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Two of the most important museum commissions in the country are being awarded this year. New York's Museum of Modern Art (MoMA) is expanding its midtown Manhattan complex, while the Modern Art Museum (MAM) of Fort Worth is planning to construct a new building across the street from Louis Kahn's Kimbell Art Museum. The museums' selections of mostly foreign architects, documented by exhibitions at both museums, reveal a surprisingly conservative bias, despite their patronage of Modern and contemporary art.

Museum Imports

Two art museums shun American daring for tamer foreign designs.

MoMA's challenge is to insert a major gallery expansion within its tight urban block. MAM seeks a spacious, freestanding structure in a park to display its remarkable collection of Abstract Expressionist and Pop art. The two commissions seemingly require opposite solutions: MoMA must knit together disparate buildings, requiring a coherent master plan as much as a singular building; Fort Worth's MAM demands a compelling statement to give the museum a strong presence within the city's cultural district. In reconfiguring its campus, MoMA has the opportunity to embrace a bold esthetic; MAM offers the chance to critique Kahn's Kimbell with deference or defiance.

When first announced, MoMA's list of 10 anti-establishment architects suggested a serious search for a fresh approach. But the contenders' initial schemes don't explore new territory. Designs by the three finalists—Jacques Herzog and Pierre de Meuron of Switzerland, Yoshio Taniguchi of Japan, and Swiss-born, New York-based architect Bernard Tschumi—are practical, familiar, and subdued.

MAM also plays it safe, selecting Japanese architect Tadao Ando over Richard Gluckman, Arata Isozaki, Carlos Jimenez, Ricardo Legorreta, and David Schwarz (pages 44-45). Ando's stark, glass-enclosed wings may achieve a poetic dialogue with their park setting, but they break no new esthetic ground.

The outcome of both competitions is disappointing for American architecture. Not only have these leading museums dismissed some of this country's most talented designers, but they have also shunned the formal idiosyncracy and experimentation that has distinguished U.S. architecture—and contemporary museum design—in recent years. Instead, these important cultural commissions will go to foreign architects who, for the most part, design within the classic Modern tradition.

Ironically, American architects are increasingly securing prominent museum commissions abroad. One need only look to Europe, whose crown jewels of late 20th-century culture include Venturi, Scott Brown's National Gallery and I.M. Pei's Louvre. Frank Gehry's Guggenheim Museum in Bilbao, Spain, and Steven Holl's Museum of Contemporary Art in Helsinki, Finland, are nearing completion and promise exciting, unconventional approaches to the building type.

This ocean-hopping represents an internationalist trend toward architecture that is no longer culture-specific. Such exchange can result in a positive reinterpretation of context, tradition, and institutional identity. But the selections made by MoMA and MAM suggest a dispiriting revival of America's cultural inferiority complex—the decision to import design despite more imaginative talents at home. That insecurity is troubling and contradicts the iconoclasm upon which these Modern art museums were founded.

Deborah K. Dietsch

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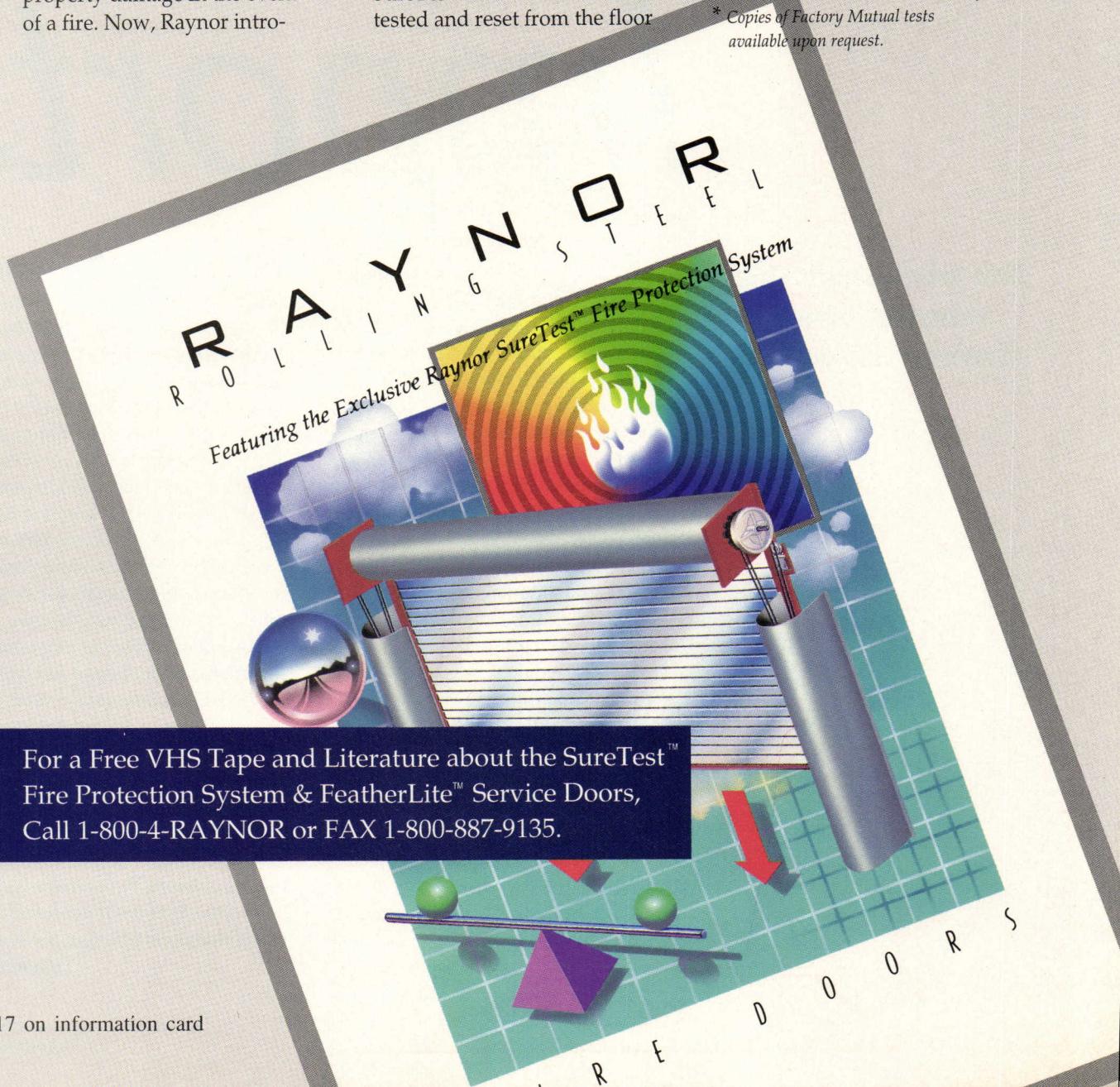
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Design kudos

I like the redesigned *Architecture*. The articles are insightful and interesting; the layout, snappy; and the editing, crisp. Congratulations on a fine publication.
Michael Stanton
San Francisco, California

Since the two major professional journals have recently changed their graphic image, it only reinforces the enormous gap in content between them. It is now clear that a great new graphic design makes the critical content of your magazine even more important. It is the best work by an already important graphic designer, J. Abbott Miller. And no little thanks are due to the editors for taking the risk.
Peter Eisenman
New York City

Sand trap

Your protest of St. Louis's plans for a golf course ("Urban Sand Trap," *Architecture*, April 1997, page 63) reads as a knee-jerk reaction to what may be a harbinger of truly creative inner-city transformation—obviously written before the amazing performance of Tiger Woods. Imagine a golf course on the site of the Pruitt-Igoe. Architects are too often locked in nostalgic attachment to a past that will never be restored. Nor should we promote creating districts devoted to serving only the poor. What is needed are new visions for less dense cities that seize the opportunities now available to create socially and economically diverse core communities.
Robert W. Corbett
Annapolis, Maryland

I appreciate your forthrightness in chastising St. Louis for a really dumb idea. Our experience has been that when residents are part of the holistic planning process, they develop the ownership and interest necessary to make the concepts work. The community should voice its concerns and make its demands to be part of the solution. Keep up the insight and the voice of reason within the profession.
A. Lee Burch
Simons-Burch-Clark-Maris
Tyler, Texas

I would like to know why St. Louis ignores the needs of its fragile urban neighborhoods. The notion of acquiring land inexpensively to build a golf course is an insensitive, unrealistic use of eminent domain. What an insult to the residents who are in need of better schools, improved housing, and safe parks and public spaces. The golf course proposal should create an uprising against such poor and thoughtless urban planning while providing an example of how not to solve a complicated urban design issue.
John G. Howard
Charlotte-Mecklenburg Planning
Commission
Charlotte, North Carolina

For art's sake

There is no need to build Disney Hall (*Architecture*, April 1997, page 11). As interesting as the project is, the profession seems to have the attitude that constructing a $200 million piece of art for its own sake is justifiable. More than a few efforts at downtown redevelopment have gone down in flames at the public's expense. Why should the public pay for an entertainment facility that only the well-heeled will be able to afford?

I agree that the entertainment industry should ante up, but the architectural profession should also be willing to cough up the dough. Will the AIA contribute? Will Gehry contribute any of his substantial fee? Probably not.
Eric D. Kuritsky
Orlando, Florida

Back in school

"Continuing Education: Scholarship or Scam?" may rate a C+ in your opinion but it's unfortunate that a rating is required at all. I find it insulting that the AIA requires me to report my continuing education activities as if I'm back in graduate school (*Architecture*, March 1997, pages 98-101). For those of us with small practices, keeping up with changing technology means staying in the marketplace or dying from lack of work. Where is it documented that those states that require continuing education have better practitioners?
Robert L. Varnes
Naperville, Illinois
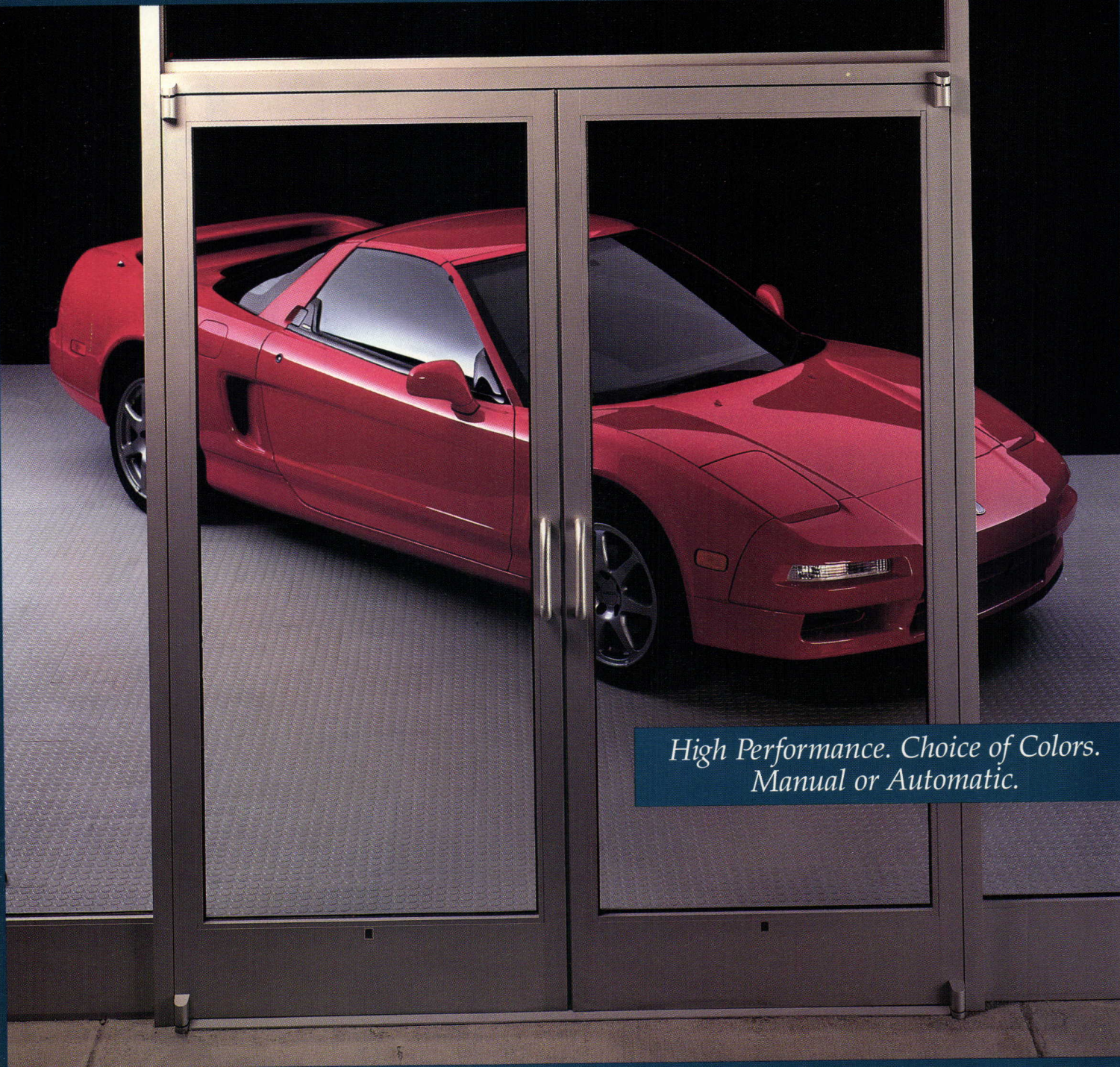
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exhibitions

city	dates	exhibition	contact
New York	through July 8	**Toward the New Museum of Modern Art** at the Museum of Modern Art	(212) 708-9400
	through September 19	**Gaetano Pesce: Material Explorations** at Material ConneXion	(212) 445-8825
	June 25-September 14	**Frank Lloyd Wright: Designs for an American Landscape** at the Whitney Museum of American Art	(212) 570-3600
Montreal	June 17-September 28	**The Architecture of Reassurance: Designing the Disney Theme Parks** at the Canadian Centre for Architecture	(514) 939-7000
Pasadena	June 28-August 31	**Architecture in Balance: 7 Southern California Architects** at the Armory Center for the Arts	(818) 792-5101
Washington, D.C.	through August 10	**Mark Bennett: TV Sets and the Suburban Dream** at the Corcoran Gallery of Art	(202) 639-1703

Mark Bennett's collage at Corcoran Gallery of Art

conferences

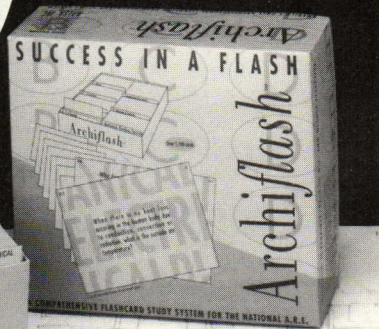| city	dates	conference	contact
Jyväskylä, Finland	August 15-17	Alvar Aalto Symposium	(358) (14) 624-811
Minneapolis	June 22-25	Building Owners and Managers Association Convention	(202) 326-6301
Orlando	June 26-29	Construction Specifications Institute Convention	(703) 684-0300
Philadelphia	June 16-19	A/E/C Systems	(800) 451-1196
	June 16-19	Construction Technology '97, sponsored by *Architecture* and *Interiors* magazines	(800) 451-1196
Washington, D.C.	June 25-28	Industrial Designers Society of America Conference	(703) 759-0100

Developer Willard Rouse, keynote speaker at
Construction Technology '97 in Philadelphia

SILICON GRAPHICS

Bay Bridge Debate

Bridge lovers in San Francisco are in an uproar over plans to replace part of the San Francisco-Oakland Bay Bridge, which sustained heavy damage during the 1989 Loma Prieta earthquake. The state of California wants to design the new span itself, while critics are pushing for a more open design process, contending that the state values expediency over esthetics.

Work has begun on a $391 million retrofit to stabilize the bridge's western side, which crosses the bay between San Francisco and Yerba Buena Island. Last year, California's Department of Transportation (Caltrans) ruled that repairing the eastern half, which extends from the island to Oakland, would be as costly as building a technologically superior new span. In February, Caltrans unveiled two possible replacement schemes: a bare-bones, $1 billion concrete viaduct, and a more costly cable-stayed bridge with two towers (above).

According to local architect Jeffrey Heller, public outcry over the agency's poor designs was so great that "you could hear it across the bay." Several engineers proposed more inspired alternatives, including T.Y. Lin's cable-stayed bridge hung from a single 600-foot-tall mast. The Oakland Metropolitan Chamber of Commerce, several Bay Area museums, and local design and engineering organizations formed the Bay Bridge Coalition to promote other design options.

Despite unveiling two additional designs this spring, Caltrans has failed to quell public opposition to its plans. Pressure from the Bay Bridge Coalition motivated the Metropolitan Transportation Commission (MTC), the quasi-governmental agency that has the final say on Bay Area transit, to convene an Engineering and Design Advisory Panel, which includes coalition members Heller and Lin. The MTC also issued a call for proposals on April 29, but required submission of complete recommendations by May 6.

Following a public review process, the four Caltrans schemes, as well as the few proposals that were able to meet MTC's seven-day notice, were presented to the Engineering and Design Advisory Panel. Caltrans plans to announce the final scheme in August.

AIA San Francisco President Robert Jacobvitz notes that Caltrans' dull bridge designs foreshadow the potential result of a pending statewide ballot measure. If passed, it would amend California's constitution to favor state-employed architects over private-sector colleagues for state projects with fees greater than $50,000. *Ned Cramer*

Gehry's
Montreal Museum

Montreal's Museum of Decorative Arts reopened last month with dynamic new interiors by Frank O. Gehry & Associates and local architect Provencher Roy & Associates. The facility is located within the north wing of Moshe Safdie's 1991 Jean-Noël Desmarais Pavilion of the Museum of Fine Arts (*Architecture*, August 1992, pages 68-73), in a ground-floor space originally intended for shops. New signage directs visitors to the 8,700-square-foot minimuseum; 1,400 square feet of offices are located on a new mezzanine Gehry inserted above the exhibition space.

Gehry's scheme focuses on sculptural containers for the museum's 4,000-piece collection of furniture, jewelry, textiles, ceramics, and other objects. Permanent galleries house clusters of 16-foot-tall, Douglas fir and glass vitrines. The floors and lower 9 feet of the gallery walls are also paneled in Douglas fir; above, the exposed concrete walls are painted white. Smaller vitrines in the temporary exhibition galleries can be relocated for each show. *N.C.*
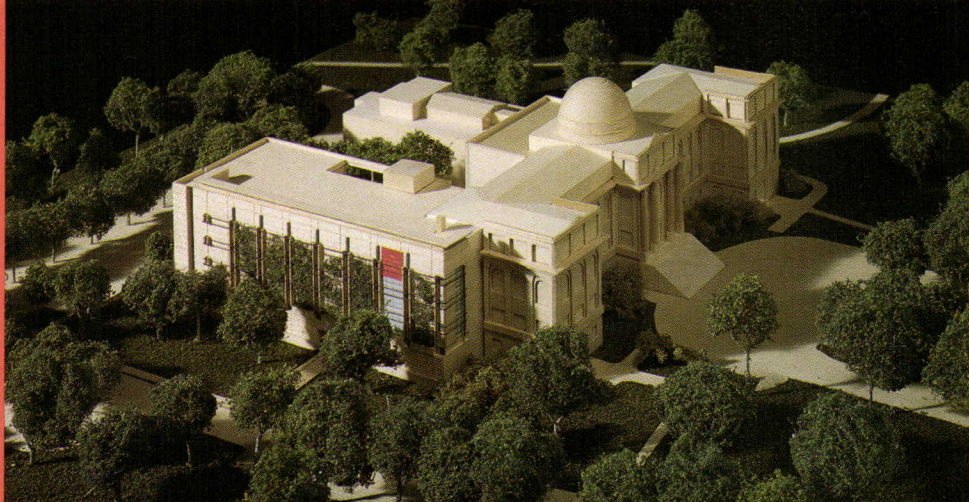

Gehry's Museum of Decorative Arts features layered signage (above)and Douglas fir vitrines (right).
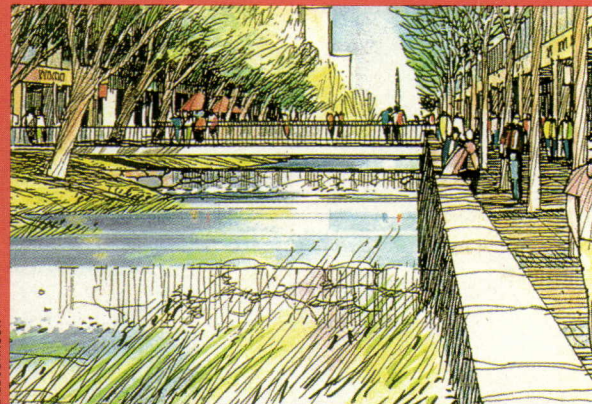
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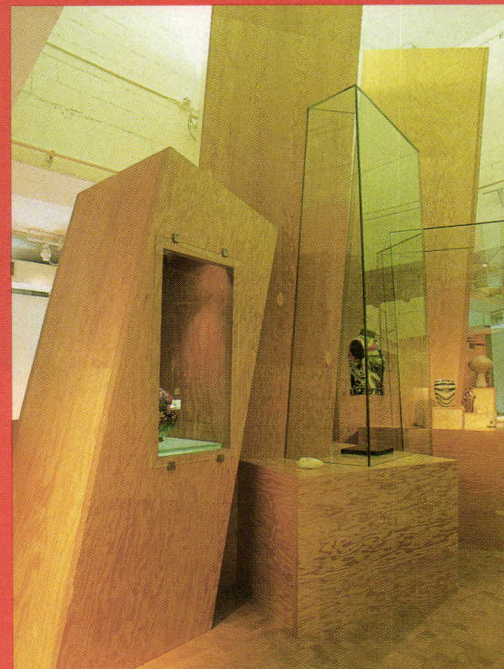
Bronx Garden Grows

The New York Botanical Garden in the Bronx kicked off a $165 million physical improvement campaign last month with the opening of the newly restored Enid A. Haupt Conservatory. The 1902 greenhouse, designed by William R. Cobb in the spirit of Victorian greenhouses, has been restored by Beyer Blinder Belle. It houses a new exhibition of tropical, subtropical, and desert ecology. The Botanical Garden also opened a new $7.5 million café designed by Cooper, Robertson & Partners.

This September, construction will begin on Polshek and Partners' 70,000-square-foot library and herbarium (above), an addition to Robert Gibson's 1902 Beaux-Arts main building. A children's garden designed by Richard Dattner and landscape architect Miceli Kulik Williams & Associates is under construction and will be completed in April 1998. *N.C.*

Oklahoma City Memorial Finalists

On April 19, exactly two years after the Oklahoma City bombing, families and survivors gathered on the Murrah Federal Building site to view five finalists' designs for a memorial to the victims. Selected from 624 entries, the five finalists are architects Hans-Ekkehard Butzer, Torrey Butzer, and Sven Berg of Locus Bold Design of Berlin, Germany; designer J. Kyle Casper and architect Brian Branstetter of Dallas; landscape architect Susan Herrington and architect Mark Stankard of Ames, Iowa; architects Richard Scherr and James Rossant of New York City; and architects Hanno Weber and Kathleen Hess of Hanno Weber & Associates of Chicago.

All of the schemes incorporate a monumental element: Scherr and Rossant's 60-foot-high tilted wall (below) evokes destabilization. Locus Bold Design's field of empty chairs commemorates each victim. Weber and Hess designed a giant ring of cypress trees. Casper and Branstetter's Donald Judd-like row of open-ended boxes is punctured with holes, creating shafts of light that illuminate victims' names on their birthdays. And Herrington and Stankard set a laminated-glass wall, inscribed with victims' names, atop a grand flight of stairs. The winning design will be announced on July 3. *N.C.*

Houston Downtown Plan

Houston's desolate downtown streets may be revived with a new proposal by landscape architect Peter Walker and Partners. The ambitious, $30 million streetscape initiative, however, conflicts with other downtown proposals, most importantly a $177 million street-improvement plan by Houston's metropolitan transportation agency, Metro.
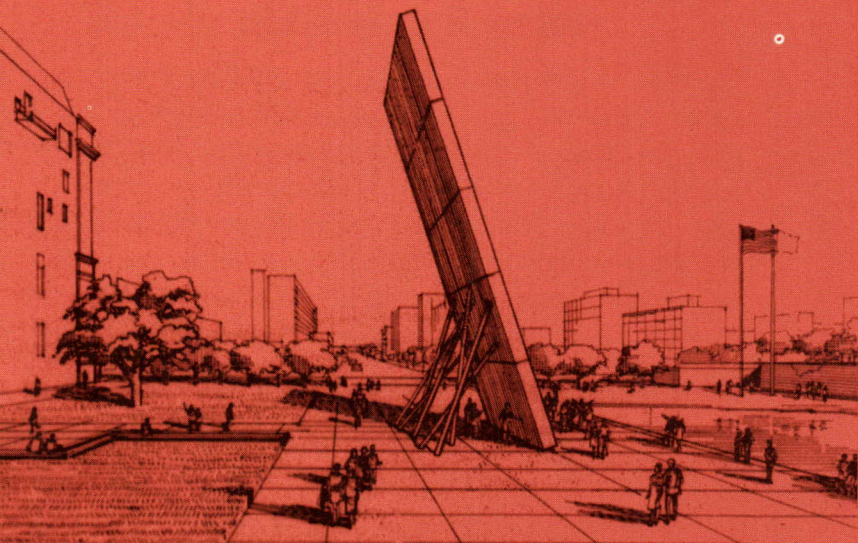
Walker's scheme, called the Cotswold Project, is spearheaded by a group of prominent local business leaders and strongly supported by Mayor Bob Lanier (a former developer). It is intended to promote development within a 60-block area of downtown Houston's neglected north side by adding landscaping, on-street parking, and a private security force. The project closes off to vehicular traffic an eight-block-long stretch of Congress Avenue, which links one of downtown's only active nightlife centers, historic Market Square, with the county courthouse and the site of HOK's proposed baseball stadium. Walker planned the avenue to entice pedestrians with cooling block-long fountains and trees (above).

Unfortunately, these changes would block several major bus routes. Metro also maintains that building the Cotswold Project would conflict with the Federal Transit Administration's grant for Metro's own street-improvement project. However, Cotswold Project Director Eugene Lee asserts that ongoing working-group sessions with Metro have been productive: "We're committed to coordinating the two programs." *N.C.*
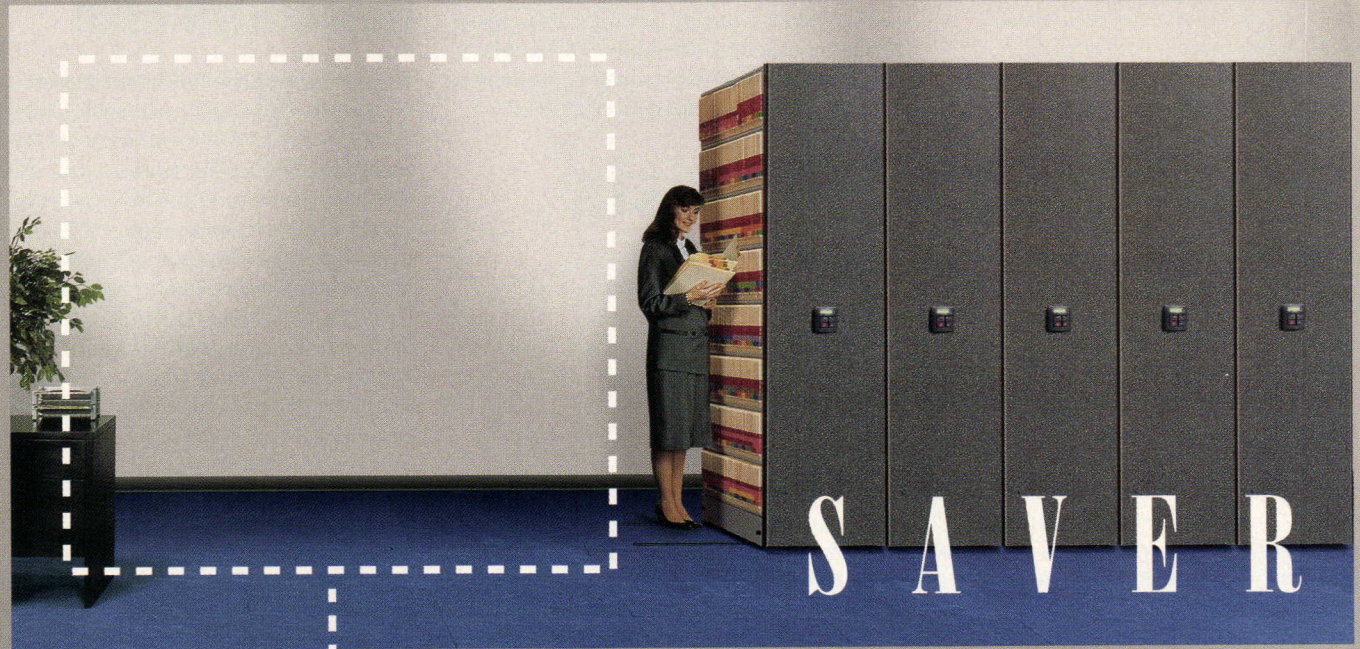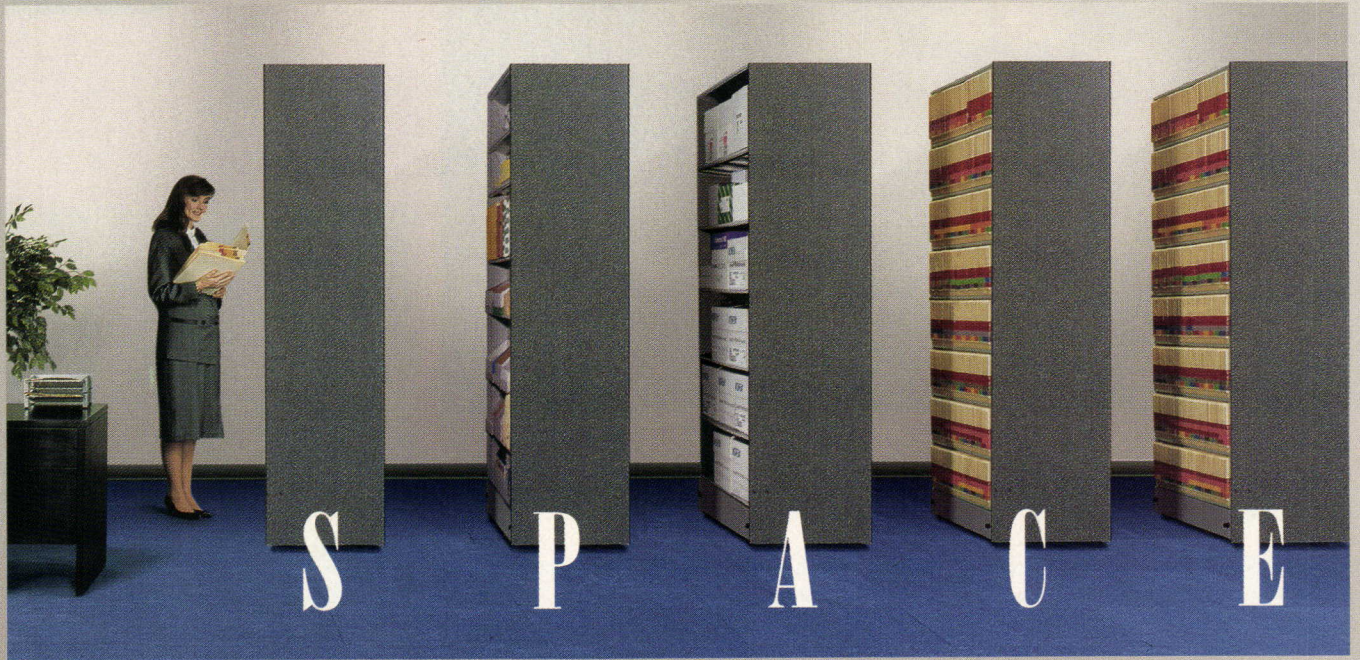
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Border Crossing Competition

The North American Free Trade Agreement has brought unprecedented prosperity to the twin border communities of Laredo, Texas, and Nuevo Laredo, Mexico. But the boom is belied by an ignominious border crossing that spans the Rio Grande and is the only pedestrian link between the two towns. To create a more inspired gateway on the American side of the crossing, local architect Viviana Frank organized a design competition, juried in April. The winning scheme by Australian architects Rebecca Angus and Stephanie Jackson proposes a sunken outdoor amphitheater and garden. A glass-covered canopy designed by Rafael Longoria and Patrick Peters of Houston took second place; a proposal for a Modern gateway by Charles York and Odell Thompson of Austin, Texas, was awarded third prize. The winners were selected by a jury that included Mexican architect Abraham Zabludovsky, New York designer Livio Dimitriu, architectural historian Stephen Fox, and National Building Museum Chief Curator Joseph Rosa. *N.C.*

First place scheme by Angus and Jackson (top) incorporates amphitheater; second place by Longoria and Peters (below) features canopy; third place by York and Thompson (right) comprises gate and courtyard.
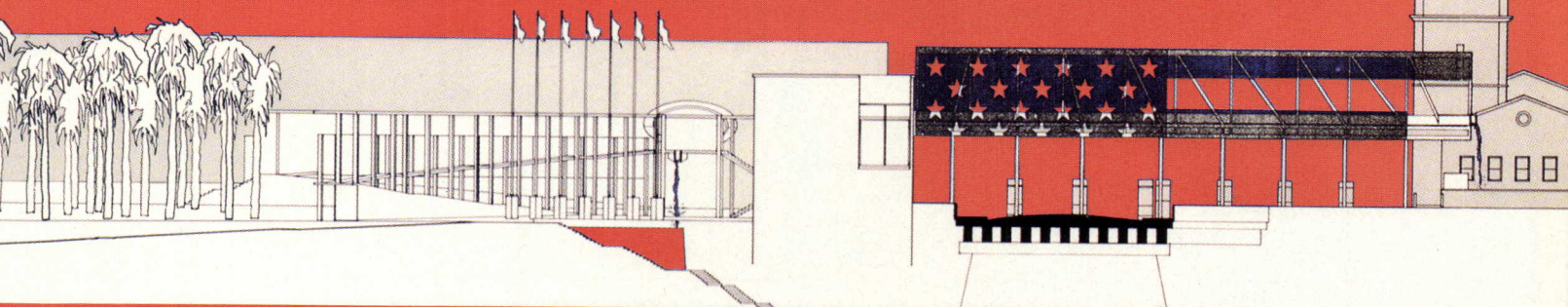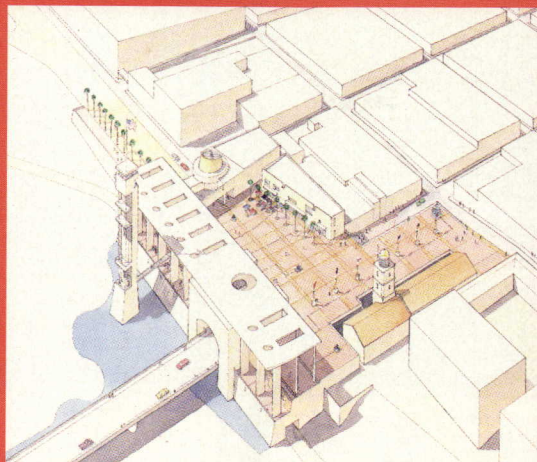
IN BRIEF

This month, **Shelley R. Poticha**, an urban planner formerly with Calthorpe Associates, joins the Congress for the New Urbanism (CNU) as its new director. The CNU has also appointed a new board member, architect **Harvey Gantt**, former mayor of Charlotte, North Carolina. **Richard L. Tuve** has been appointed president and managing principal of Cambridge Seven Associates, replacing **Charles Redmon**, who has returned to his former role as the firm's design principal. **Polshek and Partners** is closing its San Francisco office, and the principal in charge of the office, **C. David Robinson**, has established his own practice.

John Portman & Associates is designing an office and hotel tower for Korean industrial giant Daewoo. When completed in 2001, the 420-meter-high building will be the world's fifth tallest. Samsung, another Korean corporation, is building a 2 million-square-foot research center in Taejon, South Korea. Its centerpiece is a 450,000-square-foot headquarters, designed by **Perkins & Will**.
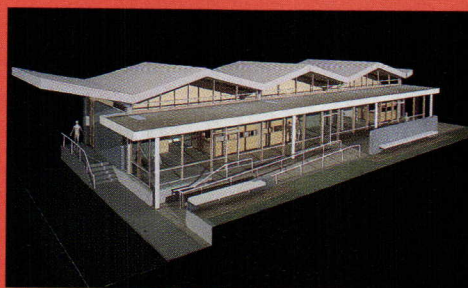
Lee Burkhart Liu's clinic in Miramar, California

Tadao Ando, who has been selected to design the Modern Art Museum of Fort Worth (pages 44-45), has two other U.S. commissions: a museum for the Pulitzer publishing family in St. Louis and a house in Chicago.

Lee Burkhart Liu is designing a 47,800-square-foot medical clinic on the Marine Corps Air Station in Miramar, California.

Yale University plans to renovate and expand New Haven's Jewish Community Center to house its art department, inviting seven architects to submit proposals for the $10 million project: **Turner Brooks**; **Deborah Berke**; **Peter Gisolfi**; **Richard Gluckman**; **Tai Soo Kim**; **Leers, Weinzapfel Associates**; and **Weiss/Manfredi**. Harvard University's Fogg Art Museum is considering a future expansion and has invited an undisclosed list of architects to develop proposals.

In staging a competition for its new 200,000-square-foot building in Fort Worth's cultural district, to replace a facility its collection has long since outgrown, the Modern Art Museum faced the challenge of creating a museum for one of America's premier collections of Abstract Expressionism. It also faced the Kimbell Art Museum directly across the street. The competing architects tried to respond to Kahn's serene and luminous structure in either form or spirit, as demonstrated by an exhibition of their designs on view at the Modern Art Museum through June 30.

Fort Worth's New Museum

Six architects contend with Kahn's Kimbell in their designs for Fort Worth's Modern Art Museum.
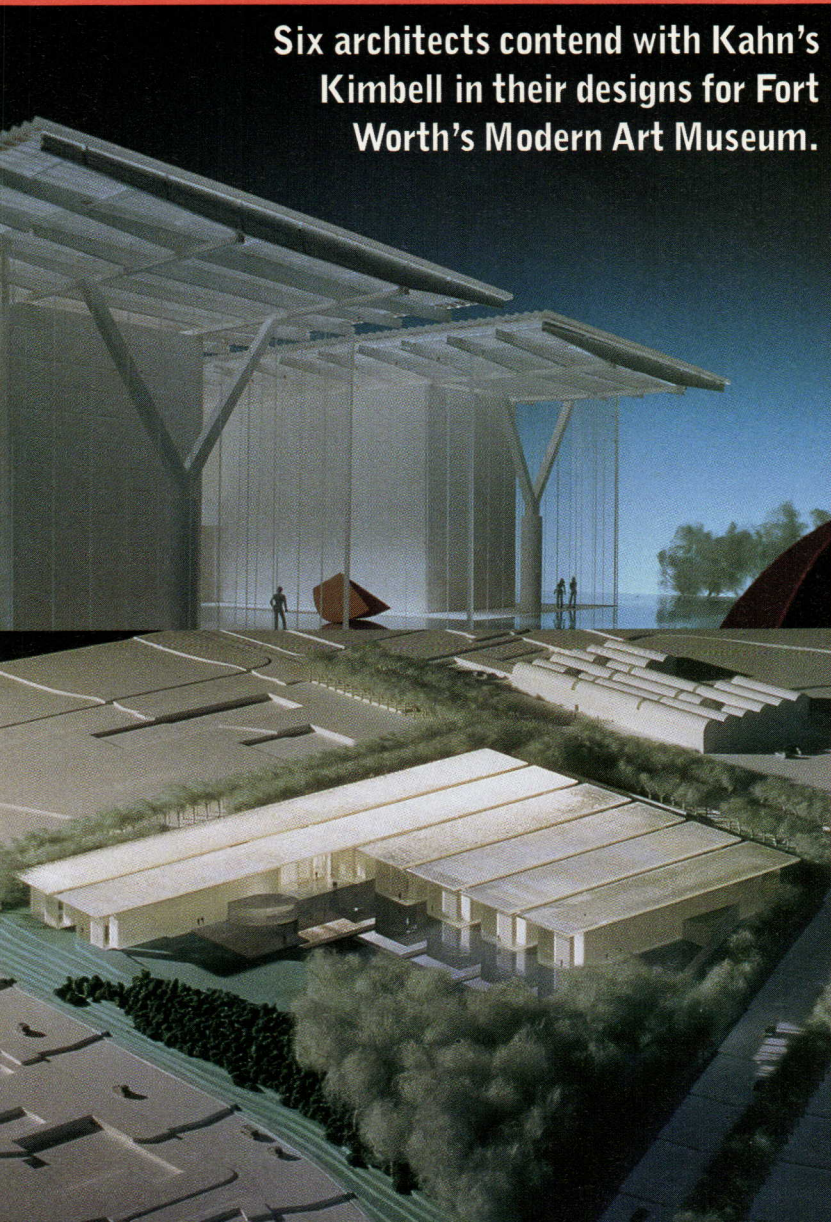
The museum cast a wide net, eliciting designs from a mixed group of six competitors. David Schwarz of Washington, D.C., has built extensively in Fort Worth, while Houston's Carlos Jimenez is noted for museums and galleries in his hometown. New York City-based Richard Gluckman specializes in gallery and museum interiors, but not freestanding buildings. Mexican architect Ricardo Legorreta has long designed in the teasing ambiguity between abstraction and regionalism, while Japan's two great exports, Arata Isozaki and Tadao Ando, have designed highly refined museums in Japan and abroad.

Schwarz cleverly responds to the Kimbell with a reference to the geometries of Kahn's Bath House in Trenton, proposing square gallery pavilions nested in the interstices of a cruciform network of galleries. Unfortunately, the proposal does not stand up to the propinquity, despite the architect's attempt at echoing Kahn's timeless forms. Schwarz's mansardlike roofs evoke suburbia, and the repetitive modules generate closed, monotonous interiors that treat all paintings equally along rigidly formal axes. Only hardy visitors would survive the museum fatigue.

The tense simplicity that characterizes Jimenez's building reads in his Fort Worth proposal as a failure of poetry. The parti—three wings abutting a long bar—lacks subtlety, and the expression is plain to the point of being diagrammatic. Sited on the far edge of the 11-acre, trapezoidal parcel, it makes no gesture to the adjacent roads and relates urbanistically to the Kimbell only through a parking lot. The inclined skylights are one-liners without resonance elsewhere in this charmless scheme.

Legorreta reiterates past formulas for playing with light without seriously rethinking the potential of galleries as light vessels. On an organizational level, he simply assembles several courtyard typologies and strings them together in an episodic sequence of corny anecdotes that introvert the structure. What occurs outside the walls is merely the vestigial by-product of the interior organization. Legorreta is the only architect to suggest a vertical

Tadao Ando's winning scheme (facing page) embraces nature. Other entries are by (top to bottom) Richard Gluckman, Ricardo Legorreta, Carlos Jimenez, David Schwarz, and Arata Isozaki.

element to break up the overwhelming horizontality of the site, but he does so simplistically with a tower whose only program seems to be height itself.

The most surprising scheme is Gluckman's. His Modernism is complex, with richly developed sections that offer plays of alternately constricted and expanded space, all revealed by light drawn through hidden skylights and backlit glass ceilings that act as light boxes. Light for Gl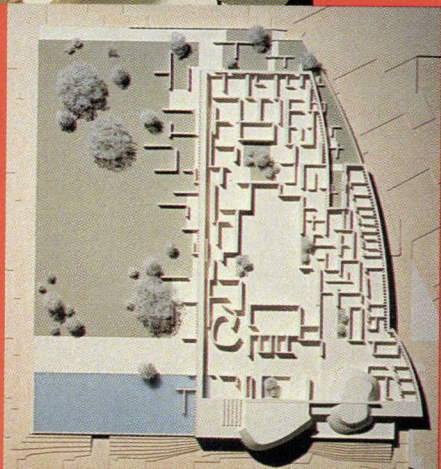uckman is cubic rather than ju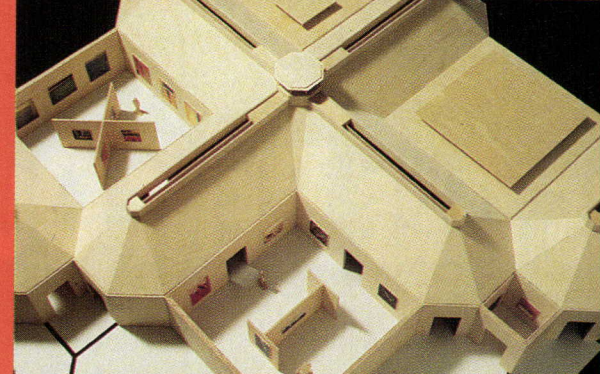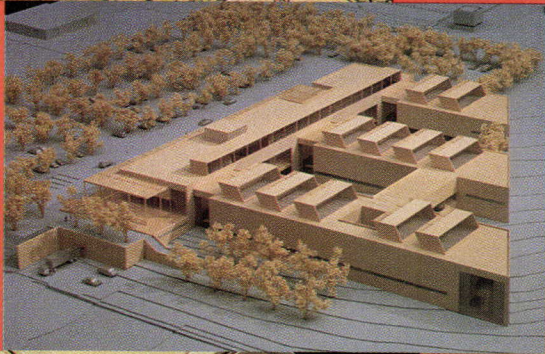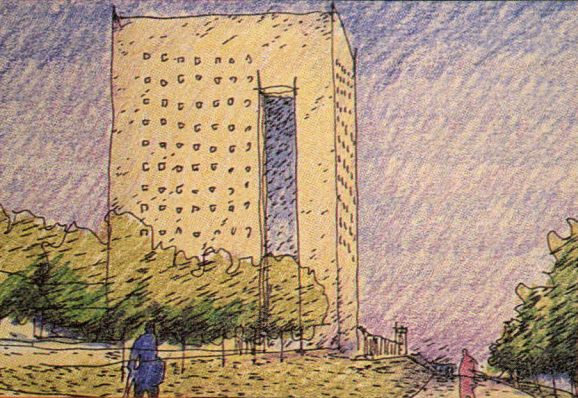st planar or punctual: He makes light itself spatial. He layers the interior and exterior in interlocking spaces and forms, sometimes including garden courts. The elegant puzzle climaxes at a rise in the site overlooking a busy intersection. The gesture gives the building a strong civic presence and the entire cultural complex a worthy architectural cornerstone.

Isozaki offers an elegant proposal as well as a conceptually sophisticated plan. By taking advantage of existing slopes, the architect buried most of the parking and liberated a large outdoor area, which becomes a park to both the new museum and the Kimbell. With this simple idea, Isozaki gives the entire cultural zone an urban concept by repeating the park that already ties the Kimbell to Philip Johnson's Amon Carter Museum to the west. Inside, a complex plan of Mondrianesque gallery walls breaks through the perimeter to form exterior sculpture galleries. On the south side, Isozaki breaks the rectilinear envelope with whalelike curved volumes that house an auditorium and an event space, adding an element of irrationality. Unfortunately, the interior galleries seem unnecessarily labyrinthine. More serious problems are an underdeveloped section and three bland facades.

Ando won the competition in May with an L-shaped building that turns the site into landscape. Always an architect who molds buildings to reveal nature and the elements, the Japanese architect capitalizes on the program's suggestion of a water feature to create an expansive, curved pond backed by a densely planted wood that erases the skyline beyond. Within this naturalistic precinct of water and sky, two-story facades of watery glass enclose double-height promenades. Close to the water, these walkways form the outer ring of four gallery fingers that project into the pond. The glory of the design is its embrace of the elements.

The scheme, however, polarizes the museum between outside nature and inside gallery rather than integrating the two, as in Gluckman's porous scheme. The galleries are stiffly ordered, and though their systematic linearity recalls Kahn's, there is little suggestion of Kahn's mesmerizing handling of light. The height for the two stories becomes domineering with Ando's roof overhangs.

Still, with walls of glass interpreting water and sky, Ando has upgraded the "water feature" into a scenic architectural drama endowed with the sanctity of nature. If, as Chief Curator Michael Auping says, "a great design will drive funding," Ando has provided the museum with a considerable assist into the next stage. Moreover, the refinement of Ando's buildings and the way they magnify and even exalt nature ensures that the new Modern Art Museum will more than hold its own in a high-noon esthetic showdown with that landmark across the street. *Joseph Giovannini*
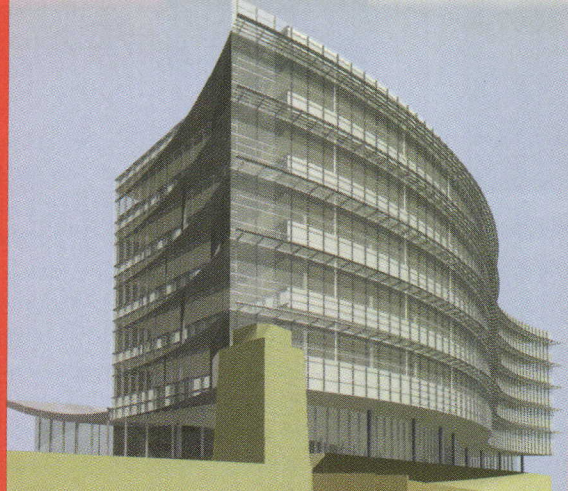
ALL HIS LOCKS ARE BENT OU

Alcoa Corporate Center Headquarters

Since the end of World War II, Pittsburgh has been powerfully engaged in the reversal of its own decline. The former steel town, once the very heart of industrial America, has undergone two major cycles of redevelopment. The first, known as Renaissance I, brought pollution control and flood management, the first urban redevelopment authority in the nation, and a parkway connecting the city with the Pennsylvania Turnpike. This massive postwar reconstruction also brought a burst of new skyscrapers at the tip of the city's Golden Triangle—the heart of downtown Pittsburgh, where the Monongahela and Allegheny rivers meet to form the Ohio River. By 1971, Pittsburgh had spent half a billion dollars on reconstructing its city center.

Pittsburgh's Latest
Renewal

Expanding its downtown across three rivers, this former steel town seeks to reinvent itself—again.

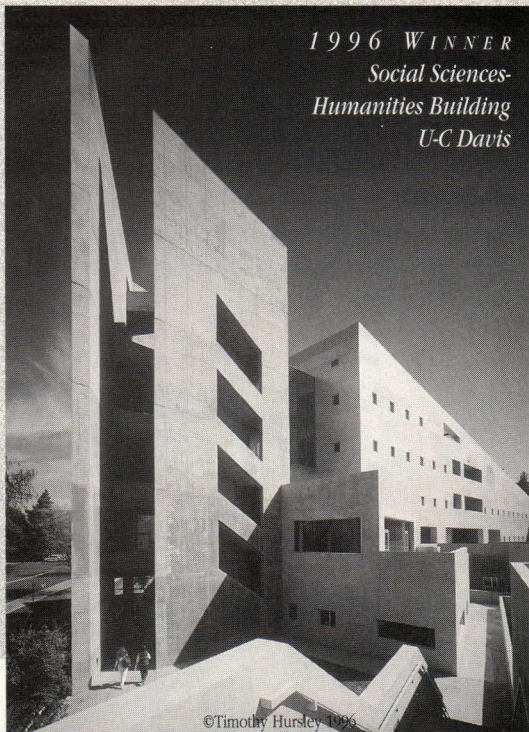**Pittsburgh's North Side and Golden Triangle**
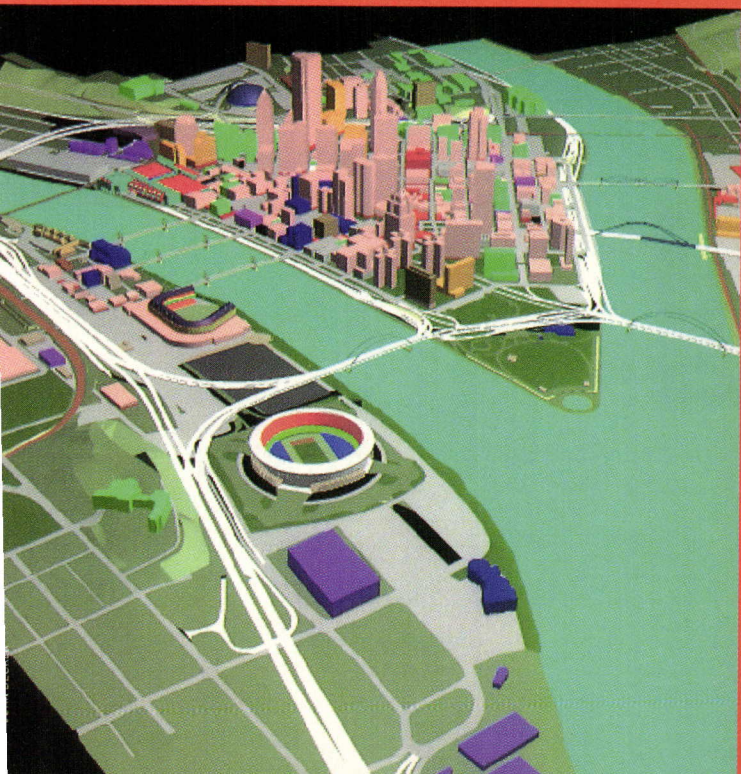
A second renaissance, begun in the 1970s and completed by the late 1980s, transformed a city once dominated by heavy manufacturing into an essentially white-collar metropolis employed in medicine, biotechnology, information and financial services, the arts, and higher education. The process generated a construction boom in corporate and research headquarters for older, reconfigured industries such as USX Corporation and PPG Industries and expanded hospitals and universities.

Today, Pittsburgh has a new development focus, which some call Renaissance III. Citywide, more than $1 billion in construction is planned or in development. The Department of City Planning (DCP) is promoting its new Pittsburgh Downtown Plan, which promises to extend downtown beyond the Golden Triangle, across to the opposite banks of the three rivers. The expanded downtown would incorporate the Allegheny's north shore and the Monongahela's south shore, as well as adjacent neighborhoods up and down the rivers. As is typical of major urban projects, two of the plan's proposals have sparked debate: a new bridge across the Monongahela and a proposed ballpark on the North Side.

The new Monongahela bridge, known as the PA Transit Airport Busway, would connect downtown's Market Street corridor with Station Square, a landmarked railroad station market and mall on Pittsburgh's South Side, and the airport to the west. The bridge, financed largely with federal funds, comprises lanes for buses and auto traffic that connect with an existing rail tunnel through Mt. Washington. Opposition to the bridge has little to do with its design. Local engineers and architects for the bridge—Michael Baker, Jr., and Tasso Katselas Associates—have devised a graceful, technologically advanced "basket-handle" structure.

Critics, however, fear the impact of the new bridge's enormous size on the small-scaled architecture along Market Street and the streets bordering the Monongahela's north shore.

Urged by Mayor Thomas Murphy, the city is seeking public support—as well as public and private funding—for a new ballpark to be built on Pittsburgh's North Side near Three Rivers Stadium. Although the architect has not yet been named, local gossip says it will be HOK Sport. The stadium, configured primarily for football, has inadequately served the Pirates since it was completed in 1971, when the team's original home, Forbes Field, was demolished. John S. Rahaim, associate director of development and design for the DCP, predicts that "the ballpark will be the focus of what is to become a prime recreational district." Opponents of the ballpark contend that it is not needed for the successful revitalization of the district and that taxpayer money could be better spent on schools and cultural facilities.

Unlike the Monongahela riverfront, which is threatened by the abutments and access roads of the new bridge, both sides of the Allegheny River are treated less obtrusively by the Pittsburgh Downtown Plan. Allegheny Riverfront Park, a two-level linear promenade designed by Michael Van Valkenburgh Associates, will follow an existing double-tiered roadway from Point Park to the soon-to-be expanded and renovated convention center. The beautiful abstract design for the park has won much public support, but opponents fear that the landscaping of the lower tier won't be able to survive a major flood.
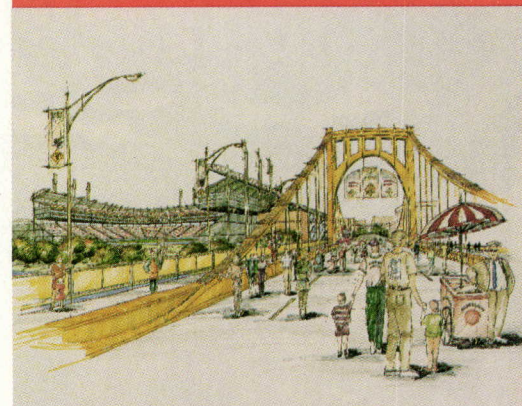
New ballpark is sited on Allegheny riverfront.

Two new projects along the Allegheny riverfront are intended as catalysts to revive the vacant manufacturing and warehouse districts on the North Side's perimeter. Under construction to the east of the proposed sports complex is the Alcoa Corporate Center Headquarters, designed by Design Alliance Architects with Rusli Associates, both local firms, to be completed in early 1998. One block east of the Alcoa headquarters, new upscale apartments are scheduled to open this month. Planners envision
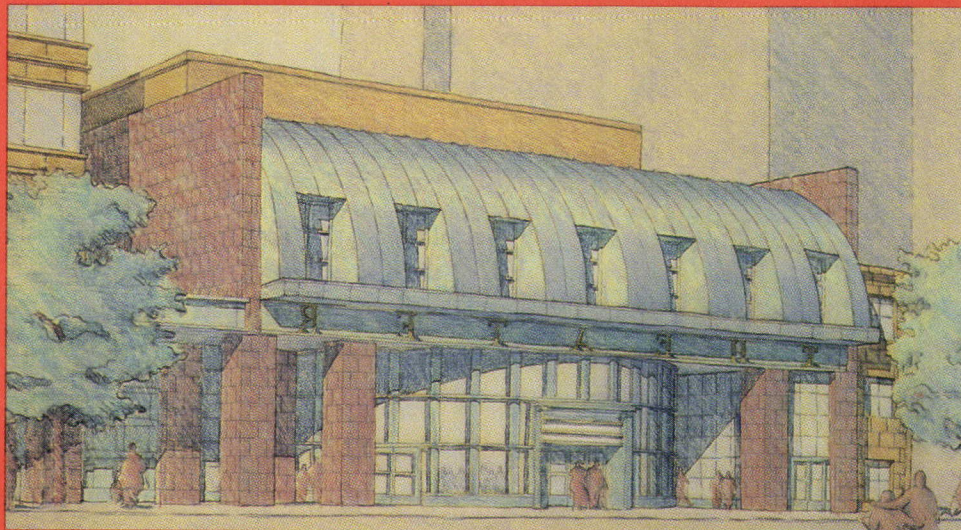
Michael Graves-designed complex will house Pittsburgh Public Theater.

these new office and residential developments as creating livelier surroundings for such presently isolated institutions as the Andy Warhol Museum, while acting as a strong magnet connecting the North Side with downtown.

Within the Golden Triangle, the Pittsburgh Cultural Trust is further developing its cultural district, which comprises a 14-block downtown area bordered on the north by the proposed Allegheny Riverfront Park. This district includes the Benedum Center for the Performing Arts and the Byham Theater, both restorations of former movie houses, and Heinz Hall, home to the city's symphony. The trust's mandate is to develop new performance facilities, as well as to renovate and expand older ones. The group's newest project is Theater Square, a Michael Graves-designed mixed-use complex comprising a 650-seat hall for the Pittsburgh Public Theater, an office building, a parking garage, and a public park. Construction of the theater began in late April; the remaining phases of the project are still in the fund-raising stage.

The trust, innovative and unafraid of the vanguard, has recently engaged architect Richard Gluckman, designer of the Andy Warhol Museum, and light, sound, and movement artist Robert Wilson to develop a plan for public art projects within the cultural district with space and light as the principal media.

Elsewhere in the Golden Triangle, local architect Burt Hill Kosar Rittelmann renovated the former Horne's department store into an expansion of insurance giant Blue Cross's regional headquarters, which opened this spring. Blue Cross consolidated over 800 employees from various suburban offices to the new downtown facility—an important investment in the future of the city center. Nearby, Cooper Carry & Associates of Atlanta is constructing

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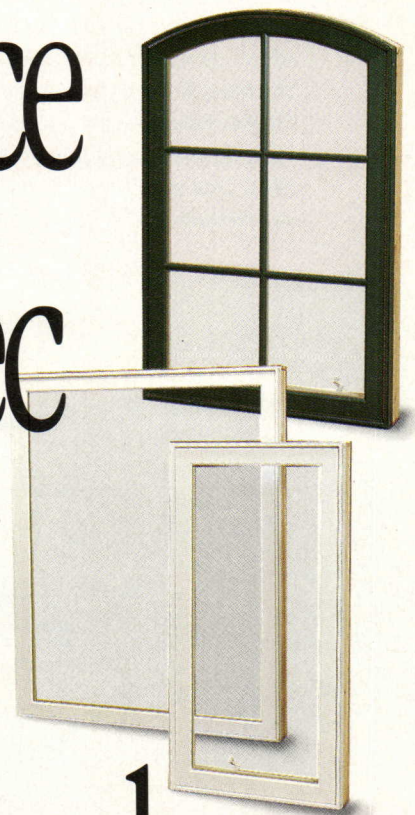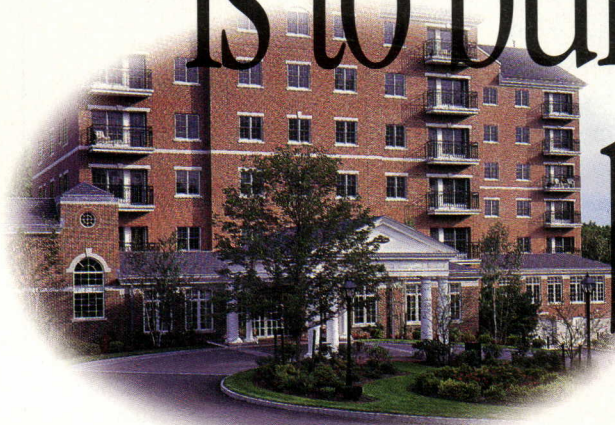
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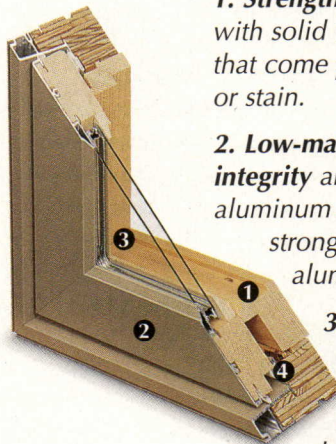
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something of a rarity in American downtowns: a four-story, 250,000-square-foot branch of Lazarus department stores.

In addition to its current initiatives in the Golden Triangle and along the riverfronts, the city is promoting the reuse of industrial buildings and sites throughout the city. The Carnegie Mellon University/NASA Robotics Engineering Consortium now has its headquarters on the Allegheny riverfront northeast of downtown in a 19th-century foundry, renovated by Pittsburgh architect Burt Hill Kosar Rittelmann. The immense interior of the former mill allows the huge earth-moving and planetary-exploration robots being developed by NASA to move about freely.

Not far from Squirrel Hill, a prestigious residential district east of downtown, a 238-acre mixed-use community is planned, to be built on slag landfill along the Monongahela. This community, named Nine Mile Run for a stream that runs through it, is now in the planning stage by Cooper Robertson & Partners with the Pittsburgh firm Urban Design Associates. The planning process includes a landscape remediation program to revegetate the currently black and barren site. The project will be completed in three phases, each lasting five years; groundbreaking on the first phase could start this summer if the necessary approvals are secured.

The notion of building housing on an environmentally transformed slag heap may be inspired, but whether the scheme will be technically and financially feasible remains in question, as does the marketing of a community built on mining wastes. But the project's indisputable urban contribution is the creation of a 100-acre open greenway connecting existing Frick Park to the Monongahela River. New paths and trails would link the community and Frick Park to public trails along the riverbank.

The Pittsburgh Downtown Plan is generally a sound, workable urban policy, similar to the successful center-city strategies of Portland, Oregon. The plan's basic premise, that downtown expand into defined and limited new sectors, zoned for mixed use, should help bring an end to the random corporate and commercial blight along suburban and regional beltways. Especially commendable are the DCP's efforts to introduce housing to create 'round-the-clock activity in the city center and invest in and preserve the city's fabric and institutions.

Unfortunately, the DCP, unlike Portland, has not embraced light rail as the primary transit option for new development. For Pittsburgh, light rail

would provide an alternate route to the airport, tie the Golden Triangle more tightly together with the proposed cross-river developments on the North and South sides, and reduce the need for widened streets and new beltways. According to the DCP's Rahaim, planners considered light rail for the new airport busway, but rejected it because of its cost.

Good news for the Monongahela bridge opponents is the decision by Paul Skoutelas, recently appointed executive director of PAT, to drop plans for the structure because of excessive costs. Skoutelas's decision has yet to be confirmed, however, by state and federal agencies. If the ballpark were also shelved, Pittsburgh's Downtown Plan would hold more promise. Given Mayor Murphy's strong advocacy of this highly visible development, however, it will probably be built. *Mildred F. Schmertz*

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Viaduct Development
Vienna, Austria
Zaha M. Hadid, Architect

Vienna is reviving its elevated, Otto Wagner-designed railway. In the 1980s, Wagner's turn-of-the-century stations became stops along a new subway system, while the viaduct that once supported the tracks became a bike path. Now, London architect Zaha Hadid is transforming a portion of the viaduct that runs through an underdeveloped area of the city into a new, 28,000-square-foot complex of housing, offices, and ground-floor commercial spaces.

Hadid intersects the arched, yellow-brick viaduct with oblique, glass-and-concrete forms: Three angular five-story buildings extend north-south between the Donau canal and the University of Vienna to house 19 apartments and 10 offices. The viaduct is carefully integrated into her design, providing a structural base for several columns and portions of the north- and south-facing structural concrete walls, as well as serving as a "found" compositional element. The east and west facades, facing the university and the canal, will be glazed and fitted with aluminum louvers to modulate daylight. Ground-floor shops, galleries, and restaurants in the new buildings and the viaduct's archways will open onto a canal-side walkway. The project is scheduled for completion in 1999. *Ned Cramer*
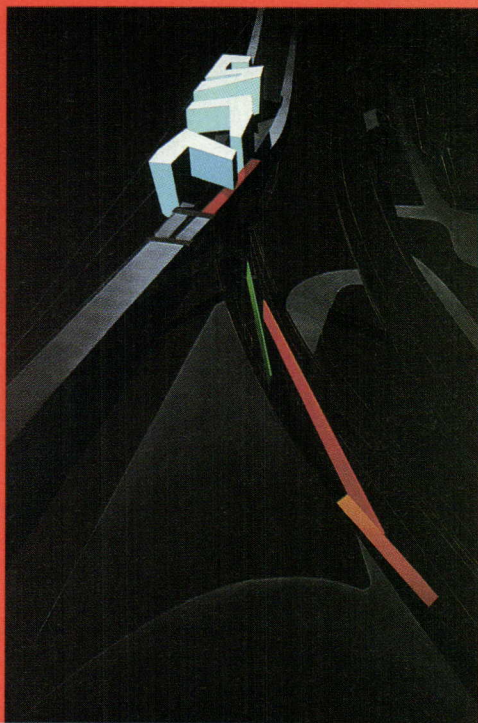
Otto Wagner's 1894 viaduct intersects Hadid's new concrete-and-glass housing.

Autodesk CEO Carol Bartz started working in the budding computer business in the late 1960s, shuffling keypunch cards for mainframes in small town banks. Bartz eventually rose to vice president of worldwide field operations at Sun Microsystems before taking the helm at Autodesk in 1992. When she arrived at the world's fourth largest software company, which controls the computerized design market with its AutoCAD software (pages 112-115), Autodesk was 10 years old and didn't have the discipline required of a swiftly growing public corporation. Over the past five years, 48-year-old Bartz has completely restructured the company and the way it develops products for architects and engineers, trying to reinforce Autodesk's dominance in the rapidly changing design software industry.

Computer *Captain*

CEO Carol Bartz guides Autodesk into the future with smarter design tools.

ARCHITECTURE: When did you enter the computer industry?
CAROL BARTZ: My first job was selling computerized services to small banks from big banks. I was hired because I knew banking and I knew computers, which I had studied in college. Then I went to 3M as a systems analyst. I wanted to be a marketing person for the graphics division, but they said, "Women don't do that," even though I knew more about the subject matter than the men. They said, "We cannot have women be our face to the customer and the world." So I said, "I'm out of here" and went to Digital Equipment Corporation in technical sales. I stayed there for six or seven years and then went to Sun Microsystems.

Sun was less than a year old—not even 100 people, only $9 million in revenues; it was nothing. Everybody said, "This will never work," but I said, "There's something really interesting here." Eventually, I became vice president of worldwide field operations. Then I came here. I've been in technology the whole time. I programmed my first computer in 1967 and for 30 years, I have never been more than an arm's length away from a computer.

What was Autodesk like when you joined?
Wild. I came to Autodesk in 1992 because it started a market with a great product. And it started the concept of the value-added reseller, because in the software area it was the first time that you had someone who took software and married it to PCs or minis. It had grown ahead of itself in a way, so I thought it was a perfect marriage of good technology with a good market position, and I have good managing skills. And I wanted to get in the software business. I was really sick of the mine-is-faster-than-yours side of the hardware business. The biggest surprise and problem was that the AutoCAD code base needed to get ready for the next century— and that work hadn't been done. Now we talk about AutoCAD being four years young. Release 14 is really Release 2. It's faster, smaller

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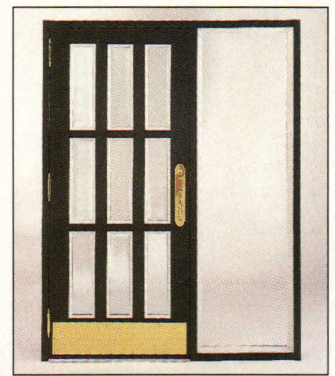

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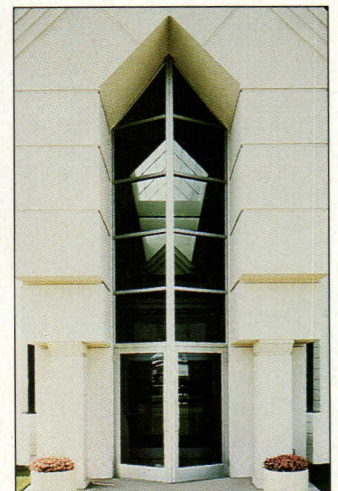*Modesto, CA (209) 545-5231*
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than 12, and has the object-oriented features we knew we wanted. We had to prove ourselves with 14 because we hadn't done the best job with 13. But we also had to take some time before we had the confidence to say, "Okay, we know we have it." Now, people are starting to see it.

You've recently purchased third-party software developer Softdesk. What's it going to do for Autodesk?
Many things. The new object applications that Softdesk has developed are just fabulous. That's important because Softdesk has proven the importance of the object technology we took such a hit for with Release 13. Softdesk has exciting technology in the civil and architectural areas. If you're an architect and you have an idea in your head, you can't go through 25 mouse clicks. You've got to get the idea out in front of you, then take that idea and turn it over to somebody who can detail and document the whole thing. It's just been too hard before. By the time you go through the process you've forgotten what your idea was.

Who is your competition?
There's no other design company that covers the landscape like we do. There are individual competitors in mechanical, in A/E/C, and so forth. Third-party software developers can talk to somebody in our A/E/C or mechanical divisions who really knows that business and wants to be a strong partner. Our specialization in various vertical markets will pay off by making us more focused.

What are architects' greatest needs currently in the digital design realm?
Architects tell us that they need better communication tools to help them throughout the design process. It is typical to find isolated groups working on just a portion of a much larger project, and as the project passes from one group to the next, design intent can get lost along the way. The result is a slower design process, increased cost of construction, and, ultimately, a poorer realization of the design.

We are focusing on creating a series of tools to help designers communicate more effectively, which, in turn, will increase productivity. It means more than getting a job done faster. Increased communication means that the final result will be much closer to both the architect's and the client's vision. Architects are already taking advantage of the Internet to help open up lines of communication. Our DWF file format has proven to be quite successful, and I believe in the future we will see an increase in the use of the Internet to collaborate on design projects.

What is "interoperability," and why is it so important to architects?
Interoperability feeds back into the idea of better communication. This becomes more critical as designs become more complex and the design model becomes more sophisticated through the use of new object-oriented technology. Without standards for [computer-generated] objects, we lose the ability

to communicate the full intelligence of the design model, and we are back to simply exchanging drawings. That is why at Autodesk we are working on a worldwide basis to establish standards for objects.

What's next for Autodesk?
It's going to be so exciting that I want to savor every minute of it. We have great products; I think we have a great strategy from a technology and a marketing standpoint. We absolutely believe in our concept of being the design software company. Like Sysco being the networking company, Netscape being the Internet company, and Microsoft being the information company, Autodesk is the design company.

Where does the CAD market stand now, in its infancy, adolescence, or has the market matured?
Adolescence. We are coming through a time of rapid growth and excitement, but I hesitate to predict too far into the future. I used to say that we can only look two years forward with any clarity, but how many people predicted the explosion of the Internet two years ago? Every 18 months we are seeing dramatic shifts in technology. The architecture community may not change as dramatically in two years' time, but what we see in the future is that model-based design will become more prevalent. Modeling will become much more affordable and will be easier, thanks to component technology like digital building blocks. I think that architects will stay in the active design phase much longer because many of the details will come from the model. In the end, designers will have more time to create and be creative.

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Campus
Interloper

Carnegie Mellon's newest building destroys the formal finesse of the university's original plan.

Hammerschlag Hall, a robust Beaux-Arts building designed by Henry Hornbostel, is a well-known icon of Carnegie Mellon University. It's the foremost example of Hornbostel's Classically inspired campus architecture. The building is also the first glimpse of the university seen from one of the city's main thoroughfares. Sadly, that first impression is now tainted by the addition of a new building at the base of Hornbostel's ornate 1914 edifice. Roberts Hall of Engineering, designed by Payette Associates and dedicated in May, is not the tarted-up parking garage that its squat, concrete shell suggests, but a $13 million building housing the engineering school's electronic materials technology department.

Hornbostel's building commands one of the most prominent locations on campus, terminating the end of an axial mall much like Thomas Jefferson's library at the University of Virginia. The building also negotiates a challenging site: From the main quad to the west, the ground drops two stories, then plunges down to a ravine.

Payette's heavy-handed new structure is bermed into this steep bluff at the back of Hornbostel's brick building, and connects to the older building through a glass bridge over a service road. Devoid of scale or hierarchy, its fortresslike, three-story base is clad in rusticated concrete panels perforated by bands of tripartite windows. Crowning the concrete base is a flimsy, glazed penthouse centered on a curving conference room—a weak attempt to mirror the symmetry of Hammerschlag Hall. Roberts Hall's only redeeming feature is that it's invisible from the main campus quad.

The clumsy modern building tries too hard to assert its own identity instead of deferring to its historic neighbor. More importantly, Payette's design is completely out of character with Carnegie Mellon's recent building program. Over the past 10 years, the university has spent millions of dollars implementing an ambitious master plan by Michael Dennis & Associates to define a new campus precinct that reinforces Hornbostel's existing quad. The buildings constructed according to this master plan sensitively reinforce the axial organization of the Beaux-Arts campus.

Roberts Hall, however, is neither formally nor urbanistically sympathetic to the rest of campus. Its cheap materials lack the careful detailing and human scale of Dennis's recent additions. Payette's design neither challenges the Classical underpinnings of the campus buildings, nor imitates their historic language. The new structure's tacked-on position behind Hammerschlag Hall lacks the formal authority created by Hornbostel and extended by Dennis.

Carnegie Mellon should have steered clear of building on the site altogether, or erected a smaller, more sensitive building. As built, Roberts Hall stands out as a poor afterthought to an otherwise carefully considered campus plan. *Raul A. Barreneche*
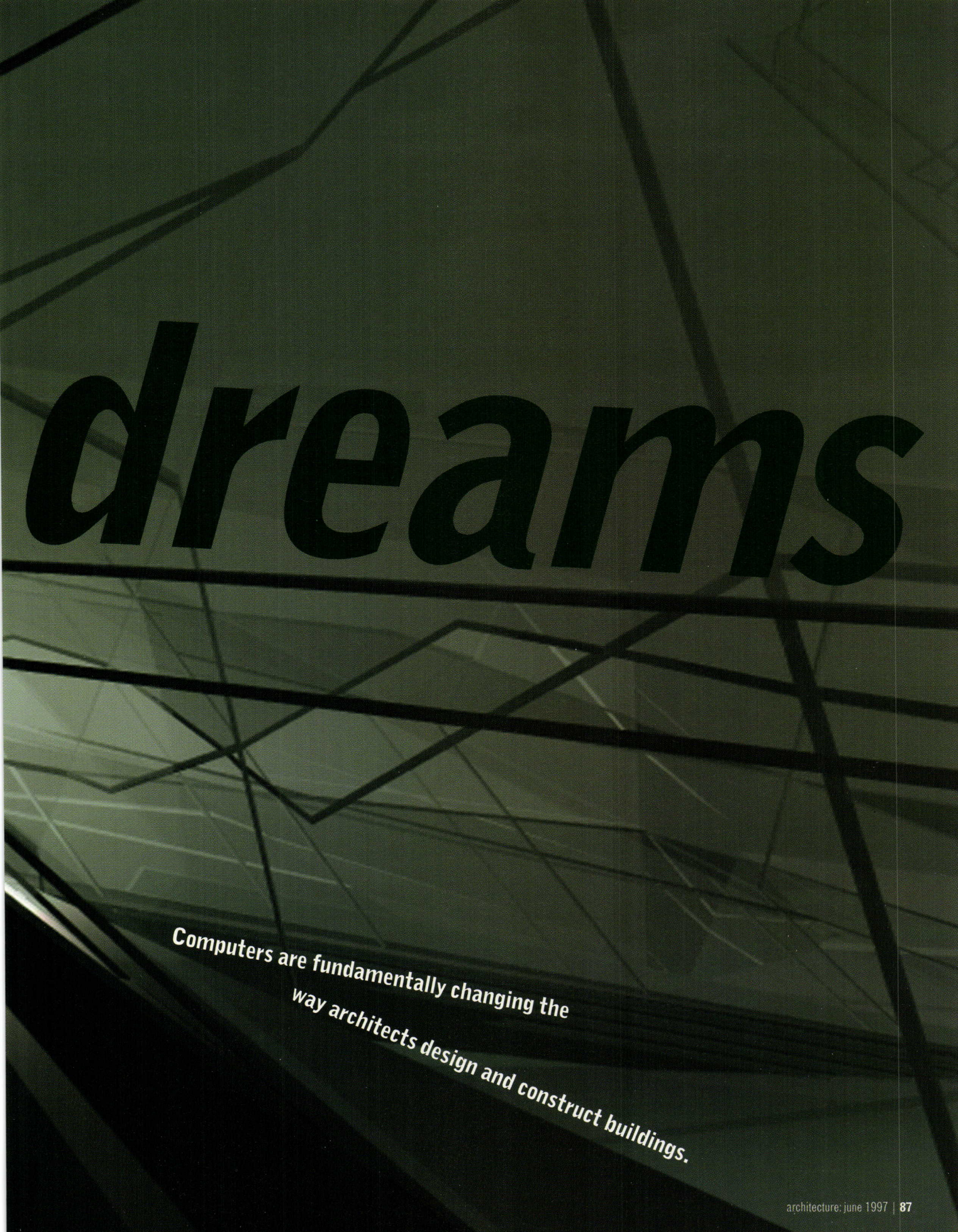
L. KAVCHAK

machine

by Aaron Betsky

dreams

Computers are fundamentally changing the way architects design and construct buildings.

Twenty years ago, digital guru Nicholas Negroponte, director of the Massachusetts Institute of Technology's (MIT's) Media Lab, promised that we would wake up one day and decide with the flip of a switch whether to live in Versailles or in a country cottage, by surrounding ourselves with electronically simulated environments that would transport us out of the everyday. That virtual freedom has not yet dawned, but the vision shines just as brightly among today's adherents of electronic realities. They promise us utopia. It is a world without boundaries, where we can wander through a maze of possibilities, where our eye delights in an array of colors and our fingers caress different textures every moment. The prophets of virtual reality, cyberspace, or the electrosphere claim that architecture will finally cast off the bounds of gravity, break open the box, and set us free.

Traditionally, architecture has been the second skin that comes between us and the world, whether as shelter or facade. Now, as William Mitchell, dean of the School of Architecture at MIT, explains, "Inhabitation is taking on a new meaning, one that has less to do with parking your bones in architecturally defined space and more with connecting your nervous system to nearby electronic organs. Your room and your home will become part of you, and you will become part of them."

The brave new world envisioned by Mitchell and others is becoming a reality. For years, engineers have been embedding more and more technology into buildings: Structures sense occupant load and adapt their temperature; glass changes from opaque to clear with the flip of a switch; security cameras watch us everywhere. It is only a small step from today's "smart" buildings to structures that appear to change color or texture; collect information about our presence; or anticipate our needs for light, security, and comfort. Microsoft magnate Bill Gates is already incorporating many of these features into his own home near Seattle, where computer chips keep track of who's inside and cater to their senses, regulate climate, play their favorite music, and present their favorite paintings on flat-screen monitors. These devices may eventually merge with the miniaturized technology we carry with us as laptops, palmtops, beepers, cellular telephones, and, more frighteningly, implants such as pacemakers, hearing aids, and contact lenses.

The question remains open whether we will ever get there. Michael Benedikt, whose book *Cyberspace: First Steps* (MIT Press, 1991)

was the first comprehensive collection of electronic architectural musings, has now "exited the cyber-prophecy field" because, he says, he felt "like a snake oil salesman." "Even with the latest technology, I never feel free or wandering," he explains. "I am always served images on a platter. It all feels like a slide show." What Benedikt sees as a distinct achievement of the computer age is the "marriage of digital design and physical production."

This combination certainly is a reality, rather than a utopia. Walk into any architecture firm and you'll see nothing but workstations. Even Thom Mayne, the Los Angeles architect who made his name through intricate, layered drawings and models that sometimes seemed more important than the built product, says that "the days of drawings are over. Design is all digital now. It gives you so much more freedom."

The technology that has enabled this emancipation is only a recent fixture in design studios. Conceived in the mid-1960s, computer-aided design and drafting (CADD) made its way from the laboratory into the drafting room in the 1970s, but until the mid-1980s, only the largest firms could afford it. The typical 1970s model was the minicomputer, a mainframe descendant that reduced hardware from a roomful of equipment to a pair of refrigerator-sized units. The cost of a single CADD seat—held by a dedicated technician, not an architect—was at least $100,000, and systems were limited to production drafting. Architects purchased hardware and software and negotiated training and maintenance from a single company, such as IBM or Intergraph.

The introduction of the personal computer (PC) in 1982 made CADD more affordable to architects and opened the door for competition among software developers. At a cost of around $10,000 for hardware and software, the PC has brought automation to firms of all sizes. There's been a shift from vendors with proprietary hardware-plus-software packages to an open market with thousands of software developers competing on multiple platforms.
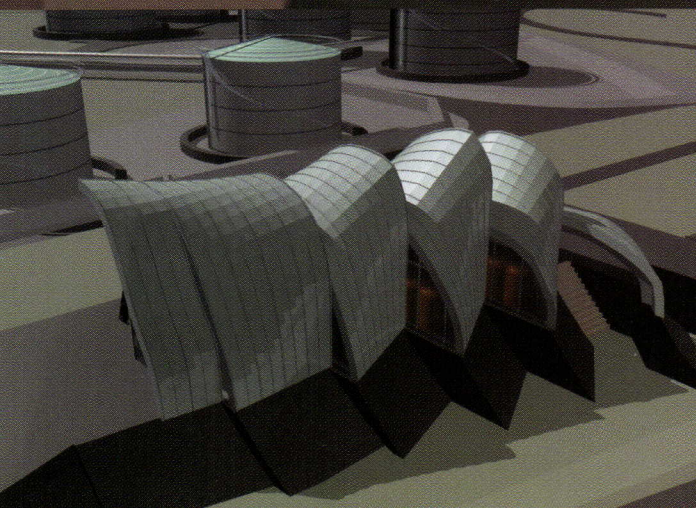
In the past few years, the emphasis of CADD has shifted from drafting to design. Release 13 of AutoCAD, the 15-year-old program that controls more than two-thirds of the architectural market, incorporates sophisticated modeling and layering techniques, and Release 14, unveiled last month, allows for even more compelling three-dimensional manipulation.

CADD allows for even greater possibilities in the creation of form. For over a decade, industrial designers, car designers, and the military have designed on the computer and sent their data directly to milling machines, laser cutters, and even factory floors to create the complex compound curves they envisioned on the screen. Now architects are tapping into its production capabilities. "Frank Gehry's Disney Hall was really the breakthrough," maintains Coby Everdell, manager of advanced visualization for Bechtel. "Gehry proved that you could create highly fluid shapes on the computer and then model them directly." For Gehry's new Guggenheim Museum in Bilbao, Spain, Everdell adds, "He found contractors who would actually use this data, so that it goes directly to the stone quarry." Everdell sees the influence of Gehry even in the large, infrastructure-related projects his construction company designs and produces, such as an 800-meter-long, glazed, cigar-shaped building in Asia. "Its section changes continually," he notes. "We could never have done that without computers."

Everdell thinks that such forms are not always the result of excessive expressionism, but actually "optimize materials" when used right. This efficiency is certainly argued by such European designers as Ben van Berkel of The Netherlands, or Vienna's Wolf Prix of Coop Himmelblau, who believes that "the computer allows you to trace the forces of gravity with great accuracy and build them." Going with the flow seems to be justifying forms that clients might have dismissed as posturing only a few years ago.

This fluidity has become a style in itself, showing up in work all over the world, and one might expect the cigarlike lozenge E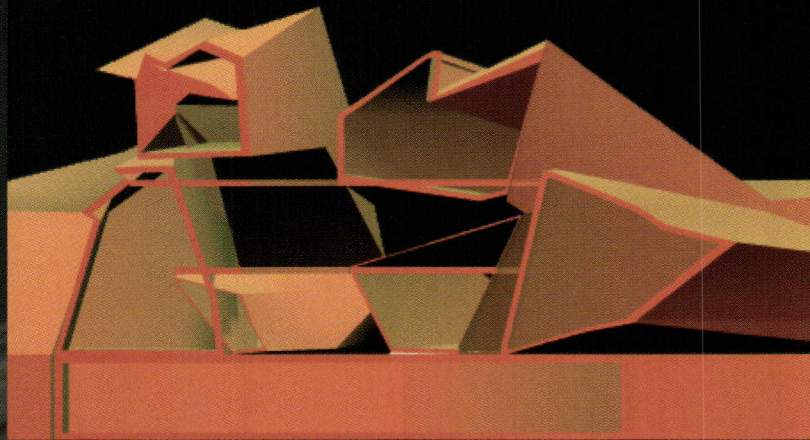verdell describes to go the way of the now-outmoded pile of matchsticks so prevalent in the design of the early 1990s. What has changed fundamentally is a way of designing, allowing architects to visualize what they build. Though many architects see three-dimensional visualization as giving them greater latitude in envisioning shapes and spaces, many still rely on physical models as giving them a better idea of the overall coherence of a space. "It's because of the way AutoCAD works," says Benedikt. "I can always tell when I walk into a space designed on AutoCAD. It is built up in layers of plans, not in sections or models."

Though Autodesk points to the ability of its program, through 3D Studio Max and other add-ons, to create such modeling capacity, many architects would prefer to use the computer to streamline products, rather than explore its speculative abilities. "It's a split as old as time itself," asserts computer design pioneer and University of Texas at Austin Professor Marcos Novak. "Most people like to use computers to represent reality. I am more interested in its abstract potential." It is that side of computers that has led Novak and his ilk to create the fantastic structures that seem to fulfill utopian promises and excite students. Novak, who got his start by studying electronic music in the 1970s before moving into architecture, identifies three kinds of future architecture: liquid spaces, transarchitecture, and avatarchitecture.

In liquid architecture, forms are fields of data, just as they are in AutoCAD, but here, they are not organized into plans or perspectives. Rather, the forms themselves have built-in programs that, as in music, provide a rhythm and structure that congeals into what appears to be form. Peter Eisenman, by theorizing an architecture that is a "rewriting" of our reality, provided the theoretical framework for this work. Greg Lynn, a 32-year-old New York City-based designer and former Eisenman employee, creates buildings based on "attractor" software that assigns weights or pulls to such forces as views, landscape conditions, or the theoretical importance the designer ascribes to an element. The result is a collection of forms that has a fluid look, as if a continuous rhythm had suddenly frozen into a fixed form. Lynn is currently drawing up the construction documents for the first of his "blobs" to be built: a Presbyterian church in New York City, an appropriate emblem of spiritual abstraction rising out

of a former laundry. To Lynn and Novak, such soft forms represent the instability that underlies our reality and that architects previously tried to deny with the fixedness of form. Our world is chaotic, coming together into momentary sensations, they claim, and architecture is the tracing or translation of such forms.

Transarchitecture is, by its very nature, hybrid. It is the result, states Novak, of "learning from software rather than from Las Vegas." Transarchitecture is essentially a technique of collage that draws on such software programs as Softimage and Photoshop to create hybrid structures out of samples of the real world. Digitized images, constructions based on algorithmic extrapolations of basis grids, and other pieces of "scanned" or "sampled" reality are brought together in the computer, which then constructs whole worlds out of them. San Francisco architect Duncan Brown, for example, has created "Zenlux Estates," an alternative to suburban development as a crazed agglomeration of abstract building blocks, and has designed a New York apartment that translates digital lines into layers of construction.

Much of this formal experimentation is centered at Columbia University in New York, where both Lynn and 38-year-old architect Hani Rashid teach "paperless studios." Rashid has created three-dimensional data spaces with his architecture graduate students at Columbia, computer worlds that change as the cursor moves through space, information, images, and sounds.

Rashid's studio has also experimented with projecting such 3-D data into real space, altering the sense of where one is or what one sees with projected, computer-generated images produced in the computer. "It's all a bit surreal," he admits, reveling in its strangeness. "We're after what I call 'phenomenological textualism,'" he claims of the work he creates with his office partner Lise Ann Couture. Rashid and Couture interpret the data of the real world, whether they be images picked up off the street or program information, as the basic structure out of which they create their collages. "In a house we're working on now," Rashid explains, "we mapped the daily rituals of getting a glass of water or going to sleep into a formal structure that became the basis of our forms." The results are once again fluid shapes that do not bear much relationship to existing residential models.

Sulan Kolatan, who also teaches at Columbia, prefers to call the lifelike forms she produces with partner Bill MacDonald "chimeras" that use "electronic mapping in an open-ended, non-deterministic manner" to create strange hybrids of furniture and architecture that float between the real and the imagined, and were recently realized in a Manhattan apartment.

For all their aspirations of creating a space that breaks the boundaries between the real and the virtual, these architects' worlds still exist mainly in the computer. What the work loses when it enters into the material world of fixed structures and gravity is, of course, the very complexity, unfamiliarity, and mutability of the designs when they are still inside the box of the computer. "It is always a problem to figure out when to print, and what you get then," admits Lynn. The forms might look strange, but do they truly create a hybrid reality?

The most extreme form of electronic architecture is therefore that which can so far exist only in the computer, what Novak calls "avatarchitecture." It is a world familiar to science fiction fans as the "dataspace" of William Gibson's novels or the world of the 1992 film *Lawnmower Man*. Here, there are no real forms, and the programmer is free to create unlimited variations of forms, figures, and spaces. Commercial versions of this alternative reality already exist. Microsoft has chat rooms where you can become a cartoon character and

wander through a plastic reality, and many local video arcades offer virtual-reality rides. What is missing in these commercial applications is the inventiveness for which young architects have been hoping. Drawing on myths and films, these virtual realities so far—with the exception of the experiments of Novak and his ilk—are no more than Disney World extensions of a familiar reality into more fluid and flexible forms.

In fact, what is getting built, even in cyberspace, looks a lot like what we already know from film, television, and video arcade games like Doom, or from architecture produced wholly on a computer. Meanwhile, efficiency is prized over invention. Thus, whatever innovation architects discover in the computer becomes either a way of building more cost-effective buildings with a certain style or is quickly left to students and their professionally marginalized teachers. One architect who helped design Microsoft's Redmond, Washington, compound was told by one corporate official that it needed to look like a "real" campus, "with ivy and stuff."
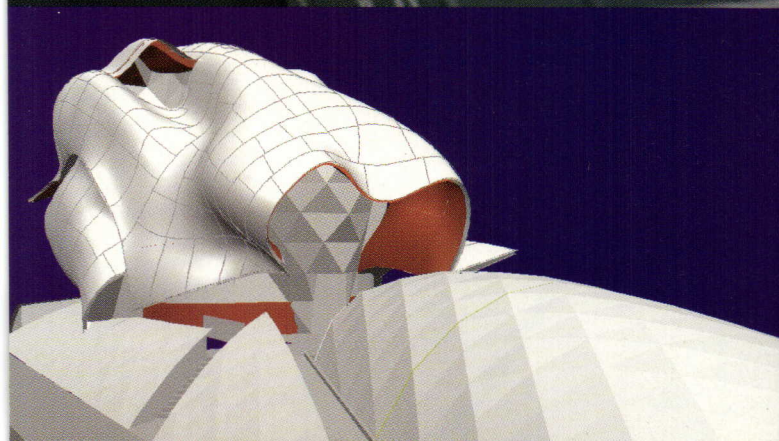
Yet the computer's ability to integrate different technologies to the point where it will be difficult to tell buildings, climate control systems, gadgets—and perhaps even our bodies—apart, promises to change the way we build beyond the rarefied world of high design. Mitchell's world of implanted technology promises a reality in which it will be harder to tell the building from the body and to create what Cuban-born philosopher Manuel de Landa calls "meshworlds" of non-hierarchical structures in which "our homes can be seen as mixtures of self-organized and planned components." Mitchell himself proposes that for designers and planners, "the task of the 21st century will be to build the bitsphere—a worldwide, electronically mediated environment. ..." This "bitsphere" would be a constructed field of information that we would actually inhabit.

On a formal level, Andrew Blauvelt, a New York-based graphic designer, points out that computers make Robert Venturi's call for the "double functioning element" and the "both/and" into an easy reality. Architecture is as much dominated by advertising and signs as it is by space—densely packed with images and allusions that change continually. We can live in a rich dataspace where we are continuously surrounded by information and projected forms, allowing access to spaces traditional architects would never build.

Even more fundamentally, as the Italian philosopher Mario Perniola points out, we now live in an "information society" rather than in the previous "mass media society." Where before we were confronted endlessly by billboards, we now have entire libraries available at the touch of a screen. Now, Perniola asserts, "everything is fixed, anchored in a spatial order, and assumed to be present and available." You can plug in everywhere, and the world can appear in many ways, but always within the apparatus on which this information is projected. Moreover, every copy or construction is a perfect translation of data. Reality has an absolute relation to our imagination. The true digital society is one that resembles an archive or an open book more than a continuous flow, says Perniola.

The task of the architect, then, will be to design that frame: to create the library of the world, the Tower of Babel that will allow us to tune in to the data stream while keeping our feet on the ground. Using AutoCAD and "blob" software, making smart, curving buildings, architects can create monuments for a digital age that are the nodes of coherence in a world made up of data. This is a task of truly visionary architecture: to build those central monuments that help us make sense of the world. Electronic architecture shows us that architecture's utopian side, which has always fed its day-to-day constructions, is certainly not dead: It has just become juiced and jazzed with some electricity and a lot of built-in memory.

Stainless-steel and wood-clad conference hall in Frank O. Gehry & Associates' Pariser Platz 3, a mixed-use project in Berlin, is modeled in CATIA.

MEDIA

La

With half of all jobs in America dependent on digital technologies, computer education is big business. The need to train for these jobs has spawned a wave of new media labs on university and corporate campuses.

bos

By Ann C. Sullivan

CAA
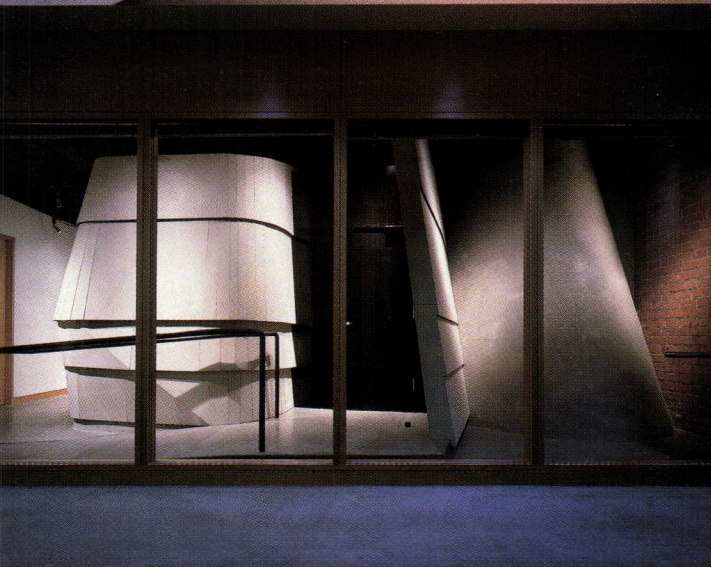
**CREATIVE ARTISTS AGENCY/
INTEL MEDIA LAB
LOS ANGELES, CA
PLESKOW + RAEL, ARCHITECT**
The unlikely marriage of a Beverly Hills talent agency and a computer chip manufacturer produced a 2,000-square-foot theater that exposes Hollywood talent to emerging media technologies.

Creative Artists Agency (CAA) teamed up with Intel, manufacturer of Pentium microprocessors, and architect Pleskow + Rael to build the interactive presentation room in CAA's Los Angeles headquarters.

Partners Tony Pleskow and Tom Rael took an aggressive design approach, inserting a steel- and fiberboard-clad cocoon into the corporate interior of I.M. Pei & Partners' 1989 headquarters (left). The bold building-within-a-building clearly establishes its own identity, inviting visitors to a space signifying exciting, unpredictable experiences.

The elliptical theater contains informal seating, where sofas and lounge chairs replace traditional task chairs. Fabric lines interior walls and ceilings. Typical computer workstations are notably absent. Instead, the technical guts of the media lab are housed in a linear "technology bar,"

which straddles the lab's canted enclosure. From the outside, monitors and CPUs betray the project's technical roots. Inside, the bar is cloaked in perforated metal panels and translucent glass (above).

Hands-on learning occurs in the center of the room, which can be cordoned off from the rest of the lab by heavy curtains and an oversized projection screen. Actors, writers, and producers interactively learn about new digital technologies in the entertainment field. A living room-like area hosts graphic presentations; and a solo computer module permits solitary study (previous pages).

With the lab's completion, CAA assures itself a role in the digitally driven entertainment scene. For Intel, the lab is an opportunity to showcase the graphic power of the PC to an industry in which rival platforms such as Silicon Graphics' are firmly entrenched.
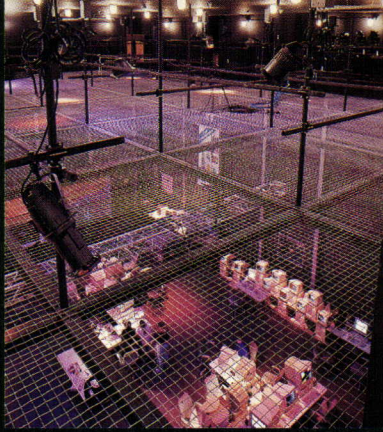
MEDIA LABORATORY MASSACHUSETTS INSTITUTE OF TECHNOLOGY, CAMBRIDGE, MA CENTERBROOK ARCHITECTS

Founded in 1985, the Media Laboratory at Massachusetts Institute of Technology is widely regarded as the country's preeminent research facility for information technologies. Its spatial requirements have grown along with its reputation.

In 1994, Centerbrook was commissioned to retrofit portions of I.M. Pei's 1985 Weisner Building, home to the media lab. The architect's biggest challenge was inserting a pleasant workspace within a three-story, windowless, black-box theater at the metal-paneled building's center.

Originally conceived as an experimental media theater, Pei's 60-foot-tall "cube," as it's called, was deemed an inefficient use of space in an overcrowded building, explains Centerbrook designer Mark Simon. The architect lowered the theater's ceiling and inserted a new media lab in the top 15 feet of the cube. Faculty offices surround the perimeter of the new 3,900-square-foot floor, and a central work area accommodates up to 20 workstations.

Centerbrook worked to humanize the concrete cell: The architect bored through the north face of the concrete enclosure to permit limited natural light to enter the workspace and installed a stainless steel trough filled with ivy above the office walls. Simon highlighted the outer office walls with brightly colored, enameled metal panels, intended to symbolize the calculative process of computer coding, he explains. These bands of color pick up on abstract painter Kenneth Noland's color scheme for the building, which appears at the entrance and in the joints between the metal panels that clad the four-story atrium.

Beneath the new computer room and above the theater stage, Centerbrook inserted a stainless-steel cable mesh ceiling that is strong enough to support the weight of lighting and audio equipment, yet allows light to pass through its gridded surface.

MIT
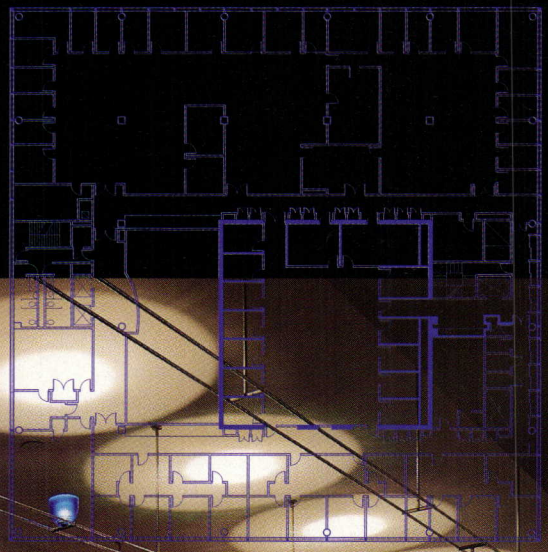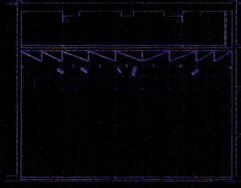
RICE

GARDINER SYMONDS TEACHING LABORATORY, RICE UNIVERSITY HOUSTON, TX

INTERLOOP ARCHITECTS

Efforts to integrate computer technology into the workplace and the classroom have persisted for more than three decades. One architect engaged in this design quest is Mark Wamble, an assistant professor at Rice University's architecture school and principal of Houston's Interloop Architects.

The first manifestation of Wamble's theories is Rice University's Gardiner Symonds Teaching Laboratory, which is located in the university's main library. Symonds abandons the typical computer laboratory setup in favor of a more collaborative, unstructured model that accommodates students from all disciplines and hosts classes ranging from chemistry to literature to architecture. "There is no one-to-one, computer-to-user ratio," Wamble insists. "Computers become one of many tools—including pencils, paper, books, and objects—in a cooperative learning situation."

The windowless multimedia classroom, which is sandwiched between library stacks, is orga-nized around two custom-designed, serpentine tables that encircle a central instructor's position (above). Each of 12 workstations accommodates two students. Wamble specified a monitor shelf that is recessed $3^1/2$ inches below the work surface (top). This subtle gesture makes a big difference: Pupils can see over the tops of their own and others' monitors to the instructor and one of two large-format projection screens—the lab's symbolic windows to the outside world.

A second large-format projection screen is located in an adjoin-ing teleconferencing room, which is separated from the classroom by retractable glass doors that roll along curved tracks in the floor and ceiling.

Accordingly, a pivoting conference table can be oriented toward the projection screen during closed teleconferencing, or it can be extended toward the classroom for joint sessions.

NYU

CENTER FOR ADVANCED DIGITAL APPLICATIONS NEW YORK UNIVERSITY SCHOOL OF CONTINUING EDUCATION NEW YORK, NY VOORSANGER & ASSOCIATES A surreal atmosphere created by hazy, colored lights confronts media lab students at the new Center for Advanced Digital Applications (CADA), which is part of New York University's School of Continuing Education. According to architect Bart Voorsanger, "I wanted to create an environment that is not connected to today's,

but to tomorrow's reality."

The otherworldly setting parallels the curriculum: CADA offers courses in cutting-edge computer modeling, animation, editing, and production management and serves as a de facto East Coast training facility for Silicon Graphics. The target audience is professional adults, and the schedule is rigorous. Classes typically consist of one to two weeks of intense, immersive study.

"People are here from 8 a.m. until 2 the next morning," observes Voorsanger, "so we cre-

ated a theatrical environment through lighting." All of the fixtures are gelled, so users can change the color spectrum of their environment, from yellows, to blues, to greens. The intention is to reduce eye strain, diminish reflections, and counter "the intensity of looking at a screen for 18 hours," notes the architect.

The new center features four digital classrooms, each with eight to 14 Silicon Graphics Indy and Indigo workstations that are clustered around the instructor to maximize sight lines (left). Monitors placed in the reception area display student work in real time. Fiber optics link the classrooms, labs, offices, and lounges to NYU's campuswide network.

So far, CADA is a success. Classes were filled to capacity for its inaugural semester last fall. Furthermore, demand remains high: Forty percent of American adults are currently engaged in continuing education, according to the U.S. Center for Education Statistics. CADA administrators are wagering that New York's thriving digital market will continue to funnel a share of this growing computer-user population into its classrooms.

By Reed Kroloff

Meyer Scherer & Rockcastle combines familiar barn and silo forms into headquarters for SEI, a financial services company. Multilight aluminum-frame windows and horizontal metal siding (facing page) reinforce SEI's rural image. Gable-end clerestory (above) lights office interior, revealing exposed interior trusses. Stone facing (below) is recycled from former fence on site.

Meyer Scherer & Rockcastle powers up a corporate headquarters for a financial services company.

bays. Each floor is filled with wheeled desks, pedestals and files, and chairs. Team members change offices simply by rolling furniture around and connecting to the nearest hanging coil. "Employee moves previously cost us about $1,500 each," claims SEI President Henry Greer. "Since our new facility opened in January, we haven't spent a dime." The new building may save us more than $12 million over the next 15 years.

The four-building complex, with its artful abstraction of rural and industrial building

SEI steps down site originally graded for a railroad, opening lake and forest views to each building. Driveway passes beneath bridge.
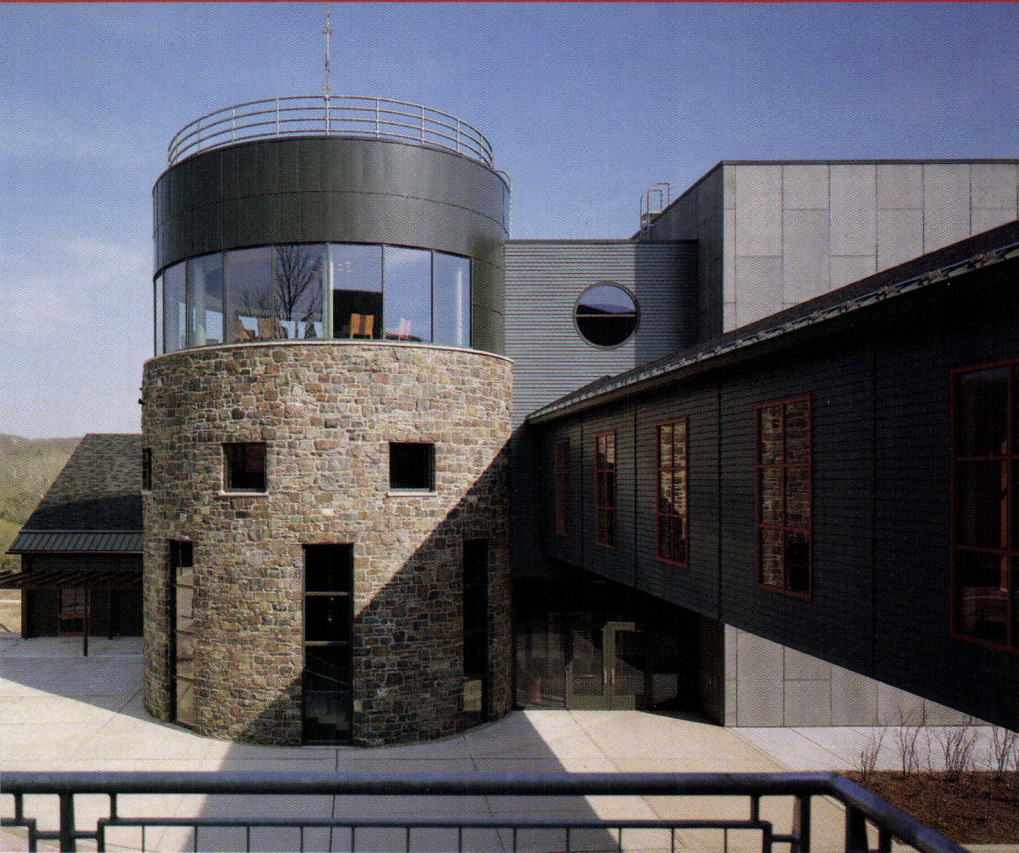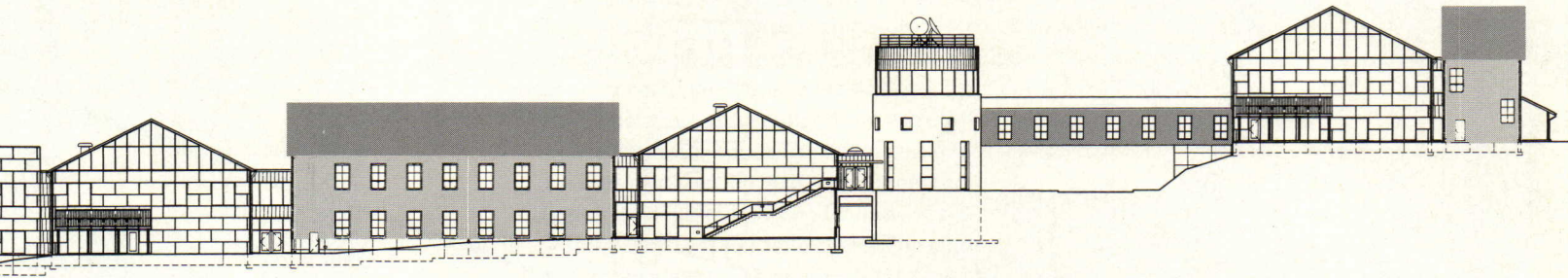
precedents, straddles a former railroad line—now a roadway—that runs along the top of the wooded 90-acre suburban site. It centers on a silo-shaped entry tower made of stone recovered from the property's former fences and overlooks a pond and a 1750s farmhouse that share the site. Scherer's thoughtful master plan preserves much of the property as wetlands, while allowing for future expansion and structured parking.

SEI neatly summarizes the challenge of creating meaningful architecture for the information age. MS&R's umbilical power cords forthrightly embrace—and signify—a technological revolution still in the making. But that embrace is countered with a comforting nostalgia of barns, sheds, and silos. The contradiction acknowledges our continued ambivalence toward technology: wrapping the future in the past eases our anxiety about the unknown. However, it is ultimately a device that leaves us in search of a new iconography for the information age.

Silo houses entrance and upper story conference room. Bridges connecting office blocks are intended to recall railroad catwalks.

Porches (facing page, top) lend familiarity and scale to gable-ended building mass. Glass connections between office blocks (facing page) articulate each building mass.
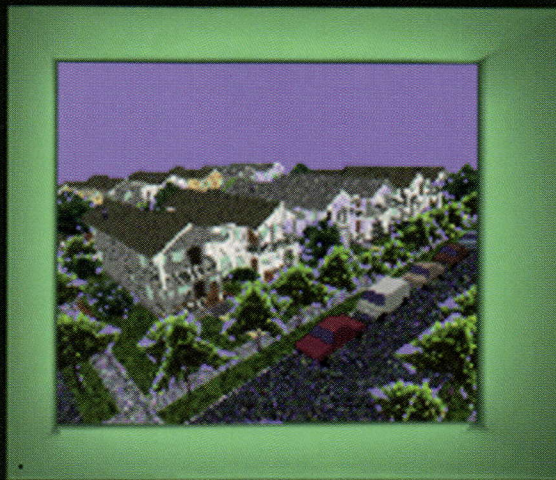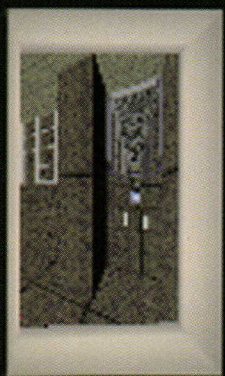
By Raul A. Barreneche

virtual spac

From stage sets to simulated disasters, architect-designed
digital environments harness the 3-D potential of cyberspace.

Virtual Gallery

HUMAN INTERFACE TECHNOLOGY LABORATORY
SEATTLE, WASHINGTON

The University of Washington's Human Interface Technology Laboratory (HIT Lab) has led research in virtual-reality technology since it opened in 1989. In 1994, the HIT Lab and the university's College of Architecture and Urban Planning launched the Community and Environmental Design and Simulation Laboratory (CEDeS Lab), to explore virtual-reality applications in architecture. The CEDeS Lab has created dozens of digital models of built and unbuilt projects that can be viewed as interactive virtual-reality environments.

Dace A. Campbell, a HIT Lab research consultant trained as an architect, created a "virtual gallery" for the CEDeS Lab with AutoCAD, 3D Studio, and Lightscape software. The gallery is an abstract computer model that organizes digital information in three-dimensional environments. Users access the site through the World Wide Web (*http://www.hitl. washington.edu/people/dace/portfoli/thesis*) and can experience the gallery either with a virtual-reality modeling language (VRML) browser, or with more cumbersome virtual-reality goggles and gloves. Both platforms allow users to navigate through the gallery in real time, although the virtual-reality goggles create a more convincing sensory experience.

Campbell's design is a colorful digital space organized along a circulation spine that links an entry vestibule, four color-coded galleries, and an archive. Inside the galleries, images of other digital building models are displayed like paintings on a wall. Viewers can click on the images to view the models—or, if equipped with virtual-reality goggles and gloves, reach out and touch them.

Navigating through the gallery is more complicated than simply double-clicking on two-dimensional screen images, since Campbell doesn't provide signage or clear wayfinding cues in the virtual space. Still, the gallery is a valuable experiment in how to organize and display digital information—an especially appropriate setting, given the gallery's digital content.

Fire Simulation
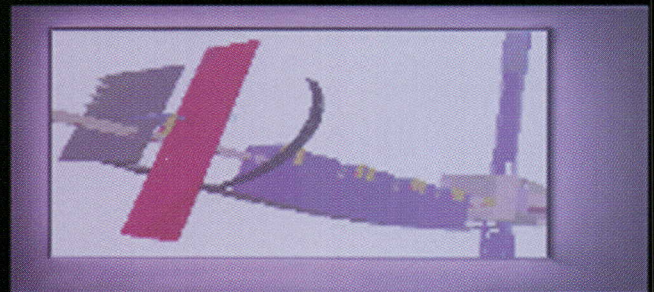
INTERFACE MULTIMEDIA, TAKOMA PARK, MD
Partners Mark Burlinson, Uwe Drost, and Jeff Pulford of Interface Multimedia in suburban Washington, D.C., developed an architectural setting for a computer game that doubles as a training program for firefighters across the United States and Canada. This group of architects-turned-multimedia-wizards was hired by Bellingham, Washington-based software developer Pacific Interactive to model a suburban strip mall for a game called Incident Command: Strip Mall Scenarios.

Interface Multimedia specializes in computer-modeling architect's designs for presentations; designing the buildings for Incident Command was the group's first foray into computer games. Pacific Interactive hired the firm for its architectural skills: The buildings on-screen form the basis of the game, and thus had to approximate real structures to offer valuable training. "They not only had to look realistic, but also follow real codes," explains Pulford.

Pulford and his colleagues modeled the game's fictional strip mall and fire station in form•Z, later rendering the final scheme in a combination of both Macintosh- and PC-based software that included 3D Studio Max by Kinetix and Electric Image Animation System by Pasadena-based Electric Image. Pacific Interactive provided the data required for modeling fire conditions, based on its experience in developing training programs for firefighters and handlers of hazardous materials.

Incident Command creates accurately modeled fires that the game's users must extinguish. The program rates the player's performance and recommends how he or she could have better doused the flames. Its graphics are not the most sophisticated, but they provide an accurate urban environment for fire simulation. Interface hopes to work with Pacific Interactive on versions of the game that simulate fires in apartment buildings and houses.

Digital Stage Sets

EMRGNT, NEW YORK, NY

Some cyberarchitects import architectural environments into the digital realm, but New York City architect Peter Erni constructs animated computer images and literally projects them into the real world. Erni's digital media consulting group, emrgnt, recently designed stage sets for a production of Jean Genet's *The Maids*, staged at New York City's Ohio Theater in March. Interactive sets replace traditional painted backdrops with animated digital tableaux that combine period interiors with complex video sequences. These filmed sequences were created by Zzyzx Studio, the local theater group that produced the play.

Erni's interiors for Genet's play—18th-century French drawing rooms filled with 1950s furniture—are rendered in AutoCAD and 3D Studio Max, an animation software manufactured by San Francisco-based Kinetix. Erni then digitized accompanying video segments and added them to the animated sequence. He later transferred the composite animation to video, which was projected onto a white screen during the performance. The filmed sets change from scene to scene.

Erni's first attempt at set design provides a lively, visually dense alternative to static stage sets. "We created an environment that acts like another character in the play," he maintains.

The architect admits that animated backdrops are only feasible for large productions. "This kind of environment is more difficult to create, and costs a lot more than traditional stage sets," he explains. For those who missed the play this spring, the production is slated to return to the Ohio Theater in September.

Cybercafés are the silicon
generation's latest escape, turning up on downtown
street corners and college campuses and in suburban malls. Besides
coffee, muffins, and the occasional guitarist, these on-line cafés offer
fast Internet access, hot CD-ROM games, and cool virtual-reality
environments. Many cafés offer up to 50 computer terminals to give
cybersippers access to the Internet, where they can browse Web sites
while ordering double espressos.

WIRED

ON JAVA

By Ann C. Sullivan

Cybercafés dot the globe from Honolulu, Hawaii, to Portland, Maine, to Reykjavík, Iceland, to Kuala Lumpur, Malaysia. By the end of the year, 1,500 of them will be up and running, offering coffee and computer access.

Today's coffee lovers are crossing paths with the blossoming Internet audience—the crusaders as well as the merely curious. They meet in cybercafés, on-line bistros that deliver fully loaded PCs, high-bandwidth Internet access, and hot-ticket software and games. Newcomers are drawn to these cafés to try out new products with a cup of coffee, and without pressure to buy from overbearing salespeople.

For architects, cybercafés combine the technical hardware of today's wired offices with the programmatic demands of food service and retail. And they have to be wrapped up in a package that balances comfort, familiarity, and techno-appeal.

"Our goal is to ease access to new technologies that are rather complicated and intricate," says Jed Smith, vice president and cofounder of the self-proclaimed industry leader in cybercafés, Cybersmith of Cambridge, Massachusetts. "We've tried to take the edge off and build a denlike, welcoming atmosphere." Cybersmith is the brainchild of Smith and his entrepreneur father Marshall Smith, founder of a trio of successful East Coast retail chains, Paperback Booksmith (1961), Videosmith (1981), and Learningsmith (1991). With four locations and a bicoastal presence, the Cybersmith chain is ahead of its competition, which consists largely of one-of-a-kind cafés with varied digital resources.

The reputed original cybercafé, Cyberia, opened in London in October 1994. Today, its progeny dot the globe, from Portland, Maine, to Reykjavík, Iceland, to Moscow, where the city's first Internet café, Virtual World, opened this spring. The International Association of Cybercafes, an on-line forum for café owners to hash out management issues, estimates 1,500 cybercafés will be up and running by the end of this year.

For big and small players alike, technical investment is no small sum. Many coffee houses install a few 486s and a 14.4 dial-up connection and call themselves an Internet café. For the Internet-adept, this minimal technology is like navigating the Autobahn in a four-cylinder sedan—slow and easily overtaxed. A Ferrari experience requires

1997 FITCH INCORPORATED

JAVANET (previous pages)
NORTHAMPTON, MA
JAVANET INCORPORATED
The domestic atmosphere of JavaNet's Northampton café caters to students and faculty at neighboring Smith, Amherst, and Williams colleges. Its second café, located in Portland, Maine, opened in February. JavaNet has laid the groundwork for a third site in Boston, where it operates as an Internet service provider.

CYBERSMITH
WHITE PLAINS, NY
SCHWARTZ/SILVER ARCHITECTS
The first Cybersmith was conceived by the father-and-son team Marshall and Jed Smith with Boston-based Seitz Architects. It opened in 1995 in Harvard Square. Schwartz/Silver Architects then redesigned the Cybersmith prototype for the company's next three sites: a high-traffic, high-tourist slip in Boston's

Faneuil Hall Marketplace; The Westchester shopping mall in White Plains, New York; and a sidewalk café on chic University Avenue in Palo Alto, California. At White Plains (above), the company's signature C-shaped booths are accompanied by modular maple hoods for computer monitors and faceted merchandise towers. The cybercafé's presence in the mall is announced by digital displays and a glass wall.
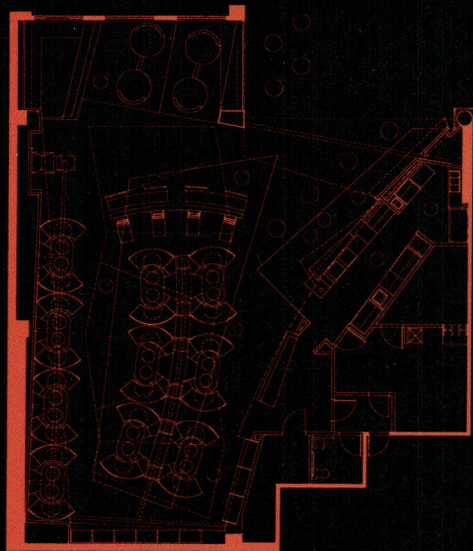
Plan of White Plains Cybersmith

CYBERSMITH
PALO ALTO, CA
SCHWARTZ/SILVER ARCHITECTS
Although the nature of a retail chain suggests formulaic architecture, Schwartz/Silver tries to work new elements into each Cybersmith. For example, the architect shrouded the Palo Alto café bar in perforated aluminum (below), despite the Smiths' predilection toward wood. "We're not interested in producing cookie-cut Cybersmiths," asserts Partner Warren Schwartz. "I wouldn't mind doing 27 more if we can continue to reinterpret the architecture as the technology develops."

The Palo Alto café has a license to sell beer and wine, a first for Cybersmith, but a must to compete on University Avenue, notes Cybersmith Vice President Jay Shapiro.

The Cambridge-based company is still deciding on an architect for its next three full-scale sites and seven store-within-a-store venues.
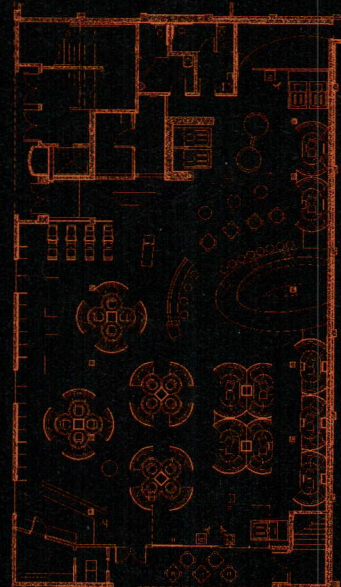
Plan of Palo Alto Cybersmith

JAMES COOK PHOTOS

THRESHOLD
TORONTO, ONTARIO
THIRD UNCLE DESIGN AND
PAUL SYME, ARCHITECT
The idea of a café conjures up images
of relaxed patrons lingering over coffee,
while computers, on the other hand,
bring to mind overworked, bleary-eyed
professionals. The cybercafé atmosphere
must put a positive spin on the computer
as a portal to new experiences.

At Toronto's Threshold cybercafé,
Third Uncle furnished the space to
encourage human interaction. Mobile
workstations and an Internet bar (above)
"support what we see as the social aspect
of the computer," explains architect Paul
Syme. Located on the ground floor of a
renovated three-story commercial build-
ing, the 2,000-square-foot linear café
includes an outdoor patio, lounge, and
basement space for gaming attractions.
The architect designed teleconferencing
facilities for the mobile office crowd on
the second floor, and corporate offices for
an investment firm on the third floor.

Plan of Threshold

a 200-megahertz Pentium PC with a T1
Internet connection.

The trick for architects designing these
digital salons is to stay flexible and try
to anticipate future technology upgrades,
since today's state-of-the-art is tomorrow's
old shoe. "The concept behind wiring
Cybersmith was to cable every station for
every possible application," recalls
Principal Patricia Seitz of Seitz Architects,
designer of the first Cybersmith. "In the
end, it was no more complicated than
putting a plug in a wall. But you have to
be able to plug in anything you want."

Third Uncle Design and Paul Syme,
Architect, a Toronto-based partnership
of architects and industrial designers,
also downplays the technical demands
of designing Internet cafés. In terms of
telecommunications requirements, "I don't
think cybercafés are dissimilar to any other
project in the 1990s," asserts Principal
Paul Syme, who worked on two Toronto
iterations, the DotCom Cafe, which opened
in 1996, and Threshold, which opened
in March. The real challenge is designing
a successful café where nearly every table
is topped by a computer.

At JavaNet cafés in Northampton, Mass-
achusetts, and Portland, Maine, the propri-
etors wanted a shop that would appeal to
both computer-savvy and computer-leery
professionals. "We wanted an atmosphere
that wasn't going to intimidate people,"
explains Stephen Found, JavaNet's
in-house designer. Found succeeded in
some respects: His homestyle cafés look
like living rooms, with hardwood floors,
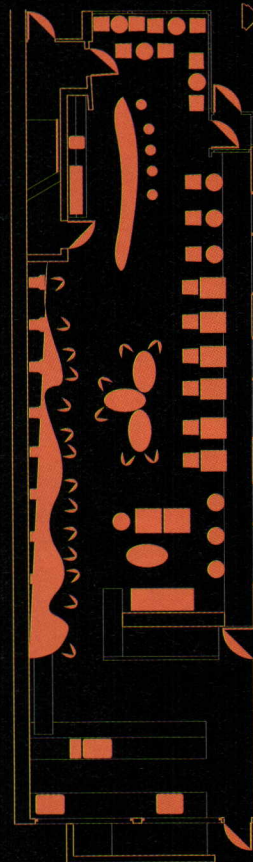
BEAN COUNTING

Oriental-style rugs, and overstuffed chairs. Such mainstream conventions neatly mask all evidence of the high-tech company behind the stores: JavaNet's primary business is subscription-based technology services. A $2 cup of coffee may bring patrons in the door, but JavaNet is really interested in selling Internet access and e-mail-with-pager accounts. "The Internet cafés are essentially showrooms for these services," explains Hunt Stehli, JavaNet's vice president of marketing.

With a corporate presence comes leverage to negotiate services and equipment from big-name vendors. "Software and hardware developers use Cybersmith locations as base sites for new products before they hit the stores," explains Jay Shapiro, vice president of real estate development. This showcasing translates into free stuff for Cybersmith. For example, Compaq loans its newest Presario personal computers in exchange for prominent exposure to patrons. To software and hardware companies like Compaq, cybercafés are magnets for the computer-buying public.

The attention has caught the eyes of some computer heavyweights, including Apple Computer. Last November, the Cupertino, California-based company announced plans to open a chain of cybercafés around the world, starting in Los Angeles by the end of 1997.

Amidst such competition, the financial burden of delivering the latest technology weighs heavily on sole proprietors, for many of whom the cybercafé is more a labor of love than a profit machine. Toronto's DotCom, designed by Third Uncle, was open less than two years before closing in April. In such a volatile field, Cyberworld in San Francisco didn't waste any time: FACE Architecture was pushed to the limit on a fast-track schedule to get a new 3,500-square-foot café up and running by March. "We designed it and did the drawings in a month, and it was built six weeks later," recalls FACE Principal Katherine Lambert. "It's the fastest job we've ever done."

The message for Apple? Hurry up. The bandwagon is getting crowded.
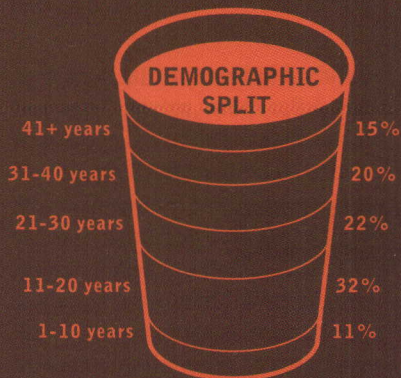
Cybercafé patrons range from elementary school kids to senior citizens, depending on the attractions offered. "Like the movies, it's an everyman activity," insists Cybersmith's Jay Shapiro, vice president of real estate development. Cybersmith has its sights set on three target audiences—young adults, parents and kids, and large parties—whereas JavaNet's sedate atmosphere is meant to attract adults, who are most likely to take advantage of JavaNet as an Internet service provider.

From JavaNet's standpoint, Cybersmith's strong emphasis on games and virtual reality, which distinguishes it from most Internet-focused cybercafés, is slanted toward too young a crowd. "Our entire business premise is really quite different from a Cybersmith," insists Hunt Stehli, JavaNet's vice president of marketing. "We are not a gaming space. We're much more sophisticated, which very clearly attracts adults."
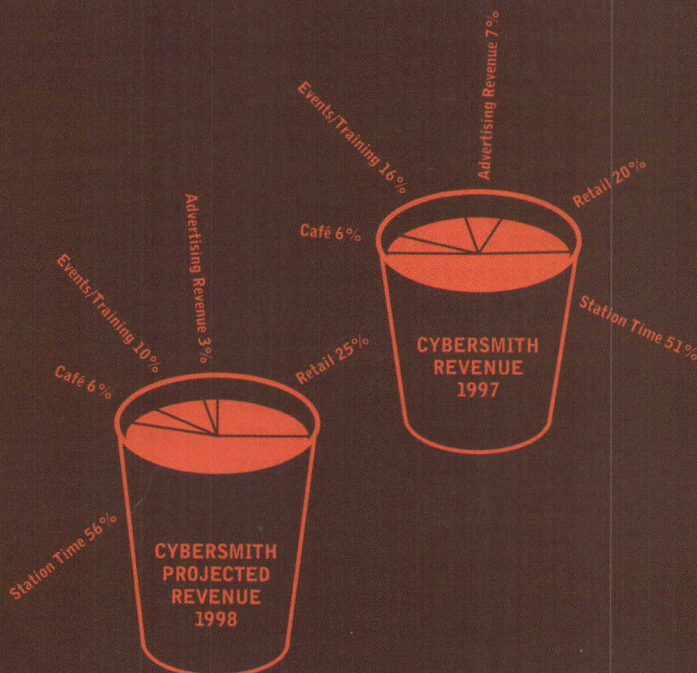
San Francisco's Cyberworld, too, is marketed for adults. "It's intended as an alternative to the night-club scene and a glorified Kinko's with business, technology, and Internet resources," observes FACE Principal Katherine Lambert, designer of the new cybercafé, which plans to serve liquor.

Cybersmith keeps track of its patrons by collecting registration information when visitors purchase computer time, which ranges from one to 50 hours and is spent with a debit card that activates the machines. In fact, 11- to 20-year-olds account for 32 percent of Cybersmith's population (above). Another 22 percent of Cybersmith's audience is 21- to 30-year-olds—a group strong enough to have earned Cybersmith the title of "Best First Date" location from *The Improper Bostonian*, a biweekly arts and entertainment guide to Beantown.

Half of Cybersmith's revenue (below) comes from station rentals, which average $6 to $10 per hour, depending on how much time is purchased. Food and beverage sales, on the other hand, account for only 6 percent of monies earned. Surprisingly lucrative is corporate event planning: Renting out its cybercafés for retreats, parties, and training seminars accounts for 16 percent of Cybersmith's revenue, up from 10 percent last year.

As expansion continues, Cybersmith's café component will likely grow even smaller. To facilitate a rapid roll-out of new locations, the company is developing plans to build "store-within-a-store" venues, which involve scaled-down versions of a Cybersmith—minus the café, retail sales, and virtual reality—inserted in an existing retail shop, such as a book or music store. Cybersmith plans to open three freestanding stores and seven store-within-a-store venues in the next 12 months. New York, Washington, D.C., and Chicago are candidates for both types of Cybersmiths.

DEMOGRAPHIC SPLIT

Age	%
41+ years	15%
31-40 years	20%
21-30 years	22%
11-20 years	32%
1-10 years	11%

CYBERSMITH REVENUE 1997

- Station Time 51%
- Retail 20%
- Advertising Revenue 7%
- Events/Training 16%
- Café 6%

CYBERSMITH PROJECTED REVENUE 1998

- Station Time 56%
- Retail 25%
- Advertising Revenue 3%
- Events/Training 10%
- Café 6%

Mansour Maboudian

GREENWELL GOETZ ARCHITECTS
WASHINGTON, D.C.

For Lucent Technologies, Greenwell Goetz Architects designed their own toys: three computer kiosks to promote the company's telecommunications networks, hardware and software for telephone systems, and microelectronic components. These high-tech display units are loaded with a touch-screen multimedia presentation that explains Lucent's product line and research activities around the globe.

A new wired showroom in Washington, D.C., is home base to the three kiosks. The 500-square-foot Innovations Center, designed by Greenwell Goetz, informs customers and federal regulators of Lucent's worldwide activities through the interactive kiosks and a 3-D video presentation.

Headquartered in Murray Hill, New Jersey, Lucent Technologies was formed last year when AT&T split into three companies. The Lucent spin-off combines AT&T's systems and technology units with Bell Labs' research division. "It's a new company and an old company. It's had a mixed start in terms of imagery," explains Principal Lewis Goetz. "The Innovations Center is intended to capture people's imagination about what Lucent ought to be."

Architect and client agreed that the kiosks should express the inventive side of Lucent and be flexible enough to accommodate inevitable hardware upgrades. Sleek metal housing replaces the laminated black box typical of trade-show kiosks. Access panels open to reveal the hardware and audio components. "We weren't interested in hiding the technology, but in showcasing it in a way that people could enjoy," asserts Timothy Bromiley, project architect.

The architect combined customized and stock parts to create the units. "We didn't want to go to the extreme of customizing every piece," explains Mansour Maboudian, senior project architect. "The fun part was finding off-the-shelf components and reengineering them."

The kiosks, fabricated by Enterprise Woodcraft & Design of Silver Spring, Maryland, measure 30 inches wide and 78 inches tall. A curved face plate of anodized aluminum conceals a monitor, CPU, and speaker components. One kiosk is portable, allowing Lucent employees to conduct off-site presentations. Its 3/16-inch aluminum face is half the thickness of the two stationary kiosks' and folds in half for easy transport. "It was critical that one person be able to erect the kiosk," explains Goetz. "Weight was an important factor."

The mobile kiosk breaks down into two main parts: the 70-pound aluminum face and a 50-pound aluminum skeleton to which the monitor, CPU, and speaker components are attached. The skeleton is built from a standard aluminum table the architect found in an industrial catalog and includes off-the-shelf casters and brakes. Makeshift shock absorbers fashioned from simple springs are among Greenwell Goetz's customizations.

The team designed and developed the kiosks in AutoCAD and form•Z. Notes Maboudian, "We designed a shelter for a computer—and we actually designed it on the computer."

CUSTOMIZED KIOSK
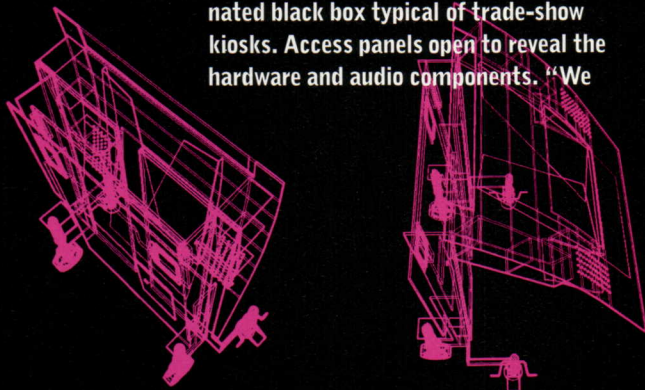
ecture
Technology & Practice

In architectural offices, the computer revolution is well under way. Now architects are refining how they employ CAD, the Internet, and other technologies. Harnessing these media artfully means knowing the difference between data and design.

TECHNOLOGY | COMPUTERS | PRESERVATION TECHNOLOGY | PRACTICE

Resurrecting Dresden Cathedral
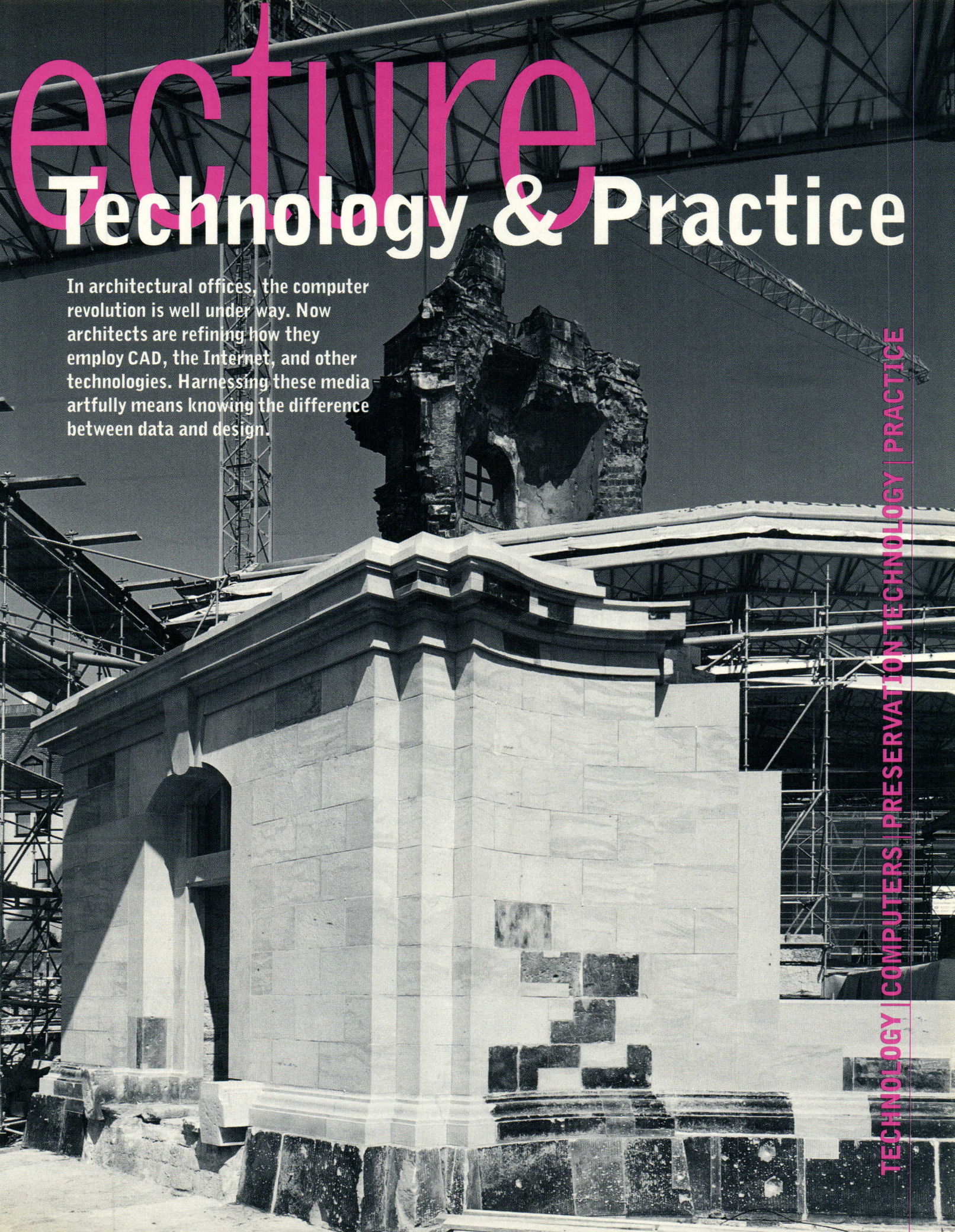
Sophisticated software helps rebuild a German landmark destroyed during World War II.

By Sarah Amelar

The 254-year-old Dresden Frauenkirche, or Church of Our Lady, is experiencing rebirth. For five decades, this legendary German Baroque cathedral lay as a pile of rubble at Dresden's center: a casualty of World War II fire bombings and a perpetual reminder of the war's darkest days. As this East German city weathered impoverished postwar years under a Communist regime, the possibility of re-erecting the cathedral remained remote. But the fall of the Berlin Wall in 1989 set off impassioned debates over the church's future. Finally, after an extraordinary international fund-raising effort and a unique pairing of preservation with computer technology developed for aircraft design, this landmark is rising from the ashes.

Cathedral's collapse

Before the devastating Allied bombing of 1945, picturesque Dresden, with its panorama of Saxon Baroque architecture, was known as "Florence on the Elbe." The 90-meter-high central-plan cathedral was designed by local master carpenter George Bahr and built between 1726 and 1743. Constructed of load-bearing sandstone, the building combined a monumental, bell-like dome with the visual lightness of four pinnacled corner towers. Eight colossal piers supported the dome and framed three balcony levels. The interior was renowned for excellent acoustics: Johann Sebastian Bach performed on its Silbermann organ, and Richard Wagner composed music honoring the cathedral.

But on February 13 and 14, 1945, Allied bombers conducted one of the most brutal air raids of the European war, hailing on Dresden thousands of tons of incendiaries and high-explosive bombs. Though the cathedral was not directly hit, fire weakened its sandstone piers, and the building soon collapsed, leaving only portions of the chancel and a corner tower intact. Soviet troops captured Dresden on May 8, 1945. Sited near the Czech and Polish borders, the city was claimed for East Germany. Over the next four decades, in the bleak landscape of Communism, public funds scarcely covered basic needs—much less church reconstruction. Nonetheless, preservationists blocked several state attempts to clear away the ruin.

Following German Reunification in 1989, a movement to re-erect the cathedral gained momentum. In 1990, a group of Dresden citizens publicly

appealed for "a worldwide campaign to rebuild the Church of Our Lady as a symbol of peace in the new Europe." Opposing voices, however, questioned the historical honesty of reconstructing a ruin. Some argued for preserving the rubble as an "open wound," as a reminder of a horrifying chapter in German history; others questioned the cultural, economic, and social justification for restoring historic buildings before meeting desperate housing shortages. Some pragmatists doubted the feasibility of raising the necessary DM 250 million (approximately US $150 million) largely from private sources.

The issues were publicly debated in the newspapers and in the Dresden Parliament. Approval ultimately outweighed resistance, and in early 1993, under the auspices of the Frauenkirche Foundation, the construction site was officially opened, and the archeological salvage began.

Documenting the rubble

The foundation decided to reuse the standing ruins and as many surviving stones as possible. The goal became not only to restore the cathedral's authentic form, but to apply the original principles of construction. For example, load-bearing masonry walls will incorporate no steel reinforcement, and reconstruction of the entirely sandstone dome will follow the ancient laws of pyramidal distribution of static loads.

For more than a year, the joint teams of Special Building and Reconstruction (SPESA), Dresden Survey Engineering (IVD), the State Office of Historic Monuments, and Saxonian Sandstone Works of Pirna oversaw the measuring, documenting, cataloging, and warehousing of 7,660 stones. The stones were photographed in situ and tested electronically for structural integrity.

Dresden's Saxon Baroque cathedral (top) terminated Neumarkt Square. Following 1945 Allied air raids, it lay as a pile of rubble (above).
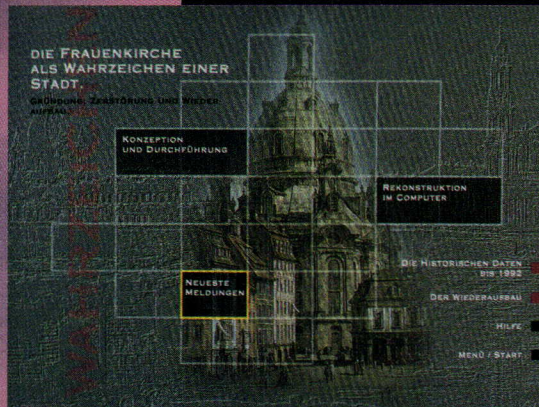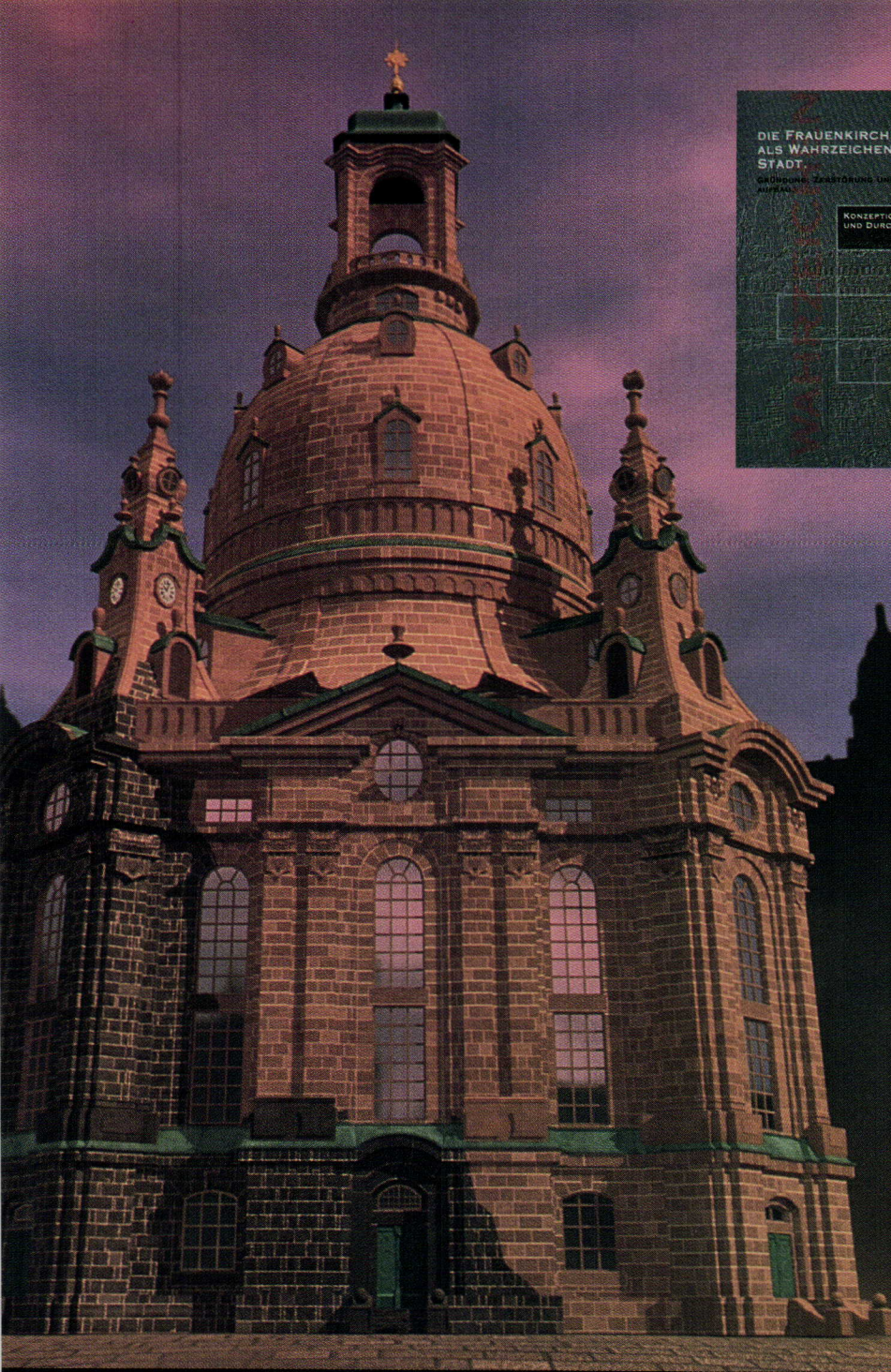
Interactive video presentation is available to visitors at construction site.

Three-dimensional computer model of church (above) distinguishes surviving masonry (lower left) from newly quarried stone. CATIA software facilitated stone-by-stone configuration of sandstone dome.
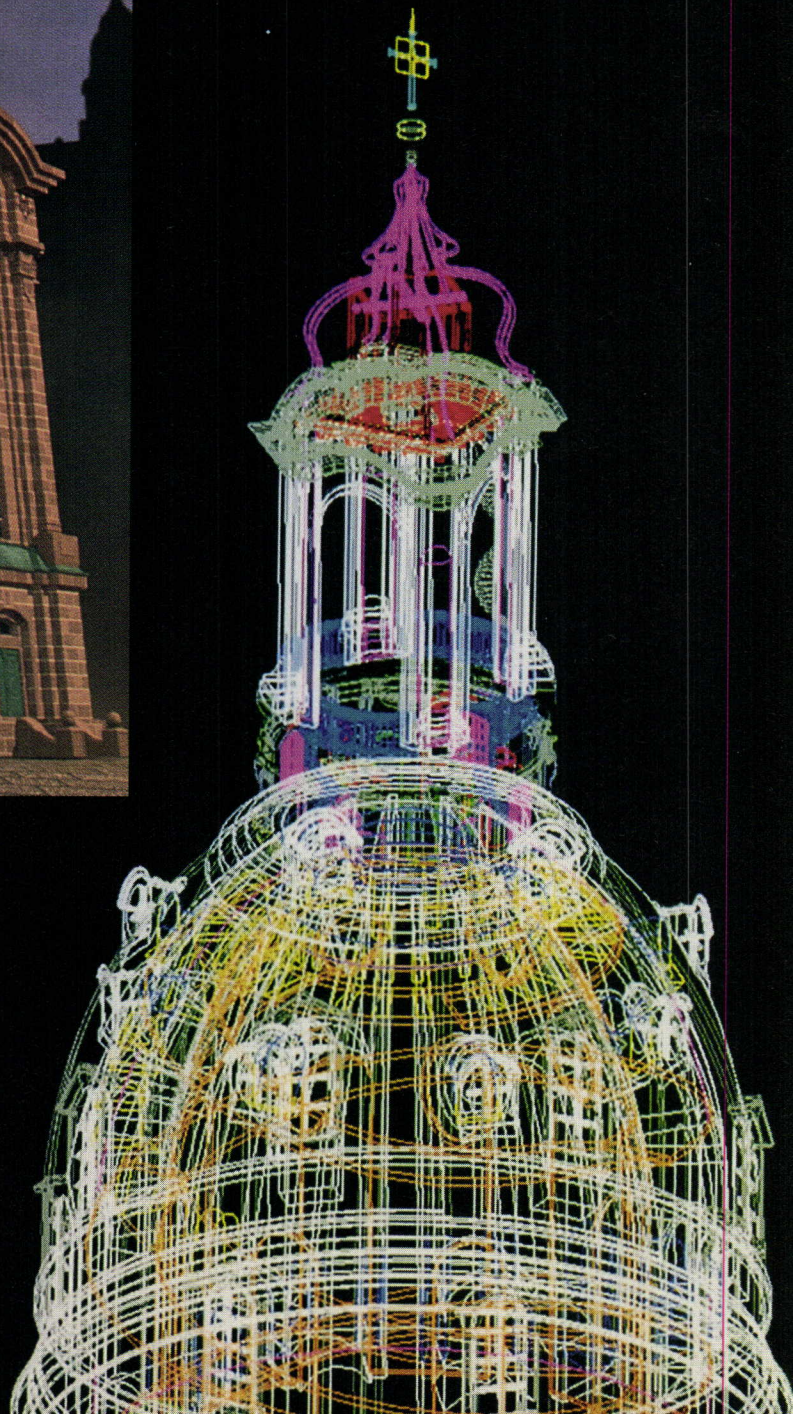
The salvaged stones were numbered and divided into three groups: uniquely shaped specimens with known locations; identifiable pieces that fit several locations, given symmetries in the design; and stones with no specific, identifiable location. About a third of the original material survived, 70 percent of which is reusable. All new sandstone will come from the original local quarry in Pirna, about 15 miles southeast of Dresden. Advanced digital cameras enabled an 11-person team to measure the stones precisely within a year and generate an extensive database of images.

Computerizing the restoration
Though the old cathedral was built by hand with few drawings, its ambitious reconstruction relies heavily on state-of-the-art technologies. CATIA, the IBM-marketed CAD software that Dassault Systems first devised for aircraft design, joined the Dresden project at an early stage. In 1990, Herbert Herz, manager of corporate responsibility programs for IBM Germany, was approached by an IBM customer with a passion for old church restorations who suggested applying CATIA to the cathedral's reconstruction. IBM ultimately responded by donating CATIA software and three IBM RS/6000 workstations and sending an IBM project manager to oversee CATIA operations at IPRO Dresden, the A/E firm in charge of the project.

Although this three-dimensional software has been instrumental in aerospace, automotive, high-speed train, and even industrial plant designs, CATIA's architectural applications have been limited. Its costs, capabilities, and jet-engine precision often exceed typical architectural needs. In CATIA, each 3-D component (for example, a single airplane wing) represents a unified database that can analyze fabrication, aerodynamics, surface stresses, hydraulics, electronics, temperature gradients, geometries of compound curves, and potential interferences between cross-connections. Frank Gehry, who designs complex and idiosyncratic geometries, is one of the few architects who uses CATIA extensively. "But for many ordinary architectural projects," observes Steven DeSimone of DeSimone Chaplin & Dobryn, an engineering firm, "using CATIA would be like hunting pheasant with an elephant gun."

For the Dresden cathedral, CATIA is no elephant gun—it's a high-tech tool that makes this restoration feasible. "This is unlike any 'normal' architectural project," asserts architect Martin Trux, a consultant to IPRO, "and the Frauenkirche is unlike any 'normal' building." As Trux explains, the cathedral's geometries change so often it might take 50 plans and 30 sections to describe the building.

CATIA creates a single 3-D model from which plans and sections can be cut anywhere. This approach differs from traditional MicroStation and Autodesk packages, which generate isolated drawings linked by file references. (Since the outset of the Frauenkirche project, however, MicroStation has introduced TriForma and Autodesk has developed Mechanical Desktop software, which, like CATIA, begin with a 3-D model, rather than two-dimensional drawings). For glitches at the site (an inevitable scenario, given the unpredictable aspects of building onto a ruin), the architectural team can generate seven or eight fully coordinated drawings in a few hours.

Managing construction
CATIA further increases cost-efficiency by allowing a small architectural team of 12 people to handle this massive project. The team includes five to six people at CATIA stations to add refinements and new information to the 3-D model continually. IPRO must integrate a constant flow of evolving data on engineering issues, stone modifications, etc. Additionally, two architects devote their attention to site supervision; another focuses on detailing; two specialists deal with specs and cost analysis; and one studies the allocation and configurations of stone.

The CATIA software, as Trux explains, effectively manages and integrates the project's "huge database, with hundreds of complicated parts." Besides archeological documentation, the data sources include pre-1945 photographs and drawings executed in the 1920s and 1930s for earlier cathedral renovations.

Rotating the highly detailed virtual cathedral and providing tours of its interior and exterior, CATIA (with 4-D Navigator software) enables the architects to fit existing stones into this complex, three-dimensional jigsaw puzzle. To entice the public and encourage donations, the virtual journey is also available at interactive multimedia kiosks on the construction site, or at IBM's web site: *http://www.ibm.com/sfasp/mason.htm*.
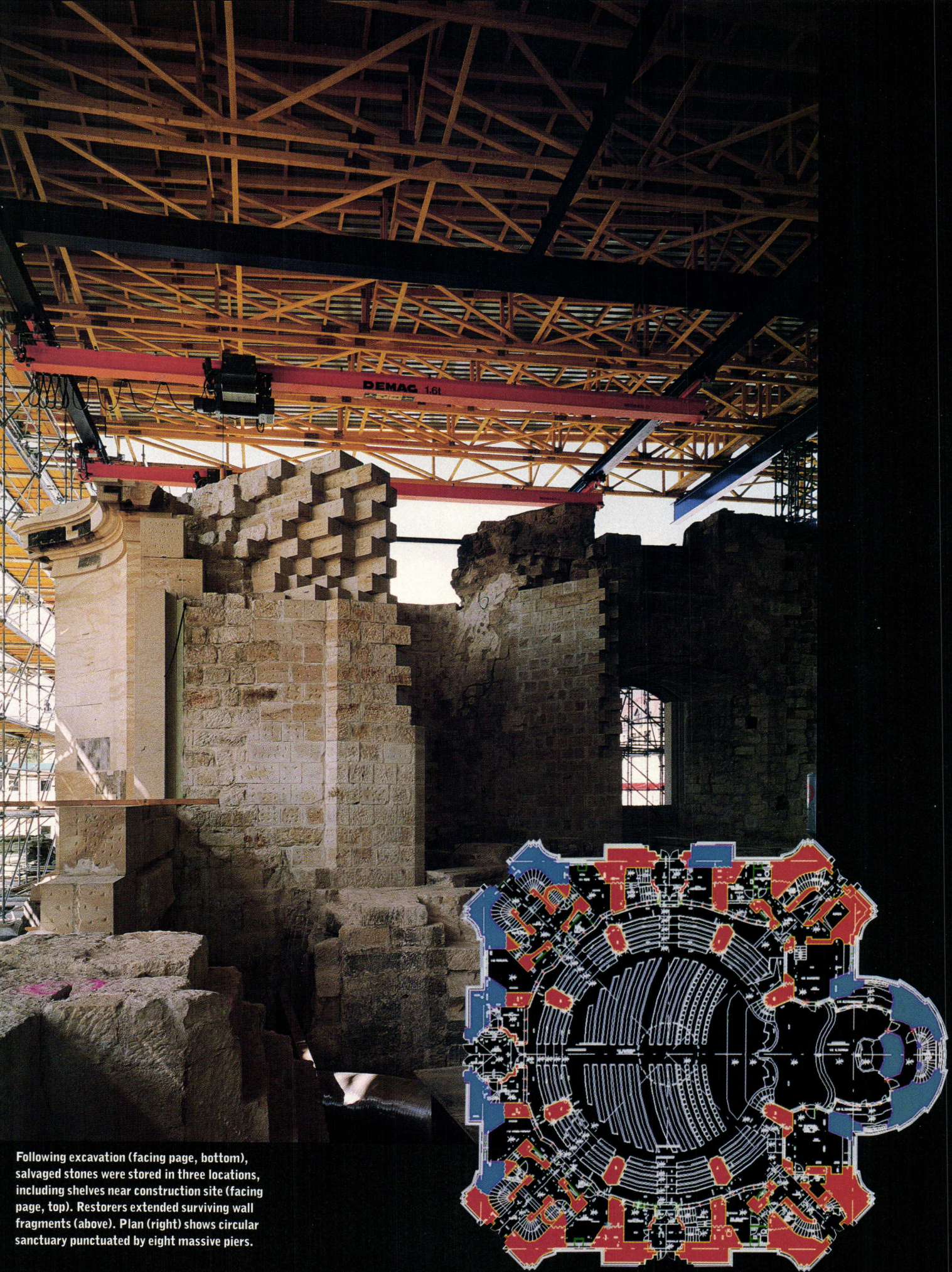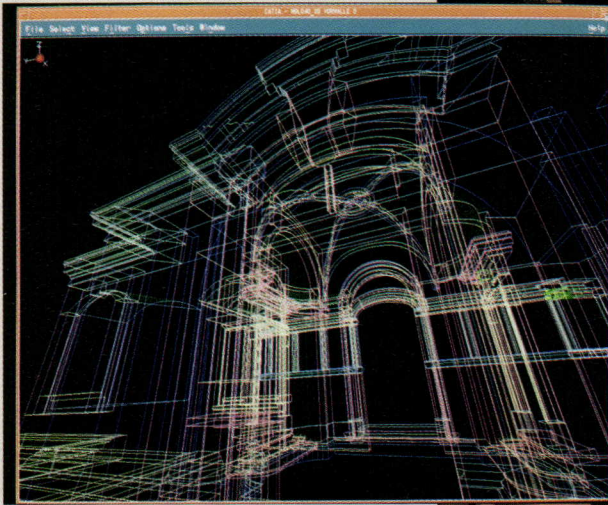
Following excavation (facing page, bottom), salvaged stones were stored in three locations, including shelves near construction site (facing page, top). Restorers extended surviving wall fragments (above). Plan (right) shows circular sanctuary punctuated by eight massive piers.

During construction, CATIA's geometric data (exported via DXS files into the CAD program Spirit) will guide computer-numerically-controlled (CNC) cutting of new sandstone blocks. According to Trux, "architects often work in tolerance of centimeters, but with [load-bearing] sandstone, it's millimeters—you have to be really exact because the material shows even the smallest mistakes." The stones will be finished by hand. In color, the newly quarried yellowish-gray Pirna stone will contrast with the dark patina of the original, replaced stones. A reminder of the cathedral's fragmented history, this juxtaposition will remain visible for decades.

Funding the resurrection

The cathedral should be completed by 2006, depending on the flow of donations. The Society to Promote the Re-Erection of the Frauenkirche has received funding from individuals and corporations in Germany and abroad, especially in the United States and England. Benefit concerts have also been staged.

The catacombs and foundation walls were finished last August, with the basement area extended to allow for the challenging task of integrating HVAC and electrical systems into the old church. The first floor was completed in April. "Last summer," reports IBM's Herbert Herz, "the catacombs were consecrated by the archbishop of Dresden. And we've started a series of concerts there to raise more funds."

CHURCH OF OUR LADY, DRESDEN, GERMANY CLIENTS: Frauenkirche Foundation, Society to Promote the Re-Erection of the Frauenkirche Dresden **ARCHITECTS:** IPRO Dresden—Bernd Kluge (project leader), Christoph Frenzel, Uwe Kind (chief architects) **ENGINEERS:** Frauenkirche Engineering (structural); IPRO Dresden (mechanical, electrical); Schmidt & Partner (mechanical); ABB Niederlassung Dresden, Fa. Strasser (electrical) **CONSULTANTS:** Special Building and Reconstruction (SPESA); State Office of Historic Monuments, State Conservator (conservation); IVD-Dresden Survey Engineering (surveying); Saxonian Sandstone Works of Pirna, Fuchs & Gierke (masonry, stonework) **GENERAL CONTRACTORS:** ARGE: Philip Holzmann, Heitit + Woerner, Saxonian Sandstone Works **COST:** $150 million **PHOTOGRAPHER:** Bildarchiv Weideraufban Frauenkirche

Wire-frame CATIA model (above left) and rendered 3-D virtual-reality model (above) document pendentives around dome.

Frauenkirche Foundation stages benefit concerts in restored catacombs to raise funds for reconstruction (below left).

to productivity has been a lingering resistance to CAD. The firm, with about 35 architects on staff, still has drafting tables for every architect and nine shared CAD workstations, says Project Manager Steve Dangermond. "Having a lot of staff from the pre-CAD era contributed to that resistance," he says. "But now it is starting to take off. And all of our new hires know CAD."

Training is key
Training is the toughest challenge. Although recent college graduates pick up CAD quickly, the basic level of computer literacy typically stops with floor plan layouts and wall sections. Veale proposes a second tier of training to expose everyone to "how to think like our best people think, to make shortcuts, and get the most out of the system. Our best guys use 3-D right through the beginning of construction documents."

And it takes discipline to be productive. "In the old days, the pencil limited how much detail you could draw," claims Sargent. "Now printers all produce 600 dots per inch. If you draw a 3/4-inch detail, you have to fight with your mind to abstract it, because you can draw something down to the thickness of sheet metal. To be productive, architects have to edit what they generate."
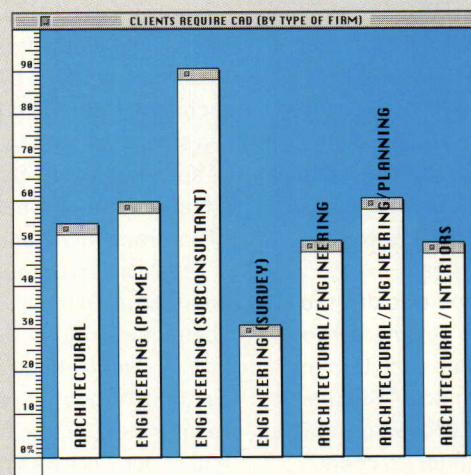
In analyzing its productivity survey results, PSMJ isolated the firms reporting highest productivity gains and looked for common characteristics among them (see sidebar, left). Among the similarities: high-productivity firms tended to have more CAD experience, more computers, and more professional staff trained to use them.

Overall, 91 percent of the firms responding to the PSMJ survey said they believe their investment in CAD has been profitable. Architectural firms showed less confidence than engineers, but only by a small margin, with 85 percent reporting that CAD was a profitable investment.

"Upper management is completely sold on it," says HDR's Souied. "There is an information technology group that serves the company nationwide, and we are on the leading edge of technology." He says one of their great advantages is the firm's wide-area network, tying together 42 offices. If Souied is working on a project in Virginia with engineers in Denver and Omaha, technology simplifies the communication. With the push of a button, he can print his drawings on a plotter half a continent away.

Some firms have yet to be convinced that the benefits of CAD outweigh the costs. "There are definitely productivity increases," says Fentress Bradburn's Rothman. "But it has taken a decade for us to use CAD as a fully integrated design tool. And I don't know that anybody has offset their initial investment with increased productivity."

Others simply acknowledge that for all of its potential complications, CAD is the best available method of doing business in construction. "In terms of pure economic productivity—forget it," says McLaughlin, who notes that some large firms are turning to foreign labor to reduce the cost of CDs. "From my perspective, if I want real productivity per person, I have the drawings done in Mexico City, where the personnel costs are one-third what they are here."

CLIENTS REQUIRE CAD (BY TYPE OF FIRM)

ARCHITECTURAL · ENGINEERING (PRIME) · ENGINEERING (SUBCONSULTANT) · ENGINEERING (SURVEY) · ARCHITECTURAL/ENGINEERING · ARCHITECTURAL/ENGINEERING/PLANNING · ARCHITECTURAL/INTERIORS

52% of architecture firms report that clients require CAD

Source for charts: PSMJ Resources

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Spinning Your Web Page

From marketing to project management, the World Wide Web offers architects new opportunities to build their practices.

By Elizabeth Padjen

Many architects have taken a surprisingly conservative approach to new Internet technology, embracing only the features that are more efficient versions of already familiar tools and services. Sending files electronically combines the best attributes of express mail services without the cost or delay. Electronic mail is an easy-to-understand hybrid of fax and voice mail. And now, as firms post home pages on the World Wide Web at an accelerating rate, it seems that architects view the Internet as nothing more than a giant brochure rack.

In fact, the growth of home pages as a marketing tool—and the concurrent sense that "everyone is doing it"—has refocused the profession's attention to the Internet. Sophisticated users welcome the trend, but frequently express ambivalence about the effectiveness of the pages.

Prestige vs. jobs

"It's pretty rare to get a job through the Internet," notes Huw Roberts, director of service technology at Ewing Cole Cherry Brott and chair of the AIA's Computer-Aided Practice committee. "We are a service profession, which means we need to nurture relationships with our clients. On the other hand, if clients can go to your home page, it's something they can check off on an evaluation form." Roger Goldstein, principal of Goody, Clancy & Associates, agrees: "You need to hang your shingle out. Traffic arrives at your doorstep in different ways, and it's hard to know how many clients are looking at home pages as first-pass research on firms."

Some architects believe that home pages seem to function less as a point of introduction than as a reinforcement of professional prestige.

"Our page probably hasn't made much difference in finding new clients," admits Bruce Dicker, managing partner of James Somes Associates (JSA) in Portsmouth, New Hampshire. "But it has had an impact in RFPs and interviews, indicating we're technically on top."

While a good home page can enhance a firm's competitive position, a bad page can do a lot of damage. "Your page is something people will judge you by," warns Roberts. "If it's not great, they will assume that your technological capability and originality are similarly limited."

Many firms are passionate advocates of the Web as a marketing tool. Home pages can be particularly effective for specialized consultants and those in niche markets.

Hannah Banks, a sole practitioner in Boston, who specializes in equestrian facilities, has received responses from around the world. "It levels the playing field," Banks asserts, adding that she has found "two to three real jobs, some per diem jobs, lots of requests for information, and, of course, lots of tire-kickers." Banks estimates that storing her page on

Ace's site combines portfolio and miniature building collection.

her Internet provider's server costs $150 per year. "It's advertising without a lot of expense," she says, "and with it, you can assume that people are seeking information, that they want to come to you."
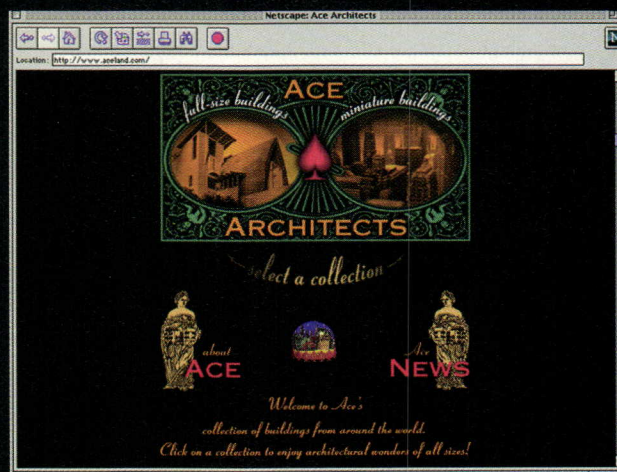
Page design

The profession's confusion about the utility and effectiveness of home pages is evident in the variety of approaches to page design. Many pages are merely the equivalent of an electronic display ad—a photograph or two with the firm's address and phone number.

Others exploit the medium's capabilities with graphics and video and audio clips, providing multiple links to other resources and continually updating information about the firm in a dynamic, newsletter-like format intended to encourage repeat visits. Such pages can promote visibility, but they have a downside.

"It's incredibly time-consuming to maintain," asserts Jill Rothenberg, information services director at ADD Inc, whose page has received two national awards and industry-wide recognition. "But the Web page promotes confidence in our technical ability."

A few firms have experimented with more interactive pages, offering limited services electronically. Newbury, Massachusetts-based Health Facilities Planning (HFP), which serves as a healthcare consultant to other architects, is one such firm, offering preliminary programming and estimating services through its home page. "Not many people have taken advantage of it," maintains Principal Erich Griebling. "They want one-on-one contact." Yet, HFP has succeeded in marketing to clients outside its region, even finding work in Venezuela.

ADD Inc

Welcome to The City, the home page of ADD Inc, a diversified group of professionals providing high quality services in architecture, design and related fields.

ADD Inc's information-laden page wins awards, but takes time to maintain.

"But I don't want them playing around"

A common reaction (usually from a senior principal) in firms contemplating full Internet access is the fear that employees will spend all their time playing. Huw Roberts acknowledges such activity does occur, but puts it in perspective: "People get on a curve. At first, they go everywhere and do everything. And then the curve peaks, and they question the time they're putting in and what they're getting out of it and conclude that it's time to get back to the real world. But in the meantime they've learned some real skills." The curve then repeats itself on the job, he notes. "The guy who researched stock cars realizes he can do the same thing for flashing and then goes on to investigate the ADA and *Commerce Business Daily*, all the while learning how to use this resource professionally. And then his activity drops off, and it becomes just another tool." The duration of both learning curves can be controlled if you manage the process. Roberts recommends staff training: "Show everyone the fun, and show them the work. The curves will still be there, but people start farther out. It's like any new medium. You have to learn how to use it. And learning on something recreational is OK."

Institutional

Residential

Furniture

Biography

SCOTT McELRATH

EMAIL
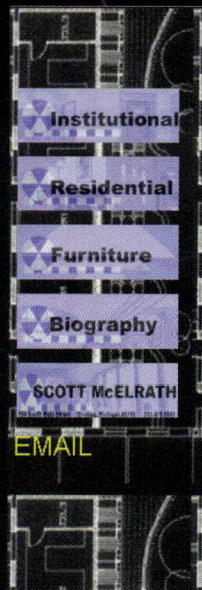
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SCOTT McELRATH
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Three-person Dangerous Architects announces alternative design philosophy.

The industry standard in home pages, if there is such a thing, seems to be evolving toward the on-line brochure—which is not necessarily the same as a print version. "This is an opportunity to change the way you've always marketed," points out Rothenberg. "Don't just reuse your old brochures—adapt them to the new technology of the Web. It's a more dynamic medium, and it's not necessarily linear."

Many pages use a "tree" structure, presenting an initial screen of choices—such as staff profiles, new projects, built projects, or firm history—that the viewer can select, proceeding to another level of menu choices. "Remember that this is a design problem," advises Huw Roberts. "An electronic brochure is non-targeted, non-project-specific, and doesn't establish a relationship—not even that brief opportunity to talk and learn more than you get with a phone call. So you must be creative in order to make that person want to follow up and call or write you. Don't just hand the project over to the kid in the corner of your office who knows HTML (hypertext markup language)."

Just as continuing competition in the architectural marketplace has affected how architects adapt home pages to marketing, so has it affected their use of the much-touted information resources of the Internet. Many architects cite marketing research as their primary use of the Web, searching other home pages for more information about projects, potential clients, consultants, and even other architects.

Research potential

Roger Goldstein, who is on-line daily, frequently turns to other resources, too, such as on-line phone books and newspaper archives. "We were getting involved in a project in Chicago," he remembers, "so I used the *Chicago Tribune* archives to learn more about the history of the project and the site. You pay a fee, but it's cheaper than taking the time to go to a library."

Bruce Dicker recalls an occasion when an ability to conduct Web searches paid off: "A client asked us if we knew anything about skateboard parks. Someone here was smart enough to buy us some time, and we were able to find plans and details on-line, so we could answer, 'Sure.'"

Architects generally have not taken full advantage of the research potential of the Internet, because of the uneven quality and quantity of information that is available, particularly from product vendors. But there are other reasons that many architects fail to exploit Internet resources, the most obvious being that it simply doesn't occur to them. "A lot of principals aren't thinking that way," says Rothenberg, "although younger staff do."

Generational ease and familiarity with technology will be the greatest agent of change in the industry, where many offices currently handle Internet access much the way they

Helpful Hints on Home Pages

- It's better to have nothing than a badly designed or outdated page.

- Establish as many links as possible: Notify search engines and pursue reciprocal links with other pages.

- Include your home page address in presentations, publications, and stationery.

- Post articles or papers by staff on your Web page.

- Don't set up empty buttons or pages with the intention of filling them in later.

- Remember that a home page is a design problem in a different, more dynamic medium—don't copy your old brochure.

- Keep navigational tools accessible and easy to use.

- Establish a simple hierarchy of information.

- Don't forget the obvious: mailing address, telephone and fax numbers, e-mail, addresses, and contacts.

- Check other home pages, including non-architectural pages, for models for your firm.

- Make your page interesting so people will return.

- Update your page regularly.

- Create concise, clear, and consistent layouts and organization.

- Remember that visitors may have a slow modem; if it takes too long to access or download your pages, you'll lose them.

- Remember that visitors have varying levels of ease with the technology; don't put vital information in a video or audio file.

- Avoid unnecessary access delays by providing small "thumbnail" images that interested visitors can click on for enlargement.

- Legibility is important: Some combinations of colored text on colored background can be hard to read, especially when printed out.

JSA developed accessible pages for marketing and secure sites for project management.

Internet—it goes by FedEx," explains Partner Brian Dougherty of Dougherty and Dougherty in Newport Beach, California, which has taken an incremental approach to upgrading equipment and access in its 20-person office.

Bruce Dicker, of the 35-person JSA, maintains that his firm's costs are manageable for a mid-sized office. Making a commitment to Internet access in mid-1996, JSA first established an "intranet" system for in-house e-mail. "At that point, we had 24 people, and you had to wonder if it was simpler to send e-mail or just yell. But it was immediately effective." Within two months, the firm established its Internet connection and home page.

With a $5,000 investment in a server and a $30 per month Internet connection, all JSA employees are now linked. "We didn't want to go back symbolically to the old days of one phone in the drafting room," says Dicker. "It's a question of who is allowed to communicate." JSA is now preparing to upgrade its system to include faster connections.

Pages for projects

Broad access, however, is more important than ensuring that everyone has equal exposure to on-line catalogs and the latest Internet joke. A simple technology that is now available is already giving some firms a competitive edge and has the potential to realign the balance of power in the construction field. "Project home pages"—also called "project sites" or "project-specific Web sites"—are an adaption of the familiar home page using similar, simple, intuitive technology to offer a new tool for managing project communications. Accessed through a password, frequently from the

introduced CAD a decade ago: isolated stations that are either shared by the staff or managed by a dedicated computer "operator."

Costs and security

Providing Internet access on a 1:1 ratio is an issue that has been solved by large firms, which typically have deeper pockets, and even many small offices (which frequently use individual Internet access accounts at an average cost of $20 per month), but juggling costs is a greater budget problem for mid-sized firms. An in-house server, including switchgear, software, and connections, can cost

$5,000 to $10,000. Upgrading phone service with ISDN or T1 lines to allow fast access can cost $500 to $1,000 per month, although many firms start out with standard lines and 28.8 or 33.6 modems.

Connecting everyone to the Internet raises security concerns, usually solved by a "firewall," which can cost $30,000 to $100,000, although lower level firewall security is now available for $10,000. Many firms, however, regard firewalls as initially unnecessary and believe that common "proxy" servers can provide some protection. "Our sensitive information is not available on the

Welcome to Tate & Snyder Architects' Homepage

Tate and Snyder Architects is a full service architectural firm based in Henderson, Nevada. Click on the menu buttons on the left side of the screen at any time to view information on the corresponding subject. Click on any thumbnail image in our website for a higher resolution version.

Tate and Snyder's easy-to-navigate page typifies marketing approach.

FACE grabs attention with manifesto on green architecture.

architect's home page, these pages are not public sites; the password limits admission to the project team, usually including the owner, architect, contractor, and consultants.

Point-and-click menu choices allow the visitor to access drawings, specifications, meeting minutes, field reports, shop drawings, requests for information, and any other job documents. Additional levels of passwords can control access

FIRMS' INTERNET USAGE

Source: PSMJ Resources

to sensitive information. Typically, documents can be modified, but when reposted to the site, they are given another name to protect the integrity of the original document. Logs record all visitors and the nature of their activity: reading, writing, saving.

JSA has used the system on five projects. "It's as though we're all working from the same file cabinet," says Dicker. Consistency of information is a clear advantage, but there are cost savings, too. "You can save 50 to 75 percent of traditional direct costs by reductions in faxes, express mail, telephone, printing, typing, and administration." Harder to quantify, but intuitively obvious, are savings in production and construction time. Dicker points to other savings through the use of a digital camera, which can eliminate the need for special site visits. A job superintendent or on-site JSA staff member can post

a photo and get immediate feedback.

One 25-person Boston firm recently landed a $42 million contract on the strength of the system. Bargmann Hendrie + Archetype (BH+A) was selected for the $100 million Basketball Hall of Fame in Springfield, Massachusetts. Coordination through a project home page will simplify communication with BH+A's lead consultants, Gwathmey Siegel & Associates and Harris Production Services, both of which are based in New York, and with the client—which includes representatives of 13 geographically dispersed organizations.
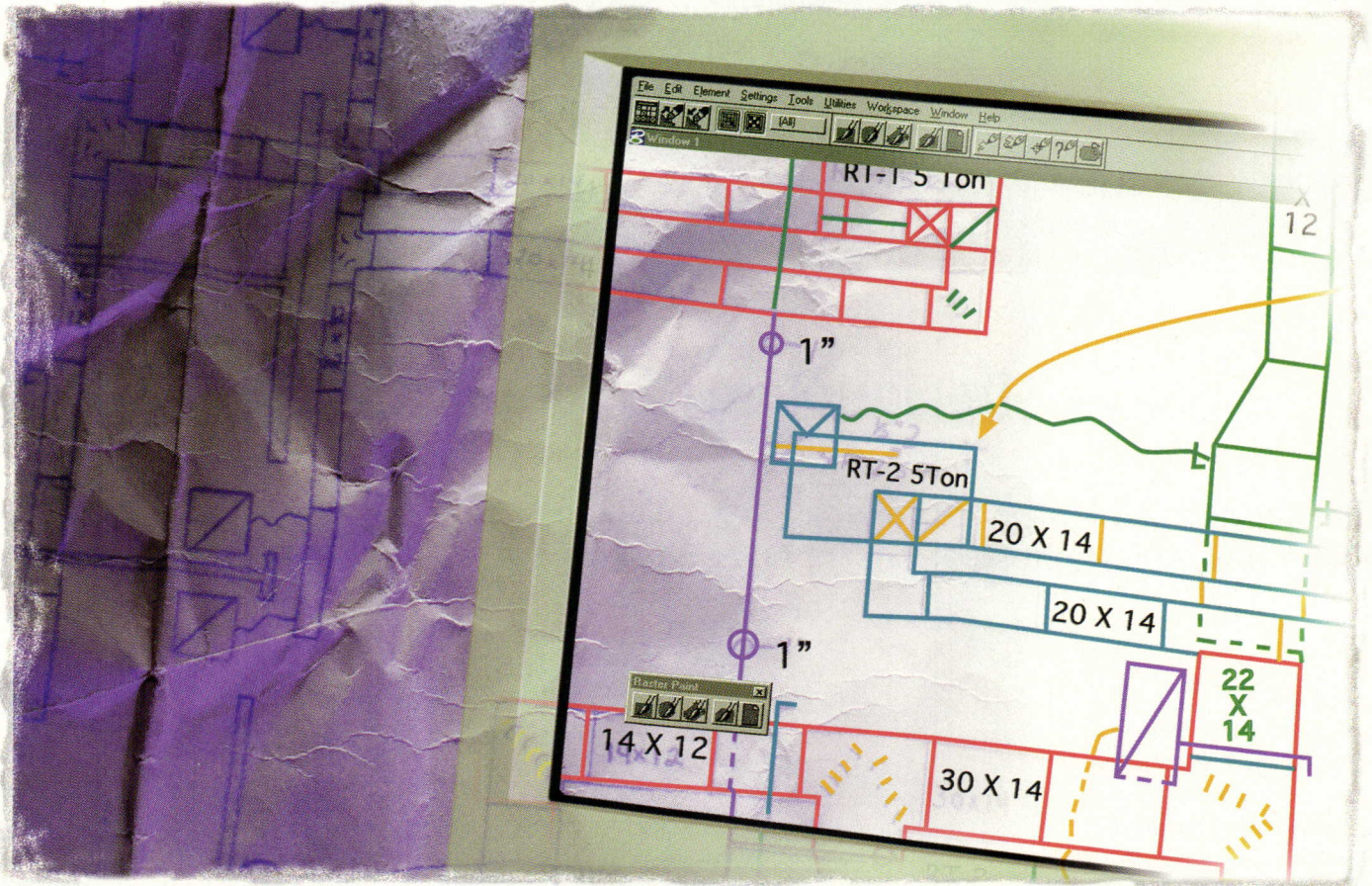
Huw Roberts, whose firm has used project home pages extensively, sees enormous opportunity ahead. "This is the next real application of the Internet. Architects can use these pages to build stronger client relationships and to improve the value of our services."
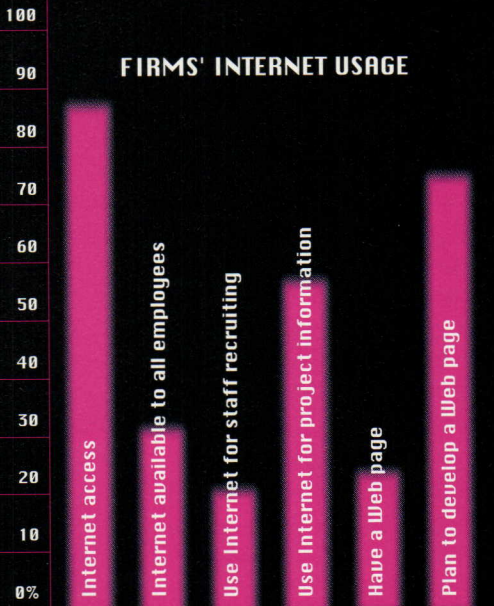
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Circle 107 on information card

Continuous edge-grip vertical joint

Designing with Aluminum Composites

Flexible, durable, and reflective, aluminium-clad insulated panels offer weathertight solutions for building exteriors.

By C. C. Sullivan

Today's architects have more exterior cladding options than ever before. Among the newest materials available on the market are composite panels that sandwich thin plates of steel, aluminum, porcelain, or stone over a lightweight core. The core can be composed of plastic, resin-coated paper, or metal or plastic mesh.

Composite panels are lighter than other exterior finishes, including metal plate, stone, and ceramic, according to Michael D. Flynn, a partner at Pei Cobb Freed & Partners and a noted cladding expert. "Composite panels require minimal fabrication, widening the market for companies that can manufacture these curtain walls," adds Flynn.

Composite choices

One of the most common composite products is a honeycomb panel composed of an aluminum skin bonded to an inner core of aluminum, extruded plastic, or stiffened paper. Another is a panel of aluminum composite material (ACM), comprising finished aluminum face sheets bonded to a plastic core.

While both honeycomb and ACM panels do not show structural stress to the naked eye and offer similar joint detailing, each is suited for different applications. "Honeycomb panels allow you to vary the panel depth to change its structural properties. You can create a thin membrane or a monolithic slab," explains Flynn. ACM, on the other hand, is more malleable and is formulated to combat crazing when bent. Furthermore, honeycomb panels often require a high degree of custom fabrication and detailing, whereas ACM manufacturers have developed standardized details to facilitate on-site installation.

Of the two composites, ACM has proved more popular, due to its slim profile, low cost, and ease of installation. ACM composites are most commonly specified in curtain wall or glazed-in systems, in rout-and-return pan assemblies, and in continuous edge-grip systems. In these applications, ACM panels can be joined mechanically with threaded fasteners, rivets, adhesives, or high-bond tapes, or even welded. Reveal and flush joints are equally effective, allowing greater design flexibility.

Assembly types

Rout-and-return installations are based on pan assemblies approximately 1 inch in depth, formed by routing a V-shaped groove and folding together and connecting adjoining panel edges, typically with riveted aluminum. These pans can be clipped, screwed, riveted, or bolted to the structure in a number of configurations; the only design limitation is the available size and thickness of the panels.

Architectural Resources Cambridge specified a skin composed of ACM pan assemblies, utilizing both aluminum reveal joints and sealed butt joints, for an extension of the Chiron Diagnostics Corporation campus in suburban East Walpole,

Massachusetts. "The system is simple; metal wall panels are mounted on a steel back-up wall with fiberglass-faced gypsum panel sheathing," explains Principal Arthur Cohen.

Edge-grip panels are less common but no less effective as pan assemblies for a lasting exterior. Edge-grip joints rely on continuous fittings to support aluminum composite panels by means of a routed groove at panel edges. No mechanical fastener is required, but a bead of structural silicone adhesive adds useful structural redundancy. The strength and stiffness of the panels make the edge-grip connections sturdy and inexpensive; where needed, stiffness can be increased by attaching aluminum extrusions to the panels with silicone or bond tape.

San Francisco-based Studios Architecture designed edge-grip panel assemblies with integrated gutter systems and internal weeps for the Silicon Graphics headquarters in Mountain View, California. This attachment option allowed the firm to articulate each panel with clean wraparound reveals on all exterior surfaces, including curved planes, soffits, and columns.

Whether framed by edge grips or pan attachments, reveal joints require gutters and weeps for water penetration and condensation, even when reveal covers are specified. Most ACM systems have these features—as well as gaskets—built into the structural extrusions and clips used for panel anchorage. Flush joints, on the other hand, require caulking with silicone sealant to articulate the panel and ensure weather resistance.

Detailing joints

Many ACM exteriors take advantage of several attachment methods and joint types. For example, the State Compensation Insurance Fund office building in Fresno, California, designed by Taylor Group Architects, incorporates both wet (caulked) flush joints and dry reveal joints for a mix of edge-grip and rout-and-return assemblies. "We used the same details for both the ACM and granite panels we specified at the base and the roofline," notes Principal Russell F. Taylor. "We selected ACM because it is more sleek than other porous finishes and can be installed in panels, like granite. The result is a flush exterior despite the different material thicknesses."

Versatile and durable, ACM curtain wall systems are more cost-effective than their sleek, high-tech image suggests.

"The dry-gasketed system is economical and weathertight, so we've used it for numerous facilities," notes Phoenix architect Randall Fonce. For the city's Juniper
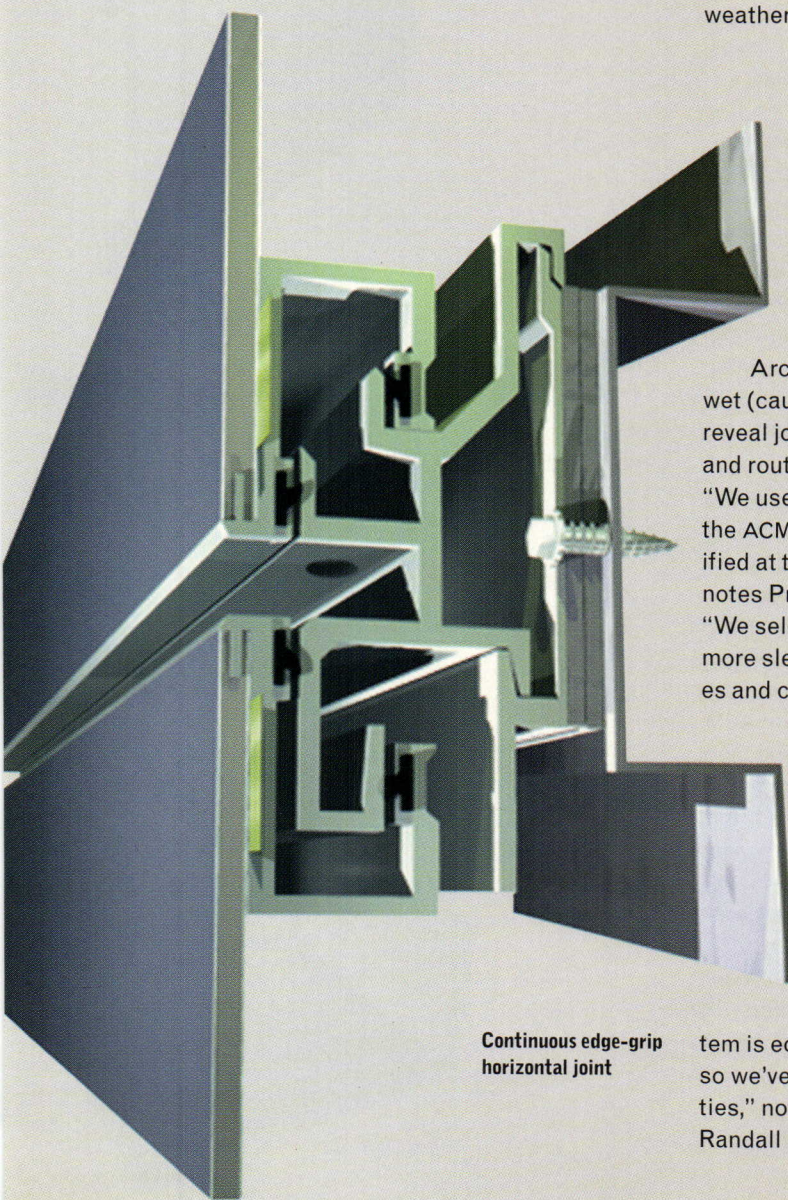
Continuous edge-grip horizontal joint

Consider the Unexpected

The plastic core of aluminum composite material (ACM) differentiates these panels from solid metal and metal honeycomb composites. This inherently insulating core material makes ACM suitable for industrial or technology-oriented applications. Consider the following:

EMI
Electromagnetic interference (EMI) can complicate radio transmission and reception even where it is most critical, such as in airport control towers. ACM's double skin helps shield against EMI and can block a surprisingly high level of interference.

ELECTRICAL STORMS
In frequent or intense electrical storms, ACM helps insulate against transfer of an electrical charge to the underlying structure. Depending on core thickness and type, flashover voltages of 2.2 - 3.5 kilovolts can be expected. The dielectric strength of the thermoplastic cores typically exceeds 25 kilovolts.

VIBRATION AND NOISE
The plastic cores of ACM panels provide good damping for both sound and vibration transfer. Compared to a solid aluminum plate, ACM offers greater damping values at much lower weights. Industrial and manufacturing facilities located near or over highways benefit from this added insulation, as do elevators and buildings housing noisy machinery or equipment.

FIRE AND TOXICITY
Some ACM products resist the most severe fire evaluations by the American Society of Testing and Materials and the Uniform Building Code. ACM has been shown to be "no more toxic than wood," according to the New York City Building Code. These and other fire-resistance requirements have led to the development of ACM panels that qualify as both interior and exterior claddings.

Branch Library, Fonce employed a simple material palette due to a tight budget. "In this case, we selected red ACM panels to make a strong design statement, as well as an uncaulked system, since silicone tends to get dirty from desert wind and dust."

Weather resistance

As for weathering, properly detailed ACM systems perform well compared to other materials, even in extreme environments. Specification and detailing of ACM should consider thermal performance, wind deflection, and moisture protection.

Unlike solid metal panels and EIFS panel systems with thick insulating underlayers, rigid ACM panels can be designed to tight thermal tolerances, even for climates with huge temperature differentials, since they resist the expansion, contraction, bowing, and buckling associated with thin metal panels. The composite's low thermal insulation (or R-value) ensures a small temperature differential between the outer and inner face sheets, therefore minimizing its tendency to bow. Wall systems should be detailed to allow significant thermal movement without adversely affecting fasteners, sealant bond, and joint design tolerances. For rout-and-return panels, wind loads are transferred directly through clips and attachments to structural underlayments.

Dry-jointed ACM systems and exteriors with reveal joints require particular attention to weep holes, internal gutters, and flashing, as well as overall corrosion resistance. As with any connection involving dissimilar metals, reactive corrosion is also a consideration where ACM panels and aluminum framing meet bolts, screws, rivets, and brackets.

Damage from corrosion and water infiltration were the primary reasons for the recladding of a three-story administrative and computer center at the University of Alaska in Fairbanks. The original 2-inch-deep steel honeycomb panels failed when water breached a number of the wet-sealed joints and caused corrosion and deformation. A retrofit of the cladding by Bezek-Durst-Seiser
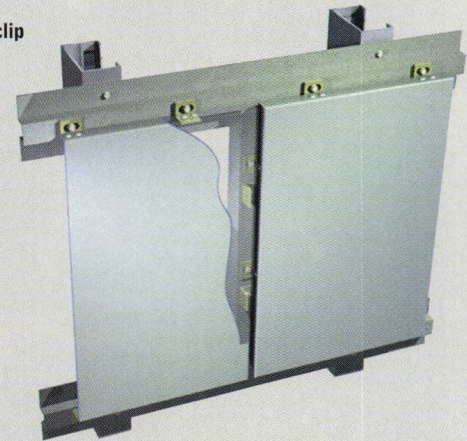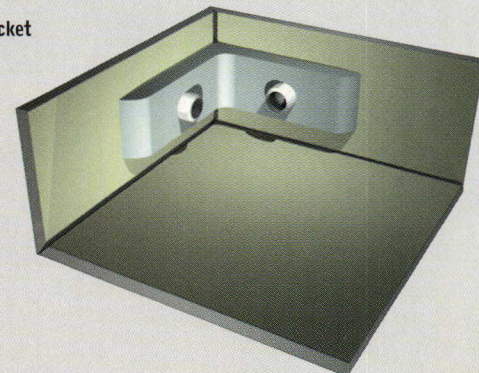

Caulking detail
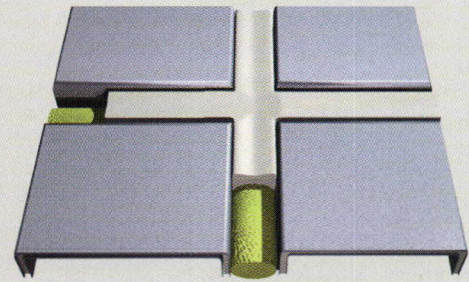
Continuous edge panel
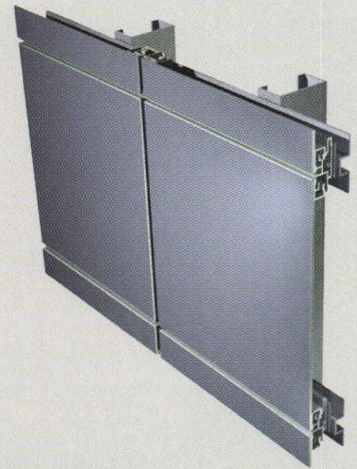
Rout-and-return clip attachment

Inside corner bracket

Architects (BDS) of Anchorage replaced the failed steel cladding with a pressurized-cavity, dry-jointed ACM system.

According to BDS Principal Dan Seiser, ACM provided the necessary weather resistance and was compatible with the existing substrate and the facade's complex profile and deep soffits. "We had to reattach the existing plywood, which provides thermal bridging and fire resistance," explains Seiser. "We then added a track assembly to allow better thermal movement and weepage."

The 3- to 7-millimeter-thick panels proved a benefit for this recladding project. The high strength-to-weight ratio of the material meant that the redesign could accommodate both the panels and the extruded framing system without affecting the original facade profile thickness.

The overall cost of the composite was lower than that of an aluminum plate system, but fireproof coatings on both sides of the ACM panels evened out the cost differential. However, because the ACM facade could be formed in the field, it was shipped flat to Alaska, reducing the final cost. "The field-fabricated return corners are not as sharp as those done in the factory," maintains Seiser. In general, ACM panels rarely delaminate due to weathering, whereas other composites may deteriorate due to water infiltration.

Finish options

As an accent material and finish, ACM is an increasingly common choice due to its easy application and many finishes. But other low-maintenance finishes may prove a better option. Despite excellent flexural strength and load-bearing capacity, ACM sheets may not tolerate point impacts and stains as well as solid materials.

Unlike stone and metal panels, ACM can be worked with ordinary shop and field tools. Flat panels may be bent or curved without altering their structural properties. Roll forming can achieve radius curves as low as 15 to 20 times the material thickness; honeycomb composites must be curved prior to manufacture.
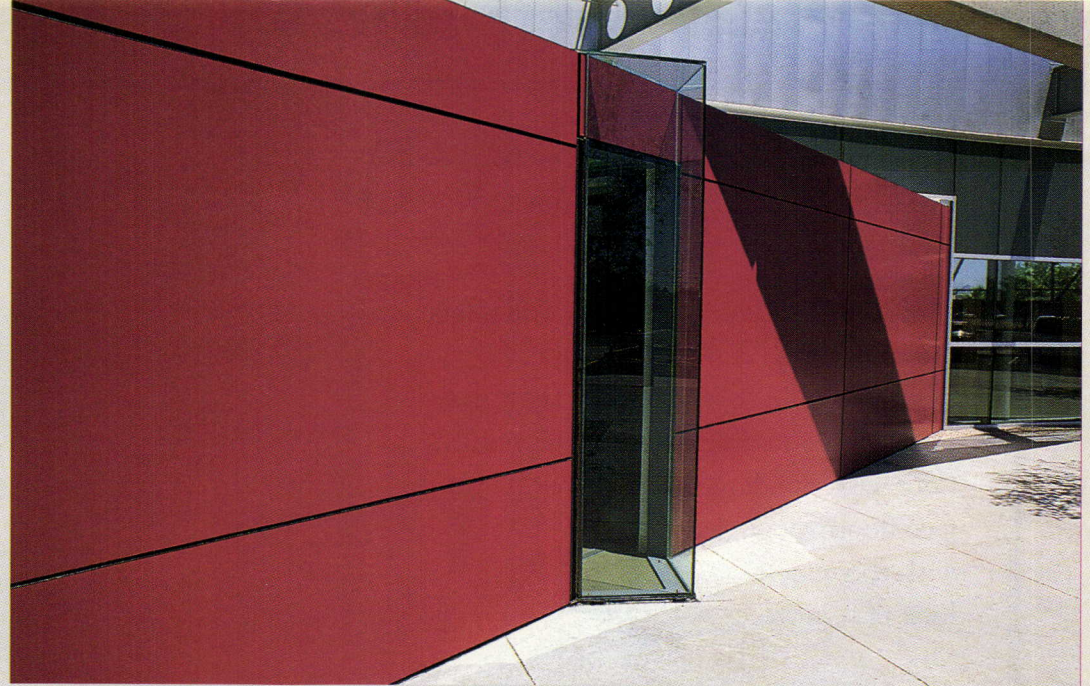
Other details possible with these composites include reverse curves, acute angles, and punch-outs, as well as exposed bolts and rivets.

A large selection of coatings, finishes, and colors are available in both polyvinylidine fluoride (PVDF) and fluorinated ethylene vinyl ether (FEVE) formulations. While high-tech, high-gloss, and high-contrast colors are often associated with ACM, common steel and aluminum finishing methods, including anodizing and electroplating, can be specified.

Synthetic granite and marble finishes are also available through at least one ACM manufacturer, offering a lightweight alternative to stone veneer. While this finish allows a stone facade that can be easily formed and hung as part of either an exterior or an interior finish system, it is rare that ACM facsimiles are confused with the real thing.

Regardless of the specified finish, the expressive diversity of contemporary architectural facades is in part due to the highly developed palette offered by ACM. Much of the material's success can be attributed to the design and manufacture of its unique sandwich structure, which fuses the attributes of aluminum and thermoplastics. The result is a truly space-age material that offers clear benefits in design and construction.

C.C. Sullivan is a freelance writer based in Brooklyn, New York.

Architect Randall Fonce specified uncaulked ACM panels to clad the Juniper Branch Library in Phoenix, Arizona.
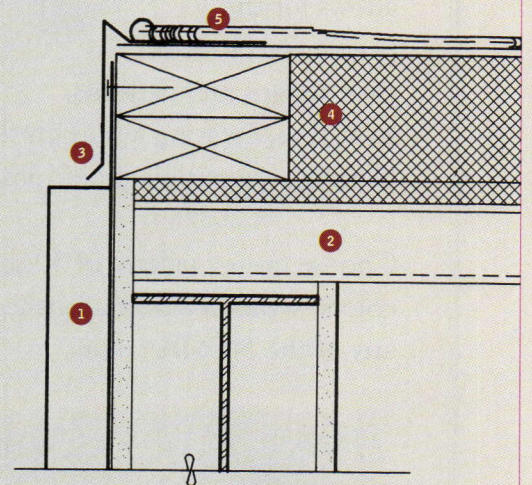
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Flexible Units

Vitra's Ad Hoc system (left) comprises flexible office units designed by Antonio Citterio and Glen Oliver Löw. The Mono Wall unit, a powered, adjustable shelving system, can be used freestanding or installed against a wall. Pick-Up wheeled filing cabinets feature two filing drawers and a flip-up lid over a storage tray. Mobile tables, which can be adjusted from 25½ to 33½ inches high, can be used as desks or meeting tables. *Circle 292 on information card.*

Office System

New office furniture from Haworth is designed to encourage innovative work methods. The Drift desk (right) allows several projects to be undertaken simultaneously, with tiered shelves that hold numerous documents. The Eight Ball conference table (not pictured) allows up to five people to share a computer screen that is projected onto the tabletop.

Causeway is a modular spine wall that carries power, telephone, and data lines and can be used with other furniture systems. The Irrigator, now in development, elevates a fiberglass cableway for power, telephone, and data lines on freestanding columns. *Circle 293 on information card.*
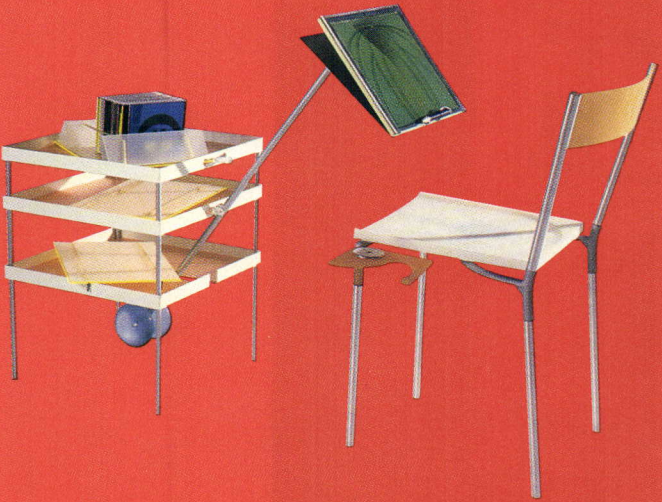
Computer Workstations

New office systems and furniture facilitate efficient cable distribution.

Electronic Workstation

French designer Matali Crassat's computer workstation prototype (above left) for Thompson comprises a desk, chair, and other components. The Thought chair reclines and comes with a mouse built into its arm. The Worksite of Thought desk features a projecting, interactive viewscreen. Separate components store data and take dictation (not pictured). *Circle 294 on information card.*

Computer Center

Ergo Systems' NetCenter 2000 is a freestanding workstation and computer center. The modular system is available in 72- and 84-inch heights and 24-, 30-, 48-, 54-, and 60-inch widths. Several tabletops and shelves can be specified. *Circle 295 on information card.*
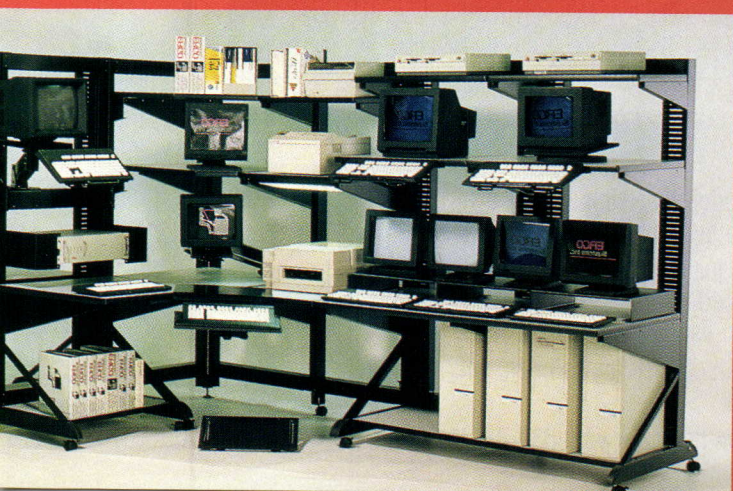
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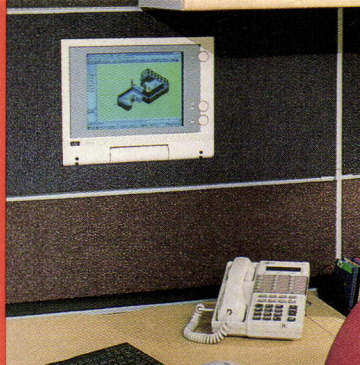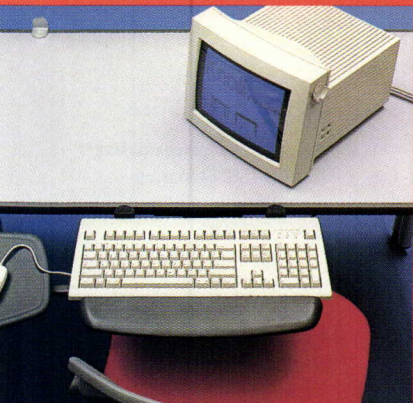
Flat-Panel Displays

Reasons workstations from Transwall now can incorporate flat-panel-display computer screens (left). The workstations' panels measure 4 inches thick, deep enough for the screens as well as telephone, data, and power cables. The panels are available in heights of 39, 54, 69, and 84 inches. *Circle 296 on information card.*

Computer Accessories

Discus accessories from Knoll (far left) adapt workstations for ergonomic computer use. The mouse pad rotates 360 degrees to accommodate left- or right-handed users and can be tilted vertically 15 degrees. The palm rest can be mounted on any Knoll keyboard support. *Circle 297 on information card.*

Worktables

Vecta's Reunion collection (left) comprises four models of office tables with specific tops for conferences, team work, individuals, and support tasks. Two leg designs are available for the collection. Tables can be joined together with the Link Leg, which houses a latching mechanism. The Snap Leg is adjustable from 28$\frac{1}{2}$-inch to 32$\frac{1}{2}$-inch heights and can be fitted with casters. *Circle 298 on information card.*

Security Camera

A new polymer security camera housing from Zero EMI (right) is currently on view in the San Francisco Museum of Modern Art's exhibition "Icons: Magnets of Meaning." The CCEVH-14 accommodates CCTV (closed-circuit television) cameras; can be fitted with a pan/tilt mounting adaptor; and measures 17$\frac{11}{16}$ inches long, 6$\frac{7}{32}$ inches wide, and 5$\frac{9}{16}$ inches high. It was designed by the Silicon Valley-based firm RKS Design, which has also created products for SEGA, Apple, and SyQuest. *Circle 299 on information card.*

Flat-Screen Television

A 4-inch-thick plasma-display television set, QFTV's FlatScreen (left), is now available through the Hammacher Schlemmer catalog. The TV is thin enough and (at 27 to 65 pounds) light enough to be hung directly on a wall like a picture. The set is manufactured in 21- and 42-inch-diagonal screen dimensions and includes a remote control and two speakers. *Circle 300 on information card.*

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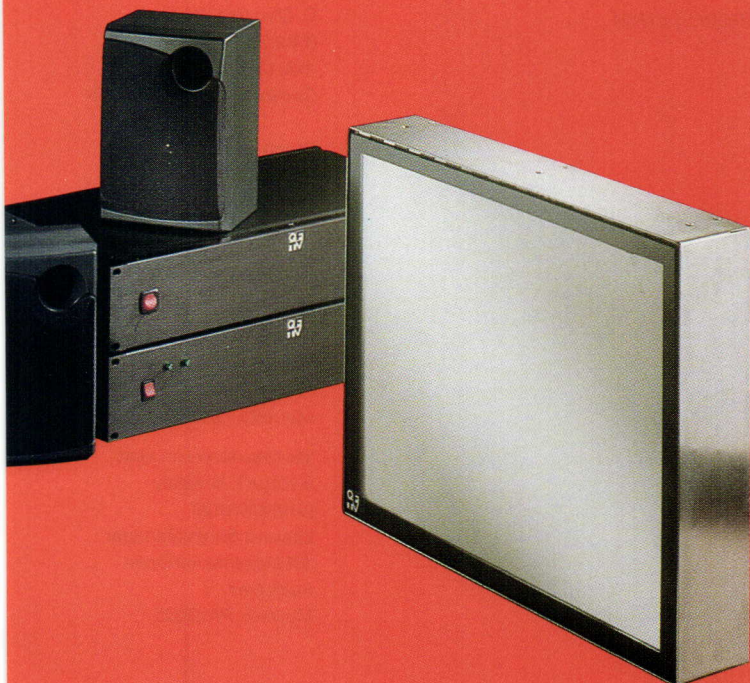
Product Information for June 1997 Advertisers

Automated Approvals

Building permits, codes, and inspections are now administered on-line.

Once viewed as Dickensian dustbins, municipal building departments are rolling out advanced information technology to streamline codes, automate inspections, and accelerate applications and approvals for building permits. The goals, maintains Michael Garvey, city manager of San Carlos, California, are "to be competitive, effective and responsive to our residents and businesses."

Target dates vary, but it is clear that by the end of 1999, most building departments will offer architects new ways to get their plans filed, reviewed, and approved. While the benefits to architects include faster service, fewer changes, and less uncertainty about approval, there are new risks as well. Robert W. Kraiss, director of corporate facilities and real estate for Adaptec, in Milpitas, California, warns, "the day will come, and sooner than you think, when we won't hire architects without electronic permitting technology."

For architects, "the price of entry is e-mail and direct Internet to every desk," explains Mountain View, California-based practitioner Zane Paxton, a participant in a national roundtable of architects exploring the issue. Furthermore, the ability to file an electronic permit from anywhere may favor larger national firms at the expense of smaller local practices that can't afford the wiring and the equiptment.

With jurisdiction over 800,000 structures, New York City's Department of Buildings is ripe for innovation in permitting and inspection. To slash up to 80 percent off approval time, the city initiated electronic filing for permits last December. Commissioner of Buildings Gaston Silva says "we're responsible for enforcing codes and zoning, but that's no reason to be a roadblock to timely approval." For clients truly in a hurry, architects may choose New York's optional self-certification process, which bypasses plan review and controlled inspections entirely. Instead, the architect explicitly assures that all work conforms to code, subject only to quality-control spot-checking by the city. Currently, nearly 30 percent of construction in New York City is self-certified, but Manhattan architect Michael Zenreich observes "we won't see the full benefit until self-certification and electronic filing are linked together."

While New York also plans to automate its buildings inspection staff by 1999, other places have already done so. Kettering, Ohio, recently equipped its inspectors with wireless modems and laptop PCs for field use. A staff of seven serves a town of 60,000. Architect Jeffrey Tyler, Kettering's chief building official, says the mobile technology allows drive-by inspections, as well as on-the-spot violation citations and certificates of occupancy.

In California's computer-centric Silicon Valley, 27 cities, two counties, and dozens of businesses launched a public-private experiment to, among other things, streamline regulations. All 29 jurisdictions agreed to reduce 444 local code amendments to a common set of 11, with standardized interpretations to guide examiners. Called the Joint Venture Silicon Valley Network, this effort will put building applications on the Internet by September. San Carlos's Garvey explains that "we can let the computerized building data tell us the best place to locate a new police or fire station, or help us predict how development in one city will impact traffic in adjoining municipalities." The humble process of computerizing building permits may soon lead to a new urban landscape fashioned in the computer's own image. *Jerry Laiserin*

Jerry Laiserin is an editor of ACADIA, *the journal of the Association for Computer-Aided Design in Architecture.*
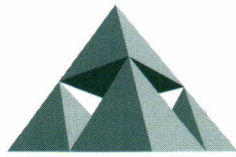
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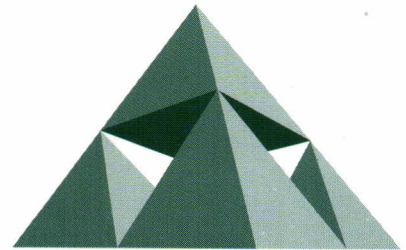
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