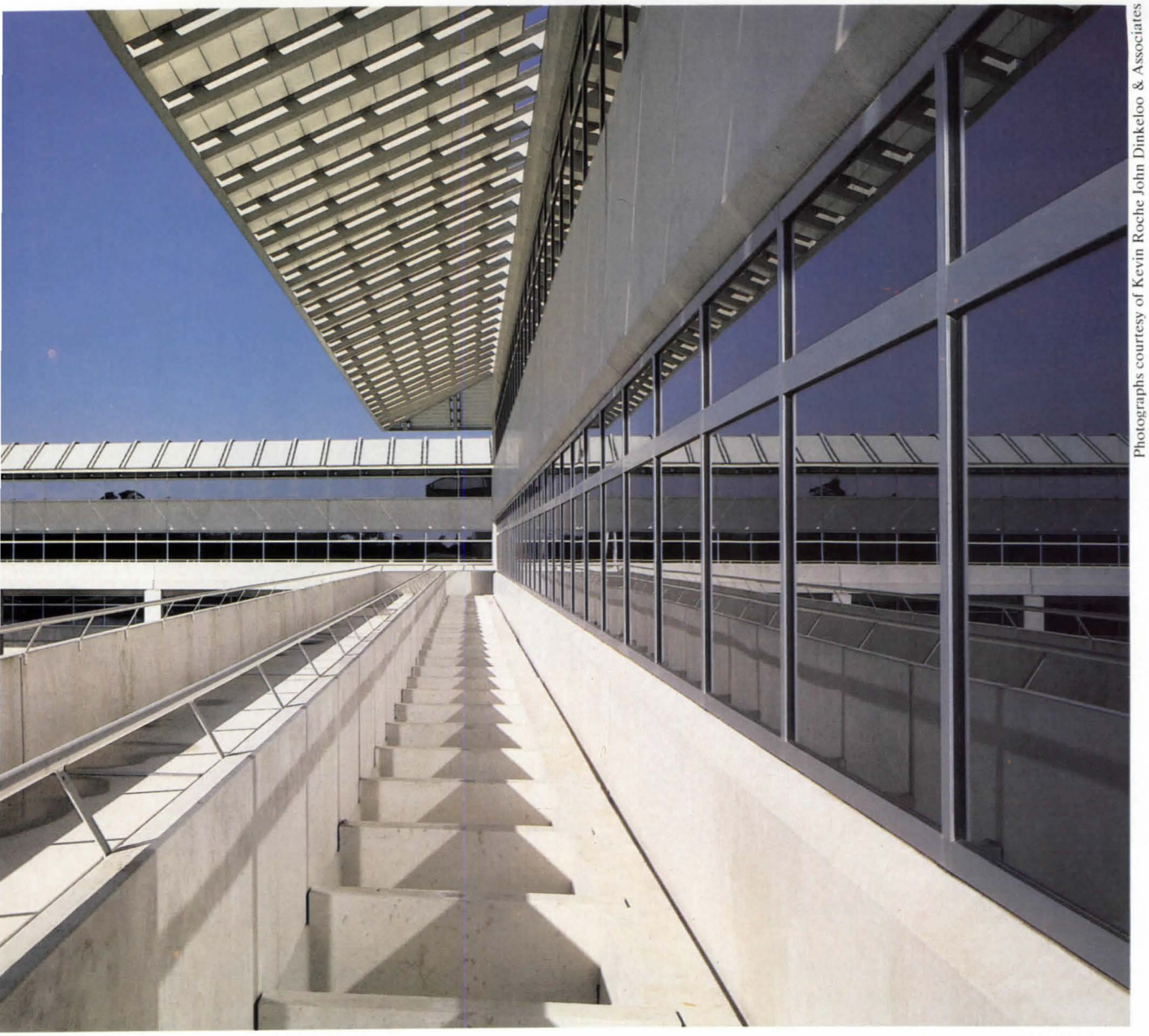


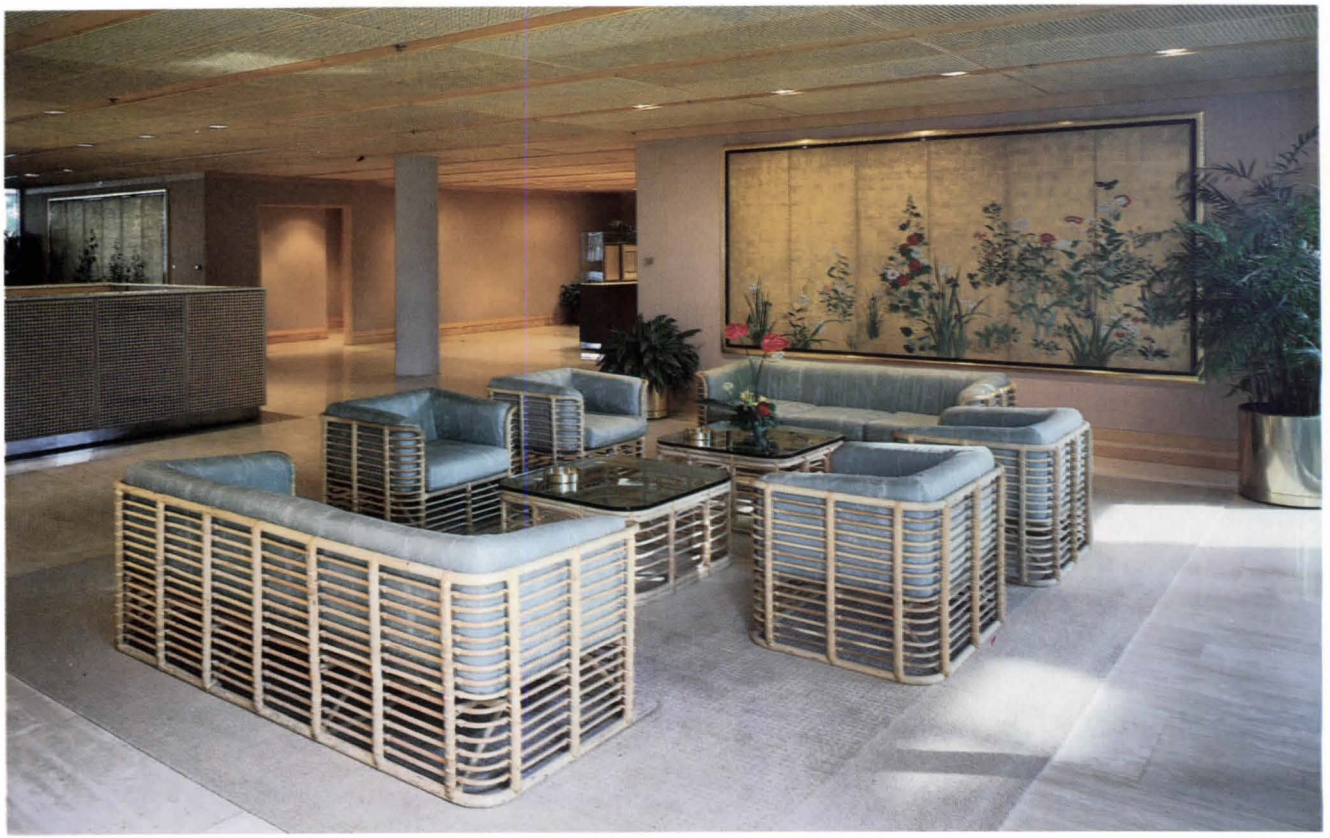
Architect utilizes webbed cane panels to add style to cafeteria (left top), central auditorium (left middle), and public lobby (across page) that also displays hangings from company collection. Above, exterior fits together like pieces in a concrete erector set. Left bottom, awning forms peak over central spine.

an 18th-century Japanese screen featuring Samurai swordsmen provides a pleasant accent in the executive conference room. The walls of the executive area, where offices are arrayed around a garden court, are covered in a fabric whose color Roche describes as "faded cranberry." Other public areas of the building are also filled with art—oils, watercolors, drawings, prints, needlepoint, and photographs—from the company's nearly 100-piece employee collection.

A large central exhibition area features material about the company and its history, including old signs, polished drill bits, and other paraphernalia for underwater exploration. The stylishly arranged material was developed by Rudolph de Harak and Tony Spagnola, who have worked with Roche Dinkeloo on corporate exhibits at the headquarters buildings for Cummins Engine Co. in Columbus, Ind., and General Foods.

Roche's interior scheme for the offices, which he has utilized successfully in a number of buildings since Richardson-Vicks, employs a 5½-foot-high, deep wall—it can include files, shelves, and closets—topped by a panel of glass 2½ feet high. Mirrors face the interior core opposite that clerestory. The result is an interior suffused with natural light. Task lighting in individual offices further reduces energy consumption. Overall, the interiors are bright and airy. □

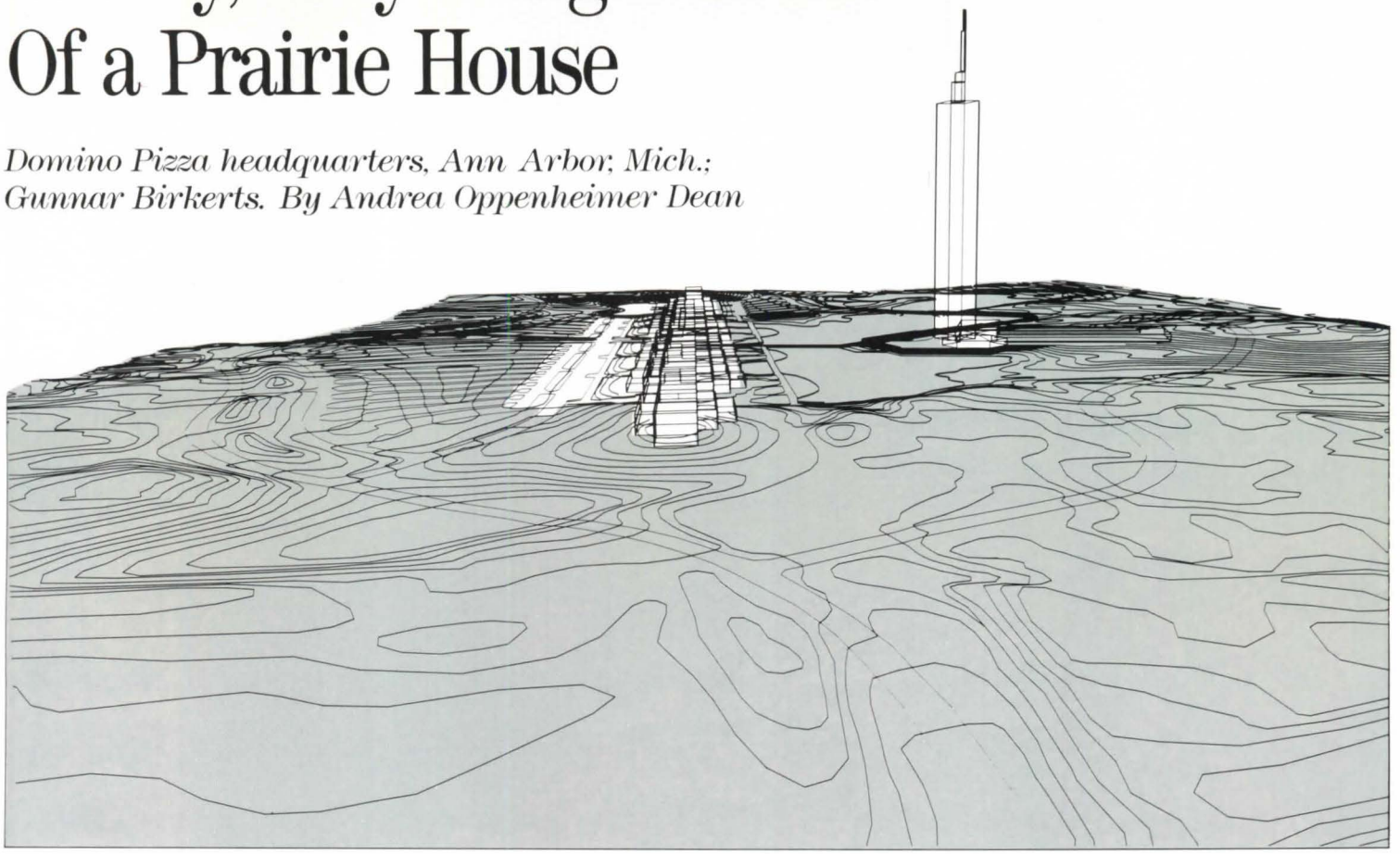




Photographs courtesy of Kevin Roche John Dinkeloo & Associates

A Very, Very Long Version Of a Prairie House

Domino Pizza headquarters, Ann Arbor, Mich.; Gunnar Birkerts. By Andrea Oppenheimer Dean



It is an unusual story, one without analogue in recent architectural history. It begins with an unusual client, Thomas S. Monaghan, founder and president of Domino's Pizza, for which this ensemble by Gunnar Birkerts, FAIA, serves as headquarters.

A Horatio Alger character, Monaghan grew up in orphanages and foster homes in Northern Michigan. He recalls that "from about the age of 4, I was intrigued with certain kinds of buildings. In cars, I'd be staring out at every house, deciding which ones I liked and which I didn't and why." His fascination with Frank Lloyd Wright—"the greatest house-builder of his century," in the words of critic Norris Kelly Smith—began when Monaghan was browsing in a public library at age 12. The once homeless tycoon has remained obsessed with Wright ever since, especially with his Prairie style and its predominantly horizontal line, which Wright called "the line of domesticity."

As a boy, Monaghan remembers, his ambitions included becoming a shortstop for the Detroit Tigers and an architect. Instead of playing for the Tigers, he bought them in 1983. He may have thought he was also buying an architect when, soon afterward, he hired Birkerts to design a headquarters that "would pay homage to Wright."

Monaghan was convinced that Birkerts, whose buildings, like Wright's "were timeless and each very different from the other," was "America's greatest living architect." A holdout against revivalism, postmodernism, and all other recent isms, Birkerts describes his interest in Wright at the time as "only average."

But he wasn't entirely unsuited for the task. For one thing, Birkerts had worked in Eero Saarinen's office after emigrating to the U.S. from Europe in the '50s and adopted the younger Saarinen's approach of viewing every new project as a puzzle for piecing together specific needs of functions, users, clients, and site. Birkerts has, in fact, developed no single emphatic or even recognizable style.

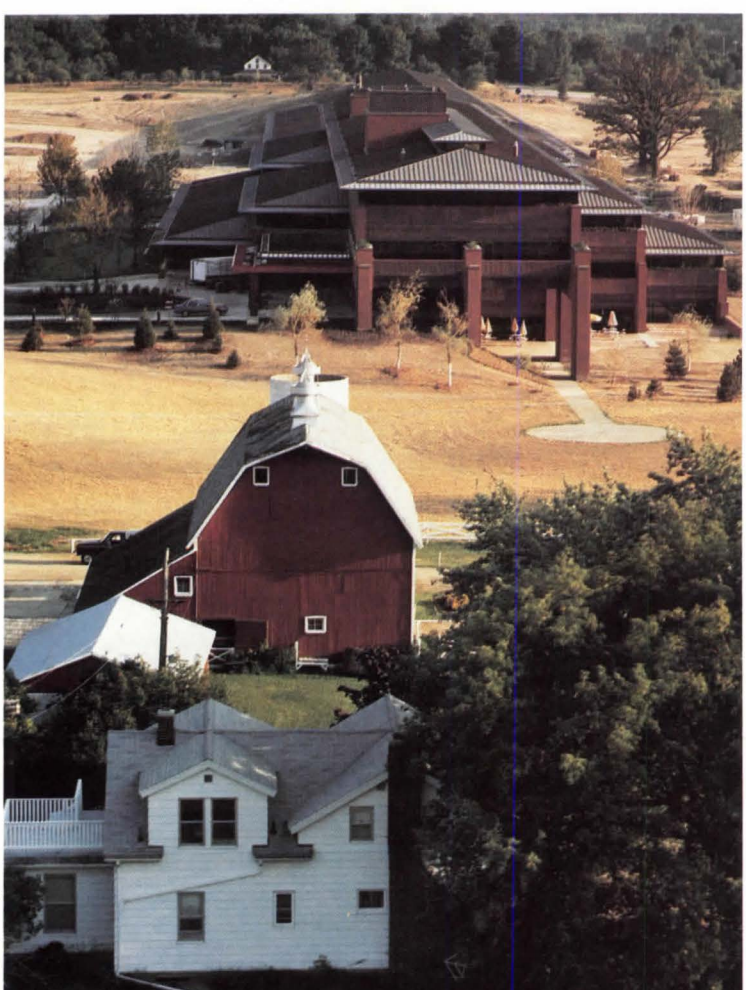
Among his early works, moreover, are buildings emphasizing long, low roofs, natural materials, and clerestories—elements identified with Wright that Monaghan would insist upon having for his 1,300,000-square-foot headquarters on a 300-acre site in Ann Arbor Township, Mich.

The client also stipulated that the complex include a farm and be pastoral in feeling, have berms, copper hip roofs, and ribbon windows à la Wright, and include a reconstruction of the unbuilt "Golden Beacon," a 250,000-square-foot mixed use tower designed by Wright in 1956 for Chicago. William Wesley Peters will be in charge of a team from Taliesin that will convert Wright's drawings—consisting of typical floor plans, elevations, a section, and a perspective rendering—into working drawings that reduce the original from 56 to 30 stories, modify it for hotel use, and fill in the missing details. Monaghan seems surprised by the idea that he may be courting Disneyfication.

Would Wright have considered accepting such a commission after chortling and harrumphing? "Wright would have sent him to hell," says Birkerts. "For me, the challenge was to pay homage to Wright as the client wished, but on my own terms." The architect hoped to educate his client, and was largely successful.

Birkerts' first triumph came in convincing Monaghan that the model he had in mind for the complex, Wright's unbuilt McCormick house of 1907, was unsuitable because too domestic, and to persuade him to accept instead a single, long (2,700-foot) building of approximately 750,000 square feet within four levels. It is based on a system of parallel "tracks" on which the spaces are aligned horizontally and stacked vertically to produce floor areas from 28 to 196 feet in width and of almost any length. In its flexibility and common sense functionalism the scheme was in the tradition of Wright's "organic architecture," a concept that has long been key also to Birkerts' work.

Phase I (a 220,000-square-foot, four-story office building sited along a ridge between two drainage areas and hills to the north and south) and phase II (a warehouse and operations plant to the south) are complete. Phase III (additional offices and commercial space) will begin construction to the north of the office



Photographs by John M. Williams

The 270,000-foot-long complex, now comprising a warehouse/operations building (above) and offices (left), will include a working farm and an interpretation of Wright's unbuilt 1956 'golden beacon' for Chicago to be adapted by a team from Taliesin.

building next summer or fall, and the "Golden Beacon" will rise across the western drainage area, which will be damned to create a shallow lake just west of the office building.

No shortcuts were tolerated when it came to landscaping, which Monaghan regards, together with the roofs, as "90 percent of the job." The land has been scooped up into great rolling hills. This was, as Birkerts says, "an artificially forced project in more ways than one."

The new buildings are, in Monaghan's words, "like a long ship thrusting through the landscape." The warehouse burrows into the earth between two broad berms, while the office building, which is on a hill, rises somewhat stiffly to its four stories. Its composition of hipped copper roofs, redwood soffits, mullionless clerestories, and brick cladding with barely perceptible joints holds up better at close range than from any distance where its volumes tend to blur and lose coherence.

When I visited in early October, the copper roofs hadn't yet weathered to green, which will heighten the building's graphic definition. The pergola outside the main entrance was still unassembled, and little ivy plants had barely begun to take root and sprout around the building, which Monaghan hopes will in time be almost 90 percent covered—an idea with which Birkerts has no quarrel. But Domino's defining characteristics were in place. Its long, low roofs are "beautiful things," as Monaghan said of Wright's; its proportions and dramatic scale changes are deftly handled, as is the detailing.

The architect's interior design work was restricted to an unassuming lobby, below-grade space for exercise, eating, and relaxing, and an executive suite, where the client let loose. Monaghan explains, "It was one of the great opportunities of

The client requested 'a monument to Wright' and specified use of natural materials—long, low, copper-covered roofs, ribbon windows, and berms a la Wright—as seen in office building from northeast (below) and northwest (bottom). Across page, no expenses were spared in Wrightian executive suite; stained glass door, below left, leads to skylit corridor of executive offices.

Balthazar Korab

John M. Williams

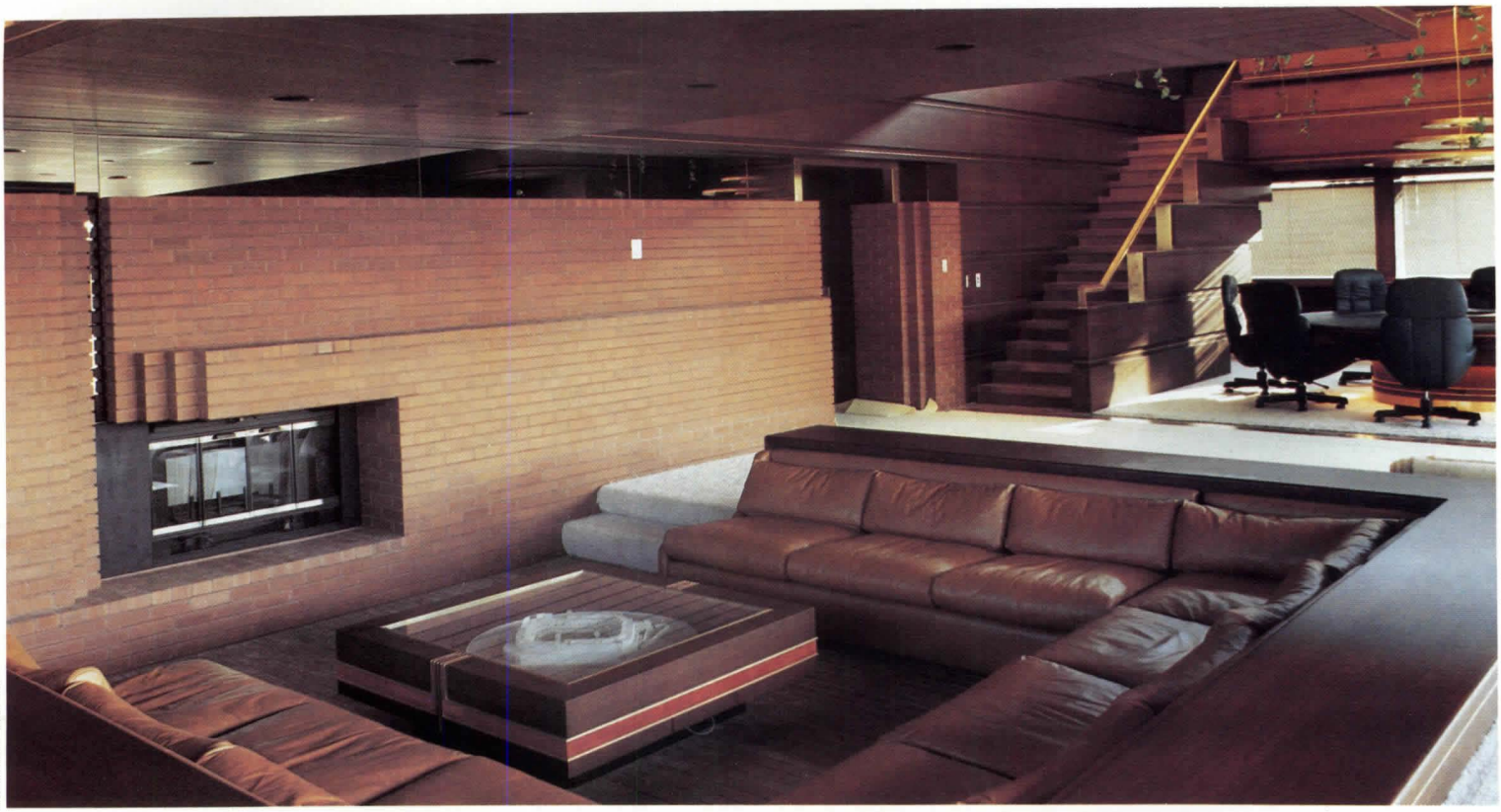
my life—to really let things go wild." (The cost for four rooms was about $2.5 million.) "I wanted to design it with Gunnar, not his staff. He's the kind of person I wanted to be. Not having a father, I suppose added to it. He has integrity, a sense of humor, he's straightforward, an avid listener. Whenever Gunnar insisted on something I backed down, because I respect him." This explains a lot about the collaboration in general.

The detailing of the executive offices is Wrightian with walls of African mahogany, floors of leather tile, and ceilings finished in raw silk. Monaghan has turned the grandest space, centered on a Wrightian fireplace, over to public use, for "public relations." He works in an ascetic cubbyhole.

The first question that comes to mind when one looks or thinks about Domino's unusual headquarters is: How Wrightian is it? Monaghan's assessment seems to have changed with time. During earlier stages of construction, he voiced concern that Birkerts was straying too far from Wright; by this October he was saying, "None of it is a copy of anything Wright ever did. It's just taken elements that I like—I guess it wouldn't have mattered if Wright had done them or someone else had. It's not a Wright building; it's Gunnar's." That seems accurate. As for his reservations about the building, Monaghan says, "They're in now; I hardly look at them." His regrets linger, however, for the lack of mullions, which gave Wright's windows a certain rhythm, for Domino's roofs that dip at their edges and are trimmed in tin rather than being all of a piece, à la Wright, and for its brick cladding, which Monaghan would have liked redder.

And what would Birkerts have done differently in the absence of Wrightian restraints? The architect says he probably would have left the landscape flat, as he found it, instead of creating mounds and valleys, and he would have "flown more of the building over the land using prevailing technologies." In fact, one of the most appealing aspects of the complex is the way the buildings interact with the landscape, which is improved for its hills, even if created by man rather than nature.

Birkerts adds, "I was not particularly following the Wright



Balthazar Korab

Balthazar Korab

Balthazar Korab

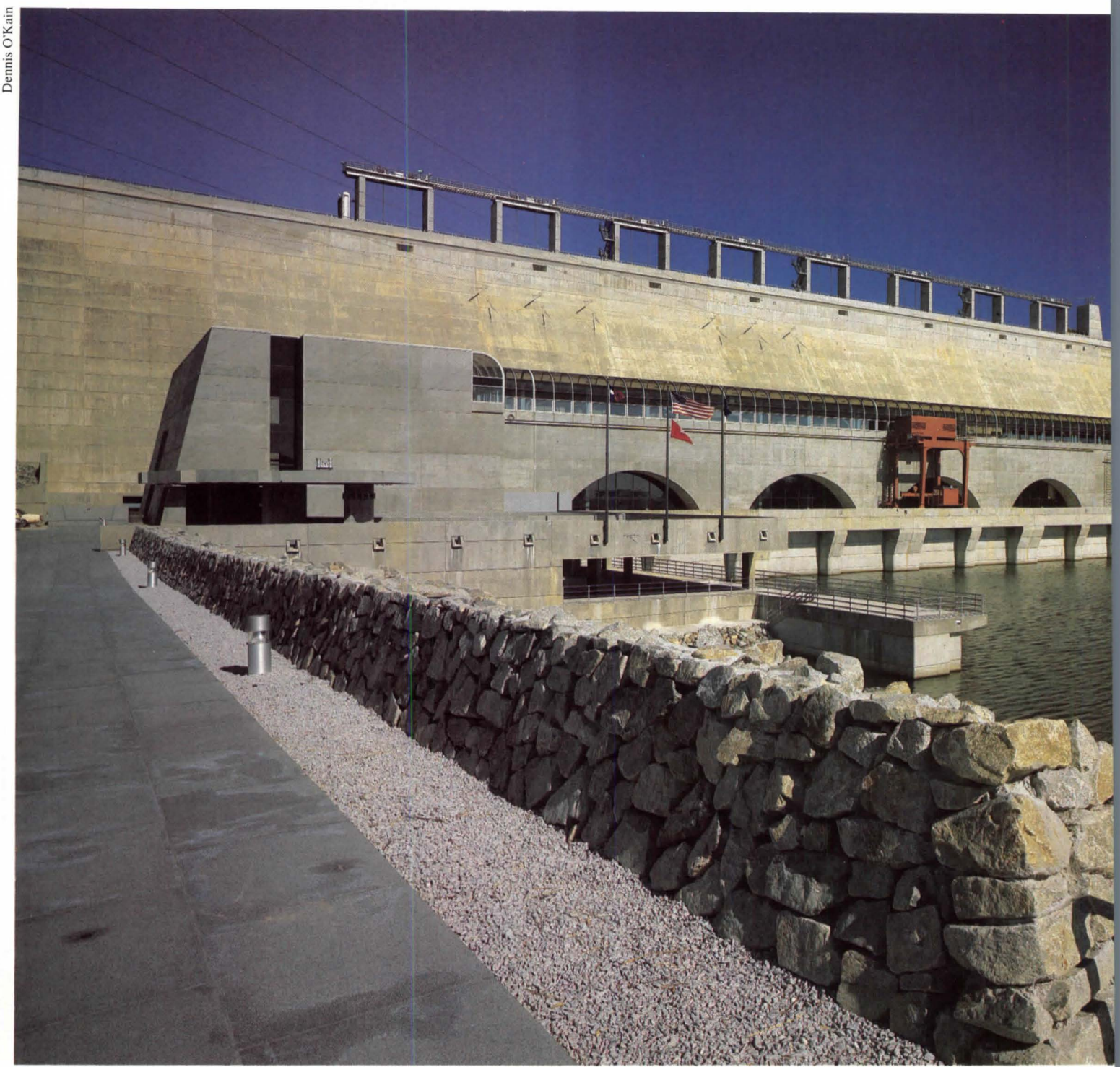
form language," and points to the departures from Wright mentioned by Monaghan plus the creases and edges of the roof, the use of copper trim where Wright would have used brick, plus "modernizations" made possible by technologies unavailable to Wright. After accepting the commission, Birkerts says, "I looked at Wright only from the corner of my eye, not wanting to become too familiar with him. Though Tom wanted me to practically copy Wright, I've remained myself."

Wright probably would have approved. "All the great styles, approached from within, are spiritual treasure houses to architects," he wrote in 1910. "Transplanted as forms, they are tombs of a life that has been lived."

Predictably, perhaps, Birkerts' interest in Wright has soared since beginning this commission, and he feels the experience has made him "ready to accept more influences—but to synthesize them my own way." He also admits this might have happened anyway. "It's the times. I'm grateful," he says, "that it was Wright, not a lesser architect, to whom I had to pay homage." □

Kaleidoscope

Dennis O'Kain



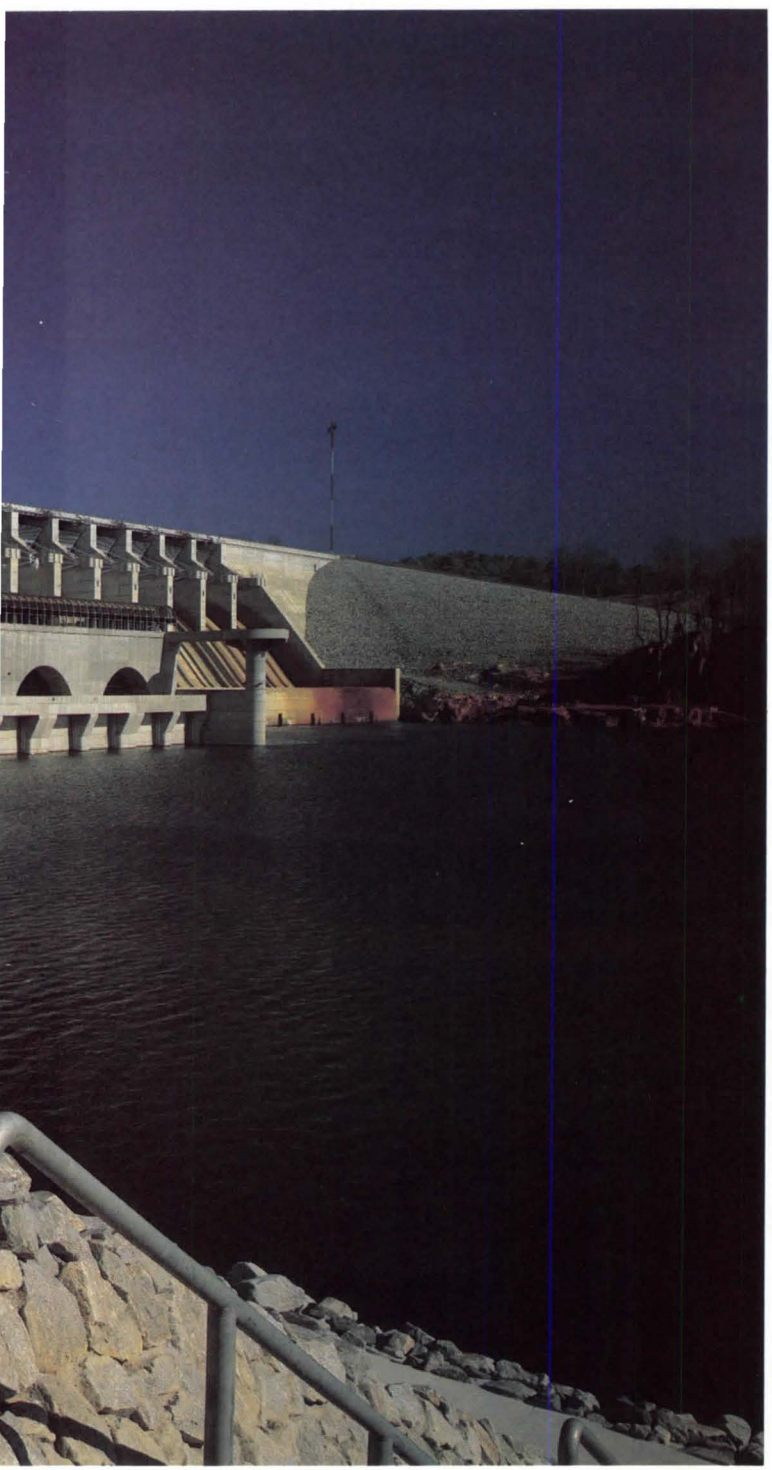
'Wondrous, Hulking Machine' On the Savannah River

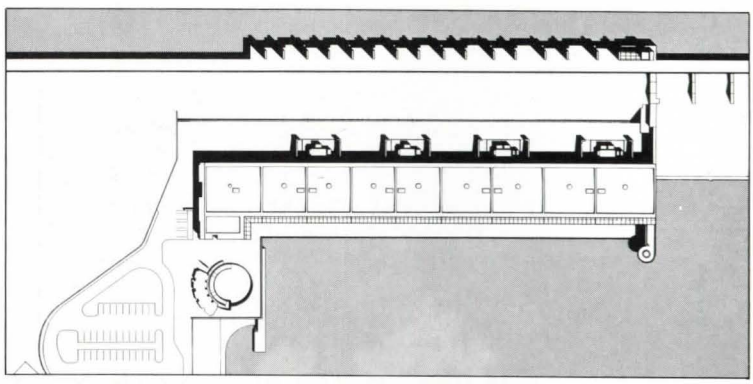
As the name implies, a powerhouse encloses the functional heart of a hydroelectric dam—the giant generators that transform the force of falling water into electric power. For the Richard B. Russell Dam, Hamilton Smith, FAIA, of Gatje Papachristou Smith designed a powerhouse that economically expresses its function. This he integrated with visitor facilities that allow you to climb over and through this wonderous, hulking machine.

The dam is named for Georgia's late, longtime U.S. senator. It spans the Savannah River, which forms the border between Georgia and South Carolina, and is the third in a Savannah River trilogy built since the end of World War II by the U.S. Army Corps of Engineers.

The Russell dam was an unusual assignment for an architecture firm with no engineering arm. Gatje Papachristou Smith first provided four elevation studies for the powerhouse—two in precast concrete, one in mirror glass, and the one chosen, poured-in-place concrete. Subsequently, with the corps of engineers acting as both client and consulting engineer, the architects were engaged to design the building and integral visitor facilities. Margaret Helfand was project architect; Peter G. Rolland was landscape consultant; Claude Engle consulted for lighting.

Poured concrete has the pleasing effect of visually tying the powerhouse to the dam itself: The building seems to grow out of the higher, wider expanse of concrete. On the powerhouse's





Dennis O'Kain

Allen Freeman

Left, the powerhouse extends in front of the dam, with exhibition wing at left and golf-tee platform at right. Above, two views of the circular ramp in front of exhibition wing.

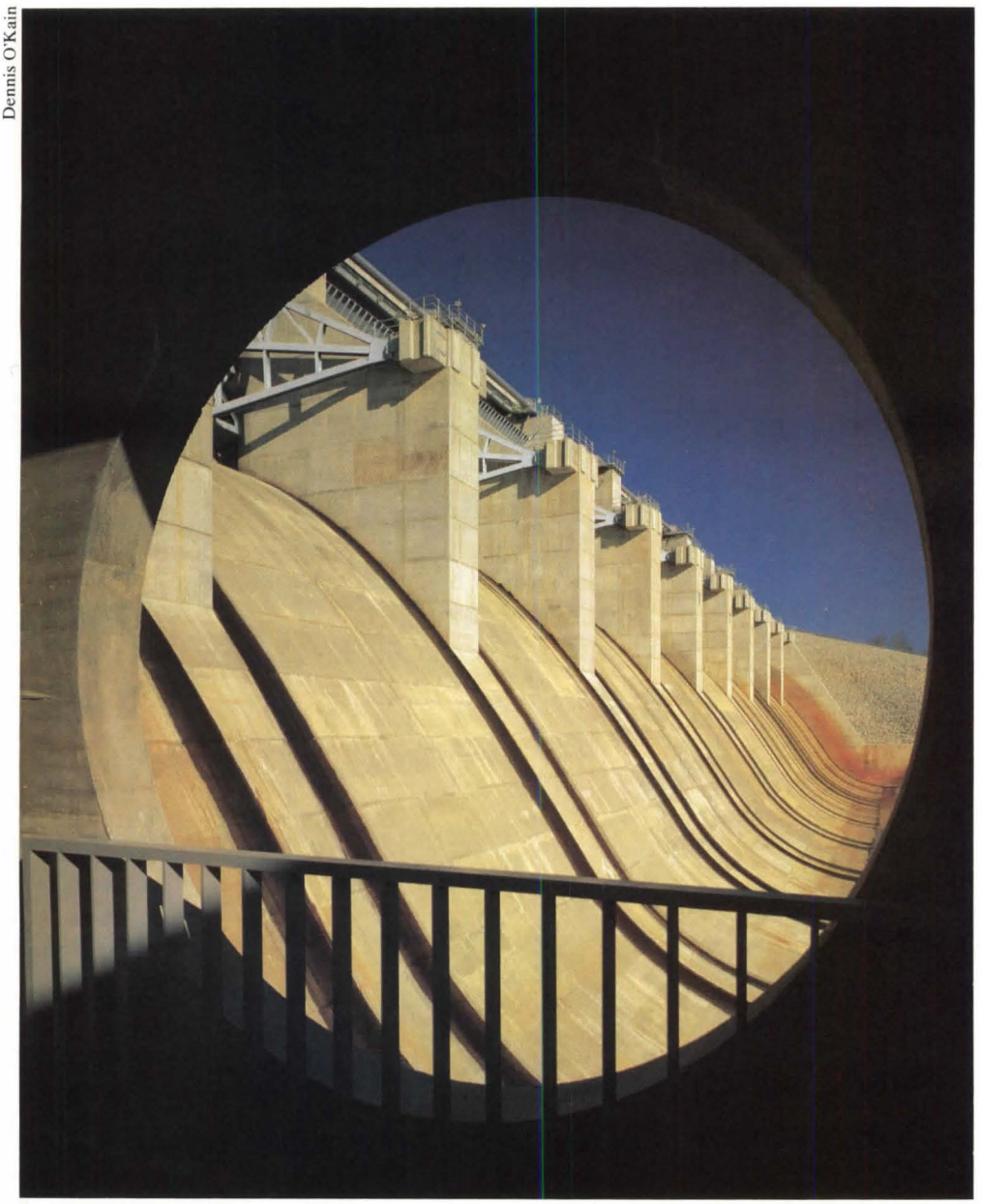
main, downstream elevation, the positions of eight generators (only four are now in place) are expressed by wide, arched openings that suggest aqueducts. The visitor enters the powerhouse through a three-level exhibition wing—not yet fitted out—and ascends to a walkway, covered by an arched ribbon of glass, that extends the length of the building at its top edge.

At the far end, a golf-tee-shaped platform sprouts from the riverbed to give visitors bird's-eye views of the long powerhouse, the gently curving spillways beyond, and the wide waters downstream. From there you re-enter the powerhouse and cross its shorter dimension on a high walkway, from which you view the tops of the gigantic generators lined in a row along a room of awesome size (photo overleaf). The interior exposed steel frame within this building of poured concrete seems incongruous; Smith explains that the dam is located within a seismic zone and the concrete lends needed lateral stiffness.

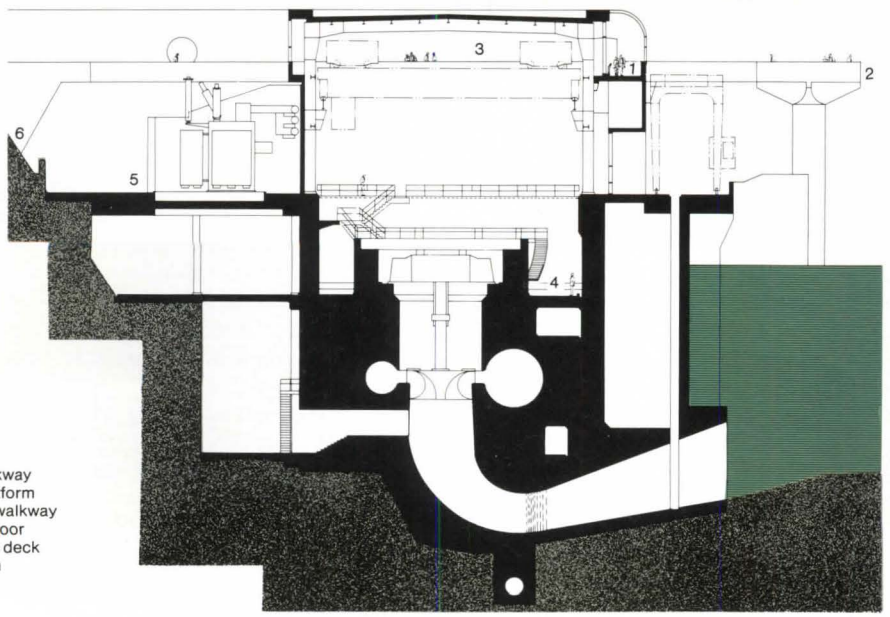
Transformers are aligned in a row behind the powerhouse, nestled between it and the high wall of the dam. You walk past a porthole with a view of the spillways and, unexpectedly, tunnel into the face of the dam. Deep within the wall, an elevator takes you to the top, from which you have impressive panoramas.

From facade concepts to powerhouse completion, the architects spent seven years on the Russell project. It is undoubtedly a damsite better for their collaboration.—Allen Freeman

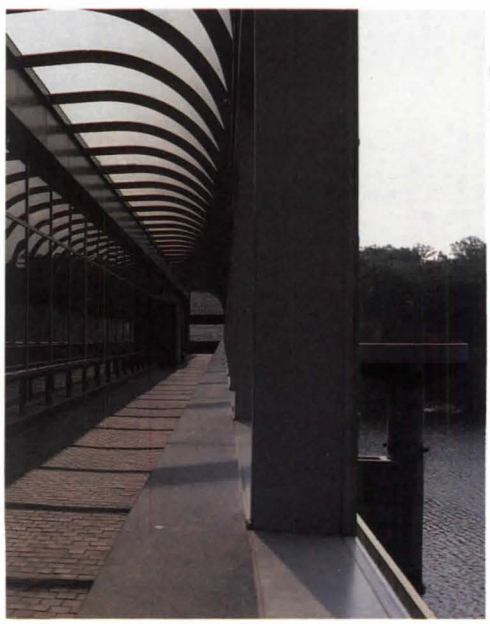
Dennis O'Kain



Left, large porthole frames the spillways. Below, the viewing platform from glazed walkway. Right, the powerhouse interior. Its construction is composite steel and reinforced concrete; steel bents support the bridge crane rails (under clerestories) and the roof system. Powerhouse section shows massive underground structure. □

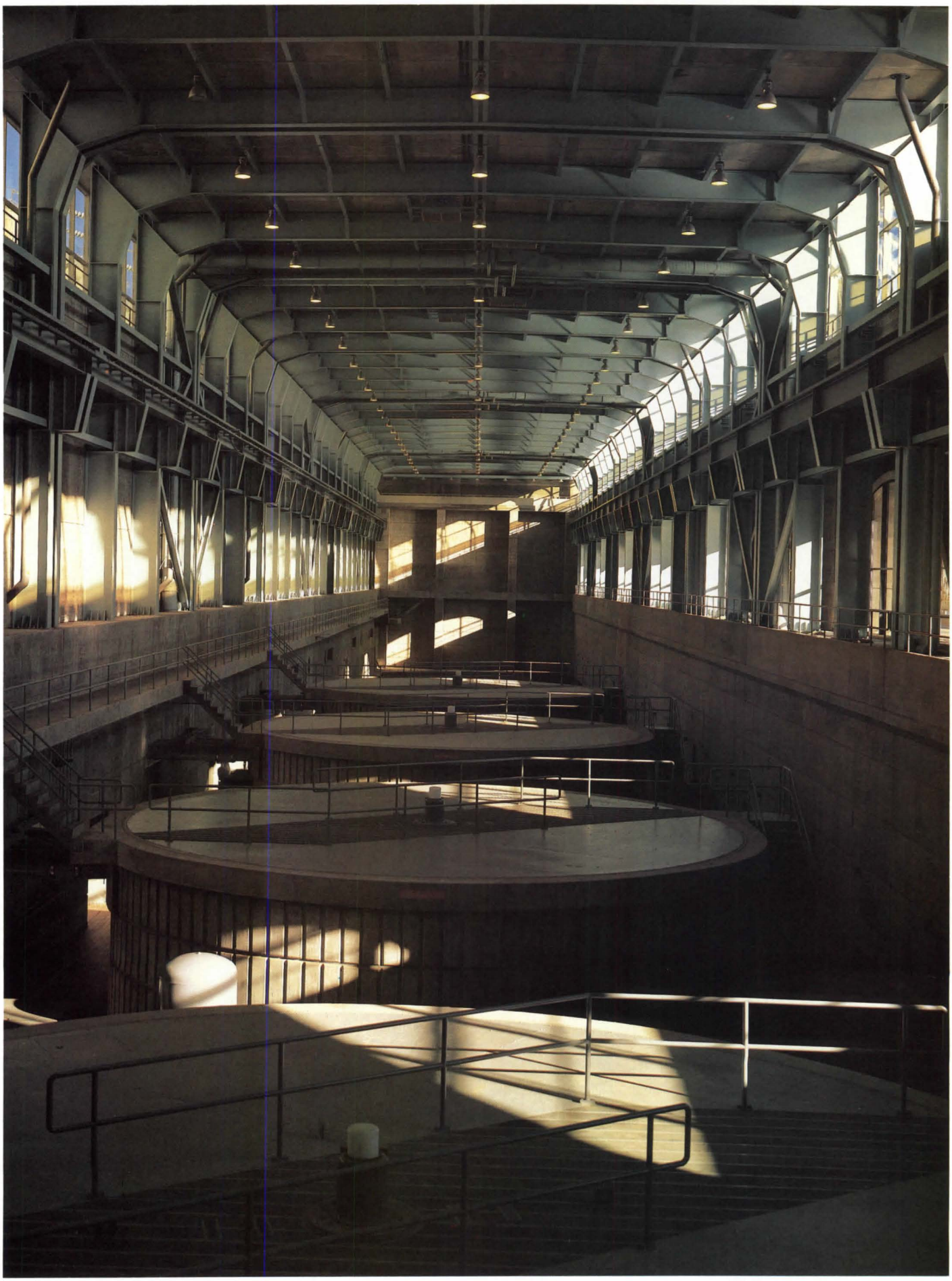


1 Visitors walkway
2 Viewing platform
3 Cross-over walkway
4 Generator floor
5 Transformer deck
6 Face of dam



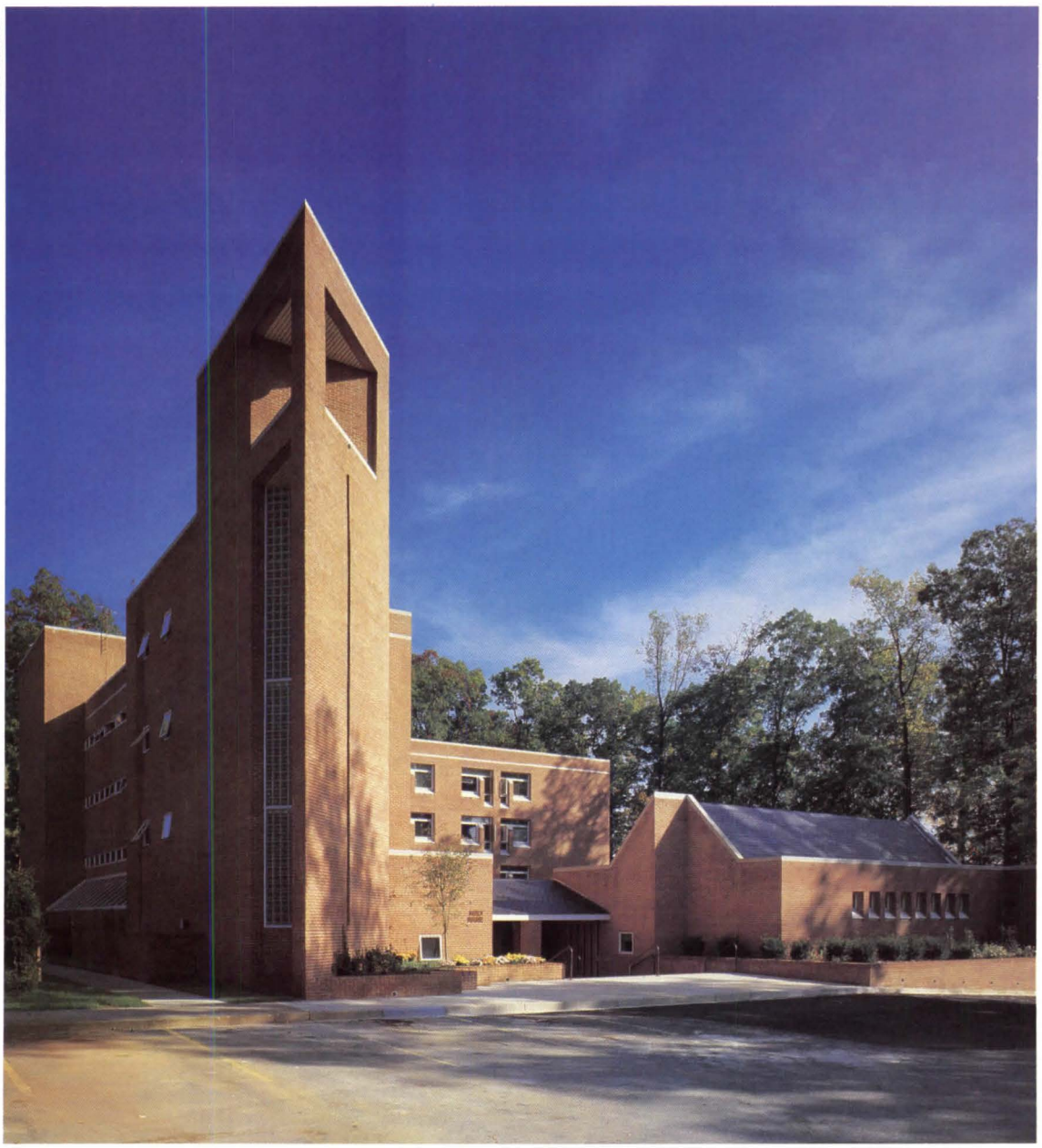
Allen Freeman

Dennis O'Kain



Quiet Religious Community Of Diverse Brick Buildings

Robert Lautman



Robert Lautman

This Franciscan friary sits on a modest site in a Maryland suburb of Washington, D.C., abutting a formidable parish church. It was designed by Frank Schlesinger, FAIA, to accommodate 36 residents, most studying at Catholic institutions in the capital area.

The friary consists of three buildings enclosing a landscaped cloister: a four-story, L-shaped dormitory, a refectory, and a chapel. Its presence is announced by an angular bell tower. All are brick with steel frames.

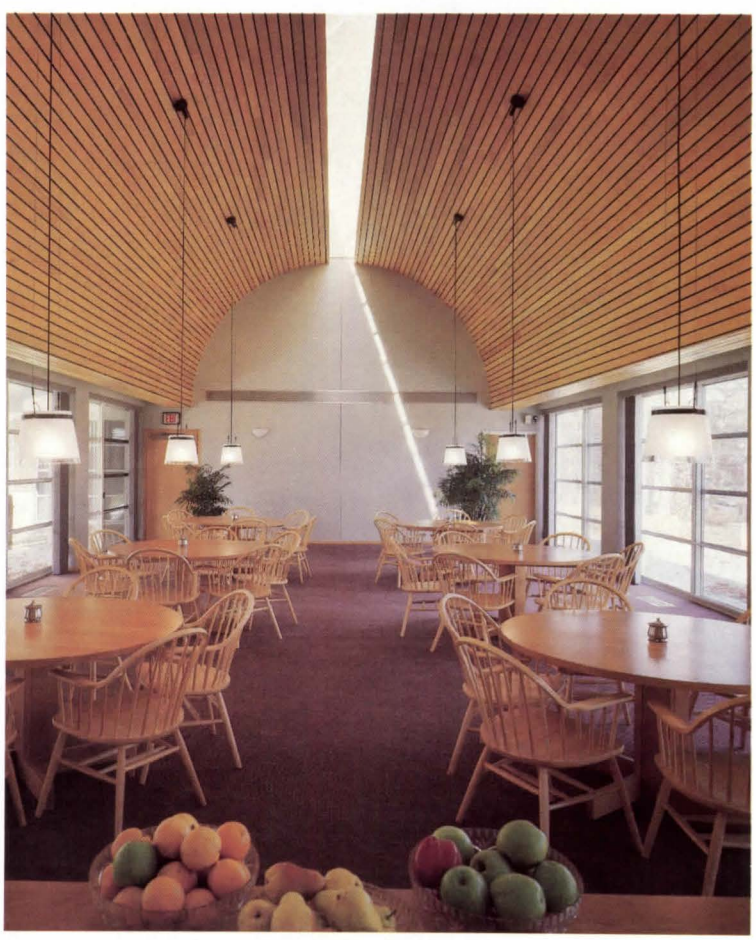
The dormitory is plainspoken, perhaps excessively so; the chapel is perky and angular; the refectory has a vaulted, skylit roof. The whole has a vaguely Scandinavian look to it.

The interiors are not lavish but quite comfortable, thank you. There are two moments of drama: The refectory ceiling where the vault is faced in wood slats over insulation batts, with a slit of light at its center; and the chapel, with its tall volume and light coming in softly from high windows and a clerestory over the altar.

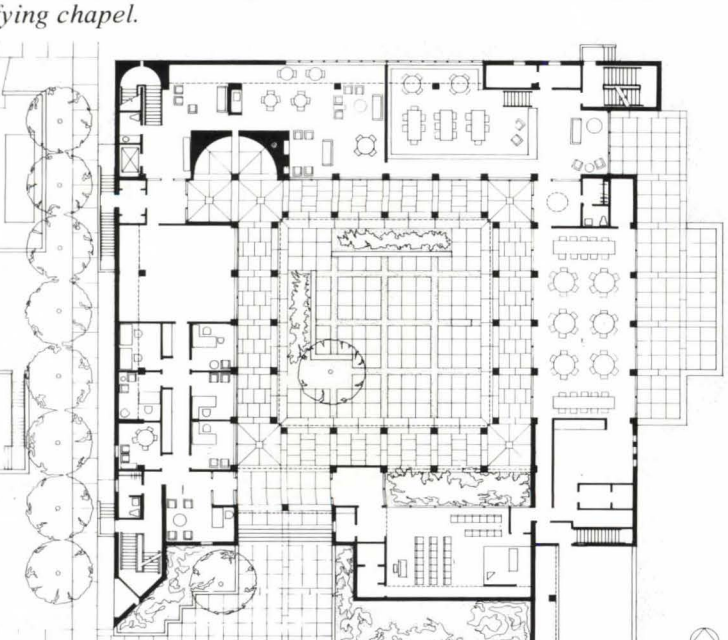
Other public spaces including a library are on the ground floor of the dormitory. Upstairs, lounges are placed at the juncture of the L on each floor to encourage contacts among the friars. The last was a key program requirement. Since the friars spend their days apart at a variety of campuses, there was a desire to provide a variety of spaces in which they could be together when in the friary. There are, and they are pleasant spaces indeed.

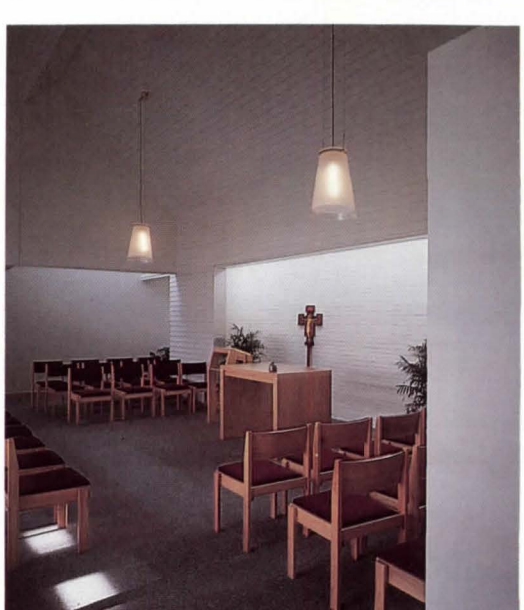
—Donald Canty, Hon. AIA

Top left, bell tower signals the friary entrance. Dormitory is in background, chapel to the right. Bottom left, cloister looking to the refectory. Right, the refectory interior with its wood slats and skylight. Below right, the small and simple but highly satisfying chapel.



Harlan Hambright





Harlan Hambright

Lodge for a Famous Family Nestles Against a Hillside

When the Trapp family of musical fame came to Stowe, Vt., it opened its home to paying guests. The Trapp lodge soon became a popular attraction but never lost the character of a home. The lodge was destroyed in a tragic fire a decade ago. Many irreplaceable mementos were lost, but the lodge itself has been replaced with a larger facility that manages to remain somewhat domestic in scale and feel.

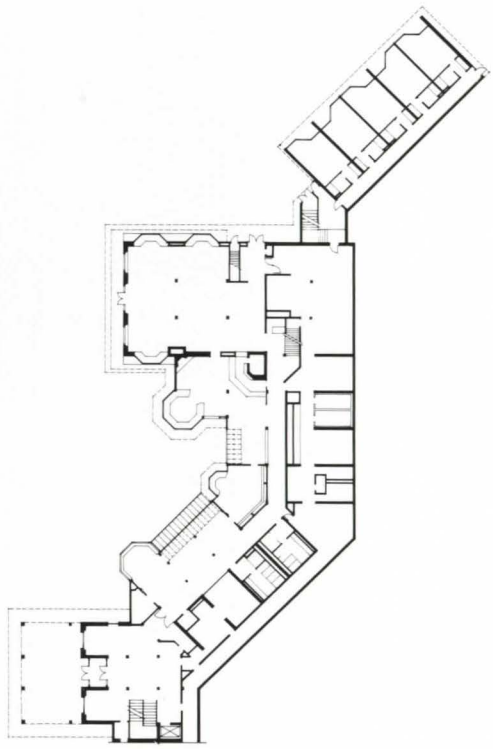
The lodge has its inevitable Alpine appurtenances—gables, dormers, decorated balconies, flower boxes—but it also manages to be a solid and serious work of architecture. Much of this has to do with the relationship between building and site. Designed by the Burley Partnership (project designer Robert Burley, FAIA, project manager, James N. Groom, AIA) the lodge is terraced into a hillside overlooking a magnificent valley view. The Trapps (the matriarch Maria is in residence, and youngest son Johann is the lodge's operating head) runs a cross-country skiing center with the lodge as its core. The terracing with entry doors against the hillside means that many guests can all but ski into their rooms from the woods above. And the hill shields the lodge from northerly winds.

In its massing the lodge follows the hill's contours. What is basically a very long building is broken twice at 45 degree angles, diminishing its apparent bulk.

Corridors on the guest room floors are single-loaded so that all of the rooms share the valley view. The lobby is simple and businesslike with some well-crafted woodwork. Instead of making it a social center, a "living room" and library were placed for this purpose between it and the bar/dining area.

—Donald Canty, Hon. AIA

This page, from top: the entry wing, the lobby, and the bar. Across page: above, profile of the lodge nestled into the hillside, and below, dining wing seen from a balcony on the entry wing.



Huge Bland Tower Gets A Gracious New Forecourt

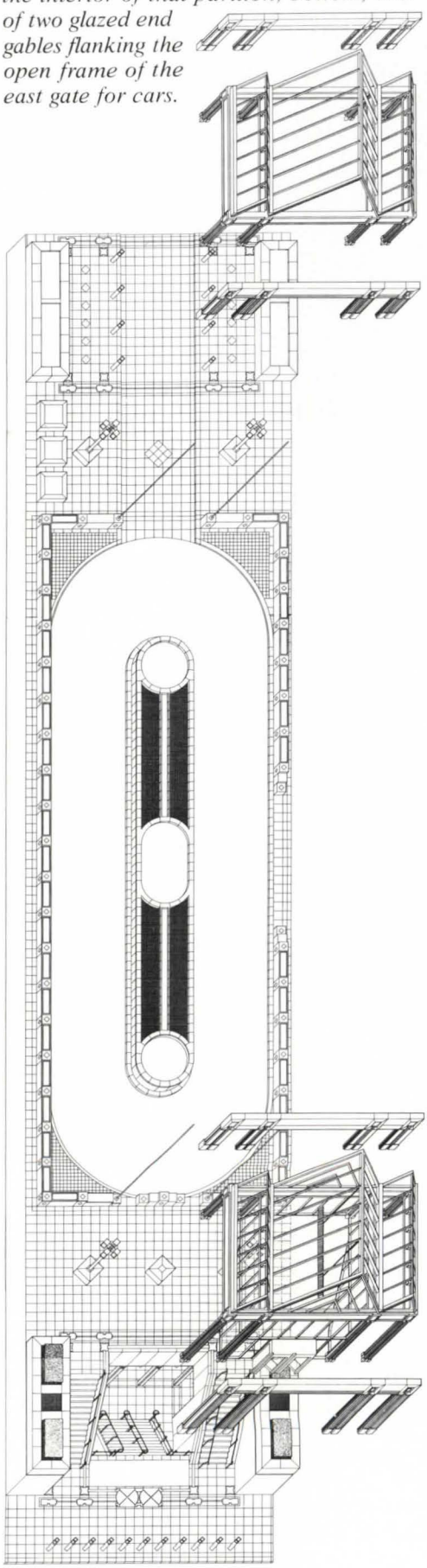
Photographs by Barbara Karant, Karant & Associates, Inc.

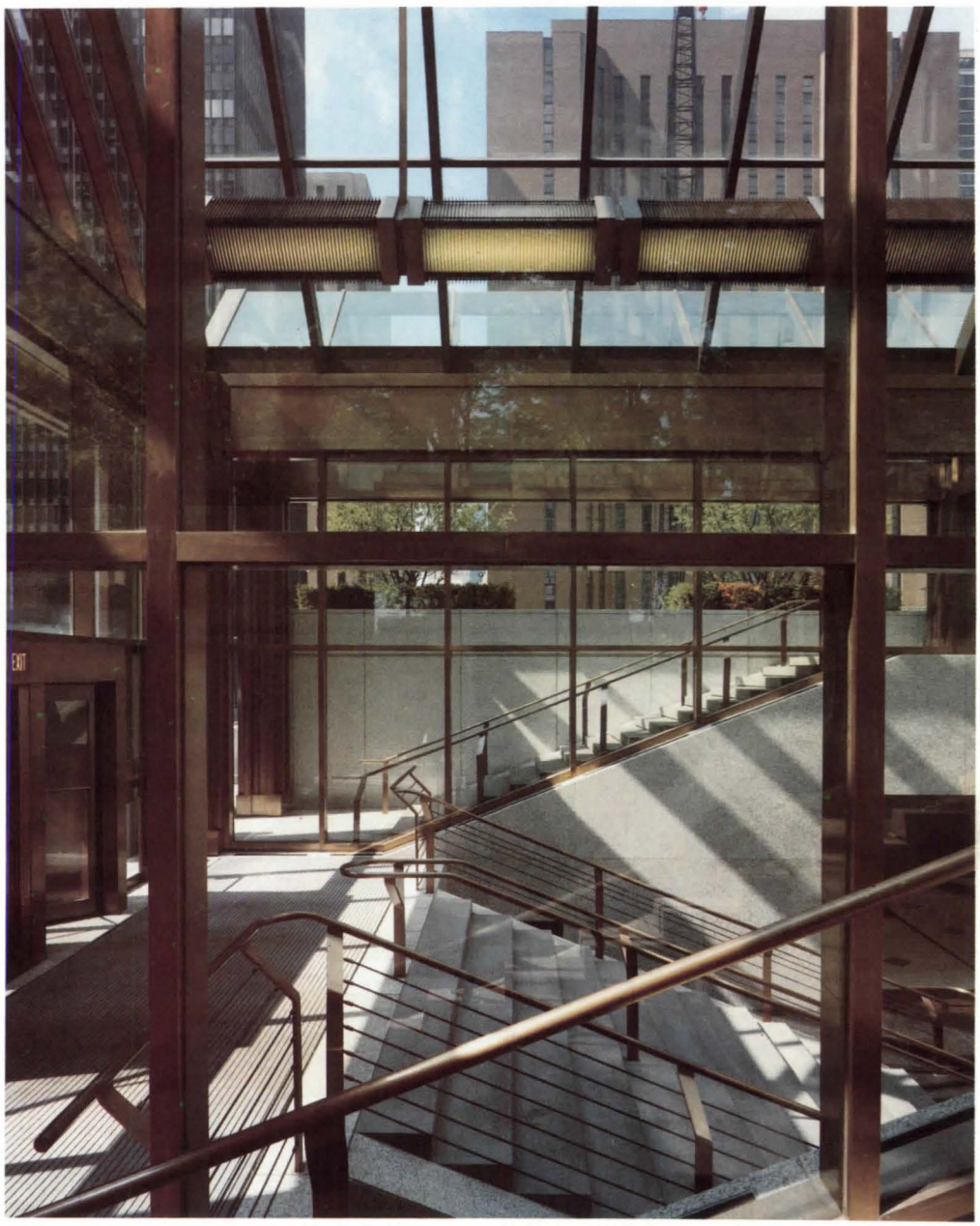
The 80 stories of Edward Durell Stone's Amoco (nee Standard Oil) building in Chicago rise relentlessly from a block-sized plaza in Illinois Center, a mammoth 1970s development at the north end of Olmsted's flavorful Grant Park. Although Amoco faces south, the majority of workers approach on foot from Michigan Avenue to the west. Now Perkins & Will, collaborators with Stone for this 1974 tower, have bettered a formerly barren pedestrian approach with two pleasantly scaled, glassy, gate-like pavilions that anchor a new oval driveway centered on the north side.

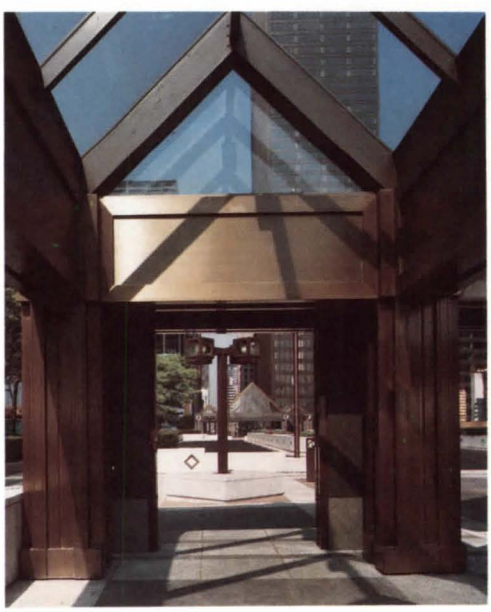
Wojciech Madeyski, AIA, of Perkins & Will set the pavilions on an extension of Stone's marble plaza in what was formerly the last block of East Lake Street. Each is essentially three gables set parallel, with the center ones reaching twice the height and spanning twice the breadth. They are clad in bronze and fronted on the gable ends by freestanding screens of red granite with white granite accents. The west gate, enclosed by glass, is for pedestrians, who can descend within it to a concourse entrance to the tower; the east gate, whose center gable is an unglazed frame, is a portal for cars into the oval driveway.

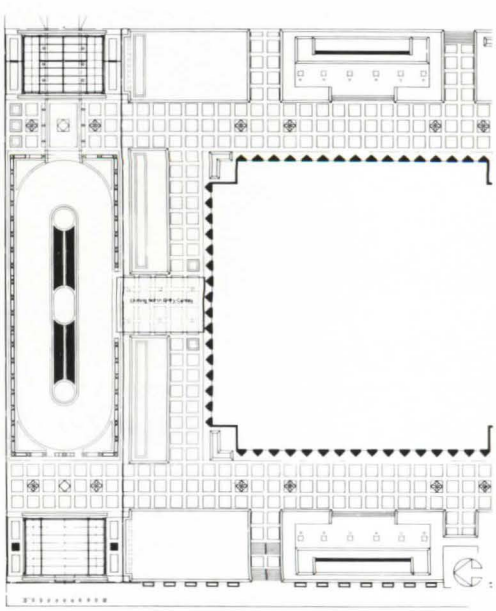
Madeyski is studying other ways to improve the base of this, the fifth tallest U.S. building.—Allen Freeman

Left, two views of the pedestrian gateway at the west end of the oval driveway. Right, the interior of that pavilion; bottom, one of two glazed end gables flanking the open frame of the east gate for cars.



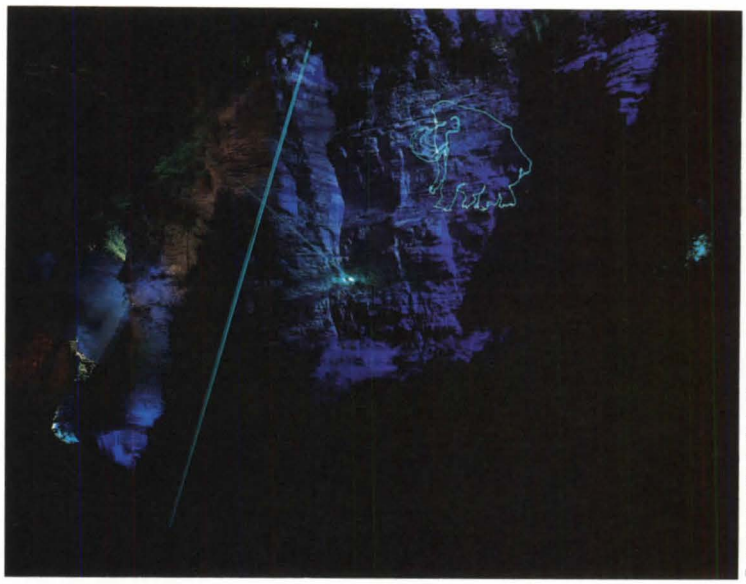






Reviving a Town with Sound, Light, And Design

Visitor facilities, Watkins Glen, N.Y.; Centerbrook. By Michael J. Crosbie



Courtesy, White Oak Design, Inc.

© Ellison Photo

Chad Floyd, AIA

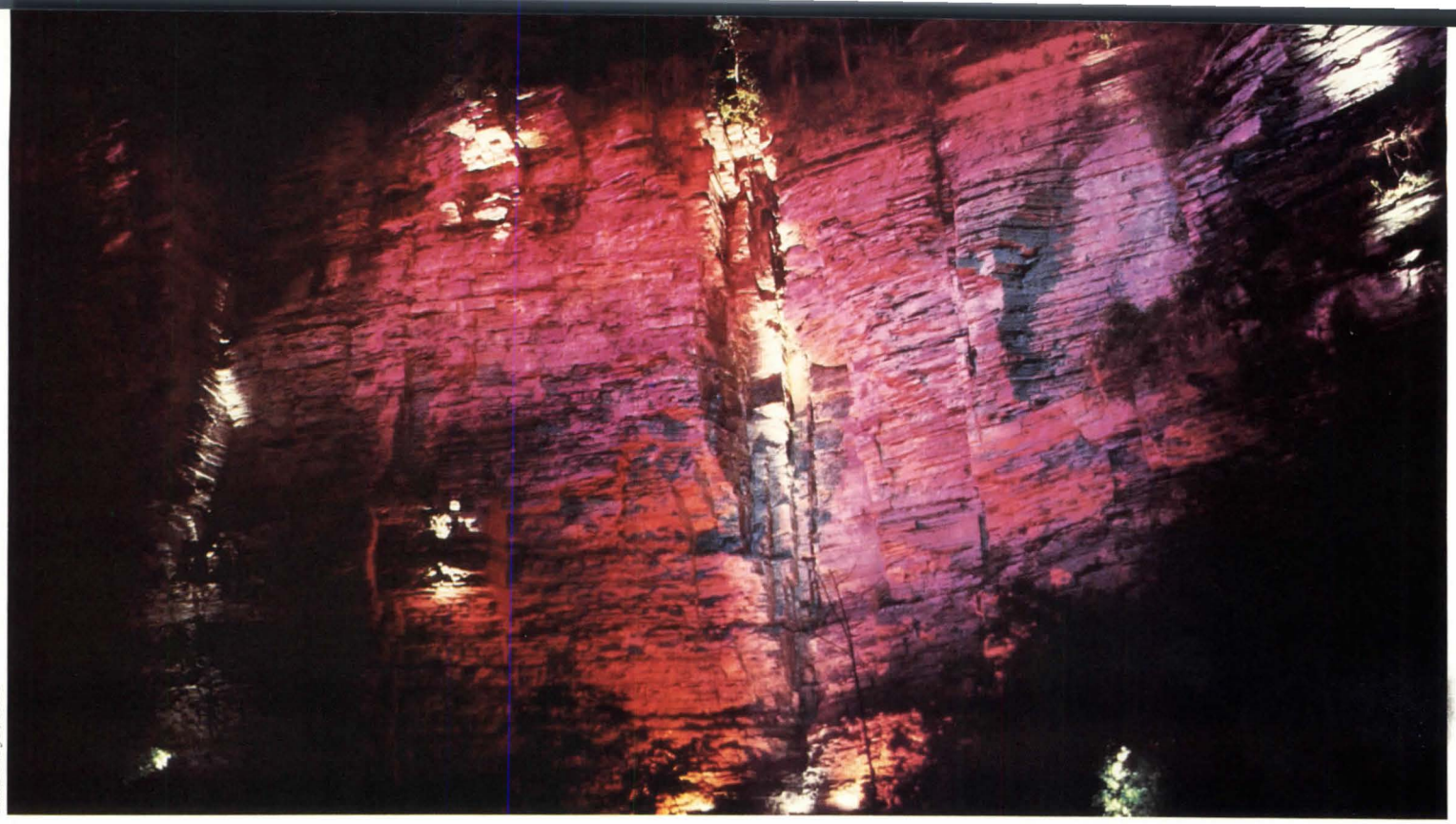
Middle and top, Glen Gorge by day and by night, when the gorge is transformed into a canvas for laser lights. Above, new and refurbished park buildings.

The pitch darkness of Glen Gorge cracks open with a rod of blue laser light. Stereophonic, synthesized music builds, echoing like thunder off the gorge's naturally carved walls. Over the heads of the assembled, more lasers and slides flash and dance upon the walls, graphically depicting the history of this 4.5 billion-year-old furrow. Like the participants of some ancient ritual, the visitors to Watkins Glen State Park in upstate New York stand silently, occasionally emitting "oohh"s and "aahh"s as they partake of a sophisticated sound and light show, one of the first of its kind in the U.S.

"Timespell" is a 25-minute multi-media extravaganza that is part of a comprehensive revitalization plan by Centerbrook Architects of Essex, Conn., for the small town of Watkins Glen (population 2,500), noted for its natural beauty and auto racing. An interpretive show by the media-production firm of White Oak Design of Marblehead, Mass., Timespell is refreshingly different from the run-of-the-mill National Park Service experience of faded slide shows and Smokey-the-Bear-bonneted guides. Through original music, laser lights that assume the forms of moving creatures, and slow-dissolve slide projectors, the visitor learns how the gorge was formed, discovers traces of early man, and becomes acquainted with the history of Watkins Glen itself. During the day the gorge continues to be one of the state's most popular tourist attractions, explored along foot paths that follow the river and snake under waterfalls. Timespell's technical equipment is carefully hidden in rock crevices and behind trees so as not to detract from the glen's natural wonders.

Greeting park visitors are new facilities designed by Chad Floyd, AIA, of Centerbrook, with the assistance of graphic designer Brenda Huffman of Ivoryton, Conn. Central to the design is a colorful, illuminated gazebo where visitors purchase tickets for the two-nightly shows. Next to the gazebo is an inviting grape arbor (the region is also known for its wine production) where one can enjoy refreshments purchased at a concession stand above which bands perform. Rounding out this assembly is a renovated 1927 park pavilion with original decorative tile and brickwork, now housing a gift shop and exhibits; new parking; and a 4.5 billion-year time line that stretches 800 feet along the entrance walk to the park (all of civilization is contained in the last quarter-inch).

As the first step in the redevelopment plan, Timespell has generated new life for Watkins Glen. The town first gained prominence a century ago as a resort spot five hours by train from New York City at the southern tip of Seneca Lake—the largest of the five Finger Lakes, nearly 40 miles long and two miles



Chad Floyd, AIA

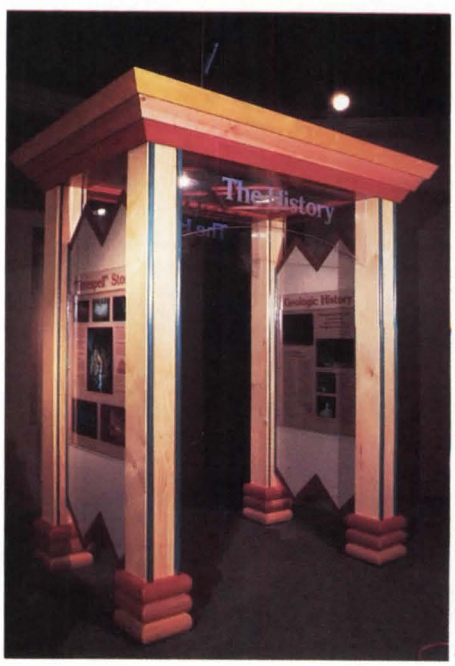
wide. Noted for its natural salt-water springs, Watkins Glen attracted robber barons, movie stars, writers, and artists who came to take "the cure" and enjoy the gorge and the lake. But when the Catskills resorts opened in the '20s, closer to the city, Watkins Glen went into a decline, arrested only after World War II, when the first auto race was run in the town streets. In the 1950s a new track was built, and Watkins Glen attracted racing enthusiasts from around the world to witness the U.S. Grand Prix. With the track outside of town, however, Watkins Glen began to wither, and by the late-'70s hit bottom when the Watkins Glen Grand Prix Corporation went bankrupt and the track closed.

In 1979 Centerbrook was engaged to do a revitalization plan for the town. Chad Floyd used the same approach he had in Roanoke, Va., (see Nov. '84, page 54) of involving the community through storefront design centers where townspeople were invited to come in and share their ideas about what Watkins Glen needed. He met with a steering committee composed of civic and business leaders and hosted a series of live television programs where more ideas were collected, presented, and the plan formulated. The plan was based on exploiting the town's natural resources—namely the gorge and the lake—to activate tourist trade. It encompassed 30 acres, extending from the lake to the gorge a half-mile away, with the business center of Watkins Glen between the two, and called for the light and sound show, a 300-boat marina, hotels, a convention center, a museum, housing, new commercial space, a lakeside park, and other attractions.

The natives were unprepared for the impact of Timespell alone. "Timespell created a sensation and a traffic jam," says Joseph Barrick, the attraction's manager, "and it really lifted the morale of the town." Other pieces of the plan that have fallen into place include Seneca Market—a festive food, gift, and local crafts emporium that now occupies a refurbished 19th century foundry building; a new marina building; a breakwater that is nearing completion; a new pier with a delightful, figural pavilion at its very end; elderly housing; and spruced-up Victorian commercial buildings sporting new colors and graphics up and down the town's main thoroughfare. According to Gilbert Smith, director of the Schuyler County Industrial Development Agency, money for these projects has been forthcoming from the Appalachian Regional Commission, the Farmers Home Administration, private investment, and state, county, and local funds.

The plan has a long way to go to be fully realized (perhaps it never will in its entirety), but for now Watkins Glen appears on the road to successful rural renewal. □

Chad Floyd, AIA



Chad Floyd, AIA

Top, illumination in rock crevices lends gorge dramatic depth; middle, restored 1920s park pavilion now houses gifts and exhibits, above.

The Unique Hilltowns Of France

They are closely fused to their sites. Photos and text by Henry Plummer

Anchored into the majestically wild landscapes of southern France are some of the most vital settlements ever built by man. While certainly picturesque, the extraordinary human significance of these villages stems not from formal or figural imagery, but from their communion with the earth.

These towns have sprung up where the physiognomy of the ground is most powerfully shaped, each tying its architectural identity to a remarkable fundament of rock. Precipitous cliffs, cavernous fissures, and rocky spines appear as primordial upheavals in the earth's crust—alive and active with inner forces. These are awesome sites, with deep emotional impact and concentrations of geological energy. It is no wonder that such landscapes have been thought from ancient times to be inspirited.

But beyond offering a surface topography that is vitalized, even incarnated, these eruptions of ground also open up the earth's surface. A variety of "insides" is created where man can cling and dwell. The topography here is made warm and protective, forged into a relief we can adhere to and inhabit. This dynamic ethos of the ground itself has been nurtured and enhanced over centuries by folk builders, who have maintained a continuous and intimate collaboration between each village and its unique microcosm of stones, water, and trees.

Fragmentary clusters of buildings interlace, pepper, and highlight the landscape, rather than coalesce into an absolute man-made island. Unlike more celebrated hilltop villages, as those in Italy with their tight crystalline masses and almost sculpted figures, these villages are openly arrayed and shuffled with the ground. Rock and vegetation permeate the town as a continuous presence. There results an exceptional rapport between settlement and earth. Instead of floating on the terrain like an outpost, tenuously deposited on hostile and foreign soil, the villages dovetail and interpenetrate with their rugged yet benevolent sites.

Settlements are built up into their own strong and individual characters, standing boldly as throngs of houses set informally about the nuclei of castle and church. These lineaments are given added identity by the way they are rising out of, lined along, backdropped, or overhung by natural features. Structural elements of topography and water courses are echoed, framed, and haloed by groupings and directions of buildings, which accentuate pinnacles, ride crests, embed into recesses, outline ridges, crease along folds, and yawn around crevices.

Site and buildings communicate also within the architectural fabric itself. Naked rock continually rises alongside cut stone, primeval matter counterpointing that which has been removed from the ground, shaped, and then assembled for human purpose. Within walls and floors, there are mixtures of more rudimentary and more ordered pieces of rock, a melange of boulders and dressed blocks, broken and rustic stones straight from the soil interspersed with cleanly shaped cubes. Even the roofs, with clay or slate tiles barely transcending natural states, their earth-filled crevices bearing moss and primitive life, carry on an active dialogue between building and land. And the walls are blossoming with living things—long intertwining vines, overspilling bouquets of flowers, potted plants at windowsills and doorways, and rich patinas left by wind and rain.

An openly configured settlement not only assimilates the landscape but embraces people as well. Discontinuous villages are generously unclenched into many inviting paths of entry and penetration, and are internally riddled with space-enwrapping hollows and chasms, and the multibranching passages of footways. Space filters freely into and through the porous ensemble, opening the settlement up to its surroundings and increasing its reception of the outer world. Whether approaching from a distance or immersed in the heart of a village, we are offered a perpetual welcome and inclusion.

A sense of deep belonging is elicited as well by the spatial structure of each individual street and square. Unlike more defensive and harsh vernacular settlements, the inner walls here do not become sealed up into taut and resistive boundaries, which would cast us "outside" even while enclosed in their vacuous cavities. The edges of these volumes are highly permeable, their surfaces scooped out and etched into a soft and hollow spatial structure. Encompassing volumes are indented with many smaller man-sized alcoves, continuous walls imprinted with offsets and projections, houses localized into multiple centers of gravity by ground-hugging roofs and inflective thresholds, and solid surfaces of stone and tile deeply honeycombed with robust textures. There is a generous sense of interiority at many scales, assuring us everywhere that we belong.

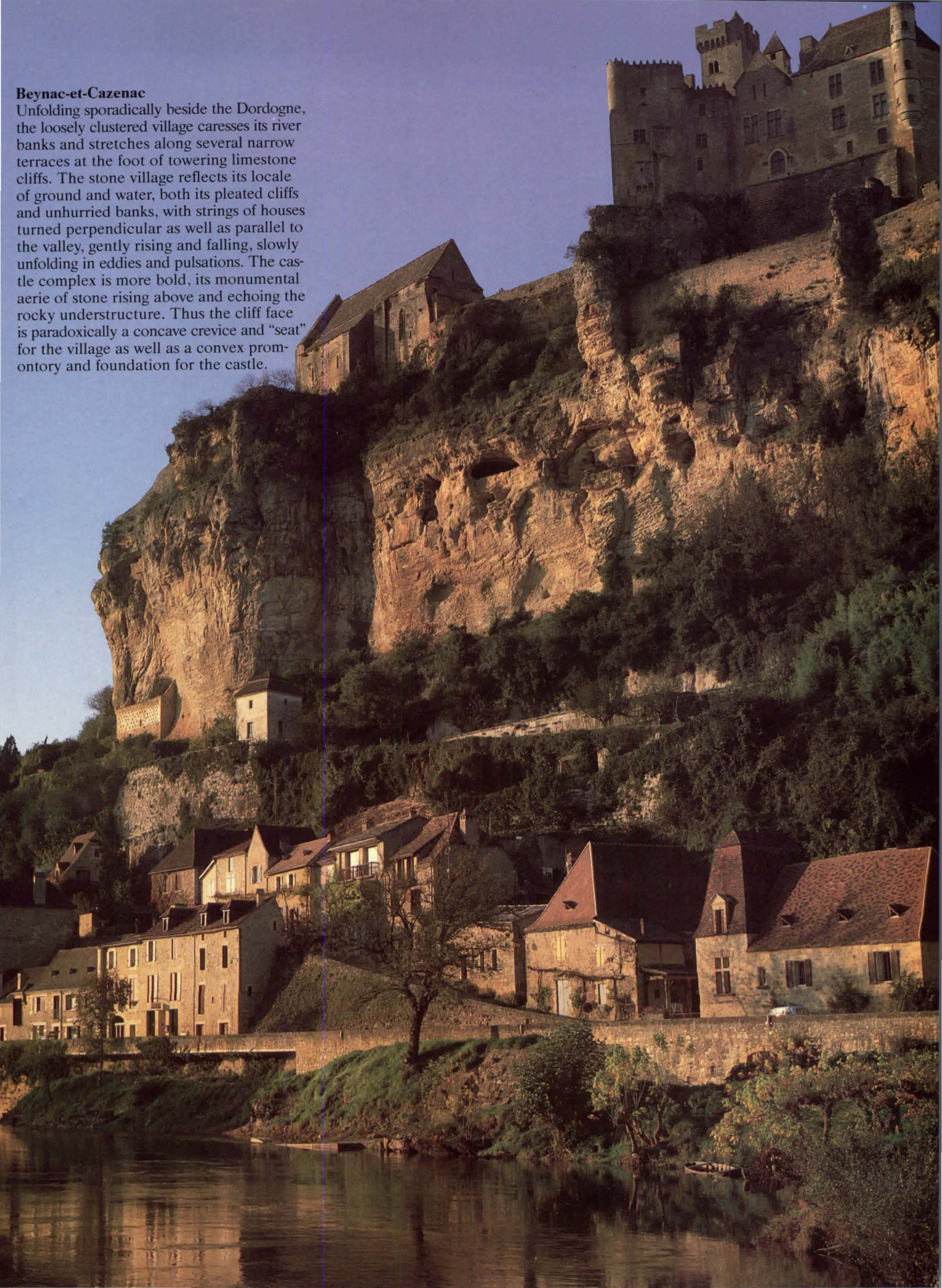
Hollowed volumes become animated and brightened into a warm and gracious countenance. Golden stonework is playfully assembled—relaxed, spontaneous, and joyful—while streetscapes have the intimate and cozy dimensions of a miniature village. Overspreading flowers and happy colors give a festive atmosphere to the stony understructure, and distinctly friendly visages are evoked by the anthropomorphic lines of roofs, facades, and fenestration. Such hospitable constructions convey an immediate human recognition and allow us to feel "at home."

Adding to the store of rootedness and kinship is also a temporal dimension—a built fabric that speaks to us of its own making, recalling countless human innovations and changes in the settlement. We grasp this human legacy first in the variety and particularity of dwellings, in the personage of each eccentric volume and detail. The collective effect is an entire village with the transient and protean memory of a collage, its diverse parts and pieces an evolving structure that links past and future. And at the smallest size, within the patchworks of assembled material, is a microstructure of metamorphic construction, each surface reflecting thousands of human hands and decisions.

Surfaces are impregnated with traces of former times—outlines of filled-in windows, vestigial columns and archways, superimposed layers of plaster and paint, and handcrafted doors. Like the settlement morphology as a whole, the built tissue simultaneously emerges out of and refers back to its various sources, its terrestrial and human roots, presenting to us a dialectical kind of architecture that is overflowing with sympathetic relationships.

The villages presented here belong to a variety of different geographical regions in southern France. Yet most are concentrated in a handful of distinctive landscapes, including the tributaries and river valleys of the Dordogne, Lot, and Var, as well as the mountainous typography of Auvergne and Haute-Provence.

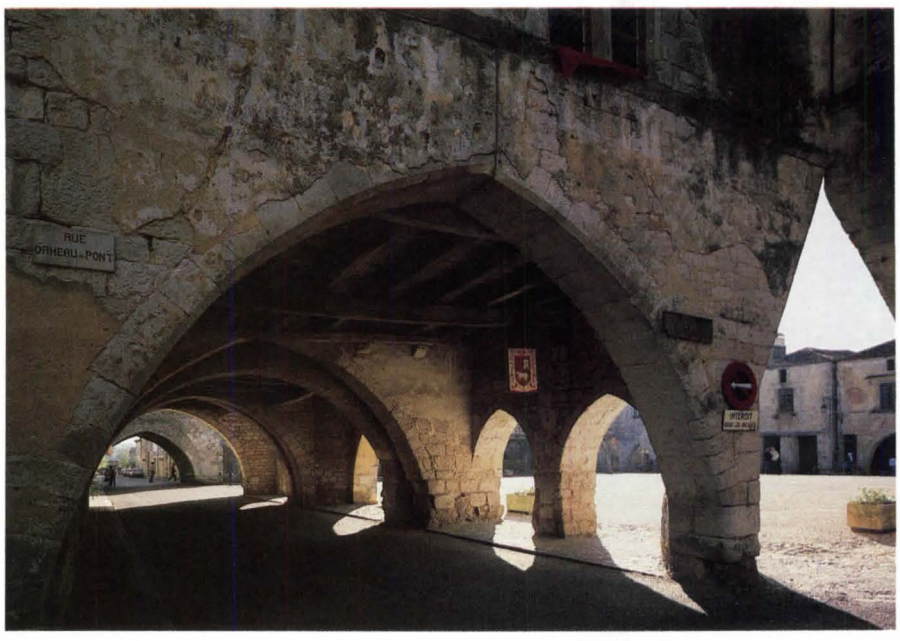
Mr. Plummer is an architect and a professor of architecture at the University of Illinois, Urbana-Champaign. He is author of Poetics of Light, *a forthcoming bilingual book to be published by* A+U, *Tokyo. This article is based on his work as a Graham fellow during 1983-85.*



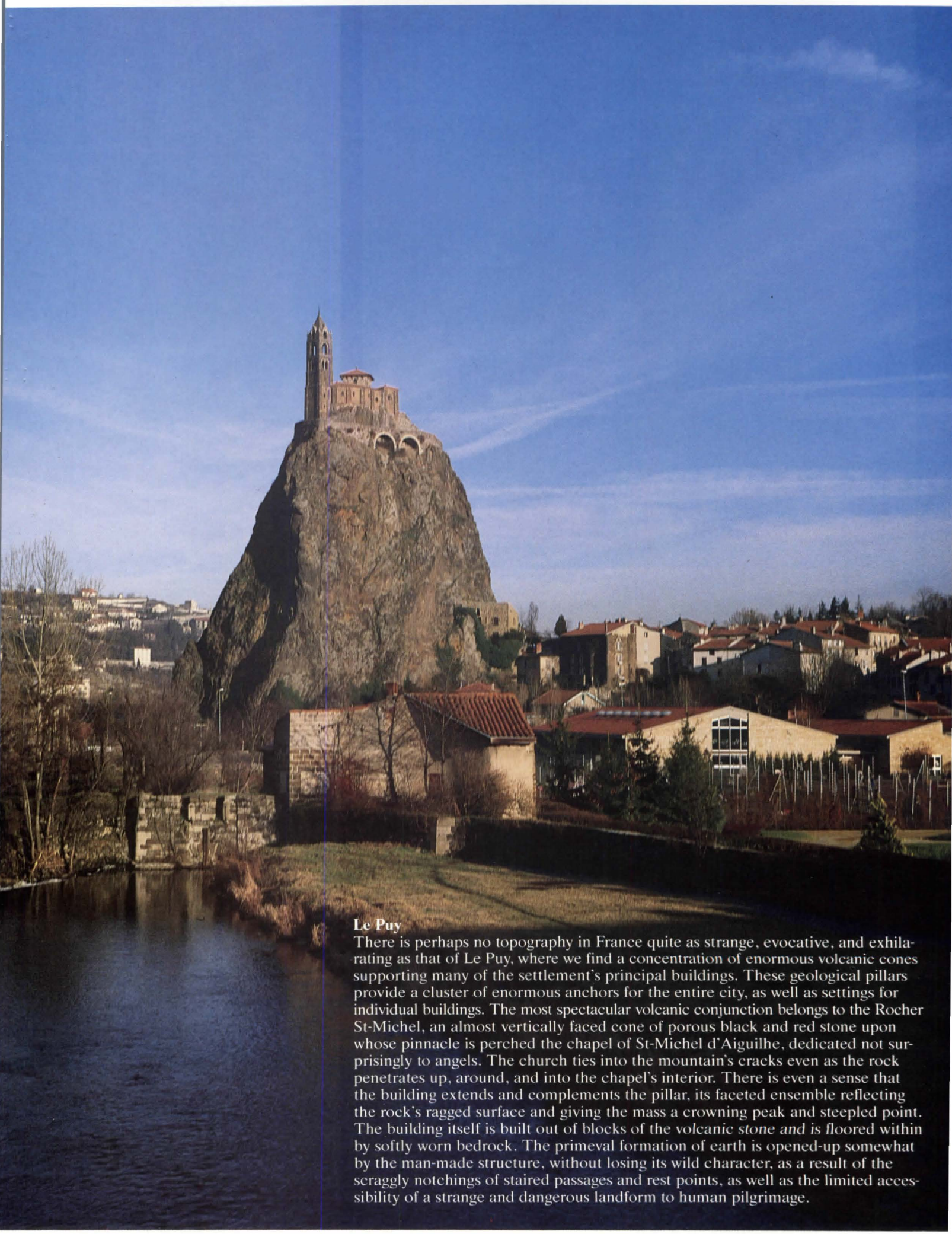
Beynac-et-Cazenac
Unfolding sporadically beside the Dordogne, the loosely clustered village caresses its river banks and stretches along several narrow terraces at the foot of towering limestone cliffs. The stone village reflects its locale of ground and water, both its pleated cliffs and unhurried banks, with strings of houses turned perpendicular as well as parallel to the valley, gently rising and falling, slowly unfolding in eddies and pulsations. The castle complex is more bold, its monumental aerie of stone rising above and echoing the rocky understructure. Thus the cliff face is paradoxically a concave crevice and "seat" for the village as well as a convex promontory and foundation for the castle.

Rocamadour
The settlement (above and right) is lodged into shallow ledges of huge limestone cliffs winding along a deep river canyon. The entire topography is hollowed out, not only the almost "sunken" valley hewn by the river Alzou, but its side walls pitted with caves, many of them being venerated sites from Magdalenian through medieval times. The village is emplanted loosely into this chthonic landscape. A castle above is notched into its cantilevering rock foundation, projecting precariously over the old village, the latter being tiered and strung along either side of a narrow street. Between castle and village is fitted the ecclesiastical city, pinioned into the most precipitous ranges of cliffs. Chapels are inserted under enormous overhangs of rock, are hollowed out of the earth itself, and fold along with the irregular stone shelves. Several buildings are embedded so deeply into and so enwrapped by their cliff faces that they appear as facades cut out of the living rock, an impregnation reinforced by the way interior ceilings are shaped directly out of the sloping cliff. Less inhabited cliff faces are cut into rough ramps, stairs, and terraces, only barely transmuting the rugged ground into a humanized landscape. And remaining interspersed throughout the built fabric are wild natural elements—boulders set into walls, overgrown vines and flowers, and thick groves of trees.

Monpazier
The main square of Monpazier, the Place Centrale, is the best preserved of Périgord's medieval *bastides.* The sense of an "inside" is not due merely to the overall cavity but to a concentration of many viscous elements. The oblong volume opens to the village church at one corner and contains an innermost pavilion, a covered market housing the old measures. Bounding the square is a hollowed perimeter of stone arcades or galleries, called *cornières* (right). The heavy arcades, appearing almost excavated from the earth, are shaped of large ground-hugging archways that pull and sink down into the ground. Covered passages are formed as a sequence of individually roofed bays, occasionally interrupted by spaces open to the sky, so that every volume is a localized housing with a strong sense of gravity, anchored to a particular location on the ground. Bounding each porous bay is a variety of thick arches, their openings massive and deeply set, each a small room encompassed by larger and larger rooms.



St-Cirq-Lapopie
The settlement rides atop a semicircle of sheer cliffs overlooking the Lot Valley. The topography of this escarpment includes two large rocky crags at the very edge of the precipice, the higher taken by castle ruins and the lower by a 15th century church, each extending without entirely covering up or taming its perch. The village of old houses is built with stones from the hillsides and manifests its wild terrain by variable tiers that both express and take root in the surface relief. Spaces between buildings are hollowed out into half-open courtyards and cascading terraces. Luxurient outcroppings of soil, rock, grass, vines, and trees emerge between and on top of buildings, and brown tiled roofs are thickly powdered with rust-colored lichen. Indeed the man-made surfaces are so coated with patina and plants that the architecture becomes a bed for vegetation.



Le Puy
There is perhaps no topography in France quite as strange, evocative, and exhilarating as that of Le Puy, where we find a concentration of enormous volcanic cones supporting many of the settlement's principal buildings. These geological pillars provide a cluster of enormous anchors for the entire city, as well as settings for individual buildings. The most spectacular volcanic conjunction belongs to the Rocher St-Michel, an almost vertically faced cone of porous black and red stone upon whose pinnacle is perched the chapel of St-Michel d'Aiguilhe, dedicated not surprisingly to angels. The church ties into the mountain's cracks even as the rock penetrates up, around, and into the chapel's interior. There is even a sense that the building extends and complements the pillar, its faceted ensemble reflecting the rock's ragged surface and giving the mass a crowning peak and steepled point. The building itself is built out of blocks of the volcanic stone and is floored within by softly worn bedrock. The primeval formation of earth is opened-up somewhat by the man-made structure, without losing its wild character, as a result of the scraggly notchings of staired passages and rest points, as well as the limited accessibility of a strange and dangerous landform to human pilgrimage.

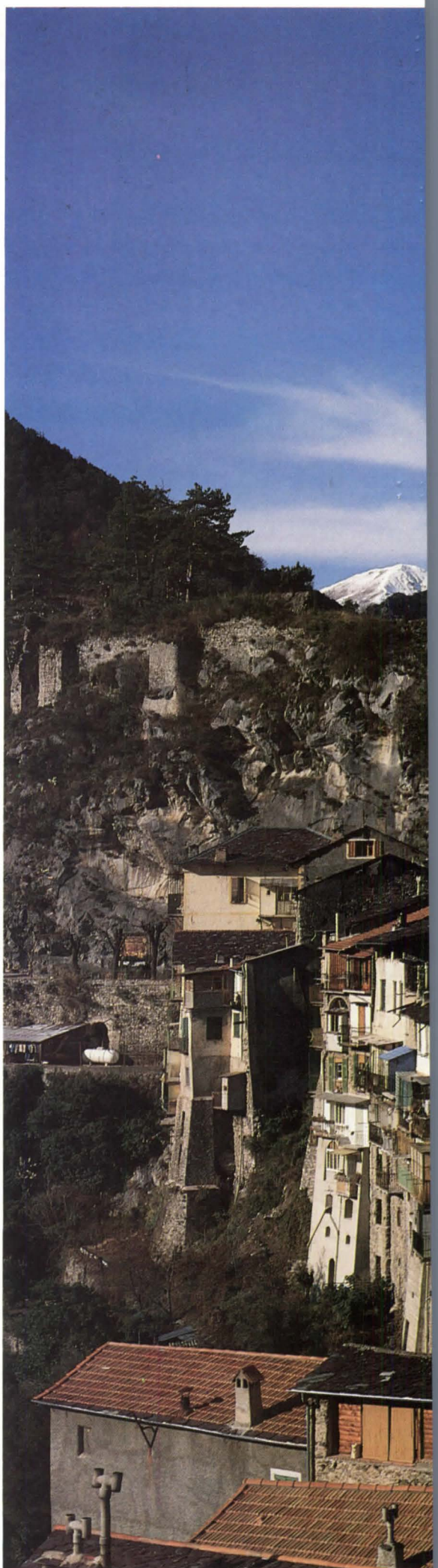
Pérouges
Ringing a softly rounded hilltop in the rich farmlands northeast of Lyon is the fortified medieval village of Pérouges (left). The entire circular village is built out of cobblestones, as if pieced together spontaneously with loose rocks taken directly from the site. Floors of narrow alleys and small squares are thickly textured and full of friction, their centerlines occasionally grooved into water troughs, while the walls display a more evocative history—with cobbles set playfully around large cut blocks and the mysterious remains of previous buildings. The deep crevices of pebbled surfaces not only grasp space but provide such an effective matrix for climbing vines that some walls are thick with draperies of green leaves.

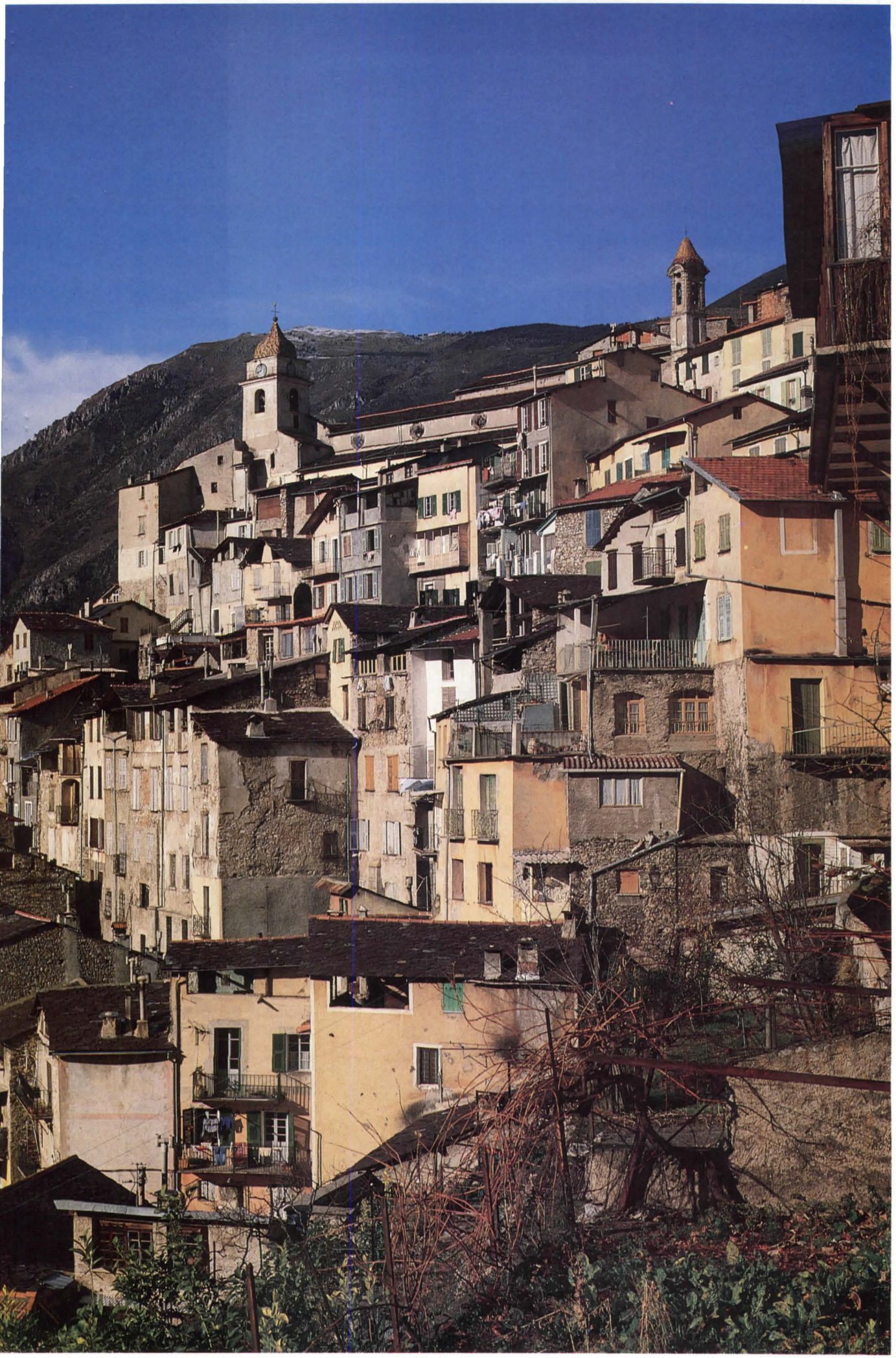
Polignac
Northwest of Le Puy is a vast plateau ringed by mountains, within which rises an extraordinary butte of basalt (left). The isolated rock was worshiped as far back as the Roman era and was the site of an oracle. Remains of a later medieval fortress still ring the butte's upper surface, now as an incomplete garland that reinforces without subduing the landform's volcanic presence and vital geographical center. The village is clustered loosely around the rock's base, anchoring into the inflective concavity at the foot of the pedestal as well as the powerful magnetism of its topographical island.

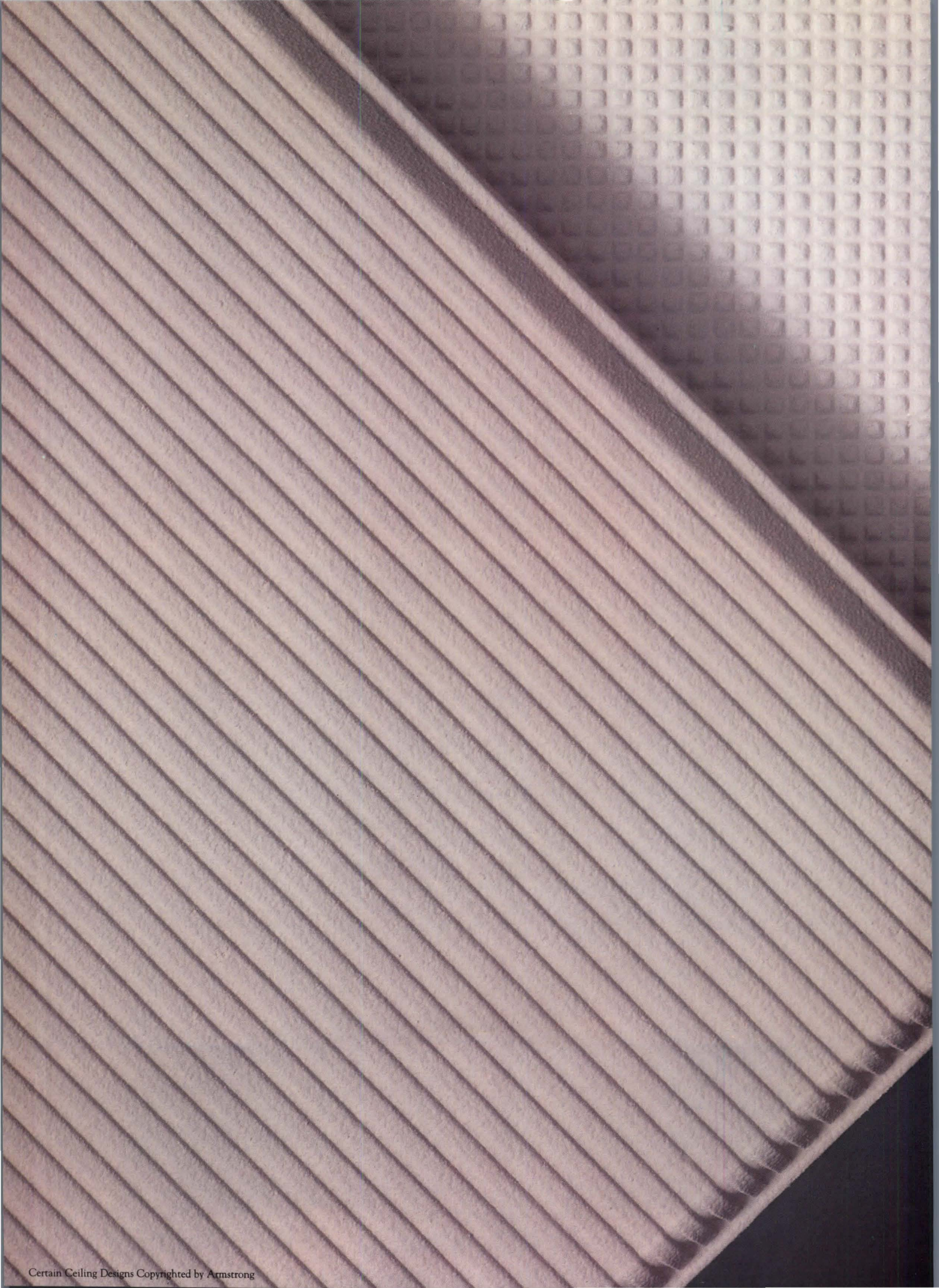
Gordes
The Provençal village (right) is tiered around a mountainous promontory overlooking the Imergue Valley, on the edge of the Vaucluse Plateau. At the top is a Renaissance chateau built up on the site of a medieval fortress. Strings of houses articulate contours and bite into the narrow ledges of steep hillsides, weaving around the landform with a series of concentric "ribbons." Each sequence of dwellings alternates with massive outcrops of naked rock, whose vertical faces are hollowed into troglodyte homes and seized by retaining walls.

Saorge
Suspended high in the Pre-Alps near the Italian border, a landscape of towering snow-covered peaks and plummeting gorges, is the mountain village of Saorge (right). The site is a stepped semicircular shelf halfway up the hillside, overlooking a curve in the Roya Valley. Larger terraces of rock have been articulated by churches. Houses are banked into rising tiers, standing one upon the other like an amphitheater, each row slightly displaced from the next to claim its own slice of sunshine and view. Every house is somewhat different in color and shape, as well as slightly skewed from its neighbors, creating an assortment of overlapping colored planes, a bristling montage of human improvisations. The streets between buildings are enclosed footpaths, often vaulted over and roofed by narrow bridges, weaving in and out of shadows and sunlight, down into the earth and up into the sky.

La Roquette
The village is stretched elliptically along the elevated shoulder of a mountain (below), seeming to rise buoyantly out of the earth as an independent spur, and sets precipitously on the brink of the cavernous Var Valley. A church steeple fastens the village's center, while houses graft into the rock even while allowing earth and vegetation to well up between them. Low field walls and roadways hold onto the billowing hilltop in a series of tethering loops. □







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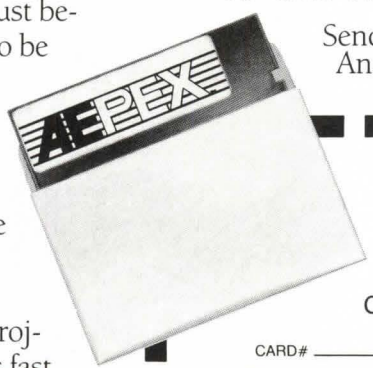

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Technology & Practice

Most editors (myself included) imagine their magazines to be a kind of high-fidelity conduit for information. We don't create the music, but we collect it, encode it, and deliver it back out amplified and clarified.

The trouble with this image is that it doesn't account for the large quantity of important work that never gets air play. So although there's more (and more diverse) technology and practice material presented this month than ever before, I can't help thinking of all the material we take in and don't relay.

The extent of this information pileup was brought home to me at the five-day congress of the International Council for Building Research, Studies, and Documentation (CIB.86), held in September here in Washington. Five hundred papers—all dealing with new building technologies and construction practices—were published in the (not widely disseminated) proceedings of that event. More than half of these papers were grouped in a category called "translating research into practice," which meant that the material had direct and immediate field applicability.

Given my belief that significant advances in architecture always stem from new materials or processes, I'm left feeling that our profession's progress depends on the transmission of such information. Here's what practicing architects can do to help this transmission along:

1. Help us use these pages wisely. Let us know about the topics you feel are most important.

2. Express support for organizations funding important building research. Many of these groups have communication channels of their own targeted directly toward those professionals most interested in their work.

3. Explore and utilize new systems for collecting and storing information. Computers helped create the wealth of information we'd all like to access; on-line services and in-house database files can help us use it.

4. Of greatest importance, cultivate your thirst for learning about new ways to do things. Encourage visits from manufacturers' representatives and get them talking about the "whys" of new products. Send firm members to the important conferences and trade shows in our industry: AIA's, CSI's, the A/E/C Systems show, Neocon, etc. Use each project to add to our profession's collective exploration of the future.

Appreciating good music depends, in part, on the quality of the sound system. But it depends even more on the musicians and the audience. Architects, in our analogy, play both of these roles.—Mitchell B. Rouda

Tax Overhaul: Advice for Survival

An AIA roundtable. Edited by Karen Haas Smith

The market for architectural services will be hard-hit in the near term by the new tax laws. That's a nearly universal consensus. The removal of many of the tax incentives for real estate investment will bring an abrupt halt to many types of commercial and multifamily residential development activities that relied on tax-shelter financing. Coming at the beginning of a downturn in construction, the tax reform measure will accelerate the trend.

Making money in the practice of architecture is going to be much more difficult in the next few years. Architecture firms—no matter what their size and status—need to scramble quickly to come to grips with the many implications of tax reform.

To help identify the issues that firms need to explore in hammering out their responses to the new tax laws, AIA tapped the knowledge of four real estate experts: developer James Lewis, of Washington, D.C.; architect Harold Adams, president of RTKL Assoc., Inc.; economist Anthony Downs, senior fellow, the Brookings Institution; and Terrance L. Kohl, a Bethesda, Md., accountant serving architectural firms.

The four engaged in a panel discussion moderated by Paul Knapp, the Institute's administrator for communications. They began by discussing general market conditions, which tax reform may amplify.

Overbuilding

Anthony Downs: Since 1978 all but two years have been very high-level construction years, and it has really been almost a super-boom. If you look at the number of square feet of office, industrial, and commercial space under contract in every year since 1978, it has been averaging over 900 million square feet. Last year was one of the highest ever. So the architecture profession has had a tremendous . . . run, and it is in for a downward movement. It is not going to last just one year either.

Harold Adams: We clearly have an overbuilt situation in most markets across the country. And I think that it is overbuilt in a wide range of project sizes. The small accountant, doctor, lawyer, dentist have all been in the marketplace building little office buildings and looking for shelters, along with the large investors. The new tax law, together with the overbuilt environment, is going to cause a pause for architecture firms. I think that the smaller firms, just getting started, which have been quite busy working on projects that have probably been driven by shelters, are going to suffer.

Some very large firms—such as those in the Southwest that have been doing large, speculative office buildings for [tax] shelter—have become veritable factories for turning out these projects, and have done well. These firms may also be hurt.

John Lewis: The tax laws as they were written created an artificial economic impact that resulted in good times with an overbuilding situation. For the next year or two, activity by architects has got to slow down because building has to slow down. But once the adjustments take place and the excess products on the market become absorbed, then I think things will simply be in a healthier posture in the long run. We won't have this artificial impetus for building that produces distortions in the marketplace.

Downs: The positive effects [of tax reform] come for the owners of existing buildings. Most developers share your view. They were suffering from tremendous overbuilding, and they have long thought our existing buildings, whatever kind they are, would do better if there weren't so much competition.

Terrance Kohl: I think there are a couple of plus areas here. One, rehabilitation credits have not totally been eliminated. So they are still there for architects to work with as far as renovation of older buildings.

Also, I think we probably will have a market for low-income housing.

Another area that might be coming forth is cooperative-type units. They are going to be open to corporate ownership, trust ownership, estates, and partnerships—and they haven't been in the past. So that area might expand a little bit.

Adams: For the last couple of years we have seen an increase in pension funds as clients, and some of them are European pension funds—management firms. They are certainly going to be in this market, looking for existing properties that they can rehab to increase their earning power. That is a pattern that we have seen developing for the last couple of years. I think that will increase. There are a lot of foreign investors . . . .

Foreign investors, investment trends

Downs: The Japanese, in particular—and any other country that has had a big movement of exchange rates favorable to them versus the dollar—will be more interested in buying existing property first because that is less risky. But ultimately [they will be] perhaps building more properties.

Lewis: I agree with that. My projects seem to be a little larger anyway and have a higher image [than typical], which, I think, a lot of foreign investors like. I have a very substantial amount of interest from those sources for investment in my projects and, as Tony says, the exchange rate is so favorable now that it is a real bargain.

I heard somewhere recently . . . that we are at a watershed with the Japanese investors coming into this country. They are going to shift from unloading products here—because apparently that is equaling out price-wise and value-wise—into investing in real estate; in permanent investments here. I can see that taking place. The main people who have approached

Ms. Smith, former acting editor of Architectural Technology, *is president of Editor's Ink of Washington, an editorial consultation firm.*

Illustration by Brian McCall

me for investing in my projects have been the Japanese and some European investors. I have not had much interest from Arab investors in the last couple of years. The reason is obvious . . . the decline in the price of oil.

Downs: REITs [real estate investment trusts] are back into favor in the sense that a whole bunch of them were issued last year, but they are not doing all that well because there were so many put on the market. Their market prices have been below their issuing prices in many cases. I know at least two REITs that have been withdrawn from a potential offering in the last six months because the market is so saturated now.

They didn't get hurt by the tax reform and, relatively speaking, it has improved their position. But they are not counted as passive income. The income from an REIT in the new tax bill is considered portfolio income. Real estate syndications are passive income, so all the losses there cannot be used against gains in the other two categories. REITs are not passive income. Their positive income flows cannot be sheltered with losses from syndications. They are portfolio income, like stocks.

Quality of design

Paul Knapp: AIA President John Busby has said that design quality will be of increasing importance as speculative development gives way to what we call an investment-oriented construction economy.

Downs: Well, there will be a cost pressure. If you mean by "design quality" improving the effectiveness of a building or increasing its marketability because of the design, yes. If you mean by design quality higher cost of construction per square foot, based on more lavish design, then I would disagree because I think there will be pressure to be cost-effective. You can't be as generous in the construction of buildings as you could under a syndication where they had huge profits in buildings.

Adams: I think that is true. On the one hand, we have seen in the last few years more emphasis on quality, better materials, more lasting design. But that is because it is marketable. I think the quality people are going to survive.

On the other hand, it is going to be tough to make the deals

Tax Changes Relevant to Architects

Passive Loss Provision. Under existing law, losses from "passive" real estate investments (where the taxpayer has a passive limited partnership role) can be used to offset income from all other sources. Under the new rules, which will phase in gradually, such losses will be used only to offset income from other investments of the same type. They will no longer be used to offset wage, salary, or portfolio income. The result is that investors need to "repackage" their passive shelters in real estate so that losses will be offset by income from other passive investments. Investment counselors stress "shelter configuration" as a key to lowering tax liabilities. The rule applies to any losses related to rental property. However, an exception is made for taxpayers earning less than $100,000 a year, allowing them to take as much as $25,000 in rental real estate losses. The allowance is phased out for taxpayers earning between $100,000 and $150,000.

Rehabilitation Credits. The new law reduces the special tax credits for rehabilitation of certified historical buildings from 25 to 20 percent. Credit for rehabilitation of nonhistoric buildings more than 50 years old would be 10 percent under the new law, which applies to projects completed after Jan. 1, 1987. The current law provides 15 percent credits for nonresidential buildings at least 30 years old and 20 percent for nonresidential buildings at least 40 years old.

Low-Income Housing. Recognizing the need for tax incentives to attract investment in low-income projects, Congress exempted them from the new restrictions on real estate tax shelters. Projects in which 85 percent of the units are occupied by families earning 80 percent or less of the area's median income are covered by a transition rule allowing investors to retain their tax shelters. Such projects are usually built with federal and state subsidies.

Depreciation Write-offs. Depreciation write-offs have been substantially reduced. For example, nonresidential real estate will be written off in straight-line fashion over 31.5 years. Residential real estate will be depreciated over 27.5 years, a much less generous write-off than the current 19-year depreciation period.

Subchapter S Corporations. Under the old regulations, partnerships, Subchapter S corporations, and personal-service corporations could postpone taxes on some of their income by putting the business entity on a fiscal year different from the calendar year they use to figure their personal taxes. The income realized between the end of the fiscal year and the end of the calendar year was not taxed for another year. The new tax bill eliminated that loophole. The exception is for professionals who can demonstrate sound business reasons for not having the years coincide.

economic without the shorter depreciation periods and without the shelter.

Lewis: I think the firm's name goes a long way. In Houston and Dallas—at present very, very bad markets—Philip Johnson's buildings are leasing up very well.

Downs: Leasing up means nothing today when you are giving concessions. You can get the building full overnight but you're not collecting any rent from it.

Adams: Well, Tony, let me tell you. Leasing makes a big difference to a developer.

Lewis: If it is occupied you have something to start with. It is better than not occupied. The better buildings, particularly those attached to big-name architects . . . are getting occupied and at favorable rents.

Kohl: One of the underlying issues is that people who do have money will be looking for better bargains and situations. The buildings with better marketability, better quality design, will attract that money . . . .

Lewis: If you have a downturn in the market and you have an extreme situation of overbuilding, the best building in the area can always be adjusted downward and leased, where the others may not be able to get leased at all. So you are more competitive, and I think your downside is covered better in that situation.

Knapp: Do you expect investors in this investor-oriented economy to get more involved in design and construction discussions—perhaps even in the decisions? I have heard it stated by some architects and new developers that investors are trying to get into the action too much, dictating too much of what goes into a project.

Adams: I think it is the marginal architects in the country who would say that. I think those are the guys who have been in trouble and will continue to be in trouble. The better projects are the ones where the client is deeply involved. You need a good client participating with you to have a good project.

Kohl: I think the investment syndicator—whatever type of entity that is going to be—is going to be more concerned [with the design process] because he is concerned about marketability and, therefore, is going to be more involved with the process.

Diversification of services

Adams: I think that certainly you are going to see some [architecture] firms diversify in the types of services they offer, trying to get into property management as some firms got into construction management in the '70s.

There is an opportunity with the computerization of our practices to expand our services for clients with multiple buildings . . . to help the client manage their properties by having it all on computer. There are many, many corporations out there and governmental agencies that need to know what they have. They really do not know what real estate they own, and they need to have someone help them pull it all together and create an inventory of their properties.

Personally, from my own viewpoint, I think that architects should stick to what they know and be good architects. We never got into construction management because we feel that it is an area that contractors do. We always relied on working with good construction firms and have not tried to get into areas that are really outside of our realm of training.

Downs: I don't see any particular advantage for architects doing property management. In fact, it probably goes against their mental set because they are imaginative, creative types. Managers have to do budget cost control and promote occupancy. I don't think that architects have any particular advantage in this and maybe some disadvantage.

Adams: As in other economic down-turns, I think that the firms with some diversity are going to be the ones that will survive. But, clearly, when there is a shortage of work with everyone scrambling, it will even affect the larger firms and the firms that are diverse, simply because the marketplace is going to again be glutted with architects willing to cut their fees, willing to do free work—free front-end work—that is going to have an overall detrimental effect on the profession.

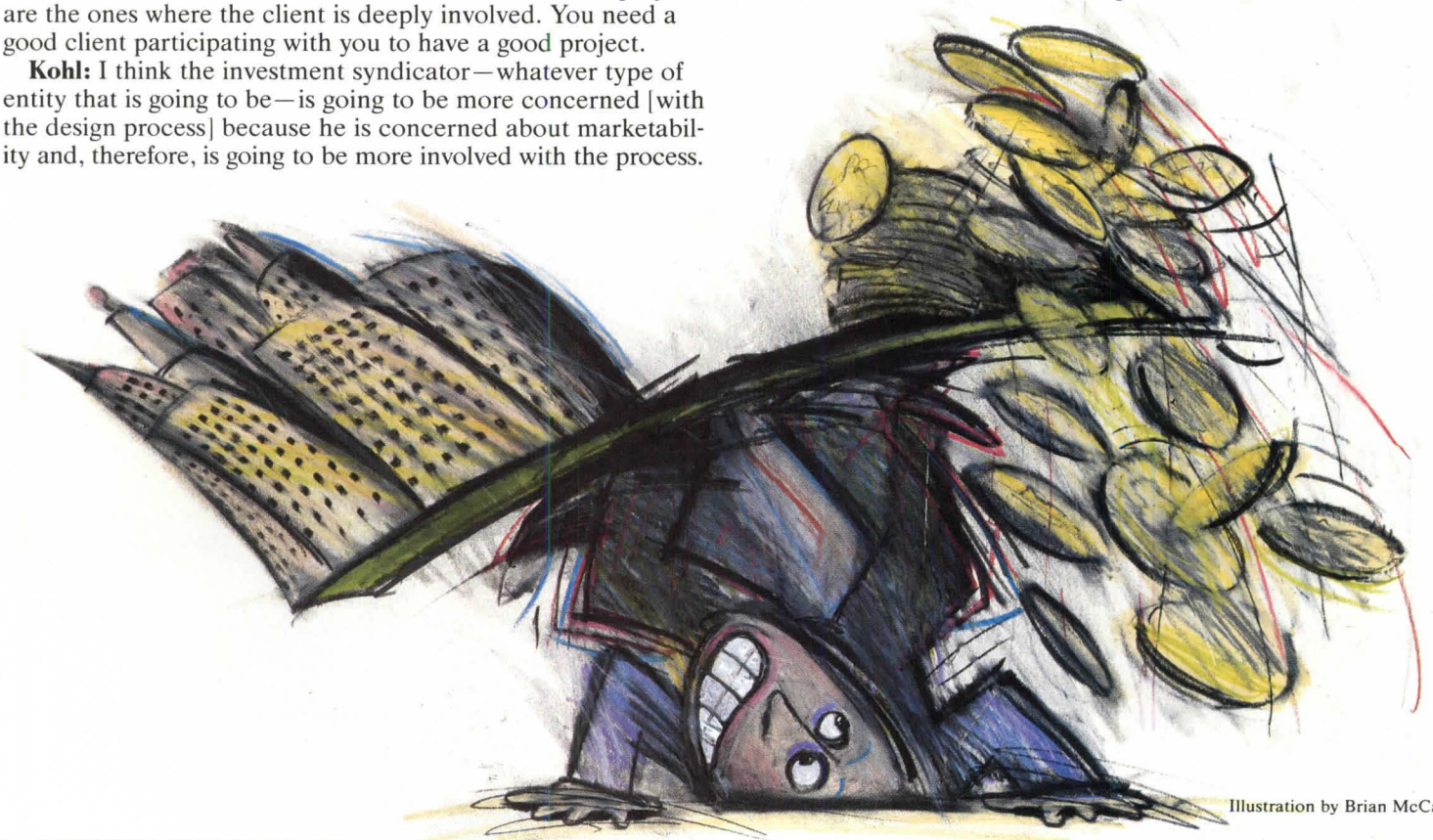

Illustration by Brian McCall

Diversification by developers

Downs: Developers are much more likely than architects to expand into management. They have organizations that are entrepreneurial in a different way from architects. They are financially free and have a different kind of aggressive personality and are going to be looking for someplace to put those personnel.

Kohl: I have some architecture firm clients getting into building maintenance management—the elevators, heating units, and all those types of things. I think there might be a need because of the need owners have to operate their buildings on a more economical basis.

Adams: I think that is true. There have been a lot of buildings built in the last 20 to 30 years that have a pretty short life cycle. There is a great opportunity to go in and start upgrading those facilities where the roof is failing and the facade is failing and the mechanical-electrical systems need upgrading. Corporations are going through the electronic revolution.

I think on a very short-term basis everyone should be out marketing accounting firms because they are going to grow dramatically in office space. So those are areas where I think the architect will have a market.

Geographic diversification

Knapp: There seems to be a lot of migration of firms. They are expanding throughout the country.

Adams: There is quite a number who are scrambling to find other markets and to diversify out of their local economy.

Knapp: Suppose you were to get a job in a city where you don't have an office. Would you associate yourself with a local firm? Or would you need to call on the services of a local firm?

Adams: Occasionally we would associate with a local firm, but not very often. We are following national clients. They really do not demand a local firm, except perhaps in civil engineering to help in the process of garnering approvals. What has happened in large architecture practices, such as ours, is much like what is happening in the law and accounting firms. You follow your major clients wherever they go or you start having an erosion. They find other firms to serve them. So New York law firms are opening branches in L.A., and other places, to serve their major corporate clients.

Downs: Does that mean that the share of all architecture that is being done by large firms is getting larger?

Adams: Probably. I think the large firms are continuing to get larger. The smaller firms are doing well. The middle firms are the ones having more difficulty.

Downs: The middle-sized business probably has difficulties because it has structured overhead that is fairly sophisticated in this country, but it also suffers probably most erratically by the market. So I think you are going to see an increase in the size of their operations. The small, local firm will probably do fairly well.

Adams: The large firms are also facing new competitors. The Japanese are a major competitive threat out there for the large firms. They are beginning to be of great concern to the E & A firms. The Japanese have some very, very powerful firms that have 1,200 or 1,400 architects and engineers on their staff. They can design it, they can built it, and they will finance.

Lewis: I know the Japanese often tie a requirement that you use their [design] services into their willingness to invest. That could erode the work of our architects.

Income deferral

Knapp: Do you know of any loopholes [in the new tax law]?

Downs: Right now under the present law there is a big incentive to convert corporations to master-limited partnerships because you can get rid of a layer of taxation. You can take [several] smaller partnerships and put them into one partnership, and sell shares in it that are partnerships—just like in a syndicated partnership. They are limited partnerships. They are ownerships of this master-limited partnership. It is a partnership and, therefore, it is not taxed at the partnership level and the taxes flow through to the partners. I know several firms that are now converting themselves into master-limited partnerships. I think it is a gigantic loophole, and Congress will probably do something about it.

Adams: We haven't found any loopholes. We have deferred taxes and the rates will bring that down and it will drop some major sums of money to the bottom line, even in our own corporation. And for the big public corporations that is going to be somewhat of a windfall.

Downs: The basic advice that most economists are giving is if you are in a 50 percent bracket as an individual or the maximum corporate bracket (45 percent), defer your income to next year and pay off as many expenses as you can this year. If you are going to sell some asset anyway, sell it this year so you can get capital gains.

Adams: And be very charitable. It is a good year for major gifts to charities.

Downs: The directly expensible business deduction went from $5,000 to $10,000 per person. So you can still directly charge off a true business expense—and even more next year than you can this year. But the tax rate against which you are charging it is, of course, going to be lower next year.

Knapp: What advice can you give the small firm?

Kohl: I think they are going to have a problem in 1987 because if they are on the fiscal year—meaning other than a corporate calendar year—they are all going to have to file short years to coincide with the calendar year. That is going to be part of the new regs.

The dialogue above demonstrates that even the most knowledgeable experts have no standard advice on how to respond to tax reform.

Diversification, quality, and cost-effectiveness repeatedly emerge as keys to survival in a sluggish, near-term market. But these words have many meanings.

Quality is an especially slippery term. Sensible and client-responsive design, good materials, and well managed construction is one definition of quality design service, which will establish a solid reputation and develop a stable clientele.

Cost-effectiveness is perhaps easier to define but more difficult to accomplish. Without the tax incentives for speculative development, economic criteria will tighten quickly. Firms that can keep overhead down while maintaining consistent quality and creativity will have the edge.

Each firm must take a hard look at where it stands and what it needs to do to adjust to this rapidly changing business environment. The need for individualized strategic market planning was never more pronounced. The advice of top marketing, legal, and accounting talent will be essential. Both near-term and long-range targets will be useful, although they will need adjustment as the impact of the new legislation becomes clearer. □

Making Economics Integral to Design

'Cost planning' process provides more feedback sooner.
By C. Steven Surprenant

"The estimator screwed up again!" has become the battle cry of many architects facing clients with cost overruns in their hands. Whether project cost control is an in-house effort, provided by an outside estimating service, or overseen by a construction manager, the architect rarely accepts the blame personally. But, as the first edition of the AIA Handbook of Practice stated in 1917, "One of the architect's most serious tasks lies in estimating the probable cost of the work. To the owner, the reasonable correctness of such an estimate is of prime importance, since his course will be guided by it." Almost 70 years later, the way architects perform this mission of cost control still strongly influences how the profession is perceived, valued, and respected.

Why do architects so frequently have problems controlling construction costs on their projects? Out of the infinite number of reasons, two are paramount: the failure to establish realistic budgets at the onset of design and the absence of cost control during design. Both are the architect's responsibility.

Traditionally, architects don't utilize cost control techniques until a design has been well developed—they hand over drawings and specs to an estimator who performs cost takeoffs in areas that roughly correspond to the way the jobs are broken down by trades in the field. However, the real opportunity for saving money lies in the conceptual stages of design, before any detailed drawings are developed where materials and methods become fixed. And it is too often true that the architect doesn't have a real handle on the construction cost until bids are tendered. "One has to recognize that for the most part a project's construction cost is determined by the design, not the contractor," says John Mouton, AIA, assistant professor, Virginia Polytechnic Institute and State University, college of architecture. "The contractor doesn't determine the cost; he just calculates it based on what's in the design documents."

Cost planning begins in concept phase

Over the last 40 years, cost specialists have begun using an effective, formal technique known as "cost planning," developed originally by the Royal Institute of Chartered Quantity Surveyors in Britain. This method positively contributes toward lowering construction costs, improving design efficiency, and accelerating schedule progress without sacrificing objectives of either the architects or the owner. The basic tenet of cost planning is that cost expertise must be an integral part of the design team's skill, an active, not reactive, process.

Mr. Surprenant is assistant to the president of Centerra Corporation. Centerra's holdings include Henningson, Durham & Richardson, a national architecture, engineering, and planning firm, and Centerra Construction.

The first step in cost planning entails development of a realistic project budget. Although it is the owner's responsibility to set the cost limit for construction, it is the architect's responsibility to check and validate the budget, as a standard, contractual service to the client. Ideally, such an estimate should be based on data for at least 10 to 20 projects of similar scope; current material, labor and equipment prices; and anticipated market conditions at the time of construction.

Admittedly, getting to a reliable, fixed budget is no easy trick. The client may boldly declare that money is no object and then exclaim upon seeing the design's $11 million price tag, "But I only have $7.5 million, tops!" Conversely, if the design team sweats the details to bring in an estimate of $6 million, and the client says, "That's great, I was thinking of $9 million . . . let's make it a third bigger and better!" design time and money goes down the drain just as quickly. The owner must understand and agree that the budget must be fixed and followed.

Cost control as a design tool

The other major step for avoiding blown budgets is careful cost control during design. "Cost control is a concept quite different from cost estimating," says Paul Waddlelove of PWA Cost Consultants, Arlington, Va. Cost estimating forecasts expected capital expenditures based on a given design; it doesn't control costs by influencing design. Without good cost control, Waddelove says, many projects are subject to "scope creep," whereby certain elements such as the exterior closure or the mechanical system tend to grow in size or complexity, and therefore, so does the associated cost. While most architects understand that this can occur, they still assume effective cost control can be achieved through accurate estimating. This is a fallacy. Cost estimating identifies overruns, but it does so late in the process, requiring expensive redesign.

Consequently, the earlier cost planning begins in the design process, the greater the chance for cost savings. Steps for developing an effective cost control strategy during design include:

1. Develop mini-cost budgets. Based on a realistic budget, a cost plan for controlling expenditures can be established by setting cost targets or mini-budgets for each major building system—the sum of which obviously cannot exceed the total budget cost limit. These mini-cost budgets are strictly a design tool, and as such may represent a departure from the procedural formats with which estimators normally work. Traditional cost estimations are normally divided into the 16-division U.C.I. format, which works well for contractors ordering materials, but not so well for architects trying to determine which building elements are creating an overrun on the budget. Since the U.C.I. format separates work by trade, not by building component, estimating using that system will tell the architect that the con-

crete costs too much, but not whether the cost problem is in the concrete foundation, the wall panel system, or the roof deck. On the other hand, a building-oriented classification, such as the Uniformat system, which divides the building into system "chunks," allows architects and engineers to develop designs for each of these systems while keeping an eye on the individualized budgets.

"The crux of cost planning is in how you structure cost data and estimates," says Brian Bowen, executive vice president of Hanscomb Associates, Inc., Atlanta, and one of the "founding fathers" of the Uniformat classification system. "What architects really need is functionally oriented cost structures placed in the language of design."

Uniformat dates from 1972 when Hanscomb Associates was retained by AIA and the General Services Administration (GSA) to assess the feasibility of a construction cost databank and an access system. The recession in 1974 influenced AIA to drop out of implementing the system, and GSA hired Hanscomb Associates to develop the Uniformat system to a greater level of description and link it to U.C.I. format. The 12 major Uniformat classifications are:

- Foundations
- Substructures
- Superstructure
- Exterior closure
- Roofing
- General conditions
- Conveying
- Mechanical
- Electrical
- Interior construction
- Special conditions
- Site work.

Waddlelove recommends that U.C.I. format be used as subcategories under each of the main Uniformat classifications. This allows for easy translation to the numbers necessary for analysis of contractors' bids and makes conversion to a computerized format very easy, he explains.

Each member of the design team is made responsible for designing to predetermined minibudgets for his or her particular portion of the project. The cost target does not dictate the design, but it does help to establish design limitations. It's important to involve all A/E disciplines in the design process as soon as the minibudgets are established. If the architect waits until architectural features are fixed before involving the engineers, a substantial opportunity for saving money may disappear.

2. Employ a cost specialist. A cost specialist, in-house or consulting, should be part of the design team at the earliest stages of the design process. Cost control is a full-time profession, and the cost specialist's experience and knowledge can greatly increase the accuracy of estimates. Despite the fact that cost specialists work with numbers and dollar signs, ideally they are artists as well as scientists. A good, conceptual cost specialist is able to visualize the design and its components before it is drawn up. The cost specialist's expertise will lower the firm's design costs by aiding the choice of cost-effective solutions that are easier to design, thus eliminating the design of alternatives for pricing purposes only. A cost engineer appreciates that certain materials are easier to design and detail than others and can bring that fact to bear early in the design process. For example, an architect might propose a concrete structure, and the cost specialist will counter that designing in steel will save enough upfront design time to make steel a worthwhile consideration. In terms of client relationships, hiring a consultant or developing in-house expertise in cost planning can add credibility to the cost decision-making process.

3. Develop alternative designs. When cost control begins before the pencils hit the boards, the design team immediately

Cost Tips for Architects

1. Economic and market conditions can have more effect on construction costs than any other single factor. Since the early '70s, there have been two major peaks and valleys in construction costs that have been highly unpredictable. One way to prevent this factor of uncertainty from jeopardizing the project is to conceive of the building in terms of "base bid" and "alternates." Early in the design the owner and architect decide jointly on the minimum amount of construction that will result in a usable building. This becomes the "base bid package" in construction documents. Everything else is an "add alternate." At bid time, the contractors price all the alternates, giving the owner the option of selecting one or more as the budget allows. Good candidates for alternates are items that could be added to the project after construction with a minimum disruption to operations.

2. Watch your "economies of scale" in choosing construction materials and methods. If you use a greater diversity of materials on the project, chances are you'll create a money run for the contractor; and your bid prices will go up substantially. In other words, try to avoid the little isolated pockets of work where you may specify small quantities of one material in a particular room and a small quantity of a different material in another similar room that performs the same function.

3. Installation costs are usually figured per piece. The fewer pieces of material utilized in the construction of a project, the lower your costs will be. For example, a 4x4-foot precast panel will cost the same for a contractor to hang as a 24x4-foot precast panel even though it may be six times bigger. The cost is essentially the same. In fact, with the economies of scale due to more materials in a larger piece, it may even cost less.

4. When analyzing concrete versus steel structural systems, don't forget the fireproofing aspect of steel. It can cost a lot more to fireproof the steel than many people assume. This expense may tip the scales toward concrete.

5. Work with a mechanical engineer early-on in design to determine the right location for equipment and adequate amount of ceiling space. Bad locations and inadequate space can lead to longer pipe runs and heavier gauge ductwork, which add considerably to the cost of the facility.

6. On projects that require Davis-Bacon wages or union labor, stay away from labor intensive construction materials and methods. They will greatly increase the construction costs. For example, use drywall instead of plastering, single-ply roofing instead of three-ply, and precast exterior wall systems rather than a brick veneer, etc.

Paul Waddlelove, who composed these tips, is president of PWA Cost Consultants in Arlington, Va.

	Cost Plan Sep 15, 1985	Cost Check #1 Nov 1, 1985	Cost Check #2 Dec 1, 1985	Schematic Estimate Jan 10, 1986
Foundations	75,000	80,000	80,000	81,000
Substructure	850,000	875,000	849,000	851,000
Superstructure	3,443,000	3,820,000	3,402,000	3,400,000
Exterior closure	3,555,000	5,589,000	3,577,000	3,627,000
Roofing	320,000	332,000	321,000	315,000
Interior construction	2,841,000	2,947,000	2,853,000	2,915,000
Conveying systems	1,400,000	1,540,000	1,320,000	1,320,000
Mechanical	2,925,000	3,100,000	2,966,000	2,960,000
Electrical	1,838,000	1,850,000	1,803,000	1,805,000
General conditions and profit	2,070,000	2,416,000	2,060,000	2,069,000
Net Building Cost	19,317,000	22,549,000	19,231,000	19,343,000
Equipment	—	—	—	
Site work	200,000	162,000	141,000	157,000
Contingencies	6,246,000	5,741,000	4,061,000	3,901,000
Progressive Cost	$25,763,000	$28,452,000	$23,433,000	$23,401,000
Target Cost	25,000,000	25,000,000	25,000,000	25,000,000
Difference from Target Cost	+763,000	+3,452,000	−1,567,000	−1,599,000
Cost per SF	70.97/SF	78.81/SF	70.10/SF	69.73/SF
Gross Floor Area	363,000 SF	361,000 SF	334,365 SF	335,610 SF

becomes more cost conscious. Instead of developing just one design alternative, several cost-effective schemes should evolve as the team searches for the design that will be most compatible with the budget. "One valuable aspect of developing alternatives according to the mini-budgets is that it helps take the unknowns and surprises out of the design," Waddlelove maintains. This can avoid the delays and disappointments that occur when a more detailed design finally turns out to be too costly and the architect has to start over.

4. Keep checking after the concept phase is complete. Once a realistic budget and cost plan are developed, there is a great temptation to discontinue any other cost control efforts until bids are received. However, with the total budget and cost targets for each system established, the cost specialist must monitor the entire cost plan through continuous cost analysis. This process, called cost checking, includes both formal and informal estimating at predetermined and fixed points during design.

Cost checking entails periodic cost analysis of design on a monthly basis during all phases of design. This checking process shows any cost variations, uncovers the reasons for them, and suggests corrective measures. Cost checking starts early. A number of design solutions considered for each building element during conceptual design can be analyzed through cost checks. Only those alternatives meeting the cost target will be carried forward for further consideration, at which time selections will be based on other design factors.

As the design develops, periodic cost checks should continue, though they need not be a super-intensive work effort. In fact, the most important aspect of the checking process is to determine variances since the last report, the resulting cost impact, and corrective measures, if necessary.

5. Set fixed points for formal cost checks. In addition to the informal cost-checking process, the cost specialist should provide estimates at fixed points during design, namely at the completion of schematic design, the completion of design development, the 60 percent completion point of contract documents, and 100 percent completion point of contract documents. Each estimate must be developed based upon a careful measurement of quantities where possible and reasonable allowances for the remainder of the work. All estimates should use current prices for material, labor, and equipment escalated to the midpoint of construction. An example of the formal cost checking process is shown in the chart above.

As with the informal cost checks, the architect can compare each completed estimate to the cost plan and identify those areas that need adjustment to satisfy budget requirements. These periodic checks and estimates may show that the projected construction cost will be over budget. When this occurs, the reasons for the deviation must be identified and investigated individually so that corrective action can be aimed at the right system, not as a general scaleback of the project. Sometimes it is in the owner's best interest to accept the deviation and amend the budget. However, this decision should be made only by the owner and only after having been thoroughly informed of all the alternatives by the architect.

Cost planning is a dynamic, ongoing process involving constant budget planning, estimating, comparison, and human action to keep the design within budget. It does not add much to the design cost of the project. In many cases this investment, like insurance, can actually decrease costs.

The bottom line of construction cost control during any design is that if the architect holds the prime contract, it is the architect's responsibility. If this responsibility is ignored, the outcome could be devastating. □

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Why Sealant Joints Fail

Though a small part of a building's exterior, sealants perform a very large function.
By Karen Warseck

Joints sealed with an elastomeric sealant usually fail from a combination of factors that can be summed up in six words—a lack of attention to detail. Too often, since the sealants are a small percentage of the work, they are perfunctorily specified, easily substituted, and haphazardly applied. Yet successful joints require meticulous design, precise sealant selection, and painstaking application.

The most common reason for sealant failure is too few or incorrectly sized joints. In order to preserve the esthetics of a building facade, joints may be undersized or, to limit the number of joints, made huge, following the ill-conceived rationale that "if you use bigger joints, you need less of them."

Many architects, if they size joints at all, only consider movement due to thermal expansion and contraction. However, a number of other factors influence correct sizing and placement. Any change of plane or materials requires a joint. Windloading affects joint placement not only for structural glazing applications but also for parapet walls. Moisture-related movement of materials also plays a part—concrete shrinks as it dries, brick grows as it absorbs water, and wood alternately shrinks and swells. Differential thermal movement between different but adjacent materials must also be accommodated with joints.

If the joints are detailed too far apart, or are made too small, the building simply creates its own. Most often the new joints appear as cracking in the exterior walls, but incorrectly sized or located joints also manifest themselves by causing bending or bowing out of the walls, crushing at the joints, or shearing of the curtain-wall fasteners or masonry ties.

Joint sizing does not allow much of a margin of error. If the joints are too narrow (less than ¼ of an inch), the expansion of the substrate can cause the joints to close too much and extrude the sealant. When the building later contracts, the extruded sealant is no longer in the joint and leaks result. If a joint is too wide (more than one or two inches, depending on the sealant), the sealant may sag out of it. In addition, a wide joint requires a deep sealant bead to avoid cohesive failure, and, the deeper the bead, the less able the sealant is to stretch. (This phenomenon can be illustrated by rubber bands. If you have two bands of equal length, the thicker one will not stretch as easily or as far as the thinner.) The forces attempting to stretch the thick bead may then cause undue stress at the bond line and rip the sealant from the substrate (Figure 1). To prevent this action, the joint should be designed so that the depth of the sealant is ½ the joint width and never more than 1:1 at mean temperature nor deeper than half an inch (Figure 2).

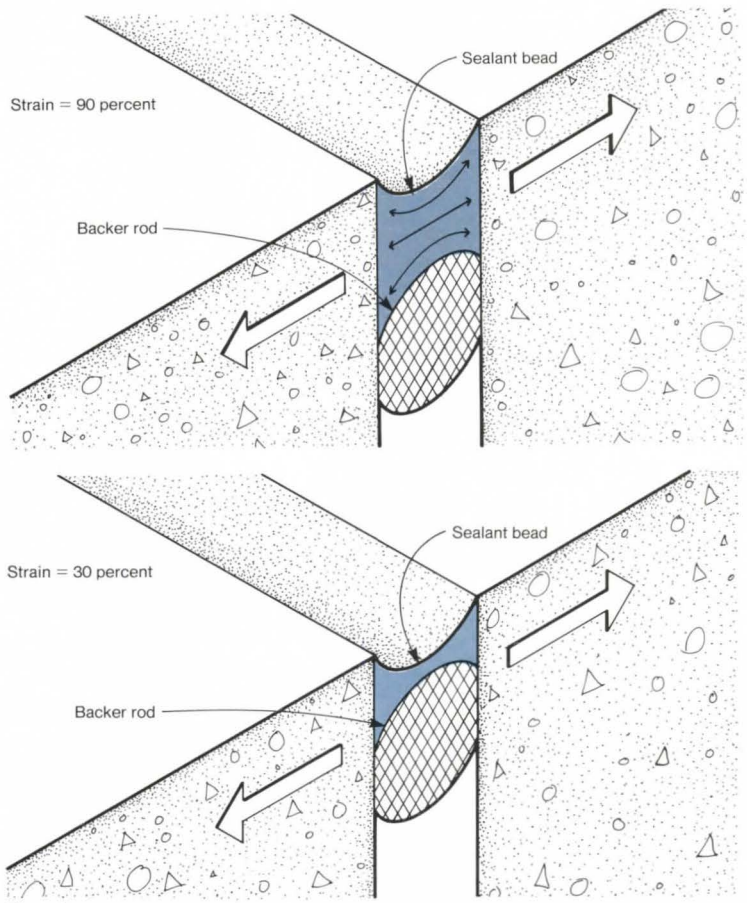

Figure 1

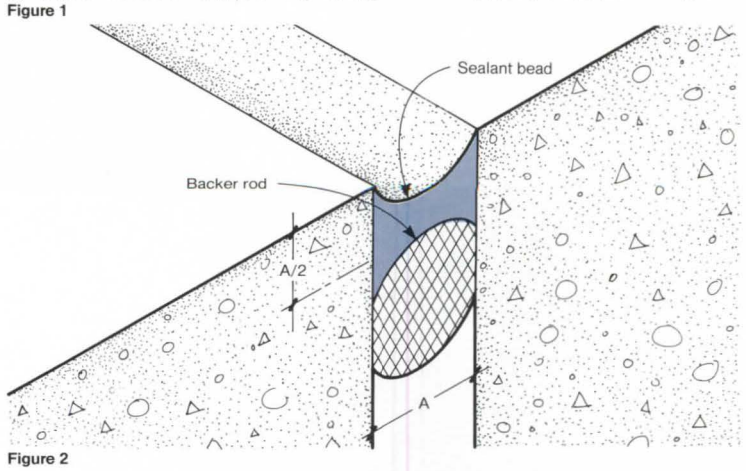

Figure 2

Figure one shows stresses in sealant and adhesion stresses for deep and shallow beads after 50 percent movement. In figure two, optimum joint depth is half the sealant's width.

Ms. Warseck, an associate member of AIA, is director of technical services for the Atlanta office of Hoffman Architects, a firm which specializes in roofing, waterproofing, masonry, and structural problems in existing buildings.

Selecting the right sealant

When the joint is properly sized and located, the most common cause of failure is that the sealant chosen lacks sufficient movement capacity for its intended use. Part of the problem lies in the manufacturers' imprecise descriptions of their products. The terms "elongation," "modulus," and "performance" are used interchangeably, to the confusion of anyone attempting to evaluate the differences and similarities of the multitude of sealant products and formulations available.

Setting clear definitions of terms is the first step to selection of the proper sealant. *Elongation* defines the length to which the sealant can stretch, expressed as a percentage of its original size. *Modulus* defines the tensile strength of a sealant at a given amount of elongation. At 150 percent elongation, high modulus is defined as 100 to 150 psi, medium modulus as 80 to 100 psi, and low modulus as 20 to 40 psi. The modulus has a direct effect on the elongation capacity, since the lower the tensile strength, the easier the sealant may stretch. High-modulus sealants are recommended for uses where high strength is required and little movement is expected. A perfect use for a high-modulus sealant is in structural glazing, where the strength of the adhesive is the highest priority. Low-modulus sealants are used where movement capability is the overriding concern. Low-modulus sealants tend to be easily torn or punctured. An example where low-modulus sealants are suggested is for weather seals on metal curtain-wall buildings, where both high thermal and high wind movement capacity are required.

Performance relates to the amount of expected joint movement and the capacity of the sealant to elongate and recover. Low performance sealants will not work in joints that experience movement greater than ±5 percent of the joint width. Medium performance means that the sealant will work in joints that move up to ±12.5 percent of the joint width. High performance will take movement in joints greater than ±12.5 percent.

Recovery characteristics are also important to proper sealant selection. Some sealants stretch, but once subjected to tensile forces, do not easily return to their original shape, a phenomenon known as *stress relaxation* (Figure 3). Other sealants experience *compression set,* meaning they will remain bulged out after being compressed and do not easily stretch out again (Figure 4). In both cases, the sealant has developed a "memory," which eventually will cause failure. A stress-relaxed sealant will assume a distorted shape when the joint closes. When the joint reopens, the sealant will not stretch as it should from its distorted shape and will therefore fail. A sealant with a compression set will rip from the substrate under the tensile stress developed as the joint opens.

Proper sealant selection also entails avoiding incompatibility between the sealant and the substrate. Improperly chosen sealants can cause straining or etching of the substrate and loss of sealant adhesion. Other symptoms of incompatibility problems include disintegration, discoloration, or hardening of the sealant. When any chance of incompatibility is present, the architect should request that the manufacturer test the actual components to be used in the assembly to determine possible detrimental effects before construction begins.

The specifier also needs to consider appropriateness of the

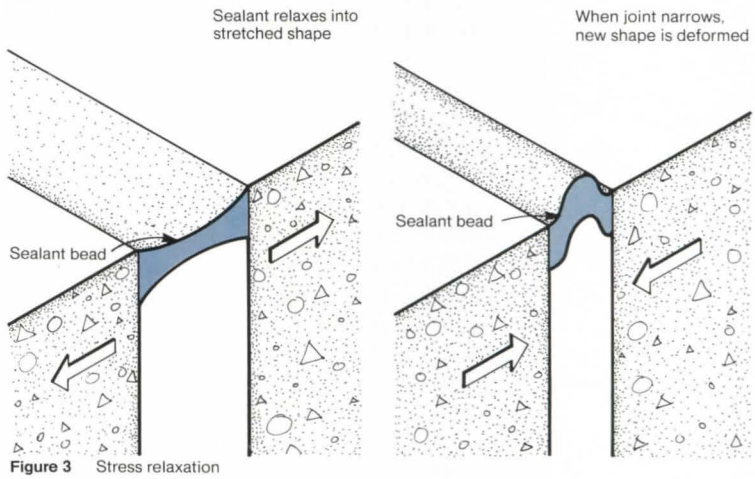

Figure 3 Stress relaxation

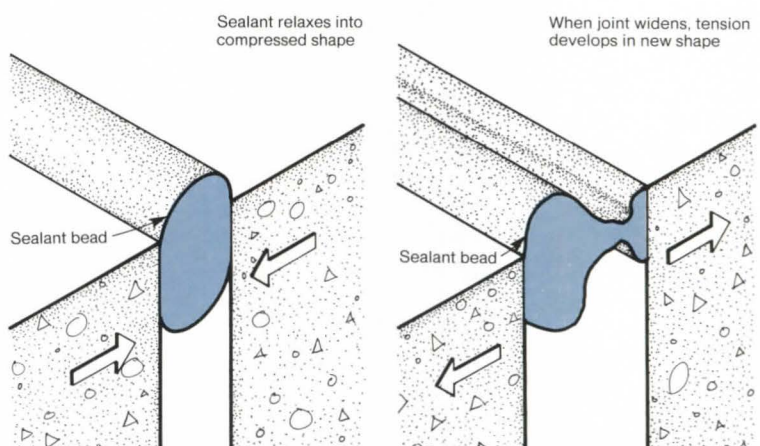

Figure 4 Compression set

Stress relaxation causes the sealant under tensile stresses to lose its original shape, shown in figure three. In figure four, compression set means the sealant bulges out of shape after being subjected to compression.

sealant for the environment in which it is expected to perform. Important characteristics include:

- resistance to puncture and vandalism
- ultraviolet resistance
- chemical resistance
- abrasion resistance
- ability to withstand extreme weathering
- ease of access for application and repairs
- reaction to continued submersion
- ability to resist dirt pickup due to slow cure or dust attraction.

Failure to take these factors into consideration can result in adhesive failure, cohesive failure, craze cracking, hardening, disintegration, color changes, or other types of premature failure.

Sealant selection does not end with preparing specifications. The same consideration must be given to any proposed "or equal" substitution as for the original specified product. Keep in mind that, in general, different brands of sealant are not equal, and never assume that one formulation of sealant can be substituted for another.

Avoiding application failures

The sealant's main function, accommodating movement, is more easily performed if the sealant does not do double duty as weather protection. But, as in most cases, when the sealant does form the joint's sole weather protection, careful spacing, location, and sizing of the joint are even more critical to the ultimate success of the seal. Even the finest set of specifications proves useless if it is not followed, or if the application is faulty. Consequently, architects need to design around the potential sealant problems that could develop in the field.

For instance, all sealant manufacturers state in their recommended application procedures that the substrate must be clean and dry for the sealant to properly adhere, and the most common of all adhesion problems begins when this basic rule is violated. Cleaning deficiencies include not cleaning at all, using contaminated or dirty solvent, using the wrong solvent for a particular sealant, allowing contaminated solvent to dry on the substrate, using contaminated rags or brushes, or using a rag containing lint.

The second most prevalent adhesion problem is caused by the improper use of primers—not using the primer at all, using too much primer, using the wrong primer for the specified sealant or substrate, or not allowing the primer to dry completely before applying the sealant.

The weather on the day of application can also cause problems in the field. Beware of applying an organic sealant at too low a temperature—cold causes the sealant to lose viscosity, making it difficult to apply without gaps and voids, and too thick to properly tool. In addition, the cold air is usually less humid, and less available moisture may retard the cure. Also, if the substrate has contracted due to cold temperatures, the joint will be wide open. If the sealant is applied then, there may be trouble later when the substrate warms up and expands, causing the joint to close and the sealant to be squeezed out entirely.

Too high a temperature can cause the sealant to sag or even flow out of the joint. If the sealant sags, the bead formed is of uneven thickness, causing differential stresses in the bead and eventual failure. High temperatures can also cause a premature skinning over the sealant bead. This can result in craze cracking of or blistering below the surface. If the joint is smaller due to thermal expansion of the substrate, when the temperature drops and the substrate subsequently contracts, the small bead of sealant may rip apart or be pulled away from the substrate. Even a spring or fall day may not be ideal—a large temperature swing while the sealant is curing may cause adhesive failure and/or craze cracking in the partially cured sealant.

Weather factors other than temperature are also at work in the field. With very few exceptions, sealants must be applied to dry surfaces. Applying the sealant when there is dew, frost, or any sort of precipitation will guarantee adhesive failure. A sealant applied when the substrate is still damp from a previous rain or from insufficient curing time will share the same fate.

Even if the weather is perfect, field applications can go awry—the most common cause being unauthorized substitution of the specified product. Many sealants look alike, but they do not perform in the same way. Also, improper storage of the materials can cause sealants to freeze, prematurely cure, or exceed their shelf life.

As for painting, there is only one word to say: don't. Sealants are used for the specific reason that they are able to and supposed to move. Most paints will not adhere to most sealants, and, in general, are not formulated nor intended to take the kind and amount of movement to which sealants are subjected. Thus, when the joint moves, the paint will crack. If the paint is adhering to the sealant, and the paint cracks, the sealant will also. If a colored sealant is desired, talk to the manufacturer—sealants now are available in a range of colors in addition to the usual black, bronze, white, and transparent.

To allow sealants to perform their jobs properly, attention must be paid to the joint surface. The edges of the joint must be smooth cut and without jagged edges so that sealant doesn't develop air pockets during installation. Any mortar must be removed from the joint or cohesive failure can result. Backer rods form another component of sound joints. Backer rods create the proper depth to width ratio, act as a bondbreaker, and provide a firm surface against which tooling can be done. Failure to specify an appropriate bondbreaker to prevent adhesion of the sealant on more than two sides of the joint creates a nightmare. A joint with three-sided adhesion will fail—cohesively, adhesively, or both ways (Figure 5).

Backer rods are of two types, open-cell polyurethane and closed-cell polyethylene. Closed-cell backer rods should not be used with sealants that cure by reacting with moisture in the air because the closed cells will not allow air in from the back of the sealant bead, in turn retarding the cure. Closed-cell rods must also be protected from puncturing, to avoid formation of gas bubbles in the sealant, known as outgassing. Open-cell backer rods should not be used where moisture absorption into the backer rods can be a problem, including horizontal joints and submerged joints.

Since backer rods are held in place by compression, it is important that the rod selected is about 20 percent larger than the maximum expected joint opening. If the rod is too small, it will not function as intended and proper tooling will be impossible.

Bondbreaker tape should be used only where there is a firm bottom surface and when the joint is so shallow that a backer rod will not fit. Sizing of the tape is very important—if it is too small, three-sided adhesion will result; if it is too large, the tape will wrap around the bottom and sides of the joint, eliminating some of the bonding area required for good adhesion.

Tooling also helps protect the weathertightness of the joint

Three sided adhesion of the sealant may result in both adhesive and cohesive failures.

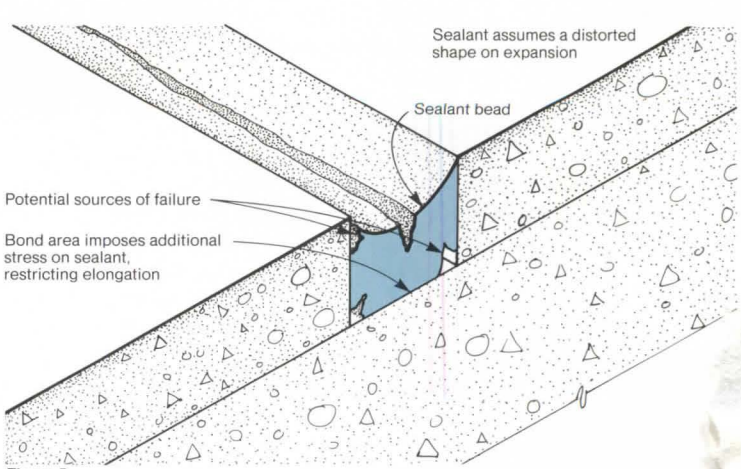

Figure 5

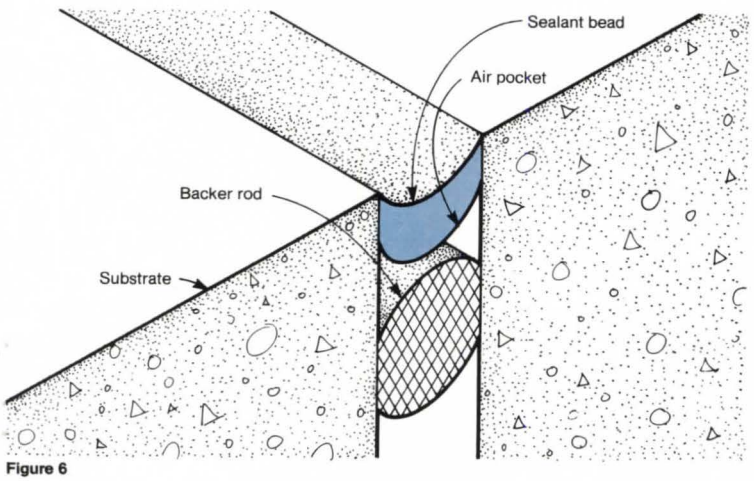

Figure 6

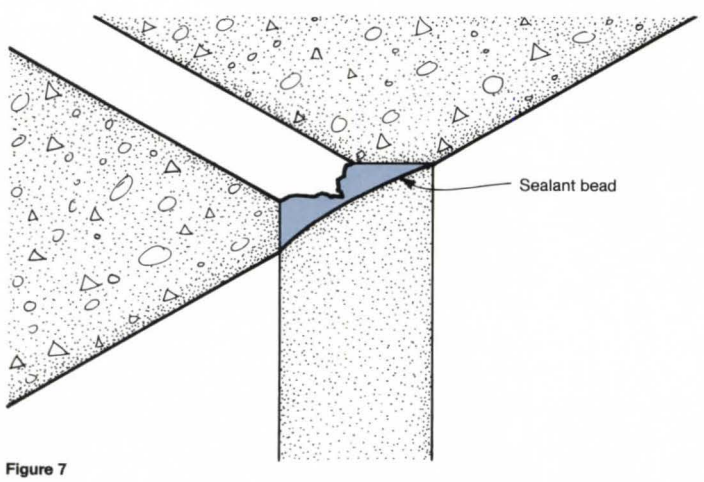

Figure 7

Figure six shows improper bead shape due to poor tooling. In figure seven, if movement at the neck of the joint exceeds the sealant's limitations, a cohesive tear may develop.

by eliminating air pockets created behind the sealant during gunning. If the air pockets remain, they may expand and rupture during hot weather. Tooling also forces sealant contact with the sides of the joint, promoting good adhesion. During the process, the sealant is pushed against the backer rod and pressed into an hourglass shape, allowing it to stretch properly. Without tooling, the bond area between the sealant and the sides of the joint may not be sufficient to prevent the sealant from pulling away from the sides of the joint (Figure 6).

Substrate failures

The materials to which a sealant may be applied carry individual sets of precautions. Masonry and concrete substrates connote special care in choosing a compatible sealant. Because masonry and concrete are porous, some sealants may bleed into them, causing unsightly discoloration. Acid cure sealants can etch the surface of limestone or marble. In concrete applications, if the stress on the sealant is stronger than the tensile strength of the concrete, the thin, sharp edges of the concrete joint will spall. One way to minimize spalling is to chamfer the edges of the joint. However, the sealant bead must be kept below the bottom of the chamfer or tearing may occur (Figure 7). In all applications, the concrete must be sufficiently cured and dry before sealant is applied.

Aluminum coatings contain mill contaminants, oils, graphite, and carbon residues and oxides that act as release agents for elastomeric sealants. Some baked-on coatings will also make adhesion difficult. Adhesion testing to determine the suitability should be done by the sealant manufacturer for each installation because variations in fabrication make each batch of coating different.

Galvanized steel has a history of poor sealant adhesion. Due to the sacrificial nature of the galvanizing, the surface gradually erodes, making long term performance of an elastomeric sealant difficult. Galvanized steel normally requires an alternate form of joint seal.

Wood substrates demand that joint movement due to swelling and shrinkage be accommodated. Wood is best painted before sealing; paint must be compatible with the sealant and firmly adhered to the wood. Unpainted wood does not make a good substrate for any sealant. Unpainted wood will absorb moisture, and adhesion problems will eventually result. Woods that are naturally resistant to water, such as redwood and teak, have sealant problems—they contain natural oils that may affect the adhesion. Most softwoods such as pine contain natural resins that may bleed out under the sealant and affect adhesion.

Surface sealers and coatings may also prove unfriendly to joint sealants. Masonry sealers, anti-graffiti compounds, and waterproofing compounds and coatings vary widely in composition and formulation. Their main purpose is to provide a surface that will repel dirt, paint, and/or water. Unfortunately, these compounds often end up repelling sealants. Some sealant manufacturers, recognizing the widespread use of such compounds, have pretested them to determine compatibility with sealants. However, surface compounds undergo frequent and drastic formulation changes and can also vary widely from batch to batch. The application thickness can affect the sealant adhesion. Some sealers and coatings even have a base compound with low solvent resistance that dissolves into a clear gummy residue upon contact with sealant or primer, making adhesion impossible. Visually, many of these coatings are clear and difficult to detect. If a masonry or concrete surface is suspected of having been treated with one of these compounds, an adhesion test should be performed prior to sealant application. (Whenever possible, sealers and coatings should be applied after the sealant is cured, as it is extremely difficult to apply such materials onto the surface without contaminating the joints, no matter how careful the applicator.)

Form release agents, if applied according to the manufacturer's recommendations, usually do not affect sealant adhesion. However, too thick of an application may leave a brittle film that can flake off, thereby creating loss of bond in that area. Petroleum-based release agents may be incompatible with the sealant. Testing should also be done on the actual materials used in construction to be sure that there will be no detrimental effects on the bond.

Testing can be a good idea in a range of other situations as well, following the time-honored advice "better safe than sorry." Though sealant joints are only a small part of a building's exterior, they are asked to perform a very large function: keeping the interior draft free and dry. They are not a component where chances should be taken, and their specification and application must never be treated lightly. □

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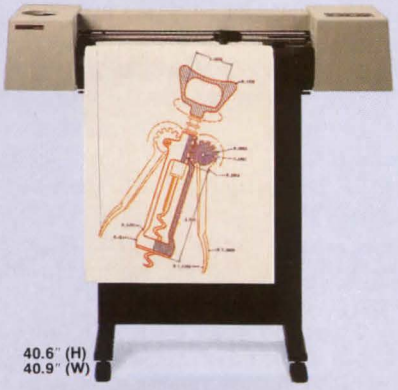

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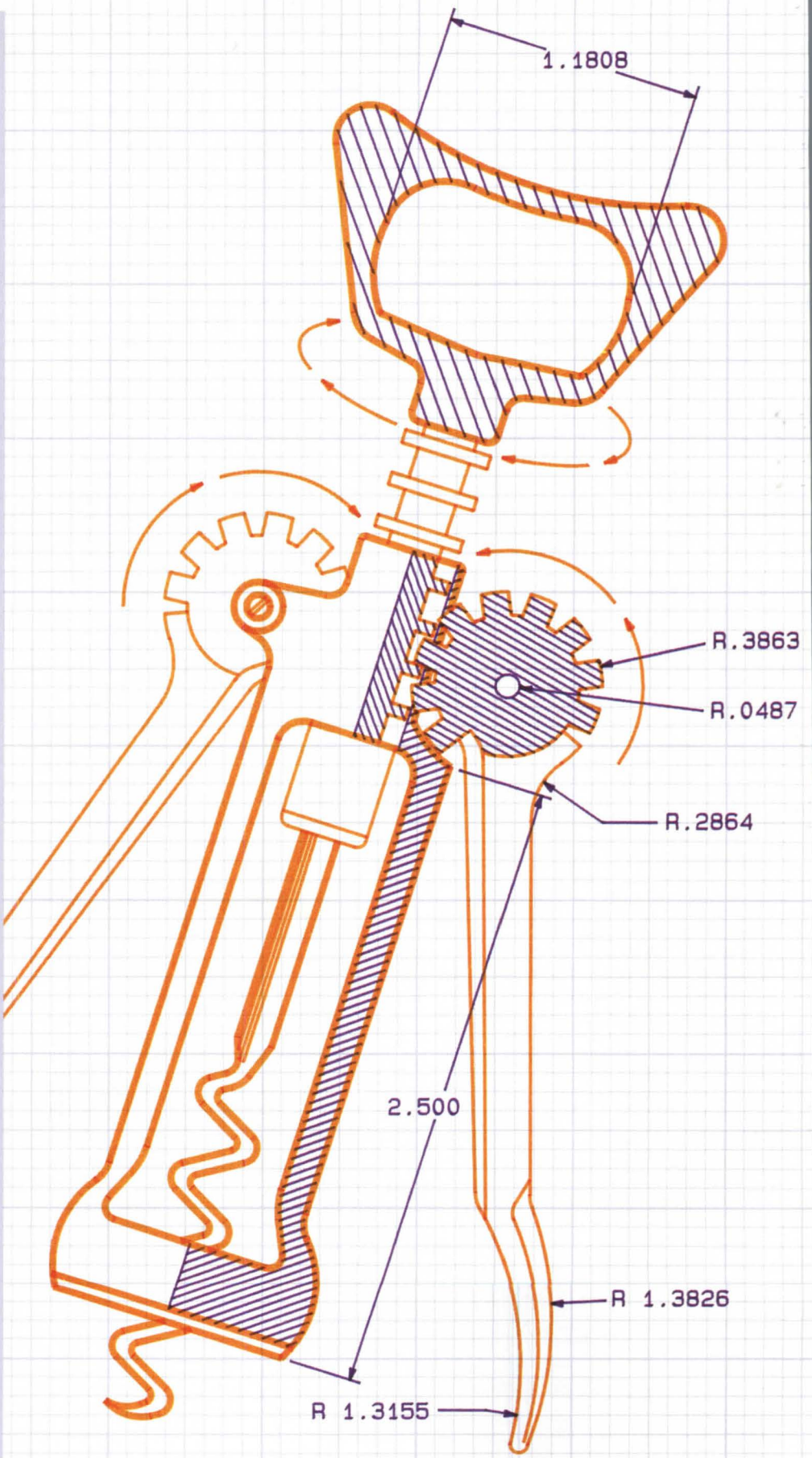

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The 1987 AIA Architectural Photography Competition is being organized by the St. Louis Chapter AIA. Winning entries will be exhibited at the 1987 AIA Convention in Orlando, Florida. The 1st, 2nd and 3rd place winners will be published in "Architecture" and images for the 1989 AIA Engagement Calendar will be selected from the entries.

ELIGIBILITY

This competition is open to all individual AIA members, Associate members of AIA, Student members of AIAS and professional affiliate members of AIA components, in good standing, except professional photographers who are members of the AIA and/or any of its components.

AWARDS

Two Thousand Five Hundred Dollars **($2500.00)** in cash prizes will be awarded as follows:

First Prize	**$1000.00**
Second Prize	**$ 700.00**
Third Prize	**$ 300.00**
Bethune Award	**$ 500.00**

(The Bethune Award is for best image of an architectural subject in the United States.)

Conditions of Entry

1. Only 2″ × 2″ 35mm color slides may be entered.
2. Entries must have been exposed by and be owned by the entrant.
3. Previously published work, photographs pending publications and previous cash winning slides in the AIA National Photo Competition are not eligible.
4. Entry fee is $15.00 per entry for AIA members, associates and professional affiliates; $10.00 for student members. Entrants may submit up to five (5) slides for each $15.00 entry fee, and enter as many times as desired.
5. The entry fee is non-refundable and must accompany the slides entered.
6. **Make check payable to: St. Louis Chapter AIA Photo Competition.**
7. The subject matter must be Architectural or some element of the man-built environment. Photographic interpretation of the subject matter is the issue, not the architecture.
8. Slides bound over "ready mounts," glass mounts or otherwise too thick for standard manual projection will NOT be judged.
9. Clearly mark each slide with:
   a. Entrant's name
   b. Slide title
   c. Serial no. of slides (A, B, C, D, E) to agree with entry form
10. Slides should be mailed with
    a. Completed entry form
    b. Entry fee (check or money order)
    c. **Self-addressed envelope of adequate size and with adequate postage if you desire to have your slides returned.**
11. Entrants grant permission to the AIA to reproduce slides for exhibitions, publication and for promotional purposes. All reproductions will become the property of the AIA.
12. Great care will be taken with all slides submitted, but no responsibility for loss or damage during transit or any phase of the competition will be assumed by the St. Louis Chapter AIA or by the AIA.
13. The decision of the judges shall be final on all matters relating to the Competition.
14. Entries shall be mailed to:

St. Louis Chapter AIA
911 Washington Ave. #225
St. Louis, MO 63101-1203

and shall be postmarked no later than **March 31, 1987.**

15. Submission of slides implies entrants acceptance of all the above conditions.
16. Void where prohibited by law.

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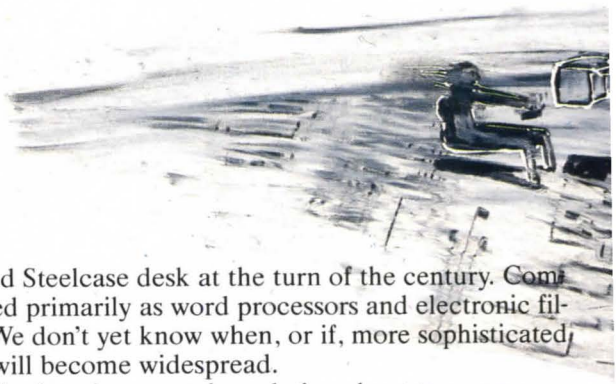
Whatever Happened to the Office of the Future?

Much has been promised, but little has really caught on.
By George Rand



For some time now we have been told to expect the presence of computers to revolutionize the work place. Pundits in the field of management and organizational development predicted radical changes in business methods due to the power of the computer to manage, generate, transform, and transmit information. They imagined that these technologies would lead to a radically different physical setting for office work.

Clearly, computer-driven information systems have fulfilled some of their earlier promise. They have sold in great numbers and have produced vast increases in efficiency. Soon, one-third of the office work force will sit at a desk with a terminal.

But the broader promise of radical change in the physical setting of work in the office remains unaddressed. Perhaps most disappointing is that there has been no significant change in the spatial constraints that are used in office planning and design. For the most part, planners still establish adjacencies between departments based on how often employees meet or communicate in person and on the phone.

Computers have not allowed the kind of spatial freedom once imagined where product development could be in one city and market research in another, where department heads could meet electronically, or where the controller could obtain updates in his or her "electronic cottage" while on vacation at the shore.

Even less utopian ideas have met resistance from the most educated and flexible members of the corporate hierarchy. For instance, efforts to adopt executive work stations have had very disappointing results. These stations might allow managers to increase their ability to plan and communicate effectively and permit them to use their specialized decision making skills on a broader range of problems. But they also require managers to operate keyboards, and this has been resisted like the plague. Similarly, teleconferencing might eliminate needless travel to meetings. Yet the idea has not taken hold in large corporations. The use of such new technologies has been generally restricted to companies in the computer business who may have software designers "on line" transmitting information from their homes hundreds or thousands of miles away. The technologies have allowed some of these smaller companies to magnify their effectiveness at delivering services and has also permitted groups of providers to become loosely coupled into "information archipelagos."

For most large corporations the presence of massive numbers of computers has not changed the fundamental work patterns that were created by the introduction of the typewriter, telephone, and Steelcase desk at the turn of the century. Computers are used primarily as word processors and electronic filing systems. We don't yet know when, or if, more sophisticated applications will become widespread.

Is the promised environmental revolution about to occur, now that new generations of flexible, low-cost office systems are becoming available? Will systems hosted by a minicomputer and assisted by large numbers of inexpensive microcomputers be passed out to managers like the monthly marketing report? Will other systems become more common, such as electronic mail, video disc storage, micrographics, optical wire transmission to allow easy hookup of networks and allow transmission of high resolution graphics, network and computer conferencing to augment and substitute for meetings, CAD for design and engineering applications and a variety of graphic communication needs, and the use of robots to do mindless work? And if these technologies ever do catch on, will they really change the way offices are designed?

For the present, the consensus is that the office revolution remains a future promise. The patterns of resistance are still too great for new organizational ideas to take hold. Perhaps there is a need for a kind of Corbusian vision of how new technologies can go together to define a whole new social setting, a way of turning the office building into a "machine for thinking," something more than a "smart" building. But the immediate prospects for this kind of utopian experimentation are limited. The market for new office buildings is glutted in many major American cities. Also, large, profit-sensitive corporations are becoming cautious, consolidating their office work force through major layoffs, and in many cases reverting to a traditional hierarchical pattern of departments and divisions dominated by central administration.

Questioning the safety of VDTs

One reason the "office of the future" has not been embraced with more enthusiasm is a lack of acceptance of the basic element of computer technology—the video display terminal—by the work force. VDTs were introduced in large numbers in the early 1980s with little concern for what they would do to the physical setting of work. For one thing, these "silent" machines were attached to printers and other peripherals that created more noise than the typewriters they replaced. For another, VDTs created "territorial" conflicts over protocols of use, and conflicts eroded internal administrative agreements that had kept life peaceful in the office.

Mr. Rand is associate dean of UCLA's graduate school of architecture and urban planning.

Illustration by Brian McCall

VDTs have also posed new ergonomic requirements. The typewriter requires digital force to strike the keys. This means the operator needs to assume an upright posture to set the muscles for this kind of activity. Computers, on the other hand, can be "played" from a backward reclining posture, especially when composing text, and this requires a whole new set of furnishings that can be adjusted to task requirements. Moreover, the change in operating posture and the presence of a glass screen subject to glare has meant a different set of lighting requirements than those in vogue during the typewriter days.

Worker concerns about health and safety have dogged the reputation of VDTs since their introduction. Health concerns range from minor visual and postural fatigue to major work related disabilities.

The gravest concern raised so far involves whether VDTs leak radiation. This threat appears to have been for the most part overstated and not based on scientific analysis. The primary type of radiation that generated concern was X-rays. Large-scale tests have shown these emissions to be lower in contemporary equipment than background radiation.

A second source of concern is from ELF (extremely low frequency) fields produced by the horizontal and vertical deflector coils that aim the electronic beam gun that illuminates the interior surface of the tube to produce the image. These coils create a magnetic field that extends beyond the confines of the box. While these fields are not very different from those found in most laboratories and houses, and there is no sound evidence of negative biological effects, there is some frightening but highly controversial evidence from animal embryogenetic studies that similar pulsed magnetic fields can produce developmental defects in chick eggs. Though these effects are questioned and their applicability to humans seems remote, they remain a source of concern. No studies can assure us that eight hours a day in an electronically wired environment is completely harmless.

A third source of concern has been the reported increase in adverse pregnancy outcomes in VDT workers. Clusters of failed early pregnancies have been reported mostly in anecdotal accounts, and most researchers believe these are statistical aberrations. Just now a series of large-scale studies is being undertaken in the U.S. and Scandinavia keeping track of women before, during, and after pregnancy to determine whether rates of early abortions are associated with VDT use. The objective of the studies is to test women frequently and regularly before they are pregnant, to see if they have an early pregnancy and then abort. This is done on the assumption that many women may not know they were pregnant and then had spontaneously aborted. In typical Scandinavian fashion, the equivalent of our National Institute of Occupational Safety Health has determined that pregnant women can request alternative work settings without penalty until these tests bear results. U.S. regulators have been reluctant to call for national standards regarding VDTs and

pregnancy. This raises a number of complex issues about whether asking for a job change in a voluntary system might result in a loss in opportunity for promotion or job advancement.

The final main source of concern with VDTs is the electrostatic field produced by the screen itself. This may produce a negative charge on the face or skin of the operator and be responsible for some of the skin rashes and other dermatological symptoms that have been reported by operators. In some instances simply raising the relative humidity in the space and treating carpet with antistatic material has solved the problem.

Michael Seuss of the World Health Organization regional office in Copenhagen has reported the results of an expert panel convened to evaluate these and other potential hazards of VDT work. What becomes apparent from the list of the WHO recommendations is that the VDT interacts with other factors in the office environment to create a wide array of work-related problems. For example, intense work demands for accuracy and production may amplify frustration with low level environmental hazards, including inadequate temperature, humidity, lighting, and noise levels, and electromagnetic fields.

Other studies indicate there is a significant interaction between the worker's psychological and physical characteristics and the potential dissatisfaction with VDTs. At the simplest level, older workers are more prone to suffer a decline in visual accommodation, visual fatigue, and eye strain than younger workers and therefore find VDT work uncomfortable.

Those with a minor visual impairment are likely to have their problems exacerbated into a more extreme impairment. VDT work clearly tends to magnify deficiencies that are already present. It's difficult to lay blame for these ills on the machinery, since most are caused by personal factors such as uncorrected vision long in need of therapeutic help, poor work posture, stress from extrinsic sources, or generally poor working conditions.

Aside from physical problems, the introduction of the computer has caused psychological difficulties, especially related to the monotony of simple data input tasks. Stress is increased as a result of the physical inactivity typical of VDT operators.

Jean Stellman of Columbia University's School of Public Health sees office automation, for the present, as reducing rather than upgrading the status of clerical work. Her surveys show that all-day VDT operators (versus half-day users) experience lower job satisfaction and feelings of physical well-being.

The solution to these problems may lie in totally new software programs that are more tailored to human psychology, including the need for stimulation and diversity. What do workers do when the system is "down?" How do they feel when the system does not respond or forces them to wait while it searches? In past years, concern was given primarily to visibility of the screen, for example, with debate centering on the merits of white on black versus black on white displays, their legibility and readability. (Generally, most scientists prefer the white background with dark figures.) Now the concern seems to be shifting to learnability of the program (its user friendliness) and the overall usability of the system.

Taken together, all these concerns mean that, at least for some time, technology will become an ever greater issue in collective bargaining agreements governing an expanding range of environmental concerns. More and more unions will demand health provisions in contracts affecting VDT workers: rest pauses and maximum hours, particular levels and design of lighting systems, provision of eyeglasses specifically for VDT work, pregnancy transfer, and ongoing review of any pertinent research findings.

One way to ease tensions regarding technology may be to increase worker involvement in the implementation of office automation. "Participatory planning" avoids adversity and enables solutions to be customized. The use of new office equipment is so sensitive to context and to the needs of individual users that uniform prescriptive recommendations are not possible.

At a recent conference on the impact of the video display tube, Allan Westin of the department of political science at Columbia University reported on a study of 110 U.S corporations performed between 1982-1985 carried out by the Educational Fund for Human Rights with support from IBM, Hewlett-Packard, Control Data, Kelly Services, and Haworth. The study showed that in the early period (1980-83) of adoption of VDT-based systems into large businesses little attention was given to ergonomic issues. The most recent results suggest top management in major corporations has shifted from a reluctant disinterest to aggressive advocacy of voluntary standards for VDTs, furniture, work rules, etc. Westin reports that 61 percent of the firms sampled now have a VDT task force in which top management is represented. More telling, the percent of VDT workers (four-plus hours per day on the machine) with ergonomically specified chairs, desks, screens, and keyboards has risen rapidly from a rare few to more than 50 percent—and the number is rising.

Office layouts remain parochial

Despite the rapid rise in the use of office technology, we are left with a pretty parochial idea of the office space itself: a desk, a chair, and a sidetable.

If one scans the available technologies there exists an opportunity to rethink the functional organization of the firm in terms of work stations, offices, departments, break areas, conference areas, etc. Our intuitions are now being shaped by the technological patterns suggested by the hardware and software packages that are available. The question is whether there are architectural ecologies in which these new modes of communication will be more likely to flourish.

Computers should make it possible to pack people into tighter spaces when they need access to one another. They should also make it possible for workers to be accessible to each other while seeking relief from intense work conditions in a secondary work site that might be less populated. An important lesson here, lest we go off and try to design the computer augmented version of the Pantheon, is that the introduction of the computer into the work place occurs on a moving target, a work environment that is relatively young in its history, and has already been transformed a number of times.

Computers may be bringing us silently to the brink of a "contractual" economy in which employees are paid for delivering services, wherever and whenever they are performed. This would free the service worker to have more flexible hours and to work in more diverse settings, including work in the "field" where it makes sense to be at the point of sales or the actual place of a business transaction, and possibly including work at home.

Viewed in this way, computers threaten to break open the entire logic of the contemporary office environment. □

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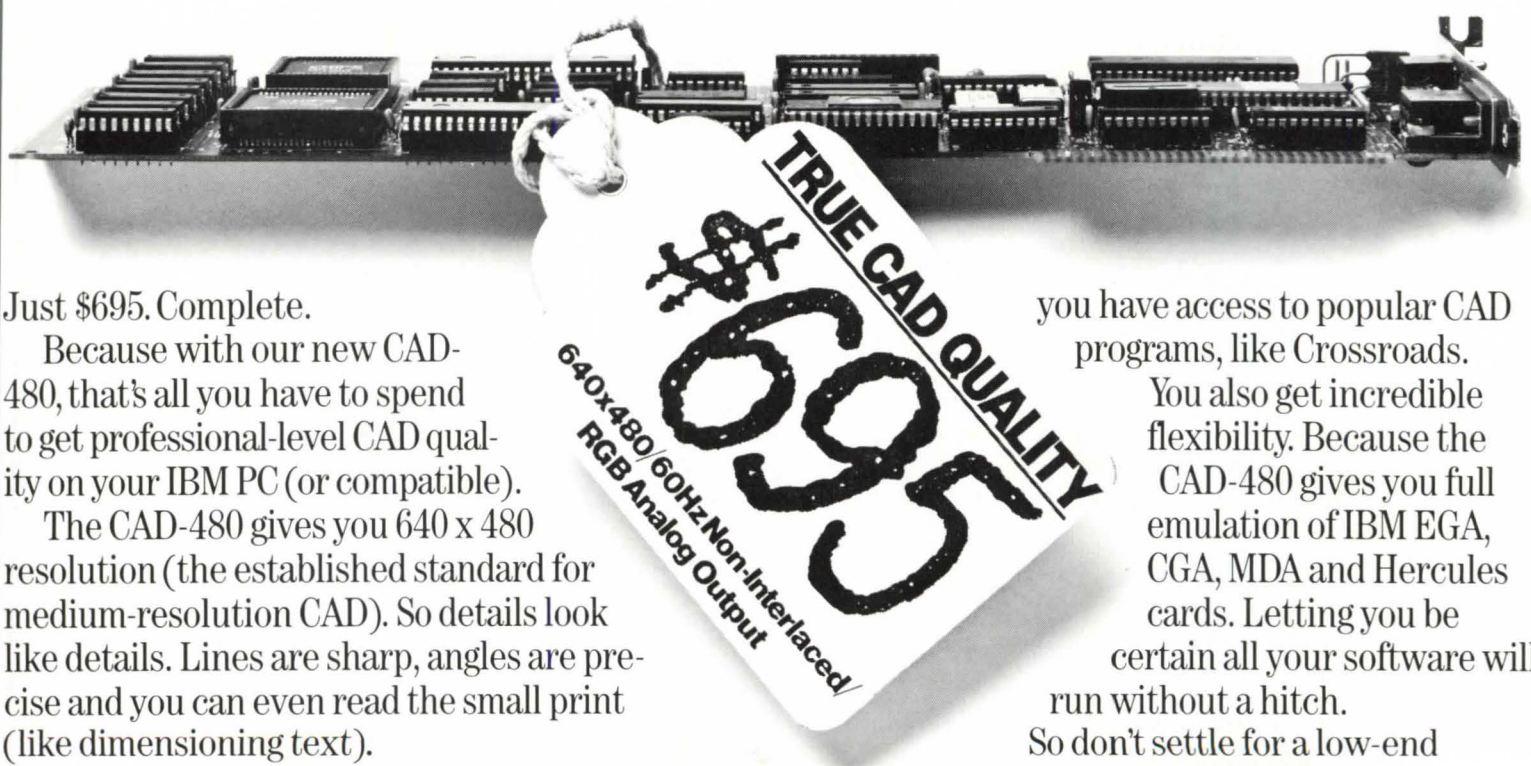

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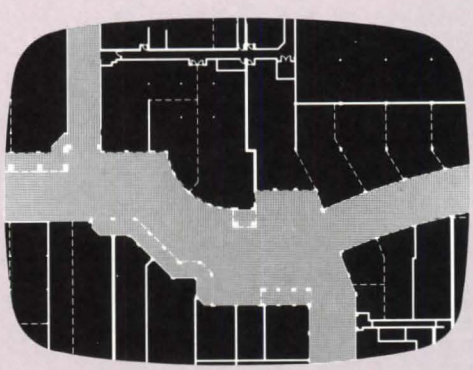

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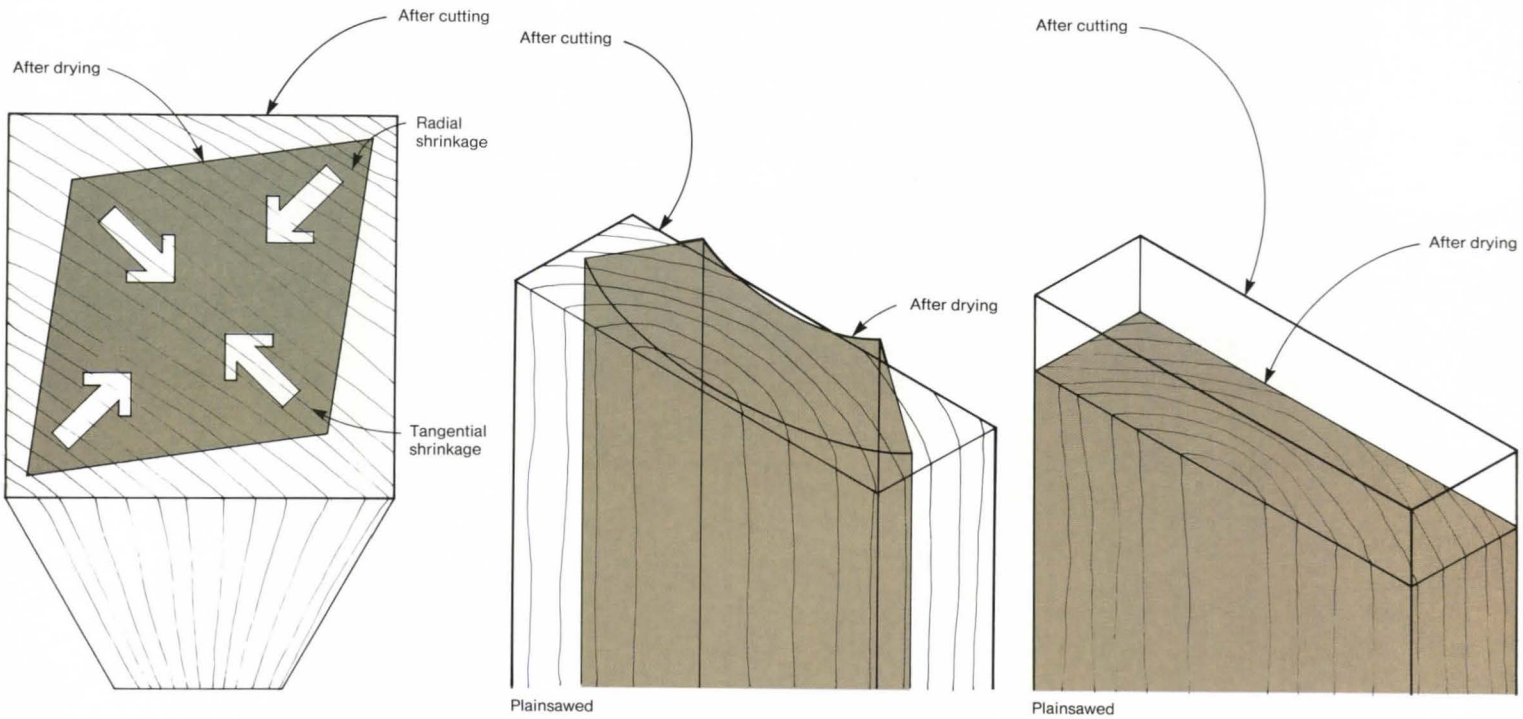


Wood Connections: There's a Right Way and a Wrong Way

Details must allow wood to shrink and swell. By M. Stephanie Stubbs

One of the biggest problems in detailing wood connections is accounting for the shrinkage that occurs as wood loses moisture. Moisture loss begins at the moment the saw blade turns the tree into lumber and continues whenever the atmospheric relative humidity is less than 100 percent. Until the point at which all the water left in the wood is contained within the structure of the cell walls, known as the fiber saturation point (usually at 20 to 30 percent its moisture content), the wood shrinks very little, although it undergoes weight reduction as the water evaporates. When wood dries beyond the fiber saturation point, however, it shrinks at a relatively rapid rate, roughly in proportion to the amount of moisture lost. This potential shrinking of timber in place and the restraining action of connectors designed to keep the timber where the architect puts it often cause excess stress and cracking. According to *Sweet's Selection Data,* wood installed at a moisture content of 19 percent could easily dry to a 5 percent moisture content, resulting in shrinkage of as much as 2.5 percent, or ¼ inch in the width of a 10-inch board.

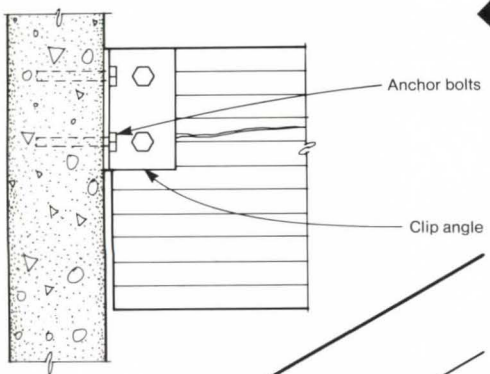
Moisture content in wood is subject to change in most heated buildings, where it loses moisture in the winter and gains it back again in the summer. According to the *Selection Data,* it may swing from 5 percent moisture content in winter to 12 percent or more in the summer. Airconditioning also exacts its price in moisture—if the relative humidity is constant between 40 and 50 percent, the moisture content of the wood will drop to approximately 8 percent. These moisture fluctuations mean wood members may continue to shrink and swell.

Anticipation of where and how a particular piece of timber will shrink allows the designer to locate connections to take this extra stress. Considering a cross section of a tree, as shown above, tangential or radial shrinkage ranges from 2 percent at 20 percent moisture content to about 7 percent at 0 percent moisture content. Radial or edge grain shrinkage is normally about 1.5 percent at 20 percent moisture content and about 4 percent at 0 percent moisture content.

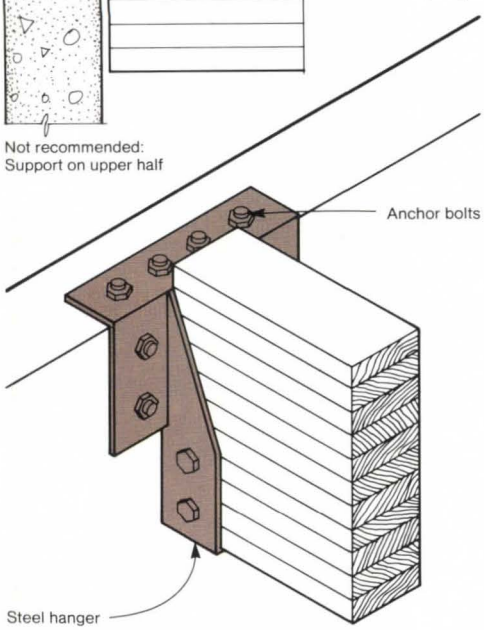
Shrinkage across the grain is usually much less, amounting to .01 to .03 percent.

When significant changes in the moisture content of the wood are expected, shrinkage must be considered, not only in wood-to-wood connections, but in wood-to-other materials connections as well. The first nine examples in this article indicate problems of shrinkage with the use of plain-sawed ("flat-grained") lumber, and with glued laminated members, such as those created by notching.

The other great enemy of wood is decay, which becomes a serious problem when all or part of the wood member is exposed to conditions that maintain its moisture content at greater than 20 percent but less than its fiber saturation point. The last two examples show two problematic details too often used, together with alternative details for avoiding decay of wood members connected to concrete foundations.

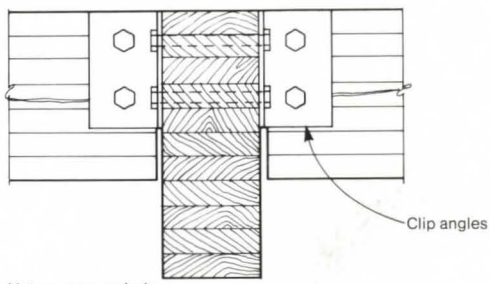


Not recommended:
Support on upper half



Clip angles or internal anchors in the upper portion of the beam can result in shear strength reduction of the beam, and foster moisture-induced splitting at the connector.

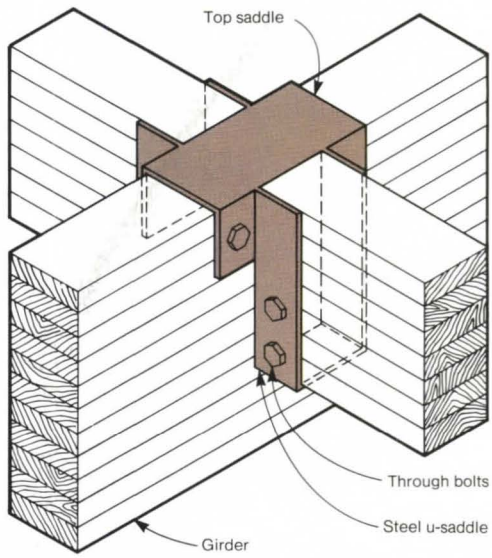
The redesigned beam, rather than being notched, is attached to the side of the lateral supporting member with a steel beam hanger. The hanger supports the beam on its underside. Anchor bolts connect the hanger to the supporting member and to the beam.

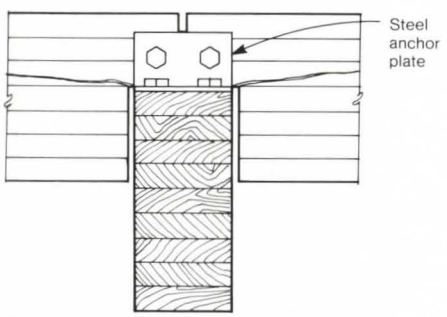


Not recommended:
Support on upper half

Clip angles attached to wood beams on both sides of a wood girder compound the shear strength reduction potential and are likely to cause splits in the tops of both of the beams.

The redesigned solution shows a beam-to-girder connection that provides top restraint while eliminating the need for notching of either member. Steel saddles provide the connections. They are bolted through both sides of the beams and the girder. One saddle sits on top of the girder—it is welded on either side to U-shaped saddles, which are in turn double-bolted around the bottoms of both beams.

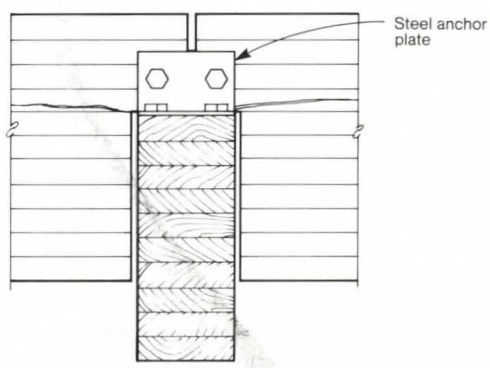




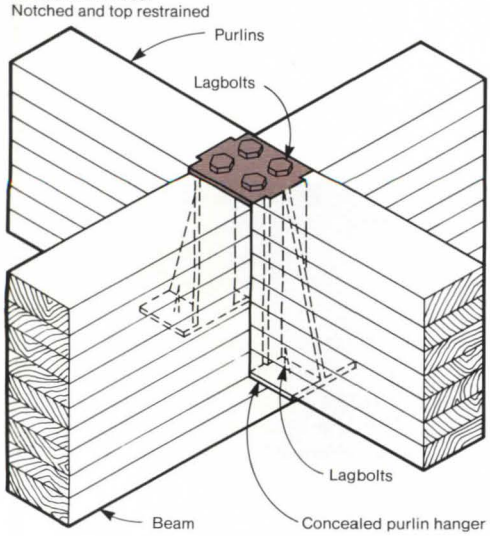
Not recommended:
Notched and top restrained

Notching a beam-to-purlin connection can result in the same type of split as in the example above. Notching is particularly prone to splits and water migration if the end grain of the purlin is exposed in the notch.

The redesigned example shows purlins connected to the beam via partially concealed purlin hangers. The end plates of the purlin hangers attach top and bottom to both the beam and the purlins with nails or lag bolts.

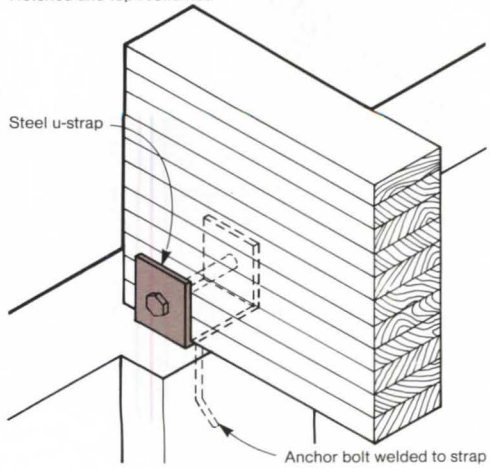


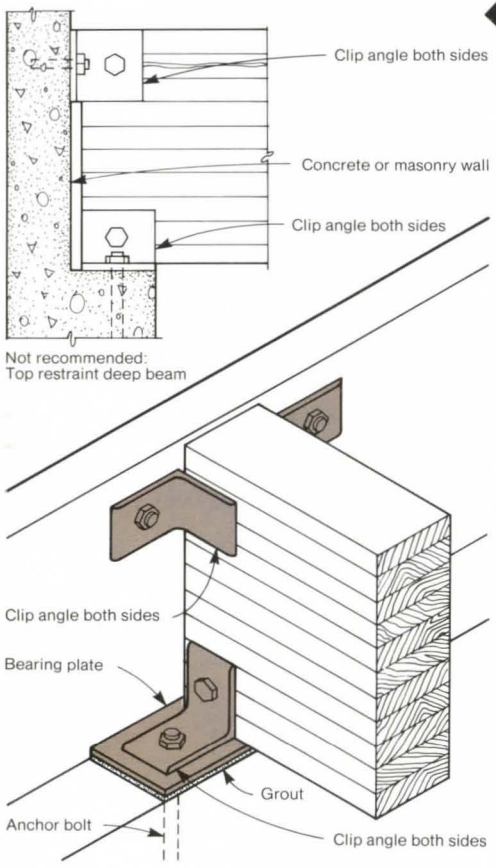
Not recommended:
Notched and top restrained



Cutting a sharp notch in the end of a wood beam, as shown, can severely reduce its shear strength. This kind of notching may also exacerbate water migration in the lower part of the beam, which may cause a split.

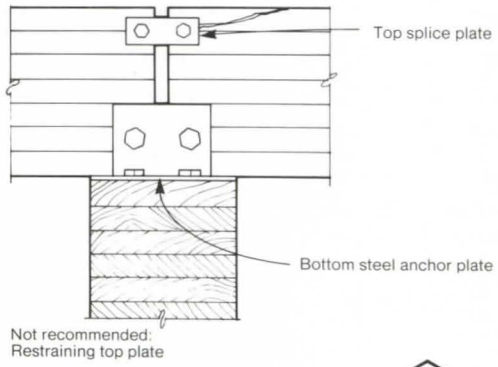
The redesigned example presents a method for attaching a beam to the top of a lateral support member without being notched. A steel U-strap bolted through the beam is welded to an anchor bolt that penetrates the support member vertically.

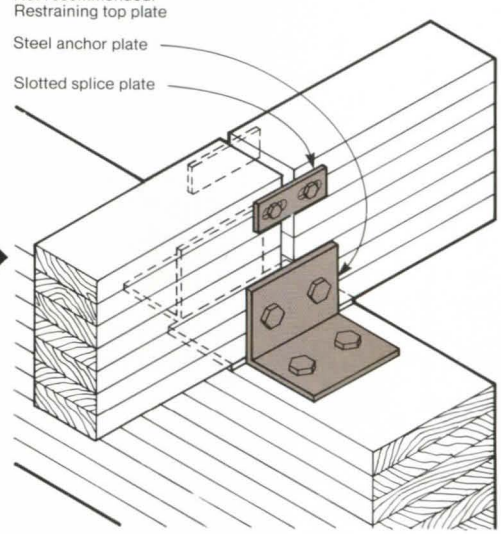




When a deep beam bears on a masonry or concrete surface, it is often supported at the upper portion by clip angles, as shown. Shrinkage due to dryness can reduce the depth of the beam enough to cause a split at the upper connection, if the connection at the bottom of the beam restrains movement.

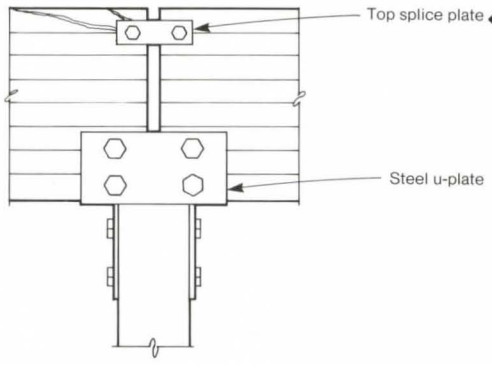
The redesigned example employs clip angles fastened to the masonry on both sides of the top of the beam. These clip angles provide lateral support to the beam but are not fastened in order to allow the beam ½-inch free movement as it shrinks and swells. A second set of clip angles are bolted both to the beam and to a plate bearing directly on the masonry below. Grout also levels the bearing plate to the masonry.





The ends of beams are often attached by top splice plates, as shown. A negative moment can develop in the top of the beam if the bolt holes are not slotted to allow the ends of the beams to move. The negative moment in turn can result in a split at the splice plate.

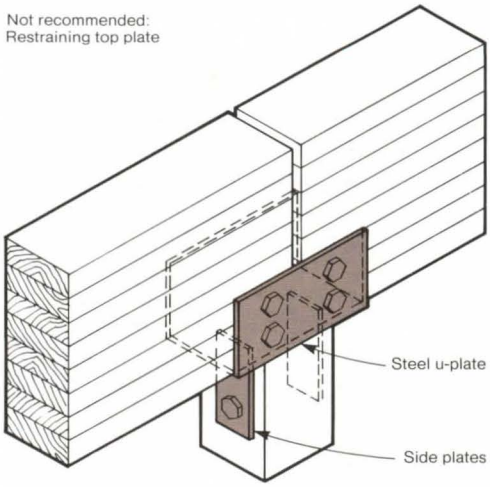
The redesigned example shows a beam-to-beam connection, using slotted holes in the top plate, which resist moment yet permit end-to-end movement.



Beam-to-column connections experience the same problems of top restraints, causing splitting if the beam is spliced directly over the column.

The redesigned example shows the top plate free. Steel plates provide restraint at the bottom of the beams. Bolts through the beams hold a steel U-plate in position, and steel side plates are bolted through the column.

Not recommended:
Restraining top plate



Sources for information

American National Standards Institute
1430 Broadway
New York, N.Y. 10018

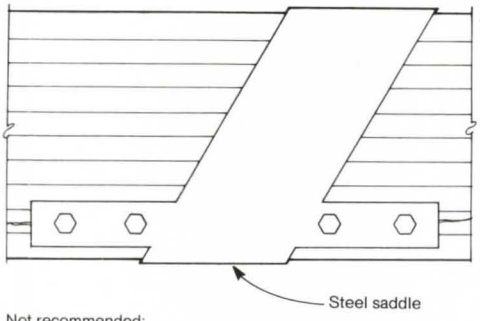
Forest Products Laboratory
U.S. Department of Agriculture
P.O. Box 2417
Washington, D.C. 20013

National Forest Products Assoc.
1250 Connecticut Ave. N.W.
Washington, D.C. 20036

Northeastern Lumber Manufacturers Association
4 Fundy Road
Falmouth, ME 04105

Southern Forest Products Assoc.
P.O. Box 52468
New Orleans, La. 70152

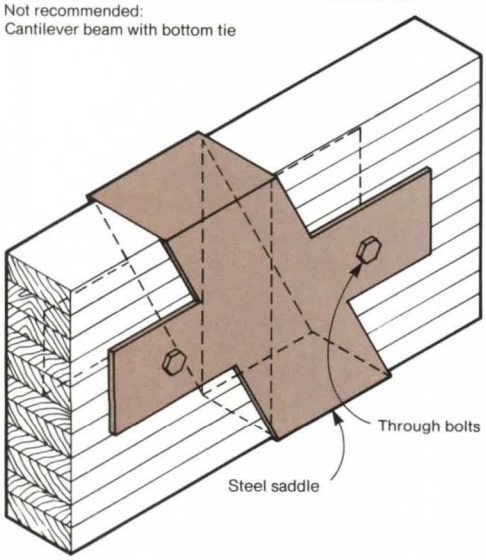
Western Wood Products Assoc.
1500 Yeon Building
Portland, Ore. 97204 □

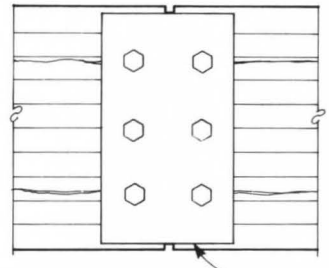


Not recommended:
Cantilever beam with bottom tie

To splice two members where one forms a cantilever, some designers specify a saddle system to form a tension connection, as shown. Bolts in a single line form the connection. The saddle will provide the cantilever with adequate support. But if the support beam shrinks, the saddle has a tendency to move downward while the tension bolts try to restrain it, creating a good reason for the wood to split.

In the redesigned example, bolts are placed in the middle of the supporting beam and the cantilever beam, away from the planes where the greatest tension is likely to occur. Bolts connect through the saddle on both sides of both beams.

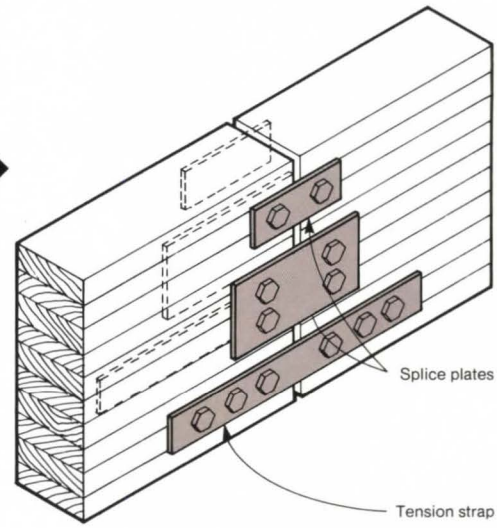


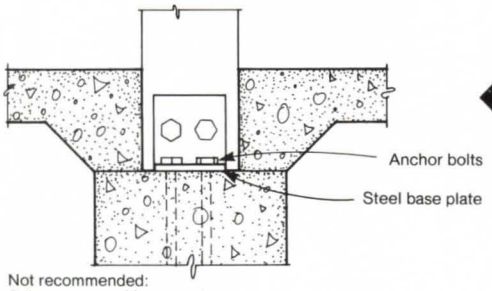


Not recommended:
Long splice plate

Splice plates on the sides of two beams are also used to connect beams end to end. As the beams shrink, the steel plates resist the beam's tendency to pull apart, often resulting in cracks in both of the wood members. If one beam is supporting the second beam, a split at the bolt holes may seriously reduce their effective strengths.

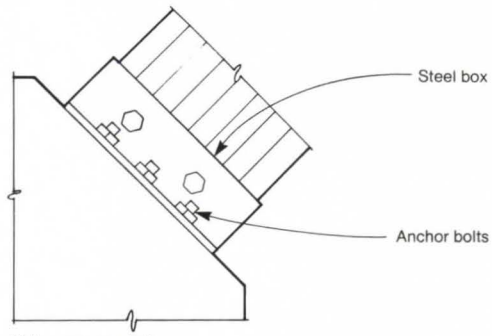
The redesigned beam shows several examples of effective side-splice plates, including a tension strap. Separate plates, bolted through both sides of the beam and spanning the joint, allow enough room for both beams to move independently of each other.



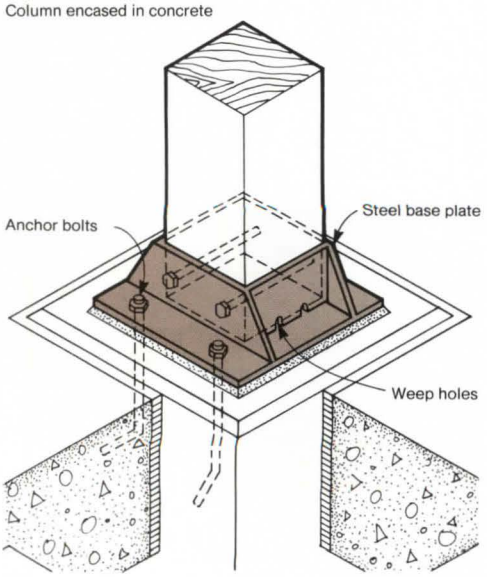


Not recommended:
Column encased in concrete

Water allowed to remain in contact with a wood beam or column may create an environment in which microorganisms thrive, resulting in decay. Therefore, the use of a closed steel box to cover the base of a wood column or arch attached to a concrete base can lead to damage of the wood member if moisture is able to get in and accumulate. Providing weepholes in the down side of the box, as shown in the redesigned example, or designing a drainage method to promptly take the water away from the wood, should alleviate the problem.

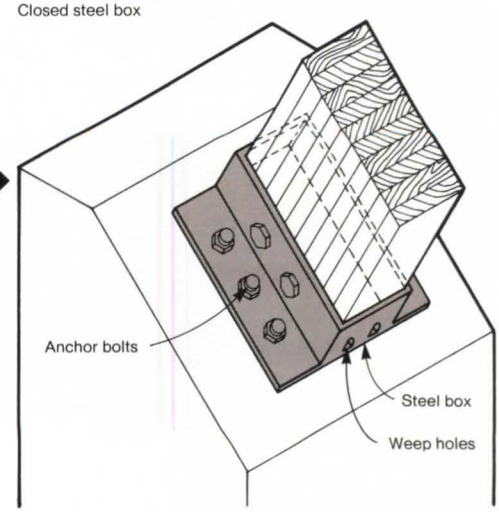


Not recommended:
Closed steel box



Concrete placed around the base of a wood column or arch can also foster moisture problems, especially if the concrete is in contact with the ground. Moisture will migrate into the lower portion of the wood and cause decay.

This redesigned example also shows weepholes in the down side of the welded steel box. The steel box is connected to the concrete with anchor bolts, and to the glued laminated wood arch with galvanized bolts. □



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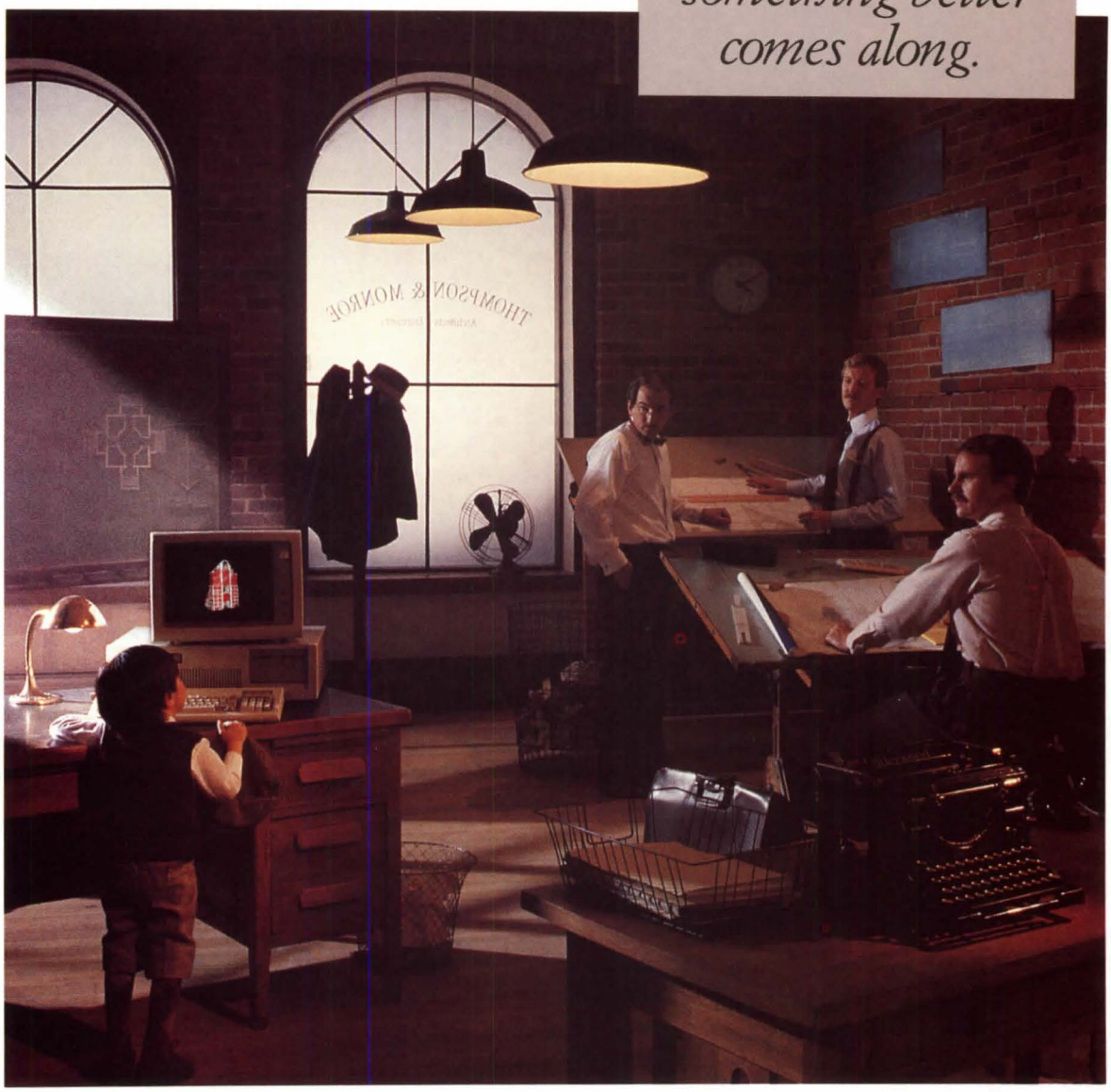

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An Inventory Process for Determining Asbestos Control Needs And Costs

Collect accurate data before deciding what to do about asbestos.

By Robert N. Sawyer, M.D. and Roger G. Morse, AIA

Growing knowledge regarding the potential hazards of exposure to asbestos fibers has led to ever more complex federal, state, and local regulations, as well as great anxiety on the part of building owners, buyers, tenants, and workers. Four years ago, federal law mandated the identification of friable asbestos, in all its forms, in school buildings. Efforts are currently underway to expand these provisions to other building types as well. Whether or not identified asbestos should be removed remains one of the principal challenges facing building owners and their professional consultants. In this article the authors argue for the use of a systematic process to inventory asbestos materials before control decisions are made. Their process, which utilizes standard database software and personal computers, helps determine appropriate and necessary control strategies and generates cost information.

The role architects may perform in such an inventory process remains unclear. Architects may be the most capable for performing asbestos risk assessment and determining control strategies, because of their knowledge of where, and in what form, asbestos is likely to be found in buildings. Architects are not currently able to get involved with asbestos, however, if they also wish to carry professional liability insurance. We hope that the situation will change with promised legislation to set professional standards or limit architects' liability in some other way satisfactory to insurance carriers.—Ed.

In 1972, all asbestos-bearing surface treatments used by Paul Rudolph, FAIA, in the Yale Art and Architecture building were removed after it was found that casual disturbance of the exposed asbestos-bearing acoustical treatments had caused measurable elevations of respirable fibers above the background levels normally encountered. Because studies indicated that asbestos fibers pose potential health dangers, the prevalence of asbestos in buildings has since been the subject of intense scrutiny by a number of interested groups, most significantly the Environmental Protection Agency.

In the absence of guidance, early control efforts were preoccupied with removal and ranged from conservative management to severe overreaction. Now, however, it is generally accepted that the discovery of asbestos-bearing materials within a structure does not necessarily indicate high hazard or imply that the material need be removed. Rather, current thinking indicates that the first step should be analytical, assessing contamination potential and examining various options for controlling the release of asbestos fibers.

The assessment task, unfortunately, can be complicated by a variety of problems. These include the correct identification of asbestos in a wide range of material types, the misconceptions concerning measurements of airborne asbestos, the lack of definitive exposure standards, misinformation concerning exposure risk, and the severe emotional and political influences that plague the current situation. In spite of these obstacles, the effective manager of asbestos-bearing materials must assemble the necessary information, relate this data to regulatory compliance, choose a strategy for control, and write contracts for services. Information requirements can include identifying and

Dr. Sawyer is an independent consultant in industrial medicine and also a principal in the firm of Entek Environmental and Technical Services, a Troy, New York, firm specializing in environmental consultation. Mr. Morse, a registered architect, is president of Entek.

locating asbestos-bearing materials within a building, specifically identifying friable asbestos materials, assessing material condition, estimating quantities, determining the scope of required repair or removal, and calculating control costs.

One effective way to assemble this considerable quantity of information in an organized and useful way is through the use of a formalized information management system using direct input of field data acquired during an asbestos survey. Data defining asbestos-bearing material and its location, condition, accessibility, and quantity comprise an asbestos-control inventory; this can in turn be related to costing information. When summarized, collated, and displayed in a matrix, all of this information clearly shows survey parameters in both tabular and graphic formats. The quantity of information involved in this process makes the use of hand-held computers extremely helpful for data collection and sorting.

Survey, inventory, and assessment

There are three rather distinct parts to the proposed "direct input" process. The first is a survey of the structure and suspect materials using a specific classification scheme. This is most efficiently accomplished by having survey personnel follow a sequence of computer-generated queries. The survey data are then assembled as an array of variables in a readily accessible inventory database. Finally, a summarized assessment of the materials and control requirements is generated based upon collations of the inventory data. A three-dimensional representation of the data quite literally provides a picture of the problem and highlights priorities for action.

In an effective survey, all structural spaces are investigated, and each material suspected of bearing asbestos is identified and characterized with respect to both contamination and control factors. Since different types of asbestos-bearing materials differ in contamination potential and methods most efficient in their control, survey information is obtained for each type of suspect material. Commonly encountered suspect material types are fireproofing on structural steel, acoustical treatments, insulation on thermal systems, ceiling tiles, floor tiles, stored replacement material, and debris.

For any given type of material, its accessibility, condition, and quantity are the most important determinants of contamination. These characteristics also affect the most promising approaches for control. Accessibility is important because disturbance of asbestos-bearing materials can cause release of fibers. Accessibility is determined in the survey phase by assessing the location of the material relative to the typical activity patterns within a building. The condition of asbestos-bearing material also affects contamination potential, since intact material is generally less likely to be a source of fiber release than damaged material. Knowing the condition of the materials also helps determine what to do about them: damaged material implies the need for direct action such as repair or removal, while intact material may only require monitoring. It is critical that this kind of determination of appropriate control methods be made during the survey, in order to assign priorities and assess costs for the work to follow.

There are six phases of data collection typically required to generate adequate survey information. This proposed sequence will produce a comprehensive inventory of all spaces in a building and the suspect material types found within those spaces. Project identification, administrative information, facility structural data, heating and ventilation system definition, and dates of key activities also need to be collected, but these are assumed to exist elsewhere and are not discussed below.

1. Identification and description of the surveyed space. Assessors note the location, level, compass orientation, number or name, and use of the surveyed space.

2. Classification of the surveyed space as to accessibility. Assessors consider whether access to a space is unrestricted (that is, the space is open and occupied on a regular basis by persons using, operating, maintaining, or administering a building) or restricted (entrance is controlled by facility-management personnel). Spaces such as offices, corridors, classrooms, gymnasiums, and parking facilities are examples of unrestricted spaces. Restricted spaces include mechanical rooms, chases, tunnels, crawl spaces, and storage areas.

3. Identification of each suspect material type. Assessors describe specific construction materials, using standard architectural classifications.

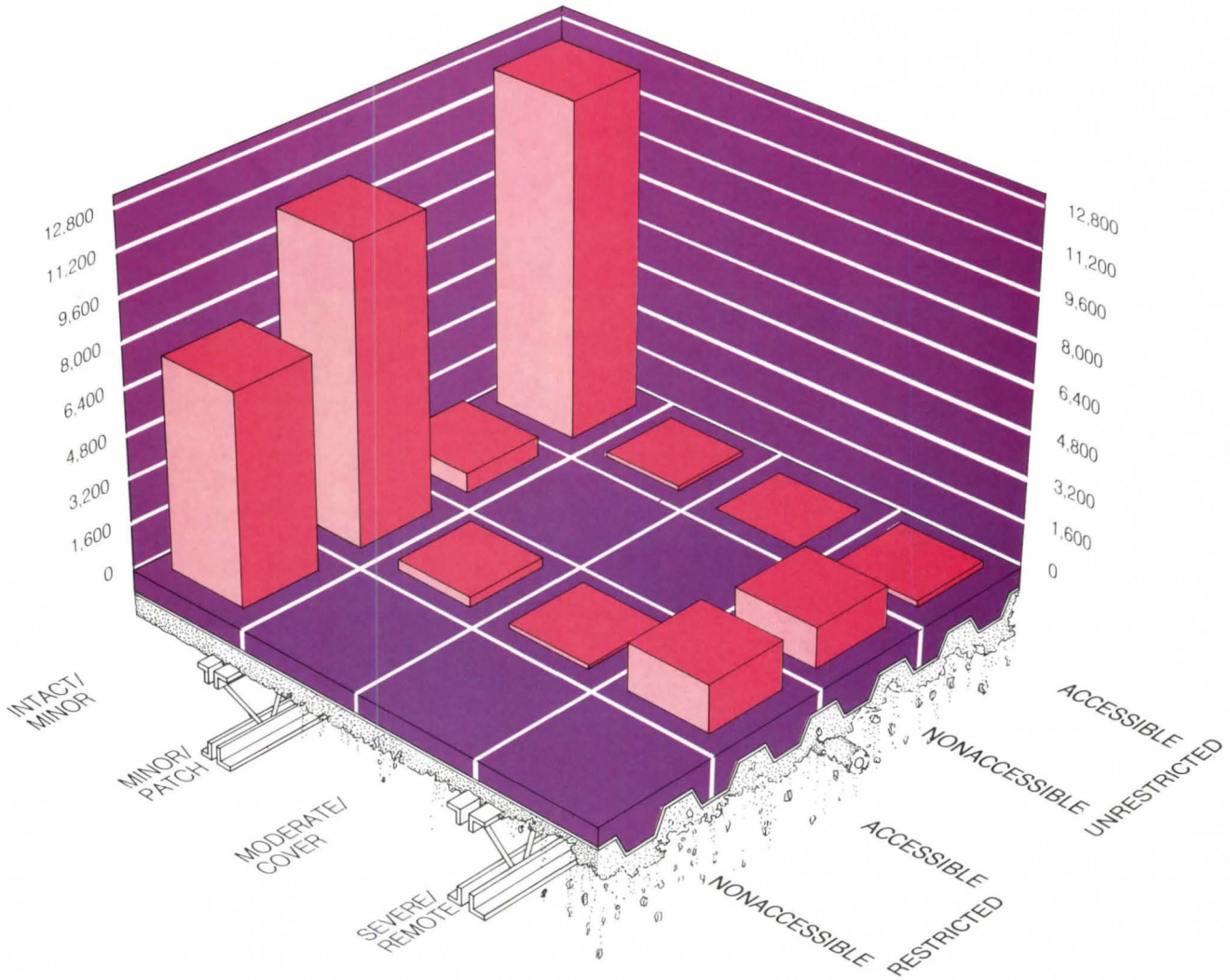
4. Sampling. Assessors sample suspect materials for later analysis. The analysis reveals the content of asbestos and other components. This information is then added to the data.

5. Categorization by material accessibility. Assessors define materials within an area as either accessible or non-accessible according to their location within that space. Materials are accessible if they are located below some selected nominal elevation, typically 10 feet. The assessor may also classify mechanical equipment as accessible if it is subject to frequent maintenance. Non-accessible materials are those located behind or within structural or finish surfaces, or above some defined elevation. Spaces above essentially intact suspended ceilings are included in the classification of non-accessible, even when the space is used as a return air plenum.

6. Quantification by condition and method of repair for each material type. Assessors quantify materials in each accessibility category by condition and repair category appropriate to that material type. An example of the dual classification of condition and method of repair can be drawn from an assessment of pipe-cover insulation. When the insulation is intact and performing well, the assessor recommends monitoring and maintenance. With minor damage, such as punctures, cuts, or exposed ends, the assessor specifies direct and local application of a coating to restore design integrity. If damage is moderate, and the pipe cover has broken, cracked, or crushed sections, a plastic or metal cladding is necessary. When damage is so severe that design integrity cannot be restored, removal and replacement is required.

The quality of data acquisition during the site survey is critical to the subsequent inventory and assessment process. Further, to be cost effective, data should be collected in a single-pass survey and acquired in a sequence that most efficiently uses personnel. Since the survey typically generates a significant amount of data, it is essential that assessors record this data in a format compatible with commonly available software, which would permit rapid assembly and display of the potentially complex inventory of information.

In the end, the inventory is simply a database array of survey information, dimensioned by the data acquisition categories. The data can be listed or sorted by any database software for any variable, including location, material type, system, condition, classification—or any combination of variables, such as condition and accessibility together. The inventory array can



For small surveys (several buildings), a spreadsheet program with data sorting capabilities such as Lotus 1-2-3 is adequate to process the data collected. When a survey exceeds about 10 buildings, a database software package such as dBase III Plus is necessary to process the data. Both of these packages interface directly with statistical graphing software such as Perspective or Statgraphics. Devising a program for a hand-held computer that can make field data entries accessible to spreadsheet or database programs is a relatively straightforward task.

Matrix Dimension	Dimension Variable	Classifications of Data
First	Accessibility	Accessibility of surveyed area, and of material
Second	Condition	Intact condition to failure of design function
Third	Quantity	Lineal, area measurements, or units

The inventory variables of accessibility, material condition, and quantities form a matrix that reveals the differences between various situations and strategies of control.

ESTIMATED LINEAL FEET OF PIPE INSULATION

Condition/Damage: Recommendations:		Intact/ None	Minor/ Patch	Moder./ Cover	Severe/ Remove	Group Totals
Unrestricted areas	Accessible	12,129	98	33	168	12,428
	Nonaccessible	735	0	0	930	1,665
Restricted areas	Accessible	11,163	273	50	1,163	12,649
	Nonaccessible	8,205	0	0		8,205
	Total Amounts	32,232	371	83	2,261	34,947

This 16-cell matrix provides an easily understandable stratification of contamination potential and the likelihood of exposure. The matrix also indicates priorities for control.

also accommodate other pertinent information such as mechanical system identification, a photography and video index, or air-sampling data.

Even when sorted by pertinent variables, the body of inventory information can rapidly become massive, complex, and extremely difficult to comprehend. A matrix combines the data in a form that facilitates the asbestos control assessment. The inventory variables for this matrix are accessibility, material condition, and material quantities (see Figure 1).

The matrix data shown in Figure 2 comprise an example display of pipe-insulation information for an entire school district. As the data show, there are nearly 35,000 linear feet of insulation in the entire system. The total quantity of material in the removal category is 2,261 linear feet, or 6.5 percent of the total. Only 0.5 percent of the total, or 7.0 percent of the severely damaged material to be removed, is accessible and in unrestricted common areas. Over 32,000 feet, 92 percent of the total, is intact. Sorting the inventory database by combinations of accessibility and condition for any of the 16 cells not only provides location listings, scope of work, and cost information, but presents a single-table representation of the situation. Perhaps of more importance, the matrix provides an easily understandable stratification of contamination potential, exposure, and recommended control sequence.

Presented in this manner, the data are complete, but may be difficult to visualize. The matrix can alternatively be displayed as a rotated graphic three-dimensional image, as shown in Figure 3. This image, which seems to communicate information more effectively, can be produced directly by existing statistical graphing software.

The matrix system is flexible in arranging information. One useful modification, for instance, accommodates different concepts of accessibility by considering accessibility of the material itself, rather than accessibility of the area in which the material is located, as the major determinant of matrix dimensions. In buildings with complex use patterns, the classification format can be expanded to create even more quantity breakouts. As an example, airport terminals typically require additional classes of area accessibility due to separated circulation patterns for public, staff, and maintenance personnel.

Another way to modify the matrix is to ignore the distinctions between unrestricted and restricted spaces, which are not always significant. Material within a building is simply classified as either accessible or non-accessible. The result is an 8-cell matrix that contains essentially all of the attributes of the 16-cell matrix, but with even less complexity and subjectivity as to what constitutes a restricted space.

The matrix used as an example displayed information on pipe insulation. Modifications to the matrix can also be made to account for various other analyses and material types, since the matrix format is applicable to any asbestos-bearing material, and can display inventory data, stratification of control priorities, work categorization, and cost estimation.

With surface treatments, which include spray-applied or troweled fireproofing or acoustical plasters, the moderate category (amenable to repair) is usually inappropriate for friable surface treatment materials and can be eliminated from the matrix assessment. Also with surface treatments, the accessibility of the space typically has great significance in determining control priority. With some other materials, including ceiling and floor tiles, appearance is a factor, so any level of damage warrants removal and replacement.

Administrative use of the process

A facility manager can use the inventory and matrix displays to provide effective information management. As asbestos-bearing thermal insulation materials are patched, repaired, or removed and replaced with non-asbestos insulation, the matrix can be updated by movement of material quantities from one cell to another. With repair by patching or covering, for instance, the quantities can be shifted to the left column, which denotes intact material. When asbestos-bearing material is removed and replaced with non-asbestos bearing material, the quantities previously entered on the form leave the matrix altogether, since the material in that area no longer contains asbestos. And as sections of insulation deteriorate or become damaged, the appropriate quantities should be moved from the left column into the appropriate right-hand column location.

In an aggressive repair-and-removal program, the listed quantities of asbestos material within the matrix will either move to the left (be repaired) or move off the matrix (be replaced) over a period of weeks or months. Over a longer period of time, possibly years, removal and replacement should eventually empty the matrix.

This approach is more than a tool for inventory and the development of an asbestos control strategy and schedule. It also forms the basis of a record-keeping system for administrative applications. The survey and analytical data that provide inventory information should satisfy any compliance requirements, such as those generated by the EPA.

Cost analysis is another use of matrix data. Since the matrix summarizes quantities of material within each condition category, the assessor can quickly estimate the amount and type of work that is needed. Personnel requirements are also simple to determine, assuming that staff personnel handle management and minor repairs while major repairs and removal require outside specialist contractors. Multiplying by the local unit prices for the various control procedures, the assessor is able to convert quantities from specific cells into cost estimates.

The matrix is also useful in setting priorities for the asbestos control work schedule. With its flexibility in aspects of inventory data array arrangement, format, and sorting, one of the most significant attributes of the matrix format is that a large amount of information is organized for visual inspection and quick analysis. Material quantities considered most sensitive (higher priority) dwell toward the matrix corner cell of greatest accessibility and most severe damage. Those areas and quantities of material of least concern are found at the diametric corner. It should be noted, however, that concepts of abatement priority based on material accessibility may vary according to structure characteristics, populations involved, or opinions as to what combinations of accessibility and material condition are more bothersome than others. The matrix accommodates such permutations, in either of two ways. First, the format for data collection and entry could be altered. Second, and more efficiently, the data collected by the survey format described earlier can be shifted by computer software to accommodate the various concepts of priority ranking. Whatever the priorities, when material quantities are presented within the matrix of accessibility and condition, the differences between various situations and the best strategies of control become clear.

With this flexibility, the matrix format rapidly provides an actual image of the overall asbestos situation within a building and provides it in an effective and readily understood visual representation. □

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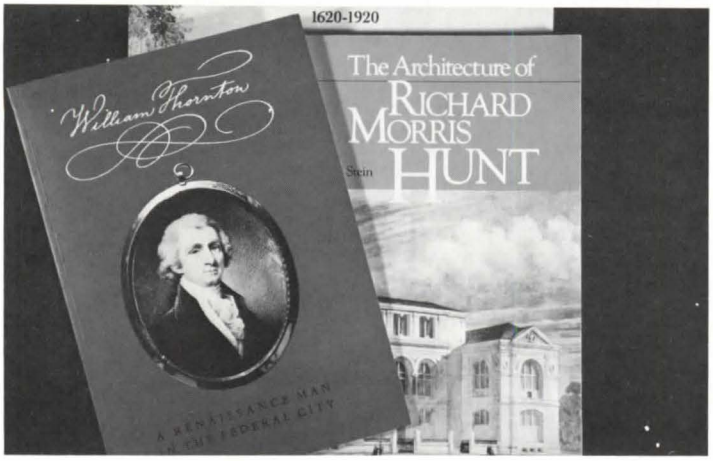

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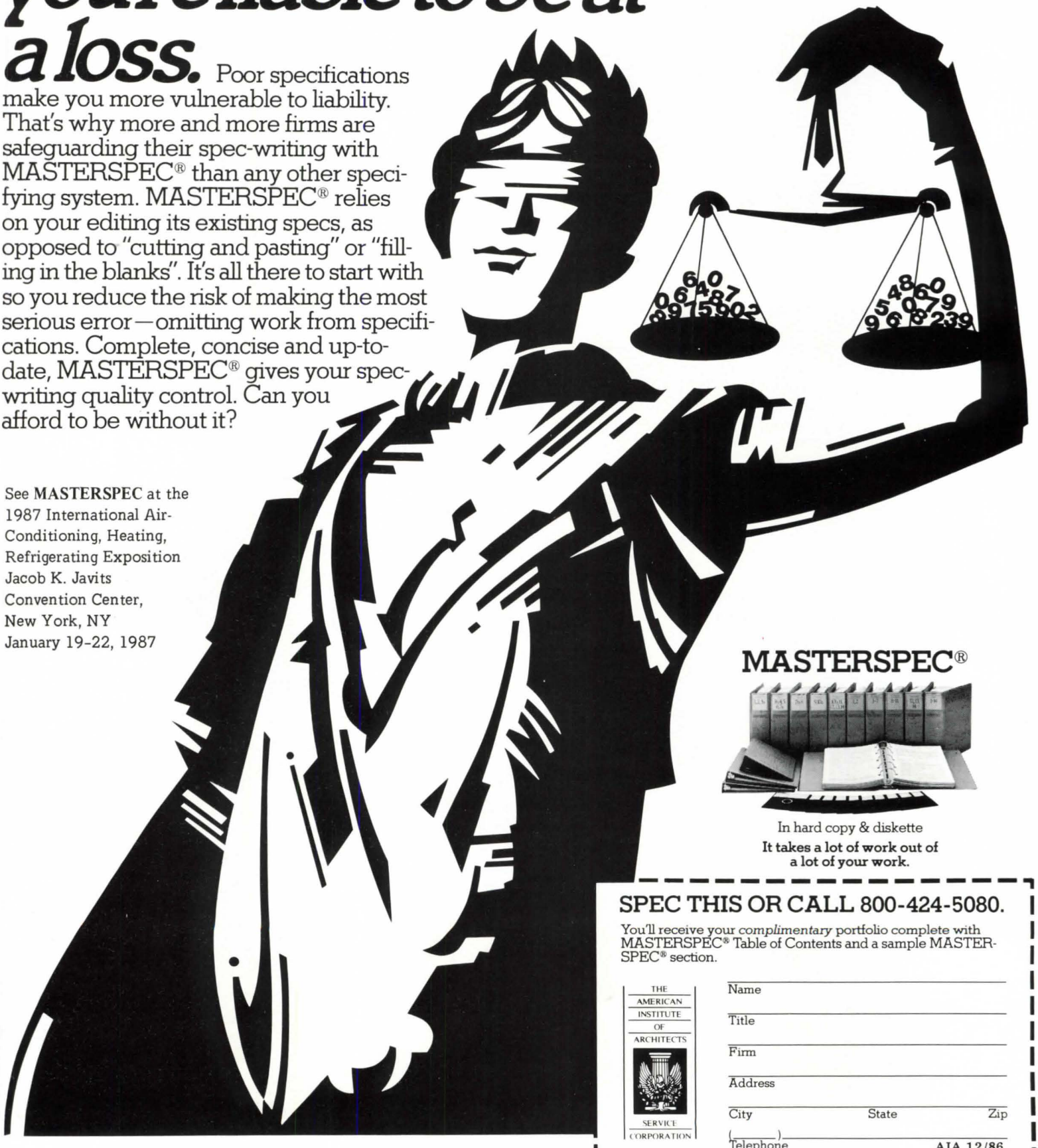

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Code Organizations Debate Stair Design

Accidents on stairs result in 1,800,000 to 2,660,000 disabling injuries every year, according to a study on home safety prepared by the Buffalo Organization for Social and Technological Innovation (BOSTI). Though all would agree that proper stair design lessens the number of stair-related accidents, there is no consensus on exactly what safe stair design entails. Consequently, standards-setting organizations are focusing much attention on quantifying proper sizing of risers and treads, shapes of nosings, size and placement of landings, dimensions of handrails, spacing of balusters, as well as proper stair surface texture, color, and lighting.

Standards set the rules

The National Fire Protection Association's "NFPA 101 Life Safety Code" has been a forerunner in defining stair safety for the general population. It sets dimensions for new and existing stairs according to class of fire protection, as shown in the chart below. Stairs for existing buildings may remain in use if they meet a separate set of dimensional requirements. The "Life Safety Code" also defines requirements for enclosures and protection, guards and handrails, and ventilation and pressurization requirements for smokeproof enclosures, right.

Though poorly designed stairs are a potential safety hazard for the general population, they represent an even greater potential threat to people with visual or physical impairments. The American National Standards Institute's "Providing Accessibility and Usability for Physically Handicapped People," ANSI A117.1-86, the "classic" consensus standard for barrier-free design, deals with stairs that are required as a means of egress and stairs between floor levels not connected by an elevator.

The ANSI standard states that all steps shall have uniform riser heights (with a maximum height of seven inches) and uniform tread depth (with a minimum width of 11 inches) measured from riser to riser. The standard forbids open risers on accessible routes. Nosings and handrails comprise the other main topics covered in the stairs portion of the standard, below right.

The "Uniform Federal Accessibility Standards," on the other hand, specify uniform tread widths of a minimum width of 11 inches, but do not restrict riser height, specifying only that risers be of uniform height. Compiled in 1984, the "Uniform Federal Accessibility Standards" combine design, construction, and alteration standards for buildings under the jurisdiction of four standards-setting federal agencies: The General Services Administration, The Department of Defense, the Department of Housing and Urban Development, and the U.S. Postal Service.

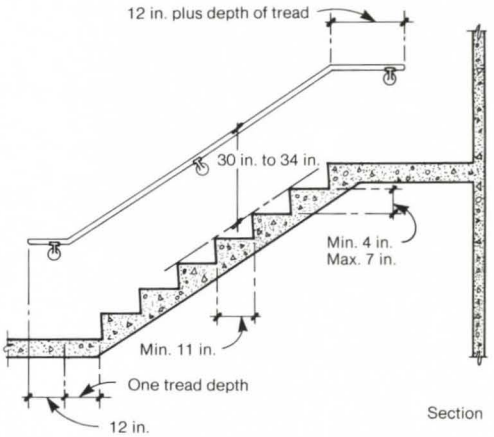
These standards also cover nosing shape and size: Risers are required to be sloped, or the underside of the nosing should have an angle not less than 60 degrees from the horizontal, and project no more than 1½ inches.

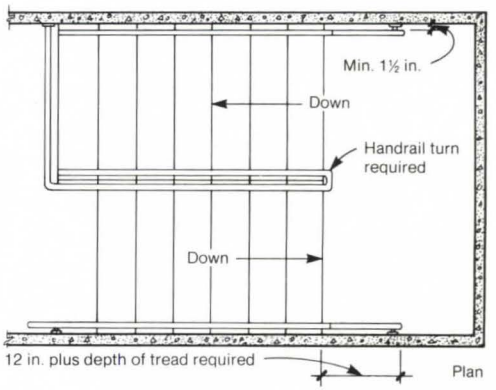
Handrail requirements in both national standards are similar—they specify handrails on both sides of the stairs, and dimensions and locations of the handrails.

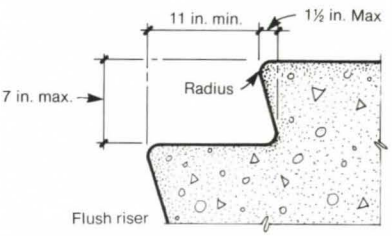
New Stairs

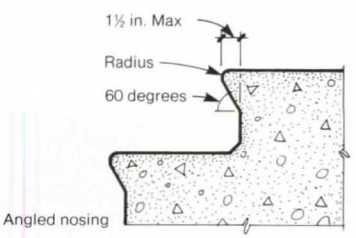
Minimum width clear of all obstructions, except projections not exceeding 3½ in. at and below handrail height in each side	44 in. (36 in. where total occupant load of all floors served is less than 50)
Maximum height of risers	7 in.
Minimum height of risers	4 in.
Minimum tread depth	11 in.
Winders	See text
Minimum headroom	6 ft., 8 in.
Minimum dimensions of landings in direction of travel	See text

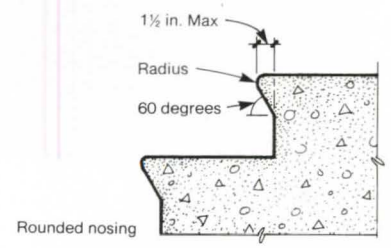
Doors opening immediately on stairs without a landing at least the width of the door are not permitted. See text for requirements for existing buildings.











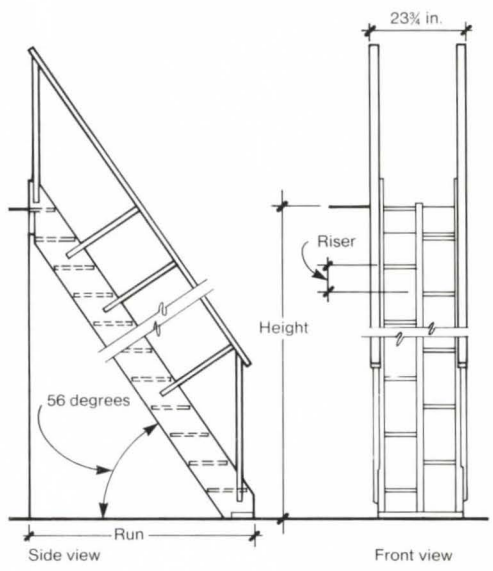
Codes make standards law

National standards often serve as the reference, or form the technical basis, upon which model building codes are written. Separate sets of requirements often exist for stairs in public places, in residential occupancies, and for stairs that form part of a legal exit way. The model codes have debated many questions of safety in stair design over the last 10 years, but none has received as much attention as the controversial "7-11" rule. The "Uniform Building Code," used as the model code for much of the western part of the country, was the first to adopt the 7-11 rule, which states that "the rise of every step in a stairway shall be not less than 4 inches nor greater than 7 inches" and "the run shall be not less than 11 inches as measured horizontally between the vertical planes of the furthermost projection of adjacent treads." Exceptions to this rule are permitted for private stairways serving an occupant load of less than 10 people, winding stairways, circular stairways, and spiral stairways in residential applications.

The Building Owners and Code Administrators' "BOCA Basic/National Building Code," serving as a model code for most of the Northeast and Midwest, placed a similar 7-11 requirement in the 1984 version of the code, withdrew 7-11 in 1985, and is now offering a modified version for approval in January 1987.

The last holdout from the 7-11 debate was the "Southern Building Code," which just last month approved the maximum riser height of 7 inches and a minimum tread width of 11 inches for exit stairs (dwelling units may have a maximum riser height of 8¼ inches and a minimum tread width of 9 inches). Existing stairs not meeting the 7-11 requirement may remain in place, according to the discretion of the building official.

All three of the model building codes have hotly debated the question of what kinds of stair configurations constitute a legal exit way. For example, the latest changes to the "Southern Building Code" also include a ruling that prohibits exit enclosures with common walls to be considered as separate exits, which means scissor stairs, though still potentially part of the exit capacity requirements, cannot count as independent exits. Architects are advised to check all applicable codes for stair configurations, as exactly what is a legal exit stair changes with almost every addition of the building code.



Allowable stairs vary

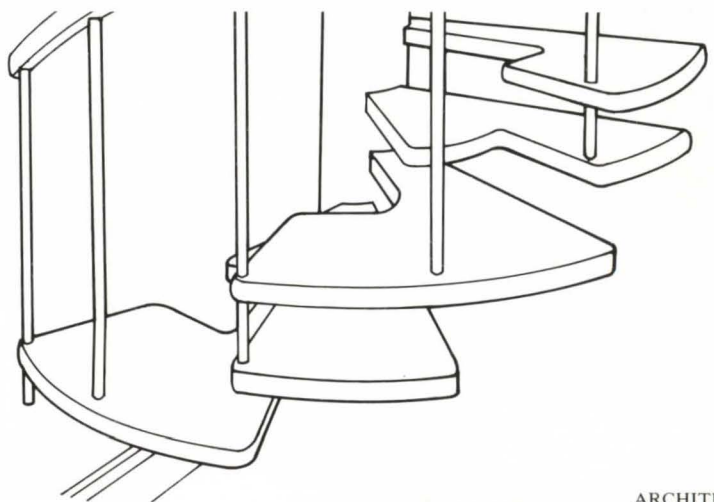
Allowable stair construction changes almost as rapidly as allowable stair dimensions. For example, an increasingly popular yet controversial stair type, with treads alternating for the left and right feet (above) was recommended for acceptance into the "Southern Building Code" this November. The design, manufactured by Lepeyre Stair, provides a series of steps attached in an alternating manner so that both feet are not at the same level at the same time. It can be installed in tight spaces at an angle of 50 to 70 degrees from the horizontal, and is, according to Lepeyre, safer than a spiral stairway, since there is a uniform 9½-inch tread width. SBC approved application for this type of stair in mezzanines serving not more than 250 square feet in area and not serving more than five occupants. A wood version, with code-complying balusters and handrails, was approved by BOCA in 1985 for residences.

Another interesting staircase configuration, shown below, is not approved in America for egress even though it is legal in parts of Europe and appears considerably safer than conventional spiral stairs, because of the wider treads it offers. The catch is the Life Safety Code's requirement that all treads be identical. Like other stairs that fail to meet code, the design may still be employed if code-approved egress pathways are provided by other stairs.

One area of stair research that has gained attention most recently is use of stairs by the elderly. Stairs pose potential hazards to anyone with visual impairments or difficulty walking. AIA's *Design for Aging: An Architect's Guide* (AIA Press, Washington, D.C. 1986) recommends that different colors and surfaces be used to differentiate tread edges in facilities used by the elderly. The guide further states that risers and treads of contrasting colors are particularly helpful to people with visual impairments, although it cautions against use of patterns with a hypnotic effect.

One of the most important safety features of stair design for people with limited stamina and perception difficulties is stairs of uniform height, with a minimum of three and a maximum of 10 risers per flight. The *Design for Aging* guide claims that a high percentage of the falls that occur in elderly residences can be traced to a single riser whose height is different from the other uniform riser heights on the stair. Other challenges include designing the stairs so that they have runs as straight and short as possible and lighting the stairways to a higher intensity than normal, day and night.

—M. Stephanie Stubbs



This alternating tread, spiral staircase has treads specifically designed to be wider at the newel for safety. Of German design, it forces the user to begin descent with the right foot—the top landing is to create a narrow tread on the side of the newel.

Built in 1981 at a cost of $330 million, the Tropicana Hotel & Casino is a special blend of elegance and excitement. With 515 guest rooms, 4 lounges, 7 restaurants, 8 shops, and a 50,873 sq. ft. casino, the Tropicana is an emporium of activity with all the conveniences of home.

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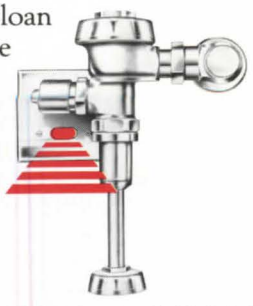

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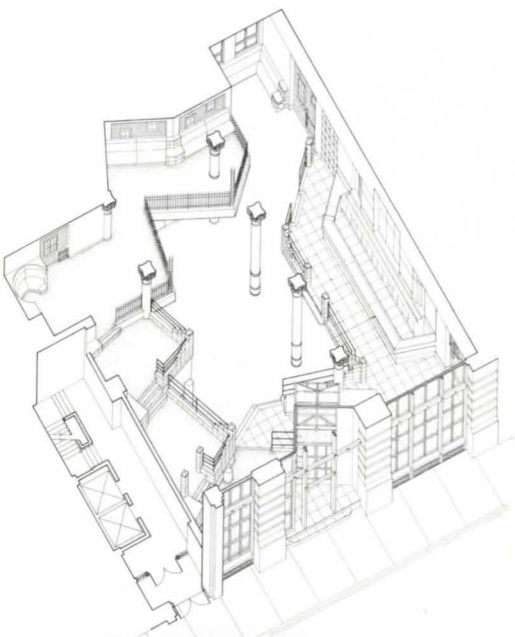


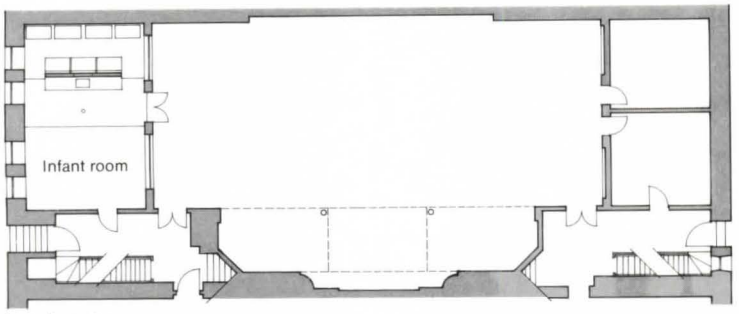
Photographs © Timothy Hursley/The Arkansas Office

Stylistically, 20/20 was best described by its designers as what baroque would have been had electricity been invented, an apt description encompassing all the bits and pieces of almost every style imaginable. Bands of neon light and commercial aluminum storefront mix with copper-colored Corinthian capitals, Plextone spray-painted walls, and wicker furniture—a physical incarnation of "Casablanca" meeting "Miami Vice."

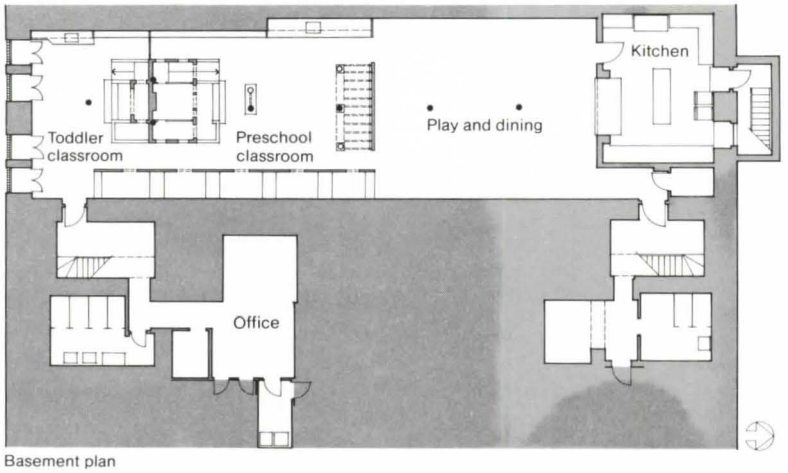
One of the latest of a series of trendy restaurants to open in New York City, it avoids some of the pitfalls so often associated with this current design vogue. Although the space is vast—240 people seated in 9,200 square feet—architects Haverson & Rockwell broke it down into more intimate areas, creating a series of mezzanines that rise along one side. The ground floor center seating area is a piazza, a center stage for what they think of as an opera set; those seated on the balconies are the spectators of the action.

No surface is left untouched here. Using back-lit, faux windows, the designers created nine vignettes depicting different street scenes for the wall areas that add visual interest to a space already well encrusted in detail. Slate, wood, and carpet adorn the floors, while copper-color piping, black metal rails, and wood imitating stone blocks are used on the balcony fronts. Beams with recessed lighting were added to the ceiling, forming a grid of coffers banded in two colors that play off the continuously changing angles of the mezzanine levels. Add to this the 240 patrons that regularly populate the restaurant every evening and the space becomes highly animated—a design concept consistent with the owners' desire that the restaurant be a food theater.

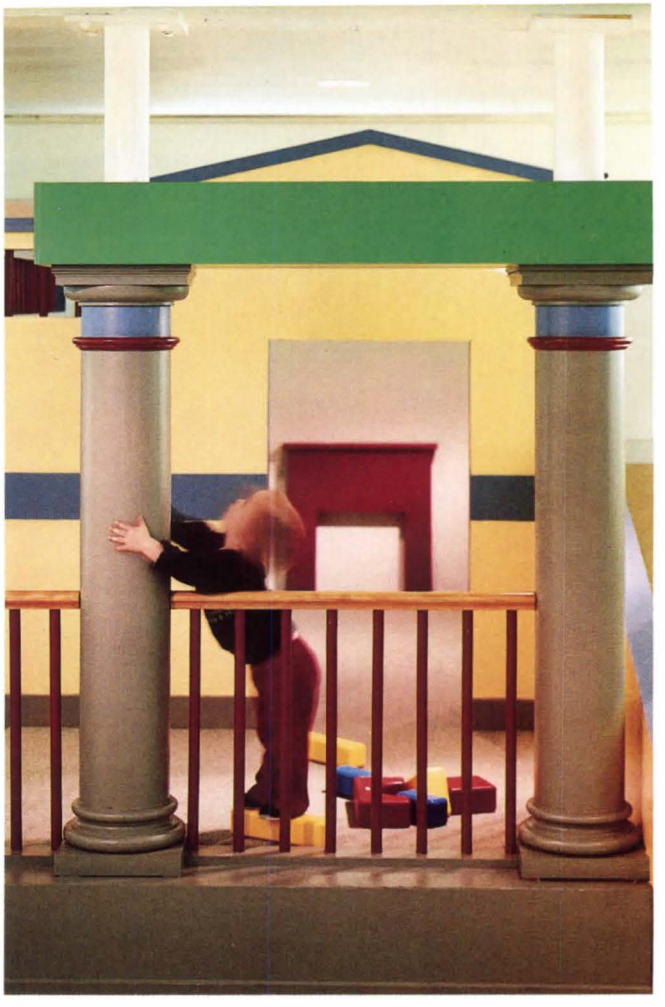
All of this intense design activity was accomplished in a mere eight months—tight constraints considering the difficulties encountered in New York City construction. Given the amount of effort put into the design, one hopes the restaurant will survive being just another trend.—Sharon Lee Ryder

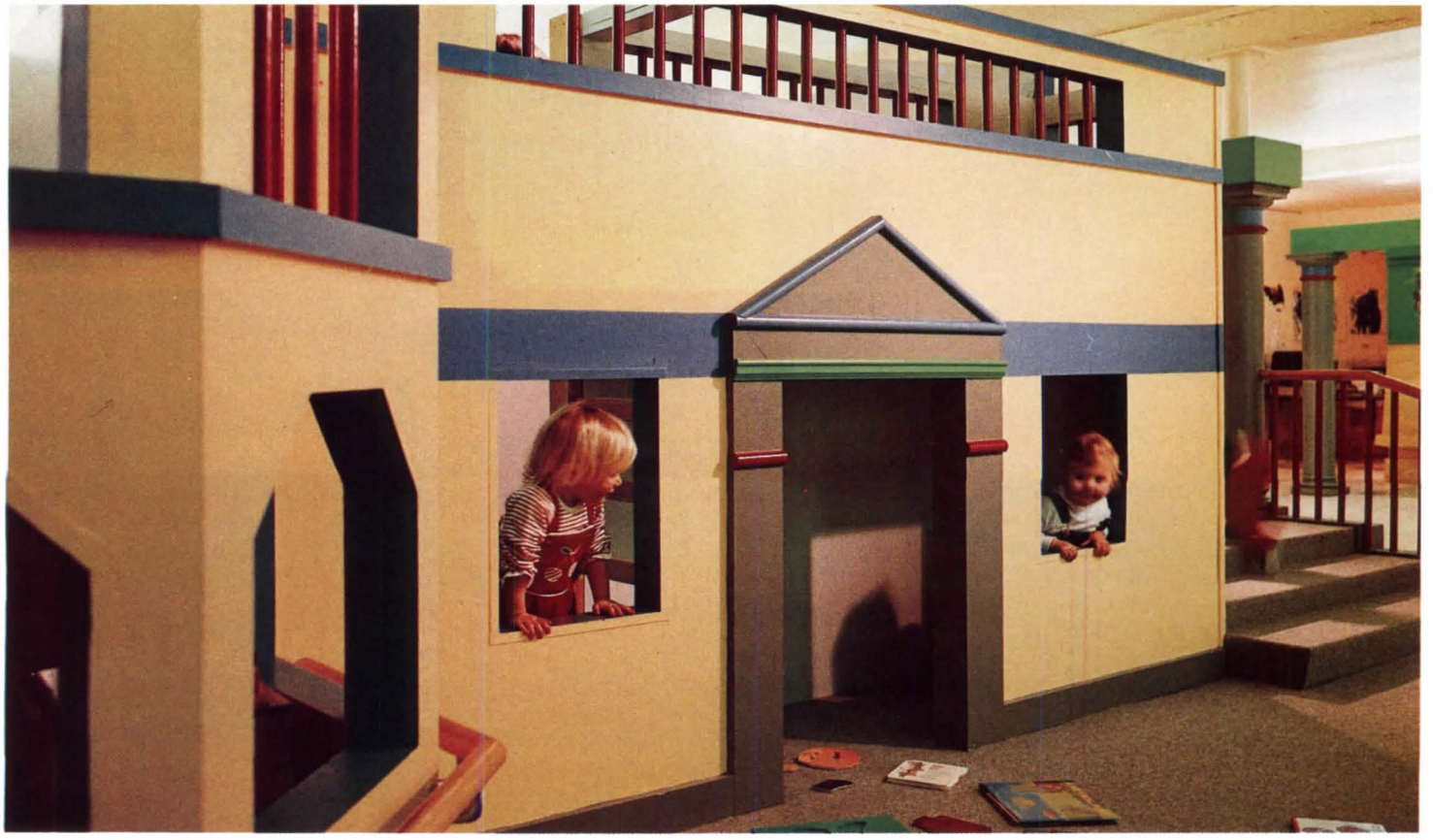


Main floor plan



Basement plan





Photographs © Steve Rosenthal

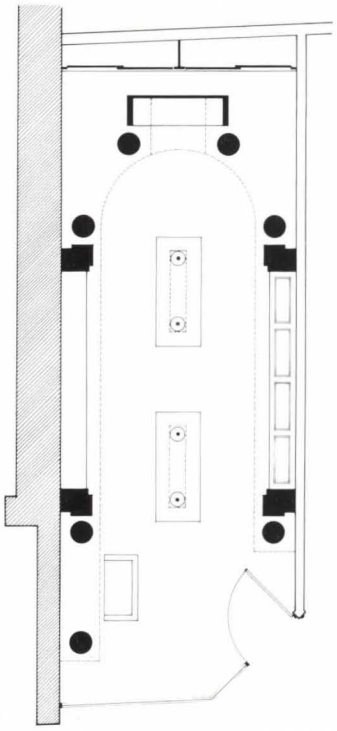
When Boston advertising agency Hill, Holliday, Connors, Cosmopolous, Inc., decided to take the highly unusual step of creating a day-care center for its employees, it was fortunate enough to find space near its John Hancock Building offices in the basement of the historic First Baptist Church by H. H. Richardson.

But not everything about the space was fortunate. It was without daylight and had an unusually low ceiling and a forest of peculiarly placed columns. Out of this architect Leers, Winzapfel Associates, Inc. have created a bright, colorful, and cheerful—even whimsical—children's village.

Principal structures in the village are a tiny Victorian house—complete with porches, steps, slides, and balconies—that neatly incorporates several of the columns. More of the columns became part of a "garden trellis" incorporating a group painting easel and dividing active from quiet play. Storage cubbies are behind what seems to be a streetscape of miniature row houses.

Each structure contains concealed light fixtures aimed upward that make the ceiling seem a bit higher and contribute to the happy atmosphere.

—Donald Canty, Hon. AIA

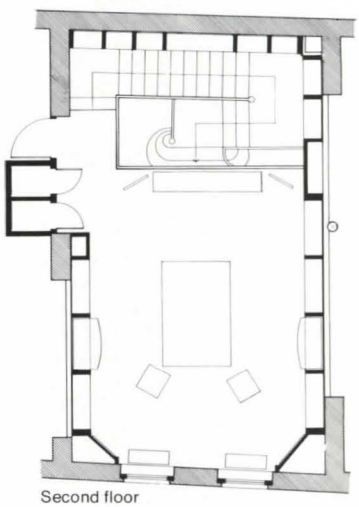


Designing an interior for a retail store is a difficult problem. "You have to do the best background possible," says Mark Simon, AIA, of Centerbrook. "It has to be subtle and quiet. The products are the most important objects." To design such spaces at the South Street Seaport in New York City is to confront even more constraints imposed on the historic building by the Rouse Co. Original brick walls and heavy timber ceiling beams had to be left exposed as much as possible, and plans were heavily scrutinized for their compliance.

Simon's solution was simple and strong. At Siena Fine Papers, a store selling European stationery and accessories, he designed a giant piece of furniture. Picking up on the Italianate theme, he built an entablature with an architrave concealing display lighting for the shelving below. A plain frieze and neon-banded cornice complete the classical motif. An arched display niche flanked by two columns at the far end lends a sense of vista to the long, narrow space, drawing visitors down the sides past the merchandise while concealing a storage area behind. Two tables, also of Italian inspiration, divide the display space and create cir-

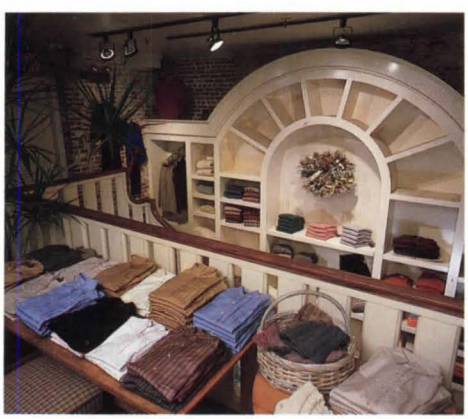
Photographs © Norman McGrath

Across page, an Italianate theme characterizes the interiors of Siena Fine Papers. Left and below, a graceful stair leading to a rounded Palladian-style display cabinet in the Patrick Sheeran Clothing store.



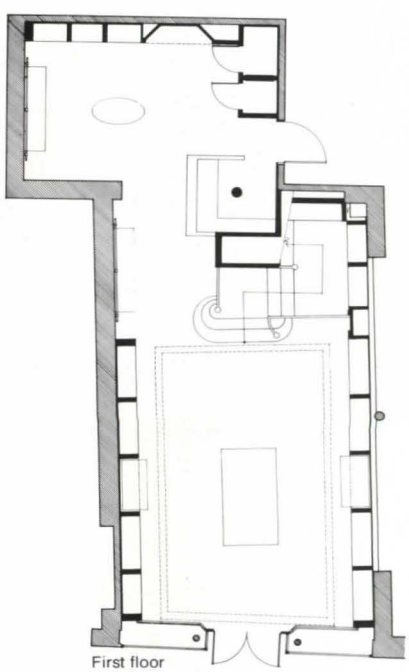
Second floor

cular movement through the store. While Simon likens the design to the Uffizi Gallery miniaturized a hundredfold, the concept successfully bridges the scale between the overall container and the myriad of objects on view. Their colorful qualities are offset well against the whiteness and simplicity of the design. Although no longer a store selling paper, the elegance of the design still serves the needs of the new owners who sell hand crafted jewelry. "It was designed to make things look prescious," says Simon. And in this regard, its intentions are, perhaps, even better served.



At Patrick Sheeran Clothing in Shermerhorn Row at the Seaport, Simon confronted a similar problem: enticing buyers through the store and up to the second story where the women's department was located. Using another simple architectural device, a stairhall modeled on those found in shingle-style houses, Simon turned the trip upstairs into a merchandising asset. Set well back in the space past the men's clothing, the stair is graceful and elegant, broader at the bottom, inviting the buyer up. As one approaches, the two-story space reveals itself; the rounded Palladian-style display cabinet is a surprise. At the first landing, only one-quarter of the way up, shelving begins displaying various merchandise to be found upstairs.

Detailing here as in the other store is otherwise kept to a minimum so that the merchandise becomes the prime focus. To offset the historically derived but definitely modern design, owner Sheeran chose several French pine cabinets to contrast with the cream white display shelves. Although Sheeran no longer owns this store, the interior is still intact, serving its new merchandising tasks with equal finesse.—Sharon Lee Ryder



First floor

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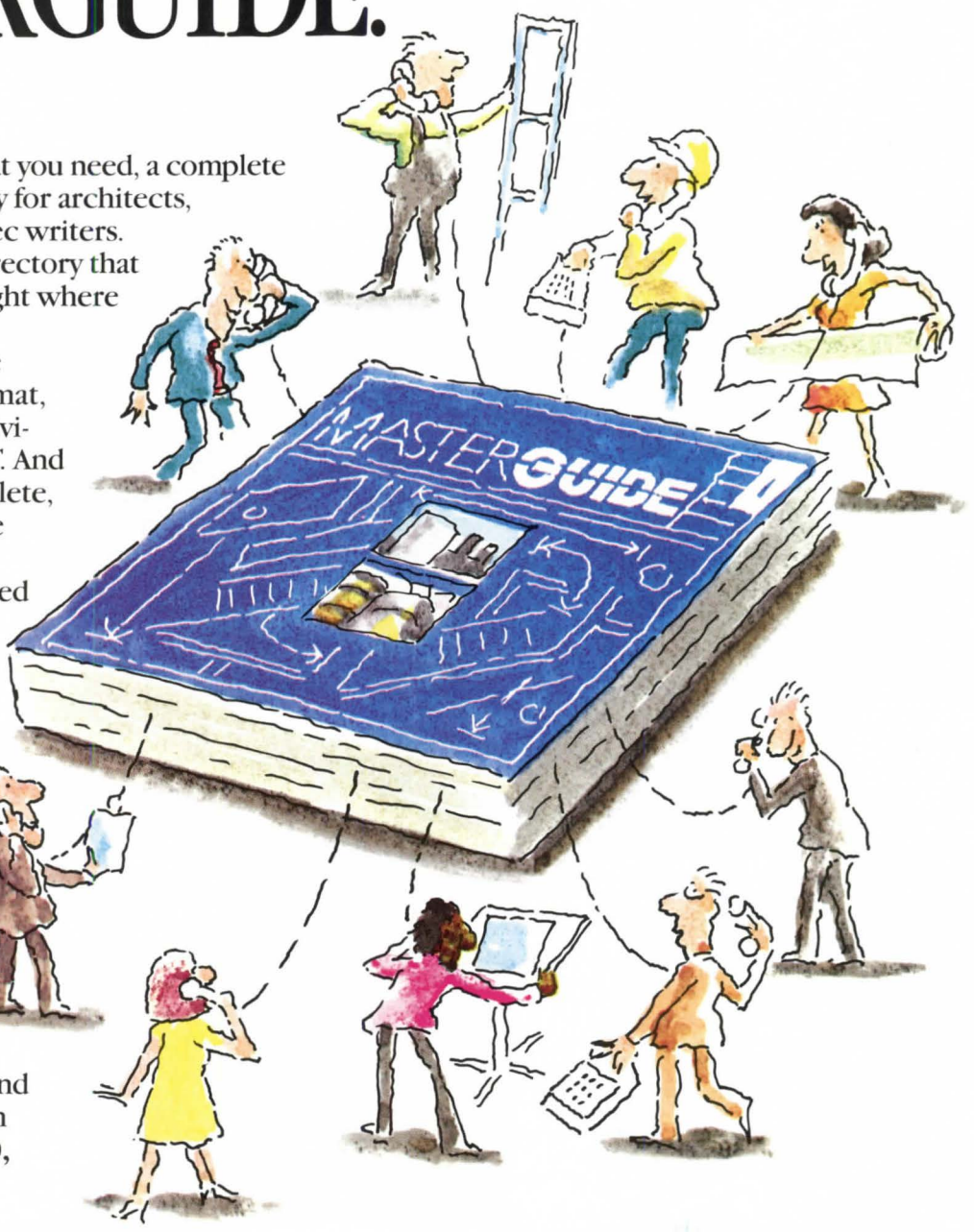

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BOOKS

Guggenheim Letters Shed New Light on Wright

Frank Lloyd Wright: The Guggenheim Correspondence. Selected and with commentary by Bruce Brooks Pfeiffer. (The Press at California State University and Southern Illinois University Press, $29.95 hardbound, $17.95 paperbound.)

In this book's concluding pages, Bruce Brooks Pfeiffer imagines a dream sequence in which the trustees of the Guggenheim Foundation are gathered at Frank Lloyd Wright's masterpiece, the Solomon R. Guggenheim Museum in New York City. In the dream Wright returns, and Pfeiffer asks some provocative questions. "How would he react to the upper ramps being converted for storage? To the drive-through at the entrance being glazed in for a restaurant and gift shop? To the charming cafe he designed next to the ground level floor being converted for storage and restoration work? To the Thanhauser gallery that cuts into the main ramp like a blast of honky-tonk in the middle of a Beethoven symphony? And now, to the impending structure that is to rise behind and above it?"

Pfeiffer, director of the Frank Lloyd Wright archives, performed a stellar service to scholars in his past publications of Wright's *Letters to Apprentices, Letters to Architects,* and *Letters to Clients*—all reviewed, and commended, in the pages of this magazine. The book now under review is even more revealing of Wright's personality and architectural genius, concentrating on correspondence about a single building that is, says Pfeiffer, Wright's "crowning achievement" and whose execution was so complex and fraught with problems that nearly 17 years passed between commission and execution, requiring six separate sets of construction documents and 749 sheets of sketches, renderings, and drawings.

The lengthy drama had a cast of characters that included architects, artists, philanthropists, politicians, city officials, planners. The saga, with all its relentless trials and tribulations, brings to mind, says Pfeiffer, the *Oresteia* and the *Book of Job.* The letters selected for this book come from a vast correspondence that "collectively would stack as high as the model Frank Lloyd Wright made for the Guggenheim in 1946." They tell a "one-sided" story, Pfeiffer admits, from the point of view of a single man—the building's creator. And, despite the helpful chronologically arranged commentary provided by Pfeiffer, one does wish to read some of the letters that at times prompted Wright's outpourings of hurt, anger, and defiance. Nonetheless, Wright comes across as a remarkably patient and long-suffering protagonist in this drama.

Wright inspects museum under construction.

The first letter, dated June 1, 1943, is from the Baroness Hilla von Rebay, the remarkable first curator of Solomon Guggenheim's collection of non-objective paintings. She rather timidly asks Wright if he ever came to Manhattan would he discuss with her a building appropriate to house the collection. She tells him that she requires "a fighter, a lover of space, an originator, a tester, and a wise man." It was this woman, says Pfeiffer, who "initiated, propelled, and in truth inspired" the Guggenheim.

Wright, thinking that the baroness was a man (she had signed her letter "Hilla Rebay") asked the writer to Taleisin in a letter dated June 10, 1943. "Bring your wife," he cordially invites. In her reply, while informing Wright of her sex, she takes full credit for forming the Guggenheim collection. She urges Wright to come to New York City, citing her traveling difficulties as a non-citizen of the U.S. and the problems with Guggenheim himself, who was then 82 years of age. She says there is no time to lose because the building she wants will require "endless thinking, planning, testing." She had no way of knowing how appropriate the word "endless" really was.

By June 29, 1943, things had moved so rapidly that Guggenheim wrote to Wright, outlining contemplated costs (no more than $750,000, exclusive of site), architect's fees, and other practical matters. The correspondence further reveals that by July Wright was deeply involved in finding a site, having had conversations with Robert Moses, New York City's commissioner of parks, outlining three possible sites for Guggenheim's consideration.

Matters were off and running, and Wright and his wife had become such friends of Hilla Rebay that they were on a first-name basis and had even succumbed to her medical quirks that she considered efficacious, both having permitted large black leeches to be applied to their throats for blood-letting. And because she thought bad teeth were a cause of poor health, Wright had his teeth pulled, reporting to her on July 23, 1943, that he had had a hard time adjusting to dentures and wondering if a second application of leeches would be helpful. Where else but in his correspondence would we learn these facts about the master?

The detail as to leeches and dentures is only indicative of other information offered up in these fascinating letters. They reveal conflicts in personality and other complications compounded on Nov. 3,

continued on page 132

Books *from page 131*

1949, by Solomon Guggenheim's death; the execution of his will, in which he designated $2 million for the museum, by a board of trustees who turned out to be vacillators; the dismissal by the trustees of Hilla Rebay as the museum's director and her replacement, in 1953, by James Johnson Sweeney. Sweeney and Wright were incompatible, to say the least. Wright thought Sweeney did not understand the purpose of the museum as he designed it and that his demands for working space at the expense of space for exhibitions was unreasonable. They differed on lighting, on color, on placement of art—everything.

The correspondence also details the postponements in construction due to red tape, controversies with trustees, and demands of city officials; the discouraging search for, final acquisition of, and official approval of a building site on Fifth Avenue; the worry over fees, payments, bids, and rising construction costs; the seemingly ceaseless preparation of models and working drawings; and Wright's tenacious determination to maintain the integrity of his design. Fourteen years after its commission, the museum finally had ground-breaking on Aug. 16, 1956.

The problems did not cease, and Wright paid a "staggering price" in his struggles, says Pfeiffer. Arguments and discussions with the trustees continued, and Wright was at the building site "in all kinds of weather, watching, supervising, advising, correcting, and feeling, no doubt, a deep sense of satisfaction with the anguish and frustration of it all."

On April 9, 1959, at the age of 91, Frank Lloyd Wright died in Phoenix, six months before the completion and dedication of the museum on Oct. 21. Wright had seen the Guggenheim for the last time in January of that year. The forms were down, says Pfeiffer, "and the sense of the architecture, as conceived and finally realized in the third dimension, was evident in its startling, but nonetheless quiet, drama." Surely Wright was pleased.

In this remarkable book's concluding pages Pfeiffer reminds us that the ideal can never be achieved in the kind of world we live in. "The ideal museum envisioned and designed by Frank Lloyd Wright could only have been built where he is now. But what has survived is miracle enough." With all the indignities the Guggenheim has endured, "the original idea prevails and is itself so powerful and all-pervasive that the building is indeed a living testament to genius." These letters, which required endless time and effort to write, are also testimony to that genius. If "ecstasy" always has a companion, these letters underscore the "agony."

—Mary E. Osman, Hon. AIA

Mrs. Osman was associated with AIA for more than 24 years and during that time was books editor for this magazine.

The Concept of Dwelling: On the Way to Figurative Architecture. Christian Norberg-Schulz. (Rizzoli, $17.50.)

This book is another installment in the development of a general theory of architecture begun with the publication of the author's *Intentions in Architecture* (1963). In that important essay, Christian Norberg-Schulz argued that the "present situation of architecture is confused and puzzling" and that there was a lack of correspondence between the current way of life and "the existing architectural frame."

The Concept of Dwelling is based on the same premise. His theory has always been phenomenologically structured, based on perception, both its Gestalt properties and the schemata that result from learning, and tied both to our sense of "being in the world" and to the means by which we make concrete our presence and our experience—the hierarchically ordered thing we call architecture. Norberg-Schulz's original and comprehensive theory was derived from German philosophy of the 19th and 20th centuries and the work of perception psychologists such as Jean Piaget and James Gibson. The theory and its relevance for design were distilled into *Existence, Space and Architecture* (1973), and some of that material is reprinted in this new work.

In part, this book is another chapter in the body of literature that declares the modern dead. In Norberg-Schulz's terms, functionalism/modernism was "non-fig-

urative," failing to satisfy our need for dwelling, for place, and our need to see ourselves in and belonging to the world. The modern, the argument goes, lost its figural capacity, in part because it moved too much toward abstract organizations of space. The loss of figure has left us spiritually lost, awash in a world characterized by buildings without clear terminations and clearly defined elements. Norberg-Schulz argues for an assemblage of architectural elements in the world rather than in the mind. The resonance we anticipate in experiencing architecture is to be universal in the life of man, not in some abstract principle.

Beyond this indictment, the book is a study of the phenomenological nature of dwelling, reminiscent of Gaston Bachelard's *The Poetics of Space.* The experience of dwelling is a state of being in and belonging to a place. Dwelling is at the heart of the human condition, denoting in Heidegger's words "the way in which humans fulfill their wandering from birth to death on earth under the sky." For Norberg-Schulz, there are modes of dwelling, scaled versions of the ways in which we gather the world in places—settlement, urban space, public and private dwelling. Norberg-Schulz is especially interested in describing the process by which we identify with and orient to places and architectural figures.

The actualities or the facts of architec-

continued on page 134

Landmarks of Texas Architecture. Text by Lawrence W. Speck, photographs by Richard Payne. (University of Texas Press, $29.95.) Texas, writes Lawrence W. Speck, AIA, in his introduction to this book that gives new meaning to the reviewer's old cliché "lavishly illustrated," has as broad a sampling of architecture as it does geographic and ethnic variety. "In the stones of the Alamo and the steel and glass of our downtown skyscrapers lie the silent embodiment of who we are and where we have been." Richard Payne, AIA, captures in sumptous color the Alamo, skyscrapers, and just about everything in between. Among the buildings premiated are missions, Mies van der Rohe's Museum of Fine Arts, and Louis Kahn's Kimbell Art Museum. Above is an arcade of Cram, Goodhue & Ferguson's Lovett Hall at Rice University.

Books *from page 133*

ture are divided into three categories: built form, organized space, and building types. These constitute a language of means that may satisfy the human need for "gathering" between the earth and sky. Norberg-Schulz then breaks down this language into morphology (the "how" of built form), topology (spatial organization), and typology (manifestations of the modes of dwelling). Using these constituents, Norberg-Schulz discusses the nature of settlement, urban space, institutional buildings, and house. In each mode, historical and contemporary developments are described and analyzed.

The book concludes with a section on language as the common denominator of all modes of dwelling. The issue here is the manifestation of existential experience through language and architecture. The work of art, the building, "gives the world presence," writes Norberg-Schulz. Whatever is contained in the gathering of spaces, realized in a known form or type, reveals aspects of the world. The process is interactive, involving identification of viewers/dwellers with structures, especially as they are figures against the ground of the sky. Identification with these figures, Norberg-Schulz contends, reaffirms our being in the world and reinforces the world's presence in our lives. To live in meaningful environments, we need meaningful figures with which to locate ourselves, through which and within which we dwell.

But is image making for image sake truly figurative or even worthwhile architecture? That last phrase is a reference to Norberg-Schulz's admiration for Michael Graves' drawings as being "on the way to figurative architecture." But all is not right in *PostMod Land,* as he warns: "Even the present advocates of figurative 'postmodernism' hardly grasp the existential nature of type and figure, and therefore become victims of new eclecticism."

To summarize the intent and significance of this book, I'll borrow an anecdote. Recently, a colleague told me a story about discovering an unusual certificate in the bowels of a mausoleum he was inspecting for a rehabilitation study. In a niche of thick masonry wall was a diploma awarding a Master of Restorative Arts degree to the finder. Therein, perhaps, lies Norberg-Schulz's role in contemporary architectural theory.

—Herbert Gottfried

Dr. Gottfried teaches in Iowa State University's college of design.

The Design of American Housing: A Reappraisal of the Architect's Role. Robert Gutman. (Publishing Center for Cultural Resources, 625 Broadway, New York, N.Y. 10012. $5.95.)

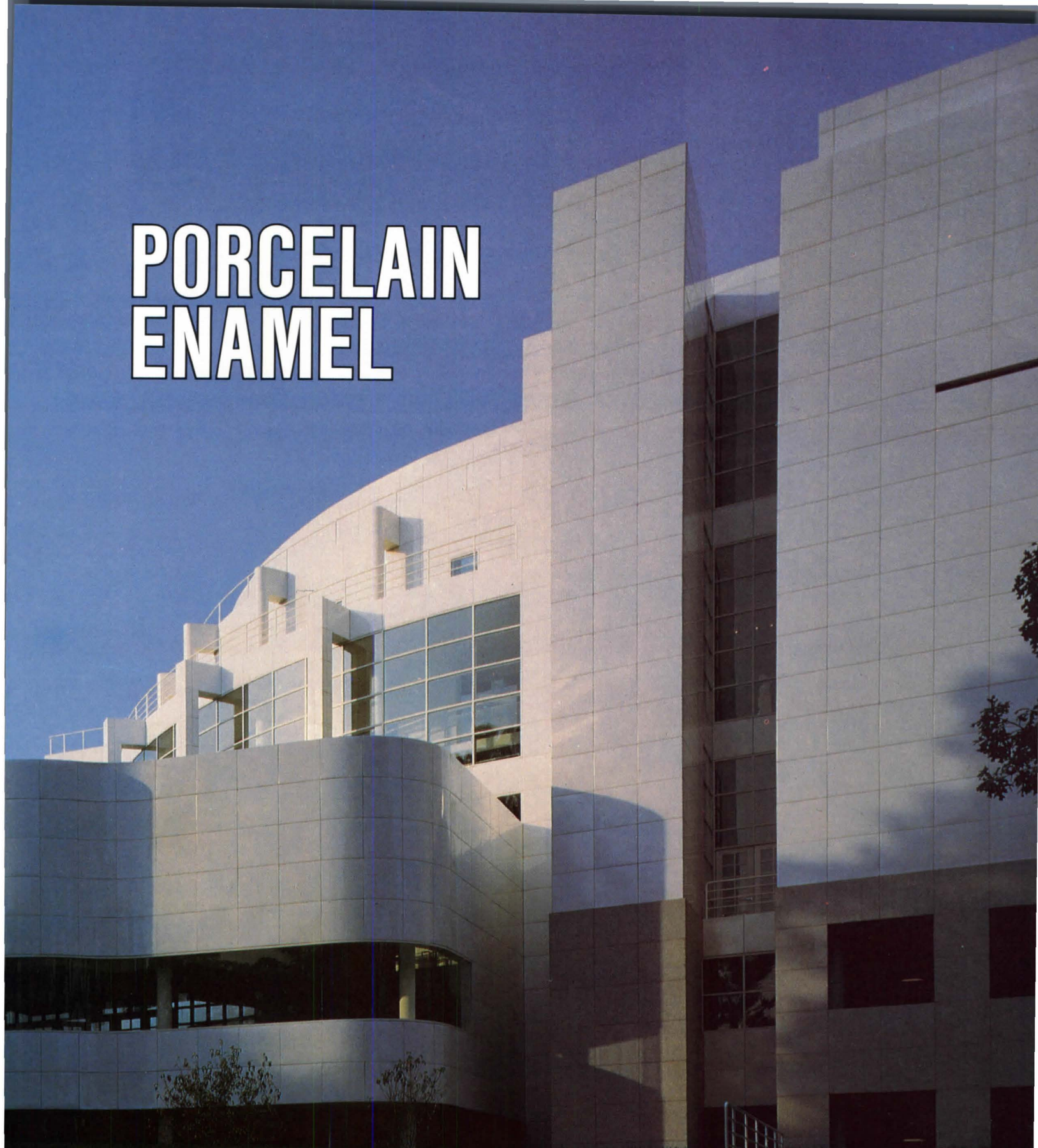
Just how involved are architects in the design and production of housing in the U.S.? In less than 60 pages, sociologist Robert Gutman, Hon. AIA, examines the nature of the housing industry in this country and finds that architects are indeed involved in housing design on a scale that may be surprising to some.

The most visible, of course, are those architects who design houses for the rich and famous—a well publicized if small market. But Gutman uncovers architects as consultants to or among the ranks of mass market homebuilding firms and developers of upper-scale housing enclaves, who employ the likes of Robert A. M. Stern, FAIA. Public and nonmarket housing, virtually dormant at this time, has used the talents of such architects as Kahn, Rudolph, Moore, and Venturi.

There are architects involved in stock plan services throughout the country, where builders and prospective homeowners can send away for house plans found in books and magazines. And there are more architects exploring the design/build model of practice, in effect developing their own housing schemes.

The irony of this involvement, Gutman tells us, is that architects who work for developers or sell stock plans are generally regarded by the rest of the architectural profession as some kind of lower life form, pandering to popular taste and violating the sanctity of the discipline. He suggests an examination of the values communicated to architecture students that discourage their needed contributions to the housing industry.

—Michael J. Crosbie



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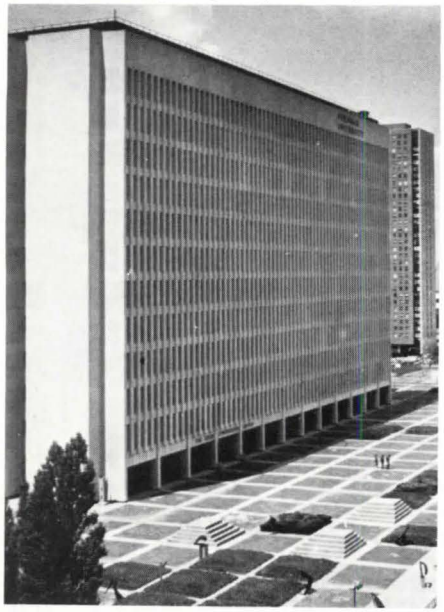
Circle 36 on information card

What Do These Prestigious Buildings Have In Common?

FORDHAM UNIVERSITY



SEALED WITH POLYSULFIDE 1965

Lincoln Square of Fordham University
New York, NY
Architect: The Perkins & Will Partnership

CARPENTER CENTER, HARVARD UNIV.

SEALED WITH POLYSULFIDE 1963

Carpenter Center For The Visual Arts
Harvard University
Cambridge, Massachusetts
Architect: Le Corbusier

United Airlines Headquarters
Libertyville, Illinois

UNITED AIRLINES HEADQUARTERS

SEALED WITH POLYSULFIDE 1966

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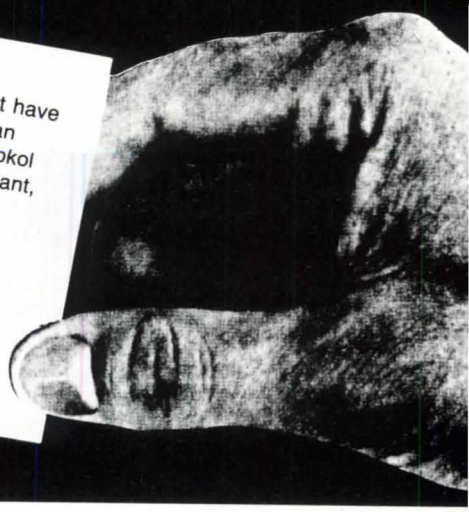
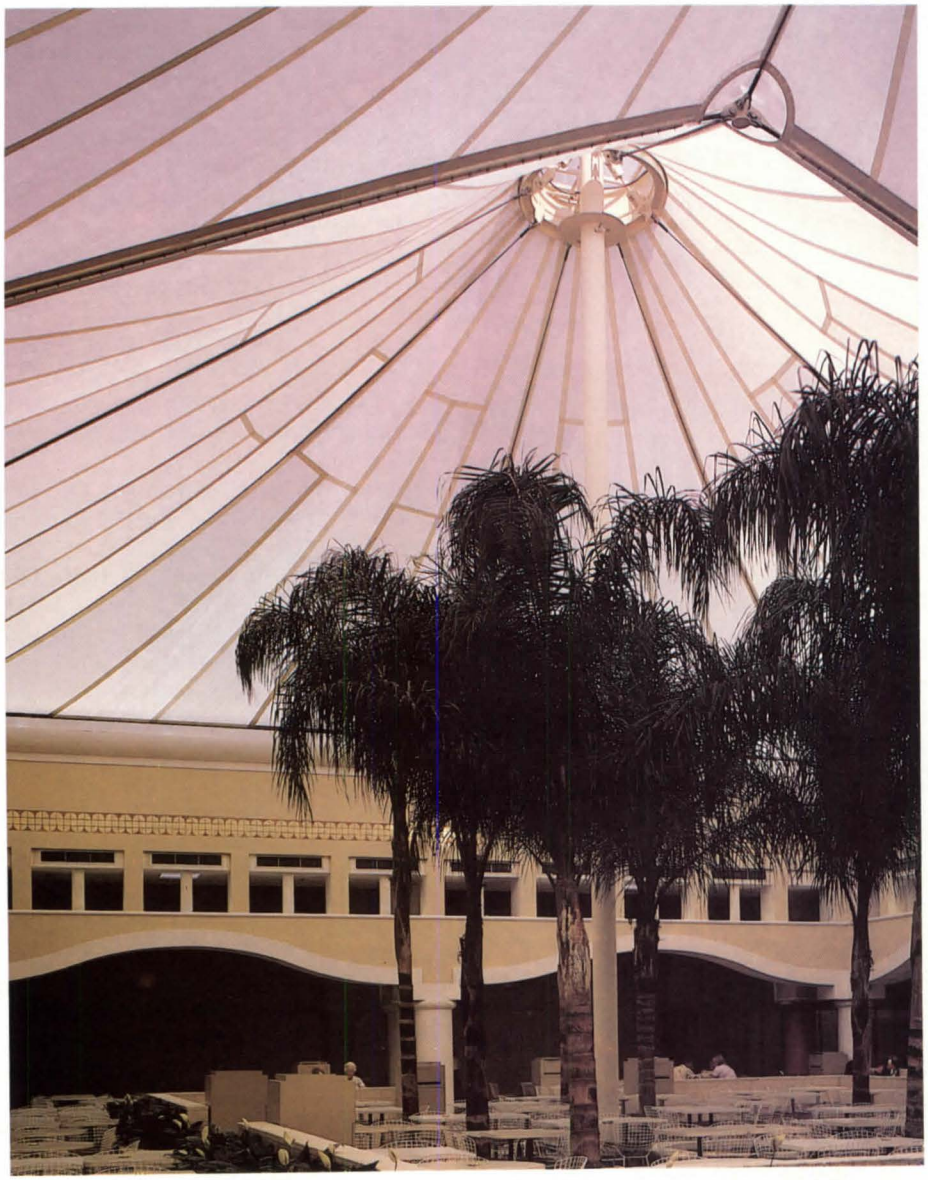


Circle 42 on information card

PRODUCTS

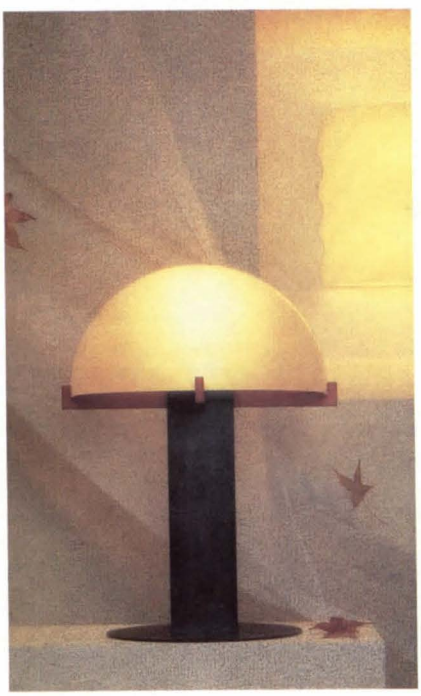


Natural Lighting
Softglass Natural Lighting Systems (above), by ODC, offer a sculptural and soft counterpoint to conventional skylighting systems. According to ODC, Softlight combines the flexibility, weathering, and UV protection properties of silicone with the strength, dimensional stability, and noncombustibility of a woven glass fiber membrane. A tubular steel frame supports the system. The product comes with a 10-year guarantee against leaks, 25-year warranty and maintenance agreement, and is designed to provide many safety benefits, including fire resistance.
ODC
Circle 201 on information card.

Drapery Rods
Trendy, reflective Cirmosa drapery rods designed by Kirsch (below), come in five colors for either pinch-pleated or Ripplefold drapery systems and in several adjustable sizes. Extra slides, center supports, and bracket extender kits are available separately.
Kirsch
Circle 202 on information card.

Table Lamp
The Zink table lamp in galvanized steel and brass or satin black (below), is designed by Ron Rezek and distributed by Artemide. The six-pound lamp is 21 inches high with a 14-inch diameter shade and a 3-inch diameter pole, and comes with a six-foot cord.
Artemide
Circle 203 on information card.

—Amy Gray Light



NEW AND NOTEWORTHY

Licensed Wright Furniture Reproductions
A licensed, signed, and numbered series of furniture designed by Frank Lloyd Wright between 1908 and 1949 is now available in America, marketed by Atelier International.

Licensed by the Frank Lloyd Wright Foundation and available through Atelier and its Italian affiliate, Cassina S.p.A. of Milan, the furniture is an extension of the "Masters Collection," a program that researches and reproduces classic and modern furniture designs of notable 20th century architects. Wright is the first American listed in the collection, which includes the furniture of Le Corbusier, Charles Rennie Mackintosh, Gerrit Rietveld, and Gunnar Asplund.

The initial introduction includes five chairs and two tables; the three shown on this page are the Robie chair, the Allen table, and the barrel chair. Designed in 1908, the Robie chair is a high-back spline chair in natural light cherrywood with a cushioned, upholstered seat covered in wool/nylon-blend fabrics available in three colors; a limited selection of other fabrics; or in a full selection of leathers. The Allen table is rectangular and features staved end details. The top comes in two lengths, each two to four inches thick. Designed in 1917, the table is also made from natural light cherrywood. The barrel chair is a low-backed chair in natural light cherrywood or cherrywood-stained walnut and features curved staves and spline arms. Designed in 1937, the chair has a cushioned upholstered seat covered in wool/nylon-blend fabric, a limited number of other fabrics, or leathers.

Atelier International says additional furniture designs by Wright will be introduced to the collection on a periodic basis.
Atelier International
Circle 169 on information card

Nylon Gaskets
An expanded line of nylon gasketing called Wild Hairs comes in 26 styles to accommodate most applications for perimeter seals, sweeps, astragals, and rolling overhead doors.

The nylon gaskets come in three finishes: clear anodized, gold anodized, and hard-coat duranotic anodized. The company supplies stainless-steel sheet-metal screws for installation. Optional "fast-attach two-way tape" allows press-on section installation and offers the security of mechanically applied sections.

Underwriters Laboratories classifies the gaskets for use with hollow metal, steel-covered composite, passenger elevator, and rolling type fire doors rated up to three hours. The manufacturer ships the gasketing in custom lengths, either individually polysleeved or set-packed. A free brochure details the entire Wild Hairs line.
National Guard
Circle 233 on information card

Saddle-Type Frame Connectors
PF post-frame connectors for 2x4 and 2 x6 joists combine a patented slant nailing feature with a design allowing two connectors to be nested to form one saddle-type connector. Slant nailing provides double-shear values for the nesting feature and requires fewer nails; special double hangers are unnecessary. PF code acceptance is pending.
Simpson Strong-Tie
Circle 239 on information card

Door Catalog Available
An updated door catalog features the newest wood door products available. It details the entire line of doors along with installation, specification, energy, and size information. Marvin Windows offers all products in numerous standard sizes including single, double, and triple width doors. The full-color brochure presents sidelights and transoms, as well as various glazing options.
Marvin Windows
Circle 215 on information card

Software for Space Forecasting
A software package offered by AIA gives architects the capability to provide facility and space forecasting services for clients. FM:FORECAST is available as one of AIA's new MASTERSYSTEMS software tools and runs on IBM PCs and compatibles. Software support is also available.
AIA, Professional Systems Division
Circle 235 on information card

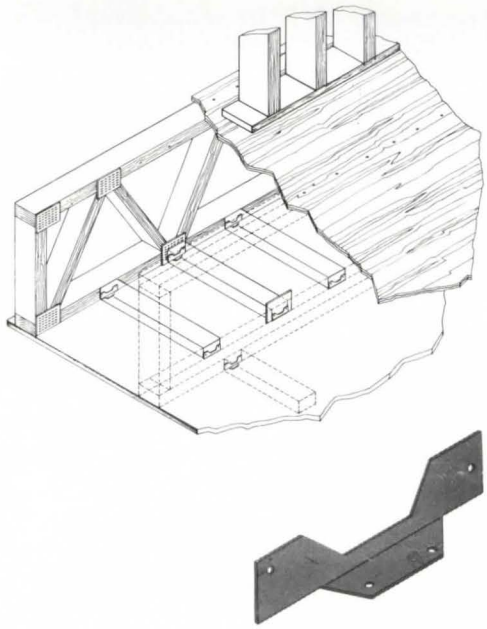
Bent Laminated/Insulated Glass Units
Standard Bent Glass Company will make laminated/insulated glass units (below), of clear, tinted, spandrel, patterned, or pyrolitically coated reflective glass to customer specification with no minimum quantity requirements. When used with a butyral interlayer, bent laminated/insulated glass units with chords in excess of 118 inches or heights of 240 inches are restricted in size only by the flat-glass manufacturer's limitations or the 102-inch width of available PVB.

An eight page, full-color brochure contains 19 photographs of projects utilizing the curved architectural glass, a brief product description providing details of the types of bends available, and instructions on sizing and ordering.
Standard Bent Glass
Circle 230 on information card

Asbestos Encasement System
The Staytex Asbestos Encasement System process consists of spraying on a low-density cellular polymer insulation and covering it with a Staytex surface, designed to be impervious to normal impact and abrasion, that prevents fiber release. The Staytex system is estimated to cost 50 to 70 percent less than removal and replacement costs and is reputedly more effective than paint-type coatings that coat asbestos fibers.

Staytex systems have received nationwide approvals from the Building Officials and Code Administrators; International Conference of Building Officials; Southern Building Code Congress International; U.S. Department of Agriculture; U.S. Department of Housing and Urban Development; and the Industrial Risk Insurers.
Barrier Systems
Circle 204 on information card

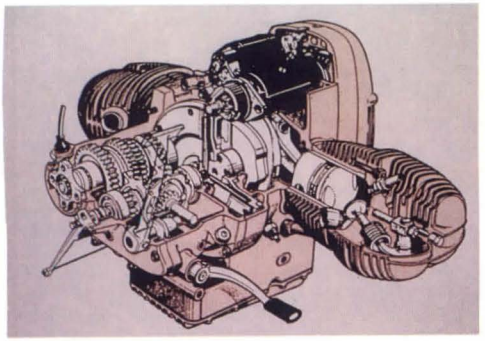
Factory-Finished Door Frames
Two door frame lines called "Wallmate" and "Instaframe" are available in 20- or 18-gauge steel and are factory-finished ready to be installed after the wall is constructed. The Instaframe is designed so that a complete pre-hung assembly can be installed. The frames come in a range of sizes for a variety of walls, with fire-rated units also available.
Steelcraft, by American-Standard
Circle 199 on information card



Fire-Rated Floor-Ceiling Assemblies
A single-layer drywall assembly for wood-web floor trusses utilizing Panel Clip UBC blocking clips has achieved a one-hour fire rating. The system (above), employs a single-layer gypsum board applied directly to floor trusses spaced 24-inches on center. The assembly restricts direct flame-through into the plenum by fire stopping all longitudinal gypsum joints with 4x2 solid wood blocking. The Panel Clip Company will make available complimentary copies of test report FC-392. A preliminary research report number is forthcoming.
Panel Clip
Circle 217 on information card

Flexible Coating
Tamms Industries designed this textured, noncementitious acrylic emulsion made for sealing hairline cracks on interior or exterior surfaces. The coating is said to provide a water-repellent, nongloss finish with high ultraviolet resistance for concrete block, masonry, brick, plaster, stucco, and poured or precast concrete. Tamms Industries recommends the Tammolastic coating for interior surfaces above and below grade and exterior surfaces above grade. Tammolastic cleans easily with soap and water, and is available in white or almost any color. It is packaged in five-gallon plastic pails.
Tamms Industries
Circle 229 on information card

Automatic Window Shading Control
New Somfy comfort control motorizes solar screens, greenhouse, or skylight shading systems. The appliance automatically operates window shading systems for maximum heat gain in winter and energy-saving shading during summer.
Somfy Systems
Circle 194 on information card
Products continued on page 140



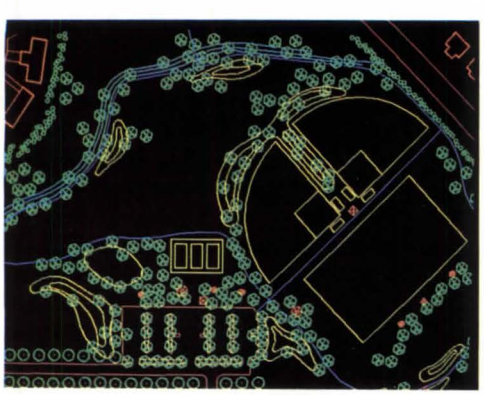
Two-Color Blue Prints
Using Repro Specialty Coating's two color paper, TGP33ST, results in a tonal blue and reddish print (above), made with only one pass through a diazo blueprint machine.

Any intermediate film may be used when going from a translucent original to the two-color process. Other alternatives are to use a sepia print or a halftone screened original. The paper coating is said to combine excellent image density and visual contrast at all speeds, and the paper is designed to maintain a long shelf life if properly stored in a dark cool place away from ammonia vapors. Papers and films are available in a variety of colors, weights, types, and contrast, and come in several cut sheet, roll, and roll-feed sizes.
Repro Specialty Coatings
Circle 208 on information card

CADD for Landscape Design
Landcadd is a fully integrated software package that customizes AutoCAD, a general-purpose drafting system, to produce technical documents for grading, planting, site, and irrigation plans, and is complete with quantity takeoffs and cost estimates.

Landcadd features three separate programs that may be purchased individually or as a package. Purchasing all three together results in a savings of 25 percent. The programs are called site planning and landscaping design, cost estimating, and irrigation design.

Landcadd, written in AutoLISP, provides over 200 symbols and 25 custom commands when purchased as a package. They include a series of templates for AutoCAD 2.18 and 2.5, with menus provided for Landcadd using the same tablet configuration as AutoCAD and the new AutoCAD AEC overlay. AutoCAD, produced by AutoDesk, must be purchased separately.



Landcadd
Circle 205 on information card

Aluminum-Surfaced Laminates
A line of decorative laminates with metallic surfaces features a range of metal tones, finishes, and raised-surface patterns. The Metal Laminate Collection comes in five different tones, with both flat and raised-surface treatments available, and a number of three-dimensional raised-surface patterns that feature geometric designs. Three flush-surface finishes are also offered.
Formica
Circle 236 on information card

SEALANT PRODUCTS

Joint Design Digest
A joint design catalog serves as a guide for using polysulfide-base sealants for expansion joints and glazing. The 16-page publication details subjects on anticipated joint movement, joint width for various building materials, temperature gradients for two geographical belts, tooling of polysulfide-base sealants, and typical sealant uses for concrete/masonry construction.
Morton Thiokol
Circle 181 on information card

Silicone Non-Acetoxy Sealant
Rhodorsil 6B is a non-acetoxy medium-modulus silicone sealant that allows primerless adhesion to most substrates and cures quickly. The one-part silicone sealant is non-corrosive, and is said to be particularly suited for glazing plastics, metals, and silicone insulated-glass units where acetoxy sealants cannot be used. When exposed to the air it cures to a flexible rubber bond. The sealant comes in five colors.
Rhone-Poulence
Circle 179 on information card

Flexible, Expanding Sealant
Phenoseal Surpass is a flexible, low-temperature, weather-resistant sealant flexible enough to be used for expansion joints up to ½ inch when used with an appropriate backing material.

The sealant is suggested for sealing exterior or interior substrates where a high degree of joint movement is expected. Reportedly safe to apply in any indoor environment, the sealant may be painted with oil or latex-based paints.
Gloucester
Circle 192 on information card

Sealant Compound
K-20 Sub Surface Sealer sealant compound deeply penetrates concrete and masonry materials, creating an interior seal that is an effective barrier to water, oils, chemicals, and most acids. The sealant strengthens materials and prevents deterioration due to spalling, crazing, and seam separation. Unlike conventional sealants that create a surface seal or glaze, K-20 SSS fills capillaries inside concrete and masonry. A two-part mixture, the sealer components react catalytically and gradually harden to create a permanent bond. The non-toxic product can be used widely in new construction and repair.
Lopat Enterprises
Circle 180 on information card

Two Sealants Available
Two sealants offered through the Pecora company are recommended for use in expansion control joints, precast panels, and curtain wall joints.

Pecora 864 is a one-part silicone compound that cures with atmospheric moisture to form a flexible, low-modulus sealant suggested for use in joints that have dynamic movement. This sealant is recommended for precast panel joints, mullion joints, and other construction joints subject to movement, but is not recommended for use below grade or in horizontal joints subject to abrasion, physical abuse, or continuous immersion to water.

Dynatrol 1 is a general purpose one-part, non-sag, low-modulus, moisture-curing polyurethane joint sealant. Designed for tilt walls, copings, glazing, bedding panels, window and door perimeters, and metal curtain walls, this sealant provides a rubberlike seal said to maintain an effective bond between materials of similar or dissimilar porosities, surface textures, or expansion coefficients.
Pecora
Circle 191 on information card

Sealant and Adhesives Brochure
An eight-page, four-color brochure describing a new line of 24 adhesives and sealants with a wide range of applications is offered from Uniroyal.

Silaprene products bond and seal virtually every combination of substrates, and are designed for exceptional resilience and durable bonding strength.

A two-page selector guide determines the various adhesives and sealants that best serve various bonding substrates listed, and a properties guide describes colors, polymer bases, and joining methods available.
Uniroyal
Circle 190 on information card

Waterproofing Membrane
Carlisle Sure-Seal Liquiseal fluid-applied membrane is a two-component self-curing polyurethane waterproofing system that forms a seamless, impermeable coating to an appropriate substrate, preventing the lateral transfer of water.

Liquiseal can be used in most sandwich waterproofing installations or, when covered with certain types of insulation

and ballast, as a roof system. A vertical grade (trowel-applied) Liquiseal is available for use when a non-sag waterproofing application is necessary. This vertical grade is designed for coating walls, vent pipes, air ducts, etc., without loss of proper thickness due to "sliding" of the membrane.

Liquiseal can be mixed at the job site and applied using a squeegee, trowel, or spray equipment. The product provides a waterproof, rubber membrane without the necessity of time-consuming splices and terminations.

Carlisle SynTec Systems
Circle 172 on information card

50/50 Membrane Sealant System

A system for horizontal joints creates watertight seals designed to allow unprecedented ±50 percent joint movement capability.

The 50/50 sealant system is composed of a precompressed expanding foam sealant tape made of polyester polyurethane impregnated with neoprene rubber suspended in chlorinated hydrocarbons. Within this water-resistant foam tape a polyester polyurethane membrane has been hermetically sealed, creating a permanent water and vapor barrier. The same watertight membrane has been applied to the top and bottom of the foam tape to protect the product surface. One surface membrane is black and the other gray, making the product reversible.

To prevent the product from being expelled from the joint during deflection and shear, an epoxy primer is applied to the sides of the foam tape and the joint walls before installation.

Will-Seal Construction Foams
Circle 186 on information card

Elastic Lead Sealant

Weathercap is a soft lead strip that, when set and bedded in caulking compound or sealant, forms a cap to enable a permanent elastic seal for any masonry joint.

Weathercap, being an adjunct to caulk or sealant, reduces the size opening of a joint to be caulked or sealed, for improved and long-lasting leakproof joints. After installation, the surface oxidizes to a neutral gray, which blends well with masonry.

Weathercap
Circle 188 on information card

General Purpose Sealant

High-modulus, one-part silicone sealant offers exceptional adhesion, weatherability, and elasticity of ±25 percent. CFP 399 is designed to form a permanent watertight, weatherproof bond impervious to UV rays, ozone, rain, or extreme temperatures.

CFP 399 tolerates joint movement of ±25 percent. However, to ensure performance under all variations in temperature at the time of installation joint width should be four times the expected joint movement and a minimum of ¼ inch.

Elco Industries
Circle 184 on information card

Fast-Curing Adhesive Sealant

Sealants that are said to resist chemicals, water, oil, and most solvents, and withstand a wide range of temperatures, are available with Master Bond EP 24.

Master Bond claims its epoxy system stands up to temperature extremes ranging from -60 degrees to 250 degrees Fahrenheit and is relatively insensitive to mixing ratio and to substrate cleaning procedure.

The polymer adhesive is formulated to be applied without sagging or dripping, even on vertical surfaces. The sealant is recommended for bonding to metals, plastics, rubbers, glass, ceramics, and concrete.

Master Bond
Circle 183 on information card

EMI/RFI Gasketing and Shielding

Vanshield gaskets and seals are manufactured from electrically conductive rubber, providing a shield against electromagnetic interference. Shielding products, including cut parts, are precision extruded or precision molded using top grade silicone elastomers. These elastomers offer resistance to aging in electri-

continued on page 142

Products *from page 141*
al environments at both high and low temperatures. Vanshield products are provided in free and supported frames, with the conductive silicone permanently bonded to a metal strip or component.
Vanguard Products
Circle 177 on information card

Acrylic Polymer
SC Seal Cure is a sealing, curing, hardening, and dust-proofing agent for concrete surfaces that minimizes hair cracking and spalling of horizontal and vertical concrete surfaces in both interior and exterior exposures. The single component, ready-to-use polymer does not contain chlorinated resins, and resists discoloration due to UV exposure. The seal also provides resistance to acids, alkali, grease, oil, water, and de-icing salts. Seal Cure may be sprayed, rolled, or brushed on the desired surface, and the time required for curing is as little as 30 minutes.
Tamms
Circle 182 on information card

CREDITS

Allied Bank Tower, Dallas (page 44). *Architect: I.M. Pei & Partners, New York City.* Mechanical and electrical engineer: Cosentini Associates. Landscape architect: Kiley-Walker. Ceiling surfacing system: Armstrong Fine Line, Armstrong Cirrus. Doors: Louis Hoffman, Crane Fulview, Weyerhaeuser, Fujitec. Floor surfacing: Cold Spring Granite, Harter Precast, Burlington Stone. Handrails: Livers Bronze. Lighting: Kurt Versen, Day-Brite. Roofing: Neogard Poolguard II, Tremproof 60, Bituthane Volclay Panels. Plumbing: Sloan, McGuire, RASCO, Reliable. Toilet stalls: Global. Tubs & lavatories: Briggs, Fiat. Washroom and bathroom accessories: Bradley. Water closets: American Standard. Water fountains: Filtrine. Security and fire detection: Kidde Automated Systems. Stairs and treads: Allied Iron Works. Wall surfacing: Cold Spring Granite, Olden & Co., Flour City. Hardware: Sargent, McKinney, Van Duprin. Paint and stain: PPG, Pratt & Lambert. Partitions: U.S. Gypsum. HVAC: Trane, Marley, Brandt Engineering, Meuller.

88 Kearny Street, San Francisco (page 50). *Architect: Skidmore, Owings & Merrill, San Francisco.* Management partner: Robert H. Armsby, AIA. Design partner: Lawrence Doane, AIA. Project manager: Richard Hampel, AIA. Senior designer, architecture: Allison Williams, AIA. Senior designer, interiors: Richard Irving. Job captain: Joseph Lipkos. General contractor: Swineerton & Walbert Co. Engineers. Graphics consultants: Skidmore, Owings & Merrill. Lighting consultants: The Engineering Enterprise, Dan Dibble. Building developer: Multi-Asian Properties. Owner: Jaymont Properties. Floor covering: Edward Fields, Design Weave, Azrock, Robert Cunningham, American Olean. Walls: Jack Lenor Larson. Paint: Fuller-O'Brien. Polane finished wood panels: Design Workshops. Granite wainscot: Robert Cunningham. Ceilings: Celotex, Donn, U.S. Gypsum. Doors: Design Workshops, D-F-W Company. Hardware: Cookson, Stanley, Rixson-Firemark, Yale, Tydix, Norton. Windows: Cobbledick-Kibbe. Window treatment: Tech Shades. Lighting: Shaper Lighting, Kurt Versen, Lucifer, Lite Control. Signage: Thomas Swan Signs. Bathroom fixtures and hardware: American Standard, Bobrick. Upholstery fabrics: Spinneyback Enterprises, Randolph & Hein, Unika-Vaev, Sunar Textiles. Seating: Herman Miller, Knoll International, Brueton Industries, Brickel Associates, Axiom Designs. Desks: Design Workshops. Tables: Zoragraphos. Storage and filing equipment: Shaw-Walker.

Conoco Inc. Petroleum Headquarters, Houston (page 56). *Architect: Kevin Roche John Dinkeloo & Associates, Hamden, Conn.* Exterior walls: Eagle Lake Concrete Product, Amarlite, Featherlite Precast. Thermal insulation: Owens-Corning, Dow. Waterproofing and sealants: Volclay Panels, Xypex Chemicals, Tremco, Dow-Corning. Fire protection: Dricon, Koppers, NXC. Roof: Koppers, Gates Engineer Co., Tremco. Sheet metal:

Arlington Lane. Skylights: Naturalite. Doors: Amarlite, Williamsburg, Techniques Inc., Atlas. Windows: Amarlite. Glass: Guardian. Hardware: Sargent, Stanley, Rixson, LCN, Norton, Dorma, Von Duprin, Grant. Ceilings: Gulf Coast, Gold Bond, U.S. Gypsum, Armstrong, Chicago Metalic. Interior partitions: U.S. Gypsum, Gold Bond, National Folding Wall Co., Kwik Wall. Toilet partitions: Knicker Bocker. Chalkboards: Eberhard Faber Board. Paint: Dupont. Wall coverings: B.F. Goodrich, Tandem Fabric, Design Tex, Brunschwig & Fils. Paneling: Techniques Inc. Interior finishes: Wilsonart. Tile: American Olean. Flooring: Armstrong. Floor treatment: Robertson Precast Ltd. Carpet: Alexander Smith, Milliken. Bathroom and washroom accessories: American Dispenser. Automatic banking system: Diebold. Library equipment: Supreme Equipment, Kardex. Food service equipment: Chrysler Koppin, Traulsen, Hobart, Master Disposer, Bally. Loading dock equipment: Rite Hite. Furnishings: R-Way, Gunlocke, Alma, Hickory Business Furniture, Vecta, Bright Chair Co., Smith & Watson, Dunbar Furniture, Carnegie, Glant Fabric, J. Lenor Larson, Papiers Textile, J.G. Furniture. Floating floors: Mason Industries. Raised flooring: Floating Floors. Water chillers: Carrier. Cooling towers: Marley Cooling Tower Co. Boilers: Cleaver-Brooks. Furnaces: Carrier, McQuay. Insulation: Knauf, Owens Corning. Roof ventilators: Acme Engineering Manufacturers. Hot water heaters: A.O. Smith, P.V.I. Industries. Drainage: Zurn. Water closets: Crane. Sinks: Powers-Fiat, American Standard. Drinking fountains: Filtrine Manufacturing. Shower receptors: Powers-Fiat. Automatic sprinkler system: Reliable, Pyrotronics, Ansul. Electrical distribution system: General Electric, Slater, Lutron. Lighting fixturers: Lightolier, LPI, Sterner, Tsao. Public address system: Toa, Sondolier, Dukane. Electronic closed circuit detection: Notifier Co., Emhart. Elevators: Montgomery Elevator. Belt conveyor: Litton, Unit Handling System.

Domino's Pizza, Inc., World Headquarters, Ann Arbor, Mich. (page 66). *Architect: Gunnar Birkerts & Associates, Birmingham, Mich.* Design architect: Gunnar Birkerts, FAIA. Principal in charge: Anthony Gholz, AIA. Design development: Anthony Duce. Designers: Kevin Shultis, Kathleen Reehil. Architects and engineers: Giffels Associates. Landscape architects: Beckett Raeder. Consulting mechanical engineers: James Partridge Associates. Ceiling surfacing system: Ownes Corning, U.S. Gypsum, Stretchwall. Doors: Tubelite, Brite Vue, Bilt-Rite, Overly. Elevators: Schlinder Haughton. Flooring surface: Collings & Aikman, Endura, Dal-Keyston, Glen-Gery. Handrails: Fabricated Pipe. Lighting: Hubbell, Kim. Roofing: Styer Roofing, Carlisle. Waterproofing and sealants: Kopper, Perma Glass, Dow Corning, Tremco. Stairs: Fabricated Steel, Endura. Wall surfacing: Glen-Gery, Styer Roofing, Forms + Surfaces. Windows: Wausau, LOF, Floral Fabricators. Skylights: Super Sky. Hardware: LCN, Lawrence, Schlage, Von Duprin, Blumcraft. Paint: Cabot. Partitions: U.S. Gypsum, Herman Miller. Flush valves: Delany. Plumbing fittings and showerheads: Kohler, Powers. Hot tub: Sunrise Industries. Sprinklers: Reliable, Automatic Sprinkler. Toilet stalls: All American Metals. Tubs and lavatories: Kohler. Washroom and bathroom accessories: Bradley. Water closets: Kohler. Water fountains: Filtrine. Communication: Rolm. Computer room: Donn. Kitchen: Great Lakes Hotel Supply. Lockers: Medart. Security and fire detection: RCA.

Watkins Glen Redevelopment, Watkins Glen, N.Y. (page 76). *Architect: Chad Floyd, AIA, Centerbrook Architects, Essex, Conn.* Project managers: J. Whitney Huber, AIA, and F. Bradford Drake, AIA. Timespell Show: White Oak Design. Design and color consultant: Brenda Huffman Graphic Design. Rendering: Stephen L. Floyd. Doors: Morgan, Kawneer. Floor surfacing: Collins & Aikman. Lighting: Steber, Stonco, Kleigl, Neolite. Signage: Brenda Huffman, design. Wall surfacing: U.S. Gypsum. Windows: Weathershield, Kawneer. Hardware: Stanley, Kawneer, Schlage. Paint and stain: Cabot's, Benjamin Moore, Sherwin Williams. □

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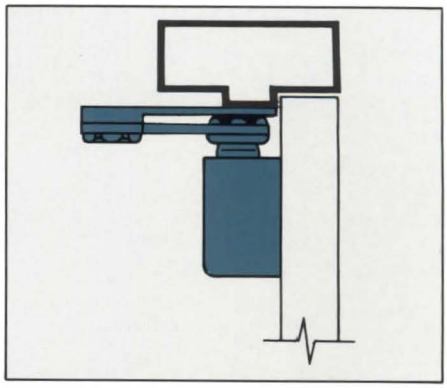

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