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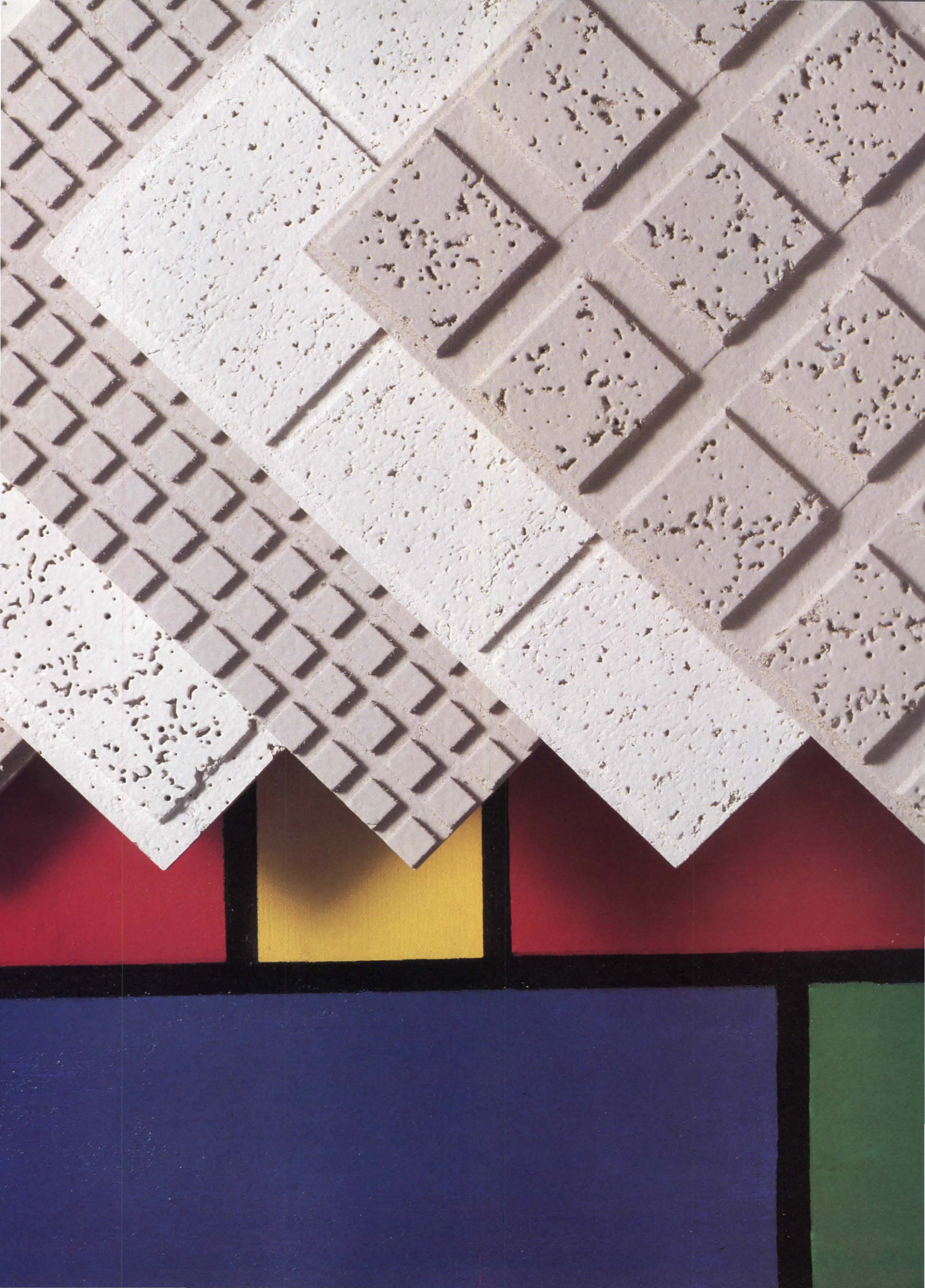

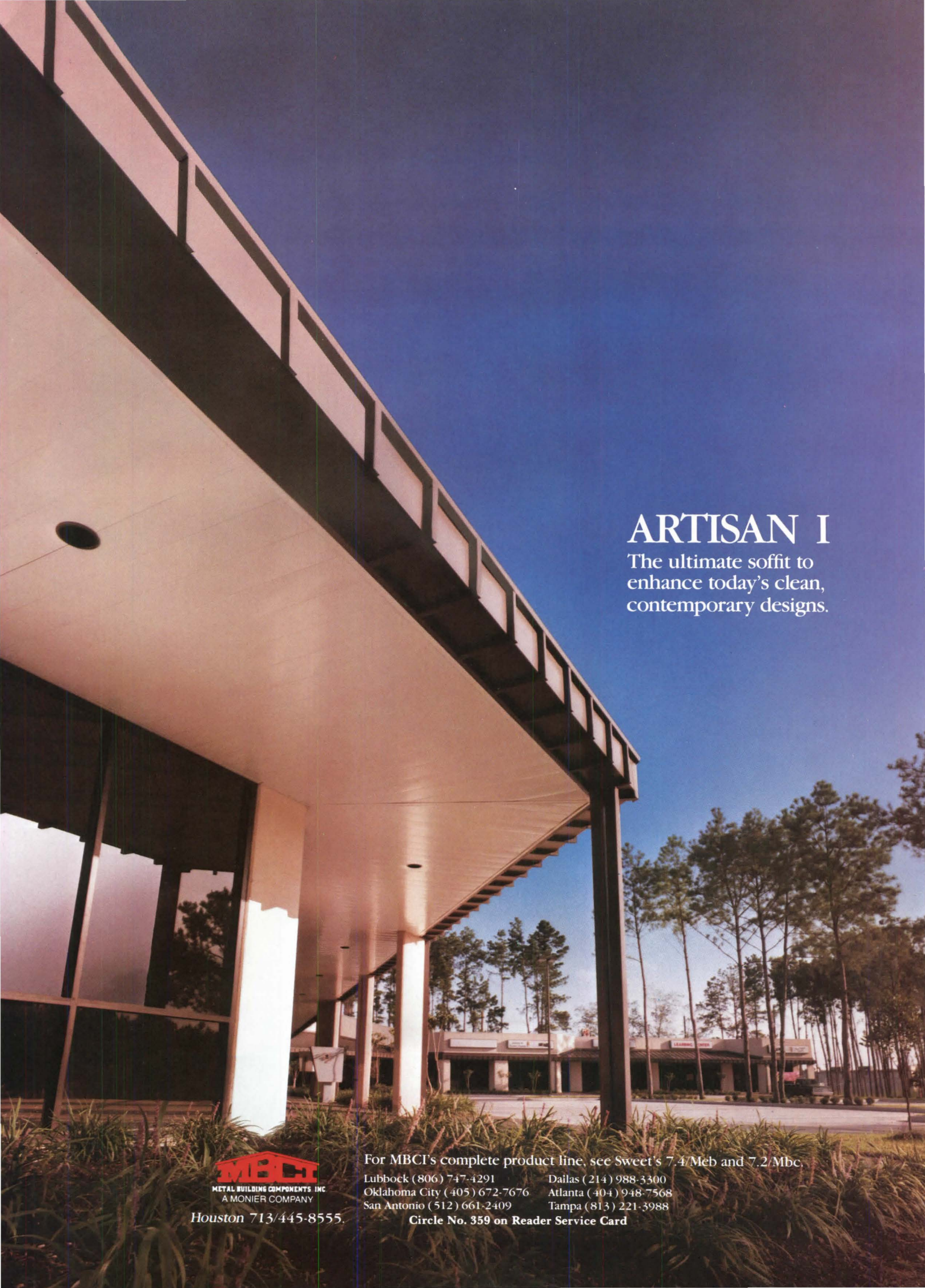
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# Progressive Architecture

OCTOBER 1985



**Penton/IPC**
Progressive Architecture (ISSN 0033-0752) is published monthly by Reinhold Publishing, A Division of Penton/IPC, P.O. Box 95759, Cleveland, OH 44101: Philip H. Hubbard, Jr., President; Harry I. Martin, Robert J. Osborn, Vice-Presidents; Penton/IPC: Thomas L. Dempsey, Chairman; Sal F. Marino, President; James K. Gillam, N.N. Goodman, Jr., Paul Rolnick, Executive Vice-Presidents. Executive and editorial offices, 600 Summer St., P.O. Box 1361, Stamford, CT 06904 (203-348-7531).

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## ARCHITECTURAL DESIGN



## TECHNICS



## SPECIAL SECTION




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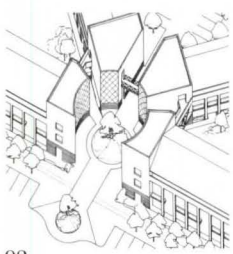
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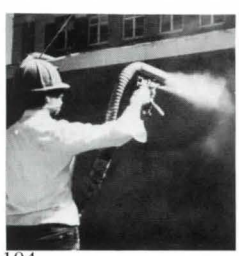
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## DEPARTMENTS



***Cover***
*Central reception area, Procter & Gamble General Offices, Cincinnati, Ohio (p. 71), by Kohn Pedersen Fox Associates. Photo: Peter Aaron © ESTO.*

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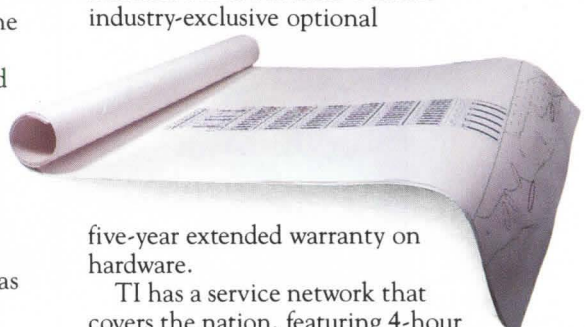

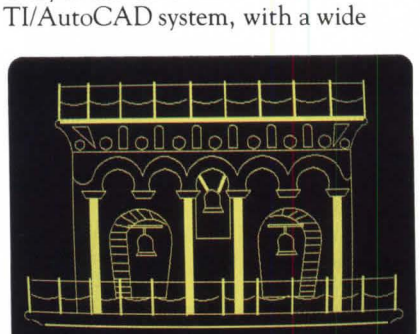

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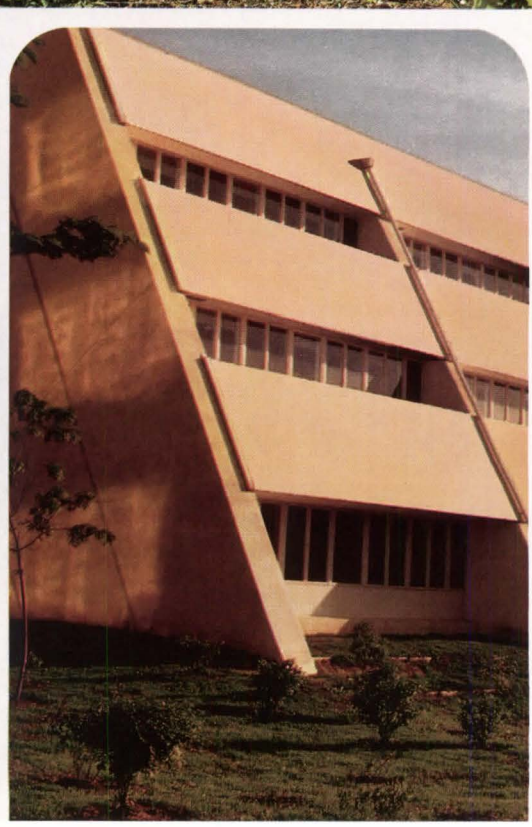

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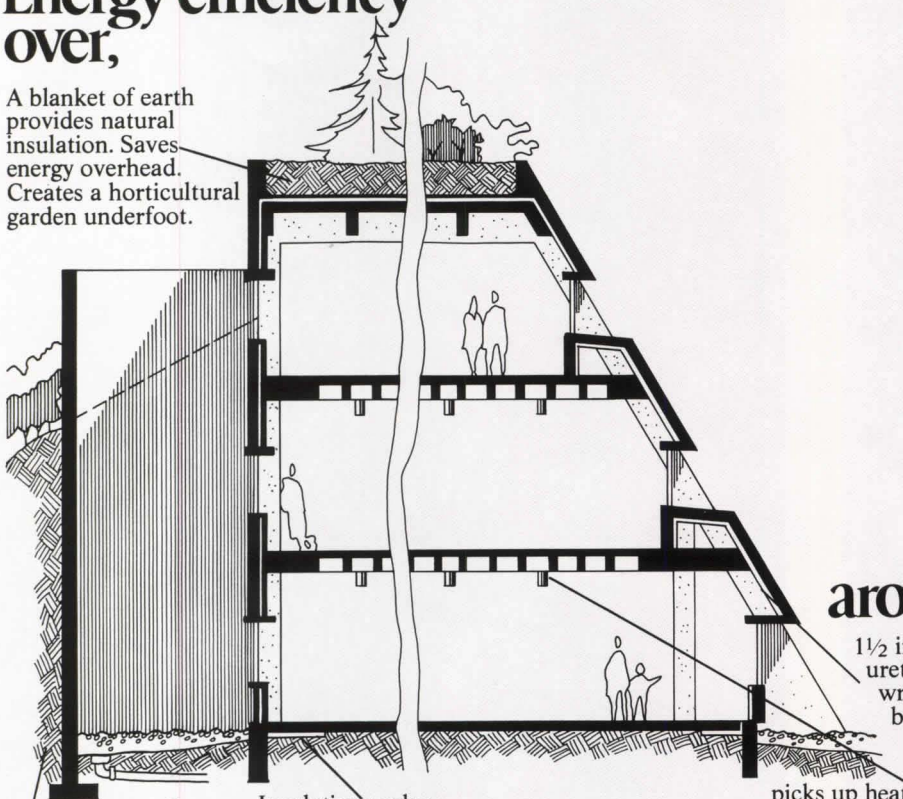

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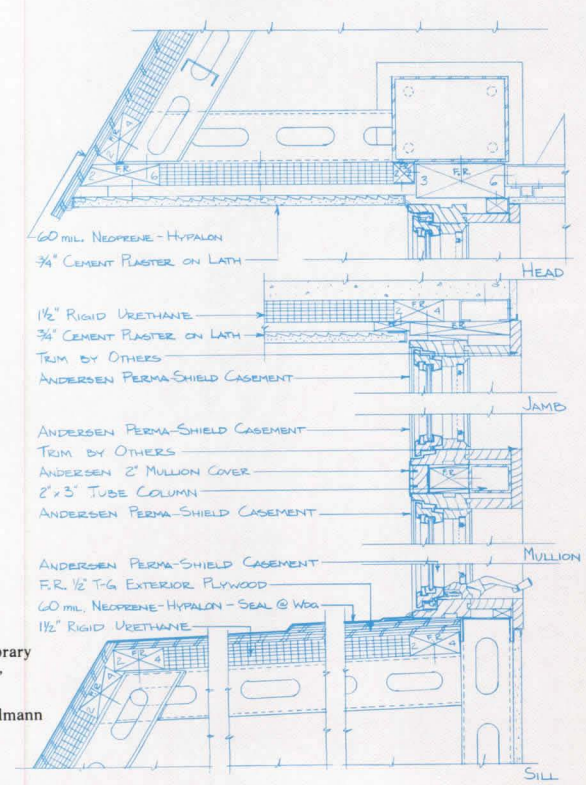


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# *Architecture of Our Time*

IT is easy for us to associate the dominant architectural styles of past times with the societies that produced them. The Roman arena, the Gothic cathedral, and the Rococo palace are seen as embodiments of the cultures they were built to serve. In our own country, it is easy to relate the chaste but robust Neo-Classical forms of Jefferson, Latrobe, and Mills to the new-found independence and the ideals of the early republic. (The contemporary Federal style of Bulfinch and others, on the other hand, cleaves close to the taste of the English nobility; there are always countercurrents.)

From the 1830s on, however, the frequent introduction of new styles makes it much harder to read the aspirations of society from its buildings, either in America or elsewhere in the Western World. This parade of styles was based upon an unprecedented knowledge of past cultures and facility at imitating their forms. Throughout the century from the 1830s to the 1930s, there was constant vacillation between two principal design sources: the Classical, expressing a pride in the orderly, educated, imperial societies of the time; the Medieval, idealizing an earlier age of piety, pastoral simplicity, and unself-conscious craftsmanship. Despite outbursts of partisanship on one side or the other, the public came to view all of these styles as interchangeable expressions of security and cultural connection to the past.

Growing up as a subversive movement during this period, Modernism expressed a different set of ideas gaining currency during those decades: a faith in technology and the future generally, a scientific ethic of economy, and a resulting rejection of past conventions. Buildings, like aircraft, could be created through reason, with no precedent to rely on. After jarring the entrenched historicism a few times from the 1880s onward, Modernism finally became dominant around 1940—but later in some major nations and never, anywhere, in single-family houses or residential interiors.

While mainstream Modernism—more or less codified in the International Style—was adopted over most of the world to signify progress and scientific reason, many of the masters were mavericks who violated its ideals of economy and technological justification. Frank Lloyd Wright was the most flagrant nonconformist, standing for willful individuality in form-making and sometimes borrowing unabashedly from selected cultures, such as the Japanese and Mayan. But there are irrational, nonconformist qualities in the work of other revered Modernists—Aalto, Le Corbusier in his later years, Louis Kahn. Their work seems to embody one strain of modern thinking that the International Style suppressed—the concepts of the subconscious, of primitive urges, and archetypal forms, ideas that grew out of the period's maverick science, psychology. The public admiration for these architects seems to reflect, as well, the period's veneration of individual genius, even if its products expressed a rejection of the prevailing order (or perhaps *because* they did).

The undisputed reign of Modernism suffered its first serious challenges in the late 1960s, when we first began hearing arguments from within the Modernist establishment for reviving historical conventions. But it was not until the 1980s that we began seeing large-scale new buildings representing the revisionist principles of Post-Modernism.

In this decade, the movement to set aside the discipline of Modernism has expanded not so much by winning avowed converts, but by the infiltration of Post-Modern ideas into the work of architects who are not necessarily proponents of the movement—some of whom do not even acknowledge its influence. Their adoption of historical conventions is often related to a need—widely agreed upon today—to relate new architecture to the existing context. It is also related more subtly to the large proportion of today's architectural commissions that involve preservation or reuse of old buildings—surely a larger proportion than ever before in America. When one has had to work closely with historical details, an appreciation develops. Other influences include establishment of landmark districts and revision of zoning laws to favor traditional construction patterns.

For decades, the Modernists had argued that architects were obligated to express the spirit of their times—the *zeitgeist*. The counterargument of the Post-Modernists has been that whatever we build, even in emulation of work from another time, is inevitably a reflection of its own time. What the acceptance of historical conventions now reflects is clearly a loss of faith in technology and the scientific method—a loss brought on not only by general disillusionment about the fruits of progress, but by the blunders that architects and planners, specifically, perpetrated under the guise of scientific thinking. Society now puts a positive value on the character of earlier buildings and is again ready to accept imitations. But this new period of eclecticism includes among its options the whole range of Modernist modes, right up the sleekest high-tech—and that has by no means lost its appeal for portions of the profession and the public.

As in much of the 19th Century, we have an ecumenical situation that in itself implies a lack of strong conviction. The works that flaunt their conviction—that express a dedication to one set of ideas or the other—are the ones that arouse indignation among opposing architects and critics; to the public, I believe, the contest of styles appears to be merely a game. The majority of architects today will do a bit of this and a bit of that, and they fit well into a society where success means adapting one's performance to the circumstances. ■

John Morris Dixon

*If the character of each era is expressed in its architecture, how will observers in the future interpret today's buildings?*

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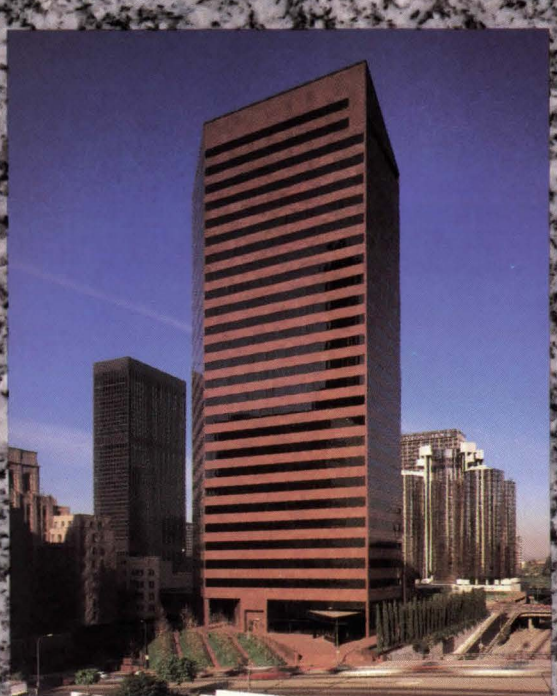

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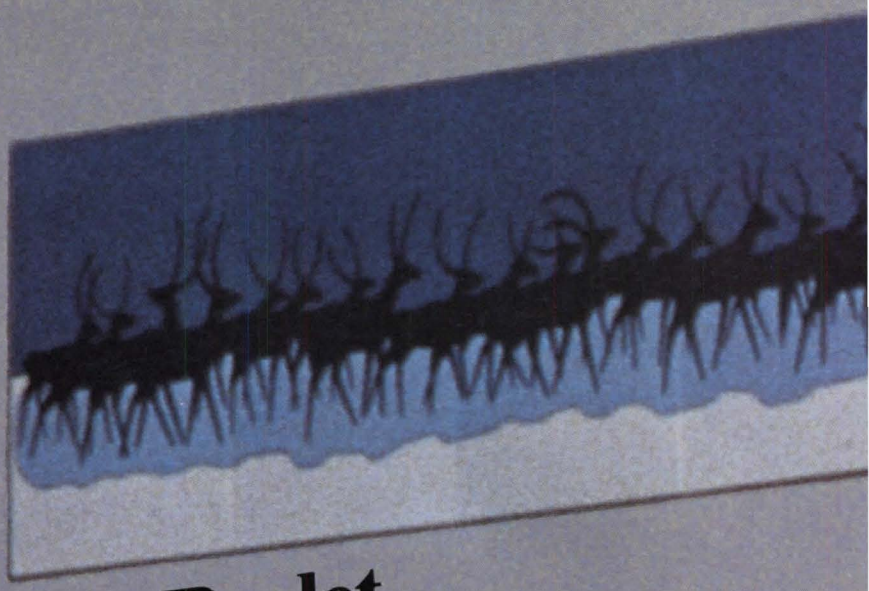

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*North Pole, Alaska*
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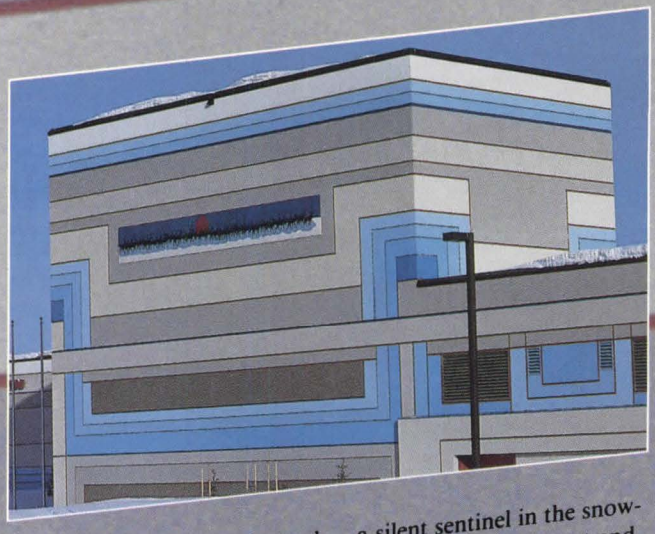

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# *Views*

**High-Tech Structure: Pro**
I have just returned from a visit to the PA Technology Facility in Hightstown, N.J., to find it on the cover of P/A, August. While photographically you may do it justice, editorially it is a limp description of a strong building. Weak prose of a nontrivial design may be a reversal of the usual complaints about P/A "fluff."

Your observer is so caught by the non-U.S. credentials of Rogers that she forgets to identify the role of Kelbaugh and Lee, a not inconsequential design firm with local roots.

Your observer has missed the site and the siting. Not only is car parking, building approach and experience from adjacent roads omitted; so is the broad picture of this place in New Jersey. The absolute flat bovine grasslands have spawned vomiting industrial plants that earlier epitomized a 20th-century landscape, together with the infamous N.J. highway and strip development. Within such pollutant land uses the oasis of a smug Princeton village is all the more striking. Similarly PA Technology is an aberration on the human horizon. Nearby are more recent prototypical phenomena, the trite countryside speculative office buildings and labs, whose qualities this design challenges.

And while the photos show it, only the barest caption identifies the interior aesthetic experience. Here technology is transcendent with the luminous bubbles of the basilica ceiling whose plexi curves simultaneously dance reflections and transparent views of the underside of the roof-mounted mechanical systems. Those decorative driving machines on the crest of the crystalline enclosure that both shade and invigorate their parasite. Inside the user is constantly reminded by the ceiling views about both tensile suspension and comfort deliverance.

*Jeffrey Cook*
*Professor*
*Department of Architecture*
*Arizona State University*
*Tempe, Ariz.*

**High-Tech Structure: Con**
I have enjoyed reading P/A over the last nine years, however, your recent cover story about Richard Rogers' PA Technologies Building (P/A, Aug. 1985, pp. 67–74) has given me second thoughts about your magazine. It really saddens me to see "bad" buildings getting front page coverage, while so many good and sensitive designs (albeit non-avant-garde) go unrecognized.

I have personally seen Rogers' project, which is located in an area of sprawling farmland, suburban developments, and several open and green office campuses. At first impression, I was horrified with the building's overwhelming presence. (The project's design is much more befitting an oil refinery along the New Jersey Turnpike.) It did not come at all as a surprise to me that the project was designed by someone who lives outside the United States, who would have little concern for (or knowledge of) local context. What did come as a surprise, was that local officials allowed it to be built.

So your article did not discuss at all the issue of context, but was purely an evaluation of a building in a vacuum. Fine . . . if it were only a good building. Tremendous effort is made to show off the superstructure; to the point where serious technical problems are created, among which are far too many roof penetrations and pitchpockets (are they all dry?). And what is created by all these expensive details . . . ordinary (if not mundane) office space, that *still* has columns in it. I feel that good architecture deals with *all* issues: context, ambiance, detailing, budget, etc. Buildings are for people and communities . . . let's stop seeing buildings which are "designed to be on the cover of P/A."

*Peter G. Longley, RA*
*Associate*
*The Hillier Group*
*Princeton, NJ*

[Two letters; two points of view. Longley would have us say less about the PA Technology Facility. Cook accuses us of not saying enough. Both readers point out how the building contrasts with its context: One considers that a virtue, the other a vice. Rogers is certainly aware of this context and no doubt pleased with the contrast, but that's not really the point. This architect can build and has built the same type of building in the English countryside and the heart of Paris. American architects, attuned these days to contextualism, may find that approach off-putting. From our point of view, it's worth reporting for the debate it may inspire, as well as its inherent quality.

The few interior columns to which Longley refers support the A-frame and are the sole supports in the building. As for the pitchpockets: at last sighting they were dry. P/A gave due credit to Kelbaugh & Lee, whose own previous work has been covered in P/A feature articles.—Editors]

**Developers and Architects**
Thanks, folks, for a well-done issue (P/A, July 1985). It's good to see that "developer" is no longer a four-letter word in a leading architectural journal. As the "middle market" diminishes and the international school dies, an important sorting and shakeout is happening among developers as among architects and designers. It's an exciting, dynamic, fertile (and to a few, a threatening) period of transition and positive discontent.

Of course, as in other such periods before, it seems that aesthetic error increases with the change rate. But the best developers and their architects and designers cheat those odds. And your issue illustrates both the preceding points eloquently.

*Mike Tatum*
*Corporate Design Director*
*The HOK Interiors Group*
*Dallas, Texas*

**Superinsulated Walls: Up to Codes?**
We have been reminded by Benjamin W. Kitchen, AIA, of Westmont, N.J., that the superinsulation wall sections that appeared in the April issue (pp. 112–115) did not show fire stopping between floors in accordance with most national code requirements.

The superinsulation wall sections, almost all from completed buildings, were presumably built—and approved by code officials—as shown in P/A. According to one representative of the superinsulation community, fire stopping represents an area that they have not addressed adequately. To fire stop the thick, superinsulated walls would require a wider horizontal barrier than the framing members used in typical wood frame construction.

**Computer Software Clarification**
The statement on page 74 in the September issue that "Vendors have gone after the broad area of project management, rather than concentrating on any one discipline such as architecture, engineering, or construction" is misleading. The author was referring to just those computer vendors whose products were reviewed in the article, not to all vendors of project management software. There are vendors who have written software specifically for architects.

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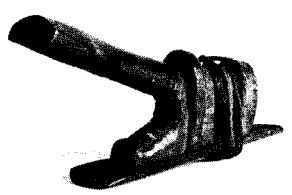

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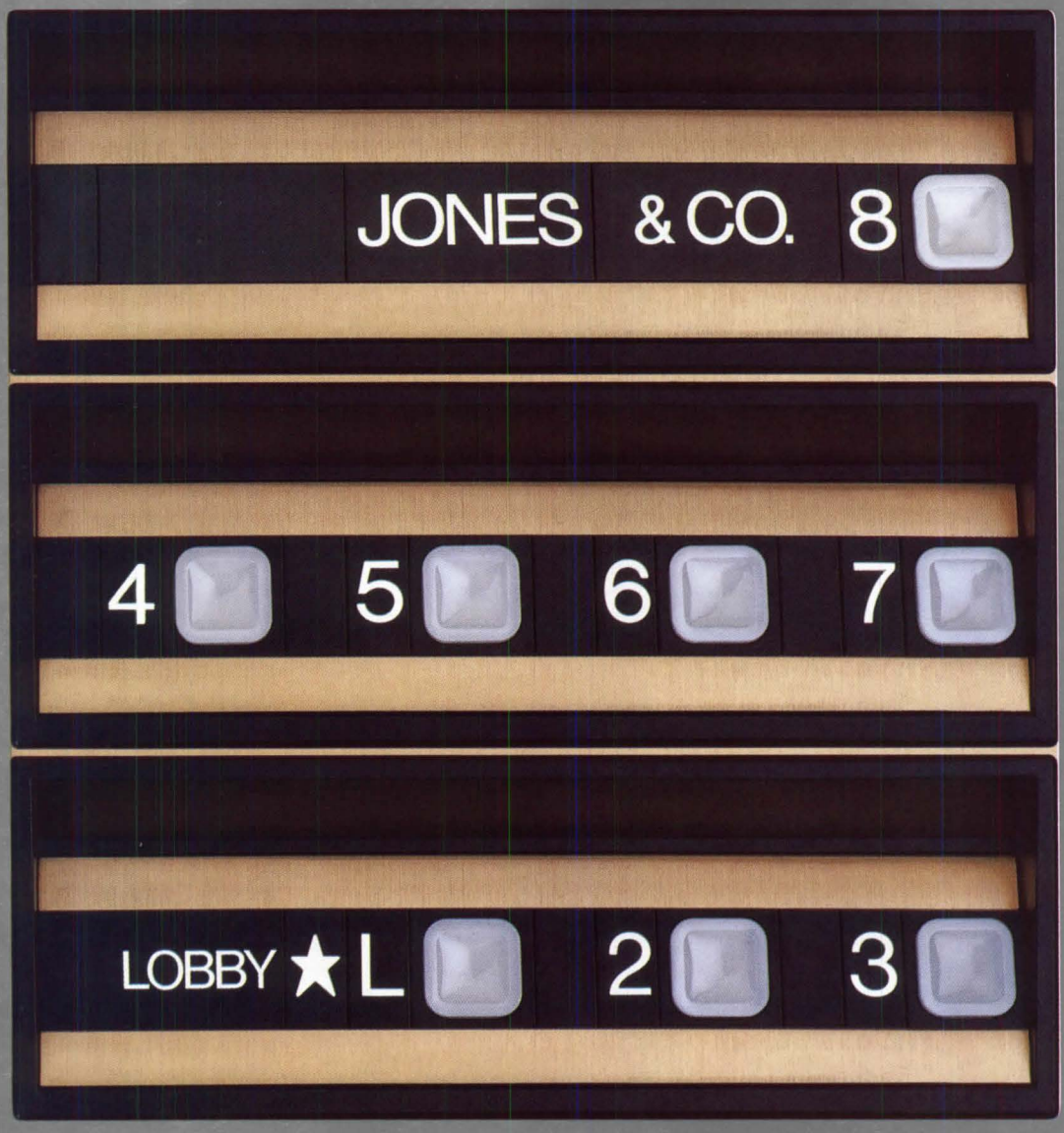


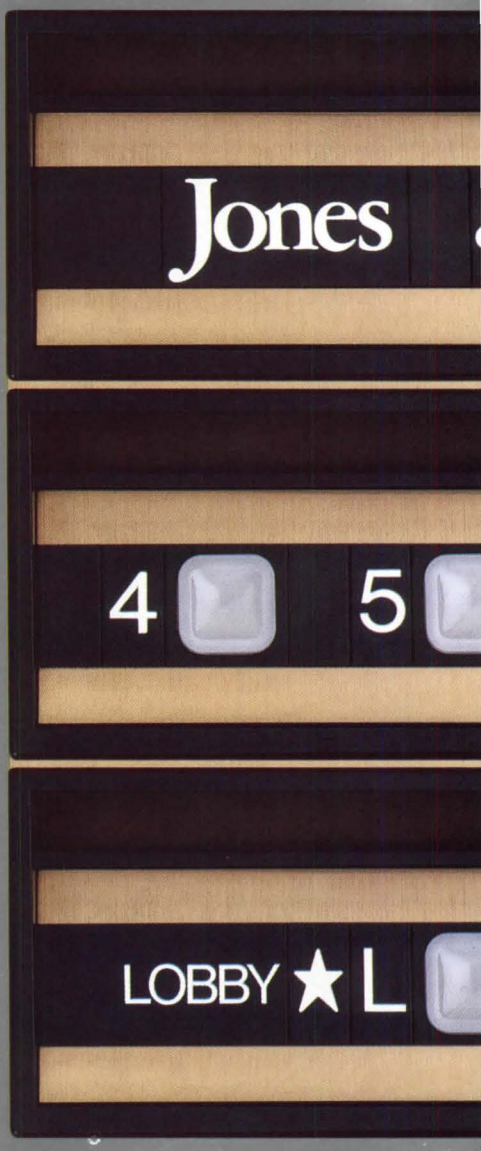



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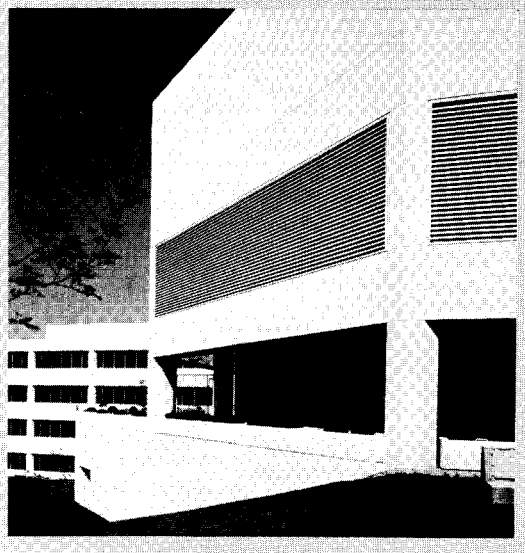

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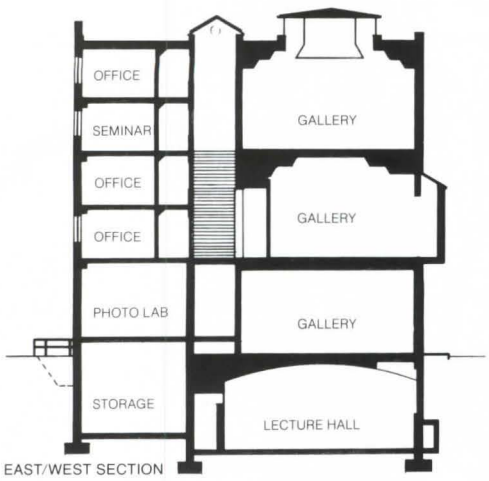
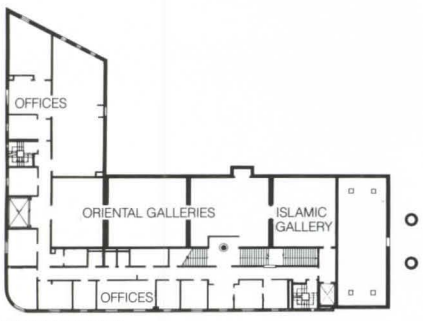
# P/A News Report





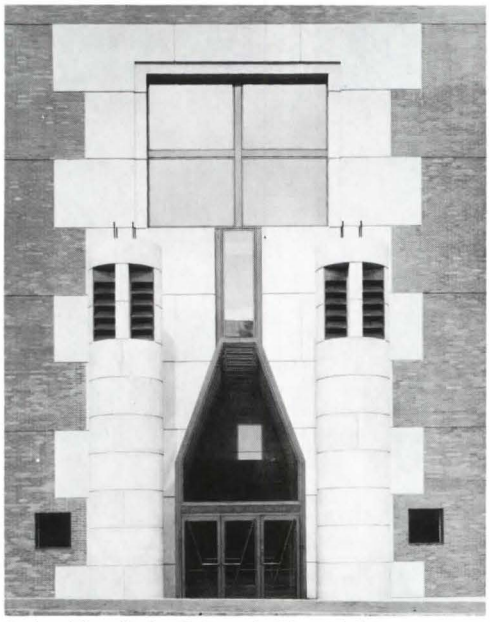
EAST/WEST SECTION

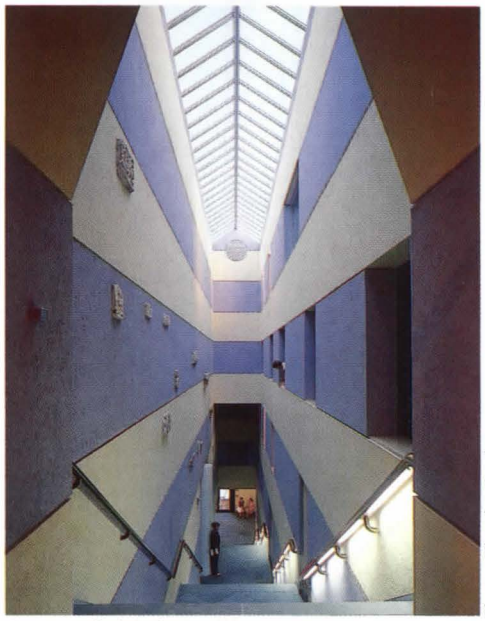


SECOND FLOOR

FIRST FLOOR ←N 20'/6m


*Sackler's curved northwest corner.*


*Stair with galleries (left) and offices (right).*


*Entrance facing the Fogg.*

Photos: Timothy Hursley

## *Stirling at Harvard: The Sackler Wing*

James Stirling's most recent American work, the Arthur M. Sackler Museum, adjacent to Harvard's Fogg Museum of Art, is a starkly uncompromising design, a maverick in appearance yet characteristically logical on closer examination. Like many of this architect's best works, it is the affirmative result of severely constricting circumstances, hemmed in as it is by heavily trafficked streets on three sides and surrounded by existing buildings of varying character, importance, and quality. It is not surprising that the result is a controversial building provoking strong feelings pro and con. For once my own initial reactions to a Stirling building were negative. Bluntly put, the exterior, on its own, is neither attractive nor interestingly shaped. Further reflection, however, demonstrated my first thoughts to be somewhat off the mark.

Curiously, the bichromatic brick shell of the exterior suggests the kind of building one might have expected from Venturi some 20 years ago. Lifted away from Cambridge and plunked down in a small or middle-sized town anywhere in America, the Sackler Museum could be taken from the outside to be a hospital, professional offices, public school, or public housing. In the distinctive academic context of Harvard, however, this quality establishes a stabilizing contrast with the Sackler's immediate neighbors on Quincy Street: the generic brick Georgian of the Fogg on its right and the concrete Brutalism of Gund Hall on its left. Moreover, the distinctively hued and striated brick of Stirling's Museum makes a forceful yet friendly gesture towards two nearby historic monuments: the red brick Ruskinian Victorian Memorial Hall, just across the way, and Richardson's tawny brick Queen Anne Sever Hall, just out of sight around the corner.

Studied from the inside out, Stirling's museum scores its own unique points. Entering through a provocatively overscaled portal that faces the end wall of the Fogg, the visitor finds himself in a strikingly tall lobby with a

# Pencil points

***James Stirling*** *has been awarded the commission for Mansion House Square in London by developer Peter Palumbo, whose bid to build a tower designed for the site by Mies van der Rohe was rejected.*

***A new steel canopy*** *added to Walter Netsch's 1962 library at Mies's Illinois Institute of Technology has been removed. The brightly colored beams and red suspension cables designed by Robert Nevel, architect for the library's renovation, were deemed inappropriate and disrespectful to the memory of Mies, the campus architect.*

***Renzo Piano*** *has been awarded the commission to rehabilitate the Lingotto factory in Turin, Italy, as a conference center and university. The complex had been the subject of an international competition for ideas in which Piano and others participated (P/A, Aug. 1984, p. 23).*

***The 1985 Louis Sullivan Award*** *for Architecture has been given to Benjamin Thompson of Cambridge, Mass., by the International Union of Bricklayers and Allied Craftsmen. The jury, chaired by Robert Venturi, previous winner of the Sullivan Award, singled out for special commendation Thompson's work at Faneuil Hall in Boston and South St. Seaport in New York.*

***The GSA*** *has ordered a special National Endowment for the Arts panel to review possible relocation sites for the controversial "Tilted Arc," the large rusted steel sculpture by Richard Serra that, critics contend, renders unusable the New York plaza in which it is located (P/A, April 1985, p. 29).*

- *Now a second Serra work in St. Louis faces a similar challenge. "Twain," a triangular composition of eight steel panels up to 10 feet high, was designed by Serra specifically for the site. City aldermen, citing maintenance problems and the site's development potential, propose to call a public referendum on the sculpture's removal. Both cases are being closely watched by public art advocates.*

***Christo's latest wrapping*** *is the Pont Neuf in Paris. The work, which could cost $2.6 million, was unveiled, so to speak, last month.*

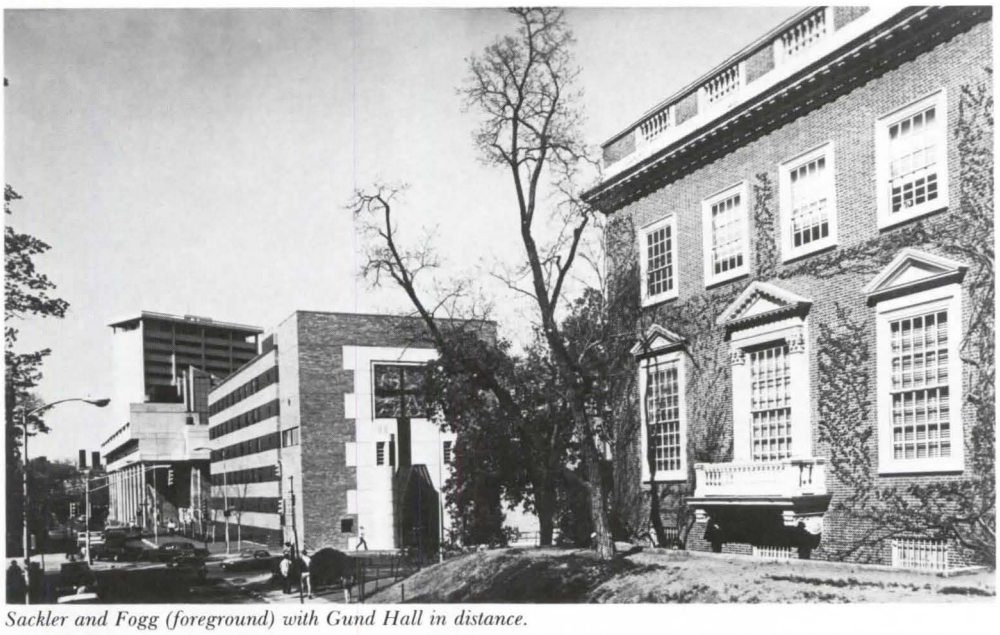
***Tadao Ando*** *has been awarded the fifth Alvar Aalto Medal by the Finnish Association of Architects, the Foundation for the Museum of Finnish Architecture, and the Architectural Society.*

Timothy Hursley

*Galleries enfilade.*

Timothy Hursley

*Top floor gallery.*



Rick Stafford

*Sackler and Fogg (foreground) with Gund Hall in distance.*

long, high, narrow grand stair just opposite and to the left of the entrance. On the exterior, the portal is flanked by two columnlike forms, which will serve as supports if the controversial overhead connector reaching across Broadway to the Fogg is ever built (it is now on "hold" according to a university spokesman). For the present, these "columns" function as ventilators, but also work as key parts of the surprisingly emphatic frontispiece, given that the rest of the exterior so completely eschews all monumental effects.

It is the aforementioned *grand escalier*, however, that is the building's key feature; a gestural extension of the entrance portal, it leads to many of the public and private spaces. Its startling bichromatic walls, recalling the exterior design, are brightly illuminated by a continuous glass roof, which creates the effect of an attenuated, inclined galleria drawing the visitor onward and upward to the exhibition spaces. The stair also serves to articulate and divide the building vertically as well as by floor. To its left are five floors of offices and seminar rooms, served by corridors running parallel to the stair. On the right one gains access to the galleries, whose height is twice that of the office space. Since the five-floor office component literally wraps around the three-level gallery component (hence the "logic" of the exterior curve instead of a right angle at the intersection of Quincy and Cambridge Streets), this distinction in height is not stated on any of the three street façade elevations, or in the building's exterior mass. Instead of large, open, loftlike spaces, the exhibition areas are divided into individual galleries of varying rectangular shape, each of which is assigned a specific subject of Ancient, Islamic, or Oriental art.

As now completed, the Sackler Museum may or may not be truly "finished." One of the conditions of the design was that the building must function either with or without the connecting bridge to the Fogg, a condition that I suspect Stirling both rued and relished. If authorization to build this connector is ultimately forthcoming, the link will be made at the third gallery level, and on the exterior, this dramatic extension will become a component of the "columned" entrance portal. Part of the wit of Stirling's design is that the mass of his building can stand by itself, or be linked to its Neo-Georgian neighbor via a plug-in Archigram-like arrangement. A connector over Broadway would accomplish a great deal architecturally and urbanistically to relieve both the visual and the physical anxiety at this disturbingly disjointed intersection on the periphery of the Harvard Yard.

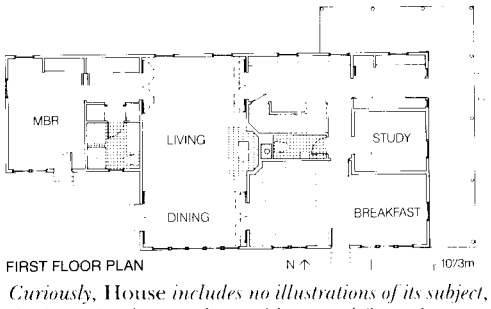
Whatever the ultimate solution, Stirling will have left his distinctive mark within the architectural free-for-all of Harvard. It is his particular gift to have designed a vital Modern building that mediates between its Victorian, Neo-Georgian, and Contemporary neighbors, effecting an uneasy truce if not a lasting peace. ***John Jacobus*** ■

*The author is Professor of Art History at Dartmouth College, Hanover, N.H.*

# House *and Home*

To most architects, it's a familiar story: a couple, on a limited budget, hire an architect to design their house; an architect, trying to establish a practice, struggles to produce drawings on time; builders, hoping to make a profit, wrangle with the architect, the owner, and their own coworkers. But as told by Pulitzer Prize winning author Tracy Kidder in his new book entitled *House*

Steve Rosenthal




FIRST FLOOR PLAN

*Curiously,* House *includes no illustrations of its subject, the Souweine house (above with ground floor plan).*

(Houghton Mifflin), the story seems surprisingly new.

Kidder documents the actual construction of a house for the Souweines in Amherst, Mass., designed by Boston architect William Rawn, and built by a group of carpenters who call themselves Apple Corps. It's a history not just of decisions made and actions taken, but of the second thoughts, the shifting alliances, and the small compromises that populate every building project. A difference of $660 on the bid poisons the relationship of owner and builder for several months. A late drawing of the frieze and a mistake in the specification of exterior trim pits architect against builder. A change in the type of brick produces a tense moment between architect and owner. As he tells this story, Kidder interjects several asides, including a short history of the architectural profession and of wood frame construction, a discourse on endangered woodlands, and even a story of Richard Morris Hunt suing his first client for his fee.

However entertaining the book, its real value—and newsworthiness—is as a case study on the practice of architecture and the process of building. Tracy Kidder's *House* should do more to inform the public about architecture, about its procedures and problems, than almost any effort by the profession. Architects should not just read *House*, they should applaud it. ***Thomas Fisher*** ■

# *The Limits of Growth: Boston's Downtown Plan*

Defying the laws of amenity if not gravity, highrises of mammoth proportions have towered across the skylines of America's cities. Philadelphia, which once kept its ceiling lower than William Penn's statue by civilized consensus, has broken through the barrier, while New York, Chicago, Los Angeles, and others build to the adage, "The sky's the limit."

Despite, or perhaps because of, these megastructures, some cities have moved to set a height ceiling or stop construction altogether. In July, San Francisco approved zoning to limit highrise building; San Diego has moved for a moratorium on downtown development. Now Boston may join the list with a plan to put a lid on center city growth.

Billed as "Downtown Guidelines: Growth Policies for Central Boston 1985–1995 . . . a briefing document," the six-page statement released this summer outlined plans to slow the city's rampant construction. Though nebulous in its outlines and still tentative in its commitment, the proposal offered by Boston Redevelopment Authority (BRA) director Stephen Coyle puts a cap on heights, ups the so-called linkage payments to other neighborhoods, and incorporates concerns for open space, housing, jobs, and design review.

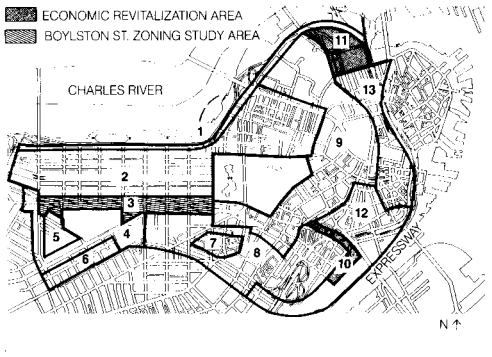
Specifically, the policy statement produced by the two-year-old administration of Mayor Raymond Flynn would restrict heights to under 155 feet in most of the central city. It would permit 300 to 350 feet on the near perimeter at North and South Stations and in town at Bedford Crescent, however, while also allowing "discretionary height bonuses" up to 500 feet in so-called "planned development areas."

To coax builders outside the congested downtown, the master plan proposes "linkage"—parceling money to underbuilt areas like Dudley Station, in the blighted ghetto of Roxbury. "To reinforce the human scale of Boston's core," it sets design standards for small-scale, "block-size" structures, setbacks, and traditional streetwalls. By endorsing masonry materials, it theoretically calls a halt to the flood of glass towers downtown, symbolized succinctly by the Exchange building, which opened this year.

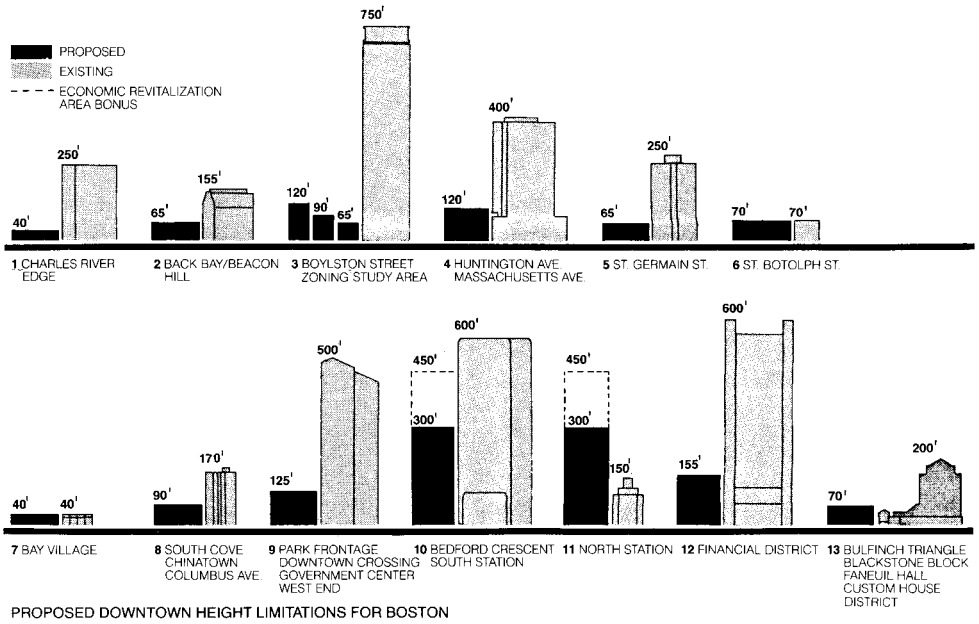
The document begins in a conciliatory tone with a preface on the public realm. Practically paraphrasing Anne Whiston Spirn's recent treatise *The Granite Garden,* the growth guidelines propose to extend the "Emerald Necklace," Frederick Law Olmsted's park system, and to "reforest Boston." More tangibly, the paper ends with the mandate to "develop a new zoning ordinance." Simple as the phrase may sound, it is that lack of zoning that has made the city a builder's free-for-all. Some 20 new highrises have penetrated the fragile cityscape, the bulk dating from the last few years of Mayor Kevin White's two-decade reign. It is, therefore, the promise of zoning that is "readable, understandable, and accessible to the public" that has made the Boston plan inspire hopeful if cautious responses.

Though one former urban design director of the BRA took a *Boston Globe* editorial to task for calling this a "bold plan," many skeptics and activists see cause for cheer in the immediate temporary restrictions and anticipated new zoning plan, due by 1987. Veterans consider the still tentative outline quite radical in the context of Boston's long-time zoning-by-whimsy. Developers have also come through with supportive statements.

Therein, of course, lies the problem. The fabric of the plan has yet to be tightened enough to make its vision controversial. For instance, shoehorning still more structures into the city at the proposed rate of 1,000,000 square feet a year can only serve to under-



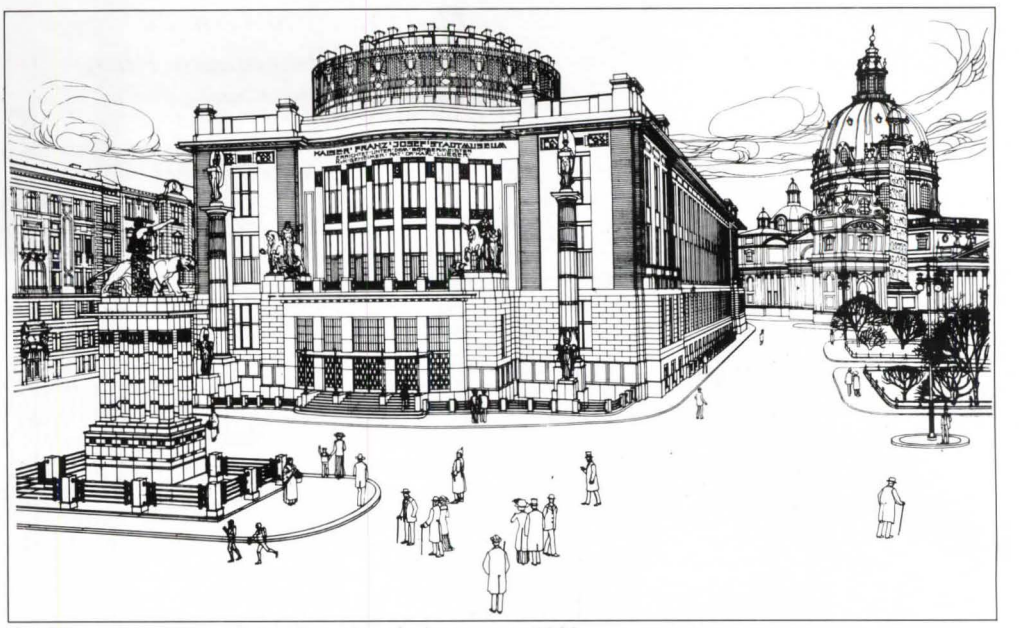

Boston Redevelopment Authority




PROPOSED DOWNTOWN HEIGHT LIMITATIONS FOR BOSTON

mine the microclimatic and environmental standards espoused elsewhere in the guidelines. Plans to ease traffic congestion do not jibe with requests for 5000 to 10,000 parking spaces in a city already up to its EPA limit. Finally, the notion of linkage simply permits the downtown's problems to pack their baggage and head elsewhere. Beyond such internal contradictions or conflicts, architects worry about the design review process. Unquestionably, city planners will need to show sensitivity in shaping the massing and envelope guidelines into specific design dictates. But even a Merlin couldn't wizard away the real estate rampage and housing problems to be addressed. Boston, a bust city in the 1960s and early 1970s, has become a boom town in the 1980s. To the good, a quiescent community has become a vociferous one; to the bad, sluggish real estate interests have become voracious. The city's plan cannot totally resolve the conflict between growth and no-growth, but at least planners have put pen to paper to try to do so. Also positively, for the first time in decades, the paper plans, the review, the debate, and the dialogue are on the table, not under it. ***Jane Holtz Kay*** ■

*The author, whose books include* Lost Boston *and the soon-to-be-published* Preserving New England, *is the architecture critic for the* Christian Science Monitor.



*Otto Wagner, project for Kaiser Franz-Joseph city museum, 1908.*


*Gustav Klimt, poster.*


*Oskar Kokoschka, poster, 1908.*

## *Dream and Reality in Vienna*

Experiencing the exhibition "Dream and Reality" begins even before the visitor enters Vienna's Künstlerhaus. Across the street from the museum—though admittedly not by arrangement of the current show's curators—stands the 86-year-old Karlsplatz subway station pavilions by Otto Wagner. And atop the museum—this time, by design specific to the show—are two objects meant to represent the exhibition's opposing aspects: a golden Klimt-inspired statue stands for the dream; a construction reminiscent of the Karl-Marx-Hof is a metaphor of reality.

These foretastes, charming as they are, are slightly misleading: the exhibition goes far beyond the art-and-architecture content they suggest; and the "reality" aspect goes farther than social housing, to represent the baser sides of humanity, with war, bloodshed, and rampant, blatant discrimination. As eloquently stated by the exhibition's designer architect Hans Hollein (the curator was Dr. Robert Waissenberger of the Historical Museum of the City of Vienna), the exhibition presents concrete objects which are also "metaphors of a dream that became reality and a reality that no one envisaged even in a dream."

The exhibition's organizers might have more easily achieved success by treating only the increasingly popular fin-de-siècle art and design. Or they might have followed an alternative, single-minded route by examining the social and political events that led up to the Viennese acceptance of the Nazi invasion. Instead, they strove to represent virtually all public aspects of the period—politics, social history, psychology, music, theater, literature, art, and architecture—in a daring undertaking that manages to succeed overwhelmingly. The visitor, bombarded with impressions both aural and visual, static and kinetic, in a space almost too small for its contents, is nevertheless left with not only a series of stimulating experiences but also a global view of the times, and most likely the desire to learn more. The catalog, with essays by experts going beyond the exhibition coverage, would be a good place to start.

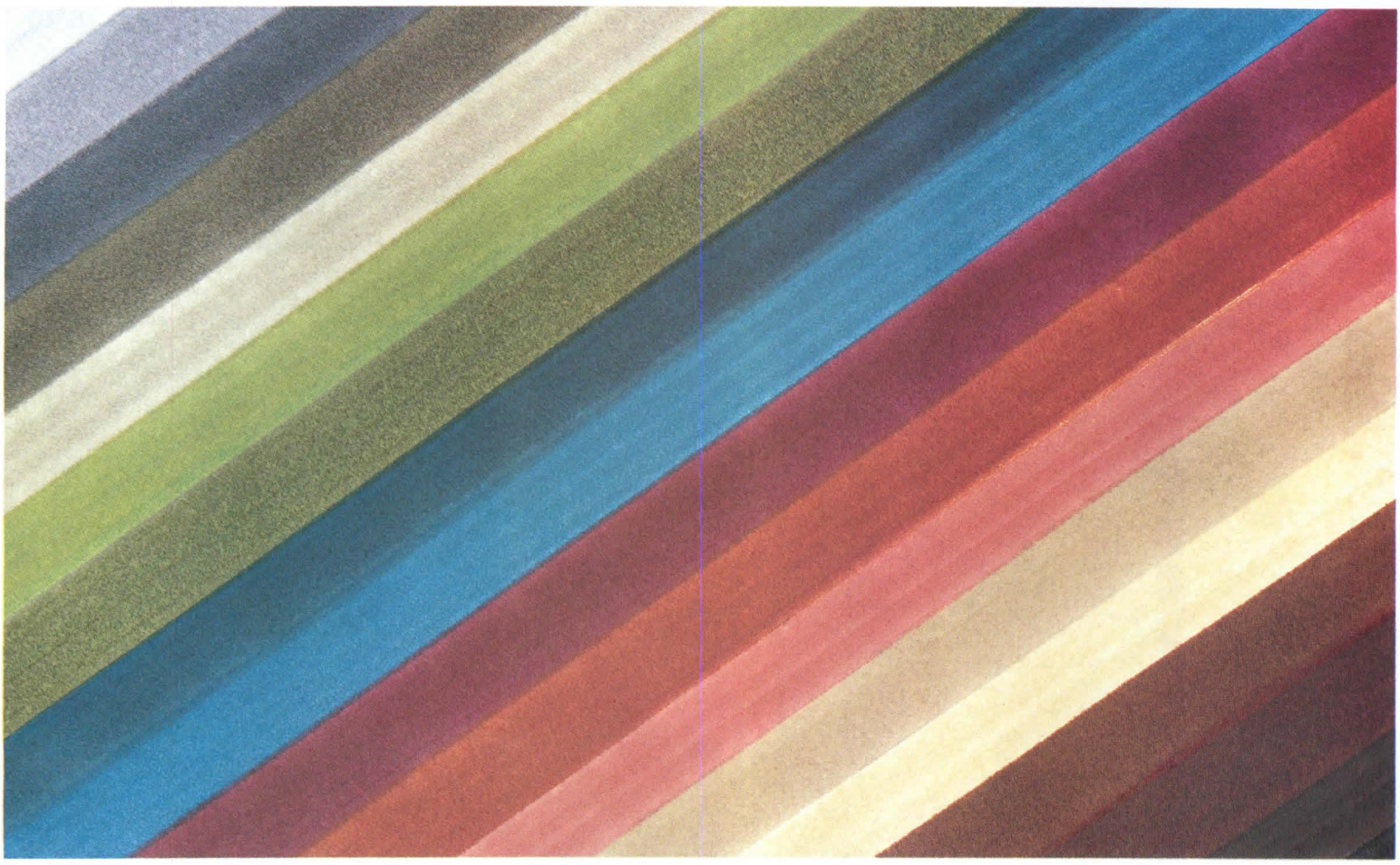
The exhibition's 24 sections are arranged chronologically, beginning with the World's Fair of 1873 and the subsequent Stock Market crash, passing through Lueger's policy of communalization of services, looking at anti-Semitism and Theodor Herzl's writings, referring in elaborate detail to World War I, and ending with the Depression, paving the way for what was imminent but in the show merely implied: Nazi rule. Events are represented through paintings and photographs of the era, posters, cartoons, declarations of war, postcards from the front line, and bloodied uniforms.

Between the history sections are sections on music: a variety of material including Mahler's musical sheets, programs, shadow drawings, sketches for the sets of his production of *Tristan and Isolde,* a reconstruction of his gravestone, his funerary shirt; on psychology: Freud's books, a miniature therapy couch on a pedestal; on literature: books, of course, as well as letters, a painting of the Cafe Griensteidl, a reconstruction of the photo-lined room of Peter Altenberg; on theater: Friedrich Kiesler's Space Stage; on film: clips from Austrian silent films; and the list goes on.

For all the wealth of this material, fine art and architecture do take center stage. As one enters, mannequins in costumes from the Imperial silver wedding jubilee pageant of 1879 herald the visitor's ascension up the stairs to the dramatic Otto Wagner room, with color photographs, drawings, and elaborate models of notable works such as the Postsparkasse and the Steinhof church, and actual artifacts such as a ventilation standard from the Postsparkasse. There is even a full-scale reconstruction of the Die Zeit news agency portal.

Centerpiece of the ground floor of the exhibition is the full installation of Gustav Klimt's Beethovenfrieze. Also on the ground floor, the Wiener Werkstätte is represented by numerous decorative art objects, while Josef Hoffmann's Palais Stoclet is shown in drawings and a fine wood model. The front of Adolf Loos's American Bar is reconstructed, as is a corner of Loos's room for

# COLOR IT METAL



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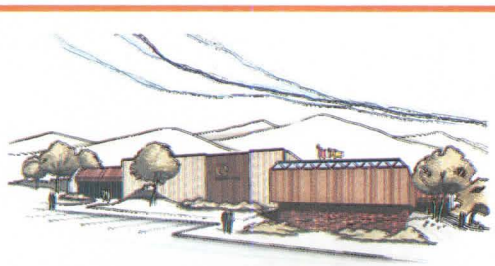

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the Turnowsky family, and his House at Michaelerplatz is well represented.

Throughout, Hollein's sets for the exhibit rooms themselves are in evidence, usually with great effect.

Unfortunately for non-German speakers, all written material, including the catalog, is in German. The British magazine *Architectural Design* is publishing a complete issue on the show this fall, which will help English speakers. The exhibition itself, however, ends October 6. But the subject matter and artifacts will be featured again in two major shows next year—a French one with more emphasis on Viennese politics, and an American one with none. The restructured French version will be shown at Paris's Centre Pompidou from early February to May 4th. And at New York's Museum of Modern Art next summer (June 30–October 22), an exhibition called "Vienna 1900: Art, Architecture and Design" will feature a more limited time span (1898–1918) and subject matter; social history, for example, will be discussed only in the accompanying catalog. ***Susan Doubilet*** ■

## *Housing in the Cincinnati Hills*

The soft shale and limestone hills in and around Cincinnati have made that area world-famous as a hunting ground for paleontologists and other fossil fans. But they've also created headaches for generations of builders. Hamilton County has the highest per capita cost from landslide damage in the country—higher even than San Francisco.

When Cincinnati's Hillside Trust sponsored a national competition for a hillside housing project, sensitivity to the city's fragile environment was a primary criterion. Entrants received a geotechnical report on the site when they registered, and each submission was reviewed by a geologist. Five of the 101 entries won $5000 First Prizes, including entries by the team of Schwartz-Kinnard, Neal Payton, and Nelson-Byrd, Charlottesville, Va.; Stanley D. Overton, Jr., and Katherine Setser, Nashville, Tenn.; Charlotte R. Hitchcock and Arthur G. Selbert, New Haven, Conn.; Hokanson/Lunning Associates, Minneapolis; Julie Gross and Kevin Kemp, Chicago. Honorable mentions were awarded to Adele Naude Santos Architects, Philadelphia, Pa.; Osler/Milling Architects, Ann Arbor, Mich.; and Barry Stedman, Cincinnati, Ohio.

The seven-member jury, organized by Charles Graves, FAIA, and led by Bill Lacy, FAIA, was "impressed with how [all] the winners sculpted the site," Graves said. (Also on the jury were William Behnke, FASLA; Steven F. Bloomfield, AIA; Charles W. Moore, FAIA; William Pedersen, Jr., AIA; Anne Whiston Spirn, ASLA; and Carl A. Strauss, FAIA.)

In sponsoring the competition, the Trust hoped to identify a "Cincinnati House," a type of building so uniquely adapted to the site conditions that it would become a model for other projects "in the same manner that distinctive site and climatic conditions produced housing types associated exclusively with San Francisco and Charleston." One of the five first-prize winners will be built on

*Schwartz-Kinnard, above; Hokonson/Lunning, below.*

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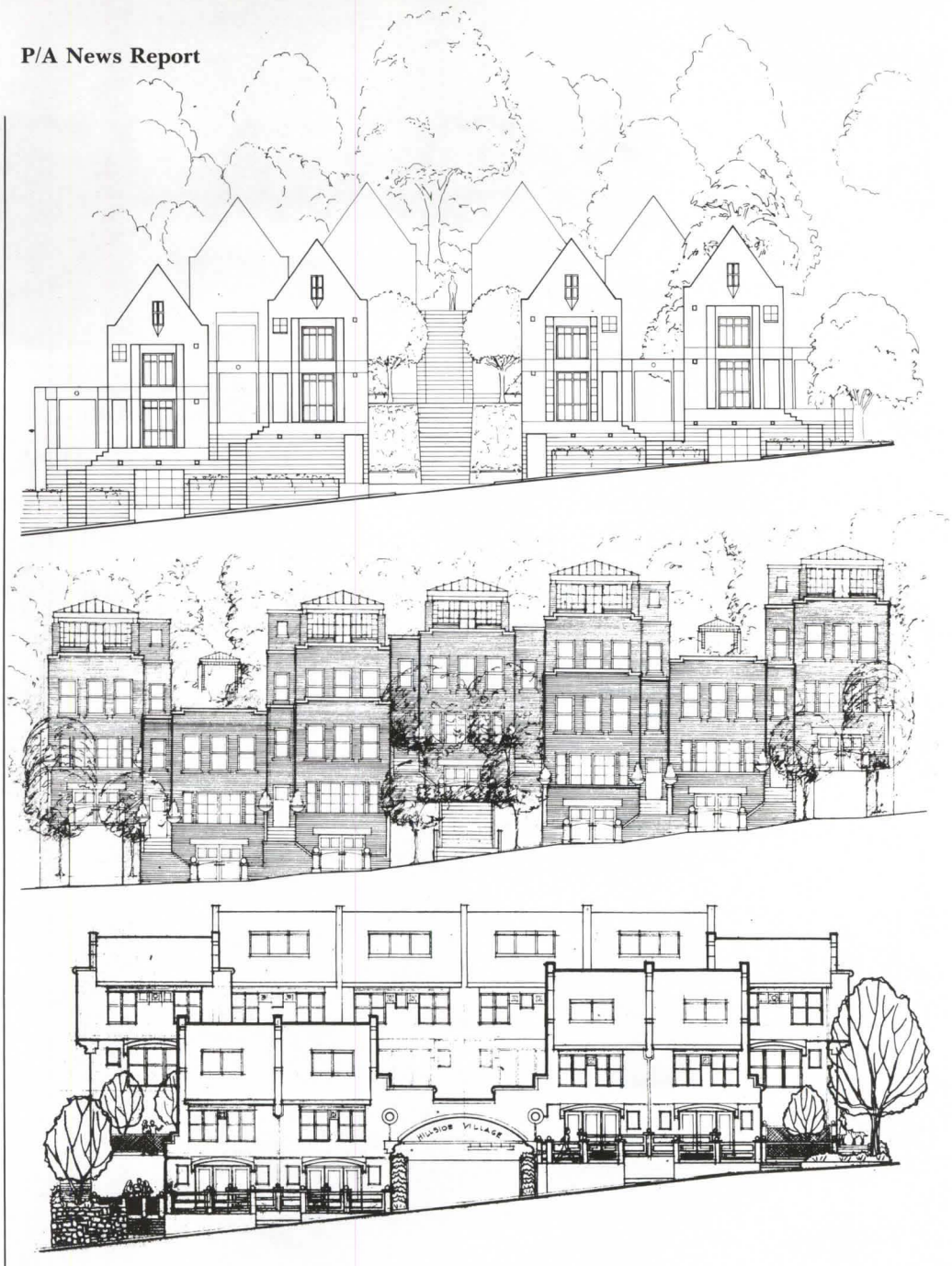

*Top to bottom: Overton, Kemp, and Hitchcock.*

the site, described by the jury as "a sloping site of extraordinary physical beauty commanding sweeping views of Cincinnati." Developers have been invited to submit proposals for the project, and a committee representing the trust will choose one based on experience with similar projects and proof of ability to finance construction.

The developer will then select one of the five top designs and contract with the architect to build the project, which Graves described as a "relatively modest" ten units, with a city agency reviewing the work as it progresses.

Though the Trust will offer the developer a choice among the top five entries, the jury had an obvious favorite: the Schwartz-Kinnard entry. "This entry, in contrast to so many, utilized the entire site and seemed completely adapted to its hillside location," they wrote. Parking was handled "in a direct and gracious manner," and the units formed a sequence of spaces "ordered into the proper hierarchy of public, to semiprivate, to private precincts within the development."

The winning entries, honorable mentions, and 20 other submissions were placed on exhibit in downtown Cincinnati September 25.

***Melissa Brown*** ■

## *Two Paris Shows: Kid Stuff?*

Two highly publicized and well-attended Paris shows—one on architecture in cartoons and the other a Lego show—played with the fanciful side of architecture. The summer show "L'Architecture est un Jeu . . . Magnifique" at the Centre Pompidou displayed the creations of 30 European architects, commissioned by the Lego toymakers in Denmark. Some used more than 20,000 plastic blocks, each of them a stock piece from the Lego collection. A smash with the public, especially children, most of these colorful conceptions of urban dwellings are remarkable for their apparent and accessible livability.

Most impressive is the disciplined yet highly flexible order imposed by the blocks; the variety of architectural forms and idioms possible is nothing short of amazing. One wonders whether these blocks—which are available in an astonishing array of parts composing a highly technical toy building

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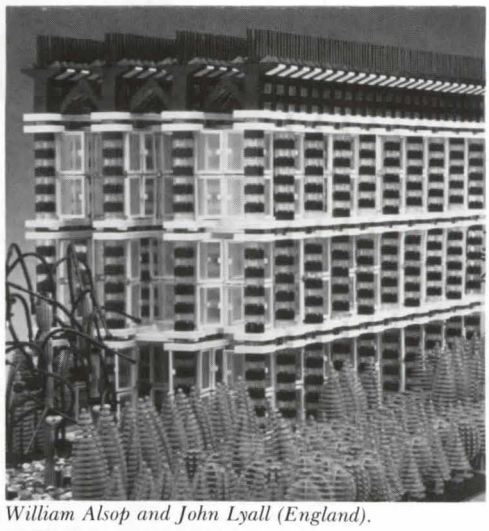
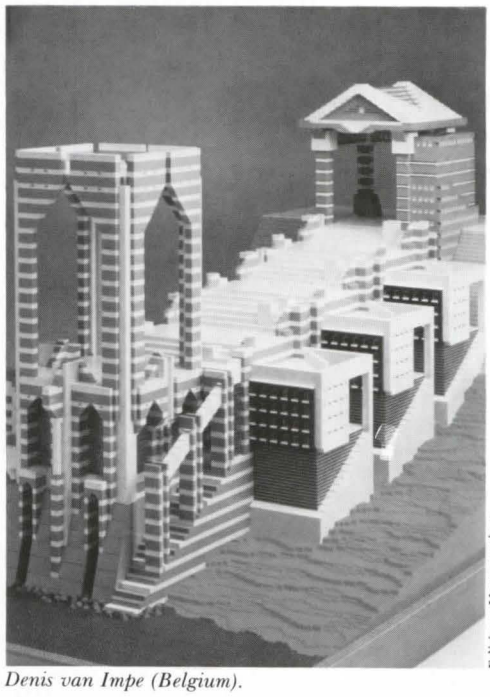


*William Alsop and John Lyall (England).*



Editions Vormgeving

*Denis van Impe (Belgium).*

system—couldn't be an important addition to architectural education. The parallels with real unit masonry building systems are genuine and close, and it is easy to imagine mature students—even seasoned practitioners—gaining new insights from their study and use. Several of the most elaborate constructions suggest that there is also genuine potential for Lego blocks in architectural presentation models. Perhaps Lego had these notions in mind when they sponsored the show. Next, they ought to bring this magnificent game to the U.S.

By comparison, "Architectures de Bande Dessinee" (literally, the architecture of drawings in bands, the French term for cartoon strips) is less accessible and certainly less useful, but no less amusing or remarkable. Cartooning for both adult and youth audiences is a large and serious hardcover publishing business throughout Europe. Most strips are produced by French, Belgian, and Italian artists (not at all a misuse of the term; their work has by now its own circle of discerning critics and collectors). Americans may be most familiar with the wholesome, beautifully drawn and often exotically set "Adventures of (boy journalist) TinTin and (his dog) Milou," written and drawn by the late Belgian, Hervé, which have been translated into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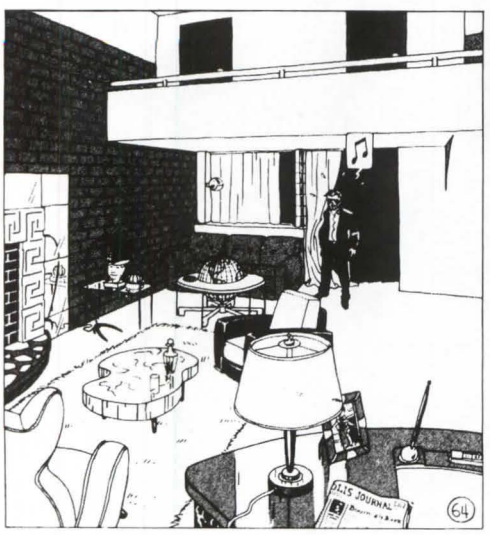
English and many other languages. The premise of this show, organized by the Institut Francais d'Architecture in Paris with support of the French government (through late November), is that architecture has figured prominently in an enormous number of cartoon strips and that the conceptions of cartoonists can be enjoyed on this basis alone.

They are right. The hundreds of original drawings on display, excerpted from the stories in which they originally appeared, show fascinating depths and strengths of stylistic presentation against which work of

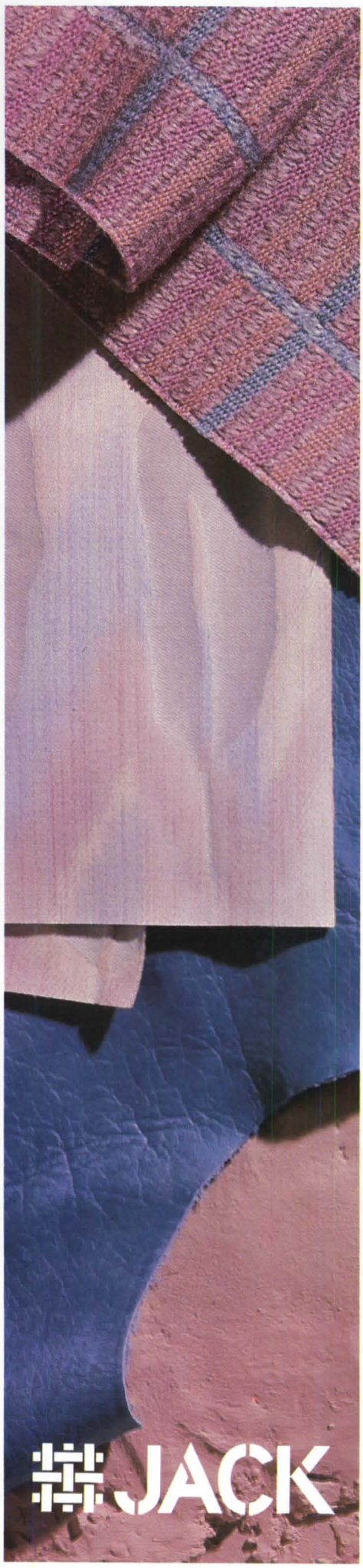



*Architecture in cartoons at IFA, Paris.*

the profession itself pales. Most successful are the drawings of historic and contemporary settings meant to be "real" within the context of the stories. American architecture and design of the 1950s figures prominently, reflecting a general preoccupation in France with "style retro" (ducktail haircuts, chinos, and James Dean).

Urban and suburban settings, from the gritty to the pristine, are presented in startling and captivating ways. Here architecture—for such it is—is given a life that is missing from most architectural renderings, as speaking, acting characters move in and through the mostly splendid drawings. This show, too, should come to America.

***Thomas Vonier*** ■




## *Architecture for the Masses*

Starting this fall, the TV networks promise a virtual media blitz on the subject of architecture, with two series about American design produced for U.S. public television, two series on international architecture to be imported from England, and an assortment of other programs, including one on Florida architecture and another on British country houses.

Aspiring to be the U.S. counterpart of BBC's successful "Civilisation" programs, "America By Design," a coproduction of WTTW Chicago and Guggenheim Productions, scheduled for fall 1986, examines aspects of the American built environment—the home, the workplace, the street, public places, and public projects—in a five-part series. Host Spiro Kostof, Professor of Architectural History at Berkeley and author of the recent *History of Architecture: Settings and Rituals* (P/A, Sept. 1985, p. 235), takes the approach of a cultural historian, analyzing the vast range of American design—from earth-moving projects of the Army Corps of Engineers to individual monuments like Monticello and ordinary structures such as the mobile home—for cultural implications.

"Pride of Place: Building the American Dream," an eight-part series developed by Mobil Corp. and produced by Malone Gill Productions (PBS, spring 1986), examines American architecture through investigation of specific types of buildings and development: the campus, dream houses, suburbs, resorts, public buildings, the skyscraper, and the city. Host Robert A.M. Stern, architect, educator, and author of *New York 1900* and *New Directions in American Architecture,* looks at great American buildings and places, which he sees as the product of collaboration between patrons with dreams and architects who made the dreams real (hence the subtitle, "Building the American Dream"). His point of view is buttressed by interviews with patrons including Phyllis Lambert of the Canadian Center for Architecture and developer Gerald Hines, and with architects Jaquelin Robertson, and Susanna Torre.

Two English series are not yet scheduled for U.S. airing. "Architecture at the Crossroads," a ten-part BBC production written and produced by Peter Adams, will examine Modern architecture and current alternatives, including the "pop-up" cities Houston and Dallas, where, in the words of the producer, architecture is collected like designer jeans. Anglia Television's six-part "Space on Earth," produced by John Lloyd Fraser, also deals with contemporary architecture and its future, devoting one episode to cultural centers, two to skyscrapers, and another to conservation.

Back in the States, "Fantasy of Florida: Dreams Expressed in Architecture," a five-part series produced by WEDU Tampa and Atlantic Productions currently airing on Florida public television, chronicles that "playground of the rich, paradise of the poor," from the grand hotels of tycoons Henry Flagler and Henry Plant to roadside motels, with Frank Lloyd Wright, Morris Lapidus, and Paul Rudolph in between. Scheduled to coincide with the National Gal-

lery of Art's exhibition of the same name, "Treasure Houses of Britain," a three-part series hosted by John Julius Norwich and produced by Malone Gill, will explore the country house in British social and architectural history from the Renaissance on.

Why the sudden preoccupation of the mass media with architecture? Those who initiated the four series, who are not architects but businessmen or film producers with track records in other subjects, claim to be responding to heightened public interest in architecture, while trying to increase that interest. This campaign will assume multimedia dimensions with books to be published in conjunction with three of the programs: *America By Design,* by Spiro Kostof (Oxford University Press); *Pride of Place: Building The American Dream,* by Robert Stern (Houghton Mifflin/American Heritage); and *Space on Earth* by Charles Knevitt, architecture correspondent for *The Times* (Thames Methuen). ***Natalie Shivers*** ■

*The author, an architect with Hardy Holzman Pfeiffer Associates, New York, has published* Those Old Placid Roads: The Esthetic and Development of the Baltimore Rowhouse.

## *WORLDESIGN 85*

Washington, D.C., was the site of WORLDESIGN 85/ICSID USA, the 14th Congress of the International Council of Societies of Industrial Design. The August conference, convened for the first time in the United States, was hosted by the Industrial Designers Society of America (IDSA). Daily sessions featured experts from around the world who discussed the international economy, problems of business and productivity, marketing, practice, and, of course, design—of consumer electronics, industrial equipment, furniture, and exhibits, to name a few items. On Friday the 23rd, "Design Excellence" day, luminaries such as Bruce Burdick, Mario Bellini, Emilio Ambasz, and Lella and Massimo Vignelli starred in "Meet the Press"-style interviews, and in afternoon presentations, industrial designers from the U.S. and abroad explained their work on everything from computer design to color theory.

Throughout the conference, the Design Excellence Center housed 47 exhibits by design firms, manufacturers, design schools, and professional and trade organizations. Most of these exhibits were more informative than compelling, with a few exceptions, such as that of General Motors' Epcot-Center-based World of Motion, which featured the Lean Machine, a three-wheeled, single-occupant car that looks like a cross between a tricycle and a torpedo, gets up to 200 mpg, and offers the maneuverability of a motorcycle with the stability and protection of an enclosed automobile.

The 1985 Industrial Design Excellence Awards (IDEA), presented at the conference, honored 32 outstanding designs, among them Bill Stumpf and Jack Kelley's Ethospace system for Herman Miller, and Vignelli Associates' Artemide showroom at Dallas's World Trade Center. Also recognized were Niels Diffrient's Jefferson Chair for SunarHauserman, and Vignelli Associates' dinnerware for Sasaki China.
***Pilar Viladas*** ■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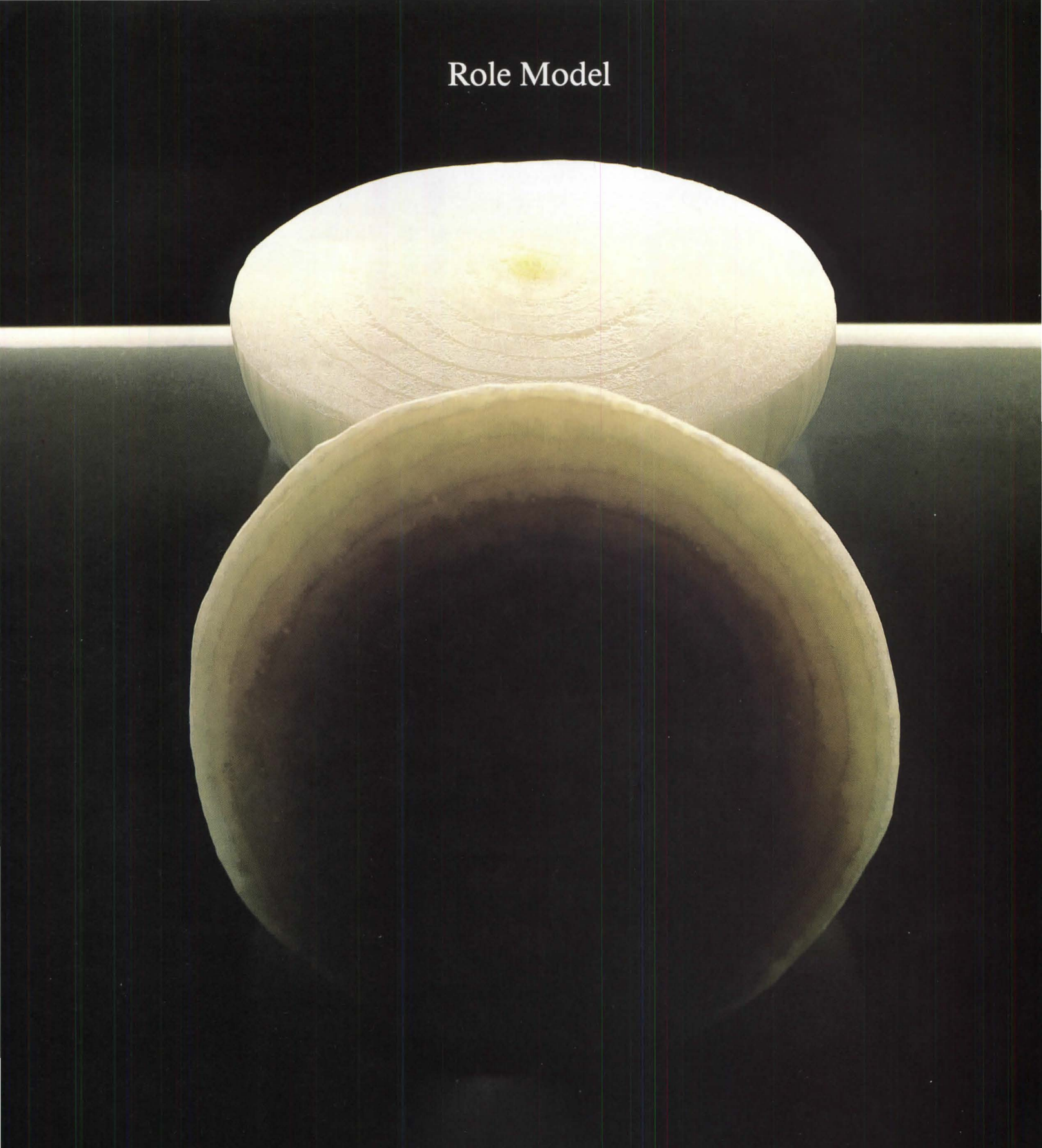

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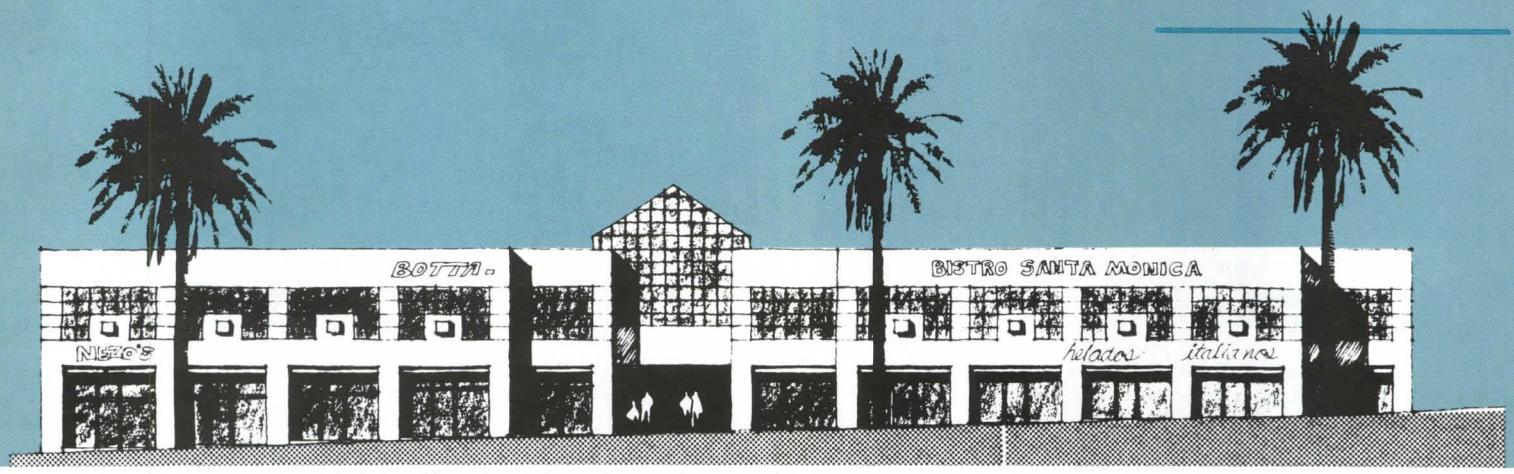
# *Perspectives*

Randolph Harrison

***The strip retail center, that much maligned predecessor to the enclosed mall, is making a comeback in California and elsewhere. Changes in the type are discussed below. A second Perspective describes Almere, a Dutch new town.***




*The Boulevard, West Hollywood, Calif., designed by Robert Jacques of the Nadel Partnership.*

## *Strip Retail Returns*

The "strip retail center," a group of six to twelve small shops with parking in front, has long been a familiar sight in American cities. Eclipsed for several decades by the enclosed shopping mall, it has become one of the hottest market items in commercial development. Throughout Southern California where the current boom originated, an estimated 2000 centers have been built in the last five years, including 400 in Los Angeles County alone. Now, strip retail centers—which contain 7-Eleven-type markets, fast food stores, dry cleaners, video rental stores, and the like—are rapidly spreading across the nation, often as urban "infill" projects on sites such as former gas stations.

Several factors contribute to the current boom. A dramatic shift in American lifestyles and shopping patterns is the primary cause. With the increase in two-job couples, some people willingly pay higher prices at strip retail centers in order to save time, rather than shop at the larger stores and supermarkets. For food purchases, 1983 and 1984 national surveys show that shoppers value fast checkout time above all else, including price. Renewed interest on the part of many commercial developers in older city neighborhoods, reflected in the renovation of existing malls and the construction of new downtown retail centers such as South Street Seaport and Harborplace, has also contributed to strip retail's resurgence. Developers are also finding new markets in many black, Latin, and Asian inner-city neighborhoods which had been overlooked in the past. In Los Angeles, for instance, some of the greatest strip retail center growth is happening in Koreatown, Watts, and East L.A.

Looking at the bottom line, strip retail centers often mean big profits for small and mid-size real estate developers who can raise the $1 to $2 million required for construction. In Southern California, construction runs about $50 a square foot for the typical one-story project. Land costs vary greatly, for instance, from $20 a square foot in East L.A. to $80 or $100 in desirable West L.A. Rents differ as well, ranging from $1 to $3 a square foot a month. A small 6000-square-foot center renting at $2 a square foot should net the developer/owner $2500 to $3000 a month, if all the stores are leased.

Developers typically seek corner sites with daily traffic counts of 40,000 to 50,000 cars and 100,000 people within a two-mile radius. Former gas stations—1900 have closed in Los Angeles County during the last decade—are favorite locations. These stations occupy busy commercially zoned corners, and the lots average 15,000 square feet—too large for the single store, too small for a supermarket or office building, but just the right size for a strip retail center.

So far, vacancies have not been a problem at most Southern California centers. Rents may be higher than at traditional streetfront shops, but the strips offer easy parking for customers, and their small-size shops offer tempting startup opportunities for businesses that cannot afford to move into larger malls. Many centers have above-average traffic—often 3000 transactions a day or $200 a square foot in sales, as compared to the typical $140 a square foot for larger shopping centers.

Despite their popularity, strip retail centers are entering a difficult period in Los Angeles, a pattern that will probably be repeated several years from now in other cities where the boom is just getting underway. Architects criticize most projects for banal design, although the offending strip retail center usually looks no worse than the gas station it replaced. City planners and neighborhood associations complain that strip retail centers diminish a street's pedestrian activity by placing a parking lot between the sidewalk and store window displays which appeal to passersby.

The validity of this criticism depends on location. In locations favored by pedestrians, the typical strip retail center is a detriment. Along many busy city and suburban streets, however, there's often no pedestrian activity to lose. In West Hollywood, California, a project called The Boulevard accommodates both pedestrian and vehicular traffic. Completed in August, this two-story 28,000-square-foot building on Santa Monica Boulevard was designed by Robert Jacques of Herbert Nadel, AIA, and Partners, Santa Monica. With its front façade flush along the sidewalk and its 90 parking spaces located behind the building, The Boulevard responds architecturally and contextually to this stretch of Santa Monica Boulevard where patrons of the area's upscale shops and restaurants stroll up and down the sidewalk throughout the day and long into the night. Each of The Boulevard's eleven street-level shops has its own front doorway, and the building's central entrance opens into a two-story steel-ribbed galleria, which allows pedestrians to reach the eleven second-floor shops and the rear parking lot one story above street level.

Whether or not to adopt a pedestrian-pleasing arrangement like The Boulevard, while a big issue for architects, is unfortunately the least of the strip retail center developers' worries. Responding to rising complaints about inadequate strip retail center parking, overly bright lighting, nighttime garbage collection, and noise from 24-hour fast food stores, the Los Angeles City Council is considering a ban on these projects at any location contiguous to or across the street from residentially zoned property. In a city like Los Angeles where commercial strips traditionally back up to residential property,

such provision would greatly slow the current strip retail boom.

Los Angeles' strip retail boom may also slow because of overbuilding. "Until a year ago, developers acquired top locations at good prices and made a lot of money," declares commercial real estate investor/developer Tony Kouba who specializes in strip retail centers. "Eventually, the good sites became scarce or too expensive. But new investors didn't realize this. They only saw the profits from prior projects. In their eagerness, they built in already-saturated areas or selected marginal locations." Some new developers bought sites on busy streets, which get the drive-in traffic but lack the population density necessary for the crucial neighborhood walk-in trade that often means the difference between profit and loss. Others were mesmerized by the high traffic numbers without analyzing what those figures meant. Does a site face a fast-moving eight-lane boulevard filled with commuters who stop at a strip retail center on impulse, if at all? Or a slower-moving four-lane street used by local residents more likely to shop?

"Other developers are risking trouble, because they didn't put themselves in the merchants' place," continues Tony Kouba. "Meeting Los Angeles' minimum parking requirements isn't enough, particularly if the center has several fast food stores. To attract repeat customers, nothing gives a center a bad name faster than inadequate parking. And would-be shopkeepers are starting to consider this factor in leasing decisions."

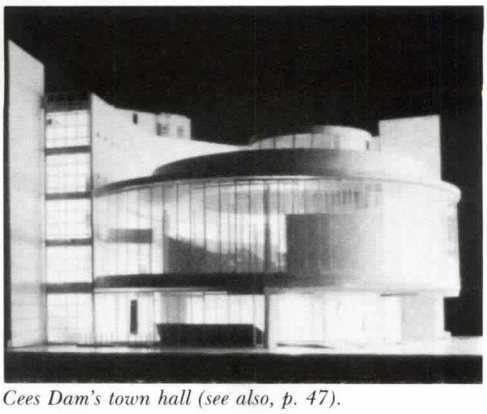
Despite these and other problems, strip retail is no endangered species, although it may experience retrenchment over the next 12 to 18 months and emerge on a less volatile, more predictable footing. The relatively easy dollars are nearly gone, if they ever existed. Like most real estate development, it will take good design and planning, careful market research, and hard work for future strip retail builders to make a profit.

***Christopher B. Leinberger*** ■

*The author, President and Managing Partner of Robert Charles Lesser & Co., a management consulting and market research firm specializing in real estate, writes monthly columns for* NY Air, Builder, *and* National Real Estate Investor *magazines, and occasionally contributes to the* Wall Street Journal.

## *Dutch Town Planning in Practice: Almere*

Since World War II, the Dutch government has spent between 6 and 16 percent of its annual budget meeting the urgent construction demands of the war-devastated but prosperous country. Mass production techniques have been encouraged and programs expanded to meet new needs of the elderly, single parents, minorities, and students. The most ambitious building project of recent years has been the reclamation of the vast inland South Sea. Nearly half of what is now the Ijssel Lake has been turned into polders, heavily irrigated meadows dotted with towns, living town planning experiments.



*Cees Dam's town hall (see also, p. 47).*

Almere, situated twenty minutes from Amsterdam in the Southwest Polder (and 12 to 18 feet below sea level) is destined to become the largest of these new towns. The first phase, Almere-Harbor, completed in 1980, adapts the Dutch rural vernacular to large, institutional apartment blocks. A series of interlocking hexagonal neighborhoods center on a water-bound town hall.

The second phase, Almere City, is a much larger and grander conglomeration of neighborhoods. Two- to four-story strips of attached housing units are grouped around a central playground and a school, or recreational facility. An axially arranged shopping street at the center of the city connects an artificial lake to a train station. Most of the central area is the work of the architecture firm VDL, which has adapted both the details of Berlage and the scale and geometries of

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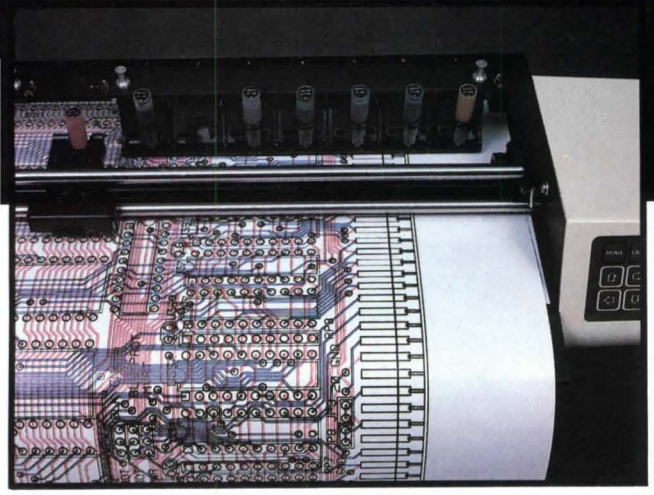

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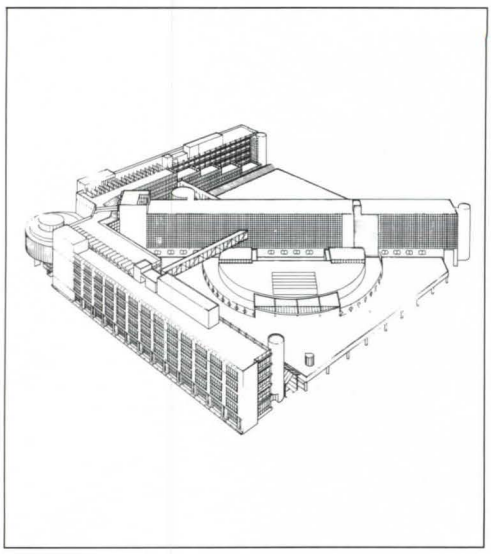

*Dam's town hall, above;*
*Almere mainstreet, right.*

Modernist architecture. A grand new town hall, designed by Cees Dam and now under construction, gestures to the open land, outside the city limits. Rem Koolhaas has just finished his design for the main police station and "community center." Finally, the newest neighborhoods of Outer Almere, the first of three planned "suburbs," offer a more abstract, whitewashed urbanism.

Culture is transplanted wholesale into Almere, as is light industry. The Dutch planners do not want the city to become a bedroom community for the 64 percent of inhabitants originally from Amsterdam. A complicated structure of subsidies for schools, libraries, music groups, minorities, and young people is meant to breathe life into the matrix of public amenities and mass-produced housing on this isolated site.

The city celebrated its first anniversary this year amidst complaints that it lacks life, activity, and diversity. Yet its cheap housing remains in continued demand, and stores and communal buildings, including the churches attended by 35 percent of the population, are quite active. Almere is not a particularly beautiful city, nor is its setting ideal, yet, unlike our own company towns and suburban developments, Almere reflects a society which has had to construct its own country out of marshes and the sea, one which continues to create comprehensible, comprehensive, and communal forms of urban order.

***Aaron Betsky*** ■

*The author is a designer in the office of Frank O. Gehry & Associates in Los Angeles.*

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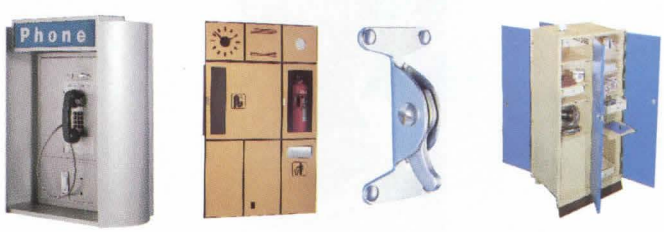


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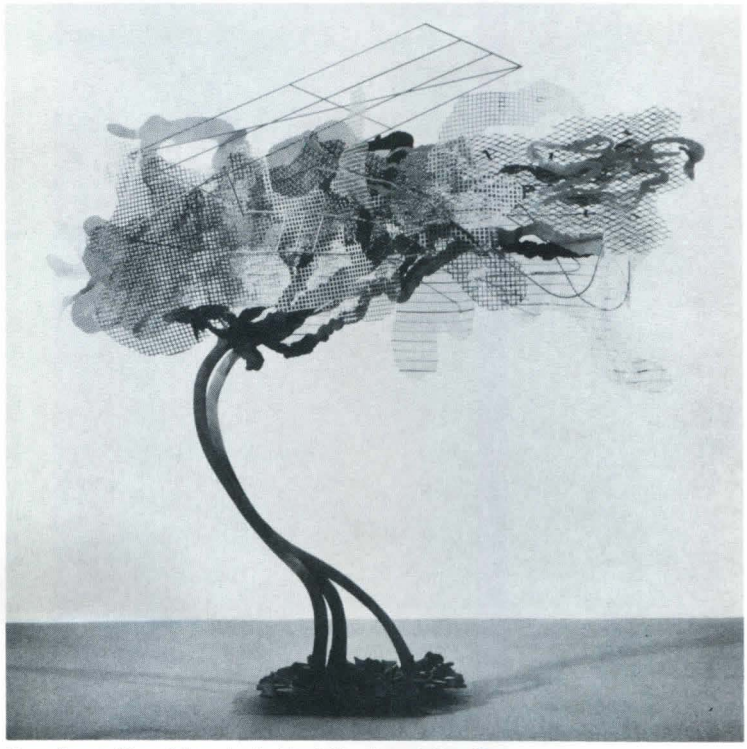
# P/A Calendar



Nancy Graves, "Trace," from An Architect's Eye, through Nov. 10.

### *Exhibits*

**Through October 20**
White City: International Style Architecture in Israel, with photographs by Judith Turner. Judah Magnes Museum, Berkeley, Calif.

**Through October 26**
Chicago and New York: More than a Century of Architectural Interaction. The New-York Historical Society, New York.

**Through October 26**
Design for Need. Design Centre, London, England.

**Through October 26**
Architectural Fantasies. Loewenstein Library Gallery, Fordham University at Lincoln Center, New York.

**Through October 27**
Wendell Castle: Recent Works. Taft Museum, Cincinnati.

**Through October 27**
Alvar Aalto: Furniture and Glass. Akron Art Museum, Akron, Ohio.

**Through October 27**
Los Angeles Collects: Functional Fantasy Furniture. Craft and Folk Art Museum, Los Angeles.

**Through October 28**
Times Square: Keep It Alive; also Great Squares of the World. Municipal Art Society, New York.

**Through November 9**
Glasgow/Budapest 1902. Glasgow Art Gallery & Museum, Glasgow, Scotland.

**Through November 10**
An Architect's Eye: Selections from the Collection of Graham Gund. Mount Holyoke College Art Museum, South Hadley, Mass.

**Through November 10**
Walter Gropius. Busch-Riesinger Museum, Cambridge, Mass.

**Through November 29**
The Work of Afra and Tobia Scarpa, Architects and Designers. Center Four, International Design Center, New York.

**Through December 2**
Athens: European Concern. Zappeion Megaron, Athens, Greece.

**Through December 8**
Mario Botta: Architettura 1960–1985. Scuola di San Giovanni Evangelista, Venice, Italy.

**Through December 8**
Paris Recorded: The Thérèse Bonney Collection. Cooper-Hewitt Museum, New York.

**Through December 28**
Building Our National Image: Architectural Drawings for the American Republic, 1789–1914. National Building Museum, Washington, D.C.

**Through January 15**
150 Years of Chicago Architecture. Museum of Science and Industry, Chicago.

**Through February 16**
High Styles: 20th Century American Design. Whitney Museum of American Art, New York.

**Through December 11**
The Critical Edge: Controversy in Recent American Architecture. Acklind Art Museum, University of North Carolina, Chapel Hill; also **January 8–March 8,** University Art Museum, Berkeley, Calif.; **May 8–June 8,** Nelson Atkins Museum, Kansas City, Mo.

**October 14–26**
Housing the Homeless. AIA Building, Washington, D.C.

**October 18–January 1**
Arthur Erickson: Selected Projects. Vancouver Art Gallery, British Columbia.

**October 21–November 15**
Three Firms: Steven Holl Architects, UKZ, Giuseppe Zambonini. Columbia University Graduate School of Architecture and Planning, New York.

**November 5–April 6**
The Architect and the British Country House. Octagon Museum, Washington, D.C.

### *Competitions*

**October 15**
Registration deadline, University of Miami Campus Redesign Competition. Contact Prof. Ralph Warburton, AIA, AICP, Professional Advisor, Campus Plan Competition, University of Miami, Coral Gables, Fla. 33124-9178.

**October 18**
Submission deadline, Arts on the Line Central Square Station Open Competition. Contact Arts on the Line Station Modernization Program, 57 Inman St., Cambridge, Mass. 02139 (617) 864-5150.

**November 1**
Concrete Reinforcing Steel Institute Design Awards VIII. Contact Executive Vice President, CRSI, 933 N. Plum Grove Rd., Schaumburg, Ill. 60195 (312) 490-1700.

**November 1**
Proposal deadline, Violated Perfection: The Meaning of the Architectural Fragment. Contact Laurel Bradley, Dir., Gallery 400, College of Art, Architecture & Urban Planning, Box 4348, Chicago, Ill. 60680.

**November 25**
Registration deadline, First Stage of Sesquicentennial Park Design Competition for downtown Houston. Contact Theodore Liebman, AIA, Professional Advisor, % Central Houston Civic Improvement, Inc., 2040 Two Shell Plaza, Houston, Texas 77002.

### *Conferences*

**October 15–20**
Solar '85: Passive Solar Industries Council 10th National Conference. Raleigh, N.C. Contact Solar '85, 850 Morgan St., Raleigh, N.C. 27603.

**October 22–27**
SAIE (International Exhibit of Building Industrialization) and International Exhibition of Publications on Architecture and Town-Planning, Palazzo della Cultura e dei Congressi, Bologna, Italy. Contact Salone Internazionale dell'Industrializzazione Edilizia, Piazza della Costituzione, 6, 40128 Bologna, Italy.

**October 24–26**
AIA Symposium: Housing the Homeless. AIA Building, Washington, D.C. Contact Ravi Waldon, AIA Design Dept. (202) 626-7429.

**October 25–27**
Frank Lloyd Wright's Publicly Accessible Buildings: Problems and Programs. Darwin D. Martin House, State University of New York at Buffalo, Buffalo, N.Y. Contact John F. Quinan, Ph.D., 611 Clements Hall, SUNY at Buffalo, Buffalo, N.Y. 14260 (716) 636-2436.

**October 27–30**
IFMA '85: Conference and Exposition of the International Facility Management Association. *Mart Center*, Chicago. Contact Kathy Thomas, IFMA, Summit Tower, Suite 1410, 11 Greenway Plaza, Houston, Texas 77046 (713) 623-4362.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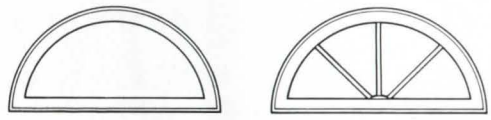

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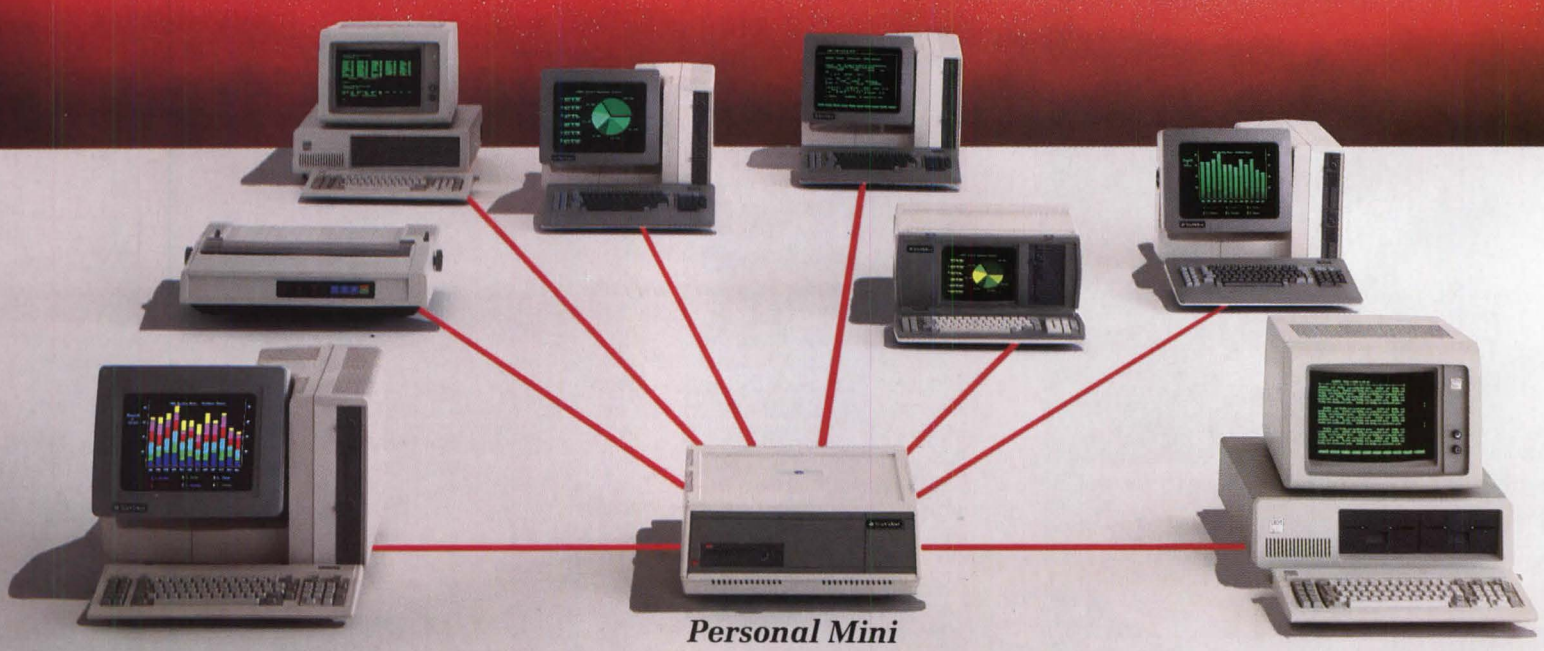

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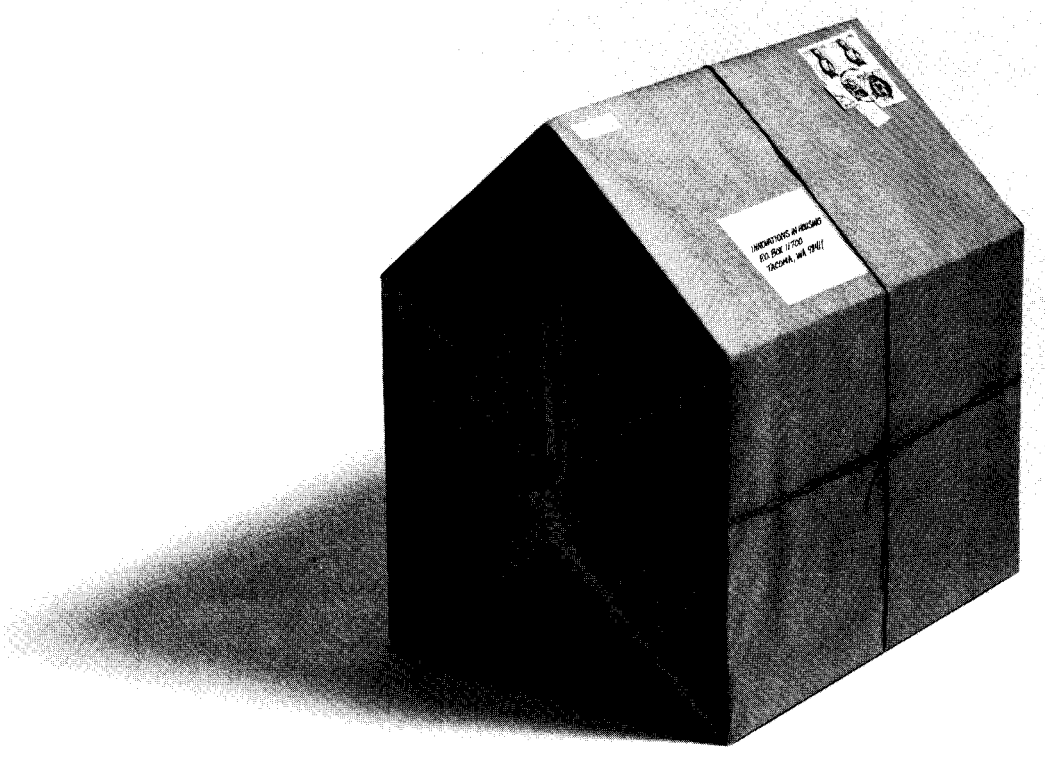

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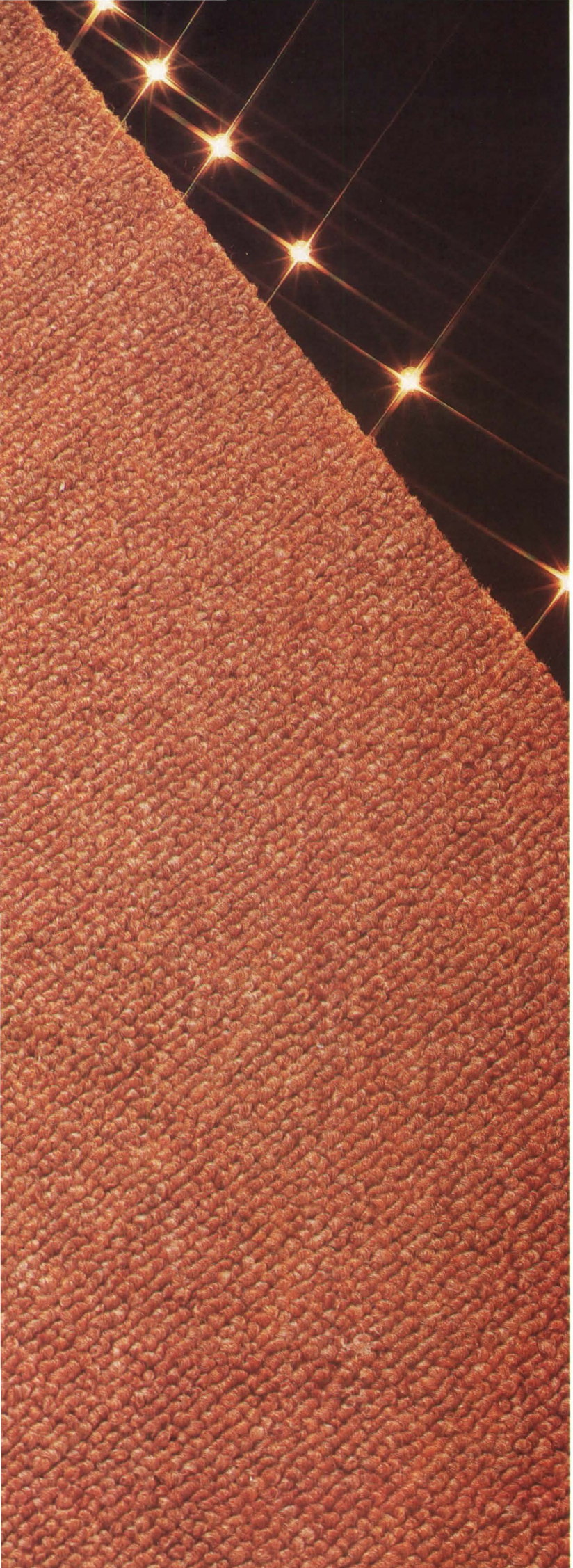

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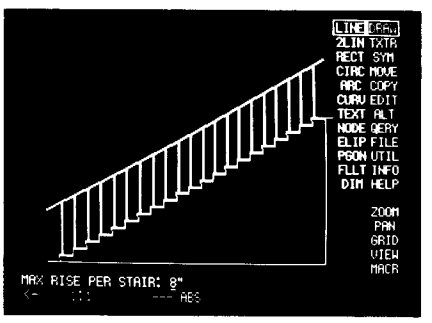


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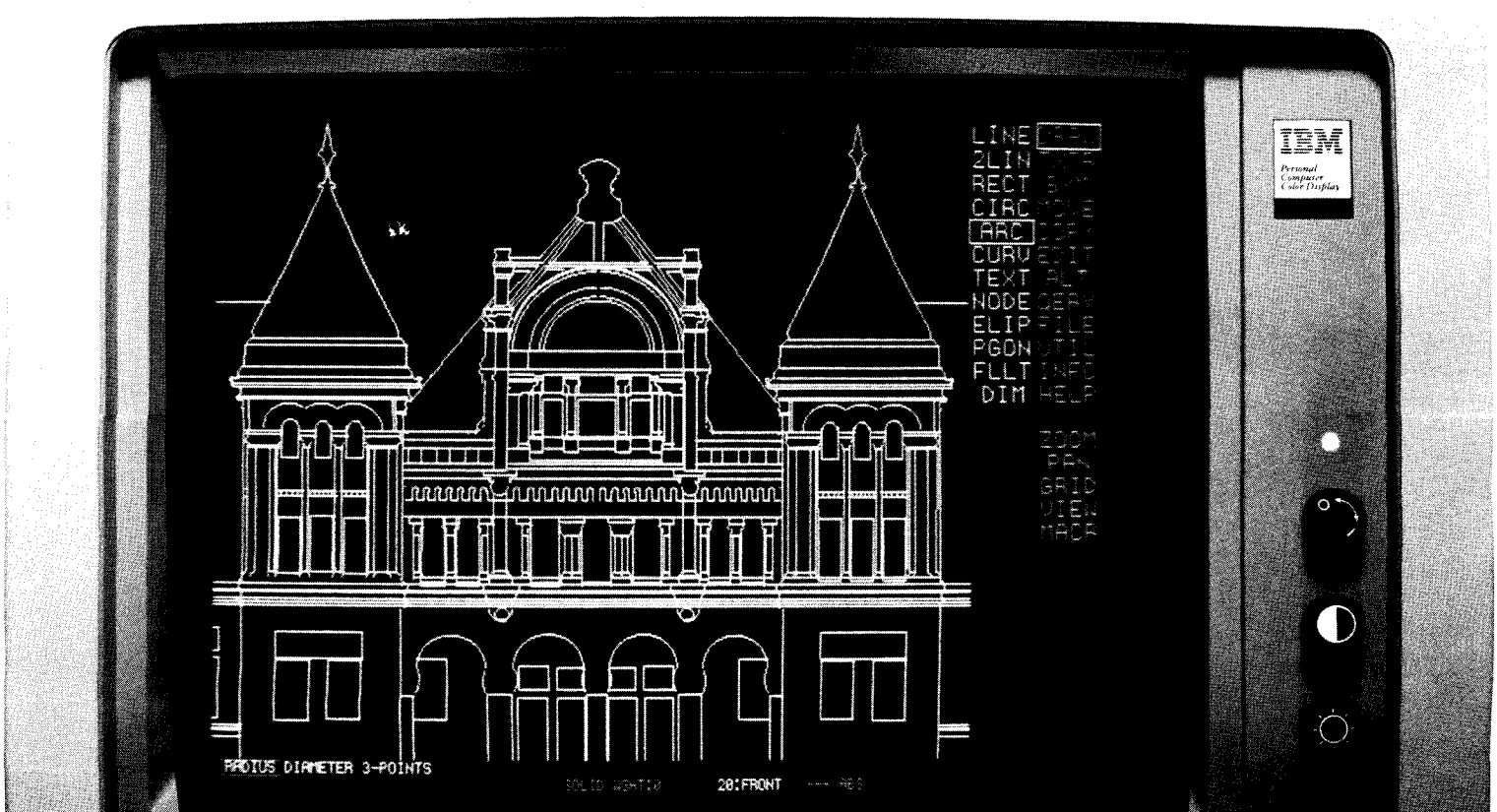
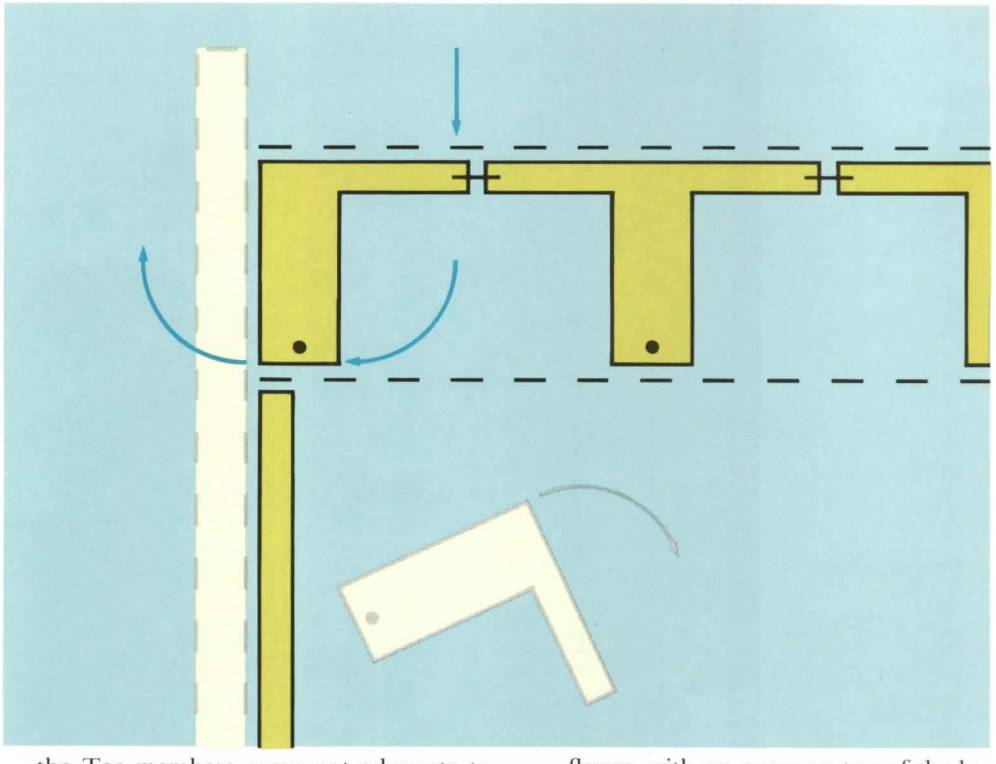


# P/A Practice



## *Building Failures: Precast Concrete Roof Systems*



Design: Samuel G. Shelton

Many buildings use precast concrete, either for the structural system or for cladding. Whether we select precast units from a catalog or loading table, or detail them on the drawings, they are all "made to order." As such, the design professional controls the final product and how it is used in the building. When designers relinquish their control to others, crucial aspects of the design, such as structural safety, may be established by someone who may not have a clear view of the overall project or who may not have the training or experience to understand the implications of routine decisions. The designer can lose this control in many ways:

- By writing specifications that shift undue responsibility to the manufacturer.
- By not detailing important connections.
- By not checking shop drawings in detail (a verbose rubber stamp doesn't keep you out of court).
- By not getting out in the field to be sure that the physical reality of the design is consistent with the mental and paper image.

The case study below looks at issues of responsibility for the design of precast concrete structural members. As with all failures, there are valuable lessons to learn.

**Case Study**

***1 The Problem***

A 60-foot-long L-shaped precast prestressed concrete roof unit, which was the end unit of a precast single Tee roof system, collapsed during the construction of an indoor swimming pool. The entire structure was stable after erection (dead load only), but the end unit failed, suddenly, by rotating and falling to the ground while workmen were in the process of installing a 1½-inch concrete topping.

***2 Background Data***

There is nothing structurally wrong with the roof system concept or with the use of a partial Tee or an L-shaped member at the ends of the roof. There were no unusual circumstances involved except that the architect and engineer who prepared the documents left it up to the fabricator to design all connections.

***3 The Cause***

A The primary cause of this failure was the inadequacy of the flange-to-flange connections between the end L-shaped Tee and the first interior Tee. These connections, made by field welding two adjacent U-shaped #3 reinforcing bars embedded in the 1½-inch-thick top flange of the Tee members, were not adequate to resist the overturning tendency of the unsymmetrical-shaped end member because of construction loads.

B There are several reasons why the flange-to-flange connection could have been inadequate; only a few are listed here:

a) Because an L-shaped prestressed member is an unsymmetrical section, the application of prestress force in the stem produces a more pronounced sweep (horizontal deformation), and possibly camber, than a normal symmetrical Tee section. This can result in gaps and vertical misalignment between the flanges of adjacent members, which make it difficult to achieve a good connection at the U bars.

b) In almost every case with the type of connection used, another reinforcing bar (or slug) is required to complete the connection because the normal gap that exists between adjacent units will not usually permit a direct welded connection. With an overturning tendency present, there is a "roll" or pin joint effect that makes the quality of the weld important to the strength of the connection.

c) In the examination of the wreckage, it was noted that the #3 U bar connector was placed off center in the 1½-inch flange, with no cover on top of the bar. If the embedment of the bar is inadequate, it will have little resistance to pull-out or any rotation. Because the placement of the bar is a hand operation and because there is only 1½ inches to work with, it is not surprising that embedment is inconsistent. In the interior Tee members, this is not all that critical; but in the L-shaped end member, it is very critical, since this connection is the key to the overall stability.

***4 Implications***

A The manufacturer should have paid more attention to this end L connection detail because of its importance in the structure.

B The architect or engineer should have called attention to it on the drawings and details, particularly because the end condition is not a typical situation.

C While the architect and engineer depend on the manufacturer to know these things and provide for them, the overall structural intent and delineation are the designers' responsibility. When a detail is important to the safety or integrity of a structure, they must either flag it on the drawings (when they relegate the design to the manufacturer by specification), or design it themselves and show it on the detail drawings.

[*Continued on page 62*]

*5 The Fix*

A The failed L-shaped unit was replaced.

B Additional weld plates were installed between the L-shaped unit and the first interior Tee unit.

C The L-shaped unit was shored from below until the topping was installed and the roofing in place.

*6 How to Avoid*

A Look for unstable structural conditions that can arise during the erection or early life of prefabricated elements. They may be subject to unusual construction loads prior to becoming part of a total assembly.

B Use weld plates (also known as distribution plates) suitably anchored in the concrete edge, and not reinforcing bars, for making the side connections between flanges of precast Tee members. The detail for this is not standard, so the drawings must show it. Add extra connections for all eccentric conditions and between end members and the first interior member. Shims may be used to make up any differences in camber of the members.

C The architect and engineer should always call attention to special conditions on the drawings and detail them if necessary. Do not depend on the fabricator to do the design.

D Shop drawings should be checked carefully when there are unusual conditions. Make sure the fabricator has noted special connection and/or erection procedures.

E The follow-up and monitoring of unusual or special conditions in the field by the design professional is essential.

F On the drawings, structural members may be shown as built in masonry or other material, giving designers the feeling that they have allowed for rotational stability. But during construction, the infill may not be there, creating an unstable condition.

G When the specifications clearly put the onus of design and erection on the fabricator, calculations have to be submitted by the fabricator for approval. Make sure this is done. Calculations should show any consideration for overturning forces.

*7 Lessons to Learn*

The architect or engineer designs and details the system; the fabricator or manufacturer designs the parts. The erector (generally the fabricator also) has the responsibility of assuming the safety of all the elements throughout all stages of construction by whatever means necessary: plates, temporary shoring, etc. This was a case of failure during construction and before the parts became a total system (with topping, etc.); therefore, the primary responsibility for the failure lies with the erector. The end L-shaped member was not stable during construction loads—a requirement spelled out in the specifications. But the fabricator, who was really responsible for seeing that the erection was done, shares this primary responsibility by not providing for adequate connections in the first place, which would allow the erector to assure its safety throughout its life.

*8 Legal Case References*

The case was settled just before the jury was about to be selected. The precast contractor contributed the major share of the claim. The professionals and the contractor contributed minor shares.

*9 Other References*

*Architectural Precast Concrete* by Prestressed Concrete Institute, 201 N. Wells St., Chicago, Ill. 60606, p. 71.

*Construction of Prestressed Concrete Structures* by Ben C. Gerwick, Jr. (Wiley-Interscience), pp. 151–153, 159–163.

*Prestressed Concrete for Architects and Engineers* by H. Kent Preston (McGraw-Hill), pp. 94–105.

*PCI Design Handbook* by Prestressed Concrete Institute (address above).

***Raymond A. DiPasquale*** ■

*The author is an Associate Professor of Architecture at Syracuse University and heads a firm in Ithaca, N.Y., that specializes in structural consultation and building failures investigation.*



## *Law: Disclosing options to clients*

A professional does not commit malpractice when he chooses a particular course of action among acceptable alternatives. Just as a physician who chooses one of two medically acceptable procedures cannot be charged with liability because his choice is claimed to be inferior to the alternative available, so an architect or engineer cannot be held liable for malpractice for selecting an acceptable design that is not the best one available.

Notwithstanding the foregoing principle, New York's highest Appellate Court has recently ruled that a design professional may, under certain circumstances, be charged with liability for malpractice for failing to advise his client of all available alternatives, including those that he does not believe are desirable. (*Westmount International Hotels Inc.* vs. *Sear-Brown Associates, P.C.*) This decision

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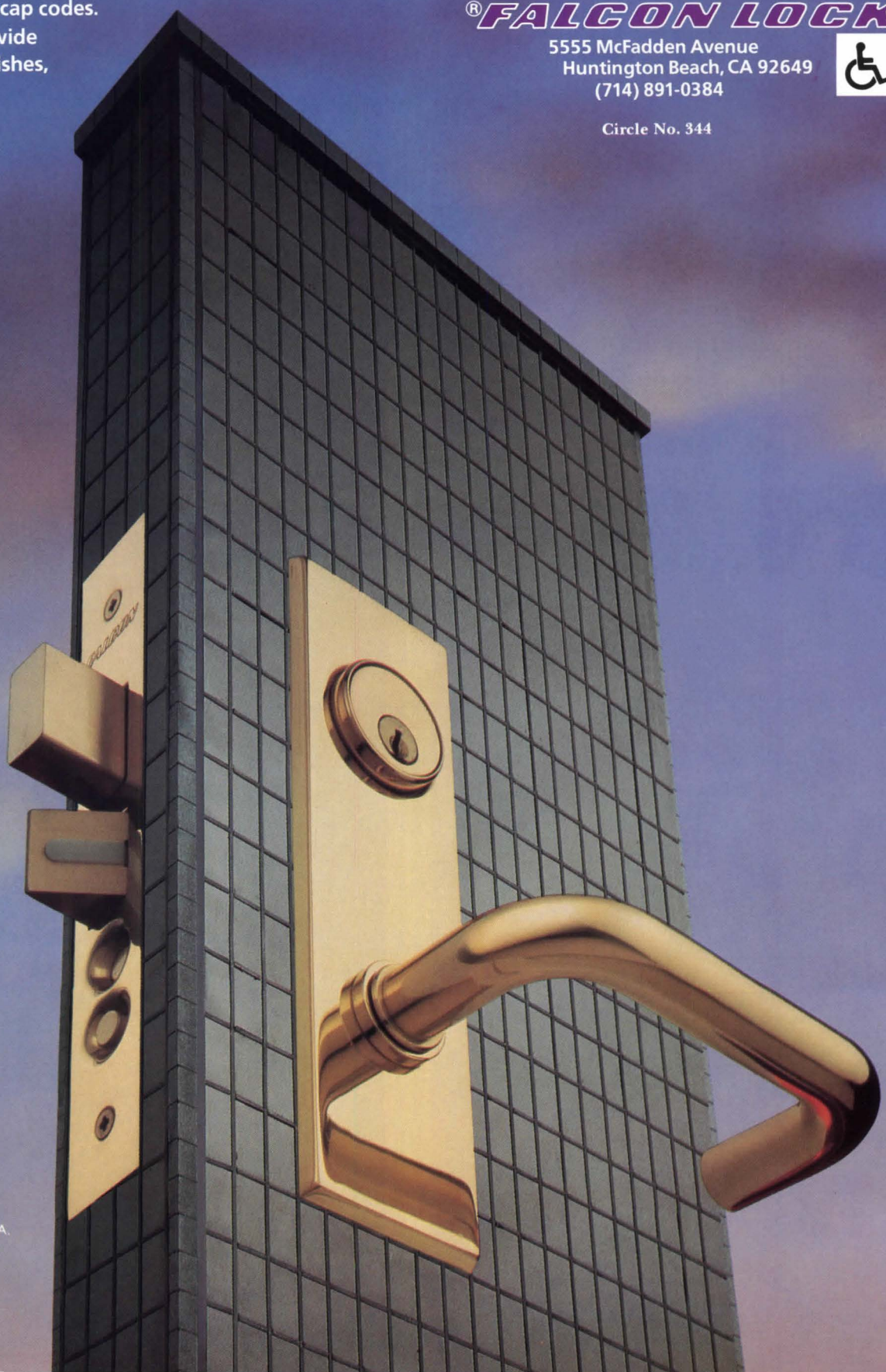

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(if not reversed on reargument, which has been requested) would appear to create a new common law duty of disclosure for architects and engineers with potentially far-reaching consequences.

In the *Westmount* case, which is an action for engineering malpractice, the owner retained an engineer to advise him whether a new ballasted roof could be installed on his hotel. The engineer advised the owner that such a roof would not meet the requirements of the Building Construction Code and recommended that it should not be installed. The owner, as the basis of his claim for malpractice, contended that the engineer used but one of two methods of analysis permissible under the Code and failed to advise the owner of the existence of the second method, thus causing him unnecessary costs and expenses. The engineer, in resisting the claim, contended that he had no obligation to disclose every alternative approach to his client, particularly if he had valid reasons to reject an alternative because in his judgment it would be a safety risk.

The Court, in reaching its conclusions, made a significant distinction between the obligations and liabilities of an engineer or other design professional who was retained to advise the owner as to what "should" be done as contrasted to the retention of such a professional to advise the owner as to what "could" be done. In the latter situation, ruled the Court, there was a duty of disclosure of all possible alternatives. The Court said:

*"(The engineer) moved for summary judgment, arguing that a professional does not commit malpractice where he chooses among acceptable alternatives. . . . The difficulty with the argument is that its motion papers nowhere state whether its agreement with the (owner) was written or oral or what the agreement required it to do. If (the engineer) was hired to give its professional judgment as to whether a ballasted roof* should *be installed, its decisioin to use the test it considered best and not to inform (owner) of any alternatives would not be actionable under the professional judgment rule. But if (the engineer) was hired to determine whether a ballasted roof* could *be installed under the Code, he would be required under the terms of the contract to inform (owner) of the alternative method of analysis which was more likely to produce a favorable finding."*

The Court, in defining the duty of disclosure for a design professional, relied upon an earlier case involving the duties and obligations of a professional accountant. The Court in the case referred to held an accountant liable for malpractice for his failure to clarify for his client the essential terms of a relationship between his client and another party, failing to disclose internal accounting deficiencies, and failing to disclose other information it possessed which resulted in its client making certain purchases which resulted in damages being sustained by the client. The engineer in the *Westmount* case, however, argued that the decision relied on was not an appropriate precedent since the accountant in that case had entered into an express agreement to disclose to his client any irregularities that he discovered, which was an obligation of performance beyond the normal standard of the exercise of due care.

In any event, the distinction made by the Court in the *Westmount* case between the duty to advise what *should* be done and a duty to advise what *could* be done is not only extremely fine to support a differing rule of liability but it would be difficult in the case of most contracts to establish whether the architect was being retained for one or the other functions, or for both. In the usual architect-owner agreement, the schematic phase of services reflects aspects of both what could and should be done. The architect's function is not easily classified into such a dichotomy, and therefore his potential liability, under the rule of the Court, must be uncertain.

The potential liability of architects and engineers has been progressively expanding. This is reflected in the abandonment by the Courts of the rule of privity, which had protected the design professional from claims of parties with whom he had no contractual relationship, such as contractors or bonding companies. It is also reflected in decisions in some states subjecting architects to liability for breach of warranty where traditionally negligence was the sole standard for determining liability. The Court's decision in the *Westmount* case adds a new and disturbing element in the establishment of standards of practice upon which the architect may place reliance and seems to open the door of expanded liability for architects into uncharted waters. In any event, this case seems to suggest that, as a matter of self-protection, it would be advisable for an architect to advise his client of all alternatives regardless of his judgment as to their desirability.

***Norman Coplan, Hon. AIA*** ■

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

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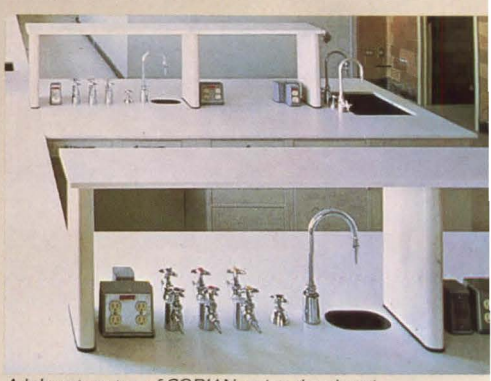

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Progressive Architecture
OCTOBER 1985

# Cincinnati Centerpiece

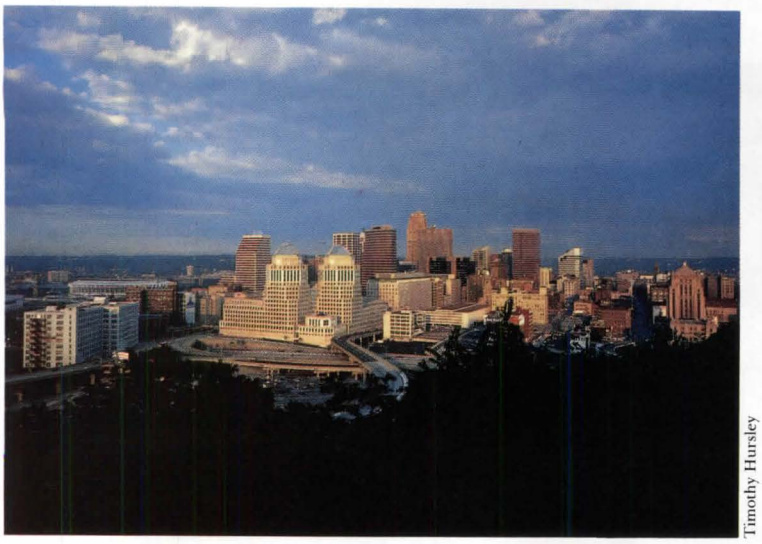
## Procter & Gamble's new headquarters in Cincinnati, Ohio, designed by Kohn Pedersen Fox of New York, is convincingly contextual, at both urban and architectural levels.

Judith Turner

NO American business can touch Procter & Gamble's dominant position in the consumer marketplace. P&G's Ivory soap, Crest toothpaste, Pampers diapers, and Folgers coffee, to name just a few of over 200 brand name products, can be found in 97 percent of all American households. Founded by two Cincinnati candlemakers in 1837, P&G is now the largest advertiser in the U.S., the soap in soap opera, with annual sales of over $13 billion.

Yet this business giant has kept a consistently low profile in its hometown of Cincinnati, a posture epitomized by its shyly conservative 1956 headquarters building. The 1972 addition by SOM copied that conservatism verbatim; only a subtle change in stone coloration distinguishes new from old. Given such a history, the selection of Kohn Pedersen Fox as architects for the consolidated world headquarters in early 1982 was a surprisingly risky move. Although the architects' portfolio has since exploded (P/A, Oct. 1983, pp. 69–91), KPF was at that time a relatively untested young firm with few projects—most notably, from P&G's perspective, AT&T Long Lines, Hercules headquarters, and 333 Wacker Drive—completed or under construction. Up against SOM New York and I.M. Pei & Partners in the final round of interviews, KPF had a long shot at best. Yet "they were talented and hungry," says David Crafts, of P&G's corporate buildings division. And they were willing, initially at least, to work with a master plan developed by Cooper Eckstut Associates of New York. That firm, together with Rockefeller Center Development Corporation, had been advising P&G for nearly a year. Their two-phase plan proposed the construction of a second building on the same block with, and parallel to, the original Central building, and a 30-story tower on the adjacent block.

KPF's early massing studies worked with the Eckstut tower, adding wings to better unify the complex as a U-shaped ensemble. But the tower itself proved problematic, with its floor plates too small for P&G's departmental needs and its midblock location unresolved. When a church on site decided finally to sell and move, KPF was free to use the entire block, and the L-shaped configuration emerged, with wings the width of the older building.



Timothy Hursley

Viewed from Mt. Adams (left), P&G is a weighty addition to the Cincinnati skyline. From the highway (below), the towers and glass bridges between them form the promised gateway to downtown. The highway itself appears to penetrate the cafeteria before curving right at the last, most dramatic moment. Seen from the city (facing page), the complex forms a literal corner to downtown. The original 1956 headquarters building (at left, facing page) is treated with respect but not undue deference, the width of its rectangle is repeated in the new wings, clad in Vermont marble, deer brown granite from Canada, and Bedford limestone drawn from the same quarry mined for the original building. The park does much to unify old and new, while providing the citizens of Cincinnati a gracious garden of pergolas, parterres, and fountains.

Jock Pottle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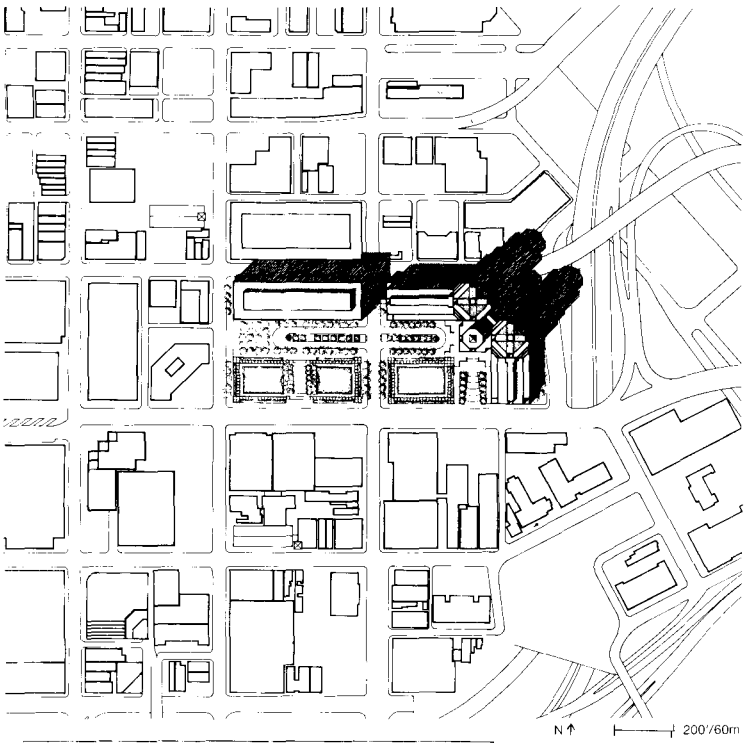
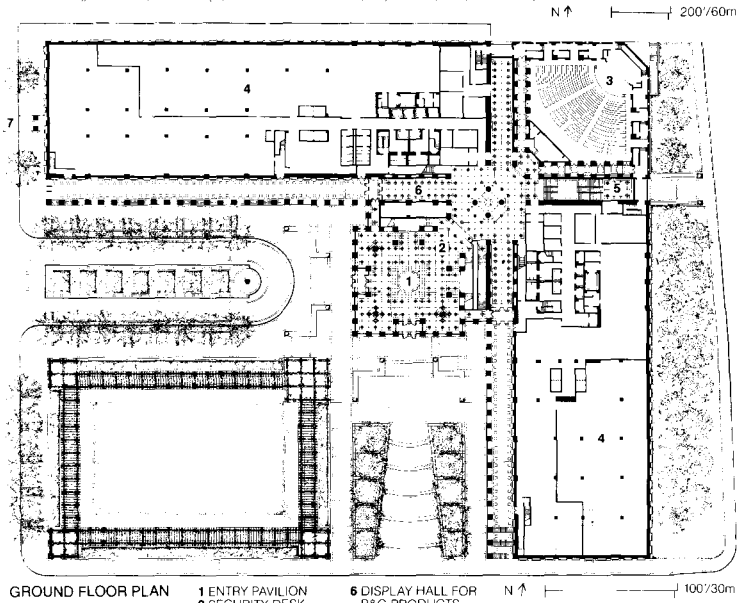
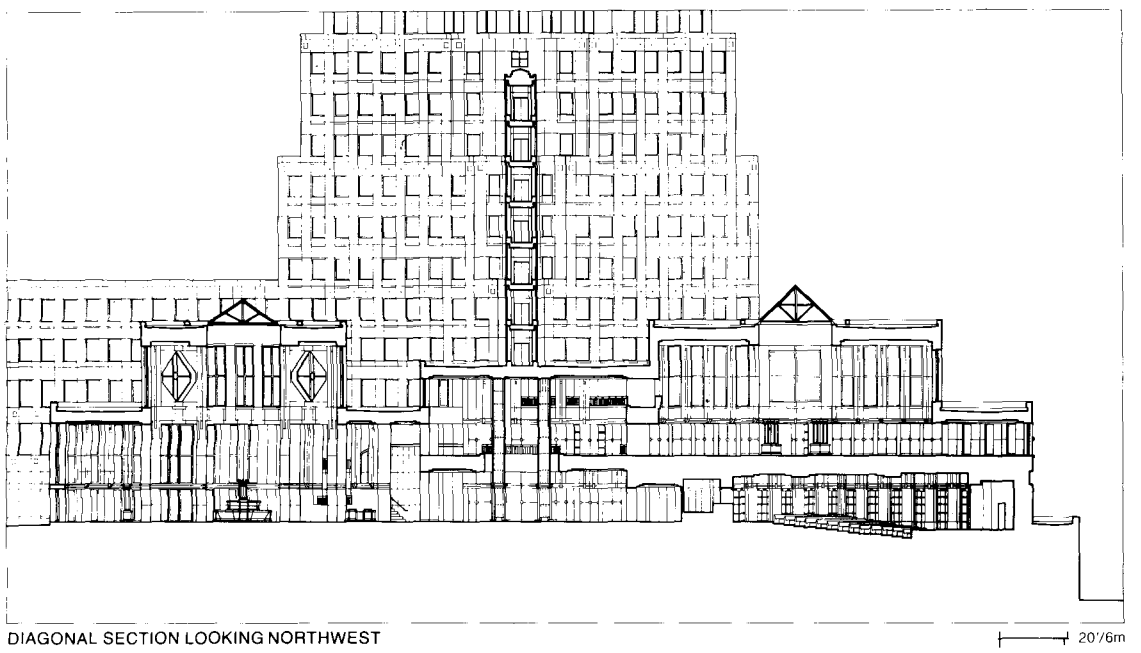


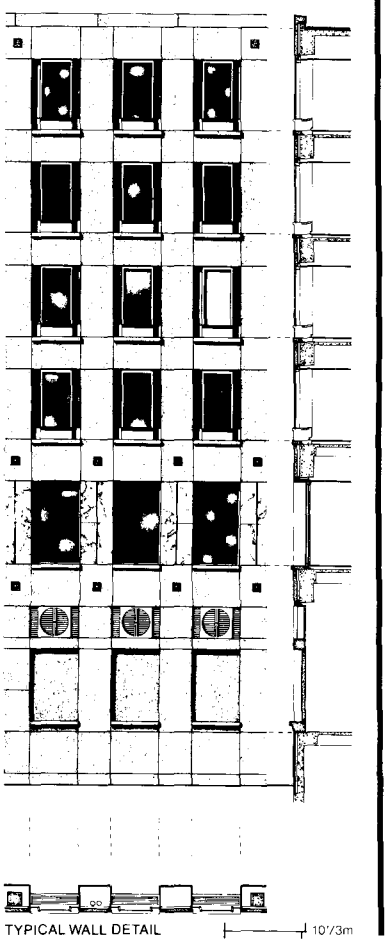

GROUND FLOOR PLAN

1 ENTRY PAVILION
2 SECURITY DESK
3 AUDITORIUM
4 MECHANICAL
5 EMPLOYEE ENTRANCE (ONE FLIGHT BELOW)
6 DISPLAY HALL FOR P&G PRODUCTS
7 BRIDGE TO CENTRAL BUILDING

P&G is by far the most elaborate and richly detailed project built by KPF to date. Construction managers Huber, Hunt & Nichols, involved from the project's inception, played a commensurately greater role in the design and detailing of such elements as the curtain wall (below) and stainless steel ornamental system. The tripartite aluminum-framed window, with reflective center pane and clear side lights, is a KPF signature element evolving through several projects. Its use in Cincinnati is especially apt, matching the tripartite window bays of the Central building. Also, the stainless steel grilles (shown in the wall elevation, below) are a variant of those designed for Wacker Drive. The diagonal section (bottom) shows the relationship of entry pavilion to cafeteria, through the double-height circulation knuckle.




DIAGONAL SECTION LOOKING NORTHWEST




TYPICAL WALL DETAIL

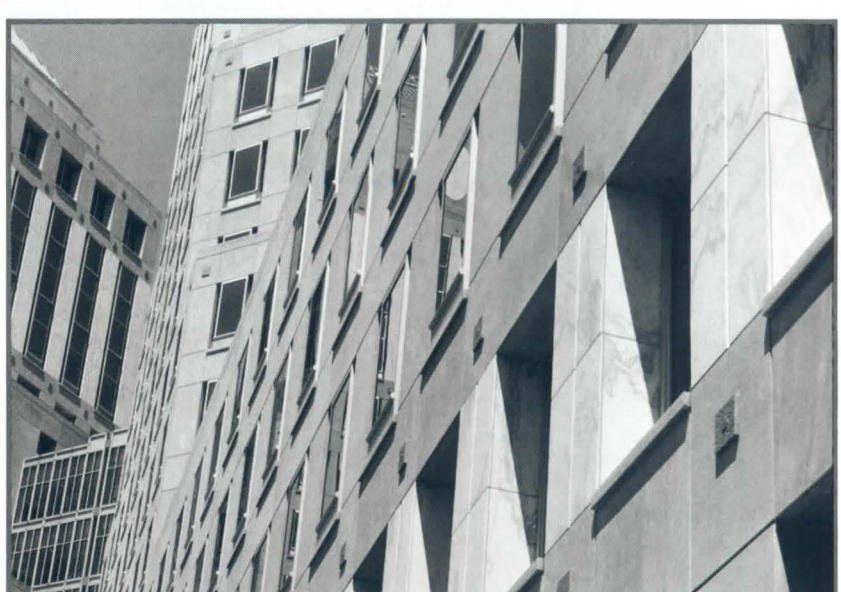
Backed up to the outer edge of the block, the low-rise L became a boundary wall, separating the downtown from highways beyond. Yet, viewed from those highways, the building should form not a wall but a gateway, or so reasoned the architects, whose final twin tower solution is both corner anchor and frame. The octagonal pyramidal towers are massed to match a trio of Cincinnati skyscrapers: the Art Deco Times Star and Gas & Electric buildings and the earlier 1913 Central Trust building.

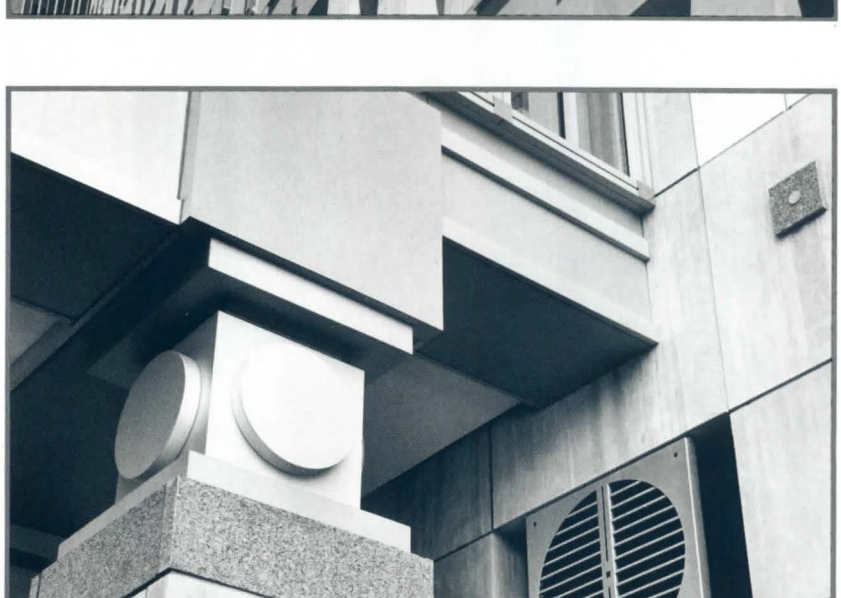
The Central building's arcade was modified to match its offspring, the column spacing reduced and entrance recentered to line up with a Classical Masonic Temple across the P&G park. The park itself does more to unify new and old than any patching of old or respectful new gestures could accomplish. The architects are careful to call this space a garden, not a plaza—a telling distinction. Although the gardens are open to the public, those who stroll through the pergolas and parterres understand that they are guests of the company. The repaving of Broadway to match the grand drive completes the creation of a P&G precinct.

The garden's formality is thrown into high relief by its surroundings. Downtown Cincinnati peters out as it approaches the highways at the eastern end; this neighborhood remains as yet an unresolved mix of residential, warehouse, underutilized waterfront, and parking, earmarked for attention in the Cincinnati Year 2000 plan. KPF's grand, terraced stair to the south of the new entrance pavilion, which now terminates rather abruptly in a blank wall, is obviously designed with the future in mind. P&G hopes to help shape that future: the company is considering an ambitious plan to develop land owned north of the headquarters buildings (now parking) for retail and residential use.

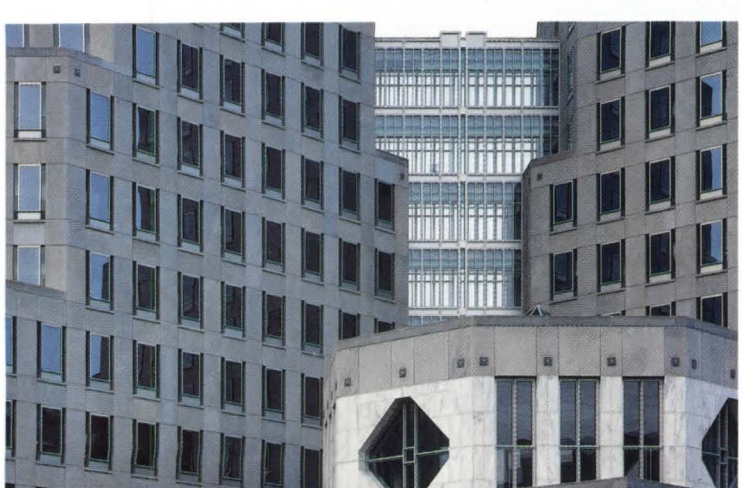
Although the current fashion among corporations is to team up with a developer for new construction—witness IBM with Robert Maquire in Philadelphia or Republic Bank with Gerald Hines in Houston—P&G did it the old-fashioned way, paying out of pocket (despite a temporary disturbed balance sheet). To this day, reticent executives won't name the price tag, except to say that estimates are generally too high. (Most quoted guesses run from $100 million.) P&G built the largest office building in the city—but it doesn't look that way. Stately Art Deco Carew Tower (see P/A, Jan. 1985, p. 43) is still the tallest on the skyline; P&G is in fact one of the shorter if most elaborate silhouettes.

If the new headquarters epitomizes old P&G values, it also documents slow changes in the corporate culture. The age of invention in consumer products is past, say some of those involved; the future belongs to marketing and sales. P&G practice has reflected that reality for some time, but the new building gives it the force of physical fact. In 1956, when P&G was building its headquarters, competitor Lever Brothers was building one as well in New York City. P&G executives deliberately chose not to compete on architectural grounds with the innovative SOM-designed Lever House, now a landmark. This time, however, they chose to make a statement. They have succeeded in doing so, on their own terms. ***Daralice D. Boles*** ■



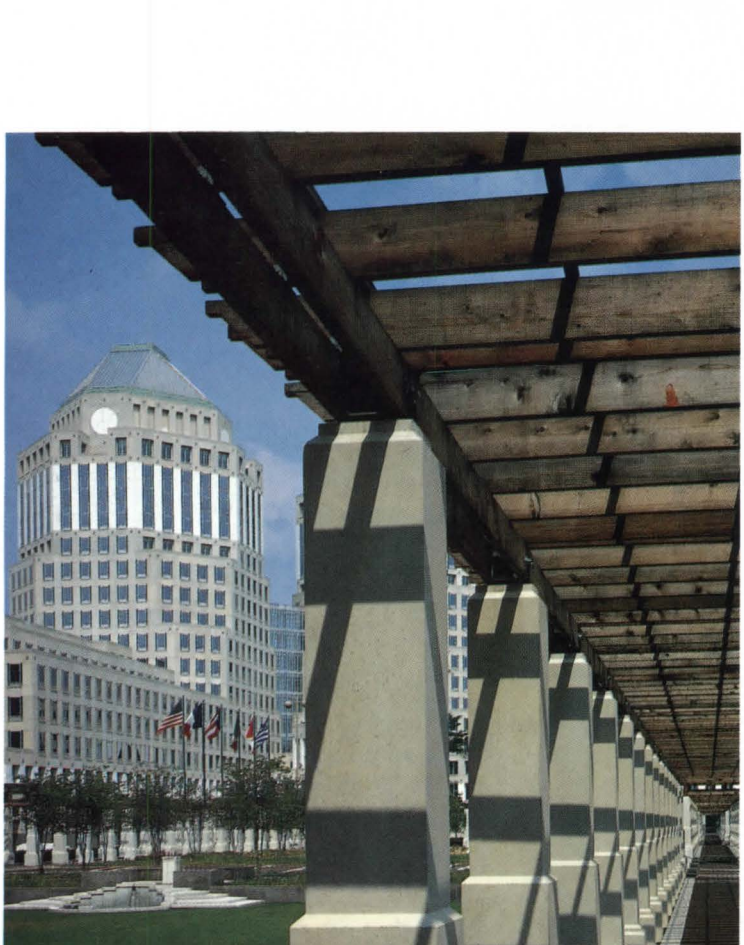


Photos: Judith Turner



Barbara Karant

Dubbed inevitably the "Ivory towers" by the local press, the twin 17-story pavilions (facing page and below left, from the garden) are clad in Indiana limestone for roughly half their height; above, flat marble pilasters and continuous windows set a slight vertical emphasis, capped by terne coated stainless steel pyramids that are, sadly, not lighted at night. The pergolas, too, earned the epithet "tombstones" prior to the addition of the redwood trellis (left), which will one day be completely covered in wisteria. The juxtaposition of materials — curtain wall, punched limestone wall, marble, granite, and stainless steel — works successfully at grand scale (left) and in detail (below). The main entrance, with its glass, stainless steel, and brass doors, was fabricated, like most of P&G's custom elements, in Cincinnati. The entry pavilion is one of few places in the building where the stars and moon logo, a source of strangely negative and persistent rumors tying the company to Satanism, remain.



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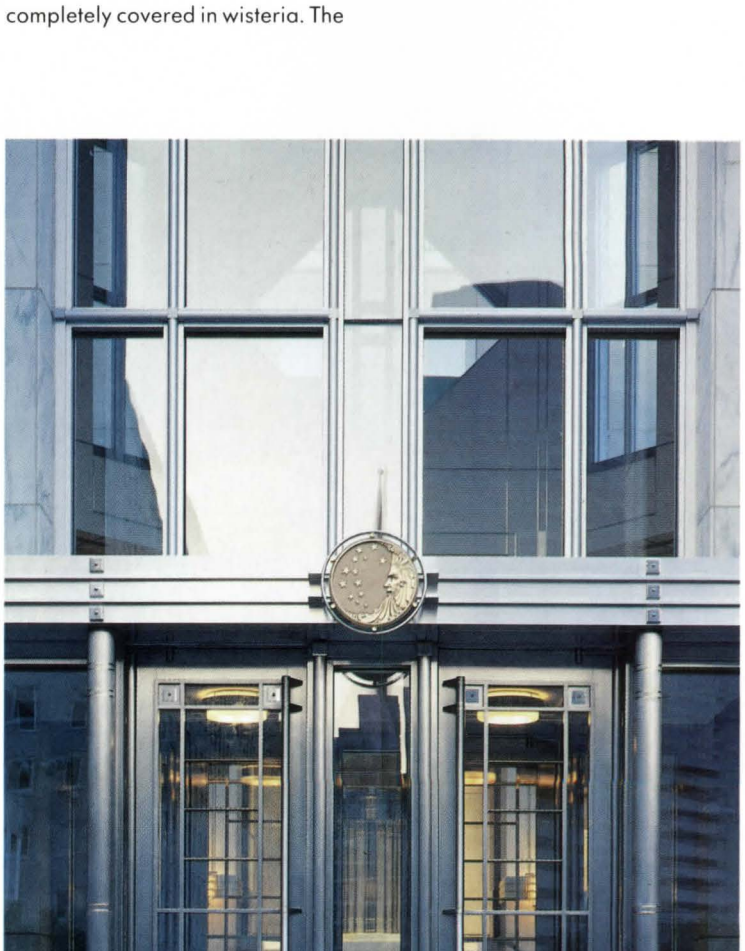
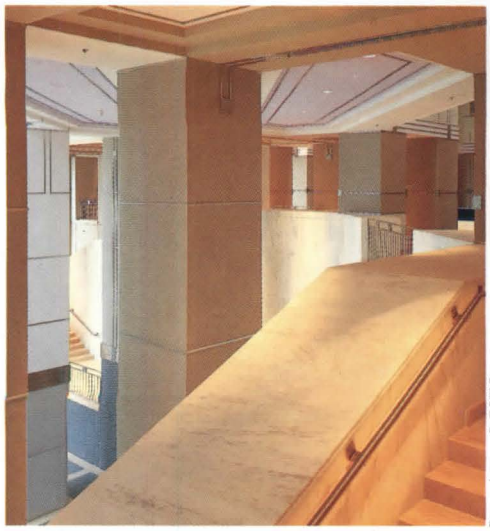
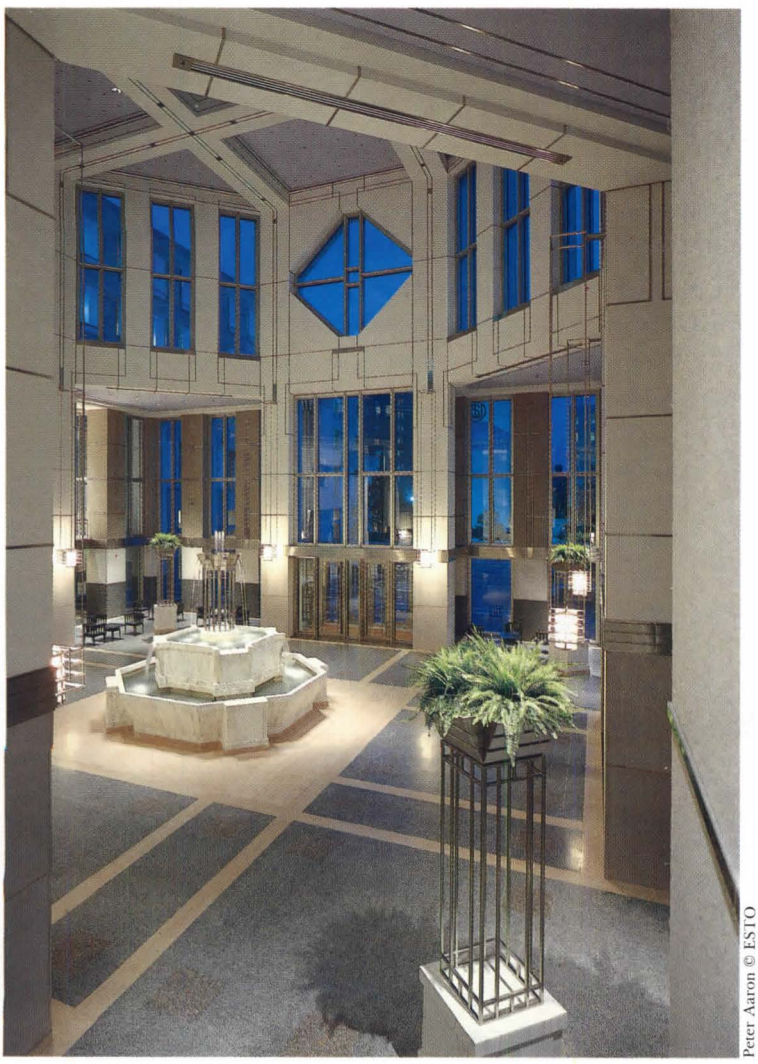


Timothy Hursley



Peter Aaron © ESTO

Visitors to the new main lobby are greeted by marble and terrazzo, liberally punctuated with stainless steel. A carefully controlled vocabulary of trim parts, both horizontal and vertical, was used consistently throughout the public spaces on the ground floor. Other elements in stainless steel emphasizing the verticality of the space include the upper portions of the planters and the central fountain, the suspended light fixtures (detail photos, following pages), and the railings. Clearly delineated ceiling panels are in varied pastel hues, adding further definition to the spatial sequences of the pavilion. From the entry, planes, stairs, and spaces *recede and* ascend (facing page) affording a visual layering and a perception of the spaces beyond the viewer. Another vantage point (on stair, above, left) indicates the ever-changing perspectives from peripheral locations.



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Barbara Karant

Judith Turner

**At Close Range**

Having struggled successfully with urban design and massing issues on a project of P&G's magnitude, some architects would have been content to apply a few standard details, pick colors and furniture, and call it quits. Certainly, if profit were the motivation, the designers would have come out much farther ahead that way.

Kohn Pedersen Fox Conway, KPF's planning and interiors affiliate, might have seemed an even more unknown quantity to P&G in the early 1980s. Despite a fair amount of work to its credit, a long track record was not the group's greatest asset. Its identity as a discrete organization was still in the nebulous stages, its separation from a young parent blurred by frequent, and beneficial, staff interchanges. It was clear early on, however, that a KPF/KPFC combination would best serve Procter & Gamble. While distinct boundaries exist on paper between the KPF designed public spaces and the KPFC office areas, the collaboration nevertheless resulted in a remarkable unity.

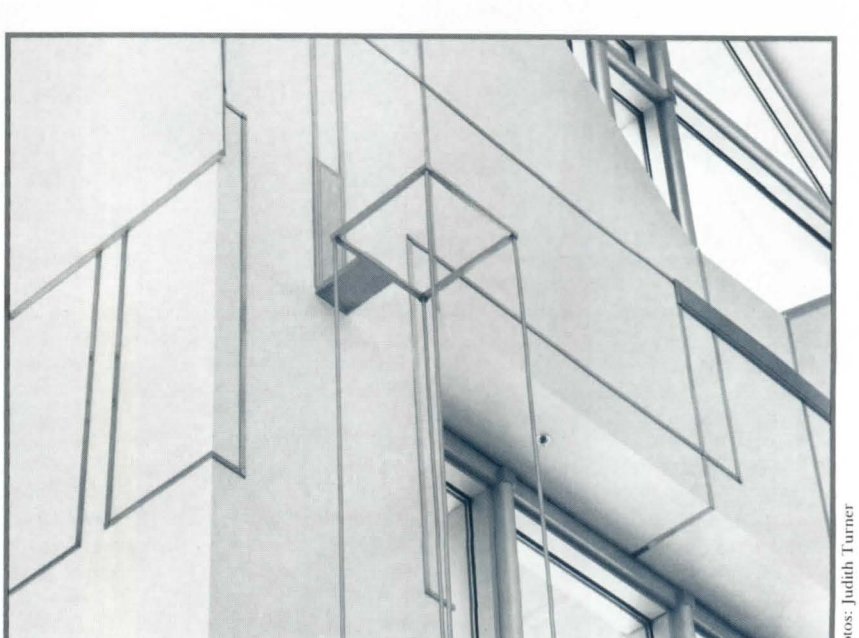
Because the main entrance pavilion is such a prominent massing element, the experience of its volume inside the stainless steel doors is not a surprise in itself; it is a huge reception area worthy of grand functions as well as handshakes. Central to this space is the marble and stainless steel fountain, and ringing that—at a distance—are seating areas and the reception/security desk.

It is not the specific elements alone, however, that give the pavilion its presence. The real magic is in the spatial layering and interior vistas that unfold after the foreground has been assimilated. To the immediate left of the main entry, layers of circulation flow through a visual slot, while receding with each successively higher floor (full photo, previous page). Two grand stairs parallel each of the six-story wings, providing still more overviews of the pavilion. References to Piranesi are hard to resist.

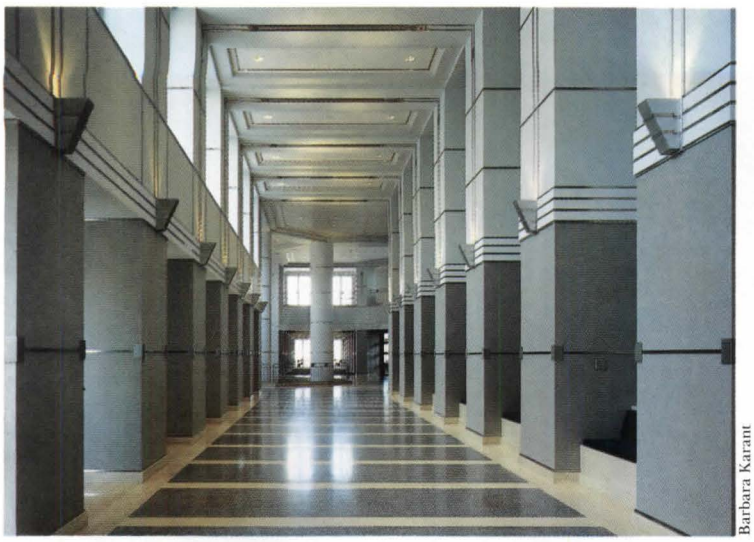
Having dealt with visual aspects on the immediate and the distant levels, the eye turns to the middle distance, and the ceilings, trim, and fixtures take their place. In what is obviously one of the most highly orchestrated interiors in recent memory, impressions of Wright, Mackintosh, and Wagner are also unavoidable. Inset coffers or ceiling planes of varying subtle pastel hues cap spaces defined by columns and beams. Stainless steel light fixtures—both suspended and in sconce form—add periodic accents of extreme beauty, while reinforcing and being reinforced by the careful system of stainless trim on the walls. The whole gives the impression that every detail has been a labor of love.

Since many employees in the existing building make this floor part of their daily lives, a bridge joins the buildings over Broadway Street at this level. By far the strongest emphasis on the second level, especially in the east wing and center, is on eating. Employees can eat in the bright, spacious cafeteria or elect sit-down table service at the end of the east wing.

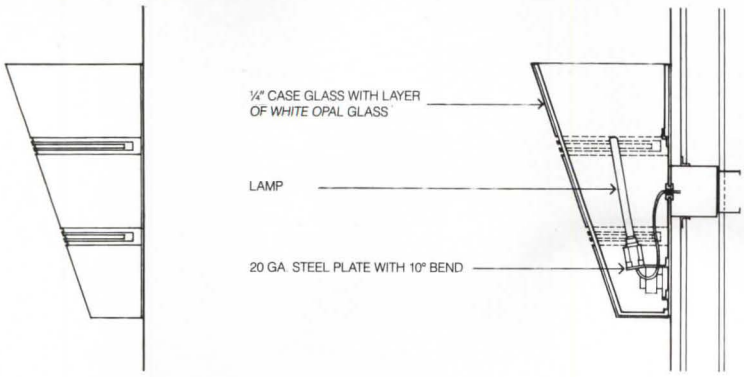
Above this level, the main office floors begin, with the largest departments occupying the largest floor areas. There is no rank hierarchy as to level in the new quarters. The topmost executives, in fact, remain at the top



Photos: Judith Turner



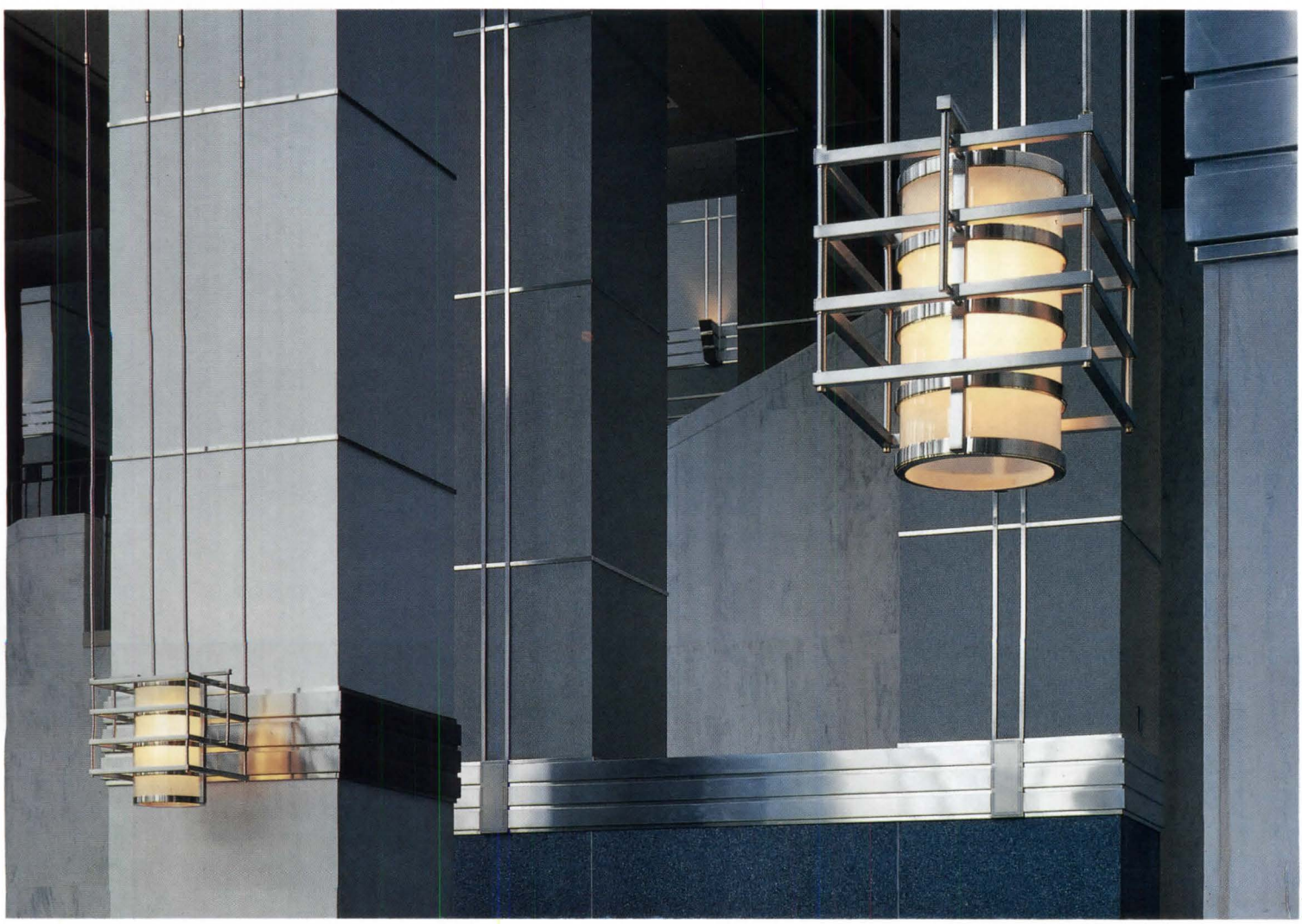
Barbara Karant



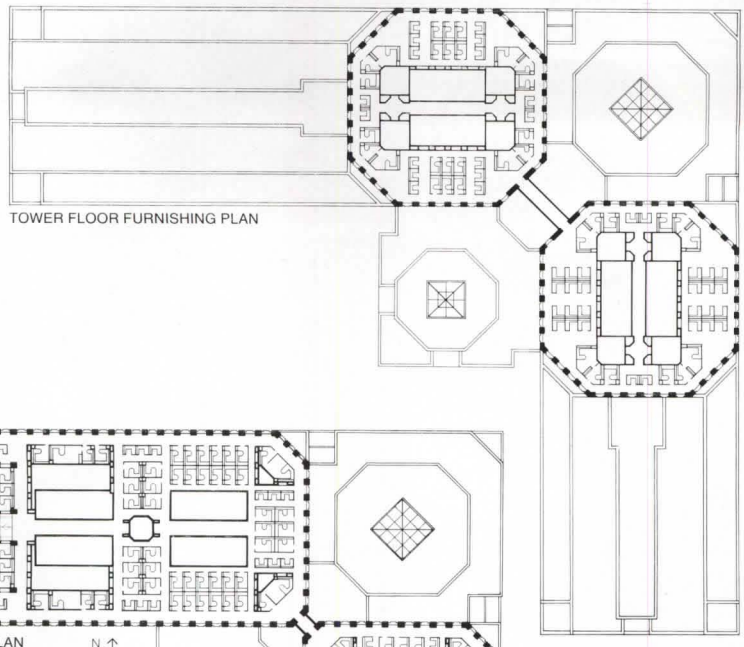

GLASS SCONCE ELEVATION SECTION

Lighting fixtures, like almost every other aspect of P&G interiors, were the subject of almost unbelievable detail study. The relatively simple, but very striking sconces (left and facing page) are the most numerous; most are wall mounted, while some appear to gain added support from elegant stems adorned by brass details. Suspended fixtures (below) are sophisticated elements in the entry pavilion, picking up on, and reinforcing, the dual vertical stainless steel wall trim vocabulary.

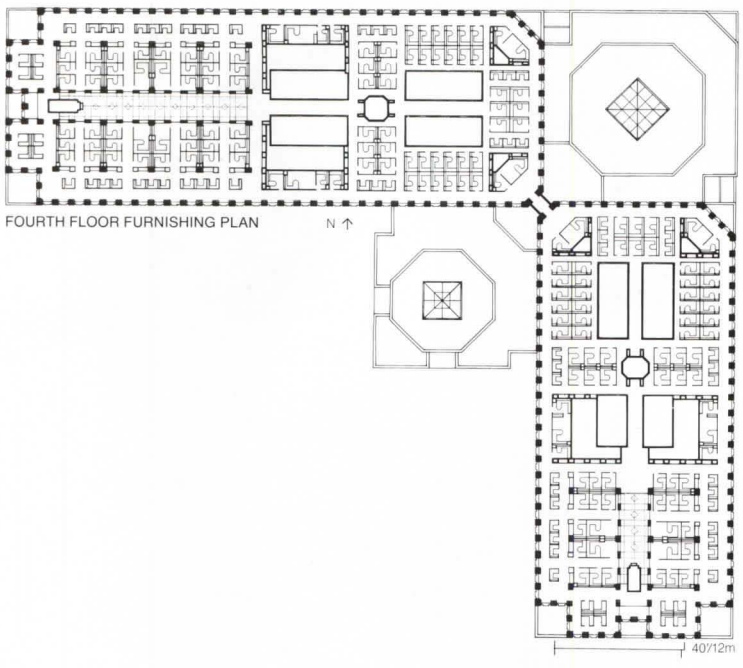
The same degree of care has gone into the detailing of travertine-edged terrazzo floors, the consistent 5-inch travertine base, and the fabric-and-stainless wall surfaces that take over beyond the entry pavilion. Multistory ceremonial space leading to the auditorium (facing page) features overlooks from circulation areas marking the entrance to the cafeteria above.



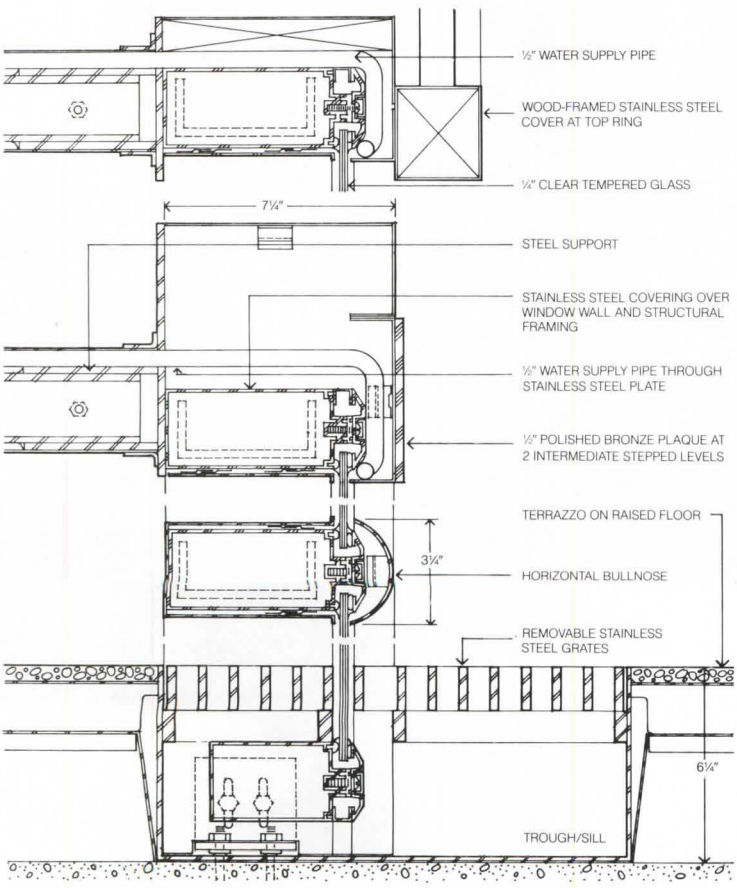
Jock Pottle



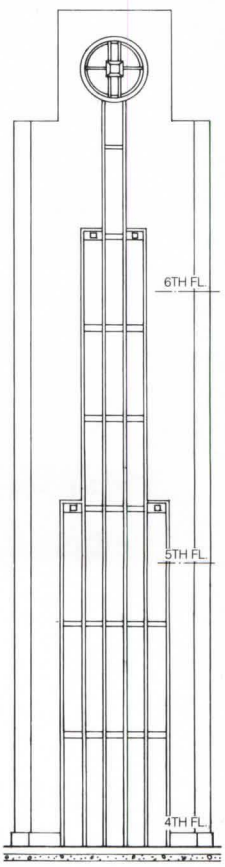
TOWER FLOOR FURNISHING PLAN




FOURTH FLOOR FURNISHING PLAN




SECTION AT WATERFALL




WATERFALL ELEVATION

■

of the existing "central" building. Floor dimensions in the new wings remain constant on levels three through five, with the sixth floor, recessed, forming the transition to the tower floors. New elements are introduced at the fourth floor, however. Short bridge connectors, which will continue upward to join the towers as high as the tenth floor, appear first on four. Atriums in the north and east wings enhance floors four through six, guaranteeing no "deep" floors.

It is in the office areas that the other painstaking work by Kohn Pedersen Fox Conway takes over. The client wanted the best and least hierarchical environment for employees, and gave a mandate to pursue a course of open office systems throughout. Thus, the use of exterior circulation on all offices guaranteed views to all employees, and an open office configuration would provide flexibility for a changing company. But what combination of furniture, acoustics, and lighting was "best"? Company officials were escorted through some of the most highly regarded offices in the country, often coming away disappointed.

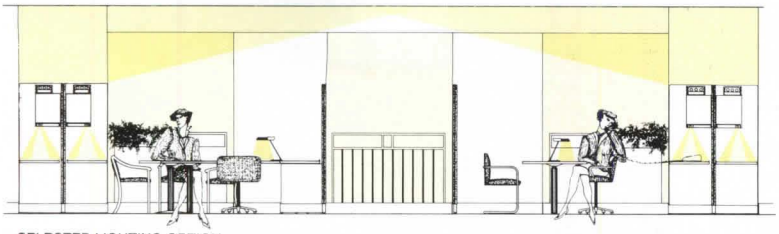
An exhaustive study finally reduced the number of office systems to three or four. This was to be one of the largest systems bids ever, so availability and schedules were critical. P&G and KPFC had specific lighting requirements for this installation, and sought the solution separately.

The search for an optimum ambient light source led to a company, Peerless Electric, that had been doing research into both the physical and the perceptual qualities of light. Having discovered that user comfort and satisfaction are considerably higher when the light source is perceived, Peerless did a series of fixtures with bands of diffused light visible to the user. This added a direct, in addition to reflected, component to the ambient light, and raised the perceived amount of illumination in the space. In addition, a special reflector was designed for the P&G fixture, giving the bounced light from the ceiling a broader distribution and eliminating "hot" areas. Part of the consideration in awarding the final systems contract was the willingness of the winner, JG Furniture, to work with Peerless.

If there is an especially pyrotechnic aspect of the KPFC package, it has to be the two office wing atriums. Although obviously on a smaller scale, their proportions recall the Larkin Building, as does the verticality of the dramatic hanging lighting fixtures and waterfalls. (Offices on these floors generally progress from managers inside, on the atrium, to clerical on outside circulation corridors.) The waterfalls, while still being finetuned, are exquisite pieces of sculpture in themselves. The collaboration and cross-referencing between KPFC and KPF is most visible in these magnificent spaces, which cap the orchestration begun at the entry.

The comprehensive nature of this commission makes it the kind that most architects can only dream about. Although costs are not disclosed, it is obvious that the elegance produced is more a function of design skill than extravagant materials. Add to the above the extremely high regard that flows both ways between the architects and the client, now that the job is complete, and very little more could be asked for. ***Jim Murphy*** ■

Peter Aaron © ESTO



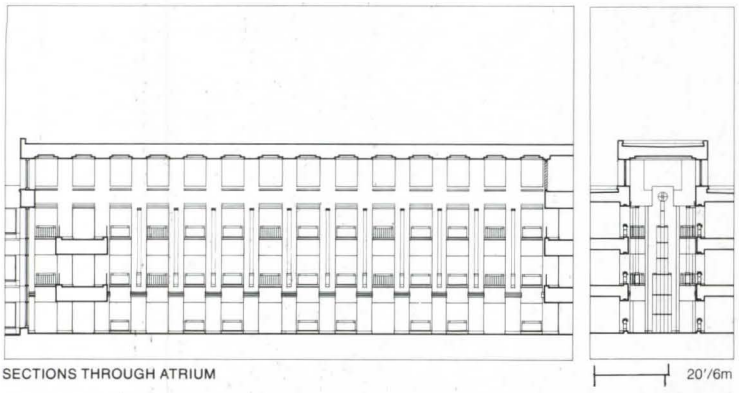
SELECTED LIGHTING OPTION

Two atriums in the office wings (preceding page) have as focal points elegant waterfalls that tumble water out of tubing, onto glass sheets, over bullnose mouldings, and into a catch trough at the floor. Suspended lights hang from outriggers which are themselves uplights. Lighting was also a major consideration in office areas (left), where the ambient component was designed independently and integrated by the lighting and furniture manufacturers. Typical of the whole design approach at P&G, the carpet pattern and chair fabric were also part of the design package from KPFC, and wall colors vary subtly from floor to floor. Included in the architects' — KPF's — responsibilities were the cafeteria and the auditorium (bottom, left and right). Loggia approaches line both office wings (facing page), and grilles reminiscent of KPF's 333 Wacker Drive building allow the first-floor mechanical spaces to breathe.

Barbara Karant

Barbara Karant

Jock Pottle



SECTIONS THROUGH ATRIUM

20'/6m

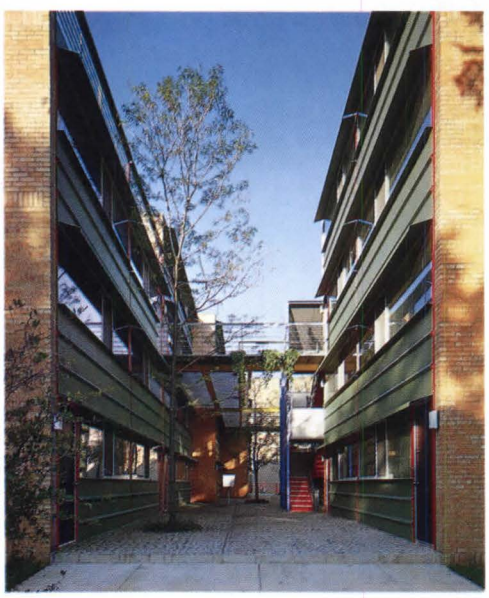
***Project:*** *Procter & Gamble General Offices, Cincinnati, Ohio.*
***Architects:*** *Kohn Pedersen Fox Associates, New York (A. Eugene Kohn, partner in charge; William Pedersen, partner in charge of design; Robert Cioppa, managing partner; Alexander Ward, senior designer; Lee Polisano and Timothy Hartley, project managers; Benedict Curatolo, job captain).*
***Interior architects:*** *Kohn Pedersen Fox Conway Associates, New York (Patricia Conway, partner in charge; Randolph Gerner, managing partner; Judy Swanson, design partner; Karen Dauler, project manager; Amy Langer, senior designer, Mickey Mallardi, job captain).*
***Client:*** *Procter & Gamble.*
***Site:*** *new buildings, block in downtown Cincinnati bounded by 5th, 6th, Broadway, and Sentinel Streets. Plaza extending westward from Broadway to Sycamore Street.*
***Program:*** *new general offices, total of approximately 800,000 sq ft, including auditorium, dining facilities, training center, and entry pavilion. Plaza design to face new and existing buildings. Alteration of existing ground floor.*
***Structural system:*** *concrete pan joist and frame system with concrete mat foundations under towers. Long span steel girders in entry pavilion and cafeteria.*
***Major materials:*** *limestone, granite, marble, precast concrete, reflective and clear glass, aluminum mullions and grilles, terne-coated stainless steel roof. Interior: terrazzo, granite, marble, carpet, travertine, African mahogany, gypsum board, fabric, decorative stainless steel (see Building Materials, p. 163).*
***Mechanical system:*** *variable air volume with perimeter radiation.*
***Consultants:*** *Bentley-Meisner Associates, landscape; Weiskopf & Pickworth, structural; Syska & Hennessey, mechanical; Gordon Smith Corporation, exterior wall; Fisher Marantz, lighting; Cerami & Associates, acoustical; Hubert Wilke, audio visual; Tracy Turner, graphics.*
***General contractor, construction manager:*** *Huber, Hunt & Nichols.*

Jock Pottle

**840 Michigan apartments**
**Evanston, Illinois**

# At Home in Illinois

*As architect-developer, David Hovey has created a 24-unit complex in the suburbs of Chicago that demonstrates both his business ingenuity and his own colorful version of Miesian design.*



*Entry to the complex is between plain brick walls (above right) into a central court activated by brightly painted structural and cladding elements (facing page). Stair towers, enclosed with translucent glass, serve as lanterns at night; to obtain the glass channel components, no longer marketed in this country, Hovey bought a producer's remaining inventory and warehoused much of it for other projects. Stairs lead to third-level entry platforms, which are linked by latticelike decks serving as the required second route of egress for upper-floor units. Courtyard paving, of black river stones set deep in concrete, has an irregular, dappled look more closely related to the foliage than to the structure.*

DAVID Hovey decided several years ago that the way to produce buildings that satisfy him is to control the whole process, from site acquisition through construction and operation. When he left the large Chicago firm of C.F. Murphy & Associates (now Murphy/Jahn) in 1978 to be his own client, he started with small residential projects, and the scale of his work has been growing to match his standing with bankers and investors. Presented here is his largest project completed to date, a 24-apartment complex in suburban Evanston.

Design ingenuity was key to developing the site here, which had previously stumped some excellent developer-architect teams. Located among dignified old houses and apartments, only a short walk from a commuter railroad station and the lakeshore, the property commanded a price that could not be reconciled with the 24-unit size allowed under local zoning. Hovey worked out a scheme with parking underground, below two rows of units entered through an open central court; there are three full floors, plus penthouse spaces on the fourth level opening to roof terraces. The project's three-story-plus-penthouse silhouette and concealed parking satisfied neighbors and zoning officials. For prospective tenants, each unit offered ample outdoor space (on the roof or at grade), generous exposure, and protected parking, thus justifying rents above prevailing levels in Evanston and balancing the economic equation.

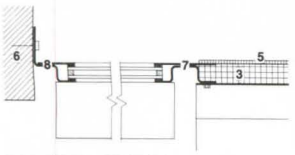
Once he had development economics and functional organization well in hand, Hovey could address the points of form and structure that concern him. He is one of Chicago's remaining staunch Miesians, intent on expressing economy of means through exposed steel structure. For Mies's austere colors, however, Hovey substitutes brightly painted elements, as seen in his own house (P/A, July 1983, pp. 82–85).

Here, Hovey's color scheme starts where his structural system does—with the brick bearing walls, which are of a variegated rosy tan. For the thin, precisely formed spandrel panels that he has stretched between these massive, earth-toned walls, Hovey chose a vivid, obviously synthetic green (of an intensity that is hard to reproduce in print). Primary colors used on smaller steel elements in the wall and courtyard set up retina-shocking contrasts with the luminous green. Translucent glass used to clad the stair towers produces blurred and blended images of these bright elements, much as they would be seen reflected in moving water.

Hovey's unified operation, eliminating negotiations between architect, owner, and builder, allowed the complex to be completed only 18 months after the site was first considered—less than 12 months after start of construction. While no market preference survey could have suggested Hovey's machinelike forms and bold colors, finding 24 tenants was no problem at all, he reports. Occupants tend to be city-oriented single people or couples without children at home, who favor Modernism. As Hovey's development-construction company, Optima, Inc., moves on to larger projects—the latest proposal comprising 280 units—he must make sure that each one can tap an appreciative market for the work of Hovey the architect.

***John Morris Dixon*** ■

## 840 Michigan apartments

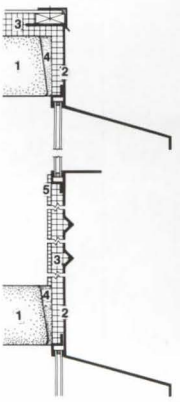


HORIZONTAL SECTION

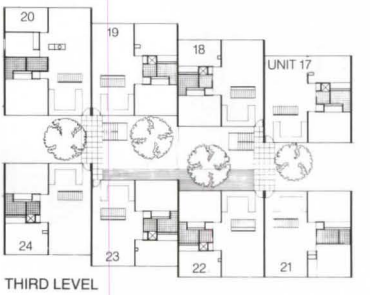
1/300mm

1 PRECAST CONCRETE DECK
2 PRESS FORMED STEEL FASCIA
3 INSULATION
4 GROUT
5 FIBER BOARD
6 BRICK BEARING WALL
7 PRESS FORMED MULLION
8 PRESS FORMED SIDE MULLION

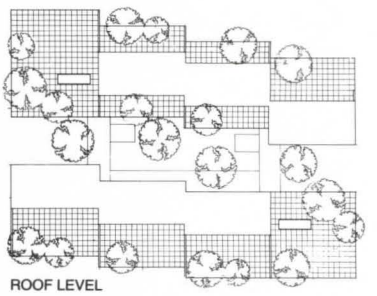
EXTERIOR WALL



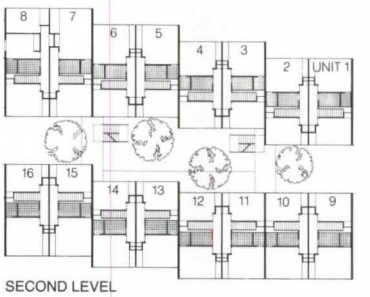
VERTICAL SECTION



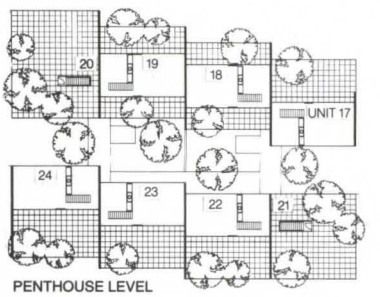

THIRD LEVEL



ROOF LEVEL




SECOND LEVEL




PENTHOUSE LEVEL


STREET LEVEL

*From outside the site (top photo) the complex looks unassertive among mature trees; vivid green of north walls is usually in shade. Plans show arrangement of 16 townhouses capped by eight flats with penthouse spaces (no plumbing) that could be approved under zoning, each of which opens to a large roof deck (photo above). Parking under the complex has direct access to townhouses, some of which have ample basement storage areas. Units are staggered in plan in response to angled street line to north and stepped wall of apartment house to south. Penthouses are placed irregularly, making sure that the central court never has two facing four-story walls. Curtain walls (details at top, photos facing page) are assembled of a few thin, press-formed steel elements. The green-painted spandrels, stiffened by ridges, are mounted to reveal slivers of the vivid red mullions, which vary in visible width as one moves past them. Insulating glass is set directly into wall, without frames; standard thin-line blinds assure visual order; white-painted operating sash appear at intervals; spandrel projections effectively shield openings from rain.*

***Project:*** *840 Michigan apartments, Evanston, Ill.*
***Architect:*** *David Hovey, Chicago.*
***Client:*** *Optima, Inc., Chicago.*
***Site:*** *28,400-sq-ft corner lot, flat; four-story apartment house to south.*
***Program:*** *24 rental units; townhouses and penthouses. 41,154 sq ft, enclosed (12,354 basement, 28,800 above grade).*
***Structural system:*** *masonry bearing walls, precast concrete floor slabs.*
***Major materials:*** *steel-framed curtain walls, steel spandrel panels, insulating fixed glass and sliding steel windows (see Building Materials, p. 163).*
***Mechanical system:*** *unit heaters and exhaust fans for parking; baseboard electric heating and central air conditioning for each apartment.*
***Consultants:*** *Rittweger & Tokay, structural; A.T. Associates, mechanical.*
***General contractor:*** *Optima, Inc.*
***Costs:*** *$40 per sq ft, including landscaping and fees.*
***Photography:*** *Bill Hedrich, Hedrich Blessing, except this page, top, John Morris Dixon.*

**Arbour Park**
**Tempe, Arizona**

# At Home in Arizona

*Circular entry courts (left) connect parking to three-story apartment cortiles, their stuccoed walls patterned with projecting blocks. All mechanical equipment is housed in a wedge-shaped piece at the outer entrance of the center cortile (facing page).*

*A 289-unit apartment complex in Tempe, Arizona, proves the profitability of good design, while drawing upon the architecture of its region.*

RICHARD Marmor came to the Phoenix area seven years ago, drawn like so many others to a flush, profitable market. Unlike most, he stayed. The Chicago-educated lawyer turned developer surveyed the Southwest scene and spotted his niche. The Phoenix housing market is geared towards wealthy snowbirds, the smallest offerings 600- to 800-square-foot apartments. Marmor broke ranks to build 350-square-foot efficiencies and 500-square-foot (gross) one-bedrooms that catered not to an upscale clientele but to a transient population of entry-level white collar and blue collar workers, students, and fixed income retirees, people of limited means poorly served by the luxury-laden local housing stock.

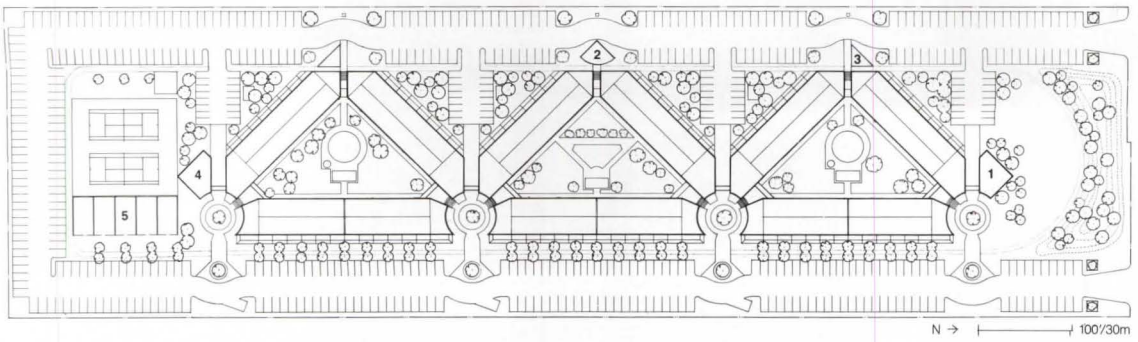
Even having found his niche, Marmor and his partners felt the crush of competition from other developers. For his first solo project, Arbour Park in Tempe, the developer realized he'd have to modify his formula, and the ingredient he added was, in essence, architecture. When he asked Joseph Valerio, a long-time friend and associate, to take on the project, he presented the architect with a kit of proven parts: a standard unit floor plan, selected building materials: masonry block, cement roof tiles, aluminum sliding windows, and wood frame construction. (Local Ball Architects did the working drawings.)

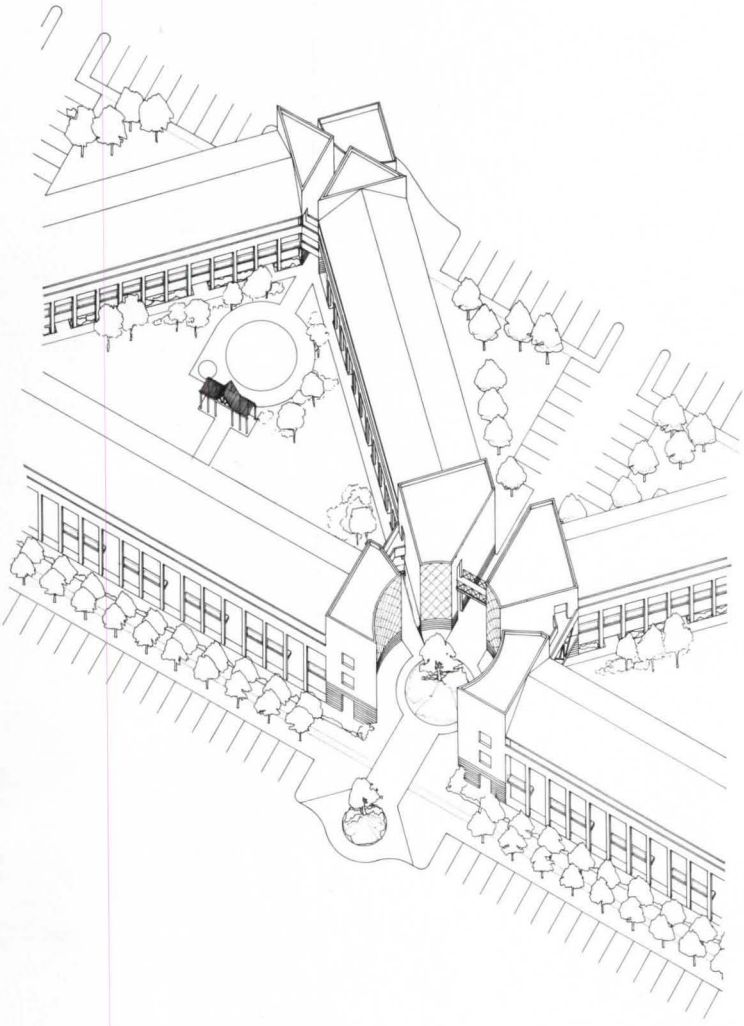
Arbour Park sits on Apache Boulevard surrounded by the honky-tonk trailer parks, motels, industrial parks, and fast-food joints that line this local version of Route 66. Valerio's plan makes the most of the rather awkward rectangular lot. (Where else, says the architect gleefully, can you build an arcade almost 1000 feet long?) With parking on the outer edges (both the number of spaces and the high perimeter wall are mandated by Tempe's building code), the units turn inward to form three courts, each triangulated, focusing on a pool and ramada or volleyball court. Tempe's strict height restrictions were somewhat subverted by excavating one-half flight (the excavation is extended on the outside of ground-floor units to create terraces for these garden apartments). The nine, three-story buildings were built in phases, the first fully rented and occupied before ground was broken for the last.

The complex compensates for tight unit plans, pared down to an absolute minimum, by generous outdoor rooms and recreation facilities, which include racquetball courts, a one-half-mile running track and fitness trail, "party" hall, tennis courts, and weight room. Units can be rented on a monthly basis, although most occupants opt for a six-month or one-year lease. Proximity to Arizona State University one mile away has the predictable effect, but the percentage of students is kept to 20 or 25 percent, scattered throughout the complex. Rent of $400 per month for a one-bedroom unit includes all utilities and furnishings.

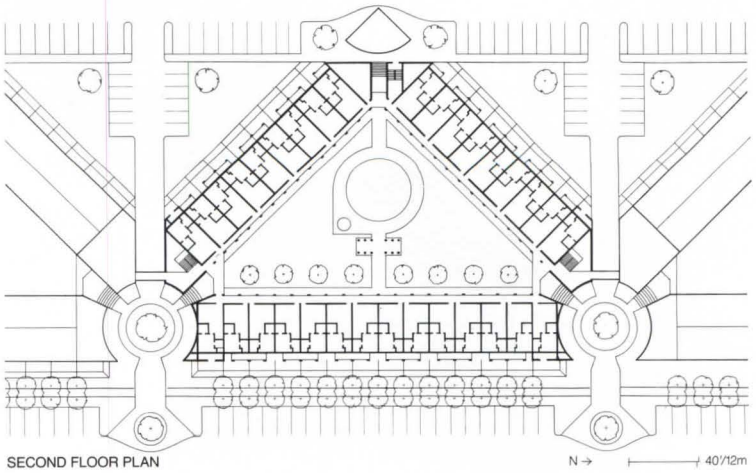
At $7.5 million ($26,000 per unit), Arbour Park, although inexpensive, cost slightly more to build than a conventional Sun Belt model, but the added cost is more than countered by the nearly full occupancy rating, at a time when luxury units stand begging. The developer puts a dollar value on his success: at $.80 to $.85 a square foot, his intake is nearly twice the current mark. Proof, sadly still necessary, that good design is a worthy investment. ***Daralice D. Boles*** ■

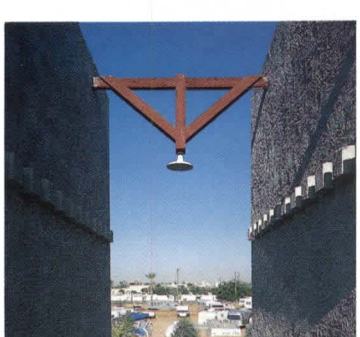
## Arbour Park



*Units are paired motel-style along continuous open-air corridors (photo, top). The individual units (above) have been pared down to a bare minimum and furnished in durable fashion (waxed banana excepted). They open at rear to terraces on the ground floor and balconies above, set within a deep arcade or beneath a sloping Spanish-style roof (facing page). Decorative detailing is simple and inexpensive, accomplished by projecting blocks or timber trusses (facing page, top). Although surrounded by honky-tonk, Arbour Park expects new neighbors: a mini-storage facility built by developer Marmor has just opened on one side, and the trailer park on the other (visible in distance, facing page, top) has been put up for sale.*






***Project:*** *Arbour Park, Tempe, Ariz.*
***Architect:*** *Joseph M. Valerio, Chicago, Ill.; Robert Ball Architects, local representatives (Joseph M. Valerio, AIA, Vince James, Mike Garber, Paul Mueller, project team).*
***Client:*** *Richard Marmor, Arbour Development Co.*
***Site:*** *10.28 acres of former farmland with 350 ft of frontage on Apache Blvd. in a rapidly developing mixed-use district one mile from the Arizona State University campus.*

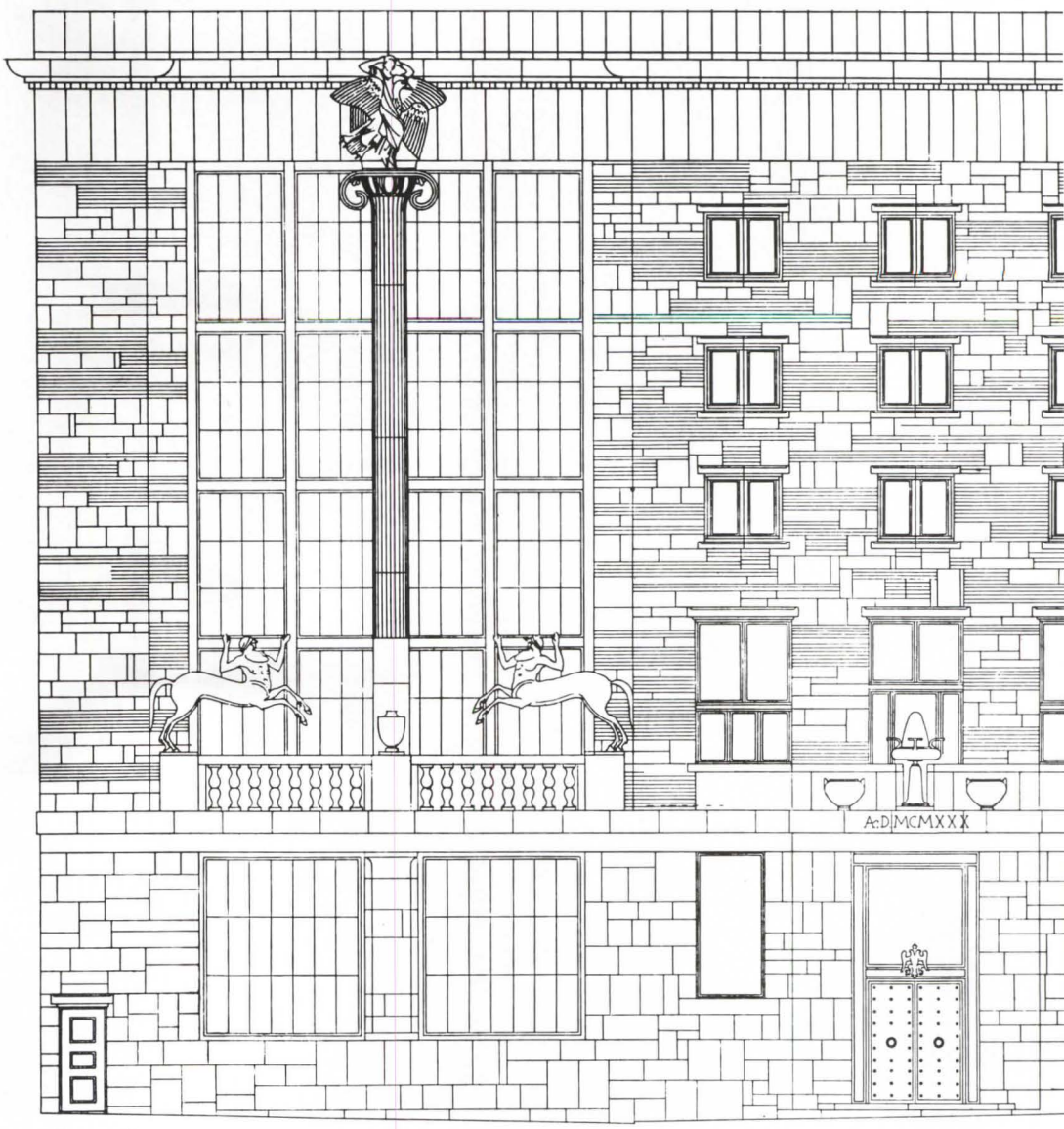
***Program:*** *288 one-bedroom units; one two-bedroom manager's residence with 434 parking spaces, bicycle storage areas. Total building: 81,672 sq ft.*
***Structural system:*** *reinforced masonry with concrete foundations on spread footings; wood floor decks; preengineered wood truss roof.*
***Major materials:*** *stucco, concrete roofing tiles, lightweight concrete topping on plywood deck, welded steel railings and drywall (see Building Materials, p. 163).*

***Mechanical system:*** *chilled and hot water distributed to apartments from central mechanical plant; fan coil unit controlled by thermostat distributes air to each room via ducts.*
***Consultants:*** *Landscape Design Services (Ray Brooks); McCausland Engineering, structural; Jeffries Engineering, mechanical; W.K. Grommes & Associates, electrical engineering.*
***General contractor:*** *Arbour Development Co.*
***Cost:*** *$7.5 million, all inclusive.*
***Photos:*** *Barbara Karant, Karant Associates.*

**Precursor:**
**Jože Plečnik**

# Jože Plečnik in Ljubljana

*An extraordinary body of work, which can be seen as another precursor of Post-Modernism, was created in Yugoslavia over 50 years ago.*




*Library, side entrance*

JOŽE Plečnik reminds us of the diversity present in early Modern architecture and that the International Style resolution of the 1930s was never preordained. For Plečnik knew well the work of Le Corbusier but rejected the imagery and ideas he represented. Yet there are Modernist elements to Plečnik—his geometrical reduction, and the use of 20th-Century materials and building techniques.

The NUK or the Slovene National and University Library in Ljubljana, Yugoslavia, compels attention from almost any viewpoint. From Ljubljana's castle overlook, the library is a large hollow block, standing apart from its neighbors by both bulk and flat roof. Within the city it becomes contextual: Portions of its façades can be glimpsed down streets and across squares, the brick and stone part of the streetscape. Up close it becomes apparent that the form is really a trapezoid in order to fit the site. The strident multicolored walls that from a distance both give a focus and allow it to fit the surroundings are a series of fragments. The basement story of weathered and heavily rusticated granite and limestone gives a pedestrian scale, while above, the red brick walls, encrusted with hunks of broken white limestone, provide a textured and sculptural surface. Against this almost primitive surface—which has origins in the Slovenian vernacular—the refined elements stand out: the crisp and regular fenestration pattern,

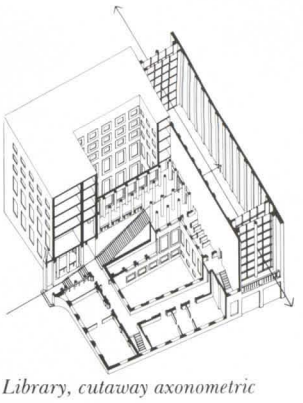
*Library, balustrade*

the angular window bays of the upper floors, and the classical details. Exaggerated balusters and urns are on top of the entrances. A gesturing sculptured figure by Lojze Dolinar, cantilevered on a large masonry block, overpowers a door underneath. Fittingly, this is a side entrance. On top of the polychrome walls is the smooth entablature, with a jutting cornice of dentils. On the top of the cornice, a row of projecting cylindered antifixae are carried on a continuous wave of cavetto moldings. At the rear of the side, two tremendous four-story glazed openings are incongruously split by elongated Ionic columns with bronze volutes.

The major entrance, a projection symmetrically located on the front façade, is diminutive for the clifflike wall above. This shift in scale begins to prepare the visitor for the interior, though nothing is really adequate for the sensation of stepping from the bright sun of Ljubljana into the tomblike atmosphere. From the cramped and dark lobby, a long axial staircase in black marble ascends slowly across nearly two thirds of the building. One rises toward light, which at the top of the climb is revealed to be a great hypostylic hall of thirty-six black marble Doric columns with smooth shafts. The outer boundary of the hall is glazed on two sides. The balustrade is also of black marble, and the sections are composed of two large portions of fluted Doric columns and a slender Ionic column supporting a thick slab. On the stairway axis is a tall doorway, Egyptian in feeling, that leads to the culmination of the journey, the great reading room with the tall glazed windows at the ends. The glazing is 20th Century, yet the room is archaic with galleries for books, wood paneling, and reading tables carried on what appear to be fragments of black marble columns.

With its urban character, the eccentric resolution of parts, and the transformation of classical elements, the NUK is almost a textbook example of Post-Modernism, and perhaps it could be so considered if it were not for its dates, for its architect Jože Plečnik first designed the building in 1932, and after some redesign, it was constructed between 1939 and 1942. Plečnik's other work (see

**Precursor:**
**Jože Plečnik**



*Library, cutaway axonometric*

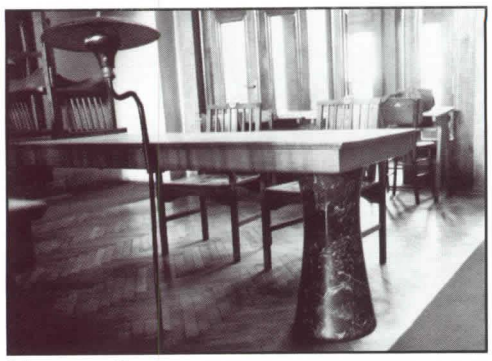
*Library, main entrance*

*Library, aerial view*

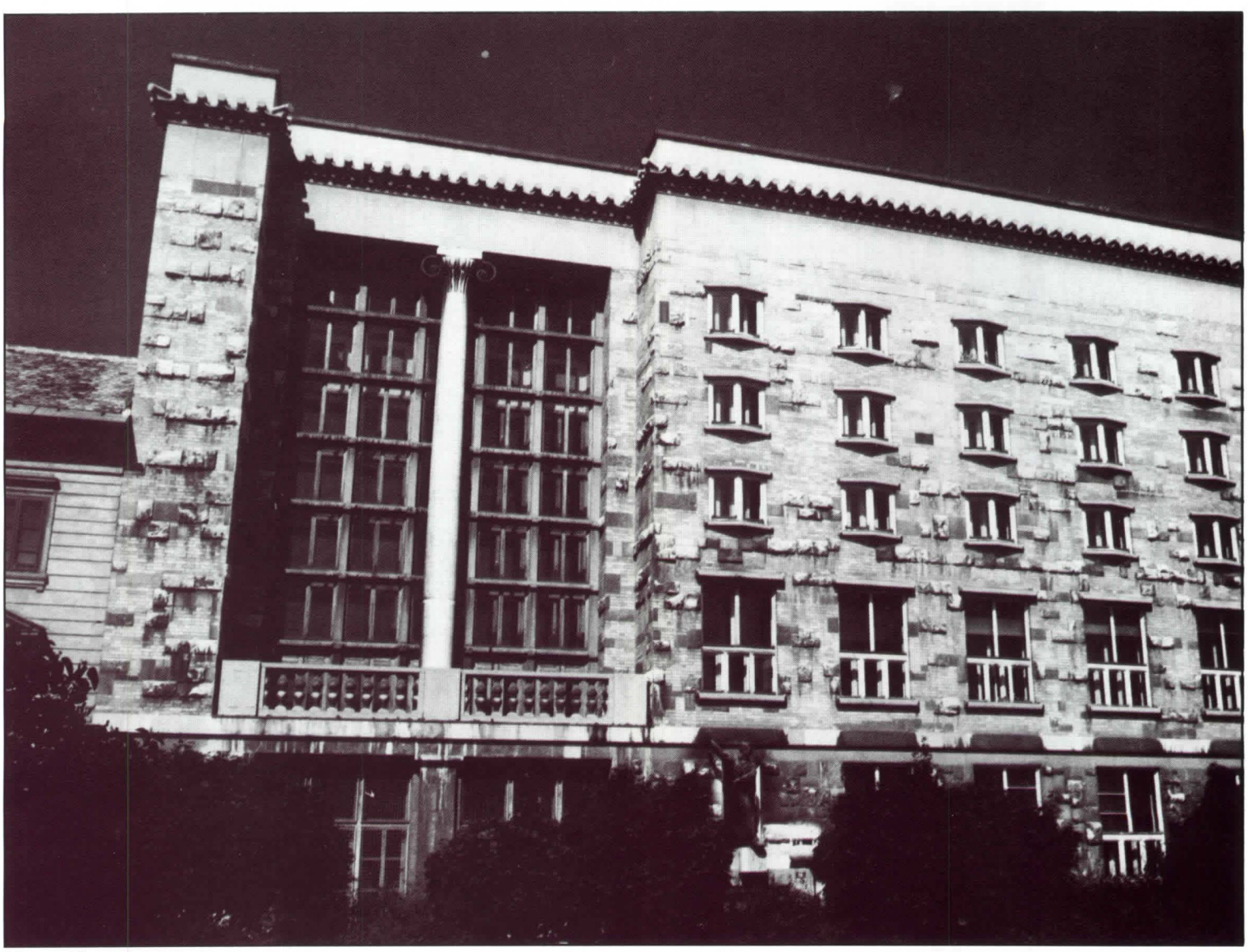
Book review, p. 147) also calls to mind Post-Modernism, and to some degree there is an affinity, for Plečnik, in spite of being trained by Otto Wagner, chose not to follow the functionalist and engineering direction that Wagner pointed toward, and instead created a personalized and yet resolutely nationalistic and Slovene classical architecture.

Jože Plečnik was born in Ljubljana, Yugoslavia, in 1872.[1] His father was a cabinetmaker and he was schooled locally and in Graz, Austria, and appeared bent on a career as a furniture maker and designer. In 1894, he entered Wagner's studio in Vienna. In time, Plečnik became a member of the *avant-garde*—Loos praised his designs—and he joined the Secessionist group in 1901, and became its secretary in 1905. He designed several buildings of note in Vienna and was nominated—though rejected at least partially on racist grounds as a Slav—to be Wagner's successor at the Vienna Academy. Between 1911 and 1920 Plečnik worked and taught in Prague, Czechoslovakia. In 1920 he was offered the position as head of the architecture department of the newly created University of Ljubljana, and he returned home where he remained until his death in 1957. While he continued to do extensive work in Prague and in other places, the majority of his work, and the most important, is in Ljubljana.

Plečnik's architecture can be understood at least partially through his personality. Profoundly religious, he saw the calling of architecture as similar to that of a monk's vows—total devotion with little recompense. He lived the life of an ascetic, never marrying and demanding the same of his students. Satisfied with the small stipend he received from the University, Plečnik refused compensation for the extensive work he did for the city and other patrons. Extremely nationalistic, his work in Ljubljana was an attempt to create a Slovenian architecture. The Slovenes, Plečnik believed, descended from the Etruscans and their culture was Mediterranean. In 1899, he had visited Italy and was fascinated by Michelangelo's reversal of classical precepts. Many of Plečnik's refinements of the classical orders, or their



*Library, reading room*



*Library, side entrance*

transformation, can be interpreted in light of the Michelangelo/Mannerist/Etruscan background. At the same time, he came from a craft tradition, and was also interested in the vernacular of Slovenia, which appears in his multicolors, and the seemingly haphazard placement of rustication, as on the NUK. Apparently, the builders were allowed to place the rustication on the library walls as they pleased, in a good Arts and Crafts tradition. So with Plečnik, there is the very fertile combination of Mediterranean-Classicism-Mannerism, the local vernacular and the crafts, and the *Wagnerschule*.

Ljubljana is the capital of the Socialist Republic of Slovenia, the most prosperous and cosmopolitan city in present-day Yugoslavia. An old city, it dates back to the Romans. For most of the 19th Century, it was ruled by the Austrian Empire, but following the breakup in 1918, it became part of the new Republic of Yugoslavia. Nestled in the Julian Alps, Ljubljana is beautiful and picturesque, a mixture of high style and vernacular buildings which spread out from the old castle overlooking the town. In 1895, an earthquake extensively damaged the town, especially the newer sections. Reconstruction followed the plans of the architect Max Fabiani, with many of the new buildings in the Jugendstil or Secessionist idiom. Plečnik returned to this scene in 1920. His position as head of the architecture department made him de facto city architect. While Plečnik's work in Ljubljana can be seen as individual designs, they are all part of a greater whole: his conception of a city and its architecture. Plečnik is unusual in that while he did a master plan, he was also capable of designing the individual detail. Durda Gržan-Butina, a historian of Yugoslavian city planning, points out that Plečnik consciously built choice into the city by developing variety and complexity within an overall order. He was also interested in communication and in providing accessibility to all the inhabitants.[2] Plečnik's work is extensive, ranging from green spaces to lamp posts, from bridges to office buildings.

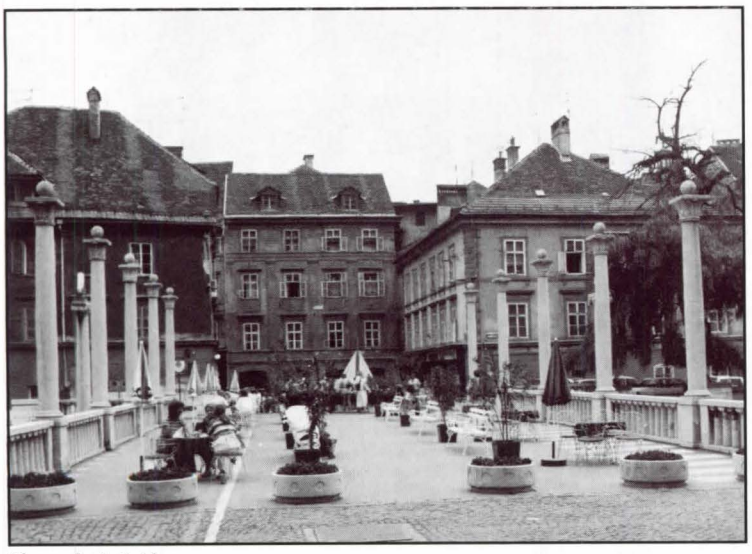
The NUK does not sit alone, but is part of a sequence on Vegova Street that Plečnik very carefully orchestrated. The south end

**Precursor:**
**Jože Plečnik**

*Bench, Vegova Street*

*Vegova Street*

*Shoemaker's Bridge*



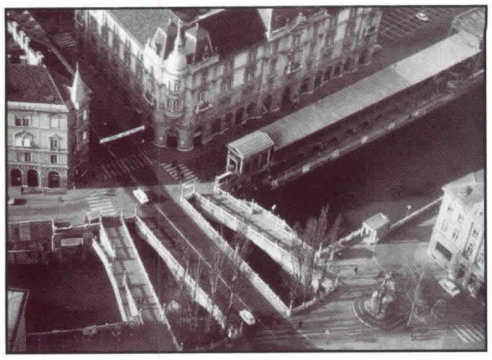
*Shoemaker's Bridge*

*Three Bridges, gatehouse*

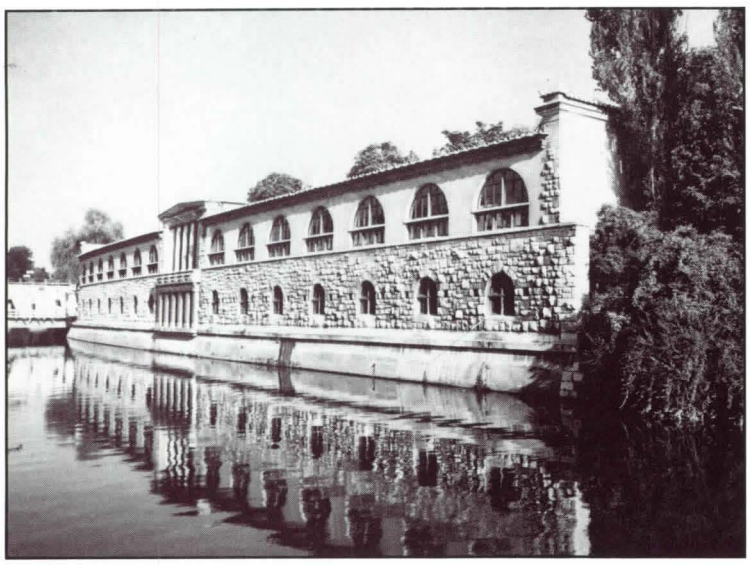
of Vegova Street is anchored by a large monolithic shaft of a monument to the French Revolution that Plečnik designed in 1930, while the north end spills into Congress Square, which Plečnik both redesigned and provided a small fountain for at the center. Along the west side of Vegova Street, the library is set back, and a small terrace raised above the street is furnished with planting and Plečnik-designed benches. These benches are ubiquitous in Ljubljana; made of precast concrete end sections, the seat and back are simple wood poles. The multicolors of the NUK are carried on up the street in other façades—belonging to the university—that Plečnik or his students either painted in different colors, or hung with plaques and other identifications of their activity. In front of these buildings there is a demarcation between passage and rest in the low stone walls, the planting, paving, and benches. The street also has a third structure, in addition to the façades and the space in front—the trees and columns that create an alley. The columns in Plečnik's simple style are really cylinders of marble, which carry the busts of famous Slovene musicians and writers.

One of the most impressive demonstrations of Plečnik's ability is the Ljubljana River sequence for which he designed the market and a number of bridges, three of which were built. The river is the backbone of the city, and splits the old section of town from the newer 18th- and 19th-Century sections. Plečnik accepted the river as the focal point, for along it was located the old market area; churches and the city hall were focused upon squares that provided connections.

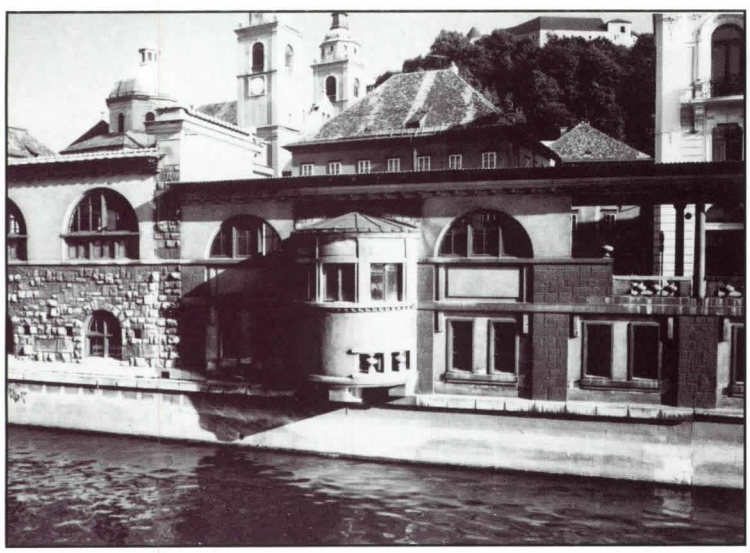
The Shoemaker's Bridge (1932) is a poised thin slab, supported at the middle by a narrow pedestal and crowned by a low balustrade and 14 columns—six Corinthian on each side rise from the balustrade, and two Ionic are mounted on the pedestal and serve as light standards. The bridge is light and open, actually a double square in plan, yet the columns give it a spatial definition. On either side of the bridge Plečnik sheathed the river banks in granite and allowed vegetation to grow out and over, so when the bridge is reached, either from along the river



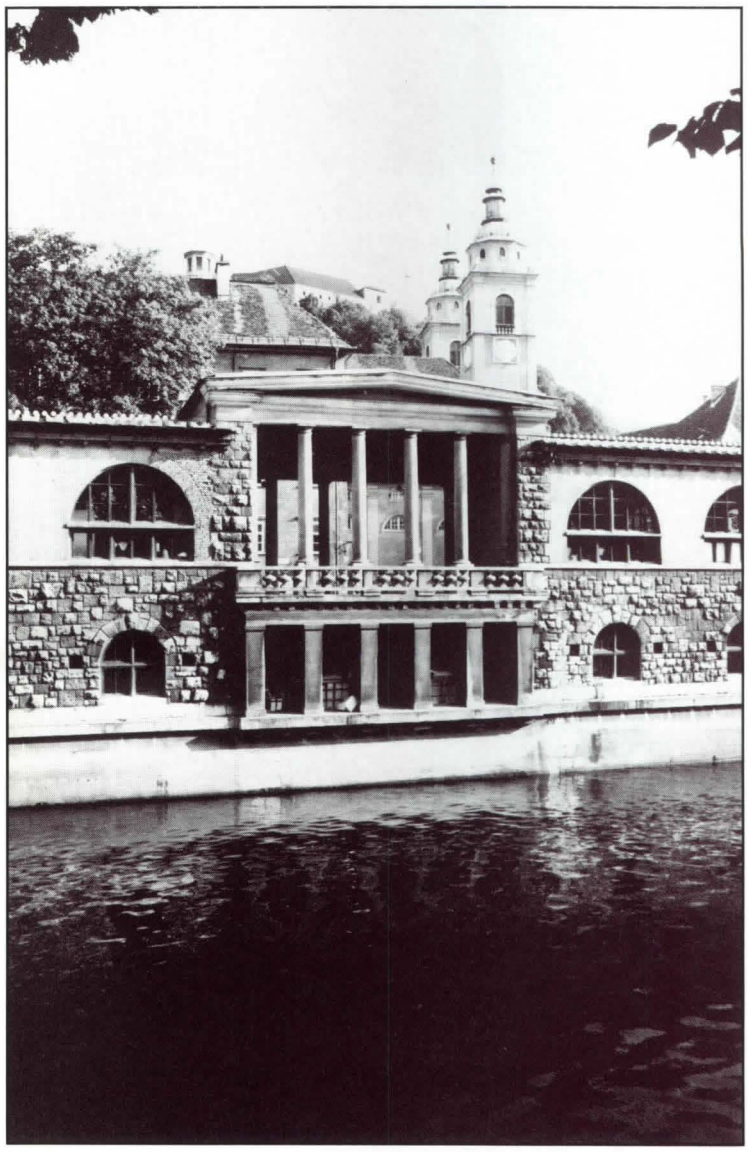
*Three Bridges*



*Market*



*Market, showing upper open portions*

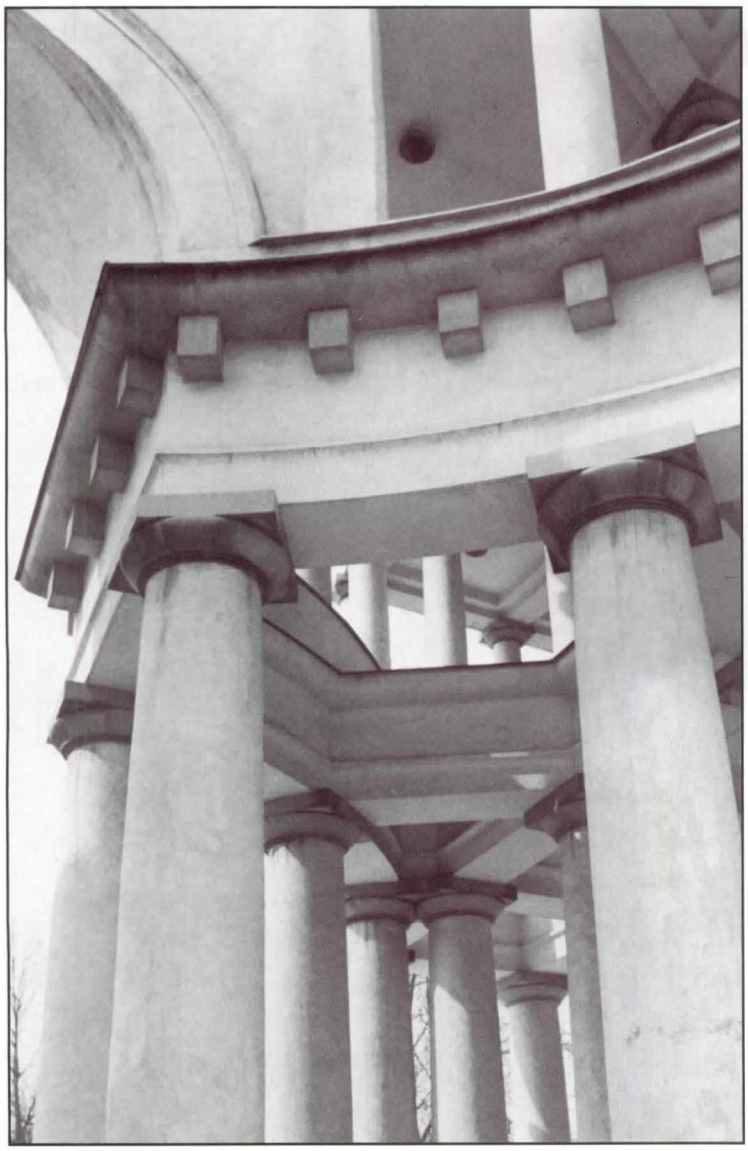


*Market, portico*

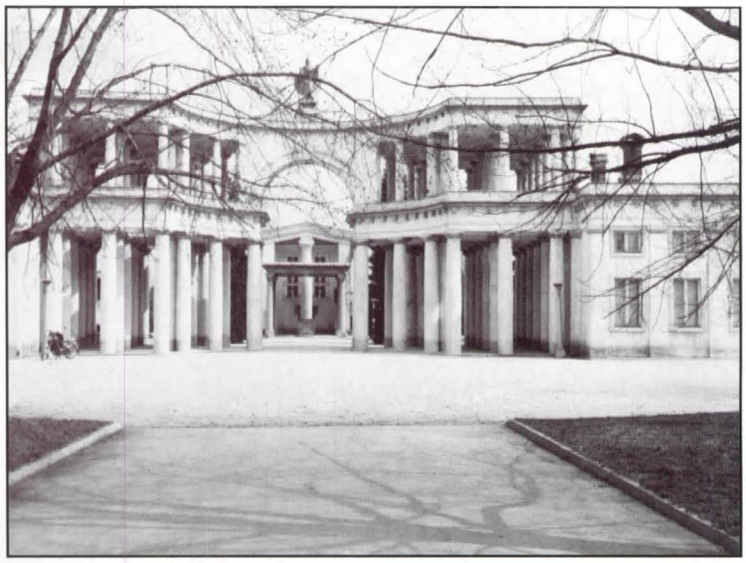
or from the narrow streets of the town, it is an urban space, a defined area for both passage and rest.

The centerpiece of the river sequence is the Three Bridges (1931) where Plečnik added two pedestrian bridges to either side of the Camolo Bridge (of 1841) at the heart of the city. The old bridge linked both the street and square that led to the city hall, and on the opposite bank, seven roads that converged in front of St. Mary's church. Originally Plečnik thought about widening the bridge to a double or triple square, similar to the Shoemaker's design, but then, in a stroke of genius, added the separate pedestrian bridges. Defining the three separate spaces of the bridges and the banks on either side are the usual elements of Plečnik's vocabulary: a low balustrade with fat-bellied balusters. On top of the pedestals at the corners, giant double balusters serve as lamp standards. The space is large, and the river running through provides an endless cross axis. The surrounding buildings provide one layer of closure, while within the square extending across the bridge, spatial definition into separate areas and pedestrian scale come from Plečnik's "street furniture." So strong are his architectural elements that the space feels closed and intimate. Beneath the bridges, Plečnik placed toilets, and to one side a terrace and arcade, and a few feet above river level, a café. Adjacent to the Three Bridges was the old market area, which Plečnik visually linked together (1939–1942) with a series of architectural devices. A small gate or guardhouse in the form of a temple enclosing a portico is the first structure, which leads to a colonnade of widely spaced columns that culminate in the sheltered market area. Meanwhile down at the river level, a series of arched openings roll off, to be interrupted by rectangular windows, before arches in a different rhythm occur. The upper markets are both open and closed and are split into two sections. Each has a large colonnaded temple portico as the central feature of the river frontage. Concrete is the basic material for both the Three Bridges and the market. Both smooth- and rough-faced ashlar are used as covering in

**Precursor:**
**Jože Plečnik**



*Zale Cemetery, gate*



*Zale Cemetery, gate*

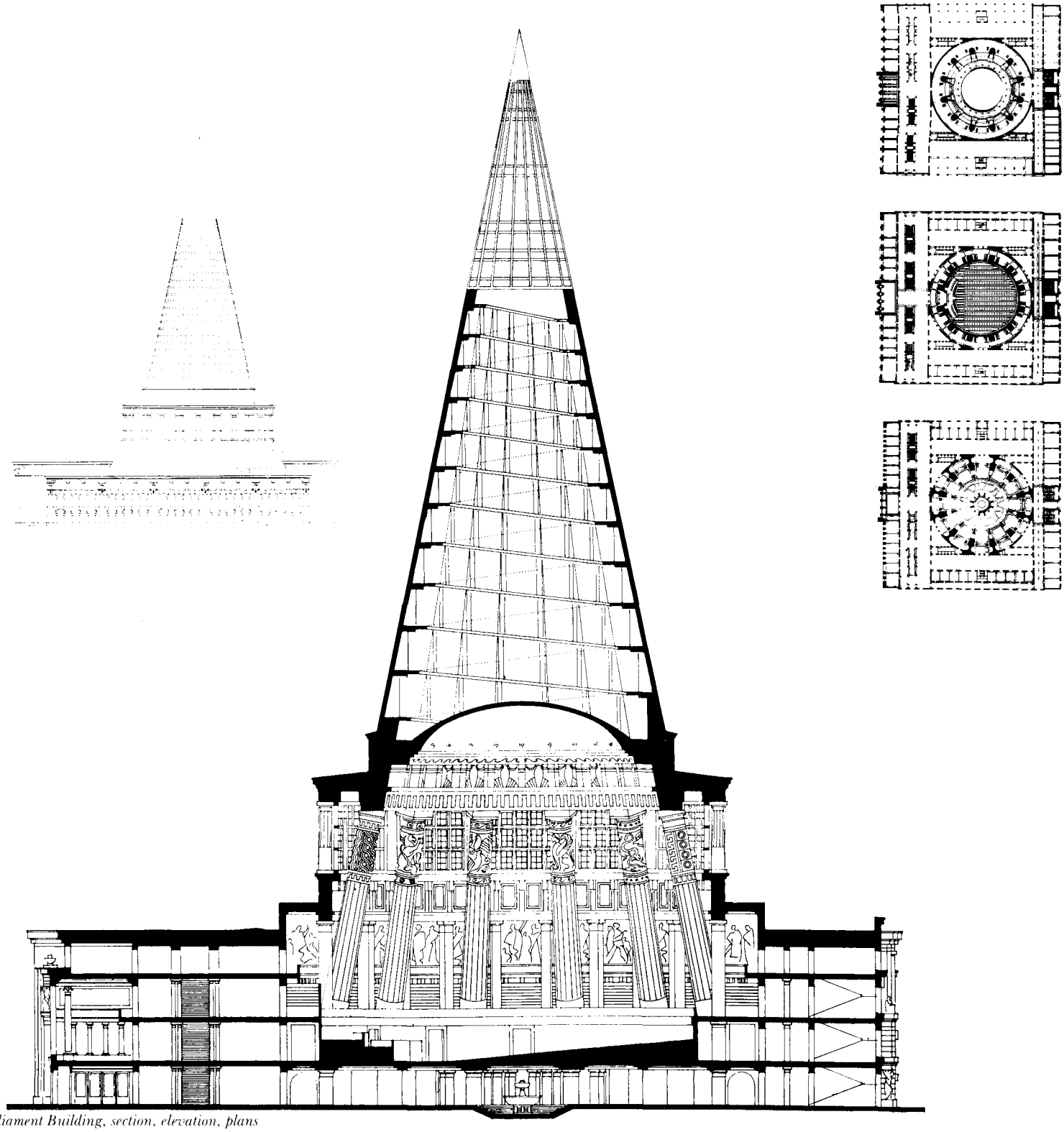
*Cultural Center*

parts of the market to provide changes of texture and variety. At times this gives the structure an archaic, almost "found" quality.

Fundamental to Plečnik's architecture was the belief in the validity of architectural ornament as one of the major elements of design. He could design at the large scale, but the success of the scheme depended on how well the detail was handled. Obviously entranced by columns, moulding, balustrades, bollards, frames, and all those elements that modernists generally deplored as excess, Plečnik lavished attention on them to create a new, 20th-Century Slovene architectural language. For him it was essential to think about the profile of mouldings, or the entasis (or lack of) in columns. In the geometrical simplification apparent in much of his ornament there can be seen traces of the geometry of the Secessionists and 20th-Century Modernism. Plečnik's love of columns finally enabled him to design a structure of just columns, the gates to the Žale Cemetery, where two colonnades are superimposed on each other. The treatment is marvelously simple and exquisitely handled.

His work fell off during and after World War II. Not that he didn't have ideas, as his project for the Ljubljana Parliament indicates, with its inclined columns in the rotunda and great pyramidal dome. Yet this was decidedly at variance with the new ruling functionalist orthodoxy of Tito's Communism, and in general Plečnik was avoided. There is one late building, the Ljubljana Cultural Center (1956–1957) completed the year he died, which involved some remodeling and additions to a preexisting monastery. The cloisters are typically Plečnik; here, favorite architectural elements—the column, the arch, and the baluster—are used with a rich surface stucco decoration of patterns based upon Slovene folk art. Otherwise, his last years were occupied with various projects, one of which was a study in clay of columns and capitals.

Plečnik's architecture illustrates several important issues that transcend its immediate local and nationalistic aspirations. For while the work can be viewed as response to the Etruscan heritage, a crucial aspect that



*Parliament Building, section, elevation, plans*

must not be missed is that it is not a simple mimicking of the past, but a reinterpretation. This new look, filtered through the Mannerist-Secessionist sensibility, gave his work a unique vocabulary of profiles, mouldings, and details that could be used from the cornice to the city as a whole. His city planning was architectural, and he used his Classicism to accomplish his goals, rather than relying on social-economic indeterminants. The work is eccentric and yet engaging and has both wit and drama. It is akin on one hand to the light chamber music of Mozart, and on the other to a full symphony by Mahler. Miraculously, it remains very fresh.

***Richard Guy Wilson*** ■

*The author is Professor of Architecture at University of Virginia, and author most recently of* The AIA Gold Medal 1907–1982 *and* McKim, Mead & White Architects *(Rizzoli, 1983).*

***Footnotes***

[1] *Most of the writing on Plečnik is not in English. The major exceptions are: Richard Bassett, "Ljubljana 1925,"* Architectural Review, *CLSVIII (October, 1980), 249–252; Richard Bassett, "Plečnik in Ljubljana,"* Architectural Review, *CLXX (August, 1981), pp. 107–111; and Ian Bentley and Durda Gržan-Butina, editors,* Jože Plečnik, 1872–1957 *(Headington, Oxford: Urban Design, Oxford Polytechnic, 1983). This last is an exhibition catalog to which I am indebted. There is an extensive non-English literature on him, including Damjan Prelovsek,* Joseph Plečnik Wiener Arbeiten von 1896 bis 1914 *(Wien, Edition Tusch, 1979); Lojze Gostisa,* Arhitekt Jože Plečnik *(Ljubljana: Mladinska, knjiga, 1968); France Stele, Anton Trstenjak and Jože Plečnik,* Architectura perennis *(Ljubljana: Mestna Obcina Ljubljanska, 1941); and many articles on his work.*

*I am indebted to Peter Krečič of the Arhitekturni Muzej Ljubljana, located in Plečnik's former house and studio, for assistance.*

[2] *Durda Gržan-Butina, "Ljubljana: Master Plan and Spatial Structure, in* Jože Plečnik.

***Photos:*** *Richard Guy Wilson except far left p. 100, top and left p. 102, R.M. Andrews; top p. 101, Peter Krečič.*

# The Watery Underworld

GREEK and Roman Mythology depict the underworld as a watery place, girded by rivers with names such as woe and lamentation. The ancients got the general idea right, for the "underworld" does contain enormous amounts of water, nearly two million cubic miles in aquifers alone. They weren't too far off with the specifics, either, for when subsurface water enters a basement, woe and lamentation are not far behind.

The waterproofing of walls below grade has a long and, until recently, a slow-moving development. As historian Norman Davey reports in his *History of Building Materials*, archaeologists have found bitumen-covered foundations in Babylonian temples dating as far back as 2800 B.C. Says Davey, "These early mortars contained from 25 to 35 percent bitumen, the rest of the mixture being loam and chopped straw or reeds." While the Romans invented some innovative drainage and waterproofing techniques of their own, the development of perimeter foundation drainage and coal tar and asphalt waterproofing, similar to what we use today, did not occur until the 18th Century in France. And only in the last decade or two have new drainage and waterproofing systems emerged to complement or replace those traditional methods.

### A Grounding in Water

Before reviewing those systems, let's first consider the soil conditions that often dictate their use. The permeability of soil most affects drainage and waterproofing decisions. The impermeable clays and silts have a fine-grained latticelike structure that holds water; the permeable gravels and sands, a coarse-grained, interlocking structure whose voids allow water to flow.

Impermeable soils aid in the excavation of a site because they reduce the amount of groundwater seepage and thus the amount of pumping required. They make poor backfill material for the same reason—they inhibit drainage. Even when not immediately adjacent to a building, impermeable soil can cause problems. Researchers have linked the excessive settlement of some buildings to ground vibrations carried through impermeable soil, especially water-saturated sands and silts. Studies also have shown that continuous vibrations can eventually liquefy those soils to a point where they lose most of their compressive strength, causing nearby buildings to settle, however solid their own bearing soil might be.

The groundwater level also affects the choice of drainage and waterproofing materials. That level, below which water fills the soil's pores, varies with the amount of rainfall and with the contours of the land: High ground generally has a deeper groundwater level than valleys. Groundwater exerts hydrostatic pressure against foundations equal to their depth below the groundwater level times the unit weight of water (62.4 pounds per square foot). Foundation drainage and waterproofing work in concert to resist that hydrostatic pressure: the former by drawing down the groundwater below the basement floor slab; the latter by repelling whatever seepage water remains.

While soil investigations are the only sure way of determining the soil types and groundwater levels, not every code requires them, especially for residences and light-frame buildings. The Deep Foundation Institute, according to engineer William Loftness, "wants to see soil investigations required in every code," although it recognizes that there is considerable opposition, particularly among owners who "see soil testing as an unnecessary expense and not the unnecessary costs they can incur without them."

New technology may help resolve the issue. While boring remains the dominant method of investigating soil conditions, it takes time and requires some guesswork about what exists between boring locations. For detecting subsurface conditions, the National Bureau of Standards has developed methods of using microwaves that promise greater speed, accuracy, and eventually lower costs. Using a microwave transmitter and receiver, a soils engineer can transmit a band of frequencies into the soil and, by analyzing the delay and distortion in the frequencies, gauge the type and depth of subsurface materials.

### Man the Buckets

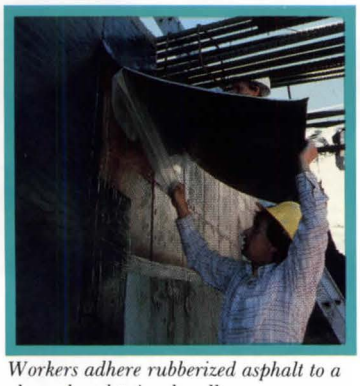
Groundwater first becomes a problem during the excavation of a site. For excavations in relatively impermeable soil or that barely extend into the groundwater, sump pumps usually suffice in removing water. To prevent the pumps from drawing out the fine particles from the soil and possibly undermining nearby structures, the sump pits usually have filter linings.

Excavating in modestly permeable soil (such as sand) and to depths around 18 to 20 feet below the groundwater level, most contractors use well points. The well point—a pointed pipe two or three inches in diameter that is perforated and covered with a screen—connects to a pump via a series of riser and header pipes. To speed up the well points' removal of groundwater in silt, contractors sometimes use a process called electro-osmosis, where a negatively charged electrode in the well point increases the draw of water from soil containing positively charged electrodes. Well points work too slowly in impermeable soil and often require too close spacing in highly permeable gravel to be cost effective. And while rows of well points can step down the sides of an excavation, few contractors use them for deep foundations.

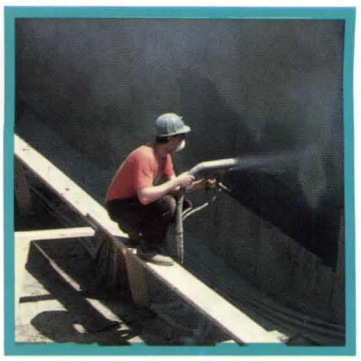
*Subsurface waterproofing and drainage rarely get enough attention. Half of all basements leak not for lack of products, but for lack of concern.*

to cross the Acheron for Dante's *Inferno*.

**Architects Setter, Leach, and Lindstrom and waterproofing consultants associated with the Underground Space Center have designed a three-layer waterproofing system for the new Telecommunications Building at the University of Minnesota. The system consists of a two-part spray bentonite, rubberized asphalt sheet, and EPDM rubber sheet. The following photographs show the installation sequence.**



*Workers adhere rubberized asphalt to a cleaned and primed wall.*



*A worker sprays bentonite before covering it with polyethylene.*

In deep excavations, wells offer the best method of dewatering. Wells also may be the only option in permeable gravels because of the high rate of groundwater seepage, or in constricted sites because of the ability of one or two wells near the center of an excavation to adequately lower the groundwater level over a large area.

The prevalence of contaminated groundwater in urban areas has become a major dewatering problem. Several states have passed laws controlling the removal and disposal of the contaminated material on a site. "In Massachusetts," says Joseph Guertin of the Boston engineering firm of Goldberg, Zoino & Associates, "if the owner doesn't clean up the site, the state has a first lien on the property. In a tunnel project that we did, the owner had to build a treatment plant to clean the water before discharging it. Architects and engineers now have to worry about the quality as well as the quantity of groundwater."

Laws also govern the effect dewatering has on nearby structures; buildings with very shallow foundations or on wood piles usually suffer the most if the groundwater beneath them subsides. Preventing that subsidence, says Guertin, "demands monitoring the groundwater levels beyond the site's perimeter. If sensitive buildings stand near the site, the contractor may have to erect a barrier in the soil and recharge the groundwater level outside the barrier by pumping water into the ground."

Making the walls of an excavation impermeable offers another way of keeping groundwater out of an excavation without causing subsidence. One method, adapted from bridge construction, involves driving interlocking steel sheeting into the ground and then excavating and dewatering the soil within the cofferdam. Another, called the slurry trench method, involves digging a trench around the proposed excavation, filling it with a bentonite clay slurry that consolidates the soil, placing reinforcing steel into the slurry, and then displacing the slurry with concrete that hardens into a reinforced retaining wall. As excavation proceeds within that wall, contractors will angle post-tensioned tie-back rods into the ground to prevent the wall's overturning.

The bentonite clay slurry works by penetrating the pores of the soil and forming a gel to prevent the passage of water. A similar principle governs the grouting of soil, where a cement or chemical grout is injected under pressure into the ground and hardens to seal cracks or voids and to make the soil impermeable. The type of grout used depends upon the type of soil. Sand-cement grouts work best in coarse-grained gravel; cement grouts, in fine gravels and coarse-grained sands; and chemical grouts, in fine-grained sands and silts. While grouting techniques have improved, they remain a relatively expensive and somewhat unpredictable method of consolidating soil. The same might be said of freezing soil to prevent the flow of water; some geotechnical engineers will consider it only after other, more conventional dewatering techniques have failed.

### Down the Drain

Dewatering or draining of the foundation begins above ground, with sloping grades, discharging runoff, and holding foundation plants away from the building. Below ground, drainage depends upon the quality and location of the backfill and perimeter drain pipe. The backfill material should include a cap of relatively impermeable soil to reduce rainwater seepage, a compacted upper layer of gravel that acts as a filter to prevent fine silt or clay particles from washing into the drain from the adjacent soil, and a bottom layer of small stones, wrapped in a filter fabric and placed around the drain pipe. A large building or one located in impermeable soil may also require gravel and drain pipes under the basement floor slab to draw down the groundwater.

Those are well-known, but not necessarily common practices. Says waterproofing consultant Brent Anderson, "In residential projects especially, the debris that comes out of the hole usually goes back in as backfill." A large-scale survey of residential construction problems conducted by researchers at the Technical University of Aachen, West Germany, confirms that observation. "The vast majority of examples of moisture penetration and water damage to basement walls (occurred in buildings where) effective drainage systems and seepage layers in front of the basement walls or beneath the basement floors were not constructed," report the authors of the study.

Because of the frequency of improper backfilling around foundations, and because of the high price of suitable backfill material in some parts of the country, prefabricated drainage boards or mats have become popular alternatives. These prefabricated systems all have some sort of free-draining core and a filter fabric covering. The mat type systems typically have cores of corrugated, cellular, or fiber plastic; the board type, cores of rigid fiberglass or asphalt-coated polystyrene beads. While both types drain equally well, some consultants prefer the board type systems because they insulate as well as drain.

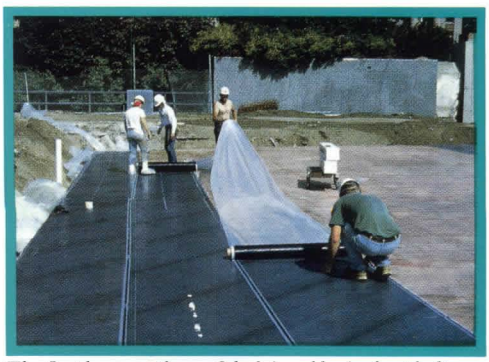
Differences also exist in the sizing of the filter fabrics, generally made of polypropylene. Some companies wrap the prefabricated drains in fabrics with an EOS (a measure of equivalent opening size developed by the Army Corps of Engineers) of 75 or 100; others use fabrics with an EOS of 50. The higher number indicates a smaller opening size. While companies that use fabrics with

| Major divisions | Symbol | Name | Value as subgrade | Frost action | Compressibility | Drainage |
|---|---|---|---|---|---|---|
| **Course-grained soils** | GW | Well-graded gravels or gravel-sand mixture, little or no fines | Excellent | None to very slight | Almost none | Excellent |
| Gravel and gravelly soils | GP | Poorly graded gravels or gravel-sand mixtures, little or no fines | Good to excellent | None to very slight | Almost none | Excellent |
| | GM | Silty gravels, gravel-sand-silt mixtures | Good to excellent | Slight to medium | Very slight | Fair to poor |
| | GC | Clayey gravels, gravel-sand-clay mixtures | Good | Slight to medium | Slight | Poor to practically impervious |
| Sand and sandy soils | SW | Well-graded sands or gravelly sands, little or no fines | Good | None to very slight | Almost none | Excellent |
| | SP | Poorly graded sands or gravelly sands, little or no fines | Fair to good | None to very slight | Almost none | Excellent |
| | SM | Silty sands, sand-silt mixtures | Fair to good | Slight to high | Very slight | Fair to poor |
| | SC | Clayey sands, sand-clay mixtures | Poor to fair | Slight to high | Slight to medium | Poor to practically impervious |
| **Fine-grained soils** Silts and clays liquid limit <50 | ML | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity | Poor to fair | Medium to very high | Slight to medium | Fair to poor |
| | CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays | Poor to fair | Medium to high | Medium | Practically impervious |
| | OL | Organic silts and organic silt-clays of low plasticity | Poor | Medium to high | Medium to high | Poor |
| Silts and clays liquid limit ≥50 | MH | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts | Poor | Medium to very high | High | Fair to poor |
| | CH | Inorganic clays to high plasticity, fat clays | Poor to fair | Medium | High | Practically impervious |
| | OH | Organic clays of medium to high plasticity, organic silts | Poor to very poor | Medium | High | Practically impervious |
| **Highly organic soils** | Pt | Peat and other highly organic soils | Not suitable | Slight | Very high | Fair to poor |

From *Soils in Construction* by W.L. Schroeder, by permission of John Wiley & Sons.

*Workers then install drain pipe encased in rock and filter fabric.*

*Free-draining backfill is laid against extruded polystyrene insulation.*



*The first layer on the roof deck is rubberized asphalt laid on a clean, dry surface.*

smaller openings argue that the very purpose of these fabrics is to keep fine soil particles out of the drainage system, others argue that fabrics with openings too small can cause those "fines" to cake up. In theory, the fabrics with larger openings catch larger soil particles which, in turn, naturally filter out the finer material. Evidence exists to support both sides.

The drainage pipes used at the perimeter of the footing and under the basement floor also differ considerably in performance. In general, the nonmetallic porous pipes resist siltation and corrosion better than metal pipe or those with perforations or open joints. In large commercial projects, according to Andrew Ciancia of the engineering firm of Woodward Clyde, "porous wall concrete pipe has become the standard." Residential builders tend to use the less expensive open-joint, perforated pipes, sometimes wrapping them in filter fabric to reduce siltation.

The placement of the drain pipe may matter more than its construction. The lowest point in the drain pipe system must be above the highest possible water level at its point of discharge to prevent a back-surge of water. The pipe itself, a minimum 4 inches in diameter, must be at least 4 inches above the bottom of the footing to prevent undermining the building, no higher than the top of the footing to prevent groundwater infiltration into the basement, sloped no less than ⅛ inch per foot to ensure adequate drainage, and provided with at least one cleanout in case the pipe becomes blocked. Sizing the pipe involves a tradeoff between a less expensive small pipe with deeper footings (to prevent groundwater from backing up higher than the basement slab) or a more expensive large pipe with shallower footings. Given the exacting requirements of foundation drainage and the messy conditions that usually prevail on a site, it's little wonder that the Germans found in their residential survey that "91 percent of all the drainage failures were due to the . . . inappropriate position, gradient, (or) dimensions" of the drainage pipe.

**The Finger in the Dike**

Just as the best waterproofing rarely works without some form of foundation drainage, the best drainage system cannot compensate for inadequate waterproofing. Yet inadequate waterproofing is what most buildings have. "Many builders just don't care," says Brent Anderson. "If it's black and sticks to the wall, they're satisfied, even though what they've put up is little better than black paint. The building codes are part of the problem, since most of them only require the dampproofing of basement walls."

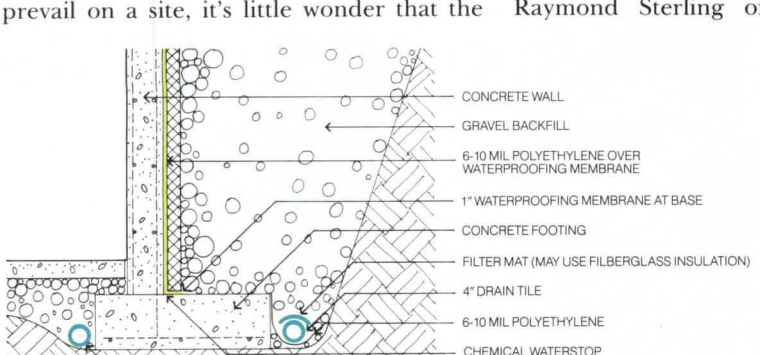
Dampproofing retards, but does not stop, the infiltration of water. Unmodified asphalt or coal tar coatings remain the most common dampproofing materials, although cement parging, low-solid polymer sealers, water repellants, or polyethylene sheeting are also used. In a controlled situation, those materials appear to work. But in practice, they usually are either so thin that even the most careful backfilling will damage them, so brittle that they cannot bridge cracks or tolerate movement in the foundation wall, or, in the case of asphalt emulsions, so soluble in water that they eventually re-emulsify and lose all water repellancy.

The number of lawsuits arising from inadequate waterproofing alone should discourage those practices. "Thirty-five percent of all claims against architects are water-related," says Anderson, "with 15 percent directly related to the selection of waterproofing materials." Why do so many people still dampproof basements? "The materials are inexpensive and easily applied," says Dr. Raymond Sterling of the Underground Space Center at the University of Minnesota. "Also, some basements will stay dry, regardless of what's put on the foundation walls, because of low groundwater level or well-drained soil. Just because a system works once, however, doesn't mean it's a good system."

Making dampproofing even harder to justify are the number of effective, reasonably priced waterproofing systems now available. Those systems fall into five categories: built-up membranes, modified bitumens, sheet membranes, liquid-applied materials, and bentonite clays.

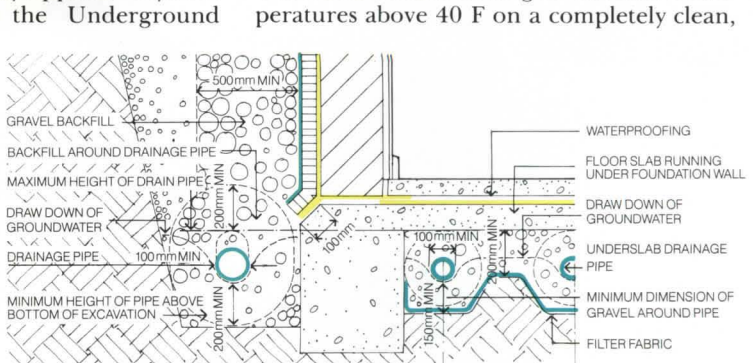
Built-up waterproofing, like built-up roofing, contains several layers of asphalt or coal tar and glass-reinforced fabrics (organic felts rot too easily underground). As the processing of asphalt has improved and as the federal government has ordered the removal of toxins from coal tar, the flexibility of those materials has decreased. The cooler temperatures below grade also reduce their ability, even when reinforced, to bridge cracks or reseal leaks. The advantage of built-up waterproofing lies in its familiarity, moderate price, and ability to conform to complex forms.

Modified bitumens, below grade as above, compensate for some of the drawbacks of built-up membranes while retaining some of their advantages. The most popular modified bitumens, indeed the most popular of any waterproofing system, "with 30 to 40 percent of the market," claims Anderson, are rubberized asphalt sheets. Comprised of approximately 90 percent asphalt and 10 percent styrene-butadiene rubber to increase the material's softness and durability, rubberized asphalt has several layers of polyethylene sheeting to protect the asphalt from groundwater and water vapor. Its drawbacks include having to install it in temperatures above 40 F on a completely clean,




FOUNDATION BASED ON AMERICAN PRACTICE

From *Underground Waterproofing* by Brent Anderson, by permission of WEBCO Publishing Company




FOUNDATION BASED ON GERMAN RECOMMENDATIONS

From *Structural Failure in Residential Buildings*, Volume 3 by Erich Schild, Rainer Oswald, Dietmar Rogier, Hans Schweikert, by permission of John Wiley & Sons.

*A two-part bentonite is then sprayed over the rubberized asphalt.*

*Workers join the top layer of EPDM sheets with contact adhesive.*

*The contractor adds red food coloring to water during the flood test.*

well-drained surface and to seam and adhere the 3 to 4-foot-wide sheets with great care. But rubberized asphalt offers several advantages, such as the ability to bridge cracks up to ¼ inch wide and to adhere to a variety of substrates, including concrete, masonry, and wood.

Sheet membranes vary widely in composition and performance. While they're generally the most expensive waterproofing systems, they have considerable elasticity, and puncture and chemical resistance. They divide into two groups: the synthetic rubbers and the plastics. The most commonly used synthetic rubbers below grade—butyl and EPDM—have a similar strength and flexibility, although EPDM has a greater resistance to acids, oils, and solvents. Neoprene, a third type, has fewer applications below ground because of its greater cost.

The commonly used plastic sheets—PVC and CPE—have solvent-welded seams, which are more easily and securely made than the cemented seams of EPDM. The drawback most often cited with the plastic sheets has to do with their embrittlement and shrinkage over time. CPE, in this sense, has an advantage because it doesn't require the plasticizers that can migrate out of PVC, although some PVC manufacturers incorporate additives in the material to reduce its shrinkage or embrittlement.

When using any of these sheet materials below ground, fully or partially affixing them to the foundation becomes essential. Otherwise, any water that gets through will travel under the membrane and make finding and repairing a leak nearly impossible. To avoid the cost of full adhesion, many companies recommend affixing the sheets in, say, five- or ten-foot grids so that a leak can be more easily found.

This points to one of the major advantages of liquid-applied waterproofing—it is monolithic. A range of materials even wider than the sheet systems exists in the liquid-applied category, including urethanes as well as synthetic rubbers and plastics. The urethanes are the most commonly used liquid waterproofing, "with about 20 percent of the market," says Anderson. Many manufacturers offer it in an unmodified state or with some percentage of asphalt or coal tar added. The coal tar reduces the cost of the urethane, although in some situations, the long-lasting, objectionable odor of coal tar requires the use of a pure urethane liquid. Manufacturers deny any real performance difference between the two, although some consultants question how much coal tar a urethane liquid can take before becoming something else.

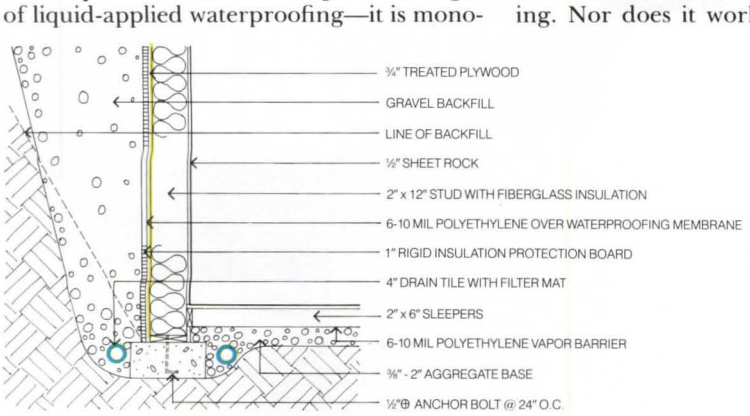
Countering the liquid-applied systems' advantages of full adhesion, moderate cost, and easy application are drawbacks such as the need to have concrete foundation walls cure at least 28 days before applying the liquid, concrete surfaces completely smooth and free of contaminants, and an applicator who can ensure a uniform coating thickness.

The fifth type of waterproofing—bentonite clay—has the least in common with the other four. Formed by the decomposition of volcanic ash and mined largely in South Dakota and Wyoming, bentonite swells from 10 to 20 times in volume when exposed to water, returning to its original state when dry. Bentonite products come as cardboard-faced panels, as rolls adhered to geotextiles, or as trowel-on or spray-on mixtures. Its advantages include the ability to bridge cracks, to reseal any punctures, to adhere to rough surfaces in almost any temperature, and in the case of the trowel-on and spray-on mixtures, to adhere fully to the foundation wall. Bentonite doesn't work as well as other waterproofing materials in soils with a high salt content, which reduces the clay's swelling. Nor does it work well in arid climates with sudden rainstorms, which can penetrate a foundation before the clay has time to swell, or in soil with running water, which can erode the clay from the wall. While one of the oldest and least expensive waterproofing materials, bentonite products, with the exception of the cardboard-faced panels, are relatively new to the U.S. market. The reception, though, has been good. "Bentonite's the second fastest growing waterproofing material, next to EPDM," according to Anderson, "with 15 or 20 percent of the market."

### Places Please

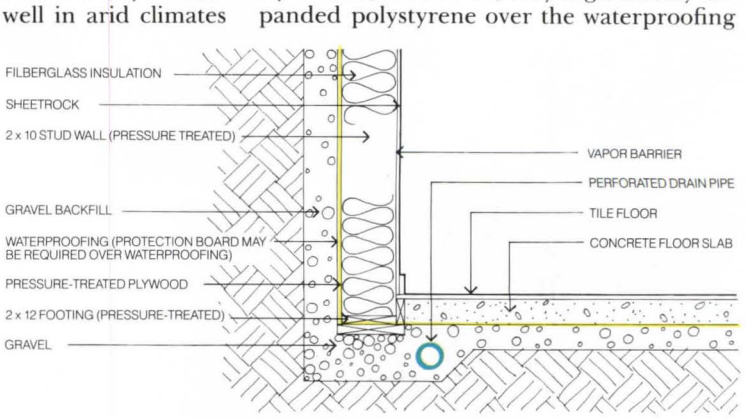
Following the selection of a waterproofing system comes its proper placement. Almost without exception, waterproofing specialists recommend affixing the waterproofing directly to the foundation wall. While that location has its problems—surface contaminants or irregularities, for example, can interfere with adhesion—waterproofing works best on a firm substrate.

The placement few manufacturers recommend, but some contractors use, is on top of exterior insulation. That allows contractors to use less expensive, low density expanded polystyrene insulation, which, unless protected from groundwater by the waterproofing, loses much of its insulating value. It jeopardizes the integrity of the waterproofing, though, and the insulation as well, for if the waterproofing does fail, the leak probably will go undetected, at least until the insulation itself has become thoroughly saturated with water. If the use of inexpensive insulation becomes a factor, it's better to use it inside the foundation wall and provide a protection board over the outside waterproofing to prevent damage during backfilling. Otherwise, most consultants and companies recommend using extruded polystyrene or, if need be, very high density expanded polystyrene over the waterproofing




WOOD FOUNDATION ON CONCRETE FOOTING

From *Underground Waterproofing* by Brent Anderson, by permission of WEBCO Publishing Company




WOOD FOUNDATION ON GRAVEL BASE

From *Earth Sheltered Residential Design Manual* by Dr. Raymond Sterling, William Farnan, John Carmody, by permission of Van Nostrand Reinhold Company.

*The red food coloring highlights any leaks during the 48-hour test.*

*A high density extruded polystyrene insulation goes over the EPDM.*

*Free-draining backfill is then carefully placed over the insulation.*

to protect it from backfill and thermal shock.

"Flowerbed insulation," according to design consultant Ken Labs, offers a fourth option, less tested but potentially as successful as placing the insulation on top of the waterproofing. It involves canting the rigid insulation away from the foundation wall below grade. That warms the entire soil mass around the building, allowing, according to Labs, "footings only 2½ feet below grade in even the coldest climates" while still protecting the waterproofing from thermal shock. Because the canted insulation doesn't protect the waterproofing from backfill abrasion, a separate protection board also must be used.

Placing waterproofing on the inside of foundation walls creates another set of problems. Waterproofing in that location not only allows the foundation walls to become saturated with groundwater. It also prevents the moisture from evaporating, driving it further up the walls. If, as in many older buildings, there is no exterior foundation waterproofing or its application isn't practical, the solution lies not with interior waterproofing, but with the evaporation of moisture in the floors and walls through the use of vented interior cavity walls and raised floors.

Even if a building has exterior waterproofing, moisture can rise if a gap exists between the floor and wall membrane. Making that connection often requires the insertion of a dampproof course in the wall, accomplished by cutting thin slices of the wall, a section at a time, and inserting a waterproof material, such as polyester resin or slate.

### Dampened Expectations

"You can look at the fact that one third to one half of all basements leak, and think it's a terrible problem," says Raymond Sterling, "or you can look at it and say that, by doing almost nothing, one half of the buildings stay dry anyway." Whether we see the glass—or the basement—half full or half empty depends upon our expectations. With earlier technology, we had no choice but to accept some infiltration of groundwater into basements. Our expectations and capabilities coincided. The situation has changed, however. We now have the ability to stop groundwater infiltration at a cost only slightly greater than, and in some cases equal to, the cost of earlier methods. But our expectations have not kept up, as exemplified in the codes' acceptance of dampproofing. History shows that such disjunctions rarely last. Expectations eventually conform to technological capabilities. But until then, basements will remain damp, owners will remain irate, and the rivers of woe and lamentation will continue to flow. ***Thomas Fisher*** ■


### Acknowledgments

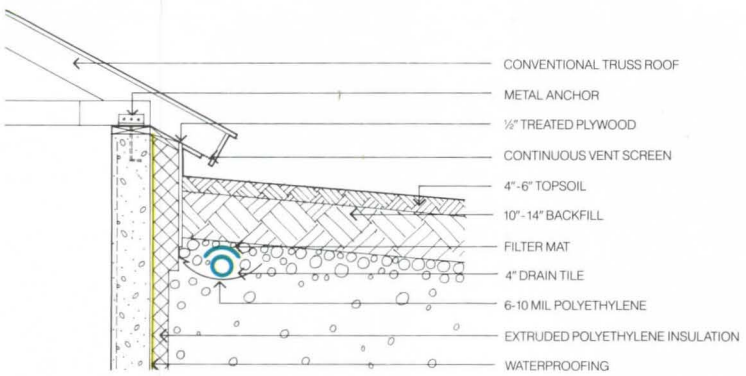
We would like to thank the following people for their contributions to this article: Ken Labs, Undercurrent Design; Brent Anderson, BA Associates; Craig Gilbert, BRW; Raymond Sterling, Underground Space Center; Frank Marshall, John Harlan, McCelland Engineers; Wesley Stimpson, Haley & Aldrich; Andrew Ciancia, Ulrich Luscher, Woodward Clyde; Robert Thomson, Thomas Eppes, Enka; Mark Caputo, Sarnafil; Douglas Bowers, Geotech; James Moran, Koppers; Susan Bailey, Advanced Drainage Systems; Cathy Dunkin, Charles Mills, Monsanto; Joseph Guertin, Goldberg, Zoino & Associates; Thomas Cunningham, American Wick Drain; Frank Kelly, J & P Petroleum; Ryan McKendrick, American Colloid; William Boyles, Tamms; Timothy Eorgan, Carlisle; William Loftness, Deep Foundations Institute; Barbara Ellington, Mameco; Albert Kilchesty, Pecora; Wayne Peterson, Dow; Allison Corvington, Owens-Corning.


### Further Reading

The German residential study mentioned in the text is available as an amply illustrated book entitled *Structural Failure in Residential Buildings* by Erich Schild, Rainer Oswald, Dietmar Rogier, and Hans Schweikert (John Wiley & Sons, New York, 1980). An excellent overview of waterproofing systems is Brent Anderson's book *Underground Waterproofing* (WEBCO Publishing Company, Stillwater, Minn., 1983). The Underground Space Center's *Earth Sheltered Residential Design Manual* by Dr. Raymond Sterling, William Farnan, and John Carmody (Van Nostrand Reinhold, New York, 1982) contains concise information on draining, waterproofing, and insulating below grade.

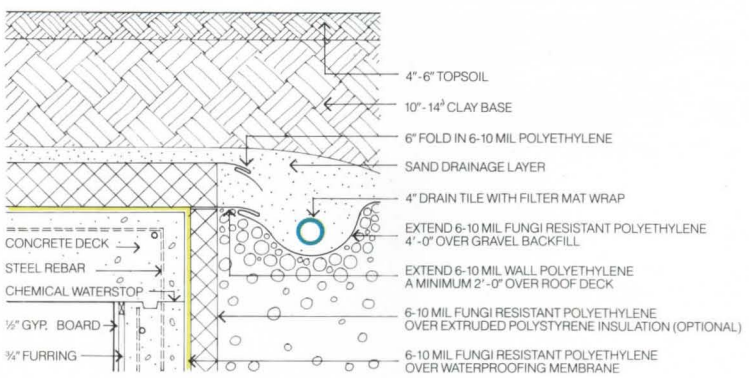
***Photos:*** *Brent Anderson*

(See chart, following pages)




EXTERIOR WALL AT EARTH BERM

From *Underground Waterproofing* by Brent Anderson, by permission of WEBCO Publishing Company

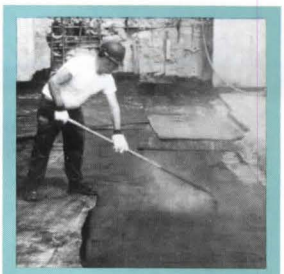



WALL AND ROOF OF EARTH-SHELTERED BUILDING

From *Underground Waterproofing* by Brent Anderson, by permission of WEBCO Publishing Company

## The Application And Performance of Generic Waterproofing Products

**Cementious Membrane**

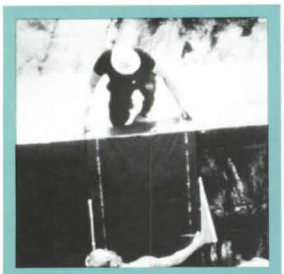


**Hot Rubberized Asphalt**

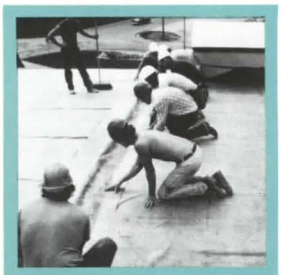
**Liquid Applied Solvent Systems**

**Liquid Applied Urethanes**

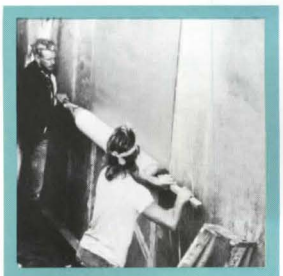
| | Cementious Membrane | Hot Rubberized Asphalt | Liquid Applied Solvent Systems | Liquid Applied Urethanes |
|---|---|---|---|---|
| **Longevity** | Very Good | Good | Good | Fair |
| **Cost** | Good | Fair | Excellent | Excellent |
| **Crack Bridging Ability** | Poor | Very Good | Very Good | Good |
| **Elastic Properties** | Poor | Good | Excellent | Good |
| **Resealability** | Good | Good | Good | Poor |
| **Leak Localizing Capability** | Excellent | Excellent | Excellent | Excellent |
| **Temperature Sensitivity** | Good | Fair | Very Good | Fair |
| **Moisture/Humidity Sensitivity** | Very Good | Fair | Good | Poor |
| **Adheres To Complex Substrate** | Good | Good | Excellent | Excellent |
| **Seamless Application** | Very Good | Excellent | Excellent | Excellent |
| **Resistant to Chemicals** | Excellent | Very Good | Good | Good |
| **Non-Toxic** | Very Good | Good | Poor | Poor |
| **Low Skill Required** | Good | Fair | Good | Fair |
| **Compatibility Of Materials** | Excellent | Very Good | Fair | Fair |
| **Freeze-Thaw/Wet-Dry Cycles** | Very Good | Very Good | Very Good | Good |
| **Permeability** | Good | Very Good | Good | Good |
| **Puncture Resistance** | Excellent | Very Good | Fair | Good |
| **Climatic Restrictions** | Good | Good | Very Good | Fair |
| **Interior Treatment Possible** | Excellent | Poor | Poor | Fair |
| **Cure Time** | Good | Good | Poor | Poor |
| **Versatile Application** | Good | Fair | Excellent | Excellent |
| **Quality Control** | Good | Good | Good | Good |
| **High Production Rates** | Fair | Fair | Excellent | Very Good |
| **Available Applicators** | Good | Very Good | Very Good | Excellent |
| **Head Pressure Resistance** | Excellent | Very Good | Good | Good |
| **Warranty Program** | Very Good | Very Good | Excellent | Very Good |



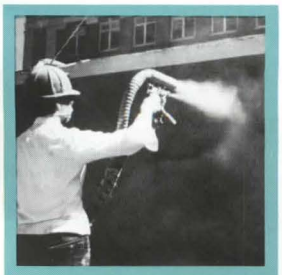
**Rubberized Asphalt Sheets**



**Vulcanized Rubber Sheets**



**Plastic Sheets**



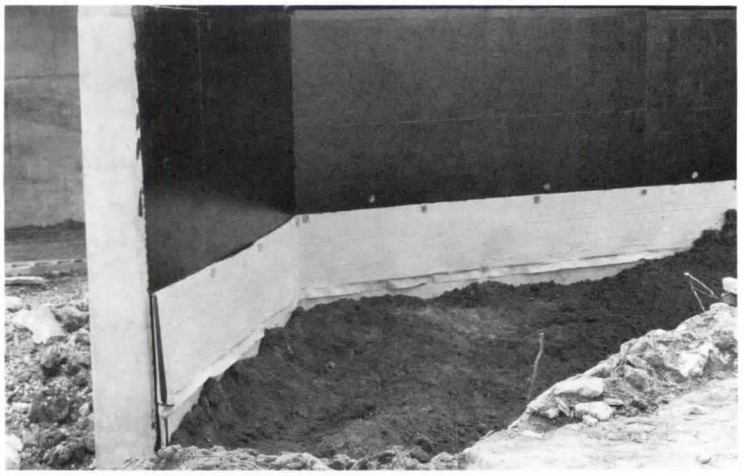
**Spray Applied Bentonites**

**Bentonite Panels**

| | | | | |
|---|---|---|---|---|
| Good | Very Good | Very Good | Excellent | Excellent |
| Very Good | Good | Good | Very Good | Very Good |
| Good | Very Good | Very Good | Very Good | Very Good |
| Good | Good | Fair | Poor | Poor |
| Fair | Poor | Poor | Excellent | Very Good |
| Very Good | Good | Fair | Excellent | Good |
| Good | Good | Fair | Very Good | Excellent |
| Good | Good | Good | Excellent | Excellent |
| Good | Fair | Fair | Excellent | Poor |
| Poor | Good | Good | Excellent | Fair |
| Very Good | Excellent | Excellent | Poor | Poor |
| Very Good | Very Good | Very Good | Good | Excellent |
| Very Good | Fair | Fair | Fair | Excellent |
| Very Good | Excellent | Excellent | Excellent | Excellent |
| Excellent | Excellent | Excellent | Good | Very Good |
| Very Good | Excellent | Excellent | Very Good | Very Good |
| Very Good | Very Good | Very Good | Poor | Poor |
| Good | Good | Good | Good | Good |
| Poor | Poor | Poor | Poor | Poor |
| Excellent | Excellent | Excellent | Excellent | Excellent |
| Very Good | Good | Very Good | Excellent | Good |
| Very Good | Very Good | Very Good | Good | Excellent |
| Good | Good | Good | Good | Very Good |
| Excellent | Excellent | Excellent | Fair | Excellent |
| Very Good | Excellent | Excellent | Excellent | Excellent |
| Very Good | Excellent | Excellent | Very Good | Good |

Chart: Brent Anderson

# *Technics-Related Products*



**Hydraway™ drain** is both water collector and water conduit. It consists of heavy-duty filter fabric permanently bonded to an internal supporting core. Water passes through the filter into the conduit and around the perimeter of the foundation to a conventional drain outlet, such as a storm sewer. The drainage system is attached inexpensively and easily to the foundation with either nail gun or mastic. It is approximately one inch thick, 36 inches wide, in rolls up to 200 feet long. Monsanto Co.
*Circle 102 on reader service card*

**Hydroshield Mastic 451,** combined with Koppers heavy duty glass fiber mesh, provides a durable, waterproof membrane for subgrade levels. Hydroshield is a solvent-based asphalt mastic that is unaffected by immersion in water either before or after curing. It is not damaged by soil alkalinity, acidity, or minerals. Koppers Company.
*Circle 103 on reader service card*

**Aquasel waterproofing system** consists of a combination of sheet membranes and accessory products. Membranes are a laminate of polyethylene and rubberized asphalt. The primer, membrane, and protective panel provide triple protection against water penetration, freeze/thaw damage, and other destructive effects of water. In the unlikely event of a puncture, the membrane is self-healing. J&P Petroleum Products, Inc., Tex-Mastic Construction Materials.
*Circle 104 on reader service card*

**Sonneborn Hydrocide®** solvent-based asphalt compounds have high vapor barrier efficiency and provide dampproofing protection to interior surfaces above grade, exterior surfaces below grade. They offer excellent adhesion to concrete, masonry, and steel and form a continuous flexible film without cracks or pinholes. They are resistant to lime, gypsum, and ground and airborne chemicals. Rexnord Chemical Products, Inc., Sonneborn Building Products.
*Circle 105 on reader service card*

**Duramem elastomeric membranes** for horizontal or vertical applications are discussed in a four-page brochure. They are suited to two-course concrete construction of parking garages, decks, shopping malls, and plaza areas; in single-course construction for waterproofing tunnels, foundations, reflective pools, and planters. A table shows the material's conformance to ASTM C836-76 standard; another shows typical properties of the cured materials according to the same standard. Pecora International Corp.
*Circle 200 on reader service card*

**Tuff-N-Dri™ waterproofing** eliminates passage of water through membrane coating when properly applied, with positive drainage and proper grading. It is a polymeric composition that can bridge foundation shrinkage cracks. It is applied to surfaces by airless spray and has a cure time of 16–24 hours. Tuff-N-Dri is resistant to acids, bases, and salts and to soil degradation. Owens-Corning Fiberglas Corp., Protective Coatings Business.
*Circle 106 on reader service card*

**Corrugated polyethylene pipe** can be used around exterior or interior foundation walls to intercept water that might otherwise enter basements. The water is then channeled away from footings and walls to a suitable outlet. The pipe is available in diameters from 3 to 24 inches to meet various drainage requirements. Advanced Drainage Systems, Inc.
*Circle 107 on reader service card*

**NobleSeal TS waterproofing** and isolation sheet membrane is chlorinated polyethylene synthetic elastomer laminated to spun-bonded polyester. Designed for use in thin-bed ceramic and marble tile installations, it also can be used in below-grade foundation insulation systems when insulation, drainage mat, or other items are to be adhered to the membrane face. The Noble Co.
*Circle 108 on reader service card*

**Karnak One-Kote** is a single-component synthetic rubber membrane waterproofing system that is fluid-applied. It is available in horizontal and vertical grades, the latter suitable for waterproofing foundation walls. It can be applied with brush, roller, squeegee, or spray and needs no heating. One-Kote is compatible with concrete, stone, brick, cinder block, wood, metal, foam glass, and urethane foam. Karnak Chemical Corp.
*Circle 109 on reader service card*

**Typar™ geotextile filter** fabric for construction increases the life of drainage systems for building foundations. It improves separation of subsoil and drainage aggregate and allows free passage of water while retaining solids. Typar eliminates the need for slant-wall ditches and shoring. Du Pont Company, Typar Sales.
*Circle 110 on reader service card*

**Chemstop® Masonry Heavy Duty** waterproofing can be used below grade in conjunction with a coating. It forms a water-repellent film at the surface and a gel-like film that lines the pore walls, to protect against moisture penetration by capillary action. It is formulated for use with porous masonry products. Tamms Industries Co.
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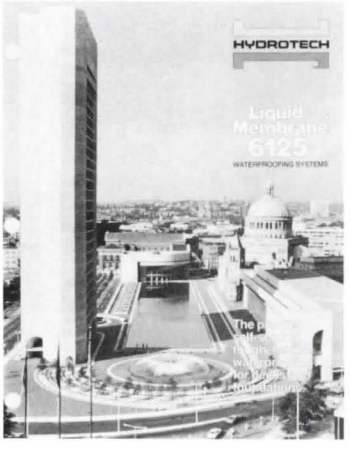


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[*Continued on page 114*]

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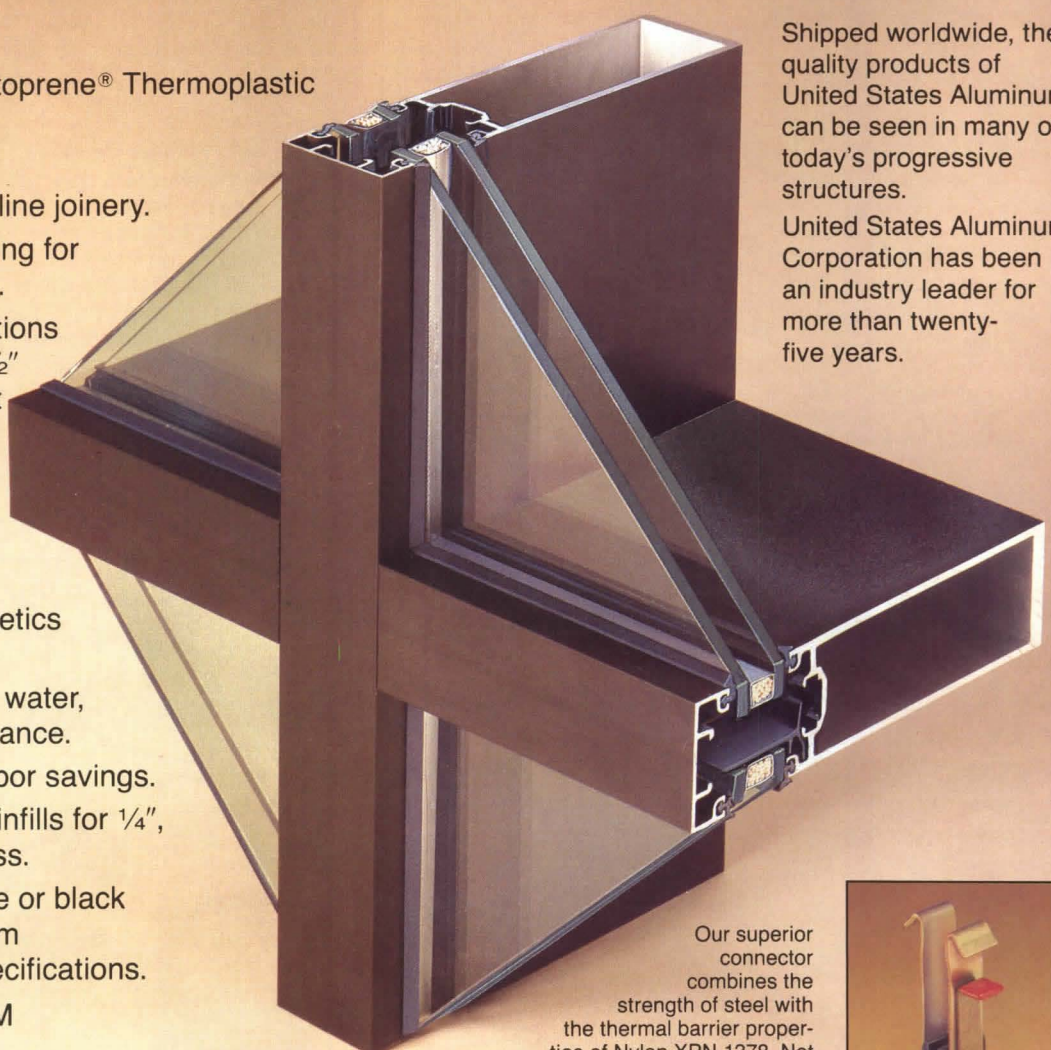

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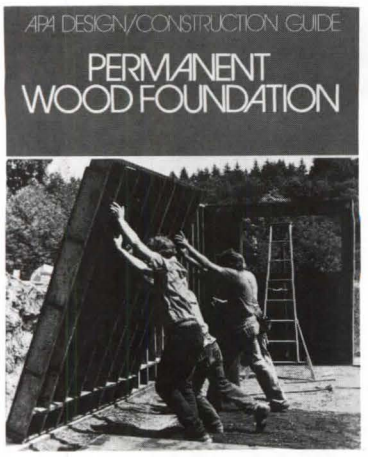


**Permanent Wood Foundation** guide covers the system's advantages, code acceptances, structural elements, site preparation and drainage, and complete construction recommendations. The 40-page design/construction guide has illustrations, specification charts, and a step-by-step installation guide. Plywood and lumber components are pressure-preservative treated for permanent protection from fungi, termites, and decay. For a free single copy, request Form A400 from the American Plywood Association, P.O. Box 11700, Tacoma, Wash. 98411.

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**Nokorode waterproofing** compound has an asphalt base with fibers and mineral fillers and cures to a waterproof, tough, adherent film. It is specifically for use on below-grade structures. In severe conditions, it can be applied in three coats, with the first two embedding an asphalt-saturated glass membrane. Lion Oil Co.
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**Insulated drainage board** relieves hydrostatic pressure, protects the waterproofing system against backfilling damage, and adds insulation value. It is attached to the wall after installation of the waterproofing system and allows drainage into the perimeter drain. Drainage panel consisting of filter fabric, drainage board, and vapor retarder is recommended for horizontal applications. GeoTech Systems Corp.
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**Lead as a Building Material** is an eight-page brochure that explains the use of sheet lead as below-grade waterproofing membrane. Photos and diagrams illustrate how lead was used in the University of Michigan Law Library underground annex. Other lead uses described include plumbing, roofing and flashing, sound barriers, and x-ray shielding. Lead Industries Association, Inc.
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**Cordrain™ blanket drains,** installed between a foundation and the surrounding soil, provide positive drainage before water reaches the structure. Water is easily discharged into a drain or sump, eliminating the need for aggregate and perforated tile, according to the manufacturer. Drains consist of a deep-formed plastic core, with a series of peaks, valleys, and water channels, and filter fabric that will not clog. The fabric allows water to pass freely into the core to be drained away. Burcan Manufacturing, Inc.
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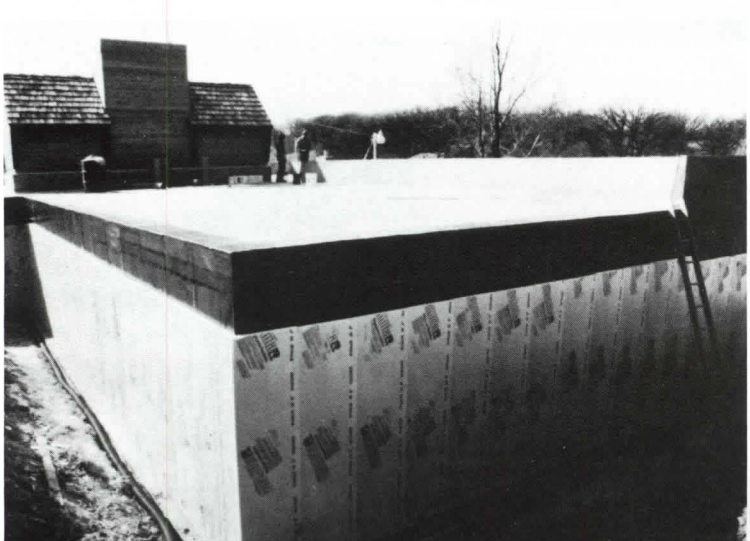

**Foamular® extruded polystyrene** foundation insulation, applied around concrete or concrete block exterior walls, can be attached mechanically or with adhesive, or held in place by backfill. It offers resistance to moisture such as wet soil, condensation, ground water, water leakage, humidity, and freeze-thaw cycles. It retains an R-value of 5 per inch thickness after prolonged exposure to these weather conditions. UC Industries, Inc.

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**Foundation waterproofing** brochure provides information about sheet membranes, liquid membranes, Plastiwrap multilayer membrane, and Hey'Di waterproofing based on crystallization. Hey'Di chemicals react with moisture to form crystals that penetrate pores in the foundation and block passage of water, becoming part of the structure. Progress Unlimited, Inc.

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**Sure-Seal™ waterproofing** systems, both sheet and liquid-applied, provide effective water barriers in construction applications. A four-page brochure provides physical property tables for Butyl®, neoprene, and EPDM sheet membranes and vertical and horizontal grades of Liquiseal® liquid membrane. Carlisle SynTec Systems, Division of Carlisle Corp.

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**Enkadrain®** subsurface drainage mat combines polyester nonwoven filter fabric and compression-resistant nylon matting. It relieves hydrostatic pressure, filters soil from the water, and provides a water escape route. It can be used for commercial foundations, residential basements, retaining walls, and similar areas. Enkadrain can replace gravel or stone, graded aggregates, sand blankets, and corrugated sheet. Information in an eight-page brochure includes design considerations, installation methods, typical applications, and specifications. American Enka Co.

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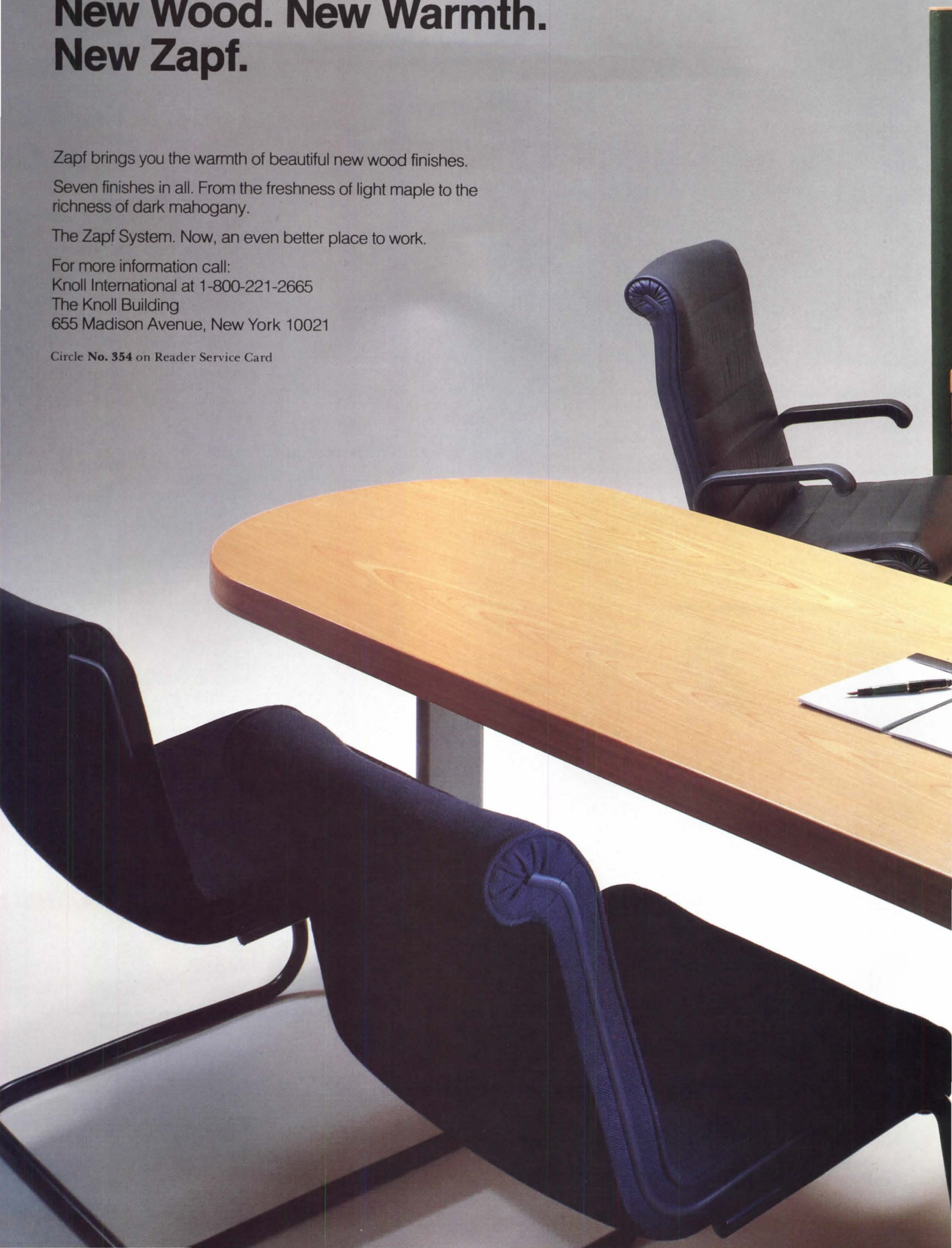


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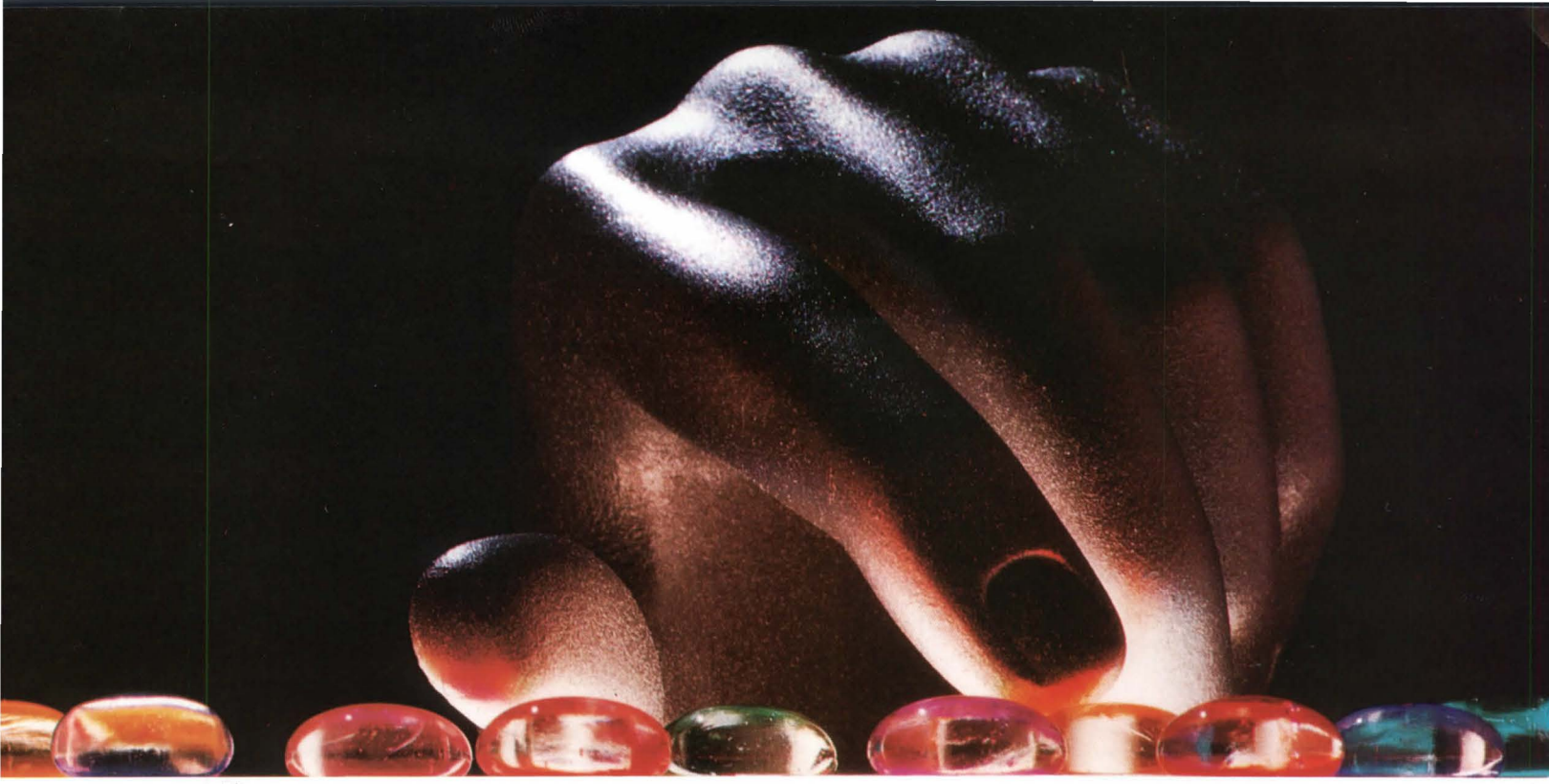

# environmental systems and controls

Progressive Architecture's
Special Supplement

# Environmental Systems and Controls

## Progressive Architecture's Special Supplement

**October 1985**

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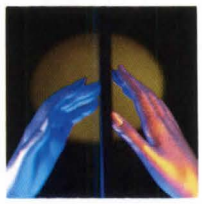

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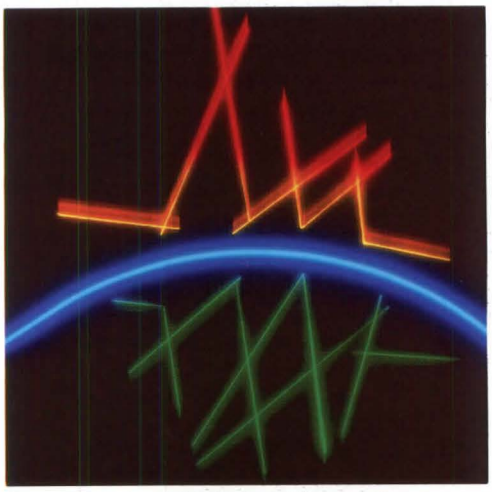
# Industry Ready with High-Tech Environmental Control Systems . . . but Is the Market?



photography courtesy Belden Electronic Wire and Cable

*Payback still rules the energy management picture*

The future holds an almost endless array of energy-saving products from which architects will be choosing and specifying in the next five to ten years.

Energy management products will be less expensive, easier to install, easier to calibrate, and easier for the building owner to reprogram and maintain.

They will also become sufficiently small and inexpensive for routine installation in smaller commercial buildings, even those under 200,000 square feet.

Solid-state circuitry, new ballasts, and advanced phosphor technology will boost the lumens-per-watt output of lighting fixtures. Such conservation strategies as daylighting will be facilitated by the ability to send signals to each fixture over AC power lines. New glazings and insulations will give architects ever more flexibility in manipulating the building envelope.

Just around the corner are glasses that will change their reflectivity characteristics in response to electronic commands and occupancy sensors that will raise or lower the heating range or "float" in a room and turn off lights when no one is present.

But just as certainly as developments in software and hardware will make buildings ever more energy efficient, the speed with which new technologies are applied in the field will depend almost entirely on the needs of the marketplace.

**Great American dream is not energy saving**

Currently, "the Great American dream is not the commercial building that incorporates every state-of-the-art energy saving product and strategy," according to William H. Gantz, principal, Henderson/Gantz Architects, an 18-man, seven-year-old firm in St. Louis. "The market is not asking for any technology that does not offer a two-year payback."

Many architects echo Gantz. Charles Davis, president, Davis Associates Architects & Consultants, Inc., Chicago, agrees. "The energy crunch of 1976 is such a dim memory that most of us cannot employ many of the design solutions that looked so attractive when energy prices were heading through the roof.

"In fact much of current building design is almost playful, with energy management systems and high-tech HVAC components being specified almost to reduce problems created by whimsical designs."

**Other forces press for energy-saving design**

Nevertheless, despite speculation that the price of oil could drop to $10 a barrel, there are many pressures forcing architects to design energy-efficient buildings.

Chief among these is the certainty that the cost of electricity is on the rise. "Regardless of where the price of coal and oil goes, utility rates will continually increase," Joseph H. Newman, president of Tishman Research Corp., New York, says. Increases are inevitable because utilities have strapped themselves for new generating and distribution equipment, Newman adds. "Lighting is the energy hog of the present and the area where most of the future savings will be found," Newman claims.

A study recently completed on Park Plaza, the 26-story one-million-square-foot headquarters building of the Public Service Electric & Gas Co. (PSE&G), Newark, confirmed what many other studies have shown: lighting accounts for 25 percent or more of the power consumed by an office building. When computer-related loads are subtracted, lighting represents 40 percent of total energy consumption.

For the study, the glass-clad office tower (completed in 1980) was fitted with triple the number of sensors normally required for building control. Data were recorded every 10 minutes for all energy components over a two-year data collection period.

Conducted for the U.S. Department of Energy by Tishman Research, the extensive study points the way to future energy savings and to some problems with present energy saving theories and equipment.

During the last year of the data collection period, energy consumption increased 12 to 14 percent per month, primarily due to escalating use of on-site computers, word processors, and other data processing equipment.

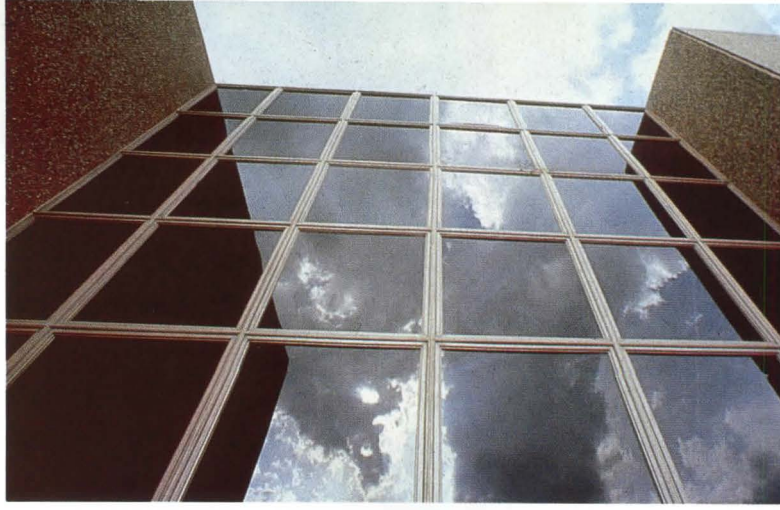
**Computers use more and more power**

Newman feels that experience with Park Plaza and other structures indicates that design standards and other conservation efforts are being offset by the ever-increasing energy impact of the electronic office. "The magnitude of the computer load is certainly a clue to what can be expected in large commercial office buildings in the future. People are paying a bigger energy price to achieve greater productivity."

Another Park Plaza finding: without proper design and maintenance, energy management systems malfunction frequently and may actually result in energy waste rather than energy savings. The study recommends that the reliability and accuracy of instrumentation should be improved.

Newman also says, "we are moving toward development of controls that will allow the individual more latitude in controlling his environment, a better balance between central and local control."

"There is a need to adapt lighting to changes in space uses," notes Dave Peterson, manager, lighting controls product programs, General Electric Co., Warwick, R.I. "VDT use has caused a major shift in space usage and requires adaptability in lighting. There also has been a recognition of people and productivity needs. Lighting is a very visible way for the individual to change the environment and feel good about it. Now, there is a greater interest in allowing the individual to adjust lighting levels, but if you give control to the individual, the system must be smart enough to recognize that the individ-



*Glass gets better and better. At left is newly developed Louverre two-layer glass with photo-etched "slats" that can be ordered at any pre-set angle. At right is Andersen's high-performance insulating glass with metallic, low-emissivity coating.*

ual has requested a change and, if needed, bill the user for it. This capability is especially desired in tenant-occupied buildings."

The trend toward individual control over the environment is evident in General Electric's teaming of its programmable load control unit with ROLM's digital telephones to allow an individual working late or on a weekend to punch a button on his phone to turn on the lights and another to reactivate air conditioning in the work area.

**Occupancy sensors cut load**

Lighting was used as much as 50 percent of the time when space was unoccupied at Park Plaza, with lighting accounting for 40 to 60 percent of power consumption during weekday nights and on weekends. This should create a bright near-term future for occupancy sensors, like Tishman's Infracon® or the ultrasonic Light-O-Matic by Novitas, Inc., Santa Monica, Calif. The sensors turn off lights in a space minutes after it becomes unoccupied.

Newman believes occupancy sensors will one day be widely used to control temperatures in individual offices and workspaces, dropping the temperature range or "float" when the room is unoccupied and raising it when an occupant enters.

**Cash flow or straight payback?**

Another technological development in lighting control will take off when architects begin to evaluate electronic controllable output ballasts on a cash flow rather than a simple payback basis, according to Joseph B. Coleman, director of marketing for Luminoptics, a division of Universal Manufacturing Corp. located in Pleasanton, Calif.

Used with one or more of the most common lighting strategies—scheduling, load shedding, daylight harvesting, and task tuning—Coleman claims fluorescent lighting systems based on controllable output ballast technology can approach 50 percent or more in annual savings.

On the near horizon, Coleman says, is the ability to send a signal to the ballast via AC power lines, simplifying installation and making control and reprogramming simpler.

The fluorescents themselves are becoming more and more efficient. John C. Hoffman, product manager of North American Philips, Bloomfield, N.J., cites three reasons:

- Smaller-diameter tubes, which get the phosphors closer to the arc stream.
- More expensive and more active trichromatic phosphors.
- Solid-state ballast circuitry.

These developments will eventually achieve an efficiency of something like 110 lumens per watt with good color compared with the 70 lumens per watt of standard tubes.

**EMS for smaller buildings**

Energy management systems will become commonplace in smaller commercial buildings, according to James A. Dudley, vice president and general manager of the building automation systems division of The Trane Co., La Crosse, Wisc.

Trane's Tracer 100 building management system is a standalone that will accommodate up to 96 sensor points and provides monitoring and control of HVAC, management information for proper system operation, a self-prompting easy-to-use operator interface, and the ability to be upgraded.

Reid Overcash, vice president for sales and marketing of Triangle MicroSystems, Inc., Raleigh, N.C., forecasts a huge market for smaller energy management systems. "Only five to seven percent of commercial buildings in the U.S. have building controls."

Overcash believes all EMS systems will become more user friendly. Triangle's TMS4800E handles up to 80 sensing points and is designed for buildings up to 200,000 square feet. It can be programmed using a menu control and a blinking cursor to enter or change a program.

**Electronic venetian blinds**

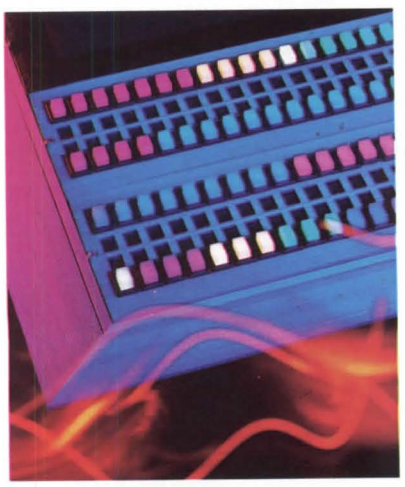
Windows, the weakest part of the building envelope from the standpoint of energy efficiency, will become less so with improved low emissivity glass coatings and such high-tech developments as metallic coatings that can change a window's reflectivity by applying an electric charge. "In effect, we could be making a variable venetian blind," according to Jack M. Ullrich, manager of sales promotion, Andersen Corp., Bayport, Minn. Researchers also are working to perfect a double-glazed window with a perfect vacuum between the two panes, Ullrich says.

In another variation on the venetian blind idea, Corning Glass Works, Corning, N.Y., has recently marketed Louverre™ glass, a single-layer glass that incorporates a photo-induced "slat" that may be ordered at a preset angle. Currently in the $27 a square foot range, cost of the glass will eventually move down to around $20 a square foot as greater quantities are produced, predicts Robert M. Dorwart, manager of new business development for Corning.

A new generation of environmental technologies and products is moving quickly to center stage, perhaps too quickly from the standpoint of a marketplace that currently does not demand quantum leaps in energy-saving capabilities. Nevertheless, the trend is apparent. Owners, pushed by rising electric costs, and buildings that demand ever more electricity for lighting and cooling will be more willing to pay for products and strategies that make for a better working environment and pare energy costs. ■

**Dennis O'Brien** *is a free-lance writer who has extensively covered the architecture, development, and construction markets.*

# When It Comes to Energy Efficiency, Control Is Critical



*Architects are turning to new systems in response to client demands for energy control*

There is a new, crucial factor that determines a building's energy efficiency: intelligence. The latest automated energy control systems can "learn" the typical use patterns of every use zone in a building and provide just enough energy to meet the need. They can write detailed reports on how much energy the building uses—and when. Some can even take orders over the telephone. As such systems become mandatory in large office buildings and other complex structures, architects are coming to realize that in an energy-conscious era, the way a building thinks is just as important as the way it looks.

**Control center evolves**

Even as early as 1968, the Pima County Government Center, Tucson, Ariz., was designed with energy efficiency in mind. In keeping with that goal, a Johnson Controls T6000 control center was installed in the original building to monitor and control its heating and cooling equipment.

Though the early T6000 was nothing more than a big time clock, the energy savings it produced was enough to convince officials to install the systems in the next two buildings constructed at the center, recalls James Kelly, AIA, director, Pima County's Facilities Management. In 1973, a Johnson Controls JC/80/35 building automation system was added to fine-tune the job of the T6000.

By 1980, the complex had expanded to five buildings, comprising more than 600,000 square feet. "With all that demand, we started looking for a more sophisticated system," Kelly says. Officials selected another Johnson Controls system, the JC/85/40, bringing all energy-using equipment in the facility under the control of a single system.

Kelly explains that the newest system combines a number of advanced energy management functions, such as duty cycling, demand limiting, chiller optimization, and programmed start/stop for various equipment systems. "The system shuts equipment on and off in specific use zones according to a previously determined program," Kelly says. The system also produces energy-use reports and has a maintenance message system that helps technicians keep the equipment in peak condition.

The automation system has accounted for substantial energy savings, Kelly says. "We expected an initial savings of about $60,000 per year, and we've met that goal fairly closely," he says. Kelly adds that savings like these can make it worth an architect's time to become aware of automated building systems. "Usually an architect turns the specification of an energy control system over to a mechanical engineer. But there are ways to design a building so that it works optimally with an energy system," Kelly says.

**Retrofit includes computers**

Although some buildings start life with automated energy systems, others get them only after their energy performance makes it clear that improvements are needed. Such was the case with Schalick High School, a one-story, concrete block structure in Pittsgrove, N.J. "The structure was built in 1978, but after a few years the school system felt they could save a lot of money by managing the building's energy systems," recalls John W. Gibson Jr., AIA, vice president, Basco Associates, the Cherry Hill, N.J., architectural firm chosen for the energy retrofit.

A Barber Coleman Econ 6 Supervisor system was specified for the building and installed in late 1984. By February, 1985, the system was in control of the high school's corridor and exterior lighting, all of its heating and air-conditioning equipment as well as all electrical systems. Plans are also under way to tie the building's hot water heater into the system, Gibson says.

"The Econ 6 system was chosen for its expandability," Gibson explains. "Originally, the system was programmed for seven use zones, but as time went on, we saw we could get greater efficiency by redefining the building into 11 zones."

Gibson says that the system's 64K memory can actually learn how energy is used in each of the zones and can adapt its program accordingly. Programs can also be modified for seasonal variations.

Gibson believes the installation of the system was a wise investment. "Our initial figures indicate a 15 percent reduction in electrical consumption, and that does not include the system's performance for the brunt of the winter," he says. "We're already seeing a savings of $1,000 per month in utility bills. At that rate, the system will pay for itself in less than two years."

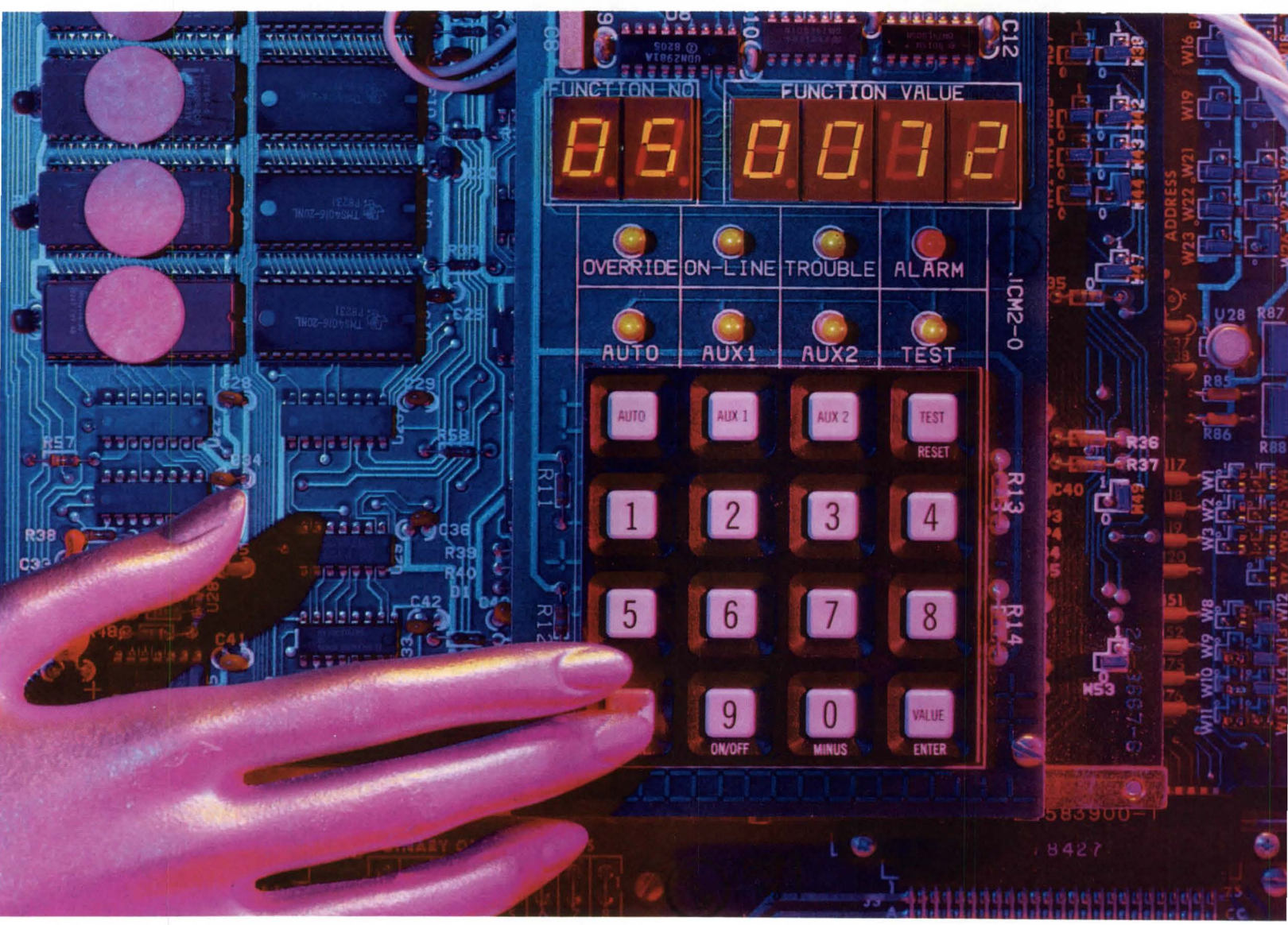
**Automated high-rise**

The application of an automated energy system in the 52-story Manufacturers Hanover Corp. world headquarters on New York City's Park Avenue represents another example of an energy retrofit—on a much larger scale. When Manufacturers Hanover purchased the two-decade-old high-rise, formerly the headquarters of Union Carbide, energy efficiency was one of the primary goals for the renovation, recalls Alan B. Abramson, PE, vice president, Syska & Hennessy, the New York-based firm that handled the mechanical engineering.

"The operational needs of the building dictated that we install a centralized, automated energy control system," Abramson says. The engineer's specifications resulted in the purchase of an MCC Powers System 600, which provides monitoring and direct digital control of the building's energy systems. The System 600 runs on a Digital Equipment Corp. PDP-11, which can produce color graphics to illustrate the status of the building's major systems.

Abramson says that the energy savings produced by the system are difficult to measure, primarily because it was installed simultaneously with a number of other energy-saving building and equipment modifications.

Nevertheless, he is enthusiastic about the opportunities offered by a computer-based, distributed




direct digital control system. "The days of direct digital control are here. We feel it's a first consideration in any major new building."

So impressed are the engineers with the system's performance that they are specifying similar systems in most of their newer projects. "We start with the assumption that direct digital control will be used, unless the building operators are unwilling to adopt such a system or the building's mechanical control systems are incompatible," Abramson says.

**Futuristic systems, futuristic controls**

It is not surprising that some of the most advanced alternative technologies for efficient energy use are frequently linked with computerized control systems. The marriage of the two technologies can often yield remarkable energy savings.

When Florida Power & Light began an experiment with thermal storage at its Southern division marketing office in Pompano Beach, Fla., it also desired that the facility's heating and cooling systems be monitored and controlled by computer.

The basic thermal storage system installed in the company's facility works by creating ice on refrigeration coils in three underground 1,100-gallon tanks filled with water. The refrigeration compressors operate at night, shifting peak demand to a time when electrical rates are lower. During the day, the ice water is pumped through air handling units for the building's air-conditioning system.

The inherent economics of thermal storage are improved still further by the addition of a Controlled Energy Management System (CEMS) 1000, produced by Electronic Development & Assembly Corp., says Larry Curvin, president of Thermodynamic Systems Inc., the firm that did the engi-

photography courtesy Belden Electronic Wire and C

neering, manufacturing, and installation on the thermal storage system and controls. "The CEMS-1000 allows us to program the function of 16 of the HVAC system components, including air handlers, chilled water pumps, and the three compressor units," he says. "Cutting back on unnecessary operation of these units saves an additional 25 percent on the cost of energy consumption."

Curvin is especially appreciative of the CEMS-1000 remote system capabilities, which allows technicians to monitor the HVAC system's performance and make programming changes over the telephone and daily logging of operations for a comparison of system performance. "With a new technology such as thermal storage, clients tend to think that any minor problem is the fault of the system," Curvin says. "The CEMS allows us to determine how serious a malfunction is from our office, without making a trip to the facility itself, which saves us unnecessary service calls. I think that automated energy control is going to be a priority factor in the development of thermal storage systems," Curvin predicts.

**Boeing updates plant**

Sometimes a computerized energy system can launch a prewar facility into the space age. Boeing Military Airplane Co. (BMAC) in Wichita was founded in 1926 and has produced more than 15,000 aircraft since then. But by the early 1980s the plant had spread to encompass eight million square feet of covered space and presented serious energy problems.

"We had several hundred pieces of HVAC equipment—air handlers, unit heaters, exhaust fans—that used to run wide open 24 hours a day," says F. Lynn Whorton, PE, project manager for the plant's energy retrofit.

BMAC specified an Alpha/Net 4000 system, produced by AMF Control Systems, to monitor and control more than 1,900 HVAC devices throughout the plant's 25 main buildings. The system's 12.5 megabyte computer keeps track of the plant's 1,300 analog and binary sensors, which constantly report on temperature, humidity, chilled water flow, equipment on/off status, and other factors.

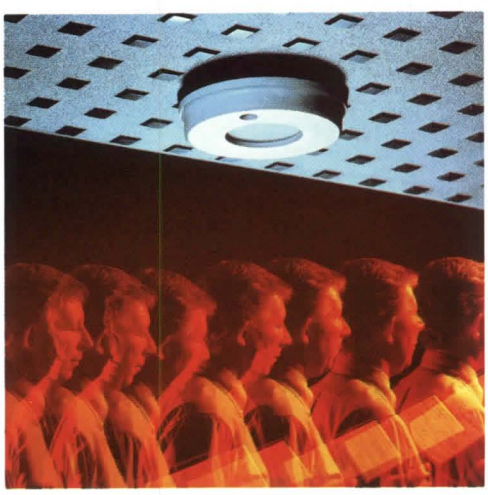
At the plant's energy management facility, operators monitor system status by means of a black-and-white CRT, while a color CRT presents simplified graphics that allow for quick troubleshooting in the event of a malfunction.

Whorton says that the Alpha/Net 4000 system has helped the plant to keep its energy bills in line. "We've calculated the first year savings produced by the system at about $1.1 million," Whorton reports. He adds that future modernizations at the plant will bring the facility's lighting systems under control of the computer as well. ■

**[Scott Knickelbine]**

*Thermal storage coils used at Florida Power & Light, Pompano Beach, Fla.*

# Cutting the Cost of Lighting



*Options range from simple motion detectors to elaborate computer systems*

Lighting can account for a major portion of a building's energy consumption. Little wonder that a number of new lighting control technologies have emerged ranging from diminutive occupancy sensors to computer-operated systems that keep track of thousands of lights in multistory buildings. Such systems are increasingly becoming a part of the architectural design of many new structures, as highlighted in the case studies that follow.

**Computer design reduces energy use**

Perhaps the best time to control energy use is before the lighting system itself is designed. That was the approach taken by Frederick Rickson, AIA, when his firm, Rickson Associates, Boulder, Co., was chosen to design an extension of the main office of the Bank of Boulder. Exterior lighting was a special problem because the bank's new drive-up area would be open all night.

"The main bank sits one story above the drive-up area, which is actually below street level in a scooped-out hollow," Rickson explains. "That depression, combined with a heavy overhang above the drive-up area, created several very dark places that were not reached by street light." Adequate lighting of the 11,000-square-foot area was necessary for customer security, Rickson says, but keeping many high-powered lights on all night would have been too expensive.

To overcome these problems in the design phase, Rickson used a computer-aided design program called Photon, produced by Cala, Inc. The specification called for energy-efficient metal halide lamps. The program, which runs on an IBM PC, graphically demonstrates the effect of various lighting placement options by producing a shaded image of the area. "The graphics portion of the program gives a photographic type of image, allowing the designer to see the overall picture," Rickson says. "You can spot errors in placement immediately, and the image makes the design easy for the client to understand."

Most importantly, however, Photon makes it possible for an architect to avoid the temptation to provide too much lighting. "In the past, the tendency would have been to use many more lights in a dark area such as this, just to make sure enough light was provided," Rickson says. "The computer allowed us to solve the lighting problem without excessive work and without overdoing it."

**One-switch lighting for civic center**

City officials decided a complete redesign of the Hartford Civic Center in Hartford, Conn., was in order after a roof collapse in the late '70s. An entirely new lighting scheme, with a new control system, was part of that design, says John Kirchner, PE, Ellerbe Associates, Bloomington, Minn., the A/E firm in charge of the project.

"We looked at several options on how to control lighting in the main arena, which seats up to 16,500 people," Kirchner says. "One of our concerns was to provide the right amount of light for each of the various kinds of events for which the arena is used."

The engineers specified a customized, microprocessor-driven control system designed and manufactured by Sterner Lighting Systems. "The most important aspect of the system was the ability to program a series of switches on the control panel through an entry keyboard," Kirchner explains. "When programmed, each switch controls an entire lighting configuration for a specific event, be it a basketball or hockey game, a convention, or a concert. By activating a single switch, the operator can turn on just the right lighting sources to provide adequate illumination in each instance."

Reconstruction of the project was completed by 1980. Kirchner says that the system has more flexibility and is much easier to use than previous control systems, which provide flexibility by adjusting scores of individual matrix pins. The system also has been an energy saver in its five years in operation at the facility.

"The control system allows you to quickly select the right fixtures for the event, whether they are the high-efficiency metal halide high-intensity discharge lamps for longer events or incandescent lamps for times when you need quick-on, quick-off lighting. The incandescents can also be automatically dimmed to the proper intensity, providing more energy savings in addition to extending lamp life," Kirchner says.

**System spares electricity**

When the Youngstown, Ohio-based Cafaro Co. became concerned with high power bills at its all-electric shopping mall in Sandusky, Ohio, it asked its corporate energy manager, Darell L. Roberts, AIA, to design a solution. "We saw our main problem was excessive lighting levels in the mall's main concourse," Roberts says.

To effect a reduction, Roberts specified the Enertron Master/Follower system. The system consists of a series of master controllers, which may be set to maintain various light levels, and subsidiary controllers that take their "orders" from the master controllers. The system also connects with a series of photocell sensors, which offset sunlight and monitor lamp deterioration. The system, installed two years ago at the Sandusky Mall, controls 800 F-40 fluorescent lamps in the concourse. According to Roberts, it has had substantial effect on energy use at the mall. "The system allowed us to reduce the lighting on the concourse from 15 footcandles to 10 footcandles, and to do it so evenly that the reduction is hardly noticeable visually. In addition, because the lamps and ballasts run cooler, we save money in air-conditioning costs as well," Roberts says.

The system was linked to an Andover AC-256 microprocessor, which both monitors energy use and turns the lamps on and off according to a preprogrammed schedule. "In 1983, the computer measured a 25 percent reduction in energy costs as a result

*Bank of Boulder main office, Boulder, Colo.*

photo courtesy Philip Wegenor Kantor

of the control system," Roberts reports. "Because of rate increases, by 1984, that figure rose to 39 percent, and this year we're predicting a 50 percent savings in our energy costs."

The energy savings gained paid for the system in just 15 months, a figure that has prompted Roberts to specify the lighting control systems in 10 of Cafaro's other malls, with three more planned for 1986.

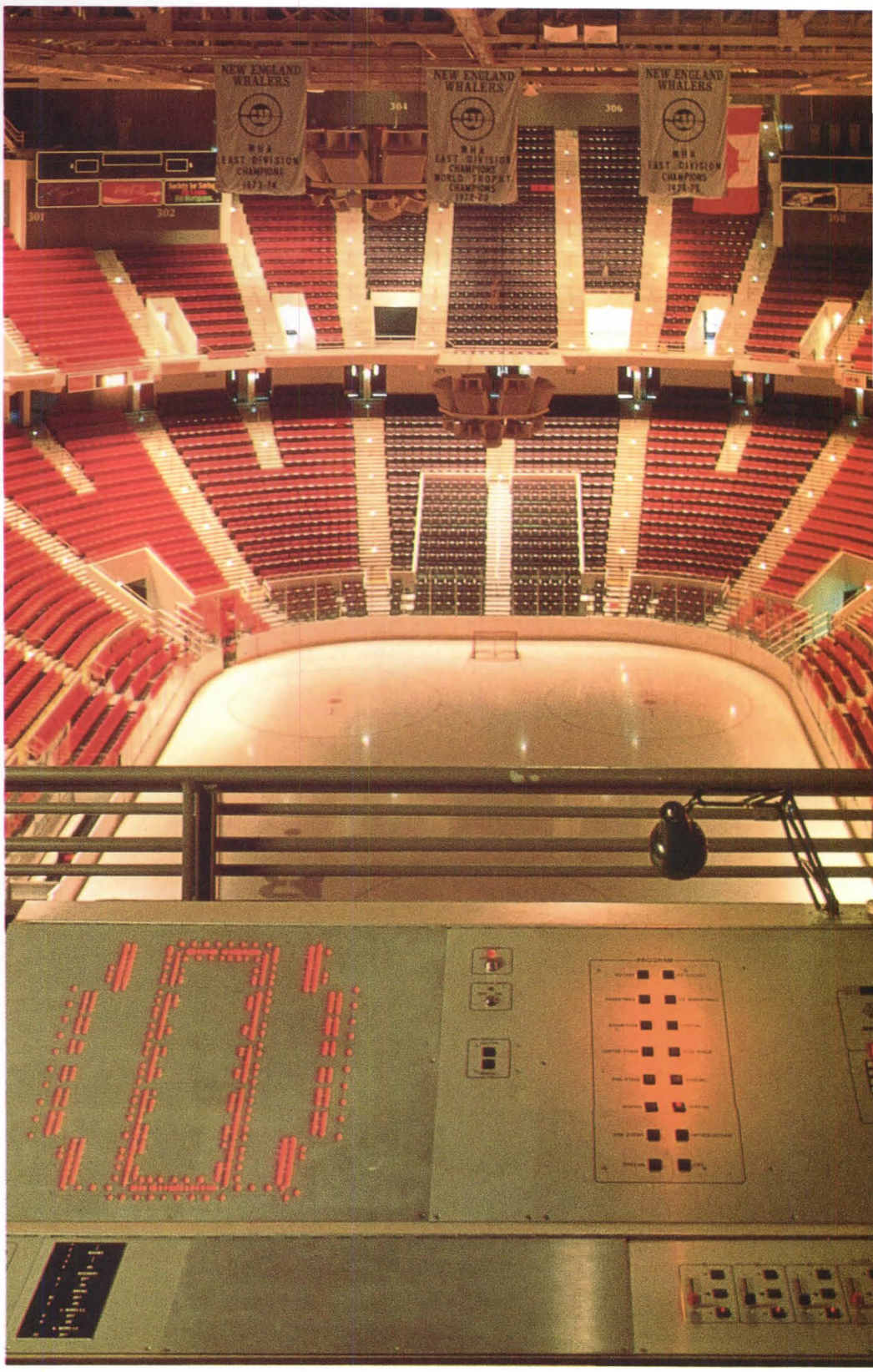
**Occupancy sensors provide "elegant" solution**

While some firms are controlling their lighting costs with elaborate computer systems, others are obtaining good results with smaller, simpler devices. Beginning in 1982, 2,000 Novitas Light-O-Matic motion-sensing lighting controls have been installed at the Allied Corp. headquarters in Morristown, N.J.

Mel Rappaport, senior vice president, T. M. Bier & Associates, the engineering firm that installed the sensors, explains that the sensors turn on the lights in a room when they detect motion and turn the lights off from 30 seconds to 12 minutes after motion is no longer detected. The occupancy sensors are so sensitive they pick up minor motions such as moving in a swivel chair or turning the pages of a notebook. One sensor is installed in each of the controlled office areas and conference rooms in the facility's 13 administrative buildings.

"In terms of design and installation, the device is really quite simple," Rappaport says, "but it represents the most elegant and sophisticated way to control lights. Scheduling computers have their place, but they can only turn lights off and on according to program, whether or not somebody is actually in a room. An occupancy sensor, however, can respond to random use demands, so that lighting is almost never wasted."

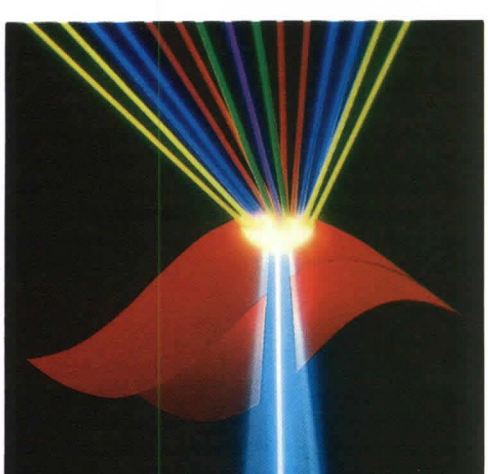
The little sensors have had a big impact on electricity use at the Allied headquarters, Rappaport says. "The occupancy sensors really cut down on lighting, especially in the offices of people who are in and out a lot." The devices have been responsible for cutting lighting expenses at the facility by 50 percent, he adds. "That adds up to about $550,000 in two years." ■ **[Scott Knickelbine]**




*Hartford Civic Center, Hartford, Conn.*

photo courtesy Nick Wheeler

# Technologies Meet the Challenge of Energy-Efficient Heating, Cooling



photography courtesy Belden Electronic Wire and Cable

*New systems for energy-efficient heating, ventilating, and air conditioning are changing the shape of modern buildings*

The challenge of creating energy-efficient buildings is being met by an amazing variety of new heating, ventilating, and air-conditioning technologies. Combinations of dehumidifiers, heat pumps, computers, energy recovery devices, and even ice-makers are being employed, all designed to wring the maximum value from every kilowatt-hour. The impact these systems are having on the size and shape of modern buildings is attracting the attention of an increasing number of architects.

**Humidity control is key**

The Social Security Administration's Metro West complex in Baltimore, Md., is an early example of energy-conscious design. General Services Administration specifications for the building, which was constructed in the mid-seventies, stressed low energy consumption. Peter Kastl, AIA, was a project manager for the architects, Leo A. Daly, Washington, D.C., and the Ehrenkranz Group Architects & Planners, New York, who designed the building's systems.

A high-efficiency HVAC system was a key element in the building system, which was selected on a total-owning cost basis from among several offered by consortiums of leading manufacturers and builders. "The system has three principal virtues," Kastl says. "It maintains conventional comfort levels very economically. It adapts readily to changes in space layout, and it is adaptable to changing heat loads in the space."

One key to the system's efficiency is a two-stage Kathabar central unit that uses a lithium chloride liquid desiccant to almost completely dehumidify outside air. This removes the dehumidification load from the chilled water air-conditioning system and saves approximately 600 tons of refrigeration capacity. It also allows the system to operate with lower outside air volumes, Kastl says.

Fan coil units above the ceiling recirculate air locally and are fed only tempered fresh air. The reduction of necessary air volume for the HVAC system had an important effect on the entire building. "The system requires less room for mechanical equipment areas, air shaft space, and ventilation ductwork. This enabled us to design for a 30 percent savings in the ceiling-to-floor space, so we were able to reduce the overall height of the building and subsequently the building's cost."

Kastl feels that an understanding of new HVAC systems can be valuable to an architect. "It's important for an architect to have a better understanding of mechanical systems than is usually the case. You need to be aware of what impact the HVAC system specified is going to have when you set dimensions on things like sandwich depth. The way the HVAC system works with the building design is ultimately going to affect the satisfaction of the occupant," Kastl says.

**Recovery wheels solve problems**

When Boston University officials decided to link two parking garages to form a 168,000-square-foot science and engineering complex, they realized they had a heating problem on their hands. "In order to provide proper ventilation in a building that housed chemistry and biology labs, a very high amount of air has to be circulated through the building," explains Emmette Jackson, PE, who is in charge of HVAC engineering for Shooshanian Engineering Associates, Boston. "That is a lot of air to heat and throw away."

In order to reclaim that heat, Shooshanian and university officials specified the use of four Senex Energy Recovery Wheels, manufactured by Cargocaire Engineering Corp. The 14-foot wheels spin slowly between the supply and exhaust air-streams, transferring interior heat to the supply air in winter and dehumidifying supply air in the summer. The HVAC system takes in up to 160,000 cubic feet of air per minute. That air is used for ventilation in offices and make-up air for exhaust hoods in the classrooms. Of that supply, up to 140,000 cubic feet of air are directed back through the energy recovery wheels, and the remaining amount exits through exhaust units designed for special contaminants, Jackson says. The building is heated and cooled by fan coil units suspended in the ceiling.

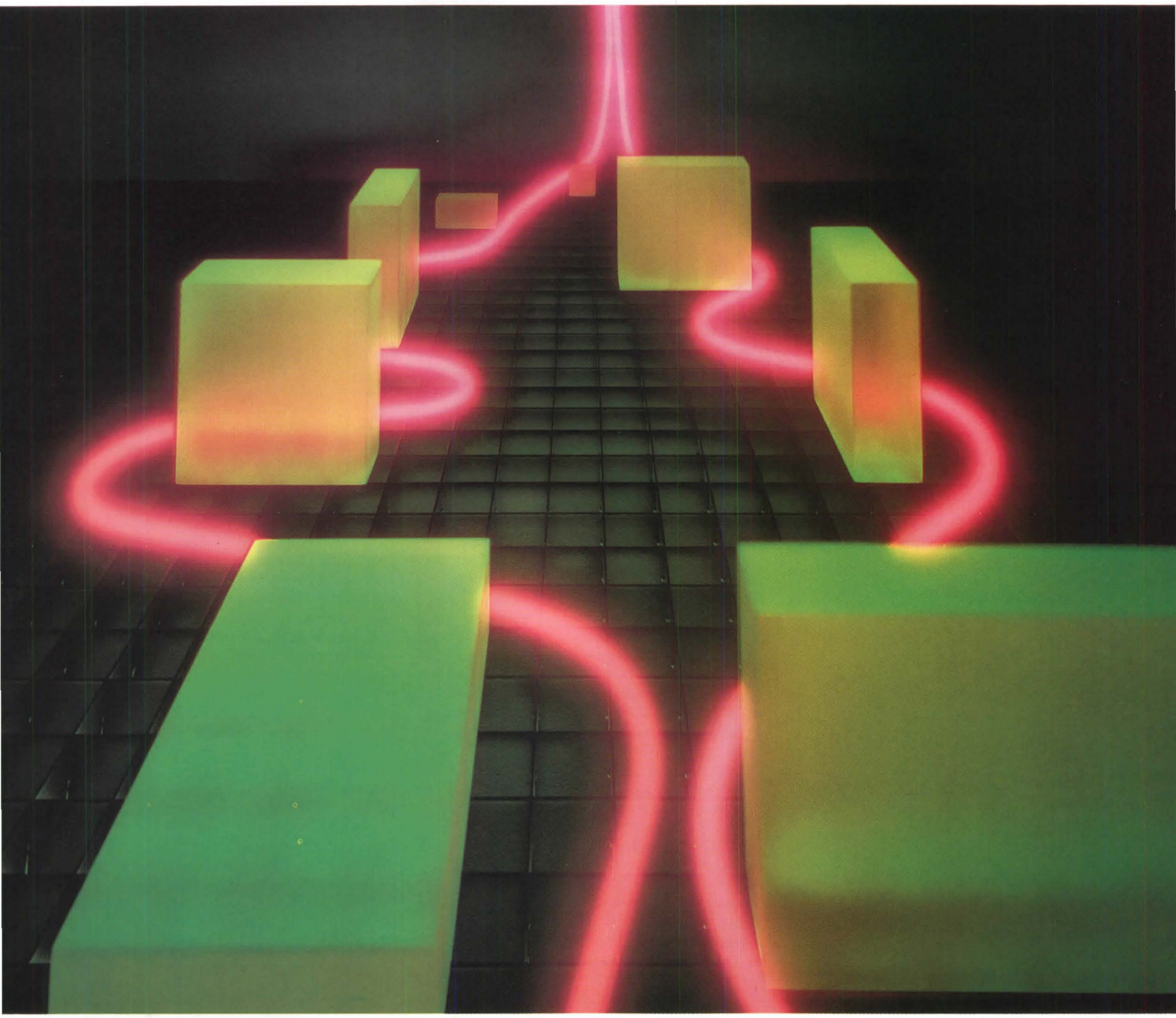
The manufacturer of the system estimates that the yield was $220,000 in reduced equipment and energy costs in the first year, Jackson reports.

**Thermal storage reduces peak demand**

Although some systems strive to reduce the amount of energy needed for heating and cooling, others are designed to perform these tasks when energy is less expensive. That is the case with the thermal storage system designed for the Plaza Towers, currently under construction in Schaumburg, Ill. When finished, the building's cooling system will use heat exchangers to refrigerate hundreds of gallons of water-and-glycol solution, creating ice and an icy slurry at night when electrical rates are low. In the day, the ice and icy slurry are melted, and chilled water runs through air handler coils to provide air conditioning for the twin 20-story towers' 851,000 square feet of combined floor space.

"The beauty of the system is that it spreads its electrical demands over a 24-hour period, instead of 12 hours, thus taking advantage of lower off-peak electrical rates," says Sean J. Ehlke, whose firm, Otis Associates Inc., Northbrook, Ill., designed the buildings and specified the cooling system. "Also, most of the buildings' electrical demands occur at night, when the ice is being formed for daytime cooling. With electrical rates continuing to rise over time, we expect air-conditioning savings as high as 60 percent."

Ehlke says the thermal storage system uses 18 ice builders, manufactured by Perma-Pipe, arrayed



photography courtesy Belden Electronic Wire and Cable

in two 350-ton chillers. Although the cost of this equipment is slightly higher than that of more conventional whole-building air conditioners, the buildings' developer, Otis Development Co., Northbrook, expects the system to pay for itself in three to five years.

"There are other economic benefits to a thermal storage system as well," Ehlke says. "Because you're running at cooler temperatures, you can downsize piping, ductwork, fans, and motors. The mechanical plant also tends to be smaller, especially if the ice-builders are located underground and adjacent to the building. Since tenants will pay their own electrical bills, the savings will add up as electrical rates increase."

**HVAC of the future**

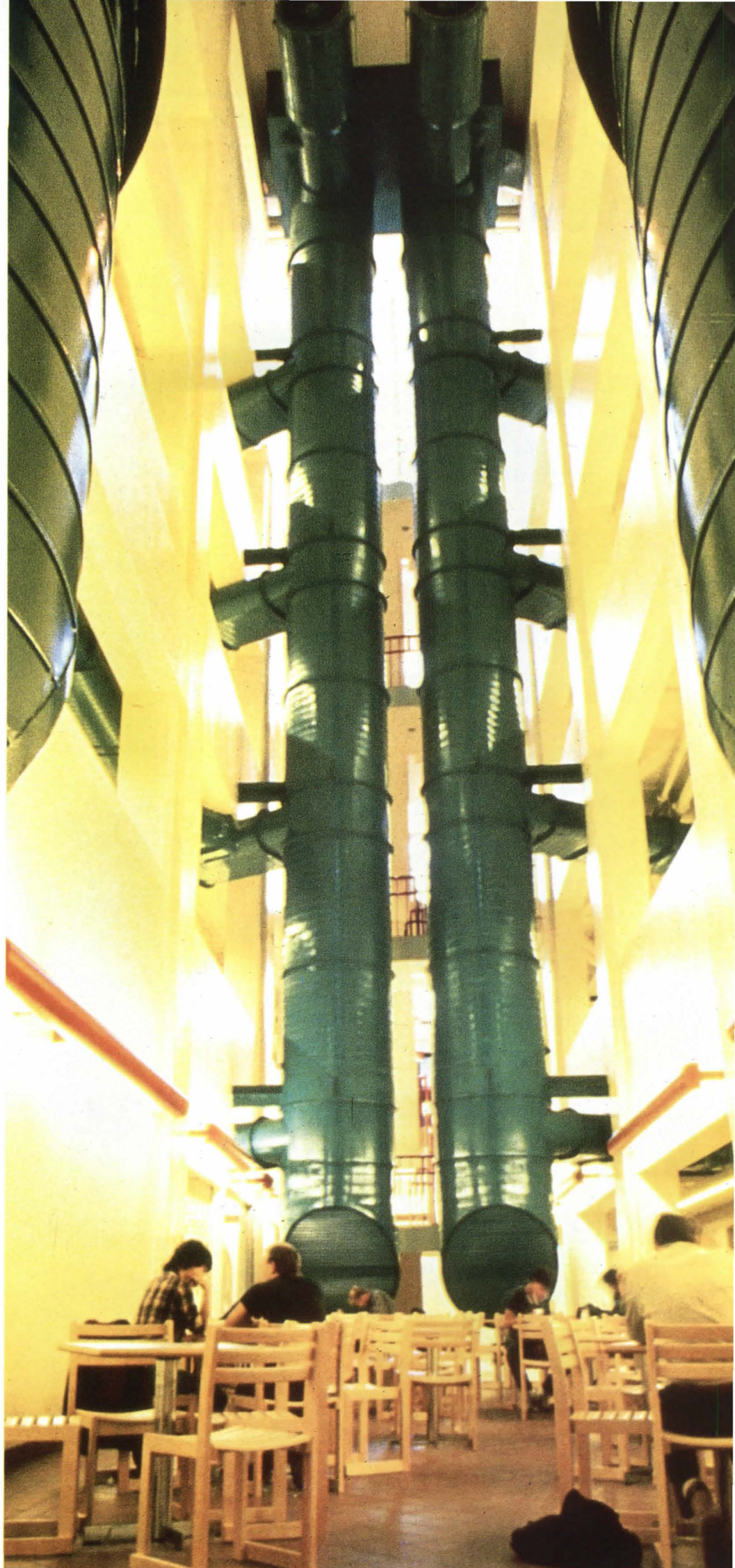
Even as some architects are learning to adapt their designs to today's heating and cooling technologies, Kenneth Woods, AIA, president, Woods & Associates, Inc., Naperville, Ill., is designing for the HVAC systems of tomorrow. Woods's firm produces model energy-efficient homes in the Chicago area, and the architect feels that much of the technology his firm employs is destined for use in larger projects.

One of his primary concerns is ventilation. "Much of the fresh air in buildings of the past got in through leaks around windows, doors, and so on," Woods says. "In the effort to create superinsulated buildings, we are creating air-tight structures that allow the build-up of harmful gases and particulates released from building materials, smoking, and other sources."

In a new 2,500-square-foot home in Naperville, however, Woods has been able to combine high energy efficiency with adequate ventilation. "The house is totally sealed, like a balloon," Woods says. "In addition, it's pressurized so you don't have infiltration of outside air. In fact, you get exfiltration." One-inch extruded polystyrene foam sheathing and a layer of 6-mil polyethylene in the 6-inch walls provides not only air-tightness, but the thermal lag needed to take advantage of natural cooling as well.

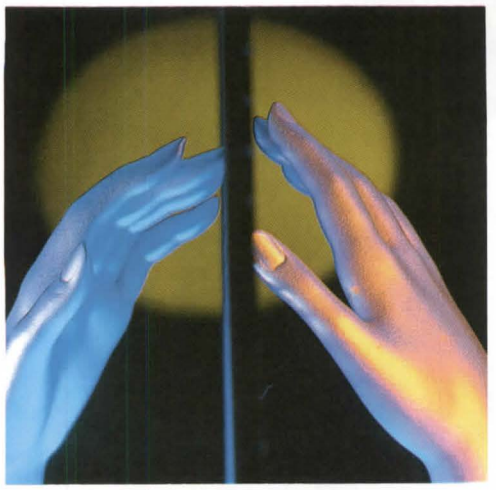
The house is entered through an airlock. Incoming supply air is purified through a series of four filters (two particulate and two gaseous absorbing) and a negative-ion generator. Contaminant sources inside are kept to a minimum. No particle board is used in the interior, and carpeting—which Woods says can collect contaminants—is relegated to a few small areas of the house. The gas-fired Amana Heat Transfer Module is kept outside, and a heated glycol solution is brought in by means of a heat exchanger. Interior appliances are electric. Inside air is recirculated through an additional series of six filters.

"This combination of technologies produces an environment that is both healthful and energy-efficient," Woods claims. "The entire gas utility bill for 12 months came to $97.50," Woods says. He adds that these innovations are not too experimental for use in more conventional buildings. "Much of the filter technology we've used for this home is already in use in major hotels, hospitals, and office buildings," Woods notes. ■ **[Scott Knickelbine]**



*Science and Engineering Complex, Boston University, Boston, Mass.*

# Architects Consider Building Envelope as the First Step in Environmental Control



The wonders of environmental controls not withstanding, architects continue to seek new ways to create building envelopes that are, themselves, efficient systems to weather the environment.

At Wisconsin Electric Power Co., the design tactic was to combine innovative uses of gas for heating and cooling, as well as building designs to minimize energy loss. Staff architect Gerald Hoefer, AIA, accomplished that in the company's 42,000-square-foot engineering and vehicle maintenance facility in Waukesha, Wisc.

He selected an insulated precast concrete structure. In the office area, three-and-a-half inches of fiberglass insulation plus preinsulated precast concrete planks were specified. Occupied in August, 1985, the building has twice the R-value required by the state.

*Wisconsin Electric Power Co. facility in Waukesha, Wisc. (top). St. John's University, Seton Earth-Sheltered Passive Solar Apartments, Collegeville, Minn. (above).*

Other parts of the building envelope chosen to maximize energy efficiency include:

- Roof system designed to prevent dew point occurring within the insulation.
- Orientation of the building so the south wall is the building's main light source. Double-pane windows with a three-inch gap and a venetian blind within the gap allow the window to also function as a net winter heat source.
- An extended roof line to shade windows from direct sun in summer.

The structure includes other systems to provide efficiency, including:

- Solar-heated hot water.
- Photoelectric light control and light fixtures with dimming ballasts allow lights closest to the windows to be dimmed when daylight adequately illuminates the work area.
- Controls to set back temperatures on weekends.
- Gas-fired absorption air-conditioning system.
- Berms around certain areas of the building to assist in insulating capabilities.

**Earth and masonry save energy**

The firm of Hammel Green & Abrahamson, Inc., Minneapolis, has previously designed earth-sheltered structures. But the design of the St. John's University, Seton Earth-Sheltered Passive Solar Apartments, Collegeville, Minn., was the first such design undertaken by the firm solely to specifically conserve energy by earth sheltering.

Theodore Butler, AIA, vice president, says, "Because of the loan sources, the project demanded earth shelter. We chose concrete masonry because we wanted a material that fit well with the campus and had structural significance. The masonry resists the earth pressures and rot, as well as relating to the campus."

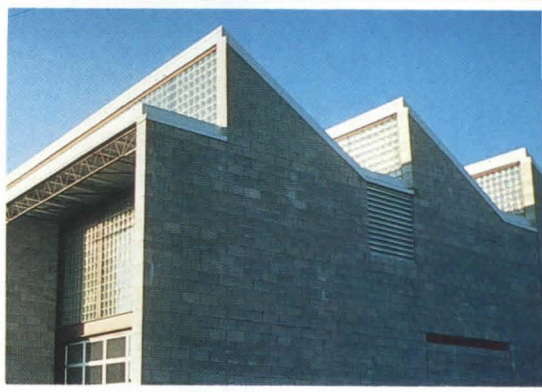
The complex is built with 16-inch side walls that include a four-inch split faced block veneer, three-inch rigid insulation, one-inch airspace and eight-inch painted concrete masonry backup wall that also serves as the interior wall surface. The buildings are underground on the north side, and the south side captures passive solar heat through extensive glazing.

**Glass design saves energy**

The five-story Appleton Center office building in downtown Appleton, Wisc., completed in January, 1985, was designed with energy efficiency in mind. "There was a definite interest in conserving energy," recalls Bruce Sprenger, AIA, project manager, Hellmuth, Obata & Kassabaum, Inc., St. Louis. "We knew that glass area would be an important factor in the building's thermal performance."

After a study of design options, HOK proposed a single, narrow glass ribbon that wraps entirely around the building at each floor. A green-tinted, Polarpane® 1/ST insulated butt glazing system,

*Appleton Center, Appleton, Wisc.*



*Bea Underwood Elementary School, Battlement Mesa, Colo. (top). Chapel Hill Transit Operations and Maintenance Facility, Chapel Hill, N.C. (above).*

manufactured by Hordis Brothers, was selected for its thermal properties.

"The idea was to minimize the actual glass area while maximizing the amount of visibility provided," Sprenger says. To achieve the effect, sills are set high and the glazing system gives the appearance of continuous glass. Curved spandrel glass was used on the building's corners to complete this concept. The result is an office interior that presents an open feeling, although the windows comprise only four feet of each story's 13-foot floor-to-floor height.

**Uses morning light to preheat**

For the 48,000-square-foot Bea Underwood Elementary School, Battlement Mesa, Colo., Gary Ross, associate, and David Koenck, associate, at Caudill Gustafson & Associates, Aspen, had a goal to minimize energy use without an elaborate system of controls. "The school is in a fairly remote area, so service for elaborate electronic controls would have been a continuing difficulty," recalls Ross.

The long axis of the building is oriented 15 degrees from true east/west exposure in order to pick up the early morning light to preheat the building. Daylighting was used throughout, with light shelves bouncing light into the building. Clerestory windows also were chosen as a design and energy element. To maximize solar gain, the designers had the south area regraded. Inside, the building was zoned with three individual air-handling systems.

**Passive solar aids winter heating**

Energy-efficient design captured the attention of officials for the city of Chapel Hill, N.C., when the city's Transit Operations and Maintenance Facility was being planned. "City officials were excited about the benefits. It became the first in a series of energy-efficient buildings built by the city," says Ted Hoskins, AIA, CHR Associates, Chapel Hill.

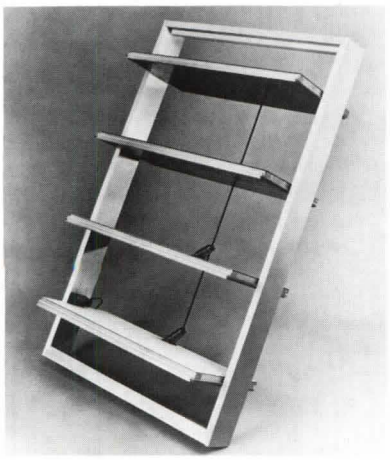
The entire south facade is glass block. "We wanted to use sunlight for daylighting and to augment winter heating," Hoskins says. "The facility is an example of common, straightforward construction techniques used in a thoughtful way."

Glass block, manufactured by Pittsburgh Corning, and half-inch-high and four-inch-deep mortar joints in an egg-crate pattern were designed to create a venetian blind effect. "The venetian blind effect cuts off the sun angle in summer, eliminating need for other costly shading solutions," Hoskins says. In addition, the architects specified a thickened floor slab and exposed it to the south facade to store the heat. Gas radiant heaters warm the people in the maintenance facility without heating the entire airspace in the building.

Also incorporated were a solar hot water system and a nighttime structural cooling ventilation system. ■ **[Rhea Dawson and Scott Knickelbine]**

# New Products and Literature

**Automatic InsulLouver,** an electrically operated louver system, is designed for skylights, clerestory glazings, and other locations in which precise management of heat and light is required. The device features a factory-mounted high-torque electric motor. Each automatic InsulLouver is custom manufactured, pre-hung in a hardwood frame, and shipped ready to install. Daylight or solar controllers are directly compatible with the 12-volt DC motor. InsulLouvers have mylar brush-fin seals and tubular rubber closure seals to stop heat transfer. First Law Products, Inc.
*Circle **420** on reader service card*



**Thermospan overhead-type door** provides energy efficiency for commercial and industrial applications, manufacturer claims. Door features a thermal break that separates inner and outer skins so that heat or cold can not be conducted, resulting in an installed U-value of 0.11. Other features include a joint seal, jamb seal, and optional top seal. Roll-formed built-in insulated struts add strength and prevent deflection; U-shaped bottom astragal provides seal at the bottom. Wayne-Dalton Corp.
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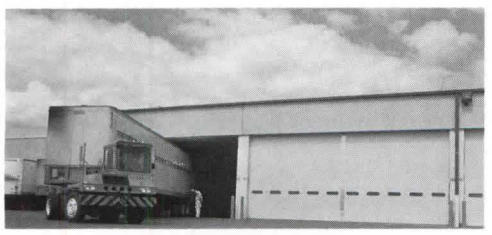
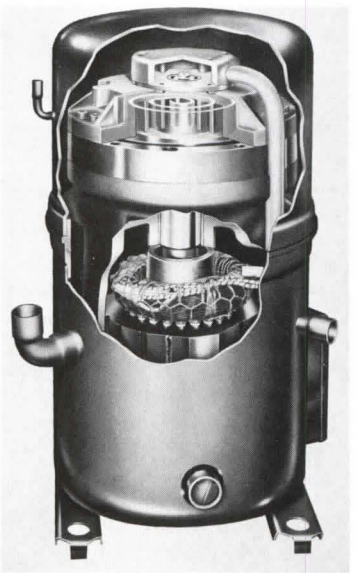


**System 600 Building Management System** is described in a 10-page color brochure. System features, such as centralized data collection, modular system design, user-definable functions and integrated energy management, fire alarm, smoke control, access control, maintenance management, and temperature control, are explained. Operating system, kernel software, and applications software are also detailed. MCC Powers.
*Circle **423** on reader service card*

**The Compliant Scroll™ compressor** is the key component in an advanced technology 7½-ton heat pump. The scroll function works through the interaction of two spirals within the compressor unit. One spiral is held stationary while the second orbits inside the first. The orbiting spiral is connected to the crankshaft by compliant drive mechanism. The resultant action produces a continuous gas flow and continuous compression that contributes to improved operating efficiency and significantly lower noise levels, manufacturer claims. York Heating and Air Conditioning.
*Circle **427** on reader service card*

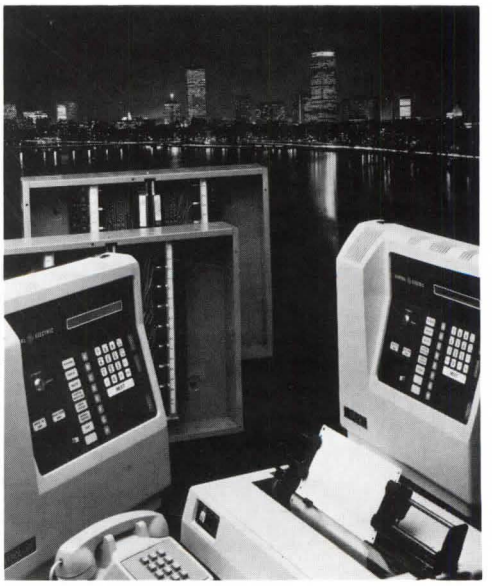


**Lancer Jr.** adjustable frequency AC drives are described in a new bulletin. The drive features microprocessor-based control and sine-coded, pulse-width modulated output that closely matches pure sinusoidal power for smooth torque and reduced harmonics for minimal motor heating, manufacturer says. An integral digital meter indicates running condition and fault condition. Stock models are equipped with a run/stop switch and manual speed setter that is front mounted for simple installation. Louis Allis.
*Circle **424** on reader service card*

**The ZoneAll computerized zone control system** is designed to give multiple-zone capability to single zone HVAC units and systems, either in new or retrofit applications. With the ZoneAll system, one heat pump can heat and cool four zones, allowing each zone to have its own thermostat for individual control. If zone requirements vary due to tenant changes, a simple rearranging of ductwork is all that is required in most cases, rather than physically moving heat pumps into different areas, manufacturer claims. Existing thermostats and devices can be used in conjunction with the ZoneAll system. American Air Filter.
*Circle **425** on reader service card*

**The ES300 Energy Saver** is a feed-forward oxygen trim control system for optimizing boiler performance and safety. Microprocessor-based, the device automatically measures and calculates more than 25 variables, which are used to select an optimum excess air control output. By "remembering" the last position of the damper for a boiler load the ES300 can immediately correct for trim, maintaining near optimum efficiency even during swinging load conditions, manufacturer says. System components include a microprocessor-based controller, an in-situ zirconium oxide oxygen probe, trim drive unit, probe control unit, and rugged industrial transducers for sensing damper position and inlet air temperatures. Lear Siegler, Inc.
*Circle **426** on reader service card*

**Modular energy management system** is a highly cost-effective method of controlling lighting and other electrical loads, manufacturer says. The programmable system offers several options to increase its flexibility, including telephone override capability, telecommunications to permit multi-building control from a single location, and the Auditor energy accountant to keep track of and bill for after-hours electricity use. General Electric Co.
*Circle **429** on reader service card*



**Photon,** a PC-based graphic computer-aided design program that designs and analyzes lighting systems, is described in an eight-page brochure. System hardware requirements, help screens, error message system, and the way in which planes and lines are defined for analysis are outlined. The brochure also describes the way Photon assists in defining luminaire layout, printout options, and various data management functions. Cala, Inc.
*Circle **428** on reader service card*

**Infracon,** a lighting control/occupancy sensor, turns office lighting on and off as it detects and responds to changes in radiated heat caused by the presence and movement of a human body, manufacturer claims. The sensor is lightweight and is approximately 6¼ inches long. It houses an electronic printed circuit board that allows minimal power usage by the sensor itself. Tishman Research/United Technologies.
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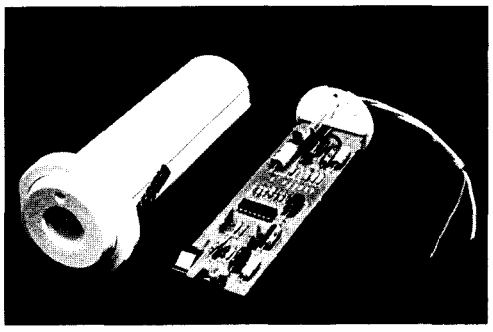
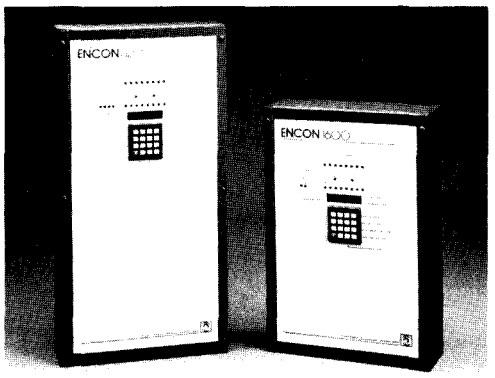


**Alpha/Net 4000** integrated energy management and facilities automation system can be configured to control a facility with as few as 64 points or as many as 10,000 points, manufacturer claims. The system's building block approach permits additions and changes as the requirements of the facility change. Application software enables the system to perform functions such as demand limiting, adaptive optimized start/stop, duty cycling, calculated point, event control, and direct digital control. AMF, Inc.
*Circle **432** on reader service card*

**Encon 1600 and 3200** facility/energy controllers are modular/field expandable with four to thirty-two loads and four to sixteen loads respectively. Features time of day scheduling, duty cycling, analog control, demand limiting, optimized start, data acquisition, and remote communications. Analog signal transmission technology (frequency current pulse) eliminates interference, need for shielded wire, and field calibration of sensors, manufacturer claims. Encon Systems, Inc.
*Circle **434** on reader service card*




**The CEMS™-1000 load controller** is designed for use in retail chains and other facilities where centralized control of widely scattered installations is needed. Device allows programming of energy use and temperature set points. Programming changes may be made over ordinary telephone lines. Standard functions include control by time of day, control to temperature set point, control by digital input, demand control, auto answer, and auto dial out for alarms or automatic reports. Electronic Development and Assembly Corp.
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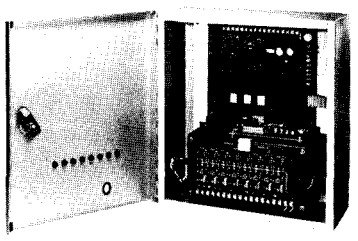
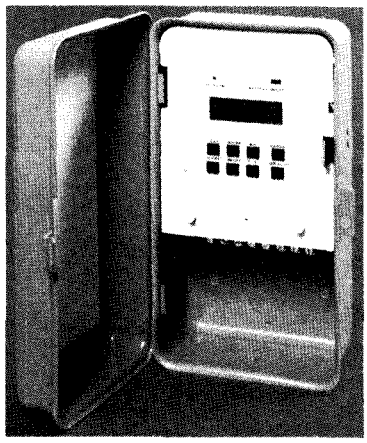


**The Luminoptics** fully integrated electronic Light Monitoring and Control System and its application in commercial, industrial and institutional facilities are fully explained in a 12-page brochure. It depicts how the computerized system automatically implements control strategies such as scheduling, peak demand load shedding, daylight harvesting, task tuning, and maintenance factor compensation. Operation of the system is through the use of solid-state, high frequency, controllable output ballasts, microprocessors, and photosensors. Universal Manufacturing Corp.
*Circle **431** on reader service card*

**Model D100 digital time switch** provides automatic control of lighting, HVAC, and other electrical equipment. Device offers seven-day and 24-hour schedules. Controlling a single channel, the device can provide on/off switching for two circuits with up to six pair of on/off operations per day, manufacturer says. Manual key permits override at any time. Automatically recharged battery maintains memory schedules and time/date displays for up to one week in event of power failure. Tork.
*Circle **435** on reader service card*



**ENC-2000 Series** microprocessor-based distributed control system controls energy use and building functions in small- to mid-sized commercial and industrial facilities. System features two-way remote communications options and a five-layer prioritized programming framework. Optional RS232 two-way serial communications port allows interface with remote personal computers. The ENC-2000 executes custom personal computer software commands and provides system status feedback for building control systems, vendor claims. Mac Victor Manufacturing, Inc.
*Circle **436** on reader service card*

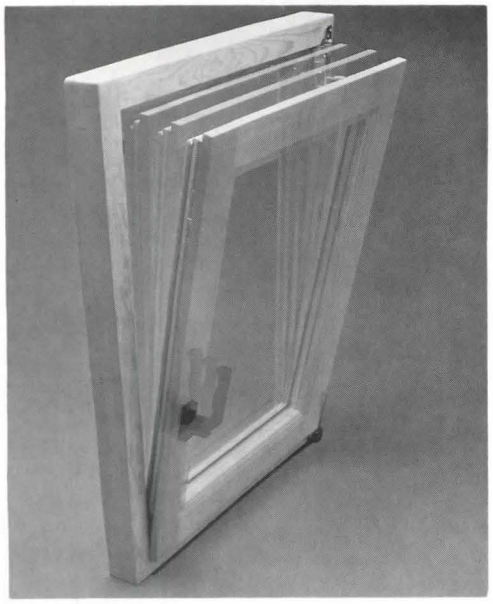
**Model HP-1100** programmable microelectronic thermostat can be programmed to regulate the temperature in any work environment. Device is designed for three-stage heating, two-stage cooling, and use on conventional or heat pump systems. Device features solid-state construction with precision microelectronic controls and allows automatic raising and lowering of temperature to preselected levels at predetermined times, manufacturer says. M-C Products.
*Circle **438** on reader service card*

**Enertron** solid-state light level control equipment allows the user to select light levels based on the use requirements of a particular facility. System also senses and adjusts for sunlight contributions through skylights and perimeter walls. Light level control in combination with sensing sunlight contribution results in 25-to-35 percent reduced light energy consumption in most installations, manufacturer claims. Enertron, Inc.

*Circle **439** on reader service card*

**Magnum Tilt Turn Window** tilts in at the top, pulling in cool air and pushing out warm air to provide optimum fresh air ventilation. It also opens to the side a full 180 degrees for easy maintenance and emergency exit, manufacturer claims. Operation is controlled by a three-position handle. Adjustable locks maintain contact with the weatherstripping, which is welded at all four corners for a continuous, high-performance seal, to provide insulation from cold, heat, and noise. Marvin Windows.

*Circle **437** on reader service card*



**Network 2100,** an integrated building management system, combines energy management, life safety, security, facilities management, and direct digital control with stand-alone capabilities in one package. The system performs several HVAC control functions, including proportional-plus-integrated-plus-derivative control, positional motor control, optimum start/stop, comfort compensated duty cycling, and demand limiting, manufacturer says. The system also monitors the status and run times of many types of building equipment. Barber-Coleman Co.

*Circle **440** on reader service card*


**The DSC-3500 System,** which combines both resident and owner programmable energy management programs with digital system control capabilities, is detailed in a new brochure. The eight-page, full-color brochure describes ways the DSC-3500 System can reduce energy consumption 10 to 30 percent by controlling electrical and mechanical equipment. Centralized control and communications, distributed processing, and networking are described. Johnson Controls.

*Circle **422** on reader service card*


**Environmental control systems** for computer facilities are described in an eight-page color brochure. Cooling devices for large computers, water-cooled mainframes, and mid-sized and small computers are featured. The brochure also describes computer-grade power protection and control units as well as centralized computer system monitoring devices. Liebert Corp.

*Circle **442** on reader service card*


**Hedron™ I hexagonal-shaped glass block** eliminates the need for disruptive posts, columns, or angles at glassblock panel junctures, providing structurally sound, aesthetically pleasing, gently rounded continuous glass face at corners, manufacturer claims. Vue pattern features clear exterior and interior block surfaces for maximum light transmission and visibility. Decora pattern has moderately distorted inner surfaces for limited visibility. Partial vacuum between block halves produces an R-factor of 1.79 in standard square units. Pittsburgh Corning Corp.

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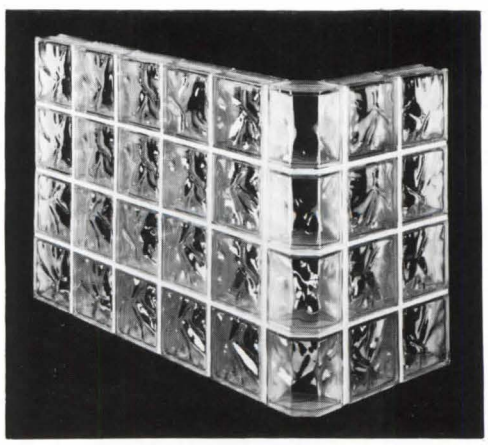

# MORE ENERGY-EFFICIENT BY DESIGN

With natural gas you've got the power to make every size project more energy efficient.

Because today, there's a whole new generation of super-efficient gas equipment to give you the options you need.

Advanced, fuel-saving gas heating and cooling systems that keep operating costs down.

And that can make whatever you're designing look even better.

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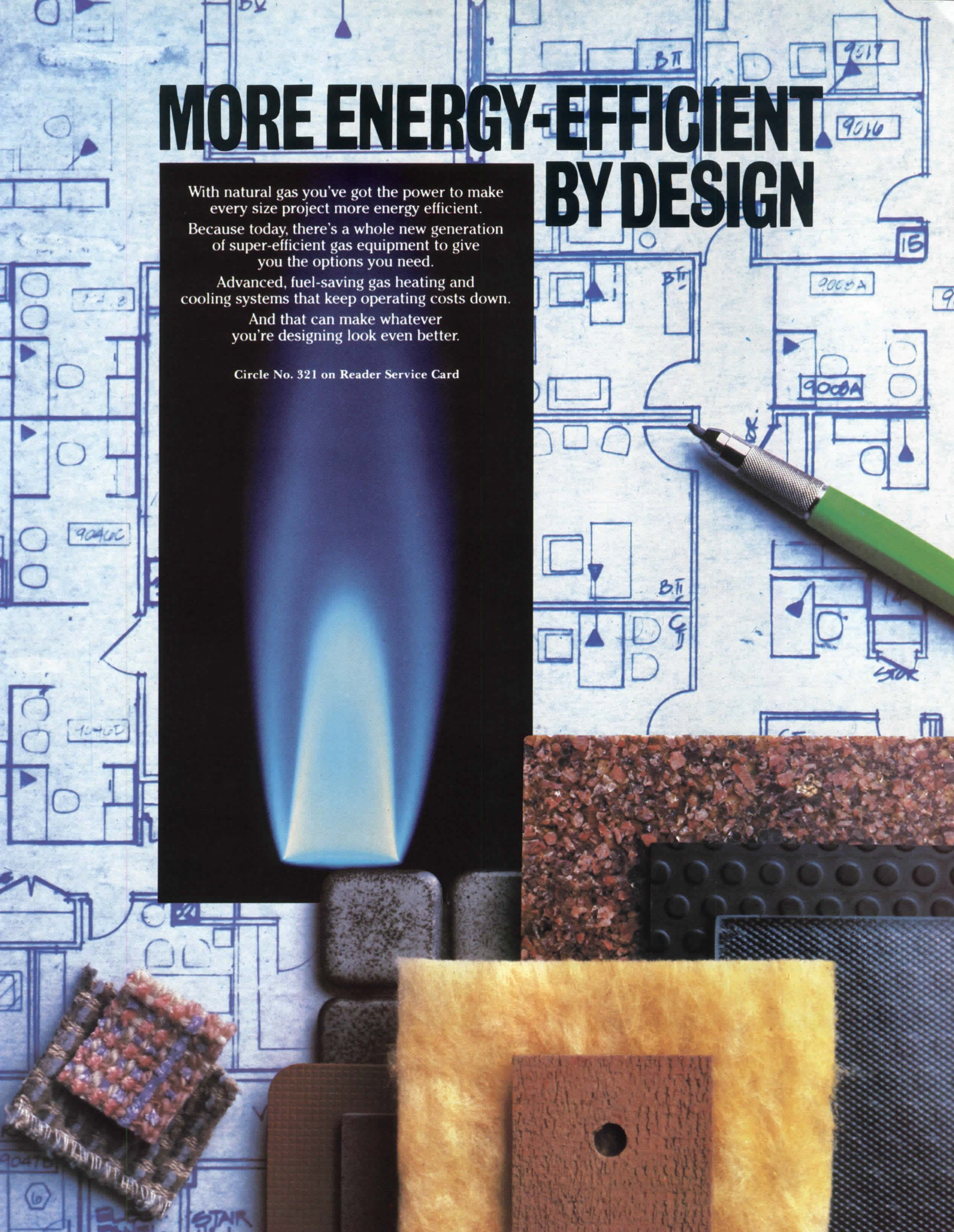


## Gas. America's best energy value.

# Andersen® windows in a manufacturing plant?

Welcome to the age of enlightenment.

Factories used to be dark, drafty, depressing places to work. But the Werner-Pfleiderer Corporation found an enlightened alternative for their North American corporate headquarters: Andersen Perma-Shield® windows.

Planting the headquarters and industrial facilities in an old apple orchard, architects proposed a stimulating work environment in keeping with the natural setting.

So Andersen set the mood. Beautifully.

Where closed walls might have been, Andersen Perma-Shield casements reach up and bring sunlight deep into work areas, illuminating employee workloads, brightening human spirits. (Research shows that visual tasks can be performed *three or four times* more effectively under daylight conditions than under artificially lit conditions.)*

Andersen® windows lighten up energy costs, too. In summer they open smoothly, inviting refreshing breezes indoors. Reducing air conditioning demands.

Come winter they close snug, secure against freezing winds. Far more weathertight than industry air infiltration standards (N.W.M.A. 2-80), to help reduce heating costs.

And Andersen windows stay on the job. Our solid wood core is covered with rugged Perma-Shield® vinyl that won't chip, flake or peel. And it doesn't need painting.

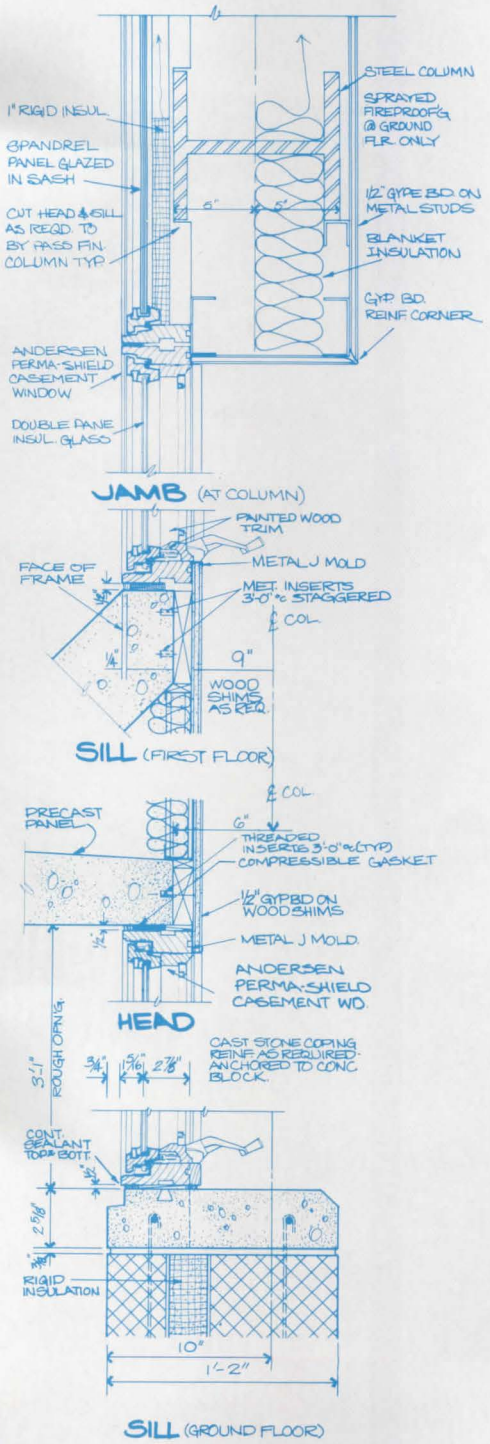
In attractive, earthy Terratone color, Andersen windows blend beautifully with most exteriors. Contributing to a comfortable workplace that keeps employees happy and productive all year long.

Welcome your clients to the age of enlightenment with quality Andersen windows, gliding patio doors and the extraordinary new Andersen roof window.

For more details, consult Sweet's File 8.16/An. or look in the Yellow Pages under "Windows" for your local Andersen distributor. Or write the Andersen Corporation, Box 12, Bayport, Minnesota 55003.

Come home to quality. Come home to Andersen.™

Andersen® Windowalls®
ANDERSEN CORPORATION BAYPORT, MINNESOTA 55003




Werner and Pfleiderer Corporation—
U.S. Headquarters Ramsey, New Jersey.

Architect: Ballou-Levy-Fellgraff
Ridgefield Park, New Jersey

Printing limitations prohibit exact duplication of Terratone color. Use actual sample for building specifications.

*Source: Benefits of Daylighting, Cost and Energy Savings, ASHRAE Technical Paper. J.W. Griffith, 1977.



Circle **No. 328** on Reader Service Card

# Now your firm can afford the best


***The dual-screen Interact***™ *is designed for continuous production work in the architectural office, and features extensive display and dynamics capabilities.*

***The Professional Interpro 32***™ *operates not only as a graphics terminal networked to a VAX or Micro II—but also as a standalone workstation running software developed for the IBM PC family and for the UNIX operating system.*

*For a system to meet the needs of any architectural firm—large or small—look to Intergraph for a solution.*

With Intergraph, you can configure a system that best suits your firm now, and that can grow as your need for automation increases. Begin with our new entry-level Micro II™ processor and up to four workstations, then meet any future requirements by adding additional processors and workstations, linking your entire system with our Ethernet network.

***The low-cost Intergraph Micro II,*** *offering roughly the same power as a VAX-11/750, measures only 24"x11"x 29", and serves as a standalone system in an office environment.*

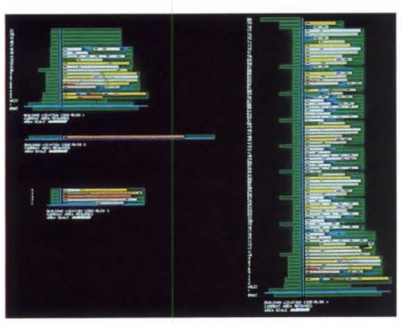
# The System supporting the Solution

*(Because there's more to architecture than just drafting)*

At Intergraph, we design our systems to carry you through *all* phases of a project, not just drawing production. Our interactive graphics solutions work in as many different fields as you do, automating the complete range of design and engineering disciplines.

### Marketing and Programming

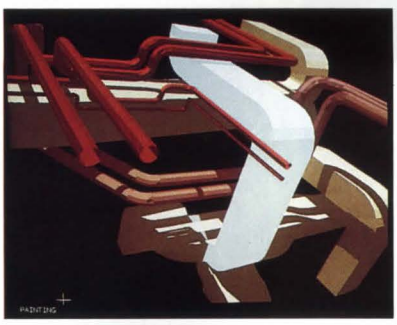
Your first job is marketing, and Intergraph helps with design visualizations that let your prospects see their projects before construction.



For facility planning, Intergraph offers an extensive array of tools, including the ability to generate multi-building stacking diagrams.

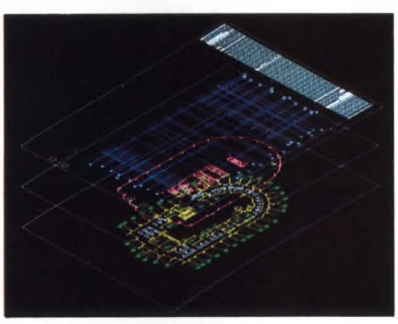
### Schematic Design

For schematic design, we combine 3-D modeling with adjacency analysis so your client can preview the proposed design.

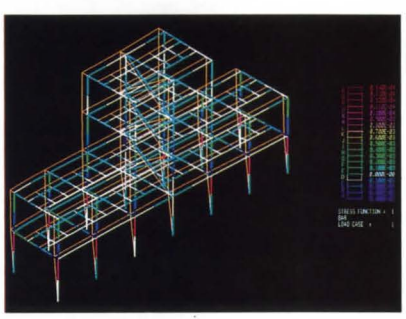


### Design Development and Engineering

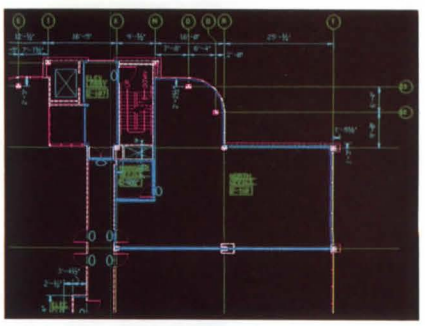
Intergraph offers complete software for mechanical, electrical and plumbing engineers. From schematic layout to analysis to documention, our system automates each phase of the engineering process.



With an Intergraph system, teams of engineers and designers have common, simultaneous access to a project database, so that the latest version of all work is available to all.

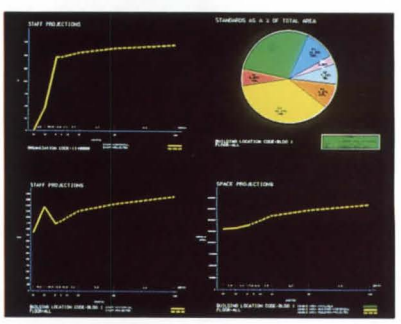


Intergraph enables engineers to solve structural analysis problems without having to buy time on a mainframe computer. The new Intergraph RandMicas™ product is *interactive* software for 2-D and 3-D frame and finite element analysis and design.



### Construction Documents

Our drawing production software—including sections, details, elevations, site plans and engineering drawings—is the most mature in the CAD industry.



### Facilities Management

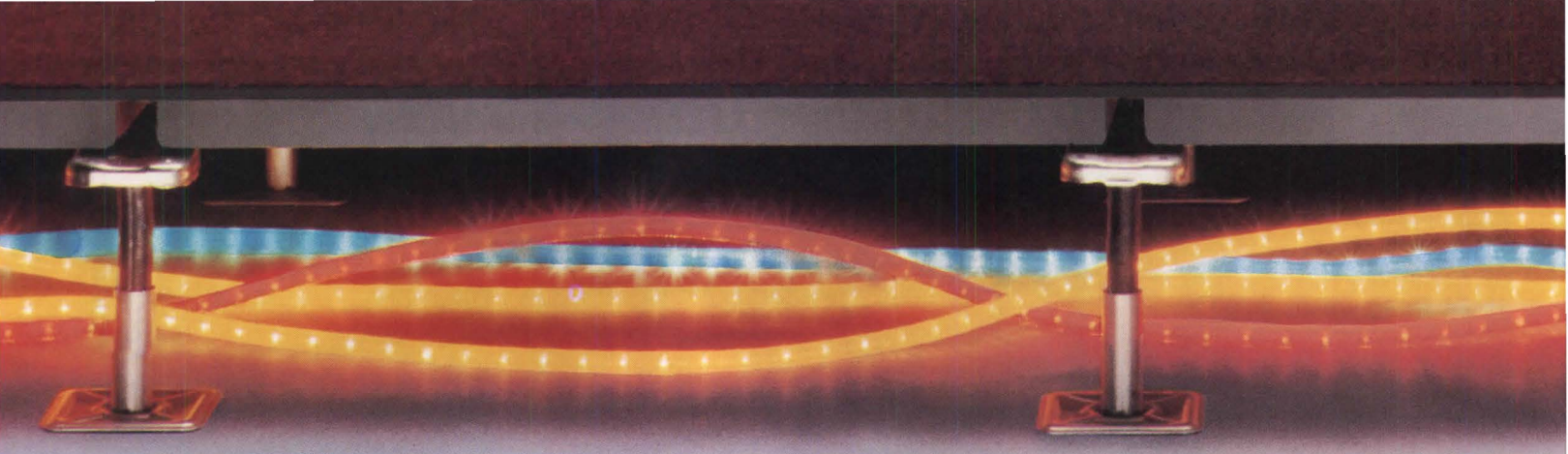
Occupancy information becomes part of the design process with the Intergraph system's ability to combine database management information with graphics.

For marketing a franchise, the Intergraph system helps prepare detailed facility plans for potential clients.

*For more information, or to schedule a demonstration, contact:*

INTERGRAPH

Department PG95
One Madison Industrial Park
Huntsville, Alabama 35807
205/772-2000

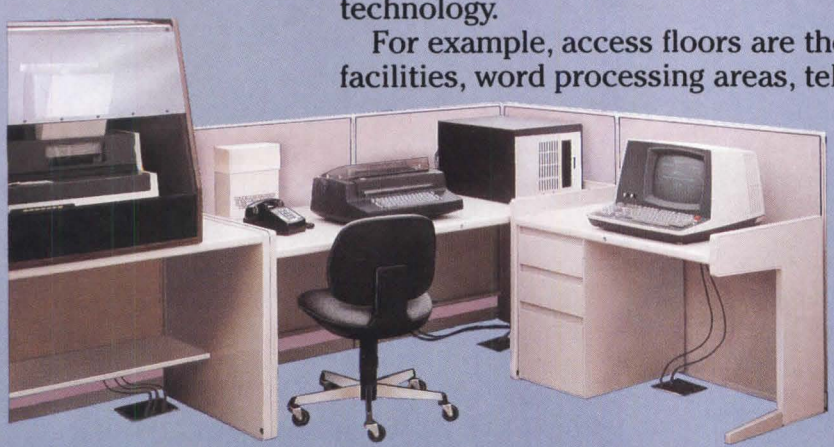


# When to buy an access floor.

It's easy to be confused about access floors. Yet, when used in the right applications, they are a superb solution to a complex set of design problems.

Put simply, the more important flexibility is to you, the more you need access floors. Because access floors allow building management a great deal of latitude in adapting an interior space to changes in occupancy, work flow and technology.

For example, access floors are the logical choice for open offices, CRT facilities, word processing areas, telecommunications rooms, laboratories and, of course, computer rooms.



Experience has shown that access floors are highly cost-efficient in office buidings with:

- A 50% + open office plan.
- A 10% or more annual move rate.
- An occupant density of 200 sq. ft. or less per person.
- And technology-oriented workstations with as little as 20% computer terminal density.

In short, the best time to use access floors is whenever the productivity of occupants is most dependent on the network of electronic, communications and computer support systems.

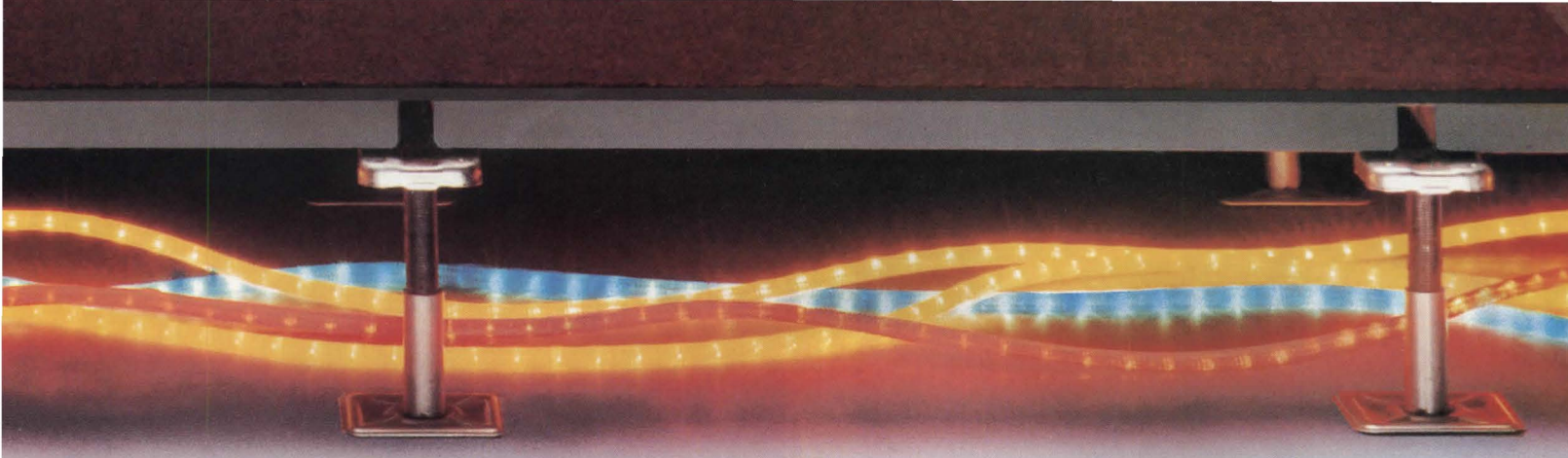
# When not to buy an access floor.

There are times when a project is better served using traditional service distribution concepts. But they may be fewer than you'd expect.

While today's average access floor plenum height is only 6", access floors can add to total building height in some instances.

Also, facilities in which 90% or more of the plan will remain unchanged each year should probably continue to provide services via in-floor trenches.

Cost is a key, obviously, but most people just assume that access floors will be more expensive. In today's marketplace, you may find access floor costs competitive in more installations than you ever imagined.

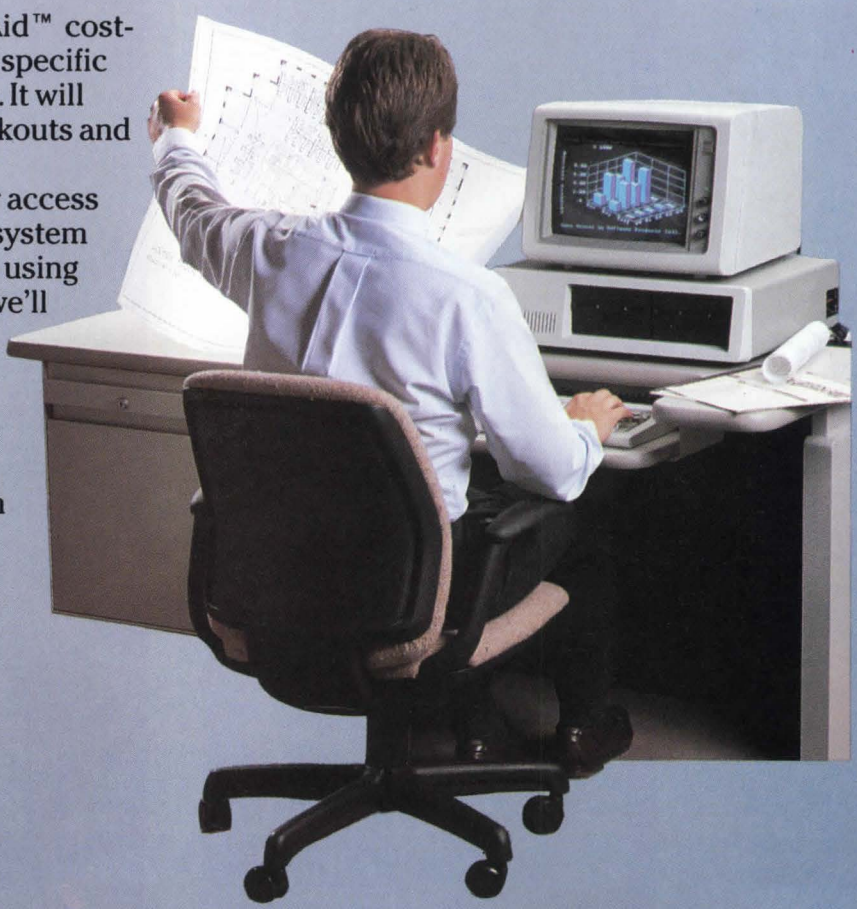


# How to tell the difference.

This part can get very tricky. Comparing the initial and long-term costs of access floors with other construction techniques is no simple matter. You need a computer to factor in labor, material and operating costs.

Which is why we developed the DesignAid™ cost-comparison system. It will use data for your specific project to help you compare design options. It will even provide you with detail drawings, breakouts and specifications.

Obviously, we're pretty confident that our access floors will hold their own against any other system you're considering. But when you should be using another system, we'll tell you. Honest. And we'll even help you choose the best alternative.



## How to learn more.

This is the really easy part. You can get full details on Donn access floors and the DesignAid system by talking with your Donn representative.

We can help you buy our product. We can help you buy somebody else's product. And we can help you decide for yourself.

DONN®

**Donn Corporation**
Westlake, Ohio 44145

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With the advent of Du Pont certified ANTRON PRECEDENT™, commercial carpets enter a new age. Take on a luxurious dimension. And lead brilliantly longer lives.

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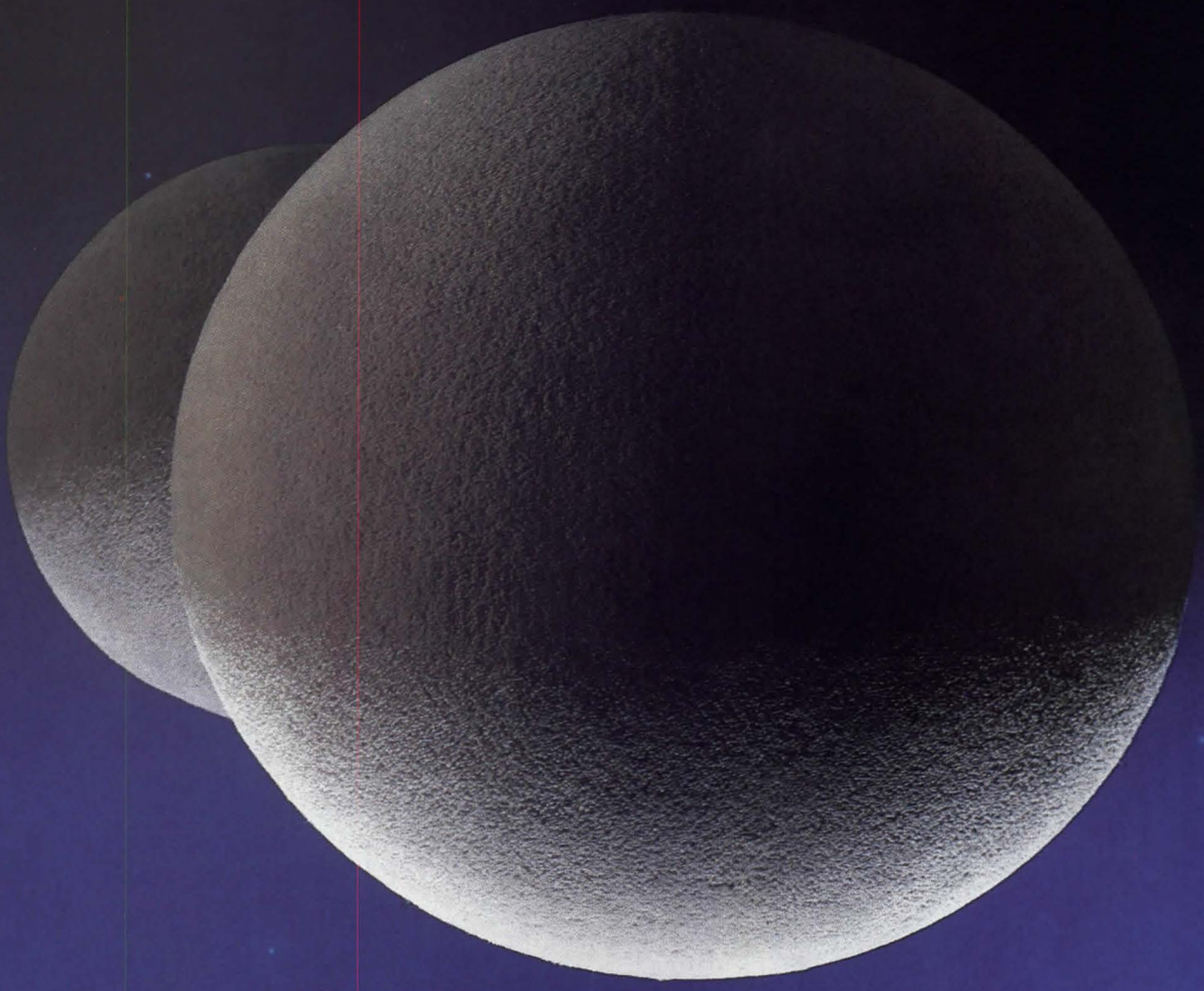

# Du Pont introduces Antron Precedent™ with performance that will eclipse all other carpets.

standards. And what comes out is a carpet system that's so advanced it commands a Du Pont certification mark.

So when you demand the ultimate in performance and style, specify a carpet that's backed with the quality "Q".


It's your assurance that it's met the toughest specifications in the business. Those of Du Pont for ANTRON PRECEDENT.

Call today for more information and a list of quality licensed mills. (800) 448-9835. New certified ANTRON PRECEDENT... only from Du Pont. It's nothing short of out of this world.

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## Reflective Glass

**Power to totally overshadow conventional reflective solutions.**

LOF Glass introduces ECLIPSE reflective glass, the pyrolytically-coated float that leaves traditional alternatives fading completely from sight.

ECLIPSE reflective is a dramatic new alternative for the building designer's palette, combining high reflectivity with excellent daylight transmission. Exteriors take on a striking yet subdued appearance; interiors are bathed in a soothing warm glow. Beautiful.

Technically speaking . . . absorption so low that colored substrates in most vision applications require no heat treating; UV control that blocks over 90% of the sun's damaging ultraviolet rays; sealant compatibility that borders on universal. And the list goes on.

ECLIPSE reflective means options: Cut, temper and fabricate it as you would any annealed glass. Expose the coated surface to the exterior. Use it as the second surface in an insulated glass unit. Bronze. Grey. Blue-green. The choices are yours.

Choose ECLIPSE reflective for the fastest, most reliable delivery. Choose ECLIPSE reflective for the commitment and expertise of the manufacturer that cares about providing the industry's best float.

Choose ECLIPSE reflective from LOF Glass. Be part of a remarkable solar occurrence. Call: (419) 247-4803. Write: LOF Glass, FGP Marketing Department, 811 Madison Ave., P.O. Box 799, Toledo, Ohio 43695.

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## Visibly Superior.

LOF Glass

A Libbey-Owens-Ford Company

# Books

**Jože Plečnik: Architecture and the City** *edited by Ian Bentley and Djurdja Gržan-Butina. Urban Design, Oxford Polytechnic, Oxford; available in U.S.A. through Worldwide Books, 37 Antwerp St., Boston. 1983, 64 pp., illus., $8.50.*

**The Literature of British Domestic Architecture 1715–1842** *by John Archer. The MIT Press, Cambridge, Mass. and London, 1985. 1078 pp., $100.*

## *Plečnik's Legacy*

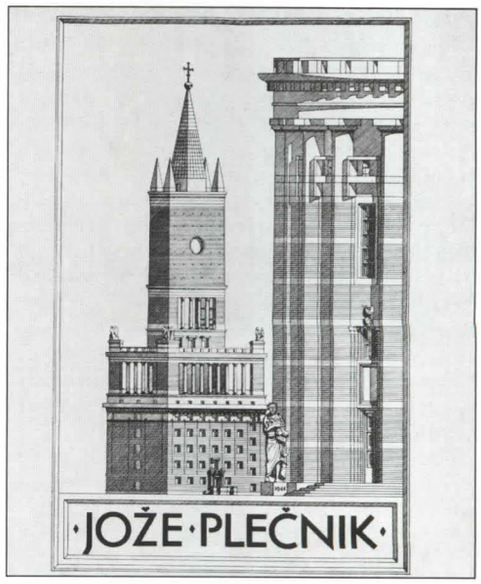
Although the point of initial attraction to the work of Jože Plečnik may well be the Post-Modernist interest in his use of historical forms, this book addresses many other themes that concern thoughtful designers today. Themes such as the proper relation of buildings and their urban context and the publicly relevant use of indigenous and historic formal references receive thoughtful attention from the book's five essayists, who bring to the English-speaking world its first real knowledge of Plečnik's work and the ideas and methods that informed it. The book was designed to accompany a traveling exhibit of Plečnik's work, consisting of 25 large color prints and drawings, which has shown to critical acclaim at the RIBA, and in Oxford, Birmingham, Leicester, and Glasgow. Plans are underway for the exhibit to be shown in the United States.

As shown in the first essay by Peter Krečič, "Plečnik and the Critics," Plečnik's work was controversial in its own time as well as now. In Vienna, where he emerged as one of Otto Wagner's leading students, he eschewed both the engineering approach and the decorative Secessionist style, preferring to interpret tradition in his own rather personal terms. His work was more consistently appreciated in Prague, but he was severely attacked by functionalist critics after his return to Ljubljana in 1922. Only after 1972, the centenary of Plečnik's birth, was there sufficient interest in his unique contributions as an architectural Modernist to demand that his work be researched in relation to criticism of its historicism and eclecticism. Art historian Nace Šume was Plečnik's chief advocate in this regard, and his essay shows how Plečnik's architectural vocabulary, even if borrowed, was always consistent with his own architectural purposes. Ian Bentley's essay shows how Plečnik deliberately chose vernacular as well as Mediterranean Classical formal elements in his effort to establish a new Slovene national architecture in the wake of the collapse of the Austro-Hungarian Empire. The new architecture had to be designed around common elements of experience and traditions appropriate to as many social groups as possible, and had to promote both a sense of Sloveneness and a sense of democracy. The latter was accomplished by various participatory devices strangely prophetic of social organization in Yugoslavia today.

One cannot fully appreciate Plečnik's contribution to urban design without visiting Ljubljana, the capital of Slovenia, where Plečnik held the Chair of the University's Architecture Department and was de facto City Architect from 1921 until his death in 1957. No one can visit Ljubljana, or live there, without feeling that it is a uniquely comfortable and interesting sort of place, even if one is totally innocent of any knowledge of how or by whom it was designed. Djurdja Gržan-Butina, in her essay on Ljubljana's master plan and spatial structure, successfully documents Plečnik's influence on the city's overall imageability, accessibility, and its integration of complexity and variety at all scales within the overall order. Richard M. Andrews, who contributed most of the book's many photographs, develops this theme in his discussion of Plečnik's plans for restructuring the two waterways that provide focus for the central portion of the city. This river scheme was the heart of Plečnik's sophisticated urban design, built in part on ideas enunciated by Camillo Sitte and the Garden City movement, but unique in its blend of traditional and Classical elements with Modern principles.

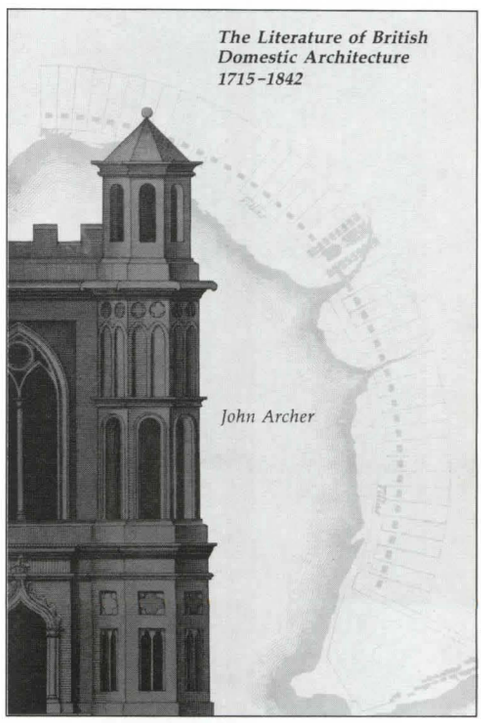
Summing up, this little book is a very substantial contribution to understanding a fascinating designer whose approach to a more responsive architecture has been both misunderstood and underrecognized internationally. As an accompaniment to the exhibit for which it was designed, the book's small size and black-and-white photographs are totally appropriate. But we may hope that its authors will give attention to an expanded version which, by additional research outlined by the authors themselves, and with larger and more complete graphics and color photographs, will provide even fuller expression to the potentialities inherent in the work of their remarkable subject. ***Robert G. Dyck*** ■

*The author is Professor of Planning at Virginia Polytechnic Institute, Blacksburg.*




## *British Domestic Architecture*

Books about architecture could be bought at reasonable, even ludicrously low prices in second-hand bookshops in Britain until fairly recently, but those days are gone forever. Today, any 18th- or early 19th-Century book with illustrations by architects, or books associated with changes of taste in architecture, command considerable sums (if they can be found at all). This simple fact demonstrates the growing interest in architectural history and in the recognition of the importance of the printed source in processes of great changes in style. Scholars, collectors, and students have created a demand for significant source-books, so that the serious architectural historian is hard-pressed to find any interesting book on the antiquarian market, even if he or she can afford the



prices. A major bibliographical study of such historic books has long been overdue, and it is symptomatic of what Dr. Watkin has called the "Rise of Architectural History" that such a work has been published in 1985. Such symptoms give cause for pleasure in these dispiriting times, and it is to be hoped that the rediscovery of important literature concerned with historical architecture will form the bedrock upon which intellectually respectable architectural theories may be built in the future. Real sources, history, and facts are considerably more interesting and useful than the vapid ramblings and pseudo-theories of those who led architecture into such a dead end over the last two generations.

There can be no question that domestic design in Britain developed and changed partly because of the influence of printed sources. From Colen Campbell's *Vitruvius Britannicus* to John Claudius Loudon's enormous and important *Encyclopaedia of Cottage, Farm and Villa Architecture* (which went into at least fourteen editions) architectural ideas were given wide currency through the printed book during the period covered by Professor Archer's massive study. In later times, of course, journals such as *The Studio* and later architectural magazines were just as potent in their function, and efficiently disseminated architectural fashion in our own century.

The bulk of Archer's huge tome is given over to descriptions of books and periodicals that contain designs for domestic architecture, but printed works that cover landscape design, draftsmanship, agriculture, and perspective are also listed. Bibliographical details are given for each entry and all known editions, while plates and texts are subjected to analyses in the commentaries. Architecture and the book trade are discussed in the long introduction; content, layout, and illustrations are described; and theories, dwelling types, and planning are outlined. Comprehensive appendices include checklists of handbooks and manuals, books showing domestic interiors, chronological lists, and names of printers, publishers, and even booksellers. There is a useful index. Archer has limited his study to books that contain original designs for residential buildings, and has only catalogued publications that include at least one design for a whole dwelling in plan, elevation, or perspective. However, he has included enclosed garden buildings (such as lodges and hermitages), but has omitted builders' handbooks, artisans' manuals, and collections of ornaments, although he recognizes that these contain designs for Orders, doors, windows, stairs, mouldings, and other motifs. Nevertheless, he has included a checklist of the most important publications in these latter *genres* by the most significant authors (such as the Langleys, the Nicholsons, and others). Where any notable views or information about the three-dimensional design of residences occur, Archer has mentioned the publications in some form in his splendid book. Topographical views, rather than original designs, have been listed in the appendices.

Archer's zeal and tenacity have been extraordinary, and have contributed in no small measure to this vast study (publication of which was supported by the J. Paul Getty Trust). Colossal must have been the labor involved in the mere collection of the material, let alone the writing of the critical and descriptive commentaries, and it is not surprising that the project "extended over a dozen years." John Archer has concentrated on books and periodicals with British or Irish imprints, has excluded single sheets, manuscripts, and drawings, has omitted Continental or American editions of British books and periodicals, and has confined himself to the period 1715–1842, which has given him immense scope. He justifies the chronological limit of 1842 as an "appropriate, if not necessarily pivotal, date" at which to conclude his book: It was then that Loudon's *First Additional Supplement* to his *Encyclopaedia* appeared, while *The Builder* (that huge source of information concerning Victorian buildings) first came out in that year. In a way, it is a pity that the great wealth of Victorian publications dealing with housing has been omitted: The works of Henry Roberts alone are of international significance in the development of working-class dwellings, and there are many other publications that could provide the meat for a massive bibliography. Perhaps Professor Archer might be persuaded to bring out another book covering the period 1842–1914: it would be welcomed by students of the Victorian age.

[*Continued on page 153*]

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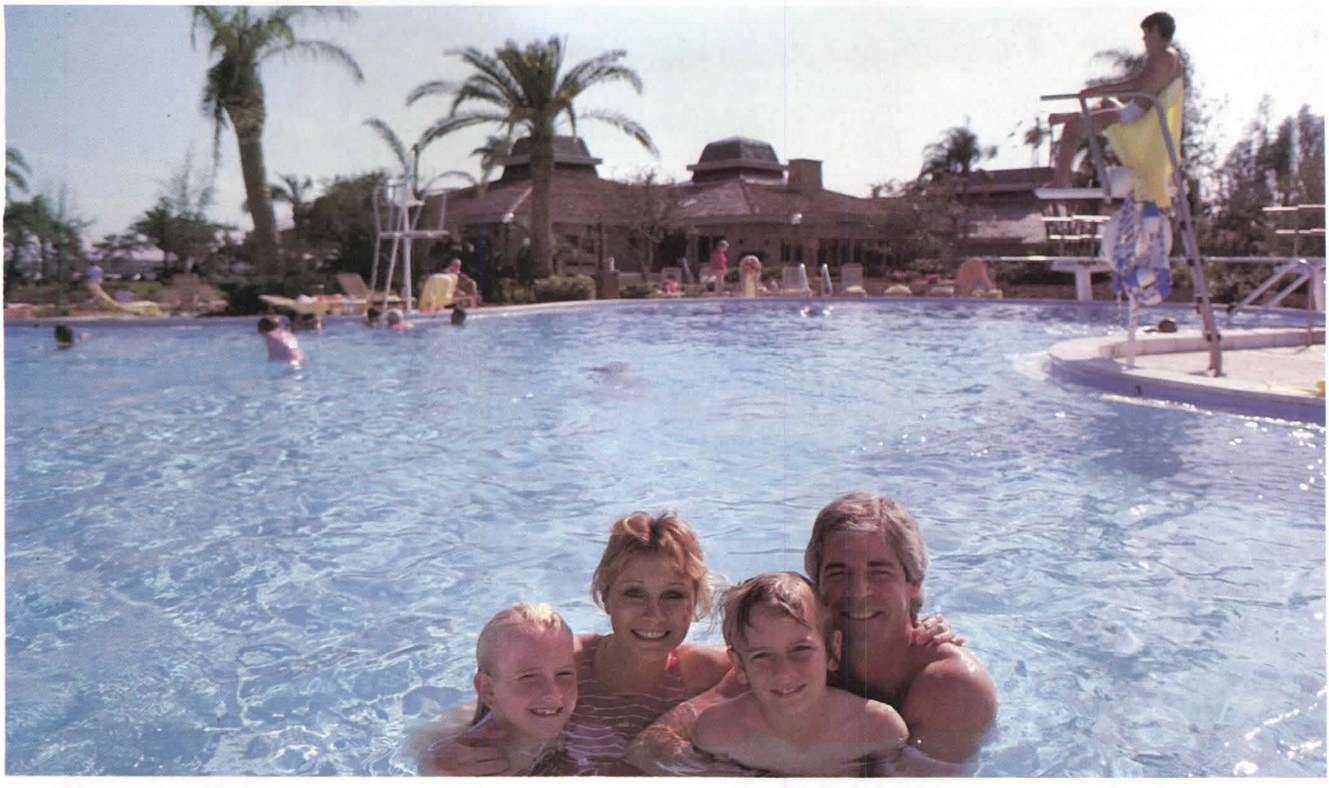

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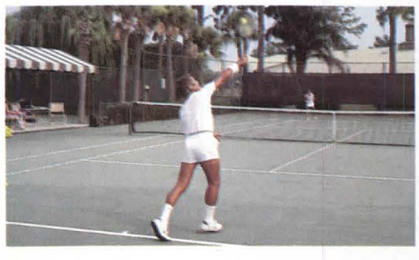

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*The Literature of British Domestic Architecture* augments such major scholarly works as Howard Colvin's magisterial *Biographical Dictionary of British Architects 1600–1840*, yet there are a few points with which to quibble. For example, a list of "Sources Consulted" is surprisingly meager, as well as comprising a curious assortment of titles; while the author seems to regard Richard Brown's *Domestic Architecture* of 1842 as rather more "comprehensive and thorough," "voluminous and authoritative," and "impressive . . . and encyclopedic . . ." than it actually is. Colvin's description of Brown's book as "an indiscriminately eclectic work" is much nearer the mark, for the contents are peculiar, to say the least. Much of Brown's *oeuvre* is decidedly unscholarly, while his designs all too often have more of a hint of the fairground about them: His "Egyptian Pavilion," for example, owes more to Foulston or to Robinson than to ancient Egypt, while his plate of "Egyptian Columns, Walls, and Ceilings" belongs to the "Commercial Picturesque" tradition rather than to scholarly observation, despite the fact that by 1842 there were many accurate renderings of Egyptian architectural detail and décor to be found in published sources. Brown's "Egyptian Orders" are grotesque, and have little resemblance to reality.*

Another problem arises with the illustrations to Archer's book. There are only eleven of these, intended "to offer a taste of the various architectural styles, dwelling sizes, and illustration techniques found in British architectural books of the period." These reproductions are of indifferent quality, however, and the tiny selection is so pointless as to prompt the question of why they were included at all. Indeed, the pictures are curiously random and, like the list of "Sources Consulted," are most unsatisfactory as a collection, in spite of the author's claims to have chosen some of the "less well-known but . . . interesting and handsome designs." One of Richard Brown's villas (not by any means the most unusual of his strangely eclectic creations) is reproduced!

However, these relatively minor matters, though raising questions about Archer's judgment, pall when viewed against the book as a totality. The coverage of the subject is remarkable, and the book will be of considerable help to students of the period. A scholarly bibliography of the literature of British domestic architecture has been needed for some time, and Professor Archer deserves our gratitude for providing it. Perhaps his publishers could have been persuaded to produce a less unwieldy volume, though, for the book is very heavy, and would have been better as two volumes. Very generous left-hand and bottom margins on each page surely were not necessary, for they have inflated considerably the size of the book. Binding is unattractive and dull, and is not strong enough for the sheer bulk of the tome; my review copy is looking tired already.

On the credit side, modern methods of bibliographical description, cross-referencing, and standard methodology of cataloguing books can only be welcomed, while the advanced technology that makes it all possible for such an immense range of titles is all to the good. It is a pleasure to be able to salute the arrival of a useful work that will be a tool for further study. Archer's book is a major attempt to outline the development of architectural ideas of this period by a methodical examination of the published sources. His industry is to be applauded; the effort of visiting the many libraries necessary for his task deserves respect, while his diligence in getting it all down in usable form warrants our thanks. The publishers' claim that the book "will serve as a standard resource for researchers and librarians, book dealers and collectors" is not idle; this is a significant book that will be of great use to scholars.

***James Stevens Curl*** ■

* *See Curl, James Stevens.* The Egyptian Revival. An Introductory Study of a Recurring Theme in the History of Taste. *London, Winchester (Mass.), and Sydney, 1982. Pp. 173–77 for illustrations of Brown's work.*

*The reviewer, a British architectural historian, is the author of* A Celebration of Death *(1980),* The Egyptian Revival *(1982),* The Life and Work of Henry Roberts (1803–76), Architect *(1983), and other titles. His* The Londonderry Plantation 1609–1914 *is to be published by Phillimore & Co. Ltd. in 1985.*

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**Coming next month**

# *P/A in November*

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*Detail from St. Louis Union Station.*
*Architects: Hellmuth Obata & Kassabaum.*

## *Remodeling and Preservation*

Continuing a tradition dating back to 1976, P/A's November issue will be devoted to remodeling and preservation. Included will be the exhilarating example of the St. Louis Union Station, the largest project yet to qualify for rehabilitation tax benefits, which has been converted into a hotel and retail center. At the other end of the scale will be a small Frank Lloyd Wright house in Los Angeles, carefully restored as a house. A new kind of feature will analyze the generic problem of transforming industrial buildings for other uses. And a round-table discussion sponsored by P/A will take up the timely issue of Federal policy regarding preservation and reuse.

## *Technics: Replacement Materials*

An article closely linked to the issue theme will take up the matter of substitute materials: what products are available, whether and when to use them.

## *Future Issues*

P/A in December will include features on controversial new completed buildings, plus a Technics feature on entrances. Then in January, the annual P/A Awards issue will explore the frontiers of excellence and innovation in architecture.

# *New Products and Literature*



*Ampat/Planar flush glazing system.*

*Detail of glass connection.*

*Horton's low-cost, high-security revolving door.*

## *Ampat/Planar Flush Glazing System*

Pilkington, the English glass company, and Ampat, the American curtain wall company, have joined to produce a new butt-glazed curtain wall system. It features a flush, glass skin with no protruding mullions. Bolts, set within countersunk holes, fasten the glass to angles that, in turn, attach to the curtain wall framing. Triangular corner plates or deep window sills and heads cover the bolts and angles on the inside of the glass walls.

The advantage of the glazing system lies not just with its flush surface, but with its adaptability to sloped, vertical, and horizontal positions without the need for exterior glass stops. It costs about the same as other silicone structural glazing systems and offers greater wind resistance and thermal performance. ■

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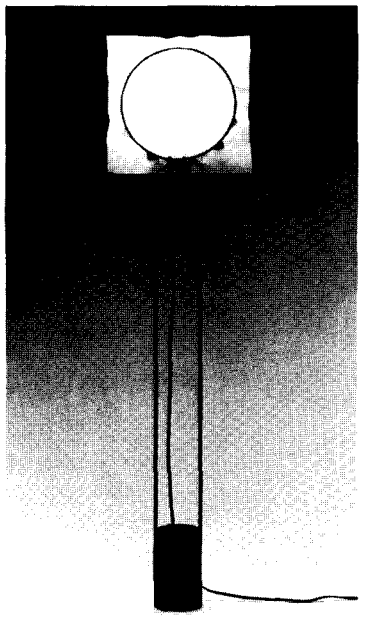
## *Horton Control-Flow Revolving Door*

Horton Automatics, the door manufacturing division of the Dallas Corporation, has introduced a new low-cost, high-security automatic revolving door. By using flat tempered glass panels rather than curved glass, the company has brought the cost of the automatic revolving door down to that of a manual door. The flat panels also allow the reglazing of the enclosure on site, with "off-the-shelf" glass.

The door can come equipped with a badge reader. Should an unauthorized person attempt to enter or exit, the door automatically stops, a voice module announces "Wrong way. Please exit," and the door backs the person out and remains locked until an authorized badge is shown. The reader system records the badge numbers, and the date and time of their use. ***Thomas Fisher*** ■

*Circle 101 on reader service card*

# *New Products and Literature*



**The Corona floor lamp,** which has been selected for the permanent design collection of the Museum of Modern Art, New York, is constructed of satin black enameled steel rods with a weighted base for stability. The rods bend at the top to support the ceramic socket, which accepts a conventional bulb, and terminate at the hoop. The replaceable shade is handmade of Japanese rice paper, which provides both diffused and reflected light. It is also available in a wall-mounted version. Both are UL approved. Porcelli Associates, Inc.
*Circle 120 on reader service card*

**SNAP energy management system** automatically reduces the cost of electricity required to operate retail facilities, schools, offices, and light manufacturing. It controls air conditioners, exhaust fans, refrigeration, heating, and lighting. SNAP/NET software provides a means of supervising up to 100 SNAP installations from a single location. The system is easy to install and easy to operate, and will usually pay for itself in 18 months or less, according to the manufacturer. AMF Control Systems.
*Circle 122 on reader service card*

**A laser plotter system,** developed for CAD needs of architectural and engineering firms, produces a sharp, 8½" x 11" negative of a completed drawing from magnetic tape. The negative can be reproduced to a full-size photo tracing on polyester or other photosensitive material. The negative can be stored by the customer in place of a full-size drawing. All types of CAD drawings can be laser plotted and reproduced by the Laser-Trace System. CAD TECH, Inc.
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**Heat-Soak**™ energy storage block system, manufactured of high thermal capacity concrete, dry stacks within stud walls. It provides thermal mass for heat storage and reduced temperature variations (with a decrease in heating and cooling loads) and sound privacy. The block design does not interfere with electrical wiring. It requires no maintenance and is compatible with wood or metal stud construction. The National Concrete Masonry Association.
*Circle 124 on reader service card*

**Natural Textures** is a collection of 258 wallcoverings in colors and in neutrals with a subtle hint of color, which can be picked up in furniture, carpets, or accessories. All are Class A fire rated and several are washable. J.M. Lynne Company.
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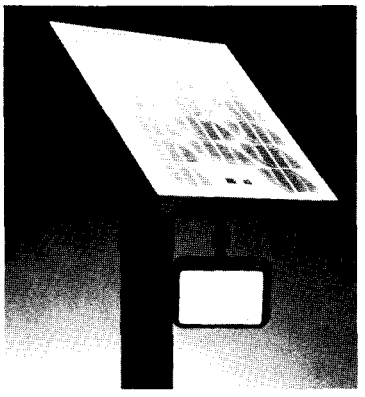

**1st STAR outdoor light** is battery powered with solar energy collected by photovoltaic panels. At sunset the light turns on automatically, using stored energy. Designed for commercial and industrial applications, it requires no external wiring. Panels, light, and battery have a compact aluminum housing and can be mounted on a pole or structure that faces south. The 5-watt halogen lamp is swivel mounted to adjust in any direction. Elan Emergency Lighting, Div. of Altus Corp.
*Circle 126 on reader service card*

**The Foster coating/urethane roof** system, for use with sprayed-in-place urethane foam, provides a watertight, weather-resistant protective seal. The system, manufactured on site and applied with airless spray equipment, is fully adhered and requires no ballast. It can be applied over asphalt, wood, concrete, metal, and other existing roofs. H.B. Fuller, Foster Products Division.
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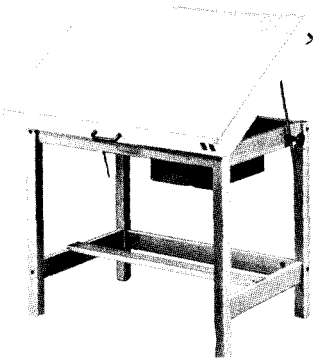

**The Forester Lite light table** has a removable light box that is portable and functions independently of the base. It has a handle, legs, cord holder, and rubber bumpers. Bases are available finished or unfinished and have an optional front storage compartment. Mayline Co.
*Circle 128 on reader service card*

**Public restroom** replacement/rehab products that are vandal-resistant are offered in a new catalog. Now available are partitions, grab bars, stainless steel mirrors, and hand dryers. Later additions will include high-pressure sodium light fixtures and graffiti-removing chemicals. Restroom Facilities Products, Div. of Intexx Corp.
*Circle 227 on reader service card*

**Emergency Lighting** catalog covers fixtures for commercial and industrial applications, exit signs, component heads, fixtures, and accessories. The catalog also features Spectron emergency light with microcircuitry that monitors readiness, diagnoses malfunctions, and provides visual status indication and low-voltage battery disconnect. Dual-Lite, Inc.
*Circle 206 on reader service card*

**Custom engraved signs** in solid brass with polished or satin finish have black-enamel-filled engraving and a protective lacquer finish. They are available in several shapes, sizes, and styles of lettering and come with brass mounting screws. Riro Co.
*Circle 130 on reader service card*

**Moving message display signs** have a wireless remote control keyboard. The signs can be programmed from distances to 30 feet. They have 22 display functions, a capacity for 1600 characters, and a memory backup of one year. There are two sizes: 31" x 4" with 2" characters; and 54" x 8" with 4" character size. Characters are available for English, French, Spanish, and German. Gamma Technologies.
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**The Associate** CAD software draws double-line walls from single-line boundaries, with intersecting lines deleted. Windows and doors can be inserted in place and to scale on walls, which gap to accommodate them. Drawings can be enlarged to insert details, then reduced to presentation size. A freehand sketch mode allows entry of unique symbols and even creation of a symbol library. Cascade Graphics Development.
*Circle 132 on reader service card*

**Three-step polyester roofing** system consists of a mastic adhesive coating, Rufon® polyester roofing mat by Phillips Fibers Corp., and a mastic topcoat. For sunlight protection, an aluminum topcoat should be applied. The system is suitable for both new construction and repair of old roofs. Gulf States Asphalt Co., Inc.
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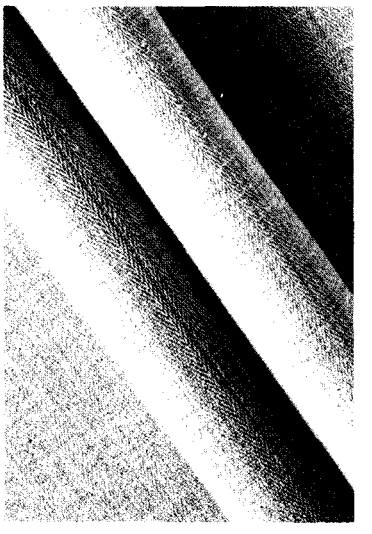

**Linen Hall II wallcoverings** of Belgian linen yarn blends are available in a variety of textures and colors in widths from 25 to 54 inches. There are 70 items in the collection, all treated with Scotchgard® to resist soil and stains, and all have Class A flamespread ratings, in accordance with ASTM E-84. Hamilton Adams Imports, Ltd.
*Circle 134 on reader service card*

**Metal Roofing, Fascia, and Wall Panels** brochure provides profile drawings and installation details of the several types of panels offered. Included in the 20-page brochure are color photos showing the panels installed on buildings. There are descriptions of the metals and various textures and a color chart. Descriptions of coatings available are also included. Engineered Components, Inc.
*Circle 207 on reader service card*

**Merlin Jr,** a lightweight lettering system, produces type on adhesive-backed tape. The compact, portable system uses 75-foot tape and carbon ribbon cartridges for clean loading. Each type disc has 101 upper and lower case letters, numbers, and symbols in popular typestyles. Automatic kerning makes visually attractive characters and letterspacing. Applications include lettering for technical drawings, proposals, labels, slides, and reports. Varitronic Systems, Inc.
*Circle 135 on reader service card*

**Drinking Fountain/Water Cooler** catalog SW-583 covers interior and exterior models, both standard and barrier-free. Installation drawings are included for several types. There are wall-hung and recessed designs and vandal-resistant fountains for outdoor public areas. The catalog has a color chart and a model selection guide. Sunroc Corp.
*Circle 208 on reader service card*

**Office furniture** brochure illustrates in color eight installations and identifies the companies, cities, and interior designers responsible for the designs. The 16-page brochure includes an additional list of companies and designers who have used the furniture. There are photos and descriptions of product design and manufacturing procedures. Harry Lunstead Designs, Inc.
*Circle 209 on reader service card*

**Polybrane® roof system,** single-component, spray-applied polyurethane roofing, cures to a rubbery seamless surface. The system is described in a four-page color brochure, with pictures, charts, and diagrams of the roof. It is energy efficient and monolithic. Polymer Plastics Corp.
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**'Made in Florence'** is a directory of ten manufacturers of traditional Florentine terra cotta, complete with addresses and telephone numbers. Some of the manufacturers also use molds to produce decorative objects. Suitable for exterior or interior use, the tiles are resistant to fire, chemicals, and abrasion and are easy to clean. Italian Tile Center.
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**Comstoc® media reference chart,** a six-page fold-out, makes it easy to determine specific plotter media by showing manufacturer, plotter model numbers, and types. The chart also indicates availability of K&E transparent paper, vellum, or film and plotter points. There is a special section on electrographic plotter media. Keuffel & Esser.
*Circle 212 on reader service card*

**Concealed Fastener Roof Systems** brochure explains three types of roof fastening: Klip-Rib®, standing seam, and batten. Details of each method are shown, along with color photos of installations. Specifications, color chart, finish choices, and panel profiles are provided. ASC Pacific, Inc.
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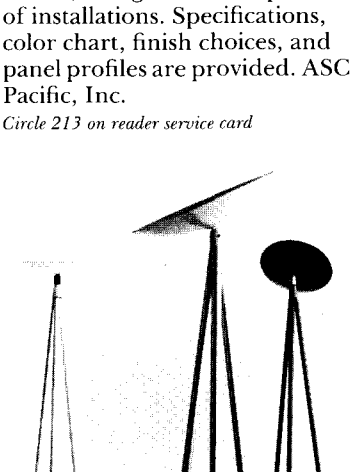

**The Palomar floor lamp** from Stilnovo, introduced at last year's Milan Fair, was designed by Asahara Sigheaki. It has a tripod base, modern dish head, and uses a 300-watt halogen lamp. Finishes are black, white, and chrome. Thunder & Light.
*Circle 136 on reader service card*

**The Atlas 1985 door catalog** covers rolling service doors, fire doors, shutters, and grilles. Featured is the "Enermaster"™ insulated metal rolling door with 1½ inches of foamed-in-place insulation between two metal faces, thermal breaks at top and bottom of each slat, and weatherstripping on all sides. Drawings, illustrations, charts, and photos are included for products described. Atlas Door Corp.
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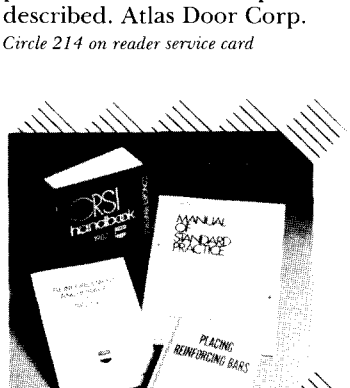


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**CRSI catalog** listing technical literature and services is organized into nine sections: Design aids, Testing, Detailing aids, Placing aids, Pavement design and construction, Bridge design and construction, Structural bulletins, Engineering data reports, and Case histories. The 12-page pocket-sized catalog also lists a number of computer programs. Concrete Reinforcing Steel Institute.
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**Custom Architectural Fountains** brochure has color photos of 26 fountain installations in cities around the country and identifies others world wide. The eight-page brochure illustrates the variety possible and explains design and engineering assistance available. Kim Lighting, Subsidiary of Kidde, Inc.
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**Softshine™** furniture-mounted indirect lighting accommodates either three or six Sylvania Octron lamps, depending on the fixture length. The striped fascia lens provides visible low brightness; the interior wide-spread lens distributes light over a broad area of the ceiling, providing even, ambient light. Softshine is compatible with most major office furniture systems. Peerless Lighting.
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**Expanded polystyrene** (EPS) insulation for roofs has a typical R-value of 3.9 per inch (at 75 F), which does not decrease over time. It can withstand temperature cycling and does not absorb an appreciable amount of moisture. EPS is available as flat board, tapered board, or laminated to structural board. The Society of the Plastics Industry, Inc., Expanded Polystyrene Div.
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**Econoline vertical filing cabinets** accommodate drawings in several sizes in as little as 40 percent of the space required for flat files. Bilateral spring compression keeps drawings flat in folders. The cabinets are shown in a four-page folder that provides specifications and information on capacities. Ulrich Planfiling Equipment Corp.
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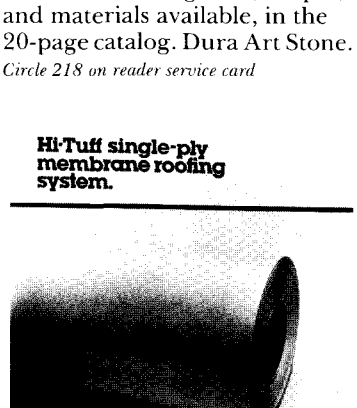
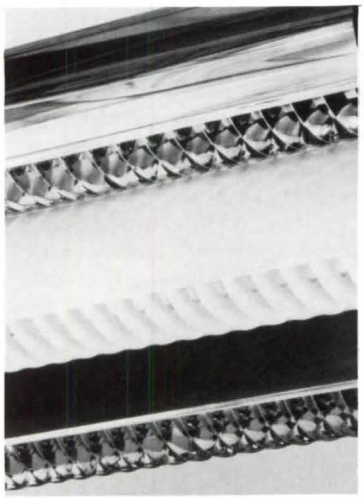
**Landscape furniture** and furnishings catalog covers planters, trash receptacles, ash urns, benches, picnic tables, parking bollards, tree grids, and light bollards. Materials include cast stone/precast concrete; Glascrete, a combination of resin, small aggregate, and fiberglass; and Fiberlite, a gelcoat and fiberglass laminate. The products are illustrated and described, including sizes, shapes, and materials available, in the 20-page catalog. Dura Art Stone.
*Circle 218 on reader service card*




**Hi-Tuff roofing** is based on Du Pont Hypalon® synthetic rubber reinforced with fully encapsulated polyester scrim for wind resistance. Hot-welded seams provide watertight protection, and its reflective white surface offers energy savings. The roofing system is fully described in an eight-page color brochure. J.P. Stevens & Co., Inc., Elastomeric Products Dept.
*Circle 219 on reader service card*
[*Continued on page 162*]



**Tubular Lighting System 8,** an eight-inch-diameter linear fixture, is available in a choice of surface finishes including polished plated and a large selection of colors. Paravex® parabolic convex louvers, which control glare from parallel and perpendicular viewing angles, are blackened on the lamp side to prevent reflection back into the fixture. Descriptions, illustrations, and photometric data are provided in a 24-page color brochure. Staff Sales, Inc.
*Circle 220 on reader service card*

**Infra-Foil reflective insulation** Type P10-R30/23 has an R-value of 30 in summer and 23 in winter. It has nine reflective layers and ten reflective air spaces, available in parallel or accordion types, to prevent heat transfer. The insulation is attached between standard ceiling joists, forming an edge-to-edge reflective vapor barrier. It is nontoxic and has a Class 1 fire rating. Aluma-Foil Insulation Corp.
*Circle 139 on reader service card*

**Marghestone® tiles,** manufactured from resins and natural marble, can be used on floors and walls. The tiles have a granite look, but cost much less than granite. A six-page color brochure illustrates the ten colors available. Standard size is 12″ x 12″ x ⅜″, with custom sizes available to 24″ x 24″ x ¾″. Verona Marble Co., Inc.
*Circle 221 on reader service card*

**The Stand Alones** computer support tables, single and double stem bi-level CRT tables, cantilevered display tables, peripheral machine tables, and single surface tables are all height adjustable. Frames and bases are of heavy-gauge metal, and surfaces are oak veneer or laminate. They can be used alone or as part of an ergonomic workstation. The furniture is illustrated in color and described in an eight-page brochure. Human Factor Technologies.
*Circle 222 on reader service card*

**Metal panels** in several series are described and illustrated in a 20-page brochure. Color photos show the panels in typical applications. Information for each series includes description, application, design flexibility, profile drawings, and suggested specifications. Materials and coatings are discussed, and a color chart is included. Metal Building Components, Inc.
*Circle 223 on reader service card*

**Tambours** in hardwoods, hardwood veneers, metallics, wood-finish vinyls, laminates, and metallic-look Mylars are available in several profiles. They are shown in a 14-page brochure, along with benches, planters, and accessories—available in red oak or laminates—and architectural grilles in wood. Color photos show the products in use. Material and dimension information is provided. Shōgun International Corp.
*Circle 224 on reader service card*

**'Obtaining Predictable Concrete Finishes'** brochure explains how specifying the correct concrete form, materials, and techniques affects finishes. Illustrations show how to avoid problems such as mechanical transference, surface discoloration, bugholes, honeycombing, and nonadherence of coatings. The brochure includes illustrations of finishes and recommended forms for achieving them. Simpson Panel Products.
*Circle 225 on reader service card*

**Lithotex® formliners** can be used to create almost any desired texture or sculptured effect. More flexible than rubber, the formliners are available in a variety of standard, special, and custom textures for cast-in-place, precast, or tilt-up architectural concrete. The forms can be used up to 50 times without a form release, substantially more times using Lithotex maintenance products and special care. L.M. Scofield Co.
*Circle 140 on reader service card*
[*Continued on page 163*]

**Lexgard® laminates,** composites of Lexan® polycarbonate sheets bonded with an interlayer film, are available in bullet-resistant and forced entry-resistant glazing. The products are described in a 20-page brochure that covers several Lexan sheet products. General Electric Co.
*Circle 226 on reader service card*

## *Building Materials*

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

**Procter & Gamble General Offices, Cincinnati, Ohio (p. 71).** *Architects: Kohn Pedersen Fox Associates, New York, N.Y.* Limestone: Indiana Limestone. Marble: Vermont Marble. Glass: PPG Industries. Precast concrete: Marietta Concrete. Fabric, marble, stainless steel trim: Tarpenning-LaFollette. Aluminum and glass, stainless steel and glass assemblies: Crescent Corp. African mahogany: Midwest Woodwork. Brick and precast pavers: Marietta. Installation of pavers, terrazzo with inlays: Mike Carnevale. Roofing: IRMA system. Rigid insulation: Dow Chemical. Terne coated stainless steel roof: Follansbee. Paint: Glidden. Computer (raised) floor: Tate Architectural Products. Locksets: Schlage. Door closers: LCN Closers. Panic hardware: Von Duprin. Security system: Rusco. Fire detection system: Bogar. Elevator and moving stair equipment: Westinghouse; custom elevator interiors: Tyler Elevator. Stainless steel handrails: Tarpenning-LaFollette. Custom light fixtures: Bergen Art Metal. Toilet partitions: Mills. Bathroom accessories: Bobrick. Water fountains: Haws. Sprinklers: Cincinnati Sprinkler. Air conditioning chillers: Trane. Environmental controls: MCC Powers. Carpet tile: Interface. Fiberglass lay-in ceiling: Owens-Corning. Fluorescent office lighting fixtures: Peerless Electric Company. Office work stations and tables: JG Furniture. Ring lamp: Atelier International. Files and shelving: GF. Seating: Knoll, Sunar, Shaw-Walker, Vecta. Upholstery material: Knoll. Window shades: Mecho Shades.

**840 Michigan apartments, Evanston, Ill. (p. 88).** *Architect: David Hovey, Chicago.* Brick: Custom Brick. Sliding windows and doors: Acorn Building Components. Flush steel insulated entrance doors: Allied Door. River stone: Swake Stone Co. Acoustical spray textured ceilings: USG. Ply asphalt roofing: Koppers. Urethane insulation: OCF. Drywall: USG. Exterior paint (semigloss latex) and interior (flat latex): Benjamin Moore. Hinges and door closers: Stanley. Locks: Schlage. Basement panic exit doors: Von Duprin. Stacked washer/dryer units: General Electric. Smoke detectors: BRK Electronics. Exterior lighting (incandescent): Prescolite. Interior lighting (incandescent): Progress. Electrical distribution: Square D. Lavatories: Corian. Plumbing fittings: Moen. Bathroom accessories: Cerilian Products. Electric baseboard heating: Federal Pacific. Air conditioning: Carrier Corp. Blinds, 1″ mini in all units: Levolor.

**Arbour Park, Tempe, Ariz. (p. 92).** *Architects: Joseph M. Valerio, Chicago, Ill., with Robert Ball Architects, Phoenix, Ariz.* Wood trusses: Schuck Components. Hollow masonry block: Superlite Builders Supply. Aluminum sliding windows: Joe Keith Ind. Solid-core entrance doors and mahogany hollow core interior doors: Schuck Components. Roofing: Monier. Integral color stucco: Western Stucco. Locksets: Weslock. Kitchen range, refrigerator, garbage disposal: Admiral. Coin-operated washer/dryers: Web Service Co. Smoke detectors, fire alarm pull stations, heat sensors in laundry rooms: Chambers. Luminated entry sign, acrylic unit directional signs: Blier Signs. Fabricated steel handrails and stair stringers: D&M Iron. Incandescent lighting: Progress, Abolite. Fluorescent lighting: Progress. Electric distribution: Square "D." Fiberglass tubs: Hesco. Lavatories and stainless steel kitchen sinks: American-Standard. Plumbing fittings: Price, Pfister. Bathroom accessories: American-Standard. Sprinklers: Toro. Gas heating system: Raypack. Air-conditioning system: Dumbush. Carpets: Handcraft Carpet Mills. Custom-built oak, oak laminate furniture: Sterling Mfg. Herculon nylon fabric: Hercules. Draperies: Master Drapery. Traverse rods: Kirsch. T.V. satellite dish: Menl Cable.

# P/A Job Mart

**Situations Open**

**Assistant Technical Editor**
Progressive Architecture is seeking a graduate in architecture or building technology for the position of Assistant for technical subjects. Interest in building materials and construction essential, as are strong writing and research skills. Opportunity for advancement with experience.
Reply:
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600 Summer St., P.O. Box 1361
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**Architectural Designer**—Design commercial & residential properties with Architect's approval: Prepare inf. re; design specif. materials, equipm't estimated costs & bldg. time et. al.; plan project layout. Prepare design drawings for building; Provide client with sample recommendations & shop drawing reviews; site progress superv. et. al. Skilled in innovation & implementation of cost effective ideas & energy conservation techniques & utilization incl. through computer modeling approaches; research & implementation of life & fire safety codes. $2,383.00 per mo.; Bachelors deg. in Arch. & 3 yrs. exp. in position or M.Arch. degree & 1 yr. exp. in pos. in lieu of Bach. deg. & 3 yrs. exp. in pos.; Job Site: Corona del Mar, Ca.; Please send ad & resume to Job #1767 P.O. Box 9560, Scto., Ca. 95823-0560 not later than Nov. 9th, 1985. If offered employment, must show legal right to work.

**Arch. Designer/Project Mgr.** w/degree in architecture, min. 5 years experience. Strong in conceptual and detail design; capable of managing full A/E team. Position further requires exp. in graphic & verbal presentation; production; specifications; constr. admin. Salary negotiable. Reply to Box 1361-467, *Progressive Architecture.*

**Architecture Critic/Feature Reporter**—Writes critical reviews & special features on urban design & city planning applying knowledge & experience gained in field as professional architect. Cooperates with editors & colleagues under pressures of daily newspaper. Demonstrates independence, insight & initiative to seek out relevant urban issues for subject matter. Must have proven ability to write clear, compelling prose on urban issues, accessible to general readership of major city newspaper, yet of a standard respected by professionals. JS: L.A. 40 hr. wk. B.A. (Architecture). 4 yrs. exp. $735.00 per wk. Send ad & resume to Box 1361-468, *Progressive Architecture.*

**Carnegie-Mellon University,** Department of Architecture, is seeking persons for full-time, tenure track faculty positions for 1985–86 with substantial theoretical knowledge that is integrated with architectural design, persons with a focused pedagogy for design studio and/or management or computer aided design. In addition to teaching, successful candidates will be expected to supervise students in graduate and undergraduate programs, conduct research and participate in committee work. Salary and rank will be commensurate with qualifications. Send resume and list of references to Omer Akin, Head, Department of Architecture, Carnegie-Mellon University, Pittsburgh, PA 15213. Carnegie-Mellon is an EO/AA employer.

**Dean, College of Architecture and Environmental Design, Arizona State University**—Arizona State University invites applicants or nominations for the position of Dean of the College of Architecture and Environment Design. ASU, a major research University, located in the Phoenix metropolitan area, consists of 11 colleges with a total student enrollment of 40,000. The College includes three academic units: the Department of Design Sciences, the Department of Planning, and the School of Architecture. Candidates should possess an advanced degree or equivalent professional qualifications in one or more of the fields represented in the College. Previous university administrative experience is desired as is the demonstration of outstanding professional leadership. The preferred starting date is July 1, 1986. Salary is competitive. Nominations or applications must be received by November 1, 1985. Correspondence should be addressed to the Chair, Dean of Architecture and Environmental Design Search Committee, Office of the Academic Vice President, Arizona State University, Tempe, AZ 85287. ASU is an Equal Opportunity, Affirmative Action Employer.

**Faculty Position**—Architecture—1986. The Drury College Department of Art and Architecture seeks candidates for one associate and one assistant nine-month tenure-track position for the spring or fall 1986 in the following areas: Structures, Environmental Technology, History/Theory/Criticism and Computers. Candidates should possess a Master of Architecture and/or Doctorate in Architecture or a related discipline and a teaching, publication and research record in their area of specialization. Applicants who can contribute in more than one of the areas stated above will be given preference. Well developed communication skills are required, both written and verbal, with curriculum development experience and architectural registration desired. The salary range for the associate professorship is $30,000–35,000 and $20,000–25,000 for the assistant professorship. Submit curriculum vitae, a letter of application clearly stating your design and teaching philosophy and the names, addresses and phone numbers of four references to: Jay G. Garrott, Department of Art and Architecture, Drury College, 900 North Benton Avenue, Springfield, Missouri 65802. Other documents should not be forwarded until requested. Letters of application must be received by November 1, 1985. Drury College is an Affirmative Action/Equal Opportunity Employer and invites applications from all qualified individuals.

**Faculty Position—Ferris State College** Open Dec. 1985. Responsibility for courses in basic drafting, architectural presentation, working drawings and related subjects in established associate degree program. Assist in development of baccalaureate programming in Facilities management. Professional degree in Architecture with architectural office experience essential. Familiarity with computer graphics required. Information and application instructions may be obtained from James B. Shane, AIA-Head, Construction Dept., Ferris State College, Big Rapids, MI 49307, (616) 796-0461 ex 3763. Affirmative Action/Equal Opportunity Employer. FSC is a major Michigan State College and is located in the heart of a year round recreational and scenic area, an hour's drive north of the state's second largest city.

**Production oriented architect** to carry project from Design Development to completion with a minimum of 3 to 5 years experience. Salary commensurate with experience and qualifications. Good benefits including pension plan. Send resume to Alpha Associates, Inc., P.O. Box 1250, Morgantown, WV 26507.

**The University of Colorado at Denver** seeks a Dean for its College of Design and Planning. The College offers graduate programs in Architecture, Urban Design, Interior Design, Landscape Architecture, and Planning/Community Development. Qualifications include earned doctorate or the appropriate terminal degree, significant administrative experience, energetic leadership in program development and excellent academic/creative accomplishment. Deadline for completed applications: November 15, 1985. Letters of application or nomination to: Professor Carolyn Simmons, Chair, Search Committee, Dean of the College of Design and Planning, University of Colorado at Denver, 1100 14th Street, Campus Box 126, Denver, CO 80202. An AA/EEO employer.

**The University of North Carolina at Charlotte** seeks faculty to work together in developing program to address major architectural issues and to provide innovative, holistic and rigorous architectural education. Two positions for Visiting Assistant/Associate Professors to teach architectural history and upper year studio are available for Spring 1986 Semester beginning January. Two multi-year, tenure track positions at the rank of Assistant or Associate Professor are available beginning Spring 1986 Semester to teach first/second and third/fourth year studios and a course in urban design, interiors, energy design, man-environment, construction design, life cycle building analysis, graphics or computer aided design. Masters in Architecture or equivalent required; teaching and practice experience preferred. Salary and rank commensurate with qualifications. Forward letter describing approach to teaching architecture with vitae to: Dean Charles C. Hight, College of Architecture, UNCC, Charlotte, N.C. 28223. Affirmative Action/Equal Opportunity Employer. Deadline for receipt of applications is November 1, 1985.

**Services**

**Edwards + Shepard Agency, Inc.** is the leading, most effective personnel placement agency for architects and interior designers. Call Valerie Glod for current listing of available candidates or submit resume for confidential interview. 1170 Broadway, N.Y., N.Y. 10001 (212) 725-1280.

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# International Furniture Competition

WINNING PROJECTS TO BE DISPLAYED AT MAJOR INDUSTRY EVENTS

**PROGRESSIVE ARCHITECTURE** announces the sixth annual competition recognizing outstanding furniture and lighting design proposals, not yet being marketed by any manufacturer as of entry deadline, January 16, 1986. The competition is intended to give the design professions a forum to express ideas about the next generation of furniture design, at a time when architects and designers are increasingly custom-designing furniture for their projects and manufacturers are increasingly open to fresh ideas. The competition is specifically aimed at furniture intended for use, but the design need not be constrained by existing production or marketing practices. Entries may be based on either fabricated pieces or project drawings. Designers are encouraged to consider the aesthetic and ideological implications for furniture design implied by the current concerns within architecture and other design disciplines.

**WINNING PROJECTS** will be published in the May 1986 P/A and they will be displayed at major industry events during the year. Winners will be honored in New York City at an awards ceremony in early March attended by press, designers, and industry manufacturers.

In addition to the exposure afforded the submissions, the competition will encourage further discourse between the entrants and respected furniture producers. Any ongoing discussions will, of course, be up to the individual designers and manufacturers, but benefit to both is anticipated.

**SUBMISSIONS** are invited in all categories including chairs, seating systems sofas, tables, desks, work stations, storage systems, lighting, beds, and miscellaneous furniture pieces.

**THE JURY FOR THIS COMPETITION**

*Ralph Caplan,* New York, author, editor, critic.
*Paul Haigh,* principal, Haigh Space Ltd., New York, architect and furniture designer.
*Perry A. King,* principal, King Miranda Associates, Milan, Italy, industrial, furniture, lighting, and interior designer.
*Margaret McCurry,* principal, Tigerman Fugman McCurry Ltd. Architects, Chicago, Ill., architect, interior and furniture designer.
*William Stumpf,* principal, William Stumpf + Associates, Minneapolis, MN, industrial and furniture designer.

**JUDGING** will take place in New York City during the month of February. Designations of *first award, award,* and *citation* may be made by the invited jury, based on overall excellence and advances in the art.

*[Turn page for rules and entry forms]*

DEADLINE FOR SUBMISSION

JANUARY 16, 1986

**Entry form**
**International Furniture Competition**

*Please fill out all parts and submit, intact, with each entry (see paragraph 11 of instructions). Use typewriter, please. Copies of this form may be used.*

ENTRANT:
ADDRESS:

ENTRANT PHONE NUMBER *(day):*
*(evening):*

CATEGORY:

ENTRANT:
ADDRESS:

DESIGNER(S) RESPONSIBLE FOR THIS SUBMISSION
*(identify individual roles if appropriate):*

*I confirm that the attached entry meets eligibility requirements (paragraph 1-3) and that stipulations of publication agreement (paragraphs 4-6) will be met. I verify that the submission is entirely the work of those listed on this form (or an attached list as necessary).*

SIGNATURE
NAME *(typed)*

FURNITURE COMPETITION
**Progressive Architecture**
*P.O. Box 1361, 600 Summer Street, Stamford, CT 06904*

*(Receipt)*
*Your submission has been received and assigned number:*

ENTRANT:
ADDRESS:

ENTRANT:
ADDRESS:

**ELIGIBILITY**

1 Architects, interior designers, industrial designers, and design students from all countries may enter one or more submissions.
2 Design must be original. If found to be substantially identical to any existing product design, entry will receive no recognition.
3 Designer may be under contract to or in negotiation with a manufacturer for this design, but design must not be available in the marketplace as of entry deadline.

**PUBLICATION AGREEMENT**

4 If the submission should win, the entrant agrees to make available further information, original drawings or model photographs as necessary, for publication in the May 1986 P/A and exhibition at major industry events.
5 P/A retains the rights to first publication of winning designs and exhibition of all entries. Designer retains rights to design.
6 P/A assumes no obligation for designer's rights. Concerned designers are advised to document their work (date and authorship) and seek counsel on pertinent copyright and patent protections.

**SUBMISSION REQUIREMENTS**

7 ***Submissions will not be returned under any circumstances.*** Do not use original drawings or transparencies unless they are sent with the understanding that they will not be returned. P/A will not accept submissions with outstanding custom duties or postal charges.
8 Drawing(s) and/or model photo(s) of the design should be mounted *on one side only* of one 20″x 30″ foamcore board presented horizontally. ***Any entry not following this format will be disqualified.***
9 There are no limits to the number of illustrations mounted on the board, but all must be visible at once (no overlays to fold back). No actual models will be accepted. Only one design per board.
10 Each submission must include a 5″x 7″ index card mounted on the front side of the board with the following information typed on it: intended dimensions of the piece of furniture, color(s), materials, components, brief description of important features, design assumptions, and intentions. This information is to be presented in English.
11 Each submission must be accompanied by an entry form, to be found on this page. Reproductions of this form are acceptable. All sections must be filled out (by typewriter, please). Insert entire form into unsealed envelope taped to the back of the submission board. P/A will seal stub of entry form in envelope before judging.
12 For purposes of jury procedures only, projects are to be assigned by the entrant to a category on the entry form. Please identify each entry as one of the following: Chair, Seating System, Sofa, Table, Desk, Work Station, Storage System, Lighting, Bed. If necessary, the category *"Miscellaneous"* may be designated.
13 Entry fee of $35 must accompany each submission, inserted into unsealed envelope containing entry form (see 11 above). Make check or money order (no cash) payable to *Progressive Architecture.*
14 To maintain anonymity, no identification of the entrant may appear on any part of the submission, except on entry form. Designer should attach list of collaborators to be credited if necessary.
15 Packages can contain more than one entry; total number of boards must be indicated on front of package.
16 Deadline for sending entries is January 16, 1986. First class mail or other prompt methods of delivery are acceptable. Entries must show postmark or other evidence of being en route by midnight, January 16. Hand-delivered entries must be received at street address shown here by 5 p.m., January 16.

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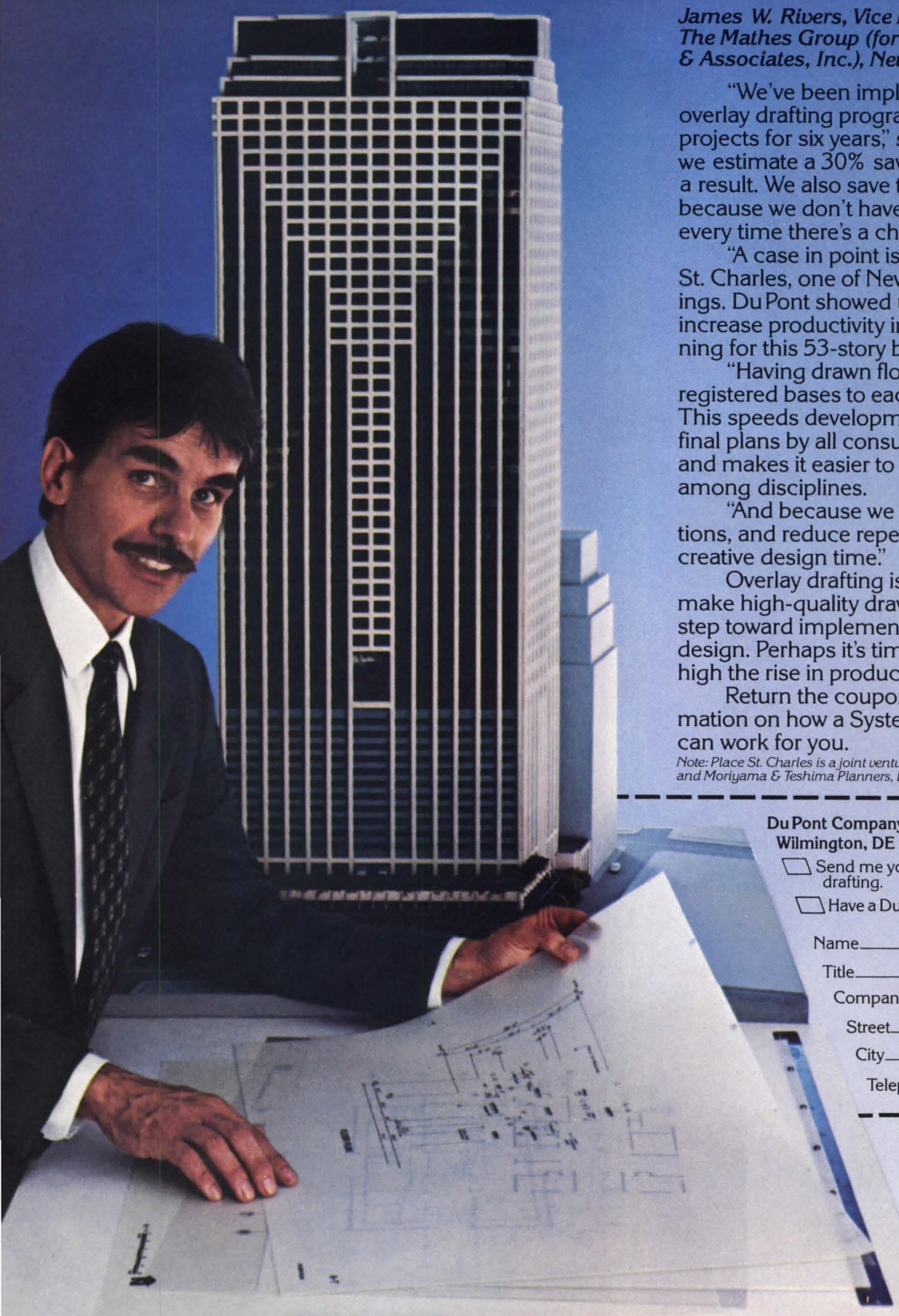

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*The Mathes Group (formerly Mathes, Bergman & Associates, Inc.), New Orleans, Louisiana*

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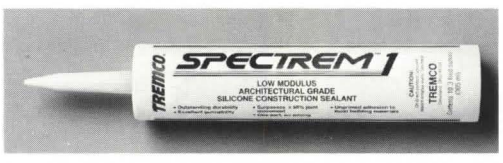



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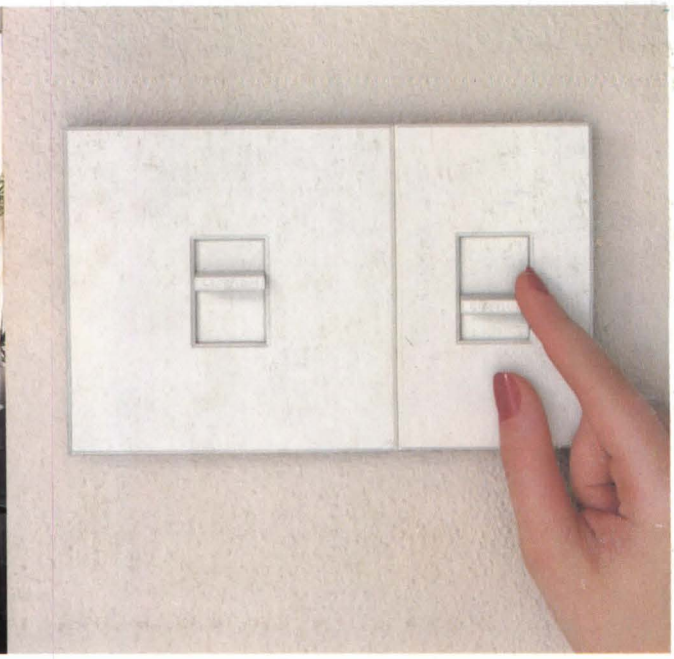

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**Nova**—the designer's choice for every lighting control need. *

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* *Nova wall-box dimmers and custom-built systems have been installed in the Hyatt and Marriott Hotel chains, plus the Grand Hyatt, Coca-Cola, Disneyworld & Disneyland, AT&T, IBM, the World Trade Center in New York, Citibank, Arco, Revlon, Pennzoil, Texaco and the White House.*

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