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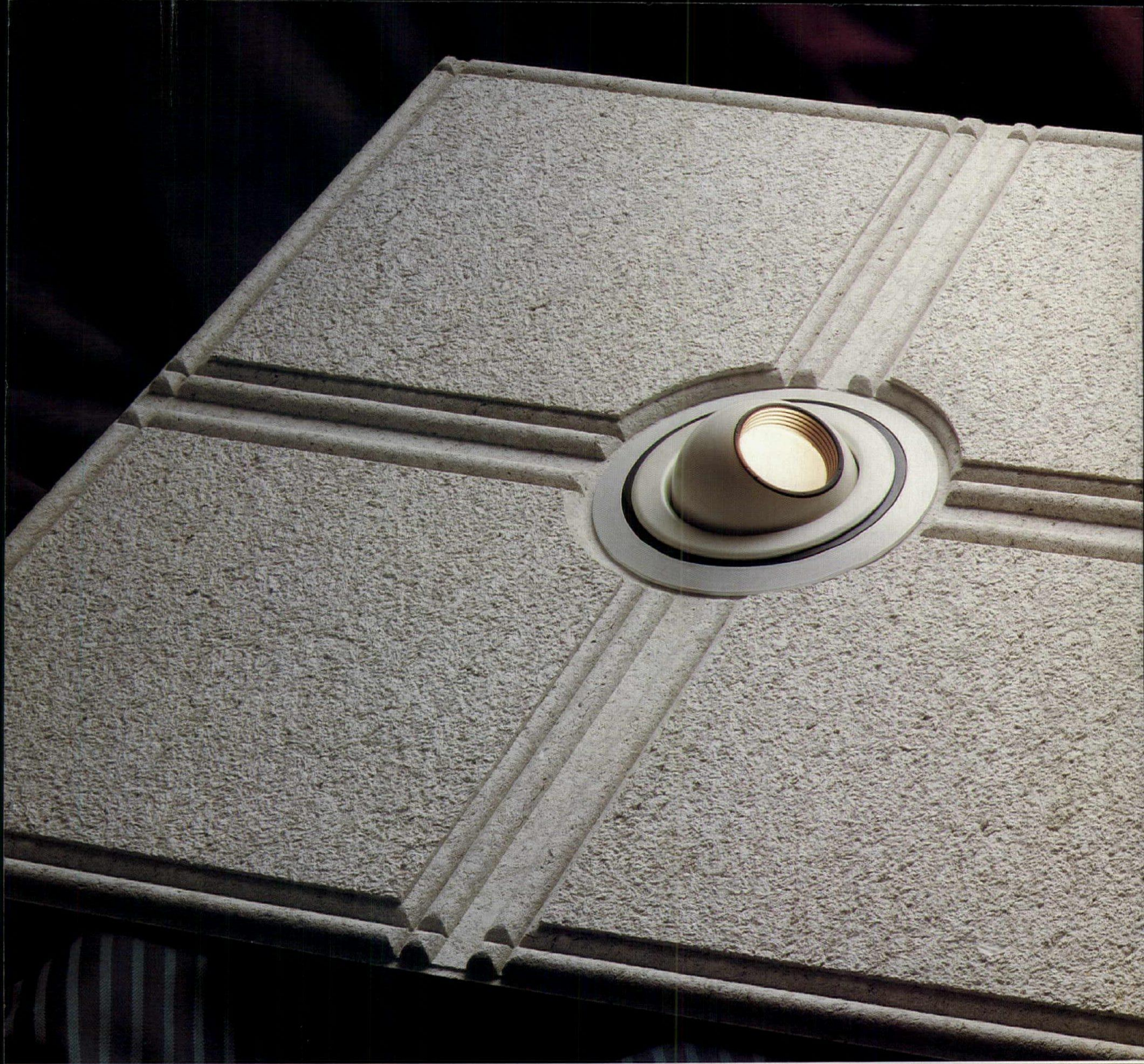

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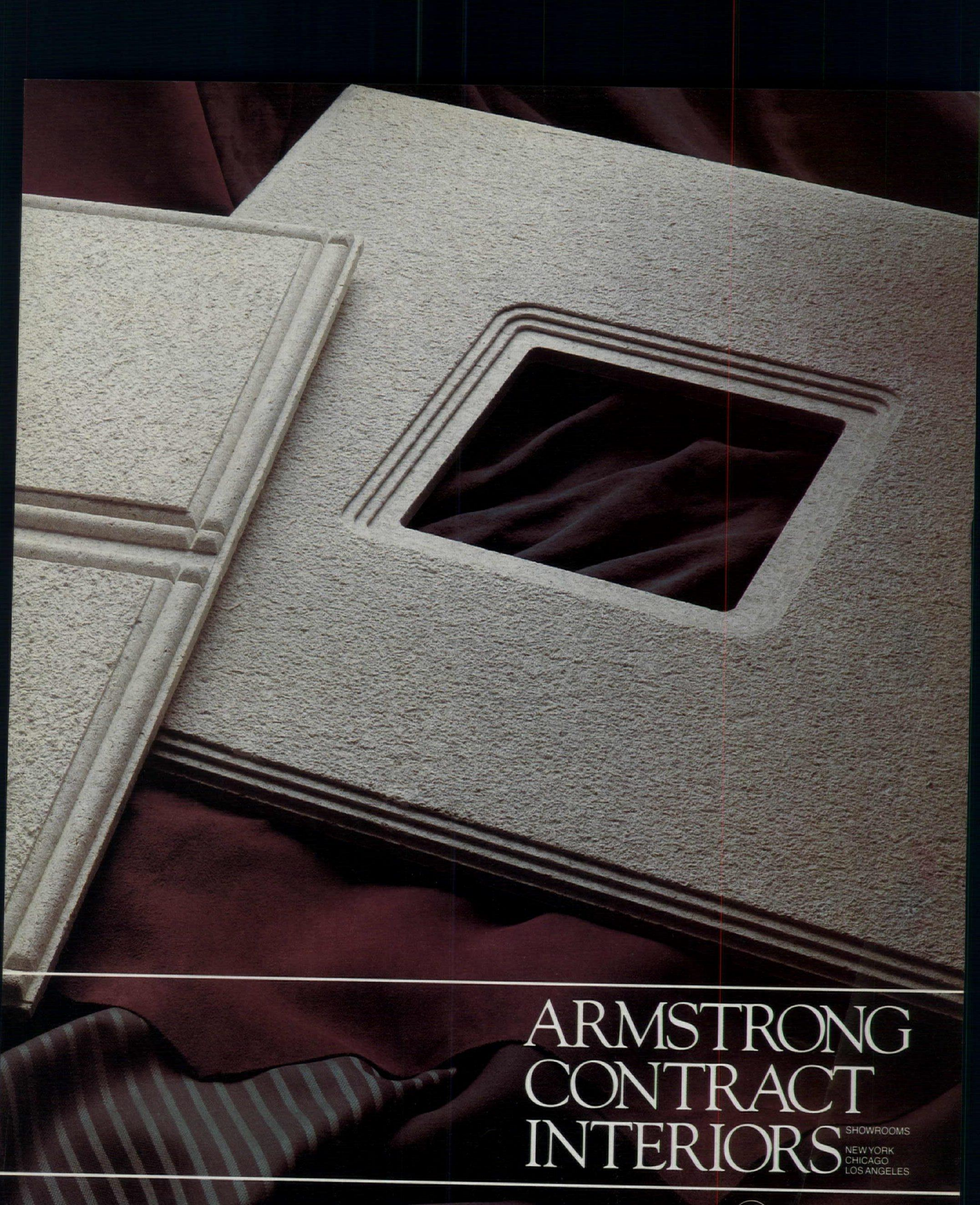
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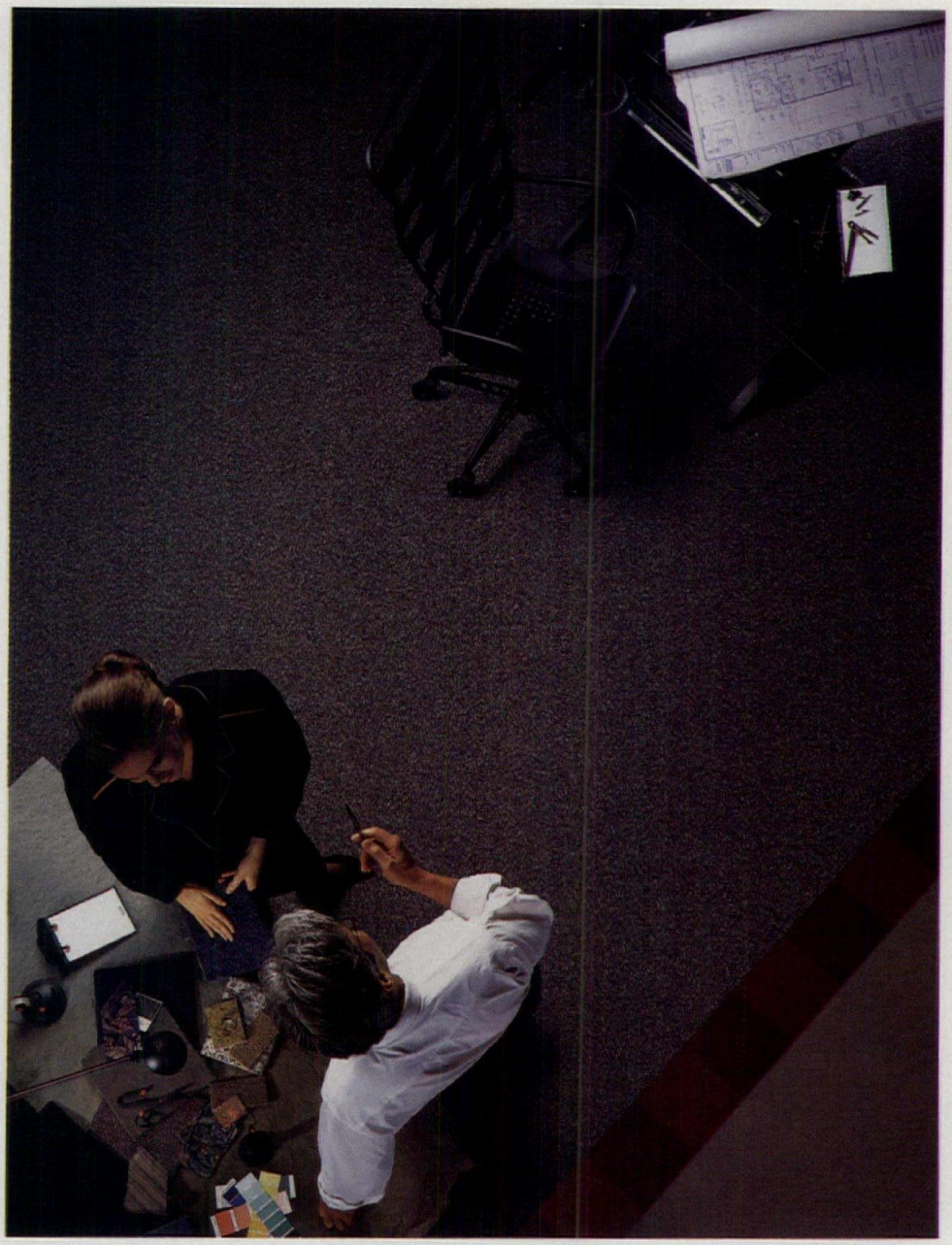

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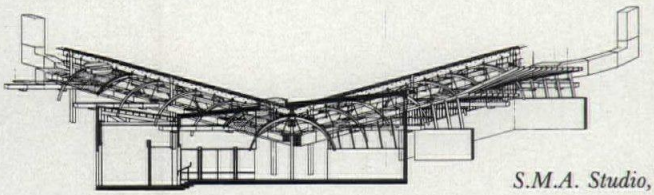

S.M.A. Studio, p. 98

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Editorial
Patterns of Exploitation

The recent death of an architecture student raises questions about the treatment and working conditions of both students and recent graduates.

Last semester, a student at an East Coast architecture school, who had been putting in long hours to complete his final project, drove home to change for the jury, lost control of his car, and was killed. One wants to say that such a senseless loss was an isolated incident. But for those of us who survived architecture school – "a five year fraternity hazing," as one New York architect recently called it – we know that abuses of body and mind were legion and that any one of us, exposed to the same hazard near the end of a semester, could have suffered the fate of that student.

Some schools of architecture have begun to acknowledge the pressure placed on students and the concomitant risks that go with it. A few schools have even taken steps to change the situation: coordinating assignment due dates, for example, or providing psychological counseling on demand. Such efforts are commendable, but they mostly address the symptoms rather than the underlying causes of students' exhaustion and overwork.

That may be because the reasons are complex and deep-rooted in the profession. First, there is the fraternity aspect of architecture, where the pressure on students and interns, in particular, becomes a kind of rite of passage or, less generously, a weeding out of those unfit for membership in the club. Then there is the macho approach that sees students and recent graduates in need of toughening up if they are to make it in this field. Finally, there is the romanticized image of the architect-as-suffering-artist, which, if less overt, remains widespread in the schools and, as it is internalized by students, may inhibit them from protesting their conditions.

At issue is not the value or even the necessity of hard work, commitment, or dedication. There has never been, and probably will never be, a lack of that among students and recent graduates who are serious about becoming architects. The question is: When do we cross the fine line between hard work and exploitation? The answer, I think, depends upon who is to gain from the extra effort.

For example, some schools have begun to reduce the length of semesters, in part to save money on utility costs. That, combined with the need to cover more material within the architecture curricula, can greatly add to the time pressures on students. It is difficult to see how this benefits students or, put another way, it is easy to see how students' willingness to work hard can be abused.

Taking advantage of such willingness becomes even greater once these students graduate and take entry level jobs in offices. Here, architects with the greatest reputations are sometimes the worst offenders, allowing students and recent graduates, for instance, to work for little or no pay.

The irony is that such treatment of employees may, in the long run, harm a firm. Some offices, according to an architecture professor who studies such matters, have not adopted computer technology because of the plentiful supply of inexpensive labor from students and recent graduates. Exploitation thus becomes institutionalized: Some firms come to depend upon overworked, underpaid staff to survive, and they resist even talking about the problem. One dean of architecture, at a local AIA meeting, mentioned the exploiting of employees as a topic that should be addressed; "That was the only subject they never got around to discussing," he says.

The architecture profession, of course, is not alone in mistreating its young. The medical profession is probably worse, for its formalized internship programs, intended to give recent graduates a full range of experience, also force them into working unconscionably long hours for relatively low pay. One difference is that the medical profession, in part forced by the life-or-death errors that exhausted interns can make, has begun to openly discuss and seriously address the problem.

This can be a life-or-death issue for the architecture profession as well, not only individually but collectively. Once exploitation becomes part of the culture of a group, it tends to perpetuate itself, just as abused youths are more likely to become abusive parents. It also tends to color all relationships. How much does the mistreatment that architects accept from developers, for example, have to do with the tacit acceptance of such behavior within the profession's own ranks?

Resolving the problem will require further effort by faculty and administrators in the schools, more teeth in the pertinent section of the AIA's code of ethics, and a stronger stigma being attached to the exploitation of employees. But most of all, it will demand that students and recent graduates simply not take it anymore. **Thomas Fisher** ■

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Views

Classical Critique

It was refreshing to see some Classical work in the February issue ("The Classical Critique," p. 80), especially following on the highly circumscribed content of the January issue. But the text was disappointing. Instead of a critical appraisal of Mr. Blatteau's work on its own terms, we were offered only a tired polemical debate about Classicism vs. Modernism and the validity of Classicism in general. For example, the proportions of the Ionic order shown on page 83 (figure 7) are distorted by compressing the architrave to a fraction of its usual height; yet the article tells us nothing about the architect's design intent in doing so. Moreover, mention is made of a "nondescript" office building into which, interestingly, one of the Riggs Bank projects is inserted, but where is the plan to show how it was done?

Your decision to publish this work should alone be a sufficient argument for its validity, without the need for extensive disclaimers in the text. In July 1988, you published a Quinlan Terry building with comparative essays by Gavin Stamp, Sir John Summerson, and Leon Krier addressing issues such as siting, context, proportion, and detailing – but taking as given the fact that Mr. Terry's building was not Modernist. It would be gratifying to see P/A striving to reach that level of excellence in criticism again.

Michael Evan, Architect
Alexander P. Vucelic, M. Arch.
Long Beach, California

[A more detailed analysis of the detailing and plans might have been in order. We believe, however, that the work of Blatteau or Terry is, in fact, polemical, presenting a pointed critique of Modernism. To claim that this work is self-evident or to call for a strictly formal analysis of it is to assume, wrongly, that this architecture – or any architecture – can be understood apart from its historical or cultural context.–Editors]

Americans in Paris

Our News Report article on the Salon International de l'Architecture in Paris (P/A, Feb. 1991, p. 21) mistakenly reported that Kohn Pedersen Fox Associates was the only American firm represented at the Salon. The Hillier Group of Princeton, New Jersey, also exhibited work.

Environmental Telephone Number

In Practice Points (Feb. p. 43), the telephone number given for the AIA Environmental Resource Guide Newsletter contained an error. The correct number is (202) 626-7463.

March Photo Credits

The model photographer of the projects by Mazria Associates in the environment issue (March, p. 75.) is Kirk Gittings/ Syntax.

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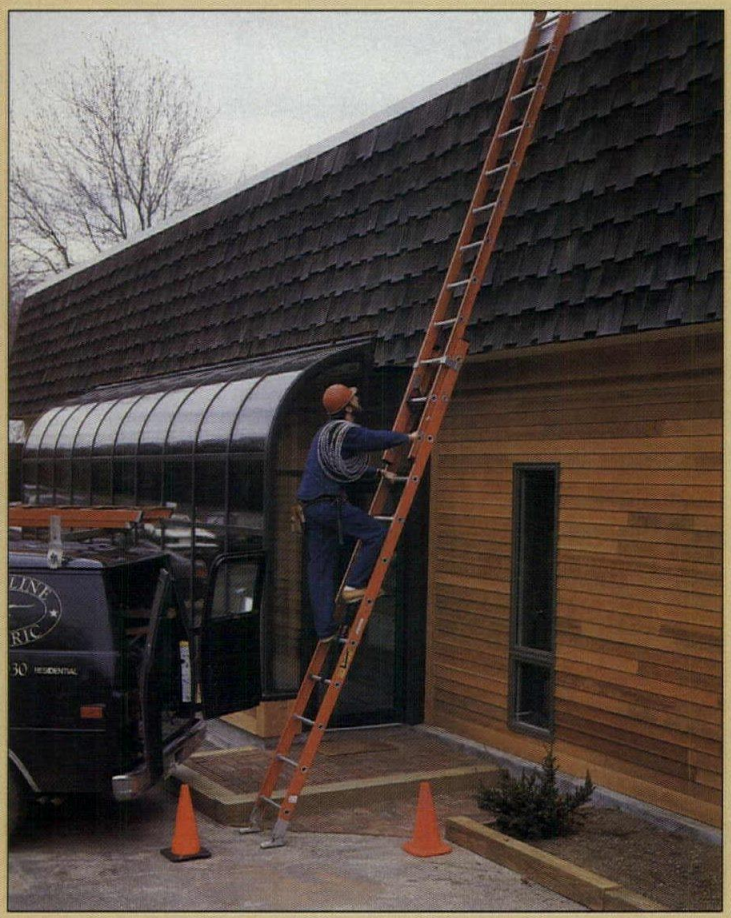

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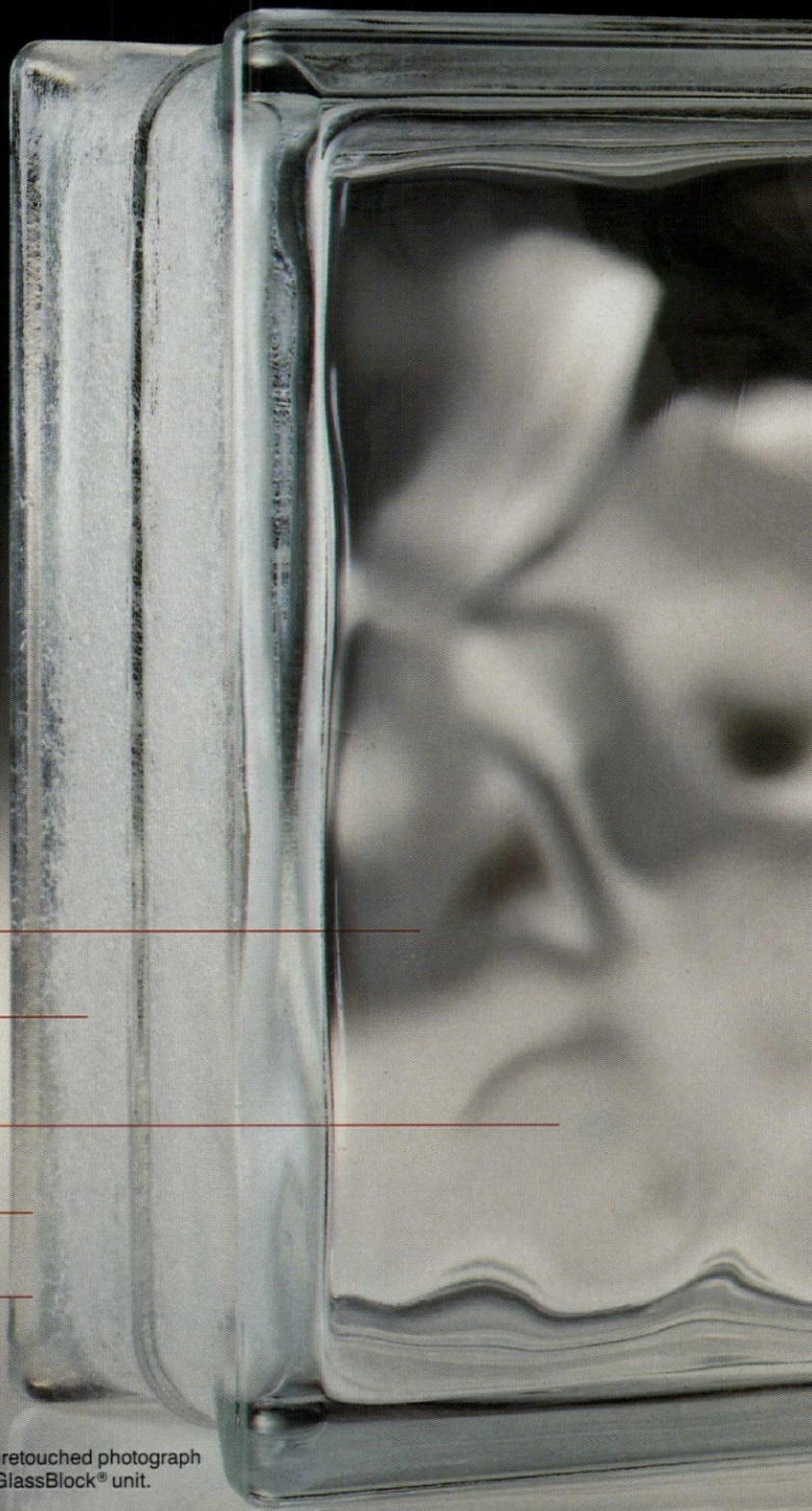

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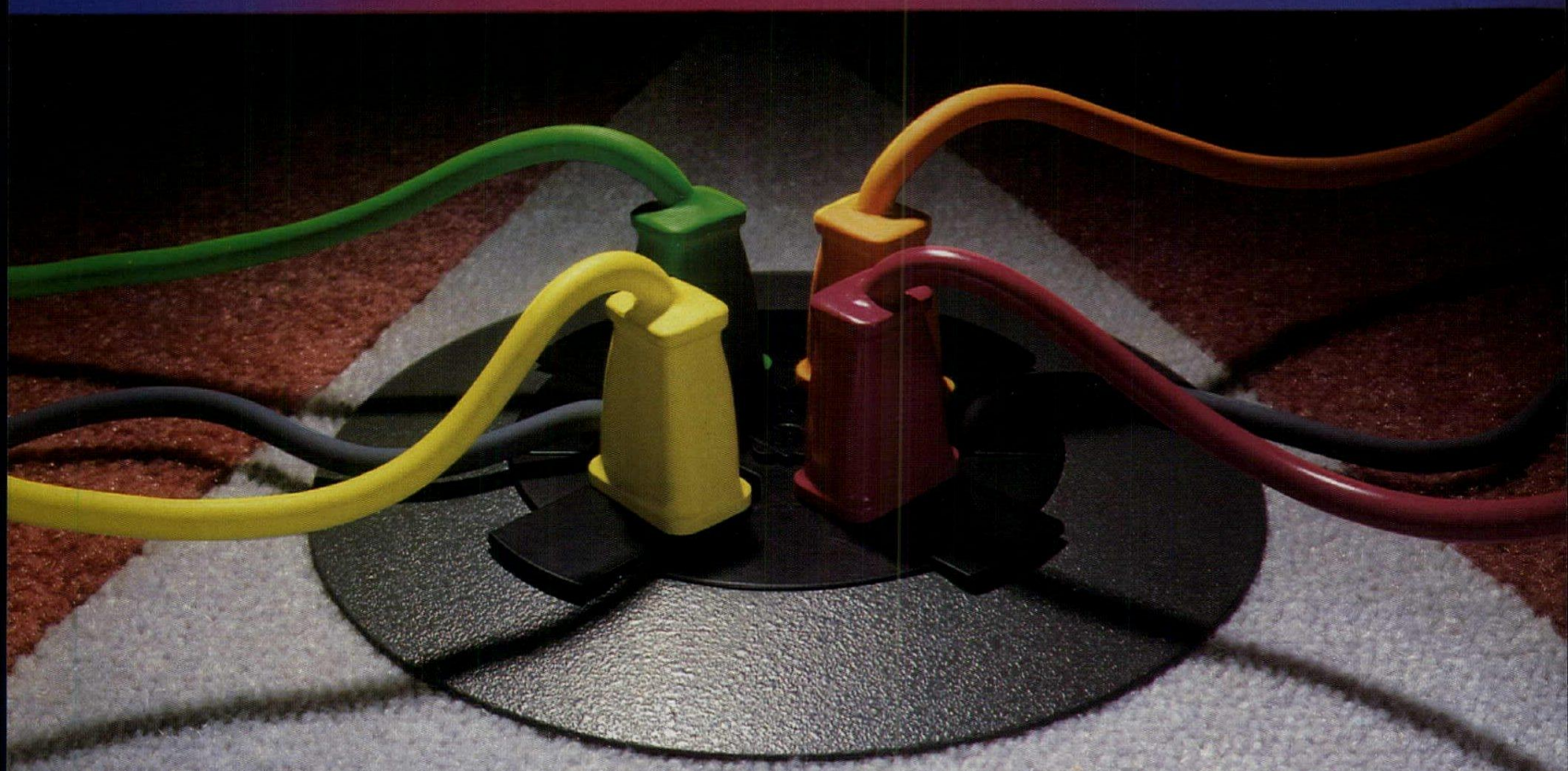

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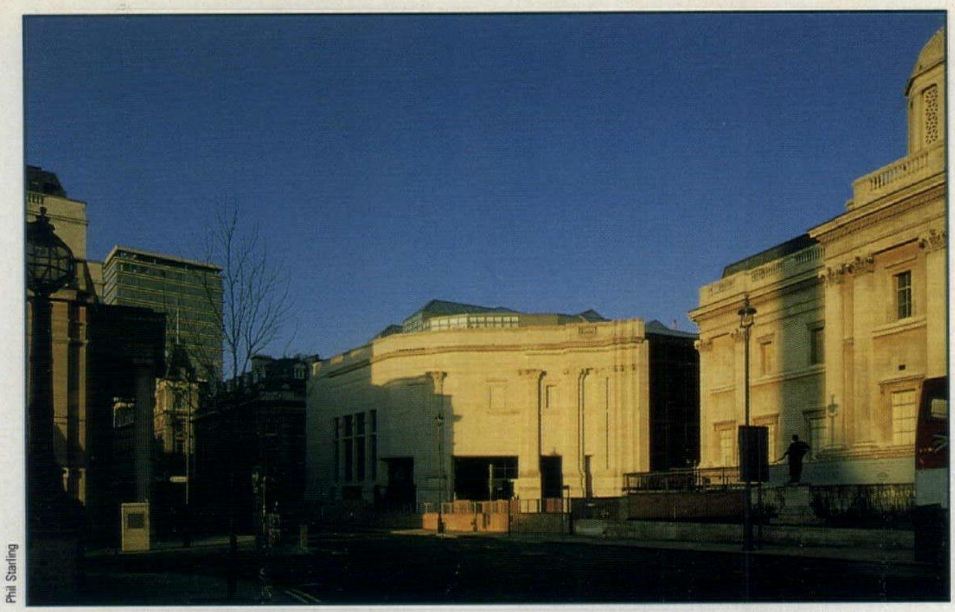

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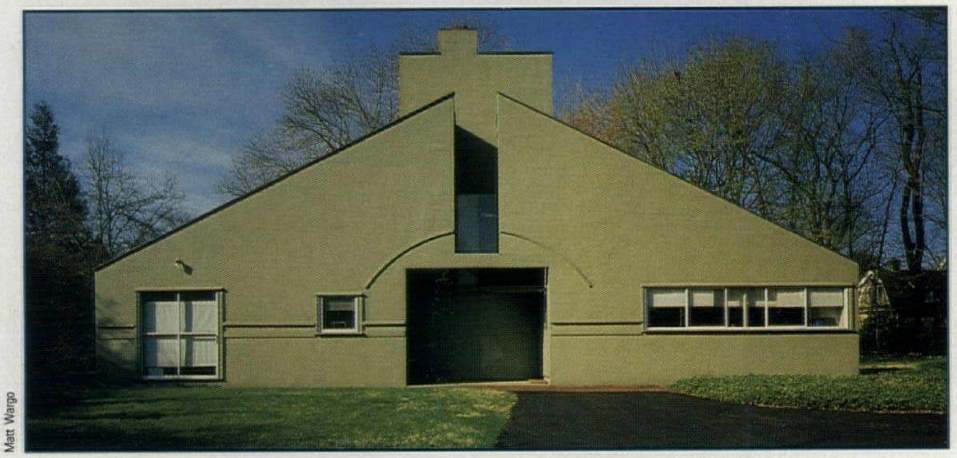
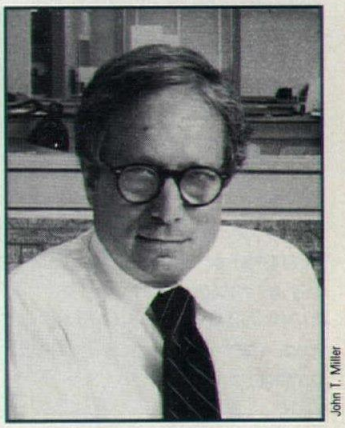


Matt Wargo

Robert Venturi (right) and two of his works: the nearly completed addition to Britain's National Gallery (above) and the 1965 Vanna Venturi house (left).



John T. Miller

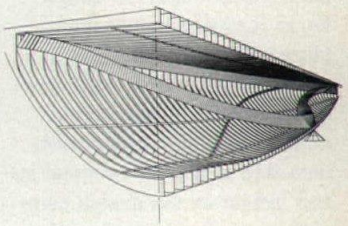
Robert Venturi Wins 14th Pritzker Prize

"He has expanded and redefined the limits of the art of architecture in this century, as perhaps no other has, through his theories and built works." So reads, in part, the statement of the jury that chose Robert Venturi for the 1991 Pritzker Architecture Prize. Venturi, 65, is the 14th recipient of the $100,000 prize, established by the Hyatt Foundation in 1979 as an architectural equivalent of the Nobel Prize; he will receive the award in a ceremony in Mexico City on May 16.

Venturi is the sixth American (following Philip Johnson, Kevin Roche, I.M. Pei, Richard Meier, Gordon Bunshaft, and Frank Gehry) to win the Pritzker. His selection indicates the extent to which Post-Modernism has moved into the architectural mainstream; the only other architects to win the prize for their association with Post-Modernism have been James Stirling and 1990 laureate Aldo Rossi. Venturi's chances were probably not hurt, however, by the presence on the seven-member jury of Lord Rothschild, chairman of the board of trustees of Britain's National Gallery of Art; Venturi, Scott Brown & Associates designed the National Gallery's much-publicized new wing, which opens this summer.

As the jury citation points out, Venturi's career has been marked not only by his influential theoretical treatises – most notably the books *Complexity and Contradiction in Architecture* (1966) and *Learning from Las Vegas* (1972, co-authored by Denise Scott Brown and Steven Izenour) – but also by substantial built work, including the seminally Post-Modern Vanna Venturi House (P/A, May 1965, p. 168), which received the AIA 25-Year Award in 1989; fire stations in Columbus, Indiana (1968), and New Haven, Connecticut (1974); Gordon Wu Hall at Princeton University (1983); and the addition to the National Gallery. His firm, Venturi, Scott Brown & Associates, has also been involved in preservation and rehabilitation projects such as the Furness Library at the University of Pennsylvania (this issue, page 82).

Venturi was born in Philadelphia in 1925, and received his A.B. and M.F.A. degrees in architecture from Princeton. He was a Rome Prize Fellow of the American Academy in the mid-1950s, and has practiced in Philadelphia since 1957. He has held professorships at the University of Pennsylvania and Yale University. He received the AIA Medal in 1978 for *Complexity and Contradiction*, and he is a Fellow of the AIA. **Mark Alden Branch** ■



Current work by Rafael Viñoly is featured in Projects, page 120. (Above: schematic roof structure for Viñoly's Tokyo Forum.)

Pencil Points

Two long-fought architectural battles have been settled recently in New York City. The United States Supreme Court refused to review a lower-court ruling that denied St. Bartholomew's Church the right to erect a 47-story tower on its Park Avenue property, thus upholding the landmark designation of the church and its adjacent community house. Meanwhile, Donald Trump's proposed Trump City (P/A, Jan. 1986, p. 25) mixed-use development for Manhattan's West Side riverfront, has been scaled down from 14- to 8.3-million-square-feet in a surprisingly peaceful end to the bitter confrontation between the developer and community activist groups opposed to the project's disproportionate size.

The Association of Collegiate Schools of Architecture has chosen Professor Kenneth Frampton of Columbia University as recipient of the 1991 AIA/ACSA Topaz Medallion Award for Excellence in Architectural Education.

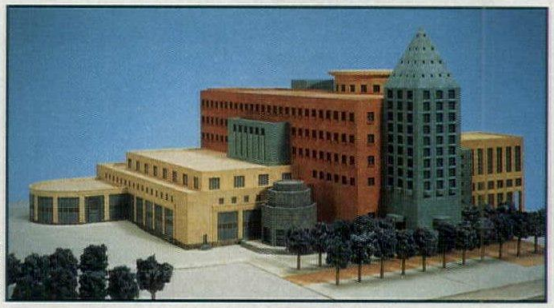
San Francisco's infamous Embarcadero Freeway, irreparably damaged in the 1989 Loma Prieta earthquake, is being dismantled. Viewed by many as an urban eyesore since its construction in 1959, the 1.7-mile stretch along the city's waterfront will be replaced with a broad roadway, landscaped plaza, and promenade.

A new quarterly publication called *Competitions* has been launched to provide information and insight on the design competition process. Timely and thorough competition announcements, features on "successful competitors," and comprehensive documentation of recent architecture, landscape architecture, and public art competition results are included. Contact Competitions, PO Box 20445, Louisville, Kentucky 40250.

Denver's New Library

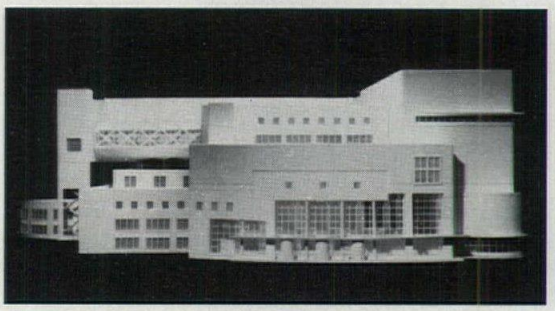
What does a library want to be, now that books, magazines, and newspapers must vie with so many other media – television, computers, videos – for our attention? The three architectural teams recently invited to compete for the commission to design a large addition to Denver's central library each offered a different vision of what libraries may become in the next century.

At one extreme was the proposal made by Hoover, Berg, Desmond in association with F&S Partners of Dallas. It placed the library's resources in a large, open box, wrapped by circulation space and an outer block of offices. The most daring of the schemes – complete with a lattice-truss reading room that bridged over the existing library – this proposal emphasized flexibility and indeterminacy, suggesting that libraries should embrace new information technology, perhaps even relinquishing their former role as storehouses of print media. The difficulty the Hoover team encountered was integrating that vision into Denver's Beaux-Arts Civic Center and relating it to the historic existing library.



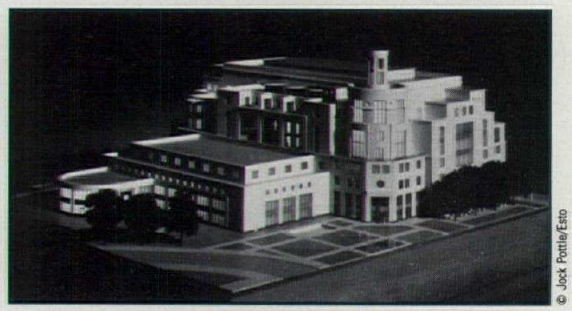
William Taylor

Winning Denver entry by Graves-Klipp team.



Don Wenderski

Hoover Berg Desmond/F & S Partners entry.



© Jock Pottle/Esto

Entry by Stern and Urban Design Group.

An opposite vision was offered by the team of Robert A.M. Stern Architects and the Urban Design Group of Denver. Their design, borrowing materials and details from the original library, fit comfortably into its physical context. Organized around a stone and wood-paneled "grand hall," their proposal also hewed most closely to the familiar image of a library. Even though the stack areas offered considerable flexibility, the message here was that the library should be a tradition-bound institution – a repository of our past – inviting, but not overtly competing for our time and attention.

Between those two positions stood the team of Michael Graves, Architects, and the Klipp Partnership from Denver, whose design was ultimately selected by a committee of citizens and library and city personnel. Consisting of a series of clearly articulated parts, the scheme managed to be sufficiently monumental to hold its own within the Civic Center while not overpowering the existing library, which was treated as one of several pieces plugged into the main transverse block. Inside, the stack areas were treated as "poché" around a series of well-defined circulation and reading spaces – an approach that allowed for flexibility in adapting new media technology, while retaining a clear hierarchy of monumental rooms. The winning Graves/Klipp scheme, in short, envisioned a more ambiguous – and a more probable – role for libraries in the future: institutions that will have to keep one foot in the past and one in the future, that will have to be at once civic and yet increasingly assertive in a society that is, unfortunately, becoming less and less literate. **Thomas Fisher** ■

Editor's Note: Mr. Fisher, P/A's Executive Editor, served on the professional advisory panel that assisted the library's selection committee in choosing architects.

Isozaki Revisited at MOCA

"Arata Isozaki 1960/1990 Architecture," the retrospective that opened March 15 at Isozaki's own Museum of Contemporary Art in Los Angeles, is a stunning eyeful of a show that spans a singularly prolific and thoughtful career.

The exhibition covers an extraordinary range from the metabolist megastructures of Isozaki's Cities in the Air series (designed between 1960 and 1963, when the young architect was just setting out after ten years with mentor Kenzo Tange) to Nine Houses, a string of disciplined études on the nine-square and other cubist geometries, which evolved over two decades; there is a diverse array of prime institutional and commercial projects dating from the late 1970s to the present, culminating in two recently completed major works: the Sant Jordi Sports Hall, readied for the 1992 Barcelona Olympics, and the Team Disney headquarters building in Orlando (both featured in P/A last month, pages 69–83).

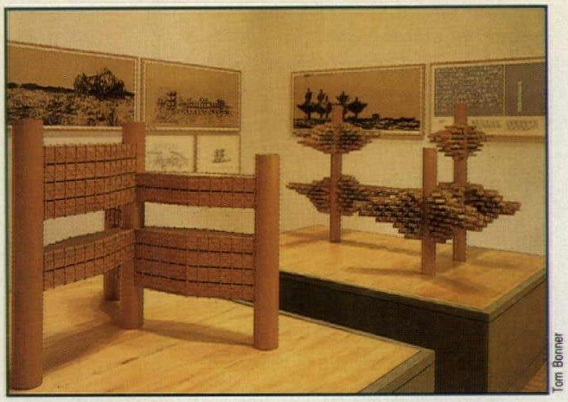
The installation (also designed by Isozaki) in-

cludes 250 drawings, silkscreen renderings, and sketches; and 35 models, many exquisitely made of wood. These presentations were purposely kept "unsullied" by photographs; instead, carefully orchestrated slide presentations of realized buildings (grouped thematically and edited by Isozaki) are screened separately, on high definition TVs housed within darkened hollow cubes that were built for the occasion.

The decision to sequester photographic facsimiles from the other, more "hypothetical" media of drawings and models, creates a curious effect: It puts realized and unrealized projects on equal footing within the main display, rendering the early visionary projects on the face of it as plausible as the built works of renown.

The sheer volume of work shown is staggering. Its historical moment is further enhanced by the exhibit's inaugural installation within the museum that constituted Isozaki's first commission in the U.S., and whose acclaim contributed significantly to the architect's international stature. After June 30, the show will travel to four venues in Japan (among them Isozaki's Kitakyushu City Museum) and by the fall of 1992 will wind up in Paris at the Centre Pompidou, a co-sponsor of the show.

On the whole, the presentations' level of finish is extremely high; the relative scarcity of thumbnail sketches and complete absence of working or study models cast a homogeneity over the installation that belies the exhibit's enormous breadth. The models seem extremely valuable and inviolate; quotations from the architect's writings, silkscreen renderings, and ink drawings are all framed, and in many cases hung a little high – not at eye-level. This treatment has a sanitizing effect that lessens the sense of the exploration and creative struggle that must have taken place over these 30 years. To suggest, if only via the installation's external polish, that this architecture sprang fully fledged into being somehow diminishes Isozaki's genuinely heroic dimension. **Ziva Freiman** ■



Tom Bonner

"Cities in the Air" models in Isozaki exhibition.

High-Rise Fire in Philadelphia

On Saturday evening, February 23, as George Bush announced the beginning of the ground war in the Persian Gulf, fire sirens could be heard whining above the President's voice throughout Center City Philadelphia. Like the Middle East, the One Meridian Plaza building across from City Hall was ablaze. Set against the night sky, flames could be seen from miles away lapping at the gray, granite-clad walls of the 38-story structure.

The fire bégan on the 22nd floor of the office building and quickly spread upwards. Firefighters, three of whom were killed by asphyxiation when they were trapped on a floor above the advancing flames, were hindered by failures of the building's standpipe and emergency generator systems.

But these failures might not have been so tragic had One Meridian Plaza been fully equipped with sprinklers, which it was not. The structure was designed in the late 1960s by architects Vincent G. Kling & Associates and completed in 1972, when Philadelphia building codes did not yet require sprinklers on all floors of high-rises. This effectively changed in 1983 when Philadelphia adopted BOCA as its building code. At about the same time, Phildelphia amended its fire code to require existing high-rises to meet higher levels of life safety, including the provision of sprinklers in certain areas such as basements, assembly areas, and mercantile spaces. In keeping with this ordinance, One Meridian Plaza had sprinklers on only its basement, 11th, and 30th floors.

So firefighters could only look on with frustration as the fire raged, reaching temperatures of 2000 degrees Fahrenheit and buckling floors and ceilings. As Saturday evening wore on to Sunday morning, spectators gathering at the base of the inferno were mesmerized by the sight of glass plummeting 25 stories to the pavement as flames leapt from floor to floor. Nineteen hours after the

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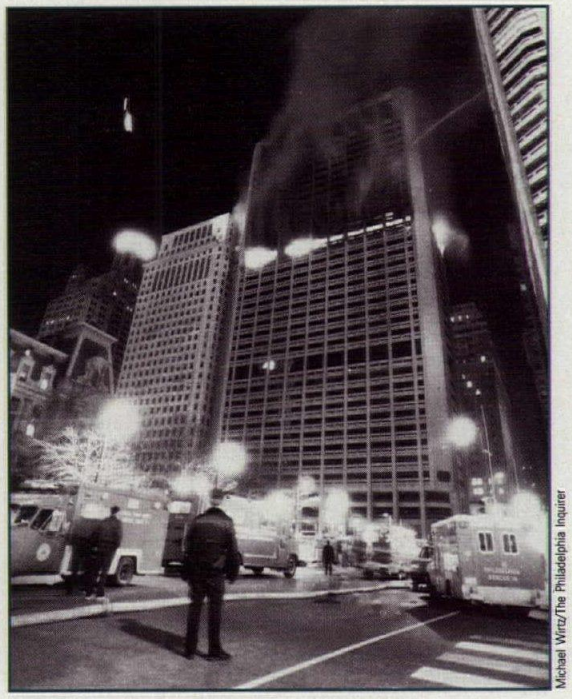


Michael Wirtz/The Philadelphia Inquirer

Firefighters battle One Meridian Plaza blaze.

Obituaries

Landis Gores

Architect Landis Gores died on March 18 in Norwalk, Connecticut, at age 71. Gores was one of five architects – including Philip Johnson – who drew international attention in the 1950s for their avant-garde houses in New Canaan, Connecticut. Gores graduated from the Harvard Graduate School of Design in 1942, having studied with Walter Gropius and Marcel Breuer. He was associated with Johnson from 1946 to 1951, when he established his own practice in New Canaan.

John Graham

Architect John Graham died in Seattle on January 29 at age 82. Graham's best-known work is the 600-foot-tall Space Needle for the 1962 World's Fair in Seattle, but he is also credited with establishing a prototype for shopping malls with his 1940s Northgate Mall near Seattle. He took over his father's firm, John Graham Associates, in 1945.

Shiro Kuramata

Architect and designer Shiro Kuramata died in February at the age of 57. The Osaka-born Kuramata (P/A, Sept. 1988, p. 74) was considered a major force in the rise of Japanese design in the international market. His abstracted Modernism can be found in shops, commercial spaces, restaurants, and bars around the world, among them shops for Issey Miyake. Also revered as a furniture designer, Kuramata produced many classic pieces, such as the twisting chest of drawers called "Furniture in Irregular Forms," designed in the late 1960s and "How High the Moon" (1986), a ghost-like chair of expanded metal.

Berthold Lubetkin

Architect Berthold Lubetkin died on October 23, 1990 in England. He was 88. The Russian-born Lubetkin studied at several Eastern European schools of architecture in the 1920s under some of the most progressive Constructivist/Modernist practitioners of the day. Lubetkin moved to London in 1931, designing houses, commercial of-

(continued on next page)

Obituaries

(continued from previous page)

fices, government buildings, and zoos. His additions to the London Zoo (1932–1937), including the recently restored Penguin Pool, were praised for their sensitivity (to inhabitants) and pure Modernist form. Lubetkin retired to the English countryside in the 1950s.

Oscar Nitzchke

Modernist architect Oscar Nitzchke died on February 11 in Ivry-sur-Seine, a Paris suburb. He was 90. The Swiss-born Nitzchke enrolled at the Ecole Nationale Supérieure des Beaux-Arts in Paris in 1920 and left two years later to work with Le Corbusier. He came to New York to work with Harrison & Abramovitz in 1938 and remained with the firm until 1953, working on the Alcoa Building and the Mellon Bank and Trust Company in Pittsburgh, the Los Angeles Opera House, and the United Nations in New York.

George Patton

Landscape architect George Patton died on March 3 in Philadelphia at age 70. He designed Locust Walk on the University of Pennsylvania campus, collaborated on the restoration of Independence and Rittenhouse Squares in Philadephia, and provided site planning and landscaping services for the Kimbell Art Museum in Fort Worth, Texas, and the Philadelphia Museum of Art, among other sites. Patton studied in Europe (1949 to 1951) as a Prix de Rome Fellow and as a Fulbright Scholar; established George E. Patton & Associates in 1954; and taught architecture at the University of Pennsylvania.

William H. Short

Architect William H. Short died on February 20 in Princeton, New Jersey. He was 66. A graduate of Princeton University, Short was chosen by Frank Lloyd Wright to supervise the construction of the Guggenheim Museum while with Holden, McLaughlin Associates, New York. He later established a partnership with Robert Venturi before founding Short & Ford & Partners, Princeton, in 1974.

Fire

(continued from previous page)

fire started, the sprinklers on the 30th floor functioned properly and the fire was extinguished.

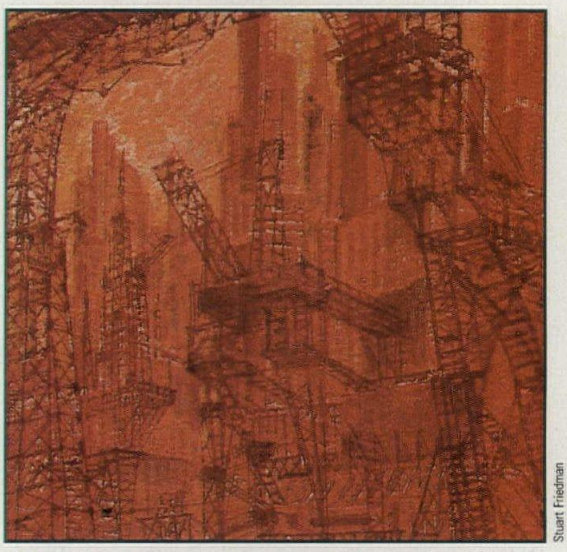
The cause of the fire and the failure of the building's suppression and support systems are still under investigation and, predictably, officials on all sides of the incident are reluctant to comment on the record. But, speaking at a news conference in mid-March, Philadelphia Fire Commissioner Roger M. Ulshafer indicated that he believed "negligence" was responsible for the fire's raging out of control. He also quoted fire-protection experts as calling the blaze "probably the most significant high-rise fire in this century in this country. . . [and one that is] going to change the way the fire-protection industry looks at things."

Speculation on the fate of the charred skyscraper is rampant and estimates of damage range upwards of $100 million. There is concern that the high temperatures compromised the structural integrity of the building's steel frame and its curtain wall panels, in which case One Meridian Plaza will need to be razed. A preliminary forensic engineering report from the Kling-Lindquist Partnership (the successor firm to Vincent G. Kling & Associates), on behalf of building owner and manager Richard J. Rubin Co., was under way at press time, but it may take years to untangle the complex web of litigation which is sure to be spun around the incident.

In the meantime, the citizens of Philadelphia have a temporary monument: The vacant, blackened shaft of One Meridian Plaza is a sobering reminder of the fragile ecology of high-rise architecture. **Donald Prowler** ■

Russia's Iakov Chernikov Rediscovered

How did an architect as talented as Iakov Chernikov (1889–1951) elude chronicles of the Soviet avant garde? His belated entry into our Modernist histories was marked recently at Columbia University, with an exhibition of 400 drawings and a symposium that attempted to locate his position in Russia between the wars. Chernikov approached Leonidov, Tatlin, and Ginzburg in talent and diligence: He built dozens of Modern structures, established his own design school in 1928, published four pedagogical design books, and produced 18,000 drawings during his lifetime. Esteemed by his colleagues, Chernikov joined neither the Constructivist nor the Suprematist camps. It seems that his independence and the dualities in his *oeuvre* stymied attempts to place him in standard histories. He was alternately labeled an artist and an architect, famous for his abstract designs before he shifted to a Classical mode in the 1930s.



Stuart Friedman

1930 ink-and-gouache illustration by Iakov Chernikov.

Many of the exhibited plates, taken from his books, are studies in abstract composition. Seen in sequence, these small drawings delineate his creative leaps and graphic dexterity – talents that translated into the Piranesian fantasies he drew when Stalin banished Modern abstraction from architecture and the arts.

These later drawings are Chernikov's most provocative. He resurrected the academic training of his youth to conjure monumental cityscapes of awesome beauty. At the symposium, Chernikov's grandson, architect Andrei Chernikov, noted that the imaginative realm was important in Russia before and after the advent of Modernism. A vision of beauty seems to have been more important to the elder Chernikov than allegiance to Classical or Modern aesthetics: He was "absolutely an artist, absolutely alone." Joan Ockman, who contributed to *Iakov Chernikov: The Logic of Fantasy* (Columbia Books on Architecture, catalogue 2) likewise detected a sense of reverie in his drawings; they are more a science fiction than a utopian conviction to be realized. Kenneth Frampton speculated that this may explain our keen interest in Chernikov today, when utopia's links to the empirical realm seem particularly tenuous.

Philip Arcidi ■

Westweek 91: The Famous Five Hit L.A.

Without a doubt, architectural luminaries ruled the day at the annual Westweek design fair held March 20–22 at the Pacific Design Center in Los Angeles. Aldo Rossi, Robert Venturi, Denise Scott Brown, and Richard Meier were in town to introduce a line of fabrics for DesignTex, while Peter Eisenman offered a preview of his new textile collection for the Knoll Group, which will be formally introduced in the fall.

DesignTex, a division of Steelcase, turned over the Murray Feldman Gallery to the architects, who designed three follies to display their wares. Venturi and Scott Brown had collaborated on a refreshing lineup of four weaves that played on the

(continued on page 32)

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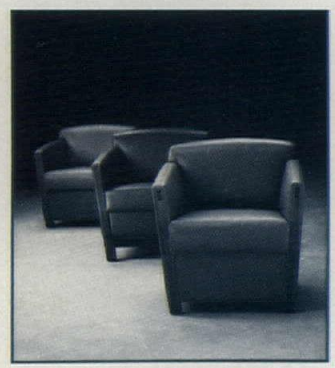

Highlights from Westweek: Reale table by Carlo Mollino, reissued by ICF (top) and Swathmore armchairs by Michael Shields for Brayton (above).

Westweek *(continued from page 30)*

juxtapositions of intricate Japanese motifs with bold stripes and polka dots, and floral patterns on checkerboard fields; their "folly" resembled a stage-set, featuring a gigantic cutout of a sofa as the fabric-clad centerpiece.

Rossi created the illusion of an old-world room, complete with overstuffed armchairs, his own (splendid) drawings on the floral fabric-covered walls, and an illusory backlit "French door." His fabrics are quite nostalgic in flavor yet delightfully unpredictable, especially a painterly weave based on masonry patterns of pre-Classical Sicilian architecture. More abstract, as may have been expected, Meier's cotton textiles featured an array of relatively colorful geometric progressions of squares and grids, displayed in a folly built of freestanding planes.

Most manufacturers did not launch new products at the event. Most notable among the limited introductions were the Reale table from ICF, a reissue of a 1946 wood-base table designed by Italian architect Carlo Mollino, now available with a glass or granite top; compactly scaled leather seating by Robert Arko for Metropolitan Furniture, commendable for its dynamic contours; and the Swathmore armchairs by Michael Shields for Brayton International, a series of upholstered seats with pleasing laser-cut molding details.

Ragnars Veilands

They might be giants: Aldo Rossi, Robert Venturi, Denise Scott Brown, and Richard Meier, whose DesignTex textiles were unveiled at Westweek.

These introductions illustrated what may be the payoff of a slow year for the industry: While the volume of new merchandise has slowed to a trickle, what new pieces are put into production seem on the whole more carefully considered.

Ziva Freiman ■

"Whither Social Responsibility?"

An impressive group of some 20 architects, planners, and academicians converged at the New School for Social Research in New York on March 2, invited by Susana Torre of Architects, Designers and Planners for Social Responsibility/New York (ADPSR) to "revive a long silenced discourse." For 8 hours, the panelists, aided by a sympathetic audience, re-opened a spectrum of socially progressive issues: minority advocacy, cultural pluralism, urban planning strategies that benefit the poor, and environmental sustainability.

While ambitiously broad in scope, the symposium managed to offer more than a grazing menu: Outspoken voices were strategically distributed, and diplomatic statements gave way to spontaneous, not to mention contentious comments. In the morning, the cultural critic Richard Sennett promoted B.V. Doshi's Indian Modernism as a rare convergence of responsive and responsible design, readily adapted by succeeding occupants. In a more provocative talk, Richard Ingersoll, an editor of *Design Book Review*, warned that our environmental profligacy could lead to an eco-fascist nightmare, where zealots rank the restoration of a ravaged planet above individual rights.

The last panel of the day, "Ethics vs. Esthetics in the Discourse on Design," was the liveliest: Zeynep Celik, an architect and historian, advised her colleagues to steer clear of the paternalistic connotations of "social responsibility," and suggested that enclaves in the Third World could show how to adapt Modern technology without the hegemonistic tendencies critics find in our own culture. J. Max Bond, architect and dean at City College of New York, argued that the architectural press (including P/A) as well as ADPSR underrepresents the work of African-American architects. Alice Friedman, like many recently degreed art historians, invoked the the Frankfurt School of Marxism and Post-Structuralism. Commenting on Mies van der Rohe's Farnsworth house, she said that despite (or because of) its rigorous poetics of form and structure, the house was flawed: It accommodated Mies's rarefied concept of dwelling, but made almost no provisions for the client's privacy and comfort. Spirited comments about the tradeoff between aesthetic quality and plurality ensued, with interjections about the arms industry and our unraveling environment – a rambling, but illuminating extension of today's architectural debate.

Philip Arcidi ■

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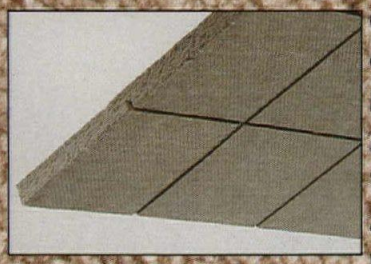

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Calendar

Exhibitions

Steven Holl
Through June 23

Minneapolis. Holl's architectural thesis of phenomenological order implicit in the disorder of the modern urban landscape is central to "Edge of the City," the final exhibition in the six-part Architecture Tomorrow series. His renewal schemes for city edges in Cleveland, Dallas-Fort Worth, Manhattan, Phoenix, Milan, and Fukuoka, Japan, are presented with models, maps, photomurals, and watercolor drawings. Walker Art Center.

Rockefeller Environments
Through September 30

Washington, D.C. Mounted in celebration of the National Building Museum's presentation of its fifth annual Honor Award to the Rockefeller family, "Ideal Places: Rockefeller Visions for America" documents the family's construction of new environments (Rockefeller Center) and preservation of significant places (Williamsburg, Virginia, and Acadia National Park, Maine). National Building Museum.

American Urbanism
May 3–June 2

Charlottesville, Virginia. "Future Directions in American Urbanism: An Academic Perspective" is an invitational exhibition of "current thoughts and trends in urban design as explored in graduate programs across the United States." Second Street Gallery.

Young Architects
May 9–June 24

New York. Work by winners of the Architectural League of New York's 10th annual Young Architects competition will be exhibited. This year's theme was "Practice." Urban Center Galleries.

Competitions

Erskine Award
Application deadline May 31

Stockholm, Sweden. The Ruth & Ralph Erskine Award Foundation 1991 scholarship will honor completed "buildings or community structures of innovative social, ecological, and aesthetic character. . . to the advantage of the less privileged." The program is overseen by the National Association of Swedish Architects. Individuals, groups, and organizations may apply. Contact Ruth & Ralph Erskine Award Foundation, Svenska Arkitekters Riksforbund, Norrlandsgatan 18, 2 tr, 111 43 Stockholm, Sweden.

Nara Convention Hall
Registration deadline May 31, submission deadline December 9

Tokyo. The City of Nara, Japan, is the site of the 1998 World Architecture Exposition (Expo '98). A two-stage open international competition for the design of the Nara Convention Hall housing a 2000-seat auditorium is the first of twenty-five "redevelopment" projects planned. Any registered architect may enter. A typewritten request for registration materials must be on A4 paper with name, date of birth, address, telephone number, name of employer, work address and telephone number; documentation of eligibility must be included. Contact Architectural Communication Consultant, Playguide Building, 2–6-4 Ginza, Chuo-ku, Tokyo 104 Japan.

Cedar Awards
Registration deadline June 7, entry deadline July 12

Bellevue, Washington. The Cedar Shake & Shingle Bureau and the AIA have announced a call for entries in the 10th biennial Excellence in Design awards program. Entries, by any architect or designer, may be submitted in six categories: residential/single family; residential/multi-family; vacation homes; commercial/

(continued on next page)

Calendar *(continued from previous page)*

institutional; remodeling/restoration; and interiors. Contact Cedar Shake & Shingle Bureau, 515 116th Avenue, N.E., Suite 275, Bellevue WA 98004–5294 (206) 453-1323.

Presidential Design Awards
Entry deadline June 24

Washington, D.C. This two-stage awards program, administered by the Design Arts Program of the National Endowment for the Arts as part of the Federal Design Improvement Program, honors exemplary achievements in the fields of architecture, landscape architecture, engineering, graphic design, historic preservation, product/industrial design, and urban design and planning that were commissioned, produced, authorized, or supported by the federal government. The program is conducted every four years. Contact Presidential Design Awards, National Endowment for the Arts, Design Arts Program, Room 625, Washington, D.C. 20506 (202) 682-5437.

Landscape Architecture
Entry deadline July 7

Washington, D.C. The second annual "Landscapes for the 21st Century" competition, sponsored by *Landscape Architecture* magazine calls for entries in four categories: private landscapes, public landscapes, theorectical landscapes, and student entries. Submissions may be made by individuals or teams. Winning designs will be published in the December 1991 issue. Contact Bill Thompson, Department UL, Landscape Architecture, 4401 Connecticut Avenue, N.W., Washington, D.C. 20008 (202) 686-2725.

East Meets West
Entry deadline July 22

Tokyo. An international competition, "East Meets West," sponsored by Central Glass Co., Ltd., and Shinkenchiku-sha Co., Ltd., invites participants to act on the current multi-faceted discourse between Eastern and Western cultures with a proposal for a facility, of any scale and for any site, that symbolizes this juncture. Cultural facilities, goodwill centers, and the like are encouraged. A request for competition requirements is suggested. (There is no formal registration system.) Contact Shinkenchiku-sha Co., Ltd., Department of the Central Glass International Architectural Design Competition 1991, 31–2, Yushima 2-chome, Bunkyo-ku, Tokyo 113 Japan.

Conferences

NEOCON® 23
June 11–14

Chicago. This year's contract furniture trade show and conference will emphasize the changing international marketplace. The Merchandise Mart is the main venue for events. (See p. 171, for a NEOCON® preview.) Contact Angela Hartung, communications coordinator, 470 The Merchandise Mart, Chicago IL 60654 (312) 527-7782.

Historic American Theaters
June 18–22

Northern Calfornia. Participants in this traveling conference sponsored by the League of Historic American Theatres will discuss restoration and operation by visiting 17 theaters from Sacramento to San Francisco. Contact The League of Historic American Theatres, 1511 K Street, N.W., Washington, D.C. 20005 (202) 783-6966 or FAX (202) 393-2141.

CSI Convention/Exhibit
June 28–30

San Diego. The 35th Annual Convention and Exhibit of the Construction Specifications Institute will be held at the San Diego Convention Center. Contact Sandy Humphries, CSI Convention Services Department, (703) 684-0300. ■

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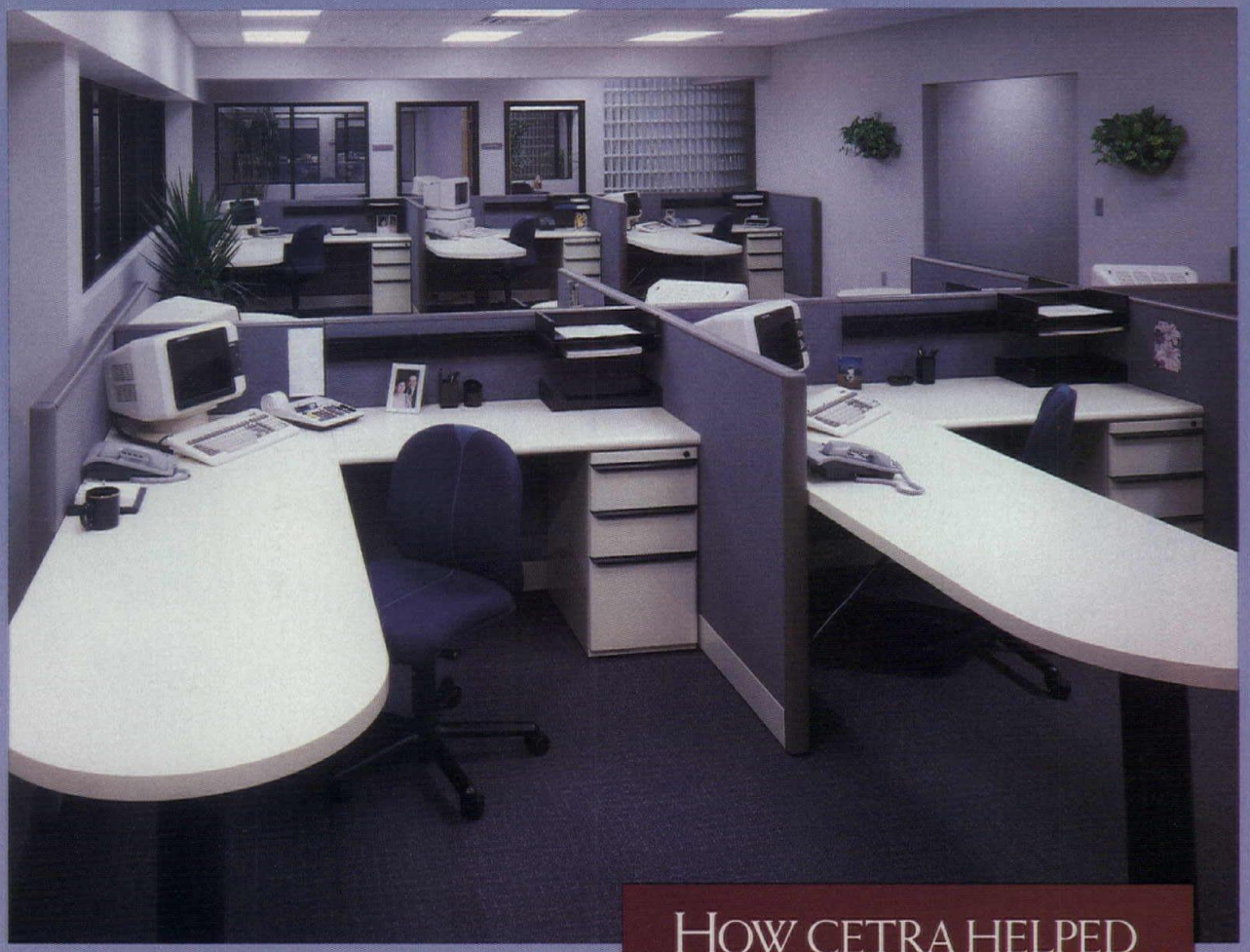

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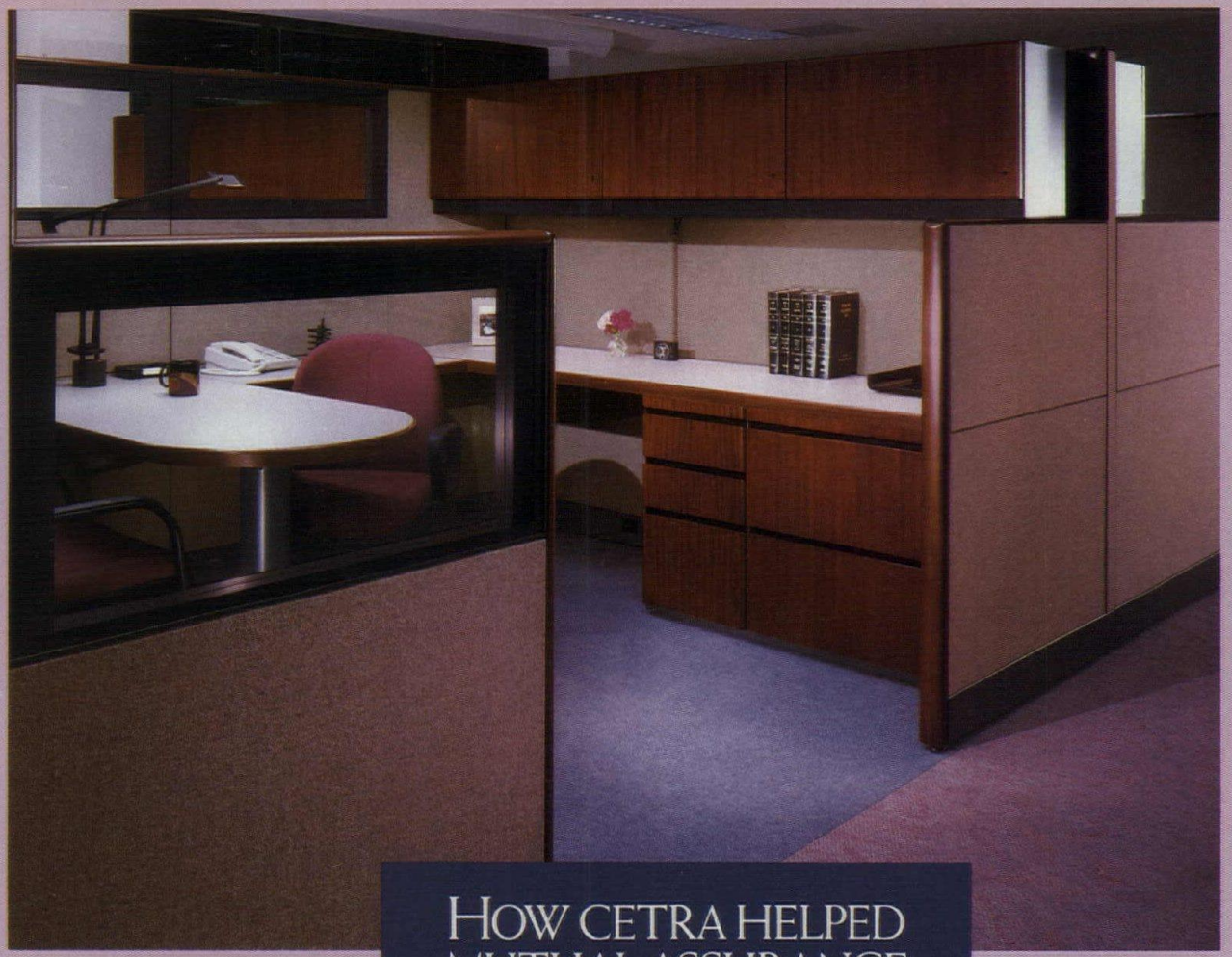

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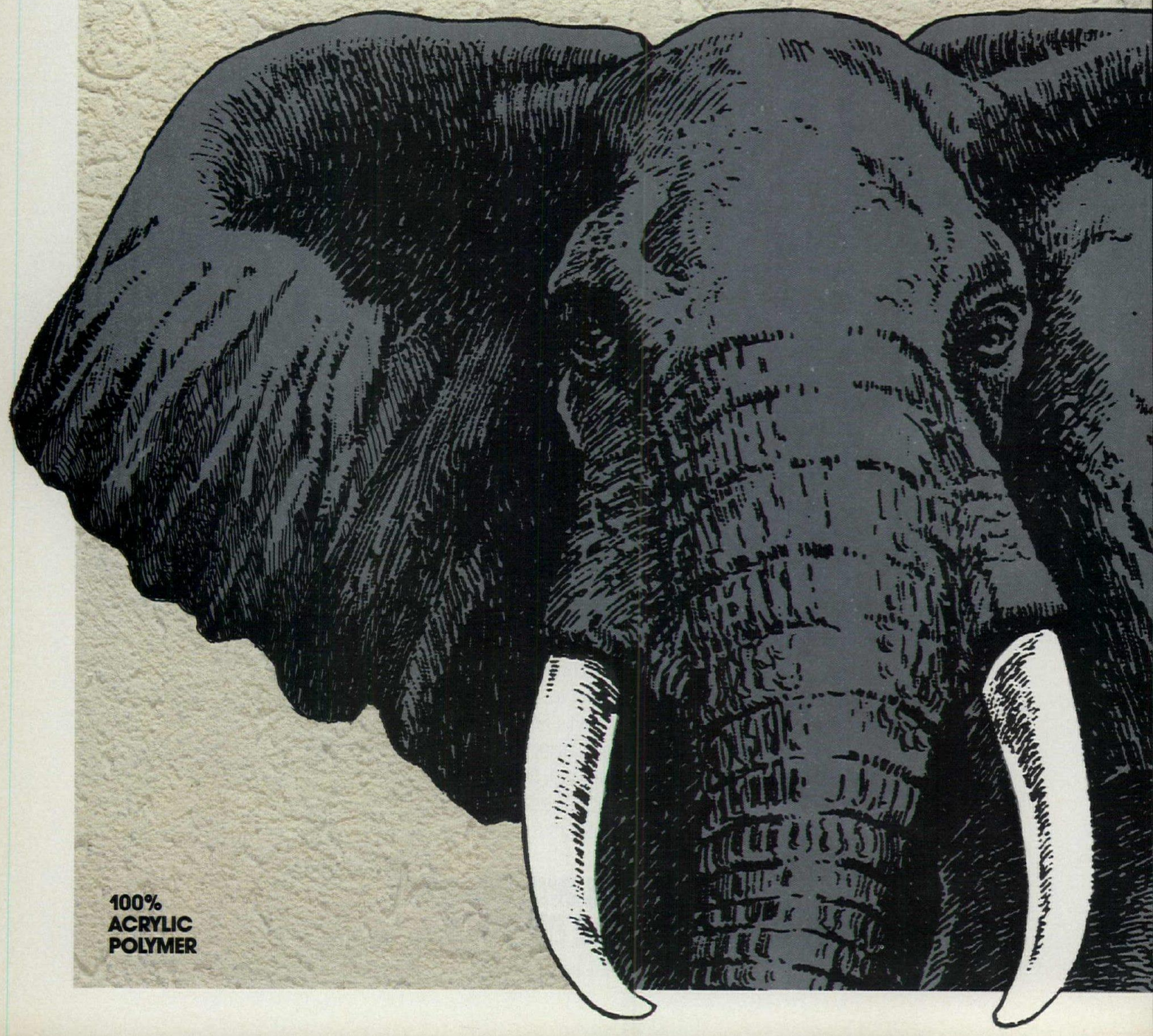

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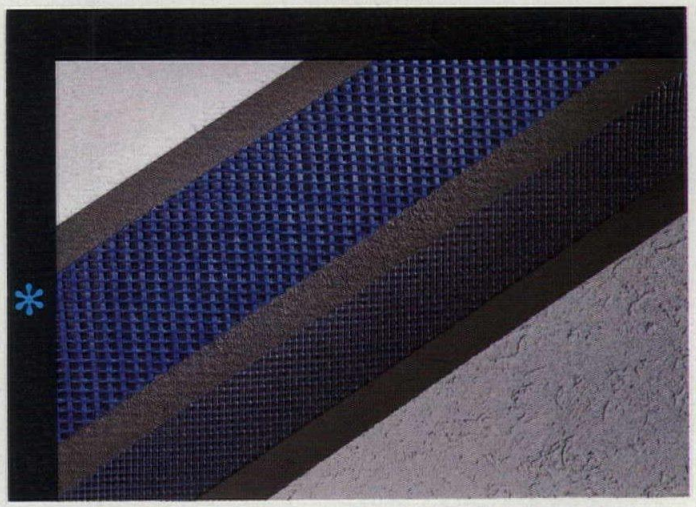

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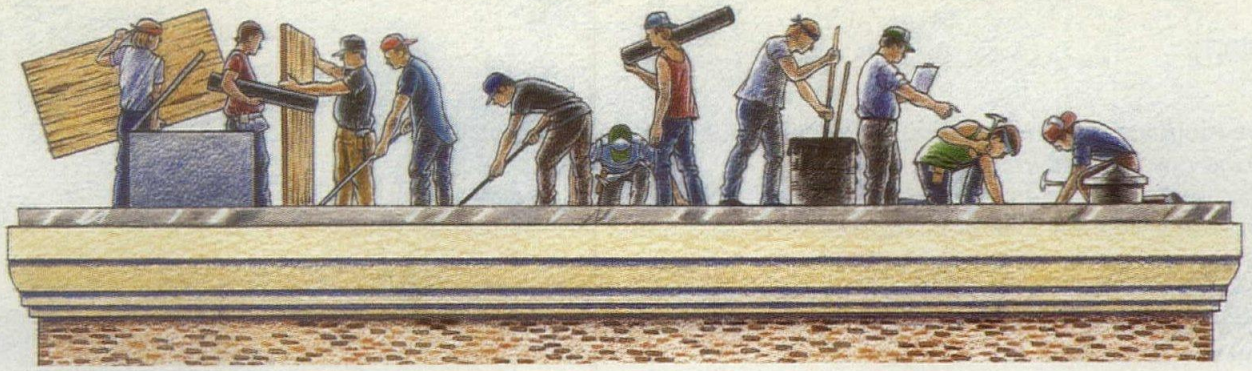
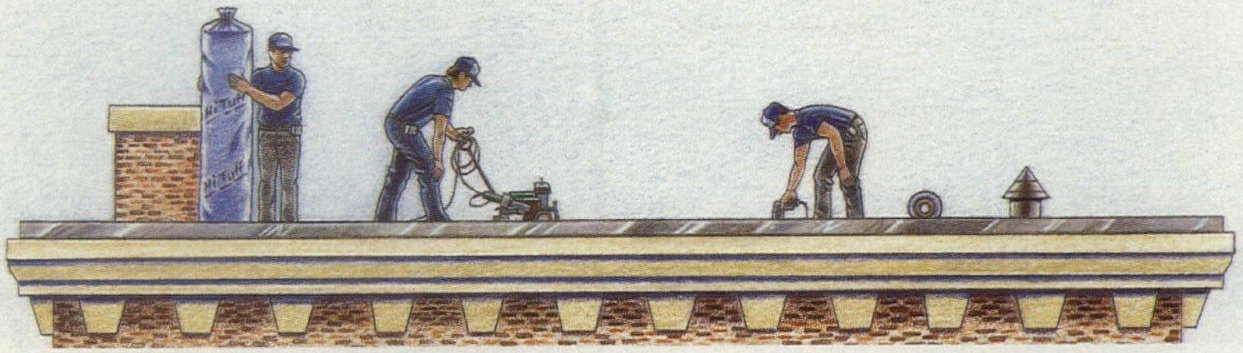


Their roof gives you more installers. Ours gives you more roof.



Before you buy a roof, maybe you should see what you're buying. Take the built-up-roof in the top picture, for instance. Look at all those people installing it. Are you buying a roof, or renting a small army? Now, look at the Stevens contractors in the bottom picture. Rather small group, wouldn't you say? That's because they work with the Stevens Hi-Tuff® Roofing System. Which costs a bit more to buy, but is much less expensive to put down. So more of your money gets spent on the roof. And less on their labor. Add the life cycle energy costs and the Stevens roof is actually less than the built-up-roof. Because the Hi-Tuff® roof is white, so it saves on air conditioning. Plus, it's made from Hypalon.* Which makes it naturally fire resistant. Chemical resistant. And strong, because hot air welded seams are the most reliable in the industry. So don't let the biggest part of your roofing investment walk off when the job's done. Get a Stevens roof and keep it where it belongs. On the roof. To find out how, call today at (413) 586-8750 and ask for Dave Brown or Bruce Abbott.

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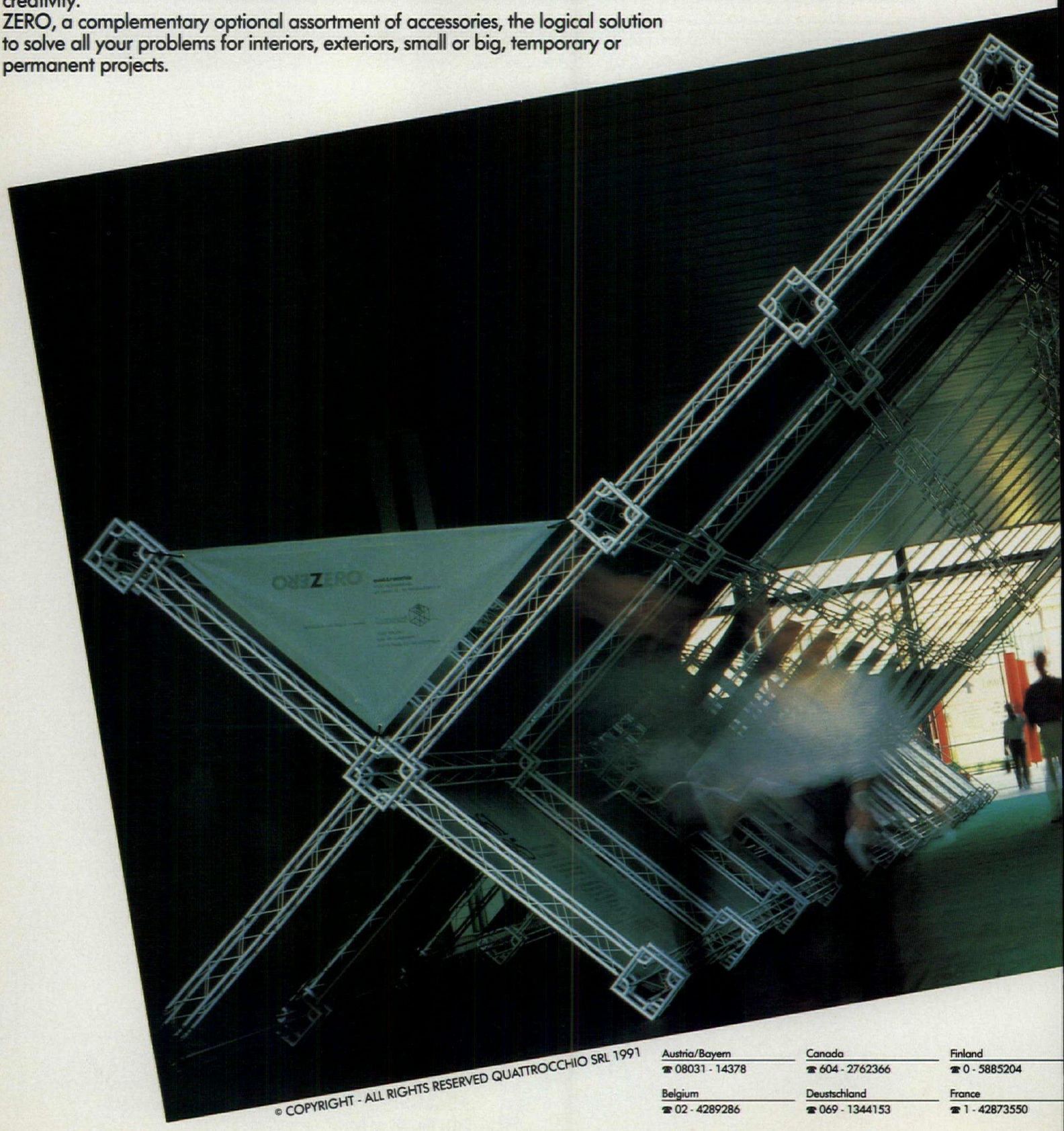

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Technics
Steep Roofings Recommendations

Architect **H. Leslie Simmons** recommends measures architects can take to make sure that steep roofings live out their full lives.

No matter how competently a building is designed or how well it serves its purpose, no matter how beautiful or well received it is, the owner's elation will quickly fade if the roof leaks. An architect must begin thinking about the building's roof and continue to keep it constantly in mind from the initial allocation of sufficient funds through design of the building, selection of the system to be used, drafting of the contract documents, and administration of the contract. If that sounds overblown, consider that in 1986, 80 percent of post-construction litigation involving new buildings resulted from roof leaks.

Although the architect should be concerned throughout the process, here we will discuss primarily the design phase of his or her work. It is worthwhile, however, to touch briefly on the construction phase. It is generally accepted in the construction industry, even among building contractors, that the most important factor in roof failures is poor installation. The National Roofing Contractors Association advocates continuous visual inspection of low-slope roofing during its installation, and architects often specify at least some inspection during that time. Unfortunately, this is rarely the case for steep roofing. If continuous observation is not possible, the architect should at least require periodic inspections by the roofing manufacturer and by his or her own representative to ensure that the requirements of the contract documents are fulfilled.

An architect can achieve better steep roofing by producing better contract documents, paying more attention to the structure, sheathing, and fasteners, knowing and following industry accepted details, ventilating the attic, and providing ice shields in northern climates.

Better Contract Documents

The contract documents must include all necessary requirements. Roofing consultants are sometimes called in to help design and specify low-slope roofing on major projects, especially if there is existing roofing. Unfortunately, they are seldom used on projects with steep roofs. Many architects believe that steep roofing is simpler and causes fewer problems than low-slope roofing. They think that it does not warrant the same amount of detailing or specification. It is common to find many roofing and flashing details on the drawings when low-slope roofing is used, but very few roofing details on drawings for projects with steep roofing. Specifications for steep roofing are often sketchy and lacking in detail. In fact, it is difficult even to find guide specifications for many types of steep roofing. Better detailing and more complete specifications could prevent some failures associated with steep roofs.

The Roofing's Support System

Two of the major factors contributing to steep-roofing failure that are under the control of the architect are the design of the roof support system and the selection of the sheathing and its fastenings. The roof support system must be stable and free from excess deflection. Thermal movements must be adequately accounted for. The applicable building code should be strictly adhered to and good engineering practices should be followed. Even correctly selected and installed steep roofing will fail if the underlying structure sags or moves more than the roofing can accommodate. Excess movement will cause flashings to pull away from adjacent walls and major penetrations, such as chimneys. Joints in the roofing and its underlayment and in flashing will open and permit water intrusion. Roofing, flashings, and underlayments may even split.

The sheathing most used today beneath steep roofing is plywood, but other sheathing is permissible for many steep-roofing types. Spaced 1 x 4 or

1 ESTIMATED AVERAGE LIFE SPANS OF ROOFING

Material	Life Span in Years	Remarks
Asphalt roll roofing	20 to 25	
Composition shingles	20 to 25	1
Slate	40 to 175	2
Wood shingles	15	
Wood shakes	30	
Clay tile		
Flat	75 to more	
Others	100 or more	3
Concrete tile	50 to 75	
Mineral-fiber-cement tile	30	4
Metal tile	20	5
Sheet metal	20	6

1 Some shingles are warranted by the manufacturer for 30 years.
2 Average is low (50 years) for Pennsylvania slate, moderate (100 years) for Vermont and New York slate, and highest for Virginia slate. Slate may require removal and relaying one or more times to achieve its useful life.
3 Some manufacturers claim 350-year life spans. Some will warrant their clay tile for 50 years. Clay tile may require removal and relaying to achieve its full life span.
4 This is a standard warranty. The material might last 50 years or more, and some manufacturers warrant their product for that long.
5 If properly maintained, metal tile will last indefinitely. Some manufacturers warrant their products for up to 35 years.
6 If properly designed, installed, and maintained, metal roofing can last much longer. Repairs may occasionally be necessary, however.

New Clay Roof Tile Standard

ASTM has just released C 1167–90, *Standard Specification for Clay Roof Tiles,* prepared by Subcommittee C-15.06 on Roofing Tile. The first such specification for tile roofing, it applies to clay, shale, and similar naturally occurring substances that are fired in manufacturing. It classifies all products into the following appearance types: *high-profile* tiles (Type I) have a rise-to-width ratio greater than 1:4; *low-profile* tiles (Type II) have a rise-to-width ratio less than or equal to 1:4; flat and all other types of tile are grouped together (Type III).

The *Specification* grades tile as follows: Grade 1 resists severe frost action and should be used in regions having a weathering index (WI) greater than 500; Grade 2 resists moderate frost action and is suitable for regions with a WI of 50 to 500; Grade 3 negligibly resists frost action and may be used in regions with a WI of less than 50. Tiles are graded by cold water absorption or freeze/thaw testing.

The WI is the product of normal annual freezing degree days and the average annual winter rainfall. Winter rainfall is the sum of the mean monthly equivalent rainfall occurring between the normal dates of the first and last killing frosts; it is the total precipitation less one-tenth the total fall of snow, sleet, and hail. The publication contains a map of the WI zones.

The *Specification* also describes tolerances, strengths, textures, color, efflorescence, and other topics of interest to specifiers. For more information, call ASTM, Philadelphia (215) 299-5585. **Kenneth Labs** ■

2 SUPPORT AND UNDERLAYMENT REQUIREMENTS

Roofing Types	Underlayment Requirements				Remarks
	15 lb	30 lb	1 Layer	2 Layers	
Roll roofing					
4"/foot and steeper	●		●		
Less than 4"/foot	●			●	
Composition shingles					
4"/foot and steeper	●		●		
3"/foot to 4"/foot	●			●	
2 1/2"/foot to 3"/foot	●			●	1
Slate					
4"/foot and steeper					
1/4" thick and thinner		●	●		
More than 1/4" thick		●		●	2
Less than 4"/foot					3
Graduated, all slopes		●		●	
Wood shingles		●	●		4
Wood shakes		●	●		4, 5
Clay tile		●	●		6
Concrete tile		●	●		6
Mineral-fiber-cement tile					
4"/foot and steeper		●	●		5
3"/foot to 4"/foot		●	●		5
Class A roofs					7
Metal tile		●	●		
Sheet metal	●		●		8

Note: The data in this figure are not complete. It is necessary to point out many additional requirements for underlayment in the contract documents. Check with the applicable industry source for additional requirements.

1 The entire underlayment should be applied using hot asphalt or mastic.

2 As an alternative, a single layer of 55-or 65-pound felt may be used.

3 Slate on slopes less than 4"/foot should be installed over membrane roofing or waterproofing

4 Underlayment is optional except in snow areas.

5 Felt eave strips and felt interlayers between wood shakes and mineral-fiber-cement tiles are essential.

6 Underlayment scheduled is often used for roof slopes of 4"/foot and steeper, but there is disagreement in the industry about underlayment requirements for clay and concrete tile. Where slopes are 3"/foot or less, concrete tile should be installed over a membrane roof. On slopes less than 4"/foot , concrete tile is sometimes installed in a bed of mortar over a membrane roofing. This method is called mud-set.

7 Use 40-pound asphalt-impregnated glass fiber felt over roll roofing.

8 Applies to architectural metal roofing only. Structural metal roofing may not need underlayment. Comply with manufacturer's recommendations. Underlayment felt should be covered by a layer of rosin-sized paper to prevent roofing from sticking to felt.

1 x 6 board sheathing is recommended for some types of steep roofing under certain conditions. If roofing failure is to be prevented, its sheathing must be designed and installed in compliance with the requirements of the building code and the recommendations of the roofing manufacturer and, where plywood is used, of the American Plywood Association. Other sources of recommendations include the organizations listed in "Recommended Reading" at the end of this article.

Industry Recommendations

Roofing sometimes fails because the designer did not follow the recommendations of the manufacturer or other interested organizations. Most manufacturers offer specific recommendations for selecting and applying their products. Where such advice is missing, organizations like those referenced in "Recommended Reading" at the end of this article are there to fill the gap.

Unfortunately, the recommendations of those organizations do not always agree with those of the manufacturers or with each other's. An architect must examine all available data applicable to the type of roofing or flashing being considered and bring professional judgment and experience to bear before deciding which recommendation, if any, to follow. The worst mistake in this regard is to include in the specifications such statements as "Install in accordance with manufacturer's (industry) (NRCA) recommendations."

The Right Roofing Material and System

No steep roofing type is suitable for use in every climate zone or on any roof slope. Reroofing projects require careful evaluation of the existing roof structure to ensure that it is strong enough to support the new roofing. For example, an existing roof that was covered with composition shingles may not be sufficiently strong to support clay tile or slate without failure.

It is equally incorrect to assume that apparently similar roofing materials should be installed in the same way or using the same underlayment. For example, the underlayment requirements for wood and slate shingles, though similar, are not alike (1). Selecting the wrong material gauges for metal roofing can also lead to failures. The publications listed in "Recommended Reading" suggest the proper gauges to use.

Attic Space Ventilation

Failing to provide sufficient attic space ventilation will result in excessive heat build-up in steep roofing and premature roofing failure, especially in asphaltic roofing. Even when the roofing itself is unaffected, the underlayment may be.

Flashing, Accessories, and Specialties

Poorly designed flashing, accessories, and specialties will fail and produce leaks, as may the wrong type of flashing, accessory, or specialty for the condition. An example is requiring metal roofing to bond with bituminous flashing. Because the rates of contraction of these two materials are quite different, locations where they are bonded together often leak. Another example is selecting a standard gravity roof ventilator for use on a standing-seam metal roof. It is much safer to select an item designed to fit the contour of the roofing.

A related problem is selecting the wrong flashing material. Using a metal that will react galvanically with metal roofing is one example. In fact, using any material not recommended by the manufacturer of the roofing is potentially harmful. The Cedar Shake and Shingle Bureau, for example, warns against using copper flashing with cedar shingles or shakes, and further suggests that all metal flashing materials be painted.

Another problem is selecting a flashing with a life span that is much less than that of the roofing (2). For example, using galvanized metal flashing with a slate roof is foolish. The National Slate Association's booklet, Slate Roofs, recommends using only lead-coated copper in slate roofs.

Roll roofing and composition shingles should have roof edge flashing with a drip at the eaves and along the rakes (3, 4). Omitting the drip edges will result in deterioration of the sheathing and fascia boards in those areas.

Type and Number of Fasteners

Specifying fasteners that will rust or otherwise corrode or react galvanically or in some other way with the roofing selected is a major contributor to steep roofing failures. All fasteners in every steep

roofing system, including those used in underlayment, should be non-corrosive.

Requiring the wrong number of fasteners can also cause problems. Composition shingles should each have four fasteners, but wood shakes and shingles, which are much heavier, should never have more than two fasteners, lest they split more readily than normal. In each case, the number and type of fasteners should be determined and clearly shown on the drawings, or specified, or both.

Some metals will react with some roofing materials. Some metals have longer useful lives than others. It makes no sense to save a few dollars by using fasteners that will last only a fraction of the life of the roofing. For example, clay roofing tiles have a life span of 75 years or more (2). The fasteners should have commensurate life spans.

Ice Shields

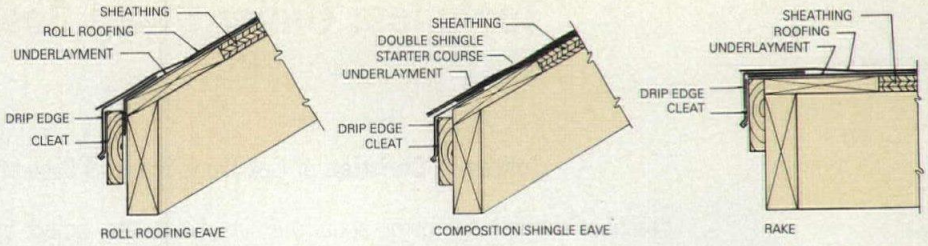
When the January mean temperature is 30 F or lower, an ice shield should be provided along the eave edges of every steep roof, regardless of the roof slope or underlayment used, and even when there is no other underlayment. Some jurisdictions may have more stringent requirements. The ice shield may consist of two plies of the same weight felt used under the roofing (4). Where the underlayment felt is 15-pound material, one ply of 50-pound felt is generally acceptable as the ice shield in lieu of two layers of 15-pound felt. As an alternative, a layer of an adhered membrane material specifically made for the purpose (essentially, a waterproof membrane) can be used.

The ice shield should extend up the roof to a point not less than 24 inches inside the wall line of the building. It should be set in hot asphalt or mastic. Where two layers of underlayment felt are required, an ice shield may be formed by adhering the underlayment to the roof deck using hot asphalt or mastic from the roof's edge to a point 24 inches inside the wall line (4).

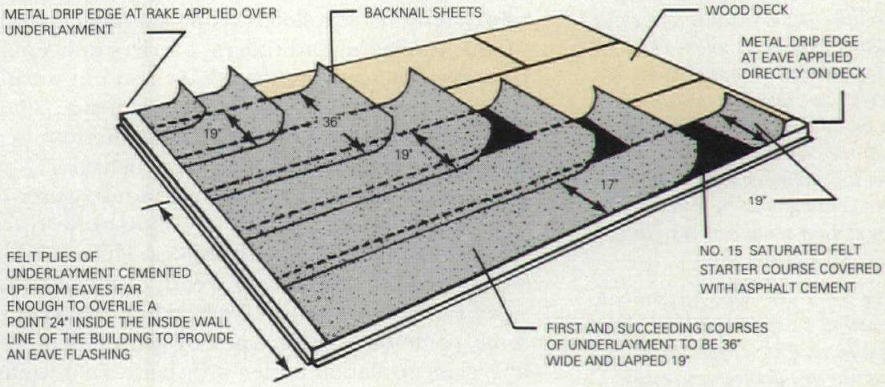
Conclusion

Architects may not have complete control over what happens during steep roof installation, but many failures start during the design process, and it is then that the architect can prevent future problems. When Benjamin Franklin wrote "A little neglect may breed great mischief" to start his "for want of" sequence, he might well have been writing about an architect's responsibility for roofing. To paraphrase him, "for want of the right nail the roof may be lost." It is the architect's responsibility to see that – in the design of steep roofing and its presentation in contract documents – no required feature or sequence is neglected. **H. Leslie Simmons** ■

The author, a registered architect for almost 30 years, has practiced as a specifications consultant since 1975. He is the author of two specification 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, and three more are under way (Van Nostrand Reinhold).*



3 DRIP EDGE DETAILS FOR ROLL ROOFING AND SHINGLES



*ALL WEIGHTS AND DIMENSIONS ARE APPROXIMATE

4 APPLICATION OF DOUBLE LAYER FELT UNDERLAYMENT AND EAVE FLASHING

Recommended Reading

Architectural Sheet Metal Manual, Fourth Edition, Sheet Metal and Air-Conditioning Contractors National Association (SMACNA), Chantilly, Virginia (703) 803-2980, 1987.

Installation Manual for Concrete Tile Roofing, National Tile Roofing Manufacturers Association, Los Angeles, California (213) 660-4411.

Design and Application Manual for New Roof Construction, Cedar Shake and Shingle Bureau, Bellevue, Washington (206) 453-1323.

The NRCA Roofing and Waterproofing Manual, Third Edition, National Roofing Contractors Association (NRCA), Rosemont, Illinois (708) 299-9070, 1990.

Repairing and Extending Weather Barriers, H. Leslie Simmons, Van Nostrand Reinhold, New York (800) 926-2665, 1989.

Residential Asphalt Roofing Manual, Asphalt Roofing Manufacturers Association, Rockville, Maryland (301) 231-9050, 1988.

Sheet Copper Applications, Copper Development Association, Greenwich, Connecticut (203) 625-8210, 1980.

Slate Roofs, National Slate Association, 1926; Reprinted by Vermont Structural Slate Co., Fair Haven, Vermont (802) 265-4933, 1977.

Stainless Steel: Suggested Practices for Roofing, Flashing, Copings, Fascias, Gravel Stops, and Drainage, Nickel Development Institute, Toronto, Ontario, Canada, 1972.

3 *Roll roofing and composition shingle roofs should have roof-edge flashing with a formed metal drip edging at the eaves and along the rakes. Along the rakes, the drip-edge flashing should be applied over the underlayment. Beneath roll roofing, the drip edge at the eaves should be placed over the underlayment. At the eaves, beneath composition shingles, the drip edge should be installed directly on the deck, beneath the roofing underlayment.*

4 *Although there have been some efforts to do away with underlayments for asphalt shingle roofs, most manufacturers and trade associations still recommend them. Opponents argue that their main value is in protecting the sheathing from rain during construction, and if the roofing can be applied soon enough, it is not necessary. The Asphalt Roofing Manufacturers Association requires the underlayment as protection prior to shingle application and to protect the deck in the event that shingles are lifted or blown off by wind; they also note that the underlayment is part of all fire-rated assemblies. Verdict? Read the manufacturer's warranty.*

Technics: Under Steep Roofing

Jeffrey E. Christian of Oak Ridge National Laboratory

describes the latest findings about attic insulation and radiant barriers.

1 *ORNL's Large Scale Climatic Simulator (LSCS) bakes and chills building assemblies under controlled conditions so that their thermal and moisture responses can be studied in detail. Underneath the chamber is a metering room that represents the indoor space. Throughout the attic tests, the metering room was maintained at 70 F.*

2 *The 14' x 16' Attic Module can test at full scale any product that might be used in a real attic – including insulation, convective barriers, radiant barriers, and ventilating devices. When fully prepared for testing, the Module is loaded into the LSCS.*

3 *This plot shows the R-value of 3 different installations of the same type of loose fill, blown-in, fiberglass insulation at different attic temperatures representing heating season conditions. All three installations were blown in by the same contractor. If the R-value were independent of temperature, it would graph a horizontal, straight line; instead, at about 40 F, the R-value decreases as the attic temperature decreases. This degradation is a result of natural convection within the insulation.*

4 *Scientists have long recognized that convection loops within porous media assume, in plan view, a honeycomb pattern (hexagonal Benard convection cells) when heated from below.*

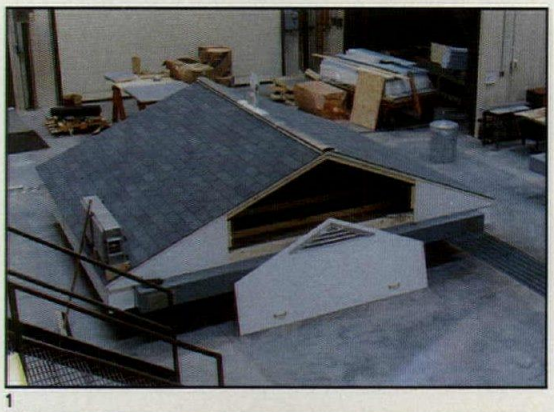
5 *This photograph taken by an infrared camera (through the triangular gable vent of the Attic Module) shows the top insulation surface with the climate chamber temperature at -5 F. The light areas are warmer than the dark ones by about 2 F, revealing the tell-tale hexagonal Benard convection cell pattern.*

Researchers at the Oak Ridge National Laboratory (ORNL) are determining the effectiveness of attic insulation and radiant barriers in keeping heat in houses during the winter and out during the summer – and the results challenge some long-established assumptions about thermal performance. In studying insulation behavior – in part for Attic Seal, Inc., a private industry user of the Department of Energy's (DOE) Roof Research Center – ORNL's Kenneth Wilkes, Philip Childs, Agnes Delmas, and Robert Wendt confirmed that significant natural convective heat loss can occur in some commonly used types of blown, loose-fill fiberglass insulation under sufficiently cold winter conditions. Thermal performance tests are being conducted in the Center's Large Scale Climate Simulator (LSCS) and a 14' x 16' Attic Module (1,2). These studies have quantified the convective heat loss in at least one loose-fill fiberglass insulation, and confirmed that the heat transfer through this insulation is not entirely the result of conduction and radiation. Natural convection can be responsible for as much as half of the heat loss at very low temperatures – for example, when the attic is 0 F (3).

Heat transfer through this type of fiberglass insulation is usually attributed to 60 percent radiation and 40 percent conduction. Radiation occurs through the emitting, scattering, and absorbing medium of floors and air spaces. Radiant heat transfer can be thought of as a change in energy state, from internal energy at one surface to electromagnetic energy for transmission, then back to internal energy at the receiving surface. Conduction occurs through entrapped still air as a result of elastic collision of molecules, and in the solid material (such as glass fibers) through the transfer of kinetic energy between particles or groups of particles at the atomic level.

Background of Current Research

Working at Owens-Corning Fiberglas at the time, Wilkes and James Rucker in 1982 first measured heat transport in fiberglass loose-fill insulation in a 14' x 20' attic test module that was greater than that measured in standardized, small-scale test methods (ASTM C 687), and also greater than that predicted by detailed conduction and radiation modeling. This additional heat loss was attributed to increased heat transport by natural convection within the insulation when the attic was



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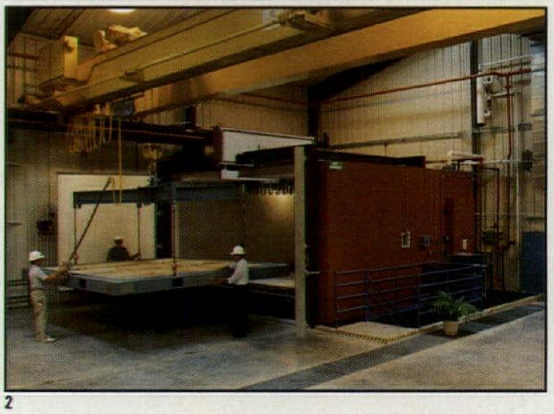

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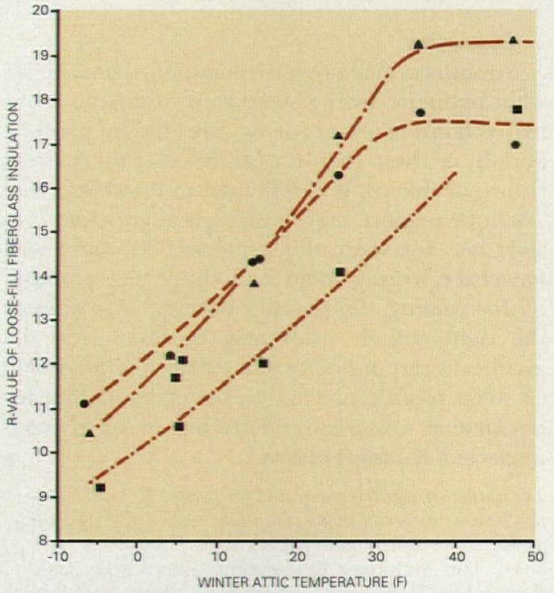
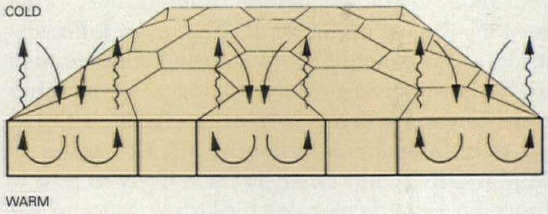


3 ATTIC TEMPERATURE VS. R-VALUE OF BLOWN-IN FIBERGLASS INSULATION (NOTE: CURVES SHOW ONLY AN APPROXIMATE FIT TO DATA POINTS FROM TEST).



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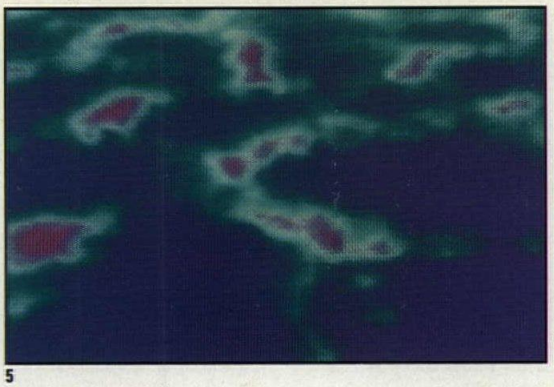

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colder than the space below the ceiling. Natural convection is generated within the insulation layer itself by differences in air densities caused by temperature differences. In very permeable attic insulations, warm air near the drywall ceiling can rise towards the top of the loose-fill insulation, carrying additional heat with it. As this air reaches the top of the insulation, it cools and becomes more dense, whereupon it falls back into the insulation (4,5). This natural convection only occurs when the temperature difference across the insulation is larger than a certain critical value; this, in itself, is a subject of study.

What Does It Mean?

Because the insulation tested by ORNL conveyed heat through natural convection, and because the standard test procedures for thermal performance do not measure convection losses, the Roof Research Center's findings are expected to affect the insulation industry. Impacts could include changes in test procedures and the physical characteristics of some of the loose-fill fiberglass insulations available. One meaning of this research for architects is that the design load could change for calculating ceiling heat loss when sizing HVAC equipment.

The influence of this convective heat loss through attic floor insulation on annual energy bills needs to be determined. In mild climates, the impact is probably insignificant because there are only a few hours when the ambient temperature is low enough. The results from these and other attic insulation system tests will be compiled by the Department of Energy (DOE) and be used to develop an attic design handbook in 1992.

Convection Retarders

The Roof Research Center has tested several materials that can eliminate any significant convective heat transfer through attic insulation. The Center is now working with industry to develop cost-effective "convection retarders." One patented product, developed by Attic Seal, Inc., retards convection in the loose-fill fiberglass attic insulation. It resembles a pillow with a filling consisting of a fiberglass blanket and a pillow case made of perforated plastic membrane material.

Several interesting tests have been run with the attic test module insulated with different systems. One system consists of, from bottom to top, fiberglass loose-fill insulation, a perforated polyethylene film, a one-inch-thick layer of fiberglass blanket, and a radiant barrier (emittance of 0.05). A comparison of results on the same configuration with and without the radiant barrier showed that, by adding the radiant barrier, heat flow through the ceiling decreased by 6 to 8 percent under simulated winter conditions, and by 36 to 42 percent under simulated summer conditions. This had no dust on the low emittance surface, which would tend to degrade performance over time.

When the radiant barrier was turned over so that the surface facing the roof had an emittance of 0.25, the ceiling heat flow under simulated summer conditions decreased by 19 percent, with respect to the same configuration without a radiant barrier. In other words, the radiant barrier's effectiveness was cut in half. An emittance of 0.25 is approximately what is expected after 4–5 years' dust collects on top of a radiant barrier. Products developed from this research could influence the insulation industry and cut energy bills. Because of these findings, it is hoped that an effort will be made to modify routine, small-scale testing procedures to simulate more closely the performance of loose-fill fiberglass insulation in attics.

Radiant Barriers Research

Radiant barriers (also called "reflective barriers") usually consist of a thin sheet or coating of a material – usually aluminum – that reflects infrared (thermal) radiant energy [see BSB 8/90], and that is applied to one or both sides of a supporting substrate. They are installed in buildings to reduce summer heat gain and winter heat loss, thereby reducing heating and cooling energy use. For several years now, DOE has been working on a *Radiant Barrier Fact Sheet* for attics. It answers several frequently asked questions about radiant barriers, such as life-cycle cost and energy saving benefits compared to insulation. The *Fact Sheet* was a cooperative effort, with contributions from DOE, the Electric Power Research Institute, the National Association of Home Builders' National Research Center, the Reflective Insulation Manufacturers Association, and the others listed below.

Field and Roof Research Center tests in the Large Scale Climate Simulator and in the Attic Module show that radiant barriers are effective in reducing cooling bills and, possibly, heating bills. The field tests were conducted by the Florida Solar

Test Methods and Controls

Private industry reviewers of ORNL's research suggested testing an insulation that should not convect when installed in an attic, as a scientific control. We complied by substituting expanded polystyrene (EPS) boards, cut and planed into two layers with a total thickness of 5". The Attic Module, loaded with this EPS system, was tested at 6 different winter conditions in the LSCS with climate chamber temperatures ranging from 45 F to -18 F. The measured resistance was found to be within 2.3 percent of the resistances obtained from a simple parallel path conduction calculation using the known thermal conductivity of the foam.

A sample of EPS cut from the same billet was tested in an unguarded thin heater apparatus as described by ASTM C 1114 in 1988, and again in March 1991. The measured resistance of one inch of this material was within 0.5 percent of R-3.96 ft2(F)hr/Btu. This confidence test demonstrates the accuracy and reliability of very difficult measurements. After testing at ORNL the EPS samples will be tested in a collective, "round robin" procedure by Owens-Corning Fiberglas, the Certainteed Corporation, and the National Institute of Standards and Technology. This cooperation assures the reaching of a common agreement within the industry.

A contract has recently been signed between ORNL and the Cellulose Industry Standards Enforcement Program to test cellulose blown-in insulation. Additional attic insulation types will be tested as more manufacturers make use of this National User Facility.

Energy Center at Cape Canaveral, the Mineral Insulation Manufacturers Association in Ocala, Florida, the Tennessee Valley Authority in Chattanooga, and Oak Ridge National Laboratory in Knoxville. Most of the field tests used clean radiant barriers. Dust collects on the surface of aluminum foil applied to the attic floors; this increases the emissivity and decreases the reflectivity, both of which reduce the barrier's effectiveness. Preliminary findings suggest that a dusty attic floor installation will lose about half of its effectiveness within one to ten years after installation. Dust is not expected to be a problem for reflective barriers attached to rafters with the shiny side facing down.

Radiant Barriers Performance

Savings depend on where the barrier is applied (attic floor or rafters), the size of building, number of floors, color of roof, thermostat settings, tightness of the building envelope, climate, HVAC efficiency, fuel prices, rate of dust accumulation, and amount of insulation. To realistically determine a radiant barrier's effect on energy costs, numerous site-specific conditions should be included in the analysis. The *Fact Sheet* provides some savings estimate ranges based on "typical" conditions (6,7). It also includes a worksheet that allows the input of several important site specific conditions, such as fuel prices, equipment efficiencies, and other economic assumptions.

Moisture condensation under radiant barriers has been researched in climates as cold as Knoxville, and no significant problems were observed. The potential increases in colder climates and is a concern only for barriers laid directly on attic insulation. Attic ventilation helps the performance of radiant barriers in the summer and removes excess water vapor in the winter.

The effect of radiant barriers on roof life is not known. Rafter-mounted radiant barriers may increase shingle temperatures by 2 to 10 F, while floor installation may increase the temperature by 0 to 2 F. Radiant barriers must have a Flame Spread Index of 25 or less (ASTM E-84) and a Smoke Developed Index of 450 or less.

Natural convection and radiant barriers are just two of the issues currently being studied "under the roof." Attic ventilation optimization, wind washing (loss of insulation R-value from soffit vent air flow, for example), and moisture condensation and control strategies are among a list of other unresolved attic issues. While the ultimate attic has yet to be built, results from the research going on now at ORNL and other places is likely to lead to more energy-efficient, longer-lasting attics in the future. **Jeffrey E. Christian** ■

The author is the R & D program manager for Building Thermal Envelope Systems and Materials at the Oak Ridge National Laboratory, where he manages 3 test facilities for measuring the energy-efficiency of attics, low-sloped roofs, basements, slab-on-grade foundations, masonry walls, and frame walls. He sits on ASHRAE Committee 90.2, the Board of Direction of the Building Thermal Envelope Coordinating Council, and chairs the Department of Energy's Moisture Control Strategies for Buildings Research Review Panel. He is a coauthor, with the University of Minnesota's John Carmody and P/A's Kenneth Labs, of the Department of Energy's forthcoming Builder's Foundation Handbook.

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6 PRESENT VALUE SAVINGS OF RADIANT BARRIERS (IN CENTS PER SQUARE FOOT) USED WITH DIFFERENT LEVELS OF CONVENTIONAL ATTIC INSULATION

City	Dusty Radiant Barrier on Attic Floor				Radiant Barrier Attached to Rafter Bottoms			
	R-11	R-19	R-30	R-38	R-11	R-19	R-30	R-38
Albuquerque,NM	5-18	3-10	2-6	1-5	24-27	12-15	8-10	6-8
Atlanta, GA	5-17	2-8	1-5	1-4	21-25	10-13	6-8	5-7
Bismarck, ND	5-14	2-6	1-4	1-3	18-20	9-10	5-6	4-5
Chicago, IL	4-13	2-6	1-4	1-3	17-19	8-10	5-6	4-5
Denver, CO	5-15	2-7	1-5	1-4	19-22	10-12	6-8	5-7
Houston, TX	5-19	3-10	2-6	1-4	23-28	12-15	7-10	5-8
Knoxville, TN	5-17	2-8	2-5	1-4	22-25	11-13	7-9	5-7
Las Vegas, NV	7-24	3-12	2-7	2-6	30-36	15-19	9-12	7-10
Los Angeles, CA	3-8	2-5	1-3	1-2	11-12	6-7	4-5	3-4
Memphis, TN	5-18	2-9	1-5	1-4	23-27	11-14	7-9	6-8
Miami, FL	6-23	3-12	2-7	1-6	28-36	15-20	9-13	7-10
Minneapolis, MN	4-13	2-6	1-3	1-3	18-19	8-10	5-6	3-4
Orlando, FL	5-21	3-10	2-7	1-5	26-32	13-17	8-12	7-10
Phoenix, AZ	8-29	4-14	2-8	2-7	36-43	17-23	10-14	8-12
Portland, OR	4-11	2-5	1-3	1-2	14-16	7-8	4-5	3-4
Raleigh, NC	5-16	2-8	1-5	1-4	20-24	10-12	6-8	5-7
Sacramento, CA	5-18	3-9	2-6	1-5	23-26	12-14	7-10	6-8
Salt Lake City, UT	5-16	2-8	1-5	1-4	21-24	10-12	6-8	5-7
St. Louis, MO	5-16	2-8	1-5	1-4	21-24	10-13	6-8	5-7
Seattle, WA	3-8	1-3	1-2	0-1	11-12	5-5	3-3	2-2
Topeka, KS	5-17	2-9	2-5	1-4	22-26	11-13	7-9	5-7
Waco, TX	6-21	3-10	2-6	1-5	26-31	13-17	8-11	6-9
Washington, DC	5-15	2-7	1-4	1-4	20-23	9-12	6-7	5-6

6 *These tables are excerpted from the forthcoming DOE* Radiant Barrier Fact Sheet, *and give long-term savings expressed as a present value. The cost for radiant barriers installed by contractors in new construction ranges between 15¢ and 30¢ per square foot, according to the Reflective Insulation Manufacturers Association. The numbers in these tables can be used to find the simple payback (in years) by dividing the first cost by the present value savings. Both installations assume that the radiant barrier has an emissivity of 0.5 or less when clean. The range of values given for floor installations embody variations in dust accumulation and uncertainties in the effect of dust on heat flow. In the rafter-mounted cases, the lower value applies to houses without air conditioning ducts in attics, and the second, higher value applies to houses with attics containing air conditioning ducts. The rafter-mounted radiant barrier also covers the insides of the gables.*

Acknowledgment

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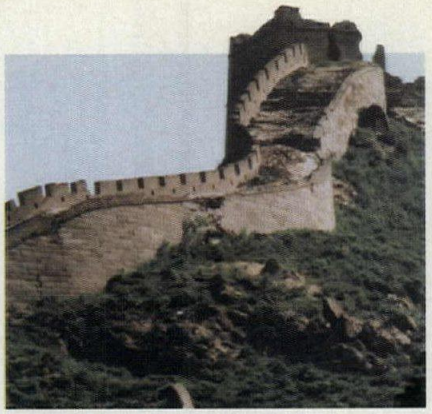

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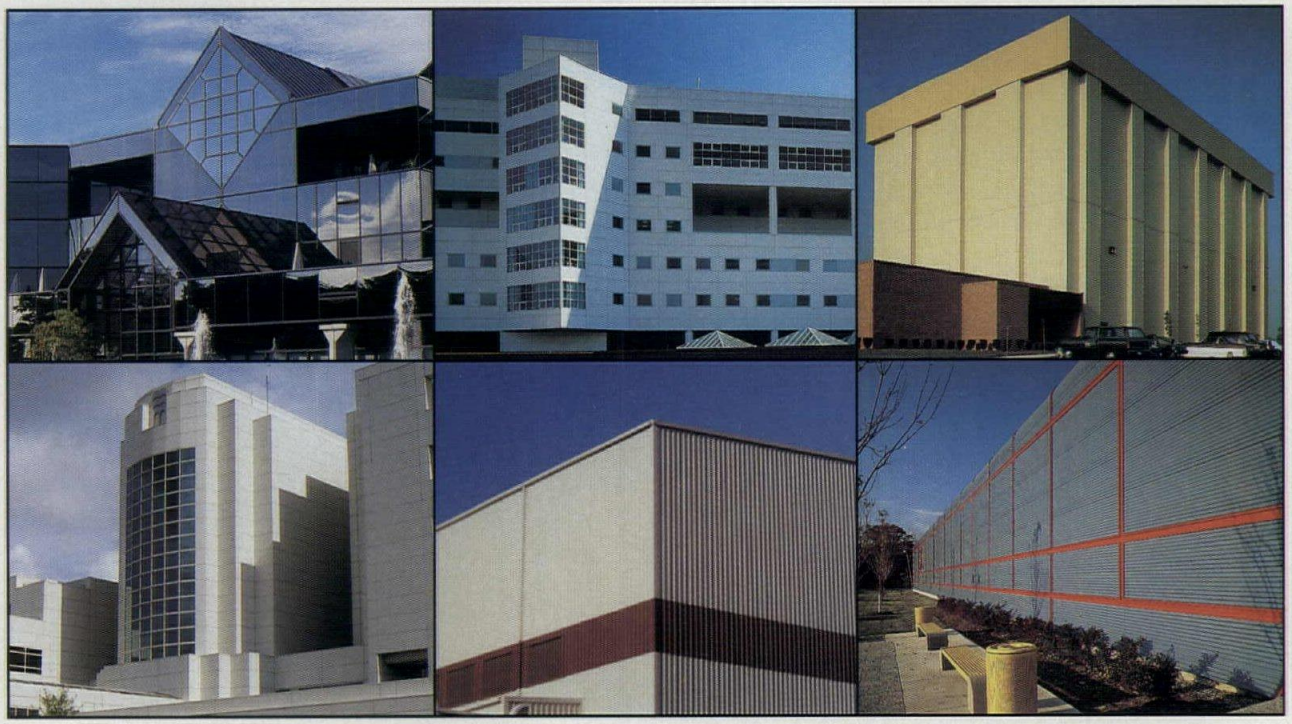

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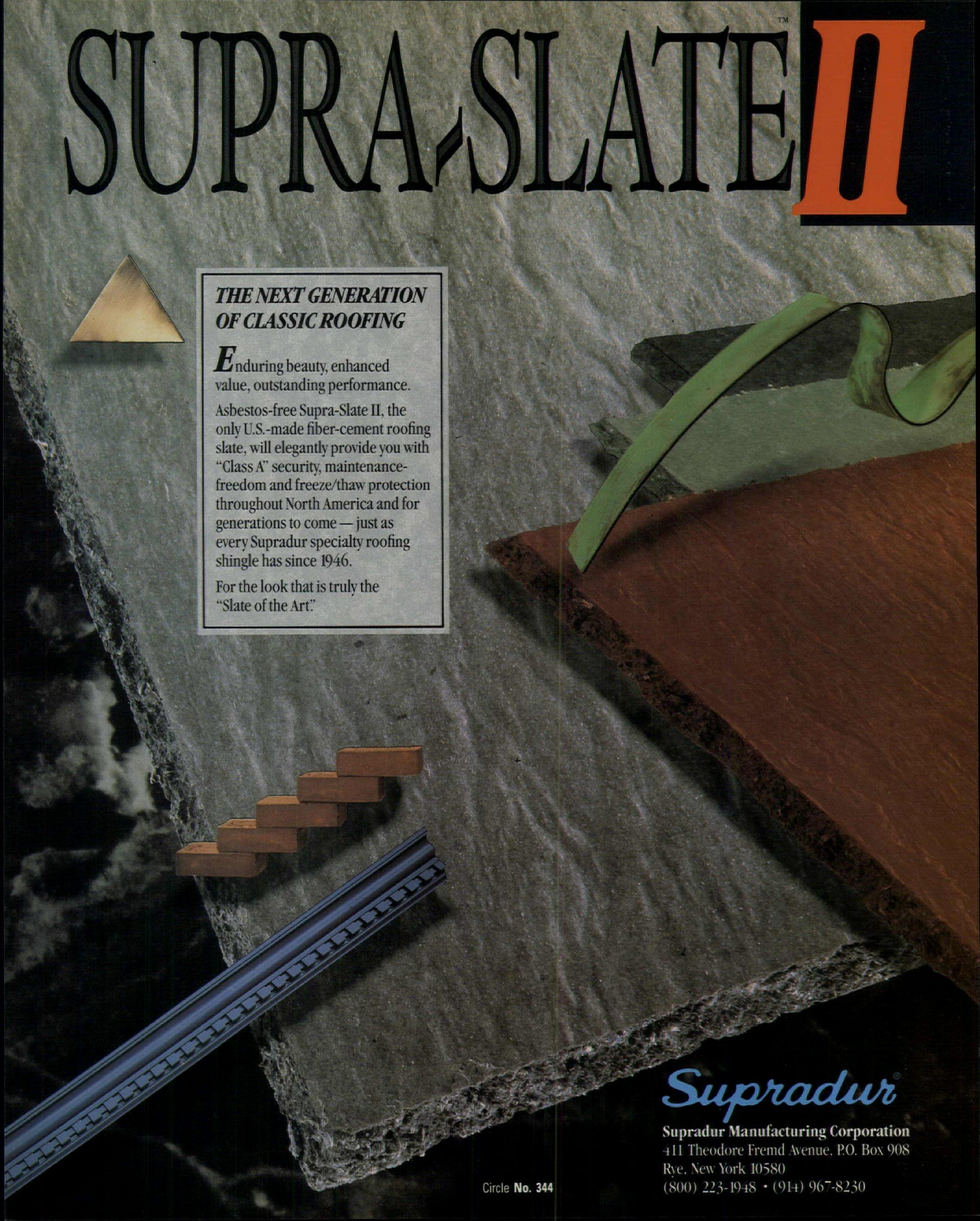

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Technics Topics
Preservation Project Options

The National Park Service's Preservation Assistance Division elaborates on the *Secretary of the Interior's Standards for Rehabilitation* in a conversation with P/A.

P/A's October 1990 "Cleaning The Carnegie" article by John Dencler and Judy Selwyn was a popular one – and was controversial with readers who abide by The Secretary of the Interior's Standards for Historic Preservation Projects. *We explore this topic further by inviting the National Park Service (NPS), the Federal agency that administers the Secretary's* Standards, *to discuss their policies and rehabilitation guidelines.*
Kenneth Labs

P/A: "Cleaning The Carnegie" struck a nerve among readers who adhere strictly to NPS guidelines. In response to a reader's letter (January Views, pp. 11–12), coauthor Dr. Judy Selwyn concurred on the value of the NPS's *Preservation Briefs,* but pointed out that they are general and broad in scope – more or less suggesting that if you understand the rules, then you know when you can break them. What are the limitations of the Park Service's guidelines?

NPS: Before answering your question about "limitations," we need to talk about the philosophical framework of our program, which is based on *The Secretary of the Interior's Standards for Historic Preservation Projects,* and its accompanying guidelines. The standards and guidelines were designed to be *general and conservative.* We recommend approaches that are cautionary toward historic building materials, that emphasize repair over replacement, and that stress limited, rather than wholesale, change to accommodate new uses. Varying treatments are considered within the framework of the *Standards,* including general and specific standards for protection, stabilization, preservation, rehabilitation, restoration, and reconstruction.

Of the six sets of standards governing project work, the *Standards for Rehabilitation* (1) are probably the best known and most frequently used because of Federal tax incentives and other Federal and state programs. The Secretary's standards are based on internationally accepted principles and on years of preservation practice within the Park Service, and they apply equally to historic buildings of all types, styles, and materials. These principles must be met for any Federally funded preservation project involving a historic building listed in the National Register of Historic Places. Conformance to all ten rehabilitation standards is required for a project to be eligible for Federal tax incentives.

The overall purpose of our publications is to share accepted, time-tested methods as well as to discuss techniques that are in the category of "scientific pioneering." The emphasis and technicality differ according to the target audience. For example, *Preservation Briefs* are short, generously illustrated essays in bulletin form, intended to increase general awareness on broad issues ranging from abrasive cleaning to exterior paint problems on historic woodwork to preserving historic plaster. *Preservation Tech Notes,* also purposely limited in length, provide case-specific information on innovative preservation techniques for architects and craftsmen.

Preservation Case Studies focus on a particular property, such as photogrammetric recording of the Dorchester Heights Monument in Boston. Our *Technical Reports,* such as "Epoxies for Wood Repairs in Historic Buildings" describe more sophisticated methods for preserving historic materials. Finally, we have co-published books, such as *The Window Handbook: Successful Strategies for Rehabilitating Windows in Historic Buildings* (cooperatively developed by the National Park Service and the Center for Architectural Conservation, Georgia Institute of Technology).

Now, to answer your question. Yes, there are inherent limitations to each of these types of guidance. First, each historic building is unique, a product of its environment, its designer and construction, and its use over time. Second, the physical conditions for one building are never exactly the same as for another, and conditions can vary dramatically (as Dr. Selwyn notes) on different parts of the same building. Third, no written guidance can take the place of a detailed on-site inspection of a property. For this reason, we recommend using a qualified preservation expert on every project involving a historic building. This individual, or team, well grounded in the principles of preservation and knowledgeable about specific preservation techniques, products, and treatments, must apply broad philosophical principles to specific situations and conditions, then draw conclusions and apply appropriate treatments.

For example, if the National

Tech Notes

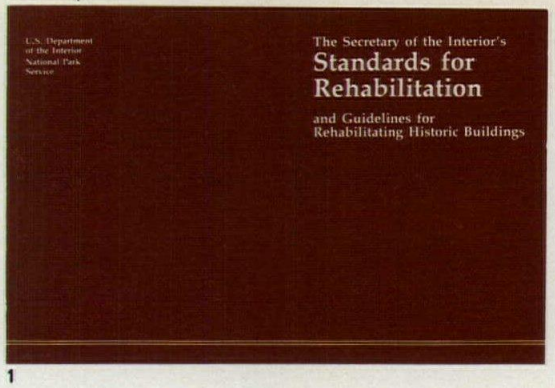
Visual Research Methods in Design **by Henry Sanoff is a distillation of more than 20 years of environmental design research by one of the field's founders. Chapters discuss environmental measurement, imageability, mapping, visual notation, simulation, and applications. VNR, New York (800) 926-2665, 223 pp., $29.95.**

The Preservation and Repair of Historic Stucco **(#024-005-01066–1) and** ***Preserving Historic Ornamental Plaster*** **(#024-005-01067–0) are Preservation Briefs 22 and 23 from the National Park Service. These 14 and 16 page guides ($1.00 each) and a new** ***Catalog of Historic Preservation Publications*** **are available from the Government Printing Office, Washington, DC (202) 783-3238.**

The 1991 ASTM Standards in Building Codes, **28th ed., contains 1300 ASTM standards referenced by U.S. model codes, MASTERSPEC, SPECTEXT, NAVFAC, the Army Corps of Engineers, HUD Reference Standards, and the National Building Code of Canada. ASTM, Philadelphia (215) 299-5585, 4 volumes, 7080 pp., $345.**

Hillside Building: Design and Construction **by engineer Arthur Levin isn't quite as ambitious as its title implies, but it is a perfect primer for architects considering foundation and plan strategies for houses on steep slopes. Arts + Architecture Press, Santa Monica, CA (213) 395-0732, 172 pp., 175 illus., $19.95.**

"As rehabilitation work moves a property forward in time with necessary alterations, restoration moves it backward in time."



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Park Service were going to issue "Cleaning The Carnegie," the material would probably be published in the preservation case study series, which deals with individual buildings whose preservation requires specific technical and scientific study and problem-solving. Dencler and Selwyn's cleaning techniques, though applied with rigorous controls, still need to be characterized as "experimental" because there are several unknowns, in terms of their long-range effects. Sandblasting and water repellent coatings are, indeed, "not recommended" in NPS guidelines. Your readers who wrote in to comment on this issue are correct. But because the National Park Service is conservative doesn't mean we should be viewed as boxed-in, stodgy, dogmatic, or – worst of all – "anti-scientific." If new information becomes available that invalidates time-tested information, we make revisions accordingly to acknowledge the most advanced technologies. But in the interim, *we will continue to recommend the safest, most cautionary procedures for our nation's historic properties.* This philosophy is reflected in the Secretary's *Standards* (2) and *Guidelines.*

P/A: Do NPS standards and guidelines differentiate between buildings of varying degrees of significance?

NPS: No. Guidelines and standards apply to all historic resources on the National Register. These include buildings of local, state, and national significance.

P/A: What are the distinctions between restoration, rehabilitation, and reconstruction?

NPS: First, we're sorry you didn't ask us about the other three work treatments we recognize, namely, protection, stabilization, and preservation. This total of six treatments comprises the full range of work options described within *The Secretary of the Interior's Standards for Historic Preservation Projects.* For example, the standards for protection, stabilization, and preservation call for retaining and preserving materials, features, and spaces identified as characterizing a particular property. Replacement of historic material is as limited as possible. This "retain and repair" approach acknowledges a property's history with its continuum of growth and change. Preservation is the preferred treatment for a historic property that isn't severely deteriorated because it stresses maintenance over replacement and over change.

The goal of rehabilitation is also to preserve the historic character of a property while making possible an efficient, contemporary use. Within this popular treatment, existing historic features can be repaired or, if damage and deterioration are extensive, replaced in kind or with substitute material. As an interpretive approach, rehabilitation is the only treatment that, while emphasizing the preservation of existing materials and features, also encourages development of a property to meet new uses. Thus, new additions and alterations to a historic building may be considered as integral components of project work.

Restoration, unlike protection, stabilization, preservation, and rehabilitation, seeks to reestablish a specific earlier period of significance through targeted demolition of later end sometimes historic – features, and reconstruction of lost and missing features. Although restoration often involves extensive preservation work in the form of repairs to existing historic features, the overall project goal is still to return the property to an appearance it had during its period of greatest significance for interpretive purposes. As rehabilitation work moves a property *forward* in time with necessary alterations, restoration moves it *backward* in time. Finally, restoration is appropriate only when the property's earlier history is so significant that it justifies demolition of features that would ordinarily be retained and preserved in the other treatments, which include protection, stabilization, preservation, and rehabilitation.

Reconstruction of a property that has vanished is the least used treatment. It should only be undertaken when no other property of its type or association has survived, and only when adequate documentation exists to permit accurate execution. The documentation requirements set forth in the *Standards for Reconstruction* are necessarily very strict.

P/A: Can or should an architect without experience in restoration or rehabilitation tackle a historically significant restoration project with National Park Service guidelines alone?

NPS: No. Expertise in understanding and working with historic architecture is gained only through years of specialized education and/or work experience. Familiarity with contemporary architectural, engineering, and construction practices does not ensure the outcome of a good preservation project. Many techniques and products that are suitable or recommended for use in new construction are inappropriate for use in older and historic buildings. Modern portland cement-based mortar, for example, is generally unsuitable for repointing pre-20th Century brick, which is quite soft and easily damaged by the very hard portland cement.

Many universities and colleges throughout the United States offer degree programs in historic preservation and related topics, and international courses in the subject are given at York University in England, as well as at the International Centre for Conservation (ICCROM) in Rome. The Association for Preservation Technology (APT), the National Preservation Institute, the Campbell Center for Historic Preservation Studies in Mt. Carroll, Illinois, the American Institute of Architects (AIA), RESTORE, and many state and local preservation commissions offer short-term specialized training courses in various aspects of preservation. The National Trust for Historic Preservation publishes an annual listing of both academic and more practical training courses in a fall issue of *Preservation News.* State historic preservation offices are also usually a good source of information for such training programs.

"No written guidance can take the place of a detailed on-site inspection of the property."

THE SECRETARY OF THE INTERIOR'S STANDARDS FOR REHABILITATION

The Standards that follow were originally published in 1977 and revised in 1990 as part of Department of the Interior regulations. They pertain to historic buildings of all materials, construction types, sizes, and occupancy and encompass the interior and exterior of historic buildings.

The Standards are to be applied to specific rehabilitation projects in a reasonable manner, taking into consideration economic and technical feasibility.

1 A property shall be used for its historic purpose or be placed in a new use that requires minimal change to the defining characteristics of the building and its site and environment.

2 The historic character of a property shall be maintained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.

3 Each property shall be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or architectural features from other buildings, shall not be undertaken.

4 Most properties change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.

5 Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a property shall be preserved.

6 Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.

7 Chemical or physical treatments, such as sandblasting, that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible.

8 Significant archaeological resources affected by a project shall be protected and preserved. If such resources must be disturbed, mitigation measures shall be undertaken.

9 New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.

10 New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

P/A: How can an architect find a reputable preservation consultant?

NPS: Again, state historic preservation offices and local preservation or landmark commissions may be able to provide a list of consultants. Local chapters of the American Institute of Architects may be a good source for this information. The Association for Preservation Technology (APT) also maintains a listing of its members' interests and areas of expertise, and universities with historic preservation programs may be helpful. When selecting any kind of professional guidance, remember the importance of checking references.

P/A: In addition to the NPS publications listed in Ted Babbitt's October article on repointing brick, can you suggest some other sources of information on historic masonry?

NPS: The following publications on various aspects of historic masonry may be useful to your readers. ■

Recommended Reading

Cleaning Stone and Masonry, J.R. Clifton, editor, STP 935, ASTM, Philadelphia (215) 299-5585, 1986.

Exterior Masonry Restorative Cleaning, J.J. Lucas, S.M. Tindall, and B.J. Rowe, Monograph Series 04M521, CSI, Alexandria, VA (703) 684-0300, 1987.

Masonry: How to Care for Old and Historic Brick and Stone, M. London, Respectful Rehabilitation Series, The Preservation Press, National Trust for Historic Preservation, Washington, D.C. (202) 673-4058, 1988.

1 *Each of the six categories of preservation treatment – protection, stabilization, preservation, rehabilitation, restoration, and reconstruction, in addition to acquisition – has its own set of standards and guidelines. The guidelines make up 48 of the 59 pages of the* Standards for Rehabilitation, *the most widely used of the seven standards. It is available from the Government Printing Office (202/783-3238) for $2.00.*

2 *To be eligible for Federal tax incentives, a rehabilitation project must meet all ten of the Secretary's* Standards. *Certain treatments, if improperly applied, or certain materials by their physical properties, may cause or accelerate physical deterioration of historic buildings. Inappropriate physical treatments include, but are not limited to: improper repointing techniques; improper exterior masonry cleaning methods; or improper introduction of insulation where damage to historic fabric would result.*

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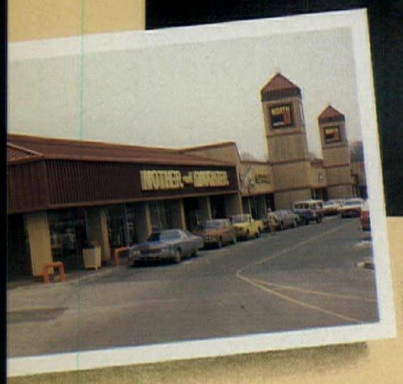

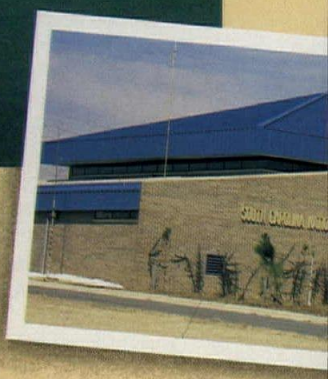

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Diagnostic Clinic 5/91
Granite Thickness

This first Diagnostic Clinic begins a series of occasional one-page articles offering lessons learned in the field.

Economic constraints often force architects and contractors into material changes that deviate from the specifications. Dimension stone can often be reduced in thickness and still meet wind loads, but problems in handling and erection and the anchorage needs for thinner stone must also be considered in design.

A 15-story reinforced concrete office building was clad with a granite-faced precast concrete system. The granite panels were fabricated according to the architect's specifications, except that 1″ stone was substituted for the specified 1¼″ thickness. Wiss, Janney, Elstner Associates (WJE) was asked to investigate when a piece of granite fell and injured a workman. The investigation revealed cracking in several of the granite panels, mostly in long, narrow ones.

The horizontal placement of the anchors and the nearness of the anchors to the panel surface created a plane of weakness within the stone at the anchor line. WJE determined that a two-hole cross section, which occurred with vertical placement, was 3½ percent stronger than the four-hole cross section used with horizontal placement. In addition, a 1¼″ cross section is 56 percent stronger than a 1″ cross section.

When bumped during erection, panels fractured along the plane of weakness through the holes. The impact of swinging a panel 8 inches into place and hitting another panel, or a straight impact of the stone face with the panel angled 8 inches from the vertical – compounded by the stress concentrations around the anchor holes – creates a bending stress at the line of anchors of about 1500 psi. This is the average bending stress at failure of the granite used on the building. With 1¼″ granite, the impact stresses would have been reduced to about 900 psi, again taking into account the stress concentrations around the pin holes. This is well within the measured strength of the granite, so the thicker stone would not have cracked or failed under this impact load.

For a new construction project, WJE was asked to determine if 1″ granite panels roughly 7′ long could be used for the entire height of a 28-story building and, if not, the maximum unsupported length of panels that might be placed. WJE analyzed and tested wind loading, flexural strength, and average modulus of rupture, and found that both flexural and anchor strength restricted the height. WJE also determined that half-size panels with smaller area-anchor configurations would be adequate throughout the height of the building.

Unfortunately, many of the 1″ panels were broken during transportation. With 1¼″ stone, there would have been no transportation problem, and greater unsupported panel lengths could have been used.

Ultra thin panels (less than 1¼″ thick) need to be evaluated from a practical and functional point of view, as well as from *in situ* structural requirements. Even if stone panels have been designed to resist wind loading and the anchorage system is adequate, handling problems and erection impact loads must be considered in the design.

Seymour Bortz and Gail Hook ■

The authors are senior consultant and graduate architect, respectively, at Wiss, Janney, Elstner Associates, consulting engineers, Northbrook, Illinois.

Anchors are visible at the crack where the granite slab split and fell.

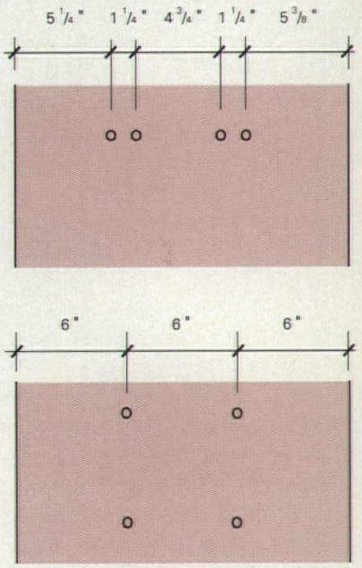
Transportation and handling impact loads may exceed in-service wind loads.

Recommended Reading

Exterior Cladding on High Rise Buildings, Chicago Committee on High Rise Buildings, c/o John Zils, SOM, Chicago, (312) 641-5959, 1990.

New Stone Technology, Design, and Construction for Exterior Wall Systems, STP 996, ASTM, Philadelphia (215) 299-5585, 1988.

"Physical Properties of Marble," *Marble Engineering Handbook,* Marble Institute of America, Farmington, Michigan (313) 476-5558, 1962, pp. 9–19.



The close spacing of in-line anchor holes contributed to fracturing (top), whereas the non-linear arrangement better resisted breaking (bottom).

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The Always Table
Design: Toshiyuki Kita, 1989

The "Always" perfect solution for cafeterias, conference areas, restaurants, or dining rooms.

photo: ABBY SADIN

Practice

Susan Radonsky offers pointers in establishing and maintaining a firm's library.

Management: The Firm Library

A well-organized library can significantly affect a firm's success and longevity. By providing ready access to information and materials, a library can be vital in preparing for client interviews and presentations, and an invaluable aid in the development phase of new projects and the administration of projects under construction.

In many design firms, however, bibliophobia (the fear of libraries) is rampant: Personnel may resist contributing resources (often squirreled away in their workstations) out of an irrational conviction that books and materials, once put in a library, will never be found.

That fear can be allayed with a commonsense approach to organizing the library. Arrange books and materials in basic categories and, where appropriate, subdivide materials within a broad subject area.

General categories that may be useful include: Architectural Practice (for example, AIA Professional Practice Handbooks and cost estimating manuals), Technical (codes, association manuals, and standards), Indices (such as the Architectural, Avery, and Art Indices), Product Literature (for both architecture and interiors), Samples, and General. A firm with a specialized practice may subdivide the last section into broad subsections, such as historic preservation, places of worship, or medical facilities. Most architectural libraries use the Construction Specifications Institute's (CSI) Master Format© system for cataloguing product literature, catalogues, and samples.

Don't define your firm's areas of expertise too narrowly when deciding which of the materials that have found their way into the office belong in the library. Literature or other material you may never expect to use again could be relevant in the next job.

When you have organized the materials, post signs to identify CSI sections and subsections for books and product literature and samples. Keep information that is not in book or catalogue form (such as product literature and samples) in folders, binders, or shelves.

Date and catalogue all library resources when you receive them. You may also want to post new product literature on a "New Products" board before filing it in the library. To avoid confusion, archive out-of-date codes. (Some states and municipalities have adopted as their building code a prior edition of a federal or regional code. If you have projects in those states or cities, you may want to keep copies of the relevant earlier edition.)

Most firms keep a file of the names, addresses, and telephone numbers of product representatives and distributors. To make the library's resources more accessible to firm personnel, add the CSI division number for the products carried by representatives on their business cards.

Some firms keep a set of final job specifications in their library. The library may also be the logical place to archive materials from completed projects. There, they are available for reference if a client later commissions additional work and requests similar finishes; the firm "precedent file" is also readily accessible to other designers in the firm who want information about how a particular material has worked in other projects. A firm may also include its slide library, marketing materials, and consultant files in its library.

Once the library has been organized, it is important to designate who will be responsible for keeping it updated, so that new materials are properly dated, catalogued, formatted, and filed; perhaps more important is to orient new employees on how the library is organized. The librarian can be a liaison with product reps by coordinating requests from firm personnel for information on particular issues or products. The librarian can also organize presentations on special topics for the office or a design team.

Each firm's library will have its own personality. It is important, however, to remember that a library becomes a significant asset only when the firm's architects take advantage of its resources. Here, the commitment of the firm's senior members can be key. If senior personnel respect what a well-organized library can offer, it will become an important – and well-used – tool for the entire office. And, if a firm's principals and senior associates regularly return borrowed materials, the design staff will, sooner or later, stop squirreling away resources. **Susan Radonsky** ■

The author, a librarian and consultant to design firms, is based in Cambridge, Massachusetts.

Practice Points

New laws have reduced the paperwork that architecture and engineering firms must submit to win government contracts. The *CBD Weekly Release* publishes a complete, official list of government opportunities. Call (800) 487-4824, ext. CBD for subscription information.

Looking for work or new employees? The AIA Referral Network is a national computer database allowing AIA members and architectural employers to post or search for résumés and job listings. Call (800) 242-6381.

U.S. construction activity is expected to fall 3 percent this year. The annual U.S. Industrial Outlook published by the Department of Commerce notes that construction spending has gone down each year since 1986 and is unlikely to recover to 1987 levels before the mid-1990s.

What do clients really expect from architects? *CLIENTS* is a quarterly report published by GUIDELINES that is the result of surveys of housing, government, institutional, corporate, and commercial clients. The survey asked clients how they chose architects, why and when they were willing to pay high fees, and what factors caused them to break a relationship with a firm. For subscriptions call (800) 634-7779.

Norman Coplan discusses some of the less obvious pitfalls of arbitration.

Law: The Pros and Cons of Arbitration

In negotiating contracts with clients, architects must often decide whether future disputes should be resolved by the arbitration process or by court litigation. Many owners automatically strike contract provisions for arbitration on the theory that architects may obtain favored treatment under this procedure or that facts can be better established in litigation through pre-trial discovery. A majority of insurance carriers representing professional designers also dislike arbitration.

The form contracts issued by the American Institute of Architects all call for the arbitration of disputes. Underlying this approach is the belief that arbitration is not only quicker and less expensive than litigation, but that it provides a procedure where technical disputes can be resolved by technically knowledgeable arbitrators. However, this belief is not necessarily valid in every dispute. Arbitration, compared with litigation, has both advantages and disadvantages that must be evaluated.

The American Institute of Architects' owner/architect agreement (B141) provides for arbitration of disputes pursuant to the Construction Industry Rules of the American Arbitration Association. The Association presumably provides panels of potential arbitrators who are knowledgeable in the construction field, these panels being made up of architects, engineers, representatives of institutional owners, bankers, and attorneys practicing in that area. In practice, however, the availability of arbitrators rather than their background often plays an undue role in the makeup of the panels.

The arbitration provision contained in B141 states that no third party can be included in the arbitration proceeding between owner and architect unless the owner and architect agree to such inclusion in writing. The underlying purpose of this limitation was to avoid including the architect in every arbitrated dispute between the owner and the contractor. However, this limitation also prohibits architects from bringing, say, the consulting engineer into the arbitration in circumstances where it is the consultant who is responsible for the performance about which the owner is complaining. In such circumstances the architects, if found liable, must bring a separate and independent action or arbitration proceeding against the consultant, which is inconvenient, expensive, and time consuming.

Because of court calendar congestion and the time that pre-trial discovery procedures usually take, conventional wisdom is that disputes that are submitted to arbitration are determined substantially faster than through litigation. This would undoubtedly be true in a dispute involving a simple issue such as the unpaid fees of the architect. If, however, the dispute involves a complex claim of malpractice, the time involved for determination might well rival the time involved in litigation. If many hearings in arbitration are required they are generally scheduled over a long period of time, since hearing dates must accommodate three arbitrators, the parties, and their attorneys. Arbitration hearings are usually scheduled for one or two days at a time, with long intervals between the hearings. The length of time required for arbitration therefore depends upon the number and complexity of the issues involved, the detail of the proof, and the availability of the arbitrators.

Normally, the arbitration procedure does not provide for pre-trial discovery. Although this results in great savings of time and money (legal expenses) it may be a significant disadvantage for architects who must defend against a claim of negligence in their performance. The purpose of pre-trial discovery, such as depositions, bills of particulars, and interrogatories, is to enable one party to ascertain the details and evidence of the other party's claim so that an appropriate defense may be prepared and surprise at the trial avoided. If architects must defend themselves without knowing in advance the nature and details of the claim against them, they are at a great disadvantage in preparing a defense. In some situations arbitrators will permit a limited pre-trial discovery, but only where need can be demonstrated and where the discovery will not unduly delay the hearings.

It is also conventional wisdom that arbitration is significantly less expensive than court litigation. This is probably true in most instances where legal fees are concerned. However, the filing fees and other charges by the American Arbitration Association can substantially exceed any fees payable to a court to process a case. The filing fee payable to the American Arbitration Association for a claim of $100,000 for example, is $1,750. If there are three arbitrators each may receive up to $500 per hearing after the first one. These costs, along with the cost of recording and transcribing the testimony, are generally divided between the two parties to the arbitration and substantially exceed the filing fees and related costs of a court litigation.

One of the great advantages of arbitration is its informality. The legal rules of evidence need not be followed and the arbitrators may receive in evidence documents, such as affidavits, that would not be admissible in court; or they may receive testimony, such as "hearsay," that would not be admissible in litigation.

One of the major disadvantages of arbitration, however, is that the decision of the arbitrators is not subject to appeal unless fraud or arbitrator misconduct can be established. An arbitrary decision by arbitrators or one contrary to the evidence is not, unlike a court decision, appealable. The absence of such redress makes arbitration in that sense more of a gamble. In any event, the decision to include or exclude arbitration in the owner/architect agreement is not an easy one and should be carefully considered.

Norman Coplan ■

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

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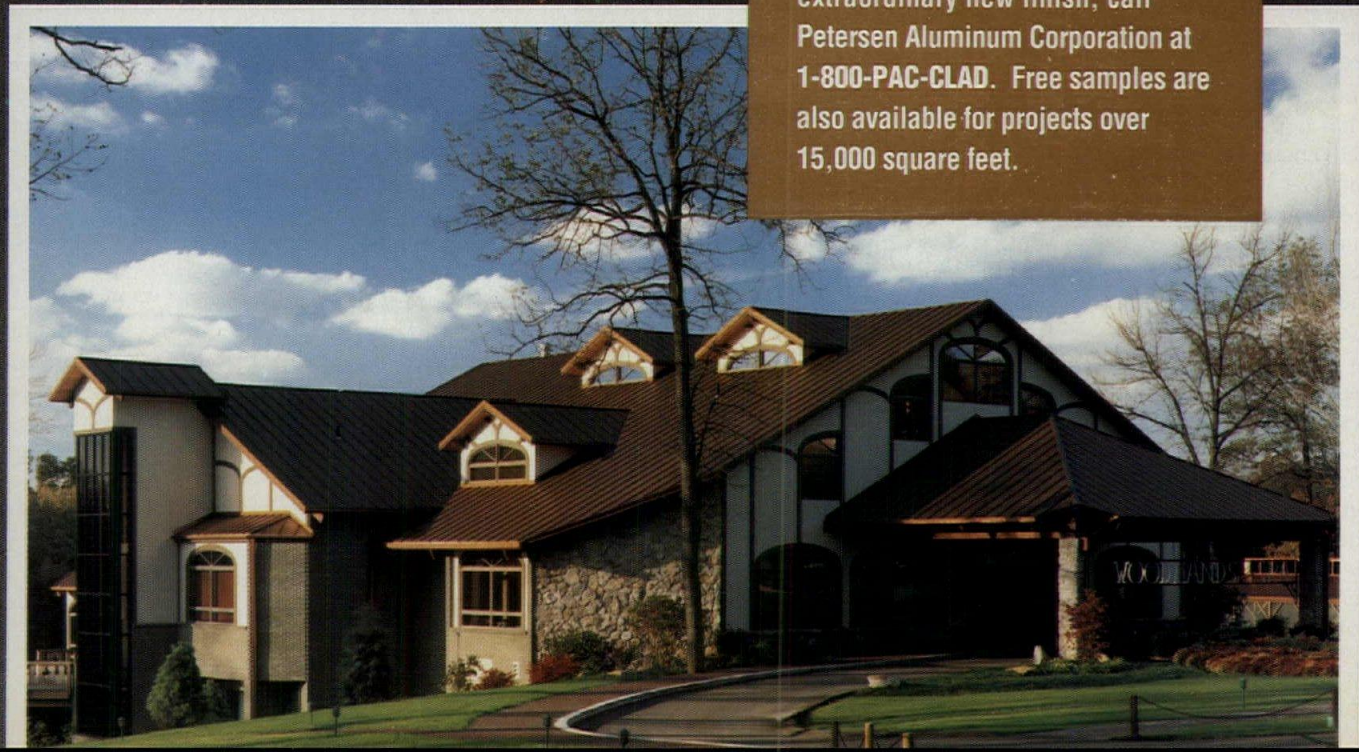
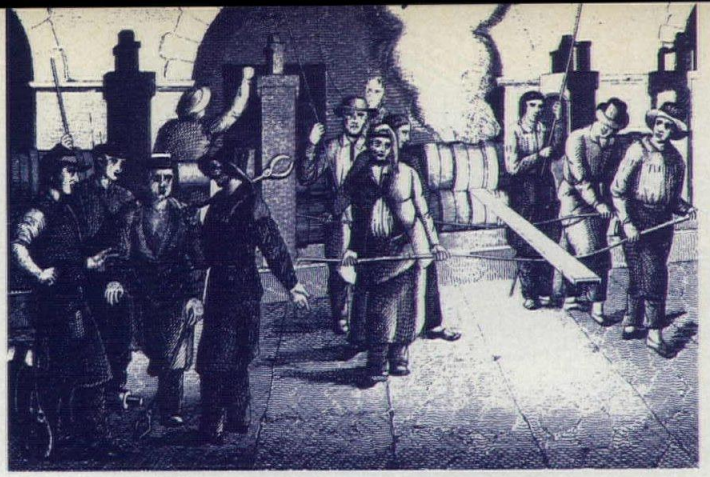


William Lohmann argues for greater commitment among architects to use recyclable products.



Specifications: Recycling Construction Waste

It is no longer surprising to see the term "waste management" in a contractor's work plan. Appearing among more familiar entries like "resource management," "project scheduling," and "cost control," it reflects a growing level of concern about the handling and disposal of waste materials resulting from construction. Pressures to address the problem are mounting and, as in the energy crisis of the 1970s, waste management will have an impact on the entire design and construction process in the next decade.

Construction work and demolition generate mountains of waste materials. A recent New York State study, "Managing Construction and Demolition Debris: Trends, Problems and Answers," succinctly defines the problem facing New York construction and demolition contractors. Up to 5 million tons of construction and demolition waste are generated in the state every year and New York's current landfill sites, many of which no longer accept such debris, will reach capacity by 1995. Disposal costs also are escalating, disposal rules are becoming tougher, and debris must be hauled farther as landfill sites close. In Bangor, Maine, the closing of a low-cost municipal landfill to construction waste materials has forced contractors to use a commercial waste-to-energy plant at a cost of $30–$60 per ton. In many areas, contractors are required to separate construction debris at the site. Steel reinforcement, for instance, had to be separated from concrete during removal of an earthquake-damaged freeway in San Francisco last year.

Apart from economic factors, there may also be a moral imperative. The Initiative for Environmental Sensitivity in Construction contends that the construction industry, a major consumer of dwindling raw materials, should take greater care to preserve and recycle these resources. And the American Institute of Architects has announced a study on the environmental impact of architectural design, covering among other factors, the capacity of construction materials to be recycled.

Recycling is just one waste management technique. Others are: reduction of the waste stream at its source, resource recovery through energy generation facilities, and (as a last resort) landfill disposal. Of the viable options, recycling seems to hold the greatest potential for a long-term solution to the crisis.

When demolition debris is dispatched to a landfill site, natural reclamation takes hundreds of years. Recycling, in contrast, returns construction and demolition materials to beneficial use in a relatively short time and saves energy, thus preserving important fuel resources. On-site reconstituted asphalt for 1,500 miles of Florida highway, for example, saved over 2 million tons of new asphalt and more than 300 billion BTUs of energy.

The recycling loop is complex and involves many interdependent factors, however. Reusable components, such as window sash and doors, fireplace surrounds, and decorative moldings, are sometimes salvaged before demolition of existing buildings. Clean demolition debris is removed as it accumulates, usually by a separate subcontractor. Hazardous waste is handled by another subcontractor. Construction debris, consisting mostly of packaging, temporary materials, and scrap wood, metal, and glass, must be separated by type of material before pickup at the site or at the recycling plant, where it is converted into a marketable form by a recycler, sold to a manufacturer, and reused for new products.

Not all parts of the recycling loop are in balance. While upstate New York now has several recycling firms dealing in construction and demolition waste, other parts of the country have none. Presumably a dependable market for recycled materials has not yet developed in those areas. A large recovery center for building materials has been proposed for Portland, Oregon, but not many communities are even considering such a major step. Most manufacturers of building products do not use recycled materials, and of the few that do, an even smaller number advertise the fact. Packaging for construction products has not yet been subjected to the scrutiny accorded even McDonald's hamburger containers.

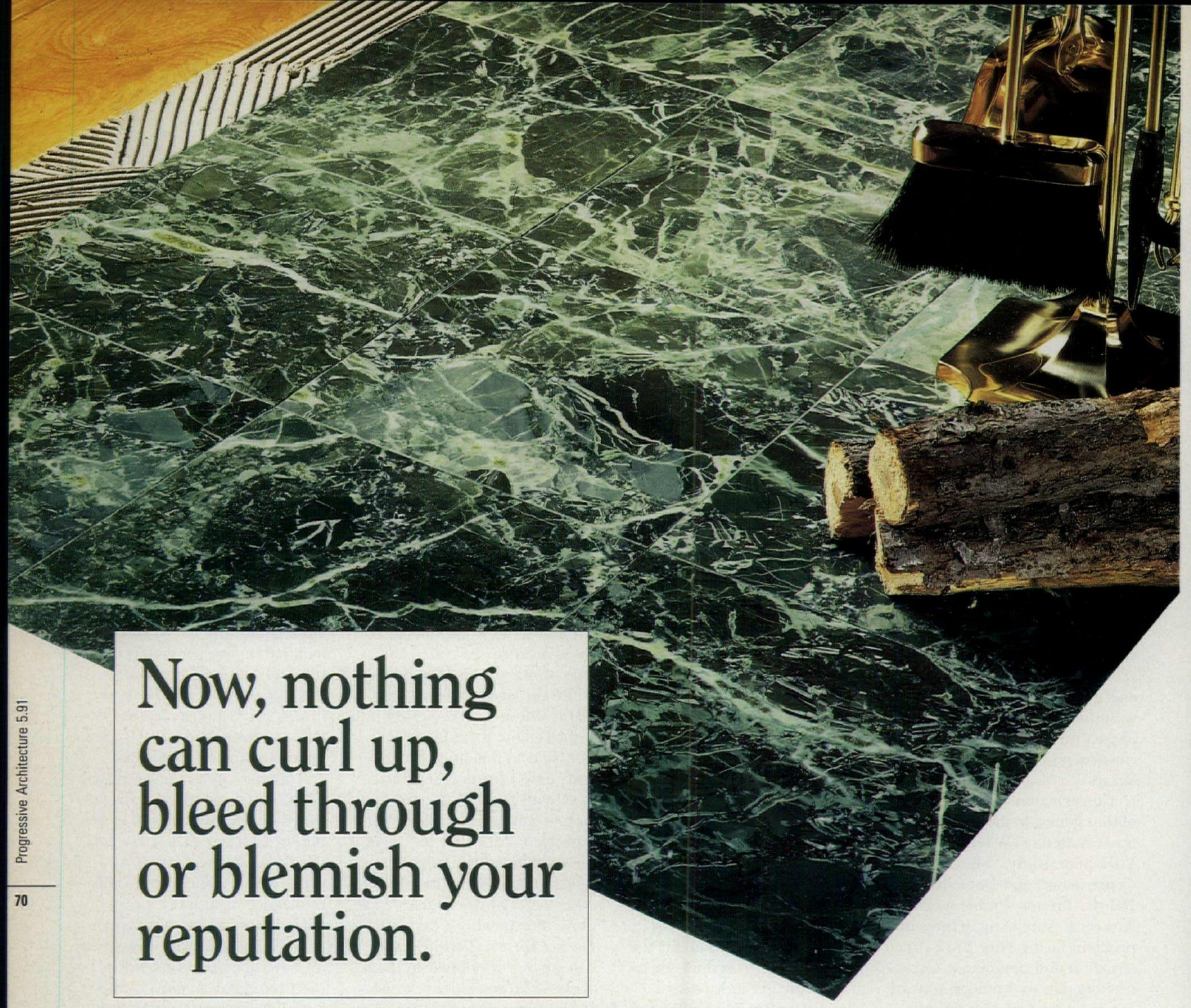
A proposed recommendation of the Construction Industry Affairs Committee (CIAC) of Chicago recently addressed some of those factors. It urged building clients and contractors to make a commitment to the recycling process for their projects, encouraged design professionals to specify recycling requirements for waste materials and to name prequalified recycling firms, and suggested that alternate bids could be used to determine the added cost or savings of recycling requirements before proceeding with them on the project. Aside from specific waste management issues, the CIAC recommendation also promoted the reuse of salvaged materials when appropriate and urged design professionals to specify new products made of recycled materials whenever possible.

Unfortunately, the proposed CIAC recommendation was rejected by the Builder's Association of Chicago (BAC), one of the CIAC member organizations. BAC's stated reason was reluctance to support a presumed increase in construction costs. While recycling cost studies have not been initiated in the Chicago area, gaps in the recycling process and the lack of competitive services have led to higher waste disposal costs elsewhere. For the present, some relatively low-cost landfill facilities are still available in Illinois.

Thus far, the construction industry has not responded to recycling needs in a significant way. Perhaps it is waiting for greater landfill pressures, economic incentives, or restrictive legislation before acting. But one thing is clear. The problem will not go away.

William Lohmann ■

The author is Vice President, Specifications, for Murphy/Jahn in Chicago.



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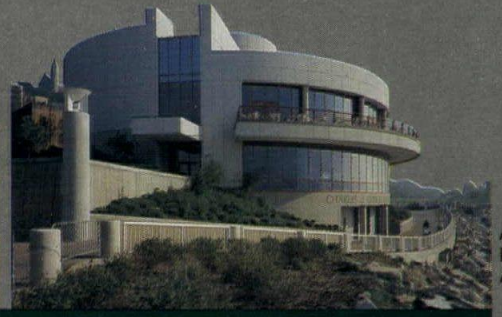

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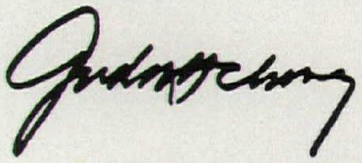
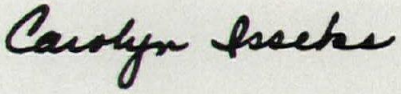
"Carolyn's been wit

Gordon Chong is the owner of Gordon H. Chong + Associates, a 45-person architectural practice located in San Francisco, California. He is president of the San Francisco Chapter of the AIA for 1991, and has been a director of the California Council of the AIA and president of Asian American Architects and Engineers.



Carolyn Isseks is vice president of Dealey, Renton & Associates, an independent insurance agency based in Oakland, California. She has represented DPIC's unique insurance program of education and loss prevention services for over thirteen years. She is also a member of the Professional Liability Agents Network (PLAN), a nationwide group that specializes in serving the risk management needs of design professionals.



Carolyn and Gordon met in 1977. "I was new and he was new," she says, "and we sort of grew together." Perhaps all clients don't take advantage of Carolyn's brand of thorough service, but Gordon does. "He's cautious," she says. "He tends to call us before he starts a project or gets into certain areas. He might say, 'We're thinking about a joint venture with another firm. How will that impact our insurance?' Then our contract analyst and I work together to give him some advice on short and long-term consequences."

On the account management side, Carolyn doesn't just wait for the renewal quote to come in. She's on the phone with DPIC—dealing with the underwriters, pointing out her clients' strengths, negotiating for the terms she needs. And she's persuasive.

"I expect a high quality of service for him—I want to be as professional as Gordon is. He emphasizes high standards in serving his clients. And we feel the same way." Carolyn also works hard to keep Gordon H. Chong + Associates informed about the many premium reduction opportunities available from the DPIC program.

Carolyn has a master's degree in education and began her working life as a teacher. The teacher in her still comes out when she's conducting a workshop panel on liability issues for one of the Bay Area AIA chapters or a brownbag seminar for one of her clients. "I love to see the light bulb go on in someone's head," she says. "The 'oh, now I know what you're talking about.' I think that's what I like about this job: I'm always teaching and getting close to people who, I think, appreciate what I have to tell them. They all have the same interests—they want to better their practice in a professional way."

h us since the beginning.

Today, 15 years later, with a staff of 45, our firm and its needs have changed and the relationship has changed. In the early years our primary focus was getting work in, making ends meet. We were required by our clients to have insurance and had to struggle to find a million dollars in coverage. Carolyn did a great job of finding alternative proposals for a small firm—she brought us the best of a terrible situation in terms of cost.

Today our projects and contracts are bigger and more complex. Now we use Carolyn's agency, Dealey Renton, a lot for contract review and assistance. Our prospective client may be saying 'it's an unalterable contract—if you don't sign it in the next two days we're going to go to the next architect on the list.' But the agency can call our client's contract manager and say 'it's not in the best interests of either party to do this.' Then the feedback isn't coming from me, which would be totally self-serving. It's coming from Dealey Renton's contract review specialists who know industry standards. They've made little word changes which I think have made the difference, not only in terms of the insurability of the contract, but also from a business perspective.

For us the whole idea of service and quality assurance is key. It's been the focus of our firm since we started and it's very characteristic of what our clients demand. Our firm has never had a claim in its 15-year life. I believe that this is in part due to the preventative approaches to professional liability which DPIC and Dealey Renton advocate."

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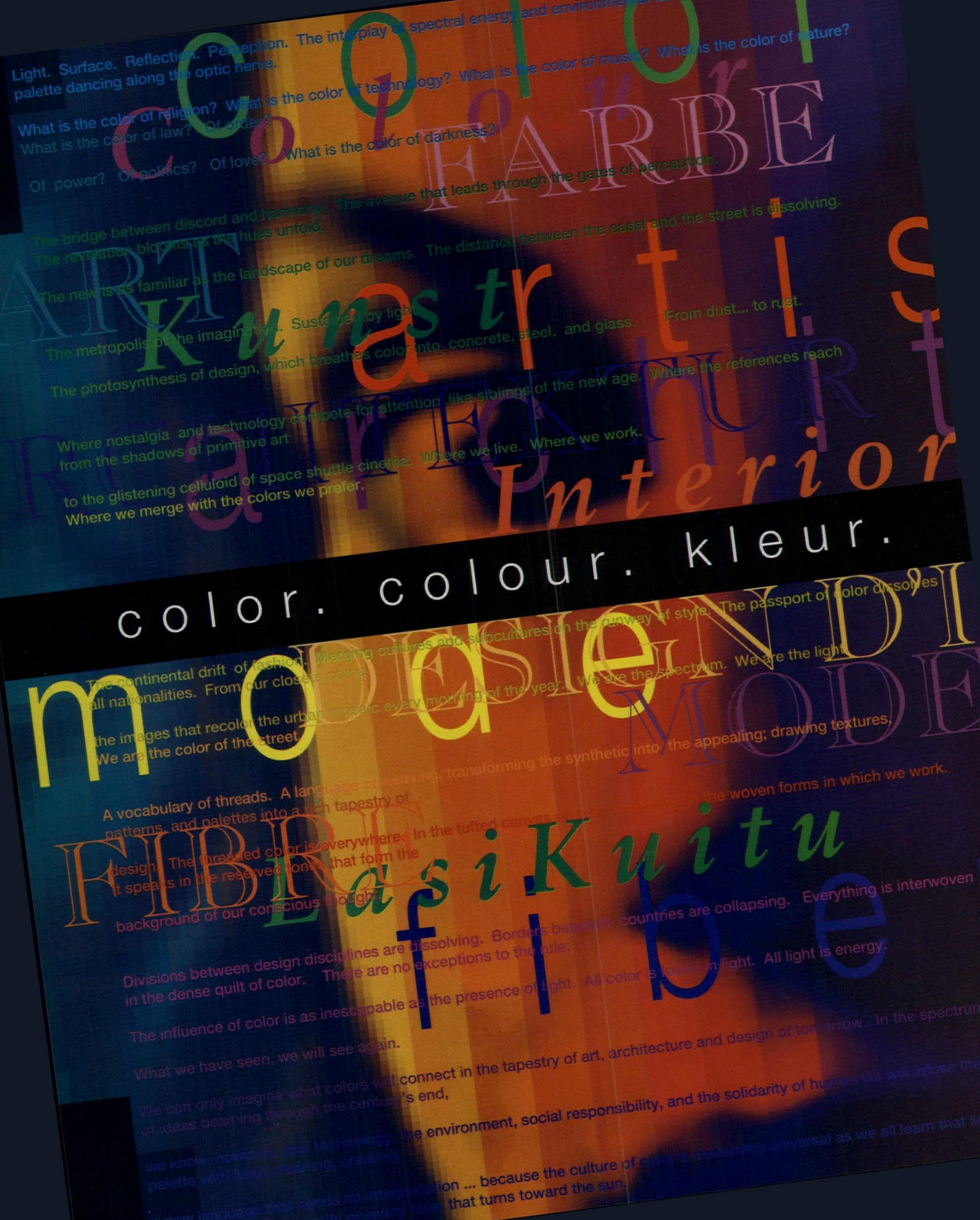
Light. Surface. Reflection. Perception. The interplay of spectral energy and environmental
palette dancing along the optic nerve.
What is the color of religion? What is the color of technology? What is the color of music? What is the color of nature?
What is the color of law? Of order?
Of power? Of politics? Of love? What is the color of darkness?
The bridge between discord and harmony. The avenue that leads through the gates of perception.
The revelation blooms as the hues unfold.
The new is as familiar as the landscape of our dreams. The distance between the easel and the street is dissolving.
The metropolis of the imagination. Sustained by light.
The photosynthesis of design, which breathes color into concrete, steel, and glass. From dust... to rust.
Where nostalgia and technology compete for attention like siblings of the new age. Where the references reach
from the shadows of primitive art
to the glistening celluloid of space shuttle cinema. Where we live. Where we work.
Where we merge with the colors we prefer.
color. colour. kleur.
The continental drift of fashion. Merging cultures and subcultures on the runway of style. The passport of color dissolves
all nationalities. From our closets come
the images that recolor the urban mosaic every morning of the year. We are the spectrum. We are the light
We are the color of the street.
A vocabulary of threads. A language of weaving, transforming the synthetic into the appealing; drawing textures,
patterns, and palettes into a rich tapestry of
design. The threaded color is everywhere. In the tufted canvas of the woven forms in which we work.
It speaks in the reserved tones that form the
background of our conscious thought.
Divisions between design disciplines are dissolving. Borders between countries are collapsing. Everything is interwoven
in the dense quilt of color. There are no exceptions to the rule.
The influence of color is as inescapable as the presence of light. All color is found in light. All light is energy.
What we have seen, we will see again.
We can only imagine what colors will connect in the tapestry of art, architecture and design of tomorrow. In the spectrum
of ideas beaming through the century's end,
we know however, that technology, the environment, social responsibility, and the solidarity of humanity will infuse the
palette with deep meaning, creating
a new language that needs no interpretation ... because the culture of color is becoming universal as we all learn that life
that turns toward the sun.

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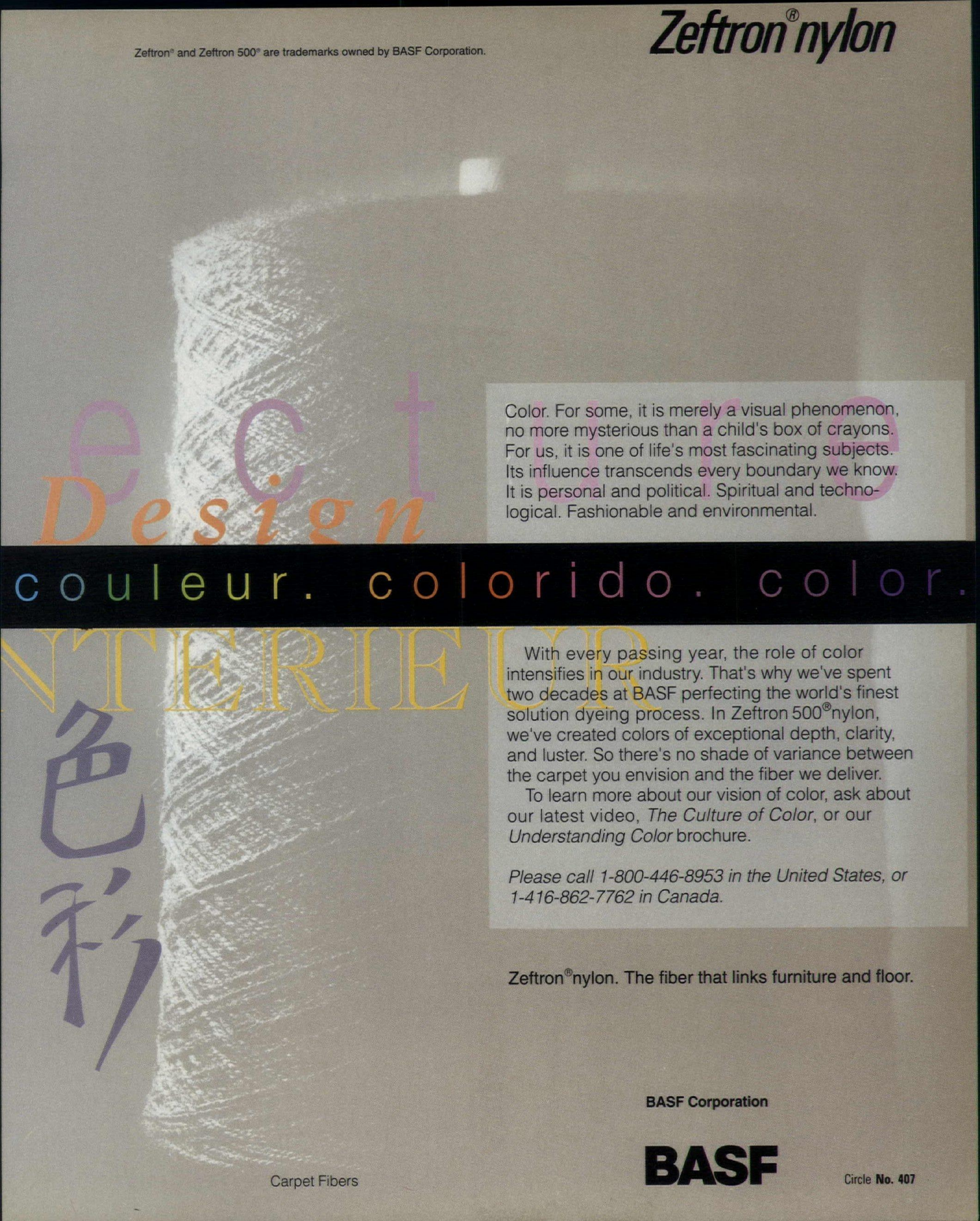

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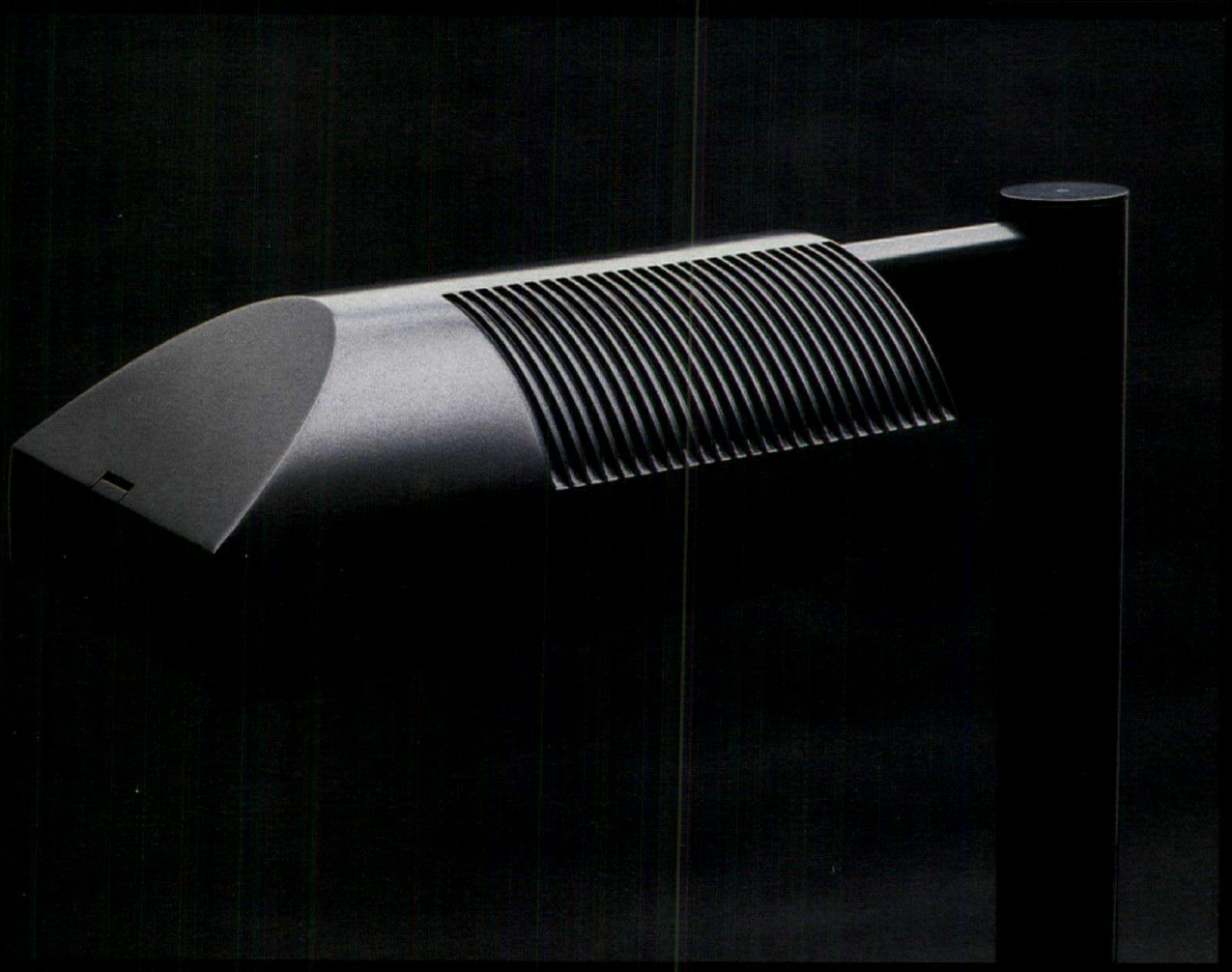

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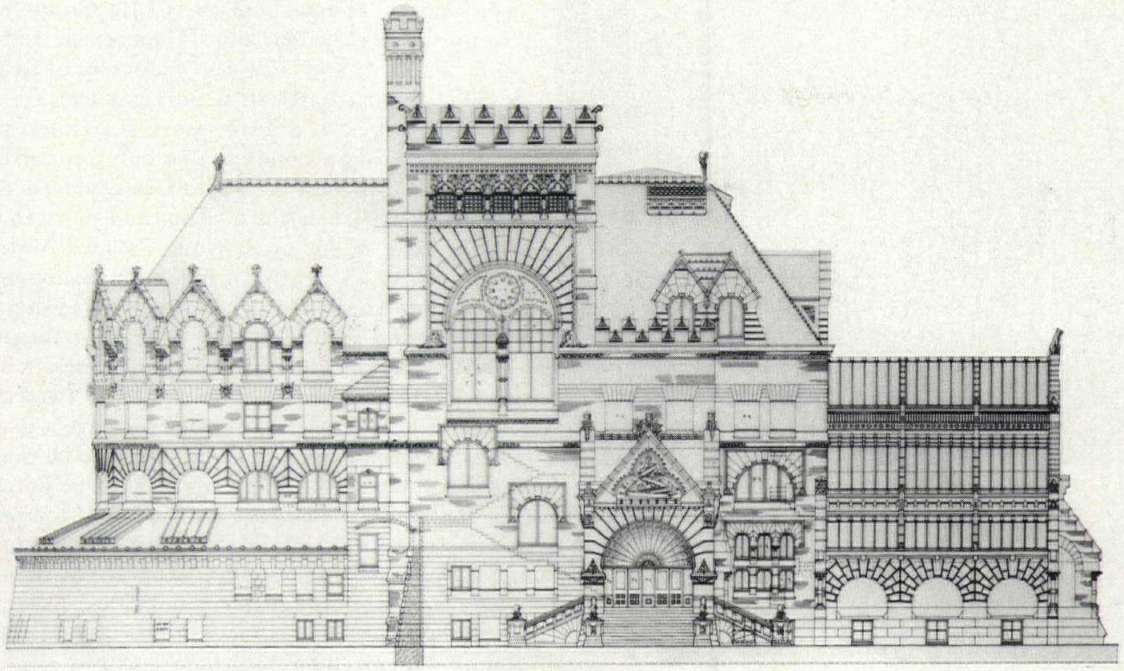
Buildings with historical values

ranging from extremely important to relatively less important

take on new or renewed stature after the architectural interventions

shown on the following pages.



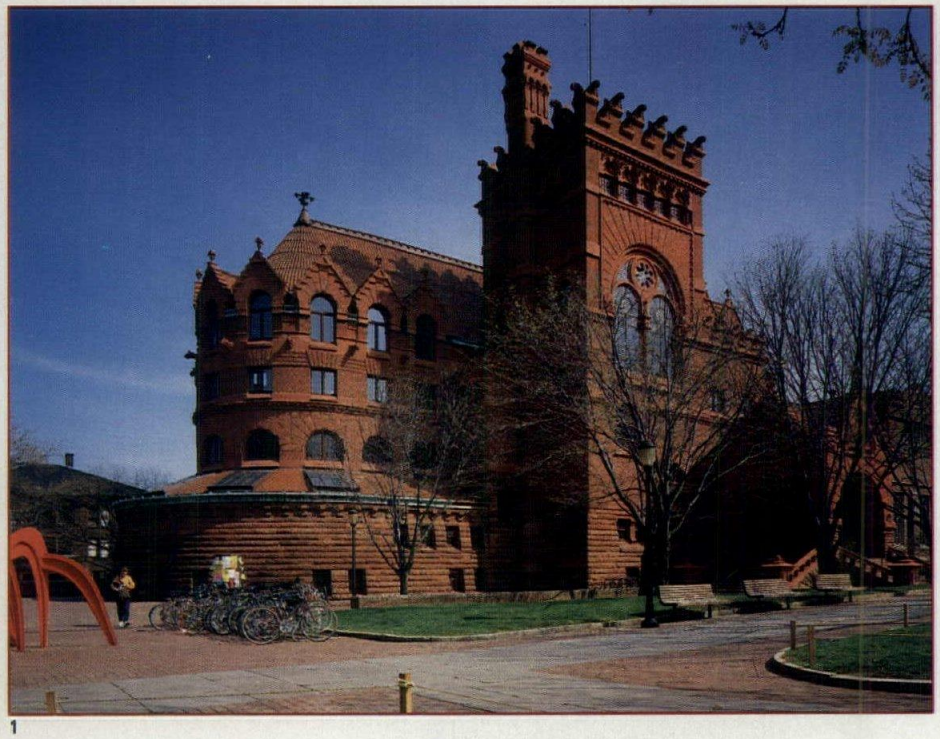
George F. Thomas

Furness library, west elevation, from photostat of lost original linen drawing.

While the buildings featured in this issue have little in common, they all deal with existing buildings. The Furness Library on the University of Pennsylvania campus (p. 82) has just been restored by Venturi, Scott Brown, while several Ledoux landmarks (p. 106) have been restored or cleaned. Continuing to work his way through a voluminous L.A. former warehouse, Eric Owen Moss again arrives at a unique solution (p. 98) and at MIT, architects Schwartz Silver have skillfully added to an existing library (p. 90). **Jim Murphy** ■

Mending a "Difficult Whole"

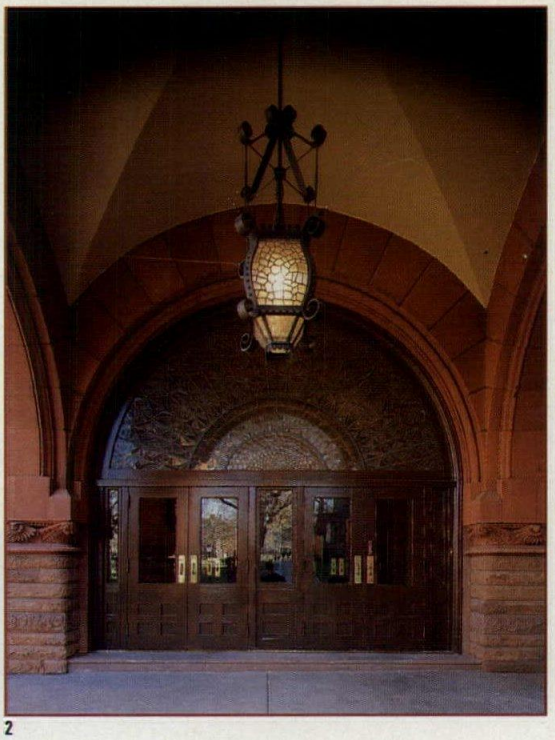
Venturi, Scott Brown & Associates' restoration of the Furness Building at the University of Pennsylvania pays homage to an exemplary Mannerist.



1

"It's one of the all-time greatest works of American architecture," says Robert Venturi of the Library Frank Furness built at the University of Pennsylvania in 1891. Venturi's encomium is an informed one: He cited Furness's idiosyncratic work in *Complexity and Contradiction* (1966), and was the design principal for the building's restoration, a six-year project. But Venturi is quick to add that he (like nearly everyone in Philadelphia before the mid-1960s) once considered Furness's buildings ugly: "I've learned that you can come to love what you hate." He recalls that nearly 30 years ago Denise Scott Brown, at the time another young faculty member at Penn, protested plans to raze the Furness Building, long before Venturi revealed his Furnessian sympathies.

The Library is one of the most accomplished designs of Furness, and a fortunate survivor; about half of his 600-odd buildings have been demolished. Venturi, Scott Brown & Associates, who planned and executed the restoration, share credit with their resourceful consultants, particularly George Thomas and the CLIO Group for historical research, Marianna Thomas, the restoration architect, and Nicholas Gianopulos of Keast & Hood Company, the structural engineer.

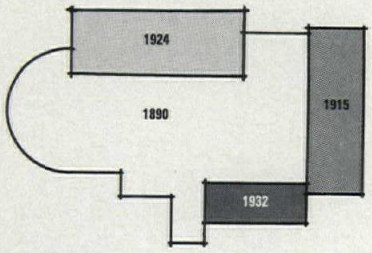


2

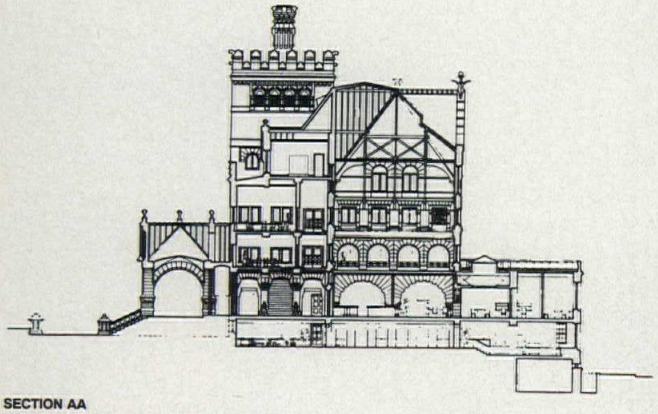
The Library is a "difficult" work of architecture (Venturi's term for buildings that defy a summary description): Furness used 19th-Century norms as a point of departure for a richer and more challenging style of his own. While Richard Morris Hunt (Furness's teacher) followed Beaux-Arts models, and Henry Hobson Richardson (Furness's contemporary) reduced his buildings to broad, compressed Romanesque masses, Furness pursued another course: a highly mannered Victorian Gothic. The Library façade does not have a fixed focal point; its center seems to alternate between the cubic stair tower and the gabled entry porch. The building is a composite of crenellated volumes with façades that look incidental in composition, but are precisely calibrated. Venturi was intrigued by Furness's unorthodox combinations, like the fenestration of the stair tower, where Renaissance frames support a Gothic rosette, with a row of cottage windows and Classical arches above.

Furness's leaps in scale and varied surface patterns likewise adumbrated the work of Venturi, Scott Brown & Associates. Furness's handrails on the front stair, for instance, are as broad as the the cornices of the façade. The brick façade is structural, but it reads like a discourse on architectural conventions: Terra cotta voussoirs are chiseled to look like stone, but their load-bearing role is belied by their flatness. The stair tower is ungainly yet self-assured, crowned by a band of machicolation that is at once top-heavy and lively.

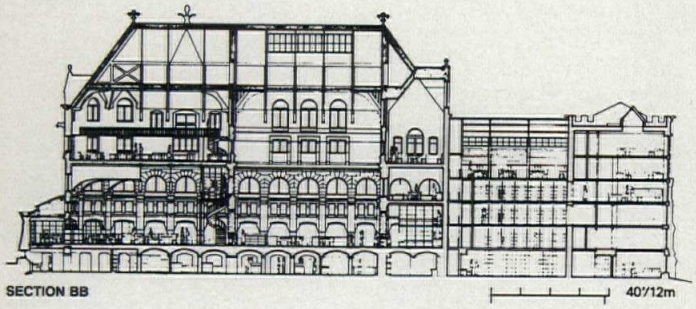
The Furness Building (1) is the liveliest on the Penn campus: Leaded glass (2) and textured terra cotta (3) render the façade a composite of animated motifs.



PLAN DIAGRAM, ADDITIONS TO LIBRARY

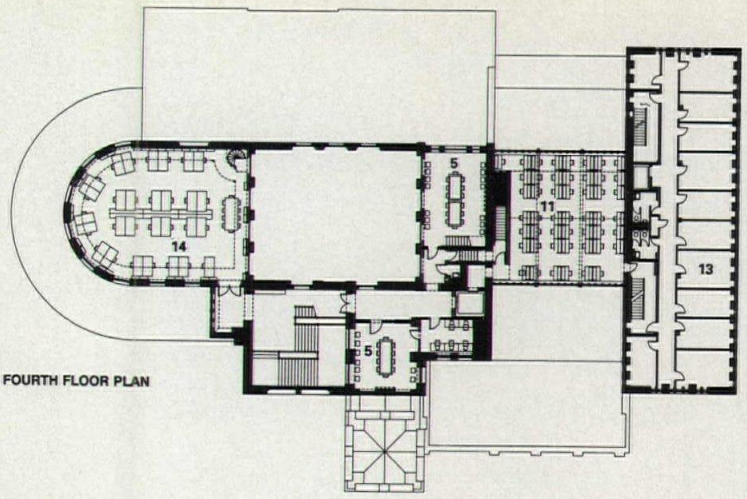


SECTION AA

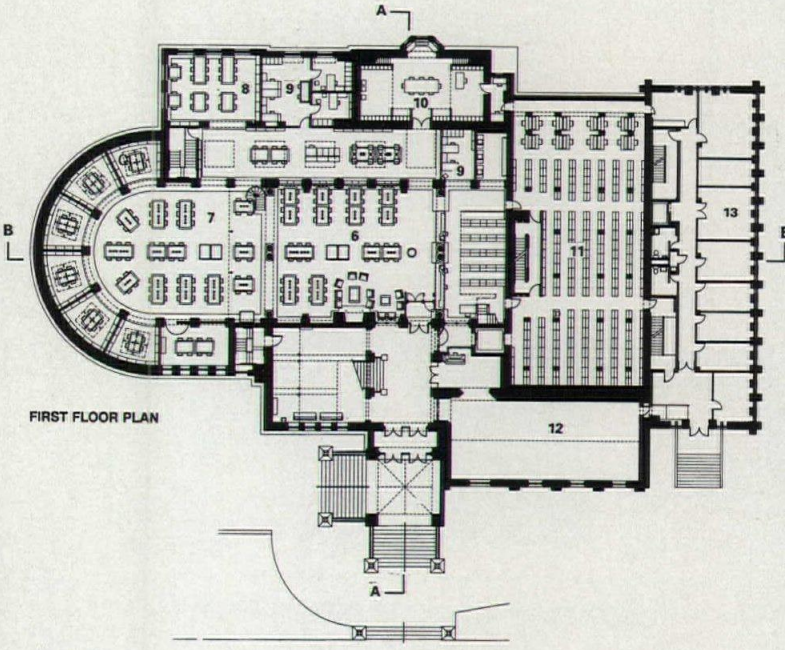


SECTION BB

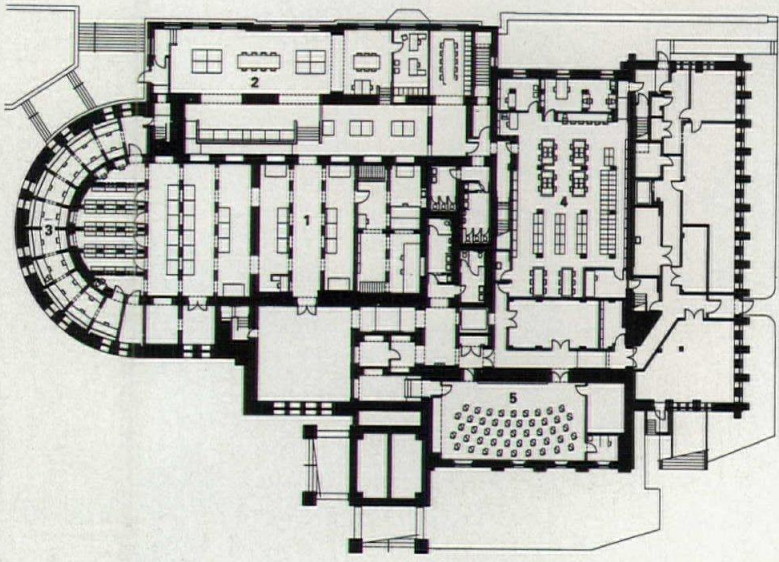
40'/12m



FOURTH FLOOR PLAN



FIRST FLOOR PLAN



GROUND FLOOR PLAN

N

40'/12m

1 ARCHITECTURAL ARCHIVES
2 KROIZ GALLERY OF THE KAHN COLLECTION
3 STUDY CARREL ALCOVE
4 SLIDE & PHOTO COLLECTION
5 SEMINAR ROOM
6 MAIN READING ROOM
7 ROTUNDA READING ROOM
8 PERIODICALS READING ROOM
9 LIBRARY OFFICES
10 PERKINS RARE BOOK LIBRARY
11 CARRELS/BOOKSTACKS
12 ARTHUR ROSS GALLERY
13 FACULTY OFFICES
14 LOUIS KAHN STUDIO

On the 34th Street elevation (4), the Lea Addition of 1924, which incorporates the bay window, proved an expedient brace for the 4-story-tall reading room wall. An archival photo (5) shows the glass-roofed bookstacks with a façade later obscured by the Duhring Addition, built by Furness's successors in 1915.

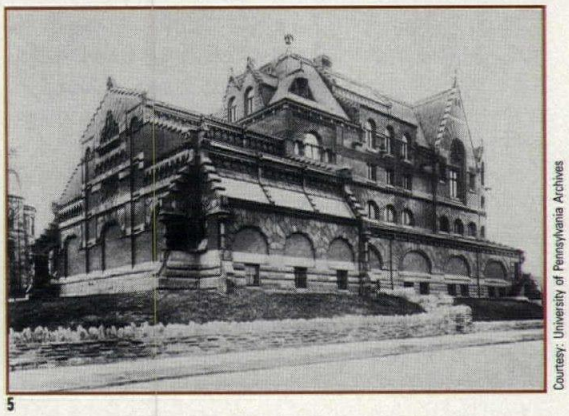
4

Furness's seemingly endless repertoire of motifs was at once his forte and his weakness: In some buildings, heterogeneity overwhelmed his sense of synthesis. The recollections of Sullivan, who worked in Furness's office, imply that Furness reveled in his architectural eccentricity, and did not pause to enumerate any parameters or theoretical bases for his style. George Thomas suggests that load-bearing masonry construction provided the framework for Furness's best work: The Penn Library was an optimal size for him – impressive in scale, but compact enough to sustain a coherent hierarchy of parts.

The Reading Room

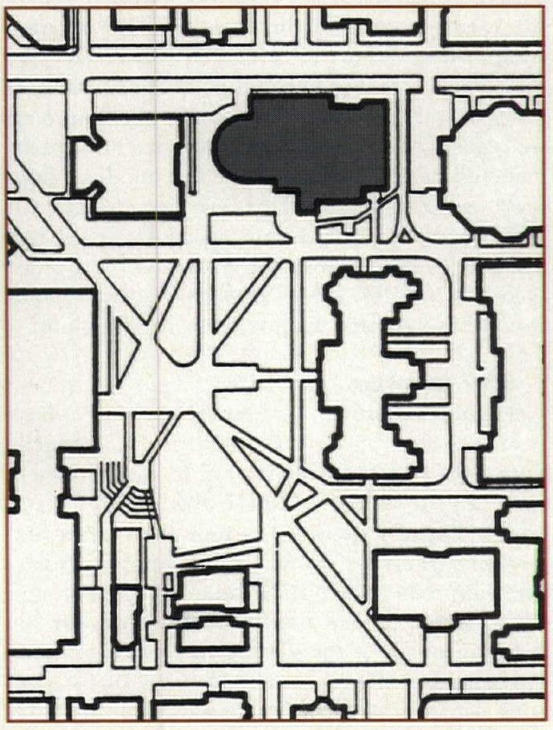
The primary dividend of the restoration is the Library's main reading room: An intermediary floor that had bisected the room since 1922 has been removed, and one of the great interiors of 19th-Century America is once again intact. This space is like a *palazzo cortile* with a permeable enclosure: Arches and windows open the four-story space to light and views into the surrounding rooms. This monumental room is as eccentric as the exterior, and is at the same time its reciprocal – a serene place in a building of dynamic parts.

The historian James F. O'Gorman noted that Furness exposed the steel beams (whose depth and number exceeds structural demands) that span the adjacent rotunda reading room, and set them on undersized foliate crockets – a witty turn on the Structural Rationalism of Viollet-le-Duc. The articulation of the reading room walls is Furness's own: Brick piers carry the load of the four-story wall, but the interstitial terra cotta cornices and pilasters, by virtue of their high relief, are as prominent as the brick surfaces. At the same time, the flat sides of the terra cotta pilasters imply that they are pieces inserted within the wall. They



Courtesy: University of Pennsylvania Archives

5



SITE PLAN

N ← 100'/30m

Excerpt: Heeding Emerson's Call

"A. . . remarkable source of ornamentation was derived from Emerson's potent symbol of America – the railroad. . . Furness found in railroading many effective forms: The flaring smoke stacks of early locomotives were remembered in his chimneys; their pistons anticipated his short columns; their particularized design of boiler, cab, and great wheels provided a

Courtesy: George E. Thomas

Graver's Lane Station, c. 1885, designed by Furness for the Philadelphia and Reading Railroad.

model for functional design. . .

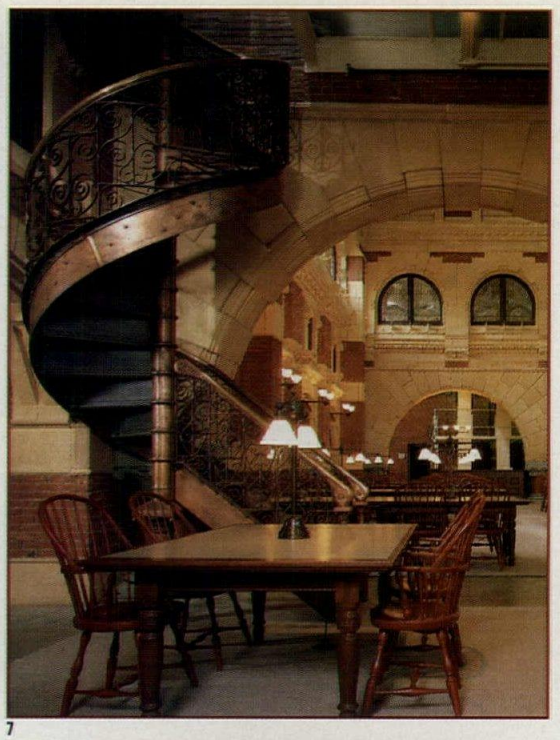
"As Furness shifted away from formal composition towards functional expression, ornament was largely freed from its architectonic role, and. . . could well have been abandoned. Though it was not required in Furness's new functional mode, ornament was still needed to express the forces of commerce and industry at the core of the American soul. . .

"[At] the Library of the University of Pennsylvania. . . form expressed function to a degree unprecedented in American architecture. Complicated assemblages of volumes denoted purpose by fenestration, scale, and shape – leading to a blurring of building typologies even as they denoted the various activities within. Legends about the library reported that it was adapted from a railroad station. In fact it could only work as a library. However, the realization that it no longer looked back to historic forms, but instead to the most modern building type that then existed, denoted the nature of the Furness achievement."

George E. Thomas ■

Excerpted from Frank Furness: The Complete Works *Princeton Architectural Press, 1991 (see Books of Note, p.114).*

6



7

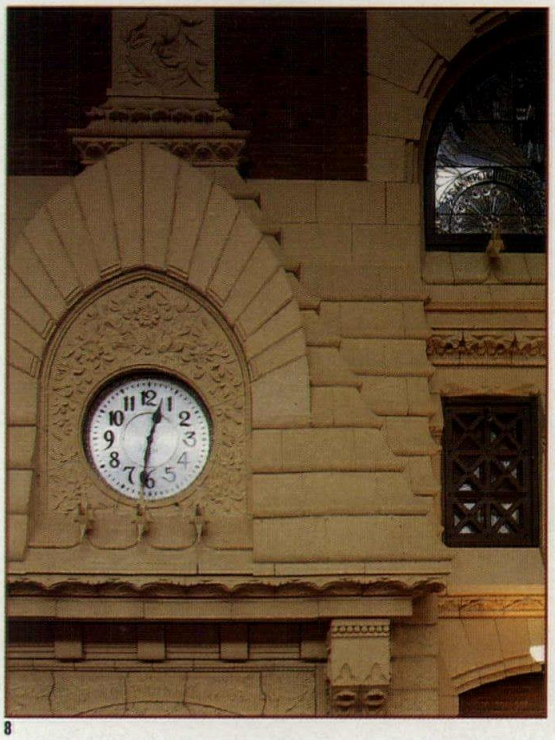
Project: *Restoration of the Furness Building, University of Pennsylvania, Philadelphia.*
Architects: *Venturi, Scott Brown & Associates, Philadelphia (Robert Venturi, principal; David Marohn, associate in charge; Brett Crawford, project manager; Chris Appleford, Denise Scott Brown, Dave Franke, Rick Mohler, Tom Purdy, Mark Schlenker, Mark Stankard, Nancy Rogo Trainer, project team).*
Client: *University of Pennsylvania.*
Site: *the east side of the campus green, adjacent to 34th Street.*
Program: *the 116,600-gross-sq-ft restoration comprises a fine arts library (26,800-sq-ft), architectural archives, gallery, studio and seminar rooms, faculty offices, and lounge.*
Structural systems: *wood trusses (steel reinforced) and load-bearing brick walls in library building; concrete floors, columns, and fire stair in flanking bookstack building.*
Major materials: *load-bearing brick and sandstone walls with terra cotta ornament and roof tiles.*
Mechanical system: *four-pipe fan coil units; fin tube radiation.*
(continued on page 88)

make the enclosure seem deep, while emphasizing its planarity – a duality that presages the work of Venturi, Scott Brown & Associates, where the non-structural role of the Modern façade is always evident.

Nicholas Gianopulos says that Furness's preference for massive walls was structurally advantageous: They have proven strong enough to prevent failures from Furness's "optimistic and willful" engineering design. In other buildings, Furness relied on the sophisticated engineering provided by the Phoenix Iron Works, but in the Penn Library there is no consistency in Furness's structural design. When Gianopulos added steel to the raking chords of the truss over the reading room, he saw that the scalloped gussets act like diagonal braces, but found the top chord faulty in design. To Furness's credit, Gianopulos found no wall cracks that would indicate a structural problem, and he concludes that the intermediary floor built in 1922 was not a corrective device, but simply a way to provide more space. However, had it not been for the bracing provided by the Lea Addition on the 34th Street side, Gianopulos would have advised against removing the floor.

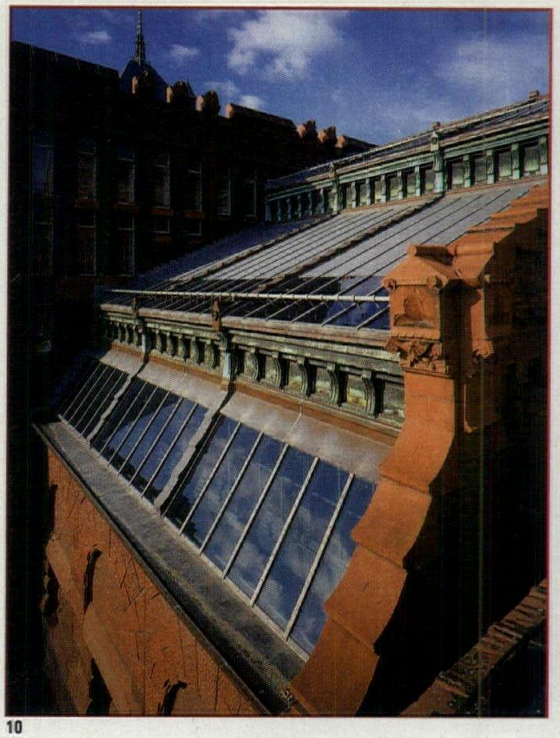
Other Alterations

Furness's Library was one of the first whose reading room and stacks were set in distinctly different building envelopes, with "high architecture" and a utilitarian space forthrightly juxtaposed. Furness designed a four-story glass and steel bookshelf system as a self-supporting structure within the glazed stack building. Even though the greenhouse roof made this space unbearably hot (and much of the glazing had to be covered) Furness's bookstacks remained in place for decades. Unfortunately, current structural and life-safety standards made the stacks obsolete. A flat-



8

The steel stair that rises from the Library foyer (6), like the terra cotta ornament of the interior, was originally white, perhaps to maximize the interior's available sunlight. In the rotunda reading room, a copper stair (7) rises to carrels added in 1904; the desk in the foreground, designed by Venturi, Scott Brown & Associates, was modeled on the Library's original furniture. The lancet arch of the fireplace (8), one of Furness's favored motifs, appeared on many of his building façades. The main reading room (9) is an imposing, but not overwhelming space, with stacked cornices and arches to modulate the 54-foot-high walls.



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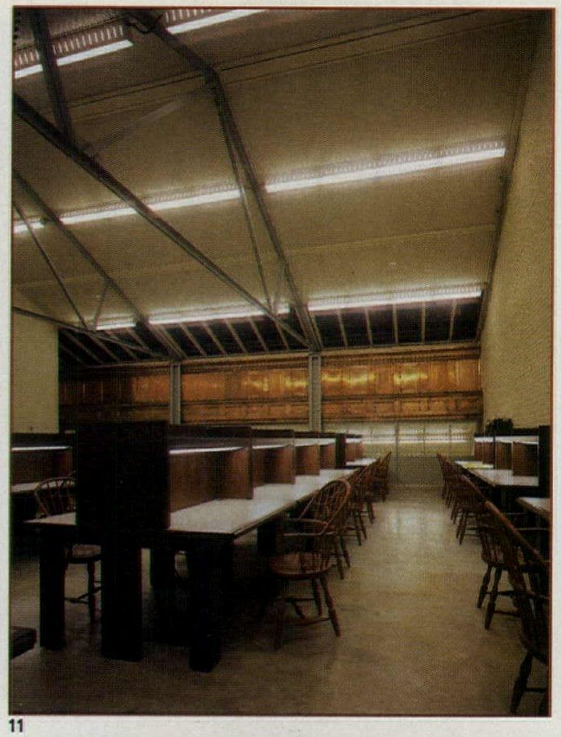


11

(continued from page 86)

Consultants: *CLIO Group, Philadelphia (George Thomas, Carl Doebley, principals; Penny Baker, Carol Benenson, Susan Glassman, Laurie Nicholas, Graydon Wood, project team) historical; Marianna Thomas Architects, Philadelphia (Marianna Thomas, principal; Robert Nevitt, Owen Robbins, Nancy Rogo Trainer, project team) restoration; Keast & Hood Co., Philadelphia (Nicholas Gianopulos, principal; John LeBlanc, Suzanne Pentz, Ole Wurtz, project team) structural; Marvin Waxman Consulting Engineers, Wyncote, PA, mechanical; Irving Schwartz Associates, Jenkintown, PA, electrical; John A. Van Deusen & Associates, Livingston, NJ, elevator; Jules Fisher & Paul Marantz, New York, lighting; Thomas Goonan Associates, Springfield, VA, fire protection; Chapman & Ducibella, Wilton, CT, security; Ostergaard Associates, West Orange, NJ, acoustical; Arena & Co., Wallingford, PA, construction costs; R.M. Shoemaker Co., West Conshohocken, PA, construction manager.*
Costs: *$16.5 million.*
Photos: *Matt Wargo, except as noted.*

plate slab and column system is now in place, but Furness's roof truss remains, and the copper and glass roof is once again close to its original appearance. Throughout the rest of the library, Venturi, Scott Brown & Associates' presence is barely discernible: They found one of the original library tables and used it as model for new reading tables. Marianna Thomas worked from photographs to recreate some of the leaded glass windows that line the reading room, and she drew sketches for reinforced gypsum/fiberglass plaques – lightweight substitutes for terra cotta that could be attached without disturbing the load-bearing walls.

The light fixtures are derived from gas lights installed shortly after the Library was built. While gas illumination was common in 1891, Furness hoped to dispense with it in the library because the gas's sulphurous fumes were harmful to paper. According to David Marohn, associate in charge at Venturi, Scott Brown, the problem of daylighting helps explain the generous height and glazing of the reading room: It is a vast light well for a multifunctional building. The structure housed the University Library, archeological collection, and a lecture hall for public events, later Kahn's architecture studio.

Today the Furness Building is a mixed-use center for Penn's architecture students, and an exceptional lesson in the manipulation of space and light. On the rare afternoons when the Library is closed and the lights turned off, the setting sun models the terra cotta surfaces and the room's tactile qualities come to the fore. The sensuous surfaces – with spiky crockets, striated plates, and foliate string courses – seem to be animated by a botanical soul. **Philip Arcidi** ■

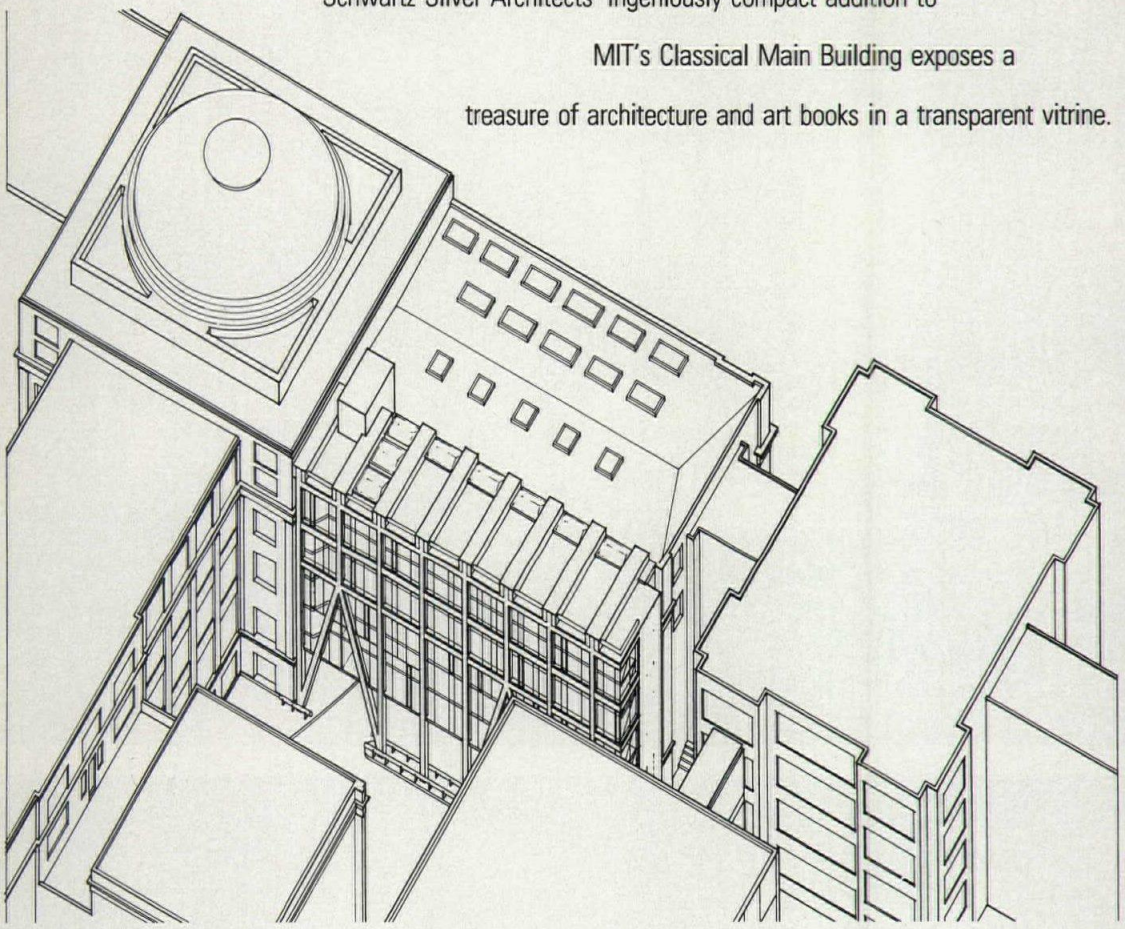
12

While the green copper cornices of the bookstack wing are original, the balance of the glass and lead-coated copper roof is new (10). Inside, the original trusses remain (11), but flat plate concrete floors have replaced Furness's steel and glass bookstacks (some of which were installed behind the circulation desk in the reading room). The vast stair hall (12), once an exhibit area for the University Museum, leads to the studio Louis Kahn preferred to the Modern facilities next door. This fourth floor room (13) was originally the University's public lecture hall, set above the rotunda reading room (14). Like the adjoining main reading room, it has been an instant success with Penn's students.

13, 14

Book Cage

Schwartz Silver Architects' ingeniously compact addition to MIT's Classical Main Building exposes a treasure of architecture and art books in a transparent vitrine.



AXONOMETRIC

1

On many American campuses, architects have been learning to insert buildings where there is just no space. But the recent extension to the old Rotch Library at MIT is nonetheless an extreme example: Fitted into a 30-foot-wide space above a truck turnaround, this building faced such constraints that half-inch dimensions were critical.

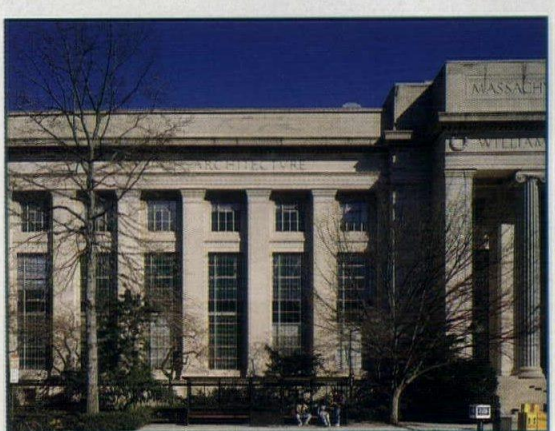
Although MIT is a dense urban campus, sheer availability of land was not the issue; a number of other, more ample sites for this library were considered. The obvious difficulties of this site were outweighed by its advantages: adjacency to the architecture and planning school, which it serves primarily, high accessibility from the entire institute – for students taking art-oriented electives – and continued occupancy of the space the architecture library moved into over 50 years ago.

Expanding the library at its present location was, however, a very tricky procedure. The only way to grow was to expand into an already small rectangle to the east, used at basement-level as a service court. A major limitation was the need to retain a truck turnaround drive – with a vertical clearance of 17 feet – through this courtyard.

To meet this challenge, Schwartz Silver Architects came up with a scheme that fitted six floors of stacks above the turnaround space, within the same vertical dimension as the four-story wing it was attached to. (MIT would not permit greater height to avoid competition on the skyline with the low dome that marks the main entrance to the whole institution.) Since the standardized bays of the MIT main buildings, which housed the original library, would not carry the load of continuous book stacks, it was logical to use the entire addition for stacks, with minimal floor-to-floor heights, and to remodel the original space for reading rooms and administration.

The library continues to occupy the second floor of the old building – the only level at which the floors of the old and new coincide – plus a portion of the floor below. To make the drastically altered outlooks from the other floors acceptable, the architects allowed a five-foot-wide skylighted slot between the old walls and the new floor slabs and made the addition a glass cage. The notion of transparent library stacks, the architects admit, defies conventional logic, but today's glazing materials can sharply reduce heat gain and virtually

(continued on page 94)



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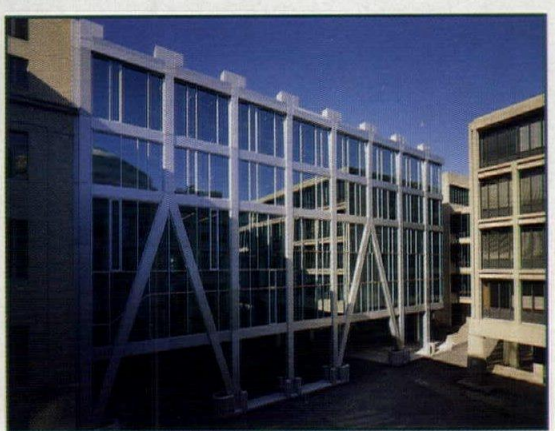
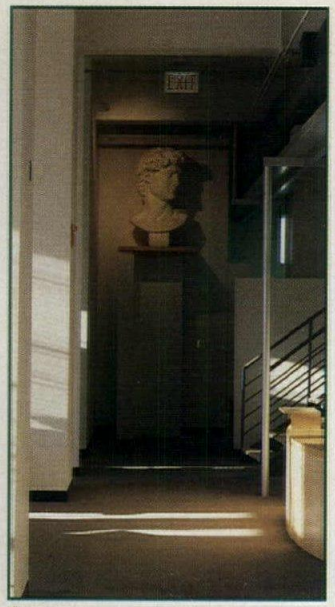


3

The geometry of the library's glass cage extension (1,3) follows the levels of adjoining buildings, while the six floors of stacks displayed within follow their own closer floor-to-floor spacing, made possible by suspending them from roof girders. To accommodate a preexisting truck turnaround, the supporting columns part at two points, forming angular portals. The library's entry/reading room/ administrative areas occupy a remodeled portion of Welles Bosworth's original building (2).



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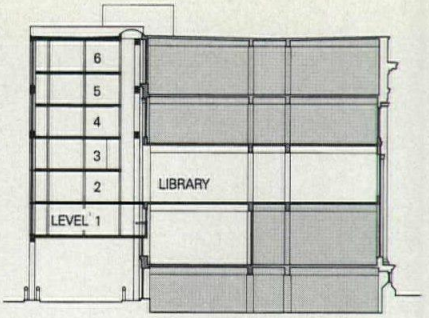
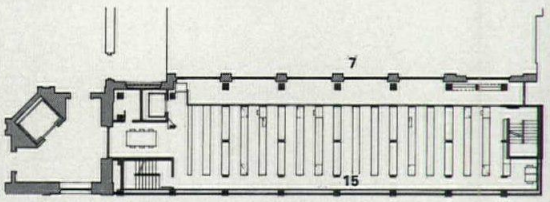
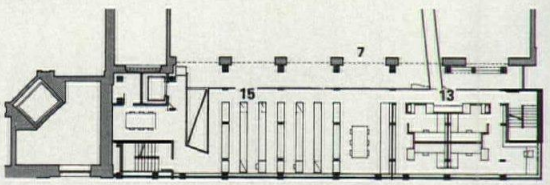


SECTION AA

40'/12m

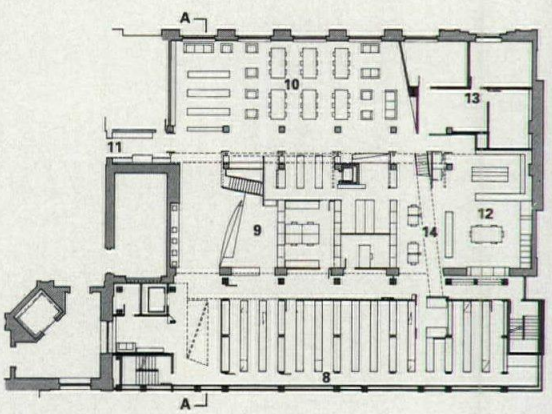


FOURTH, FIFTH SIXTH FLOOR PLANS

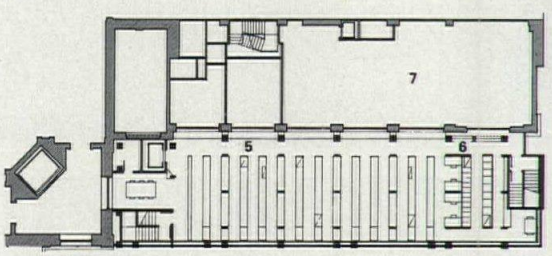


THIRD FLOOR PLAN

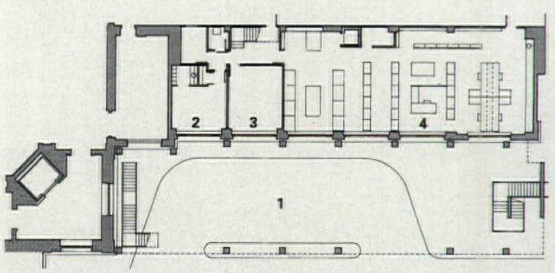
1 TRUCK TURNAROUND
2 STAFF
3 CONFERENCE
4 WORK AREA
5 PERIODICALS
6 MICROFICHE
7 OPEN TO BELOW
8 LIMITED ACCESS STACKS
9 CIRCULATION DESK
10 READING
11 ENTRANCE
12 URBAN DOCUMENTS
13 OFFICES
14 BRIDGE
15 OPEN STACKS



SECOND FLOOR PLAN



FIRST FLOOR PLAN

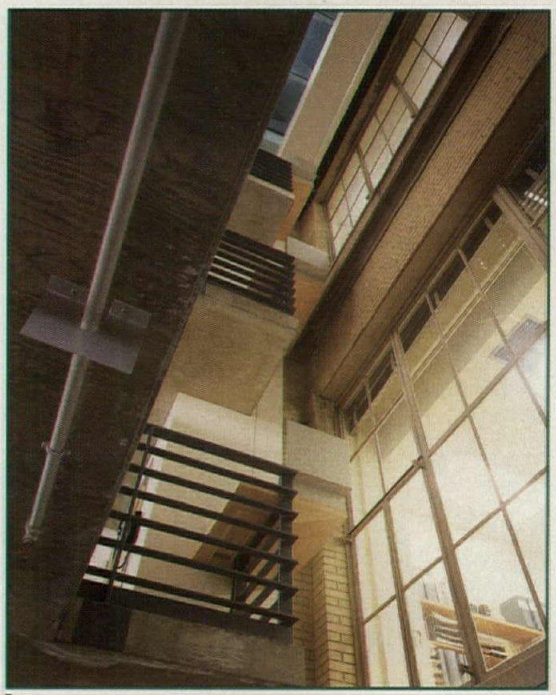


GROUND FLOOR PLAN

N

40'/12m

The section (top of page) most clearly indicates the complex relationship of the new stacks to space the library has long filled in a wing of MIT's main building. The library's original second-floor entry still offers an axial view of the plaster head of Michelangelo's David (4; see also Furthermore, April P/A, p. 150). The 5-foot-wide, 60-foot-high skylighted slot between the old wing and the new stacks (8) reveals the two completely separate structural systems; this gap and the transparency of the stacks compensate for the exterior views once enjoyed from other floors of the old wing (6). Small balconies overlooking the slot (5), near the elevator at each floor, accommodate electronic catalogues. New reading rooms (7) have been housed in the old wing, with its high ceilings and limited capacity to support stacks.



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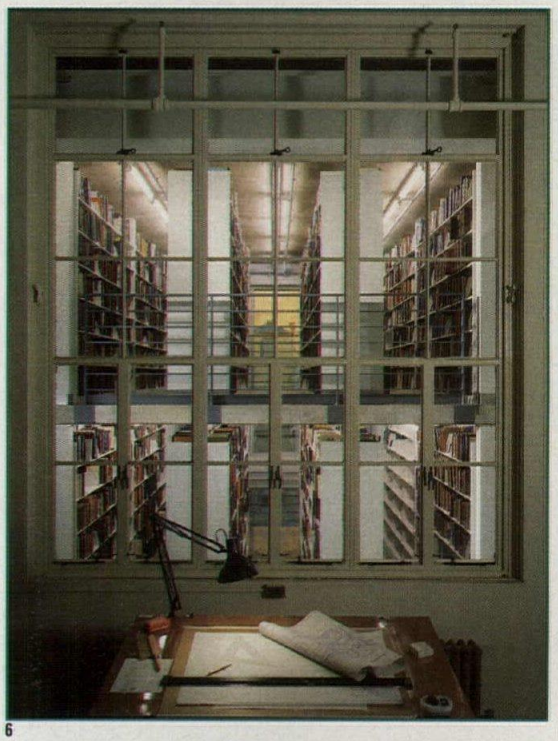

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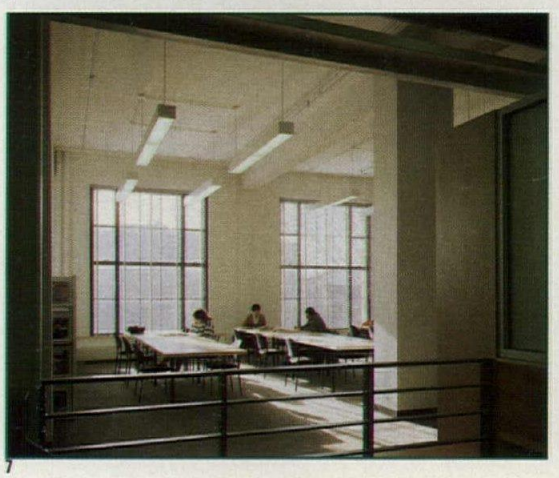
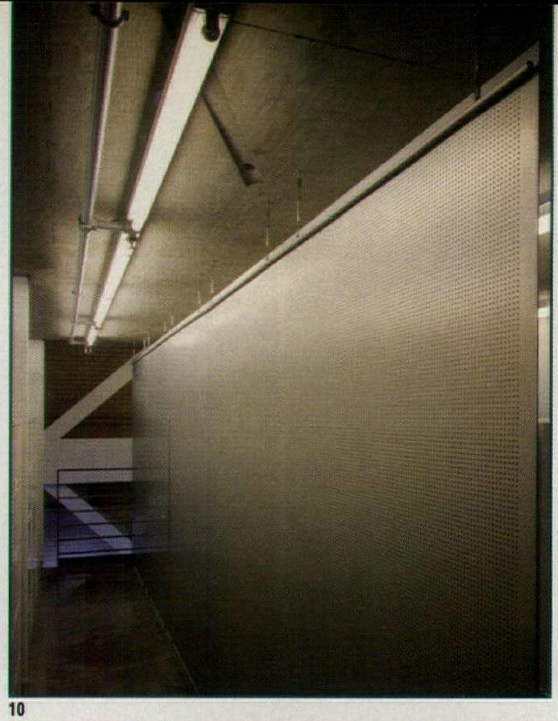


7

8

9



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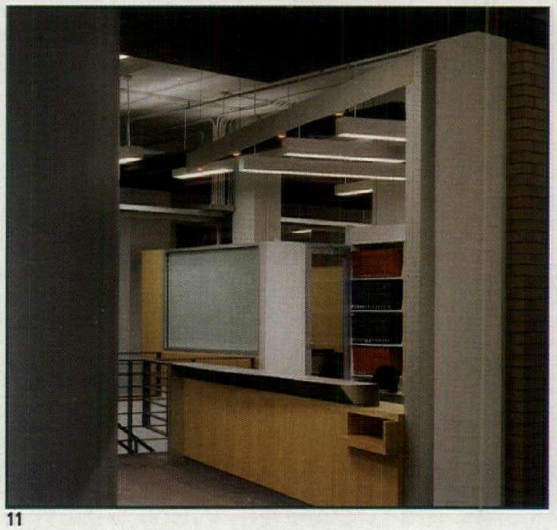

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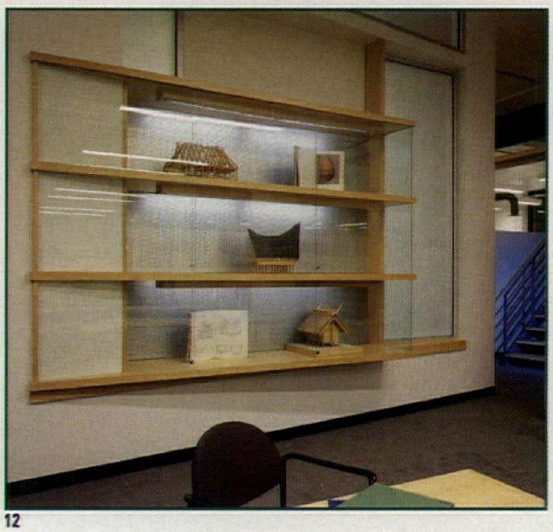


12

At certain points where the grids of the old and new structures do not dictate geometry, the architects have introduced angled elements, such as the stair/bridge (9) that leads from the second (entry) floor of the library to some within-stacks offices. The main desk (11) angles to face those entering the library. A display case (12) on the angled wall at the end of the reading room is reoriented to the underlying grid. In the two-story well at the second-floor entry to the stacks (13) an angular bracing beam is played off against the railing of an angular bridge. Throughout the stack structure, exposed concrete floor slabs (10) display the traces of slots in the plywood forms required to fit them around the web of temporary diagonal bracing. (p. 97).

(continued from page 90)

eliminate ultra-violet rays (see Selected Detail, p. 97). "Now," they observe, "the collection, rather than the reading room, becomes the star of the show."

To fit the six levels of stacks in within the vertical dimension available, the architects established an 8′-8½″ floor-to-floor height; a 7″ slab left 8′-1½″ clear on each floor for 8′-0″ stacks. To eliminate the depth of structural beams at each floor, the entire structure is suspended from massive girders (paired 36″ members) at the roof. One-inch steel plate tension members carry the floors with minimum obstruction of floor space. (With fireproofing and gypsum board, they yield 6-inch-thick verticals that are integrated into the stack layouts.) To allow the required clearance for the truck turnaround, the architects developed triangulated portals where the outer columns carry suspended loads to the ground.

The structural framing of the addition follows the bay spacing of the original buildings, with horizontal bracing at their floor levels, rather than those of the stacks. The resulting syncopation of levels is a dominant theme of the addition, apparent from both inside and outside. In the spacing of vertical mullions, the architects have expressed the alternating two-foot, three-foot modules of the stacks and their aisles – but they have left out module dividers in a seemingly random pattern to keep the wall from being too dense and repetitive.

Wherever the rigor of the design did not rule absolutely, the architects have made a point of inserting intuitive – subtly playful – elements. In addition to the irregularities of the mullion patterns, they have also used occasional angular elements in the gridded field. These typically have a functional basis: The main desk inflects toward the entrance; an office partition deflects to capture a window; a stair acknowledges a circulation route. To architect Robert Silver, the angles enrich the grid, much as Broadway enhances the plan of Manhattan.

In the area of materials and color, the partners passed up the potential of applied color in favor of "natural" finishes on maple, aluminum, steel, and concrete, with black for synthetics such as plastic laminate. For students in an architecture school, they felt, building materials should display their true colors. **John Morris Dixon** ■

Project: *Addition and renovation of the MIT Library of Architecture, Planning, and Art, Cambridge, Massachusetts.*

Architects: *Schwartz Silver Architects, Boston (Warren R. Schwartz, Robert H. Silver, Ann Pitt, Laura Briggs, Randolph Meiklejohn, Tim Downing, Chris Downey, Elise Gispan, Nancy Hackett).*

Client: *Massachusetts Institute of Technology.*

Site: *30' x 100' sliver adjacent to existing wing (1 1/2 floors of which housed library, remodeled as part of this project); ground level had to be reserved for existing truck turnaround, with 17' clearance.*

Program: *full-service branch of MIT library, with its own work and administrative spaces; 9,200 sq ft renovated, 17,500 sq ft added; total: 26,700 sq ft.*

Structure: *pile foundations, steel frame, concrete floor and roof slabs, all independent of existing wing.*

Major materials: *aluminum and glass curtain wall; heat-mirror glass; 1/8" aluminum insulated panels (see Building Materials, p.187.)*

Mechanical system: *air conditioning for entire library, using chilled water and hot water from central MIT system; vertical 4-pipe units in addition, local 4-pipe units in renovated area – consoles at perimeter, ceiling-hung outlets for interior; special rare book zone with special humidity controls.*

Consultants: *Simpson Gumpertz & Heger, structural; R. G. Vanderweil Engineers, mechanical.*

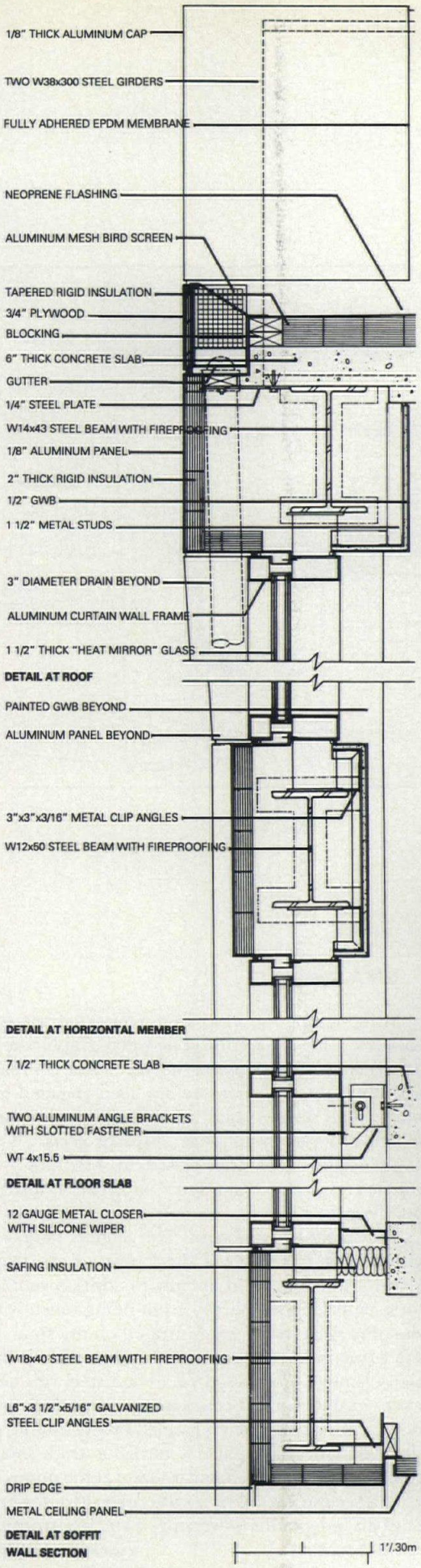
General contractor: *George B.H. Macomber.*

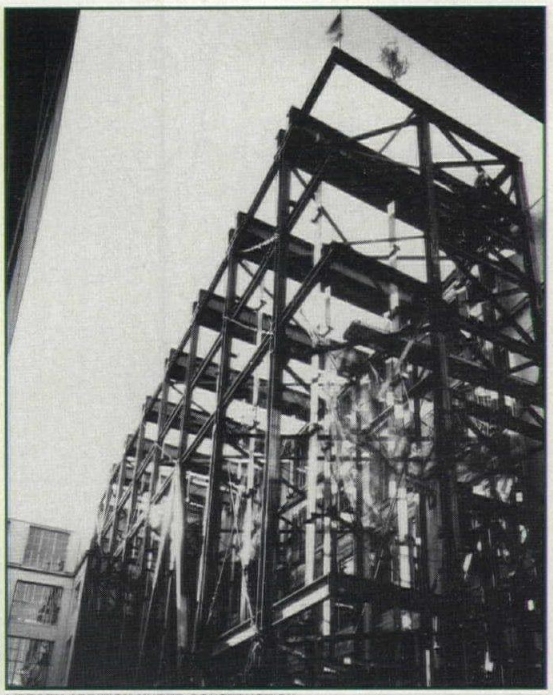
Costs: *$5.8 million, including furnishings.*

Photography: *Chuck Choi, except as noted.*

Selected Detail

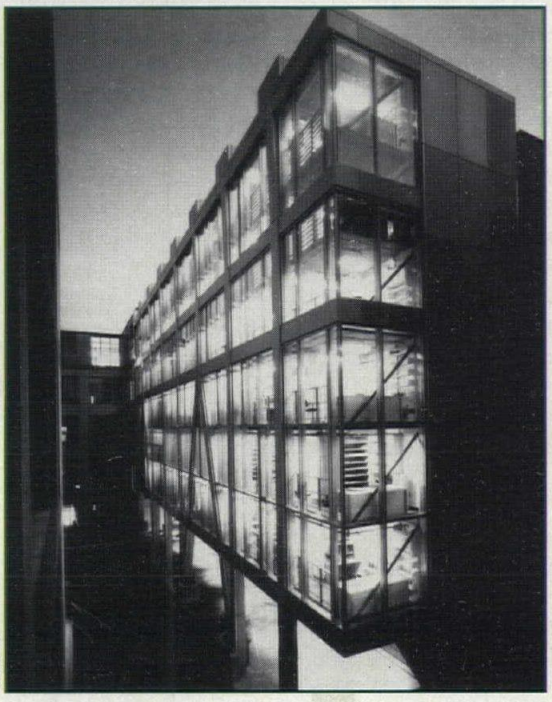
Wall Section
MIT Library of Architecture, Planning and Art
Cambridge, Massachusetts





Curt Berner

LIBRARY ADDITION UNDER CONSTRUCTION



Chuck Choi

LIBRARY ADDITION COMPLETE

The shimmering vitrine of the MIT Library addition depends on a very straightforward curtain wall of clear anodized aluminum and high-performance glass. Horizontal members are primarily for bracing, since floor slabs are suspended from paired 36-inch girders.

At the roof line, the gutter is placed outboard of the girders and the upper column enclosure is canted out, giving a slight projection to the top tier of the wall and generating deeper shadows.

Where floor slabs approach the curtain wall, wind bracing is introduced, with vertical play to allow for extension of the floor suspension system under loading. A metal closure makes the rare books area, which has special humidity controls, subtly readable in elevation.

The glass that made this transparent cage concept feasible for library stacks is "Heat Mirror 55," a product developed in the mid-1970s at MIT and produced commercially under royalty agreements. The 1½-inch-thick sandwiches of glass and plastic block most of the ultraviolet radiation.

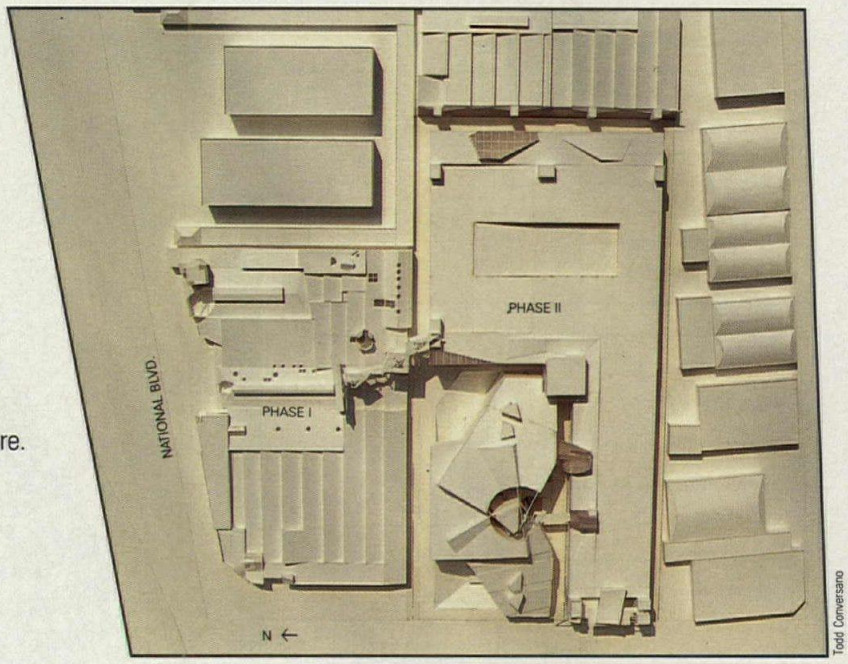
During construction, extensive cable bracing had to be introduced to brace the 70-foot-high columns before stack floors were poured. The 135 points where cables passed through slabs are marked by visible patches in the concrete (photo 10). ■

Rites of Passage

Two projects, part of an on-going opus

by Eric Owen Moss, Architect,

embody polar aspects of an analogical architecture.



Todd Conversano

The work executed so far by Eric Moss on the 60,000-sq-ft grouping of warehouses at 8522 National Boulevard is only part of what promises to become a significant project on an urban scale. The next phase of development, shown in the model above, comprises 300,000 sq ft and entails the demolition of existing warehouses on the site to make way for a mixed-use complex including theaters, restaurants, retail, office space, and parking garages. Beyond that, a 2000-foot-long air rights development, laid along derelict Pacific Railroad tracks that arc around the warehouse district, is being contemplated by the Community Redevelopment Agency, Culver City, and Frederick Smith, Moss's client for the first adaptive use phase.

Eric Moss has arrived at a world view from which there is no turning back. Unlike his peers who are content to mouth (and build) platitudes about the dislocation of our times, Moss operates from the conviction that human understanding has always been limited – our body of knowledge no more than a patchwork of rationales slapped like poultices over gaping realities. "We always think we know everything. It always changes," he says. "Everyone tries to put up constructions, roadmaps. In the end it's all bigger than you are, bigger than Darwin, than Marx, than Toynbee." This realization cannot be reversed, and it informs the fundamental aspiration of the architect: to create buildings that "confound your experience of buildings. . . confound your understanding of understanding."

Such a broad premise transcends specifics of program and site. Yet anyone familiar with Moss's work will recognize its heady influence, expressed – and experienced – through time-honored architectural devices. At its finest, his manipulation of space, light, materials, scale, and structure results in profoundly enigmatic places whose qualities are as gripping as they are elusive.

S.M.A Studio

In designing the offices for Scott Mednick Associates, a firm specializing in video graphics and advertising, Moss revisited the warehouse complex at 8522 National, where he has been engaged for more than three years in various owner- and tenant-generated adaptive use projects. The 16,000-square-foot area leased by Mednick was cobbled together from four different industrial buildings.

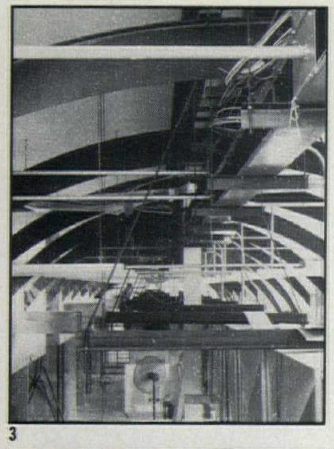
Moss's most prominent intervention here – a great spine that extends the length of the main space – was conceived initially to address ventilation requirements. Barred from doing much with the office plan, Moss concentrated on the spine as the primary organizing object and dominant design element. Composed of arched steel ribs and exposed ductwork, it connects two important vertical elements: At one end a metal stair, leading to the roof and a loft gallery, incorporates a small, triangular exercise room at its base; at the opposite end, a second stair rises to the "executive tower," once an independent two-story structure fronting the street.

(continued on page 102)

1

2

In the initial phase of the work on the warehouse complex, Moss defined an L-shaped internal street punctuated by three "events": an elliptical entry rotunda, an enlarged space at the elbow of the path, and an oval meeting room at its end (see plan, p. 104). Tenant spaces are set off from the public circulation by overlapping storefront systems (2), consisting of a 2x4 frame drywall skin with rectangular openings; another 2x6 stud frame plane cut with arches, and a layer of plate glass sealing the arcade. The new central spine structure within the Mednick studio "corrects" the original misalignment of the existing centerposts (1). On either side, low-partition open-plan areas are interspersed with semi-enclosed spaces and private offices. The spine's steel ribs pierce the drywall enclosures in certain places; elsewhere, the tapered beams are cut and fixed to the wall.



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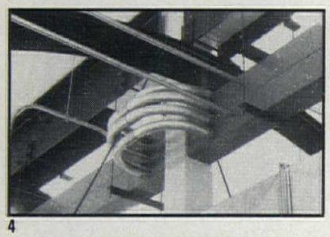

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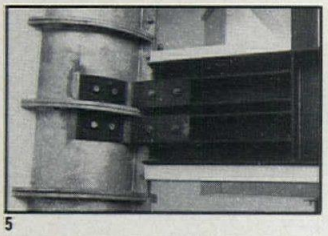

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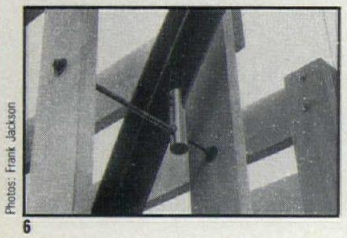
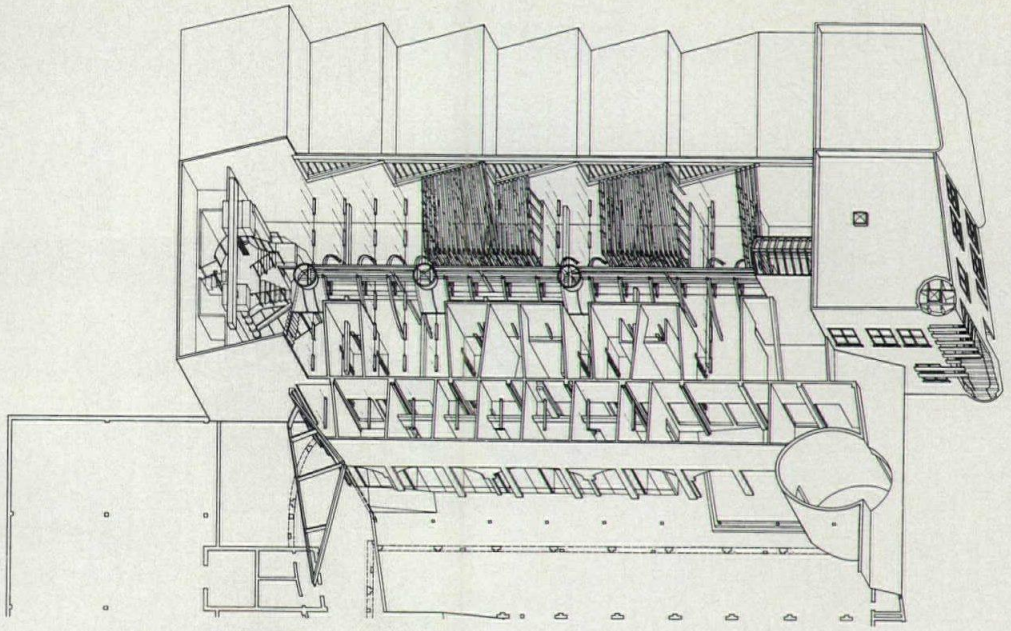


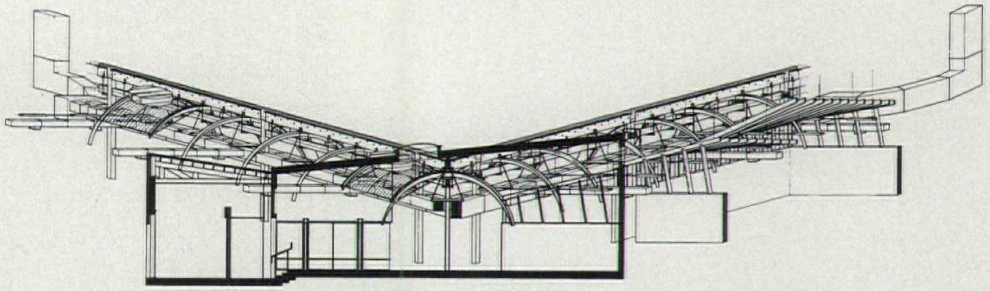
6

Photos: Frank Jackson

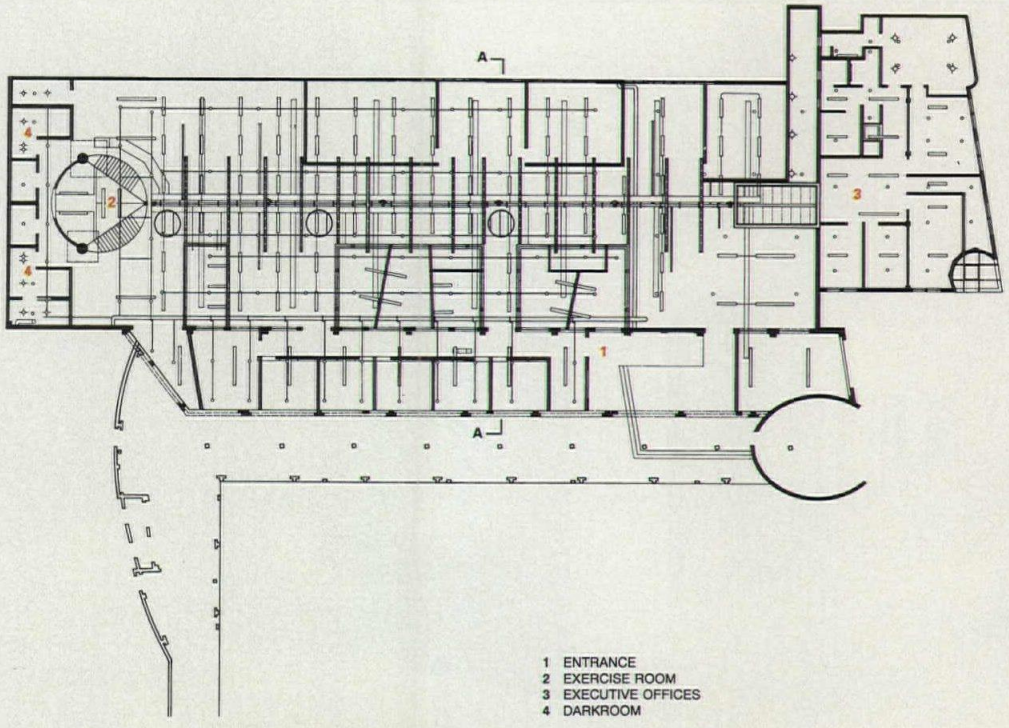
In his search for "alternative" techniques of building, Moss contrived a series of details no less considered than the elaborate masonry of a medieval abbey. The spine under construction (3) reveals an intricate and hierarchical support system for ribs, ducts, and wooden box conduits. Wherever the boxed channels containing power and data cables collide with an existing column, the wires are conducted around the obstacle in arched metal casings (4). The galvanized steel Deslauriers columns that flank the exercise room are engaged by the gym walls (5). The steel beam bisecting the glazed partition is attached to the column with metal angles. Each of the spine's tapered steel ribs is fixed at one of its ends and is usually free at the other. Where a rib invades a wood frame structure, the beam is held between the fir members by a slotted steel rod (6).



AXONOMETRIC



SPLAYED PERSPECTIVAL SECTION AA 20'/6m



1 ENTRANCE
2 EXERCISE ROOM
3 EXECUTIVE OFFICES
4 DARKROOM

GROUND FLOOR PLAN INCLUDING CEILING PLAN N → 20'/6m

7

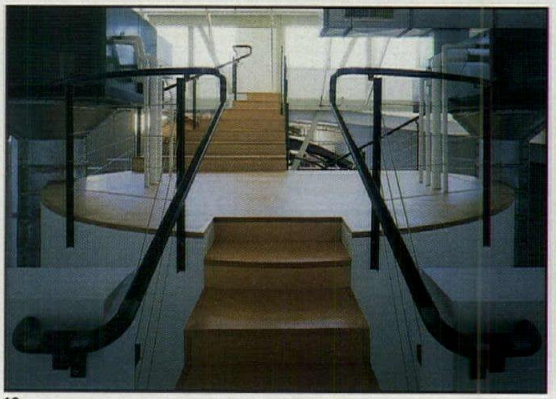
8

At both ends of the long space, Moss affords raised vantage points from which the profusion of structure filling the upper third of the studio can be seen and assimilated. A loft gallery at the south end provides a long view of the spine (7). At the north end, the architect cut a second-story window (8) in a wall screening the executive offices. Seen in its entirety, the procession of arched steel ribs suggests the contours of a barrel vault; exposed ducts and box conduits are supported at intervals by chain-hung crossbars, which are suspended, like the ribs, from the metal-clad center beam. Fluorescent tubes are similarly hung; the dispersion of the fixtures follows the grid of original roof joists. Hyperbolic shed frames of vertical grain Douglas fir define semi-enclosed offices within the main space, their configuration echoing the line of existing sawtooth lights.

Project: *S.M.A. Studio, Culver City, California.*
Architects: *Eric Owen Moss, Architect, Culver City, (Eric Moss, principal; Greg Baker, Dana Swinsky Cantelmo, Todd Conversano, Lucas Rios, Jenifer Rakow, Scott Nakao, Sumathi Ponnambalam, Jose Pimental, Elissa F. Scrafano, project team).*
Client: *Frederick Norton Smith, owner; Scott Mednick, tenant.*
Site: *grouping of existing warehouses dating from the 1920s, 1930s, and 1940s, comprising 60,000 sq ft.*
Program: *studio and offices for a design/advertising firm specializing in video graphics, including large open office for drafting, executive offices, 3 conference rooms, 2 reception areas, private offices, kitchen, exercise room. Total: 16,000 sq ft.*
Structural system: *existing wood truss sawtooth warehouses and two-story wood post-and-beam structure. New steel angles bolted to each side of the existing center wood beam.*
Major materials: *drywall partitions, vertical grain Douglas fir, hot rolled steel, cedar strandboard, galvanized steel. (See Building Materials, p. 187.)*
Mechanical system: *exposed 7- and 10-ton air handling and ductwork.*
Consultants: *Kurily, Szymanski & Tcherkow (Joe Kurily), structural; AEC Systems (Greg Tchamitchian), mechanical; Silver, Roth & Associates, Inc. (John Silver), electrical; Teters Construction (Mike Teters), steel fabricator; Saul Goldin, lighting.*
General Contractor: *A.J. Contracting of California, Inc.*
Costs: *not available.*
Photos: *Grant Mudford, except as noted.*

The metal utility stair provides access to the roof (10). Its landing serves two exposed HVAC units perched, like anachronistic machine-age capitals, on top of massive steel columns that flank the exercise room at ground level (9, 12). The gym ceiling is pierced to allow piping through to the units (11). A tapered T-beam, identical to the ribs of the spine, is inclined to follow the slope of the stair. "Transepts," connected to the public hall, cross the long studio space at three points. To mark their position, Moss cut above each a circular skylight; a ribbed acrylic canopy beneath it refracts the light.

9



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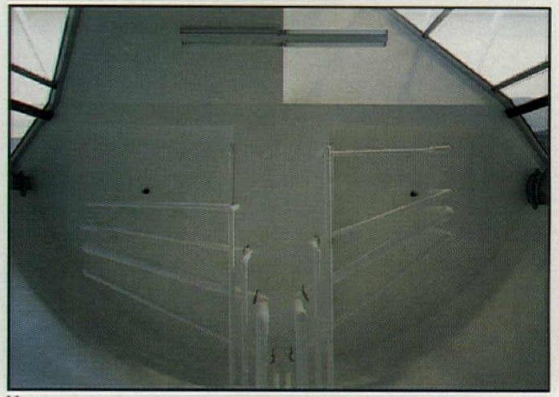


11

S.M.A Studio *(continued from page 98)*

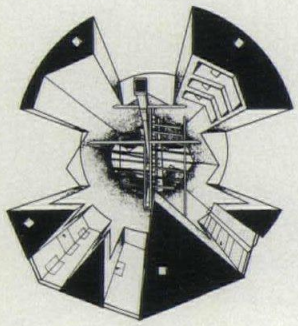
The profusion, and in some instances the sheer superfluousness, of the spine structure would suggest that Moss is preoccupied at least to a degree with technology. But his attitude to this, too, is colored by his overweening recognition of "the limits of what's rational, analytical, intellectual." Science, it would seem, is always scrambling to catch up with the evidence. And technology, its handmaiden, is fallible. Thus Moss's construction, while drawing almost exclusively on a trove of industrial components, resists solutions that reek of "idolatry."

The technological aspects of the building are "in opposition to the assembly line machine, Prouvé, [his collaborator Marcel] Lods, the whole lineage ending in Lloyds Bank," he asserts, "the antithesis of the off-the-shelf ideology." Instead, a certain ad hoc quality is introduced through details that range from the crude (holes punched through drywall) to the prosaic (hardware store hangers) to the lyrical (undulating, flawless wood frames). "Every piece suggests a body of technical knowledge," the architect says, "a different strategy of making things."

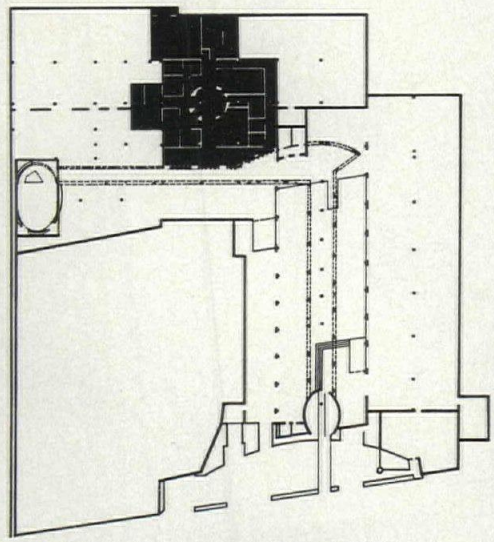
The dichotomy between the rational ("Apollonian") and the unfathomable ("Dionysian") aspects in the architect's work extends also to the "ordering," and "exegetical" drawings he produces first to direct, and later to examine, the design. The plan, a roadmap of grids and governing lines, often constitutes the tool of reason. The section gives rise to the poetic.

As a whole the Mednick studio can be seen as a departure from much of Moss's earlier work: It is an object that seems to displace, rather than form, space. And while the armature of the spine is engrossing as an assemblage, the interior is somewhat stifled by it – and weakened as a spatial experience. But Moss is not content to build what he has already accomplished so admirably before; instead, the architect continues to take risks that pay off more often than not.

12



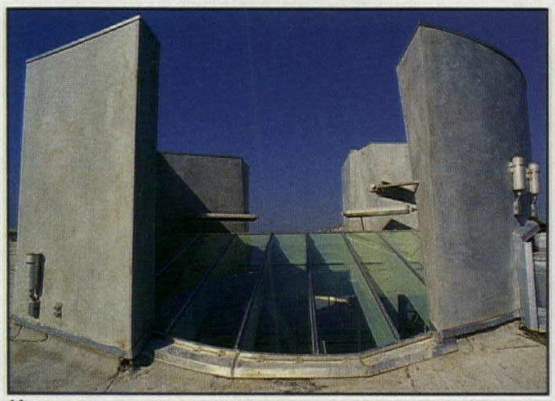
WORM'S EYE PERSPECTIVE OF DRUM



PLAN OF PHASE 1 (GOALEN OFFICE IN TINTED PORTION)

N 100'/30m

13



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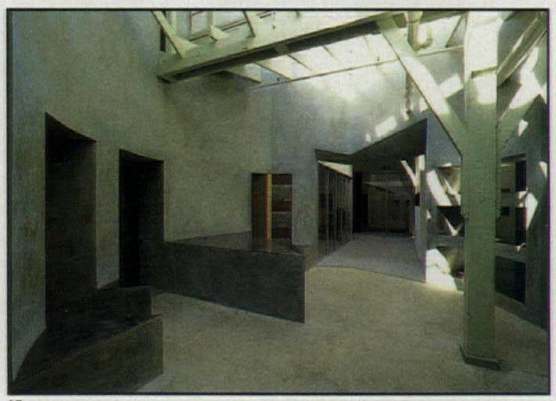


15

The drum, built at the crossroads of the office, is bisected by the existing warehouse clerestory and wood post-and-beam structure painted pale green (16). The drum's massive, irregularly formed walls are constructed on a stud frame surrounding four steel columns, of which only one is visible. The "street corner" is furnished only with projecting steel-covered counters at varying heights (15). The walls are finished with two layers of steel-troweled cement plaster, the first brown coat partially covered by a second, gray coat. The structure of the drum pierces the roof (14), and two moderately inclined new skylights surround the original clerestory. Because of its shifted geometries, there are points where the thickness of the drum wall approaches zero. Steel ties were used in the door lintels to strengthen the plaster at the thinnest points (13).

Goalen Group Office

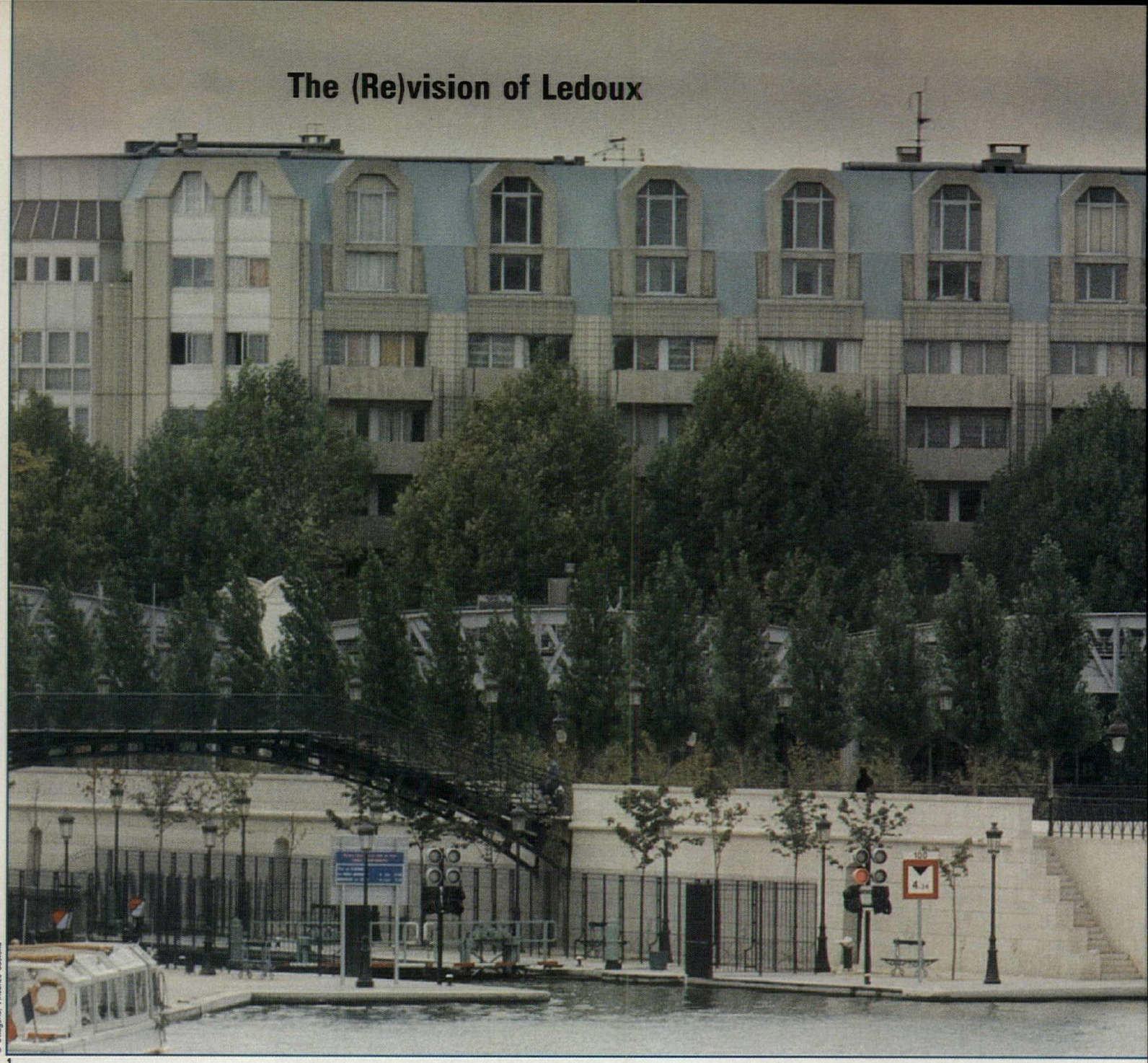
The office for this film production company, completed some months before the neighboring Mednick studio, reflects a more familiar aspect of Eric Moss's work – particularly the central drum around which the adjoining office functions are arrayed. It is an "event," a non-utilitarian volume with an astonishing presence that evokes other such forceful spaces, notably the entry rotunda and elliptical conference room that were among Moss's first contributions to this building.

The "street corner," as Moss calls it, is familiar also as a broader design strategy. The acute, sculptural forms of the drum (generated by the overlaying and shifting of a circle and an octagon) are surrounded by restrained, almost tame architecture. The juxtaposition of the safe and the unpredictable yields the quality of building that so interests Moss. To confound expectations it is necessary to have a firm grip on what those expectations are so that the confounding element can kick off from the norm; history attains a paradoxical importance. This pattern can be discerned in early works such as the Petal House (P/A, June 1984, p. 100), whose unfolding roof caps the consciously mundane massing and visage of a suburban shingle house; similarly, the bent clay pipe column that "buckles" at the end of the Lindblade Tower arcade (P/A, Nov. 1989, p. 74) is the more startling for Moss having established the sidewalk arcade to begin with.

In the end, an architect examining Moss's work must recognize architecture that does not pretend to point the way. If anything, its ineffable qualities, however immediate to experience and easy to praise, are impossible to subject to a categorical imperative. Shorn of the world view and vision that drive it, this kind of architecture is meaningless. **Ziva Freiman** ■

Project: *Goalen Group office, Culver City, California.*
Architects: *Eric Owen Moss, Architect, Culver City (Eric Moss, principal; Greg Baker, Todd Conversano, Amanda Hyde, Sumathi Ponnambalam, project team).*
Client: *Frederick Norton Smith, owner; Goalen Group, tenant.*
Site: *group of existing warehouses dating from the 1920s, 1930s, and 1940s, comprising 60,000 sq ft.*
Program: *4500 sq ft for a film design and production company, including central drum, conference room, offices, projection room, screening room, kitchen, reception.*
Structural system: *existing, 8x8 wood columns, trusses, posts; sawtooth roof with plaster walls. New, structurally independent moment frame: four 8x8x1/2" steel tubes on concrete footings; drum, 16-gauge steel studs; all other, 25-gauge steel studs.*
Major materials: *two-colored cement plaster in drum; laminated clear glass skylight, hot rolled steel doors and counter tops; birch plywood cabinetry in kitchen (see Building Materials, p. 187).*
Mechanical system: *2, 5-ton HVAC units on roof; radiused 18"x18" exposed galvanized sheet metal duct.*
Consultants: *Kurily, Szymanski & Tcherkow (Joe Kurily), structural; Greg Tchamitchian, AEC Systems, mechanical; Silver, Roth & Associates, Inc. (John Silver), electrical; Saul Goldin, lighting.*
General Contractor: *Turner Smith Company (Turner Smith, Richard Fackrell, Gary Fackrell).*
Costs: *not available.*
Photos: *Frank Jackson.*

The (Re)vision of Ledoux



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1

Some of Ledoux's major buildings are now being restored.

The following pages feature the best of this work,

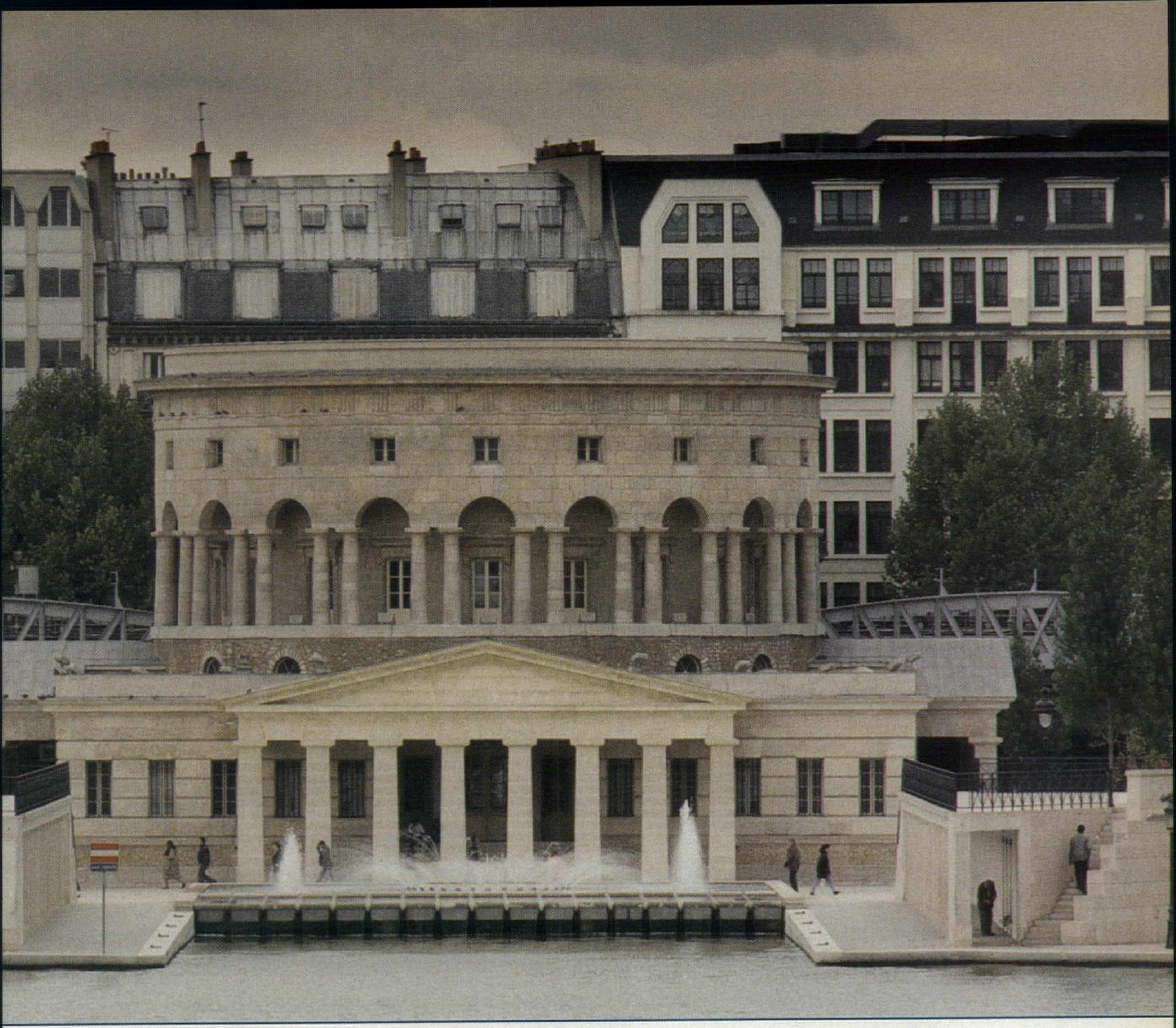
along with commentary by Anthony Vidler, the Princeton historian and critic whose

monumental book on Ledoux is reviewed in this issue.

Introduction

Few architects have been rediscovered as many times – for as many reasons – as the 18th-Century French architect, Claude-Nicolas Ledoux. Seen by some as a revolutionary and by others as a conservative – by some as a creator of abstract form and by others as a designer of figural buildings – Ledoux's various revivals say as much about his interpreters as they do about the man himself.

The material on the next 11 pages is no exception. Based on the research of Anthony Vidler, the Princeton historian and critic who has spent the last 25 years studying Ledoux, the following text records the preoccupations of our own time as it peels away the various interpretations and "misreadings" of the past. For example, Ross Miller's



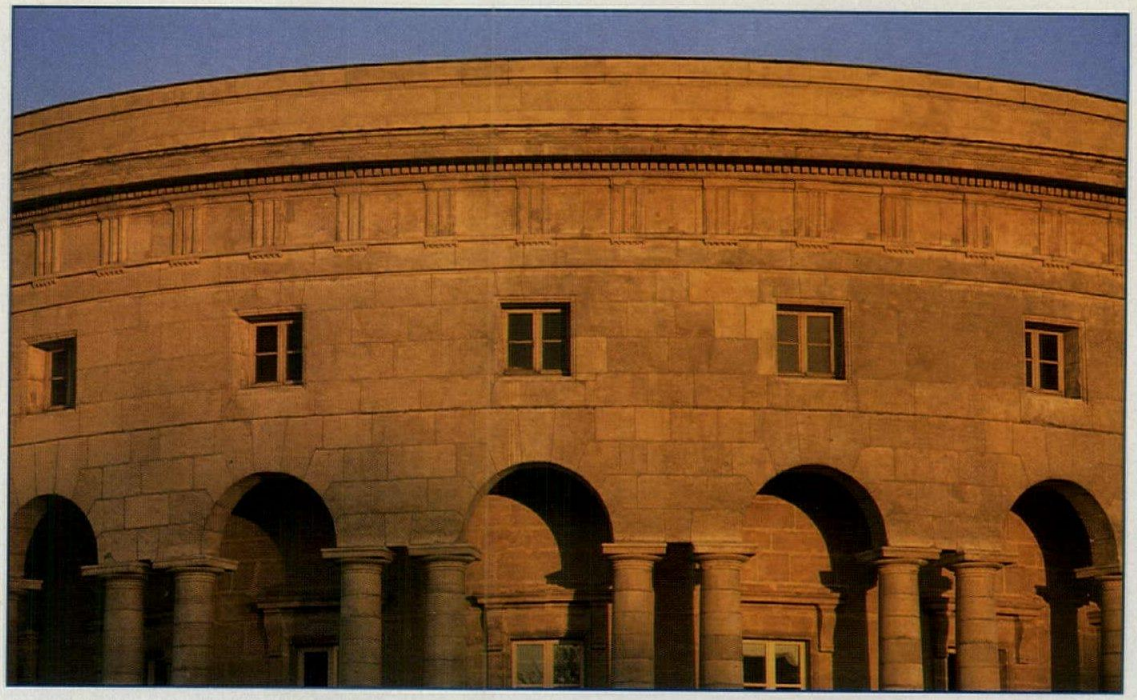
Ledoux was commissioned to design 65 tollgates or barrières *along Paris's wall, the most monumental of which stood at La Villette (1). After the wall was demolished in the 19th Century, the building was mistreated. To make way for a large warehouse built next to it in the mid-1800s, for example, the portico facing the canal was removed. Only now, as part of a major restructuring of the canal area under the direction of French architect, Bernard Huet, has the exterior of the building been restored, including the reconstruction of the missing pronaos.*

interview with Vidler (p. 115), in addressing the radical political implications of Ledoux's work often ignored by his formalist admirers, reveals the interest of historians such as Vidler in "destabilizing" our assumptions about the past. Likewise, Barry Bergdoll, in his review of Vidler's book on Ledoux (p. 114), brings out the revisionist aspects of the work, challenging, for instance, the romanticized image of the architect as a visionary who built little and suffered greatly. Finally, Vidler, in his own essay (p. 109), finds in the various aesthetic interpretations of Ledoux, "the struggle for the territory of the city."

The occasion of these essays is the opening, in May, of a new museum in France devoted to the work of Ledoux (p. 112). Also, several buildings by Ledoux, including his tollgate at La Villette in Paris (above), the Chateau de Benouville in Normandy (p. 111), and the coopers' workshop in the Saltworks at Arc-et-Senans (p. 112), have been recently cleaned or restored.

But those events are really an excuse for our showing work that we think deserves more attention than it has received in the U.S. architectural press. This stems not from an antiquarian interest on our part, but from a conviction that, in understanding Ledoux, standing as he did at the beginning of the Modern age, we can better understand ourselves at the end of that era. Ledoux accommodated the change from the *Ancien Régime* to post-revolutionary France by embracing the values of both in his work, creating an architecture at once representational and abstract, monumental and populist, traditional yet inventive. As we move into a post-modern, post-industrial period, we might well keep such a strategy in mind. **Thomas Fisher** ■

As Anthony Vidler describes in his book, Ledoux's tollgates took three forms: the temple, the rotunda, and the pavilion with a central drum. The building at La Villette is one of the largest of the centralized pavilion type (axonometric below). Unlike Palladio's Villa Rotonda, whose plan achieves a certain frontality with the major rooms entered off its north-south axis, Ledoux's tollgate is bilaterally symmetrical in plan, with a greater emphasis placed on the center through the intrusion of the drum into the corner spaces (plan below). His treatment of the building's Classical detail is severe. Although he uses the Doric order in a highly mannered way, inserting an arcaded wall, for example, between the paired columns and the entablature in the drum (2), Ledoux also emphasizes the order's primitive origins, with a minimum of detail in the wall and at openings (3). It is this combination of the primitive and the mannered that attracted later architects, such as Gunnar Asplund in his Stockholm City Library.



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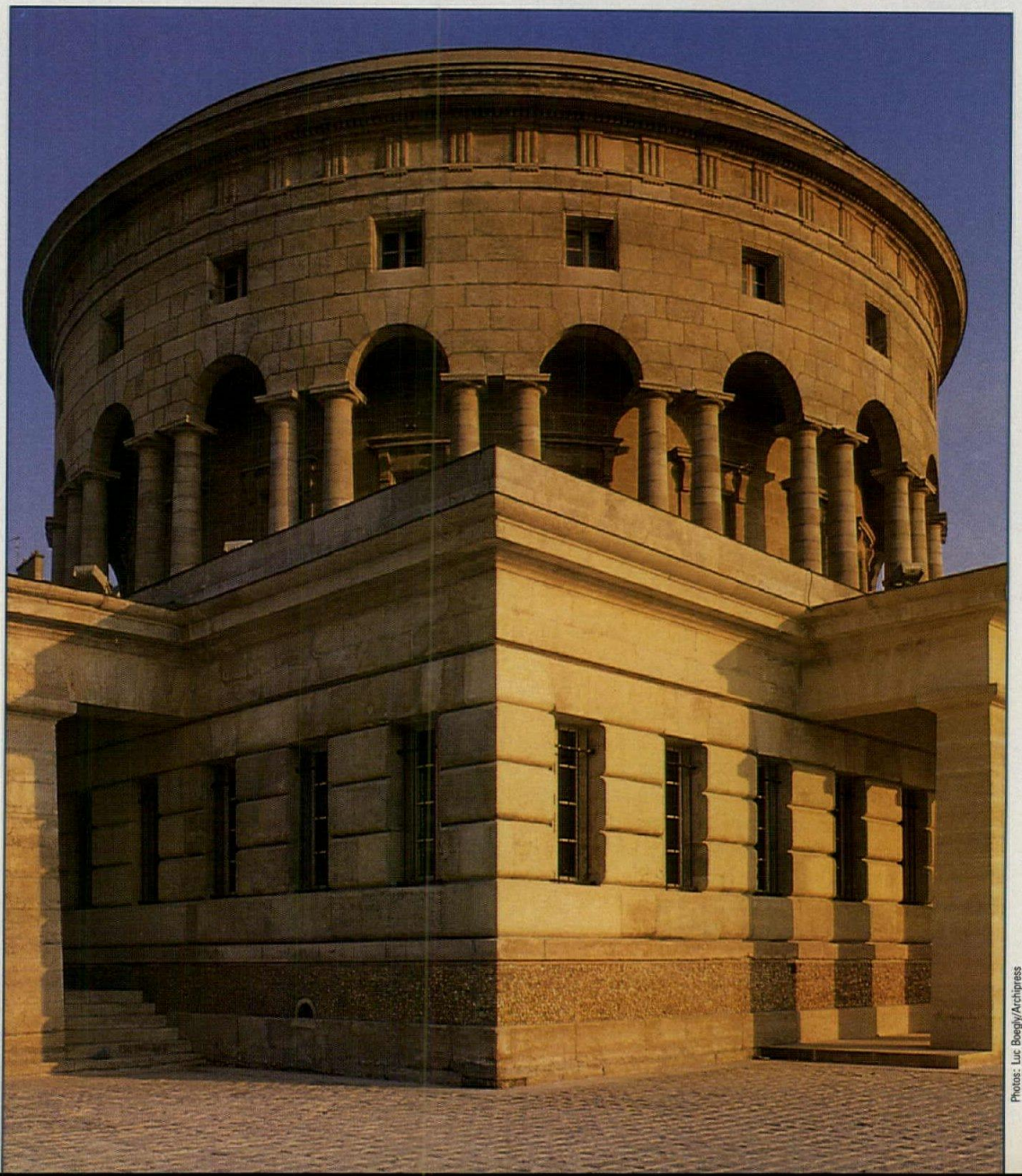
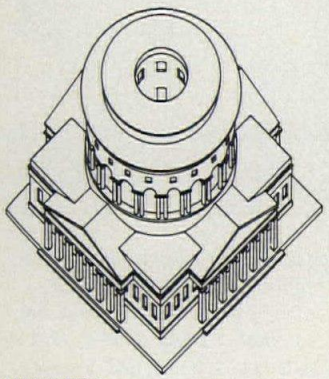
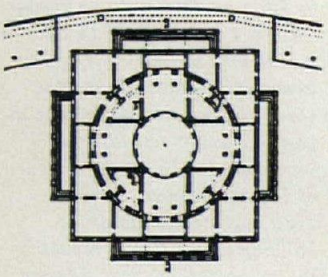




AXONOMETRIC



FIRST FLOOR PLAN

N 40'/12m

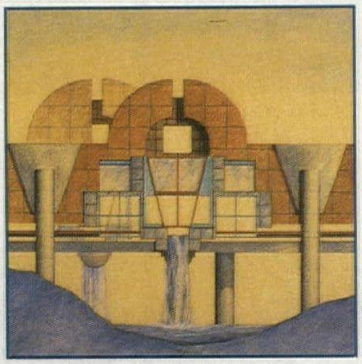
3

Photos: Luc Boegly/Archipress

From Ledoux to Le Corbusier, to Johnson, to...

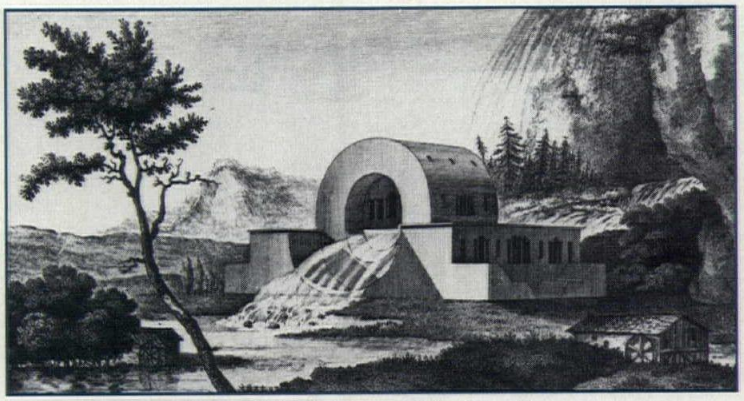
The architecture of Claude-Nicolas Ledoux, from well before the French Revolution until the present, has proved to be fertile ground for critical battles and mythical interpretations, even as it has stubbornly resisted historical exegesis. A history of attitudes towards Ledoux would, indeed, furnish a well-illustrated account of the most extreme political and aesthetic positions in architectural criticism, theory, and history over the last two centuries without, at the same time, revealing more than a caricature of his life and professional activity.

Indeed in the 30 years that I myself have been aware of his work – from the fall of 1959 when, as an entering student in Cambridge University School of Architecture, I was presented by Colin Rowe with the newly published *Architecture in the Age of Reason* by Emil Kaufmann, to the fall of 1989, when I completed the design of a Ledoux museum in Ledoux's own Saltworks of Chaux in France – my own attitudes towards Ledoux have undergone continuous development and change. And this not simply because I did more and more research (which is true), but also because I, like all scholars, was influenced by the way in which the study of cultural and social history changed over the years. I was especially influenced by the French *Annales* school of the 1920s and its contemporary followers on one hand, and on the other, by certain Post-Structuralist thinkers, notably Michel Foucault, whose works began to come out in the mid-1960s as I began my first serious research on late 18th-Century French architecture. As an architect and architectural critic, I also had to gauge the influence of Ledoux and Boullée in particular on contemporary design from the mid-1960s on. This influence emerged not only in the revival of utopian thought, associated with the political "communitarian" movements around 1968, where Ledoux, and, of course, Fourier became heroes of Haight-Ashbury; the influence also showed up in the serious architectural press.



Paschall/Taylor

Fargo Moorhead Cultural Center Bridge, Michael Graves, Architect



House of the Surveyors of the Loue River

Aldo Rossi, for example, in his articles in *Casabella* from the early 1960s and in his translation of Boullée's Essay on Architecture into Italian, self-consciously referred to Ledoux and Boullée when laying out a formal theory for the movement that became known as Neo-Rationalism. Rossi spoke of what he called the "difficult" abstraction involved in the geometries of Boullée and Ledoux, making a sharp distinction between their synthetic view of abstract form and the more simplistic reductivism common to many so-called Modernist projects of the 1960s. For Rossi, Ledoux was closer to Adolf Loos than to the followers of Mies van der Rohe. Post-Modern examples of Ledoux's influence include Michael Graves, whose Fargo Moorhead Cultural Center Bridge owed much to Ledoux's imagery; Philip Johnson, whose architectural school at the University of Houston closely ressembled Ledoux's own "House of Education"; and Robert Stern, whose Point West Place office building outside of Boston drew from Ledoux's design for the prisons of Aix-en-Provence.

If Ledoux has been the inspiration for the clearly different movements of Neo-Rationalism and Post-Modernism, he was, some 60 years ago at the outset of Philip Johnson's own career as architect and critic, seen as an equally powerful force in the support of Modernism. Emil Kaufmann's, Hans Sedlmayr's, and Sigfried Giedion's essays of the 1920s and early 1930s were clearly influential on Johnson and Henry-Russell Hitchcock as they developed their theory of Modernist form in *The International Style* of 1932; and in an interview in *The Architectural Review* just after the construction of his Glass House in 1949, Johnson cited the abstract geometries of Ledoux's ideal projects as a fundamental source.

How might we explain the apparently contradictory idea of a Ledoux adduced to justify high Modernism, Neo-Rationalism, and Post-Modernism, all in the space of some 60 years? Is it the calculated blindness of architects in search of justification in the past, simply taking from Ledoux whatever seems appropriate – the inevitable eclecticism of the modern period? Is it a result of analogous political and cultural conditions, repeated over time? Or is it more a set of contradictions embedded in Ledoux's own architecture that have been susceptible to differing and apparently opposed interpretations over the last century or so?

The history of the admittedly creative misinterpretation of Ledoux began in his own lifetime. At first recognized as a brilliant, but wayward designer, he was quickly attacked as an architect ruinous for his patrons, a dangerous megalomaniac, and an enemy of the classical tradition. The licentious gossip surrounding the commissions for the two most celebrated courtesans in France – Madame du Barry, mistress of Louis XV, and Mademoiselle Guimard, dancer at the Paris Opera – rapidly attached itself to Ledoux. The Neo-Classicist Quatremère de Quincy, looking at the new tollgates or *barrières*, accused Ledoux of having submitted architecture to "kinds of torture" – an aesthetic disapproval that was soon reinforced by the architect's political disgrace after 1789. The utopian designs for the Ideal City of Chaux published just before his death did nothing to enhance Ledoux's reputation as a serious architect.

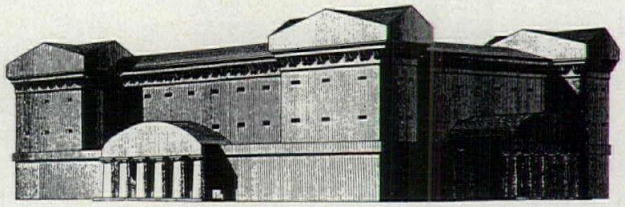
The Romantics, as well, were uniformly against his geometrical designs. Accusing the architects of the late 18th Century of having reduced architecture to mere geometry, "the bony skeleton of an emaciated invalid," Victor Hugo counted the *barrières* of Paris among the worst examples of modern architecture: "Are we fallen to such a degree of misery that we should be forced to admire the *barrières* of Paris?" he asked in his celebrated declaration of "War on the Demolishers" in 1832. Hugo's was only one of the voices condemning Ledoux's architecture under the July Monarchy and the Empire: Léon Vaudoyer, the architect son of one of Ledoux's younger contemporaries and emulators, Antoine-Laurent-Thomas Vaudoyer, invented the caustic epithet *architecture parlante* to characterize the most pictogrammatic of Ledoux's designs. Following an ironic description of the sphere house – illustrated, it should be noted, as a bourgeois country cottage with brick rustic trim – Vaudoyer remarked sarcastically: "No doubt the architect would have built the

home of a drunkard in the shape of a wine bottle." The notion of *architecture parlante* was quickly taken up in a positive way by students of symbolic form in the late 19th Century and, by devious routes, was resurrected again by the semiological theorists of the 1970s, and thence adopted by Post-Modernists as the war cry against an abstract Modernism that refused "to speak."

Ledoux's anti-Revolutionary reputation also brought him back into favor in the Second Empire. By 1859, a renewal of interest in Ledoux's architecture had been sparked by Haussmann's demolition of the remaining *barrières* in conjunction with the expansion of Paris, demolitions photographed in various states of ruin by Atget and Marville. Critics were by now nostalgic for the *Ancien Régime* and ready to remember Ledoux's own cries of "vandalism" when his *barrières* were sacked in 1789; now Ledoux became a vanishing symbol of an exotic, aristocratic, pre-revolutionary world, a world definitively lost by the successive revolutions of 1789, 1830, and 1848, and decisively destroyed by the forces of modernity and Haussmann. Here Ledoux became favorably remembered by the brothers Edmond and Jules de Goncourt in their studies of the lives of Madame Du Barry and Mademoiselle Guimard.

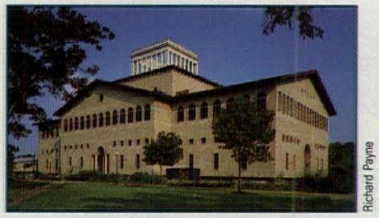
Peter Vanderwarker

Point West Place, Robert A.M. Stern, Architects



Prison, Aix-en-Provence

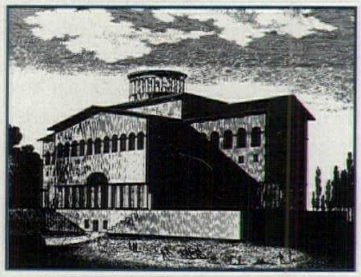
And yet, politics refused to go away. With the revival of revolutionary sentiments following the defeat of the Paris Commune in 1871, and stimulated by preparations for the celebration of the first centennial of the Revolution itself in 1879, the whole question of "revolutionary" architecture was once more put on the agenda. It was between 1874 and 1900 that a series of studies was published that sought for the first time to go back into the archives and situate Ledoux and his contemporaries in their own revolutionary times. Victor Hugo, nearing the end of his life, identified "revolutionary" architecture with the geometric abstraction of the late 18th Century.



Richard Payne

University of Houston College of Architecture, John Burgee Architects with Philip Johnson

Emil Kaufmann, similarly, tried to describe a "revolutionary architecture" that corresponded, more or less, to the period of the Revolution itself, and that, in turn, was the very representation of modernity in its abstraction. He invented a new myth: Ledoux as the forerunner of Le Corbusier – a tantalizing if historically fallacious characterization expressed in Kaufmann's 1933 book, *Von Ledoux bis Le Corbusier* (From Ledoux to Le Corbusier). Ledoux was now presented as an eponymous hero of Modernism, a "revolutionary" avant-garde architect before the fact. Certainly, as Kaufmann himself recognized, Ledoux was no political revolutionary; but his formal transformations and utopian aspirations seemed, in retrospect, to anticipate those of the emerging bourgeois state. Like Ernst Cassirer, preoccupied at the same time with the resolution of problems of individuality (Rousseau) and objectivity (Kant), Kaufmann found in Ledoux a rich subject for study at a moment when the rational ideals of the *Neue Sachlichkeit* (New Objectivity) were being attacked by the nostalgic and emotive appeals of the Third Reich.



House of Education, Chaux

That Hitler's architects would themselves find inspiration in the archaistic monumentality of Neo-Classicism, while denouncing Modernism as Bolshevik; that the socialist architect Hannes Meyer would, on his part, claim Ledoux as a forerunner of the social architect; that, in opposition to both Meyer and Kaufmann, Hans Sedlmayr, a conservative and former Nazi sympathizer, would rejoin the attack on Ledoux, this time as the evil, rationalist genius of a "loss of center" – these turns of interpretation only reinforced the mystique surrounding Ledoux's architecture. The taste for his architecture has always been subject to such political shifts: Note the fascination with pyramidal monuments sited in the Tuileries gardens and Louvre courtyards, from the first, commemmorating the war dead of 1793, through the large monument conceived by L.-E. Lheureux for the first Centennial of 1889, to I.M. Pei's own pyramidal entrance to the Louvre itself. While we might hesitate to call any architecture "revolutionary" in essence, Ledoux's work operates in a cultural field of forms and symbols that certainly evoke a revolutionary tradition, and one that is, apparently, not yet dead. Consider the recent restoration of Ledoux's *barrière* at La Villette. Architect Bernard Huet has framed the tollgate itself with classically molded terraces, converting the former canal into a reflecting pool worthy of Versailles. This scheme, hailed as the fulfillment of the program to "re-build" the traditional city, first launched by Rossi and his peers, then elaborated by Léon Krier and Maurice Culot, has, in a single gesture, rendered Ledoux, in the calm following two centuries of fierce debates, a museum piece.

It is equally ironic that, a little farther down the canal, the 19th-Century slaughterhouse of La Villette has been torn down to make a new park. The forms of this celebrated commission by Bernard Tschumi (P/A, November 1989, pp. 65–73) are not, of course, overtly 18th-Century; they are reminiscent of another "revolutionary" architecture, that of Constructivist Russia in the 1920s, and they thereby announce their symbolic association with this "red" quarter of Paris. And yet, as if echoing an 18th-Century aristocratic theme, they have been named "follies" by their architect, and in their cubic shapes, they seem to emulate the equally abstract forms of Ledoux, if not those of his tollgates. Side by side, then, on this still active site of political struggle, there are two architectures derived in some way from Ledoux or his contemporaries, the one Neo-Rationalist, the other Neo-Modernist; both echo the debates around Ledoux himself in the 1830s and the 1930s. Perhaps this only reinforces our suspicion that architecture, when officially employed on an urban scale, whether for tollgates, slaughterhouses, or parks, inevitably operates as the aesthetic cover for something else: the struggle for the territory of the city. It is this struggle, seen at its modern inception, that I have sought to document historically in my work on Ledoux. **Anthony Vidler** ■

The author is the William R. Kenan, Jr., Professor of Architecture at Princeton University, where he also teaches in the European Cultural Studies Program.

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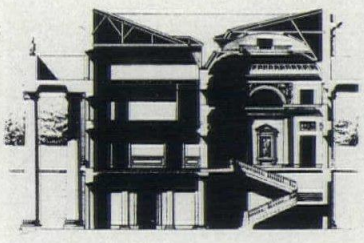
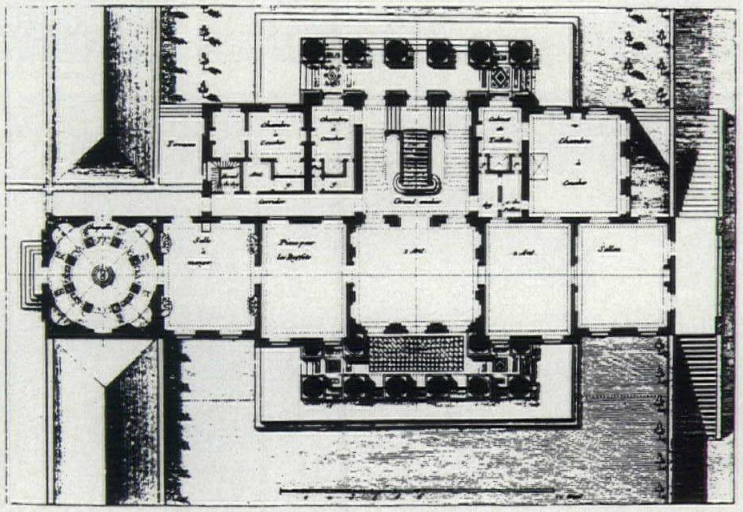


SECTION 20'/6m



FIRST FLOOR PLAN N ← 20'/6m

Designed for the Marquis de Livry in 1769, this chateau in Normandy (4), recently cleaned and internally upgraded by the French government, shows the extent to which Ledoux, before the revolution, was a popular court architect comfortable working in the established French Baroque manner. Consisting of a suite of public rooms stretched across the front face, the house has a narrower rear façade enclosing bedrooms on the first floor, centered on a large stairway (plan, left). As the section shows (left), this division between public front and private back is reflected in the treatment of the roof, with its mansard slopes draining to the center of the structure.

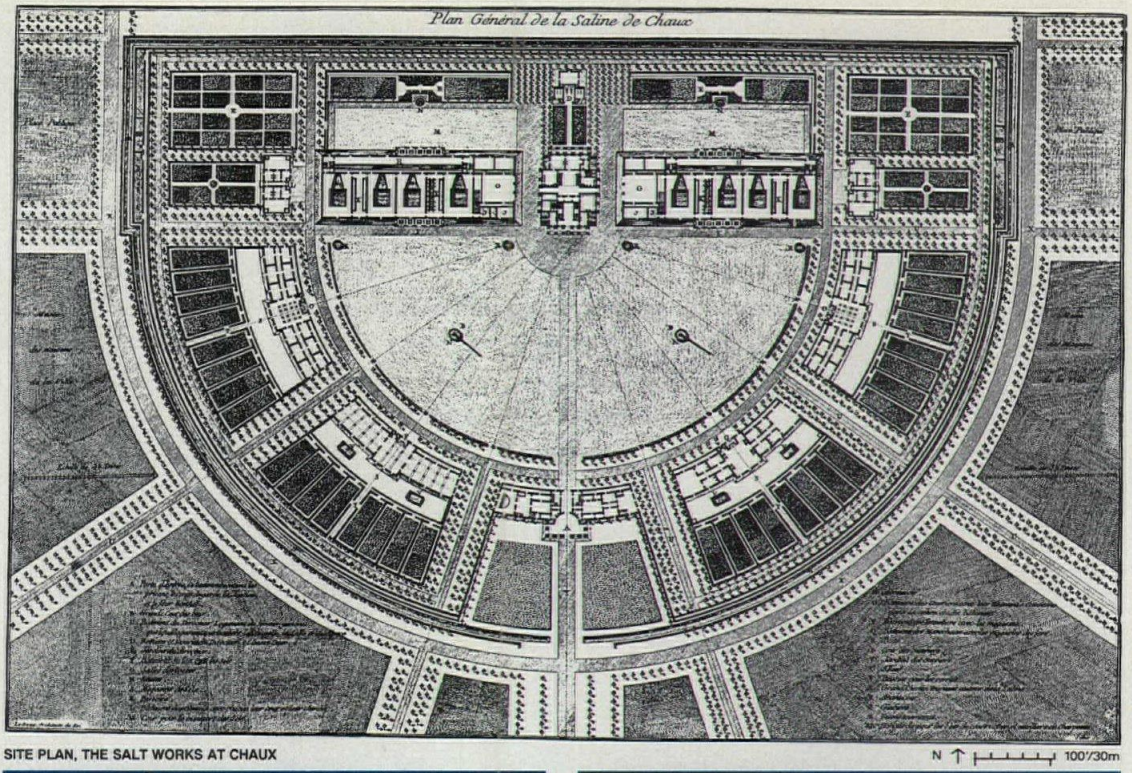
The Ledoux Museum

Le Musée Ledoux: *Fondation Claude-Nicolas Ledoux, Saline Royale d'Arc-et-Senans. Arc-et-Senans, Doubs, France*
Conception: *Anthony Vidler*
Architects: *Pierre Schall and Anthony Vidler*
Restoration of the tonnellerie: *Conseil Général du Doubs and Jean-Gabriel Mortamet, Architecte en chef des Monuments Historiques*
Curator: *Florence Burgerey*

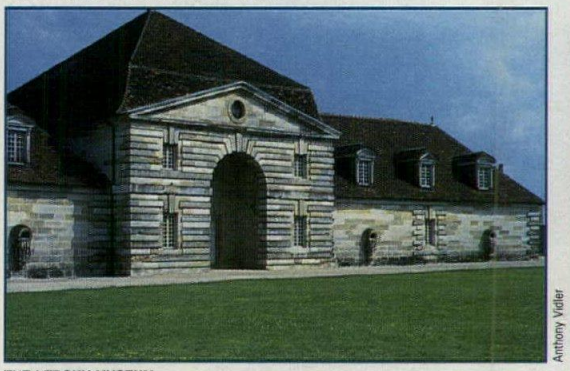
The Ledoux Museum is installed in the old royal Saltworks of Chaux, built by Claude-Nicolas Ledoux at Arc-et-Senans in Franche-Comté between 1774 and 1779. Used as a warehouse in the late 19th Century and partially destroyed by a land speculator in the 1920s, the Saltworks of Chaux was gradually restored beginning in 1938 and completed in the late 1960s as a conference center, leaving only the coopers' workshop, or *tonnellerie,* untouched. This building has now been restored according to its 18th-Century plan to house a museum dedicated to the life and work of Ledoux.

Commissioned by the then director of the Ledoux Foundation, Richard Edwards, and conceived by architect and historian Anthony Vidler, the museum houses one of the largest collections of architectural models in Europe, containing some 60 large- and small-scale models of Ledoux's built and unbuilt projects, accompanied by video displays, enlargements of Ledoux's engravings, and an information bank. Envisaged as an introduction to Ledoux's life and work for the casual visitor, the museum also serves the needs of architects and students interested in studying the formal characteristics of Ledoux's work; specialists and historians will find documentation, data bases, and a research center on the upper floors.

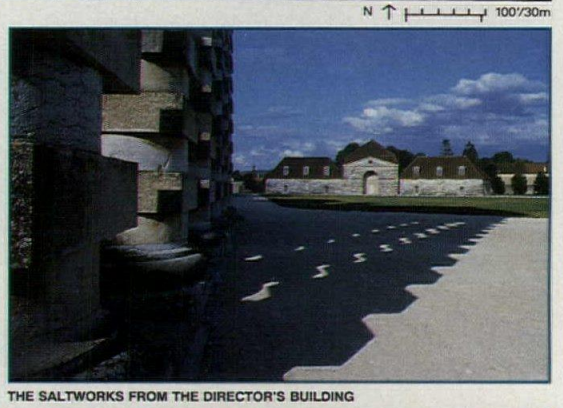
The Ledoux museum is conceived of as a historical presentation of the architect's built and unbuilt designs, from his earliest Parisian *hôtels* to the Ideal City

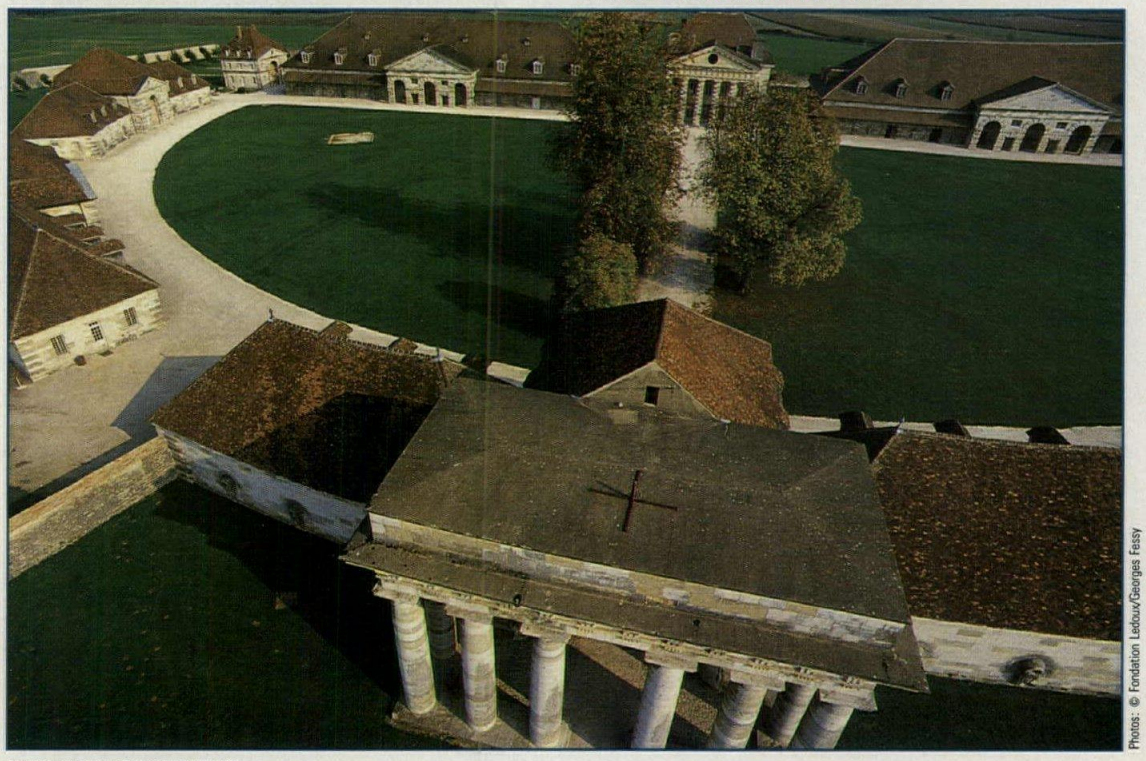


SITE PLAN, THE SALT WORKS AT CHAUX

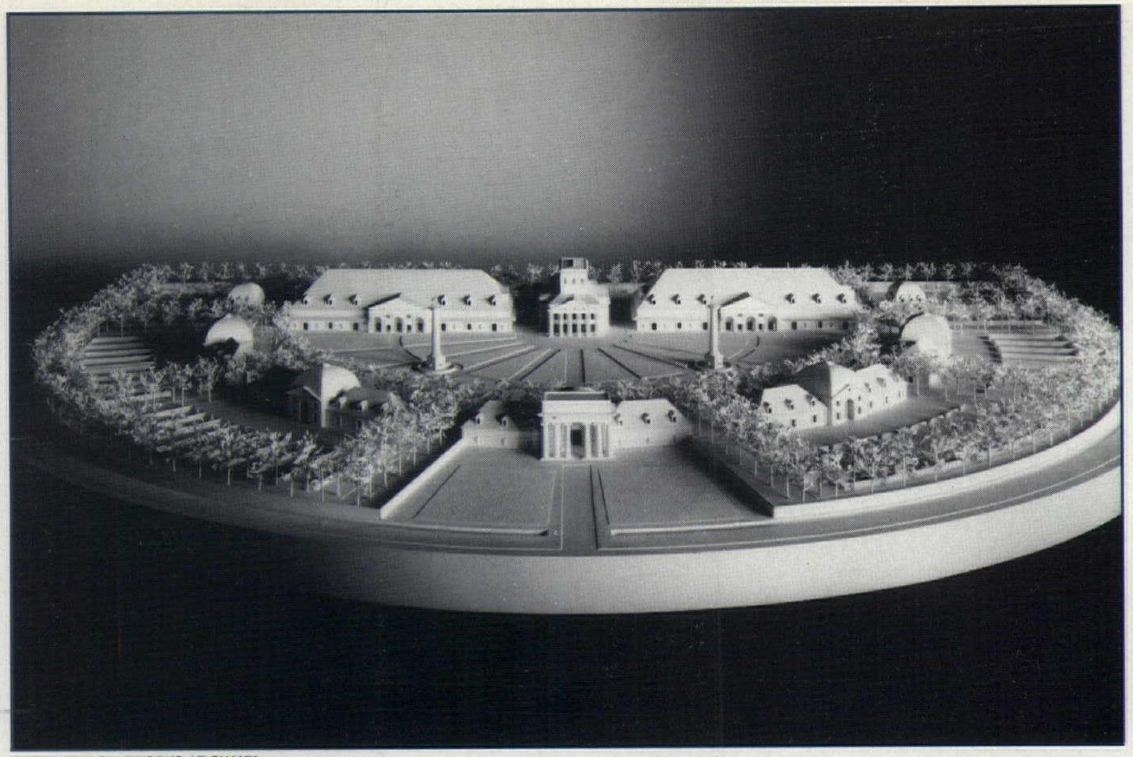

THE LEDOUX MUSEUM

Anthony Vidler

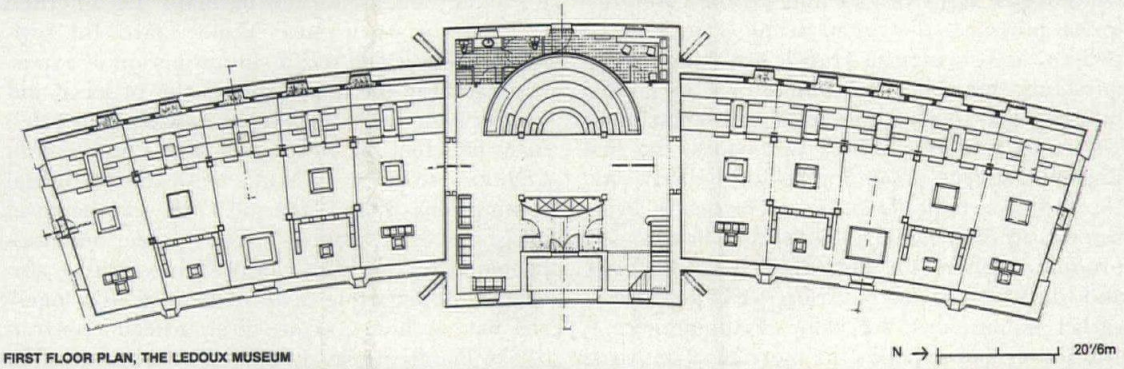

THE SALTWORKS FROM THE DIRECTOR'S BUILDING


AERIAL VIEW OF THE SALTWORKS

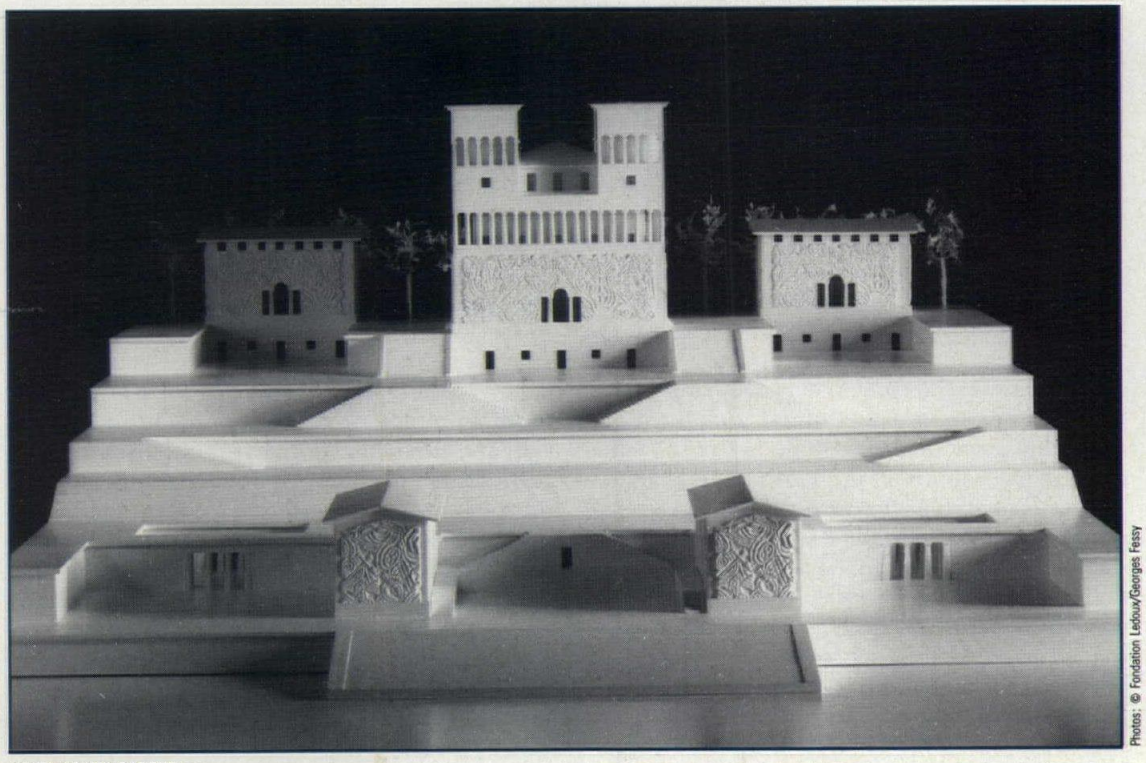
Photos: © Fondation Ledoux/Georges Fessy



MODEL, THE SALTWORKS AT CHAUX



FIRST FLOOR PLAN, THE LEDOUX MUSEUM



MODEL, HUNTING LODGE

Photos: © Fondation Ledoux/Georges Fessy

he imagined growing up around the Saltworks, chronologically and thematically organized on the first floor of the *tonnellerie*. The design of the museum echoes the geometrical and spatial language of Ledoux himself, underlining his vision of theatrical form which was, for him, the essential link between art and society. The entry hall, with its semi-circular amphitheater, reflects Ledoux's passion for the pure geometries of antique theaters that influenced his designs for the Theater of Besançon and the contemporary plan of the Saltworks itself. This theater will serve to show a video presentation of the life of the architect in his 18th-Century context. The two wings, dedicated respectively to his career before and after the Revolution of 1789, are inspired by the form of Roman stadiums, with a stepped section recalling the project by Etienne-Louis Boullée for the National Library. Above the entry, the cylindrical volume of the second floor gallery, designed by Ledoux as the communal space and apartments of the coopers, houses a panoramic exhibition of the tollgates, or *barrières*, of Paris, built by Ledoux between 1785 and 1789.

The idea of a museum of models is itself derived from 18th-Century projects: Ledoux's teacher Jacques-François Blondel, Boullée, and Ledoux himself supported the establishment of a didactic museum of drawings and models for the students of the Academy of Architecture. In his own text, published in 1804, Ledoux spoke of his projects as a kind of "museum" for young architects that would equal Diderot's encyclopedia in its demonstration of Enlightenment principles. In this way the Ledoux Museum offers a double vision of the work of an 18th-Century architect: The visitor is confronted with a *mise-en-scène* which, while faithful to the historical record, presents the work in a way that is comprehensible to people of the late 20th Century. ■

Books: Ledoux and Durand

Two recent books, one on Ledoux and the other on Durand, point to real differences not only in the work of those two French architects, but in the approach of the two authors.

Books of Note

Frank Furness: The Complete Works *by George E. Thomas, Jeffrey A. Cohen, and Michael J. Lewis, introduction by Robert Venturi, Princeton Architectural Press, New York, 1991, 385 pp., illus., $65 cloth, $39.95 paper. Furness's Emersonian sympathies and the progressive ambitions of his buildings are described in this first complete monograph,* *excerpted on p. 82.*

Britain *by Peter Murray and Stephen Trombley, Van Nostrand Reinhold, New York, 1990, 201 pp., illus., $24.95 paper. This pocket-size guide to Modern British architecture is a respectable source for the architect-tourist, with buildings evaluated in brief.*

Charles Rennie Mackintosh: The Architectural Papers *edited by Pamela Robertson, MIT Press, Cambridge, Massachusetts, 1990, 240 pp., illus., $35. Essays by architectural scholars introduce the transcripts of six enlightening lectures and an Italian diary produced by Mackintosh between 1891 and 1902.*

Thinking the Present: Recent American Architecture *edited by K. Michael Hays and Carol Burns, Princeton Architectural Press, New York, 1990, 136 pp., illus., $10.95, paper. Rafael Moneo's call for greater critical insight on current architecture opens a set of essays given at a conference at the Harvard Graduate School of Design by Peggy Deamer, Martin Filler, Alan Plattus, Hays, Burns, Herbert Muschamp, and Hal Forster.*

Claude-Nicolas Ledoux: Architecture and Social Reform at the End of The Ancien Régime *by Anthony Vidler, MIT Press, Cambridge, Mass., 1990, 446 pp., 382 b/w illus., $50.00.*

J.N.L. Durand (1760–1834), Art and Science of Architecture *by Sergio Villari, Rizzoli, New York, 1991, 102 pp., 105 b/w illus., $25.00 (original paperback).*

The work of Claude-Nicolas Ledoux and J.N.L. Durand not only helps us understand a vital historical passage – the restructuring of society and political life during the French Revolution – but questions the ability of architecture to convey meaning and to constitute itself as a language or system of referents. These two books, the first English-language monographs on Ledoux and Durand, are radically different in nearly every respect. Anthony Vidler's *Ledoux* is a handsomely produced volume (the illustrations limited to black and white, and in good measure well known from earlier publications, are alone disappointing). It synthesizes and expands the more than ten years of Vidler's research on Ledoux, offering new insights, connections to the social and economic context, and information on Ledoux's milieu.

Vidler's text is as wide-ranging and documented in its interpretation as Sergio Villari's book on Durand is focused and speculative. While Villari offers a highly selective account of Durand's life and work and of his tremendous importance as a teacher – wholly inadequate in comparison with a recent French monograph by Werner Szambien[1] – Villari's book is really an extended essay on the relationship of Durand's theory of architecture to modern structural linguistics. This potential anachronism in interpretation is tempered by Villari's attempt to situate Durand and the Ecole Polytechnique at the heart of the "scientistic" ethic of Ideologue culture in the 1790s.

Readers will find few direct links between the two books, their conception and ambitions being so divergent. But their juxtaposition is nonetheless highly suggestive in a variety of ways, of which only a couple can be sketched here. Both books put recurrent themes of contemporary architectural debate in a historical context: the issue of typology in architecture, for instance, or the possible meanings of the Classical orders in the modern period. Two historical themes emerge clearly: the challenge of creating an architectural form and image for wholly new programs, and the desire to create an architecture that is normative, capable of solving the need of modern society for repeatable building types, without losing the meanings associated with individual objects.

Both Ledoux and Durand faced the unprecedented social and representational demands placed on architecture in the decades around the Revolution. A range of new institutional programs – from theaters to factories – challenged architects to define new forms and to adapt the inherited language of architecture. Vidler shares the revisionist view, which sees a vibrant period of experimentation in the forms and images of social and productive relations in the years preceding 1789; he argues that the Revolution marks no break in Ledoux's work or thinking between the official commissions of the 1770s and 1780s and the novel programs and solutions of the public buildings imagined for his ideal city of Chaux. Vidler also dispels the lingering myth of Ledoux as a lonely visionary architect; we are given instead a portrait of a brilliantly successful professional immersed in his society.

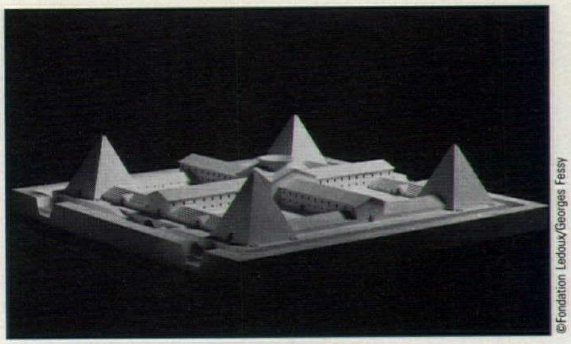
Ledoux's quest to understand and extend the meaning of architectural form, its syntaxes and capacity for communication and persuasion, are analyzed as part of the Enlightenment world of philosophical inquiry, linguistic speculation, and physiocratic reform. Throughout the book, architectural theory and form are seen as shaped by social setting and aspirations.

Ledoux also invested traditional architectural rhetoric with new powers and capabilities, inspired in part by philosophic and aesthetic theories of sensation (notably the writings of Condillac), which related visual forms to the communication of ideas. Coupling such ideas with the desire for social reform, Ledoux, like such contemporaries as Boullée, contemplated the power of architecture to effect changes in human behavior. In his projects for prisons at Aix and at Chaux, Ledoux implemented his belief that "One can be made virtuous or vicious, as the rough or polished stone, by the friction of our surroundings." But his was no quest for a mechanistic architectural template, as the variant forms he proposed for many individual pro-

(continued on page 193)

Perspectives

Critic **Ross Miller** discusses with **Anthony Vidler** some of the social, political, and architectural implications of Ledoux's career.



©Fondation Ledoux/Georges Fessy

Model, Cannon Foundry

A Conversation About Ledoux

Miller: Tony, you've written and thought extensively about how Ledoux has been read and misread by Modernists and Post-Modernists alike. What is there left in Ledoux that one might see originally anymore?

Vidler: You mean, what might we see of him today that is not colored by the lens of previous interpretations?

Miller: Yes.

Vidler: Well, in one sense, of course, any direct and unmediated vision of the past is unattainable. To pretend otherwise today would be rather like accepting Jean-Jacques Rousseau's claim that individuals might reach a point of transparency in their knowledge of nature and self – a condition disallowed by modern psychoanalysis. But, in another sense, that of a "fresh" image of Ledoux, certainly I would support the notion of a Ledoux re-conceived according to contemporary historical and interpretative models. In my own monograph, I attempted to sketch such a figure, one that emerged from a study of the architect and his work according to the criteria of cultural and social history. I was concerned to look beyond the Romantic, but still very pervasive, image of the individual artist struggling with genius against external forces – an image, by the way, to which Ledoux at the beginning of the Romantic era was only too pleased to subscribe – and situate him in a more institutional context. I wanted to uncover the economic structures, the patronage circles, the intellectual and professional contexts of his commissions, as well as the way in which completed buildings were received and, if possible, used over time. In this way, the very practice of historical research led to a re-formulation of Ledoux, one that I hoped would be less open to architects today simply borrowing his forms.

Miller: Some Post-Modernists have tried, so to speak, to "skin" his buildings and steal his elevations, and yet, from your reading, his work resists such skinning. How does this relate to the current debate between Modernists and Post-Modernists?

Vidler: Here, of course, you are referring to the double interpretation of Ledoux in the Modern period: a Ledoux who is Modernist and abstract, and a Ledoux who is figurative and fragmented. In a sense, I would submit that these two views of Ledoux are each, at least partially, correct; that is, they can be found, without too much distortion of his work. As I argue in the book, Enlightenment thinkers were split in precisely the same way, as they thought about the nature of language; and Ledoux was no more than a prisoner of this double problem. Simply put, it was (perhaps still is) the question of whether architecture should embody rational values in its pure geometries or take it upon itself to express and communicate these values to a wide, popular audience: architecture as *reason*, or architecture as *staging* reason. For this latter task, more self-explanatory, pictorial, and figurative means were obviously needed. In a sense Ledoux only anticipates the re-play of this argument between Modernism and Post-Modernism insofar as he stood at the beginning of the modern period. What is interesting, in your perception that Ledoux in some way resists skinning for images, is the way in which he tried to weld the abstract and the figurative into a spatial architecture.

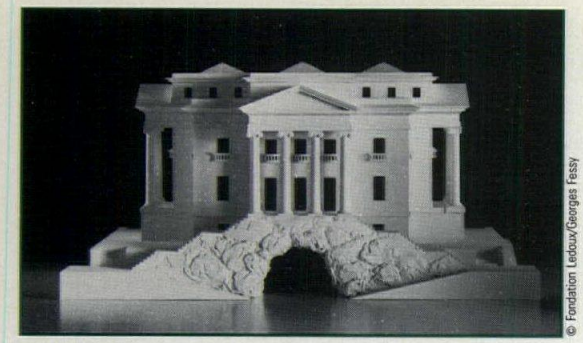
"It was (perhaps still is) a question of whether architecture should embody rational values in its pure geometries or take it upon itself to express and communicate these values to a wide popular audience."

Miller: Perhaps the "revolutionary" aspect of his designs is that they do not, in fact, replicate the "high" and the "low" in society by means of a similarly split architectural language.

Vidler: Certainly the Socialist architect, Hannes Meyer, saw Ledoux as representing one of two ways to "revolutionize" architecture: The one, Ledoux's way, was to "raise" all social subjects to the level of high architecture; the other, Meyer's way, was to lower all architecture to the level of social construction.

Miller: Look at how far we've come from the world of work – a world that seems to run consistently through Ledoux's architecture – as the primary task that defines either society or architecture. People in his era were really defined by their work.

Vidler: Well, this is a complex question. Ledoux, like Diderot in his Encyclopedia, was concerned to embrace all work in his analysis and to respond to all social tasks in his architecture. Here he shared the overt aim of the Enlightenment's reform program. But his preoccupation with production was shared equally by early industrialists who were, as Michel Foucault has shown, more concerned with work discipline and efficiency. Hence the invention by Jeremy Bentham after 1789 of the "Panopticon," an institution that supposedly enforced desired social behavior



Model, Château d'Eyguières

through continuous surveillance – a function that Ledoux also insisted on in his design for the Saltworks of Chaux. It would be a mistake, however, to try to distinguish too clearly between "reform" and "repression" in the Enlightenment. For believers in enlightened despotism, as the *philosophes* were, the two were part of the same model of social re-fashioning. I make the point that Ledoux was not precisely Bentham, in so far as his architectural imagination was still controlled by a largely classical sense of the symbolic as opposed to the instrumental effects of form; but his programmatic aims were – insofar as they were clear to managers and workers alike – entirely "Panoptical." In this sense, Ledoux was caught between a paternalistic vision of reform, in part to compete with the increasing productive power of England, and a more idealistic vision of human nature regaining freedom in nature, following Rousseau.

Miller: How much has Ledoux been mis-imagined in the sense that his work has been thought of only in elevation, and not as a three-dimensional whole?

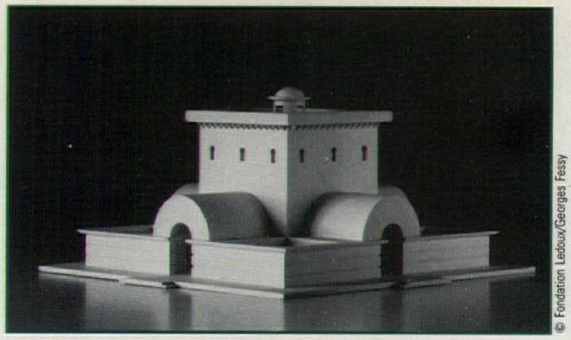
Vidler: This is a point I have always insisted on, and it goes to the heart of Ledoux's fascination for me as an architect, apart from my interests as a social historian. He is certainly not an architect who is solely preoccupied with the façade, nor with the distribution of social functions in plan. It was not accidental that his own preferred method of design was the model: He would work in model, present his projects to clients in model, and we find again and again records of his lawsuits trying to get his clients to pay for these often very expensive forms of representation. Perhaps this is why, without having recourse to the axonometric – a projection that was confined to engineering at the time – his buildings have the air of large models. You only have to look at the newly restored La Villette tollgate to see what this means both for the resulting sense of geometrical solidity, and for the ambiguities in scale. The cube, the pyramid, and the sphere were of interest to Ledoux, not so much for their outward purity – although he preserved this wherever possible – but for their potential, internal elaboration in three dimensions.

Miller: Returning to the "political" Ledoux for a moment, can you talk a little about the conditions of his arrest during the Revolution?

"If Ledoux did not invent the Modern architectural condition, he was certainly among the first to respond to it inventively."

"It was not accidental that his own preferred method of design was the model: he would work in model, present his projects to clients in model, and we find again and again records of his lawsuits trying to get clients to pay for these often very expensive forms of representation."

"The Modern period is full of examples demonstrating that, of all artists, architects are the most dangerous."



Model, Paris Tollgate, Santé

Vidler: His arrest was, I think, almost inevitable. Once the so-called Law of the Suspects had been passed in 1793, every revolutionary committee in every quarter of Paris was bound to enquire as to the *civisme* of its inhabitants. Ledoux was hardly unknown, as the most infamous architect of the Old Regime. He was by no means the innocent architect working quietly at home for Republican ends that he tried to portray to his captors; nor were they in any doubt as to his identity, despite the fact that Ledoux tried later to pretend his arrest was an accident. Rather, he was simply lucky not to have been guillotined before the fall of Robespierre, as were so many of his former patrons and friends.

Miller: Part of the nostalgia, I think, surrounding the various revivals and misreadings of Ledoux, is associated with the idea that an artist can be dangerous. Was Ledoux dangerous?

Vidler: The modern period is full of examples demonstrating that, of all artists, architects are the most dangerous. Ledoux, in his attempt to develop a language for a public monumentality in this first age of institutionalization, and in his utopian claims for architecture in the social order, certainly anticipated many of the ways in which such aspirations have since proved to be of less than clear benefit to the society on which they are visited. On another level, he was in his own time recognized as being profoundly dangerous for architecture by what the Neo-Classicist Quatremère de Quincy called his "dis-membering" of the Classical language. Here we have returned to our original problem, because it was precisely this dismembering – which at once relied on geometry to supply a lost unity and forced the Classical elements into a figurative, as opposed to a structural, role – that produced the contradictions in the reception of his work by Modernists and Post-Modernists. If Ledoux did not invent the Modern architectural condition, he was certainly among the first to respond to it inventively. Perhaps the Romantics were correct in seeing something of the monstrous in his work; he has often been compared to the Marquis de Sade, but I cannot help thinking of Mary Shelley's Frankenstein who made his debut, after all, only a few years after the publication of Ledoux's utopia – a work that Goya would no doubt have included among the products of the "Dreams of Reason." ■

To **Robert McCarter's** argument that words cannot give meaning to architecture,

Thomas Fisher offers a counter view.

A Question of Things

"No answer in words can reply to a question of things." Ralph Waldo Emerson

One of the traditional criticisms leveled at the academic world by professional architects has been that we in the university know nothing about the making of things. It is imperative that those involved in the academic study of architecture think about the nature of making, for it is in the university that the question of things may be considered in both a speculative and disciplined manner. We should remember that Louis Kahn, one of our greatest builders and teachers, said that "the profession is in the marketplace; architecture is in the university." Yet we in the academic world may rightly be charged with an over-reliance on words. We do not build and inhabit the speculative investigations that we undertake in the university, and therefore we must be even more vigilant in recognizing the influence of language on our work.

Words should never be a subsitute for things, and the use of so many words to explain and rationalize architecture poses a real danger to any thinking about the nature of making: architecture needs no explanation, and its reason-for-being comes with being built and inhabited. Too close a reliance on the verbal explanation reduces the building to the status of a footnote.

"Familiarity with the current phraseology of the applied arts is useful in assisting the student to a comprehension of many things apparently incomprehensible," Louis Sullivan noted nearly one hundred years ago; "Metaphor and simile are rampant in this connection, a well-chosen word often serving to justify an architectural absurdity." Metaphors and narratives are not architectural concepts; they are literary concepts, and thus cannot directly "in-form" – give form to – the act of architectural design. As Jose Ortega y Gasset has said, "Any reference, allusion, narration only emphasizes the *absence* of what it alludes to. Things that are *there* need not be related." In architecture, ideas or concepts are understood only by being present in experience. Architecture is not simply a means of expression; it makes a place for meaningful experience.

While we can describe architectural space that already exists, using words in the form of narratives, analogies, and metaphors, this process of description is something completely different from the process of design and making. Description and design are not simple inverses of each other. Yet it is difficult to escape the influence of language; as Paul Valéry has said, "Most people see with their intellects more often than with their eyes. Instead of spaces, they become aware of concepts." The use of analogies to language in "interpreting" and giving form to architecture denies architecture its own particular realm of order and experience. This narrow form of "reading" relies heavily on representation, distancing us from the reality of present experience by replacing the now absent or displaced meaning with a resemblance, a substitute – something that "stands for" rather than simply standing. Presentation, on the other hand, may be understood as revelatory – as a bringing forth into presence. Architecture does not represent or refer to things that are absent; it makes *things* present in experience.

"Architecture needs no explanation, and its reason-for-being comes with being built and inhabited. Too close a reliance on the verbal explanation reduces the building to the status of a footnote."

The promise of "Post-Modernism" in architecture was that the "abstract" forms and spaces of Modernism would be replaced by forms capable of being recognized by their inhabitants, with the expectation that "meaning" would automatically result. This promise has been subsumed in the production of architectural things as mere "signs," determined by the visual and verbal, with an almost complete loss of experiential engagement. This reduction of architectural design to the status of a sign has been aided by a totally appropriate mixture of superficial wit, deep cynicism, and condescension toward "people."

Despite its debt to history, "Post-Modernism" in architecture has not involved the analysis of historical buildings as experienced places of use and meaning; quite the opposite, it has reduced all of architectural "history" to a standard set of formal "sign" elements to be positioned in narrative, metaphorical, or other allusionary compositions. (In this "Post-Modernism and "Deconstructivism" are revealingly similar.) When "composition" is thus understood as a skill, technique, operation, or performance involving only formal concepts, with no reference to experience and human action, it becomes quite literally disembodied composition. A kind of "de-composition," these methods are used as means without ends, as techniques that do not acknowledge

"Architecture is thus as much about ethics as it is about aesthetics, and building may be considered an evaluation, a revelation of our own values."

man the actor as their goal. If architects focus only on compositional methods as means without ends, the ends will certainly be determined by forces outside of architecture – by those economic forces we find so prominent within the profession today, masquerading as "fashion" and "style." These "ends" lead directly to architectural "objects" produced only to be consumed.

Yet, as Frederick Kiesler said, "what we really need is not more and more objects, but an objective." Architecture is directed towards the gathering of human action into place. Architecture is essentially determined by the end towards which it is directed – the specific actions that take place in its spaces. To give form and dignity to the rituals of daily life involves making a place where shared values may be present. Architecture is thus as much about ethics as it is about aesthetics, and building may be considered an evaluation, a revelation of our own values. Recently however, any question concerning the ethical aspects of architectural design has been answered by an uncomfortable silence.

The promise of what has been called "deconstruction" in language was, as Antonin Artaud said many years ago, "to break through language in order to touch life." Yet, from our present perspective, we must admit that quite the reverse has happened. Language has not been overcome, rather words seem to exercise an ever-greater influence over things, and are used to turn reality into a game, rejecting value and meaning. It is indicative of the nature of such contemporary "theory" that in all its investigations of language, form, and meaning there is almost nothing said about our everyday experiences.

Contemporary manifestations of architecture, despite their exaggerated energy and diversity, seem secretly driven by fear of an unconscionable lack of principles, and are desperately seeking escape in the diversionary adventures of form. As the forms become more idiosyncratic and their historical sources more obvious, the need for words of "explanation" has become greater, as has the threat posed by alternative theories of architectural order. So-called "De-constructivism" in architecture (the academy's most recent gift to the "real world") may reject "presence," "place," "order," "hierarchy," "experience," and the part that "the body" plays in all these, but this does not in the least af-

(continued on page 194)

"If architects focus only on compositional methods as means without ends, the ends will certainly be determined by forces outside of architecture – by those economic forces we find so prominent within the profession today, masquerading as 'fashion' and 'style.' "

An Editor's Response

Robert McCarter's elegantly argued essay shows how one extreme can breed another. He is justifiably skeptical of those in the academy who would place criticism above the making of architecture itself, and of those in the profession who would convert architecture into signs and symbols. And he is correct in asserting that "Architecture is. . . as much about ethics as it is about aesthetics," challenging those who "turn reality into a game, rejecting value and meaning."

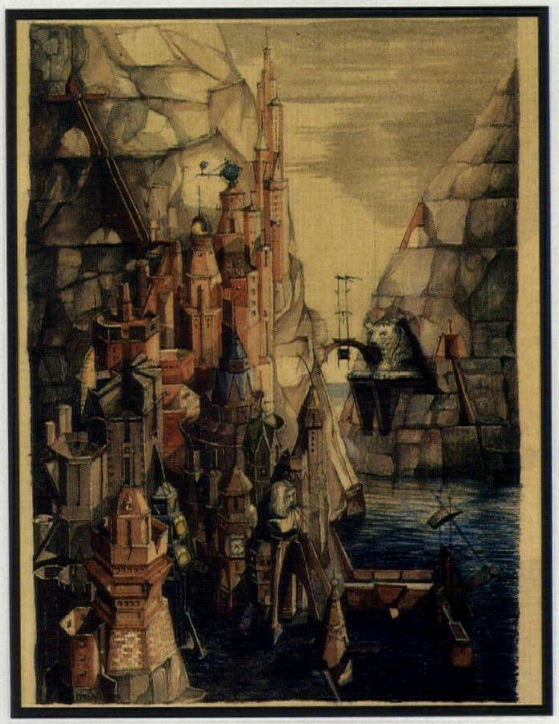
But in his reaction to some of the extremes of Post-Modernism and Post-Structuralism, McCarter lapses into another, equally extreme position. He seems almost paranoid about language. Words, for him, get in the way of our direct experience of architecture – an appealing argument, especially for visually oriented people, but one that is logically flawed. Language and architecture are an inseparable part of culture; imagine trying to make a building without language, or telling a client that "architecture needs no explanation." Also, as Kant argued, there is no such thing as a direct experience; all of our perceptions are colored by personal biases and cultural expectations, formed through language.

McCarter's attack on criticism is not new, at least in architectural circles. His belief that meaning in architecture "is never given by verbal explanations and theories," was a notion dear to Modernism, which is partly why so much architectural journalism, even today, remains largely descriptive and bereft of ideas. If the meaning of a building is self-evident, then all one needs to do is be led, verbally and visually, through it. The irony here is that such criticism (if it can be called that) limits our ability to address the ethical issues that McCarter sees as an essential aspect of architecture. A "building may be. . . a revelation of our own values," but the only way really to argue, defend, or modify the ethics of architecture is through language.

Is there not some middle ground between the value-free verbal games of Post-Structural critics, which McCarter so rightly condemns, and the language-free experience of architecture that he so desires? I think so. What is needed is not the dismissal of language, but the better use of it in the making and interpretation of architecture.

Thomas Fisher ■

Resting on "long flamingo legs," the city of Baucis never touches the ground.



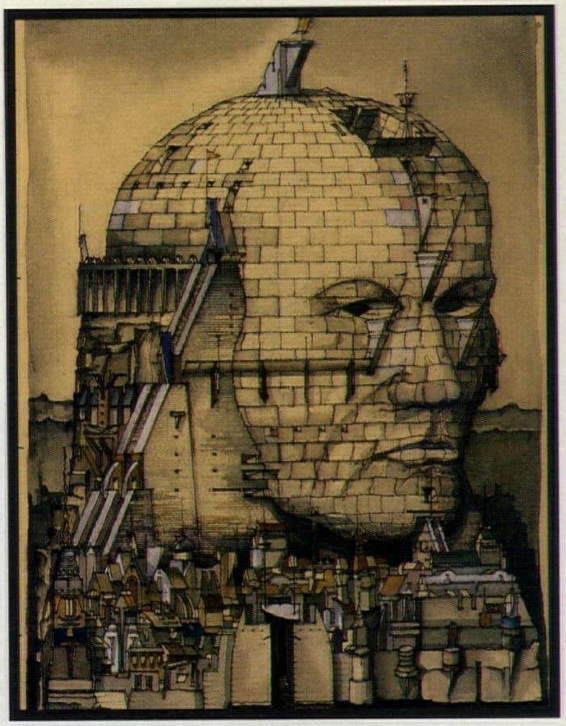
Zora, a "honeycomb" of a city that no one can forget.

Gallery: An Illuminated Text

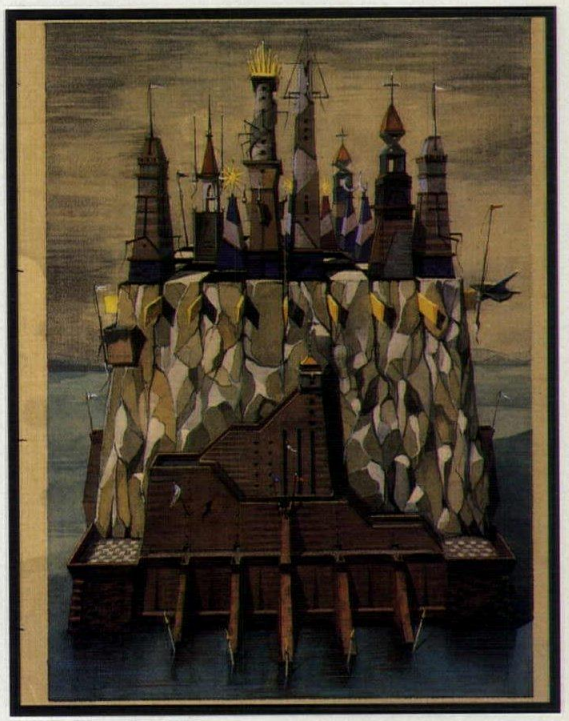
In December we ran in this section excerpts from Italo Calvino's *Invisible Cities*, a masterwork of urban fables that has enjoyed a world-wide following among architects. Some time after select passages appeared in Perspectives, we learned that Paul Haigh, an architect and industrial designer with a practice in Greenwich, Connecticut, has been laboring for the past six years on a series of pen and ink washes inspired by the book. Shown here are four of the seven he has completed so far.

Painting is a discipline hardly alien to Haigh; prior to taking his professional degree, the English architect studied painting and drawing as an undergraduate at Leeds College of Art – a pursuit of visual expression triggered in no small part by his experience as the sighted son of blind parents.

The abundant visual metaphors in *Invisible Cities* – its parables of cities that see – were the book's initial attraction for Haigh. More complex affinities emerged later, in particular a parallel between what the architect calls "the dialogue of opposites" in the book, and the dualities and synthesis that characterize his own design process. "[The illustration work] is the other side of practice," Haigh says – a journey of self-discovery that illuminates and inspires the daily work of design.



One of the frontispieces for "Cities and Memory."



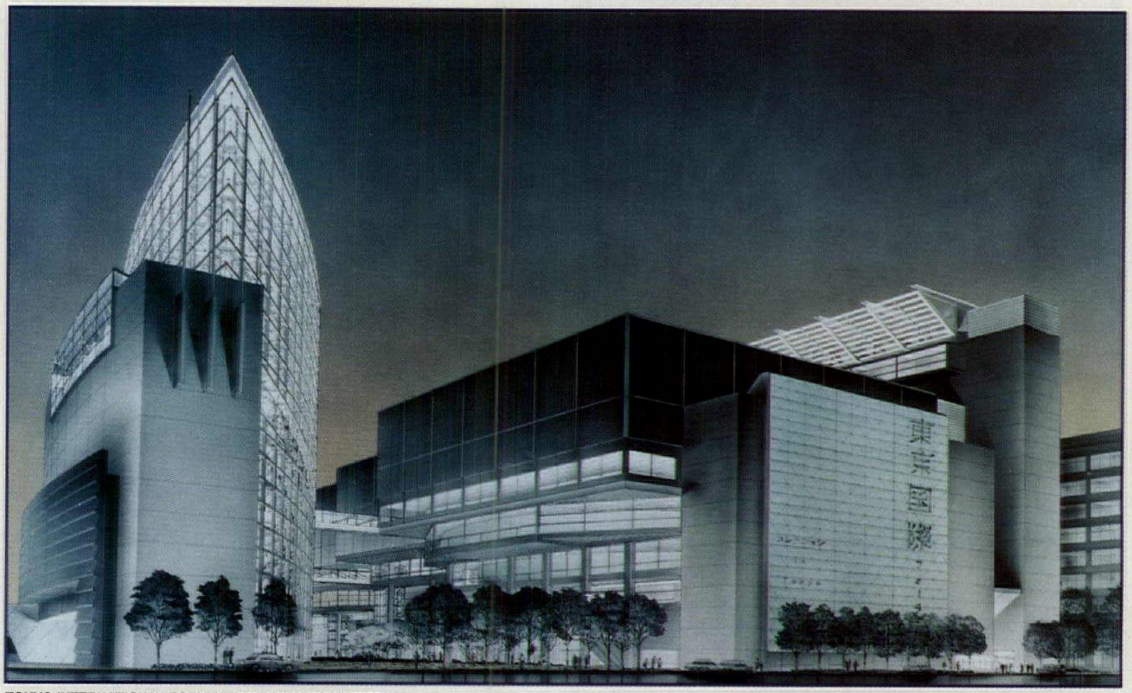
The chess set of Marco Polo and Kublai Khan, the protagonists of Invisible Cities.

Projects: Rafael Viñoly Architects

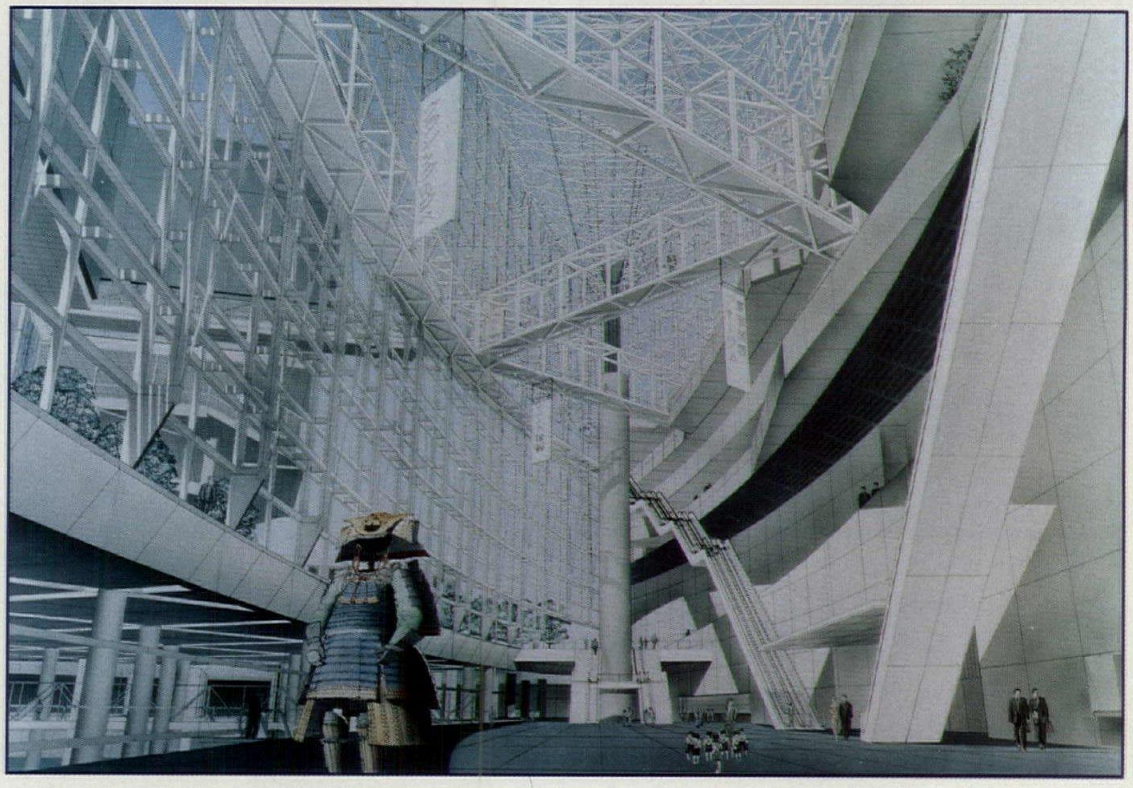
Three current projects by his firm indicate some of the variety in the Uruguayan-born architect's site-specific designs.

Born in 1944 in Uruguay, Rafael Viñoly was educated in Argentina and was a principal of a flourishing firm there in the 1970s, which produced internationally recognized works, such as the Buenos Aires TV Production Center (P/A, July 1979, p. 78). After teaching stints at Washington University and Harvard, Viñoly emigrated to the United States to begin his practice over again in New York in 1982. Here, he played a leading role in a promising but aborted plan for the railyard site now owned by Donald Trump on Manhattan's West Side; he has since completed some excellent moderate-scaled buildings in New York.

In 1989 Viñoly had the great good fortune to win the design competition for the Tokyo International Forum, a 1.5-million-square-foot, billion-dollar cultural/convention complex in the heart of the Japanese metropolis (P/A, Jan. 1990, p. 27). Judged by a panel that included I.M. Pei, Kenzo Tange, Fumihiko Maki, Vittorio Gregotti, and Arthur Erickson, the competition drew 395 entries from 68 countries. Scheduled for completion in 1995, the Forum has helped make Viñoly possibly the busiest architect in New York these days.



TOKYO INTERNATIONAL FORUM: EXTERIOR FROM NORTH

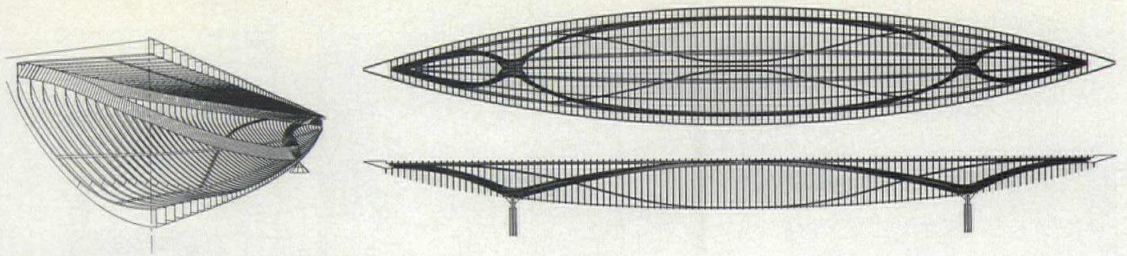


GLASS HALL WITH UNDER-PLAZA EXPOSITION HALL AT LEFT

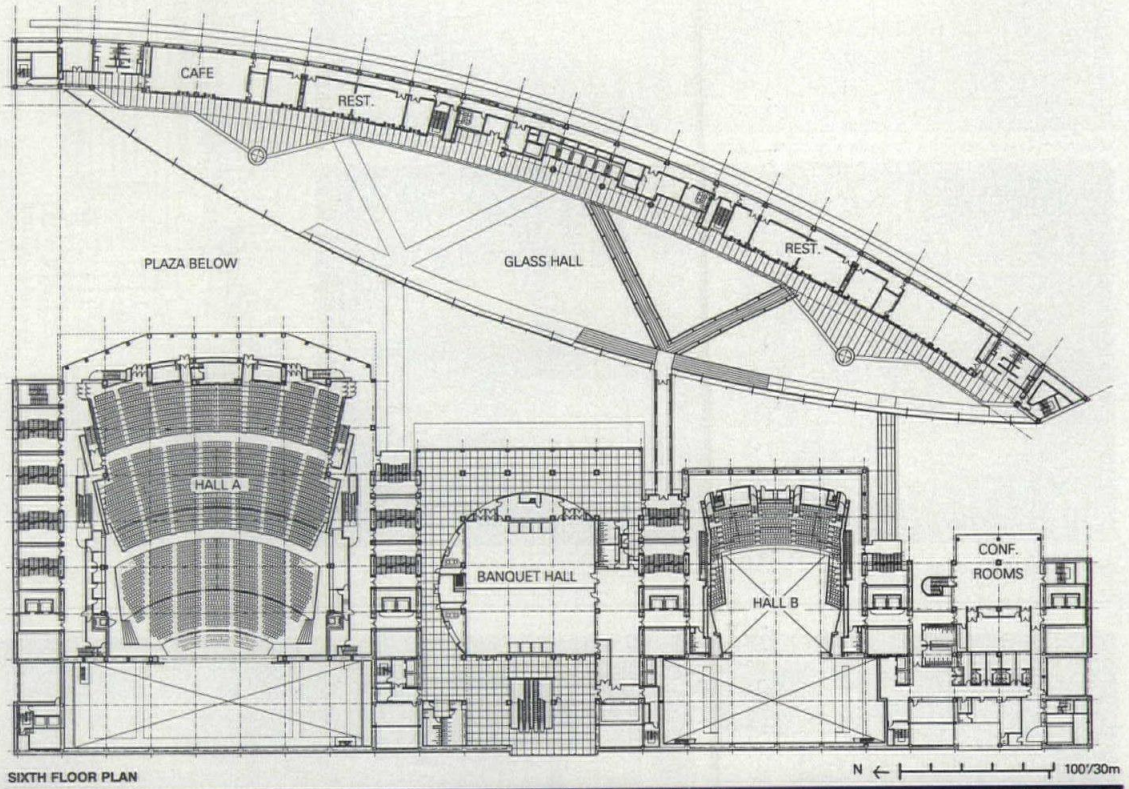
Tokyo International Forum

On a 6.7-acre site in the very center of Tokyo, the municipal government is building a complex of four theaters and extensive convention, conference, and public information facilities. Viñoly's scheme was particularly praised by jurors for its ability to accommodate related or unrelated concurrent events in its various components.

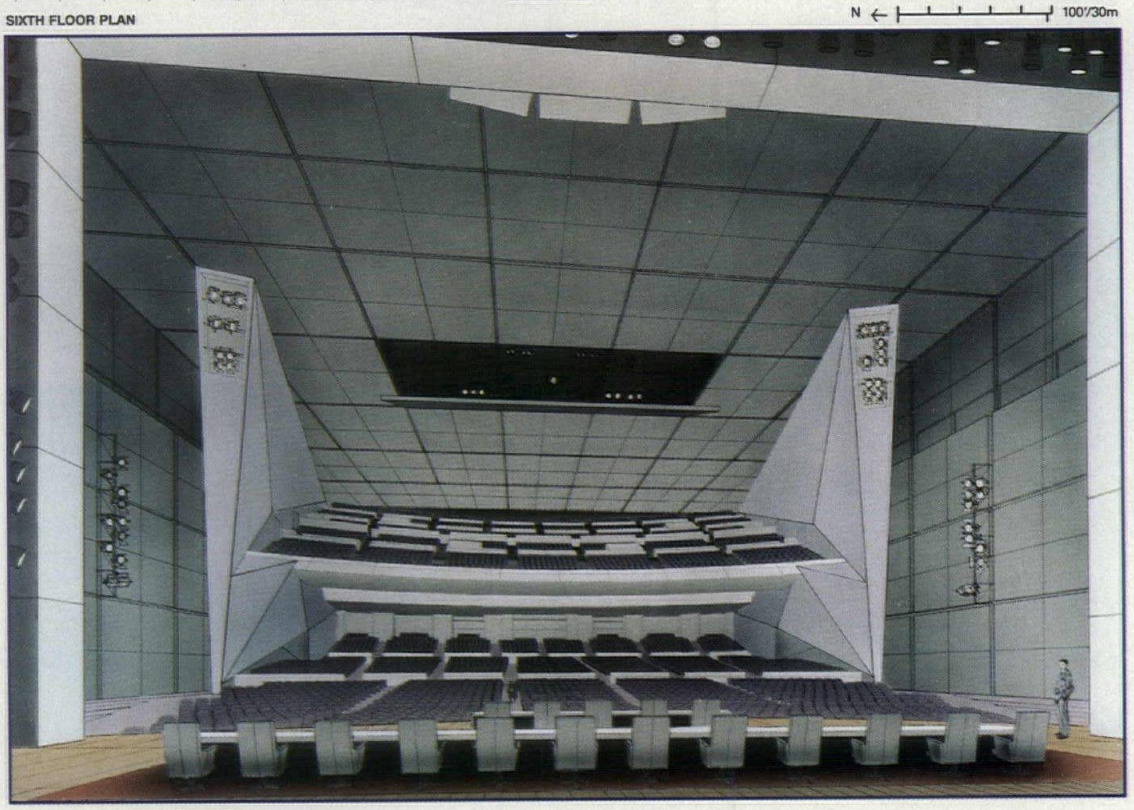
The signature element of the Forum will be the Glass Hall, a glazed volume 682 feet long and 189 feet high, whose curved



SCHEMATIC DRAWINGS OF GLASS HALL ROOF STRUCTURE



SIXTH FLOOR PLAN



THEATER INTERIOR

walls take their geometry from the east boundary of the site, which responds to the mainline elevated railroad into Tokyo Station. Hugging the outer curve of the Glass Hall is a lower curved structure, housing restaurants and other facilities.

The Glass Hall roof, conceived as a triangulated space frame, now has a sophisticated, project-specific combination of tension and compression elements that carry loads to the two primary columns. Japanese engineer Kunio Watanabe has been much involved in the structural scheme.

The volume of the Glass Hall will extend below ground, where it will link with transit lines, an 875-car underground garage, and a vast exposition hall below the central open plaza. Above the plaza, bridges will link the Glass Hall to the theaters.

These theaters will range in capacity from 100 to 500. Their relative volumes will be plainly visible from the Glass Hall and the central plaza. Their stagehouses will form a rather formidable palisade along the commercial street to the west, which the architect intends to relieve with surface treatments articulating elements behind the walls.

Responding to a constricting set of requirements, Viñoly's Tokyo Forum will give its district's cityscape of stolid banks and offices a welcome landmark, crystalline and buoyant, along with a substantial open plaza. And it will bring a lot of day and evening public activity to a location that has excellent transportation connections.

Lehman College Gym

Back in New York, Viñoly has designed athletic facilities for Lehman College, a unit of the City University located in the Bronx. Here, the siting of the building was shifted at Viñoly's urging to create a defining wall and a gateway for the campus along a major boulevard.

Stretching 608 feet along the boulevard, the building will be pierced by a public opening that will form the north terminus of the tree-lined College Walk. Here, students will enter the commuter campus from parking areas across the boulevard and from a subway station nearby.

The building's 131,000 square feet will house basketball courts, an Olympic-sized pool (which will be the only indoor pool this size in New York City), racquetball courts, gymnastics rooms, ballet studios, fitness rooms, locker rooms, classrooms, and offices. The curved stainless steel roofs will be supported on spidery steel trusses and divided into layers, between which clerestories will admit reflected light into the principal interiors.

Residence in Connecticut

Located on a seven-acre hilltop site, this house takes major elements of its plan from the massive concrete foundations of a house designed previously for the client by another architect. It was essential for Viñoly to salvage as much of the investment as possible.

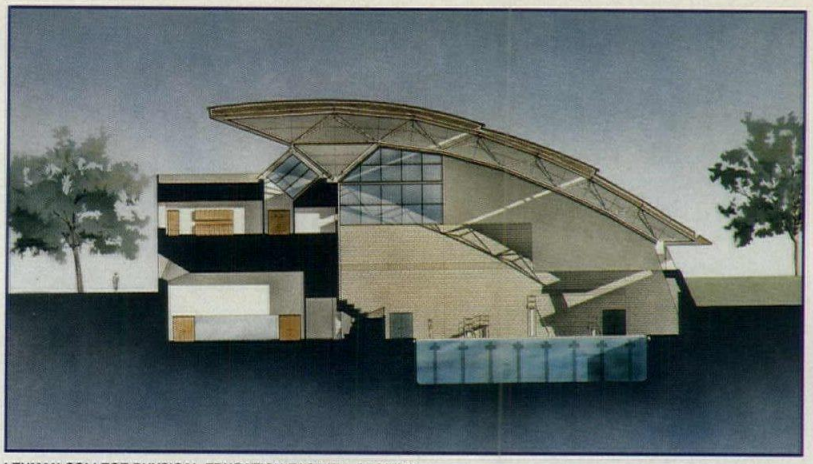
The scheme includes self-sufficient wings for the owner and for guests, each with its own mechanical system and basement garage; the owner's private "tower" contains a library and a penthouse office. Linking these wings is a central block of common spaces that gives almost equal emphasis to the living room and an indoor lap pool. Sets of parallel walls will provide hanging backgrounds for the owner's art collection and will define spaces for the kitchen and other service functions.

The podium from which this central portion rises is approached by a grand stair and extends out to form an extensive terrace and outdoor pool deck. Beneath the main living spaces are a gymnasium, storage areas, and mechanical services for house and pools.

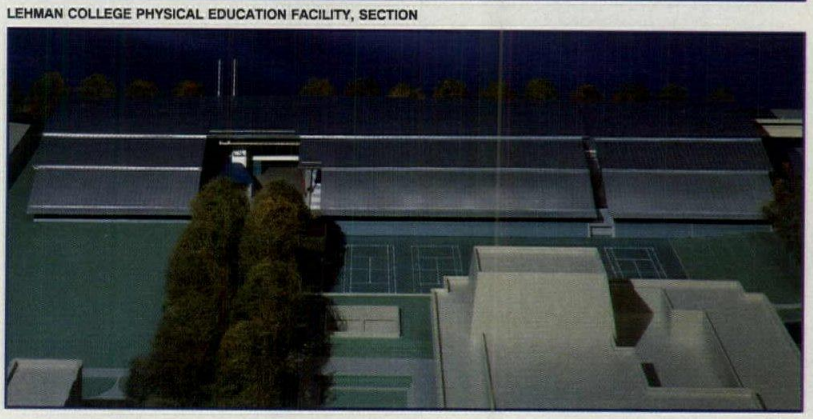
Underlying this scheme is an ingenious exercise in reusing parts of a proposed building that the owner had rejected and the architect had no commitment to. An architect who draws inspiration from the specifics of the situation, Viñoly has managed to make his design a seemingly original whole.

John Morris Dixon ■

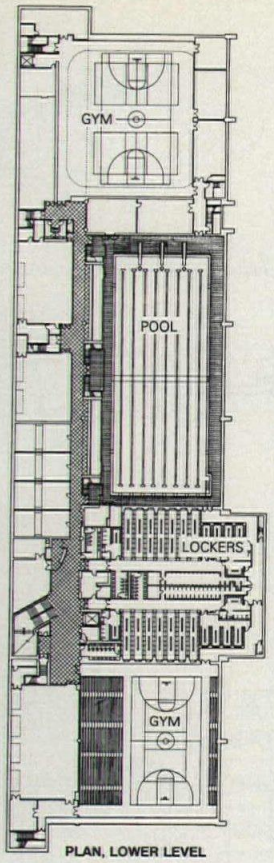
Rafael Viñoly Architects' project managers for these projects: Harris Feinn, Sandy McKee (Tokyo International Forum); Donna Wax (Lehman College); Michael Dobbs, David McAdams (house in Connecticut).



LEHMAN COLLEGE PHYSICAL EDUCATION FACILITY, SECTION

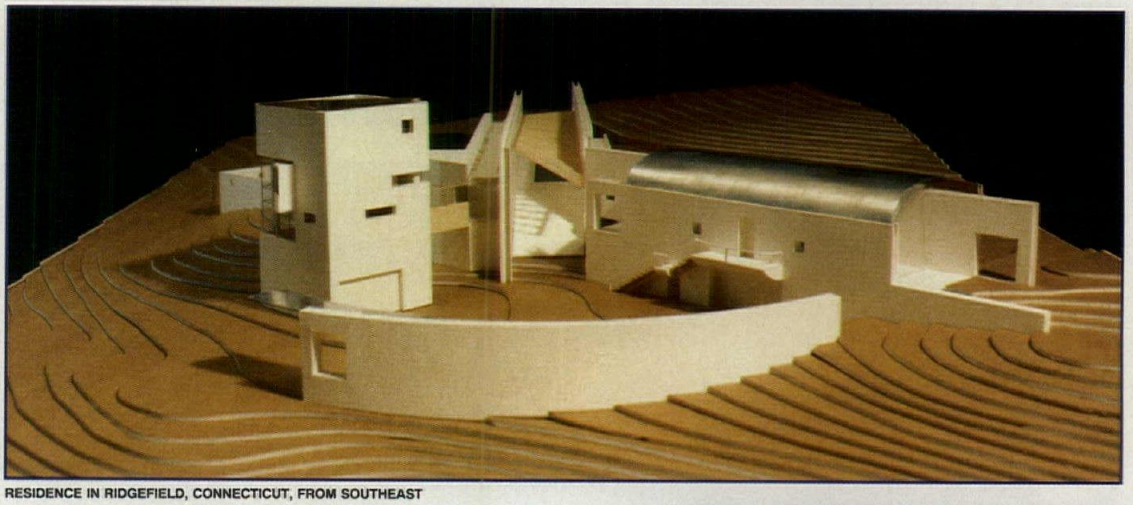


VIEW OF GYM FROM SOUTH

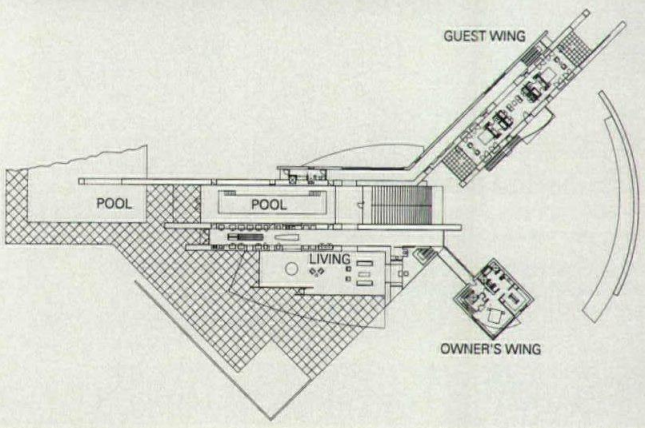


PLAN, LOWER LEVEL

N ← 100'/30m

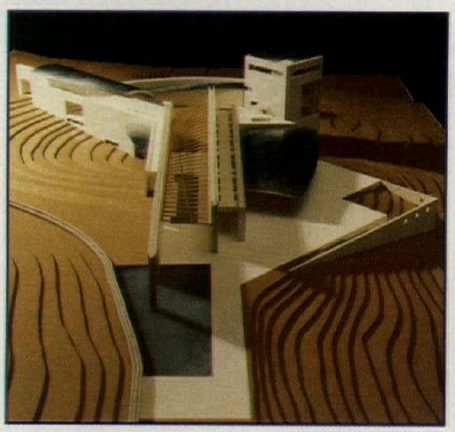


RESIDENCE IN RIDGEFIELD, CONNECTICUT, FROM SOUTHEAST

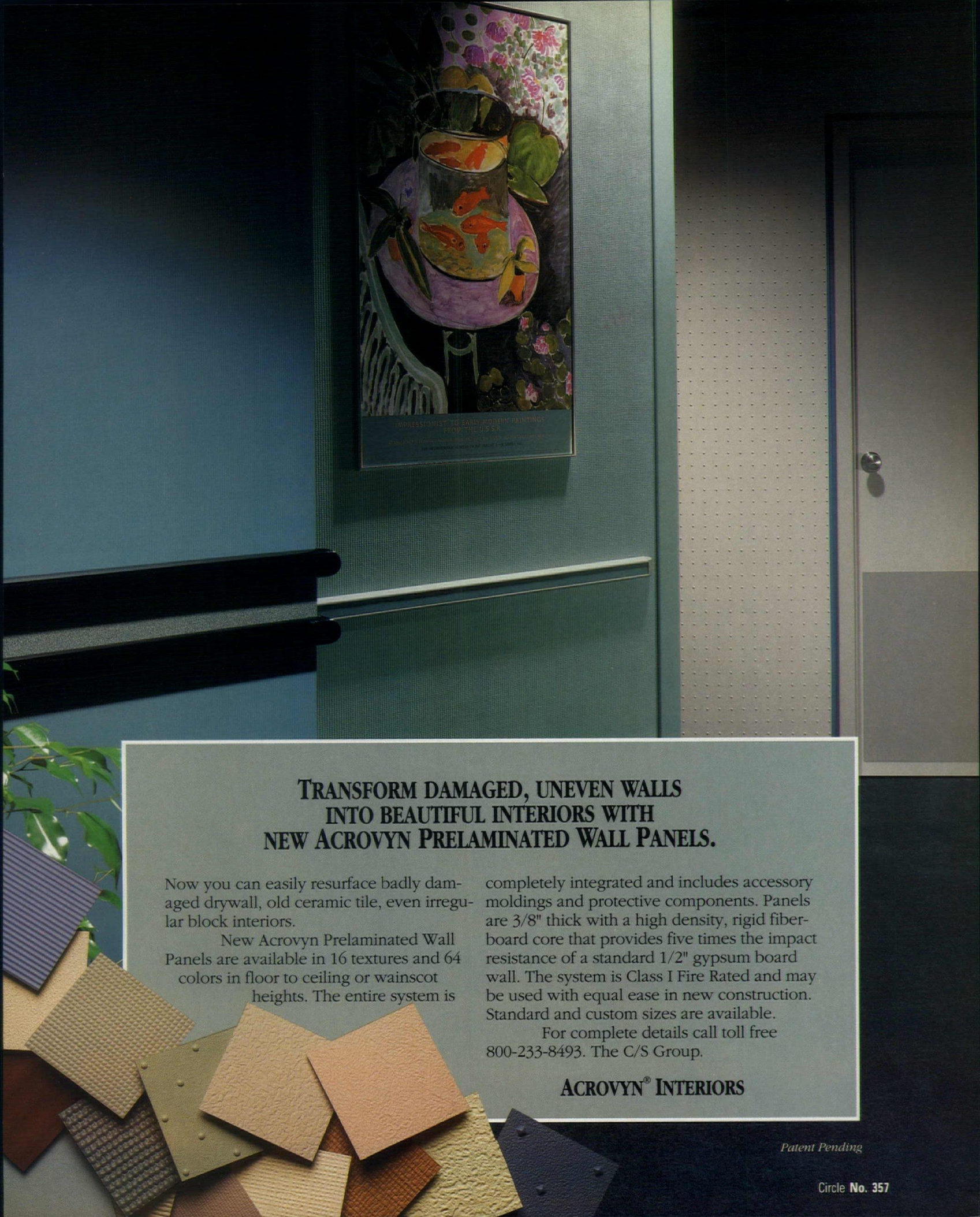


MAIN FLOOR PLAN

N ↖ 40'/12m



VIEW FROM NORTHWEST



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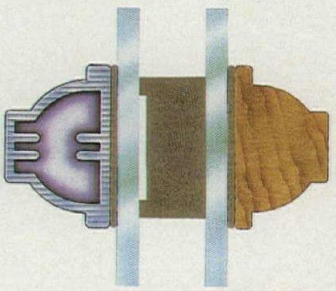

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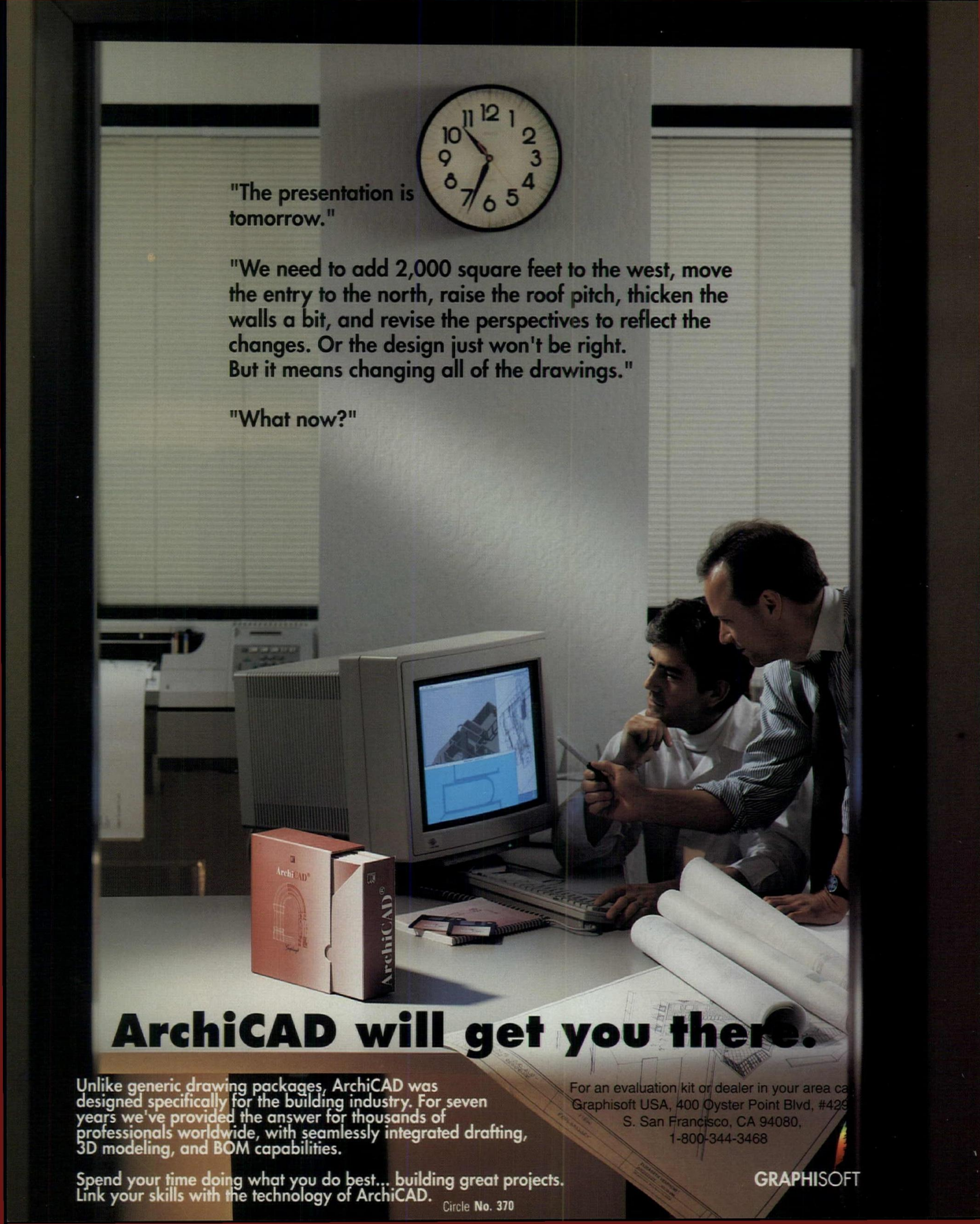
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Computer Focus

Contents

Illustrations by Leslee Ladds. Cover inset: a 3D-Studio rendering by Autodesk.

P/A looks at how new applications of computer technologies are transforming the practice of architecture – from animation and CAD networks to new sources of information available on CD-ROM.

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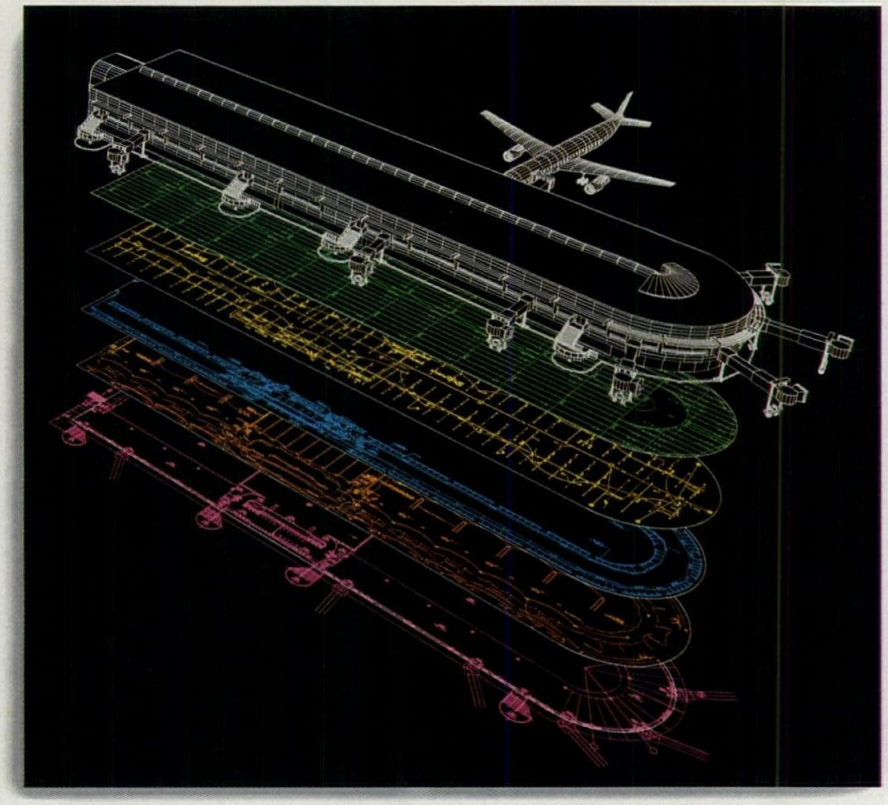

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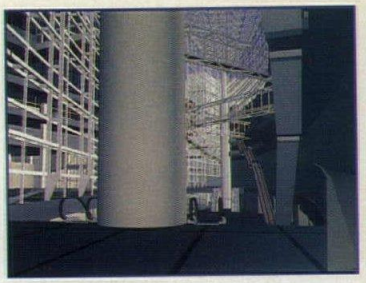
Circle **No. 329**

Roundtable
Computer Animation and Rendering

Six architects and designers discuss state-of-the-art computer modeling technologies and suggest where they may lead the profession.



Kinetic Designs

Last March, P/A's Assistant Editor Julie Meidinger invited representatives of one computer graphics service bureau and five New York architectural firms, each currently using a different CAD platform to create computer renderings and animations for their clients, to discuss the state of the art in architectural computer modeling. The firms range in size from 3 to 130 employees and they design everything from interiors to skyscrapers.

The Panelists

Inga Ford is a Senior Associate and Computer Systems Manager of Walker Group/CNI, a multidisciplinary firm with four locations worldwide. Walker Group/CNI currently uses Arris software on 386-PCs and on Sun and Silicon Graphics workstations.

Tomas Hernandez is Director of Computer Services, Kohn Pedersen Fox Associates. The 130-person New York office uses a combination of Intergraph workstations and Macintosh applications for all projects.

Gregory Kiss is a Principal of Kiss Cathcart & Anders Architects. He has recently founded *Kfx*, a company that does Macintosh modeling, rendering, and animation.

Michael O'Malley is the president and founder of Kinetic Designs, a computer graphics firm whose clients are primarily architects and industrial designers.

Hernando Ruiz of Maurice Wasserman Architects, uses AutoCAD for every project. He has recently been testing Autodesk's 3-D Studio.

Joseph Vance, associate at William McDonough Architects, uses Macintoshes for CAD and 3D modeling and is working with Kinetic Designs on animation.

P/A: What are the advantages of using computers rather than traditional rendering techniques?

Hernandez: At Kohn Pedersen Fox, we place tremendous emphasis on clay models for conceptual design. They are very effective; you can cut them up very quickly and put together various schemes of a project. That process, I think, will probably be with us for quite some time; there is something about a physical model that you just can't get with a computer. Architectural line renderings will be with us for a long time. They have that "done by an architect" look. But computer animation shows a level of dynamics that you cannot get from any other medium. I think computer images will supplement, but not replace, architects' presentation skills.

Ruiz: The software I use can apply surface materials and define the light and the amount of texture that the materials have. You can even insert a drawing and hang it on the wall. To do an animation is a form of realism. You can walk through your design using an AutoCAD model, and as you are drawing your plan, you can be working in 3D and create something that looks like a photograph. You get animation, too.

P/A: Why would architects go to a service bureau to do animation and rendering rather than do them themselves?

Vance: If you figure out how much it actually costs to get all the equipment, and if you're going to do it right, it's a lot of money. The unfortunate thing is you'll spend $40,000 on equipment that in two years will be obsolete ... for the likelihood of doing maybe three or four videos a year. You would rather have the client pay for it as a reimbursable on a per-project basis. You might build the CAD model yourself, pick the colors, and have someone at a service bureau get involved. They will keep up with the technology, and they'll rent equipment if they need to.

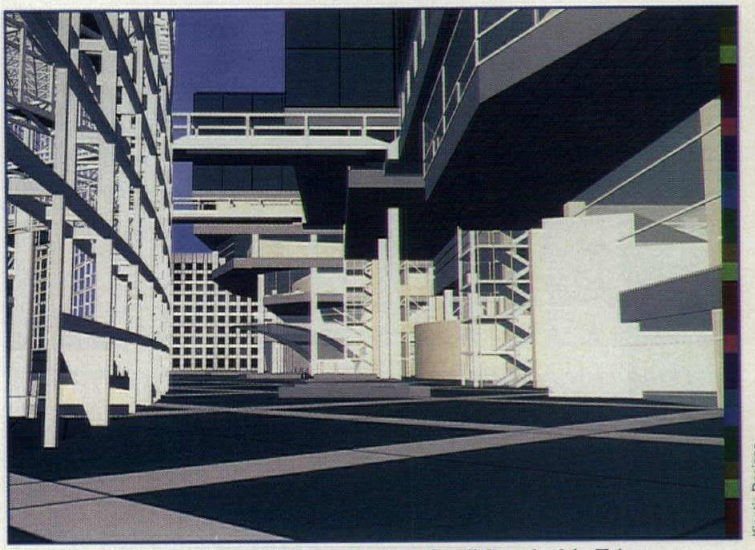
Kiss: Well, I partly disagree. I think things have changed enough nowadays that doing renderings is well within the reach of anybody who has almost any kind of computer in the office. Esthetic value and accuracy of these images aside, the fact that they are done on a computer still seems to dazzle people and really adds value to them.

Video is one or more orders of magnitude more complex, but even that is within the sight of most PC users. Even simple animations will serve well as a client presentation. They are not up to commercial grade video standards, but the technology is changing quickly enough that by the time this article is published there may have been another leap of performance in that field. I think there will always be a role for service bureaus and people who are pursuing the very highest end.

P/A: Are there some clients now that require it?

Ford: We did a study for Saks Fifth Avenue when they expanded, and the client actually came in and sat with us at the computer and went through a study of the escalator. They wanted a much more interactive – "what if I stand here and look through, what type of a view do I get?" presentation – as opposed to a canned presentation where we were selling them something.

Vance: We've done the same thing, and whether it is good or bad, we find that many clients are much more capable of getting a sense of scale looking at a TV



Kinetic Designs

These two stills (above and top right) from an animated walkthrough of the Tokyo International Forum (see Projects, page 120) were created by Kinetic Designs at the firm of Rafael Viñoly Architects using Alias 3 software on the Silicon Graphics Personal Iris and 3D AutoCAD.

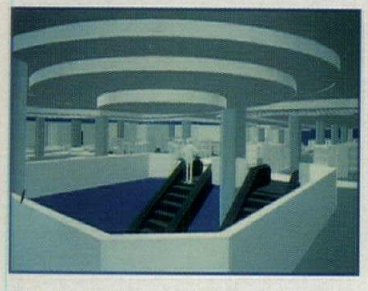
"... we find that many clients are much more capable of getting a sense of scale looking at a TV screen or a computer screen than they are looking at a model."

– Joseph Vance

screen or a computer screen than they are looking at a model.

O'Malley: Not everyone can read a floor plan, but everybody knows how to watch TV.

Vance: There are extreme measures you have to go to with some clients to try to get them to understand how to look at a model. With computer power getting cheaper and software getting more powerful, it has been really wonderful to sit down with clients in front of the computer monitor. We've given several presentations



Walker Group/CNI

These two 3D interior images of a European department store by the Walker Group/CNI were generated from contract documents and rendered with Arris software.

that way now on the Macintosh using a program called SmartScrap, a scrapbook desk accessory. We save rendered screen images from ArchiCAD into SmartScrap, and move from image to image with a click of the mouse. We sit there and talk about it and even trace over it and scribble on it.

P/A: This is in your office?

Vance: Both in our office and also at the site for clients who have Macs. We had a meeting inside the office last week – actually we were working on a video – and the principal of our firm picked up his marker and started sketching over the image on the screen.

P/A: Have you had many clients willing to pay for extra videos or do you absorb the extra costs?

Ruiz: For our small firm, being able to give the client that photorealistic image rather than a presentation board enhances our marketing and image.

Vance: We have the situation where the software we're using – ArchiCAD – is absolutely fabulous in doing quick modeling, rudimentary walkthroughs, casting shadows, and looking at some angles. That is invaluable to us as a design tool. And for certain casual client presentations it is perfect. But because we are only a ten-person office, we're finding that to go the next step to a finished rendering gets to be fairly complicated. Even a Mac requires many hours to learn the tweaks involved. We are finding it difficult to justify the extra software and hardware expense and the staff time for only two or three renderings a year.

Recently, we have had two clients who specified in the contract that we are not allowed to bill extra for in-house computer time, period. When you get to the point of saying you need this "knock-your-socks-off rendering," you have to convince them that this is not normal CAD, but something extra. We've found it is much easier to say we need to go to a service bureau, and they're going to charge you x amount for this. And as we all know, if you are on a fixed-fee basis, there is also the problem of doing something in-house that could otherwise be billed as a reimbursable.

Hernandez: I think it is much more difficult for someone without an architectural background to give us the kind of image we need. It is a fallacy to think that someone without architectural knowledge can pick up modeling software and create something an architect can use.

Kiss: Some of the things I've seen done with StrataVision are pretty deplorable; people tend to paste wood grain and marble all over the walls.

O'Malley: In your case, there is a commitment to bring some functions in house that could alternatively be billed out. There is a principal in the firm who is actually mastering the technologies. A small firm can go all the way. It is a matter of focus.

Ruiz: [The computer rendering or animation] becomes part of the service you are providing; it is not something you are going to charge the client extra for. It also aids you in design.

Kiss: Since we're small enough, I think having everyone in the office work on these things is a great help because it prevents all sorts of procedural problems that occur if you have teams divided up. You can transfer several people to work on one project to avoid bottlenecks and big crises. I have found that architects, even the most fuzzy-headed creative types, tend to be pretty good with the software, provided the software does not have an obtuse interface. The problems are not necessarily problems of learning the software.

P/A: Are special skills required for creating computer animation?

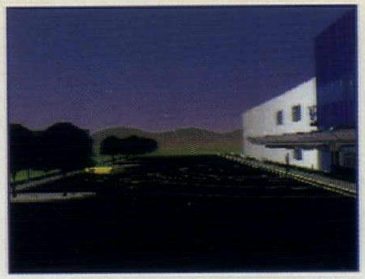
Kiss: I think, as the power of software has grown to show you images of tremendous fidelity and detail, the problem is understanding what you see. Now that you are able to create the attributes of materials with such detail you have to start understanding what it is that makes up the way materials look. Why does metal look the way it does? It has something to do with the fact that metal has a kind of crystalline structure that is polished by machining so it has both reflective and granular qualities. Likewise, you have to be a film director to some extent to make an animation.

O'Malley: Anybody at a certain point will be able to sit down and do a kind of photorealistic rendering or animation using off-the-shelf materials the software manufacturer provides. But to make something that stands out will still require the same kinds of talents that make a good renderer or photographer.

Hernandez: Which goes back to the fact that the education and background of operators will determine what they can or cannot do.

Kiss: You can see now that a lot of computer-generated images have a kind of sameness to them, a kind of flatness. It is still a new enough phenomenon that these images all tend to take people's breath away. But, in the very near future, in order to continue to stand out, you're going to have to go beyond that and understand, in a much more subtle way, what you have to do to the image to give it some character.

O'Malley: I think the basic ideas we have about color and light have not really changed for about




KCA

Four frames from an animation produced by Kiss Cathcart & Anders for a factory project in California. The construction documents and 3D modeling were done in MiniCAD+; rendering and animation with Stratavision and Strataflight. The final project was output to videotape.

250 years. I have a feeling that they will change as a result of everybody's learning to render with software.

P/A: How so? How will they change?

O'Malley: There are a lot more people thinking about it now than there have been for a long time, because you have to think about these things to master the high-end packages. The people who wrote the software we are using know a lot about light, and as users we are starting to think about the issues they had to master to give us this product.

P/A: I think there are still a lot of firms out there, though, that just use the computer to lay out the perspectives and then hand render. Do you see that?

Vance: We do it all the time.

P/A: Do you see that ever ending?

Ford: One problem is that we don't have enough machines to let them be tied up for hours doing renderings.

P/A: And that's just a matter of costs coming down, right?

Ford: Right, and the speed.

Hernandez: It also has something to do with the stage you are at. If you're doing conceptual work, it is more difficult to make just a hint or a suggestion of something with a computer than to do it by hand. A computer wants to render real things. It is extremely difficult to create a drawing that hints at a basic form or idea. A computer drawing is too finished to use at this stage, but in a rendering, you can make a little squiggle and get the idea something is there.

P/A: So that suggests that even when there are enough computers and they are fast enough, there will still be a demand sometimes for hand rendering.

Ford: We have not done many presentations that were not manual, because we do interior retail and there are a lot of soft surfaces. The client doesn't want to see a plant made out of triangles.

Kiss: I think there will always be a reason for hand renderings. You may want that look. A computer is a tool, just as a piece of charcoal is. Computers will become relatively more important and perhaps some of the work being done by hand now will be done on computer by artists in software that emulates charcoal.

Ruiz: The computer could start a new art form, which would create a new way of doing things, like photography did 150 years ago.

O'Malley: Work needs to be done on the input to computers. There are great print and video tape output options, but no input device yet has really been able to match the kind of tactile quality you get with a pencil.

Kiss: Even now there are pressure sensitive cordless styluses, which can do wonderful things, but because you are looking at the screen and drawing in a different place, there is a problem.

P/A: You are all using different platforms. Is anyone here going to argue that the one you are using is better than anyone else's, or do you find that the issues that have been so big in the computer industry in the last decade are becoming less important?

O'Malley: I think all the systems we use look pretty much the same now, and they are far more similar than they were five years ago. What matters are the people sitting in front of the machines.

P/A: Then why buy one computer rather than another? Are there still any relative advantages?

Ruiz: I think it's a matter what software your consultants are using, and how you can trade information back and forth.

Ford: I think it also depends on when you purchased it.

Hernandez: There wasn't anything else out there at the time we bought Intergraph for the specific things that we needed to do. We needed connectivity, volume, and speed. But we're a large firm. We have seen it emerge and get easier to use. We have been happy with it, and we have seen the prices go down. It works for us.

Ford: When we switched to Arris it was because we did not want to buy into a company we had to buy everything from. We had just come from that, and it was a nightmare.

Kiss: I would say that one important thing is to try to get a computer that you can afford to give to as many people as possible in your firm. If you can afford to give everybody a Silicon Graphics machine, that's great; but do that even if it has to be a PC clone.

Hernandez: The problem with all the systems is that there is no single platform you can do everything on. Spend $30,000 on a Silicon Graphics machine, and try to write a letter on it, then it seems ridiculous. While on the other hand, to try a high-end rendering on a Macintosh is difficult. Not impossible, but difficult.

Ford: We deal with a lot of clients who have other types of CAD. We have other offices that have different machines, and we have Macs that have CAD, so we have to think about how to get drawings to the other platforms.

Hernandez: The one thing really needed is a more universal file we can all use that is not DXF. We need something a little more foolproof.

O'Malley: DXF has been great. I love DXF.

Hernandez: I don't.

Kiss: It is better than nothing.

Ford: What about IGES?

O'Malley: DXF was a proprietary standard that could be followed. IGES was developed by a committee, and it was a huge standard and none of the companies that tried to adhere to it were able to implement the whole thing. So when one IGES output did not read into another it wasn't a standard anymore. It is better now.

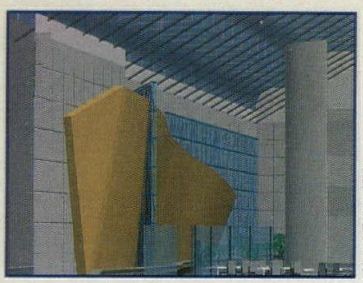
Kiss: There is some talk about Renderman becoming a 3D rendering standard. There are more and more programs incorporating it. Whether you will then be able to reconstruct a manipulable model from it, I don't know. I think the intention is just to produce a renderable file.

O'Malley: I think we will have to wait and see.

P/A: What about other changes that some of this will bring? For example, do you see the whole process of communicating a design to the contractor changing through any of this? Medieval builders used to build models of parts rather than do working drawings; they would build a piece and then they would do it large scale.

Kiss: A few years ago we designed a board room table; it had some very long, subtle curves in it, and our cabinet-maker was having a really hard time laying it out in the studio. So we actually printed out a quarter of the table at full scale on a big dot matrix printer and taped it together and sent it to him. So, that is sort of a crude step in that direction.

O'Malley: I really think interactive meetings with clients using rendering and animation is an



Walker Group /CNI

"The animations we do are passive. You put them on the TV and you watch them. The ability to show those frames on the computer screen fast enough to achieve animation is what is going to bring us to the next stage."
– Michael O'Malley.

important frontier. Interactive sessions with clients present a whole bunch of difficult problems. The next thing that will become central is a database that actually helps you build a building. That is not going to be very flashy; it's not primarily visual.

Vance: Most of the packages I'm using now have some type of database that, theoretically, you could give to the contractor. Most architects are not going to do this, no matter how accurate the computer is, because they are wary of taking the liability.

Hernandez: That is why you'll never see it.

O'Malley: No, you will see it, but you will not see it in the architectural office; you will see it in the construction manager's office. I think the architect's role is going to get reduced by this whole process to being a stylist, like the relationship between an architect and a master builder. The master builder is going to start to have a lot of control because he is going to be the one that has the database that builds things.

Hernandez: The architect and the contractor have two very different roles in the completion of a building project. Until the liability issues are resolved, you will not see much data being transferred among the building professions.

O'Malley: I think you are right in the long run, but it is going to be a very difficult transition, and there is a legal problem to overcome. But I think that the competitive pressures starting outside of this country will eventually force us into using construction databases.

P/A: What do you think architects will be doing with computer animation five years from now?

Vance: Virtual reality. Five years from now I think there is no doubt you will be sitting in a room and the client will put on little goggles and gloves and you will take a walk through the space you have designed.

Kiss: I think you're right on some level, although I'm not really convinced that that is the form it will take. I cannot see the chairman of the board in goggles with a joystick.

O'Malley: At the base of this comment is a technical point. Right now, animations are achieved by writing frames out to videotape, one after the other. The animations we do are passive. You put them on the TV and you watch them. The ability to show those frames on the computer screen fast enough to achieve animation is what is going to bring us to the next stage. I can do that now with little frames. They will only be about two inches square, but it is digital animation on the computer, right in front of you.

Ford: I think that in five years, the clients will still want to be able to take something home with them. They will want a big output on a piece of paper they can sit down with.

Vance: But they will have a computer that could play the thing you give them digitally.

O'Malley: Video animations, which are so hot now, are in a technologically primitive state.

Ford: I think costs are going to have to come down.

O'Malley: Virtual reality is just a more advanced understanding of how light and perception work. I think it is going to take a little longer than five years, but it is going to happen.

Kiss: It is a matter of how you define it. Virtual reality demands an acceptance in your mind of what you are seeing, and an understanding of it in a three-dimensional way. I would argue, as an architect, that it is here already. As I work inside 3D models in the computer, I feel as if I am in the space already, even though I cannot render them in real time.

Hernandez: The current research in virtual reality is leading to capabilities that will allow architects to sculpt an object in three dimensions using their hands.

Kiss: You can do it in a crude way with the mouse. It is not as good as reaching your hand out and seeing and feeling the object, but it is a matter of degree; I would argue that it is here already.

P/A: Do you have any doubts about the new technology?

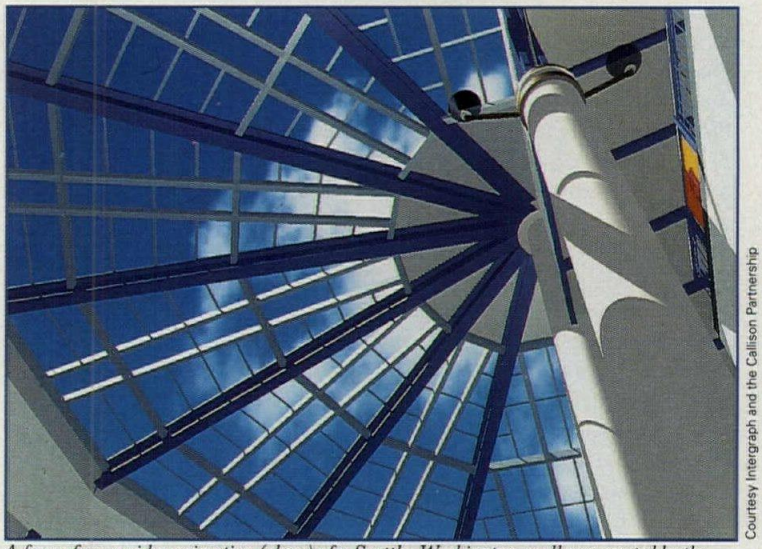
Vance: I have seen one down side. It is true there are all these things we can do with the computer that are amazing, but some of the drawings architects used to do, even working drawings, were truly works of art. The old draftsmen used one hardness of lead, yet made drawings that were breathtaking. You will never get that kind of drawing from a CAD program and a plotter. You cannot get that amazing variety of line weights or that little extra pressure at the end of each line or intersection of lines that transform a drawing from a "construction document" to something that is wonderful to look at.

Ford: The younger architects don't know how to do that.

Hernandez: That is a lost art.

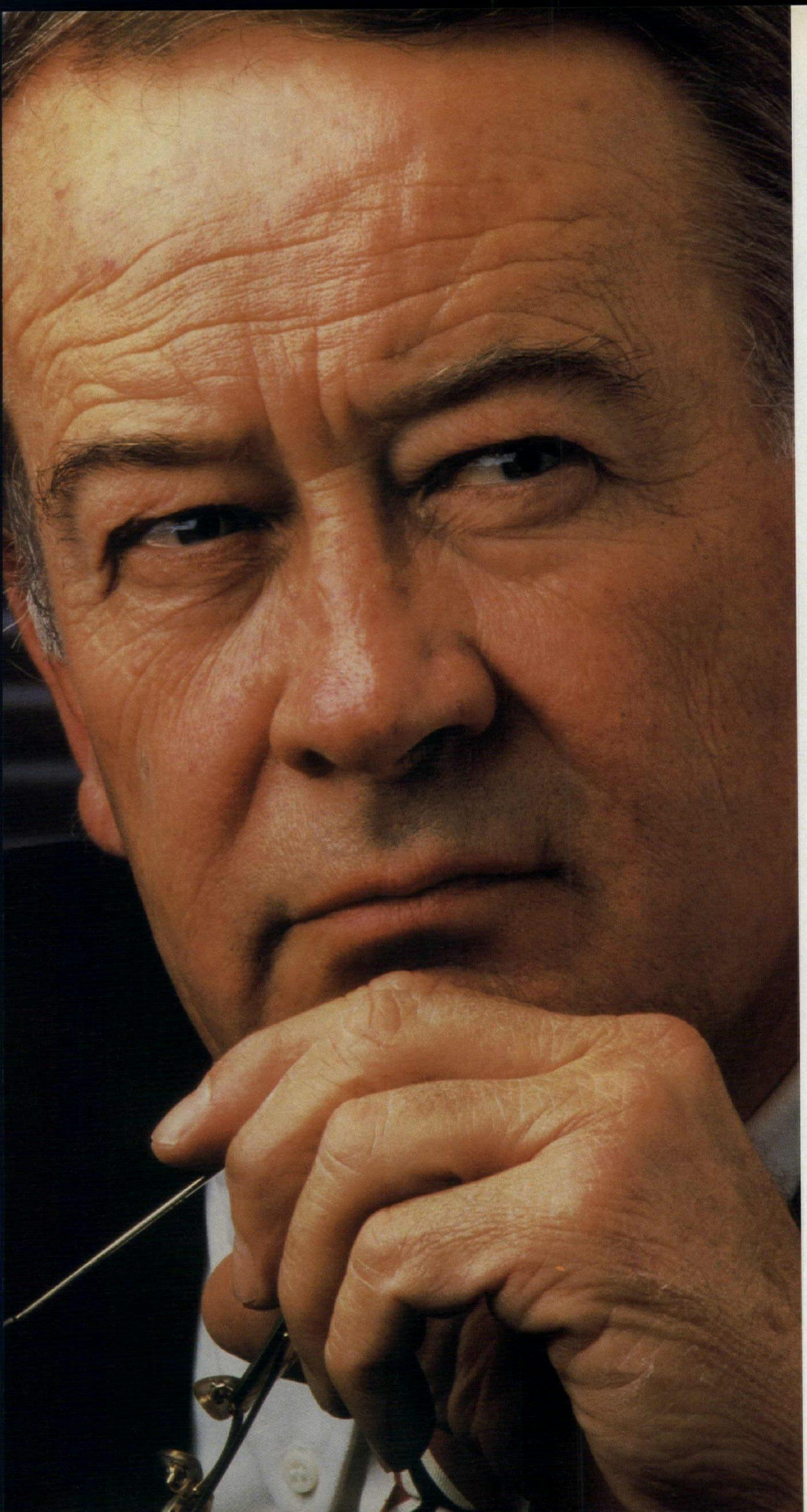
P/A: It may be lost, but one of my favorite Marshall McLuhan sayings is that "every new technology turns its predecessor into an art form." We are probably going to see artists down in SoHo making really beautiful detail drawings that you frame.

Ford: Some day we will be there too. ■



Courtesy Intergraph and the Callison Partnership

A frame from a video animation (above) of a Seattle, Washington, mall was created by the Callison Partnership, Ltd., Seattle/San Francisco, on an Intergraph system. A remodeling study of an existing atrium in a major Korean department store (top left) was done by the Walker group with Arris.



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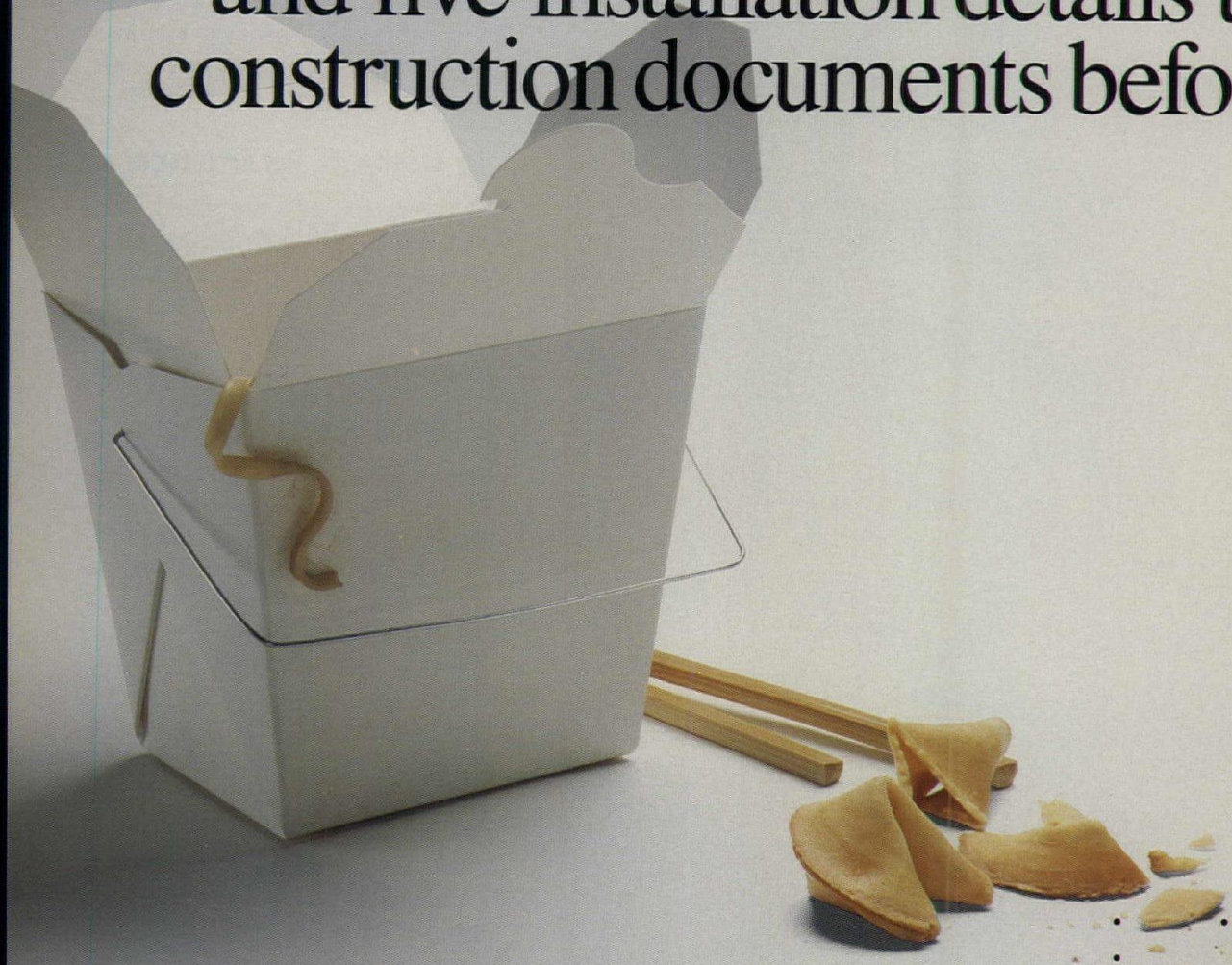

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CAD and the Profession

Garry Stevens argues that CAD mainly benefits the marketing and management of firms, while **Emil Kish** counters that computers can enhance productivity if the machines are wisely chosen and used.

How Computers Are Used in Practice

We have arrived at an important juncture in the history of computing in our profession: This history is long enough to reveal clear trends in the use of computing, but not long enough to institutionalize them. As more and more architects and firms invest more and more time, money, and effort into particular ways of using computers, these practices will become resistant to change. Now is the time to decide if computing is developing the way we think it should.

The true state of computing in practice has been largely obscured by a concentration of interest on large firms. According to the AIA 1989 survey on computing, not only do a much greater proportion of large firms use computers than typical firms, but they also use computing for more activities. The impression created is that computers are ubiquitous, that computer-aided drafting is quite common, and that computer-aided design applications are rising at a steady pace.

Yet, over 90 percent of architectural firms have fewer than 25 people in them. The typical architecture firm has a total complement of about four people, two or three of whom are architects. Almost all the CAD literature in the popular architectural press, however, recounts the experience of a small number of huge firms.

When the survey evidence is corrected to take into account the distribution of firms in the profession, the picture we get is that wordprocessing is extremely common (done by 75 percent of all firms), followed by financial management (about half of all firms). Computer-aided drafting is uncommon (done by one-third of all firms), and computer-aided design is almost nonexistent (done by about one in ten of all firms). We should note that only about 15 percent of all architects have some experience with CAD. Further, in spite of the claims that CAD systems are intended as tools to enhance the design abilities of architects, there are twice as many nonarchitects (presumably drafters) in practice laboring with mouse and keyboard as there are architects.

The profession as a whole has decided to use computers pretty much as any small business would. Even the large firms for whom computing has proved attractive beyond standard business applications have declined to follow the vision of CAD systems operated by architects.

If the focus on large firms has caused an unfortunate confusion in describing the current computing scene, it is not entirely without warrant. Our profession is undergoing a slow, but pronounced structural change, stratifying into a few enormous firms and a large number of very small ones. The large firms are commanding more and more of the income flowing into architecture. Of the more than 13,000 architectural firms in the United States, the largest 200 alone now account for more than one-third of all receipts, a proportion that has increased markedly over the past 20 years.

The Economics of Computing

There is one obvious reason why a firm might want to use computers: to do things more efficiently, that is, to increase productivity or to reduce costs. Work by economists at the Brookings Institution has shown that, at the level of economic sectors or industries, computers have failed to do either. Their study of the most heavily computerized sector in the world, the American finance sector, has shown that its productivity per person is about the same as it was in 1950. Studies of other sectors of the economy show spectacular falls (yes, falls) in productivity whenever computers are introduced. Computers, it has been said, appear everywhere but in the productivity figures.

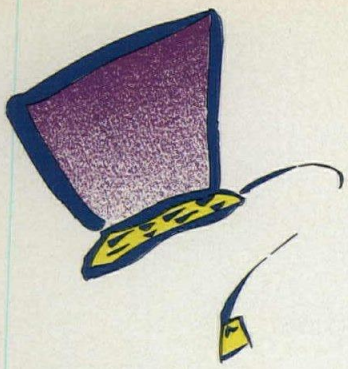
CAD is a process technology used to produce a good. David Noble first showed in his book *The Forces of Production* that firms do not acquire new process technologies mainly for economic reasons. It is true that the acquisition is justified in economic terms, but justifications are not the same as motivations, and economics can obscure the latter and serve as after-the-fact rationalizations. Noble showed that in the past 200 years, technologically precocious firms did not prosper through low prices and new products, but through high prices and innovations in marketing and organization.

Several studies of the acquisition process of CAD equipment show that the process goes like this: It starts with a product champion (in multidisciplinary firms, invariably an engineer) who is given complete responsibility for choice, implementation, and evaluation. One of the most common findings is that these champions quite cheerfully admit to researchers that the economic rationale they devise is constructed to justify the purchase no matter what. This is usually quite easy to do if one relies on vendors' bloated productivity claims. The next step is a brief investigation of two or three systems, followed by a few perfunctory tests and then purchase. One study of firms whose CAD purchases averaged over $5 million each revealed an entirely ad hoc acquisition process. And although all decisions have a veneer of economic respectability, at heart they were based on hunches, faith, and a delight in technology for its own sake. Finally, study after study has failed to find a single CAD-using firm in engineering or architecture that has ever bothered to conduct a comprehensive post-purchase economic evaluation of their system. Most firms simply do not know how their systems affect profitability.

But surely, if CAD systems are not cost-effective now, they will be one day? Yes, they will. Looking at the history of automation technologies from the steam engine and the electric dynamo to the automobile assembly line, it seems that new process technologies reach a break-even point with older methods after 30 to 50 years. There is no doubt that CAD will one day be cost-effective. The point is that economic efficiency cannot be the reason behind the use of CAD now.

Computer Benefits

Computers do have some benefits. One important benefit is that computers assist some firms to increase their market. There are two ways to do this: by grabbing new markets through new services, or by expanding into old ones through increased market share. Computing does seem to allow an industry to generate a few more services, but the effect is not as great as might be



"Studies of other industries reveal not a more equitable distribution of wealth following computerization, but an even greater concentration in the large and wealthy companies."

thought. The extreme paucity of CAD use is a testament to this; architects are, quite simply, not expanding their design services with computers, even in large firms. However, there is one notable exception to the architects' lack of interest in design tools, and that is image-generation programs that produce dramatic perspective images of a building. Why have these succeeded, and the multitude of other design tools failed, to capture the imagination of architects? Because they impress clients. They are excellent marketing tools, and firms can use them to expand their market share.

But – and it is an important "but" – this does not imply that small firms will thus be placed in a better economic position vis-à-vis larger ones. Although it is thought that computers, and especially micros, have provided power to more individuals and organizations, the most extensive users of micros are in fact those organizations who have been traditional users of large computers. In architecture, the most intensive computer users are precisely the very large firms who have been longest involved in computing. Studies of other industries reveal not a more equitable distribution of wealth following computerization, but an even greater concentration in the large and wealthy companies.

How Computers Affect Firms

What else do computers do? Studies of computer use in a large variety of firms from several industries reveal the same patterns. Typically, the first functions to be computerized, and the ones which remain dominant, are those that facilitate control over resources, especially funds and personnel. In one extensive study of firms in New York, it was found that many applications were used to implement long-standing goals of management to exercise better control over human processes in their organizations. Computing provides deeper and fuller access to the inner workings of the firm than was possible manually, enabling management to reach deeper into the life of the organization and thus control practice more fully. And what have architecture firms done? They have, first and foremost, automated office functions. Large firms also automate the documentation process. CAD systems enable much more sophisticated monitoring of drafting, and provide greater control over the work of the drafter.

The issue of whether CAD is a deskilling technology, much debated ten or so years ago in the architectural literature, is largely a red herring. Some people like to use CAD systems, and regard them as ways of upgrading their skills, others do not. One clear trend that has emerged, though, is the typecasting of CAD system users, whether they be architects, engineers, or drafters, as CAD operators. Given that CAD systems are being used almost entirely as production drawing systems, their operators find themselves permanently stuck in front of the machines. Rotation to design tasks is uncommon, as the skills they have acquired are too valuable to be let sit idle. I find that young graduates with CAD experience are actively concealing their experience from new employers after a few years in front of the screen, for fear of never designing again .

The fact is that CAD experience is not a skill senior management is acquiring. I do not believe they ever will. Architects have always been streamed into two broad categories, the few senior design architects and the many junior documentation architects. CAD systems only reinforce this distinction, and design architects are no more likely to use these machines than executives are to fire their secretaries and type their own memos on wordprocessors.

The Image of Computing

There is a third and final reason to use computers. Computers are potent symbols of progressivism. It is generally assumed that "computerization" of any process necessarily makes that process better. Indeed, CAD so bedazzles the bureaucratic mind that some corporations and government bodies have made CAD use mandatory for their architectural consultants, obliging firms otherwise uninterested in the technology to purchase the systems. Architectural patrons believe that the construction industry is technologically backward and grossly inefficient. CAD systems impress the money men as one solution to this.

CAD is not really about better design, or about economic efficiency. It is about gaining market share and controlling people. The sooner the profession realizes this, the more effective it will be in using computers.

Garry Stevens ■

The author is an assistant professor in the School of Architecture at the University of Notre Dame. His most recent book is The Reasoning Architect.

How to Select a CAD System

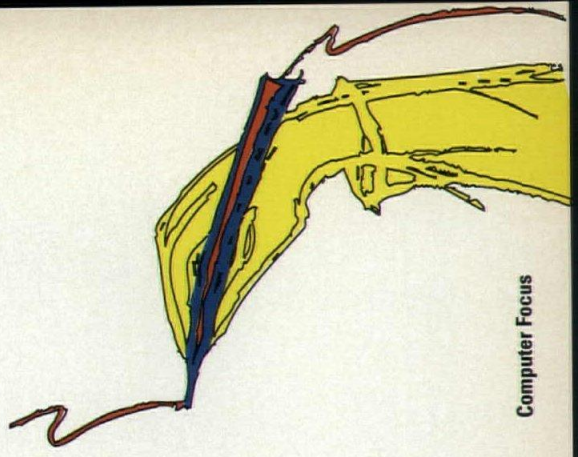
CAD works. Depending upon the hardware and software, CAD can be productive. Even small part-time practices can justify a CAD purchase, especially with the advance of microcomputers, because of savings of production time. Statistics show that 30 to 40 percent of the Architectural/Engineering (A/E) offices have some type of CAD system, and at least 50 percent of these firms are satisfied with its productivity, sometimes cutting drawing time by more than half.

So why is CAD not working for many A/E offices and government agencies? Why do these firms and agencies lack this productivity on their existing system? Why do some shy away from using any CAD system at all? There are various reasons – knowing others' bad experiences, high initial costs – but the most probable reason is the fear of failure. The goal in using computers in a professional office is to enhance productivity. When investment in a system fails to produce the desired results, the tendency is to obscure the original goal to justify the investment.

Why do CAD Systems Fail?

Typically management is blamed for the failure of CAD in the A/E office. If the system does not live up to expectations, it is commonly thought that office managers have failed to commit sufficient time and resources to establishing the CAD system.

The truth is that there are still relatively few people in management positions who understand CAD and who have knowledge of more than one system. Without this knowledge they find themselves in a difficult position to make



"The most important criterion in determining which system to buy is productivity. Less important... is to know which system is the 'de facto' standard in the industry."

decisions about CAD investments. Often, buying a system before knowing exactly how it will be used can be costly. As with any capital expenditure, lack of research prior to investment can lead a firm into financial crisis, even bankruptcy, if it squanders money on useless products.

How to Compare Systems

The most important criterion in determining which system to buy is productivity. Less important, I think, is to know which system is the "de facto" standard in the industry, or how compatible one system is with others. (What good is that knowledge if you can't use the system efficiently?) Besides, most programs today have import/export capabilities, enabling the user to transfer files between different programs and systems.

The major parts of a productivity analysis should be: (1) learning curve, (2) system usability, (3) time required to complete a given task, and (4) cost. The learning curve is the time required to learn the software and to be productive with it. The older, command-line CAD programs on PCs are hard to learn, while Macintosh-based software seems to teach itself. The Navy recently conducted a study on PC training costs and found that the average yearly training cost per PC is $410; the same for the Macintosh is only $48.

The usability of a system depends on whether the features/tools one wants to use are available on the program, whether they are easy to use, and how quickly projects can be drawn using the program. Often "high-end" programs have hundreds or even thousands of features, but most architectural staff members will use less than half of the features available on "low-end" products for. Thus, intelligently designed, generic programs tend to be more useful than feature-laden ones. They are easier to learn and faster to operate.

The last part of the productivity analysis is cost. The dedicated CAD systems with expensive display consoles common in the 1970s did not produce anything better or faster than today's Macintoshes and PCs. These earlier systems cost hundreds of thousands of dollars. Complete CAD systems can be purchased today for less than $10,000, and prices are coming down.

Start Small

There may be no ultimate solution to buying a CAD system, but here are some guidelines: The most important rule is to start small. Invest only in a system that increases productivity enough to pay for itself. To be productive with CAD you have to be able to draw with it as fast as you can using traditional methods. Since almost every architectural project has some repetition, the machine's ability to do such work fast should produce enough savings to pay for itself in a single project.

Also, when buying a computer, start with the software. While a company may want to sell you its software and its workstation as a package, ask whether it will pay for itself. Can you use the computer for other tasks in addition to drafting? CAD, even though it is increasingly used for design, is still primarily a drafting tool. But there are other uses for the computer, as well, which can add to your productivity.

Beware of Too Much Control

Computer needs for professionals depend on the work they have to do, their training, and their ingenuity. As more and more firms make PCs or Macs available for employees, they must provide full computer support for these users.

The danger here is that firms will institute controls in lieu of such support. The number of computer managers tends to grow as the confusion in the company created by the purchase of nonworking systems grows, but in reverse proportion to actual computer productivity. And these managers, to justify their existence, tend to institute rigid controls instead of working closely with the end user to provide what support they can. So keep the number of computer support personnel to a minimum.

Also, beware of consultants who offer to control your CAD operations. They tend to justify your investment (so that you feel good about it) and convince you to make a long-term plan for its use (with their help, of course). If your CAD is not profitable, is a financial drain, or has proved frustrating to use, you have probably bought the wrong system for your operations. Get rid of it. Sell it as soon as you can, because it loses its value day by day. From the proceeds of the sale buy a system which pays for itself. You should not hesitate to upgrade to new CAD software packages if they can do more in a simpler, faster, and friendlier way than your old package did.

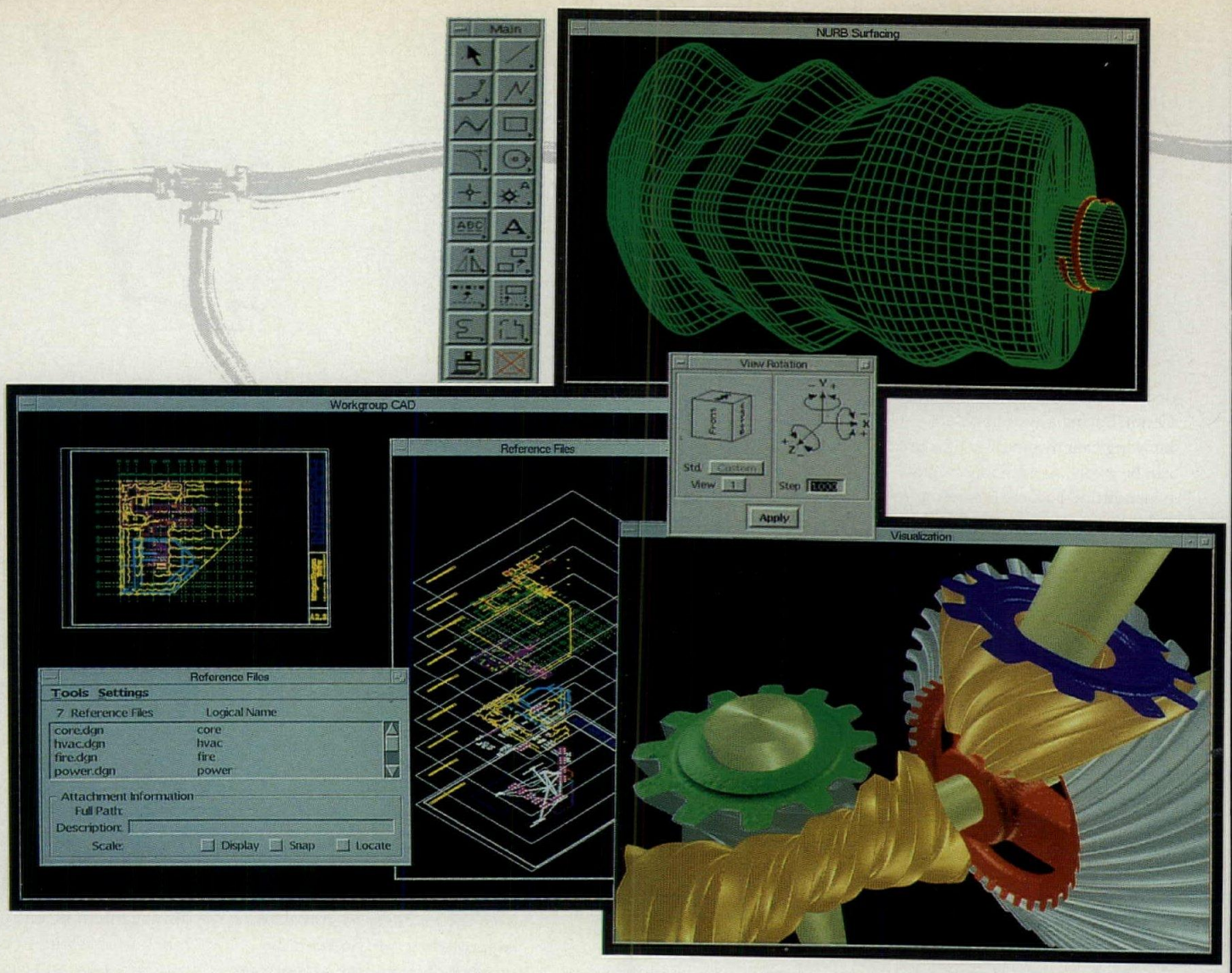
Finally, write good, enforceable contracts for prompt replacement of faulty equipment. If your system fails, you cannot afford to wait for repair, or worse, wait for your support group to find and fix a bug in the system.

Productivity, Not Uniformity

People in different positions will use the computer differently, and people have different aptitudes for mastering certain programs. Some people will work best with an alphanumeric system and others with a graphic system. Experience shows however, that you cannot be a casual user of the alphanumeric system, while most graphic systems will feel more natural.

If management wants to help employees become more productive in their work, it should give them tools that build on their previous training and experience. Management often spends too much time trying to automate routine tasks, and too little trying to augment the staff's professional capabilities. Rather than enforce uniformity and provide the same "state-of-the-art technology" for all (which is not only a myth in the fast-changing world of computer technology, but can make some valued employees feel obsolete), management should realize that there are numerous "off-the-shelf" products available in today's computer market, specifically designed to enhance the professional's productivity. Any computer and associated program that make professionals more productive in their work should be available to them, because the goal is productivity, not uniformity. **Emil Kish** ■

The author is an architect in Kensington, Maryland, who teaches CAD.



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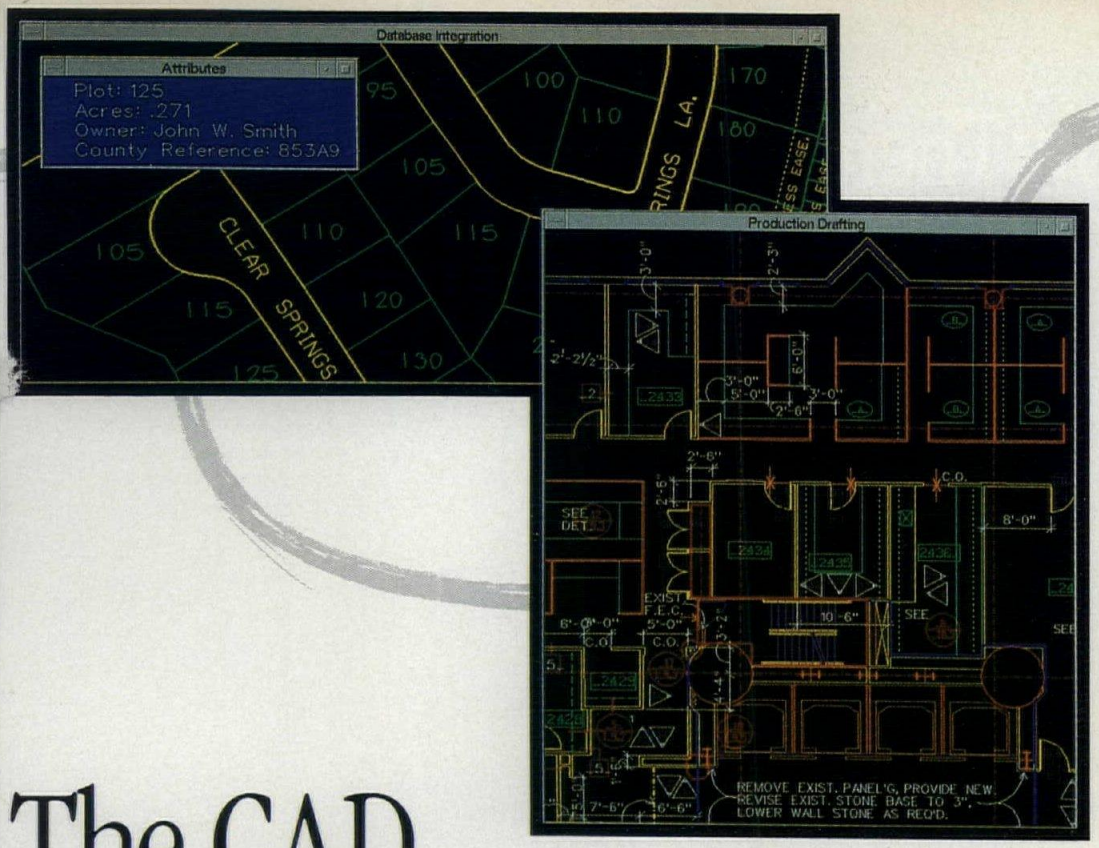

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CAD for Workgroups
Networks in the Architectural Firm

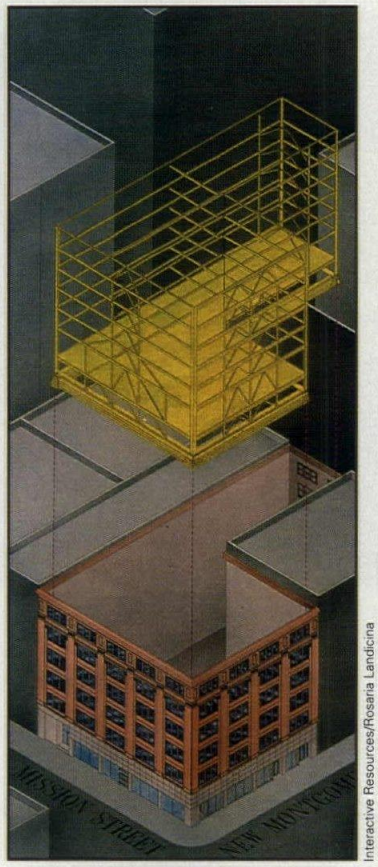
Architect and computer consultant **Mark Lauden Crosley** profiles two architectural firms that have implemented CAD networks and the systems they use – AutoCAD and CADvance.

Imagine an architectural firm with no central drawing storage: no flat file where a designer can go to look at a drawing, and no way to find it. Now imagine the firm without tracing paper, vellum or mylar: no way to overlay one drawing on another. This is the paper-based equivalent of a firm with a PC CAD system, but without a computer network and network-oriented software.

An architectural office with unconnected PCs depends on the dreaded sneaker network. Often it's a challenge to figure out who's working on a drawing, and in the worst case two or more people realize that they're working on a different version of the same drawing. It's difficult, too, to view someone else's work at your own computer – by the time you've made a copy and loaded it, it may have been changed. And as disks are passed from desk to desk, they may be misplaced, file names can be mysteriously mangled, and chaos reigns.

While a networked CAD system may not solve all your problems – any more than a flat file or tracing paper would – it can make life a lot easier. It enables you to keep a single copy of each drawing on a central computer, called a server, and to control access to it. Only one person at a time can work on it, but others can view it as a "reference file," and use it as an underlay for their own work. Base drawings can be archived to prevent modifications. The network software, which is ideally invisible to users, automatically handles plotting and printing for the entire firm, queuing up requests as they arrive.

A well-planned CAD network has another benefit, too. It enables a project team to divide a project into parts based on, say, spaces, floor levels, or disciplines, and then share these parts with relative ease. Thus, a new level of coordination and communication is possible, which can support a much higher level of cooperation among the workgroup members.



Interactive Resources/Rosaria Landicina

A 3D model of a structural retrofit was created by Interactive Resources using CADvance Software. Color was added later.

Nevertheless, a network must be planned and managed carefully. Above all, it's vital to use appropriate software. In this article, we'll look at two firms that have had success with CAD networks, then take a closer look at the networking capabilities of two widely used CAD programs, AutoCAD and CADvance.

Networking CADvance at Interactive Resources

Interactive Resources is an architectural and engineering firm in Point Richmond, California, across the bay from San Francisco. They began using CADvance in 1985, and when they installed their third CAD station, they realized they had a problem. "It got ridiculous," says the firm's computer manager, Karl Grossner. "People were wandering around shouting 'Where's that file?' and 'I need to see what's going on here!' The computer was starting to change the way we were working, not for the better." They made two big changes. A fast laser plotter was purchased to make it easy to plot drawing check sets, and they installed a network for all the computers in the firm.

Charles Beavers, an Interactive Resources principal, says "I wanted to adapt the computer system to the way architects work, not vice versa. We 'multitask' – going back and forth from one job to another. Karl has customized CADvance, our databases, and word processing so that anyone can use them, any time, without having to be a software expert. The network is the key to it all."

Interactive Resources now has about 50 employees and 48 computers, linked by Novell's NetWare 386. Grossner estimates that only half the employees know anything at all about "operating" a computer; some don't even know there's a network. People think of the network as a "big hard disk," from which they can retrieve any files they need. Interactive Resources uses few of Novell's data security features, though each user has a private directory on the server. There's never been a problem with people mangling each other's work, intentionally or otherwise.

Beavers says that reference files are CADvance's nicest network feature. " We spend less time explaining changes and passing around revisions. A revision is just there on a drawing when someone else calls it up as a reference file. There's only one copy, and everyone who is referencing it can see it." This is particularly important in a firm like Interactive Resources, where in-house engineers use architectural files as base drawings.

CADvance's concurrent licensing has made it possible for Interactive Resources to pay for 11 copies of the software at a significant discount, and share them among 22 architects, engineers and drafters, as needed. "Instead of having to keep each station as busy as possible" says Beavers, "we can be part-time CAD-workers, just using it when we need it. That's how architecture *should* be done, right? You use a tool when you need it, and it's as if CADvance were sitting there on the network, waiting for you when you're ready."

AutoCAD at VZM

Vickerman Zachary Miller is a multidisciplinary firm that includes architects, and structural, civil, mechanical, and industrial engineers. VZM has grown from a staff of 3 to over 50 since 1980, and they have taken great care to maintain the kind of team attitude that is possible in a small office. They view their computer system as an important tool in achieving this goal.

VZM installed its first three AutoCAD systems in 1985. It

"... VZM is a democratic kind of firm. Decisions are generally made by consensus, and the people are 'networked' in every manner."

became clear that passing disks around was not a good way to coordinate work. When VZM renovated new quarters at Oakland, California, in 1987, they installed cabling for a Novell network. Currently they have linked twelve 386-based AutoCAD stations, other PCs for non-CAD work, and Macintoshes for graphic design. Virtually all the professional staff are "CAD literate."

Willis A. Gortner, the Director of Architecture, says "We've broken through the 'CAD operator barrier.' It's essential to have a computer on every desk; people use them for everything. And they need to share access to the same files." The open access policy has not resulted in conflicts or data loss. Only rarely has VZM protected sensitive files by placing them in restricted directories, since password protection is not available for individual files.

The key to VZM's successful CAD networking, according to CAD coordinator Rose Vigdal, is the firm's use of standards. She has orchestrated the establishment of conventions for layers, symbols, plotting, and other CAD issues, while extensive standards have been set up for workstation configuration. As a result, any designer can work on any drawing without having to decipher someone's else's work, and people can easily sit down at any workstation and begin working. "This is important," adds Gortner. "People wear more than one hat here: They do design one minute and engineering the next. The CAD system has to support this kind of mode-switching and file-sharing."

Network management is shared among several people, so that no full-time administrator is required. A consultant is responsible for installing, maintaining, and upgrading hardware, and he works with individual coordinators who are responsible for the software for separate areas, such as CAD, graphic design, word processing, and accounting. The data files on the server are backed up automatically every night, and maintenance is performed on weekends. The server has been "down" for only four working hours in the past several years, though production manager Ed Castillo points out that they realized how dependent they were on the network during those four hours.

Vickerman Zachary Miller

Vickerman Zachary Miller designers Sara Anne Towery and Max Peyan use AutoCAD on Novell Netware 286.

VZM eagerly awaited AutoCAD's Release 11 with enhanced networking support. They are beginning to use its reference file capabilities, which they feel will be useful in dividing large projects into manageable chunks that can be worked on by individuals. Vigdal says some retraining is required: "People aren't used to the idea of seeing more than one file at a time." The firm has had some difficulty with AutoCAD's file locking system and its method of logging the name of the current user: users have been temporarily unable to access their drawings or start AutoCAD due to accidental corruption of files.

Gortner emphasizes that VZM is a democratic kind of firm. Decisions are generally made by consensus, and the people are "networked" in every manner. The links between the computers are, he says, a natural extension of a network that would exist without any computers.

Comparing Systems

CADvance, from ISICAD, and AutoCAD, from Autodesk, both have features that are geared to networking. In order to further evaluate these features, we installed both programs on a Novell NetWare 386 network, consisting of an Arche Technologies Legacy 386-33 server, an Arche 486-33 workstation, and an NEC Prospeed 386SX laptop, hooked up with Ethernet connections.

CADvance (Version 4.0) was easy to install on the server, and could be configured differently for each station. Memory management software was required to free enough memory for the program. CADvance requires a copy protection device, but only one is needed for the entire network. It allows a specific number of users at a time, using "floating licensing": They may be at any computer on the network. ISICAD's licensing includes tiered discounts for multiple users.

ISICAD touts its certification of CADvance with specific networks, currently NetWare and Lantastic. CADvance is smoothly integrated with these systems, and is tested by ISICAD to be close to bulletproof. While CADvance also runs on other networks, no claims are made for certification on these.

We found that CADvance handled most of the file-sharing requirements of a network with ease. When two users tried to access the same file – whether a drawing, a macro, or a support file – only one access at a time was allowed, avoiding conflicts. When access to a drawing is denied, the current user is identified, so that the locked-out user can request access. CADvance can also put a "wait" on a file, so that it loads as soon as it is released by another user.

CADvance has built-in message-sending capabilities, displaying messages from one user directly on the drawing screen of

"It became clear in our interviews and testing that networked CAD is far superior to the chaos of the sneaker net."

3 Network Feature Comparison

	AutoCAD	CADvance
Single copy of software on server	Yes	Yes
Site licensing	Yes	Yes (w/ quantity discount)
File locking	Drawings	All files
File passwords for drawings	No	Yes
Messaging across network	Text mode, via network	All modes
Plot queuing	Via third party software	Yes (Built-in)
Number of reference files at one time	Unlimited	8
Number of layers per reference file	Unlimited	255
Ability to reference a file in use	No	Yes
Database capabilities	Via third party software	Direct link to dBase; SQL built-in
Offload tasks to server	Via third party software	Database searches, hidden line removal
Type of network support	Non-specific	Certified for Netware, LANtastic

another. A password can, optionally, be assigned to a drawing to restrict access to authorized individuals. Also, plots are automatically queued by the network, without user intervention.

There are several features available specifically to users of NetWare 386, even those using 286 PCs: First, CADvance can extract data directly from a server-based database using SQL procedures, which we find useful for maintaining facilities records. The same database is available to all users, but SQL enables them to conduct intensive searches on the server, without tying up a designer's workstation or requiring the entire database to be downloaded to the workstation. Second, hidden line removal tasks can be sent via the network to another workstation, allowing the designer to continue working while this time-consuming task proceeds.

CADvance allows users to view up to eight reference files at a time, with up to 256 layers each. The visibility and ability to snap to individual layers of each reference file can be controlled via a menu. A user may reference a file that is currently in use without difficulty, and it can be updated at any time to reflect changes made at another station. This feature proved particularly important in a workgroup setting.

AutoCAD (Release 11 for DOS/386) is sold with a network license for a specific number of users, with no discounts for multiple users. Installation requires some tinkering and in-depth knowledge of the network. AutoCAD, like CADvance, can run on most networks, but the documentation explains that no specific networks are "supported." We found that with patience, some fine-tuning can be done for a particular network, though the manual explains little about specific networks.

Instead of using a network's file-locking capabilities, AutoCAD has its own system for protecting drawing files. Used properly, the system is effective, but a clumsy shutdown or power failure can make a drawing temporarily inaccessible until the file lock is deleted. (If this file is accidentally deleted, simultaneous access to a drawing is possible.) Other files (symbol and non-drawing) may be placed in read-only directories for protection, though this can lead to difficulties with some third-party software. No password option is provided. Plot queuing can be performed indirectly if the network (or a third-party program) provides the appropriate utilities.

AutoCAD allows an unlimited number of reference files, with an unlimited number of layers. This enabled us to divide a project into very small subparts, which proved useful on a complex 3D model and a multidisciplinary, multilevel set of plans. They can also be nested, with, say, a bathroom referenced in a housing unit plan, which is referenced in a building plan. Layers in a reference file can be turned on and off individually, but the settings are not retained from one session to the next; a macro is required to reset a specific layer configuration.

Unfortunately, it's not possible to reference a drawing that is currently being worked on. This is a major AutoCAD limitation. Likewise, while it is possible to update a reference file to reflect changes that have been made by another user, this cannot be done if the file is still being used elsewhere.

Drawing management can prove difficult with large numbers of reference files, and third-party developers have marketed several programs for keeping track of AutoCAD drawings. To date, though, the major developers of architectural add-on software for AutoCAD have yet to produce network-oriented enhancements.

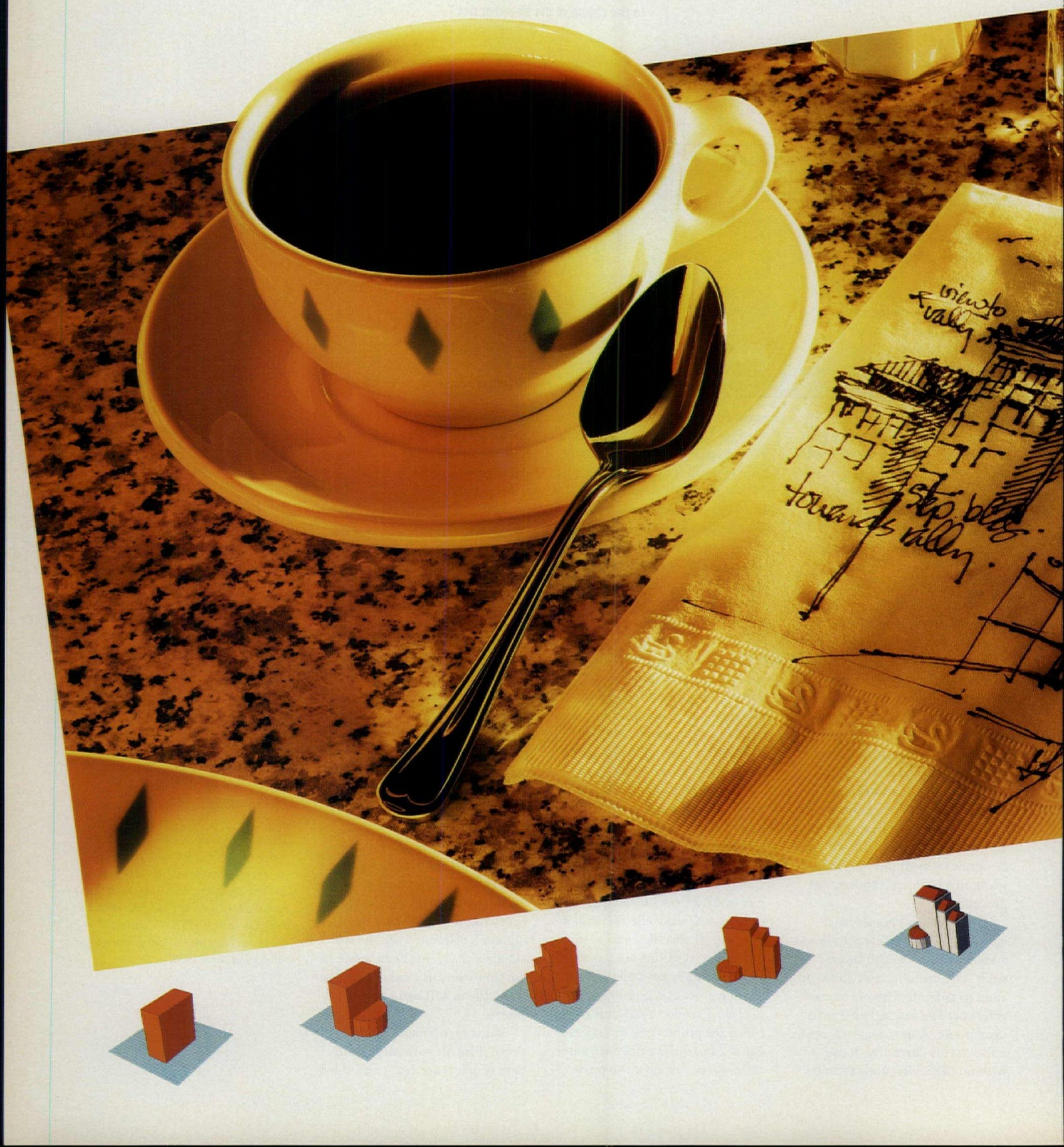
Both CADvance and AutoCAD include features that make a network installation useful to any firm with more than a single CAD station. These are both complex products with many other facets, but CADvance has a more mature network interface, particularly for Netware and LANtastic users. ISICAD has integrated CADvance into the network environment, while Autodesk has left much of the work to users and third-party developers. AutoCAD's lack of network-specific features requires some compromises, and should be networked with caution. CADvance can be networked without reservation.

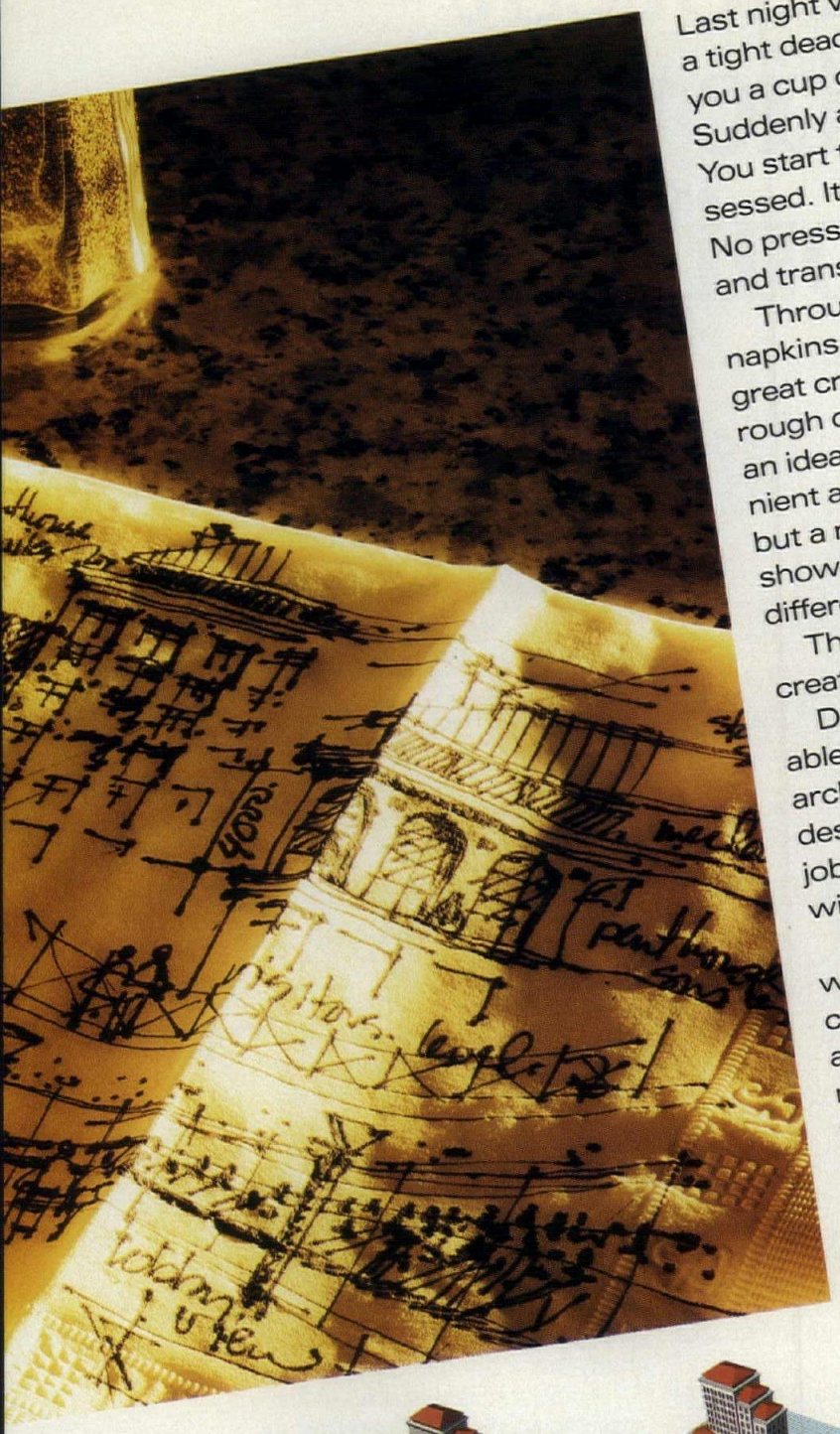
It became clear in our interviews and testing that networked CAD is far superior to the chaos of the sneaker net. We found that well-conceived software and a well-managed system promote cooperation, and architecture is, after all, a team sport.

Mark Lauden Crosley AIA ■

The author has an architectural practice in San Francisco and is a computer-aided design consultant to architectural firms and software developers. He represented the AIA on the CAD Layering Guidelines committee and is the author of The Architect's Guide to Computer-Aided Design *(Wiley and Sons, 1988).*

On paper it's just an idea.





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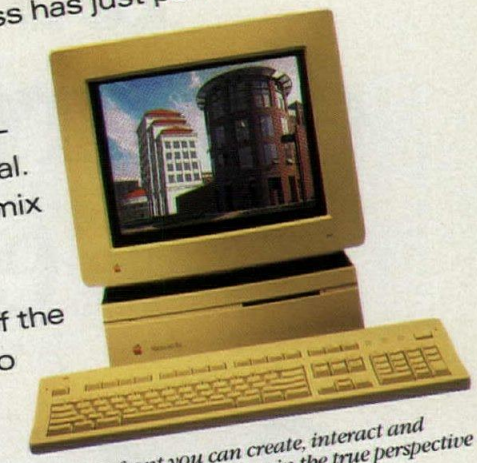

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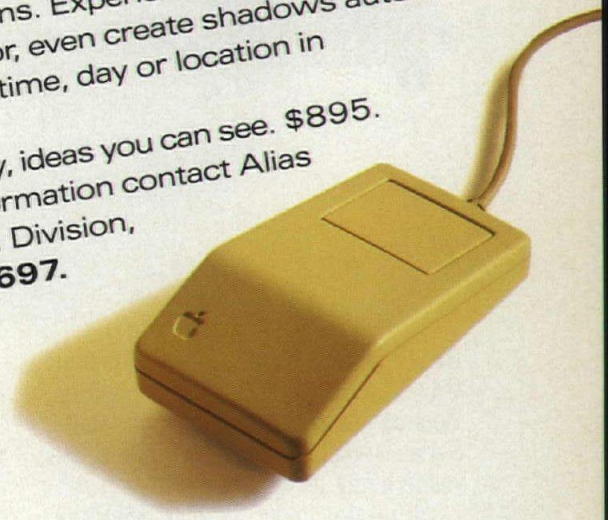

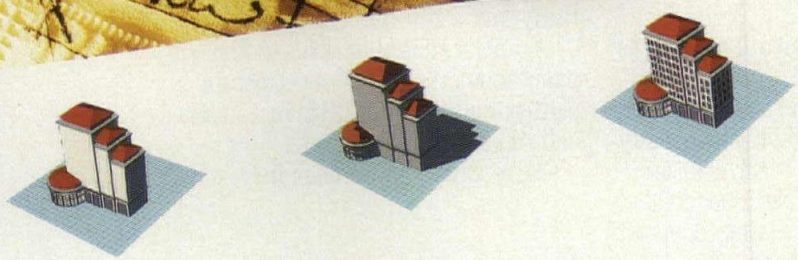

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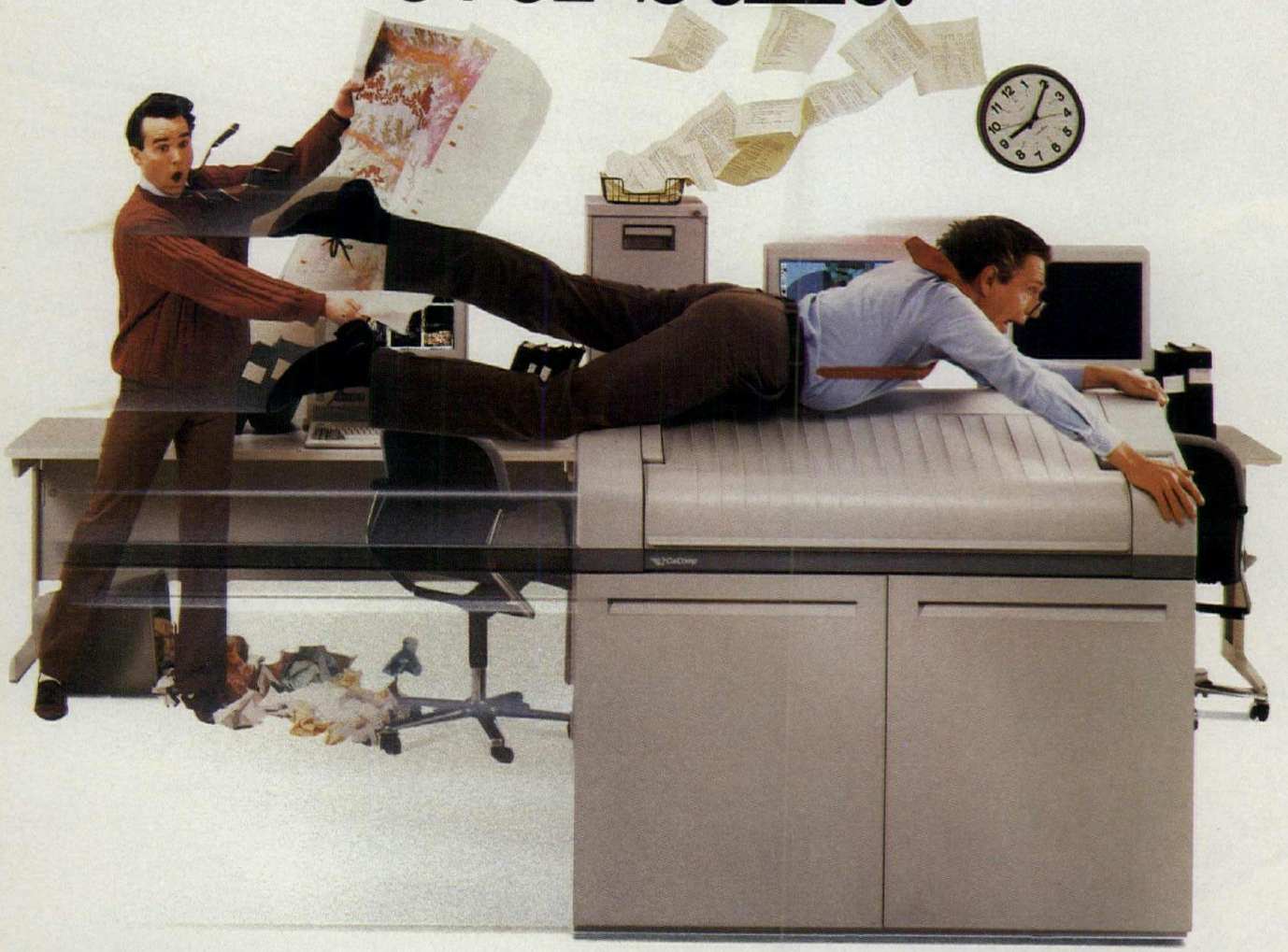

Buckle your seat belt and return your tray-table to the full upright position. Because with CalComp's new 68000 Series, 400 dpi color electrostatic plotter, you're going to fly.

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Plotting speed is awesome too–a head-spinning 2.0 ips.

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Of course, you can run in cut-sheet mode, too.

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Reliability is excellent. And CalComp supports you with a **1-year on-site warranty** and a full line of supplies.

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CD-ROM Databases for Architecture

Michael Chusid discusses the effect

CD-ROM technology will have on architectural design and specifications.

Our troops in Operation Desert Storm went to war armed with 1,300 CD-ROM computer drives loaded with thousands of pages of maps, an entire Jane's military equipment catalogue, including diagrams, (and) voluminous procedure manuals. With an arsenal of design databases now available in CD-ROM format, architects can use the same weapon in their battle against the "paper storm" of information besieging the construction industry. The new databases include fast and convenient access to industry standards, product information, and programs to enhance architectural productivity. And the cost of CD-ROM readers has fallen to the point where most design offices can afford to put one on their front lines.

CD-ROMs are essentially the same as the now familiar compact disk (CD) audio recordings, but contain computer-readable information instead of digitally recorded music. Each CD-ROM contains up to 650 megabytes of data, equivalent to 1,800 floppy diskettes or as much as 250,000 typed pages, allowing an entire library to be stored on a single 4.7-inch-diameter disk. The large storage capacity of a CD-ROM is especially important to architects because it makes possible the distribution of graphics, which consume more computer memory than is practical to distribute via floppy diskettes. Several of the databases take advantage of this feature to distribute CAD libraries and bit-mapped photographs and product illustrations. In the future, animation, audio, and multimedia presentations will also be available on CD-ROM.

How a CD-ROM Works

A CD-ROM functions as a gigantic floppy diskette, except that the information is "read-only memory" (ROM). This means that data cannot be added to or erased from a disk by a user, a feature which makes a CD-ROM a reliable medium for storing archival reference material. Data is optically inscribed inside a plastic disk and is more durable than magnetic media. Once a CD-ROM is mastered, reproduction costs are as low as two dollars a disk, making frequent replacement with updated disks affordable. CD-ROM drives, the pieces of equipment that read the disk and feed data into a computer, are available from under $500 and are offered as standard equipment on many brand-name computers sold through department stores and discount chains. Most CD-ROM disks are compatible with MS-DOS personal computers that many architectural firms already have, but be sure to check hardware compatibility before you buy any software.

While CD-ROM technology is impressive, its laser disks are just a convenient distribution package. The distribution package will undoubtably change as even more advanced systems for mass storage or on-line transmission of data become practical. The important development is that a vast quantity of architectural data is being converted to electronic media. While distributed on a CD-ROM now, the data can be easily translated to other media in the future.

Effects on Practice

The conversion of data to electronic media can lead to improvements in architectural practice. For example, the speed and thoroughness with which CD-ROM databases can be searched can reduce the professional staff time spent looking for information and can potentially result in more complete searches. While some CD-ROM disks have a hefty price tag, they generally cost less than comparable hard-copy references. By reducing the expense of organizing and maintaining a library and cutting the cost of the space and utilities dedicated to bookshelves, CD-ROM technology makes it feasible for even a small firm to enjoy a complete reference library. Furthermore, a CD-ROM is ideal for consolidating the proliferation of engineering programs, expert systems, and CAD details that are now available to the building team. Architects who are quick to integrate these new electronic tools into their practices may even be able to parlay them into a competitive marketing advantage.

The Construction Criteria Base

The most extensive architectural CD-ROM database is the Construction Criteria Base (CCB), published by the National Institute of Building Sciences (NIBS). Containing 2,000 megabytes of information on four laser disks, the CCB includes virtually all Federal agency publications on construction, such as guide specifications from the Corps of Engineers, Naval Facilities Command, General Services Administration, NASA, Department of Veterans' Affairs, and other agencies; Federal construction cost estimating systems; design guidelines; CAD libraries; engineering manuals; OSHA regulations; Architectural and Transportation Barriers Compliance Board Uniform Accessibility Standards; EPA regulations; and much more. By bringing together all these documents for the first time, NIBS hopes to increase inter-agency cooperation to reduce redundant construction regulations. CCB also includes construction documents from the private sector, including reference standards from nearly 100 construction trade associations: from the Air Conditioning Contractors of America to the Wood Moulding and Millwork Producers Associ-ation. The American Institute of Architects' MASTERSPEC, BOCA National Code, and SSCCI Standard Code also are available at an additional cost to pay these organizations' royalty fees.

The CCB database contains full text and is searchable by key word or phrase in less than five seconds. Text can be processed within CCB using SPECSINTACT, the government's specification processing program, or translated to most word processors. Where documents include graphics, these can be viewed with pan, zoom, and print capabilities. The CCB is easy to use, updated quarterly, indispensable for architects doing government work, and reasonably priced at under $1,000 per year. I recommend it to all architects who use technical references and standards in their work.

Eclat

If CCB is an encyclopedia of references and standards, then Eclat is an encyclopedia of product information. Its name, which means "great brilliance, as of performance or achievement" is appropriately chosen since it represents a quantum leap forward

"Architects who are quick to integrate these new electronic tools into their practices may even be able to parlay them into a competitive marketing advantage."

in the presentation and manipulation of building product information. Eclat is one of the first systems to successfully integrate product selection, text, graphics, and computational capabilities into an elegant, easy-to-use platform. It takes advantage of MicroSoft Windows 3.0 software to enable text and graphics to be cut and pasted into specifications and product data sheets in ways that were not previously possible. Using a mouse for "point and click" convenience, Eclat should find acceptance even among architects who have until now resisted computers.

Eclat includes "electronic binders" from leading manufacturers of furniture systems, mechanical and plumbing products, and electrical and lighting products; other divisions are being added and additional manufacturers are signing up at a rapid pace. Herman Miller, Bradley Corporation, Lightolier, and USG Interiors are a few of the firms already participating in the program; because manufacturers pay to be in Eclat, the system is being distributed without charge to qualified designers.

With Eclat, users can either go directly to a manufacturer's catalog or search for a product using generic criteria. Similar products from competing vendors can be quickly found and compared, and product attributes selected. As in a printed binder, manufacturers can include product descriptions, photographs, drawings, test reports, price sheets, and other pertinent information, but unlike print catalogs, Eclat can link related information in an intelligent way, so that all information about a particular product can be viewed at one time. Expert systems and design calculations also can be built right into Eclat. For example, photometric data can be calculated at the same time fixtures are being selected.

CONI

CONI (CONstruction Information), a joint venture of the Construction Specifications Institute and CAD Information Systems, is organized into four databases. MANUFACTURERS can be searched by name or keyword to find addresses and phone numbers for home offices and field sales representatives. PRODUCTS can be searched by brand names, model numbers, or product attributes; once a product is identified, scanned images of the manufacturer's catalog can be viewed. ORGANIZATIONS provides addresses and phone numbers for a large number of industry organizations and can be searched by name, acronym, or keyword. Finally, DOCUMENTS contains guide specifications from CSI's SPECTEXT, the Corps of Engineers, Naval Facilities Command, and NASA, and the full text or scanned pages from more than 20 standards-writing groups including ASTM. While CONI has been in development for several years, it remains a frustratingly incomplete database and demonstrates the enormous task of encoding the full range of construction information. Since product literature will be entered into CONI without charge, manufacturers should be encouraged to participate. The current release contains information from divisions 15 and 16; a release later this year will expand these areas and will launch into Divisions 7, 8, and 9.

Systems for Specifiers

Specification writers are among the greatest beneficiaries of CD-ROM technology. In addition to the specifications included on CCB and CONI, several other specification programs are on CD-ROM. With SuperSpec, a specifier uses checklists to record and coordinate design decisions in a natural manner as they are made throughout the design process. Checklists are then sent to SuperSpec via mail, fax, or modem, where project information is fed into a mainframe computer and specifications are compiled and returned for final review and editing. SuperSpec checklists are included in Eclat.

SPECSystem, formerly SweetSpec, is now available on a stand-alone CD-ROM and can be used on a personal computer without connection to a host computer. The program's "expert system" engages a user in a question-and-answer session to identify specification requirements. SPECSystem compiles and formats a specification which can be further edited if required by the project. It also generates an audit trail and coordination notes to aid project quality control. Nearly 400 specification sections are available on SPECSystem's CD-ROM, including Divisions 1–16.

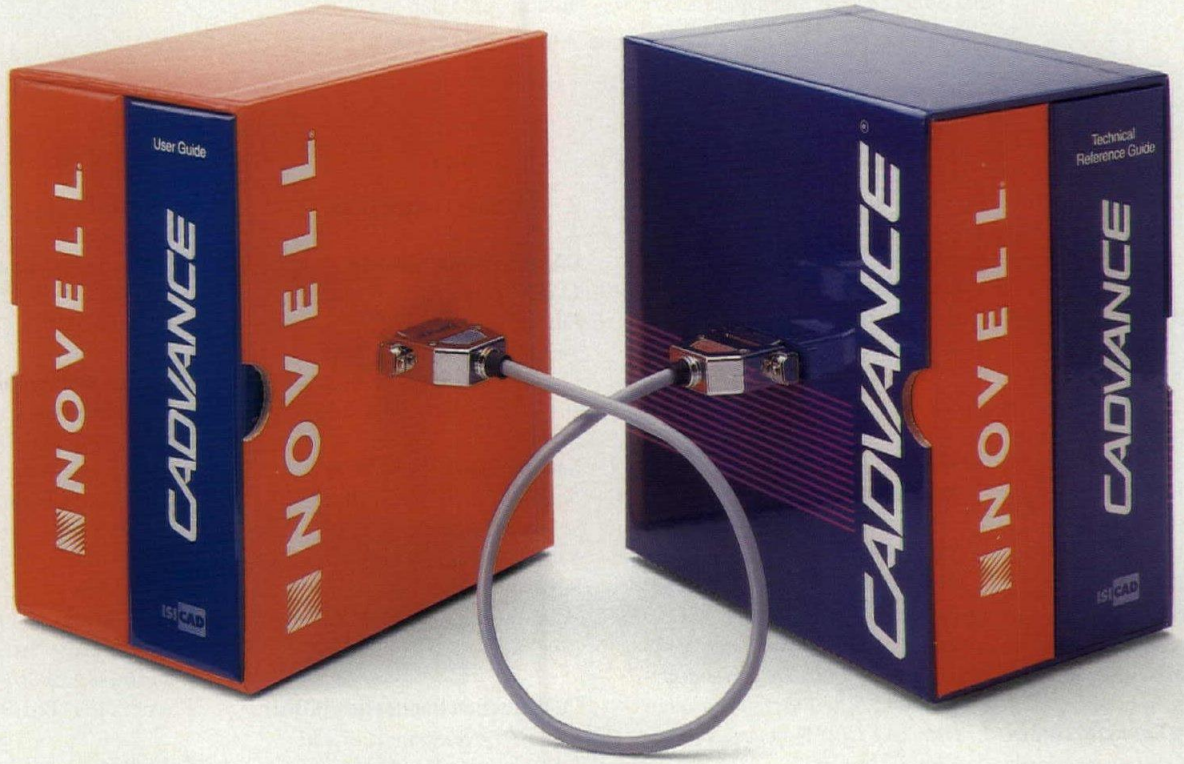
CAP (Computer Aided Planning, a division of McGraw-Hill) is redefining information management in the contract furnishings industry. Its CD-ROM combines a database of 200 catalogs from over 40 manufacturers with software to facilitate a full project cycle from design to specification, budgeting, ordering, and inventory control. It is meant to be used by dealers, manufacturers, and facility managers as well as by designers. The program also contains links to AutoCAD which enables users to pull systems components out of the database to assemble full-color, 3-D drawings of work stations or other environments.

McGraw-Hill also publishes Electronic Sweet's with SweetSearch, an electronic index to products in Sweet's catalog files. Since it is distributed to every office receiving Sweet's General Building files, Electronic Sweet's has been instrumental in creating architectural awareness of CD-ROM technology. An extensive collection of product selection templates allows a user to define desired product criteria to close in on products that fit the defined attributes and their location within Sweet's. After looking up a product in SweetSearch, a user must still hunt down the Sweet's hard copy volume and manually type or redraw data into the computer. In my opinion, SweetSearch would be more useful if it included catalog page images and data which a user could manipulate directly.

Indexes and Other Uses for CD-ROM

A visit to a large public or university library will make apparent the significant impact of CD-ROM technology on bibliographic research; CD-ROM programs, with their fast search capability and Boolean logic, have gone a long way towards replacing static reader's guides and indexes. ICONDA (International CONstruction DAtabase) covers the world's literature on construction, civil engineering, architecture, and town planning. Citations are compiled by the International Council for

PERFECT FIT.



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"CD-ROM programs, with their fast search capability and Boolean logic, have gone a long way towards replacing static reader's guides and indexes."

Building Research, studies, and documentation from 750 journals from over 30 countries. By combining keyword in a search, such as "STRESS CORROSION" and "FASTENERS" and "FAILURES," I was able to locate in minutes relevant articles and dissertations which had eluded me in weeks of conventional research. Architects practicing overseas can also locate industry standards on CD-ROM indices published by Information Handling Services: **Perinorm** contains British, French, and German standards and can be referenced in three languages, while **Worldwide Standards Index** contains summaries of standards from 380 international organizations. There are also worthwhile CD-ROM databases on education, healthcare, and other industries in which architects work..

Architectural firms will also be able to avail themselves of other CD-ROM systems. **Intergraph**, for example, uses a CD-ROM to distribute software for its CAD work stations. **ImageCels** by Imagetechs offers over 1,000 photo-realistic images of building materials, finishes, textures, and landscapes on a CD-ROM which can be used with 3D computer modeling and rendering programs. There are also extensive CD-ROM libraries of clip-art that can enhance desktop publishing. For contractors, material-safety data sheets on CD-ROM can simplify compliance with job site safety regulations. Some forecasters predict CD-ROM drives may become almost as common as fax machines. If this happens, the medium could become practical even for distributing bidding and construction documents.

If you have been waiting to purchase a CD-ROM drive until hardware prices fall and good software is available, your wait is over. Besides, there is an important side benefit of owning a CD-ROM drive: When it is not in use for computing, you can always plug in a set of headphones and listen to music.

Michael Chusid ■

The author is a consultant in electronic media for building products and will speak on the subject during NEOCON® 23 at the Chicago Merchandise Mart on June 11, 1991. He is president of Chusid Associates, with offices in Oklahoma City, Oklahoma, and Glencoe, Illinois.

Additional Information

CAP-Electronic Sweet's
CAP-Electronic Sweet's
Div. of McGraw-Hill
169 Monroe Avenue, N.W.
Grand Rapids, MI 49503-2651
(616) 454-0000

Construction Criteria Base
National Institute of Building Science
1201 L. Street, N.W.
Suite 400
Washington, DC 20005
(202) 289-7800

CONstruction Information (CONI)
A Joint Development of The Construction Specifications Institute and CAD Information Systems
655 S. Revere Parkway
Englewood, CO 80111
(303)799-1311

Eclat
Eclat
7041 Koll Center Parkway
Suite 220
Pleasanton, CA 94566-9820
(415) 484-8400

Intergraph
Intergraph Corporation
Huntsville, Alabama 35894-0001
(205) 730-2000

ICONDA
SilverPlatter Information, Inc.
One Newton Executive Park
Newton Lower Falls, MA
02162-1449
(617) 969-2332

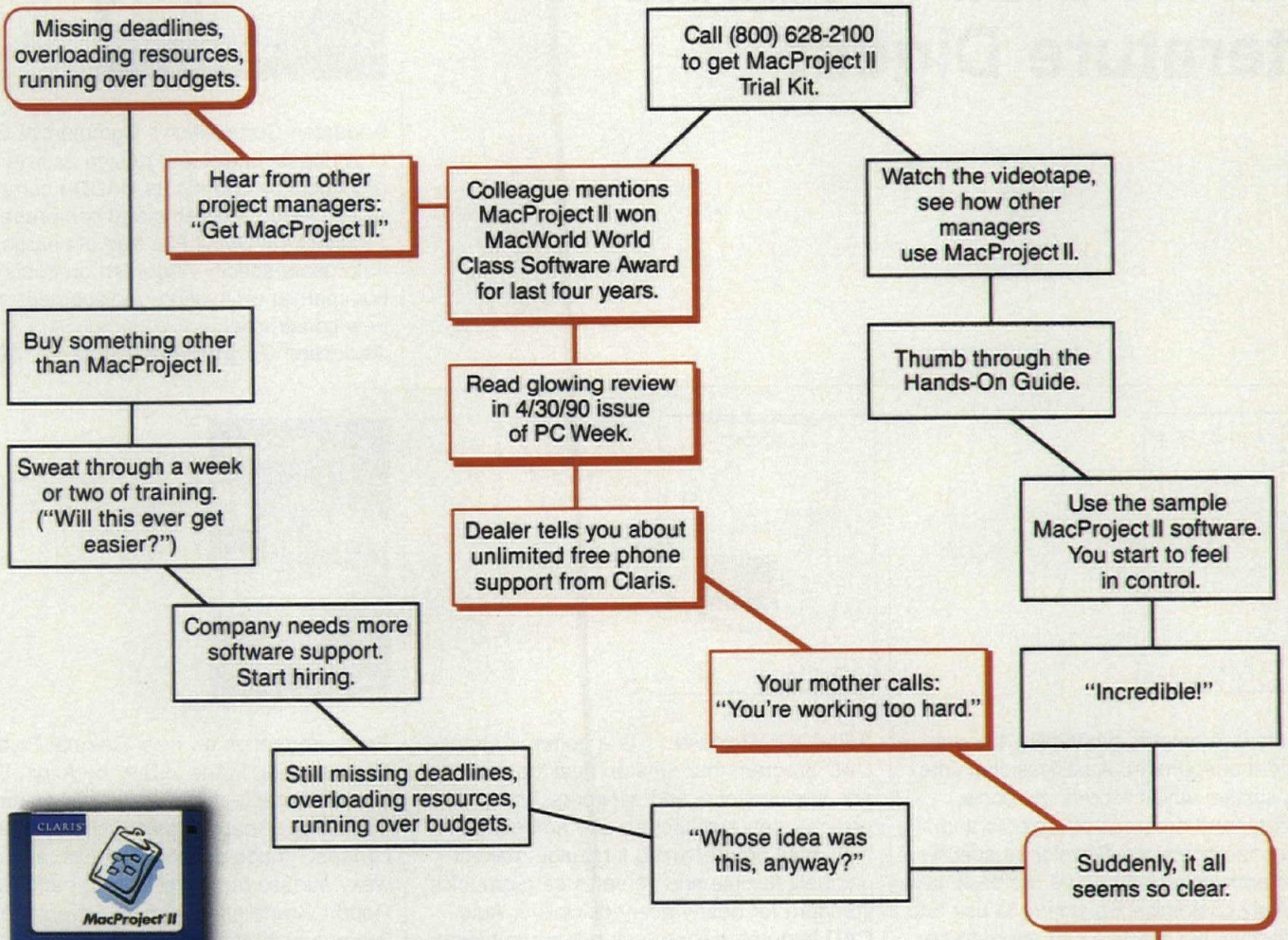
ImageCELS
Imagetects
7200 Bollinger Road, Suite 802
San Jose, CA 95129
(408) 252-5487

Perinorm and Worldwide Standards Index
Information Handling Services
15 Inverness Way, East
Englewood, CO 80150
(800) 241-7824

SPECSystem
SPECSystem
999 Peachtree Street, NE
Atlanta, GA 30367-5401
Phone: (404) 881-9880

SuperSpec
SuperSpec, Inc.
1660 Prudential Drive
Jacksonville, FL 32207
(800) 359-7732

Why 9 out of 10 project managers follow this path.



Oh sure, a few take other paths. But for 92%* of those who buy project management software for the Macintosh, all roads lead to MacProject® II.

Right out of the box, MacProject II will have you scheduling, managing, and controlling projects of any size. Even if you've never so much as blinked at this kind of software before.

And yet, there's nothing simple about its capabilities. For instance, there's no limit to the number of tasks, subprojects, resources, and customized resource calendars you assign to a project. On a network, MacProject II lets different people update their own subprojects, all linked to a master file that can be reviewed by the entire project team.

Also, you can manage dozens of projects simultaneously by gathering resource information into a single file.

And an exclusive MacProject II feature —called Interactive Resource Leveling— practically eliminates the possibility of overloading your staff.

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To that end, we've prepared a Trial Kit that includes a videotape overview, sample software, and tutorial guide.

To order your kit, just give us a call at (800) 628-2100 Ext. 36, and we'll beat a path to your door.

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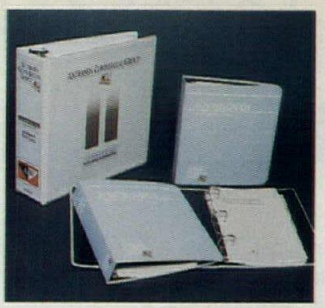
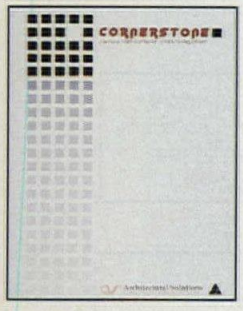
For a hands-on demo, see us at A/E/C Systems Booth 1637

*Source: International Data Corporation, April, 1990. †Refundable by Claris with proof of purchase. Offer good in U.S.A. only. In Canada, call 1-800-668-8948.

Computers Hardware/Software and Related Products Literature Digest



Andersen Corporation's Commercial Group provides technical and design assistance to architects by offering its CADD-I computer-aided design programs and comprehensive Architectural Detail File free of charge. Both help users specify Andersen products for commercial renovation, replacement and new construction.
Andersen Corporation. Circle No. 380



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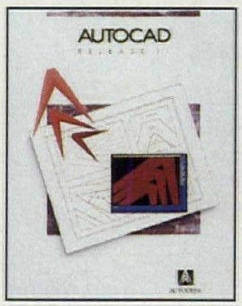
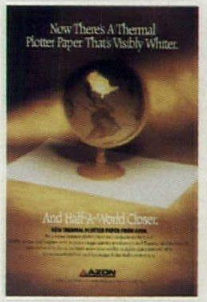


AutoCAD® Release 11 is a general purpose CAD program that runs on desktop computers, workstations, and networks. The program's open architecture and embedded high-level programming language make it uniquely flexible and versatile as a graphics standard for nearly every discipline. AutoCAD features easy-to-use pull-down menus, dialogue boxes, and icon menus.
Autodesk. Circle No. 382



Free information on new Thermal Plotter Papers made in the U.S.A. by Azon. Extremely durable, heavyweight Premium Docu-Bond® paper has superior whiteness, contrast, image density, flatness, and a non-waxy surface for better pen or pencil take. Report Grade offers similar advantages in a lighter weight paper.
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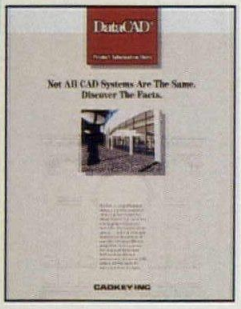

DataCAD is a sophisticated, computer-aided design program developed by CADKEY's A/E/C product group specifically for the architectural, engineering, and construction industries. DataCAD offers a high level of integration between two-dimensional drafting and three-dimensional design. Complete with a three-dimensional modeling system, DataCAD provides the editing and modeling capabilities you need. **CADKEY®.** Circle No. 384

For fast color plotting, the 68000 Series color electrostatics from Calcomp speed along virtually non-stop, completely unattended. Easy to use with front-load access, auto take-up reel, and the ability to accommodate four users, the Calcomp 68000 is ideal for high-demand environments where speed and quality are a must.
Calcomp. Circle No. 385

DynaPerspective 2.0 is a 3 dimensional modeling, rendering, and animation software for the IBM or Macintosh. This innovative software is the first, easy-to-use "sketch-pad" that lets you quickly visualize your ideas in bold, three-dimensional color. With DynaPerspective, you can turn a great idea into a showpiece for your clients.
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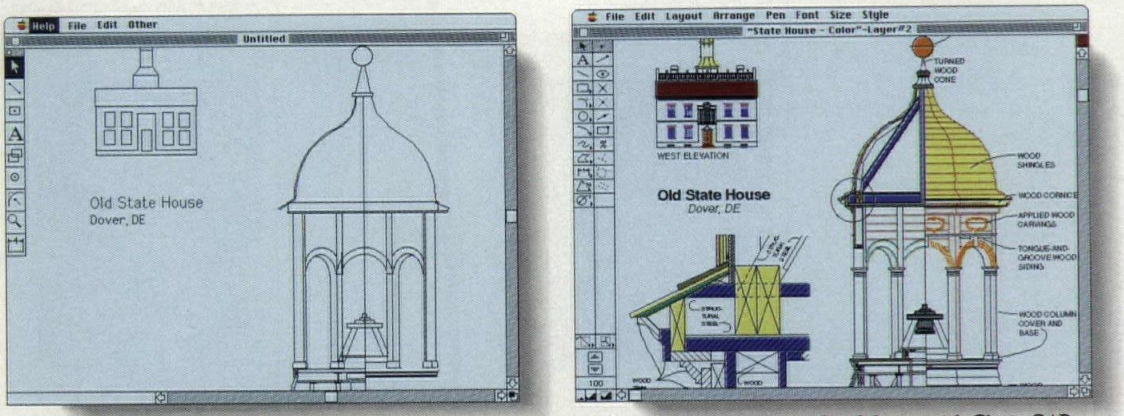

In the time it takes to get started with other CAD packages, you can be presenting your completed design with Claris CAD.

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Claris™ CAD is the fastest, smoothest way to go from concept to final working drawing. Exactly why we're consistently first in independent comparisons on features, graphics speed, and ease of use. Only Claris CAD takes full advantage of the natural intuitiveness of the Mac. So there are no confusing dialog boxes or hidden commands.

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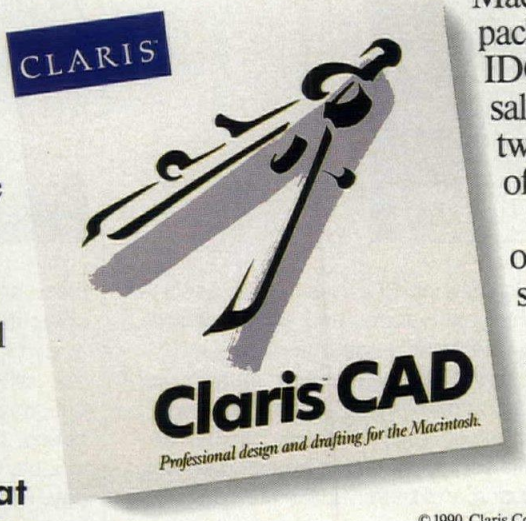

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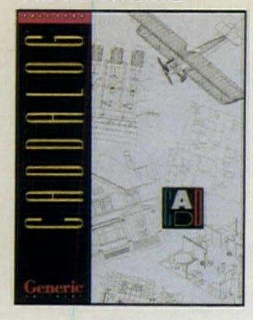
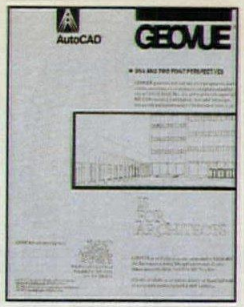


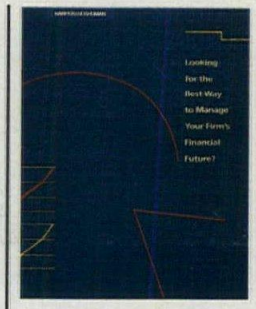
Free CADDalog™ from the leader in low-cost software. In our CADDalog, you'll get detailed descriptions of all Generic Software products you've read so much about, including: Generic CADD 2D, Generic 3D, Generic CADD for the Macintosh, and 2D and 3D Symbol Libraries.
Generic Software, Inc. Circle No. 387

GEOCAD is an architectural application to AutoCAD, containing symbol libraries and routines which create complete presentation and working drawings, including plans, details, schedules, architectural fonts, and much more. GEOCAD has a uniquely friendly graphic interface which builds on architects' skills instead of forcing them to learn new ones.
GEOCAD Inc. Circle No. 388

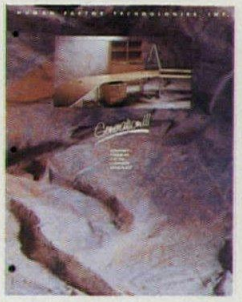


GEOVUE creates perspectives directly from two-dimensional elevations and plans done in AutoCAD or GEOCAD, without the need to build three dimensional models inside the computer. Perspectives are constructed using a horizon line, picture plane, and station point. Multiple perspective studies can be generated on a single drawing and display.
GEOCAD Inc. Circle No. 389

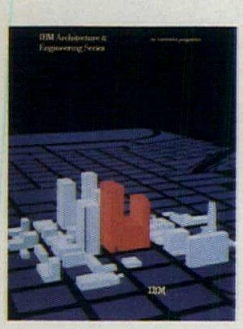
ArchiCAD is an architecturally-dedicated 2D/3D program which optimizes the creation of plans, elevations, sections, perspectives, and bill-of-materials with a fully integrated database. ArchiCAD works like architects do, assembling real elements: slabs, walls, and roofs from building components libraries. New compatability features: MacRenderMan interface, DXF exchange format, and Swivel 3D import. **Graphisoft.** Circle No. 390



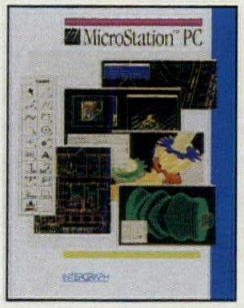
CFMS (Computer-based Financial Management System). Harper and Shuman develops, sells, and supports financial management software specifically for architects. The only system sponsored by the AIA, MICRO/CFMS runs on PCs and CFMS runs on the DEC VAX. A modular approach lets you buy only what you need.
Harper and Shuman Inc. Circle No. 391



The total solution to every computer support furniture application, Generation III. This modular furniture can be used as stand-alone tables or workstations. Height-adjustment mechanisms include electric, crank, and manual. A full range of tables, accessories, storage, and swivel arms are depicted in this 32-page brochure.
Human Factor Technologies. Circle No. 392

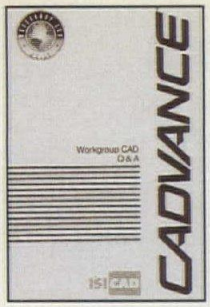


The IBM Architecture and Engineering Series (AES) is an innovative 3D CAD system with advanced tools for building design, analysis, and facilities management. With AES, users can more efficiently develop, study, analyze, and communicate their design concepts within a set of integrated applications. Combined with IBM's powerful RISC System/6000™ and Personal System/2® workstations, AES can help your firm gain the competitive edge.
IBM Corp. Circle No. 393



With MicroStation PC, version 4.0, users will enjoy the new features and enhancements, such as a graphical user interface, advanced dimensioning features, more powerful surfacing commands, Oracle database support, exceptional rendering capabilities, unparalleled programming environment for customizing and better application solutions, and much more.
Intergraph Corp. Circle No. 394

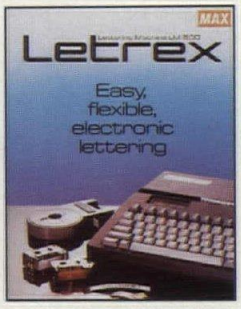
Ioline architectural plotters work with leading computers and CAD software, accept an array of media sizes, and offer multi-pen rail, rollfeed, pencil adapter, and file server options so you can tailor a solution to your needs. Choose from low-cost, single-pen models to full-featured plotters. Inquire today. **Ioline.** Circle No. 395



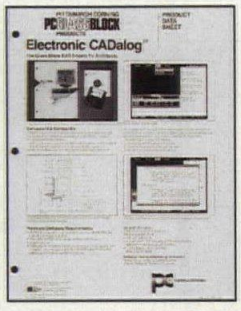
If you've wondered if you need CAD or what PC-CAD packages run on a network, then you'll want the "Workgroup CAD Q & A" handbook. It answers your questions and gives you information you need to understand how Workshop CAD can help. Compare CADVANCE, the first PC-CAD package designed for networks and certified by Novell, with other PC-CAD packages.
ISICAD, Inc. Circle No. 396

Laticrete Ceramic Tile, Pavers, Brick, Marble, and Natural Stone Installation Specifications are available on floppy disk for micro computers and word processing equipment. Micro disks for Apple Macintosh and floppy disks for IBM PC and other formats are available.
Laticrete International. Circle No. 397

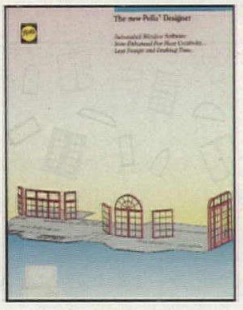
This brochure describes the Marvin Windows CAD Program and Library, designed to help architects specify wood windows. The CAD Program, written for CAD versions 2.5 to 10.0, includes two-dimensional floor plan symbols, elevations, special sizes, and a product scheduler. The CAD Library is a DXF library of standard elevations and cross-sectional details.
Marvin Windows. Circle No. 398



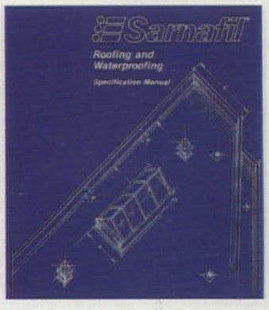
MAX Co., Ltd., introduces enhancements to its Letrex LM-500 Lettering Systems: Letrex LM-500 Super A/E System and Letrex Tape Trimmer. The new Super A/E System has the toughest tape and ribbon cartridges you can buy; lettering will not crack, smudge, or flake. With Tape Trimmer you can remove excess tape from top and bottom of labels.
MAX Business Machines Corp. Circle No. 399



The Electronic CADalog™ system from Pittsburgh Corning Corporation provides architects, designers, and specification writers with technical information, specifications, and more than 200 detail drawings and descriptions of PC GlassBlock® applications. It is available on 5¼" or 3½" diskettes for use on IBM PC or compatible computers. Minimum 512 RAM required. **Pittsburgh Corning Corporation.** Circle No. 400

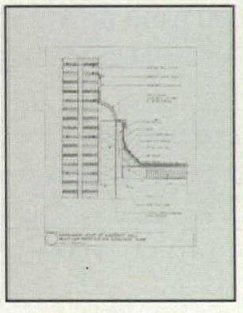


Pella®, the window manufacturer that brought you the first CAD window design package, now brings you an enhanced version of their Designer AutoCAD® package. Designer is a user-friendly, IBM-compatible, menu-driven computer program that works within existing AutoCAD or AutoCAD AEC® systems to detail Pella Products.
Rolscreen/Pella Windows and Doors. Circle No. 401



Sarnafil, a roofing systems manufacturer for over 25 years, has published an updated, comprehensive Design/Specification Manual. The lavishly illustrated, 350-page Sarnafil Design Manual includes full color cutaways of the "new" mechanically-fastened Sarnafast disk-attached system and the Sarnafil adhered, IRMA bar and ballasted systems. **Sarnafil.** Circle No. 402

LaserCAMM. Add in-house laser cutting to your CAD system! LaserCAMM is a turn-key laser cutter that integrates fully with many CAD systems. It uses a laser beam to cut and scribe a variety of sheet materials into intricate patterns. Any shape that is drawn on your CAD system can be precisely cut by LaserCAMM.
Scale Models Unlimited. Circle No. 403



The Vertex Detailer™ and Dynamics Details™ save hours of detailing time. You assemble building details rather than having to draw them using CAD primitives. Dynamic Details are pre-assembled details, ready to use and easily customizable. (Require AutoCAD.) Free demo disk.
Vertex Design Systems. Circle No. 404

Velour Texture
Manganese/Heavy

Velour Texture
Mahogany Color

Velour Texture
Manganese/Fine

Velour Texture
Butte Brown Color

Island Teal

Indian Turquoise

Sandrift

Peach Sand

Highland Heather

Pumice

Frost White Satin

Dawn Grey Mat

Palisade Blue

Mountain Blue

Terra Cotta

Misty Grey

Prairie Peach

Adobe

Architect:
J. N. Pease Associates

University of North Carolina Center for
Public Television, Chapel Hill, NC

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Progressive Architecture Penton's Video Library

An exclusive new feature for companies that want to distribute their video cassette presentations to the architectural marketplace. Only $900 per video listing.

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216/338-1078
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Video For Sale: The organization offering the video will contact you for purchase order.

Remodeling with Tile

With the Laticrete system, new tile can be put down directly over old flooring saving time and demolition costs. A video shows how marble is installed over linoleum and ceramic tile. Craftsmen demonstrate how the Laticrete Pro-Float system is used to even out the surface over the linoleum. Troweling techniques for applying adhesive thin set (Laticrete Drybond mixed with Super Flexible 333 liquid is shown) and methods for the application and clean-up of SP-100 stainless grout are also demonstrated.
Video For Sale. Free Information Available.

Laticrete International
Bethany, Connecticut

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Julius Blum ornamental railing components add traditional elegance to a variety of environments. Engineered for design flexibility and structural soundness, they exhibit superior performance characteristics, as well as classic good looks.

Providing clear and complete details of stock components, Blum's comprehensive catalogs enable the designer to specify railings for style, appearance and building economy. Engineering data is also included so that architects and designers can ensure their installations meet applicable codes and safety requirements.

Julius Blum's metal railing components are available in steel, aluminum and bronze. They are stocked in substantial quantities and ready for prompt shipment. For more information, please refer to Sweet's catalogs or call or write for Julius Blum Catalog 15.

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The Knoll Group

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New Products and Literature

1

2

3

1 Updated Textile
This cotton and polyester floral pattern was originally designed in 1934 for the Waldorf Astoria hotel in New York. It is available in several colorways.
F. Schumacher & Co.
Circle 100 on reader service card

2 Molded Wood and Steel Chair
A side chair, designed by Bruce Sienkowski, has a molded plywood seat and back in maple and a formed steel frame with a powder coat finish. It is 34⅛ inches high and 24 inches wide.
Charlotte.
Circle 101 on reader service card

3 Stylized Chesterfield
The "Apparition Sofa," designed by John Hutton, has been added to the Enchanted Collection. It measures 96″ × 38″ × 35″. Donghia.
Circle 102 on reader service card

Preview: NEOCON® 23

This year's NEOCON®, June 11–14 at The Merchandise Mart, Chicago, will focus on "political, environmental, and economic forces at work in the new business climate of the '90s." The International Federation of Interior Architects/Designers' biennial World Congress, "City 2000: A Living Laboratory of Modern Urban Design" (Chicago is the "City"), will be held concurrently, at a variety of Chicago venues.

A sampling of NEOCON® events are: "Designs of the World: The Power of Innovation" moderated by Helen Rees, Director, Design Museum of London (June 12, 8:30 a.m., Chicago Theater); "Addressing the Nation's Housing Problem" moderated by Thomas Fisher, Executive Editor, P/A (June 12, 10:30 a.m., Merchandise Mart, 13th floor showroom); and "International Symposium on Modern Architecture" with landscape architect Daniel Urban Kiley, architect Ricardo Legorreta, and Helsinki architect Raili Pietila, (June 14, 8:30 a.m., Chicago Theater).

Among exhibitions scheduled are: "A Survey of Russian Architecture" cosponsored by the USSR Union of Architects and The Merchandise Mart (Merchandise Mart); "*Progressive Architecture*'s Affordable Housing Initiative Competition" cosponsored by P/A and The Merchandise Mart (Merchandise Mart); and "Australian Architecture and Design: Beyond Tradition in the 1990s" (Art Institute). ■

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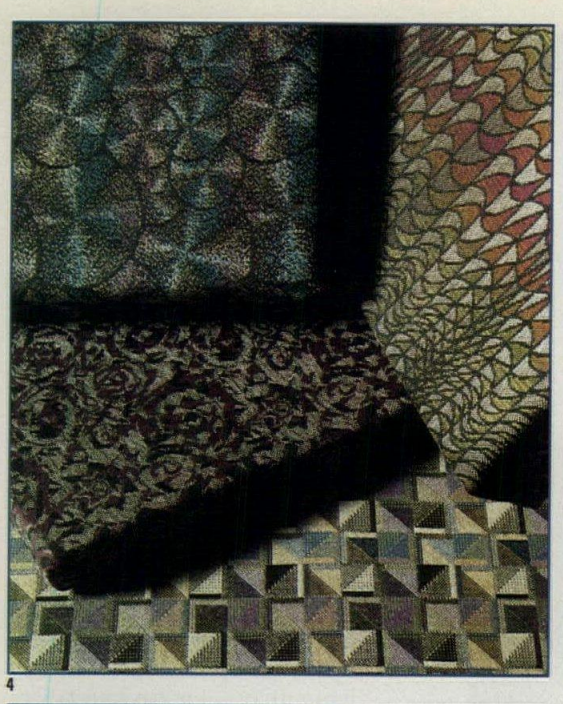

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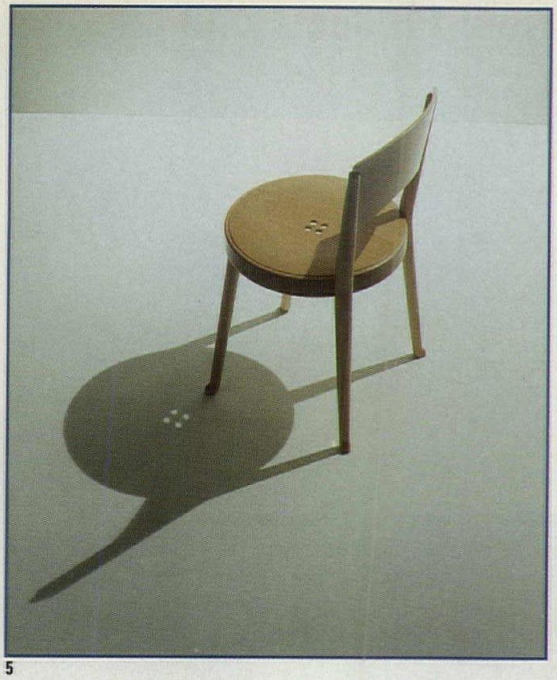

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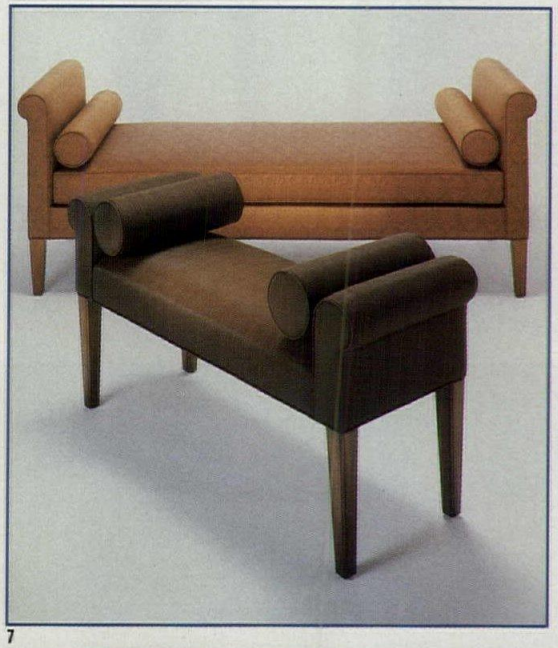

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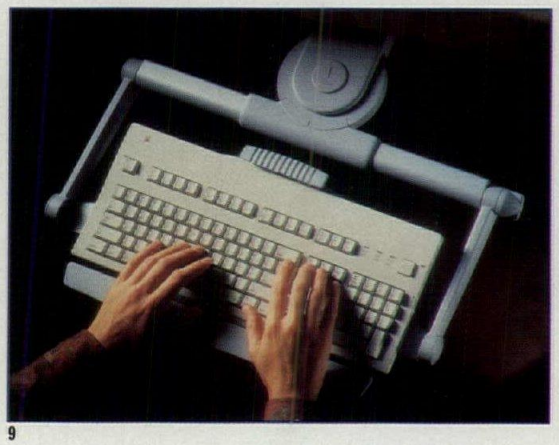


9

(continued from page 171)

4 Panel and Upholstery Fabrics
Textile designer Jhane Barnes's new "Whimsical Traditions" collection includes seven upholstery and four panel fabrics in 52 colorways. KnollTextiles.
Circle 103 on reader service card

5 Small-Scale Contract Chair
Enzo Berti's "Portofino" chair, an arm or armless side or pull-up chair, was designed as restaurant/institutional seating. It can be specified in several wood finishes and an optional upholstered seat. Atelier International.
Circle 104 on reader service card

6 Vinyl Sheet Flooring
"Possibilities" is a new commercial vinyl sheet flooring designed to have the appearance of carpet. It is available in three patterns and ten colors. Armstrong World Industries.
Circle 105 on reader service card

7 Day Beds
Shelton, Mindel & Associates, Architects, New York have designed a collection of upholstered furniture called "Arboretum." The "Linden" series of daybeds is available with one or two roll arms, bolster pillows, and a single seat cushion. A sofa may also be specified. Jack Lenor Larsen.
Circle 106 on reader service card

8 New Lounge Seating
Robert Arko's "Albion Lounge" series includes lounge chair, loveseat, and a three-seat sofa. Metropolitan Furniture Corporation.
Circle 107 on reader service card

9 Keyboard Support System
This articulating keyboard support "tool" has tilt and height adjustability, and height adjustable palm rest. It accommodates keyboards up to 10″ × 22″, attaches to worksurfaces of 20-inch depth minimum, and can be moved 20 inches to left or right. It may be ordered in Chalk or Meriorite. Details.
Circle 108 on reader service card

(continued on page 174)

Artemide®

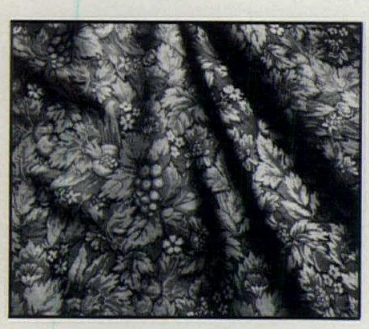
ASTREA

Chandelier from the new "Milano-Torino" lighting collection designed by Turin architects Toni Cordero and Pietro DeRossi.

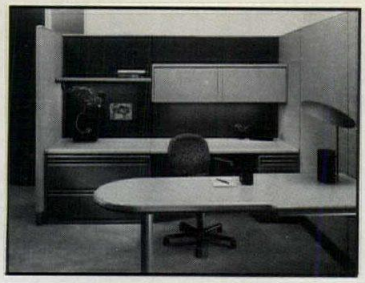
For information and catalog material call Artemide ☎ 1.800.359.7040

(continued from page 172)

NEOCON® Products

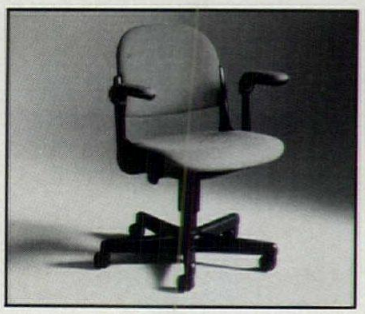


French Tapestry Design
"Canterbury Tapestry" has a motif of grapes, berries, and leaves. Three colorways are available. Brunschwig & Fils.
Circle 109 on reader service card

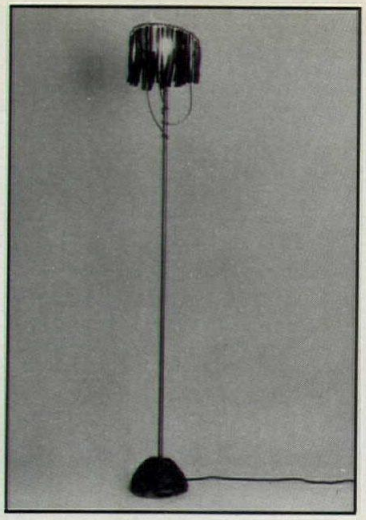


New Systems Furniture
This new office furniture system designed by Otto Zapf offers: rounded edge detail; wood, glass, fabric, and acoustical panel inserts; 12 accent colors; two-point panel lock systems; post-installation electrical and data conversion anywhere on panels; laminate worksurfaces with molded vinyl edge; panel and seating fabrics designed by Deepa Thomas; 8 paint finishes; and built-in task lighting. Allsteel.
Circle 110 on reader service card

Coordinated Carpet Collection
A new collection of coordinated texture patterns from Lowe's Carpet Corporation in Anso® IV HP nylon includes "Tassel Braid," "Velvet Square," and "Silhouette"; each is available in 24 colors. Everlock anti-microbial backing is standard. Allied Fibers.
Circle 111 on reader service card



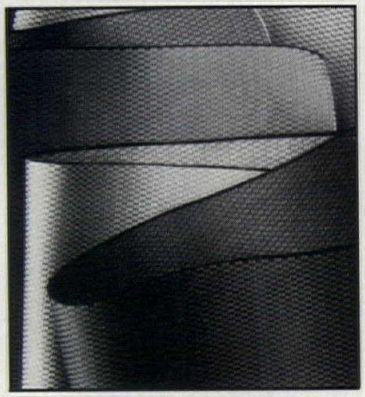
Operational Chair
The "Piretti Collection," designed by Giancarlo Piretti, now includes the Operational Chair. Arm or armless versions are available. KI.
Circle 112 on reader service card



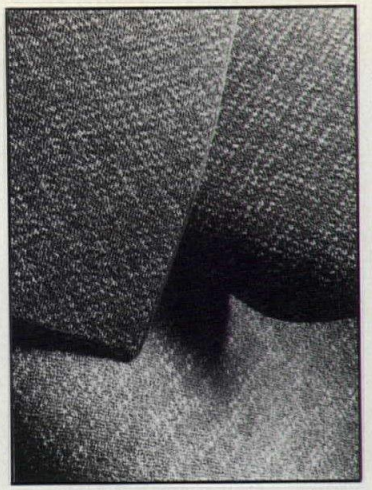
Metal and Glass Floor Lamp
Architects Toni Cordero and Pietro Derossi have designed the "Priamo" floor lamp as part of the "Milano-Torino" collection. A diffuser in white polycarbonate material, with blue cathedral cut glass, is housed atop a zinced metal pole and raw brass base. Artemide.
Circle 113 on reader service card

Mobile Computer Stand
The "Commuter" mobile computer stand, designed by Paul Siebert and Koji Hikawa, has a sliding top, accessory shelf that slides to the left or right of the top surface, adjustable interior shelves to hold a printer and other accessories, and is available in several finishes. A single cable connects the computer and printer to a building's power source. Steelcase.
Circle 114 on reader service card

"Relay" Furniture Brochure
Geoff Hollington's recently introduced "Relay™ Furniture" (P/A, September 1990, p. 161) group of freestanding pieces is described and illustrated in a new brochure. Herman Miller.
Circle 200 on reader service card



Silk and Cotton Fabric
Mark Pollack's "Merlin" fabric is 24 percent silk, 31 percent cotton, and 45 percent polyester and is available in five colorways. Pollack & Associates.
Circle 115 on reader service card



New Commercial Carpet
"Palisades" is a commercial carpet from Blue Ridge Carpet Mills tufted of yarn-dyed Zeftron® nylon and solution-dyed Zeftron 500® nylon. The carpet carries Zefwear® Ten-Year Limited Wear Warranty and Zefstat® Anti-Shock Limited Warranty. BASF Carpet Fibers.
Circle 116 on reader service card

Computer-ready Desk
A new keyboard drawer is among the upgraded features in the existing line of computer casegoods. It is made from thermoformed black plastic and can be locked into place. Nova Office Furniture.
Circle 117 on reader service card

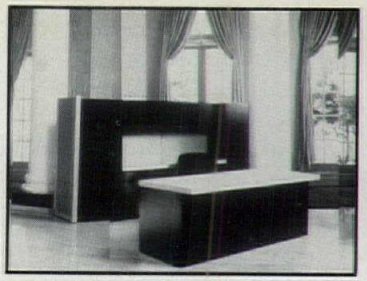
1930 Sofa Design
This sofa, designed in 1930, has a solid hardwood frame covered with polyurethane foam, Italian nut wood feet, and foam and natural goose-down cushions. Palazzetti.
Circle 118 on reader service card
(continued on page 176)

(continued from page 175)

"Ergonomic" Chair
"Primar" is a new line of "ergonomic" swivel and conference chairs with pneumatically adjusted seat height, independently adjustable and lockable seat, and backrest inclination. Constructed of lightweight polymers, the chair is said to be easily moved. Girsberger Industries.
Circle 119 on reader service card

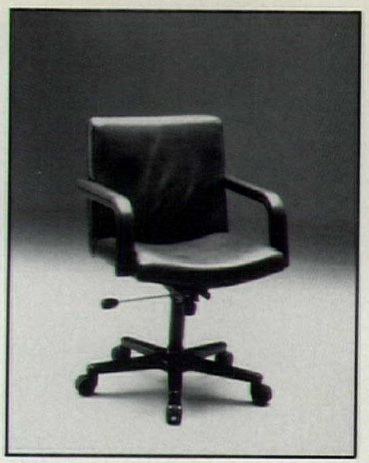
Washable Wallcoverings
Warp lays in the "Striations" wallcovering collection are treated with a water-resistant coating, making the collection suitable for high-traffic areas in institutional, hospitality, and commercial environments. J.M. Lynne.
Circle 120 on reader service card

Wright-inspired Textiles
"Pattern Winslow," inspired by Wright's Winslow House, is a rayon/cotton tapestry offered in 16 colorways. Arc-Com Fabrics.
Circle 121 on reader service card



Wood Panel System
The "Prism" wood panel office system, originally launched by CorryHiebert, is offered in several finishes and edge details. A maple and black ChromaKote finished desk and credenza and overhanging cabinets are shown above. Gunlocke.
Circle 122 on reader service card

Expanded Textile Collection
"Drive-In" has been added to Deepa Textiles' "American Pie Collection." It is constructed of Du Pont Antron nylon and is applicable for office, conference room, and public seating. Du Pont.
Circle 123 on reader service card



New Chair
A sled-base guest armchair and reduced-scale swivel office chair have been added to the senior series seating collection. A swivel/tilt mechanism with tilt lockout, tilt tension control, and pneumatic height adjustment is available. The base is cast aluminum with black epoxy finish. Kron U.S.A.
Circle 124 on reader service card

(continued on page 178)

Medallion

An exciting new design concept for your glass entrances!

Brite Vue's new Medallion Doors...a badge of distinction for your glass entrances. The innovative 2½" tubular framing presents an appearance of grandeur that is aesthetically pleasing and is a dramatic departure from the conventional designs so long in use. Framing is available in aluminum brass or stainless steel with all popular finishes.

Doors can be full framed or without vertical frame members. Tempered glass can be clear or tinted. Laminated glass is offered with PVB interlayers in custom designs as shown here.

Be among the first to give your entrances the new Medallion look. Call or write for complete information.

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Circle **No. 405** on Reader Service Card

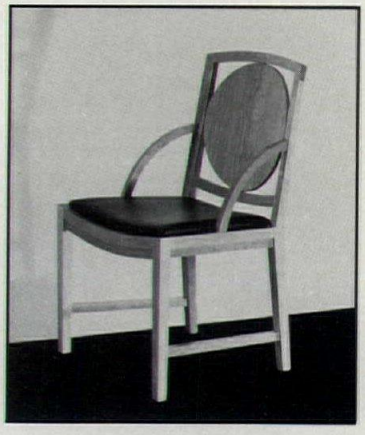
(continued from page 176)

Executive Seating
A new line of executive seating, designed by Michael Shields, has a quadra-tilt mechanism, forward thigh support, and adjustable lumbar support. Medium- and high-back executive chairs, conference, side, and task/operational chairs, and drafting stools are available. Brayton International.
Circle 125 on reader service card

New Seating Collection
Toshiyuki Kita has designed a collection of executive and task seating. Chairs have automatic height adjustment and polished or epoxy finished aluminum or chrome-plated base. ICF.
Circle 126 on reader service card

Eight-chair Seating Series
"System 18" is an eight-chair ergonomic seating series designed by Bernd Crabus. Executive, management, and task models are available with biosynchronized seat and back adjustments and a tilt-lock mechanism. Comforto, A Haworth Company.
Circle 127 on reader service card

Stacking Chair
The "Palmer" stacking chair, designed by Kevin Stark, is appropriate for conference room, private offices, dining and reception area seating. The maple frame may be ordered with standard or special order finishes. HBF.
Circle 128 on reader service card



Pull-up Chair
The "Boullée Chair," from the Ward Bennett Collection, has a solid wood frame in cherry, maple, or ash and an upholstered leather seat. It is 35″ high and 21½″ deep. Geiger.
Circle 129 on reader service card

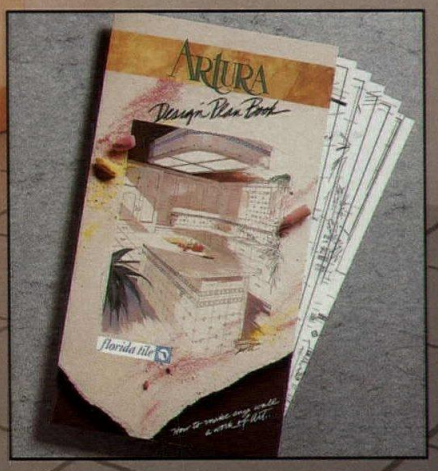
Computer Products

Construction Database
System George 4™ is a construction database with more than 200 architectural specifications and professional practice documents. The documents can be customized for any project with editing and database management software. The program also links with CAD and spreadsheet data and creates finished documents. AEISI.
Circle 130 on reader service card
(continued on page 180)

the ARTURA COLLECTION

A GALLERY OF POSSIBILITIES.

The Artura Collection from Florida Tile opens your mind to a whole new world of redecorating and remodeling possibilities. Artura can provide a home, new or old, with a look that will increase its resale value and help it to stand apart from others on the market. From the exclusive trim features to the wide variety of beautifully designed tiles, Artura lets you express your individuality. So whether remodeling, redecorating, building or selling, look into the many benefits of the Artura Collection from Florida Tile. Pick up your Artura Design Plan Book at any participating Florida Tile distributor. For the one nearest you call 1-800-FLA-TILE.



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(continued from page 178)

Plotter Paper

Graphtec has introduced a new presentation-grade paper that has a stain-resistant white coating that allows a sharper image and greater color uniformity than other plotter papers. Graphtec Precision Image.

Circle 131 on reader service card

Photo Image Library

Apply photorealistic textures, fixtures, people, and plant materials to animation, rendering, and desktop publishing packages with images from the ImageCELs® library. The CD-ROM version of ImageCELs® is compatible with most platforms. Imagetects.

Circle 132 on reader service card

Facilities Utilities

CADapult provides facilities management software modules for AutoCAD including a space planning menu system, and databases for tracking area, objects, and costs. CADapult.

Circle 133 on reader service card

Financial Management

A Macintosh version of SEMA4 financial management software for design firms includes features such as time billing, budgeting, job costing, general ledger, and a custom report generator. Sema4.

Circle 134 on reader service card

Drawing Database

It is possible to connect CAD drawings with dBase-compatible drawing files with VIEW/PLUS for electronic storage, search, and retrieval. Sirlin.

Circle 135 on reader service card

Gypsum Information

An electronic version of the *Fire Resistance and Sound Control Design Manual* allows users to transfer any of more than 300 Gypsum Association assembly descriptions and drawings into word-processor or CAD files. Vertex.

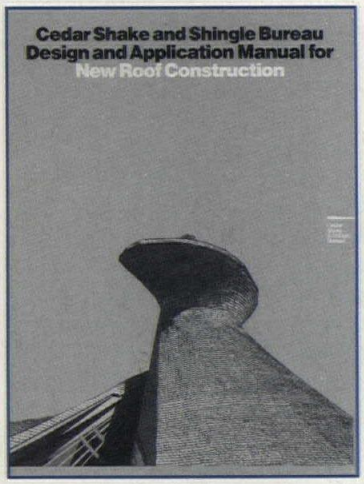
Circle 136 on reader service card

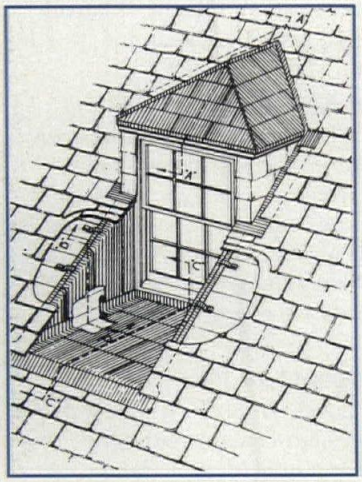
(continued on page 183)

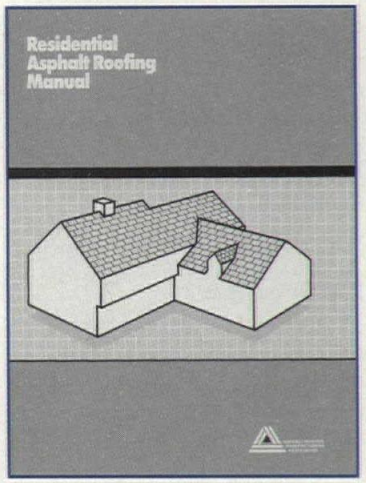
Technics-Related Products

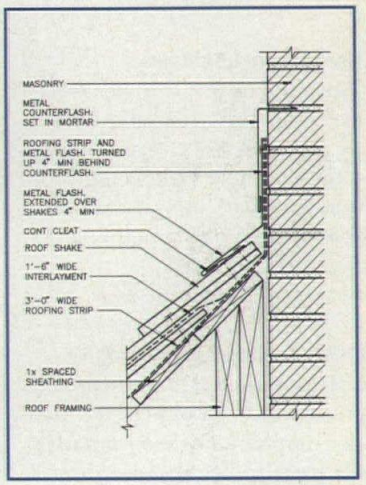
Useful sources of sloped roofing details

– manuals, guides, and computer software – are presented here.









Cedar Shakes
The 20-page *Design and Application Manual for New Roof Construction*, published by a manufacturers' association, describes the range of cedar roofing products currently available. The book contains more than 60 sloped-roof cedar shake and shingle drawings – including roof-juncture, hip and ridge, flashing, and ventilation details. A text explains important construction considerations and treatment guidelines. Cedar Shake and Shingle Bureau.
Circle 201 on reader service card

Sheet Metal Manual
A guide to architectural sheet metal applications has more than 300 construction details for roofing systems and accessories. The manual features information on the design of roof drainage, gutters, flashing, expansion joints, and metal roof systems. A comparison of the qualities of different sheet metals and recommendations and references are also provided. Sheet Metal and Air Conditioning Contractors National Association.
Circle 202 on reader service card

Slate Tile Booklet
The technology for laying a slate tile roof has changed little in the half-century. This classic reference booklet contains residential slate tile roofing details and specifications that were originally published in the 1930s, making it useful for preservation or restoration applications. Hilltop Slate.
Circle 203 on reader service card

Metal Roofing
Metal Architecture magazine has published a series of *Metal Roof Systems Reference Guides*, which feature articles written by industry experts, engineers, and architects. The second issue in the series, for example, includes thorough generic detail drawings for metal roofing and accessories. Each issue contains a guide to metal building products, literature, research, and industry news. Subscriptions and individual back issues are available. Metal Architecture.
Circle 204 on reader service card

Asphalt Roofing Manual
The *Residential Asphalt Roofing Manual* explains the production of an asphalt roof from the manufacturing process of asphalt roofing products to the inspection and maintenance of the completed job. The book's 12 chapters cover product selection and specific application information for different types of asphalt roofing. Asphalt Roofing Manufacturers Association.
Circle 205 on reader service card

Copper Roofs
Copper and Common Sense incorporates research conducted over the last 45 years into a 103-page manual for the design and construction of copper roofs. The manual covers mechanical properties, installation procedures, and common industry standard specifications for sheet copper roofing products. Details for standing seam, batten seam, horizontal seam, and ornamental roofs, and flashing, gutters, and expansion joints are included. Revere Copper Products.
Circle 206 on reader service card

Computer Roofing Details
"Dynamic Details"™ are generic building details for use with AutoCAD drawing files. Details can be used as-is at any scale or customized for a specific project. Detail groups for built-up, composition shingle, and wood shingle and shake roofs are each available as a separate package. In addition to generic details, Vertex also provides electronic manufacturers "CADalogs"™ that run on any ordinary PC. Roofing details are available for Allied-Signal, ASC Pacific, JPS Elastomerics, and Manville products. Vertex.
Circle 207 on reader service card

Leak-Proof Roofs
A brief monograph, *Preventing Leaks in Metal Roofing*, explains the causes of leaks in metal roofs and suggests methods of using sealants, underlayments, and sheet metal to prevent leaks. Details illustrate the ideal leak-proof configurations. The Construction Specifications Institute.
Circle 208 on reader service card

(continued on page 184)

Technics-Related Products
Steep Roofing Materials

Fiber-Cement Shingles
"Supra-Slate II" shingles look like slate, but are made from an asbestos-free fireproof fiber-cement. These lightweight, weatherproof shingles are available in four unpainted colors. Supradur.
Circle 137 on reader service card

Metal Roofing Accessories
Galvanized steel flashings, trim pieces, and custom-curved panels complement the company's tile panel roofing system. Met-Tile.
Circle 138 on reader service card

Ridge Ventilation
"Roll Vent" is a ventilation system made of a nylon and polyester matrix that conforms to a variety of roof pitches without interfering with the roof profile. Benjamin Obdyke.
Circle 139 on reader service card

Roof Ridge Vent
"Vent-top ThermaCal"® is applied between exposed roof decking and any nailable roofing material to provide a layer of open air space to reduce heat build-up over sloped ceilings. Cornell Corporation.
Circle 140 on reader service card

Asphalt Shingle Guide
The *Roofing Specification Guide* illustrates a full line of shingles in a variety of colors and styles. Certainteed.
Circle 209 on reader service card

Fiberglass Shingles Catalog
An information-filled catalog and specification guide includes installation photographs, specifications, and details. Manville.
Circle 210 on reader service card

Metal Roofing Brochures
Two four-color brochures contain information on manufacturers' associations, life cycle costs, and examples of metal roof installations. American Iron and Steel Institute.
Circle 211 on reader service card

Quilted-Look Tiles
"Southern Slate" is a new style of fiber-cement roofing tile that has a quilted appearance. Fibrecem.
Circle 141 on reader service card

Pine Shakes
Thick, high-density southern yellow pine shakes resist wind and hail and are said to be less likely to curl, split, or break than other wood shingles. Perma-Pine.
Circle 142 on reader service card

Shingle Brochure
Eight types of asphalt and fiberglass shingles – available in a variety of colors are illustrated in this brochure. BPCO.
Circle 212 on reader service card

Lightweight Mission Tile
"MaxiTile" is a lightweight fiber-cement roofing tile that looks like clay mission tile; it is available in four earth-tone colors. MaxiTile
Circle 143 on reader service card
(continued on page 187)

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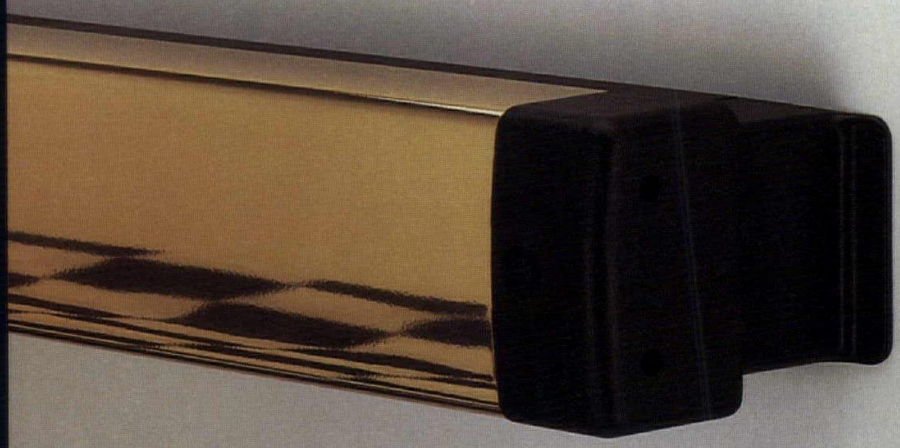

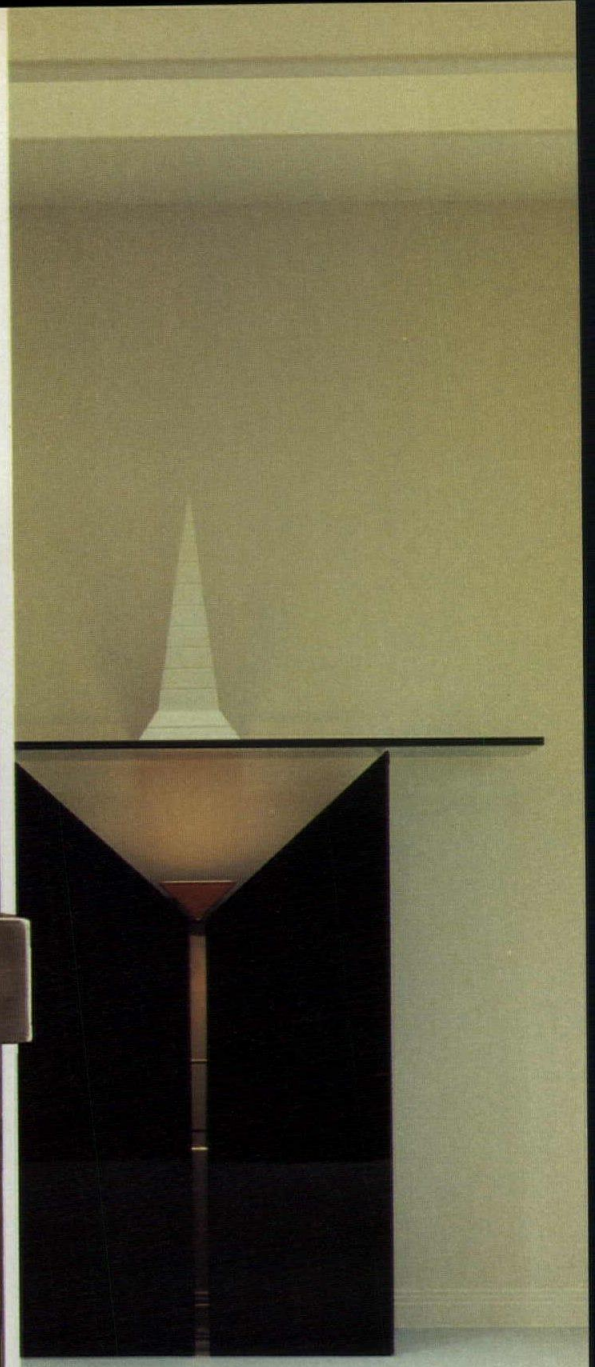

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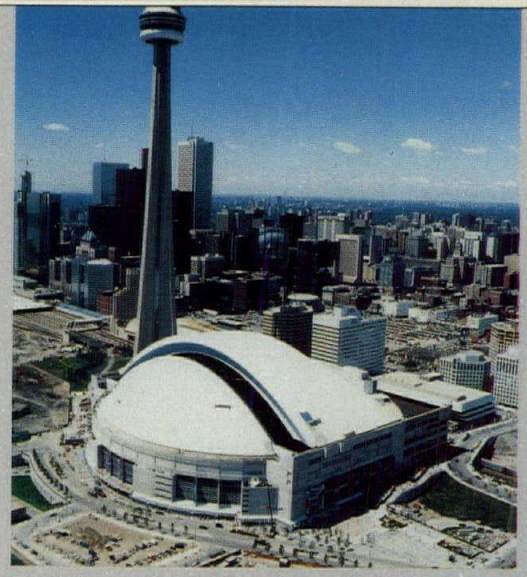

Sports/Convention: SkyDome

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☐ No, We have no immediate need, but please arrange to have **"specification" information** forwarded to us.

Building Materials

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

Project: Restoration of the Furness Building, University of Pennsylvania, Philadelphia (p. 82). *Architects: Venturi, Scott Brown & Associates, Philadelphia.* Wood truss renovations: R.K. Metals. Flat plate concrete floors, columns, and fire stair: Madison Concrete Construction. Replacement terra cotta tiles and ornaments: Ludowici Celadon. Tile re-roofing and recreation of ornamental copper: Kulzer Roofing. Replacement of portico steps: W.N. Russell. Masonry restoration: M.P.G. Recreation of interior terra cotta ornament, window surrounds, and decorative bands with reinforced gypsum fiberglass: Design Cast Stone Systems. Plaster restoration: Guy C. Long. Restoration paint: Benjamin Moore. Woodwork restoration stain finish: MISCO. Library building skylights: Fisher Skylights; bookstack building skylights: Boehm Skylights. Portico vestibule leaded glass restoration: Morgan Bockius Studio. Laylight, sash, and door leaded glass restoration: Cummings Studios. Wood storm sash windows, library building: Boyertown Millwork. Metal storm sash windows, library building: Commercial Windows. Wood and steel window restoration: Greenland Studios. Steel interior sash windows, bookstack building: Hopes. Ornamental handrails: Fillipi Brothers. Restoration of copper plated and brass railings: Gigher Ironworks. Restoration of library clocks: Gordon S. Converse. Ribbed rubber flooring: Musson Rubber. Carpet: Karastan Carpets and Commercial Flooring. Metal ceilings: Structural Systems, Alpro Acoustics Division. Suspended acoustical ceiling tile: Armstrong Contract Ceilings. Custom wood exterior doors: Boyertown Millwork. Hollow metal doors, hardware restoration, new window and door hardware: McAulliffe & Sons. Recreated library circulation desks and custom library partitions: Hammond Millwork. Library tables, carrels, computer stands, and display cases: Valley City Manufacturing. Windsor arm chairs: Warren Chair Works. Upholstered arm chairs: Lawsonia Inc. Five & one-half level hydraulic elevator: Eastern Elevator. Steel bookstack shelving: Estey and Library Products South. Rest room fixtures: American Standard. Recreated portico leaded glass and iron lamp: Danny Hurwitz. Custom chandeliers, sconces, and table lamps: Bergen Art Metals. Bookstack lighting: Lite Control. Air handling units and four-pipe fan coil units: York. Fintube radiation: Airtherm. Pneumatic controls: Industrial Valley Control and Johnson Controls. Sprinkler system: Automatic Sprinkler. Fire alarm system: Pyrotronic Fire Alarm Systems. Security System: Radionics and Delmarva Systems.

Project: MIT Library of Architecture, Planning and Art, Cambridge, Mass. (p. 90) *Architects: Schwartz Silver Architects, Boston.* Curtain wall framing: A&D Prevost. Curtain wall glazing: Alpen, Inc., Boulder, Colorado. Interior storefront and skylight framing: Atlas Architectural Metals. Membrane roofing: Goodyear. Bookstacks: Borroughs Manufacturing Corp. Elevator: Dover. Sprinkler heads: Reliable Automatic Sprinkler. Fan coil units: Carrier.

Project: S.M.A Studio, Culver City, Calif. (p. 98) *Architects: Eric Owen Moss, Architect, Culver City.* Floors: existing concrete, acid washed and sealed; 20-lb gray commercial carpet. Roof: existing sheathing on 2x8 wood

(continued on page 188)

(continued from page 187)

rafters. Ceiling surfacing, drywall. Wall surfaces: exterior, plaster color coat; interior, cedar strandboard by Weyerhauser, drywall, plate glass. Windows: interior installation, Series 1500 single glazed, International aluminum Corp.; reception window, 2 TM Cobb vertical grain Douglas fir doors with lights. Skylights: Bristolite. Doors: interior, solid core birch with flush light by TM Cobb; solid core masonite, clear sealed; metal roll-up by Porvene. Hardware: hinges, Hager; locksets, Schlage; door closers, Rixon Firemark; Door-O-Matic floor closers. Kitchen equipment: range, Thermadore; sink, Elkay. Stair handrails: 2" OD steel pipe, threaded rod, cables. Fluorescent tubes: LA Lighting.

Project: Goalen Group Office, Culver City, Calif. (p. 104) *Architects: Eric Owen Moss, Architect, Culver City.* Floors: existing concrete, ground and sealed; commercial carpet. Walls: drywall. Roof: existing sawtooth clerestory system. Wall surfaces: exterior, stucco over studs and corrugated sheet metal over studs; interior, drywall over metal studs, cement plaster over 16 gauge studs. Windows: existing clerestory/wood frames. Skylights: laminated ¼" glass 24" o.c.; aluminum frame. Doors: Masonite over solid core, paint and clear finish. Partitions: drywall over 25 gauge metal studs. Paint and Stain: interior, flat white, eggshell finish on walls and ceiling; semi-gloss light green on all existing exposed wood. Hardware: Schlage hinges and locksets; Automatic door closers by Door-O-Matic. Lighting: fluorescent tube fixtures; 36" sign light above skylight; low-voltage fixtures in drum, conference, set projection, screening rooms. ■

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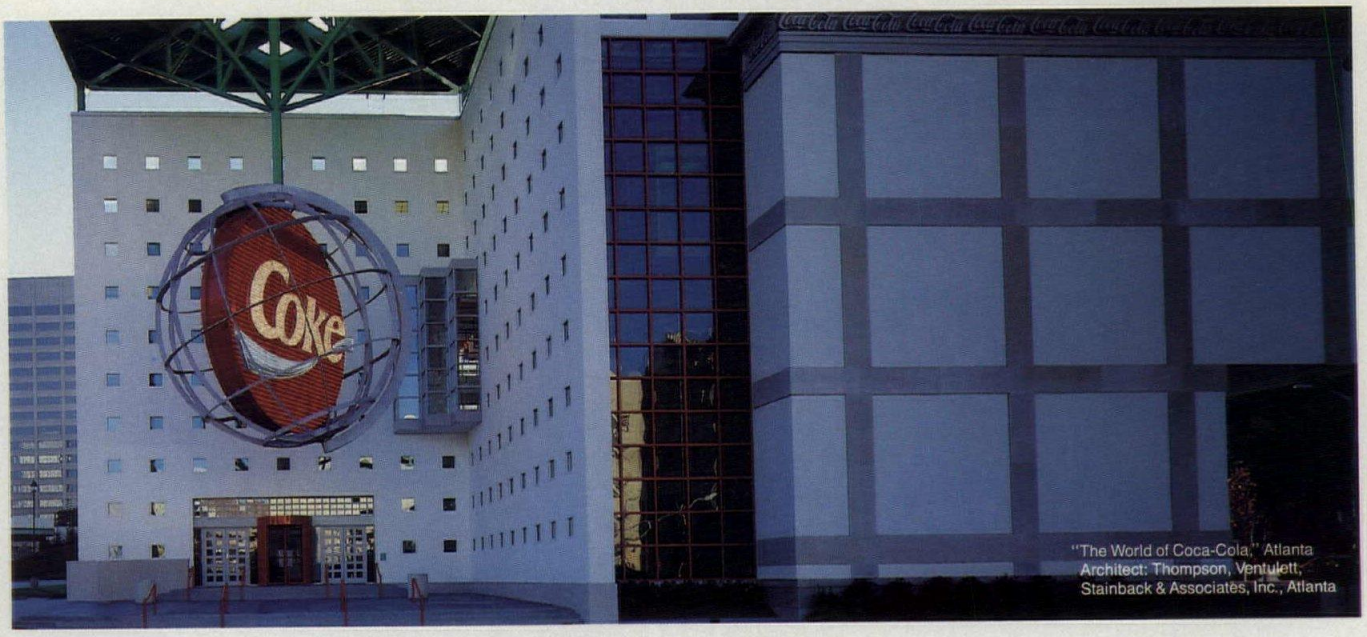

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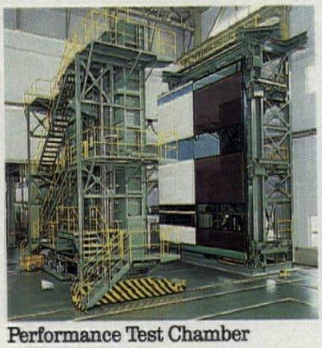
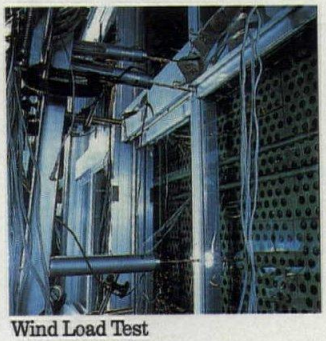
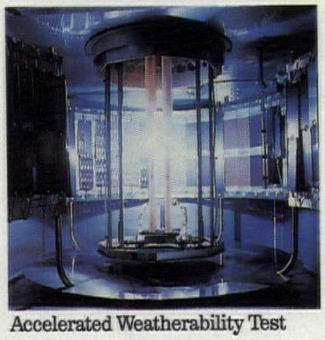


Performance Test Chamber



Wind Load Test



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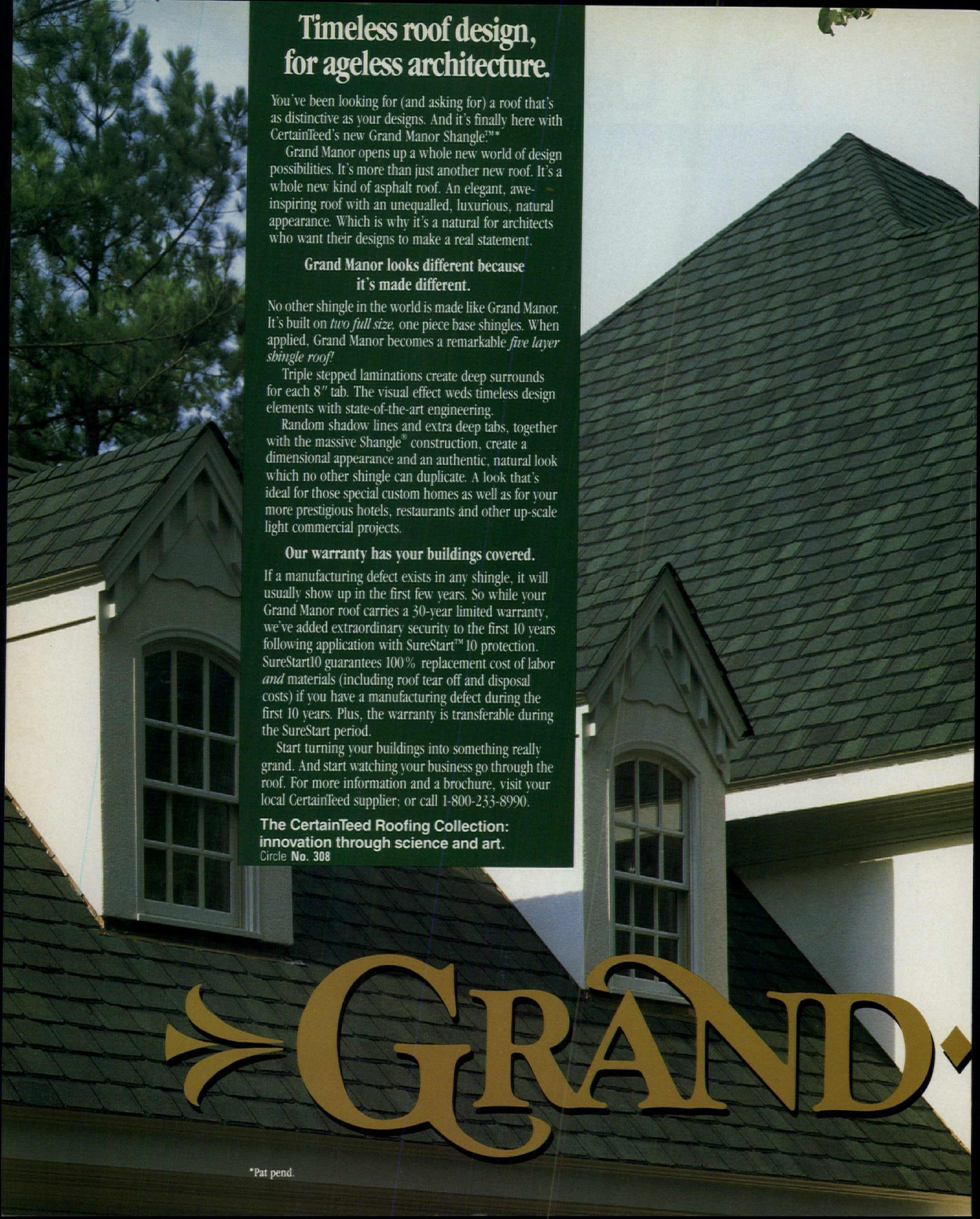

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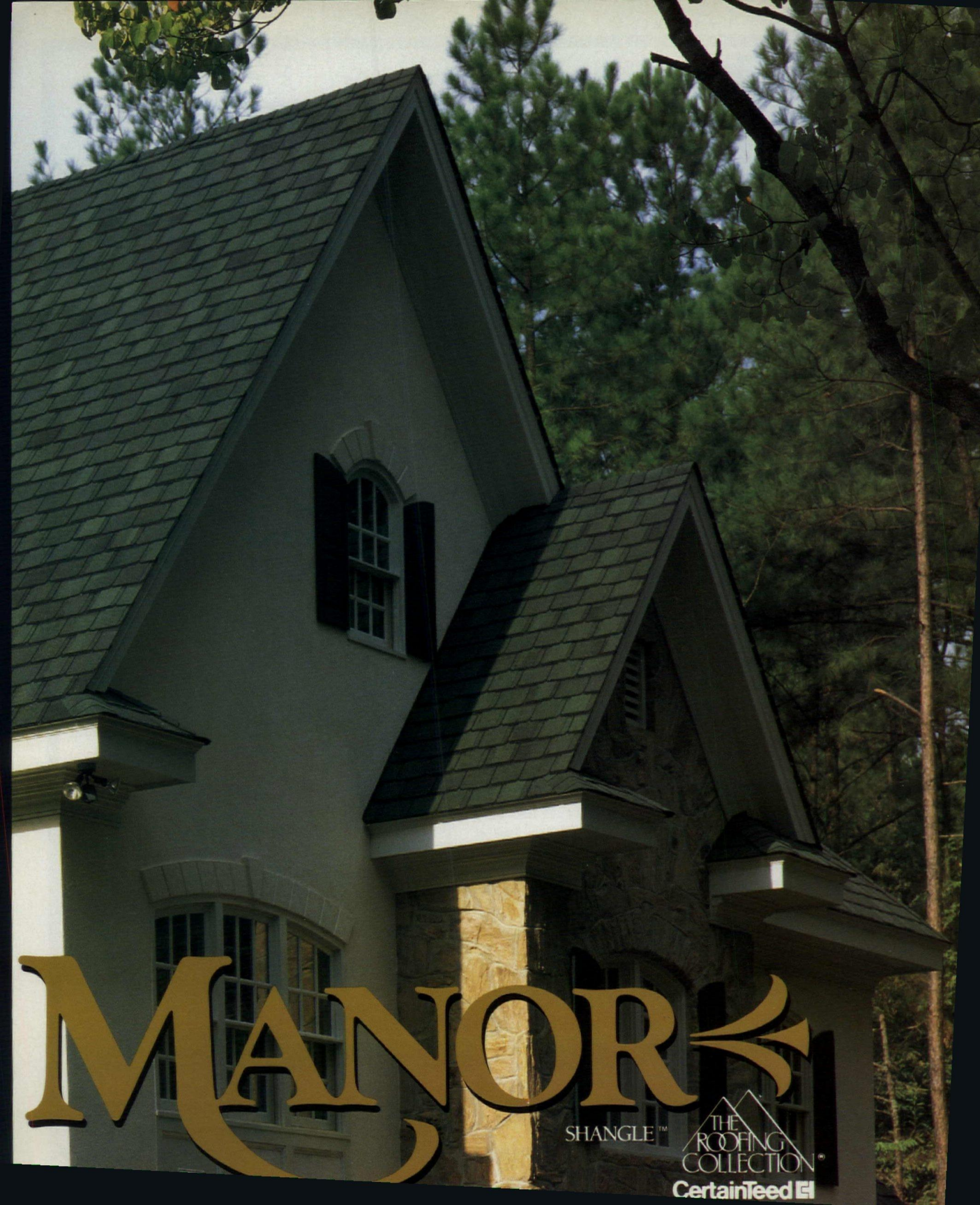
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Books *(continued from page 114)*

grams attest, the tollgates of Paris being the prime example. Rather Ledoux sought to create what Vidler aptly labels "fictions of functions" or narrations about the occupants and users of a building, their society, and its potential. He employed architectural expression to reform social programs, forging the social and built environment into a symbiotic search for representation.

Durand's diatribe against character and any source for architectural beauty outside of the pure fulfillment of function and economy has long been viewed as an attack on Ledoux's generation and on Durand's own teacher, Boullée. But Vidler intriguingly observes that Ledoux's own late work, in which the form and program were developed in tandem, was no doubt a response to the increasingly pragmatic and rationalist atmosphere of the engineers and scientists who came to the fore in the 1790s, especially after the arrival of Bonaparte. Vidler even questions whether Durand actually dismissed "character" definitively from architecture, or simply systematized it, making it an academic version of the preceding generation's experimental approach.

Although Villari uses a novel interpretive apparatus – the metaphor of treating Durand's theory as a linguistic construct which anticipates the precepts of structural linguistics – he reproduces the long-standing view of Durand's significance. For Villari, Durand's primary achievement was to have affirmed "a radical principle of the autonomy of architectural language" after a period so intensely interested in the architectural symbol and the sign, returning by an entirely different intellectual route to the notion of an autonomous architecture of the Viennese historian, Emil Kauffman in his 1933 book, *From LeCorbusier to Ledoux*. In contrast to Ledoux's search for an architecture of legible reference, Durand constructed an architectural language that was an arbitrary and self-contained system. Villari sees the Ideologue position of the 1790s foretelling the insights of Structuralism by advancing the key notion of *analyse*, which sought to explain how human cognition operated in relation to the complexity of nature by reducing any field to a concrete set of elements that can be combined in an infinite variety of ways. Durand's achievement was his recognition that architectural language was based not on imitation, but on composition, construction, and convention; Durand acknowledged the fundamentally arbitrary nature of the architectural language.

Unfortunately Villari is content simply to make this point. Even Durand's famous insistence on economy is explained as the force "which gathers and organizes the internal grammatical laws of the architectural language." Villari's is a persuasive demonstration, but ultimately he remains mute on what precisely Durand might have wanted to say with his architecture.

Barry Bergdoll ■

The author is Associate Professor of Art History at Columbia University.

1 *Werner Szambien,* Jean-Nicolas-Louis Durand 1760–1834, De l'imitation à la norme. *Paris: Picard, 1984.*

(**Perspectives** *continued from page 118*)
fect the fact that these conceptions are a fundamental part of human nature, having admirably served the greatest architectural minds of our era – Wright, Le Corbusier, Aalto, and Kahn.

"Daring is the motive force of the finest and greatest acts," Igor Stravinsky said. "All the more reason for not putting it unthinkingly at the service of disorder and base cravings in a desire to cause sensation at any price. I approve of daring; I set no limits to it. But likewise there are no limits to the mischief wrought by arbitrary acts." Architecture is not a provocation but a vocation, a calling forth into being – it is thus something poetic. The poetic has nothing to do with chance, with the arbitrary, with designing with "eyes closed," or with the copying of forms. The poetic has to do with order, clarity, precision, passion, discipline, and understanding the nature of things. Architecture, as all art, is essentially constructive – it is the contrary of chaos.

Today we often hear the word "invention" used to describe what architects might do. Yet, as Alvaro Siza has so aptly said, "Architects do not invent anything; they transform reality." Rather than "inventing" new forms of spatial experience, the almost incessant talking and writing about architecture going on today has too often resulted in only the fashionable re-cycling of forms. Also inherent in this focus on "invention" is the infatuation with change, often used as an excuse for the arbitrary abandonment of fundamental principles and values. Rather than being something particular to the impending arrival of the 21st Century, the situation is really no different from that in 1959 when Aldo van Eyck said, "Modern architects have been harping continually on what is different in our time to such an extent that they have lost touch with what is not different, with what is always essentially the same.

In the act of design, freedom is achieved only through order, through boundary, through measure. Architecture is concerned with space and its use – inhabited space: space conceived and formed through its being occupied. Architecture is distributed in the dimensions of space, measured by the body. We must inhabit the buildings of architecture's history, in order to analyze and develop the principles upon which they were based. We must also inhabit the projects of architecture's future, so that abstract ideas are used to construct concrete visual and tactile spatial experience. In this way we understand that architectural design is about making and the poetics of construction, rather than about the arbitrary arrangements of forms or signs. It is how buildings are made or constructed that determines what they will mean – "meaning" is never given by verbal explanations and theories.

Architecture is an act of construction, not creation, and is therefore more dependent on ideas of order than on the order of ideas. The constructions of architecture are capable of innumerable interpretations, yet we are lost without a sense of order and discipline. As we consider the answer of words and the question of things we should remember what Paul Valéry said, "What we call space is relative to the existence of whatever structures we may choose to conceive. The architectural structure interprets space, and it leads to hypotheses on the nature of space." **Robert McCarter** ■

The author is the Assistant Dean and Associate Professor of Architecture at Columbia University. He is also Principal of Robert McCarter Architect in New York and the editor and co-author of Frank Lloyd Wright: A Primer on Architectural Principles, *Princeton Architectural Press, 1991.*

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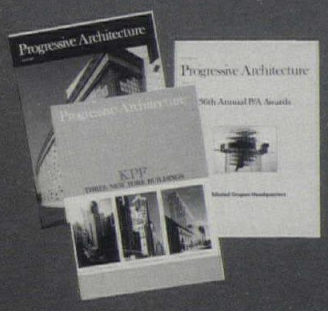

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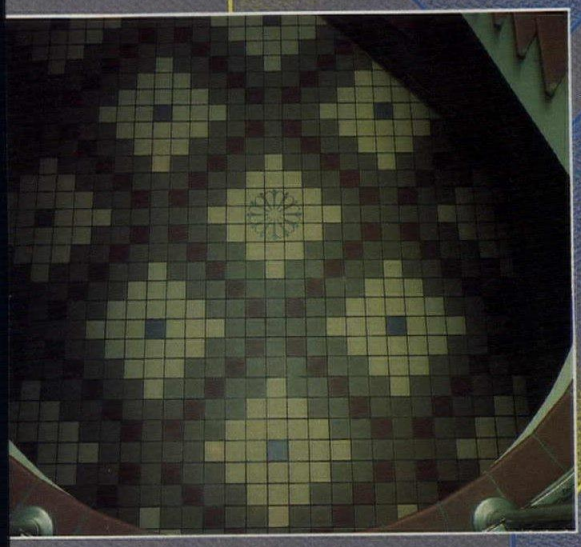

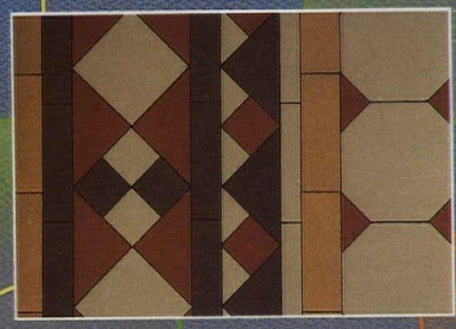

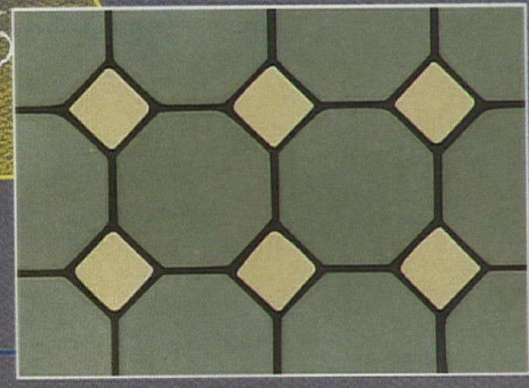

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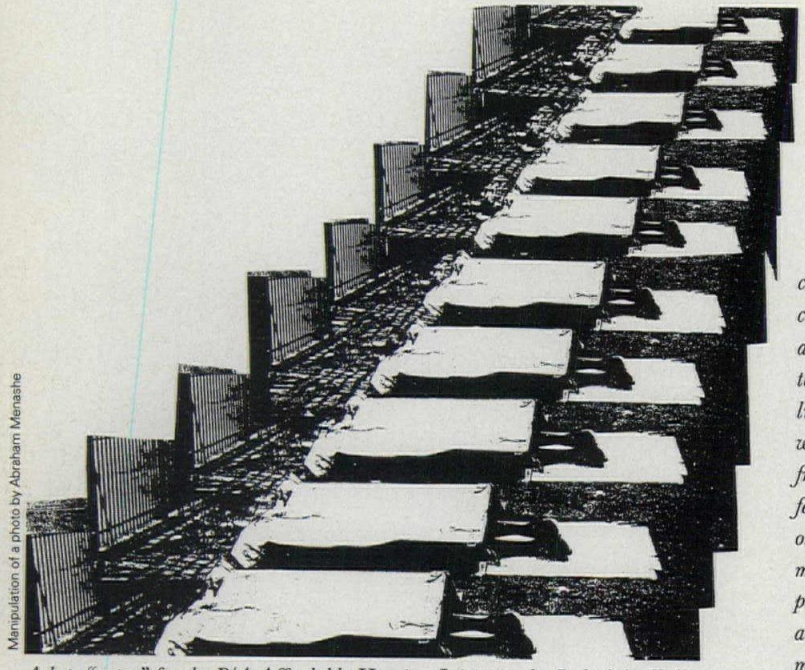


Manipulation of a photo by Abraham Menashe

A late "entry" for the P/A Affordable Housing Initiative by Judi Ashe Tollas.

P/A shares its editorial offices with employees of other Penton-owned magazines, and we P/A editors have been less than popular around here lately. They seem to hold us responsible for the stacks of cardboard and trash bags full of discarded packaging – refuse from the entries in our affordable housing competition – that are clogging the hallways and taking over common areas.

But we didn't anticipate receiving 590 entries for this first-time competition (the results of which will appear in next month's issue), and we certainly hadn't stopped to think that entrants would package their entries so carefully: Many arrived in large boxes or sandwiched between several layers of cardboard. We were trying to figure out what to do with all the trash when we got some food for thought (above) from architect Judi Ashe Tollas of Sunstructures Architects, Ann Arbor, Michigan. She writes:

"Upon seeing the size of the box in which my associates are sending their competition entries to you, a vivid image suddenly struck me . . . all of these hundreds of boxes landing at your doorstep one day soon. How ironic that many homeless people use such boxes as shelter in this country. I was inspired to send this graphic piece to you as an "entry," if you will, toward tackling the question of affordable housing."

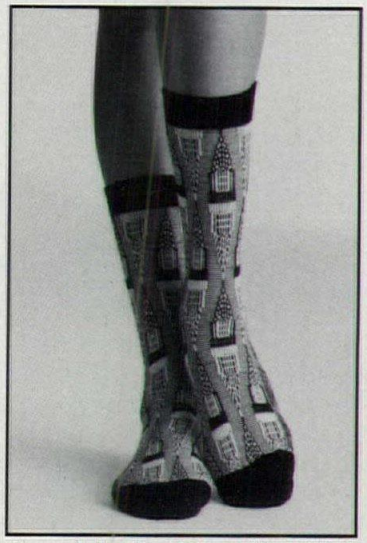
Ms. Tollas's sobering entry is based on a photograph by Abraham Menashe that appeared on the title page of our October 1988 issue on housing.

. . .

When architects talk, P/A listens – or so it seemed to one of our editors while having breakfast recently with some architects in New York. The conversation had wandered, inevitably, to talk of the recession and to speculation about the future form of the profession, when all of a sudden a mustachioed man from the next table joined in. He, it turned out, was also an architect and had strong opinions about what the profession should or should not do. An impromptu roundtable followed (although the tables themselves were square) about whether the profession should become more or less involved in construction, whether non-architectural corporations should or should not be allowed to own firms, whether architects should or should not oppose the licensing of interior designers, and whether fees would or would not recover from the current downturn. A lot of different opinions were voiced. But what our editor heard was underlying agreement among those assembled that the profession is at an important crossroads and that, if it is to prosper, it must make major changes in the way it operates. Such talk is something we all should listen to.

. . .

Tea kettles by Graves, china service by Stern, and wristwatches by Rossi . . . they're handsome, but a bit pricey. As we scale down our consumer ambitions in this austere, excess-is-out decade, consider architectural *socks* as a modest alternative. New York textile designer Kim McDonald gave us a scoop on her Chrysler Building hosiery (below), developed for the DKNY 1991 fall line, as a gesture of thanks: She was inspired by a Hugh Ferriss rendering she saw in a recent P/A. One of our editors, assured that the socks are for both men and women, proudly modeled the socks for us and gave them rave reviews. (No, those are not his legs in the picture.) He offers one warning, though: Don't put them in the dryer. He did, and is now planning to pass his pair on to a worthy six-year-old.



Deco socks by Kim McDonald for DKNY.

. . .

If you look closely at this month's cover photo of the Fine Arts Library at Penn, designed by Frank Furness and restored by Venturi, Scott Brown & Associates, you'll see, painted on a window in the upper left, the legend "MEN SHOULD BE WHAT THEY SEEM." Since, unlike consumer magazines that rely on newsstand sales, P/A does not often put text on our cover, we became curious about the message we were disseminating almost subliminally.
As it turns out, the quote is from *Othello* (Act III, scene iii, verse 126). The story we got from the Fine Arts Library is that Frank Furness asked his brother, Shakespearean scholar Horace Howard Furness, to supply appropriate quotations for the building; this observation (uttered, ironically, to the hero by the duplicitous Iago) was among them. Without stretching too far, we can imagine that some Modernist ghost was having fun with the architect who once began a book by saying "I like complexity and contradiction . . . " ■