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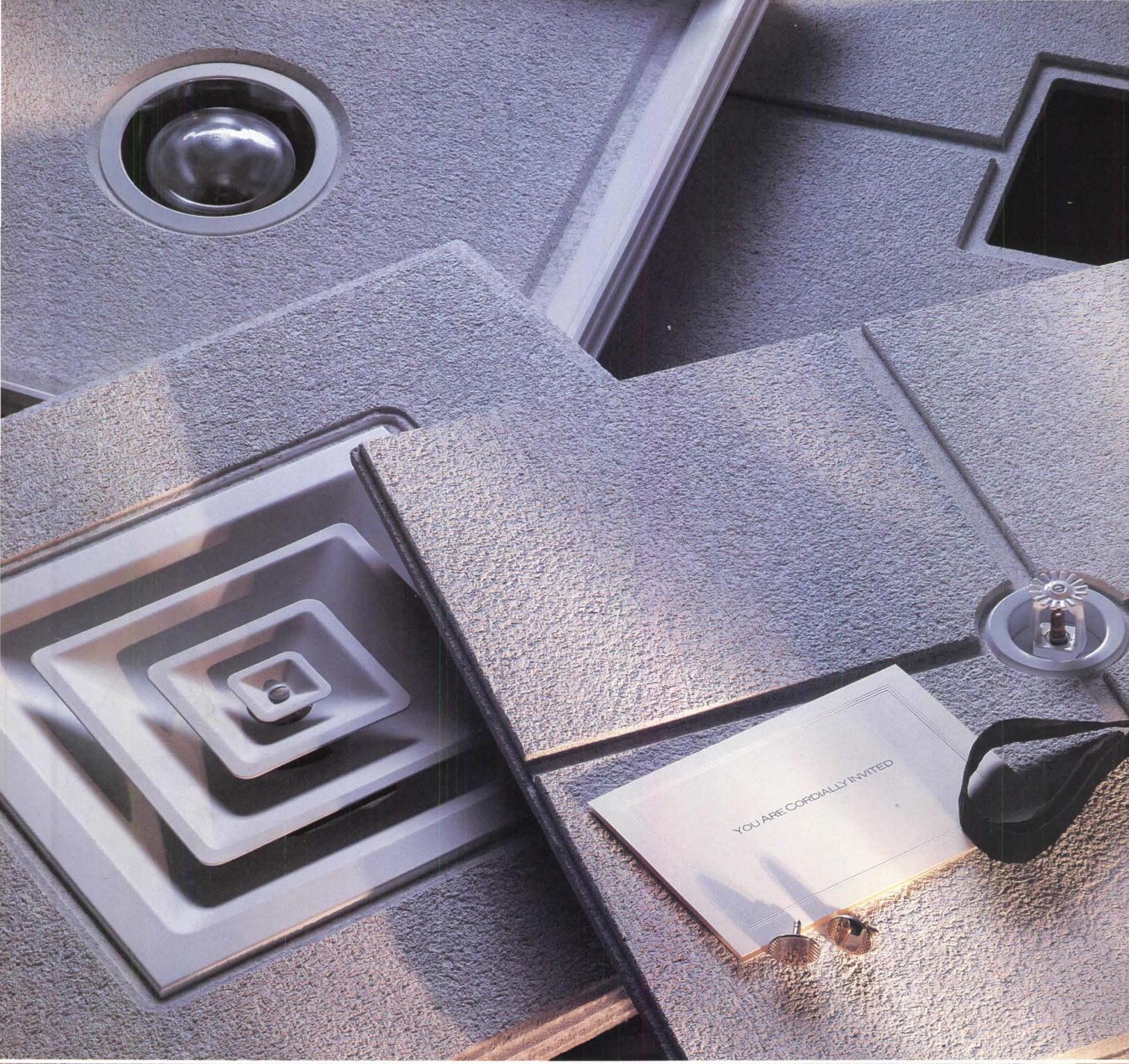

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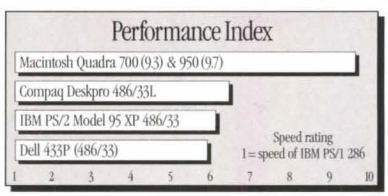

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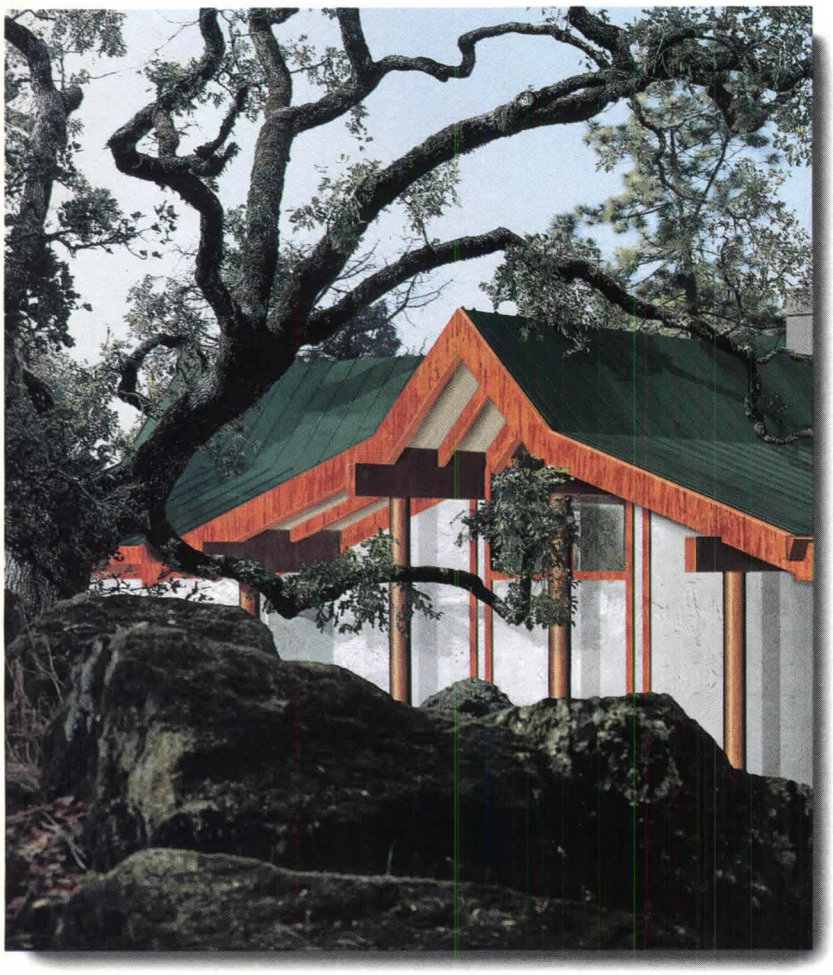

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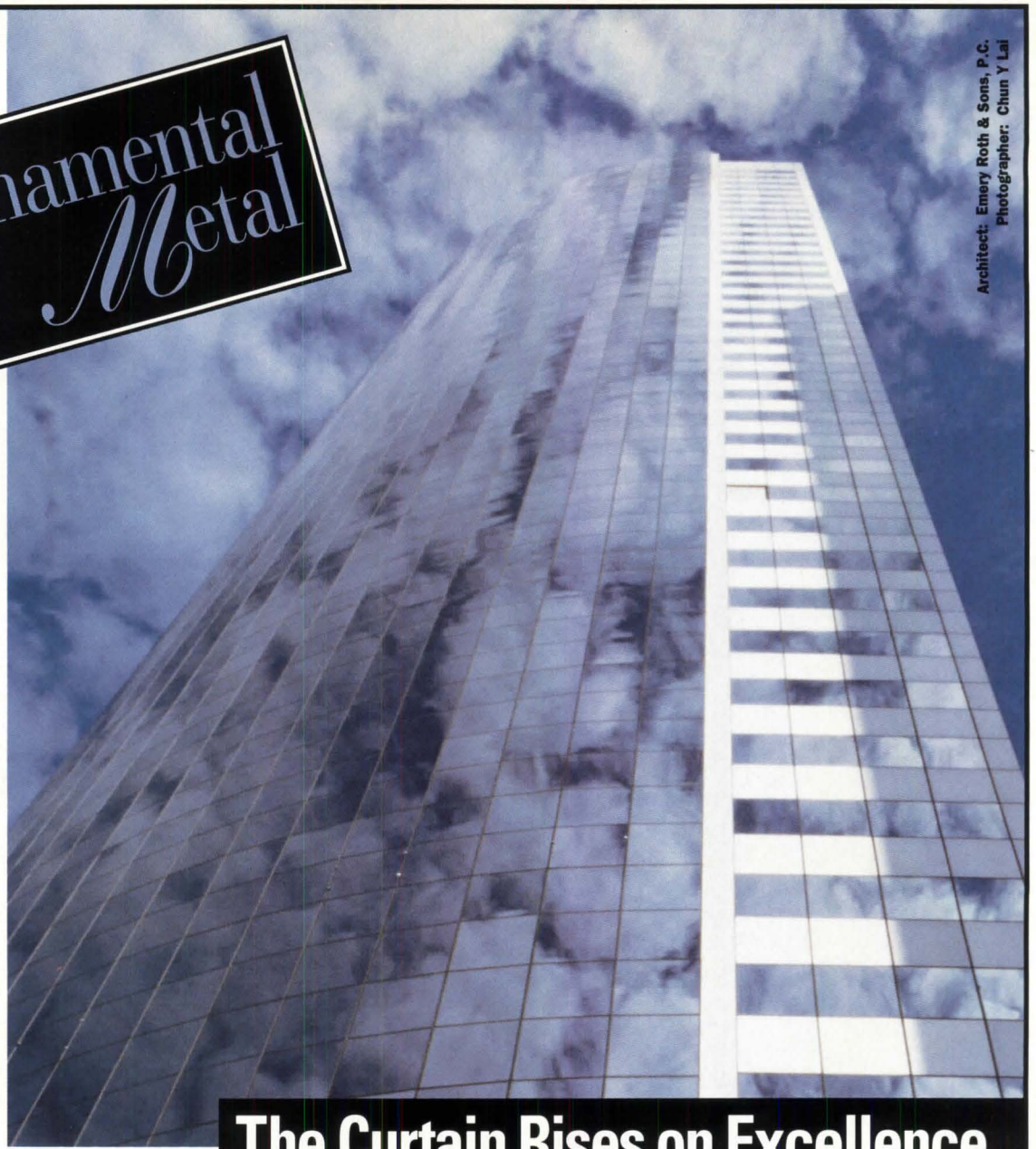

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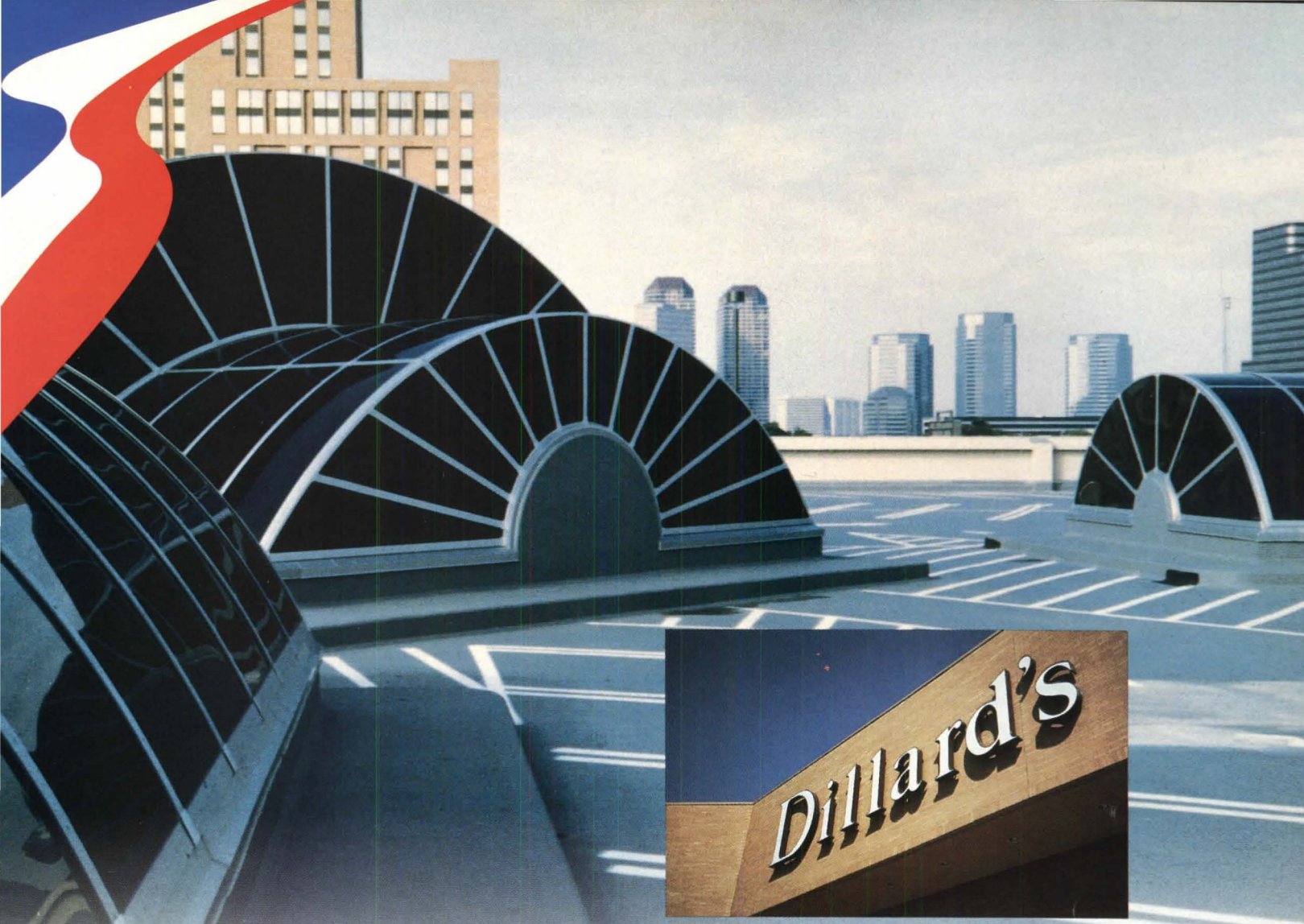

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SEPTEMBER 1992

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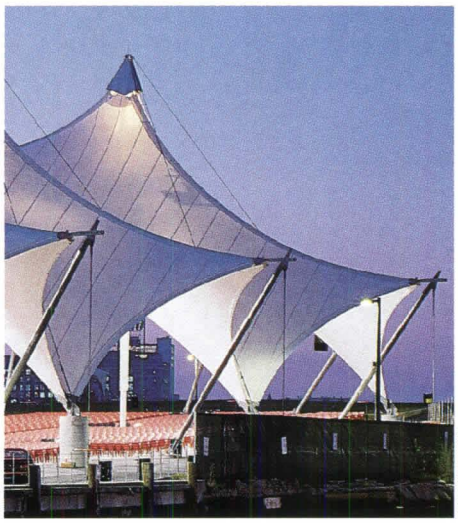
COVER:

Virginia Air & Space Center/Hampton Roads History Center, Hampton, Virginia, designed by Mitchell/Giurgola Architects (page 44). Photograph by Jeff Goldberg/Esto.



ROBERT DAVIS

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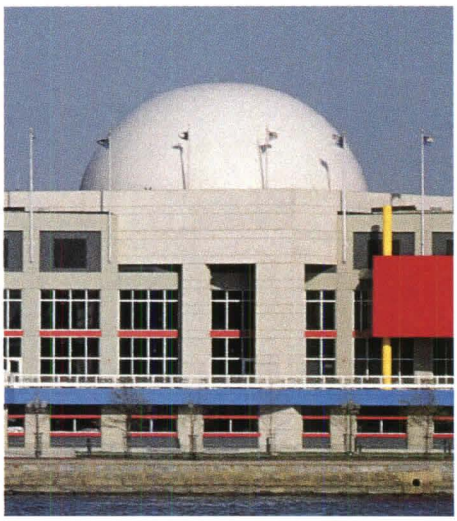

MATT WARGO

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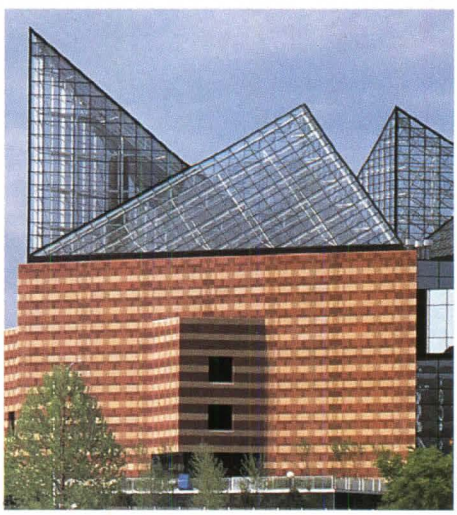

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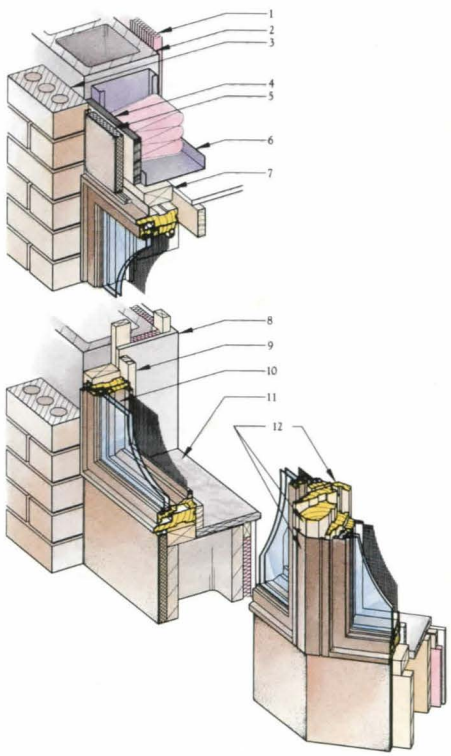

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Public-Spirited Plans

WHAT WOULD YOU DO TO IMPROVE YOUR CITY'S WATERFRONT, parks, and subways? Two nonprofit groups in New York City are asking that question of not only architects, but the public at large. The National Institute for Architectural Education (NIAE) and the Municipal Art Society (MAS) are undertaking separate events aimed at improving the public spaces of New York. Their mutual goals are to find out what New Yorkers really want out of their city and to encourage government authorities to implement designs that reflect New Yorkers' needs. Although the events share similar titles—NIAE's is called "Designing New York" and MAS's is named "Design New York"— the organizations are tackling their public outreach programs through complementary means.

Over the next three months, the NIAE and a committee of leading designers and educators are cosponsoring three weekend design charettes, each focusing on a different type of public space—waterways, parks, and subways. Teams of students and professionals will develop schemes for specific sites within New York that will be reviewed by a multidisciplinary jury and exhibited to the public in November and December.

Similarly, the Municipal Art Society has solicited ideas from the public in a two-part competition, the results of which will be displayed next September. The initial stage, conducted this spring, consisted of a grand-scale brainstorming session, intended to generate urban design solutions from a broad spectrum of New Yorkers. Suggestions included transforming vacant office buildings into housing for the homeless, installing more public toilets and better subway turnstiles, and tearing the entire city down and starting again. Several of these proposals, such as renovating the Staten Island Ferry terminals and various subway stations, will be closely studied by NIAE's Designing New York charette teams.

Both New York design competitions send a significant message to architects and city officials alike, suggesting a participatory model of urban redevelopment. "Over the past 100 years, architects and planners have decided how New York City should be designed," MAS proclaimed in its call for ideas. "Now we want you (the public) to tell us what should be created."

Indeed, suggestions by public and private groups helped generate Mayor David Dinkins' new long-range plan to double the area for parks and esplanades along the city's waterfront. If approved by the City Council, the plan will change zoning laws, forcing developers to build smaller, lower buildings and provide more access to New York's 578-mile waterfront. The Municipal Art Society commends the city for recognizing the "human dimension of waterfront planning."

New York's public-spirited blueprints for future development signal a fundamental break from the grand urban plans of the past. They indicate that the role of the architect must change—from design dictator to community facilitator. The needs of the people who use buildings and civic spaces must be studied to make our aging cities really work. Such participatory action may lead to real, large-scale commissions for out-of-work architects, and should benefit the public in the process. If architects and designers can effect change in the mean streets of New York, they can make it happen anywhere. ■

—DEBORAH K. DIETSCH

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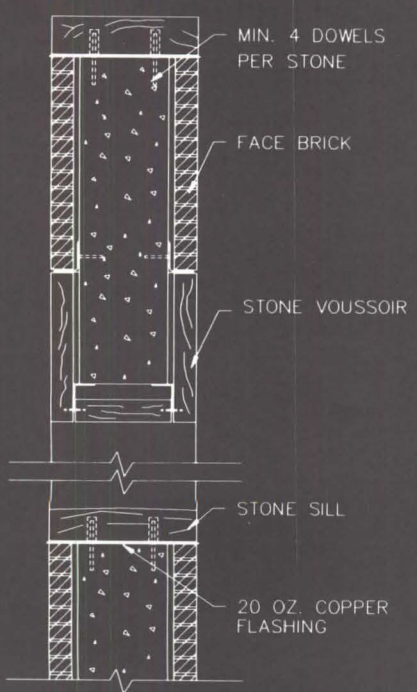
Brick IN ARCHITECTURE

Volume 49, Number 4

Design #1 Hopkins Hall, Williams College, Williamstown, Massachusetts

In this issue:
Hopkins Hall at Williams College in Williamstown, Massachusetts; the new home of the Aaron Copland School of Music at Queens College, City University of New York, in New York City; and the Advanced Engineering and Computer Applications Laboratory Building at the Georgia Institute of Technology, Atlanta, Georgia. Three academic structures that continue the tradition of brick . . . in untraditional ways.

NORTH ENTRY WALL ELEVATION



SECTION @ NORTH ENTRY WALL

Photography by Steve Hogben

Architect:
Architectural Resources Cambridge, Inc.
Cambridge, Massachusetts

Old inspires new in the Williams College expansion of Hopkins Hall, built in 1890. With an innovative 16,500 SF addition, the College was able to restore the facility to its original central role on campus–the site of both college administrative offices and academic classrooms–while adding an upbeat, contemporary dimension to the existing structure's Romanesque-revival design.

Brick was used to closely link the addition with the original building. The architectural firm of ARC used a medium iron spot Roman brick (measuring 3⅝" x 11⅝" x 1⅝") and an extra thin joint to virtually match the look, texture, and coursing of the existing portion's skin.

So as not to overwhelm the older structure, the architects carefully massed the addition with a dramatically stepped back fourth floor. On the north elevation, as the addition appears independent of the older building, the facade rises to full height –an unabashed five floors high, including lower level entry.

"Historically, many academic institutions are constructed of brick. Since it is important to our practice that the buildings we design fit into the context of the existing campus, here, as in many institutions, brick was the natural choice."
—Henry S. Reeder, Jr., FAIA, Architect

"To blend with the existing building, we chose a Roman brick, and to match the coursing, we used an extra thin joint. We then detailed the facades to create a contemporary reinterpretation of the original building's stone accents."

The addition's rich rhythm of pitch-roofed dormers and its decorative motif of pulled-out cast stone recall the original building's entry tower and rusticated stone base. Appearing in discreet tiers on east and west elevations, the decorated gables assume even greater prominence on the north facade, where they boldly define towers and emphasize entryways.

At the main entry itself, the distinctive gable feature becomes something else entirely–a roofless, pedimented porch front, framing but not enclosing the entry door. Twin stairways, shielded by a ramp wall of cast stone-capped brick, lead from the "faux portico" down to a lower-level entry, where attached and freestanding brick columns provide lighting and form a transition between building and landscaped areas.

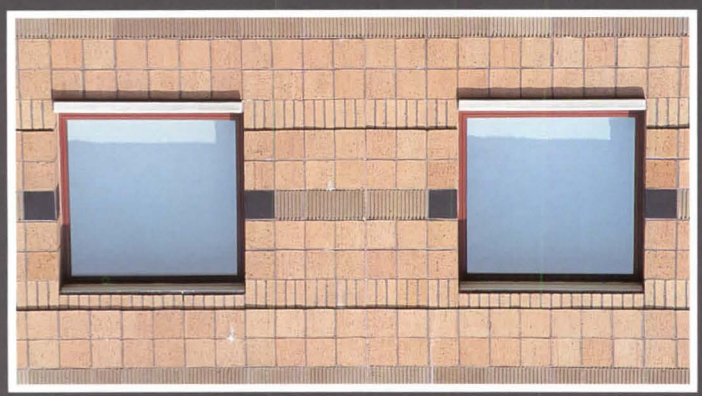
Design #2 The New Music Building, Aaron Copland School of Music, Queens College,

Architects:
Marquis Associates
San Francisco, California and
New York, New York &
Wank Adams Slavin Associates
New York, New York

Built under the flight patterns of two major airports and across from a major highway, the Queens College New Music Building, home of the Aaron Copland School of Music, had to be designed to withstand extraordinary acoustic challenges. One of the techniques for treating the acoustic problems was double and triple-level ceilings separated by anchors–a solution that raised the height and visual mass of the building well beyond that of a normal two and three-story building.

The architectural team, an association of Marquis Associates and Wank Adams Slavin Associates, relied on brick to downscale the 120,000 SF building. They chose an oversize brick module, measuring 8″ high x 16″ long x 4″ deep for the facade. Through brick patterning of two major brick colors and two additional accent colors, they were able to create an invitingly detailed fabric and a warmer, more human scale for the structure.

"As a school, the building will get a lot of wear, and brick is a durable material. Brick fit in well with the campus, allowed us to achieve the effect we wanted, and was economically feasible."—Robert B. Marquis, FAIA, Design Architect, Marquis Associates



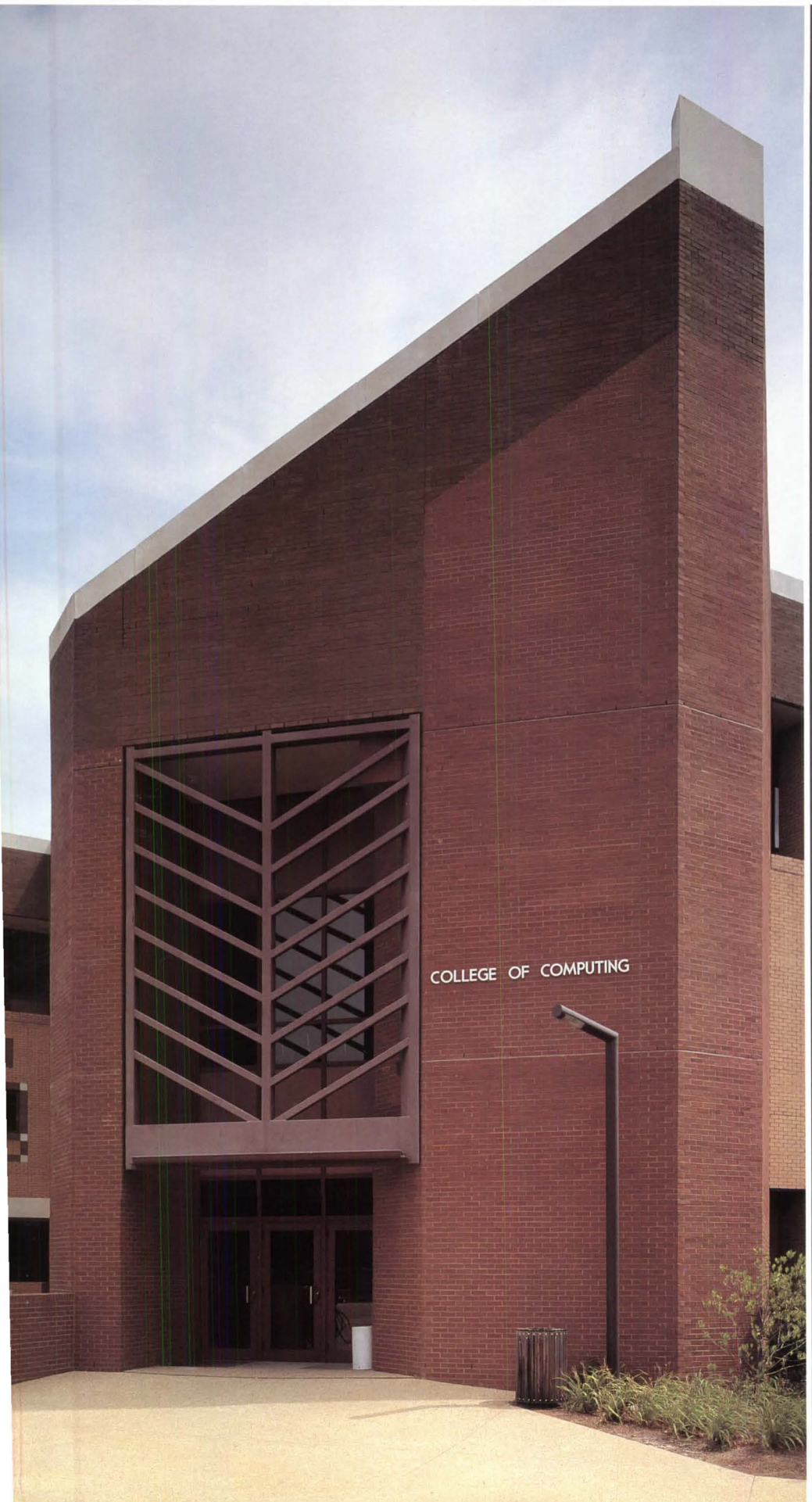
The major patterning theme of the building begins with a ribbed wainscot-style base of "smog" gray brick. Upward from the base, expanses of peach brick are interrupted by individual courses of the gray brick and by slightly inset soldier courses of a vertically striated variation of the peach brick.

"Brick plays a major role as the material of choice for the academic world. In this building, because of its size, complexity, and functional requirements, brick was especially appropriate."
—Leonard Franco, Project Architect, Wank Adams Slavin Associates

For an extra measure of drama, they reversed the brick pattern of gray-on-peach to peach-on-gray at the main entrance, and framed the entrance–as well as the library window wall–with a glazed white brick. And to add punch to the facades, the architects placed black brick accent markers at windows and doorways.

Completed in March 1992, the building now houses teaching facilities, a music library, and a 490-seat Concert Hall on the interior . . . with a harmonious interplay of brick colors, textures, and patterns orchestrated on the exterior.

Photography by Jennifer Lévy



Architect:
Hall, Norris & Marsh, Inc.
Atlanta, Georgia

Brick is no stranger to the Georgia Institute of Technology. Its campus is filled with traditional red brick structures. In designing a massive new building for the school, though, architects Hall, Norris & Marsh decided to pursue a less conventional route. They used three different colors of brick: a red brick, creamy tan brick, and dark brown brick. For greater comfort during Georgia's hot summer months and a lighter look all year round, they chose the light creamy brick as the predominant material for the facade.

Colors and patterns enhance building's dual purpose.

Unlike most academic structures, this university building had to serve two distinct client groups and functions. The lower story contains freshman chemistry laboratories and lecture rooms. The upper three levels are research laboratories and offices requiring restricted access.

The architects dealt with the building's dual purpose by enlivening the freshman entry facade with warm, cheerful patterning. Checkerboarded brick pavers, brick colonnade, decorative red brick and cast stone lintels, and wittily patterned fenestration are modernized versions of the campus's traditional limestone-and-brick accents.

Photography by Steve Hogben

Georgia Institute of Technology, Atlanta, Georgia

"We have always enjoyed sculpting with brick. Because of its small module size, we can carve out forms, recesses, and pockets easily. Our use of color and patterning are a more recent enrichment of that. Brick patterning adds life and flair to a building—qualities that kids on campus relate to quite well and especially like."—Peter Norris, Architect

Restricted access to the building's upper stories is housed in a projecting stairway tower, clad in a subdued pattern of red brick and dark brown brick. The low-key dark brick extends from the stairway tower into a glass-roofed, brick column bridge, connecting the lab with an adjacent campus building.

A major challenge to the architects was to downscale the 130,000 SF facility, which had no distinctive internal features to express, and which extended to the building lines on all sides. Brick patterning became part of the solution. A strong band of dark brick wraps around the building at the roofline, forming a "hat" that makes the upper portion of the building almost disappear. Wide horizontal bands of the red brick restate the building's height, continuing around a cylindrical side entrance feature. And on the east facade, the verticality of a pitched roof elevator tower interrupts the facade's vast expanse, set over a beveled-corner overhang.

"Longevity and maintenance are important considerations in any institutional building, and you can't beat brick for that."

—Peter Norris, Architect

The Brick in Architecture Awards Competition is Coming Soon!!

Enter your project beginning October 1, 1992. Application deadline is January 11, 1993. Entry forms will be available from the American Institute of Architects awards department or the Brick Institute of America.

For more information or assistance, please call the Brick Institute of America or the BIA regional office in your area:

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Mid-East Region
P.O. Box 3050
N. Canton, Ohio 44720
(216) 499-3001

Masonry Institute of Iowa
Region 6
5665 Greendale Road
Johnston, Iowa 50131
(515) 252-0637

Brick Association of North Carolina
P.O. Box 13290
Greensboro, North Carolina 27415
(919) 273-5566

Brick Association of South Carolina
625-C Taylor Street
Columbia, South Carolina 29201
(803) 252-5571

Brick Institute of America
Region 9
8601 Dunwoody Place, N.E.
Suite 507
Atlanta, Georgia 30350
(404) 993-9714

Mississippi-Louisiana Brick Manufacturers Association
812 N. President
Jackson, Mississippi 39202
(601) 944-1395

Southwestern Brick Institute
314 Highland Mall Boulevard
Suite 251
Austin, Texas 78752
(512) 451-4668

Brick Institute of America
Region 12
1780 S. Bellaire, Suite 602
Denver, Colorado 80222
(303) 691-2141

Brick Institute of California
3130 LaSelva, Suite 302
San Mateo, California 94403
(415) 578-0894

View from the Bleachers

As an architect, I commend HOK Sport for its triumph of urban design and esthetics in Oriole Park at Camden Yards (July 1992, pages 65-71). However, as a Baltimore Orioles season-ticket holder, I find the ballpark to be, literally, a pain in the neck. The plan, characterized by rows of seats running almost parallel to the foul lines (rather than oriented toward second base), results in spectators situated down both foul lines facing away from the infield. This condition, combined with the shallow slope of the grandstand, forces people to crane their necks in order to see across aisles and rows of viewers in front of them. Those of us shorter than 5 feet 8 inches, particularly women and children, do not find Oriole Park to be user-friendly. I would like to remind your critic that the basic function of a ballpark is to provide a comfortable place for fans to watch baseball. Oriole Park, despite its "cutting edge" design, falls short of this function.

William R. Shoken, AIA
Baltimore, Maryland

Lazarus Defense

We wonder from what higher authority Jeffrey Bellows (Letters & Events, June 1992, pages 18-19) received the wisdom that our house does not belong to our landscape, and which public we neglected to serve with our personal investment.

The Lazarus House (April 1992, pages 52-57) is indeed a personal statement, but the statement was made by us. Our family decided we wanted a home in a beautiful location near New York, near the western Massachusetts art centers, and near skiing.

We wanted a home that we, as six adults living diverse and active lives, could use collectively or individually. We searched for a location for two years. We consulted with the architect, Warren Schwartz, at every step. We think he and the builder, David Haust, realized our concept and executed our program magnificently. Furthermore, we think our "Modern barn" works extremely well in the locale and on the terrain.

The Lazarus Family
Copake Falls, New York

Learn While You Earn

Much is being written about mandatory continuing education requirements for licensing and AIA membership (see pages 99-102). A recent AIA *Memo* compared architects with health professionals and stated that we did not need continuing education because there is no public outcry about our incompetence. However, I have a bigger question: Who is going to provide this education and will it be of sufficient quality to justify the cost?

In medicine, continuing education is provided by medical schools, where those who teach are on the leading edge of their profession and conduct advanced research while practicing. But the majority of architecture professors are career teachers, not practitioners. The research they perform is theoretical and has little to do with public accountability. Many of them are not licensed nor have worked in firms long enough to qualify for licensing. While their value in preparing young minds is indisputable, it seems more logical that practitioners should be providing courses to keep teachers informed of the pro-

fession's trends. To make continuing education tenable, the AIA needs to be sure there are courses available in every locality on topics ranging from new technologies to legal issues. The courses should also be affordable.

Practitioners should be able to satisfy continuing education requirements by conducting individual research and presenting papers at architecture schools. Practitioners, teachers, and students alike would benefit.

Louise J. Miles, AIA
Agora Architects
Washington, D.C.

Corrections

Through a joint venture, Houston-based 3D/International and San Antonio-based Ford, Powell & Carson are undertaking the preservation and extension of the Texas State Capitol (July 1992, page 106).

Zimmer Gunsul Frasca Partnership is the design architect of the Earth and Marine Sciences Building (May 1992, pages 63-64) at the University of California, Santa Cruz. McLellan & Copenhagen is the executive architect.

September 23-24: Capital Design Week at The Washington Design Center, Washington, D.C. Contact: (202) 554-5053.

September 24-27: "21st Century Outlook: Images of the Architectural Profession," joint conference in New Orleans of the AIA corporate architects, public architecture, and architects in education committees. Contact: Marc Gravallese, (202) 626-7539.

September 26-November 14: National Institute for Architectural Education career days. Contact: Lauren Yessayan, (212) 924-7000.

September 29: "Taliesin Legacy: The Independent Work of Frank Lloyd Wright's Apprentices," New York Institute of Technology, Old Westbury, New York. Contact: Stephen Judge, (516) 487-7822.

October 1: Registration deadline for the O. Jack Mitchell Design Competition for the Heart of Hermann Park, Houston, Texas, sponsored by the Rice Design Alliance. Contact: (713) 732-1992.

October 2-3: "International Design and Practice: Strategies and Resources for Success/Pitfalls to Avoid," AIA international committee conference in Seattle. Contact: Dena Sollins, (202) 626-7415.

October 7-10: First annual AIA conference on courthouse design, Washington, D.C. Contact: Lynne Lewicki, (202) 626-7467.

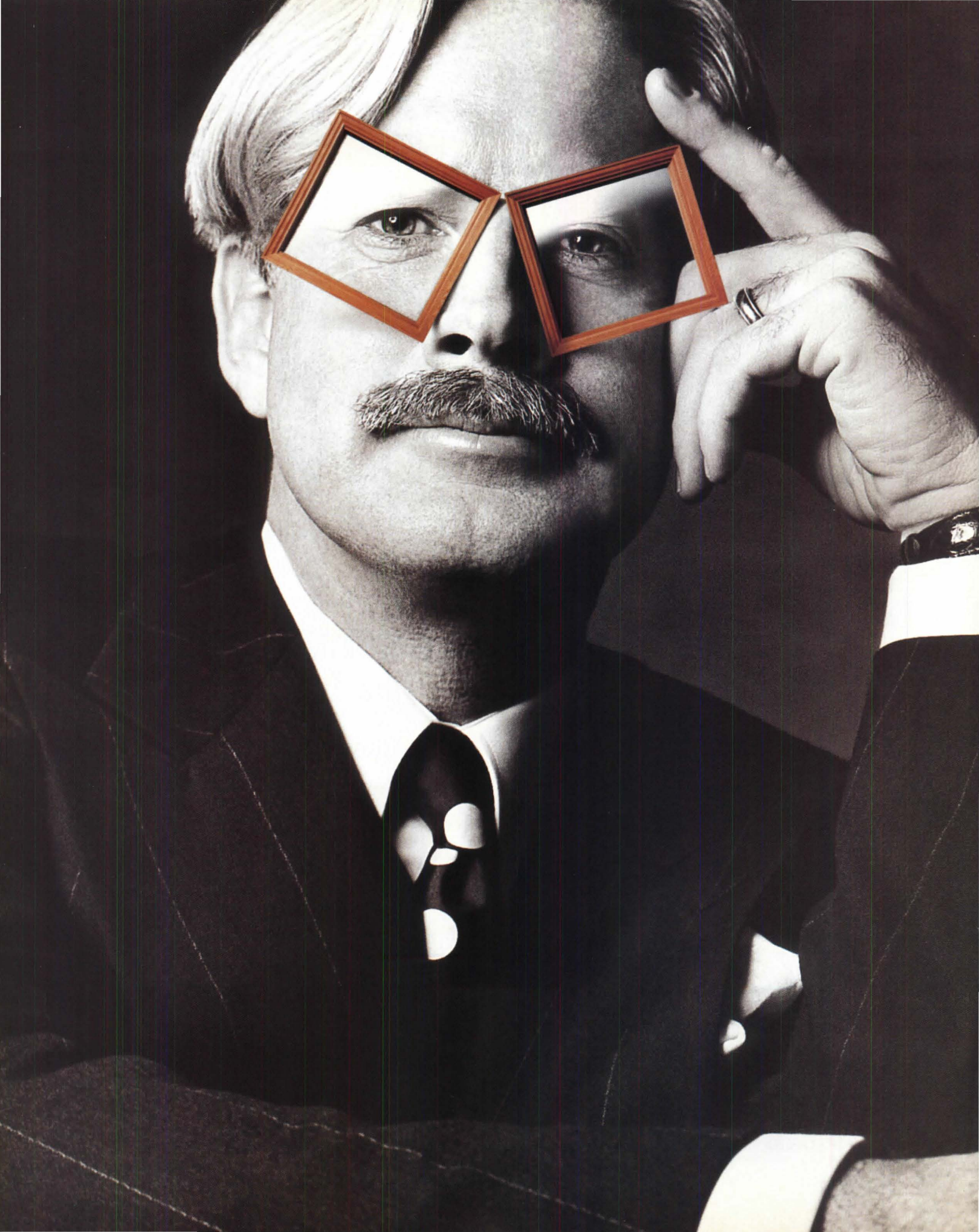
October 9-11: "The Future of the City," Young Architects Forum conference examining the impact of planning on private in San Francisco. Contact: Monica Williams, (202) 626-7445.

October 13: Submission deadline for the Boston Society of Architects' honor awards program. Contact: (617) 951-1433 x221.

October 15-17: "Design America Now: At Home and Abroad." Designer's Saturday at IDCNY and throughout Manhattan. Contact: (914) 937-7474.

October 15-17: "Cities Reclaim their Edge," 10th annual Urban Waterfronts Conference in Washington, D.C. Contact: The Waterfront Center, (202) 337-0356.

October 17: Fund-raising auction in Washington, D.C., to benefit Octagon restoration. Contact: Patricia Sagon, (202) 362-6677.



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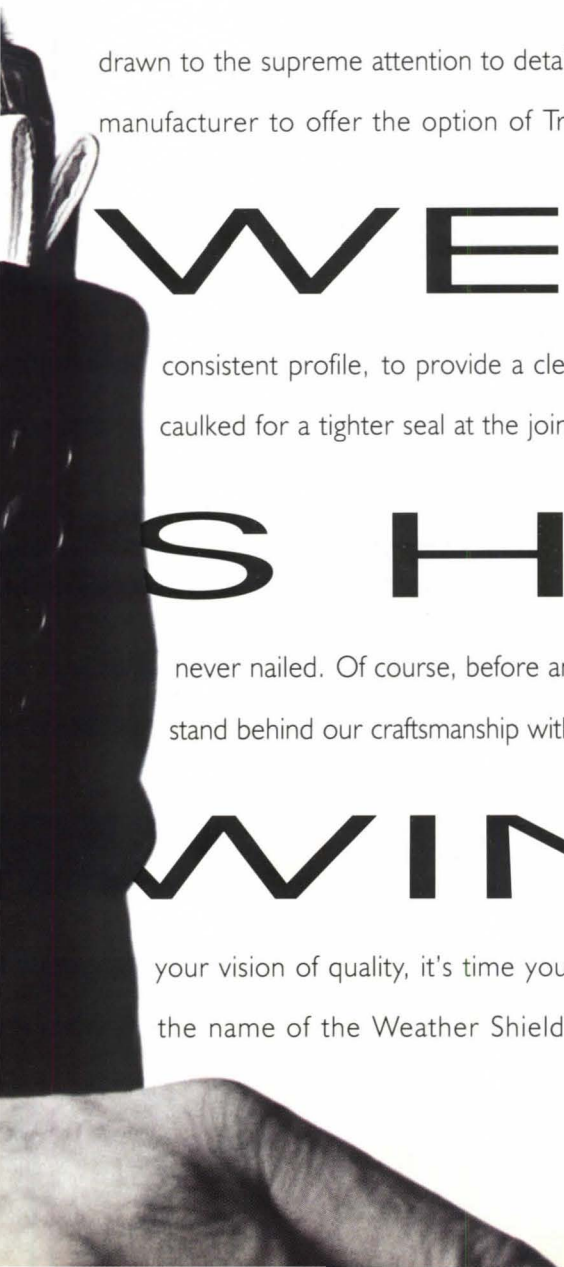

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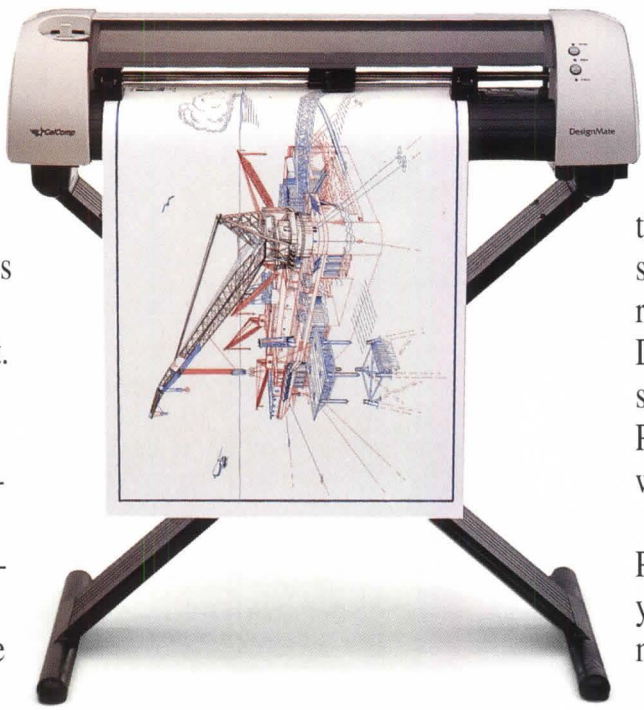

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NEWS

LAX Control Tower ▪ Tadao Ando Gallery ▪ Mall of America

Atlanta Builds for the 1996 Summer Games

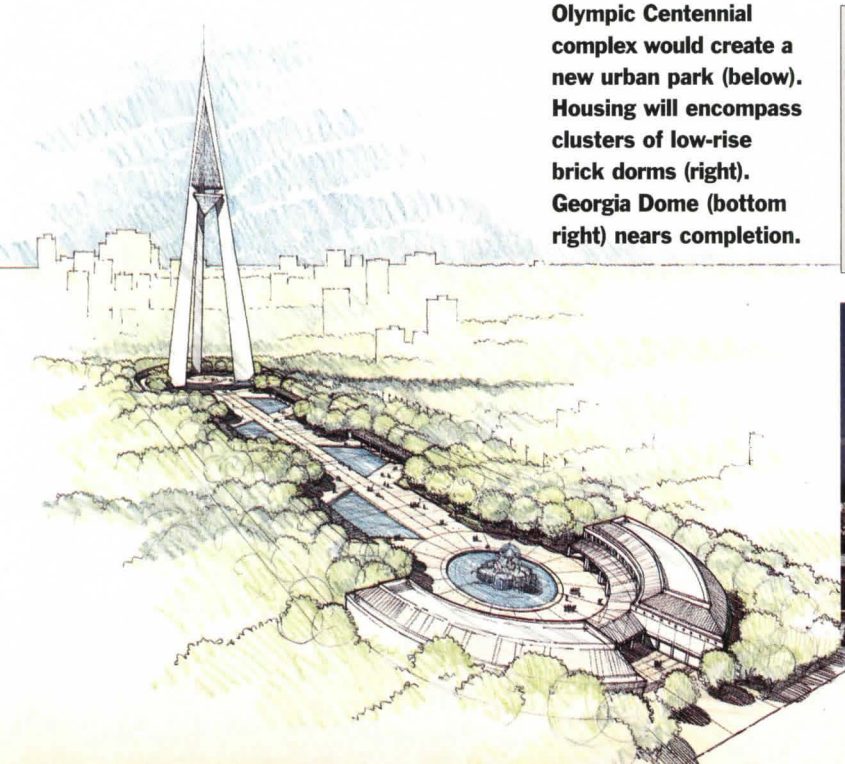
THE SUMMER GAMES IN BARCELONA HAVE ENDED, AND Atlanta is now gearing up for the Olympics in 1996. The Atlanta Committee for the Olympic Games began awarding contracts for major new sports facilities this past spring, and other groups around the city are taking advantage of this construction to plan civic improvements that will outlast the 16-day event.

This month, the Atlanta Chapter of the AIA will hold a five-day Regional/Urban Design Assistance Team session to develop an agenda for improving the city's urban environs, with emphasis on creating new public spaces. The team will also strive to establish public/private partnerships to help rejuvenate Atlanta's poorest neighborhoods. New York City architect Alexander Cooper, principal of Cooper, Robertson & Partners, will head the 13-member R/UDAT volunteer team, which includes architects, planners, and landscape architects.

Local groups are hoping to ride the wave of civic boosterism. The Atlanta Project, established almost a year ago by former President Jimmy Carter, is an outreach program that brings together government agencies, volunteers, and the business community to address urban ills. Atlanta attorney John R. Aldridge is also spearheading the Phoenix Youth Foundation, a grass-roots movement to fund youth programs as a humanitarian adjunct to the 1996 games. Although not yet formally endorsed by the Atlanta Olympic committee, the Phoenix group has proposed the construction of an Olympic Centennial complex, celebrating the modern-day revival of the games in Athens in 1896, and generating revenues to help the city's youth. Designed by Alexander Carter of the local firm Nichols Carter Grant Architects, the proposed park would include an Olympic Games museum and a 720-foot-high monument.

Although the Olympic Centennial park is still hypothetical, work is progressing on a number of bona fide Olympic projects. Atlanta-based Sizemore Floyd Ingram is responsible for programming and master-planning the 26 Olympic venues, which include eight new facilities and renovation of 18 existing structures. In mid-July, the Atlanta Committee for the Olympic Games named a consortium comprising Heery International, Rosser Fabrap International, Williams-Russell and Johnson, and Ellerbe Becket to design the main Olympic stadium. The formidable task of creating housing for the approximately 20,000 athletes is also under way. Local architect Niles Bolton Associates, in association with Nix Mann Viehman, was selected to design the main $75 million complex on an 8-acre site adjacent to the Georgia Tech campus, which will accommodate 4,000 athletes during the games. In addition to the main complex, the committee will also build five other Georgia Tech-based housing projects, designed by five firms: Cooper Cary & Associates; Jova/Daniels/Busby; John Portman Architects; Smallwood, Reynolds, Stewart, Stewart and Associates; and Turner Associates.

Meanwhile, finishing touches are being applied to the Georgia Dome, a 70,500-seat covered stadium and auditorium. Designed by a joint venture of Heery International, Rosser Fabrap International, and Thompson, Ventulett, Stainback & Associates, the flexible facility was planned before Atlanta was awarded the contract for the Olympic Games, but will serve many major athletic events. —LYNN NESMITH



Olympic Centennial complex would create a new urban park (below). Housing will encompass clusters of low-rise brick dorms (right). Georgia Dome (bottom right) nears completion.

DETAILS

Samuel M. Brody of New York-based Davis, Brody & Associates died on July 28. **Paul Gapp**, the Pulitzer Prize-winning architecture critic of the *Chicago Tribune*, died on July 30. Mexican architect **Ricardo Legorreta** has been selected to design a 35,000-square-foot library for the city of Chula Vista, California. **Robert Venturi** and **Denise Scott Brown** have been awarded a National Medal of Arts. Kansas City-based **Ellerbe Becket** has been commissioned to design a $179 million basketball arena in Portland, Oregon. Hollywood producer Joel Silver has obtained permission from the South Carolina Coastal Council to build three guest cottages designed by **Frank Lloyd Wright** for his 1939 Auldbrass Plantation in Beaufort, South Carolina. The 10-year-old, $2.5 billion redevelopment plan for New York's Times Square, which centered on four skyscrapers designed by **John Burgee** and **Philip Johnson**, has been indefinitely postponed. However, Burgee recently unveiled a scheme for a $6 million exposition pavilion to be built at 42nd Street and Fifth Avenue. The Marlborough Gallery has selected **Richard Gluckman** to expand its New York gallery and to design a 7,000-square-foot gallery in Madrid. **Robert Timme** of Taft Architects has replaced **Peter Wood** as dean of the University of Houston College of Architecture. San Francisco-based **MBT Associates** has opened an office in Seattle, Washington. **Anshen + Allen** has won a British competition to design a hospital in Norwich, England. AIA President-elect **Susan Maxman** has received the Woman of Achievement Award from the Freedom Valley Girl Scout Council. **Lawrence Doane**, former senior design partner of Skidmore, Owings & Merrill, has opened Lawrence Doane Architect in San Francisco. **Robert A.M. Stern** has been commissioned to design a house in Telluride, Colorado, for Oprah Winfrey. New Mexico-based **Richard Yates Architects** won a competition to design the Native American Preparatory School in Santa Fe. **Hellmuth, Obata and Kassabaum** has been selected to design the International and Domestic Terminal at the Sendai Airport in Miyagi Prefecture, Japan.

Clark County Center

C.W. FENTRESS

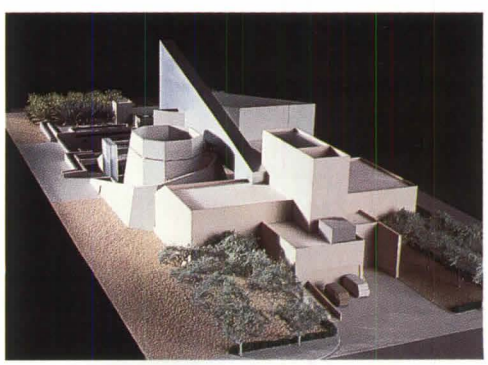
IN JULY, DENVER-BASED C.W. FENTRESS J.H. Bradburn and Associates was selected over Antoine Predock and Venturi, Scott Brown and Associates to design a $45 million government center for Clark County, Nevada. Located on the old Union Pacific Railroad yards west of downtown Las Vegas, the 350,000-square-foot complex (right) includes a single-story auditorium, pyramid-shaped cafeteria, and cylindrical, six-story reception hall linking two curved office buildings. The architects arranged the structures around a colonnaded amphitheater to create a public forum. The buildings, which will be clad in a local red sandstone, are punctuated by square, recessed windows for solar control. The competition entry included a 60-acre master plan that incorporates a police department, county archives, performing arts center, child-care facility, and parking structure. Construction of the civic complex is scheduled to begin next June.

SOUTH ELEVATION

Los Angeles Air Control Tower

A $19 MILLION AIR TRAFFIC CONTROL TOWER, DESIGNED BY Siegel Diamond Architects in conjunction with Holmes & Narver Architects and Engineers, will become the new gateway icon of the Los Angeles International Airport. Located west of William Pereira's futuristic, 1962 Theme Building Restaurant, the 280-foot-high structure repeats surrounding aeronautical forms (left). A curved metal "wing" inserted between the control cab and 22-story-high computer and mechanical facility is supported by steel tubes that emulate the struts on biplanes. Design principal Katherine Diamond repeated this vaulted form in the roof of the adjoining administration building, and created a second curved wing to house technical equipment and link the two structures. She enclosed a three-story visitor's lobby and the tower landings in green-tinted glazing, articulated by crossed mullions. Construction of the 55,000-square-foot project will begin next spring.

Phoenix Science Museum



ANTOINE PREDOCK IS DESIGNING THE ARIzona Museum of Science & Technology (right), his second recent science museum commission. For the 3-acre site in downtown Phoenix, Predock devised an assemblage of sculptural forms coupled with flat-roofed volumes that evoke the plateaus, peaks, and ravines of the surrounding desert. Visitors pass through a below-grade courtyard and lobby to enter a spiral-shaped planetarium facing north, a five-story IMAX theater to the south, or orthogonal exhibition spaces to the east. A narrow, angled structure bisecting the site contains a 12-foot-wide exhibition hall on the third floor. The architect also incorporated a variety of indigenous plants on different levels to represent the layered desert landscape. Predock is currently designing a scheme for Tampa's Museum of Science and Industry, due to begin construction next April. The Arizona Museum of Science and Technology will break ground next March.

Ando Gallery Opens in Chicago

IN HIS FIRST PERMANENT AMERICAN INSTALlation, Japanese architect Tadao Ando has imbued a gallery in the Art Institute of Chicago with the stark spirituality that has brought him international renown. The room, which houses 17th-century Japanese folding screen paintings, is the final space a visitor encounters in the museum's $5 million galleries of Chinese, Japanese, and Korean Art. The new galleries opened to the public June 3 in an area that has largely been devoted to temporary exhibitions. After experiencing the brightly lit, white-walled rooms of the other Asian galleries, the 1,800-square-foot space at first seems dark, even foreboding. But in Ando's skillful hands, the gallery becomes both inviting and enlightening.

The design subtly expresses essences of Japanese culture, avoiding tatami mats and other visual clichés. Sixteen pillars, each 1 foot square and 10 feet high, occupy the front of the gallery. Arranged in four rows of four, the pillars evoke the wooden supports of classical Japanese houses where folding screens, called *byobu*, are used to subdivide rooms. The gallery's oak floor and pillars are stained black, suggesting trees growing out of the earth. Initially, this metaphorical forest obstructs the view of the folding screens, representing what Ando calls a "tension in the Japanese spirit." Through it, the visitor observes a clearing and the screens, set behind glass at the west and north sides of the room. "The *byobu*, seen through the pillars, embody the profound love of nature of traditional Japanese people, and evoke an image of their way of life," Ando explains.

The expressive force of Ando's minimalist design is remarkable given its absence of natural light. Ando has used daylight with great effect in his Japanese churches, such as the Chapel with the Light just outside his native Osaka. According to Yutaka Mino, the Art Institute's curator of Asian Art, three windows could have allowed daylight to enter the room. Instead, a wall was built to protect the fragile paintings, and the screens are bathed in soft fluorescent light. Some foreigners have fallen on their faces designing buildings in Chicago, but in this small space, Ando has managed a quiet tour de force.

—BLAIR KAMIN

Blair Kamin writes for the Chicago Tribune.

WILLIAM KILDOW PHOTOS

Light-sensitive 17th-century folding screen paintings from Japan (top) are housed in a new Tadao Ando-designed gallery at the Art Institute of Chicago. Black-stained oak pillars (above) suggest the supporting posts of Japanese houses. Ando eschewed natural light for the minimalist space, illuminating the screens with a soft fluorescent glow.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Giant Mall Reaches Beyond Retail

DESPITE THE FACT THAT RETAIL VACANCY rates are at record highs around the country, Mall of America opened in suburban Minneapolis last month with conspicuous fanfare. The 4.2-million-square-foot facility is touted as the nation's largest fully-enclosed "combination retail and family entertainment complex." Designed by the Jerde Partnership in association with local architects Hammel Green Abrahamson and Korunsky Krank Erickson Architects, the gargantuan shopping center is anchored at either end with seven-level parking garages that appear as giant billboards along the highway. Four major department stores, more than 350 shops, and scores of restaurants wrap around an enclosed 7-acre amusement park, which includes a half-mile-long roller coaster and a log-chute water ride dominated by a 15-foot-tall Paul Bunyon.

Mall of America combines shopping and amusements on a 78-acre site in suburban Minneapolis.

Although the new mall seems massive, its original scheme would have created a significantly larger complex, including a 1,000-room hotel and a tram linking the mall to the airport. Mall of America's scaled-down version leaves West Edmonton Mall in Canada, completed 10 years ago by the same developers, retaining the title of largest hybrid mall complex on the continent. However, its developers still hope to build a 1.2-million-gallon aquarium, designed by Eskew Filson Architects of New Orleans.

Critics of the Mall of America argue that the Twin Cities, with nine major shopping centers and an active downtown retail district, don't need the massive facility. But the owners maintain that the mall will not only draw from the 2.5 million residents of the immediate metropolitan area, but the 27 million people who live within 400 miles.

While the new mall is banking on its entertainment component to generate the visitation necessary for financial success, older suburban malls around the country are trying other techniques to fill vacant space and increase traffic. Public institutions and other nonretail functions that were barred from shopping malls a few years ago are now seen as assets by developers and owners. A mall in Everett, Washington, recently added a city hall annex, and Bear Canyon Plaza in Tucson, Arizona, and the Galleries in Syracuse, New York, have both incorporated public libraries. At the Independence Mall in Kansas City, Missouri, the local chapter of the American Red Cross opened a relief center.

Even with diversification, marginal malls are failing around the country, and some are being transformed into new uses. After renting space for two years in the Beau Monde Shopping Center in suburban Denver, Colorado, the Happy Church congregation purchased the entire complex for $7.8 million in 1990. And as an ironic counterpoint to all the urban factories that were converted to shopping malls in the 1980s, Black Diamond Equipment, a producer of mountain-climbing gear, recently moved its manufacturing plant into the former Engh Village Shopping Center in Salt Lake City, Utah. ■

—L.N.

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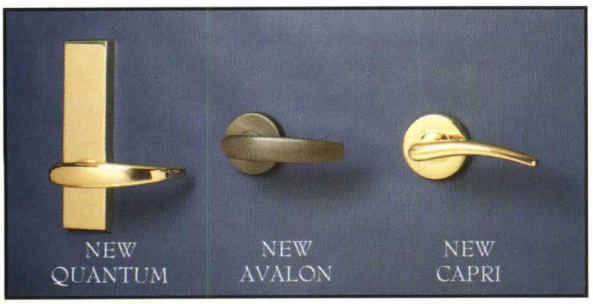

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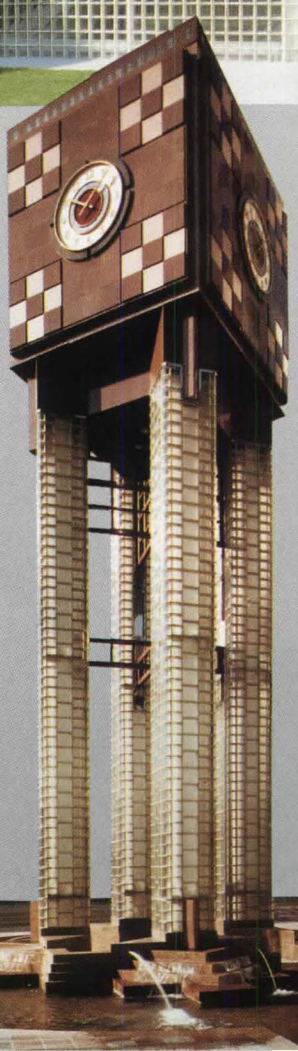

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There Are 174 In AutoCAD

3. Phenomenal 3D rendering. Capabilities that used to come only with AutoShade® are now built into AutoCAD® Release 12. And hidden line removal is up to 100 times faster.

4. AutoCAD SQL Extension (ASE) allows you to access data in standard database management systems via SQL. ASE provides commands for manipulating external nongraphic data and linking it to graphic entities in AutoCAD drawings.

5. Region Modeler creates intelligent 2D models. Allows you to quickly create 2D shapes with holes and complex boundaries. Automatically finds area, perimeter and inertial properties of a region.

6. Automatic timed save at user-selected intervals.

7. Now you can use PostScript® typefaces in AutoCAD drawings.

8. You can also import PostScript files into AutoCAD, and plot them.

9. New boundary polygon command surrounds an area with a closed polyline automatically.

10. New Fence or Polygon window crossing selection feature speeds selection of entities in dense and complex areas of drawings.

11. No Main Menu! You now enter directly into the AutoCAD drawing editor, where you can perform standard file handling and configuration operations, as well as work on your drawing.

12. Dramatically improved entity selection speed in large drawings.

13. Nested entity dimensioning. Entities within blocks or external references are now easily dimensioned.

14. Locked layers feature prevents accidental modification of drawing data.

15. PostScript output feature lets you enhance AutoCAD drawings by using PostScript-compatible imaging programs.

16. Release 12 and Release 11 drawings are forward and backward compatible.

17. Support for 255 individual pen widths for laser and electrostatic plotters.

18. You can plot without leaving the drawing editor. (And without losing the UNDO file.)

19. Now you can import TIFF, GIF and PCX raster images into your drawing.

20. GripEdit feature allows interactive editing of selected entities without running a command.

21. PickFirst feature lets you select entities prior to executing a command.

22. Improved external references. You can attach, reload or bind Xref files while the "master" is being edited.

23. Enhanced hatching. Automatically hatch bounded areas with a single pick.

24. New continuous polyline linetypes facilitate contour mapping and other applications.

25. Programmable dialog boxes can be customized for your particular working environment or by third-party application developers.

26. AutoCAD's new integrated calculator performs calculations based on existing geometry and includes extensive algebraic and geometric functions.

27. New ALIGN command lets you move and rotate entities in 2D or 3D.

28. 3D ROTATE command rotates entities about an arbitrary 3D axis.

29. 3D MIRROR command mirrors entities on an arbitrary 3D plane.

30. CHANGE command enhancements simplify entity property modifications, such as elevation, color, layer, linetype and thickness.

31. Advanced, multipoint tablet calibration allows compensation for map projections or stretched drawings.

32. Platform-independent menus and dialog boxes that follow operating system standards. So AutoCAD works like other programs on your computer.

33. An improved graphical interface makes the power of AutoCAD more accessible to everyone.

34. Cascading pull-down menus that put more power at your fingertips.

35. Pop-up menus at the cursor location for often-used items.

36. Screen menu is automatically updated to reflect the currently running command.

37. Shift and Control key combinations allow you to invoke more commands with your mouse and digitizer buttons.

38. Single mouse click-and-release action for selecting pull-down menus.

39. Automatic Drawing Conversion. Full support for any drawing created by any version of AutoCAD.

40. Enhanced CONFIG command allows for configuring AutoCAD from the drawing editor.

41. New dialog boxes give you control of dimension variables and styles.

42. Dimension dragging feature provides visual feedback while creating dimensions.

43. RECTANGLE command now allows you to create a rectangle with just two screen picks.

44. Enhanced Write Block command helps developers maintain "smart" drawings (entity handles).

45. Enhanced command transparency lets more commands be used inside other commands.

46. Transparent "Object Filters" dialog box allows more flexible definition of selection sets.

47. ZOOM Window is now the default.

48. DXFIX utility reads R12 DXF™ files and translates them into R10 files.

49. New COMPILE command compiles shape files, font files and Type 1 PostScript fonts.

50. Now you can fill closed polylines with PostScript patterns for extremely high-quality output.

51. Network users can view and plot AutoCAD drawings without using server authorization.

52. Database-specific drivers link AutoCAD and external nongraphic databases, such as dBase,® Paradox,® Oracle® and others.

53. Create New Drawing command now allows you to start with an unnamed

New Features Release 12.

drawing or specify a prototype drawing.

54. OPEN command presents "Open File" dialog box to simplify loading of existing drawings.

55. SAVE AS command now changes the current drawing name to new name specified.

56. END and QUIT commands prompt you for a file name when exiting an unnamed drawing, to prevent you from losing data.

57. Several AutoLISP® enhancements, including much faster loading of LISP routines.

58. A wide range of new and enhanced system variables, especially created for the power user.

59. DD Modify command allows for interactive editing of entity parameters.

60. New Units Control dialog box shows all units, angles and direction values on-screen as well as precision settings.

61. New special context-sensitive help dialog boxes allow you to browse through available help files.

62. New View Control dialog box allows selecting with a pick instead of typing in view name.

63. You can plot AutoCAD drawings as bit map files in PCF, TIFF, TGA and GIF formats. You can even automatically FAX your drawings to a subcontractor or client.

64. 24-bit, true color rendering is supported by appropriate hardware.

65. PostScript files can be brought in as outlines or fully rendered images.

66. Modify Entity dialog box enables you to edit an entity's properties directly.

67. Mirrored blocks can now be exploded.

68. List and load standard AutoCAD SHX fonts as well as Adobe Type 1 PostScript fonts from dialog box.

But Either One Of These Alone Makes It Worth The Price.

1. Something every AutoCAD® user has been waiting for: new technology that virtually eliminates regens. A new built-in 32-bit display list permits pans and zooms without regens. So you can spend your time editing your drawing, instead of waiting for regens.

2. The plot quickens. Now you get WYSIWYG plot preview, on-the-fly plot device selection and the ability to save plot configurations.

69. New option allows a box to be drawn around dimension text automatically.

70. Insert a text string before or after dimension text automatically.

71. Configuring for ADI® drivers has never been easier, with the new feature that displays all drivers in the appropriate menu when configuring AutoCAD.

72. HP LaserJet legal-size paper output is now supported by a new, improved device driver.

73. ADS applications can now be compiled by inexpensive "real mode" compilers; no need for costly development tools.

74. AutoLISP and ADS can now be used to drive the PLOT command.

75. Linetype scaling adjusts to view scale in Paper Space.

76–174. Unfortunately, we're out of space. But you get the idea. Release 12 is the most significant enhancement of AutoCAD ever. Its improved performance will pay off for every AutoCAD user. So the cost of an upgrade can pay for itself in a couple of weeks.

If you're still not convinced, call your Authorized AutoCAD Dealer. Your dealer can give you an even more complete list of the new features. And tell you what you need to do to upgrade. If you need more information or the number of your nearest dealer, call

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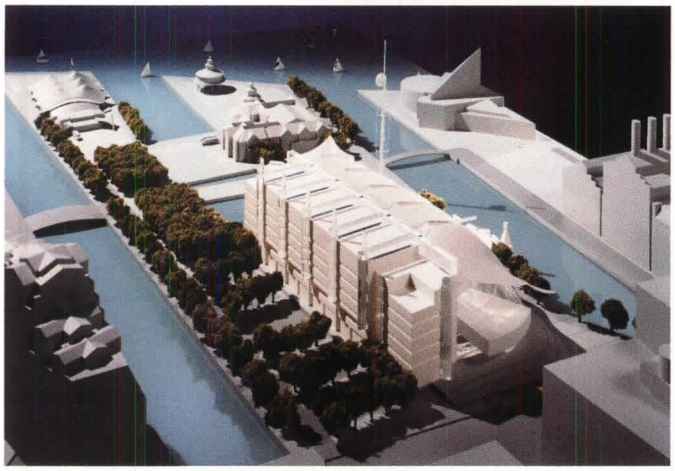
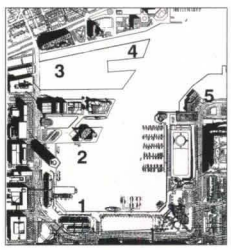
New Projects for Baltimore's Inner Harbor



Christopher Columbus Center of Marine Research and Exploration
Baltimore, Maryland
Zeidler Roberts Partnership, Architects

THE $160 MILLION CHRISTOPHER COLUMBUS CENTER, DESIGNED by Toronto-based Zeidler Roberts Partnership for the north shore of Baltimore's Inner Harbor, will house a marine biotechnology facility, nautical archaeology unit, science training center, and exhibition space. The eastern half of the building (top), which will be clad in metal panels and articulated by stainless steel duct enclosures, will contain offices on the second level and laboratories and teaching areas on the third, fourth, and fifth floors. The western section will be devoted to public functions, including retail spaces at ground level and an exhibition area and training facilities on the second floor, its third level is stepped back to allow views of scientists at work behind glass walls. This waterside portion of the structure will be encased in glass and covered by a ribbed, fiberglass-reinforced Teflon canopy (above). The translucent roof is being designed by FTL Architects, the firm responsible for the Pier Six Concert Pavilion (pages 54-59) located to the south of the Columbus Center. Construction, scheduled to begin in October, should be completed in late 1994.



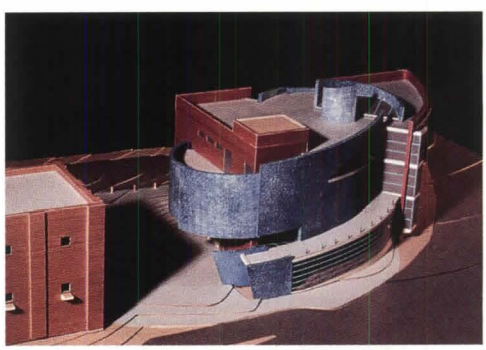
SITE PLAN

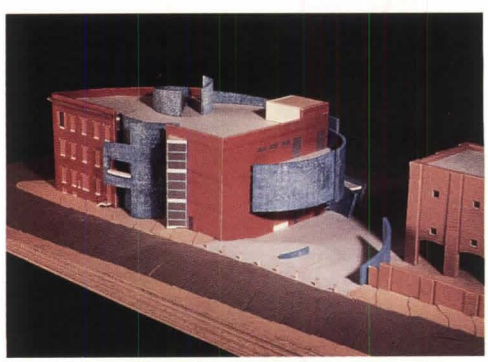
1 HARBORPLACE
2 NATIONAL AQUARIUM
3 COLUMBUS CENTER
4 PIER SIX PAVILION
5 VISIONARY ARTS MUSEUM

Benjamin Thompson & Associates' Harborplace helped set the stage for development of Baltimore's Inner Harbor in 1978. The complex has been joined by a variety of cultural and scientific facilities.

American Visionary Arts Museum
Baltimore, Maryland
Castro Swanston Associates, Architects

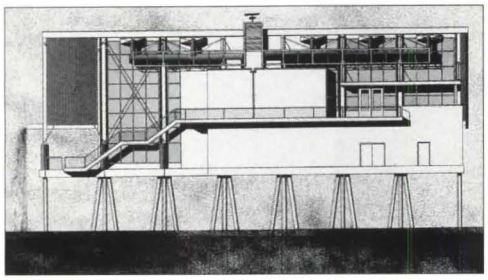
A THREE-STORY TROLLEY WORKS BUILDING on the southern edge of Baltimore's Inner Harbor will be recycled as part of a 33,000-square-foot museum devoted to "visionary" art. Baltimore-based Castro Swanston Associates will expand the existing brick structure with a sculptural volume (below), containing galleries, theater/classroom, library, museum shop, offices, and café. A concrete wall will spiral through the building, enclosing a circular stair that provides access to second-and third-floor galleries, and will emerge on the roof as two curved walls. Visitors will approach galleries on an enclosed ramp that wraps around the building's northeast face and terminates in a glass and steel circulation spine. This corridor will serve as the building's sole axis, symbolically linking the harbor to Federal Hill, which rises to the southwest. The architects will renovate a brick structure on the south end of the site for additional gallery space. The scheme includes a sculpture garden adjacent to the annex, and a pedestrian plaza between the two structures (bottom). Construction of the $6.5 million project is scheduled to begin late this year.



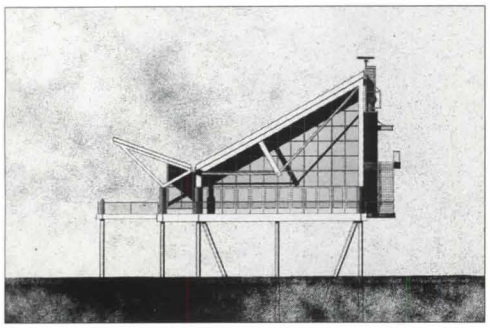


Aquatic Transportation Facilities

Passenger Ferry Terminal
Seattle, Washington
The Miller/Hull Partnership, Architects



SOUTH ELEVATION

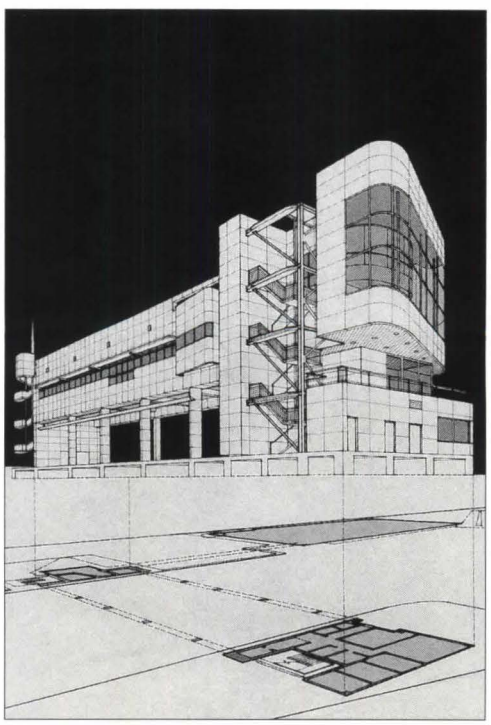


WEST ELEVATION

LOCATED IN DOWNTOWN SEATTLE'S CENtral waterfront district, the 7,500-square-foot ferry terminal will serve passengers traveling to and from Vashon Island and other destinations across Puget Sound. Miller/Hull designed a double-height waiting area that rests on concrete pilings 19 feet above sea level (top left). The structure was designed to recall the ramps, hoists, gangways, and railings found along Seattle's working waterfront. The two-story space will be framed in steel trusses (below left) and enclosed by glass walls that afford views of Elliot Bay to the west and the Olympic Mountains to the west. Gesturing to incoming ferries, a cantilevered steel canopy will project over a balcony where passengers await boarding. An exposed steel staircase that spans the two-story south facade will lead to a bar on the second level. San Francisco artist Paul Koss is designing a video screen for the bar that will project radar images of activity on the bay. Construction of the $6.2 million project, which includes an adjacent concrete float to moor as many as four vessels, is scheduled to begin in early 1993. ■

Berth 30
Port of Oakland, California
Jordan Woodman Dobson Architecture

OAKLAND-BASED JORDAN WOODMAN DOBson created a machine esthetic for a 15,000-square-foot administration building anchoring a 34-acre container terminal complex. Located just south of the San Francisco Bay Bridge, the streamlined structure (right), to be clad in porcelain-coated metal panels, contains a cantilevered, 23-foot-high operations control room and a spine of elevated offices that creates a gateway for trucks. Responding to cranes dotting Oakland's industrial shoreline, the architects exposed the steel staircase and adjoining seismic frame, and hung a second staircase from the north facade. In addition to the administration building, the architects designed a container storage yard, maintenance facility, and marine operations building on the site. Construction is scheduled to begin this month.



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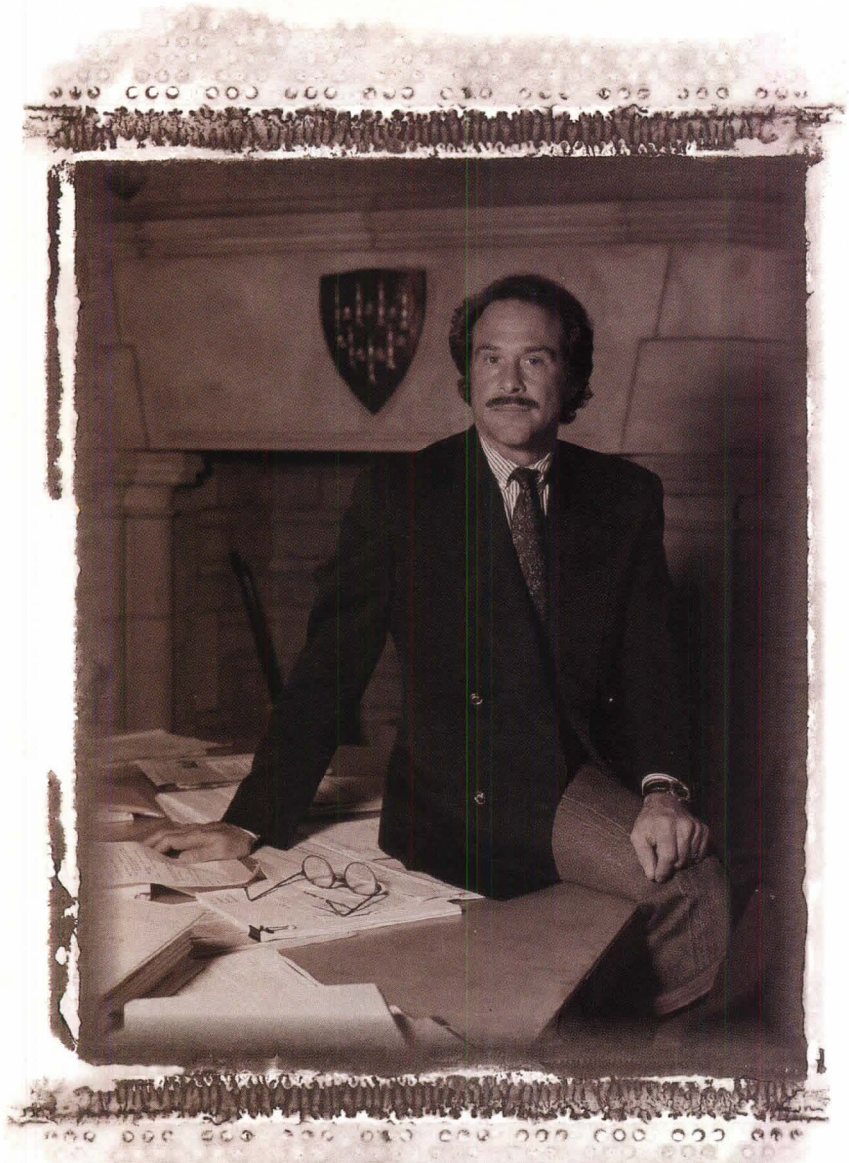

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David Teitelbaum, General Partner
Cathedral Stoneworks
The Cathedral of
St. John the Divine
New York City

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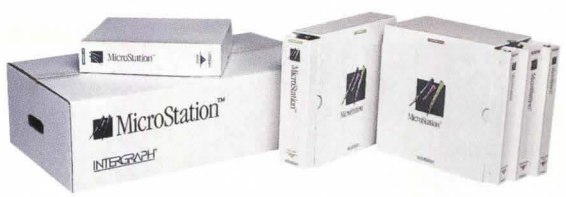

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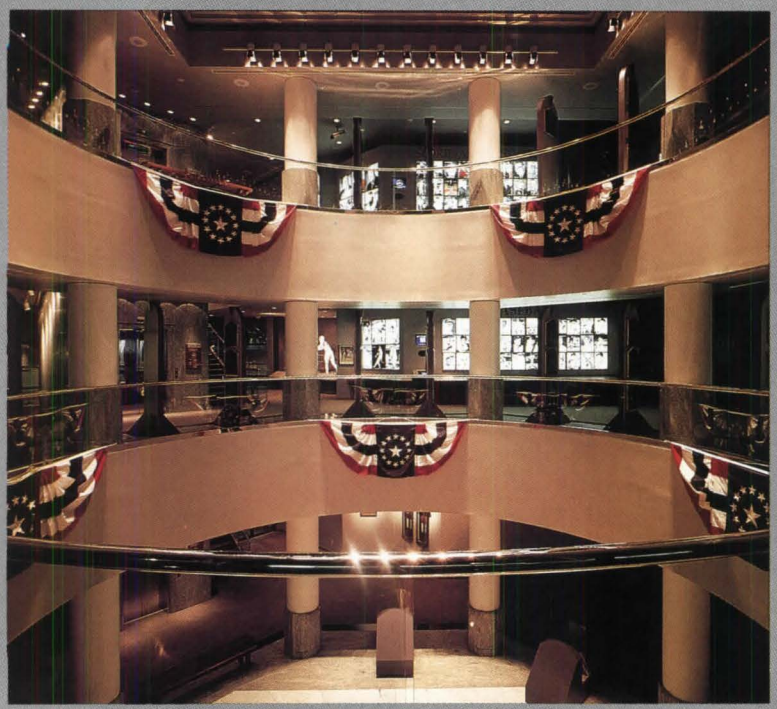
Classic GLASS HANDRAILS



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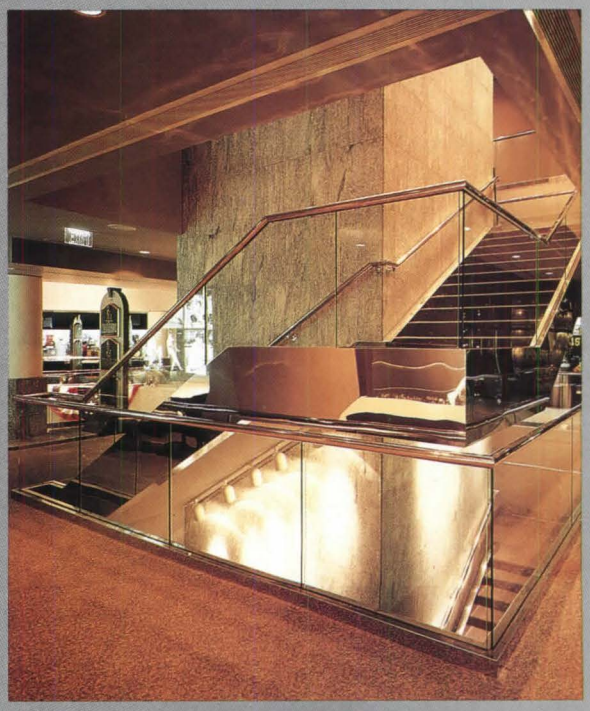

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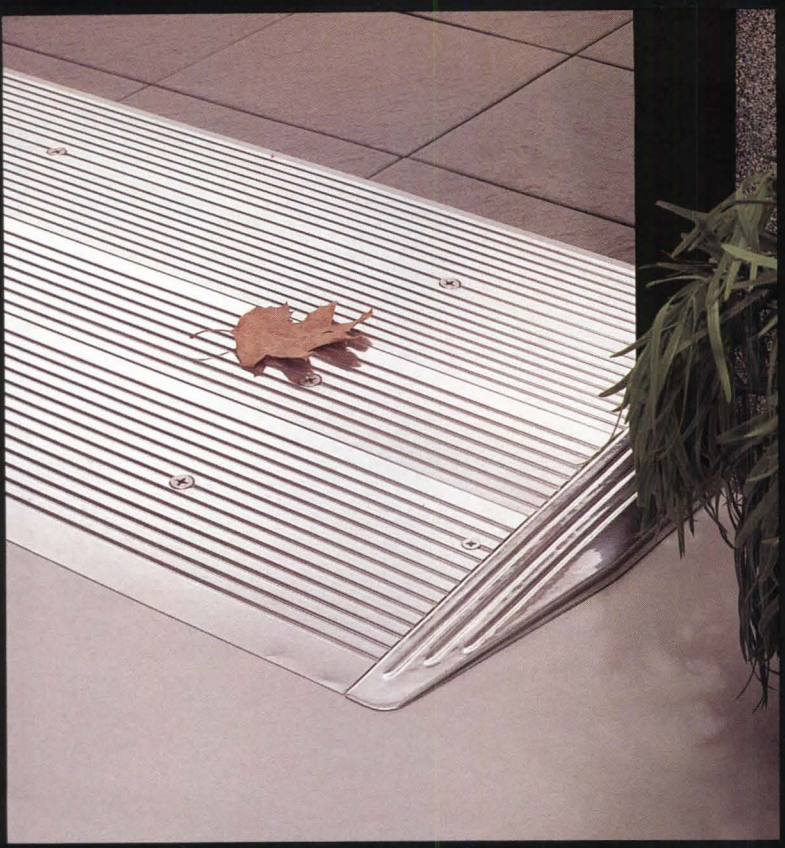

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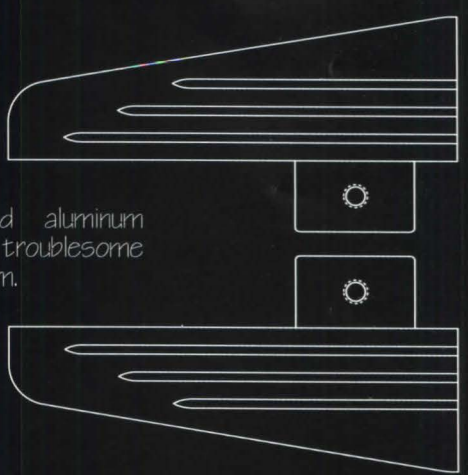

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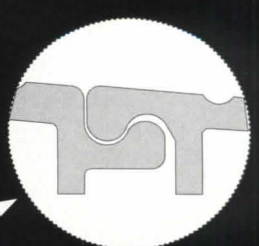

- Top plate is 7" wide, allowing for floor closer preparation.

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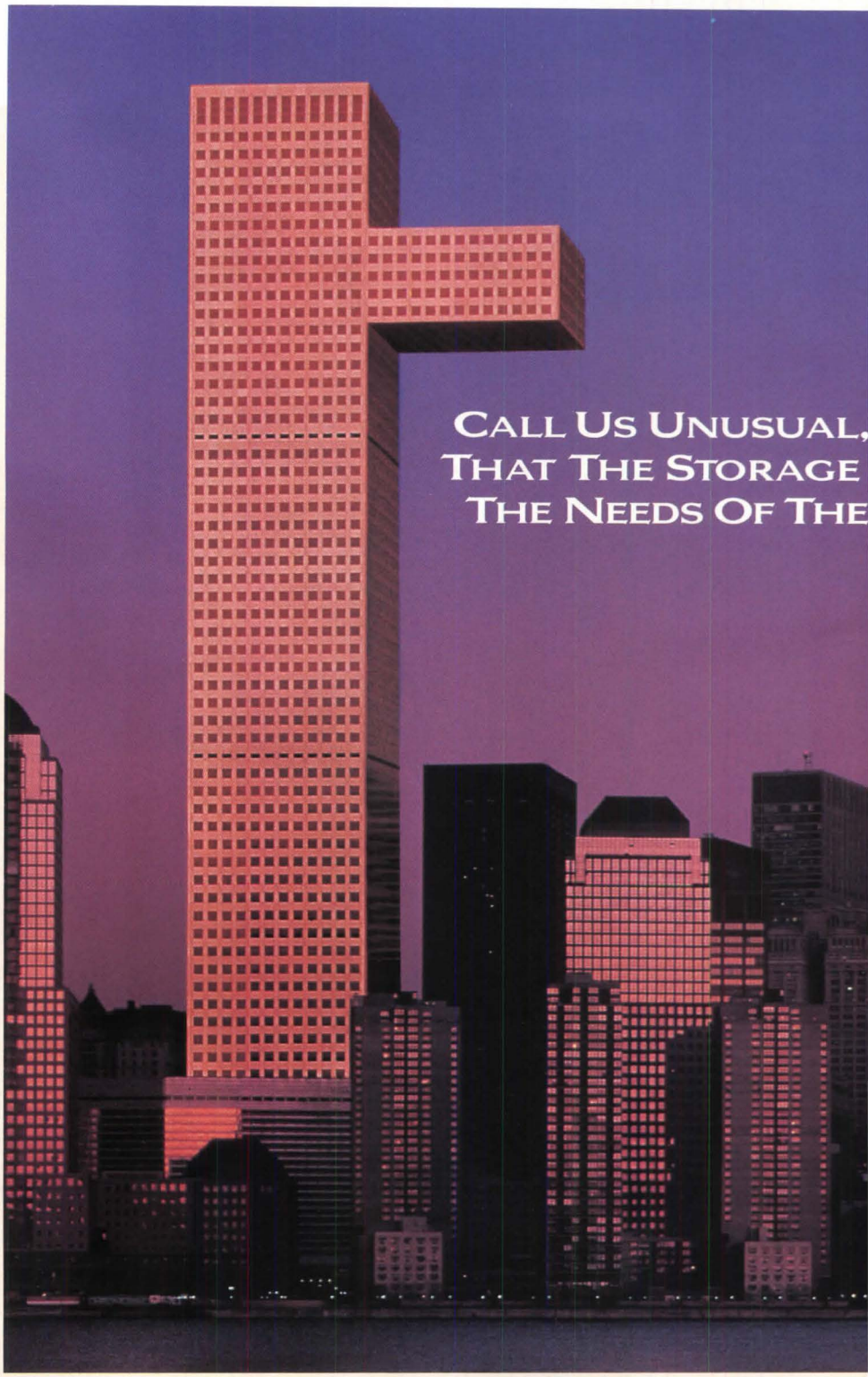
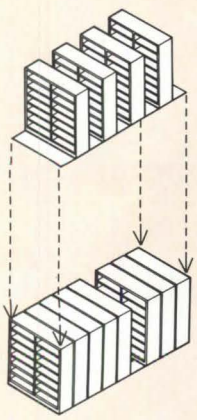


WHAT WAS IT THAT ALLOWED THE TAJ MAHAL, NOTRE DAME AND THE ACROPOLIS TO ALL BECOME ARCHITECTURAL ICONS?

WE'D LIKE TO SUGGEST THAT IT WAS SIMPLY THE FACT THAT THEIR DESIGNERS DIDN'T HAVE TO WORRY ABOUT WHERE TO PUT THINGS.



THINGS LIKE OFFICE SUPPLIES, FILES, PRINTOUTS FROM COMPUTERS.

WITH EVEN THE INVENTION OF THE TYPEWRITER SEVERAL YEARS OFF, ARCHITECTS OF THE PAST WERE FREE TO CONCENTRATE ALL THEIR ENERGIES ON THE ONE THING THAT REALLY MATTERED, ARCHITECTURE. WHICH, AS IT HAPPENS, IS THE VERY *THING* EACH SPACESAVER SYSTEM IS DESIGNED TO ALLOW YOU TO FOCUS ON.

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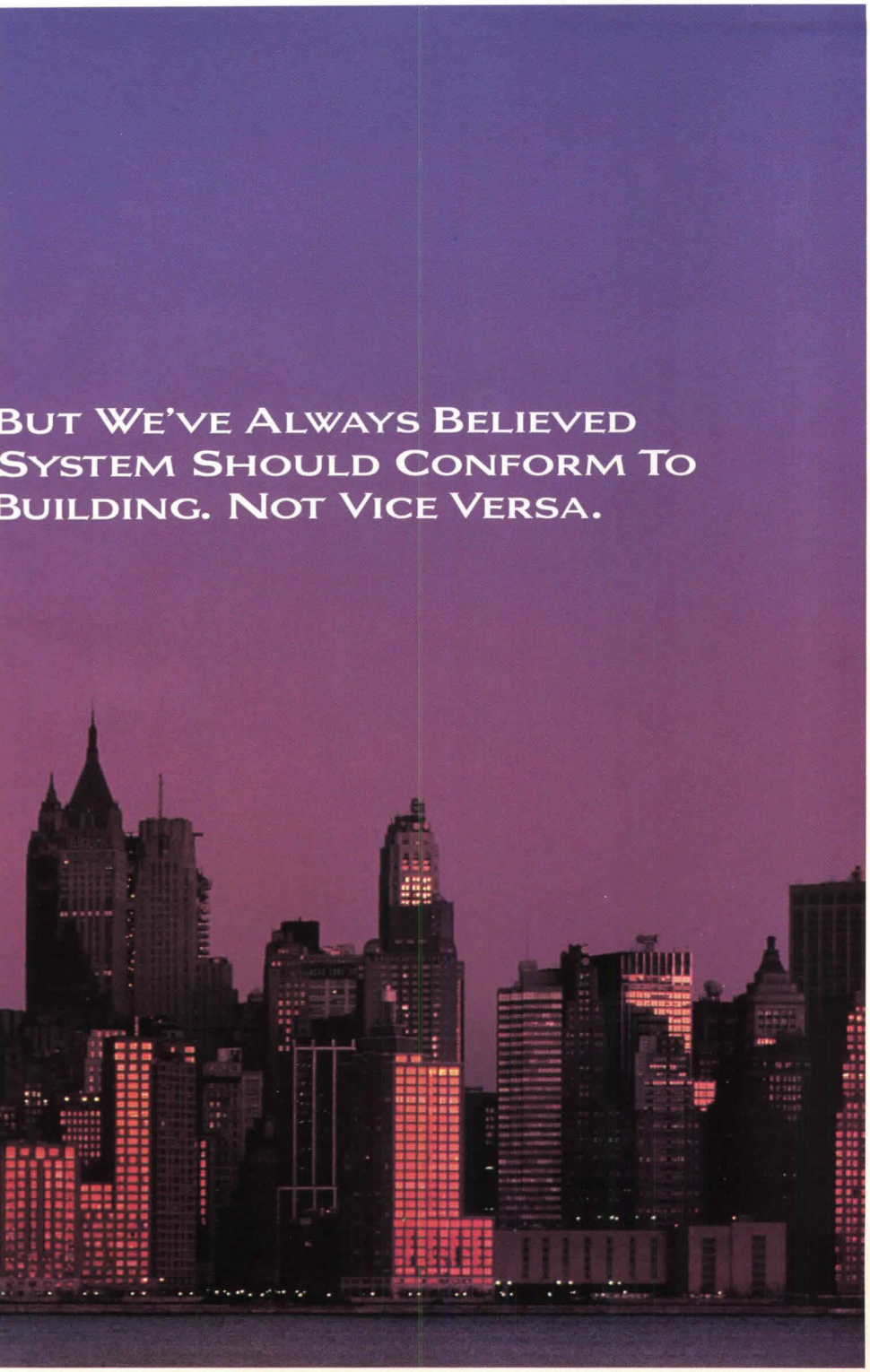

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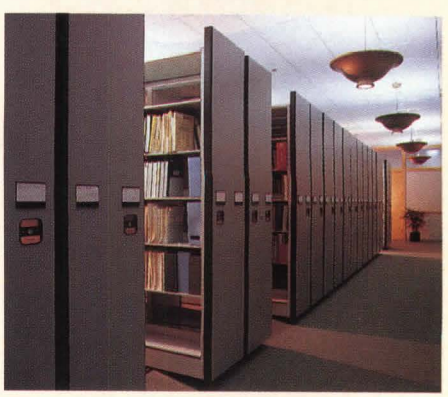

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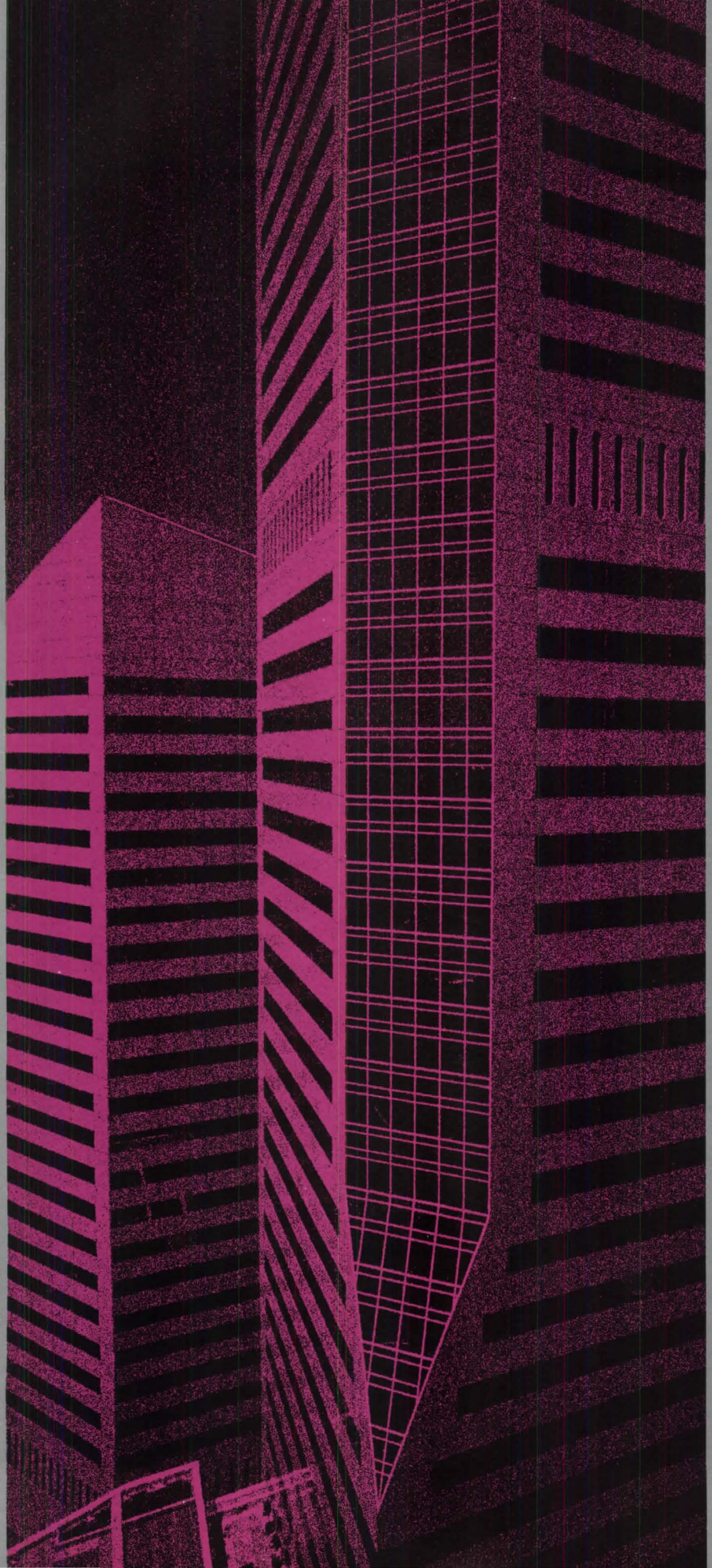

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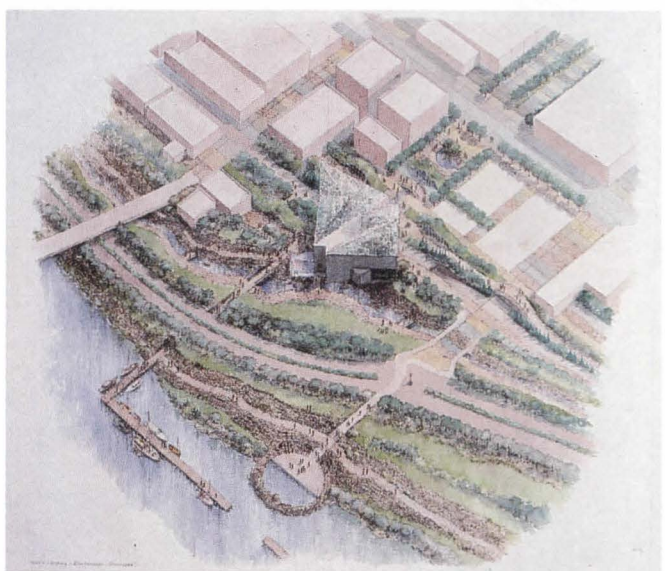
ARCHITECTURE

On the Waterfront

"IF THERE IS MAGIC ON THIS PLANET," THE NATURALIST LOREN EISELEY WROTE in his landmark book, *The Immense Journey*, "it is contained in water." More and more cities are finding truth in Eiseley's statement, as they revitalize their urban waterfronts with a tidal wave of aquariums, performing arts centers, maritime museums, and other public buildings. Capable of drawing more than a million people a year, these tools of economic development contain more magic than any wand.

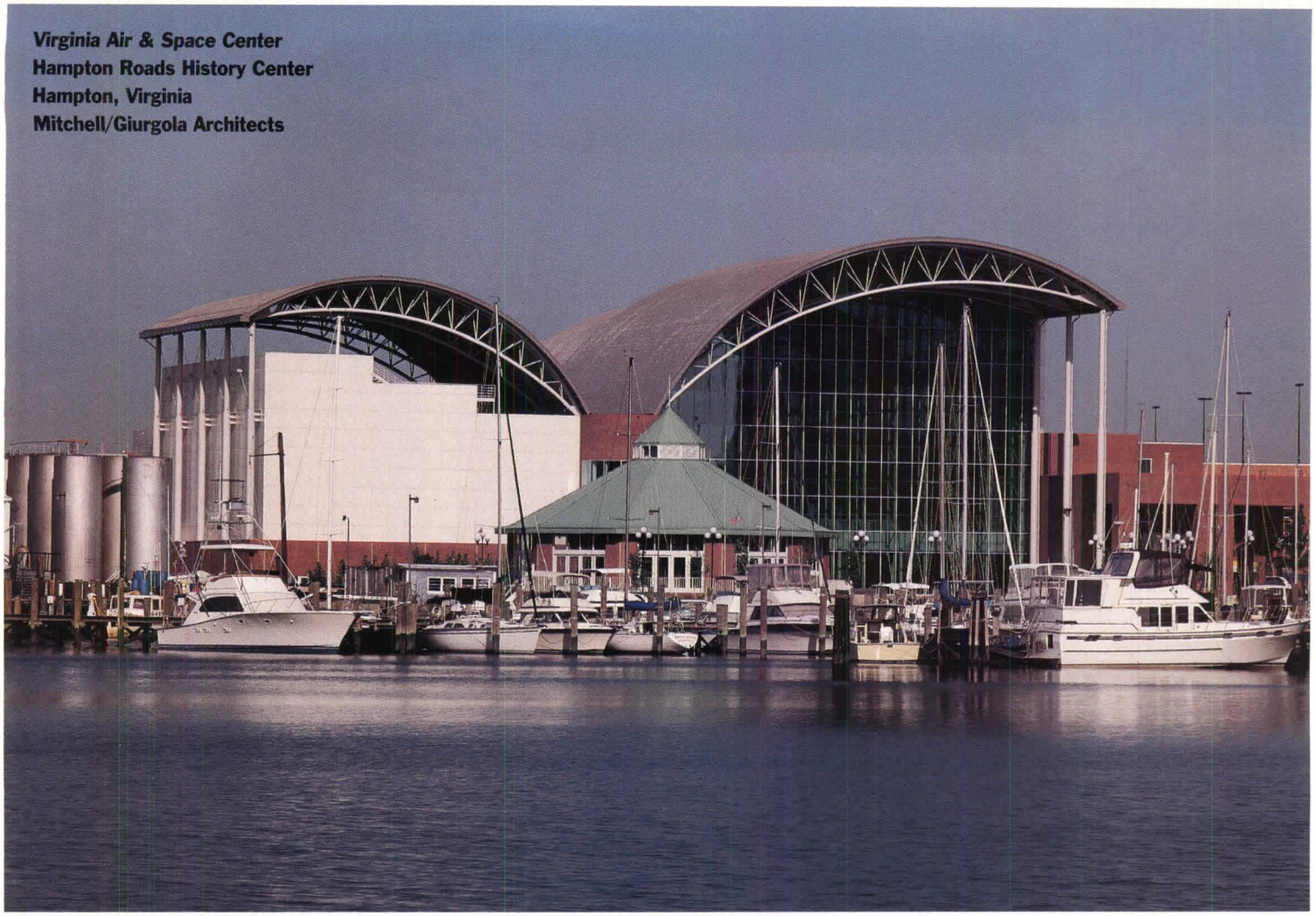
According to Codirector Ann Breen of the Waterfront Center in Washington, D.C., between 3,000 and 5,000 cities in the U.S. have developed their waterfronts. The trend, Breen notes, is away from festival marketplaces and toward parks and promenades. Moreover, Boston's rerouting of its central artery and San Francisco's sweeping revitalization of its Embarcadero area are evidence that even larger cities are finally demolishing highways to retrieve their harbors and quays.



TENNESSEE AQUARIUM ON ROSS'S LANDING, CHATTANOOGA
DRAWING BY JAMES WINES, SITE

Not surprisingly, aquariums are emerging as the dominant anchors of this waterfront resurgence. An essay in this issue discusses the booming building type's complexity of exhibits and architecture, underscored by a close-up look at three examples: Cambridge Seven's Tennessee Aquarium in Chattanooga; SRG Partnership's Oregon Coast Aquarium in Newport; and the Hillier Group's Thomas H. Kean New Jersey State Aquarium in Camden. Baltimore, which already boasts a successful aquarium, has added FTL Architects' fabric-roofed theater to its harbor ensemble.

The cost of this renaissance, however, may be the demise of the working waterfronts that gave birth to America's cities. With a lowlife reputation made famous by Marlon Brando, urban docks and piers are easy targets for demolition. Not in Hampton, Virginia, however, where city planners preserved the region's fishing fleet and processing plants just yards from its new Mitchell/Giurgola-designed Virginia Air & Space Center. Although the success of this recent venture has yet to be determined, vitality on the waterfront, derived from a mix of uses, is what more architects should strive for. ■



Virginia Air & Space Center
Hampton Roads History Center
Hampton, Virginia
Mitchell/Giurgola Architects

Hampton Takes Flight

AS THE FIRST POINT OF LAND touched by the English colonists who continued upriver to settle Jamestown, Hampton has been a waterfront community since its settlement in 1610. Located at the southernmost tip of the Virginia peninsula, this city of 135,000 lies between the shipbuilding centers of Norfolk and Newport News and the aerospace community of Langley Field, where NASA was born and the U.S. Air Force is headquartered. Although Hampton's waterfront downtown was devastated when local businesses fled to the suburbs in the 1960s, the city still prides itself on both its explorations into space and flight, and its seafaring history.

Celebrating this aerospace and oceangoing heritage, the renaissance of Hampton's harbor recently took flight with the April opening of the Virginia Air & Space Center and Hampton Roads History Center. Designed by Mitchell/Giurgola of New York with Rancorn Wildman Krause Brezinski Architects of Newport News, the new museum is intended to attract merchants back to the banks of the Hampton River.

On the east side of the building, the museum's forecourt, linked by a riverfront esplanade to an existing hotel, creates Hampton's primary public space and includes a 10-sided pavilion housing a restored carousel. Salvaged from a nearby amusement park, the noisy carousel adds to the festivity of this plaza. To the north, across Settler's Landing Road, the architects made room for future businesses with a 460-car parking garage that also offers 20,000 square feet of storefronts. To unify museum, carousel pavilion, and parking garage, the architects clad the waterfront trio in brick—"Virginia's original building stone," according to design team member Walter Wildman. Notes principal Steven Goldberg, who designed the building along with Romaldo Giurgola and John Kurtz, "It's rare for an architect to have such a significant impact on a community's future growth."

And what an impact! To visitors approaching the city from the highway, the museum's dramatic visage imbues Hampton's sleepy downtown with an important new presence. Arranged as a series of pro-

SITE PLAN

Hampton, Virginia's 118,000-square-foot aerospace and history center includes a vaulted museum (top), carousel pavilion (facing page), and 460-car parking garage (left in left photo). Bermed forecourt provides a riverside plaza for the city (plan).

gressively larger and higher vaulted forms, the structure's main wing reaches 96 feet at its apex. Supported by concrete piers and concreted-filled steel pipes, the trusses that hold the museum's metal roofs aloft are based upon the structure of an airplane wing, but their bananalike curve is Mitchell/Giurgola's own design. Facing south, the smaller wing is clad in aluminum to address commercial warehouses along the waterfront. The two wings are joined by an east-west spine, culminating in an oriel window that serves as a knuckle between the aviation and space and history exhibits. To the north, the building takes a bow to downtown Hampton with a low, block-long arcade.

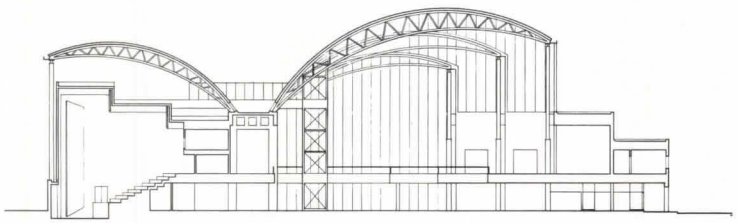
The northern vault, which spans 127 feet, covers a glass-enclosed, eight-story-high volume, within which exhibits on flight and space are displayed. The smaller wing shelters an IMAX theater and exhibits devoted to Hampton's seagoing history.

Within the larger portion of the building, the glass-enclosed exhibit space is a knockout. Light penetrates the interior not only through glass-covered east and west facades, but also from north-facing clerestories. "We had some fights with the exhibit designers," Goldberg admits, describing these designers' penchant for darkness, which allows greater control over the drama of displays. "To me, you want to see airplanes in natural light." As a result, Goldberg has developed the aerospace exhibitry into a fine art. Not only is the museum's collection of fighter aircraft and antique flying machines daylit, but a 45-foot-high gantry connects stair and elevator towers, allowing visitors to view them from above. The stairway's many landings grant more perspectives, and a second-story mezzanine almost puts a visitor in some of the cockpits. A glass-enclosed elevator at the southeast corner of the large, hangarlike room adds a dynamic element, creating a sensation of lift-off on its way to the gantry above.

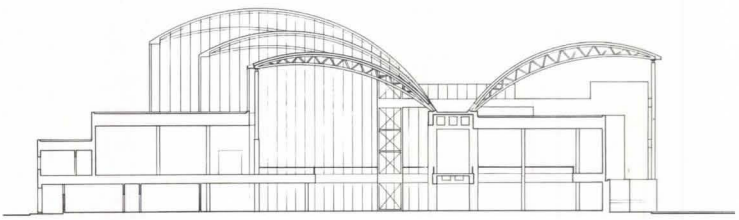
Hampton's pursuit of cutting-edge architecture and its brave decision to draw tourists with a museum are consistent with another unusual approach to waterfront development in this small city. A few yards away from the museum lie the wharves and processing plants of the region's commercial fishing industry. Deeming this local Cannery Row a significant part of Hampton's waterfront activity, city planners elected to retain the piers, trawlers, and industrial sheds. The architects, realizing the significance of this decision, gave museumgoers a view of the commercial docks from an observation deck high atop the south-facing wing. The Hampton waterfront thus embodies an essential attribute that distinguishes it from recent festival marketplace harbor developments: it is real. Whether this reality will one day produce a thriving waterfront downtown remains to be seen, but the aerospace and history center adds a crucial ingredient in what the city's planners and the Mitchell/Giurgola design team were hoping to achieve: an appropriate civic symbol for Hampton, and a rediscovery of its waterfront origins. ■

—HEIDI LANDECKER

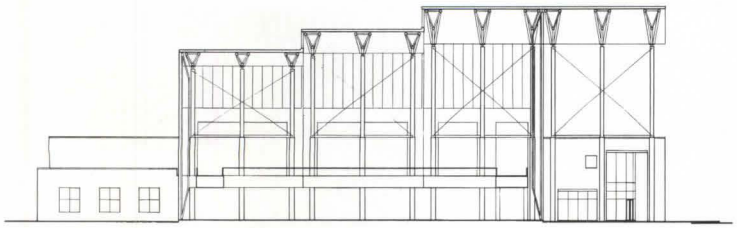
Glass-enclosed vaults of museum grow progressively wider and higher from west to east; brick arcade embraces the street (facing page). Trusses are supported by interior concrete columns that form circulation spine, culminating in oriel window (above). Glass-enclosed stairwell of parking structure across the street (left) recalls oriel of museum. Storefronts along street level of garage are designed to attract merchants.



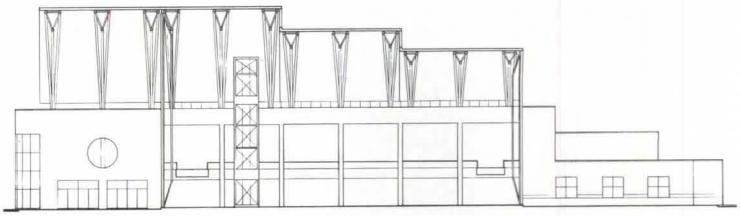
SOUTH–NORTH SECTION



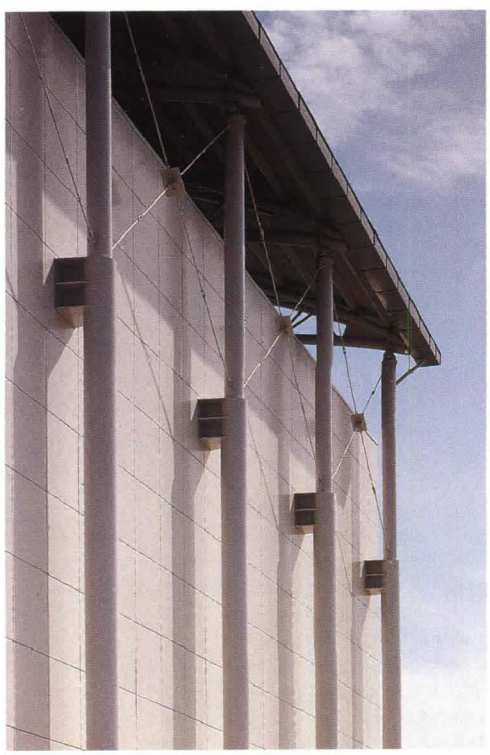
NORTH–SOUTH SECTION

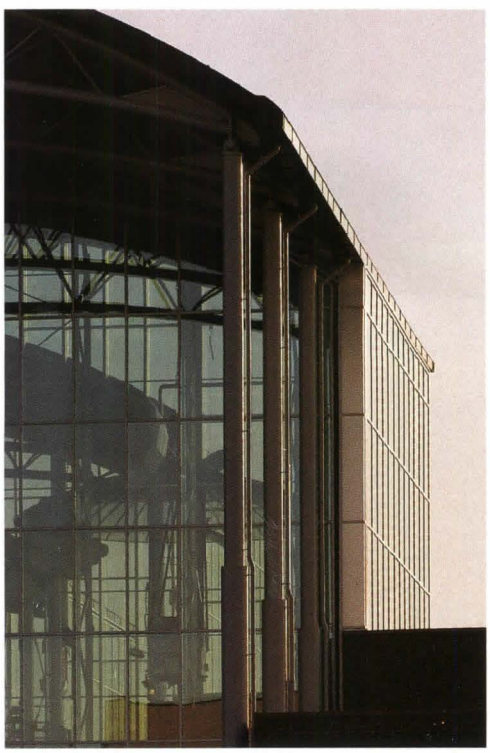


WEST–EAST SECTION

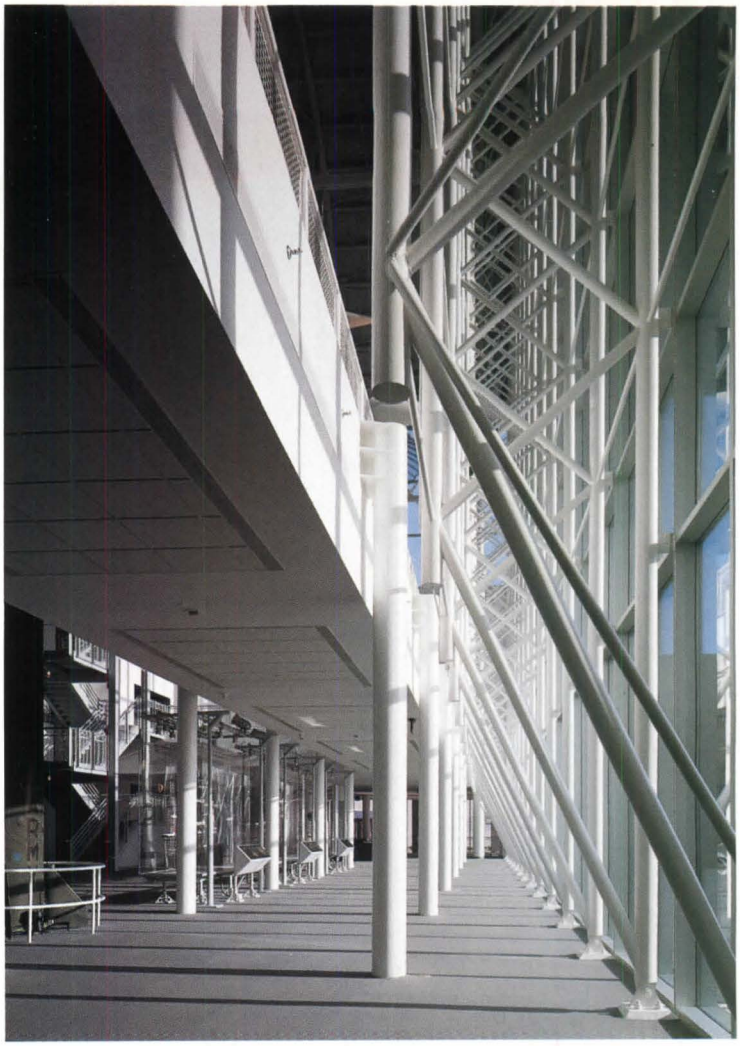


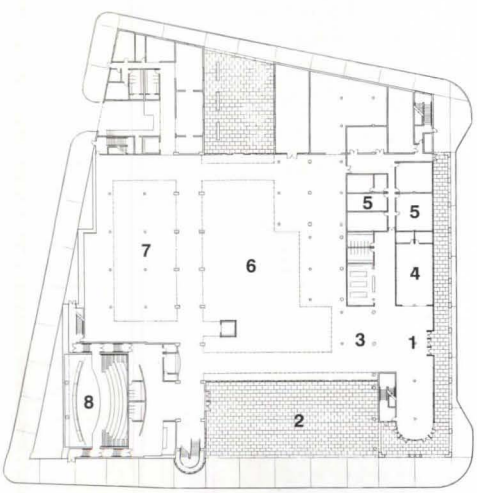
EAST–WEST SECTION





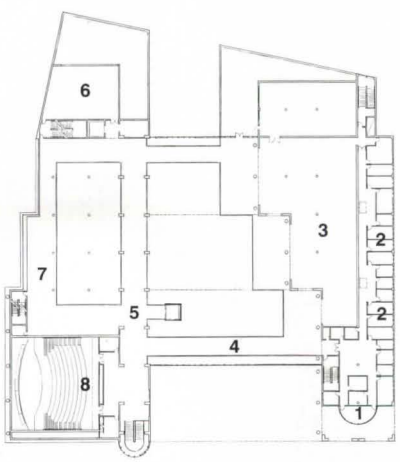
Steel columns support roof trusses, creating a canopy over plaza (facing page, top left). Oriel window (facing page, top right) joins aluminum-clad IMAX theater, topped by observation deck, to primary exhibit wing, where vertical trusses reinforce glass facade (above). Tension rods provide lateral support for steel columns (far left). Glass facade permits view of aerospace exhibits suspended from trusses inside the building (left).





GROUND FLOOR PLAN

1 LOBBY
2 PLAZA
3 RECEPTION
4 GIFT SHOP
5 CLASSROOM
6 AVIATION EXHIBITS
7 HISTORY EXHIBITS
8 IMAX THEATER



SECOND FLOOR PLAN

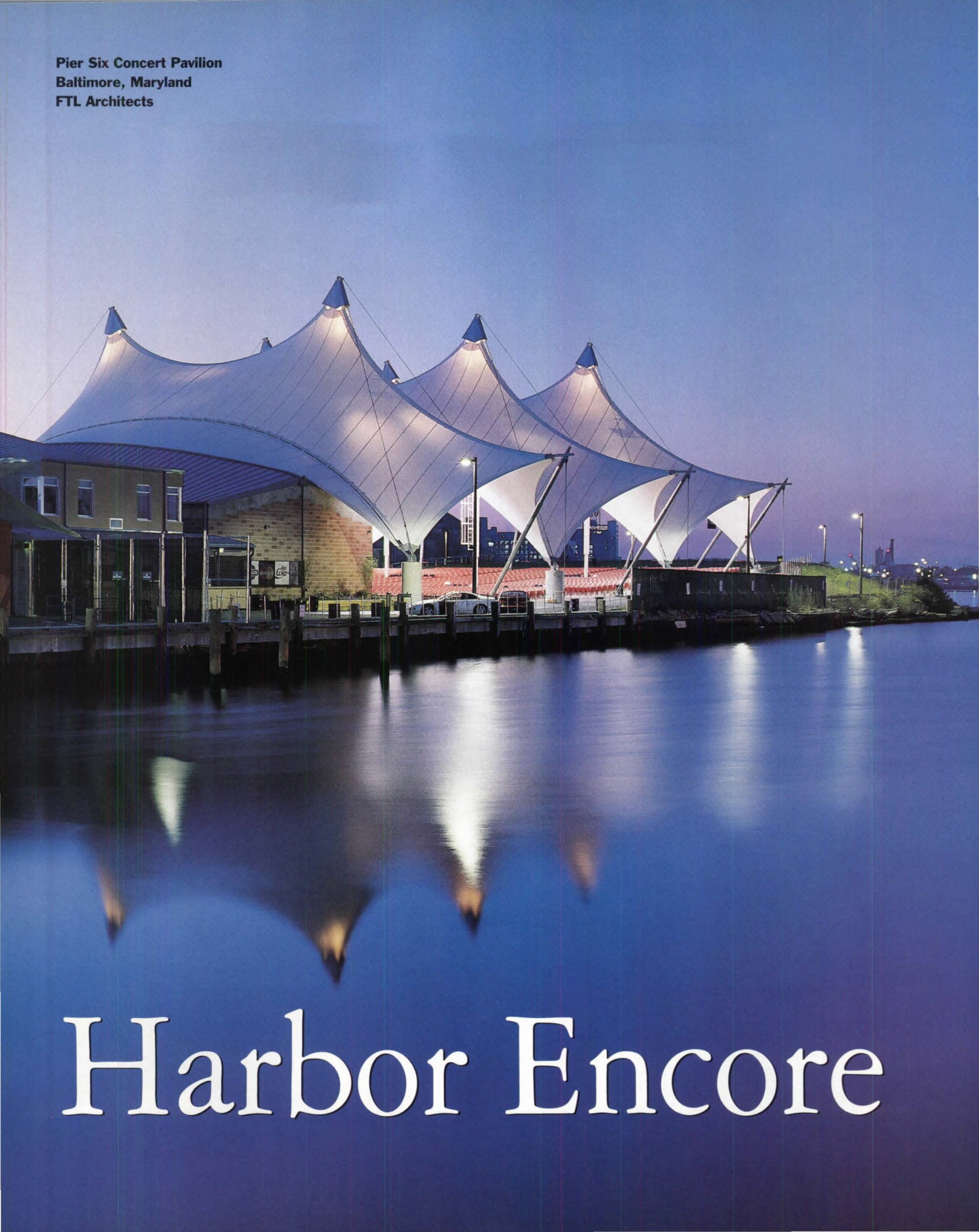
1 LIBRARY
2 STAFF OFFICES
3 SPACE EXHIBITS
4 MEZZANINE
5 AIR FORCE EXHIBITS
6 MECHANICAL
7 EXHIBIT MEZZANINE
8 IMAX THEATER

Landings provide observation points (above left). Internal vertical trusses support glass facade (above right). Catwalk (facing page) permits observers to look down on planes.

VIRGINIA AIR & SPACE CENTER
HAMPTON ROADS HISTORY CENTER
HAMPTON, VIRGINIA

DESIGN ARCHITECT: Mitchell/Giurgola Architects, New York City—Steven M. Goldberg (partner-in-charge); Romaldo Giurgola, John M. Kurtz (design partners); Channing Redford, Stuart Crawford, Christel Knappe (project team)
ARCHITECT OF RECORD: Rancorn Wildman Krause Brezinski, Newport News, Virginia—Walter Wildman (*partner-in-charge*)
LANDSCAPE ARCHITECT: Lois Sherr/Rancorn Wildman Krause Brezinski
ENGINEERS: Stroud, Pence and Associates (structural); H.C. Yu and Associates (mechanical/electrical); Rancorn Wildman Krause Brezinski (civil)
CONSULTANTS: Krent/Paffett Associates (exhibition planner); H.M. Brandston & Partners (lighting); The Norfolk Group (special effects/accent lighting)
GENERAL CONTRACTOR: W.M. Jordan Company
COST: $18 million—$153/square foot
PHOTOGRAPHER: Jeff Goldberg/Esto


Mission Control
11786
FS-786
A Quick Trip into Space



Pier Six Concert Pavilion
Baltimore, Maryland
FTL Architects

Harbor Encore

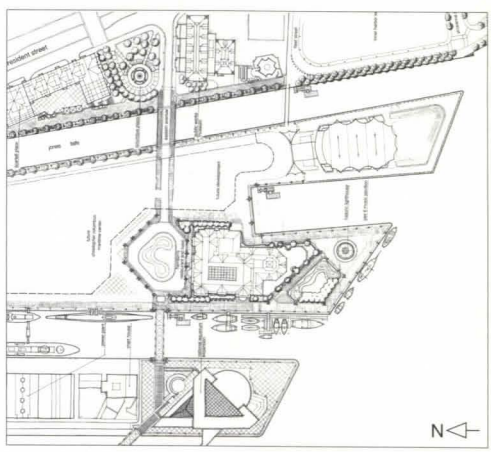
BALTIMORE'S INNER HARBOR IS an ongoing success story. A virtual wasteland in the late 1950s, the active downtown was launched with the Charles Center, a 33-acre urban renewal project. Then in the early 1960s, a proposed interstate highway that would have cut a swath directly through the historic urban core was defeated, prompting the city to commission Wallace, McHarg, Roberts & Todd in 1964 to develop a long-range master plan for the Inner Harbor. This plan resulted in I.M. Pei & Partners' 28-story World Trade Center in 1977, Benjamin Thompson & Associates' Harborplace in 1980, and Cambridge Seven's aquarium in 1981.

Over the past decade, diversified recreational and commercial development has thrived, extending the boundaries of the popular waterfront district. HOK's extraordinary new baseball stadium at Camden Yards (ARCHITECTURE, July 1992, pages 64-71) provides a bold new gateway along the main approach from the south. And now, FTL Architects' Pier Six Concert Pavilion provides a lively urban anchor to the northeast.

The new concert pavilion solidifies the city's plan for the prominent waterfront site. Although the Pier Six parcel was originally slated for commercial development, the city of Baltimore commissioned New York-based FTL Architects in 1981 to design a temporary performance structure to last three to five years. Based on the success of this pavilion, the city awarded the Baltimore Center for the Performing Arts a 25-year lease for the site last year. "The original facility was a great structure," explains Facility Manager John Wright. "We only tore it down so we could make room for something bigger, better, and more permanent."

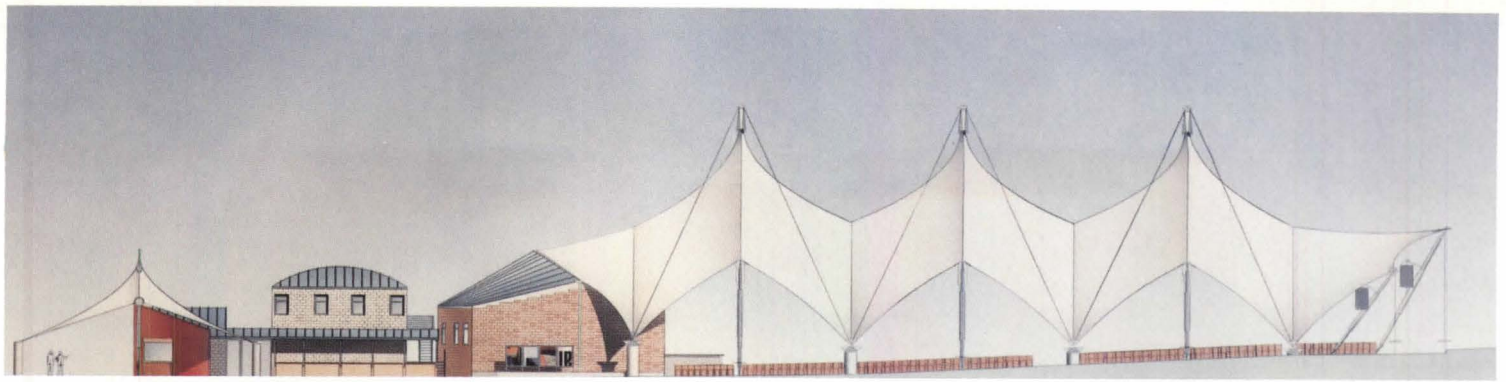
Surrounded by water on three sides, the site of the original concert pavilion afforded FTL Architects the luxury of creating a sculptural object that sat comfortably among its eclectic neighbors. But by Principal Todd Dalland's own acknowledgement, FTL's first structure wasn't large enough to compete with the aquarium, office towers, festival marketplace, and the historic industrial structures that line the waterfront.

For the latest incarnation, the architect not only increased the size of the temporary facility by 50 percent, but developed a distinctive structural expression that imparts a

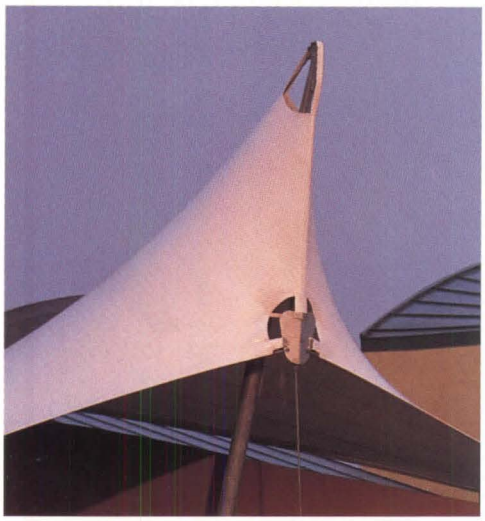


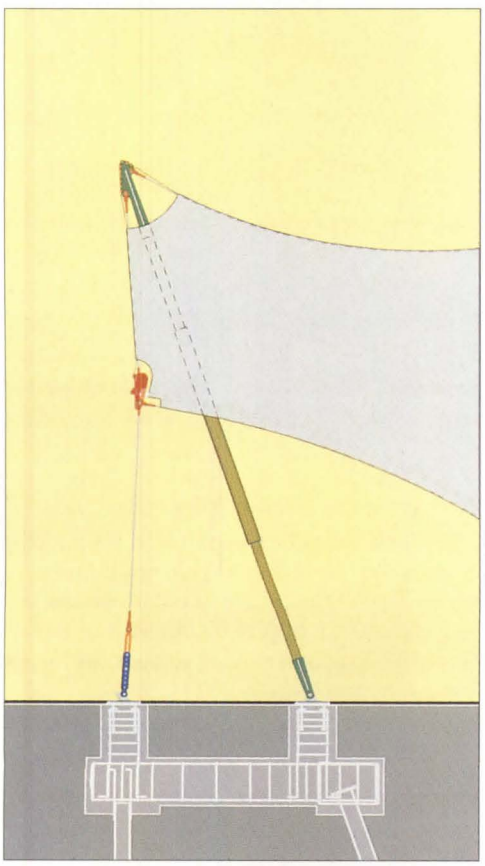
Surrounded by water on three sides (top), Pier Six Concert Pavilion anchors the eastern edge of the Inner Harbor (site plan). The three bays of the tensile structure (facing page) shelter 3,400 seats. An earthen berm along the southern end accommodates an additional 1,000 patrons.

ROBERT DAVIS



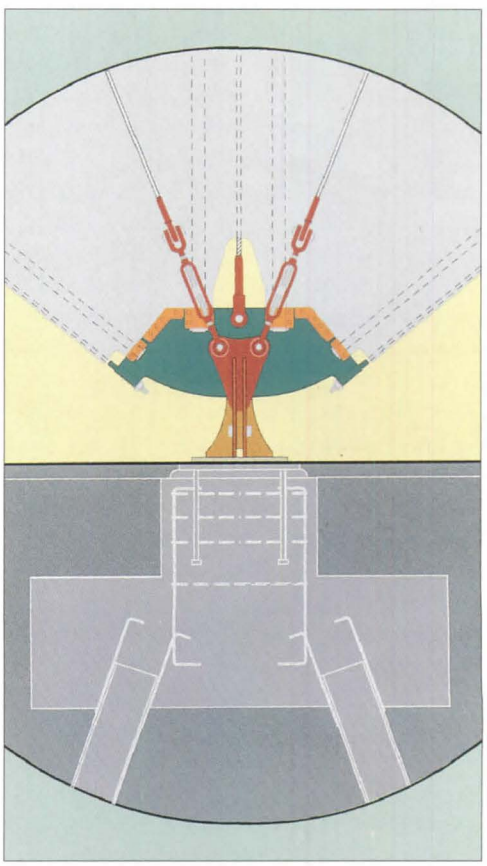
NORTH–SOUTH ELEVATION





ENTRY PAVILION COLUMN DETAIL

PERIMETER COLUMN DETAIL



VALLEY CABLE ANCHORAGE DETAIL

more commanding urban presence. "Our first effort was more of an organic form," recalls Dalland. "It looked like a giant horseshoe crab that crawled out of the water." Although such marine imagery was appropriate in this context, FTL strived for a more serious expression in its Pier Six encore.

The new 3,400-seat theater is sheltered by a vinyl-coated polyester tent. However, to imbue the complex with a feeling of permanence, the architects combined their fabric structure with a colorful, masonry assemblage. Replacing the first pavilion's collection of support trailers with more enduring ancillary structures, FTL housed the stage, administrative offices, ticket booths, dressing rooms, and mechanical systems in these two-story masonry buildings.

Masonry structures crowned with double-curving roofs support northern edge of fabric pavilion (elevation, facing page top). Small tents that shelter queueing areas for ticket booths (facing page, center left) are supported by single column (facing page, bottom left) and tie-downs. Main tent with three symmetrical bays (above) is supported by six central masts and angled point-support system (facing page, center and bottom center). Both structures incorporate underground pier footings. Fabric membrane is clipped to circular aluminum plates (facing page, center right and bottom right) that rest on concrete anchors.

Structural limitations of the wharf required that the "back of the house," which encompasses a loading dock for heavy trucks, had to be positioned along the northern end of the site, away from the tip of the pier. Accordingly, FTL arranged the solid buildings to create a "waterfront village" that successfully integrates this service area and the main public entrance. Constructed of utilitarian concrete block in a variety of earth tones and crowned with curving, standing-seam metal roofs, the ensemble recalls vernacular waterfront architecture and defines a forecourt for the tent. At the stage building, where hard and soft structures meet, the architects incorporated a reinforced concrete frame that doubles as the anchorage of the northern edge of the tensile membrane. A concrete beam set atop the stage's curving back wall encases a series of metal clips that tie down the fabric roof. The metal roof rises to shield this curved structural beam, while the tent sweeps downward, repeating the catenary of the roof line.

The strength of the Pier Six Pavilion lies in the sympathetic juxtaposition of these masonry buildings, which rest squarely on the ground, and the soaring tensile structure, which appears to hover above the pier. To accentuate the verticality of the tent, the architects supported its three symmetrical bays with six masts that rise 70 feet. After the masts were erected, the three fabric sections were laid on the ground and laced together with massive clips. Rigging mounts attached to the top of the masts were connected to 12 cable winches resting on the ground. The entire membrane structure was raised at once by utilizing the winches and two small cranes along the perimeter.

Determined to express the materials in pure tension, Dalland, in collaboration with British engineers Buro Happold, specialists in tensile structures, designed tapering columns and masts that appear to gently rest on the ground without anchor bolts. Stainless steel caps crown each of the six columns. The two cables that extend from each cap are anchored to a large, heart-shaped steel plate, which is bolted to a concrete pile. At the

perimeter, connecting cables from the angled masts sweep directly into the earth to create a dynamic, uninterrupted tension.

In addition to its web of exposed supports, the fabric-covered pavilion encompasses an underground structural system. Pile footings are submerged approximately 50 feet deep. Underground concrete pile caps anchor the cables with narrow tapering steel sleeves that receive the cables at grade.

The result of this structural tour de force is a clear, linear sequence of spaces that offers views of the surrounding harbor. Within the tent, the architects designed a gently raked concrete floor and created a stage that can accommodate large musical acts. The sound system, which was developed by Jaffe Acoustics, a firm that has worked with FTL *Architects on other* concert pavilions (ARCHITECTURE, September 1991, pages 102-105), is designed for amplified performances. The acousticians incorporated a soft wall of absorptive panels along the rear of the stage.

FTL is accustomed to working with tight budgets, and Pier Six—at a cost of $4.7 million—is no exception. To get the highest quality seating for the pavilion, the city specified the same seats as the Orioles' baseball stadium and piggybacked the order to negotiate a rock-bottom price. Less successful, however, are the areas bordering the performing complex. The city has plans for a new bulkhead and a 20-foot-wide waterfront promenade that will wrap around the pier at water's edge. But until these major renovations are completed, a chain-link fence provides a temporary solution to the security requirements of the theater.

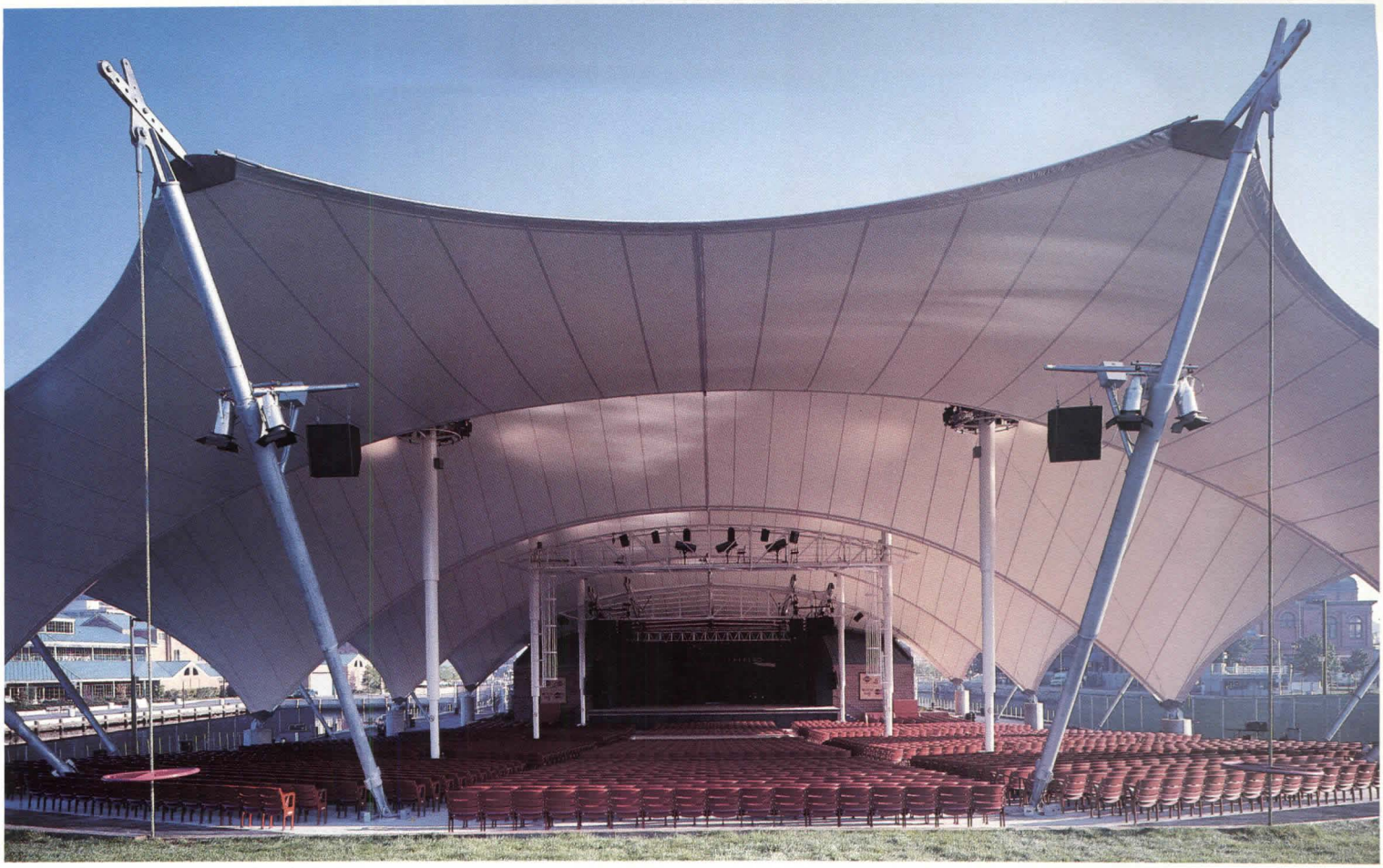
Over the past 15 years, FTL has strived to refine tensile structures, pushing for a broader range of projects, including recreational, retail, commercial, as well as portable military structures. Dalland admits his influences are Italian Renaissance architects, Le Corbusier, and Otto Frei. The Pier Six Pavilion's combination of structural clarity and urban sensitivity reflects these precedents, and positions the technical wizardry of the pavilion in the realm of architecture rather than engineering. By configuring curved surfaces in a repetitive, symmetrical sequence, FTL embraces a design formality not commonly associated with fabric-roofed buildings, while maintaining a commitment to the structural determinism of tensile buildings. ■

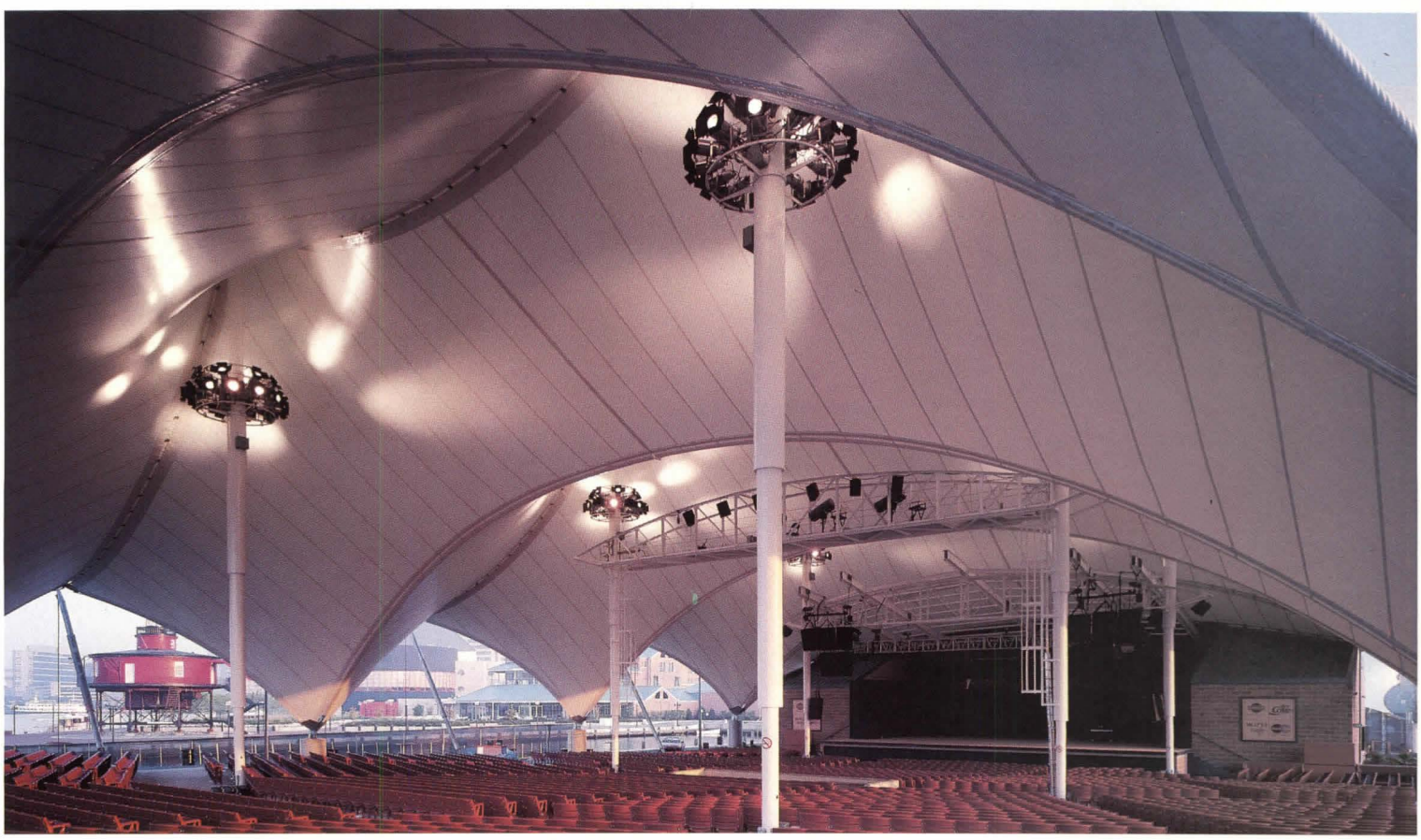
—LYNN NESMITH

A pair of small tents flanks colorful support buildings (above). Tensile structure arcs over auditorium without disturbing views out to the harbor (facing page, bottom). Lighting trusses hang from columns and curve to conform to roof configuration (facing page, top).

PIER SIX CONCERT PAVILION
BALTIMORE, MARYLAND

CLIENT: Baltimore Center for the Performing Arts
ARCHITECT: FTL Architects, New York City—Todd Dalland (principal-in-charge of design); William Lenart/AXIS (design associate); Sam Armijos, Ronn Basquette, V. William Murrell, Amedeo Perlas, Ali Tayar (design team); Andrew Formichella, Mike Meyer, Marianne van Lent, Izumi Asakura (CADD drawings)
LAND PLANNER/LANDSCAPE ARCHITECT: Crozier Associates
ENGINEERS: Buro Happold (tensile structure); M.G. McLaren (structural); Buck Seifert and Jost (mechanical/electrical/lighting); Qodesh Engineering (civil)
CONSULTANTS: Jaffe Acoustics (acoustics); Robert Davis (theater); Maryland Sound (audio engineering); Julius Heywinkel (fabric supplier/pavilion); Serge Ferrari (fabric supplier/entrance); Clycan Structures (roof fabricator)
CONSTRUCTION MANAGER: Whiting Turner
COST: $4.7 million—$118/square foot
PHOTOGRAPHER: H. Durston Saylor, except as noted





Age of Aquariums

From New Jersey to Oregon, aquariums are stimulating tourism and bringing new life to waterfronts.

STEVE ROSENTHAL

NEW ENGLAND AQUARIUM, BOSTON, MASSACHUSETTS
CAMBRIDGE SEVEN ASSOCIATES, 1969

PETER AARON/ESTO

MONTEREY BAY AQUARIUM, MONTEREY, CALIFORNIA
ESHERICK HOMSEY DODGE AND DAVIS, 1984

PETER AARON/ESTO

RING OF FIRE AQUARIUM, OSAKA, JAPAN
CAMBRIDGE SEVEN ASSOCIATES, 1990

STEVE ROSENTHAL

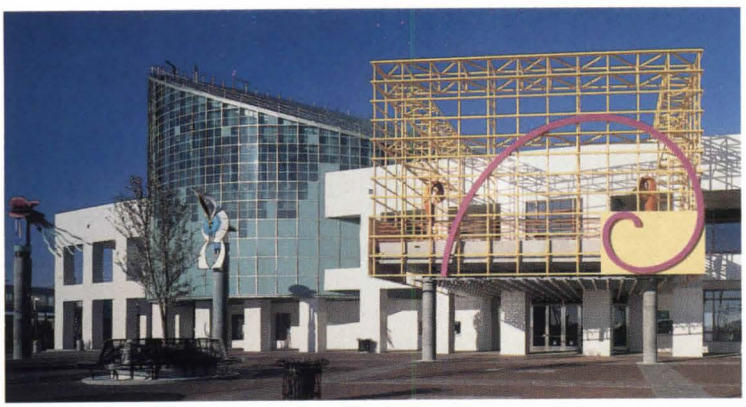
NATIONAL AQUARIUM IN BALTIMORE, BALTIMORE, MARYLAND
CAMBRIDGE SEVEN ASSOCIATES, 1981

FROM THE DAY IT OPENED IN AUGUST 1981, Baltimore's National Aquarium has been the number-one paid tourist attraction in Maryland, drawing 1.5 million people a year, generating $128 million in annual revenues for the region, and increasing adjacent land values. Admiring how the Cambridge Seven-designed ecoplex attracted tourists, promoted education, sparked spin-off development, and transformed Baltimore's image, other cities have decided to build aquariums as anchors for urban revitalization. "Not a week goes by that we aren't visited by a delegation from one city or another planning an aquarium," marvels David Pittenger, deputy executive director of the Baltimore facility.

Just as natural history museums proliferated in the late Victorian era and art museums flourished in the 1930s and 1940s, the aquarium business is booming at the end of this century, with more than 30 projects in various stages of planning and construction. Appealing to all ages and based on reality rather than make-believe, aquariums have become one of the most visible and effective tools of cities hoping to rejuvenate decaying waterfronts and lure tourist dollars.

Nearly two dozen major aquariums have opened in the U.S. since 1969, drawing more than 23 million visitors annually, according to the American Association of Zoological Parks and Aquariums. Although their construction costs—ranging from $350 to $500 per square foot—are high, these family-oriented facilities require far less land than zoos and draw more upscale visitors—people willing to pay as much as $11.50 a head, as well as spend several hours browsing or dining in nearby shops and restaurants. When placed next to other attractions such as convention centers or festival marketplaces, aquariums help coax out-of-towners to extend their visits. And for cities seeking to build people-magnets that will give their communities an image of being both on-the-move and environmentally sensitive, few attractions are more politically correct.

Boston, Monterey, Seattle, and New Orleans have all built aquariums as focal points for ambitious waterfront revitalization campaigns; all were rewarded with larger-than-expected turnouts from tourists and local residents alike. Seeking similar economic boosts, the cities of Camden, New Jersey; Chat-



TIMOTHY HURSLEY

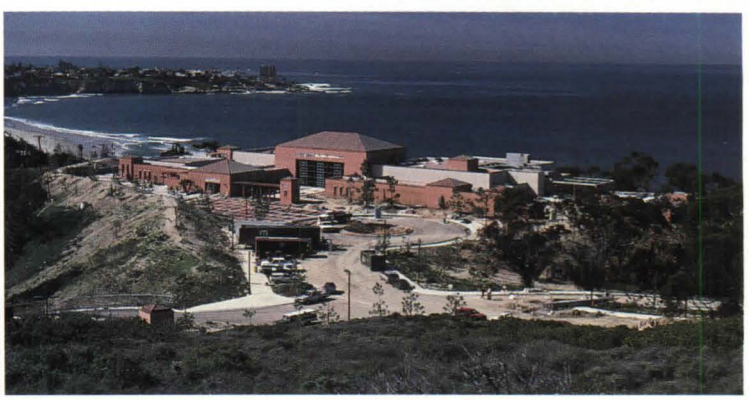
AQUARIUM OF THE AMERICAS, NEW ORLEANS, LOUISIANA
THE BIENVILLE GROUP, 1990

NICK MERRICK/HEDRICH-BLESSING

JOHN G. SHEDD OCEANARIUM, CHICAGO, ILLINOIS
LOHAN ASSOCIATES, 1991

WILLIAMS-PTAK

TEXAS STATE AQUARIUM, CORPUS CHRISTI, TEXAS
PHELPS GARZA BOMBERGER, 1990



MATTHEW KIWALA

STEPHEN BIRCH AQUARIUM MUSEUM, SCRIPPS INSTITUTION OF OCEANOGRAPHY
LA JOLLA, CALIFORNIA, WHEELER WIMER BLACKMAN & ASSOCIATES, 1992

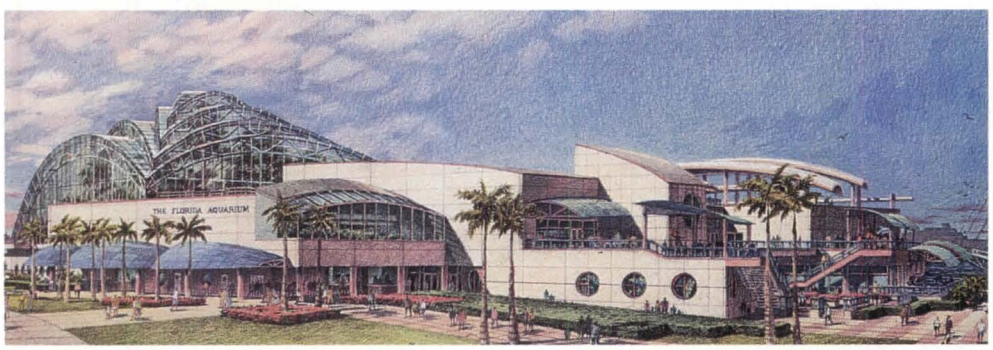
Many of today's aquariums combine architecture and nature in ways that underscore the fragile state of the environment.

tanooga, Tennessee, and Newport, Oregon, opened aquariums this year (pages 72-75). La Jolla, California's $10.5 million Stephen Birch Aquarium Museum at the Scripps Institution of Oceanography debuts this month. Among the North American cities now planning aquariums are Tampa, Florida; Charleston, South Carolina; Cleveland, Ohio; Albuquerque, New Mexico; Duluth, Minnesota; Dana Point and San Francisco, California; Toronto, Ontario; and tiny Seward, Alaska. Aquariums are also one of the few building types in which American architects have taken a leading role around the world. Projects in the works for London, Hamburg, Moscow, Genoa, Edinburgh, and both Makung and Kaohsiung in Taiwan are all led by American design teams.

Current projects are a far cry from the primitive fish-in-a-box "parlor" aquariums of the mid-19th century, which displayed fish in murky tanks along the walls, as if in an art gallery. By the 1980s, they had become urban extravaganzas—part zoo, part botanical garden, part aviary, and part natural history museum. Unlike early aquariums, which focused on the display of marine life, the newest ones recreate environmentally accurate settings to educate the public not only about the various specimens, but the worlds they inhabit.

For architects, today's aquariums represent one of the few building types to evolve in the 20th century—manmade structures that replicate natural habitats so realistically that animals breed and otherwise behave as if they were in the wild. Fittingly, many are strong examples of the "green architecture" movement—buildings that combine architecture and nature in ways that underscore the fragile state of the environment. And they're attracting a wider array of designers, from Italian architect Renzo Piano to New Jersey's Hillier Group to the young California firm Holt Hinshaw Pfau Jones.

The evolving aquariums of the 1990s are different from the pioneering institutions of the 1970s and 1980s in design, exhibits, and operation. Cambridge Seven's 1969 New England Aquarium, for example, contains almost Piranesian spaces in which light comes primarily from the tanks themselves, immersing visitors in a dreamlike environment to evoke a strong emotional response. The architects' trademark one-way circulation routes through their aquariums are unapologetically de-



FLORIDA AQUARIUM, TAMPA, FLORIDA, 1995

UNDERWATER WORLD AT PIER 39, SAN FRANCISCO, CALIFORNIA, 1993

Esherick Homsey Dodge and Davis

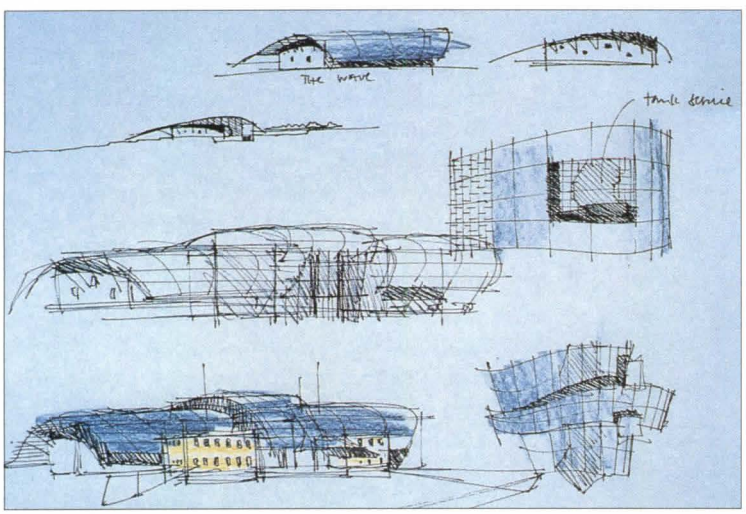
A flooded forest enclosed by a giant glass dome and a multistory replica of a coral reef will be among the featured exhibits of Esherick Homsey Dodge and Davis's 120,000-square-foot Florida Aquarium (top left) designed with the Tampa office of Hellmuth, Obata & Kassabaum for a 4.1-acre parcel on the Tampa waterfront. Its most distinctive architectural element will be a shell-shaped glass dome over the forest wetlands exhibit, designed to provide the maximum amount of sunlight needed to sustain native Florida habitats. San Francisco's Fisherman's Wharf is the proposed site for Underwater World at Pier 39 (bottom left), a 42,000-square-foot project that will enable visitors to see what divers see by moving through a transparent acrylic tube surrounded by a 770,000-gallon tank filled with marine life from San Francisco Bay. EHDD's largest and most sculpturally dramatic project is the National Institute for Marine Biology (facing page) in Taiwan, a 258,000-square-foot complex that features a series of curved metal roofs, evoking waves or a sea serpent. EHDD is also working on a large addition to the Monterey Bay Aquarium and the newly commissioned Cleveland Aquarium.

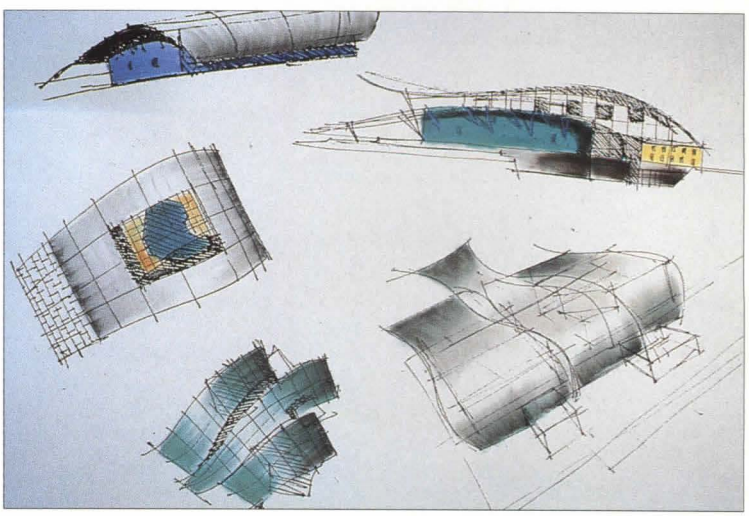
To keep increasingly sophisticated "aquatourists" entertained, architects realize they can't keep repeating the same building profiles.

signed to maximize the number of people who can visit per hour. Their rooftop pyramids in Baltimore, Osaka, and Chattanooga have become signature elements, signifying a mixture of aquatic and terrestrial habitats. In contrast, Esherick Homsey Dodge and Davis's 1984 Monterey Bay Aquarium introduced natural light, wide corridors, and hard-edged surfaces into a low-rise structure designed to look like a local cannery. The building fits comfortably into Monterey's Cannery Row, on the former site of a sardine processing plant. With its rambling profile, random circulation, and hands-on exhibits, the building is diametrically opposed to the more controlled Cambridge Seven approach of geometric forms, brilliant graphics, and theatrical lighting.

As a group, today's aquariums are more technologically sophisticated, more regionally focused, more realistic in interpreting natural habitats, more multidisciplinary, and more aggressive about interweaving information about people and animals. To avoid redundancy for an increasingly sophisticated breed of "aquatourists"—who seek out aquariums whenever they visit a new city—architects have realized they can't keep repeating the same building profiles and themes. Aquarium experts predict the diversification of the building type will continue as new aquariums seek to differentiate themselves from existing, globally oriented facilities, and capture the individual characters of their regions.

Thanks to technological advances in acrylic tank windows and life-support systems, the possibilities for diversification seem endless, and architects are pushing the limits to build innovative facilities. For example, Esherick Homsey Dodge and Davis has designed a $50 million addition to the Monterey Bay Aquarium that will contain a million-gallon "outer bay waters" exhibit housing blue and thresher sharks, ocean sunfish, and schools of fast-swimming albacore, bonito, and other fish found in the open waters off the coast. Many aquarium architects are breaking even further out of the box, creating outdoor exhibits to complement indoor displays by taking people from simulations of nature to the real thing. The Oregon Coast Aquarium, by the SRG Partnership of Portland, houses only part of its exhibits in a building; most are designed as natural outdoor habitats.





NATIONAL INSTITUTE FOR MARINE BIOLOGY, KAOHSIUNG, TAIWAN, 1996

More architects are creating architecture that recalls structures indigenous to the area, rather than repeating an "aquatecture" formula.

Having gained valuable experience on one aquarium, many architects have gone on to design others. Seattle-based firms Bassetti Norton Metler Rekevics Architects and Kramer, Chin & Mayo Engineers International, which collaborated on the 1977 Seattle Aquarium, are working together again on the Penghu Research Aquarium in Makung, Taiwan. Even relatively inexperienced firms are able to market themselves as knowledgeable experts when they join forces with exhibit designers and life-support system specialists.

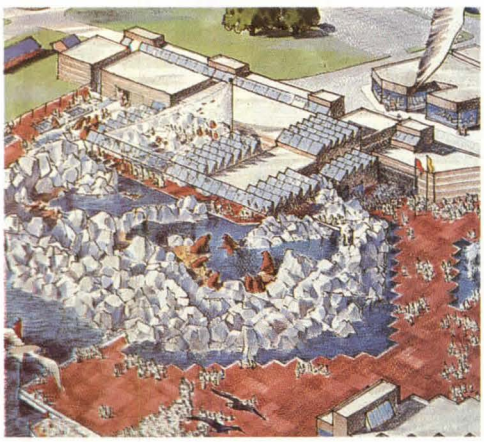
John Schleuning of the SRG Partnership, for example, says his firm could not have designed the Oregon aquarium without help from exhibit specialists BIOS and ENARTEC, a Seattle-based firm that specializes in life-support systems. At the same time, Schleuning points out that his firm, as a general practice familiar with Oregon's coastline, was instrumental in creating architecture that recalls structures indigenous to the area, not an "aquatecture" formula.

Like SRG, many architects are coming up with innovative ways to present the mysteries of the deep while tailoring their buildings to specific regions. They include:

Stronger conservation messages: Responding to the growing public interest in the environment, more aquarium directors are stressing the need for long-term global stewardship of the world's oceans, rivers, and other waterways.

Public demands: Animal rights groups have grown increasingly strident in challenging aquariums that exhibit dolphins and whales, raising doubts about whether facilities can count on exhibiting the popular marine mammals. In June, South Carolina became the first state to ban captivity of dolphins and other cetaceans. In response, the South Carolina Aquarium and others are finding new star attractions or playing up the interaction between species, rather than relying on animals they may never be able to display.

Variety of form and scale: Two basic aquarium profiles have emerged—one that is contextual, such as Monterey's, and another that makes a bold statement for its setting, such as Chattanooga's. By designing small institutions that focus on a particular region, such as Cambridge Seven's Alaska Sea Life Center in Seward, architects are showing that second- and third-tier cities can successfully tailor aquariums to their markets.



ALASKA SEA LIFE CENTER, SEWARD, ALASKA, MID-1990s

GENOA AQUARIUM, GENOA, ITALY, 1993

LANDUNGSBRÜCKEN AQUARIUM, HAMBURG, GERMANY, MID-1990s

Cambridge Seven Associates

The Alaska Sea Life Center (top left) in Seward, Alaska, will be Cambridge Seven Associates' next U.S. aquarium. Scheduled to open in the mid-1990s, the 60,000-square-foot marine center and public plaza will focus on marine mammals and seabirds from Resurrection Bay and the Gulf of Alaska. The center will combine outdoor exhibits—an artificial rookery for sea lions, sea otters, and seabirds—with underwater exhibits that take visitors on a simulated journey to the ocean floor. Already under construction is the Genoa Aquarium (center left), designed by Cambridge Seven in collaboration with Italian architect Renzo Piano. Planned as part of the city's Columbus 500 Exposition, the aquarium will enable visitors to experience marine habitats from two historical perspectives—the 15th and 20th centuries—and from two cultural perspectives—Europe and the New World. For Hamburg, Germany, Cambridge Seven has designed an aquarium topped by a pyramid (bottom left) which will rise on the banks of the Elbe River. The project is part of a mixed-use development master plan, also by Cambridge Seven, which includes an IMAX theater, retail pavilions, hotel, and waterfront promenade.

By commissioning projects that focus on their particular region, second- and third-tier cities can tailor aquariums to their markets.

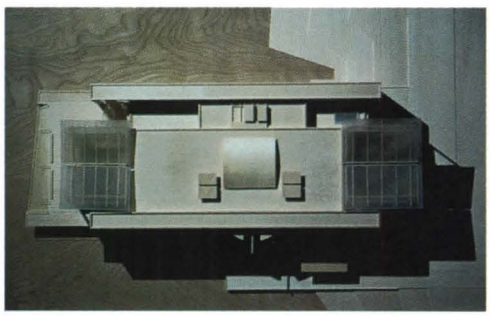
New approaches to exhibits: Increasingly, exhibits stress total ecosystems, using those habitats to educate visitors about the area where the aquarium is located. Architects are challenged to find ways to immerse visitors in various habitats by displaying the subject from above and below the water's surface, or literally directing them through watery environments in giant, acrylic tube walkways.

Exhibit specialization: As more and more zoos and aquariums are built or expanded, exhibit design has emerged as a new career alternative, combining the design skills of an architect and set designer, and the scientific knowledge of a biologist. Architect Frank Zaremba, for example, left Cambridge Seven in 1987 to join Richard Lyons in forming Lyons/Zaremba, a Boston-based firm that is now designing exhibits for aquariums around the country. Moreover, the tone of the architecture of an aquarium is often dictated by its exhibits. When an aquarium houses a blockbuster attraction, as in Camden, much of the facility may be designed around it, as opposed to a building with numerous smaller exhibits, which may be represented by more low-key architecture, as in the Oregon Coast Aquarium. In many cases, architectural design becomes secondary to exhibit design.

Interdisciplinary approach: As aquariums grow more complex and individual exhibits become more important, architects are assembling design teams with far more consultants, in areas ranging from aviculture to zoology. Notes Partner Peter Chermayeff of Cambridge Seven, "On almost every one of our current projects we have as many as 20 to 30 consultants." As the building type evolves and the design teams grow, architects find they may have to relinquish the design control they had with earlier aquariums, sharing the decision-making with landscape architects, urban designers, exhibit designers, botanists, ecologists, and others.

As technology and exhibitry become even more sophisticated, future breakthroughs will only increase the number of ways to set up encounters between people and animals. The architects' challenge will be to assemble and manage the teams that will make each aquarium educational, distinctive, and a strong economic catalyst for its region. ■

—EDWARD GUNTS



SOUTH CAROLINA AQUARIUM, CHARLESTON, SOUTH CAROLINA, 1995

Clark & Menefee Architects in association with Eskew Filson Architects

Bucking the trend of hiring an architecture firm that specializes in aquariums, the city of Charleston sponsored a national design competition for the South Carolina Aquarium in 1986. The local firm of Clark & Menefee Architects (subsequently relocated to Charlottesville, Virginia) was awarded the commission for the 85,000-square-foot marine complex. In addition, New Orleans-based Eskew Filson Architects and a consortium of exhibit designers and aquarium consultants were also hired. The $25 million facility will be built on the Cooper River waterfront in Charleston's historic district. The concrete structure will house aquatic environments native to the state and incorporate nonlinear exhibition paths, multimedia presentations, and hands-on experimental displays. A pair of double screen walls will bracket the north and south elevations (top left and bottom left), and open-air aviaries clad in wire mesh and crowned with butterfly roofs will anchor the east and west ends (center left). The lobby will contain a massive schooling tank and a 32-foot waterfall. Construction will begin late this year, with the opening planned for 1995.

Tennessee Aquarium
Chattanooga, Tennessee
Cambridge Seven Associates, Architect

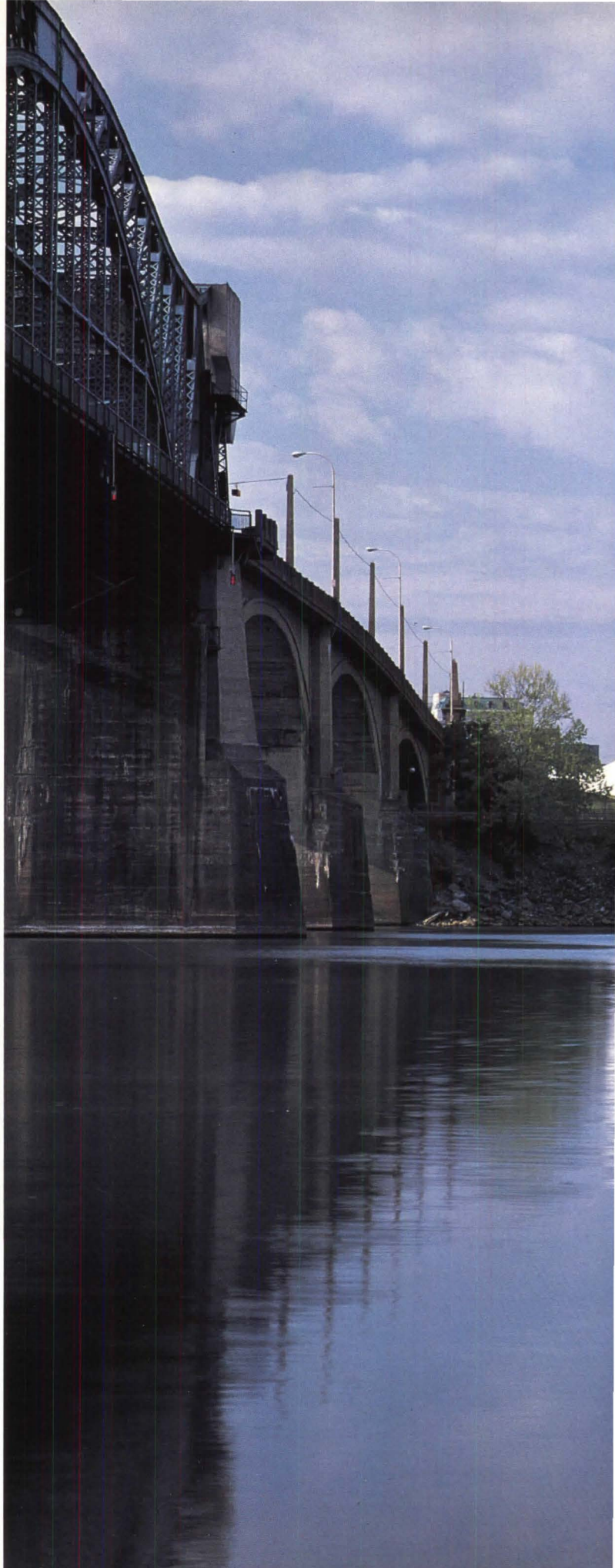
WHEN CHATTANOOGA'S civic leaders first approached Cambridge Seven to design an aquarium for the banks of the Tennessee River, the client envisioned an attraction similar to the National Aquarium in Baltimore, which the firm designed 15 years ago. But instead of cloning Baltimore's showpiece, which offers a global view of marine life, the architects recommended a building that would focus on the ecosystems of the Tennessee River Valley, creating America's first major institution devoted primarily to freshwater habitats.

"It's our very own, homegrown cathedral of conservation," boasts Mayor Gene Roberts. Cambridge Seven and Boston-based exhibit designers Lyons/Zaremba tell the story of the Tennessee River in a 130,000-square-foot building that simulates riverine habitats from Appalachia to the Gulf of Mexico, and is a metaphor for the river itself. Their greatest challenge was to take ordinary plants and wildlife that depend on the river—rainbow trout from forest streams, river otters from mountain pools—and exhibit them in such a way that they seem out of the ordinary.

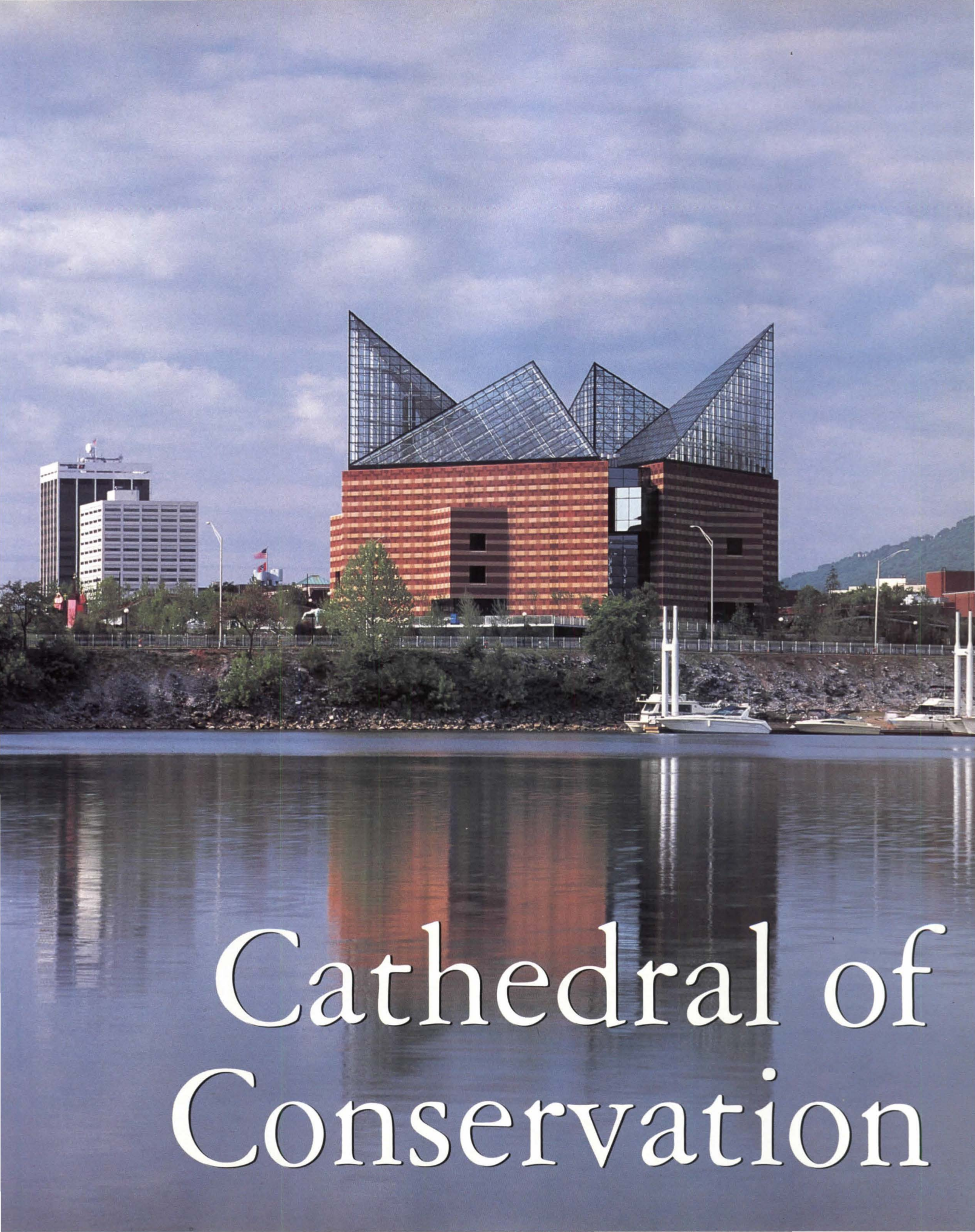
"This building is a love affair with the river," maintains Partner Peter Chermayeff. "We came to the conclusion that we should use the river as a story line, a linear sequence, literally from its origins in the Great Smoky Mountains through its midstream and down to the Mississippi delta. The key was to find the intrinsic interest, the excitement, in what seems ordinary but isn't."

The privately funded, $45 million Tennessee Aquarium features many Cambridge Seven trademarks—rooftop pyramids, a one-way circulation path, backlit graphics, and fish-themed artwork. Benefitting from ever-advancing technology, the firm has reached beyond its previous aquarium efforts, creating richly detailed, sensitively interpreted environments that not only show off the animals but take ecotourists on a three-dimensional journey to the worlds they inhabit.

The goal, Chermayeff explains, was to put architecture in service of a larger objective: connecting people to the Tennessee River by setting up encounters that stimulate an emotional response. "The aquarium is intended as an immersion experience, where visitors will



The $45 million Tennessee Aquarium rises on the banks of the Tennessee River (these pages) to anchor an ambitious riverfront revitalization program that includes a 22-mile greenway, children's museum, visitors' center, and waterfront housing.



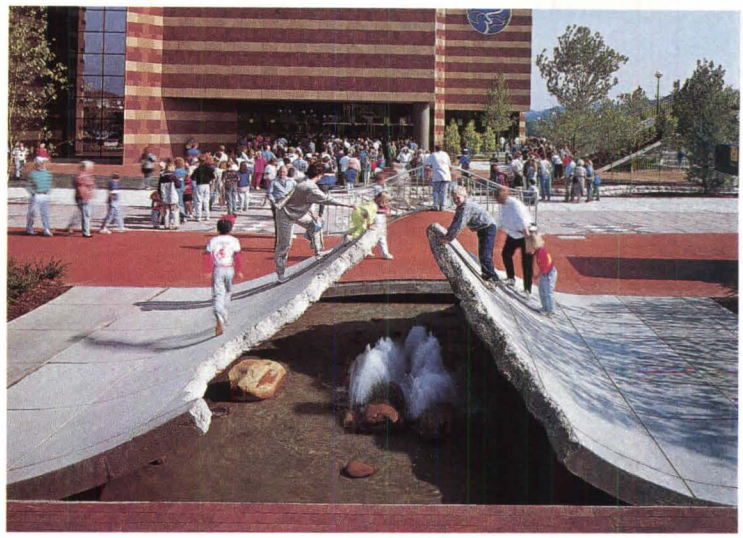
Cathedral of Conservation

be surrounded by the animals and feel their presence all around," he explains. "We've tried to get the interior architecture to be so secondary it seems to disappear."

A visitor's experience begins on the banks of the Tennessee River, where a 2-acre, $10 million park and plaza were created to mark the birthplace of this city of 152,000. Called Ross's Landing, the area was designed by the New York firm SITE and Virginia-based landscape architects EDAW, in collaboration with Robert Seals Architects of Chattanooga and public artists Stan Townsend, Jack Mackie, and others. According to SITE's James Wines, the park is arranged as a series of 35 bands that connote the passage of time, tracing the story of the city with artifacts that depict milestones such as the Civil War and the growth of the railroad industry. By focusing on local lore the same way Cambridge Seven focused on local habitats, the team produced a rich tapestry that weaves the history of the city and its people to the site.

As seen from downtown, the 12-story aquarium rises from the park and looms in the distance like a crystal-crowned Oz. Chermayeff conceived the building as a large cube that is clad in two tones of textured concrete block and marks a terminus to the city's main north-south thoroughfare. To hint at the riverine theme, he capped the five-story base with two sets of glass pyramids that house the building's two terrestrial exhibits, one representing each end of the river. Inside, the cube is divided on the diagonal into two triangular volumes, and each floor is further split to create simulated habitats for 3,500 living specimens. The diagonal divider—marked on the exterior by mirrored glass walls—is a 60-foot-deep circulation "canyon" with ramps and bridges that wind down through the building, linking exhibits along a one-way route that echoes the river's flow.

From the lobby, visitors start their journey by traveling four stories up a slow-moving escalator to an orientation point that offers panoramic views of the river below. From there, they proceed to the first major exhibit, the Appalachian cove forest, which combines natural and artificial trees with indigenous plants, animals, birds, and reptiles, against a waterfall and mountain stream. Leaving the cove forest, visitors find themselves atop the darkened circulation canyon and begin their descent through the building. Alternating between the architectonic central space and side galleries containing naturalistic settings, they take in river habitats, manmade lakes, and fertile swamplands. The final aquatic ex-

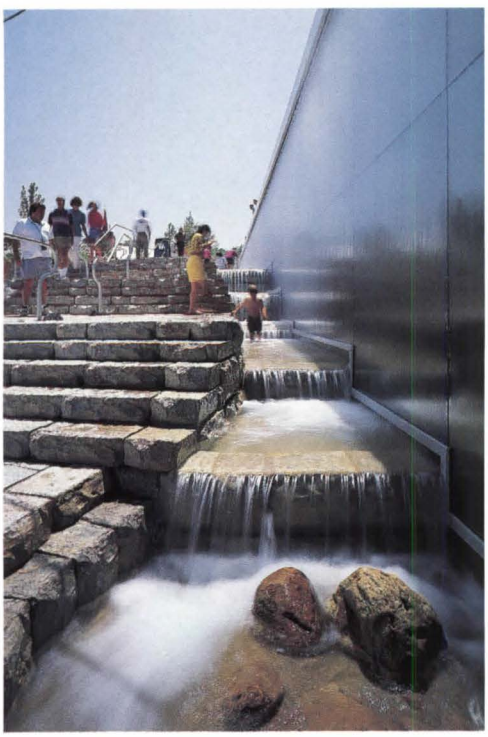


SITE

SITE

Ross's Landing (facing page, top) is a combination of landscaping and public art that tells the history of the city. SITE's fractured pavement (top right), sculpted pools (center right), and lifted landscapes (right) surround the aquarium. Northeast facade becomes a water wall (facing page, bottom left) that spills into the park (facing page, bottom right).

AERO PHOTO SERVICE



hibit is the building's largest, a 137,000-gallon tank that simulates Nickajack Lake near Chattanooga, marking a return to the point where the journey began.

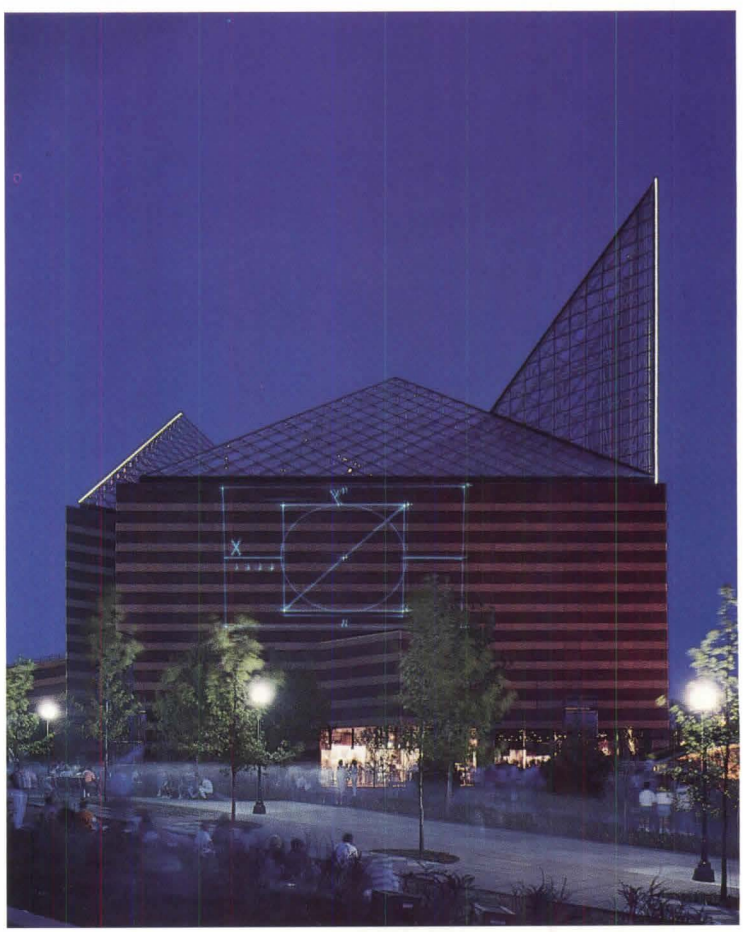
By the time visitors leave the aquarium and park, they have been treated to a double dose of architectural storytelling from two world-class design teams, working to create powerful anchors for Chattanooga's waterfront revitalization. "One of our expectations is that the people of Chattanooga will rediscover their own river, their own sense of themselves," Chermayeff maintains. "We've reached into the soul of the place, and I think that's going to have strong meaning for the people of the region."

In the process, Cambridge Seven, SITE, and the other team members have also demonstrated why aquariums are so popular in the 1990s: they don't display fish in a box, but literally transport people to worlds they may never have a chance to visit—providing experiences they can not only move through, but be moved by. By celebrating the ordinary in Tennessee, Cambridge Seven and its collaborators truly made it seem extraordinary. Indeed, they have done the job so well that the real star of the show is not architecture at all, but the river itself. ■

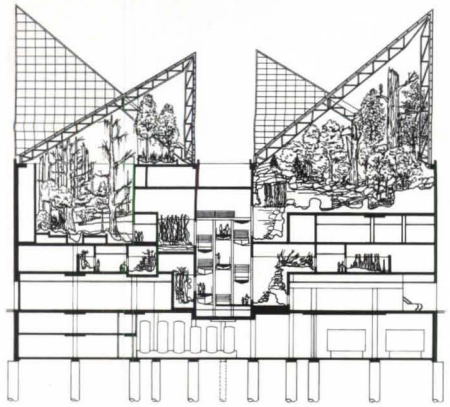
—EDWARD GUNTS

TENNESSEE AQUARIUM
CHATTANOOGA, TENNESSEE

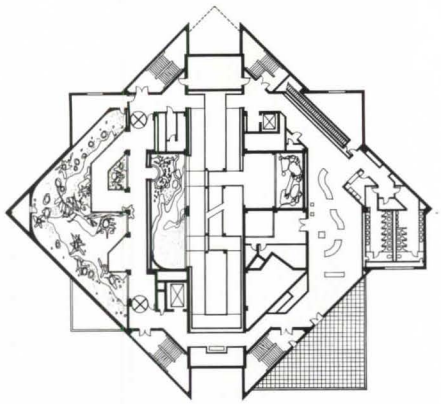
ARCHITECT: Cambridge Seven Associates, Cambridge, Massachusetts—Peter Chermayeff (principal-in-charge); Dick Tuve (project manager/principal); Steve Imrich (project architect); Bobby Poole (technical development/principal); Peter Sollogub (design principal); Nick Forbess (construction administration); Jess Kilgore, Denise Tran, Ed Benner, Andy Douglas, Ken Roberts, Rob Wilkinson, Jim Cowey, Ellen Fortin, Louise Hara, Lorraine Guthrie, Carl Peterson, Erwin Lee (design team)
ASSOCIATE ARCHITECT: Derthick, Henley & Wilkerson, Chattanooga, Tennessee—Alan W. Derthick (principal)
LANDSCAPE ARCHITECTS: SITE Projects; EDAW
ENGINEERS: Weidlinger Associates (structural); John L. Altieri Consulting (mechanical/electrical); ENARTEC Consulting Engineers (life support)
CONSULTANTS: Lyons/Zaremba (exhibition design); Chermayeff & Geismar (graphic design); The Larson Company (habitat fabrication); Sound Design Studio (environmental sound); Sherry Wagner, Andrea Fisher (museum shop planning); Sherry Wagner (folk art collection/TVA production); Claire Nivola (sculpture); Brandston and Partners (lighting); Schirmer Engineering Corporation (life safety); Fred Brinks Company (video production)
GENERAL CONTRACTOR: Turner Construction
COST: $45 million—$346/square foot
PHOTOGRAPHER: Nick Wheeler/Wheeler Photographics, except as noted



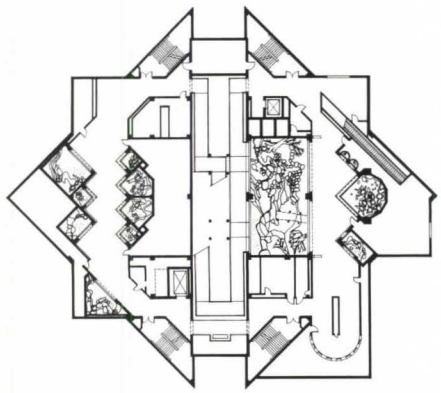
Cambridge Seven's signature pyramids rest on a five-story base clad with textured concrete block in two different earth tones (top right). Scored concrete surfaces change depending on sunlight, appearing as bands or a herringbone pattern (facing page). On opening night, the southwest elevation was enlivened by lasers and neon lights (right).



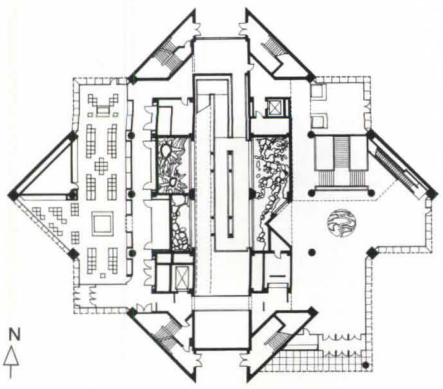
WEST-EAST SECTION



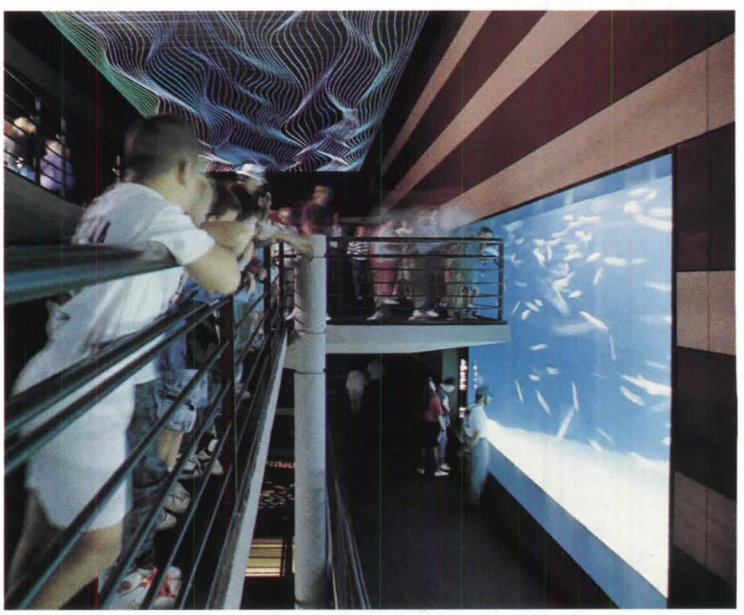
THIRD FLOOR PLAN



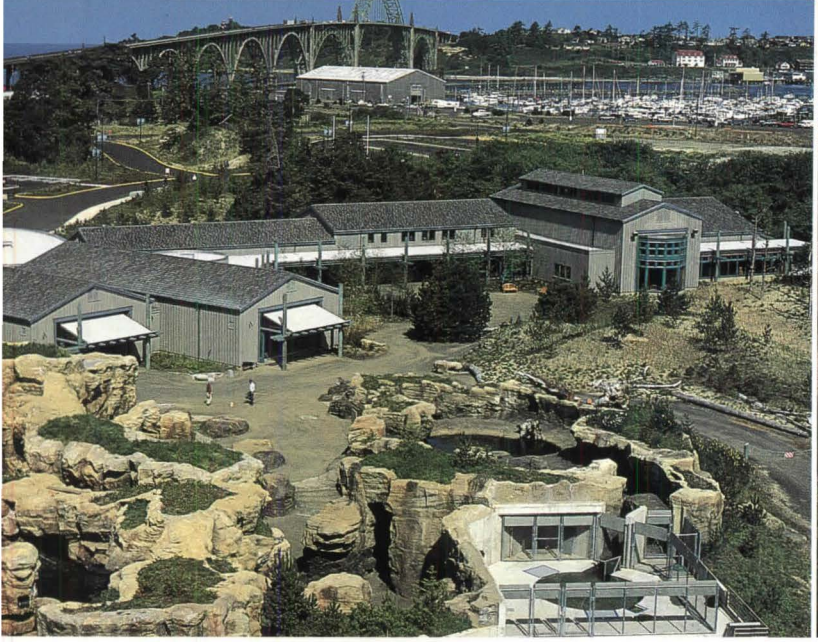
SECOND FLOOR PLAN



FIRST FLOOR PLAN



Exhibits such as the Appalachian cove forest (facing page), Mississippi delta (top right), and rivers of the world gallery (center right) are linked by a 60-foot-high circulation canyon (right) with bridges and ramps that run through the aquarium's center (section and plans). Acrylic windows afford underwater views of habitats visitors have seen from the surface.

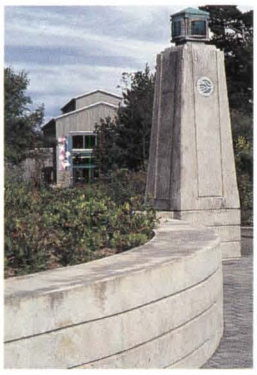


Oregon Coast Aquarium
Newport, Oregon
SRG Partnership, Architects

Coastal Education

VISITORS TO THE OREGON Coast Aquarium won't be thrilled by blockbuster shows of whales, dolphins, and sharks. And they won't find huge fish tanks, exotic environments, or other types of aquatic wizardry. For the mission of the $24 million private, not-for-profit institution—Oregon's first aquarium—is education. "We want people to come away from here with a better appreciation of our natural resource bank, so they can work to conserve it," explains the aquarium's executive director, Phyllis Bell. Visitors are encouraged to learn about the state's different coastal habitats—rocky shores, sandy beaches, ocean waters, and wetlands—within a 40,000-square-foot building and 2.5 acres of outdoor exhibits. And they are allowed to discover these treasures at their own leisurely pace, asking the aquarium's volunteers about the wonders of such indigenous creatures as a rhinoceros auklet or a decorated warbonnet.

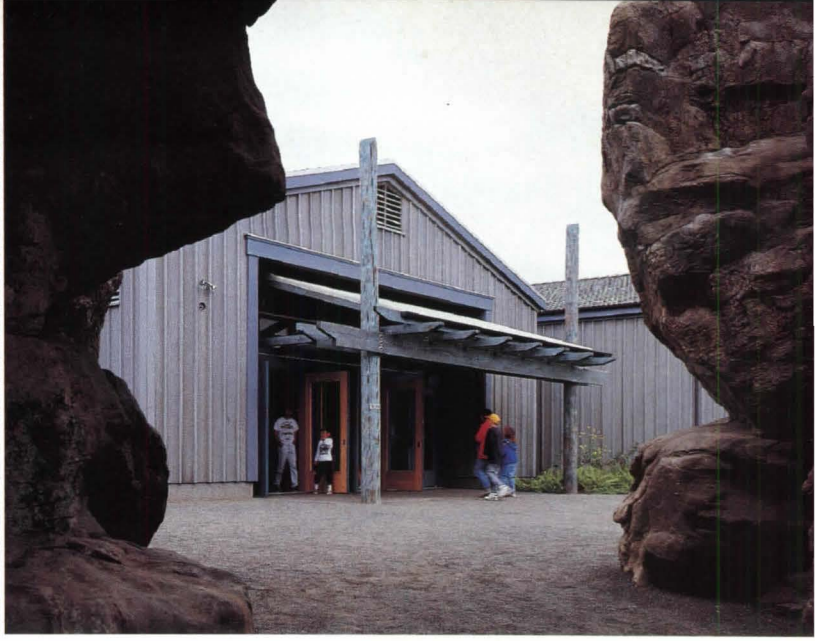
The Oregon aquarium's educational thrust is furthered by its association with its next-door neighbor, Oregon State University's Mark O. Hatfield Marine Science Center—the two institutions now share training, research, and educational programs—and its proximity to state and national environmental agency offices. This concentration of related activity is located on Yaquina Bay to the south of downtown Newport, a coastal town of 8,900, whose timber and commercial fishing industries fell on hard times in the 1980s. Boosting this depressed economy, and the entire region's, is another of the aquarium's noble goals. Like most American aquariums, the Newport facility was conceived as an opportunity to take advantage of increasing tourism; in this case, community leaders hoped to draw from six million visitors to the Oregon coast each year.

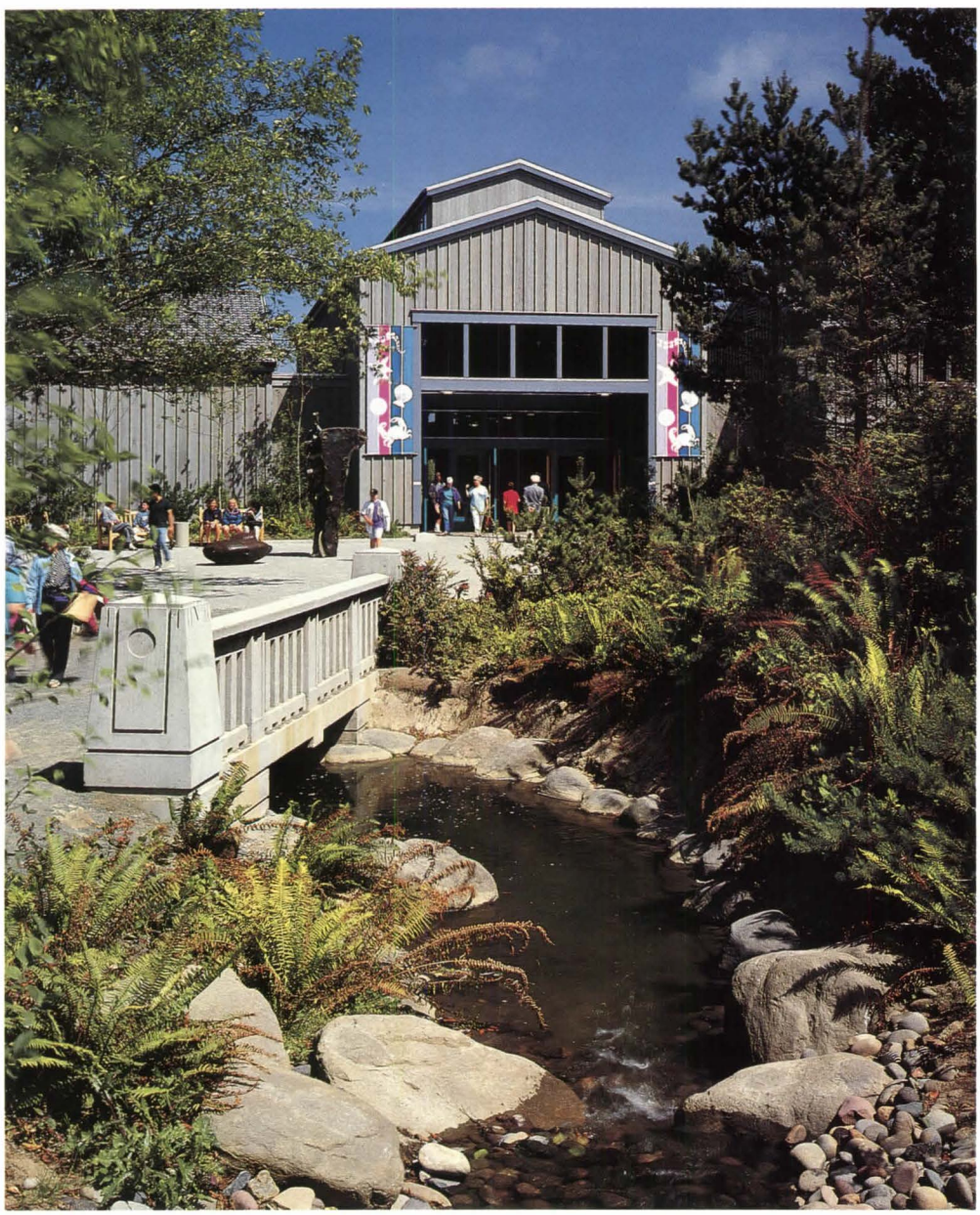


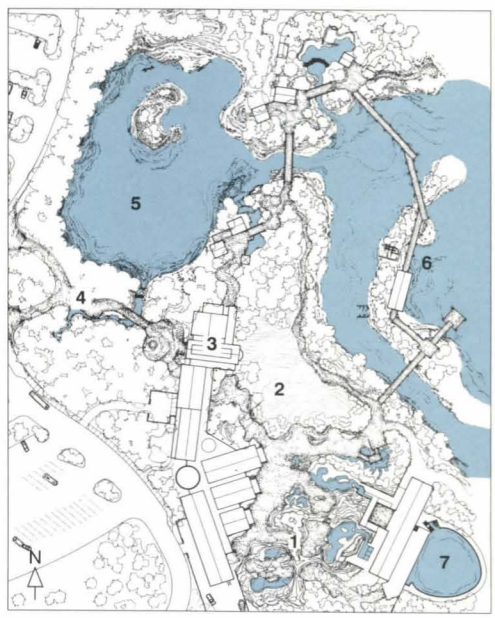
The Newport aquarium reflects the current trend of drawing attention to local marine life and regional ecosystems. But unlike its urban counterparts, such as the Chattanooga and Camden aquariums, this coastal enclave downplays architecture in favor of a naturalistic setting, designed to simulate a microcosm of its Yaquina Bay surroundings.

"We tried to achieve a truly environmental experience," explains Principal Jon Schleuning of Portland's SRG Partnership, architects of the aquarium and leader of the project team, which included exhibit designer BIOS, outdoor aquarium designer Fulton Gale Architects, and landscape architects Walker & Macy. "The building forms a background to the exhibits."

Underscoring the aquarium's ties to its surroundings, SRG designed the timber structure to recall the architecture of nearby canneries and lumber mills, with an obvious nod to the landmark Monterey Bay Aquarium by Esherick Homsey Dodge and Davis. The building's linear arrangement of board-and-batten gabled sheds exudes an appropriately vernacular character, as if the structure had been recycled from the sawmill that once stood on the site. "It's like a well-worn corduroy jacket," notes Schleuning, who oriented the building to open out to-



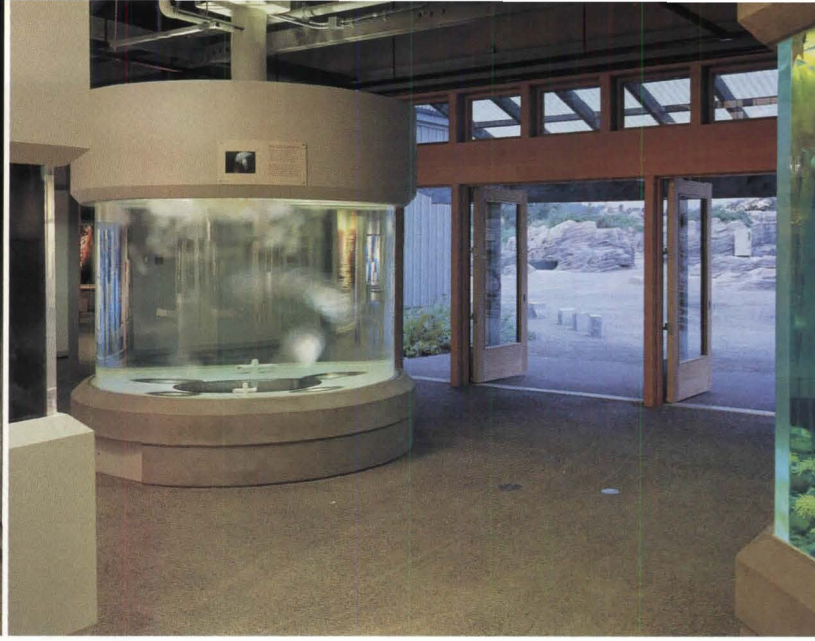




SITE PLAN

1 OUTDOOR EXHIBITS
2 DUNES
3 AQUARIUM
4 STREAMBED
5 FRESHWATER POND EXHIBITS (PHASE II)
6 ESTUARY EXHIBITS (PHASE II)
7 DEEP SEA EXHIBITS (PHASE III)

Sited on Yaquina Bay, the Oregon Coast Aquarium comprises outdoor exhibits (site plan and facing page, top left), including wetlands (top left) and streambed at entrance (left). Indoor exhibits are housed in gabled pavilions (facing page, top right) with timber-framed entrances (top right). Entrance gates (facing page, left inset) are designed to echo nearby bridge. Door hardware (facing page, right inset) extends educational theme.



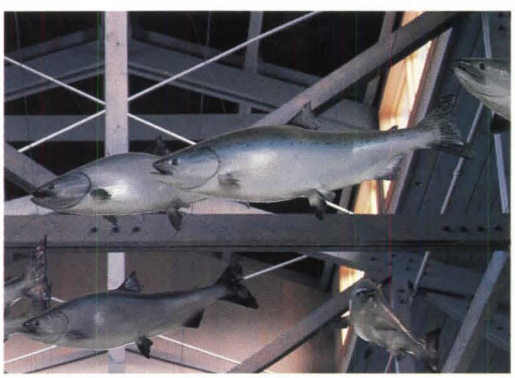
Visitors are directed from lobby (facing page, bottom) to introductory exhibit with video screens (facing page, top left) by school of fiberglass coho salmon hanging from exposed trusses (inset below). Walkway from lobby to galleries (top left) and open doors in gallery pavilions (top right) link indoor and outdoor displays. Exhibits include freestanding tanks (above) and touch pool (facing page, top right).

ward the recreated dunes and outdoor exhibits that comprise most of the aquarium. Accordingly, he lined up back-of-the-house functions, such as classrooms, bookstore, and support services, against the western edge nearest the parking lot, and housed galleries and exhibits within a trio of open-door pavilions that extend into the landscape to the east. A drumlike theater, in which a short movie on migrating gray whales is shown, forms a hinge between the two main wings.

Interiors are similarly low-key, with exposed timber trusses and ductwork, to showcase displays that are intimate and interactive. In one gallery, common species such as shrimp are individually sequestered in their own 2-by-2-foot, wall-mounted tanks for close-up study. In another, visitors are encouraged to dip their fingers into a "touch pool" filled with chitons and sea stars, or peer through a video camera into the depths of a tide pool. The only false note among the hands-on exhibits is a high-tech wall of video screens that passively introduces the public to coastal ecosystems. To encourage visitors to wander from these interior displays to the outdoor exhibits, the architects bracketed each gallery with doors and provided a sheltered zone of walkways and canopies that accommodates Oregon's rainy climate.

In contrast to the indoor exhibits, the 7,850-square-foot seabird aviary and pools sporting sea otters (extinct from the Oregon Coast since 1911), sea lions, and other marine animals incorporate more showy aquarium techniques. They are set within environments constructed of concrete formed in plastic molds peeled from rocks, meant to simulate the cliffs of nearby beaches. The water that splashes over these manmade rocks similarly mimics nature: artificial surf is created by wave machines to form tide pools filled with anemones and starfish.

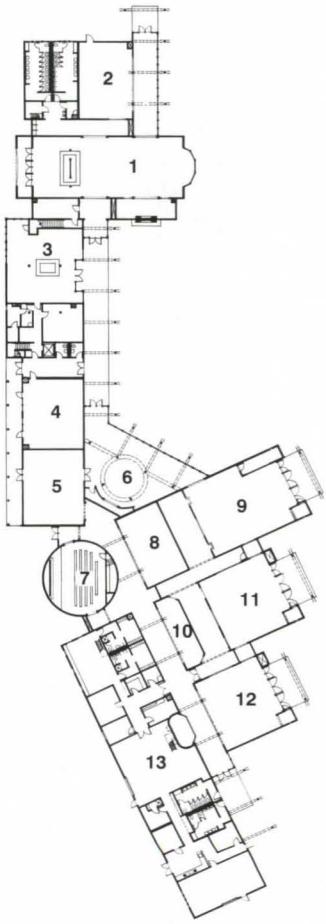
In the future, the aquarium plans to expand with more outdoor exhibits, including a salmon hatchery, that will be linked by boardwalks around a freshwater pond and saltmarsh. And expand it must: since opening in May, the small aquarium has broken anticipated attendance records—300,000 visitors in its first two months of operation. So far, its emphasis on learning has proved a success, attracting large numbers of school groups and the disabled to the ecosensitive complex. And despite local competition—the Undersea Gardens in downtown Newport, the Sea Lion Caves down the road, and a "Zoozeum" of reptiles and "dinosaurs" next door—the Oregon Coast Aquarium's humble exhibits prove that the commonplace can be elevated to draw the crowds. After all, the building's most popular attractions are tanks of jellyfish and kelp. ■



—DEBORAH K. DIETSCH

OREGON COAST AQUARIUM
NEWPORT, OREGON

ARCHITECT: SRG Partnership, Portland, Oregon—John Schleuning (design principal); Dennis Cusack (managing principal); Richard Farrington (project architect); Laura Hill (interior design); Douglas Reimer (construction architect); Kelcey Beardsley, Jim Wilson, Alan Osborne, Diana Moosman, Laurel Amato, Fred C. Gast, Jr., Ken Klos, Bonnie Bruce (design team)
LANDSCAPE ARCHITECT: Walker & Macy
ENGINEERS: Holmes/Entenman Engineers (structural/building); Tom Fowler Consulting Engineers (structural/exterior aquarium); Carson Bekooy Gulick Kohn (mechanical/electrical) Wilsey & Ham Pacific (civil)
CONSULTANTS: BIOS, Inc. (exhibition design); Fulton Gale Architects (exterior aquarium design); ENARTEC (life-support systems); Towne, Richards & Chaudiere (acoustics); Spectrum Systems Design (audio/visual); Halliday Associates (food services); Cost Planners (cost estimating)
GENERAL CONTRACTOR: Mountain States Co.
COST: $4.6 million (exterior); $8.5 million (building)
PHOTOGRAPHER: Strode Eckert Photographic

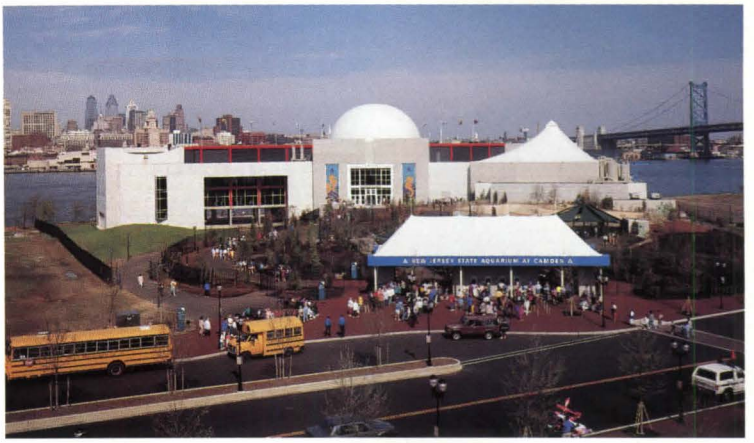


FIRST FLOOR PLAN

1 LOBBY
2 CAFETERIA
3 SHOP
4 CLASSROOM
5 NEW CURRENTS EXHIBIT
6 INTRODUCTORY EXHIBIT
7 AUDITORIUM
8 WETLANDS EXHIBIT
9 SANDY SHORES GALLERY
10 COAST LAB EXHIBIT
11 ROCKY SHORES GALLERY
12 COASTAL WATERS GALLERY
13 SUPPORT SERVICES

Thomas H. Kean New Jersey State Aquarium
Camden, New Jersey
The Hillier Group, Architect

Aquatic Anchor



DESPITE ITS IGNOMINIOUS REPUTATION AS ONE OF the most economically depressed cities in the country, Camden, New Jersey, is preparing a revival. The Thomas H. Kean New Jersey State Aquarium, designed by the Hillier Group of Princeton, opened in February as the first building in the city's redevelopment plan for the banks of the Delaware River. "Camden thrived on the water," explains Thomas P. Corcoran, president of the development group formed in 1984 to foster growth along the city's waterfront.

Located directly across from Philadelphia's Penn's Landing, the 110-acre site was well served at the turn of the century by ferries and a rail line. Workers built boats in its shipyards, canned soups for Campbell's, and assembled radios for RCA. But water travel diminished after a bridge linked Camden to Philadelphia in 1926, the railroad declined, and Camden's manufacturing base began to erode in the 1950s. It was not until 1984 that the development association commissioned Wallace, Roberts & Todd of Philadelphia to design a master plan for the old ferry site. A park was proposed along the river, and an aquarium was selected as the plan's civic anchor.

Commissioned in 1985 by the New Jersey Sports and Exposition Authority, the Hillier Group carefully considered the aquarium's site, its urban context, and the project's ultimate economic goals. The architects insisted on a freestanding building next to the water to convey the significance of the building and master plan. Yet the firm recognized that the structure had to be sensitive to the scale of the park.

Hillier wove these seemingly contradictory objectives into a coherent whole by organizing the building along a curved circulation spine punctuated by highly articulated programmatic elements. From the water, the spine appears as a formal frontispiece: a bowed wall of cast-in-place concrete that embraces the river. The architects marked the center of the spine with a commanding fabric dome above a central lobby pavilion and bracketed the structure with a restaurant at one end and an auditorium at the other. With this symmetrical composition, the building formally announces to Philadelphia that Camden has indeed returned. But the traditional massing is penetrated by brightly colored, Tinkertoylike shapes, signifying that while the city means business, it also knows how to have fun.

On the east side, the architects dissolved the symmetry into an informal collection of pavilions that blend into a garden setting.

West face of aquarium (facing page), which anchors Camden's waterfront plan, projects across the Delaware River to Philadelphia. East face (above), trimmed with tents and banners, extends into adjacent park.

The aquarium's relationship to the park is strengthened by a forecourt of outdoor exhibits and a series of tent structures, culminating in an opaque fabric dome over the lobby and a translucent fabric tensile roof over a 760,000-gallon open ocean tank.

From the lobby rotunda, the public can circulate to any exhibit. First-time visitors begin with the first-floor tanks, which reflect the diverse marine life of New Jersey. Labs on the second floor allow for a detailed examination of individual species from around the world. Albeit educational, the exhibits are less memorable than the building's connections to its site and the local community. Exterior vistas from critical interior points reinforce the aquarium's civic goals. So does a clever lighting display on the exterior of the lobby dome that predicts tomorrow's weather. The dome glows blue at night if blue skies are expected, red if storms are imminent, and white if overcast.

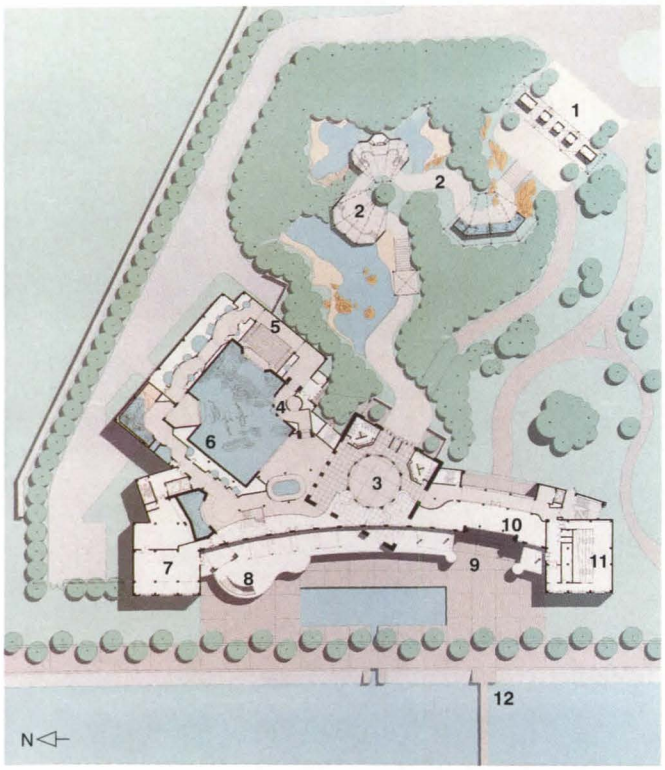
Although it will be years before the full ramifications of the Camden Aquarium are known, it is clear that some big fish have already caught the bait. Campbell's Soup Company will occupy a $36 million, Hillier-designed office building to the north, scheduled to break ground this fall, and General Electric will lease a $65 million facility now under construction to the east. The Delaware River Port Authority is also committed to building a $25 million headquarters, and financing is now being sought for a $33 million hotel/conference center and an $18 million performing arts center. And, in its first four months of operation, the aquarium has welcomed 600,000 visitors, nearly twice as many as projected. ■

—NANCY B. SOLOMON

Bold geometries interrupt the waterfront facade. Classroom is dressed up in yellow (top), wet lab pops out as a red cube, and projection booth is a red rectangle (facing page). Offices are tucked below blue balcony.


Life
on
the
Rocks

After meandering through exterior exhibits, visitors reach a rotunda (facing page) with fossilized sea creatures embedded in terrazzo floor, ceramic wall tiles rendered in gradated patterns, fish mosaics based on Roman originals, and opaque fabric roof. Sea lab (top right) forms transition from lobby to amphitheater (bottom right), where visitors view sharks underwater. Translucent fabric roof over open ocean tank (center right) allows sunlight to penetrate the briny deep.

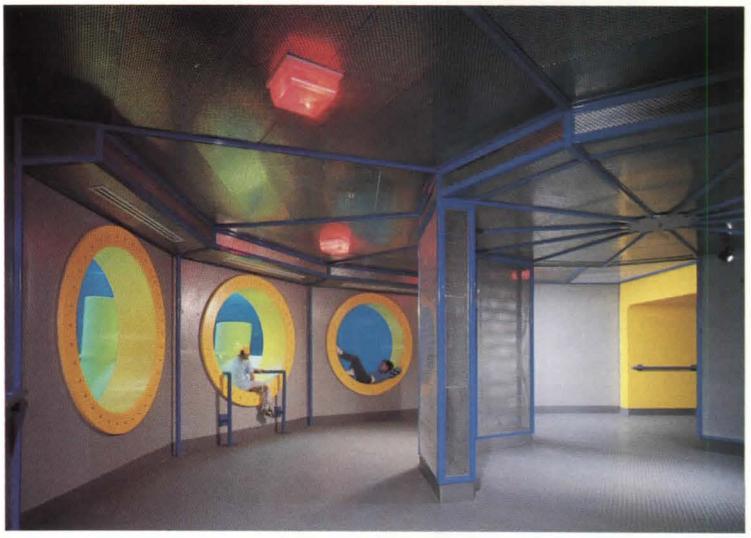


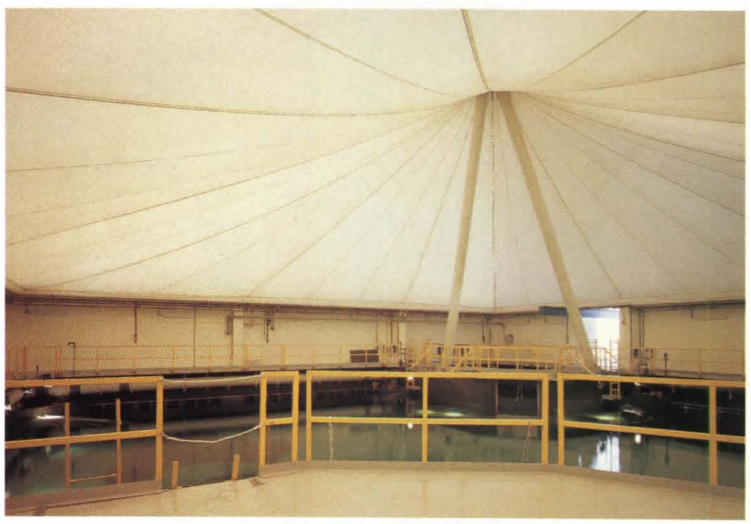
SITE PLAN

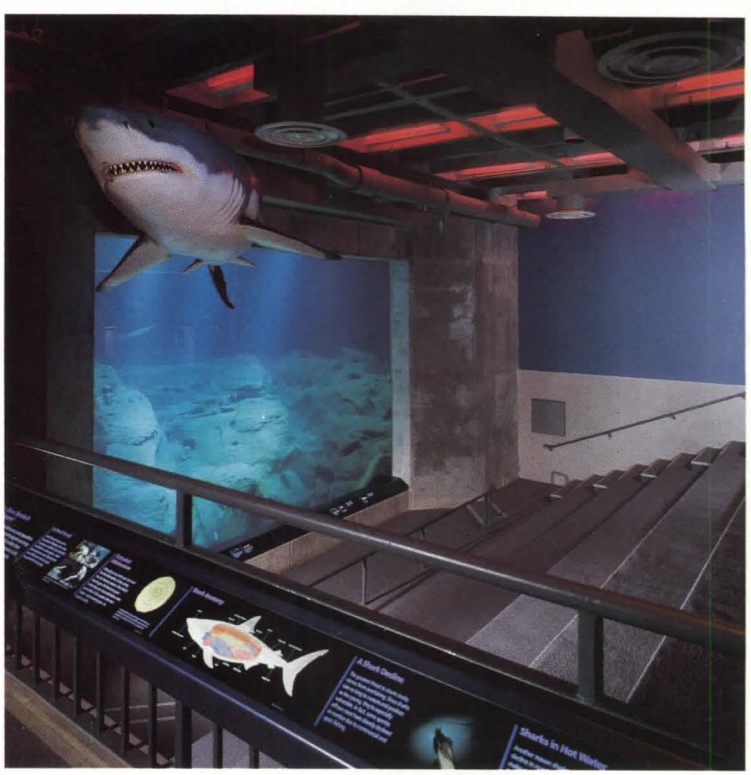
1	ENTRY BOOTH	5	AMPHITHEATER	9	PORTAL
2	OUTDOOR EXHIBITS	6	OPEN OCEAN TANK	10	BOOKSTORE
3	LOBBY	7	RESTAURANT	11	AUDITORIUM
4	SEA LAB	8	TERRACE	12	FERRY LANDING

THOMAS H. KEAN NEW JERSEY STATE AQUARIUM
CAMDEN, NEW JERSEY

CLIENT: New Jersey Sports and Exposition Authority
ARCHITECT: The Hillier Group, Princeton, New Jersey—John Pearce (project principal); Steve McDaniel (design architect); Len Groom (project architect); Metin Celik (project coordinator); Marty Bloomenthal, Thom Britschge, Jean Clarke, Howard Davis, Zlati Dinev, Helio Gonzalez, Kun Lim, Dave McHenry, Bill Metzger, Sarah Noble, Brian Norkus, Brian Pearce, Cheryl Sanders, Beth Ann Tobias, Phil Turolla, Alison Wray, Jon Yee (design team)
PLANNER: Wallace, Roberts & Todd
ENGINEERS: Paulus, Sokolowski and Sartor (structural); Syska and Hennessy (mechanical/electrical/life support)
EXHIBITION DESIGNERS: Coe, Lee, Robinson, Roesch (exterior); Joseph A. Wetzel Associates (interiors); Mary Scott Cebul and Chris Matheu (conceptual)
CONSULTANTS: Gary Steffy Lighting Design (lighting); Cerami & Associates (acoustics); Lou Garibaldi (life support); Philip C. Antico (food service)
CONSTRUCTION MANAGER: Lehrer/McGovern/Bovis
COST: $52 million—$185/square foot
PHOTOGRAPHER: Matt Wargo







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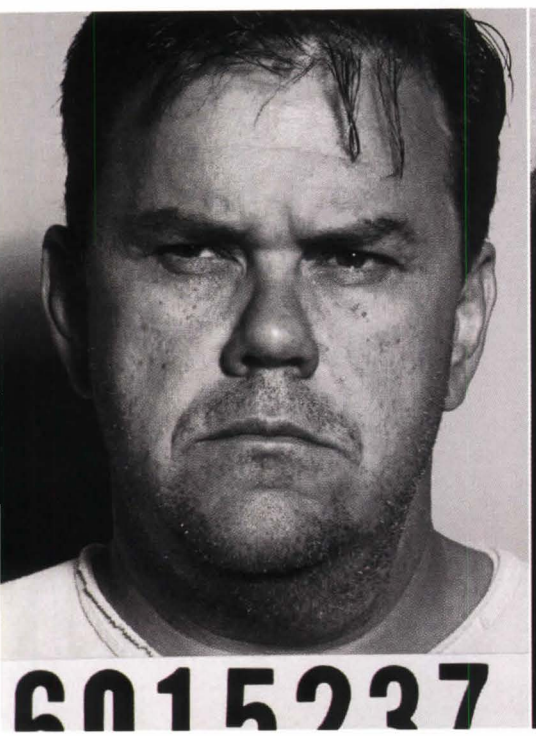

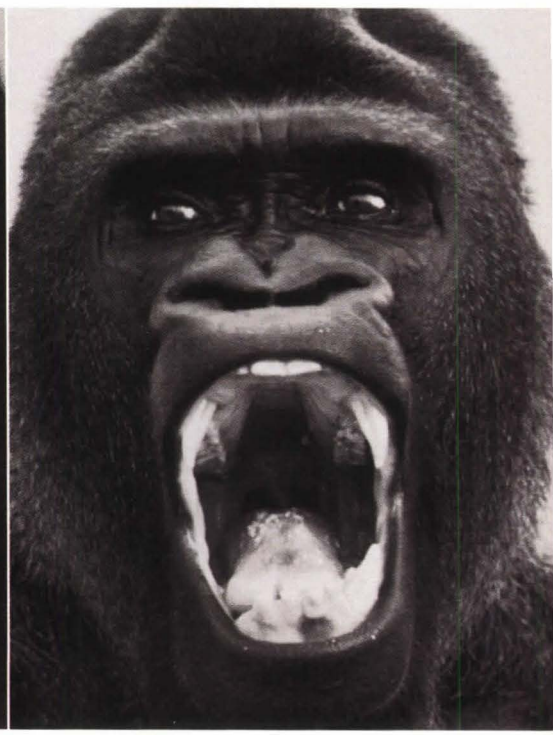

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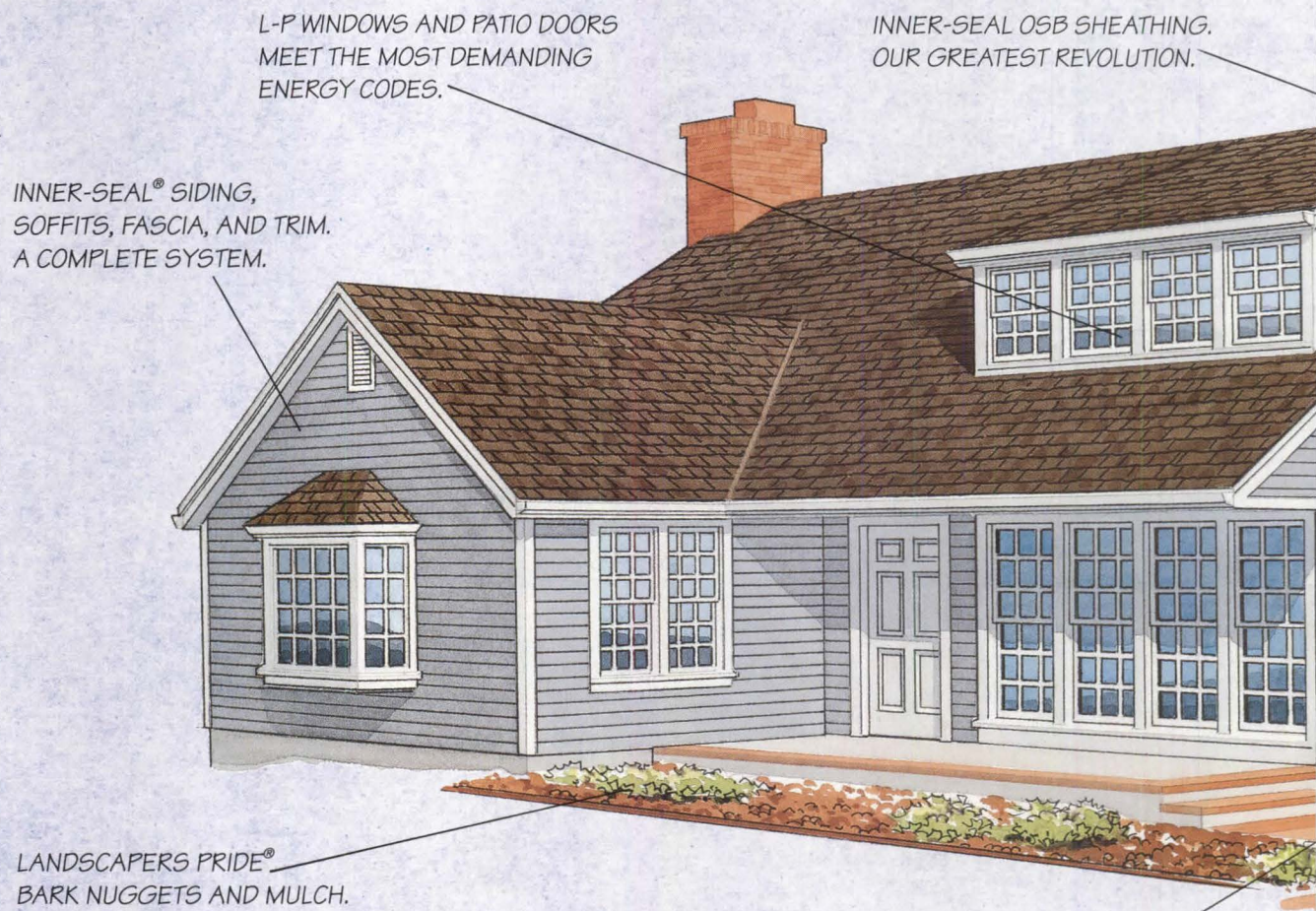

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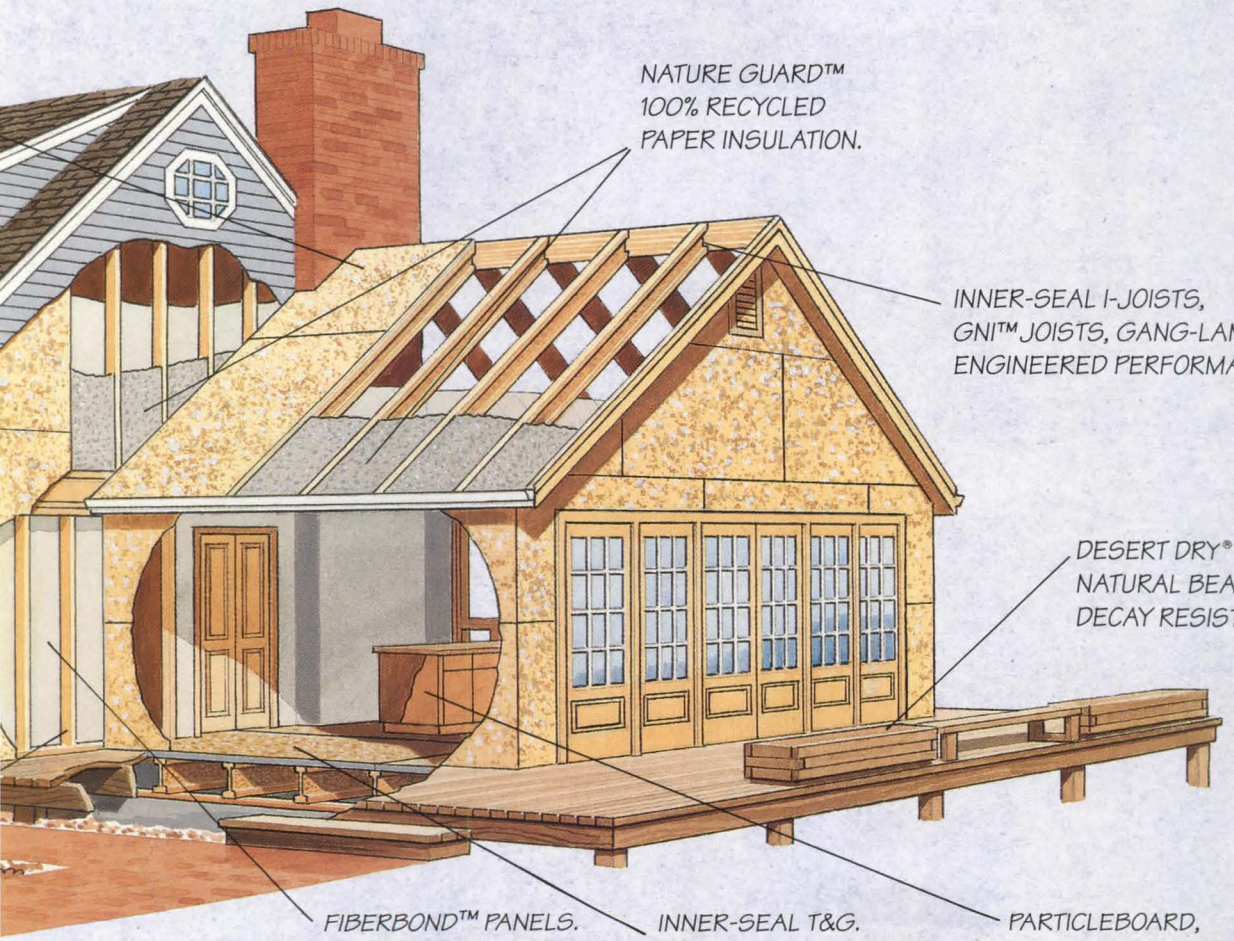

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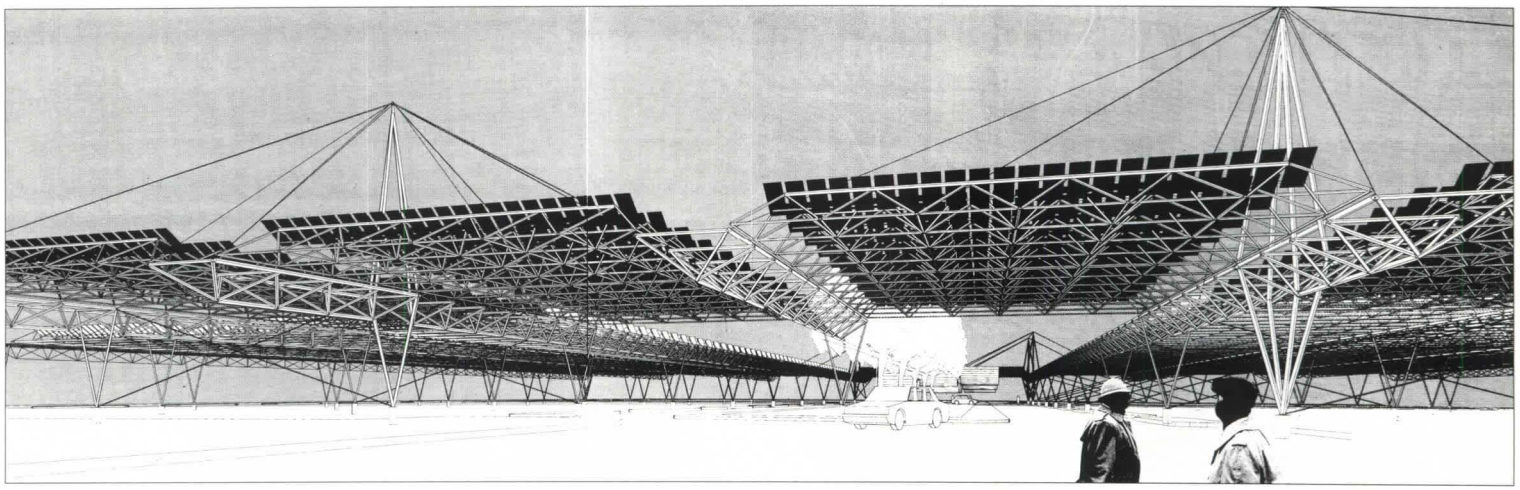
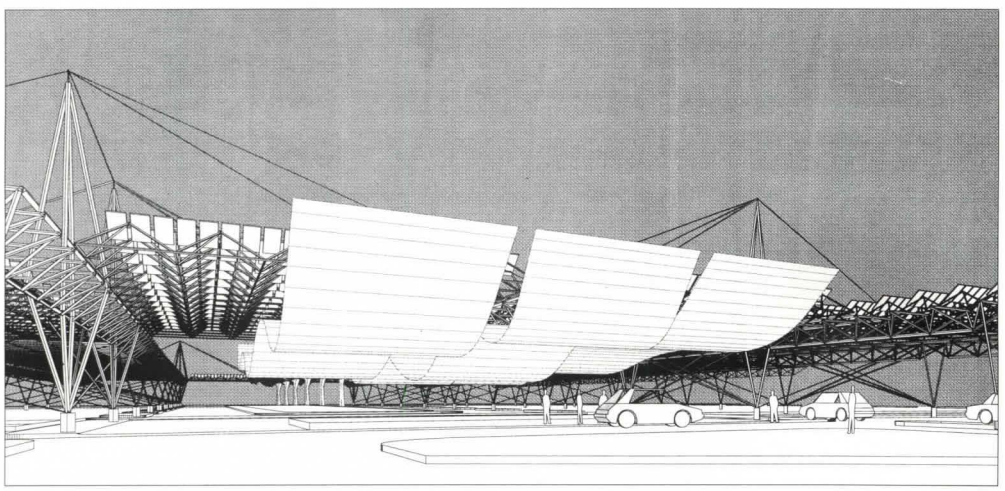
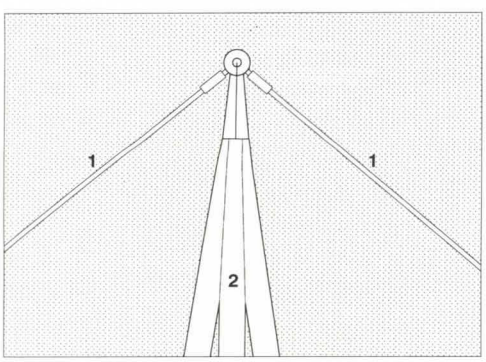


NORTH ENTRY PERSPECTIVE

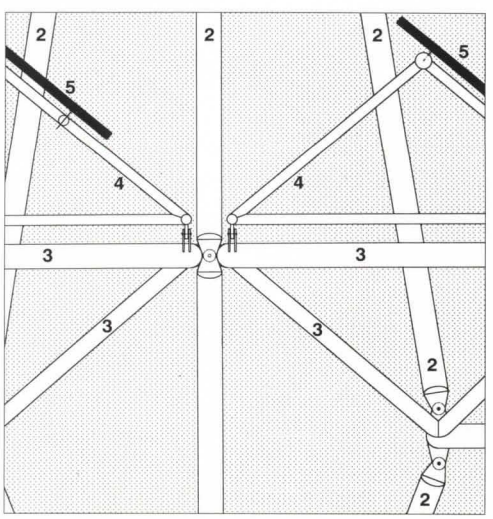


FABRIC BANNERS AT CENTER OF CANOPY



TOP OF MAST

1 TENSION CABLES TO SUPPORT DOUBLE-SPAN GIRDERS
2 MAST
3 GIRDER
4 JOIST
5 PHOTOVOLTAIC PANEL

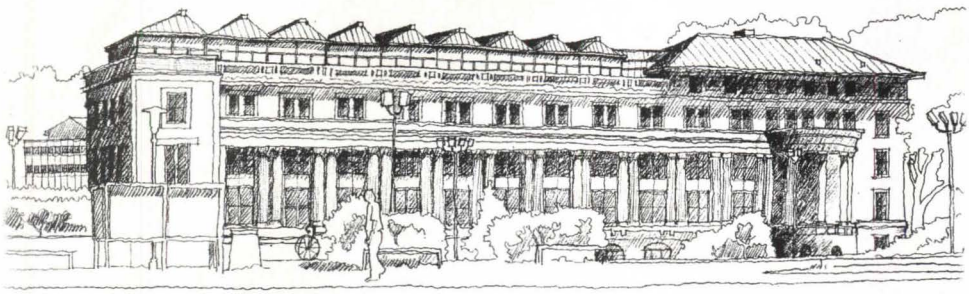


MAST, GIRDER, AND JOIST CONNECTIONS

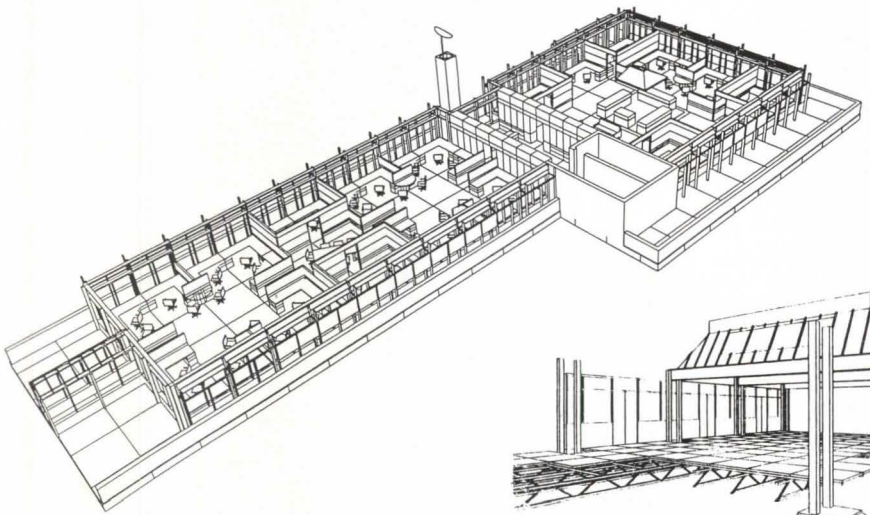
New York State Solar Canopy Competition Winner

HOPING TO INCREASE DEMAND FOR PHOTOvoltaic panels, the New York Power Authority and the New York State Association of Architects cosponsored a statewide design competition in the spring for a solar collector canopy. Competitors were asked to design a structure with 70,000 standard photovoltaic panels on a 19-acre parking lot. At peak sunlight, such an array could generate 3,400 kilowatts of electricity—enough to power 45,000 75-watt light bulbs.

First place was awarded in June to Kiss Cathcart Anders Architects of New York City. The architects developed a modular system of prefabricated aluminum elements that can be assembled on any site. Space-frame girders, supported by V-shaped columns, span parking lanes to form the structural grid. Photovoltaic panels attach to space-frame joists, which are bolted orthogonally or diagonally to the tops of the girders to optimize solar collection. Taller masts, equipped with cables to support the grid from above, can be substituted for standard columns to mark an entry or eliminate a neighboring column. The architects proposed that fabric banners be draped from the grid for shade, fixtures be installed for night lighting, and outlets eventually be incorporated for recharging the battery-operated vehicles of the future. —N.B.S.



MARGARET MORRISON CARNEGIE HALL WITH INTELLIGENT WORKPLACE ROOFTOP ADDITION

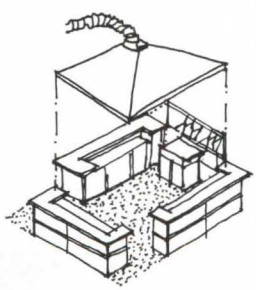


INTERIOR AXONOMETRIC

STRUCTURAL COMPONENTS

Carnegie Mellon's Office of the Future

IN JULY, CONSTRUCTION BEGAN ON A 6,000-square-foot laboratory atop an existing building (above left and top) on the campus of Carnegie Mellon University in Pittsburgh, Pennsylvania. Billed as the Intelligent Workplace, the modular structure will enable researchers to test innovative office materials and systems, studying how they work together. The project is designed by the Pittsburgh-based architecture firm of Bohlin Cywinski Jackson, architect Pierre Zoelly of Zurich, Switzerland, faculty members of Carnegie Mellon's Center for Building Performance and Diagnostics, and structural, mechanical, and electrical consultants. The $3 million addition is sponsored by the Advanced Building Systems Integration Consortium (ABSIC). A partnership of Carnegie Mellon, the National Science Foundation, and 10 U.S. companies, ABSIC was established in 1988 to improve the quality of the workplace.



Mechanical, telecommunications, and furniture systems within the model office will reflect state-of-the-art technology and ergonomic research from around the world. Components will include operable windows, light shelves to control glare, and water-filled mullions in the curtain wall to minimize heat loss. Two separate mechanical systems—one based on air, the other on water—will be installed and compared. A well-ventilated service pub containing kitchenette, facsimile machine, photocopier, and printer will provide an informal area for social gatherings (inset).

The penthouse is designed for ultimate flexibility. Mechanical and telecommunication systems will be threaded through the floor's open-web steel joists (above right), thereby saving space and guaranteeing easy access. Bolted rather than welded, the steel framing can be disassembled and replaced by new products in the future, as can all of the building's components. The prototype will be completed next September. —N.B.S.

T&P Briefs

■ THIS MONTH, US AIR'S NEW TICKET counter at LaGuardia Airport's East End Terminal debuts with the first architectural application of composite carbon and glass fiber in the United States. New York-based architects **Smith-Miller & Hawkinson**, with engineers **Ove Arup & Partners**, shaped the lightweight material, more commonly used in aircraft and racing-boat construction, into a 270-foot canopy that resembles an airplane wing.

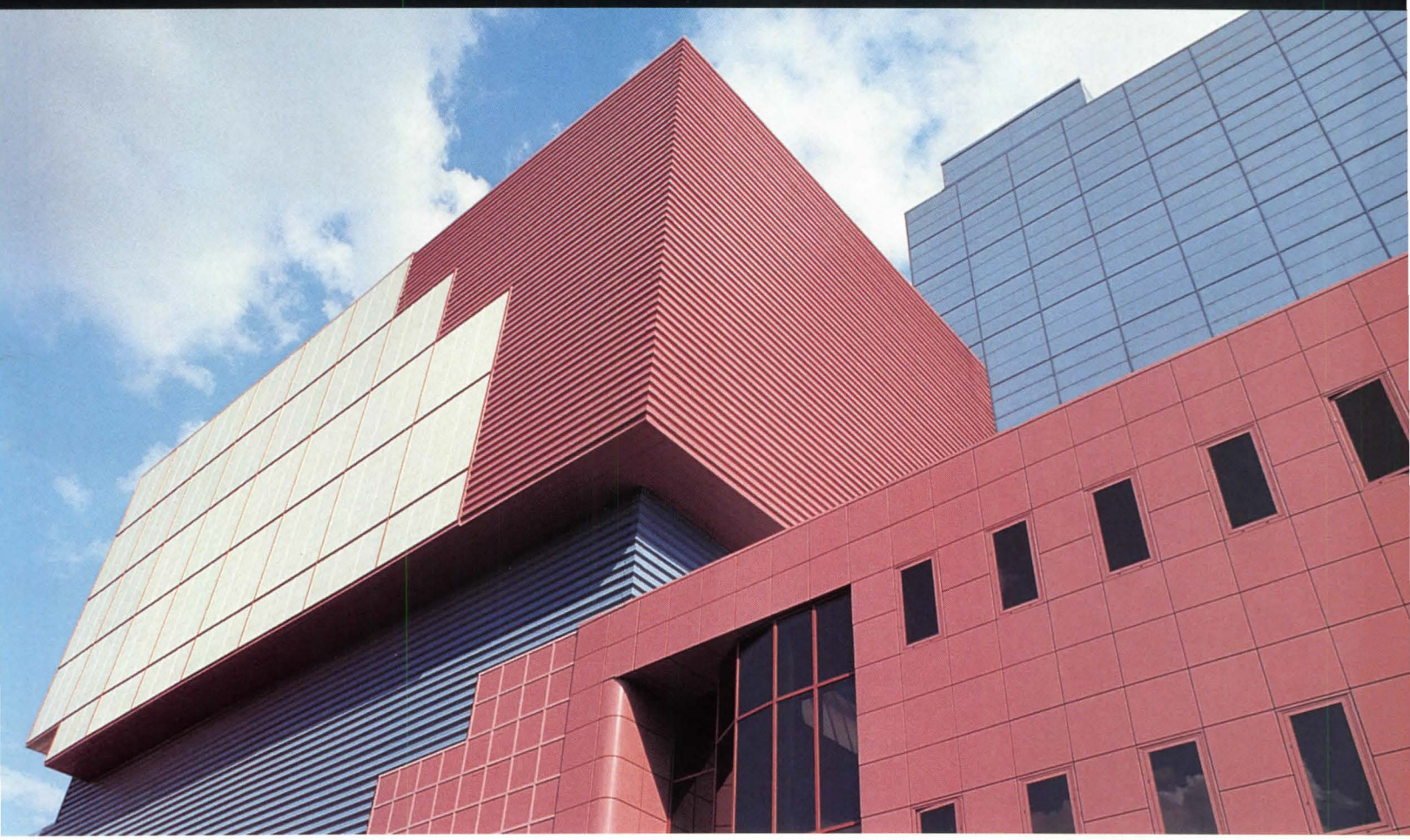
■ Construction crews have started raising a unique double-lined, tensile fabric roof that will eventually enclose Denver's International Airport. Scheduled for completion next fall, the structure is designed by Denver-based architects **C.W Fentress/J.H. Bradburn and Associates** and New York City-based engineers **Severud Associates**. Peaks and valleys formed between 34 steel posts, which reach up to 120 feet in length, echo the nearby Rockies.

■ American Plywood Association (APA) of Tacoma, Washington, is working with **ECOM Associates** of Milwaukee, Wisconsin, to develop two software packages to facilitate the design of wood structures. One program is tailored to timber and engineered beams. The other assists in either panelized or conventionally framed flat-roof construction. Both programs will be available this fall. Contact Kathy Nelson of APA at (206) 565-6600.

■ Avoiding the legal jargon that often obscures the meaning of government documents, the U.S. Department of Justice has developed technical assistance manuals to clarify titles II and III of the **Americans with Disabilities Act**. For copies, contact the department's ADA hotline at (202) 514-0301 or (202) 514-0383.

■ How does your firm stack up against others around the country? To find out, consult the 1992 edition of the ***Architecture Factbook: Industry Statistics***. The pamphlet, compiled by AIA's Office of Research & Planning, presents a range of statistics, from construction activity and client base to average compensation for architects across the country. Reported client billings in 1991, for instance, dropped 8 percent below the 1990 figure. To order your own copy, contact the AIA bookstore at (800) 242-4140. ■

From Here To Eternity



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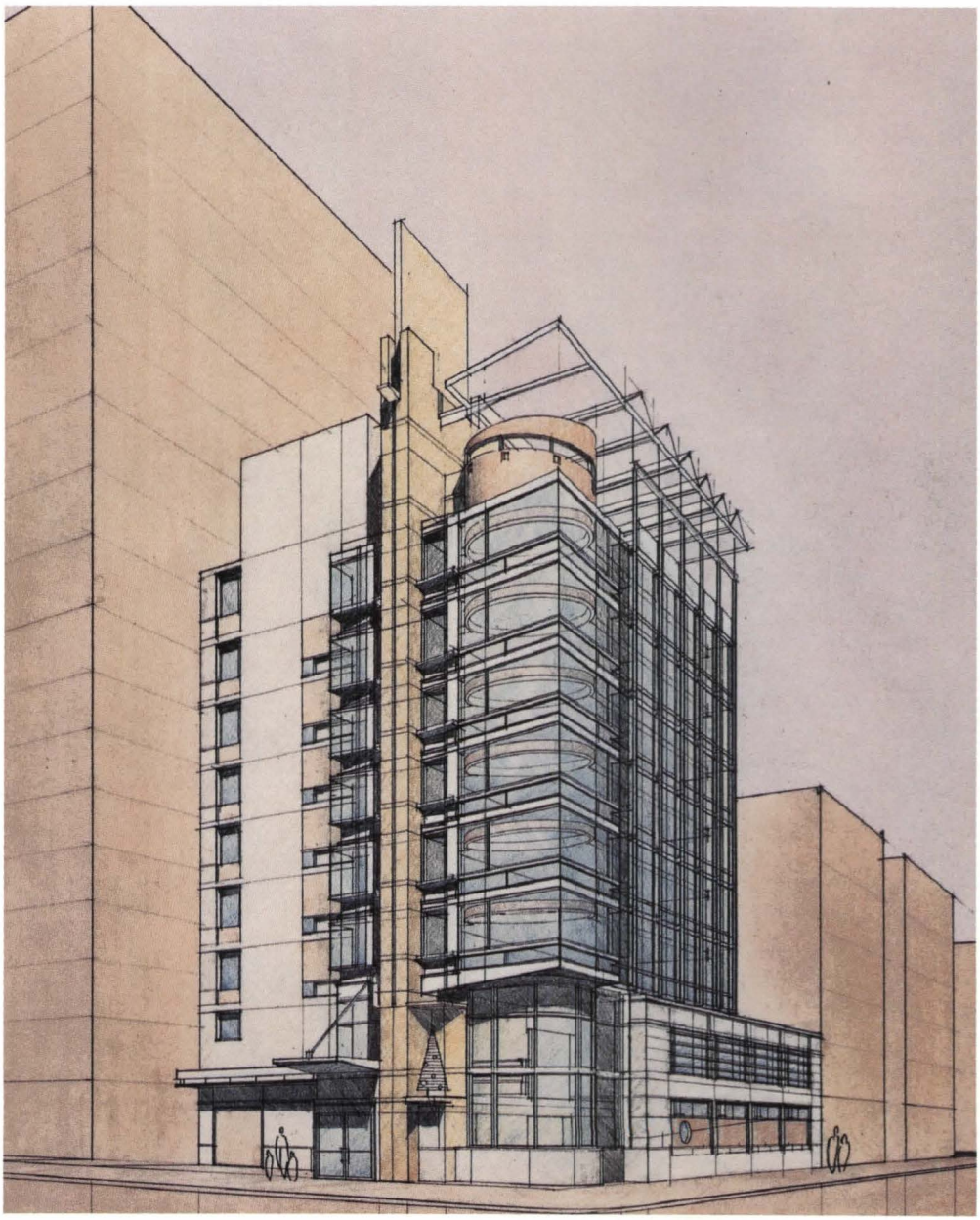
Pro Bono Architecture

Public service architecture benefits an increasingly broad spectrum of needy clients.

ARCHITECTURE AS A PUBLIC SERVICE IS ALIVE and well, from volunteer efforts by individual architects to pro bono collaborations among firms. "Pro bono work fills a basic, old-fashioned sense of professional responsibility," explains San Francisco architect Herbert McLaughlin of San Francisco-based Kaplan McLaughlin Diaz (KMD), a firm that has pursued numerous public service projects over the past 30 years. "We want to give something back to the community." Though not compensated monetarily, work undertaken on a *pro bono publico*—for the good of the public—basis affords architects new project experience, polishes their professional images, and attracts for-profit commissions. Nonprofit organizations that depend on fund-raising, private donations, and grants—particularly those institutions that serve the poor and the ill—are the most common beneficiaries of pro bono architectural services. "Design shouldn't be the province of only those who can afford it," contends Katherine Lambert of FACE Architects in San Francisco, whose recently completed AIDS center was designed for a nonprofit group.

Although some architects undertake projects on a pro bono basis from start to finish, most practitioners donate a project's conceptual designs, presentation drawings, and models to help raise money to finance the building's construction. Once funds are secured, design and construction documents are often completed for compensation. Architects eager to donate their services but unfamiliar with pro bono practice should carefully consider how to find worthy clients and projects, how the work will be supported, and the legal ramifications of their altruism.



Claremont Park Family Care Center
Bronx, New York
Perkins & Will, Kohn Pedersen Fox, Swanke Hayden Connell, Architects

Sited on a corner in the heart of an inner-city neighborhood, the nine-story AIDS center (above) will house acute-care clinics, counseling, child care, and administration in one building. Glass-enclosed cylindrical corner will contain consultation and conference rooms, playrooms, and classrooms. The three firms divided pro bono programming and design equally to share costs, while project team members donated personal time after hours.

Why pro bono?

FOR MANY, TAKING ON PRO BONO WORK IS a way to produce socially responsible architecture during difficult economic times. Bailey Pope, an Atlanta architect and member of a group of design professionals who build prefabricated houses for the city's homeless, contends: "It's a direct, hands-on way to help people who wouldn't have a place to live

otherwise." Pope, who works for Bradfield Associates, adds, "I thrive on the immediate gratification of this work. In one afternoon, I can help change somebody's life."

Mark Chen of Perkins & Will, a firm now collaborating with Kohn Pedersen Fox and Swanke Hayden Connell to design an AIDS family-care center in Bronx, New York (previous page) notes that, while contributing to a worthy cause, pro bono work can also bring returns that exceed financial profits. "Designing the AIDS center was a chance to do something new in health care. The exposure of our involvement doesn't hurt the firm." Many architects also cite praise from their pro bono clients, the community, and their peers as motivation for their volunteer efforts.

"Pro bono work allows us to make contact with business people and other professionals who donate their time to building committees," says Suzanne DiGeronimo, whose Paramus, New Jersey firm, Architects DiGeronimo, has undertaken such diverse pro bono projects as a home for babies with AIDS, teaching solar design techniques to Navajo Indians in Arizona, and designing handicapped access to churches and community centers. Most architectural work comes through referrals, DiGeronimo notes, and pro bono work providing handicapped access for a church, for example, might generate a commission to design a school for the parish.

Image- and practice-building aside, architects must have a strong commitment to the pro bono projects they undertake. "If you don't believe in the cause or the people you're helping, you may get halfway through the project and say, 'to hell with it,' " warns McLaughlin, adding that pro bono work can be emotionally as well as financially draining.

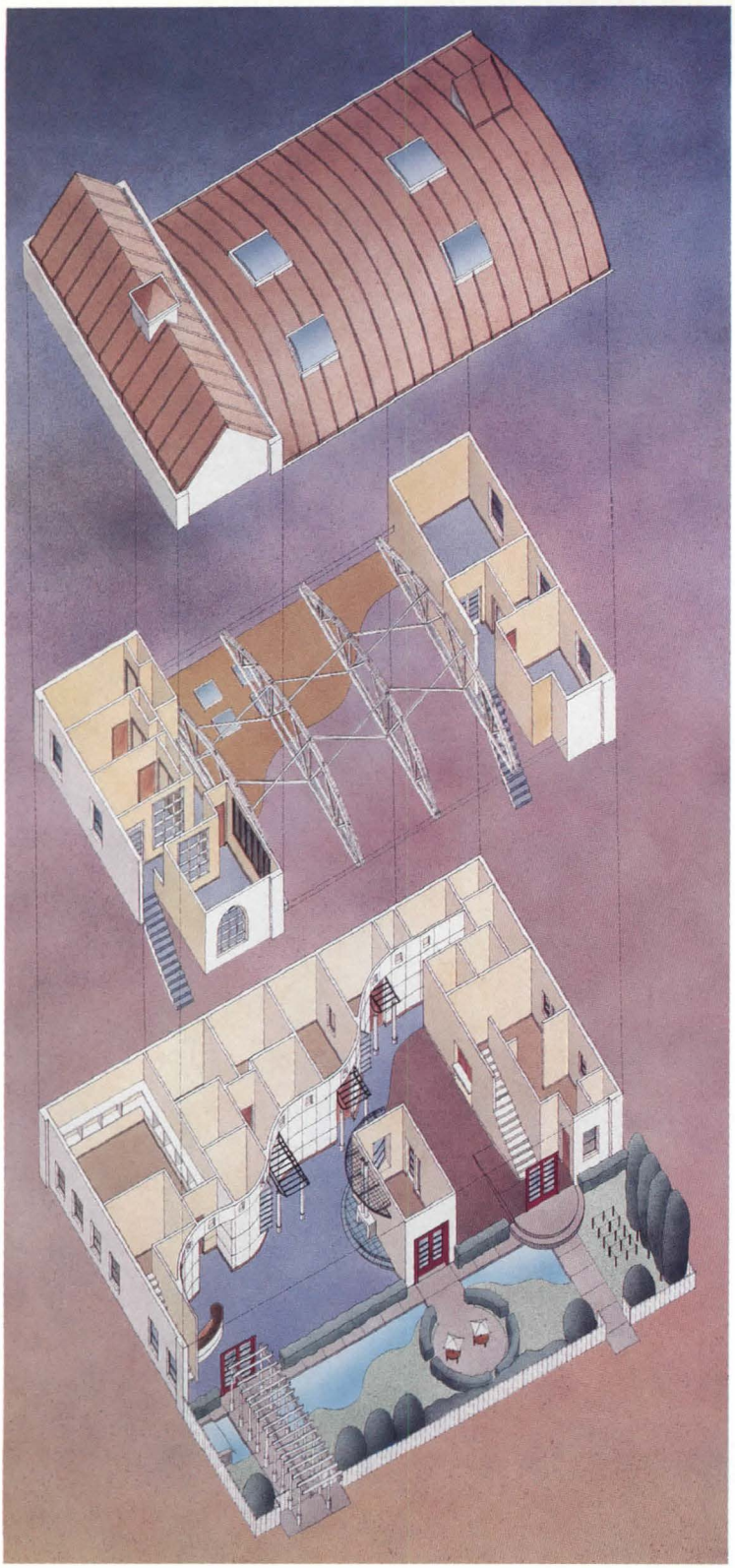
Scope of pro bono services

THE TENDERLOIN AIDS RESOURCE CENTER (right) by FACE Architects in San Francisco was undertaken as a pro bono project from start to finish. The 2,300-square-foot office space encloses a San Francisco storefront prevention center that offers information on the HIV disease, counseling, testing, and condoms. "We volunteered to do the entire project because we were excited about it," says architect Katherine Lambert, adding that it was small enough for her 10-person firm to handle. FACE's design work on the project began after the firm's normal workday, and eventually became an office-wide effort, supported by the firm's for-profit projects. "There's often more design latitude in pro bono work," notes Partner Mark Kessler. "Clients put themselves

SHARON RISEDORPH PHOTOS

Tenderloin AIDS Resource Center San Francisco, California FACE Architects

FACE Architects provided pro bono services for the storefront AIDS center from conception to completion, supporting the project with proceeds from for-profit commissions. Built by volunteers without construction experience, details such as reception desk (top left and above) are elegant but require only simple assembly with standard hardware.



DAVID WAKELY PHOTOS

Center for AIDS Services
Oakland, California
ELS/Elbasani & Logan, with Guillermo Rossello

Housed in a former grocery store, the center provides support services to residents infected with HIV. Serpentine wall (above, top right, and center right) separates communal spaces (right) from private areas. Architects provided design and administration services for a reduced fee of 2.5 percent of construction costs.

in your hands. But you have to design economically." Since volunteers inexperienced with construction built the center, details were designed so that they could be accomplished by novices.

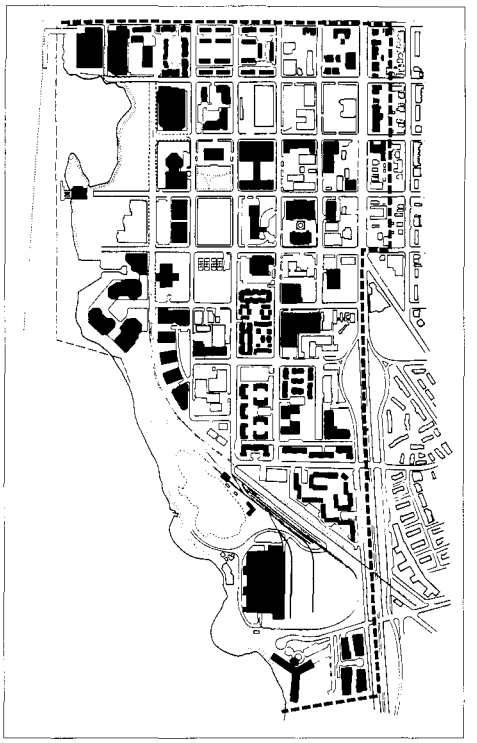
Glenda Hope, chair of the Tenderloin AIDS Network, which conceived the center, describes FACE Architects as "available, creative, and able to see the possibilities of the space. They understood what we were trying to do—create a place that affirms the dignity of people." The project led FACE to take on more pro bono work—designing an AIDS hospice as well as offices for a nonprofit neighborhood development corporation in San Francisco.

Some architects undertake "clientless" pro bono work—projects or services that are important to the community but may be overlooked. Kaplan McLaughlin Diaz, for example, has conducted dozens of independent studies to help identify and solve local urban problems. This activity is often supported by a partnership between the firm and a private foundation or public agency. KMD studied the impact of rapid office growth on downtown San Francisco, a project that eventually led the city to adopt measures to control development.

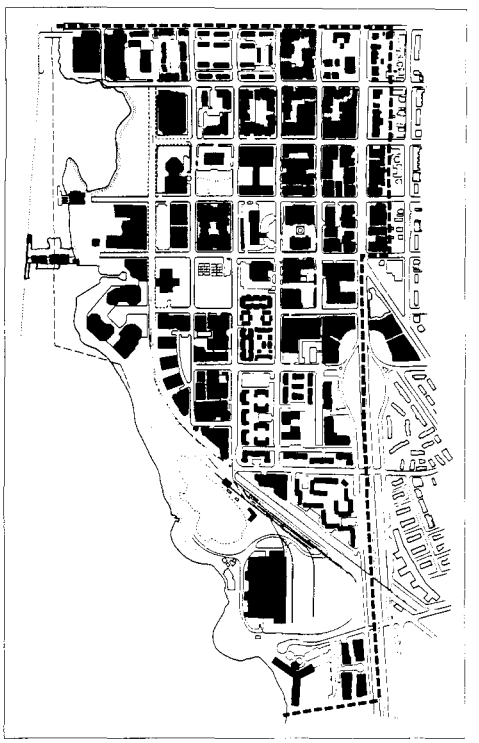
Community involvement

ARCHITECTS SHOULD BE ON THE LOOKOUT for pro bono possibilities in their own backyards. After attending a public hearing on the city's plans for development in the Old Town North neighborhood of Alexandria, Virginia, where he lives, architect Lee Quill of Skidmore, Owings & Merrill/Washington chaired a group of concerned citizens. "Residents and commercial tenants were screaming at each other, unable to reach a consensus," notes Quill. The group met weekly for 18 months to study the area and generate a development scheme that would balance public good with private gain, boosting both residential and waterfront development, and establishing building-height limits. Working with the city planning office, the group refined its development plan (right), which the city council accepted and voted into law with only minor changes. "Our group accomplished about 90 percent of its objectives," maintains Quill.

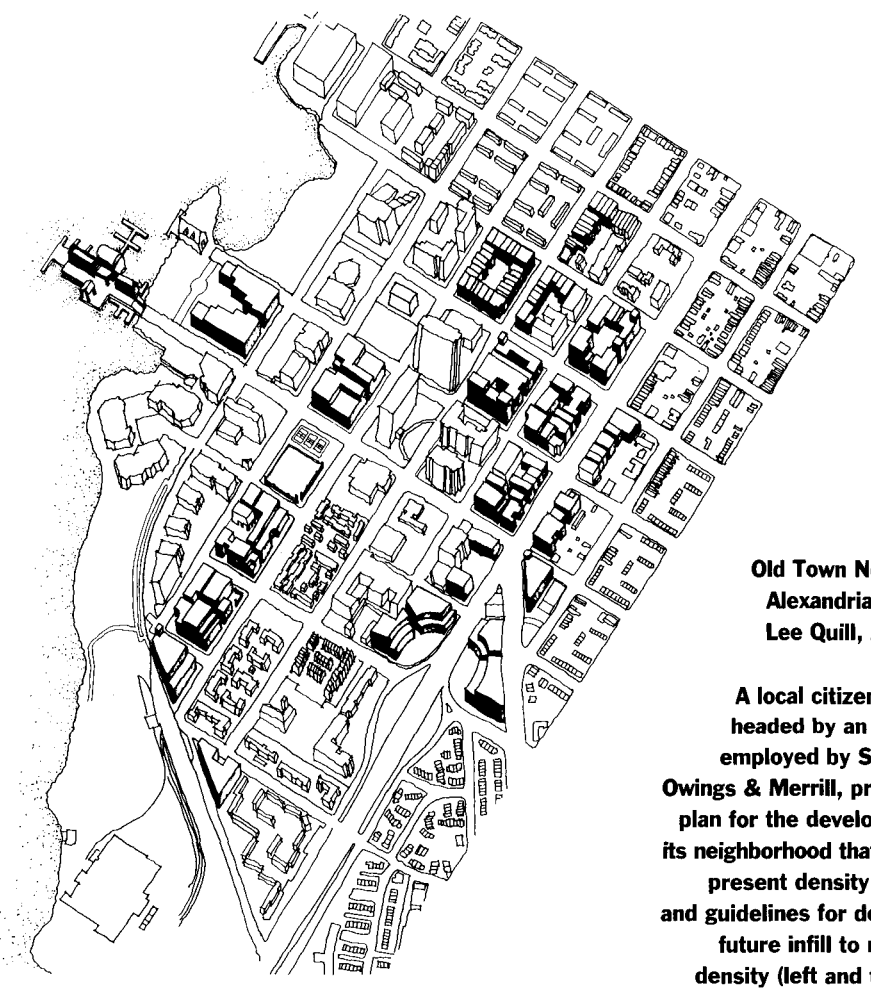
Young architects who want to get involved with pro bono work may be frustrated if their employers fail to pursue such volunteer activities. In Washington, D.C., a fledgling organization matches architect volunteers with needy clients. Solo practitioner Chris Snowber



EXISTING



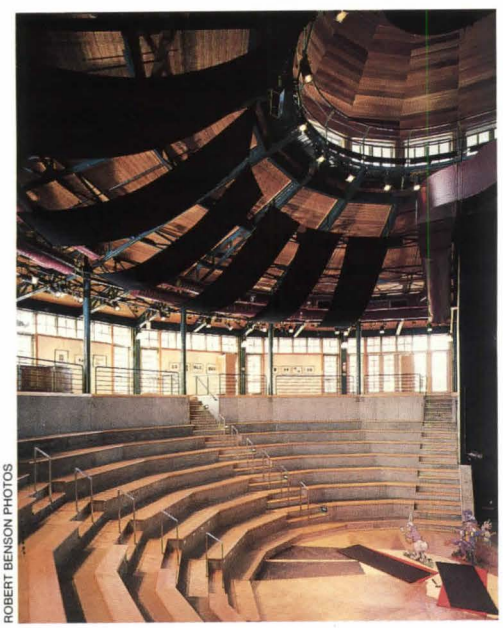
PROPOSED



PROPOSED

Old Town North Plan
Alexandria, Virginia
Lee Quill, Architect

A local citizens group, headed by an architect employed by Skidmore, Owings & Merrill, produced a plan for the development of its neighborhood that outlined present density (top left) and guidelines for developing future infill to maximum density (left and top right) over a 20-year period.



ROBERT BENSON PHOTOS

Watkinson School Arts & Athletic Center
Hartford, Connecticut
Jack Dollard, Architect
Jung/Brannen Associates

Designed for a private school with an agricultural history, the building suggests images of New England barns and stables, and also relates to the school's Victorian context (top). Entry is located on the west side (above), where dissimilar programs of gymnasium and theater join. Barnlike volume to the north houses gym, while curved wing contains theater (left). With support from a local company, Aetna Insurance, Jack Dollard prepared the center's conceptual design, which was used for a fund-raising campaign. Construction documents and administration were completed by Jung/Brannen for compensation.

is a 36-year-old architect who wanted to volunteer at a community design center, where clients walk in for design services. When he found that no such center existed in the nation's capital, Snowber started Community Design Services (CDS), a nonprofit organization that matches the expertise of would-be pro bono architects with clients in search of design services. "We make it easier for architects to participate in pro bono work," notes Snowber, who founded the organization last October. The group also draws volunteers from landscape architecture, interior and graphic design, structural, mechanical, electrical, and civil engineering.

To find volunteers, Snowber placed a one-page questionnaire in the newsletter of the DC/AIA Chapter and received 50 responses from architects. Many are now involved in projects that range from a maternal and child-care clinic for Hispanic women to an AIDS hospice for a local homeless shelter to a new play area for a Ronald McDonald House near Children's Hospital in Northeast Washington, D.C.

CDS restricts its services to conceptual design and graphic presentations for fund-raising purposes. This limits the organization's liability (it carries no insurance for its volunteers) and defuses criticism that CDS is taking for-profit work away from architects. "We don't take work, we make work," maintains Snowber, pointing out that the service acts as a catalyst for projects that might not get funded otherwise, planting the seeds of compensated work for architects in the future.

Potential clients fill out an application requesting design services and are assigned to a project manager, who outlines the scope of services. Snowber and an oversight committee choose architects from a pool of volunteers, matching their expertise with the project's demands. Client meetings, design, and a final presentation to the client are coordinated by the project manager. At the completion of services, client and volunteer provide feedback to CDS on how well the process worked. To aid their own members seeking pro bono work, AIA chapters in Philadelphia, Phoenix, and St. Louis are now contemplating starting programs modeled on CDS.

Supporting pro bono

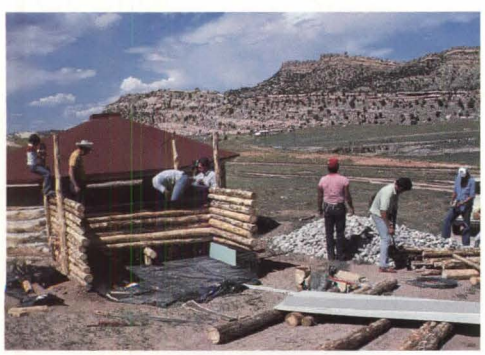
PRO BONO SERVICES ARE TYPICALLY DONATED and supported by a firm's profits. Some firms set aside a percentage of each year's earnings to finance such volunteer work. Others, such as Kaplan McLaughlin Diaz, consider public service part of their marketing

Charleston Cottages
Charleston, South Carolina
Chris Schmitt & Associates

Low-cost public housing for the homeless, built with volunteer labor, is modeled on the city's historic "freedmen" cottages.

BEAT Houses
Birmingham, Alabama
KPS Group

With local architects KPS, Bethel-Ensely Action Task, a nonprofit group, builds and renovates houses in a derelict city district.



Native American Solar Education
Fort Defiance, Arizona
Architects DiGeronimo

Volunteer architects train Native Americans to design solar-heated houses and help them to construct the homes in a fuel-scarce desert.

budget or overhead. KMD offers its employees incentives, including a sabbatical program, for pro bono ideas. "Those who come up with research projects that can be a benefit to the profession are given five weeks of paid leave to pursue them," explains McLaughlin. "The studies are written up and submitted as articles to journals, which is a way of getting the information out to the profession. If an article is published, we pay the employee $1,000."

Personal time spent on pro bono work is not tax deductible, but billable hours, supplies, computer time, and other operational expenses can be deducted from a firm's profits. For this reason, architects should keep records of expenses and billable hours spent on pro bono projects.

Firms can spread out the expense of pro bono work by teaming up with other firms on projects—a strategy employed for the design of the Claremont Park Family Care Center in Bronx, New York, to be operated by the Pediatric AIDS Clinic of Bronx Lebanon Hospital. The center will provide "one-stop shopping," according to William Caspe, a physician at the clinic, for outpatient care and dental services for AIDS-afflicted children, adolescents, and women of child-bearing age; preschool and educational programs; services to parents and caregivers; and a play area.

Swanke Hayden Connell, Kohn Pedersen Fox, and Perkins & Will were brought together by Dennis Cahill, former publisher of *Interiors*, and have completed preliminary design of the center, which awaits funding efforts and a bond issue that is pending before the New York State legislature. The firms have donated professional and personal time to the project, have opened their offices to Caspe for project meetings, and are preparing a roster of their clients who might be called upon for donations. "When my enthusiasm wanes, these architects pick me up," says Caspe. "They've taken this project on as a personal cause, and their work legitimizes it. The state health department was impressed by the drawings and wanted to help. If architects in other cities put consortia together to build projects like this, it would help tremendously."

Another strategy for individual architects interested in pro bono work is to receive support for their services from private corporations. Jack Dollard, an architect in private practice in Hartford, Connecticut, has been paid by Aetna Insurance over the past 12 years to donate his time to pro bono architecture. Among the projects Dollard has completed with Aetna's support are a day-care center for the city's Women's League, a halfway house for alcoholic mothers, an Easter Seals rehabilitation center, the Hartford Center for the Arts, and a gymnasium and theater for a small private school in the city. For this last project, Dollard developed schematic plans and elevations for fund-raising. Construction documents were then completed for compensation by Boston-based Jung/Brannen Associates.

Pro bono caveats

THE COMMON CRITICISM THAT PRO BONO takes otherwise compensated work from architects is a misconception. "The client gets up-front programming that will help to turn a dream into a viable project," maintains Chris Clark, AIA's director of practice programs. "The project then gets kicked out to the professional community for compensation."

However, architects must keep in mind that they are liable for pro bono work. "Just because you're not paid doesn't mean there's no risk," notes Clark. A reasonable standard of care should be exercised, and a contract outlining scope of services should be signed. Discussing the services to be provided helps the client set reasonable expectations and protects the architect from becoming a hostage to good will. "Defining the scope designates when your services stop," adds Clark, "and you can always renegotiate for further services, if you're willing to do more." Risk in pro bono work rises as the project moves from schematics and design development to construction documents.

"You should pick your pro bono clients and projects carefully," advises Katherine Lambert. "If a client isn't cooperating with contract negotiation, that's a warning signal." Firms should be aware of individual employees providing pro bono services after hours, especially if company facilities and equipment are used to perform the work. Such a practice exposes the firm to liability, and should only be permitted if sanctioned by the firm. But individual architects within a large firm doing pro bono work can benefit the entire firm, as Lee Quill of SOM demonstrates. Quill's pro bono efforts have led to compensated feasibility studies by SOM for a developer who wants to build 100 units of multifamily housing in Alexandria. "Pro bono work has given SOM name recognition and credibility within the community, and sparked interest in other projects," notes Quill. "It's opened a lot of doors for us." ■

—MICHAEL J. CROSBIE

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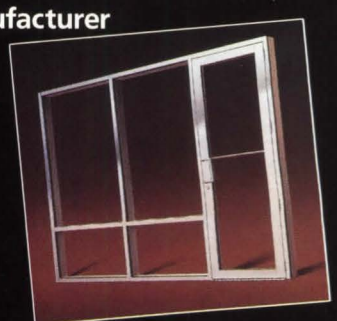

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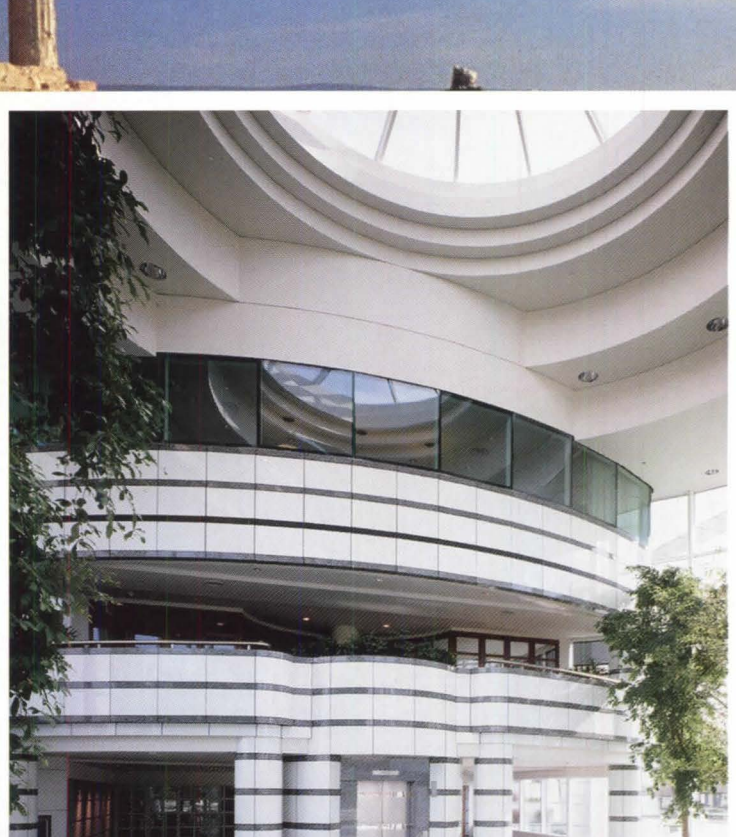

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NEOPARIÉS

Continuing Education for Architects

AIA membership will soon require learning activities outside the office.

THIS FALL, NOT ONLY ARCHITECTURE STUdents but professionals will be going back to school. Continuing education will soon be a requirement of AIA membership, according to an amendment to the Institute's bylaws that was passed by more than two-thirds of the delegates to this year's convention. Beginning in January 1995, AIA members must document and report their learning activities to the Institute in order to renew their membership in 1996.

These new requirements, says Richard Hobbs, vice president of the AIA's practice/education group, are intended to elevate the profession's standard of excellence by providing members with a professional development program based on their own educational needs. Hobbs is quick to point out that the decision to require continuing education was "initiated by members, studied by members, approved by members, and the program adopted will be created by members." At the 1991 convention in Washington, D.C., six component chapters—Iowa, Minnesota Society, Northern Minnesota, Minneapolis, St. Paul, and the Region of the Virginias—first proposed that the Institute study mandatory continuing education. At Grassroots '92 in February, conclusions of a study conducted by the AIA's life-long learning committee were reviewed by representatives of all the components before the final vote.

The AIA stresses that public pressure was not the impetus for the new learning requirements. Although numerous states require mandatory continuing education for other professions—including law, medicine, psychology, and accounting—currently, only Iowa and Alabama require follow-up courses for registered architects. Alabama's law takes effect in the fall of 1993, and Iowa has required continuing education for all professions since the 1970s. According to Samuel Balen, executive vice president of the National Council of Architecture Registration Boards (NCARB), several other states—including Minnesota, Louisiana, North Carolina, Georgia, and Wisconsin—also have such legislation pending before their state assemblies.

Will continuing education actually improve practice? Is there a correlation between increased general knowledge and improved job performance? Educational researchers still consider the link between education and improved proficiency in the workplace to be tenuous. Specific details of how the AIA will structure and implement its educational requirements are to be determined by its life-long learning committee before the 1995 deadline. However, based on the committee's year-long study of the subject, some guidelines have already been established:

Architects are personally motivated toward continued learning, although quality programs are not always readily available.

- The program's approach will be self-directed.
- A core curriculum on health, safety, and welfare as they pertain to construction will be required.
- A variety of learning activities beyond coursework will be accepted.

In 1990, the AIA enlisted the Oklahoma Research Center for Continuing Professional and Higher Education to study how architects learn, and to evaluate the continuing education programs of other professions for their suitability as models for the AIA's program. The results of this survey, detailed on the following pages, indicate that architects actively pursue continued learning based on personal motivation. According to Oklahoma Research Center consultant Michael Price, the continuing education requirements of the Canadian Royal College of Physicians and Surgeons were used as a model for the AIA's program, since the Royal College's membership size is comparable to AIA's. Unlike the learning programs of other organizations, which require outside accreditation, the Canadian program asks its members to plan their own learning activities and monitor their continuing quality.

In addition to allowing credit for attending conferences, workshops, and seminars, the Royal College's program is structured to credit involvement in more self-directed activities, such as correspondence courses, public service, and scholarly pursuits, including teaching and publishing papers. Similarly, the AIA's program, by providing a framework rather than specific requirements for continuing education, will enable architects to tailor a learning program to their individual career objectives.

Starting in January 1993, approximately 2,000 volunteers will participate in a pilot program to determine this framework, as well as the amount of time and money that architects may be expected to spend on learning activities. The pilot program will be evaluated and refined over the next two years, until it takes effect in 1995. During the test period, the AIA plans to compile a computerized database directory of approved courses and events. Instruction ranging from structural design and preservation methods to marketing—or even art classes for improving presentation techniques—may comply. According to the Oklahoma Research Center study, many programs available to architects, particularly offerings from universities, will need to improve during the next two years to meet the professions' increasing demands. In addition to these formally administered learning activities, many informal activities such as project research, in-house training, and mentor programs are also being considered as acceptable methods of continued education.

—MARC S. HARRIMAN

Results of AIA Learning Survey

HOW DO ARCHITECTS LEARN? DO THEY learn primarily from their work, or are other, more structured methods—such as in-house seminars, professional development courses, or involvement in design-related community groups—more effective? Do architects read? What educational resources do architects want beyond what is currently available?

In August 1990, the AIA decided to study members' learning activities to answer these questions. The Oklahoma Research Center for Continuing Professional and Higher Education was commissioned to prepare a survey questionnaire that would extract information about professional development interests and activities from a representative cross-section of AIA members.

A random sample of 2,000 AIA members received the questionnaire, and 970 responded. Emphasizing architects' personal motivation and preferences, the survey targeted four aspects of architectural learning. Targeted areas were: methods—such as in-house seminars, night classes, and other preferred formats for continuing education; resources—adequate libraries, a personal computer, CADD instruction programs, or an architecture school available to architects near their workplaces; barriers—common deterrents to participation in learning activities; and competencies—areas of expertise architects have sought to improve in the last year. Participants were asked to select from a listing of choices in each category, and then rank their selections on a scale of 1 to 5, indicating those they were most motivated to implement or pursue further.

Methods of Learning

Five most-used learning methods

1. Communications with suppliers, contractors, consultants, and/or clients
2. Reading technical and practice sections in architectural periodicals
3. Reading articles in journals other than architectural magazines
4. Learning new procedures and principles from peers
5. Attending seminars away from the office

Five least-used learning methods

1. Practice audits
2. Correspondence courses
3. AIA supplementary education guides
4. Vocational or college courses
5. Intern development programs

Five most-preferred learning methods

1. Learning through communications with suppliers, contractors, consultants, and/or clients
2. Learning new procedures and principles from peers
3. Travel
4. Reading technical and practice sections in architectural periodicals
5. Mentors

Five least-preferred learning methods

1. Correspondence courses
2. Practice audits
3. Intern development programs
4. AIA supplementary education guides
5. Audiocassettes

Most-preferred formal learning methods

1. Seminars away from office
2. Professional conferences
3. Lectures by local architecture schools
4. Lunchtime seminars
5. Scheduled in-house seminars
6. Formal in-house training programs

Findings, confirmations, and surprises

MANY OF THE LEARNING PATTERNS REVEALED by the survey come as no surprise. After the end of their formal education, architects acquire most of their knowledge through on-the-job training. Informal, project-centered learning through contact with clients, consultants, and suppliers dominates more formal methods such as university courses, conferences, and in-house programs. Informal mentorships remain important to young architects' professional development, and older architects recognize mentoring as part of their professional responsibility. Tried- and-true methods of learning are preferred over newer methods such as correspondence courses or computer-based, self-study courses.

The competencies that architects actually pursue and are motivated to learn more about are topics not covered in depth in university courses, especially technical and business-related aspects of architectural practice. Other areas of interest, such as career advice, reflect the changing times in which U.S. architects practice.

Comparisons with earlier studies of other professions by the Oklahoma Research Center reveal that, just as for doctors, lawyers, and other professionals, time and cost are the major deterrents to architects' pursuit of further learning. But the comparisons show that architects are among the most highly motivated professionals when it comes to pursu-

Twenty-one methods of learning were included in the survey. According to responses, the methods architects use most often tend to be informal and project-related. For instance, learning from suppliers, clients, consultants, contractors, peers, and mentors ranks high, both in actual practice and preference. Reading journals and books is a frequently used method, but falls below other learning methods on the preference rankings. Not surprisingly, travel is a highly preferred way of learning, but is rarely utilized. Among the least-preferred methods are correspondence courses, practice audits, intern development programs, and audio cassettes.

ing new competencies. Larger firms, as expected, have access to more resources that aid in the learning process—libraries and sophisticated computer equipment, for example—than do smaller firms.

Architects also avail themselves of a complex array of approaches to learning more about practice. They travel, read, take courses, attend seminars, as well as learn from everyone involved in the building process. According to the survey, the sheer quantity of learning activities pursued by architects exceeds that pursued by other professionals.

Of the preferred informal methods of learning, reading ranks surprisingly high for a profession long considered more responsive to visual diagrams than to written words. Besides professional journals, architects cite standard references, books, and other publications as frequently consulted sources of information, although a third of the respondents reported having no access to up-to-date libraries within their firms.

Although almost three-quarters of the respondents reported being in close proximity to a school of architecture, only a very small percentage have taken continuing university courses. Is this lack of participation due to the barriers of time and money, or to a paucity of suitable offerings? If the latter is the case, it may suggest an opportunity for schools of architecture to join other academic disciplines such as business, law, and engineering in offering continuing education programs, especially since 82 percent of the respondents have participated in seminars and lectures outside the office.

Small versus large firms

DIFFERENCES BETWEEN LARGE AND SMALL firms (those with fewer than 10 people) were very pronounced. According to the survey, architects who work for small firms are eager to develop their design expertise; in large firms, the primary area of interest is project management. The surprise is the high level of motivation to learn more about so-called "soft" topics—listening skills, conflict resolution, mentoring, business writing, and career planning—subjects not often covered in offerings from university schools of architecture.

The perception that program offerings for architects are of poor quality ranks high as a barrier to participation in continuing education. This perception is stronger among architects than among other professionals studied by the Oklahoma Research Center, and may indicate that those offering outside programs must respond more effectively to the

Findings on Competencies

Competencies pursued

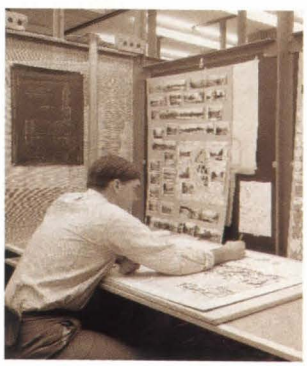
1. Serve as mentor
2. Produce efficient construction documents
3. Effectively listen to clients
4. Apply building codes
5. Resolve project conflicts
6. Make effective formal presentations
7. Set personal and professional goals

Least-pursued competencies

1. Apply knowledge of seismic construction
2. Perform post-occupancy evaluations
3. Develop facility management services
4. Develop human resources plan
5. Organize joint ventures
6. Start own office
7. Compete for competition projects

Most-preferred competencies

1. Effectively listen to clients
2. Produce efficient construction documents
3. Make effective formal presentations
4. Achieve personal and professional goals
5. Make informed practice decisions
6. Resolve project conflicts
7. Use CADD systems
8. Manage liability exposure
9. Serve as mentor
10. Maintain personal career plan
11. Apply knowledge of building codes
12. Develop marketing program
13. Manage medium to large projects
14. Use computer software
15. Develop strategic plan
16. Write effective letters, articles



Five least-preferred competencies

1. Apply knowledge of seismic construction
2. Develop facility management
3. Organize joint ventures
4. Develop human resources plan
5. Apply expert knowledge of interior environmental health hazards

The survey polled architects for expertise they sought to improve or specific skills they wanted to pursue. Respondents ranked these competencies on a scale of 1 to 5, and were asked to note their motivation to learn more about each of 42 subjects in the near future. The respondents reported engaging in an average of 19 of the 42 over the last year. These most frequently selected competencies included both "hard" and "soft" subjects: listening and communications skills, producing effective construction documents, being a good mentor, understanding world issues, setting personal goals, using computers, and marketing. There were some interesting discrepancies between the competencies architects are pursuing and those they are interested in pursuing in the future. The respondents indicated a greater motivation (compared with actual recent participation) to learn more about CADD systems, liability management, career planning, strategic planning, "boom or bust" cycles, and social/environmental issues.

Learning Resources

Most common resources

1. PCs
2. Architecture school nearby
3. Up-to-date library
4. Computer modem
5. Cable TV
6. VCR in office
7. Electronic retrieval system
8. In-house training coordinator
9. CD-ROM reader

The availability of resources for learning contributes heavily to whether a practitioner engages in continuing education. For example, only a small percentage of respondents report having CD-ROM equipment, which could be an important resource in the future. Nearly two-thirds of firms report having an up-to-date library.

needs of their audience.

One of the primary reasons for conducting this survey was to identify the differences between learning techniques in firms of different sizes. As anticipated, architects in small firms have access to fewer internal resources, are more concerned about general competency, and are more likely to venture outside their firms to learn than are their counterparts at larger firms. What was surprising was the insignificant role of mentoring in small firms, as compared with its major role in larger firms—the opposite of what the task force's educated guesses would have predicted.

Of the survey's revelations, among the most surprising was the difference made by an individual designated as training coordinator, not only in the frequency and number of in-house programs, but also in the respondents' motivation to pursue future learning of all kinds. Although such coordinators were more frequently found in larger firms, this difference held no matter the size of the firm, as long as a coordinator was indicated.

Overall, 27 percent of respondents reported having a training coordinator on staff; firms of 100 or more had the highest percentage (51 percent); firms of 9 or fewer had the lowest (14 percent). No matter what the size of the firm, employees of those practices with coordinators were more likely to engage in learning activities, were more discerning about the quality of programs, and had a higher degree of motivation to participate in future learning activities.

Younger architects

A COMPARISON OF ARCHITECTS' LEARNING preferences at different ages offered some surprises. Architects with less than four years' experience are the most motivated to continue learning. Their level of motivation is higher for almost all of the competencies. Recently licensed architects also engaged in more learning activities than their more experienced colleagues. Those with fewer than four years' experience were more likely to be pursuing knowledge about practical and technical areas such as building codes, waterproofing, specifications, construction documents, computers, structural design, and information management. They were also concerned about soft issues such as goal setting, design, listening skills, and broadening their world view.

In spite of the technological revolution that is often believed to have captivated the young, it is architects over age 50 who are most likely to use audiocassettes and videotapes as learning methods. Older architects are more motivated than their younger counterparts to pursue competency in liability management and mentoring. In terms of learning activities actually pursued, older architects are more active in learning about marketing, strategic planning, leadership development, and starting a firm.

Although younger architects are more motivated to learn, they indicate greater barriers to participation in formal learning activities. These include concerns about time, family, and cost.

Future learning tools

WHAT CONCLUSIONS CAN BE DRAWN ABOUT professional development activities pursued by architects? The opportunity to participate in continuing education, whether through the resources of a firm or an individual's own initiative, seems to create the desire for more. Perhaps architects in small firms would show increased motivation if more learning resources were available to them. These resources could be in the form of improved chapter offerings or liaisons with local universities, whether teaching, attending design critiques, or participating in continuing education seminars taught by professors. Recent evidence suggests that new technologies can be at least as effective as the teacher-student encounters that have historically characterized American architectural education. Interactive computer tools, such as multimedia learning packages that allow random access to information, promise to be more adaptive to the various learning styles of architects. Other technologies, including videoconferencing and electronic-mail networks, promise increasing access to the best teachers and sources of architectural information and knowledge.

Barriers to Learning

Most frequent obstacles

1. Inconvenient time or difficult to get away from office
2. Direct and indirect cost too high
3. Poor quality of programs offered
4. Activities infringe on family time
5. Keep up-to-date on my own
6. No energy or interest

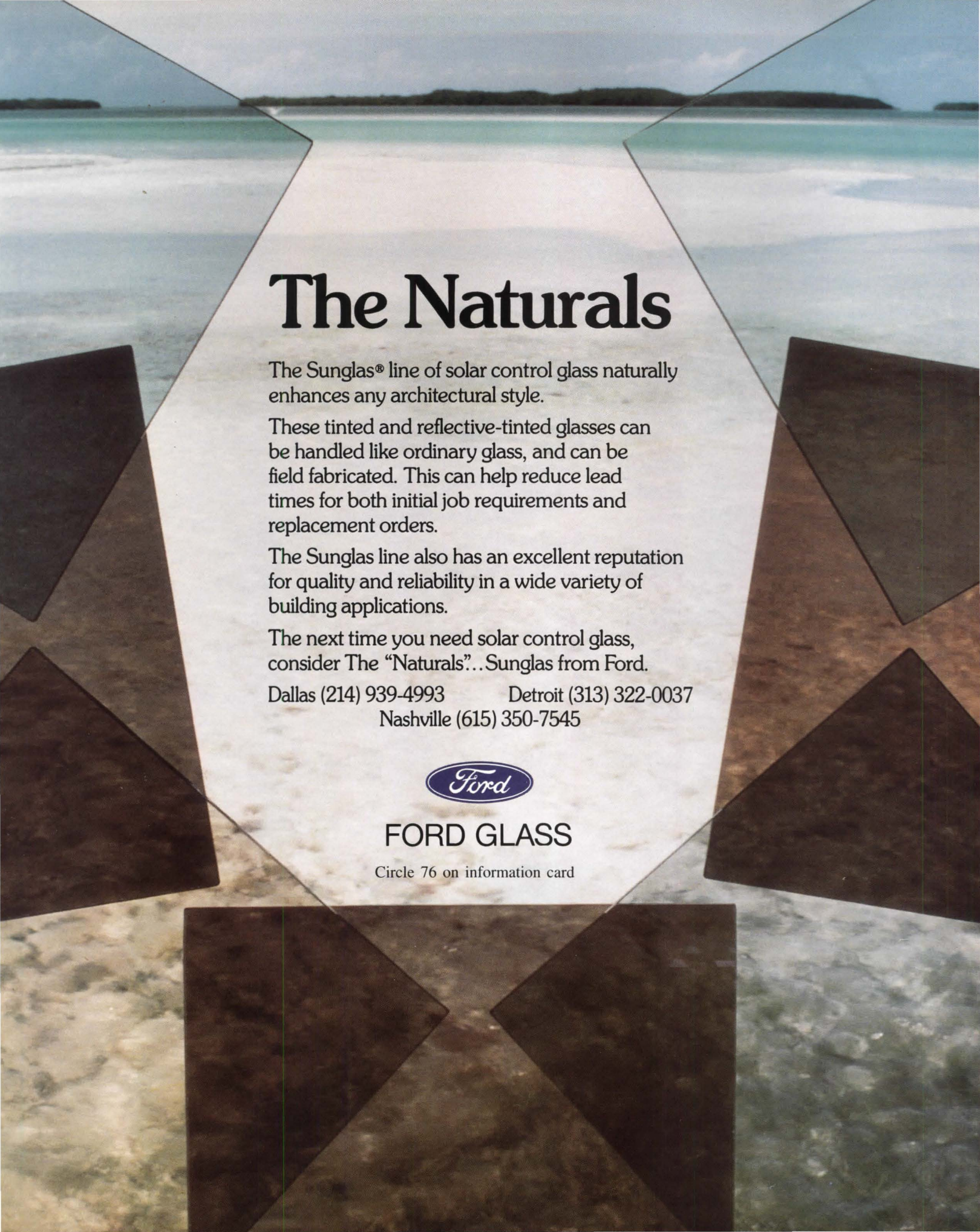
Respondents ranked those factors that precluded their participation in continuing education activities over the past 12 months. Like other professionals surveyed, architects rank time and the demands of practice as the primary obstacles. Unlike other professionals, architects gave the poor quality of available programs a high ranking. Architects with fewer than four years' experience were also particularly concerned about cost.

Within the architect's office, it is obvious that substantial improvements may be accomplished by designating a training coordinator. Such an individual can be responsible for contacting the suppliers, consultants, and clients from whom we already learn so much, and arranging for presentations on their areas of expertise. And, judging by the significant amount of time architects spend reading and the variety of publications they pursue, any embellishments to firms' existing libraries would benefit everyone. Fostering one-on-one mentor relationships would also answer a need expressed by both young and mature practitioners.

The dissatisfaction expressed by survey participants about program quality should spark a wealth of seminars, evening courses, and other offerings by educational institutions. Architects exhibit a tremendous interest in short-term learning activities outside the office. Institutions should take advantage of the opportunity to design new programs for practitioners hoping to keep pace with a changing profession. ■

—JOSEPH BILELLO AND CYNTHIA WOODWARD

Joseph Bilello, AIA, is director of education programs for the Institute. Cynthia Woodward, AIA, is a member of the AIA's firm recognition task force.



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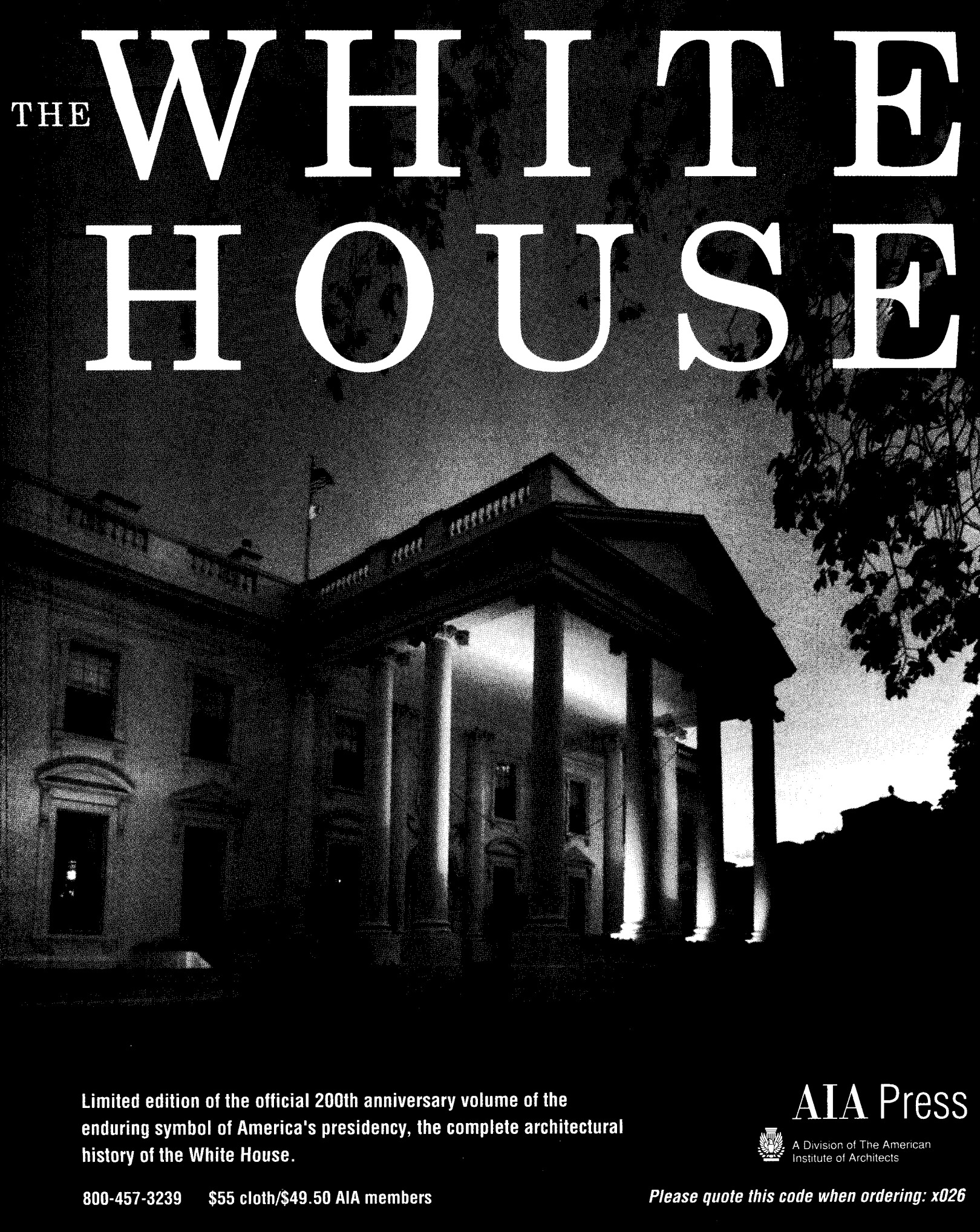

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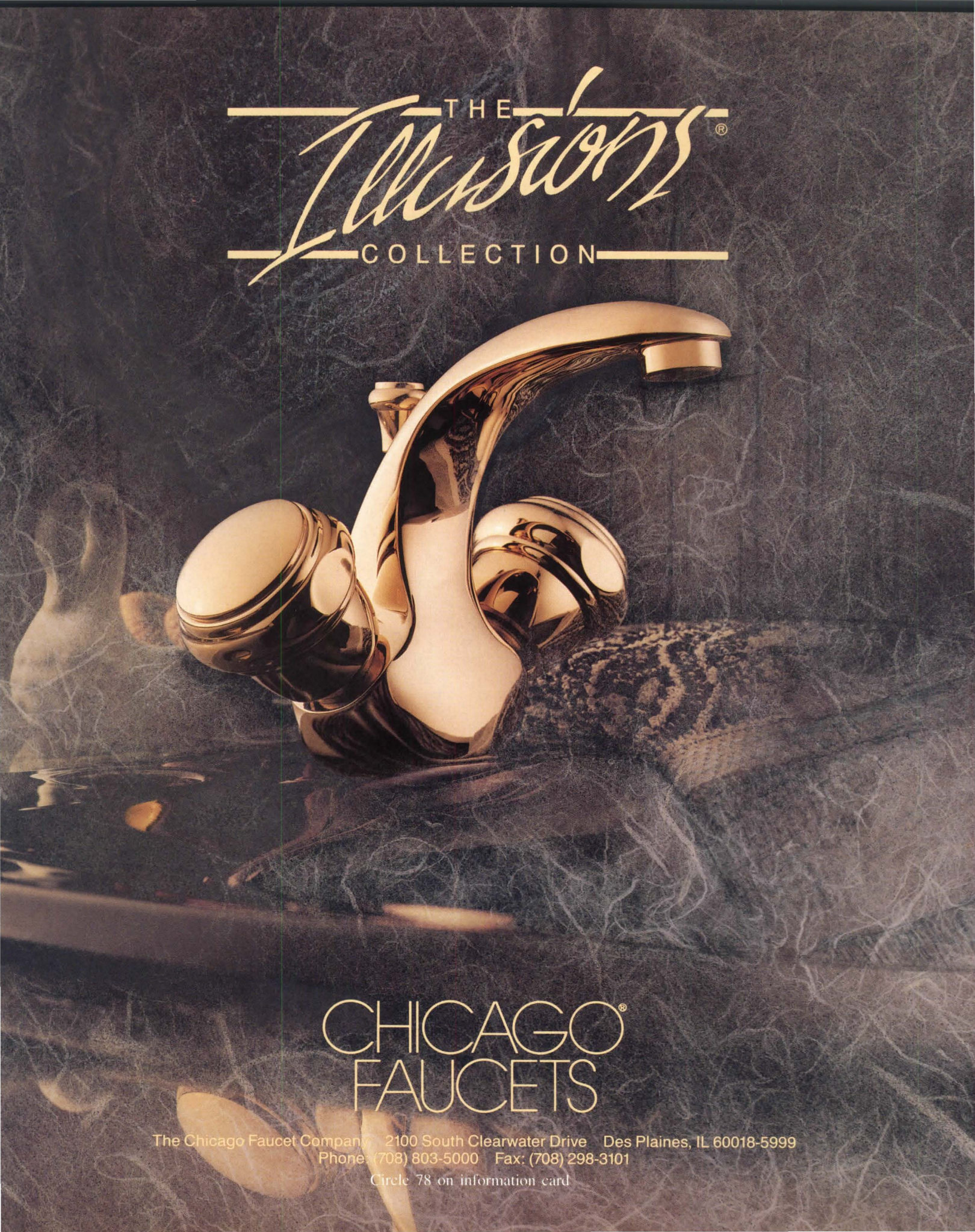

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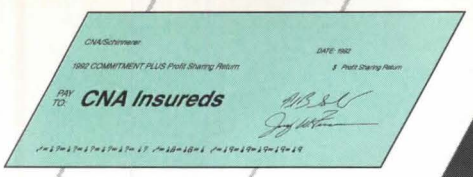

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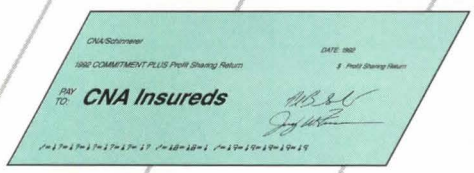

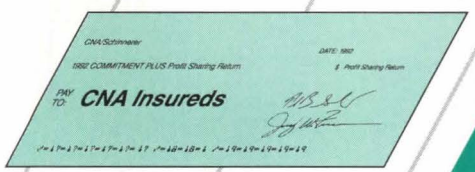

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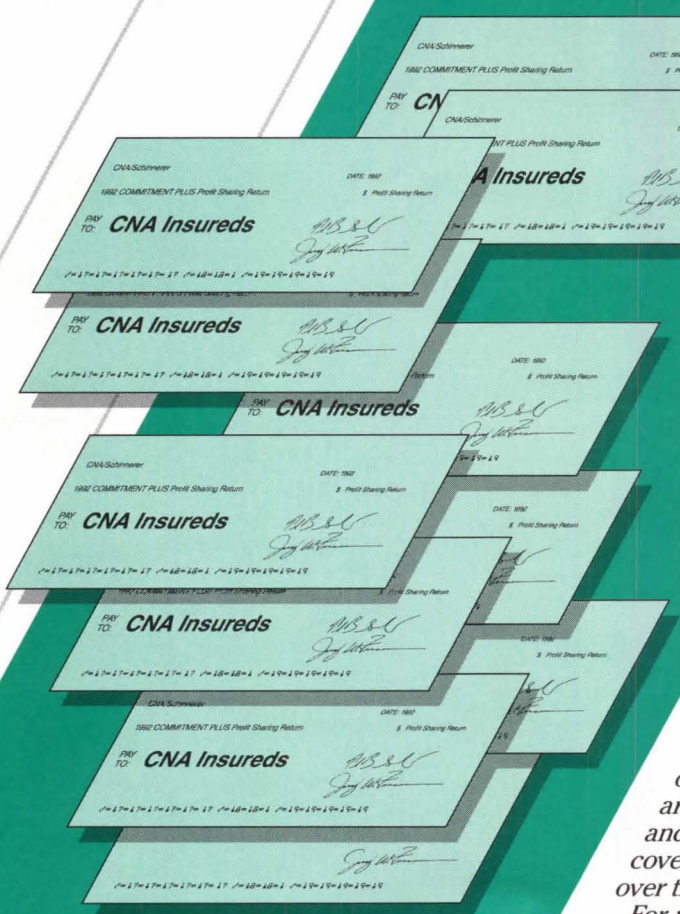

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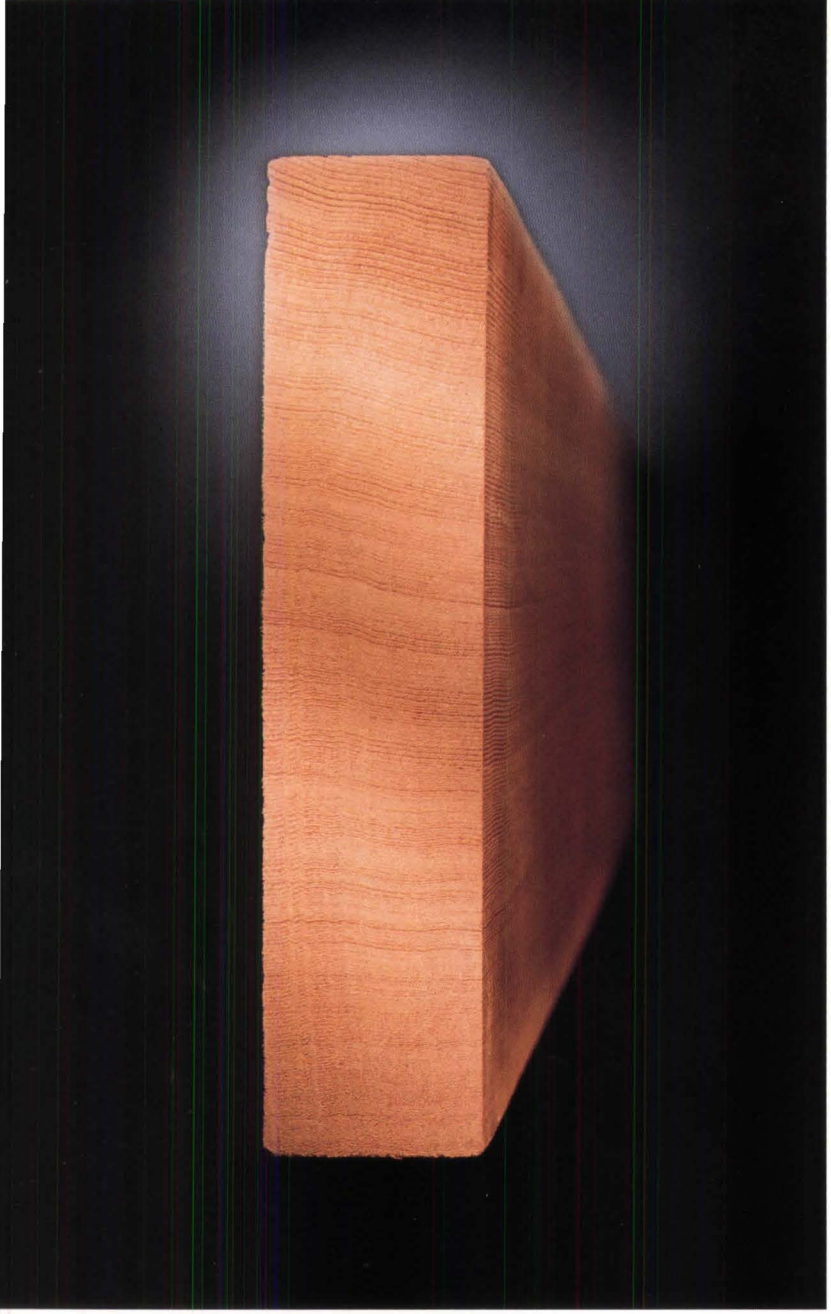

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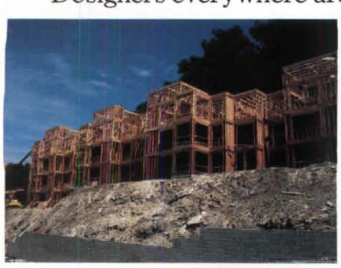

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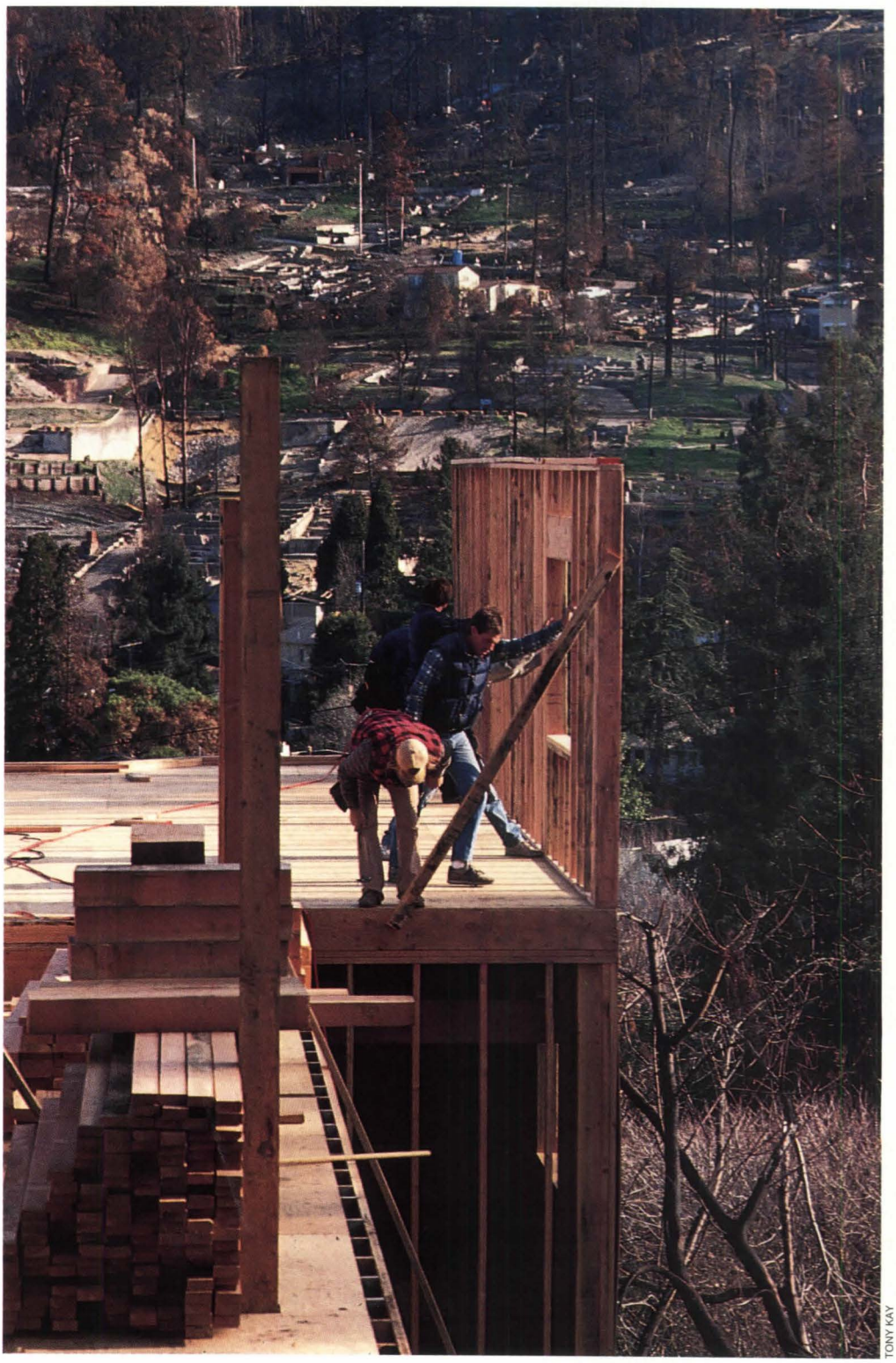
Planning Fire-Safe Design

Sparked by the Oakland fire, California undertakes new construction initiatives.

NEARLY ONE YEAR AGO, WIND-BLOWN flames swept through the Oakland/Berkeley hills destroying some 3,400 dwellings, killing 25, and leaving thousands homeless. The October 1991 East Bay fire was the most destructive urban wildfire in United States history, with a price tag that may eventually exceed $1.5 billion. Called the "fire of the future," an urban wildfire results from the spread of suburban-style development into areas where fire was once integral to the local ecology. Considering how widespread such suburban development is, the East Bay fire might better be termed the "fire of today."

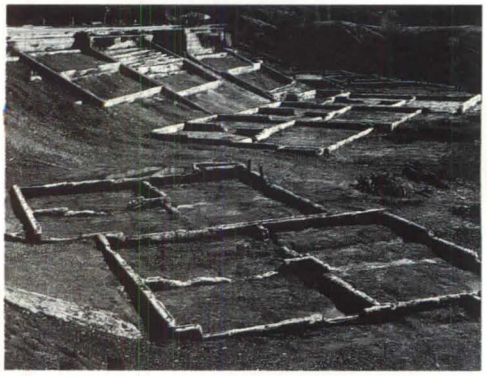
Fires like Oakland's have grown increasingly more dangerous over the last 30 years. In California, the Department of Forestry estimates that 10 million people—a third of the population—live in hazardous areas. From the East Bay hills and the slopes of Mount Tamalpais in the north, to the canyons and hillsides of Southern California, to the entire western slope of the Sierra Nevada, the danger zone includes some of the state's fastest growing areas. And the problem is not limited to California. Last November Wallace Stickney, Director of the Federal Emergency Management Agency (FEMA), reported that tragic urban wildfires have occurred "from the Carolinas to Florida, from Montana to Michigan, from Texas to Colorado."

Fire-safety experts maintain that design strategies for minimizing wildfire danger in urban and suburban areas have been known for years, but are often ignored in favor of architectural fashion. Now, the East Bay fire has brought new attention to fire-safe design. Among other initiatives, the cities of Oakland and Berkeley have drafted new zoning and building restrictions, the California Department of Forestry has begun to develop a computer model, and FEMA has announced



TONY KAY

Nearly a year after a two-day fire in the Oakland/Berkeley hills destroyed 3,400 houses, the process of rebuilding continues. New houses (right) must conform to revised building codes restricting wood roofs and other exterior finishes.



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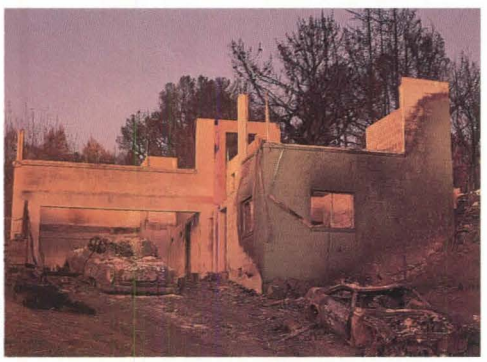

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The fire scorched steep hillsides leaving only concrete and masonry foundations of many houses (top). Swirling winds spread the 1,800-acre fire through dry vegetation close to structures (second from top). The blaze was additionally fueled by unsafe building components including eaves and vents, decks, and porches. Shattered windows allowed fire to sweep inside houses, leaving only a shell (third from top) or chimneys (above).

a national urban wildfire education campaign. More significantly, California may finally be on the verge of enacting statewide wildfire-safety legislation, a move that may set a precedent for other states where the wildfire danger is high.

Wildfire dynamics

THE 1,800-ACRE EAST BAY INFERNO PRESENTED mixed messages: its sheer size got people's attention, but at its height, the fire mocked all efforts to build fire-safe houses or maintain landscapes that mitigate hazards. Surveying the devastation, one might easily have concluded that residential construction methods hardly mattered. Such thinking, however, ignores the reality that not every destructive wildfire need be as big as Oakland's. And analysis has shown that fire-safe design probably played a role at both ends of the East Bay fire. "Had the original area been fire-safe, the fire probably wouldn't have grown so large," says Bruce Turbeville, an education officer with the California Department of Forestry. Similarly, at the fire's edge, where the flames were finally contained, there was a clear difference in the fate of reasonably fire-safe and obviously fire-unsafe structures, according to Alan Sundberg of the Oakland Building Department.

The dynamics of urban wildfires are fairly well understood. Starting with a man-made or natural ignition source, they burn uphill or with the prevailing winds until they reach a built-up area. There, if unchecked, they rapidly escalate as they meet structures, which contain high concentrations of flammable material. One of the greatest misconceptions about fires is that people and property are somehow safer from such disasters in urban areas. In fact, urban natural areas, known as "wildlands," can be even more dangerous than open countryside. In times of periodic drought, lush residential landscaping becomes as dry as kindling, which only adds to the problem. Oakland's disaster was kindled in dry brush, and quickly spread to a concentrated residential area surrounded by stands of dry eucalyptus and pine. The 2,000-degree intensity of the East Bay fire was sustained not by burning vegetation, but by burning structures. But for the tremendous amount of flammable construction in the wildland area where the fire began, the spread of the blaze to seemingly safe urban communities might never have occurred.

In hindsight, the very predictability of the October fire was remarkable. Fourteen major wildfires have burned sections of the East Bay hills since September 1923, when a fire destroyed 523 homes in a wood-shingled neighborhood north of the campus of the University of California at Berkeley, including some by Bernard Maybeck and other early Bay Area architects. Four of the subsequent fires have burned parts of the area torched by last October's blaze. Some residents, including baseball great Reggie Jackson, have been burned out twice.

Oakland residents may finally be wary of such recurrent fires, and as a result, the surge in new home design predicted as a windfall from October's fire has been slow to arrive. Over the summer, a few signs of recovery began to appear in the hills above Oakland as the skeletal frames of new houses rose to the whine of saws and pop of nail guns. But according to statistics from the Oakland Community Restoration Development Center (CRDC), a service center set up to facilitate rebuilding, an average of only 75 building permits per month was granted over the summer, a handful considering the extent of the destruction. Elissa Brown, a spokeswoman for the center, says the issue is one of consumer confidence. "As people see the quality of new houses up there, they will want to rebuild," Brown predicts. However, based on realtor listings and letters to the *Phoenix Journal*, a monthly newspaper by and for fire survivors, it is likely that a third of all owners of property in the devastated area may ultimately choose to sell their lots, rather than build new houses.

Oakland's rebuilding effort was greatly facilitated last winter by an East Bay AIA-led charette organized under the California Emergency Design Assistance Team program. The effort, which brought former residents together with local architects, led to the development of district-specific design-review checklists that residents, architects, and contractors say are working well.

Insurance problems

THE MOST PRESSING PROBLEM CONFRONTING homeowners since the fire has been settling with insurance companies. While some problems related to the sheer volume of claims filed were inevitable, an investigation this spring by the state insurance commissioner identified a "nightmare involving widely divergent rebuilding estimates, revolving claims adjusters, and inadequate communication." Among other problems, the fire exposed the systematic underinsuring of homes. Most homeowner policies cover only the exact reconstruction of a house. However, many historic houses cannot be rebuilt as originally

designed because of changes in building, energy, and seismic codes.

The insurance problem has dogged nearly every architect working with a client who lost a home. One East Bay architect says his first task is often "forensic" architecture: the creation of a complete set of drawings for a house that will never be rebuilt. Such effort is particularly important for truly historic, custom-built structures, many of which were destroyed by the fire. Armed with drawings of such details as banister rails and cabinet trim down to the last screw—and largely fictitious bids from contractors and suppliers—homeowners have found they can bargain with insurance adjusters for such mundane design elements as a new foundation, which may not have been covered by the policy.

Not only has this charade added to expenses, delayed rebuilding, and frayed tempers, but it has exposed a major failure of public policy, says Berkeley-based disaster preparedness consultant Joshua Lichterman. Insurance companies are selling policies that claim to offer "guaranteed replacement value," yet homeowners, whose only failing was to buy a standard product, are left holding the bill for hundreds of thousands of dollars for roughly equivalent structures.

Dangerous seclusion

GIVEN THE COSTS—BOTH EMOTIONAL AND monetary—why do people rebuild in fire-prone places? Because of the quality of life they afford. In California, the boundary between rural and urban areas is stocked with rambling, wood-frame houses closely set amid dense foliage. Steep hillsides afford spectacular views—as well as allow flames to spread as if up a chimney. And while narrow, twisting streets offer a sense of seclusion, they can also be deadly during times of panic and confusion. Many of the 25 who died during the East Bay fire were trapped in or near their cars while attempting to flee.

Ironically, it is often the most dangerous aspects of these types of neighborhoods that are most appealing. Some towns have mandated such elements as wood siding, shake roofs, overhanging eaves, and lush landscaping in design-review codes. It should therefore come as no surprise that residents of the burned-out areas of Oakland and Berkeley—many of whom escaped with little more than their lives—now plan to restore many of the most dangerous aspects of their former environments. Lush vegetation is a prime example. While providing for privacy on relatively small lots, such planting can also carry fire

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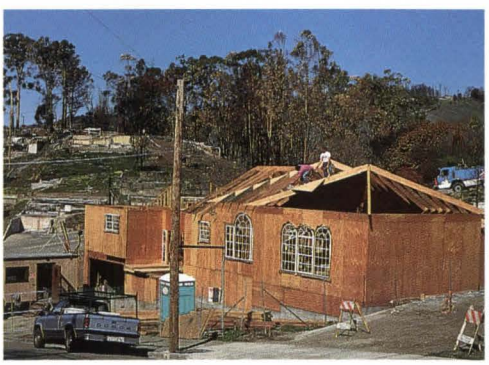

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The estimated $1.5 billion in damages from the Oakland/Berkeley disaster makes it the costliest fire in U.S. history. Efforts to rebuild have proceeded slowly, often hampered by inadequate responses to insurance claims. During the summer, an average of 75 building permits per month was granted for the fire-ravaged area; some estimates predict that as many as one third of homeowners will not rebuild (top). New construction reflects residents' increased concern for fire safety, and more stringent requirements for exterior finishes by the cities of Oakland and Berkeley. Building codes still permit wood framing and sheathing (center left and right), but cladding is required to be fire-safe. As a result, Franklin D. Israel of Los Angeles designed a new metal-roofed, stucco-clad house (above left and right) to replace a wooden building that burned down.

right to the front door. U.C. Berkeley Engineering Professor Patrick Pagni, who co-taught a spring graduate seminar on the East Bay fire, puts it bluntly: "The people up there can count on another fire by 2010 if vegetation patterns are not changed."

Landscape design

IN TERMS OF THE LANDSCAPE, TWO STRATegies have proven particularly effective for achieving fire-safe design. One is to maintain fuel breaks in vegetation; the other is to periodically remove dangerous concentrations of brush. The California Department of Forestry has long advocated the former strategy in the layout of developments. In its standard document, "Fire Safety Guides for Residential Development in California," the agency explains how new, carefully located open spaces (such as golf courses or utility easements) may actually protect older, more dangerous areas.

"Fuel modification," as the second technique is known, can take many forms, including mechanical removal of combustible vegetation or controlled burning. All aim at creating a more parklike setting free from the buildup of brush that is so characteristic of urban natural areas, says U.C. Berkeley Forestry Professor Robert Martin, who co-taught the U.C. Berkeley fire seminar with Pagni. Martin believes proscribed burning best simulates natural processes. It also gives urban firefighters the chance to observe wildland fires and gain experience working in wildland settings. But permits to burn are difficult to obtain, and the practice can normally only be applied on large, single-property holdings.

Not all steps need be so extreme, however. Over the years, the California Department of Forestry has produced a profusion of educational material outlining landscaping tips for designers and homeowners. Unfortunately, the most effective measure—and one that is required by law in unincorporated areas—is all but impossible in urban settings: the clearing of all flammable plants for a distance of 30 feet around a house. The California Department of Forestry's guides, however, offer numerous other strategies that can be applied in urban areas: trimming dead wood, cutting weeds, moving stored firewood away from buildings, raking up debris, and planting to avoid "fire ladders"—interlocking levels of vegetation by which low-intensity ground fires may climb into the trees.

Model structures

DESIGN OF FIRE-SAFE STRUCTURES HAS FOcused on features that may give a house a reasonable chance of surviving a normal wildfire, explains Richard Schell, another California Department of Forestry officer. Over the years, the department has identified a number of fire "entry points," such as flammable siding, exposed decks, eaves, porches, attic vents, and interior corners that trap burning debris. Windows that crack or transmit enough heat to allow a house literally to "explode" are another concern.

But in the last year, the California Department of Forestry, along with Martin, has been attempting to reach beyond such rules of thumb and create a "structural ignition assessment model." Schell says the goal of the model is to provide a standard tool with which designers and regulators may evaluate different overall house designs. The model is based on a computer database that now includes entries for 4,300 homes either damaged, threatened, or destroyed by wildfires; most of the entries are products of the East Bay fire and a 1990 Santa Barbara fire. Of the 205 data points reflecting house materials, configuration, access, and surrounding vegetation, Martin's preliminary findings indicate one dominant area of vulnerability: roofs. In particular, houses with wood roofs are 50 percent more likely to burn than those with roofs of other materials, according to Martin. And wood roofs are not only dangerous to a building's occupants, but to neighbors as well. Pagni says one graduate student in his seminar estimated that every burning shake roof in the October fire placed 60 downwind dwellings at risk through the burning fragments it cast off.

TONY KAY

California's Department of Forestry is devising a standard for evaluating house designs.

Martin emphasizes that the model is aimed at analyzing the complex interrelation of elements that determine whether a building will survive. Ultimately, the most important factor may be whether firefighters decide to try to save a house. Under crisis conditions, a house with a wood roof that is located on a

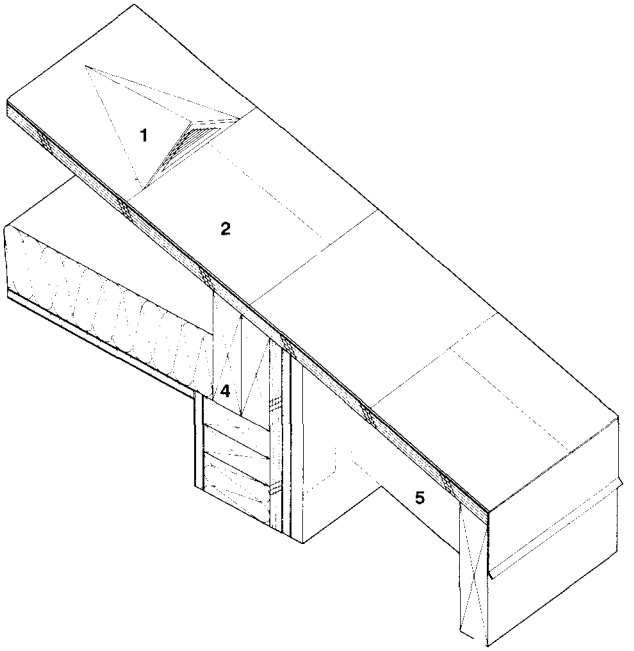
Fire-Zone Requirements

AS A PART OF ITS RESPONSE TO THE OCtober 1991 East Bay fire, the City of Oakland has approved a number of new building code restrictions over and above current national code requirements. These limitations will apply in a new fire-hazard zoning district that includes much of the fire-devastated area, as well as other areas of the city with similar topographic characteristics.

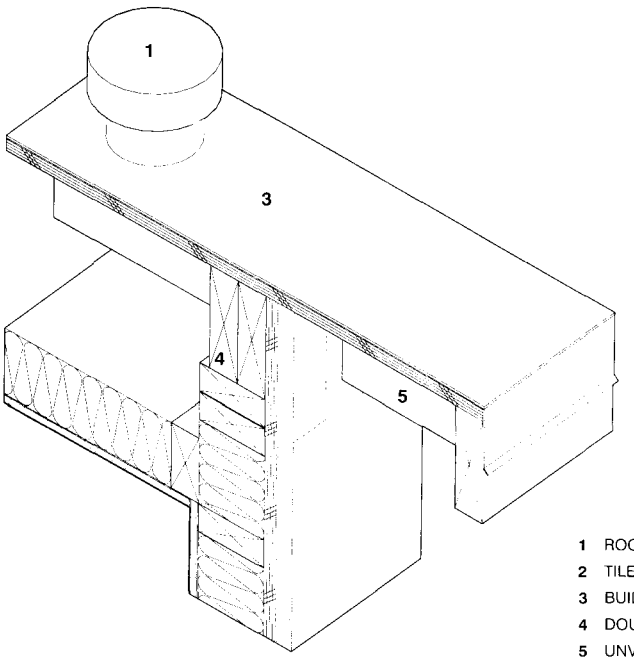
In addition, Oakland has taken a number of other actions. Key among these may be the creation of a Fire Prevention and Suppression District. If such a district is established, its residents would pay for vegetation management and removal, additional fire personnel during times of high hazard, code enforcement, evacuation route signage, and citizen training and education. Other city efforts have been directed at upgrading utility services and identifying key streets for possible parking restrictions and widening. Voters passed a $50 million citywide bond issue by a 75 percent margin in June to pay for upgrading emergency response facilities.

Drawings (facing page) show architectural details that satisfy new provisions of the Oakland building code in the fire-hazard zoning district. These details include:

- Attic venting under eaves is prohibited. Roof vents (top left and right) are recommended.
- Wood siding is allowed only when installed over a 1/2-inch-thick gypsum board underlayment (center left); 7/8-inch-thick stucco (center right) is also permitted.
- Double blocking at projections such as decks and balconies (bottom right) is mandatory. For cantilevered decks and balconies (bottom left) triple blocking is recommended.
- Any roof that does not carry a class "A" fire rating is prohibited. This measure bans all new wood roofs.
- State energy codes governing the use of double panes of glass will be enforced. Windows have been shown to be a key area of fire vulnerability.

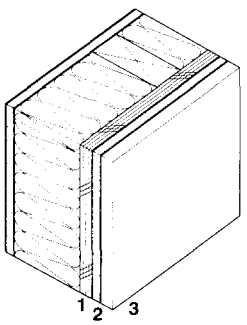


SLOPED ROOF AND EAVE

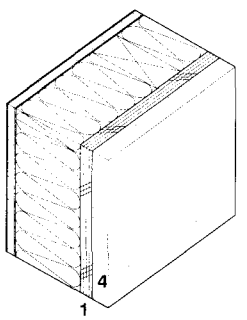


FLAT ROOF AND EAVE

1 ROOF VENT
2 TILE OR SHINGLE ROOF
3 BUILT-UP ROOF
4 DOUBLE BLOCKING
5 UNVENTED EAVE

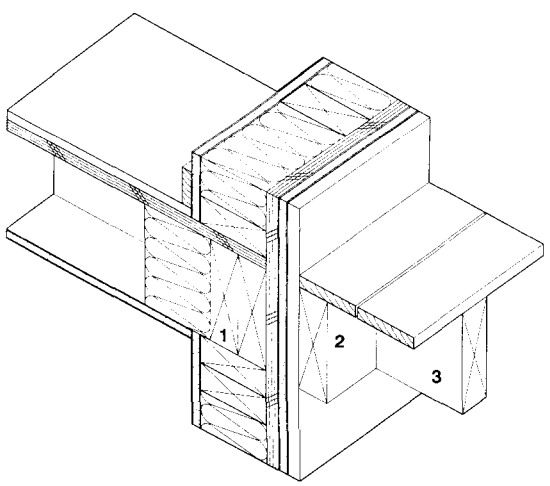


EXTERIOR WALL– SIDING

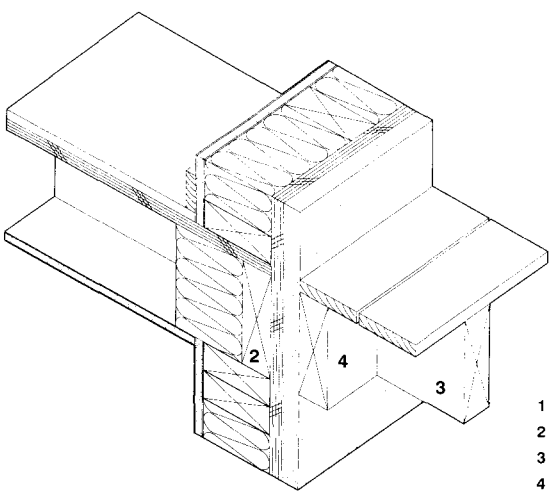


EXTERIOR WALL– STUCCO

1 PLYWOOD SHEATHING
2 1/2" GYPSUM SHEATHING
3 SIDING
4 7/8" STUCCO



CANTILEVERED DECK AND BALCONY



NONCANTILEVERED DECK AND BALCONY

1 DOUBLE BLOCKING
2 SINGLE BLOCKING
3 JOIST
4 LEDGER

narrow driveway under overhanging vegetation is a magnet for trouble, no matter how beautifully designed it may be.

Will fire occur again?

AFTER YEARS OF FAILED ATTEMPTS, LANDscape management and wood roofs may finally be the subject of comprehensive legislation in California. A bill introduced this year by Assemblyman Tom Bates of Berkeley would instruct the California Department of Forestry to map all wildfire hazard zones in the state, and impel local jurisdictions to enact vegetation-management plans and limited bans on wood roofs. The pending legislation would require that all roofs in hazard zones carry at least a "B" fire rating. This would exclude all wood shakes except those that have been factory-treated with a fire-retardant chemical and been installed as part of an integrated system. In comparison, most clay or cement tile, asphalt shingle, or built-up roofs carry an "A" rating. Currently, most wood roofs are so hazardous they carry no fire rating, Pagni says. Shakes cannot be effectively treated after they have been installed, despite what certain fire-prevention "experts" claim, says Martin.

If the Bates bill passes, the legislation will mark something of a national watershed. For years, the wood-products industry has claimed that shake roofs were no more of a hazard than other design elements. But now that wood roofs' destructive role in recent wildfires has been documented, the industry has backed down, according to Pat McLaughlin of Favro McLaughlin, a firm that represents wood shake and shingle makers. The industry now favors an integrated approach such as that of the Bates bill, McLaughlin says. Emphasis is now on the ability of shake and shingle makers to provide a fire-retardant product.

Mike Westfall, president of the Cedar Shake and Shingle Bureau in Bellevue, Washington, agrees that shake and shingle makers now see California's proposed limited ban as a "reasonable" approach, but he adds that the trend against wood roofs has been fueled as much by competition among manufacturers as by real fire-safety data. "From a consumer's point of view, wood roofs may still be better than heavy, class 'A' roofs," Westfall says. Among the reasons are installation cost, cooling bills, and earthquake safety.

However, many believe that even the Bates bill does not go far enough. Critics argue that laboratory testing is no guarantee that chemicals in the wood won't break down over the 20-to-40-year life of a roof. In wildfire areas, "wood belongs inside the house, not on it," says Pagni. Many cities, Los Angeles included, have enacted total bans on wood roofs and called for a minimum "A" fire-protection rating. And designers and homeowners have in many cases chosen to act on their own. Martin was so convinced by his research that he removed the wood roof from his own Oakland home long before it wore out.

As part of its response, the city of Oakland, where 95 percent of the October fire's damage was concentrated, has enacted a ban on new wood roofs in a fire-hazard zoning district that includes much of the fire area along with portions of the city with similar topography. Berkeley has taken similar steps. Still, the package of zoning requirements in which the Oakland ban is contained is measured at best. Other proposed code changes, such as a ban on wood siding, were whittled away after homeowners objected. And a recommendation that many homeowners be required to install residential sprinklers was scuttled by the city council after it was deemed too expensive.

TONY KAY

Most policies cover only exact reconstruction, not changes that conform to new codes.

Other planning issues were detailed in a report issued last February by the Oakland/Berkeley Mayors' Joint Task Force. Addressing the response of the community's emergency services, the report pointed out inadequate emergency communications systems, policy conflicts between police and fire departments, lack of emergency response training, and an almost total lack of evacuation planning. In addition, the report states that poor utility service may have significantly contributed to efforts to fight the blaze. Disaster consultant Lichterman says 17 of 22 reservoirs in the area ran dry during efforts to fight the fire. Overhead power lines also caused major problems both in evacuating the area and fighting the fire. Utilities will be relocated underground as rebuilding in the devastated zone continues. But the issue of who will pay has yet to be resolved.

Responsible design and planning

ULTIMATELY, THE RESPONSIBILITY TO CREATE a safer environment may rest with designers and homeowners, and some families are turning the trauma of losing their homes into the opportunity to build a better one. Los Angeles architect Franklin D. Israel, who has designed a metal-roofed stucco house to replace a 1926 wood structure that went up in flames, notes, "We have an advantage building in 1992 rather than 1920. We know more about environmental issues, materials, and construction." Rather than copy the siting of the original house, which was built in the days when a front and back yard were considered necessities, Israel customized the new dwelling to his client's needs by responding to its hilly site with terraced landscaping—including drought-resistant plants placed away from the house. Similarly, San Francisco architect Stanley Saitowitz reports that the three houses he is designing to replace wood dwellings will include steel framing, stucco and cement fiberboard walls, and built-up tar and gravel roofs.

Individual architects' attention to fire safety notwithstanding, building in wildland areas may have become too dense. In Oakland, for example, Hiller Highlands, a 65-acre planned unit townhouse development, will probably be rebuilt as it was before the fire—directly in the path of the flames.

Critics point out the real problem is not so much a community's immediate response to disaster but a commitment to long-term vigilance. "I'm not really worried about this year or next year, but what do you do in 10 or 20 years?" asks Steve Belcher, an assistant to the Berkeley city manager. "How do you maintain a sense of priority?"

Unfortunately, people's willingness to live in harm's way makes it the responsibility of the government and the building trades to require fire-safe design. Having suffered both a major earthquake and fire in the last three years, Bay Area residents may now be more attuned to the importance of disaster planning than the occupants of any other region in the U.S. But the disaster East Bay residents fear most—a major earthquake on the northern portion of the Hayward fault, which runs through heavily populated regions, has yet to occur. If it does, warns Lichterman, the fires that follow may "make the East Bay fire look like child's play." ■

—DAVID MOFFAT

David Moffat is associate editor of Traditional Dwellings and Settlement Review.

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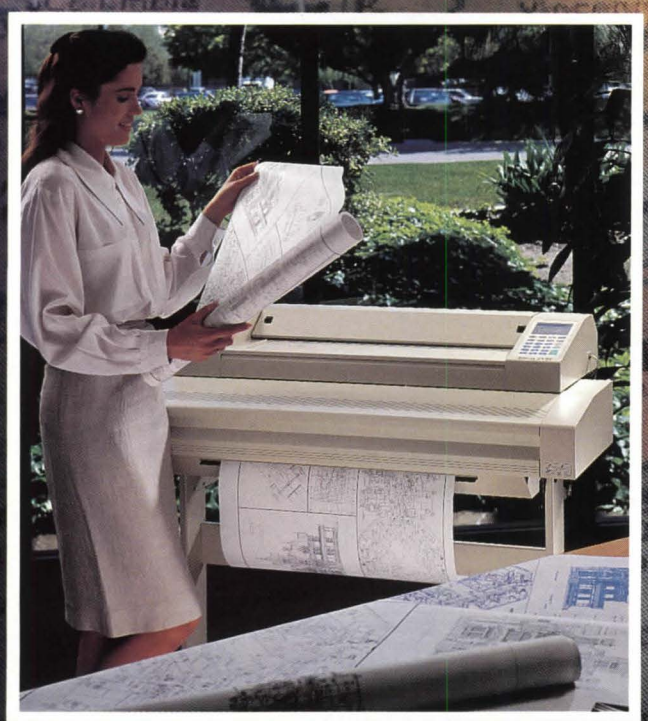

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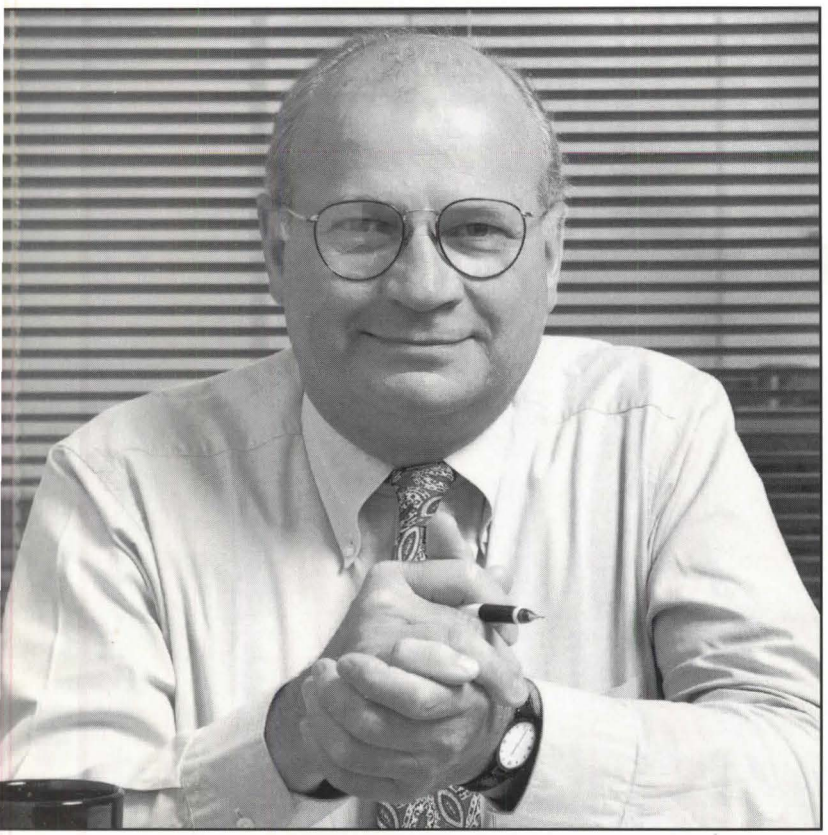

Peter Steffian, FAIA, is a partner of SBA/Steffian Bradley Associates Inc., a Boston-based architecture, interior and urban design firm founded in 1932. Peter is past president of the Massachusetts Council of Architects and a past director of the Boston Society of Architects and is chairman of the Board of Registration of Architects for the Commonwealth of Massachusetts. We value our relationship with his firm and appreciate his willingness to talk to you about us.

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Moving to Metric

Whatever happened to this country's long-promised conversion to metric measurement?

THE UNITED STATES REMAINS THE ONLY INdustrialized country in the world that still employs the outmoded English system of measurement, although transferring to the simpler, decimal-based metric system has long been promised. In 1975, Congress passed the Metric Conversion Act, establishing metric measurement as this country's preferred system. Eighteen years later, action has finally been taken: as of September 30, 1992, all federal grants, procurement, and business activities are to be written in metric units to the extent feasible by government agencies, according to an executive order signed by President Bush in July 1991.

The term "to the extent feasible" allows agencies to set their own timetables, and those involved in government building have agreed that, as of January 1994, all federal design and construction projects will be measured in metric units. Since the federal government is the largest single client for architects, accounting for 10 percent of the U.S. construction industry, the new policy means that architects will have no choice but to follow the rest of the world and adopt metric measurement.

The system of measurement specified in the President's order is the International System, or SI, the abbreviation for the French *Systeme Internationale*. It contains six basic units relevant to building construction: meter for distance, kilogram for mass, second for time, ampere for electric current, kelvin for temperature, and candela for illumination. Dimensions on architectural drawings are expressed in millimeters; areas in square meters.

Metric proponents point out that, for design and construction, SI units are more rational than the English system. Because metric dimensions are based on units of 10 with no fractions, they are easier and faster to manipulate, less prone to error, and more accurate. No special calculator is needed to add, subtract, multiply, or divide dimensions, as is necessary with the English system. Once the metric system is in place, American architects

600 mm is the basic planning unit for architectural design.

▪

Standard width of gypsum wallboard is 1,200 mm.

▪

400 mm is the standard stud spacing dimension.

▪

Doors will be 900 by 1,200 mm, but door thickness will remain the same.

▪

600 by 600 mm is the preferred masonry module.

▪

Metric modular brick measures 90 by 57 by 190 mm.

▪

Metric modular block measures 190 by 190 by 390 mm.

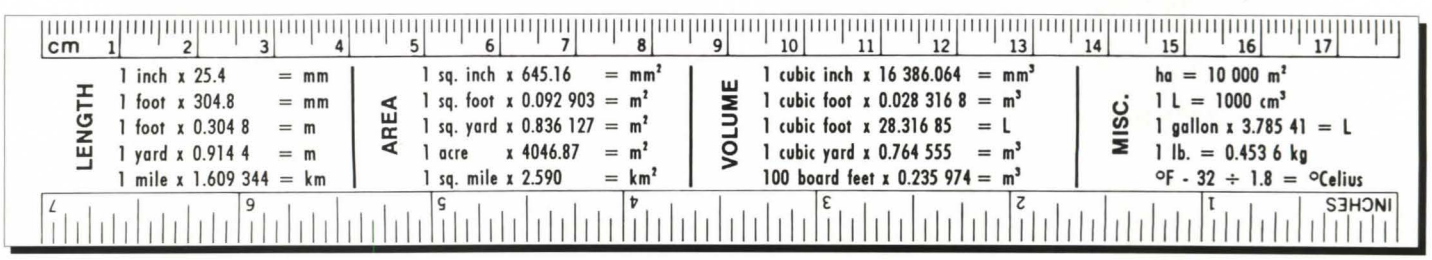
and building product manufacturers will be more competitive in the world market, which is predominantly metric. Architects in countries such as Great Britain and Canada, which converted to the metric system in the 1970s, report that the transition required no special training, and architects needed less than a week to adjust. Manufacturers and the building trades, however, were slower to respond.

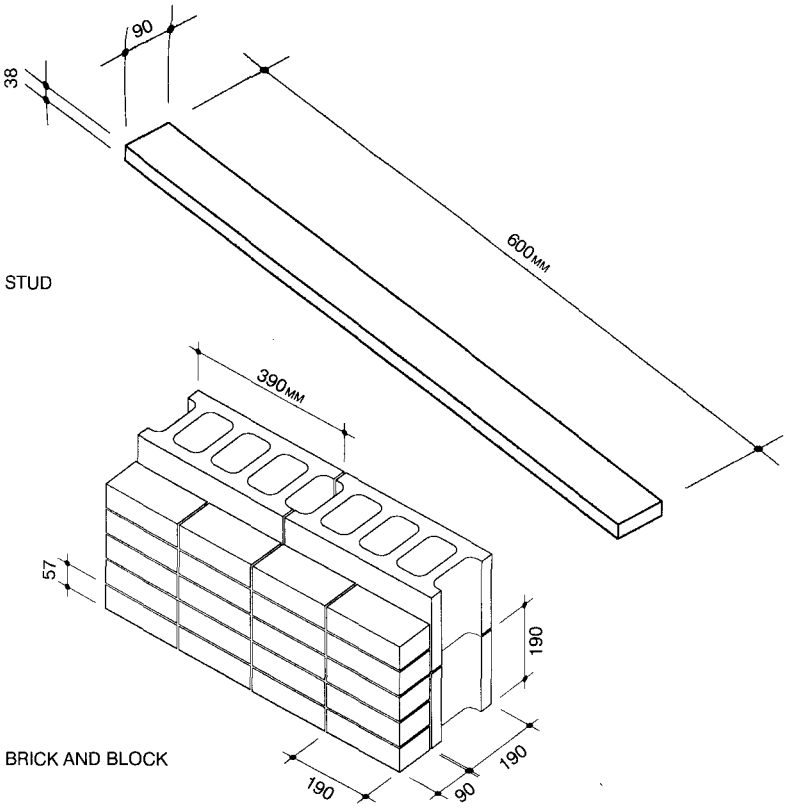
Thinking metric

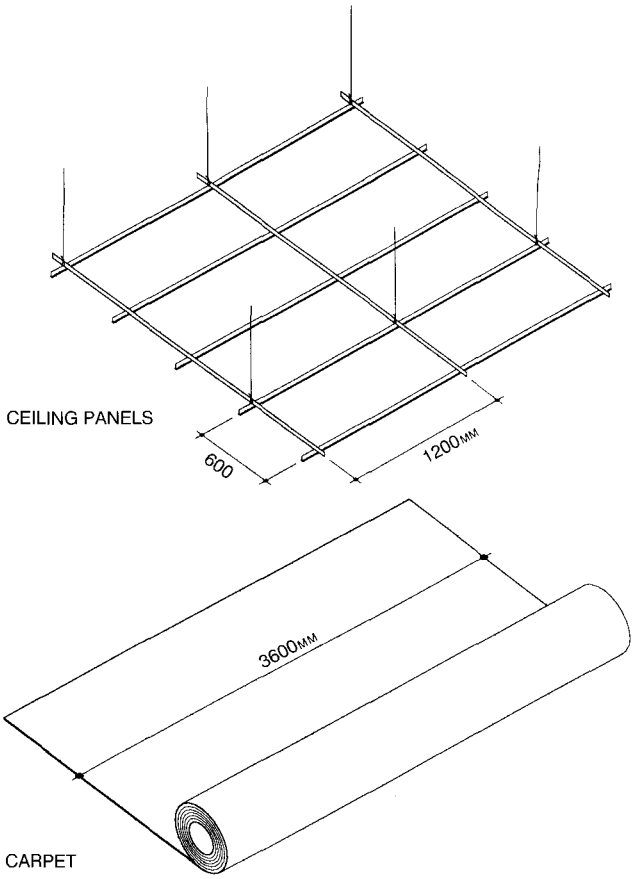
CONVERTING ENGLISH UNITS TO METRIC requires some simple calculation, but visualizing space in metric units will be more difficult, according to architect David Clark of 3D International in Washington, D.C., who has worked on metric projects for international clients since the late 1960s. "Architects will have to develop a frame of reference for dimensions and quantities," notes Clark. "Quit converting numbers, and start thinking metric." One way to begin is to visualize metric measurements for familiar architectural components (left).

Donald Cox, an associate of Richard Meier & Partners, New York, who has worked on a number of metric projects abroad, suggests carrying a metric ruler to take common measurements such as table and chair heights, stair treads and risers, and material sizes. "It helps to get a gauge on what these dimensions are and makes them easier to comprehend," explains Cox.

A pocket metric guide for architects, published by the AIA's building performance and regulations committee, helps visualize metric sizes, such as the actual dimensions of a 2 by 4 (in millimeters, a 38 by 90), and equivalents for ADA standards (the turning radius for a wheelchair, for instance, is 1,500 mm). A handy plastic pocket ruler (below) that measures both centimeters and inches and also gives metric conversions for length, area, and volume was received by every attendee at the AIA convention in June. "It's in the profession's interest to move toward metric," notes Hugh Gershon of Hugh Jay Gershon, Architect, Glen Head, New York, chairman of the building performance and regulations com-







mittee's metric task force.

For now, teaching the metric system to future architects does not appear to be a priority. According to the National Architectural Accrediting Board, there are currently no plans to require metric measurement in architecture schools, nor does the National Council of Architectural Registration Boards intend to convert its licensing exam to exclusively metric units. Because the exam is also used in Canada, quantities are expressed in both English and metric units.

Metric pilot projects

THE FEDERAL GOVERNMENT IS DEMONstrating its commitment to metric conversion with a program of pilot projects around the country. Currently, metric is the measurement of choice for nearly $1 billion worth of federal projects, and the General Services Administration (GSA) is monitoring how well architects are adjusting. "In general, architects like working in metric," claims GSA project manager Otto Shick. Architects working on these pilot projects began them in English units and then, at the GSA's request, converted to metric in schematic design, when the program got off the ground. Shick explains that large projects of more than $1 million in construction were selected as metric pilots to discourage contractors from converting metric units back to English, which is easily accomplished with small projects.

The GSA supplies architects with sample metric drawings and specifications, steel manuals in metric, the current metric edition of the "Means Building Construction Cost Data" and the GSA's "Metric Design Guide" (available by calling Shick at 215-656-5805), which gives conventions for drawings, specifications, and material sizes; tips on adjusting to metric; and a directory of manufacturers who supply products in metric sizes.

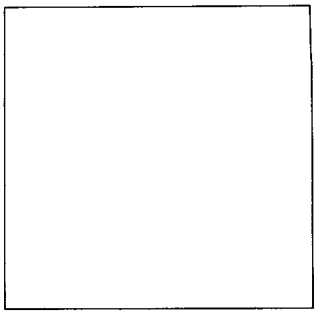
Geddes Brecher Qualls Cunningham Architects of Philadelphia is designing a $70 million, 39,400-square-meter office building for the GSA, and reports few problems with the transition. "It hasn't been difficult," maintains associate and project manager Joel Brown. Switching from English to metric at the end of schematics changed the building module from 40 by 40 feet to 12 by 12 meters, which involved redesign. An add-on program for AutoCad sets the default to metric units, architects use specially designed pocket calculators for metric conversion, and manufacturers of materials such as ceiling tiles and access flooring either offer metrically measured products or have agreed to supply them for this project.

"Problems arise in translation when consulting with those outside the project team, such as public utilities representatives and surveyors," notes Brown, who anticipates resistance from the building trades. "They have to lay out the building in a measurement system unfamiliar to them. They may add premiums to the construction cost, but that will probably depend on the bidding climate." GSA will offer metric training seminars for contractors, and construction will be managed by a contractor familiar with metric measurement.

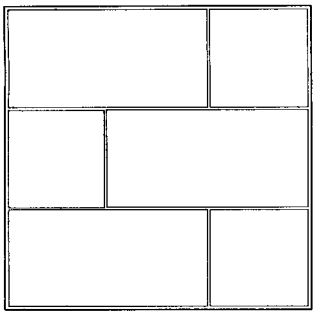
Allied groups and standards

TAKING THE METRIC PLUNGE, THE AMERIcan Society for Testing and Materials (ASTM) publishes its standards in both exclusively metric and dual units. New editions are being converted to metric units wherever possible. As of January 1993, the American Society of Civil Engineers' new publications will be metric only, and existing publications will be converted as new editions appear.

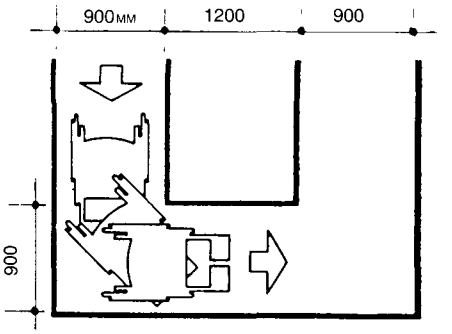
More moderate conversions—to metric editions of publications also produced in English—can be expected from the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE), which publishes its "Handbook of Fundamentals" in metric and English versions. Metric editions of ASHRAE's other handbooks are being prepared. The American Institute for Steel Construction's "Load Resistance Factor Design Specification for Structural Steel Buildings" is now available in a metric edition, and the in-



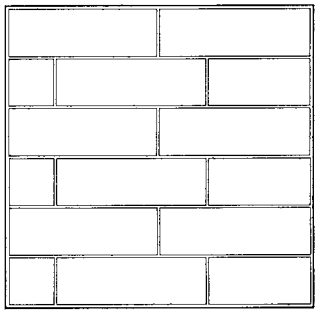
BASIC MASONRY MODULE
600 x 600MM



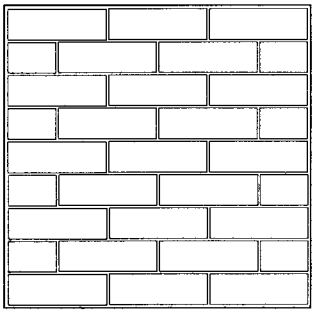
MERTIC CONCRETE MASONRY UNIT
FORMAT: 200 X 200 X 400, 3 COURSES = 600MM



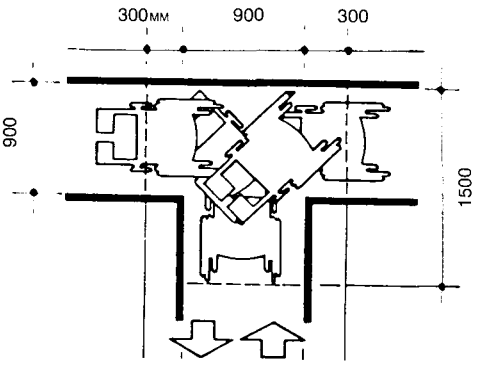
180° TURN



METRIC UTILITY BRICK
FORMAT: 100 X 100 X 300, 6 COURSES = 600MM



METRIC STANDARD BRICK
FORMAT: 100 X 67 X 200, 9 COURSES = 600MM



90° TURN

stitute also publishes "Metric Properties of Structural Shapes." Dual units are included in standards of the Brick Institute of America, the Underwriters Laboratories, the National Fire Protection Association, and the American Society of Mechanical Engineers.

National codes, of course, will be slower to offer exclusively metric units. The Building Officials and Code Administrators (BOCA) code and the Council of American Building Officials (CABO) code offer dual units, while the International Conference of Building Officials (ICBO) code includes a table for English-metric conversion.

The board of directors of the Construction Specifiers Institute in February approved including metric units in all its documents. CSI's SPECTEXT is already available in dual units. MASTERSPEC is about to convert all 430 sections of its specification to metric. "GSA and other government agencies use MASTERSPEC," says Warren Hoppe, senior director of AIA's professional systems division, "and some sections have already been converted for their use." Full conversion will take approximately nine months.

AIA's ninth edition of "Architectural Graphic Standards," to be available in March 1994, will include a new chapter on metric measurement. The tenth edition, to be published in 1998, will be completely metric. ■

—MICHAEL J. CROSBIE

Metric Resources

SI Metric Training Guide. National Metric Council, 1735 N. Lynn Street, Suite 950, Arlington, Virginia 22209, (703) 524-2007.

ASTM E621, Standard Practice for the Use of Metric (SI) Units in Building Design and Construction. American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103, (215) 299-5585.

ASTM E713 Guide for Selection of Scales for Metric Building Drawings. American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103, (215) 299-5585.

ASTM E577 Guide for Dimensional Coordination of Rectilinear Building Parts and Systems. American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103, (215) 299-5585.

NIST Special Publication 330, The International System of Units (SI). Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, (202) 783-3238.

Metric Units of Measure and Style Guide. U.S. Metric Association, 10245 Andasol Avenue, Northridge, California 91325, (818) 363-5606.

The Architect's Studio Companion: Technical Guidelines for Preliminary Design (includes dual units). Edward Allen and Joseph Iano. John Wiley & Sons, Professional Reference and Trade Group, 605 Third Avenue, New York, New York 10158 (800) 225-5945, extension 2497.

Metric Guide for Federal Construction. Construction Metrication Council of the National Institute of Building Sciences, 1201 L Street, NW, Suite 400, Washington, D.C. 20005, (202) 289-7800.

Metric in Construction Newsletter. Construction Metrication Council of the National Institute of Building Sciences, 1201 L Street, NW, Suite 400, Washington, D.C. 20005, (202) 289-7800.

METRIC-X Conversion Software. Orion Development Corp., P.O. Box 2323, Merrifield, Virginia 22116, (800) 992-8170.

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Types of estimates

THE MOST COMMON AND DETAILED APPLICATION is the estimate a contractor compiles for bidding on a construction project. But cost estimation is also helpful during three phases of design, according to James E. Rich, a cost engineer based in Chesapeake, Virginia. Conceptual estimates, determined when the design is 5 percent complete, enable owners to plan budgets and control costs. When the design is about 35 percent finished, a preliminary estimate helps architects select materials and decide between alternative systems. And a final estimate, when the design is more than 90 percent complete, enables architects and clients to identify expensive items that might be respecified, review plans for discrepancies and omissions, and evaluate bids from contractors. The more complete the design and the more timely the pricing information, the more closely a final estimate will match the actual bids. Contractors' 100 percent estimates are highly detailed, generally based on completed working drawings and specifications. Information from these estimates is often reapplied later, if this builder wins the contract, to order supplies, hire crews, rent equipment, and schedule construction. Most estimating software today can perform these detailed evaluations.

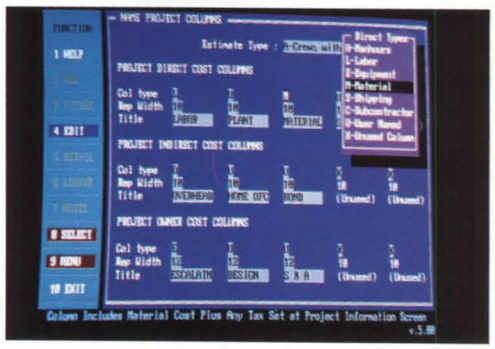
Design information

THE NATURE OF INFORMATION ABOUT A building changes at each phase of design. Owners' conceptual estimates are based on general assumptions about the proposed building's systems, anticipated square footages for various functions, and the historical costs of similar buildings. At the 35 percent phase, estimators measure building systems or assemblies (walls, floors, roofs) within a building. These assemblies are described in general architectural terms (metal stud interior partition, concrete slab on grade), without consideration of their precise construction. Final estimates, by contrast, are based on detailed building components (bricks, mortar, nails) and are usually organized according to the Construction Specification Institute's (CSI) 16-division format. As the estimator collects this information from a variety of sources, currently available software stores and mathematically manipulates it.

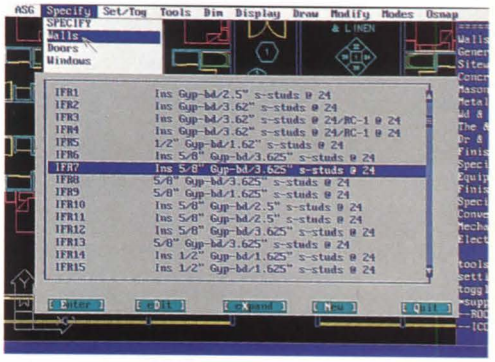
Obtaining quantities from drawings

INCREASINGLY, THE INFORMATION SOURCES are also electronic. According to Kevitt Adler, president of Memphis, Tennessee-based Management Computer Controls, about 70 percent of an estimator's time is consumed in performing take-offs. Traditionally, this process has entailed reading or measuring dimensions from paper drawings and counting discrete items such as doors and fixtures.

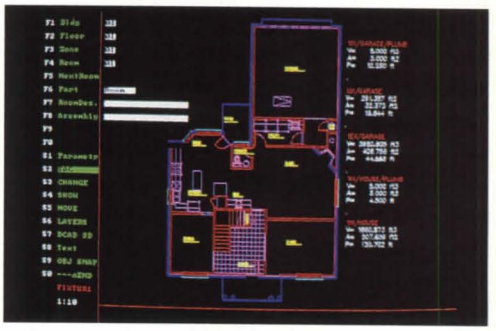
Composer Gold (top right) is geared toward preliminary estimates. Precision CAD Integrator (second from top) facilitates detailed specification of building elements within AutoCad applications, with connections to Means databases. QBIDS Professional (third from top) is a database management program with links to Means data and a variety of CADD systems. The Hyper-Estimator (bottom) combines a price database with simplified take-off methods.



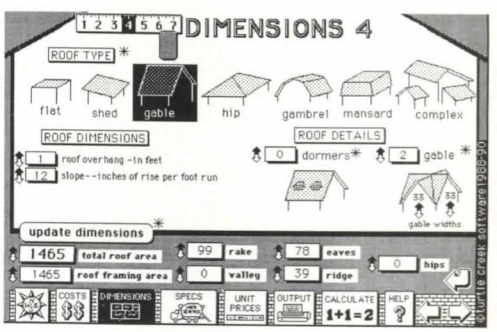
COMPOSER GOLD, BUILDING SYSTEMS DESIGN



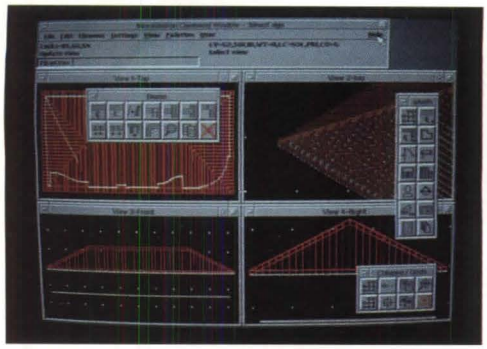
PRECISION CAD INTEGRATOR, TIMBERLINE SOFTWARE



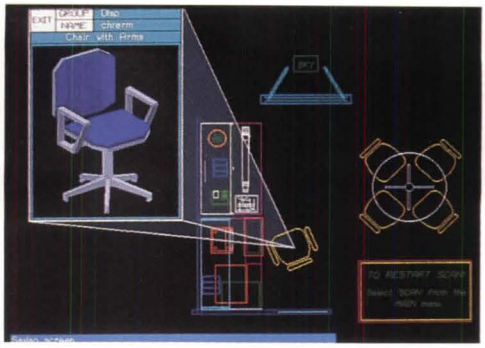
QBIDS PROFESSIONAL ESTIMATOR, *QUADRIC SOFTWARE*



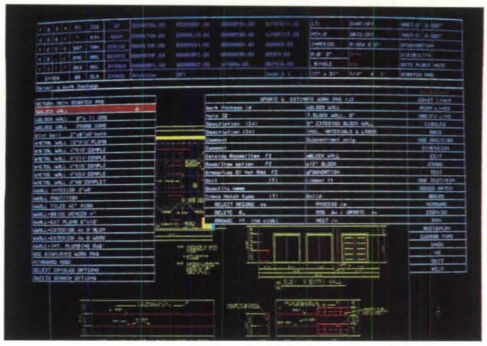
HYPER-ESTIMATOR, TURTLE CREEK SOFTWARE



MICROARCHITECT, IDEAGRAPHIX



ARRIS, SIGMA DESIGN



DESIGNBID, DICKENS DATA SYSTEMS

MicroArchitect (above left) integrates database functions with graphic elements. The database for Arris (above center) includes up to 80 attributes per CADD symbol, facilitating estimation as well as other analytical reports. DesignBid (above right) is a CADD system with an integrated database that automatically adjusts to any changes in the drawings. MeansData (below) is a Lotus 1-2-3 template containing the standard, annually updated Means data files, with pricing data organized by CSI division. Estimating (facing page left) is a spreadsheet integrated with Softdesk's applications. DesignCAD (facing page center) integrates a bill of materials and job costing programs within CADD. Cadkit (facing page right) can generate a bill of materials for interior elements.

Even with modern calculators and spreadsheets, the data must be measured and typed by hand, introducing ample opportunity for mistakes. Now, electronic digitizers remove some of the tedium and potential for error. With a paper drawing fastened to a digitizing tablet, the estimator can trace over lengths, circumscribe areas, and count fixtures while the corresponding numbers are computed and stored instantly. According to Adler, the time saved by automated decision support tools is better applied to the expert interpretation of construction documents than to tedious take-offs.

For estimators working with some CADD systems, the take-off process may be even more automated. The user can select lines, polygons, or symbols that represent lengths, areas, or objects. The numeric equivalents of those graphic representations are then stored in a database built into the CADD system. Not all desired measurements, however, are represented by graphic elements. For example, an architect may need to know the distance between two buildings, but the drawing may not include a line that represents that distance. With some CADD software, such as Drawbase, a measurement that is not already represented by lines on the computer screen can be taken off by identifying a series of points that define the length or area.

In some systems, including ArchiCAD, lengths and areas are automatically stored as building elements are drawn. And in rare cases, such as with Intergraph's Project Architect, even if the designer does not outline each room, the software "figures out" room areas from the overall floor plan and the size and position of interior partitions. These and other CADD systems sport databases to keep track of sizes and counts. Databases that are integral with the drawings have the advantage of automatically reflecting any drawing changes. When pricing information is input, the databases can be programmed to compute simple estimates, or the quantities can be exported to full-blown estimating software. This is the case with CADD systems such as DesignCAD 2d, Arris, ASG Core, and AdCADD. In some software, such as ArchiCAD, DesignBid, Landcadd's EZ-Estimate, and Cadkit, the CADD databases are preprogrammed to give cost estimates. Other CADD systems that provide more detailed material databases include PartMaster Plus, Architectural Construction System, and MicroArchitect. (See facing page for sources.)

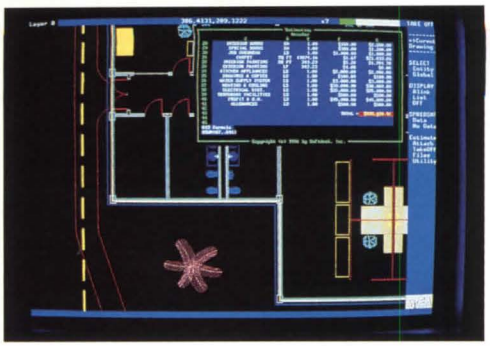
In practice, however, quantity take-offs are complicated, and their complete and straightforward automation may never be possible. For example, the several dimensions needed to completely define an element might be scattered over different drawings and shown at different scales or in the form of notes or specifications. Counts of objects may be difficult when, for example, many repetitive fixtures are designated by only a few representative symbols.

	A	B	C	D	E	F	G
1			*** MeansData Estimate ***				
2	==========	==========	==========	==========	==========	==========	==========
3	Estimate:	MeansData 123		Date:	Sept 20, 1991		
4	Description:	Cornice Repair					
5	Project:	Sample Estimate		Bid Date:	Oct 25, 1991		
6	Location:	Kingston, MA		Job #:	123A		
7	Sq. footage:			City Indx:	BOSTON, MA		
	A	B	C	D	E	F	G
8	==========	==========	==========	==========	==========	==========	==========
9	Line #	Description					$6.746
10	----------	----------	----------	----------	----------	----------	----------
11		Manhours	Matl	Labor	Equipment	Sub	Total
12	==========	==========	==========	==========	==========	==========	==========
13							
14	0152540290	SCAFFOLDING,STEEL TUBULAR;1USE/MONTH,NO					
15		PLANK,BUILDING EXT 1-5 STORIES				15.00	C.S.F.
16	Unit values	1.43	13.96	38.67	0.00	0.00	52.63
17	Totals	21.45	$209	$580	$0	$0	$789

MEANSDATA, R.S. MEANS

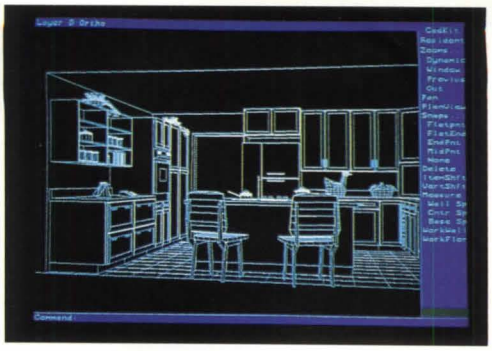
Cost information

KINGSTON, MASSACHUSETTS-BASED R.S. Means, which has traditionally supplied timely, regionally adjusted labor and material information in book form, now offers the same data electronically. Architects can link this data directly to their CADD or estimating systems. In practice, even when updated quarterly and adjusted for regional variations, these databases must be further modified to represent local labor and material prices and the complexity and special conditions of the job. For example, the way in which an architectural element is detailed will affect how long it takes to install and, therefore, the final price. Virtually all estimating systems allow users to adjust cost values to reflect project-specific conditions. But many of these adjust-



ESTIMATING, SOFTDESK

DESIGNCAD, AMERICAN SMALL BUSINESS COMPUTERS



CADKIT, AUTOCAD

ments require a degree of expertise that may never be replaceable by automation.

Once provided with quantity and pricing data, estimating software is ready to combine this information with material selections and calculate the cost of the proposed building. Most programs include extensive databases of materials, so estimators can choose the specified materials from prepared lists instead of typing in material data from scratch. In many programs, such as EasyEst and Professional Estimating, the take-offs are input by building assembly; the software breaks down each assembly into its components to perform the detailed cost computations.

Despite differences between available systems, most software calculates 90 percent and 100 percent estimates, including basic labor and material costs, markups for insurance, taxes, overhead, and profit, and further adjustments for alternates, substitutions, and contingencies. Most have customizable report formats, allowing construction managers to view their data in a variety of ways, to test different crew configurations, for example. Some programs have specialized capabilities. For example, Dacis HomeBuilder can analyze a wood-frame wall and determine the sizes and lengths of lumber required, taking into account framing for openings, corners, and so on. A few of the other available estimating systems suitable for final estimates are: Bidmaster Plus, Construction Contractor Management, Estimating 4 Construction, Interactive Cost Estimating, MacNail Estimating, The Precision Collection, Pro-Bid Estimating, Quick Bid!, Means Astro II, and QBIDS Professional Estimator. Some of them can also perform preliminary estimates.

Compared to manual calculations, these systems are more precise because they reduce arithmetic errors, respond instantly to last-minute changes, and can reflect actual costs based on previous jobs. Moreover, the material databases serve as checklists, making it more difficult to overlook important items.

Sources for Cost-Estimating Software

AdCADD Estimating
Softdesk, Inc.
(603) 428-3199

Arches
Icarus Corporation
(301) 881-9350

ArchiCAD
Graphisoft USA
(800) 344-3468

Architectural Construction System
Porak Computing Services
(719) 593-1187

Arris
ALCE
Sigma Design, Inc.
(617) 270-1000

ASG Core
ASG
(415) 322-2123

Bidmaster Plus
Estimation Inc.
(301) 636-4566
(800) 235-7878

Cadkit
Cadkit
(303) 455-0123

COMEST
Construction Sciences Research Foundation Support Center
(800) 473-2773

Composer Gold
Building Systems Design, Inc.
(404) 876-4700
(800) 875-0047

Construction Contractor Management
Exceiver Corporation
(612) 441-8166

Dacis HomeBuilder
Dacis PanelBuilder
Dacis Systems, Inc.
(412) 935-4924

Drawbase
CADworks, Inc.
(617) 868-6003
(800) 866-4223

DesignBid
Dickens Data Systems, Inc.
(404) 246-5734

DesignCAD 2D
American Small Business Computers
(918) 825-4844

DigiPop
Prosoft Inc.
(813) 251-1628

EasyEst
Contractors Management Systems
(800) 255-7407

Estimating 4 Construction
Software Constructors, Inc.
(615) 383-4850

EZ-Estimate
Landcadd Inc.
(303) 688-8160

Interactive Cost Estimating
Management Computer Controls, Inc.
(901) 346-9880

MacNail Estimating
Hyper-Estimator
Turtle Creek Software
(607) 589-6858

Means Data Source
MeansData for Lotus
Means Astro II
R.S. Means Company, Inc.
(617) 585-7880
(800) 448-8182

MicroArchitect
Landscape Designware
IdeaGraphix, Inc.
(404) 261-8261

PartMaster Plus
AAAWare
(800) 237-7289

Precision CAD Estimator
Precision CAD Integrator
Timberline Software Corp.
(503) 644-8155

Pro-Bid Estimating
Pro-Mation, Inc.
(801) 261-8595
(800) 521-4562

Professional Estimating
Enterprise Computer Systems
(800) 992-6309

Project Architect
Intergraph
(800) 826-3515

QBIDS Professional Estimator
Quadric Software USA
(800) 695-2437

Quick Bid!
Quick Bid
(800) 880-8254

Estimation as a design tool

A FEW SYSTEMS ARE DESIGNED SPECIFICALLY for architects to use during preliminary design stages. They help architects choose materials, decide between building systems, or establish building size. Unlike software for final estimates, these programs deal with incomplete designs and broadly defined specifications. One such system is COMEST from the Construction Sciences Research Foundation, associated with the CSI. A private-sector version of the Naval Facilities' cost estimating system, COMEST has been available for several years on the Construction Criteria Base CD-ROM produced by the National Institute of Building Sciences (ARCHITECTURE, March 1991, pages 157-160). For conceptual and preliminary estimates, historical cost data, which is based on existing buildings, contains about 1,200 building assemblies with regional variations. In addition, COMEST includes detailed databases, organized by CSI division and suitable for 100 percent estimates, which can also be used with other estimating software. According to COMEST's codeveloper James Rich, an integral part of the final estimate preparation is a procedure for converting actual construction costs into a cost-per-assembly format and recycling these costs back into the historical database. This process improves the accuracy of future conceptual and preliminary estimates.

The Composer Gold software also facilitates early estimates by responding to changing variables as the design develops. At the conceptual phase, the estimator works with the facility's gross areas and historical cost-per-square-foot data. Preliminary estimates deal with building assemblies and with costs generated from specific unit prices, labor, and equipment figures. What-if comparisons are possible at both phases of design. A version of Composer Gold is also available on the Construction Criteria Base. Other systems that serve various stages in design by providing databases with varying degrees of detail include Arches, MeansData for Lotus, and Precision CAD Estimator.

Design integration

INCREASINGLY, PIONEERING SYSTEMS SUCH as Precision CAD Estimator and QBIDS Professional Estimator are designed to be integrated with the database capabilities of CADD software. Precision CAD Estimator, for example, can process a text file generated within a CADD system such as AdCADD or ASG Core. The data transferred from the architect to the estimator in this file can be customized by an architectural firm to accommodate the particular expertise within the design team. For example, to thoroughly assess the cost of a concrete slab, an estimator needs to know the slab's area, thickness, strength, color, gravel depth, reinforcing, and the unit costs of these and other factors. However, architects seldom consider all of these factors at the moment of initially designing a slab. To compensate, the CADD software can be configured so that the architect supplies the area of the concrete slab by drawing it on a foundation plan, and specifies the concrete's color by responding to an on-screen question. After the file containing this information is transferred to the estimating software, the estimator might obtain the structural data from other design team members. Thus, the custom-designed interface between the estimating and CADD software can be set up to ask the right person for the right information at the right time.

The more estimating systems improve communication between design and construction professions, the more accurately the players will be able to predict building costs. These systems will not turn a novice into an expert estimator, but they will give architects more tools to expand the quality of the information they provide their clients. ■

—B.J. NOVITSKI

Problem: **Your client wants to create a room full of windows to display priceless artwork and expensive furnishings.**

Solution: **Hurd windows offer the most UV fading protection of any residential window—without blocking natural light or tinting the view.**

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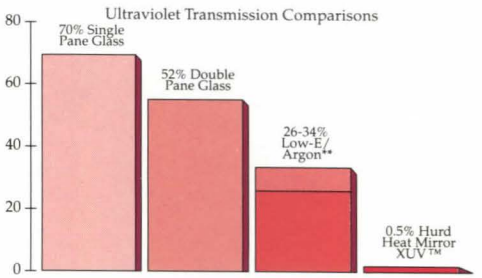
Just look at the numbers. Hurd windows can reduce up to 95% of outside noise, insulate to R8* and block over 99% of the sun's harmful UV rays—in most any size or shape you want. Hurd performance really means you have more design freedom.



Unprotected exposure to the sun's damaging ultraviolet rays is the leading cause of fading damage. Hurd windows block over 99% of the sun's harmful UV rays—without blocking natural light.

Hurd gives you a choice of windows that offer the option to tune a building for the most energy efficiency possible—even reduce the HVAC investment—without compromising comfort or design.

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When You're Serious About Windows.™

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Hurd windows look good in fine print and even better up close. See for yourself. *Calculations based on center of glass values for Hurd InSol-8 windows with Superglass System with Heat Mirror Film in a 1" thickness. Total unit R value is 5.5 for commercial size units. 4.6 for residential size units. All data were collected using the standard ASHRAE 1989 calculation method and standard winter conditions of 0°/15. Calculations made using LBL Window 3.1 Computer Modeling Software. **The range of ultraviolet transmission comparison performance is based on published figures. Heat Mirror™ and Heat Mirror Film are trademarks of Southwall Technologies.

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White-Collar Comfort

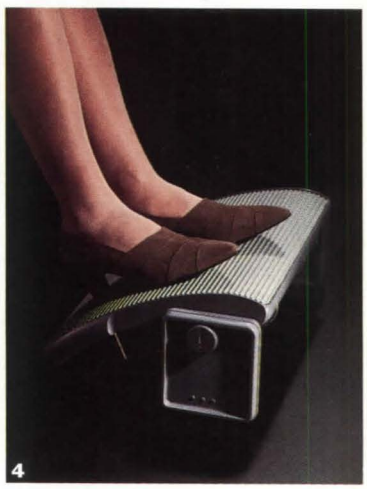
Steelcase Design Partnership introduces new office systems and amenities.

1. Stow Davis, a member of the Steelcase Design Partnership, now offers the Nines casegoods collection designed by Donald Brinkmann of Gensler and Associates Architects. The line is based on the repetition of 9-inch-square wood veneer units. Circle 401 on information card.
2. The Personal Privacy Screen by Steelcase is available with a variety of inserts, including translucent or fabric-covered panels. Circle 402 on information card.
3. Steelcase introduces a bullet-shaped table and curved edge to its Paladin casegoods collection. Circle 403 on information card.
4. Details, a subsidiary of Steelcase, markets an adjustable footrest that reduces fatigue. Circle 404 on information card.
5. Angles upholstery is available from Steelcase in three patterns and 12 colors. Circle 405 on information card.
6. Stow Davis introduces its first textile collection. Circle 406 on information card.


1


2


3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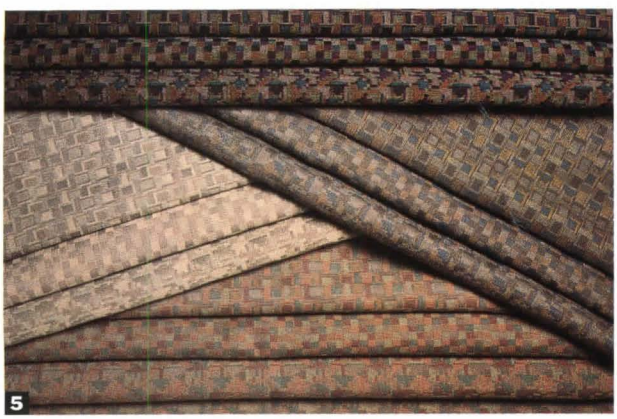
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6

Modular seating

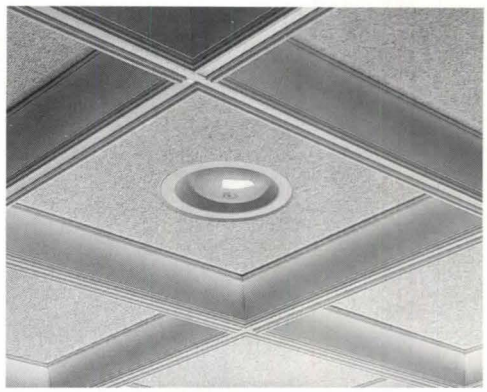
KINETICS INTRODUCES THE 250 SERIES lounge chairs and the modular 250 Continuous Series seating for airports, lounges, and reception rooms. The seats offer tubular steel construction, high backs, and wide cushions. The lounge model is available in two-, three-, and four-chair units; the Continuous Series allows the connection of seats and tables in a range of seating configurations. Kinetics is a Haworth Portfolio Company.

Circle 407 on information card.

Accessible faucets

AMERICAN STANDARD NOW OFFERS THE Heritage line of faucets, designed by Chicago-based architects Stanley Tigerman and Margaret McCurry. The collection features gooseneck spouts and wide levers to control water flow. Both features make the faucets especially appropriate for healthcare applications. The hardware also incorporates ceramic disk valves to prevent dripping. American Standard Plumbing Products.

Circle 408 on information card.



Coffered panels

METAPHORS IS A COFFERED CEILING SYSTEM produced by Armstrong World Industries that consists of 2-by-2- or 4-by-4-foot ceiling modules inserted into Armstrong's Prelude 15/16-inch or Suprafine 9/16-inch Exposed Tee grid. The system is available with three molding designs—cove, crown, and microstep—which are factory-painted white to coordinate with ceiling grid and panels.

Circle 409 on information card.

Contract seating

FIXTURES FURNITURE INTRODUCES BOLA Delux, a high-back chair with arched armrests for conference, hospitality, and patient rooms. Available in a range of colors, the chair can be specified without arms. The company also introduces a wood model of the Bola chair that is available in a variety of finishes, with or without arms.

Circle 410 on information card.

Office system

PANEL CONCEPTS OF SOUTHERN CALIFORNIA manufactures wood and metal office furniture systems for four different office types. The systems include Panel Concepts' IMPAC-8 cable management capabilities and a selection of finishes and fabrics.

Circle 411 on information card.

Ergonomic chair

AMERICAN SEATING AND DESIGNER DONALD Chadwick have developed the ergonomically designed Evo office chair. The chair uses flexible resins rather than steel mechanisms to create passive support. American Seating offers a collection of four stretch fabrics—two solids, one patterned, and one iridescent—for upholstering the chair. The fabrics are designed to minimize wear. American Seating.

Circle 412 on information card.

Compact filing

DESIGNED TO REDUCE THE FLOOR SPACE required by standard upright filing systems, the Times-2 Speed File by Richards-Wilcox (above) is a rotating cabinet housed within a larger cabinet. A foot pedal unlocks the inner cabinet, which rotates 180 degrees to provide access to twice as many files as can be stored in conventional systems. The units are available in combination with other Richards-Wilcox office products. *Circle 413 on information card.*

Office furnishings

PROTOCOL UNVEILED ITS FIRST OFFICE SEATing collection at NeoCon, which includes a lounge model, occasional chairs, a stool, a bench, and beam seating. The company also introduced a line of tables with a variety of top sizes in a choice of two laminates.

Circle 414 on information card.

Sprayed-on finish

SEAGRAVE COATINGS CORPORATION INTRODuces Omniplex, a lightweight, nonporous polyester material that is spray-applied to countertops, furniture, and signage to simulate the colors and textures of granite, onyx, and other natural stones. The substance can also be applied to complex shapes and surfaces. Available in custom or 12 standard colors, Omniplex can be textured, sanded, or polished. A clear topcoat provides additional protection and a glossy finish. Seagrave Coatings Corporation.

Circle 415 on information card.

Modular furniture

QUORUM OFFICE FURNITURE INTRODUCES A modular furniture system for corporate, hospital, and day-care facilities. The system includes components for a reception station, a resource center, a teacher workstation, and child-care areas. Movable walls, constructed from plastic laminate, can be used to create individual niches for cribs and to separate play areas from sleeping sections. Quorum Office Furniture.

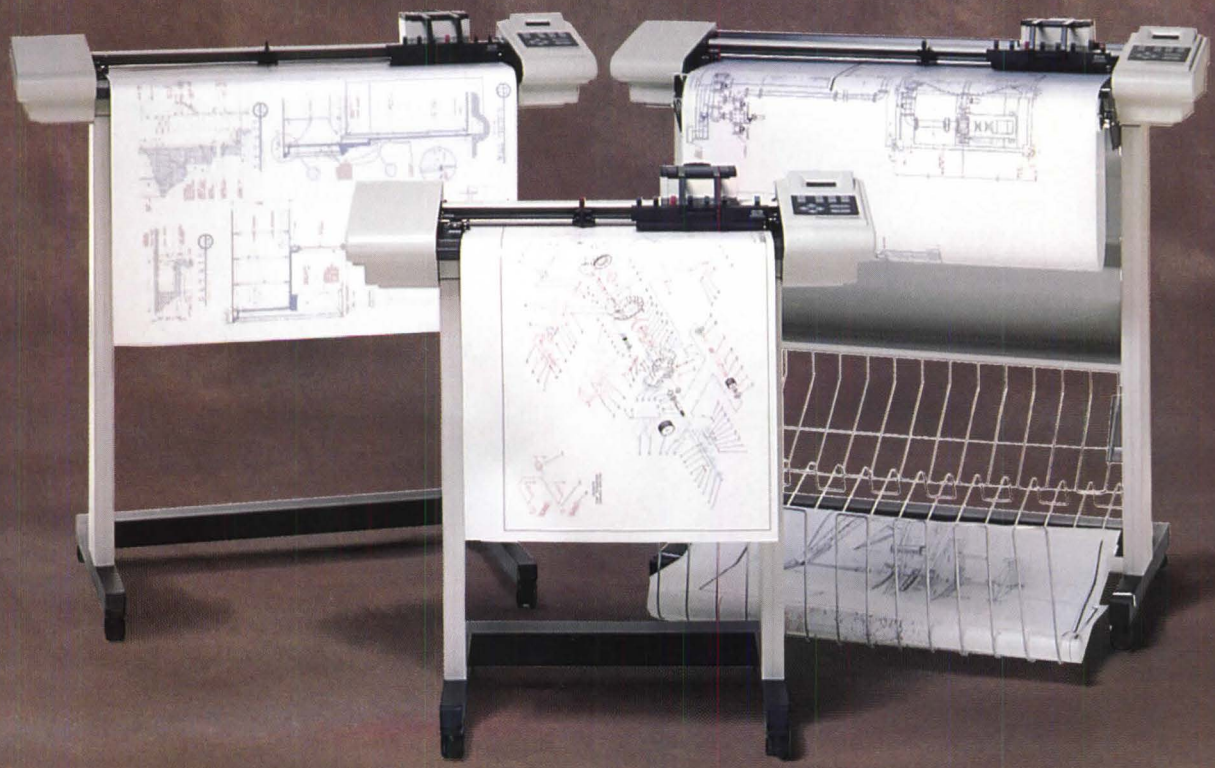
Circle 416 on information card.

Overhead protection

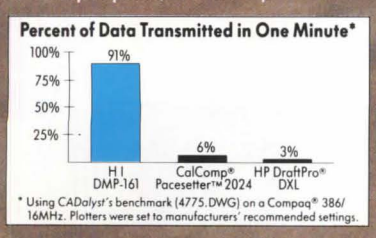
EIDE INDUSTRIES MANUFACTURES RETRACTable and stationary canvas awnings purported to withstand winds up to 50 mph. The awnings, which come in more than 300 colors, are supported by frames treated to resist corrosion caused by harsh sun and inclement weather. Retractable awnings are produced in a variety of sizes, shapes, and configurations, while stationary canopies can be manufactured to unlimited specifications.

Circle 417 on information card.

Our DMP™-160 Series Does the Work of Four Plotters, a Scanner and a Night Shift.



Never before has one family of plotters done so much, so fast, and so well. Our D- and E-size plotters are the only ones that include the new, highly-compact HP-GL/2 plot language and 512K standard memory. That's the equivalent of 2 MB on other plotters. And they're the only ones that can be expanded to 4 MB. So instead of tying up you and your computer during long or multiple plots, our new plotters release your equipment 15 to 30 times faster than the competition.



Increased AutoCAD® Productivity. These new plotters arrive AutoCAD ready with ADI® drivers which allow you to immediately harness the full productivity features of the DMP-160 Series.

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Ergonomic CADD

NOVA OFFICE FURNITURE INTRODUCES THE Super CRT Support desk for CADD workstations. The CRT, which is positioned below the desk surface, can be located 20 to 40 degrees below the line of sight and 28 to 32 inches from the eyes, which reduces fatigue and promotes upright posture. The desk is 36 inches deep in order to accommodate 19- to 22-inch monitors. The support is available in wood or plastic laminate. A pull-out tray for a computer mouse is also available.

Circle 418 on information card.

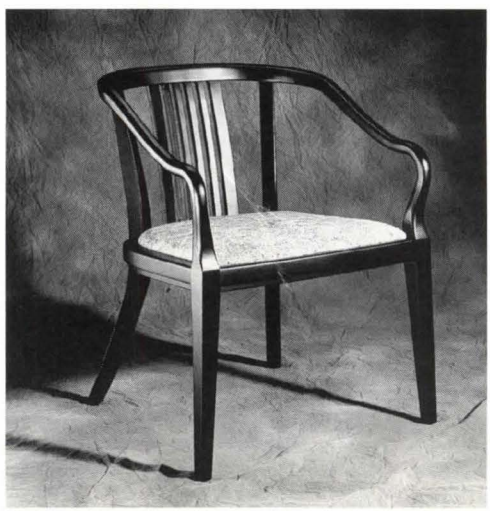
Skylight system

CO-EX CORPORATION INTRODUCES THE Rodeca skylight and panel system, constructed of modular polycarbonate sheets with an aluminum framing system. Suitable for vertical and sloped applications, the system is available with clear or tinted glazing.

Circle 419 on information card.

Wood furniture

ALMA INTRODUCES THE HELIOS WOOD CHAIR collection (above) with seven back styles. Designed by Alex Forsyth, the line includes a range of finishes. Forsyth has also designed the Cavetto collection of office furniture, including a maple desk with bird's-eye maple border. *Circle 420 on information card.*



Linoleum flooring

FORBO INDUSTRIES INTRODUCES MARMOleum Fresco (above), a line of linoleum floorcoverings in neutral and pastel colors. The product is constructed from raw materials including linseed oil and pine resins. The material can be cut to create inlays, geometric patterns, and symbols to direct traffic flow. Forbo also manufactures vinyl flooring. ■

Circle 421 on information card.

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Did you miss valuable information offered by advertisers in last month's issue of ARCHITECTURE?

The manufacturers listed below were advertisers in last month's issue who are anxious to provide you with their latest product information and literature for your planning needs. To receive this information, circle the appropriate numbers on the self-addressed, postage-paid response card. For product information and literature from advertisers in this issue of ARCHITECTURE, circle the appropriate numbers shown on the advertisements.

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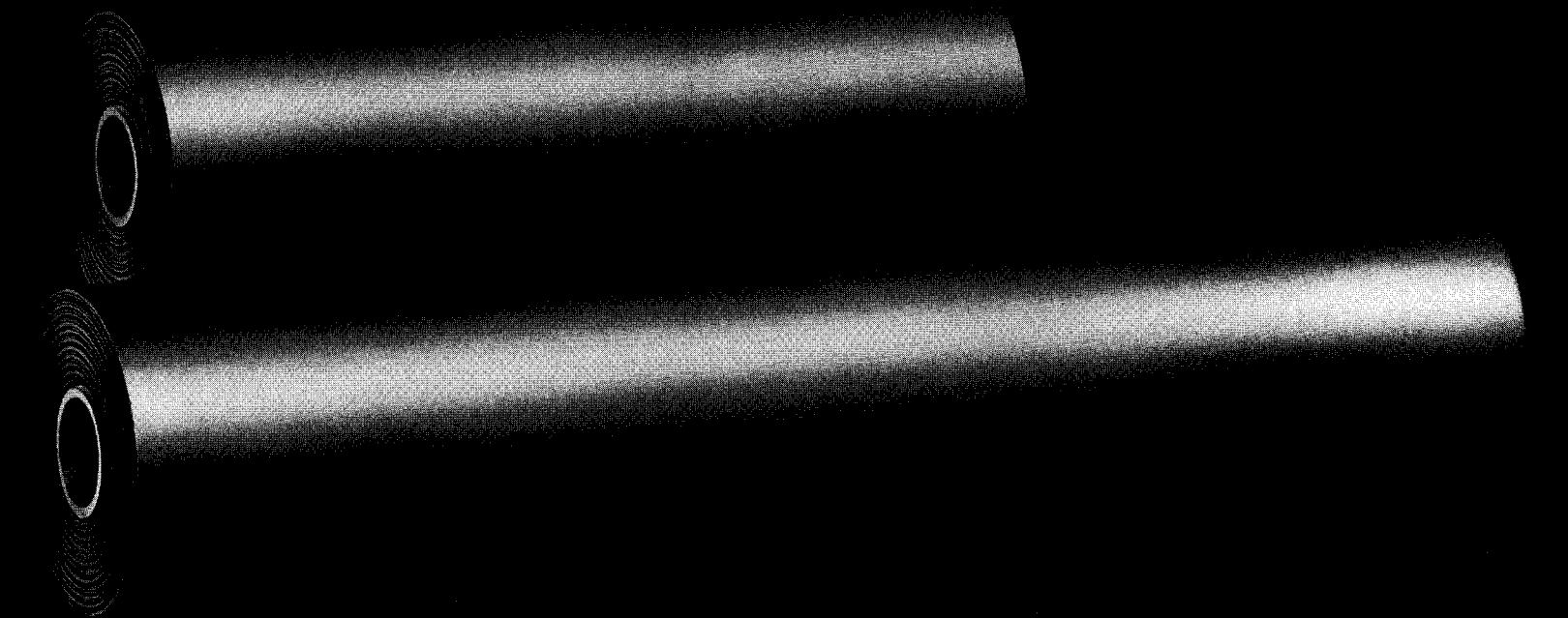
GOODYEAR HAS TAKEN A GREAT ROOFING IDEA



AND EXPANDED ON IT.

Introducing 10′3″ wide Versiweld™ Roofing System for ballasted applications.

At Goodyear, one great idea often leads to another. In this case, we've taken our one-of-a-kind, white 6′ wide Versiweld single-ply mechanically-fastened system and made it *two*-of-a-kind with the development of a black 10′ 3″ wide roll especially for ballasted applications.

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If you're looking for a sizable improvement in ballasted systems, ask for Goodyear's new 10′ 3″ wide Versiweld Roofing System. For more information, contact your Goodyear Field Sales Engineer or Full Service Distributor. Or call 1-800-992-7663. In Ohio call 1-800-231-5867.

Challenge Us.

We're not satisfied until you are.

GOODYEAR

Circle 106 on information card

Neat file

ARCHITECTURE's "No Excuses After This" information exchange

HVAC *CSI Division 15000*

Baseboard Unit

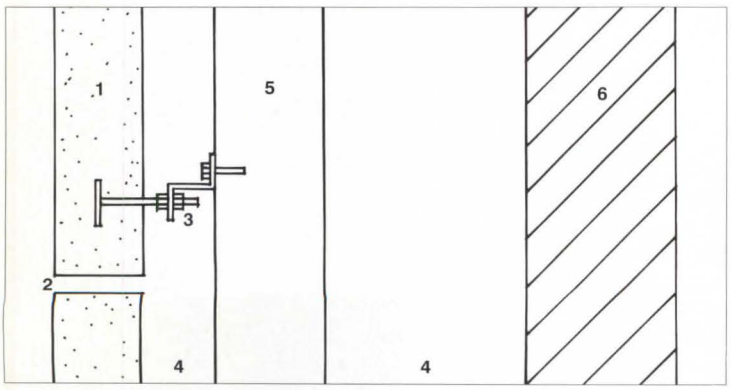
We've developed a detail for hot-water baseboard heating that gives the unit a clean look and prevents dirt from being drawn up behind the heater and streaked across the wall above it. The unit should be installed before the finish plaster coat is applied, and the finish coat should butt against the top of the heater. Another successful technique is to install trim over the top of the unit. In either case, the crevice between the heater and the wall is eliminated, preventing the collection of dirt.

William L. Kite, Jr., AIA
William Kite Architects
Providence, Rhode Island

Hidden Diffusers

For a resort hotel in the Colorado Rockies, we eliminated exposed diffusers on the air-handling system throughout most of the public areas. Depending on the area and its architectural treatment, we pressurized wall and/or ceiling cavities and used reveals to pass air into the spaces. In a stone-walled rotunda, for instance, we applied 21-by-9-inch limestone pieces held in place by a mechanical attachment system (below). Joints between the 3-inch-thick stone pieces are left open, and the cavity behind the stone wall is pressurized with low-velocity conditioned air, allowing the wall to breathe quietly.

Jeff Olson, AIA
Pellecchia Olson Architects
Denver, Colorado



WALL SECTION

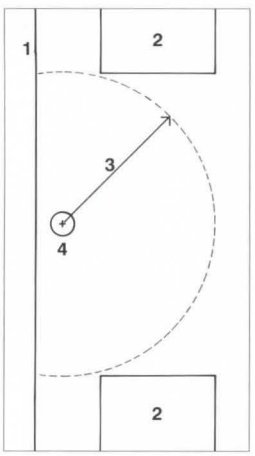
1 STONE PANEL
2 OPEN JOINT
3 PANEL ANCHOR
4 PLENUM
5 STEEL STUD
6 CONCRETE MASONRY UNIT

Door Hardware *CSI Division 08710*

Hardware Mounting

Closers and other screw-mounted door hardware require sufficient wood blocking within a wood door to ensure proper fastening, especially in particleboard or mineral-core doors. Blocking inside the door provides fasteners and is preferable to through-bolting the hardware, which can be unsightly. Adequate blocking for mounting hardware is especially critical in institutional buildings, where doors are constantly opened and closed. Most wood-door manufacturers provide blocking, but it must be called for by the architect, who should indicate the location of the blocking in the wood-door section rather than the hardware section of the specifications.

Patrick Timpe, AIA
Browning Day Mullins Dierdorf
Indianapolis, Indiana



DOOR ELEVATION

1 STRIKE EDGE
2 WINDOW IN DOOR
3 RADIUS EQUALS HOLE RADIUS PLUS 7 1/2"
4 HOLE FOR HARDWARE

Bore-hole Spacing

When locating windows in wood doors, the bore hole for the door handle should be at least 7 1/2 inches away from the window opening. This distance is a minimum design guideline; the door's manufacturer should be consulted for recommended dimensions. Closer proximities invite cracking of the door between handle and window. Splitting the window into top and bottom lights, with sufficient material between them and the bore hole, allows lights to be positioned closer to the door's strike edge (left). This minimum spacing around the bore hole, and the location and size of all door openings, should be drawn and noted on the door schedule.

Keith Rupert, AIA
CTA Architects Engineers
Billings, Montana

UPCOMING NEAT FILES

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Finish Selection *(05030)*
Diagnostics and Restoration *(01100)*
Sitework *(02000)*
Plumbing Materials *(15400)*
Skylights *(07800)*

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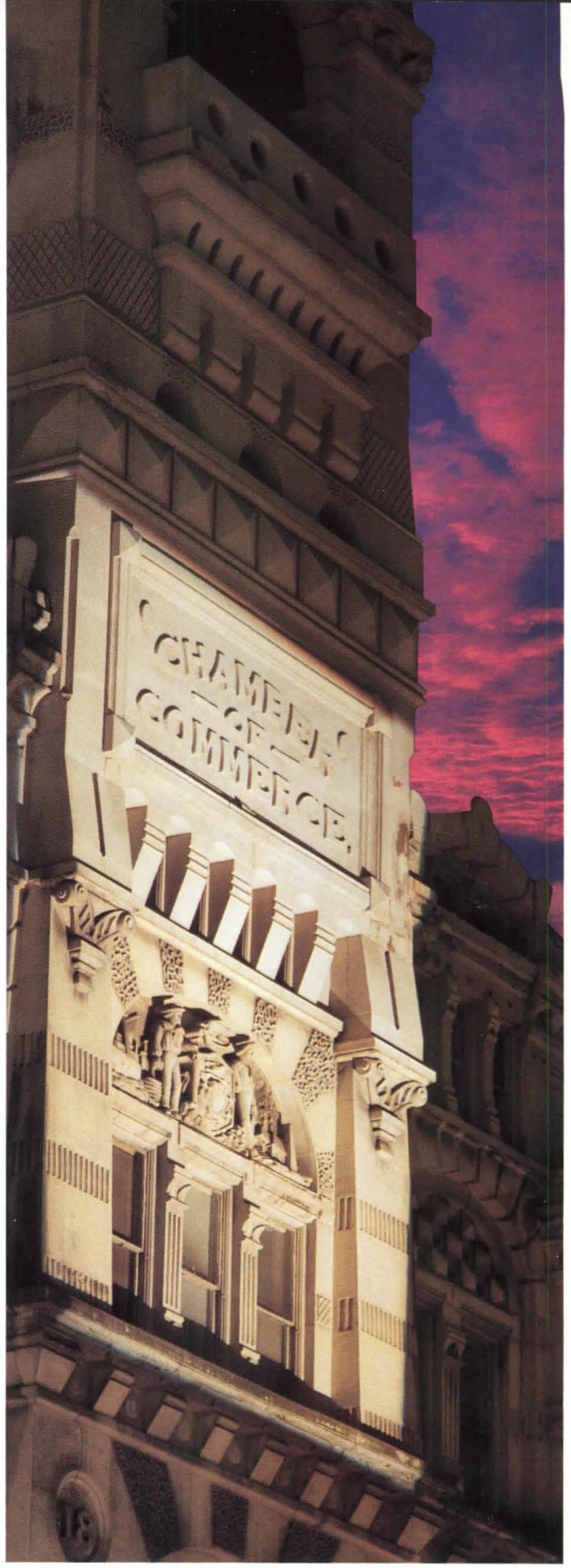

It used to be that all special effects were created in Hollywood. But not any more.

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Highlight architectural details. Project a design or logo.

Until now, your choice of exterior lighting fixtures has been extremely limited. The Phoenix 100™ changes all of that, giving you an unprecedented design tool.

It uses a shutter and/or custom designed templates to precisely control the light pattern. Changing templates can announce important events – perfect for retail needs. Optional color filters allow you to "paint" objects for special effects.

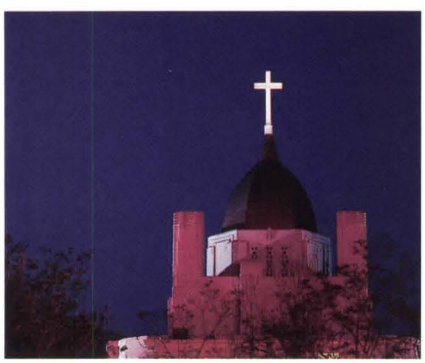
Eliminate light trespass. Reduce light pollution.

Get precise control over the light pattern and eliminate spill-over light in unwanted areas. Reduces light pollution by controlling the amount of reflected light.

Highlight Architectural Shapes. Sharp outlines on facias, recesses, murals, entry-ways or other details will make features glow without an apparent light source.

Precision Outlining. Make sculptures, statues or even sales merchandise appear to glow by projecting a precise out line of the object.

The Phoenix 100™ Offers On-Site Flexibility. With a variety of lamp and mounting options and the ability to make



zoom and shutter adjustments on-site, the Phoenix 100™ offers all the flexibility you'll need. For example, you have the ability to double your beam size. Or give shapes a sharp or soft edge with the focus adjustment.

Stands up to weather. Insects. Even vandals. All adjustments of the Phoenix 100™ are located within the unit's sealed housing, preventing moisture, vapor, dust or insect problems.

And all access doors and azimuth adjustments are made from rugged, tamper-resistant hardware. The double locks on the tilt adjustment can withstand a 200-lb. force.

Create your own special effects! Call (414) 438-1200, Ext. 987 today for a FREE brochure.

For Further Information Contact: Mr. Chris Zuzick, Market Development Manager

PHOENIX®

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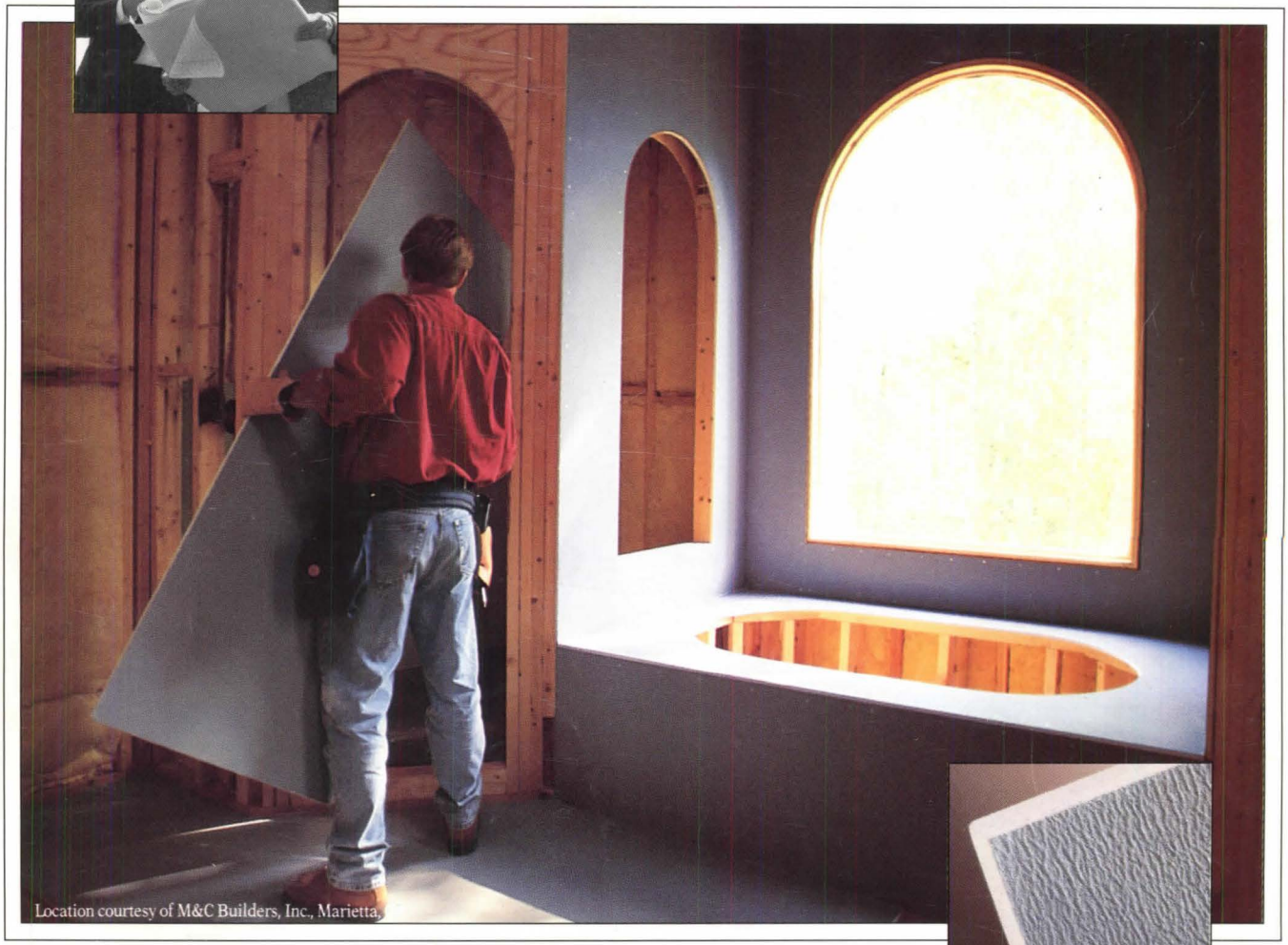

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G-P: Better than cement board, right. The surface resists water, so the tile stays tight and the stud cavity stays dry. Dens-Shield lasts better than MR greenboard, too.

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