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**Da Vinci**



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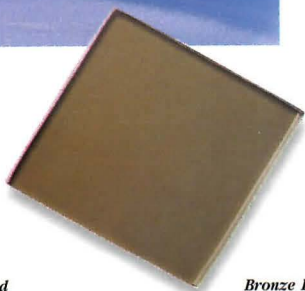
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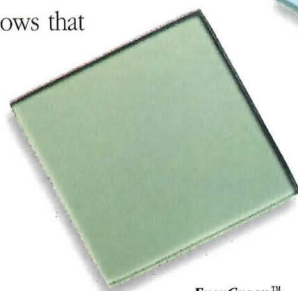
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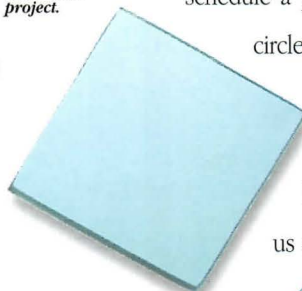
*Bronze Tinted Float Glass*



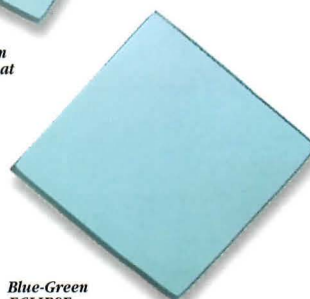
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\*Popular Mechanics 1991 Design & Engineering Award; R&D Magazine 1991 R&D 100 Award

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Circle 2 on inquiry card

**Location, location, location**

In your July article on USAA Insurance Co.'s office [RECORD, pages 56 to 61], you stated the project had been carried out "with a good measure of environmental sensitivity." The largest environmental impact of any project is location. When offices are located downtown, they become transit accessible, employees living nearby can walk to work, and downtown cultural life is supported. When companies move to the suburbs, getting to work becomes difficult. The preservation of oaks and cypress wetlands is important, but has minimal impact when compared with the larger impact of location. By giving such positive coverage to suburban sprawl, you harm the cause of sustainable development which, by definition, must take place on transit corridors and in urban clusters.

*Jonathan F. P. Rose  
Katonah, N. Y.*

**Elitism in licensing**

You reviewed the current efforts of NCARB to keep abreast of changes in the global practice of architecture [RECORD, August 1994, page 9]. You had been a guest at our annual meeting in Detroit and were clearly impressed by the progress achieved in many of NCARB's innovative programs affecting registration and reciprocity.

You warn, however, against what you perceive as a problem arising from NCARB's express goal of eliminating impediments to reciprocity. Reciprocity builds uniformity and uniformity, according to your editorial, breeds elitism.

It is that last leap which gives me trouble. Unlike many professional and licensing bodies, NCARB is governed by its members

boards and not by platonic guardians far removed from the issues and problems its policies affect. So, as you had the opportunity to observe in June, a majority of NCARB member boards (not its board of directors) sets policies for the council.

It was such a majority which, in the early 1980s, voted to require the accredited degree—the requirement you brand "elitist"—as a condition to obtaining the NCARB certificate. That decision followed in the wake of several states which had already established the degree requirement for registration and served to encourage many other states in the ensuing years to adopt the degree requirement. Today the overwhelming majority of U.S. jurisdictions require the accredited degree for registration.

As a footnote to the history of the degree requirement, it is interesting that Berkeley, California, and Cambridge, Massachusetts, were the most ardent centers of opposition to the degree requirement in the early 1980s. Support for the degree requirement came first from the Southern states, the Midwestern states, and the prairie states, hardly famous for elitist sentiments.

Perhaps the irony is best explained by changes in the opportunities for education over the past two decades which you may have overlooked. State universities and special institutions like the Boston Architectural Center and SCIArch afford opportunities for architectural education which the Harvards and MITs with tuitions set at over \$20,000 do not provide.

*Continued on page 21*

**Through November 19**

"Morris Lapidus: mid-Century Modernist" exhibition, Buell Hall, Columbia University, New York City.

**Through November 21**

Exhibit of winning and selected entries from The End's design competition. Call 213/296-6226.

**Through November 30**

"Sex, Cities and Satellites" lecture series, Southern California Institute of Architects, Los Angeles. 310/574-1123.

**Through November 30**

"New Chicago Interiors 1994" exhibition, Chicago Athenaeum.

**November 3-January 15**

Rem Koolhaas exhibition includes urban proposals for the architect's Euroville project, as well as built and unbuilt projects such as the 1993 proposal for the University of Paris Jussieu Library. Museum of Modern Art, New York City, 212/708-9750.

**November 10-12**

"65th Birthday Party" of Frank Lloyd Wright-inspired Arizona Biltmore celebrating renovation of the resort in Phoenix. By invitation only.

**November 10-December 17**

"Photography Takes Command: The Camera and British Architecture 1890-1939" exhibition, Heinz Gallery, Royal Institute of British Architects, London, 071/631-1802.

**November 11-12**

"Dreamt, Made and Signed" conference will host an array of international architects, clients, economists, and businesspeople discussing one question: Who is responsible for history-making urban projects and how? Monte Carlo, Monaco. Call 921/65151.

**November 11-13**

Antiques Forum, "How Did They Make That?" at Historic Deerfield (MA). Call 413/774-5581.

**November 30-December 1**

"Philadelphia Lights '94" exposi-

*Continued on page 21*



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Few construction projects in recent years have proven quite as poignantly the impact of the design and construction *process* on the final *product* as the new Denver International Airport [see pages 30 to 37], conceived as a replacement for the old Stapleton Airport. Then-Mayor Federico Peña began a site search as early as 1983. Between then and the hoped-for opening in February 1995, an antic series of events occurred. Here are highlights:

- It took two popular votes to annex the remote site and approve the plan.
- A program manager—an increasingly popular way to administer large, complex projects—brought on board a seasoned engineering and airport-planning firm and a design-construct firm to work with Denver's city engineers.
- Conflict between civic desire for image and the practical aspects of operating the airport first came to a head in the choice of architects. The city fathers began to worry that image was being sacrificed to operating concerns, and selected a respected local firm of architects to deal with this, giving the firm three weeks to do the job. The architects came up with a scheme that was buildable on schedule, would bring an overstepped budget in line, and symbolize Denver. But how did the project get so over-budget in the first place?
- Airlines stayed on the sidelines, while contract documents went ahead without significant airlines input. When heard from, they requested among other items an automated baggage-handling system, which alone added nearly \$200 million to the budget and risked upsetting an already delicate schedule. The baggage system failed to pass muster and the city decided in favor of a hybrid baggage system to reduce risk of further delays.
- Opening the airport on time ultimately became the major focus of the project, in large part because revenue was needed to service the bonds.

This project underscores conclusively the intimate links between process and product. As James S. Russell's article points out, the chain of command was muddled and the city acquiesced to the short-term needs of the airlines and bond-rating agencies and not enough to the long-term implications for the project.

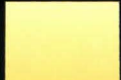
DIA is not alone in this, nor is the clash between product and process limited to large projects. I urge you to read the Denver article, and to reflect how its lessons apply to your own experience. *Stephen A. Kliment*

### Anna Egger-Schlesinger Is Appointed RECORD Design Director

RECORD's new design director joined the magazine in 1971. A graduate of the Kunstgewerbeschule für Angewandte Kunst in her native Austria, Anna played an important role in many design awards won by RECORD over the years. She is a member of the Society of Publication Designers and the Architectural League, and has served as a guest lecturer at the Center for Publishing at New York University's School of Continuing Education. *S.A.K.*

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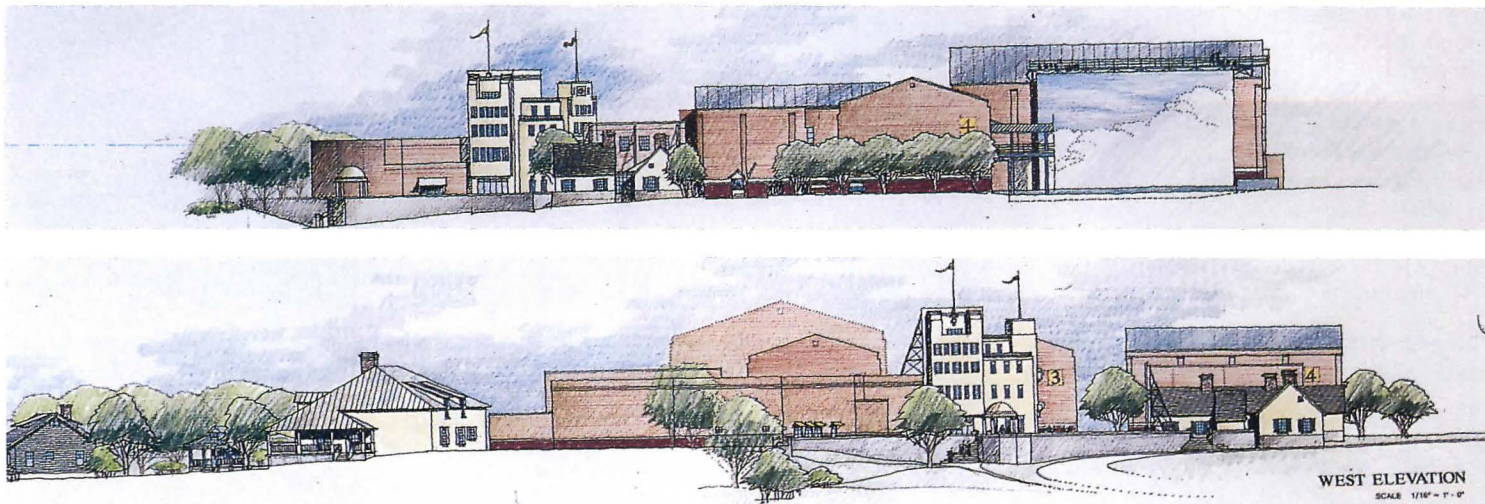


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**North Carolina**

**Klieg Lights for Carolina Campus**



A mock, \$15-million replica of a generic American town will house the North Carolina School of the Arts new School of Filmmaking. The facilities will include a main street with a pastiche of historic facades, a 300-seat theater, 50-ft sound stages, and one-story

bungalows “all jammed up against each other.” Backen Arrigoni & Ross Inc.—who once designed a production studio for George Lucas and a Disney lot in Burbank—display a nostalgia for the early days of film, when movies were made on studio lots. Here, the

architects have designed a small village for students to use as backdrops for their film projects. The street and building facades can be manipulated and rearranged, with buildings’ backs left blank. The project will also provide a new entrance to the main campus. ■

**California**

**Cliffside Glass and Steel House Acknowledges Two Modern Masters**

A residence north of the Hollywood hills in Los Angeles adds to the legacy of dramatic cliffside California houses. Taking cues from Neutra and Wright, Edmund M. Einy Architects has designed the 6,500-square-foot house as a series of planes that slip out over the landscape and down the side of a hill. “I wanted to blur the boundaries between inside and out,” says Einy, a native Angeleno. Scuttling an original plan to build a huge cantilevered structure (the clients felt uncomfortable with the height), Einy designed a two-story glass-and-steel bar that runs along the hill’s edge, opening up the house to the dramatic view below. A box-like library is pulled away from the main bar, supported by columns, and provides the only view back to the street. Below, a long narrow garden slips out from under the library, and further down, a swimming pool sits on yet another ledge. ■

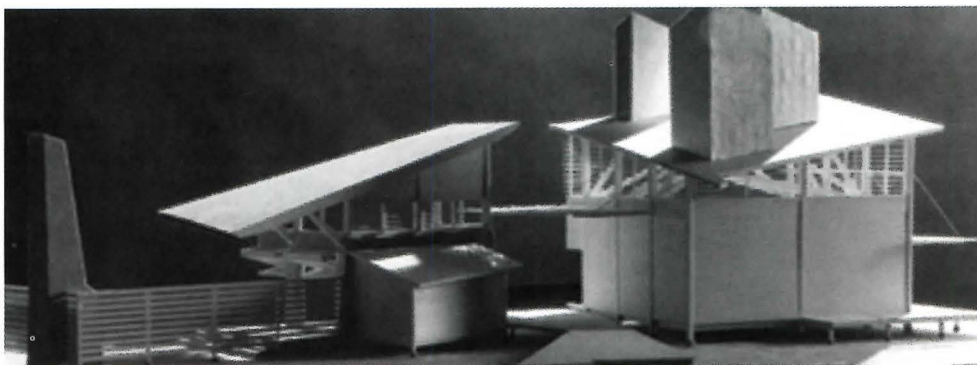




## Florida

### Culture Comes to Smyrna Beach

The Atlantic Center for the Arts in New Smyrna Beach, Fla., will be an arts colony retreat to foster exchange between artists of varying disciplines. The design by Thompson & Rose Architects draws upon indigenous "cracker" architecture and the site's natural drama. Embedded in a 60-acre ecological preserve of dense Florida jungle, a swooping boardwalk weaves together the various, shack-like studios and workshops. Roofs work like gigantic scuppers to dramatize the region's torrential rains, and a giant lightning rod crowns the sculpture studio. ■



## San Francisco

### Bay Area Designers Push Social Agenda

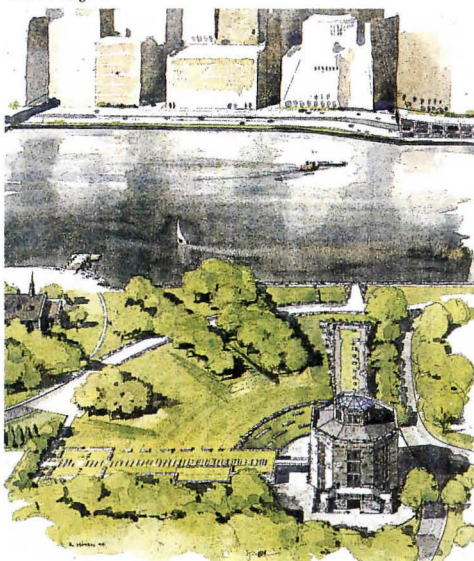
In a noble effort to highlight architecture's social agenda, 14 members of San Francisco's design community have formed an action group that wants to shake up what it sees as a lethargic establishment in and outside the AIA. The group, whose members include architects Robert Marquis and Ron Kappe, developer John Stewart, and sociologist Clare Cooper Marcus, is a combination think-tank and outreach enterprise.

Its first steps consist of developing a catalog of successful low-income housing in the Bay Area, to answer such questions as "who manages and builds affordable housing?" and "why is affordable housing good economics for everyone?" The group's goals differ from those of the New Urbanists such as Peter Calthorpe and Dan Solomon, who focus on the community facets of design. ■

## New York City

### Roosevelt Island Gets an Eight-Sided Facelift

© R. Hoyen



Tanner Leddy Maytum Stacy Architects has finished preliminary designs for the restoration of the Octagon on Roosevelt Island. The \$3.5-million project is part of a larger effort to preserve the Island's history. The Octagon—which sits on the northern tip of the Island and once housed an insane asylum—was partially destroyed by fire in 1982. Since then the interiors have collapsed or rotted away. Rather than reconstruct the space, TLMS will make it structurally safe and preserve it as a ruin. The famous wrought-iron staircase will be inaccessible, but pinned in place with stainless-steel braces. The roof will not be replaced; rusted gurneys will be left. The idea is to accept the ecology of the island—the ecology of decay and rebirth. In a gesture to the past, the building will one day house rotating exhibits of art by people with a mental disability. ■

## Indiana

### Brave New World Comes to Hoosiers In 1996



© James F. Housel  
Danadjieva & Koenig Associates has completed a preliminary design for a 100,000-sq-ft enclosed entertainment facility at the Indiana White River State Park. "Future Park" is meant to showcase the latest in virtual-reality hardware in two theaters. The massive complex on Indianapolis's main street will have a giant asymmetrical glass roof that sits atop a rough limestone base: the limestone is indigenous to Indiana; the roof's form is inspired by limestone geode crystals. ■



## Briefs

•DMJM Keating is the name of the new Los Angeles-based firm made up of DMJM and the former firm of Keating Mann Jernigan Rottet. Richard Keating is principal in charge of design worldwide. A subsidiary firm, DMJM Rottet, will handle interiors. Keating told RECORD he made the move in order to focus his energies on design, leaving marketing and management to DMJM, which was taking up too much of his time and effort.

•The French firm Macary-Zublena will design the main stadium in Saint-Denis, just north of Paris, for the 1998 World Cup Soccer Games. Macary-Zublena won the competition with a classical, elliptical design.

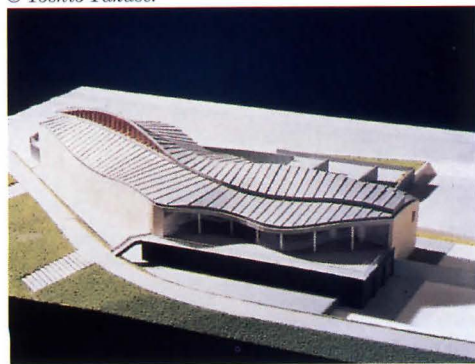
•One of the country's biggest design firms is getting bigger: The Hillier Group—a firm with offices in Philadelphia, Dallas, Kansas City, Princeton, and Sydney, Aus.—has just bought New York's Eggers Group P.C. ■

## Poland

### Isozaki on Banks Of the Wisla

After a six-year odyssey and fund-raising delays, Arata Isozaki's Japanese Art Center will be completed this month. The Center lies in the soft shadow of the Renaissance Wawel castle, between Krakow's Wisla River and a main road. A grand stairway leads up to the building entrance, which pierces through to the back, affording a view over the river to the castle. Isozaki's trademark undulating walls and twisting rooftop will house 10,000 pieces of art, including Ukiyo-E woodblock prints and Buddhist sculptures. A spine along the roofline will filter in natural light. ■

© Yoshio Takase.



## Paris

### City Rescues Champs-Élysées With Trees, Light, and Love

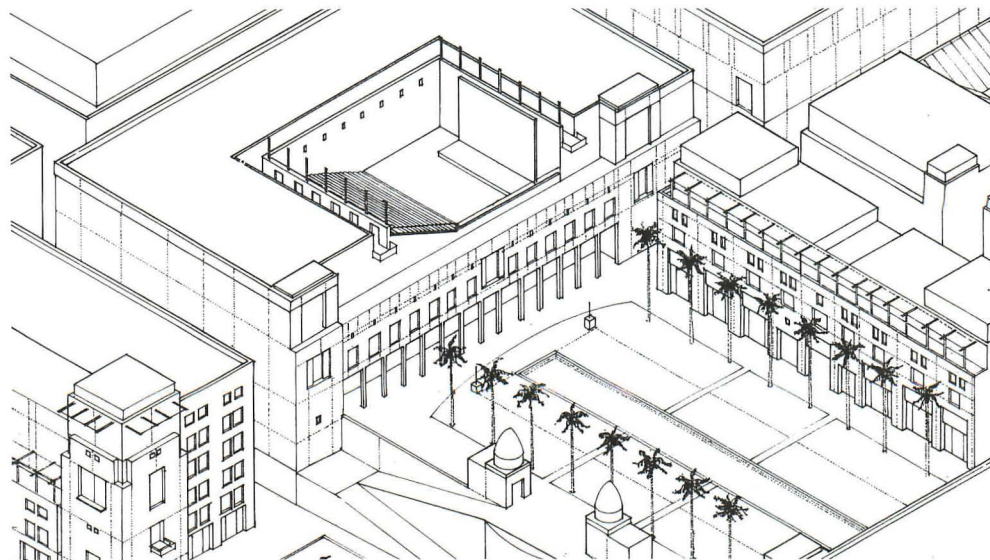
After a two-year, \$45-million renovation, the Avenue Champs des Elysées has been reborn under a veil of green light, orchestrated by lighting artist Yann Kersale. The much-needed renovation has not attempted to turn back the clock, but to dignify the Avenue's current popular appeal. Architect Bernard Huet has subtly ordered the streetscape by taking out the parking alleys, opening sidewalks to their full 65-ft width, and adding a second row of trees. Parking is relegated to underground lots, creating a relatively unencumbered walk from the Arc de Triomphe to the Rond Point. An important part of the project was the introduction of modern urban furniture, designed by Jean-Michel Wilmotte, and six almost-transparent bus stops by Sir Norman Foster. Wilmotte's clean-lined streetlights, stoplights, and benches are intentionally non-obtrusive. *Claire Downey*



© Didier Boy de la Tour

## Lebanon

### Hope and Renewal in Beirut



Drisin McFarlane Architects has won one of three first prizes in an international competition to reconstruct Beirut's historic core. Once one of the East's true architectural treasures, the site was mutilated by 25 years of war: buildings were scarred or destroyed,

and no infrastructure remains. The project will contain souks, a museum, a public library, housing, commercial space, restaurants, and a cinema complex. The Lebanese company Solidere will offer a development and construction contract to the eventual winner. ■



# THIS BANK SELECTED US BECAUSE WE PAID HIGHER

It looks less like a bank and more like an English country manor. But the charm of the Investors Savings Bank belies the challenges its design and construction presented. Particularly to Marvin Windows and Doors.

For one thing, fast-track construction scheduling was necessary due to constantly evolving design constraints. For another, it wasn't until thermal efficiency, condensation resistance and aesthetics were factored in that wood was chosen over aluminum. Consequently, Marvin wasn't selected for the job until construction was underway, making manufacturing and delivery deadlines extremely tight.

But Marvin's biggest challenge proved to be the building's three massive window and door assemblies, the largest of which measures 28 feet wide by 30 feet high. Using a combination of sturdy Magnum Double-Hungs and French Doors, Marvin not only built them on schedule, but also engineered them prior to delivery to guarantee they would withstand the strong, prevailing winds off the lake. And, like all 177 of the bank's other made-to-fit windows and doors, they were built with features designed specifically for the project. Features such as authentic divided lites, interior windows and doors glazed to match those on the exterior and a durable, factory applied finish in two complementary colors; Midnight Teal for the sash





## The New American Ghetto

*Photographer Camilo José Vergara has studied inner-city America for decades, capturing images of once-vibrant neighborhoods reduced to ruins.*

*By Camilo José Vergara*

A tour of the ruined neighborhoods and downtowns in America's once-mighty industrial heartland offers some startling sights: former banks with Classical porticos boarded up; Art Deco automobile showrooms, their wrap-around windows cinderblocked; splendid hotels with silent ballrooms; neo-Gothic churches abandoned in the march of time.

With so many of the surrounding buildings leveled, these substantial "leftover" structures—too costly to tear down—dominate the streetscape in isolated grandeur. Common wisdom tells us to relocate the people, demolish the remains, and rebuild. Structures that attracted immigrants from the entire world, that survived riots and decades of disinvestment now have no future. Although their immediate meaning is of neglect and failure, is it possible for these ghetto cityscapes also to stir our imagination?

This essay looks at two Midwestern cities—Chicago and Gary, Indiana—where the new American ghetto, with its contradictions, inequality, and tragic allure reveals itself to us. Though still a vibrant city, Chicago exhibits erratic patterns of development, where large sections of the urban landscape have been neglected or abandoned. Meanwhile, much of moribund Gary has been leveled by urban renewal and the work of scavengers.

### Reinventing the city

Chicago has lost about 900,000 people since 1950, over 23 percent of its population. Among those fleeing in 1992, more than twice as many were residents of wealthy neighborhoods than of poor ones. But whites weren't the only ones leaving the city. During the 1980s alone, the city lost 100,000 African Americans. "The strongest force behind that migration today," states a December 1993 *Chicago Tribune* study, "is fear of crime." Asked to comment, Mayor Richard M. Daley replied: "You're going to have a smaller city, better quality of life.... The city will get smaller and then reinvent itself. You'll start planning it differently in a way." Indeed,

*Camilo José Vergara is a photographer whose book The New American Ghetto will be published by Rutgers in the fall of 1995.*

© Camilo José Vergara photos



*These abandoned buildings on 47th Street in Chicago were once clubs where blues greats like Muddy Waters and B.B. King had played. Only a mural hints at the area's rich past.*

Daley keeps the demolition crews busy, clearing space for Chicago to "reinvent itself."

On thoroughfares like West Madison Street in Chicago, we can see what is happening to large parts of urban America. Once one of the nation's most important commercial streets, West Madison has been through two riots and four decades of disinvestment and is today mostly gone. Moving west from the Loop (Chicago's still thriving downtown), a buffer zone of institutions and housing leads to five miles of large-scale abandonment, and then to affluent Oak Park.

The process of abandonment, fire, and demolition is repeated throughout Chicago's ghettos, as it was in the South Bronx a dozen years ago. This is happening at a time of particular economic hardship: 21 percent of the population falls below the poverty level—four times the number of poor than in the ring of suburbs surrounding the city. A shortage of affordable housing combined with a scarcity of rent subsidies is forcing destitute residents to double up or live in substandard dwellings.

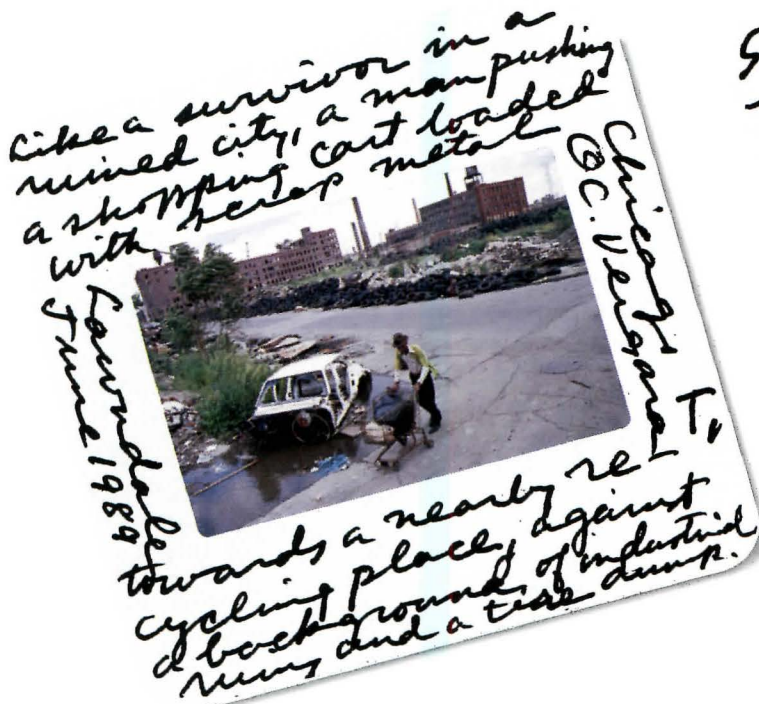
In many areas of Chicago, according to an official of the Buildings Department, "a building that is not occupied has a very short life because scavengers will come in, strip the

plumbing, and cause fires." Yet the city is very slow in transferring the rights to abandoned buildings to non-profit community groups willing to rehabilitate them. Why this is so is a matter of speculation. But many people suspect an undeclared "clearance" policy. In any case, the consensus is that if a structure is not going to be rehabilitated soon, it should be demolished. Last year, the city approved a five-fold increase in its demolition budget, raising it to \$10 million.

"Abandonment is old. It may be picking up speed now, but this has been going on since the 1950s," says Professor Charles Hoch of the University of Illinois. This time, however, nobody seems to be surprised that so much of the city is disappearing. "To the banks, to the people who own those buildings, their value in money terms is insignificant even though their value as shelter is still great. Capital is into new edge cities, not into restoration, protection, or preservation."

As privately owned apartment buildings disappear, the only large investment in low-income housing is the rehabilitation of projects belonging to the Chicago Housing Authority (CHA), an institution that has long been associated with mismanagement, semi-abandoned highrises, concentrated poverty,





and high crime rates. Because it provides housing of last resort, the CHA has often been called "Chicago's unofficial shelter system." For nearly three decades, CHA developments, widely resented as "places to load down poor people" and as "hellholes," have defined the city's worst ghettos.

**Changing direction at the CHA**

For Vincent Lane, chairman of the CHA, the solution is to create "normal neighborhoods," communities of mixed-income residents. He equates his program to "a revolution." To decentralize poor people, Lane wants to build scatter-site housing for families now living in large developments, while making the high-rises attractive to working-class families.

Patrick T. Reardon, the *Chicago Tribune's* urban affairs writer, refers to Lane's plans as "Seeds of the future stabilization of Chicago..." Yet these seeds need a lot of costly protection just to survive. Reclaimed buildings have thick iron grids on their ground floors with signs saying, "Entry Requires Passing Through Metal Detector." Guards sit in the lobbies. Visitors have to be escorted by residents and sign a register.

In the past, vacancies were usually concen-

trated in the upper stories of these edifices, but now for security reasons the situation is reversed: in rehabbed buildings the top floors are again occupied, yet it is common to find the ground-floor windows bricked. At night some sense of security is maintained with powerful lights placed high above the ground. The CHA's attempt to create "normal neighborhoods" has resulted in buildings that resemble fortresses under siege.

Lane's most ambitious plan is to create an economically integrated community in the infamous Cabrini-Green development. Through a combination of demolition and new construction, he plans to change the population mix from one in which 92 percent of its families receive public assistance, to one where the poverty rate is 25 percent, slightly above the citywide average.

The cost of the physical transformation of Cabrini-Green's 3,600 apartments is \$350 million, \$50 million of which has been okayed by HUD. Within two years, the CHA expects to get another \$50 million from Washington and to leverage the rest from private investors. Cabrini-Green, bordering the affluent North Side of Chicago, may become part of an expanding and prosperous Loop.

One Chicago housing official, who prefers not to be named, is highly critical of the expensive rehabilitation of complexes that have become unmanageable, while many smaller buildings scattered throughout the city are demolished. The official explained, "If any reasonable individual [had] been in control of the situation, that individual would probably have said, 'No, let's start disinvesting in these enormous high-rises and divert the money into rehabilitating an equivalent number of units in some very high-quality buildings that happen to be vacant.'"

When asked why Chicago wasn't doing this, the official reminded me of the 1966 Gautreaux class-action suit that charged the CHA with discrimination and the federal government with financing segregation. A federal court decision in 1969 stopped Chicago from building public housing in poor, black communities, a practice that historian Arnold Hirsch called "reinforcing the ghetto." It is tragic that a quarter-century later, when economic segregation is seen as a far worse evil than racial segregation, the Gautreaux decision forbids the CHA to rehabilitate vacant buildings in depopulated black neighborhoods, where they are plentiful. And as plans to house project residents outside



Two photographs taken four years apart show the Lawndale section of Chicago deteriorating from a slum into an urban no-man's-land (opposite). Chicago's Near West Side and skyline in 1989 (below).

the city's ghettos meet strong opposition from neighbors, the CHA's efforts are primarily directed to the land and the buildings already under its immediate control.

### The capital of black America

Gary ranks first in the nation among cities in population loss during the 1980s. At the National Black Political Convention in 1972, an event held at a time of hope, the 3,500 delegates and alternates were enjoined to "Come Home to Gary." In 1994, the city still wants people to return. Banners strung along Broadway read, "Come Home ... to Gary."

In his five terms as mayor, from 1968 to 1988, Richard Hatcher linked the city's downturn to the interstate highway system, cleared dozens of acres for reconstruction, and built the Genesis Convention Center. But his goal of building a Civil Rights Hall of Fame at the city's most prominent intersection remains unfulfilled. This is the city that Hatcher wanted to make the capital and economic center of black America. During the first 15 years of his administration, Gary received \$300 million from Washington. In 1976, federal funds accounted for 36 percent of the city's entire budget. But during Hatcher's tenure in office, U.S. Steel Gary Works, the company that created the city, eliminated 20,000 jobs.

Steel City looks desolate. Viewed northward from Washington Street, the ruined downtown rises like a mirage above large empty fields. A few prostitutes with harsh faces, working out of semi-abandoned buildings, are what remains of a once legendary red-light district. Street dogs trot along the empty lots. Plywood nailed across openings of vacant buildings has gone from brown to gray, and the boards are falling off, leaving the vacant structures accessible to squatters and scavengers.

Malfunctioning street lights are sometimes cut down as if they were trees stricken by a deadly disease, their jagged aluminum stumps left imbedded in the cement. Overgrown sidewalks line streets that have lost their names and sometimes even their traffic signs. Trees grow from the roofs of abandoned buildings, and in parking lots wild



shrubs break out of the concrete. Broadway, the city's main commercial street, has only one building undergoing rehabilitation, a former Sears store. "Fifty years ago, during the war, this was one of the busiest places on the planet," says James B. Lane, professor of history at Indiana University Northwest.

### Plans that remain on paper

Visions of renewal involve the development of resorts by the waterfront, the transformation of Gary's airport into a third regional airport for the tri-state area; a minor league stadium by the Indiana Toll Road; and casinos to attract gamblers from the Chicago metropolitan area. None of these would directly affect the city's downtown or Broadway, its major commercial street. Anyway, these plans remain on paper.

Nationally, we seem unable to achieve the consensus needed to rebuild our cities. But as we see in Chicago and Gary today, we certainly seem able to blow up and bulldoze structures that we consider useless. Our extraordinary ruins represent a short transitional period when stately structures built for the affluent become the homes, churches, and businesses of the poor, and after decades of neglect and disinvestment are discarded.

America does not share Europe's respect for ruins. From a distance, they are perceived as messengers of bad news. We either ignore them or react to them with anger, resentment, guilt, or despair. Ruins stand as witnesses to their own past, not doing what they were built to do, yet possessing an awesome power to stir the soul.

Historical precedent teaches that it will be a long time before these ruins can be looked upon with anything resembling appreciation. In England, for example, a century elapsed after the abrupt termination of the monasteries in the sixteenth century before observers could view them with interest and esthetic delight.

There is something inspiring about ruins. As witnesses of the urban condition, they urge us to ask: "Is there no choice but to stand by and watch the destruction of our cities?" Stripped to their essences, left-over buildings and discarded spaces form cityscapes of great power.

We need to hear the elemental chant that comes from our skeletal neighborhoods. Their once-familiar song beckons us to come home and perhaps to try again. ■



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**Calendar** continued from page 4  
tion," Adam's Mark Hotel. Call 215/668-1700.

**November 15-17**

Build Boston exposition, World Trade Center, Northern Ave. On Nov. 15 at the exposition, the Boston Society of Architects presents a lecture series on the future of architecture envisioned in the work done by winners of its Unbuilt Architecture awards program. Call 800/662-1235.

**November 17-20**

Symposium on Healthcare Design, Marriott Marquis Hotel, New York City. Call 510/370-0345 for details.

**November 18-December 17**

Actions + Continuities exhibition of buildings and projects of architects Thomas Hanrahan and Victoria Meyers, I-Space Gallery, Chicago. Call 312/587-9976 for details.

**November 18-June 11**

"Ladies Mile: Emporia and Entertainments" exhibition of costumes and accessories of the 19th century from the famed retail establishments of New York City's Ladies Mile. Museum of the City of New York; call 212/534-1672 for details.

**November 22-26**

Bluegrass Forum 1994 international architecture student symposium will address "The Uncertain Middle," focusing on the future of the changing city and the role of the architect in future society, among other topics. University of Kentucky, Lexington; phone 606/257-7617 for details.

**November 29-December 3**

"Making Cities Livable" conference, La Playa Hotel, Carmel, Calif.; call 408/629080 for details.

**Competitions**

- Theater Design Awards entries due Nov. 7. Call 212/807-7171 for details.
- "Unbuilt Architecture" contest entries must be submitted by Nov. 8. Call Boston Society of Architects, 617/951-1433, ext. 232.
- Brick in Architecture awards program, sponsored by the AIA and Brick Institute of America. Entries must be postmarked by Jan.16. Call 703/.620-0010 for further details.
- Home Design contest, sponsored by Trus Joist MacMillan, offers \$50,000 cash award. Call 800/338-0515 for entry information.
- Architectural Design Competition, sponsored by the Royal Oak Foundation, is calling for entries emphasizing collaboration of architecture, interior design, and landscaping. Students and graduates no more than five years out of school are eligible. Entries for the \$15,000 prize must be received between April 1 and April 15. Call 212/966-6565 for more information.

**Letters** continued from page 4

In any case, NCARB does not believe that the degree requirement alone can adequately determine if an applicant for registration has the skills, knowledge, and ability to practice architecture in a way which will satisfy the public's legitimate expectations; nor, for that matter, can a nationally administered exam alone or an intern-development program alone provide conclusive assurance of an architect's competence. But surely, no one can doubt that all three—rigorous education, internship, and examination—do indeed help to

insure that the public's health, safety, and welfare will be better protected. That protection is, after all, is what NCARB and its member boards are all about.

*Homer L. Williams  
President, NCARB  
Washington, D.C.*

#9

IN A SERIES

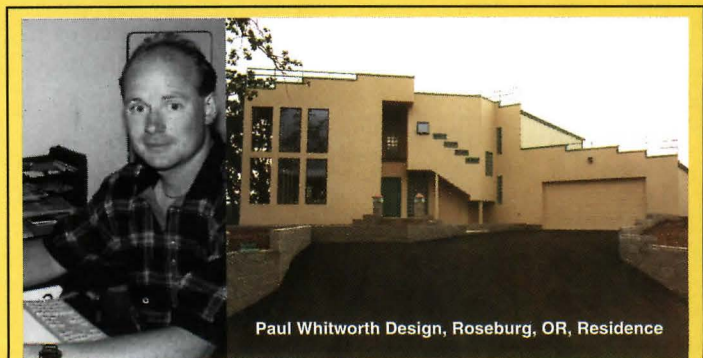
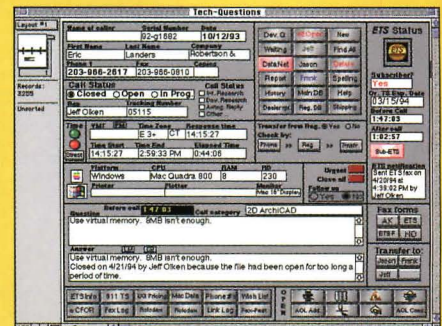
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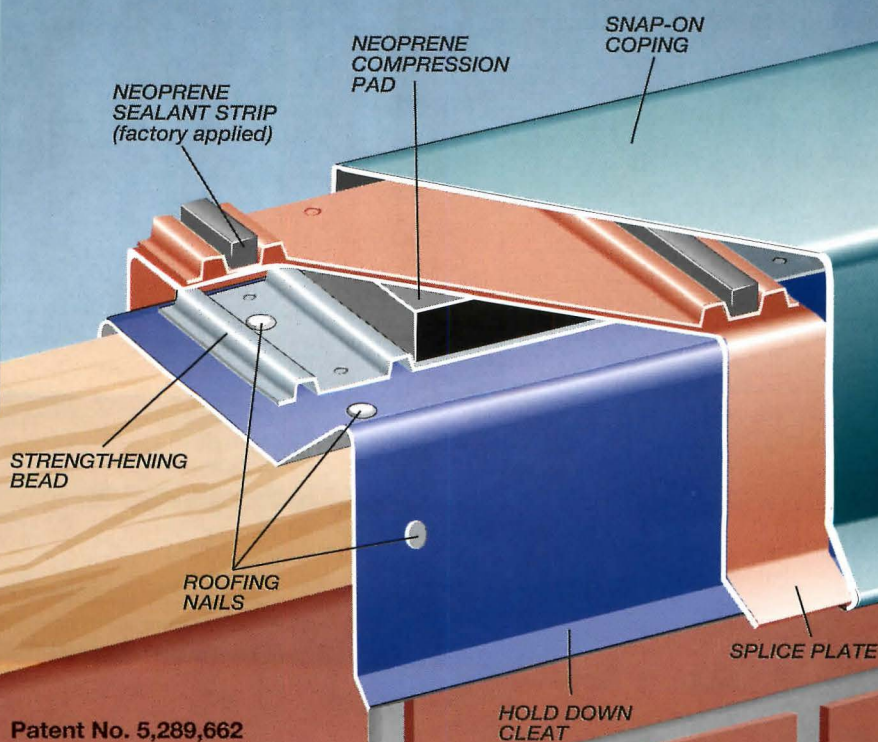
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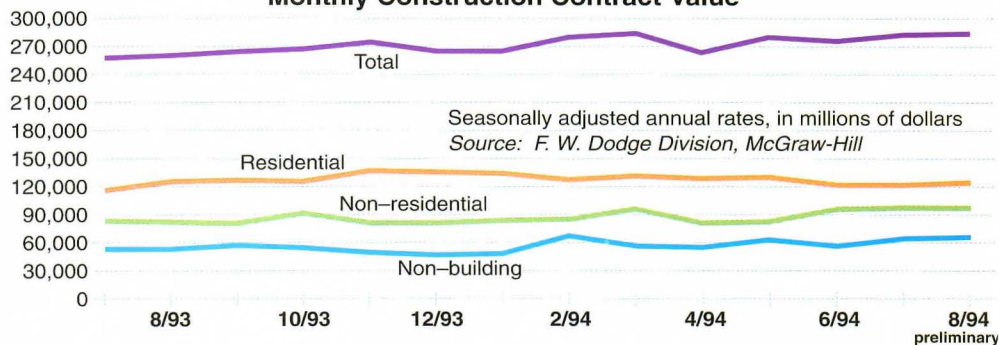


Indicators

**Broad, but minimal growth in volume**

Residential construction, which had dropped after spring's interest-rate run-up, has stabilized at about 15 percent below peak volume. Multifamily units have gained considerably, but are a small percentage of the residential total. Non-residential types are slowly gaining strength, led by store construction. Non-building work was boosted by near-record levels of road and bridge construction. This month's Financial Outlook and Construction Volume Forecast (following pages) describe the likely shape of 1995. ■

Monthly Construction Contract Value



**Commodities still pushing prices up**

The extended construction recession reduced manufacturing capacity so much that even this year's mild growth in construction has created supply bottlenecks and rising prices. *Engineering News-Record* reports double-digit annual increases for reinforcing bar, aluminum sheet, lumber, gypsum board, and pipe. In some cases, capacity is simply too low. (Manufacturers are adding steel plants, for example.) In other areas, such as gypsum, increased demand allows companies to return prices to pre-recession levels. Under either scenario, long-term inflation is unlikely. Labor-rate increases have been subdued, a situation that may change if volume continues to expand. Subcontractors who rely on skilled trades are already finding shortages, and are beginning to bid prices up in active markets. Regionally, Midwestern metro areas and a scattering of Southern cities are seeing substantial price rises over last year. In many areas, though, prices have slipped in the last few months, suggesting that uncertainty over the sustainability of growth—driven by the Federal Reserve's persistent tightening—remains. ■

Building Cost Indexes

	1990	1991	1992	1993	3/94	6/94	10/94	% change from 6/94	% change from 10/93
Atlanta	2238.80	2278.83	2404.75	2458.75	2508.84	2513.86	2518.63	+0.2	+5.0
Baltimore	2579.90	2508.06	2607.76	2787.51	2787.51	2803.46	2787.14	-0.4	+2.6
Birmingham	2149.96	2189.75	2279.26	2485.05	2582.97	2496.13	2468.66	-2.1	+1.3
Boston	3110.03	3102.31	3355.57	3624.03	3526.11	3596.09	3601.94	+0.2	+2.2
Chicago	2893.6	3034.72	3162.99	3347.46	3352.90	3385.54	3445.54	+1.8	+3.6
Cincinnati	2638.73	2674.15	2817.16	2892.78	2892.78	2949.90	2992.01	+1.4	+2.5
Cleveland	2886.93	2903.81	2903.1	3088.76	3301.60	3319.82	3278.68	-1.2	+6.1
Dallas	2061.61	2215.88	2278.21	2365.65	2574.11	2585.70	2451.03	-5.2	+6.8
Denver	2321.28	2375.26	2438.39	2573.90	2723.27	2660.41	2617.35	-1.6	+2.0
Detroit	2974.47	3046.92	3136.74	3373.95	3449.02	3440.36	3408.63	-0.4	+3.2
Kansas City	2645.28	2637.20	2677.21	2874.34	2961.58	2916.25	2916.25	0	+1.5
Los Angeles	3020.51	3097.83	3198.66	3334.43	3362.31	3415.04	3438.14	+0.7	+3.0
Minneapolis	2648.43	2711.5	2811.14	2978.60	3152.68	3196.33	3158.25	-1.2	+7.2
New Orleans	2220.20	2260.52	2360.24	2414.37	2506.85	2604.77	2484.44	-4.6	+5.5
New York	3847.21	3997.91	4151.28	4349.20	4298.61	4382.77	4454.01	+1.6	+2.5
Philadelphia	3040.85	3169.81	3130.58	3377.98	3405.18	3435.77	3490.93	+1.6	-1.1
Pittsburgh	2717.08	2807.73	2954.64	3140.13	3257.09	3247.32	3231.97	-0.5	+5.4
St. Louis	2602.16	2686.93	2743.01	3034.48	3050.80	2963.30	2968.74	+0.2	+1.6
San Francisco	3245.04	3270.90	3298.09	3428.04	3467.40	3499.57	3535.98	+1.0	+2.9
Seattle	2552.58	2715.04	2787.74	2980.82	3073.30	2991.70	3065.28	+2.5	+4.7
<b>20-City avg.</b>	<b>2702</b>	<b>2751</b>	<b>2834</b>	<b>3046</b>	<b>3116</b>	<b>3115</b>	<b>3116</b>	<b>0</b>	<b>+3.31</b>

Source: *Engineering News-Record, Construction Economics Department*. The Building Cost Index combines 68.38 hours of skilled labor weighted by the 20-city average of bricklayers', carpenters', and structural ironworkers' rates, plus 25 cwt of standard structural steel shapes at the mill price, plus 22.56 cwt (1.128 tons) of portland cement spot-priced locally, plus 1,088 board-ft of 2 by 4 lumber spot-priced locally. The base year is 1913 = 100. To

compare a given city's costs by percent, divide one index into the other. Example: the index for a city for one period (200.0) divided by the index for an earlier period (150.0) yields 1.33, which means the costs in the later period are 33 percent higher than the earlier period. Likewise, the earlier period's costs are 75 percent of the those in the later period (150.0 divided by 200.0 = .75 or 75 percent).

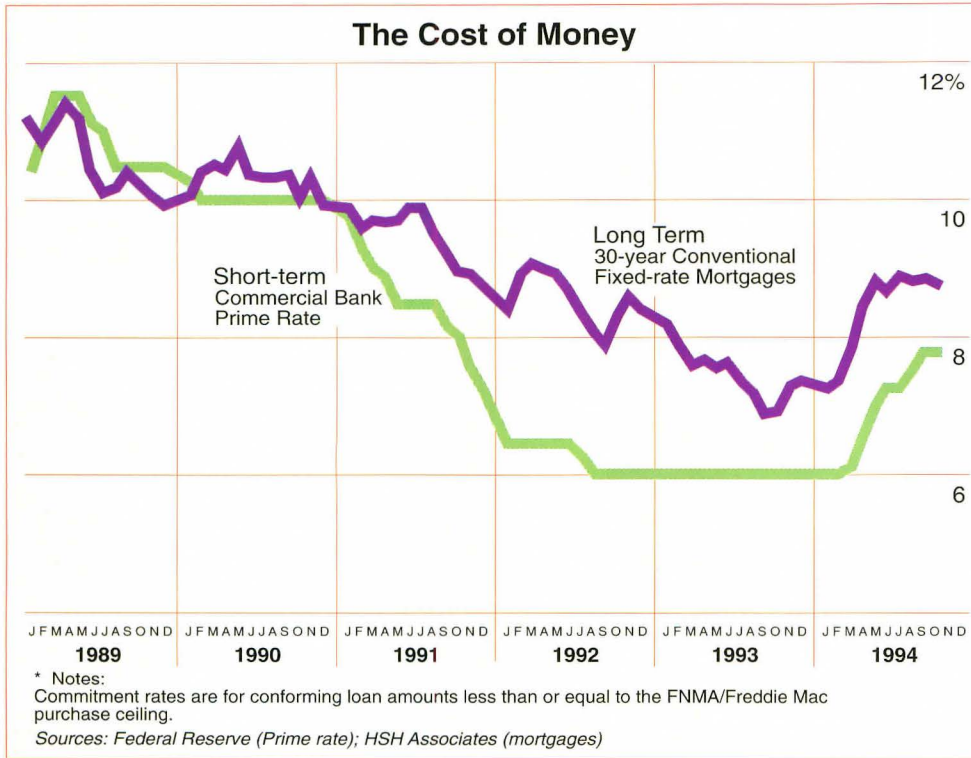
Short Takes

• **Disney quits Virginia.** Disney's America—set for a location near the Civil War Manassas battlefield and now canceled—did not fall victim only to blistering criticism by historians and environmentalists. It became emblematic of America's penchant to build new in exurban green-field sites, rather than rebuild struggling cities. At one time, the company considered sites for urban theme parks. Several well-located military bases are up for grabs. Could an urban theme park be Disney's public-relations salvation?

• **AIA's trumpeting its reorganization.** The evidence available to most members of the "new" AIA is *AIA Architect*, a tabloid that's replaced the reasonably useful *Memo*. How many pages of members patting each other on the back can we take?  
 • **Is the skyscraper dead?** For now it is, according to F.W. Dodge figures. Though office buildings more than four-stories high were as much as half the office market in the 1980s, the figure now hovers around 30 percent. ■



# Why the Fed Won't Speed Growth



Despite strong economic growth, broad gauges of inflation are running just under 3 percent, little changed from their 1993 levels. If those measures are not rising, why is Federal Reserve policy still focused on inflation, and what will its monetary tightening mean to construction activity in 1995?

Entering 1994, the economic expansion was picking up tremendous speed. The Federal Reserve worried that the prevailing surplus of labor, material, equipment, and plant capacity would vanish. It's just this surplus that has fostered expansion without causing prices to tick up. If the Federal Reserve waits for inflation to spiral, it will have no choice but to step hard on the monetary brakes. Such an action would probably dump the economy into recession.

**Fed focuses on inflation**

To avoid such an outcome, the Federal Reserve early this year shifted monetary policy from one that accommodates growth to one that restrains it. Its purpose was to slow economic growth to less than 3 percent, a

rate it regards as consistent with the nation's ability to add production capacity. These actions, in the Fed's view, will extend an inflation-free expansion well beyond 1995.

Last spring, the Federal Reserve moved quickly to firm, then push up interest rates. Initially these actions drew only mild criticism, since the economy still seemed robust. But the debate has become much more heated since the Fed raised rates again in August. The bond market, its vision similar to that of the Fed, drove its rates upward in anticipation of further Fed restraint. In contrast, industries (including construction) lobbied vigorously against further hikes.

Since the Fed's view is that low inflation—even if it means somewhat slower growth—is better long-term than robust growth *with* inflation, this debate will only intensify. Rates will certainly rise again, by mid-November at the latest. But this year's steady tightening of monetary policy has taken time to impact the economy. Now, evidence is mounting that a transition is underway in the sectors that

have been pushing the economic advance. Gains in consumer spending, which accounts for 70 percent of GDP, and have bolstered demand for most of the recovery, are easing. Meanwhile, capital expenditures and exports of goods and services are rising.

This poses a monetary dilemma. The portents of inflation are easiest to document in the manufacturing sector. Indeed, it was signals in this sector that caused the Federal Reserve to tighten aggressively in 1994. Then, however, consumer spending was robust. In 1995, consumers will be less bullish. The Fed would like to maintain growth at a 2.5- to 3-percent real rate. The unrelenting tightening of monetary policy in 1994 (chart), however, could sap consumer outlays enough to push GDP growth well below 2.5 percent. As this occurs, the Federal Reserve will ease rates in 1995 as it shifts its focus gradually back to sustaining expansion.

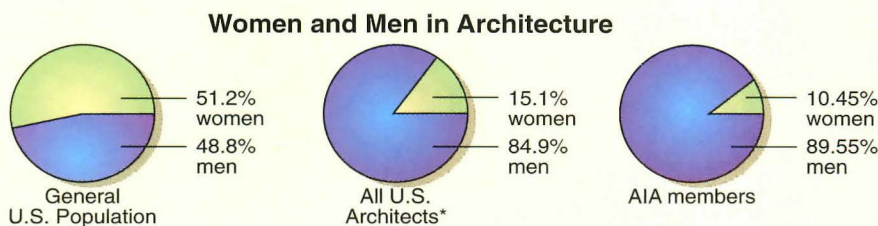
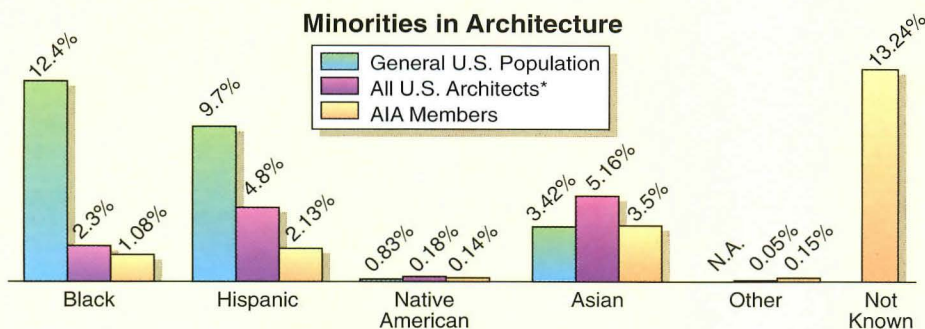
**Tight money pays some dividends**

In this less-robust expansion, construction activity will be mixed. Rates on 30-year fixed-rate mortgages will soon climb above 9 percent. That's too high for many first-time buyers, so they'll continue to rent rather than own. This group's housing decisions will strengthen renovation activity and new starts in multi-family housing in the year's first half. Single-family starts will slip until there is a clear break in rates.

With uncertainty pervading the bond and stock markets, pension funds and other financial institutions will allocate more investment dollars to those (primarily existing) retail and office properties that have strong cash flows. Rather than expand plants, manufacturers throughout the 1990s have invested large sums in equipment to increase productivity. As the economic revival in Europe spurs demand for the reasonably priced output of American plants, producers will shift more capital investment toward the kinds of renovations and expansions that will increase capacity. There's also pent-up demand for public facilities such as schools and prisons, but decreasing tax receipts had reduced what public agencies could build. Most state and local governments are now reporting budget surpluses, so more money will be budgeted for long-delayed projects. *Phillip E. Kidd*



## Architecture Doesn't Look Much Like America



Source: AIA (1994); U.S. Census (1990, 1993)

\* Architects as defined by the U.S. Census, which includes related professions such as landscape architects, land planners, and environmental planners.

By Sheri Olson

That racial minorities and women are underrepresented in architecture is not news. The extent to which the profession has failed to attract members of these groups was strikingly underlined at the AIA conference "Breaking the ICE: Building New Leadership," held last August in Washington, D.C. Amazingly, this was the first AIA conference developed for those "marginalized," as organizers put it. Presenters documented a stunning divergence in the numbers of women and people of color in the population at large versus their participation in the profession (chart). Another striking finding was the failure of women—who have entered the field in large numbers—to advance.

The conference was organized jointly by the National Minorities and Women in Architecture Committee, the National Organization of Minority Architects, and the AIA's Expert Panel on Diversity. (Diversity in this instance included lesbian, gay, and disabled attendees.) Through a series of workshops, caucus sessions, and roundtable discussions, the 200-plus participants sought to develop

Sheri Olson is an architect, writer, and teacher with her own firm in New York City.

"an inclusive, responsive, relevant profession by inviting, cultivating, and empowering diverse leaders." Sharon Sutton, an architect with the Urban Network of the College of Architecture at the University of Michigan, keynoted. Ken Rhyne presented the perspective of an American Indian architect.

In perhaps the first survey that has attempted to track the progress of women and minorities in architecture, Kathryn Anthony, a professor at the University of Illinois, Urbana-Champaign, found dramatic pay disparities. Men with 15 years experience typically earned \$10,000 per year more than comparably experienced women, according to her early findings. Anthony found more differences in gender than in race. Many respondents told her there was little commitment to equal opportunity in firms. About two-thirds said a "glass ceiling" limited advancement.

### No role models

Key to increasing minority participation in the field is role models, say experts. And it is critical that they be visible in schools, where many aspiring architects first encounter the profession's culture. Michael Kaplan, professor at the University of Tennessee, reported

that only 8.7 percent of tenured architectural faculty are women. Jack Travis, a New York City architect, shared projects done by minority high school students participating in a program he developed to encourage interest in design. While women and minorities currently account for up to half of those entering professional programs, "the graduates are not as impressive as the enrollment," says Cecil Steward, dean of architecture at the University of Nebraska. Only 26 percent of female students complete their degrees. And there is significant further falloff between graduation and licensure.

In a workshop devoted to concerns of lesbian, gay, and bisexual designers, Seattle architect Rena Klein discussed the toll exacted by "staying quiet, hidden, and trying to pass." [See also RECORD, June 1994, page 36]. Gay and lesbian architects rallied around three primary items: a more inclusive workplace, rather than the "don't ask, don't tell" policy prevalent; domestic partnership benefits; and more aggressive enforcement of AIA ethical guidelines prohibiting discrimination based on sexual orientation.

### Networking and mentoring

Networking opportunities abounded, and federal agencies offered a job fair, and gave advice on taking advantage of minority-preference programs. Conference members, in comments summarized at the closing session, suggested that the AIA could "institutionalize openness" by creating incentives for firms to redress pay and hiring inequities. Members also called for changes in the election process for AIA's board of directors and in the dues structure to allow greater access and participation. Participants urged support for research and publication on the issues facing women and minorities, proposed the creation of a network for minorities, and asked AIA to actively develop professionals who would act as mentors within communities that don't see architecture as a welcoming profession.

As co-chair Stephen Glassman noted, "the people who most need this type of conference are absent." To create a sense of urgency among the larger membership, one attendee suggested offering scholarships for the next diversity conference (to be held in 1995, says AIA) to heterosexual white males. ■



## Construction's Balancing Act

Three years into economic recovery, the construction industry's subdued expansion is in transition. Single-family housing provided most of the upward momentum in the early stages, with broader participation by other industry sectors getting underway in the latter half of 1993 and into 1994. This pattern of recovery—a surge of housing followed by a handoff to nonresidential building and public works—is certainly consistent with the traditional construction cycle. What's been different this time is that recovery has unfolded much more gradually than in previous upturns, dampened further by a commercial-building sector that isn't supporting recovery because it's still awash in a glut of space.

To put this in perspective, consider that income properties (commercial building plus multifamily housing) made up more than one-third the volume of total construction in the mid-1980s. This sector is now holding at just an 18-percent share. Having finally bottomed out in early 1993, the income-property group is capable of impressive gains on a percentage basis, but its contribution to the rest of the industry in absolute terms is limited. Institutional building and public works now comprise a higher percent of the market. At best they'll grow five to 10 percent annually, precluding the kind of second-stage boost income properties once offered.

The strength of the recovery at this phase depends on a balancing act: whether other construction types will increase to offset single-family housing, which is losing momentum. In the typical six- to seven-year construction cycle, this "filling in" usually occurs during the second and third years. This time, however, the non-single-family recovery is at least a year later than normal. In next year's "soft landing" economy, where real economic growth settles back to the 2.0- to 2.5-percent range, the forecasted changes in activity (charts this and following page) depend on several factors.

- With higher mortgage rates, how much will *single-family housing* decline?
- Will the *income-property* group's fragile turnaround be derailed by 1995's weaker economic growth?
- Can the hesitant recovery for *manufactur-*

### 1994-95 National Estimates Dodge Construction Potentials

October 1994

	1994 Preliminary	1995 Forecast	Percent Change 1995/94
<b>Nonresidential Buildings</b>			
<b>Floor Area</b> (in millions of sq. ft.)			
Office Buildings	102	112	+10
Stores and Shopping Centers	235	215	-9
Other Commercial	220	238	+8
Manufacturing Buildings	120	130	+8
<b>Total Commercial &amp; Manufacturing</b>	<b>677</b>	<b>695</b>	<b>+3</b>
Educational, Hospital & Health	160	168	+5
Other Nonresidential Buildings	70	69	-1
158	163	+3	
<b>Total Institutional &amp; Other</b>	<b>388</b>	<b>400</b>	<b>+3</b>
<b>TOTAL NONRESIDENTIAL BUILDINGS</b>	<b>1,065</b>	<b>1,095</b>	<b>+3</b>
<b>Contract Value</b> (millions of \$)			
Office Buildings	\$13,350	\$14,975	+12
Stores and Shopping Centers	14,450	13,925	-4
Other Commercial	10,775	12,100	+12
Manufacturing Buildings	9,200	10,175	+11
<b>Total Commercial &amp; Manufacturing</b>	<b>\$47,775</b>	<b>\$51,175</b>	<b>+7</b>
Educational	\$19,025	\$20,075	+6
Hospital and Health	10,125	10,150	—
Other Nonresidential Buildings	18,275	19,100	+5
<b>Total Institutional &amp; Other</b>	<b>\$47,425</b>	<b>49,325</b>	<b>+4</b>
<b>TOTAL NONRESIDENTIAL BUILDINGS</b>	<b>\$95,200</b>	<b>\$100,500</b>	<b>+6</b>
<b>Residential Buildings</b>			
<b>Dwelling Units*</b> (thous. of units)			
Single-Family Houses	1,045	980	-6
Multifamily Housing	225	240	+7
<b>Total Residential Buildings</b>	<b>1,270</b>	<b>1,220</b>	<b>-4</b>
<b>Floor Area</b> (millions of sq. ft.)			
Single-Family Houses	1,922	1,810	-6
Multifamily Housing	228	245	+7
<b>Total Residential Buildings</b>	<b>2,150</b>	<b>2,055</b>	<b>-4</b>
<b>Contract Value</b> (millions of \$)			
Single-Family Houses	\$115,900	113,225	-2
Multifamily Housing	13,375	14,850	+11
<b>Total Residential Buildings</b>	<b>\$129,275</b>	<b>128,075</b>	<b>-1</b>
<b>Nonbuilding Construction</b>			
<b>Contract Value</b> (millions of \$)			
Transportation Construction	\$40,350	\$42,500	+5
Environmental Construction	17,550	18,200	+4
<b>Total Public Works</b>	<b>\$57,900</b>	<b>\$60,700</b>	<b>+5</b>
Utilities	\$4,500	\$4,800	+7
<b>TOTAL NONBUILDING CONSTRUCTION</b>	<b>\$62,400</b>	<b>\$65,500</b>	<b>+5</b>
<b>All Construction</b>			
<b>Contract Value</b> (millions of \$)			
<b>Total Construction</b>	<b>\$286,875</b>	<b>\$294,075</b>	<b>+3</b>
Dodge Index (1987=100)	111	114	

\*F.W. Dodge basis



To keep the construction recovery on track, writes Robert Murray in Dodge/Sweet's 1995 construction-volume forecast, institutional and commercial building will have to pick up housing's slack.

ing building finally take hold?

- Are state and local finances in good enough shape to improve the outlook for *institutional* building?
- To what extent will *public works* become a victim of deficit-reduction pressure and congressional gridlock?

On balance, the construction industry will experience a slower pace of expansion in 1995, but expansion nevertheless. Following gains of 9, 7, and 7 percent during the first three years of recovery, a 3 percent advance for total construction contract value is projected for 1995.

#### **Soft landing for single-family housing**

*Outlook:* Due to early 1994 strength, single-family housing starts this year will come to 1.045-million units, a 3-percent gain over the previous year and the highest annual rate since 1986, when 1.081-million units were reported. Next year's activity will slip back, a decline spread throughout much of the nation. The Northeast is best able to avoid a 1995 downturn because it has the least to lose. Since 1991, its recovery has lagged well behind other regions.

*Influences:* Single-family housing maintained an annualized rate of 1.1-million units during 1994's first quarter, but the next two quarters eased back to the 1-million-unit mark. The culprit: fixed-mortgage rates that rose from 6.8 percent in October 1993 to 8.5 percent by mid-1994 (representing an additional \$200-per-month for a \$150,000 mortgage). Even with the higher cost of financing, the single-family decline thus far has been quite modest, and it's unlikely to worsen substantially going into 1995. Consumer confidence has generally held up through most of 1994. While consumer unease has grown a bit in 1994's third quarter, it's not expected to build dramatically over the near term, particularly given the improved employment picture.

Fixed-mortgage rates, moving up to 9 percent from mid-1994's 8.5 percent, will push a few first-time homebuyers out of the market. Yet, current levels are still manageable by the standard of recent years. Adjustable-rate mortgages (ARMs) will also keep some buyers in the market since initial

rates have shown smaller increases. During 1994's third quarter, the ARM share of mortgages issued had climbed back to 40 percent from 20 percent in 1992-93.

The first half of the 1990s has seen the 35- to 54-year-old-demographic group grow by more than 10-million persons, compared to 9 million during the second half of the 1980s, so the demographic fundamentals of the single-family market remain strong. In addition, the Census Bureau has raised its population-growth estimates to take immigration growth into account, boosting projected near-term demand for single-family housing. Single-family construction should remain at around 1-million annual units through the mid-1990s.

*“On balance the construction industry will experience a slower pace of expansion in 1995 (3 percent versus 7 percent in 1994), but expansion nonetheless.”*

With less pent-up demand and a slower economy, single-family starts will move below 1-million units in 1995, but not much below, given the continued demographic support and the modest reduction in affordability 9-percent mortgages represent.

Maturing baby boomers will make the 45- to 54-year-old age group the fastest growing segment of the population during the second half of the 1990s. This will strengthen the trade-up market in the years ahead, as homeowners with rising incomes look for larger houses.

In an environment of higher mortgage rates, regions that have grown most over the past three years will be susceptible to a mild 1995 setback. The Northeast, which really has shared little in the upturn thus far, will likely plateau during the first half of 1995, then benefit from improving conditions in next year's second half. Its level of activity relative to the 1991 trough will still show only limited improvement when compared to other regions, since the Northeast's slow job expansion, consolidation in its key industries,

and cost disadvantages will impede any return to mid-1980s growth.

#### **Income properties: little real growth**

*Outlook:* The income-property group finally bottomed out in early 1993, after seven years of decline that plunged the group's square-foot total to one-third its 1985 peak. Last year witnessed a modest 6 percent increase, and 1994's stronger economy has enabled a faster pace of recovery: a 17 percent increase to an estimated 785 million sq ft. There will be some negative impact from 1995's softening economy, but the result will be a slower rate of growth for the group as a whole—not a downturn. A retail-construction retreat from 1994's robust volume is the

primary reason the group will advance just 3 percent next year to 810 million sq ft. The projected 1995 expansion for other building types within the income group comes to a more substantial 8 percent.

*Influences:* Office vacancy rates have retreated from 19 percent two years ago to 16 percent at mid-1994—a sign that market fundamentals are coming into better balance. The equilibrium office-vacancy rate is usually considered to be about 10 percent, so a healthy office-building market is still barely in sight.

Another positive development is that banks are now more anxious to lend for real-estate development. They showed substantial profits over the past year due to the large spread between their cost of funds and the lending rates they were able to charge. This spread is beginning to narrow, and the banking industry is more aggressively searching out other ways to increase revenues. One indication of this trend is the greater volume of commercial and industrial loans. After falling during much of 1993,



commercial lending was rising at an 8-percent clip by mid-1994. Investors have shown renewed interest in the higher returns generated by some income-property markets. They are putting money into real-estate investment trusts (REITs). These vehicles have been directed at existing properties for the most part, so they aren't yet a factor in new construction. Though real-estate investment is clearly losing its stigma, the tighter regulatory framework put in place after the excesses of the '80s should prevent any surge in financing for purely speculative projects.

On the demographic side, there remain some influences limiting growth. Those born in the 1970s as part of the "baby bust" group are now reaching young adulthood, causing the number of 18- to 34-year-olds to shrink by 5.8 million during the 1990s. Growth in this group, just entering the labor force, is what is needed to help absorb the overbuilding of the last decade. Many corporations will continue to downsize and shift more employees to "contract" status, which will restrain office-employment growth. As communications and computer technology make mobile work possible for more workers, fewer will need office space; per-worker office square footage may already be lower than it was 10 years ago.

In summary, trends support a continued upward trend in the income-property group as a whole. The total volume, however, is still very low by historical standards, meaning that only modest strengthening in absolute terms is required for these categories to report significant percentage gains.

With the single-family market losing momentum in 1994, growth has emerged in *multifamily housing*. And the extremely low levels of construction in recent years means that demand is catching up with supply. As occupancy rates recover, cash flow improves, making properties appealing to lenders, and encouraging construction of new units. The reinstatement of tax credits for low-income housing has also helped boost the multifamily total, and REITs have shown particular interest in multifamily housing. Over the course of 1994, activity has strengthened to such an extent that this sector should report

**1995 Regional Estimates** Dodge Construction Potentials October 1994

Contract Value (in millions of dollars)	1994 Preliminary	1995 Forecast	Percent Change 1995/94		1994 Preliminary	1995 Forecast	Percent Change 1995/94
<b>Northeast</b> CT, ME, MA, NH, NJ, NY, PA, RI, VT							
<b>Nonresidential Buildings</b>				<b>Residential Buildings</b>			
Commercial and Manufacturing	\$7,050	\$7,575	+7	Single family Houses	\$12,075	\$13,025	+8
Institutional and Other	8,800	8,925	+1	Multifamily Housing	2,275	2,400	+5
<b>Total</b>	<b>\$15,850</b>	<b>\$16,500</b>	<b>+4</b>	<b>Total</b>	<b>\$14,350</b>	<b>\$15,425</b>	<b>+7</b>
<b>Nonbuilding Construction</b>	<b>\$10,825</b>	<b>\$11,300</b>	<b>+4</b>	<b>TOTAL CONSTRUCTION</b>	<b>\$41,025</b>	<b>\$43,225</b>	<b>+5</b>

<b>North Central</b> IL, IN, IA, KS, MI, MN, MO, NE, ND, OH, SD, WI							
<b>Nonresidential Buildings</b>				<b>Residential Buildings</b>			
Commercial and Manufacturing	\$11,550	\$11,650	+1	Single-family Houses	\$25,800	\$24,475	-5
Institutional and Other	10,600	10,925	+3	Multifamily Housing	3,150	3,600	+14
<b>Total</b>	<b>\$22,150</b>	<b>\$22,575</b>	<b>+2</b>	<b>Total</b>	<b>\$28,950</b>	<b>\$28,075</b>	<b>-3</b>
<b>Nonbuilding Construction</b>	<b>\$13,850</b>	<b>\$14,375</b>	<b>+4</b>	<b>TOTAL CONSTRUCTION</b>	<b>\$64,950</b>	<b>\$65,025</b>	<b>-</b>

<b>South Atlantic</b> DE, DC, FL, GA, MD, NC, SC, VA, WV							
<b>Nonresidential Buildings</b>				<b>Residential Buildings</b>			
Commercial and Manufacturing	\$9,800	\$10,675	+9	Single-family Houses	\$28,650	\$28,875	+1
Institutional and Other	9,775	10,325	+6	Multifamily Housing	2,975	3,525	+18
<b>Total</b>	<b>\$19,575</b>	<b>\$21,000</b>	<b>+7</b>	<b>Total</b>	<b>\$31,625</b>	<b>\$32,400</b>	<b>+2</b>
<b>Nonbuilding Construction</b>	<b>\$11,325</b>	<b>\$12,100</b>	<b>+7</b>	<b>TOTAL CONSTRUCTION</b>	<b>\$62,525</b>	<b>\$65,500</b>	<b>+5</b>

<b>South Central</b> AL, AR, KY, LA, MS, OK, TN, TX							
<b>Nonresidential Buildings</b>				<b>Residential Buildings</b>			
Commercial and Manufacturing	\$8,050	\$9,050	+12	Single-family Houses	\$19,225	\$18,325	-5
Institutional and Other	7,275	7,800	+7	Multifamily Housing	1,825	1,625	-11
<b>Total</b>	<b>\$15,325</b>	<b>\$16,850</b>	<b>+10</b>	<b>Total</b>	<b>\$21,050</b>	<b>\$19,950</b>	<b>-5</b>
<b>Nonbuilding Construction</b>	<b>\$10,500</b>	<b>\$10,875</b>	<b>+4</b>	<b>TOTAL CONSTRUCTION</b>	<b>\$46,875</b>	<b>\$47,675</b>	<b>+2</b>

<b>West</b> AK, AZ, CA, CO, HI, ID, MT, NV, NM, OR, UT, WA, WY							
<b>Nonresidential Buildings</b>				<b>Residential Buildings</b>			
Commercial and Manufacturing	\$11,325	\$12,225	+8	Single-family Houses	\$30,150	\$28,525	-5
Institutional and Other	10,975	11,350	+3	Multifamily Housing	3,150	3,700	+17
<b>Total</b>	<b>\$22,300</b>	<b>\$23,575</b>	<b>+6</b>	<b>Total</b>	<b>\$33,300</b>	<b>\$32,225</b>	<b>-3</b>
<b>Nonbuilding Construction</b>	<b>\$15,900</b>	<b>\$16,850</b>	<b>+6</b>	<b>TOTAL CONSTRUCTION</b>	<b>\$71,500</b>	<b>\$72,650</b>	<b>+2</b>

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*Revenue surpluses are up, so local government may start spending again if tax-cut pressures don't prevail. Congressional gridlock is stalling expansion in health care and public works.*

a 23-percent gain, a rate, however, that will not be sustained given lower consumer confidence and a softer economy in 1995.

The *office-building* sector showed meager improvement in 1993, with contracting rising 4 percent. A more substantial 15 percent rise (to 102 million sq ft) is projected for 1994. The upward momentum should continue into 1995 as activity climbs to 112 million sq ft, still an extremely low volume.

The first profitable year for the hospitality industry in a decade was 1993. The stage was set for a strong *hotel* rebound in 1994 contracting. From the dismal 19 million sq ft reported last year, contracting surged in early 1994 to 28 million sq ft, up 49 percent. The growth of casino gambling in several states should keep this category on an ascending path. Accordingly, next year's volume is projected at 32 million sq ft.

For many years *warehouse* construction maintained a one-to-one relationship with store construction. In this recovery, warehouses took a different path. While store construction began its respectable upturn during the 1992-93 period, warehouses plunged to historic lows. (One explanation is that large discounters increasingly maintained inventory on-site and other retailers moved to just-in-time inventory practices.) This year has seen a strong if belated rebound: warehouses should climb 26 percent. More growth is likely in 1995.

*Stores and Shopping Centers* is a category that has stood apart from other income-property types. It dropped only moderately during the recession and has had a much stronger recovery. The robust performance has continued into 1994, with contracting estimated to rise 13 percent, bringing activity to within 15 percent of the mid-1980s peak. This category's healthy volume is vulnerable, however. Store construction typically lags the trend in single-family housing, suggesting softening ahead. The retail sector's transition to giant warehouse-style outlets and specialty stores won't be enough to balance slowing retail sales overall. Despite plans for expansion by discount chains, contracting in 1995 is expected to slip.

#### **Manufacturing out of the doldrums**

*Outlook:* Manufacturing construction is still at a weak volume (falling in 1992 to the lowest level since World War II), but has turned around. After 1993's advance to 109 million sq ft, stronger activity in the second half of 1994 should lift this year's total to 120 million sq ft. Slower expansion for the general economy during 1995 may dampen some upward momentum, but contracting next year will still climb.

#### **Pressure's on for institutional building**

*Outlook:* The broadening of economic recovery in 1994 has eased state and local fiscal distress. In response, institutional building has shown renewed vigor after two years of slippage. Steady gains during 1994's first half, led by schools, court houses, and detention facilities, should push this year's volume of institutional building up 3 percent. The gradual upward trend will continue through 1995.

*Influences:* The broad pattern for institutional building has avoided the boom-and-bust behavior of housing and commercial building. Institutional building has been dampened by the fiscal straits of state and local governments. As unemployment rose during the recession, governments confronted lower tax receipts and higher demand for services. These funding shortfalls tend to lag the business cycle—both on the way down and on the way up. A recent study by the National Governors Association said "states are now able to use increases from existing revenue sources to fund modest program increases." Instead, 20 states used revenue surpluses for tax cuts.

Since most public projects are financed through the bond market, rising interest rates affect the institutional market—but in a diffuse way. One limitation is the need to keep interest payments on debt at manageable levels. A more potent influence is the scrutiny given bond issues by voters hesitant to add to their tax burden.

Despite this year's pickup in interest rates, the stronger tax-revenue picture should make it easier for states and municipalities to borrow money for capital improvements. *School* construction is the largest institution-

al building type. Activity bounced back in 1993, and further gains are predicted for 1994-95. According to the latest projections prepared by the National Center for Education Statistics, total enrollment of primary and secondary students will increase by 10 percent. Most of the growth will come from the K-8 cohort.

The crime legislation passed by Congress in late August ensures that *corrections* construction will continue to grow. Although construction has risen substantially in recent years, it's unable to *keep pace with incarceration*. By 1993, the prison population was nearly 130 percent of capacity in state prisons. The federal crime bill would authorize \$7.9 billion over six years for facilities.

Uncertainty over the shape of *health-care* reform has contributed to a mild retreat in construction activity. New health facilities slipped 3 percent in 1993, and a similar decline is likely this year. With further debate on a health-care bill put off until 1995, uncertainty will dampen this market for at least another year. Accordingly, health-care building will remain flat in 1995. Ultimately, expanded coverage for long-term care and continued growth of the elderly population (particularly the "very old"—those 85 years old and above) should benefit the nursing-home market.

#### **Gridlock victimizes public works**

*Outlook:* Continued strength for highway and bridge construction, benefiting from 1991's Intermodal Surface Transportation Efficiency Act (ISTEA), will push total public-works construction up 9 percent in 1994. This year, federal support levels out, so public works will grow only 5 percent, the slowest rate of increase since 1991, which was the final year of the preceding highway program. Although states were given greater leeway under ISTEA to transfer funds to mass-transit projects, Dodge data over the last two years show that highway and bridge projects remain the prime focus. Public-works growth depends on Congressional passage of three big environmental bills early in 1995 (the Clean Water Act, amendments to the Safe Water Act, and reauthorization of "Superfund" toxic-waste cleanup).

*Robert Murray*



## Is This Any Way to Build an Airport?



© Timothy Hursley/The Arkansas Office

*DIA's Concourse A (foreground) was designed by the SLP/TRA team to echo a design developed for the main terminal by the Perez Group, which was superseded by the fabric roof designed by Fentress Bradburn (background). Continental Airlines demanded the bridge.*

Denver-area residents squirm under an uncomfortable international spotlight. It shines on the all-but-complete 26-sq-mile, \$3-billion Denver International Airport (DIA), which has yet to open because designer-builders can't get its exotic automated baggage-handling system working. DIA, for better or worse, is a product of the *process* by which it was built much more than the studied response to user needs that most architects strive for.

On the one hand, the baggage-system drama has obscured an enormous accomplishment: that the complex was mostly designed and entirely built in just over four years, absorbing huge changes imposed after construction began. (The delays are a major source of frustration for the thousands who worked unending nights and weekends to meet an excruciating schedule.) DIA should have been a case study in its use of many widely touted techniques for assuring quality, controlling costs, and avoiding communication breakdowns. It's now clear that there were flaws in the way the project was structured, but even a perfect organization would have been sorely

tested by the scope of changes and the schedule. Once the airport's functionality is tested, the airport's designers will be blamed if choices—many not under their control—prove to be flawed.

On the other hand, DIA is a state-of-the-art example of a larger construction trend in which schedule, cost, or ease of decisionmaking take primacy in owners' minds over the suitability, quality, longevity, or civic quality of the completed structure.

DIA was controversial from the beginning. Stapleton, Denver's current airport, is a major airline hub, close to downtown, and has had \$100 million in recent improvements. But its runways are too short for jumbo jets, bad weather halves its capacity, and nearby residents opposed expansion because of airport noise. In 1983, Mayor Federico Peña began the search for an alternate location. In 1988 the city made a preliminary agreement for a 53-sq-mile site in Adams County, east of Denver. Because only the city and county had the bonding capacity to build the airport, two hard-fought votes were required to annex the

remote site to the city and approve the planned new facility. As early as 1987, United Airlines and Continental Airlines objected to the plans, fearing the cost burden.

### Engineers design the process

The design and construction process at Denver was organized under a Program Manager, an increasingly common method for very large and complex projects. The City of Denver amalgamated its engineering staff with Greiner Engineering, Inc., an engineering, architecture and airport-planning firm, and Morrison-Knudsen Engineering, which is a design-construct firm. The city and Greiner/MKE acted as a Project Management Team (PMT), coordinating schedule, cost control, information management, and administration of some 100 design contracts and, ultimately, some 160 general contractors and more than 2,000 subcontractors (chart opposite). This entity was the "owner" to whom the architects reported.

Peat Marwick, a consulting firm, performed a feasibility study in 1986 and projected passenger traffic. Based on the projections, Greiner devised Denver's parti, a variation of the hub-airport scheme first used in Atlanta. It divided the terminal complex into a land-side, for passengers arriving and departing from Denver, and three airside concourses (more can be added) intended to ease the transfer of passengers from one flight to another. Depending on the season, as many as 50 percent of users will change planes.

### A symbol? Or just easy-to-clean?

A split between those who would operate the airport and the city's aspirations for it became evident in the selection of the architects. Airport personnel, happy with work The Perez Group had done at Stapleton, convinced Denver to hire the New Orleans firm. Perez admits that on objective criteria, the firm scored lower during the selection process than other competitors, among them I. M. Pei & Partners and Murphy/Jahn.

In an unusual split of responsibilities, Perez's team (which included local firms Reddy & Reddy; Bertram Bruton and Associates; and Pouw and Associates) was contracted to create standards that would unify the entire airport, and to take the design of the main



*The travails of Denver's yet-to-open new airport bespeak the price paid when the process by which projects are built becomes more important to owners than the quality of the finished product.*

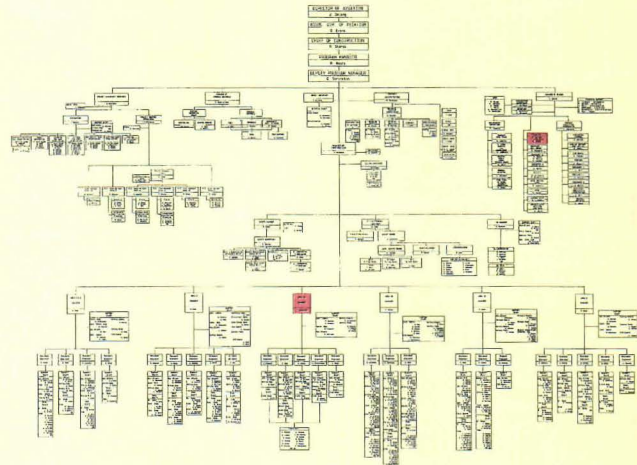
terminal only through schematics and design development, at which point it would be handed off to another firm. August Perez, the principal designer, says the direction he was given came from airport personnel, whose focus was operational. "Our work was done inside the department of public works," says Perez. "They didn't give us much support in some of the esthetic directions we wanted to pursue. Almost all decisions were made in reaction to maintenance or technical issues."

Among the project requirements, however, was a specific charge to develop a signature image for the airport, one that would capture the uniqueness of Denver and Colorado. Perez designed a stepped-roof profile supported by an exposed truss system over a large central atrium, evoking the lacy structure of train sheds. He thus brought the imagery of railroading, responsible for Denver's early growth, into the jet age.

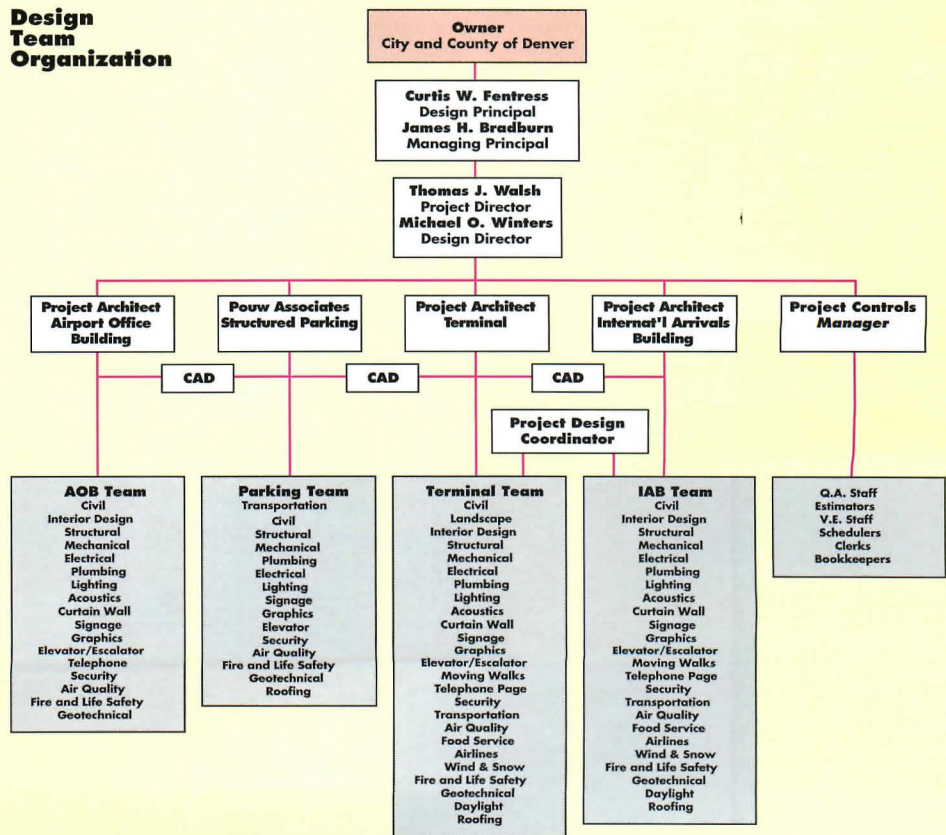
The mayor, city council, and others were concerned that this expression was not powerful enough for the project, considering it was financed by more than \$2-billion in city and county debt. A blue-ribbon panel was formed to review the design and urge improvement. "The head of Stapleton for 35 years was a maintenance engineer," explains architect Harry Teague, of Aspen, who was among those brought in to suggest changes. "He was calling the shots, so he was going for simple, low-cost, easy-to-clean stuff."

**Fentress Bradburn gambles and wins**  
Discussion went on. Says Teague: "The blue-ribbon commission liked what we came up with, but the airport commission would shoot it down. We were making what I consider rather desperate moves." Eventually the city council endorsed Perez's design and the firm proceeded. But controversy over the terminal's roof boiled over again when an evaluation of Perez's design indicated the *roof design would push the project off schedule and \$48-million over budget.* The firm of C.W. Fentress J.H. Bradburn and Associates had been retained to do the evaluation for technical compliance, and was slated to take the project from design development through construction. (Architect Bertram Bruton and Associates was also part of the Fentress Bradburn design team.)

### Project Organization



### Design Team Organization



*The scale and complexity of the effort at Denver International Airport is conveyed by the organization chart for the main terminal's architects (above). The colored boxes in the top chart indicate the points at which this team interacted with the entire airport's*

*project-management organization. The PMT had responsibility for such equally gigantic contracts as site grading and roads (\$379 million), runways (\$400 million), specialty systems (mainly communications—\$491 million), and utilities (\$184 million).*



*Was the Project Management Team effective? It largely failed to sort out the conflict between the city's design aspirations and the maintenance orientation of the airport operators.*

Though Perez says he can prove the design was on budget, the PMT accepted Fentress Bradburn's analysis, and gave the firm three weeks to come up with a new design.

Working in secret with Horst Berger as an engineering consultant, Fentress Bradburn unveiled a proposal for a Teflon-coated fabric roof over the terminal, the peaked profiles of which, it was quickly agreed, evoked the Rocky Mountains. The proposal was accompanied by engineering data and a value-engineering analysis. Design principal Curt Fentress justifies it this way: "The fabric roof was the only alternative that was buildable and met the schedule. We were able to take out something like 300,000 tons of steel and 1,000 linear ft of sheer walls underneath."

As Ginger Evans, who became associate director of aviation for DIA, says, "The roof was a better solution from an energy standpoint. And the slope is better for drainage, which is an important issue in large public buildings. This roof has a 10-year warranty. Most have a three-year warranty." For Perez, this grandstand play was a nightmare come true. The Fentress Bradburn redesign was accepted, and the roof has become the signature image of the airport complex.

**Who was minding the store?**

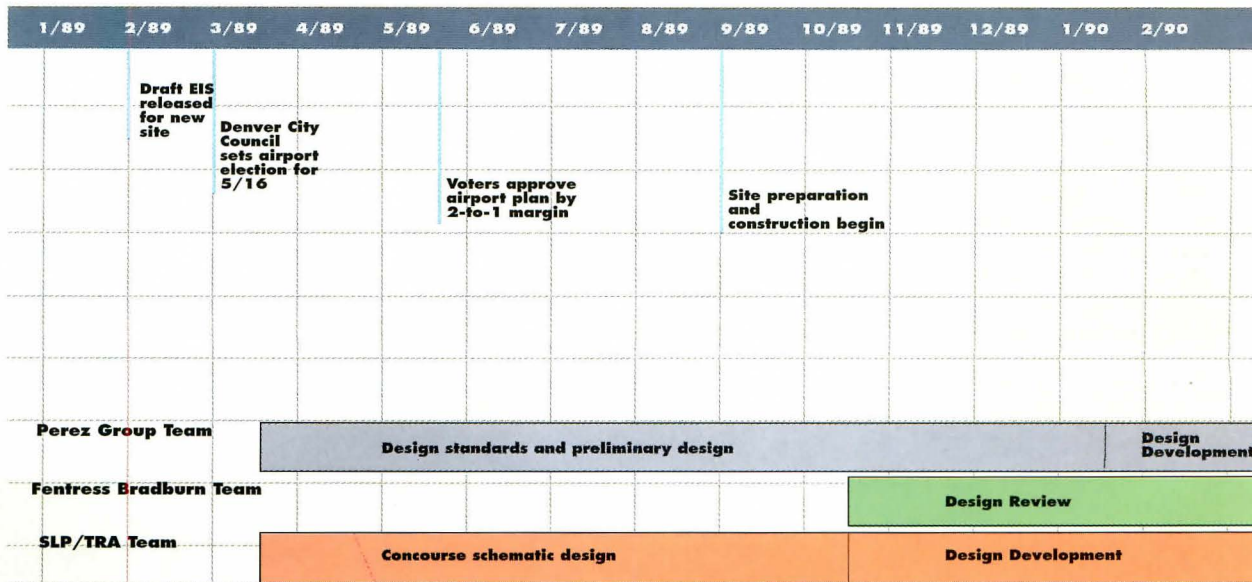
At this point it is already worth questioning the effectiveness of the PMT. It largely failed to sort out the conflict between the city's design aspirations and the maintenance orientation of the operators. Nor did it detect the cost and constructability issues affecting the Perez design even though the PMT had enormous construction and cost-estimating expertise in-house. It fell to the architects—often not trusted on cost and schedule issues—to raise the red flag. Indeed, Fentress Bradburn is still not trusted: "A local cost-estimating firm under contract to Perez came in with one estimate," says Evans. "Literally a month later, the same firm working for Fentress brought in an estimate on the same design that was \$35-million higher. That's a real credibility issue." Savings from the Fentress Bradburn redesign proved so substantial at bid, however, that the city upgraded the floor finish in the terminal and doubled the size of its parking structure (designed with Fentress Bradburn by Pouw and Associates) to 12,000 spaces.

At the time, many saw Fentress as the archetypal architect/egomaniac, intent on pursuing his own artistic agenda even if it meant

upending the process of getting the project built. Indeed, say critics, the concept of handing off the design-development documents to a separate firm created an incentive for Fentress Bradburn to find fault with Perez's design. There were lengthy disputes about what should and should not have been included in the documents Perez handed over. Fentress Bradburn claimed that the CAD documents Perez prepared did not follow standards developed by the PMT, and had to be redone. (Perez disputes this.) That the PMT largely sided with Fentress Bradburn in the CAD dispute raises the question of why it wasn't aware that Perez's documents didn't meet the standards. In retrospect, all parties agreed that handing the design off to a second firm midstream was a bad idea. On the other hand, there's now no regret over proceeding with the Fentress Bradburn design.

**An airport without airlines**

Throughout this battle, and for a considerable time after, airlines weren't heard from. Cash-strapped, they would not lease gates, hoping to halt the project. The city ordered design teams to proceed to bid without formal input from the ultimate users. In the





meantime, air travel entered a recession, putting the survival of Continental—one of Stapleton’s big users—in jeopardy. Rating agencies downgraded DIA’s bonds, considerably increasing the project’s long-term cost.

To get the airlines to sign, the city agreed to a stunning range of design changes, while assuring airlines and bond-rating agencies that the late 1993 opening date would be maintained. Continental convinced Denver to move international gates away from the north side of the main terminal to its terminal A, and to build a bridge from terminal A to the main terminal, duplicating the function of a below-ground people-mover system. A basement was added the full length of the concourse. Service cores, located between groups of gates, received a second level.

United requested even more substantial modifications. It widened Concourse B by eight feet to accommodate two moving walkways in each direction. It added a second level at the service cores and had the roof redesigned to provide a clerestory of natural light. Most important, it wanted an automated baggage-handling system to assure that nearly all transferring passengers’ bags reached flights

on very short turnarounds. These changes primarily affected the design team responsible for the concourses, a joint venture of Seracuse Lawler & Partners, of Denver (now Allred Seracuse Lawler), and TRA, of Seattle (with Ron Abo Architects, of Denver). Rather than use a conventional ticket counter, United wanted a walk-through type. Architects redesigned Main Terminal counters, and installed an underfloor mezzanine to support reconfigured baggage conveyors.

Once United committed to a completely automated baggage-handling system, DIA, only a few weeks later, chose to extend the system to the entire airport. These decisions triggered far-reaching changes. “We were building the concourses before the designers of the baggage system were even on board,” says James Allred of the SLP/TRA design team. Adds James Bradburn, “When the airline said we need a DCV [destination-coded vehicle] baggage system, we had to rearrange all the guts of the building to accommodate it.” Richard Haury, Greiner/MKE’s program manager and now director of Greiner’s air-transportation division, claims “We anticipated that one day Denver would need a fully automated baggage

system, but we couldn’t force it on the airlines. We did the next best thing, which was to prepare for a system even though we didn’t know what it would be.” Why wasn’t design delayed until the airlines signed on? Haury says airlines “would never have gotten on board unless the city *built* the project.”

### The schedule takes over

The baggage system added \$193 million to the project. Related changes to the design and construction of buildings amounted to another \$100 million, estimates Haury, much of it in complex and difficult-to-coordinate mechanical, electrical, and telecommunications systems. “In fairness to everybody, nobody had any concept of the amount of redesign and reconstruction required by the decision to change to a DCV system,” says Bradburn. Adds Thomas Walsh, a senior associate at Fentress Bradburn, “That’s what gave rise to the tremendous amount of ripping out and changing. The contractor and ourselves were somewhat in a box as to what to install to maintain the building’s baseline when we didn’t have a design for the baggage system. We knew we couldn’t stop, but we didn’t know what you shouldn’t put in that might have to come out.”

3/90	4/90	5/90	6/90	7/90	8/90	9/90	10/90	11/90	12/90	1/91	2/91	3/91	4/91	5/91	6/91	7/91	
			<b>Denver issues \$704 million in construction bonds</b>						<b>City and state propose tax break to lure United maintenance facility to DIA</b>				<b>DIA opponents begin petition drive; Congressman asks GAO probe</b>				
				<b>United is unhappy with DIA design but city refuses to redo plan that gives prime concourse A to rival Continental</b>				<b>PCL Construction wins \$37.7-million contract to build AGTS tunnel</b>					<b>Denver mayoral candidate Don Bain urges 2-year moratorium on construction</b>	<b>Tentative agreement on incentive package for United maintenance facility; Gov. Romer orders special legislative session to consider</b>			
					<b>Acquisition of 33,000 acres of land for DIA nears completion</b>					<b>Pena announces he won't seek a third term</b>			<b>Standard &amp; Poor's downgrades DIA bonds to BBB-; Moody's maintains rating at Baa-1</b>		<b>State attorney general rules incentive plan illegal; legislature approves rewritten package. City's is approved for a total of \$323 million</b>		
<b>Report on Perez DD set</b>			<b>Revise design to meet budget</b>			<b>Construction Documents</b>						<b>Bid/negotiate</b>					
<b>Design Development</b>			<b>Construction Documents</b>									<b>Bid Concourse C</b>	<b>Bid Concourse B</b>	<b>Construct Concourse C; Bid Concourse A</b>			



*Negotiators for the city seemed unable to grasp the construction consequences of changes they permitted the airlines to exact—consequences that will be felt for the life of the facility.*

In response to the huge scope of the changes, “The easy way out would have been to extend the schedule two years,” admits Ginger Evans, “though I still think it’s better to get contractors in and out as quickly as possible.” Facing ultimatums from bond-rating agencies (DIA’s revenues were supposed to service the bonds) and airlines, the city had little choice but to stick with its opening date.

The focus of decision making switched to a single priority: getting the airport open on time. And contractors moved, putting as much as \$130-million of work in place per month. Evans estimates acceleration costs at \$30 to 40 million, but not all of the costs were in dollars: “When you start working double and triple shifts, quality begins to fall down,” says James Allred. “It’s getting enough qualified people to do the work, and getting work reviewed, then getting deficiencies corrected, yet always staying on schedule. Maintaining morale becomes very difficult when people are working Christmas Eve.” Ginger Evans echoed his comments. “Some people had worked long weeks for years. They were burnt out and had reached a point where they couldn’t continue. It wasn’t a reflection on them as individuals.”

The emphasis on schedule also took its toll on budget and quality-assurance procedures. “There was a TQM [Total Quality Management] process,” notes Bradburn. “Once schedule took over and the changes started flowing, the question of whether documents met standards and were constructable was really left to the architect.” Coordination requirements, especially for the 20-some mechanical, electrical, and communications systems, increased geometrically. The city blames Fentress Bradburn for coordination failures that cost \$17-million in change orders. It has filed a claim. A former site inspector asserts rushed contractors omitted vital steel reinforcing and falsified inspections, says an October Associated Press report. DIA pledges a full investigation.

**Stress, and more changes**

Work also slowed because every contractor request for clarification had to be routed to a city resident engineer, who was supposed to interpret the documents. According to Evans, the resident engineers usually routed the request to the design team. Turnaround time was much too slow. Though the original contract called for minimal involvement by the architects in the construction phase, Fentress

Bradburn ended up moving a staff of seven to a trailer on site, just to act on requests for clarification more quickly. On site, things got “testy,” says Evans. The city and contractors engaged in partnering sessions early on to reduce friction. “I’m a big advocate of partnering,” says Bradburn. “And initially we all went full measure, hiring a facilitator and involving the contractors, major consultants, and subcontractors.”

Much of the trust built up through the partnering process evaporated later, says Bradburn, as the schedule became more punishing. “If you’ve got the commitment, and everyone understands what you’re trying to do, the partnering process will respond,” he says. “We and the contractors wanted to be partners, but the city’s side was damaged by Bill Smith’s death.” (Smith, associate director of aviation, was in charge of the project. He died of brain cancer in 1992.) “Then the process didn’t have the stability to withstand being loaded up with schedule issues and changes. Once the owner commitment was gone, the lawyers took over.”

Significant changes were still to come. The city agreed to shift a massive air-cargo

7/91	8/91	9/91	10/91	11/91	12/91	1/92	2/92	3/92	4/92	5/92	6/92	7/92	8/92	9/92	10/92	11/92	12/92	
United agrees to lease 45 gates at DIA	Continental stops paying certain taxes claiming it should get same tax breaks offered United	Terminal bids come in low; 6,000 spaces added to parking structure	S & P asks slowing of construction due to Continental's financial woes and United's shaky commitment	Air cargo dispute resolved	AMR Combs decides to move operations to DIA instead of Front Range	Continental signs 5-year lease for 20 gates	OSHA announces major construction safety investigation	UPS will set up HQ at Front Range airport	United unveils \$246 million of construction at DIA	Bill Smith, Manager of Public Works, dies of brain cancer	Adams County sues DIA over noise monitoring	Denver sells \$392 million in revenue bonds	DIA cargo facilities are to shift from far north of airport site to south, near terminal; engineers redesign	Fabric roof at main terminal complete				
United says it is considering other states for maintenance facility	Extra work requested by Continental and United increase DIA cost by \$522 million	United chooses Indianapolis for its \$1-billion maintenance base	Adams County Commission starts boycott of United when it sides with Denver on air cargo	DIA decides to extend automated baggage system to entire airport	Adams County threatens to reclaim airport land	Changes requested by United raise total airport cost to \$2.7 billion	First panel of Teflon roof hoisted into place	Federal Express will move part of cargo operation to DIA										
Continental announces reorganization	Denver attempts to forestall conversion of Front Range Airport (Adams County) from general aviation to cargo carrier operation	United signs 30-year lease; takes 42 gates																
	Redesign to add parking	Redesign for ticketing changes and automated baggage system																
Design Development		Redesign Concourse B for United																Redesign Concourse A to accommodate Continental changes



complex, originally planned for a remote edge of the site, to a location near the main terminal. Cargo users had threatened to move to Front Range Airport in adjacent Adams County, if DIA didn't place the facility near the airport's freeway access road (a location Fentress says makes the airport approach unnecessarily ugly). Rental-car companies balked at the fees charged for their in-terminal locations and said servicing within the parking structures was inconvenient. They demanded, and finally received, a separate campus. Passengers will now be forced to take shuttle buses out of the terminal complex to rent or return vehicles.

The city let the official opening slip from October 1993 to December. On that date, participants say, the airport was ready for passengers, even if not fully complete. The obstinate baggage system forced postponements, first to March, then May. As of this writing, the official opening is scheduled for February 28, 1995. Having agreed to design and build a system that could serve up to three hubbing airlines, BAE, of Dallas, was defeated by computer-programming complexities. Haury, of Greiner, defends the decision to go ahead with the automated

system: "I've refused to say that it was unrealistic. If so, [the company] shouldn't have contracted for the system. All the simulations and prototyping showed that it should have worked." While a separate firm struggles to solve the system's difficulties, the airport has gone ahead with a hybrid that includes old-fashioned tugs and carts.

### Learning from DIA

Two maladies were responsible for most of DIA's travails.

- *Responsibilities were not clearly defined.* The muddled chain of command was named by all the designers as the most frustrating aspect of the project. Bradburn faults the city, which he says "infiltrated" the PMT with its own staff in such a way as to inappropriately undercut the authority of Greiner/MKE personnel nominally in positions of higher responsibility.

Both Bill Smith and his successor, Ginger Evans, were often seen as heroes when they cut through red tape—but much of what they were cutting through seemed to have been created by the way the project was structured. During construction, for example, a PMT resident engineer (as is common on

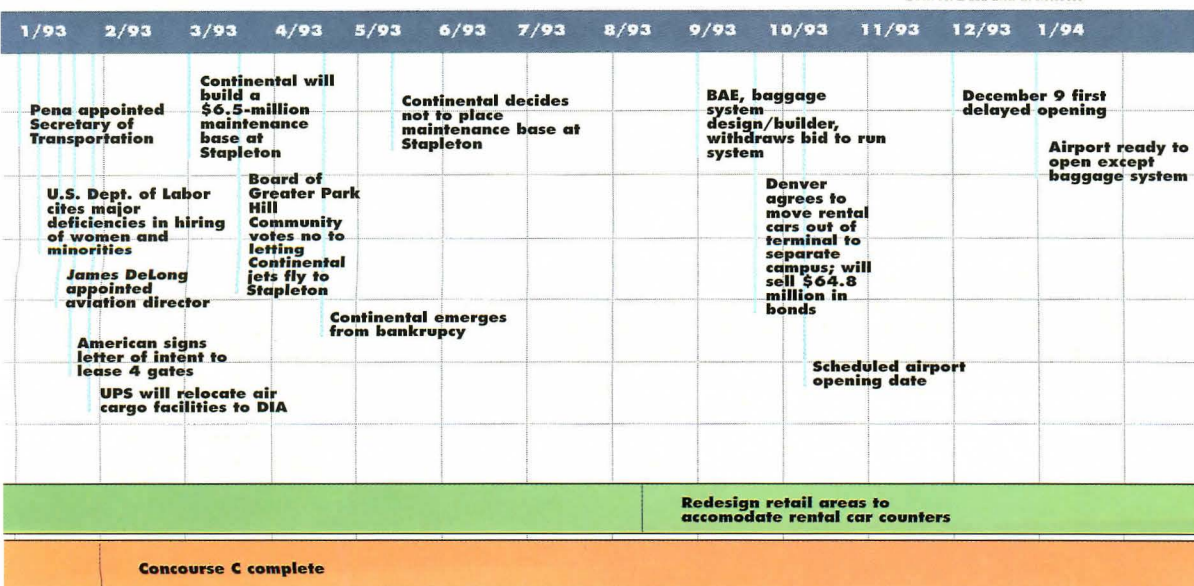
government projects) was supposed to handle much of the construction-phase activities normally done by the architect. As the schedule became more pressing, the designers ultimately had a considerable presence on site. "Looking back," reflects *Reginald Norman*, the PMT's design project manager for the terminal, "it's inconceivable that architects shouldn't be on site, even without all the changes." It meant, noted more than one participant, that resident engineers became paper shufflers.

With its mega-project expertise, Greiner and Morrison-Knudsen should have been able to handle the enormous scheduling and coordination issues that came up as the scale of changes enlarged. Coordination, however, was not the responsibility of the PMT, but of the designers. Designers say their firms were not structured to take on coordination at the scale ultimately require.

- *The process took over.* The project became beholden to the needs of negotiators and bond-rating agencies, to the detriment of the completed facility. Those negotiating for the city seemed not to grasp the construction

*Continued on page 97*

Source: DIA and architects





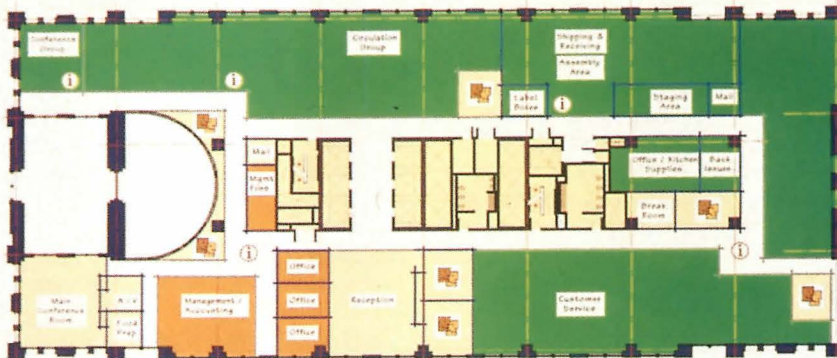
## A Firm Evolves with Technology

Is it realistic to take a practice completely into the computer age? Two and a half years ago [March 1992, pages 44-45], RECORD looked at Eastlake Studio, a firm, says principal David Johnson, that "wants to be recognized as the architectural practice of the future." That means it has evolved as rapidly as has the computer industry. (One partner, Robert Young, left to form a new firm that uses computer tools in a broader context—opposite). Eastlake partners Johnson and Thomas Zurowski remain committed to the design of buildings and interiors. Nevertheless, computers permit the firm to tackle a wider-than-average range of specialized auxiliary services, some of which have been key to securing design commissions.

### Accessible FM Solutions

When it began, Chicago-based Eastlake Studio typically chose easy-to-use tools (the Apple Macintosh) over more powerful systems that may have proved daunting to staff (in terms of learning) as well as pocket-book. They've kept to this basic philosophy, and found that it appeals to clients too. The firm has developed a kit of facility-management tools called "Friendly Facility Management." They reject the CAD-centric approach to computer-aided facilities management (CAFM), noting "Most people don't like using CAD systems." Many owners don't need or don't have in-house expertise in altering or updating CAD-generated documents. It's far more important to be able to find documents, to know you have the relevant version, and to appropriately sort them. The *toolkit is, therefore, built around FileMaker Pro, a powerful but easy-to-use database that runs on both the Macintosh and Windows-based PCs. FileMaker Pro tracks text and graphics—CAD drawings, scanned images, charts, and graphs.*

In 1991, the facility-management staff of Chicago's Children's Memorial Medical Center began looking for appropriate CAFM solutions. Apple Computer referred it to Eastlake Studio. Children's commissioned the firm to assist in its CAFM implementation, which included developing electronic documentation of the 1-million-sq-ft facility, and programming a project-management system to track costs, inventories, purchase orders, budgets, and schedules. The solutions



1

*Unusually clear; computer-generated blocking diagrams for Morningstar, Inc. enabled Eastlake Studio to rapidly present several alternatives, and gave the owner increased confidence in its decisions (1, above). Rendering of design (2); the completed project (3).*

Eastlake developed were all Macintosh-based, such as project management using FileMaker Pro. Eastlake produced graphic documents using Engineered Software's PowerDraw (a successor to ClarisCAD), both of which offer good information-attachment. CAFM tools and consulting not only enhances Eastlake Studio's revenues, but, in the case of Children's, led to a design commission for its Therapeutic School.

### Productivity dividends in design

Morningstar, Inc., a Chicago-based financial information publisher, chose Eastlake on the basis of its design ability for the conversion of 100,000 sq ft of leased space into a corporate headquarters. The client benefited from the speed and flexibility with which the firm could respond to unanticipated project changes. Halfway through design development, lease negotiations broke down. Eastlake Studio switched gears to develop blocking, stacking, and space plans for alternate locations. The clarity of communication inherent in the firm's small-format color blocking and stacking drawings (created in Innovative Data Designs' Macdraft—above) helped Morningstar to quickly select a new space. It also won Eastlake referrals from the real-estate brokers involved in the deal.

The original design projected 75,000 sq ft of space on three floors. Morningstar ultimately

decided to lease 100,000 sq ft on four floors, in a building with a very different floor plate. Despite a total redesign, the design-development presentation was set back only one month from its original tight schedule. Eastlake's presentation to the client included a complete set of small-format color drawings augmented by an animated walk-through (2, opposite), particularly appreciated by those who found plans hard to understand. Eastlake was able to execute the sophisticated animation so rapidly because effort to extrude the floor plate to 3D is minimal, and the firm pasted in 3D representations of system furniture from a library it has built up over the years. Is this quicker and less expensive than building a physical model? "We don't have much experience with physical models," Johnson admits.

Presentations are derived from CAD-based data, not done separately. Thus, the design team, using Macdraft, constantly built up information on each phase, which meant that creation of construction documents went very rapidly. One week after the design-development presentation, the Morningstar permit set was issued. Two weeks later, construction documents were completed. Neither Johnson nor Zurowski believes they could have executed the work at such a pace without their staff's well-honed computer skills.

### Tool becomes revenue generator

When RECORD first visited Eastlake, the firm had already abandoned presentation drawings and models for computer animations and small-format color output. These tools have matured rapidly, and the firm recently showcased their skills at the Chicago Athenaeum



*With powerful computer hardware and software, architects can use design thinking to solve client problems in new ways. A firm that grew up with computers shows how.*



2

where, invited to exhibit a design project, Eastlake exhibited a house design using an interactive computer presentation rather than drawings and models. A model was made in Autodesk's form-Z. It was rendered with Strata StudioPro, and animated using Macromedia Director. The architects included on-screen buttons so viewers could intuitively move around the model and cue animated walkthroughs. Using hypertext links, visitors could read explanatory text

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3

about elements of the project. Eastlake Studio is now using these same tools and integration skills to assist clients—such as a modular-house builder and a developer—to create clear and persuasive presentations.

### **Coping with electronic obsolescence**

Even for a firm as sophisticated about computers as Eastlake, the question of when to upgrade hardware and software constantly arises as powerful and feature-rich new pro-

grams make excessive demands on older equipment. How do they know when to upgrade? "If people aren't screaming that they can't get their work done, it's not an issue," replies Zurowski. Eastlake currently uses Macintosh Centris and Quadra models with at least 12mb of memory and 80mb of disk storage. From now on, they will buy Power Macs. The firm sends out for color printing. Color technology, though plunging in price, still requires too much expertise to get good quality in-house, Zurowski feels.

For non-Macintosh clients, Eastlake has added a 486 PC with AutoCAD that's devoted to testing and demonstrating systems compatibility. Using Timbuktu communications software from Farallon, the PC and Macintosh can interact and share files; each can even remotely control the other. Eastlake Studio is also successfully translating both the MacDraft and PowerDraw CAD files it uses to and from AutoCAD. What's in the future? Maybe a Personal Digital Assistant—like the Apple Newton—for surveys and other facilities work. *Kristine K. Fallon*

## **Using Design Thinking To Restructure Business**

Robert Young, one of the three Eastlake founders, formed Midland Studio in 1993. He is convinced that the Information Revolution, like the Industrial Revolution, will fundamentally transform patterns of life and work, with profound effects on the built environment. He sees the problem-solving and integrative thinking embedded in architects' outlook and training as highly suited to analyzing information technology's effect on living and working patterns.

Young is convinced that architects can add value in the fast-changing context of business restructuring. This approach requires a deep involvement in a business's strategy rather than a conventional toting up of the usual program areas. Young stresses the importance of "defining the problem very, very well." That's because the problem is much bigger than just rearranging the desks. Indeed, devising suitable new work environments becomes a means to test workplace ideas. The number of variables is much

higher, however, with a corresponding need for more sophisticated analytical tools. Also, businesses today must make decisions faster, which means response times in facilities planning and design must compress too.

### **Realizing a new workplace culture**

For example, Young notes the trend toward atomizing corporate-support functions. Accounting, information systems, and facilities—previously centralized—are now being located with the groups they support. These support staff must now find new ways to maintain a common knowledge base with their community of practice, their co-professionals. Making this business-culture change involves telecommunications, computer tools, human-resource policies, and facilities. (One question, for example, is whether some people should have desks in more than one location.) And financial judgment is needed to properly allocate costs.

Another fast-changing area: professional competence demands more and more knowledge. This leads to more specialization, so tasks require input from more people, as well

as skillful integration. The result, says Young, is that all work is becoming collaborative.

Many such issues came up when Herman Miller commissioned Midland Studio to develop a facilities strategy for its West Michigan sites, which house manufacturing, warehousing, distribution, and office activities. Midland, using FileMaker Pro database software on the Macintosh, is reducing the reams of interview notes and programmatic requirements it collected to data that can be analyzed and integrated. Emerging are definitions of as many as 50 new "places" that never existed before, just as "factory" was a new sort of place at the beginning of the Industrial Revolution. A program requirement that came out of Herman Miller's rethinking is a fully equipped, acoustically isolated meeting space, located on the factory floor; where workers (who today are asked to take on much more responsibility for manufacturing quality control) convene to instantly solve production problems. Over a year into the Herman Miller project, Young is exhilarated: "We have a client who shares our vision." *K.K.F.*



## Low-Priced and Full-Featured CAD Packages With Long Lineages

By Steven S. Ross

The two CAD packages reviewed in detail this month have a long lineage—MiniCAD for the Mac is at version 5.0 now, and Visual CADD, although just starting out, is from the developers of Generic CADD. They share other points as well. Their prices are low for such full-featured packages. They embrace graphical, flexible interfaces (Mac and Windows). They each import files of well-known competitors that won't be upgraded again (Claris CAD for MiniCAD and GenCADD for Visual CADD). And they run on fairly small computers, although you'll be happier with faster machines. Both have lots of commands to delight production drafting enthusiasts. MiniCAD adds 3D and a strong rendering module as well. Both support underlying databases; MiniCAD's link is especially strong.

### MiniCad 5.0

**Vendor:** Graphsoft, 10270 Old Columbia Rd., Suite 100, Columbia, MD 21046. 410/290-5114, fax 410/290-8050. \$795, upgrades from MiniCad+ 4.0, \$150. Software for both the 68K-series and Power Mac are included in the same box, as is an architectural add-on package and tutorial CD-ROM.

**Equipment required:** Power Macintosh (with at least 5MB RAM left after System and Finder load) or 68K-series (with or without math coprocessor; 2.5MB needed after System and Finder loaded). Power Macintosh and 20MB RAM strongly recommended for 3D. Color monitor strongly recommended. MiniCad is compatible with cache cards, CPU accelerators, and so forth.

MiniCad (the + in MiniCad+ 4.0 has been dropped) continues to be a powerful, versatile 2D and 3D drafting package with an integrated database, good macro language, and DXF and Claris CAD file support. It will run on computers as small as the Macintosh Classic; although architects won't be happy with the performance on such a small machine, it does give you an idea of the stability and speed of the overall package.

We found MiniCad comfortable on the slowest credible Power Mac (a Centris/Quadra 610 with 40MHz Power Mac upgrade

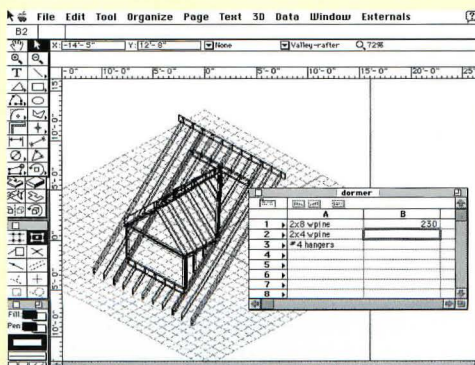
card and 8MB of RAM) once 32-bit addressing was turned on and we experimented with the balance between virtual memory and RAM partition. It reacted almost instantaneously in a top-of-the-line 8100 with 32MB.

The architectural module includes symbol editing and exchanges (one style window for another, for instance), a tape measure tool, parking space layout, a wall Y-join tool, a "cloud" in which to note revision numbers on a drawing, and a "fancy door" parametric symbol tool.

The advanced design module, which also comes with MiniCad, allows you to create QuickTime animations—walk-throughs and fly-arounds—and to purge objects (particularly important when creating stationery pads for standard drawing formats).

**Manuals:** User guide, tutorial, and guide to Pascal-like macro language; all first-rate (but with quite a few typos). Interactive CD-ROM training disk included. Good on-screen help, including balloon help.

**Ease of use:** Standard Macintosh with palettes full of icons; this version allows palettes and menus (the "overlays") to be customized. Slow unless you have plenty of memory, but faster than last version, especially on Power Macintosh (turn on virtual memory and increase memory partition size



*Dormer shown in 3D MiniCAD5 for the Mac allows you to choose one of a dozen views off the standard menu, or rotate and save your own. With the built-in spreadsheet, open to start creating a bill of materials.*

beyond 2500K with Power Mac).

**Error-trapping:** Standard Mac and very stable. To activate new automatic precision feature on 4.0 files, go to Units command on Page menu and change units to feet and inches—even if the files are already in feet and inches. Stationery pads (style sheets) need to be resaved with the name "MiniCad Defaults" instead of "MiniCad+ Defaults." Convert their units as well.

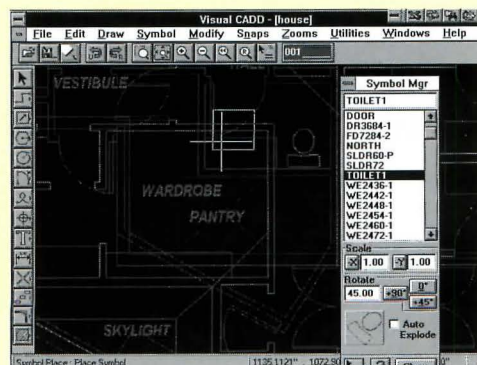
MiniCad behaves with grace under pressure. A rendering can be interrupted by low-memory conditions and not completed; you then start over. But it is tough to lose work. We deliberately forced low-memory conditions to see what would happen; MiniCad would warn and offer to save the existing work in a "recover" file.

**300 on Reader Service Card**

### Visual CADD 1.0

**Vendor:** Numera Software Corporation, 1501 Fourth Ave., Suite 2880, Seattle, WA 98101, 206/622-2233, fax 206/622-5382, BBS 206/233-0371, CompuServe 74222,3031. \$495 with support until August 1, 1995 (normally, 90 days free support), competitive upgrade price \$199.

**Equipment required:** Computer capable of running Windows 3.1 or higher, 4MB



*The Symbol Manager in Visual CADD; note the representation of symbol in lower left area of Symbol Manager window. Note also the default background color; true GenCADD black.*



*MiniCAD for the Mac version 5.0 and Visual CADD embrace flexible graphical interfaces, import files of well-known competitors that won't be upgraded again, and run on fairly small computers.*

RAM (8MB or more strongly recommended).

Generic CADD users may flock to this 2D Windows package that allows the same two-letter shortcut commands. The vendor has gone to some lengths to follow Generic CADD conventions—even to leaving the default window background as black. There are a few rough edges (see error-trapping, below). But the developers (the same team that originally helped develop GenCADD) seem to have come up with a winner.

Visual CADD is “pure Windows.” It is capable of inserting OLE objects into other software files (that is, it is an OLE 2.0 server). It prints and plots through Windows drivers. You can open multiple drawing windows (lots of them with 8MB, lots and lots with 16MB of RAM) and cut and paste between them. Third parties can access it with Microsoft Visual BASIC or C++ to create add-ons.

But do you have to switch from GenCADD? Not necessarily. For one thing, GenCADD is faster on a given machine. And, as a DOS application, GenCADD takes less memory than Visual CADD. But Visual CADD, aside from having Windows flexibility, also has loads of new features. None is particularly compelling in general. But if you want it, and you want to stay as close as possible to

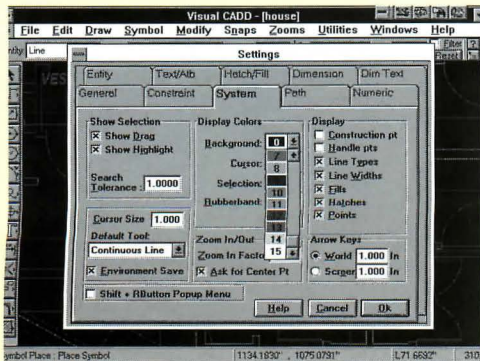
GenCADD, Visual CADD is your only option.

There's now a Match Tool command to extend GenCADD's Match Entity command, for instance. Match Tool loads all properties of a picked entity and automatically gives you a tool to create the same type of entity.

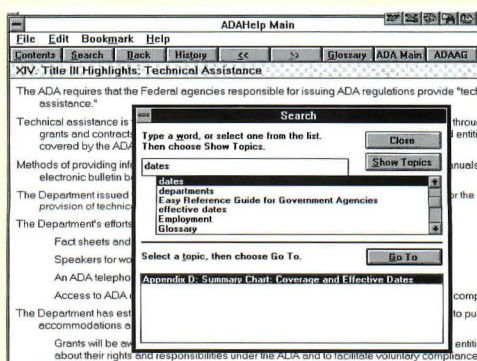
Dimensioning is easier; you click on the object once to get “implicit” dimensions; you don't have to snap to endpoints unless you want to.

You can now specify an offset, a distance from another object, to instantly create entities (a parallel line, a row of windows) parallel to a selected entity. A new “array copy” command allows you to copy an entity into an array—rows and columns of them. There's also a “fit scale” command that allows you to select an entity to scale. You pick two points on it, then pick two points somewhere else in your drawing. The entity is copied to the new position, and scaled to match the difference in distance between the points on the original and the points in the new copy.

As in the upcoming AutoCAD 13, hatching is associative; you don't have to re-hatch when you edit a filled area. A polyline command lets you draw a freehand continuous curve that's a single entity.



*The VC environment is almost infinitely changeable; here, we change background color to Windows white; the cursor to black. If you are importing files from GenCADD, you should also change some line colors—yellow on black, for instance.*



*Above, an example of how to use the help search engine in ADAHelp 2.0; there are about 800 topics in this list.*

There's now a combination of Rotate and Match Angle—you pick two points on an entity you want to rotate to set the start angle, pick two new points elsewhere in the drawing to define the new angle, and the entity is rotated to match them.

*Manuals:* Getting Started, Reference, Tutorial. Plenty of architectural references.

*Ease of use:* Lots of little productivity improvements. Tiling or other windows rearrangement loses your zooms; if you want to keep a view in a window, save it, then rearrange and recall the view. As is typical of Windows, there's a separate utility menu to set defaults for commands; the defaults don't always pop up for changing as you execute the command.

*Error-trapping:* You can save files with an extension that does not reflect the actual file type—a GCD file as DWG, for example. There's a good undo/redo.

**301 on Reader Service Card**

## ADAHelp 2.0

**Vendor:** Kelley Computer Software, 1701 Broadway, Suite 2-348, Vancouver, WA 98663. 206-696-2690. \$295; multiple licenses available at deeply discounted prices.

**Equipment required:** Any computer that runs Windows 3.1 or greater. Works best when you use it within a Windows-compatible CAD package.

This is a set of on-line Windows help files. Like all Windows help files, they can be invoked from within just about any Windows software by pressing F1, then searching for the .HLP file you want. What do you get? Over 700 pages of the ADA Accessibility Guidelines (ADAAG) including graphics cross-referenced by over 800 regulation topics and 2500 hypertext links.

*Manual:* Simple, straightforward.

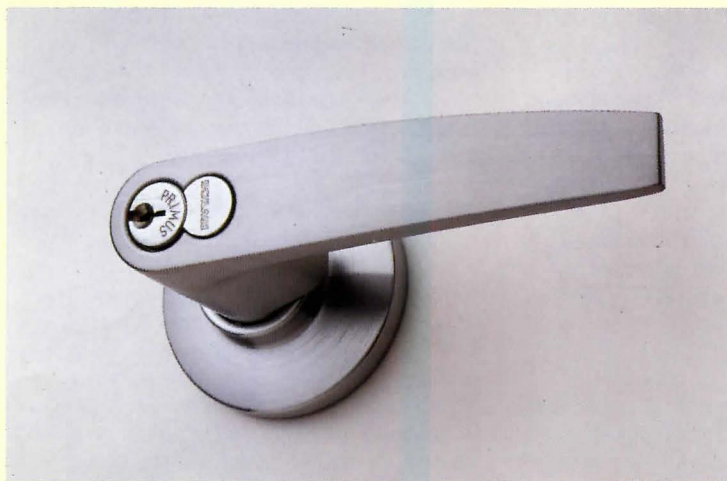
*Ease of Use:* It may be tough to find the proper .HLP file on a system loaded with subdirectories.

*Error-trapping:* Uses Windows standard help system; you can go back and forth with ease once the file is on-screen.

**302 on Reader Service Card**



## Locksets: Hardware and Software



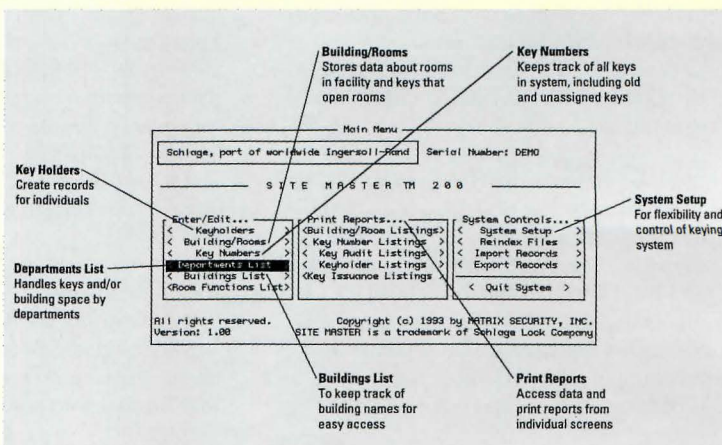
1



2



3



4

**303.** Schlage Lock Company, a market leader with almost 40 percent of the commercial-lock business, is expanding its line of ADA-compliant hardware, particularly in its Grade 2 S-Series keyed levers (suitable for residential, multifamily, and light- and medium-duty commercial applications). An interchangeable-core option has been added to the Jupiter (1) and Neptune designs, permitting re-keying without removing the whole lever set. These Grade 2 locksets are compatible with the design of Schlage's heavier-duty D-Series products, so each door in a facility can have the most appropriate and cost-effective hardware within a coordinated design and keying system. Flair (2), a new more graceful and "residential" lever in the S-Series, nevertheless meets Grade 2 requirements, and is UL listed for three-hour doors. CL-Series (3) is an entirely new

lock line for cabinet doors and drawers that can be master-keyed to Primus or any other Schlage key system.

Asked about the effect the ADA is having on hardware specification, Schlage's commercial marketing manager Martin Burkhardt observes that, as architects and managers become more knowledgeable about the regulations, they *are* retrofitting correctly and putting compliant hardware only on the doors that require it. But he does see a tendency to replace non-compliant Grade 1 knobs with Grade 2 ADA levers. This may save money over Grade 1 levers (which must meet a severe 1,200 inch/pound loading test), but may not prove durable enough for the anticipated traffic. (Conversely, specs for new construction often call for all-compliant hardware, even for back-of-the-house doors.)

Liability exposure—for both owners, managers, and architects—is driving development of more-secure key-control strategies. The American Society of Industrial Security reports that the first question a plaintiff's lawyer will ask a building owner when seeking damages for an on-premise assault is "When did you last re-key? And where are the records?" Burkhardt feels that it is the architect's responsibility to lay out the security options for the client, and to be sure that design decisions and hardware-specification choices don't compromise occupant safety. Site Master 200 software (4) addresses the most basic key-control issue: the number of circulating keys, which locks do they fit—and who has them. The software also lets the facility reintegrate old key combinations or bittings back into the master key system. Schlage Lock Co., San Francisco.



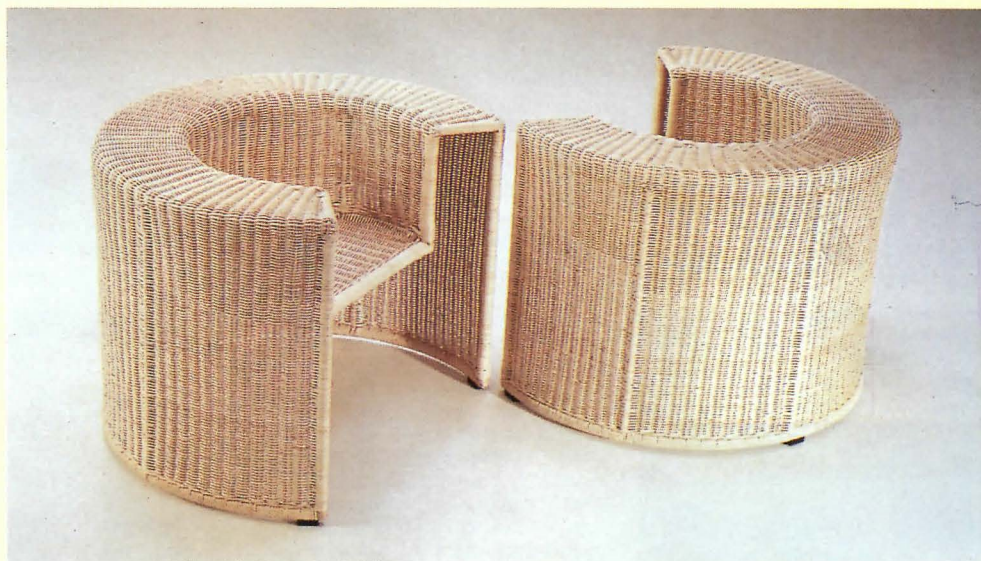
## Gravesian Plasticware



304

**304.** Michael Graves' newest home designs for Italian manufacturer Alessi are made of a solid thermoplastic material that bears little resemblance to the polystyrene often used for salad bowls. And with the most expensive item in the line being the thermal carafe (top) at \$100, the prices are right. The collection (stacked, above) includes a tray, storage canisters, and a rimmed bowl. Graves says that his designs take off from the porcelain-enameled metal cups, coffee pots, and plates that have been part of the American camping experience for years. (He likes their combination of attractive appearance and ruggedness.) His colorful Euclid kitchenware assembles basic geometric shapes—the circle handle, triangle spout, and square legs of the carafe, for example—with a light-hearted, chunky appeal. The Markuse Corp., Woburn, Mass. ■

## The Next Generation



305

**305.** In conjunction with the completion of Mario Botta's first U.S. building commission, the San Francisco Museum of Modern Art (see page 74), ICF is introducing F.D. (top), the Swiss architect's newest addition to a collection of seating and tables. (Botta's first U.S. interior was for ICF; he designed the company's showroom in Long Island City, New York—see RECORD, Mid-September 1987, pages 124-129.) Displaying the same interest in simple geometries as his architecture, the semi-circular chair has a tubular steel frame covered with natural wicker. Seats are upholstered in leather. Other introductions from the company include the Vico chair by Italian designer Vico Magistretti (above left), which has been added to the permanent modern design collection of New York City's Metropolitan Museum of Art, and the Layered Wood chair by Timothy



deFiebre (above right), which has a seat and back of 1/8-inch-thick maple ply. It comes with an upholstered seat in both arm and armless versions. Call 800/237-1625 for pricing and ordering information.

According to President George Johnson, ICF, which recently turned 30, has introduced 25 new products during the past year, a revitalizing burst of activity from a company whose future seemed clouded only a short while ago. International Contract Furnishings, Inc., New York City.





### 306. Subtle leverage

Designed by Knud Holscher for made-in-Denmark D-Line, the "squiggle" lever meets accessibility and safety standards, and can be ordered with UL-listed mortise locks. Offered in satin stainless-steel and polished brass finishes. Importer also sources hardware and locksets by Modric of Great Britain and FSB of Germany. 800/621-1937. The Ironmonger, Chicago.



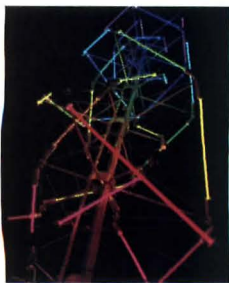
### 307. Bi-component glass fiber

A new filament technology produces fiberglass with bounce: an irregular twist along the length of the fiber makes it soft, resilient, and form-filling. Made of two different forms of glass fused together, Miraflex has thermal performance identical to standard fiberglass batt insulation (without the itch) and can be used to make fabric with a soft hand. Owens-Corning, Toledo, Ohio.



### 308. Recycled in style

Unlike other well-meant but clumsy seating made of recycled materials, the Misaki Bench rises above its post-consumer plastic and sawdust origins. For outdoor use even in the most severe environments, the bench has mortise-and-tenon construction, and may be anchored to pavement. Can be specified in two integral colors, or ready for staining. 312/997-2385. Prairie Fish, Chicago.



### 309. Neon sculpture

Eric Zimmerman's Electric Trees have bright neon "limbs" and "twigs" growing from modular Power Trunks set on a 7 1/2-ft-high base. Neon tubes in 16 colors can be computerized to light in sequence. Trunk units can be stacked to a 35-ft overall height, are UL listed for indoor and outdoor sites, and resist seismic and wind loads. Architectural Cathode Lighting, Huntington Park, Calif.



### 310. Healthcare upholstery

A new Naugahyde pattern, Waterford is described as a transitional style created by angles and linear design direction with a woven-texture surface. It comes in 11 warmer-toned colors for the heavy wear and cleaning requirements of hospitality, institutional, and healthcare seating. Coordinates with Beacon woven-look vinyl. Uniroyal Engineered Products, Sarasota, Fla.



### 311. Slate from India

A new import line for this stone fabricator and distributor, natural-cleft slates come in the colorations shown here, from Kota Brown to Kund multicolor, as well as other exotic tones. Furnished as 12- by 12-in. tiles, slates can be used indoors and out, as flooring, fireplace surrounds, walls, and terraces. Granite & Marble World Trade, Chicago.



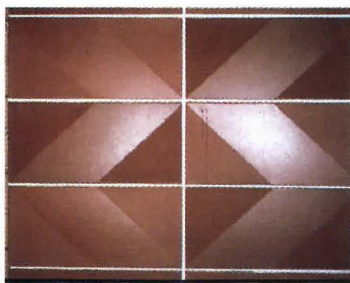
### 312. Integral-color concrete

Kit of sample chips demonstrates the 38-color range available in mineral-oxide powder pigments. Used to uniformly color exterior or interior-concrete pavements, poured-in-place structures, and floor slabs, pigments exceed the performance requirements of ASTM C979 and are said to be lightfast, lime-proof, and weather resistant. Davis Colors, Reseda, Calif.



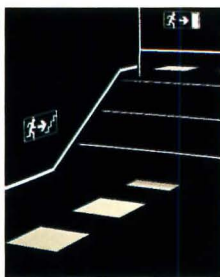
### 313. Versatile direct-vent

Many Heat-N-Glo gas fireplaces eliminate the hazards of negative pressure in the fireplace by supplying the fire with outside air only, and meet new indoor-air quality standards. Improved flue configurations allow several 45-deg. bends for almost-anywhere installation. Heat-N-Glo Fireplace Products, Savage, Minn.



### 314. Light-catching SGFT

The Spectra-Glaze masonry line now includes a PatrN-Glaze design option. Here, the pre-glazed face can be specified in one of several attractive low-profile patterns that subtly change appearance according to the angle of the light source. The light-reflecting patterns are available on 8- by 16-, 12- by 12-, and 16- by 16-in. through-wall units. The Burns & Russell Co., Baltimore.



### 315. There when you need it

Safe-T-First is a system of photoluminescent escape-route indicators integrated with rubber and vinyl flooring, base, and accessories. Materials come in 18 colors, with "glow-in-the-dark" properties that are unobtrusive until the lights go out. Line is labeled Class A, and can meet ADA slip-resist and high-contrast regulations as needed. Johnsonite, Chagrin Falls, Ohio.



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Leslie Armstrong, AIA, is known for her innovative work in interior space, particularly theater environments. She is co-author of the definitive **Space for Dance—An Architectural Design Guide** and a specifier of DuPont Antron® nylon.

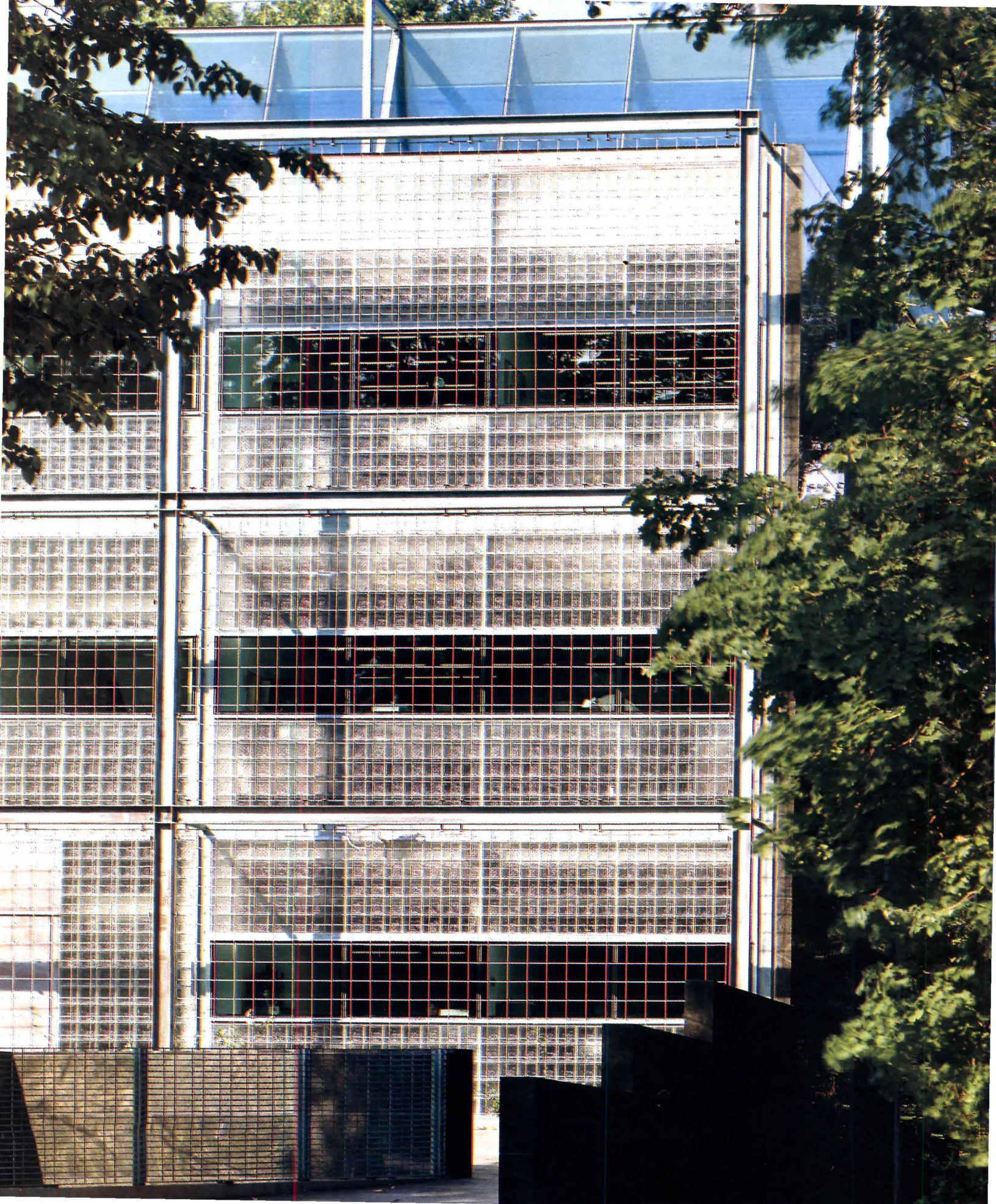


“The visitor should be the protagonist in the lobby and public spaces, and the art should be the protagonist in the galleries,” says Mario Botta of his San Francisco Museum of Modern Art (page 74), itself a lead player in the Yerba Buena redevelopment. Architecture as protagonist takes different form in each of the projects featured in the following pages. Architects Heikkinen-Komonen’s new glass-and-copper Finnish Embassy (page 60), the new star on Washington, D.C.’s famed Embassy Row, “expresses the open, welcoming image Finland likes to project to the international community,” according to RECORD editor Clifford Pearson. Enrique Norten perched his cafeteria for Mexico City media conglomerate Televisa atop an existing two-story parking garage (page 68), remaking a bland back-lot box into the centerpiece of employee social life. Bohlin Cywinski Jackson/James Cutler’s design of a guest house for Microsoft chairman Bill Gates (page 84), the first completed building of a 42,000-square-foot lake-front compound, engages the landscape in an ongoing dialog of new construction and land preservation: a forest of alders was planted where site demolition had occurred and wetlands were created adjacent to the lake to, among other things, ensure a seasonally changing backdrop. Other examples of how architects seek to maintain a delicate “ecosystem” are contained in Building Types Study 721/Campus Residences (page 88), which reviews three approaches to fitting new buildings into tradition-laden campuses.

*Karen D. Stein*

*Manufacturers’ Sources  
listed on page 101*







# Diplomatic Maneuvers

*Embassy of Finland  
Washington, D.C.  
Heikkinen-Komonen Architects  
Angelos Demetriou & Associates,  
Associate Architect*

Set on a densely wooded site on the stretch of Massachusetts Avenue known as “Embassy Row,” the new glass-and-copper Finnish Embassy in Washington, D.C., fuses Modern design with natural surroundings in a manner quintessentially Finnish. Its generous use of glass—not the stone or brick more commonly found on the mock fortresses and diplomatic palaces of Embassy Row—expresses the open, welcoming image Finland likes to project to the international community. And the building’s reserved exterior and complex interior are not unlike the Finns themselves, says architect Mikko Heikkinen.

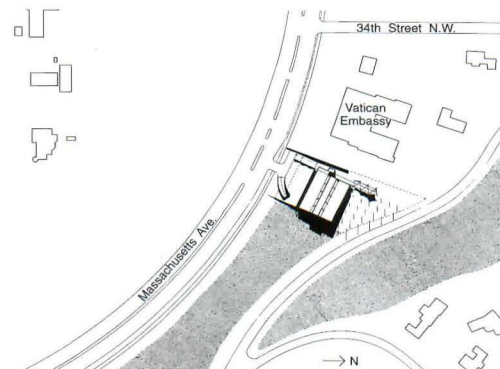
“We thought of the building as a jewel box,” explains Heikkinen’s partner Markku Komonen. On display inside the box is a country with a rich heritage of design, one rooted in using traditional and contemporary materials in innovative ways. “Finnish architecture has long been identified with Modernism,” states Hannu Mäntyvaara, the Finnish Minister in Washington, “so we wanted to display this and other contemporary trends in our building.”

At first glance, the Embassy seems to make a clean sweep of tradition—its crisp Modern lines and striking combination of patinated copper and glass block contrast with the Vatican’s Renaissance *palazzo* next door. But like most of its conservative neighbors, it sits back from the street to create a front court for cars. In massing and height too, the new Finnish building echoes the older architecture around it, especially that of the Vatican’s stone structure to the west. The compact footprint for the 51,000-square-foot Embassy is driven by local codes that limit cutting down trees and by the demands of a difficult site that slopes steeply from Massachusetts Avenue on the south down to Rock Creek Park on the north. Parking for 50 cars—roughly one for each employee—is provided in a continuous loop structure under the building.

The Embassy’s main elevation, which has raised many eyebrows in stodgy Washington, is a double-layered composition with a three-story bronze trellis projecting six feet in front of a glass-and-metal facade. Like Pierre Chareau’s 1932 *Maison de Verre* in Paris, this facade combines glass block with bands of clear glass to create a rhapsody in transparent and translucent materials. The projecting trellis, which will support roses and clematis vines as time goes by, will become a leafy wall protecting the south elevation from the sun during summer months. It also creates a tall, narrow transition space between the building and the forecourt.

Technically a chancery rather than an embassy because it does not include the ambassador’s residence, the building has offices along its north and south sides. In between is a four-story-high skylit space, which the architects call “the grand canyon.” Belying its glass-and-metal exterior, the building is a concrete-frame structure with a 13-foot-high, 100-foot-long double truss running above the “canyon.” In dramatic fashion, the architects suspended three stories of copper-clad conference rooms and spiral stairs from the truss. Bridges over the canyon help stabilize the suspended elements. Restrooms and kitchenettes are housed in stainless-steel-clad towers at the east and west ends of the grand interior space.

*continued on following pages*



*The \$10-million building’s street facade (top, middle, and opposite) features copper and bronze treated with ammonia sulfate and copper sulfate to give it a rich green tint. Park land lies to the north and east of the Embassy; the Vatican Embassy is to the west (site plan).*



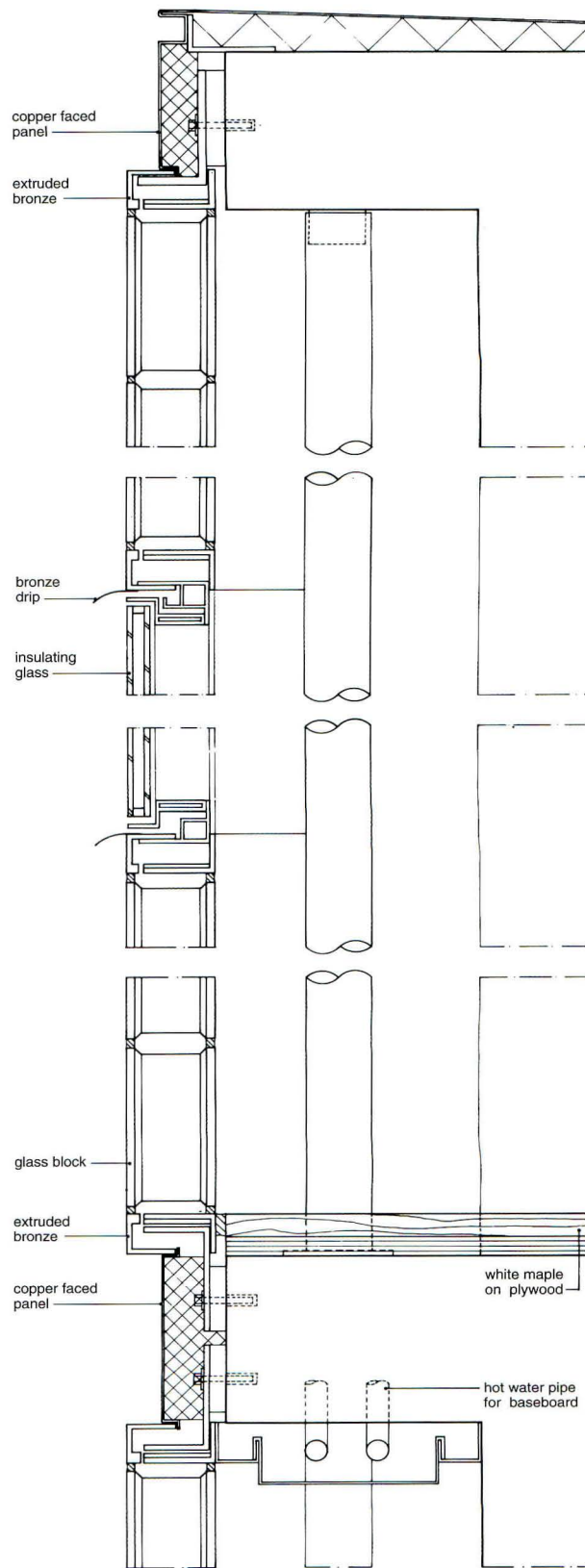
The most remarkable aspect of the Embassy's interiors is the powerful presence of the outdoors—both in the private offices and the public spaces. On the east and west ends of the building, sections of curtain wall supported by tensile rods and cables bring in light from the sides, while a two-story-high wall of clear glass on the north makes the large multipurpose room known as Finland Hall seem like an extension of Rock Creek Park. Echoing the tall slot of space created on the building's south elevation by the bronze trellis, Heikkinen and Komonen created a two-story-high glass-enclosed porch that projects six feet from the glass wall of Finland Hall. Ventilated but not air-conditioned, the porch also serves as an environmental buffer for the building's glazed north face.

Perpendicular to the porch and running near the west edge of the site is an outdoor walkway that extends into the trees and over the hillside. Covered by a tensile canopy supported by cable-stayed masts, the walkway provides a spark of exuberance to complement the more rigid form of the Embassy itself. In a similar vein, a grid of small lights on slender posts visually extends the floor plane of Finland Hall into the wooded rear yard.

Although security concerns called for bullet-proof glass on lower floors and a bank-lock entry vestibule (in which the door at one end must close before the door at the other end can open), the Embassy is friendly and accessible, especially when compared to the fortress-like embassies that the United States has been building since the advent of car bombs. *Clifford A. Pearson*

### Up Close

*Designing with nature.* So much of Finland's identity is tied to its lakes and forests that its architects have become skilled at working with nature in innovative ways. For example, rather than simply use natural materials, the new Finnish Embassy highlights the presence of nature in a more abstract and complex manner. For its street facade, the architects designed a three-story metal trellis that will become a wall of vegetation changing in color and density each season (opposite, bottom left). Growing up an artificial surface, the vines symbolize nature controlled by man. On the east and west elevations, glass and polished granite reflect nature, multiplying images of nearby trees (opposite, bottom right). On its rear (north) elevation, the Embassy projects out into the site by way of a covered walkway and a glass-enclosed porch (opposite, top).



WALL SECTION





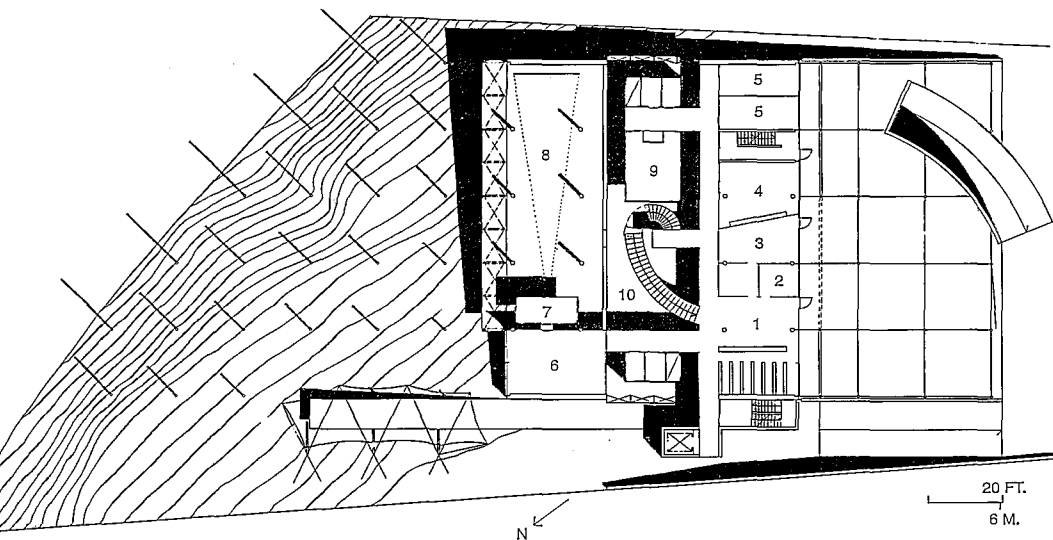
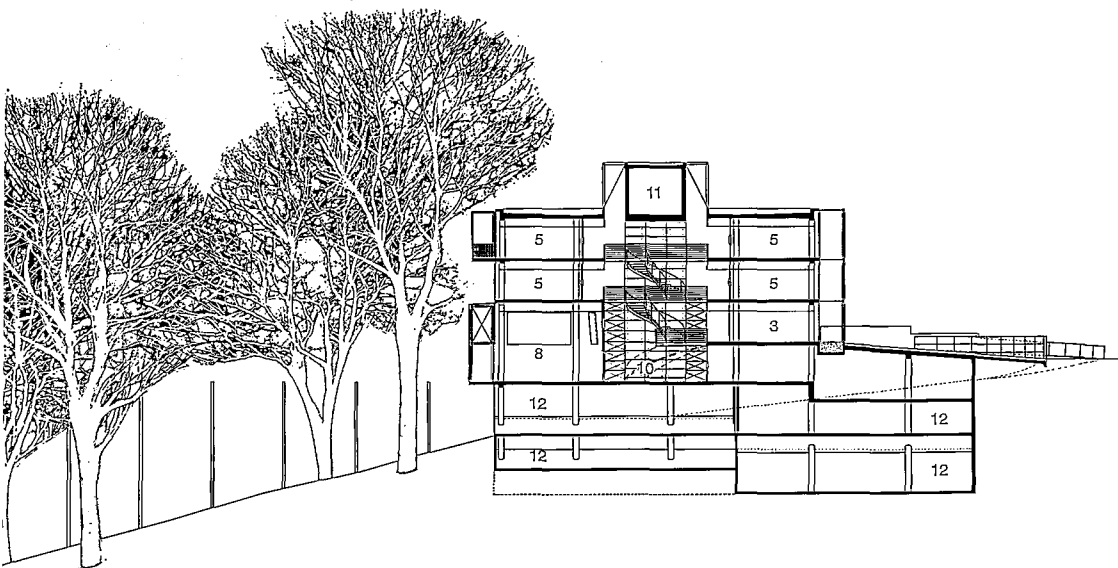












- |              |                  |
|--------------|------------------|
| 1. Lobby     | 7. Audio-visual  |
| 2. Reception | 8. Finland Hall  |
| 3. Entry     | 9. Conference    |
| 4. Mail      | 10. Grand canyon |
| 5. Office    | 11. Mechanical   |
| 6. Library   | 12. Parking      |

The Embassy's multipurpose room, Finland Hall, can open onto the "grand canyon" in the center of the building when a panelized wall is slid out of the way (previous pages). A projection room at the east end of the hall and a tilted acoustical screen along the south edge are clad in maple-veneer plywood.

In section and plan, the building shows a straightforward organization with offices and public rooms on either side of the central "canyon" and parking below (left). Mechanical equipment is tucked within the 13-foot-high double truss running the length of the building. In the "canyon," curving stairs and strips of light inject a sense of dynamism (opposite top). A cantilevered bridge and conference rooms suspended from the central truss seem to float in the four-story-high space. Lighting is generally kept subdued, but a few strips of halogens and some spot lights help punctuate features such as stairs and copper-clad surfaces.

Eleven-foot-high panes of glass are held in place by steel pins on the porch that cantilevers out from the north face of the building (opposite bottom). Cedar planks give the porch the feeling of being both outdoors and in.

#### Credits

*Embassy of Finland*  
Washington, D.C.

**Architect:** Heikkinen-Komonen Architects—Mikko Heikkinen, Markku Komonen, partners-in-charge; Sarlotta Narjus, project architect

**Associate Architect:** Angelos Demetriou & Associates—Eric Morrison, project architect

**Engineers:** Smislova, Kehmemui & Associates (structural)—Matti Ollila, project engineer; Alphatec (MPE)—Joel Majurinen, project engineer

**Landscape Architect:** Lee & Liu Associates

**General Contractor:** Chas. H. Tompkins Co.







# Under Cabled Arches

*A Mexican media giant's  
employees eat in a vaulted  
cafeteria filled with daylight.*





TV Studio Cafeteria for Televisa  
Mexico City  
TEN Arquitectos, Architect









The media conglomerate Televisa controls Spanish-language information around the world through television, radio, and magazines in Central and South America, the U.S., and Spain. The company has numerous facilities scattered around Mexico City supporting this diverse media empire, including the densely built San Angel complex, where Enrique Norten has designed a new employee cafeteria. When the company decided to provide this facility for the employees, the only available horizontal surface turned out to be the top of a two-story parking garage in the back corner of the property. Norten's design solution to enclose the new space was dictated by the limited capacity of the existing garage structure. The design, in practical and spatial terms, is remarkable given the severe restrictions of the site and the program.

The structural form of the arching cafeteria roof results directly from the problems of building over the existing garage. The new building had to be light enough to be carried by the existing concrete columns and footings, and could not be moved or enlarged (although shear walls were added to increase earthquake resistance). The new structure also had to align with the garage column grid; one end of the great curving roof beams rest on a row of garage columns, and then are hung from leaning poles that bear on the last available garage columns below. By angling the stainless-steel poles outward, Norten was able to extend the coverage of the roof, and actually stretched it a little bit further by cable-supporting the final extension of the arch.

Despite the tight order of the garage structure, the cafeteria roof feels lightly suspended overhead, billowing up like a *tendido* (a canvas awning stretched for shade over streets and courtyards). Anchored on one side by the solid kitchen block, the roof structure is otherwise unconstrained; the lightweight curtainwall glazing on the opposite side is like a transparent web holding back the elements. The airy space is a perfect environment to complement the character of Mexican food, which always seems best eaten outside.

Aside from the practical feat of building the cafeteria on the garage roof, Norten also had to make the place accessible and attractive to hungry workers. The garage location was inconvenient and the area around it unkempt. Norten turned the unused space along the sloping garage entry drive into a plaza for eating, visiting, and other more organized activities, with angular light standards, seats, and tropical planting. Glass-enclosed escalators and a sweeping bridge reach out from the corner to draw diners into *de comida rapida*.

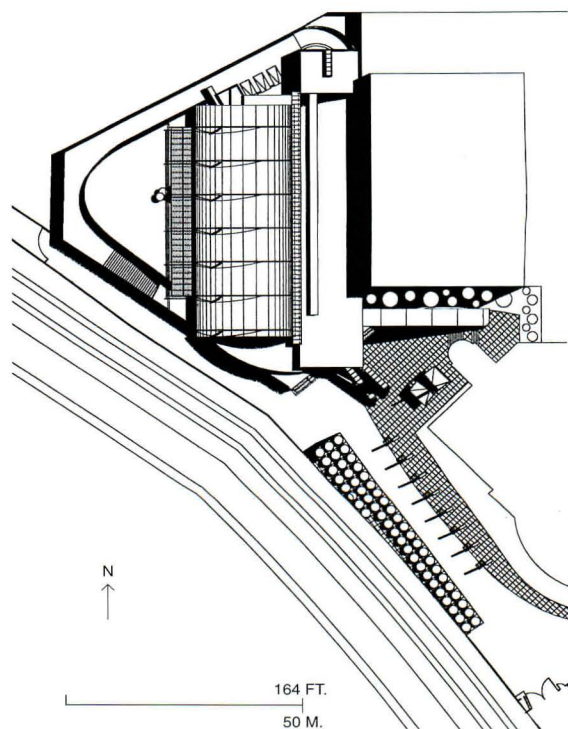
The narrow streets within the heavily-guarded compound are lined with yellow buildings with red bougainvillea and filled with congested activity—sets under construction, crews loading vans, and music spilling from windows. The cafeteria is the only place for relief.

The 32,300-square-foot cafeteria serves 6,000 meals a day and is open 24 hours. The full-service kitchen and bakery receive whole sides of beef, crates of fruit and vegetables, tons of corn and wheat flour, transforming *el toro* at the dock into *el taco* on the steam table. The vaulted dining hall can seat over 1,500 and is also used for parties and formal receptions. A small bar and a sweeping range of toilets anchor one end of the lofty space. The entire project was built in six months while keeping the garage below in operation.  
*Gerald Moorhead*



The new cafeteria, and the concrete garage structure below it, really doesn't have a "facade." Norten hung a "screen" of white metal panels at the end of the drive to unify the assembly, and to provide a focus for the approach down the ramping plaza (previous pages and

above). This is used as a projection screen during outdoor activities. Two glass-enclosed escalators (above and opposite) penetrate the screen and a sweeping bridge extending from behind the screen connect to the adjacent office building and also overlook the plaza.





The low-ceilinged bar area (opposite top), backed by lavender glass mosaic tile, closes the vista at one end of the long dining hall. Beyond the sheer glazing at the edge of the vault (opposite bottom), the unused triangular end of the garage roof is walled off as an outdoor plaza.

The section (middle drawing below) shows how the new roof is supported over the existing structure, aligning canted supporting members over existing columns, and suspending from cables the outermost section of the arched roof structure and exterior sun shade.

**Credits**

TV Studio Cafeteria  
Mexico City

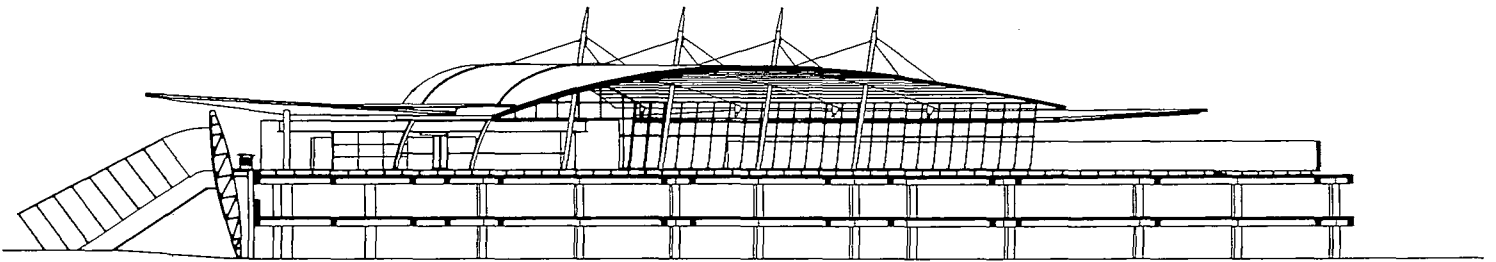
**Owner:** Televisa San Angel,  
Mexico D.F

**Architect:** TEN Arquitectos—  
Enrique Norten, Bernardo  
Gomez-Pimienta, principals;  
Gustavo Espitia, Rebeca Golden,

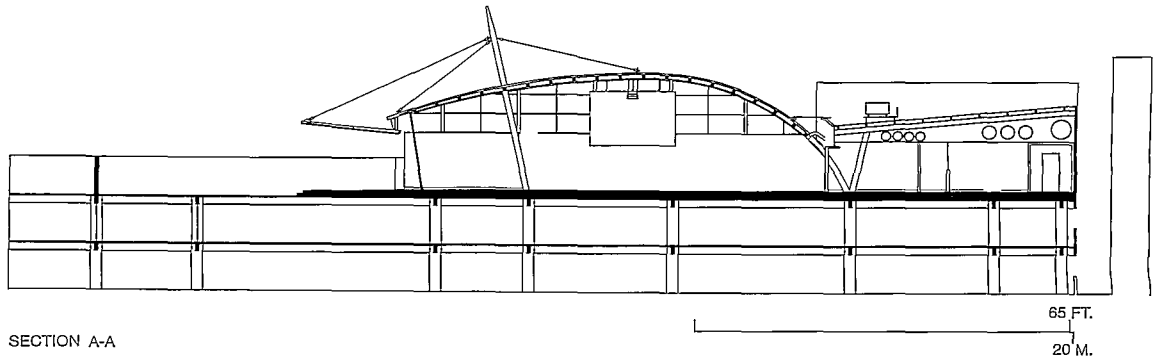
Hector L. Gamiz, Javier Presas,  
Leonardo Saldivar; Roberto  
Sheinberg, project team

**Structural Engineer:** Ove  
Arup + Partners, New York; Sal-  
vador Aguilar; Mexico.

**General Contractor:** Ideurban  
S.A.— David Serun; director.

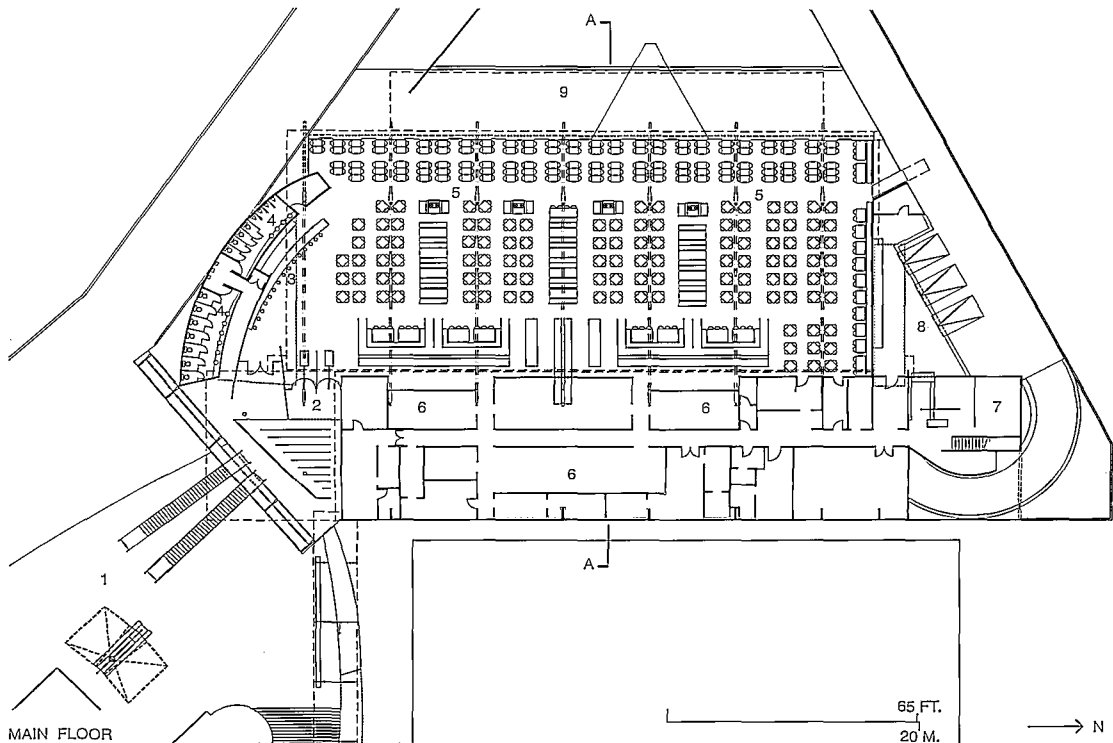


SECTIONAL ELEVATION



SECTION A-A

- 1. Plaza
- 2. Vestibule
- 3. Bar
- 4. Restrooms
- 5. Dining area
- 6. Kitchen
- 7. Offices
- 8. Delivery
- 9. Terrace



MAIN FLOOR

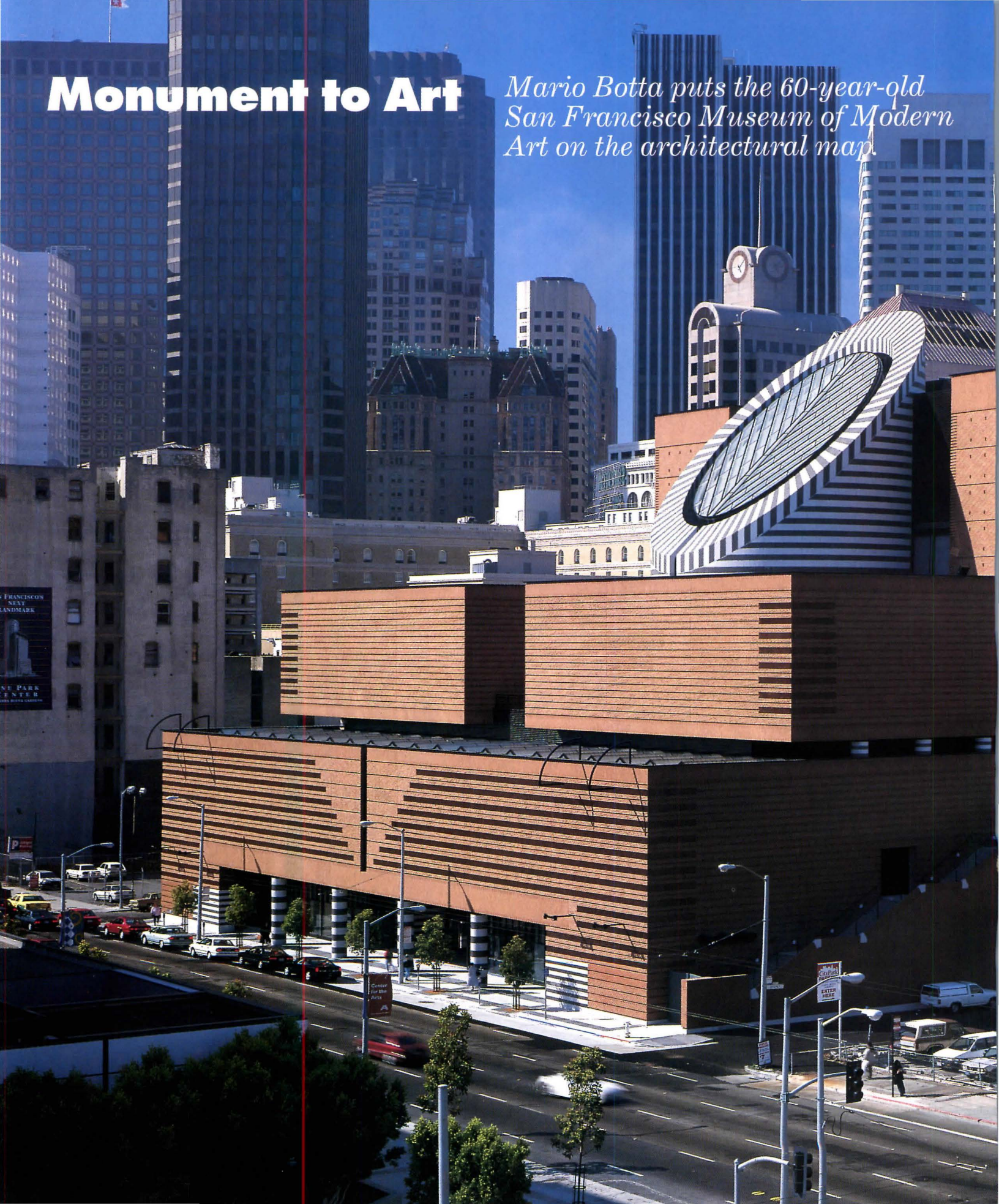






# Monument to Art

*Mario Botta puts the 60-year-old San Francisco Museum of Modern Art on the architectural map.*



FRANCISCO'S  
NEW  
LANDMARK  
  
PARK  
ENTER  
HERE

Corner  
for the  
Arts

ARTISTS  
ENTER  
HERE



*San Francisco Museum of Modern Art  
San Francisco  
Mario Botta, Design Architect  
Hellmuth, Obata & Kassabaum,  
Architect of Record*









**T**he most shocking thing about the new San Francisco Museum of Modern Art (SFMOMA), which opens to the public in January, is the quick money behind it: a whopping \$85 million, including a \$25 million operating endowment, all raised by private donation in five years, all during an economic downturn. The bulk was given by the board of trustees, a testament to the group's commitment to the project and, more importantly for their architect, to their wish to make their presence known. Mario Botta, of Lugano, Switzerland, has seen to that.

Although a local art critic writing in the *San Francisco Examiner* recently called the building "a visitor from outer space," its form is hardly alien to those familiar with Botta's previous work. It does, however, represent a climax of the architect's career so far—the simple geometric forms of his Ticino houses blown up to gigantic scale. Having long outgrown previous quarters in the War Memorial Veterans Building in San Francisco's civic center, the trustees decided to move SFMOMA downtown and construct a new facility in Yerba Buena Gardens, the San Francisco Redevelopment Agency's 87-acre mixed-use project in the South-of-Market Street area. Museum director John Lane says Botta was chosen after an extensive architect selection process because "we had been a museum without any presence and we needed an architect who would give us a strong image on the exterior."

The architect took the request quite literally, making the centerpiece of his stepped design a truncated cylinder, which he calls "a head showing its face to downtown." (Sadly, this "head" overlooks the backside of Fumihiko Maki's building across the street, suggesting that, through no fault of the individual architects, a cohesive Yerba Buena complex plan exists only on paper.) Working with local firm Hellmuth, Obata & Kassabaum, Botta packed 225,000 square feet into a site footprint of 60,000 square feet. The fortress-like pre-cast structure is clad in bands of rusticated red brick accented by flamed white and black granite. Having proved the rule that horizontal stripes accentuate girth, Botta further emphasized the museum's horizontality by raking the mortar joints between brick courses, a detail favored by Frank Lloyd Wright. Future development plans call for office towers to occupy the parking lots currently flanking the museum, and their elongated profile will perhaps have the welcome slimming effect of corset stays. The bricks, some 600,000 in all, were rolled in sand before baking to give them a grainy, rusticated finish, supporting Botta's vision of SFMOMA as "an ancient palace."

Unlike the dense exterior, inside there is an immediate sense of expansive space. Entry is beneath an arrowhead-like pattern in the center of the facade and circulation between galleries, which are organized around a soaring, top-lit central staircase, is equally straightforward. Characteristically, Botta used logic to dramatic effect. *Karen D. Stein*



*In front of the Botta-designed museum is MGA Partners' \$23-million Yerba Buena Esplanade, which links Center for the Arts buildings by James Stewart Polshak (right in photo) and Fumihiko Maki (left).*

©Perretti & Park Pictures photo

## Viewpoint

The San Francisco Museum of Modern Art is a monument—perhaps the last of a dying breed. It does not respond to its environment, but creates its own. It does not reveal its interior, but hides it. It does not state the new, but upholds commonly held values. This museum is not multi-cultural, or politically-correct. It just is. Either you accept the premise that, as an art institution, it has the right to assert its physical superiority over its surroundings, or you don't.

History is the key to the museum's monumentality. First, there is the history of the institution itself. In its previous location, SFMOMA was no more than a few hallways hidden in the Beaux-Arts War Memorial Veterans Building, a bland but grand structure in a civic center that included City Hall. Daniel Burnham had envisioned the grouping in a vast scheme to tame the sharp hills of the peninsula to the rational axiality of his 1905 "Improvement and Adornment of San Francisco" plan. Only the center was built, and over the years it was marooned between the office-building corridor of Market Street and the freeway extension. To many, it was a paradigm of the split between civic ideals and urban reality.

Now the museum has moved to a location much like the old civic center, except that this isolated array of cultural institutions has been consciously assembled. The heart of Yerba Buena is the Moscone Convention Center, partially sunken and topped by a park dotted with cafes, waterfalls, and an amphitheater. Urban planning has been camouflaged as a tourist attraction. Just as Burnham sought continuity, so the developers of this area anticipate a forest of skyscrapers, which will merge the low-slung forms of the cultural and convention enclave with the financial district across Market Street. For now, only the museum, a performing arts center, and a visual arts center occupy the vast tract.

From the center of the outdoor Yerba Buena Esplanade, the museum looks magnificent. Framed by the deferential twin art centers, it rises in insolent symmetry to the quasi-tower of the skylight cylinder. This sheared-off tube is like a cut-off Capitol dome, a well-worn symbol of democracy. It seems both ridiculous and hopeful. The museum is an efficient monument. It looks only in one direction, leaving the rest of the city an elegant, but anonymous back. Mario Botta's sense of proportion and meticulous detailing save the building from bombast. Yet these same skills isolate it from the city around it.

Inside, reliance on monumental traditions continues: there is a grand central rotunda and an equally grand staircase. The entrance to the stair, however, is a dark maw of granite, and the elaborate circulation sequence takes over the rotunda. The rotunda's columns, seemingly reaching for the sky, do not so much hold up the ceiling as they tether shifting planes to the black granite floor. In an exquisite balancing act, Botta projects a sense of soaring Modernism that distracts from the museum's old-fashioned roots. SFMOMA will pay a hefty price for being more than functional: temporary walls are heavy and expensive to move, heating and cooling loads are high, and many guards will be needed to supervise the extra fire exits resulting from the layered plan.

The realities of daily life with their demands for economy and life-safety tend to dissolve monumental traditions. SFMOMA stands firm against developing trends, swaying only slightly in the breeze of a new age. If Yerba Buena is reminiscent of a Roman forum unearthed in a modern city, then SFMOMA is a marble and brick totem that caught the eye of the archeological explorer in search of the lost beauties of a self-confident architecture. *Aaron Betsky*





*"The visitor should be the protagonist in the lobby and public spaces, and the art should be the protagonist in the galleries," asserts Botta. To ensure this, the architect designed a massive central stairway, with balconies, which he likens to "piazzas," arranged like stacked trays over the lobby. Flanked by matching information desks (opposite) the stairway occupies the cylindrical black-and-white striped tower visible on the exterior, which rises 145 feet above the ground floor to a giant clear glass skylight.*

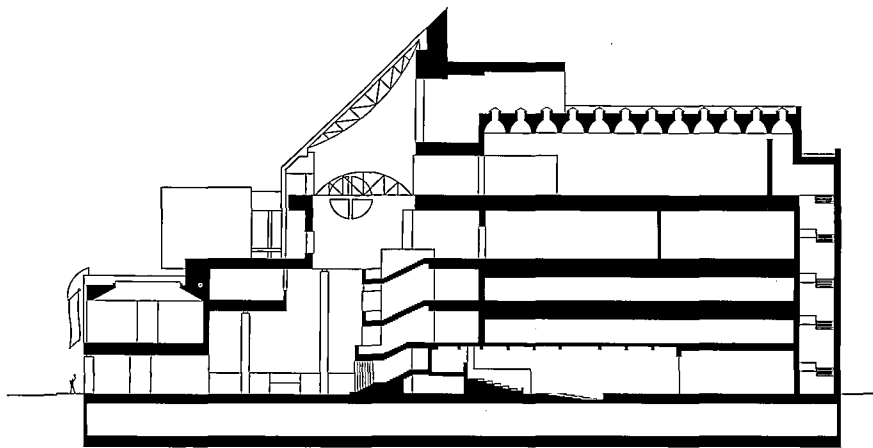
*Floors and stairwell walls are alternating stripes of polished and flamed black granite. Asked about his spare palette, Botta explains: "In a world of many colors and materials, there is poetry in their absence. It's not me that supplies color, but the sun, and the visitors." Recessed tungsten-halogen downlights in risers dramatize the staircase's ziggurat form (below).*









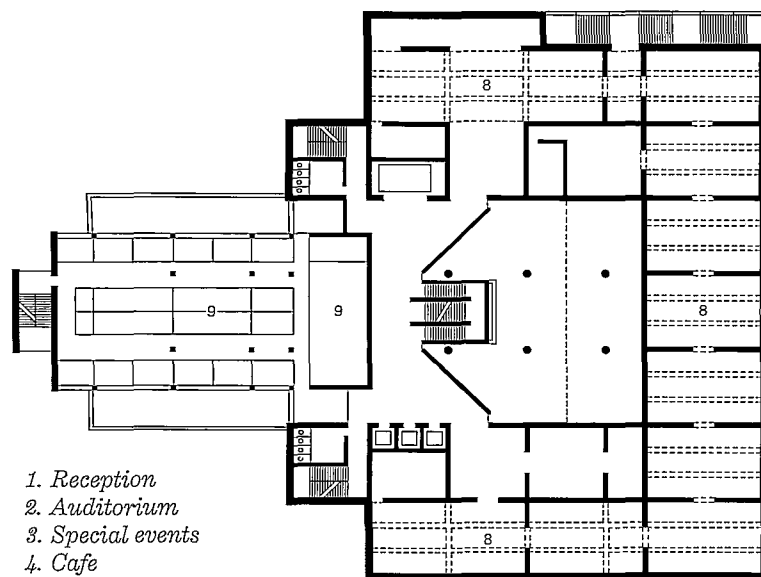


SECTION A-A

*In plan, the huge skylight atop the central stairway is an ellipse but, mounted on the truncated cylindrical turret at 45 degrees, it appears from a distance to be a circle. It is composed of 1/2-inch-thick clear glass, creating dramatic shadows inside the cylinder. Heat gain and glare can be uncomfortable on the pedestrian bridge leading to the enormous fifth-floor temporary exhibition spaces (opposite), so mitigating measures are being reviewed by the architects.*

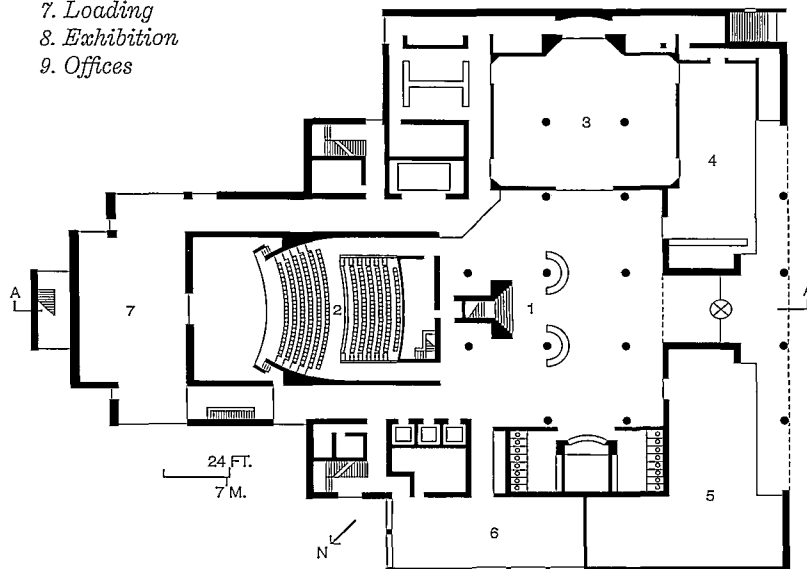
*On the ground floor is a 400-seat auditorium, an unusually large 4,000-square-foot shop and a 2,500-square-foot cafe, telltale signs of museums' growing reliance on other profit centers.*

*Gallery-ceiling heights vary between 16, 18, and 23 1/2 feet. Galleries along the perimeter are lit by skylights, while interior galleries, which feature daylight-sensitive photography and works on paper, have indirect light.*



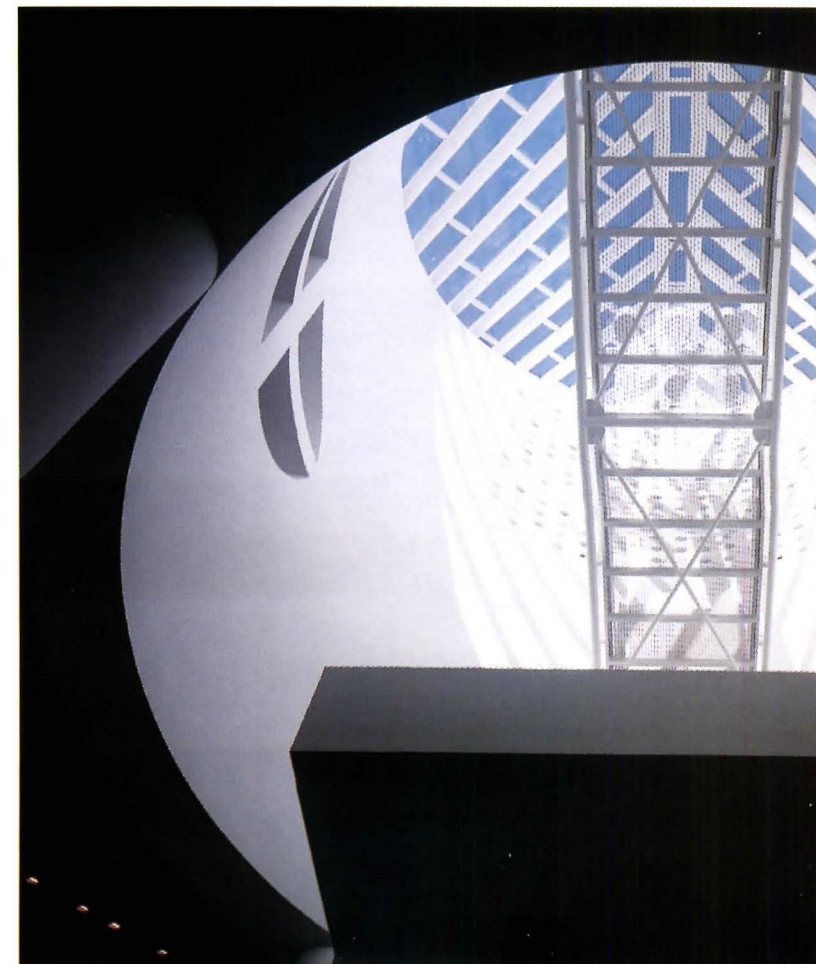
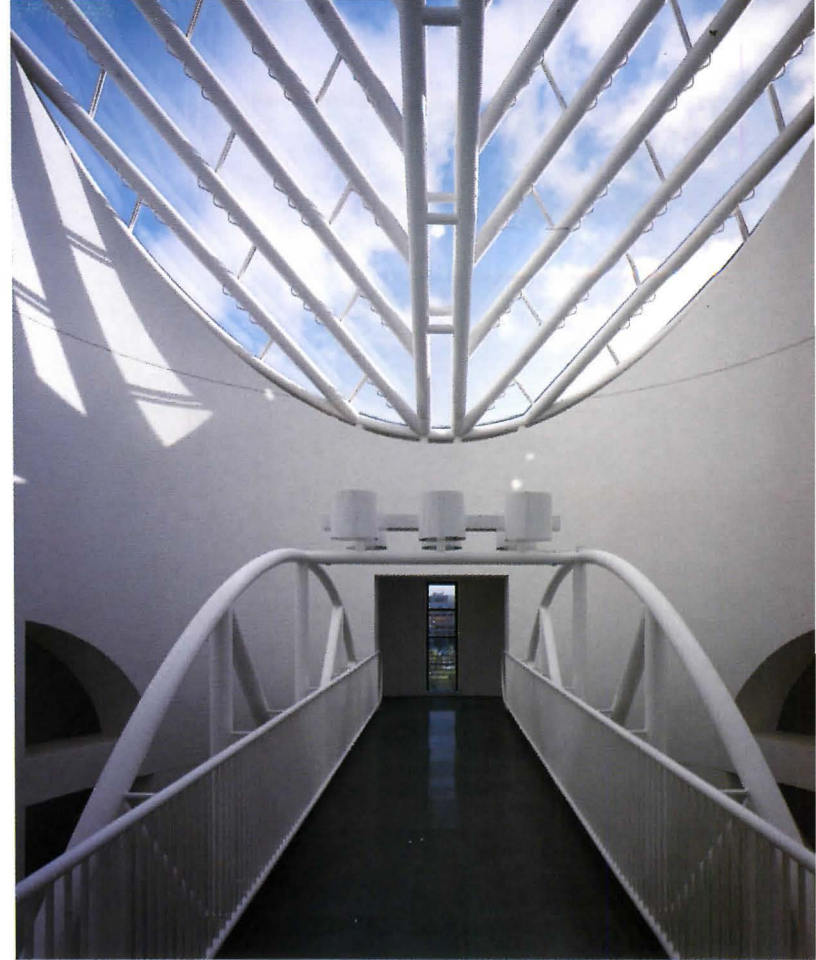
SECOND FLOOR

1. Reception
2. Auditorium
3. Special events
4. Cafe
5. Bookstore
6. Classroom
7. Loading
8. Exhibition
9. Offices



FIRST FLOOR









The museum has 50,000 square feet of exhibition space. Daylit galleries are topped by deceptively simple skylights—glass gables with metal-panel bases perforated at an angle, allowing only north light to penetrate to twin curved plastic lenses.

**Credits**

*San Francisco Museum of Modern Art  
San Francisco*

**Design Architect:** *Mario Botta Architect—Mario Botta, principal-in-charge; Ugo Früh, project architect; Thomas Hegi, Davide Macullo, Maurizio Pelli, project team*

**Architect of Record:**

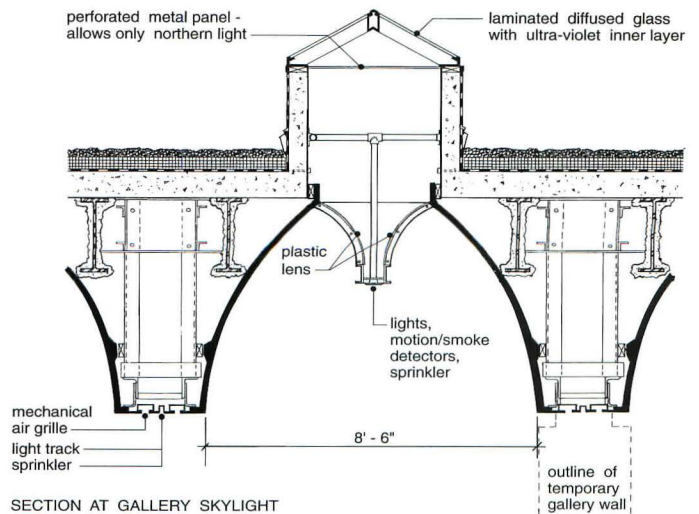
*Hellmuth, Obata & Kassabaum—Patrick MacLeamy, principal-in-charge; Mark Otsea, project manager; Mark Piaia, project architect; Andres Grechi, Stuart MacDonald, Laurence Rugg, Lou Williams, project team*

**Engineers:** *Forell and Elsesser (structural); Flack and Kurtz Consulting Engineers (mechanical/electrical); Leonard D. Auerback (acoustical)*

**Consultants:** *Bechtel International (project management); Fisher Marantz (lighting); Steven R. Keller and Associates (security); Gensler & Associates (interior design)*

**General Contractor:**

*Swinerton & Walberg*









# Gateway to Haven

*Guest House, Gates Residence  
Medina, Washington  
Bohlin Cywinski Jackson/James Cutler  
Architects, A Joint Venture, Architects*





**W**hen a mogul of technology along the lines of Microsoft chairman William Gates builds a house for himself and his family, the world watches to discover how he establishes his priorities, how he deals with privacy, how he distances his home from his work environment.

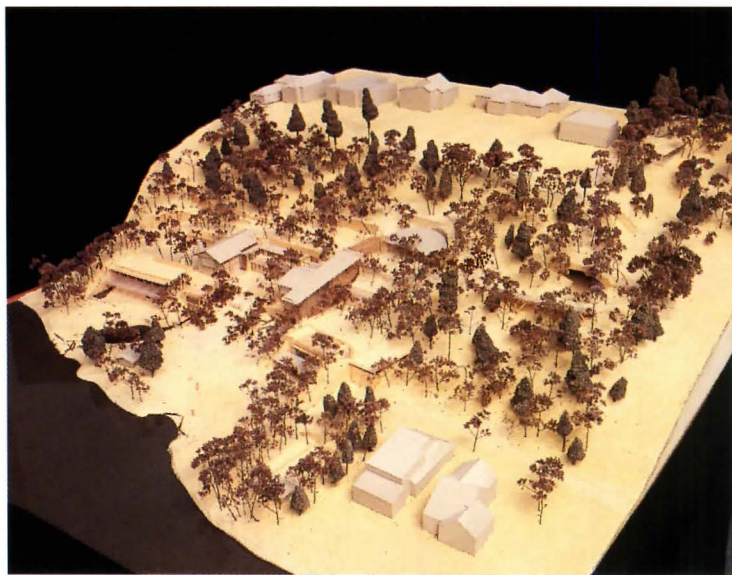
In Gates's case, the driving force was the land. He selected this modest-sized 4.5 acre site in a close-in Seattle suburb for its access to the Microsoft offices in Redmond and to Interstate 405 (which leads directly to the SeaTac airport); and for its dramatic profile—it slopes from a high of 170 feet at the entrance to 16 feet above sea-level at Lake Washington. He liked it for the view across the lake to the Seattle skyline and to the Olympic Mountains beyond, and, not least, for its potential as a haven for the complex and conflicting demands of privacy, business gatherings, and entertainment.

The site became a remarkable challenge. With its great drops in elevation, its unstable glacial subsurface (requiring a maze of retaining walls), its wetlands potential, and its small window of access at the southeast corner, it largely determined the location of buildings, the placement of the 1,000-foot drive, and the distribution of services. The drive, carefully choreographed, leads from site entrance to main house at a pleasing grade despite the contours, and its course was deliberately mapped out to serve Gates as a decompression device at the end of 15-hour workdays. Immediately after entering the site, the road passes the guest house (deliberately tucked into the side of the hill, opposite page), proceeds downhill through a small ravine, and curves across the site as a sort of pastoral lane, offering a series of “revelations” as it approaches the main house.

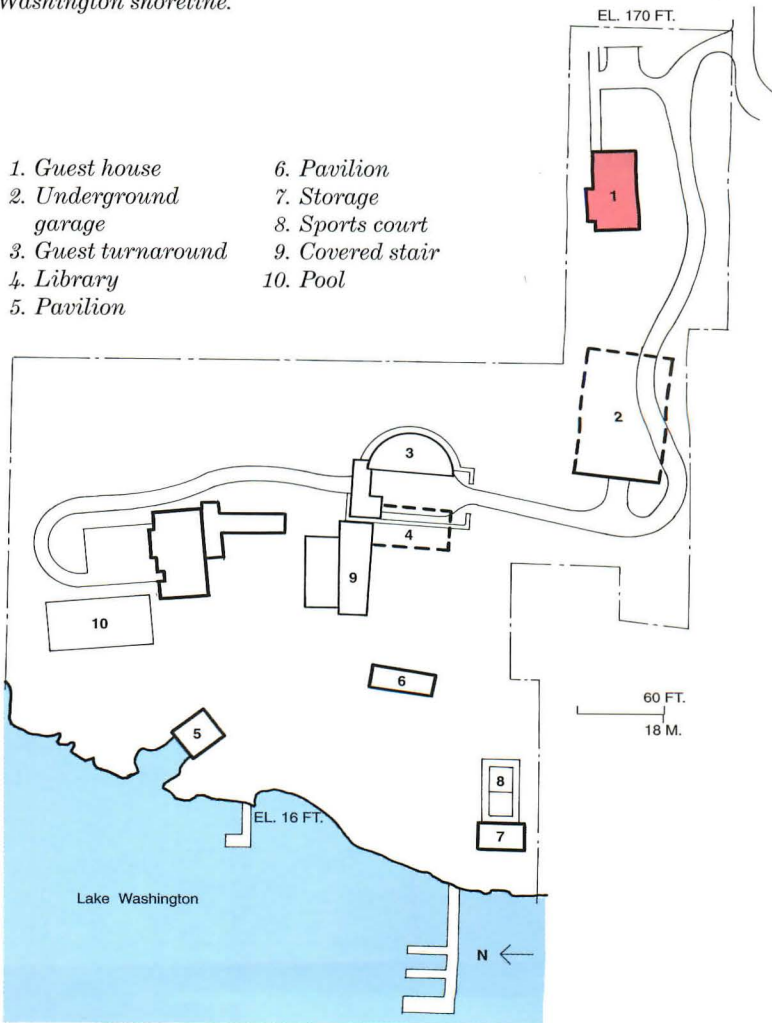
A decent concern for ecology was a critical factor in developing the site. Of the two existing houses, one was demolished, the other sold and carted off by barge. The destruction caused by the sitework triggered a decision to give back to the site what was being destroyed. Says joint-venture partner James Cutler: “In the case of the upper site forest, where the guest house is, we planted a so-called ‘emergent forest,’ that is, a forest that will be a stable system in the long-term. We planted alders. This way we got a jump-start. Alders grow very fast. Their root nodules are nitrogen fixers: they prepare the soil for other types of life. Then the other trees come up between them, slowly, evergreens such as cedar, hemlock, and fir. We wanted to restore the ecosystem, so we went to some clearcuts and bought the duff—the top soil that contains the seeds for the next generation of trees, and we spread it over the site. We didn’t know what we would get, but we knew we’d get something close to what would normally happen. It’s burgeoning; it’s one of the things I’m most proud of.”

Another ecological tactic was creating a wetlands area at the lakeside. “We’re diverting the water to a 100,000-gallon cistern half way up the slope. A pipe will lead water to one corner of the site which we’re dedicating to wildlife,” says Cutler. “Bill [Gates] was skeptical at first. His role was always to be skeptical. We explained that this was not only a good thing to do, but as the years went by he would be able to see the way the animals came on a seasonal basis, and his children could come to this place and take pleasure in actually being around things other than people.” Once convinced of its merit, Gates gladly paid the moderate added cost.

A key demand, underscoring the Gates’ core attitude to the project, was to conceal all the state-of-the-art communications technology. “Here’s how it’s going to function,” the architects were told. “Here’s what the device looks like. You go design it so we don’t have to see it.”  
*Stephen A. Kliment*

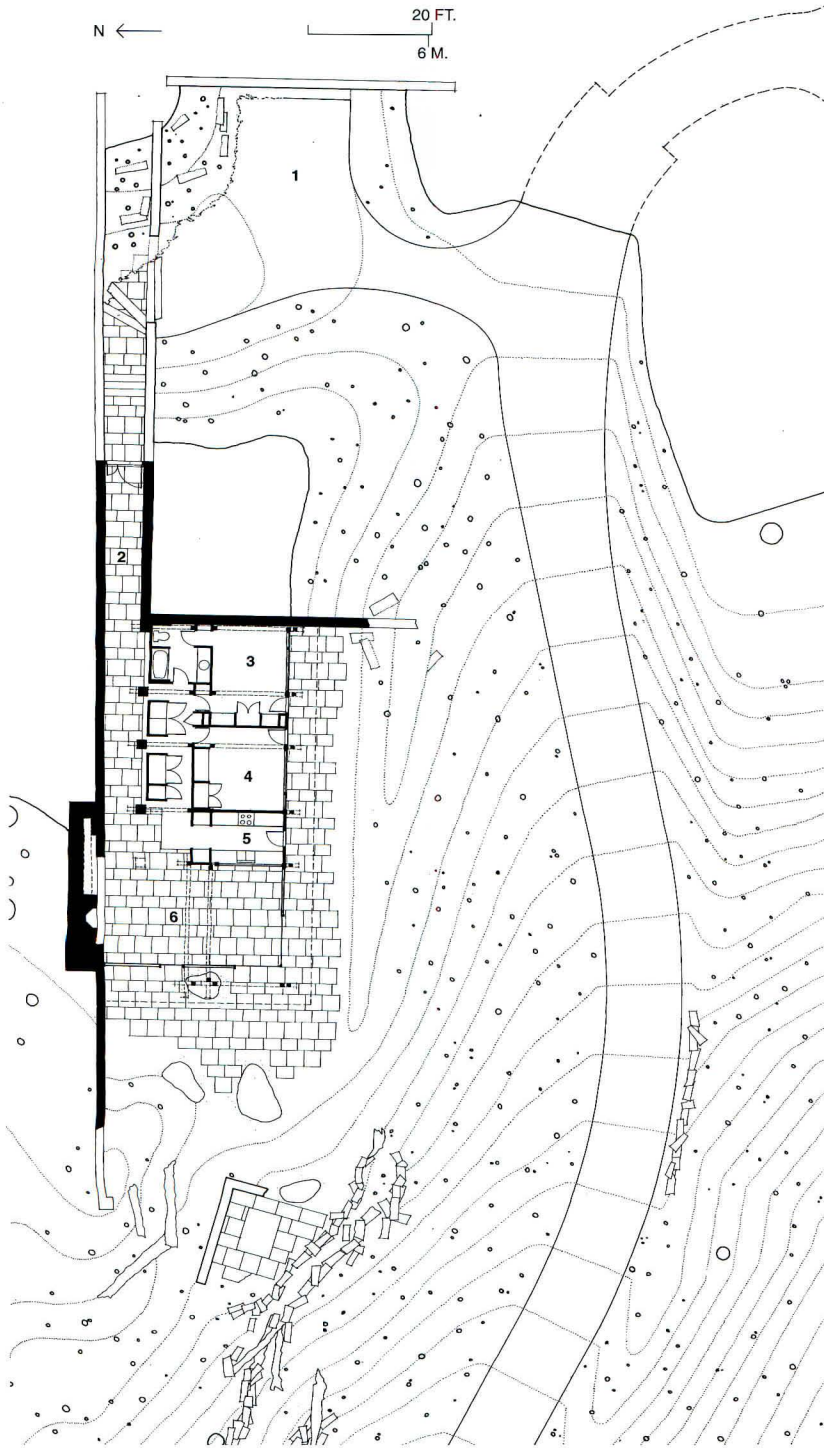


The Gates guest house is located at the southeast corner of the steep 4.5-acre site, which drops 154 feet from its high point to the Lake Washington shoreline.



GUEST HOUSE / GATES RESIDENCE





GUEST HOUSE FLOOR PLAN

1. Parking
2. Hall
3. Bedroom
4. Guest room/study
5. Kitchen
6. Living/dining

The 1,700-square-foot guest house is the first of two buildings completed at this writing (the other is the vaulted underground garage). Situated at the entry to the site, wedged into the hill and barely visible from the main drive, the house was built well ahead of the other structures in order to test attitudes, design, materials, and the caliber of the construction team, but mainly to get any divisive issues on the table in good time. For example, after reviewing the effect of the narrow palette of materials used in the guest house—mainly rough concrete, granite, Douglas fir heavy timber, and glass—the Gates' asked for a greater range in later structures—more wood species, more types of stone, and softer lines.

In joint venture partner Peter Bohlin's words: "You approach the guest house on foot by going down three steps, and are drawn towards distant light along a hall bordered by high concrete walls (opposite page, top left), then make your way past a rhythm of concrete columns (top right) to the living/dining space." The concrete and granite fireplace has part of the wall cut out as a metaphor for the past (bottom). The wood column is framed at an angle to make for a wider opening.

The massive 4-by-12-inch beams span 14 feet, and, along with the wood posts, come—in another bow to ecology—from salvaged, tough, old-growth lumber milled at a small local mill by a used-lumber broker. The mill sends 10 percent of its output to the project. Finishes contain no toxic VODs. The tern-coated stainless-steel roof edging is lead-free.

#### Credits

Guest House, Gates Residence  
Medina, Washington

**Owner:** Mr. and Mrs. William H. Gates, III

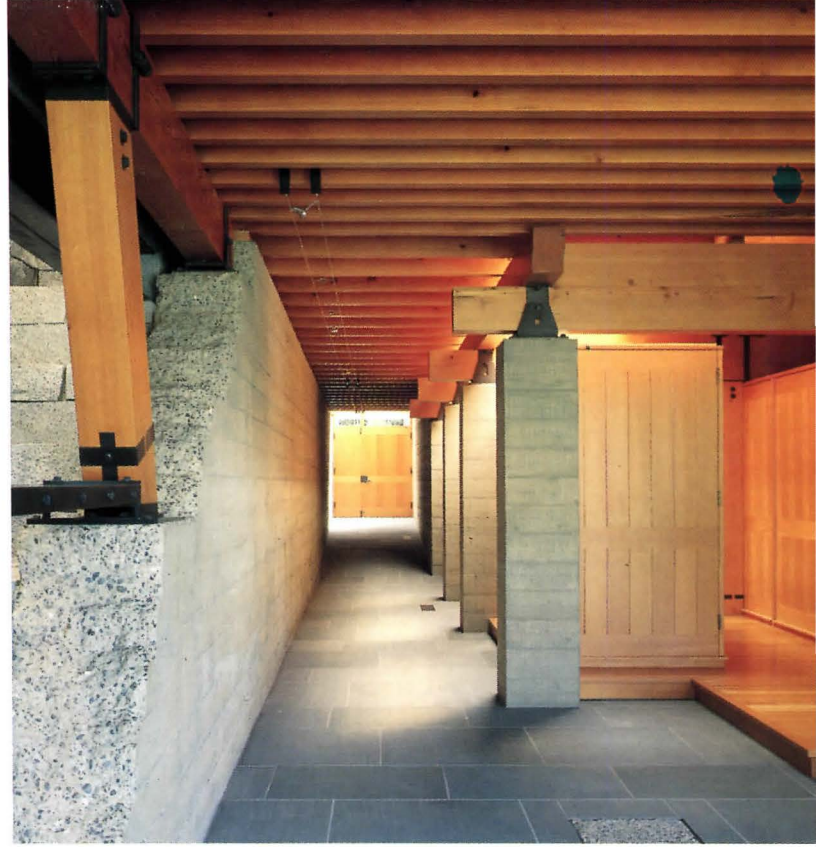
**Architect:** Bohlin Cywinski Jackson/James Cutler Architects, A Joint Venture. Peter Bohlin/Bohlin Cywinski Jackson, James Cutler/James Cutler Architects, partners-in-charge; Pat Munter, project manager; Theresa Thomas, project architect; Stephen Altherr; Bruce Anderson, Russ Hamlet, Robert Miller, Alan Purvis, Terrence Wagner, project team

**Engineers:** KPFF Consulting Engineers (structural and civil); Interface Engineering, Inc. (mechanical and electrical)

**Consultants:** The Berger Partnership (landscape architects); Michael R. Yantis, Inc., PS (acoustical); Wetherholt and Associates (roofing/waterproofing); The Music Room (audio/visual); NBBJ Interiors (interiors)

**General Contractor:** Sellen Construction Company







# Dorms and Traditions

*Placing new buildings amid campus architecture can be fraught with peril, especially at tradition-laden colleges in the Northeast. Three recent projects approached the problem in differing ways, from innovative to respectful. The degree of originality each architect could bring to a building depended not only on design philosophies and client expectations, but also on how closely the new must integrate with the old at each site. Kenyon College (below) allowed inventively free use of*



© Chuck Choi photos

## **The Woodlands Dormitories**

*Kenyon College  
Gambier, Ohio*

*Thompson and Rose Architects*

Responding to Kenyon students' wishes for on-campus apartments, Thompson and Rose Architects designed a one-apartment-per-floor residence, each consisting of a living room with kitchenette, a bathroom, and two single bedrooms and one double, complete with study desks. The exterior materials carry through those found on the imposing Collegiate-Gothic main campus—

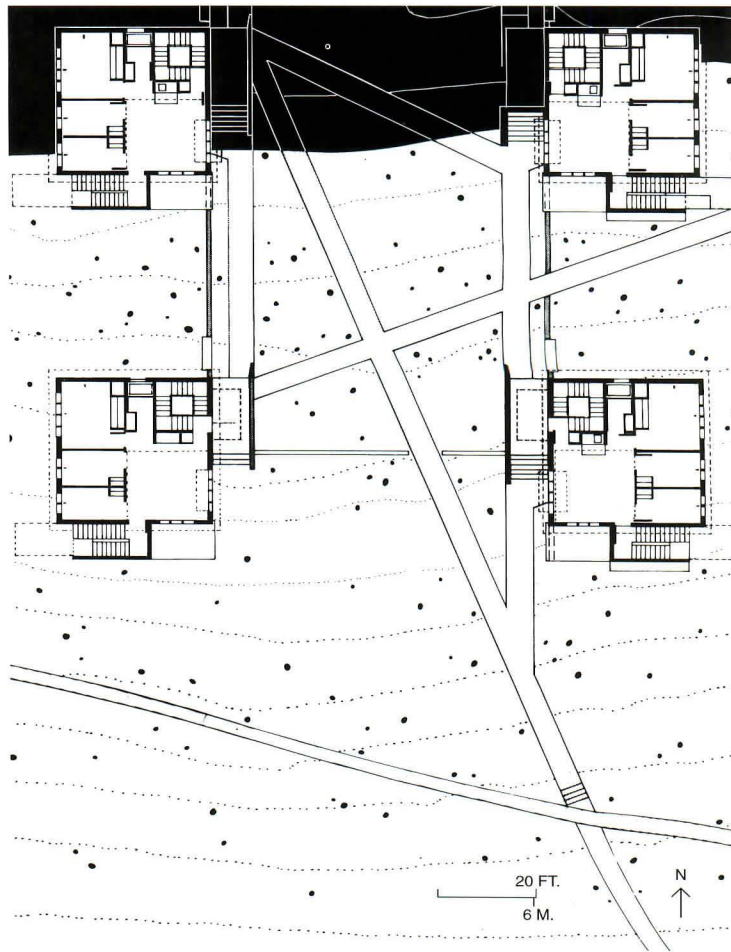
sandstone, rough stucco, mahogany, and lead-coated copper. To give the roofs visual strength, the architects suspended gutters seven inches below edges, giving them greater depth. The site the architects helped choose is a woodlands south of a mile-long formal campus axis, terminated until now by the original 1830 Old Kenyon Building (background



traditional forms for a student residence in a relatively isolated location. The site at Middlesex School (page 94) demanded great skill in creating appropriate buildings to unite venerable neighbors.

These buildings tell more. To those who haven't been around campuses in some time, new-style dormitories are much more than rooms with a bed, desk, and bureau. Most "dorms" are now called "student housing," and many students now share

apartments, not just rooms. This approach is meant to prepare students for life after diplomas, even though some large universities cite difficulties in matching compatible students. At the three schools shown here, the students themselves had choices, including apartments. And not only are both sexes now housed together in adjoining suites (as some have been since the 1970s), at Bates (page 90), there is talk of both sexes sharing the same apartment. Charles K. Hoyt



above). They continued that axis by centering four pavilions in a loosely defined quadrangle, informally crisscrossed by pebble paths. Architectural imagery evokes up-to-the-minute creativity as well as sylvan cottages of the Arts and Crafts Movement. Bay-windowed living rooms on the upper two floors combine into one large element on the facade. The windows overlook activity in

the central court, where walks lead south to foot trails and playing fields. Bedrooms face the woods. Construction is wood frame with plywood beams. (Construction cost was withheld by the owner.) Forty-eight students now occupy the three-story buildings, meeting the promise the college was founded on: an arcadian retreat from the "vice and dissipation of urban life."

#### Credits

*The Woodland Dormitories, Kenyon College  
Gambier, Ohio*

**Architects:** *Thompson and Rose Architects—Charles Rose, Maryann Thompson, principals-in charge; Warren VanWees, Francisco Thebaud, design and production team*

**Consultant:** *Sam Williamson (landscape)*

**Engineers:** *Wayne King, Ocmulgee Associates (structural); Brad Schaffer, M-E Associates (mechanical)*

**Construction Manager:** *Albert M. Higley Company—Larry Buyck (manager); Gene Goff (supervisor)*



## Residence Halls

*Bates College  
Lewiston, Maine  
William Rawn Associates,  
Architects*

© Steve Rosenthal photos



Founded in 1850 to serve the specific educational needs of "Indians, freed blacks, and the children of Maine," who may come from isolated communities with few educational resources, Bates College retains an egalitarian atmosphere to this day. A sense of community among the 1,500 students has been and continues to be crucial to instilling respect for others' differing

interests, aptitudes, and backgrounds. This has been reflected in buildings that are austere, traditional in aspect and intimately non-institutional in size—a standard that architects William Rawn Associates respected in designing this new village-like complex to house some 160 students. The layout of Bates' campus is close-knit of necessity in the severe winters of

*One example of Rawn's use of traditional elements is found on gable ends, where windows in the center are grouped to form a larger composition, while the buildings' corners are visually strengthened by solid walls punctured by relatively small openings. But the horizontally-grouped windows run in unexpectedly asymmetrical bands and the entrances below them are not monumental compositional elements, but friendly, domestically-scaled porches instead.*





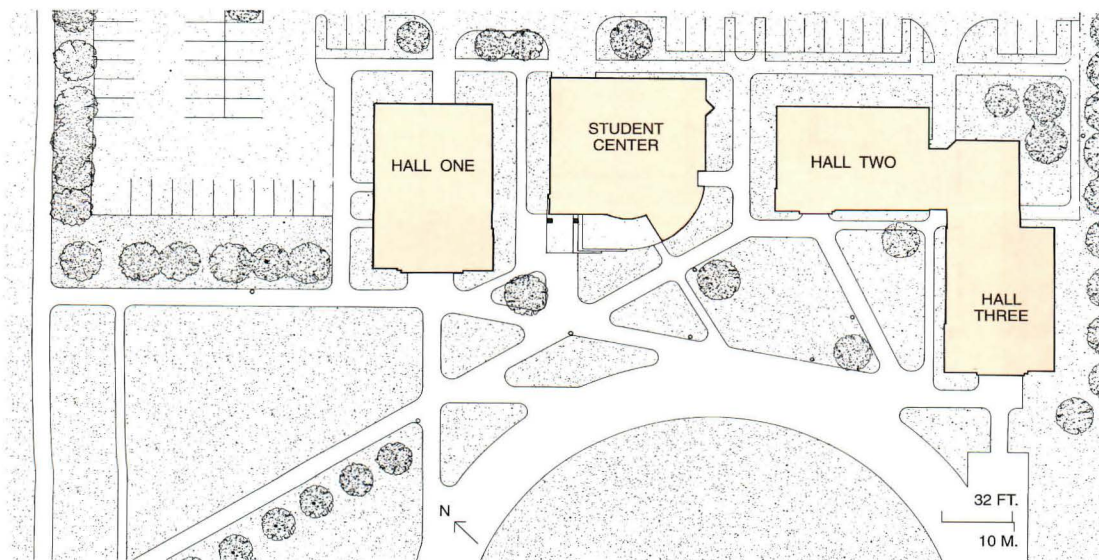
a relatively remote location in the middle of the state, where getting from one building to another can be a chilling experience. William Rawn and his design team placed their new buildings in a location determined by a masterplan by Dober, Lidsky, Craig & Associates to define a corner of the campus. Rawn's new central student center is on axis with existing

entrance gates across playing fields (photo below).

The architects have purposely chosen a design language that, at first glance, appears almost as traditional as that of their buildings' neo-Georgian brick neighbors in this relatively new section of the school's development. But, in reality, there are fundamental differences that go

beyond the exaggeration of the white wood framing of the heavy thermal glass. The architects have made a statement about the nature of Bates, its traditions, and about the age in which the buildings were built. In creating the spirit of community, the school has never had fraternities or, as a pioneer in co-education, sororities. All students eat in one dining hall. It is not surprising

then that the school's new president, Donald Harward, insisted on a heavy involvement of students in the programming of their new living quarters. He appointed two articulate students to lead the process. Given the choice of five alternatives, ranging from single rooms along a corridor with no common spaces to several people in large shared rooms, the students chose suites.





Each suite has four to six bedrooms around a shared living room. Many bedrooms are singles; some are doubles. The architects built cardboard models of different room configurations. Using these, the students picked preferred furniture arrangements, resulting in four prototype variations, which include desks facing windows or desks facing walls under raised

bunk-style beds, leaving the window area free for lounge seating. Projecting closets in double rooms provide semi-privacy for beds placed on either side. Floor plans of Hall One (below) are typical for all three residential buildings. A similar flexibility was chosen for the student center, which is normally arranged for study at tables or in lounge seating (photo and plan

opposite). Other arrangements include all tables for social occasions and an auditorium (photo below left). All wall construction is concrete block, and floors in residential buildings are concrete plank. Because the three dorms are similar, there were economies of construction that held costs to \$95 per square foot, including some custom cabinetry. C.K.H.

**Credits**

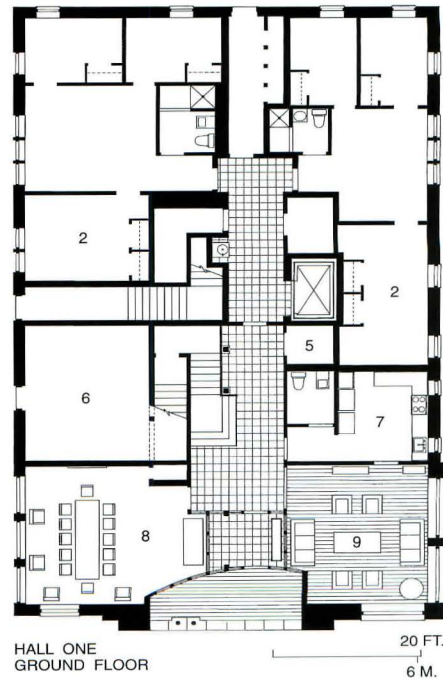
*Bates College Residence Halls and Social/Study Center  
Lewiston, Maine*

**Owner:** Bates College—Donald Harward, president; Bernard Carpenter, vice president for financial affairs; Celeste Branham, dean of students

**Architect:** William Rawn Associates, Inc.—William Rawn, principal-in-charge of



- 1. Single bedroom study
- 2. Double bedroom study
- 3. Living room
- 4. Laundry
- 5. Utility
- 6. Bike storage
- 7. Kitchen
- 8. Meeting room
- 9. Common room

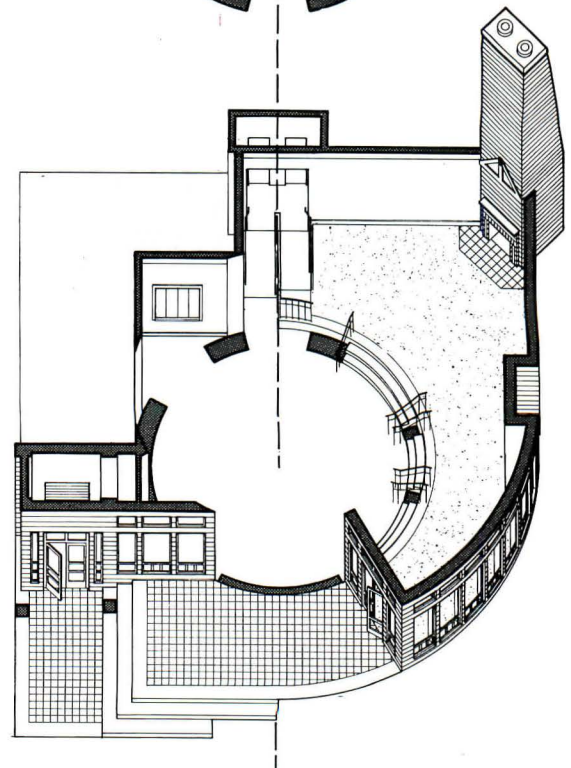
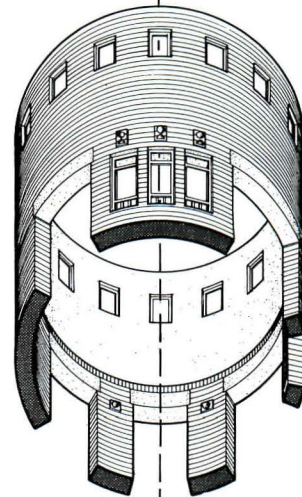
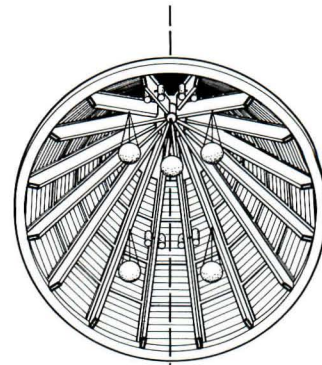
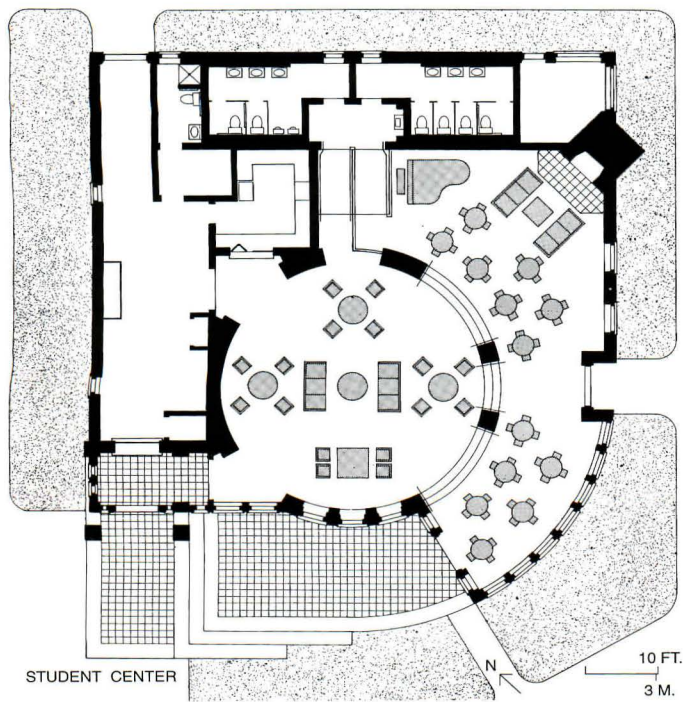




design; Alan Joslin, senior associate and project architect; Doug Johnston, associate and construction-phase coordinator; Thomas Rossant, David Yosick, Barry Ganek, Laura Yanchenko, project team

**Engineers:** LeMessurier Consultants (structural); TMP Consulting Engineers, Inc. (mechanical); Lottero + Mason Associates, Inc. (electrical)

**Consultants:** R. Lawrence Kirkegaard & Associates (acoustic); A.M. Fogarty & Associates, Inc. (costs)  
**General Contractor:** Oullet Construction, Inc.  
**Campus Planner:** Dober, Lidsky, Craig & Associates





## Kravis House

*Middlesex School  
Concord, Massachusetts  
Schwartz/Silver Architects*

Middlesex is a 300-student-preparatory school with a picturesque 1920s landscape designed by Frederick Olmsted's sons and distinguished neo-Georgian architecture by Peabody and Stearns. But a neglected area of asphalt and maintenance structures once separated the athletic complex from the main campus to the south. Overcrowding had pushed faculty members out of

the dorms and off the campus. The challenge was to lure them back where they could more closely guide students. Schwartz/Silver responded with a plan for a circular drive surrounded by new buildings, echoing the main campus plan. Included are two dormitories—Kravis House (shown here), a matching dormitory soon to be built, and a student center nearing comple-





tion in back of the renovated original dining hall. Kravis House has been so successfully received that its formal massing, as well as its basic plan, are being adopted for the second dorm. Schwartz/Silver provided faculty with their own “houses”—attached duplex apartments flanking the main building, complete with private terraces. Freshman students,

who go to bed early, occupy single rooms on the first floor. On two floors above, students share living-study rooms (photo right). Construction is wood-frame, the roof is slate, and windows and exterior paneling are aluminum-covered wood. Of the building’s appearance that so literally extends the feel of the campus, Robert Silver notes: “We have no stylistic axe to grind.” C.K.H.

**Credits**

*Kravis House  
Middlesex School  
Concord, Massachusetts*

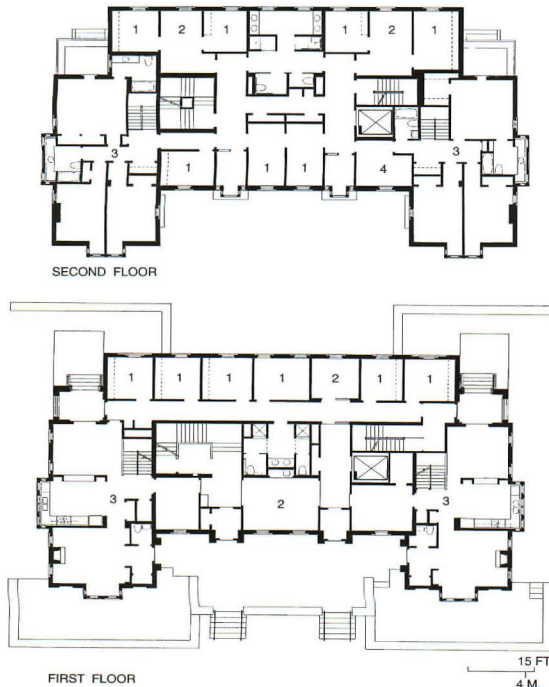
**Architect:** *Schwartz/Silver—Robert Silver, principal-in-charge; Robert Miklos, principal designer; John Nakazawa, John Traficonte, Randolph Meiklejohn, Diane McCafferty, project team*

**Engineers:** *Charles Chaloff*

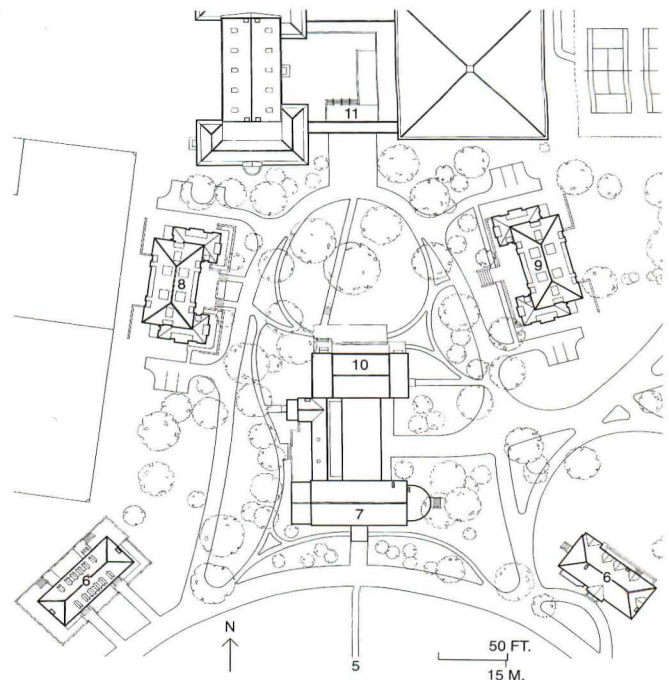
*Consulting Engineers, Inc. (structural); TMP Consulting Engineers, Inc. (hvac, plumbing, fire protection); Lottero & Mason Associates, Inc. (electrical)*

**Consultant:** *Susan Child Associates—Chris Moyles, designer (landscape)*

**General Contractor:** *Mansfield Builders, Inc.—John Thompson, supervisor*



1. Single bedroom
2. Common room
3. Faculty duplex
4. Student study
5. Main campus
6. Old dorm
7. Dining hall
8. New Kravis House
9. Future dorm
10. New Student Center
11. Athletic Center





# COMISKEY PARK SEES ABOUT 1,500 HITS PER SEASON. ITS KAWNEER DOORS SEE ABOUT 80,000 HITS PER GAME.



## *Hits at Comiskey?*

Usually about 15 a game. Maybe 20 or more if it's a slugfest.

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**Denver Airport** *continued from page 37* consequences of changes they permitted the airlines to exact. The consequences of redesigning the terminals and concourses so late in the process will be felt for the life of the facility. Bradburn regrets the bridge to terminal A, which, even with moving walkways, means a much longer walk for arriving international passengers. And the look of the concourses responds to the standards and design that Perez did for the main terminal—they weren't reworked to reflect the roof profile Fentress Bradburn developed. Already DIA looks like the hodgepodge older airports often become.

The marriage of the Fentress Bradburn roof to the terminal building—a structure that otherwise remains much the way Perez designed it—is not entirely a happy one. The roof is a dramatic form, supported by an elegant tensile structure. Unfortunately, it meets the infill curtain-wall of the building underneath with a lumpy fabric welt. (See also RECORD, June 1993, pages 106-107). The wall cladding, consistent with standards developed under Perez, is a shadowless, scaleless, grid of metal and glass. What might work for a bland, off-the-shelf develop-

er office building is far less appealing when extended with little subtlety over a 900-ft-long elevation. One hopes it meets operational requirements (metal that's easy to clean; glass that's readily replaceable).

#### What would have worked better?

Design/build, says Ginger Evans, would have created incentives for the designers to avoid delays and expedite the most buildable design. The Greiner/MKE team, however, was supposed to play much the same role as a contractor and developer would in a design/build team. Also, says James Bradburn, "design/build has real problems when you have a signature building. It removes designer from owner, which only works if you can write everything down. And many of the important things can't be written down in a program." Indeed, most of DIA's problems are attributable to keeping designers and users apart until very late in the game.

Because governments require bids, a design/build solution would probably have to be structured as a bid competition, further distancing the design team from the users. Negotiated construction contracts, if legal, could have smoothed communications and

speeded the job, notes Haury, but would not necessarily be less expensive. A more critical issue is the way the project was financed. Denver couldn't underwrite the project without issuing revenue bonds, which created unrealistic schedule pressure. And it was held hostage by airlines, which needed to be much more concerned about their short-term needs than about Denver's long-term ones.

A project of such enormity, Haury notes, can't responsibly be undertaken by the city without looking 50 to 60 years into the future: "This is not just a building, it's transportation for a major city." Airline resistance killed a major revamping of benighted Kennedy Airport in New York, and is a major reason why no major airports are on the boards in the U.S. Though some argue that battling bond-rating firms and airlines is an appropriately entrepreneurial role for a city, DIA, if it opens in February, will have come in a year and a half late and (depending on who you talk to) \$800-million to \$1-billion over budget. Hundreds of millions of dollars of this represents work redone—a colossal waste. Denver should inspire a long-overdue look at how the nation establishes needs for and finances such facilities. *James S. Russell*

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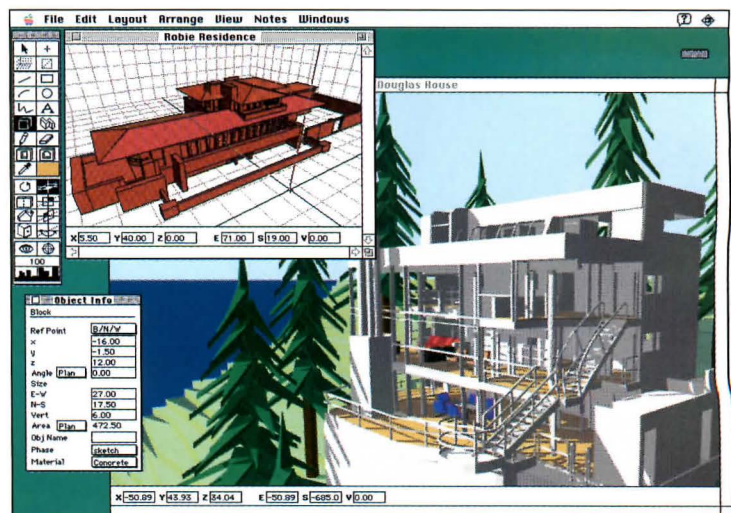


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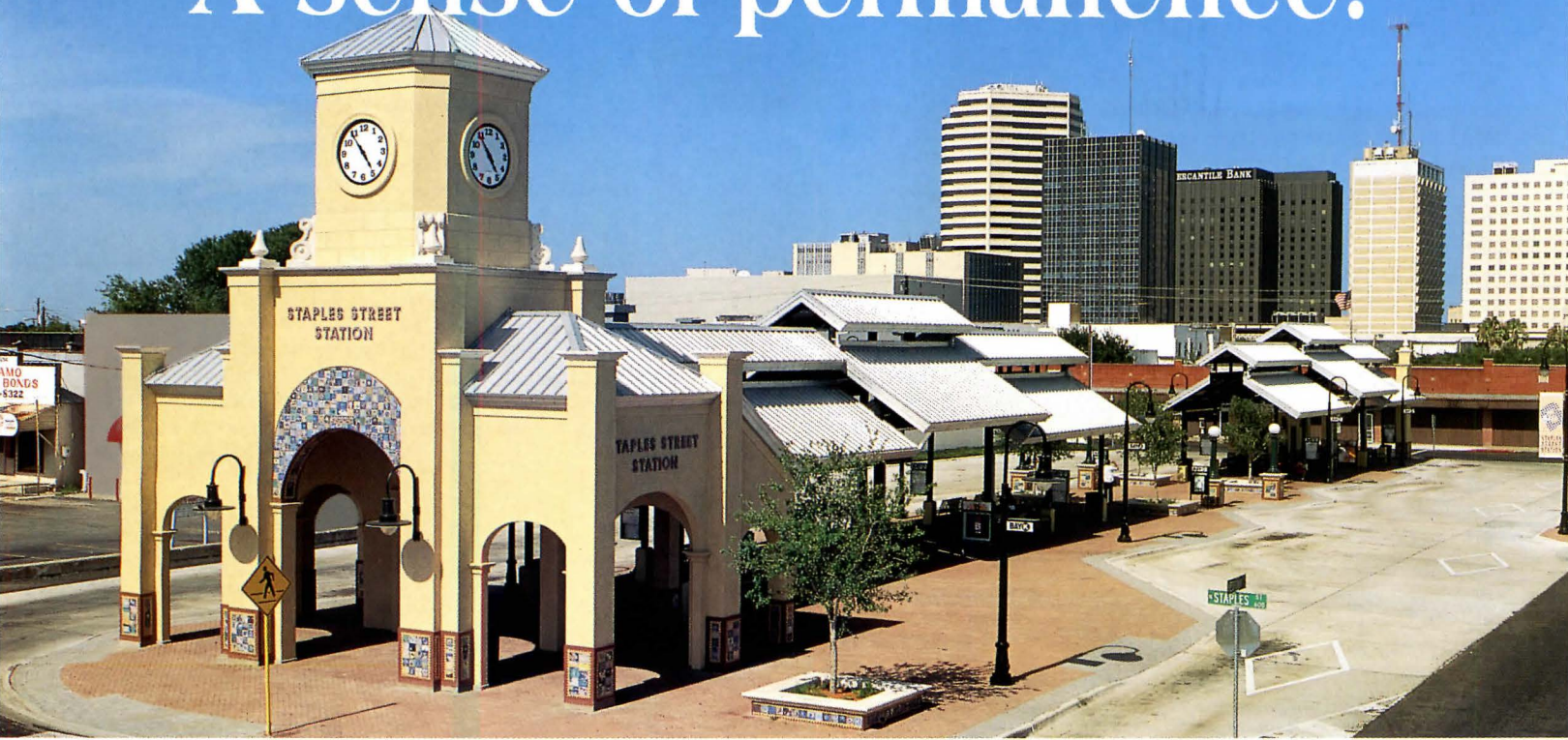
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*Project: Staples Street Station, Corpus Christi, TX / Client: Corpus Christi Regional Transportation Authority / Architect: John Wright Architects / General Contractor: Progressive Structures / Roofing Contractor: Haebler Roofing (all of Corpus Christi). MBCI Metal Roofing System: LokSeam®, 12 inch, 24 gauge, Galvalume finish.*



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## Manufacturer Sources

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

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Embassy of Finland, Washington, D.C.

Heikkinen-Komonen Architects  
Angelos Demetriou & Associates,  
Associate Architects

Glass block: Pittsburgh-Corning Corp. (custom-thickness Essex pattern). Curtain-wall framing and windows: TSI Exterior Wall System. Copper-panel cladding: Armetco Systems, Inc. Maple and cedar flooring: South Eastern Floor Co., Inc. Entrances: Brite Vue Glass System, Inc. (custom). Upswinging doors: Overhead Door Co. Locksets: Abloy Oy/Avain-Aitta. Hinges: McKinney. Closers: Dorma. Exits: Von Duprin. Perforated-steel ceilings: Dominion Applicators. Acoustical fireproofed wood panels: Elam-Trading Oy. Granite flooring: Sayegh International. Reception seating: Herman Miller (Eames Aluminium Group). Finland Hall seating: Skanno. Indoor lighting: Staff Lighting; Lightolier, Inc.; Bafux; Edison Price Lighting; Artemide. Outdoor luminaires: BEGA. Special lighting: Lightron. Elevators: Dover.

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San Francisco Museum of Modern Art

Mario Botta, Design Architect  
Hellmuth, Obata & Kassabaum, Inc.,  
Architect of Record

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Gates Guest Residence, Medina, Washington

Bohlin Cywinski Jackson / James Cutler Architects, Joint Venture, Architect  
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in two ways: by architect's name and by building  
type.

KEY:  
RL RECORD LIGHTING  
BTS Building Types Study  
PR Pacific Rim

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Architects: Aldrich & Quesada Green, Seattle, WA

Designer: Stephen S. Fuller, Atlanta, GA

Architect: O'Neill Pennoyer, Sommerville, MA

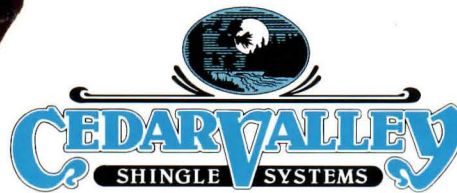
Architect: Johnson & Rosser, Hilton Head Island, SC

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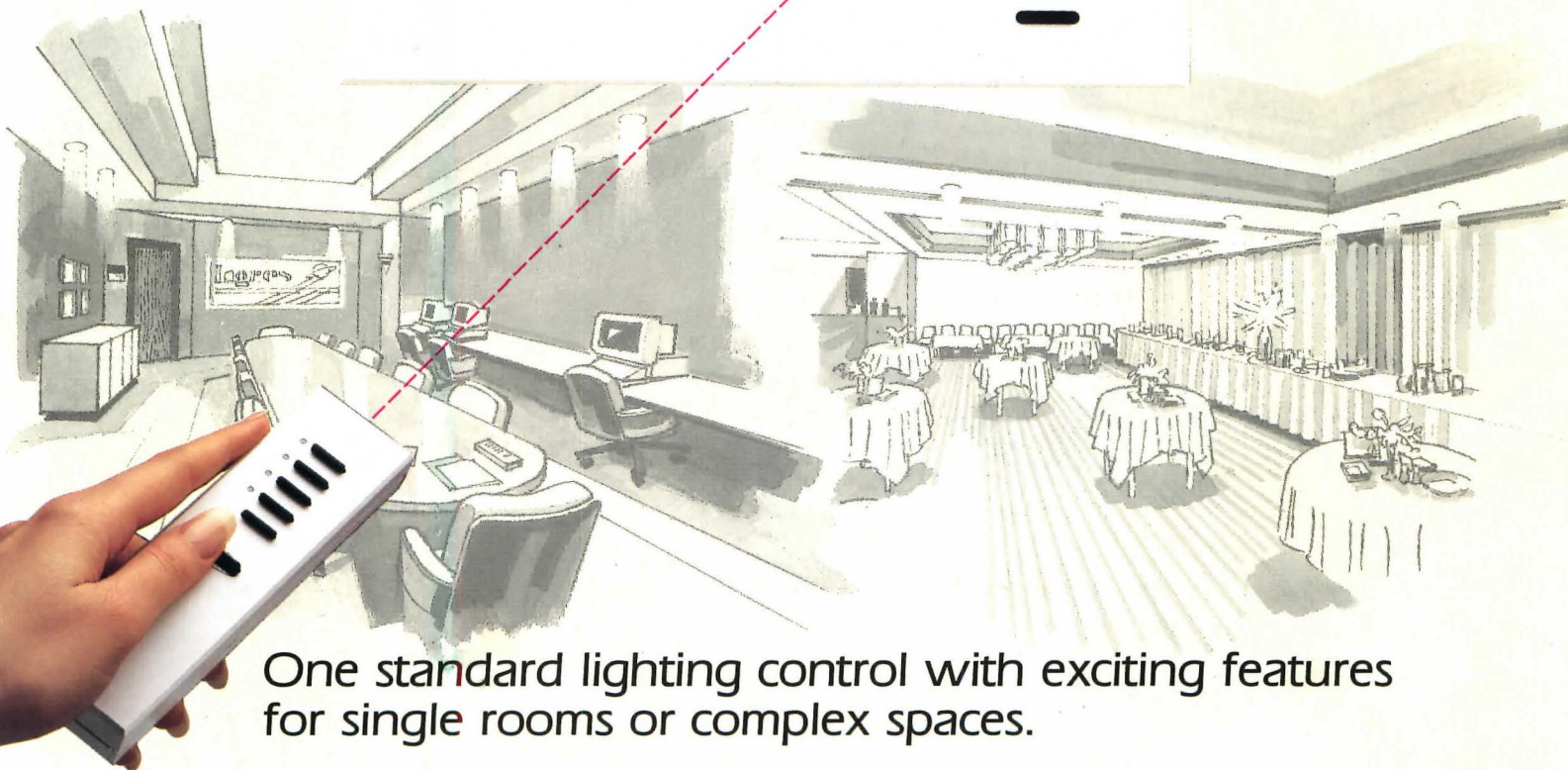


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