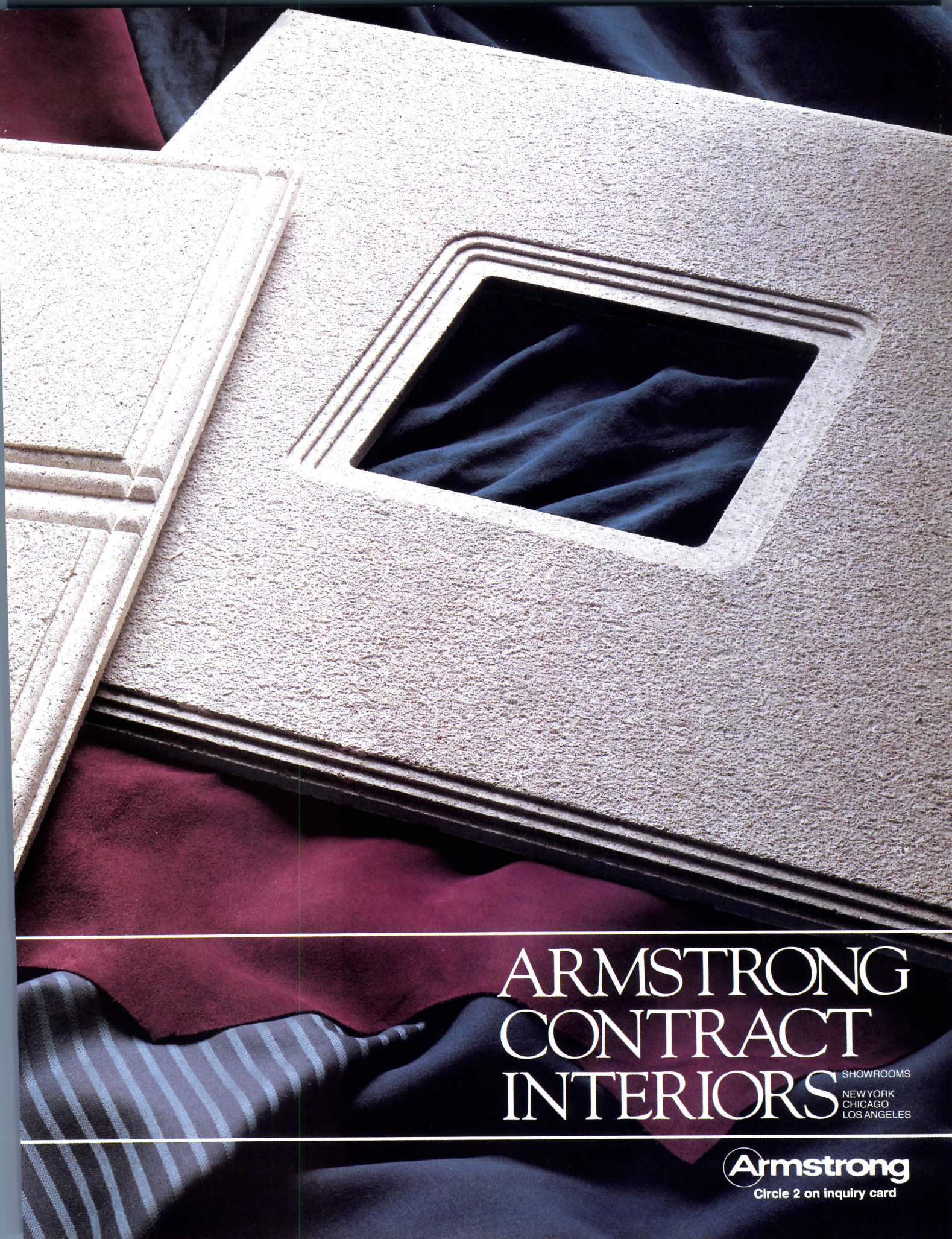

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Bank of China

Re "Scaling New Heights," by Peter Blake [RECORD, January 1991, pages 76-83]. Blake considers that Norman Foster's Hong Kong and Shanghai Bank is a conventional structure that expresses its structure for decorative reasons. Not so. Hong Kong and Shanghai is similar to Pei's Bank of China in that loads are collected in tension and returned to principal towers: in Foster's case these are clad-steel towers which contain services and economize on available floor space; in Pei's case these are massive corner pillars which return all loads to foundation. Foster's design allows for one-third additional height to be added to the existing stucture. Pei's building is a closed system. Another point of correction: Hong Kong is not in an earthquake zone.
David Booth,
Hong Kong

The enormously expensive structural system devised for the Hong Kong and Shanghai Bank does, indeed, transfer loads to principal towers by means of huge and expressed trusses; but in view of the fact that the system seems, if anything, to have added to the cost of Foster's extravaganza, it is hard to see the point of this elaborate expression. Everyone I talked to seemed to think that Hong Kong was, indeed, in an earthquake zone. The majority of earthquake shocks originates in the circum-Pacific belt around the edges of the Pacific ocean; and Hong Kong is within that circum-Pacific belt.—Peter Blake

Facing fees

Your editorial in the May 1991 RECORD ["Jumping Through Hoops," page 9] provides further convincing proof that RECORD is setting the pace for identifying major issues facing today's architects. Many firms, by accepting woefully inadequate fees for projects, will continue to suffer losses after other segments of our economy turn profitable. Instead of applauding firms who win commissions for low-balling fees, we should recognize architectural firms that refuse to get in the gutter with clients who treat architecture as a product to be taken off the market shelf.
Barry B. LePatner, Attorney
New York City

Apologies

I am extremely sorry we failed to attribute the lighting design for the Thayer School of Engineering in your May issue [RECORD, pages 84-87] to Peter Knuppel, I.E.S. His contribution was extremely important.
Robert Venturi, Architect
Venturi, Scott Brown and Associates
Philadelphia

Corrections

In the article on CambridgeSide Galleria [RECORD, May 1991, pages 96-103], the building shown in the left of the photo on pages 96-97 is not part of the Galleria. It is an office building known as Ten Canal Park and was designed and developed by Unihab, Inc.

The left-hand caption on page 45 of "Towns for All Seasons" [RECORD, June 1991] misidentified the architects of the mixed-use neighborhood in the photograph. They are Architects Lorimer-Case of San Diego. Lorimer-Case is responsible for the planning and design of all buildings and open space east of Vermont Street in San Diego's Uptown district.

Through August 15

"New Chicago Skyscrapers: Chicago's Newest High-Rise Architecture and Design for the Next Millennium," Jaroslav Fragner Gallery, Society of Czech Architects, Bethlehem Square, Prague. Co-sponsored by the Chicago Atheneum and the Prague-Chicago Sister Cities Committee.

Through August 18

"McKim, Mead & White's New York," New-York Historical Society, 170 Central Park West, New York City. 212/873-3400.

August 11-14

National Conference of States on Building Codes and Standards, Holiday Inn, Duluth, Minn. NCSBCS, 505 Huntmar Park Dr., Herndon, Va. 22070. 703/437-0100.

September 4-7

National Association of Women in Construction Convention and Trade Show, Opryland Hotel, Nashville. 817/877-5551.

September 8-October 6

Fifth International Exhibition of Architecture, Venice Biennale; Biennale Gardens and Fondazione A. Maseri, Venice, Italy. 39 41/410-685.

September 25-26

"Capital Design Week," Washington Design Center's 8th Annual Symposium on Architecture and Design. 202/554-5053.

October 3-6

American Institute of Graphic Arts National Design Conference IV, Chicago Hilton and Towers. 800/548-1634.

October 3-December 31

"Tadao Ando," Museum of Modern Art, 11 West 53rd Street, New York City. 212/708-9750.

February 15-19, 1992

A/E/C Systems Europe, AMK Centre, Berlin, Germany. Sharon Price, A/E/C Systems Europe, 365 Willard Ave., Suite 2K, Newington, Conn. 06111. 800/451-1196.

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Remaking Education

Starting on page 133 you'll see a 60-page section celebrating ARCHITECTURAL RECORD's centennial. It's surrounded by a one-of-a-kind collection of vintage ads paired with current ads by the same advertiser. Observe the incredibly rich path America has traveled architecturally in one hundred years from that July 1891 day when the first RECORD came off the press. Look too for some bold glimpses into the future in three areas—design, office practice, education of the architect. Of the three, I want to devote this centennial editorial to education, because it's the hot button of the profession's future.

Values, attitudes, skills, and creative processes learned by students in their formative years end up shaping their whole careers. So it's fair to ask what the architectural community, including the schools of architecture, is doing to form this impressionable clay into architects who can excel in the still unknown climate of the new century.

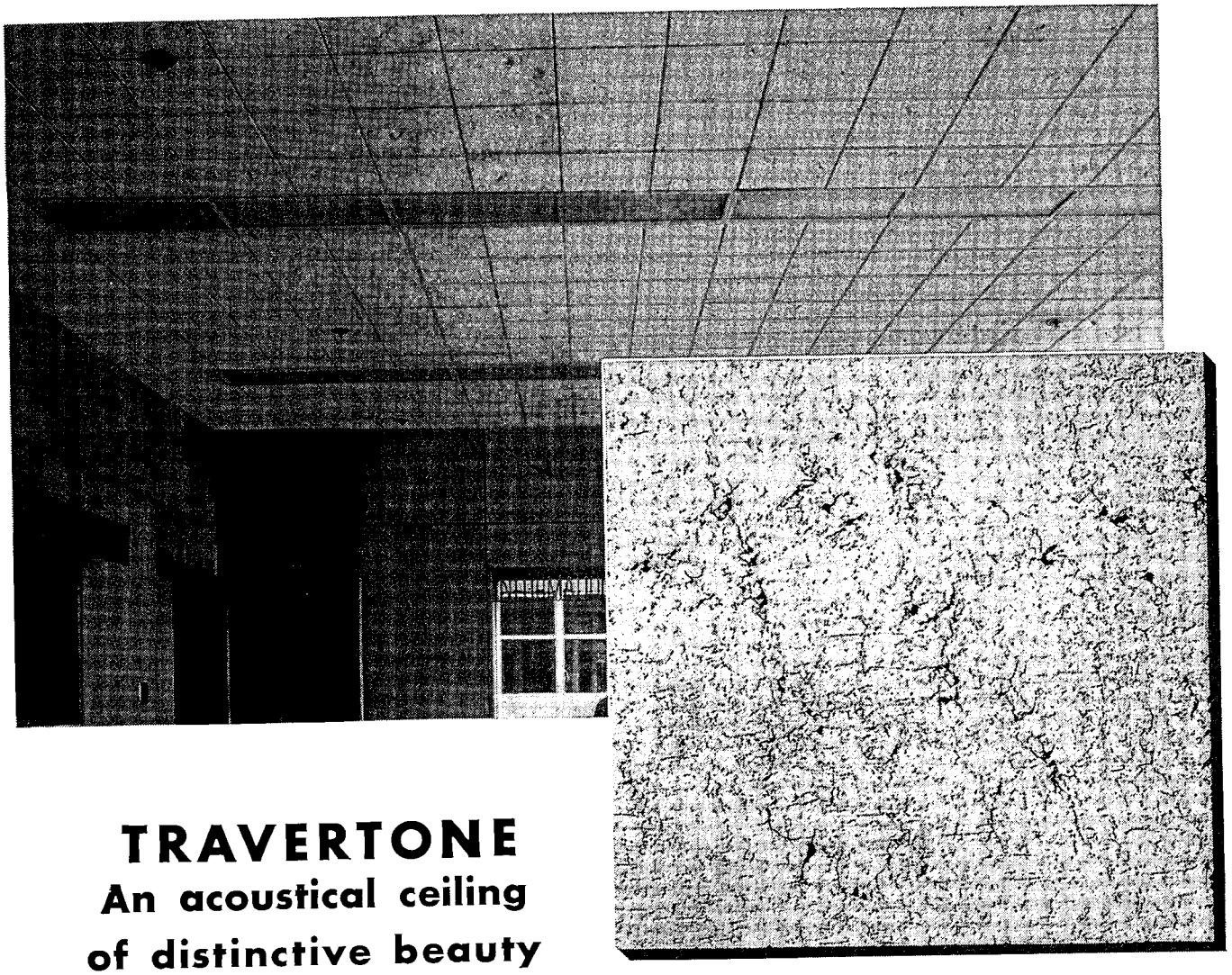
• Point One: Too many people believe that the schools alone are responsible for producing a ready-to-use architectural graduate. This is nonsense. It also goes against the entire U. S. tradition, where for generations the practice gap was filled by a loose apprenticeship system in which the architecture firm saw to it that the green trainee was transformed into a viable architect. This system has all but broken down. New employees learn catch-as-catch-can.

• Point Two: Thanks to a sharp look by such groups as the presidents of the five major societies involved in the practice, teaching, and licensing of architecture, the various roles are getting more focused. So we begin to see a framework loosely made up of (1) the *established schools*, with a design/theoretical or an engineering tradition, (2) *firms*, which must provide real-world substance, (3) a network of *professional-development programs* which keep the architect up-to-date (voluntarily for now, by law if some people have their way), (4) a system of nontraditional *specialized schools* or programs in areas such as management or preservation.

• Point Three: Today's schools are working in a bit of a vacuum, not really knowing what the profession expects of them. The standoff may shortly be resolved by NCARB's insistence on admitting to the licensing exam only graduates from accredited schools. This way, visiting accrediting teams will be looking for evidence that the curriculum corresponds to some extent to the requirements of licensing, which tests for the health, safety, and welfare aspects of practice.

This could, if we aren't careful, lead to homogenization of the schools. But one of the great virtues of our present system is its diversity; each school is unique and it should be encouraged to remain so. A program such as Cooper Union's, which at first glance is hard to connect to the real world, has no problem placing its graduates. Why? Because it hand picks its students, then teaches them how to think for themselves through a rigorous program of diversified exposure and discipline.

Such a mix of schools and other venues is the answer to remaking education. How the architectural community of schools, practitioners, and nontraditional providers rises to the challenge will shape our quality of life well beyond the life spans of most of us. *Stephen A. Kliment*

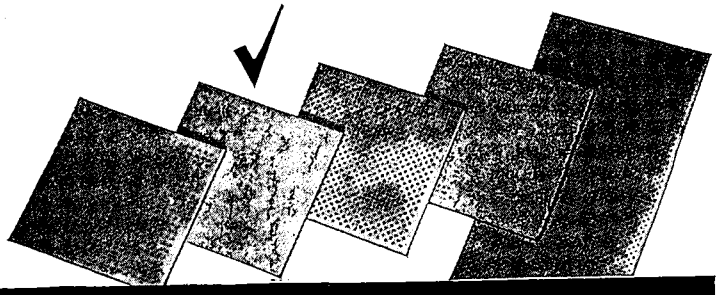


TRAVERTONE
An acoustical ceiling of distinctive beauty

Architectural plans often call for an acoustical material that's not only efficient but distinctive in appearance as well. Armstrong's Travertone will meet that kind of specification. The white painted surface of Travertone is fissured to give it a random texture that avoids mechanical appearance as much as possible. A ceiling of this unusual texture looks well in most any type of interior—traditional or modern. And Travertone is highly efficient, absorbing as much as 70% of the sound that strikes its surface.

Armstrong's Travertone is made of mineral wool, fully meeting the requirements of building codes as an incombustible material. It's available with either square or beveled edges. The square-edged material is slotted—or kerfed—along the sides to receive splines which assure perfect surface alignment. Both types can be cemented in place to any solid, sound surface.

If your plans require a low-cost material, Armstrong's Cushiontone may be more suitable. For moisture resistance, consider Armstrong's Corkoustic. For very high efficiency, there's Armstrong's Arrestone. For complete details and assistance, contact your Armstrong acoustical contractor or write to Armstrong Cork Company, 2408 Stevens St., Lancaster, Pennsylvania.



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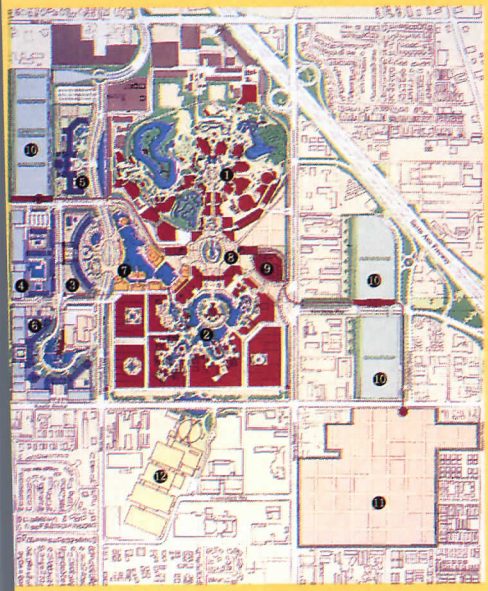
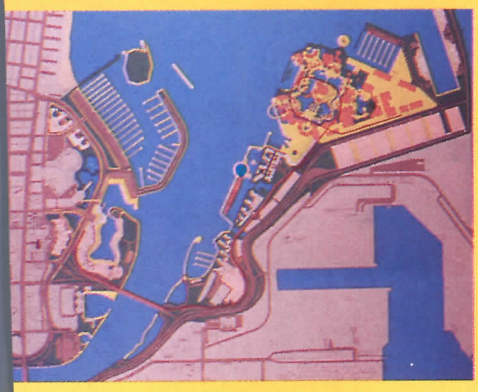
California

Disney to California: Make Room for Mickey

1





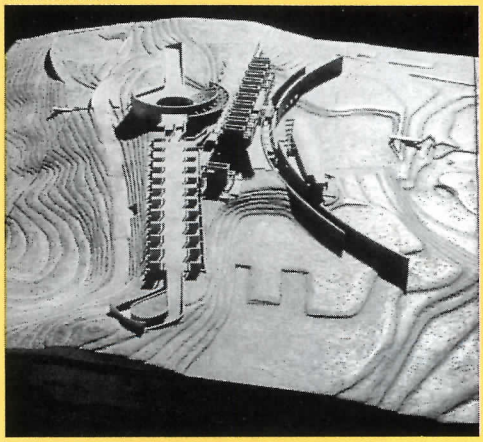
It's just what California needs: more Disney. So the entertainment—and aspiring architecture—giant is planning a new $3-billion "attraction" for the Los Angeles area. Disney is proposing to build either Disneyland Resort, next to Disneyland in Anaheim *(1, 2)*, and/or Port Disney *(3)*, on the water in the city of Long Beach. With the two simultaneous schemes, Disney has tried to generate support by pitting the communities against one another. Port Disney, a "complete waterfront destination," offers a marine equivalent to Orlando's Epcot. The extravagant water-themed amusement park will be combined with six resort hotels, a marina, cruise-ship port, and a harborfront festival marketplace. Disney Resort will boast Westcot, a park of science-based rides grouped around a golden "Space Station Earth." New hotels and a lakeside mall will elevate Disneyland's somewhat forlorn surroundings into a full-blown resort. Though the company points out that Port Disney will increase public use of the waterfront, the project will also require massive landfill of an environmentally sensitive waterway. The Anaheim proposal depends on the use of over $80 million of public funds to upgrade the nearby Santa Ana Freeway and its offramps, build new parking garages, and convert the downtown into a "garden district." In both places, public concerns could derail the Imagineers' attempts to create the perfect image of reality. *Aaron Betsky*

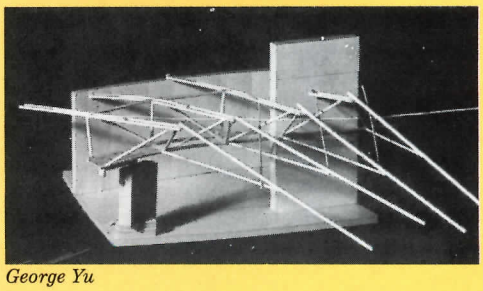
Japan

Morphosis Tees Off at Chiba

Following three years of planning, site work is set to begin at the Golf Club at Chiba Prefecture, designed by Morphosis of Los Angeles. Like many traditional Japanese buildings that harmonize with their natural settings, the project uses architecture to engage rather than confront the landscape. The scheme for the 70,000-sq-ft complex consists of four basic elements: a circular wall fragment held by trusses (bottom photo) at the entrance leads to a parallel row of light monitors marking the clubhouse; a pavilion for dining and entertainment, offering an expansive view, nestles against a long curved wall that provides access to the golf links. The architects selected natural materials—granite, wood, and copper—in an effort to further blend the buildings with the landscape. When built, Chiba could be a refreshing change from the ersatz baronial mansions that seem to dominate this national building type. *Naomi R. Pollock*

Tom Bonner





George Yu

California

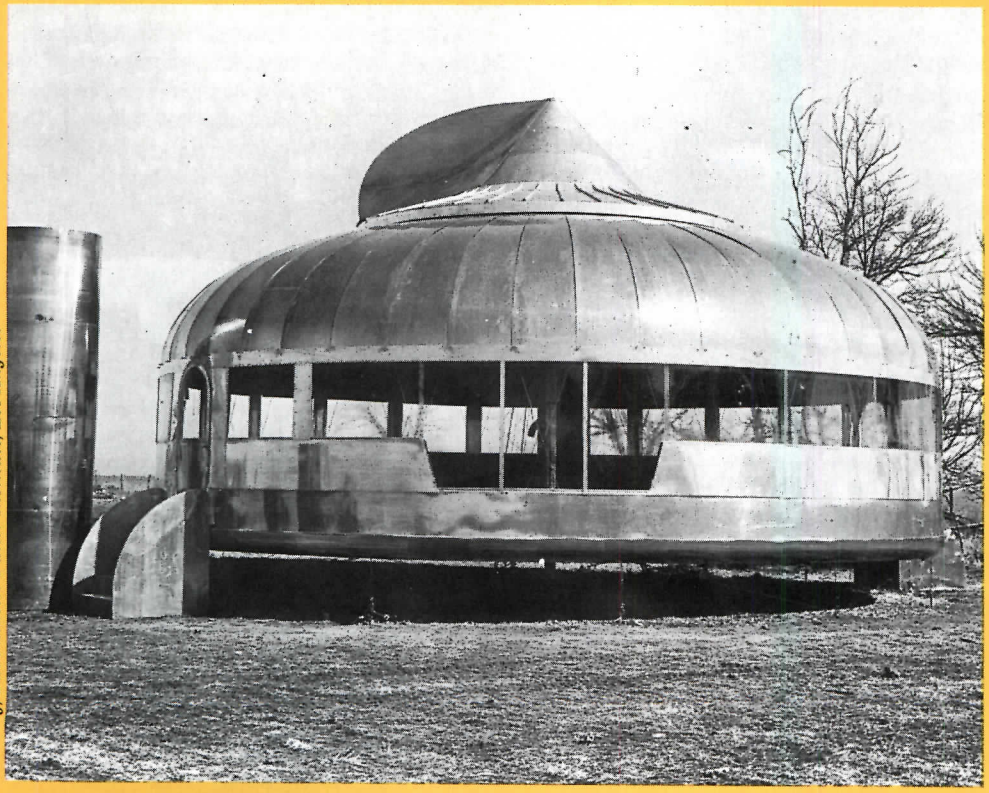
New Civic Center for Thousand Oaks

Tom Bonner

The Civic Arts Plaza in Thousand Oaks, California, designed by Antoine Predock in collaboration with Dworsky Associates, is the first component of a phased redevelopment plan for the Canejo Valley city. The architects designed the 182,000-sq-ft fine-arts center to include a council chamber/theater and a parking structure. The 24-acre site takes advantage of existing topography for dramatic views, and incorporates indigenous vegetation into the design. The $25-million project will be completed in 1993. ■

Kansas

Little Dwelling Machine on the Prairie



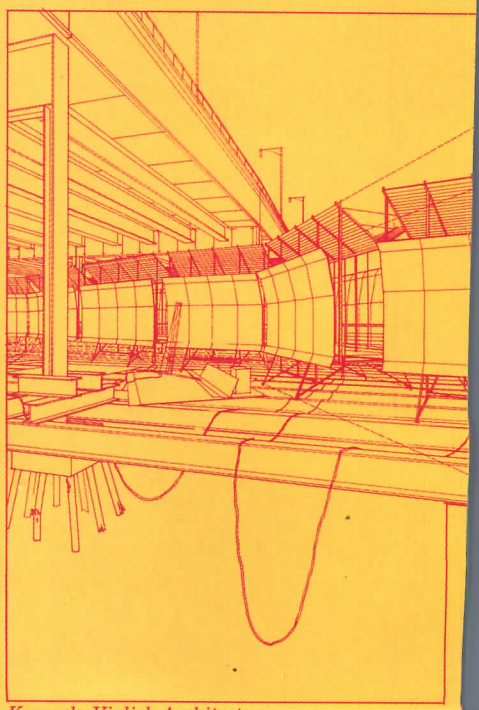
© The Estate of Buckminster Fuller Courtesy, Buckminster Fuller Institute, Los Angeles

The Dymaxion Project, based in Washington, D. C., is raising funds for a charitable trust to restore Buckminster Fuller's innovative modular house in Wichita, Kansas. The circular aluminum house was unveiled in 1946 as a low-cost house that could be dismantled and moved. Fittingly, the Dymaxion (Fuller's combination of *dynamic, maximum,* and *ion*) Project wants the Fuller house to become a permanent museum, based in Wichita but able to travel to sites around the country. *Maria L. Angeletti*

Massachusetts

Pedestrian Bridges Wait for Green Light

Kennedy Violich Architects of Boston is studying the design of temporary pedestrian bridges for major construction sites. Funded by the National Endowment for the Arts, their Interim Bridges Project (IBP) proposes three wooden bridges that could be built during the decade-long construction of Boston's $5-billion Central Artery Project (CAP). Scheduled to begin this fall, the CAP will replace 7.5 miles of expressway with mostly underground roadways. The architects believe their research—they have explored prototypes ranging from the covered wooden bridge to the airport jetway—will be useful to cities other than Boston. "As our infrastructure ages, many cities will undergo dramatic upheavals," says Sheila Kennedy. Rebecca Barnes, manager of urban design for the Massachusetts Department of Public Works, which manages the CAP, describes the state's own scheme for pedestrian passage (which includes Jersey barriers) as "ambitious bureaucratically but not architecturally." Will Boston show the courage to build the NEA-backed bridges, proposed for key points on the CAP? Barnes couldn't say, but she did comment that "if the IBP does get built, the construction period will certainly be a lot more interesting." *Nancy Levinson*



Kennedy Violich Architects

New York

Roberto Burle Marx's Unnatural Art

© *Michael Moran*

"Roberto Burle Marx: The Unnatural Art of the Garden" is on view at the Museum of Modern Art in New York City through August 13. The 81-year-old Brazilian landscape architect was in New York for the opening and spoke with Peter Slatin.

'm glad that I work in Brazil—it's a big ountry with a fantastic flora. And the more know the flora the better I can express myelf. This is not to say that I need to use verything in the same garden. You need to se restraint and to know exactly what you ant to say through a plant or through a rouping of plants. But a garden is not only composition by itself. You have to link the arden to existing nature. If you create a arden for nuns, it must be different than a arden for a warrior—or a garden for sexal pleasure, with many *raffinements.* I'm king a little, but what is important is to unerstand that man has a need, not to be side constructed space but outside.

alance in a garden is arrived at through ange. I wouldn't want a garden that was ways in bloom. Every day a garden changes, and that is one of its qualities: instability. A garden is not a copy of nature. The basic laws you need to understand are those of construction. A garden is a construction, like a novel by Dostoevsky or Tolstoy. They knew how to capture a climate, to dramatize certain moments, to emphasize. It's the same thing in a garden: how you conduct the spectator to see the same thing from different angles. If you go through a garden, you begin to discover special moments and special perspectives.

The last work is always the thing that excites me. I don't want to repeat the same thing. I like when I am able to make mistakes, because from the mistakes I take my advantage. I prefer making a mistake and correcting it to being afraid of making a mistake.

Life is so difficult, I think that if we can find the lost paradise in the garden, a little of what we lost, it would be good. It's very important to understand that you are living *now.* We are obliged to do something that belongs to our time. ■

Design

Briefs

Commissions

• German architect Josef Paul Kleihues of Berlin was selected from a field of six to design a new building and sculpture garden for Chicago's Museum of Contemporary Art. The other finalists were Fumihiko Maki, Emilio Ambasz, Tadao Ando, Christian de Portzamparc, and Morphosis.

• Henry Cobb of Pei Cobb Freed & Partners, in association with Jung/Brannen, will design a $184-million federal courthouse for a 4.6-acre site on Fan Pier in Boston. The major construction project will break ground in October 1993.

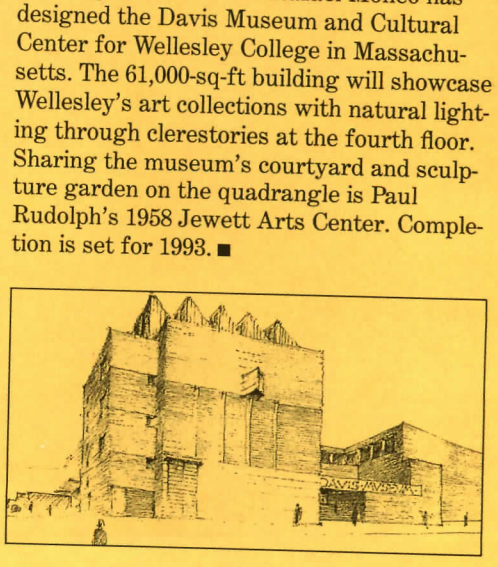
• Architect Stanley Saitowitz has won an international competition for the design of the New England Holocaust Memorial.

Follow-up

Results are in for *Oculus*'s reader survey [RECORD, April 1991, page 39]. Suzanne Stephens, editor of the feisty newsletter of the New York Chapter of the AIA, wanted to know whether she was on track in her reporting of project and architect news—both official and behind the scenes—not directly related to the chapter. Respondents generally supported the newsletter's editorial direction and content, while seeking more "unofficial" real estate news and practice information. Better chapter coverage was relatively low on the list. Says Stephens, "It seems our readership is interested in hearing independent voices expressed."

Projects

For his first architectural commission in the U. S., Spanish architect Rafael Moneo has designed the Davis Museum and Cultural Center for Wellesley College in Massachusetts. The 61,000-sq-ft building will showcase Wellesley's art collections with natural lighting through clerestories at the fourth floor. Sharing the museum's courtyard and sculpture garden on the quadrangle is Paul Rudolph's 1958 Jewett Arts Center. Completion is set for 1993. ■



Emilio Ambasz: Garden Architecture Goes to Town

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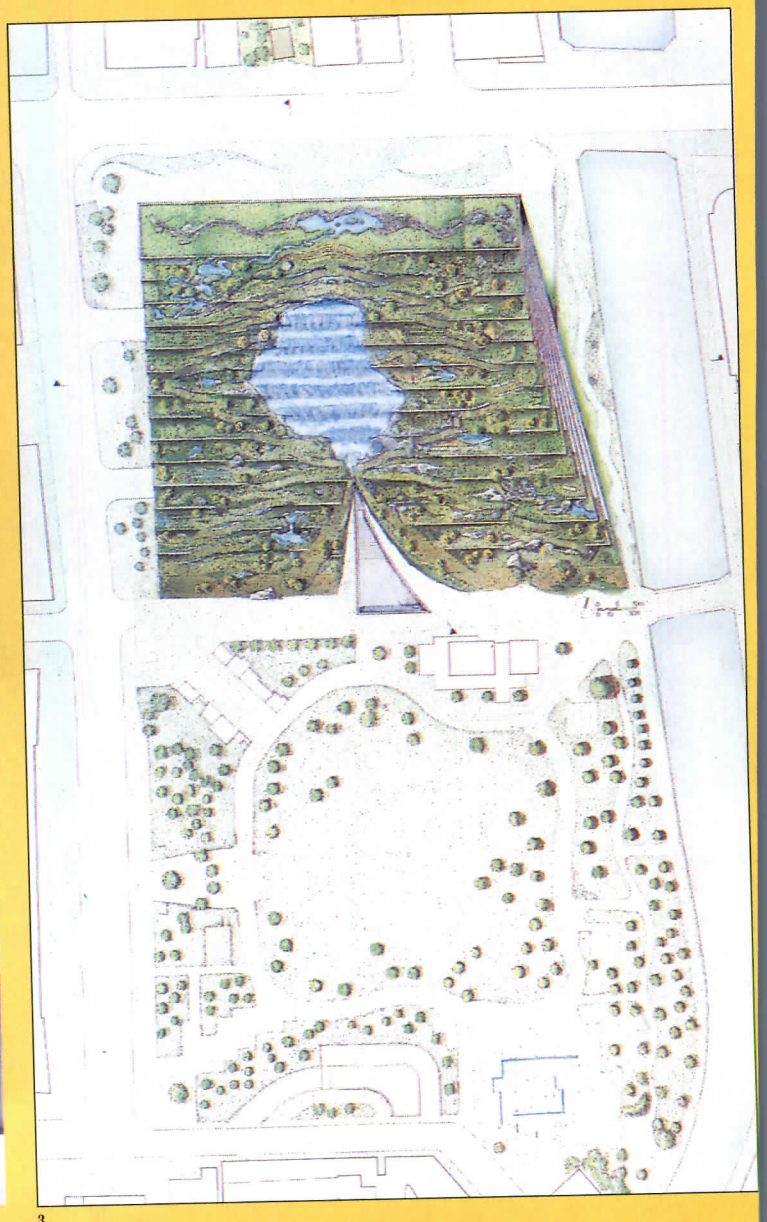


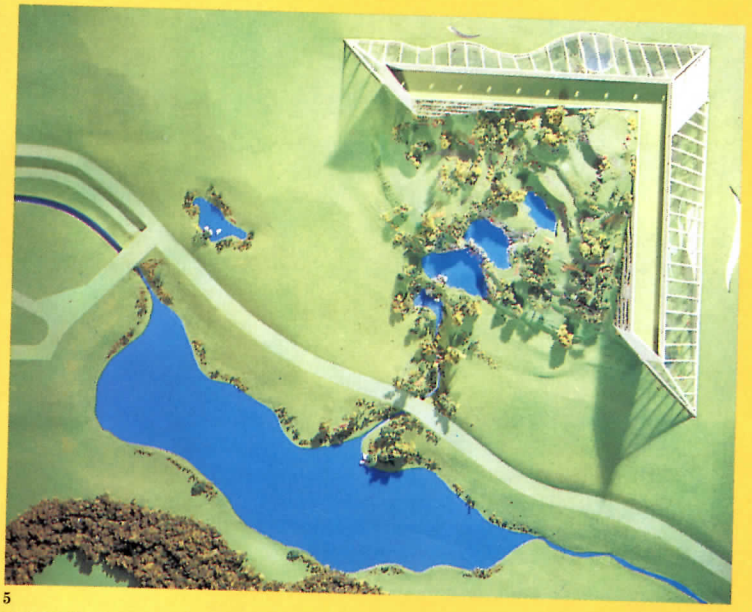
3

"You *can* have urban development and not lose your connection to the garden," says Emilio Ambasz. The New York-based Argentinian architect is referring to several projects in the Far East and the U. S that are moving full speed ahead. In Singapore—"an inconceivably well-run place," says Ambasz, deadpan—the architect is renovating one of the island's few remaining examples of grand 19th-century architecture, a convent and cloister *(1)* directly across from Raffles Hotel. He has created a historical datum by designing a sunken courtyard to conceal new construction, while restoring the existing buildings. Work will begin early next year.

In Fukuoka, Japan, groundbreaking is set for January 2, 1992 on Ambasz's plan for a $350-million civic center *(2, 3)*. Designed at the prefecture's maximum allowable height and set on a 3.4-acre site adjacent to an important riverside park, the 1-million-sq-ft layered-glass building simply brings the park along with it, stepping it up over 15 broad terraces to a grand plaza overlooking Fukuoka Bay. As Fukuoka's tallest building, the hall is expected to become a symbol for the region and for the sponsor, Daiichi Life Insurance Company.

Gardens play a leading role in two other large-scale Japanese projects. Shin-Sanda literally, "new town"— *(4, 5)* is a workers' center built by the pension fund of Mycal, a large department-store chain. A gently stepped garden simultaneously enfolds a glass and concrete building while yielding views of carefully landscaped forest and pond beyond. A glass wall is strung along

Richard Scanlan photos



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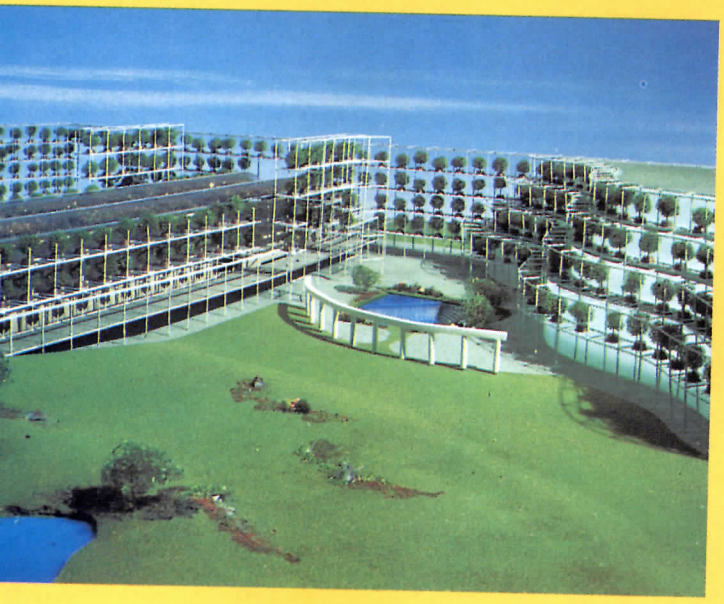

7

e top of the low, L-shaped main structure d slopes to the ground on one side, form- g an atrium garden. The sloping, pastoral ndscape, which climaxes in trees that seem grow from the building's fulcrum, con- als major underground spaces such as nference and banquet rooms, which are ached through discreet openings in the rden. Construction is expected to begin in tober.

e garden has become the building skin of nbasz's 3.25-million-sq-ft, first-phase scheme for the commercial and civic core at Nishiyachio Station *(6)*. This entirely new town, which will house up to 47,000 people, has been master-planned for a site 37 minutes by bullet train from Tokyo. Ambasz has designed an open, tiered steel structure covered in ivy and holding a tree in each open space. The undulating structure wraps around the downtown center buildings. Construction has already begun on the first phase of the 10-year project; completion is projected for 18 months, but must be calibrated with the correct planting season for the trees.

Back in the United States, the city of Columbus, Indiana, has approved Ambasz's proposal for a $7.5-million cable-stayed suspension bridge *(7)*. As vehicles cross the bridge's summit and begin to descend into Columbus, on line with the tower of Eliel Saarinen's First Christian Church, the humming bridge falls silent—a signal of arrival. The bridge should be completed by October 12, 1992, in time for the grand celebrations planned to mark the 500th anniversary of Christopher Columbus's arrival in the New World. *P. D. S.*

Washington, D. C.

Living Up to Promises

Howard Associates' "Super House I" won the Autodesk Images competition.

Computer developments that were promised for last year—especially networking and more accessible 3-D—became reality this year, says RECORD editorial consultant Steven Ross of the A/E/C Systems show and conference, held in Washington, D. C., May 7-10. (See "A/E/C Products Review," this issue.) This too was the year that many exhibitors started giving in-booth tutorials on their systems, taking potential users through the paces. Reflecting the depressed state of the economy, attendance was down (19,500 versus 24,300 in 1990), yet exhibitors reported that those who did show up had a strong sense of what they were there for and, better yet, were buying.

"You'll need a steel stomach during the shift-over," said Thomas Kvan of the Coxe Group in "Managing the Future of Computerized Design Practice." He drew a chart showing costs outpacing profits during the intermediate period of bringing people up to speed on newly installed systems. "Firms that fail in CAD have failed to analyze what they needed," he said in recommending a matrix-style analysis of what your firm really needs. Design firms want high graphics capabilities, while others may want heavy drafting and word processing.

Everything from photorealistic walk-throughs to 1,000 times current capacities was promised in "Future Directions for MicroCAD." Although UNIX, with multitask capabilities, is generally believed to be the operating system of the future, DOS continues to be widely used. Why? "There was so much of it sold before UNIX came along," said Berry Taylor of CADKEY. Charles Evans of Intergraph promised that system development would become more user driven in response to criticism that it had been supplier driven.

The real payoff from CAD investments comes from integrating the design process and other management functions, said Steven Ross, who chaired "Computer Integration: The Real Payoff," a panel of practitioners who have attacked the integration issue from different perspectives. Charles "Chief" Boyd, president of The Boyd Group in Tulsa, Oklahoma, said it is tougher to manage owners (clients) than staff. With roughly 40 ongoing projects in 10 Western states, Boyd uses the computer not only for CAD but also for scheduling and for progress checks. He notes that the machine doesn't set schedules; he does. "You have to demand performance from designers—time frame for completion and so forth—otherwise they play with it until the cows come home, and you are broke."

Terrill W. Janssen, president of ArchiTECH, a Chicago-based consulting firm specializing in corporate-facilities management, said networking computers throughout a practice is key, even for smaller firms. "The network should be completely invisible to the user," he said. He also said networks should be set up "peer-to-peer" so that anyone can exchange information with anyone else, rather than only working from a centralized file server. Barry Pendergast, president of the 8-person Pendergast Group in Calgary, started with tiny Apple II computers and now has 12 Macintoshes. The Macintosh Appletalk network is peer-to-peer and has a full electronic mail system. Using Timbuktu software (the DOS equivalent is Carbon Copy), he can work with a client over the phone, with Macintosh screens at either end. "The result is not necessarily better architecture, but happier, more involved clients."

John Forney, an architect with Venturi, Scott Brown and Associates, describing what he calls "CAD in the traditional firm," said "We can all design and manage projects. The firm has moved its AutoCAD system high up—everyone except the top two are CAD trained, although not all are really comfortable." There are 20 personal computers, seven running AutoCAD. The Novell network "allows us to work in a chaotic way to spread computers throughout working areas. This allows better coordination of teams, better CAD training." Dennis Neeley, president of ASG, the developer of many AutoCAD add-on programs, spoke of CAD "as the central gathering place for information—a 3-D storage outline." Computer-aided facilities management allows the design professional to be a valuable helper to the owner in the long-term management of a building.

When you buy into CAD, you need to rethink procedures, not try to force 200-year-old methods into the computer. So advised architect (and RECORD contributing editor) Kristine Fallon, who heads Computer Technology Management, a division of A. Epstein and Sons. She chaired a panel on "System Compatibility: Achieving Effective Data Exchange." Any decision to go to CAD, said Fallon, must reflect a strategic business vision, not a quarter-to-quarter mindset. Be sure to automate the transfer of data among computer applications in your firm, she added, and make computer-based information accessible.

A new book published by OnWord Press, of

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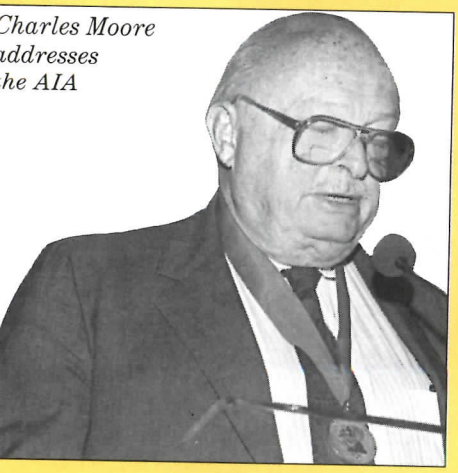
1991 Issues

AIA Draws 9,200 to Its 1991 Convention

The American Institute of Architects sensibly labeled its 1991 convention, held in Washington, D. C. May 16-20, "1991 Issues." And issues there were, enough to draw over 9,200 people, the AIA's third-largest crowd ever. Kicked off by Charles Moore's keynote address, sessions ranged from encouraging better business to business in another field. "Design Excellence in the Public Work Place" turned out to be advice on getting a job with the feds, where projects can run to over $100 million. "Maximum design fees are 6 percent," said one panelist, "but, of course, we'll try to negotiate you down."

The education of the architect was a seemingly ubiquitous topic. The most far-reaching of the many resolutions passed was 1-1, "to analyze the benefits of mandatory versus voluntary continuing education." At this year's Walter Wagner Education Forum, chaired by RECORD editor Stephen Kliment, participants agreed that mandatory programs should not be established, but proposed a number of ways to maintain architects' design skills, such as sabbatical programs that allow time to pursue teaching opportunities, research, or travel. Though the panel found no absolute solutions, at a workshop called "Who Should Benefit from Education?", NCARB vice president Harry Robinson took a direct approach to that question. "The only straightforward answer," he said, "is the public."



Charles Moore addresses the AIA

Rizzoli led the 2nd International Architectural Book Awards, the brainchild of John Hoke, with four of the 17 citations handed out by a jury comprising Hugh Hardy, John Dixon, Deborah Dietsch, Stephen Kliment, Eugene J. Mackey III, Peter Miller, and Charles Moore. MIT Press was the runner-up, with three awards. Susan Maxman, who went on to win election as 1992 AIA president-elect, was nominated at the Women in Architecture forum. At a panel examining first-time Honor Award winners, a packed room heard Maxman, Christopher Rose, Charles Pawley, and Carol Ross Barney urge optimism and perseverance in applying for awards.

At Saturday's General Session, Robert Venturi read an amusing essay on "Why it is hard for an architect of our time to find the time to design in the first place." Venturi enumerated a laundry list of current required marketing and survival skills, including "the charisma of a matinee idol," "shyster legal skills," "psychiatric genius," and "Machiavellian strategizing." Rod Hackney, Charles Correa, and Andres Duany followed 15-minute remarks at Sunday morning's General Session with two-hour workshops on urban design and planning. Whether due to the business downturn or to curiosity, a Weld Coxe-moderated panel many predicted would draw at most three dozen bodies attracted a throng of 300 to listen to six trained architects talk about life outside traditional practice. At an update session on energy and the environment, architects faced the topical question of "green"—and not-so-green—products. What is the architect's liability for not informing the client that an installed product contains CFCs or other ingredients known to be harmful? How do such concerns affect esthetic standards for judging

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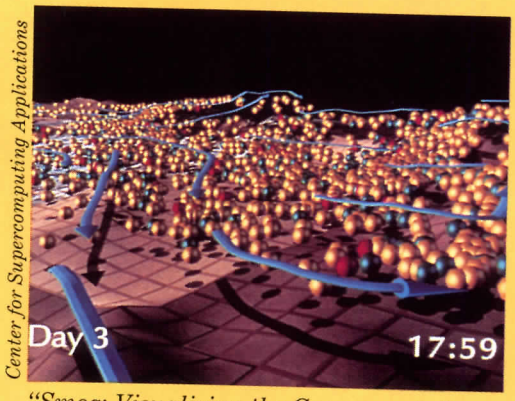
Chicago

NCGA Looks to Specialization



"Smog: Visualizing the Components," by a winner in the 1991 International Computer Animation Competition

Continuous screening of the winning entries in the 1991 International Computer Animation Competition highlighted the National Computer Graphics Association Conference and Exposition, held in Chicago April 22-25.

Increased compute power was certainly prominent on the show floor. Hewlett-Packard/Apollo demonstrated their new RISC workstation, which provides 57 MIPS of performance for a base price under $13,000. The HP/Apollo machine debuted in March, only 13 months after IBM's Risc System 6000, which provided 27.5 MIPS performance at a comparable price. This demonstrates that the compute power available for a given price is doubling each year, meaning increasingly affordable, easier-to-use systems. NCGA President Joel Orr commented on the trend toward specialization. "Both the computer-graphics business and the meta-business groups like NCGA are struggling to adapt to a rate of change that is in itself accelerating. NCGA's response will resemble that of computing at large." If Orr is correct and CAD products become increasingly targeted to specific professional markets, the problem of exchanging information among the participants in the design/construction process could grow. *Kristine K. Fallon*

Site Furniture

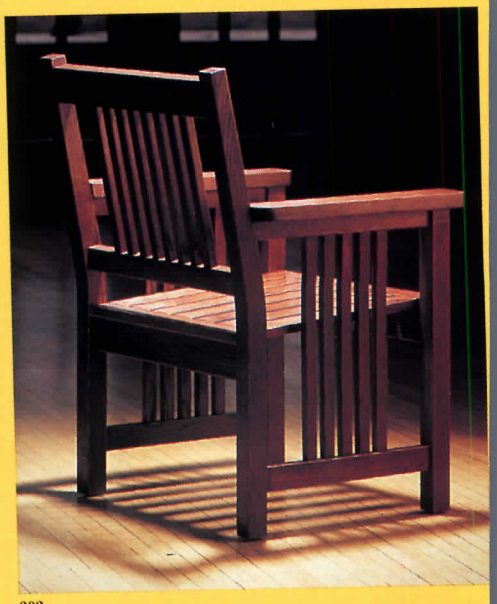
300

301

New pieces in styles from nostalgic to avant- garde are made of wood from sustained-yield forests, and aluminum, the most successfully recycled material in America. J. F. B.

300. Lightly Scaled Lutyens. A new line from a source of traditional English garden furniture, the Adamstown range is made by an American manufacturer using Honduran mahogany. The Lutyens-style loveseat shown is 56-in.-wide by 38-in.-high, finished in a high-gloss marine paint that retains the wood's natural look. An armchair and a three-seat bench are included in the collection; an exterior-grade stain in pastel colors is a custom-finish option. Country Casual.

301. Café. Named after the Spanish city famous for fine metalwork, architect Jorge Pensi's Toledo chair has a back and seat of cast aluminum neatly joined to a polished, tubular-aluminum frame. The footed table base, also aluminum, supports a stainless-steel top patterned with concentric rings. KnollStudio Division, The Knoll Group.



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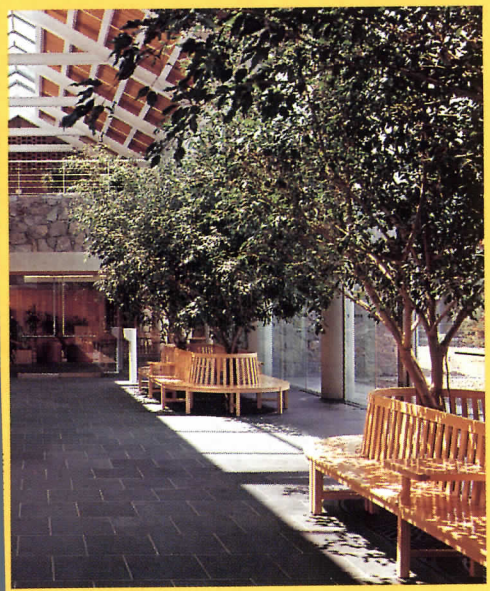
302. Americana. A new wood-seating line from a firm known for contemporary designs in modern materials, the Kenworthy collection includes the Cimarron Bench, Southwestern in feeling and detail (above), and the Prairie Chair (top). Woods used are red oak and maple for interior applications and Australian Jarrah for outdoor exposures; seating incorporates mortise-and-tenon construction with concealed fastener LSI/Landscape Forms.

303. Custom details. Architects Benjami

Residential Elevator



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Thompson Associates customized the Fox Island bench to fit the program of a skylit corporate lobby. Site-specific details include the elongated-oval shape, bench arms wide enough to hold a telephone, and the use of ash wood. Finish is clear Awlgrip. Weatherend Estate Furniture.

304. Classic. The comfortably contoured Philippine mahogany slats of the Victorian bench are set within black cast-iron ends. A penetrating sealer allows graceful weathering in exterior applications. Sitecraft. ■

305. Home Lift. Motivated by the all-too-obvious demographics of the postwar baby-boom (everyone's getting older), Otis has decided to re-enter the residential elevator business. Hydraulic residential elevators had been offered by Otis Brothers as early as the 1880s, with stylish installations in Gilded Age mansions, the Kremlin (the Czar had one all to himself), and one model in a 10-story New York City apartment building that is still in use. But the Depression and the war-production requirements of the '40s made the residential product less attractive, and Otis withdrew from the market.

The 1991 model offers features such as two-speed leveling and an automatic battery back-up system found in commercial units, while meeting all code requirements of Part V, ANSI A17.1, covering elevators installed in a private residence, which limit size, capacity (700 lb), rise, and speed. Current codes would have to be modified to permit the use of residential-type elevators in other applications. An industry committee has asked the Architectural and Transportation Barriers Compliance Board to clarify how the final regulations of the Americans with Disabilities Act will affect elevator design.

The new elevator has a 50-ft maximum rise (up to five stops) and travels at 36 ft per minute in two speed phases that produce a smooth acceleration. Operation is by a quiet, roped-hydraulic mechanism that needs a pit only 12-in. deep; both motor and valve are housed in a locked power cabinet to further isolate noise. The safety gate, which must be closed for the elevator to operate, is made of clear plastic slats. The package offers several cab options, all with 3- by 4-ft clear floor space, large enough to accommodate a standard wheelchair. The Regency (top right) incorporates oak panels, lighting, and a 7-ft 4-in.-high interior. The Omni cab (bottom) shown with the see-through folding safety gate that is standard on all models, has laminate surfaces and stainless-steel fixtures. Residential elevators use standard single-phase 220V current, and need no more than 20 sq ft of space in either new or existing homes. Otis says the installed price, including cab and features such as in-car phone, will be about $18,000. Otis Elevator Co. ■

Product News continued on page 251

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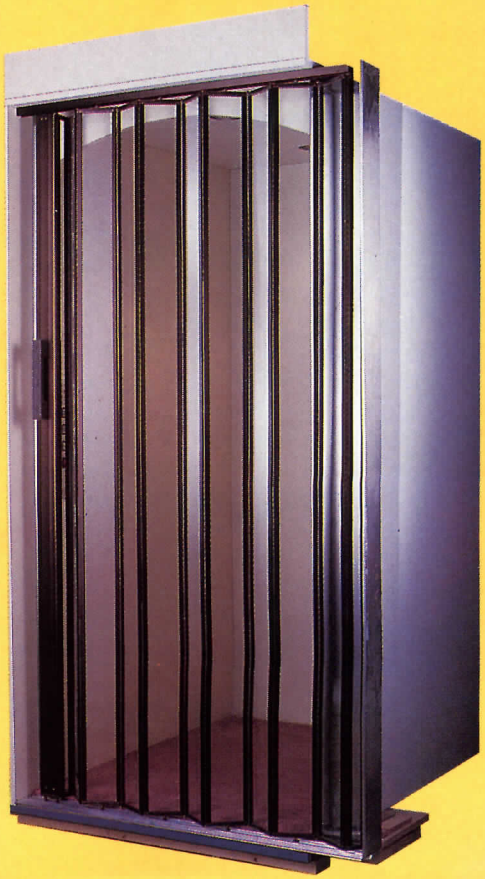


Will the Real Architect Stand Up?

By Weld Coxe

At issue is control of project teams: Who, actually, is the client's architect? Who has the last word on matters that produce architecture? This question solves itself in smaller firms or firms doing smaller work in which a single project architect deals with the client, designs, and carries projects from start to completion. But offices doing larger, more complex projects and highly structured firms tend to split the architect role into two or more parts. A project manager guides project progress; a project designer does the creative part; a possible third party, the technical specialist or job captain may guide materials and construction methods.

Designers and managers may clash over who talks directly to clients and when; showing clients concepts that exceed or challenge their programs; the kinds of staff to hire and/or assign to projects; stopping design when the budget or schedule runs out instead of when the design is right; and who decides what is right. Clashes cause higher-than-normal turnover rates, keep firms from hiring the most talented people, and make architecture fall short of aspirations.

Initial culprit: the age of efficiency

Culture clash is becoming particularly acute now because of a remarkable shift in the marketplace and its demands over the past three decades. For generations, until the 1960s, the profession was divided into architects and draftspersons who took orders and did the work. Most architects, by education and position, saw and sold themselves as generalists, able to deal with clients, design, and manage projects.

The post-World War II wave of major projects created a demand for larger firms at a time when the career draftsperson was disappearing and being replaced by educated and registered architects who expected more than to take orders. As the marketplace put increasing emphasis on the ability to design complex buildings with tight cost and time constraints, many larger firms began differentiating roles and designating separate project managers and project designers. By the 1970s, clients were becoming aware of these distinctions and began to ask: "Who will be our project manager?" Firms responded by giving this role to those most skilled at planning, organizing, and monitoring delivery. Project managers thrived.

Design frequently became a separate function over which a principal-in-charge held the last word. Project designers became members of project teams, reporting to project managers (see left-hand diagram). Some firms experimented with equal triads of manager, designer, and job captain, but, in most cases, few clients were demanding to know their designers, and designers in strongly managed firms resigned themselves to secondary roles.

A new interest in design begins to crack designers' shackles

In the 1980s, clients developed a rising interest in quality of design and asked: "Who will be the designer on this project?" The answer was easy when a single design principal had the last word. The so-called star design firms grew. In many larger firms with no single design star, the answer became more complex.

Projects and clients that called for a designer to take a strong lead ran afoul of project managers accustomed to the final word. Which brings us back to the question: On complex projects requiring a team of skills, who is really the architect? Some argue that the architect can be a collective team, but when the job is in construction and a design question comes up in the field, the client sees whoever makes the decision as the architect. When that person says: "Make it white," and then returns the next day to say that someone else decided to make it black, the culture clash is on the table.

This condition is not universal, of course. For the many clients, projects, and firms that give management and delivery somewhat higher priorities than architecture, the strong project-manager system may still be appropriate. But for clients and firms that

Mr. Coxe is head of management consultants The Coxe Group, Inc., and frequently speaks and writes on design-management.

Practice This Month

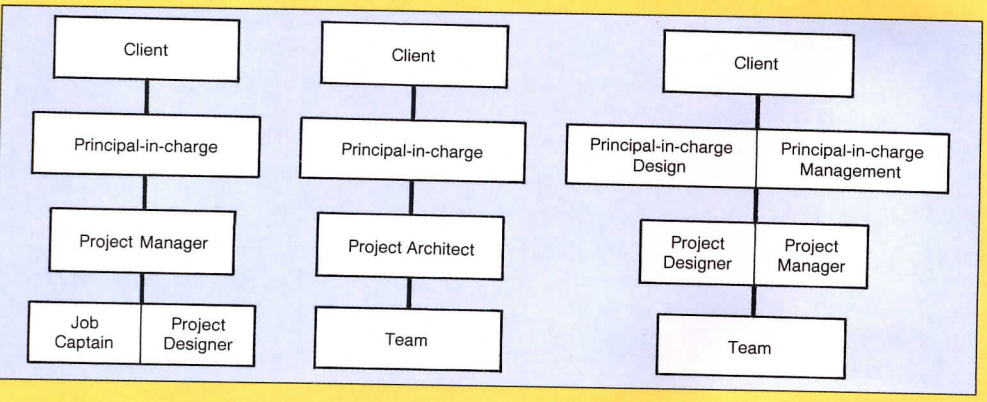
Starting last month, RECORD is covering technology and practice in alternate months. The purpose: to better focus the information you need in each field. This month, for instance, you will find everything from some good news about what it costs to build in your area *(Construction Costs Nose-Dive)* to some soul searching on a time-honored design-education tool *(Juries on Trial)* by, of all people, an architectural school professor. Kathryn Anthony at Urbana-Champaign has conducted extensive interviews of students and faculty in schools across the country, as well as established practitioners.

Other things you will want to find out: How the age-old conflict between managers and designers is being resolved now that designers are coming into their own (article, this page); how employees may be motivated by more than just money (*Turned On*, the second part of an analysis by veteran manager Chuck Deakin); what NCARB examinations may be like if they are automated (*License Exams by Computer*, in a forecast by Administration and Methodologies Committee assistant chairman William Wiese, II).

Well-known attorney and architect Arthur Kornblut and his associate attorney Gary Stearman tell you how well the new copyright law will protect you and what to do to make it work *(Nipping the Copycatters)*. Noted analyst Phillip Kidd predicts how the falling cost of interest will boost construction volume *(Economy: Rates Down, Housing Up)*. Interviewer Alan Ostrom shows how four big offices use annual meetings to keep their branch offices in the family *(Pulling Together)*. As part of RECORD's ongoing specification series, consultant Susan Greenwald gives a step-by-step approach to developing performance criteria for windows. And, finally, John Hughes and Ann Moore show how Gensler and Associates use CAD to get a project through an approvals gauntlet.

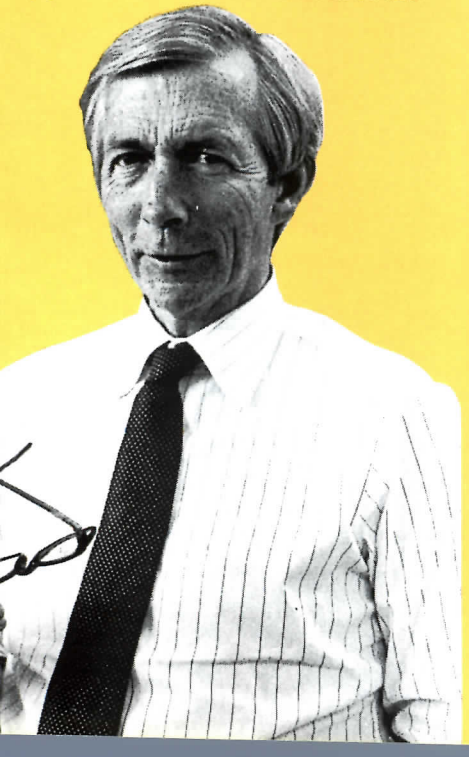
Enough? Are there neglected subjects you would like to see covered? Have proposals, causes, or gripes? Let us hear from you.
Charles K. Hoyt

Turning designers and managers from adversaries into partners: two current approaches with promise and one that may not work long-term.



have quality of architecture as a significant objective, the role of the designer takes on much greater importance. It is in those firms trying to make the shift from a strong management to a stronger design culture that the conflict is currently most acute.

The conflict has both creative and practical roots. On the creative side, the aspirations and training of virtually all architects emphasize design and society's endemic interest in designers as stars only serves to fan the situation. Still, there is the reality that today's complex projects require organizational, technical, and managerial disciplines that frequently consume more time than creativity. Some designers—and most of the current media—exacerbate the culture gap by flaunting egos, which effectively puts down the contributions of the



team that handles the management and technical functions. Are there solutions to the dilemma? Currently, concerned firms are following three directions:

Solution 1: one generalist head

A generalist project architect responsible for both design and management leads the design team. This is typical in virtually all smaller firms, even though the leader may go by a different name, such as project manager. This is also the preferred structure in most star design firms today. (See middle diagram.) The leaders of strong design firms are very clear about why they organize their teams this way. "We don't have any totally design people or totally management people. We really want architects who can deal with the client, run the job, and go out in the field, not just designers," said Warren Cox of Hartman Coxe & Associates in a recent roundtable. "We put a very high premium on technical interest as well as creativity," said Joseph Esherick. There is evidence that the generalist project-architect structure is becoming more popular. The shortcomings of this approach are that the demands of large and complex projects may simply overwhelm the generalist, especially one who is strongest in design.

Solution 2: a dual head

A designer and manager act as one to lead the project team. Sullivan and Adler, Perkins and Will, and Mitchell/Giurgola, among other firms, have established this tradition. Firms such as Pei Cobb Freed and Kohn Pedersen Fox are adopting it. (See right-hand diagram.) While the approach has enormous practical merit, it works when one leader acts only with the agreement of the other and neither blames the other if things go wrong. That is a good definition of true partnership and, if more young architects see their future as part of a partnership of equals, it may thrive. But it doesn't work too well when the system is imposed in mature firms using forced marriages between former adversaries.

Solution 3: prince and pauper joint ventures

Two firms divide the functions between them. One designs; the other implements. There are growing numbers of such joint ventures between nationally and internationally known star design firms and (usually) local firms. But the practice may not survive over the long haul. Architects in firms that associate with stars say they do so in hopes of learning more about design to better compete for whole projects in the future. There is little evidence that either type of office can retain staff for the long haul; young apprentices who train in them move on to start their own practices and achieve the satisfaction of offering rounded services. There will probably always be a certain number of design-only offices that survive, but the culture of the profession makes it unlikely there will be many production-only offices to support them.

No matter which direction firms take to address the culture clash, they cannot ignore it. All architects, whether generalists, specialized managers, job captains, specification writers, field specialists, or designers, want to feel they are making a meaningful contribution. And society, in truth, does not care one whit whether the function of a whole architect is embodied in a single individual, in a pair or triad of individuals, or in a larger team acting as a whole. The only thing that matters is quality of the result. ■

Construction Costs Nose-Dive

Costs are down in response to weak demand, but, with construction volume picking up, watch out.

What was foreseen has come to pass. Costs fell in every district of the U. S. in the fourth quarter of 1990. [See RECORD, January 1991, page 48]. Indeed, they fell in the second half a total of over half a percent, resulting in a loss for the entire year. This month, we are playing catch-up and reporting on two quarters, as reflected in the chart at right. It was not difficult to predict this cost slippage, because costs in general seem to follow supply-and-demand. And this was a period of low construction volumes. The last drop occurred in the final quarter of 1989, when the construction slump was beginning to be felt. (Costs recovered modestly in the first and second quarters of 1990 in response to some optimism that the slump might be short-lived.)

What does the future hold? If the most recent construction figures (for May) are any indication, costs could well be on the way back up. New contracts picked up 12 percent for all construction including public works—those for housing, the largest building component, 8 percent, according to the F. W. Dodge Division of McGraw-Hill.

The Eastern U. S. held its traditional role (temporarily lost in the first quarter) by, if not having the largest increase in costs, having the smallest decrease—although the near full-percent decrease in the Northeast almost wiped out that district's second-quarter gain. Still, the Northeast continues to remain the most expensive place to build.
Charles K. Hoyt

Data supplied by Dodge Cost Systems Marshall + Swift

U.S. Summary of Building Construction Costs (in per cent)

DISTRICTS	# METRO AREAS	7/1990 TO 1/1991	1/1990 TO 1/1991	1977* TO 1/1991
EASTERN U.S.				
METRO NY–NJ	18	–.02	0.35	2008.25
NEW ENGLAND STATES	33	–.06	0.50	1857.09
NORTHEASTERN STATES	120	–.77	–0.10	1754.18
SOUTHEASTERN STATES	106	–.12	0.01	1822.40
AVERAGE EASTERN U.S.	277	–.39	0.04	1809.05
WESTERN U.S.				
WEST CENTRAL STATES	122	–.96	–0.47	1698.75
PACIFIC COAST STATES	106	–.60	–0.16	1813.12
AVERAGE WESTERN U.S.	228	–.78	–0.33	1751.92
UNITED STATES: AVERAGE	505	–.57	–0.12	1783.26

*USING ONLY CITIES WITH BASE YEAR OF 1977.

HISTORICAL BUILDING COSTS INDEXES

Average of all Nonresidential Building Types, 21 Cities

1977 average for each city = 1000.0

Metropolitan area	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 1st	1990 2nd	1990 3rd	1990 4th
Atlanta	2098.6	2078.0	2360.6	2456.7	2448.7	2518.3	2561.9	2580.9	2697.3	2740.4	2726.7	2719.5	2712.6	2711.3
Baltimore	1446.5	1544.9	1639.5	1689.7	1703.7	1743.8	1765.2	1780.2	1849.1	1886.8	1900.6	1894.6	1902.1	1895.2
Birmingham	1407.2	1469.9	1468.1	1535.7	1594.7	1565.7	1587.4	1542.6	1612.5	1643.0	1647.1	1639.3	1639.4	1634.5
Boston	1283.7	1432.5	1502.0	1569.9	1646.0	1721.0	1773.6	1883.0	1921.6	1917.2	1939.9	1941.3	1928.0	1918.4
Chicago	1323.6	1344.7	1425.8	1439.5	1476.7	1528.0	1599.9	1591.4	1636.5	1672.8	1680.1	1688.3	1693.4	1690.9
Cincinnati	1385.2	1350.4	1362.6	1430.8	1484.5	1486.6	1499.4	1510.9	1526.8	1560.7	1568.6	1570.3	1563.4	1552.3
Cleveland	1388.2	1459.5	1511.4	1475.9	1464.0	1474.1	1525.7	1541.8	1550.7	1556.3	1559.7	1550.7	1540.4	1526.1
Dallas	1481.9	1750.6	1834.3	1925.9	1958.0	1963.3	1973.9	1947.2	1927.2	1877.3	1889.3	1868.6	1854.7	1837.0
Denver	1487.4	1632.2	1679.1	1800.1	1824.3	1821.8	1795.8	1732.7	1725.3	1725.9	1716.6	1692.3	1685.3	1663.7
Detroit	1447.4	1580.3	1638.0	1672.1	1697.9	1692.6	1696.6	1689.3	1734.4	1751.2	1761.2	1766.4	1751.7	1737.4
Kansas City	1233.2	1323.4	1381.8	1407.5	1447.1	1472.5	1484.7	1493.7	1505.6	1518.8	1526.4	1526.1	1520.0	1510.8
Los Angeles	1387.5	1474.3	1503.3	1523.9	1555.1	1571.0	1609.7	1675.1	1789.5	1813.7	1831.5	1819.1	1816.7	1800.9
Miami	1380.6	1369.1	1392.1	1467.6	1522.2	1540.6	1566.2	1589.2	1625.2	1641.3	1641.3	1640.4	1640.4	1638.8
Minneapolis	1327.7	1442.6	1576.8	1624.6	1640.4	1661.0	1674.0	1677.0	1690.6	1712.5	1728.0	1706.4	1692.0	1676.0
New Orleans	1505.7	1572.7	1616.9	1650.5	1691.4	1762.5	1760.2	1699.8	1707.3	1685.0	1707.7	1711.6	1702.6	1695.3
New York	1319.4	1419.2	1491.8	1672.5	1747.2	1806.7	1899.9	1980.9	2065.3	2157.2	2148.4	2148.4	2141.7	2126.2
Philadelphia	1539.5	1660.7	1769.4	1819.5	1922.1	1967.9	1992.7	2023.5	2171.4	2244.3	2290.7	2287.9	2271.7	2249.0
Pittsburgh	1341.7	1493.2	1479.5	1497.2	1576.1	1611.0	1665.8	1647.3	1700.3	1721.3	1717.9	1713.4	1698.7	1688.7
St. Louis	1320.0	1397.3	1451.2	1524.9	1625.5	1641.8	1647.4	1653.5	1705.7	1761.1	1759.8	1754.5	1740.9	1732.5
San Francisco	1644.8	1776.4	1810.1	1856.8	1935.3	1961.8	1995.5	1992.0	2090.9	2114.3	2145.6	2155.7	2159.2	2156.0
Seattle	1616.8	1814.9	1962.7	1979.0	1948.9	1937.9	1925.3	1874.7	1968.0	1987.0	1999.3	2012.8	2009.2	2017.6

Costs in a given city for a certain period may be compared with costs in another period by dividing one index into the other; if the index for a city for one period (200.) divided by the ind for a second period (150.0) equals 133%, the costs in the one period are 33% higher than the costs in the other. Also, second period costs are 75% of those in the first period (150 divided by 200.0 = 75%) or they are 25% lower in the second period.

uries on Trial

Interviews with over 600 architectural students in schools across the country, plus faculty and practitioners, reveal that school juries may need an overhaul.

Michael Kinsella

Sarah Joyce takes a crit from University of Illinois professor William Eng. Ideally, such dialog prepares architects for their clients.

y Kathryn Anthony

a nutshell:

Few students seem to learn much from de-gn juries.

Many are highly dissatisfied with them.

They express stronger dissatisfaction with al juries than interim ones, noting that fi-l ones are simply too late to act on ggestions.

Female students are the most dissatisfied th juries *and* the whole education process. uries and studios may be more stressful r women and minorities, scaring them vay from the profession.

Architectural educators know surprisingly tle about the effectiveness of juries as aching and learning techniques, and are ten unclear and ambiguous about their rpose.

Visiting critics also often lack background iteria for effective criticism.

Students and faculty agree that too many culty criticize harshly, often competing th each other at the student's expense.

question of manners

Have you ever taken freshman design? hen maybe you should re-take it!" If such ror comments as this one to a final-year udent were taped and sent to their par-ts, they would likely withdraw them from hool and ask for their money back. What the interviewed students have to say?

The point seemed to be to humiliate the stu-nt, his effort, and his ideas."

We brought our models in. The jurors oked at two out of 60 and said they all ank."

My project was torn apart without any sug-stion to improve it."

was told in a very unprofessional way at I was stupid and in the wrong field."

What good can such personal attacks do hen meant to injure rather than educate? give a student a swift kick rather than a

. Anthony is an associate professor in School of Architecture at Urbana-ampaign and author of a forthcoming ok, Juries on Trial. *She invites input.*

direction can only frustrate and kill that spark to explore. What the jury says in those forgotten five minutes will be remembered by the student for years to come."

The need to improve juries—not abandon but modify them to be more effective as a teaching and learning tool—is evident.

What the graduates have to say

Many well established architects echo the students' comments. Several are quick to point out the overwhelming negativity found in many of today's college and university juries. One says that some of his employees, invited to serve as visiting critics, have walked out on juries when the atmosphere became so brutal. Another simply refuses to participate, preferring to join students in one-on-one desk crits, which he believes are more effective.

Joseph Esherick: "Some argue that the jury is a rite of passage. I argue that juries build adversarial roles between designers and clients by putting students on defense. Scrimmages, battles, and football games may be won by such things, but not an education."

EDAW president Christopher Degenhardt: "A student has to be fairly strong to withstand some of these juries and come out with any self-confidence."

Laurence Booth: "They're very inefficient and undisciplined. If we taught medicine this way, we'd all be dying."

Pointing to new approaches

Perkins and Will's Larry Perkins: "Juries have exposed students' poor English and lack of speech command. Faculty should be responsible for seeing that its own jury comments are organized and to the point."

Jack Hartray: "If you're going to have a jury from outside the school, it ought to be involved in an initial discussion of the program with the students and might meet in the middle of the project to assess progress and establish a dialog with them. When a jury comes in only at the end of a project, it will be unlikely to address the same group of issues with which students and their faculty advisors have been concerned."

Donald Hackl: "People should be seriously re-examining the whole educational process to determine whether or not there is an alternative way of positively reinforcing the learning experience rather than using the criticism mode exclusively."

George Pappageorge: "As architecture is built in the public realm, where opinions and tastes vary, diversified criticism through the jury process can prepare the aspiring archi-

Turned On

By Chuck Deakin

One of the most effective ways you as a manager can motivate employees is to show that you care about them—by being visible and accessible, by recognizing good work as well as bad, and by regularly talking to each of them about work progress and career goals. You need a plan not to lose the process in the turmoil of ordinary business.

Knowing how much caring is enough

Job captains should visit every member of their team twice a day, the department head and project manager once a day, and the owner or partner-in-charge twice a week. Too much time? These visits can be brief—all totaling no more than an hour a week per employee—and do double duty by revealing project problems. Keep track of how many visits you make in a month. If you find that, on a random basis, you get to employees less often than you want, schedule appearances. This may seem too structured, but it is better than neglect. Key is how these visits are perceived. You can either reinforce a taskmaster image or show that you are interested in the person by offering help, encouragement, and constructive criticism. Offer criticism, no matter how constructive, quietly in private, compliments in public.

You can either reinforce a taskmaster image or show that you are interested in the person by offering help, encouragement, and constructive criticism.

Using performance reviews for rapport

Most managers keep their office doors open to employees' problems. It is rare that anyone comes. Fear isn't what keeps employees away. Seeming to put too much importance on a single frustration is. A semiannual review is a good time for an open and candid discussion of the whole range of employee/employer concerns. Get the salary discussion out of the way at the beginning. If employees are disappointed in the money part of the discussion, they may find candor difficult on other subjects. Self esteem is firmly anchored in pay rates. If you cannot revive candor, better to continue the discussion at another time—even waiting until the next interview. For long-term employees, six-month interviews may come around more rapidly than new subjects to discuss. Lunch may be a good alternative.

Schedule interviews well ahead and propose a possible agenda. But let the employee structure the time. Besides money, discuss
1. How the company sees the employee's work habits, professional strengths, and areas where improvement could be made, considering job description and potential;
2. How the employee sees the firm and suggestions on changing and improving it;
3. What the employee's career goals are. Knowing these gives you an opportunity to match firm needs with an employee's.

Keep interviews as informal as possible. Key-word notes help retain and digest discussions. Should formal notes become part of the employee's personnel file? Standard rating and self-rating forms, and a half-page follow-up summary *seem* a good idea. Summaries record what was said and reinforce contracts made. Employees use self-rating forms to compare their estimations of their abilities with those of their supervisors. The comparison helps both parties explore working better together.

But an increase in employee lawsuits claiming wrongful termination may convert today's innocent efforts for positive motivation into tomorrow's basis for expensive court settlements. Keep the review forms and your comments clear, simple, and as correct as a good specification paragraph. And if written interview comments are inhibit

Mr. Deakin is an adjunct professor in the Tulane School of Architecture and a veteran of managing large and small firms.

tect for the kind of challenges one experiences in private practice."

When effective, juries can offer a variety of new perspectives from a wide range of subdisciplines; they can help students prepare for professional presentations to coworkers, clients, and others; and they can bring students into the world of criticism, a fundamental component of environmental design *and* all the fine arts. The consensus is that juries currently are just not used to their maximum potential.

Answers in looking at the design studios

The pressing problems found in academic design juries may well be symptomatic of some broader problems with the overall design-studio experience. For example, the unstructured curriculum giving relatively little systematic guidance from instructors can easily contribute to the sense of overall chaos and confusion that many design students experience throughout their studies.

The late nights and weekends in studios often encouraged in school reinforce the idea that architecture's rewards are not commensurate with the work expended. They also indicate that it is perfectly acceptable to disregard time management and other organizational skills. Rather than creating an esprit de corps in which students help each other, the result is more often than not an assemblage of overstressed exhausted students who can barely keep their eyes open in juries. The studio becomes more of an endurance test for the survival of the fittest, rather than a true learning environment.

The lack of emphasis on written and oral communication skills in favor of graphic and visual communications skills reinforces the notion that only design is of supreme importance, and that other skills can be ignored. Yet being able to communicate in written and oral form, managing time effectively, working with others in cooperation rather than competition, and a host of other skills not taught in studios are often the keys to professional success after school is over. Architectural educators and students may simply be missing the mark. A major overhaul of the design studio, the heart of architectural education, may be in order. ■

Part two. Motivating architect employees is not all financial incentives [covered in part one, RECORD, *May 1991, page 36]. It is also good management techniques.*

nd lack substance because of a fear of liti-ation, it is probably best not to use them.

Dealing with greener pastures

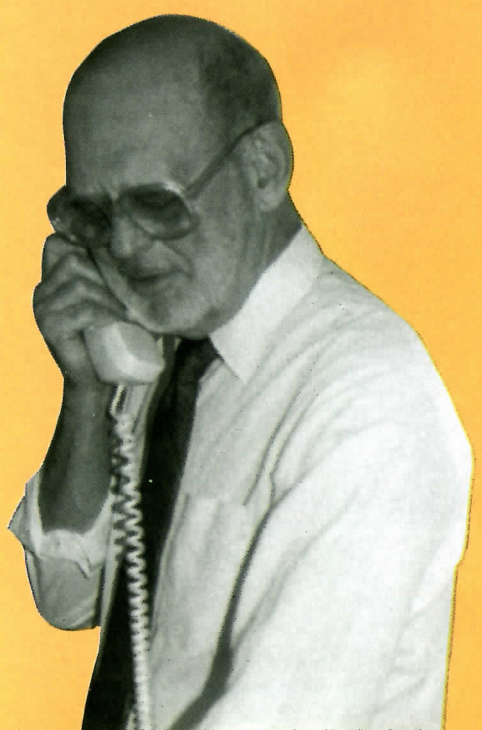
Discussing the career plans of the employee luring the interview helps define them. You nay feel that this risks speeding the depar-ure of a particularly valuable person, lthough the opposite may be true. If you annot match employees' abilities with ap-ropriate advancement, they are going to nove on anyway and will make the move ooner if not given responsibilites that help em toward set goals. If career plans are ft vague and undefined, unease may lead mployees to any greener pastures that me along.

Then a valuable employee does decide to ove on, try not to burn bridges. The tempo-ry inconvenience may be an irritant, but rnover is a part of any vital enterprise. ersonal growth breeds change. Wish de-rting persons well and congratulate them their moves. Tell them to keep in touch d to call you first if they find that things e not as great as foreseen. Resist the mptation to see the quitting employee as ddenly indispensible and to match the new m's salary offer. Such a raise may indi-te that the person was being underpaid in e first place or, worse yet, that you will erpay if manipulated into it. Either percep-n by your staff will do damage to your lary- and employee-review program and ninish morale.

aking firings positive experiences

tting people go is also part of staff moti-ion. A company that boasts of never ng is being unrealistic. The relationships ople have with their company are like any er human relationships; in time, they nge. Compatibility is a complex condition l its absence does not indicate a shortcom-ing of either party. Members of the staff who complain constantly or make unexpected errors inappropriate to their proficiency are almost always subliminally crying for attention. If semiannual interviews and other motivational techniques do not turn around troubling employees, they may be signaling you to fire them. A great many otherwise motivated and valuable people simply do not take responsibility for their own future by voluntarily changing jobs. In prosperous times, the people you fail to motivate and chose to terminate may soon find jobs in environments that suit them better and in which they are happy. Weed out incompatible staff members when your office is busy. During a recession, termination becomes much more painful for everyone involved, including the person doing the firing. It is difficult in prosperous times to upgrade your staff by replacing marginal performers, but that is the ethical and humane time to do it and the time that will produce the least emotional wear and tear on you. It is irresponsible to let people go without giving the reasons. Pump up their egos as much as possible. They will need the self confidence to find the next job.

Resist the temptation to match a quitting employee's new salary offer. This indicates either you were underpaying or can be manipulated into overpaying.



Keeping job descriptions to yourself

Job descriptions may *not* motivate enthusiasm and self respect. More often, while costing large investments in management time, they have become stumbling blocks. What architects do cannot be easily defined or confined. It involves many pursuits that change with immediate needs and problems that require judgment and abstract thinking to solve. Job descriptions encourage employees' complacency and, sometimes, an erroneous idea of specialization and status. When the team is in high gear to meet a deadline, "I don't do windows," is not what you need to hear. The primary uses made of job descriptions by employees are putting them in resumes when looking for a new job and campaigning for a raise by claiming that they can do all of the work described in the next higher classification.

Nonetheless, classifying skills and qualifications is useful for managers to insure that wage levels are justly distributed, and that there is an appropriate ratio of skills within the staff. The best use of job descriptions is not to help employees understand their job, but for statistical staff analysis.

Importance in employment contracts

A better use of management time is employment contracts for employees who have been with the company two or three years. These confer recognition and status. Rather than defining work responsibilities, focus on the general responsibilities of the employee and the company to each other. Management's objection to employment contracts is a loss of flexibility in letting people go, but that can be answered with a mutual four-weeks-notice clause. List the details of financial and fringe-benefit packages. Include how necessary staff cutbacks will be handled (e.g., taking place in proportion to the numbers of employees in each job category with contract employees going last in reverse order of seniority). Mature employees as well as managers know that architecture is cyclical. ■

License Exams by Computer

What to expect if the NCARB goes through with computerized exams.

By William Wiese II

A recent study indicates that a computer-administered National Council of Registration Boards examination could dramatically improve services to candidates and solve some serious problems facing state boards. This is supported by a report issued by an NCARB team in conjunction with its test developer, Educational Testing Services.

If the project goes through, candidates could look forward to multiple exams each year, avoiding the frustration of waiting six months to a year to repeat failed divisions. Scores could be reported within a few weeks, rather than months. The exams could be scheduled by appointment, limiting the number of candidates sitting at any one time, which might offer significant relief to large states that now find it difficult to locate suitable facilities.

In order to realize the advantages of a totally computer-administered examination, the NCARB/ETS team proposes these moves:
1. Convert written multiple-choice tests to tests administered and scored by computer.
2. Develop current ETS research in figural response methodology (described, right) and reduce the number of multiple-choice questions when the graphic nature of figural response is more appropriate.
3. Develop computer simulations with computer scoring to test for the ability to apply knowledge in practice areas identified in the recently revised test specifications.

Mr. Wiese is assistant chairman of the NCARB Administration and Methodologies Committee and director of operations for the architectural firm of Freeman French Freeman of Burlington, Vermont.

Conversion of several multiple-choice divisions to computer has already been done. Pilot tests clearly demonstrate that test administration by computer works at least as well as paper and pencil. Multiple-test administrations could be offered each year as the pool of questions grows.

New testing methodologies

Research in testing methodologies and significant advances in computer technology have encouraged the NCARB in its search for computerized exams. Explorations include the potential for developing new tests that may permit greater accuracy as predictors of professional performance. Figural-response methodology appears to be a promising means of doing this. Candidates are required to complete a partially drawn figure such as a moment diagram, truss, and boundary survey. Early research indicates this could be developed for field trial soon.

The research team has focused most of its energy, however, on the development of computer simulations and automatic scoring systems, which, through a collection of vignette scores, might provide a profile of a candidate's ability to analyze, make appropriate judgments, and arrive at reasonable conclusions. A typical problem simulated on a computer screen might be to review a proposed building floor plan for code compliance, making corrections where needed. Another might be to prepare a block diagram on a given site responding appropriately to programmatic, zoning, and site constraints. The council plans limited field trials on four or five simulations this year.

While a major objective of the simulations is to present realistic problems, the testing environment limits a sense of reality. The development team has attempted to deal with this issue by placing candidates at a typical drafting station with reference books, file cabinet, and drafting board shown on one of the two monitors used at a test station (right in photo). Instructions tell candidates they can access a drawing by moving the mouse-controlled pointer on the screen and clicking the button on the mouse. The drawing will then appear on the working monitor (left in photo). The table of contents for reference books on the simulated shelf, and selected pages, will appear on the working screen when the pointer is moved to a chosen reference. The same procedure is used to enter a file cabinet and display materials from a drawer.

In tutorials, candidates learn to handle the mouse and a set of icons to move through the simulation, finding resources, manipulating plans, marking up drawings, creating diagrams, etc. There are no commands to be remembered and no typing or CAD required.

Addressing the doubters

Extensive pilot testing of multiple-choice exams involving both computer-experienced and inexperienced people has detected no difference in performance between groups tested on computers and those using paper and pencil. Nonetheless, much research remains to establish that the operation of computers has no influence on examination performance. Some comfort on this point can be drawn from the fact that implementation is unlikely for five or six years, by which time, candidates will be far more computer literate than those of us who have been out of school for longer than five years.

The NCARB/ETS team has moved further along than it anticipated in 1988, and encountered only pleasant surprises. If it continues progressing at the same rate, implementation of a fully computer-administered and scored exam could be possible in 1996. ■

Nipping the Copycatters

Copyright protection under the new copyright law is a major improvement, but its interpretation is an open question.

y Arthur Kornblut and Gary Stearman

n December 1990, new federal legislation xtended copyright protection to prevent the nauthorized construction of copycat build-gs [RECORD, January 1991, page 29]. The Architectural Works Protection Act" (Sec-on 701, Title 17, U. S. Code) allows an rchitect to bring copyright-infringement ac-on when a subsequent building's design is dentical to a design copyrighted by the ar-nitect. It closes a loophole in earlier opyright law, which courts had interpreted apply only to unauthorized reproduction nd use of architectural documents.

he revised law expands existing protection y creating a new class of copyrightable ubject matter called "architectural works," efined as "the design of a building as em-odied in any tangible medium of xpression, including the built building, its lans, or drawings . . . . "

Why the new legislation was passed

he need for remedial legislation became lear after a series of court decisions found o violation of a copyright when copycat uildings were built, despite the existence of opyrights on the drawings. In one New ork case that received widespread public-y, *Demetriades v. Kaufmann,* the court llowed construction of the copy of a house esigned by architects Nadler Philopena and ssociates (photo), only ordering the defen-ants to cease using or reproducing its opyrighted plans [RECORD, May 1989, ages 37-39].

umerous other courts reached similar deci-ons. The harsh rule created by these cases as: "One may build a house which is identi-l to a house depicted in copyrighted rchitectural plans, but may not directly opy those plans and use the infringing copy construct the house." So said the court in e 1988 case of *Robert R. Jones Associates,*

r. Kornblut is an architect, an attorney Kornblut & Sokolove, and former chair-an of the American Bar Association's orum Committee on the Construction In-ustry. Mr. Stearman is an associate in e firm and a member of the Contract w Committee and the Construction In-stry Committee.

Inc. v. Nino Homes. These decisions gave architects little real protection.

In the *Demetriades* case, the court spent much of its time discussing the difference between copyright protection and patents. Copyrights protect only the particular expression of an idea, not the idea itself, whereas design patents confer a far broader right of exclusive use and thus require far more stringent and rigorous criteria. The old reading was that protecting a building protected an idea.

How the new law changes things

Under the new law, the construction of a copycat building will be a copyright infringement. However, the extent of a particular imitation will be a recurring question. The definition of an architectural work in the law hints at this dilemma. "The [architectural] work includes the overall form as well as the arrangement and composition of spaces and elements in the design, but does not include individual standard features."

Precisely how the courts will interpret this is open to conjecture. On what basis will they compare two overall designs? Will portions of the design be considered protectable or will they be called standard features? How large must it be, or how many features must it contain to be protectable? No doubt, future rulings will depend on individual circumstances and, because facts change so much from case to case, architects probably will gain little certainty or guidance from past findings. Nonetheless, the new law is definitely a plus for practitioners. Uncertain legal recourse is far superior to no recourse at all.

For the architect who proves copyright infringement, the copyright law provides a full panoply of remedies. In brief, it empowers courts to issue injunctions, award damages (both actual and statutory), award attorneys' fees and costs, and, conceivably, even order the demolition of offending buildings.

How the new law doesn't change things

As originally proposed, it would have limited the property rights of an owner of a building built from plans that were copyrighted by the architect. Because the design of the

A copy of this house a few doors away in a New York suburb brought widespread press attention to the issue (see text).

building itself can be copyrighted, any change to the building would violate the copyright. The law makers considered this problem and then explicitly provided for no limitation on property owners' rights. The owner may alter or destroy a building without obtaining its architect's consent.

Another unintended consequence of enlarging the scope of copyright protection would have precluded pictorial representations of buildings without the consent of the copyright owner. This would have limited architects' access to others' ideas and a free flow of information. Thus, the law states that pictures, paintings, photographs, and other pictorial representations of the work may be made, distributed, or displayed, as long as the work is ordinarily visible from a public place.

Lastly, the law applies only to architectural works created after the date of its passage (December 1, 1990), or to work that is unbuilt and unpublished.

The new law is a significant step forward in efforts to protect the creative work of architects. Although uncertainty remains on how the law will be applied by the courts, the copyright statute now clearly places architects where they should have been long ago: on a par with other creative individuals such as musicians, writers, artists, and film makers. ■

This article is not offered as legal advice, which should be sought from an attorney to address your particular circumstances.

Economy: Rates Down, Housing Up

Falling interest rates indicate that housing will follow its traditional role by leading the economy out of recession in the next quarter.

By Phillip Kidd

With the economy in recession, two questions are on everyone's mind. How soon before it ends? And how strong will the initial recovery be? Evidence suggests that the expansion will begin in the fourth quarter. Unfortunately, it may be very sluggish at first.

At midyear, the economy is still groping for something that can break a chain of downward pressures. For a while, many thought exports could be a positive force. Now, the ascending value of the dollar against other currencies combined with less-than-robust growth in our major trading partners are making this less certain. Another negative is the huge deficits at the federal, state, and local levels that curb stimulative government spending. Indeed, most current actions to reduce these deficits are only hindering economic growth. Tax increases take more money away from businesses and consumers, diminishing their ability to buy goods and services. Spending cuts and worker dismissals decrease deficits, but curtail government demand for domestic output.

However, certain positive forces are being created to end the slide and regenerate expansion. First, inflation is being driven below 4 percent after persistently holding in the 5.5- to 6.0-percent range last year. With inflation moderating, the Federal Reserve has gradually relaxed monetary policy to reverse the economic downturn.

Falling interest rates

The impact has been felt in the short-term end of financial lending markets. Since the first of the year, short-term rates (under one-year) have fallen over 100 basis points (one-hundreths of a percent) to the 5.5- to 6.0-percent range. In contrast, intermediate-term (three- to seven-year) rates have steadily fluctuated between 7.0 and 8.0 percent, while long-term (10- to 30- year) bond rates have oscillated between 8.0 and 9.0 percent—a return to traditional spreads. As a result, the yield spread between 90-day financial instruments and 30-year instruments has widened from 150 basis points in late December to 260 basis points in mid May. This has improved lending margins (lending rates minus cost of funds), helping boost first-quarter commercial-bank profits.

In the second half, as better profitability spreads throughout the financial system, banks will become much more willing lenders of funds, especially for single-family-house mortgages. Their return as suppliers of credit will occur at a time when conditions in world financial markets are changing.

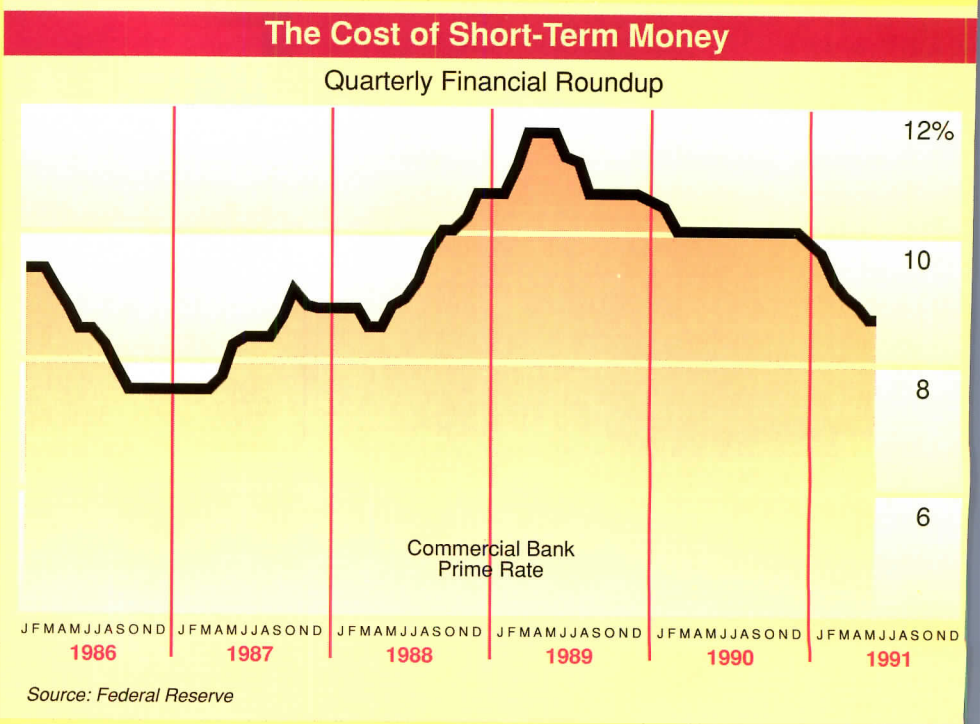
Until recently, foreign central bankers, especially in Germany and Japan, have been raising interest rates to curb inflationary pressures in their economies. As long-term rates climbed overseas, investors sold U. S. stocks and bonds to invest in higher-yeilding financial instruments abroad. To retain funds, domestic long-term rates remained stubbornly high, despite the recession and easier monetary policy.

Now growth and inflation are subsiding abroad. Central bankers, specifically in Germany and Japan, are beginning to ease monetary policy, forcing foreign short- and long-term rates down. In the United States, monetary policy, with inflation moving lower and the economy remaining weak, will become even easier.

In the third quarter, domestic interest rates will fall. Short-term rates will tumble 50 basis points to 5.00 to 5.50 percent. Longer-term rates will drop 100 basis points, with fixed-rate single-family house mortgages slipping below 9 percent.

Rising demand for single-family houses

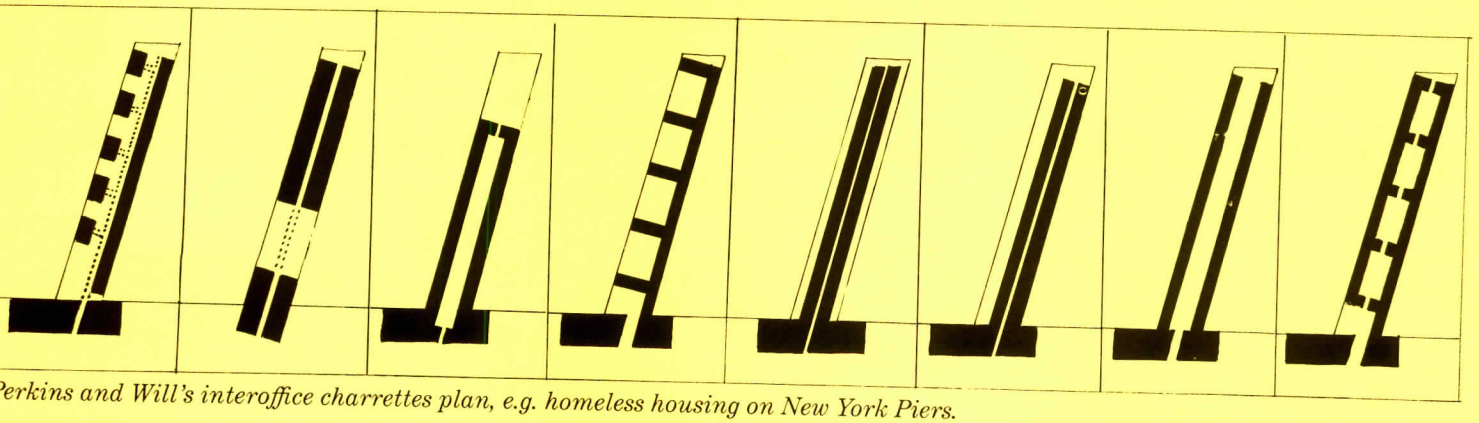
Among working Americans, there is still a sizable pent-up demand for house ownership. With house prices appreciating very slowly and mortgage rates declining, house buyers will energetically enter the market this summer and fall. As this fresh wave of house buying gains momentum, existing-house sales will spurt. In addition, the substantial inventory of previously started houses will be reduced. As they are sold, housing starts will climb. Sometime in the fourth quarter, housing activity will become vigorous enough to start shaking the economy out of recession. That will set the stage for a robust economic expansion beginning in the second quarter of 1992. ■



Dr. Kidd is an economic consultant and former director of research for McGraw-Hill Information Services Company.

Pulling Together

How four firms with far-flung offices use meetings of the minds to maintain identity.



Perkins and Will's interoffice charrettes plan, e.g. homeless housing on New York Piers.

By Alan Ostrom

The people in your firm's St. Louis or Chicago office may hardly know their counterparts in the New York or San Fransisco office, let alone what they are doing and how they do it. What should be a unified culture is a web of subcultures. Impose home-office control and you suffocate creativity and initiative. Leave the branch offices alone and you lose the firm's identity. What to do? Four firms use periodic firm-wide meetings to strike a balance.

All four say they place an emphasis on design at these meetings. But, says Bill Valentine, director of design in Hellmuth, Obata & Kassabaum's San Francisco office: "Design is not just what designers think is important." Clearly, there is also an emphasis on management. The four also move their conferences around from office to office, though HOK tends to meet at its home office in St. Louis and other firms consider meeting where they do not have offices to see what the competition is doing.

Close ties

HOK is perhaps the most insistent upon trying to maintain the far-flung firm as an extended family. It holds meetings three times a year, invites junior as well as senior people, includes business and project management on the agenda, and may invite outside speakers with special expertise. Covering so much ground accentuates a problem of all the firms: Designers get to know less of their work than they want to.

Ostrom is a freelance author who frequently writes on architecture.

What is HOK trying to achieve in its meetings? As Valentine sees it: "These conferences promote a 'we' versus a 'we and they' attitude, a comfortable exchange of ideas, and make the people invited feel they are valued, which attracts and keeps talent."

Substantive interaction

Gensler has a standing design steering committee of the senior design partners from each of its six offices. It meets quarterly to discuss and critique current work. Although there is little theoretical discussion, the meetings, according to Tony Harbour, managing principal of the Houston office, help significantly in developing ideas and improving work. "There have been a couple of projects on which there were somewhat heated discussions. Changes were made and the projects ended up obviously much better." Other benefits of getting together: "Designers feel free to send drawings between offices for comment any time and will pick up a phone and ask for advice."

Rolling up the sleeves

Perkins & Will holds its meetings three or four times a year at no regular interval. Aaron Schwartz, partner in the New York office, insists on flexibility. There is no set format. "If the system ceases to serve, it will be changed." Like the other firms, the design partners from the several offices started out showing slides of their recent work and discussing it. But recently, design partners from the several offices split into groups on charrettes to solve public-benefit problems (see illustration). Different senior designers attend each meeting. Discussion, aside from the charrettes, generally moves quickly from show-and-tells into general matters such as the relationships between designers and technical or management people. Where do the meetings appear to be heading? The firm may hold conferences in cities where it does not have offices and may use the charrettes to expose the designers to input by specialized outside consultants such as acousticians and landscape architects.

Keeping agendas varied

Skidmore, Owings & Merrill, with the longest history of far-flung offices, invites participants from the several disciplines within the firm and from all levels, including those just entering. As David Childs, partner in the New York office, explains, SOM has people from technical areas talk about design and vice versa. He, like Schwartz, keeps experimenting. "You don't want to have it static." Several years ago, he organized a three-day charrette on a master plan for New York's West Side. While this did not lead directly to SOM's commission to design Worldwide Plaza, a major office-residential complex there, Childs believes that it influenced the firm's final solution.

Last year, participants moved to each of the four major offices to talk about how architects go about designing. Discussing this in such a structured way, Childs believes, takes it beyond the intuitive approach developed in job-by-job communications. Inviting architects from other firms to its meetings is perhaps unique to SOM. Adds Childs, who plans to add cities without SOM offices: "Walking around and talking about reactions to details as well as buildings or places is as important as anything we do." ■

Specification Series: Windows

By Susan Greenwald

Successful window specifications depend on an analysis of performance requirements. Whether the windows are to be wood, metal, or plastic, many of the issues involved in selection and specifying are the same. This article will focus on performance criteria for windows and how they can form the backbone of specifying them. Here is what you need to consider:

1. Determine the design wind load:

Design wind load is proportional to the square of wind speed and also varies with topography, geographic location, and height above the ground, among other factors. Design wind load is governed by code; ASCE 7 (formerly ANSI A58.1) is more stringent than some local codes and is often used. The project structural engineer will usually determine the design wind load; on very simple projects, the architect may determine design wind load based on code or on tables in ANSI/AAMA 101, while on very complex projects, wind-tunnel testing may be recommended and a consultant may be needed.

A wind speed map of the U. S. appears in the appendix to AAMA 101 (and in BOCA and ASCE 7) and tables are included that translate wind speed to design pressure for various heights above the ground. If your project is an assembly building or critical facility, is in a hurricane zone, or is in a category other the Exposure C, the AAMA 101 Tables will not apply and your engineer must calculate the design pressure.

2. Identify special performance requirements:

Identify any performance requirements that require special attention. (See *Performance Considerations*, opposite page.)

3. Select frame material:

Decide on window-frame material, which will determine the standards to use. American Architectural Manufacturers Association (AAMA) standards apply to aluminum and plastic framed windows; National Wood Window and Door Association (NWWDA) standards apply to wood and clad wood-frame windows.

4. Weigh using standard windows

Determine whether standard pre-engineered windows tested under AAMA101 or NWWDA IS 2 can be used. Consider:

- If there is a standard-grade window that suits your project's basic performance requirements for wind load, water-leakage resistance, and air-infiltration limits.
- Unusual or additional performance requirements beyond standard characteristics.
- If your windows are larger than those tested by the manufacturer. Very large windows may require custom testing.
- Mullions or other components in your windows not included in the standard windows that may require custom testing.

NWWDA and AAMA have developed methods for classifying performance of windows. Each of these standards also establishes minimum requirements for quality of materials, tolerances, adhesives and preservative treatment (for wood), weather stripping, hardware, and glazing material. In general, these standards are minimums. The specifier may want to include more-stringent requirements. For example, in IS 2, finger jointing of sash and frame parts is permitted; this may not be desirable for windows with transparent finishes.

5. Select window grade:

For standard windows, select a window grade that has been tested structurally for 1.5 times the design wind load (or higher load if recommended by your structural engineer). The window selected should also have been tested for water-penetration resistance at a minimum of 15 percent of the design wind load, but never less than 2.86 pounds force per square foot. If products are available that have passed a more-stringent water-resistance test, by all means specify the higher level. Tests performed under the AAMA and NWWDA standards:

- *Structural:* Windows are tested for support of a uniform static load in accordance with ASTM E330. AAMA specifications require a test load equal to 1.5 times the design wind load (effecting a safety factor of 50 percent over design wind load), while IS 2 levels do not include a safety factor. Thus, a C-20 aluminum window has been tested at a 50-percent-higher load than a Grade 20 wood window.
- *Air infiltration:* Windows are tested according to ASTM E283. Infiltration is measured in CFM per lineal foot of crack length for most operating sash (except aluminum jalousie windows and sliding glass doors), and in CFM per square foot for fixed sash.
- *Water transmission:* Water leakage is the most undesirable common problem with windows. Both the AAMA and NWWDA standards include testing of windows for water penetration under conditions simulating wind-driven rain according to ASTM E547 or, for certain AAMA classified windows, ASTM E331, which is somewhat more stringent. The highest standard window grade resists leakage at 6.24 psf under NWWDA. Under AAMA, the test pressure is 15 percent of design pressure; this would be six psf for an HC-40 window and nine psf

Testing of a 21-by-64 foot all-glass curtain-wall mockup at the Construction Research Laboratory.

Ms. Greenwald is owner of ArchiText, a specifications consulting firm in Chicago, and editor and publisher of Construction Index, *a quarterly index of architectural periodicals.*

A step-by-step approach to producing performance criteria as a basis for specifying any type of window.

or an HC-60 window. Many window manufacturers test at higher pressures, with 10 and 12 psf becoming more common.

5. Set thermal-transmission criteria: Thermal-transmission characteristics of windows are improving, largely due to advances in glass technology. ASHRAE issued new procedures for determining window U values in 1989, and the Lawrence Berkeley Laboratory developed a computer program, WINDOW 3.1, which applies the ASHRAE method. The ASHRAE standard takes frame losses into account, and therefore favors windows with less-conductive frames (such as wood). A further advance, the program Frame 2.1 calculates window-frame performance more accurately.

AAMA 1503.1 classifies windows by U value (not calculated by the ASHRAE method) and by Condensation Resistance Factor (CRF). The Appendix to AAMA 101 includes a helpful discussion of recommended CRF for various outside air-temperature and interior relative-humidity conditions. Since thermal performance standards are in flux, review manufacturers' literature and select a product that has acceptable values and test methods; methods are likely to vary between manufacturers.

6. Review product data: Review manufacturers' literature to determine their range of products that meet basic requirements for sizes, shapes, types of operation, performance, and cost.

7. Field test: Consider specifying a simple field hose test of windows in accordance with AAMA 501.3 or, for large projects, more complex pressure-chamber test procedures according to AAMA 502-90. This test at the start of window installation can identify problem details before all windows are installed; performing on randomly selected completed windows, can also identify installation problems.

References

American Architectural Manufacturers Association (708/699-7310):
AAMA GS-001 (Aluminum-window specs).
AAMA 501-83 (Curtain-wall testing).
Continued on next page

Performance Considerations

CSI's *Manual of Practice* includes a list of performance criteria, many of which apply to window selection; this list is a useful tool for reminding the designer of issues that should be considered when selecting and specifying windows. The following is a summary of criteria to consider for windows, using the CSI list as a guide:

1. Safety and protection

Fire safety:
- Fire rated assembly: fire windows or other opening protective devices; vertical separation of openings (BOCA 905.0 and 906.0).
- Egress windows: special requirements for size, operation, and placement. (See BOCA Code, 809.4)

Life safety (other than fire):
- Windows falling out: Sill height and mode of operation are two factors that affect probability. Limit stops can be placed on most types of windows, but they many conflict with natural ventilation requirements.
- Danger of falling glass injuring people and property: Some glass manufacturers recommend against tempered glass in windows above the ground floor, because glass fragments falling to the ground are likely to injure pedestrians passing below.
- Danger of human impact: safety glazing or a protective railing (BOCA 2203.2, CPSC 16 CFR 1201).

Property protection:
- Burglary resistance: Can be tested in accordance with ASTM F588 (cited by NWWDA) or by AAMA 1302.5 for windows and by AAMA 1303.5 for sliding glass doors. Windows may need to protect against forced entry when open and closed. Burglar bars may conflict with ventilation, egress, and other window functions.
- Vandal resistance: glazing resistant to scratching and intentional breakage. Framing and coatings also may need to be vandal-resistant.

Handicapped considerations:
- Operation of windows by disabled: Most products currently on the market, especially horizontally or vertically sliding windows, are far from complying with *Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities* (ADAAG), which includes:

1. Windows that are pushed, pulled or lifted to open must require no more than 5 pounds of force (lbf) to open or close.
2. Locks, cranks, and other hardware shall comply with requirements for controls and operating mechanisms, which include operating clearance and height within reach. In addition, mechanisms must not require tight grasping, pinching or twisting of the wrist. The force to activate mechanisms must not exceed 5lbf.

2. Functional
- Strength: In addition to descriptions in the main text, consider:

Dynamic load: water penetration under dynamic load in accordance with AAMA 501.1
- Snow load: May be applicable in the case of roof windows.
- Dead load and transport loads: window-washing equipment, attachment points of adjacent doors.
- Concentrated loads: roof windows to sustain the weight of maintenance personnel; impact and concentrated loads on all windows.
- Seismic load: In high seismic zones, anchoring systems and likelihood of glass failure may merit additional consideration.
- Thermal load: range of ambient temperatures the system must operate under.
- Durability: resistant to moisture, heat, cold freeze-thaw, corrosion, chemicals (acid rain), ultraviolet light, stains, abrasion, scratching, and decay; cleanable, dimensionally stable, finishes colorfast, durability of hardware, weatherstripping, and sealant, tight and sturdy joinery.
- Transmission: See discussion in text.
- Waste products: Are windows recyclable? Are the processes involved in manufacturing them wasteful of materials or energy?
- Operational characteristics: interference with furniture arrangement or traffic patterns in interior or outdoor spaces.

3. Sensible
- Esthetic properties: sight lines, sizes, shapes, colors, textures, and uniformity or contrast.
- Acoustical properites: noise control, when closed.
- Illumination view: light level; view; appearance of oclors. If windows are reflective, will reflections be unobjectionable? Privacy from viewing in?
- Ventilation: natural ventilation; screens needed. Maintain security of the window when open; undesirable fumes and noise.
- Measurable characteristics: tolerance for levelness, plumbness, flatness, weight.
- Material properites: hardness, toughness, thermal expansion.

4. Practical
- Interface: fit, attachment, compatibility with tolerances of surrounding construction, erection sequence.
- Service: ease of cleaning, ease of glass replacement.
- Personnel needs: need for training of maintenance personnel.
- Cost: not included in CSI's list, but usually an important consideration.
- Warranty and manufacturer's product support: also not in CSI's list, but often a consideration.

AAMA 502-90 (Window and sliding-glass-door field testing).
ANSI/AAMA 101-88 (Aluminum-window and sliding-glass-door specs.)
AAMA 1O1V-86 (Vinyl-chloride-window and sliding-glass door specs).
AAMA 1503.1-88 (Thermal-transmission and condensation testing.)
AAMA 1504-88 (Thermal performance standards).

National Wood Window and Door Manufacturers Association (708/299-5200):
ANSI/NWWDA Industry Standard IS. 2-87, Wood Windows.
ANSI/NWWDA Industry Standard IS. 3-88, Wood Sliding Patio Doors.

ASCE 7-88, Mininium Design Loads for Buildings and Other Structures; American Society of Civil Engineers; 1990 (212/705-7496).

ASHRAE Handbook, 1989 Fundamentals Volume, American Society of Heating, Refrigerating and Air Conditioning Engineers; 1989 (404/636-8400).

The BOCA National Building Code/1990, Building Officials and Code Administrators International, Inc. (708/799-2300).

16 CFR 1201 Consumer Product Safety Act Regulations, Part 1201, Safety Standard for Architectural Glazing Materials, Code of Federal Regulations, Washington, D. C.

Manual of Practice, Chapter IV-4, Performance Specifying; Construction Specifications Institute; 1985 (703/684-0300).

Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Federal Register, January 22, 1991; Architectural and Transportation Barriers Compliance Board (202/653-7848).

WINDOW 3.1; Lawrence Berkeley Laboratory (415/486-6845).

FRAME 2.1; Enermodal Engineering (519/884-6421). ■

CAD to the Rescue

Studio Plaza: the concept . . .

and the reality.

By Ann Moore and John Hughes

Two developments of the past decade have intensified architects' need to find an accurate, realistic way to present design, says Edward Friedrichs, managing principal of architects Gensler and Associates, Los Angeles: client uncertainty about the multiple choices in today's design approaches and scrutiny by lay people on local review boards whom design must satisfy. Architects need a way to communicate design—literally, clearly, and with analysis of its impact—as never before. And Friedrichs believes that, with CAD, architects can present a realistic picture of a design concept quickly and accurately.

He has watched the firm evolve with CAD. Twenty-five yers ago, Gensler had one office in San Francisco. Today it has 650 people and additional offices in Houston, Denver, Washington, New York, London, and Los Angeles where it has done many projects for the entertainment industry. One of these projects, the headquarters building for Columbia Pictures, Studio Plaza, shows vividly how the firm came of age in its use of CAD.

Ms. Moore is director of communications for Gensler and Associates.
Mr. Hughes is freelance writer in Fort Collins, Colorado.

The automated advantage

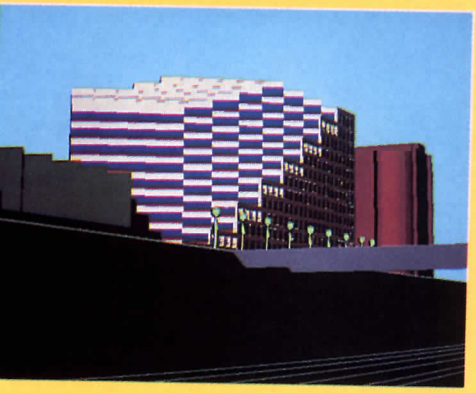
When Columbia Pictures awarded the contract to Gensler in 1984, it required that the work be done on CAD. It further stipulated that Columbia be shown the same kinds of computer modeling that Gensler had done for other projects. But there was an even more practical reason for CAD: The architects had three months before groundbreaking. And design included resolving numerous program complications and negotiating approvals with the city of Burbank, California, where it was to be built.

Columbia's program called for a 450,000-square-foot building. As a result of various mergers and acquisitions, several film groups with distinct personalities were being brought together under a three-party lease in the single facility. The Coca Cola Corp., owner of the building, authorized the Columbia team to work with the architect in designing the building and its interiors. As project principal, Friedrichs headed the team, which included six CAD-proficient architects who represented most of the CAD capability in Gensler's Los Angeles office at the time.

Design complexities

Marvin Taff, project design leader and also principal of the Los Angeles office, had the

Another in RECORD'S *series of case studies shows how one project convinced Gensler and Associates to become serious about CAD.*



ob of finding a column grid that met both he program requirements for the offices nd the need for four levels of parking un-erneath. CAD's speed helped him explore any options before settling on the ideal so-ution. Project architect Bruce Campbell oordinated the work of some 25 consul-ants. They and the client submitted changes most daily. The system immediately told of ny effects on floor areas caused by anges, enabling Gensler to monitor plan-ng efficiency.

ven during construction, it was not clear hat portion of the building Columbia would cupy. Although the program assumed 30 rcent of the space would be leased for ultitenant use, the design was to allow for dically different mixes—a single large ten-t to many small ones with equal itability. Even though the leased space d to be flexible, Columbia's program was evitably specialized in the spaces for its rn use. Along with screening rooms, corpo-te and executive dining rooms, production eas, and penthouse, Columbia needed an most unlimited number of corner offices the myriad executives involved in film aking. Again CAD came to the rescue by lping to find space configurations that uld satisfy either general or specialized es.

e architects found that a saw-toothed fa-le, because of the many corners it duced, would be equally servicable for all individual tenants and film executives. D satisfied client questions about the ef-t by showing how it would look to sersby on the adjacent freeway and to executives within.

Facing the other "client"

Satisfying the city of Burbank was the next hurdle. There was public concern about how the building would relate to its surroudings because each side of the small triangular lot faced a very different neighbor: the free-way, another studio, and a residential community. To accommodate the ambitious program on this lot, Gensler placed 13 sto-ries on the free-way side and stepped the height down toward the residential area. The city agreed to the unusual mass, because Gensler used CAD to demonstrate, through a series of sequential frames, how the project would affect the skyline from all sides. While the city thought that the plan's apex at an intersection would block views and create a traffic hazard, the computer model showed that the corner, cut out at the lower levels, would give a full view to ap-proaching drivers.

The city agreed to the unusual massing because Gensler used CAD to show, through sequential frames, how the project would affect the skyline from all sides.

System components

When the Los Angeles office began design-ing Studio Plaza in 1984, the firm had been committed to CAD for only about a year. At the time, the network consisted of a VAX file server that stored all of the firm's in-formation and made it accessible to the eight Intergraph workstations and the few archi-tects who were CAD literate. But the office was sure of the system's value, and the ex-perience with the Studio Plaza project, about 98 percent of which was done on CAD, con-firmed that faith.

Since Studio Park's completion, the Los An-geles office has retired its original equipment and replaced it with Intergraph's most recent technology. Today the office has 35 high-resolution Intergraph workstations tied into a network with IBM and Macintosh computers. The machines run Intergraph architectural software, Project Architect and Project Layout, and the rendering and paint programs Modelview and DP Studio. Most of the firm's output is produced on two electrostatic plotters from Versatec, and a thermal color output device from Shinko Electric Co., Ltd. Intergraphs's Frame Grab-ber, with its ability to transfer output from computers to a video-cassette recorder, al-lows the architects to create animations. In combination with various word-processing and desktop-publishing programs, the sys-tem opens a wide range of applications from architectural and interior design, and speci-fication writing to graphic design.

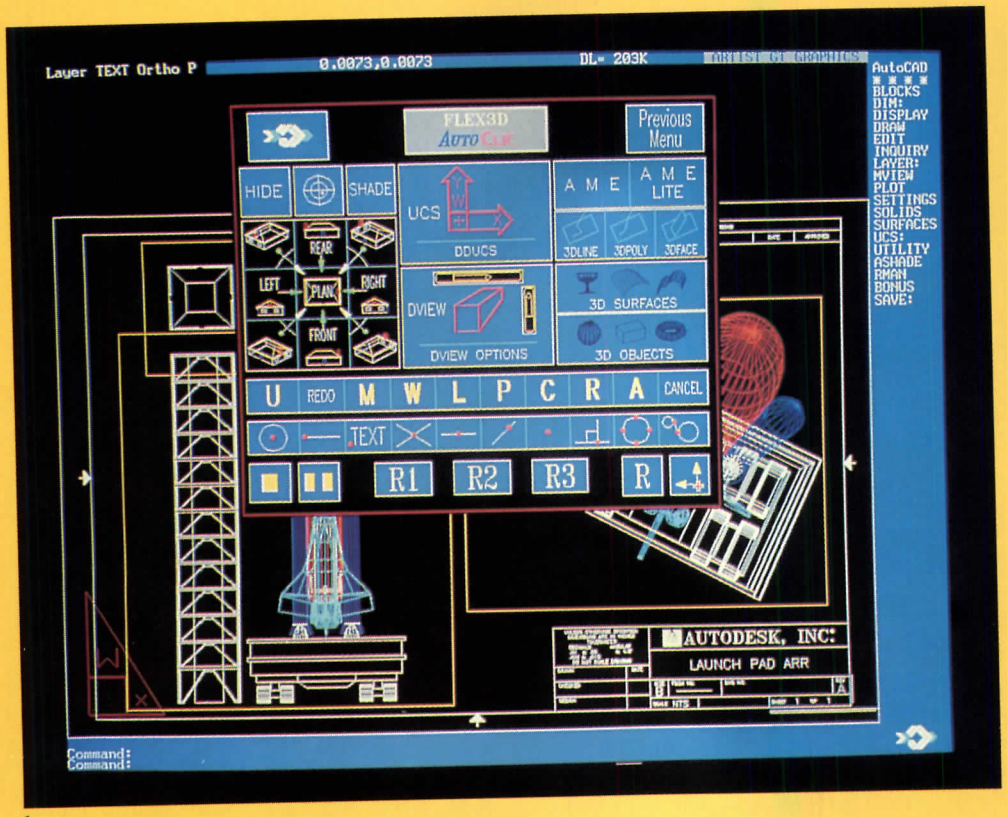
Connected since 1983 with the firms's CAD growth is Yousef Jalali. He is an architect with hands-on experience in design develop-ment and construction documentation, and helped design the network and teach design-ers how to use it.

The worth of a satisfied client

While Gensler has been improving its CAD applications, Columbia Pictures has under-gone its own evolution. Having been recently acquired, it is again relocating—to the old MGM studios in Culver City. And it has returned to Gensler for master planning and feasibility studies, renovation and new buildings, advanced food-service facilities in-cluding an employee cafeteria, landscaping, and graphic design including that for a com-munity newsletter.

The diversity of this large project occupies almost a third of the CAD-trained staff in the firm's Los Angeles office. But one of the most valuable assets remaining from the Studio Plaza experience is the electronic database now being transferred to Colum-bia's facility management team. Trained by Gensler in CAD, Columbia will be able to better manage its move and carry on maintenance of its new facility afterward. ■

Products Review from A/E/C Systems



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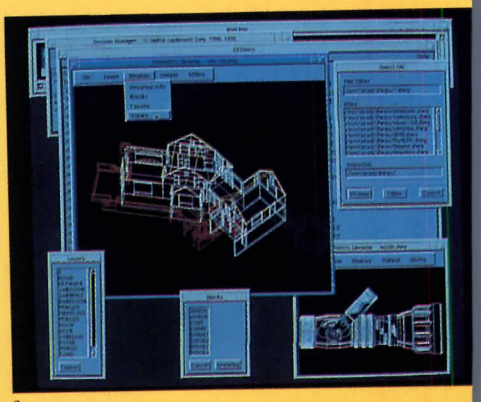

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By Steven S. Ross

New "before CAD and after CAD" software highlighted this year's A/E/C Systems show. But attendees seemed hard-pressed to figure out exactly how to fit the new tools into their practices.

Given the economic climate, it was hardly surprising to see the prominence given to "after CAD" computer-aided facilities management—CAFM for short. The new and improved tools allow architectural practices to offer facilities-management services as an extra deliverable. They also allow corporate architectural staffs to better run their own assets.

"Before CAD" computer-modeling software is meant to replace napkins and tissue as the starting point for conceptual design. Using the computer may not be as comfortable as sketching, but it offers some advantages:

- Sophisticated analysis of light and shadow can be performed easily—almost automatically with some software.
- Some of the modeling software allows simple animation and walk-throughs—great for getting clients involved before detailed design work begins.
- The resulting file can be inserted into sophisticated drafting software, giving a base upon which drafters can hard-line a drawing.
- Because the file is three-dimensional, drafters are forced to use either true 3-D or true 2-D to work with it. This reduces the chance of less-experienced drafters wasting their CAD time doing pseudo 3-D perspective drawings in 2-D.

On the equipment front, the big news was, well, bigness. HCS/Savin introduced the world's fastest E-size laser printer, the 536-XL, base price $129,500. HCS/Savin and Xerox were among the firms exhibiting D-size facsimile machines. These machines can send and receive to and from normal-size facsimile equipment as well.
Circle number **306**

Mix and Match

Interconnectivity was also featured at many booths. Vendors of CAD software, workstations, even networks designed to send files to plotters, all crowed about being able to work with other vendors' products. Booths with UNIX, Macintosh, and DOS machines tied together were quite common. The advantage: In-office flexibility, lowered risk of obsolescence, and some real price leverage for architects thanks to competition from so many suppliers.

Sun even was using a new version of its PC NFS networking package in the booth to link DOS computers to a UNIX server, and not bothering to display it. There are about 100 compatible products listed in Sun's new PC-NFS directory now.

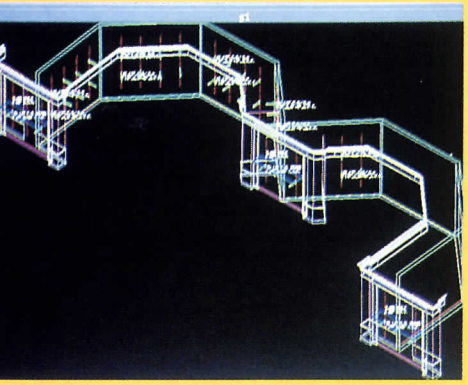
HCS/Savin, Intelligent Images, and Byers Engineering demonstrated software and hardware that allows different CAD packages to share the same output device. Bye Plot Station can now read an AutoCAD DWG file directly, with no need for an intermediate plot file to be made.
Circle numbers **307, 308, 309**

Apple demonstrated its new operating system—System 7 for the Macintosh—for the press (the formal release was a few days after A/E/C Systems ended). System 7 offers many new features that should make it much easier for Macintoshes to be networked and share files for CAD in large offices.
Circle number **310**

Autodesk demonstrated its faith in the Mac by privately showing AutoCAD 11 on it. Unlike AutoCAD 10 for the Mac, the new release will allow interchangeable use of either the standard AutoCAD interface, or Macintosh-like interface. It was promised for fall. *Circle number* **311**

Computer-modeling software and computer-aided facilities-management tools were the prime focus of interest.

For more information, circle item numbers on Reader Service Cards.



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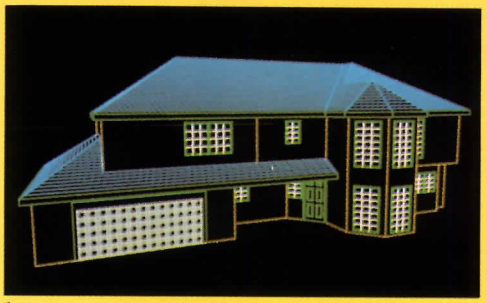

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1. Autoclic by Artist Software
2. Drawing Librarian by SoftSource
3. IBM's AES developed by SOM
4. Specs on CD ROM by ECLAT
5. D-size laser printer by Savin
6. Thumbnail 3-D by Integrated Computer

utodesk also announced a forthcoming ex-ension for Windows (to be delivered first alf of 1992), and released AutoCAD 11 for un SPARCstation workstations, and of-ered hands-on classes at the Sun booth.

BM appeared in force, demonstrating its ES (Architectural and Engineering Series), eveloped mainly by Skidmore, Owings & Merrill. AES includes seven separate mod-les for CAD, modeling, facilities anagement, and more. It runs particularly ell on the IBM RS/6000 workstation. BM's CADAM and Micro-CADAM soft-are, acquired from Lockheed, will be arketed mainly to mechanical design and ther nonarchitectural markets. *ircle number* **312**

everal vendors offered add-ons to AES, in-uding K+CZL. The firm's Production+ oolkit includes a mouse-oriented interface, le-management tools, and some parametric esign, all for $1,295. It works with the PS/2 nd RS/6000 versions of AES. *ircle number* **313**

ewlett Packard demonstrated its top-of-e-line Apollo 900 Series 700 workstations, ith performance ranging as high as 72.2 PECmarks and UNIX standard enough to n more than 3,000 different software pack-es. *Circle number* **314**

efore-CAD Modeling

odeling software allows designers to ickly block out alternatives in three-di-ensional space. The resulting files can then printed or plotted, or transferred to full-atured CAD software for hard-line afting. As you might expect, however, the various new packages shown at the show have specific strengths and weaknesses.

Alias released a version of its Upfront 3-D modeling software for IBM-compatible computers. Like the Macintosh version released late last year, Upfront for DOS offers automatic generation of shadows at any time, date, and latitude, automatic shading, and exchange with CAD files in a wide variety of formats including, of course, DXF. Upfront is particularly good for drawing static models. Alias offers several animation packages as well, however. Price of the Macintosh version is $895; the DOS version is $995. *Circle number* **315**

Several Macintosh-only modeling packages were shown that are better out of the box at animation—walkthroughs, for example. Virtus WalkThrough, $895, has drawing tools (a "room" tool, for instance) that make it particularly easy to create models with interior spaces in 3-D. The mouse can then be used to point the way as you move from interior to exterior and back again. There's no need to compile a series of steps beforehand, then replay the images. Virtus WalkThrough creates its 3-D shaded views in real time, as you move the cursor. *Circle number* **316**

ModelShop II from Paracomp, $895, now offers seamless import and export of Claris CAD 2.0 files. A designer can block out a model in 3-D using ModelShop II, and import it directly into 2-D Claris CAD. Or, you can sketch and draft in Claris CAD and import into ModelShop for fast creation of 3-D models. ModelShop makes it easy to create rendered models for presentation as well as preliminary design. Walkthroughs are possible, too. And Paracomp offers fancy animation tools, including FilmMaker and Swivel 3-D Professional, that work with it. But this new version retains an odd quirk of predecessors—you cannot cut a hole in a surface in the Z-dimension. For example, if you start with a 2-D floor plan (drawn in the X-Y dimension) and extrude the walls upward (Z-dimension) to create a 3-D model, you cannot then cut windows into the walls you create. To cut a window, you have to create a wall surface in elevation (X-Z dimension), then extrude it forward or back (Y dimension). *Circle number* **317**

Also for the Mac, form • Z from autodessys, Inc., $999, has drawing tools that approach full-blown CAD. Notice the complex rooflines in the accompanying image, (photo 16). Walkthroughs should be set up ahead of time with a separate "Imager" package that creates PICT files. A "Presenter" program then shows the images as a smooth animation. *Circle number* **318**

Thumbnail 3-D is a $749 AutoCAD 10-386 or Release 11 add-on that allows designers to draw a bubble diagram on-screen, refine it into a space plan, and then scale it for use as the basis for refined drafting. After that, Thumbnail 3-D creates a 3-D exterior view. The vendor is Integrated Computer Graphics, Inc. *Circle number* **319**

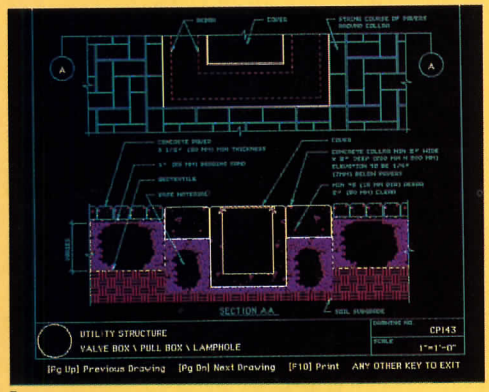
StereoCAD, Inc. offers Realtime for $1,500; it converts 3-D DXF files into 3-D renderings you can walk around. There are versions for DOS and for Sun Series 4 workstations. *Circle number* **320**

Photorealistic renderings from 3-D DXF are possible with Big D Rendering Software 6.0 from Graphics Software, Inc. *Circle number* **321**

IrisView from Silicon Graphics also allows viewing of 3-D DXF files from AutoCAD, as wireframes or fully shaded models. The software is not fooled by complex models created using AutoCAD with add-on packages from ASG, EDA, and others. Instead of Silicon Graphics workstations, the system can be used with add-on boards in a DOS PC with 80386 or 80486 CPU. Microchannel and AT-bus versions are available. *Circle number* **322**

Interior-design firms might look at FirstPASS, an AutoCAD add-on that allows you to lay out space roughly while generating a project database. The vendor is Data One, Inc. *Circle number* **323**

DesignView, $895, meant more for mechanical designers than for architects, allows parametric analysis to be done on simple sketches. There's an easy gateway to VersaCAD. The developer is Computervision. *Circle number* **324**



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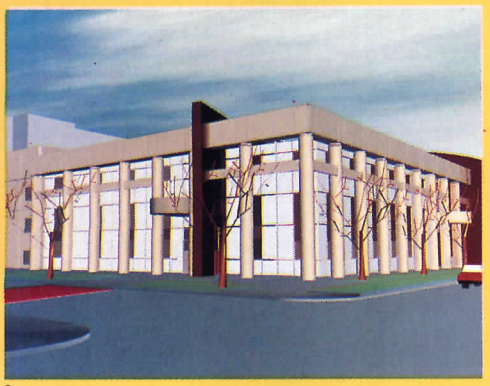
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Virtual Reality

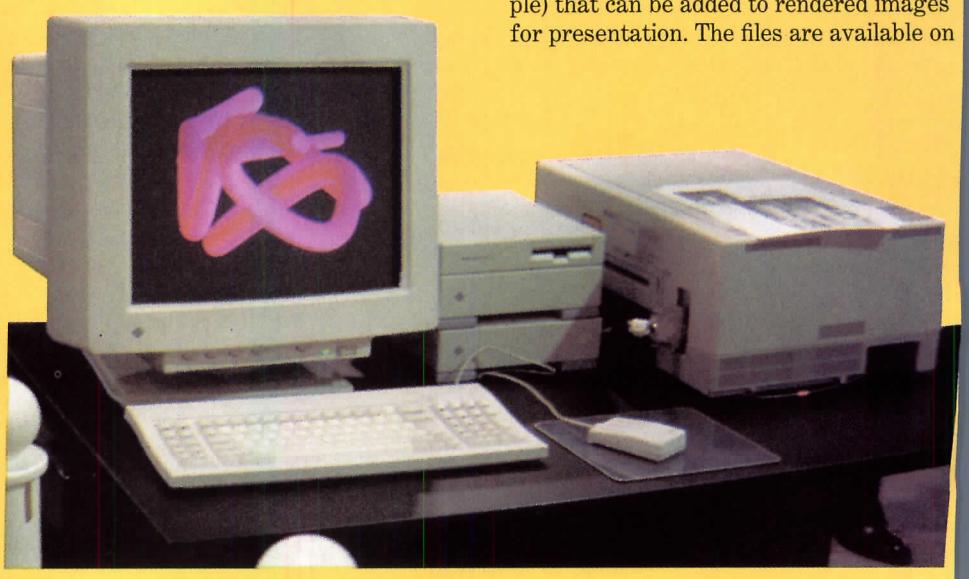
Once you have a model, why view it on a flat, two-dimensional computer screen? Several companies offered what has come to be called "virtual reality" to fool your eyes into viewing a computer monitor in 3-D. Intel's demonstration was perhaps the most all-enveloping. The effects came from a small company called Sense8, which is producing a programmer's toolkit for what it calls "virtual worlds." Sense8 was founded by several pioneers of the technique from Autodesk. *Circle number* **325**

The eyeware used by Intel is quite heavy, however, because it includes small, separate screens for each eye. StereoGraphics Corporation uses much lighter glasses that are actually liquid crystal shutters. The shutters are synchronized with a special monitor that alternately flashes two slightly different perspectives of the same image on-screen. An entire system, including twin TV cameras, costs a bit less than $8,000. *Circle number* **326**

That's pricey. But many existing video cards work; you may have them in your system already. And among the compatible CAD and rendering software are FastCAD, Pixar Renderman, Arris CAD, and MicroStation. StereoCAD 3-D (a more advanced version of Realtime) works with it as well.

Autodesk showed 3-D Studio a new, more powerful version of its 3-D animation software. *Circle number* **327**

Imagetects showed its comprehensive—and beautifully done—ImageCEL libraries of surface finishes and objects (including people) that can be added to rendered images for presentation. The files are available on



For more information, circle item numbers on Reader Service Cards.

floppy disk or CD ROM, in a wide variety of graphics formats for UNIX, DOS, Amiga, and Macintosh. *Circle number* **328**

Graphisoft released Version 4.0 of its ArchiCAD 3-D drafting and modeling software for the Macintosh. The new version has better DXF translation, compatibility with RenderMan shading software, and better built-in shading. It can import Swivel 3D-files (typically for fixtures and furniture) as well. *Circle number* **329**

After CAD-CAFM and Estimating

Jung/Brannen Research & Development demonstrated Archibus/FM 5.0, facilities management with strong links to AutoCAD. All three modules of the system, (space, furniture, and equipment leasing) can be purchased for a total of $3,995. *Circle number* **330**

CAFM Works released upgrades to its space planning, floor-stacking and blocking, and space-analysis software. It is now possible to track groups as well as individual space needs. *Circle number* **331**

SoftCOST introduced Success 2.0, a new PC-based estimating system that runs under Windows. *Circle number* **332**

Advanced Maintenance Management System, from Spacesave Software Systems, Inc., handles only maintenance. But it can run on even a small IBM XT or compatible. *Circle number* **333**

MiCAD showed its new facilities-management link to AutoCAD. Separate modules handle furniture, space management (the CAFM Works system, actually), lease inventories, projections, and more. Typical prices are under $500 per module, on top of $1,295 for the base system. *Circle number* **334**

Project Planning

Open Plan 4.0, the latest version of Welcom Software Technology's project management software, was released at the show. There's now a graphic-user interface, support for PostScript printers, and better on-screen editing. Versions are available for DOS, UNIX, Macintoshes, and even DEC VAX computers. Single-user licenses start at $4,200. *Circle number* **335**

Also demonstrated was the FastTrack series for scheduling and project planning on the Macintosh, from a Software. The a Information Manager package, for tracking project status, is $695. The resource allocation module is only $235. *Circle number* **336**

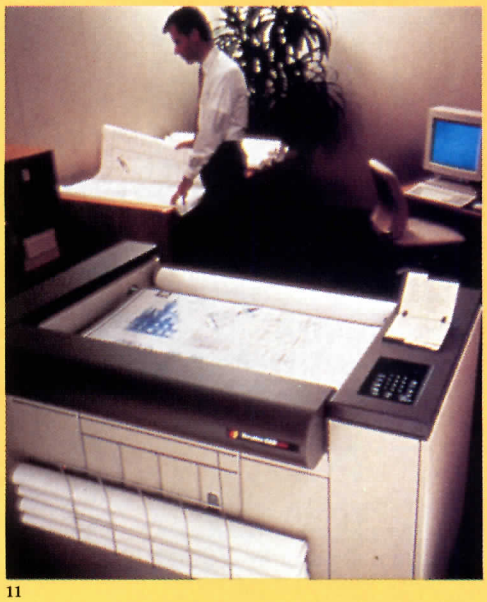
CAD

Windows was the look of the future in CAD. Windows versions were announced for Autodesk's AutoCAD (actually, an extension that fits over the existing version of AutoCAD), IsiCAD's Cadvance, and Cadkey's DataCAD. IsiCAD also announced a version for the Sun SPRACstation. You'll wait until late this year or easily next for delivery of any of these products, however.

DCA changed its name to Softdesk and released a raft of new products. Among them were GenCADD COGO, a coordinate geometry package that runs with 2-D Generic CADD 5.0. This is the first of a series of such packages; specific modules for architectural drafting, facilities management, and other specialties are promised soon. Modules are about $500 each; Generic CADD 5.0 is an additional $500 or less. *Circle number* **337**

Softdesk, better known for its AutoCAD add-ons, also announced an AutoCAD estimating package with links to Timberline's software, and a landscape package, both for release later this year. *Circle number* **338**

7. Electronic CADalog for Concrete Paver Institute by Vertex
8. ASG Model Vision
9. Sun's PC-NFS networking package linking DOS computers to a UNIX server
10. ImageCEL 3-D CAD model with surface finishes and objects by Imagetects; RenderStar by Modern Medium
11. Versatec CADcolor by Xerox



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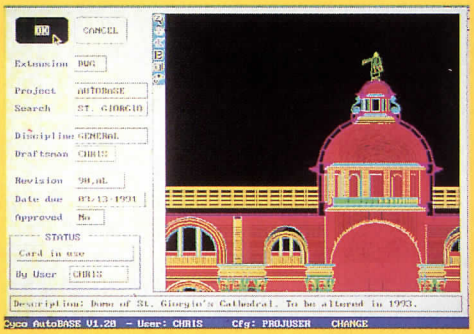

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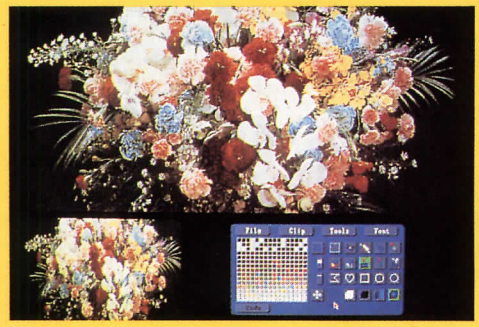

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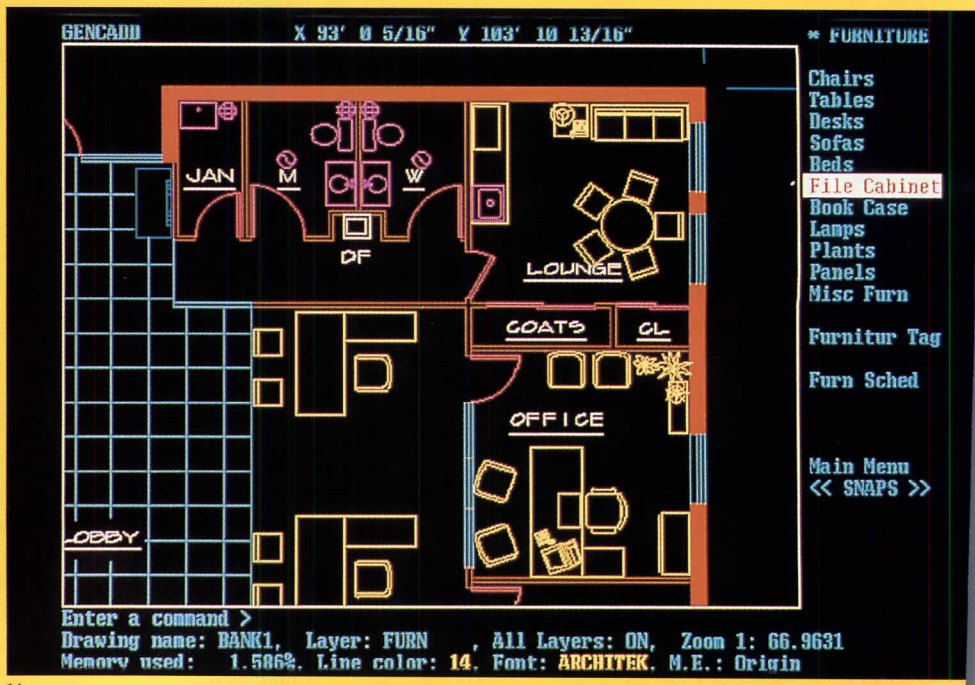

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Wind-2 Software added some new reports for its practice management series, including departmental revenue distribution and a purchase-order system. *Circle number* **339**

Other new entrants into the AutoCAD add-on market include APDesign Series, an Australian import with strong networking and metric capabilities. The distributor is CadSoft International, and prices range from $250 to $995 per module. *Circle number* **340**

Printers, Plotters

The big news was at the high and the low end. Roland introduced an 8-pen A-size plotter for only $695. It can use serial or parallel interfaces, on DOS or Macintosh equipment. CalComp introduced its fast D- and E-size Pacesetter series, successor to the popular Artisan Plus models, and added to the versatility, speed, and color capabilities of its electrostatic plotters. *Circle numbers* **341, 342**

Many large-format scanners were in evidence—in part due to the trend toward taking on facilities-management tasks. Often, old blueprints must be scanned into CAD files. Houston Instruments' LDS 4000 Plus can now scan directly into Intergraph MicroStation (via RLE or Group 4 formats). *Circle number* **343**

Networks

Synergis Network FileManager allows users to track and display AutoCAD drawings and associated files across UNIX and DOS workstations, as long as they are networked to a UNIX file server. *Circle number* **344**

The new Drawing Librarian Professional from SoftSource also allows CAD files to be viewed across many platforms; it was demonstrated at the show running in Windows, UNIX, and DOS. *Circle number* **345**

SirlinVIEW/POP allows you to view AutoCAD drawings inside most DOS applications—including Lotus 1-2-3 and dBase IV. The price is only $99. *Circle number* **346**

AutoBASE from Cyco International uses AutoCAD files to create a user-defined database that can combine the images with text. Single-user licenses are $699; six terminals on a network can be serviced for $1,999. *Circle number* **347**

Graphics Boards

With software-only display-list processors now quite common, manufacturers of graphics accelerator cards have been looking for a new edge. In return, display-list processors are also getting more features. Among the graphics-board offerings were many that could be considered separate computers, able to run software to, for instance, conve vectors to raster images for quick printing or to allow image editing outside of CAD.

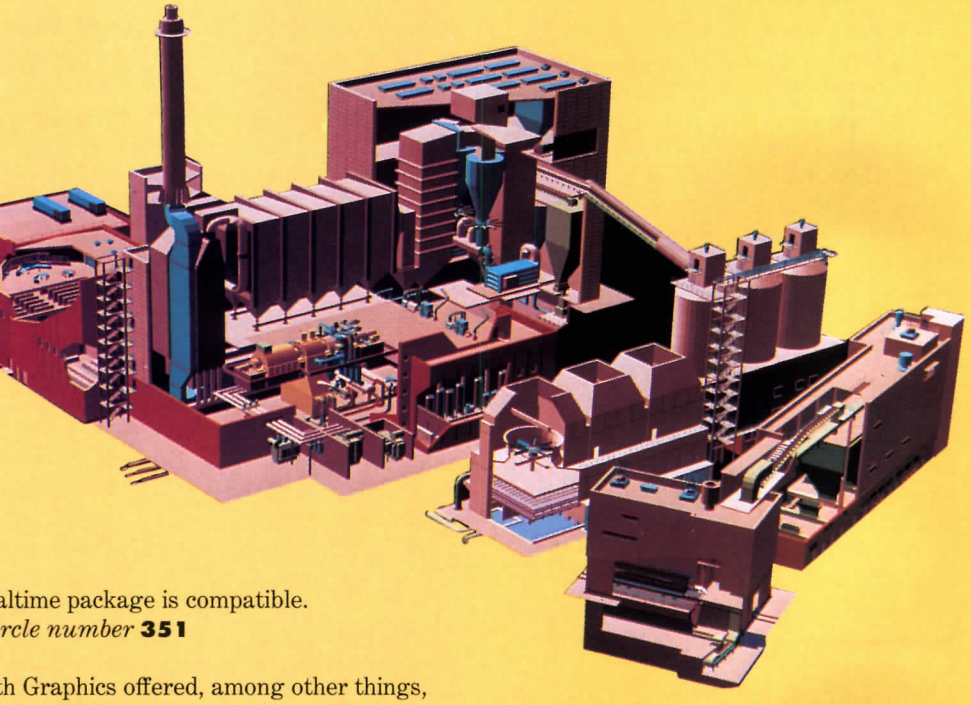
ATI Technologies introduced low-cost boards (as low as $499) and bundled Panacea's display list drivers for AutoCAD wit its VGAWONDER XL series. *Circle number* **348**

Expert Graphics, a pioneer in the field, showed upgrades for its Rasterex series. *Circle number* **349**

Hercules showed its Superstation 3-D car for graphics acceleration, image capture (genlock), and true-color graphics. AutoC ADI protected-mode and Windows drivers are free for now, along with the board. Prices range up to $5,895 (with 16 MB of board memory). *Circle number* **350**

Artist Graphics displayed low-end VGA cards with an optional turbo module, and also showed improved display software, i cluding a menu for AutoCAD. The 3-D

For more information, circle item numbers on Reader Service Cards.



altime package is compatible.
rcle number **351**

h Graphics offered, among other things, -bit NTSC output for making videotape lkthroughs and other applications.
rcle number **352**

ecifications

e business of delivering manufacturers' ecifications began to settle into a groove. ualified practices get the specs—auto- ated product catalogs—free or at nominal st, often on CD ROM. The CD ROM disk ght also include software that allows easy arching of product alternatives, and easy port of drawings to CAD. Your up-front st: Roughly $500 for a CD ROM player at connects to your personal computer. ost CD ROM products seem to run only on OS systems, however.

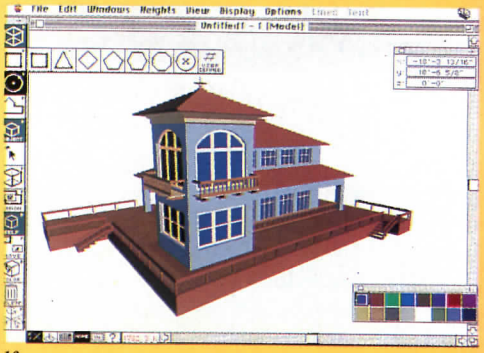
LAT, which has been sending such CD M disks quarterly since the beginning of 1, announced agreement with Architec- al Synthesis, Inc. to make it easier for rs to access "intelligent" details from I through ECLAT disks.
rcle numbers **353, 354**

I and ECLAT both announced agree- nts with ASG; the ASG add-ons to oCAD will be able to access both ASI ECLAT information. ASG, in turn, an- nced a link with SuperSpec; ASG Specify can recognize CSI specification divisions on your drawing, and lead you to the correct spec section. SuperSpec returns a completed spec for $395 per project.
Circle number **355**

National Institute of Building Sciences has updated its four-disk set of government construction specifications. New databases available on the CCB (Construction Criteria Base) CD ROMs include Masterspec, BOCA, and SBCCI building codes. Most of the graphics elements are pixel-based, rather than vectors, but they can be exported into specification documents. Or, if exported to CAD, they can be used as a guide for your own vector-based drawings.
Circle number **356**

Vertex Design Systems showed updates of its CAD Detailer. A separate division also distributes free (to qualified practices) "Vertex Electronic CADalogs" of details and specifications on floppy disk, for such vendors as Manville, DuPont, and Concrete Paver Institute. *Circle number* **357**

CAP-Electronic Sweets joined the Windows revolution with software for specifying furniture and for facilities management. ■
Circle number **358**



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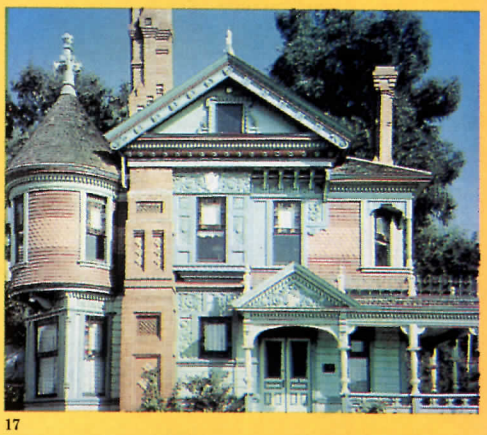

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12. AutoBASE by Cyco
13. Image '90 by Rasterex
14. GenCADD FF&E by Generic Software
15. DataCAD Windows by CADKEY
16. Form • Z by autodessys
17. Nth Engine by Nth Graphics
18. REALTIME by StereoCAD, Inc.

The New Moderns, *by Charles Jencks. New York: Rizzoli, 1990, 300 pages, $75.*

Reviewed by Karin Robinson

Charles Jencks's mania for sorting architects and their work into categories is now well known, and his latest book will not disappoint followers of his characteristic style of analysis and criticism. There are lists and definitions, a flow chart of categories (what Jencks refers to as "fibrous bundles"), and pictorial essays representing selected categories. Jencks's preference for categories is not universal, however. For his many critics, the collection of interviews included in the book will provide the dialog they find lacking in the two-dimensional lists and charts. In the end, the interviews prove to be the most enlightening and engaging chapters for believers and nonbelievers alike.

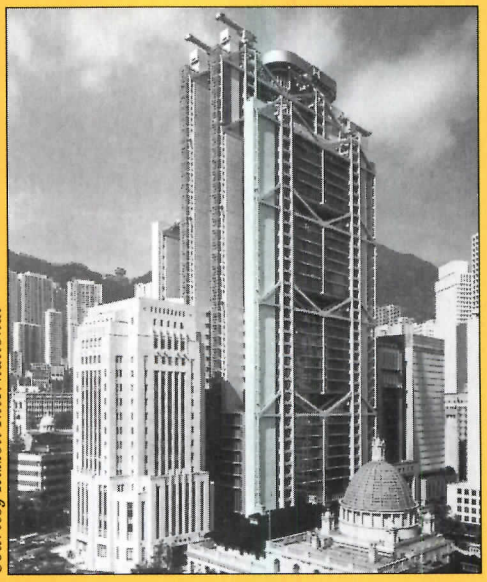
Jencks selects Philip Johnson, Peter Eisenman, Richard Meier, and Fumihiko Maki for cross-examination. Serving simultaneously as interviewer and critic, Jencks is enlightening in both roles. It should not surprise anyone that Jencks characterizes Johnson as a Modernist, a Late Modernist, and a Postmodernist at different points in their conversation. His multiple designations of Johnson's work are reflective of well-documented changes in Johnson's style. But when Jencks talks to Eisenman, he uses those same three categories (and several more). The multitude of categories is not representative of a series of stylistic changes on Eisenman's part, but instead reflects Jencks's struggle to place Eisenman in a category that fits. Eisenman, of course, is known to slip in and out of categories.

Elusive architecture piques Jencks's interest throughout the book. In his essays he focuses primarily, though by no means exclusively, on Deconstructivism, a movement that strives to be slippery. But Jencks's search for overall analytical definitions comes up against the Deconstructivists' desire to elude capture. While he maintains that his system of categories is actually flexible and dynamic, in the extreme case of Deconstructivism these categories ultimately lack resolution and stability. Jencks's difficulty in containing the theories of Deconstructivism in useful categories may explain his misgivings about the movement. He shows concern that this architecture is deliberately obscure and presents no readable whole to the public. He also doubts whether "Late Modernism" (meaning a direct, if somewhat diluted descendant of Modernism) and "New Modernism" (a revitalized Modernism born in response to Postmodernism) are really so different after all.

If Jencks presents any overall thesis in the book, it is that Modernism is headed for self-destruction. The death of Modernism is inevitable, he says, because the movement was founded on the denial of its predecessors and the perpetual revolution of the new. As soon as its forms are generally understood and easily replicated, it enters the mainstream and must be rejected itself by subsequent Modernists, he argues.

Jencks observes that this regeneration is occurring more frequently, and predicts the entire Modern movement will self-destruct within 60 years. While Jencks feels an obligation as a critic and historian to document the latest progression of Modern architecture, he remains a confirmed Postmodernist.

Karin Robinson is a New York architect.



Courtesy Rizzoli International

Norman Foster's Hong Kong & Shanghai Bank exemplifies the New Modernism.

Intercultural Architecture: The Philosophy of Symbiosis, *by Kisho Kurokawa, with an introduction by Charles Jencks. Washington: AIA Press, 1990, 208 pages, $60.*

While his nomenclature is esoteric, Kurokawa's message is simple: a symbiosis of cultures will end up replacing both International Modernism and literal Postmodernism as the driving esthetic of 21st-century architecture.

Kurokawa, whose writing, if not his architecture, reflects a certain defensiveness in the face of Western architecture, develop in this book an intricate but, in the end, coherent design philosophy, using examples from (mostly) Japanese architecture, painting, and urban design. The philsophy says that the new architecture will end up weaving together different periods and different cultural values into a single (but not necessarily identical) architectural language.

Kurokawa sees no future for Modernism s long as its foundation continues to be the machine-driven, noncultural tenets defined by the Bauhaus. These tenets, as he sees them, are based on the Western value system of the pursuit of modernization throug industrialization, a direction that hasn't proved right for all cultures.

He cites the example of a Western architec asked to design desert housing for Bedoui to help these nomads settle down so the state could educate the children and provi health care. The design proved to be so un suitable that the Bedouins kept their shee and goats in the houses and continued to l in tents.

"Different countries and peoples must rec ognize their differences, and then look for ways to cooperate with each other," write Kurokawa. The author sees the symbols (not necessarily the literal elements) of dif ferent periods melding in a symbiosis tha creates its own architecture. While this vi doesn't differ greatly from the traditional focus on site, climate, program, technique and theory as determinants of form, it do add the key ingredient of cultural diversi

S.A.K.

Robert Maillart and the Art of Reinforced Concrete, *by David P. Billington. New York: The Architectural History Foundation and MIT Press, 1991, 151 pages, $60.*

Reviewed by Eric DeLony

The Swiss engineer Robert Maillart, who lived from 1872 to 1940, built bridges and industrial structures of startling originality. His intuitive use of reinforced concrete and exquisite sense of form insured his legacy among architects. Maillart's structural artistry receives a thorough examination in this well-illustrated book, furnished with both English and German texts. Neither history nor biography, the book is a visual analysis of 14 of Maillart's major works, ranging from the little known Chaisso warehouse shed of 1924 to his most photographed structure, the Salginatobel Bridge of 1928, a stark, three-hinged concrete arch spanning a gorge high in the Alps.

This book is the third of four volumes by Billington on Maillart. The first, *Robert Maillart's Bridges: The Art of Engineering*, won the Dexter Prize as the outstanding book on the history of technology in 1979. In the second book, *The Tower and the Bridge*, Billington compares Maillart with other engineering masters such as Thomas Telford, Gustave Eiffel, and John Roebling. The last volume, a biography of Maillart, is due out next year.

Billington, who teaches structural engineering at Princeton, attempts to liberate architects, and especially engineers, from designs based purely on functional efficiency and computer analysis. Instead, he proposes designs, such as those by Maillart, that express how structures behave and exhibit intuitive understanding of the nature of materials and clear sense of form.

Maillart's Schwanbach Bridge

Eric DeLony, an architect, is chief of the Historic American Engineering Record *and a specialist in the history of bridges.*

Violated Perfection: Architecture and the Fragmentation of the Modern, *by Aaron Betsky. New York: Rizzoli, 1991, 208 pages, $50.*

Reviewed by Scott Gutterman

Despite attempts by Postmodernism and Deconstructivism to grab center stage, no architectural movement has yet emerged to replace Modernism as the reigning theory of this century, states Aaron Betsky in *Violated Perfection*. As Betsky puts it, "the Project of the Modern" is not a relic of a more optimistic age, but an abiding riddle whose meanings continue to unfold.

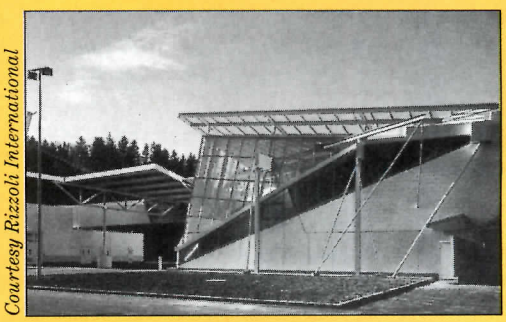
Viewed in this light, both Postmodernism and Deconstructivism are recent attempts to express the complexity and difficulty of Modernism's various creeds: truth in building, the integration of technology and modern life, accommodation of a rapidly expanding world. The utopian strain of early Modernism has given way to an awareness that technology may not only fail to save the world, but could in fact destroy it. Betsky analyzes architecture in terms of an ongoing critique of Modernism, in which the "truth" in building is often revealed to be a sham and in which the form and language of technology are put to far-from-utopian ends.

The author opens by examining a "play sculpture" by the California-based firm Morphosis. The work's structural complexity and its ambiguous function, argues Betsky, make it appear as a "fragment of an architectural investigation into the conditions of the world in which we live." He goes on to say that this oblique, challenging work holds a "romantic and liberating message": that built work can question its own status and emerge the stronger for it. Such statements tend to obscure as much as they explain and often saddle projects with more significance than they can comfortably handle.

The book makes the case for an expanded list of contemporary "violators," including architects as diverse as Steven Holl, Zaha Hadid, and Shin Takamatsu, and artists such as Tadashi Kawamata, and the late Chris Burden. The gathering might seem hopelessly broad were it not for Betsky's clever, if occasionally cloying sub-groupings, such as Shards and Sharks, Technomorphism, and Masques, Messages and Texts. His thematic, literary approach strongly recalls that of Postmodernism chronicler Charles Jencks. His penchant for high-flown reference is also evident; at one point he cites philosophers Susan Sontag, Theodor Adorno, Jacques Derrida, and Michel Foucault—in a single paragraph.

Nonetheless, the idea of a fragmented Modernist paradigm is intriguing, and Betsky backs up his conceits with mostly clear writing and solid research. The lingering question of "What next?" hangs over the book, though, as heavily as it does over the profession. Is the kind of self-reflective, "heterotopic" model that Betsky proposes a credible one for future building? Or will a less reactive, more positive form of architecture appear, one that maintains Modernism's sense of hope while avoiding its tendency to devour everything in its path? Betsky wagers only the most tentative guesses as to these tough questions. But *Violated Perfection* succeeds as a document of the problematic present.

Scott Gutterman is a freelance writer specializing in art and architecture.



Courtesy Rizzoli International

Coop Himmelblau's Funderwerk 3 factory violates any sense of perfection.

Briefly noted

Lost Broadway Theatres, *by Nicholas van Hoogstraten. New York: Princeton Architectural Press, 1991, 288 pages, $39.95 (cloth), $24.95 (paper).*
Between 1882 and 1932, nearly 90 legitimate theaters opened their doors along or near New York's Great White Way. But the curtain has come down on more than half of these houses. The book's engaging text and photographs document 54 Broadway theaters, keeping at least the memories alive.

American Picture Palaces: The Architecture of Fantasy, *by David Naylor. New York: Prentice Hall, 1991, 224 pages, $19.95 (paper).*
An engrossing history of American movie theaters, this book traces the building type's roots in vaudeville houses and takes the reader on a tour of outrageous designs. Naylor profiles some of the architects responsible for the neo-Byzantine, pseudo-Persian, and mock-Italian extravaganzas from the 1920s and '30s. He then notes the sad fate of many of these theaters and efforts to save survivors.

Great Inventions/Good Intentions: An Illustrated History of American Design, *by Eric Baker and Jane Martin. San Francisco: Chronicle Books, 1991, 144 pages, $16.95 (paper).*
A delightful collection of great (and not-so-great) ideas filed with the U.S. Patent Office from 1930 to 1945, this book records the era's fascination with locomotion, streamlining, and "modern" gadgets. Entries include a sleek "stapling machine," a railway car designed by Raymond Loewy, Buckminster Fuller's famous Dymaxion House, and the classic Schwinn bicycle.

More Than Housing: Lifeboats for Women and Children, *by Joan Forrester Sprague. Boston: Butterworth, 1991, 235 pages, $29.95.*
Sprague, an architect and planner, has written a first-rate primer on the kind of buildings homeless women and children need to turn their lives around. Termed "lifeboats" because they literally rescue lives, these buildings provide emergency, transitional, or permanent housing for single women and their children. The book includes 50 case studies of successful projects. ■

Drawn for ARCHITECTURAL RECORD *by Sidney Harris*

ARCHITECTURAL RECORD Centennial

Turn of a Century

Earlier this year one of our neighbors, Carnegie Hall, headed into its second century. Nearly torn down in the early 1960s to make way for an office tower, Carnegie Hall is now in better health and more popular than ever. To celebrate its 100th birthday Carnegie threw a party and invited some familiar names to clear their throats and hum a few bars. For RECORD's own centennial, a lavish party with full orchestra didn't seem quite right. Like Carnegie Hall, however, we elected to celebrate our first 100 years by doing what we do best, marking the occasion with a special edition of the magazine that would look both backward and forward at the course of architecture.

To this end, we invited some of our friends to contribute their voices to the celebration. In her opening essay (page 134), Suzanne Stephens compares the early ARCHITECTURAL RECORD with the magazine in the 1990s, noting the legacy of figures such as Montgomery Schuyler, Russell Sturgis, and Herbert Croly. Next comes a story on the most important buildings of the last 100 years (page 136), based on a survey of our readers. Still looking to the past, our centennial coverage includes a "RECORD Album" of reminiscences from former RECORD staffers (page 140) and a collection of cartoons that have enlivened our pages over the years (page 142).

Because the development of modern architecture has been so closely linked with advances in technology, an article entitled "From High-Rise to Low-E" (page 144) serves a key role in our review of the last 100 years. Rounding out our look backward is a series of articles examining architectural history from 1891 to 1991 (page 150). Written by an all-star cast—Jack Hartray, Witold Rybczynski, Robert A. M. Stern, Thomas Hine, Robert Campbell, and Mildred Friedman—these essays are personal perspectives on six periods of architecture.

Stephen Kliment's interview with Arthur Holden (page 174), a 100-year-old architect who has always gazed ahead, highlights one man's dedication to the profession of architecture. The final three articles evolved from discussions with leading practitioners, critics, and educators who collectively climbed out on a limb to imagine the future. In "Future Talk" (page 176) some top architects explore directions in which design may go at the turn of the millenium; in "Office Shakeup" (page 182) a group of management experts discuss how computers and other office systems may change the practice of architecture. The special section closes with a look at architectural education, provocatively entitled "Academe or Boot Camp?" (page 188). Come celebrate with us. *C. A. P.*

Coming Full Circle

The reader of THE ARCHITECTURAL RECORD 100 years ago would no doubt marvel at today's version, with its larger, 9- by 10 7/8-inch page size and its lush, color photographs on glossy paper. The reader would also be amazed (or puzzled) at some of the subjects, such as "Automation in Practice" or "Finetuning DataCAD 4.0" currently explored within its pages. In looking further, however, the same reader would find certain interesting similarities in underlying values, attitudes, and concerns. Like the generations of a family, certain traits show up consistently over the years, and others appear, then recede for a while, and finally become dominant again.

THE ARCHITECTURAL RECORD, a quarterly until 1902, when it became a monthly magazine, was 7 by 9 3/4 inches in size and was filled with text, much like the literary magazines of the day. The occasional drawings and black-and-white photographs were supplemented by photographic portfolios. Astonishingly enough, color reproductions resembling hand-tinted postcards appeared in early 1894 and then disappeared, not to return until May 1959.

If the format of the early issues showed a literary bent, so did the actual content. Poetry, fiction, and essays on general topics mixed with profiles of architects, articles on architectural history, criticism, and analyses of individual buildings and architectural styles. The mix reflected the conviction that the architectural reader should be as up-to-date on art, sculpture, furniture, and gardens as on the latest in lighting of office buildings or steel-skeleton construction. While the intent was to appeal to a broad public, articles on the use of terra-cotta in construction or the planning of bathrooms in office buildings indicated that the interests of professional readers loomed large in editorial consideration.

THE ARCHITECTURAL RECORD was founded by publisher and clothing manufacturer Clinton Sweet, who in 1868 had first launched the weekly *Real Estate Record and Builders' Guide* with the help of journalist David Croly. By 1891 advances in the printing of halftone photographs had encouraged Sweet to start an architecture magazine. Furthermore, interest in architecture seemed to be mounting with the planning of the 1893 Columbian Exposition in Chicago. A 28-year-old staff writer from *Record and Guide,* Henry W. Desmond (1863-1913), was named editor of THE RECORD.

Desmond, who became a company partner when Sweet's company merged with F. W. Dodge in 1896, also helped develop *Sweet's Catalogue.* But Desmond had other ambitions too. He wrote at least two novels, one of which, *Raymond Lee,* appeared in installments in THE ARCHITECTURAL RECORD. No doubt, Desmond's literary enthusiasm helped the magazine develop its lively, engaging style of architectural journalism.

Desmond was aided by pieces from a prolific writer and columnist for *The New York Times,* Montgomery Schuyler (1843-1914), and by architect-turned-historian Russell Sturgis (1836-1909). While Schuyler was later cited by Frank Lloyd Wright and Lewis Mumford as the leading architectural critic of the time because of his Modernist orientation, Sturgis was considered, as *The Nation* put it in 1901, "the foremost writer in America on architecture and allied subjects." David Croly's son, Herbert Croly (1869-1930), was another staff member who was much acclaimed—mostly for his later achievements when he became the founding editor of *The New Republic.*

While not intensely ideological, THE RECORD consistently voiced certain concerns. Schuyler, Desmond, and others railed against slavish copying of historical models, and used satire to underscore their contempt for formulaic Classicism. But while Schuyler, Sturgis, and company could be called rationalist, and argued that a building should express its structure and materials, they were not totally antipathetic to using Classical and even Gothic vocabularies.

Schuyler was more upset by bad proportions and haphazard eclecticism. A series of 26 unsigned essays, called "Architectural Aberrations" and attributed by historian Helene Lipstadt to Schuyler, were published in THE RECORD from 1891 to 1912. The articles were often penetrating examples of undiluted vitriol poured over the periodical's pages. About the Fagin Building in St. Louis, for example, Schuyler said, "We cannot say it is the worst that can be, but can anybody indicate anything quite so bad that has been?"

When THE RECORD published Frank Lloyd Wright's essay "In the Cause of Architecture" in 1908, it gave extensive photographic coverage to the Larkin Building in Buffalo. But in the next issue it brazenly ran Russell Sturgis's tradition-grounded evaluation of the Larkin, which included the observation, "Few will fail to pronounce this monument . . . an extremely ugly building."

Herbert Croly's less esthetically detailed criticism called for balancing innovation with tradition. Architecture should symbolically express its purpose, Croly felt, and show a sense of "propriety," such as fitting in with the natural or urban surroundings.

While THE RECORD in its first two decades concentrated on East Coast Beaux-Arts-inspired work, articles such as one analyzing the structure of the Reliance Building by Burnham and Root and another presenting the Auditorium Building by Adler & Sullivan, showed a strong interest in the early Modernist architecture coming out of Chicago. THE RECORD's firm profiles usually focused on practitioners close to home, including Richard Morris Hunt, R. H. Robertson, and Henry J. Hardenbergh. We might well wonder w

When THE ARCHITECTURAL RECORD *debuted in 1891, it was quite unlike the current magazine. Or was it? A closer look reveals some unsuspected similarities, notes critic Suzanne Stephens.*

Frank Lloyd Wright and the Prairie School architects or Greene & Greene in California were not given more attention or at least published sooner. But one couldn't telephone Chicago before 1892 or California until 1915. And since railroad travel took so long, writers made the trip only every few years.

Judging from the sheer number of articles on European architecture, it would seem that when the magazine's writers did travel, they went in the other direction. THE RECORD examined the history of architecture in England, Germany, and France in a voluminous number of essays. This preoccupation with Europe reflected America's much-debated deference to European precedents, of course. But THE RECORD even ran general articles about Europe, such as "How a Rich Man May Live in Paris."

THE RECORD's pages often were given over to similar American-based sociological ruminations. One essay in the "Cross-Currents" section took smokers to task—not for health reasons, but because smoking demanded of its participants "something of an air."

THE RECORD today is more likely to deal with burning buildings than smoking cigars. The complexities of construction, including fire codes and handicapped-access laws, require more specialized coverage in the field. In 1891 THE RECORD worried whether or not the architect was in danger of losing his status as an artist by becoming too professional. Now it wonders if the architect is losing ground as a professional by not providing enough across-the-board services.

Today ARCHITECTURAL RECORD ("THE" was dropped from the title in 1937) reaches 75,000 subscribers in a country where there are an estimated 70,000 registered architects, and another 20,000 not registered. Under the present editorship of Stephen Kliment, and with the new graphic design by Massimo Vignelli introduced in the March 1991 issue, the differences in the two RECORDs are indeed striking.

Individual buildings, not historical articles, dominate the "feature fill." Other topics, such as news on design, practice, and products, and book reviews are contained in a section of yellow pages at the front of the book. In terms of coverage, RECORD continues its long-standing practice of publishing Building Types Studies, and devotes special issues to houses and to interiors. Now, however, the projects are literally all over the map—from Tokyo to Berlin to Barcelona. The names no longer refer to East Coast architects: Arata Isozaki, Santiago Calatrava, Aldo Rossi, and Antoine Predock are featured along with Venturi and Scott Brown. Lesser-known firms are published as well—a practice that continues from the early days. One will not find heavy doses of avant-garde design in today's RECORD—but then one did not find this kind of experimentation in the earlier one either. Kliment maintains that "the role of ARCHITECTURAL RECORD is to show the best of what is being done, but with a special tip of the hat to the stylistic mainstream."

The individual buildings thus function as microcosms for the discussion of the larger architectural issues of the day, and reflect the magazine's turn to social, environmental, functional, and technical considerations. Feature articles on buildings often have two, and sometimes three, levels of textual explanation: captions present the specific physical facts, and a staff-written text discusses the architect's intentions and the problems needed to be solved by the architectural design. Sometimes a third type of text, called "Viewpoint," and written by a contributor, evaluates the building's success in achieving its goals. When it works, this "layering" is tremendously insightful. Interestingly enough, the early RECORD often fostered debate by having writers and contributors disagree with one another in print. This spirited approach is one that could be revived to great advantage between the staff and its contributors.

While esthetics is still a criterion for evaluating architecture, the painstaking analysis of the proportions of a voussoir or the projection of an oriel of the 1890s doesn't seem as pertinent today. The writing style now is also more direct, more colloquial, less florid. But the criticism today is not usually as biting as the unsigned "Aberrations" or as feisty as the other commentaries from the past.

It is significant to note that in spite of the various changes in criteria for assessing a building or an urban complex, some have resurfaced. Today a building is still judged in terms of its relationship to the urban context or the appropriateness of the symbolic expression to its program. The spirit of Croly, Desmond, et al. lives on. Like Harry Desmond before him, editor Stephen Kliment seems keen on stirring up debate with his contentious editorials, particularly about the role of the profession or the architect's design responsibilities.

Indeed, it would seem that, either by design or by accident, much remains the same. All of this is to say that even as ARCHITECTURAL RECORD must cover increasingly complex subjects in more intensive ways, certain values and attitudes continue to be upheld by circumstance, intent, or maybe even "heredity." Like all the best celebrations, RECORD's centennial marks a good beginning, not an ending. ■

Suzanne Stephens is the editor of Oculus *and is a regular contributor to* The New York Times *and* Architectural Digest.

The Century Club

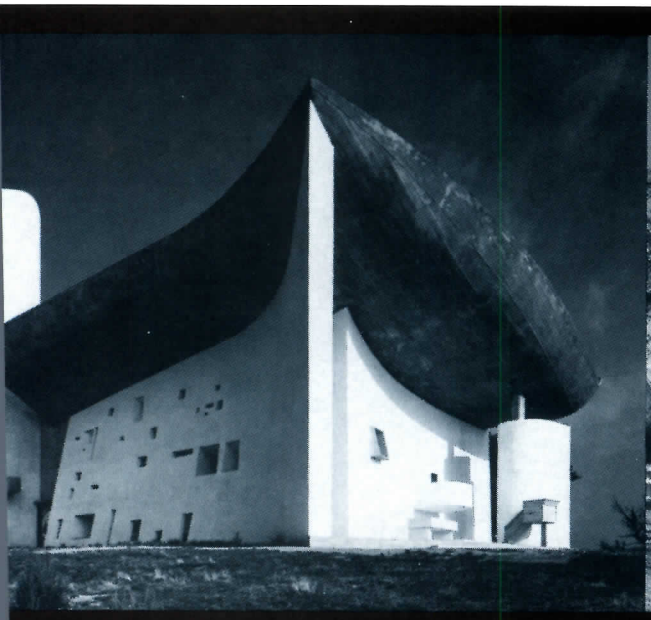
(1) *Fallingwater/Frank Lloyd Wright, ©Esto;* (2) *Villa Savoye/Le Corbusier, ©Esto;* (3) *Barcelona Pavilion/Ludwig Mies van der Rohe, ©Esto;* (4) *Chapel of Notre Dame-Ronchamp/Le Corbusier, ©Esto;* (5) *Kimbell Art Museum/Louis Kahn, ©Esto;* (6) *Robie House/Frank Lloyd Wright, ©Esto;* (14) *Unity Temple/Frank Lloyd Wright, ©Esto;* (15) *Bauhaus/Walter Gropius, ©Esto;* (17) *Dulles Airport/Eero Saarinen, ©Esto;* (19) *Salk Institute/Kahn, ©Esto;* (21) *Vanna Venturi House/Robert Venturi, ©Esto;* (21) *Empire State Building/Shreve, Lamb & Harmon, ©Esto;* (25) *Yale University Art & Architecture Building/Paul Rudolph, ©Esto;* (25) *Sagrada Familia/Antoni Gaudí, ©Esto;* (30) *Thorncrown Chapel/E. Fay Jones, ©Timothy Hursley.*

There is something about the number 100 that triggers an editorial instinct to assess accomplishments. In 1956, when the American Institute of Architects marked its centennial, ARCHITECTURAL RECORD polled 50 architects and scholars to determine the most significant works of architecture over the preceding 100 years.

And this year, to celebrate its own hundredth birthday, the magazine asked its readers the same question, requesting each to nominate 10 important buildings and to comment on them.

Thirty-five years ago, the top 15 works of architecture (excluding houses) were (in order): Wainwright Building (Louis Sullivan), Carson Pirie Scott Store (Sullivan), Rockefeller Center (Hood & Fouilhoux, ar others), Lever House (SOM), Trinity Chur (H. H. Richardson), PSFS Building (Howe Lescaze), General Motors Technical Cente (Saarinen & Saarinen), Lake Shore Drive Apartments (Mies van der Rohe), S. C. Jo son & Son Administration Building (Fran Lloyd Wright), Monadnock Block (Burnha & Root), Daily News Building (Howells & Hood), TVA Norris Dam and Power Hous (Roland Wank), Boston Public Library (M Kim, Mead & White), Stock Pavilion (Nowicki & Deitrick), and Christian Scien Church (Bernard Maybeck). The top five houses were: F. C. Robie (Wright), Fallingwater (Wright), Taliesin West (Wright), Henry Villard (McKim, Mead & White), and Watts Sherman (Richardson) One thing that strikes an observer of bo

Asked to select the most important buildings of the last 100 years, RECORD *readers chose many of the usual suspects and a few surprises. Shown here are the top 13 and some of the others in the top 100.*



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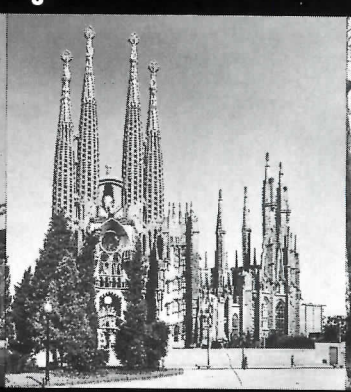

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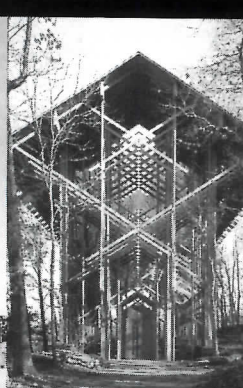


30

veys is the seriousness and consistency rchitects' judgments of architecture. At lance, one might think that the same ldings fill both lists—despite the fact that umber recognized on this year's list did exist 35 years ago. Conversely, some of buildings eligible earlier are now too old ualify under the 100-year deadline. Allen eman, of Washington, D. C., regrets t Richardson and Root died before the h of your magazine."

striking that year in, year out, Frank d Wright remains the pre-eminent erican architect in the eyes of his col- ues. In the present survey, Fallingwater dged out the Robie House *(6)* as ght's most esteemed work, but both es still outrank almost all other buildings. In fact, RECORD's readers think Fallingwater the most important building of the last 100 years. Michael Bobrow, of Los Angeles, calls the building simply "the standard for all residential design," while Stanley Tigerman of Chicago thinks, "It helped instill Modernism as a powerful movement." Balthazar Korab, architect-photographer, sees Fallingwater as "the last of 19th-century architecture, showing that [Wright] can meet the Moderns head-on."

Wright's Robie House draws the same high praise. "The Robie demolished the traditional box of domestic shelter," says New York photographer G. E. Kidder Smith. "American houses were never the same thereafter." Robert Miller of Washington, D. C., sees it as "both one of the earliest realizations of Modernist space and a new national (now international) house image."

Because architecture in general and RECORD in particular are more international now than ever before, this year's poll includes foreign as well as domestic architecture. As a result, Le Corbusier has found his proper place on the list of most important buildings. Like Wright, Corbu has two buildings ranked among the first six in importance: the Villa Savoye *(2)* and the chapel of Notre Dame de Ronchamp *(4)*. Kidder Smith forthrightly calls the Villa Savoye "the greatest house of the 20th century," but otherwise few of RECORD's respondents have a great deal to say about it—they just vote for it. And Ronchamp elicits similarly spare remarks: "The best church since Chartres," says

In this year's poll the top six works were all low-rise buildings, and high-rise projects were relegated to the second tier of importance. Thirty-five years ago, high-rise office buildings ranked at the top.

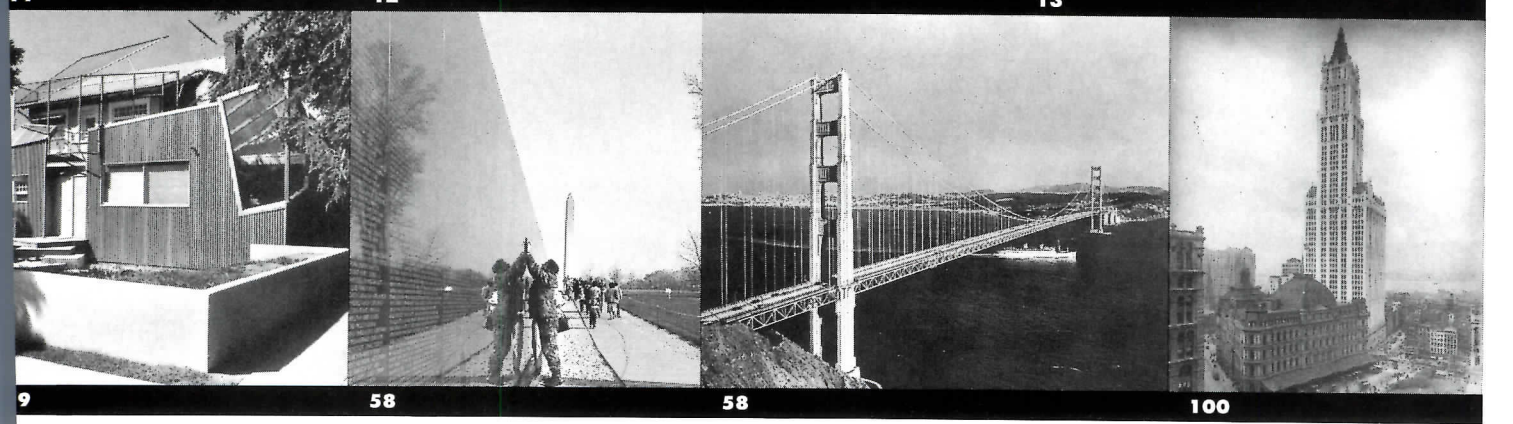
Reginald Cude of Washington, D. C., and "one of only one," states Bobrow.

Two other revered architects designed buildings ranked among the most important six: Mies van der Rohe for the Barcelona Pavilion *(3)* and Louis Kahn for the Kimbell Art Museum *(5)*. Mies's little building elicits perhaps the most eloquent encomiums—"The jewelbox of the International Style," says J. Irwin Miller, architectural patron of Columbus, Indiana, and "a Bauhaus chapel," according to Cude. Louis Kahn, the first post-World War II architect to reach this rarefied level of esteem, designed three buildings within the top 50 on our list—the Salk Institute *(19)* and the Richards Medical Lab *(41)*, in addition to the Kimbell. Referring to the Kimbell, Philip Freelon of Raleigh, North Carolina, declares, "I've traveled all over the world, and this is still my favorite building." About the Richards Medical Lab *(41)*, Bobrow's approval is the tersest possible: "!"

A major change reflected in the 1991 poll is the shifting perception of just which building types count as important. In 1956, at the start of a boom in office building, that building type produced five of the six leaders. (Of course, separating houses from the rest of the voting also skewed the list.) This year all six leaders are low-rise buildings (half of them houses), and high-rise buildings are relegated to the second tier of importance. Therein the old leader, Louis Sullivan's Wainwright Building *(11)*, fell 10 places in rank, even though Cude finds that it "gets better every year."

In 1991, the top choice in office buildings i Mies's Seagram Building *(7)*. One unsign ballot cites this as "the perfect office buil ing." The second most popular office building is William Van Alen's Chrysler Building—Art Deco may have been utte démodé 35 years ago, but its esthetic cre tials have been firmly re-established in recent years. In Irwin Miller's observati "It stands as perhaps the largest examp eccentric architecture ever built, but... of imitators doesn't reduce its importan RECORD's home base, Rockefeller Cente *(9)*, by Raymond Hood and many others, ceives just as many superlatives now as then—"the best," "the greatest," "still t one to beat"—although its ranking has

In 1956 Art Deco was utterly démodé, but today its esthetic credentials have been firmly re-established. So it is not surprising to see William Van Alen's Chrysler Building near the top of the list.



pped six places in 35 years. In a burst of ncy, Kidder Smith accuses "a conspiracy of yscrapers so fetching that they constitute e spontaneous center of New York City."

ver House *(10)* is seen by Bradford Per- ns of New York City as "the milestone odern office building," while Wright's S.C. nnson and Son Administration Building), says Tigerman, shows "the most spiri- l side of an aspiritual building type."

e only midrise building in the top tier is Pompidou Centre by Rogers & Piano). This is also the only example among the 13 buildings of high-tech architecture— f any of the other trends, like tmodernism or Deconstructivism, that e occupied our attention in the last few decades. Indeed, one suspects that these trends are still too fresh to produce the works of finished art that thoughtful architects regard as "important" architecture.

But some of the avant-garde has already entered the architects' hagiography. Witness, for instance, the house Robert Venturi designed for his mother *(21)*, about which Ron Bentley of New York City comments, "Postmodernism established on terms any true designer could love." Or witness Frank Gehry's own house in Santa Monica, California *(49)*, where Gisue Hariri of New York City admired the introduction of "inexpensive materials with an artistic expression."
Grace Anderson

(Complete list of best buildings on page 266)

(7) Seagram Bldg./Mies van der Rohe, Esto; (8) Chrysler Bldg./William Van Alen, ©Esto; (9) Rockefeller Center/Hood & Fouilhoux, ©Esto; (10) Lever House/SOM, ©Esto; (11) Wainwright Bldg./Louis Sullivan, ©Esto; (12) Pompidou Centre/Piano & Rogers, ©Richard Einzig; (13) S. C. Johnson & Son Bldg./Wright, ©Bettmann Archive; (41) Gateway Arch/Eero Saarinen, ©Stan Ries; (41) Portland Public Service Bldg./ Michael Graves, ©Esto; (41) AT&T Bldg./ Johnson-Burgee, ©Esto; (47) Crow Island School/Perkins & Will, ©Hedrich-Blessing; (49) Atheneum/Richard Meier, ©Esto; (49) Gehry House/Frank Gehry, ©Esto; (58) Vietnam Memorial/Maya Ying Lin, ©Esto; (58) Golden Gate Bridge/J. B. Strauss, ©Bettmann Archive; (100) Woolworth Bldg./Cass Gilbert, ©Bettmann Archive.

Record Album

Elisabeth Kendall Thompson *joined* ARCHITECTURAL RECORD *in 1937 as assistant editor, then became Western editor and senior editor. She retired in 1975, but remains active in the Bay Area AIA.*

Photographers were a great source. In New York, salesmen for news-photo agencies brought all sorts of things from all over the world. I remember some Chinese project—workers tamping an earthen project with their feet. Roger Sturtevant was a superb photographer on the West Coast, a wonderful source. He let the film present the architect's idea. When I first came out to be Western editor in January 1947, it was a

Grace Anderson, *currently an editor-at-large, started at* ARCHITECTURAL RECORD *in 1952 as a secretary and quickly became an editorial assistant. She later served as news editor and senior editor.*

John Knox Shear was editor-in-chief from 1954 to 1958, and he had more charm than anybody is supposed to have. The first thing he did was redesign the magazine. The second thing he did was insist that we get first-rate architecture. We had just been doing—whatever. John insisted that we were worthy of the Mieses of this world, and we started getting them immediately. It was a big change.

Herbert L. Smith, Jr., *the originator and first editor of* RECORD HOUSES, *began at* ARCHITECTURAL RECORD *in 1949. He was managing editor throughout the 1970s, and retired in 1990.*

Frank Lloyd Wright couldn't stand to be in the background. Sometime in the early '50s, Pier Luigi Nervi came to the U. S. to do a building, and we had a party for him downstairs. We'd invited Wright too because he said he'd like to meet Nervi. Nervi had been taken around earlier to see New York in a car we'd hired. The press asked him what his impressions were of the city. Nervi started to answer, and of course Wright couldn't

Blake Hughes *joined* ARCHITECTURAL RECORD *in 1951 as a promotion and research manager. After a stint as assistant publisher, he became publisher in 1968 and retired in 1979.*

It was a long haul, but I really had a great love for the magazine and still do. We had to fight like hell and it was a lot of fun. I was publisher for 12 years. During that period we won two National Magazine Awards, of which I was particularly proud. The first was in 1971, when we sort of cooked up a special issue with the French magazine *L'Architecture d'Aujourd'hui.* It was called "New Uses for Old Buildings." In

James M. Fitch *worked at* ARCHITECTURAL RECORD *from 1936 to 1942. He established the nation's first historic preservation department, at Columbia University, in 1964, and is now at Beyer Blinder Belle.*

There were three of us on the staff of RECORD at the time, trained as architects, who formed a kind of trio of radical theoreticians: myself, C. Theodore Larson and K. Lonberg-Holm. We must have caused a lot of trouble. We were constantly working to fill the pages of the RECORD with contempo rary architecture. It was not a terrible struggle. Kocher [A. Laurence, RECORD ed tor 1937-42] was himself a convinced Moder

Elisabeth Kendall Thompson
Grace M. Anderson
Herbert L. Smith Jr.
Blake Hughes
James M. Fitch

Four alumni and one longtime current editor tell Peter Slatin about their days at ARCHITECTURAL RECORD. *They recall Philip Johnson and the pyramid, and Frank Lloyd Wright and the broom closet.*

world apart, a new way of living, and the buildings were a primer for such a life. There wasn't a sense of dog-eat-dog, but of great freedom. To scout buildings we traveled by train, carefully planning each trip, getting on and off the train—Missoula, Yakima, Spokane, Boise. Discovery trips. You could find small gems and meet young architects. Many of them felt submerged in conventionalities and wanted to try new things, so they had to find the people with the wealth. One architect said, "But now I'm running out of relatives." It was exciting to find something that made a bit of a dent in the wall of conventional thinking. ■

Let me tell you about Emerson Goble [RECORD editor, 1958-67] and Philip Johnson. I'm used to see the world of architecture leaders as a pyramid. You go down halfway, and you draw a line across, and you've got something like seven-eighths of the volume below that line. Above that, he'd draw a stripe—actually draw it in perspective, on a blackboard (he was an electrical engineer)—and say, "Then you care about this little stripe, the very good architects." And at the very top there was a little bitty spot. That was Philip Johnson. This was in 1953. Philip Johnson barely had a license. Em thought Philip was, in his words, "precious." ■

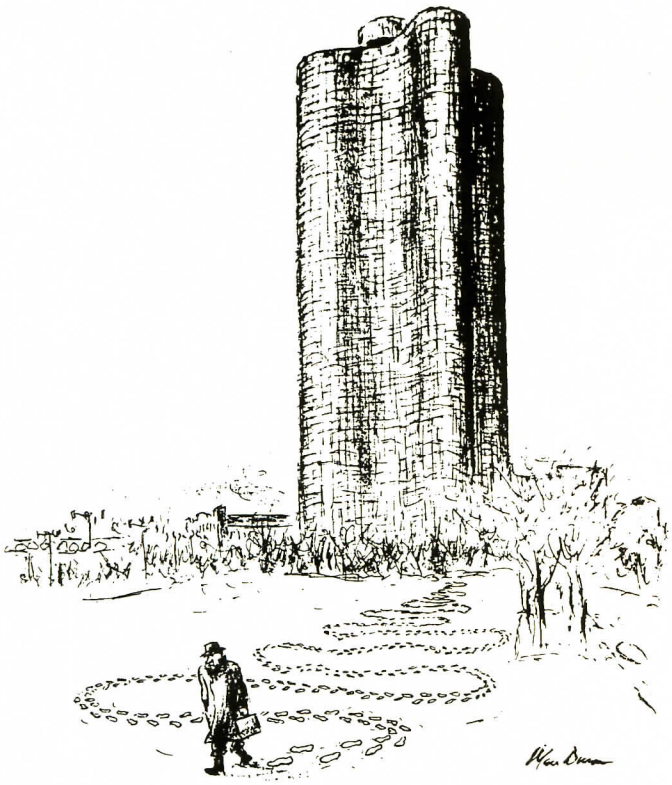
stand that, and so Wright moved in and said, "Oh, the trouble with New York is it's like this," and he described cubes and boxes, and then he said, "it should be like this," and he did the swirls of the Guggenheim Museum. And with that he threw his scarf around his neck, popped his hat on, and walked into the first door outside the room. Jeanne Davern, our news editor, had sort of snooped around earlier, and she realized that Wright had disappeared into a broom closet. So she quietly closed the double doors to the suite we were in, extricated Wright, put him on an elevator, and sent him home. I don't know how long he would have stayed there. ■

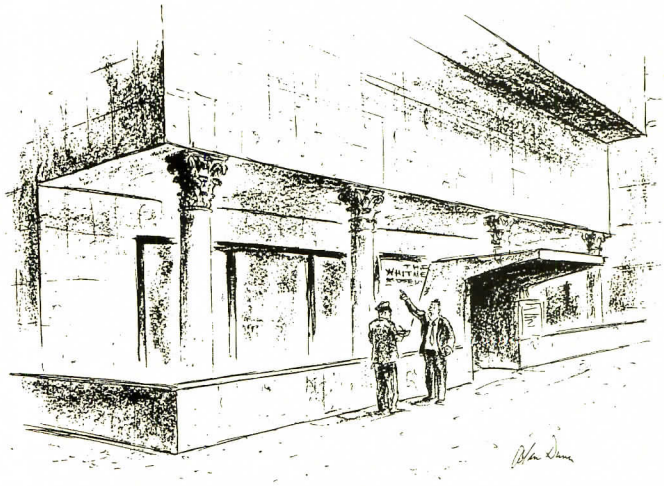
1976 we ran the results of an International Architectural Federation competition—we formed a nonprofit corporation to raise money—for the urban environment of developing countries. We selected the Vancouver Habitat. Part of the idea was to make architects more aware of what it takes to design habitats in developing countries. Another thing we did was get into book publishing. I wanted as many people as possible to know about RECORD. We even put out a cookbook—*The Architectural Cookbook.* Leading architects from all over the country sent in their favorite recipes. It was a joke, but it sold a lot of copies. ■

architect. Of course we were all militant modernists of the Bauhaus school—we didn't call ourselves Modernists, but Modern. "Modernist" was a term of opprobrium those days, because of "Moderne"—those were scare words. We thought the Chrysler Building was just dreadful. You see I'm older now, and from a curatorial point of view of course it's an important part of the national collection of architecture. But personally I don't think very much of it. I think a lot of other buildings are more impressive. But my involvement in historic preservation during the last 20 years has shifted my whole perspective to that of a curator. ■

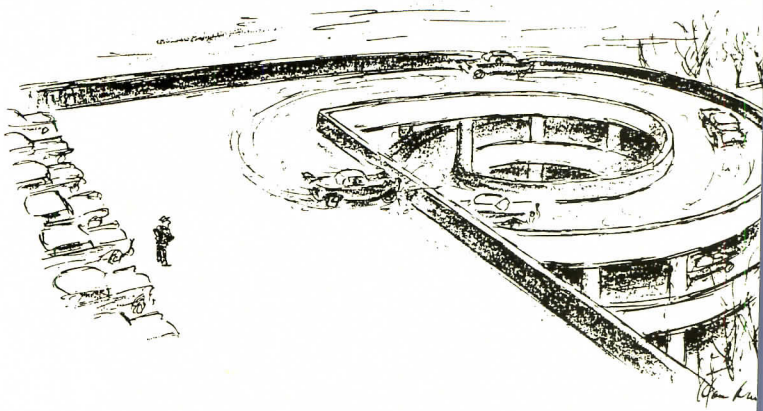
Just Kidding

©Alan Dunn

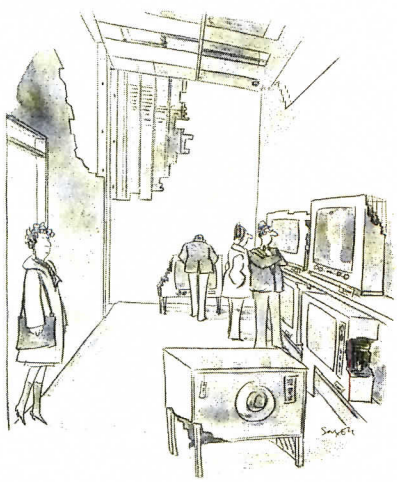




"It happened during the night—pure vandalism, I think!"

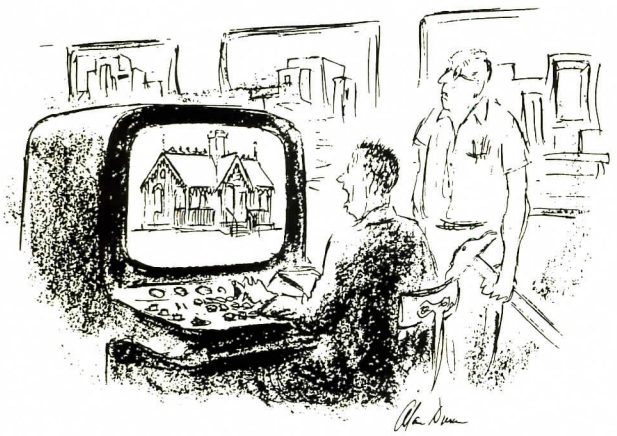


©Charles D. Saxon

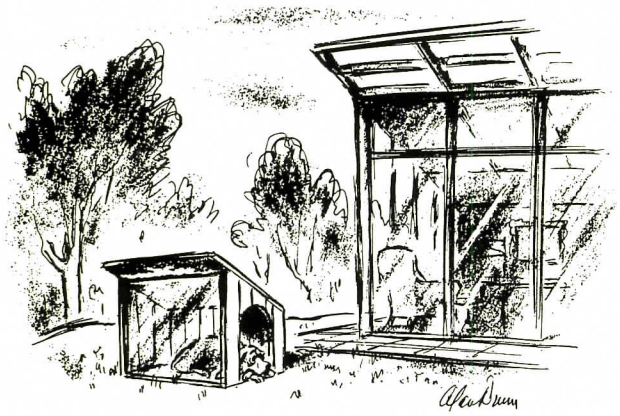


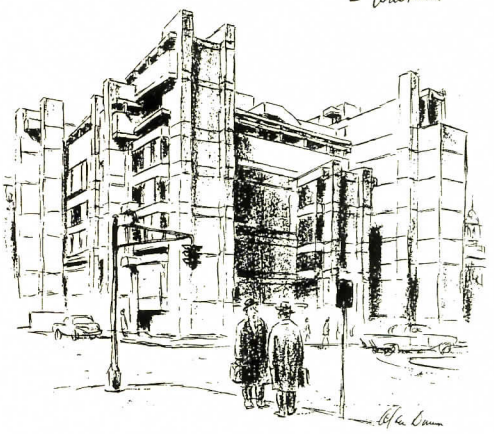
"Does it come à la carte?"

Since 1936 RECORD *has featured cartoons by a trio of artists whose wit has kept architects on guard and in stitches. The work of our latest cartoonist, Sidney Harris, can be found in the Books section.*



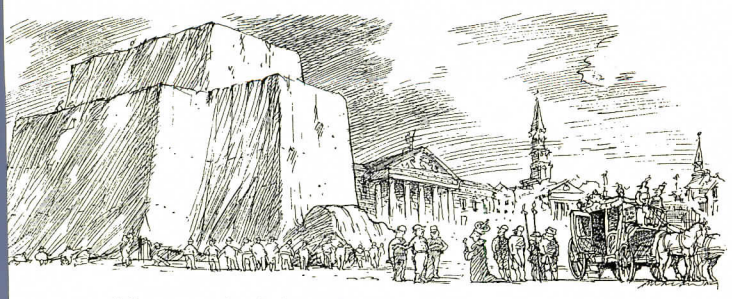
"Of course I fed it the right data—Call IBM and hurry!"



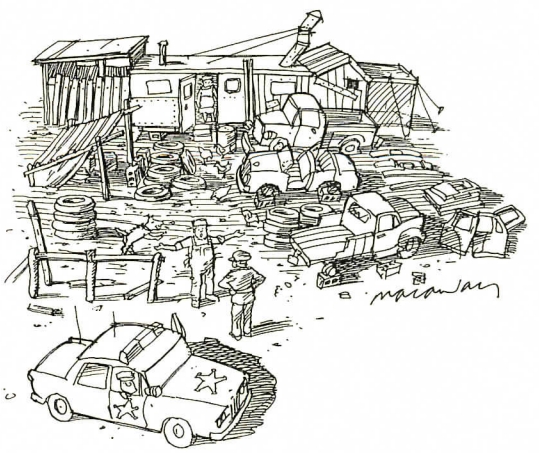


"I don't know how to break it to Paul, but my mother saw it and she loves every little nook and cranny."

David Macaulay



"Come again, Prince. Building? What building? Do you see a building, Eddie?"



"Whaddya mean a public menace? Don't you know Deconstructivism when you see it?"

From High Rise to Low-E

Reflecting both the times and the perspectives of various editors, the coverage of technology in ARCHITECTURAL RECORD has waxed and waned. In the early decades, building materials and engineering were discussed almost as architectural history in the scholarly articles of Montgomery Schuyler and Russell Sturgis. In certain periods technology clearly played second fiddle to design; in others (particularly the 1930s, '40s, and '70s), the magazine reflected the preoccupation with technique of many practitioners.

RECORD articles have covered innovations in structural engineering from presentation of the skeleton frame as an engineering triumph in the 1890s to the graceful, winged buildings of Eero Saarinen in the 1950s and '60s; from the flamboyance of Santiago Calatrava to the zealous efficiency of Leslie Robertson's composite structure for the Bank of China in the 1980s. The magazine has documented mechanical engineering trends that range from the evolution of elevator technology to improvements in lighting, air conditioning, and energy conservation. As newer materials superseded older ones, each received a place in the magazine. At various times coverage has focused on iron, steel, concrete, fireproof construction, aluminum, plywood, glass and glazing, and fabric. RECORD codified practices as they became accepted in "Time-Saver Standards," which was once a regular department in the magazine and now an often-revised book. Throughout, RECORD has given a voice to the visionary, if not always prescient, spirit that accompanies architectural and technological innovation.

The 1890s

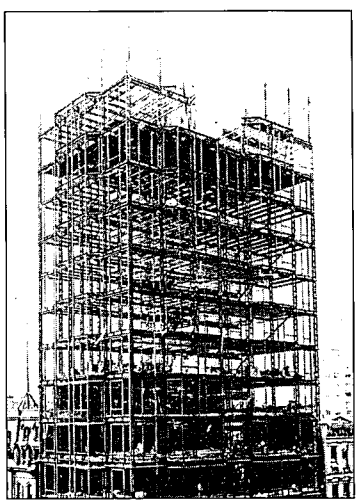
"... there is simply no limit to the height that a building can be safely erected. This result has been reached mainly through three inventions, all of which are distinctively American: 1. The modern passage elevator; 2. The flat-arch system for fire-proof floors; and 3. The skeleton construction."—William J. Fryer, October-December 1891

"New opportunities are opening up for architects to display their skill in treating problems of height, such as their professional brethren of a few decades ago never dreamed."—William J. Fryer July-December 1892

Though Fryer treats his high-rise innovations equally, the development of the skeleton frame came to overshadow all others. In its first coverage of tall buildings, RECORD used the Astor Hotel in New York City (which would rise to the lofty height of 17 stories) and the Sun newspaper building (to be 28 stories) as examples. Until then, the tallest buildings in New York or Chicago seldom exceeded 8 to 10 stories.

At first, cast iron was used to free masonry of its load-bearing function. Relatively small plates of rolled iron were riveted together to make built-up girders and arches for the old Metropolitan Opera House, which also claimed to be the world's first "fireproof" theater (1883). Only slightly later, cold-rolled steel became the standard for construction. In "Some Practical Limiting Conditions in the Design of the Modern Office Building," George Hill in 1893 outlined such now-familiar maxims as the provision of adequate light and building services (ventilation, toilets), "a pleasing environment," and urged the architect to design for ease of rearrangement and maximum rentable area at minimum cost consistent with maintaining "true economy."

Though much of what was later called the Chicago School predated RECORD's earliest issue, the magazine examined D. H. Burnham and Company's Reliance Building in Chicago, erected in 1894-95, in great detail. The two-way bracing of its steel frame was described, with



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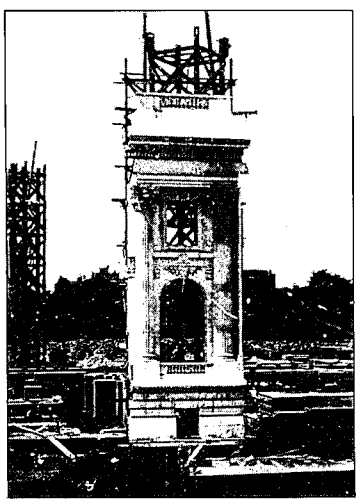

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The Reliance Building (1), *Chicago; D. H. Burnham & Co., Architect (January-March 1895). The New York Public Library* (2); *Carrère & Hastings, Architects (November 1902).*

Gretchen Bank traces ARCHITECTURAL RECORD's *century of covering technology, noting architects' tendencies to take building systems for granted or to express them as the essence of design.*

pandrel girders for portal bracing and two-story columns to enance rigidity of the vertical members. Other significant buildings f the same period published in RECORD include Adler and Sullivan's Wainwright Building in St. Louis (1890-91), and their Guaranty Building in Buffalo (1894-95).

900 to 1920

The many practical advantages of concrete and the increasing carcity of lumber assure it a prominent place in the architecure of the future."—H. Toler Booraem, September 1908

n the early years of the new century, RECORD organized its conruction-related pieces into a "Technical Department," and linked hem in any given issue to the work of one architectural or engineerg firm or to one building type. Innovative designers continued to cus on tall buildings. RECORD covered the first reinforced-concrete yscraper, the 1904 Ingalls Building in Cincinnati, an otherwise unemorable 15-story building designed by Elzner & Anderson.

rnest Flagg's Singer Building was the first tall building set on a neumatic caisson foundation (1908), a scheme based on the concept an air lock and suitable to the greater weights of taller buildings. rra-cotta, which might be called the high-tech material of the pe-od, received extensive attention. The elaborate use of white terratta in Cass Gilbert's neo-Gothic Woolworth Building (completed in 13 and for 16 years the tallest building in the world) was captured a portfolio of highly atmospheric photos *(3)*.

this period, progressive technology was used in the service of traional-looking architecture. The erection of a single bay of the New rk Public Library at Fifth Avenue and 42nd Street in 1902 showed curtain-wall technique in the service of Carrère and Hastings' Beaux Arts vision *(2)*. Willis Polk's Hallidie Building in San Francisco, which anticipated the sheer glass and metal walls of the Modern era, was completed in 1918 but not shown in the magazine until 1931.

Other technical issues covered in those decades included the preservation of building materials, the invention of the revolving door (1904), the properties of paints, lighting and ventilation, and the question of building-height limitations.

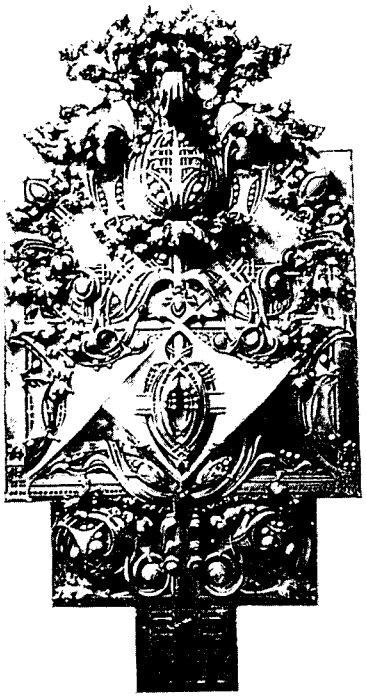
The 1920s

"The Modernist movement in European architecture has already clearly indicated its ultimate objective, and is employing familiar structural systems with an architectonic significance that is foreign to their traditional import in historic modes."—Leon V. Solon, September 1926

The Wrigley Building in Chicago (1921), American Radiator (1924), Standard Oil (1926), and New York Telephone (1926), in New York, were typical of their time. Though technically sophisticated, they lacked the structural "honesty" of late 19th-century Chicago commercial structures that (mostly European) historians would later evaluate so glowingly. The tall-building craze peaked in all-too-American fashion in the secret designs for a 185-ft spire to crown William Van Alen's Chrysler Building in New York. Just after completion of rival 40 Wall Street, the Chrysler spire was lifted through a fire tower using a 20-ton derrick and riveted into place. The 90-minute operation assured the structure world's-tallest status until overtaken a few months later by the Empire State Building.

On a smaller scale were the residential experiments by California transplants Richard Neutra, R. M. Schindler, and William Wurster.

Tebbs-Hymans



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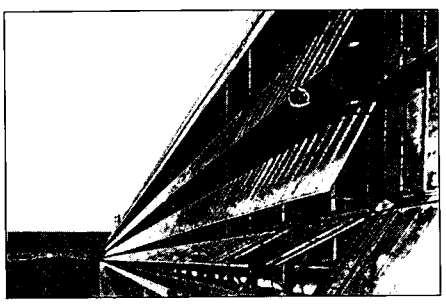

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Detail of the Woolworth Building (3), *New York; Cass Gilbert, Architect (February 1913). Terra-cotta model of decoration by Louis Sullivan* (4) *(April 1925). Detail of light monitor* (5) *from Ford Motor Company Plant, Detroit, Michigan; Albert Kahn Co., Inc., Architect (October 1930).*

It was in the 1930s that air conditioning first became viable. In 1932 and 1934 RECORD *began the process of explaining this technology, which would transform building construction.*

Houses by Neutra and Schindler featured waterproofed plywood with collapsible glass partitions and glass walls framed in light steel and supported on cantilevers, respectively. During the 1920s, RECORD continued to cover new materials and methods, such as ferroconcrete (1927), and the textile-block slab construction method used by Frank Lloyd Wright in the Millard House in Pasadena in 1923 and in Midway Gardens in Chicago.

Though finished in the early '30s, the powerful forms of such great bridges as the Golden Gate, the San Francisco-Oakland Bay Bridge, and the George Washington Bridge were actually designed in the 1920s. They found their way into the magazine through the kinds of dramatic abstract photography favored in the period.

The 1930s

"As a new science and industry, air conditioning is contributing much to the health, comfort, enjoyment, and longevity of humanity.—C. Theodore Larson, September 1932

Though the Great Depression took a tremendous toll on the construction industry in general and architects in particular, it also had a long-term impact on the way architects worked. For the first time government would play a significant role in construction, and architects participated in the design of the vast new infrastructure completed under the New Deal. In 1933, the construction industry submitted to the federal government a public works program of more than 2,700 projects including roads, bridges, water works, sanitation facilities, housing, hospitals, and schools. During the decade, many of these projects were actually built.

On other fronts, Albert Kahn's innovative work for auto companies and other concerns was structurally adventurous, made ready use of daylighting, and gave industry a forward-looking image *(7, 8)*. Frank Lloyd Wright also employed daylighting—using Pyrex tubing intended for chemistry—in his designs both for the Administration Building (late 1930s) and the Laboratory Tower of the S. C. Johnson and Son complex completed in 1946. Neutra experimented with a prefabricated unit that combined plumbing for the bathroom and kitchen. Meanwhile, Buckminster Fuller was busy developing a simplified one- or two-piece copper bathroom; he is better known, though, for his Dymaxion Transport Unit, a three-wheeled vehicle aerodynamically designed to achieve 40 miles to the gallon.

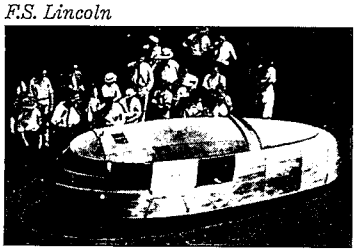
It was in this decade that air conditioning first became viable. In 1932 and 1934 RECORD began the process of explaining this new technology, which would transform building construction. Many other products and materials emerged during the '30s, notably aluminum, which lent itself to glazing applications, foil insulation, and lighting. One of the era's most noted photographers, Margaret Bourke-White, captured the technological idealism of the decade in a photographic series for RECORD in 1934 that focused on various elements of a fully industrialized society.

The 1940s

"Building as usual has gone by the board. . . . [Architects, engineers, builders, and manufacturers must] accept the challenge . . . their technical ingenuity suddenly created by growing scarcities of materials."—The Editors, January 1942

Although America was not yet fighting in November 1941, RECORD declared war anyway. In so doing, the editors tried to predict the difficulties that lay ahead (". . . the time for lip service is past. Materials critical to military and naval success MUST be conserved in building"). In the years following, much of the work covered in the

F.S. Lincoln



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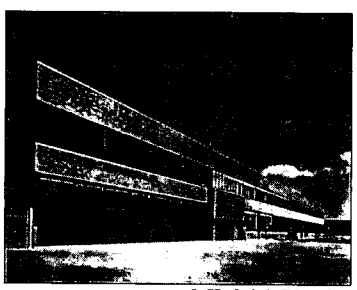

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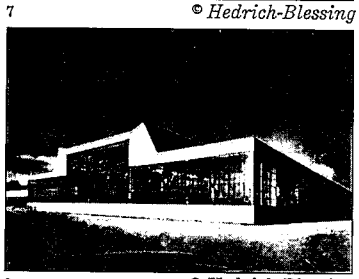

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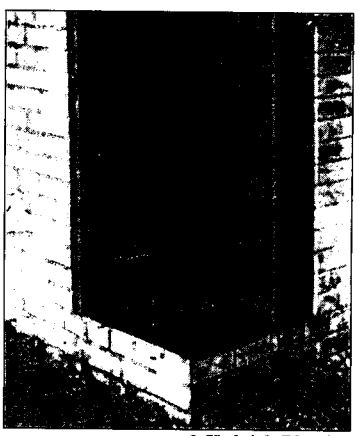


9 © *Hedrich-Blessing*

Dymaxion Transport Unit (6 *Buckminster Fuller, Designe (August 1933). Export Buildi* (7, 8), *Dodge Truck Plant, Wa ren, Michigan; Albert Kahn Co., Inc., Architect (June 193 Detail, Alumni Memorial H* (9), *Illinois Institute of Technology, Chicago; Ludwi Mies van der Rohe, Architec (September 1947).*

magazine focused on the war and related conservation efforts. The magazine itself went to a smaller format in July 1943. Though many categories of building languished, many '40s innovations were simply trends of the previous decade that were rapidly advanced by wartime. Driven by war-production needs, architects turned to the design of affordable and easy-to-produce housing (see, for example, Arthur Holden profile, pages 174-175). "Systems of prefabricating the shells of buildings—the enclosing walls, roofs, and floors—have been devised by ingenious architects and engineers endeavoring to produce buildings by mass-production methods, thereby saving time, material and labor."—September 1943.

With the Turner Construction Company, Albert Kahn developed a type of reinforced-concrete construction for factory design that allowed longer spans. Thus, fewer columns interrupted the assembly-line space. Also during this period, George Fred Keck designed one of the earliest solar houses in Illinois.

The political dislocations in Europe in the 1930s and war in the 1940s brought distinguished practitioners to our shores. These émigrés' first American works were realized during this decade. Mies van der Rohe, as director of architecture at Chicago's Illinois Institute of Technology, designed the school's new campus. Philip Johnson wrote about the earliest buildings in 1947 including the Minerals and Metals Research Building (1943), Library and Administration Building (1944), and Alumni Memorial Hall (1945-46). All were based on the same unit of construction, a cubic bay 24 by 24 by 12 feet, and relied on structure and materials for esthetic effect. Meanwhile, Walter Gropius and Konrad Wachsmann developed a "Packaged Building System" that was prefabricated, fully demountable, and modular. The system lent itself to barracks, hospitals, and other temporary buildings.

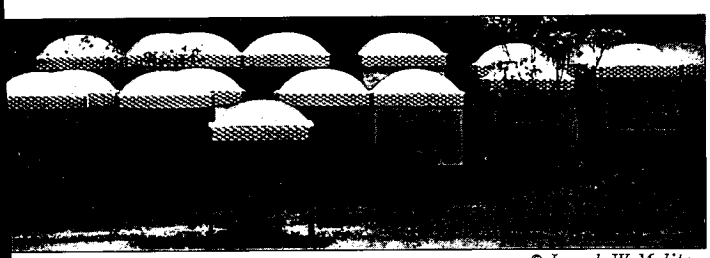
The 1950s

"George Nelson's aluminum house shows for the first time positively the advantages possible to residential building through the full use of technology and prefabrication."—Minoru Yamasaki, December 1957

The single-family house, emblem of the postwar boom in construction, was the subject of intense research and invention. In the above quote, Yamasaki refers to George Nelson's 1957 Experimental House which was based on a 12- by 12-foot aluminum and glass component *(10)*. Units could be grouped in a variety of ways, and could be set on either columns or slab-on-grade, and so were adaptable to a variety of site conditions.

While Levittown exemplified a new level of traditional-looking, yet highly standardized construction, other subdivision architects—for example Anshen & Allen—used readily available materials efficiently by employing open planning. In linking indoors and out, their unabashed Modernism responded to the Californian climate and a more recreation-oriented lifestyle. Early issues of RECORD HOUSES (begun in 1956) often focused on technical innovations in modest houses designed by young architects. The first issue, for example, featured houses that used cantilevered trusses, arched vaults made of plywood, and bubble-shaped roofs of thin-shell concrete.

While RECORD gave wide coverage to such trends as housing and materials development, it continued to report on major breakthroughs in architectural design. It marveled over the exterior window-washing devices at Lever House, designed by Skidmore, Owings & Merrill (1950-52), but also noted problems with the curtain wall at the United Nations in 1952. Signature details by Mies for the Seagram Building were described by Arthur Drexler in 1958. The



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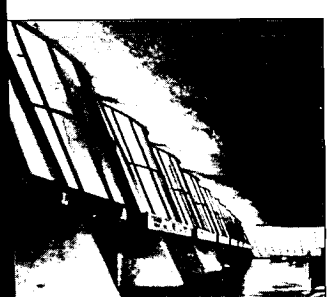

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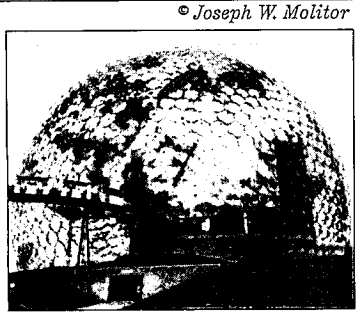

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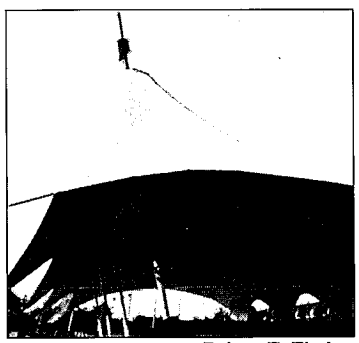


13 *Robert E. Fischer*

Experimental House (10); *George Nelson, Architect (December 1957). Dulles International Airport* (11), *Chantilly, Virginia; Eero Saarinen, Architect (July 1963). U. S. Pavilion* (12), *Expo '67, Montreal; R. Buckminster Fuller, Architect (mid-August 1980). Bicentennial pavilion* (13), *Philadelphia; Geiger Berger Associates, Engineers (mid-August 1976).*

"structure-formed design" for Hugh Stubbins's Berlin Congress Hall presaged the soaring forms of Eero Saarinen's work, so much of which would be seen in the 1960s.

The 1960s

"Dulles is unique because it is the first airport really to be planned from the start for the jet airplane."—Eero Saarinen, July 1963

Airports suited to the jet airplane were the building type of the 1960s and air conditioning was the technology of the decade. Extensive coverage of Idlewild Airport (now Kennedy) explained the planning for automobiles and airplanes, baggage handling, and lighting. Saarinen's Dulles Airport, published in 1963, remains among the decade's most memorable structures *(11)*. Articles with titles like "The Case for Controlled Environment" promoted wider use of air conditioning in schools and hospitals.

The 1960s were also the decade of flexible space and modular planning, concepts reflected in schemes for pre-engineered subsystems for the integration of structure, lighting, and hvac. Most prominent was the School Construction Systems Development (SCSD) project for 14 California school districts championed by Ezra D. Ehrenkrantz. The technological idealism of the decade was perfectly suited to the architecture of world's fairs, which took place in Seattle, New York, and Montreal, and which were rife with tree-form fan vaults, bubble domes, and space frames. These complex structures needed roofs, and they drove the development of early single-ply systems of Hypalon synthetic rubber and polyisobutylene.

Concrete—cast-in-place, precast, and prestressed—came of age in the 1960s. It was used in buildings ranging from garages to banks, and was seen in detailed examinations of the work of Minoru Yamasaki, Marcel Breuer, and the last works of Walter Gropius.

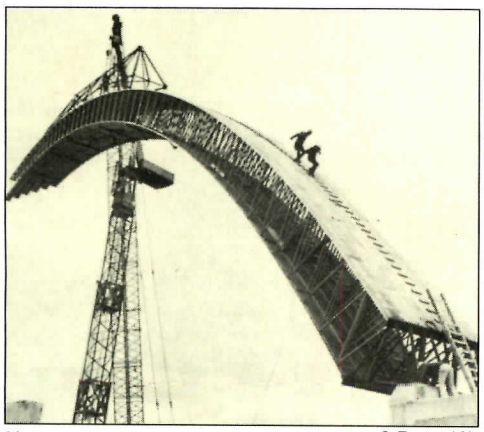
Stories on the use of computers first began to appear in the 1960s. An analysis of wind loads on SOM's Beineke Library at Yale and Saarinen's CBS Building in New York was shown in 1963. The same year the Chicago office of Skidmore, Owings & Merrill installed a computer. In 1964, RECORD headlined a story: "The Computer Center: New Building Type?"

The 1970s

"There is just no doubt that we have the cost-effective technology to reduce energy consumption in both new and existing buildings by a third, or maybe even a half."—Walter Wagner, mid-August 1975

The oil embargo of January 1973 changed forever the way Americans thought about their buildings, their automobiles, and their daily lives, and RECORD quickly oriented its technical focus to developments associated with energy-conscious design. The magazine published designs for solar houses, outlined the State of California's energy-efficient building program, and described data bases of pertinent information developed by the office of Ezra D. Ehrenkrantz and Associates and Donald Watson.

Buildings were becoming more complex, and in 1973 the magazine began a special mid-August issue called "Engineering for Architecture," developed by senior editor Robert E. Fischer. The issue showed that architects remained concerned with technology and its expression in buildings. Features focused on the field of space-frame design, the cable-stayed, tentlike fabric structures of Geiger Berger Associates, and engineer William LeMessurier's structurally inven



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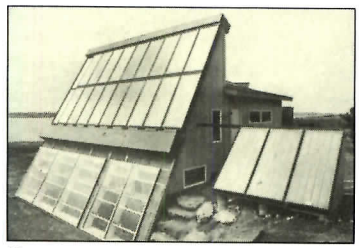

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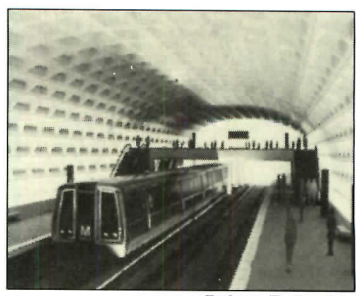


16 *Robert E. Fischer*

Stadium Roof Truss (14), *University of Idaho, Moscow; KKBNA Engineers and Clin Smull, Hamill and Associate Architects (mid-August 1975). Solar House* (15), *Little Comp ton, Rhode Island; Travis Pr Architect (mid-August 1976). Metro Station* (16), *Washington, D. C.; Harry Weese & Associates, Architects (mid-August 1978).*

Beginning in 1973, a special mid-August issue, called "Engineering for Architecture," recognized that architects remained concerned with technological advancement and its expression in buildings.

ive Citicorp Center in New York (Hugh Stubbins, architect—1976). he decade saw the highest level of government patronage of build- ng research in Operation Breakthrough, an effort to increase roduction of housing through in-factory processes. But the pro- ram's widely publicized difficulties presaged the low level of overnment research sponsorship that prevails today.

nspired by the SCSD projects of the 1960s, European architects de- ised new ways to express the increasingly important mechanical ystems in the astonishing Centre Pompidou, in Paris, by Piano and ogers (1977) and Norman Foster's Sainsbury Center Museum at he University of East Anglia (1979).

ECORD also turned to architectural applications of computer tech- ology—still an embryonic field such a short time ago. Computer raphics as a daylighting tool was highlighted in 1978. By 1980, idmore, Owings & Merrill was using computers for presentations, ructural analysis, and coordination of consultants' work.

he 1980s

Clients are the angels of invention."—Charles Thomsen, ugust 1986

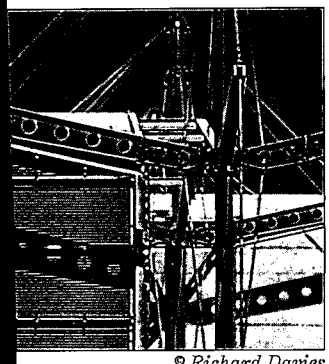
ichael Graves's Public Service Building, in Portland, Oregon, set e tone for a decade that saw both a renewed interest in history and e greatest commercial real-estate boom in the United States. De- lopers learned that architecture helps rent buildings, and chitects such as Kohn Pedersen Fox, Cesar Pelli, Helmut Jahn, d Philip Johnson enriched the minimalist material palette of the s, driving the development of new technologies for the use of thin ne, reflective glazing and gasketing products, and new systems mounting curtain-wall panels. Richard Rogers's Lloyd's of London, a high-tech reinterpretation of the traditional bourse, demonstrated everything from external "plug-in" service modules to high-tech workstations.

Nearly invisible for decades, the historic preservation movement came into its own in the '80s, driven by public interest and tax cred- its. Historic-preservation research burgeoned, and new materials and techniques were rapidly developed to substitute for irreplace- able or failed original materials. Organizations like the Association for Preservation Technology and the International Council on Monu- ments and Sites sponsored research on historic materials such as paint, masonry, and roofing. One of the biggest preservation stories was restoration of the Woolworth Building in 1981. Later the Statue of Liberty was rescued. The decade ended with reopening of the long-neglected Ellis Island National Monument.

During much of the decade, technology was hidden behind Postmodern facades. Santiago Calatrava's work in Europe in the mid-1980s presaged a renewed interest in a less boxy and more fluid form of Modernism. I. M. Pei used components developed for yacht- racing in the flush-glazed pyramid of the Louvre. James Carpenter made artistic use of improved glass-coating technologies in exam- ples of architectural art.

Computer-aided design and drafting (CADD) entered the vocabulary of most architectural and engineering professionals. As computers have shrunk in size and price and become more powerful, they are making profound changes in all aspects of practice. The effects of these changes on the way buildings are designed and built are the stories of the next decade. ■

Gretchen G. Bank is a freelance writer based in New York City.



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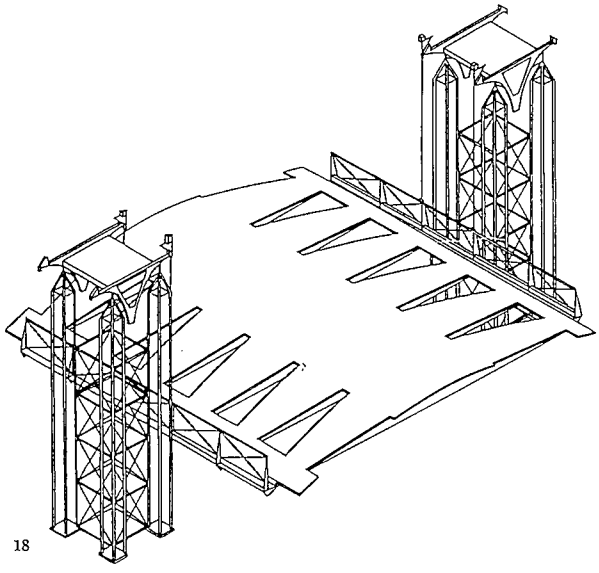

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Renault Parts Distribution Center (17), *Swindon, England; Foster Associates, Architect (August 1985). Roof section for Zupa Exposition Hall* (18), *Zurich; Santiago Calatrava, Architect (August 1986). Miglin-Beitler Tower* (19), *Chicago; Cesar Pelli & Associates, Architects, HKS Inc., Associated Architects (October 1990).*

1891/1909 Imperial Style

There seem to be seismic fault lines in history where the texture and scale of human events change abruptly. Sometimes these breaks are marked by obvious events such as political revolutions or natural catastrophes, but they often grow from forces that remain unseen by the people they affect. This type of hidden upheaval occurred in America in the years between 1891 and 1909.

In terms of classical history, the period resembled the transition from the Roman Republic to the Empire. But there were no outward signs of a change, nor was there a new vocabulary to describe it. No Rubicon had been crossed, no Augustus had been crowned. The Presidency had passed from Cleveland to McKinley to Roosevelt with only one more-or-less-routine assassination.

The economy, however, was undergoing profound change. The family-based, agrarian society for which our political and cultural institutions had been designed was being supplanted by a continental, and in some cases, a world system of commerce and industry controlled from large cities. In the process, the small entrepreneurs who had been the leading citizens of the 19th century were being displaced by an emerging class of corporate manipulators. Capitalism was undergoing a quantum leap in the scale of its operations.

American businessmen of the early 19th century had grown up on farms and had built their businesses in stages. They understood the system that supported them. In contrast, the new breed of speculators saw the national economy as a vast game of chance, whose rules, if they existed at all, were hidden below the surface.

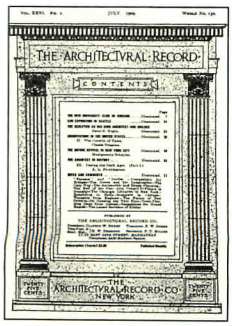
America grows up

By the end of the century, Western expansion had ended, and our national energies were redirected toward the larger world. We had a "splendid little war" with Spain, acted as mediator between Japan and Russia, and subverted the government of Hawaii in the interest of fruit growers. America was growing up. Fraud was in the air. It was an age that bred rascals such as Jay Gould, P. T. Barnum, and William Randolph Hearst. But it also produced heroes like Jane Addams, Clarence Darrow, Eugene Debs, Peter Altgelt, William Jennings Bryan, Thorsten Veblen, and Upton Sinclair. There were also some interesting architects at work.

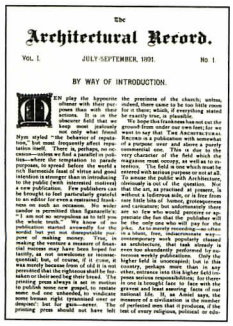
The earliest issues of THE ARCHITECTURAL RECORD say little about the state of the nation, but much about the need for a national architecture. Similar sentiments no doubt were expressed in Florence before Brunelleschi. In an 1891 RECORD essay called "The Battle of the Styles," A. D. F. Hamlin states that "the decorative and architectural forms in which the conceptions of modern architecture are expressed are the weakest side of its development." This statement is revealing. In recognizing an emerging "modern architecture" behind the eclectic range of facades, Hamlin was separating function from form. A belief in this dichotomy was characteristic of the changing times.

The assumed separation between art and technology and between culture and commerce permitted privileged and well-educated men like Henry Adams and Henry James to live within a brutal, laissez-faire industrial system without making an effort to moderate its excesses. America in the so-called "Gilded Age" was preoccupied with business. But business was assumed to be outside the cultural and moral universe.

Inside that universe, the full spectrum of European historical style was available for churches, court houses, libraries, large residences and any other building type that could be fitted behind a horizontal facade. The possibilities listed by Hamlin were "Romanesque, Byzantine, Gothic, Cinque Cento, and Louis Quinze" with a caution



July 1891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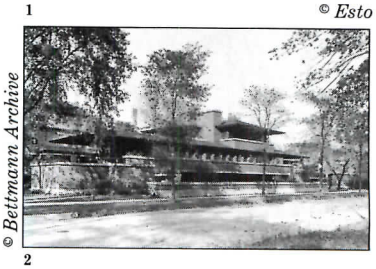

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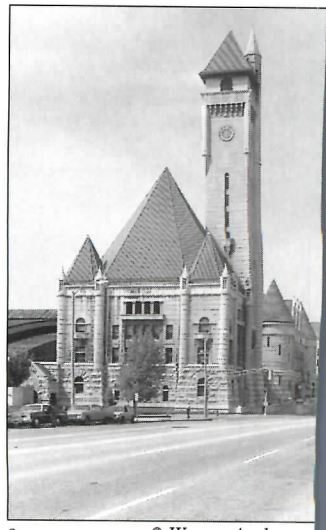

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Chicago architect Jack Hartray chronicles the skyscraper's coming of age and the beginnings of Modernism amidst the greed and style wars of a burgeoning American empire.

gainst disregarding the wise limits of scale in the use of the Roman rders, which could lead to the "Jesuit and Roccoco styles."

amlin's eclectic litany of decorative styles made no mention of rank Lloyd Wright and the Prairie School. Such a home-grown ovement was not considered suitable for connoisseurs of the time. his recent book on Wright, Joseph Connors provides a profile of e architect's early clients as managers of small and medium-sized mpanies, technically trained, mobile, middle-class, and Republican. ey and their suffragette wives practiced liberal religions like Uni-rianism and Christian Science, and had a serious interest in music. better circles, they were probably thought of as *nouveau riche*; t Wright characterized them as "businessmen with unspoiled in-ncts and untainted ideals."

generation earlier, H. H. Richardson's clients probably had similar stes. Their profile might have included a few Episcopalians and me of the scholarly minority among Ivy League graduates, but e Richardsonian style was as unsuited as Wright's to the preten-ns of the emerging upper class. Although Richardson died in 86, the early issues of RECORD show that his influence remained ong into the early '90s. The style he invented had little to do with European origins. In plan, scale, and form, it was a modern erican development. Richardsonian decoration was integral to structural fabric of his buildings. What was built was what you w. This earthy integrity was inappropriate for expressing limitless alth and power. The Glessner House was too solid to be tentious.

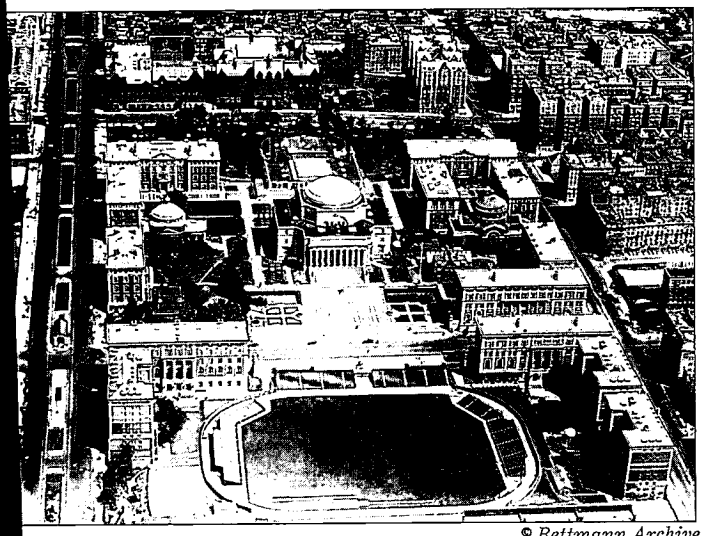
e Glessners and the Robies, however, would not prosper in the v economic environment. The Prairie School and the hardsonian style would disappear with the last generation of self-de Americans. Unspoiled instincts and untainted ideals cannot survive in a world where gambling has replaced investment.

Insecurity, on the other hand, provides a fertile environment for revivals of Classicism. The resurrection of Greek and Roman forms has recurred in chancy times throughout Western civilization. From the barbarian chieftains who promoted themselves as Holy Roman Emperors to Philip Johnson's split pediment, which prefaced the breakup of AT&T, a return to Roman grandeur has always been the architectural equivalent of thumb sucking.

There had been, of course, an early Classical tradition in the United States with higher motives. Jefferson, Bulfinch, and Latrobe had employed Classicism as a reference to the Roman Republic. In this context it served as a reminder of the obligations of individual citizenship and of government's collective responsibility to serve the public interest. The Classicism of the Gilded Age was larger in scale and more opulent in decoration. It evoked a more licentious period in Roman history, perfectly appropriate for those Americans moving to the top of the food chain. In the eclectic, open market of the 1890s, the Classical idiom was one of many available alternatives. But by 1910, the Beaux-Arts style had been granted a monopoly.

Emerging building types

A number of new building types emerged in the late 19th century, the most obvious being the great rail terminals of Europe and the U. S. Train stations provided an occasion for cast iron and steel to emerge from behind masonry, to become expressive elements of a new architecture. European architects seem to have been more comfortable in exploiting the expressive opportunities of iron and masonry than Americans, who were getting their Beaux-Arts theory second-hand. This reticence to embrace fully the possibilities inherent in the new construction was an example of our national tendency to keep art and technology in separate pigeon holes.



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H. H. Richardson's Glessner House (1) *and Frank Lloyd Wright's Robie House* (2) *lacked the pretentions of much Classical design in the age of robber barons. Train stations such as Union Station in St. Louis* (3) *and college campuses such as McKim, Mead & White's Columbia University* (4) *represented important new building types.*

In 1909 critic Claude Bragdon assumed Classicism was triumphant. There was, however, one loose end. He had to acknowledge the undeniable achievement of Louis Sullivan.

With their great wealth earned from railroads, steel plants, and oil conglomerates, quite a few industrial magnates founded universities at the turn of the century, setting off a wave of campus construction. These universities were built in a variety of architectural styles, but they all owed a great deal to Beaux-Arts planning. Jean Paul Carlhian, an American architect who graduated from the École des Beaux Arts, pointed out that the institutional master plan, which the school often gave as a student problem, was most useful in training future American practitioners. As a result, we owe France our lasting gratitude for teaching us to organize campuses that remain today more coherent and flexible than those based on later theories.

Development of the tall building

Beaux-Arts theory had less to offer in solving the problem of the tall office building. Here form and function came together because, as a contemporary critic said, the skyscraper responded to the "simple force of need." The first attempts at high-rise design sought to employ orthodox academic theory by piling up classically proportioned horizontal strata to form vertical facades. The resulting assembly of layers did not result in a coherent whole. Eventually, John Root and Louis Sullivan liberated the tall building from the proportional constraints of the academy. While their achievement was acknowledged by contemporary critics, it was not felt to be artistically significant. Neither high-rise buildings nor their commercial purposes were culturally respectable.

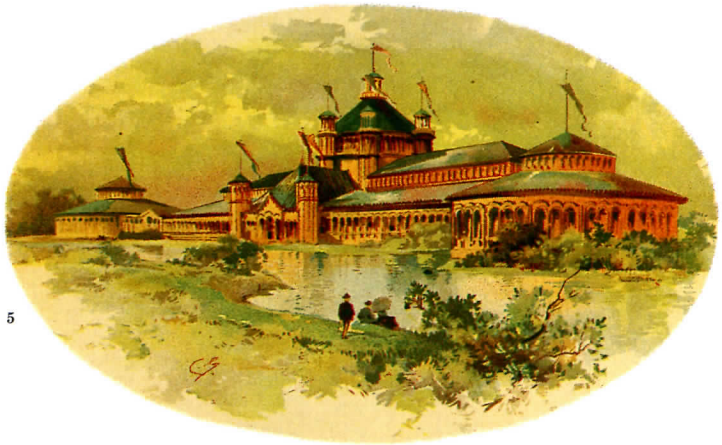
The commercial high rises of the time were austere buildings unlikely to become popular favorites even in the hands of an artist like Sullivan. And the districts in which they were located were even more of an acquired taste. These downtown areas were little more than unrelieved grids of crowded streets with no purpose other than providing minimal access, air, and daylight. There was none of the grace or hierarchy found in the boulevards of Paris or Vienna. If classical precedent had proved useless in the design of individual high-rise office buildings, there is little doubt that our cities badly needed Daniel Burnham's Beaux-Arts approach to planning and urban design. The 1893 Chicago World's Fair, for example, was important not for its buildings but for the spaces between them.

Modernist dogma condemns the 1893 World's Fair for corrupting th taste of succeeding generations. This distorted view of history overlooks the long Classical tradition in America and pretends, without evidence, that there was popular affection for the new commercial high-rises and the squalid districts in which they were located. It overestimates as well the importance of the Fair, which as a demonstration of Classical architecture was inconclusive. Frederick La Olmsted's naturalistic landscape seems to have been at odds with the formal planning concepts of the Fair, while the Classical architectural motifs on the buildings were confined in most cases to surfaces rather than spaces. Structures like the Fisheries Building, whose exterior expressed its plan, were really Victorian designs painted white. Although the shallow relief of Sullivan's Transporta tion Building was an honest expression of plaster veneer, the more pretentious buildings around the Court of Honor were less convinc ing expressions of the same temporary construction techniques.

It was not the Fair but the instability of the age which prompted th Classical revival. It was the only safe choice in a frightening time. The relationship between national pessimism and the production o Corinthian columns can be seen today on Pennsylvania Avenue.

Changes in practice

In many ways, Burnham's management of the design and constru tion of the Fair would set an important precedent for future generations, anticipating the organization of today's large multidi ciplinary offices. The low opinion of Burnham expressed later by



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Sullivan and Wright may have had as much to do with a disagreement about professional practice as with esthetics.

Burnham was an intriguing figure who doesn't fit neatly into any ideological debate. He was a pragmatic architect who understood both the uses and the limitations of the Classical style. It is important to remember that after the Fair, it was Burnham and Company that produced the Reliance Building, whose clearly expressed metal frame and daring curtain wall became the hallmarks of Modern skyscraper design. And the value of Burnham's later contribution to urban design and planning as spearhead of the City Beautiful Movement is unquestionable. The damage done by Modern urban-planning theorists, on the other hand, is not yet fully understood.

The general adoption of the Classical style required formal training in esthetics. Because the Classic orders were best learned in schools, university-based professional programs began to displace apprenticeship as the primary method for training architects. In addition to providing authoritative proof that our buildings were a continuation of a glorious past, the university degree offered a sense of legitimacy to a profession that was no less insecure than its clients. The American version of Beaux-Arts education probably raised the minimum level of professional competence, but in doing so it imposed the university as the orthodox authority over design. Long after they abandoned the Classical style, the schools continued to act as incubators and launching pads for esthetic novelties. In the process, we lost the possibility of producing the cranky regional styles and individual geniuses that made the 19th century so interesting.

In 1909 RECORD published a three-part essay by Claude Bragdon that set down the myth on which the newly adopted American Classical Revival was based. In this story we are told that Classicism had evolved virtually without interruption until a period of error in the middle of the 19th century. This stylistic lapse expressed itself in the Gothic farm houses, Queen Anne cottages, and Romanesque public buildings that Henry James categorized as "the romantic, the anecdotal, the supposedly historic—the explicitly pathetic."

John Ruskin, a man of "stupefying ability" but "quite the most unreliable critic and exponent of architecture who ever lived," according to Bragdon, is one of the villains of the Classical party line. Similarly, Bragdon described H. H. Richardson as "a genius whose pernicious and pervasive influence delayed the normal evolution of architecture."

Bragdon provides the flip side of Sigfried Giedion's history of architecture. Both men were stylistic propagandists pretending to write history. Both edited the evidence to support their conclusions. And both believed in an evolutionary progress toward a final esthetic truth that had been frustrated by evil geniuses. These are essentially biblical views of history, differing only as to the identity of the devils and the decor of heaven.

In 1909 Bragdon assumed Classicism was triumphant. There was, however, one loose end: the undeniable achievement of Louis Sullivan. Skyscrapers were too big to overlook, so he defined architecture so as not to include them. Like Henry Adams, Henry James, and others who had become disoriented by the times, Bragdon concluded that the nation's work and the buildings that housed its workers were outside the realm of culture, outside the accepted confines of architecture. ■

Jack Hartray is a principal with Nagle Hartray Associates.

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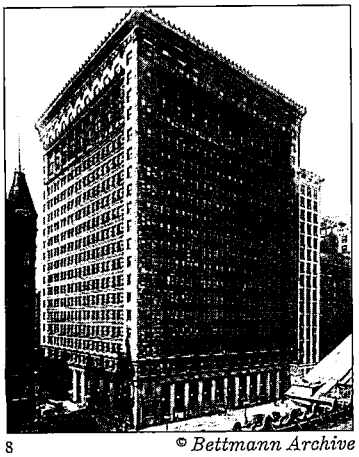

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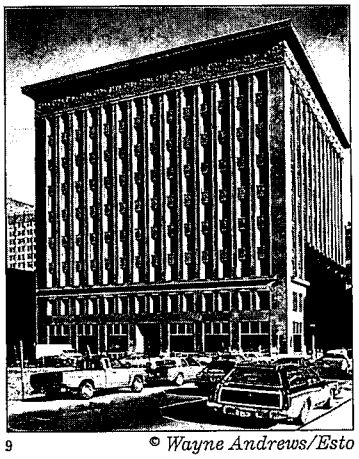


9 © *Wayne Andrews/Esto*

As a model of Classical design and planning, the 1893 Chicago World's Fair (6) *was inconclusive. The Fisheries Building at the Fair* (5) *was actually more Victorian than Classical. The Reliance Building* (7) *and the People's Gas Building* (8) *were two skyscrapers by Daniel Burnham in Chicago. The Wainwright Building* (9) *was perhaps Louis Sullivan's most eloquent skyscraper design.*

1910/1919 Breaking Through

Unlike the 1920s, the 1960s, or the 1980s, the decade between 1910 and 1919 has no name. That is a shame, for in retrospect it is clear this was an important period, perhaps the most important of the century. The '20s were the Jazz Age, the '60s were characterized by youthful (hence temporary) rebellion, and the '80s by a widely deplored, but hardly novel acquisitiveness (which already appears to be on the wane). Looking back, one sees that what changed most during these decades was fashion. But between 1910 and 1919, the world was altered in fundamental and lasting ways. Before 1910, one could view life from the comfortable perspective of the 19th century; after 1919 that was no longer possible. The modern era had begun.

The chief event that ushered in modernity was World War I. The effect of the catastrophic war was not only political—two vast empires, Turkey and Austria-Hungary, disappeared, and a third was tranformed by the Russian Revolution into the Soviet Union—but also psychological. It was not merely a question of casualties—which were enormous—but of a change in the nature of warfare, which escalated to include such barbarisms as poison gas, attacks on merchant ships, the indiscriminate aerial bombing of towns and cities, and reprisals against civilian populations. "When all was over," wrote Churchill, "Torture and cannibalism were the only two expedients that the civilized, scientific, Christian States had been able to deny themselves."

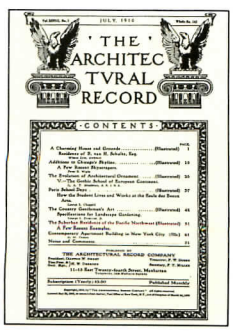
It was not only The Great War, however, that marked this period of change; the ideas of two intellectual giants were also transforming human perception. Albert Einstein, who began publishing his work on relativity in 1905, proposed the General Theory of Relativity in 1915. Time and space, which had seemed to be of absolute duration and extent, turned out to be elastic, and Newtonian physics, which had stood the test of the previous 200 years, was fundamentally altered. Sigmund Freud likewise called into question traditional beliefs, and introduced new concepts of guilt, personal responsibility, hidden meaning, and sexual gnosticism.

The cutting edge

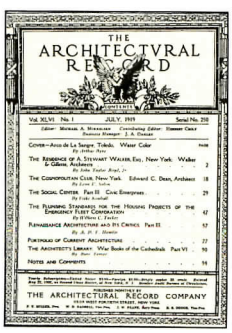
The world was no longer what it seemed. The effect of this apparen disorder was felt throughout society, but earliest among the so-called avant-garde, a term coined earlier to describe new and unconventional movements in the arts. The word "cubism," referring to the work of Cezanne, Braque, and Picasso, was already in common use by 1911; Stravinsky's first success, "The Fire Bird," was performed in 1910; Diaghilev staged "The Rite of Spring" in Paris in 1913. In 1918, Oswald Spengler published the first volume *Decline of the West*, which reflected the new, brittle sensibility; by 1919, Proust produced the first volume of *Remembrance of Thing Past*. Thomas Mann wrote *Death in Venice*, and James Joyce was writing *Ulysses*. The Modern Movement in the arts was underway

What about architecture? Architects were slower to respond to th new reality, for buildings, unlike paintings and books, were ill-suit to avant-garde experimentation. For one thing, they cost a lot mor Proust published at his own expense; an architect, if he wanted to build, had to find a wealthy client. What is more, the audience for the demanding and difficult avant-garde literature, music, and art was tiny, while architecture—a social art—had to appeal to a broader public. Urban buildings in particular tended to reflect a s etal consensus, which was firmly conservative. That is why many the proto-Modern Parisian buildings of the period, by architects s as Tony Garnier or Auguste Perret, while sometimes technically a venturous, exhibited what Reyner Banham called a "stripped classicism" that fell within the academic tradition.

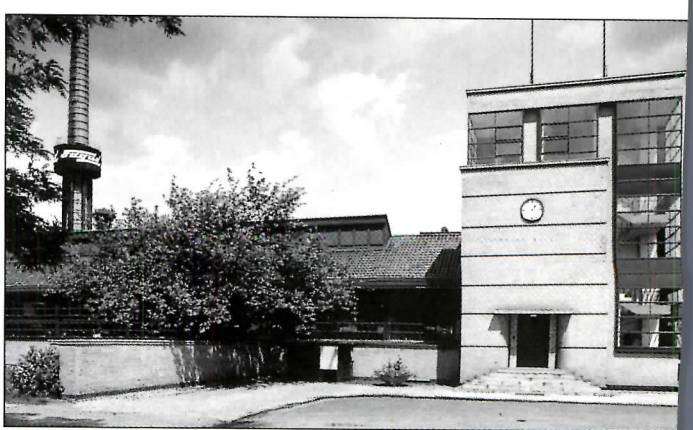
In Vienna, the originators of the ultra-progressive, turn-of-the-ce tury Secession style, Josef Hoffmann and Otto Wagner, were



July 1910



July 1919


1 © Peter Aaron

Architect and author Witold Rybczynski charts the course of architecture during a time of radical change before and after the devastation of World War I.

elderly but still active. But Wagner's buildings, although they incorporated inventive details and ornamentation, were increasingly grounded in Classicism, and his 1911 book on city planning proposed a recognizably traditional metropolis. The younger generation was more adventurous. As early as 1910, Adolf Loos built what was arguably the first European example of a cubical, undecorated (at least on the exterior), white-walled villa—the Steiner house—in a Viennese suburb. But his office building on Michaelerplatz, completed two years later, incorporated Doric columns and marble cladding, and its reinforced-concrete frame was hidden behind a traditionally composed facade.

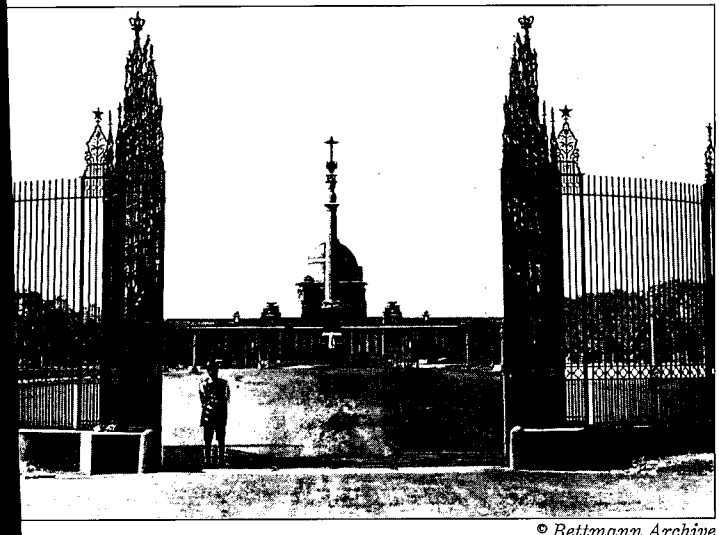
If there was an architectural avant-garde, it was to be found in Germany where, in 1907, Hermann Muthesius founded the Deutscher Werkbund. The most influential German buildings, in terms of the later evolution of Modernism, were Peter Behrens's AEG Turbine Factory (1909) in Berlin, Hans Poelzig's Chemical Factory (1911-12) at Luban, and, above all, Walter Gropius and Adolf Meyer's Fagus Factory (1911) and their Model Factory at the 1914 Werkbund Exhibition (it is no wonder that Modernism would later incorporate what some would call a "factory esthetic"). Of course, industrial buildings were intended to be functional, and factory owners allowed their architects a latitude for experimentation not found in public buildings whose formal language was circumscribed by convention. Architects understood this, and when Behrens designed the new German embassy in St. Petersburg (1912), or when his assistant, Ludwig Mies van der Rohe, entered the competition for the Bismarck monument in 1910, they both adopted a Neoclassical style.

Nikolaus Pevsner called Behrens, Gropius, and the Werkbund architects the "pioneers of the Modern Movement," which they undoubtedly were. But it is misleading to characterize the principal importance of this decade as consisting only in the laying of Modernism's foundation. After all, the same period that saw the construction of Josef Hoffmann's masterful Palais Stoclet in Brussels also produced Edwin Lutyens's striking Viceroy's House in New Delhi, and Frank Lloyd Wright's new rural retreat at Taliesin. Eliel Saarinen's Helsinki railroad station, completed in 1914, was contemporaneous with Charles McKim's New York masterpiece, Pennsylvania Station; the year after Bruno Taut's Glass Pavilion at the 1914 Cologne Exhibition, Bertram Goodhue built the influential California Building at the 1915 Panama-California Exposition in San Diego. Before the war, when Le Corbusier was still Charles-Edouard Jeanneret, an unknown domestic architect in the Swiss town of La Chaux-de-Fonds, the Greene brothers had already perfected their distinctive residential style in Pasadena.

At home with Lutyens, Pope, and Platt

Nothing marks the period as strongly as the achievements of the many domestic architects. The English master was undoubtedly Lutyens, although Robert Lorimer also produced some beautiful, grave country houses in his native Scotland. But it was in the United States, already the richest country in the world, that the design of large houses flourished. On the East Coast, society architects such as Thomas Hastings, John Russell Pope, and Charles Adams Platt were building dozens of wonderful country villas, and in Southern California, skilled designers such as Goodhue and Myron Hunt were developing a Mediterranean domestic style.

American architecture of the period obviously was anything but the "esthetic wasteland" that James Marston Fitch described in *American Building*. Like most architectural historians of the 1940s, Fitch simply would not tolerate the eclectic movement that characterized this period. Not that all contemporary architects were comfortable with the variety of styles and approaches. In an essay published in the September 1913 issue of ARCHITECTURAL RECORD Ralph



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Gropius and Meyer's Fagus Factory (1) *was an icon of emerging Modernism. During the same period, Lutyens designed the Viceroy's House in New Delhi* (2)*, and Saarinen designed Helsinki Station* (3)*—two buildings less clearly identified with Modernism.*

The decade was, at least architecturally, much like our own. The orthodoxy of Classicism—like that of Modernism—which had held sway for decades, had been questioned and was found wanting.

Adams Cram enumerated at least seven major tendencies. To begin there was Classicism, of which he described three types: pure Classicism (led by the venerable firm of McKim, Mead and White), and still the style of choice for public monuments such as Henry Bacon's moving Lincoln Memorial (1912-1917); Beaux Arts (typified by Carrère and Hastings's New York Public Library, which had opened its doors in 1910); and neo-Colonial (chiefly visible in the country-house movement). Then there were two variations of Gothic—one, more or less canonic, which was exemplified by Cram's own work at Princeton and his many churches; the other, a freer interpretation, such as his partner Bertram Goodhue's robust designs for West Point.

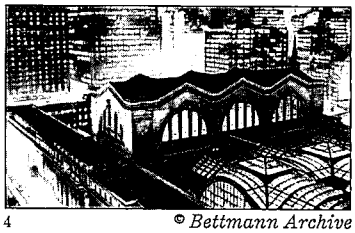
Lastly, Cram added steel-frame construction, which had liberated architects from the constraints of traditional masonry building 20 years before, and which was still, as he put it, "having its fling," and something that he called Post-Impressionism. By that he presumably meant (he mentioned no names) the work of architects who did not take their cues from historical styles: Louis Sullivan (then in the final productive phase of his career), his disciple Wright, and Southern California innovators such as Irving Gill.

"What lies before us?" Cram asked. "More pigeon-holes, more personal followings, more individualism, with anarchy at the end?" We can surely sympathize with his concern, for his description of architectural chaos could serve to characterize the 1980s, a heady decade of architectural pluralism during which critics have been barely able to keep up with the apparently inexhaustible invention of new theories, and new—and old—styles. Indeed, the 1910s were, at least architecturally, a period much like our own. The orthodoxy of Classicism—like the orthodoxy of Modernism—which had held sway for more than two decades, had been questioned and found wanting, and individual architects were free to go off in a multitude of directions, combining and recombining old forms with new materials.

One thing that all architects of the early 1900s shared, whatever their stylistic preferences, was the use of up-to-date technology; in that sense, at least, the Modern revolution in architecture had already occurred. The year 1913 saw the completion of what ARCHITECTURAL RECORD admiringly called "the latest and greatest of our skyscrapers," the Woolworth Building. At 55 stories, it was the tallest building in the world, or rather the tallest Gothic tower ever built. Cass Gilbert's tour-de-force was a curious blend of canonic design and modern construction. Though it had exquisitely carved ornament, flying buttresses, and grinning gargoyles, it also incorporated a host of technologies that even 50 years before were either unknown or uncommon: a steel-frame structure, elevators, hot-and-cold running water, central heating, telephones, and electrical lighting. The only device that was needed to make this a fully modern, 20th-century office building was air-conditioning (the first air-conditioned office building was not erected until 1928).

Structural pioneers

The Woolworth Building is a reminder that although the esthetic pioneers of the Modern Movement may have been in Europe, the technical innovations in architecture were taking place in the United States. In 1914, Jeanneret produced the Domino house, an idea for a reinforced-concrete system that he proposed should be used after the war for low-cost housing reconstruction. It was never realized, but thanks to his own and others' promotion, the famous sketch (it was hardly more than that) became a seminal symbol for a new architecture. Four years earlier, however, the New York architect Grosvenor Atterbury had already begun work on a concrete building system for housing that used precast, hollow-core panels for walls, floors, and roofs, and combined these with precast concrete porches, chimney tops, and other components. All the elements were cast in a factory and transported to the site for erection. This was not a theoretical proposal: between 1910 and 1918, Atterbury built several



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4a © *Bettmann Arc*

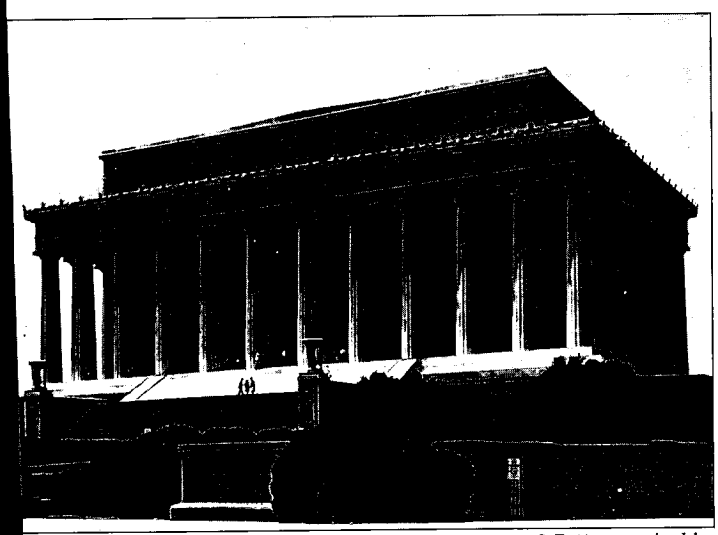
hundred inexpensive houses at Forest Hills Gardens, a new railway suburb in the New York borough of Queens. Atterbury was a curious blend of reformer and society architect, and his remarkable building system produced housing that was comfortingly traditional. The houses had pitched roofs, dormers, gables, mullioned windows, and an overall appearance that has been described as German-Tudor. This conservatism satisfied the occupants, and it undoubtedly explains why proselytizing historians of Modern architecture have neglected this inventive architect.

The period saw the consolidation of housing as a key concern and as a fit subject for architectural study. The British Garden City movement, begun by Ebenezer Howard at the turn of the century, produced developments such as Letchworth, and the Hampstead Garden Suburb, where Barry Parker and Raymond Unwin pioneered mass-housing design; on the continent the chief housing architects were Muthesius and Heinrich Tessenow. In the United States, most new housing was suburban, spurred on by the phenomenal growth in automobile ownership. Ford introduced his inexpensive Model T in 1908, and by 1913 there were one million passenger cars registered; two years later the number more than doubled. Many middle-class suburban houses were designed by architects, and as early as 1912, ARCHITECTURAL RECORD ran a seven-part series on "Building a House of Moderate Cost." One architect who had long been interested in low-cost housing was Irving Gill, whose 1910 Lewis Courts in Sierra Madre, California, and several later bungalow courts are exemplary projects that provided inexpensive and attractive housing in a communal setting. But Gill, like Atterbury, was an unusual architect, and it was the postwar housing shortage of 1918 that focused attention squarely on mass housing. Although ARCHITECTURAL RECORD continued to publish its annual country house issue, articles began to appear regularly on "industrial" housing, featuring the work of Atterbury, Clarence Stein, and Henry Wright.

The new interest in housing was symptomatic of change that had taken place in the architectural profession. The war and its aftermath had put architects into new roles, designing war installations (such as Cass Gilbert's extraordinary Brooklyn Army Supply Base), factories, factory housing, hospitals, and (a sad outcome of the war) veterans' homes. This experience suggested that architects had a social role to play in the new, unsettled, postwar world, a world in which the debate between the Classicists and the Gothicists ("between Tweedledum and Tweedledee," as one critic put it) seemed to many to be increasingly beside the point.

The year 1919 closed a chapter on American architecture that had begun 30 years before. Although Beaux Arts Classicism no longer held sway, it was by no means clear what would replace it. Would it be an outgrowth of Gothic—as Ralph Adams Cram hoped—or some form of indigenous style of the type that Sullivan had explored? The answer, we now know, lay across the Atlantic, for 1919 saw the establishment of two European institutions that would change the face of architecture around the world: that year, Walter Gropius founded the Bauhaus, and Jeanneret and two friends decided to start a new magazine called *L'Esprit Nouveau*. Cram closed his essay on style in American architecture on an optimistic note, suggesting that the future held "the promise of a new day." Little did he know just how new it would be. ■

Witold Rybczynski, teaches at McGill University and is the author of Home *and* The Most Beautiful House in the World.



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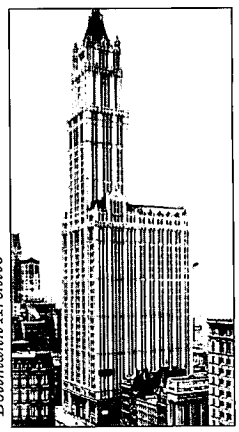

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American architects combined structural and technological daring with a more conservative approach to style. Charles McKim's Pennsylvania Station (4, 4a), *for example, wrapped great metal and glass vaults in the garb of Classicism, while Cass Gilbert sheathed the Woolworth Building* (6) *in an elaborate Gothic skin. Henry Bacon's Lincoln Memorial* (5), *built between 1912 and 1917, was a more straightforward exercise in Classical design.*

1920/1929 Housing America

Decades are false. While time can be neatly divided into 10-year-long intervals, trends of thought and action are rarely as amenable to simple categorization. Though the 1920s immediately conjure up brilliant images of a prosperous and playful era that ended decisively with a bang when the stock-market crashed on October 29, 1929, in architectural and urbanistic terms the period's parameters are not quite so clear. In fact, it can more accurately be said to have begun with the cessation of the "war to end all wars" and ended with the election of Franklin D. Roosevelt in 1932.

The period got going in the wake of the nation's rise as a major player on the international stage, was characterized by an intense focus on the virtues of commerce and convenience as applied to the daily life of everyman, and ended with financial collapse accompanied by massive self-doubt. Though its conclusion is best symbolized by the stock market's crash in 1929, the winds of self-confidence began to go out of its sails in 1927. (In so many ways the era reminds us of the 1980s, which began to misfire with the crash of 1987, only to conclude with the second crash of 1989.) The manifestations of a new spirit, defined in large measure by the Modernist esthetic, which would flower in the 1930s, was first felt in 1927.

ARCHITECTURAL RECORD began the period as a stylistically conservative magazine, but in the early 1930s came to feature some of the most important works of the avant-garde in both Europe and the United States. Like the rest of the profession, RECORD participated in the profound revolution of taste that marked the late 1920s and early 1930s, when "the battle of styles" between Traditionalism and Modernism was at its zenith.

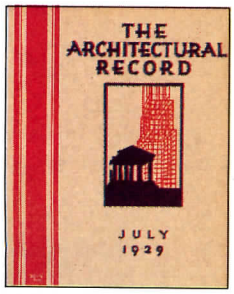
While American architecture in the 1920s was dominated by the commercial skyscraper (as was that of the 1980s), this essay will concentrate on an often-overlooked building type—housing. Then as now, housing was an important but sublimated issue. But more serious thought and work was done on the subject in the 1920s. While the bulk of the architectural profession stood aloof from the hard realities that the post-World-War-I housing shortages posed for the average American, there was a cadre of committed architects, planners, "do-gooders," and journalists who did care about the subject.

New models of suburban development

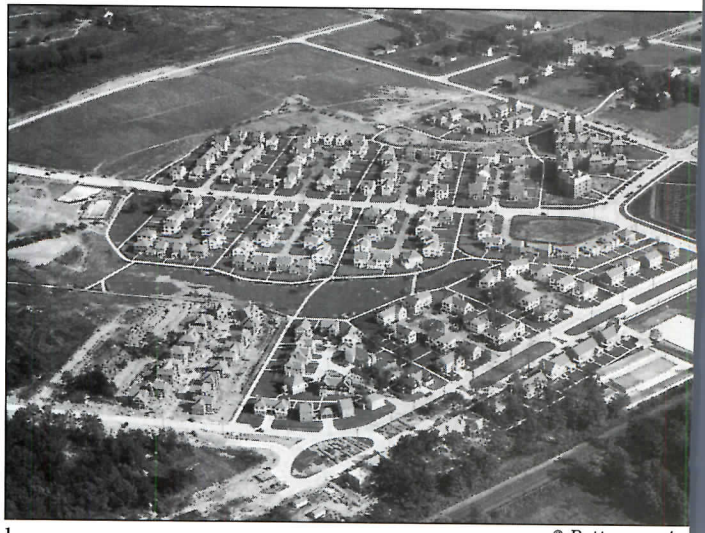
Though the federal government's effort to provide good, affordable housing for war workers was curtailed by Congress as part of peacetime demobilization, that program, which included the construction of model towns, continued to have a positive impact on the architectural profession and even on market-driven housing throughout the 1920s. In a two-part series, "Garden Apartments in Cities," published in RECORD in July and August 1920, John Taylor Boyd, Jr., featured the work of Clarence Stein and Andrew Thomas two architects with very different backgrounds and intellectual orientations who made valuable contributions to the housing movement in the 1920s. It was Stein and Thomas, working independently, who created the most compelling paradigms for middle-class, suburban-style living close to the city's core.

A graduate of the Ecole des Beaux Arts, Stein was an intellectual who preferred theory to the day-to-day struggles of professional architectural practice. As an apprentice in the office of Bertram Goodhue, Stein was in charge of designing in 1916 the new copper-mining town of Tyrone, New Mexico. Tyrone was in many ways the model for the government-sponsored war-housing effort, a new town built by the Emergency Fleet Corporation and bearing many similarities to French architect Tony Garnier's Cité Industrielle project. After World War I, Stein emerged as a socially committed professional who effectively absorbed ideas from leading planning theorists—including Ebenezer Howard, Patrick Geddes, Raymond

July 1920



July 1929



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Architect Robert A. M. Stern and historian Thomas Mellins review a series of innovative housing developments from the 1920s that helped shape American suburbs for the rest of the century.

Unwin, and Henry Wright, his sometime collaborator. Stein's first major work, designed in collaboration with Wright, Frederick L. Ackerman, and Marjorie Sewell Cautley, was the Sunnyside development in Queens, New York (1924-28), sponsored by the City Housing Corporation. Sunnyside looked back to prewar residential subdivisions such as Prospect Park South in Brooklyn, where the gridiron street plan had been accepted with only modest alterations (such as landscaped malls, perimeter gateposts, and stringent land-use controls).

Sunnyside also contained the germ of an intricate, hierarchically structured circulation system that was to reach its fullest expression in 1927 at Radburn, New Jersey, Stein and Wright's most innovative town design. Lewis Mumford praised Sunnyside as "an enclave in the midst of an industrial desert—using rows of attached houses and garden apartments to wrap the perimeter of the typical city block and define mid-block mews, which increases the overall density while fostering an atmosphere of suburban greenery." Journalist Bruce Bliven saw Sunnyside as a collection of "seventeenth-century New England villages, each grouped around its common."

On balance, many of Sunnyside's strengths have also been its weaknesses. The stripped-down traditionalism of Sunnyside's architecture paved the way all too smoothly for the detail-free barrackslike housing of the Depression and post-World-War-II era, and the town's fervent emphasis on community was sometimes misinterpreted by the public as being anti-private and anti-individual. Sunnyside marked the Indian Summer of the suburban enclave within the urban milieu. The declining role of the small-scale structure in city development, and the expanded geographic scope of development made possible by the automobile focused the eyes of the middle class on the relatively open land beyond the fringes of urbanism, an area that came to be labeled "exurbia."

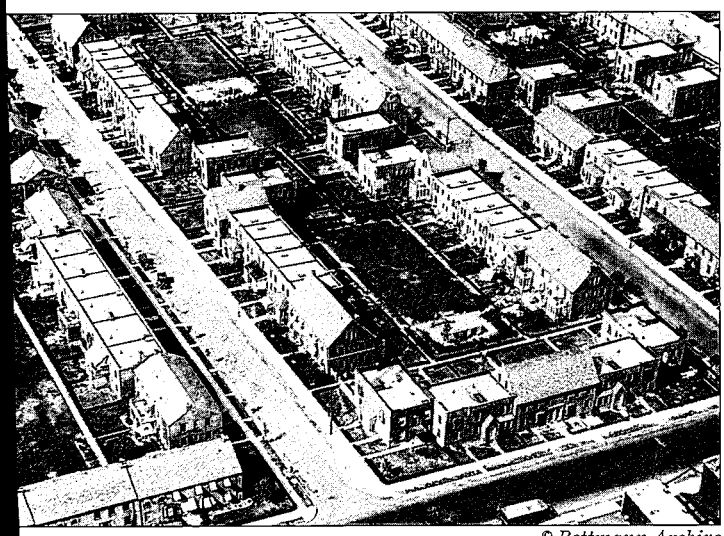
Separating traffic by type

Located 10 miles from New York, Radburn, New Jersey, was conceived of by Stein and Wright as a "town for the motor age." The relationship between the car and the suburb at Radburn was akin to that between cat and mouse, with the car subverted and community life reoriented to pedestrians and bicyclists. Borrowing ideas from Frederick Law Olmsted and Calvert Vaux's Central Park, Stein and Wright separated Radburn's traffic by type: a system of walkways allowed children to go to school without ever having to cross a street. Grouped around cul-de-sacs that were intended to function as little more than service alleys, the houses faced away from the street and toward continuous greenswards containing the town's walkways and bicycle paths.

At first, Radburn was viewed as a high point in town planning but a disappointment architecturally. Lewis Mumford considered its layout "admirable," but found the house designs not "particularly triumphant examples of modern architecture."

But even the town's plan failed to function as Stein and Wright had hoped it would. For both children and adults, the automotive cul-de-sacs proved more compelling as focuses of community life than the greenswards. Except for rare occasions of neighborly ceremony, the back doors of houses at Radburn functioned as the front doors might, with dinner guests arriving in their cars at the same place that cups of sugar were exchanged and bicycles were stored.

When the Depression hit, construction at Radburn was stopped with only one-fourth of the project completed. Although the notion pioneered at Radburn—that a town could be designed to provide both automotive convenience and country serenity—was never fully tested, it did form the basis for a number of idealized urban visions formulated at the close of the interwar period.



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Sunnyside (1, 2) *is a suburban development in Queens, New York, where Clarence Stein and Henry Wright began experimenting with pioneering notions of traffic hierarchies that would culminate later in the decade in Radburn, New Jersey* (3).

The garden apartment adapted the special qualities of upper-class apartment houses to the economic and social realities of middle-class tenants and the growing role of the automobile.

Another important figure in housing design in the 1920s was a self-taught architect named Andrew J. Thomas, who combined proselytizing and organizational skills with an entrepreneurial talent. Having developed techniques for decreasing costs, partly as a result of his experiences as supervising architect for the federal government's Emergency Fleet Corporation, Thomas set out to perfect, or at least rationalize, the tenement type. Thomas was so successful that, in the eyes of some observers, his designs afforded more light and air than was provided in the typical Park Avenue apartment. Because Thomas was content to pursue his reformist goals within the prevailing economic system, his work was consistently undervalued by his contemporaries and is still overlooked today.

Thomas's greatest achievement was Jackson Heights, Queens, a sprawling residential enclave developed by the Queensboro Corporation. Taking the city block as the unit of development, Thomas evolved at Jackson Heights a new housing type, the "garden apartment," a term that he probably invented. According to John Taylor Boyd, Jr., "the use of the block as a unit . . . reached its fullest development" at Jackson Heights. "Providing community amenities as well as housing accommodation, this little-known development is a sub-city within the city," added Boyd.

The garden apartment adapted the compositional and esthetic unity typical of palatial upper-class apartment houses to the economic and social realities of middle-class tenants, a location in the outer boroughs, and the increasingly important role of the automobile. Thomas was influenced not only by prewar New York examples but also by work he saw in suburban Berlin and Vienna, and by quadrangular dormitories being built by leading American colleges such as Princeton and Yale. Thomas also drew from his personal experience: unlike most architects of the time, who were born into wealth, Thomas had been born and reared in a tenement and began his architectural career building tenements. More than had any previous designer, Thomas imbued the multiple dwelling with a sense of "home," jettisoning high-style, academic Classicism in favor of an eclectic mix of essentially vernacular ornamental details, many of them based on those used in Italian villas and Spanish farmhouses.

As in all of Thomas's work involving groups of buildings, the structures at Jackson Heights were massed to reflect the status of the block as the development unit and at the same time to preserve the character, individuality, and domestic scale of the components.

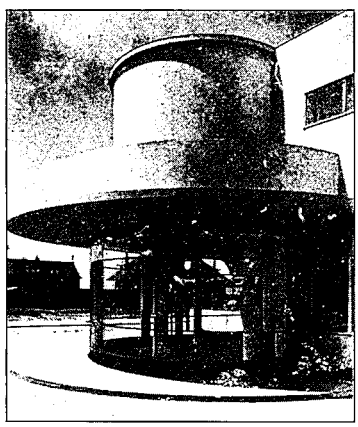
Setting standards

By 1924 Thomas's work at Jackson Heights had made clear that high land coverage and high density were not necessarily incompatible. Thomas also made the idea of neighborhood planning more glamorous than it had been before, and established humane and practical standards for housing in the city—standards that would prove influential in the reworking of prevailing legislation and the passage of the Multiple Dwelling Law of 1929.

In 1926, the architect and historian A. Lawrence Kocher introduced ARCHITECTURAL RECORD's annual country house issue with an essay titled, "The Country House: Are We Developing an American Style?" Kocher responded to his own question by stating that American architects were arguably no closer to that end "than our novelists to the 'great American novel.' But if such a style is to be achieved it will be, not by the general adoption of any group of historic shapes and details, but by a free selection and development of styles to meet the newer and more diverse needs of modern life."

With Kocher's arrival, RECORD took on a new mission, the introduction of European Modernism to American readers. European Modernism was not completely undiscussed or unseen in the pages

While most American residential architecture remained traditional in style, European architects set a new course. In Hook van Holland, for example, J. J. P. Oud designed a Modern development with shops (4) *and workmen's dwellings* (5).



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of RECORD before the late '20s, but the formal experiments of the Modern movement were known only to a handful of American architects.

RECORD had given its readers an early jolt of stylistic Modernism in February 1923, with Edith Elmer Wood's "Recent Housing Work in Western Europe," illustrated with examples encountered during a 0-month tour of England, France, Belgium, and Holland. Wood concluded that "architectural styles are conservative except in Holland, where an ultra-modern school has arisen, especially at Amsterdam, which is stirring the imagination of the younger men and women to reat enthusiasm."

rank Chouteau Brown also noted the relevance to American prace of Modernist Dutch housing in his four-part series "Low Rental lousing," in 1924 and 1925. Brown discussed the American "suburan type" and then examined examples from the Amsterdam School Expressionism—including housing projects by U. Gratama, J.C. an Epen, and Michel de Klerk. Despite these articles, European odels failed to affect mainstream American residential architecre, which tended to maintain traditional historical forms.

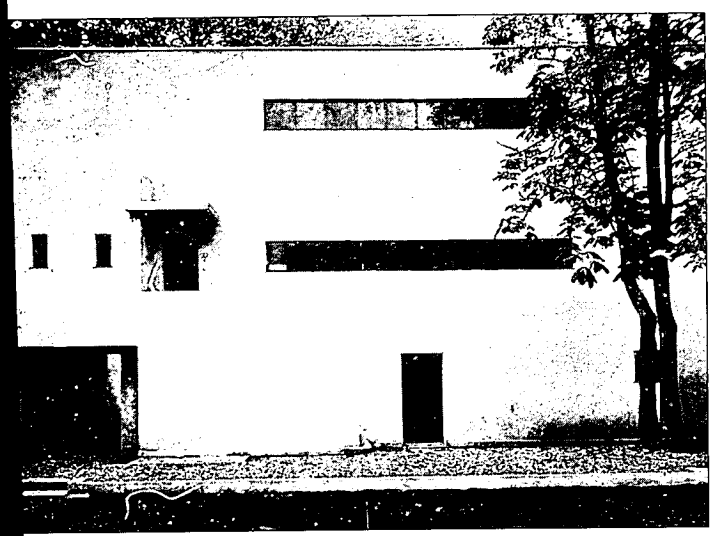
troducing the European prophets to America

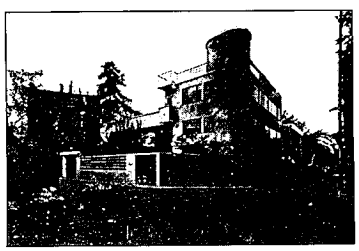
1928 Henry-Russell Hitchcock wrote a two-part series of seminal ticles entitled "Modern Architecture." The articles introduced a riety of European designs, ranging from a vernacular-inspired using group by the English firm of Pakington, Enthoven and ey, in Byfleet, to ardently ahistorical examples of Modernism ch as André Lurçat's house for Jean Lurçat in Paris and Le Corsier and Pierre Jeanneret's Miestchaninoff residence in Boulogne-r-Seine. Egged on by the zealotry of Philip Johnson and Alfred rr, Hitchcock would eventually place himself squarely in the revoionary camp of the New Pioneers and help to establish the International Style as the right and true Modernism. But in these two articles for RECORD he was more reserved in his judgment. "Despite their considerable achievement, the New Pioneers," he stated, "are best considered as prophets whom the future will find false or true." As for their theory, Hitchcock concluded, it still "is largely a promise" since "for its full achievement it requires mass production."

As the period drew to a close, RECORD kept its eye on Modern European housing design but also sought out as many American experiments as it could find. For example, RECORD featured Rudolph Schindler's vigorously sculpted Lovell Beach House in Newport Beach, California, and Richard Neutra's office-building project for his ideal city, Rush City Reformed, in September 1929.

The late 1920s were a crucial time for Modernism, not only in terms of its flowering in Europe, but its widespread dissemination in the U. S. At the decade's close, just as Walter Gropius, Le Corbusier, and other European Modernists were transforming their polemics into actual construction, the economic tide turned and the opportunity to build diminished greatly. By the time the American architectural profession had begun to catch up with the pioneering efforts of the early Modernists, the stock-market crash and resulting Depression shut down almost all building activity. As a result, the American chapter on the development of canonic Modernism virtually closed after having been barely opened. ■

Robert A. M. Stern is a principal in Robert A. M. Stern Architects. Thomas Mellins is an architectural historian and coauthor with Mr. Stern and Gregory Gilmartin of New York 1930: Architecture and Urbanism Between the Two World Wars, *published by Rizzoli in 1987. Parts of this article are taken from that book and printed with permission from Rizzoli.*





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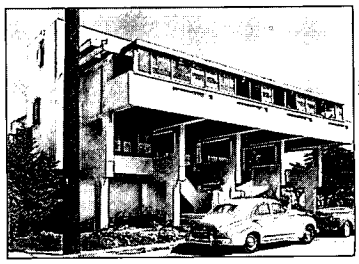

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A private residence by André Lurçat in Versailles (6) *and the Miestchaninoff residence by Le Corbusier* (7) *were two early examples of Modern houses seen in* RECORD. *Later in the decade* RECORD *published Rudolph Schindler's Lovell Beach House in California.* (8)

1930/1945 From Pope To Grope

The decade and a half from 1930 to 1945 gave America Fallingwater and Mount Rushmore, Colonial Williamsburg and the PSFS Building, the Jefferson Memorial and Hoover Dam, Rockefeller Center and the Quonset hut. Rogers and Astaire danced through a lacquered fantasy of a streamlined new world. The miracle of wartime industrialization spurred innovation in techniques and materials, realizing modernist visions in the process.

Dominated as they were by the Great Depression and World War II, these years were not the best time to be an architect. Construction shrank by 86 percent from 1928 to 1933, and architects' incomes declined accordingly. But it was a fertile and exciting time for architecture, as it shared in the liberation of thought and action brought first by unprecedented failure, and then by equally unprecedented success.

The failure, of course, was the apparent collapse of the economic system in a severe and long-lasting Depression that virtually stopped private building for several years and threw many architects out of work and out of the profession entirely. For many, the romantic skyscrapers and pastoral country houses of the previous decade became repellent and embodied the very excesses that had given rise to the current problems.

In the absence of clients, architecture turned its attention to society. It was clear that most people had not shared in the boom. In 1934, for example, RECORD reported on a study of 57 middle-sized American cities, which found that 65 percent of their dwelling units were without central heating, 25 percent without baths or showers, 20 percent without indoor toilets, and 31 percent without gas or electricity for cooking. Moreover, architects needed only to look around their own cities to see the evidence of physical deterioration and of social problems that seemed generated by dwelling patterns designed to provide maximum immediate returns to developers while ignoring the long-term needs of residents.

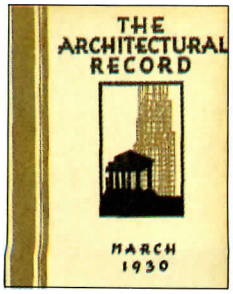
New ideas enter mainstream

Such newly inescapable realities rendered many of the traditional concerns and authoritative figures in architecture utterly irrelevant and offered the possibility for ideas from prophets and exiles to enter the mainstream. The Modernist diaspora from Europe, spurred by the rise of Nazism, accelerated the diffusion of new architectural ideas here.

But it is a mistake to view the period only in terms of a transition from the Beaux-Arts, of which John Russsell Pope's National Gallery and Jefferson Memorial were the final manifestations, to the International Style, as institutionalized at Harvard by Walter Gropius. This passage of authority from Pope to Grope, from Paul Cret to Mies van der Rohe, from Ionic columns to lallycolumns, did take place. But in this period, it had more impact in schools than on actua construction.

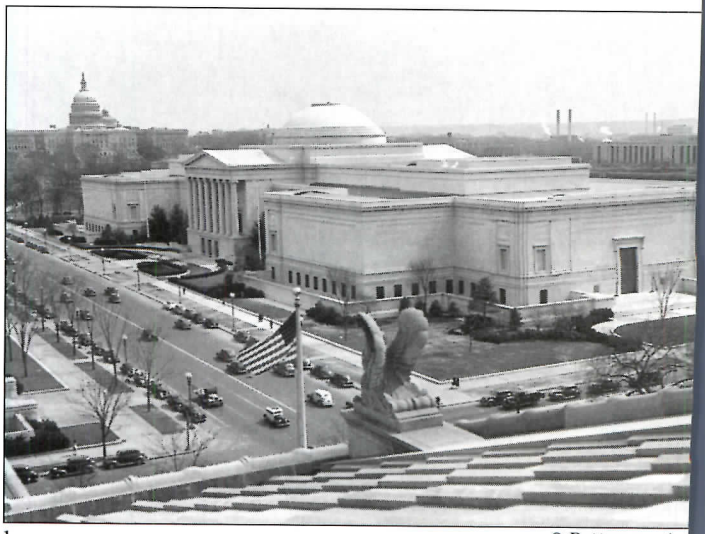
Well before the Europeans arrived, the failure of business as usual had given increased prominence to such home-grown reformers as Clarence Stein, Henry Wright, Lewis Mumford, and the large-scale housing and regional planning movements with which they were as sociated. Franklin D. Roosevelt, a president with a publicized predilection for the Dutch Colonial style, inaugurated programs th operated on a scale that was beyond even the ambitions of the avar garde utopians and virtually forced the creation of the modern planning profession.

Industrial designers and movie-set designers shaped an image of popular modernity, suggesting that people were ready for a new world, and perhaps that architecture wasn't giving it to them. Peo



March 1930

July 1945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From the depths of economic collapse to the frenzy of wartime production, American architects learned how to think on a grand scale, explains architecture critic Thomas Hine.

ble started looking at Buckminster Fuller's Dymaxion House and he many more conventional proposals for mass producing houses as f they were Fords. And Frank Lloyd Wright, having lived through he boom in relatively inactive silence, burst back onto the scene to oint an American way out of failure, and in the process to design allingwater, the Johnson Wax Building, the Hanna House, Taliesin Vest, and the Usonian houses.

he automobile remakes America

nd even this account ignores changes that would reshape the coun- y. Vast internal migrations—Okies during the Dust Bowl, blacks om the rural south to the northern cities, and the wartime rush to alifornia—changed the shape of the nation. Even during the De- ression, the automobile was remaking American life, with the eation of-auto-based shopping centers, the rapid evolution of the rvice station, and other drive-in services.

ew Deal programs like the Civilian Conservation Corps vastly in- eased the number of attractions accessible by car, encouraging ch new building types as the motor court and the chain restau- nt. The trailer emerged as a new housing alternative, and chitects were urged to take the lead in designing this intessentially American fusion of mobility and housing. And the rplane emerged as an issue of design, both in the friendly form of e DC-3, introduced in 1935, and heralding a new era in civilian nsportation, and the anticipated bombing in the European war, hich seemed to render urban concentrations obsolete.

ore "public good has come out of the bankruptcy of the economic der," Lewis Mumford wrote, "than ever came regularly out of its st flatulent prosperity." Arthur Schlesinger, Jr., recalled "a se, at once depressing and exhilarating, that capitalism itself was shed." Roosevelt called it "an era of building; the best kind of building—the building of great public projects for the benefit of the public and with the definitive objective of human happiness."

The thousands of state and local parks, housing units, parkways and highways, post offices, and other public buildings produced in the New Deal era still constitute a large percentage of the American public landscape. It is a contribution that is so persuasive that it tends to be anonymous.

Many of the public buildings were executed in the "starved classical" style that Beaux Arts architects had developed to cope with modernity, while more modest structures were designed to be erected by workers with little or no building experience. Many architects were part of the New Deal, either working for various government agencies and private firms that designed its buildings and other structures or, especially earlier in the decade, working in relief-oriented programs on such tasks as building models of historic buildings for distribution to schools. (The Historic American Building Survey is virtually the only such New Deal program that continues to this day.)

Thinking big

The era produced some masterpieces, to be sure, but the society seemed to be focused on a scale that was not architectural. The Golden Gate Bridge, perhaps the most beautiful addition made to any city during the era, transcended architecture. Rockefeller Center, whose origins predated the Depression and was hardly an indication of the fall of capitalism, nonetheless embodied design at the scale of the city rather than the building.

Congress gave the Tennessee Valley Authority virtually dictatorial control over parts of seven states with a land area roughly that of Ohio. Great dams were built, towns inundated, lakes created, new

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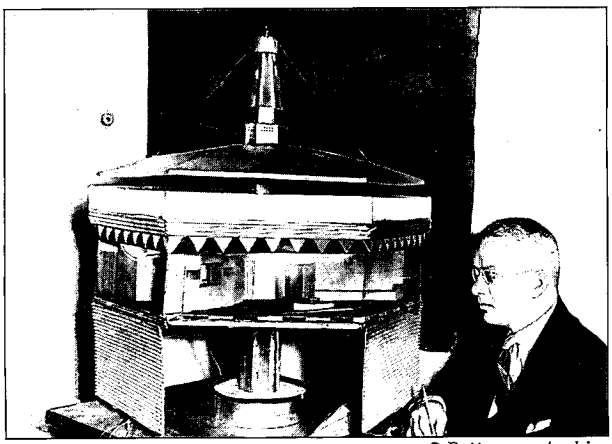

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John Russell Pope's National Gallery (1) *was one of the last manifestations of the Beaux-Arts tradition in the U. S. Although completed in the Great Depression, Rockefeller Center* (2) *was born of the glory years of the Roaring Twenties. With his Dymaxion House* (3) *Buckminster Fuller rethought how houses should be built.*

The Second World War ended the Great Depression and set off a period in which the American industrial machine was able to redirect itself and then outproduce the world.

towns built. The Greenbelt towns of Maryland, Ohio, and Wisconsin tried to convert the advanced thinking about housing and settlements into a new national standard, while other programs strove to create model subsistence communities.

Even RECORD and the other architectural magazines de-emphasized their traditional concern for documenting individual buildings to concentrate on issues of industrial housing production, community planning, highway and park design. Indeed, many predicted that the era of the building was over, and the skill of the architect would come in putting standardized components together.

Meanwhile, such industrial designers as Raymond Loewy, Henry Dreyfuss, and Walter Dorwin Teague were focusing widespread attention on a scale smaller than architecture: household appliances and other useful objects. Such attention to the small had a huge goal—to restart the economy by exciting people about buying things.

Harvey Wiley Corbett wrote in RECORD in 1935 that architects were the only trained and experienced industrial designers and urged his colleagues to "fight off the eggbeater specialist." By the time of the 1939 New York World's Fair, however, Norman Bel Geddes and his fellow industrial designers had surpassed most architects as visionaries of the total environment.

Many commentators noted the irony in 1935 when Frank Lloyd Wright unveiled the model for his decentralized, suburban-agrarian vision of the American future—Broadacre City—in what appeared to be the stronghold of all he opposed—Rockefeller Center. In retrospect, Wright's choice of venue appears the most astute and prescient part of the whole plan. Broadacre City and Radio City were two manifestations of the same already evident phenomenon: physical decentralization accompanied by a centralization of communications through broadcasting and the print media.

It was during the 1930s that Wright used his flair for publicity to become what he still is, the only really famous American architect. He appeared on the cover of *Time* in 1936 with a drawing of Fallingwater in the background. That image of modernity and luxury in the wilderness might be questionable, but it still defines a dream of transcendent domesticity and captures the popular imagination as few buildings ever have. And with the Johnson Wax building, he provided an image of streamlined poetry that graced the company's packaging and advertising for decades.

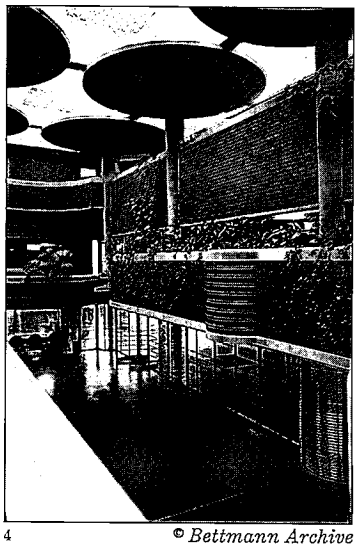
But though Wright was able to re-create himself just after the economy hit bottom in 1933, many architects resigned themselves to a future that would never again be as prosperous as it was in the 1920s.

Recovery was slow. The New Deal building programs and other government inducements helped generate a revival of private construction during the latter half of the decade, and while architecture students continued to press for the elimination of educational methods and teachers who were left over from an earlier epoch, those architects who had survived in the profession turned from social reform to getting the job.

Wartime production

For the economy as a whole, the war is what ended the Depression. But it also ended civilian architecture. Virtually all construction was shut down in April 1942 in an effort to direct all skills and materials to the war effort. While some attention was given, for example, to how war workers' dormitories and housing developments would be used after the conclusion of the world conflict, the main issue facing

Frank Lloyd Wright burst back onto the scene with his Johnson Wax center (4). *The DC-3 airplane* (5) *heralded a new era in civilian transportation, while the Golden Gate Bridge* (6) *highlighted the grand scale of many projects during the 1930s. The 1939 World's Fair* (7) *focused attention on the postwar future even before America joined the war. Albert Kahn's Ford Bomber plant* (8) *epitomized the nation's wartime production capabilities.*



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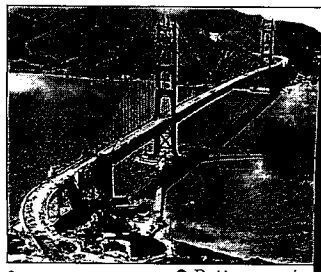


6 © *Bettmann Arc*

ıe nation and its people was producing necessities immediately.

uch wonders of rapid design and efficient production as the Willow un Bomber Plant, designed by Albert Kahn Associates outside Deoit, and the accompanying "Bomber City" where its workers were oused, perhaps best represent this time. The war produced some ew building types, such as the day-care centers and the healthaintenance organizations that grew up in conjunction with aiser's shipbuilding and other war-production activities.

ıe loss of traditional material sources spurred the development of w materials, recycling, and a spirit of improvisation with the maials that were available. The ingenuity of the military nstruction battalions, which included many architects, inspired me contemporary observers to hail the advent of a distinctive Sea-e architecture based on raw industrial components used in expected ways. (Most of the published examples of the approach, ch as the Camp Parks complex near San Francisco, turn out to ve been designed by Bruce Goff, who was doing similar things be-re the war.)

arning to love the machine

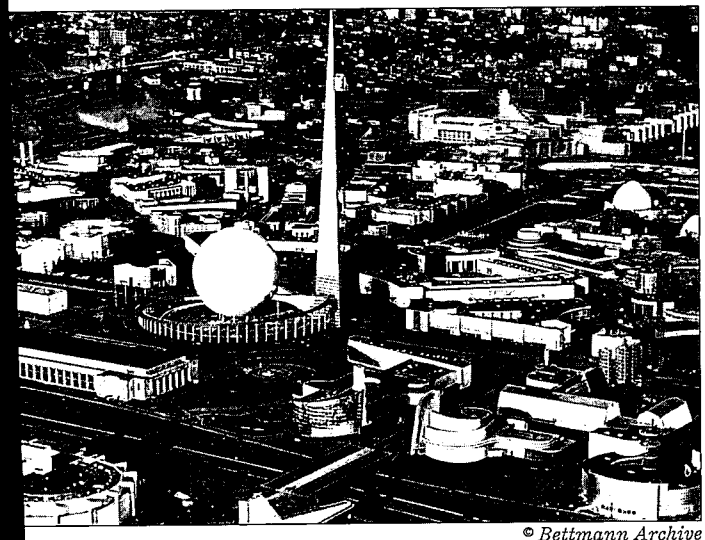
rtainly, the ability of the American industrial machine to redirect elf and outproduce the world was a source of confidence. And en technology works well in a life-or-death situation, it is easy to l comfortable with, and even love, the machine.

rking against the true functionalism that grew from the necessi- of war was the propaganda for the post-war future. This effort, ich began only months after America's entry into the war in 1941, centrated on all those things that the modern thinkers of the 0s had thought were obsolete. It glorified the individual home, d with modern conveniences provided by the same manufacturers who were making the stuff that would win the war. Although the kind of community in which this home would be placed was little discussed, it would be a place of refuge, a place of personal liberty—something like Broadacre City without the architecture.

Soldiers and war workers were encouraged to look forward to returning to a kind of life that they probably had never had, and which America had never been able to provide to very many of its citizens, but which was familiar from movies, radio, and *The Saturday Evening Post*. Fighting to protect your home is a noble reason for war in a democracy. During World War II, Americans were encouraged to go a step farther and fight for a home they had never had. In defiance of the community and regional planning ideals of the 1930s, and despite the best efforts of reformers and social critics who argued against the propaganda for cottage, car, and white picket fence, they succeeded.

And architects, having digested Modernism as an idea during the 1930s and experienced the triumph of technology during the war, welcomed the return of prosperity, clients, and the chance once again to design buildings. ■

Thomas Hine is the architecture critic for The Philadelphia Inquirer *and the author of* Populuxe. *His latest book,* Facing Tomorrow: What the Future Has Been, What the Future Can Be, *will be published by Alfred A. Knopf next month.*



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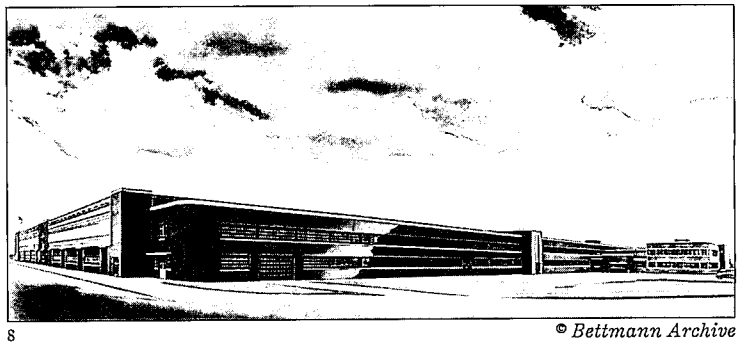


8 © *Bettmann Archive*

1946/1969 Modern Times

It was the era I grew up in. When it began in 1946, I was opening my eyes to the world beyond my own neighborhood in Buffalo. When it ended, I was just out of architecture school. I remember it well. It began with trust in science and progress. Science had won the war with the help of the atomic bomb. Science would win the peace.

How blinkered today seem those scientific beliefs, as you come across them in the pages of RECORD from 1946. In January there was an article on the Lillian Wald public housing in New York. It was devoted largely to the question of how to maximize the number of tenants per elevator per floor. There was a lot of hard-nosed talk like that, about economy of cost and production. There was no talk of style, context, or the way of life of the future occupants.

In 1946, science and reason were going to reform everything. "Houses, Faster and Cheaper" was a feature of the February issue. Fast, cheap housing was needed for the returning vet and his "housewife"—a word now virtually gone from our lexicon. The happy couple would, of course, be living in a single-family house in a suburb. Exemplary houses were shown, by the likes of Neutra, Stubbins, Soriano, and Buckminster Fuller. They exhibited plenty of skill and passion, but no concern for how they would (or wouldn't) aggregate into communities. Certainly no one worried in RECORD about whether the new suburbs would, within less than a decade, be committing murder on the city.

Two sentences give the flavor of that moment of pseudoscience and innocence. The first was by the editors: "With adequate planning, there will be no reason why the city should grow in a different direction from that of its planners." Lots of luck, guys.

The second was by the architect Hugh Stubbins. He was arguing for Modernism. He used the Piazza San Marco as an example, claiming that the architects who built each part of it were always working in the style of their own time, never imitating the past. Not quite true, of course, and things quickly got sillier: "They simply built to the problem at hand in the best and latest way they knew how." How simple it all seemed. An entire half-millenium of debate about architectural style and meaning was ignored in this sentence. Design was a "problem," the building a solution. It was as if you were to reduce cuisine to nutrition. Such a sentence couldn't possibly have been written in 1969, at the end of our period—much less today.

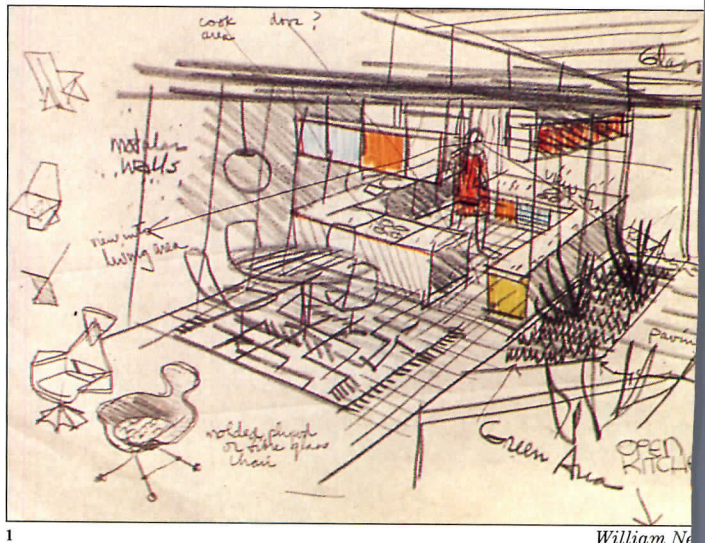
And yet . . . They did build a lot of affordable housing in the late 1940s, though not necessarily designed by architects. That's an achievement that seems beyond us today. And they built good workable schools too, and they worried about sun angles and energy efficiency even though there was no OPEC. Those self-involved suburban houses, including Stubbins's own, were frequently gems. Architects then thought of themselves as serious professionals who were in the business of creating environments for people to live and work in. Rarely did they prefer to regard themselves as subversive intellectuals or esthetic mandarins. Times have changed.

The past, in any case, is always naive. Here is Marcel Breuer 25 years later, at the end of our period, in the October 1969 RECORD, discussing his proposal for an office tower that would demolish the facade of Grand Central Terminal: "There is absolutely no doubt a skyscraper will be built above the terminal." Breuer failed to foresee the concept of transfer of development rights. One way or another, architects always seem to be shuffling along in the dark, blustering confidently as they do so.

The period from 1946 to 1969 is so full, so rich, that it's hard to know how to discuss it. Probably the best way to characterize it is simply to say that for America, it was the era of Modernism. Modernism

July 1946

July 1969


1 *William Ne*

Starting with a faith in the power of science and the rightness of Modernism, the post-war era transformed the face of American cities only to end in doubt and dissent, says critic Robert Campbell.

got started here in the 1930s, but only in scattered examples. From 1945 on, it triumphed. And by 1970, its heyday was past. After that, Modernism remained important, but it came to be seen as an optional style, rather than as an ethical and economic imperative.

Classifications are always reductive. Still, for simplicity's sake, you could say this quarter century of Modernism falls into four segments. You might call them Micro Modern, Macro Modern, Mannered Modern, and Mellow Modern. They overlap a lot in time, but they're helpful as rough categories.

Micro Modern. It arrived in the '40s, with the winning of the struggle to establish Modernist ideas, both in architecture and in urban design. Built examples tend to be small and precious. Most of them are houses. Mies van der Rohe is just getting up speed. Walter Gropius is building his Graduate Center at Harvard, and from his classes at the Graduate School of Design is spinning out a generation of talents like Philip Johnson, I. M. Pei, Edward Larrabee Barnes, and Paul Rudolph. (Gropius's Graduate Center, alas, has been demolished and replaced by Stirling's Fogg extension.) Neutra and his followers are flourishing on the West Coast, where the Case Study Houses are being built for John Entenza. Philip Johnson is designing elegant jewel-case residences in Connecticut.

Macro Modern. In the '50s and into the '60s, Modernism wins big. The streetless Corbusian city of towers, parks, and freeways begins to appear, partly through the efforts of federal urban-renewal programs. Things get larger. Gordon Bunshaft and SOM are the most influential architects in the country. It's a time of Utopianism—of big renewal projects like Ed Bacon's in Philadelphia and Ed Logue's in New Haven and Boston; of the interstate highway system; of whole new cities rising overseas, like Cumbernauld, Chandigarh, and Brasilia; of magical technologies like parabolas and cantilevers and tinker-toy assemblages, and Fuller's geodesic domes, and Nervi's concrete vaults. Philip Johnson collaborates with Mies on a spare Modernist classic, the Seagram Building.

• *Mannered Modern.* Late in the '50s a reaction begins. Architects grow bored with the austerity of Modernism. Urban critics like Jane Jacobs are appalled by its inhumanity. Americans are finding it harder to define themselves by place ("I'm a Clevelander") as they move around more, and as city centers weaken. They begin to define themselves, instead, by acts of consumption, as in the personal ads that now begin to appear: "Loves Bach, Beatles, candle-lit dinners." Designers as diverse as Eero Saarinen, Louis Kahn, Marcel Breuer, and Paul Rudolph experiment with forms that are more richly expressive and more monumental, although still abstract. Brutalism appears. Philip Johnson says, "We cannot not know history" and invents an ironic, plaster-of-Paris version of Classicism.

• *Mellow Modern.* The middle and late '60s are the end of the Modernist heyday. They are an age of political protest and psychedelic hedonism. Experts, whether generals in Vietnam or architects and planners back home, are losing status. The change is signaled by two key events: the passage of the National Historic Preservation Act and the publication of Robert Venturi's *Complexity and Contradiction in Architecture*, both in 1966. The scene is suddenly smaller and gentler, less certain, more questioning, more respectful of the past. Architects who enjoy confusion—like Aalto, with his town hall at Saynatsalo, and Stirling, with his Leicester University Engineering Building—become more influential. The move is away from simple global solutions, away from scientism. It is a move to pluralism, to regionalism, to contextualism, to sensuality, to meaning, and to a reconciliation with history. It is also a move toward personal artistic expression. By 1963 Charles Moore and his partners have created the Sea Ranch, embodying all these qualities. The

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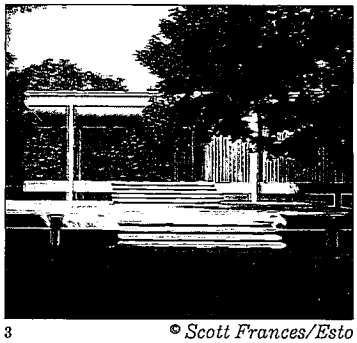


3 © *Scott Frances/Esto*

Ralph Rapson's 1945 Case Study House (1), *Charles and Ray Eames's house and studio* (2) *in Southern California, and Mies van der Rohe's Farnsworth House* (3) *in Illinois reflected architects' faith in the early part of the post-World-War-II era that Modernism could usher in a new way of living and building.*

Architects and the general public reacted to the failures of urban renewal and megastructures in a predictable way: small got beautiful, history got lovable, and incremental change got better than Utopia.

movement called Supergraphics and the British group Archigram are perceiving architecture in a new way: as something temporary and fun and, in part, a media event. For the first time, there are revivalists of Modernism: Richard Meier with his Smith House, Charles Gwathmey with his parents' house. Ecology is just around the corner. So is Postmodernism.

Taken all for all, was it a good quarter-century for architecture? In the long view, probably not. There is no undeniably, absolutely great American building from this era. Louis Kahn's Kimbell Museum would qualify, but it didn't open until 1972. Frank Lloyd Wright was past his prime, though still capable of the astonishing Johnson Wax Research Tower (1949), the Guggenheim Museum (1959), and a number of remarkable houses. Abroad were many masterpieces—Ronchamp and La Tourette, for starters—but not at home. As for urbanism, this must have been the worst single period in the entire history of Western culture, except maybe the grimmest decade of the Industrial Revolution. Americans, without much protest from architects, were enthusiastically gutting the workable old dense mixed-use city. We carpet-bombed it to make space for new freeways, plazas, and parking lots. We sucked its life out, scattering its functions in a new suburban world that, as yet, has failed to achieve an understandable order or form.

Another way of getting a handle on the era is to check the roster of winners of the AIA's 25-Year Award. That prize was created in the last year of our period, in 1969—a moment when, as noted above, architects were beginning to look backward as much as forward. So far, 17 buildings from the 1946-69 era have won the award. (Nothing finished after 1965, of course, yet qualifies.) In order of date of completion, they are: Equitable Building, Portland (Pietro Belluschi) 1948; Glass House (Philip Johnson) 1949; Eames House (Charles Eames) 1949; Bavinger House (Bruce Goff) 1950; Farnsworth House (Mies van der Rohe) 1950; Christ Church, Minneapolis (Eliel Saarinen) 1950; Lake Shore Drive Apartments (Mies van der Rohe) 1951; Lever House (Gordon Bunshaft) 1952; Yale Art Museum (Louis Kahn) 1954; General Motors Technical Center (Eero Saarinen) 1956; Price Tower (Frank Lloyd Wright) 1956; Seagram Building (Mies van der Rohe) 1958; Guggenheim Museum (Frank Lloyd Wright) 1959; Dulles Airport (Eero Saarinen) 1962; The Sea Ranch Condominium (MLTW) 1963; Vanna Venturi House (Robert Venturi) 1963; Gateway Arch (Eero Saarinen) 1964.

The list is suggestive. Only five of the 17 are public works of any kind. This was the era in which the private world first began to supplant the public realm, as it has been doing ever since. The winners represent the progression of periods pretty well: first the crisp Modern houses and office towers, then the more sculptural works like Yale and Dulles and the Guggenheim, then the modest but complex pluralism of the Venturi House and The Sea Ranch. Every winner is designed by a big name: the star system is emerging. Surely, there will be a few more awards from our quarter-century, perhaps Mies' Crown Hall or Kahn's Salk Insititute or Saarinen's John Deere Headquarters. In 1976 Boston City Hall by Kallmann and McKinnell was voted the sixth best building in American history in an AIA poll, finishing ahead of every building that has ever won the 25-Year-Award except Dulles. It's an index of a vast sea change in architectural taste that this rugged, Brutalist, Mannered-Modern structure of 1967 is, today, an unlikely prospect for such recognition.

People today often talk as if the media were a recent invention, but publications have always been central to architecture—from Palladio's books to Norman Shaw's perspectives to Le Corbusier's pamphlets. In 1964 Ada Louise Huxtable became architecture critic of *The New York Times* and architecture became, for the first time, a subject of general conversation. Later in the decade the profes-

Design progressed from the crisp Modernism of Mies's Lake Shore Drive Apartments (4) *to the more expressive Modernism of Saarinen's Dulles Airport* (5), *Rudolph's Yale Art and Architecture Building* (6), *Kahn's Salk Institute* (7), *and Kallmann and McKinnell's Boston City Hall* (8). *By the end of the '60s, it had come to the Postmodernism of Venturi's house for his mother* (9).

4 © *Ezra Stoller/Esto*

5 © *Ezra Stoller/*

sional magazines switched from black-and-white to color, and designers obediently turned on a dime: suddenly they were working in Spectravision, first with supergraphics, then Postmodernism.

Articles like this are supposed to end with sweeping generalizations. A century from now only the broadest trends of 1946-69 will still be visible. To oversimplify hopelessly—as critics do—a couple of them may look like this:

Functionalism into formalism

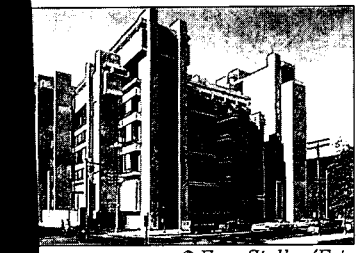
Modernism was always said to be functional. Sir John Summerson defined Modernism, in fact, as the belief that architecture is primarily the act of accommodating and expressing a program. In that regard, it's interesting to note that several of the 25-Year-Award buildings don't function all that well. One is reminded of historian James Ackerman's wonderful definition, that "functionalism is the design of the ostensibly practical." James Marston Fitch once wrote a brilliant diatribe on the wholesale environmental failings of the Farnsworth House. Yet when I took my architectural registration exam, Mies's name was the correct answer to a question that asked, which of several architects was a "functionalist." Without a doubt the Farnsworth House is a great work of art, but its essence doesn't lie in the accommodation and expression of program, except in a purely symbolic sense. Noticing such masquerades, architects over the years from 1946 to 1969 became cynical. By the end, Modernism had been stripped of its original promise to create a better, more scientific world and had come to be seen as just another arbitrary formal style, closely akin, in fact, to Cubist abstraction in painting.

The future went sour

Saint Teresa said it best, "There are more tears shed over answered prayers than unanswered ones." Or there's Lewis Mumford's comment that the Modernists were the first generation to experience the misfortune of seeing their dreams realized in their own lifetime. Modernism won its battle for the opportunity to lead the march toward a better future, then messed up. Its magical technologies are half-forgotten now. Buckminster Fuller's 1962 proposal for a dome over midtown Manhattan seems as preposterously megalomaniacal as Donald Trump's original Television City scheme with its world's-tallest building. Plug-in megastructures no longer stir anyone's juices. The Corbusian city of towers, parks, and freeways came to fruition as the nightmare of highrise housing projects. Brasilia and Chandigarh were measured by humanists and largely discredited. So were the urban-renewed centers of many American cities. New Haven, the flagship of American urban "revitalization" in this era, would probably be better off today if not a single federal renewal dollar had been spent on it. Architects and the general public reacted to all this predictably: small got beautiful, history got lovable, and incremental change got better than Utopia. In a way it's too bad. It's hard to imagine some of the wonderful, daring initiatives of the past being allowed to happen today: the filling in of Boston's Back Bay, for example, or the creation of Chicago's lakefront parks.

When we look back, what we may remember best are not the big ideas but rather our own personal lists of unforgettable places: Edward Larrabee Barnes's Haystack Mountain School of Craft in Maine, for instance. The Sea Ranch. Salk. Kevin Roche's Oakland Art Museum. Paul Rudolph's Art and Architecture Building at Yale, for all the guff it's taken. Pei's early and marvelous Center for Atmospheric Studies in Boulder. Safdie's amazing Habitat '67 in Montreal. The Guggenheim, filled with Kandinsky or Calder. And many others, including lots of houses. None of these, maybe, is a classic on the order of Taliesin East or the University of Virginia. But they're enough to make an era memorable. ■

Robert Campbell is the architecture critic for The Boston Globe.



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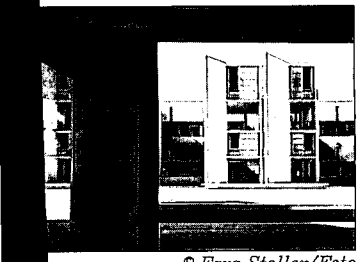

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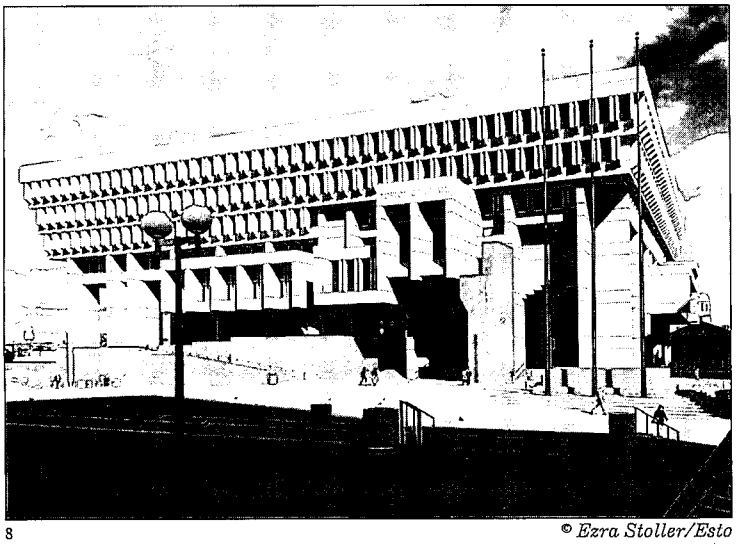

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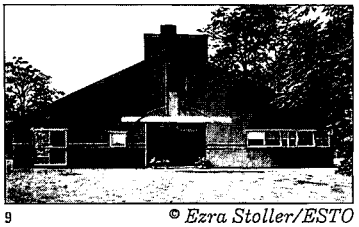

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1970/1991 Doing the Right Thing

The pendulum is swinging from the desire to remake the world to the desire to remake art. Ada Louise Huxtable, 1981

Rather than offer running commentary on the most notorious buildings of the past 20 years, this essay will take a broader look at architecture and the built environment. With Ada Louise Huxtable's premise as a starting point, I shall pursue two areas of investigation: first, the character and quality of the public realm, and second, the evolving relationship between art and architecture at the close of this century.

Let me begin with a fundamental but unglamorous topic: the desperate condition of the American urban infrastructure. The deterioration of public works such as bridges, highways, dams, mass transit, airports, parks, housing stock, as well as nonarchitectural features such as water supply, waste disposal, and energy sources is symptomatic of the "fall of public man," says the social critic Richard Sennett.

Neither the recession of the early 1970s (which led to years of thought-provoking "paper" architecture) nor the architectural expansiveness and private extravagance of the 1980s left much room or concern for the bare essentials of public maintenance. And now that the bull market has gone bust and the much-heralded peace dividend has gone to war, even less public money will be directed toward the common good.

So the recent announcement that the J. M. Kaplan Fund had promised $50,000 toward the seemingly modest project of restoring a 1911 restroom in one of Manhattan's most battered public spaces—Bryant Park—came as a pleasant surprise. Designed in the American Beaux-Arts style by Carrère & Hastings, who also served as architects of the adjacent New York Public Library, the small structure will become "New York's flagship restroom," if only another $100,000 can be raised. Its location on 42nd Street and 6th Avenue, a beleaguered block that has been under siege by drug pushers and the homeless for years, makes the proposed project even more heartening. Yet unfortunately, the Fund's largess is akin to one of George Bush's "thousand points of light," which are for the most part too dim, too distant, and too sporadic to make much of an impact here on earth.

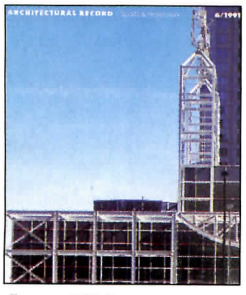
Uniting a nation with roads

To understand this current state of public affairs, we must review a bit of history. When the subject of public works is raised, we immediately think of the incredible technological progress made during the 19th and early 20th centuries. The North American continent was united by waterway, railroad, highway, and, finally, by air. Vas systems (often built, to our collective shame, with what amounted t slave labor) made the resources of the Western wilderness availabl to an intrepid, ever-optimistic migratory population seeking the promise at the end of the rainbow.

With the primary intercontinental linkages in place after World War II, our crowded, worn cities, their public works already long neglected, were abandoned by young families in urgent need of housing. In postwar America, getting from here to there became a overriding concern, and the era of the superhighway, combined wi the grid-locked commute, was underway.

Why did we abandon public transportation and multifamily housin for single-family suburban living? Was it the chicken-in-every-pot syndrome? Was it the individualism characteristic of Americans? Was the movement away from the cities not a search for space bu an escape from the culture of cities, the influx of foreigners, crime and class tensions exacerbated by neglected social and educationa

July 1970



June 1991

1 © *David*

Museum curator Mildred Friedman examines America's deteriorating infrastructure, historic preservation, and the schism between architecture and art.

systems? For whatever reason, Le Corbusier's unrealized Radiant City of towers in the park became the physical (though not the philosophical) model for the "renewal" that decimated American cities in the late 1950s and '60s.

While urban renewal was cutting an unrestrained swath through our cities, three books appeared that continue to have a powerful influence on American architecture. The first, in 1961, was Jane Jacobs's *The Death and Life of Great American Cities*, the second, Robert Venturi's *Complexity and Contradiction in Architecture* in 1966, and the third, in 1972 *Learning from Las Vegas*, by Venturi with Denise Scott Brown and Steven Izenour.

Jacobs and Venturi, et al., have much in common, yet they differ in fundamental ways. Jacobs defends the chaotic city she loves and lives in, and despises the destructiveness of suburban development. She proposes that the process of planning begin with the particular and go to the general (the antithesis of 1950s planning)—it should start with our neighborhoods, nurture their diversity, then treat the properties of each block as a unique collection of friends. Great cities, she believes, need genuine countryside nearby, not the bland, denatured automobile suburbs that are the rule in late-20th-century America.

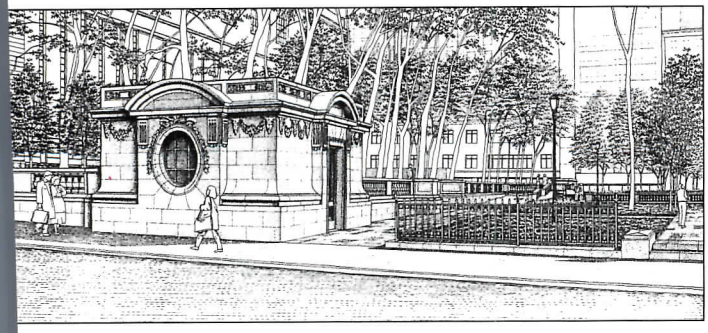
Venturi, like Jacobs, applauds diversity and complexity, and accepts disorder. But in *Learning from Las Vegas*, he and his colleagues go a step further. They extol disorder and coin perhaps their most quoted aphorism, "Main Street is almost all right." The authors go on to a semiological examination of the Levittowns of America, along with the commercial strips and suburban sprawl that surround them. But they do so with a distant eye. They look and analyze, but they don't inhabit these places. They study towns the way scientists examine specimens—at a safe distance. Nevertheless, the attitudes professed by Jacobs and the Venturis bring a renewed humanity to architectural discourse, something that had been lost in the grand schemes of Le Corbusier and America's mega-planners.

Reacting to Modernism

One extraordinary response to the revisionist ideas of Jacobs, Venturi, Scott Brown, and others (such as Colin Rowe at Cornell University and Vincent Scully at Yale) was the historic preservation movement. Beginning in the 1960s with condemnation of urban renewal's destructive impact on the city's fabric, the preservation movement grew to encompass both individual buildings and entire districts. Another response was the revival in contemporary architecture of historicism (primarily 18th-century Neoclassicism), contextualism, and ornament. Along with that revival came a rejection of late Modernism's often arid forms and banal sensibility—features left meaningless with the disappearance of the movement's essential utopianism.

Although it came too late in many places, the effort to retain our great historic buildings and districts has been essential to the partial rehabilitation of city neighborhoods. Urban renewal, which in the 1960s meant tearing down and clearing out, now meant preserving and making the best use of still-useful architecture.

But as monied youth moved in, old ethnic neighborhoods were eroded and often dispersed, and nothing substantive replaced them. Structures were restored but character was diminished. Countless urban shopping malls, aping the suburban model, filled in the empty spaces. With their "cardboard" facades, these vertical retail centers provided a comfortable reminder of the suburbs left behind by the generation moving back to a newly gentrified city. The '80s, one should remember, was the decade of greed, not grace, and neighborliness died along with neighborhood.



3 © *Tim Street-Porter*

A damaged overpass in New York (1) *reflects the deterioration of the nation's infrastructure. Restoration of a public restroom facility at Bryant Park in Manhattan by Kupiec Koutsomitis Architects* (2) *is a small step in repairing the public realm. At Frank Gehry's Santa Monica house* (3) *art mixes with architecture.*

For much of the 20th century philosophical walls have separated the visual arts from architecture. By taking down those walls we will bring renewed energy to both the private and public realms.

The question persists—how can we revitalize the public realm in a period of international conflict and fiscal crisis? In 1988, the National Council on Public Works Improvement published *Fragile Foundations: A Report on America's Public Works*. The report detailed the inadequacies of America's infrastructure and outlined the essentials required to maintain and improve our environment. The report stated that to improve the current situation, we need a 100-percent increase in the amount of capital invested each year in new and existing public works. Robert Heilbroner, in an article for *The New York Review of Books*, points out that for 25 years we have ceased to improve our public capital. To do so now, he believes we need to spend no less than $50 billion to repair 240,000 bridges, $315 billion to return our highways to their 1983 condition, $20 billion for the rehabilitation of our urban housing stock, and $25 billion for our air traffic-control system.

Although these numbers are small in comparison to the cost of the savings-and-loan debacle, neither the leadership in Congress nor the Bush administration has displayed much willingness to act. To realize change in our present circumstances we must make choices. Because politicians have not and apparently will not, architects and planners must take the initiative for moving these issues out of committee rooms and into the public arena.

The other face of architecture

A second topic that has taken on great significance in recent years is the relationship of art and architecture. This subject, a far remove from urban infrastructure, is the essential other face of architecture. Critic Suzanne Stephens has expressed concerns similar to those of Huxtable with regard to what she perceives as the merging of art and architecture. Writing about Frank Gehry's 1978 Santa Monica house, she stated in 1980 that "The combination of a system of elements that belong distinctly to art and one that belongs to architecture creates the basic split and consequent malaise. As a mixed-media work, the melding of forms creates neither a work of art nor a work of architecture, and thus becomes contrived . . . . By appropriating modern art's abstracted relationships and nonobjective qualities for a habitable dwelling, Gehry violated the basic premise of modern art, that it be about art and its own process."

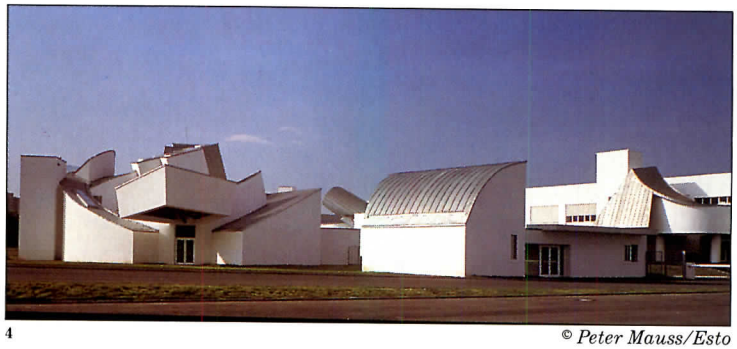
Why Stephens or Huxtable should wish to deny today's architectur its historical role as umbrella for all the visual arts is hard to under stand, for architecture is, by all accounts, the *art* of building. It is abstract and nonrepresentational and involves the relationships of planes and columns, the enclosure of space. It is, in fact, the art in architecture that separates it from mere building, and the recent re turn of art to architecture has separated mere contextualism and historicism from true invention.

The hand of the artist

The architect Henry Cobb, writing about Gehry's work, explains: " . . . he has managed to infuse his buildings with those qualities o immediacy, spontaneity, and improvisational gusto that we custom arily encounter only in works of art that have come directly from t hand of the artist." Cobb goes on to say that it is this aspect of Gehry's work that gives it its distinctive "poignancy and power."

In a 1982 critique of Kenneth Frampton's book *Modern Architecture: A Critical History*, Carlos Perez Gomez writes in a more global vein: "Ever since the time when positive reason became the only 'legitimate' mode of thinking, around the first decades of the 19th century, art, poetry, and architecture have had a difficult tim Although managing to survive, they have generally been denied their traditional roles as paradigmatic forms of reconciliation, as t means 'par excellence' to come to terms with the perennial dilemn of the human condition. In short, their function as symbol has bee

Gehry's Vitra Museum (4), *Tod Williams and Billie Tsien's "Domestic Arrangements" exhibit at the Walker Art Center* (5), *Steven Holl's Milan Project* (6), *Siah Armajani's footbridge in Minneapolis* (7), *and John Hejduk's "Victims"* (8) *all blur the distinction between art and architecture.*



4 © *Peter Mauss/Esto*

5 © *Jeff Goldberg*

put into question. Very often, even today, art is thought of as 'luxury,' ultimately irrelevant for the survival of a pragmatic human civilization: artists and architects frequently reinforce this illusion by engaging in hermetic dialogs that, even intentionally, exclude the transcendental, 'semantic,' dimension of meaning."

Gomez goes on to explain that, "The inception of technological values as the only universally acceptable values, and the peculiar position of architecture 'between the fine arts and the sciences,' has exacerbated the difficulties for the modern architect." In other words, all of the arts—including architecture—have become increasingly isolated from each other and from their traditional role as commentators on the human condition.

Still, it is possible to find distinctive "artistic" leanings in the most challenging architectural works of Gehry and a number of other architects today. John Hejduk, the inimitable dean of the Irwin S. Chanin School of Architecture of The Cooper Union, has always emphasized the art—the poetry—in architecture, and although much of this work is unrealized, he has turned generations of students into architectural iconoclasts.

A new generation

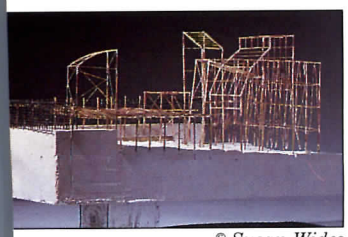
Any number of today's younger practitioners search for relationships among the arts. Elizabeth Diller and Ricardo Scofidio push the outer limits of what is ordinarily accepted as the realm of architectural practice in their various theater and museum installations. Tod Williams and Billie Tsien have brought poetic form into the abstract realm of structural geometry. And Steven Holl, whose experiential approach to urban form is "based on pure data, the essence of things felt, seen and experienced," brings to architecture a sensibility that could not exist isolated from the other arts of this time. The influence of sculpture on Holl's work, for example, comes through in the massing of his buildings and his handling of planes and edges.

It is true that architecture should be, as Huxtable characterizes it, a "business of resolving problems of purpose, structure, space, spirit, style." But does that definition deny the role of art in architecture? It is instructive to recall that critic Lewis Mumford, who wrote the memorable *New Yorker* "Skyline" column from 1931 to 1963, also wrote that magazine's art criticism from 1932 to 1937.

Just as architects are exploring the artistic aspects of building design, many artists today are taking architectural approaches in their work. The bridges of "public artist" Siah Armajani, the urban monuments of Claes Oldenburg and Coosje van Bruggen (which meld art and architecture), and the gigantic earthworks of Michael Heizer and the late Robert Smithson all demonstrate the importance of interdisciplinary exchanges between architects and artists.

For much of the 20th century, however, philosophical walls have separated the visual arts from architecture. By taking down those walls we shall encourage relationships and collaborations that will bring renewed energy to both the private and public realms of our lives. ■

Mildred Friedman was the design curator at the Walker Art Center for two decades until her retirement last year.



© *Susan Wides*

7 *Courtesy Walker Art Center*

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Arthur C. Holden, Architect at 100

Now that over-the-hill gymnasts write their life stories at the age of 16, it is good to review the life of an architect who recently celebrated his 100th birthday, a man even older than this magazine, who leads an active life, writes articles three days a week, and travels to class reunions two states away. To celebrate the occasion, I drove into the hills of northwest Connecticut one fine day last fall to renew an acquaintance with Arthur Holden that dates back past his 80th year. Alert, pink of complexion, and faultlessly dressed in blazer, blue button-down shirt, and bow tie, Arthur rose from his veranda chair to greet me. His sight had largely gone since our last meeting, so the first minutes were spent on cataloging his visitor with the familiar voice and accent but blurred features.

Old enough to have had his parents' house designed by Cass Gilbert (1858-1934), Holden survives all the original Modernists and is still around in the age of CAD and, oddly, in an era of Postmodernist forms Gilbert himself would recognize. Born in New York City in 1890, three years before the opening of the Chicago Exposition, Arthur Holden spent the first 10 years of his life in a house on Riverside Drive. He graduated from Princeton in the class of 1912 with a degree in literature and went on to Columbia for a B. Arch. in 1915 and Master's in economics. At Princeton Holden came under the influence of university president Woodrow Wilson, who sparked his lifelong interest in housing.

Holden: "Wilson got me interested in the idea of social service. The year after I graduated, a Princeton committee of social service was formed among young college graduates. This was Woodrow Wilson's idea—get these men as they come out of college to take a job at a social settlement or a boys' club. We got some 72 men to accept jobs. I was down on Avenue B, on the Lower East Side. There were immigrants from Russia, Italy, and so on. They'd have dances, debates, language instruction. So I got that point of view."

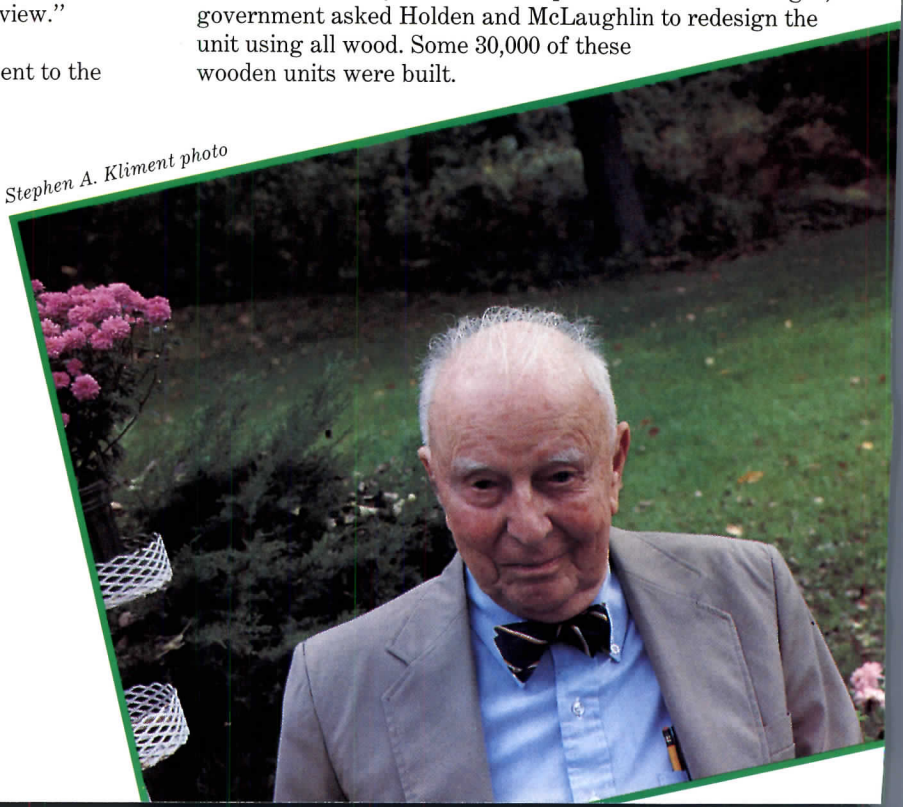
In 1916 Holden joined the National Guard, and was sent to the Mexican border with the cavalry. He served there for a year.

Holden: "When I got back, I realized we were going to get into the war, so I got a job in the Brooklyn Navy Yard. I found myself there with 14,000 men in an industrial plant. I got a job in the shop superintendent's office. They wanted draftsmen, and for two years I was converted from architect to shop draftsman. It was a wonderful experience. It got me into the industrial point of view and how it affected people."

Holden married Miriam Young in February 1917. The marriage lasted 60 years, until Miriam's death in 1977. There were three children, seven grandchildren, and nine great grandchildren.

In 1920 Arthur went into private practice, and remained a sole practitioner until 1930, when he formed a partnership with Robert McLaughlin, who would later serve as director of the Princeton School of Architecture. The partnership lasted 24 years and focused on housing and schools. The Depression began to hit hard around 1930. Holden weathered it by scaling his office down to six people, and doing work for public clients such as the New York City Housing Authority. He also recalls "living happily" in a huge house he designed for a private client on the Eastern Shore of Maryland.

Holden's social and financial interest in housing was matched by partner McLaughlin's work in prefabrication. In 1932, McLaughlin founded American Houses, Inc., for the manufacture of prefabricated houses, and in 1940 he founded a research laboratory in Bedford, New York, to study building technique. The findings were applied to the design and construction of defense housing. The units were originally framed with steel channels, with 4-ft-wide wood panels held in place by aluminum strips. Due to steel shortages, the government asked Holden and McLaughlin to redesign the unit using all wood. Some 30,000 of these wooden units were built.



Stephen A. Kliment photo

Student under Princeton president Woodrow Wilson, friend of Wright and Mumford, Arthur Holden tells Stephen Kliment of notable incidents in a long life.

At age 87, Holden decided to "retire" to rural Connecticut, near the small village of Washington. There he dictates articles on architecture and finance three days a week, has the newspaper read to him, and listens to audiotapes.

Many famous people's paths crossed Holden's.

Holden: "I was very fond of Lewis Mumford. His understanding of architecture was superb. He wasn't an architect, but he was a superb critic. He was genuine. I don't think he ever did anything just for personal advancement.

"I knew Wright pretty well. He always said what he meant and liked. He was very lovable, but I thought he suffered from too much adulation. I never gave him any adulation and I think he was really fond of me. I enjoyed his friendship."

Economics and finance have fascinated Holden all his life, dating back to his economics studies at Columbia. Over the years he evolved a series of theories about the links between money and building. He sees finance as a man-devised system of measure that records the contributions by individuals. Dispelling public ignorance in the subject, says he, would end up with the public supporting a more long-term approach to legislation. Yet Holden is a romantic at heart. In 1965 he published *Sonnets for My City*, a 230-page hardbound volume of poems interspersed with chunks of prose on art, economics, banking, and politics.

His connection with ARCHITECTURAL RECORD goes back to April 1931, when he wrote an article lambasting architects for ignoring the less glamorous aspects of their profession. He also is cousin to Thomas Holden, a former president of F. W. Dodge Co., which McGraw-Hill bought in 1962. He did Tom's house:

Holden: "Tom said he lived in an altered American farm house. He said he bumped his head all the time and was damned if he'd live in that type of house. He wanted one built so all the rooms were at right angles. Now his wife said she wanted a view of certain pine trees from the dining room, which happen to be on the west end of the house, and she wanted the morning sun in the room. So I said you'll have to build the house in the form of a crescent moon. And damned if we didn't!"

Holden's views on architecture and style are eclectic:

Holden: "I always refuse requests about what's the best piece of work. It depends on what day it is, what time, what year, because a certain building is significant at a particular time, but then it loses significance as time goes on. Naming periods is ridiculous. They come, and they change."

We went into lunch, a solid meal of pea soup, salad, bread, cottage cheese and sliced tomatoes, yogurt, apple sauce, and tea, and after a look at some family photographs, including one of Arthur aged 2 in his house on Riverside Drive, I set out to leave with:

SAK: "Well, I don't want to take up any more of your time."

Holden: "You can have my time until I drop. I can outlast almost anybody."

SAK: "You look very well. What's your secret?"

Holden: "If you have something to do that's interesting, then you're part of something. I've had a happy life. People come to me with secrets and wishes that they have, and I've had a wonderful experience listening to people."

As Holden wrote last year in the *Princeton Alumni Weekly*: "While there is life, we all continue to grow." *Stephen A. Kliment*

Future Talk

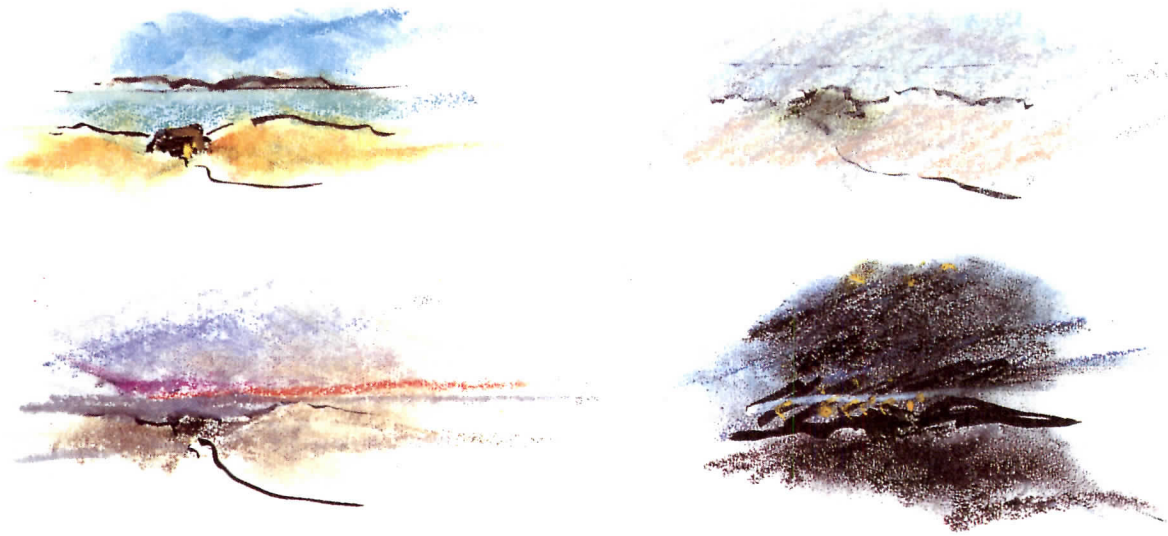
Editor's note: This article is based on the roundtable discussion "The Future of Design," held at ARCHITECTURAL RECORD*'s offices on March 7 and moderated by Stephen A. Kliment and Clifford A. Pearson. Participating were: Deborah Berke, principal, Deborah Berke Architects; Paul Goldberger, cultural news editor and architecture critic,* The New York Times; *George Hartman, partner, Hartman-Cox Architects; Gregory Hodkinson, principal, Ove Arup & Partners; John M. Johansen, principal, John M. Johansen Architect; Antoine Predock, principal, Antoine Predock Architect; Bernard Tschumi, dean, Columbia University School of Architecture; Billie Tsien and Tod Williams, principals, Tod Williams Billie Tsien Architects; Robert Watson, architect, Natural Resources Defense Council. Comments from Elizabeth Plater-Zyberk of Duany Plater-Zyberk Architects were made in a phone interview.*

With the construction industry mired in recession and a long list of environmental concerns threatening to become full-blown crises, architects today speak of the future in guarded tones. Grand visions of progress and sparkling new cities—such as those conjured up by Daniel Burnham, Le Corbusier, and Robert Moses—are clearly out of favor in 1991. Having shed the starry-eyed idealism of the City Beautiful Movement and early Modernism, today's architects are both more pragmatic about their profession's role in society and more aware of its past mistakes.

Instead of planning utopias, architects are trying to respond to the dangers that current development patterns pose for the future. Although people in the design field often differ, they speak with a single voice on the need to create buildings, neighborhoods, and cities that consume less energy, release less pollution, and devour fewer natural resources. While technological advances from previous eras (the internal combustion engine, climate-controlled buildings, and foam insulations made with chloroflurocarbons, to name a few) must take some of the blame for the state of the world's environment, it is future technological developments that must help clean up the mess. Not surprisingly, much of the Roundtable discussion centered on the role of technology, economics, and the environment in the coming generation of architecture. As Paul Goldberger stated, "I see the twin issues of economy and environment unifying design. They are not just about money and fresh air. They are about the idea that resources are finite."

Another theme that ran through much of the discussion was responsiveness. In a time when economics, development, and pollution seem to be out of control, many people are calling for design that responds to the individual needs of users and not the generic building formulas of developers or the stylistic prejudices of architects. In the future, so-called "smart" technologies may react automatically to changes in either external or internal conditions, offering users greater control over their individual environments. Instead of emphasizing mass production of identical items, building-products manufacturers may be able to use sophisticated robotics and computer technology to customize building components on a regular basis. At the same time, architects may be asked to be more responsive to the needs of individual clients and users.

Pervading the discussion was an understanding that architecture is but one element in a world of interrelated parts. While design, ecology, demographics, and politics often seem to be operating on independent levels, they all affect each other. Specifying a product such as asbestos, for example, set off a chain of events with severe impact on people's health, corporations' finances, and politicians' legislative agendas. As a result, architects will increasingly take a more inclusive approach to design, analyzing a greater variety of conditions and factors before releasing their contract documents.



In a future threatened by environmental disaster and short-term thinking, architects may be forced to bring a more integrated approach to design.

In general, participants in the Roundtable were wary of identifying forms or styles of architecture that may evolve in the next 10 to 25 years. Having just experienced a decade when image and surface seemed to be the most important aspects of many new buildings, participants wanted to stress the underlying forces driving design. Although several architects at the Roundtable prepared drawings or models for the event, they warned others about taking these illustrations too literally. Explaining his drawings of a striking kidney-shaped building (below) designed to be environmentally responsive, Gregory Hodkinson, for example, said, "It's intended to be a theoretical project that engenders some discussion and debate. Nobody is actually proposing we build this."

As Robert Watson reminded everyone, buildings usually stand for many years. "Architecture has to have a vision of the future because, whether we realize it or not, we're always designing for the future," said Watson. "If we design with a positive view of the future, then our designs will reflect that belief." Elizabeth Plater-Zyberk struck the same positive chord. "The future doesn't just happen," said Plater-Zyberk. "We must guide it. Frankly, I'm not interested in predicting the future, as much as I am in shaping it."

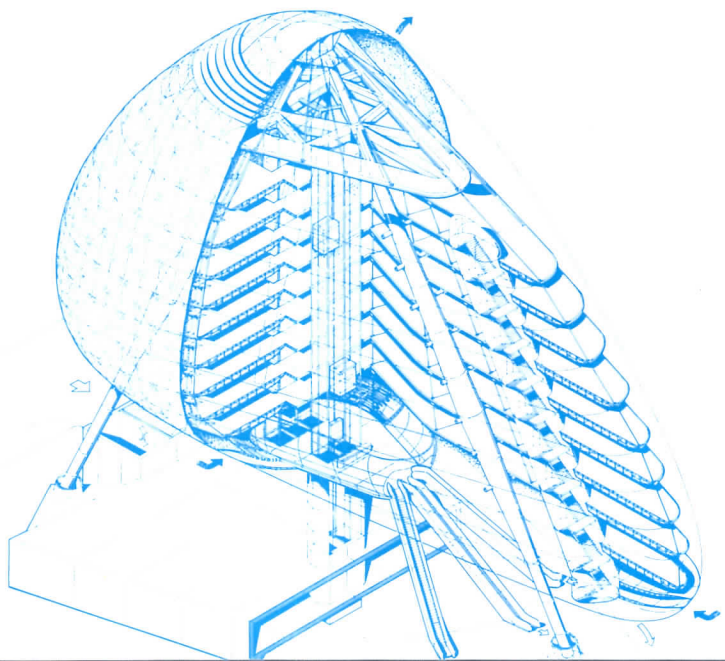
The Greening of Architecture

"The environment is the key issue," stated Hodkinson. "The realization that resources are finite and that we are, in fact, permanently affecting the environment will be the overriding concern in the way we produce buildings, the way we organize our industries, and the way we structure our transportation system."

Such concern will influence a broad range of building and design decisions, from "the materials and energy used in constructing buildings to the energy required in operating the building and making it habitable," said Hodkinson. One place to start is to understand a building's setting. In a series of colored drawings, Antoine Predock emphasized the importance in the design process of the natural context and the passage of time . The four drawings (opposite below) show the view from a site in California that overlooks a meadow and Monterey Bay. The sketches capture the sense of the place at four different times: on a sunny afternoon, at sunset, as fog rolls in, and at night. Predock stressed the need for architects to "sit on a site, put their butts on the ground, feeling and sensing the spirit of the place." Predock's appreciation of site stems in part, he said, from living for 35 years in New Mexico, a place where "the geological presence is palpable. Your feet feel time. You can sense the land moving through your body."

While many buildings seem to defy nature, standing perfectly erect in the face of strong winds or cantilevered in opposition to gravity, a theoretical office-building project by Ove Arup & Partners and Future Systems let nature determine its form (below). Shaped by forces, such as wind, heat exchange, and sunlight, the structure works with nature instead of against it. The continuously curving form of the building minimizes wind loads, while the double-glazed skin traps air from below, then warms it naturally to help heat the interior. Wind blowing over the building draws hot air out from the top during summer months. Instead of relying almost totally on artificial sources, the designers used light scoops and mirrors to bring sunlight inside. Glass louvers controlled by the building's users allow naturally heated or cooled air to flow inside the offices. According to the designers' calculations, the building would require half the amount of energy needed to build and operate a traditional office structure. "What we were trying to do with this project is understand the processes of nature and then replicate and use them in our built environment," said Hodkinson.

Growing concern for the environment is changing the way we view



Drawings by Antoine Predock (opposite), showing the same view at four different times of the day, underline the need to understand context and site. A hypothetical office building by Ove Arup & Partners and Future Systems (left) was shaped by responding to natural forces such as wind loads, heat exchange, and sunlight.

"Buildings may work as the human body does, with sensors acting as a nervous system and jacks as muscles."—John M. Johansen

the world and our place in it, said John Johansen. "Our society is beginning to see our earth less as a Cartesian-Newtonian machine and more as a living organism," stated Johansen. As a result, Johansen sees architecture becoming increasingly organic in both its physical expression and in the way it performs. Cybernetics, the science of automatic control systems, eventually will imbue buildings with two faculties to date found only in living organisms, asserted Johansen. These characteristics are: self-organization, the ability to interact with neighbors and the external environment, and self-regulation, the ability to maintain an internal equilibrium. "We're moving into a new period in which a new architectural vocabulary will develop out of the technology of electronics and controls," said Johansen. "We have moved from statics to kinetics and now to cybernetics."

Postulating further, Johansen said that buildings in the future "will be semirigid structures that will be able to respond to wind loads and changing live loads thanks to networks of sensors that act as an artificial nervous system and jacks that work as the building's tendons and muscles." In other words, buildings will work more and more as the human body does. In addition to responding to their internal and external environments, these buildings will react to the demands of their inhabitants, opening doors or windows on voice command, for example.

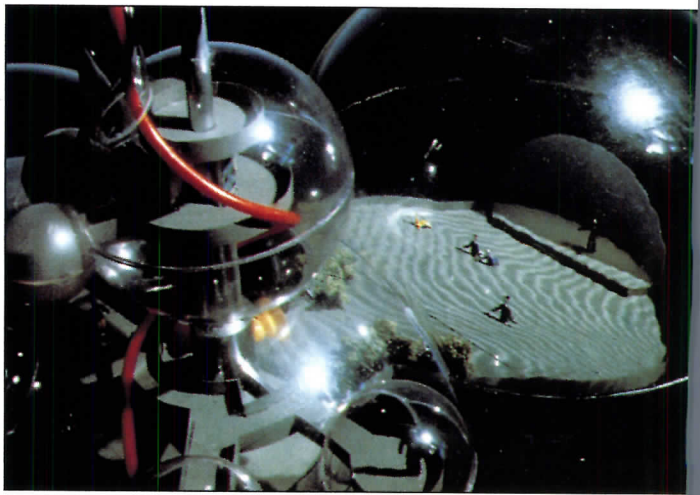
The web and the bubble

Imagining what these buildings might actually look like, Johansen developed models of two different hypothetical conference-center projects (below)—the first, suspended by cables between the World Trade Center's twin towers, the second, built of inflated bubbles that act as "living membranes." Quoting futurist John Naisbitt, Johansen predicted that the network will replace hierarchies as the preferred model for organization. Johansen's cable-suspended conference center, designed as if it were a web, is a physical representation of this kind of network. His membrane conference center would be a "froth" of air-inflated bubbles extending from a collapsible mast. By sending an electrical charge through the bubbles' membranes, operators of the building would be able to change them from opaque to translucent to transparent and adjust their insulation values and gas permeability. Because both of these projects involve lightweight structures, they would require perhaps as little as one-half the amount of materials needed to build today's typical buildings.

Still, Predock warned about becoming too infatuated with technology. "In the 1960s and '70s passive solar design became a fetish where I was practicing and became an excuse not to do architecture," said Predock. "It became an excuse, for example, not to have windows in a north wall, even though there might be an extraordinary view from there." Looking to the future, Predock said, "To trot out new devices, new Stealth diagrams—as beautiful as they may be—will be soulless unless an artist is doing it."

While most of the Roundtable discussion focused on new construction, Watson reminded participants that "if we're going to make a difference environmentally over the next 20 years, we must deal with the vast stock of existing buildings and reduce the amount of energy and resources they consume."

Watson pointed to the example set by his employer, the Natural Resources Defense Council, in retrofitting an industrial building in Manhattan and converting it into the agency's offices in 1989 [RECORD, October 1989, pages 128-133]. By reducing lighting levels to 25 to 30 footcandles (instead of the more typical 50 to 75), improving wall insulation to R-11 and roof insulation to R-30, installing thermally broken double-hung windows, and replacing old radiators with smaller ones with individual controls, the NRDC was able to



From left to right:
Antoine Predock
Bernard Tschumi
John M. Johansen
Deborah Berke
Paul Goldberger

duce the building's energy consumption by 70 percent. "That was using three-year-old technology," said Watson. "Using the best technology available today, we could reduce it another 20 percent."

As a nonprofit organization, the NRDC had to make sure all of this energy efficiency was also cost-effective. It was, asserted Watson, in part because the technology used had been commercially available for at least a year. Good technology, though, only goes so far. "The technology could get us about two-thirds of the way to where we got, and then good design took over." In addition to saving energy, the architects specified products that emitted minimal toxic gases.

Encouraging higher densities

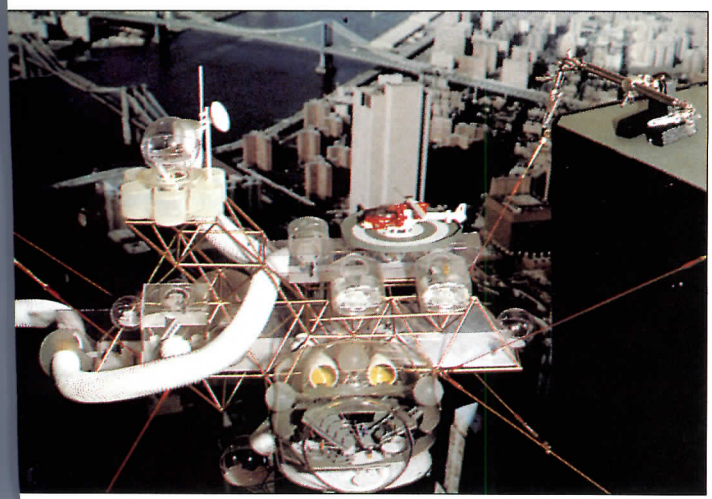
Perhaps the most important factor affecting the country's overall energy efficiency is its pattern of development. Sprawling suburban development requiring extensive travel by automobile not only wastes energy, but is a major source of pollution. "Cities are actually quite resource-efficient," stated Watson. "If you look at the energy consumption of the people in New York City, for example, relative to the rest of the country, it's about half." Although Manhattan might not be an ideal model, Watson said, "I would argue for higher density rather than lower density. Higher density is much less resource-intensive."

As for residential development, Watson recommended areas with densities similar to Brooklyn, where 4- to 6-story walk-up and elevator buildings predominate. Other suggestions included adding more trees along streets and building or maintaining good mass-transit networks. "We won't be able to get rid of cars, but I think one of the pernicious effects of television is to enhance the myth that driving is a free and open-road experience, when in fact, the bulk of it is bumper-to-bumper, sucking other people's fumes. As long as we continue to glorify the wide-open road, we are ignoring reality and ignoring the future." If America's suburbs are to be transformed into more attractive places to live, explained Plater-Zyberk, "we must provide the public realm that is missing now. The public sector will have to get back into the business of building places where people can meet, where a sense of community can develop. We can't leave it all to the private sector."

For at least the next 20 years, the United States should focus on infill development, "to increase densities and shorten supply lines for services that people demand, whether they be education, entertainment, or transportation," recommended Watson. The scale of development will have to be "more compact, more human." If we don't change development patterns, "then we're going to get our rear-ends handed to us, as the planet becomes increasingly unruly," says Watson. "We need to make choices because otherwise an unforgiving series of natural systems will make choices for us. It's either pay now or pay later. If we pay later, it's going to be a lot more expensive."

The building process itself may also change in the next couple of decades. While standardization of parts has been characteristic of modern industries for much of the 20th century, this may change. "I think we are coming into an age of advanced manufacturing processes," said Hodkinson, "in which retooling and robotics will make it possible once again to have components produced on almost a custom basis." There will be a more direct relationship between designer and manufacturer, added Hodkinson. "We're already seeing it between the designer at his or her computer and the fabricating shop. Eventually, we may get to the point where we can actually have what we want rather than what we can get from the supplier."

Deborah Berke hoped that a combination of "assembly-line technol-



Two projects by John Johansen demonstrate how buildings in the future may respond to their external and internal environments. The "bubbles" (opposite) would be inflated fabrics or "living membranes," changing in transparency as conditions warrant. The "web" (left) would be a lightweight structure suspended by cables between existing buildings.

"The pendulum seems to be swinging toward increasing control by clients, users, and the public."
—George Hartman

ogy and robotic technology" would help make housing available to more people. Her office is currently working on using modular housing in innovative ways, assembling manufactured boxes in a variety of configurations: attached, detached, and stacked (drawing below). In the past, such manufactured housing has been stigmatized by its image of cheapness and uniformity. "One way to free the making of the form," said Berke, "is to change the names we use for labeling or to make the names more descriptive of the function rather than the history of the space." So instead of "kitchen," "bedroom," and "living room," Berke used words such as "food preparation," "body storage," and "entertainment."

Not all of the Roundtable participants were as sanguine on the subject of technology. Expressing reservations about some architectural offices' heavy commitment to computers, Bernard Tschumi wondered if such investments would push designers toward standardization. "Once they have put in a certain amount of information in a computer at great cost, they find out it's much easier to retrieve the information for their next building," said Tschumi. "When they need a staircase, they just get the staircase file and use that, rather than designing another one." As a result, a new kind of standardization has developed, said Tschumi, "a standardization of thinking."

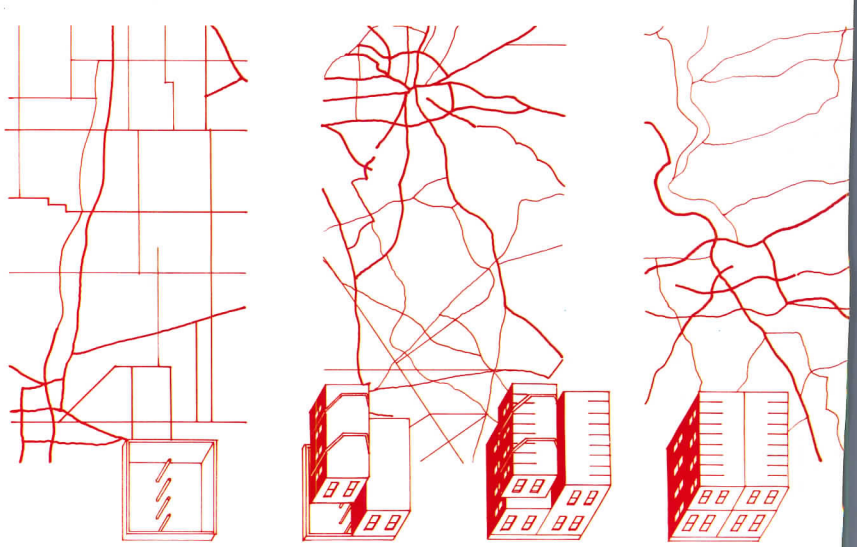
Changing demographics

With the ethnic mix of the United States' population increasingly diverse, architects and planners will face a variety of issues touching on race and culture. "One of the greatest contributions of the last generation" of architects, said Goldberger, "was reestablishing the idea of a sense of place, rediscovering the importance of context, continuity, and to some extent, historical style." How does the traditional sense of a place change as new populations move in? How does a new ethnic group adapt to the existing order? In some ways, the situation is analogous to the debate over what language to use in teaching immigrant children—English or their native tongue? As Watson explained, the country can respond to ethnic diversity by encouraging either integration or assimilation, creating either a collage of various ethnic groups or a melting pot where cultural differences are reduced. In the future, the emphasis will probably be on integration, said Watson, on finding a way for African Americans, Asian Americans, Italian Americans, and so forth to work together, but without losing their own identities.

To deal with this diversity, Johansen suggested that architects get to know the primordial symbols that appear in all cultures and religions: for example, the bridge, the tower, the cave, the house, and the forest of trees or columns. Because these symbols are timeless and common to all peoples (according to the late anthropologist Joseph Campbell), they might be used by the architectural profession to bring different groups together, said Johansen. Although Postmodernists have claimed to use traditional forms that have dee cultural associations, Johansen criticized their efforts as mostly superficial.

One reason for the Postmodernists' alleged failure to create architecture with more meaning, said Tod Williams, was that "one wa addressing the issue of image rather than content." According to Williams, "at this point in time, one needs to go back to the issue o content." Another problem stems from the public's misconception architecture, explained Berke. Not only does the public have a fuzz picture of what architects actually do, but media such as television tend to distort images of architecture. "If you watch television, yo will notice a disjunction between what is presented on the exterior a building and what is inside," asserted Berke. "For instance, on th *Cosby Show*, the family lives in a rowhouse in Brooklyn. Yet when you enter the house, there is a window on the side where there car

Providing affordable housing for a greater number of people will continue to be a priority over the next several decades, says Deborah Berke. Her modular housing project (right) is one attempt at meeting that goal. A cartoon by George Hartman (opposite) pokes fun at the role of the architect.



From left to right:
George Hartman
Tod Williams
Billie Tsien
Greg Hodkinson
Robert Watson

be no window. So what all of America is subliminally told is that disjunction between exterior and interior is perfectly acceptable. So this idea of a continuous understanding of building no longer exists in the minds of the public. Maybe this is one reason for the excesses of Postmodernism."

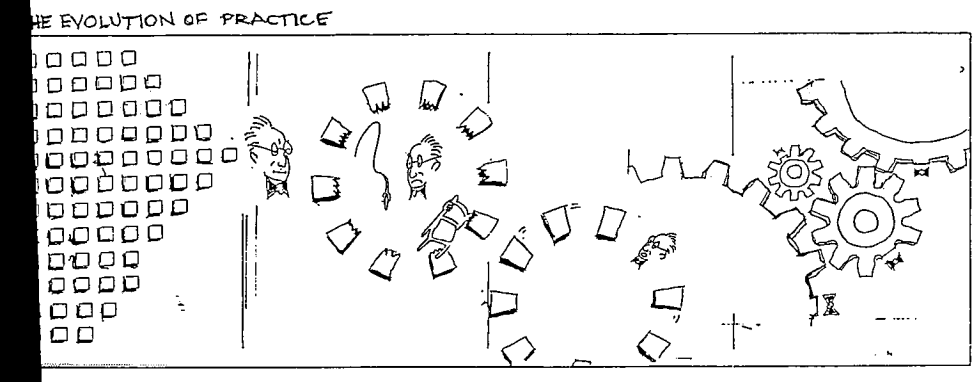
Neutral boxes for hybrid functions

This disjunction between inside and outside, added Tschumi, may have something "to do with the skins of buildings that don't quite reflect what is happening inside." Considering the growing number of hybrid buildings in which the functions of railway station, museum, shopping mall, and health club, say, are combined, Tschumi wondered, "What kind of envelope are you going to have? What kind of symbol?" One solution that Tschumi sees being used more often is "the neutral box—not in the sense of the Modern movement's glass boxes—but something like a television set: the black, perfect box that can accommodate every fantasy or every dream." Supporting his approach, said Goldberger, is the attitude that "even the most brilliant and successful architect does not, cannot, and ultimately should not design and choreograph the life that goes on within the buildings he creates." While Frank Lloyd Wright may have scolded his clients for rearranging their furniture without his consent, today most design professionals agree, "it is not the architect's job to run the lives of the people living in his buildings."

In fact, the pendulum seems to be swinging toward increasing control by the client, the user, and the public, said George Hartman. In a cartoon he drew for the Roundtable, Hartman shows the architect's role changing from that of a lion tamer or circus master, whip in hand, to that of a cog helping to mesh or engage various wheels. "I'm suggesting that maybe architects should relate to the public," said Hartman. "Our country has decided, for example, that waging war is too important a decision to be left to the military," he added. "But once we decide to go to war, we are smart enough to let the military do it. Similarily, what is to be built shouldn't be left to architects. But once we decide what to build, architects turn out to be good people to design it."

Wary of generalizing on the future of design, Billie Tsien said "the making of broad statements is in a way antithetical to being an architect, because what we do is so much about being specific." But she added, "What I hope to see in the future is an architecture that is in some way formed by a more specific kind of humanism."

Such a humanism might come about as a more cooperative and inclusive approach to architecture—one that integrates the needs of different groups of people (clients, users, the public at large, and future generations) and weaves the built environment in with the natural environmet. Architecture might develop into the practice of symbiotic relationships, said Johansen, herding unrelated groups and functions so they work better together than they would separately. While architects may fear that the habits learned from decades of mindless sprawl and insensitive development will be difficult to break, talk of the future still beckons with hopes of a design profession more attuned to values such as community, resource conservation, and environmental responsibility. *Clifford A. Pearson*



Office Shakeup

"We are moving forward to the future master-builder role of the past," says architect Dennis Neeley, president of software developer ASG. "One individual will have the knowledge and power to understand and control the entire architectural process." Too strongly put? "With a single computer model, or database, rather than a collection of separate paper documents," agrees Harvard Graduate School of Design's director of computer resources, Erin Rae Hoffer, "the architect will indeed become a master builder."

There is less agreement on the extent computers will change how architects work. "The major impact may be the different ways we execute our projects," says Hans-Christian Lischewski, director of CAD services in the New York office of Perkins & Will R + S Health Design Group. "But many aspects of the design process will not change," says Hoffer. "Task substitution is relatively easy," observes University of California professor Charles Eastman. "Complete integration into a firm's work will yield larger benefits."

Architect Charles Thomsen, president of 3D/I: "Someone comes in and automates a manual approach to save time. That doesn't work until you do the task differently." Architect Richard Price, director of Consulting for Architects/CADD, Inc.: "A debate about the extent that CAD will revolutionize architecture demands a lot from what is, after all, just one more new technology. But CAD does offer change of unprecedented scale—new ways of creating and visualizing work." How soon will such a breakthrough occur? Architect Charles Davis, head of Davis Associates, sees future change as "dramatically rapid." What will it be?

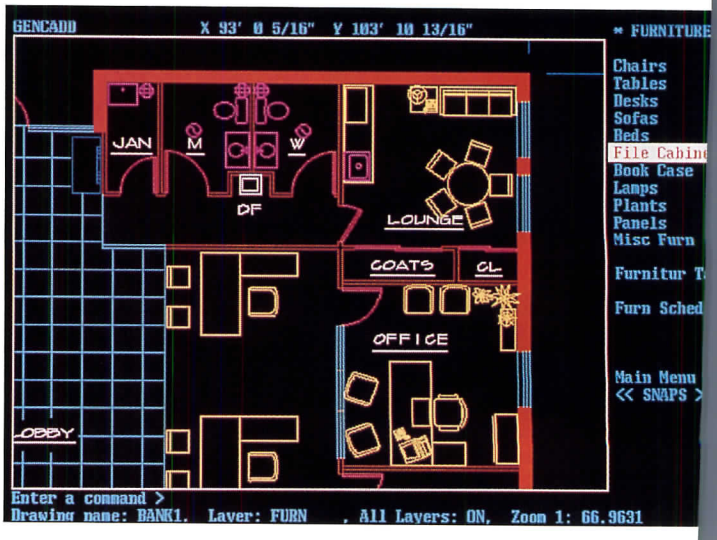
Speed and planning help in working-drawing production

"With CAD, the time needed to do working drawings will depend on the time needed for decisions and coordination, not the time for drawing," predicts Davis. This may increase pressures to produce contract documents quickly, he adds, implying a quandary computers could be backing architects into. "Artificial-intelligence programs will help us make judgments about what we are trying to draw by recognizing, for example, patterns in commands, or by suggesting a solution that worked for a similar problem," says Kevin Lippert, founder of CAD consultants Design Systems and publisher of the Princeton Architectural Press. Neeley is even more far reaching: "The results of analysis programs may be used to draw drawings automatically."

"A working drawing is a little like a haiku," says Kristine Fallon, president of Computer Technology Management, Inc., an A. Epstein Company. "It requires much concentration to distill communication down to a compact form. As construction becomes more complex, and conceivers and constructors more combative, computers will produce the nonambiguous, complete, and accurate working drawings that architects will need." Joseph Brown is managing partner of architects and engineers, Everett I. Brown, which claims to be the first firm to design a building totally with computers. He sees major changes ahead in 2-D production. "What we have now is a basketful of programs, some related in series, some isolated, that only solve very specific problems especially in the interface with engineering. Total automation of working drawings will occur by the end of this decade."

More flexibility, alternatives, and back-up in schematics

"Beyond programming, architects prove their greatest value in schematics. That's where applications are likely to see the most advance," observes Davis. Designers will be automatically made aware of the program and code requirements, and cost and mechanical-equipment consequences of their design decisions as they make them. If we define the problem incorrectly, no amount of subsequent good fortune, effort, and talent will help us solve the true problem."



Basic planning and drafting programs become faster, cheaper, and more "intelligent." Here, a package priced under $1,000 from Generic's new low-cost GenCADD line.

No one doubts that CAD and a host of other computer applications will shake up the way buildings are designed and built. But how? To find out, ARCHITECTURAL RECORD *calls on 12 experts.*

"Traditionally, CAD has been weak in preliminary design," says Neeley, "because, when it is necessary to be 'loose,' CAD is restrictive. However, software will be demonstrated this year by several developers specifically aimed at designers' use in preliminary design." [See A/E/C Systems review this issue.] "Pen-based technology," adds Price, "will help architects mimic the relative fluidity of sketching." Brown: "The general output of CAD is vectors. A designer can now use pixel technology to sketch, but conversion from pixels to vectors is difficult at best. The other problem is lack of 3-D friendliness. When both of these problems are solved, designers are going to embrace CAD as a true design tool."

Venturi, Scott Brown and Associates' John Forney: "Our office puts a lot of energy into drawings and we use computers to produce more of them to find more alternatives." Thomsen points to increasingly frequent design delays by clients: "These can run preliminary-design costs through the roof," he says. "Computers can keep design fluid and continually check it against financial and scheduling changes. This is an economic way of dealing with the problem."

A smooth flow of information from schematics to occupancy

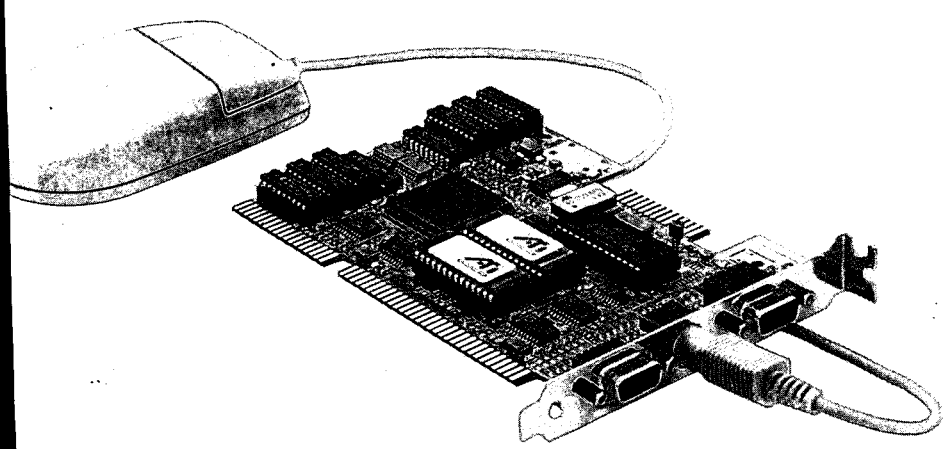
"The same computer model that is developed in the earliest design phases will carry through design development and construction drawings," predicts Hoffer. Says Neeley: "All work will be additive." Davis sees an opportunity through computer use for architects to increase the percent of their fees they collect in the earlier design phases: "What is shocking is that architects place the least value on the time when they make the most important decisions. But CAD's ability to conserve information from phase to phase and improve contract documents should reduce costs during contract administration." "The most significant value to clients of CAD drawings and their related database will be the information that is passed along to facilities managers," predicts Neeley. "Software will tie design, build, and management together." Adds Price: "Several CAD packages are starting to adapt structures derived from database-management software, and construction documents will continue to evolve into databases on buildings."

Creating a smooth information flow by using 3-D

"In design-build construction, typical of tunnels, bridges, and industrial buildings, modeling is typically an everyday design tool," says Eastman in explaining how construction may affect architectural programs. "I expect to see architects' growing use of 3-D models for design and coordination. Eventually, contractors may receive 3-D models from architects instead of 2-D documents. Brown is more emphatic: "3-D will become standard operating procedure in all phases of architectural design before the year 2000."

"The razzle-dazzle advances will be in three dimensions," predicts Lippert. As hardware becomes more capable, more sophisticated software for photorealistic rendering and animation will no longer be the exclusive domain of the largest firms." But Davis is not so sure about the extent to which 3-D will be used for design. "Quick sketches combined with projections in the mind's eye are faster and just as accurate. Shaded, colored perspective drawings are not a great help to designers. But they do make dynamite presentations." Forney: "We use wire frames as guides for hand-drawn renderings. Most architects can think in 3-D. Computer perspectives are only useful for presentations or studying tricky massings."

Neeley is more bullish on costs, timing, and usefulness: "Programs today can create a 3-D model while the 2-D drawing is created. Later this year, there will be inexpensive hardware on the market to do this." Price, too, is bullish: "For architects, 3-D computer design offers a great deal more flexibility than physical models and is potentially more cost effective."



Future flexibilty and customizing with add-on packages such as this graphics card that allows the application of 32,768 colors to screen images. The VGA Wonder XL from ATI Technologies, Inc.

"Because attributes of graphics can now be manipulated between a CAD system, a database program, and a word processor, we may soon revise furniture plans with a word processor." —Lischewski

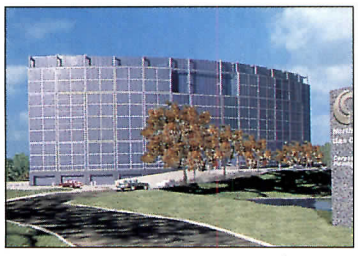
"Most 3-D CAD packages today are not true design *or* marketing tools, but only model-building and visualization tools," asserts architect Ken Sanders, director of computer services for LPA, Inc., whose view differs from the others. "Shaded 3-D images simply don't make the same impact on clients as they did five or six years ago, before widespread computer-generated animation on commercial TV. They lack the interactivity of physical models. To hold in one's hand or to walk around a physical model is the best kind of interactive experience. You can't get inside physical models. Animated film and video generated from CAD databases are free from that limitation, but they lose interaction. Virtual reality [See RECORD, November 1990, pages 28-29] for architectural design *and* marketing remains an intriguing long-term possibility. It eliminates the limitations of both physical models and film/video animation."

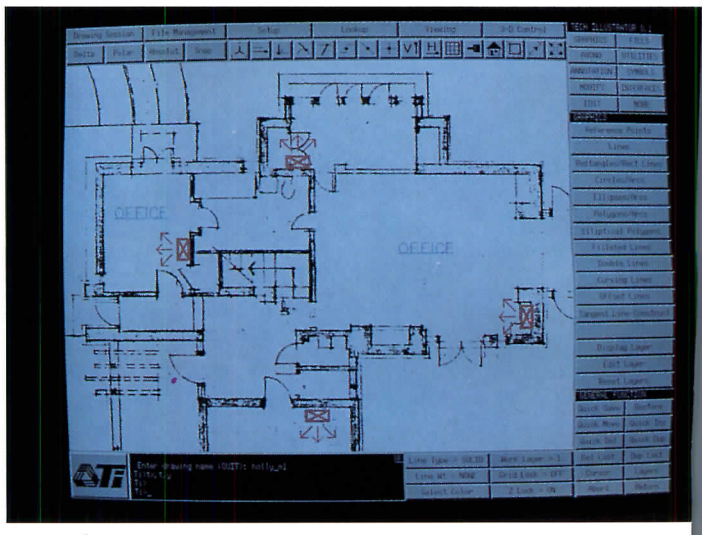
Linking words and numbers with pictures

"Because attributes of graphics can now be manipulated between a CAD system, a database program, and a word processor," says Lischewski, "we may soon revise furniture plans with a word processor. Typical details will be drawn by entering descriptions into a parametric drafting program." He sees opportunities for architects to offer new services through all this fexibility: "Because the computer is a multipurpose machine, it offers capabilities of services beyond traditional architectural activities such as facility management, geographic-information services, computer graphics, animation, and even the design of architectural 'virtual realities' for the electronic-entertainment industry." "Because every project starts out with verbal and written descriptions and many more are added as design continues, it is only logical that alphanumeric databases and calculations will be integrated with graphics," predicts Brown. "Integration of analyses and other forms of feedback into design will lead to better-performing buildings," says Eastman. Davis points to the development needed to make that happen: "From what I've seen, integrated programs so far do not respond to the sequence or manner in which architectural decisions are made. Software must allow decisions to be recorded in the order in which they are made. We need to be able to record the decision in the same terms that it was made. For example, it should be possible to instruct the system: 'Set the finish for all desk chairs in this department, or on this floor, or in stations with wood desks to . . . .' Instead we must identify each item affected by the decision. It is going to take quite a while to achieve meaningful results."

"The technical problems of integrating a network remain intimidating," agrees Lippert. But he thinks the possibilities outweigh the obstacles. "Sophisticated programs, managing drawings and people are beginning to appear. Two are Cyco's AutoBase and 10 CAD's AutoEDMS. The real challenges lie in integrating CAD with the larger workflow of the office. We need to tie-in spec-writing, accounting, and estimating. We need to create graphically sophisticated proposals that incorporate CAD drawings with ease. CAD drawings need to be linked to product samples and information, flexible detailing systems, facilities management, and model-making tools. Why spend $10,000 on a hand-built model when a laser can cut the pieces directly from a CAD system, with far greater precision? Photogrammetrics will make it possible to do highly accurate as-builts with no field measurements."

"A real design tool will allow a designer to interact with a building database in the designer's vocabulary—floor-area ratios, proportions, sequence, site coverage, building systems, etc.," concludes Sanders, "not in computers' current vocabulary of points, lines, shapes, text, etc. Such systems will be integrated through connectivity and networking instead of being islands of automation between which information can be shared only via floppy disk. True integration will not be easy. But we'll get there eventually."





"The job descriptions of management will change. Instead of overseeing the work of others, it will make the decisions and record them." —Davis

Computers' effect on the size of firms and the projects they do

"CAD will extend the ability of small and medium-sized firms to execute larger projects, making them better able to compete with the larger firms," predicts Hoffer. "This challenges predictions that medium-sized firms will be squeezed out, leaving only the largest and smallest." Forney's experience with Venturi backs this up: "Growth in computer use over the last five years paralleled the growth in the number and scale of our projects. We had to learn to produce more work, and the computer became part of an overall change in the size and shape of our practice." Price sees computers as an incentive to stay small: "Given the financial stress caused by fluctuations in work load, many firms may elect to remain small and add capacity through links with other firms and consultants. CAD's ability to transfer visual information will make such links practical."

While CAD lets smaller firms take on larger projects, whether the principals have the competence or not is another matter," observes Davis. In larger firms, the project teams will be smaller. CAD might make it efficient for a larger firm to do small projects, but the levels of hierarchy in large organizations decrease efficiency on small projects. If CAD had been fully embraced by larger firms when the cost per station was $125,000 or even $60,000, the larger firms might have gained so much of the architectural work that small firms would, for the most part, not have been able to compete. Now that a station costs $10,000, it is available to any firm. Firm size will probably not be affected." Sanders agrees: "Other market forces will influence firm size. CAD will simply accommodate the changes."

New office structures and ways of doing things

Designers will gradually replace operators," predicts Lischewski. He sees user-friendly systems taking care of that. "Architects will not have to become computer experts to perform professional services," agrees Neeley. "As hardware costs drop, offices will be better able to achieve one workstation per staff member," predicts Hoffer. "CAD groups, like typing pools, create bottlenecks in information flow and take design responsibility out of the hands of architects," observes Lippert. "One architect-one computer keeps control of a project where it belongs and fully uses computer efficiencies." Davis: "I thought it was easier to teach architecture than how to use the computer. So we hired a recent graduate architect, who was a whiz on CAD, to produce drawings. It was a disaster. He was producing both drawings and mistakes at a phenomenal rate. The nature of the problem is obvious. Manually produced drawings can be seen at a glance and are easily reviewed. Computer drawings are hidden away in the computer until they are plotted." Forney too believes that it is very important to involve everyone in an office: "There's no point to drawing by hand and then inputting it."

"CAD will affect firm structures," predicts Davis. He sees such lower-level jobs as drafting going. "The job descriptions of management will change. Instead of overseeing the work of others, it will make the decisions and record them." Hierarchies will be reduced and principals closer to the work. Does this mean fewer staff? "We find that, as old tasks are computerized, new tasks emerge. Computers don't normally reduce costs; they increase quality." Brown disagrees: "Smaller highly talented staffs will become the norm." Price predicts that the workplace as we know it today may become less important. "We're seeing a lot of interest in an alternative to the daily commute. Many architects are starting to use computers to do a fair amount of work at home." He sees breaking work down into parts to be done by independent people linked by a common database. "It's not inconceivable that the prime architect for a project may become simply a coordinator of work by others."

Certainly the office will change. "The era of the dedicated CAD room isolated from office is dead," says Lischewski. "Our effort to

Far left: Realistic presentations by Holabird & Root using digital image processing. Left: Scanned images speed up renovation drawings. Here, City of Los Angeles architects' hvac work on copied plans of Frank Lloyd Wright's Hollyhock House. Near left: Small offices enter diversified fields with full automation; here, Okrent Associates. Note: no boards.

From left to right:
Richard Price
Kevin Lippert
Hans-Christian Lischewski
Charles Eastman

incorporate computer use in drawing production led us to distribute stations throughout our drafting spaces," notes Forney. In fact, current cabling allows for a computer on every desk. "Our offices were specifically designed to eventually eliminate drafting tables," adds Brown. What does he expect offices to look like? "Local area networks and other communication devices will make office layout a moot point." Hoffer expects offices to be highly flexible, adding: "Large-scale networks will be fiber-based and transmit voice, data, and video. In smaller ones, links may be infrared, eliminating cabling." Davis predicts that, while computers are now often a shared resource, "In the future, drafting boards will be shared."

Advances in hardware and software

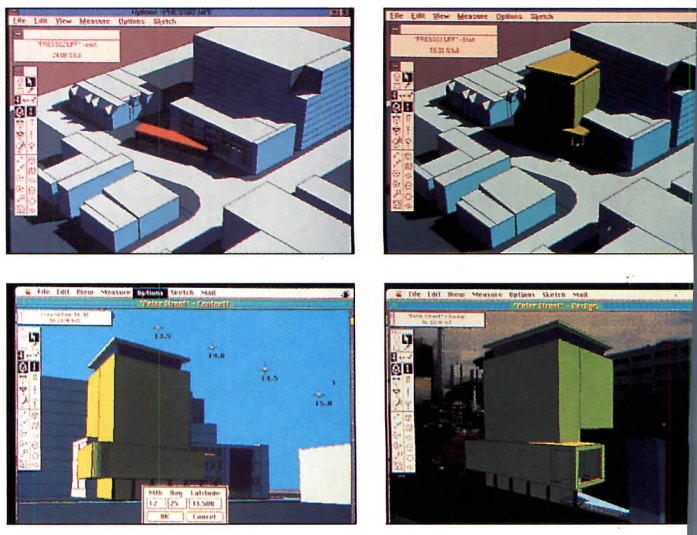
"The office of the future will have various systems configurations, streamlined for specific applications to save money and boost productivity," predicts Lischewski. "There will be task-specific, but compatible systems networked to provide an instant flow of data between them. Only compatible systems will be accepted by architects. New hardware technology will constantly fertilize the development of new software and software enhancements." Eastman agrees: "I expect to see over time more reliance on special architectural CAD applications." Coordination is what will make them work. Price: "Software will be more focused on specific tasks, allowing architects to purchase only what they need."

"Rather than relying on keyboard and mouse input, designers will be able to interact with their CAD systems through multiple channels including voice and touch," predicts Hoffer. "Hardware advances will enable designers to communicate less artificially with their CAD systems, facilitating design conceptualization for analysis and presentation. Software advances will produce more intuitive approaches to the development of computer models. Software developers will augment geometric tools, offering complex surface and solid modeling tools. Most important, software packages will be programmable, so that each office can customize them to reflect how they work and evolve."

Comments Neeley: "Advances in software will exceed advances in hardware." But Price sees plenty of room for hardware improvement. Profound hardware advances will come in solutions to the compatibility problems in communications, predicts Brown. "Hardware and software will get cheaper and more powerful," predicts Forney. Davis is more specific: "In less than 10 years the price-performance ratio has decreased 100-fold. This trend will continue for the foreseeable future. In addition, displays will get bigger; resolution and color capability will increase. With a two- or four-fold increase in speed, computers will be fast; users will not have to wai But increases in speed will be used even more to increase capability than to decrease response times. I can only hope that the new software will aid the architect rather than try to do the architect's job."

"It is difficult to imagine automated architectural design," agrees Fallon, but she sees areas in which smart systems will help out: "A architect working with a schematic floor plan touches each partitio and assigns it a wall type from a menu of options. The walls redra themselves in proper thicknesses. Rather than positioning the wall precisely and adding dimension strings, the architect indicates the desired dimension between two points and other elements position and dimension themselves accordingly. Curtain wall comes from a on-line product catalog. The CAD system figures out how the various wall types intersect. These processes go on in background as t architect continues. Design of the building core is highly automat Because elevators are critical in construction costs, the designer uses the system to minimize the number of shafts while maintaini acceptable wait times, select the elevators, and detail and draw th appropriate shafts. The system automatically generates code-com

Designing directly in 3-D may be the coming direction. The problem so far has been lack of speed and user friendliness. Here, models produced in minutes on a system by Alias adapted from one designed for the entertainment industry.



Charles Thomsen
John Forney
Kenneth Sanders
Joseph S. Brown

ant stairs and toilet rooms, and the architect moves them around until he likes the core design. All the while, the design system is maintaining an inventory of materials, product data, and quantities. It is keying this information to the CSI Index and beginning to assemble the appropriate specification sections." Concludes Sanders: "Inventing new, more-intelligent data structures will be the big opportunity for suppliers."

Keeping design reins in architects' hands

"Computerization will only provide an efficient instrument for design and production," predicts Lischewski. "Quality of design will still depend on individuals' architectural skills, which cannot be learned in a computer class." But: "The precision and hard-line quality CAD is in many ways fundamentally inimical to the fuzzy logic of design," says Lippert. "No great designs were ever made using a drawing template; the challenge for architects is to make sure that design controls CAD, and not vice versa." Davis agrees: "It will certainly be up to us architects to use CAD intelligently as a means of superior mechanical control, which might provide us with ever greater freedom for the creative process of design. The simple answer is that CAD is a tool, which in skilled hands helps an architect or designer achieve their individual goals, whatever they may be."

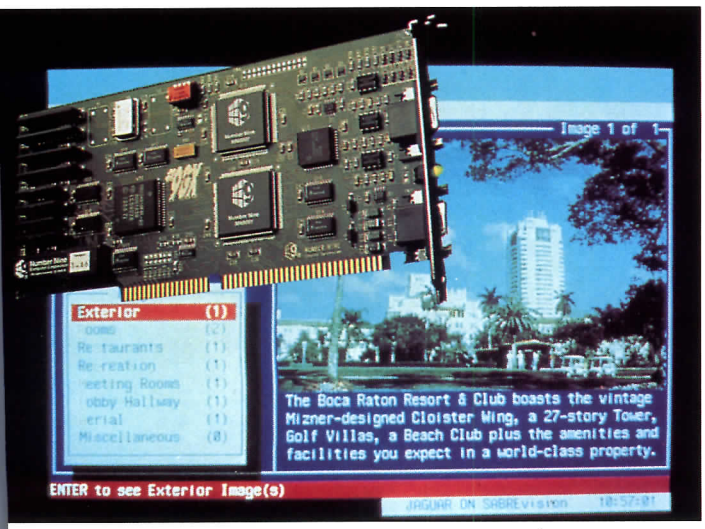
The individual will be able to shine through the technical cloud of codes, estimates, and specifications," predicts Neeley. "CAD cannot make a bad designer good, but a good designer will become better with CAD," says Neeley. Says Forney: "In the short term, drawing standards might well suffer, as it becomes easy to produce finished-looking plots that aren't as disciplined as hand-drawn sheets and experienced architects without CAD capability are unable to influence drawing methodology as completely as they did in the past. In the long term, however, the generation that is now learning computers will receive that experience. And, the standard of drawing could well increase." Brown points to the ease of using standard details as a danger: "The staff may take the easy way out."

Does CAD lead designers in certain directions? "Not really," responds Sanders. "It really depends on the value you place on design. If design isn't important to you, CAD can be used to rubberstamp a lot of stuff. If you value design and the unique problem solving of each project, you just don't let rubberstamping affect you."

A few caveats

"There is little consensus on when CAD is useful, profitable, or even practical," cautions Price. He sees a risk in packages that do not meet individual needs: "Comprehensive packages offer a consistent approach to computer use, but all so far suffer from shortcomings and unused features." The computer has generated more paper, not less, observes Forney. "There is no one design or software organization that has said: 'Let's solve the macro problems of design versus the micro problems,' " observes Brown. "The degree to which the evolution of working drawings will affect professional liability," adds Price, "is likely to continue as the topic of much debate." Brown: "The extreme complexities of the profession are enhanced when CAD joins the process." Davis: "CAD naturally discourages collaboration." A person working alone on a screen on drawings that are only partially visible at one time does so in isolation.

"What is difficult to imagine is architectural practices switching over en masse to this way of working," says Fallon. "Resistance to change is the greatest barrier to innovative technology." Price: "There is no indication that CAD will make traditional architectural skills obsolete overnight. As CAD matures and architects become more familiar with its potential, they will adapt CAD to the degree they are pushed by necessity and pulled by curiosity and innovation."
Charles K. Hoyt



Simultaneous display of graphic and alphanumeric information will speed the integration of all systems. Shown is a system developed for travel agents that shows information about hotels along with pictures and maps by SABREvision with graphics by Number Nine Computer Corp.

Academe or Boot Camp?

Participants in ARCHITECTURAL RECORD's education roundtable, "Education of the Architect— preparing for the 21st Century":

Robert Beckley
Dean, College of Architecture and Urban Planning, University of Michigan
Victor Caliandro
Architect
Robert Geddes
Architect and former Dean of the School of Architecture, Princeton University
Robert Gutman
Professor of Architecture Princeton University
David Hinson
Architect
Alex Krieger
Director of Urban Design Programs Graduate School of Design Harvard University
Susan Maxman
Architect and 1992 President-elect, AIA
Jack Naughton
Architect and Assistant Professor University of Illinois, Chicago
Alan Paradis
1990 graduate of Roger Williams College and 1991 President, American Institute of Architecture Students
Patrick Quinn
Institute Professor and former Dean of Architecture, Rennselaer Polytechnic Institute and President-elect, ACSA
Jaquelin Robertson
Architect and former Dean of the School of Architecture, University of Virginia

Others whose input is reflected in this article are:

John Hejduk
Dean of the School of Architecture at Cooper Union
John Meunier
Dean, College of Architecture and Environmental Design, Arizona State University, President, ACSA
Harry G Robinson III
Dean, School of Architecture and Planning, Howard University
W. Cecil Steward
Dean, School of Architecture, University of Nebraska and 1991 President of the AIA
Richard Tavis
Professor emeritus at the University of Illinois, Urbana

The group convened by ARCHITECTURAL RECORD *consisted of prominent educators, practitioners, and students. Their comments were supplemented with input from experts unable to attend the Roundtable in person. The panel didn't agree on all issues, but here are some highlights from the debate:*

- Expecting the schools to produce graduates suitable for immediate hiring is unrealistic and obscures the real role of the schools.

- Each school is unique and should be allowed to remain so.

- The professional office will again function as the place for providing the practical skill

- Current attempts at apprenticeship systems to round out a formal school curriculum are too haphazard.

- Alternative, nontraditional providers of education are happening and should be thought of as part of the nation's educational mix.

Moderators: Stephen A. Kliment *Editor* **Clifford Pearson** *Associate Editor*

I don't think architecture teachers are taught very well to teach.—Alex Krieger

The ability to design is the sine qua non of the architect. But design, for the architect, requires well-rounded competence if it is ever to be realized. I reject the implied opposition, however much I recognize the priority of design.—John Meunier

Panelists at RECORD's *Education Roundtable take a frank look at the future of the architect's education.*

Values, Ancient and Modern

A recurring theme tied much of the Roundtable discussion together: Is the objective of school above all to teach design? If so, what happens to the other ingredients such as practice, technology, history, and theory? One reason to stress design is, as Robert Gutman put it, "it's much more difficult within the confines of the school to teach tasks such as project management." But the student should nonetheless graduate with a clear picture of what the profession is all about, from start to finish. Robert Geddes advocated focus on community values. Students must, he said, be exposed to what he calls issues of social and physical equity, in other words, knowing who gets to build and use buildings. Performance criteria such as user satisfaction and energy performance will augment formal criteria in judging architecture. He found it distressing from time to time to be among faculty who want to be only critical and not involved. "The 'either/or' notion of schools preparing for the profession or not preparing is moot," he added; schools *must* prepare for the profession, but at the same time engage in critical analysis of society and culture."

Teamwork? If teams are the name of the game, why not instill the idea at school? It isn't easy. In team projects, asked Victor Caliandro, do students have the confidence even to understand the nature of the problem and to subject that to the scrutiny and uncertainties of their fellow teammates?

Best on teams are those with the most design confidence, said Jaquelin Robertson. Those without it get very nervous because they're worried their contribution will get lost in the mix. They also are the most combative. Good people are relaxed about working with other people, he added. If you have a mix you'll quickly get a "hierarchical train of commanders and dog soldiers." So teamwork is not as easy as it sounds, nor are problems of grading individuals on teams.

Generalist education? Strongly opposed to specialization was Patrick Quinn. But the marketplace is causing specialization in many schools whether we want it or not, said Gutman, citing programs in real estate research, doctorates for future teachers, programs in writing and criticism, management, and more. But with over a hundred accredited schools, said Gutman, this provides a kind of mosaic, "a pattern of specialization with each school representing a different specific mix of the variety now available." But Quinn sees it strictly as "circumstantial responses to the market," and not the result of "requirement or aspiration."

"You also have," said Robertson, "too many schools competing for a limited pool of decent students . . . One way to get students is to offer programs you think would interest marginal students . . . You generate your income and you stay alive that way."

Few disputed Susan Maxman's view that "problem-solving techniques architects learn in school are second to none, and can be utilized in all different ways without regret." What Richard Travis calls historical baggage militates against a practical focus in the schools. The model has been the old Ecole des Beaux Arts, which was geared to serve the situation of a client who controlled cost and supervised construction, so no one felt a need to have a practical curriculum. This mindset still pervades a majority of our schools.

"It's only in architecture," agreed Gutman, "where the image persists that the school is to provide total training. But in fact the tradition is apprenticeship. The school was introduced relatively late to sort of bolster up the intellectual prowess and theoretical underpinnings of the architect. The first schools in this country did not have their studios in the school. Students went to get their basic training in theory, design, history, and technology in the schools, but then they worked in offices."

No able-bodied 100 percent American hesitates for a moment to form esthetic judgments concerning architecture, and the notion that architecture is created by a sudden frenzy of untaught genius satisfactorily explains his own inability to create beauty.
—Joseph Hudnut, in RECORD, *May 1931.*

In Italy the student works at home, comes to school by appointment for a review, and goes back. This teaches self-reliance.

Tools for Teaching

Central to most curricula is the design studio. The panel felt the system will be with us for some time. Not that it's perfect—Robert Beckley cited a colleague who wanted to eliminate the studio, as he felt it messed up people's values. "I defended it on the basis that it is part of the professional culture—it's the way we work within the profession. It's not perfect, but it does support two phenomena—it deals with problem-solving and form-making, and it uses the one-on-one tutorial approach which has long been a model for liberal education."

The downside is the quality of the teacher, as Beckley said. A bigger concern, said David Hinson, is the manner of evaluation of the student's studio work. Opinions as to the effectiveness of juries differ, as do the marks it leaves on the student. (See page 77 for results of a major survey of the jury system). Said Hinson: "The best juries I have ever been on used the projects as a vehicle for exploring issues of the studio, and less as a way of evaluating whether the student succeeded or failed."

Caliandro cited the Italian system, where the student works at home, comes in by appointment for a review and discussion, and goes back. The final is presented to the head of design. This system helps teach the student self-reliance.

In the last 20 years the idea of *review* has replaced the idea of *jury* in many schools, claimed Quinn. The review is a learning experience, with the faculty involved, and maybe visitors.

While acknowledging the cruelties of the jury system, Robertson contended that the system isn't bad when you figure that "we really get knocked around for the rest of our lives, whether it's by clients, community groups, or whomever. It's useful as a kind of basic training to get used to that and to think on your feet and not to get all weepy when someone criticizes you personally rather than your work. It . . . should remain as a healthy, natural part of what you do."

Quinn called this an intellectual boot camp, but Maxman objected: "We all get chewed up by clients, but it's very different when you've established yourself as a professional than when you're a student and haven't yet gotten your sea legs."

On the other hand, Maxman said, we certainly need to encourage good communications skills and attitudes when dealing with the client, which is very different from communicating with your peers. "You really don't speak to clients the way you speak to juries."

The studio as teaching tool came in for additional comment from Alex Krieger. "If we're going to invent something better than the studio, it had better be something that's both more enjoyable and more rewarding to those who teach architecture. If you teach a lecture course, for example, you get saddled with thirty lectures to prepare and you read some dreary papers at the end of term. But teaching studio is a continuing dialog with a group of students, some always sharp. You see things germinate before your eyes . . . . One reason the studio has such a great hold on architectural education is because it's most rewarding to those who *teach* architecture . . . . I think studios also are fairly easy to teach, maybe not well. You don't have to prepare very much. You just show up with your intellect."

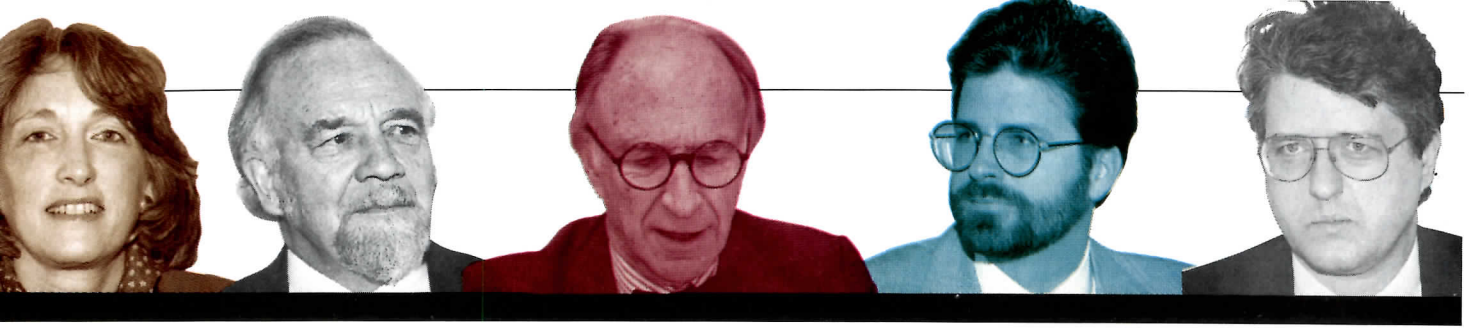
A big part of the studio experience is what students learn from each other. "Looking back on my own experience as a student," said Hinson, "I probably learned as much or more from my peers as I did from the studio critique . . . That characterizes practice as well as school."

How to teach technology came in for its share of debate. Robertson felt both design

We face a crisis. For the architectural profession it is a crisis of credibility. For architectural education it is a crisis of relevance.—Robert Beckley

Only stupid people try to transform the schools they go into.—Jaquelin Robertson

No matter what we do as educators, a good student is going to get a good education.—Robert Beckley



d technology were design subjects. "I ink everyone has tried bringing technol- y into the studio, so that it's seen as part d parcel of how you build—not just in icks and mortar, but as systems. It's a ntral design concern that can't be taken vay . . . . Certainly technology can be ught, as a design discipline, but the hard- t thing again is the willingness and ucational level of the person running the udio. Since a lot of studios are run by ju- or faculty, some of whom have practiced ry little, they often have no idea how to ordinate the issue."

ne method for making technology less ring to the student is to teach it from a storical perspective. Said Geddes, "One n get a great deal of excitement on the rt of students . . . . Ask them, say, to de- gn the technology of the Robie House."

nother way is through biography. "You n't end up slicing the world into conve- ent compartments when you study a hole person," said Geddes. "Through an dividual you can see practice, technology, d design as one whole."

n the other hand, you can cram a studio o full. "There's a temptation," claimed ieger, "to think of the studio as the urse in which everything happens. That automatically makes every other course seem less important." Still, there are ways to do it well, added Krieger, for instance, by expanding the idea of what is a suitable topic for design studio. For example lighting, or housing, or urbanism."

How students learn to communicate verbally is important. Hinson felt this should be part of the architectural curriculum. "In practice and in contact with my peers, it is so clearly evident that those who are able to express themselves articulately achieve so much more than those who do not . . . . If you can talk well, you can find someone in the architectural firm to write it for you."

While agreeing to the need for skill in verbal communication, Geddes pointed out that many "products" of the office are written. He said minutes of meetings are terribly important, both as factors in the decision-making process and because of our litigious society. "Program documents, feasibility studies—all of these require the ability to correlate verbal with graphic communications and with design ideas, and they are the work product of a practice."

"Concluded Quinn: "We are at the richest point in the history of architectural education in the use of language. We are at the lowest point in communication of ideas."

Future

As to the future, Robert Geddes sees continuing tension between the schools and the profession, but feels that's a good thing.

Controversy about schools as vocational versus cultural training grounds will continue. Hinson quoted a friend, architect Mike Price: "If a student enrolls in architecture school for the purpose of being a working architect, then the school has an obligation to work with that student to develop marketable skills. Architecture is a vocational school, not a liberal arts degree. We need to stop kidding ourselves about the breadth of the architecture education."

Yet a talk with Cooper Union dean John Hejduk, and members of the recent accrediting team, revealed an opposite view. At base, Hejduk's focus is on original, independent thinking. Any course, program, or experience that fosters independent thinking is grist to his mill. He abhors fashion, dislikes terms such as 'user friendly,' isn't turned on by computers—"the brain-hand-pencil sequence is fast enough"—and in Maxman's words: "[His students] become incredible designers because they develop an inner integrity and sense of self . . . that allows them to recognize diversity of opinion and technique of design, but keeps their own identity."

Top of page, from left to right:
Robert Gutman
Susan Maxman
Patrick Quinn
Robert Geddes
David Hinson
Victor Caliandro
Photographer: John Ashworth

Ve honor our stars. It's a star system. Vhen someone thinks of becoming an rchitect they don't think of someone who is he greatest spec writer in the world or the reatest corporate architect in the world ho is making buildings happen.
-Susan Maxman

Yet Hejduk's approach seems not to harm the marketability of Cooper Union graduates. These are said to be in demand for their ability to think through problems and applying original ideas to solving them.

Gutman feels schools *as presently conceived* are at a high point of influence, and that into the next century they will become less significant. He sees a greater role for them in post-professional and continuing education.

This shift could reverse the schools' alienation from the profession noted by so many observers. You seldom find discussion in the schools on how practice can be improved, noted Gutman, and how architects should plan their careers.

In medicine and law, more and more training goes on in non-school settings. Eventually this will pervade architecture, although right now, lamented Gutman, "the image still persists that the school is to provide all of these things."

Eventually, the role of architectural offices as training grounds will expand. Some large firms, such as Gensler and RTKL, already run their own professional programs. The American Bar Association sets a good precedent for architects: it has a subsidiary that trains people in the office to provide in-house training to newcomers.

All this means recharging the office's largely dormant role as a formal cog in the training process. Firms will find, noted Hinson, that those issues the schools resist teaching are actually taught best in the office context. He hinted that to compete in the job market, they may have to offer such training.

Nontraditional schools will end up as alternatives to the traditional schools that grew out of the Beaux-Arts mode. Examples of such schools are the Advanced Management Institute for Architecture and Engineering, the Southern California Institute of Architecture, and the CAD Institute's Professional Division.

Likewise impacting the future of schools is NCARB's decision to require a professional degree in architecture from all exam candidates. This will, said Beckley, end up tightening standards to which schools feel they must conform, and risk an undesirable homogeneity. On the other hand, it may end up creating a common core that is accepted as professional.

What about access to the schools? Beckley pointed out that the growing professional emphasis on computers favors students from privileged homes—he calls them the Nintendo Generation—over poorer candidates.

A more serious concern will be the role of students other than the traditional white male. As it is, 29.9 percent of current students are women, and 19.8 percent are minorities. Coming from many cultural backgrounds, what do these students expect from the schools? "Architecture is not abstract form, it is life," wrote Howard University dean Harry Robinson. "To produce effective . . . professionals, education must be involved in the culture that gives rise to its principles, moral obligations, and values."

What this means is educating students for the kinds of clients and typologies they will encounter in practice. And it's a matter of selecting one's heroes. As Robinson puts it, "Are they to be Postmodernist, Deconstructivist, and Historicist, or are they to be the rural poor, urban homeless, native Americans, and Hispanic immigrants?"

Robinson faults schools for running design studios without real clients, "even though their backyards are teeming with social problems that beg an architectural response and can inform a new architecture."

I think studios are also fairly easy to teach, maybe not well. You don't have to prepare very much. You just show up with your intellect.—Alex Krieger

Schools are set up to try to give you the very thing they can't give you, which is to be a superstar.—Jaquelin Robertson

In medicine and law, more and more training goes on in non-school settings. We must revive the training role of the office.

With the growing ratio of minorities, combined with the increasing global marketplace for architectural services, schools will be changing to recognize the new diversity.

Another issue the schools must deal with is cost. Many graduates embark on a career tens of thousands of dollars in debt, and at crippling entry level salaries they may, noted Hinson, end up making loan payments as high as 25 per cent of salary. This is already luring gifted students into alternate but higher paying and safer career options. In response, schools may end up arranging tuition and fees on an 'ability to pay' basis, thinks Cecil Steward.

Whether the school should end up recognizing the individual or the team came in for sharp debate. Alan Paradis argued that the purpose of education is to serve the individual. "I can't imagine an education situation or model that doesn't focus on individual achievement," agreed Krieger.

Jack Naughton objected, noting that the prevailing focus on the individual "pours accolades on the individual for the individual's sake," and loses sight of the social content of an architectural education.

Education's focus on Western civilization is also due for change. Retreat from our schools's endemic Eurocentrism is imminent. As Krieger pointed out: "We're going to see a new internationalism in curricula. Right now [at Harvard] we could fill our entire population with students from the Far East . . . They're aggressive, well educated and interested in the field. We're already seeing demand for history courses in non-European architecture, coming from American students as they mix with students from non-Western tradition."

The demand for post-graduate education will spawn a split into what Krieger called "day school" and "night school." While this will allow a single school to serve two markets—academic and practice-oriented—Krieger feared that the enormous "night school" enrolments vis a vis "day school" will relegate day schools to the role of thinker's paradise, further deepening the gap between the two modes.

The panel saw two added signs in the sky. Growing enrolments, with many students never intending to work as architects, were seen as a good sign by creating a more enlightened client group and increasing what Krieger called "the pool of patrons." He and others also see a remarriage of architecture and planning in the schools. "Curricula will begin to grapple with the very heart of the environment which they have avoided with a passion."

In sum, architectural education is likely to track a scenario consisting of schools that focus on basic general education and some interdisciplinary studies. Practice-specific skills are learned through a network of school-linked "night schools," some nontraditional schools,plus training programs at the larger—and eventually all—architectural offices.

Variations will abound. Steward sees some schools with niche specialty programs, such as management, teaching, facilities management, urban planning, or interior design. He also sees some sort of interactive television system linking some schools, some firms and related units into consortia networks, national and international. He even sees design studios taught by remote instructors.

But what counts, say Paradis and Quinn, two panelists a generation apart, is this: Will the institution cater, in the face of all these pressures, to the aspirations and dreams of the individual for whom the institution exists in the very first place?
Stephen A. Kliment

People are going to recognize that graduating from the accredited degree program is not the end that it's perceived to be now in terms of the learning process, that this technical requirement of a three-year apprenticeship is going to become more and more of a real education experience.—David Hinson

Top of page, from left to right:
Alan Paradis
Robert Beckley
Alex Krieger
Jaquelin Robertson
Jack Naughton
Photographer: John Ashworth

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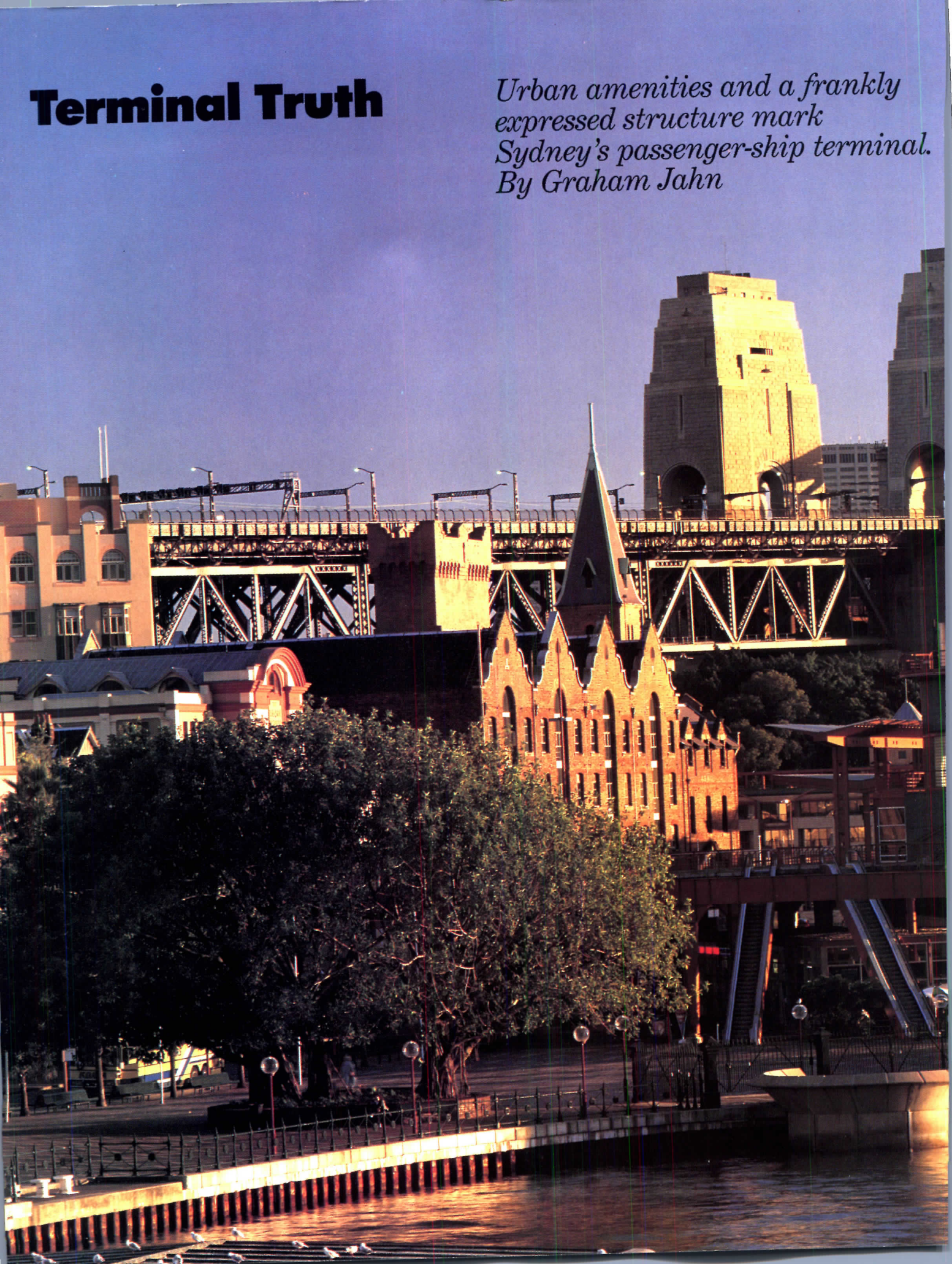
Building Types Study 692 Transportation

Early in this century the wave of economic progress and technological prowess launched by the Industrial Revolution crested in the intricate, intertwined networks that carry our energy and communications, our water and wastes, our freight and ourselves. Today, that aging infrastructure demands expansion and upgrading to meet tomorrow's challenges. For architects, perhaps the most fertile ground is in transportation, and especially in nodes of arrival and departure like those that follow, where the need for public safety and convenience merges with the opportunity for memorable public spaces.

At the Atocha Station in Madrid (pages 222-229), for example, added intercity and commuter lines are quadrupling the capacity of an existing rail complex. To avoid eclipsing the handsomely vaulted 1892 station, new construction is concentrated behind and below it, but surface elements include such resonant forms as a clock tower and a grand entry rotunda at the interface with city streets. Both expansion and public presence also topped the agenda for burgeoning Orange County, California, in building a much larger, high-profile terminal (pages 230-235) for an airfield landlocked by suburban development. In Sydney, on the other hand, the passage of time brought less traffic rather than more to a passenger-ship terminal built in the immigration-heavy 1960s (pages 204-211). The city's response was to refurbish the dockside facilities still needed to service cruise ships, and replace the rest with open space and other well-chosen urban amenities in a maritime mood. On the other side of the Pacific, a similar impulse guided Seattle in planning five bus stations (pages 212-221) along the route of a new crosstown tunnel that speeds commuters through the downtown core: each station became the occasion for extensive, neighborhood-sensitive surface improvements as well. Finally, a pair of utilitarian structures near New York City (pages 236-237) show that even the most modest elements of a transportation system need not be mundane. *M. F. G.*

Terminal Truth

Urban amenities and a frankly expressed structure mark Sydney's passenger-ship terminal.
By Graham Jahn



Overseas Passenger Terminal
Sydney, Australia
Public Works Department of New South Wales,
with Lawrence Nield & Partners

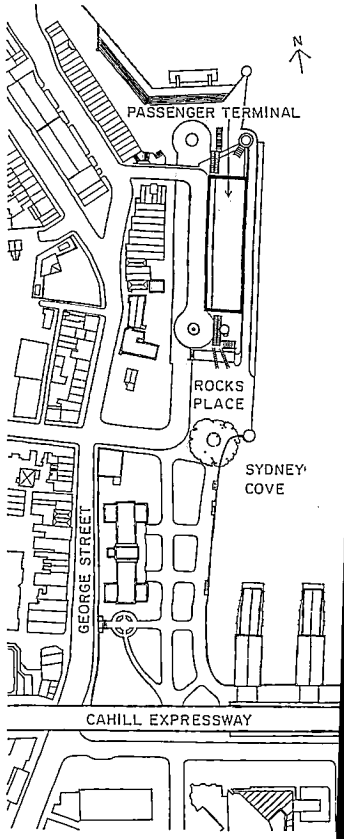
Constructivism, Futurism, and other early 20th-century European architectural movements had little impact on Australian buildings in their time. After World War II, however, institutions and industries, particularly those under progressive expansion, encouraged experiments in stylized abstraction. In 1960, long after Constructivism had lapsed elsewhere, the city of Sydney built a new overseas passenger terminal, placing it strategically between the Harbour Bridge and the recently commenced Sydney Opera House in a seemingly preemptive counterpoint to Utzon's billowing sails.

By the mid-1980s this building—a long, low butterfly-roofed shed—and the entire inner harbor shorefront had become obsolete. Pressures mounted to improve the facility, one being a competition in 1983 to refurbish the passenger terminal and its environs. Through a stroke of good political timing, the Premier of New South Wales started matters by promoting the competition entry of Peter Tonkin, an architect with Lawrence Nield & Partners long recognized for his innovative hospital design.

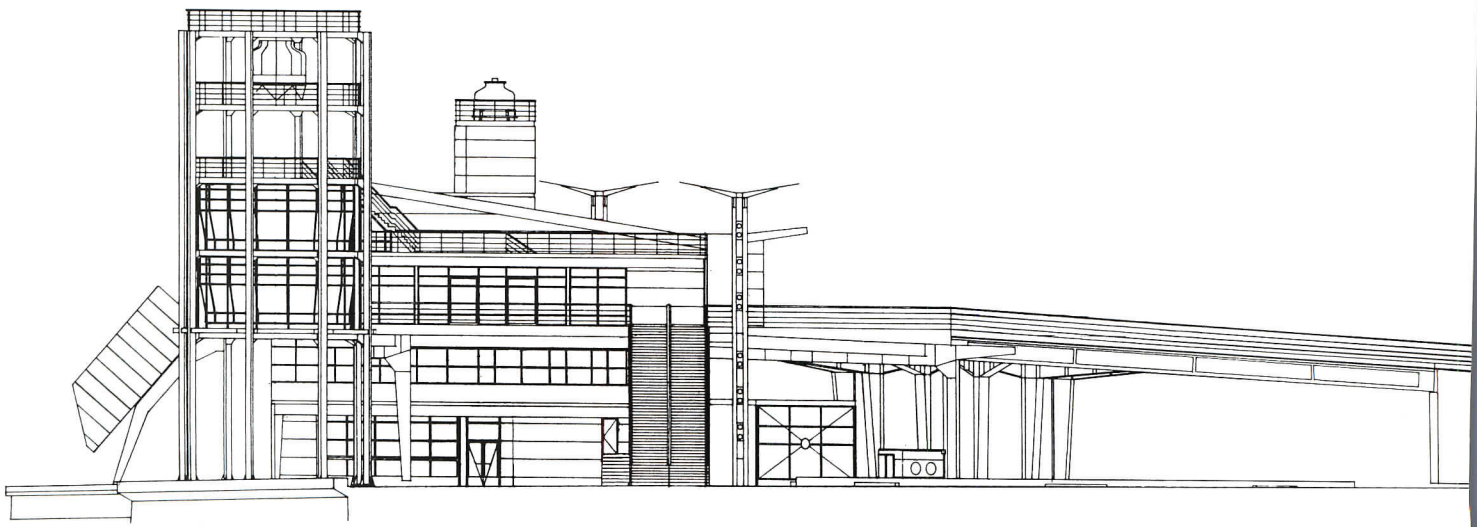
Using a working model, the architects demolished the southern third of the existing building along with a vehicle access bridge to create a generous public open space. They then shrouded the shortened building in a skirt of heavily "structured" elements, including a new elevated turning circle and raised deck-level platforms that facilitate farewells to upwards of 90 cruise ships each year. The model further revealed how removing the existing precast paneling would expose a portal frame of "skin and bones" more appropriate to the desired Constructivist imagery and visual transparency. By contrast, the terminal's eroded southern end, with its funnel tower, axially supported platforms, and splayed legs (escalators), breathes nautical life into the Constructivist images. The architects' design both is muscular and comes with the kind of carefully thought-out urban amenities (restaurants and cafes in the right places, a walkway along the water's edge) that dominate the new urban life along Circular Quay west.

Inside, the architects halved existing cargo facilities (immigration to Australia by ship has virtually ceased) and added tourist-era provisions for restocking cruise ships, together with storage for tax-free liquor (the "dead house"). Additional space for maritime workers and staff, including parking for 90 employees, is discreetly integrated around and below the main hall. A circular tower containing restaurants, services, and a viewing area gives presence to the building (especially seen from across the water). The tower, according to Nield, is just one of "a complex interaction of 'figures' used to develop scale and reference," meaning that certain elements echo and re-echo throughout the project to create a kind of "resonance" of architectural forms.

An architect and critic based in Sydney, Graham Jahn writes periodically for RECORD *about Australian architecture.*



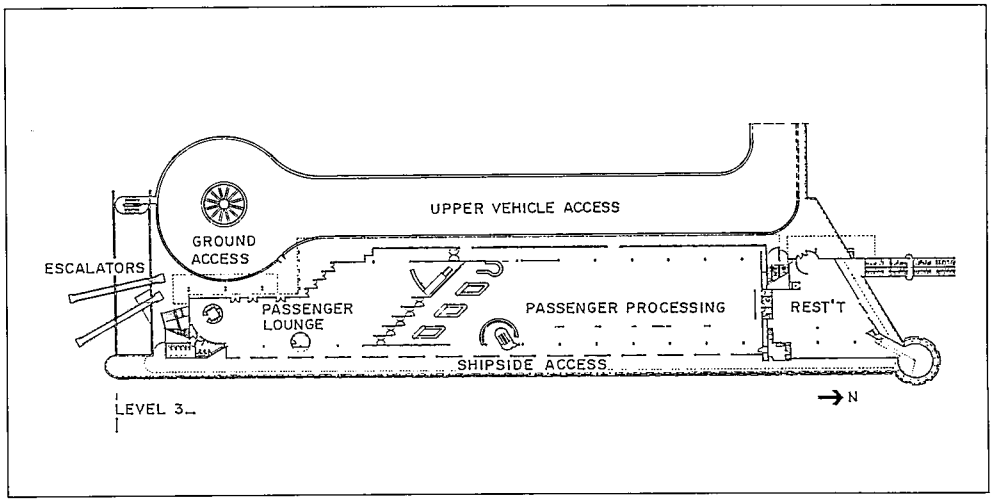
The Overseas Passenger Terminal faces and is parallel to the Sydney Opera House (site plan above and following pages). By demolishing one-third of the 1960 building, the architects created a public area south of the building, known as Rocks Place, that leads to the landscaped areas in front of the new Museum of Contemporary Art, scheduled to open later this year.

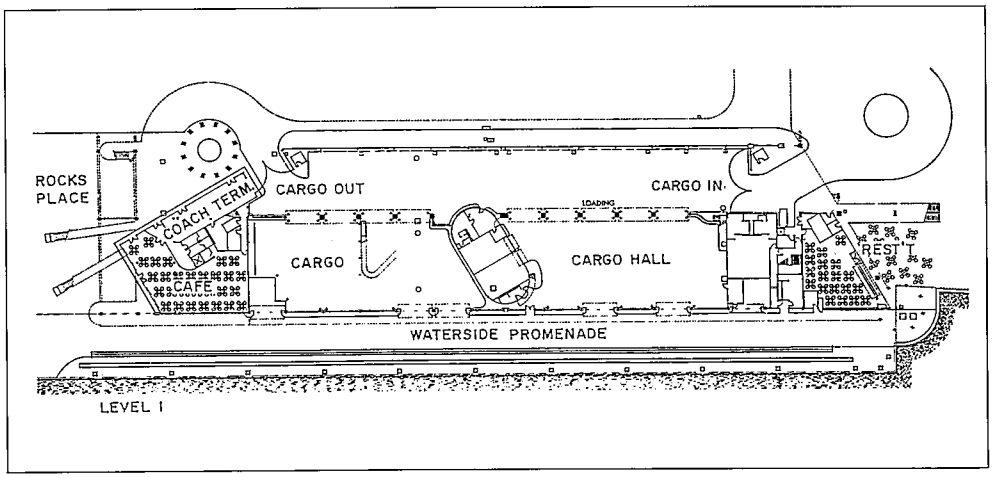


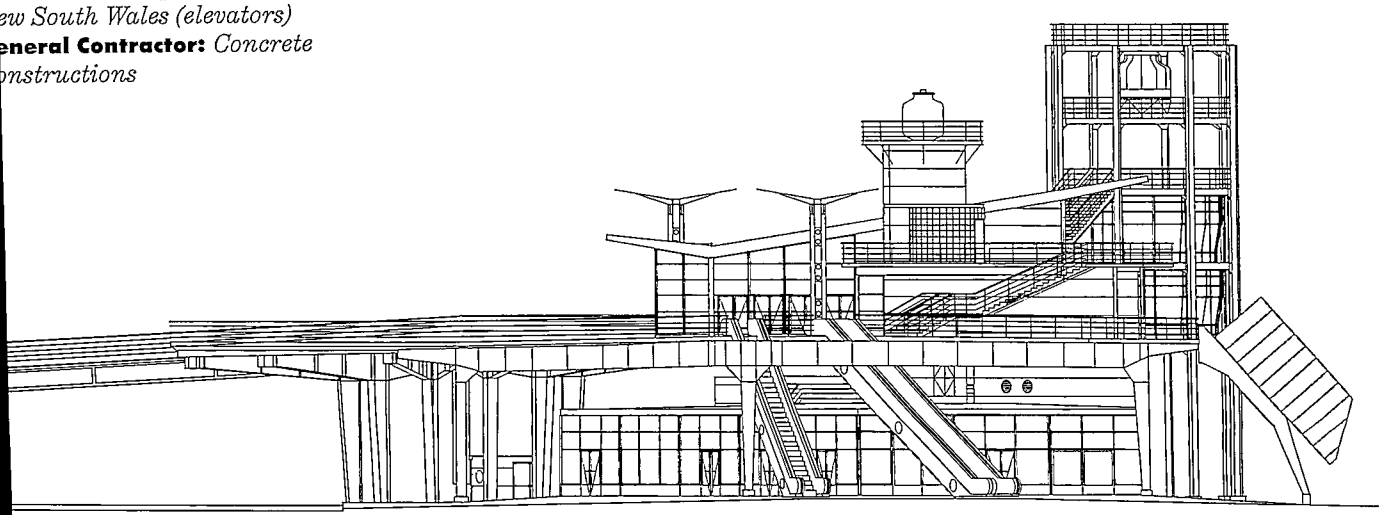
NORTH ELEVATION

After partial demolition, the southern end of the building (opposite) reveals nautical imagery fitting for a passenger-ship terminal. Splayed escalators pass beneath a flying steel beam, blurring the distinction between the terminal and new public open space to its south. Sections (below) clearly depict what the architects call a repetitive "family of forms."

Credits
Overseas Passenger Terminal
Sydney, Australia
Owner: *Maritime Services Board of New South Wales*
Architects: *Public Works Department of New South Wales, in association with Lawrence Nield & Partners—Lawrence Nield (director); Peter Tonkin (project architect); Neil Hanson*
Engineers: *Ove Arup & Partners (structural and civil); Harry Webb & Associates (electrical); Norman Disney & Young (mechanical)*
Consultants: *Thompson Harris & Partners (hydraulic); Lincolne Scott (escalators); Public Works Department of New South Wales (elevators)*
General Contractor: *Concrete Constructions*







SOUTH ELEVATION

Architectural Underground

Teamwork by architects and artists has given a distinct character to each of the five stations in Seattle's new bus-tunnel system.

Seattle's enviable location between Puget Sound and Lake Washington becomes something of a liability in the city's compact urban core, where the land mass narrows to a wasp-waisted, two-mile-wide isthmus. During the 1970s and '80s, congestion on the few north-south avenues squeezed into the bottleneck between Interstate 5 and Elliott Bay became a significant local issue, as residents began to see the city's vaunted charm compromised by day-long gridlock.

Seattle's city fathers foresaw this problem back in the 19th century, when they proposed building a north-south railway tunnel under downtown. In the mid-1980s, the area's regional transportation agency, Metro, revived the idea in somewhat different form, adopting a plan to build a 1.24-mile tunnel under downtown. Instead of trains, however, the tunnel would be used, for the first time in this country, by buses that operate on diesel fuel as they come in from the suburbs before converting to electric operation as they entered the tunnel. The $420-million project, partially funded by the federal Urban Mass Transit Administration, also included major surface improvements along the way—widened sidewalks, street clocks, and street trees with artist-designed grates—and expansion of existing trolley bus operations. The desired result: to reduce the time of a trip crosstown from nearly a half-hour to under four minutes.

The completed system, which has enjoyed steadily expanding ridership since opening last fall, comprises five stations. Each has four entrances, some worked into existing buildings to help ease congestion on the city's narrow sidewalks. The stations are unusual in several ways. For one thing, each was designed by a separate team assembled by coordinating station architect TRA to reflect the sector of downtown in which it was built. What is more, the teams consisted of both artists and architects working together from the beginning of the design process. Metro allocated one percent of the total project cost to art, and in most of the stations it is difficult to determine just where the art ends and the architecture begins.

Buses enter the system from two staging areas: Convention Place station on the north and International District station on the south (map opposite). Convention Place, below ground level but open to the sky, required 50-foot-high retaining walls; the other four stations, by contrast, are fully subterranean. Each station has three bus lanes, elevators providing handicap access, and mezzanines that permit users to go from one side to the other without crossing the busways. Tracks for a proposed light-rail transit system parallel the bus lanes.

The stations are monolithic structures capable of moving with the earth in an earthquake. They were designed not only to resist earth pressures but to also remain stable should pressure be removed by adjacent excavation. Safety and security considerations dictated that the architects avoid columns and re-entrant corners, and provide comfortable lighting levels. Toward the latter end, they focused lighting on the walls of the underground stations for optimum ambient quality and depth perception. There is lighting over all platform edges, while overhead lighting is avoided over stairs and escalators. Fresh air drawn from at least 10 feet above the street level ventilates the platforms of the four underground stations. Acoustical features include perforated metal panels with sound-absorptive insulation and sprayed-on material in the ceilings.

The tunnel itself has 1,200 feet of cut-and-cover line section built 6 25 feet below ground. Another 3,800-foot line section was constructed by boring through the soft earth with mechanized shields at depths ranging from 30 to 55 feet. Within the L-shaped tunnel, buses travel in twin 20-foot-diameter tubes, which are cast-in-place concrete structures in the cut-and-cover section and concrete-lined the bored section. Construction required a waterproof PVC membrane in the liner, compaction grouting from inside the tunnel to limit settlement, chemical-grout and jet-grout underpinning, and three types of dewatering systems—the latter a necessary respon to Seattle's wet climate and water-bound setting. *Donald J. Can*

1. White pipe trusses mark Convention Place station.
2. Buses travel between stations in parallel tunnels.
3. A sweeping vault spans the busways of Pioneer Square station.
4. Walls of University Street station are clad in a collage of granite panels.
5. Colorful tiles produced by local schoolchildren adorn the International District station.

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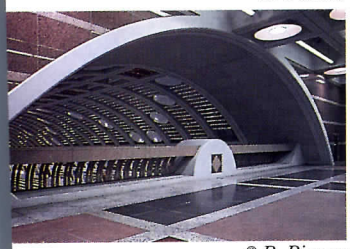

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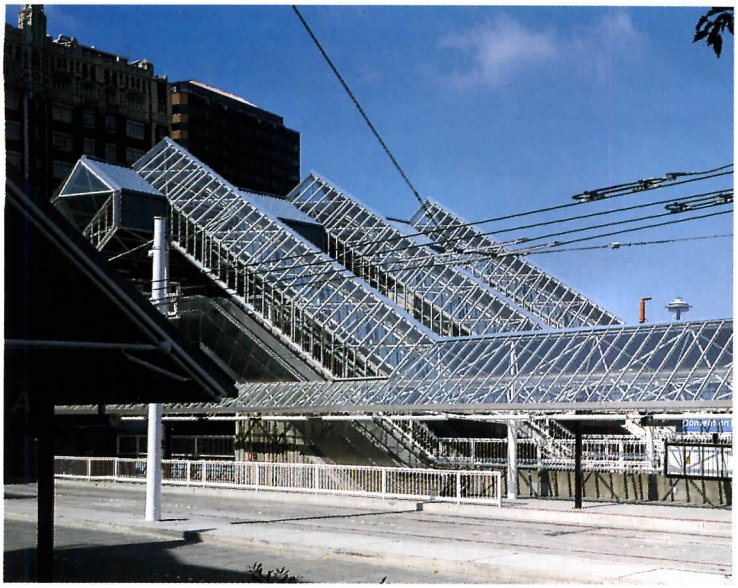
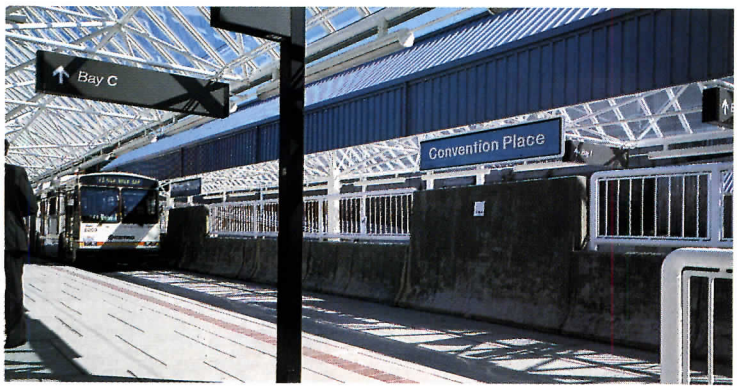
Credits
Downtown Seattle Transit Project
Owner: *Municipality of Metropolitan Seattle*
General Architects and Engineers: *Parsons Brinckerhoff Quade & Douglas—William Barnes and Francis Edward Elliott, project directors*

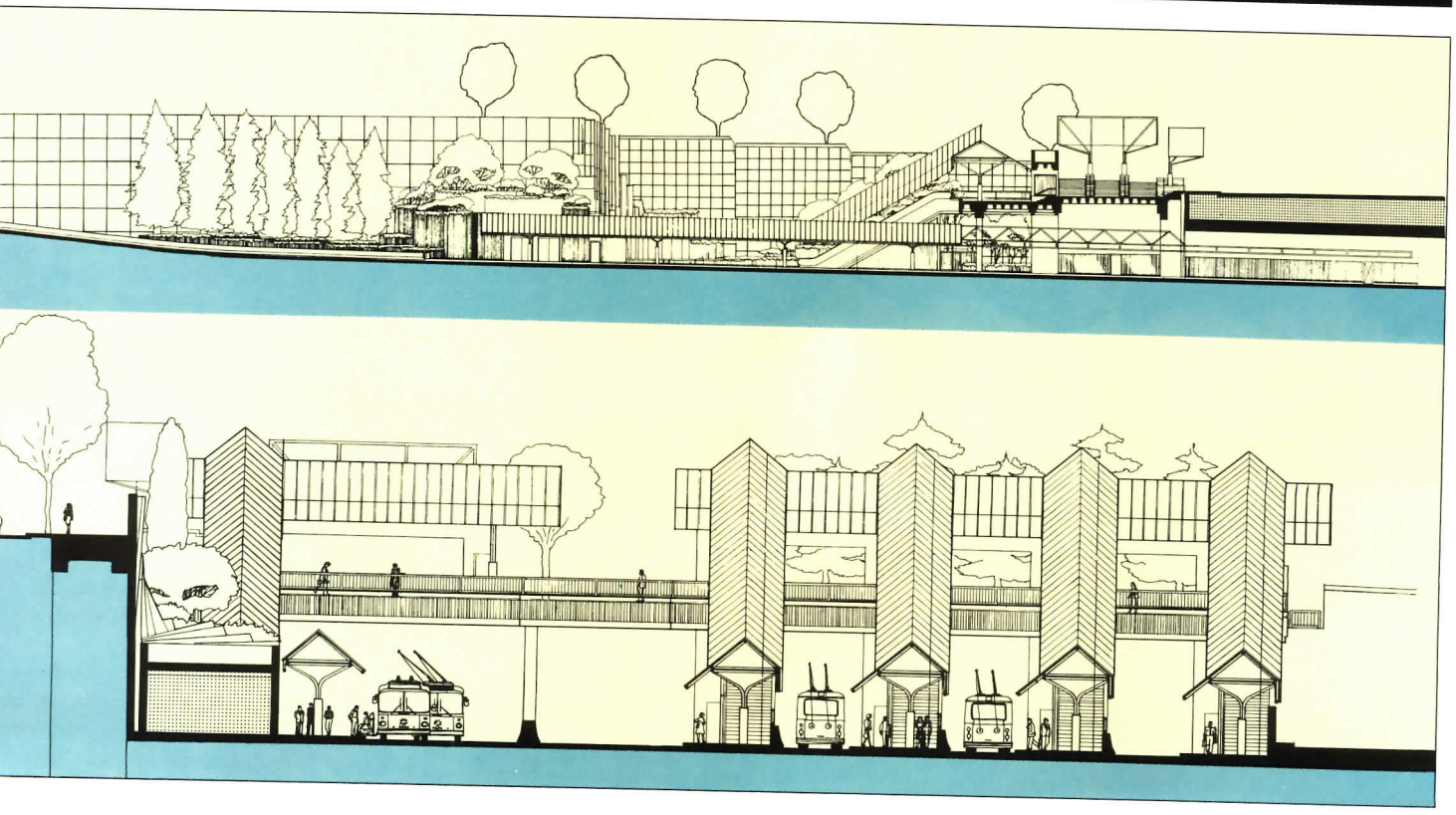
Station Architects and Surface Improvements:
TRA—Gerald A. Williams, principal-in-charge; Robert Terrell, project director; Mark Spitzer, project design architect; David Layton, project technical architect; Dennis Haskell, surface-improvement design architect

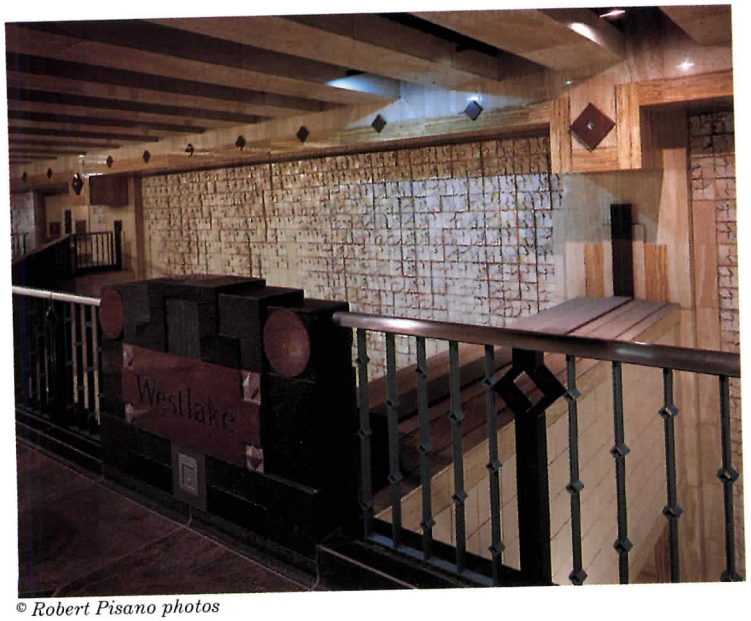




Convention Place Station

Convention Place station, the system's northern terminal, is so named because of its location a block from Seattle's new convention center, also designed by TRA. Buses traveling south on the freeway descend directly into this below-grade station and must switch over to electric operation to enter the tunnel. TRA made a huge retaining wall, supported by 12-foot-diameter caissons sunk 130 feet into the ground, a key architectural element. Terraced landscaping and a water feature by Jack Mackie both recall the features of adjacent Freeway Park, a much-publicized green space that spans I-5. Though sunken, Convention Place is the most open of the five stations (opposite). Bus platforms are sheltered by white pipe truss canopies (top and middle left) whose roofs are blue metal on the north side and glazed on the south to make the most of the city's rare sunny days. The canopies, which continue up over the escalators to the street, convey a strong sense of motion accentuated by short fluorescent tubes (escalators and stairs have fluorescents under their railings). Beyond its role as a transportation center, the station offers a gift of open space to its neighborhood: a brick, concrete, and glass-block patio with large planters whose contents were designed as miniature gardens by artist Maren Hassinger. Artists also made a colorful gesture to the landmark Paramount Theater, a 1920s movie palace across the street. Facing the Paramount at the station's corner entrance, bright neon adorns two white pipework marquees (bottom left), the work of station artist Alice Adams. Design architect was Robert Jones.





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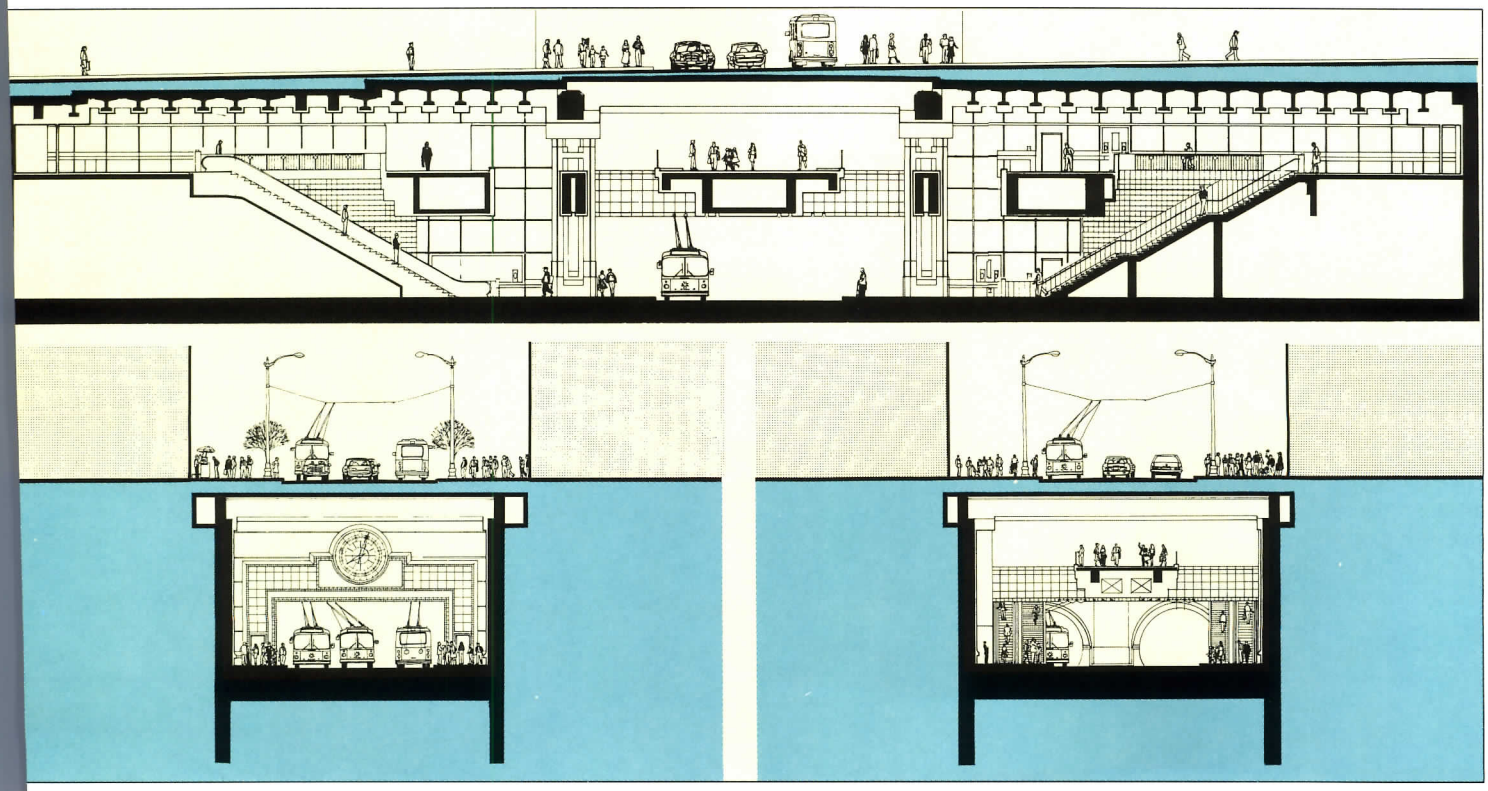
Westlake Station

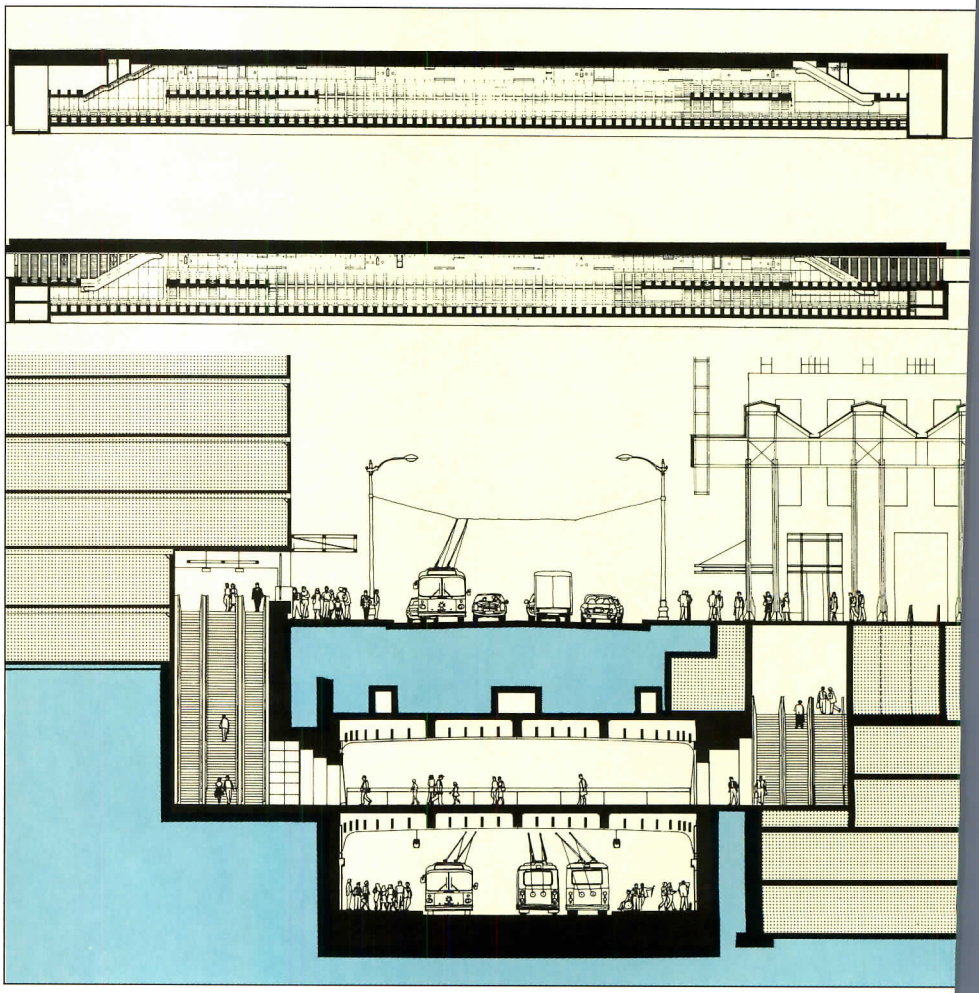
Westlake station features the system's most significant single urban-design contribution to downtown Seattle—a series of new linkages that effectively unify the city's retail core. TRA extended the station's mezzanine under three city blocks and plugged it into the Westlake shopping mall, with in-store connections to three major department stores—Bon Marché, Nordstrom, and Frederick & Nelson—and mixed-use Century Square. These connections make it possible to move among all of the city's largest retail establishments without going above-ground, an important asset in a city whose above-ground is likely to be we nine months of the year. The station's palette of terra cotta, tile, and granite echoes the ma terials of (mainly) early 20th-century buildings above. Its length is punctuated by colorful granite pilasters and diagonal patterned floors, and at key points large granite lan terns rise from the floor. Whe the station extends under Wes lake Park, lead artist Jack Mackie has festooned the wall in terra-cotta "blossoms." At other locations the wall tiles were given intricate patterns by artist Vicki Scuri (opposit Because the department store elected not to place display windows along the busway, that level instead is enlivened by three porcelain enamel m rals (top left): one by Gene Gentry McMahon on retailin themes, a second by Fay Jone symbolizing Seattle as a wat front city, and the third by Roger Shimomura celebrati the city's cultural diversity. Thanks to these bright, cartoonlike works, Westlake the system's most festive wor of urban architecture. Lead chitect was Brent Carlson.


Westlake



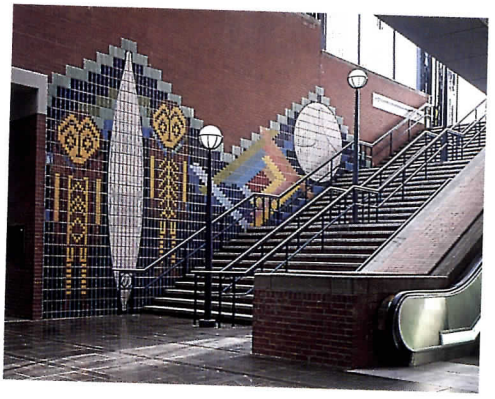
University Street Station

For each of the stations, design teams assembled boards depicting the architectural characteristics of the neighborhood. The board for University Street station is dominated by muted granite and marble, with occasional bright accents. Given that the street level boasts mainly glass or concrete facades, this being the city's financial district and focus of its postwar building boom, University Street is the most uncompromisingly Modernist of the stations—sleek and rectilinear with marble-floored mezzanines at each end and busway space rising to a flat coffered ceiling. The most prominent artworks are "collages" of granite sandblasted into patterns of squares and rectangles in black, white, and gray, with stainless-steel and colored-glass accents. The collages carpet the lower floors and go up the side walls to engulf seating and signage (top right). Walls above the granite are striated concrete panels topped by linear stainless-steel light fixtures. The granite patterning was the joint work of artist Vicki Scurri and Mark Spitzer, architect for this station and TRA's coordinating architect for the entire system. A secondary theme at University Street is information technology, expressed in two artworks (not shown) on mezzanine walls: animated light boxes by Robert Teeple and "lightsticks" by Bill Bell, which when seen head-on are abstract but when viewed peripherally offer literal images. Interestingly, the station has no real presence above ground: passengers enter from two office buildings or from a park facing Seattle's new art museum, designed by Venturi, Scott Brown and opening in the fall.



Pioneer Square Station

Seattle began in Pioneer Square. Once sadly decayed, his area's late 19th-century nasonry buildings, many oasting lavish stone orna- nent, have been largely estored into a neigborhood of afés and galleries. Though ioneer Square station's parti choes that of University treet—mezzanines at each nd and a tall volume in the enter—its character is totally fferent. Where University treet is buttoned-down and rporate, Pioneer Square is ugh and ready, with a ulted ceiling (top) that re- lls the Romanesque Revival ches above ground, exposed r grilles, and mildly Vic- rian light fixtures. Walls and ezzanines are gray granite one end and rust-colored anite on the other, echoing e neighborhood's red-brick d gray-stone palette. Unlike iversity Street, moreover, oneer Square station has a tinctive, and pleasing, pres- ce above ground: a vaulted e-metal entrance pavilion ttom left photo) whose form alls a pergola in nearby Pio- r Square. Artist Garth wards designed the pavil- 's gates, which bear figures t he calls "a cross between ron saints and curious mmuters." Alongside the sta- 's entry stairs, Laura dell's ceramic-tile mural icts stylized native Ameri- themes (bottom right to) in response to the sta- 's location not far from the where Indians landed be- Seattle was a city. Above busways, artists Kate Eric- and Mel Ziegler have niously incorporated exca- d rock and tools used for tation's construction into sized clock faces. Lead ar- ct was Jerry McDevitt.



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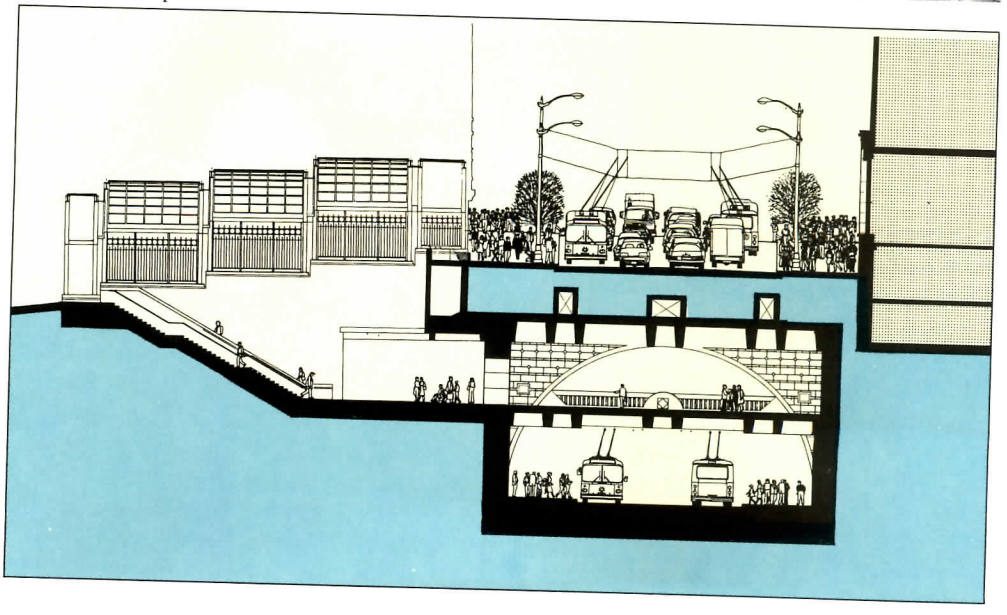

International District Station

International District station is the system's southern terminal where, as at Convention Place, buses convert to electric operation before entering the tunnel. Unlike Convention Place's open-pit design, however, busways at International District are covered by an engaging civic plaza, erected partly in response to area residents' request for more open space. Moreover, the station's architects and artists saw the plaza as an effective way of linking three very different neighborhoods: the International District, a flavorful, multiracial (but mainly Asian) area; Pioneer Square just to the north; and underdeveloped land to the south and west that has been tagged for some form of multiple-use development. The resulting plaza is the system's most appealing public gathering place. Three glazed pavilions containing escalators to the busways and a fourth reserved for community activities are framed in steel painted purple, green, and pink (top right and opposite). Brightly hued steel continues past the pavilions as trellises designed by lead artist Sonya Ishii with Alice Adams (bottom). Throughout the plaza there are handsome benches and globe lighting standards, and brick paving inscribed with symbols of the Chinese calendar. On one of the concrete walls of the lower level, metal panels by Ishii depict an origami unfolding. Design architect for the station was Gary Hartnett.

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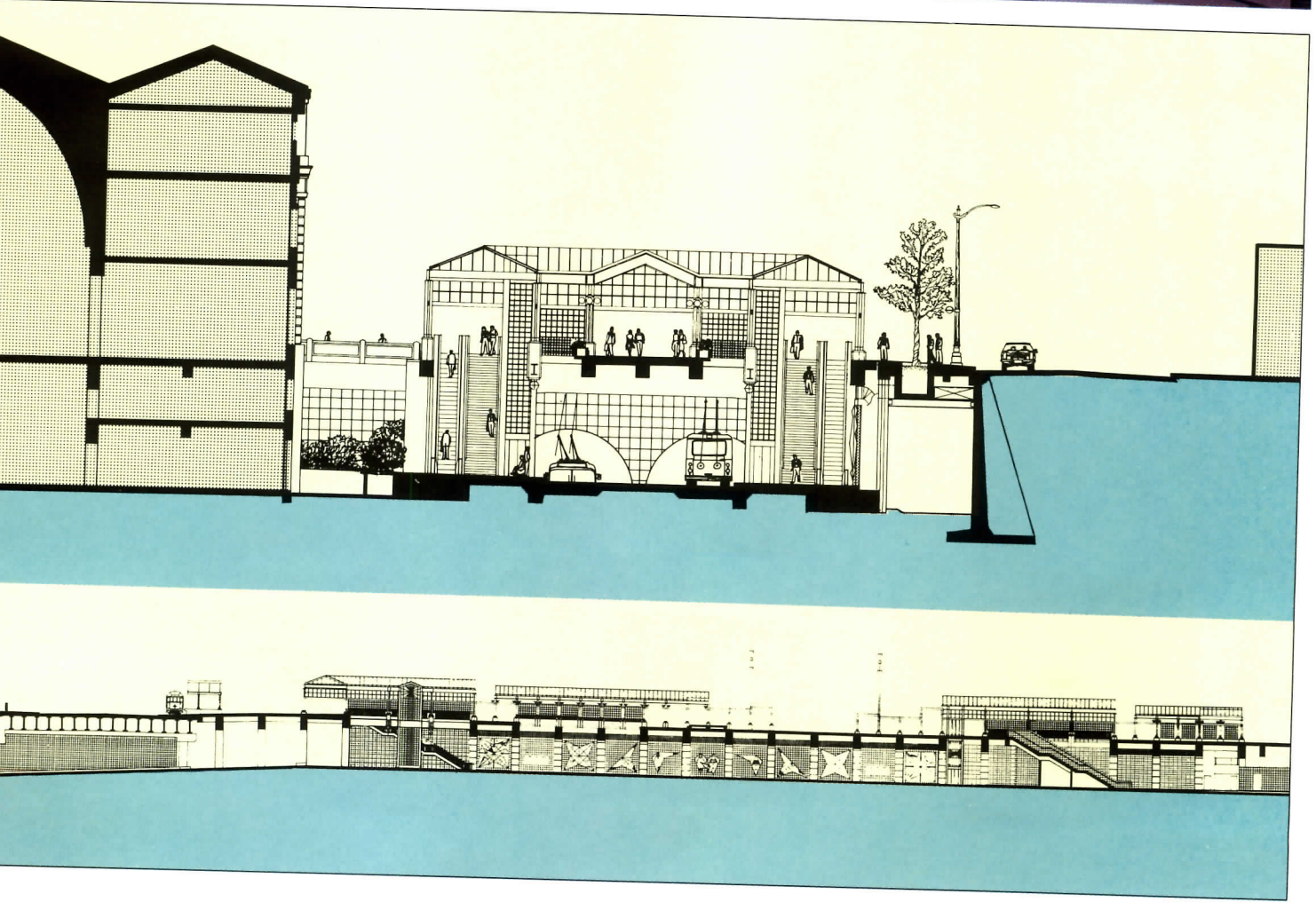


Monument to Mobility

Rafael Moneo uses elemental forms to tie together a sprawling Madrid rail complex. By David Cohn

Atocha Station
Madrid, Spain
Jose Rafael Moneo, Architect

As lecturer, essayist, theorist, and former chairman of Harvard's department of architecture (he stepped down last June), Rafael Moneo has been among the most influential yet least visible architects of our time. At age 54, he has built little—the Roman Museum of Art, in Merida, Spain (1984) being his last widely seen work. In his native Spain, though, several major projects are nearing completion, of which the Atocha Station, in Madrid, is the first.

Though Moneo's work is at heart urban, this station stands somewhat apart from the city. It is the southern terminus of the Paseo del Prado, which is part of the city's principal north-south axis, and marks the transition between the densely built historic core and fragmented modern development around it. Its program calls for tying together long-distance trains, commuter trains, the city subway, and surface bus and auto traffic—a realm in which traditional notions of urban place yield to today's landscape of mobility.

In "Operation Atocha," tracks and platforms are being relocated out of the original 1892 station, quadrupling capacity. The project is being built in two stages, a commuter facility, shown here, and an intercity concourse that will receive the new high-speed Madrid-Seville trains in time for the 1992 Expo in Seville. The two rail modes, both below grade, are tied to pedestrian, bus, and auto traffic by a shallow-domed entrance rotunda that beckons passengers from across a broad traffic interchange.

In order not to overwhelm the scale of the old station's vaulted train shed, Moneo has fitted facilities for commuter and intercity travel in separate volumes behind it. The commuter lines, at 55 feet below street level, are covered by a long-span post-and-beam structure supporting a parking deck. Cars are shaded by a carpet of aluminum domes, which spring from the corners of low square piers that incorporate lightwells to the tracks below. Intercity tracks, at 36 feet below grade, are roofed by a grid of mushroom columns that recall Frank Lloyd Wright's Johnson's Wax building. Instead of being round, however, the slab "capitals" are slightly trapezoidal (to resolve the oblique orientation of tracks to the existing train shed) and are separated by a grid of narrow skylights.

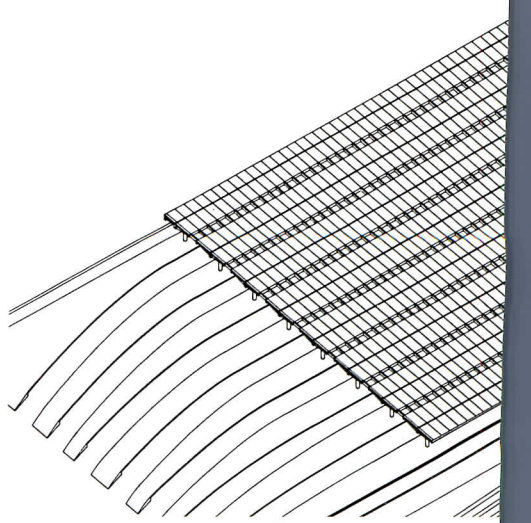
The station's interior concourses presented Moneo with his greatest challenge: to bring dignity to heavily used, low-maintenance spaces that in function, scale, and quality of finish are not very different from highway bridges. Though Atocha's engineered structure is undisguised, Moneo carefully detailed the surfaces patrons touch and see up close. Concrete finishes are as cast and the electrical conduit and lighting are surface mounted, for example, but floors are granite and walls and piers are dressed in a wainscot of high-relief, ribbed, stamped-aluminum panels.

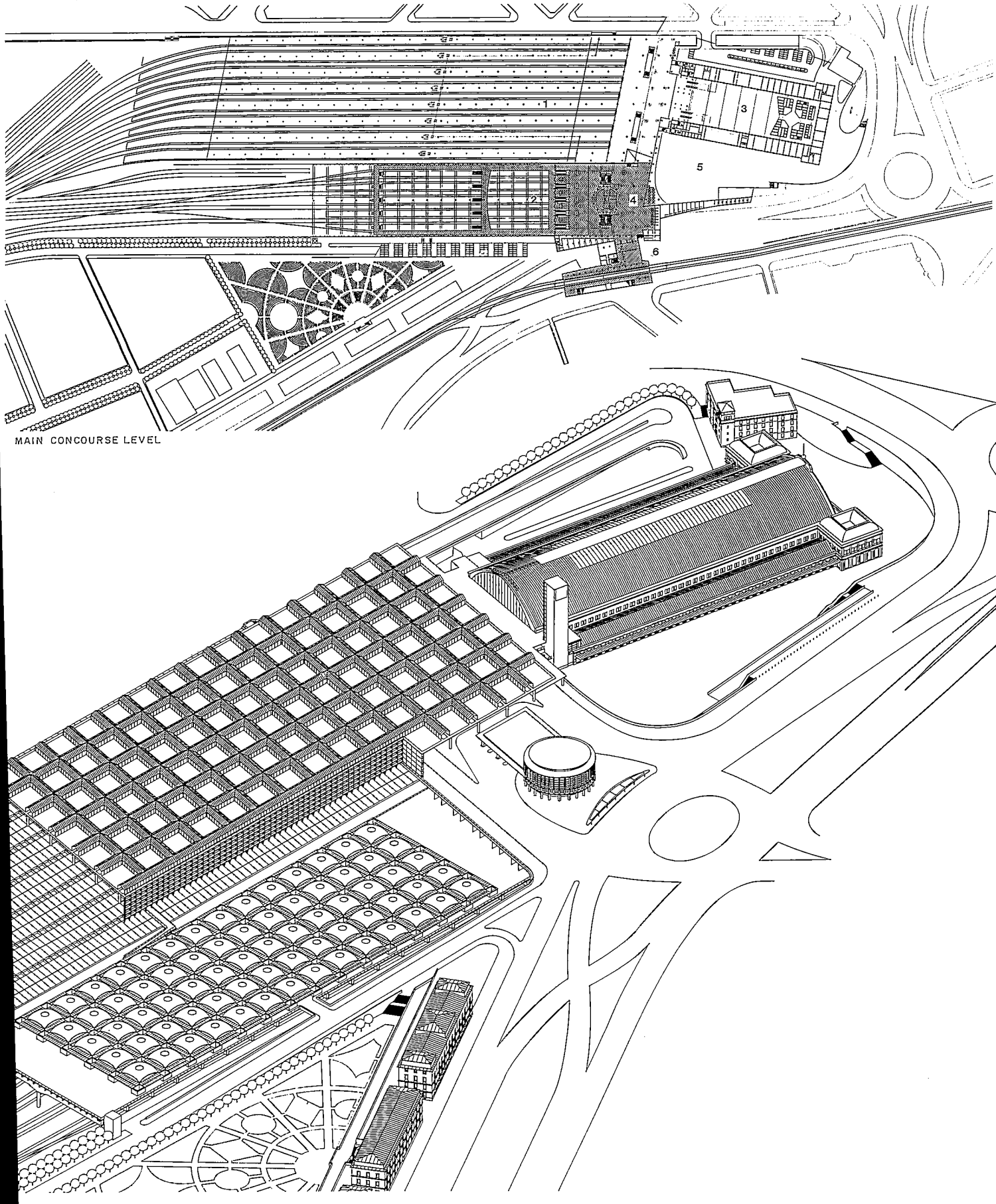
At the platform level, shafts of light enter through the lightwells and seep in at the edges. The rhythm of light and dark, and the repetitive bays marked by dome and canopy, evoke an Islamic division of space, emphasizing the station's horizontal immensity. In this, Atocha is akin to the Roman Museum of Art, where heavy brick piers and arches recall Roman masonry construction. Moneo breaks down the enormous scale of the station into an array of scale-giving architectonic forms. The rotunda (overleaf), though relatively small within the sprawling complex, anchors this panorama through its singular and perfect form.

David Cohn is a freelance writer and architectural designer who divides his time between Madrid and New York.

Fotografia F2, Madrid

The various parts of the Atocha station are expressed as discrete geometric elements (axonometric and plan, opposite): the new intercity terminal (1) (columns under construction in photo above and the commuter station (2) are both set behind the existing vaulted train shed (3), which is being converted to commercial use). Platforms for autos and buses extend from the entry rotunda (4) under the intercity canopy to a ramped exit on the far side. A clock tower, located at the joint between old and new stations, overlooks a sunken plaza (5), the primary pedestrian access to the complex. The main concourse, two levels below the vehicular drop off, also connects the station to the city subway system (6).

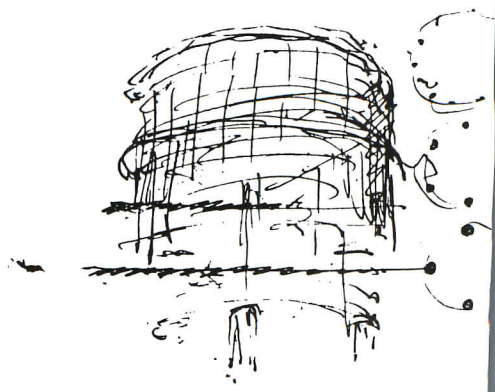


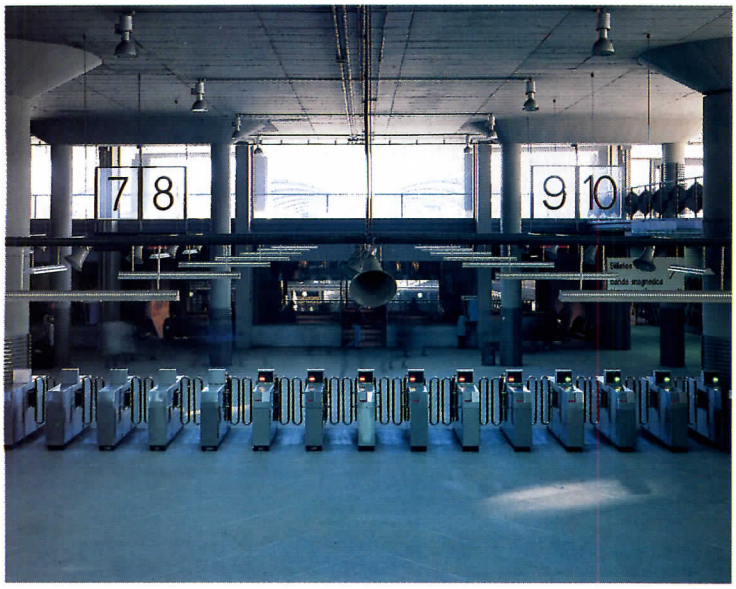


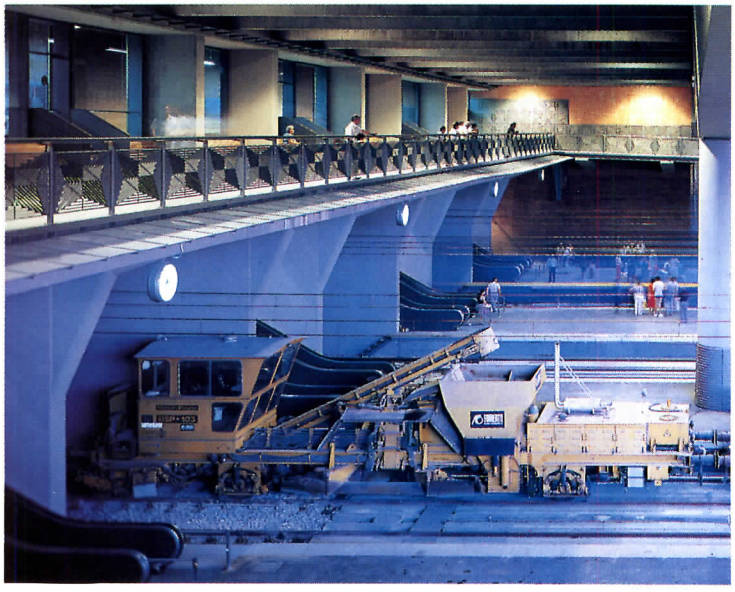
MAIN CONCOURSE LEVEL

Hisao Suzuki photos, except as noted

Within the entrance rotunda (opposite), stairs descend directly to the mezzanine from two small landings at the street. It's more lightwell than lobby. The enclosure is deceptively simple; closer inspection reveals a complex dialog among the potentially conflicting needs to support the structure, filter harsh sunlight, and accommodate circulation. Narrow metal dome ribs are mounted on concrete brackets and a concrete compression ring which is in turn supported on square brick piers. (Moneo recesses the 1/8-in. mortar joints—the bricks appear to float.) These piers are turned at 45 degrees to the line of the rotunda's perimeter (top left), bouncing sunlight through the glass enclosure. Several feet above grade, half the columns drop out. Below the street, the rotunda form dissolves. Only eight round columns support the rotunda at the concourse level; its density yields to the horizontal movement of great numbers of people. Four paired columns are all that remain at the train-platform level. Elsewhere, interior columns are wrapped with a ribbed, cast-iron corset (lower left). A deep reveal separates the broad cone of the capital from the shaft.



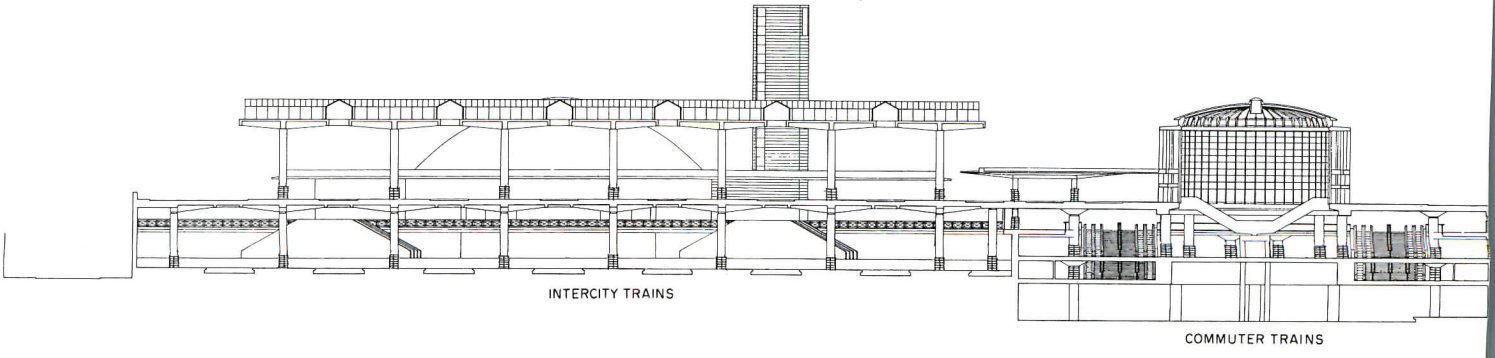


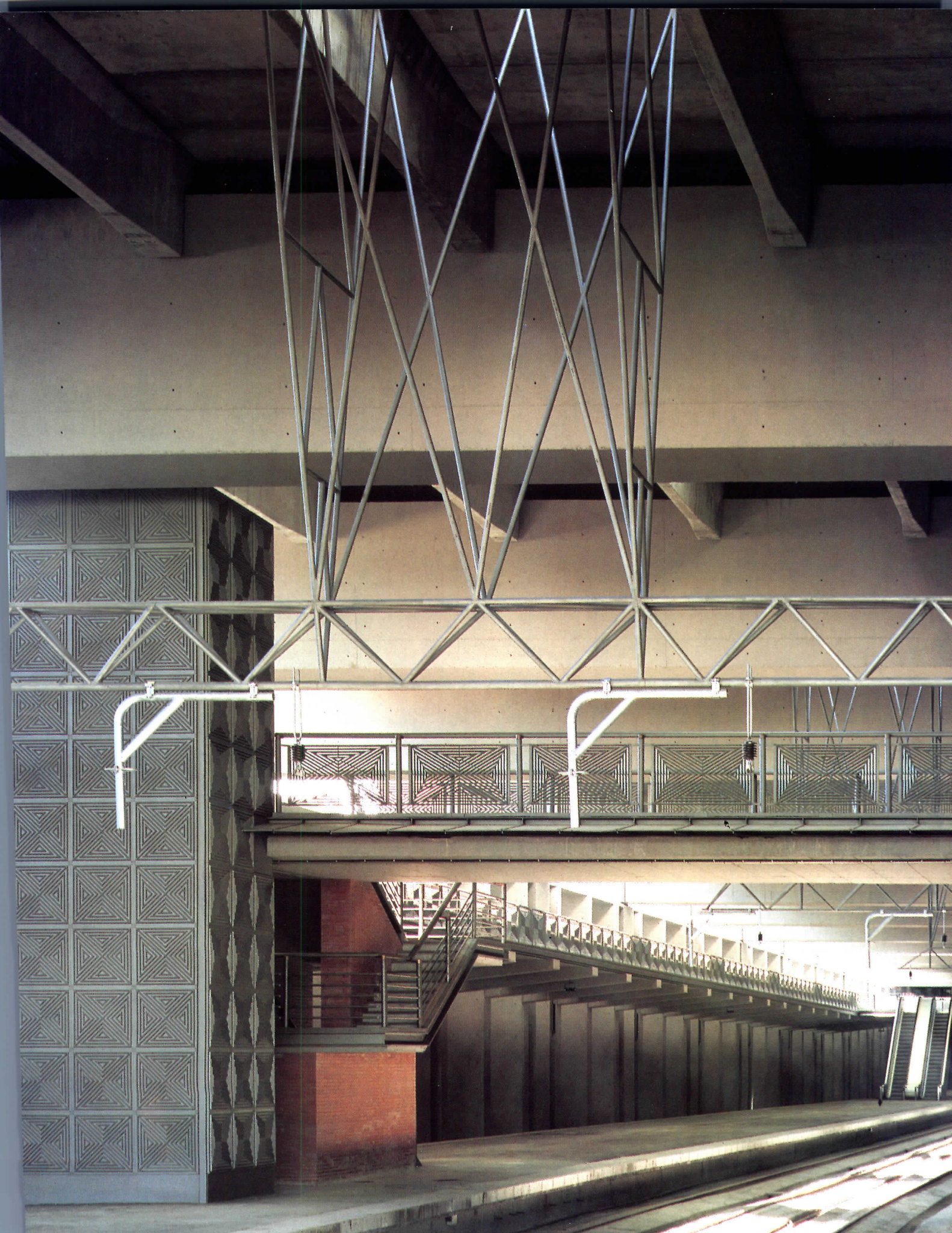


Javier Belzunce

In contrast to the hard, as-cast finish of the highway engineer's basic kit of parts—box beams, precast girders, and deck panels—spidery metal trusses (opposite) that support power cables are theatrically suspended under lightwells. Above: aluminum domes shade parked cars.

Credits
Atocha Station
Madrid, Spain
Sponsor: *Transportation Infrastructure Management Center, Ministry of Transportation, Tourism and Communications*
Architect: *Jose Rafael Moneo*
Collaborating Architect: *Emilio Tuñón*
Project Managers: *First Surface Transportation Construction Headquarters, RENFE (Spanish National Rail Network)*
Contractors: *FOSCA (commuter station); AGROMAN (subway)*





Western Hospitality

Terminal Building
John Wayne Airport
Orange County, Californi
Gensler and Associates,
Design Architect
Leason Pomeroy Associat
Managing Architect

Michael Arden

The heart of the new terminal is a rotated glass cube (above and opposite) that connects barrel vaults at front and rear, and houses such public amenities as the main restaurant and lobbies. Set forward of the building columns, the 80-foot-high glass cage is windbraced by vertical trusses. Palm trees and a bronze statue of John Wayne add local color.

Despite greetings proffered by a just-larger-than-lifesize bronze figure of the Duke himself, captured in mid-stride with right hand to holster, Orange County's 1950s-vintage John Wayne Airport presented an unprepossessing entry to the flourishing metropolitan area just south of Los Angeles. So when rapid population growth—and even faster growth in air traffic—indicated a new passenger terminal, a more hospitable welcome for travelers was placed high on the county's agenda, along with a tenfold increase in the size of the terminal (337,900 square feet versus 29,000), parking for 8,400 cars instead of 4,377, and expansion to 14 aircraft gates.

The airport's position at the intersection of two major arteries (MacArthur Boulevard and the San Diego Freeway) amid a built-up commercial district meant that the building would be highly visible, not just from a calculated frontal vantage but from a 360-degree arc through the surrounding area. At the same time its orientation and runway layout forced a long narrow footprint that in early schemes embedded the terminal in parking structures. The design team turned the awkward shape to advantage, however, with a plan that both minimizes the distance through the terminal from landside to airside and maximizes the flow of space within the building. It also results in a distinctive profile.

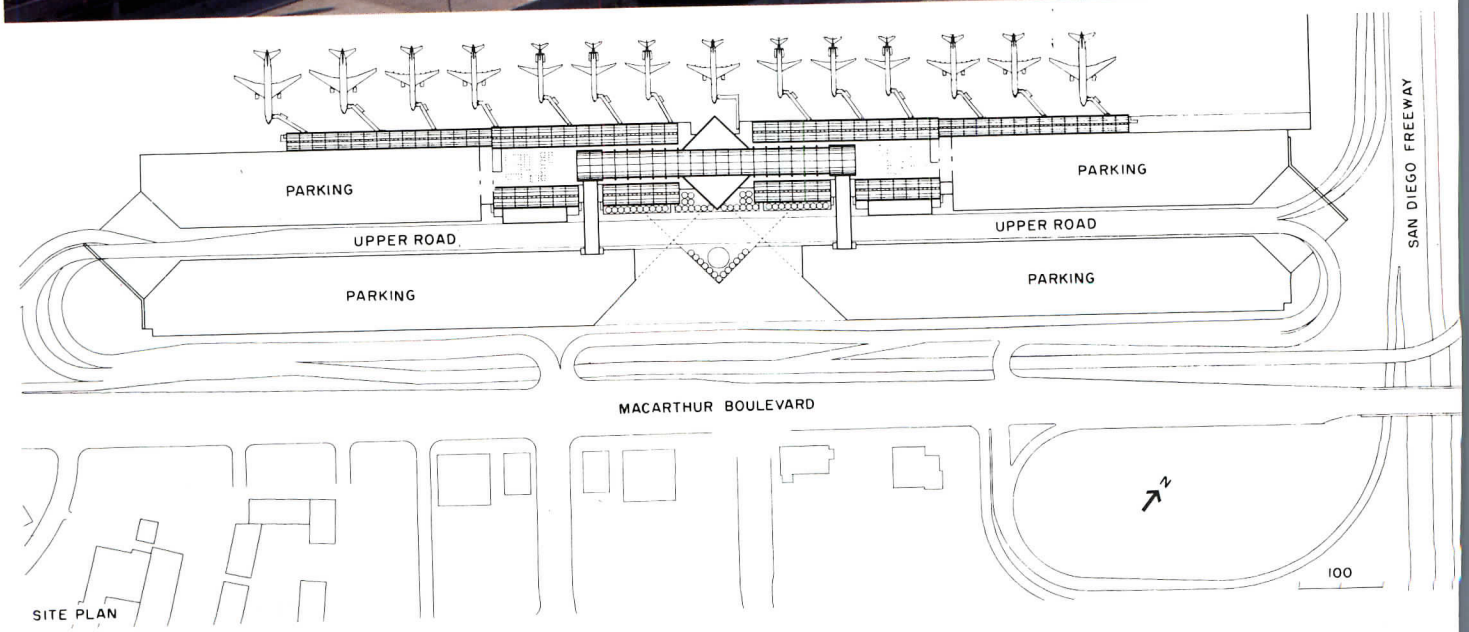
Although parking decks still frame the new terminal, the garage has been divided and pulled apart to open a 400-foot-wide window across the drop-off roadways at the front to a diamond-shaped, glass-encaged central lobby. A building-within-a-building, this "theme" element houses the main restaurant and the airlines' VIP clubs as well as the 80-foot-high ceremonial hall where John Wayne presides. The rotated cube pierces a structure roofed by three parallel barrel vaults whose rounded forms and shiny metal skin, suggestive of aircraft fuselages, reflect a two-tiered internal organization that creates clearcut circulation paths for arriving and departing passengers, with little cross flow.

On the upper (departure) level, dual ticketing and general circulation areas occupy the landside vault; concourses, waiting lounges, and a retail plaza are on the airside. In between, a larger vault links security checkpoints with the inserted central cube. As is usual, operations offices and baggage-handling facilities are relegated to the lower arrivals level. But the baggage-claim areas are not the usual pinched and dreary depths. Instead they soar through upper-level mezzanines to the 75-foot-high skylight of the center vault, creating dramatic airy spaces with a sense of movement and anticipation that evokes the grand concourses of vintage railroad stations.

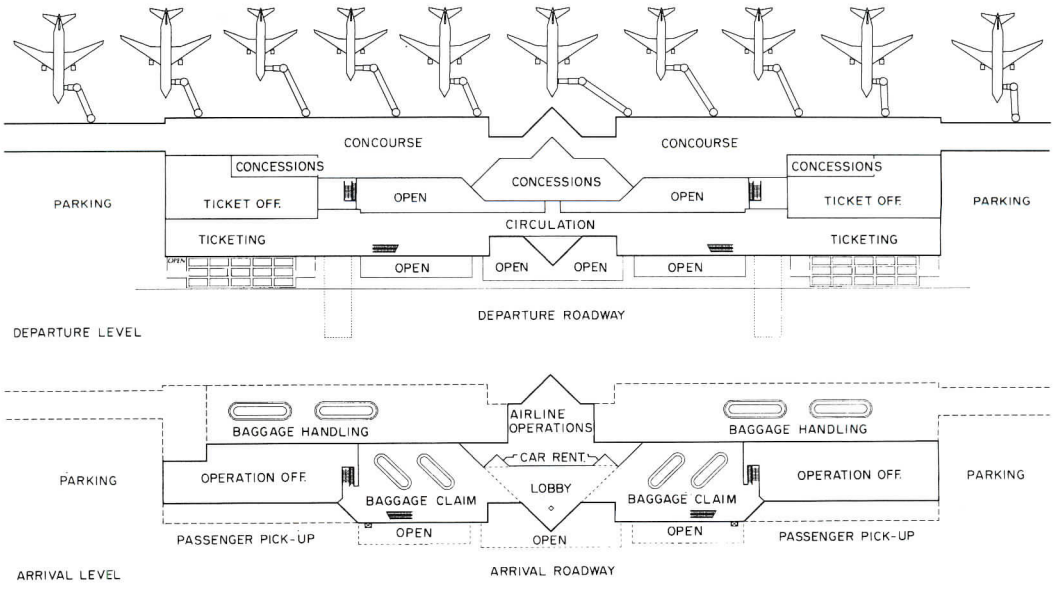
To further capitalize on a linear footprint that strings out boarding gates in a long row at airside, the architects duplicated ticketing and security functions at each end of the building, bringing passenger parking and curbside drop-off within a short walk of the airlines. Because exterior walls are glass and interior walls both few and low, people inside the building can easily see across it, from waiting planes to the surrounding city, as well as from upper-level balconies to the baggage-claim area below. Orientation is self-evident, signage spare and muted.

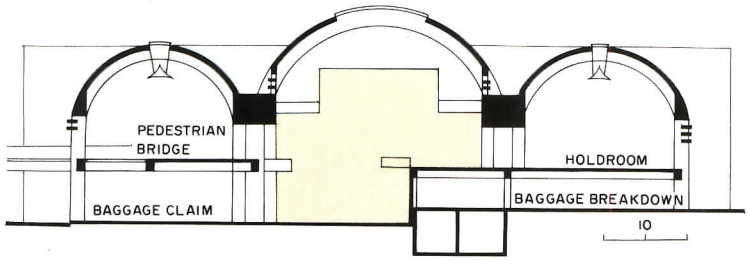
The openness of the linked spaces is bolstered by simple but elegant interiors that celebrate the attractions of the surrounding region. Lush vegetation (not least the iconic palm) and abundant daylight enhance a background of warm-toned natural stone floors and walls, which in turn play against the sleek curves of the ceiling vaults. John Wayne would be right at home. *Margaret Gaskie*

Michael Arden



ible from all sides of the d, the two-story terminal is tinguished from surround- parking decks by three tal-skinned barrel vaults. linear parti, which mini- es travel from curbside to side, places ticketing/secu- and concourses on the er (departure) level, bag- e handling and arrivals w. Double-height openings veen baggage-claim areas the central vault lend a e of space and motion.





The 2,000-foot-long, steel-framed terminal is organized by the roof vaults (section lower left) into 55-foot-wide spaces at front (ticketing area middle left) and rear (concourse top left) plus a 75-foot span across the open baggage area (opposite). Walls, floors, and columns of Jura marble in warm tones of beige accented by gray contrast with light-colored vaults which are further emphasized by natural light from glass walls, clerestories, and skylights. Artificial sources, designed and placed for easy maintenance, were reduced in number by using sconces with 1000W stadium lamps that shoot indirect light across the vaults.

Credits:
Terminal, John Wayne Airpor Orange County, California
Design Architect: *Gensler and Associates—M. Arthur Gensler, president; Edward Friedrichs, managing principal; Ronald Steinert, design manager; Andrew Cohen, project designer, Imre Takacs, construction administration*
Managing Architect: *Leason Pomeroy Associates—Leason F. Pomeroy III, president; Philip Kroeze, managing principal; Brandon deArakal project manager; Thomas Black, project manager; Joel Greer, job captain*
Planning Architect: *Thompso Consultants International—Arnold Thompson, president, Gary Blankenship, planning manager; Keith Plank, proje planner; Keith Thompson, programmer*
Engineers: *Johnson & Nielso Associates (structural); Tsuchiyama and Kaino (mechanical); R. E. Wall and Associates (electrical); Purce Noppe Associates (acoustical*
Consultants: *Lynn Capouya Inc. (interior landscape); Mulhausen Design and Associates (graphics signage*
General Contractor: *Taylor-Woodrow*

Focus on Infrastructure

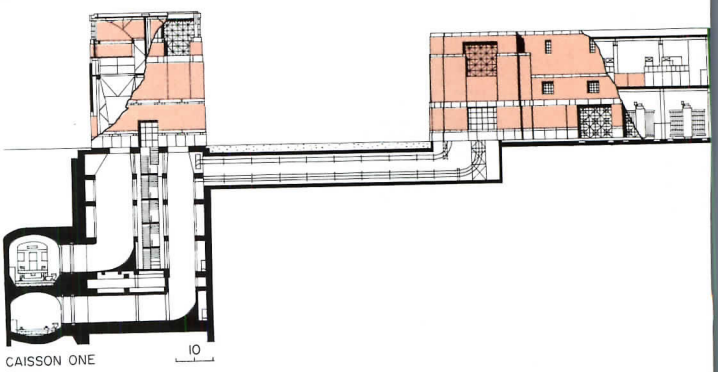
The public is likely to count architecture not as art but as basic public service. As a case in point, consider the Port Authority of New York and New Jersey. For its most imposing works—airports, bridges, tunnels, railroads, and port facilities, along with a goodly share of architectural and engineering landmarks—it commissions design stars with international reputations. But for the scores of smaller, less famous structures that lie within a 25-mile radius of New York Harbor, the authority relies on its 1,000-member Engineering Department, which incorporates an architectural

Portal Substation

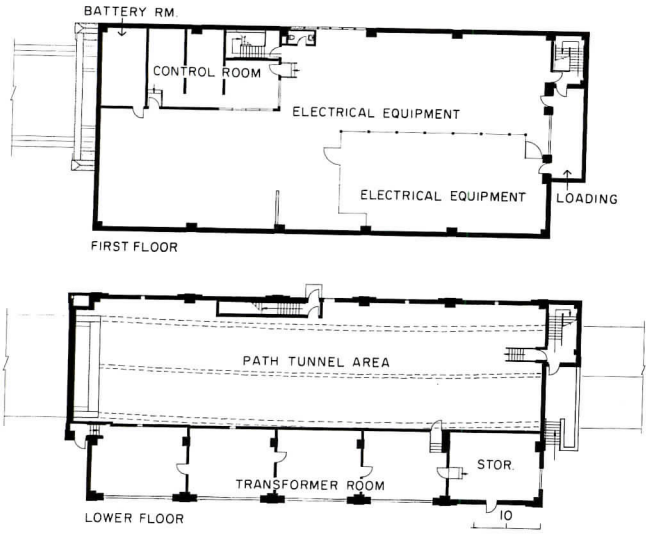
Jersey City, New Jersey
Design Division/Port Authority of New York & New Jersey

Caisson # 1

Jersey City, New Jersey
Design Division/Port Authority of New York & New Jersey



taff of 80. On the whole, these ubiquitous buildings re strictly utilitarian, providing essential but nglamorous services such as power, heat, entilation, and maintenance. More broadly, owever, and without aspiring to high art, they aim o uphold the dignity of the authority and to offer itizens a courteous neighborly presence.



Transforming transformers

Constructing a very down-to-earth technical installation on a built-up site, the Port Authority's PATH rail system, deliberately and as a matter of contextual courtesy, declined the route of least resistance. (PATH stands for Port Authority Trans-Hudson, a mass-transit line that connects New York City with New Jersey.) Rather than putting up four transformers in an unadorned chain-link enclosure as with so many industrial artifacts, the designers, under the direction of the late Joseph Cosenza and current chief architect Robert Davidson, opted for a solid seemly brick building. The mass-transit substation is located at the top of a sloping rail tunnel marked by a portal arch as it emerges at grade in a mixed-use neighborhood, not far from two- and three-story brick houses. In keeping with the prevailing mood, the two-toned red-brick building, with its soldier courses, horizontal recesses, and peaked standing-seam roof, strives for a measure of modest decency. In addition to the transformers, placed on the lower floor, the 60- by 140-foot building houses controls and other electrical gear for operations and emergency traction.

Shoehorning infrastructure

Like the Portal Substation, PATH's Caisson #1 project comprises nothing but unforgiving industrial equipment. Here, though, the precinct is the newly completed Newport residential complex. Transportation equipment occupies two buildings—a substation for switching and transformers (far left in rendering) and a ventilation building for fans and electrical gear (far right). Moreover, the structures, joined by an underground network of tunnels and airshafts, flank a high-rise apartment building. Though budget was a concern, the site—curving streets and a major park used by pedestrians—clearly deserved a stately countenance. The design vocabulary was governed in part by the Newport Master Plan, and incorporates brick masonry and precast concrete compatible with surrounding buildings and with other utilitarian elements in the PATH system. The substation, which commands an axial view across the street, has a more elaborate superstructure than the ventilation building and sports tall metal Roman-type grilles. Base courses with cast representations of railroad cars clearly identify the building's family.
Grace M. Anderson

April Supplement
To Sweet's 1969
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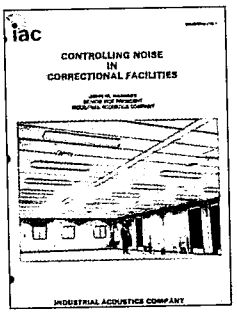
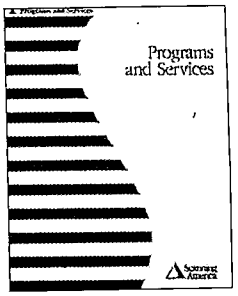
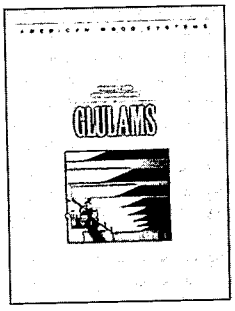
Compact electric or hydronic Omnipanels provide decorative drying and heating in kitchens and bathrooms. Available in a variety of enamel colors and metal finishes. Runtal Radiators.
400



Noise Control
Guide suggests cost-effective acoustical treatments for noise control in correctional facilities, using case studies to demonstrate successful treatments of acoustical problems. Industrial Acoustics.
401

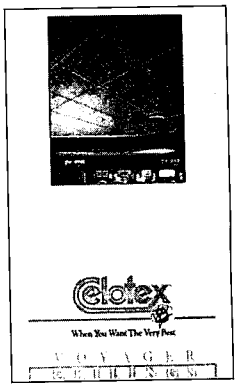


CAD-Conversion Service
A new, nationally available drawing-conversion service uses a menu format that allows licensees to grade the drawings according to a set system with standardized cost. Scanning America.
402

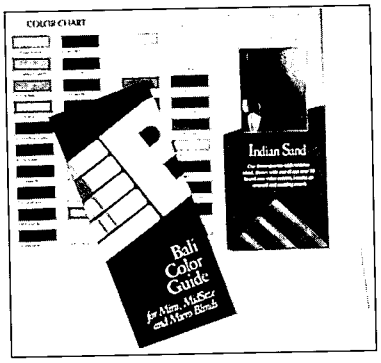


Glulams
Product and application guide for glued laminated beams. Includes new load-span tables and lists key features and benefits of glulam products. American Wood Systems.
403

Modular Offices
New brochures feature designs achieved in office systems with wood, metal, and laminated components. Many of the units feature curved worksurfaces. Panel Concepts/PCI Tandem.
404

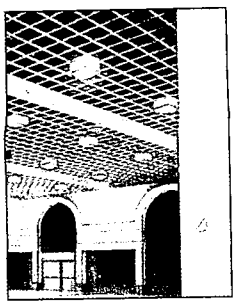


Ceiling Panels
Describes features of Celotex mineral-fiber ceiling panels. Designed for residential and light commercial applications, the panels have Class-A fire ratings. Celotex.
405

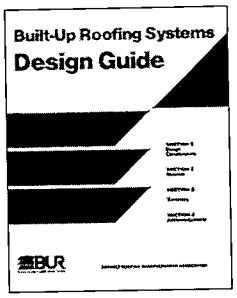


Window Treatments
Bali introduces 54 new colors for 1991, reflecting the environmental influences of earth-, sea-, and sky-tones as interpreted by interior designer Jack Lowery. All 140 hues in the collection are available on every style of premium horizontal blinds, for both contract and residential applications. New specification materials include a chip chart with product samples and a color-selector folder. Carey-McFall.
406

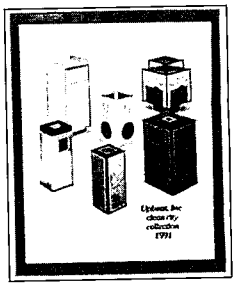
Landscape Seatin
Benches and trash receptacles can be made-to-match. Styles include four six-, and eight-foot benches in mahogany, red oak, ash, bethabara woods with cast-iron frames. Boston Design Corporation.
407



Cell Ceiling
Brochure shows how to conceal plenum and create the illusion of a ceiling with Beamgrid open-cell ceiling systems. Alcan.
408



Roofing Specs
Brochure for preparing built-up roofing specifications is a reference and guide on BUR. Provides guidelines, codes, standards, and manufacturers' data ARMA.
409

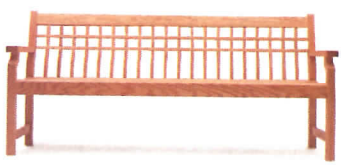


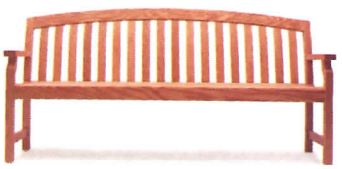
Site Amenities
Catalog covers new litter and recycling receptacles. Products have been developed according to client suggestions. Recycling units provide source separation of waste materials. Upbeat
410

Continued on page 246

LOOKS LIKE THE PERFECT SPOT FOR ONE OF OUR BENCHES.

PLACE A WOODEN BENCH FROM LFI IN ANY GIVEN ENVIRONMENT AND AN AMAZING TRANSFORMATION HAPPENS. THAT SPACE SUDDENLY BECOMES MORE INVITING. IT ALSO GROWS MORE BEAUTIFUL. UNDERSTANDABLY. OUR NEW KENWORTHY COLLECTION FEATURES DESIGNS THAT ARE TASTEFUL . . . AS WELL AS UNIQUE. STURDILY CRAFTED TO ENSURE THAT YOU'LL BE ABLE TO SIT ON YOUR INVESTMENT FOR SOME TIME TO COME. CALL 1-800-521-2546 TO RECEIVE OUR COMPLETE KENWORTHY LINE BROCHURE. THAT IS, IF YOU HAVEN'T FALLEN FOR THEM ALREADY. LFI/Landscape Forms





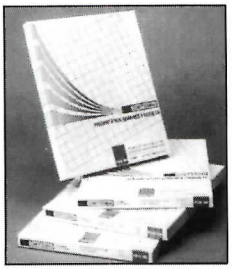
Circle 57 on inquiry card

Product Literature

Continued from page 242

Kitchen Style
Full-line product catalog describes modular European kitchen appliances imported exclusively by Frigidaire. Available in contemporary and country settings. Euroflair.
411

Custom Windows
Brochure illustrates options available on custom mahogany windows and doors such as turn and lift, glazings, shapes, and styles. Windows are waterproof, windproof, weatherproof, and sunproof. Tischler.
412

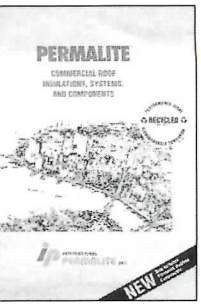


Solventless Films
Matte and clear adhesive-backed films enable designers to produce film transfers from computer-generated drawings and word-processed documents on any laser printer. Dietzgen.
413

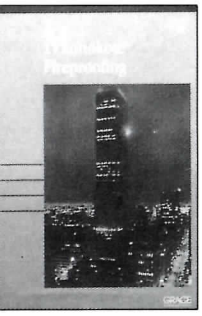
Renovation Cladding
Project case histories illustrate the use of Alucobond coated aluminum panels. Panels are said to be lightweight, flexible yet strong. Alucobond.
414

For more information, circle item numbers on Reader Service Card.

roduct Literature



Roofing Systems
Catalog available from Permalite describes roofing components and systems. Features recycled Sealskin insulation board and Recover Board. International Permalite.
415



Fireproofing
Testing information and specialty fireproofing products are highlighted in this brochure for Monokote Fireproofing from W.R. Grace and Co. Performance standard tables included. W. R. Grace.
416

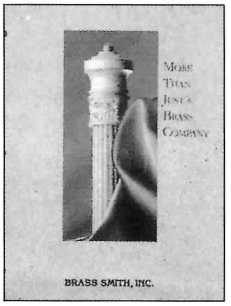
Security Intercoms
Describes systems designed for security applications in building-access control, parking garages, correctional facilities, schools, and factories. Sensor/detector compatible. Talk-A-Phone.
417

Prefab Drainage
Geotextile fabric covers plastic drain core. Cost-effective alternative to aggregate drains. Brochure describes the performance of Amerdrain products in various situations. American Wick Drain.
418

r more information, circle item
mbers on Reader Service Card.

Product Literature

Accordian Partitions
Sound control and fire safety are features of Audio-Wall, an all-steel partition for heavy-traffic areas. Suggestions for space-division problems are outlined in catalog. Modernfold.
419



Special Fixtures
Decorative fixtures, accessories, and fittings, available in new finishes such as Verdigris, shown in a detailed color brochure. Hundreds of sizes, colors, and finishes. Brass Smith.
420

Living Up to Promises

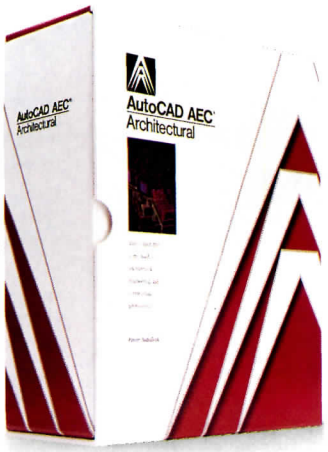
Continued from page 70

Chamisal, New Mexico, exemplifies the current phenomenon of peaceful coexistence among software systems. The 450-page *MicroStation for AutoCAD Users*, by Frank Conforti and Ralph Grabowski, priced in paperback at $29.95 (there's also a disk for $14.95), compares Intergraph's MicroStation Version 4.X with AutoCAD Release 11. The book takes up both the technical and management aspects of working with more than one system—a situation found in more and more offices. The text is rounded out by generous case studies, and appendices provide a MicroStation to AutoCAD command listing and vice versa, and a glossary of terminology for the two systems. ■

AIA Convention

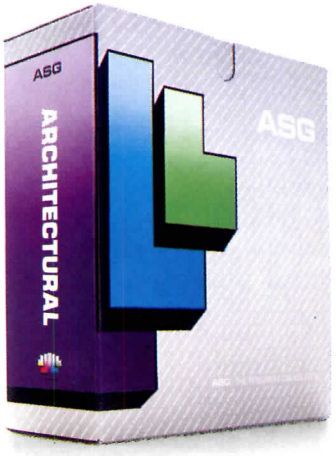
Continued from page 71

architecture? Gregory Franta from the ENSAR Group in Denver; Rocky Mountain Institute research director Amory Lovins, a physicist active in energy conservation planning for 20 years; New York architect William McDonough, and Joseph Deringer, a Berkeley architect and energy consultant, rounded out the panel. ■



Before.

AutoCAD AEC Architectural is the No. 1 selling architectural package. It offers capabilities undreamed of just a few years back. It began, however, as a product called AE/CADD, created by the founders of ASG.

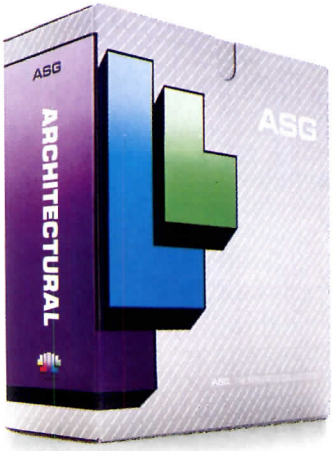


After.

Now Architectural is available once more from its creators. In an improved product called ASG Architectural—the only compatible upgrade. It is fully integrated with ASG's entire comprehensive product line.

New.

With ASG Architectural, for the first time you have design, presentation, and drafting tools that let you view multiple floors all at once. You also have versatile layer naming compatible with AIA conventions and all ASG products.



Improved.

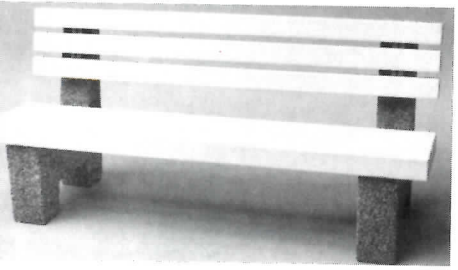
Better still, we've provided design interfaces for isometric, perspective, and AutoShade viewing. And incorporated Pella's Door and Window Designer, to let you use it while drawing. For the best architectural package yet. Call us today. At (415) 332-2123.

ASG

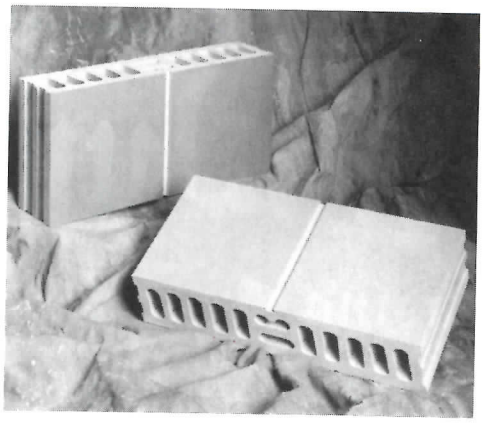
THE INTEGRATED CAD SOLUTION™

430. Commercial-style. The Professional range combines high-Btu-output cooktop units, a large (4 cu ft) self-cleaning convection/thermal oven, and a smaller utility oven within a 48-in.-wide stainless-steel housing. Options include decorative S-style grates that work with different cookware sizes, a griddle, and a wok ring. Ventilating hood is sized for the high-temperature needs of the stove. Thermador.

431. CAD furniture. Introduced as the PlanCADD Creativity Center suitable for inline, U-, or L- configurations, workstation components can also stand alone. The system includes the Astro table, with a 37- by 30-in. top that is height-adjustable within a 9 to 44-in. range. Materials are enamel-finished metal and laminate. Plan Hold Corp.



432. Plastic-lumber bench. Now offered as part of the Terra Form site furniture line, weather-proof benches have seat and back slats of recycled (and recycleable) plastic. Boards have a textured finish and come in several colors. Wausau Tile, Inc.



433. Quick brick. A new face option, Centerscore structural glazed-face blocks look like two 8- by 8-in. tiles, but go up in less time with just half the number of units. Block is incombustible, can be used indoors or out, and comes in a wide range of colors. Stark Ceramics, Inc.

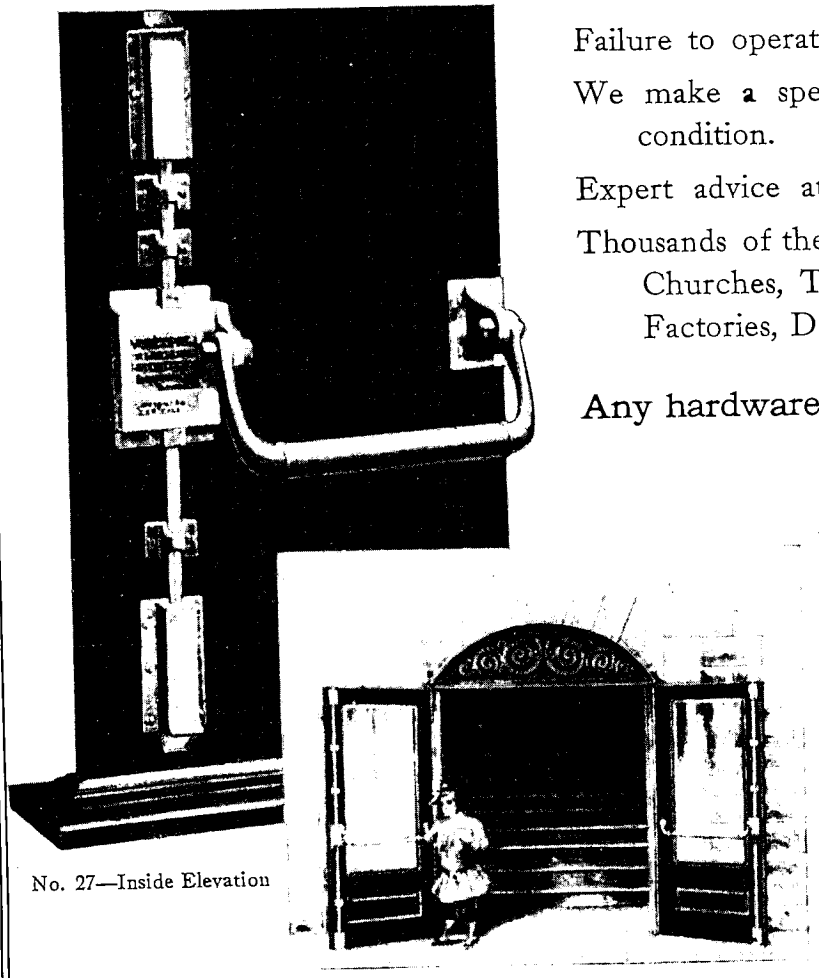
Product News continued on page 257

TRADE MARK
REG. U. S. PAT. OFFICE

Von Duprin

Self-Releasing Fire Exit Latches

Simple in construction. Unexcelled in workmanship.
Strong to withstand severest handling.
Mechanism so well balanced that a mere child can operate.
Can not become blocked by accident or design.



No. 27—Inside Elevation

Failure to operate is impossible.

We make a special device for every special condition.

Expert advice at your command.

Thousands of these Latches in use on Schools, Churches, Theatres, Auditoriums, Factories, Department Stores, etc.

Any hardware dealer can furnish them.

Branch Offices

Atlanta, Ga. . . . . Beaullieu & Applewhite
Birmingham, Ala. . . . . Brewer & Scanlon
Boston, Mass. . . . . R. J. Gilkie
Buffalo, N.Y. . . . . Coville & Harwick
Chicago, Ill. . . . . John C. Bold
Columbus, Ohio . . . . . R. L. Watson
Denver, Colo. . . . . Geo. P. Heinz & Co.
Los Angeles, Cal. . . . . W. H. Steele
Philadelphia, Pa. . . . . T. B. & H. S. Hendrickson
Portland, Oregon. . . . . A. J. Capron
San Francisco, Cal. . . . . A. W. Pike Co.
Seattle, Wash. / Spokane, Wash. / Tacoma, Wash. . . . . F. Crowe & Co.

Alberta / Manitoba / Saskatchewan — Mackenzie Bros., Winnipeg, Mar.
Vancouver, B.C. . . . . Wm. N. O'Niel & Co.
London, England. . . . . H. G. McMicken
Australia / New Zealand — F. Lindsay Thompson, Sidney, Aust.

SAFE EXIT IS A UNIVERSAL DEMAND

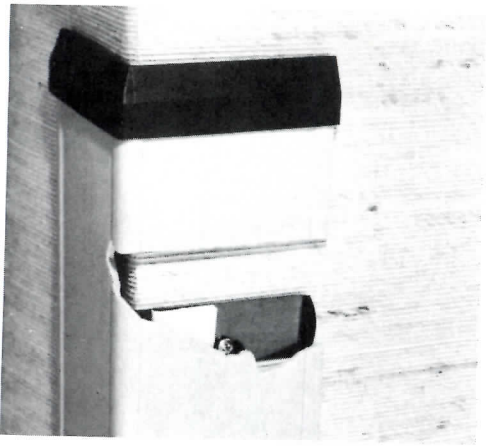
GRANT PULLEY & HARDWARE CO., No. 3 W. 29TH ST., NEW YORK CITY, NEW YORK REPRESENTATIVES

Vonnegut Hardware Co.

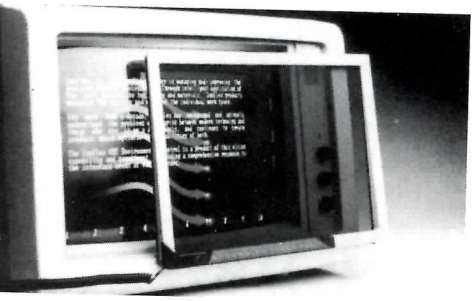
General Distributors

120-124 East Washington St. Indianapolis, Ind.

ASK FOR
VON DUPRIN
CATALOG 10 E.

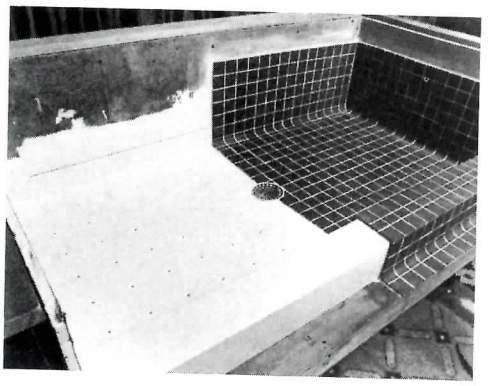


434. Corner guards. A new mounting technique permits easy snap-on installation of corner protectors with no visible hardware. Trim comes in stainless steel, solid-color PVC, clear, and custom designs of PVC and woodgrains. K. J. Miller Corp.



435. Monitor filter. A metalized-mesh filter is said to block a wide spectrum of electromagnetic radiation from CRT screens, as well as control glare, static, and reflections, and enhance display contrast. Made in sizes to fit any monitor, the Security Filter meets DOD Tempest and Swedish SRP monitor-emission standards. Sunflex.

436. Nonstructural composite. Modar, a modified-acrylic resin, is offered for fire-retardant, low-smoke uses such as fiberglass-reinforced architectural fascia. The application pictured, large columns that simulate concrete, is part of the facade of a new hotel in Hawaii. ICI Acrylics/K-S-H, Inc.



437. Preformed shower pan. The Tile Redi shower pan liner, made with Noryl hydrolytically stable engineering plastic, comes with molded-in curb, 6-in. sidewall, and built-in slope to a central, adjustable drain. The pan will not creep or sag under load, and can accommodate various thicknesses of tile, which is adhered directly to the surface as shown. Unit meets ANSI sanitary and plumbing standards, and new building code flammability and smoke requirements. Tile-Redi.

Product News continued on page 261

SPECIALIST IN ALUMINUM QUALITY AND SERVIC

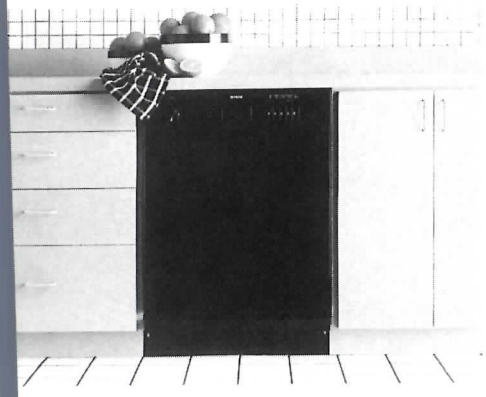
SHEET AND EXTRUSIONS

• ANODIZED • DURANODIC • FLUROPON • PAINTED •

• MILL FINISH

• COIL • ROD • BAR • WIRE • TUBING •

438. One-piece low-flush. The Fontaine toilet incorporates an ultra-low-flush (1.6 gallon) pressure-assist tank within a contemporary one-piece china fixture. It is described as one of the few low-profile toilets that meets all current water-conservation regulations. American Standard, Inc.



39. Thrifty dishwasher. A new German-ade unit designed to fit the dimensions of e American kitchen, the Bosch dishwasher said to use half the water of other dish-ashers and to be eight times as quiet. ersatile rack options accommodate long-em glassware. Bosch.

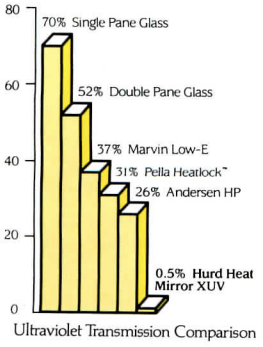
0. Wood finish. A clear, water-based ethane, Zip-Guard is low-odor, meets all C/VOS regulations, and dries quickly. itable for high-traffic interior use. r Bronze Co.

441. Shake-look siding. Made of crushed stone bound with resins and reinforced with fiberglass, Shakeside panels replicate the details of hand-split cedar shakes in a material that will not rot, warp, or crack. Siding is integrally colored in six natural-appearing colorways. Supradur Mfg. Corp. ■

R8

New Hurd InSol-8™. The biggest news in windows since double-pane glass.

The new Hurd InSol-8™ window is a remarkable achievement. No other residential window insulates to R8* and blocks over 99% of the sun's harmful UV rays.



Ultraviolet Transmission Comparison

InSol-8 windows transmit 50 times less UV radiation than ordinary "low-E" and more than 100 times less than double-pane glass. A single InSol-8 window offers more fading protection than Andersen HP, Pella Heatlock™ and Marvin Low-E windows combined.

No other window protects against fading damage to draperies and furnishings, carpet and artwork—without tinting the view.

R8 insulation provides today's best protection against winter heat loss and summer heat gain, in any climate. That's why Hurd InSol-8 means more energy efficiency and comfort than any other window.

What makes InSol-8 windows unique is the patented Superglass System® with two sheets of Heat Mirror,™ three gas-filled thermal barriers and insulating spacer technology that greatly reduces thermal conductivity through the edge of the glass panel. The advanced glazing technology that gives InSol-8 windows their R8 insulating value also creates the best sound barrier of any window—reducing outside noise by up to 95 percent.

Build in more value—in any style of architecture—with the new Hurd InSol-8 window. There's no other window like it.

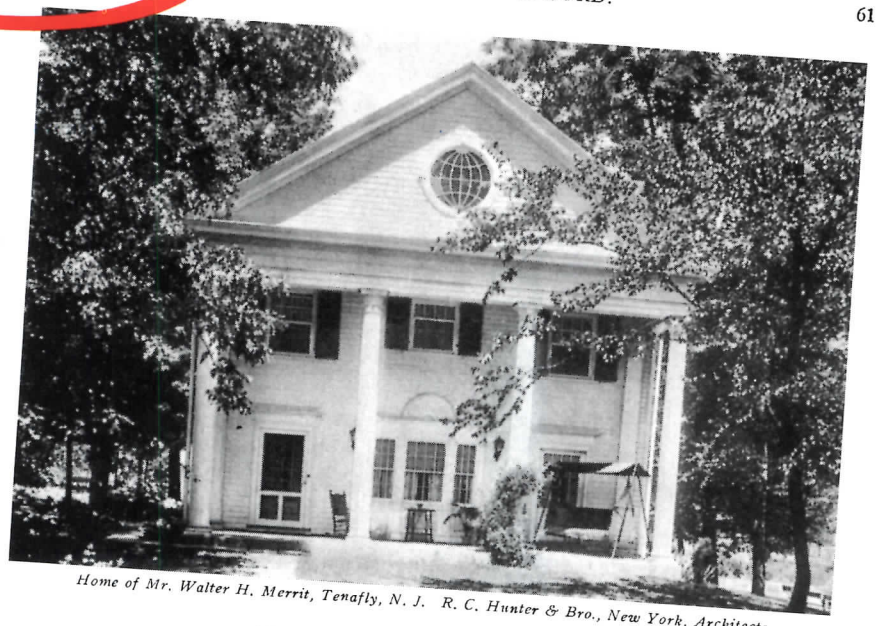
See your Hurd distributor for a demonstration.

InSol-8™
hurd
WOOD WINDOWS

Worth the switch.

*Calculations based on both center of glass and total window values for Hurd InSol-8 windows with the Superglass System with Heat Mirror in a 1" thickness. Total unit R value is 5.5 for commercial size units; 4.6 for residential size units. All data were calculated using the standard ASHRAE 1989 calculation method and standard winter conditions of 0/70/15. Calculations made using LBL 3.1 Computer Modeling Software.

Circle 69 on inquiry card



Home of Mr. Walter H. Merrit, Tenafly, N. J. R. C. Hunter & Bro., New York, Architects

What do you Demand of a Siding?

When you specify a siding do you write in the name of the wood you want and stand on that; or, do you add: "or equal?" Just what do you demand of a siding? Are you thoroughly familiar with the virtues and shortcomings of the various kinds?

Hundreds of architects admit that Western Red Cedar Siding gives them all they ask of a siding *and more.* Its extraordinary durability, ability to stay in place, freedom from resin or pitch, ease of handling and beauty of appearance place it in the front rank.

Reliable data for architects touching Western Red Cedar has been prepared in a special brochure made to fit your reference files. You no doubt will be interested. The brochure will be sent, gratis, on request.

RED CEDAR LUMBER MANUFACTURERS' ASSOCIATION

5 POINTS OF IMPORTANCE

Here are five outstanding points in the superiority of Western Red Cedar Siding:

1. It offers exceptional resistance to rot and insect attack. Durability officially rated as 125-175 compared with white oak taken as 100.
2. It will not shrink, warp or twist; it "stays put."
3. It is easy to work and to handle.
4. It does not contain resin or pitch; it takes enamel or paint readily and holds either wonderfully well.
5. Its soft, smooth texture and fine, even grain lend it marked beauty of appearance.

Write for special data for architects. See the current SWEET'S.

The Name Below is on Every Bundle:

Western Red Cedar

"The Wood That Nature Armed Against Decay"

The message
is as durable and reliable as the wood.

Western Red Cedar Lumber Association
Yeon Bldg., 522 S.W. Fifth Ave.
Portland, OR 97204
503-224-3930

WRCLA

Most Important Buildings, 1891/1991

(Complete listing for the feature story on pages 136-139)

1. Fallingwater/Frank Lloyd Wright
2. Villa Savoye/Le Corbusier
3. Barcelona Pavilion/Ludwig Mies van der Rohe
4. Notre Dame-Ronchamp/Le Corbusier
5. Kimbell Art Museum/Louis Kahn
6. Robie House/Frank Lloyd Wright
7. Seagram Building/Ludwig Mies van der Rohe
8. Chrysler Building/William Van Alen
9. Rockefeller Center/Hood & Fouilhoux and others
10. Lever House/SOM
11. Wainwright Building/Louis Sullivan
12. Pompidou Centre/Piano & Rogers
13. S. C. Johnson and Son Administration Center/Frank Lloyd Wright
14. Unity Temple/Frank Lloyd Wright
15. Bauhaus/Walter Gropius
16. Carson, Pirie, Scott Store/Louis Sullivan
17. Dulles Airport/Eero Saarinen
18. Sydney Opera House/Jorn Utzon
19. Salk Institute/Louis Kahn
19. Glasgow School of Art/Charles Rennie Mackintosh
21. Schroder House/Gerrit Rietveld
21. Vanna Venturi House/Robert Venturi
21. Guggenheim Museum/Frank Lloyd Wright
21. Empire State Building/Shreve, Lamb & Harmon
25. Yale Art & Architecture Building/ Paul Rudolph
25. Taliesin West/Frank Lloyd Wright
25. Saynatsalo Town Hall/Alvar Aalto
25. Sagrada Familia/Antonio Gaudí
25. Larkin Building/Frank Lloyd Wright
30. Thorncrown Chapel/E. Fay Jones
30. Bavinger House/Bruce Goff
30. Bank of China/I. M. Pei
33. Maison de Verre/Pierre Chareau
33. Glass House/Philip Johnson
33. Farnsworth House/Ludwig Mies van der Rohe
36. Unité d'Habitation/Le Corbusier
36. TWA Terminal/Eero Saarinen
36. The Grand Louvre/I. M. Pei
36. La Tourette Convent/Le Corbusier
36. Fagus Factory/Walter Gropius
41. St. Louis Gateway Arch/Eero Saarinen
41. The Sea Ranch Condominiums/Moore, Lyndon, Turnbull, Whitaker
41. Richards Medical Lab/Louis Kahn
41. Portland Public Service Building/ Michael Graves
41. Hong Kong Shanghai Bank Building/ Norman Foster
41. AT&T Building/Johnson-Burgee
47. Imperial Hotel/Frank Lloyd Wright
47. Crow Island School/Perkins & Will with Eliel Saarinen
49. The Atheneum/Richard Meier
49. Reliance Building/Daniel Burnham
49. PSFS Building/Howe & Lescaze
49. Monadnock Block/Burnham & Root
49. Jacobs House/Frank Lloyd Wright
49. Gehry House/Frank Gehry
49. Ford Foundation/Kevin Roche
49. Eames House/Charles & Ray Eames
49. Cemetery-Brion-Vega/Carlo Scarpa
58. World Trade Center/Minoru Yamasaki
58. Vietnam War Memorial/Maya Ying Li
58. Post Office Savings Bank/Otto Wagner
58. John Deere Headquarters/Eero Saarinen
58. Golden Gate Bridge/J. B. Strauss
58. Geodesic Dome/R. Buckminster Fuller
58. Flatiron Building/Daniel Burnham
58. East Wing-National Gallery/I. M. Pei
58. Casa Mila/Antonio Gaudí
58. Boston City Hall/Kallmann and McKinnell
58. Auditorium Building/Adler & Sullivan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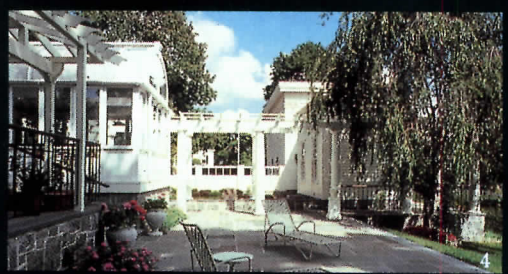
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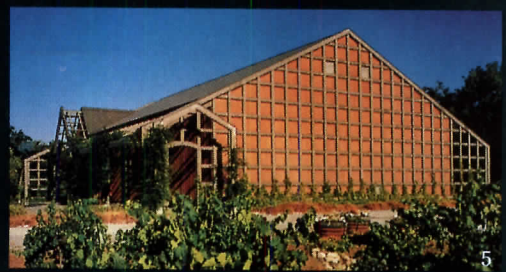
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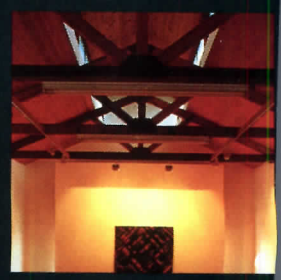


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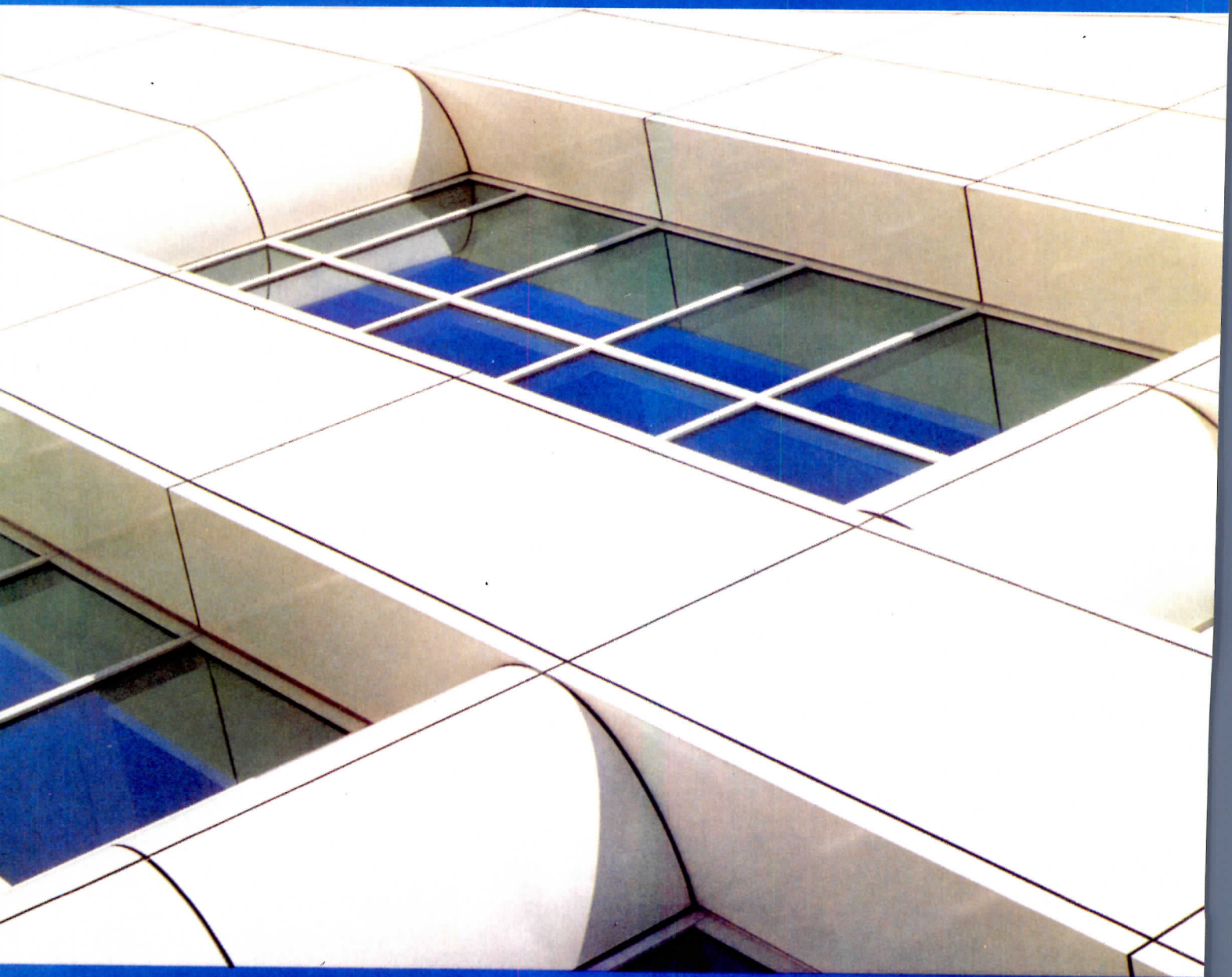
69. World Financial Center/Cesar Pelli
69. Pennsylvania Station/McKim, Mead & White
69. Palazzetto Dello Sport/Pier Luigi Nervi
69. National Gymnasium/Kenzo Tange
69. Modena Cemetery/Aldo Rossi
69. High Museum/Richard Meier
69. Lake Shore Drive Apartments/Ludwig Mies van der Rohe
76. W. H. Winslow House/Frank Lloyd Wright
76. Vuoksenniska Church/Alvar Aalto
76. Alcoa Building/Harrison and Abramovitz
76. Taliesin East/Frank Lloyd Wright
76. Swiss Pavilion/Le Corbusier
76. Stockholm Library/Gunnar Asplund
76. Steinhof Church/Otto Wagner
76. Pennzoil Place/Johnson-Burgee
76. PPG Place/Johnson-Burgee
76. Neue Staatsgalerie/James Stirling
76. Meyerson Symphony Hall/I. M. Pei
76. Lovell Beach House/Rudolph Schindler
76. Lloyd's of London/Richard Rogers
76. Leicester Engineering Building/James Stirling
76. Guaranty Building/Adler & Sullivan
76. Grand Central Station/Reed & Stem and Warren & Wetmore
76. Gamble House/Greene & Greene
76. Federal Reserve Bank/Gunnar Birkerts
76. Disneyland/Walt Disney Productions
76. Crown Hall, ITT/Ludwig Mies van der Rohe
76. British Art Center/Louis Kahn
76. Boston Public Library/McKim, Mead & White
76. Berlin Philharmonic Hall/Hans Scharoun
76. Assembly Building at Dacca/Louis Kahn
100. Woolworth Building/Cass Gilbert
100. Whitney Museum/Marcel Breuer
100. Wexner Center/Peter Eisenman
100. Villa Stein/Le Corbusier
100. Villa Maira/Alvar Aalto
100. Villa Garches/Le Corbusier
100. Furness Library/Frank Furness
100. United Airlines Terminal/Murphy-Jahn
100. Turin Exhibition Hall/Pier Luigi Nervi
100. Stockholm City Hall/Ragner Ostberg
100. St. Mary's Catholic Church/Douglas Cardinal
100. Society Bank Building/Burnham & Root
100. Smith House/Richard Meier
100. Simon Fraser University/Arthur Erickson
100. Sears Tower/SOM
100. Paimio Sanitorium/Alvar Aalto
100. San Simeon/Julia Morgan
100. San Jose Convention Center/Mitchell-Giurgola
100. RCA (now GE) Building/Hood, Harrison, Fouilhoux
100. Price Tower/Frank Lloyd Wright
100. Piazza d'Italia/Charles Moore
100. Parque Guell/Antonio Gaudí
100. Parc De La Villette/Bernard Tschumi
100. New Gourna Village/Hassim Fathy
100. Museum of Modern Art/Philip Goodwin and Edward Durell Stone
100. Museum at Monchengladbach/Hans Hollein
100. Munich Olympic Stadium/Frei Otto
100. Memorial Quadrangle/James Gamble Rogers
100. Lovell "Health" House/Richard Neutra
100. Le Raincy Church/Auguste Perret
100. Humana Building/Michael Graves
100. Hoshina Wedding Chapel/Kendrick Kellogg
100. Hancock Tower/SOM
100. Haj Terminal/SOM
100. Guild House/Robert Venturi
100. Finnish Pavilion/Alvar Aalto
100. Exeter Library/Louis Kahn
100. Einstein Tower/Eric Mendelsohn
100. Eiffel Tower/Gustave Eiffel
100. Douglas House/Ralph Erskine
100. Arcosanti/Paolo Soleri
100. Church in Neviges/Gottfried Bohm
100. Chandigarh/Le Corbusier
100. Casa del Fascio/Guiseppe Terragni
100. Byker Housing Estates/Ralph Erskine
100. Brendan Byrne Arena/Grad Associates
100. AEG Turbine Factory/Peter Behrens

SOLUTION: A

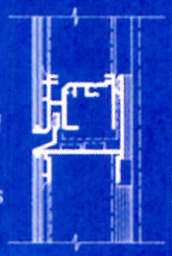


The design called for a curtainwall material that was lightweight. It had to be both flat and formable, and accept a custom painted finish.

The solution was Alucobond® material.

Lightness: Alucobond material is two thin sheets of aluminum with a polyethylene core. It weighs considerably less than solid sheet aluminum.

Flatness and Formability: Alucobond material does not oil-can, yet can be curved to a minimum bending radius of fifteen times the material thickness.



Paint Acceptance: A custom thermally c Duranar® 200 finish was applied to match the window frame extrusions and provide protec against weather and chemical attack.

Attachment: To provide for a very flush connection, Alucobond material was applied an edge grip extrusion system.

More information: Alucobond material is

Project: Salt Palace, Salt Lake City, Utah

Architect: Edwards and Daniels Associates, Salt Lake City, Utah