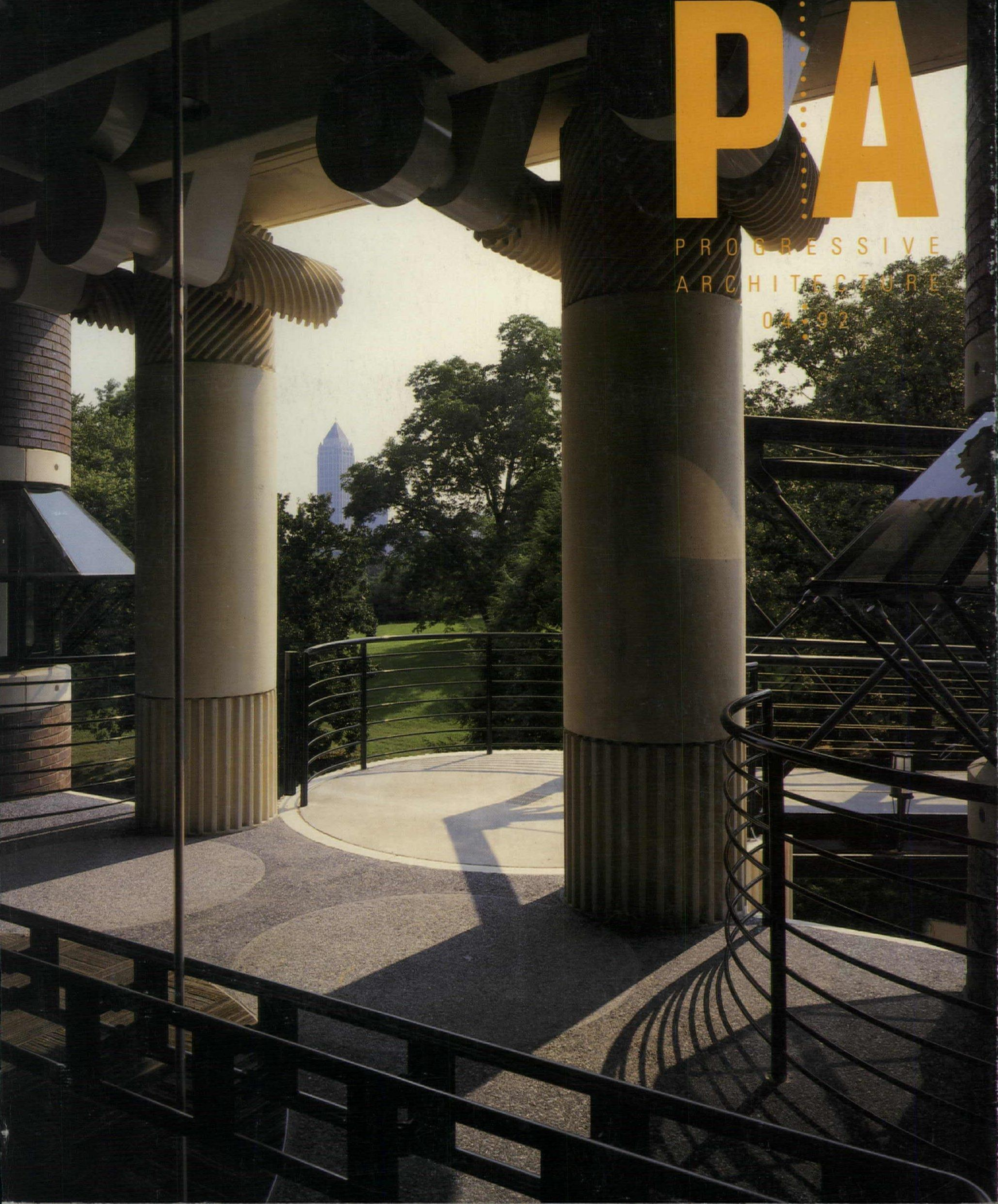
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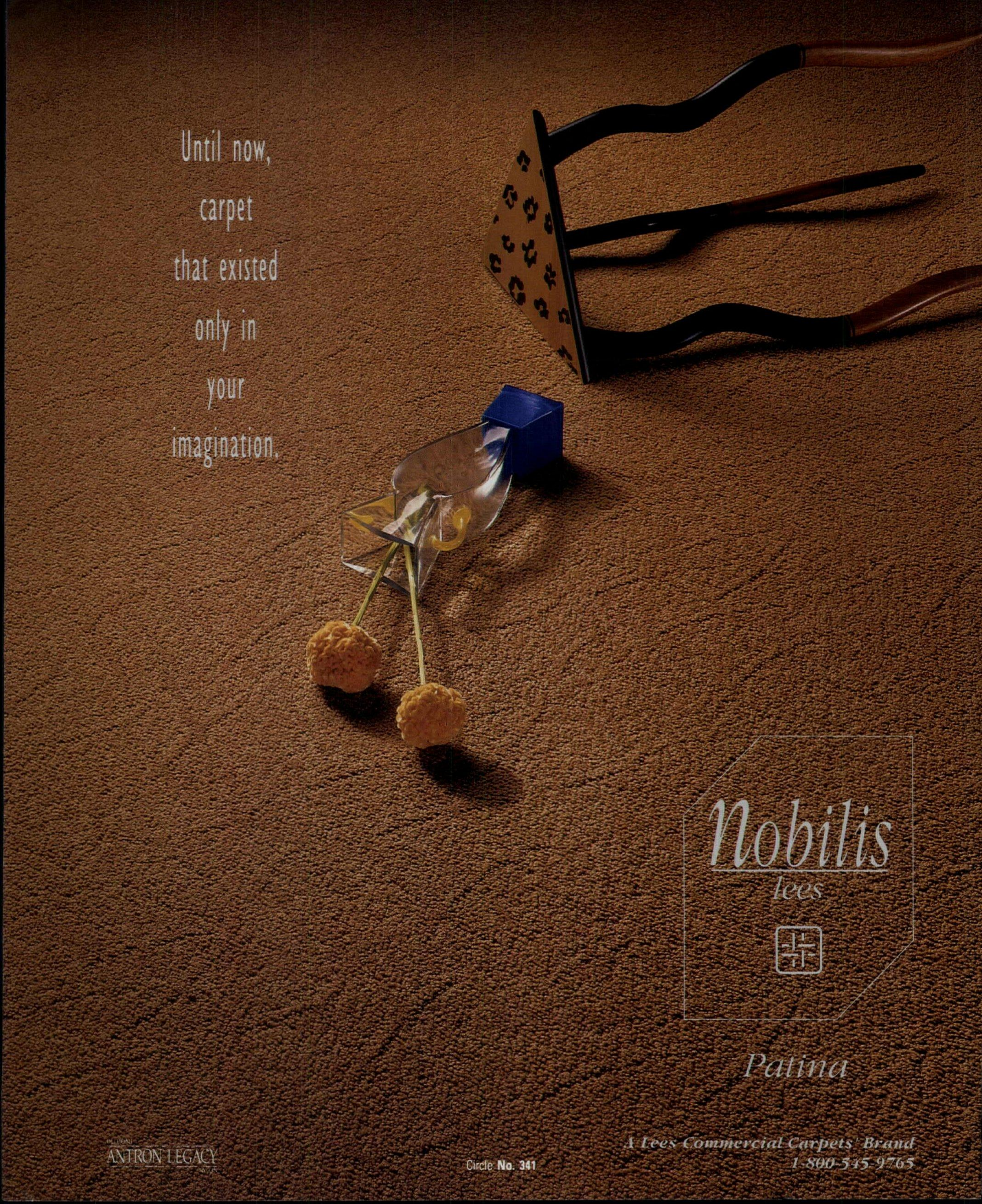
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Penton Publishing P/A Progressive Architecture (ISSN 0033-0752) is published monthly, except semimonthly in October, by Reinhold Publishing, A Division of Penton Publishing, 1100 Superior Ave., Cleveland, OH 44114-2543. Philip H. Hubbard, Jr., President; Robert J. Osborn, Vice President. Penton Publishing: Sal F. Marino, Chairman and CEO; Daniel J. Ramella, President and COO; Philip H. Hubbard, Jr., President, Eastern Operations Group.
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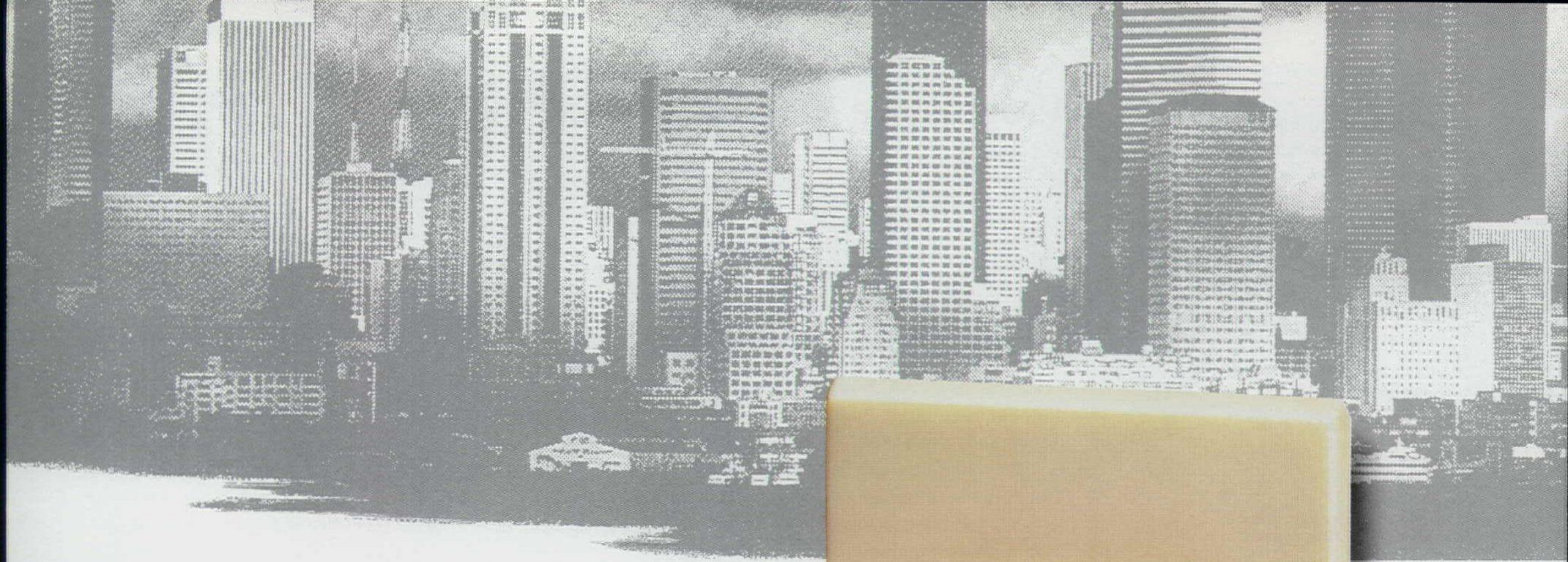

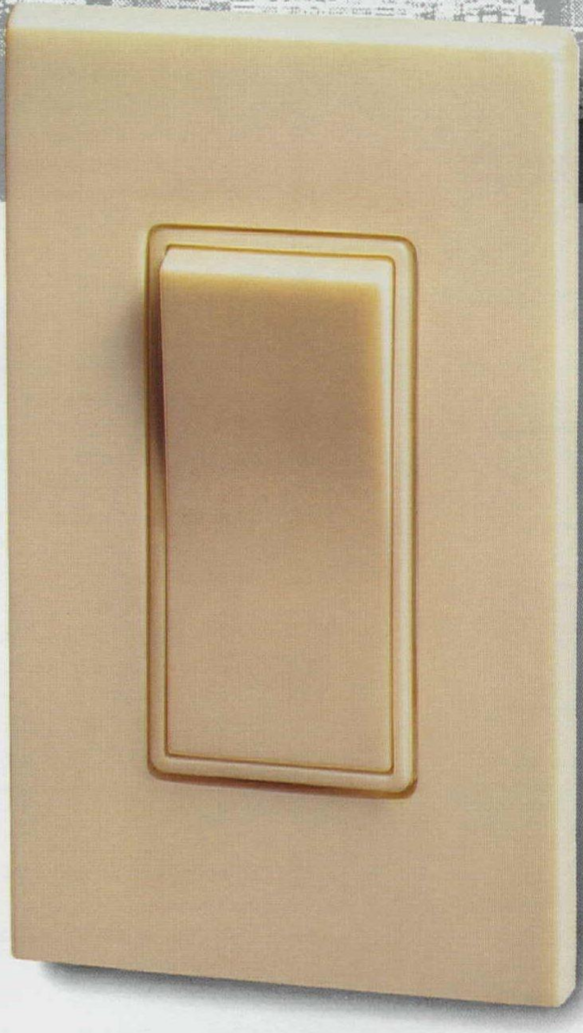

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Editorial
Counter Recession

In meeting America's needs for public sector construction and rehabilitation, the AIA President sees a way out of the current recession.

During the 1975 recession, when economists claimed that things were looking up, Hubert Humphrey pithily replied, "When you're flat on your back, the only place you can look is up." Today, many people in the design and construction industry are in the same position. The collapse of the construction industry led us into recession; with decisive Federal action, construction can lead us out, creating jobs and restoring the infrastructure network that supports a sound economy.

During 1991, construction suffered the largest percentage drop since World War II. The impact has been keenly felt in architecture: firms in many parts of the country have cut back or gone out of business altogether. In Connecticut, for example, a recent survey by the Connecticut Society of Architects/AIA indicated firms typically employing 30 people in 1990 were down to only 5 to 8 people a year later. And anecdotal evidence from all regions of the country suggests things are as bad – or worse – elsewhere.

While know-how and energy lie idle, the nation's infrastructure – from transportation facilities to public buildings – is neglected. Federal statistics demonstrate the need for billions of dollars worth of construction by the year 2000 in such areas as airports, schools, and waste water projects.

Yet, despite these and other needs, projects ready for construction now sit on the shelf. A just-completed survey for the U.S. Conference of Mayors found that three-fourths of the respondents had more than 4500 public projects stalled because no funds were available. Just these projects alone would create over 280,000 jobs. Every billion dollars spent on infrastructure can create 50,000 jobs.

How did we get into this predicament? Simple: public investment in capital programs has failed to keep pace with need. A 1990 study by the Economic Policy Institute found that "when depreciation is taken into account, the rate of non-military public investment in the 1980s was only half that of the 1970s, and just one-fourth that of the 1950s and 1960s." This lack of investment has cost us dearly. Productivity measured from 1960 to 1986 is lower in the United States than in Japan, Germany, France, the United Kingdom, Italy, and Canada.

This translates into a rocky economy. It means lost job opportunities and losses in competition overseas. It means communities that function inefficiently and thus have a tougher time grappling with the human and social problems confronting them.

The recession and the end of the Cold War provide us with both the impetus and the opportunity to rebuild and construct facilities that can get our economy up and moving now, solidifying its foundation for the future. The door is open to a redirection of national priorities. The responsibility lies with the Congress and the President, election year though this is, to hammer out the program that will get the job done. This program should contain the following elements:

1 *Revise the 1990 budget agreement between the Bush administration and Congress to tear down its so-called "firewall" between military and domestic spending, allowing military funds to be shifted to domestic needs. The firewall was erected in a world far more dangerous than today's, before Desert Storm and the collapse of the Soviet Union.*

2 *Redirect spending from defense to domestic infrastructure. Congressional leaders are proposing that as much as $110 billion be reallocated from defense over five years; the President proposes $50 billion over the same period. Adequate funds should be devoted to cushioning the impact on defense workers.*

3 *Enact economic recovery legislation to fund infrastructure projects ready for construction but blocked by a lack of funds. The Community Development Block Grant program administered by HUD can place money immediately in the hands of states and localities for a variety of public and private projects. Acceleration of the transportation funds authorized in the new federal surface transportation law would also contribute to recession relief.*

4 *Enact long-term infrastructure improvement programs to develop and construct projects essential to the livability and economic prosperity of our communities. Legislation that promotes regional planning, airport development, affordable housing production, and school rehabilitation and construction, along with measures that revise laws governing the tax-exempt bonding authority of states and localities, should be high Congressional priorities.*

These are painful times for the design profession and for the construction industry in general. The way out does not lie in letting things take their course. Rather, the Federal government must recognize the need and seize the opportunity to invest in the economy's future.

If we do this, America will be back on its feet, able to look confidently ahead to the future.

W. Cecil Steward, FAIA ■

The author is President of the American Institute of Architects and Dean of the College of Architecture, University of Nebraska, Lincoln.

P/A Competition

The New Public Realm, P/A's new design competition – announced in this issue – seeks proposals for public facilities from proactive professionals. For entry details, see page 59.

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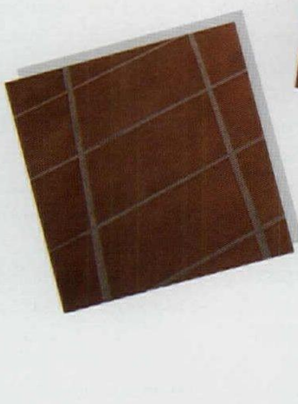

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Views

Star Watch

As a steering committee member of the AIA Committee on Design and chair designate for 1994, I congratulate your February Editorial (p. 7). It was a refreshing and most needed view.

It was not the stars you were writing about, but the meteors. The stars are a part of the collective and permanent cosmos, lighting the sky not through their individual brilliance, but by their majestic number and their seemingly everlasting beauty and stability. A meteor flies through the sky in an instant, dazzling the eye with its unique and spontaneous flash, only to die in the horizon a spent and lonely spec of dust. I hope we see the work of many more stars.

Charles E. Dagit, Jr., FAIA
Dagit Saylor Architects
Philadelphia

Dishing the Getty?

"We should concede that we should not make a critical judgment.... It may be much more successful than we imagine."

I agree wholeheartedly with Mr. Dixon in his final comments about the Getty Museum in the (February) Perspectives piece (p. 103). If that is true, why have five pages of "critical judgment" on models and drawings? Most architects have heard enough of that in school.

It is doubly frustrating to hear that there was a meeting with Mr. Meier, but we do not hear his words.

You have a great editorial staff, your magazine's content and comments are gobbled up by those in the field, but it's hard to see where this piece said more than what might be said at a dinner party. I look to P/A for thoughts I can't hear anywhere else.

Duo Dickinson, Architect
Madison, Connecticut

The Politics of Urban Design

The article "Urban Ethics" in the February 1992 issue of P/A (p. 92) dealt with some vital issues of urban design and development, specifically as they relate to the Forest City Project in Cambridge, Massachusetts, but was seriously uninformed as to the issues. The Central Square community, and Cambridge in general, did not oppose the project primarily because of traffic questions. And shop owners, for the most part, supported the project because of expected increase revenues. The issue was gentrification.

At the time Forest City was planned, Cambridge had a housing vacancy rate of 1 percent; the Cambridge/Boston area had the third highest housing prices in the nation, the second highest rents, the worst income to housing costs ratio in the continental United States, and Massachusetts had the fastest rising homeless population in the country. The last thing that the city needed – and this was the basis of community opposition – was more office, laboratory, and hotel space, especially on the last piece of open land in the city. The main ethic involved was need (lack of planned housing in a congested market) versus greed (excess of planned office space in a glutted market). Koetter/ Kim did nothing to resolve this question. They just drew the blueprints for it.

Joshua Barnett, R.A.
Cambridge, Massachusetts

Brick Veneer Correction

I am disappointed in the inaccuracies that P/A has introduced in the article "Technics: Steel Stud/Brick Veneer Walls" (Feb. p. 113) by me and Jacques Rousseau.

While the body of the article is

an accurate reflection of our views, the presentation of the figures is not. Your editors elected to invent their own captions for the figures and not use any of the commentary or captions we supplied.

The most serious misrepresentation occurs on page 116 where a brick tie was given the caption "Detail Showing Mechanical Attachment of Brick Connector to Steel Stud." The caption we supplied was "Example of a Brick Tie that is not Recommended." Our commentary, which was also deleted, went on to explain: "This style of brick tie offends several principles of good tie design. The tie is typically mounted on the face of the exterior sheathing at a stud location. Sheathing such as drywall will break down in the presence of moisture and/or load cycling and the performance of the tie will be compromised. The brick tie is held in place by one sheet metal screw in pull-out, a relatively weak and corrosion sensitive type of detail. Lastly, the strength and stiffness of the tie is severely compromised when the wire pintle is at the outer limits of its adjustment range."

Another serious misrepresentation occurs on page 114 where you added a figure not provided by us, entitled "Cutaway of Axonometric of Steel Stud/Brick Veneer Wall." Some of the details in this figure contradict design recommendations made in the body of the article. The figure shows no exterior insulation although we recommend a minimum of thickness of 1". The brick tie is mounted on the face of the exterior drywall and relies on sheet metal screws in pull-out for its connection to the stud, contrary to our design recommendations. Lastly the flashing detail is contrary to a recommendation we made in another figure that you elected not to publish. Accompanying that figure, we discussed the flashing issue as follows: "Flashing is typically installed behind the exterior sheathing and/or insulation, which is an effective method for holding the flashing in place and assuring that water cannot run down behind the flashing. A preferred method is to install the flashing under the bottom track and to provide drain holes in the bottom track. This approach allows any moisture that might accumulate in the wall to escape but has the disadvantage of creating construction sequencing problems.

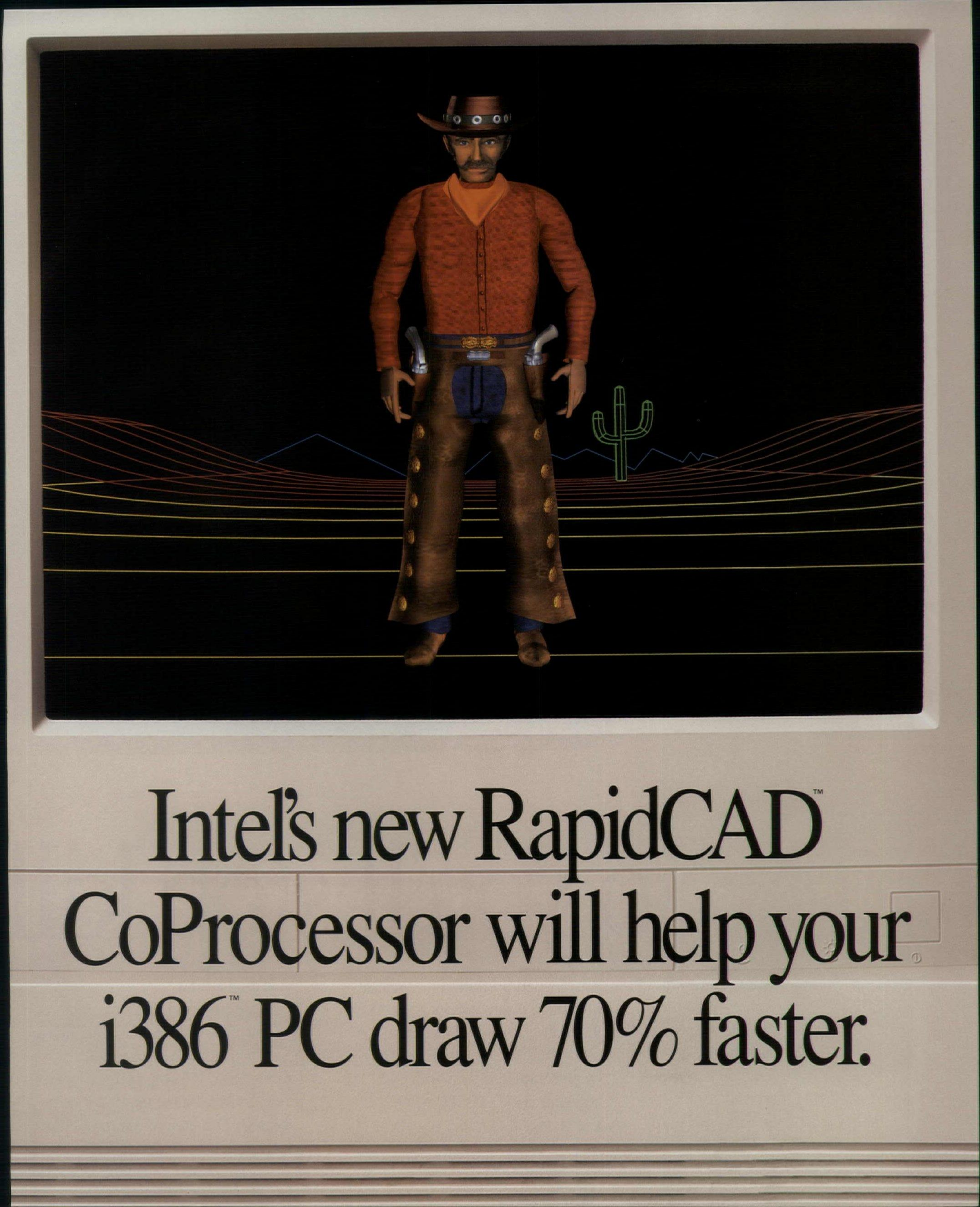
These are not the only omissions and misrepresentations from the figures but are by far the most serious. The remainder could be classified as irritants to your readers who must wonder what purpose several of the figures were intended to serve.

It is hoped that you will publish these corrections. Building designers already have a tough enough job without the additional hazard of misleading design information from P/A.
T.W.J. Trestain, P. Eng.
Structural Engineer
Toronto, Canada

[The inclusion of drawings and captions from another source was an error, and we regret any confusion this may have caused our readers. P/A is planning to publish other opinions on brick veneer construction in the June 1992 issue. –Editor]

Vico's Century

As Prof. Donald Kunze has reminded us, both Giovanni Battista Vico and Francesco Piranesi (Feb. 1992, p. 78) were of the 18th Century, not the 16th.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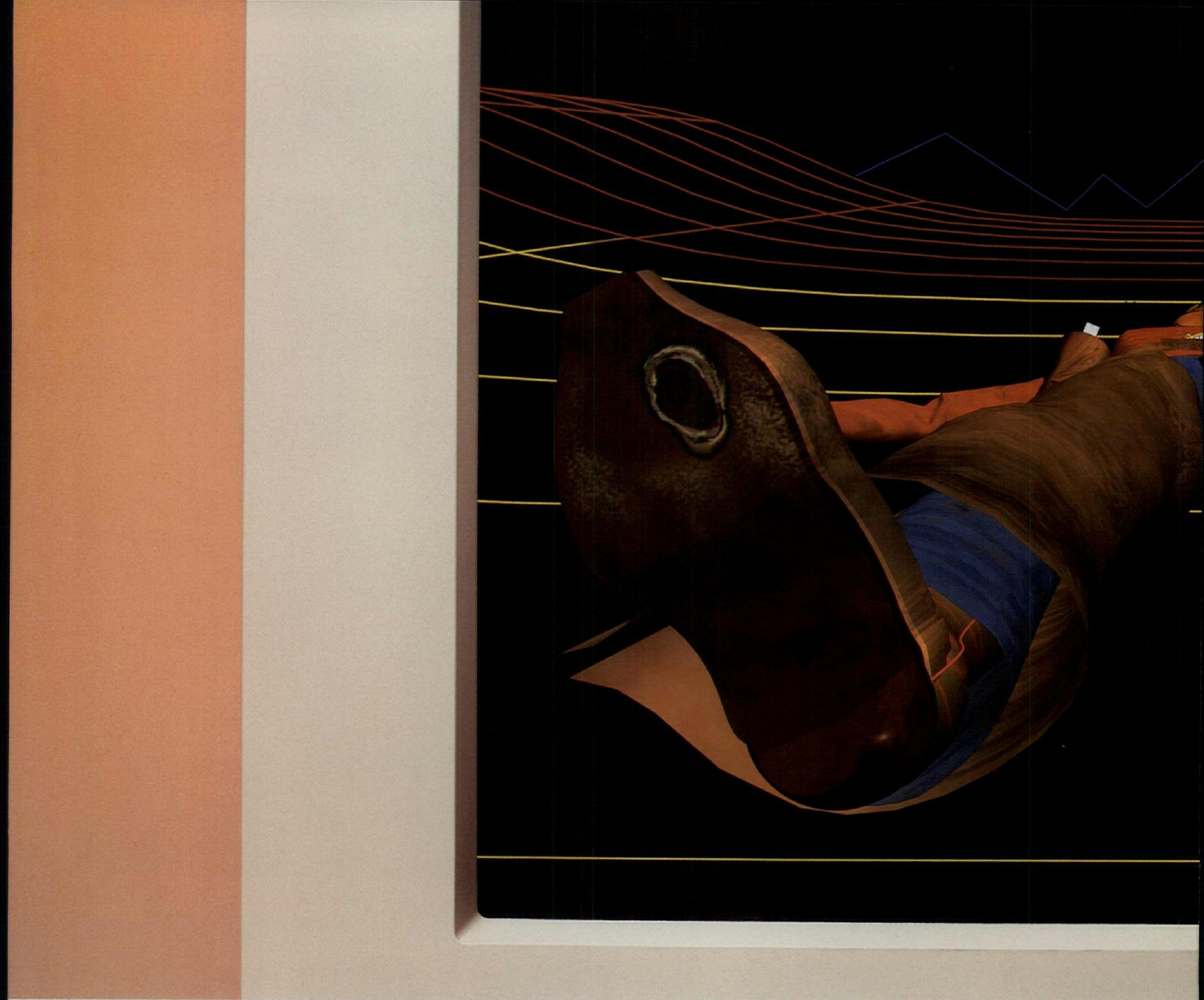

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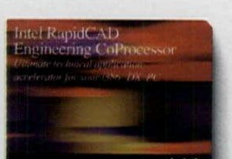

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- **Where the Practice department once covered mainly legal and specifications subjects, we now also provide management and marketing advice, profile major clients (under the name P/A Prospects), and have begun a series on architects and power.**
- **Where we once focused heavily on high-style buildings by trend-setting architects, we now have broadened the number of architects and the range of work we publish, with Young Architects issues, P/A Inquiry articles, Emerging Talent profiles, and a new series entitled "Reports from the Field" which will begin this year.**

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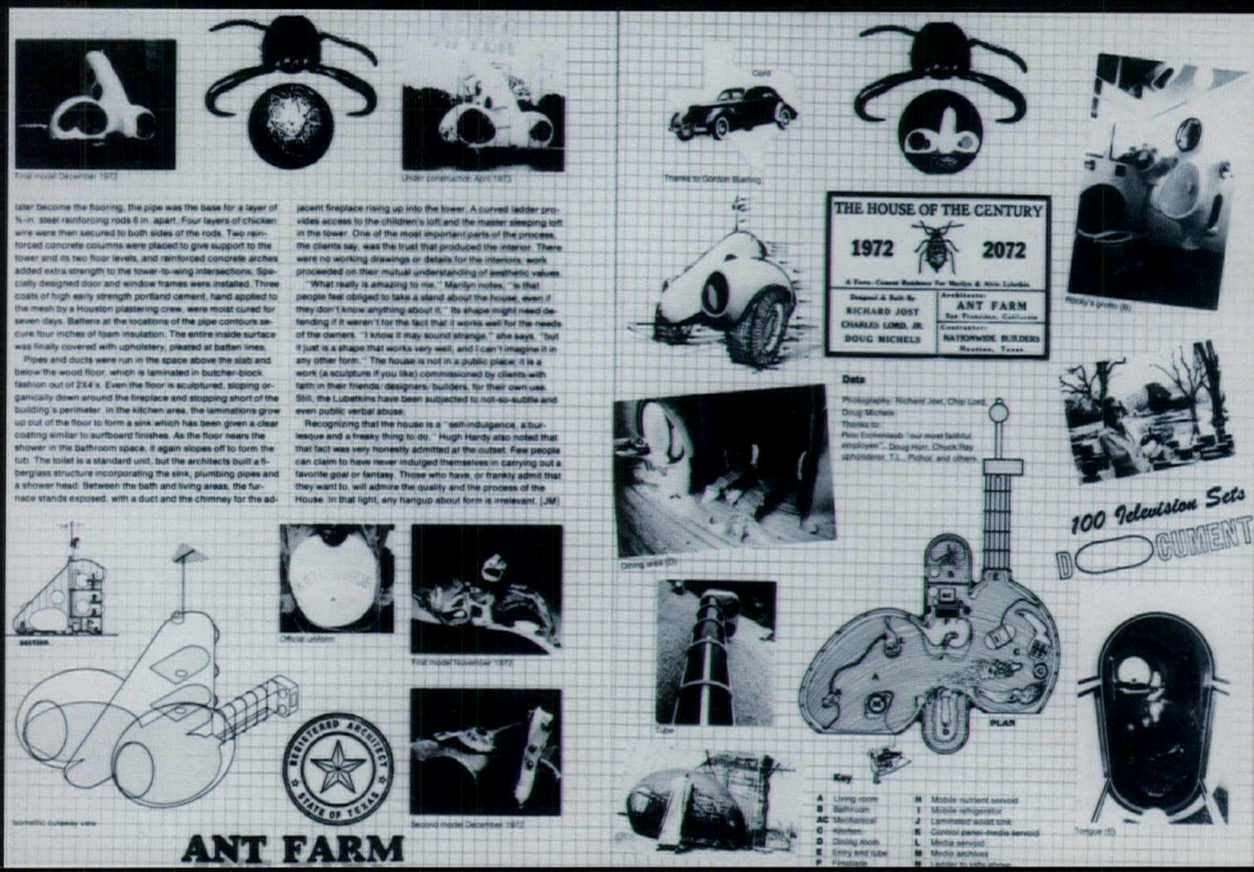


Final model December 1972

Under construction April 1973

later become the flooring, the pipe was the base for a layer of ⅜-in. steel reinforcing rods 6 in. apart. Four layers of chicken wire were then secured to both sides of the rods. Two reinforced concrete columns were placed to give support to the tower and its two floor levels, and reinforced concrete arches added extra strength to the tower-to-wing intersections. Specially designed door and window frames were installed. Three coats of high early strength portland cement, hand applied to the mesh by a Houston plastering crew, were moist cured for seven days. Battens at the locations of the pipe contours secure four inches of foam insulation. The entire inside surface was finally covered with upholstery, pleated at batten lines.

Pipes and ducts were run in the space above the slab and below the wood floor, which is laminated in butcher-block fashion out of 2X4's. Even the floor is sculptured, sloping organically down around the fireplace and stopping short of the building's perimeter. In the kitchen area, the laminations grow up out of the floor to form a sink which has been given a clear coating similar to surfboard finishes. As the floor nears the shower in the bathroom space, it again slopes off to form the tub. The toilet is a standard unit, but the architects built a fiberglass structure incorporating the sink, plumbing pipes and a shower head. Between the bath and living areas, the furnace stands exposed, with a duct and the chimney for the adjacent fireplace rising up into the tower. A curved ladder provides access to the children's loft and the master sleeping loft in the tower. One of the most important parts of the process, the clients say, was the trust that produced the interior. There were no working drawings or details for the interiors; work proceeded on their mutual understanding of aesthetic values.

"What really is amazing to me," Marilyn notes, "is that people feel obliged to take a stand about the house, even if they don't know anything about it." Its shape might need defending if it weren't for the fact that it works well for the needs of the owners. "I know it may sound strange," she says, "but it just is a shape that works very well, and I can't imagine it in any other form." The house is not in a public place; it is a work (a sculpture if you like) commissioned by clients with faith in their friends/designers/builders, for their own use. Still, the Lubetkins have been subjected to not-so-subtle and even public verbal abuse.

Recognizing that the house is a "self-indulgence, a burlesque and a freaky thing to do," Hugh Hardy also noted that that fact was very honestly admitted at the outset. Few people can claim to have never indulged themselves in carrying out a favorite goal or fantasy. Those who have, or frankly admit that they want to, will admire the quality and the process of the House. In that light, any hangup about form is irrelevant. (JM)

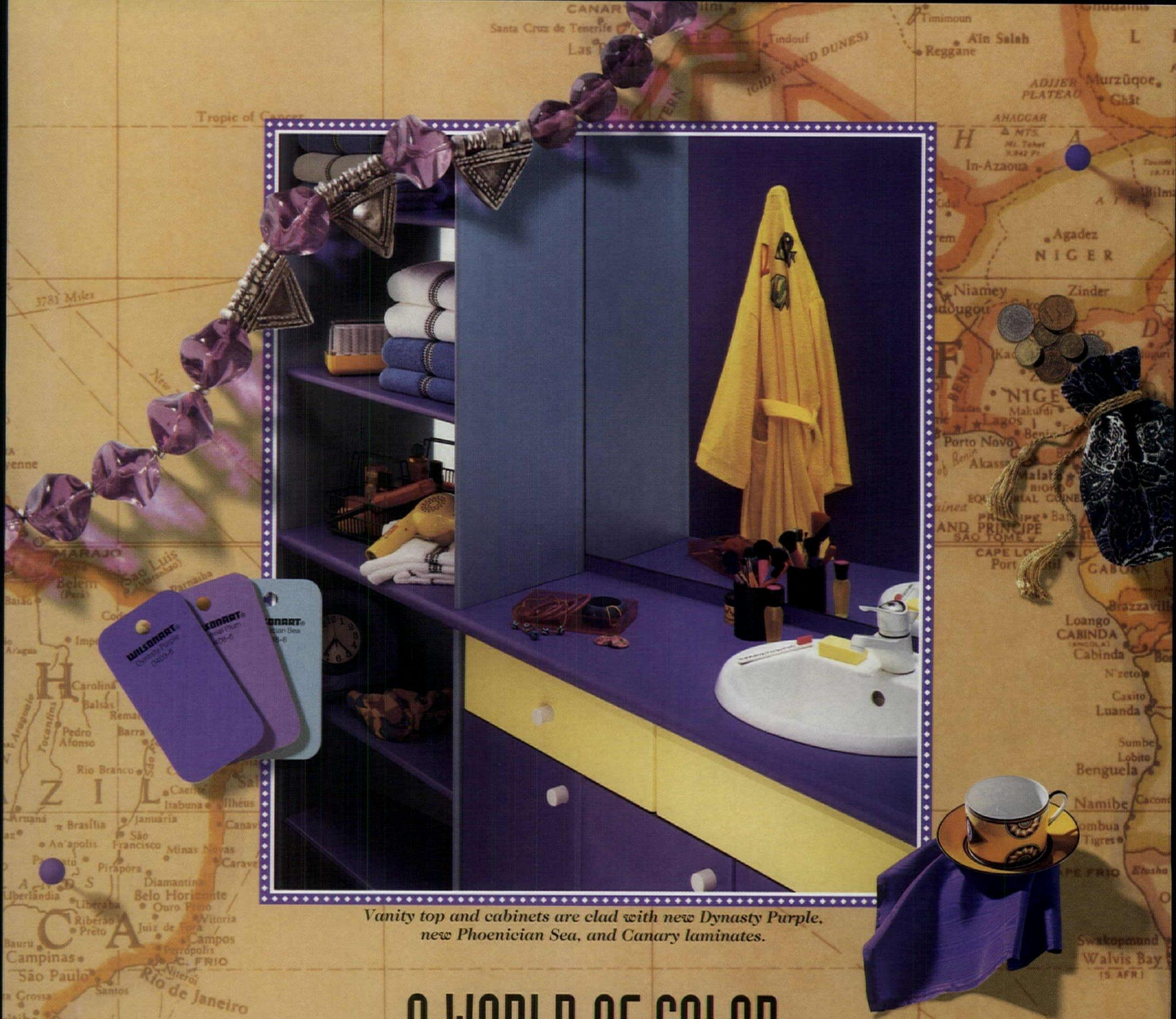
Data

Photography: Richard Jost, Chip Lord, Doug Michels

Thanks to: Peter Eichenbaum "our most faithful employee", Doug Hurr, Chuck Ray upholsterer, T.L., Pichot, and others.

Key

A Living room
B Bathroom
AC Mechanical
C Kitchen
D Dining room
E Entry and tube
F Fireplace
H Mobile nutrient servoid
I Mobile refrigerator
J Laminated wood sink
K Control panel-media servoid
L Media servoid
M Media archives



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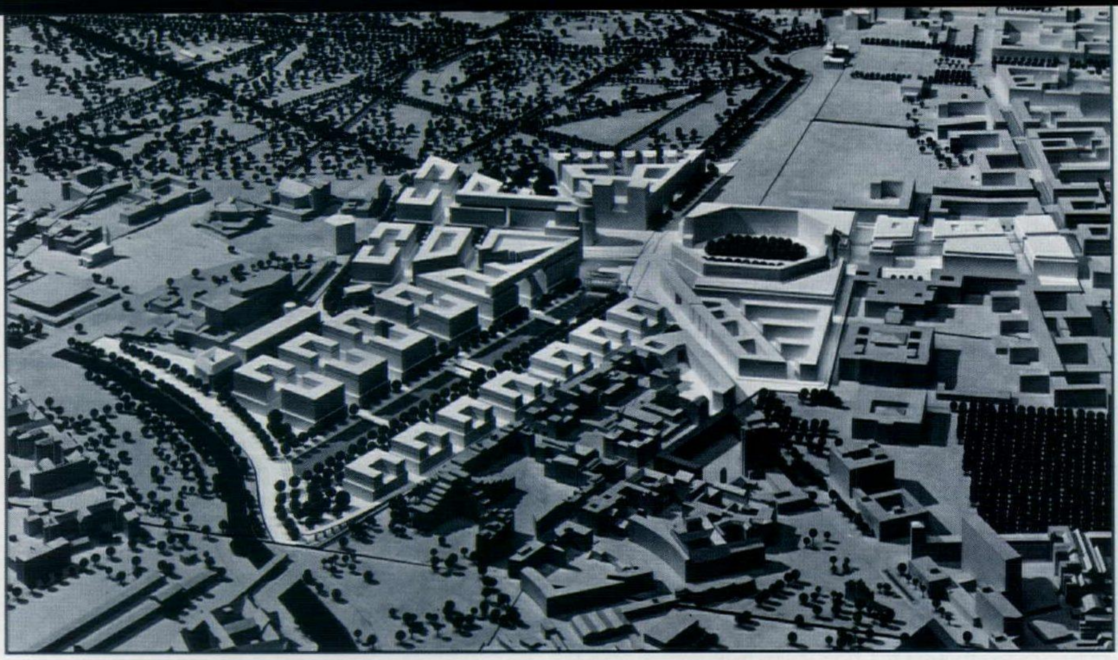


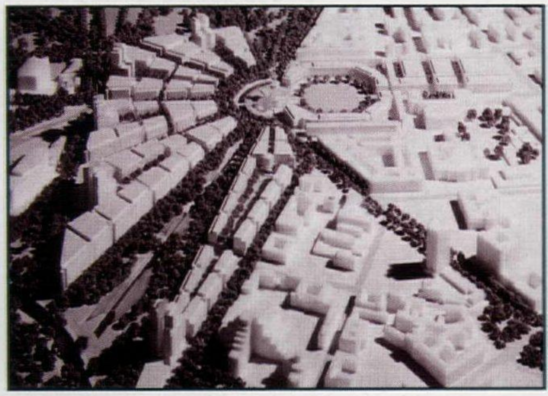
Competition-winning scheme for Potzdamer/Leipziger Platz by Hilmer und Sattler.

News Report

A P/A competition, "The New Public Realm" seeks solutions for rebuilding our public works infrastructure. See page 59.

Uwe Rau

Competition entry by Daniel Libeskind.



Eamonn O'Mahony

Developers' alternative by Richard Rogers.

United Berlin Struggles With Site at its Heart

With the reunification of Germany and the decision by the German Parliament to make Berlin the federal capital, the conditions governing the development of the city have fundamentally changed. Vast strips of land in the "dead zone" (where the wall once stood) and sites left fallow for political reasons are now ripe for development.

Although no comprehensive master plan yet exists, there are basic principles upon which most Berliners agree. Densification of the existing fabric has priority over development of new areas, and the existing transport system must be reconnected and standardized to promote public transit.

Agreement in principle, however, does not always translate to agreement in reality, as the current heated controversy over Potzdamer/Leipziger Platz demonstrates. This site formed the heart of Berlin from the 18th Century (the famous "Achtock," or Octagon, was planned in 1837) to August, 1961, when the wall was erected. Today, the area is a weed-covered wasteland that contains 48.5 acres of Berlin's most prized land. In 1990, the land was sold by the federal and city governments, for very little money, to Daimler Benz, Sony, Asea Brown Boveri, and Hertie Wertheim, with the stipulation that the Senate would control what could be built.

The government pushed for schemes that would provide a mixed-use business district development within Berlin's lowrise landscape, while the developers, unsurprisingly, wanted only top corporate and commercial renters. An invited competition of 16 architects (all German, except for Norman Foster, Vittorio Gregotti, and the Austrians, Laurids and Manfred Ortner) was held last fall; in October, the Munich firm of Hilmer und Sattler was declared the winner. Their scheme works within Berlin's famous 22-meter roof line and reintroduces the Octagon. Other notable entries included Hans Kollhoff's mini-Manhattan of towers (P/A, Dec. 1991, p. 93), Daniel Libeskind's Deconstructivist scheme, and a plan by O.M. Ungers with eight glass towers.

The four developers, unhappy with the decision, have hired Richard Rogers to make a proposal and are pushing their scheme hard. Rogers's scheme respects the 22-meter line in part, but accents axes with higher buildings and marks the center of the site with a needle-like tower. But the Senate is upholding its decision to build the Hilmer und Sattler scheme, which has been revised to allow for a few buildings as high as 60 meters. **Kelly Shannon** ■

The author is currently pursuing postgraduate study in architecture at the Berlage Institute in Amsterdam.

© Alan Delaney

As the dust settles on London's Canary Wharf, British critic Colin Davies offers a review. Perspectives, page 122. (Above: rail station by Cesar Pelli & Associates.)

Pencil Points

Pressured by architects, librarians, and other experts, President François Mitterrand has agreed to some changes to Dominique Perrault's design for the Bibliothèque de France (P/A, Sep. 1991, p. 25). The revised scheme will include movable wooden panels to protect books stored in the building's four glass towers. The towers will be reduced in height by 23 feet to 259 feet, and more books will be stored underground. But Paris mayor Jacques Chirac, an opponent of the scheme, says: "I fear the [recently proposed] changes are not enough." Chirac holds the power to grant or deny building permits, a fact that may shape the library's future.

Harvard University's Graduate School of Design has announced the appointment of a new dean: Peter G. Rowe, currently Raymond Garbe Professor of Architecture and Design and Chairman of the Urban Planning and Design Department at the GSD, will succeed Gerald McCue effective July 1.

Finalists in a two-stage invited design competition for Library Square, a 700,000-square-foot library and mixed-use complex in downtown Vancouver, are: Hardy Holzman Pfeiffer Associates, New York, with Waisman Dewar Grout Carter, Vancouver; Moshe Safdie Associates, Toronto, with Downs/Archambault & Partners, Vancouver; and Kuwabara Payne McKenna Blumberg, Toronto, with James K.M. Cheng & Musson Cattell Mackay Partnership, Vancouver.

The third Yokohama Urban Design International Competition, with the theme of "harmonizing the city center and the port," was won by Silas Chiow, Nobuyuki Kawamura, and Diane Scott, all of New York. The ideas competition was sponsored by the City of Yokohama and Yokohama Urban Design Forum Executive Committee.

Prince Charles Establishes an Architecture School

Prince Charles, Britain's royal arbiter of architectural design, officially launched The Prince of Wales Institute of Architecture late in January. It is a new school of architecture to be housed in two John Nash buildings on Regent's Park in London.

In his inaugural speech, Prince Charles argued that architecture had become an "egocentric" profession, propelled by a rationalist philosophy intended to disregard God and the natural world in favor of mechanistic pleasures. He expressed a desire to "restore the element of spirit" in the profession through an "architecture of the heart." The buildings that are most humanistic are "very particular in style, organization, and physical character. . . . They include, of course, all the great traditional architectures of the past – enormously varied as they are." The school, he continued, will embrace this sentiment, while exploring "new forms of architecture, based on new materials, new ways of building, and new forms of technology."


Richard Ivey

Home of the Prince's new school in Regent's Park, London.

Prince Charles will be an active figurehead for the school. As founder and chairman of its board of governors, he will have a hand in shaping curriculum and will have as much contact with students as his schedule allows. The faculty is composed of an international group of Classically-minded architectural academics and practitioners, planners, artists, builders, engineers, and developers. Among British instructors are Leon Krier, a traditional urban planner; Jane Dowling, a painter; Demetri Porphyrios, an architect and theorist; Quinlan Terry, an architect; and John Simpson, an architect and one of the planners for Paternoster Square (P/A, Sept. 1991, p. 23). Americans Christopher Alexander, an architect and theorist (P/A, July 1991, p. 108), and Andres Duany and Elizabeth Plater-Zyberk, architects and town planners of Seaside fame, are also on the staff.

The curriculum will cover the building arts as a whole in an effort to produce well-rounded practitioners. Field work will be an integral part of the programs at the Institute. A one-year Foundation course, for pre-college students or others interested in a career change, will commence October 1992. A two-year post-graduate course will start in the fall of 1993. Financing will be through private donations (including one from Prince Charles), government grants, and tuition. The annual fee is $1157 for British students and $8010 for overseas students. Applications for the fall term were due March 31.

What is the agenda of The Prince of Wales Institute of Architecture? Is it merely the culmination of a four-year crusade against Modernism? Will it be a bastion of Neo-Conservatism? . . . an experiment in all-inclusive building arts education? The school's potential impact is difficult to forecast. Staffed by a respected group of design professionals, the school appears to be a serious endeavor, but with just 30 positions available in its first year, much time will pass before the world will see the fruits of Prince Charles's vision.

Abby Bussel ■

Recreating The International Style

If there ever was an example of how media can alter the course of architecture, it was the book *The International Style*, by Henry-Russell Hitchcock and Philip Johnson, and the corresponding 1932 exhibit initiated by the Museum of Modern Art. As the first glimpse most Americans had of European Modernism, those two events greatly skewed our perception of that architecture, downplaying its more radical political ideas and highlighting its stylistic characteristics. Now, with the rehanging of the original exhibit at Columbia University's Buell Center (on view through May 2 and documented in the new Rizzoli book *The International Style: Exhibition 15 and The Museum of Modern Art*), we have a chance to reevaluate the show and the biases behind it.

As noted by Terence Riley, the curator of the Buell exhibit and author of the book, Johnson made attempts to broaden the social and political relevance of the show by inviting Lewis Mumford to curate a section on housing. However, the overall character of the 1932 exhibit reflected Johnson's "apolitical and elitist stance." The original show, for example, gave greatest prominence to the models of large houses for the wealthy – Le Corbusier's Villa Savoye, Mies's Tugendhat House, Wright's House on the Mesa, and Oud's design of a house for Johnson's parents in North Carolina. Likewise, the section that illustrated Modernist work from around the world contained no plans, thus emphasizing the style or image of the buildings rather than their function. (Also it contained no Expressionist or Organic work, which we now accept in the Modernist fold.)

Yet the aspects of the original exhibit that were overlooked 60 years ago seem the most compelling and the most relevant to our own time. What now catches the eye is not Gropius's Bauhaus, but his Dessau Employment Office, with its humane treatment of the unemployed through the use of distributed entrances and light-filled waiting rooms. And what holds your attention are not the big residences by Le Corbusier or Oud but the archi-

Museum of Modern Art

From International Style show: J.J.P. Oud's Stuttgart housing (1927).

tects' demonstration housing in Stuttgart – the movable beds and partitions in Le Corbusier's Double House and Oud's tiny, yet highly efficient rowhouses. The exhibit's rarely-discussed housing section, put together by Mumford, Catherine Bauer, Clarence Stein, and Henry Wright, seems the most current, with its call for drastic changes in public and financial policy and the scaling back of inflated land values as a prerequisite for the production of more affordable shelter.

This exhibition was polemical in 1932, and it remains so today, for very different reasons. Not only, as Terence Riley notes, do we "find ourselves in a world bearing striking similarities to the cultural conditions of 1932: worldwide economic instability, a severe housing crisis, and an architectural culture obsessed with simulation," but this profession seems on its way to becoming irrelevant unless it can reclaim some of the functionalist ground lost in the wake of this 1932 exhibit. Columbia's Buell Center has rendered a great service to the profession by rehanging the International Style show; we have only to act now upon what was overlooked there. **Thomas Fisher** ■

Black Women Architects Consider Their Future

In 1984, an *Ebony* magazine article spotlighted black women architects. It required only a narrow beam, for at the time there were only 16 black females registered to practice architecture in the entire country. Today, while still distinctly a minority of a minority, the number has risen to 49. A reflection of this growth is the new organization Black Women in Architecture (BWA).

To celebrate its first year of existence, BWA sponsored a symposium, "Black Women Architects: Looking Toward the Future," in association with the Howard University School of Architecture and Planning in Washington, D.C. Held February 14–15, the symposium was part of a series of programs at Howard on the "Past, Present, and Future of African-American Architects."

Attendees were welcomed by conference organizer Kathryn Tyler Prigmore, among *Ebony*'s original 16 and now Associate Professor of Architecure at Howard. The audience of about 70, including a sizable contingent of male and female Howard students, then heard from Sharon Graeber, a founding member of BWA and a project architect with RTKL in Baltimore. Graeber explained that the group's "primary goal is to address the cultural, social, and political dilemmas facing black women in the built environment professions and in the community."

A major focus of the speakers during the introductory panel was the need for greater mentorship between black professionals and students. "Many hundreds of black women have graduated from architecture school in the last ten years. Why have so few become registered?" Graeber asked. Also of concern were the absence of literature on the history of black architects and the influence of African indigenous building on American design.

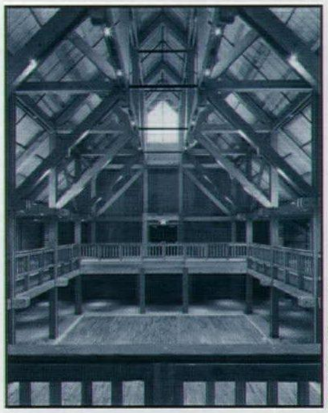
A later session was provocatively titled "Race, Culture, and Gender as Factors in Design Theory." Panelist Renée Kemp-Rotan, the Director of Programs and Services at the American Institute of Architects, offered a brief, tantalizing reference to the possibility of a black architecture that would be "polyrhythmic, improvisational, polychromatic, and based on the product of an epic memory." But, for the most part, the session veered from its billing, with speakers focusing on their own anecdotal experiences.

During her closing remarks, Prigmore implored BWA members to "write our own history [since] you won't find it in the library." It was a project the small but receptive audience seemed eager to take up. **Donald Prowler** ■

Wood Design Awards

The American Wood Council has announced the selection of 12 winners in its 1991 Wood Design Awards program. Jurors this year were Rodney F. Friedman of Fisher Friedman Associates, San Francisco; Andrea P. Leers of Leers Weinzapfel Associates, Boston, and Steven Izenour of Venturi, Scott Brown & Associates, Philadelphia. Honors Award winners are:

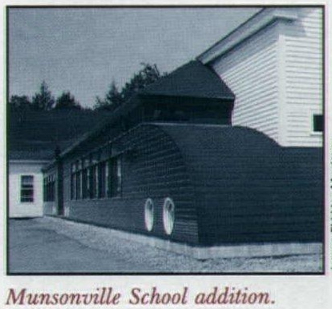
- Wheeler Historic Farm Activity Barn, Murray, Utah, by Astle Ericson & Associates, Salt Lake City;



Gordon Peery Photography

Wheeler Farm Activity Barn.

- house in the Adirondacks by Bohlin Cywinski Jackson, Wilkes-Barre, Pennsylvania (this issue, page 106);
- Knight House, Front Royal, Virginia, by Mark McInturff Architects, Bethesda, Maryland;
- vacation house, New England coast, by James Volney Righter Architects, Boston;



Joanna Eldridge Morrissey

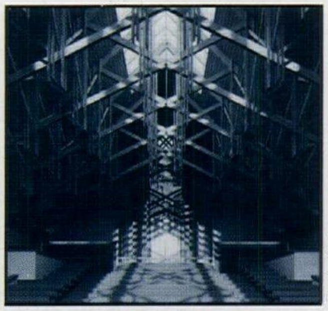
Munsonville School addition.

- Munsonville Elementary School addition, Nelson, New Hampshire, by Daniel V. Scully, Peterborough, New Hampshire.

(continued on next page)

Wood Design Wards

(continued from previous page)



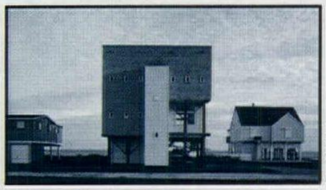
Timothy Hursley

Thorncrown Worship Center.

Merit Award winners are:

- Thorncrown Worship Center, Eureka Springs, Arkansas, by Fay Jones & Maurice Jennings, Fayetteville, Arkansas;
- architect's studio, Marin County, California, by Robert Marquis, San Francisco;
- Karau Residence, Marshfield, Wisconsin, by The Stageberg Partners, Minneapolis;
- High Ridge Ranch caretaker's house, Franz Valley, California, by William Turnbull Associates, San Francisco.

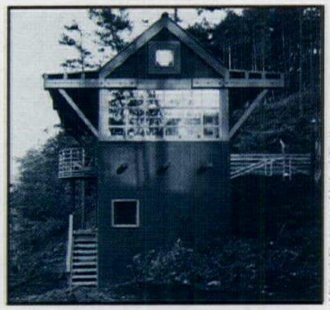
Citation winners are:



Paul Hester

Caldwell Beach House.

- Caldwell Beach House, Galveston Island, Texas, by Natalye Appel, Houston;
- fishing residence, McLeod, Montana, by Jonathan L. Foote Architects, Livingston, Montana;



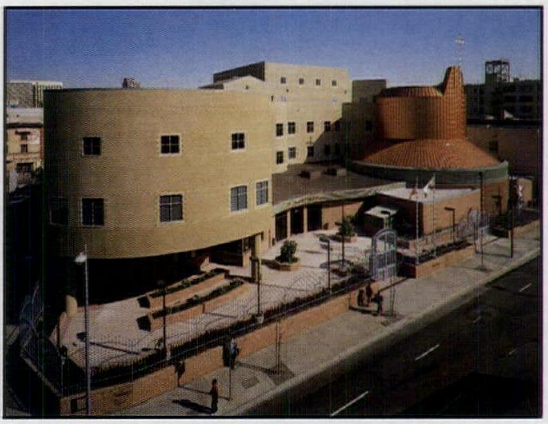
Michael Shopenn – Michael Skott

Noyes/Ryan Cabin.

- Noyes/Ryan Cabin, Decatur Island, Washington, by the Miller-Hull Partnership, Seattle. ■

Confronting Homelessness in L.A.

Two missions for the homeless in downtown Los Angeles represent attempts to create a new kind of building, dedicated to providing essential services to a diverse, and sometimes dangerous, population. The $18-million Los Angeles Mission opened for business in January, while the $23-million Union Rescue Mission is to start construction in June on a nearby site. The projects, both new buildings, are unprecedentedly large-scale efforts to deal with the growing population of L.A.'s Skid Row, which lies a mile east of the downtown office district and is home to as many as 50,000 homeless people.



Ed Glendinning

New Los Angeles Mission on L.A.'s Skid Row.

Reflecting intensive consultation with the client missions, which have been Skid Row care providers for decades, the new facilities are virtual diagrams of Skid Row life and the missions' attempt to feed, clothe, bathe, and, when possible, rehabilitate residents. And in both cases, the buildings are street-wise designs intended to handle the full variety of the homeless population while remaining durable and defensible.

Completed in January, the five-story, 155,000-square-foot Los Angeles Mission is the product of a succession of architects, starting with Scott MacGillivray and completed by The Tanzmann Associates, both of Los Angeles. The front of the building features a tall fence, fronting a narrow courtyard, where up to 200 men and women can wait; the courtyard is intended to prevent long lines in front of the mission doors. Security is an issue throughout in a population that includes criminals who prey on other homeless people. Each potential guest is interviewed before gaining admittance. People who want meals must first attend a religious service in Holsinger Chapel, a circular space expressed as a bright copper drum. Beds for up to 300 overnight guests are located upstairs. The uppermost floors are set aside for long-term residents in the rehab program, who are entitled to increasing privacy and more privileges, including a full basketball court and gym, as they advance through the program.

Three blocks away, a proposed five-story, 235,000-square-foot Union Rescue Mission is soon to start construction, with completion expected in December 1993; the architect is The Nadel Partnership of Santa Monica. With 800 shelter beds and a kitchen capable of providing up to 6000 meals daily, the program is even more ambitious than that of the Los Angeles Mission. And, like the existing building, the new mission would provide meals and counseling on the ground floor, while conducting rehab programs on upper stories.

In both cases, architects stressed functionality above image. Both mission buildings must straddle a fine line between providing comfort and discouraging dependency; they must also provide a host of "bottom-line" services to people who are often emotionally or physically ill and addicted to drugs and alcohol. Created out of idealism and religious commitment, these missions convey few illusions about life on the street. If they prove successful in meeting the needs of a difficult clientele, the Los Angeles missions are likely to be prototypes of similarly large-scale missions planned in other U.S. cities. **Morris Newman** ■

D.C. Panel on Affordable Housing

Before we can address the affordable housing problem in this country, we must first agree upon its causes. And that is no easy matter, as was evident in a panel discussion of housing experts, assembled by P/A and the AIA's "Search for Shelter" program held at the AIA's Grassroots Conference in Washington, D.C., in February.

Is the lack of affordable housing the result of a conscious and reprehensible shift in the Federal government's policies and funding priorities, as architect Michael Pyatok asserted? Or is this "crisis," as Carl Horowitz of The Heritage Foundation claimed, a fabrication of liberal special interest groups, (most of which are located, he observed, in expensive East and West Coast cities) and the product of too much regulation at all levels of government?

Likewise, as architects Pyatok, Cynthia Weese, and Thomas Howorth suggested, is this primarily a housing problem, amenable to architectural solutions? Or, as banker Noreen Beiro and developer Mark Sissman said, is it an affordability problem, requiring more creative ways of financing? Or is it, as housing authority director Donald Cameron implied, mainly a management problem, a matter of maintaining the housing we have?

The answer to all of those questions is yes, and therein lies one reason for the lack of affordable housing in this country. The diverse and sometimes adversarial groups needed to solve the problem are just beginning to learn how to sit down together – as they did in that Washington conference room – and eventually to act in concert, turning their brickbats into bricks and mortar.

Thomas Fisher ■

Obituaries

Roger C. Ferri

Architect Roger C. Ferri died November 21, 1991, of AIDS. He was 42. Ferri sought to integrate nature and architecture in both urban and rural projects. He was trained as a Classical painter and earned an undergraduate degree in architecture from Pratt Institute in 1972. He worked at Welton Becket Associates, New York, from 1984 to 1986 and opened his own firm, Roger Ferri Architect, in New York in 1987.

Anton Furst

British production designer Anton Furst committed suicide on November 24, 1991, in Los Angeles. He was 47. Furst's brooding, psycho-Gothic sets for the 1989 film "Batman" (P/A, Sep. 1989, p. 21) were characters rather than backdrops and won him an Academy Award. He attended the Royal Academy of Art in London, studying sculpture and architecture. In 1991, Furst designed Planet Hollywood, a $15 million restaurant in New York. Other projects include production design for the films, "Full Metal Jacket" and "Awakenings."

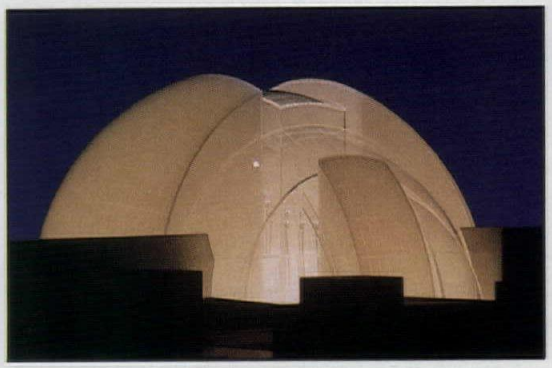
O. Jack Mitchell

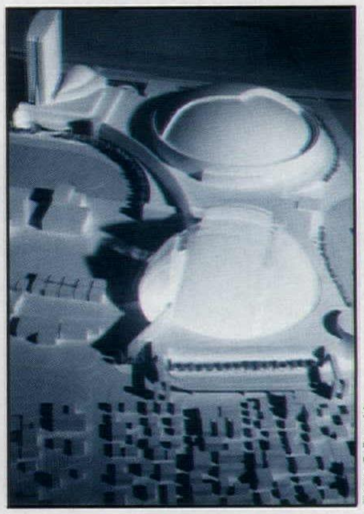
O. Jack Mitchell, FAIA, died of a heart attack on February 18. He was 60. Mitchell was dean of the School of Architecture at Rice University from 1978 to 1989 and had been a faculty member since 1966; he was acting dean at the time of his death. He held master's degrees in architecture and urban planning from the University of Pennsylvania. An active practitioner over the past 30 years, Mitchell worked primarily on urban design and planning projects. He was president of the Association of Collegiate Schools of Architecture from 1982 to 1983.

Pelli Designs a Dome (Function to be Announced)

When Cesar Pelli & Associates was asked to do a master plan for a bayside site in Fukuoka, there were two givens: a 40,000-seat domed baseball stadium designed by the Takenaka Corporation, and a name: "Twin Dome City." But the function of the second dome was (and still is) undetermined. The firm's response: a fragmented "fantasy dome" that can be built in semi-independent pieces conforming to an overall dome shape. The design accommodates large-span and conventional construction, allowing for flexibility in developing a program for the dome, which will likely involve entertainment and retail space.

The Fantasy Dome is part of a 40-acre plan that includes a 1000-room highrise hotel, which is also being designed by the Pelli firm. The 34-story hotel, boat-shaped in plan, will have a steel-and-glass "crystal garden" facing Hakata Bay. ■





Photos: R. Bostwick

Pelli's proposed "fantasy dome" (far left), part of Fukuoka's "Twin Dome City" (left).

AIA Selects Ten for Institute Honors

The AIA has announced ten recipients of Institute Honors for 1992. Honors are granted to non-architects and institutions for "significant contributions to the environment and the architectural profession," and were selected by a jury chaired this year by William Pedersen, FAIA. The honors will be presented at the AIA convention in June. Recipients are:

- sculptor Siah Armajani, New York
- engineering firm Ove Arup & Partners, New York
- the Canadian Centre for Architecture, Montreal
- Boston Redevelopment Authority director Stephen Coyle
- graphic designer Milton Glaser, New York
- The Mayor's Institute on City Design, Washington, D.C.
- The Municipal Art Society of New York
- art and architecture advocate John Julius Viscount Norwich, London
- architecture photographer Peter Vanderwarker, West Newton, Massachusetts
- landscape architect Peter Walker, San Francisco. ■

Forms + Surfaces Design Collaborations

As the manufacturer and distributor of a broad array of architectural products, Forms + Surfaces has long been known for tasteful, well-designed items. F + S has chosen three well-known names to design a new line of hardware, beginning with door pulls. Invited to create the new series are architects William Pedersen, Richard Meier, and Massimo Vignelli. The intent of the company is to have a range of design viewpoints represented, avoiding "isms" as much as possible.

Asked for their reactions to being invited to design a small component, the architects answered in somewhat different ways. Pedersen commented that "we pride ourselves on designing the most intimate parts of [any] large work in a very intense way. When that's done with care and with a level of poetry, the entire building starts to take on a different quality."

Meier sees a doorpull as "part of the larger environment and as an element in the space, not as the thing unto itself. It's like a punctuation mark rather than a sentence. It's part of a larger construct, and we don't always know what that construct is, but if it's a good comma it will be used a lot."

To Vignelli, "the solution is in the problem. . . . You approach all problems with the same kind of methodology. That is why we say all design is one, [whether] it's a brochure, or a book, or a handle, or a plate, or a chair."

When asked whether this effort will make his company more Meier/Vignelli/Pedersen-like, F + S President Chris Edwards responds, "I hope so. To be involved with these people and not be influenced would be obtuse." Following several months of collaboration between the architects and Forms + Surfaces, the new product line is scheduled to be displayed at NEOCON 24, June 8–10 in Chicago. ■

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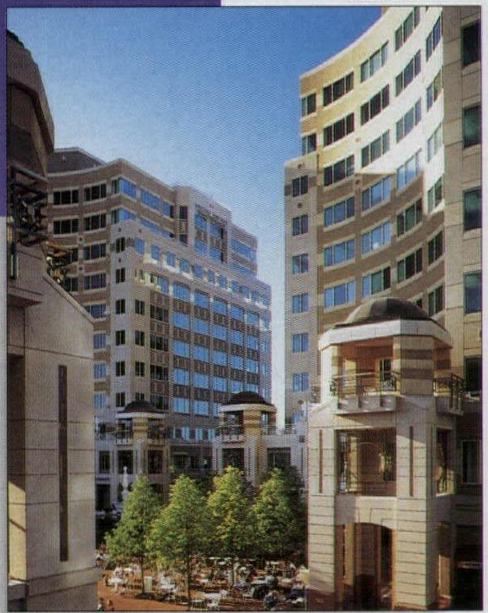

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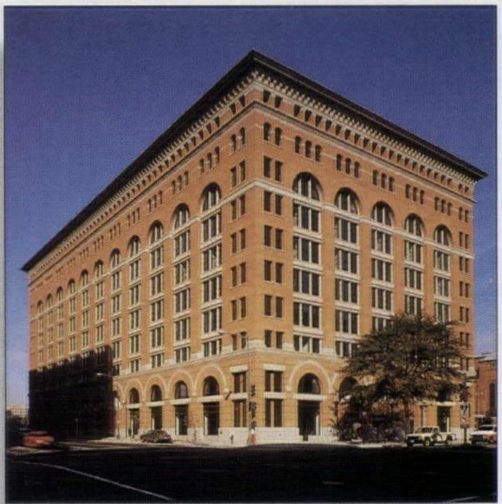

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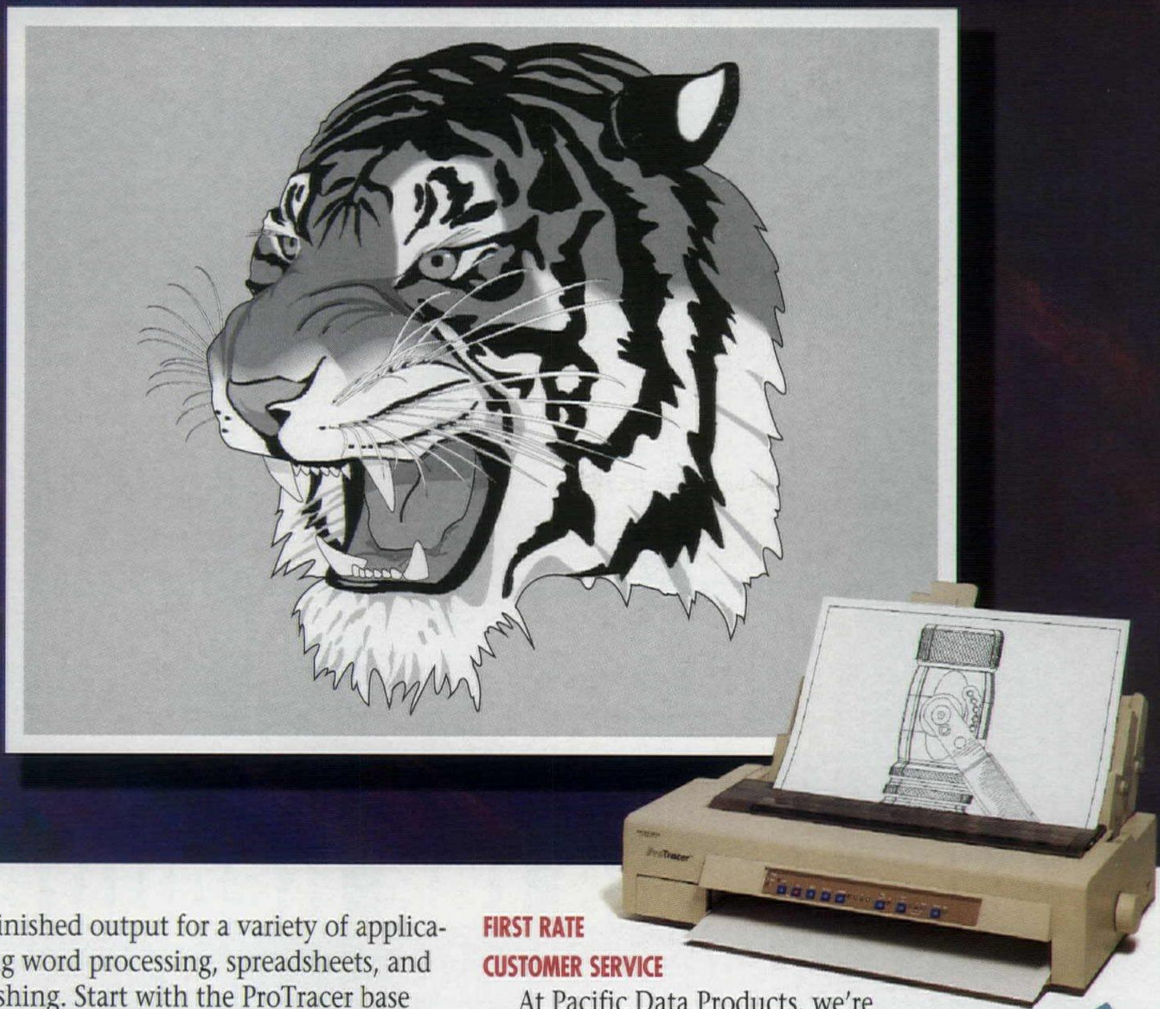

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Calendar

Exhibitions

The International Style, Again
Through May 2

New York. In case you missed it the first time, "The International Style: Exhibition 15 and the Museum of Modern Art" is a 60th anniversary "reprise" of the 1932 show co-curated by Philip Johnson and Henry-Russell Hitchcock, Jr. Archival photographs and reconstructed models are presented. The show will travel. Arthur Ross Architecture Gallery, Buell Hall, Columbia University.

Architects' Sketchbooks
Through May 24

Montreal. Subtitled "Carnet Practise," this exhibition includes text-based journals and image-based sketchbooks. The material offers an intimate perspective into the works of current luminaries, among them Aldo Rossi, Frank Gehry, and Steven Holl. Canadian Centre for Architecture.

MIT on Urban Architecture
Through June 30

Cambridge, Massachusetts. "Thinking the City: 12 Views from MIT" explores "new attitudes about the city." Department of Architecture faculty, working with students, used Boston as a point of departure for their investigations. MIT Museum.

Visionary Park Designs
April 3–May 10

Minneapolis. "The Once and Future Park, presented by the Walker Art Center and the Minneapolis College of Art and Design, will feature winning projects in a 1991 landscape design competition that called for "aesthetic and social innovations for parks." A related symposium will be held at the Walker on April 25. MCAD Gallery.

Richard Neutra Centennial
April 9–May 10

Los Angeles. Drawings from Neutra's student days in Vienna through his career as a California Modernist are presented to commemorate the centennial of his birth. A lecture and panel discussion will be held April 23 and May 10, respectively. Frederick S. Wight Art Gallery, UCLA.

Vitra Museum
April 13–May 8

Cambridge, Massachusetts. Frank O. Gehry & Associates's design for the Vitra Museum in Basel, Switzerland (P/A, May 1990, p. 94) is documented. Gund Hall, Harvard University.

Young Architects
April 17–May 15

New York. Work by winners in the Architectural League of New York's 11th annual Young Architects competition is exhibited. This year's theme was "On Hold." Urban Center Galleries.

Competitions

Design New York
Entry deadline, phase one, April 22

New York. Entrants in the first phase of this two-phase competition, a call for ideas, are invited to name a design issue currently faced by New York City and suggest solutions. Entries will be judged on their potential to generate significant design concepts. "The most intriguing ideas " will be entered in phase two, a juried design competition. Contact "IDEAS," The Municipal Arts Society, 457 Madison Ave., New York, NY 10022 (212) 980-1297 or FAX (212) 753-1816.

Architecture in Perspective VII
Entry deadline May 1

Boston. The American Society of Architectural Perspectivists has announced the seventh annual juried exhibition and the sixth annual Hugh Ferriss Memorial Prize. Unbuilt architecture may be submitted in two categories: formal presentation drawings and paintings; sketches and conceptual design drawings. Contact ASAP, 320 Newbury Street, Boston, MA 02115 (617) 846-4766.

(continued on page 36)

Calendar *(continued from page 35)*

AIAS/Green Architecture
Registration deadline May 29, submission deadline June 8

Washington, D.C. This AIAS competition asks entrants to design a new headquarters for the National Energy Management Institute on a Charles River site outside of Boston. Proposals will be evaluated on ecological impact, energy use, resource management, and "greenness" of building materials. Students and interns (out of school three years or fewer) are eligible. Contact AIAS, 1735 New York Ave., N.W., Washington, D.C. 20006 (202) 626-7455 or FAX (202) 626-7421.

Unbuilt Architecture
Entry deadline June 1

Boston. The Boston Society of Architects Design Committee has announced a competition for "Unbuilt Architecture." Entry guidelines are broad to encourage "the most inventive design[s] possible." Real, theoretical, hypothetical, academic, abandoned, and/or superseded work may be entered by anyone. A public forum will be held June 6 and an exhibition will be held at Waterstone's Booksellers June 7–22. Contact Boston Architectural Center, 320 Newbury St., Boston, MA 02115 Attn: Unbuilt Project Competition.

P/A Competition: The New Public Realm
Entry deadline June 19 (postmarked)

Stamford, Connecticut. It is no secret that public facilities in the U.S. are in need of improvement, but little has been done to alleviate current conditions. P/A invites readers to address the problems and offer possible solutions in an ideas competition, "The New Public Realm." Entrants are asked to interpret public needs broadly – including buildings, urban design, open spaces, bridges, even public policy proposals – and to suggest how public and private funds might be used to realize their ideas. (See page 59 for the competition program.) Contact The Public Works Competition, P/A, 600 Summer Street, Stamford, CT 06904.

Conferences

Lightfair International
May 6–8

New York. The Lightfair International trade show and exposition will be held at the Jacob Javits Center. It is sponsored by the IALD and the IESNA. Contact Carole Carley, Communications Manager, AMC Tradeshows, 240 Peachtree St., N.W., Suite 2200, Atlanta, GA 30303 (404) 220-2115.

Designing Accessibility
May 14–15

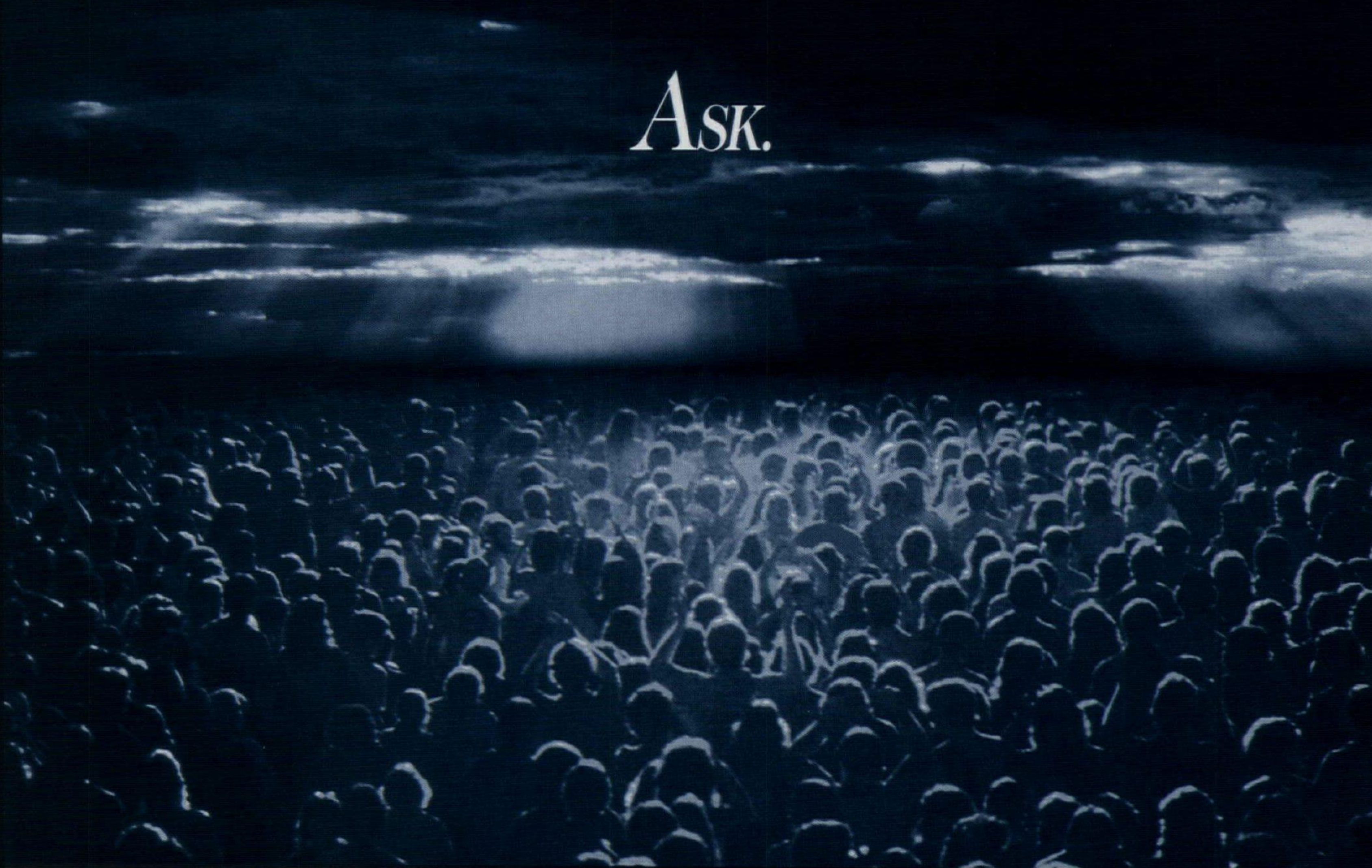
New York. "Universal Design: Access to Daily Living" is a multidisciplinary conference organized "to educate the public on designing for accessibility in order to meet the needs of more than 100 million Americans – the disabled, the elderly, and children." Contact Universal Design: Access to Daily Living, Pratt Institute, Center for Advanced Design Research, 200 Willoughby Ave., Brooklyn, New York 11205 (212) 838-6033.

International Contemporary Furniture Fair
May 17–20

New York. Launched four years ago to fill a void in the international furniture market, the 1992 ICFF will include an expanded lineup of panel discussions, among them "Architects Take a Look at Contemporary Design," moderated by P/A senior editor Ziva Freiman. Contact George Little Management, 2 Park Ave., Ste. 1100, New York, NY 10016-5748 (800) 272-7469.

AIA National Convention
June 19–22

Boston. The theme of the 124th annual AIA National Convention and Design Exposition is "Exploration '92: Engaging Society in Vital Ways." In addition to workshops, seminars, forums, and consultations, the event will include the third annual International Architecture Book Fair and a program on healthcare architecture. Registration deadline is May 22. Contact AIA Convention Department (202) 626-7395. ■



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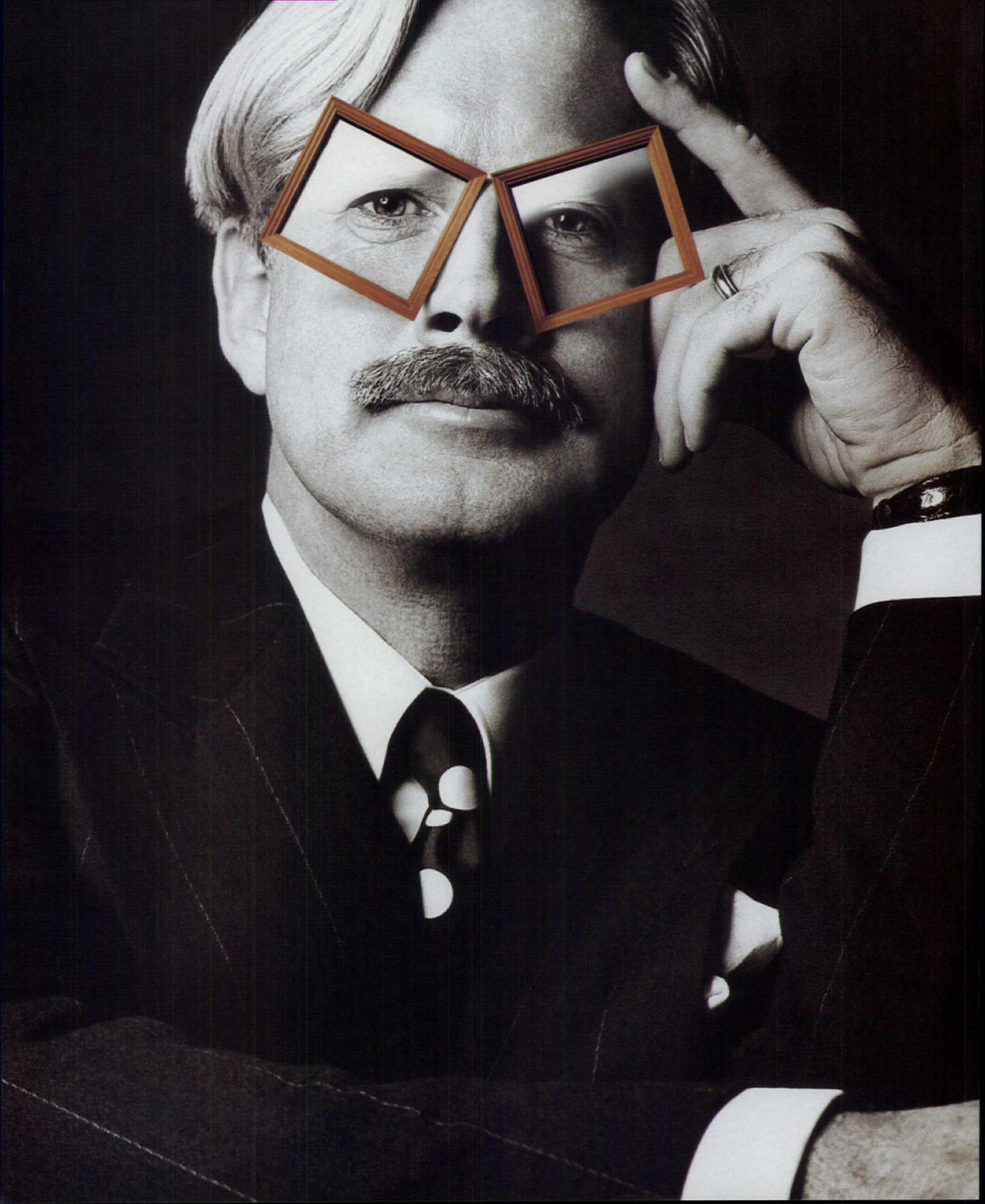


Technics
Selecting and Specifying Ceramic Tile

Architect and tile consultant **Jess McIlvain** provides an update on new materials and considerations for floor tiles.

Knowing how to select modern ceramic tiles is important to architects and owners for aesthetically pleasing and long-lasting tile installations. All ceramic tiles are not equal and some are more suitable for use on floors or walls than others. Like other building materials, ceramic tiles have capabilities and limitations that must be considered when specifying and installing them.

During the 1980s, ceramic tile use almost doubled in the United States, and it is predicted to double again during the 1990s. Even with such increases, per capita consumption of ceramic tiles in the United States is only a fraction of that in Europe. Part of the U.S. increase is because of new and innovative products. As an example, ten years ago, most ceramic tiles found on floors were quarry tiles or ceramic mosaic tiles. Today, there are other ceramic tiles available for floors, including large porcelain tiles and high-style glazed and unglazed tiles suitable for both residential and commercial uses.

Generic Tile

Ceramic tile is the generic name for ceramic surfacing units that are relatively thin in relation to facial area; they are made from clay or a mixture of clay and other ceramic material. They may have glazed or unglazed faces and are fired above red heat during manufacture to a temperature sufficiently high to produce specific physical properties and characteristics. Ceramic tile is divided into subcategories that include ceramic mosaic tile, glazed wall tile, and both glazed and unglazed paver tile and quarry tile.

Two types of paver tiles have become popular – larger porcelain paver tiles and monocottura tiles. Although smaller-sized porcelain paver tiles have been available for years, improved manufacturing techniques permit production of 3/8"-thick porcelain tiles up to 2' square. Other types of 3/8"-thick ceramic tiles range in size up to 3' by 5'. *Monocottura* is a popular Italian term given to single-fired tiles. More than 96 percent of ceramic tiles sold in the United States are single-fired. By the same logic, *bicottura* is another Italian term given to tiles with special glazes and designs that require two firings. The latter term is generally limited to wall tiles.

Porcelain Paver Tiles

Porcelain paver tiles in their popular form, usually 8" square and larger, became popular in the 1980s when they were introduced by an Italian manufacturer. Today, porcelain paver tiles are manufactured by many companies all over the world. ANSI A137.1 *American National Standard Specifications for Ceramic Tile* defines porcelain tiles as being dense, smooth, and impervious – with water absorption of 0.5 percent or less.

With such low water absorption, porcelain paver tiles should be stain resistant. This is not always the case, however. Lighter colors tend to stain and may appear dirty in heavy traffic areas and in areas where food is prepared and served. Darker porcelain paver tiles generally show fewer stains. Unfortunately, these qualities vary from manufacturer to manufacturer. On the positive side, porcelain paver tiles offer a variety of colors; they are extremely hard and are virtually indestructible. Colors extend through the full thickness of the tile body and will not wear off. Since they are dense, hard, and have a very low absorption rate, porcelain paver tiles are generally easier to maintain than other unglazed tiles.

Because many porcelain paver tiles have smooth, elegant surfaces, they should be used on exterior walkways with care and caution. When covered with a little dust and water, they become slippery. To overcome this, manufacturers offer porcelain paver tiles with textured surfaces (similar to cleft face stone or with raised diamond and other shapes) that enhance slip-resistance properties, making them more suitable for exterior applications.

Manufacturers also offer polished porcelain tiles that have the appearance of polished granite or marble. Polished porcelain tiles have a high-gloss surface that is both durable and stylish. These tiles are suitable for floors and walls. Larger sizes, up to 24" square, are available in standard and polished finishes. Although the most popular size is 8" square, 12" square porcelain tiles are available from most manufacturers, and several manufacturers offer sizes up to 24" square.

Natural Clay Tiles

Technology for natural clay unglazed tiles has also improved. A wide variety of natural quarry and paver tiles is available for use in many areas other than kitchens. As a general rule, the lower the water absorption, the better the stain resistance. Most are vitreous (absorption of more than 0.5 percent, but not more than 3.0 percent). Some are semi-vitreous (absorption of more than 3.0 percent, but not more than 7.0 percent). Semi-vitreous tiles for use on

Recommended Reading

American National Standard Specifications for the Installation of Ceramic Tile, ANSI A-108 series, 1985, 57 pp. (available from TCA).

American National Standard Specifications for Ceramic Tile, ANSI A-137.1, 1988, 17 pp. (available from TCA).

Handbook for Ceramic Tile Installation, Tile Council of America, Princeton (609) 921-7050, updated annually (appears in Sweet's Catalog).

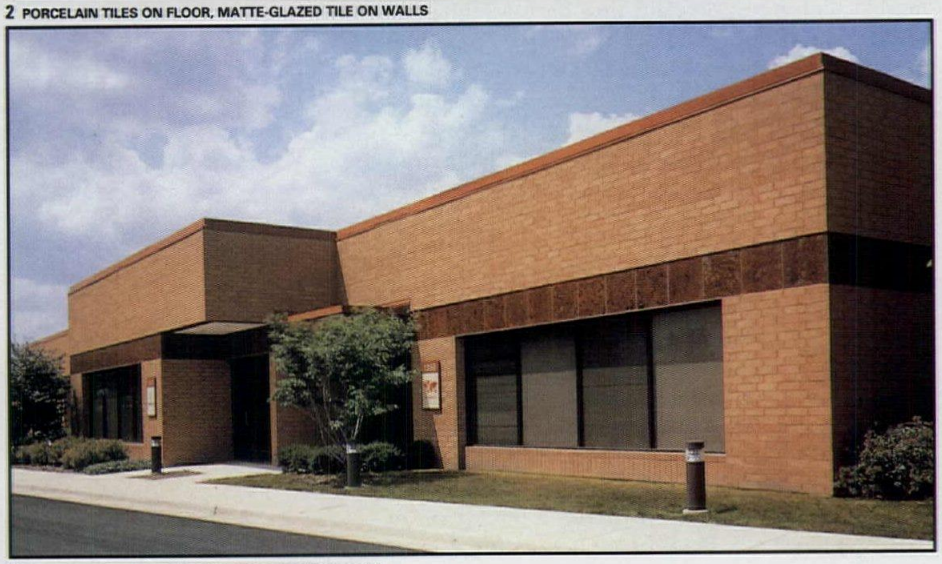
"Technics Focus: Ceramic Tile," P/A, April 1990, pp. 131–157.

1 DURABLE GLAZED PAVER TILE

DAL-TILE

2 PORCELAIN TILES ON FLOOR, MATTE-GLAZED TILE ON WALLS

American Olean/David Ottenstein



3 2' x 2' GLAZED TILES SUITABLE FOR EXTERIOR WALLS.

Buchtal

4 MEDIUM BED MORTAR TECHNIQUE FOR INSTALLING VERY LARGE TILES.

Mapei Corporation

floors in eating and food preparation areas must be selected with caution. Light-colored tiles may pose staining problems. Dark quarry tiles may have water absorption rates of 4.0 to 5.0 percent, but are generally recommended for use in kitchens and eating areas.

Terra cotta tiles are made unglazed from natural clay and are available in reds and earthen colors. They may be more absorbent than other unglazed tiles, but offer natural, warm colors that will enhance residential and light commercial floors.

Glazed Tiles

Technology for tile glazes has kept apace with new techniques for manufacturing tile bodies. Hard, durable glazes are available that are well suited for both residential and commercial floor traffic. Glazed surfaces vary from high-gloss glazes, the so-called "wet look," that offer high style and design, to low-luster finishes, and to textured, slip-resistant surfaces.

European manufacturers rate the durability of glazes according to their hardness and intended uses, yet many glazes they recommend are easily scratched and quickly show wear in traffic patterns. In my opinion, the European rating system is too liberal. Apparently, several European manufacturers and ceramic tile research centers are of a similar opinion. In Europe and in the U.S., extensive research and study is being devoted to rating of glazes for use on floors. In the next five years, a more reliable and more acceptable method should be available for determining the abrasion resistance of ceramic tile glazes.

A reliable but rudimentary test for determining hardness of glazes being considered for floors and countertops is the scratch test. Hold a case-hardened 1/4"- to 3/8"-diameter steel drill bit (the type used for drilling steel) and drag its point or cutting edge across the glazed surface. Bear down with full body weight. If the glaze can be scratched, it will wear under normal foot traffic. If the glaze cannot be scratched, it will probably perform satisfactorily. This test relates to a MOHS hardness of roughly 6, which is considered the minimum hardness for glazes used on floors subject to moderate to heavy traffic. Harder, high-tech glazes will withstand abrasion even from silica sand – 8 on the MOHS scale.

Glazed tiles are also available in a wide variety of shapes and sizes, up to 24" square (one manufacturer offers sizes up to 3' x 5'). Brightly colored glazes are generally softer and are more suitable for use on walls. Glazed tiles are available in almost any color and hue imaginable and their applications range from the mundane, as easy-to-maintain wall covering, to the elegant, as highlights in special areas.

Some manufacturers offer hard, slip-resistant glazed tiles suitable for interior and exterior surfaces subject to heavy traffic. These tiles' distinctive rough surfaces, have glazes that are applied over abrasive aggregate, such as silicon carbide or aluminum oxide. They offer a coefficient of friction similar to that of broom finished concrete. The combination of hard glazes and abrasive aggregate has proven to be excellent for wear- and slip-resistance, which are important considerations for heavy-duty floors in commercial kitchens, entrances, and pool decks.

A word of caution is apropos about highly slip-resistant tiles, and also other highly slip-resistant surfaces: because the surfaces are necessarily rough, special cleaning procedures may be required to maintain them. Sophisticated owners find that they can maintain these tiles with special degreasers and extractors. Owners of smaller facilities, however, will probably not have sufficiently knowledgable maintenance personnel. Scrubbing machines and brushes often prove ineffectual in removing dirt and debris that lodge in the tiny low spots inherent in the rough glazed surfaces. Before specifying these tiles, make certain the owner has the capabilities of maintaining them.

Slip Resistance

Slip-resistant ceramic tiles have long been available for use in kitchens, bathrooms, and other areas subject to frequent grease and water spills. The coefficient of friction (slip-resistance) has always been an important consideration in selecting ceramic tiles for use on floors and walking surfaces. To meet requirements of the Americans with Disabilities Act (ADA), certain walking surfaces must now have higher than normal slip-resistant characteristics. In general, unglazed tiles have a coefficient of friction meeting or exceeding these requirements; many glazed tiles also meet or exceed these requirements. Ceramic tile manufacturers make available current test results detailing the coefficient of friction of their products so that designers and owners can make knowledgeable selections of ceramic tile for use on walking surfaces [see P/A, March 1991, pp. 112–116 and July, pp. 45–48].

Installation

Recommended details and installation methods are published in the Tile Council of America's annually updated *Handbook for Ceramic Tile Installation.* It contains descriptions of installation and grouting materials, selection charts, and drawings showing tile details on walls and floors. Recommendations, limitations, materials, and applicable ANSI standards are included for each method covered in the *Handbook.*

ANSI standards should be supplemented in specifying porcelain paver tiles and other larger tiles. Because of the very low absorption rate of porcelain tiles and their relatively flat backs, special procedures are required for permanent, successful installations. Latex-portland cement mortars are required for bonding porcelain paver tiles. Installing tiles larger than 12" square, such as 16" or 24" square, or 24" x 36" tiles, requires techniques that go beyond those specified in ANSI standards. Larger tiles cannot be beat into ridges of thin-set mortar as simply as tiles smaller than 12" square; they act like snowshoes and tend to remain on the tops of mortar ribs created by the notched trowels, which are used to gauge amounts and thickness of thin-set mortar. Attempting to beat-in larger tiles has little effect in spreading and compressing mortar ribs to aachieve more than 50 percent coverage of the back of the tile. Designers should specify that larger tiles be pressed and twisted or mechanically vibrated into place so that mortar contact on the backs of tiles exceeds 80 percent and is sufficiently distributed to provide full support of the tiles, including edges and corners. Exterior installations require 95 to 100 percent coverage to prevent water and moisture penetration into the mortar bond coats. This in turn prevents water from getting behind tiles and causing latex leaching, efflorescence, and frost damage.

Expansion or control joints are important parts of ceramic tiles installations. Proper location and design of control joints is necessary to prevent cracking, expansion, heaving, and other damage to tile work. The TCA *Handbook* and ANSI standards provide guidelines for locations and detailing of control joints in fields of tile installations, around perimeters, and where items such as curbs and pipes penetrate tiles.

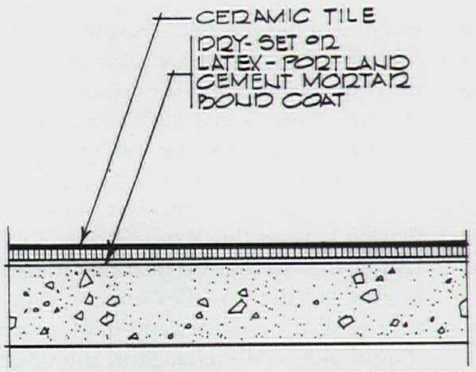
Grout

In addition to traditional portland cement grouts, there are latex-modified grouts and epoxy grouts. Latex-modified portland cement grouts offer improved stain and freeze-thaw resistance, and epoxy grouts are more stain resistant, less porous, and have better chemical resistance. Chemical-resistant epoxy grouts are preferred in kitchens and food preparation facilities. Although epoxy grouts are more expensive than cementitious grouts, many are easier to install.

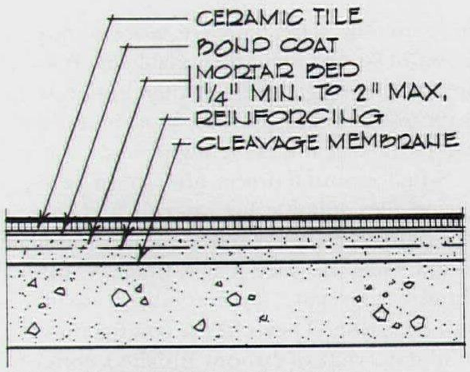
Designers need to select with care grout colors for floors subject to staining or poor maintenance. Neutral gray, dark gray, or black is a good choice in commercial kitchens, as grease and food spills will darken or blacken light-colored grout. Use of colored or light-colored cementitious grouts should be avoided in commercial kitchens and food preparation areas; they will quickly become discolored, stained, and appear dirty. Colored grouts enhance walls and floors subject to normal use and maintenance.

Standards

The ceramic tile industry, including tile, mortar, and grout manufacturers and installers, have promulgated some of the best ANSI standards available in the construction industry. The ANSI A108 and

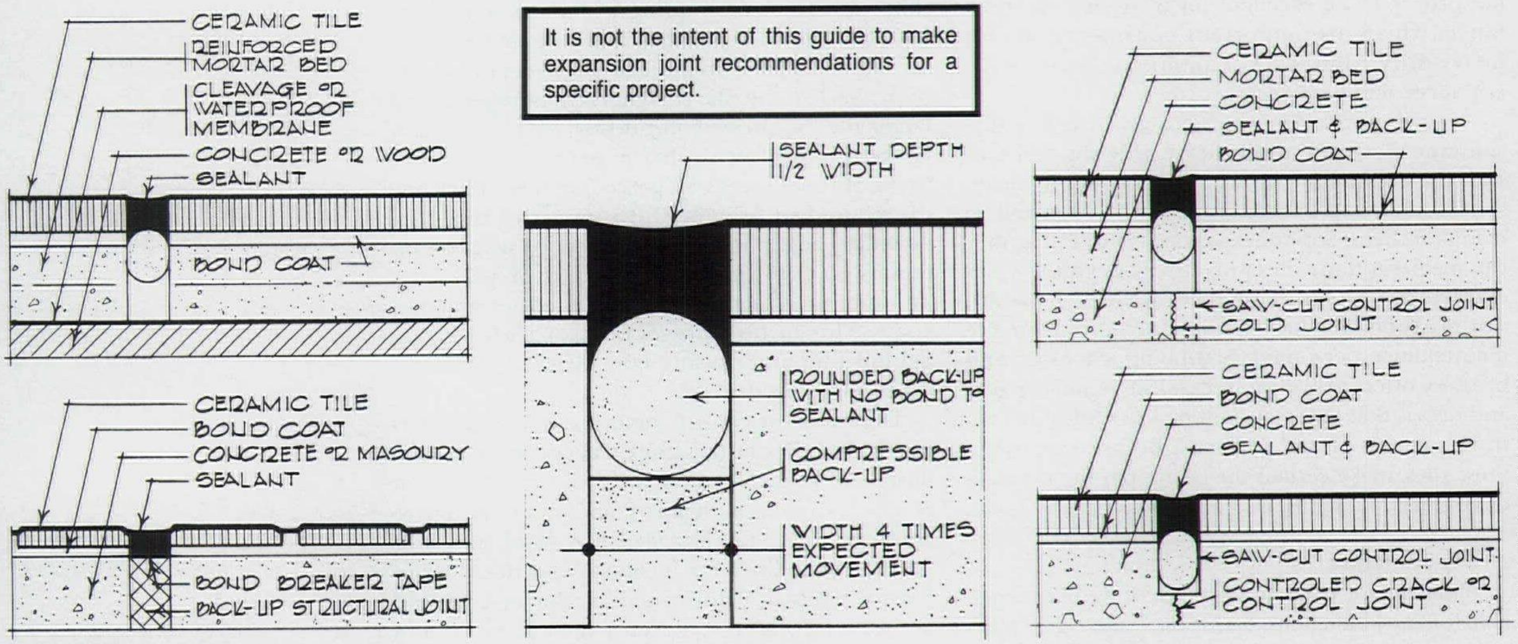


5 DRY-SET MORTAR OR LATEX-PORTLAND CEMENT MORTAR (F113-92)



6 CEMENT MORTAR CLEAVAGE MEMBRANE (F111-92)

It is not the intent of this guide to make expansion joint recommendations for a specific project.



7 JOINT DESIGN ESSENTIALS (EJ 171-92)

Details: Handbook for Ceramic Tile Installation, TCA.

5, 6 *Recommended use for this thin-set technique (F113-92) is restricted to clean concrete where no bending stresses occur – slab-on-grade floors, for example. Otherwise, a cleavage membrane (15 lb roofing felt or 4 mil polyethylene) under a reinforced 1 1/4" to 2" mortar setting bed (F111-92) is required – on structural slabs subject to deflection and bending, for example. See TCA's* Handbook *for additional conditions on use of this detail.*

7 *Control, contraction, and isolation joints must be used to accommodate thermally and moisture-driven reversible movements in the tile and its substrate, and to accommodate irreversible shrinkage in substrates. Lack of adequate provision for movement is a common cause of tile cracking. These details, plus sealants, are contained in the essential Tile Council of America's* 1992 Handbook for Ceramic Tile Installation, *which is contained in* Sweet's Catalog.

A118 series of ceramic tile installation and material standards have recently been updated. New 1992 editions will be available from the Tile Council of America later this year. For desired results, recommendations contained in the TCA *Handbook* for selection of proper installation methods and materials should be followed. Ceramic tiles that conform with ANSI A137.1 *Ceramic Tile* (most domestic and foreign manufacturers' products conform with this standard) should then be specified. It is the only viable and enforceable quality control standard for ceramic tiles in the United States. The applicable ANSI A118 and A108 standards should be used to specify materials and installation of tiles.

Project specifications should include references to TCA *Handbook* methods and ANSI standards for each location, condition, and each different method of installing ceramic tiles. This keeps contractors on the same wavelength as the architect and specifier, and ensures high-quality installations. The details and locations of expansion or control joints should be shown on drawings. Locations of these joints must be coordinated with structural requirements and locations of similar joints in substrates. Closer spacing is required for control joints in exterior tile work and in interior tiles installed under large skylights.

Properly selected and specified ceramic tile installation methods are the first step in obtaining high quality, long lasting, and esthetically pleasing ceramic tile installations. According to TCA life cycle cost studies, properly installed ceramic tile floors and walls last the life of a building, and at lower overall costs than other permanent, non-permanent, limited use or long use finishes.

Jess McIlvain AIA, CCS, CSI ■

The author is internationally recognized as a leading independent consultant on installation of ceramic and marble tiles and on the causes of installation failures. He is a registered architect and a corporate member of the AIA, a member of ASTM, a professional member of CSI, and a Certified Construction Specifier. He is listed in the American Bar Association Register of Expert Witnesses in the Construction Industry and serves on various construction industry committees, including the National Tile Contractors Association Technical Committee and the Tile Council of America Handbook Committee. He also serves as an arbitrator for the American Arbitration Association.

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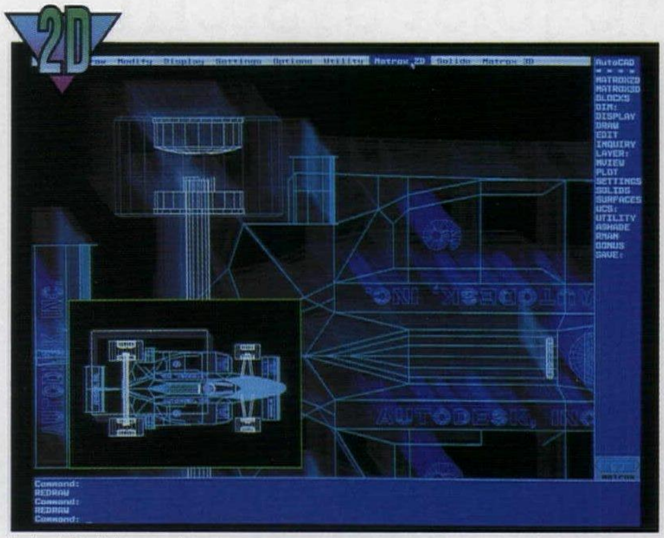

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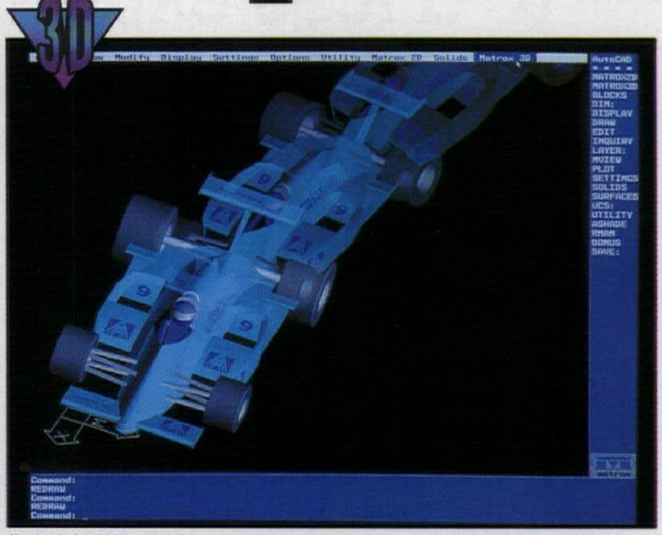

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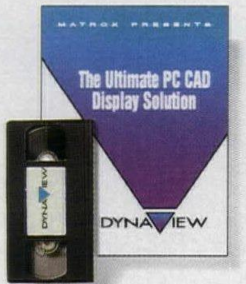

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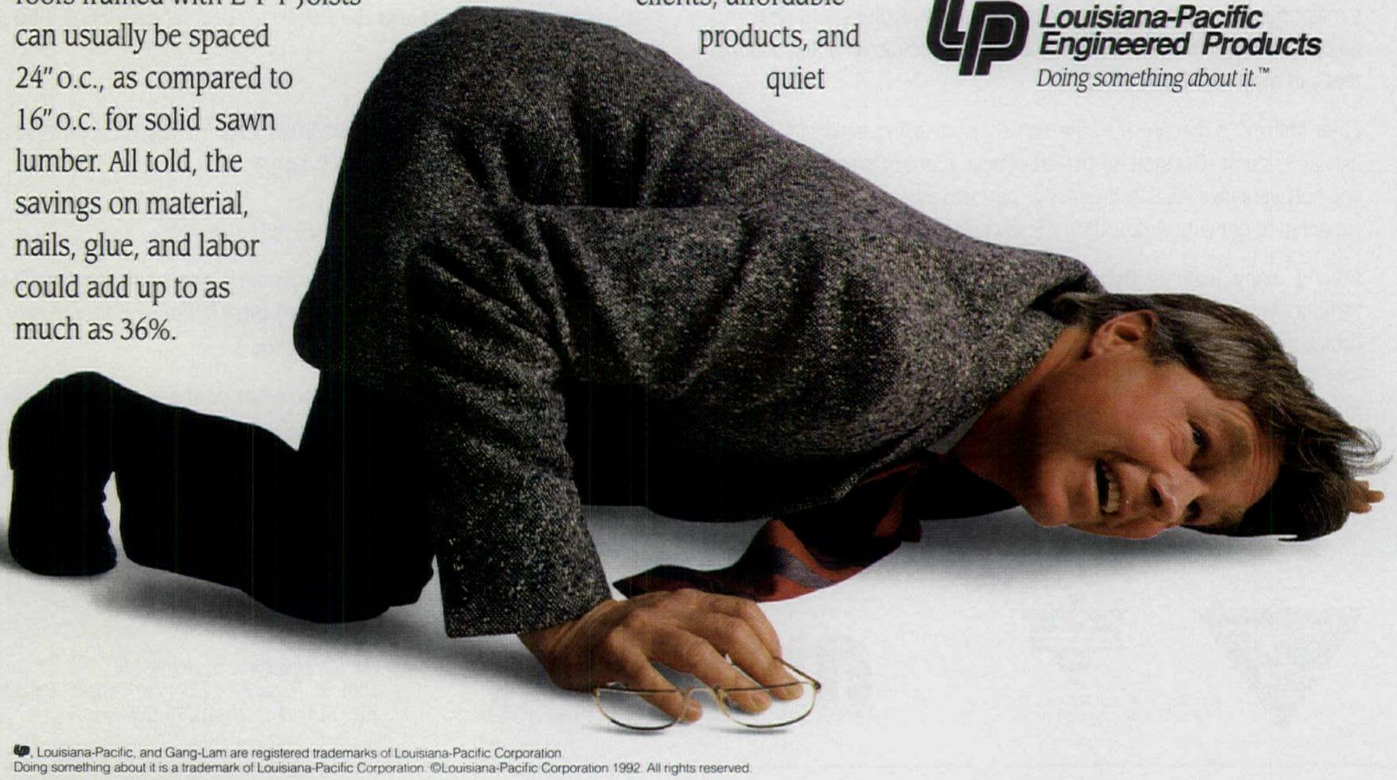

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Technics Topics
Metrication 1992

Architect **H. Leslie Simmons** provides an update on Federal policy that will affect the entire construction industry.

For years, the Federal government has been trying to convince people in this country that we should join the rest of the industrialized world and convert to the metric system of measurement. Recognizing that U.S. businesses are losing billions of dollars a year in sales abroad solely because we continue to use the "English," or customary, system, Congress passed Public Law 94-168, the Metric Conversion Act of 1975, to try to influence the change. Unfortunately, this law made conversion voluntary and, because of grass roots opposition and apathy, it failed to achieve its goals.

Congress tried again in 1988 when it passed the Omnibus Trade and Competitiveness Act, which amended the Metric Conversion Act of 1975 and stated that the metric system is the "preferred system of weights and measures for United States trade and commerce." This law requires that where practicable and economically feasible, Federal agencies will use the metric system in making grants and procurements and in other business related activities, by the end of fiscal year 1992.

On July 25, 1991, President Bush signed Executive Order 12770, "Metric Usage in Federal Government Programs," which requires that Federal agencies shall "...use to the extent economically feasible by September 30, 1992...the metric system of measurement in Federal Government procurements, grants, and business-related activities." This executive order directed the Secretary of Commerce to establish an Interagency Council on Metric Policy to coordinate the

Comparison Between Inch-Foot and Metric Scales

Inch-Foot Scales	Ratios	Metric Scales Preferred	Other	Remarks
Full Size	1:1	1:1		No Change
Half full size	1:2		1:2	No Change
4" = 1'-0"	1:3			
3" = 1'-0"	1:4			
		1:5		Close to 3" scale
2" = 1'-0"	1:6			
1-1/2" = 1'-0"	1:8			
		1:10		Between 1" and 1-1/2" scales
1" = 1'-0"	1:12			
3/4" = 1'-0"	1:16			
		1:20		Between 1/2" and 3/4" scales
1/2" = 1'-0"	1:24			
			1:25	Very close to 1/2" scale
3/8" = 1'-0"	1:32			
1/4" = 1'-0"	1:48			
		1:50		Close to 1/4" scale
1" = 5'-0"	1:60			
3/16" = 1'-0"	1:64			
1/8" =1'-0"	1:96			
		1:100		Very close to 1/8" scale
1" = 10'-0"	1:120			
3/32" = 1'-0"	1:128			
1/16" = 1'-0"	1:196			
		1:200		Close to 1/16" scale
1" = 20'-0"	1:240		1:250	
				Close to 1" = 20'-0"
1" = 30'-0"	1:360			
1/32" = 1'-0"	1:384			
1" = 40'-0"	1:480			
		1:500		Close to 1" = 40'-0" scale
1" = 50'-0"	1:600			
1" = 60'-0"	1:720			
1" = 1 chain	1:792			
1" = 80'-0"	1:960			
		1:1000		

Source: Metric Guide for Federal Construction.

Notes:
- Metric drawing scales are expressed in nondimensional ratios.
- Use only one unit of measure on a drawing; except for large-scale site drawings, the unit should be the millimeter (mm).
- Delete unit symbols but provide an explanatory note ("All dimensions are shown in millimeters," for example).
- Whole numbers always indicate millimeters; decimal numbers taken to three places always indicate meters.
- Where basic modules are used, the recommended basic module is 100 mm, which is similar to the 4" module (4" = 101.6 mm).

Tech Notes

The Graphic Guide to Frame Construction **by architect R. Thallon, with 459 line drawings and 14 tables, applies a familiar format to exclusively wood frame building. Chapters cover foundations, floors, walls, roofs, and stairs, and details are cross-referenced. Taunton Press, Newtown, Connecticut (203) 426-8171, 225 pp., $29.95.**

The University of Illinois offers two ½-day workshops for architects on *Facility Planning and Management*, July 8–17. Other July workshops follow on *Value Engineering, Contracts and Contract Documents, Human and Environmental Factors in Building Technology, Lighting and Illumination*, and *Indoor Air Quality and Thermal Comfort*. University of Illinois, Champaign (217) 333-1801.

Construction Sealants and Adhesives **by J. Panek and J. Cook enters a new third edition containing chapters on structural silicones, membrane waterproofing, insulating glass, and guideline specs, in addition to updated physical properties and performance standards. J. Wiley and Sons, Somerset, New Jersey (908) 469-4400 x2497, 375 pp., $58.95.**

Canadian Building Digests **1–250 are now available in four bound volumes. Published from 1960 through 1988, the series consists of short articles by researchers on topics ranging from soils to air leakage in highrise buildings. National Research Council Canada, Ottawa (613) 993-2463, $40 Canadian for the set.**

changeover and to form metric advisory committees from the business community and from state and local governments.

Coordination of conversion to the metric system (metrication) in Federal construction is the responsibility of the Construction Subcommittee of the Metric Operating Committee of the Interagency Council on Metric Policy. The National Institute of Building Sciences (NIBS) is providing technical and administrative support to the Subcommittee.

Schedule

The Construction Subcommittee has adopted a Milestone Plan for metrication in Federal construction. Essentially it requires that, by December 1, 1991, agencies select metric pilot projects to be built in 1991 and 1992, initiate five-year plans for conversion, and adopt a document metrication policy under which drawings and specifications will be prepared in metric measure. By March 1, 1992, agencies were to have begun design work in metric units on their pilot projects. By January 1, 1994, all new projects are to be designed in the metric system.

The Milestone Plan does not seem unreasonable, but complete conversion may take a bit longer. In fact, some agencies have already listed later target dates. This plan does not address metrication in other sectors of the economy, which will almost surely lag even further behind.

International Experience

Metrication in Canada was essentially completed in the mid-1980s. A May 1991 study by representatives of the Construction Subcommittee concluded that the Canadian experience was much like that of England, Australia, and South Africa.

To wit, conversion in the construction industry was less difficult than expected, and associated costs were minimal and were offset by later savings. Architects and engineers in general like metric dimensioning because it is much easier to use and there are fewer errors. Engineering calculations are easier and more accurate because there are no unit conversions or fractions. Metrication offers a chance to *rationalize* product sizes and shapes and to eliminate many superfluous ones. For example, the number of sizes of concrete reinforcing bars was reduced from eleven to ten in Australia, from eleven to nine in England, and from eleven to eight in Canada. The time it takes architects and engineers to adapt their thinking to metric averages less than one week. Nevertheless metrication is tied to education and cannot be complete until a new generation who think metric comes along.

Unfortunately, total conversion in Canada's construction industry has been prevented by their great use of construction products made in the U.S. Their home building industry, for instance, is still almost all non-metric.

U.S. Federal Status

Given no choice, Federal agencies have begun to convert, most of them using the Milestone Plan. The General Services Administration (GSA), for example, is currently evaluating A/E firms to determine their experience with metric, and has selected several pilot projects. All new GSA projects in the Philadelphia region will be designed in metric.

Other Federal agencies have begun to issue five-year plans for conversion and to develop pilot projects. The Department of Agriculture began document conversion in January, 1992, and has at least one metric project in the design stage. The Department of Energy began selecting pilot projects in January. The Department of State officially "went metric" on October 1, 1991, and its new work is being designed in the metric system. The Tennessee Valley Authority (TVA) will be implementing the metric system by October, 1992. TVA has also started some pilot projects and much of its present equipment is already metric.

The Federal Highway Administration (FHWA) will work closely with the American Association of State Highway and Transportation Officials to implement metric through the state grant programs. FHWA plans to complete metric conversion by October 1996. The Forest Service has begun its document conversion process and plans to follow the FHWA conversion timetable.

The Army Corps of Engineers, the Naval Facilities Engineering Command (NAVFAC), and the Air Force are late in implementing the Milestone Plan because of their downsizing after the Gulf War. Nevertheless, in October 1991, NAVFAC ordered the metrication of construction documents made for it, and the Corps is in the process of selecting pilot projects.

Private Sector Status

The Construction Subcommittee has asked eight agencies to promote and monitor metrication within their sectors of the construction industry. These are the American Institute of Architects (AIA), the American National Standards Institute (ANSI), the American Society of Civil Engineers (ASCE), the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), the Associated General Contractors of America (AGC), the Council of American Building Officials (CABO), the Illuminating Engineering Society (IES), and the National Society of Professional Engineers (NSPE).

The AIA has been pro-metric at least since 1944 and is currently considering several internal programs for dealing with metric conversion, including reconstituting its Metric Task Force. The ANSI has promoted the use of the metric system since 1975, and will publish all future standards with metric units. ASCE standards published after January 1, 1993 will contain hard metric units. Eventually, its existing standards will also be converted. The NSPE has endorsed metrication and is working hard to make its members aware of metrication activities.

The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) has been following a soft conversion policy since 1977. Its handbooks are either already available with dual or metric only units or are being converted.

The CABO, which is made up of the model code groups that publish the BOCA, Uniform, and Standard model building codes, has pledged its full support of metric conversion. The BOCA and National Codes already include dual units.

Other organizations have also begun active pursuit of metrication. For example, the American Society of Mechanical Engineers (ASME) has been committed to conversion since the 1960s and has published dual-unit standards for years. The American Society for Testing and Materials (ASTM) standards already are published with either hard metric or dual units. The National Fire Protection Association (NFPA), whose standards are now published with dual units, will include soft metric conversions in its future standards. The Construction Specifications Institute's (CSI) executive committee has recommended conversion of all new publications in metric measure, and the Board of Directors is expected to concur.

The American Institute of Steel Construction (AISC) and the American Iron and Steel Institute (AISI) are actively involved in conversion. AISI published a metric guide in the early 1980s; steel products are already available in metric sizes. The major standards of the Portland Cement Association (PCA), the Brick Institute of America (BIA), and the Underwriters Laboratories (UL) are also currently published either with dual measurements, or in two versions, one in the metric system. The Hardwood Plywood Manufacturers Association (HPMA) is considering revising its standards to reflect metric conversion. About half of wood veneer is exported in metric measure.

The Metric System

"Metric" simply means "based on the meter." There have been several metric systems in use over the years and a few still persist today. For example, the Japanese use a version that is different from the European one. The European version, which is the one that will be used in the U.S., is called *Système International d'Unités,* abbreviated "SI" in all languages.

SI was formerly introduced in 1960 by the General Conference on Weights and Measures. It is based on previous metric systems, but some of its units are different and it is more *coherent* and precise. SI is called coherent because there is only one unit for each physical quantity and there are no conversion factors or constants. For example, the meter and its decimal multiples replace such length measures as inch, foot, yard, mile, furlong, fathom, rod, chain, and others.

In earlier metric systems, a meter was the one ten-millionth part of an imaginary line running from Paris to the North Pole. This was marked on a prototype bar stored in the International Bureau of Weights and Measures in France. An SI meter is based on the electromagnetic emission of a certain krypton atom, which is a much more precise measurement than the previous prototype, and it can be easily reproduced by scientists anywhere.

SI has seven base units for the following quantities: length (meter), mass (kilogram), time (second), electric current (ampere), thermodynamic temperature (kelvin), amount of substance (mole), and luminous intensity (candela). It also has two supplementary units: plane angle (radian) and solid angle (steradian). From these all other true metric units are derived. For example, the more frequently used unit for temperature is the degree Celsius, which has the same temperature gradient as the SI base unit Kelvin. The Kelvin scale begins at absolute zero, while the Celsius scale begins 273.15 degrees higher. In other words, zero degrees Celsius (where water freezes) is 273.15 degrees Kelvin. In another example, a square kilometer is simply the area of a square that is one kilometer on a side.

The SI units most often used in the construction trades are relatively few, while consulting engineers need some others. For example, civil and structural engineers need newton and pascal and their multiples. The newton is the unit for force; torque is designated by newton meters; and structural calculations are made in kilo pascals instead of kips. Mechanical engineers use the watt in place of the Btu per hour, and the unit for energy, work, and quantity of heat is the joule.

There are also some nonmetric terms in the SI. These include those for volume (liter), mass (metric ton), time (minute, hour, day, and year), plane angle (degree of arc), velocity (kilometer per hour), area (hectare), energy (kilowatt hour), and speed of rotation (revolutions per minute). Also some units that were an integral part of earlier metric systems have been replaced in SI, including the dyne, bar, erg, kilogram-force, degree centigrade, and calorie.

SI is a decimal system, in that the multiples of its units are based on ten. It recognizes many decimal prefixes but only two are commonly used in the construction industry, kilo (1,000), as in kilometer, and milli (one thousandth), as in millimeter. Because a millimeter is too small to be measured accurately, rounding off to 5 or 10 is encouraged. Some engineering calculations, however, use the prefixes mega (one million), giga (one billion), micro (one millionth, or nano (one billionth). Use of centi (one hundredth), as in centimeter, is discouraged.

Conversions may be either soft or hard. *Soft conversion* is a change in the way a product's size is reported with no significant change in its actual size. In *hard conversion,* the physical sizes of materials are changed to those preferred under SI.

In building construction, preferred SI sizes are usually multiples of a basic 100 millimeter (mm) module. This module is small enough to provide flexibility in design and large enough to promote simplification of the number of component sizes. It is slightly smaller than the 4" module common to our customary system.

SI is generally easier for architects to use than is our customary system. For example, there is no need to convert inches to decimals of feet before multiplying dimensions to determine area. Learning to think in terms of metric dimensioning is relatively simple, requiring the memorization of only a few conversion factors. For example, an inch is 25.4 mm, four inches is about 100 mm (101.6), a foot is about 300 mm (304.8), and a meter is a little more than 39 inches (39.37). Conversion may cause more problems for consulting engineers, however, because the numbers in their calculations are much larger in SI, which makes it difficult to gain a feel for calculated metric quantities. Consequently, some engineers will continue to calculate in the customary system and convert the results to SI, until a new generation of metric-thinking engineers comes along. Greater use of computer programs in metric measure will help to alleviate this problem.

A major reason architects and consulting engineers should favor metrication is that using SI will open up their practices to work in other countries. But whether we want to convert or not, we will ultimately be left no choice. The Federal government is requiring the use of SI, state and local governments will soon follow, and private industry will not be far behind.

H. Leslie Simmons, AIA, CSI ■

The author has been a registered architect for almost thirty years and has practiced as a specifications consultant since 1975. He is the author of two spec writer's books (John Wiley and Sons), The Architect's Remodeling, Renovation, and Restoration Handbook, *and the eight volume* Building Renovation and Restoration *series, of which five volumes have been released (Van Nostrand Reinhold). He is currently updating the encyclopedic handbook,* Construction Principles, Materials, and Methods, *originally published by the U.S. League of Savings Institutions.*

Recommended Reading

Metric Guide for Federal Construction, National Institute of Building Sciences, Washington, D.C. (202) 289-7800, 1991, 34 pp.

ASTM E 621-84 *Standard Practice for Use of Metric (SI) Units in Building Design and Construction,* ASTM, Philadelphia (215) 299-5585.

Practice

Norman Coplan discusses a case in which a court was brought in to rule on the conduct of a panel arbitrating a partnership dispute.

Law: Arbitrating Partnership Disputes

When an architectural partnership breaks up or a partner withdraws, the value of each partner's interest in the firm may have to be calculated and determined. This determination is often complex and may involve questions such as whether the interest will be calculated on a cash or an accrual basis, whether there is a goodwill factor to be measured, and how work in progress, either billed or unbilled, is to be treated. It is not unusual for the parties to submit to arbitration to resolve these issues. The courts will not normally interfere in such arbitration proceedings, but in a recent case in New York the court was called upon to disqualify an arbitration panel for alleged misconduct in determining the value of a minority interest in a two-man architectural partnership.

The substance of the dispute involved the valuation of the plaintiff's 25 percent interest in the architectural firm. The plaintiff valued his interest at more than $21,000,000 and the defendant valued it at approximately $1,150,000. The partnership had been terminated in 1988, but the firm was continued under the same firm name by the partner owning a 75 percent interest with two new partners. The first hearing in the arbitration was not held until December, 1990, almost two years after the termination of the partnership.

The defendant conceded in the arbitration that the plaintiff's accrued capital was approximately $1,000,000 and, as interim relief, the arbitrators directed that the defendant pay that sum to the plaintiff. This sum was paid without objection. The arbitration proceeded throughout 1991 with 24 hearings. Upon its substantial completion, the defendant's counsel requested permission to present a surrebuttal that would result in a further two-month delay in the completion of the arbitration. To balance the equities, the arbitration panel granted the request subject to the defendant's payment to the plaintiff, as further interim relief, of the sum of $675,000; this, together with the earlier payment would equal the accrued capital account of the minority partner. The defendant refused to pay this sum and brought a motion in court to remove the arbitration panel.

The court stated that there should be no intervention prior to the rendering of an award unless the circumstances complained of are of such an "egregious" nature as to warrant it. The court then concluded that the granting of additional interim relief in the amount of $675,000 was within the equitable powers of the arbitrators and did not constitute misconduct.

In support of its conclusion the court pointed out that the rules of the American Arbitration Association authorize interim relief and give arbitrators broad equitable powers. The panel's conduct was not egregious, said the court, and would not warrant the rejection of arbitrators at the closing stages of the proceeding. Further, the court did not concur with the defendant's argument that the arbitration panel had prejudged the merits of the dispute before the conclusion of the arbitration proceedings. The court pointed out that the panel had stated that the direction for interim relief was, in its opinion, "consonant with considerations of fairness, equity, in an effort to maintain the status quo as much as possible, and keep both parties on as level a playing field as possible while this protracted dispute is being heard and resolved."

The court further indicated that the defendant had not been prejudiced in any way since it had not paid the additional interim relief and was given the opportunity to present a surrebuttal case, and was thus benefiting from the delay in the rendering of an award. On the other hand, said the court, the plaintiff, who was not on an equal footing financially with the defendant, had to incur the additional costs of the motion as well as suffer a further two-month delay in the rendering of an award.

The plaintiff requested the court to grant sanctions against the defendant on the ground that the motion was frivolous and was used as a stratagem of delay. The court concluded that the motion had been brought by the defendant primarily to delay the rendering of an award and to avoid having to pay any monies to the plaintiff. The defendant's actions, said the court, reflected an example of a more financially powerful litigant's misuse of the judicial process to try to wear down a financially weaker opponent. The intentional delay or prolonging of litigation through the bringing of baseless motions, said the court, constitutes frivolous conduct which merits the imposition of costs or sanctions.

Norman Coplan ■

The author is a partner of the New York law firm of Bernstein, Weiss, Coplan, Weinstein & Lake.

Practice Points

One-eighth of the United States's total energy use currently goes into heating and operating houses according to *Building an Environmentally Friendly Home*, a 40-page booklet published by the Massachussetts Audubon Society. The guide discusses building materials, construction techniques, and design strategies. To order, send $3.75 to the Society's Educational Resources Office, South Great Road, Lincoln, MA 01773.

The AIA warns architects to be wary of some consultants who claim to be experts on the Americans with Disabilities Act (ADA) or who charge exorbitant fees for their services. Check a consultant's qualifications carefully; there are currently no federal, state, or local government programs to certify experts.

Looking for building product information? *Architects' First Source* is a new resource guide. The first edition covers the Southeast and is available free to building professionals located in that region; it costs $75 for firms across the nation that have projects in the Southeast. Four other regional volumes are planned. Call (800) 395-1988.

Homes will be at their lowest price in the decade this year, according to data compiled by the Prudential California Real Estate Group. With interest rates at an 18-year low and the highest inventory of houses in 10 years, this group claims, the market has "bottomed out" and "should improve very soon."

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For information on any aspect of architectural copper, call 1-800-CDA-DATA. Or write: Copper Development Association Inc., Box 1840, Greenwich, CT 06836-1840. In Canada, call (416) 421-0788. Or write: Canadian Copper & Brass Development Association, 10 Gateway Boulevard, Suite 375, Don Mills, Ontario M3C 3A1.

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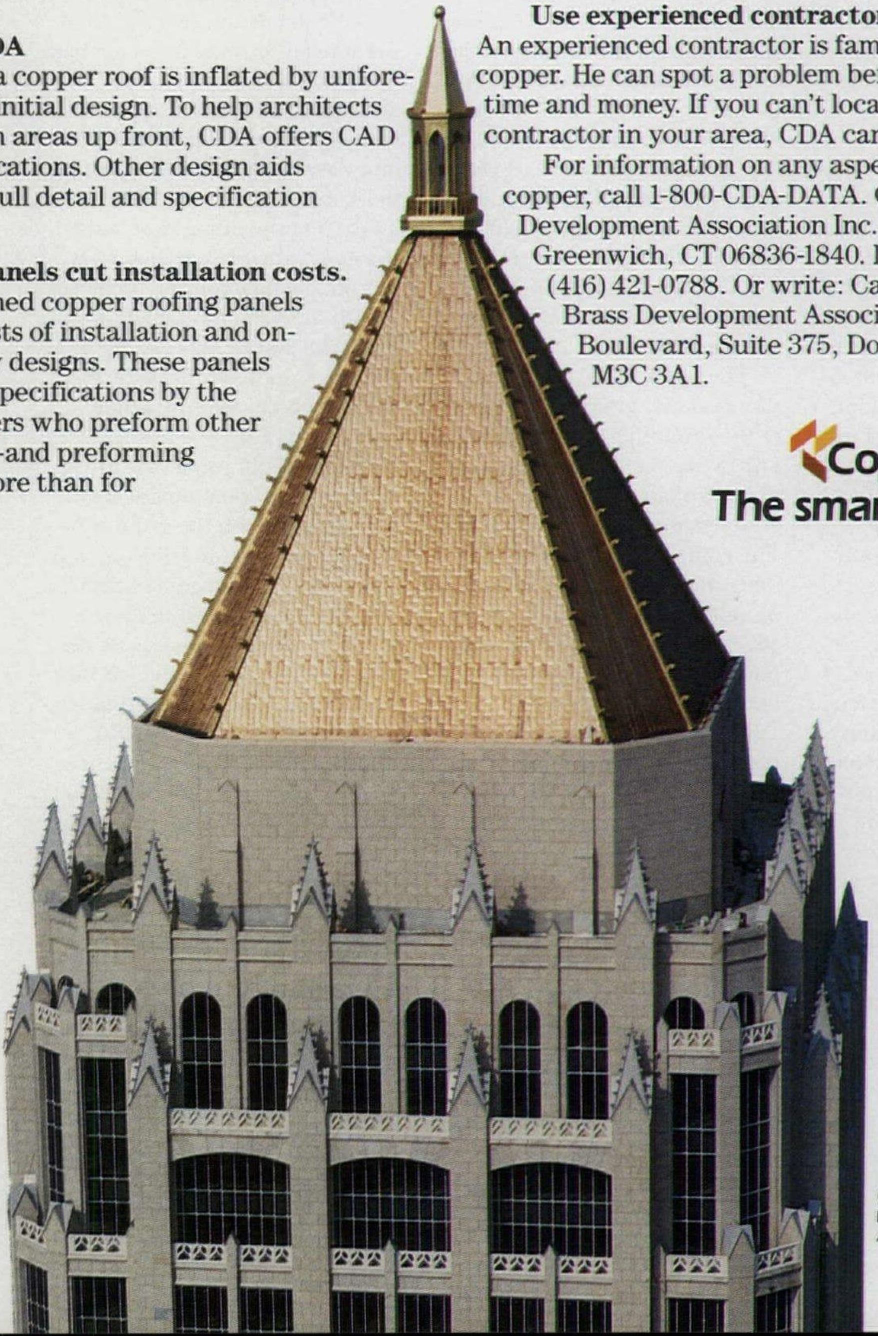

IBM Tower, Atlanta, GA
Architect: John Burgee & Associates, New York, NY
Roofing Contractor: Armetco Systems Inc., Irving, TX

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Circle **No. 343**

Nina Hartung of the Coxe Group suggests ways in which firms can train staff without spending a lot of money.

Management: Maximizing Human Resources

The recession in which we find ourselves has been particularly difficult for architects throughout the country. Even those with healthy practices know of colleagues whose firms are struggling or closing. Every firm is looking closely at how it spends dollars and is seeking ways to reduce overhead to remain competitive.

But reducing overhead and increasing the bottom line are elusive goals. Beyond the obvious reduction of frills, many expenses are fixed and out of the architect's control. Overhead costs (indirect expenses) as a percentage of net revenue have increased 29 percent for the average design professional during the last 25 years. Professional liability insurance alone now costs an average of 5 percent of net revenue, when in 1966 it represented less than 1 percent. These escalating costs have eroded profit potential for architects and have necessitated a closer look at how to manage a profitable practice.

An often overlooked way of enhancing profit is to maximize the staff's output (direct labor). As spiraling overhead costs erode dollars available for profit, they also erode dollars available for direct labor: for the average firm, direct expenses now represent approximately 37 percent of net revenue dollars; in 1966 that number was 49 percent. Making direct labor more efficient is an area of practice over which architects have control and, if properly managed, such efficiencies can improve the bottom line. More important, it focuses attention on a firm's strongest asset: the staff.

Staff Resources

Unlike computers or other equipment, staff members appreciate rather than depreciate in value. But that appreciation requires an investment in the development (and nurturing) of people, a management technique in which architects have not typically excelled. Today, architects are spending less than 1 percent of their net revenue to train and develop their staff, while other professions and businesses spend two to five times that amount.

This lack of investment in human resources is leading to inefficiencies in architectural firms. For instance, in a recent study of training and development in the design community, inexperienced staff (those with less than two years of experience) claimed a mere 30 percent effectiveness rating during their first year of employment, and reported an average of two years before feeling confident in their assignments. Experienced professionals lamented the increased complexity of projects, the use of new technology, the winning of work, and the managing of people as examples of responsibility for which they had little preparation and felt less than effective.

One way to respond to these shortfalls and to reduce inefficiencies is to install a training and development program. Although philosophically committed to training, many firms have been precluded by the reality of today's economy from thinking about such an apparently high-cost overhead item as training. However, if one considers training an investment in staff that will increase profit, not an expense, it will become a necessary activity. Simply by using the resources at their fingertips, firms can take steps to promote learning within the organization that will not require a major financial outlay.

Step 1. Learning Culture

The leadership of the firm should commit to building an organization where learning is part of the culture. Assimilating new staff, eliminating the reinvention of the wheel on every project, using resource libraries, and communicating policies and procedures all go a long way toward alleviating confusion and allowing team members to be more effective (and therefore to increase profitablility) on their projects.

Step 2. Self-Development

Every architect should be reminded of his or her responsibility for self-development. For an architect, the learning never ends: learning is a responsibility and a goal of every individual, at every level in the organization.

Step 3. Project Learning

Studies have proved that more than 80 percent of an adult's real learning happens through hands-on experiences. Why not consider the professional development implications of various assignments when scheduling staff? One way of expediting learning on projects is to assign a training coordinator to every team. At the start of the project, the training coordinator could inventory team members to assess what each needed to know to be effective on the project and help find a way to make the requisite learning happen. For example, some team members may need to learn about the building type, industry standards, and jargon; some may need to learn the firm's drafting standards; some may need to become familiar with CADD; others may need an orientation to the firm's project budgeting system; still others may want to understand more about managing people. Not every team member will have learning requirements, but for those who do, time lost to trial and error learning can be minimized.

Step 4. Mentoring

Initiate a mentoring program as a means of developing staff. Every experienced professional is a role model for the less experienced. Accountability for developing staff should be a part of every manager's and every principal's job description and performance evaluations. Staff learn by example, both good and bad.

Step 5. In-House Training

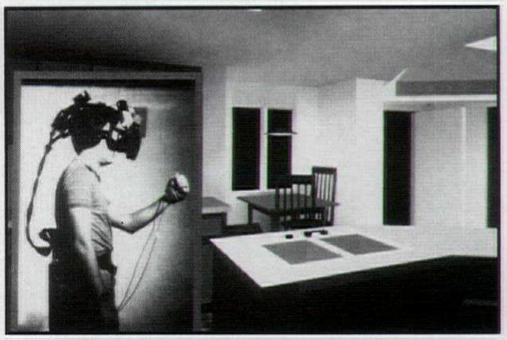
Principals and experienced staff represent a stable of excellent instructors for teaching the fundamental skills required to practice. Not only do the instructors polish their own communication skills, they also refine their mastery of a particular subject as a result of course preparation, and trainees develop a network of resources for difficult problems.

Last year, *Fortune* magazine predicted: "The most successful corporation in the 90's will be something called a learning organization." With the trend of ever increasing expenses squeezing the firm's profitability, finding a way to share knowledge – becoming a learning organization – will be the mark of a successful architectural firm in this decade and a necessity for those wishing to compete in the next century.

Nina Hartung ■

The author is a member of the Coxe Group, a consulting organization specializing in the management of architectural and other professional design firms.

Architect **Douglas MacLeod** considers the technical, conceptual, and ethical issues with Virtual Reality computer systems.


University of North Carolina

The Architectural Walkthrough Project

Computers: Virtual Reality

Few new computer technologies have captured the public imagination as has Virtual Reality. According to the media, we will soon all be immersed in computer-generated worlds of incredible splendor. Wearing goggles that house miniature television screens, such as VPL's Eyephone™, we will see these worlds in full stereoscopic vision, and wearing gloves wired with fiberoptics we will be able to interact with these imaginary settings – flying through them simply by pointing a finger or grasping objects by making a fist with our "datagloves."

Although this technology has been limited to the entertainment and defense industries, architects will soon be able to walk their clients through a proposed design in three dimensions without spending a cent on construction. There is no doubt that Virtual Reality holds a great deal of potential for the profession, but there are many issues that must be addressed before that potential can be realized. In the process, Virtual Reality will force us to reconsider some of the most basic tenets of the practice of architecture.

Warren Robinett of the University of North Carolina, Chapel Hill, is one of the pioneers in the development of this technology. Originally a video game designer, he was part of the NASA/Ames Virtual Reality research team that helped make VR a household acronym. But even he admits that it may be some time before architects begin to use these systems. Surprisingly, he believes the main reason for this may be economic. "Architects," he says, "don't spend money on this stuff. It's not a market where people will buy something. It's unlikely that an architect will use the VPL Eyephone™ because it is far, far too expensive."

What's too expensive? Christopher Allis, the Applications/Marketing Liaison for the Cyberspace Project at Autodesk points out that, "$20,000 gets a head-mounted display and a glove." But he adds, "For $30,000 to $40,000 you can have a complete system." The computer itself is a relatively small part of the cost. In fact, the first commercially available product in the field, Sense8's World-ToolKit runs on an IBM PC AT with an 80486 processor and two additional graphics boards for stereo display. Autodesk's Cyberspace, that company's version of VR, will run on similar equipment and it should be released within the next few months.

Computers, however, vary tremendously in terms of processing power, and Virtual Reality makes intensive demands on that power. In August of 1991, the Pixel-Planes 5 computer at the University of North Carolina set a world speed record by displaying 2 million triangles per second. The systems that use Sense8 software, on the other hand, may display 500 to 1000 polygons per second. Alvy Ray Smith, a well-known figure in the field of computer graphics, says "reality is 80 million polygons per second." While this may be excessive, it will be some time before VR walkthroughs can compete with traditional means of representing buildings. A good rendering on paper still contains many more subtleties in shape and shading than any Virtual Reality system.

Robinett also mentions three other technical problems with VR: "The low resolution of the head-mounted displays, the lag time between moving your eyes and the changing of the display, and the limited range of the tracking devices." The first of these is particularly serious – today even the lowest resolution computer monitors have a resolution of 480 by 640 pixels, while head-mounted displays can barely manage 360 by 240 pixels. According to Garry Beirne, a Graphics Software Designer at Alias Research, Inc., in Toronto, "If your eyes were that bad, you'd be legally blind."

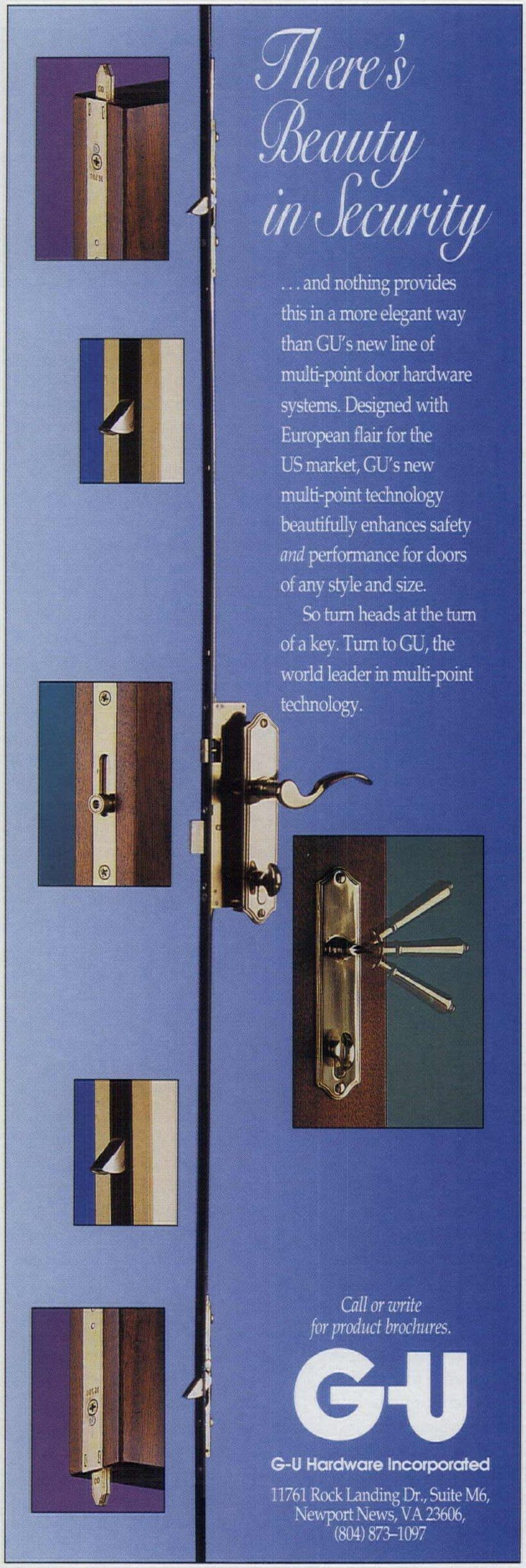
The currently crude nature of the graphics may be beside the point – it's the potential of the medium that is important. As Patrice Gelband, Chief Scientist at Sense8, puts it, "Virtual Reality gives a whole new real estate to be developed." In other words, in the future architects may find themselves designing virtual environments rather than buildings, and these environments may be radically different from anything we've ever designed before. "Think of VR as a place to go," says Gelband, "with malleable parameters in terms of time and space, non-Euclidean geometries and varying speed parameters. The kind of things you can't do in architect-designed buildings today can be explored in VR."

The process of designing in Virtual Reality may in itself be a radically different approach to architecture. In fact, the University of North Carolina at Chapel Hill has already experimented with just such an approach for their new research facility, Sitterson Hall. Before construction began they modeled the building in Virtual Reality and even convinced the architect to move a wall in the lobby that made for too cramped a space. Apparently, he wouldn't agree with them until he saw it in 3D.

Moreover, four graduate students at the university have created a program called 3D Modeler, or 3DM, that allows you to create environments using VR equipment. Robinett says, "It's like MacDraw in three dimensions. From a palette of tools you might select a cube, it would appear in front of you, and you could stretch it or scale it up." In five to ten years, Robinett believes, such tools will be commonplace and their prices could drop substantially, particularly if a consumer market develops for VR technology. As Robinett puts its, "A consumer market, such as a Nintendo game, could make head-mounted displays much cheaper, and architects might be able to piggyback on the economies of scale of such a consumer device."

Another avenue is suggested by James Durward, President of Parallel Universe Inc., in Calgary, Alberta. His company is developing what he calls, "Real-time, three-dimensional, stereoscopic, concurrent, collaborative systems," which would allow people in different locations to design things together in a single virtual space where they would all be "present." This Virtual Reality would also include a voice component so that designers could speak to one another as they work. Increasingly, telecommunications will play an important role in broadening the use and appeal of such systems.

Yet if Virtual Reality is to have a real effect on architecture it



must offer more than millions of polygons and cheap head-mounted displays. Virtual Reality in its most common form is really just graphics. That red polygon you see in three dimensions is just that – a red polygon. While it may represent a painted wall, it doesn't carry any of its properties or behaviors such as its fire-rating or its R-value. Even its color is just a combination of red, green, and blue dots rather than a paint manufacturer's specification.

Until the information that defines a building is organized in a coherent, complete, and structured form, Virtual Reality is just another means for making interesting pictures and, as such, is a dead-end for the real business of using computers to describe the design of buildings. Rather than another rendering device, architects need tools that unite all the various aspects of design – plans, sections, specifications, estimates, and code checks – into a single database.

Even if we solve all these problems and we are able to design anything and everything in Virtual Reality, the question still remains: What should we be designing? Although some of the foremost figures in the field dispute this, it seems clear that Virtual Reality is a direct descendant of air force flight simulators, and the military still plays a large role in the development of such systems. Does such an origin taint its use for more peaceful purposes?

Indeed, initial suggestions of what VR might be used for are disturbing. Virtual Reality seems to have entered an awkward adolescence where its major concerns are sex and drugs. Although every major developer is irritated by the questions, most journalists still seem more intrigued by the possibilities of sex with virtual partners, or "teledildonics," and psychedelic experiences, or "electronic LSD," than by any other aspects of Virtual Reality. Some of these scenarios are so juvenile that they seem to make a mockery of any suggestion that this technology promotes enhanced social consciousness. It is small wonder that many people are highly critical of this technology and see it as both culture- and gender-biased.

Do sex, drugs, and jetfighters have anything to do with buildings? You'd think not, yet Autodesk, the manufacturer of AutoCAD, the largest selling CAD product in the world, used Timothy Leary, a sixties icon of hallucinogenic drugs, as narrator for one of its videotapes. Stranger still is its use of the word "Cyberspace" to describe a forthcoming product. Cyberspace is a term coined by science fiction writer William Gibson to describe a computer-generated, interactive representation of all the world's data, but it is not a pleasant view of the future. Gibson's world is a violent, anarchistic society seemingly devoid of ethics and morality. It's as if someone brought out a product called The Ministry of Truth in honor of that terrifying institution of propaganda and slander in George Orwell's 1984.

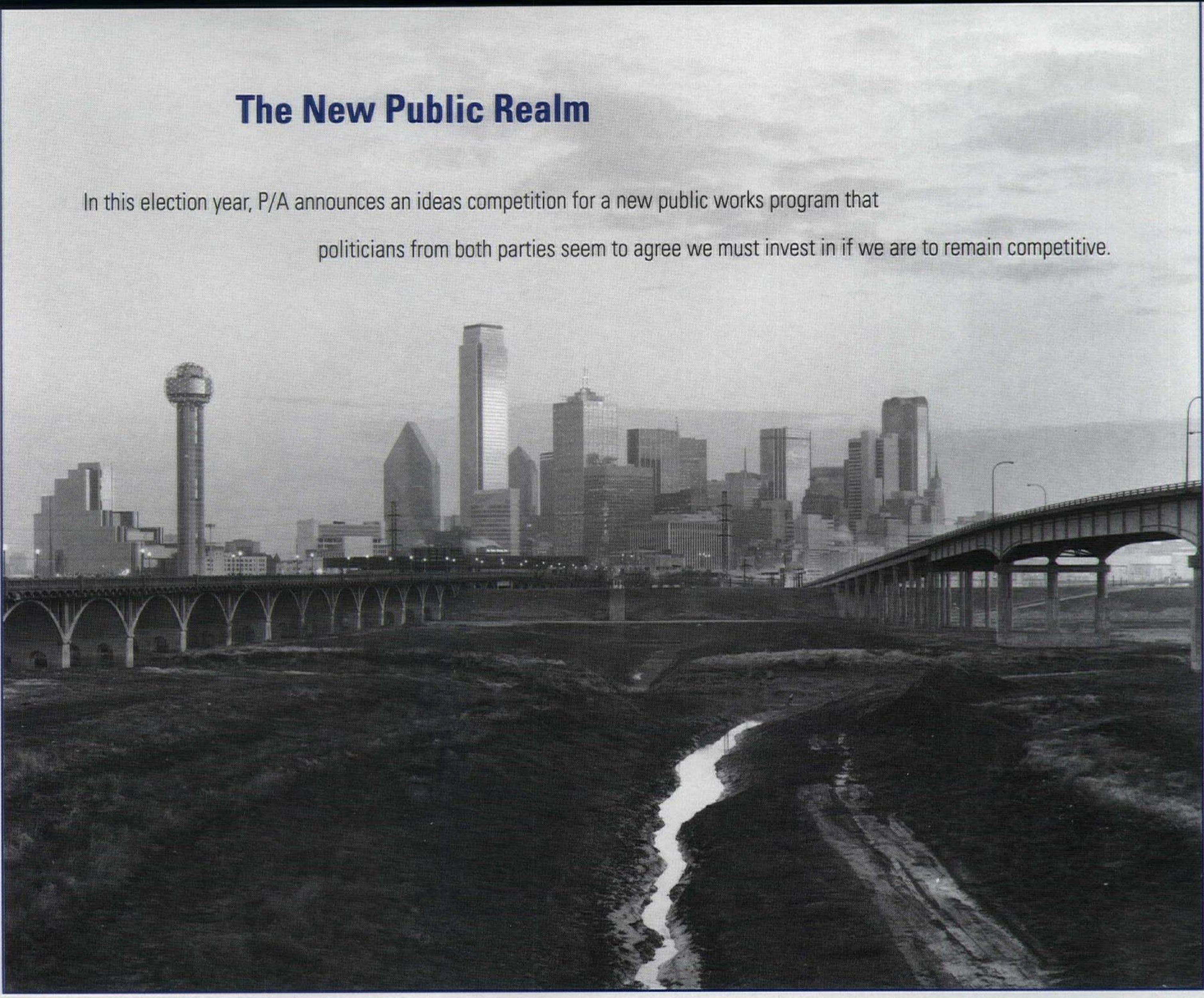
Virtual Reality isn't a panacea for either the world's or architecture's problems. There are technical, conceptual, and even ethical questions that must be answered before it can be used in any meaningful way. And these questions won't answer themselves. They demand that architects re-examine both the way they design buildings and their social responsibility to ensure that new technologies are used wisely. Virtual Reality shows promise, but its growing pains are sufficiently disturbing to require that we pay careful attention to its continued development. ■

Douglas MacLeod

The author is a registered architect in California and is currently Project Director of Art and Virtual Environments at the Banff Centre, Alberta, Canada. He has worked professionally as an architect, musician, graphic artist, computer programmer, and writer.

The New Public Realm

In this election year, P/A announces an ideas competition for a new public works program that politicians from both parties seem to agree we must invest in if we are to remain competitive.



Dallas photo: Timothy Hursley

Amidst all the political debate in this election year, liberals and conservatives seem to agree on at least one point: the need to invest more in our public facilities and infrastructure. The motives for this investment, of course, vary: liberals envision it as a way of creating jobs, while conservatives tend to see it as a way of increasing worker productivity and of enabling us to compete more effectively with Germany and Japan. Also, the ways it might be handled vary across the political spectrum: liberals tend to see the money coming mainly from the government, be it at the Federal, state, or local level, while conservatives prefer, where possible, for the government to offer incentives for private investment. Still, an enhanced public realm is a goal that both groups want to call their own.

What has been largely missing from the debate so far is a discussion of exactly what we should be investing our money in. The recently signed Surface Transportation Act calls for investment in what we normally think of as infrastructure – roads, bridges, and rail lines – with some money earmarked for such things as transportation stations. But many more types of facilities and functions are essential to the well-being and productivity of people and are in need of public investment. And we believe architects, planners, designers, and urban designers have a central role to play in identifying those facility types and defining their functions.

Accordingly, P/A has decided to sponsor a competition to solicit ideas from our readers as to what a new public works effort in the U.S. might entail. Although the AIA has been lobbying for public works (see Editorial, p. 7), the architecture and design professions have, for too long, been on the sidelines in the debate over how public money should be spent on public facilities and infrastructure. It is our hope that, with such a competition, and the exhibits and publication that we are planning in conjunction with it, the design professions can begin to reenter the debate and contribute badly needed expertise.

Thomas Fisher

Intent of the Competition

The objective of this competition is to solicit ideas for new public works in the U.S. We want to encourage broad thinking about the problems of the public realm and about possible solutions to them, and yet we want ideas that are realizable with existing technology and within the political structure of this country. In other words, we are looking for proposals that are at once visionary and practical, at once provocative and useful. To that end, we have appended to this competition announcement two articles that suggest what is possible. The first examines the current debate in Washington about public works and what that entails; the second, by contrast, looks at visionary public projects, both built and unbuilt, from the past.

An obvious reference point for this competition is the Public Works Administration that was active in the U.S. between 1933 and 1939. The types of projects the PWA built ranged from standard infrastructure (dams, bridges, highways, disposal plants) to public buildings (government buildings, schools, libraries, hospitals, jails) to residential structures (multifamily housing, army barracks) to recreational facilities (zoos, camps, park pavilions). That suggests the variety possible under the umbrella of public works, but should not be seen as all-inclusive. Indeed, we encourage entrants to think broadly about possible public works initiatives and to pursue implementation strategies that might involve the private or non-profit sector as well as the various levels of government.

Emphasis of the Competition

The emphasis of the competition will not be on the making of innovative forms (although that is certainly welcome), but on powerful ideas; those ideas may vary widely. At one extreme, a submission could make a proposal for changing existing laws or other public policies, which might have only a minimal effect on the physical environment. At the other extreme, a submission could focus on the physical environment; reexamining, for example, the design of a type of public building or structure – with only minor changes to a community or to political or economic policy.

Likewise, the scale at which the submissions focus can greatly vary. One submission might address the design of a single building on an appropriate site selected by the entrant; another might look, instead, at the design of a prototypical structure or group of structures on a generic type of site; a third might start with a change in a law or regulation and suggest what effect it might have on a type of building or urban condition. Because of the wide range of possibilities, defining the problem is as important as offering a feasible solution to it. We want to emphasize that we are not looking for grand utopian schemes, but for smaller-scale interventions that solve real problems and that might have broader relevance.

Submission Requirements

While we want to encourage entries that explore private and non-profit initiatives as well as government-funded efforts, all submissions must have a clear public benefit. Private buildings – houses or offices, for example – are appropriate only if they have some positive effect on the public realm. We have tried to keep the submission requirements to a minimum to encourage the greatest participation and to keep the focus of the competition on ideas rather than on elaborately detailed designs. Each entry should contain at least two parts:

1 There should be a written (typed or neatly printed) description of the proposal, stating the problem: what its nature is, why it exists, and why it needs addressing; and the solution: what changes it requires in the way things are done; what physical manifestation it will take, where it might occur, how it might be implemented, and – particularly – how the public might benefit from it. A synopsis of the idea should be no more than one page in length and written in an outline form, with subtitles identifying the different sections, to enable the judges to assimilate the copy easily. This page should go at the front of the entry. If the idea needs further elaboration, additional written pages (up to a maximum of twelve) can be included.

2 There should also be drawings showing the physical effects of the proposal. There should be at least one drawing or page of drawings, and no more than a dozen drawings; among the drawings, there should be at least one perspective or axonometric of the proposal's physical manifestation. Other drawings that would be useful in the judging include site plans, floor plans, sections, and elevations; entrants must determine which, if any, are necessary to convey their intent.

Submission Format

The entries should be submitted on 8 ½" x 11" sheets in a binder that opens and lies flat. THE BINDERS AND DRAWINGS WILL NOT BE RETURNED, so do not send expensive binders or original art. If your proposal is selected by the jury and we need it for publication purposes, or if your entry is selected for the exhibitions and book that we are planning on the competition, you must agree to make the original art available. All original art will be returned to you when we no longer need it for one of the above purposes. When planning the presentation, keep in mind that the 8 ½" x 11" sheets will be reduced by about 10 percent for publication in P/A, so do not use type or printing that will be unreadable at that reduction.

Eligibility

The competition is open to all people in the U.S. and Canada working in the field of architecture or in related disciplines, such as planning, urban design, interior design, and industrial design. Students over the age of 18 attending school in the U.S. or Canada are also eligible.

Given the complexities of the problems this competition hopes to address, entrants might consider forming interdisciplinary teams; in such submissions, at least one team member must meet the eligibility criteria. Eligible persons or teams may submit as many entries as desired, although each must be accompanied by an entry form and fee.

Entrance Fee

The entrance fee for individuals who subscribe to P/A is $40 per submission. For individuals who are not subscribers, the fee per submission is $70. (If you do not subscribe to P/A, but enclose a check for $48 with a subscription form from the back of the magazine, you may enter this competition at the subscriber rate of $40. Please send two checks, one for $48 and one for $40.) All checks or money orders should be made payable to: Progressive Architecture. (Canadian entrants should send drafts in U.S. dollars.) The entrance fee is not returnable.

The entrance fee, along with the completed entry forms on the facing page, should be enclosed in an unsealed envelope and attached to the inside front cover of the binder. (Enclose the subscription check and form, if applicable, in the same envelope.) Each entrant will receive notice that the submission has been delivered and logged in. Make sure entry forms are completely filled out, with a current address and telephone number.

Deadline and Delivery

The deadline for submission is June 19, 1992; all submissions must be mailed by that date. Hand-delivered entries must be received at the street address shown below, at the 6th floor reception desk, by 5 p.m. on June 19. Please send submissions to:

Public Works Competition, Progressive Architecture,
600 Summer Street Stamford, CT 06904

The judging will not take place until mid-July to allow enough time for entries to be sent through the mail. However, P/A is not responsible for binders that get lost in the mail or arrive too late for the judging, and we recommend that entrants use some form of guaranteed delivery method such as UPS, Federal Express, or Express Mail.

Jury

The jury will consist of the following architects and planners:

Harvey Gantt, FAIA

Partner, Gantt Huberman Architects, Charlotte, North Carolina; three-term Charlotte City Council member; two-term Mayor of Charlotte; first black Democratic Party nominee to the U.S. Senate, running against Jesse Helms of North Carolina.

David Lee, FAIA

Partner, Stull & Lee, Boston; Adjunct Professor, Department of Planning and Urban Design, Harvard; current President of the Boston Society of Architects.

Herbert Muschamp

Architecture Critic for *Art Forum* and *The New Republic;* Director of the Architectural Criticism Program, Parsons School of Design, New York; author of *File Under Architecture* and *Man About Town.*

Susana Torre

Principal, Susana Torre & Associates, New York; Chair, Department of Environmental Design, Parsons School of Design; Board of Directors, Architects/Designers/Planners for Social Responsibility, New York.

Robert Yaro

Senior Vice President, Regional Plan Association, New York; former Director of the Graduate Program in Regional Planning, University of Massachusetts, Amherst; Founding Director of the Center for Rural Massachusetts.

Recognition and Notification

Proposals will be recognized with either awards or citations. The winning projects, along with a jury discussion of the competition, will be published in the October, 1992, issue of P/A. Winning entrants will be notified by August 3, 1992, and will be asked at that time to provide us with the original art for publication. The next notification will be made by September 1, 1992, to secure original art for those projects that will be exhibited. We are planning exhibitions in several cities and discussing with publishers the possibility of doing a book on the competition. ■

Entry form: The New Public Realm

Please fill out all parts and submit, intact, with each entry.
Copies of this form may be used.

Entrant:
Address:

Credit(s) for publication (attach additional sheet if necessary):

Entrant phone number:

Entrant:
Address:
Project:

I certify that the submitted work was done by the parties credited and meets all Eligibility Requirements. All parties responsible for the work submitted accept the terms of the Publication Agreement. I understand that any entry that fails to meet Submission Requirements may be disqualified. Signer must be authorized to represent those credited.

Signature ______________________

Name (typed or printed): ______________________

The New Public Realm/Progressive Architecture
600 Summer Street, P.O. Box 1361, Stamford, CT 06904
Project:
Your submission has been received and assigned number:

Entrant:
Address:

Receipt:

The New Public Realm/Progressive Architecture
600 Summer Street, P.O. Box 1361, Stamford, CT 06901

Entrant:
Address:

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Strategies for Rebuilding

Would a "New New Deal" lift us out of a building industry recession?

And if not, is it still a good idea?

A senior Washington architect (who says his first job in the 1930s was "flushing water closets in empty Manhattan office buildings so their valves wouldn't rot") is pointed in expressing his view on the state of the economy: "Read my lips: New Depression."

One hopes not, but at least there is a very persistent recession on, and as national elections near, there is a rising sense of urgency about what to do. With private construction badly stalled and little evidence that anything will stimulate a quick change in its fortunes, discussions in the building industry have tended to turn on the idea that the federal government should build. Build more, that is; last year government was already the sole sector of the economy not to reduce construction spending, which in 1991, according to the Department of Commerce, took its steepest dive since 1944.

The AIA sees grand opportunities for architects with the recent passage of the Intermodal Surface Transportation Act. The law revises the framework for federal funds to be used at state and local levels on a broad range of public transportation projects. Facilities for public transit and highway systems – that is, building projects for which architects could compete – are included, as are studies for scenic beautification and metropolitan transit planning efforts.

But the new Transportation Act is no surefire bonanza of government-supported building projects; federal funds are likely still to be used mainly for building and maintaining roads unless, AIA's government affairs program says, "architects and other citizens concerned about the overall livability of cities get involved."

A Peace Dividend?

Some advocates of higher Federal construction spending envision a major infrastructure and public works reconstruction effort (apparently having concluded that, with peace now at hand, it is mainly a matter of deciding what should be built). In his ill-fated bid for the Presidency, Senator Tom Harkin proposed defense cuts totaling $420 billion over the next ten years, with two-thirds going to a fund for public works and infrastructure.

Comparisons with Depression-era programs may be inevitable, but they are not always apt. "The Works Progress Administration and the Public Works Administration were designed to conserve, beautify, and construct what was permanently needed by the nation, according to a careful plan," wrote historian Robert Goldston in his book *The Great Depression.* He challenges accepted history by saying, "They were not intended to give direct relief from the Depression, and did not."

But even if the WPA and PWA did not provide many jobs (fewer than 1.5 million total, by most accounts), they did provide for long-term basic national needs and helped give many Americans new hope. And they created buildings that are prized today.

While Congress has shown wide agreement that key elements of the national infrastructure need rebuilding, funding remains a big problem. Continuing to pay for expensive weapons contracts, even when there is no clear agreement on their need, has become an issue of saving jobs in this election year plagued with mounting national unemployment.

Roles for Architects

In any case, architects and their building industry colleagues do not typically design or build bridges, roads, utility plants, dams, railroads, and the other items that are usually thought of as infrastructure. However, Andrew Lemer of the National Academy of Sciences Building Research Board suggests that architects, landscape architects, and artists could play a role in such projects, particularly by using design to make them more palatable to a NIMBY-fixated public.

Industry lobbyists have managed to insert schools, hospitals, prisons, and other public buildings into recent laws on infrastructure, but buildings remain a small part of relatively small programs.

And some think this "insertion" strategy could bring negative results. "It downplays the big, public-works-oriented projects," argues the chief lobbyist for a construction trade group, "which most people in Congress see as vital to any plans for getting America back on its feet. The buildings people, architects included, just seem to be tagging onto the civil engineers." He believes this can undermine credibility and dilute the case for a large-scale public building effort.

For example, the General Accounting Office reported in 1991 that federally owned public buildings alone will require almost $3 billion in repair and alteration in the next four years. And a 1989 study by the Educational Writers Association estimated that America's schools require an investment of $84 billion to relieve overcrowding, correct structural flaws, and abate environmental hazards.

Put questions of strategy aside, others say; there's no agenda yet. The longtime head of a building trade group privately laments the fact that architects, engineers, trade unions, product manufacturers, building owners, developers, and contractors have not coalesced to agree on a statement of needs and plans for concerted action.

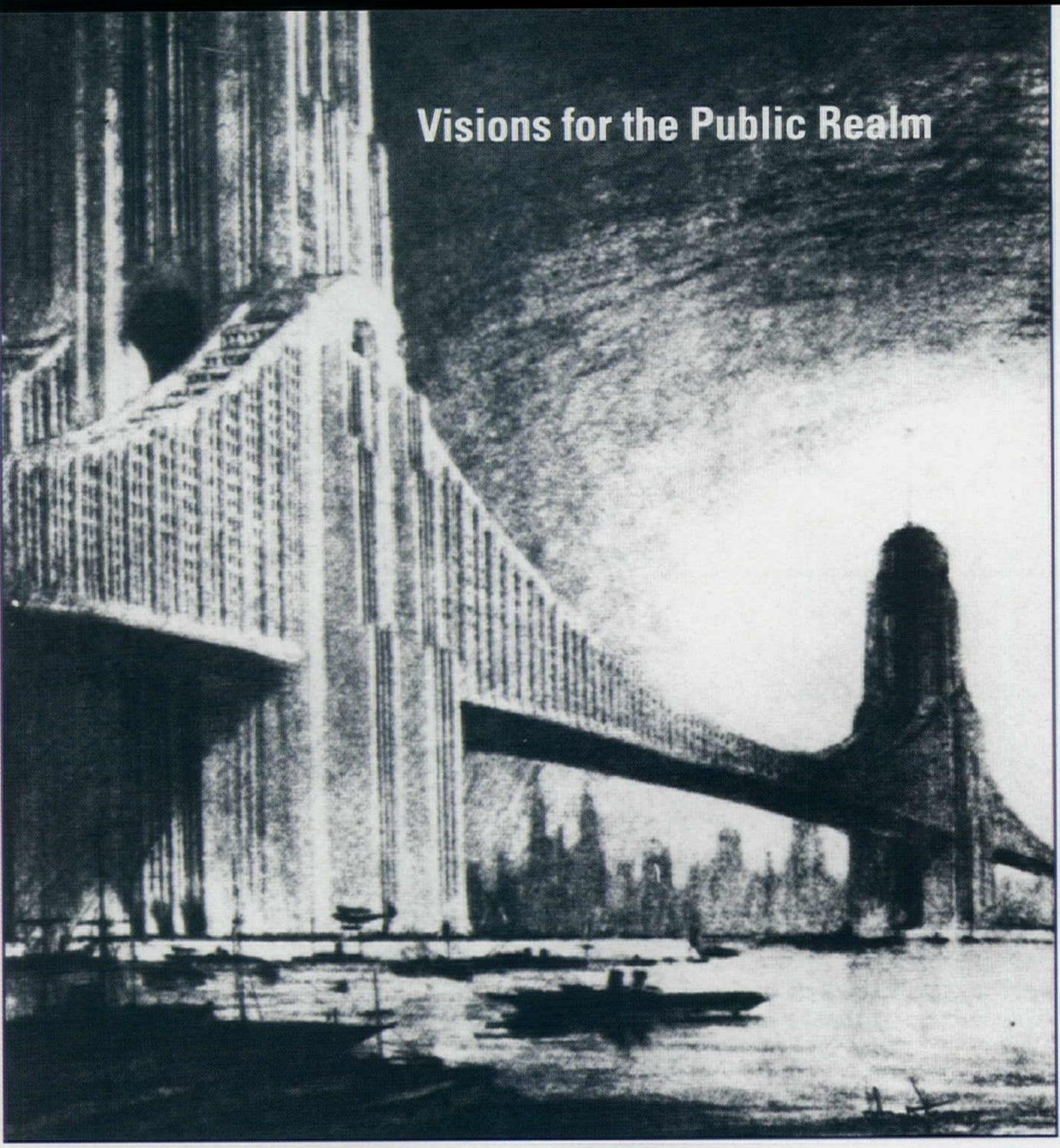
"The building sector should be a more powerful political force," he says, noting that building construction accounts for a large percentage of the gross national product. "We have to get out of the boom-bust construction cycle; we need high-level research and development going on in all sorts of areas."

Others stress rising concern over foreign competition both abroad and domestically, saying that U.S. building construction is technically antiquated and in need of rejuvenation. Some also see a major building program as a way to lead in a reordering of national priorities.

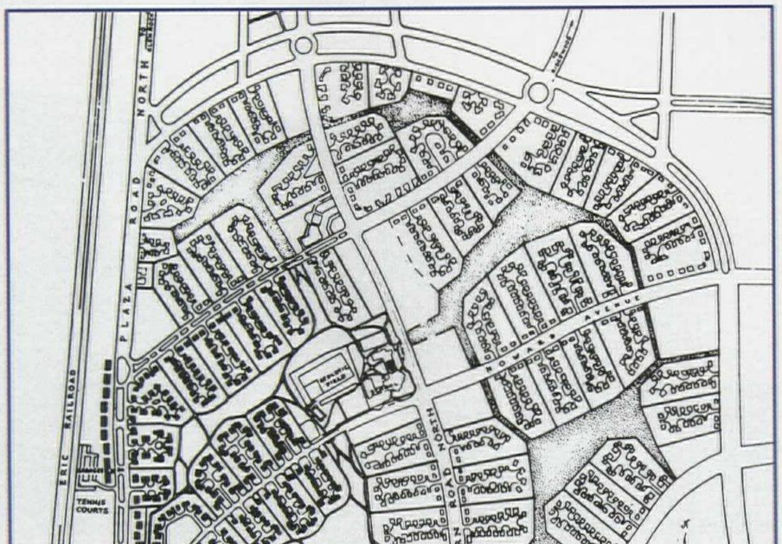
Even if a peace dividend is paid, it can be a double-edged plowshare: military architects and engineers can take on federal work that would have gone to private offices. The founding partner of a small firm that has long worked with the State Department refers to the legions of Army personnel now on more or less permanent detail designing at the Department of State as "the Rosslyn District of the Corps of Engineers." "A lot more is done in-house," he says.

Can a big new federal building program help to clear away the darkest economic times in the experience of many architects? Could it help redirect a nation that some regard as badly adrift? Perhaps. But first the "buildings people" will have to set priorities and get organized to support them. **Thomas Vonier** ■

Visions for the Public Realm



1 "APARTMENTS ON BRIDGES" RENDERING BY HUGH FERRISS



2 RADBURN, NEW JERSEY, SITE PLAN

An introductory essay and a survey of 20th-Century public works projects, both built and unbuilt, suggest ideas for a more socially conscious architecture.

The inadequacies of public works and infrastructure in the United States have been a recurring dilemma. Although some of the projects on the following pages address a set of problems different from those facing the country today, they all involve a search for new building types and programs. Each of the projects presented here is a thoughtful and sophisticated investigation into plausible alternatives to unacceptable conditions.

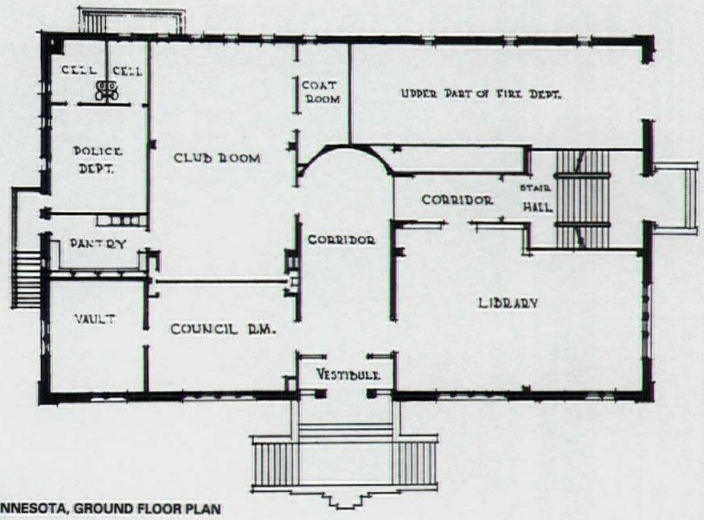
Currently, we have a country of neglected buildings and infrastructure. It is time for practitioners to examine their own towns and cities, to walk out into the streets and take stock of the successes and failures around them; to seek hidden sites – abandoned railway yards, vacant lots, and burned out buildings – and to suggest policy changes in the search for new solutions. The need for new programs is, by now, self-evident: homelessness, crime, drug abuse, alcohol abuse, teenage delinquency, unemployment, crumbling housing stocks, substandard educational and healthcare facilties, nonexistent community centers, neglected recreational sites, blighted open land, dreary suburban commercial strips – the list goes on and on.

Public officials on Federal, state, and local levels are able to call for new building programs and to administer funding, but rarely are they able to envision precise manifestations of viable projects. This is where the profession would do well to intervene. Architects have been socially active throughout most of the 20th Century, but the attraction of this role faded during the seemingly halcyon days of the 1980s, when the private realm amply occupied architects' energies. Times have, as we all know, changed.

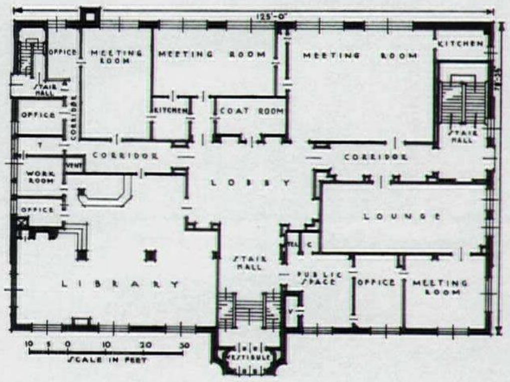
The technological, economic, political, and social revolutions of the 20th Century have spurred many of the architectural profession's greatest successes and most extravagant failures. Projects for the public realm, particularly, have been the subject of countless "visionary" and "utopian" schemes, many of which called for complete revamping – sometimes, even destruction – of existing conditions. Although the term "visionary" has been identified with paper architecture, with work destined to remain as plans and models, it may be time to reevaluate the connotations of "visionary," to use the word to mean plausible works of architecture or design that stretch the boundaries of what we consider practical.

Visions, plausible or fantastic, tend to be politically charged, and perhaps the profession needs to take advantage of this and attempt to help shape public policy. Public works projects in the U.S. – no matter how well-intentioned – are often waylaid by shortsighted policymakers; this situation is not a reason to shy away from public works, but a reason to act.

Abby Bussel



3 VILLAGE HALL, BOVEY, MINNESOTA, GROUND FLOOR PLAN

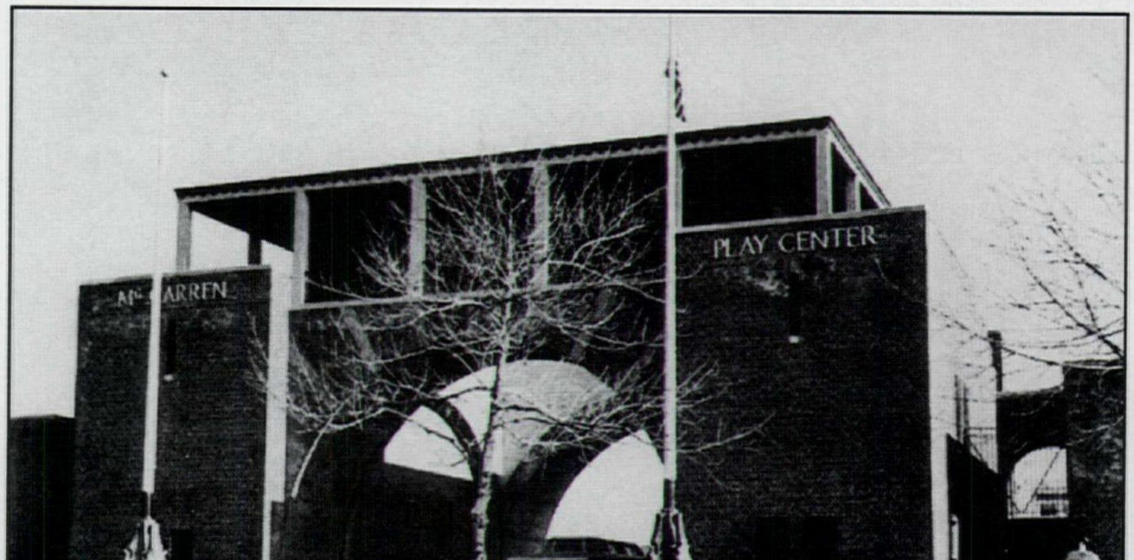


4 COMMUNITY BUILDING, ELY, MINNESOTA, GROUND FLOOR PLAN

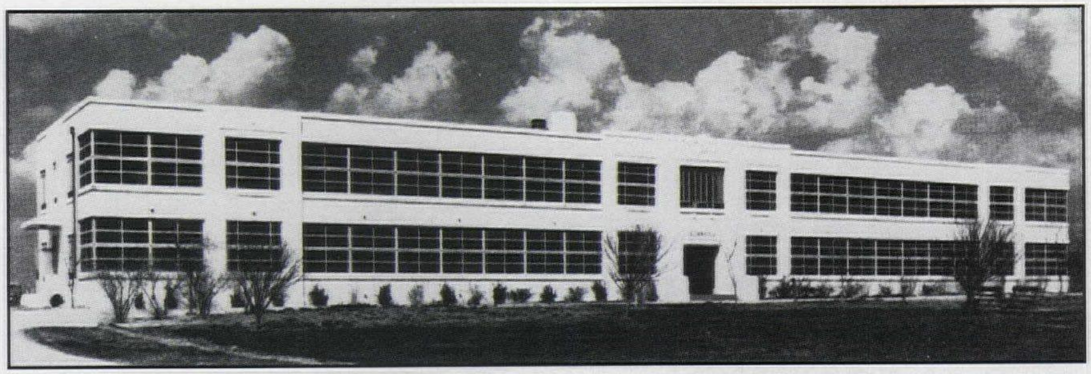
Projects
Bold New Cities

Recognizing the problems of overcrowding, pollution, and noise created by automobiles and manufacturing operations in the first half of the 20th Century, architects envisioned both high-technology engineering solutions and equally forward-looking "garden" alternatives to existing patterns of urban living.

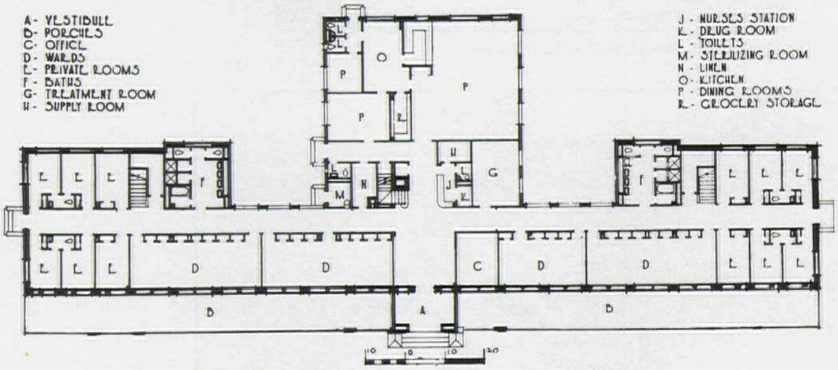
• *"Apartments on Bridges"* (1), a 1929 Hugh Ferriss rendering of a Raymond Hood scheme shows a proposal to use suspension technology to hang 50- to 60-story apartment buildings on bridges. Ferriss's drawings provided images of the modern city that helped shape public policy and conceptions of how the city should be built at the time.



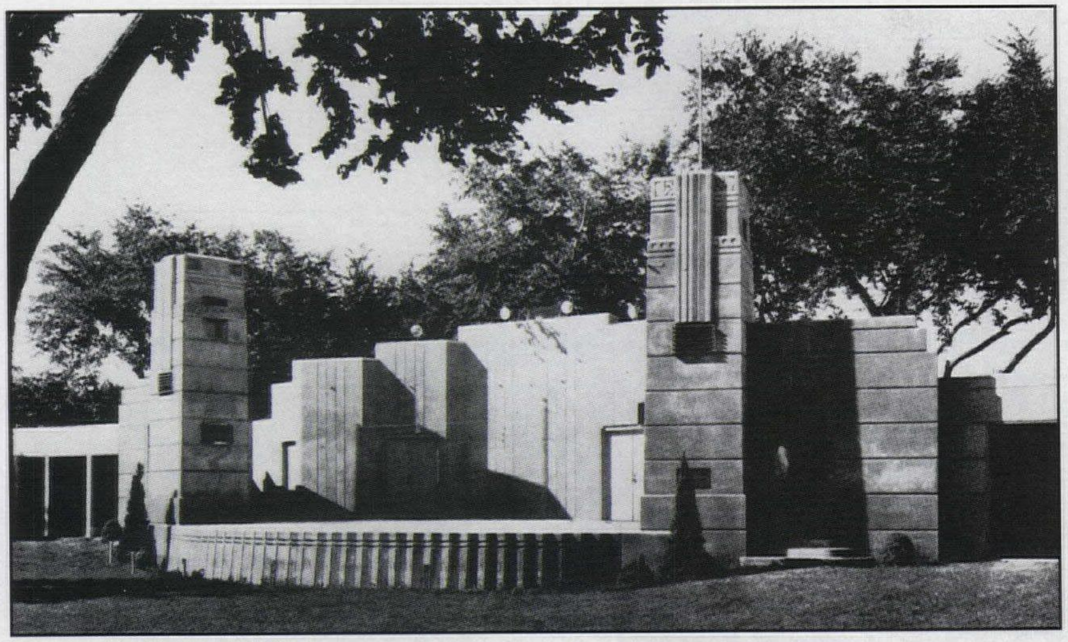
5 McCARREN PARK PLAY CENTER, BROOKLYN, NEW YORK



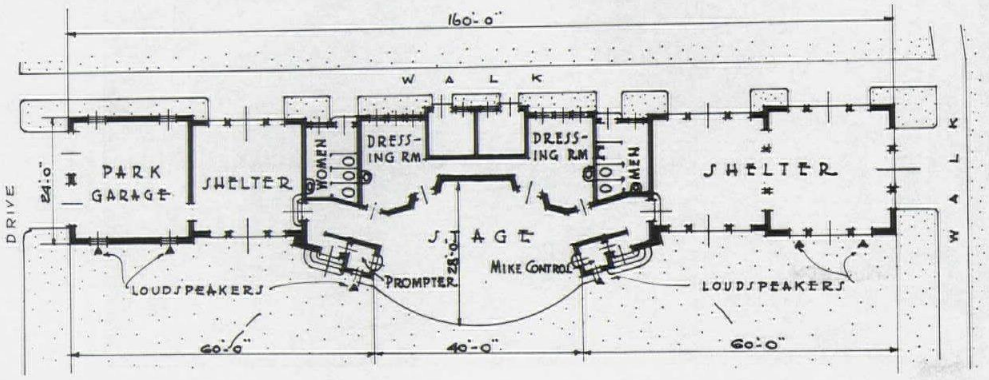
6 ELMWOOD TUBERCULOSIS SANITARIUM, FORT WORTH, TEXAS



7 ELMWOOD TUBERCULOSIS SANITARIUM, GROUND FLOOR PLAN



8 "SONOTORIUM," KEARNEY, LOUISIANA



9 "SONOTORIUM," GROUND FLOOR PLAN

• *The plan for Radburn, New Jersey* (2), which was realized in 1929, provided a lower density vision of the future metropolis. Architects Clarence Stein and Henry Wright, with the Regional Planning Association of America, proposed a planning strategy for suburban communities that separated pedestrian from automobile traffic and maximized green space as a response to what they felt were slum conditions in cities. This prototypical American "garden city" community incorporated public facilities, a school, playgrounds, and a swimming pool in a landscaped "superblock."

New Deal Strategies

President Roosevelt's Depression-relief strategy of public works programs, administered through agencies such as the Works Progress Administration (WPA) and Public Works Administration (PWA), provided a much needed boost to 1930s America. Though it is difficult to quantify the economic benefits per capita of Roosevelt's initiative, the number of projects completed between 1935 and 1943 is extraordinary: 78,000 bridges, 116,000 buildings, and 651,000 miles of road. The diversity of building types and mass employment opportunities offer valuable models for the 1990s. Some examples are:

• *Village Hall in Bovey, Minnesota* (3), completed in 1935, has a Scandinavian-inpired, brick-clad exterior. It houses a garage for the fire department, a dining room, kitchen, and pantry in the basement; the police department, library, council room, and club room on the first floor; and an auditorium and dressing rooms on the second floor.

• *The Community Building in Ely, Minnesota,* (4) is typical of PWA design. Its boxy, stone-clad exterior, demarcated by double-height glassblock panels, was austerely functional. The building fulfilled a variety of needs: the basement holds a meeting room, cafeteria, serving room, and kitchen; the first floor holds a library, lounge, meeting rooms, kitchen, office, and work space; the second floor holds an auditorium, meeting rooms, kitchen, and storage space. The third floor is service oriented, with fan room, projection booth, and storage space.

• *McCarren Park Play Center* (5) was constructed in 1936 in the Williamsburg/Greenpoint section as one of four WPA-funded swimming pool and recreation centers built in Brooklyn. The grand arch and clerestory of the entrance pavilion emphasized the importance of recreational activity.

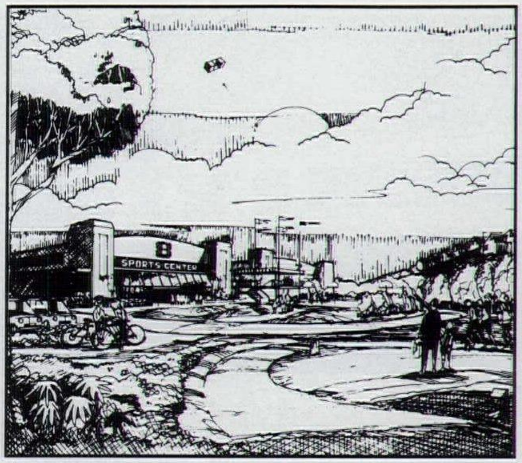
• *Elmwood Tuberculosis Sanitarium* (6,7) in Fort Worth, Texas, a two-story, T-shaped building accommodated 75 patients. Screened porches along its front elevation were accessible directly from patient rooms; doorways to the porch were large enough to wheel beds through for patients unable to walk or to sit in a wheelchair.

• *The "Sonotorium"* (8, 9) in Kearney, Louisiana, was completed in 1938. This Egyptian Revival style, open-air theater was designed to be a venue for radio programs, theatrical productions, and public speeches.

Using Local Resources

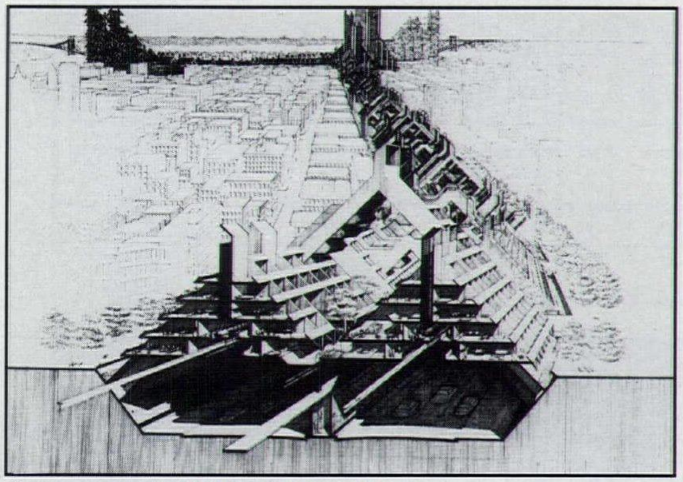
Several designers have proposed methods of turning environmental liabilities into assets. Schemes include reworking an abandoned military base into a model environmentally conscious community; a scheme to reclaim city space lost to automobiles for housing; and a proposal to rework the fabric of an existing city to minimize energy consumption. A plan for Third-World housing relies on local labor and building traditions to build low-income housing.

• *Refurbished hangars that offer*

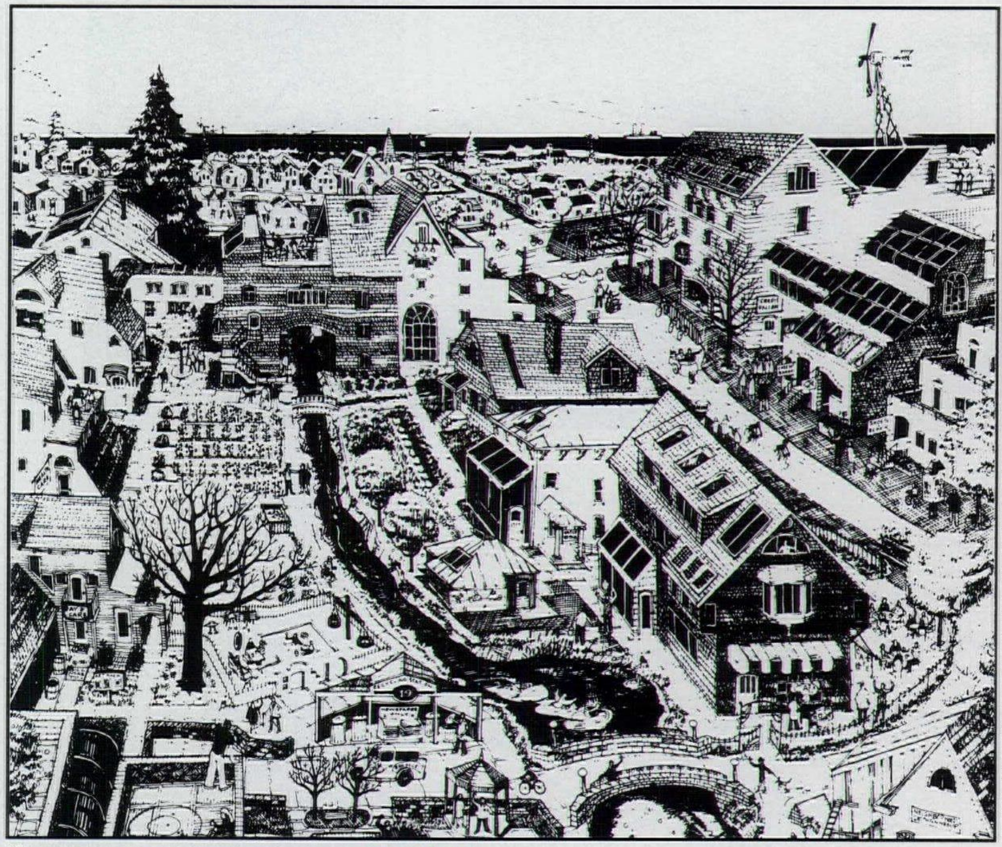


From *Sustainable Communities*, Sierra Club Books, San Francisco, 1986.

10 LIVE-WORK SPACES, MARIN SOLAR VILLAGE

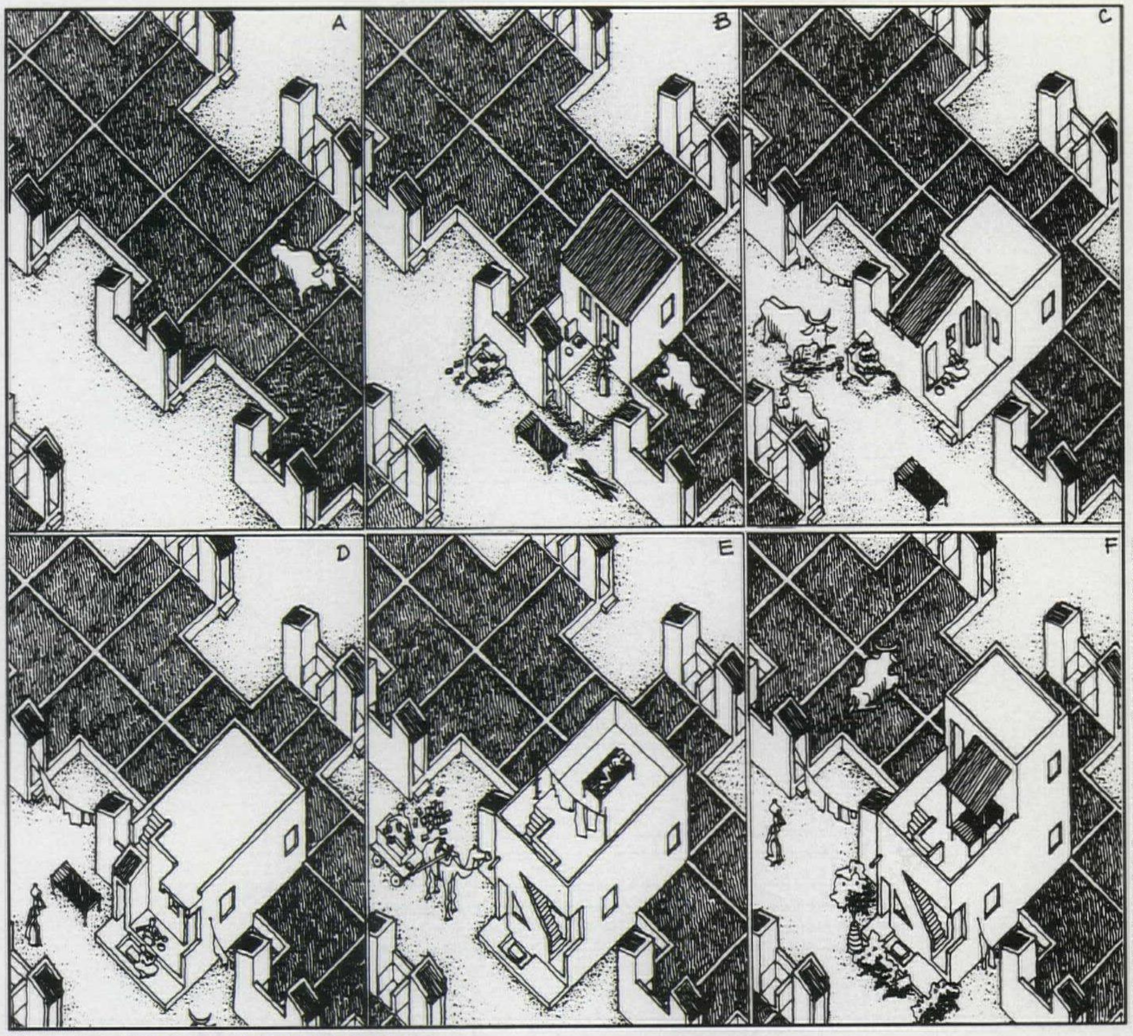


11 PAUL RUDOLPH'S "MEGA-ROADTOWN" APARTMENTS



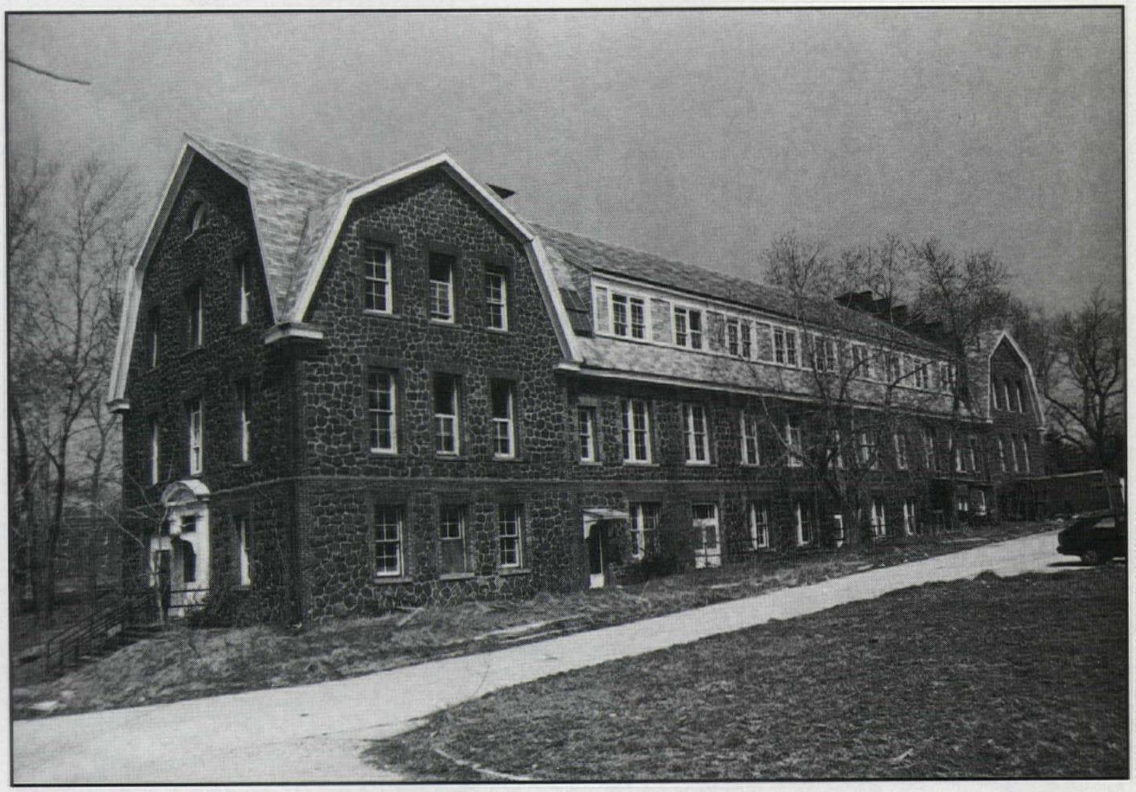
From Richard Register, *Ecocity Berkeley*, North Atlantic Books, Berkeley, 1987.

12 INTEGRAL NEIGHBORHOOD PROPOSAL FOR BERKELEY, CALIFORNIA



13 CORE-SHELL HOUSING, AHMEDABAD, INDIA, AXONOMETRIC

Illustration: R.E. Mellon from Carl V. Patton, ed. *Spontaneous Shelter*, Temple U. Philadelphia, 1988.



14 NEW YORK CITY FARM COLONY DORMITORY

NYC Landmarks Preservation Commission, Carl Forster.

low-cost live-work spaces (10) are part of a 1979 plan for Marin Solar Village on the site of an old Air Force base by Sim Van der Ryn and Peter Calthorpe. The designers suggest that environmentally sensitive suburban communities like this one can be built without imposing any major lifestyle changes on occupants.

- *"Mega-Roadtown"* (11) is Paul Rudolph's 1970 proposal to cover the Lower Manhattan Expressway with terraced apartment buildings as a way of mitigating the damage a major throughway would do to the city.
- *An integral neighborhood* (12) for Berkeley, California proposed by Richard Register; this plan provides design guidelines to turn the existing city into an ecologically sustainable community by including local agriculture and community facilities, and by providing for recycling and the use of renewable energy sources.
- *The Bhadreshwar Housing Colony* (13) is a self-help shell-frame housing project by in Ahmedabad, India. In this kind of housing, the government provides a basic unit, usually consisting of a slab on grade, roof, and kitchen-bath core, that owners complete themselves using local methods and building materials.

Work/Shelter for Homeless

Public programs exchanging employment for housing, such as the *New York City Farm Colony* (14), an agriculture-based community on Staten Island (1902 to 1925), have been a viable – if somewhat controversial – method for reenfranchising impoverished citizens. A site occupied by city healthcare and housing facilities since 1829, the Farm Colony (later known as Seaview Farms after merging with Seaview Hospital in 1915) was a self-contained complex, supported predominantly through agricultural products cultivated by its residents. It included administrative and healthcare facilties, workshops, and housing. With their design for Dormitory 1 & 2 (1904), Renwick, Aspinwall & Owen established the Colony's site orientation as well as its aesthetic character. The Dutch Colonial Revival style dormitory was constructed with fieldstone from the site. Its non-institutional design was meant to humanize the experience of communal living.

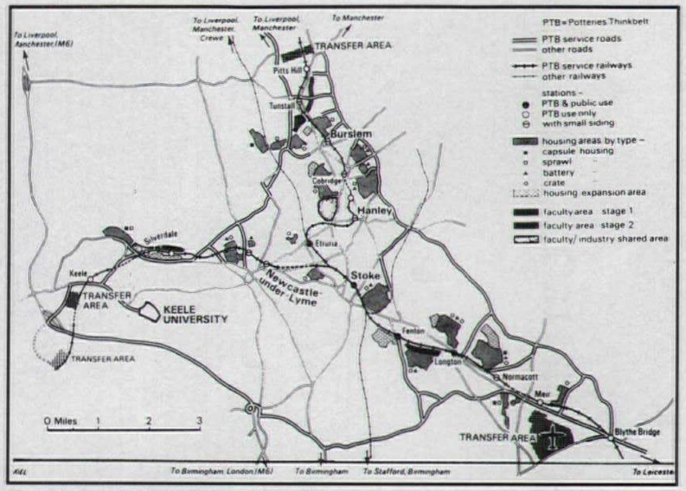
Learning on the Railroad

In the mid-1960s, British architect Cedric Price proposed *Potteries Thinkbelt* (15,16): a 100-square-mile, 20,000-student campus built around a road and railway network, midway between Manchester and Birmingham. Transforming education into a truly active experience, seminar units would travel by train and be hooked into faculty transfer areas. Demountable structures for lectures and other group meetings would be used as needed; self-teaching carrels and mobile receivers would tap into television and computer services; "crate, sprawl, battery, and capsule" housing would be built in appropriate locations along the rail system.

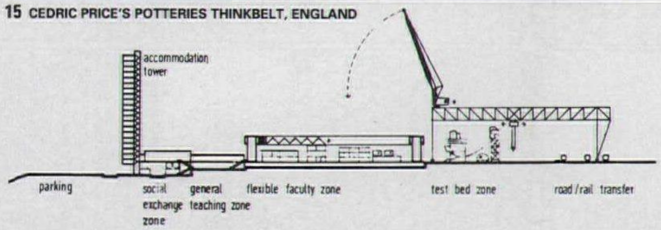
Art in a Drydock

Environmental artist and MIT faculty member Wellington Reiter (P/A, July 1990, p. 96) sought to reinterpret the function of an underused, industrialized waterfront site with his entry in the 1988 Boston Visions National Design Competition, a call for ideas, from the Boston Society of Architects, to address the city's future. With *"An Idle Vessel,"* (17) Reiter proposed to relocate the city's Institute of Contemporary Art to Drydock No. 3, and in the process, to preserve a "monumental space," support a marine industrial park masterplan, and create an international urban art park and performance center.

Abby Bussel/Julie M. Trelstad ■



15 CEDRIC PRICE'S POTTERIES THINKBELT, ENGLAND



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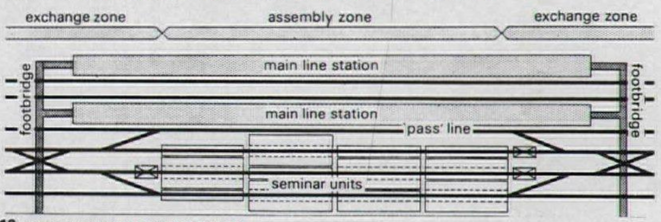
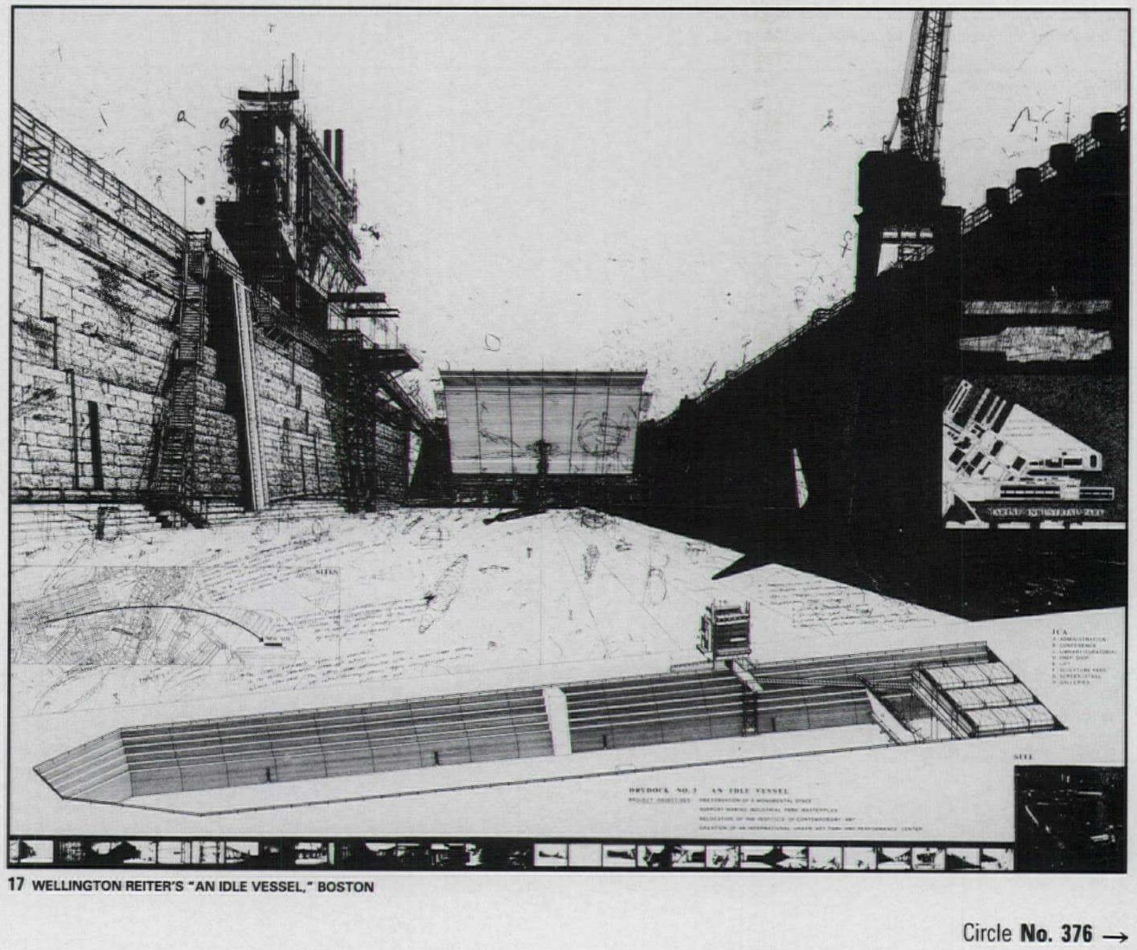


16 POTTERIES THINKBELT, SECTION



17 WELLINGTON REITER'S "AN IDLE VESSEL," BOSTON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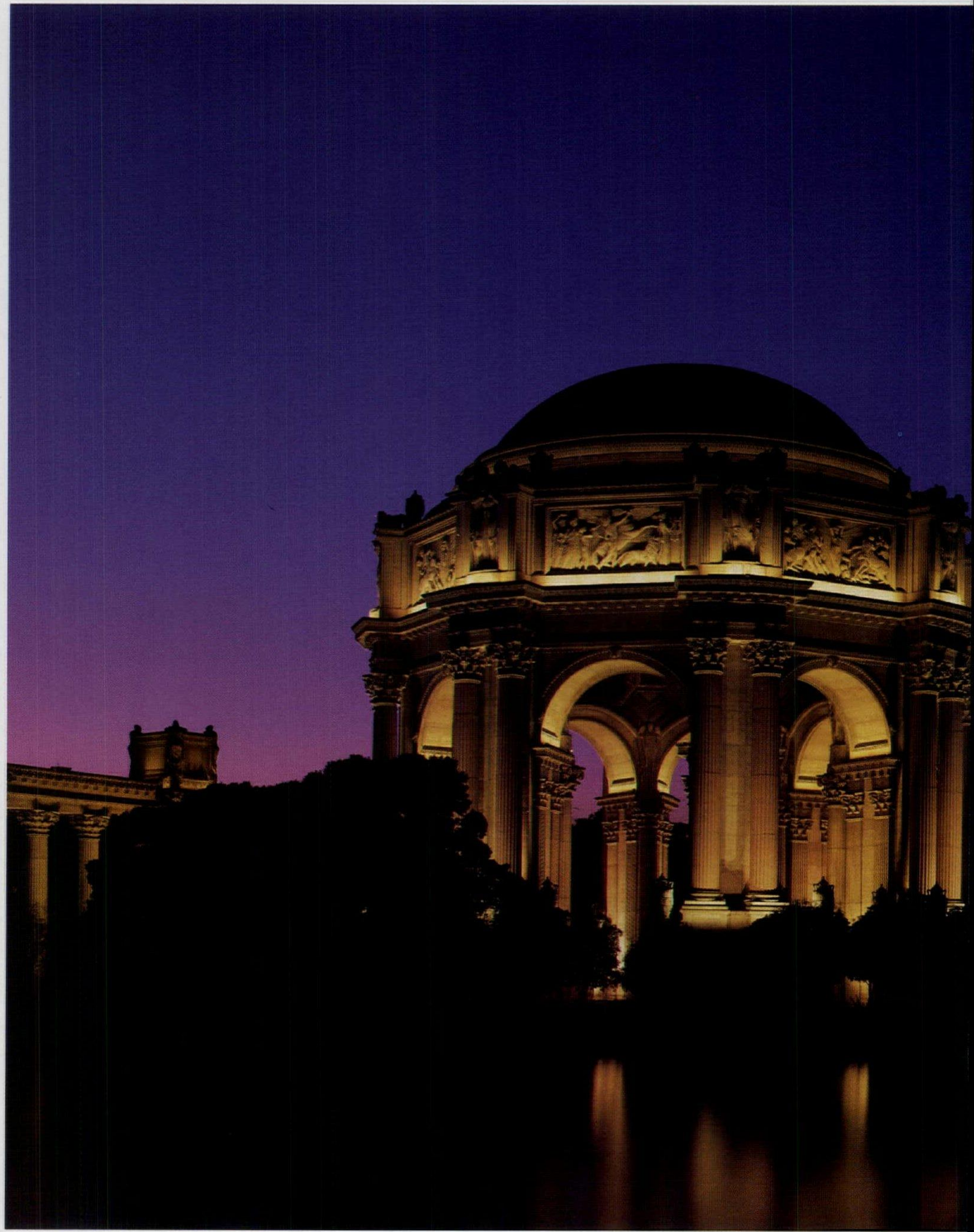

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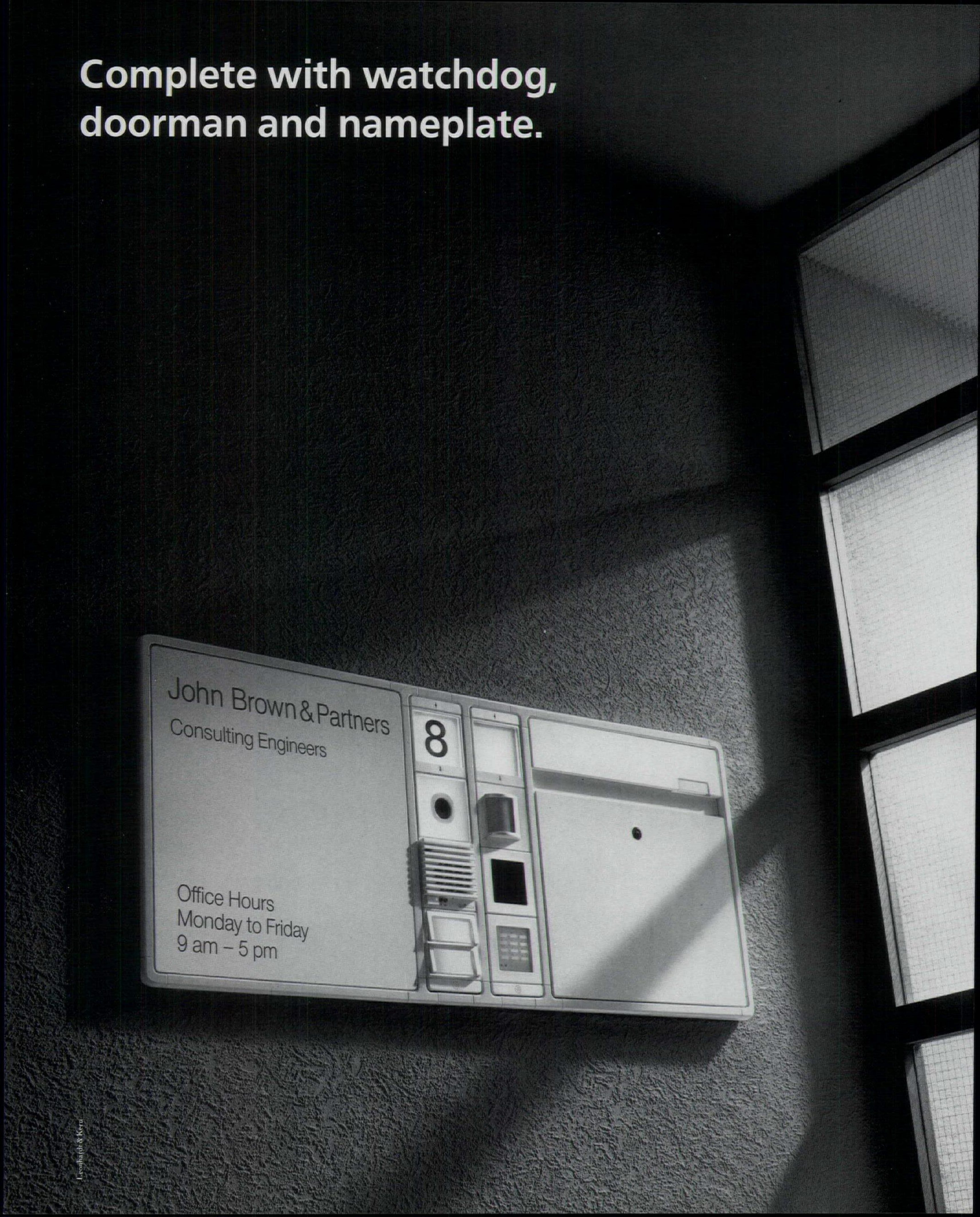
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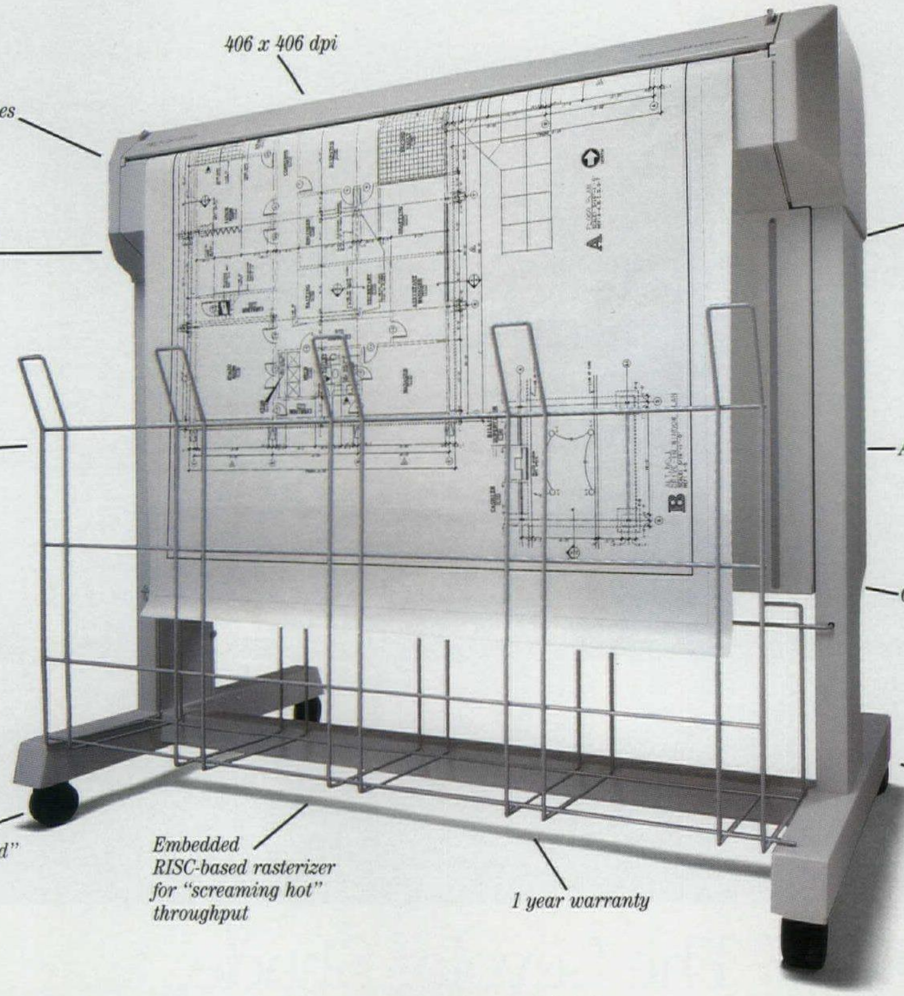

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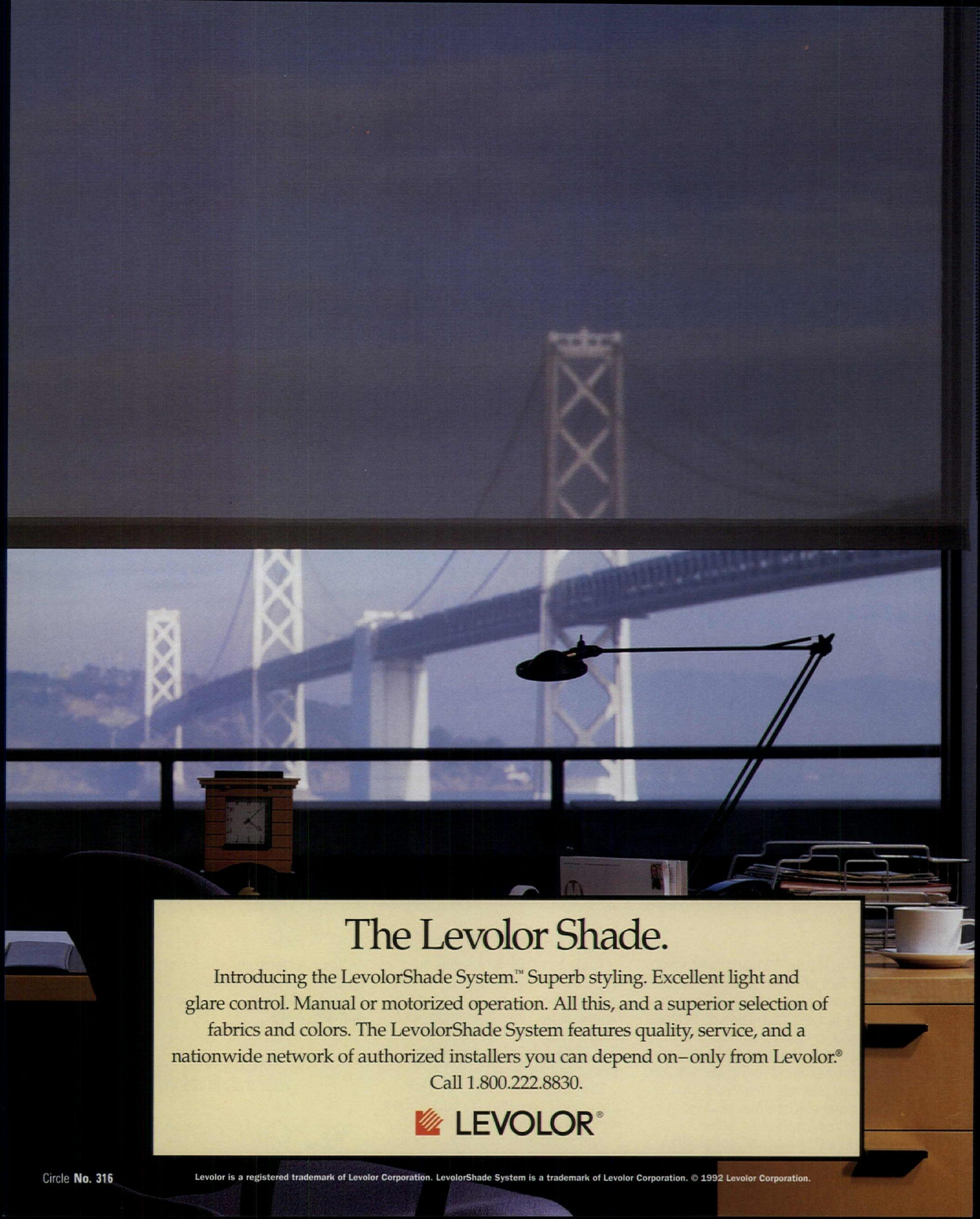
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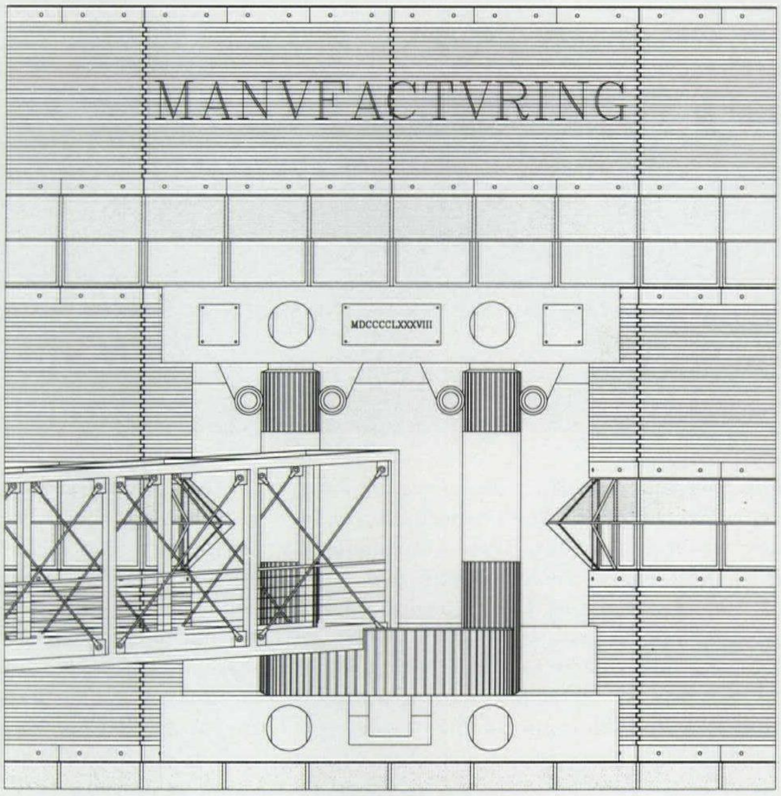
Entry portal

The Fuller E. Callaway Manufacturing Research Center



Design

Another recent winner in the P/A Awards program,

the Fuller E. Callaway Manufacturing Research Center at Georgia Institute of Technology,

by Lord, Aeck & Sargent, is featured this month;

also included are three diverse houses,

two stadium projects, and four varied public facilities.

1

Technology Expressed

Confronted with a vague program, architects Lord, Aeck & Sargent created a testimonial to technology at Georgia Tech.

With part of Atlanta's skyline as a backdrop (1), the manufacturing research facility blends smooth industrial/factory style with more explicit imagery; at the main west entry (2), the symbolism begins with an access structure resembling both a bridge and a crane, to be "operated" by the "gears" at the entry, pivoting (in one's imagination) to and from the mound on which it rests. With the exception of the mound, the east entry is the same.

What image does manufacturing research suggest? How do you design for unspecified inhabitants and research functions? These were questions posed by the Georgia Tech program that Lord, Aeck & Sargent faced after their selection for this commission. The institution, long known for its technological and research expertise but not for its architecture, wanted a straightforward structure to allow this expertise the proper setting for developing manufacturing methods. Subsequently named the Fuller E. Callaway Manufacturing Research Center, this was to be the building to respond to an indeterminate program (P/A, January 1989, p. 93). The fields of manufacturing were not identified when the design was begun; the architects were just going to have to wing it.

However, some areas of research had been discussed – such specialized disciplines as materials handling, precision engineering, microelectronics, interconnection technology, artificial intelligence, and manufacturing systems. This range would require provision for everything from vibration-free areas to places for stamping and casting. To accomplish the desired flexibility, the architects sought to provide easy access to all building systems and a building capable of accepting functional space changes as the demand arose. The campus architects also asked that the building be able to accommodate "afterlife" refitting, through low-first-cost, "low-tech" solutions, not movable parts with high-maintenance, systems-laden, high-cost aspects.

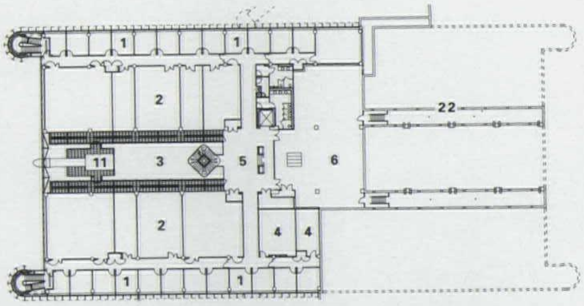
Although the school had no ambitions toward good design, the architects have, along with the pragmatism to produce a workable facility within budget, a very high design sensibility. The building could be no-nonsense as requested, but banality was out of the question for them. From his earlier years in Detroit, Terry Sargent retained images of industrial buildings by Albert Kahn. He also drew cues from Saarinen's G.M. Technical Center and Wright's Johnson Wax Building, among others, renewing his sense of their daylighting and rational building systems.

To provide functional flexibility and to accomplish the apparently paradoxical goals of a desired technical imagery versus "low-tech" requirements, the architects went for utilities and systems that would be easily accessible and, for the most part, openly expressed. There was to be no attempt to hide the nuts and bolts.

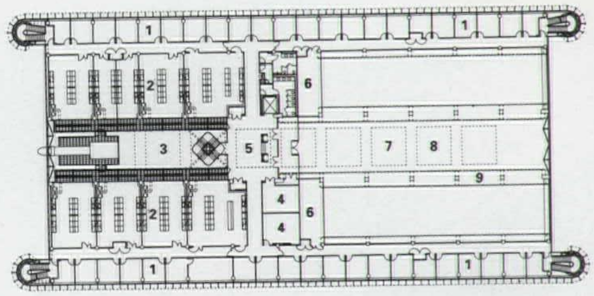
The site, some distance from neighboring buildings, was an undeveloped area of campus, sloping 30 feet down from southwest to northeast, adjacent to the campus ring road. Site topography indicated four stories above grade at the north end, two stories visible on the south. In effect, the building had no context, in keeping with its nebulous program.

In plan, the design took on an H configuration, with two double-loaded corridor blocks. Faculty and staff offices line both east and west façades, with continuous strip glazing; across the corridor *(continued on page 83)*

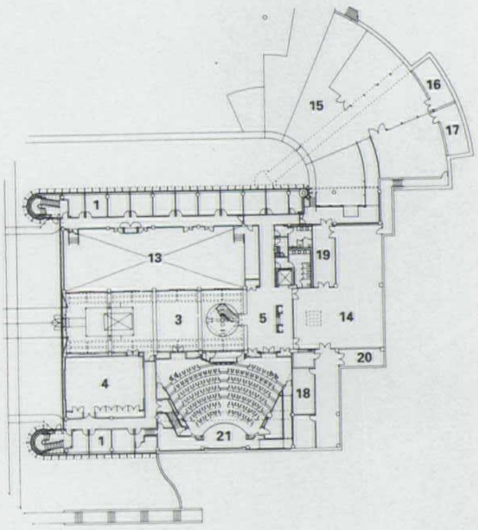

MANUFACTURING
RESEARCH CENTER



SECOND FLOOR PLAN

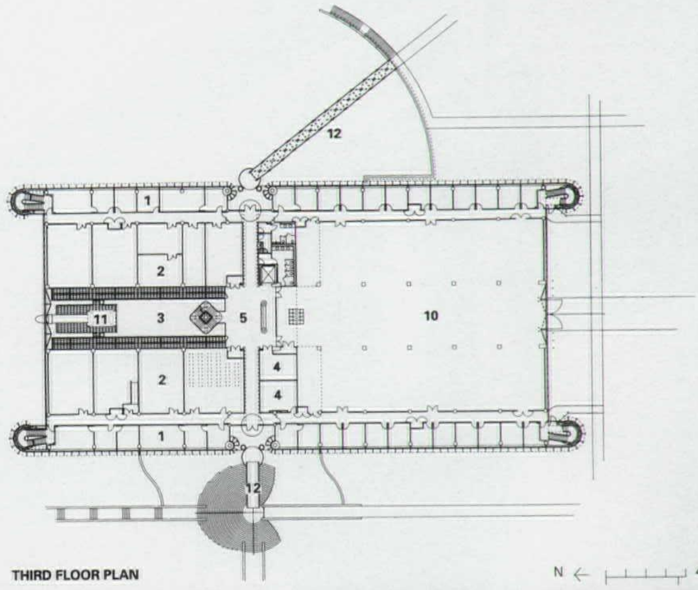


FOURTH FLOOR PLAN



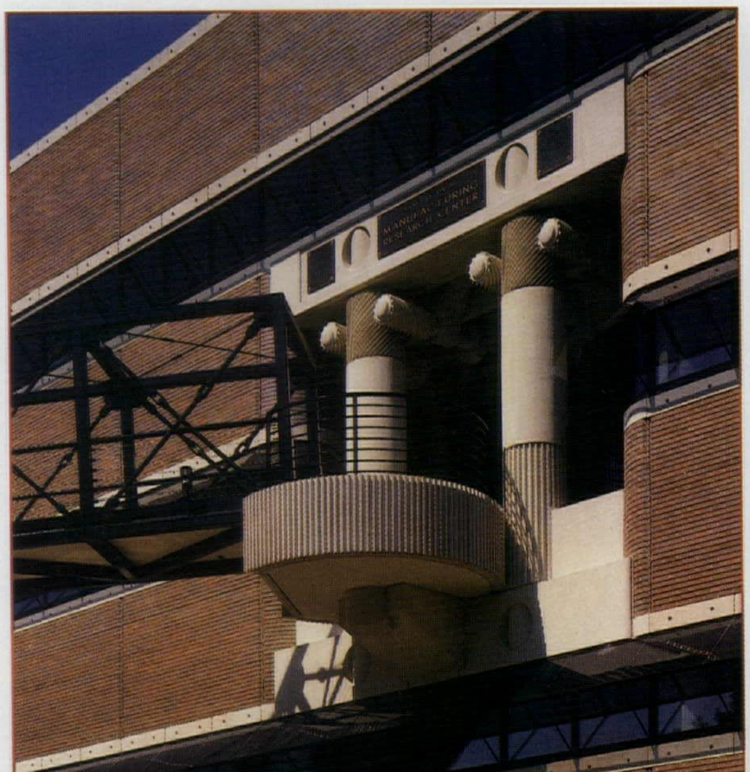
FIRST FLOOR PLAN

1 OFFICE
2 LAB
3 ATRIUM
4 CONFERENCE
5 LOBBY/LOUNGE
6 MECHANICAL MEZZANINE
7 OPEN TO BELOW
8 LIGHT MONITORS ABOVE
9 BRIDGE CRANE
10 HIGH BAY LAB
11 AHU TOWER
12 ENTRY BRIDGE
13 PRECISION ENGINEERING LAB
14 ELECTRICAL
15 SERVICE YARD
16 HAZARDOUS STORAGE
17 GENERATOR
18 STORAGE
19 CONTROLS
20 DATA ROOM
21 AUDITORIUM
22 UTILITY TUNNEL



THIRD FLOOR PLAN

N ← 40'/12m



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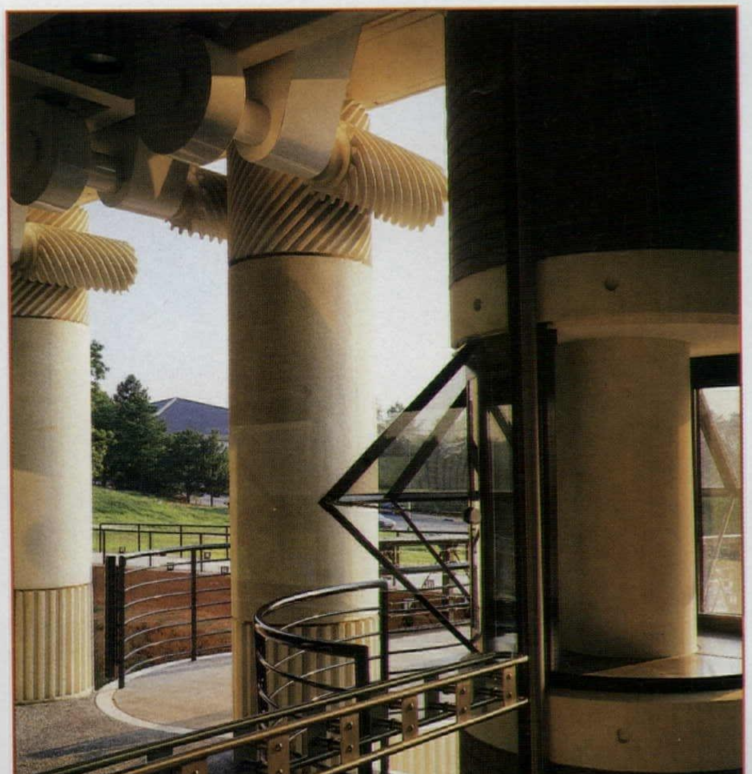

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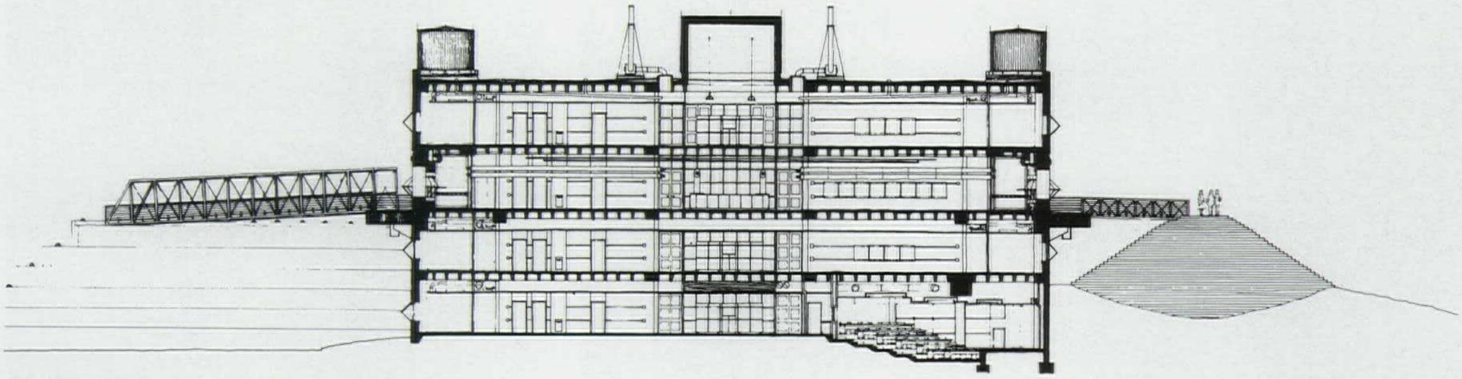
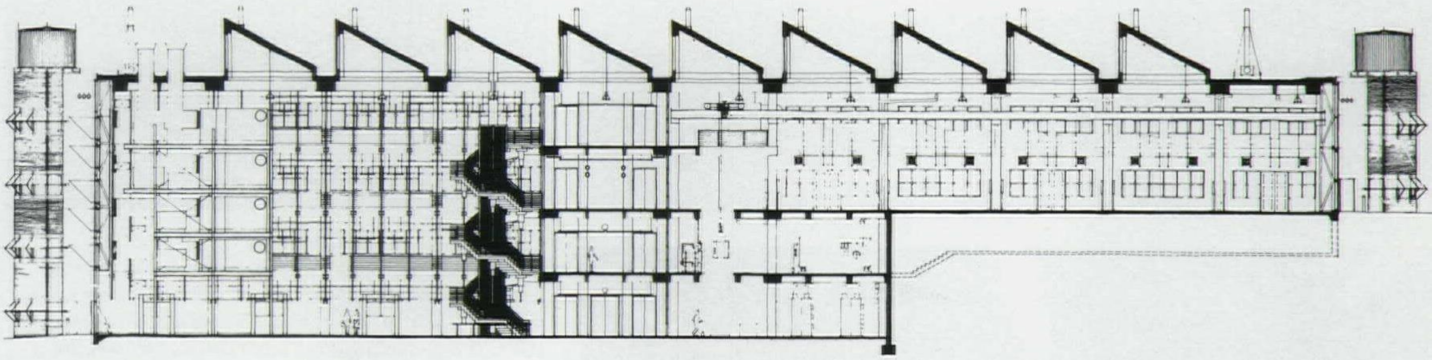


EAST-WEST SECTION

40'/12m



NORTH-SOUTH SECTION

40'/12m

(continued from page 80)

are their respective lab spaces. Space typically allocated to lab utility functions has been widened into a 60-foot-high atrium, forming not only a place for easily accessible utility functions, but a source of light and visual "air" for the labs. This allows the systems and the spatial experience to join, alleviating the usual stigma of interior spaces. In addition, the ground floor of this space acts as a lounge/foyer for the auditorium, and the floor is aptly "dressed up" in wood block flooring. Along with the auditorium, labs for vibration-free precision engineering are located on the first-floor grade level.

A free-standing HVAC "robot" at the north end of the atrium supplies air handling capacity for the building, through exposed distribution systems along the atrium walkways suspended from a catwalk/handrail assembly. Ducts and piping are painted in accepted standard colors for various systems. Centralized campus utilities feed the HVAC system for both heating and cooling.

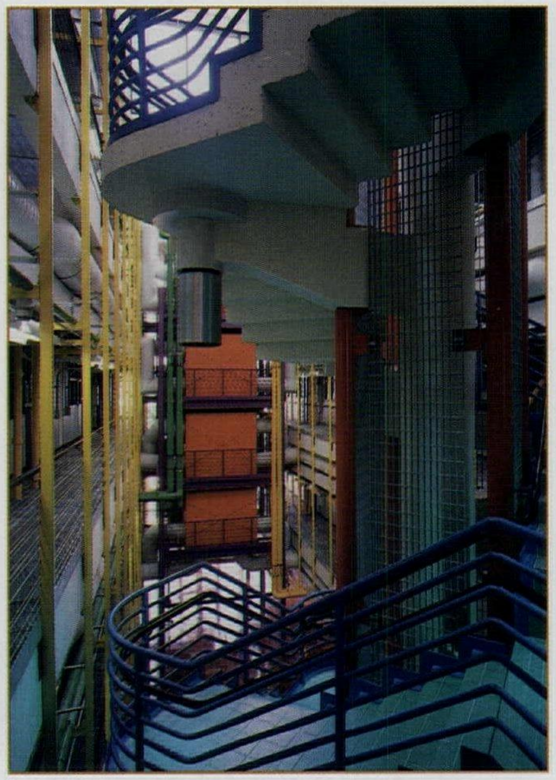
A common east-west entry hall on the third level is accessible over entry bridges. Where four floors of stacked labs center around the atrium on the north end, a two-story high-bay area with a rolling bridge crane and truck access occupies the center space in the south end of the building.

On the exterior, the horizontality of the brick and precast concrete walls is further accentuated by continuous horizontal window/sunscreen bands. A ceramic frit in a dot pattern forms the light-arresting surface of the glazed sunshades. The central bay of the north and south façades, in contrast to the mass and horizontality of the brick walls, is clad in a curtain wall of clear glazing with circular vents serving the "robot" on the north. Cylindrical stair towers form effective "hinges" at the transition from the brick strip façades to the grid of the glazed ends. The overall effect is a very tailored package that implies "manufacturing," but with a definite academic cut.

Because the majority of the requirements of the laboratory facility have been accomplished with great economy of means, there was room for a little elaboration on the architects' "theme" in the details. If the larger aspects of the building were influenced by "factory" imagery, Terry Sargent says, "in the end, no matter how 'high-tech,' theoretical, or scientific the research, in manufacturing you have to make something. To do that you must move, act, process, use tools, wheels, cogs, gears, and machines." To embody that thought the architects have borrowed forms from that vocabulary, applying them as ornament in numerous instances. Besides letting the building express its construction and operation processes, some overt symbolism is incorporated in various locations. The first instance is the pair of entry bridges, seen as "cranes" from the building to points of land; there is a direct, if only visual, connection between them and the gears on the entry columns, which might act to "move" the cranes from their landing spots. The conical

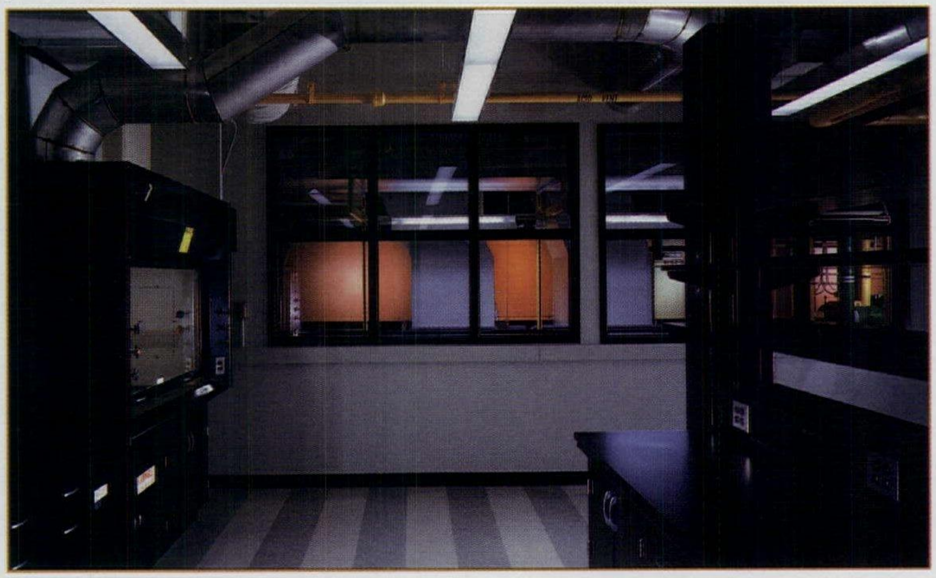
The concrete "pivot" mechanism (3) carries through to "gear" column capitals, which then visually transfer their energy through shafts to wheels on the inside of the columns. Control joints are detailed like hinge knuckles. At the entries, curved brick folds into the building, continuing the roller image a step further (only on the third floor) at a smaller scale. Fritted glass sunshades form an assembly with the projected windows (4) accenting the horizontal linearity of the façades.

5



6

Interior spaces are designed to accommodate myriad functions, providing clerestoried high-bay lab space with rolling crane capability (5), regular laboratory areas (7), and a lecture room, complete with cogged ceiling (8). A continuation of the principle of exposed and accessible system components, the skylighted atrium in the north part of the building (6, 9) allows for changing those elements as necessary. But it also gives adjoining labs light, air, and visual relief, provides for circulation, and serves as ante-area for the auditorium. Because of the latter function, the floor has been finished with a wood block surface. The dramatic and colorful stair (9) overlooks this area, while at the other end (6) an equally colorful mechanical "robot" provides air handling.



7

8

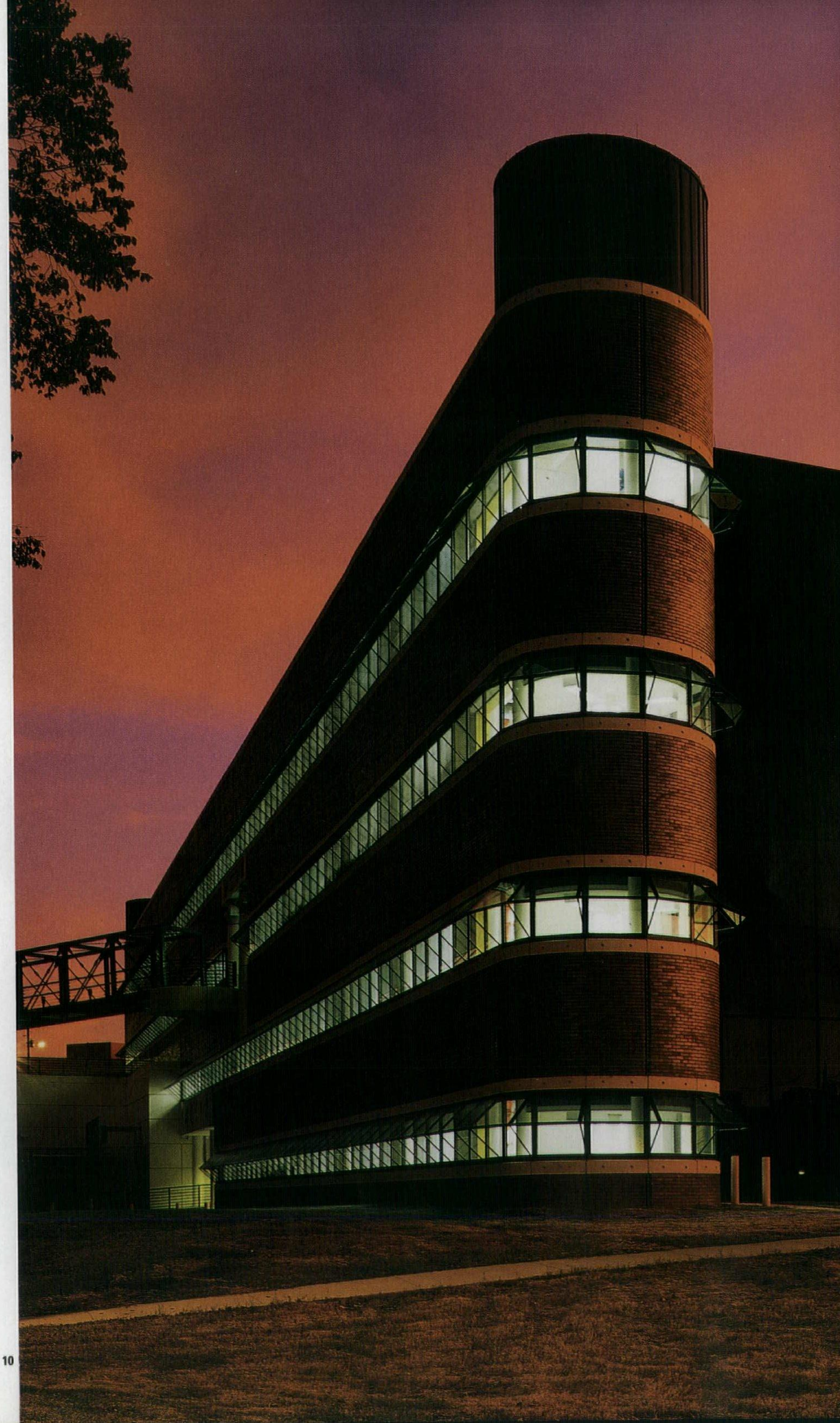
point of landing for the west bridge provides a destination, as well, for an access ramp for the handicapped. On second look, the stair towers could resemble roller bearings, the brick and precast skin, a conveyor belt – complete with "hinge knuckle" control joints. (Sargent adds that the "holes" in the precast panels correspond proportionally to the holes of computer paper.) The entry "gears" carry through into detailing in the hall inside, and the ceiling in the auditorium reflects more cog-driven devices.

While such obvious imagery might put off more theoretical or semiotical architects, Sargent and his firm have never been that uptight. Images of decomposing masonry walls and childlike castles have characterized some of their previous work; the firm eschews the consistent design paths practiced by some, believing that there are project-driven directions to inform each work. Here, the architects have perhaps created a somewhat romantic icon to manufacturing, but it is highly disciplined, and provides extreme flexibility and dynamic spatial events. And the detailing is commendable in concept and result. If the language here may be too recognizable for the academically-minded, it is in fact good visual fun. **Jim Murphy** ■

9

With the interiors lighted (10), the strips of glazing and the stair "rollers" reinforce the manufacturing and factory aura, and the air handling pylon inside the north end of the atrium stands out, with its venting ducts protruding through the glass wall.

Project: *Fuller E. Callaway Manufacturing Research Center, Georgia Institute of Technology, Atlanta.*
Architects: *Lord, Aeck & Sargent, Inc., Atlanta (Larry Lord and Terrance E. Sargent, principals in charge; Michael LeFevre, project architect; Harold Humphrey, David Butler, Allen Duncan, Jimmy Hawkins, Bert Lewars, Jack Owens, Howard Wertheimer, Sandra Nichols, F. Chip Bullock, Jr., Klaudia Keilholz, Michael Few, David Hendershot, Linda Seiz, and Valerie Von der Muhll, project team.*
Client: *Georgia State Financing & Investment Commission; Board of Regents, University System of Georgia, owner; Georgia Institute of Technology, client.*
Site: *undeveloped parcel of land on the GIT campus with a 30-foot slope from south and southwest to north and northeast.*
Program: *research labs, faculty and student offices and lounge, hi-bay labs, 100-seat auditorium, conference rooms, utility atrium, precision engineering space, and utility tunnels.*
Structural system: *cast-in-place concrete frame (25' x 35' bay typical), pan joist system, precast concrete roof planks (light monitor), steel longspan box trusses (entry bridge), and shallow spread footings. Typical loading: 125 PSF.*
Major materials: *exterior, brick veneer, precast concrete lintels, concrete masonry unit backup, ceramic fritted glazing and sunshade units, aluminum curtain wall, standing seam metal roof (monitors), built-up roofing; interior, industrial wood block flooring, unistrut and cable handrail and service support systems, steel bar grating catwalks (see Building Materials, p. 172).*
Mechanical system: *campus chilled water, and campus steam for hot water and heating; four variable volume air handlers; fume hoods through roof.*
Consultants: *Armour, Cape & Pond, structural and civil (Charles P. Armour); Newcomb & Boyd, mechanical and electrical (Bill Dean); Hanscomb Associates, cost estimating (Beatriz Pita); Westinghouse Environmental & Geotechnical Services, soils; and Tribble & Richardson, land surveyor.*
Costs: *$12.4 million; $103.33/sq. ft. (1991)*
Photos: *Jonathan Hillyer.*


10

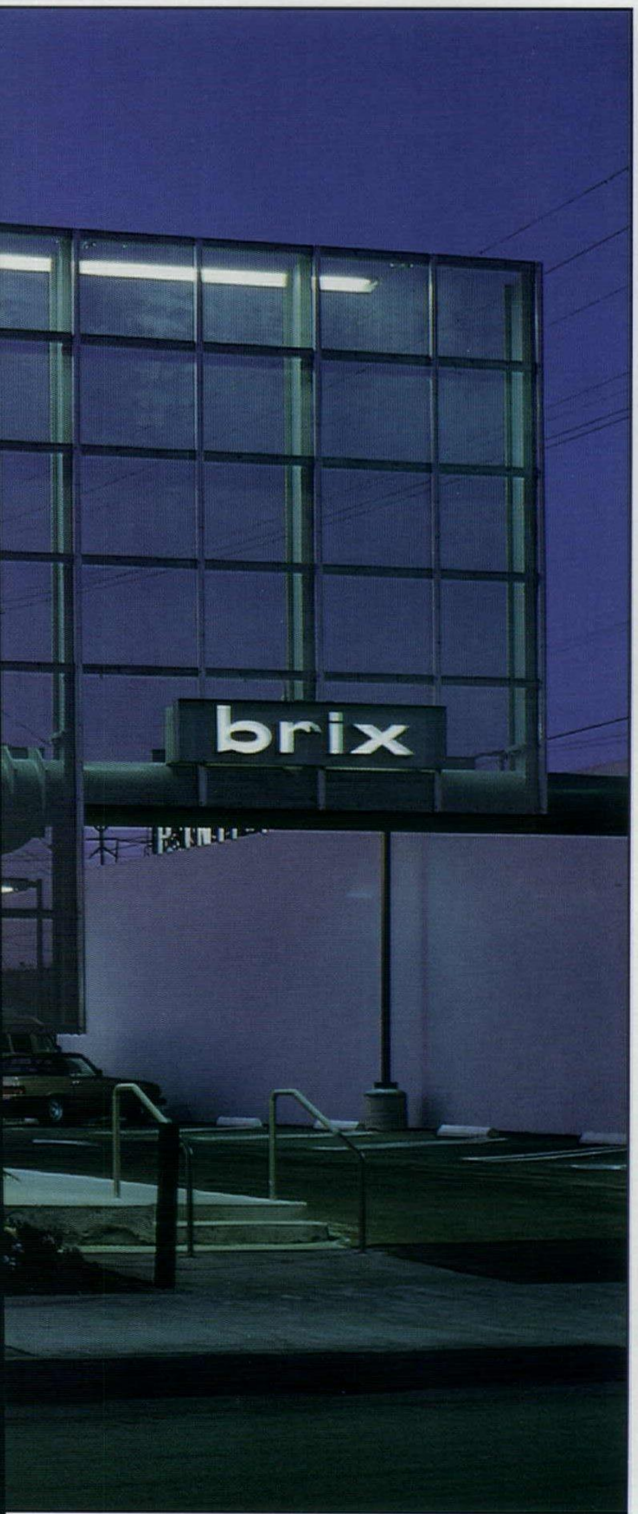
Striptese

1

A freewheeling pair of strip buildings from California and France reflect the idioms of the urban fringe, our architectural demimonde.

Like the runway performances of Gypsy Rose Lee, the best buildings of the strip mix exposé and artifice. They make seductive gestures to passing cars and render the mundane exotic, enhanced by nighttime illumination. Built to draw customers, they succeed by presenting a provocative image in their cluttered environs. Two spirited examples, based on complementary design strategies, appear in this portfolio: Brix, a remodeled health food restaurant in Marina Del Rey, California, by the Central Office of Architecture (COA) has a broad metal screen cantilevered in front of a banal box; a pharmacy in Boves, a provincial French town, by Ian Ritchie of London, is a one-of-a-kind retail/office building with bowstring trusses that span a sloping site like a bridge.

Both buildings inhabit precincts where image reigns at the expense of urban coherence. Here on the strip, architecture is episodic and only momentarily gratifying. This is an adolescent part of the urban fabric, bereft of the synthesis of form and program typical of the traditional city. In this light, the two buildings shown here are clever solutions, but remedial ones at best. Neither offers a remedy



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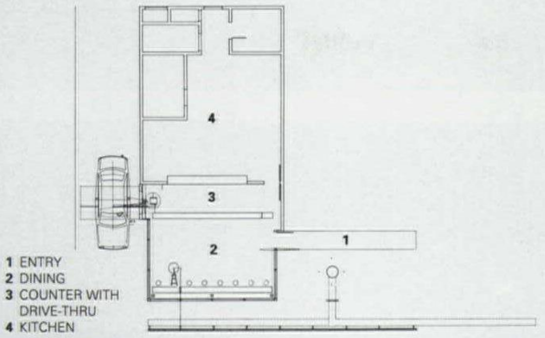
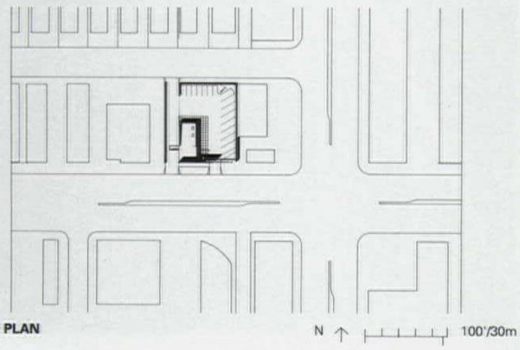


FIRST FLOOR PLAN



SITE PLAN

Project: *Brix restaurant, Marina Del Rey, California.*
Architects: *Central Office of Architecture (Ron Golan, Eric A. Kahn, Russell N. Thomsen, principals).*
Clients: *William Feigenbaum & Richard Pearce.*
Site: *a 100' x 150' commercial lot.*
Program: *renovation of a 1300-sq-ft drive-through health food restaurant.*
Structural system: *steel columns and wood frame on concrete slab; a hollow steel structure supports the perforated sheet metal screen wall.*
Major materials: *stucco, galvanized sheet metal, perforated aluminum sheet metal, clear anodized aluminum storefront, clear and obscure glass (see Building Materials, p. 175).*
Mechanical system: *roof-mounted package heat pump, gas.*
Consultants: *William K. Koh, structural; Hooshang Mozzaffari, mechanical; Rahim Peyvan, electrical.*
General contractor: *T/G Construction.*
Costs: *not available.*
Photos: *Tom Bonner.*

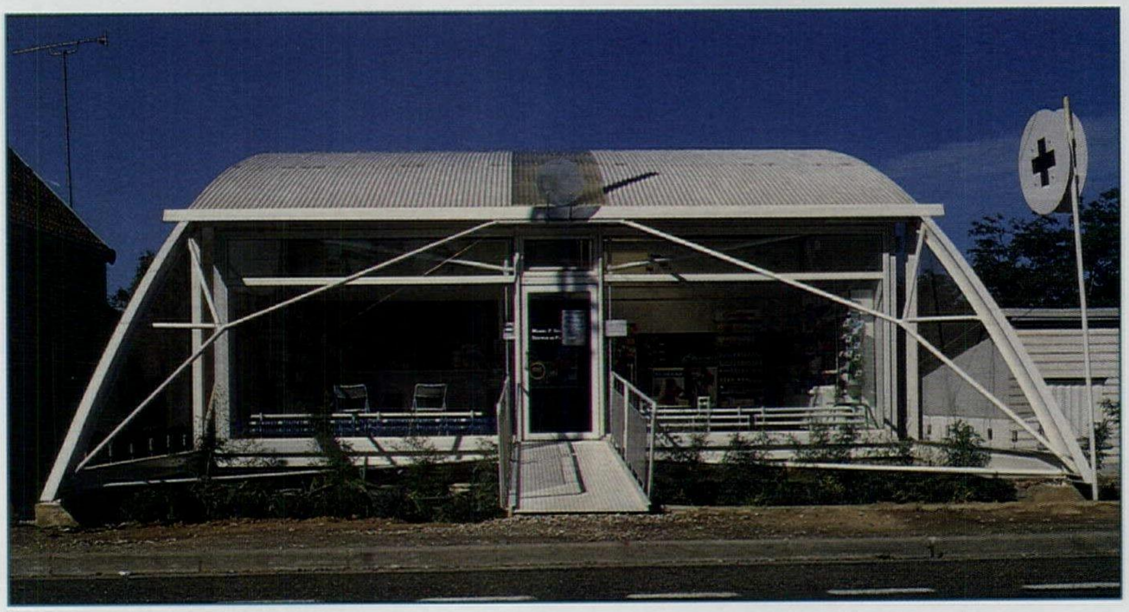
for the blight that still plagues the strip.

Nonetheless, this is a thoughtful pair of buildings; each fares well under close inspection. Ron Golan, Eric Kahn, and Russell Thomsen, the principals at COA, approached the strip critically, with a strategy of subterfuge: they consider the architectural jumble that surrounds Brix to be visual noise and describe the screen wall as a quiet pause on the roadside. At once oversized and understated, it amplifies the restaurant while defining the edge of the street, an all but abandoned urban strategy on the strip.

As the sun sets and the signs of the strip begin to glow, Brix transforms itself: its backlighted screen wall becomes an ambiguous façade, a floating picture plane that frames the glazed dining room. Built like a billboard, with a cylindrical steel beam cantilevered from a central column, the screen wall puts the commonplace in a new context, like Dadaist art. Customers en route to the front door confront a utilitarian support transformed into sculpture, a spur to seeing the vernacular of the strip anew. Ostensibly a sign, the screen is not like its counterparts on the strip. This is no mere punc-

The perforated wall in front of Brix (1) is a filter more than it is a sign. After dark, this floating façade reveals its structure, while veiling the restaurant interior. By day and night, the screen wall's transparency is evanescent; it seems solid when approached obliquely. On the approach to the dining room, customers can inspect the structure of the screen wall, built of stock billboard components (2).

3



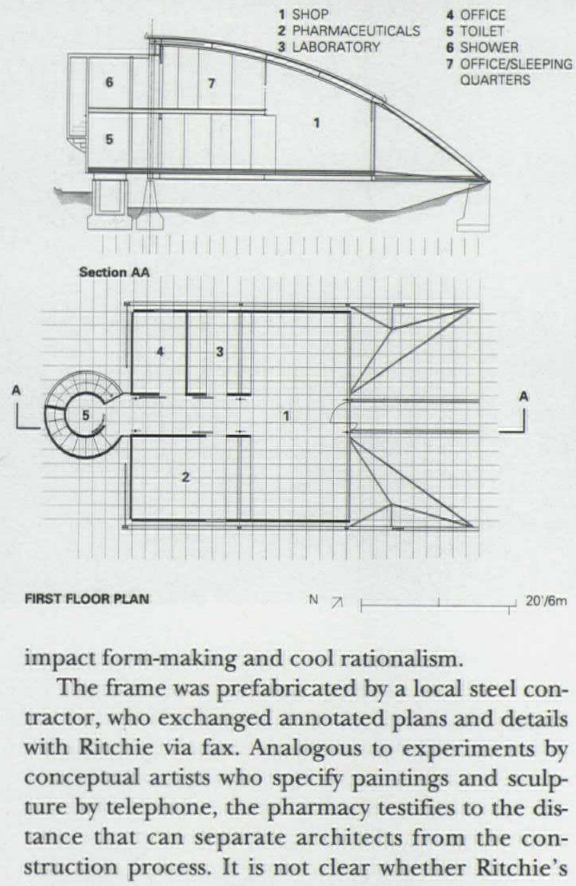
4

Designed to make a sign that says "pharmacy" superfluous, Ritchie's structure (3) lends a sense of verve to technical rationalism. Its side walls (5), lined with a mesh screen to support climbing plants, create a standout sihouette for motorists. Customers park in front (4) and cross a footbridge lined by bamboo plants. The pharmacy has no show window and accommodates two floors of office space; it could easily be converted into a house.

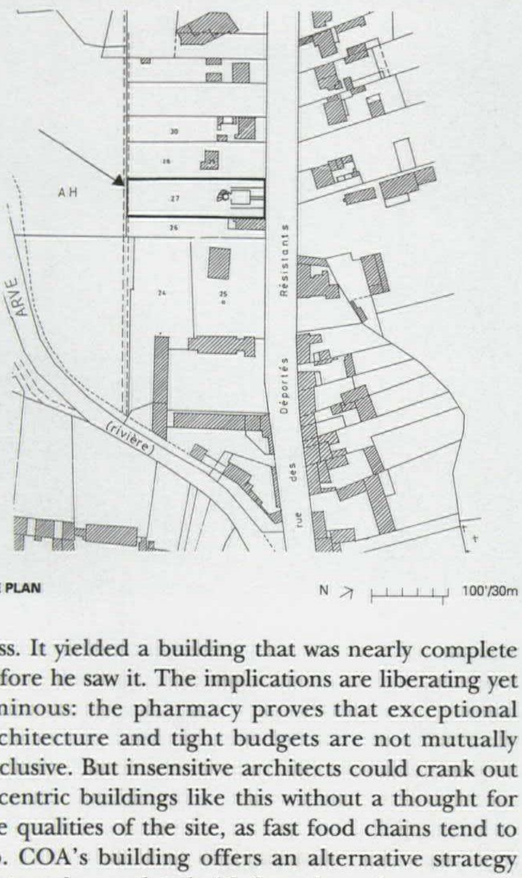
tuation point that towers over a field of asphalt, but a detached wall that plays tricks of optical illusion, like a suspended veil with seductive implications.

In concept and form, Ritchie's pharmacy is the opposite of Brix: its components are not ready-made, but made-to-order, packaged as a slick import in a small town. While COA's restaurant is a reticent interlude in the commercial strip, Ritchie's pharmacy is an eccentric form, a "duck" in the terminology of Venturi and Scott Brown. The parallel bowstring trusses that support the walls and roof elevate the 1½-floor building above grade, insurance against water damage when the river at the far end of the site floods. Ritchie sees the pharmacy as a white object set behind a field of green: bamboo plants in the foreground will render it a composite of steel and foliage, appropriate for its rustic environs, where farm machinery dots the countryside. Ritchie's allusions to objects in a field reflect the trajectory he has taken since leaving Norman Foster's office: while many high-tech architects distinguish boxy enclosures from an intricate structure, Ritchie melds the two. In doing this he is charting a bold yet risky course between high-

5



FIRST FLOOR PLAN N 20'/6m



SITE PLAN N 100'/30m

impact form-making and cool rationalism.

The frame was prefabricated by a local steel contractor, who exchanged annotated plans and details with Ritchie via fax. Analogous to experiments by conceptual artists who specify paintings and sculpture by telephone, the pharmacy testifies to the distance that can separate architects from the construction process. It is not clear whether Ritchie's intentions were ironic; ostensibly, he used the fax to save money. He knew that his limited budget precluded more than a few site visits and opted for the least labor-intensive design and construction process. It yielded a building that was nearly complete before he saw it. The implications are liberating yet ominous: the pharmacy proves that exceptional architecture and tight budgets are not mutually exclusive. But insensitive architects could crank out eccentric buildings like this without a thought for the qualities of the site, as fast food chains tend to do. COA's building offers an alternative strategy that can be emulated with fewer hazards.

Philip Arcidi

Project: *pharmacy, Boves, France.*
Architects: *Ian Ritchie Architects, London (Dominic Cullinan, job architect).*
Client: *Manual Gentit, Boves, France.*
Site: *a 43-ft-wide, sloping lot on the main road leading to a dormitory suburb of Amiens. Adjacent houses and factories have a variety of scales and building setbacks.*
Program: *pharmacy with laboratory, orthopedist's office, and sleeping quarters upstairs for night pharmacist. The building can be converted into a house.*
Structural system: *two arched steel beams are braced by a suspended floor and curved roof; the building is elevated above a sloping site, with a pair of concrete pad foundations at the back.*
Major materials: *rigid insulated aluminum roof, steel framed and plywood covered lateral walls, plate steel enclosure for stacked toilets.*
Mechanical system: *electric heat; residential hot water system.*
Consultants: *Ove Arup & Partners (Bernard Vaudeville, Bruce Danziger), structural.*
General Contractor: *Viry.*
Costs: *£105,000 (about $189,000).*
Photos: *Jocelyne van den Bossche.*

Stadium in the Stadt

1

In this, the first of two articles on stadiums, we feature a soccer facility that Gregotti Associates has inserted into a historic city

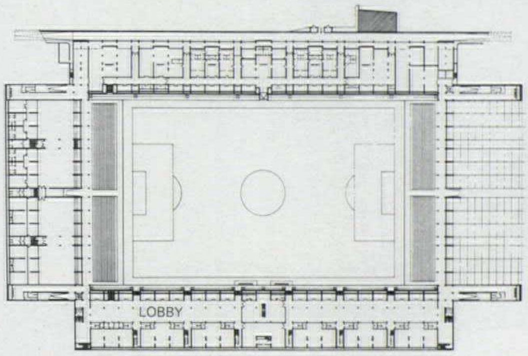
It is no coincidence that the Latin word *stadium*, meaning stage, and the German word *stadt*, meaning city, are so similar. The city was once conceived of as a kind of stage, a place to see and be seen, and stadiums once stood in or near the center of cities, a place for citizens to gather as well as to watch sporting events.

The new Masseri Stadium in Genoa, Italy, by Gregotti Associates, lives up to this etymology: the structure stands within the dense fabric of the city not as a remote object, but as welcome open space amidst narrow streets. Not that the architects had a choice in the matter; the structure replaced an earlier stadium on the same site. But Vittorio Gregotti's firm has managed to fit this Modern building into the old city without disrupting its scale. The main facade, for example, has a piece of the front of the previous stadium applied to its much larger face, reducing its apparent size. On the side streets, the building's gridded concrete walls, with their large punched openings, also maintain the height and character of the surrounding structures.

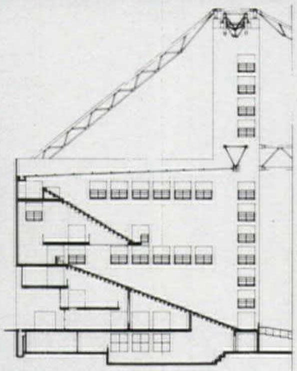
Inside, the stadium retains its urban demeanor.

2

Project: *Maserri Stadium, Genoa, Italy.*
Architects: *Gregotti Associates, Genoa (Vittorio Gregotti, Franco Bertossi, Sergio Butti, Francesca Cadeo, Sylvie Donnadieu, Gaetano Gramegna, Paolo Musa, Salvatore Regio, Isabella Vegni, project team).*
Client: *City of Genoa.*
Site: *on site of former stadium in a dense quarter of the city.*
Program: *44,000-seat soccer stadium.*
Structural system: *precast and poured concrete, steel roof trusses.*
Major materials: *concrete, steel aluminum benches, steel rails.*
Costs: *not available.*
Photos: *Mimmo Jodice.*



FIRST FLOOR PLAN N 100'/30m



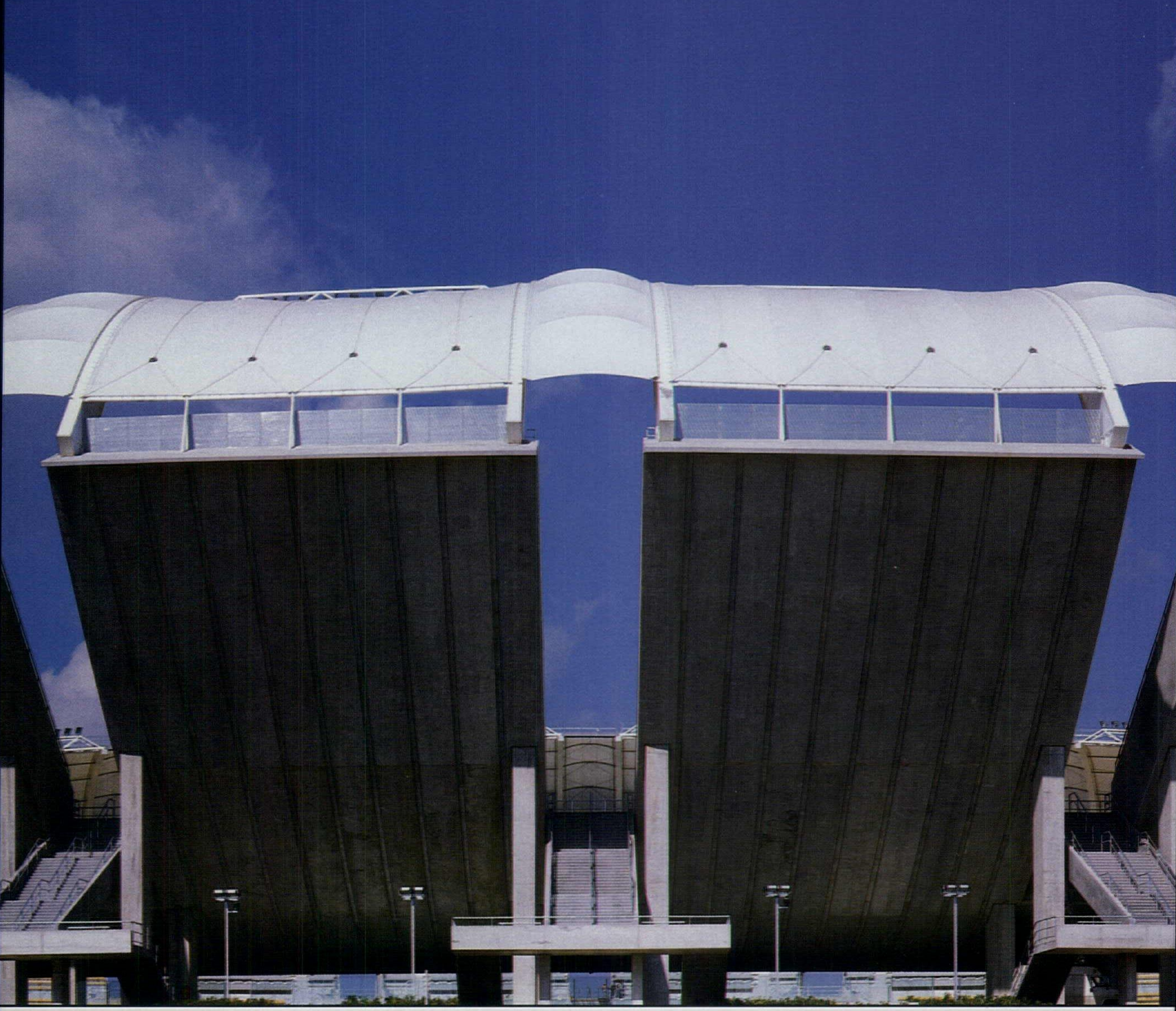
SECTION THROUGH STANDS 40'/12m

Corner towers, used for vertical circulation, separate the multilevel stands into four quadrants and provide a kind of proscenium for the spectators. Enhancing this theater-like character are the doorways and other openings in the towers, which form interior façades like the sets on a stage. These towers also extend upward to become masts, supporting steel trusses that hold up the roofs over the seating.

The Maserri Stadium stands firmly within the Italian Rationalist tradition. A grid underlies the planning of the entire stadium, for example, creating a sense of rational order that is in stark contrast to the irregularity of the surrounding urban fabric. Also, like the best Rationalist work, the stadium makes respectful gestures to its neighboring buildings while remaining highly abstract. In other words, it manages to be contextual and Modern and, like ancient stadiums, of the city and at the same time apart from it. **Thomas Fisher** ■

The new stadium occupies the tight, urban site of a former soccer facility (1), whose historic façade is partially preserved on the building's new face. The side elevations of the stadium define the street wall and maintain the height of the neighboring buildings. Corner towers, containing vertical circulation, lighting, and loudspeakers, also serve as supports for the trussed roof, which fully covers the two tiers of seating (2, section above left).

The Place of Sports



1

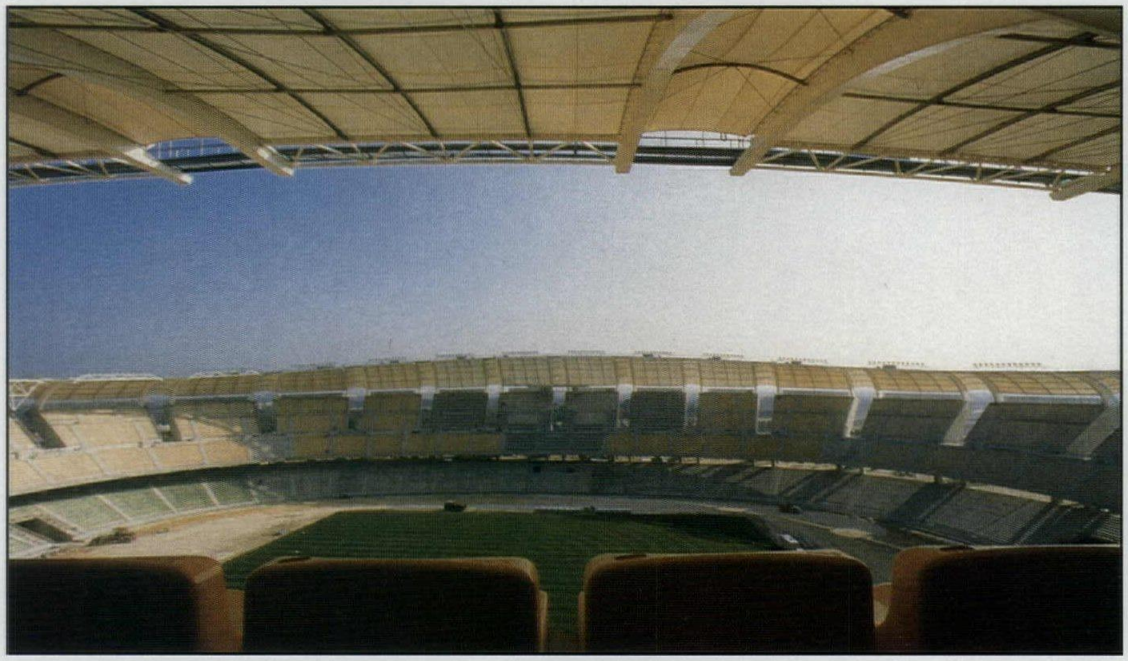
In contrast to Gregotti's project, the soccer stadium designed by Renzo Piano's Building Workshop has a strong presence in an open landscape.

The Greek root for the word stadium is *stádion*, meaning a unit of measure, often referring to the 607-foot length of the Greek track. Two things are worth noting about the origin of the word: first, it acknowledges the close relationship between sport and measure – the speed of a runner, the distance of a long jump; and second, it shows the tenuous relationship, at least among the ancient Greeks, between sport and its location. A sport, for them, required only a measured-off field, not a specialized fixed structure, a stadium.

The 60,000-seat World Cup Stadium in Bari, Italy, by Renzo Piano's Building Workshop and Ove Arup & Partners, brings to mind the ancient idea of sport as a precise but placeless activity. Granted, this stadium is a highly specialized, permanent structure. Its oblong shape, for example, closely fits the shape of the soccer field and track, making it suitable for little else.

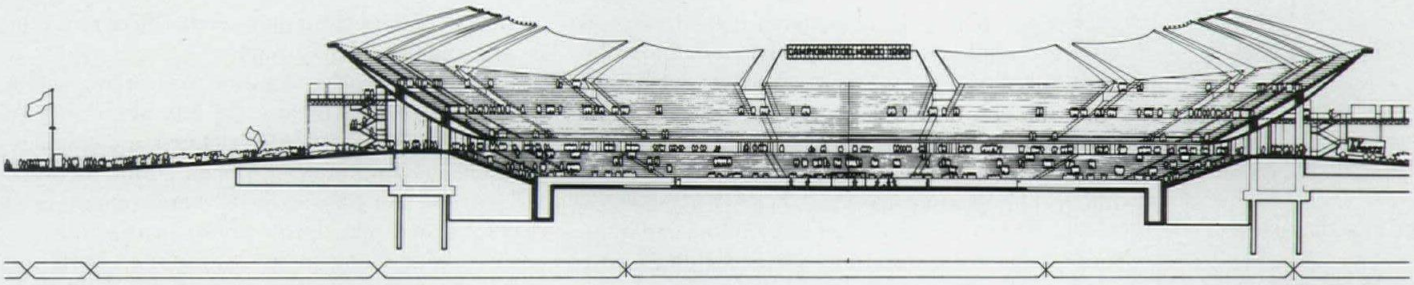
Still, the stadium's location in the countryside, surrounded by roads and parking lots, could be anywhere: suburban Boston as easily as suburban Bari. And the building itself enhances that sense of placelessness: from afar, it looks remarkably like a space-

2



3

Project: *World Cup Stadium, Bari, Italy.*
Architects: *Renzo Piano Building Workshop, Genoa, Italy (Renzo Piano, architect; S. Ishida, associate architect; F. Marano, associate engineer; O. DiBlasi, project leader; L. Pellini, project team).*
Client: *City of Bari.*
Site: *large open tract of land southwest of Bari.*
Program: *60,000-seat stadium for the 1990 World Football Championship.*
Structural system: *cast and precast concrete.*
Major materials: *steel, concrete, teflon-coated fabric roof.*
Consultants: *Ove Arup & Partners, M. Milan, structural; M. Desvigne, landscape).*
Contractor: *Bari 90*
Costs: *not available.*
Photos: *Ueli Burmann*



SECTION SHOWING DEPRESSED SOCCER FIELD AND CANTILEVERED UPPER STANDS

ship, with *pilotis* that give it a floating appearance during the day and indirect lighting on the underside of the stands that makes it glow at night.

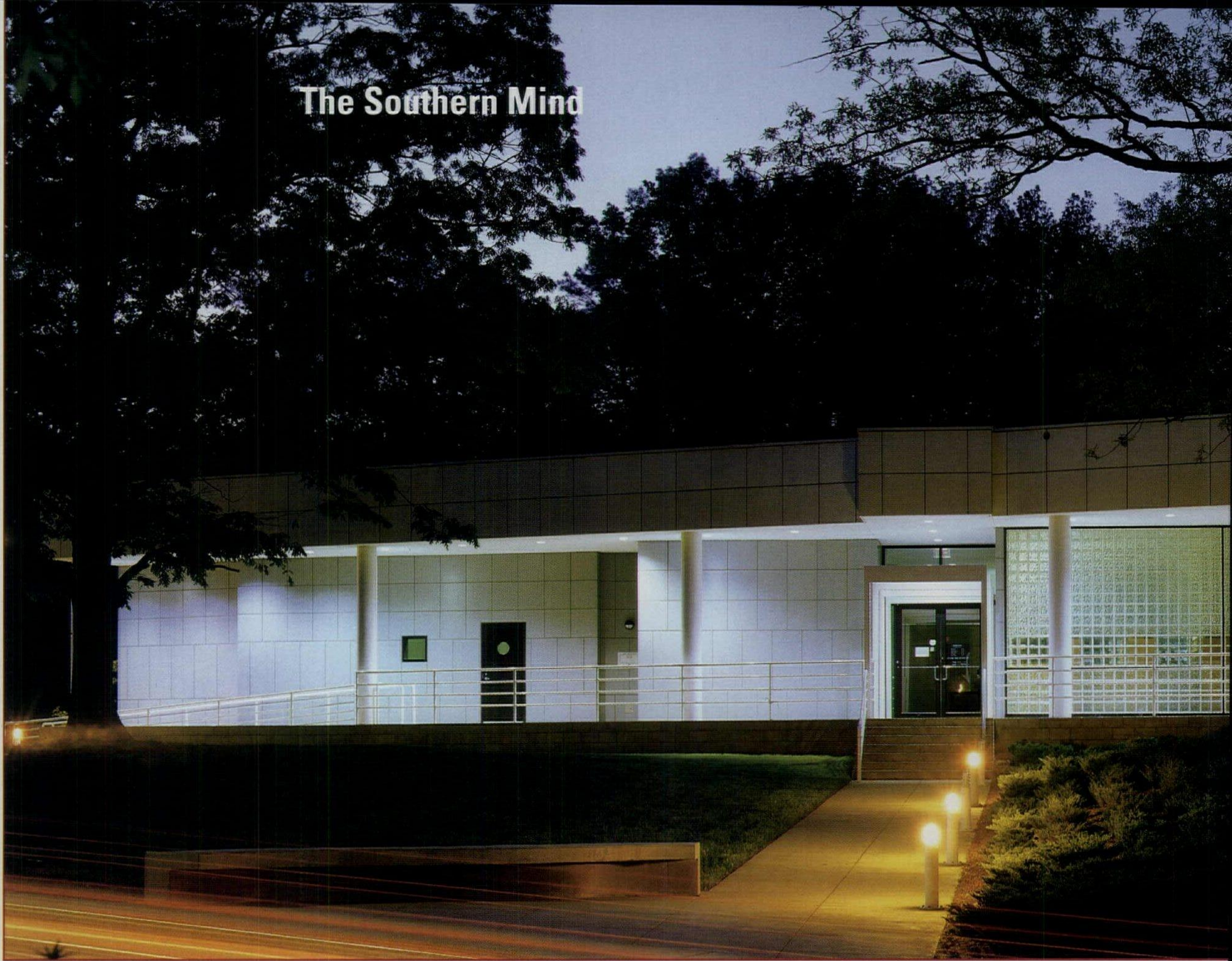
At the same time, the stadium seems carefully measured and precise. The 26 upper stands, for example, are separated by stairs that lead people away from the center, distributing crowds and separating rival fans. Equally precise calculation is evident in the daring cantilever of each stand, consisting of crescent-shaped precast concrete elements supported by only four columns, and in the control of air movement through the facility: cool air is drawn in over the surrounding foliage and is prevented from forming eddies on the field by openings at the bottom, top, and sides of each stand. A fabric roof further directs air currents and shades the seating.

This stadium is not alone in recalling the ancient idea of sport as a precise, but placeless activity. Because of television, most of us now view sports in that way – as a series of stop-action, slow-motion, and instant-replay events for which the stadium serves mainly as an interchangeable backdrop.

Thomas Fisher ■

The stadium sits in a bowl (section left), ringed by free-standing seating sections that are partially shaded by fabric roofing (3). Seating sections are separated by stairs (1), and are open at top, bottom, and both sides to encourage natural ventilation and to prevent wind eddies. From afar, the stadium seems to float above the Italian landscape (2).

The Southern Mind



1

Anthony Ames, in this small library in a distant suburb of Atlanta, explores the Modern vocabulary in a characteristically Southern manner.

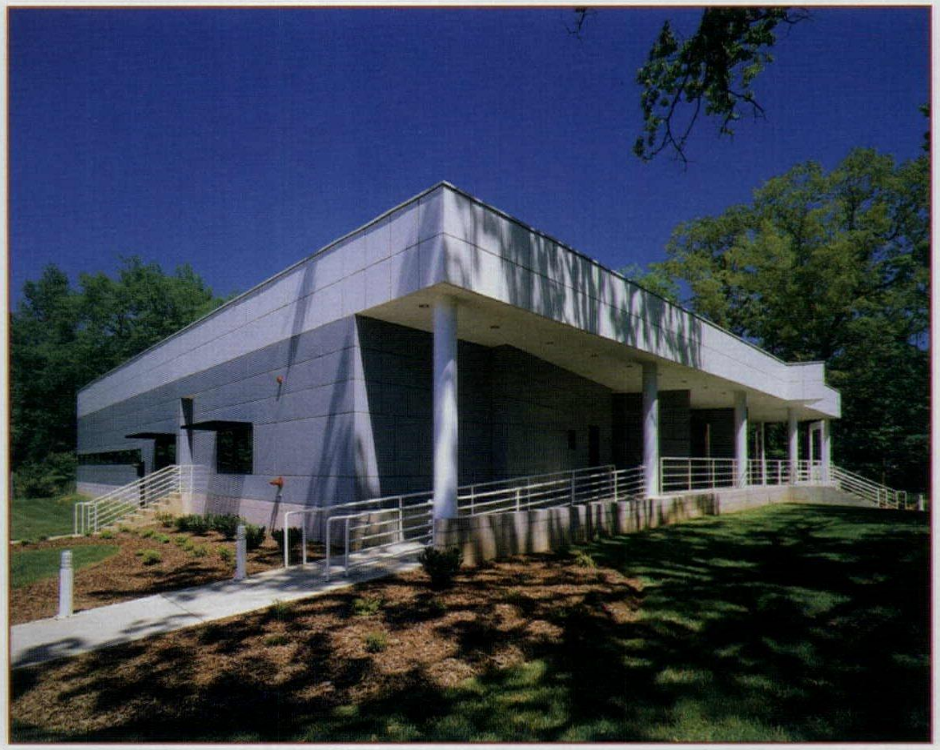
The South, as William Faulkner helped us see, is not a geographic location, but a state of mind, rooted in tradition and still yearning for its golden age when the plantation houses were white. You might then think that nothing could be less Southern than this Modernist library in Alpharetta, Georgia. But just the opposite is true.

This library, too, is rooted in tradition, and it too looks back to a golden age when buildings were white. The difference is that its architect, Anthony Ames, yearns not for the ante-bellum South, but for the heroic period of Modern architecture, working within the formal traditions established by such architects as Le Corbusier and Alvar Aalto. Sounding like a character out of a Faulkner novel, Ames says that he "would rather be good than original."

Many are the references, here, to that Modern golden age. The exterior of the library, for example, adheres quite closely to Le Corbusier's version of the International Style, with its white walls, round columns, strip windows, pipe rails, and curved glass block. Meanwhile, on the inside, book stacks that radiate from the main desk and an auditorium that "resolves" a fanning out of the staff offices recall the formal tradition of Alvar Aalto.

Ames is no copyist, however. By working within the Modernist tradition, he has been able to explore some of its forgotten richness and complexity. Consider the often unspoken affinity between Modernism and Classicism. Is there something of the Southern plantation house in the library's chaste white form, in its colonnade stretching across the entire front of the building, and in its series of steel gateways defining the approach from the center of town, like some grand manor framed by rows of trees?

This library, like so much of Ames's work, may look Modernist, but it does not arise out of a Modernist view of history, where progress reigns. Rather, this work, like the Greek Revival plantation houses not too far away, represents an older, Classical conception of the past, one in which every creative act was seen as part of an evolving tradition connected to a golden age. The latter still partly defines the Southern state of mind, and is central to understanding this work. **Thomas Fisher** ■



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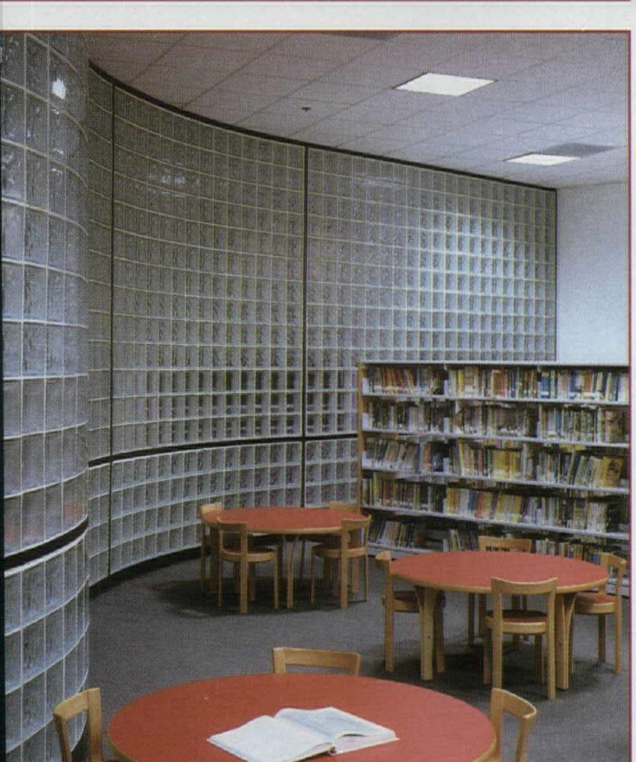

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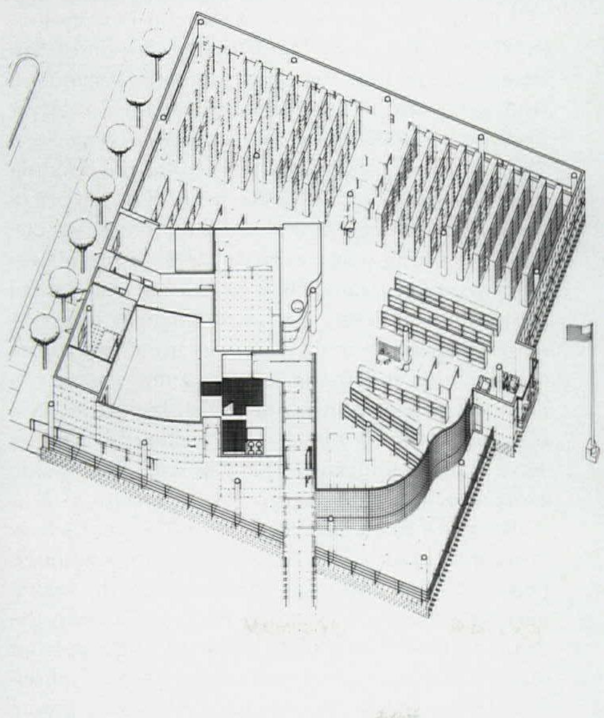


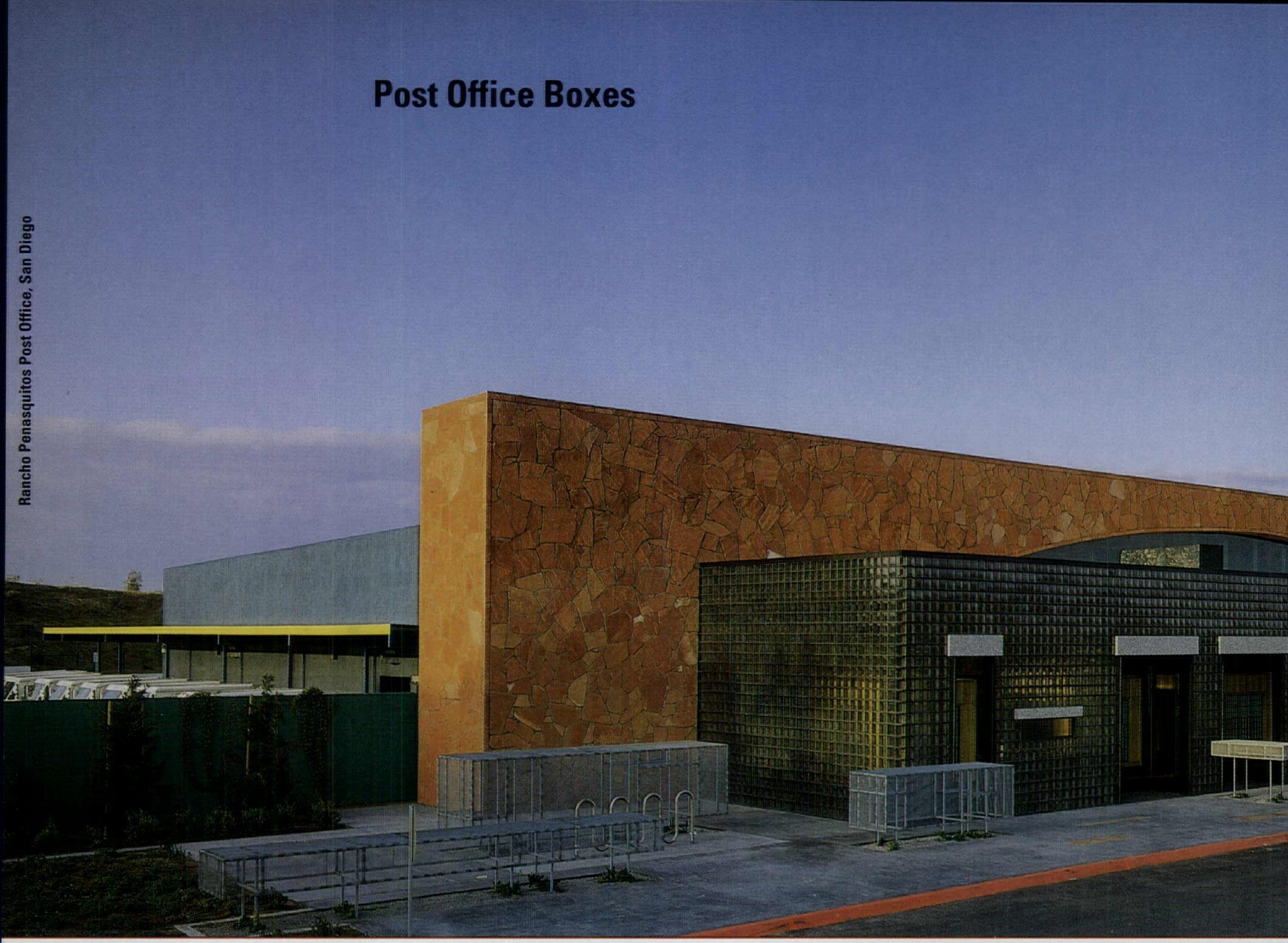
AXONOMETRIC

Project: *Alpharetta Branch Library, Alpharetta, Georgia.*
Architect: *Anthony Ames, Atlanta.*
Client: *Fulton County (James Brooks).*
Site: *corner site between residential and commercial areas.*
Program: *10,000 square feet.*
Structural: *braced steel frame.*
Major materials: *see Building Materials, p. 175.*
Mechanical: *multizone rooftop units.*
Consultants: *Jack Lynch & Associates, structural; Jones, Nall & Davis, mechanical.*
General contractor: *Frontier Contracting Company.*
Costs: *$750,000 ($75/sq ft).*
Photos: *Michael Portman.*

The library's entry, angled toward the corner of the site (1), leads to a skewing of the staff areas within the square plan (left). The frieze and columns form a front portico (2). Strip windows wrap the library on three sides; a curved glass block wall is on the fourth (3).

Post Office Boxes

Rancho Penasquitos Post Office, San Diego



1

A San Diego post office by Richard Friedson/The VISIONS Studio epitomizes the notion of a decorated shed.

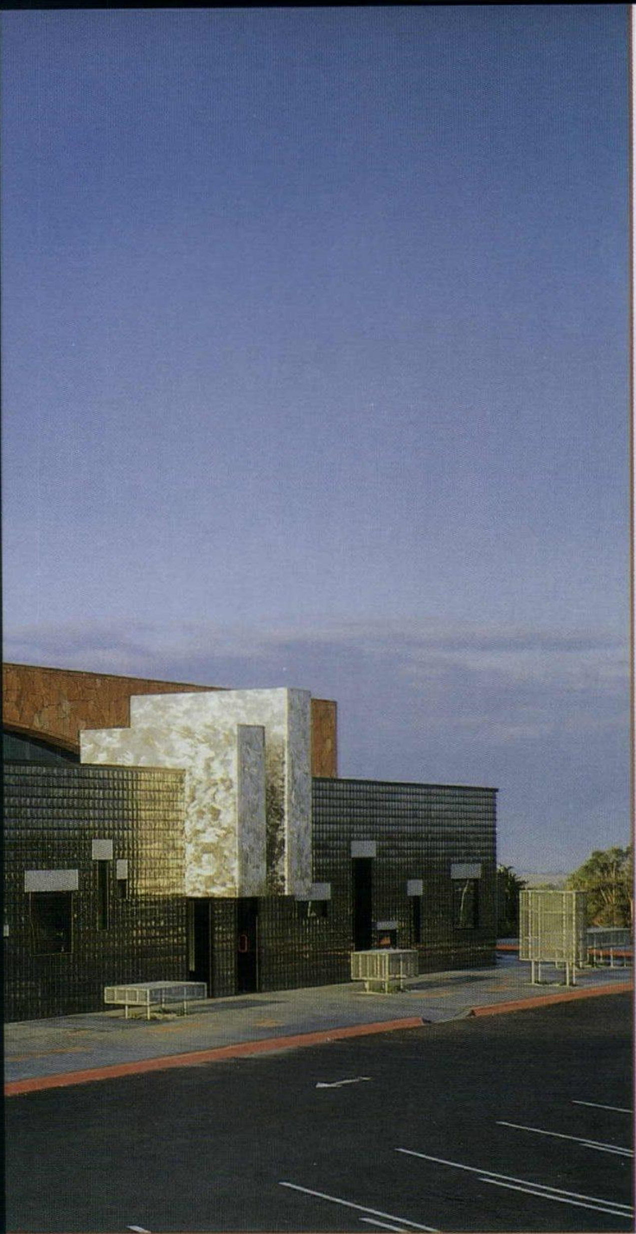
In plan, the post office at Rancho Penasquitos, by Richard Friedson/The VISIONS Studio of San Diego, is little more than the diagram of a standardized program: a 4000-square-foot public lobby fronting a 16,000-square-foot mail processing area. "A post office is really just a light-industrial building with a sales office," says Friedson. The surprises occur in the elevations and interiors. The street elevation is a long plane of glass block within a steel moment frame, punctuated by two enormous steel boxes that mark the entrance and exit doors. A series of openings in the front elevation adds a note of ambiguity: at first glance the openings appear to be doors, but they turn out to be glass enclosures. Intruding into the interior lobby, these enclosures serve as merchandising displays by day while adding extra security at night to the 24-hour facility.

Rough-finished granite, used on the street elevation for window lintels, looks incongruous amid the high-tech steel and glass. Friedson says the heavy-looking material is intended to "float" among the insubstantial-looking glass blocks. Along the front of the building, rows of steel "topiary boxes," of different sizes and heights are to be filled with greenery. The irregular size and height of these boxes, combined with the irregular, Corbusian windows on the the front wall, are intended to convey a sense of "movement and restlessness," alluding to the movement of the mail and the constant activity of the post office, according to the architect.

Inside, the materials are even more startling. A roof of off-the-shelf materials – open-web bar joists supporting galvanized steel decking – contrasts with a wall of red sandstone, applied in an irregular, "rustic" manner. A luminous green band – a reveal that opens the lobby to a clerestory tower – hovers over the rear wall.

The post office does not acknowledge the mediocre context of surrounding buildings: a deracinated Mediterranean style with white stucco walls and red tile roofs. As a freestanding building on a 3.7-acre lot, the post office can define its own context and stand its own ground. Unfortunately, a 300-foot setback robs the project of much of its power to challenge the banality of its surroundings.

Morris Newman ■



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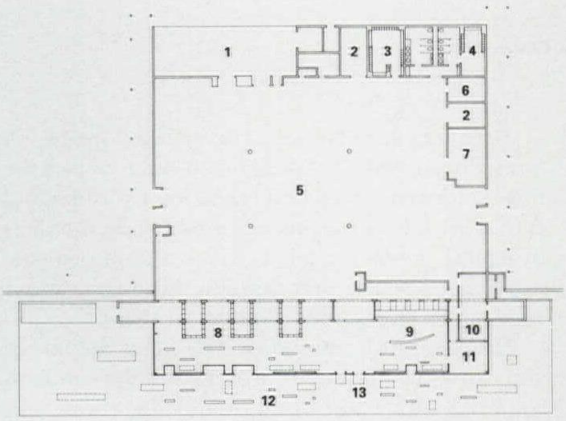


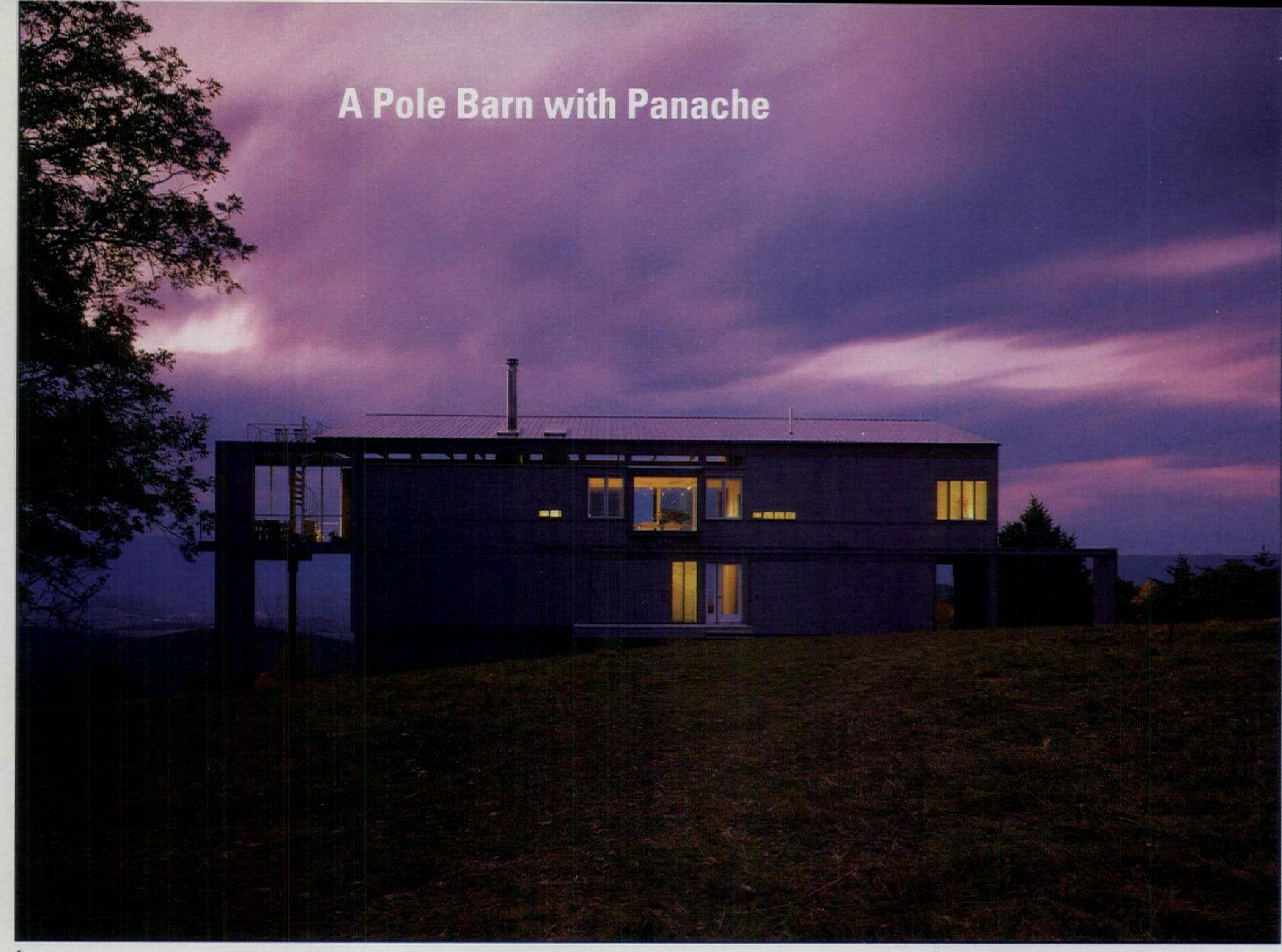
FIRST FLOOR PLAN

1 LOADING DOCK
2 STORAGE
3 MEN'S LOCKERS
4 WOMEN'S LOCKERS
5 WORKROOM
6 JANITOR
7 LOUNGE
8 BOX LOBBY
9 SERVICE LOBBY
10 STAMP STORAGE
11 POSTMASTER
12 PLAZA
13 ENTRANCE

A long slab with stone veneer (1) divides the public and service areas of the post office. A pair of steel boxes (2) marks the entrance. Inside, clear glass windows and display boxes punctuate the glass block wall (3).

Project: *United States Post Office, Rancho Penasquitos, San Diego, California.*
Architects: *Richard Friedson/The VISIONS Studio, San Diego.*
Client: *United States Postal Service.*
Site: *3.7-acre tract in a suburban setting.*
Program: *16,000-sq-ft workroom for mail processing, 4000-sq-ft lobby.*
Structural systems: *steel moment frame (lobby), wood frame bearing walls (workroom).*
Major materials: *see Building Materials, p. 175.*
Mechanical systems: *packaged units, electrically operated.*
Consultants: *Frank Brower, landscape; Flores & Ng, structural; Mattson-Beaudin, mechanical; J-Rad Engineering, electrical.*
Costs: *$2,875,000 ($143.75/sq. ft).*
Photos: *David Hewitt/Anne Garrison.*

2



1

A Pole Barn with Panache

Jerry Wells combines modest materials and simple means of construction to realize a spirited weekend house overlooking the Shenandoah Valley of Virginia.

The Shenandoah House bridges a clearing on the mountainside, obscuring the view while building anticipation of the panorama that emerges on the other side with hints of transparency (1). Summertime entertaining frequently takes place on the deck at the south end of the house (2), where a viewing platform at the top of a spiral stair offers 360-degree perspectives of the adjacent Shenandoah National Park and valley below.

Architect Jerry Wells has never been one to follow stylistic trends. So when he sat down to pen the first sketches of a weekend house for a Washington, D.C., client, his thoughts ran more along the lines of typical summer camp cabins – a kind of rustic Boy Scout pavilion with primitive facilities, a wood stove, and a large screened porch.

His client had other ideas. She loved the hiking and skiing in the woods around the Shenandoah National Park and often brought her young son along to escape the noise of the city. But eight years of renting unheated cabins with outdoor privies was enough. She wanted physical, as well as spiritual, comfort on her 160-acre tract of forest and pasture.

Their compromise produced a spirited house that draws on the imagery and techniques of local tradition without sacrificing the architect's vision. In the case of Wells, a professor of architecture at Cornell University, that vision is influenced by decades of practice in the Modernist tradition and grounding in the theory of Le Corbusier. Knowing that, it is too easy to look at the telephone-pole underpinnings of the Shenandoah House and see *pilotis* rendered in the rural vernacular. But the overriding rationality of the building, the familiar rhythm of its sweeping window wall, and details such as the floor-to-ceiling panels that open to reveal screened vents all belie the influence on Wells of early European Modernism.

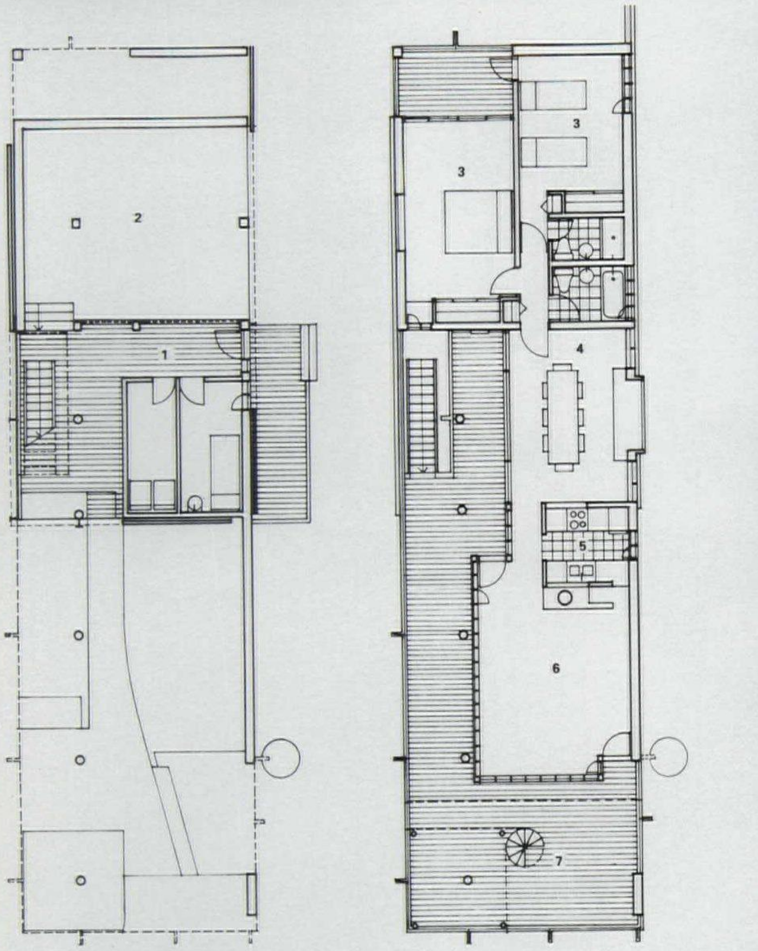
His first task in designing this house was to come to terms with a steep mountain site offering dramatic views of the Shenandoah Valley. Wells situated the house to block the view as one approaches through a clearing on the uphill side, likening the effect to a "thick wall or dam across the cascading site." The experience of entry is all-important: a heavy sliding panel pulls back, yielding access to a door, and one steps through the stark façade, climbs a stair to the second-floor deck, and confronts a 180-degree panorama of the valley floor and mountains beyond. (Better yet is the 360-degree view from a third-floor platform at the south end of the deck.)

Wells's emphasis on one façade as an archetypal wall, solid and severe, stems from his notion of buildings as assemblies of independent parts that are free to be exaggerated or articulated according to their role in the overall scheme. The opposite

(continued on page 104)

2

3



FIRST FLOOR PLAN

SECOND FLOOR PLAN N 10'/3m

1 ENTRY
2 GARAGE
3 BEDROOM
4 DINING
5 KITCHEN
6 LIVING
7 DECK

The restrained fenestration on the uphill side of the house (3) follows a proportioning system that is made explicit by a pattern of subtle framing. The opposite side of the house is open and dynamic (4), though its lower level can be enclosed with sliding panels to keep bears (and curious locals) from climbing up on the deck when the owner is away. The cavity beneath the house is enclosed only partially to anticipate later additions of an office, guest room, and swimming pool.

4

Project: *Shenandoah House, Page County, Virginia.*
Architect: *Jerry A. Wells, Architect, Ithaca, New York (Jerry Wells, Chan Byan, Jay Lamprost).*
Client: *Name witheld.*
Site: *160-acre sloping site bordering the Shenandoah National Park.*
Program: *two-bedroom, 1500-sq-ft vacation house.*
Structural system: *post-and-beam structure on concrete footers.*
Major materials: *redwood, cross-cut cedar, rough sawn cedar plywood (see Building Materials, p. 175).*
Mechanical system: *electric heat.*
Consultants: *Raymond DiPasquale, structural.*
General Contractor: *Poe & Sons, Browntown, Virginia.*
Costs: *withheld.*
Photos: *Alan Karchmer.*

5

A boxlike fireplace separates the living room and kitchen (5), which is tucked behind short walls that define a discrete volume within the free-flowing public areas of the house. Wells opened the living room to expansive views with a rhythmic window wall (6) on two sides of the room. The roof is articulated as two components with separate functions – a truss-supported corrugated metal roof that shields from the elements and a flat membrane roof that encloses the space.

(continued from page 100)
face of the building is antithetical: open, dynamic, all glass and air and exposed rafters. Likewise, he divides the roof into two parts, one a tilted corrugated metal roof that provides primary shelter from the elements and implies an orientation to the view, and the other a flat membrane roof that simply encloses the space.

Even though he is given to building in concrete, Wells says the sheer impossibility of getting a concrete truck up the mountainside forced him to look at alternative methods of construction. He settled on the idea of a "pole barn" because of its appropriateness to the setting and the fact that local contractors knew how to build one. Solid walls in the house are supported by 8x8 posts framed with 2x6 horizontal members, producing a thick wall that "gives you some depth to play with," Wells says. He uses that potential to greatest advantage in the dining room window that frames a meadow view. From outside, the windows serve sparingly as compositional devices, at the same time conforming to a proportioning system made explicit by horizontal members that add relief and detail to an otherwise common wall. Wells acknowledges: "If there were no tracery or small lines running around the building, it would be very clubby – a scaleless monster."

Formal play on the exterior was not as important to the client as achieving an unobstructed view of the valley from the living room. Wells delivered by designing a window wall using a series of vertical mullions that support floor-to-ceiling glass. "I've used these over and over again," he says. "It started out as a cheap way to make a window wall and incorporate a little structure. But there's something about the way it deals with the landscape, so that the architecture and landscape participate compositionally with each other." A boxlike fireplace separating the living room and kitchen tends to cramp the already-tight space in this 1500-square-foot house. Wells might have served his client's needs for living area better by allowing the fireplace volume to protrude outside the simple planar wall and to be flush inside, even though that would have meant sacrificing the conceptual purity of his "dam" across the tumbling mountainside.

Such a move would have had a negligible effect on a house so self-assuredly untrendy as this one. "I've never gotten too involved in the 'isms' in the past 12 or 14 years," says Wells. "It seems to me that the kind of stylistic biases people people are expressing today get in the way sometimes of thinking about issues that are more fundamental for a house like this. It's trying to take advantage of the views and the light, and to be sensitive to trapping those things as well as it possibly can." **Vernon Mays** ■

The author, a former senior editor of P/A, is editor of Inform, *the architecture magazine of the Virginia Society AIA.*

6

House of the Forest

A weekend house in northern New York State reinterprets the rustic style of the lavish 19th-Century resort "camps" of its Adirondack Mountain region.

1

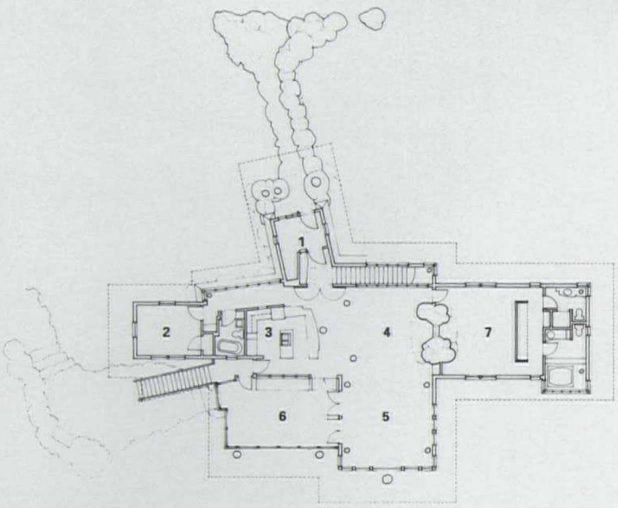
Approached from above (1), the house is seen mainly as an expanse of lead-coated copper roofs, with clerestories and spreading eaves; boulder chimneys with spark-trapping caps are Adirondack traditions. On its sunny, downhill side (2), the house displays its log structural frame, separated from an envelope mainly of milled boards; red-painted windows follow another regional custom; lead-coated copper caps on boulder foundations protect main columns from moisture and carpenter ants.

For several decades in the late 19th and early 20th Centuries, the rugged Adirondack area of upper New York State was the incubator for its own distinctive style of rustic residential architecture. Built for the summer recreation of rich city-dwellers, the Adirondack "great camp" buildings were far larger and more intricate than the archetypal log houses built earlier in the region. With their broad, bracketed roofs, cantilevered bays, and extensive verandahs, these retreats drew on a range of precedents, from the Swiss chalet to the Indian bungalow, the Zen monastery, and the Stick Style villas of other American resorts. What distinguished them from their eclectic sources was their consistent use of unmilled timbers – from log columns to twig traceries – along with cyclopean boulders.

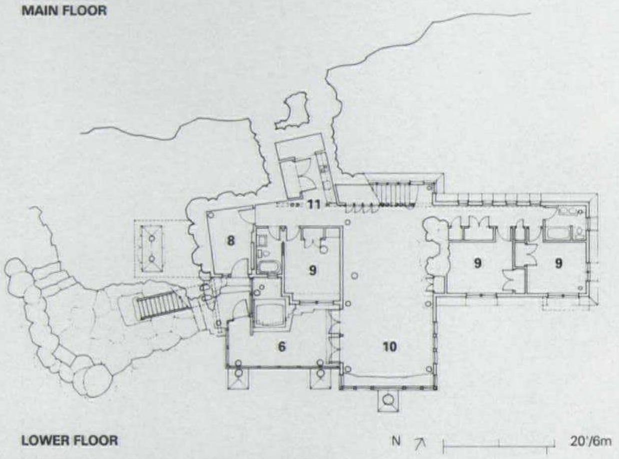
The owners of this lakeside weekend house had childhood memories of Adirondack vacations and wanted to bring some of the architectural qualities of the "great camps" into their own retreat. Inspired by Harvey H. Kaiser's book *Great Camps of the Adirondacks* (David R. Godine, Boston, 1982) they sought the author's advice, which ultimately led them to architects Bohlin Cywinski Jackson of Wilkes-Barre, Pennsylvania. With a diversity of projects throughout the Northeast, the firm had completed some modest weekend houses and had won a national AIA Honor Award for a girl scout camp building (P/A, Apr. 1986, p. 119). To prepare for this commission, partner Peter Bohlin and his project managers examined some of the surviving "great camps."

Programmatically, the house had to accommodate a family with three young children, plus occasional guests. Codes limited the floor area to 4000 square feet, and the owners preferred to devote most of this area to communal spaces, making the bedrooms and baths modest in size. The steep slope of the site toward the lake to the southeast allowed for a full lower level below the upper entry floor, with maximum exposure toward sunlight and views – both of which are filtered by the pines and hemlocks. The lower level readily became the children's preserve, roughly duplicating the upper-level plan of wings extending from a central living space.

Based on this straightforward *parti*, the architects have developed an extended discourse on Adirondack details: included are foundations and fireplaces of huge boulders, columns and beams of massive tree trunks, wall surfaces of split logs,

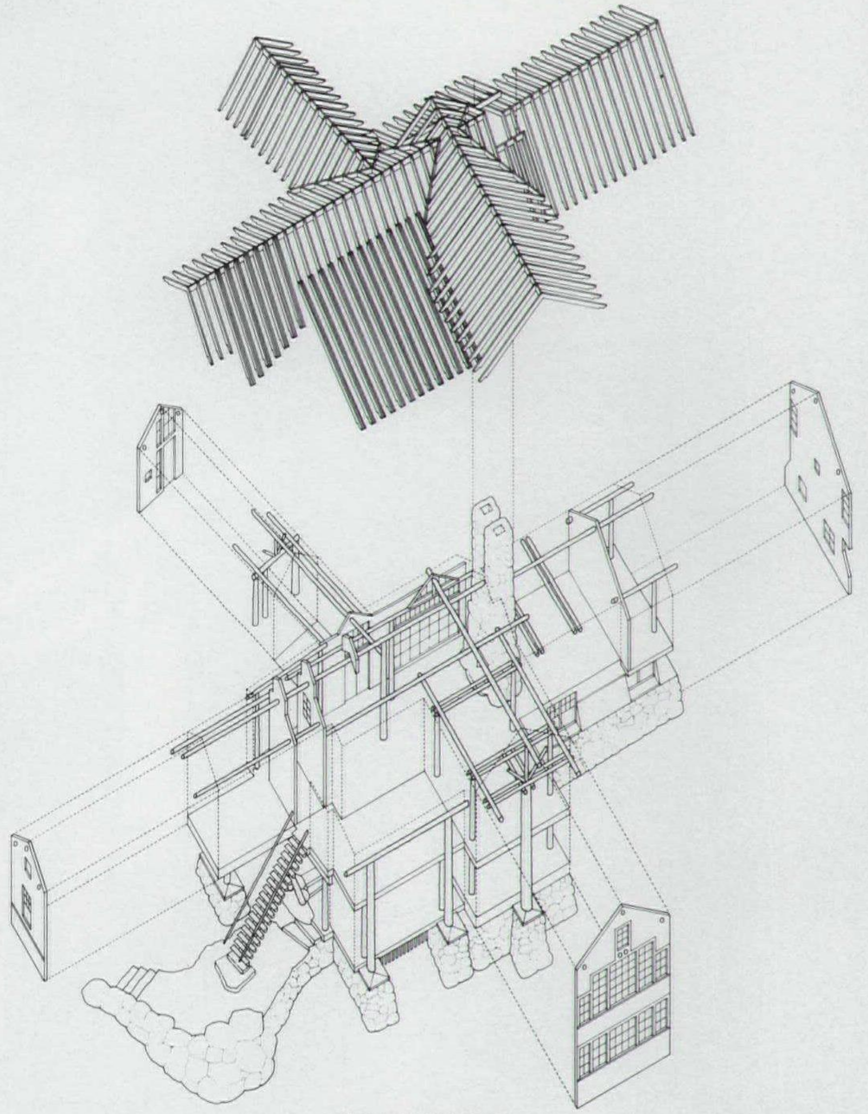


MAIN FLOOR



LOWER FLOOR

1 VESTIBULE
2 GUEST ROOM
3 KITCHEN
4 LIVING
5 DINING
6 SCREENED PORCH
7 MASTER BEDROOM
8 EXERCISE ROOM
9 BEDROOM
10 RECREATION
11 KITCHENETTE



EXPLODED AXONOMETRIC

The house forms an irregular cross in plan, with porches filling in one quadrant on both levels. The entry wing (top in plan) leads in at an angle along the boundary between the kitchen and the main living space. At the entrance (3), an irregular row of log columns rising from boulders announces the rustic design theme; gridded glass walls to either side state a Modernist counter motif. At the west end of the house (4), a guest room rides on log pilotis, *and a rustic-railed stair descends at an angle from the upper screened porch to a stone terrace. Angled eaves above the stair (5) are supported by special bracketing. In the terrace parapet (6) are intertwined branches and boulders.*

balustrades and furniture fashioned from natural branches and twigs, hand-forged iron (another Adirondack tradition) in hardware.

Yet, as Peter Bohlin points out, the layout departs sharply from the conventional rectangular rooms of the great camp buildings, adopting instead a Modernist, free-plan character that actually enhances the rustic nature of the parts. The clear separation of the main columns from the enclosing walls – in the manner of Le Corbusier's *plan libre* – preserves the natural integrity of the timbers and exposes their joints as a more traditional system could not. Liberating the plan even further, by shifting column locations away from conventional structural bays and twisting the crucial entry axis at an angle, the architects have given the columns in the main living space an apparent randomness of location that echoes the tree trunks of the surrounding forest.

Details have also been modernized. The traditional red-painted window sash of the region is reproduced literally in some places, but expanded into a Modernist grid of glazing in others. The broad eaves, with their carefully shaped rafters have in one instance been developed into a geometrically complex display of brackets that recalls some Modern sculpture. For lighting fixtures, the architects have not emulated the twig and antler sconces and chandeliers of the great camps, but developed devices using sheet steel, with slyly folkloric cut-outs of local flora and fauna.

While the original style of the Adirondack camps betrayed the influence of vernacular traditions from around the globe, Bohlin's adaptation draws on 20th-Century precedents that extend beyond his use of the Modernist free plan. In particular, he mentions his enthusiasm for houses by Aalto in Finland, by John Yeon in Oregon, and more especially for works of Asplund and Lewerentz in Sweden; the tapered corridor can be traced to Asplund's Snellman Villa, but, in a less direct way, Bohlin emulates "the way Asplund sweated the refinements," visibly taking no detail for granted.

Without adopting any of the formal devices of Deconstructivism (if you discount the angular cranks in plan), the architects have in effect deconstructed the imagery and tectonics of the old Adirondack "great camps," revealing all their essential intentions in this one modestly scaled, livable house. **John Morris Dixon** ■

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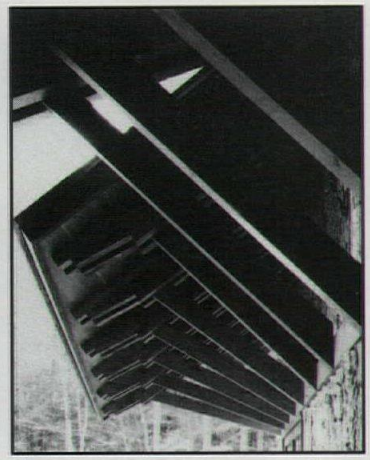

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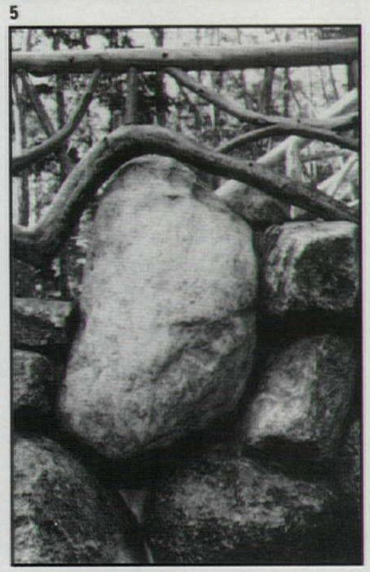

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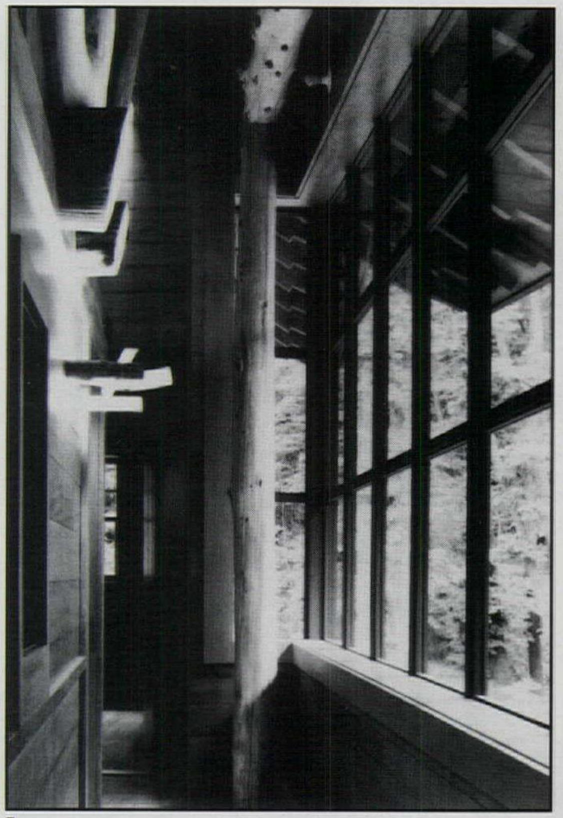

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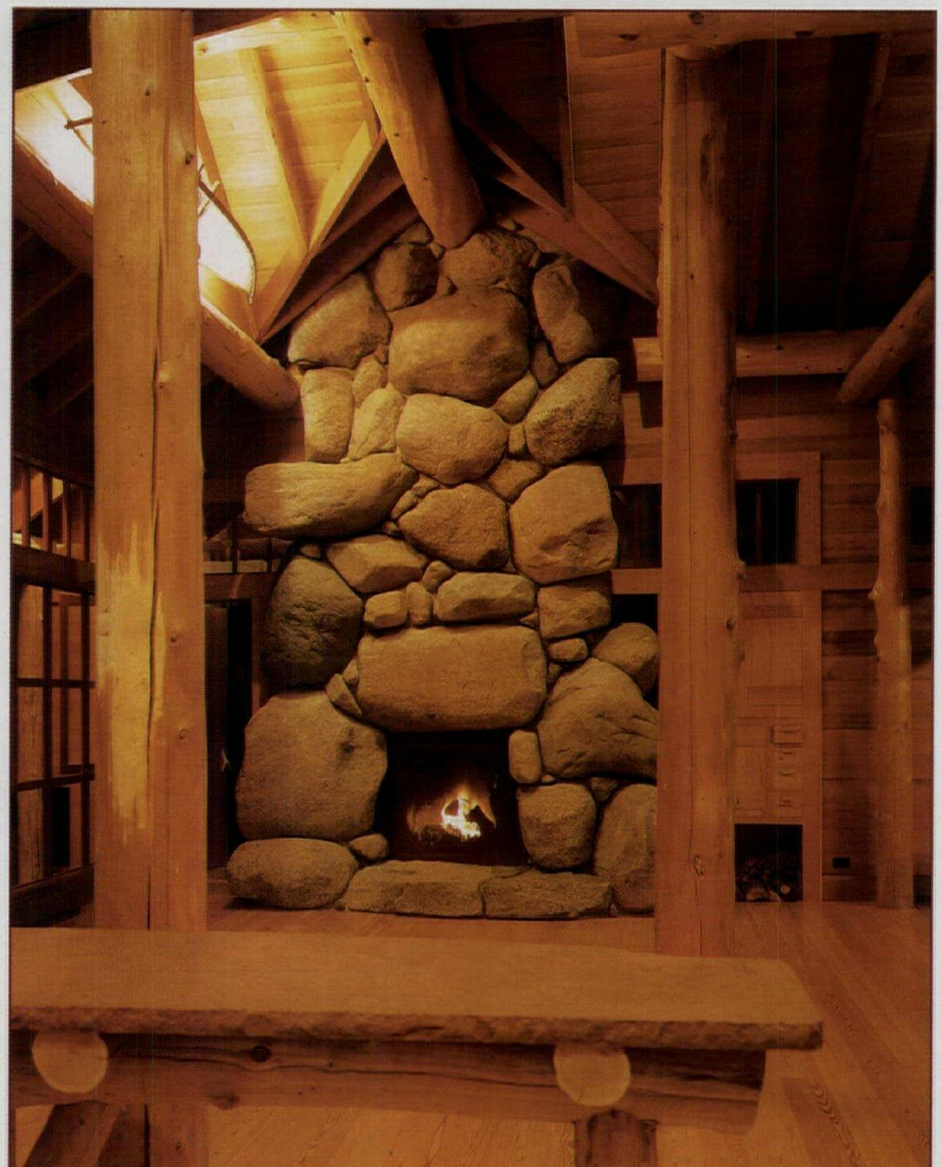
Throughout the interior, the separation of the log frame from the milled wood envelope is apparent; columns and beams are cedar, except for the longest girders, which are hemlock. In the corridor to the guest room (7) a column is isolated from the window wall. In the main living space, one regular structural bay is centered on the dining table (8), but the columns are irregularly spaced in the area around the boulder fireplace chimney (9) and the open kitchen (10). Rough-edged sandstone countertops, with log supports and rustic stools, flirt with Flintstones imagery, but fine understated cabinetwork in the kitchen and abutting the main chimney act as correctives. The window above the kitchen opens only to the upper volume of a bathroom, under the clerestoried roof peak.



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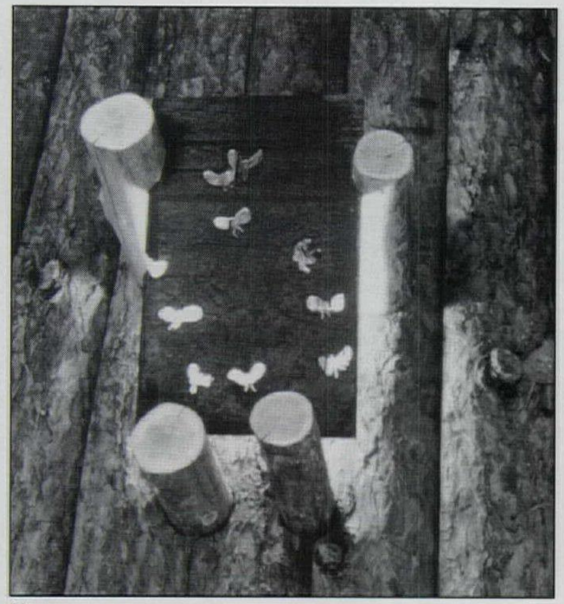

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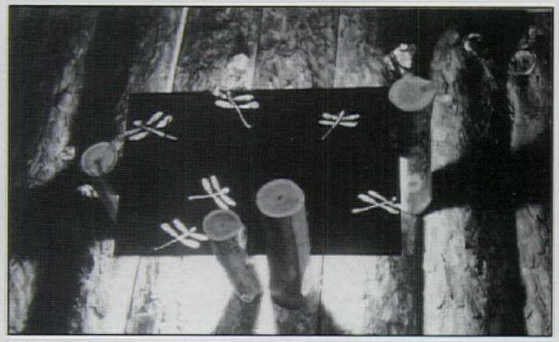

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Custom lighting fixtures throughout were designed by the architects and fabricated by a local metalworker. At the entrance (11), a metal reflector punctured with moth silhouettes is supported on log brackets; on the porch(12) a similar fixture displays dragonflies. Throughout the house are fixtures with opal glass on similar brackets (7). In the living room clerestory (13) a fixture of bentwood and rawhide is luminous both day and night. Under the rafters of the upstairs porch (14) forest silhouettes cut from sheet steel are seen against red pine bark siding. In the lower-floor recreation room (15), metal reflectors have cutouts of leaping fish, similar to those in the sculptural fixture over the dining table upstairs (8).

13

14

15

The Docklands Light [illegible] (4) is part of the cluster of buildings designed by Pelli, which also includes the low publi[illegible]ding on the east side of Cabot Square (5). The eclectic building by SOM to the north (7), is adj[illegible]nton McAslan's no-frills structure. The base of the Pelli tower is obscured by lowrise str[illegible]when viewed from the south and east (6), where future expansions are planned.

Courtesy Olympia & York

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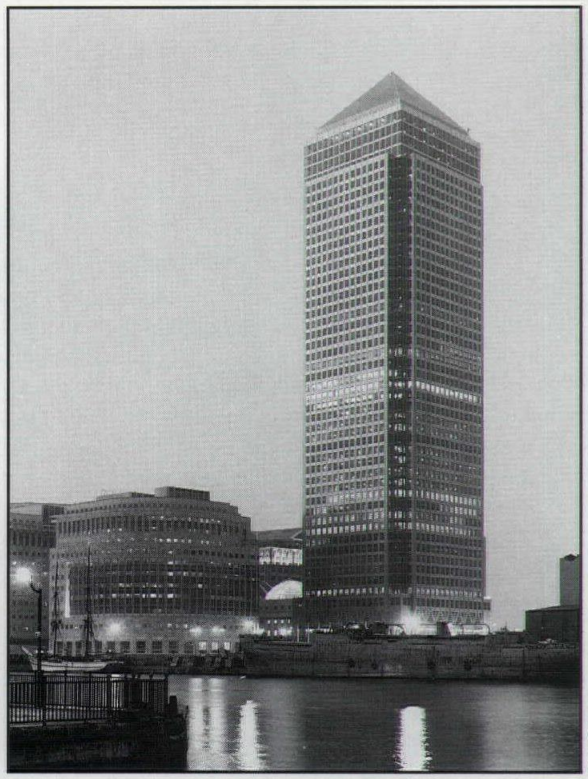

©Alan Delaney

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Courtesy Olympia & York

7

Isle of Dogs: an American Perspective

In the preceding article, English critic Colin Davies speaks of the "envy mixed with shame" in the British reaction to Canary Wharf. For American observers, there is a complementary embarrassment: given this extraordinary opportunity to display our planning and design skills, our team has produced only a watered-down restatement of familiar ideas. Canary Wharf is big, yet it is anything but brave.

As an American editor who has examined Canary Wharf, I find that Colin Davies's assessment is remarkably close to my own. The geographical and cultural gap between us cannot obscure certain fundamentals: the isolation of this complex – irredeemably, it seems – from the great city it is appended to; its monocultural dedication to one kind of business; the poor to passable architectural packages in which that business is housed.

Olympia & York's earlier World Financial Center in New York [P/A, July 1985, p. 79] is more successful in several respects. The uniformity of the office blocks is more openly acknowledged in the overall Pelli envelope, which varies only to express the small but real distinctions between upper floors and lower floors. At the base there are some genuinely engaging (if not necessarily brilliant) indoor and outdoor communal spaces. These public spaces – indeed the whole fabric – at WFC are intimately and effectively related to the Hudson River.

"Canary Wharf is like a cluster of upper-crust club men – disciplined, well-bred, uninteresting – standing shoulder to shoulder against the surrounding riffraff."

At Canary Wharf, by contrast, there are no indoor gathering places except the lively light rail station and a bland little shopping mall, and everything is turned inward, largely ignoring the potential amenities of the Thames and the docks. One problem is that the "ground level" at Canary Wharf, while it is wisely shared by cars and pedestrians, is obviously several stories above the water plane, on top of a service-and-parking podium; you can't see the water unless you find your way to the edge – which gets little design attention – and look over a rail.

It is understandable that one might want to mitigate the views of the generally chaotic neighboring developments in the Isle of Dogs, but this resolute turning inward, without even a strong center to focus on, seems like a metaphor for social class distinctions. Canary Wharf is like a cluster of upper-crust club men – disciplined, well-bred, uninteresting – standing shoulder to shoulder against the surrounding riffraff.

The superficial diversity of Canary Wharf's completed office buildings encapsulates some key urban design conflicts of our time, between individual building and the larger whole, between the traditional street-wall city fabric and the Modernist object building.

For an instructive precedent, we can look to the residential neighborhood at Battery Park City, New York, where the diversity within an urban framework is effective, at least in appearance; here stringent guidelines have melded the work of several architects to form subtly varied but consistent street and plaza walls.

At Canary Wharf, wall surfaces vary for no reason, some looking dense and load-bearing, others light and industrially detailed. Pelli's central tower has a fine, well-crafted skin that works well in distant views, but at close range it seems peculiarly flat and weightless for its pivotal position.

The planned expansion of Canary Wharf to east and west will somewhat mitigate its isolation and self-absorption. The crescent of structures now being developed on the Thames at Westferry Circus will face up river toward London. Here, waterfront terraces planned by Koetter Kim & Associates will reinforce the river connection, but the buildings themselves – by an all-star list of firms – promise the same uneasy compromise between coherence in plan and indiscriminate variation in envelope. Koetter Kim is also planning a transitional zone linked to older development to the west, as well as the extension of Canary Wharf to the east. Since any expansion is not likely to happen very soon, the respite may permit further consideration of its urban functions and forms. **John Morris Dixon** ■

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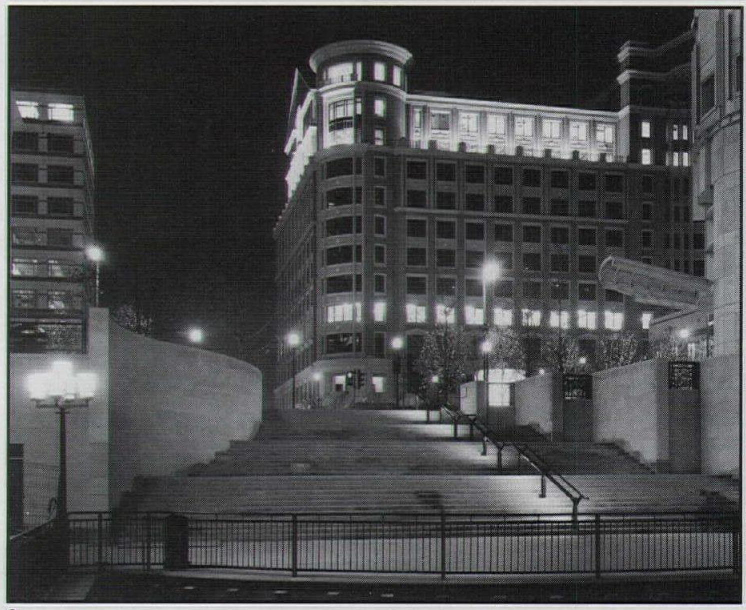

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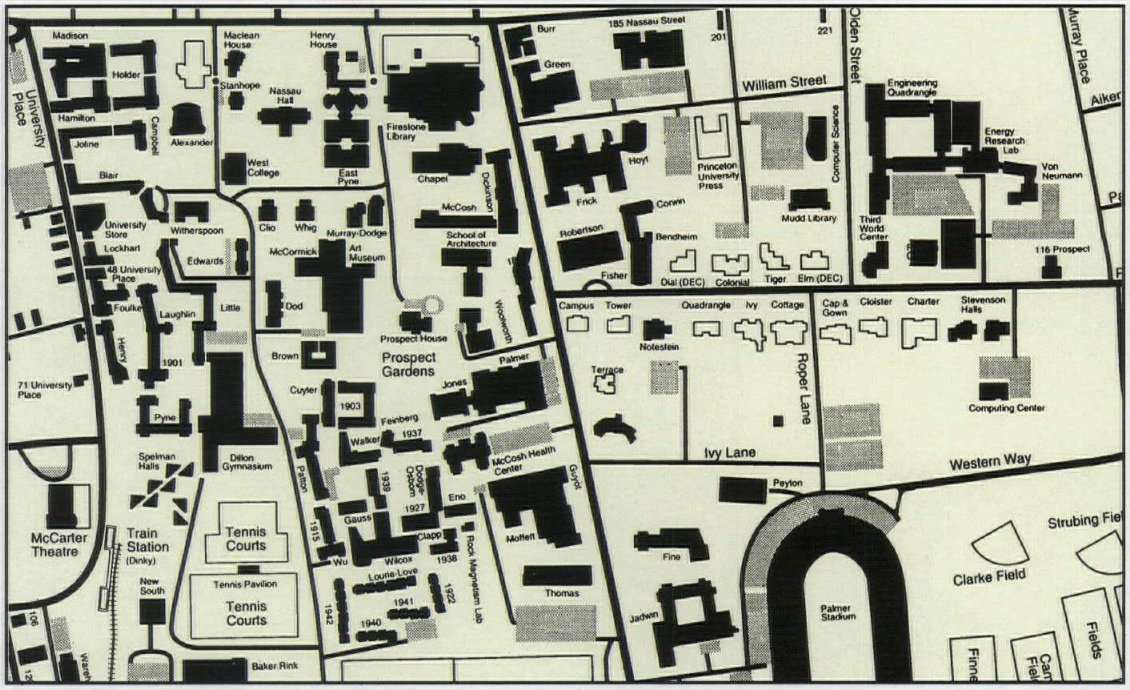
Photos: ©Alan Delaney

Aspects of the streetscape: the entrance to the Troughton McAslan building (8) and the stair leading down to the under-designed southern waterfront (9).

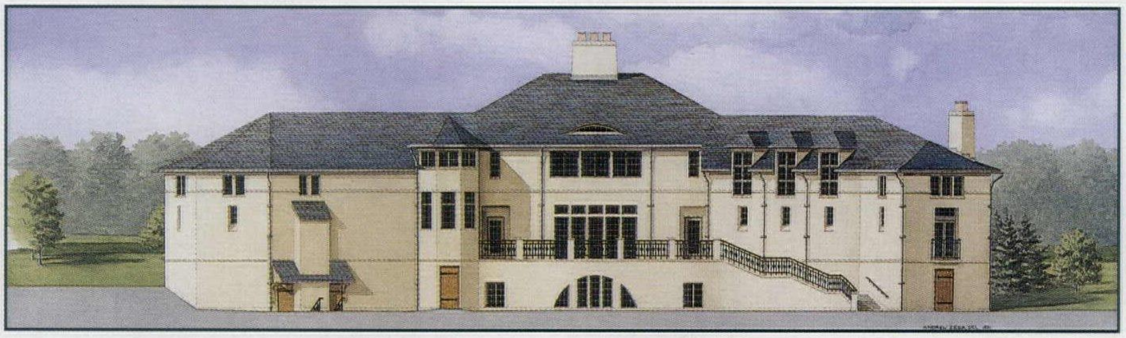
Projects Filling In Princeton

Having grown without a master plan, Princeton University's apparent randomness is proving to be its trump card for campus growth.

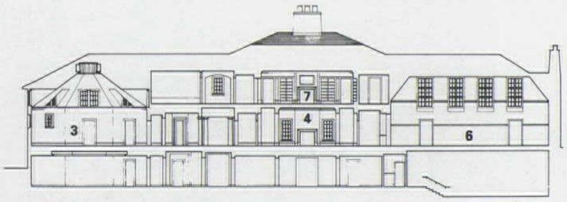


PRINCETON UNIVERSITY, CAMPUS PLAN

N 500'/160m



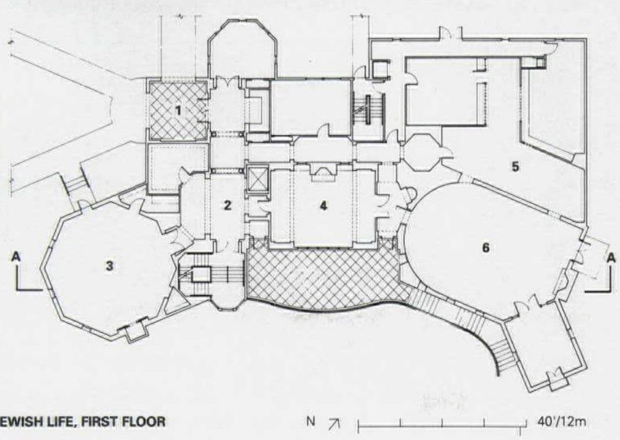
ROBERT A.M. STERN'S CENTER FOR JEWISH LIFE, ELEVATION



CENTER FOR JEWISH LIFE, SECTION

40'/12m

1 ENTRY PORCH
2 STAIR HALL
3 SANCTUARY
4 LOUNGE
5 SERVING
6 DINING ROOM
7 LIBRARY



CENTER FOR JEWISH LIFE, FIRST FLOOR

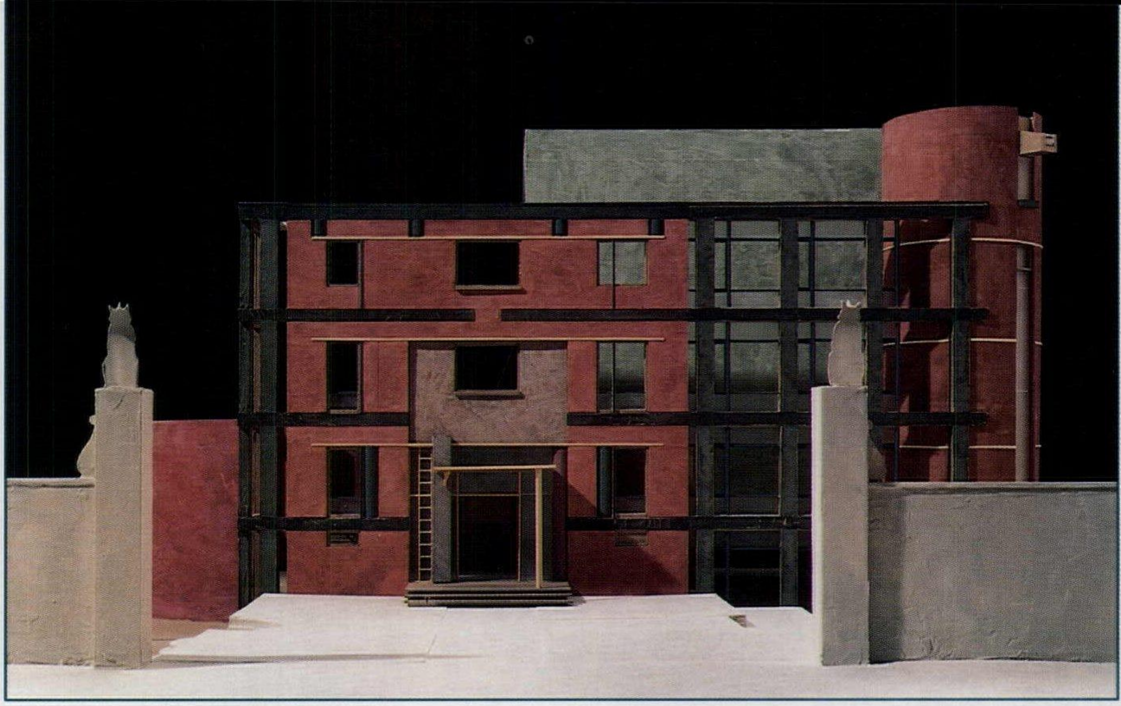
N 40'/12m

Neither the grand axes of the Beaux-Arts, nor the cloisters of the European campus, nor the polycentric plans of the Modern Movement ever took hold at Princeton. This is a characteristically American campus, a loose assemblage of buildings in a once pastoral setting. It grew by accretion, not by any comprehensive architectural vision (Ralph Adams Cram proposed a master plan in 1911, but it was not realized). Princeton's sequences of space developed circumstantially, yielding allées and semienclosed spaces delineated by a composite of masonry structures. Trees and a consistent scale harmonize the variety of building materials and historical images that have accrued over a couple of hundred years of growth.

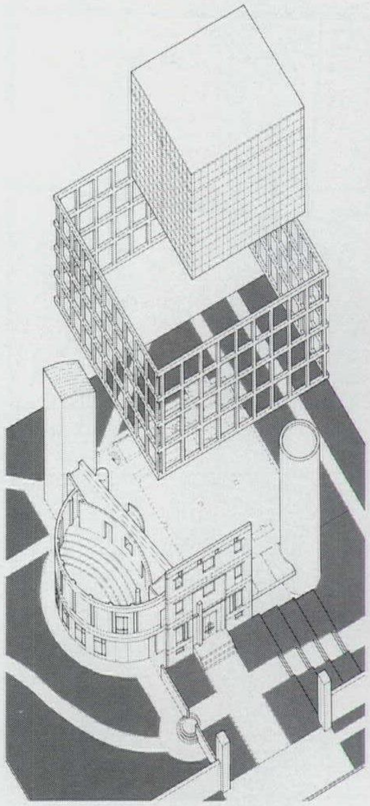
Ralph Lerner, Dean of Princeton's School of Architecture, notes that the campus is well suited to these pluralistic times, when most architects demur from making grand new plans and find more success with minor alterations to established patterns. On the stylistic front, the variety of styles at Princeton can be liberating: architects such as Venturi Scott Brown, Williams & Tsien, and Koetter Kim, among others, have turned awkward infill sites into ingenious solutions, on spatial, and often on aesthetic, terms. Architects commissioned by Princeton find the university a generous client. It considers top quality materials a prudent investment that will be recouped with lower maintenance costs and building life cycles that span half a century – twice as long as the commercial norm.

While many universities grew exponentially with the baby boom, Princeton did not, and the residential environs blend with the campus, particularly on Prospect Avenue, lined with the eating clubs to which most upperclassmen belong. This impressive street of "mansions" inspired Robert A.M. Stern's Center for Jewish Life, under construction on the edge of the academic sector. More than a dining hall, the Center will be both a spiritual and a social center, with the image of a rambling estate. The massing is of more than picturesque value: it accommodates three gathering spaces on two floors, so that services can be held simultaneously for Orthodox, Conservative, and Reform groups.

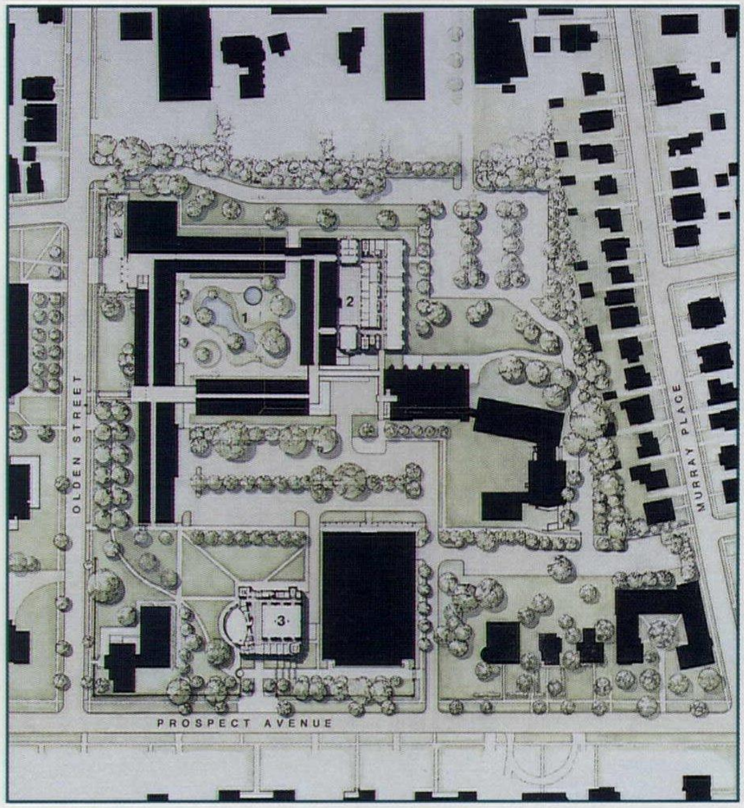
While Princeton prefers to wedge new buildings into its present bounds, rather than to erect buildings farther afield, the campus has a frontier of sorts – an engineering quadrangle to the east of the old campus core. The Hillier Group has designed two buildings for this rapidly developing quadrant, where Machado & Silvetti have recently completed Princeton's first parking garage. The Materials Science Center, under construction next door, will have a gridded façade inflected by patterns of the windows and veneer masonry. These variations, together with the composite massing, are the architects' analogy to the irregularities of the atomic and molecular structures studied in the building's laboratories. The sprawling engineering complex in the background, a mediocre work of the 1960s, will be annexed by another Hillier Group building with an elongated atrium. The coarseness of the grain in the engineering sector will be refined at its periphery: both buildings will serve as buffers for their residentially scaled neighbors.



HILLIER GROUP'S MATERIALS SCIENCE CENTER, MODEL



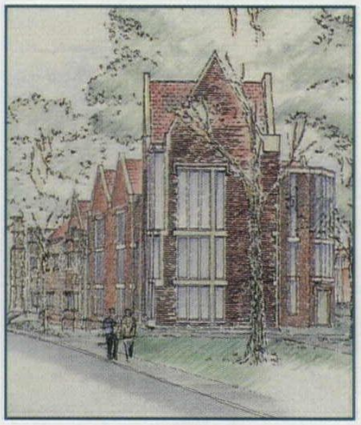
MATERIALS SCIENCE CENTER, EXPLODED AXONOMETRIC



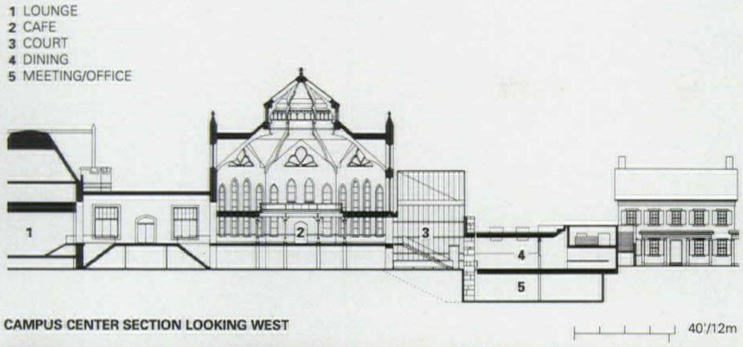
ENGINEERING QUAD, SITE PLAN N 300'/100m
1 EXISTING QUAD 2 QUAD EXPANSION 3 MATERIALS SCIENCE CENTER

HILLIER GROUP'S ENGINEERING QUAD EXPANSION (LABORATORIES, OFFICE, AND ATRIUM) MODEL

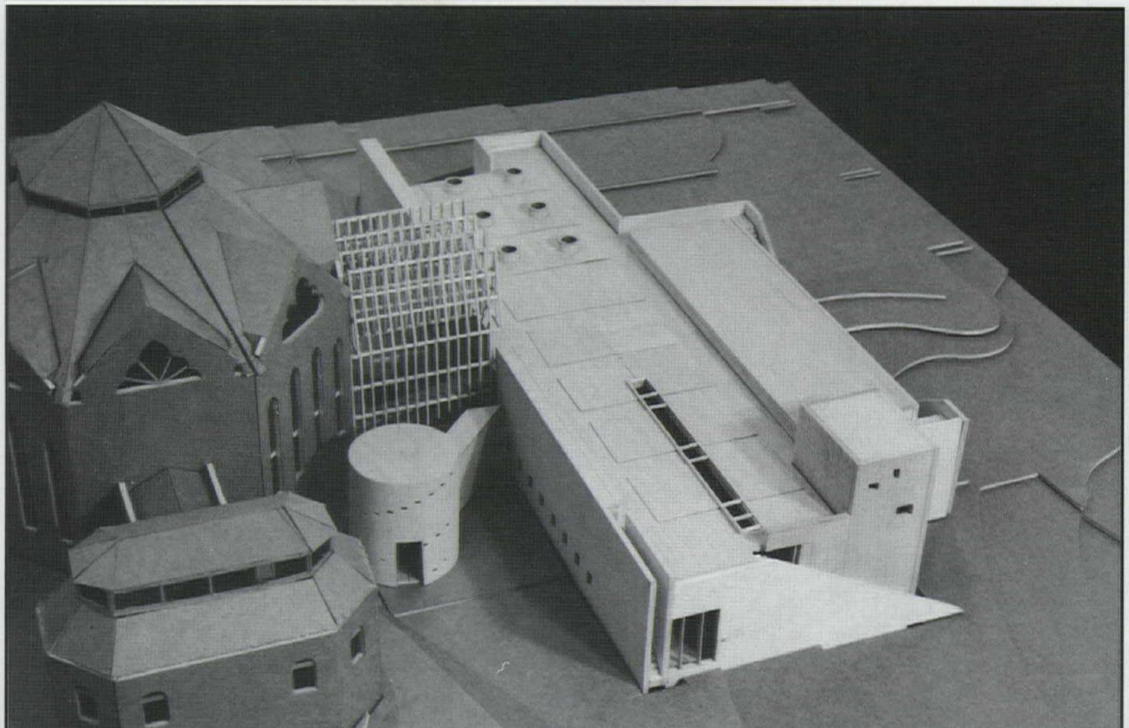
KALLMAN McKINNELL & WOOD'S ADDITION TO 1879 HALL, MODEL



ADDITION TO 1879 HALL, RENDERING



CAMPUS CENTER SECTION LOOKING WEST

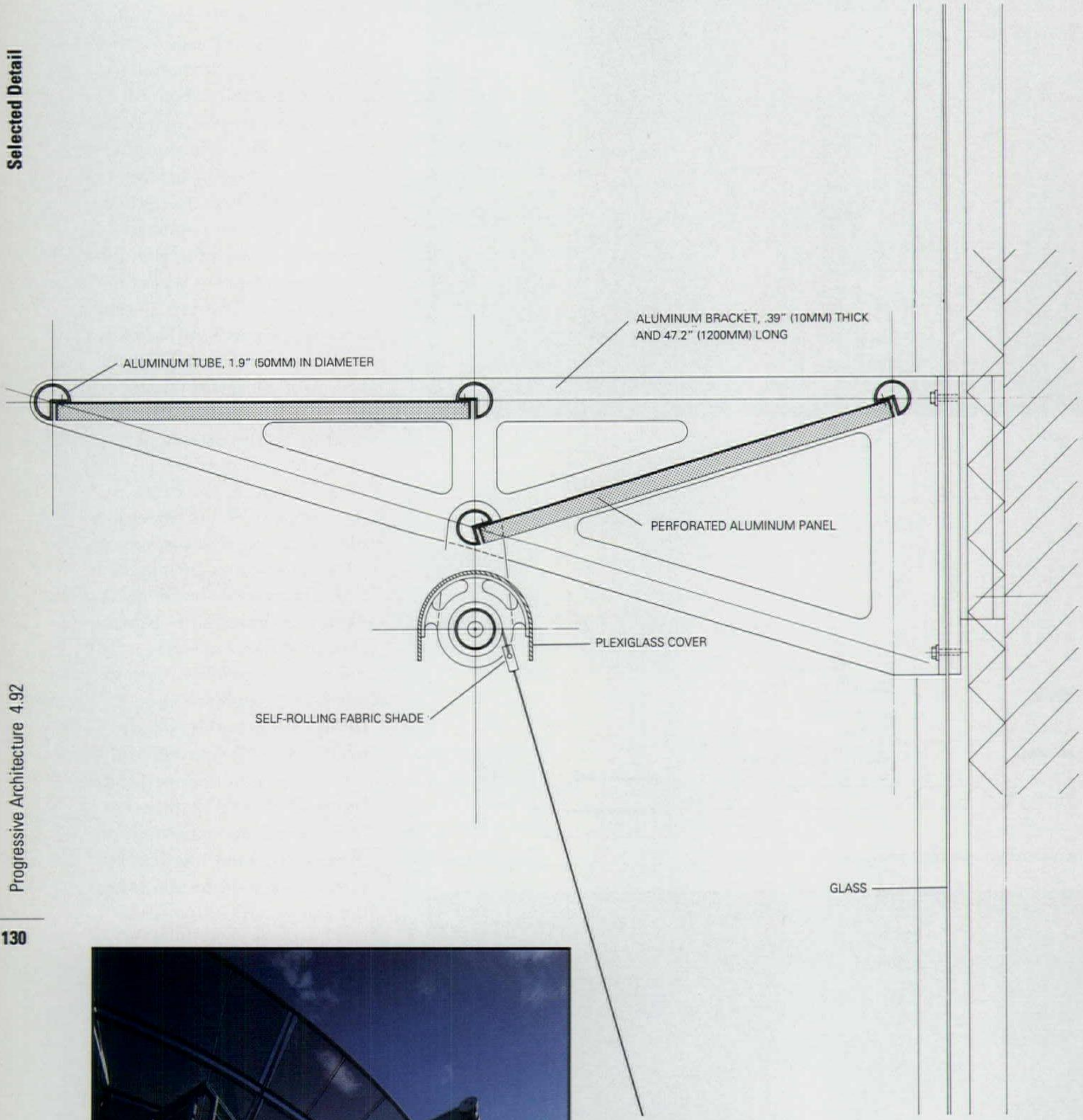


AGREST & GANDELSONAS'S CAMPUS CENTER, MODEL SEEN FROM EAST

Site work has begun on the main campus for Kallmann McKinnell & Wood's Addition to 1879 Hall, which will house the Center for Human Values and expanded offices for the Philosophy Department. By filling in a small stretch of lawn, it will give McCosh walk, Princeton's most important allée, a more definite intersection with the street; a corner tower of seminar rooms will resemble a gate post. Renderings depict façades that conform to context more literally than is the norm for Kallmann McKinnell & Wood. This will be a subtle insertion that blends with a string of Neo-Gothic façades on one of Princeton's busiest streets.

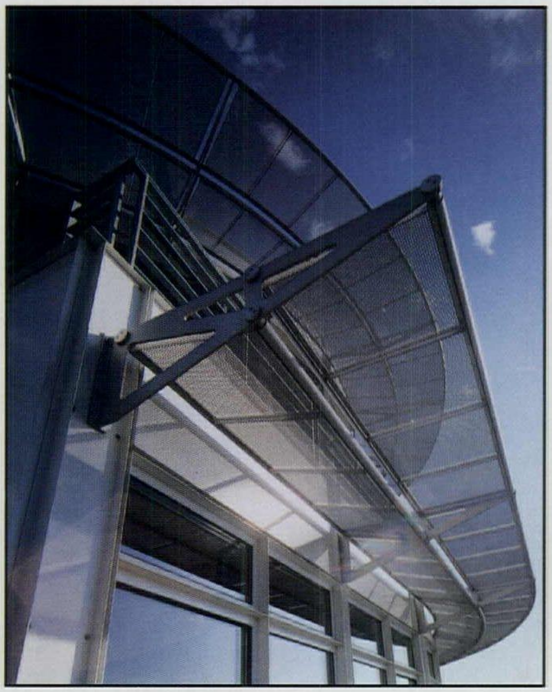
The heart of the campus, near Nassau Hall (Princeton's oldest structure) is the site of a Campus Center proposed in a feasibility study by Diana Agrest & Mario Gandelsonas. Designed like a massive podium for Chancellor Green, its octagonal neighbor, the Center's windowless façade would serve as a garden wall for the lawn on the north side. Its upper floor is designed to be level with the basement of the existing building to maximize space without obscuring the polygonal Gothic structure. A terrace would be accessible by outdoor stairs on three sides. The main entrance, a cylindrical outbuilding, seems misplaced, but in fact it would open to one of Princeton's most heavily used walks. Envisioned as a common ground for all students and faculty, the Center's new construction would be complemented by changes in the existing buildings, with a variety of dining halls and meeting rooms. Agrest & Gandel-sonas's reductive façades and cubic massing imply "infill" in a more forceful way than do other projects on campus. Nevertheless, the interior reflects their contextual sensitivity, with a layered sequence of spaces that turns the composite of new and old to advantage. **Philip Arcidi** ■

Selected Detail

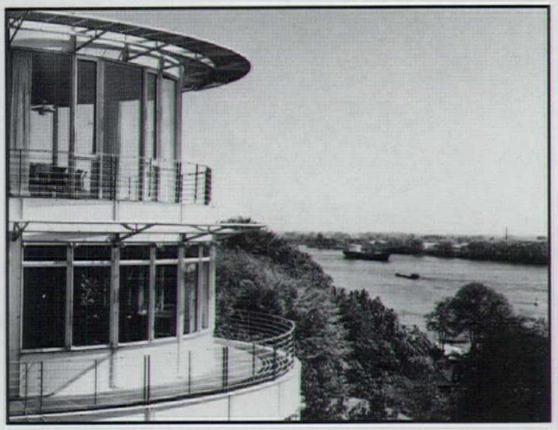


SECTION THROUGH SUNSCREEN

4"/9mm



UNDERSIDE OF SUNSCREEN



SOUTHERN END OF BUILDING

Photos: Leiska

Sunscreen
Architectural Office
Hamburg, Germany

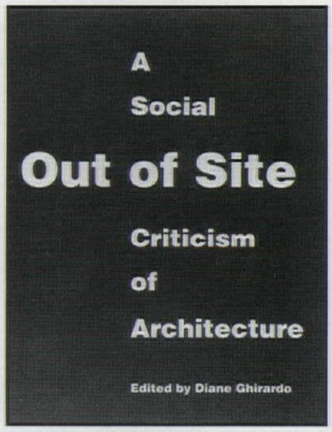
Designed by the Hamburg firm of von Gerkan, Marg & Partner, this aluminum sunscreen shades the south- and east-facing glass of the firm's own offices. Supported by triangular brackets bolted to the building, the screen consists of perforated, horizontal, aluminum panels fastened to reveals on the underside of aluminum tubes that connect one bracket to the next. To reduce the number of parts and to even out the shadow under the screen, the architects have angled the inner row of aluminum panels downward. From the center of each pair of brackets hangs a fabric roller shade protected from the elements by a curved plexiglass cover; the shade can be pulled down in front of the windows to counter the glare from the nearby harbor.

Architecturally, the sunscreen has several benefits. It resolves the problem of having a south-facing view by allowing the architects to use large areas of clear glass without greatly increasing heat gain. It also serves as a cornice to the building and ties it visually to the broad-eaved Tuscan villa at the front of the site, to which the new structure is attached. Finally, the sunscreen, along with the pipe railings, ramps, and curved end of the building, recalls the ships that ply the harbor just down the hill and a block away. ■

Out of Site or Out of Bounds?

The left and the right are in a tug of war over the scope of architectural criticism.

David Clarke's review reflects the turf war underway.



Out of Site: A Social Criticism of Architecture *edited by Diane Ghirardo, Bay Press, Seattle, 1991, 250 pp., $16.95 paper.*

In general, this is a book of essays where people bang their heads against the wall. Most of the writers are latter-day left-wingers. One can understand their frustration, but you would think they would give it up at some point. As the tide of socialism receded, not everyone was washed out to sea. When Diane Ghirardo complains in her introduction that "Architecture remains autonomous from the range of ideological, political, social, and economic roles..." she denies both the reality of clients (read *Architecture, Men, Women, and Money*, 1985, by Roger Kennedy – a *good* book) and the most basic premises of America: the right to private property and to enter into contracts freely. These conditions guarantee atomistic abrasion between professions and society at zillions of points, not just one (as in Albania). But when she speaks of "...the current institutional production of architecture..." and bandies about loaded words like "orthodoxy," she implies conspiracy. She has a way of seeming to validate reality in one sentence and to dismiss it in the next. It is teasing writing, swinging back and forth but never really going anywhere. She doesn't argue; she wisecracks and dispenses negatively charged buzzwords. Above all, it is cute, as in the book title.

Kenneth Frampton's lead article is a transcribed address on the decline of public building. Intensely literate, he drops Argan, Pugin, Ruskin, Husserl, Hertzberger, Krier, Holbein, Semper, Brancusi, Heidegger, van Eyck, Mumford, and finally Baudelaire. But not Richard Sennett, whose *The Fall of Public Man*, 1977, would seem central to Frampton's thesis. Frampton is later pilloried by his co-essayist Vincent Pecora for his running-dog imperialistic revisionism.

Margaret Crawford believes that architects are not only responsible for the homes of the homeless but also for their homelessness. She regrets the necessity of clients. She characterizes Burnham as someone who "...served Chicago's commercial and real estate interests..." as if he were some sort of whore. She (and others herein) is also fond of passive voice construction: "...the postwar welfare state...was no longer perceived as a benign mediator operating on behalf of the masses...." Perceived by whom, one wonders. She regrets the inability of architects to empower the masses in the 1960s.

Crawford (and she is again not alone herein) does a nasty little exegesis on Robert Venturi, whom I never thought I would have to defend in print but now must. I have never liked his buildings. I think they are fussy, mannered, and (my worst epithet): "look at me." But if he had never built a single beach house, his slim *Complexity and Contradiction in Architecture* of 1966 would still make him a towering figure of world architecture in the third quarter of this century. The world seems ready to toss Gorbachev in the dustbin, but history will never forget the doors he opened. It is the same with Venturi: some came in and some went out, but the doors he opened changed things for the better forever – and he cannot be held responsible for any dreadful things that may have happened as other architects took his critical voice for artistic license.

"These are latter-day left-wingers. One can understand their frustration but you would think they would give it up at some point."

Vincent Pecora also beats Venturi about the head and shoulders, apparently for fun, and leads us through a thoroughly boring history of the journal, *Oppositions*.

Mike Davis gives us an updated version of *Chinatown*, i.e., the recent development of Los Angeles's CBD with purple prose such as "...panzer divisions of bulldozers...." He also gives a twist on the passive voice with constructions such as "Downtown's only authentic, deep vision..."; except that downtowns can't have visions – only people can.

Ghirardo's article on the Wexner Center peels more onions. Re-reading it leaves me with the same impression I had the first time: that she and Eisenman are quite a pair.

Ferruccio Trabalzi's article is a thoughtful, dis-

(continued on page 177)

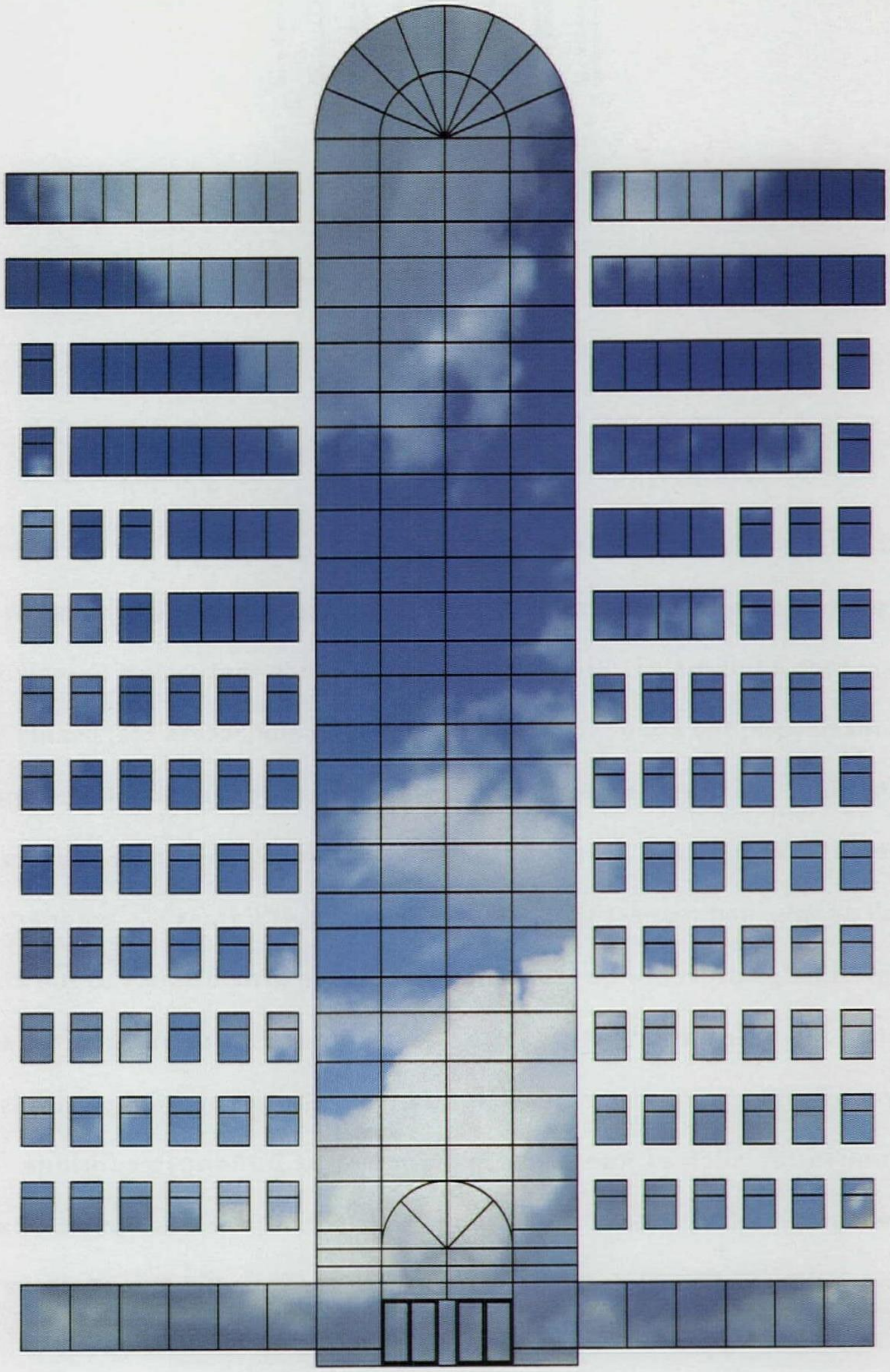
Books of Note

Architecture in Scandinavian Countries *by Marian C. Donnelly, The MIT Press, Cambridge, Mass., 1992, 401 pp., $39.95.*
From the obscure to the iconoclastic, the buildings in this survey of Nordic architecture (covering prehistoric times through the early 1970s) are positioned socially and historically.

Karl Friedrich Schinkel: A Universal Man *edited by Michael Snodin, Yale University Press, New Haven, with The Victoria and Albert Museum, London, 1991, 219 pp., $40.*
The 18th-Century German architect's masterful delineation of Classical and Gothic forms is supplemented with contemporary and archival photography. The book was published to coincide with an exhibition at the Victoria and Albert Museum.

The Villa: Form and Ideology *by James S. Ackerman, Princeton University Press, 1990, 304 pp., $45.*
Ackerman argues that this building type has not changed since its earliest incarnations in ancient Rome; its ideological and psychological program continues to be a counterbalance to urban life.

New Spirit in Architecture *by Peter Cook and Rosie Llewellyn-Jones, Rizzoli, New York, 1991, 203 pp., $50 cloth, $35 paper.*
For this international survey, the authors discarded categorical standards and sought work imbued with "spirit."



Technics Focus
Glazing

Contents

Pacific Gas & Electric.

Which glass is clear and which glass has a low-E coating?

The choice of glazing materials is one of the most complex material selection problems in design.

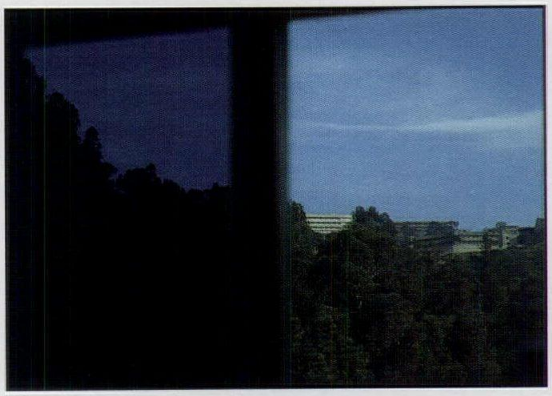
This month's Focus examines solar and optical properties, fire resistance, and breakage,

in an effort to clarify critical issues of performance.

Technics Focus: Cool Daylight

Researcher **Jennifer Schuman** of the Lawrence Berkeley Laboratory describes how

a new generation of glazing products offers the best of both worlds.



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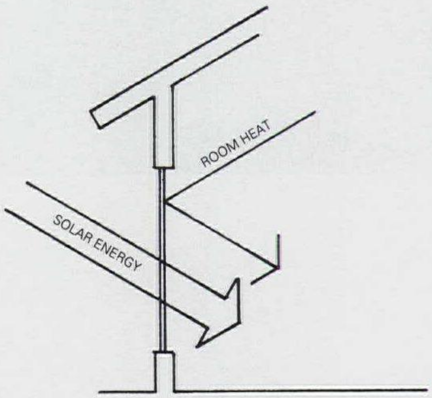

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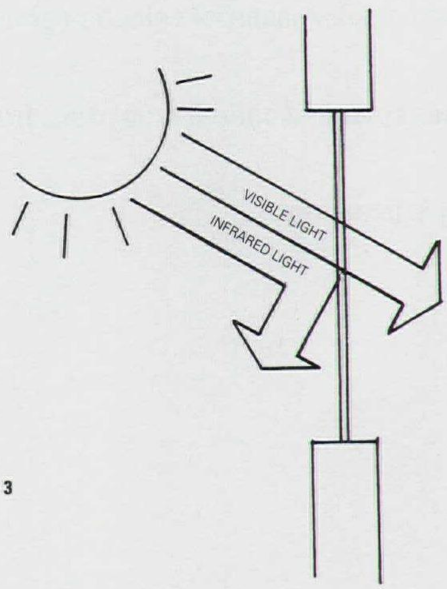


3

1 *These windows have exactly the same effect on the air conditioning, but the one on the right admits four-and-one-half times more visible light than the one on the left.*

2 *Low-emissivity coatings were originally designed to let in solar heat and keep the warmth inside a room. Conceptually, they do so by reflecting long wave infrared heat back to its source.*

3 *The ideal glazing for cool daylight would transmit only the visible part of solar energy.*

Window design is tricky business. Confronted by myriad conflicting criteria and a baffling array of products, one might be forgiven for losing sight of the window's historical reason for being: to illuminate an enclosed space and open it to the world outside.

Windows require the art of compromise. Designers must balance heat loss, solar heat gain, light, views in and out, and appearance, to name just a few of the complex issues involved (1). Something usually has to be sacrificed in the final design. For example, houses often trade smaller window area for lower heat loss, and commercial buildings often trade a darkened view for lower solar gain. Windows also have traditionally been the most vulnerable element of the building skin, a source of problems as much as an amenity.

All of that has changed over the last few years: new technologies have given architects a more versatile palette for window design, with fewer trade-offs. This article discusses the most recent glazing problem to be tackled – controlling admission of the unwanted heat in sunlight without dark or mirrored glass that sacrifices light and view.

First: Improved Window Insulation

Until just a few years ago, glazing advancements were aimed primarily at reducing heat loss, resulting in window assemblies with higher R-values. Glass is highly conductive, which means single-pane windows let heat pour out of a room. By trapping air between two panes of glass, the thermal resistance is doubled – a simple enough solution that the majority of windows in the U.S. are now manufactured with insulating glass (IG).

Air alone, however, can be only so effective. A major improvement was achieved with the development of "low-emissivity" coatings. These ultra-thin, transparent, metallic coatings make a window act like a thermos bottle, where heat is reflected back to its source. Applied to at least one of the inside glass surfaces in an IG unit or on a plastic layer suspended in the air gap, "low-E" coatings increase the window's ability to reflect long wave infrared radiation, reducing energy loss from a warm room (2).

The improvements didn't stop there. Another recent enhancement has been the use of gases less conductive than air, such as argon and krypton, to fill the gap. Low-E gas-filled windows are so effective that now attention has focused on the edge of the IG unit and the window frame as the thermal weak points of the assembly [see "Windows to the Future," P/A, June 1990, pp. 47–51]. Improvements there include thermal breaks in metal frames, greater use of wood and clad wood sash and frames, or the substitution of lower conductance frame materials like vinyl. All of these technologies permit windows to shake their heating load liability. In fact, a multilayered low-E window with gas fills and a good frame will outperform a standard insulated wall in terms of overall seasonal heating loads, even on north walls.[1] After about 15 years of research and development, windows are no longer a liability in terms of heat loss. One long-standing trade-off is down.

Next: Rethinking Solar Control

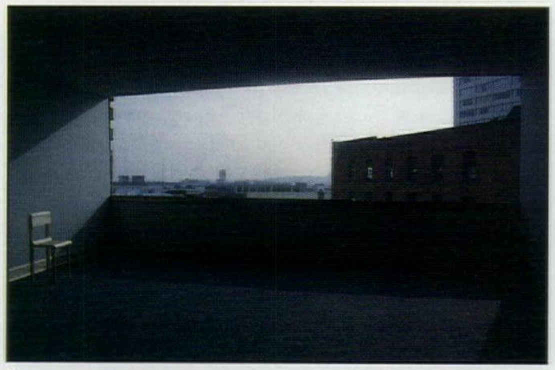
Controlling heat gain is an entirely different problem. Although the relationship between windows and air conditioning is significant, little has changed over the past decade or so in glazing technology to reduce solar gain. Houses in warm climates and commercial buildings almost everywhere generally need to limit the admission of solar heat. Standard practice includes the use of tinted glass or the application of reflective coatings to glazing, which typically create a dark or mirrored window. These windows successfully inhibit solar gain, but view out is considerably degraded, and useful light entering the space is reduced or nearly eliminated. This approach to solar control has been challenged in a rethinking of the basic problem: by focusing on the difference between solar "heat" and light, clearer glazings with excellent solar control properties are now available. Sometimes advertised as "cool daylight" glass, these products are targeted primarily for commercial buildings and sunbelt houses.

Solar Glazing

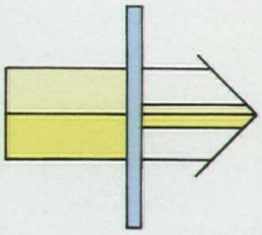
It is easiest to understand why new "cool" glazings were developed by examining the drawbacks of traditional technologies. Large cooling loads in most commercial buildings generate an unquestionable need for solar control. Since it is not always possible or desirable to shade windows with façade attachments such as overhangs, manufacturers developed tints and coatings as a way to provide shading within the glass itself. These glazing treatments work by absorbing or reflecting solar energy before it enters the space. Unfortunately, the technologies originally developed for this purpose cut light and view along with solar gain.

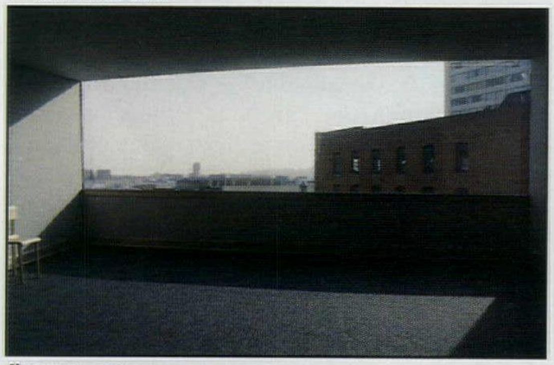
These aspects of the glass are described by two common terms. The *shading coefficient (SC)* measures how well a particular glazing reduces solar heat gain. The *SC* for common products ranges from 1.0 (clear glass) to 0.2 (reflective). *Visible transmittance* describes how transparent the glazing is to light. The common range is 0.9 (clear) to 0.06 (reflective). Many standard tints and mirror coatings achieve a low shading coefficient at the price of low visible transmittance, which means the window appears dark.

Dark windows have become an accustomed design choice. In some circumstances, low visible

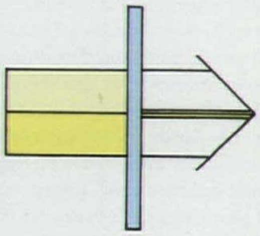


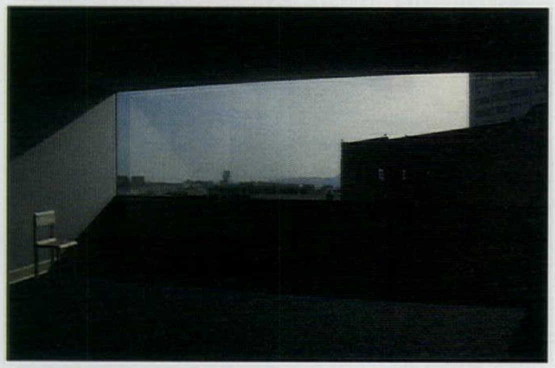
4a GRAY TINTED GLASS



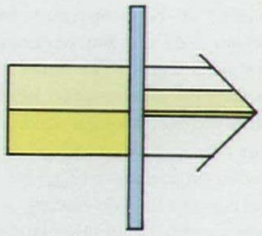


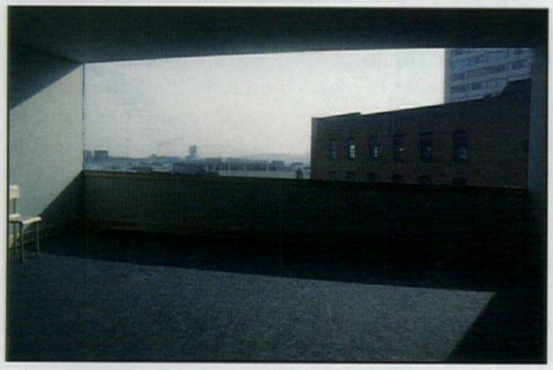
4b REFLECTIVE COATING ON CLEAR GLASS



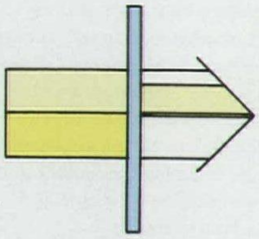


4c SELECTIVE LOW-E COATING ON CLEAR GLASS





4d SELECTIVE LOW-E COATING ON SELECTIVE TINTED GLASS



Credit: Pacific Energy Center, Pacific Gas & Electric

4 *Four types of glazing solar control are shown in this comparison of visible vs. infrared transmittances.*

transmittance is desirable – to control glare, for example. However, when light sensitivity is not an issue, or when glare control can be accomplished through other means, both research and intuition suggest that clear views are important to the well-being of building occupants, providing visual relief and a connection with the outdoors.[2] Dark windows tend to create gloomy environments, where occupants feel removed from the patterns of time, weather, and the seasons.

Dark windows also create spaces that require constant use of electric lighting. Electric lighting is one of the biggest energy users in commercial buildings, both in direct electricity and in associated air conditioning load from the heat produced by the fixtures. It is well-established that the use of daylight for illumination can be a significant energy-saving strategy.[3] Electric lighting is reduced, through manual switches or with a system of photocell sensors and automatic dimming controls, when adequate daylight enters the workspace. Effective daylighting design is inherently difficult to achieve with glazing of low visible transmittance.

How "Selective" Glazings Work

Is it possible to have both daylight and solar heat gain control? Yes, if the strategy for solar control distinguishes between the visible and invisible portions of solar energy (see sidebar). For buildings with cooling loads, an ideal glass would allow most visible light to pass through while blocking all infrared heat. Such a window could be any color (or no color), allowing clear views and admitting useful daylight, but with the shading coefficient of a dark tinted glass (3). Glazings that respond in a specific way to different wavelengths of radiation are called *spectrally selective.*

Selective glazings pay attention to visible transmittance as well as shading coefficient, because shading coefficient does not in itself differentiate among the components of solar energy. This means that two pieces of glass could have the same shading coefficient but appear very different. For example, one glass might totally block all visible light (and appear black) while another might look completely transparent, and yet the shading coefficient of the two could be identical.

Many standard tints and coatings block more energy in the visible spectrum than in the infrared (4,5), which is rather a backwards approach to the problem. It is only recently that a renewed interest in light and views has motivated a reverse technology, where transmission is reduced primarily in the infrared. More light is permitted to pass through the glass without a change in shading coefficient. Spectral "tuning" of tints and coatings is the latest focus in glazings for cooling-dominated buildings.

The consideration of light transmission together with solar control has led to a new glazing performance index, *glazing luminous efficacy* (K_e).[4] Luminous efficacy is a term normally used to describe the ratio of light output to power input of an electric lighting source, and is often interpreted as an expression of the lamp's light-to-heat relationship. Windows, in other words, can be thought of as lighting fixtures, with an associated undesirable heat component. The luminous efficacy of a window is calculated as the visible transmittance of its glazing divided by the shading coefficient. A highly selective glass, blocking heat while admitting light, will have a high K_e (6). For cooling-dominated buildings that use daylighting controls, the higher the K_e the better. There is a physical limit to the achievable K_e for a neutral color glass. Approaches to selective glazing technology fall into two categories, spectrally selective tints and spectrally selective coatings.

Selective Tints

Tinted glass – sometimes called heat-absorbing glass – has been around for a long time. Energy absorbing materials are dispersed throughout glass, lowering the shading coefficient and giving a tint. There are several standard tint compositions that appear generally bronze, gray, blue, or green in color. Blue and green glasses tend to transmit a relatively high fraction of visible light versus infrared, whereas gray and bronze are the opposite (5,6). In other words, blue and green tints are naturally selective for visible light.

The advantage of heat absorption with a tint has been the ability to provide control without the mirror appearance or cost of a reflective coating. However, there are significant disadvantages. By definition, tinted glass has color (although neutral grays are available). A tint by itself can achieve only a modest shading coefficient, partly because some of the heat absorbed by the tint eventually transfers into the space. Shading coefficients typically range from 0.5 to 0.8, varying by tint composition and glass thickness. Both the shading coefficient and the K_e of a tint can be improved if the tint is used in the exterior pane of an insulating unit.

Recently, blue and green tints (this includes aqua) have been "tuned" for even better daylight selective transmission. Selective tints in these colors are currently available from several manufacturers, who report brisk sales – possibly boosted by the current design popularity of blue and green windows. Even with highly selective tints, however, there are performance boundaries when using tints alone. The same shading coefficient limits for standard absorbing glazings apply to selective tints. The blue, green, and aqua selective tints are also already near their limit in luminous efficacy. Selective colors are limited to the blue/green family; other colors may improve somewhat, but are never likely to be in the selective category. To break away from any of these restrictions requires the use of a selective transparent coating, either substituted for or in addition to a tint.

Selective Coatings

Glass surface coatings were developed for superior solar control over tints, with the more effective coatings working principally by reflecting rather than absorbing incident solar energy. Less absorbed energy means less heat is re-radiated into the space.

Terminology

Making use of the latest advancements in glazing technologies requries new attention to some of the terminology involved:

Solar energy spans a wide range of energy wavelengths; its spectrum ranges from the *ultraviolet* (fades fabrics) through the *visible* (light we can see) to the *near infrared* (solar heat). Sunlight is approximately half visible energy and half infrared, with a very small percentage in ultraviolet (8).

Near and far infrared, also called short and long wave infrared, are what we normally think of as heat. All warm objects radiate this kind of energy, with the wavelength of the radiation dependent on the temperature of the object. The very hot sun emits short wave infrared. The much cooler objects we encounter here on earth radiate at longer wavelengths (8).

***Visible transmittance* (T_{vis}) is the percentage of light energy striking a given glazing that is passed through. Higher numbers mean more light will enter a space and views out will appear brighter.**

The *shading coefficient* (*SC*) is a measure of total solar heat that is transmitted by a given glazing. Lower numbers mean less energy is transmitted. *SC* does not distinguish among wavelengths within the solar spectrum, therefore a low coefficient can be achieved through reducing transmission of any combination of visible and near infrared energy.

***Glazing luminous efficacy* (K_e) describes the relationship between total solar heat transfer and visible transmittance for a given glazing. Sometimes called "coolness index" or "performance index," K_e is calculated as visible transmittance divided by shading coefficient ($K_e = T_{vis}/SC$). Glazing with a low K_e means the shading coefficient of that glazing is achieved with a penalty in visible light transmittance, whereas a high K_e means light is not sacrificed for solar control.**

Like some standard tints, typical reflective coatings do not distinguish between the visible and infrared portions of sunlight.

Mirrored glass tends to be even less selective than tints, with the lowest luminous efficacies of all glazing products. The mirror-like appearance itself is the clue that most visible light is being reflected away. Their shading coefficients may go as low as 0.11; however, reflective coatings with a low shading coefficient admit very little light and create a dark view. The coating industry therefore became interested in developing a more selective product, to achieve the same solar performance without a darkened mirror effect.

The success achieved with selective tints has, in fact, been surpassed in the category of coatings. An entirely new approach to solar reflective coatings, with no color or mirror effects, emerged as a variation on an established technology: the same low-E coatings developed to reduce heat loss in homes have been spectrally tuned to reduce solar gain as well. Original low-E coatings were designed to be highly transparent throughout the solar spectrum and more reflective in the energy region of longwave infrared, where room temperature heat radiates. Selective low-E coatings pull reflectance back to the shortwave infrared, to block solar heat transmission as well (7). Selective low-E coatings offer the best spectral performance with an innovative concept in reflective glazings: since they reflect primarily in the invisible infrared, these transparent coatings achieve a high degree of reflectivity without a mirror effect and without color. The shading coefficient is lowered even more when a selective low-E coating is used together with a selective tint.

The Benefits

Spectrally selective glazings yield greater freedom in the design of fenestration and a greater range of glazing options by reducing the trade-off among design criteria like window size, view clarity, glass color, shading coefficient, daylighting potential, and cooling load. For example, in a given building design, the selection of a highly selective glass over a traditional product offers the following possibilities:

Aesthetics:
- Clearer view with equal or lower cooling load.
- Larger window area with equal or lower cooling load.

Energy Use:
- Lower cooling load without affecting view clarity, glass color, or window area.
- Optimized energy savings due to daylighting.

Codes:
- More flexibility in meeting energy code requirements.
- Accommodation of neighbors' concerns regarding mirrored façades.

When selective tints are used alone, the choice of colors is currently limited to blues and greens, and shading coefficients are only moderate. With a selective low-E coating, however, the possible combinations of glazing appearance and shading coefficient broadens. These coatings help eliminate traditional conflicts between performance and appearance of glazing. When used in IG units, selective coatings additionally offer superior thermal resistance, minimal condensation, and high thermal comfort for occupants, in addition to the increased light transmission and solar control. The energy benefits of these performance features are significant in all climates.[5] In many cases, selective products also reduce ultraviolet transmission.

Cautions

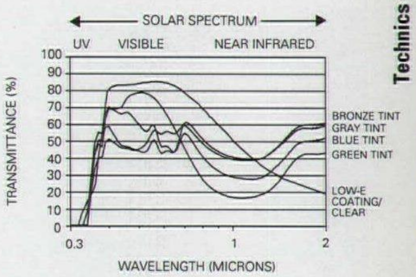
Spectrally selective tints and coatings are not a perfect solution. These technologies may require more costly fenestration systems, although the premium will normally pay back quickly if a designer capitalizes on reduced energy costs for air conditioning or lighting, or on possibly lower costs of HVAC equipment because of peak load reductions. The glazing premium also may be seen as negligible if the possible beneficial effects of clearer views on tenant satisfaction, occupant comfort, or building market value are considered.

A more difficult issue is the increased likelihood of glare when glazings with high visible transmittances are used. A typical office space receives daylight from only one side. The difference in luminance between the bright window and the darker interior can result in discomfort because of contrast glare. The brighter the window, the more likely contrast glare will be an issue.

A related problem is the reflection of bright windows in computer screens [see P/A, October 1991, pp. 35–40]. While building occupants often value view so highly that they will attempt to disregard any window glare, the eventual discomfort can take its toll in the form of diminished work performance and occupant dissatisfaction with the space.[6] A dark glazing is one approach to reducing this type of glare. Alternative architectural solutions require more skill but leave the choice of glazing less restricted. High-visible-transmittance glazing requires careful attention to glare reducing design strategies, especially if windows are on only one side of the room. Techniques include using blinds, light shelves, light-colored interior finishes, splaying the window jambs, and brightening the back of the room with a skylight or other light source.

Availability and Application

From a design and construction perspective, selective glazings are physically the same as standard products, making them an easy substitute for conventional ones. Selective tints and selective low-E coatings are available in single, insulating, or laminated glass. There are variations in types of coatings; the most selective silver-based low-E coatings must be protected from the elements and are thus enclosed in the air gap of an IG unit or incorporated into the sealed plastic interlayer of a laminated unit. More durable low-E coatings can be applied to single glazing; these "hard coat" coatings, however, have not yet been developed with selective charac-



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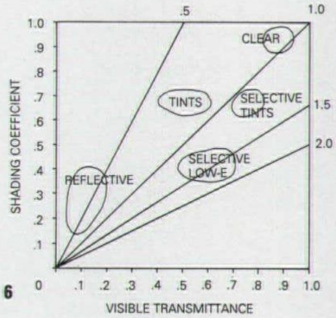

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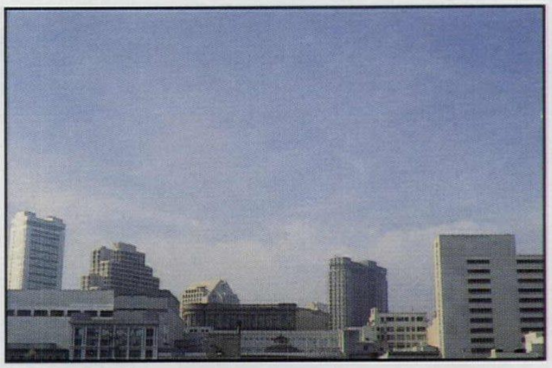
5 *The transparency of glazing depends on the wavelength of the energy striking it. Some glazings are more transparent to visible light than infrared heat. The glazings shown in (1) – which achieve the same shading coefficient through very different spectral response – are approximated by the "gray" and "low-E" curves.*

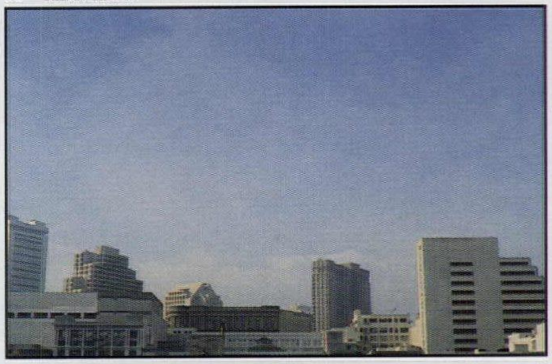
6 *Luminous efficacy (K_e) of generic glazing categories. Note that selective glazings have a very high light-to-hea ratio. Diagonal lines indicate K_e constants.*

$T_{vis} = 0.81$ **$SC = 0.88$** $K_e = 0.9$



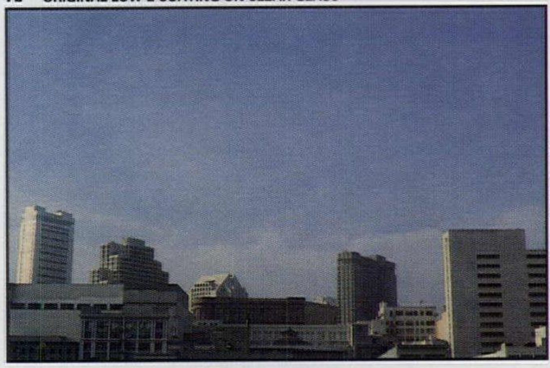
7a CLEAR GLASS

$T_{vis} = 0.77$ **$SC = 0.71$** $K_e = 1.1$



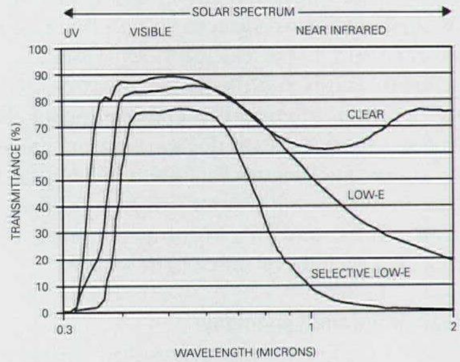
7b ORIGINAL LOW-E COATING ON CLEAR GLASS

$T_{vis} = 0.71$ **$SC = 0.49$** $K_e = 1.4$



Credit: Pacific Energy Center, Pacific Gas & Electric

7c SELECTIVE LOW-E COATING ON CLEAR GLASS



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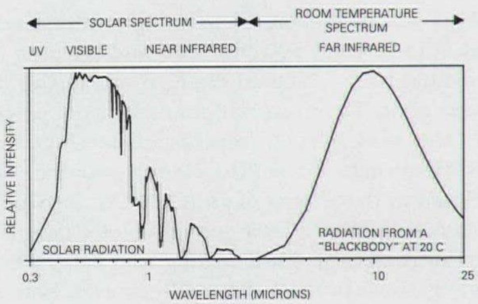

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7 *Spectral transmission of original and selective low-E coatings is compared to that for clear uncoated glazing. Note that the glazings look very much the same, even though the shading coefficients are very different. Selective low-E coatings were developed for commercial buildings, to be less transmissive (and more reflective) in the near infrared.*

8 *The spectrum of the sun's energy is shown with the radiation from a warm room. Note that the range of 7d is less than half of that of 8.*

teristics. Since the most selective low-E coatings are available only with insulating or laminated glass, designers might consider these as possible substitutions for single glazing.

Low-E coatings have not experienced degradation problems after 10 years of sales, and spectrally selective coatings are expected to share their durability characteristics. Sealed units require no special treatment in installation or maintenance. Exposed coatings need some minimal special handling, but are otherwise stable. In all cases, selective glazings require no change in building design or construction.

Choices of color depend on whether the selective glass is a tinted or a coated product. For coated glazings, a wide range of colors and exterior visible reflectances are available. For non-coated glass, selective colors are limited to the blue/green family. However, there are differences among the other colors; it makes sense to pay attention to product data regardless of desired color.

There are clear applications for selective glazings in both commercial and residential buildings. Most commercial buildings can reduce cooling costs and increase occupant comfort with a lower glass shading coefficient, which means a selective glazing results in easy energy savings. The choice of a selective glazing also can permit a subtle tint where a heavy reflective glass is indicated, or a clear glazing when a tint is expected. The transparency of selective low-E coatings is the major advantage for sunbelt residential applications, where solar control is important, but heavily tinted or mirrored glazings may be undesirable.

If the advantages of these glazings are appropriate for a building, then designers should learn more about available products. Manufacturer literature includes tables of visible transmittance, shading coefficient, U-value, and reflectance data. In addition, some manufacturers may list glazing luminous efficacy and/or ultraviolet transmission. When comparing products, check that product literature states that properties have been calculated consistently with the WINDOW 3.1 or 4.0 software (sidebar). One of the goals of the National Fenestration Rating Council (NFRC), currently establishing rating and labeling procedures for windows, is to ensure that one product can be fairly and accurately compared to another.

Making sense of the numbers may not be easy. It is important to consider all glazing performance characteristics together, while simultaneously juggling and weighting all the affected window design criteria. It is usually inappropriate to select glazing for only one or two characteristics; however this is often the case – color and/or shading coefficient alone drive most glazing decisions.

The number and complexity of variables involved in window decisions suggest that optimal design may require computer analysis. Nonetheless, careful selection is not overly difficult, given some knowledge about glass properties and design intent. The starting point in the process depends on initial criteria and the field of available products; a final decision may be arrived at through an iterative process.

For example, if HVAC loads are the primary concern, then shading coefficient and U-value may lead to an initial glass selection [see "A Thermal Performance Factor for Comparing Glazing Alternatives," P/A, June 1990, p. 45]. Then, take the visible transmittance of that glass as a new starting point in examining alternative glazings. To improve the view or the daylight, select another glazing with the same shading coefficient, but a higher visible transmittance. Or, to improve the energy savings, select a glass with the same visible transmittance, but a lower shading coefficient. In another scenario, where light and views are critical, begin by indentifying desired window area and a target for visual transmittance and then narrow the field of product choices by considering glare and air conditoning load. In all cases, examining visible transmittance together with shading coefficient will increase design choices, energy saving potential, or view clarity.

For skylight design, a simple tool to ease this process is the *Skylight Handbook* design manual developed by LBL and Charles Eley Associates.[7] This handbook contains a quick method for optimal skylight design, recognizing the benefits of glazing luminous efficacy. A similar set of guidelines for vertical glazing is under development at LBL.

A final decision will likely rest on appearance. Contact manufacturer representatives for samples and consider using them in scale models to study the effect of glazing on interior environment as well as on the façade. Other resources include utility companies, who are increasingly becoming a source of information and design assistance for energy efficient buildings. A designer can seek guidance with glazing studies at facilities such as Pacific Gas & Electric's Pacific Energy Center (in San Francisco at (800) 468-4743, Ext. 951), The Lighting Design Lab, sponsored by the Bonneville Power Administration and a consortium of northwest utilities and agencies (in Seattle at (206) 329-9711), and Southern California Edison's Customer Technology Applications Center (in Irwindale at (818) 812-7380 or in California at (800) 336-CTAC). These facilities offer not only glazing mock-up labs, but also assistance in other areas of building technology, including daylighting and electric lighting design.

Some building codes, standards, and utility rebate programs are beginning to recognize the energy benefits of selective glazings. ASHRAE Standard 90.1, on which many building energy codes are based, encourages the use of glazing with a luminous efficacy greater than 1.0.[8] Some utilities now offer rebates for installation of such glazing, which typically covers the premium for the high performance tints or coatings. For example, Southern California Edison will pay up to $3.00 per square foot of installed selective glass if daylighting controls are also used. Several other utilities across the country offer incentives for energy efficient design specifications. Inquire at your local utility for information about possible glazing rebate programs.

Another application for selective glazings, and particularly for selective low-E coatings, is in response to a growing backlash against mirrored building façades. In regions where mirrored glass has been banned, selective glazings are another alternative for solar control.

Are selective glazings the end of the technology road for windows? Probably not; researchers are active in long range concepts such as "switchable" glazings that dynamically change properties as needed and "holographic" glazings that redirect incoming light deep into the building. In the meantime, selective glazings may be our best bet for rediscovering the art of designing windows from the inside out. **Jennifer E. Schuman** ■

The author is a research staff member in the Windows and Daylighting Group of Lawrence Berkeley Laboratory (LBL) and a member of the architecture faculty at CCAC, San Francisco. LBL is the lead national laboratory for the Department of Energy's programs dealing with window and glazing technology research and development.

Acknowledgment

The author wishes to thank her colleagues at Lawrence Berkeley Laboratory for their comments, and the staff of PG&E's Pacific Energy Center for help in preparing the photographs. Thanks also go to Nick Limb and Paul Gore, Libbey-Owens-Ford, and to Jim Larsen and Bob Spindler, Cardinal IG, for providing useful information.

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WINDOW 4.0

Comparing one window to another can be a difficult task, given the various combinations of glazings, gas layers, frames, spacers, dividers, and environmental conditions that must be considered in the analysis. WINDOW 4.0 is a public-domain PC computer program developed by the Windows and Daylighting Group, Lawrence Berkeley Laboratory, for analyzing the thermal performance of fenestration products. The program has become the established standard in the glazing industry, and the new 4.0 release has been significantly enhanced to broaden its usefulness for designers and others in the building community. WINDOW 4.0 provides a versatile heat transfer analysis method consistent with the rating procedure developed by the National Fenestration Rating Council (NFRC), and can be used to design and develop new products, to rate and compare performance characteristics of all types of window products, to assist educators in teaching window heat transfer, and to help public officials in developing building energy codes. Among many valuable features, the program can perform spectral calculations and provide the visible transmittance and shading coefficient of a complete window system. It also contains a comprehensive glazing product database. To obtain the software, contact NFRC at (301) 589-NFRC, or Bostik Construction Products at (800) 523-6530, or within Pennsylvania at (215) 674-5600.


AVOID THE WORLDWIDE GLUT
OF ANONYMOUS CARS.

Technics Focus
Fire Rated Glazing

Fire protection engineer **Harold D. Hicks, Jr.**, clarifies issues in

the requirements and products for fire rated wall openings

The performance of fire rated glazing materials has historically been based on the materials' ability to resist the passage of flame for the duration of a defined fire exposure. Until the early part of the 1980s, designers were limited to the use of wired glass and glass block for the protection of openings in fire barriers. Today, a wide range of materials is available, each offering new possibilities for design. These new materials have achieved 60- and 90-minute ratings based on current U.S. fire test methods. In fact, some of the materials have the ability to provide up to two hours of fire resistance as a *wall assembly.*

1 COMPARISON OF ASTM E 152, ASTM E 163 AND ASTM E 119

	FIRE DOORS ASTM E 152 (U.L. 10B)	FIRE WINDOWS ASTM E 163 (U.L. 9)	WALLS ASTM E 119 (U.L. 263)
TIME-TEMPERATURE CURVE	Run to 8 hours or over	Run to 45 minutes	Run to 8 hours or over
UNEXPOSED TEMPERATURE	Recorded for first 30 minutes	Not recorded	Recorded every 15 minutes may not exceed 250 F above ambient
CONSTRUCTION AND SIZE	Representative	Representative	Representative
TIME OF TEST	Desired classification	45 minutes maximum[1]	Desired classification
CONDITIONS OF ACCEPTANCE	Remains in opening Movement within specified limits Separation restricted No opening except for vision panel during hose stream	No separation of edges from framing Not loosened During hose stream; 30% through openings acceptable; 50% in any light At least 70% of block shall not have through openings	Maximum unexposed side temp. 250 F above ambient No passage of flame gases hot enough to ignite cotton waste No openings before or after hose stream test, no water may pass through wall

1 UL 9 was revised during 1991 to permit running the test to the desired classification.

These new materials include wireless glass, clear ceramics, tempered safety glass, and glass block. Glass block is usually treated separately because a glass block assembly is similar to masonry construction. The tempered safety glass used in fire rated glazing is one element in a total assembly.

The use of many of these materials depends largely on the type of opening to be protected. The American Society for Testing and Materials (ASTM) maintains three fire test standards relating to the performance of walls, doors, and windows. Each method is used to determine the fire resistance rating of specific assemblies. ASTM E 119 *Fire Tests of Building Construction*[1] is the test method used to determine the ratings for walls and partitions, floor/ceiling assemblies, roof/ceiling assemblies, beams, and columns. ASTM E 152 *Standard Method of Fire Tests of Door Assemblies*[2] and ASTM E 163 *Standard Method of Fire Tests of Window Assemblies*[3] each deal with elements that may be used as protection of openings in fire barriers.

All three standards depend on the accepted time temperature curve for the testing furnace and require application of a hose stream. The differences from test to test can best be summarized (1) by looking at what is not considered when testing doors and windows, as opposed to the testing of walls. These include: 1 There is no requirement that fire doors and windows limit temperature rise on the unexposed side of the protective element (although for doors the temperature rise is recorded because building codes set a limit of temperature rise for doors used in stairwells); 2 glass blocks are permitted to have 30 percent poke-through openings on completion of the test; 3 there is no requirement to limit the passage of flame or smoke to the unexposed side of the fire window or door.

Underwriters Laboratories, Warnock Hersey, and other testing agencies use the ASTM test methods as the foundation for listing approved products. To refrain from restraint of trade, the building codes adopt the ASTM methods as opposed to a specific fire test laboratory standard. This has led to some confusion over the extended fire durations because the ASTM tests for fire windows currently recognize only 45 minutes as the maximum duration, whereas some test agencies certify for 60- and 90-minute ratings.

Traditionally, fire rated glazing was evaluated as either a window, a glass block wall, or vision panels in a fire door. Some of today's products have been successfully tested as a wall assembly. Throughout the United States, each of these elements of building construction is regulated by three model codes – the Uniform Building Code[4] (UBC), the Standard Building Code[5] (SBC), and the National Building Code[6] (NBC). Each code affects specific geographic areas of the country, and each contains similar language concerning fire barriers. Many municipalities adopt the model codes or promulgate their own code. The designer must be aware of each municipality's requirements, as even the model codes may be amended.

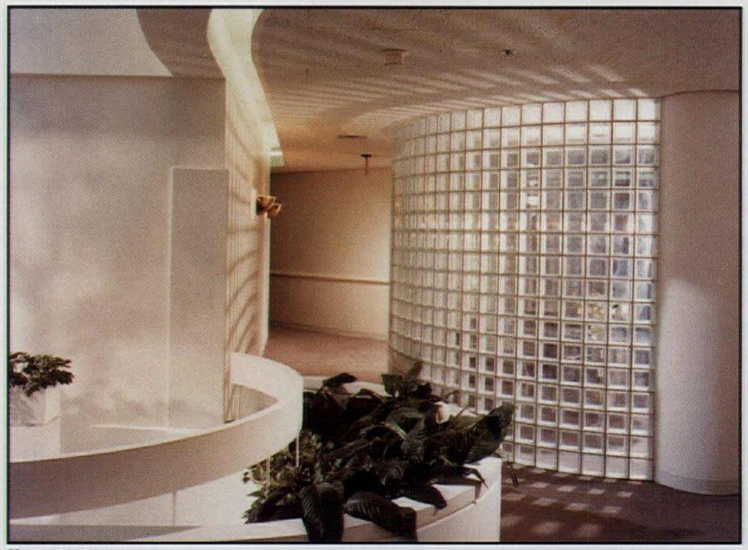
Fire Barriers

To understand where fire rated glazing can be used, the designer needs to understand the fundamentals of fire barriers. Fire barriers are defined as construction elements that restrict the passage of flames, *retard the transmission of heat,* and/or limit the spread of smoke. Fire window assemblies and door assemblies form one component of the total fire barrier. Fire barriers are described in the codes as fire walls, party walls, fire partitions, tenant separations, fire area separations, occupancy separations, shaft walls, exit enclosures, and exterior walls. Each of the building codes uses different language to define these separations.

The main reason for confusion over the use of fire rating glazing is lack of a good understanding of fire barrier fundamentals. The model codes also

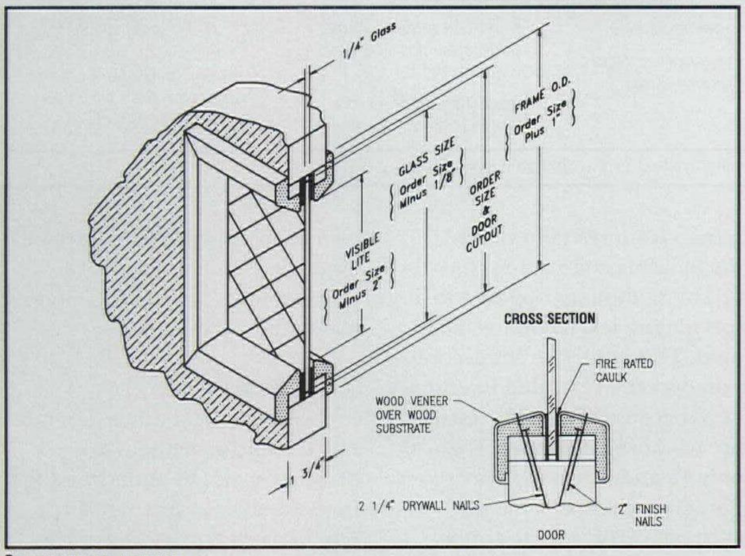
Safety And Fire Technology Inc.

2a "PYROSWISS" MONOLITHIC FLOAT GLASS



Pittsburgh Corning.

2b GLASS BLOCK

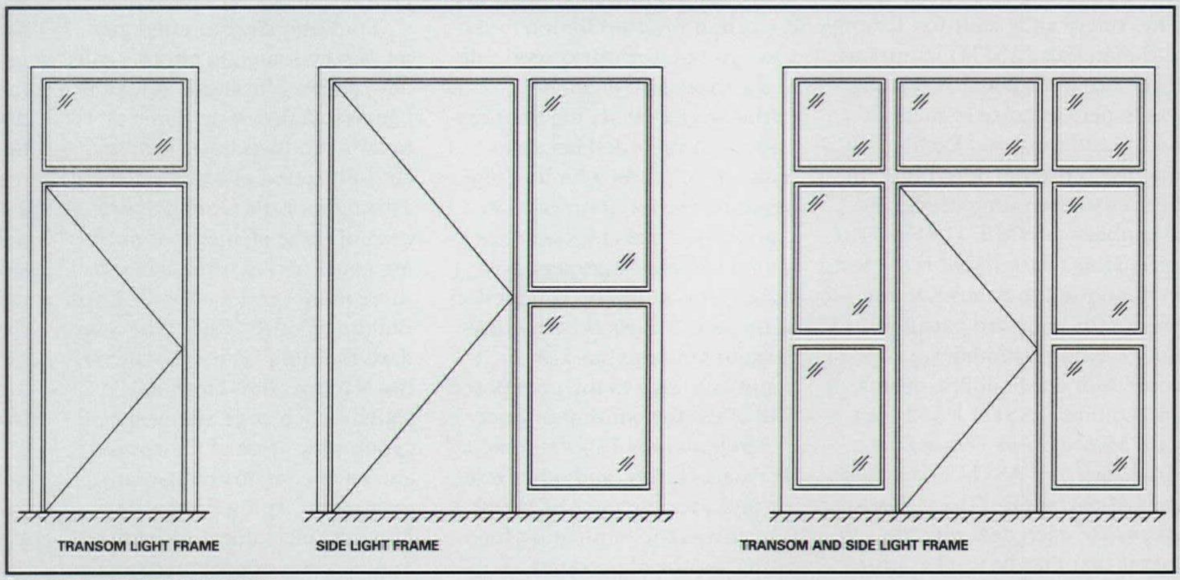


Anemostat.

2c WIRE GLASS, SECTION

Technical Glass Products/Wayne Thom Associates.

2d "FIRELITE" A FIRE RATED GLASS CERAMIC



Redrawn by Evan L. Goldenberg.

3 NFPA FIRE DOOR FRAMES AND LIGHTS

4 NFPA LIMITS ON GLAZING MATERIAL FOR USE IN DOOR ASSEMBLIES

DOOR RATING (HR)	MAX. AREA OF GLASS PER DOOR LEAF[2]
1/2 AND 1/3	Limited to the maximum area tested
3/4	Limited to the maximum area tested[1]
1, 1 1/2[2]	100 square inch (0.065 m^2)[3]

1 Maximum area of individual exposed lights 1296 square inch (0.84 m^2) with no dimension exceeding 54 inch (2.37 m) applies to 3/4-hour door rating.

2 Where used, vision panels in elevators shall conform to ANSI/ASME A17.1 *Safety Code for Elevators and Escalators*.

3 A proposed code change would permit an excess of 100 square inches in a door if so tested; until this change is accepted the building authority must determine if an equivalent level of protection is afforded.

use different terminology for each type of barrier. The term *fire separation assemblies* is defined in the NBC as "a fire resistance rated assembly of materials having protected openings, which is designed to restrict the spread of fire (see section 909.0)". Section 909.0 further defines the assembly as being used for the enclosure of exits, areas of refuge, and for subdividing into multiple fire areas. This differs from a fire wall, which must have structural independence.

The UBC defines *area separation walls* as "an assembly used to separate portions of a building so as to consider each portion a separate building". The fire resistance ratings of these walls is determined by the building construction type and will be either two hours or four hours. Occupancy fire separations are required for mixed occupancies. The fire resistance ratings determined for these walls are based on the types of occupancies to be separated.

For each type of fire barrier there are corresponding requirements concerning protection of openings. This protection includes fire doors, fire windows, fire dampers, and fire shutters. A glazing assembly that is tested by ASTM E 119 should not be confused as opening protection; it is a wall.

Fire Rated Walls/Partitions

For a fire rated glazing product to be considered a wall assembly, it must be tested in accordance with ASTM E 119. The conditions for acceptance as a wall include: 1 Maximum average temperature on the unexposed side shall not exceed 250 F above ambient; 2 there will be no passageway of flame or gases hot enough to ignite cotton waste; and 3 there are no openings before or after the application of a hose stream. The most significant criterion of acceptance is the ability of a material to resist heat transmission, specifically radiant heat. For this, a fire rated glazing assembly must have the same resistance as a wall.

A number of fire rated glazing products (2) have successfully met the conditions of acceptance for ASTM E 119. The entire assembly is tested and is approved accordingly. All approved systems consist of two panes (lites) of tempered safety glass separated by a metal spacer with a void filled with a clear polymer gel that provides an effective heat shield when exposed to fire. Because it is tested as a wall assembly, the limitations of its use are based on fire separation wall criteria. Quite often, authorities will be reluctant to accept these materials as walls; this is partly out of concern for glass breakage. However, the use of safety glazing should overcome these concerns.

Fire Door Assemblies

The National Fire Protection Association Standard 80, *Fire Doors and Windows*[7] defines a fire door as a component of a *fire door assembly*. A fire door assembly includes that portion which holds the door in place as well as any light panels above (transom) or to the sides of the door (3). The NFPA 80 technical committee has proposed new definitions for *fire door frame for lights* and *fire door frame for panels* for the 1993 edition of the code. Many of the new fire rated glazing products have been tested as both doors and transom and/or sidelights.

NFPA 80 limits the amount of glazing material that can be used in door assemblies (4). Further, 3-hour fire doors or doors having 1 1/2-hour fire protection rating for use in severe exterior fire exposure are not permitted to have glazing.

When considering glazing for a stairway, the designer must determine if the building code requires a not-to-exceed temperature on the unexposed side of a fire door assembly. For example, all three model codes require fire doors in stairways to have a maximum transmitted end-point temperature of not more than 450 F above ambient at the end of 30 minutes of standard fire test exposure. Given this requirement, fire rated glazing cannot be used unless the material has successfully restricted heat transfer. Each code does, however, permit a 100-square-inch wired glass vision panel or an equivalent protection in the door.

Fire Windows

A *fire window* is a fire rated glazed panel installed in a tested frame. The principal purpose of the window is to admit light and/or air to an enclosed space. Fire protection ratings for fire windows have always been recognized as providing less fire resistance than the barrier in which they are located. The reason for their acceptability is because easily ignited materials are not customarily stored against windows, and because fire suppression capability can easily control the small fires that may occur on the unexposed side of the opening.

The early restrictions placed on the size of glass panels stems from the limitations of wired glass. The maximum panel size of 1296 square inches probably is based on the structural stability of wired glass at 54" in the largest dimension under fire exposure. Today's glazing products can be as large as 4638 square inches with a maximum width of 50" and height of 92 3/4". The latter dimensions apply to a material that was tested as a panel to a fire door.

The maximum panel size does not govern the amount of material permitted in a fire barrier. The total area limits are defined by the building code. For walls, the limit for all opening protection is a maximum aggregate of 25 percent of the length of the wall, with the maximum area of any single opening limited to 120 square feet. The 120 square feet maximum is achieved by individual frames of fire windows.

Given these area allowances, the concern for heat transfer through a fire window has gained interest among some fire protection professionals, especially in structures without built-in fire suppression. The British recognized this concern in the mid-1960s and performed several fire tests to determine heat radiation effects. From these tests, performance requirements have been established to define safe distances from fire rated wired glass for combustibles and for people .

Heat Transfer and Glazing

Research by Margaret Law of the Ministry of Technology and Fire Offices Committee, Joint Organization Fire Research, identifies two fire protection and life safety concerns for using fire rated glazed openings. Both of these involve heat transfer. They are: 1 Means of egress past the installed glazing, and 2 non-piloted ignition of combustibles on the unexposed side of an opening.

The International Organization for Standardization (ISO), since 1976, has recognized that "glazed elements are unable to provide an appreciable degree of insulation against heat transfer." ISO Standard 3009-1981 establishes test criteria for measuring transmitted heat, permitting the national standards authority to specify safe radiation levels both for contents and for people safety (information relative to both of these performance approaches can be found in the Recommended Reading). The ISO Standard evaluates glazing based on integrity and its insulating quality. Integrity examines size of holes, cracking, and gaps around the edge of the test element. Insulating quality is a measure of radiation hazard. In response to this growing concern, the 1993 edition of NFPA 80 will contain a new appendix to address the issue of heat transfer.

Conclusion

Many of the applications of fire rated glazing will depend on the fire resistance rating of a fire barrier and the allowable amounts of opening protection. Building codes now permit the use of fire rated glazed openings in interior walls up to one hour, and in exterior fire walls up to two hours. These same codes require a minimum 45-minute-rated opening protection in one-hour barriers. Some codes do not permit glazing in a wall if it forms part of an exit corridor.

Literature circulated in this country carefully avoids any specific data on heat transmission. Although manufacturers are now drawing attention to the significance of heat transfer, current U.S. standards do not consider this issue.

Designers are being requested to accept this new technology. They in turn should request research so that they can establish safe distances between glazing and combustibles and performance requirements for egress corridors. Europeans have been using this approach for 20 years. For the U.S. to adopt this approach, a major overhaul is required of all the model building codes.

The codes should consider the following: 1 Prohibit the use of glazing in means of egress or areas where combustibles are likely to come in contact with an opening, or 2 impose restrictions on heat transmission through fire rated glazing, or 3 limit the height above the floor where glazing can be installed. In addition, safety glazing is an issue that needs to be addressed by the codes. Because of its limited application, wired glass does not have to meet the same safety requirements of other glazing systems. This exception for wired glass is being passed on to the new products. With increased panel sizes, there will certainly be an increase in exposure hazard. To move in a direction of performance standardization, more data concerning heat transfer through glazing and the impact of such radiation are needed. Until there is a change in the codes, the designer must carefully consider whether a glazed opening of large dimensions is truly as safe as an opaque fire barrier. **Harold D. Hicks, Jr., PE** ■

The author is president of the fire protection engineering and building code consulting firm of Atlantic Code Consultants of Annapolis, Maryland. He has written many papers on fire rated glazing, including the proposed Appendix to NFPA 80 on heat transfer.

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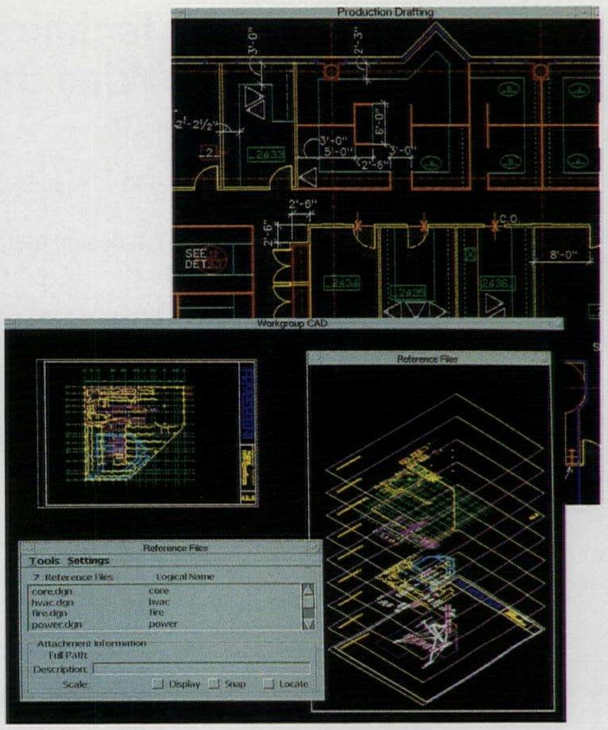

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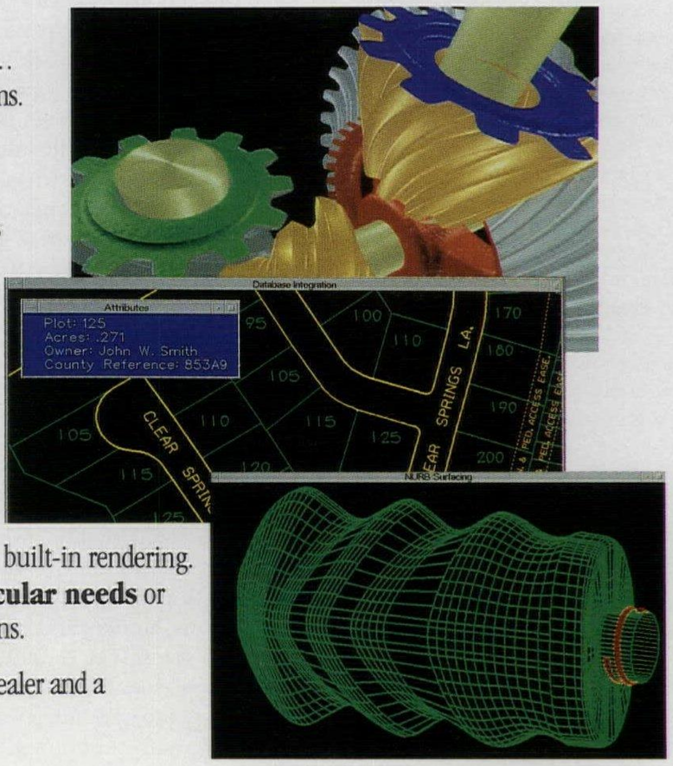

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Technics Focus
Wind Does Not Break Window Glass

Dr. H. Scott Norville of the Glass Research and Testing Lab and consultant **Paul E. Beers** discuss limitations of current design methods.

Glass Types

The basic type of glass used in architectural glazing is *annealed* (AN) float glass. Molten glass that has been "floated" on a bed of molten tin is cooled slowly so that it contains no residual stresses; this assures that the glass can be cut without cracking beyond the cut line. The strength of annealed glass is reported in terms of lateral pressures that can be sustained by plates of stated sizes at specified breakage rates. Annealed glass breaks in shards, so its use is prohibited in doors, overhead glazing, and some other applications, such as transoms and sidelights.

Annealed glass may be heat treated to produce *heat-strengthened* (HS) and *fully tempered* (FT) glass. In both cases, the glass is cooled quickly in order to produce residual tensile stresses in the interior of the panel and residual compressive stresses on the surface and edges. Fully tempered glass retains higher compressive stresses than HS glass and is stronger.

Laminated glass is made by sandwiching an interlayer of polyvinyl butyral between two (or more) plates of any combination of AN, HS, or FT glass. Laminated glass has been available for over 50 years and is used in auto windshields because the interlayer retains much of the assembly intact after breakage.

Joseph E. Minor PE, Ph.D. ■

Joseph Minor is chairman of the Department of Civil Engineering at the University of Missouri/Rolla. This sidebar is excerpted from his P/A article "Architectural Glass" from April 1990.

An important new standard, ASTM E 1300 *Practice for Determining the Minimum Thickness of Annealed Glass Required to Resist a Specified Load,* will soon become the model for window glass design in the United States as well as in some other countries. It can be used to size window glass thickness and to design window glass constructions subjected to wind loadings and uniform loadings of long duration. While ASTM E 1300 represents a marked improvement over the current design recommendations in model building codes, it does not address many problems of window glass design or breakage.

The document itself states: "Many other factors need to be considered in glass type and thickness selection. These factors include, but are not limited to: thermal stresses, the effects of wind-borne debris, excessive deflections, behavior of glass fragments after breakage, seismic effects, heat flow, edge bite, noise abatement, etc. In addition, considerations set forth in federal, state, and local building codes along with criteria presented in safety glazing standards may control the ultimate glass type and thickness selection." Although window glass thickness is traditionally designed according to its ability to resist wind loads, window glass failures most often result from causes other than wind. In this article, the methodology used by ASTM E 1300 for architectural window glass design will be examined, and the many factors it does not address, including the primary causes of glass breakage and post-breakage performance, will be explored.

Designing Window Glass Using ASTM E 1300

Required Definitions. The design of a window glass lite or a window glass construction using ASTM E 1300 consists of selecting an appropriate glass type and glass thickness to resist an equivalent design loading. Designers must understand certain definitions before they can use ASTM E 1300. The ASTM definitions cover glass type, loads, glass thickness, thickness designations, and glass lite geometry.

ASTM E 1300 defines five window glass types for which it can be used. These are annealed (AN) monolithic glass, heat strengthened (HS) monolithic glass, fully tempered (FT) monolithic glass, laminated (LG) glass, and insulating glass (IG) units. The design procedure in ASTM E 1300 is used only for lateral loads. "Lateral" is defined in the standard as the direction perpendicular to the glass surface. A "load" is defined as a uniformly distributed lateral pressure. Four specific terms are defined as loads in ASTM E 1300, the design load, the equivalent design load, the non-factored load, and the allowable load.

The *design load* consists of all loads that act on the glass including self-weight, wind load, snow load, and any other loads. The design load is to be used only in the calculation of lateral deflections. The *equivalent design load* is the magnitude of a constant load of 60-second duration which represents the cumulative effects of the components of all loads that act on the glass. The design load must be converted to an equivalent design load. The methodology to accomplish the conversion is not addressed by ASTM E 1300; it relies on the "specifying authority" to provide this information.

The charts depicted in ASTM E 1300 provide *non-factored loads* for window glass lites of specific nominal dimensions. The values from the charts are multiplied by an appropriate type factor to determine the *allowable load* for a specific glass type. The type factor accounts for the differing strengths of the various glass types as well as load duration. The allowable load is the 60-second equivalent load associated with a probability of failure of 8 lites per 1000 (or 0.008) at the first occurrence of the load. Because the type factor for annealed glass is 1.0, the non-factored load charts represent 60-second duration allowable loads for AN glass.

The "equivalent design load" is a nebulous term to most architects and engineers who design window glass. It incorporates the duration of the lateral loads that are expected to act on the glass, the time variations of magnitudes of these lateral loads, and, indirectly, the time dependence of glass strength. According to ASTM E 1300, the specifying authority is the only one who can provide information to calculate the equivalent design load. Unfortunately, beyond defining the specifying authority as "those responsible for interpreting local, state, and federal building codes," the authority's identity is unknown. The definition of "specifying authority" relieves ASTM E 1300 from providing any guidance as to how appropriate equivalent design loads for window glass should be determined.

Non-Factored Load Charts. ASTM E 1300 represents the strength of AN monolithic glass lites with continuous support on all four sides using non-factored load charts. These charts differ radically from window glass strength charts presented in model building codes. The ASTM E 1300 non-factored load charts are an improvement in that they better represent the strength of AN window glass that has been in service for several years.

To illustrate the use of the non-factored load charts, we will consider the example that is illustrated in the chart for 1/4" nominal thickness (1a). To determine the non-factored load for a rectangular glass lite with nominal dimensions of 60" x 80" x 1/4", enter the 1/4" non-factored load chart by drawing a vertical line from the horizontal axis (long dimension) at 80 and draw a horizontal line from the vertical axis (short dimension) at 60. These two lines intersect between the two non-factored load lines for 25 psf and 30 psf. Interpolating along the radial line from the lower left corner of the chart that passes through the intersection point of the horizontal and vertical lines, the non-factored load for this lite is then "read" from the chart as being approximately 27 psf.

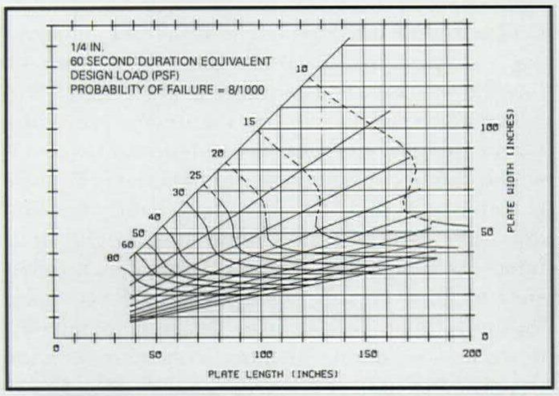
Type Factors and Glass Lite Strength. The strengths of the different glass types included in the definitions above are represented by type factors. Two basic sets of type factors are contained in ASTM E 1300: type factors for 60-second duration loads and type factors for long duration loads. For 60-second duration loads, the type factor for AN monolithic glass is 1.0, the type factor for HS monolithic glass is 2.0, and the type factor for FT monolithic glass is 4.0. For other glass types such as LG and IG units, there are more type factors. There are additional type factors for long duration loads that result in a reduction of the allowable load for a particular glass lite or construction. This reduction considers the fact that glass strength diminishes as load duration is increased.

Returning to the simple example discussed above, the 60-second duration strength of a monolithic AN glass lite having rectangular dimensions of 60" x 80" x 1/4" to resist a uniform load of 60-second duration is:

Non-factored Load x AN Type Factor =
27 psf x1.0 = 27 psf

In other words, the strength of a monolithic AN lite under a 60-second duration load is simply the value found from the non-factored load chart. The strength of a monolithic HS lite having the same dimensions to resist a 60-second duration load is:

Non-factored Load x HS Type Factor =
27 psf x 2.0 = 54 psf



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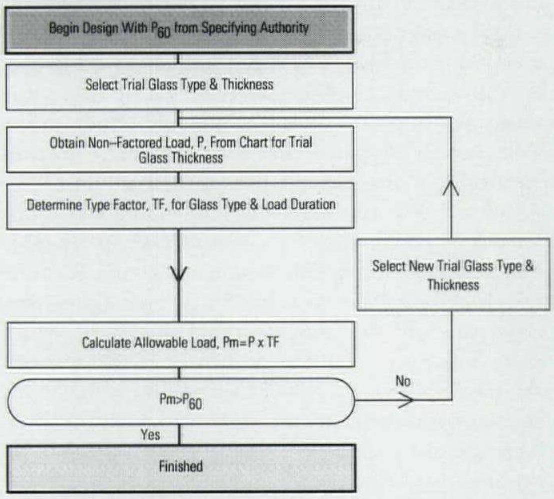
1a NON-FACTORED LOAD CHART FROM ASTM E 1300 FOR MONOLITHIC GLASS HAVING A NOMINAL THICKNESS OF 1/4"



1b FLOW CHART OF WINDOW GLASS DESIGN PROCEDURE USING ASTM E 1300

The strength of a monolithic FT lite having the same dimensions to resist a 60-second duration load is:

Non-factored Load x FT Type Factor =
27 psf x 4.0 = 108 psf

The strengths of glass lites obtained using this procedure represent uniform loads of constant magnitude that act continuously for 60 seconds. Furthermore, if the allowable load did occur on a window glass lite, it would not necessarily fail. The probability of failure at the first occurrence of the allowable load would be 0.008.

Design Procedure. The window glass designer using ASTM E 1300 simply has to select an appropriate glass type and thickness to resist the equivalent

ASTM E 1300 Background

In ASTM E 1300, the allowable load for a window glass lite or construction of specific dimensions is found by multiplying the value read from the non-factored load chart by a type factor. The type factor for AN glass is 1.0; the non-factored load charts, therefore, provide allowable loads for annealed window glass lites.

ASTM E 1300 contains 24 non-factored load charts, twelve presented in U.S. standard units and twelve in metric units. Each of the twelve charts in a particular set of units corresponds to a nominal glass thickness ranging from 3/32" to 7/8". These charts are based on a failure prediction model for annealed window glass developed by Dr. W. Lynn Beason of Texas A & M University. Dr. Beason formulated the model as a graduate student at Texas Tech. Beason's failure prediction model is an extension of the theoretical formulations of annealed glass strength advanced by W.G. Brown of the National Research Council of Canada.

The non-factored load charts in ASTM E 1300 tend to provide lower allowable loads for AN window glass than do the traditional design charts contained in model building codes such as the Uniform Building Code. The lower allowable loads result from the fact that the non-factored load charts are based on strength of AN window glass that has been in service for several years rather than on strength of new AN window glass lites.

design load, as provided by the specifying authority. To accomplish the selections, the designer must follow the procedure shown in the flow chart (1b). There is no requirement in the design procedure for the designer to check lateral deflection, which is an important consideration. An optional procedure is included in ASTM E 1300 that enables the window glass designer to compute lateral deflections under the design load. ASTM E 1300 offers no guidance as to acceptable lateral deflections. It, along with most other window glass design recommendations, makes lateral deflection considerations the responsibility of the designer.

Limitations in ASTM E 1300. There are some limitations concerning the types of window glass that can be designed using ASTM E 1300. One of the major ones is that ASTM E 1300 offers no procedure to design window glass that is supported only along two opposite sides. Another limitation arises from the absence of a procedure to design unsymmetrical LG and IG units [unsymmetrical lites were recommended as a means of controlling visual distortion in IG units in P/A, Oct. 1991, pp. 43–45]. ASTM E 1300 allows only design of LG and IG units for which both plies or lites of glass are of the same glass type and the same nominal thickness. While these limitations might be addressed in future modifications to ASTM E 1300, they will most likely not be incorporated into the upcoming edition. For such guidance, designers should refer to *A Guide to the Structural Peformance of Architecural Glass with Saflex Plastic Interlayer.*

Finally, the most restrictive limitation in lack of guidance given by ASTM E 1300 concerns conversion of design loads to equivalent design loads. The "exact" conversion is difficult to accomplish. It depends upon a knowledge of the load-induced tensile stresses across the surface of the glass lite as well as the glass type. If the designer wishes to convert a load with time-varying magnitude to an equivalent design load, an integration technique must be used (see "Failure Prediction for Thermally Tempered Window Glass Lites" in Recommended Reading, below). Wind load documents such as *Guide to the Use of Wind Load Provisions of ASCE 7-88* give wind pressures associated with 3-second to 10-second gusts. If the designer uses these pressures without converting them to 60-second equivalent design loads, his designs, in many cases, will result in glass thicknesses greater than required to resist the wind loads. This will increase the labor and material costs for the glazing system and supporting structural members.

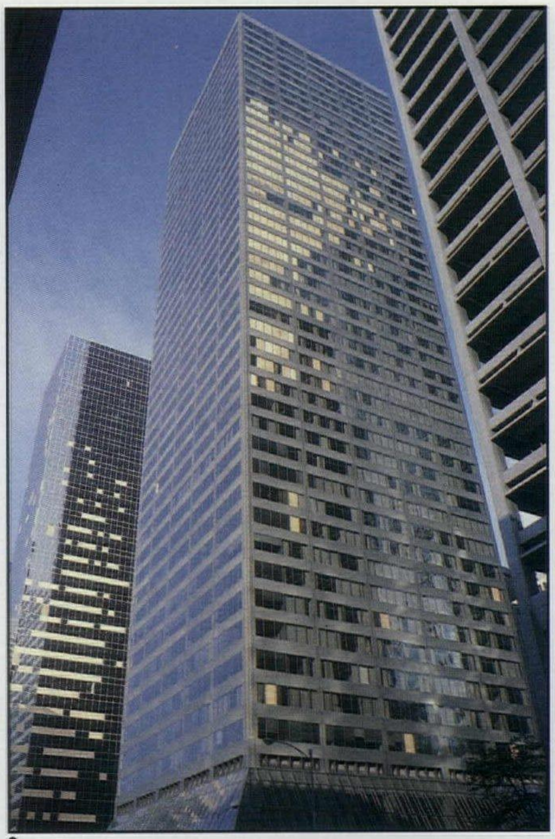
Why Window Glass Fails

Despite the focus on wind loading in the determination of glass thickness, damage surveys conducted following recent disasters have revealed that wind pressure does not cause glass breakage. Factors such as wind-borne debris, excessive building motion, and blast pressures have been documented as the cause of widespread glass breakage. The designers of window glass at the affected projects did not anticipate these factors. A major consequence of the glass breakage was a breach in the building envelope that resulted in damage to property and personal injury.

A substantial amount of glass breakage occurred in a relatively small area in downtown Houston, Texas, during Hurricane Alicia. In photographs taken after the hurricane, the density of broken window glass lites can be readily observed from the density of the plywood replacement panels (2). It is highest at a level near the elevation of the roof line of an adjacent building. The breakage density decreases with changes in elevation from rooflines of adjacent buildings. This suggests strongly, if not conclusively, that the window glass broke as the result of wind-borne debris, such as roof gravel, carried by the wind from the adjacent building. Close-up photos of broken windows (3) reveal from the fracture origin and pattern that the breakage was caused by impact rather than by the wind. Certainly wind was a factor in that it carried the debris, but it was not the ultimate cause of breakage.

Window glass broken during explosions results from uniform pressure loadings of high magnitude and short duration (4, 5). In explosions, wind has nothing to do with glass breakage. Glass breakage is also common in areas subjected to earthquakes. Breakage occurred almost at the onset of shaking in a department store near Union Square in San Francisco during the Loma Prieta earthquake of October 17, 1989 (6). Again, wind had nothing to do with the breakage. Other buildings affected by the earthquake show evidence of racking movements that could have resulted in – but fortunately did not – glass breakage (7).

Spontaneous glass breakage often occurs at projects glazed with fully tempered glass (8). Nickle sulfide contamination, a leading cause of spontaneous breakage of tempered glass, apparently cannot be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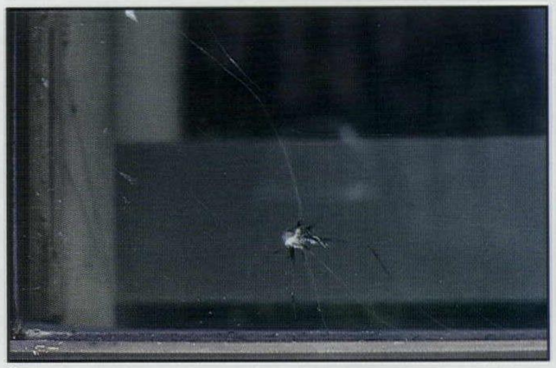
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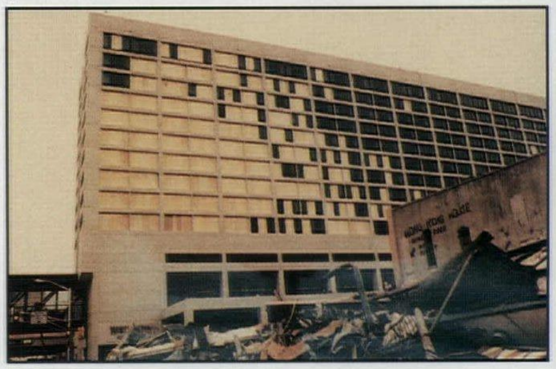
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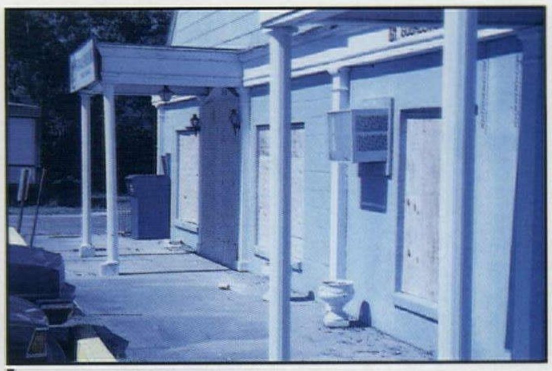
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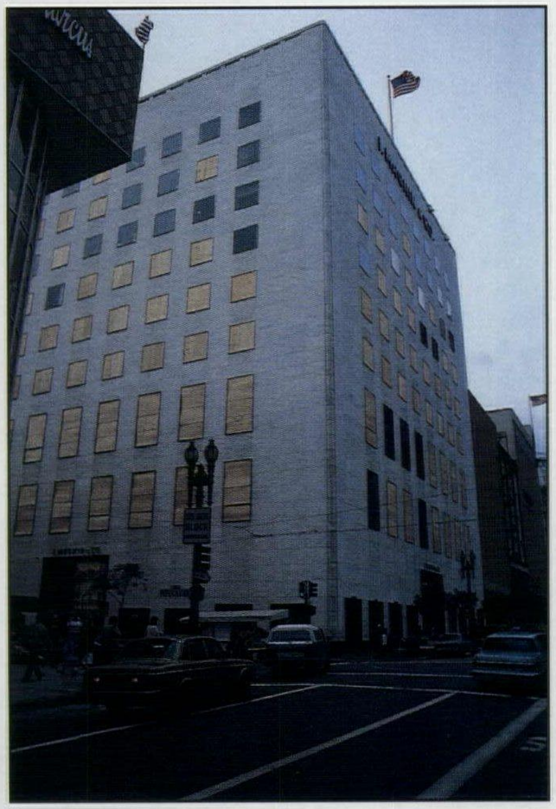
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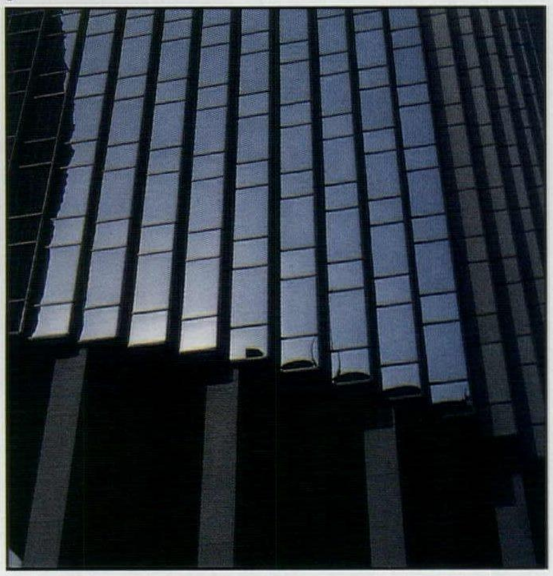
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2 *This downtown Houston building suffered extensive glass breakage during Hurricane Alicia. The breakage distribution and density evident from the temporary plywood replacement panels suggests that most breakage was caused by gravel roof ballast and other wind-borne debris blown off the roof of the adjacent building – not by the wind alone.*

3 *Study of the fracture pattern and the fracture origin of this glass from another building in downtown Houston indicates that the window was broken by impact rather than by wind.*

4 *This building in downtown Fort Worth suffered glass breakage following a gas explosion. The building was very close to the point where the explosion occurred. Structural damage to this building, other than glass breakage, was slight.*

5 *Another building with broken windows as a result of a refinery explosion in Norco, Louisiana. The building suffered significant structural damage in addition to glass breakage. In both this and the gas explosion example (4), wind had nothing to do with the glass breakage.*

6 *Glass was broken almost at the onset of shaking in this department store near Union Square in San Francisco during the Loma Prieta earthquake of October 17, 1989. Two persons were injured by falling glass from this building. Again, wind had nothing to do with the breakage.*

7 *Gaskets began to fall out from around dry glazed lites in a building in San Jose during the same earthquake. The gasket fallout resulted from sustained building motion during the temblor. Although the glass did not break, the loss of gaskets could have resulted in glass contact with the window frames and eventual glass fracture and fallout.*

8

8 *Tempered glass above a shopping mall in Florida suffered over one hundred spontaneous fractures. Fortunately the tempered glass was the outer lite of an IG unit and the inner laminated glass lite prevented shards from falling inside the shopping mall.*

eliminated completely by glass manufacturers and this problem has caused sufficient concern that one manufacturer has adopted a policy restricting the use of tempered glass for most architectural glazing applications.

All these cases show that window glass breaks as the result of varying causes, most of which have no relationship to wind loads. Architects or engineers cannot possibly be expected to account for all possible events that might break windows they are designing. One of the designer's main goals, though, should be to produce designs that minimize damage and injury in the event of window glass breakage.

Post Breakage Behavior

When a monolithic window glass lite breaks, wind and water can get into a building and can result in property damage and personal injury. If high winds or blast pressures are present when the glass breaks, shards may be propelled from the glass frame at high speeds.

The window glass designer must provide for the fact that, whether an explosion, wind-blown debris, or an earthquake is the cause, window glass breaks. A properly designed window should remain in the frame after breakage with a minimal number of glass shards falling from the window. A broken window should maintain the integrity of the building façade until the glass can be replaced. While unsightly when broken, the windows remain safe. If windows are designed with this criterion in mind, building damage and injuries associated with glass breakage will be greatly reduced. Such designs can be accomplished through the use of laminated glass, and some types of insulating glass.

Conclusion

Although ASTM E 1300 represents a significant improvement in window glass design methodology, it provides no guidance to the engineer or architect in determining appropriate design loads. ASTM E 1300 does not address directly many significant causes of window glass breakage, nor does it provide designers with the information necessary to allow them to protect buildings from damage and people from injuries if window glass breaks.

Windows can be designed to maintain the integrity of the building façade during a disaster. While glass breakage cannot be prevented, keeping glass shards within the window frame after breakage minimizes hazards to people and property and results in a much safer building. While ASTM E 1300 presents an excellent procedure for designing window glass to resist wind loads, it does not address the factors that really break glass.

H. Scott Norville, PE, PhD and **Paul E. Beers** ■

H. Scott Norville is a consultant to Glazing Consultants, Inc. in Lubbock, Texas. He is Director of the Glass Research and Testing Laboratory and Professor of Civil Engineering at Texas Tech University. He has co-authored over 60 technical papers and reports concerning glazing design and applications and glass strength and is a member of ASTM, ASCE, and NSPE.

Paul E. Beers is President of Glazing Consultants, Inc., in North Palm Beach, Florida, and specializes in glass, windows, sliding glass doors, curtain walls, and water leakage. He is a member of ASTM, the American Architectural Manufacturers Association, and serves on the panel of arbitrators for the American Arbitration Association.

Recommended Reading

"An Alternative Method to the Design of Annealed Monolithic Window Glass Lites," P.M. Bove and H.S. Norville, *Journal of Structural Engineering*, ASCE, in review (available from the Glass Research and Testing Laboratory, Texas Tech University, Lubbock (806) 742-3476).

"Architectural Glass: Strengths, Selection, Sizes," J. Minor, P/A, April 1990, pp. 47–49.

ASTM E 1300-89 *Practice for Determining the Minimum Thickness of Annealed Glass Required to Resist a Specified Load*, ASTM, Philadelphia (215) 299-5585, 11 pp.

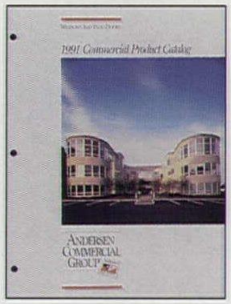
"Development of a New Glass Thickness Selection Procedure," W.L. Beason and H.S. Norville, *Journal of Wind Engineering and Industrial Aerodynamics* (Elsevier Science Publishers, New York), vol. 36, October 1990, pp. 1135–1144.

"Failure Prediction for Thermally Tempered Window Glass Lites," H.S. Norville, P.M. Bove, and D. Sheridan, Glass Research and Testing Laboratory, Texas Tech University, Lubbock (806) 742-3476), 1991, 103 pp.

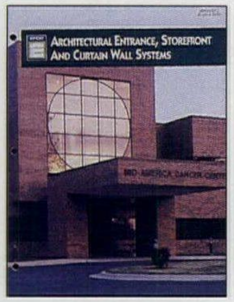
Guide to Use of Wind Load Provisions of ASCE 7-88, #852, American Society of Civil Engineers, New York (212) 705-7538, 99 pp.

A Guide to the Structural Performance of Laminated Architectural Glass with Saflex Plastic Interlayer, #8043, Monsanto Company, St. Louis (800) 325-4330, 1988, 40 pp.; includes 5 1/4" DOS PC program.

Glass/Glazing and Related Products Literature Digest

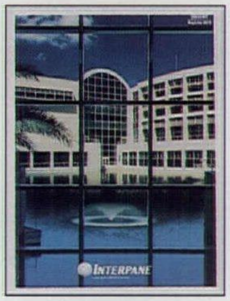


The 1992 Andersen Commercial Products Catalog includes installation and product photos, demonstrating the versatility of Andersen products for commercial use. Detailed drawings, size table specifications, and performance ratings are added to make this catalog a complete source for those specializing in commercial renovation or new construction.
Andersen Windows. Circle No. 306



EFCO's "Architectural Entrance, Storefront, and Curtainwall Systems" catalog is a complete source for glass and glazing information. The featured project photographs and detailed drawings demonstrate the flexibility of EFCO's product line.
EFCO Corporation. Circle No. 360

Curved tempered glass is featured in Glasstemp's Bentemp brochure. Custom bent tempered glass, with a maximum size of 84″ × 144″, is available in 3⁄16- to 3⁄4-inch-thick glass. Curved ceramic frit spandrel, bent 3⁄8- and 1⁄2-inch-thick glass with polished edges, and curved insulating units are just a few of the products featured.
Glasstemp, Inc. Circle No. 361



Aesthetics + Performance = Interpane Design Solutions. High-performance residential and commercial coated and insulating glass products supplied by Interpane Coatings, offer architects a wide variety of product colors and optimum solar and thermal performance. Interpane technical design support simplifies the glass equation!
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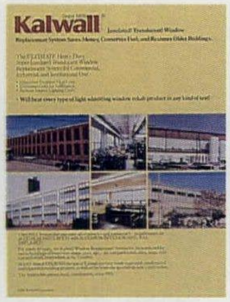
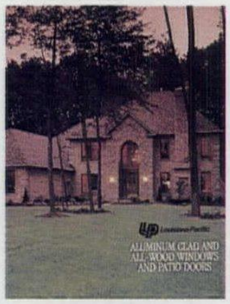
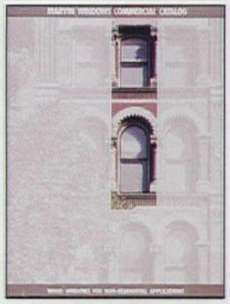


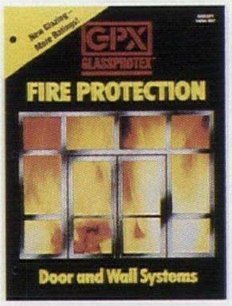
The Kalwall® System, the most highly insulating, light-transmitting, light-diffusing building system available, consists of an aluminum core that has two fiberglass reinforced face sheets permanently bonded under conditions of heat and pressure to both sides. There is a dead space between panel faces, providing insulation. The exterior face sheet has super-weathering Erosion Barrier System. **Kalwall Corporation.** Circle No. 363



Louisiana-Pacific offers a full line of all-wood, aluminum-clad, and vinyl windows and patio doors. We combine quality materials and craftsmanship to create products you will be proud to include in your projects. And we have options for any design. Simulated divided lights, dust-free muntin bars, snap-in wood grilles, Low-E high-performance glass and matching custom windows. **Louisiana-Pacific.** Circle No. 364



Marvin manufactures a line of made-to-order wood and wood-clad windows for nonresidential applications. Graphs emphasize thermal and structural performance, and tables provide energy data. Double-hung, casement, awning, gliding, and bay models are a few of the options available.
Marvin Windows. Circle No. 365



GLASSPROTEX(GPX) specializes in 20–120 minute New Technology fire and safety rated glazing products. GPX's CONTRAFLAM and PYROSWISS are both fire and safety rated and provide superior optics with no wires or yellowish tint. Safety ratings, distortion-free optics, and the largest listed lite sizes are just a few of the advantages these products offer.
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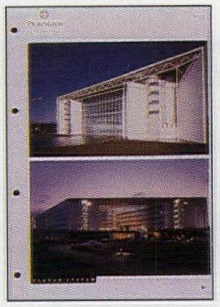

The "Pilkington Wall" structural glazing system with planar fittings provides a complete envelope to the building structure without the use of frames or mullions. By incorporating specially designed spring plates and countersunk bolt fixings, a completely flush all-glass façade can be achieved in vertical, sloping, or horizontal applications.
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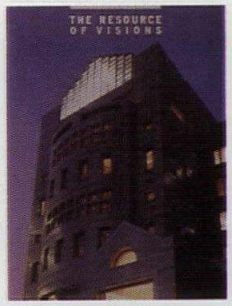
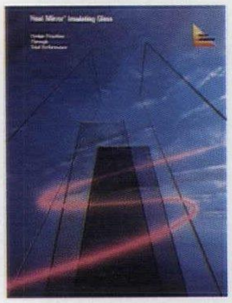


Commercial Division™. . . High Performance Products – High Performance Service. For the customer building or renovating a nonresidential structure, Pella Commercial Product line combined with the Pella Commercial Services team is the optimum choice. The Commercial Division offers high-performance products combined with the reliability and responsibility of superior service. **Rolscreen/Pella.** Circle No. 368



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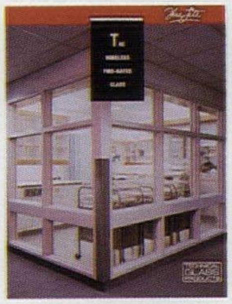
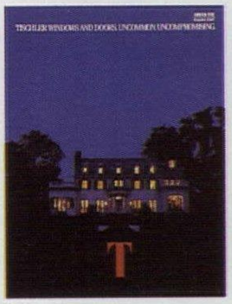


FireLite. The Clear Choice in Fire-Rated Glass. This six-page brochure from Technical Glass Products introduces you to FireLite – the wireless, fire-rated glass ceramic. It provides product usage, specifications, comparative technical data and design applications for this Warnock Hersey and U.L. listed product. It also details the availability of standard fire-rated frames. **Technical Glass Products.** Circle No. 370



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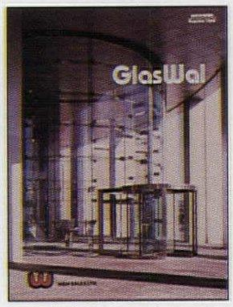

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This 200-page catalog illustrates a full range of wood doors, windows, and skylights. Technical information is instructive and comprehensive and includes performance options for each line.
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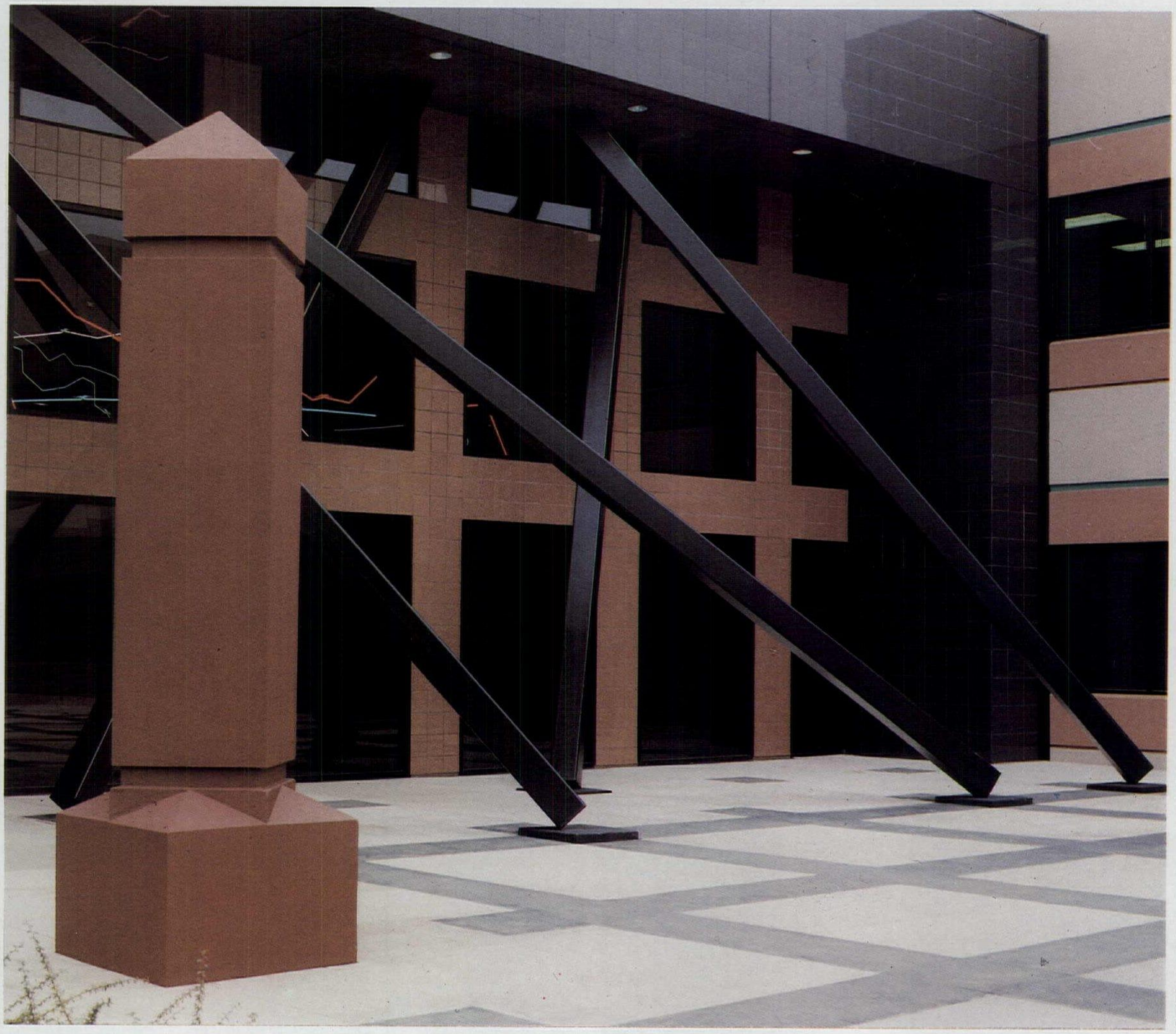

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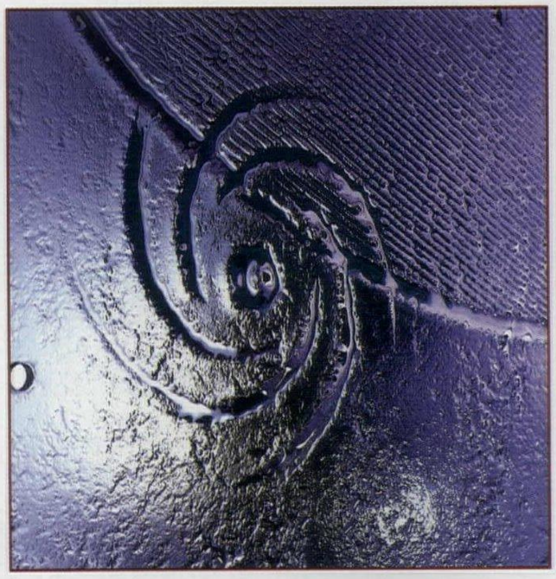
New Products and Literature



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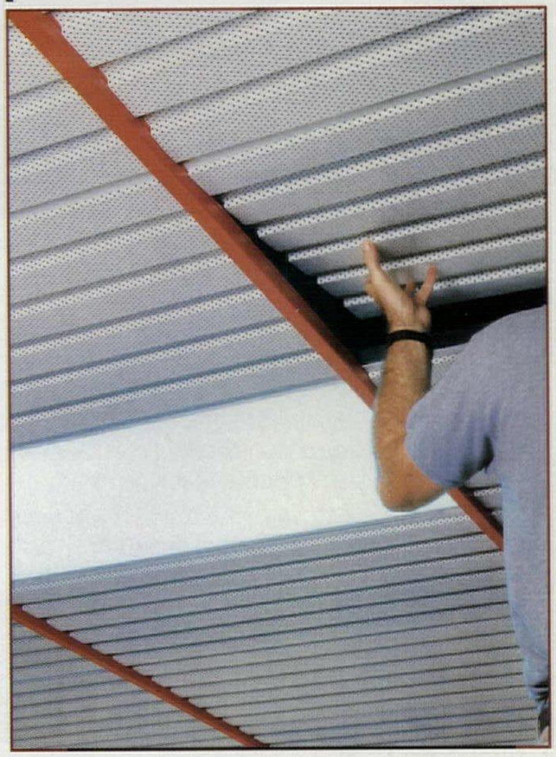

3

Building Products

1 Kiln-Formed Glass

Glass for doors and wall panels is heated in a kiln, taking the shape of the mold or pattern below it. For exterior applications, ½-inch glass is used and ½-inch or ⅜-inch glass is used for interiors. The standard maximum size is 36″ × 84″; clear, bronze, and gray tempered glass are standard. Stephen Knapp.

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2 Gilded Age Papers, Fabric

The "Newport Gilded Age Collection," including fabrics, wallcoverings, and trimmings, was produced in collaboration with the Preservation Society of Newport County. Among the products in the collection are: "Fusina Ceiling" (a paper adapted from the dining room ceiling of The Elms); "Mezza Majolica" (a border inspired by ceiling molding in the Marble House ballroom); and "Bernini" (wallpaper adapted from drapery damask in the Breakers library). Scalamandré.

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3 Corrugated Metal Ceiling

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(continued on page 158)

(continued from page 157)

New Products and Literature

Cement Panel Catalog Update

The Sweets Catalog on Glasweld, an opaque mineral fiber reinforced-cement panel, has been updated. It now includes a section on the use of panels as a recladding surface over deteriorated EIFS walls. Glasweld is used for fascia, façade cladding, spandrel panels, soffits, and balcony panels. Eternit.®

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Metal Ceilings Catalog

A new 16-page catalog includes information on a line of decorative metal ceilings and accessories. A linear baffle system, panels with stamped patterns, a chrome-finished panel, open cell ceiling, and beam-shaped wood veneer panels are among the new products described and illustrated. Chicago Metallic.

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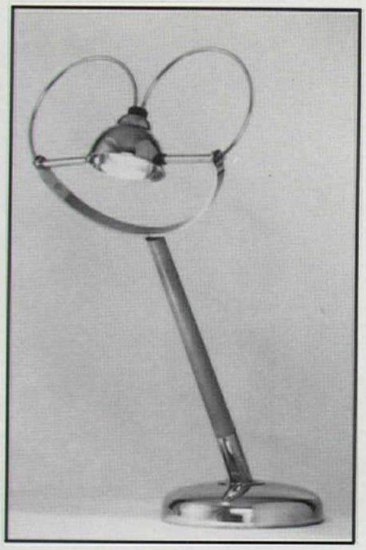

Table Lamp

Milanese architect Matteo Thun has added table lamps and wall-mounted versions to his "Art Collection" lighting fixtures. Black marble or brass nickel-plated base and head are connected by a beech wood stem. Woka Lamps Vienna.

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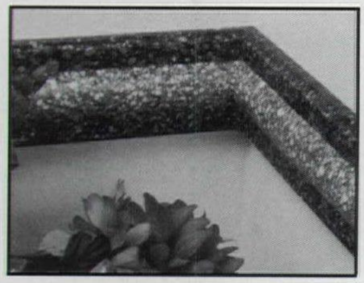


Modular Insert Molding System

"SelecTrim's"™ primary molding profiles have a machined groove (½-inch or 1¼-inches wide) designed to hold inserts and other "accent" elements. This kit-of-parts system also includes: cap, shoe, and back bank moldings; corner blocks; and plinth blocks. Components can be ordered prefinished in standard colors or in custom finishes. Poplar and red oak are used. The James Wood Company.

Circle 104 on reader service card

(continued on page 160)

(continued from page 158)

Commercial/Industrial Door Literature

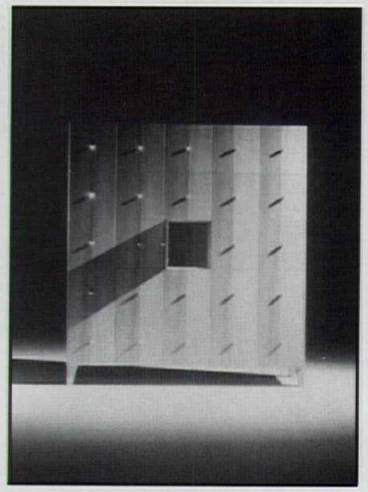
This catalog gives specifications for steel, aluminum, wood, and fiberglass sectional upward-acting doors; doors may be ordered with or without insulation. Commercial operators are also described. Clopay.

Circle 202 on reader service card

19th-Century Adaptation

The "Cathay" lamp table was adapted from a 19th-Century faux bamboo tripod (thought to have been produced in China) located in Kingscote, a landmarked house designed by Richard Upjohn in 1839 in Newport, Rhode Island. It is 26 inches in diameter and 26 inches high. Trouvailles.

Circle 105 on reader service card



Wood Cabinet

"Cut Cabinet," designed by Carlo Cumini for HORM, is constructed of hand-rubbed cherry wood and may be ordered in a variety of sizes and cabinet configurations. It is shown above with 25 cabinets, each in 12½-inch increments; it is 68 inches high and 19 inches deep. Luminaire.

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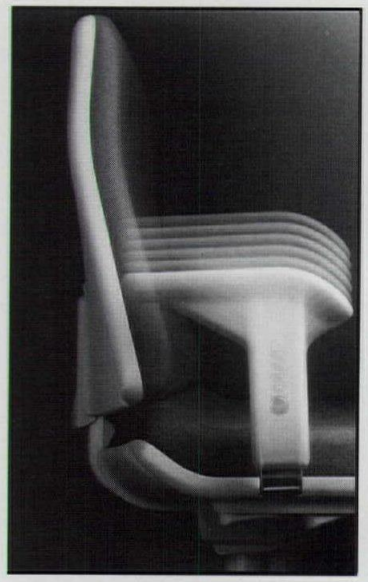

Adjustable Armrests

"Consens" office seating, originally offered in models at two different scales and in two choices of motion adjustment, is now also available with vertically adjustable armrests – to six different heights. Girsberger.

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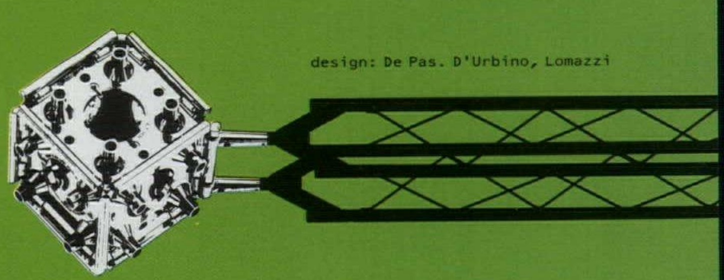
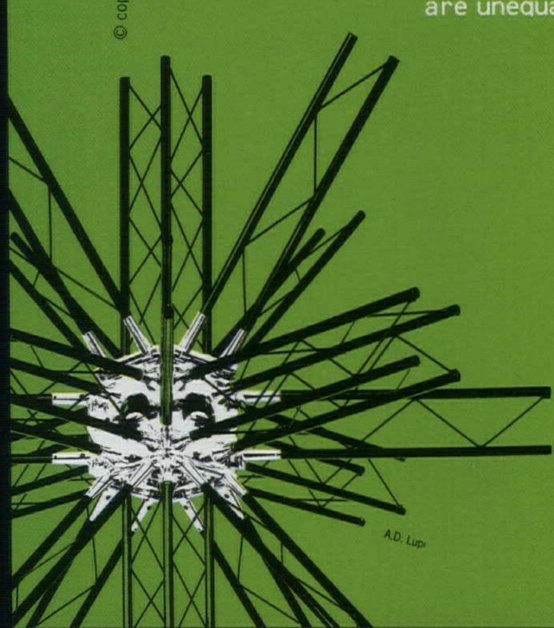
design: De Pas. D'Urbino, Lomazzi





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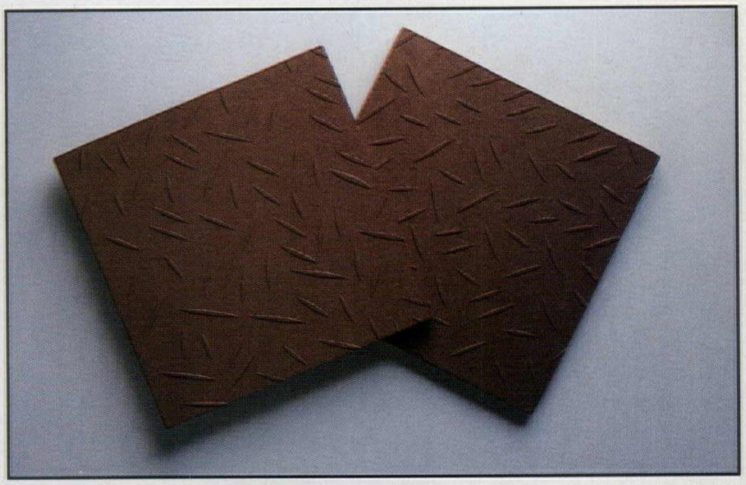
Technics-Related Products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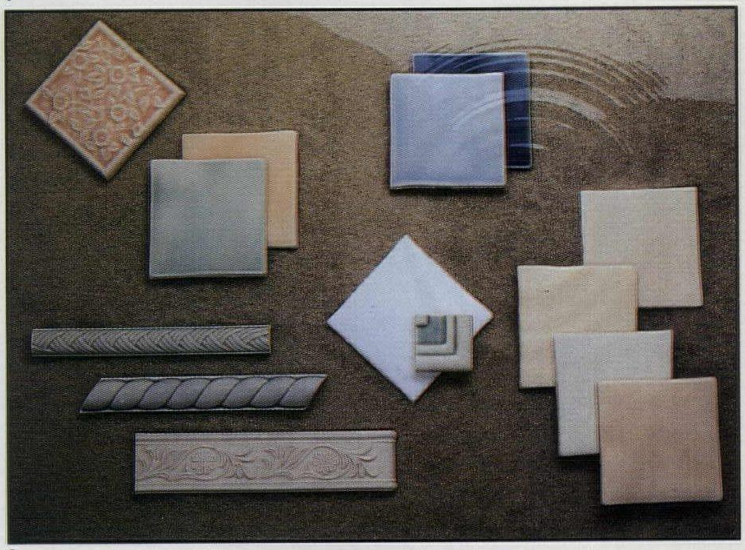
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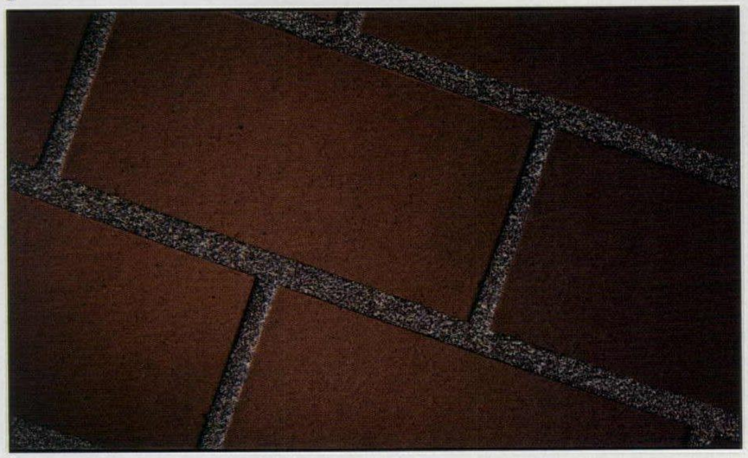

3

Tile Products and Literature

1 Slip-Resistant Quarry Tile
"Sure-Step"™ raised-texture quarry tile provides traction "by allowing water and grease to "pool" below the surface of foot traffic." The tile surface has a coefficient of friction for commercial floors, wet or dry, of 0.8 to 0.9. The half-inch-thick, 6″ × 6″ tiles are recommended for kitchens, serving lines, and exterior walkways. They are available in red, with a variety of smooth surface quarry trim. American Olean.
Circle 108 on reader service card

2 Variegated, Embossed Tiles
Hand-formed edges and variegated surfaces are characteristics of the "Echo" line of 4″ × 4″ tiles. Translucent glazes settle into recesses, taking advantage of the handcrafted imperfections. Twelve colors are offered. In addition, six floral-embossed tiles, trims, and moldings were designed to enhance the collection. Latco.
Circle 109 on reader service card

3 Speckled Tile Grout
"LATAPOXY SP-11 Spec-L Grout," for ceramic tile, quarry tile, pavers, marble, and stone, is resin-based. Its multicolored granulars, available in seven different color combinations, provide resistance to shading, mottling, and off-coloring. The grout is suggested for both commercial and industrial applications. Laticrete International.
Circle 110 on reader service card

Products and literature in this section complement the Technics article on ceramic tile (p. 41).

(continued on page 168)

THE FIRST THING WE DID TO HELP REMODEL THIS OLD HUNTING LODGE WAS

This large, beautiful room is the centerpiece of what was once an exclusive hunting lodge. Built in 1930, the property was converted to a single family residence in the early Fifties. But 40 years of paint, plasterboard and paneling had all but hidden its original elegance.

So, when new owners began renovating it in 1991, they asked architect Katherine Cartrett of Mulfinger, Susanka and Mahady to recapture the original rustic charm of the place.

They asked her to use only the finest high performance building products available. Given those terms, it's not surprising that, when the subject of windows and doors came up, the owners asked to talk with Marvin.

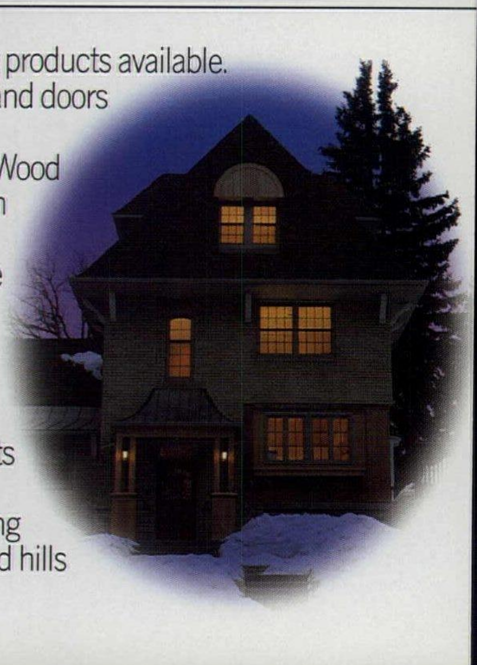
The first step was an on-site meeting. Nick Smaby from Choice Wood Custom Residential Remodelers was there. So were representatives from the Marvin dealer and distributor.

One by one, they inspected every opening in the home. Then the entire group sat down and planned the job out.

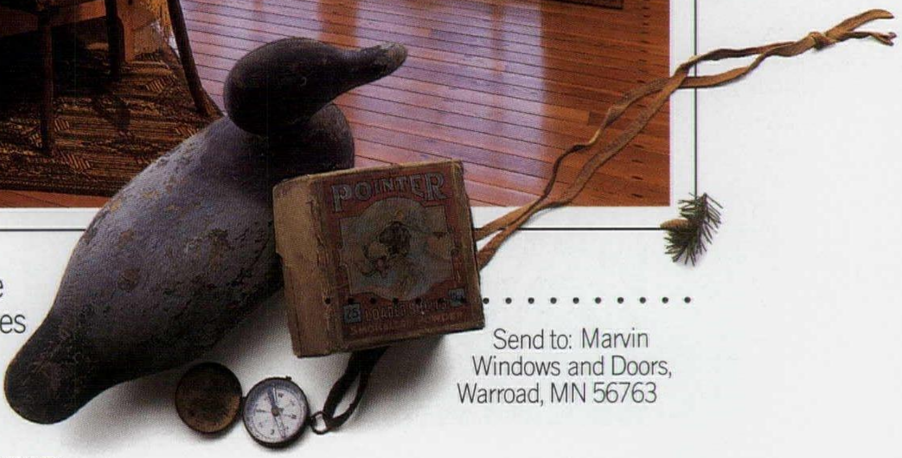
Sizes were discussed. So were shapes, styles, energy efficiency, maintenance and budgets.

By the end of the day, the plan called for a combination of new windows and replacement sash – 46 windows in all. There were eight sets of doors too.

The results of that meeting are pictured above. The Marvin Sliding French Doors add light and open the room to the panorama of woods and hills



START FIRING QUESTIONS.



beyond. And in keeping with the architectural style of the home, each door features custom divided lites and an exterior finish in a color mixed specifically for the project.

Today, this rustic home looks much like the hunting lodge it once was. And if you ask the owners, they'll tell you the key was tracking down the right window and door supplier in the first place.

MAKE US YOUR FIRST CALL, NOT YOUR LAST RESORT.

If you've got a look you're trying to achieve or a problem you just can't solve, call the one company you know will have the right solution. Call Marvin Windows and Doors at **1-800-346-5128** (1-800-263-6161 in Canada). Or mail the coupon for a free catalog featuring the entire line of made-to-order Marvin windows and doors.

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Company

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City State

Zip Phone ( )

1509204A

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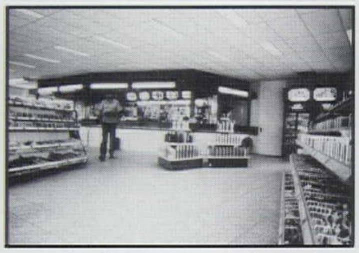
(continued from page 163)

Tile Products and Literature



Heavy-duty Tile
"Cristalli Naturali" is a series on the KER'LIFE family of hard-surface tiles. Its "slightly corrugated surface" is suitable for use in heavily trafficked areas and in areas used by small vehicles. It is available in nine fade-resistant colors. Co.Em Cotto Emiliano.

Circle 111 on reader service card

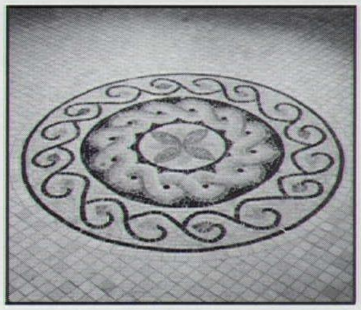
Unglazed Tile from Recycled Glass
"Prominence"™ unglazed tiles are produced from recycled glass (62 percent) and premium-grade clays. The fully vitrified, frostproof, and slip-resistant tiles are in 8″ × 8″ or 12″ × 12″ sizes and are available in 30 colors. GTE.

Circle 112 on reader service card

Wood Trim Tiles
These 16″ × 16″ ceramic tiles with wood trim are called "Intarsi" and are produced by Ceramica D'Elite Diffusion. The monocottura floor tiles are offered in nine colors. Italian Tile Center.

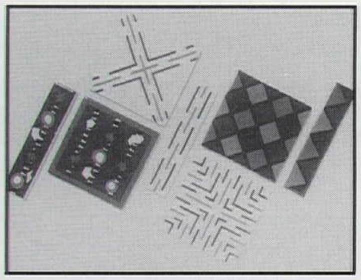
Circle 113 on reader service card

Tile Council Installation Handbook
The Tile Council of America has announced the publication of its 1992 Handbook for Ceramic Tile Installation. Standardized installation specifications are included. Contact Tile Council of America, P.O. Box 326, Princeton, NJ 08542–0326. Cost: $1.



Custom-crafted Mosaics
Italian mosaics by Sicis may be ordered in a variety of custom sizes, shapes, and designs. Mosaics are preset in Italy by hand in 12-inch mesh sheets. Hastings Tile & Il Bagno.

Circle 114 on reader service card



Patterned Wall Tiles
"Confetti Studio III" is a line of high-gloss tiles with a variety of patterns, including: Harlequin, Daytona, and Memphis. The 4⅜″ × 4⅜″ decos and 6″ × 1″ liners are suitable for residential and commercial interiors or backsplash areas. Florida Tile.

Circle 115 on reader service card

Pebbled Tiles
"Ciottoli Enduro Matt" is a series of monocottura tiles with a "pebbled-effect" from Marazzi. The 12″ × 12″ tiles are available in beige and two shades of gray. Italian Tile Center.

Circle 116 on reader service card

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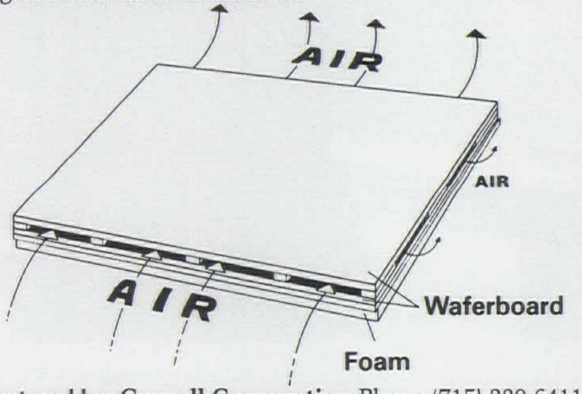
Ventilated Nail Base Roof Insulation

Vent-Top ThermaCal combines isocyanurate insulation with a ventilated space between the two waferboard layers. The internal spacer arrangement provides over 95% open air space below the top sheathing and allows air movement in all directions.

USES Vent-Top ThermaCal is used over exposed roof decking. It provides the ventilation that many users and shingle manufacturers recommend. In hot weather, this cools the sheathing and shingles. It also allows any moisture to escape. In winter it provides a cold air space below the top sheathing. This cold roof reduces snow melting and ice dam formation.



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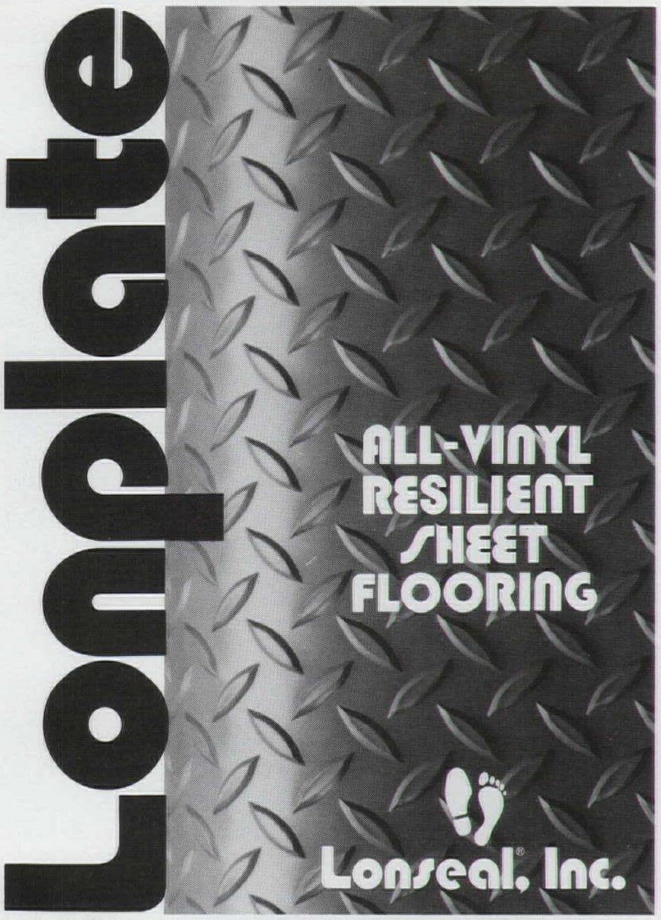

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ADVERTISEMENT

Small Company's New Golf Ball Flies Too Far; Could Obsolete Many Golf Courses

Pro Hits 400-Yard Tee Shots During Test Round

Want To Shoot An Eagle or Two?

By Mike Henson

MERIDEN, CT — A small golf company in Connecticut has created a new, super ball that flies like a U-2, putts with the steady roll of a cue ball and bites the green on approach shots like a dropped cat. But don't look for it on weekend TV. Long-hitting pros could make a joke out of some of golf's finest courses with it. One pro who tested the ball drove it *400 yards,* reaching the green on all but the longest par-fours. Scientific tests by an independent lab using a hitting machine prove the ball out-distances major brands dramatically.

The ball's extraordinary distance comes partly from a revolutionary new dimple design that keeps the ball aloft longer. But there's also a secret change in the core that makes it rise faster off the clubhead. Another change reduces air drag. The result is a ball that gains altitude quickly, then sails like a glider. None of the changes is noticeable in the ball itself.

Despite this extraordinary performance the company has a problem. A spokesman put it this way: "In golf you need endorsements and TV publicity. This is what gets you in the pro shops and stores where 95% of all golf products are sold. Unless the pros use your ball on TV, you're virtually locked out of these outlets. TV advertising is too expensive to buy on your own, at least for us.

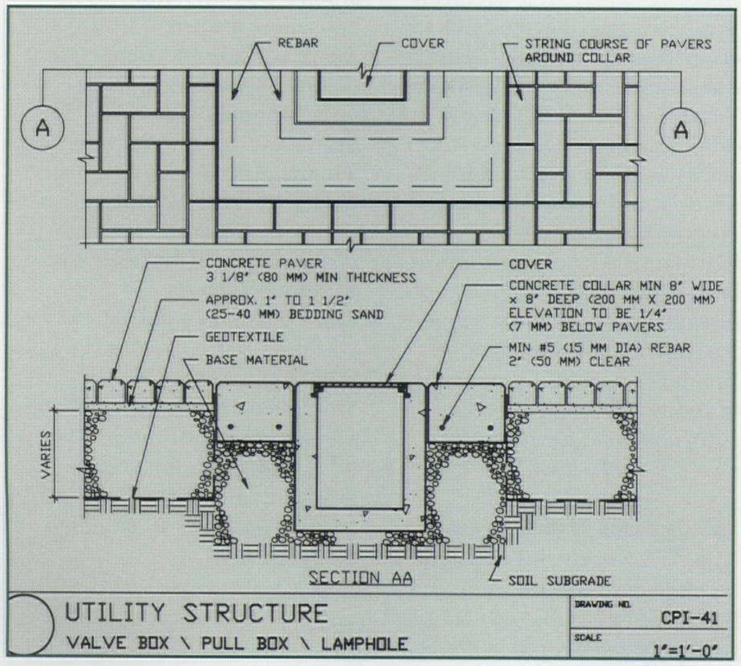
"Now, you've seen how far this ball can fly. Can you imagine a pro using it on TV and eagle-ing par-fours? It would turn the course into a par-three, and real men don't play par-three's. This new fly-power forces us to sell it without relying on pros or pro-shops. One way is to sell it direct from our plant. That way we can keep the name printed on the ball a secret that only a buyer would know. There's more to golf than tournaments, you know."

The company guarantees a golfer a prompt refund if the new ball doesn't cut five to ten strokes off his or her average score. Simply return the balls — new or used — to the address below. "No one else would dare do that," boasted the company's director.

If you would like an eagle or two, here's your best chance yet. Write your name and address and "Code Name S" (the ball's R&D name) on a piece of paper and send it along with a check (or your credit card number and expiration date) to National Golf Center (Dept S-203), 500 S. Broad St., Meriden, CT 06450. Or phone 203-238-2712, 8-8 Eastern time. No P.O. boxes, all shipments are UPS. One dozen "S" balls cost $24.95 (plus $3.00 shipping & handling), two to five dozen are only $22.00 each, six dozen are only $109.00. You save $55.70 ordering six. Shipping is free on two or more dozen. Specify white or Hi-Vision yellow.

Computer Products

New software releases provide a wealth of details and specification information.



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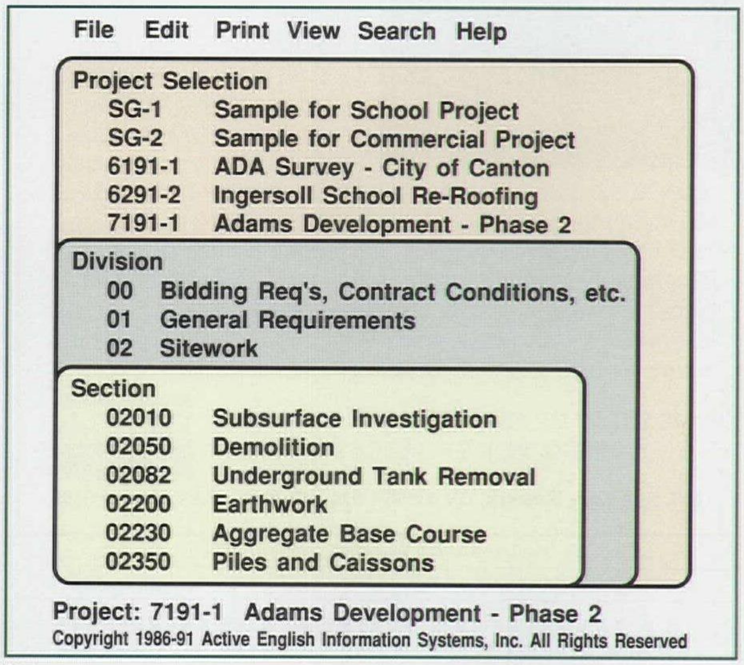

2

1 Details

The ASG/Vertex Detailer allows users to assemble custom details in AutoCAD from components. Eleven "Dynamic Details" provide predrawn details (i.e., doors, windows, roofs, or walls) that can be modified by the user, and 18 electronic CADalogs that offer details from specific manufacuturers and trade associations, such as this drawing from the Concrete Paver Institute. ASG.

Circle 117 on reader service card

2 System George

"System George" is a relational database developed by Phillips and Associates, an architectural firm in Canton, Illinois, to automate the process of selecting materials during all phases of a project. Designed by an architect, the system prompts designers and drafters to consider the pertinent information about a material. For instance, if architects want an exterior downspout, System George reminds them to place it where it can be maintained and where it will be out of the way of vehicles. The System also provides a list of available metal gauges and information about fasteners; if a specific product is referenced, regional manufacturers with phone numbers and contacts are given.

The software, updated quarterly, requires a standard PC, and includes architectural /construction applications said to have the information needed to specify approximately 700,000 building materials that can be sorted by nearly 26,000 criteria categories. Text summaries of almost 4,000 industry standards from more than 200 trade associations are included in the database. A list of more than 31,000 products is indexed for over 16,000 national and regional manufacturers. Although it requires 160 MB of memory, users have the option of loading only those sections they need. Partial packages for architects, engineers, and interior designers are available. An optional CD-ROM laser disk player and viewer allows users to make product choices from the manufacturer's electronic catalogs. Active English Information Systems.

Circle 118 on reader service card

(continued on page 172)

(continued from page 171)

Computer Products: Specifications and Details

EPIC

EPIC, formerly Architectural Synthesis, provides manufacturers' and association details in a standard format for Microsoft Windows. The "CIDS for Windows Schematic Designer™" allows users to select standard window and door configurations or to create custom configurations. Detail drawings can be exported to CAD, contract drawings, or other documents. An "Intelligent Specifications Builder" provides written specifications. Electronic Product Information Corporation.

Circle 119 on reader service card

Specifications Writing System

The AIA/Sweets SPECSystem is an electronic specifications-writing system available on CD-ROM. The system includes over 400 sections from CSI divisions 1–16. Based on the specifier's responses to a series of questions, appropriate product options are presented and the system assembles the specifications automatically. A variety of output formats is available. American Institute of Architects.

Circle 120 on reader service card

Spec-Writer

"SuperSpec" links a complete set of written specifications with a CAD drawing file in CSI MASTERFORMAT complete with applicable standards, delivery, and installation instructions. Based on design selections made in ASG CAD files, written outlines and full specifications can be generated. SuperSpec.

Circle 121 on reader service card

Construction Criteria Base

Technical information, standards, and other reference material from the General Service Administration's Public Buildings Service is available on optical laser disk. The "Construction Criteria Base" on four compact disks contains over 800,000 full-text pages of federal and private guide specifications, standards, manuals, regulations, cost estimating systems, and other information. Documents include the Department of Energy General Design Criteria Manual, AIA MASTERSPEC, the Americans with Disabilities Act, BOCA National Codes, and the Southern Building Code Congress International. National Institute of Building Sciences.

Circle 122 on reader service card

CD-ROM Catalogs

Manufacturers' catalogs including details, specifications, literature, and video images are available on CD-ROM for Microsoft Windows to qualified users. ECLAT.

Circle 123 on reader service card

Building Materials

Major materials suppliers as they were furnished to P/A by the architects for buildings featured this month.

Project: Fuller E. Callaway Manufacturing Research Center, Georgia Institute of Technology, Atlanta (p. 80). *Architects: Lord, Aeck & Sargent, Inc., Atlanta.* Cast-in-place concrete: Allied ReadyMix. Curing compound: Sonosil. Medium ironspot brick: Endicott. Curtain wall: VistaWall. Precast concrete: Cook & Ingle. Metal siding and roofing: M&M Systems. Gypsum board: USG. Fabric wall panels: Conwed Designscape. 1″ insulated glass: Independent Insulating Glass/ SE. 3/4″ tempered glass: Brite Vue Glass Systems. Hollow metal doors/frames: Steelcraft, So. GF Corp. Wood flush doors: Eggers Industries.

(continued on page 174)

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(continued from page 172)
Metal, aluminum storefront: Atlas Architectural Metals. Coiling fire shutters: Cornell. Resilient flooring: Kentile. Wood block flooring: American Wood. Ceramic tile: Dal Tile. Carpet: Shaw Industries. Ceiling tile: Armstrong Travertone, Interior Systems. Grid system: Matrix ICS. GFRG: Custom Castings. Built-up roof and foil faced/unfaced insulation: Manville. 3/4" rigid insulation: Foamular. Duron/Tnemec paint: Porter Paints. Cane bolts: Stanley. Spring hinges: Hager Hinge. Continuous hinges: Soss Invisible Hinges. Passage set/deadlock: Corbin Dursion. Locksets/lever handle: Adams Rite Manufacturing. Cylinder/padlock: Best Locking Systems of Georgia. Overhead stop: Glynn Johnson. Door closers: LCN Closers. Threshold/Weatherstrip: National Guard Products. Kickplate/push/pull: Quality Hardware Manufacturing. Exit devices: Von Duprin. Card key access and sprinkler systems: Allsouth. Auditorium seating: American Seating. Interior/ exterior signs: APCO. Elevators: Dover. Handrails: Western Wire Rope & Fittings, Unistrut. Lighting: Holophane, Lithonia, Lightolier, ICE, Kurt Versen, Devine Design, Prescolite, Hazlite, McGraw-Edison, Kim Lighting, Dual-Lite. Lavatory fixtures: American Standard. Water closets: American Standard/Beneke. Faucets: T&S Brass and Bronze Works. Fittings/valves: McGuire Manufacturing. Flush valves Delany Flush Valves. Toilet stalls: Metpar. Washroom accessories: Bradley. Water fountains: Halsey Taylor. Sprinklers: "Automatic" Sprinkler Corp. of America. Chiller: Carrier. Air handling units: Temtrol. Environmental control systems: Barber-Colman. Open office/work stations: Herman Miller. Lab casework: Kewaunee. Projection screen: Rollermatic. Porcelain markerboard: Greensteel. Aluminum sunshades: Glass & Metal Erectors. Miniblinds: Bali.
(continued on page 175)

(continued from page 174)

Project: Brix Restaurant, Marina Del Rey, California (p. 88). *Architects: Central Office of Architecture, Los Angeles.* Aluminum storefront and glazed doors: U.S. Aluminum. Porcelain tile floor: American Olean. Acoustical ceiling tile: U.S. Gypsum. Locksets: Schlage. Kitchen hoods: Captive Aire. Exterior fluorescent Poster Luminaires: Columbia. Exterior high pressure sodium & interior fluorescent lighting: Lithonia. Interior halogen lighting: Elliptipar. Plumbing fixtures: American standard. HVAC system: Carrier.

Project: Alpharetta Branch Library, Alpharetta, Georgia (p. 96). *Architect: Anthony Ames Architect, Atlanta.* Insulated metal panels: Alucobond. Aluminum windows: Kawneer. Carpet tile: Lees. Silicone waterproofing: General Electric. Roof drains: Zurn. Exterior paint: Kynar. Latex interior paint: Duron. Hinges/hardware: Stanley. Locksets: Schlage. Closers: LCN. Security system: Silent Knight. HPS parking lot lighting: Gardco. HPS bollards: Spero. Book drop: Mosler. Book-drop lighting: Bega. Fluorescent lighting: Pirelli. Sinks/toilets: Kohler. Flush valves: Sloan. Stall partitions: General Partitions. Accessories: Bobrick. Drinking fountains: Oasis. Sprinkler system: Central Sprinkler. Rooftop HVAC: Trane.

Project: United States Post Office, Rancho Penasquitos, San Diego (p. 98). *Architects: Richard Friedson/The VISIONS Studio.* Granite lintels: Cold Spring. Bar joists: Vulcraft. Glass block: Pittsburgh Corning. Entrance doors: Falconer Glass Industries. Vinyl flooring: Azrock. Color additive for concrete floor: Davis Colors. Ceiling system: Hunter Douglas. Single-ply roofing: Owens Corning. Exterior paint and stain: Sinclair. Hinges: Stanley. Locksets: Hewi, Falcon. Door closers: Norton. Panic exit: Adams-Rite. Pivots: Rixson-Firemark. Signage: Andco. Air-conditioning units: Trane. Carpet: Harbinger. Carpet base: Roppe.

Project: Shenandoah House, Page County, Virginia (p. 100). *Architect: Jerry Wells, Ithaca, New York.* Foundation: concrete. Structure: post-and-beam. Exterior cladding: cedar plywood. Interior walls: U.S. Gypsum. Interior floors: hardwood. Waterproofing/insulation: Dow Corning. Exterior stain: Cabot®. Kitchen equipment: Jenn-Air. Water closets: American Standard. Electric heating: Chromalox.

Project: House in the Adirondacks, New York State (p. 106). *Architects: Bohlin Cywinski Jackson, Wilkes-Barre, Penna.* Wood windows (double hung, awning, and casement): Marvin Windows. Window walls: custom by G.C. Doors: custom by G.C. Flagstone paving and boulder foundations: Champlain Stone Co. (some boulders from site). Fiberglass batt insulation (6″): Owens Corning. Rigid Polyisocyaurate insulation (1½″): Dow. Exterior paint: Benjamin Moore. Exterior oil stain: Cabot®. Interior oil stain: McCloskey. Interior varnish: Benjamin Moore. Hinges: Baldwin. Mortise locks: Acorn. Custom steel door levers: architects and Michall Doerfler. Refrigerator, oven, washer, dryer: GE. Wand landscape light: Wor-Ell Custom Lighting. Monopoint lighting: Lightolier. Tubs and lavatories: refurbished antiques. Toilets: Kohler. Whirlpool bath: Jacuzzi. Electric baseboard heating: Chromalox. Supplemental electric forced air and a/c: Carrier. Custom wood dining table and chairs: Ken Heitz.

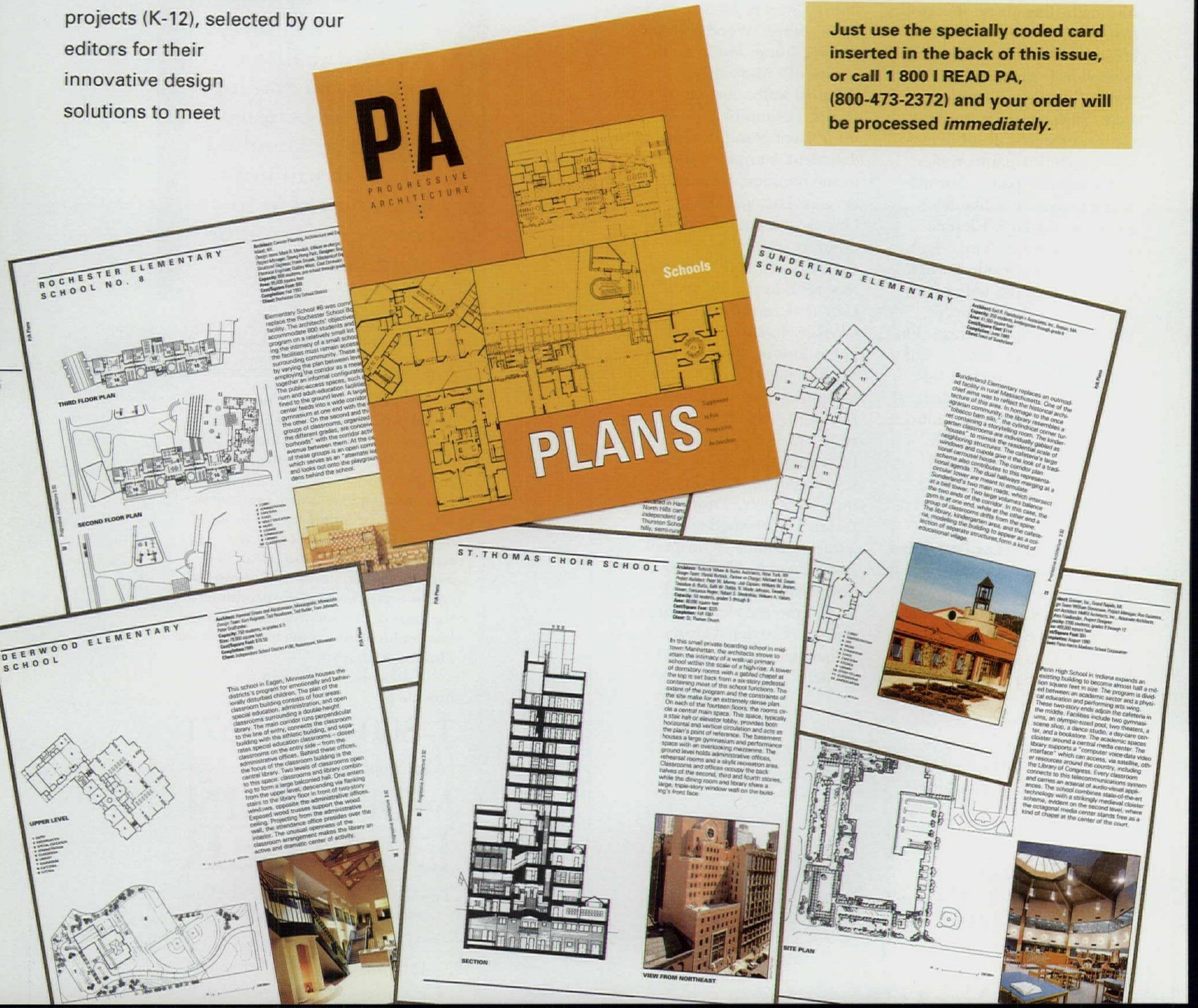
You can still get a copy of the March issue of P/A Plans!

P/A Plans is a series of supplements to our regular issues, each of which presents scores of projects of a timely building type. We'll publish a total of two in 1992. *P/A Plans* premiere edition, published in March, covers schools, and, the August edition, will cover small-scale medical facilities.

"Schools" examines the plans of more than 60 different school projects (K-12), selected by our editors for their innovative design solutions to meet the school needs of the 1990s. A primary goal of *PLANS* is to be a useful information source in this restricted economic climate. Each issue of *PLANS* will offer current ideas and direction opportunities from which designers may wish to draw cues. It is also intended as a generator of ideas among various client groups - for example, public policy-makers, managing boards, and administrators - to stimulate their imagination, opening the way for a constructive dialogue with architects.

You can still get a copy of the March issue of *P/A Plans*. Enter a one-year subscription to Progressive Architecture NOW, beginning with next month's issue and we will send you a copy of P/A Plans - Schools - absolutely *FREE!*

Just use the specially coded card inserted in the back of this issue, or call 1 800 I READ PA, (800-473-2372) and your order will be processed *immediately*.



Books *(continued from page 131)*
passionate history of low-income housing in Rome.

In her introduction, Ghirardo makes it clear that she doesn't like art mixed up with architecture, which makes the article by Rosalyn Deutsche even more incomprehensible. Deutsche writes about the homeless of New York. Her solution to their problems is an arty pram-mounted ICBM (actually a cart that provides a bare minimum of shelter) for them to push around. The Atlanta-based Center for Disease Control's recent study of 113 homeless people in Dade County showed that 57% used crack, 76% drank, 11% tested positive for HIV, and 39% reported sex with two or more partners in the preceding 30 days. Deutsche's art fair project is not only brainless, it is heartless. Such nostrums are unbelievably cavalier in the face of the problems that these people have, none of which is architectural or, for that matter, artistic.

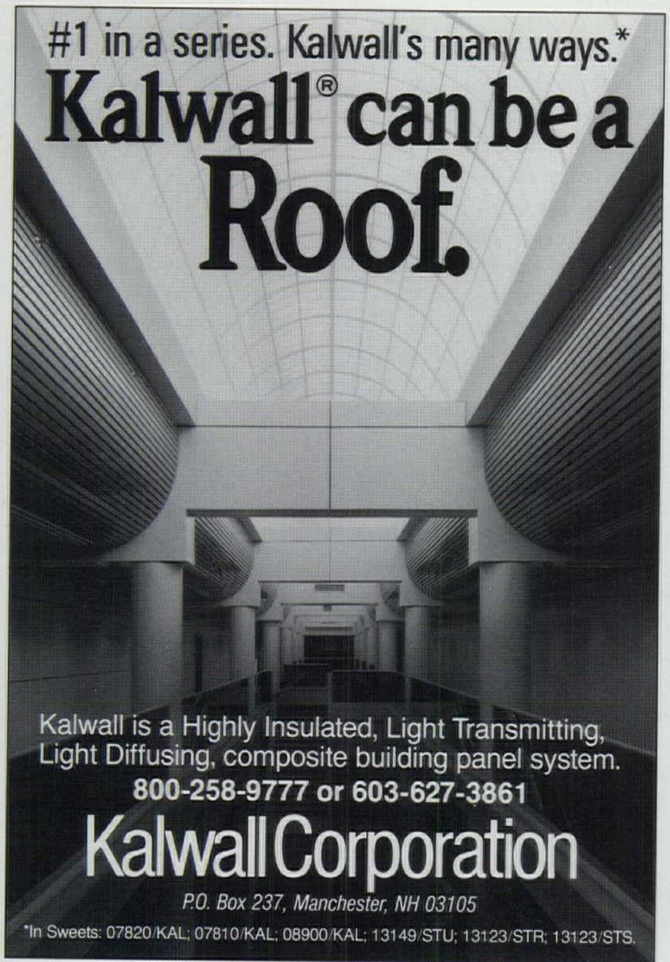
Tony Schuman's article is a sensible, untypically clear essay on Bofill's French public housing via Ledoux, Godin, and Garnier.

The final irritation is that the book is set in Helvetica (bold, no less) and the rag-right margin of the left leaf is so near the spine that one has to arm wrestle the book to read it. The last book I read in Helvetica was some Peter Cook Archigram thing from the 1960s. Almost all newspapers and books published in America are set in some variation of Times Roman. *Complexity and Contradiction* is. There are very good reasons for this. Times Roman has close to zero visual impact on American readers, such that one can Hoover-up information and ideas rather than be visually stunned.

Let us work up the scales here for a minute. It has been said (but I cannot remember by whom) that a well-dressed person is not remembered for his or her clothing. When such a person leaves the room, no one can remember exactly what he or she was wearing. Further up the scale is architecture. The works of early Saarinen the Elder, William Wurster, Vernon DeMars, Aldo van Eyck (an affection I share with Frampton), and countless, virtually anonymous period architects (one thinks of Buck Crook) are such that human life is enhanced by their architecture, not upstaged by it. Therein lies the possibility of the resurrection of architecture in our society – not by waiting for the revolution.

David Clarke ■

The author, professor at Southern Illinois University in Carbondale, wrote Arguments in Favor of Sharp-shooting *and the forthcoming* Frank Lloyd Wright and the Laffer Curve.



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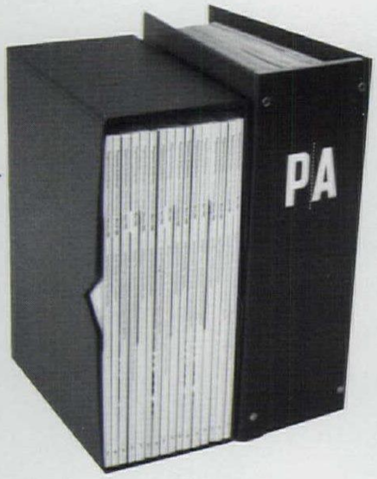

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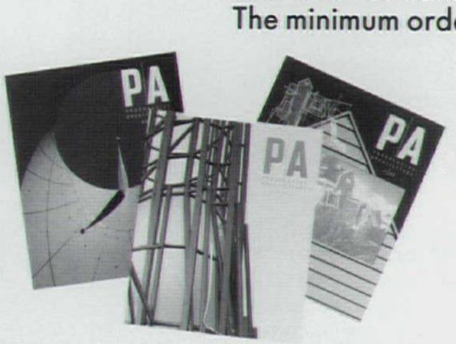

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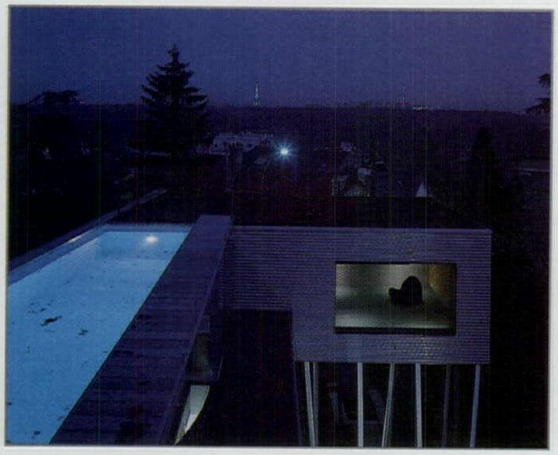

Peter Aaron/Esto

Dramatic payoff: view from the roof of the Villa Dall'Ava.

Wales Institute logo: What's on the prince's mind?

Sight of a Lifetime

In September, 1990, when Rem Koolhaas's Villa Dall'Ava (page 114) was still under construction, P/A editor Ziva Freiman visited the site and had the (unexpected) privilege of meeting the owners. Together they toured the building while waiting for OMA architect Xaveer de Geyter to arrive by train from Belgium. It quickly became very clear how the house could be taking shape as forcefully as it was in the face of fierce resistance from the neighbors: the owners were intimately acquainted with every nuance of the architecture, and were completely committed to preserving its character and clarity. And while their choice of a site seemed odd – literally squeezed amid the narrow-minded – the mystery was solved at the top (above) where, come dusk, Paris glitters on the horizon of the pool.

Carrying a Torch for Starck

Don't get us started on what was wrong with CBS's coverage of the Winter Olympic Games in Albertville. But on the positive side, it seemed that the French had gone all out to make spectacular design statements in every aspect of the games' organization (including the drop-dead architecture of the ski runs).

For starters, there was the wondrous entertainment segment of the opening ceremony, which looked like a circus devised by a latter-day Hieronymous Bosch. The costumes, the props, the choreography (dozens of dancers suspended 175 feet on bungee cords) were positively eye-boggling. Even the Olympic torch was styled to the hilt – by none other than French designer (and collaborator on two AIA Honor Award winners) Philippe Starck. The flaming carrot (below) was designed to ignite Olympian fervor in even the most sedentary armchair enthusiasts.

Starck ®

Philippe Starck's Olympic Torch.

Unintended Implications

The Prince of Wales Institute of Architecture (page 26) has been launched with the help of a suitably elegant brochure, filled with heartfelt words by the prince and silhouetted images of the school's faculty. But the school's spanking new crest (above), designed by Derek Birdsall of Omnific Studios, holds an ironic surprise. We'll let readers arrive at their own conclusions, but to us, the prince's traditional fleur-de-lis crest is sprouting three Modern towers – a little Eisenman, a little Pei, and voilà, it's a little Modern city. Is this meshing of styles merely a graphic expression of the school's mission to revive the traditional craft of the building arts while employing current technologies? Or is the prince a closet Modernist?

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P/A in May ...

Next month, we will offer the first in a series of features entitled "Landmarks," which will revisit a respected work of Modern Architecture and discuss its influence. The first "Landmark" is Eero Saarinen's TWA Terminal at Kennedy Airport, New York. Also in the issue:

... the restoration of Connecticut's High Victorian State Capitol by D.C. Cimino and Design Group One.

... three housing rehabilitation projects in Seattle.

... the ongoing restoration of the Mission San Xavier del Bac in Pima County, Arizona.

... an Indian School in British Columbia by John Patkau.

... four outstanding low-budget interiors projects.

Technics will include an article on life-cycle costing and a roundup of recent books on behavioral science. Part two of our series "Architects and Power" will appear in Practice.