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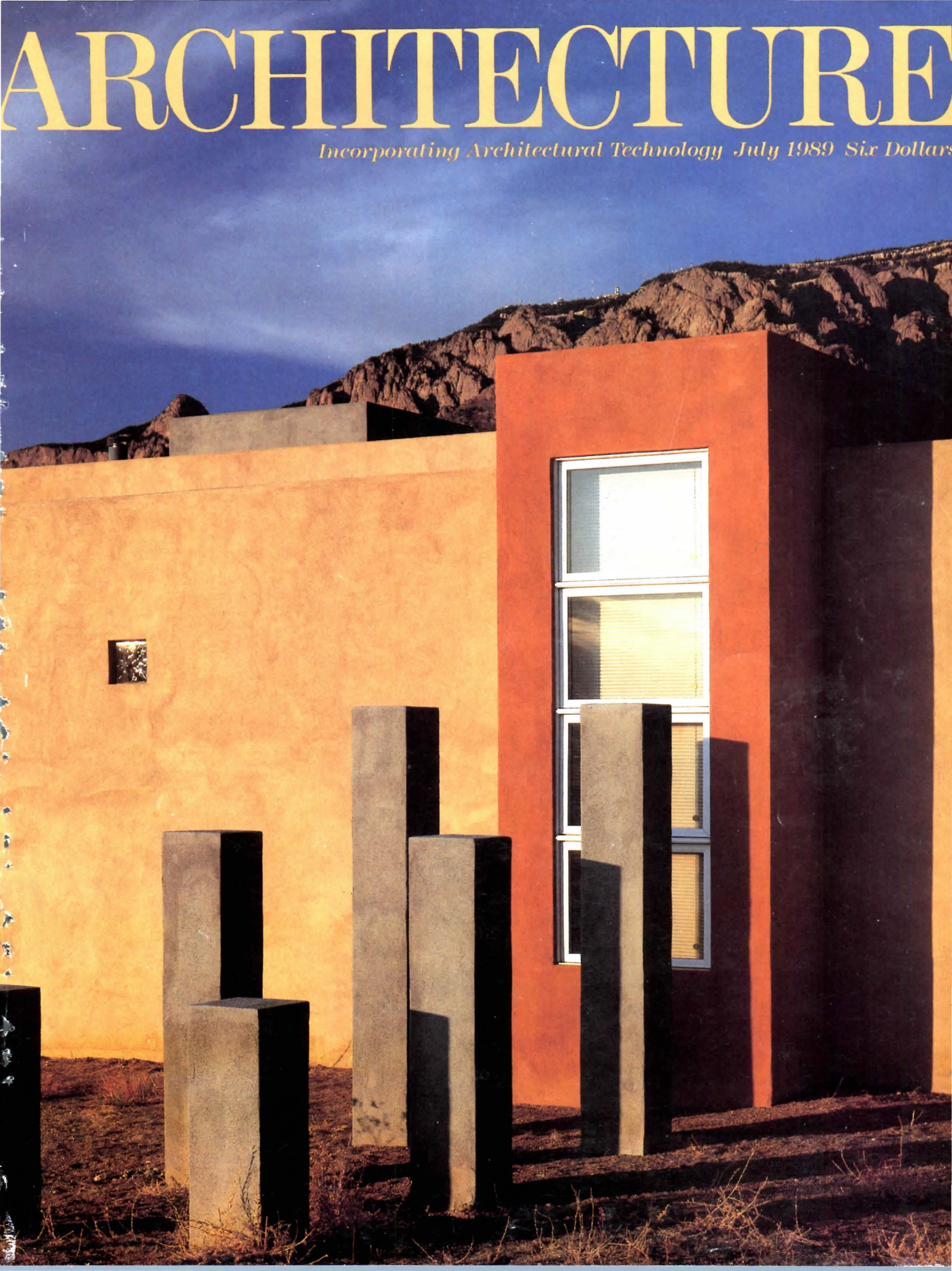

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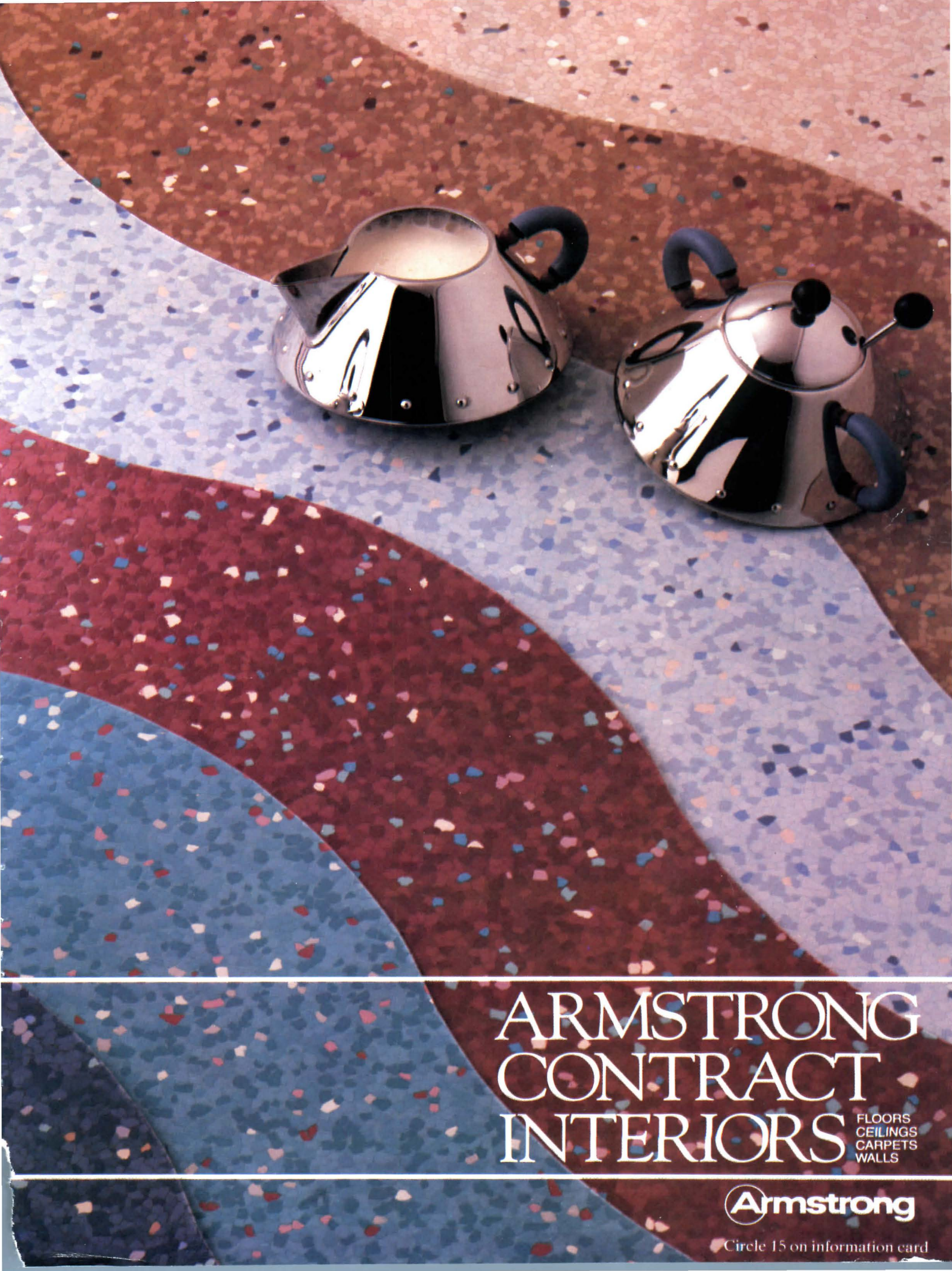

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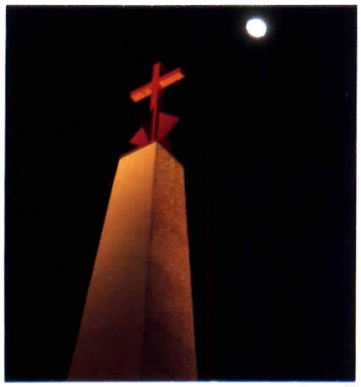

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Above, chapel spire at St. Catherine's Village, near Jackson, Miss. Right, Charlestown Navy Yard Rowhouses in Boston.

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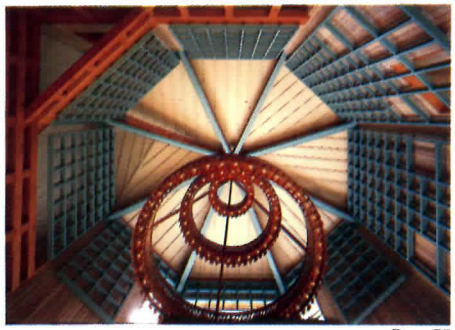
Right, the view straight up in the lounge of a house in Aspen.



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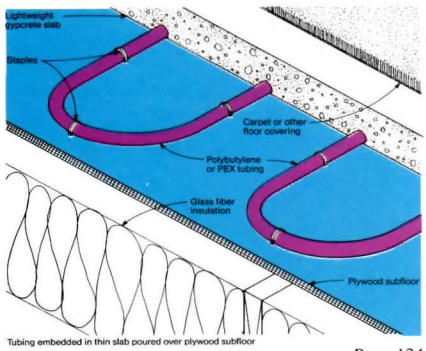
ARCHITECTURE (VOL. 78, NO. 7), incorporating Architectural Technology, publication number ISSN 0746-0554, the magazine of the American Institute of Architects, is published monthly by Billboard Publications, Inc., a subsidiary of Affiliated Publications, Inc. at 1515 Broadway, New York, NY 10036. Postmaster, please send changes of address to ARCHITECTURE, P.O. Box 2063, Marion, OH 43305-2063. Individual subscriptions: US and its possessions: $39 for 1 year, $57 for 2 years, $74 for 3 years. Canada: $45 for 1 year, $65 for 2 years, $84 for 3 years. Foreign: $63 for 1 year; $105 for 2 years; $147 for 3 years. Single copies, $6. each (except for May and September issues which are $12. Publisher reserves the right to refuse unqualified subscriptions. For subscriptions write: Circulation Department, ARCHITECTURE, 1735 New York Avenue, NW, Washington, DC 20006. Allow 8 weeks. Quotations on reprints of articles available. Editorial offices are located at 1130 Connecticut Avenue, NW, Suite 625, Washington, DC 20036. Microfilm copies available from University Microfilm, 300 North Zeeb Rd., Ann Arbor, MI 48106. Second Class Postage paid at New York, NY and additional mailing offices.



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Radiant floors are making a comeback.

Cover

A house near Albuquerque by Westwork. Photograph © Kirk Gittings (see page 80).

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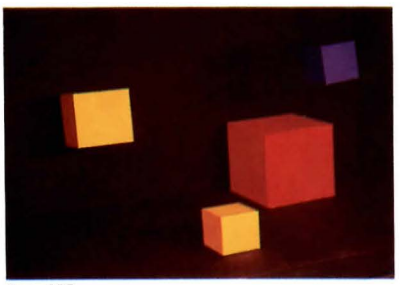

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Exploring the magic of "dimensional color." Photograph by book author Lois Swirnoff.


A chair for mind fitness.

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EVENTS

Aug. 3-6: Society of Environmental Graphic Designers' National Conference entitled "Design Collaboration: Vision, Framework, Design," Bloomfield Hills, Mich. Contact: Tina Lang-Stuart, SEGD, 47 Third St., Cambridge, Mass. 02141.
Aug. 6-10: Annual Conference of the Illuminating Engineering Society of North America, Orlando. Contact: Diane Darrow, IESNA 345 E. 47th St., New York, N.Y. 10017.
Aug. 9-12: Conference and Exhibition of the Industrial Designers Society of America, Minneapolis. Contact: Celia Weinstein, IDSA, 1142-E Walker Rd., Great Falls, Va. 22066.
Aug. 14-18: Course on the Use of Infrared Thermography for Predictive Maintenance of Power Production, Burlington, Vt. Contact: Paul Grover, Infraspection Institute, 33 Juniper Ridge, Shelburne, Vt. 05482.

LETTERS

A St. Louis Landmark: When asked about the Civil Courts building (shown on ARCHITECTURE's April cover and on page 73) Frank Lloyd Wright said in 1939, "I neither like nor dislike it. I deplore it." But the courthouse, built in the mid-'20s, has remained associated with St. Louis and its skyline, albeit less frequently now with the addition of the Gateway Arch.

This important building—on which architects William B. Ittner, George D. Barnett, and Harland Bartholomew collaborated—and the companion Municipal Courts building adjacent to City Hall are now the subject of a major renovation plan commissioned by the City of St. Louis. The Bar Association of Metropolitan St. Louis, the Circuit Court, the city, and Hellmuth, Obata & Kassabaum have joined together to restore, renovate, or replace the court buildings and detention facilities here. Because of this effort, St. Louis again has an opportunity to change the face of the downtown civic district and recapture this important urban area for the community. *Francis X. Duda*
St. Louis

Architects in Business: The corporate architects committee of AIA is most pleased with the content of Convention Resolution G-1 on expanding the influence of the architect in that it addresses a number of concerns that this committee has attempted to bring to the attention of the Institute for a considerable time.

We would like to offer a few comments regarding our view of the resolution in its final approved version. The most controversial element contained in the text of G-1 involves the references to architectural practice as nontraditional, outside of traditional, beyond traditional. The consensus of opinion held by the members of this committee is that we are architects and we practice architecture. Although we have chosen to practice, manage, enable, create, foster, promote, facilitate, or otherwise cause to come into being an architecture under the aegis of a corporate entity, this fact in no way should diminish the effort as less than architecture.

It was my privilege to receive the AIA strategic planning effort Vision 2000. As this study is clear in stating, the profession of architecture is broadly based in scope and must respond to the challenge of change in creative and positive ways if we are to enjoy the influence we desire in attaining a future that is preferred.

Any effort to place architects in positions of influence in government, industry, education, or science is not to be undertaken lightly. By virtue of our training, talent, and skill we are well suited to champion the environmental, social, and institutional concerns of corporations and governments in sensitive and creative ways.

The particular abilities of MBAs, CPAs, engineers, and bureaucrats ad infinitum have long dominated the halls of business and government (most fostered by their profession and with less than noble results in some cases). It's time we were heard from. *George W. Famous, AIA*
AIA Corporate Architects Committee
Pleasanton, Calif.

Computerized Master Specifications: I must take exception to certain statements in Martin Bloomenthal's article "Testing a Computerized Master Specification System" [April, page 107]. Mr. Bloomenthal considers a shortcoming of SweetSpec the fact that he has to type the "Related Documents" paragraph. I praise McGraw-Hill for having deleted it; for years the first thing I have done with MasterSpec is to delete this paragraph from every section.

I recommend reading Chapters 1-8 of CSI's "Manual of Practice." The needless repetition of the "Related Documents" statement refutes the principle of "say it once, say it correctly, and say it in the right place." *Gordon E. Bosl, AIA*
Albuquerque, N.M.

Hospital Design: Thank you for the superb publication quality of my article, "A Physician's View of Hospital Design" [Dec. '88, page 121]. Needless to say, I hope it is of great interest to your readership. I also was happy to note the other article entitled, "In Cleveland, of All Places" [page 88]. *James K. Stoller, M.D.*
The Cleveland Clinic Foundation
Cleveland

Addenda: The two photographs of the Folger Shakespeare Library, shown on pages 138 and 139 of the May issue and credited to Esto, should have been credited to Peter Aaron of that firm as well. Also in May, the three photographs of the CNG tower on pages 120 and 121 are Cervin Robinson's.

Openings

CCA Headquarters Draws Mixed Reviews

In early May, while much of the U.S. architectural community gathered in St. Louis for AIA's convention, a major design institution was opening its permanent headquarters in Montreal. The Canadian Centre for Architecture, just a decade old but already one of the world's foremost repositories of architectural books, drawings, photographs, and other documentation, inaugurated its new 150,000-square-foot home with three exhibitions and an eight-day series of opening events that included a congratulatory address in French and English by Prime Minister Brian Mulroney.

In this most fully bilingual city of an officially bilingual nation, the CCA's elegant logo serves Francophones and Anglophones equally, since it also stands for Centre Canadien d'Architecture. But after having visited the CCA three times in the last year, I can only conclude that the real meaning of those three letters is complexity and contradiction in architecture. This conclusion is prompted by the building, which is somewhat Venturian in spirit although not in form, and more so by the institution, which remains enigmatic and perplexing even after an extended coming out party that should have clarified its character, agenda, and public dimension.

We are told that the 130,000-volume library is, along with that of the Royal Institute of British Architects and Columbia's Avery, one of the world's three largest; that its 55,000 photographs (one of which, at $170,000, is the world's most costly) make up the largest such collection anywhere; and that its 20,000 architectural prints and drawings also place it among the top three. There are 250,000 other items such as office records and models in its archives. Its architectural bookstore is the first in the metropolitan area of 3 million. Nevertheless, it may be many years before the significance, value, and accessibility of the CCA and its collections can be finally and accurately assessed. At present, it is more a theoretical institution than a fully functioning one, and, for all its opening hoopla, a self-referential entity rather than a public resource.

In a prefeminist age, Ralph Waldo Emerson declared that every institution is but the lengthened shadow of a man; the CCA is a shadow cast by a formidable and not easily categorized woman. Phyllis Lambert, the unconventional 62-year-old heiress of the Bronfman distilling dynasty and reputedly one of the world's richest women, is the CCA's founder, president, director, main financial supporter, and unquestioned ruler. Her involvement with architecture has been long and distinguished, beginning 35 years ago with her helping select Mies van der Rohe to design the Seagram Building, her father's U.S. headquarters. It continued with vigorous preservation and historic documentation efforts in Montreal, her hometown and arguably the continent's finest city, and a real-estate and architectural partnership with former Mies colleague Gene Summers that included a laudable remodeling of the Los Angeles Biltmore hotel. Her projects also include sponsorship of a splendid and imaginative photography book documenting U.S. courthouses, and an oddly lifeless survey of architectural photography that focused narrowly on the CCA's collection of rare and expensive antique prints.

But all these efforts combined pale before the ambitious scope of the CCA itself. The real property represents an investment of roughly $60 million, and the bill for the collections, acquired with a Gettylike rapidity and determination, is about $50 million and rising. (These figures are in Canadian dollars; currently the exchange rate is about $1 to 85 U.S. cents.) One educator estimates the CCA payroll to equal that of all three architecture schools in the province combined. But none of this should present any financial strain, since the amount spent on physical plant and collections over 10 years (including that provided by outside private and governmental sources) equals about 10 days' interest on the $36 billion Bronfman family fortune.

Like the convents and monasteries that dot the vicinity of the CCA's not-quite-downtown site, the building is built of local graystone, includes well-tended grounds, takes up a full city block, and *sits behind* a fence somewhat removed from the world. Its E-shaped footprint is very much in a local institutional tradition, while its other characteristics are not. The new building wraps around Shaughnessy House, a somewhat mundane 19th-century double mansion that Lambert bought 15 years ago to save from the wrecking ball. Its exterior is introverted, austere, sparsely articulated, and in some places forbidding. Conversely, the interior is comparatively extroverted, using a rich palette of Canadian materials—primarily aluminum, maple, and black granite—and articulates its parts in a way that strongly recalls Louis Kahn and Otto Wagner. Across the street, an unfinished allegorical sculpture garden designed by Melvin Charney promises to add flair and poetry to an otherwise cautious ensemble.

Peter Rose is the third architect to be involved with the CCA, preceded by Barton Myers, who did early programming, and Gene Summers, who prepared a totally underground parti. Rose had the luxury of time: from the initial point of his involvement, design and construction took half a dozen years. The design was studied not only in drawings and models but also in elaborate full-size mock-ups. The client's and designer's roles were closely

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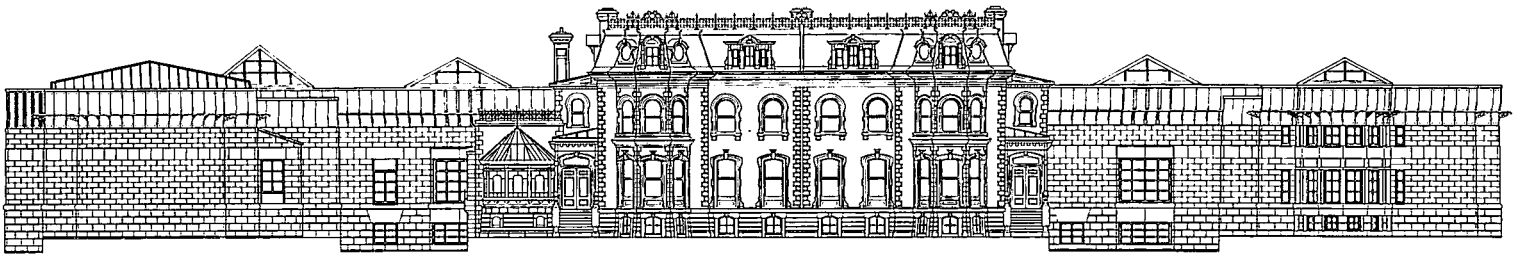

Below, front elevation. The new building wraps around the Shaughnessy mansion.

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linked and may have overlapped; Lambert is listed as consulting architect, and she met with Rose every week during the building's six-year gestation and discussed the project with him by telephone nearly every day during that period. It is widely thought that Lambert, who does not delegate responsibility easily, was responsible for much of the design, but Rose rejects such rumors and says that her function was that of a very involved client. Major roles were played also by Erol Argun, associate architect, Denis Saint-Louis, restoration architect, and Gerrard & Mackars, landscape architects. Whatever its origins, the CCA's design is subtle and complex, incorporating both modern and postmodern sensibilities, and cannot be assessed simply.

Reaction to the design has varied. The architectural press has been for the most part laudatory in print but unenthusiastic in private at the building's opening. The New York *Times'* Paul Goldberger offered up unmitigatedly rhapsodic praise, the Toronto *Globe and Mail's* Adele Friedman was fully appreciative, and the Washington *Post's* Benjamin Forgey acknowledged some problems yet was highly positive on the whole. But in the Montreal *Gazette,* Derek Drummond's opening critique called the CCA "an ultra-serious structure without humor or compassion. Relentless in its pursuit of perfection, it has crossed over into the realm of boredom." He also lamented the organization's "perhaps subliminal" definition of "architecture as an acquired taste, a precious artifact that can only be understood by an elite, educated few." Ricardo Castro's later review of the interior for the *Gazette* was merely descriptive but implicitly positive.

The *Gazette* uses a pool of nonstaff critics, most of whom, like Drummond and Castro, are McGill University architecture professors. Drummond's outspokenness was remarkable in that Lambert's family has long been a donor to McGill, and recently she had partially funded an architectural chair bearing her father's name. Indeed, it would be hard to find another critic or historian taking an undiplomatic public position, since the CCA not only is a major research center but also is expected to provide substantial patronage for those professions. Likewise, Peter Rose is the founder and administrator of the Alcan lecture series, one of the most remunerative and prestigious architectural speakers' programs in North America. One normally hard-nosed critic and Alcan beneficiary admonished a colleague to "be nice" before embarking on a CCA tour led by Rose.

If insiders tend to be politic in their assessments, the man in the street is more direct. A Francophone taxi driver, while bemoaning the destruction of older sections of the city, happened to pass the CCA and praised the saving of "Château Shaughnessy." An engineer-turned-shopowner, reminded of Lambert's contributions to local preservation, declared that "just because someone's done a lot for the city shouldn't give them permission to put up something ugly." Another Francophone involved in small-scale real estate observed wryly that "it's all tax deductible." (National, provincial, and municipal taxes in Montreal are quite high by U.S. standards.)

Beyond its new building, the CCA's initial offerings included exhibitions dealing with Montreal, the center's collections, and the design and construction of the building itself. The second of these, titled "Architecture and Its Image," was the main offering. Its nearly 400 objects included works by Durer, Serlio, Choisy, Iuvarra, Hawksmoor, Repton, Pugin, Rennie Mackintosh, John Wellborn Root, Cass Gilbert, Hans Poelzig, Mies, Hannes Meyer, Kahn, Arata Isozaki, El Lissitzky, Theo van Doesburg, Le Corbusier, Ernest Cormier, Berenice Abbott, Bernd and Hilla Becher, John Hejduk, Robert Venturi, Mark Mack, and Peter Eisenman. In addition to displaying some of the treasures amassed over the last decade, it was an intricately structured survey of architectural representation and communication arranged in 21 subsections by curator Eve Blau.

Collection Canadian Centre for Architecture

Above, view from the northeast of the rear elevation of the CCA building.

Unfortunately, the message went largely uncomprehended, since the show's brochure and catalogue still hadn't arrived several weeks after the opening, the circulation sequence was difficult to detect without those materials, and the identification labels were designed to recede modestly into the walls rather than to be easily readable.

The exhibit on the CCA's building and gardens made its points well, since its size was manageable, its subject was easily comprehended, and its catalogue was available. "Hochelaga Depicta: Documenting Montreal," the only show not explicitly or implicitly about the CCA, bore the same relationship to the other exhibitions as Cinderella did to her stepsisters. While its subject matter was arguably the most important of the three, potentially introducing the city to the many out-of-towners drawn by the opening and serving as a deeper urbanistic explication for Montrealers, it was by far the least ambitious of the three, installed in two hallways where it was difficult to see, and it had no catalogue.

Although the CCA has often been termed a gift to Montreal, it can just as readily be seen as a self-absorbed enterprise. It buys architectural artifacts at a brisk pace, catalogues them (albeit not as briskly; that process is several years behind, and no one knows exactly what the center owns), and processes them in state-of-the-art labs and workrooms. It stores them in elaborate cases protected by a fire-control system that can rapidly quench flames without harming the collection's fragile and often irreplaceable items. But for whom is all this effort being expended?

There is a scholars' wing, but its offices sit empty. To browse through the library's catalogue, one must make an appointment in advance; upon attempting to do so I learned that one day was insufficient notice. (In contrast, to use the RIBA library one merely arrives unannounced and begins work with no questions or red tape.) The CCA stresses its public nature and invites people to become members, but nowhere in its press kit or membership brochure is there any indication of the days and hours that it is open. (There is public access Wednesday through Sunday for 35 hours a week; for two hours *the normal $3 admission charge is waived.)* In Drummond's words, the CCA "is not so much dedicated to the people of Montreal as it is a magnificent gift to the architectural intelligentsia of the world . . . the

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Openings *from page 21*
esoteric nature of its collection and the controlled access to it results in the CCA being more a scholarly research library than a museum."

Even its scholarly status is somewhat murky at present. The unoccupied scholars' wing is a symptom of the CCA's ingrown nature. So far, the collections exist primarily for the curators and cataloguers. Asked which types of scholars the CCA would support, Lambert replied "we don't *support* anyone." Offered names as examples of particular intellectual approaches, she rejected association with people in the mold of the young Buckminster Fuller; "Townscape" author Gordon Cullen; architectural guidebook pioneer Ian Nairn; Jane Jacobs; and Bernard Rudofsky of "Architecture Without Architects" fame. She did approve of Reyner Banham, the most academic of the names on the list, but labeled the others "popularizers."

There is great contradiction in this concern for rigor. Lambert herself, although not trained as an architectural historian, has contributed substantially to the field through a certain kind of insight and imagination as well as by providing funding, yet she seems unwilling to recognize even stronger imaginative qualities as important. And rigor is not in abundant supply at the CCA. The building project has been subject to repeated delays, and a series of pre-opening events was abruptly canceled last fall. The press arrangements for the opening were embarrassingly haphazard. The lack of a catalogue giving a rationale for the opening exhibit reduced that effort to a phenomenon that Lambert is normally quick to belittle, a "show and tell." At the inauguration, most of the attendees were not well provided for and could not see the speakers. A fortnight later, the entire institution seemed to shut down for a week. Some of the best professionals in many fields work at the CCA, yet there is insufficient professionalism in its workings.

Just as the CCA's virtues can be credited ultimately to Phyllis Lambert, so can its shortcomings. The *Gazette's* Ingrid Peritz wrote that the CCA "came to life with a monumental human price: crushed egos and a steady hemorrhage of staff. Many employees left, unable to cope with Lambert's moods, and her insistence on putting her personal touch on every detail—from the design of the building to the type of soap in the bathroom . . . employees were forever on guard for an outburst at the slightest provocation." A leading design librarian sums up both sides of the equation by saying: "What she's done for the field in such a short time is admirable. I can't fault her efforts in any way—but I would never work for her."

With its 120 or so employees and single indoor parking space, the CCA is largely a one-woman show, and that woman is self-contradictory and far from infallible. A self-styled populist, she holds popularizers in low esteem. A terror to her staff, she identified in her dedicatory remarks human relations as the next great frontier of architectural thought. Her awareness of the wider world has great gaps; otherwise the CCA's opening events would not have conflicted with North America's largest gathering of architects a thousand miles away. Nor would she have told *Maclean's* magazine that "Montreal will be the only city in North America where there are constantly exhibitions on architecture." (The Octagon House and the National Building Museum give Washington, D.C., the same distinction, and several institutions put New York in that class as well.)

Lambert has not yet created a great architectural institution, but she has certainly planted an extraordinary seed that seems destined to grow into one. Locating it in Montreal was a considered political statement and a tribute to an extraordinary and underappreciated city. Initially, the CCA has defined architecture as an academic and esoteric undertaking, but such an inherently social and vigorous art cannot be bound by those limits forever. In the next decade or two, as the CCA emerges from its founder's shadow into full professional autonomy and takes on a stronger public character, Phyllis Lambert's lapses will fade from memory and the world will rightly marvel at her extraordinary foresight and energy.—JOHN PASTIER

News continued on page 24

Cities

Seattle Passes Initiative Limiting Downtown Development

Seattle voters in late May approved by a wide margin an initiative to place strict limits on downtown development. The passage of the slow-growth measure reflects local residents' increasing unrest with a decade of development that threatens the livability of their city and its unparalleled natural setting on the Puget Sound.

Called the Citizens Alternative Plan for Downtown Development, the measure, which was approved by 62 percent of the voters, imposes height limitations of 450 feet or approximately 38 stories for all new office towers. The initiative also limits total office construction to 500,000 square feet a year for the next five years. This annual quota will double to a million square feet a year for 1995 through 1999. Density limits on office buildings will be cut in half.

Seattle attorney Ted Inkley, who led the campaign, said that the initiative is intended "not to stop growth but to provide a predictable rate of growth." The measure, said Inkley, "directs the city land use people to formulate a growth management plan appropriate for Seattle."

Implementation of approved referendum measures can prove to be more difficult than supporters predict. Douglas S. Kelbaugh, FAIA, chairman of the department of architecture at University of Washington, said, "Unfortunately, ballot initiatives often take complex design issues and turn them into cartoon solutions."

However, he believes the one most important factor that will result from the measure is "to slow down growth to allow the infrastructure catch up with the development."

Controlling the pace of development has been a dominant issue on the West Coast in recent years. Portland, Ore., a city with a history of diligent urban planning, and Vancouver, British Columbia, both have controls governing the height and bulk of buildings but do not set quotas. Los Angeles residents voted to reduce development in some commercial areas, while in San Diego voters approved a "Quality of Life" initiative limiting residential development.

Seattle's plan to manage downtown development is modeled loosely on a measure passed in San Francisco three years ago. And both critics and supporters of the Seattle initiative have repeatedly used the San Francisco measure to reiterate their arguments.

The process of the plan in San Francisco has turned out to be in some ways more controversial than the politics of the plan itself. A design review committee appointed each year by San Francisco's planning office has the power to ration office space (see Oct. '87, page 13). Three buildings so far have been approved under San Francisco's so-called "beauty contest," which has been criticized for placing esthetics over programmatic requirements while at the same time producing unobtrusive designs likely to win the consensus of the panel.

In Seattle, the ballot initiative said that buildings will be approved on a first come, first served basis, or by any other reasonable means established by the city's department of construction and land use. In early June, the city released a draft outlining specifics of the plan and a space allocation process based on the recommendations of a design review panel.

Rebecca Herzfeld of the city's department of construction and land use said that rather than use a panel of architectural experts from around the country, as San Francisco does, the review board will "emphasize home grown solutions to Seattle's problems." The city's proposal for rationing office space spells out criteria including environmental factors, how it relates to transporation systems and traffic congestion, and intrinsic architectural quality.

Kelbaugh, who has been recommended to serve on the review panel, cited both strengths and weaknesses of the city's draft for implementing the measure. Rather than simply limiting heights and square footage, said Kelbaugh, the implementation of the program should encourage "a network of public and private space that creates an urban hierarchy with both foreground monumental buildings and background buildings."

Critics of the measure argue that it is impossible to design a city through an initiative process and review boards. "There is nothing in the initiative that will cause better design in Seattle," said Martin Selig, local real estate developer and owner of the tallest building on the West Coast, the 76-story, 1985 Columbia Center by Chester Lindsey Architects.

According to Selig, design review committees provide "the style of the day . . . always following the leader, not setting the trends."

For the near future, the effect of the initiative will be mostly symbolic. Currently, 6.5 million square feet of office space has the necessary approvals for construction. This proposed office space should delay any adverse economic impact, which was predicted by opponents of the measure, most of them downtown developers.

However, even in San Francisco, where critics had forecast scenarios of rising commercial rents, higher property taxes, declining tax revenues, loss of investment, and suburban sprawl, it is too soon to assess the economic effects of the measure because the last of the buildings approved before the enactment of the measure are now nearing completion.

The immediate impact of the divisive campaign is the message the overwhelming support of the initiative sends. "We want leaders at City Hall," said Inkley, "who add rather than detract from the quality of life in Seattle."—LYNN NESMITH

World's Tallest by Pelli Announced for Chicago

A developer has unveiled a proposal by Cesar Pelli & Associates for the world's tallest building to be located in Chicago's Loop only three blocks away from the current titleholder, the Sears Tower. Breaking from Chicago's brawny architectural mainstream, Pelli's svelte tower seems derived from art deco skyscrapers.

The 125-story proposal, shown in late May by Chicago developer Miglin-Beitler to the city's commissioner of planning, would contain 100 stories of office space, two floors of retail space, 10 stories of parking, and a two-story health club. Floorplates would range in size from 10,000

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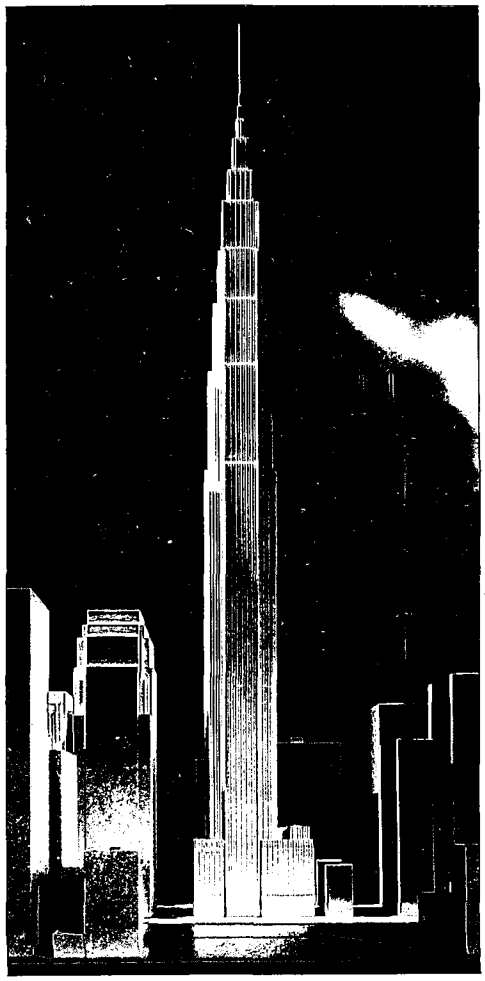

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Cities *from page 24*
to 18,000 square feet, tailored for small- to medium-sized companies and law firms. At 1,914 feet from base to spire, the proposed building would rise 355 feet taller than the Sears Tower. Yet at 1.2 million square feet of space, Pelli's skyscraper would contain only one-fourth of the total square footage of the Sears.

The building's one-acre site, now a parking lot, is across the street from 181 W. Madison, a nearly complete 50-story, million-square-foot building, also by Pelli working with the same developer. Pending city approval, current (and optimistic) projections call for a construction start by December, with completion scheduled for mid-1992. Construction costs are estimated at between $350 million and $400 million. According to the Meglin-Beitler spokesman Marc Jarasek, the proposal has so far received a very favorable reaction at the city hall and "on the street."

Since the completion of Skidmore, Owings & Merrill's Sears Tower in 1974, numerous proposals for taller buildings in Chicago, New York, and other cities have come and gone. An editorial in the Chicago *Sun-Times* called for a conscientious study of the proposal and questioned the need for another skyscraper amid the downtown's "oppressive thicket of immense buildings" and "ever darker and less hospitable streets."

In Chicago, where architecture is taken very seriously and buildings are a source of civic pride, the scheme is sure to be scrutinized on a variety of levels. Unlike Seattle and San Francisco, where voters have approved limits on downtown construction, the issue here may turn on whether the people of Chicago want a new kind of summit to its muscular skyline.

—Lynn Nesmith

Exhibitions

Morphosis Exhibit at Walker: Tangents and Outtakes

The second of six exhibitions in the Walker Art Center's "Architecture Tomorrow" series featured the work of Thom Mayne and Michael Rotondi, principal partners in the Los Angeles firm Morphosis. Upon entering the show, the unarmed viewer might expect to find a series of house models and plans, if not glossy color photographs of their interiors. Instead, the room opens into an oddly scaled landscape with elements too large to be considered models of individual architectural elements and too small to be seen as full-scale mockups. Glowing walls running through the space direct vision to the horizontal model surface in a manner that resembles scanning an archeological battlement from a low flying aircraft.

The exhibition takes pieces of the plans of three houses by Morphosis—the Reno house, the Sixth Street residence, and the Crawford residence—and transcribes plan, section and elevational data into a single model. The model is crafted out of wood, massive welded steel pieces, sheet metal, and glass into a single object of art. Plans are all drawn to the same scale and are punctuated by elements in common such as windows, doors, and fireplaces. These are used as registration marks that allow pieces of different buildings to be merged into a single object. The "source" houses become integrated in a new composition in which the end of one and beginning of the next is blurred, only suggested by the translucent walls that divide the gallery space.

Below, the Morphosis installation designed specifically for Gallery 7.

Courtesy of Walker Art Center

The model is made of four-foot-square modules. These were designed for crating and shipping from Santa Monica to the exhibition space. Each piece was welded, burnished, and acid etched to incorporate information from plans and diagrams on their surfaces concerning the respective projects.

Each element, from the modular metal pieces to the metal stands on which they sit and the wood infill elements inside their borders, represents an aspect of the meticulous detailing and self-challenge that Morphosis sets for itself in each project. Pushing themselves beyond existing knowledge, they combine canonic forms of organization with accidental discoveries that come up in the act of construction. Technologies that are well understood as a result of past projects often are replaced by variants that are completely unknown and require starting the learning process all over again.

The exhibition reproduces all the elements of work of Morphosis from the play of contrasting materials, the intense preoccupation with tight spaces, to fascination with roughly surfaced models that are more than mere representations. Morphosis designs offer an antidote to the liefless, spiritless cages of corporate modernism. There are no simple divisions into major and minor axes, or simple hierarchies. In short, the stridency of contemporary jazz does not product "singable tunes"; nor does Morphosis produce "sketchable designs."

The "Architecture Tomorrow" series, organized by Walker Art Center design curator Mildred Friedman, focuses on the accomplishments of young American architects whose work is original and experimental in nature. A six-page brochure accompanies each exhibition, and a special issue of museum's *Design Quarterly* magazine will be published to document the series.

Following its presentation in Minneapolis, "Architecture Tomorrow: Morphosis" will be shown at the San Francisco Museum of Modern Art next year.

—George Rand

Professor Rand teaches architecture and urban planning at UCLA.

News continued on page 28

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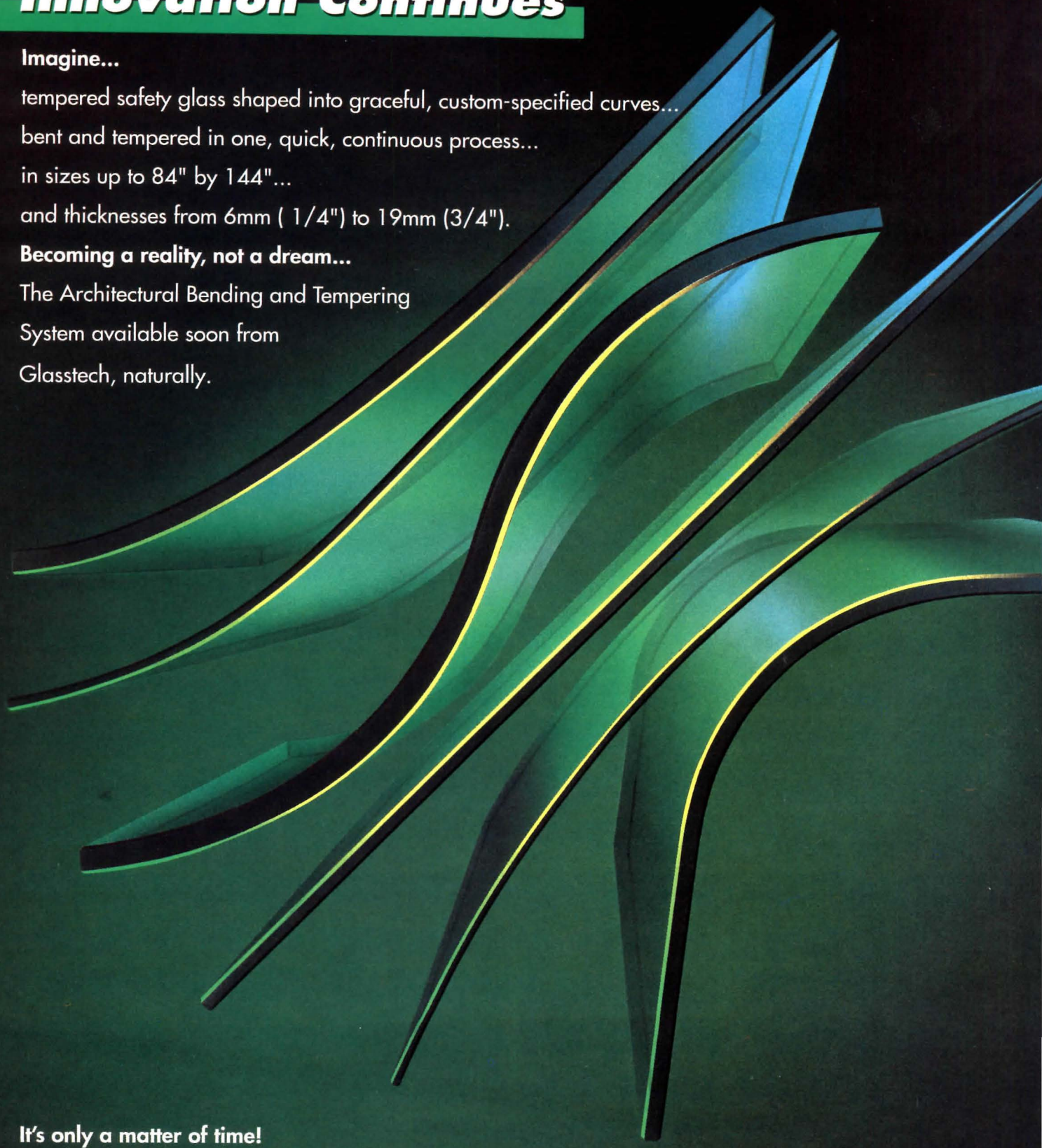

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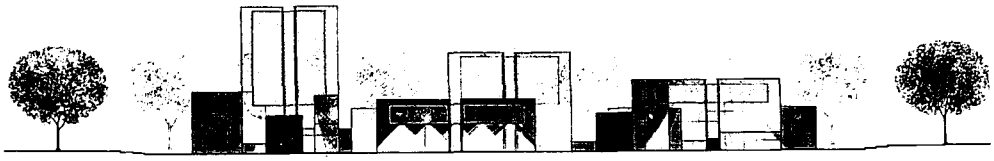
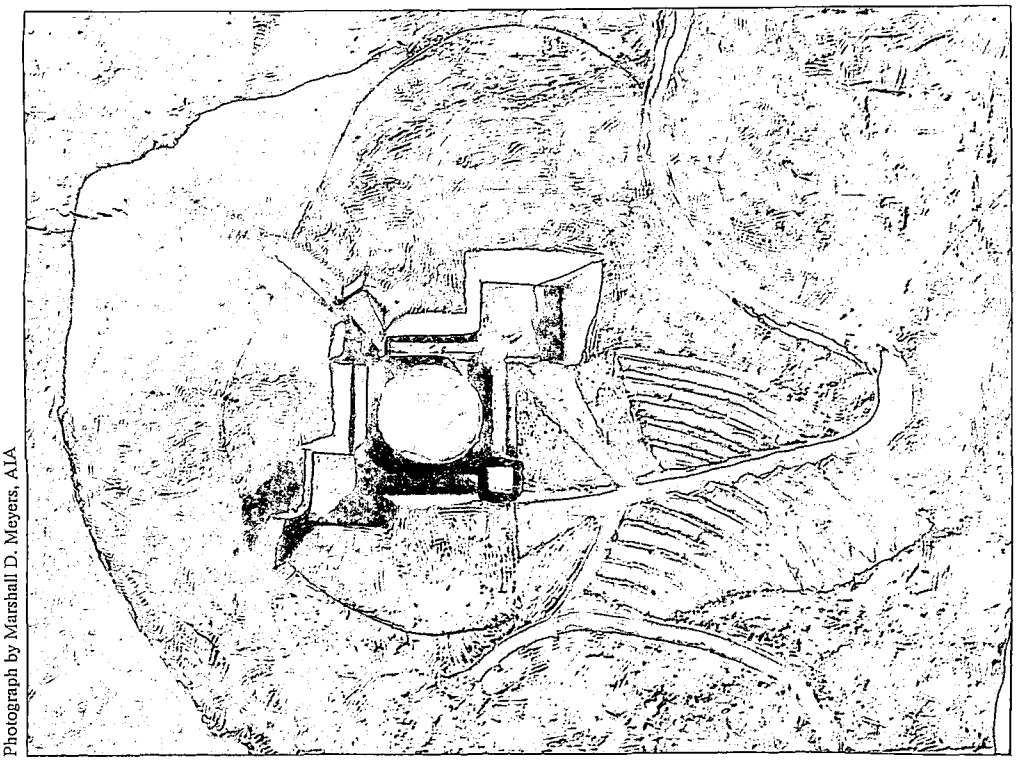


"The Experimental Tradition: Twenty-Five Years of American Architectural Competitions, 1960-1985," recently on view at the National Building Museum in Washington, D.C., examined 10 well known architectural competitions. Arranged chronologically, the exhibition traced the recent history of competitions—the renewed popularity of the competitions in the '60s, the experimentation with structure and program in the '70s, and the pervasiveness of competitions in the '80s. Shown above is an unbuilt design for the Franklin Delano Roosevelt Memorial (Washington, D.C., 1960) by George Nelson, Richard Meier, and Michael Graves. Below, is Louis Kahn's model for the Lawrence Memorial Hall of Science at the University of California, Berkeley (1962). Other competitions included in the show were Boston City Hall (1962); Yale Mathematics Building (1970); Roosevelt Island Housing competition (New York City, 1975); Minnesota II Terratectural competition for a capitol building annex (St. Paul, 1976); National Vietnam Veterans Memorial (Washington, D.C., 1981); New Orleans Museum of Art (1983); Clos Pegase Winery (Napa Valley, Calif., 1984); and the Escondido, Calif., Civic Center (1984).



Photograph by Marshall D. Meyers, AIA

Twelve Projects Recognized by Building Stone Institute

The Building Stone Institute has presented 1989 Tucker awards to 12 projects in five categories. The jurors were Peter S. Forbes, FAIA and Steven L. Einhorn, AIA.

Six projects were cited in the nonresidential category:

—Software Engineering Institute at Carnegie Mellon University in Pittsburgh by Bohlin Powell Larkin Cywinski of Wilkes-Barre, Pa., in association with Burt Hill Kosar Rittelmann, Pittsburgh.

—3401 Walnut Street at the University of Pennsylvania, Philadelphia by Geddes Brecher Qualls Cunningham, Philadelphia.

—Heron Tower at 70 E. 55th Street, New York City, by Kohn Pedersen Fox Associates of New York.

—Metropolitan Police Headquarters in Toronto by Shore Tilbe Henschel Irwin Peters in association with Mathers & Haldenby of Toronto.

—Macy's department store in The Galleria, Dallas, by Thompson, Ventulett, Stainback & Associates of Atlanta.

—Mayo Clinic in Scottsdale, Ariz., by Ellerbe Becket of Minneapolis.

A tennis cottage in La Anna, Pa., by R.K.R. Hess Associates of Stroudsburg, Pa., was the only winning project in the residential category. A pool and shower for a house on the Choptank River on Maryland's Eastern Shore, by Rubenstein-Markiewicz Architects of New Haven, was cited in the landscape category.

Two projects were cited in the renovation/restoration category: South Station Transporation Center in Boston by Skidmore, Owings & Merrill/Washington and the restoration of the Indiana State Capitol building in Indianapolis by The Cooler Group, Inc., of Indianapolis.

In addition, two interior projects by Kohn Pedersen Fox Conway Associates of New York City were honored: the lobby renovation of the MONY building and a Manhattan investment firm.

Awards

Brick Institute of America Honors Nine Architects

Nine architects were honored by the Brick Institute of America in the first awards competition for "outstanding achievement in brick design." The winning projects were selected from a field of more than 230 entries from the U.S. and Canada.

The winners are:

—Centerbrook Architects of Essex, Conn., for the Hood Museum of Art, Dartmouth College, Hanover, N.H.

—Cesar Pelli & Associates of New Haven, Conn., for Herring Hall at Rice University in Houston.

—College Planning Associates of Denver for Western Wyoming College in Rock Springs, Wyo.

—Davis, Brody & Associates of New York City for the Mount Sinai-Resident Facility in New York.

—Hagman Yaw Architects of Aspen, Colo., for the Hotel Jerome addition in Aspen.

—Kohn Pedersen Fox Associates of New York City for ABC Studios in New York.

—Meyer, Scherer & Rockcastle of Minneapolis for the Facility Systems, Inc., in Eden Prairie, Minn.

—Sasaki Associates of Watertown, Mass., for Edith Stein Hall at the College of the Holy Cross in Worcester, Mass.

—Short & Ford Architects of Princeton, N.J., for student housing at the Lawrenceville School, Lawrenceville, N.J.

The jury was chaired by Harrison Fraker, FAIA. Others jurors were Arthur Cotton Moore, FAIA, Barton Phelps, and Frank Welch, FAIA.

Deaths

Raymond Affleck: 'His Buildings Were a Microcosm of a City'

Raymond T. Affleck, chief designer of Place Bonaventure, the Stephen Leacock building at McGill University, Maison Alcan, and Place Air Canada, all prominent buildings in downtown Montreal, was preoccupied by patterns and hierarchies in urban design and the way pedestrians move in and around buildings and through cities.

Affleck died in April at the age of 66 as the leading partner in Arcop Associates, a firm he cofounded.

A 1947 architecture graduate of McGill, Affleck established a private Montreal practice in 1953. The partnership of

continued on page 30

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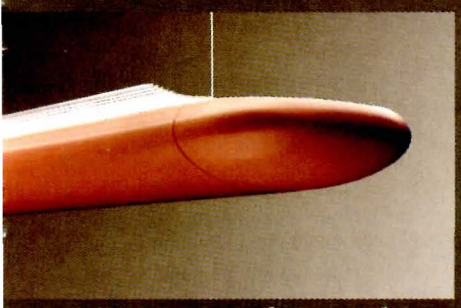

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Deaths *from page 28*
Affleck, Desbarats, Dimakopoulos, Lebensold, Sise, Architects, begun in the late 1950s, grew in the 1960s to become the largest in Quebec Province, responsible for Vancouver's Queen Elizabeth Theatre, Ottawa's National Arts Centre, and, as associate architects to I.M. Pei, Place Ville Marie in Montreal. In the U.S., the firm associated with Minoru Yamasaki to design the World Trade Center's concourse and subway stations. After 1970, Affleck and Fred Lebensold carried on the practice as Arcop Associates, Arcop being an abbreviation for architects on copartnership. Today the firm has six surviving partners and employs about 50.

During the '60s and '70s, Affleck also taught as visiting professor at the architecture schools of McGill, the University of Toronto, and the University of Manitoba, and as visiting critic and lecturer at the University of British Columbia, Harvard, and the University of Pennsylvania, among other institutions.

Affleck walked daily along Montreal's Sherbrooke Street between his house in Westmount and downtown office. On Sherbrooke he designed Maison Alcan, the complex that best embodies his urban sensibilities (see Sept. '84, page 154). The headquarters for the international operations of the giant aluminum company, Maison Alcan incorporates a historic mansion, two late-1800s row houses, a 10-story hotel and low-keyed seven- and eight-story infill buildings that skirt an old church. The ensemble preserves or adapts the old buildings, holds the street lines, and penetrates the block with new pedestrian ways.

Architect and planner Mark London, a former associate at Arcop, says Affleck "often designed the interior circulation of a building like a microcosm of a city with a clearly defined hierarchy of scaled-down squares, boulevards, and side streets. . . . He didn't particularly seek the architect's dream—an unrestricted site and a client with an unlimited budget who gave him a free hand. He felt the best architecture came from the presence of constraints and a tough, well-informed client."—ALLEN FREEMAN

George D. Riddle, AIA, of Santa Barbara, Calif., was chief architect of the Federal Housing Authority for Southern California from 1936 to 1946 and then went into the construction industry, building more than 1,000 residential units before retiring in 1953. He also served on the Santa Barbara Architectural Board of Review. He died in February at age 87.

E. Wayne Schlegel Jr. was senior manager of the advertising and marketing department at Armstrong World Industries. Shortly before his death, the E. Wayne Schlegel advertising award was created to honor an architecture product manufacturer for excellence in advertising. Schlegel died at age 51.

Wallie E. Scott Jr., FAIA, retired in 1986 as president of the architecture firm Caudill Rowlett Scott, now CRSS, but remained as senior executive officer and consultant. A graduate of Texas A&M, he later served on the advisory council to the college of architecture. He was president of the Houston Chapter/AIA in 1964. He died in April at age 67.

BRIEFS

Rotch Scholarship Recipient
Joseph J. Mamayek, an architect with Jung/Brannen Associates in Boston, has won the 1989 Rotch Traveling Scholarship, an annual award to an architect under age 35 who has worked at least one year in Massachusetts.

Frank Lloyd Wright Furniture Exhibit
An exhibition of Frank Lloyd Wright's office furniture and designs is on view at the National Center for the Study of Frank Lloyd Wright at Domino's Farms, Ann Arbor, Mich., through Aug. 15. The exhibit includes objects and drawings from the Larkin Building, the Johnson Administration Building, and the Price Tower.

Downing Award to Robert Gamble
Robert Gamble is this year's winner of the Antoinette Forrester Downing award, given by the Society of Architectural Historians for excellence in a published survey of historic buildings. □

Housing an Aging Population

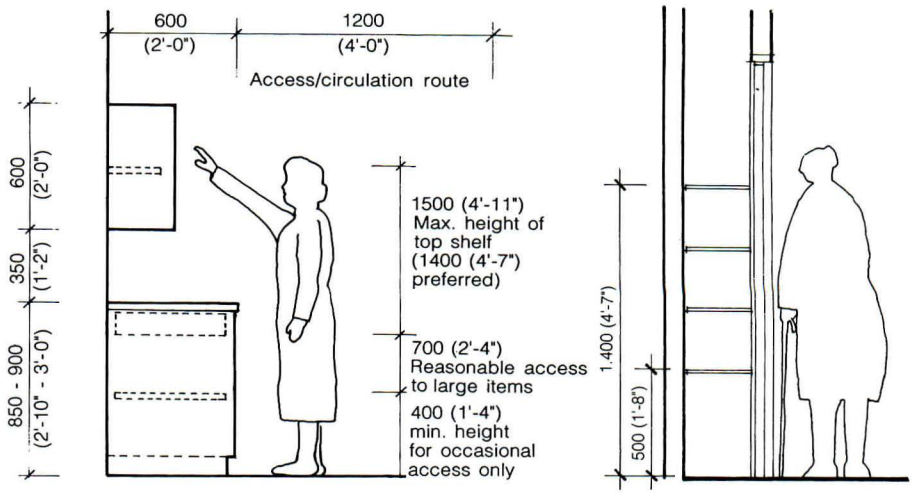
America's Aging: The Social and Built Environment in an Older Society. Committee on Aging Society, Institute of Medicine and National Research Council. (National Academy Press, $19.95.)
Housing for Elderly People: A Guide for Architects and Clients. Martin Valins. (The Architectural Press/Van Nostrand Reinhold.)

Older people are living longer, our society is "graying," and architects are faced with the challenge of building to accommodate the aging population. *America's Aging* is a collection of papers focused on restructuring the environment to enhance the social productivity of older persons and prolong their lives *in* their communities. This book looks at public policy and attempts to set a research agenda that is both environmentally focused and multidisciplinary.

This is a scholarly book written for a scholarly audience, and yet it is a remarkably readable and sensitive inquiry into the special problems facing an elderly population. In the first paper, which is, appropriately, on demographic trends, two features stand out: (1) The economic status of the elderly has generally improved. Yet there continues to be a "hard core" of poor older persons—12.5 percent of those 65 and over—who are primarily women and minorities. (2) People are living longer after reaching age 65. This raises questions about their income (does Social Security work under these circumstances?) and their ability to procure essential services, such as housing, transportation, and health care. Subsequent essays focus on policy issues involved in providing these services in light of new subpopulations with special needs.

One particular concern addressed is the vulnerability of the oldest old and their need for long-term care. Because most government-assisted housing programs take a "bricks and mortar" approach, they fail to address the support-service needs of an elderly population. The authors point out that new housing programs will require a multidimensional response that includes a range of community-based housing alternatives in addition to traditional institutional settings.

Another policy concern is the need for variety and choice not only in housing but also in transportation and technology. Clearly, this is a design problem as well as policy problem. Several authors call attention to the importance of consumer preference in a heterogeneous older population and caution against traditional design regulations that limit and standardize products and program. At the same time, they recognize that special consideration must be given to those who are too poor to make their own choices in the marketplace.



Valins's book contains guidelines for various rooms and building types. Above, key dimensions for kitchen working heights.

The authors conclude that "the prevalence of a proportion of elderly persons with poor health and economic deprivation identifies one target group of older people . . . as subjects for environmentally significant subsidy programs. Yet the majority of older people . . . remain in good health for most of their lives . . . [and] their relationship to the environment is a continuous process of active choices and self-determinative behavior." Thus, they recommend that all policies, but particularly housing policies, contribute to the autonomy and well-being of people of *all* ages.

Given the diversity among the elderly, the authors fear the limitations of age-specific programs, even though they struggle with the need to provide specific services for the poor. Although the fear of age-specific policies seems ironic given the focus of the research, it clearly points out the dangers in stereotyping the needs of any large segment of the population.

America's Aging presents the reader with a variety of perspectives on housing for the elderly and attempts to broaden the discussion to include concerns for productivity and independence. By contrast, Martin Valins's book, *Housing for Elderly People,* is a focused and practical how-to design book with a compendium of examples of housing built during the past 30 years.

Valins sets out to categorize and define housing types from developments intended for "active elderly" to those providing increasing care (for example, congregate housing, skilled nursing homes, and life-care communities). He provides a cursory review of why these facilities are needed and whom they serve, but half the book is devoted to examples, mainly British and American, of the various building types, including photos, site plans, floor plans, and brief descriptions of size, location, funding, and management. The second half of the book is concerned with "activity-based design criteria," that is, a cross between graphic standards and a pattern language.

The section on design guidelines attempts to provide detailed dimensions for every possible room in every possible building type from apartments to life-care facilities, as well as programmatic criteria for social interaction in each of the build-

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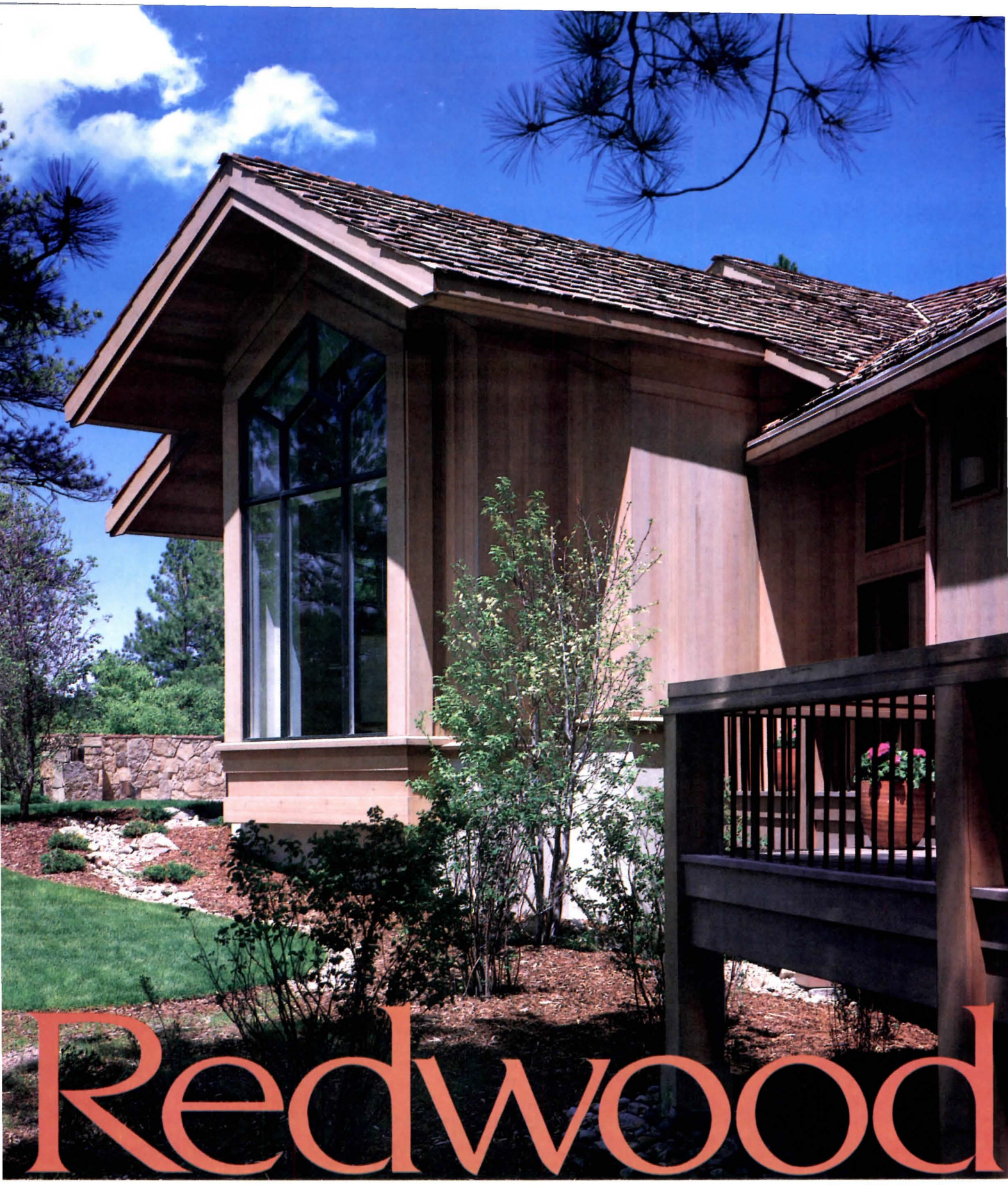

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Books *from page 37*
ing types. The result is chaotic. Standards are mixed with recommendations; there are too many alternatives and no hierarchy of information.

Certainly, there are some aspects of designing for the elderly that need the same specificity of standards as handicapped access. But, as the authors of *America's Aging* make clear, the elderly are as diverse as the rest of society. Good housing design should serve a variety of age groups without pigeonholing and stereotyping one-third of the population.

—Mary C. Comerio

Ms. Comerio teaches architecture at the University of California, Berkeley, and is a partner in the San Francisco architecture firm George Miers & Associates.

The City that Never Was. Rebecca Read Shanor, (Viking Penguin, $35.)

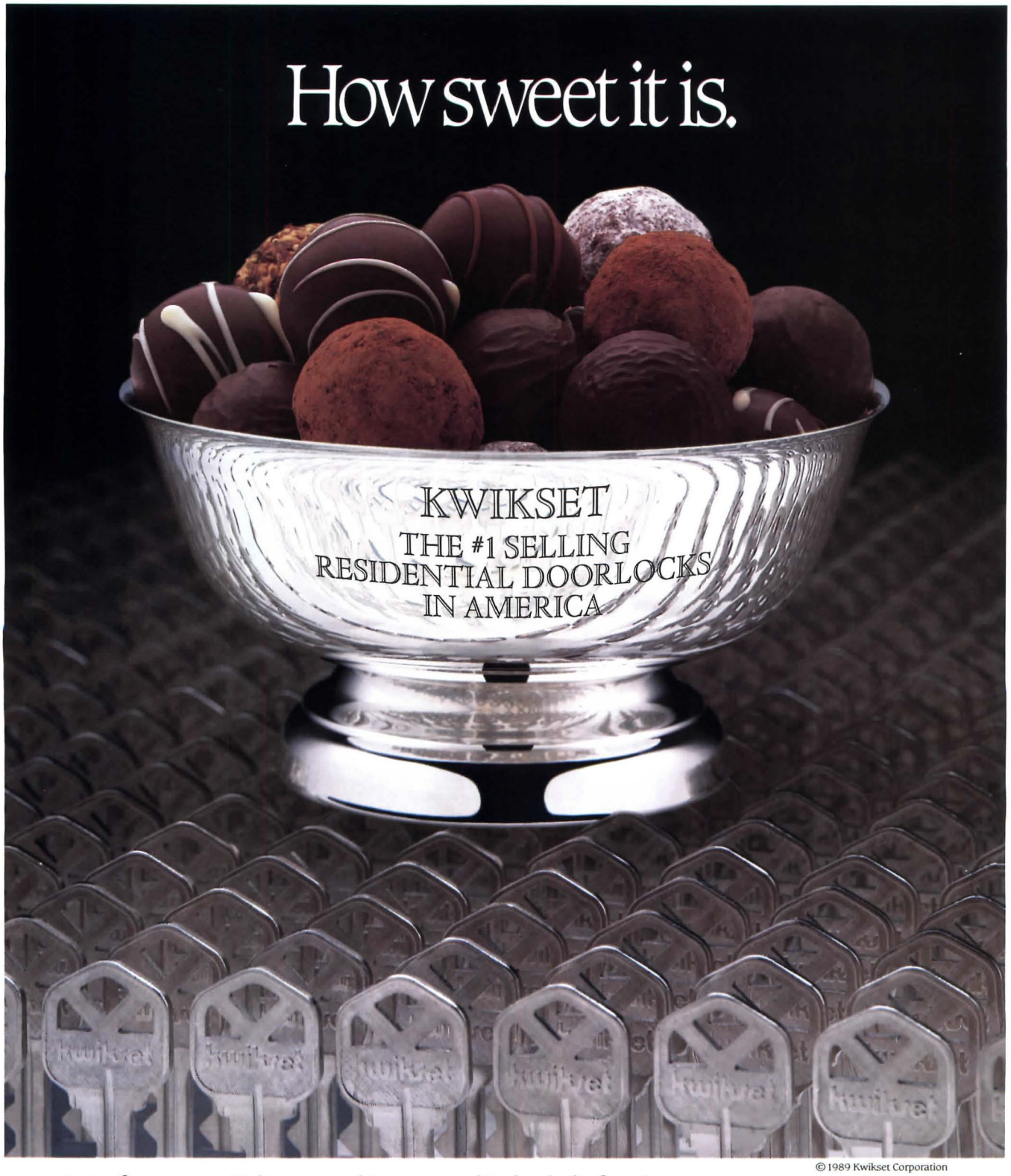
Seeing the title of this book and discovering it was on New York City, I assumed it would be about huge, mad projects such as Buckminster Fuller's 1962 scheme for putting midtown Manhattan under a glass dome or even my own 1944 proposal for turning the borough inside out. I was pleasantly disappointed—the author gives us something more entertaining. In view of its contents a more appropriate title for this collection might have been: "Some tales about the city that once was, never was, and is."

Although the frontispiece quotes old Daniel Burnham's well-worn "make no little plans," the book is not about grand plans but the histories of those little or big projects that make a city what it is at a given moment. On Manhattan Island the moment is short—"here today, gone tomorrow" is our unwritten motto and has been for 200 years.

The book presents a variety of projects, some practical, some not: roads, parks, and buildings that were or were not built; some that appeared, were used, and were swept away; others that remain to enchant or haunt us. What comes across in all these recountings is a simple fact—it was not planning but chance, politics, or serendipity that made the decisions.

The author presents no theory as to why this should be. She has no ax to grind; she is a reporter. This is all to the good since my city has no place for those who may ask "How does an important building get placed if there is no master plan?" Shanor gives us a history and the answer is clear.

For instance, she tells how the Metropolitan Museum of Art and the Museum of Natural History got sited and how the New York Historical Society didn't; how our graceful little City Hall was almost located at the old reservoir site at 42nd Street and Fifth Avenue, where Carrère & Hastings's marble New York Public Library now stands in all its Beaux-Arts grandeur. *continued on page 41*



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Books *from page 39*

We are not told of the rivalry that led two Detroit auto makers to choose Manhattan as the place for their race to build the world's tallest structure. But we are told of the time when the Chrysler Building threatened to be taller than the Empire State, and how the latter won when its architects, Shreve, Lamb & Harmon, added a 300-foot finial to be used (it never was) as a "mooring mast" for airships.

The author tells us that what started a movement toward mechanical transport systems in the city was not common sense but a distemper among horses that paralyzed traffic. She also tells about that hard winter when Manhattan and Brooklyn were physically joined by the freezing of the East River so people were able to commute by foot or wagon instead of ferry. The "ice bridge" melted, but the memory of its convenience did not—three years later Roebling's Brooklyn Bridge was started.

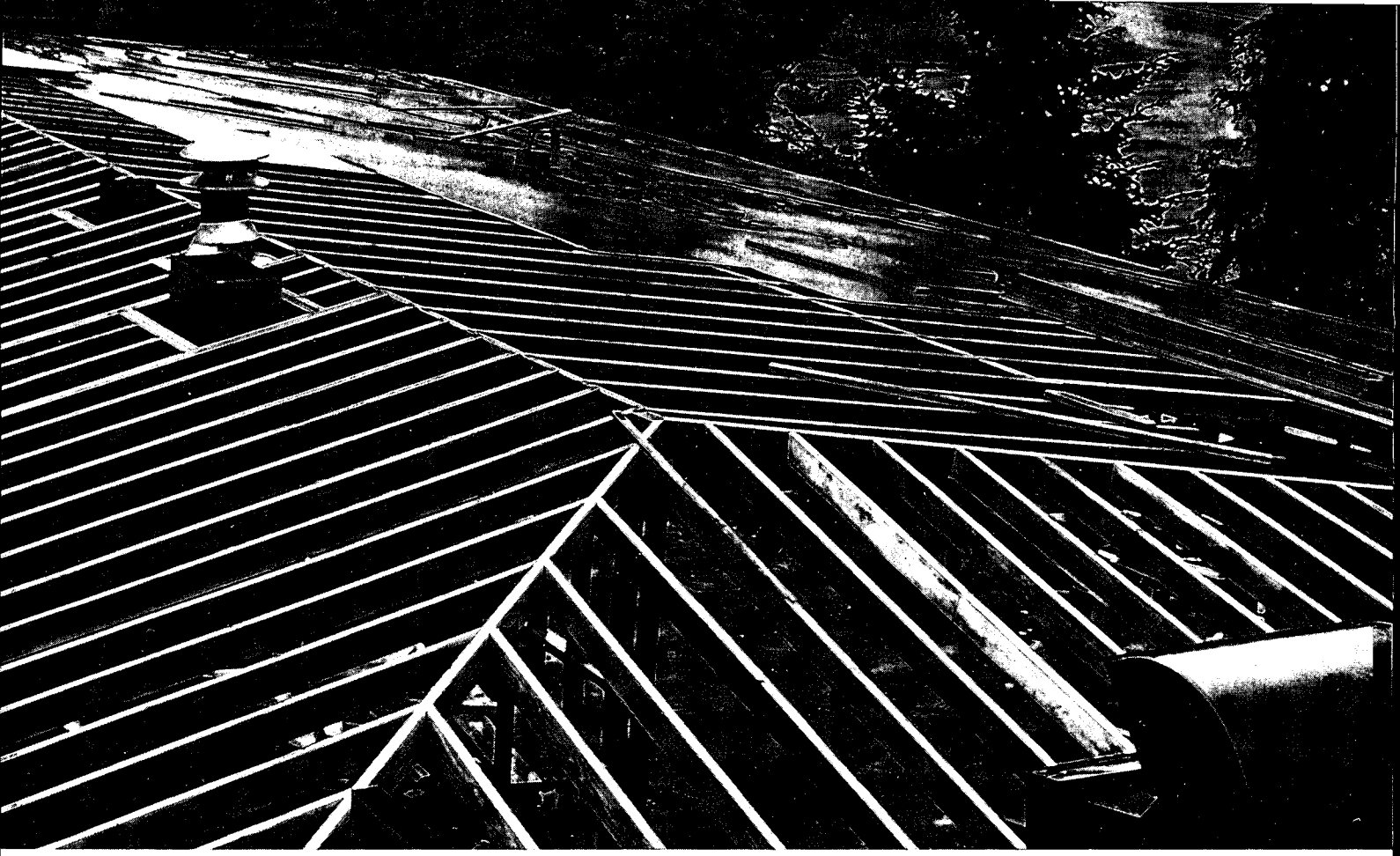
Manhattan did have one master plan that became a reality—the 1811 river-to-river, south-to-north street grid. When it was unveiled the planning commission said it might surprise some because so little space had been set aside for parks. This was no oversight. A city "surrounded by the large arms of the sea" would have plenty of fresh air so why waste potentially valuable land on parks? Surely, say, 10 percent of London's 5,000 acres of parkland would be sufficient for the health and pleasure of the citizenry.

Forty years later it appeared a mistake had been made; a good-sized park was a necessity. Who pointed out the need? Not a planning commission, not a health department, Shanor tells us, but a newspaper editor named William Cullen Bryant and later the popular landscape designer and author Andrew Jackson Downing. The city bought a large parcel of "far from attractive land," and Central Park was born.

What happened then is a typical New York story where chance plays its part. Downing went to London in search of an architect to design Gothic style villas for his new book. He returned to New York with Calvert Vaux and happened to introduce him to Frederick Law Olmsted. Later the team of Olmsted and Vaux won the competition for the design of Central Park. But it wouldn't be a New York story if there were no sordid questions: Did Vaux ask Olmsted to be his partner in the competition because Olmsted was then assistant to Egbert Viele, engineer in charge of the park development and who had made a design for it? Did Olmsted and Vaux steal important parts of Viele's scheme? Read Shanor's account and decide. One thing is for sure: AIA's competition committee would not have approved of the conduct of the Central Park competition.

The illustrations in *The City that Never Was* are on the gray side, but the text is

continued on page 43



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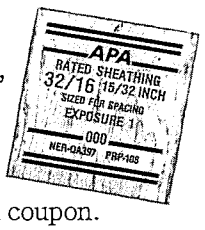

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Books *from page 41*
on the whole informative and, as far as I know, accurate. However, there is one small section that needs corrections. I mention it only because I was deeply involved, and the nerve, after all these years, is still sore. In the chapter on monuments several pages are given to abortive attempts to build a monument to the six million Jews murdered by the Nazis. One such was proposed for a site given to the city in Riverside Park. I was asked to design it, but, because of the peculiar sensitivity of such a memorial, I suggested that it be awarded through competition. This happened, and I was selected as architect, with Erich Mendelsohn placing second. As I remember it, Nathan Rappoport, a sculptor, was among the contestants. Since the memorial was on park property it turned out that the parks commissioner, Robert Moses, had to approve. He didn't, suggesting changes that I refused to make. There was a fuss. Philip Johnson, then curator of architecture at the MoMA, liked the design and gave it a month-long show, which we hoped would generate public support. It didn't and I resigned. Mendelsohn was then awarded the commission but fared no better with Moses. The scheme was dropped. Rappoport's design, which Shanor dates 1965, may have been what he submitted in the 1950 competition.

For the aficionados of American urban history, *The City that Never Was* tells us some interesting tales and provides some useful footnotes on the development of the city whose centerpiece—Manhattan—will, when completed, be called "that astonishing monument to the 20th century."—Percival Goodman, FAIA

An author and historian, Mr. Goodman is emeritus professor of architecture at Columbia University.

Brat City or Debutante? San Diego Chapter/AIA Design Awards 1960-1988.

The title of this little book was taken from the theme of San Diego's design awards program, which asked: "Is America's finest city ready to relinquish its small-town mentality and take on the responsibilities of the big-city arena?" as Russ Stout writes in the introduction.

The volume gives a useful summary of San Diego's best architecture of the last 28 years. Photographs of premiated projects are small but clear and descriptive. In addition to lists of winners and jurors for the biennial awards is a running commentary on each year's outstanding national and local events. Did you know, for instance, that in 1977 the proposition to ban nude bathing at Black's Beach was approved, Vietnam draft evaders were pardoned, Elvis died, and the Bee Gees released "Stayin' Alive"? This is a useful little book for anyone interested in San Diego or the rest of the world.

—Andrea Oppenheimer Dean

Books continued on page 44

Best Addresses: A Century of Washington's Distinguished Apartment Houses. James M. Goode. (Smithsonian Institution Press, $45.)

One might not have guessed that among the many storied public buildings and monuments in Washington, D.C., lies a mother lode of architectural material heretofore taken for granted and certainly unsung. This material is the fascinating evolution of the Washington apartment house. Its documentation by James M. Goode, former curator of the Smithsonian Institution "castle" and author of two previous books on the art and architecture of the nation's capital, is a welcome surprise.

This handsome book is a collection of profiles of individual apartment houses grouped into periods, from 1880 to the present, that the author convincingly defines as much by the vagaries of boom and bust as by those of architectural style. In this respect, *Best Addresses* illustrates the weave of factors that influence the making of cities. We learn here of the impact on apartment houses of comings and goings of wars, the arrival of rent control, the personalities of local real estate moguls, the capabilities of local architects, the height restrictions of Washington zoning, the advances of technology, the ample availability of space, the fickleness of the fashionable denizens of the city, the impact of an unpredicatable street grid, and the advantages of interesting urban topography.

Above, the art deco Kennedy-Warren, 1931, by Joseph Younger.

Of particular interest to architects today is the fact that the city's apartment houses were designed almost entirely by local professionals whose sensitivity to the Washington marketplace's standard of elegance and amenity seems to have been, at least until recently, unerring. Of note also are the author's many profiles of architects and their colorful patrons, profiles that give credit where it's due.

What particularly enriches *Best Addresses* are its generous amounts of social anecdote and its many reproductions of excellent drawings and photographs, some old and some new, showing the interiors of apartments and the life styles then and now of tenants—a looking glass that animates this book with the dimension of human habitation so often lacing in architectural monographs. It is this layer of information that communicates an immediacy of experience that to this reviewer, who as a child lived in three of the more than 100 buildings described in the book, conjures warm images of waxed inlay floors, worn marble steps, and enormous concierge desks manned by avuncular men in somehow friendly uniforms.

Perhaps the most valuable achievement of *Best Addresses* is its demonstration that even the narrowest regional topic can be of value to a wide range of readers. For architects, the story of the evolution of the Washington apartment house is truly worth reading—not only to admire its best examples but also in order to learn, sadly, that some of the least satisfying have come along in recent decades. Certainly at its height in the period prior to the Depression, the Washington apartment house—under the scrutiny of Goode's loving exposition—shows us that much greatness is possible from an architecture formed within the crucible of local concerns.

—Chad Floyd, AIA

Mr. Floyd practices with Centerbrook Architects in Essex, Conn.

ARCHITECTURE

Two rumors are rife in Washington housing circles. One is that Jack Kemp may turn out to be the best HUD secretary in many years. The other is that he will leave government at year's end to become commissioner of the National Football League and be replaced at HUD by the governor of New Jersey. We find the first credible and therefore hope the second turns out not to be.

Kemp's appointment was not exactly received with glee in these same circles. He has been a darling of the conservatives, to whom federal housing assistance is next to godlessness. At first the apprehension seemed justified. When allegations of scandals struck the program of federal assistance to local authorities for maintenance and repair of public housing (allegations that put Kemp's predecessor, Samuel Pierce, more in the public eye than he ever had been while in office) Kemp's initial instinct was to cancel the program. This at a time when many of the projects built in the 1950s and 1960s are decaying to the point of abandonment, worsening the housing crisis of the poor and forcing more of them into homelessness.

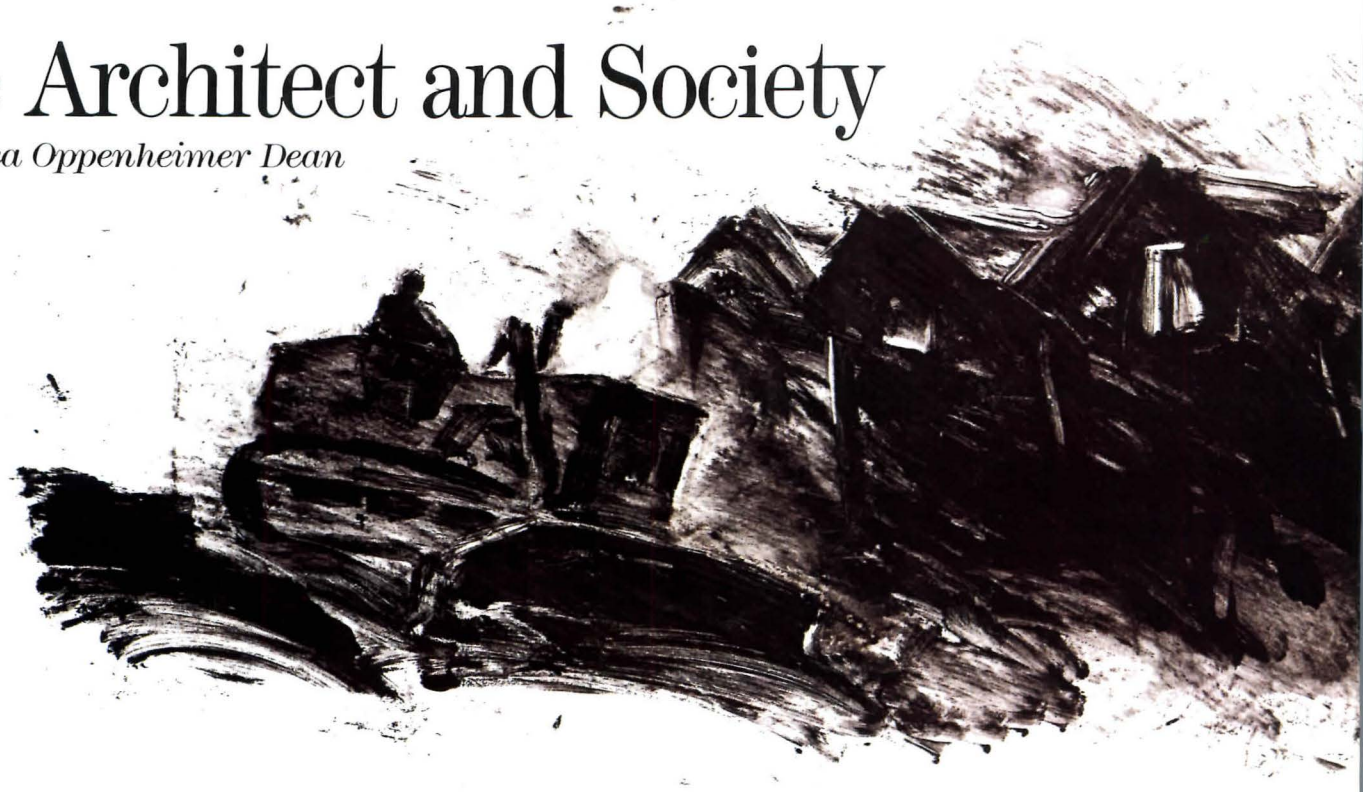
But Kemp changed his mind and decided on reform rather than cancellation of the program. This is a characteristic of the flexibility that many are finding in the new secretary. "He is constantly looking for new ideas," says one close observer. "He really wants to do something."

And he is looking not just in the halls of HUD, but in the streets of our troubled cities. He was out walking these streets and talking to their inhabitants more in his first month than Pierce had done in his entire term. The lure of the NFL is understandable; it is a lifetime job at a handsome salary. But the nation and its cities need Kemp more than the behemoths of pro football—*D.C.*

P.S. The offices of the editorial staff have been moved to Suite 625, 1130 Connecticut Ave., N.W., Washington, D.C. 20036. The new phone number is (202) 828-0993, and the Fax number (202) 828-0825. One of the things we will miss about being in AIA headquarters is the casual drop-in visits from friends and/or readers in the building for other business. The new quarters are only about a six-block walk or a five-minute cab ride from AIA. So please stop in when in town.

The Architect and Society

By Andrea Oppenheimer Dean



It's not what we praise, it's not what gets published, it's not what we teach. Social architecture has been abandoned by architects—they never took it seriously enough." That's the the assessment of John Zeisel, a sociologist and guru of social architecture during its heyday in the late 1960s and early '70s. Disputing Zeisel's grim assessment is, among others, Robert Sommer, an environmental psychologist at the University of California, Davis, whose following during those halcyon days of social concern in architecture was rivaled only by Zeisel's. "The battle has been won," asserts Sommer.

Both claims, oddly, are true, though both obscure the real story. Zeisel's pessimism is far more readily understood than Sommer's rosy outlook. The 1980s have, after all, elevated private greed over public need. It has seemed a decade of self-involved, no-holds-barred competition in which ends justified means and anything deemed of value—including architecture—was judged by standards of the marketplace and fashion. The majority of architects, like the majority of American citizens, spent most of the decade in a kind of muffled state of detachment from social and political problems—out of feelings of impotence or indifference—and took refuge in nostalgic, sentimental fritterings with form. Image meant everything, and some of America's leading architects became celebrities, cheerfully marketing designer teapots, cashing in on endorsements for trendy consumer goods, and appearing on covers of slick magazines. Privatization ran rampant and ran roughshod over the public interest, as became all too evident in the growth of homelessness and the virtual disappearance of available low-income and affordable housing.

How then can the battle for social architecture have been won? And what was the battle about?

Attitudes and ideas about social architecture during this century have been defined by modern architecture and reactions against it. So, for our purposes, the battle took form with the early modernists' struggle to come to grips with a massive housing shortage during the 1920s and '30s and to erect a belief system opposed to prevailing totalitarian ideas. To fight fire with fire, perhaps, modern architecture's founding fathers developed convictions that had the same exclusive and tyrannically paternalistic quality as the ideas they opposed. Both Wright and Le Corbusier, while agreeing on *little else*, were convinced that a revolution in architecture, which deracinated the past and the accepted culture, would spearhead a utopian new social order. Enlightened buildings, they believed, would reform the world and human nature. As Lewis Mumford later wrote, "We identified the new with the good, and hailed the New Man, the New Woman, the New Politics, the New History, the New Science; in short, the New World. History, we thought, began and ended with ourselves, and we expected the new to last forever, as if the will to change itself would remain forever unchanged."

By the late '40s, modern idealism governed urban renewal and reform programs. Harvard's Dean Joseph Hudnut confidently wrote in 1946, "When the slums are cleared, when the people live in cleanliness and space, when good schools and recreational areas are available to every citizen, . . . when the people's institutions are supported by organization and by competent facilities, we shall have established the basic conditions for social and political health."

Oh, brave new world. To architects who have recently come of age, this may come like a message from the planet Krypton.

By the late 1960s, credence in modern architecture's brightest hopes began to unravel. Ironically, faith was shattered by a widespread perception that modernism was indifferent to human needs, that its look-alike, sterile-seeming boxes were socially inept and irresponsible. As architectural historian Joseph Rykwert only half-jestingly wrote, "Modern buildings hate people."

Reflecting a broad disillusionment with modern architecture's social agenda, Ada Louise Huxtable, Hon. AIA, wrote in 1971, "The naive faith that a certain kind of design will result in a certain kind of human response is simplistic nonsense. For confirmation we have only to look at the vision of America's 'safe and sanitary housing' (now *there* was a belief system) that has turned into some of our most vicious slums." The desperate decision in 1972 to dynamite the unmanageable and dangerous Pruitt-Igoe housing complex in St. Louis seemed proof of modernism's failure as an instrument for social betterment.

Belief in architectural determinism was repudiated and replaced by a new confidence in "socially responsive architecture." As Maurice Broady, then at the University College of Swansea, England, wrote in 1972, "Even if it be admitted that architectural design may influence, it cannot be said to determine social behavior. . . . Its prime social function is to facilitate people's doing what they wish, or are obliged to do."

Illustration by Kenneth Krawczyk

In addition to being a reaction against modern architecture, this new attitude was a reflection of the anti-authoritarian climate of the late '60s and early '70s, which grew out of the civil rights and antiwar movements. During President Johnson's war on poverty and the early years of Nixon's Presidency, construction of low-income housing was at its height and advocacy for the rights of the poor and minority groups was supported by a host of federal programs. In the spirit of egalitarianism, architects forswore their roles as social engineers and esthetic poohbahs and tried to demystify their craft and make it more easily accessible to ordinary citizens. "User participation" and "advocacy planning" became the call to arms in a new series of battles on behalf of social architecture.

Because they were trained and skilled in ferreting out design needs and wishes of ordinary citizens, behavioral scientists such as Robert Sommer and John Zeisel often served as commanding officers in these battles. In fact, social scientists often were asked to play a larger role than they were prepared for by schooling or inclination. As Princeton sociologist Robert Gutman, Hon. AIA, wrote in 1968 in the AIA JOURNAL, architects, having become "ethical relativists confused about what is good or bad for man, for the community and for society, . . . turn to the sociologist in the hope that his discipline has somehow been spared this form of demoralization."

The value of design itself came under fire. Ron Shiffman, director since 1966 of the Pratt Center for Community and Environmental Development, recalls, "Those who entered the design professions were highly idealistic but often didn't have the hard skills." Architects ended up doing far more organizing and planning than designing of social architecture. Mary Camerio, now a professor of architecture at the University of California, Berkeley, asserts that "in reality most of the early advocacy/community design was anti-architecture." Many regarded design as secondary. Richard Hatch, former director of the Architectural Renewal Committee in Harlem (ARCH), wrote as recently as 1984, in *The Scope of Social Architecture,* that "the paramount purpose of participation is not good buildings, but good citizens in a good society. . . . For a time at least, architecture must cease to aspire to the condition of art."

Always fearful of losing control over the design process and being elbowed out by specialists, architects had ample reason for anxiety in the late '60s. The profession seemed to be losing its grip, even while admitting that its hold—its elitism and know-it-all-ism—had been spurious.

The late 1960s and early '70s were, nonetheless, "a terrifically exciting time—people were intensely interested in and committed to what they were doing," says Donlyn Lyndon, FAIA, chairman of the architecture department of the school of environmental studies at the University of California, Berkeley. Community groups and community action flourished, with some 80 community design centers around the country providing technical assistance for neighborhood plans, day-care centers, health clinics, housing, rehabilitation, and other projects. Only about 30 such design centers survive today.

Why then does Robert Sommer think the battles have been won? Sommer now directs a consumer interest research center at the University of California, Davis, and does consulting work for architects, which has convinced him that the methods developed by social architecture in the '60s have unalterably changed the practice of architecture and planning.

One legacy, for instance, is today's design review procedures, which originated in the community design review boards set up in the '60s. They have institutionalized participation by all manner of citizen groups in urban planning and design decisions. As a result, the following scenario would seem inconceivable today. In 1962, Philip Johnson, FAIA, critic Aline Saarinen, Ulrich Franzen, FAIA, and other design notables led a protest against demolition of New York City's venerable Penn Station. It nonetheless succumbed to the wrecking ball and was replaced by a building of no redeeming cultural or esthetic value.

A related bequest of the social architecture movement of the late '60s is a heightened urban concern and sensitivity. As Romaldo Giurgola, FAIA, said in a 1980 speech about the protest movement at Columbia University in 1968, "The whole question was about the emergence of an urban consciousness. The legacy of 1968 calls us as architects to become aware of different cultures, of different ways of life." Though often treated superficially, issues of context, regionalism, appropriate scale, and pluralism have gained acceptance and improved our cities. A direct result is that the 1980s have produced some of the best works of urban design of the last half-century. "Ideas of the public realm have been absorbed into architects' and developers' vocabulary," says

Illustration by Kenneth Krawczyk

Princeton's Robert Geddes, FAIA, "while the resurgence of the *city street* is a very hopeful sign."

Community design centers, meanwhile, though now diminished in number, are far more effective, more professional, more knowledgeable about finance, management, and "other disciplines we didn't know anything about in the '60s," as Ron Shiffman of the Pratt Center says. Robert Shibley, architecture chairman at the State University of New York at Buffalo, asserts that "social architecture has grown up. It doesn't make the outrageous claims of the '60s. It doesn't feel it has to attack the esthetic conceits of the profession to work, and it no longer calls for false choices between social, esthetic, political, economic, and ecological values. It is quietly, perhaps too quietly, working in several contexts."

Rather than looking to government for funding and guidance, most community design centers today are doing their own work and encouraging corporate input and participation, notes John Tomassi, director of the Chicago Architectural Assistance Center. Mary Camerio of Berkeley explains, "People who want to work in low-income housing today understand that they have to know about the development game. The deals are the deals whether they're made for profit or not." She claims that local governments are encouraging the existence of nonprofit development groups because municipalities want to offer incentives and some funding but don't want to control or manage projects.

Often unnoticed, the methodologies developed by behavioral scientists for social architecture in the 1960s are now integrated into the design process, much like energy-conscious design. Market research is another name for user studies, and sensitive programming, design management, postoccupancy evaluation, and other contributions of the social sciences have become commonplace. There is far more awareness today of the needs of special populations—the old, the disabled, the abused, the dying. And most reputable schools of architecture and landscape architecture now employ social scientists on their faculties, while several schools of psychology have active research and teaching programs in environmental psychology. This year, the Environmental Design Research Association will hold its 20th annual conference. The field is here to stay.

But sociologist Robert Gutman sounds a couple of warning notes. Behavioral science approaches, he explains, are being used less frequently by architects than by major developers, housing administrators, and the new client group of facilities managers—the people who determine how much space is needed, how it should be configured and furnished, and how various arrangements can affect morale, behavior, and productivity. "This is integrally connected with the most important movement in architecture of the last 20 years," says Gutman. "It is the increasing power and control of the design process by clients."

Architects have lost ground as clients have gained control. One reason for architects' retreat is that projects have become so vast and complex that most designers don't have skills or knowledge enough to assert control. A majority of architects have narrowed their role to the business side of architecture or to the fashioning of facades. One result is that many behavioral scientists have given up on architects, according to Gutman.

Among them is sociologist John Zeisel ("It's not what we praise, it's not what we read about, it's not what we teach"). He left academia some years ago to form a private consulting practice that provides market research, programming, design review, postoccupancy evaluation, and other services for building clients, not architects. "Architects treated the social sciences as a fad for a decade or two and got tired of it," Zeisel says. "We're working for the people who make the decisions about where the money flows. In the real world of finance, public administration, and development, people buy and use our services."

Though many of the objectives of '60s and '70s social architecture have been embedded in our culture and in building and development procedures, the optimism and idealism that produced them are as good as dead today. Gutman places at least partial responsibility for "the lack of a prominent sense of social mission in architecture" on Robert Venturi's call for a narrowing of the field to exclude social and political issues in his *Complexity and Contradiction in Architecture* of 1966. "It became a part of the theoretical position," says Gutman.

But there are other reasons for architecture's retreat. "In the '60s, as socially motivated architects, we expected to be hugely welcomed into poor neighborhoods and exactly aligned with the expectations of the people," says Robert Harris, FAIA, architecture dean at the University of Southern California. "In contrast, my expectation now is that the local neighborhood is not that thrilled with our arrival. 'The people' have 12 voices rather than two. It's not even certain what the social good is."

Most significant, Harris and others are increasingly stymied by new sets of problems that resist known solutions. Among these are the homelessness of millions, the plagues of AIDS and drug addiction, the scourge of intractable poverty and illiteracy among a new American class of untouchables, the imperilment of the planet's ozone, and on and on. There is anger at the pervasive greed that drives up land and housing costs, that chews up the countryside and spews out acres of soulless commercial malls and strips and office parks and traffic jams. There is a widespread feeling of being overwhelmed, victimized, at a loss for what to do, especially as costs of construction and social services far outstrip costs of goods and other services affected by increased technological productivity. In the old days, for instance, a refrigerator cost as much as two windows and a door, notes Harris. Today, a single window costs more than a refrigerator.

In the face of huge and seemingly insoluble problems, our tendency has been to distance and distract ourselves from perceptions of inequity, from our feelings, from each other, from government. Michael Brill, president of the Buffalo Organization for Social and Technological Innovation (BOSTI), points out that "architecture, itself, has become part of the distraction and entertainment industry. It has a fraudulently soothing and sentimental Bartles & James quality."

More constructive than distancing and despair are tactics many architects have chosen. They concentrate on "taking care of our cities through modest acts of responsible design and resource preservation," suggests Richard Bender, former dean of the school of environmental studies at UC, Berkeley. In that spirit, designers are staffing review boards and participating in other community groups that influence planning and architectural decisions.

But a response commensurate in scale to the size of our problems hasn't emerged, Harris says. Nor is he encouraged by students' attitudes. "For some time now students have been more oriented toward careers and personal achievement and away from dedication to society," he says. Bernard Spring, FAIA, president of the Boston Architectural Center, describes how "students at Harvard take you through mythical axes of designs. That's all they're interested in. If you ask what's the room going to be used for they don't know what you're talking about. Architecture is being remystified. Young teachers have a private language that no one understands." Dana Cuff of the University of Southern California explains that "there's an interest in symbolism and meaning, but it's formalistic." Her students tend to be "interested in real context, real clients, which is also a way to raise social interest," she says. "But it hasn't happened yet. To my students social housing is nothing but deteriorating hulks." She says there are no role models, few professors are working on socially motivated projects, and students don't see much socially motivated architecture published in magazines.

There is some evidence, frail as yet, of increased interest in social issues. Mary Camerio, who has seen a change in her classes at Berkeley, attributes it in part to "rising social embarrassment about homelessness and lack of housing affordability. It's hard to dodge problems when they meet you on the street." Robert Geddes asserts that "postmodernism at Princeton is dead. There is tremendous interest in landscaping, which is architecture working with issues of environment and ecology." Richard Bender tells how in a recent symposium at the University of California, San Diego, Richard Meier, FAIA, Ricardo Legoretta, Hon. FAIA, Fumihiko Maki, Hon. FAIA, and Richard Rogers, Hon. FAIA, each "talked with some passion about social concerns. They spoke about how important such ideas were to their own work and should be in any school of architecture."

Another hopeful sign occurred last September during an AIA workshop-type conference for its Vision 2000 program. Participants placed "community design and planning" at the top of their list of important roles for architects at the beginning of the new century. The most significant "innovative role," they believed, would be "service/assistance to the community."

The conference report concluded that, "after the uncritical 'feel-good' mood and the consumption binge of the mid-'80s, the public is slowly beginning to face economic challenges and assume responsibility to untended social problems." It mentioned that the Roper Organization has labeled the emerging trend "Back to Reality."

When it comes, if it comes, "we'll be prepared as we weren't 25 years ago," says Dana Cuff. □

This article was written for presentation at a conference, "Post Modernism: Architecture as the Critical Art of Contemporary Culture," which will be held Oct. 26-28 at the University of California, Irvine.

Photographs © Steve Rosenthal

Low-Income Housing Made High Architecture

The Rowhouses, Boston, William Rawn, AIA.
By Robert Campbell, AIA

An improbable team has put together, on a waterfront site in the former Charlestown Navy Yard in Boston, a piece of affordable housing of a quality that seems almost magical in this day of stunted public expenditures.

The team has two members. William Rawn, AIA, is a highly intellectual architect who also holds a law degree and once, before switching careers, served as vice chancellor of a university. Thomas McIntyre is a Bricklayers Union leader, with a one-of-the-guys-at-the-tavern kind of personality.

Rawn achieved an Andy Warholish two weeks of fame a few years back with his very first building, a rural Massachusetts residence that became the subject of author Tracy Kidder's best-seller *House.* Charlestown is the third affordable project he's done with McIntyre, and it's the best to date.

The first virtue of this remarkable project is its site. For once, low-income and moderate-income people have not been given the most undesirable possible location. The waterfront of Boston Harbor—polluted though it notoriously be—is precious land. Much of it is lined with condos and hotels of a costliness that would have seemed fantastic only a few years ago. Charlestown Navy Yard Rowhouses, as the Rawn-McIntyre development is called, occupies just such a site. Yet a two-bedroom dwelling here is priced between $78,000 and $98,000 (there are 50 units, most of them one-bedrooms). Just down the water at Rowes Wharf, a two-bedroom can run three quarters of a million.

Since President Richard M. Nixon's freeze of federal housing programs way back in 1973, it is doubtful whether anyone else in the country has built both this well and this affordable.

Charlestown is a Boston neighborhood just across the mouth of the Charles River from downtown. It's pretty much a blue-collar place, but in recent years there's been a lot of gentrification in the old brick houses around Bunker Hill. The Navy Yard stretches along much of the Charlestown waterfront. Most Americans know the Navy Yard because it houses the frigate *U.S.S. Constitution.* Few visitors to that landmark, probably, sense how close they are to downtown Boston. In 20 minutes or so, you can walk from the Navy Yard across a bridge to an office in the central business district. There's also a water shuttle now that makes the crossing regularly.

For a century and a half the Navy Yard was a major federal ship-building and repair facility. When it closed in the 1970s, the City of Boston, with consulting help from architects Anderson-Notter (now Notter-Finegold-Alexander) and others, created a master plan that is gradually transforming the gritty, seedy old Navy Yard into one of the most interesting residential neighborhoods in town. The Rowhouses building is the neighborhood's first major affordable chunk.

Facing page, in this view down First Avenue parallel with the water's edge, the Rowhouses building is the strong presence at left. Above, the 13th Street elevation stretches toward water.

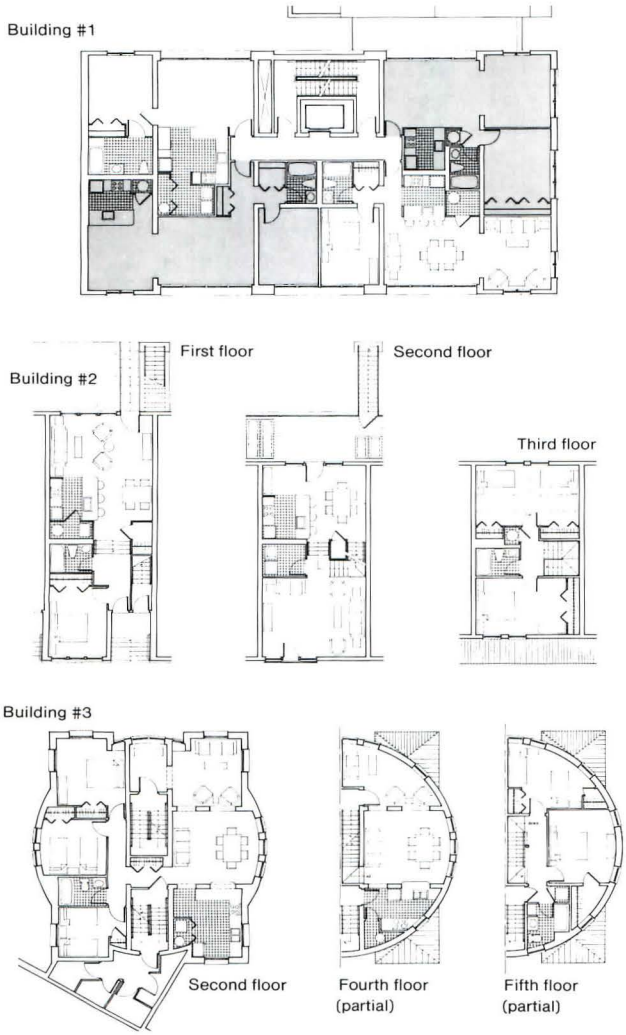
The site planning of the Rowhouses looks simple enough, but in fact it's extraordinarily sensitive. It's a successful attempt to reinforce and reconcile two different site conditions, both of which are generic to New England. You might call these two generic urban ideograms Front Street and Finger Piers.

As to Front Street: the Navy Yard, as you'd expect of a military ghetto, is a grid in plan. Its Main Street is called First Avenue. First Avenue runs parallel to the water's edge, one block back from it. Most New England waterfront towns have such a street, which always seems to be called Front Street (or Water Street or Commercial Street), and, like First Avenue, is built up on both sides, with the backs of buildings, plus a miscellany of sheds and docks, facing the water. As to Finger Piers: Boston Harbor, like many harbors, is edged by a serration of piers that are known locally as the Finger Piers because they reach into the water like a row of fingers. They always have buildings on them and the buildings are always long and thin like the piers.

What Bill Rawn has done with his Rowhouses is to maximize the strength with which they conform to both the Front Street and Finger Piers types. His building is massive, frontal, flat, and overscaled where it addresses First Avenue, emphasizing the significance of this street and helping to shape it as a spatial corridor. An arcade at the building's base denotes, so to speak, the presence of an important pedestrian sidewalk. A bold gable signals importance and repeats the gable motif of older buildings down the street. Here the Rowhouses building is tall and—as with the terraces of John Nash in London—looks as much like an important institution as like a collection of private dwellings.

But as the Rowhouses move out toward the water, they reconform into a long linear element poking toward the sea in the finger-pier manner. This element is also lower, meeting the scale of the side street—13th Street—onto which it faces. Instead of big institutional gables and arches, we see modest stoops in front and porches behind. At the water's edge, there's a small bow to yet a third waterfront icon. A round, copper-topped tower reminds us of the architectural exclamation points we so often see marking the line where ocean meets land—the lighthouse or flagpole, the grain elevator or gas tank. Each part of the Rowhouses is thus different, responding to a different site condition—yet all the parts visibly belong to one building, thanks to common materials and window treatments, and to a continuous band of checkerboard brick at second-story level.

The Rowhouses fit the Navy Yard in another way. The building is designed to recall the big, simple shapes and generous solidity of the old Navy industrial buildings, most of which are being saved for new uses. Many of these are significant works of architecture that display powerful granite and brick detailing.



Above, Building No. 1 faces First Avenue; Building No. 2 has floor-through apartments. Below, two views of Andrew Square, another Rawn-McIntyre housing venture whose interiors are similar to those of the Rowhouses.

The Rowhouses building has a hint of their grandeur, but it also has a delicacy of scale and ornament that makes it feel comfortable as a place to live. The building doesn't look like a converted factory or wharf.

Not suprisingly, the development sponsored by a bricklayers' union is faced with brick. There's a charming element of play and self-advertisement in the stripes and checkerboard patterns, as if the brickies, working on their own building, had been taking a busman's holiday. Brick is used properly here. There is a rain-shedding course of bullnoses at the building's base, for example, and the arches along First Avenue are genuine, constructed masonry arches, not brick veneer glued over a frame.

In even the best affordable housing, a successful exterior appearance often proves to have been paid for by skimping on the interiors. There never seems to be enough money to do both. That is both true and not true at the Charlestown Rowhouses. Materials like carpeting are of decent quality. But the rooms are sized, for the most part, to the legal minimum. Rawn has compensated by laying out his floor plans with great openness, so that rooms can borrow space from one another. Most units are floor-throughs, with daylight at both ends. Many are also duplexes. Most open onto a private outdoor space. There's been thought, too, about the life styles of the people who will be inhabiting the project. In most units, for instance, there's a distinction between a relatively formal front parlor and a more relaxed kitchen-dining area that doubles as a family room.

Cost-cutting shows again in the kitchens, where counter space and food storage are simply inadequate. This isn't incompetence, but a deliberate decision. Developer Tom McIntyre points out that kitchen counters and cabinets and closets are things the homeowners can add, over time, by themselves. He notes that many owners are in some line of work that is related to the building trades, or know someone who is. The same kind of thinking lies behind the otherwise suprising choice of electric heating. The great goal, McIntyre insists, was low first cost.

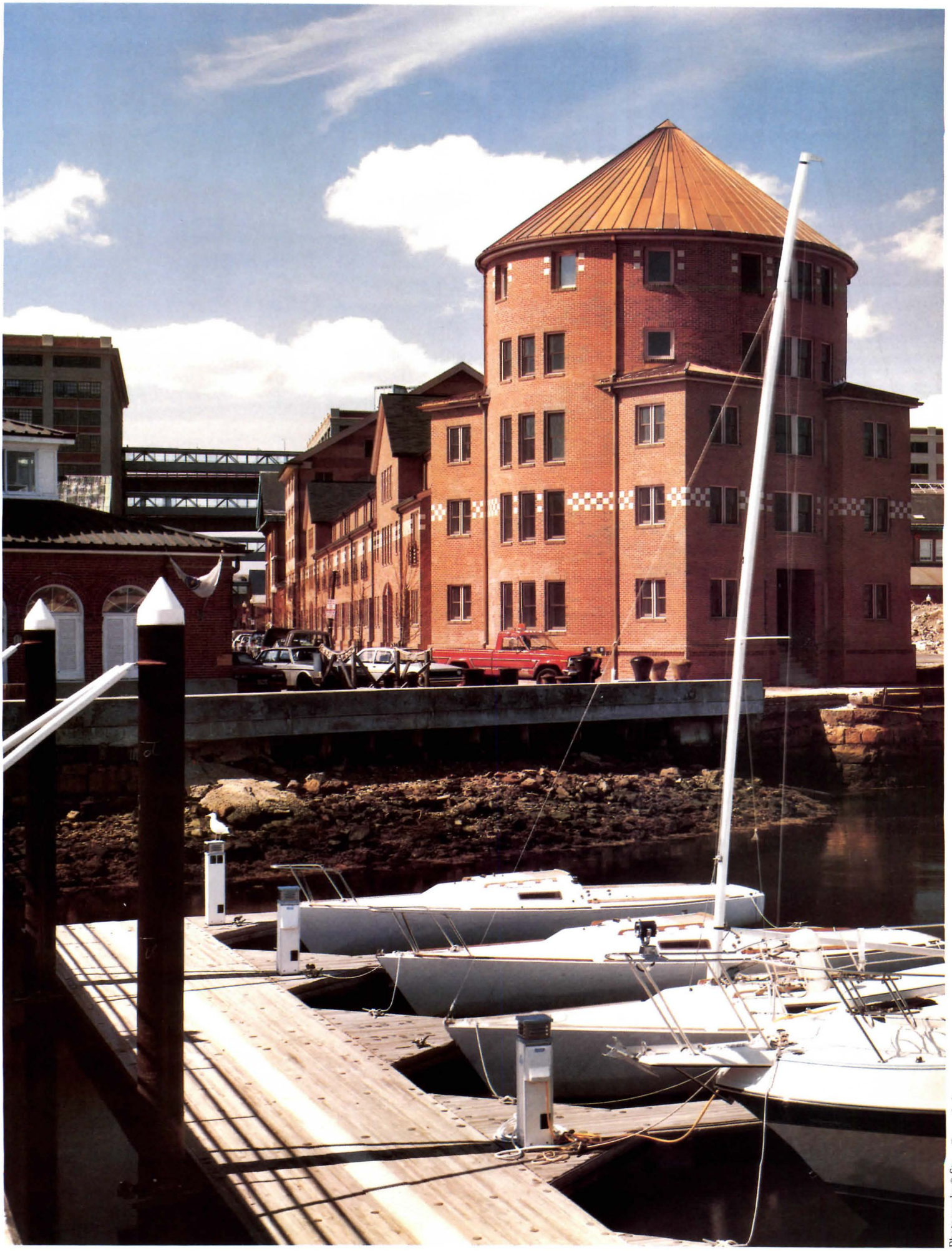
The assumption behind Charlestown Rowhouses is that if people can only once acquire a dwelling they can upgrade it later. What they can't hope to upgrade is the exterior, and McIntyre and Rawn have made sure the exterior is right from the start.

Charlestown Rowhouses is only the first stage in a larger development that will, it is hoped, continue out along First Avenue, although such a project is not at this writing in the works. Following earlier successes at Andrew Square and Back-of-the-Hill, in other parts in Boston, it establishes Rawn and McIntyre as the resident miracle-workers of Boston affordable housing.

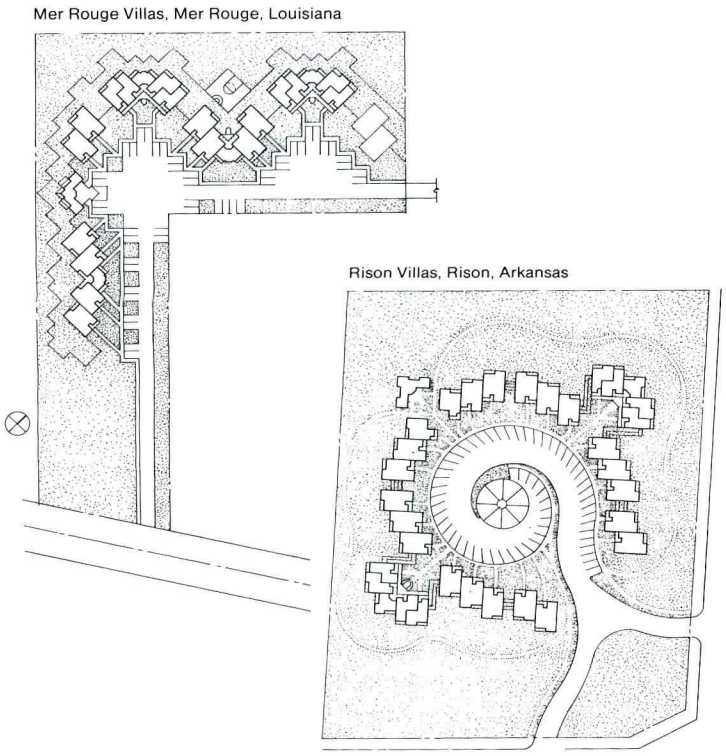
How was the miracle accomplished? It's actually fairly simple. The developer is called the Bricklayers and Laborers Non-Profit Housing Company. The Bricklayers Union president, McIntyre, heads the company. A key factor is that his projects have the strong support of the Mayor of Boston, Raymond Flynn. What McIntyre does, essentially, is borrow money at a favorable interest rate from the bank where his union keeps its pension funds. He's not allowed to borrow against the pension fund, but the fact that the union is a preferred customer of the bank lowers the interest rate. Then, using a lifetime of expertise in the building industry, he keeps construction costs under rigid control.

In the case of Charlestown, the land came at a price of only $1 from the City of Boston. The Boston Redevelopment Authority, under Stephen J. Coyle, kicked in two further subsidies: one for the copper roofs of the round tower, and another for the piles on which the building stands. In the case of the earlier Back-of-the-Hill project, the land cost $2 million, a price that was met through public and private funding sources. Generally, though, what's surprising about McIntyre's work is not how much but how little public investment is involved. So far, for example, Boston's linkage fee program, in which new downtown developments are required to provide money for housing in the neighborhoods, has been involved to only a very minor extent in the Bricklayers Union projects.

Charlestown Rowhouses shows what can be done in a field—new, high quality, affordable housing—in which it often seems nothing is possible in the United States of today. □



Photographs © Steve Rosenthal



Highly Creative Use Of Housing Subsidy

Farmers Home Administration projects, Billy Wenzel, AIA. By Robert A. Ivy Jr., AIA

Photographs © Timothy Hursley

Low-income housing usually means cheap: repetitive brick and concrete block buildings, apparently designed by machine, set in an arid, inhuman landscape—a cheap architecture for cheap buildings. That is the stereotype. Yet good design still has the power to transform a low budget into an opportunity by insisting on the best for the least money, consistently recognizing the human values of the inhabitants, daring to push the limits of bureaucratic dogma, and dreaming within the rules.

The towns of Rison, Ark., and Mer Rouge, La., illustrate the potential for design excellence in low-income housing. Both are small and remote from main roads, and both needed additional housing. The Farmers Home Administration (FmHA) offered a program for private development of rental units for households with incomes of $10,000 to $12,000. The architect, Billy Wenzel, AIA, found a site in each of the two communities and adapted a common building plan for both.

Siting was the first creative opportunity, and it cost the least. In Rison, trees outlined the perimeter of four acres of irregular, rolling landscape in a residential area near the heart of the Arkansas timber town. Wenzel inscribed a circle within the tree line—a ring of parking at the heart of the complex—bringing ordered geometry and instant community to the ensemble. Peaked roofs of individual units step back to adjust to the landscape and to the formal shape, creating rhythm and order that are in dialogue with the frame houses near the complex.

The land of the Louisiana delta extends to the horizon without a ripple. In a pecan grove on the edge of Mer Rouge, the architect set 32 family units in a 12-foot grid on a diagonal to the pecan grove, forming patterns of crossed diamonds within the trees. By saving the grove (only two trees were lost in the

Facing page, simple forms on rolling land in Rison, Ark. Above, in Mer Rouge, La., houses hunker on flat land in pecan grove.

plan), this low-income housing acquired entry allées worthy of wealthier Southern kin and priceless shade that tempers the fierce Louisiana sun.

To the visitor, the two developments appear deceptively expensive; in fact, they cost an average of $32 per square foot. The buildings, which are covered with lapped vinyl siding, match in appearance the wood frame buildings of their communities. Pitched roofs, covered with metal or asphalt shingles, relate to their neighbors; so do front porches. Each of the units asserts its own identity by defining personal space both within the unit and beyond its walls.

Children on the playground at Mer Rouge can be watched by parents folding laundry, which is centralized at both developments. The units vary from one-story connected houses to two-story apartments linked by 4x4-foot personal storage spaces on breezeways, suitable for fishing poles and barbecue grills. Surveying the complex is the manager's unit, a three-story tower astride the laundry, which recalls the aeries of Seaside, Fla.

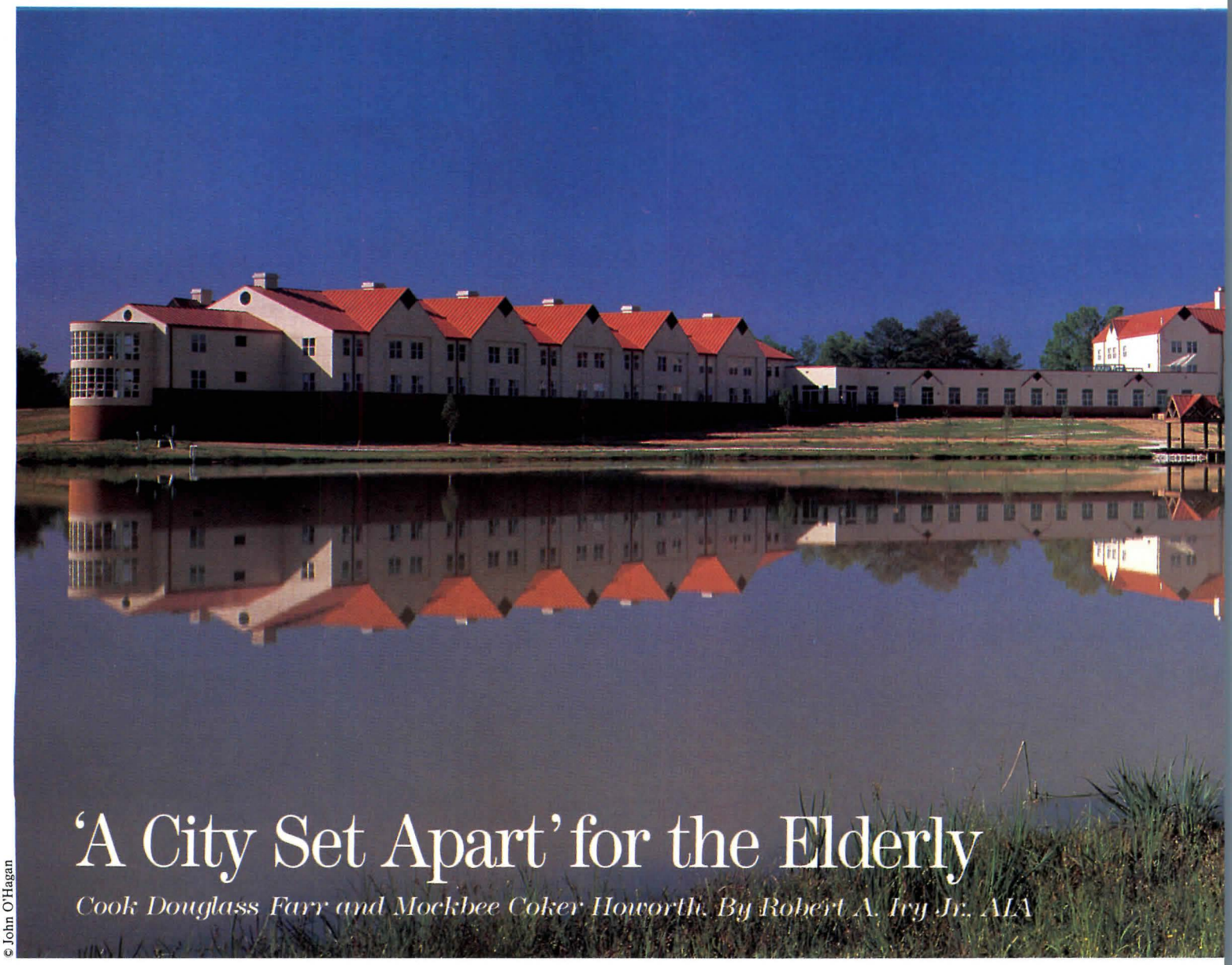
When dissected, the buildings yield the secrets of their economy. All materials are off-the-shelf. Everything from round louvers to arched, triple-glazed windows to insulated-metal-paneled doors comes from the catalogue. Yet the architect added etched glass to the doors at Rison, relating the simple buildings to their historic neighbors for an additional cost of only $56 per unit, and simultaneously satisfying the FmHA requirement for glazing.

The vinyl siding will never need paint; maintenance intentionally has been minimized. Wood trim is limited to one fascia board underneath the eave, cutting painting and replacement costs to a minimum. Soffits are metal, in pastel colors (supposedly to ward off wasps). Veneer brick outlines high-impact areas at the foundation; treillage is polyvinyl chloride. Even the ubiquitous Southern columns are metal, aluminum, or steel.

Interiors are simple and sturdy. The grid, which set the site plan, drops to four feet inside: kitchens are eight feet square to meet FmHA guidelines of 64 square feet; the 96 square feet allowed for porches are divided equally between front and back; and the 560-square-foot one-bedroom units and 650-square-foot two-bedroom units have been enhanced by combining living and dining rooms and by shaving every possible inch along the grid.

Since FmHA took life-cycle costs into account, Wenzel was able to amortize the more expensive metal shingles over a longer life span than that of asphalt. Similarly, considering the whole life of the project made feasible an energy-saving heating system—a ground-coupled, water-source heat pump, which provides constant geothermal energy, banishing the usual condenser units. Government constraint provided the inspiration.

Wenzel credits a "sensitive state architect and state director" of the FmHA in Arkansas for allowing him freedom for design and experimentation. Moreover, the absence of density requirements in rural Arkansas and Louisiana allowed siting both projects in unusual ways. Nonetheless, *the solution at both locations* achieves more by working within prescribed limits. At Mer Rouge and Rison, low-income housing has been redefined in simple, local terms, in the language of the countryside—restated, refined, and achieving more out of less. This is low-income housing of high value. □



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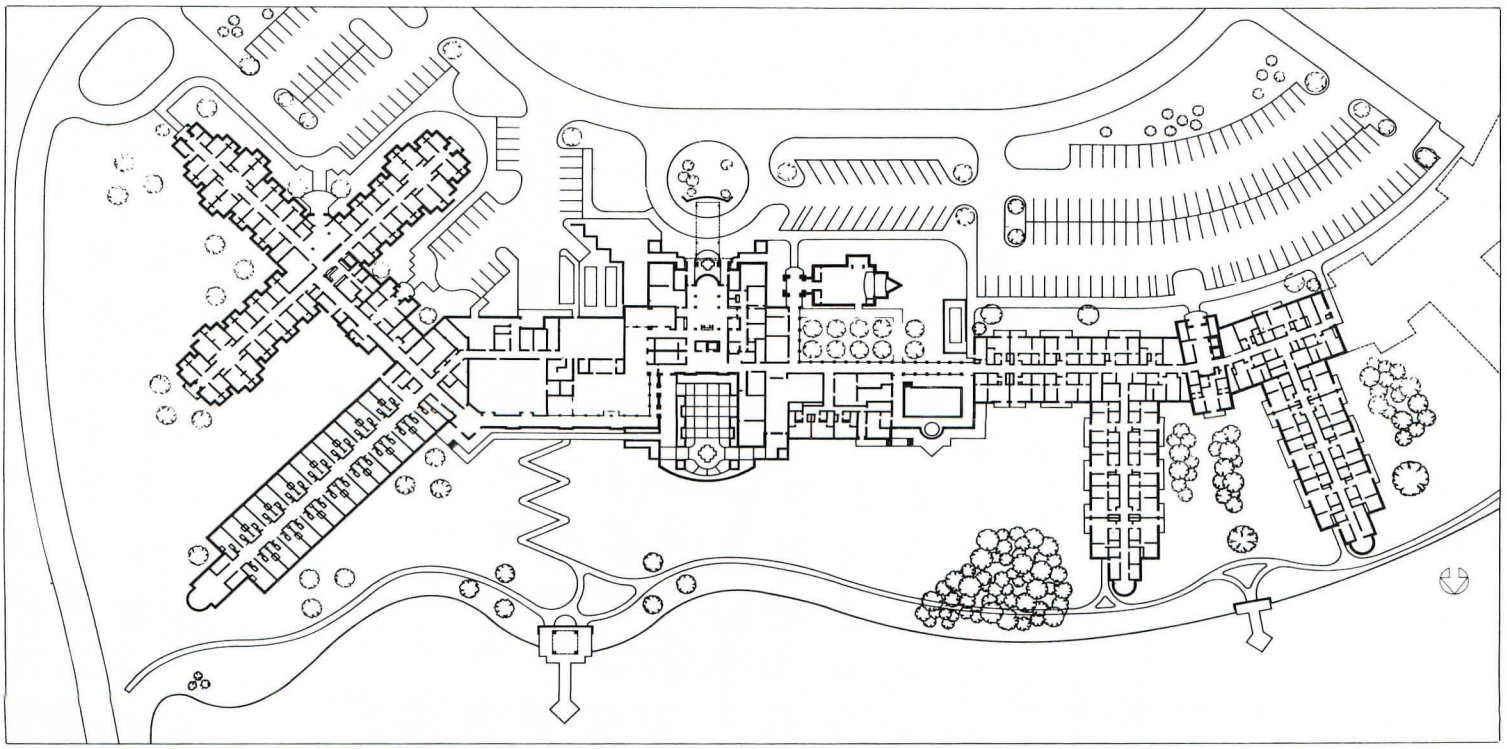
'A City Set Apart' for the Elderly

Cook Douglass Farr and Mockbee Coker Howorth. By Robert A. Ivy Jr., AIA



Above, the full village ensemble from the lake-side approach.

Siena, Italy, is a city on a hill. St. Catherine, patron of the Roman Catholic Dominican order, was born among its red-tiled roofs, towers, steeples, and stucco walls. When Community Health Services, an offshoot of St. Dominic's Inc., planned a life care community for Madison County near Jackson, Miss., St. Catherine's Siena provided the genius loci.

The Dominican sisters sought a range of offerings for residents: independent living for active senior citizens; assisted living for those with temporary disabilities or in need of moderate help; and full nursing care. As at similar institutions throughout the country, the senior resident can remain at St. Catherine's indefinitely by purchasing a life care package, which for an initial fee and monthly charges includes whatever care the resident may require throughout his or her lifetime. The result is a blend of three distinct styles of living—separated but in proximity and united by a common organization and mission.

A competition determined the architect, Cook Douglass Farr of Jackson, which was joined in the competition by Samuel Mockbee, FAIA, as design consultant. A gerontologist, staff landscape architect, and interior designer filled out the team. The program for the 180-acre site called for an ultimate motor plan of 400 units in the complex.

Although Madison County lacks Siena's hills, it has its own amenities in the quiet site of a former retreat and pastureland. A 15-acre lake cupped within the green landscape helped determine the location of the complex. A large stand of pines on the western side blocks the interstate highway's development one mile away. The site opens off a minor road on the property's northern edge, confronting the lake and its lawn.

An essential early decision was to cluster the plan within one complex of connected buildings. By grouping all services and relating every building type through common passageways to a central core, the project achieves an urban density it would otherwise lack in its bucolic setting. A visitor driving toward the site sees a small city rising up across the lake, complete with towers and peaked roofs, large building masses, three-story wings, and curving apses.

St. Catherine's Village is clearly not Siena, yet it emphatically states its purpose as a city set apart. And a large part of its story can be read in its stucco and brick walls, in its folded roofs and cantilevered terraces.

The story is clear and poetic in the small chapel, whose steeple reaches up from the rear of the complex and announces itself across the lake. The chapel nestles into the arms of the living units beside the main entrance to the complex on the south side of the property. It stands formally apart yet linked to the whole. Its iconoclastic form recalls the village church and the monument on the village square; its tower is Italianate, its roof Nordic.

The chapel contains the liveliest space in the village, under the fold of pickled pine scissor trusses that shelter diamond-patterned woodwork and ecclesiastical furniture custom designed by local craftsman Fletcher Cox. The 100-foot steeple is a void,

Photographs © John O'Hagan

Photos at top of this page and at right show the chapel embraced by the living units. The low shed roof in the top photo is the main entrance to the village. Below left, its exposed trusses, and, beyond the curved window, the main lobby. Below right, view over third floor railing above the lobby. Facing page, the apsidal end of a wing.

open to light from inside the chapel, provoking an automatic look upward.

Tying the chapel and the campus together is a corridor system, the project's most important space. It opens up beside the chapel, creating a small cloister and courtyard as it passes by. Corridors stretching out to connect the various units along the lakefront form a spine, linking the entire community. At the property's western end, the corridor branches off and forms arms of independent-living wings, terminating in semicircular, light-filled apses overlooking the lake—rooms for socializing, meeting friends, or playing bridge.

From the independent-living wings the corridor leads to activity spaces (natatorium, crafts, social rooms, deli) and the three-story lobby at the heart of the plan. Eating places, both formal dining rooms and cafeteria space for assisted living, look beyond the corridor to the outdoor terraces and the lake, separated by a low wall that defines space but lets light and views in. The corridor then turns, passes the assisted-living wing, and terminates in the nursing care wing at the rear of the complex.

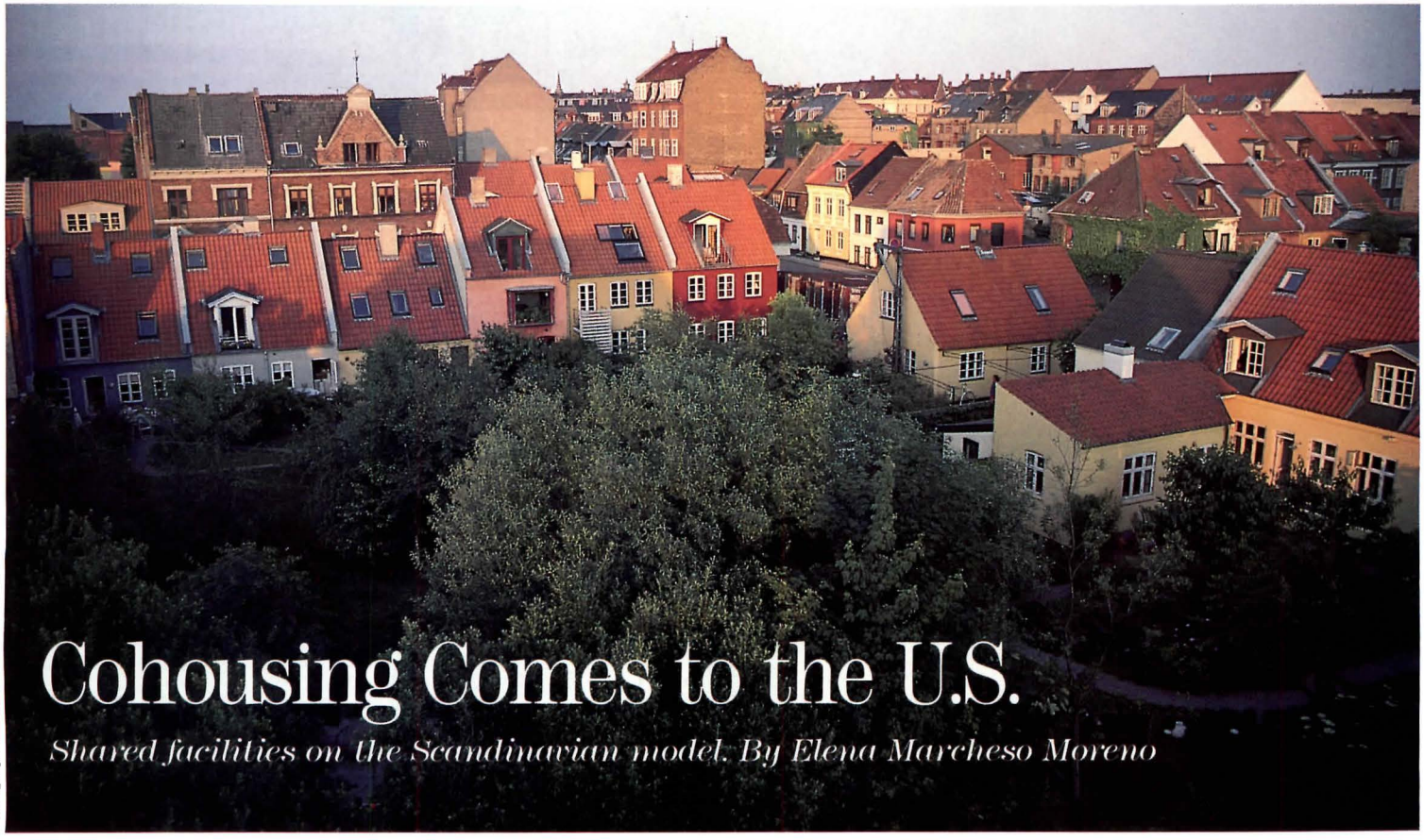
All corridors cater to residents' needs, both physical and social. Benches have been built in, to encourage socializing and to offer places to sit and rest. Handrails, available for those who need them, are one of the few hints that the complex is for senior citizens. Otherwise, the interior feeling is that of a luxury hotel.

All corridors have been carpeted, their full expanses broken by blocks of patterning. If the corridors provide an unbroken link between all pieces of the puzzle, keeping everyone secure and away from rain and wind, they also could insulate and isolate residents, particularly ambulatory, active ones, from the world. While the corridors may be a boon, they also tend to institutionalize.

Shelves along the corridors illustrate the human insistence on individual expression within the institution. The architects had thoughtfully provided a small shelf outside each unit to hold shopping bags while the resident unlocks his or her door. Instead, the residents tend to leave personal articles on the shelves as signature items, ranging from a welcoming wreath to an antique jade vase. Even in congregate living there is a need for differentiation.

The 120 independent-living units off the corridors are actually compact apartments, large enough for personal furniture and memorabilia. The units range in size from 400 to 900 square feet, comprising efficiency, one-bedroom, and two-bedroom apartments. Most share long balconies, many overlooking the lake. The complex now has 31 units for assisted living and 60 beds for full nursing care. Another 60 nursing-care beds, 31 assisted-living units, and 90 independent-living units eventually will complete the complex, which will contain more than 300,000 square feet of living and service space.

Like its Tuscan precursor, this village continues to grow, although unlike a real town its growth is limited by design. If the bones of the master plan hold, the result should be a compact new town dedicated to serving and to living, a village with a strong visual and functional identity. □



Photographs © McCamant & Durrett

Cohousing Comes to the U.S.

Shared facilities on the Scandinavian model. By Elena Marcheso Moreno

Housing is one of the greatest problems facing many Americans today. Child care is another. Many of us, despite having reasonable incomes, just survive. On top of that, most of us live far from our extended families and know few of our neighbors. Our support networks are weak or nonexistent, and the sense of belonging that comes from participating in a community is often missing.

An idea whose time has come is a new type of communal living called cohousing, which was pioneered in Denmark, where cooperative housing has become a viable alternative for people of various income levels, ages, and walks of life. A far cry from the communes of the '60s or the condominiumlike cooperatives in the United States, cohousing developments offer residents an active support system without sacrificing privacy.

In cohousing cooperative communities, individual dwelling units (usually configured as town houses) are clustered around a common building, where residents share facilities such as dining, child care, and laundry. Although residents take turns shopping and cooking for the whole community and may eat in the common building as often as they wish, each house has its own kitchen and dining area and is self-sufficient.

The social aspects of cohousing are central to its popularity. People can depend on their neighbors and interact with them daily, children can have a ready supply of playmates and a traffic-free, safe place to play, and adults, by relying on the common facilities, can have more free time.

Community housing is not really a new idea. It is a concept modeled on life in small villages or city neighborhoods less than a century ago when residents depended on each other for support. "Cohousing offers a contemporary model for re-creating this sense of place and neighborhood, while responding to today's needs for a less constraining environment," wrote Kathryn McCamant and Charles Durrett in their book *Cohousing: A Contemporary Approach to Housing Ourselves* (Ten Speed Press, 1988). The authors, husband and wife, are designers who spent a year studying Danish cohousing (a term they coined).

The establishment of a cohousing unit is a unique process. It usually is started by people who have never met before; their only bond is a need for affordable housing and a supportive community. After getting together, the resident-developers begin the planning, design, and construction phases of their housing. It generally has smaller than normal units, is dependent on a common building for shared facilities, and is connected by pedestrian roadways.

"Resident participation in the development process is cohousing's greatest asset and its most limiting factor," said the authors. "It is a huge task for a group of people, inexperienced in both collective decision making and the building industry, to take on a project of this complexity. Most residents have little knowledge of financing, design, and construction issues for housing development. They encounter problems in maintaining an efficient timeline, avoiding the domination of a few strong personalities, and integrating new members without backtracking." There is little financial incentive for private developers in this type of project.

The development process for each cohousing group varies. Some have a site in mind when they get together, others have to start by finding prospective residents who share their goals. Program development and site acquisition may be conducted at the same time. Size of projects, localities, forms of ownership, and designs all vary, yet McCamant and Durrett have identified four characteristics common to all these communities.

First, there is resident participation in planning; decisions are made as a group. Participants develop a building program, find a site, hire an architect, and, if necessary, find other residents for the project. The process weeds out people who find it difficult to concede to group decisions.

Second, design decisions encourage a strong sense of neighborhood. Unlike housing developers, cohousing groups begin by establishing a place to congregate when laying out a new subdivision, and they look for design elements that increase the potential for social contact. The most important factors determining success in this objective seem to be locating the common house and relegating parking to peripheral locations, thus leaving the streets free for walking and safe for children. Residents should pass the common house on their way home so that there

Left, at Jerngarden, a junkyard was turned into an urban complex. Below, Sun and Wind, a safe place for children, appeals to adults too.

is incentive to drop in. Similarly, centrally located play areas can be easily supervised and can be attractive as adult meeting places.

A third characteristic typical of cohousing is extensive common areas designed for daily use. Intended to supplement private living areas, these are the heart of a cohousing community. In contrast to a condominium clubhouse that is rented out and limited in size and scope, these common buildings are in constant use. They are places for tea and dinner, workshops and laundry, with areas set aside for children. The past two decades of Danish experience have shown that the size of the common house is more important than the size of dwellings.

Resident management is the final ingredient in cohousing. Major decisions are made at meetings, and all work responsibilities are divided among adults.

Following are brief descriptions of four of the cohousing communities McCamant and Durrett discussed in their book.

The community of Sun and Wind (Sol og Vind) in Beder began with an ad run by three single mothers looking for a supportive environment for raising children. It read: "We are looking for people who are interested in beginning an owner-occupied housing community with a common house and common area. The residents should be of all ages, singles and families. Our hope is through common activities to create a closer community that crosses age and education boundaries."

Sun and Wind, built over four years, is best known for its use of renewable energy. Forty percent of the development's energy requirements are met with a windmill and rooftop solar panels that respect building rooflines and otherwise blend with architectural design. Accumulated energy is stored as heated liquid in holding tanks and then returned to the houses as hot water and radiant space heating.

Individual houses are tall rather than broad to gain optimum solar access and are spread out on the site to avoid shading one another. Their colors and scale suggest the traditional Danish seaport towns nearby.

An initial planning committee began the programming process by translating goals such as renewable energy into objectives such as solar panels. The firm of Arkitektgruppen Regnbuen was selected despite the fact that its young architects had designed no cohousing or large projects. But they were enthusiastic about the concept and were willing to spend time with the residents throughout the design phase. In an unusual arrangement, the architects and future residents of Sun and Wind organized a class as part of an adult education curriculum, and over the course of five months they programmed and schematically designed the site, the individual houses, and the common facility.

The class immediately found discrepancies between the residents' objectives and the site. For example, to provide solar access, houses could not be clustered as first specified. But most program requirements were easily accommodated, including central parking areas with pedestrian lanes and courtyards scattered between the buildings.

Once a site plan was accepted by designers and future residents, a model was constructed, and design of the individual housing units commenced. It soon became clear that, although the original intent to use one design for all houses would reduce construction costs, it would not accommodate different family sizes. A basic core plan that could be enlarged or reduced was devised instead. The result was one-and-a-half or two-level floor plans for five basic models developed by resident groups. The architects helped the residents understand the effect of each design decision.

Extensive design services, combined with inflation, drove the estimated monthly payments of $530 for a 1,075-square-foot house to $880. Rather than reduce size or standards, residents elected to do part of the construction themselves and ultimately built 27 rather than 25 houses.

Architect Kai Mikkelsen predicted that Sun and Wind would be the last cohousing project where the residents would be so involved in the design. He told McCamant and Durrett, "It is too expensive and time consuming; future projects will seek more standardization. As a firm, however, we learned much from the experience; now we know how to design schools 'with' the teachers and churches 'with' the congregation."

The second community described in *Cohousing* is Jerngarden in Aarhus. In general, cohousing residents tend to prefer some-

Below, community life is integral to the cohousing concept. Here residents dine together at Trudeslund's common house. Right, proposed Cherry Hill site plan in Amherst, Mass., could be one of the first cohousing projects in the United States. Middle, land owned by Dobbs Ferry, N.Y., Fire Department will be a cooperative for the firefighters. Far right, a block of buildings in Yonkers, N.Y., is being reclaimed as a cooperative.

© McCamant & Durrett

Cherry Hill
Amherst, Mass.

what larger communities, but owners of the eight units at Jerngarden are happy with their small cooperative in the city.

When the group purchased a junkyard that new zoning laws had shut down, the owner also sold them eight tenement houses bordering the junkyard. It took some creativity to look at 40 years' debris and decayed buildings and see a beautiful community. Each household took on the renovation of its own house, with help from two residents trained as architects, and the group—which included craftspeople—worked on construction together.

The row houses front directly on the street and are painted in typical Danish colors to blend in with the neighborhood.

"Walking into Jerngarden today is like entering an urban paradise: charming houses with custom interiors share a park-like backyard, right in the middle of the city," wrote McCamant and Durrett. "Of course, what one sees today results from a lot of hard work that hasn't always gone smoothly. Focusing initially on the practical aspects of construction, the group took many years to develop its social cohesiveness." During the building process, common dinners were a necessity and have been continued. What once served as an office for the junkyard was turned into a common facility with kitchen and dining room, laundry facilities, television room, playroom, darkroom, and workshop areas. Outdoor socializing goes on in the large, common backyard.

Tornevangsgarden—the Thorny Field Farm—in Birkerød is another unusually small cohousing community with only six houses situated on an old farm site near the center of town. Arkitekgruppen was selected to design the project. Children were a major consideration, so houses were located around a small courtyard where parents can watch them at play from inside their houses. Kitchens and dining rooms in four of the houses face the courtyard. Bedrooms and private living areas overlook private gardens in the back. Owners of the other two houses now wish they had followed suit. Each house has a 1,500-square-foot lot; otherwise the grounds are owned in common. The average cost was $66,900 per unit.

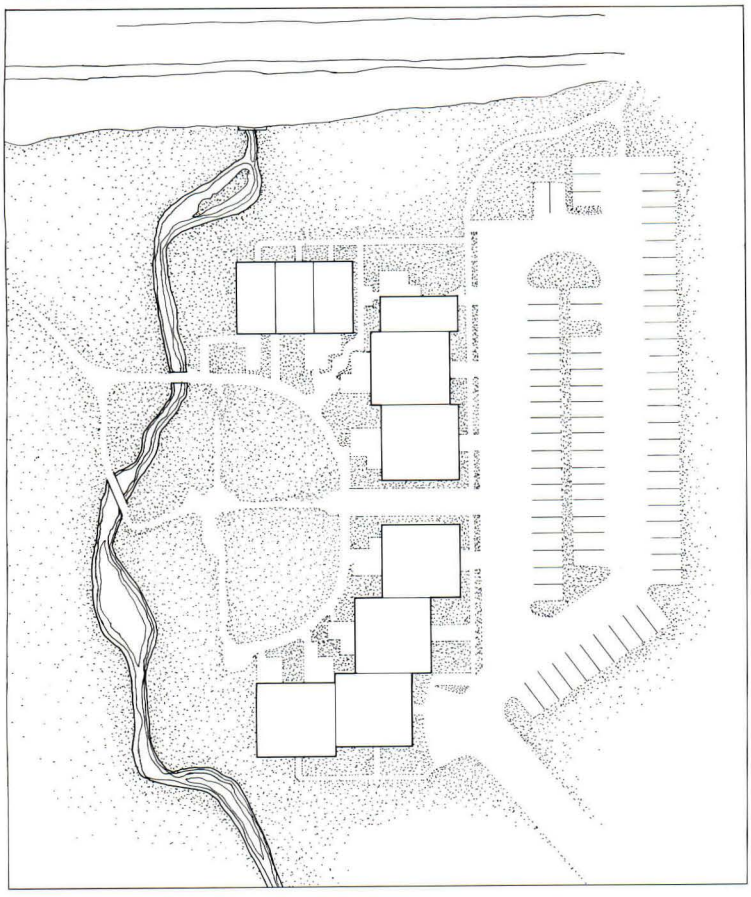
Parking is consolidated off to one side in a common carport. A timber and mud farmhouse was restored as a common building, and residents eat together twice a week. Cohousing groups this small have their own problems. For example, the number of community functions is necessarily limited, and when someone fails to do his or her share that neglect is noticed.

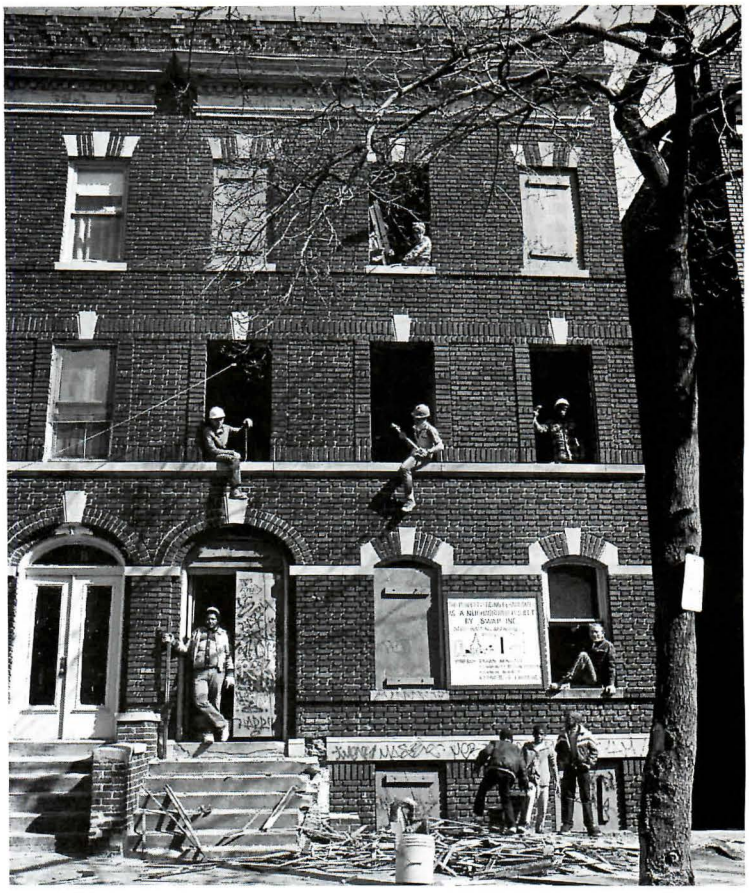
Trudeslund near Birkerød, with 33 units and a large common building, is a more typical cohousing size. Respecting the wooded and sloping site, private dwellings are located along two pedestrian streets. The common building is at the streets' juncture. Although density is the same as in single-family areas nearby, the group clustered their houses to retain the wooded nature of the site. In addition to the expected facilities, the common building has a cooperative store and a guest room, and the community has started its own after-school day-care program. People socialize on walkways between houses, and each unit has a private patio in back. Kitchen and dining areas look onto the street, in a configuration that seems to be standard for the Danes, while living areas are located away from the public areas.

Planning, design, and construction of this community were difficult. The firm of Vandkunsten Architects was selected from a limited competition. "To this day, the architects remember the process of working with the Trudeslund group as very exasperating," wrote McCamant and Durrett. The authors reported that the project architect found it frustrating to work with a group of people who were used to being treated individually by virtue of their education, income, and influence. It was a dilemma to him that they wished to act as a community.

The project has gained public attention, and residents consider it a success, but Vandkunsten Architects "feel they failed to meet their architectural ideals because of the compromises made during the design process," said the authors. The architects wanted to push the co-op idea further than the residents wanted to go, advocating smaller houses to cut costs and encourage more communal activities. "Residents, most of whom had growing families, were already taking financial risks and did not want homes so unconventional that they would have difficulty selling them. Conflicts between client and architect are common, but the participatory nature of this project, where strong-willed architects confronted equally strong-willed residents, made for a fiery design process."

Firefighters cooperative
Dobbs Ferry, NY





Courtesy of SWAP, Inc.

Attempts were made to keep to four basic floor plans, but individual preferences, especially in the kitchens, led to 33 variations. Now, however, with residents frequently eating in the common building, they agree that standardized kitchens would have sufficed and reduced construction costs. Newer communities have accepted standardization based on experiences of groups like Trudeslund.

Houses range from 970 to 1,500 square feet and have vaulted ceilings and wood floors. Houses on the south side are one-story to increase solar exposure to two-story houses on the north. Resale values have risen substantially, to the distress of some residents who watch their community becoming less affordable.

Since their return from Denmark, McCamant's and Durrett's lectures about cohousing have been well received by American audiences. Changes in family structure and work patterns, plus skyrocketing housing costs, have increased interest in new housing forms and communal living. Among recent American experiments are the following:

The town of Amherst, Mass., has decided to develop a 26-acre parcel of land and seeks proposals for 50 to 70 houses, of which one-third at the low end should cost between $75,000 and $85,000. One proposal was submitted by architect Bruce Coldham as a cohousing community. Seventy units are to be clustered in five groups, each as a separate project, with five separate common buildings. Coldham's is one of five proposals under serious consideration.

His clustered dwelling units would surround courtyards and flank pedestrian streets on the front, with private outdoor spaces in the rear. A pedestrian spine would link the clusters, and parking would be centered on the common facilities, which would, in turn, be gateways to the residential clusters. He also proposes to construct 4,000 square feet of single-story office space on the site to accommodate the growing number of people who work at home. Although the town requested that housing designs be submitted with each proposal, Coldham was committed to the participatory design process. Rather than representing the exact units to be built, he submitted indicative plans and elevations.

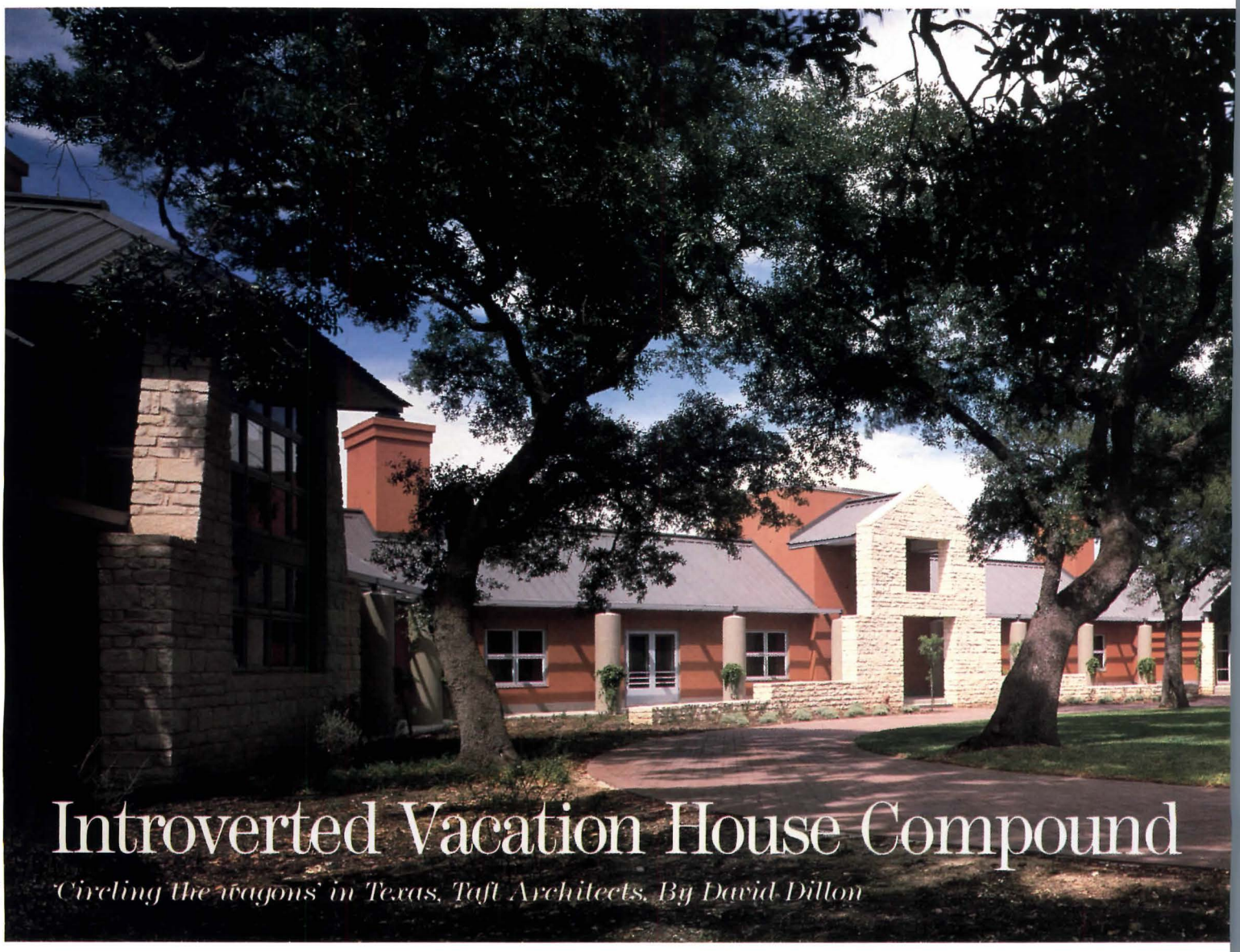
It will be some time before a proposal is selected, but Coldham has been receiving favorable response from local citizens. Still, he faces a number of tough battles, including zoning issues, legal forms of organization, and financing that must include housing subsidies from very rigid organizations.

Another unconventional housing project is in Dobbs Ferry, N.Y. The city's volunteer fire department owns four acres of land adjacent to the village center, which has been used only for recreational purposes for the past 25 years. The department has been steadily losing manpower, with some of its volunteers retiring and many more, particularly the youngest, moving to more affordable locations. Faced with the prospect of paying the firefighters hefty salaries sure to raise taxes by at least a third, the village decided instead to help them develop the parcel of land into a cooperative development. While not strictly adhering to the principles of cohousing, the objective is to provide moderate-income housing with limited equity to residents. Prices are to begin at about $63,000 for two-bedroom units, with monthly payments kept to $800. Similar units nearby currently cost $200,000.

What is missing from this project is the participatory design and the sense of community fostered by cohousing developments. However, the firefighters already have formed their own support network and will likely maintain it. Final proposals from three public-private development corporations are being considered.

As affordable housing becomes ever scarcer, innovative cooperatives are appearing. Stop Wasting Property (SWAP) in Yonkers, N.Y., is a group that has reclaimed a block of decrepit row houses and, through a program of sweat equity, has been rebuilding them. No provisions have been made for the common facilities characteristic of cohousing, but as the group so far has concentrated more on construction than on legal incorporation, they may still consider some of cohousing's options.

In each of these three cases, Americans are working mainly to narrow the gap between inflation and earning power. The logical next step in proposing contemporary approaches to housing is to re-establish a badly eroded sense of community. Cohousing makes that possible. □



Photographs © Paul Warchol

Introverted Vacation House Compound

'Circling the wagons' in Texas, Taft Architects. By David Dillon

In vast open country a sense of enclosure is a physical and psychological necessity. The Western pioneers circled the wagons at night as a defense against the weather and the natives. With time and luck a few of these crude encampments grew into towns, with a courthouse in the middle and a square of simple Hollywood back-lot buildings, past which aspiring Gary Coopers could stride uprightly. Taft Architects of Houston has done a contemporary turn on this traditional arrangement at Rancho Ramillete, a vacation house on the Frio River, 100 miles west of San Antonio. Taft was commissioned to design a retreat for three generations of a family, with enough space to accommodate five couples with children. The new compound, located across the river from the original homestead, was intended as an informal get-away where the clan could gather on weekends and holidays without ceremony and at a moment's notice.

Taft responded with a 10,000-square-foot hexagon containing seven bedrooms, a large kitchen and dining area, a library, and a barnlike gatehouse with a garage and upstairs apartment. Rancho Ramillete (loosely translated, "ranch of the flowers") has a formal lawn in the center of the hexagon and a large swimming pool and hot tub just outside it, overlooking the river. Two sides of the hexagon form a pergola that offers unobstructed views of the woods and prairie and the low hills beyond.

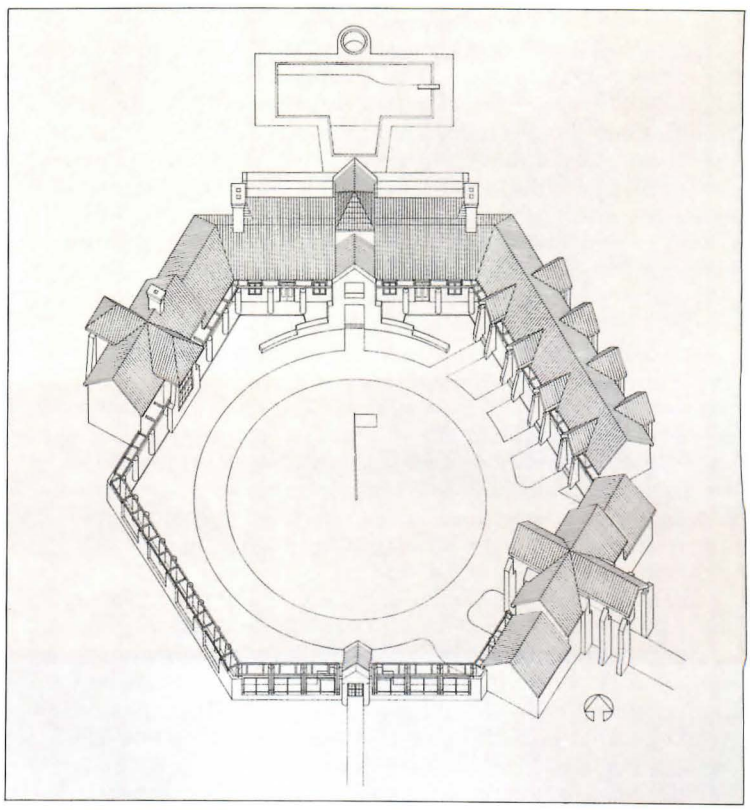
Rancho Ramillete is essentially a prairie villa that combines elements of its European prototypes with bits and pieces of Texas ranch houses and Mexican haciendas. Its formal geometry, together with its parterres and verandas, recalls for city folk the rich international tradition of farmhouses.

This architectural pedigree is hardly accidental. Taft Architects—also known as John Casbarian, Danny Samuels, and Robert Timme—won a Rome prize for 1985-86, the first ever shared by three architects. During their six-month residency they immersed themselves in Italian architecture and landscape design, particularly the farm compounds of Tuscany, an area with certain topographical similarities to the Texas hill country. Out of these experiences came many photographs, mostly by Samuels, and a deepened appreciation of pergolas, rich colors, and other elements of Tuscan architecture that eventually found their way into Rancho Ramillete.

"We enjoyed the experience so much that we gave ourselves the Taft Rome prize and kept going back," said the architects. The ranch on which the compound sits covers 3,000 acres, but the choicest building sites are along the river, which runs wild and clear much of the year and then gets clogged with rafters during the summer.

The architects spent many hours walking the land with their clients, assessing approaches and vistas. Eventually they decided to place Rancho Ramillete near a small waterfall, among a cluster of massive oak trees. Yet, instead of tucking the house discreetly into the landscape, they made it stand out from its surroundings, so that it is always perceived as a built object on the land. Outside the walls is nature; inside, order and system. This too is consistent with the villa tradition, which put more stock in the civilizing power of human artifice than in the pleasures of uncultivated nature.

Visitors approach the house along a dirt road that twists and turns to take advantage of the topography. Oak trees and large limestone outcroppings frame the drive; deer and wild turkey



feed close to the house. The wild game population is carefully controlled by the owners—another indication that in the 1980s a wilderness has to be managed in order to look natural.

The road passes beneath the two-story gate house and circles the formal green lawn that marks the center of the private realm. It is at once a large ceremonial space, with a flagpole in the center, and a secure playground for children. Enclosing it, like barracks in a frontier fort, are the low bedroom wings and the two-and-a-half-story living and dining area, with a bold limestone facade. The buildings are finished in red stucco, with metal roofs and canopies supported by hefty concrete columns. For all its formal complexity, however, Rancho Ramillete does not feel confusing or overwrought. Centering of the entire composition on the flagpole and maintaining views out to the landscape account for some of the clarity. The rest is due to the simplicity of the interior plan.

The spaces are large and cleanly detailed and connected to

Inset above is the gatehouse entrance, flanked by garages and with a guest room above. Top, the inner courtyard, centered on flagpole. Above right, parterre steps down to pool and river.

Photographs © Paul Warchol

one another by long, simple galleries. The main house of the old compound had one great room in which the family gathered for meals and entertaining, but that room was cut off from the kitchen. The clients insisted that this time all those functions be combined in one space, and that requirement determined the disposition of the other rooms. The dining and living area thus is the symbolic center of the house, with the kitchen occupying one end of the space and a large fireplace the other. The roof is supported by large wood trusses. Furnishings include a long oak refectory table, numerous Indian rugs and clay pots, and samples of Southwestern folk art. The room has the refined rusticity of a small inn in northern New Mexico.

One wing contains the library and four bedrooms, each a story and a half tall, with a small back porch that looks out toward the woods and river. This simple feature gives guests additional privacy by making in effect a house within a house. The opposite wing has more bedrooms and a second-level master suite for the grandparents that looks out through the trees onto a small waterfall. Views out and across are important at Rancho Ramillete, and in several places the house has been tweaked ever so slightly to take full advantage of them.

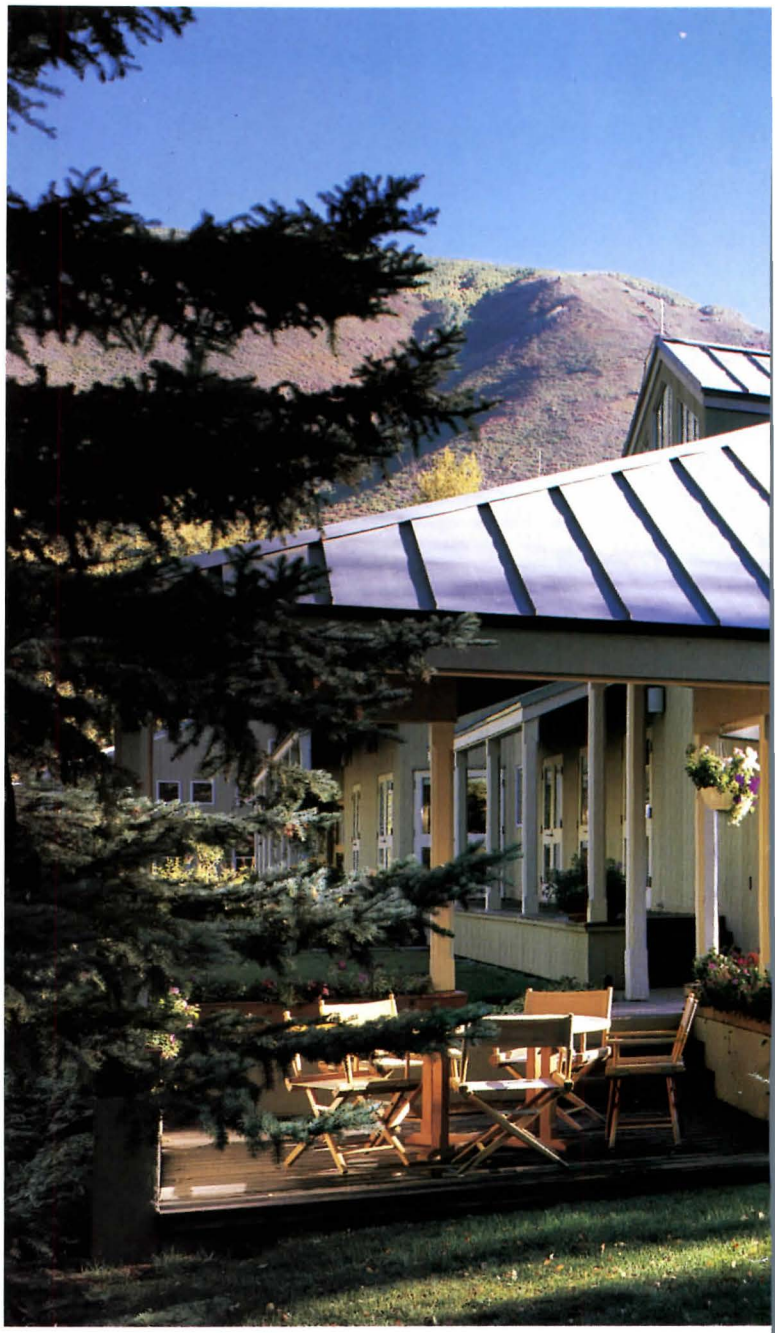
The rear of the compound, overlooking the river, is essentially one grand parterre, with a gallery porch on the top level, the swimming pool and hot tub in the middle, and a sloping grass mound at the bottom. The parterre keeps the river from flooding the house while also allowing the pool to be closer to the river—another commingling of the wild and the tame that is a central theme of Rancho Ramillete.

This talent for synthesizing diverse cultural and stylistic influences has been Taft's from the beginning. The firm's River Crest Country Club in Fort Worth combines elements of conventional blancmange country clubs with borrowings from train stations, school buildings, and town libraries. The Downtown Branch of the Houston YWCA unites the precise mathematics of the rationalists with the allusiveness of the postmodernists. Yet in both projects the result is an imaginative translation, not architectural double-talk.

At Rancho Ramillete Taft borrowed freely from the villa, the hacienda, and the Texas ranch house and organized the gleanings into a fresh, quietly abstract composition that transcends most of the clichés of hill country regionalism. There is order in this complex whole, a discernible hierarchy of spaces and uses that leaves no doubt as to what is what, or for whom. Detailing is simple and straightforward; nothing has been done purely for effect, although the limestone column and arches seem beefier than they need to be. Everything else has been rethought and subtly updated.

And therein lies the secret to Rancho Ramillete's success. Though it is unapologetically romantic, its vernacular sources have been distilled and abstracted until they suggest new possibilities instead of purely nostalgic recollections. Rancho Ramillete manages to reach back and push forward without losing its architectural balance. □

Right, the living room; above, the dining room and kitchen beyond. Both photos show extremes of the same long space that is divided by a foyer on a centered, shorter axis between the front and rear entrances. Above left, the library's inglenook.



Photographs © Norman McGrath

A Great Deal Going On in an Extra Large Vacation House

In Aspen, Colo., William Turnbull Associates and Charles Moore, FAIA.
By Lawrence W. Cheek, Hon. AIA

It's hard to say which is the more eye-popping spectacle in Aspen today: the snow-shrouded, two-mile-high mountains that cradle the town, or the price of its real estate. The bundles of money tumbling around this Colorado Rocky Mountain resort town have bought mixed architectural results. Renovations of the 19th-century houses and sandstone-faced commercial buildings generally seem to have been resourceful and respectful, although Aspenites lately are getting a little crazy with the paint—they must be having an informal competition to see how many colors one can lavish on a wall of scallop shingles. There are pretentious aeries perched on pads gouged out of the face of Red Mountain, providing their owners with staggering views of the valley while spoiling the mountain for everyone else. There are numerous respectable, if not spectacular, contemporary houses that play off the Alpine-cabin vernacular or reinterpret Victorian massing in clean, simplified lines.

There is nothing, however, quite like this house by William Turnbull Associates and Charles Moore, which, built in two phases over the past decade, has accomplished a smashing assortment of good things. The short list: it not only respects but defers to its site, at least as well as any 14,000-square-foot house can be expected to. It engages a panoply of mountain, river, and

Above, the south elevation, with concave bay shielded by a wooden screen set in eave. Opposite, side elevations of the original structure. House wraps 290 degrees around blue spruce.

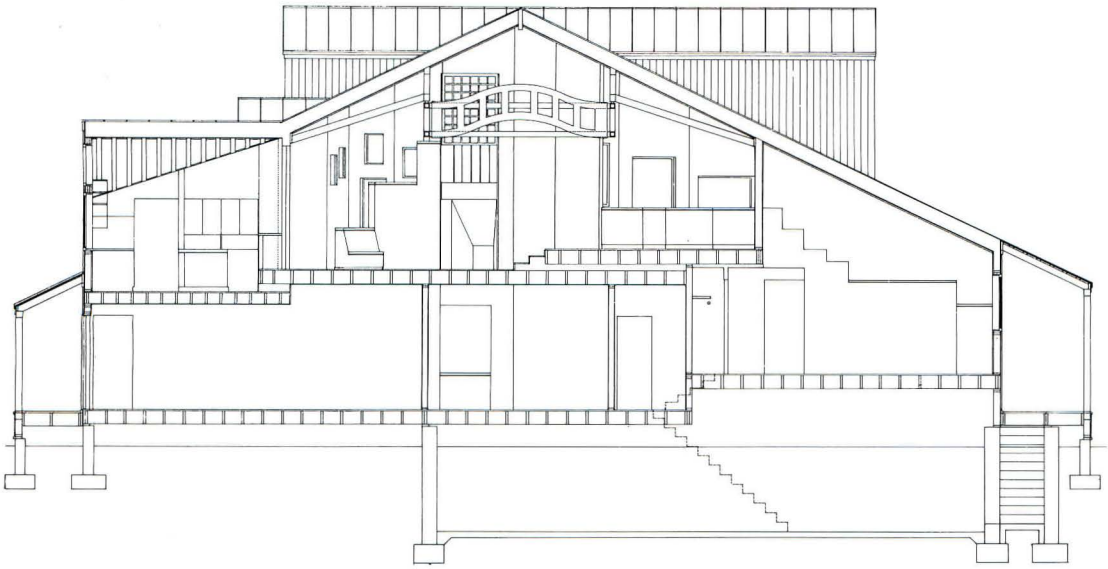
woodland views that is remarkable even in Aspen. Its interior spaces are playful, occasionally stumbling over the border into busyness, but the architects wisely stopped short of making every room into a postmodern Oz. And on the outside its lack of pretension is refreshing, particularly in a town frequently obsessed with image. Slouch in a deck chair on one of the lazy porches out back and, if you can blink out the view, you're behind a turn-of-the-century Pennsylvania farmhouse.

The genesis of this house is cluttered with interesting names. The client, a sophisticated developer who has commissioned several of the country's best-known architects on his commercial projects, first approached Philip Johnson in the mid-1970s about designing an Aspen vacation house. According to David Gibson, the Aspen architect who has worked as an associate on the project since the beginning, Johnson replied, "You don't want me—you should get one of the young turks to do it for you." The client then arranged a limited competition among young turks Michael Graves, Charles Gwathmey, and Moore/Turnbull. Gwathmey never submitted his entry, and the client chose the scheme of Moore and Turnbull.

As sophisticated as the client was, he handed the architects the loosest of programs. He wanted a house where he could bring a few friends for skiing or summer vacations, he said; it needed a master bedroom, a living room, a couple of guest rooms, and someplace to store slushy skis. There was no talk of style or materials or mood. Recalls Turnbull, "He just wanted it to be wonderful."

The site certainly provided wonderful opportunities—and a tall problem. It was a two-acre stand of cottonwood, spruce, and aspen trees, all nourished by a subterranean stream flowing only three or four feet below ground. The trees left in place around the house would give it complete privacy, but one of them—a great blue spruce about 120 feet high—dominated the buildable site. It humbled the architects. "We decided that, since we came after it did, we'd better leave it," says Turnbull.

They used the tree as a visual axle, spinning the house 290 degrees around it. Being symmetrical, the spruce suggested an orderly, circular bite out of the house. Being disorderly and capricious, the architects nibbled and chiseled the walls around it like a brook eroding a cliff. Eighteen inscrutably angled bevels



Above, bed designed by the architects. Left, dining room, and right, south-facing living room, both on the second floor. Living room is top center in section above.

Photographs © Norman McGrath

greet the tree. This is a foretaste of the experience inside.

Other features of the site inspired other aspects of the house. In particular was a small, abandoned miner's cabin, probably built in the 1880s, with a steeply peaked roof. The architects not only preserved it on the site (it's now the caretaker's apartment) but echoed its roofline in the dormers bursting out of the new house. The two eras of Aspen, the old work town and the new play town, now engage in dialogue. The views, as everywhere in Aspen, also helped design the house. On the southern edge of the property collide Hunter Creek and the Roaring Fork River, and above their confluence towers 11,800-foot Aspen Mountain. This panorama obviously called for some grand windows, but, since they would face south, a shading device also was needed. Turnbull and Moore designed a shallow, wavelike wooden screen to partially shade a concave bay of windows, and that became a theme repeated as a motif inside. These "rolling wave" forms seem to echo the S-curving paths of the skiers slicing down Aspen Mountain—you can see them from the living room—but the architects say they hadn't even thought of this; they designed the house in summer.

The construction itself is nothing exotic: a 2x6 wood frame clad in clear cedar facing bleached to a light gray (except in the courtyard, where the natural cedar color remains in salute to the spruce tree). The roof is capped in gray microzinc.

It's inside that the serious craziness begins. Enter through the main doors and begin exploring, and you become a moon in a twitching orbit around that great spruce. A hallway winding along the inside radius links the upper-level living room, dining room, sitting room, and bedroom wing. Every few feet there's a window looking out onto the spruce, but these views are maddeningly perverse. Eye-level clear windows provide a fine vista of its bare trunk. Look up, and the clerestory windows have leaded panes that abstract and distort its crown. The message seems to be: don't focus on the tree—you ain't seen nothin' yet.

And you haven't. The living room windows overlook surging creek water and ice-white mountain, the latter only a couple of miles away. The room is also a spectacle, a festival of visual jazz and high kitsch. Rolling waves crash among the exposed steel trusses that carry the roof. The light fixtures are adorned with neo-Navaho ziggurats actually stenciled by Moore and Turnbull. A windowed cove to the north offers a peekaboo glimpse of another peak. Labyrinthine stairways scatter fetchingly toward other levels and rooms. There's even a neon sculpture by Moore. This is the one place in the house where the architecture critic

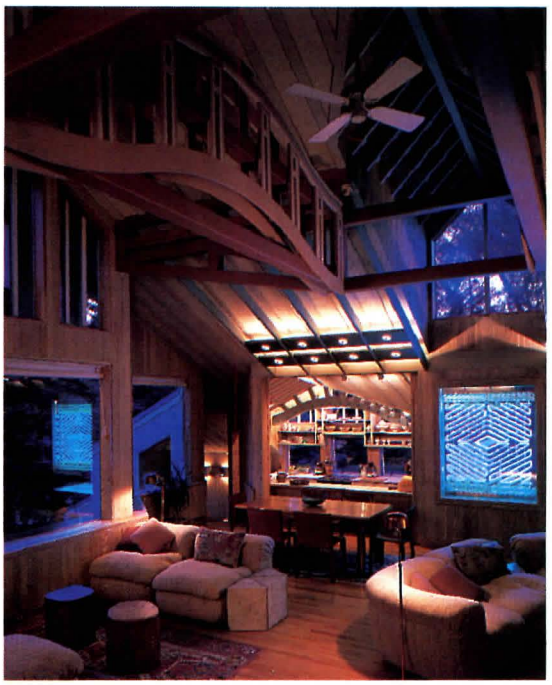
craves to put on dark glasses, pull down the Sea Ranch-style shades, and slow everything down. The view and the architecture are locked in mighty combat, fighting for attention, and the spectator is overwhelmed.

Turnbull explains: "The house has turned out to be occupied differently than we imagined it would be. It was originally intended to be a vacation home. We assumed that the client would frequently spend the day skiing, and when he came back in the evening that great vista wouldn't be there. As it has turned out, the family has come to use it nearly as a year-round home. If we had expected that, we might have done that room a little differently."

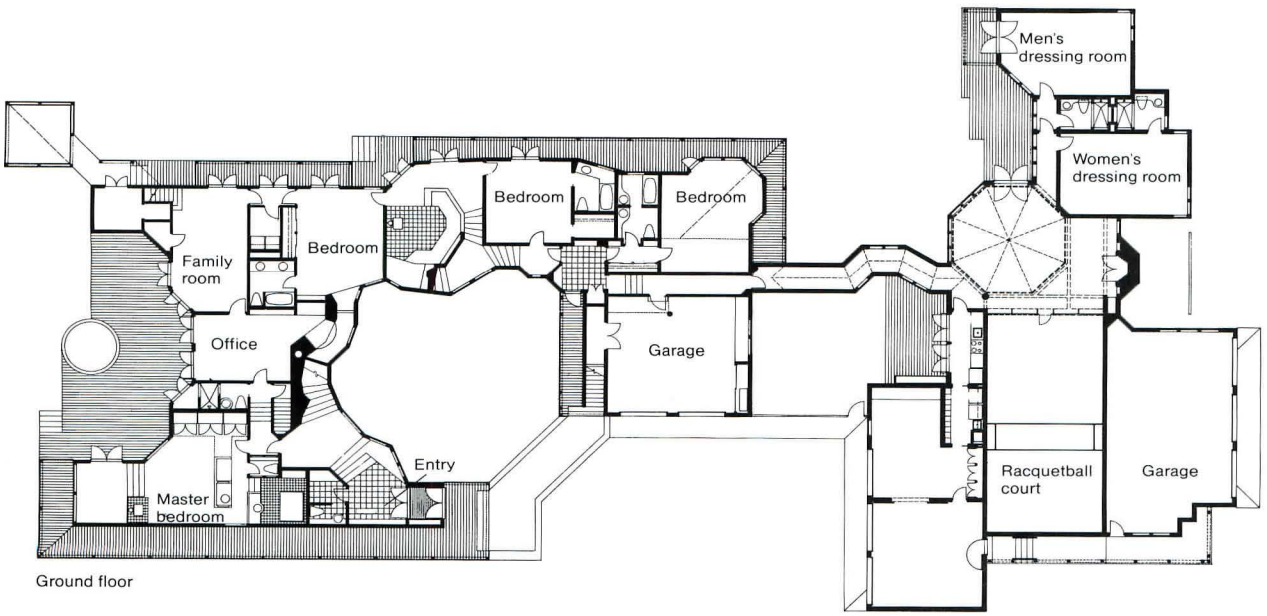
The living room also forms the only large open space in the original part of the house. The rest of it is remarkably intimate. It's also unpredictable. Walking through it is like hiking a mountain trail. You change levels every few feet: five steps up, three down, four up, five down. Every flight of stairs either curves or radiates; there's not a normal, rectangular step in the house. The footing is always changing, the sight lines always opening up to reveal an unexpected glimpse of a new room. The colors are always changing; about 50 paints and stains were used inside and out. And there are surprise nuggets of whimsy and visual puns. For example, what "artistic" feature is *de rigueur* in all mountain lodges? A mounted moose head, of course. One weekend, working on the site, Moore and Turnbull took jigsaws in hand, carved up some plywood into an exuberant sculpture of a moose head, painted it chocolate brown, and mounted it high on a wall in the sitting room. It's an ironic pun on tradition and the client's vegetarian inclination: they call it the "chocolate mousse."

The bedrooms (now totaling seven) are much simpler in form than the common areas of the house—most, in fact, are rectangles in plan. Their richness is in their furnishings: beds surrounded by sentrylike classical columns, dressers with curving pediments again recalling the wave form. (Margaret Simon, Turnbull's sister, was the interior designer.) There also is a richness of material. Bedrooms as well as all the other rooms are all paneled in vertical strips of clear cedar, stained in tones that range through brown, beige, and gray. For some sensibilities, all this may constitute an excess of richness—too much chocolate mousse, as it were—but, as Turnbull said, since the main part of the house was built, the client has been spending more and more of his time in it.

In 1988 the same architects completed a 3,400-square-foot addi-



Photographs © Norman McGrath



Ground floor

Plan above shows the original part of the house to the left and the addition to the right. Above right, another view of living room. Above left and facing page, the octagonal lounge in the addition, with triple-tiered chandelier. Beyond the glass wall at far right of facing page is the racquetball court.

tion comprising a regulation-size racquetball court, an octagonal lounge, two garages, and two bedroom-sized "dressing rooms." The "dressing rooms" were a fiction designed to slip the addition through Aspen's building codes, which forbid any new house to have more than five bedrooms—a law intended to discourage anything resembling a boarding house. The architects also faced other uniquely local legal problems. The client wanted a fireplace in the lounge, but a recent Aspen law bans all new fireplaces in the interest of preserving clean air. There is, however, one creative exception:

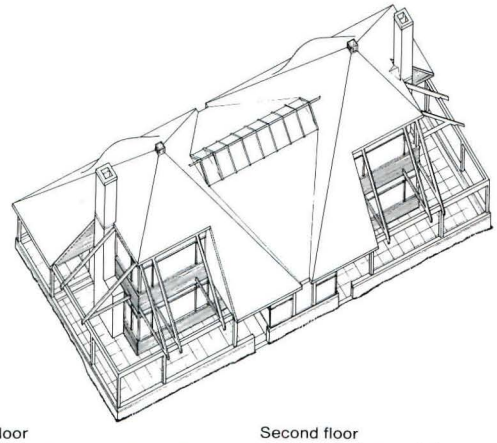
"The law says that, if you can abate three other polluting fireplaces somewhere in the valley, you can build one new one," explains Gibson. "It's a six-month process: You have to advertise for fireplace owners, screen them to make sure they qualify, document everything, notify neighbors within 300 feet, hold a public hearing, provide evidence you destroyed the three fireplaces, and refit those houses with wood-burning stoves with catalytic converters. We probably spent $15,000 clearing the way to build this fireplace." The octagonal room it occasionally heats is the centerpiece and the delight of the addition, however. A glass wall separates it from the racquetball court, making it a spectator lounge. At less competitive moments, it's simply a pleasant sitting room. There's no dramatic view, but a dizzying, three-tiered, oxidized steel chandelier provides plenty of entertainment. Like some of the design motifs in the living room, it seems remotely Navaho—it's festooned with circles, triangles, and diamond shapes, the latter embraced by lightning-bolt zigzags.

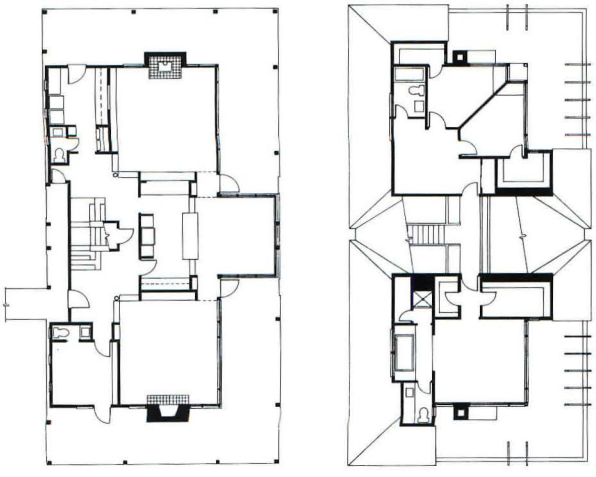
At the end of a long, leisurely visit one is left with some contradictory feelings about the house. Almost everything about it, considered alone, seems wonderful: its harmony with site, its forms, its colors, its furniture, its wit, its delight, its sense of friendly mystery. Yet, all together, there's a small, nagging impression that there is too much here: too many forms, too many colors, too much delight. Given a roaring fire, the three-room miner's cabin (probably worth only $150,000 or so) somehow seems as appealing a place to spend the winter as does the sprawling work of art next to it. Aspen is no place for Bauhaus austerity, but on sites like this one a little less architecture *just might* be more. □

The Shingle Style Deconstructed

Bainbridge Island, Wash., house, James L. Cutler, AIA. By Donald Canty, Hon. AIA

Photographs by Art Grice





The site is unusually beautiful even for Bainbridge Island, one of Seattle's wooded, water-surrounded ferryboat suburbs. It is at the top of a hill overlooking a broad bay far below. The owners—a builder, his quiltmaker wife, and their young children —are admirers of the shingle style. So Cutler made the facade, which almost no one but the family's visitors ever sees, almost a billboard depiction of that style, complete with eyebrow windows. The road to the house winds upward, away from the water, through thick woods, so as one approaches the facade shields the view until the house is entered.

Then there it is, a dazzling panorama through generous windows past widely spaced structural members. The rear, waterside of the house is a cutaway, a gentle piece of deconstructionism in which the twin pyramids of the house are, in Cutler's words, "carved away to provide large vertical surfaces of glass scaled to the view."

The exposed frame rests on low masonry walls defining outdoor spaces on three sides of the house (including a private terrace for the guest room). A third, detached pyramid serves as garage and office. Cutler calls it "a cousin to the house," and together the two buildings make a happy composition on the hilltop. They are almost, but not quite, elfin in form and materials.

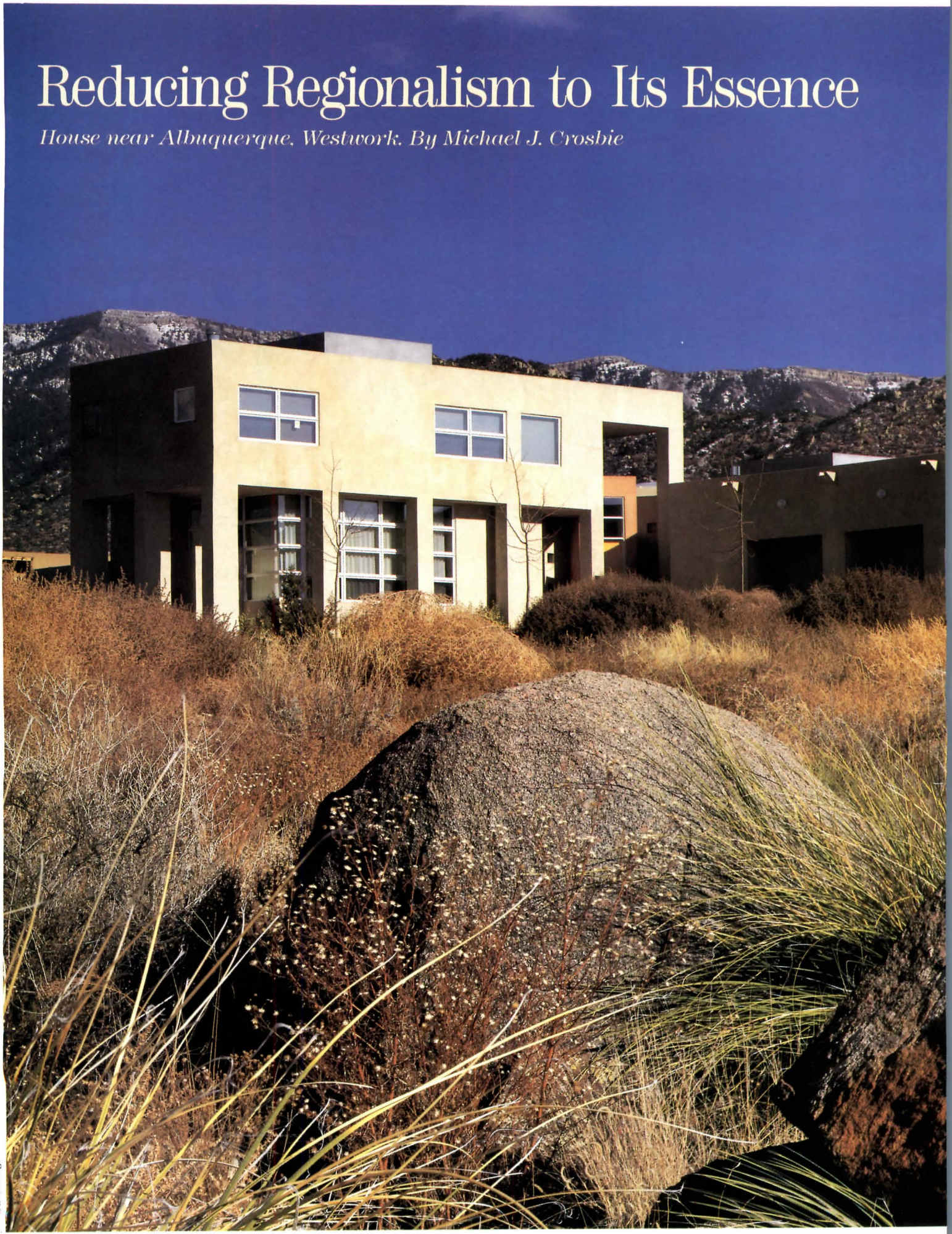
The symmetrical plan is divided into two zones separated by the foyer and an exceptionally handsome stairway rising two stories to a skylight. One side is quiet and relatively formal, with the living room on ground level and master bedroom above. The other Cutler terms "the informal, active side," with children's bedrooms above a family room.

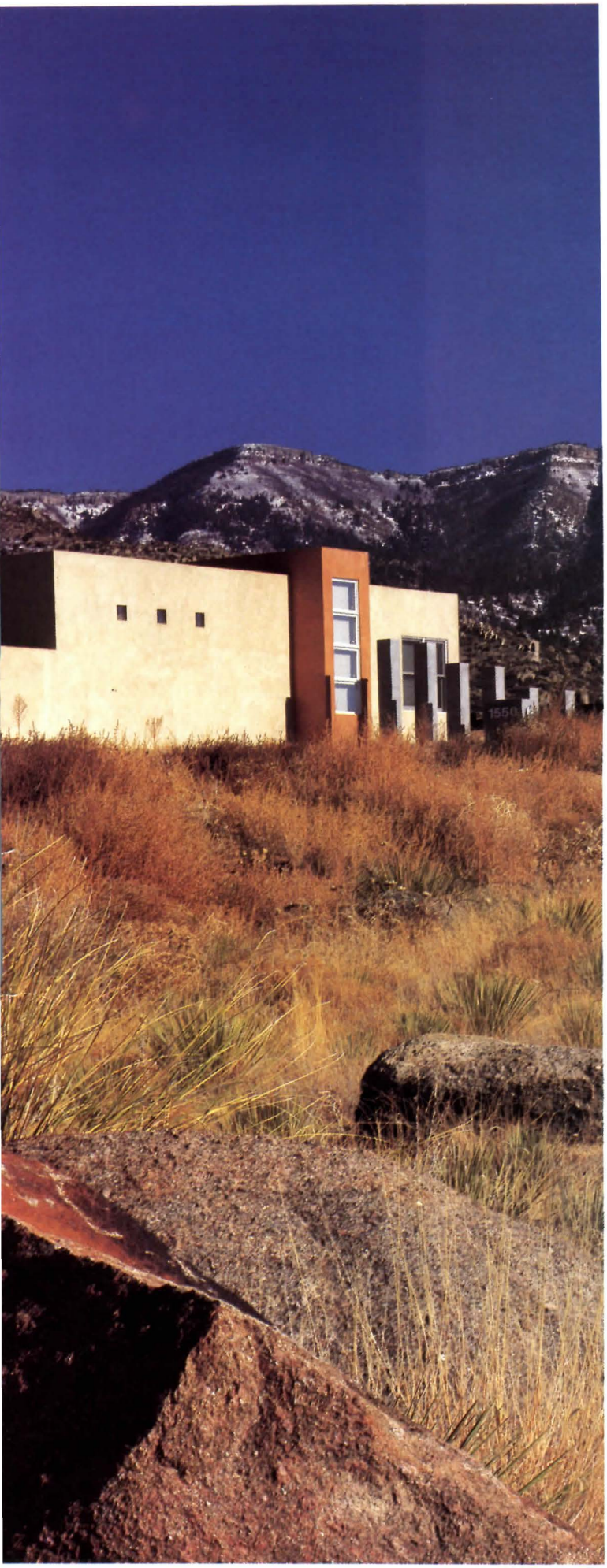
Between the two zones at ground level is the kitchen, raised on a podium so that it overlooks the living and family rooms and gets its full share of the magnificent view. It is fitting to the spirit of the house that a place of warmth and nourishment should be its centerpiece. □

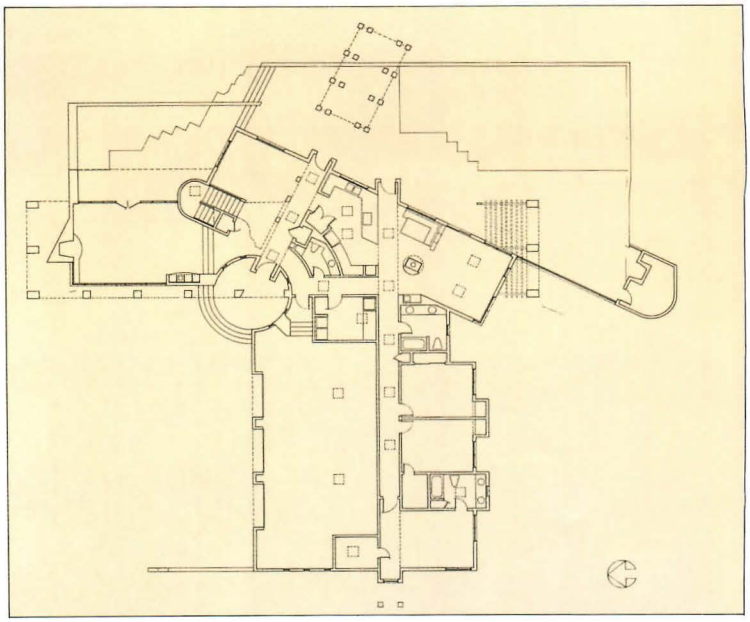
Top, the road-facing facade. Facing page, the water side of the house with the garage-office at right in photo. Left, the central stairway; three square windows at left in photo are centered on the front. Above, the kitchen and a sample view. Right, a bathroom behind one of the twin eyebrows. Detailing is characteristic of craftsmanship in the house.

Reducing Regionalism to Its Essence

House near Albuquerque, Westwork. By Michael J. Crosbie







In New Mexico, the landscape is littered with contrast. The expansive flatness of the plateau abruptly ends in mountains, while built settlements are continuously on the very edge of being reclaimed by sand and sagebrush. The Route 66 sprawl that is Albuquerque continues to grow, yet from the top of the Sandia Mountains the city appears as a minor interruption in the desert.

The precarious co-existence of city and desert is found in this house by Westwork Architects, designed by Glade Sperry Jr., AIA, with his associate Cindy A. Terry, AIA, for a local real estate entrepreneur. Westwork has long found inspiration in the traditional, regional architecture of the American Southwest. But this house represents a step back from its derivative form and ornament and an embracement of its fundamental architectonic qualities. It's as if the traditional architecture has been peeled away, like an onion skin, to reveal the essential generative forms at its heart.

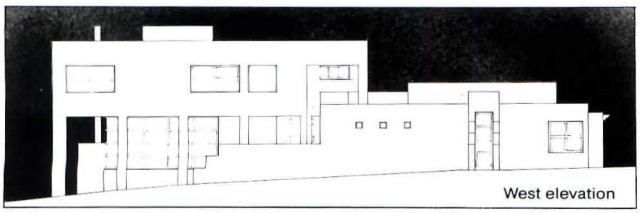
The house is located in the midst of a large development in the Sandia foothills, although these photographs give no hint of the builder-box vulgarities that lie just a few yards outside the camera's range. Surrounded by these neighbors, the house appears to be a stranger in a strange land, yet the irony is that this house is so at home in its natural landscape. The approach is from the north, and the house is bathed in the clean desert light that invigorates form and color. Sperry points out that the exterior colors have been muted (compared with the firm's past work)—again, to arrive at what is basic to the region. A stepped wall mitigates views into the motor court, and past this wall the feeling is one of arrival at a semipublic outdoor space.

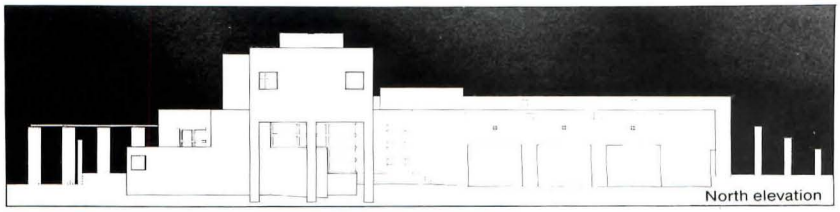
The north wing is tall and uncompromisingly rectilinear, raising its skirt to reveal a glazed volume, curved walls, and a salmon-colored rectangular element designating the entrance. The north wing, which comprises living and master bedroom space, is modern in its spirit, with a neorationalist north face that seems to wink. The west wing, devoted to bedrooms and family space, is more "regional" with its low profile, stepped walls, and scuppered vigas. Out of the west wall march six gray ghosts that descend into the earth, as if having been exorcised. For Sperry, these elements represent the grid of the city, toward which they recede.

Where north and west wings join there is a circular, open-air anteroom, a protected little niche whose curved walls accentuate the foyer's tall rectangle. Inside, the entry hall axis directs your view through the house and out again, with a glimpse of the mountaintops. Moving around the curved wall to the north is a sunken living room, which has a scale similar to the concrete block Usonian houses of Frank Lloyd Wright, with high windows that capture the mountains as if in a paneled mural.

Left, house from northwest, with Sandia Mountains beyond.

Photo below, the west elevation of bedroom wing; gray columns represent city's grid. Bottom, the living room from foyer. Facing page, top, house as it addresses mountains; below left, sunlighted bedroom hallway; below right, kitchen.





Photographs © Kirk Gittings

The west windows offer a sweeping panorama of the city, although there is an annoying tendency for horizontal window divisions to obscure views. To the east of the staircase is a small dining room and, on the same orthogonal grid, a kitchen and family room to the south.

Slicing between the kitchen and family room is a long hallway, filled with natural light. (In fact, the entire house makes excellent use of daylighting—during my visit on a clear day not a single artificial light was on and the interior was bright.) Off this hall in cell-like fashion are three bedrooms with skylighted baths and closets. The hallway terminates with a window that perfectly frames a view of the client's real estate office building in downtown Albuquerque, quite by accident, Sperry confesses. There is only one second-floor space—the master bedroom suite, accessible from the foyer stair. The suite's high windows frame more views of the mountains on two sides of the house.

If you continue directly from the front foyer to the house's "back," you find a welcoming collection of exterior spaces, each clearly defined and unique, all with privacy protected by walls that are high enough to discourage prying eyes yet low enough to admit the sweep of the mountains to the east. Compared with the tight, buttoned-up quality of the entry court, the patio spaces are variegated. The house explodes into a collection of small-scale elements that are meant to echo the meandering character of the mountains. A trellis of eight pairs of columns impales the house to the site, jumping a wall and continuing east toward the mountains. The northernmost patio space is a quiet and contemplative garden, the middle space a wonderfully shaded respite, and the southern patio a veritable outdoor dining room with fireplace and views of the mountains and the city—between which this house respectfully resides. □

A Highly Unlikely Maybeck Masterwork

Built in 1907 of reinforced concrete and lovingly restored. By Donald Canty, Hon. AIA

Bernard Maybeck, progenitor and prophet of the Bay Region style, peppered the Berkeley hills with houses, mostly of wood and shingles to blend naturally with the rich vegetation nourished by the moist climate. In form they drew from arts and crafts and even Victorian models.

This is a Maybeck house in the Berkeley hills, but dramatically unlike the others. For one thing, it is built of reinforced concrete, reflecting the fact that the client, a prominent geologist, wanted the house to be as earthquake-proof as possible. This is understandable, since the house was built in 1907, a year after the disastrous San Francisco earthquake and fire.

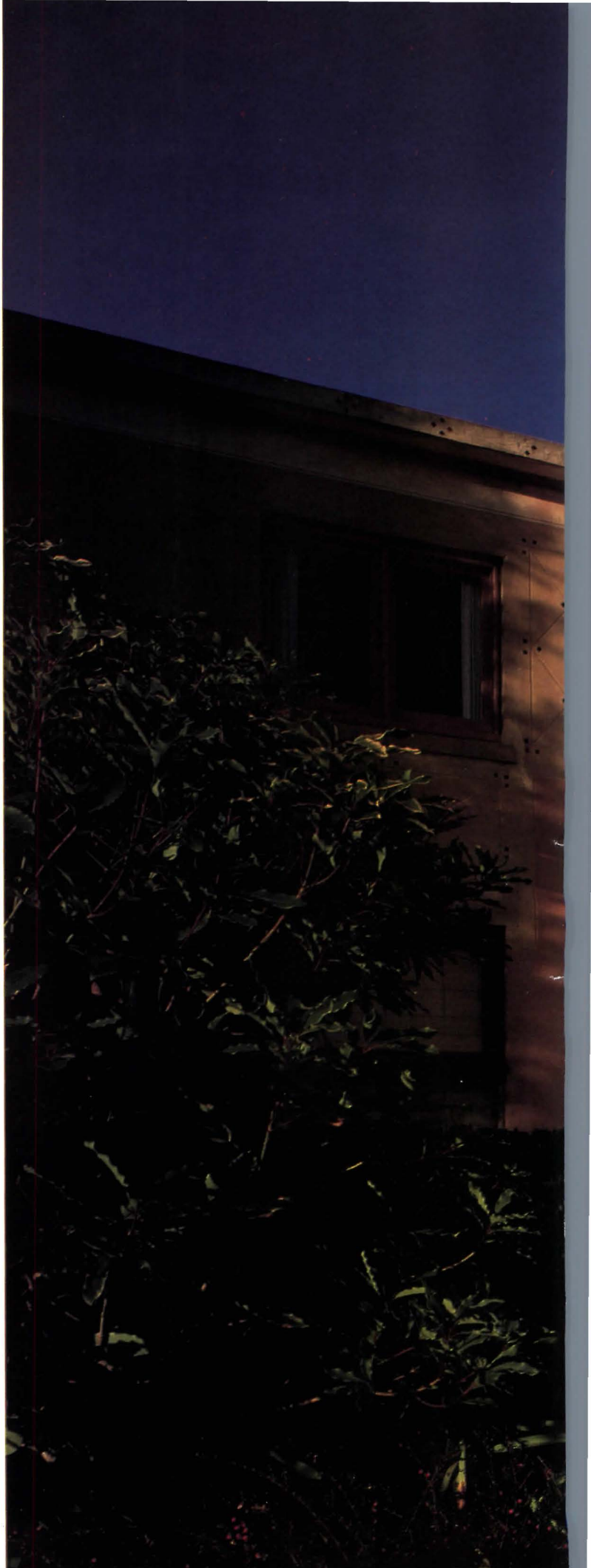
But the house differs from Maybeck's others in form as dramatically as in materials. It is bold, muscular, contrasting curves with slashing horizontal planes. It would be less surprising if it had been done by Louis Kahn than Maybeck.

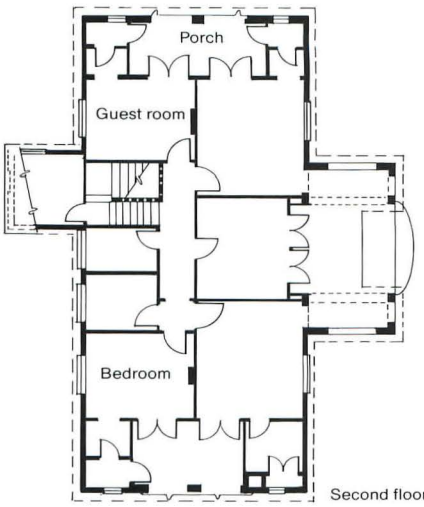
It is a precursor of modernism and also an early work of historicism. Because the emphasis on earthquake resistance reminded the romantic Maybeck of Pompei, he set out to make the house Pompeian in character and colors.

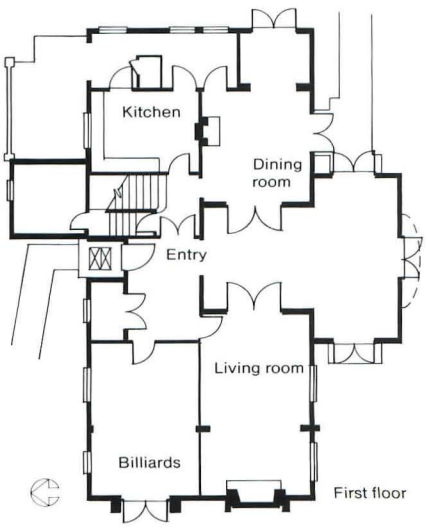
The original client, Andrew C. Lawson, lived in the house until the 1920s and rented it thereafter. Time and tenants were not particularly kind to it. The original ochers and Roman reds were replaced by a pale green, and the house fell into disrepair.

In 1954, however, it fell into just the right hands—those of Thomas and Nancy Genn, he an engineer and she an artist whose reputation for painting, sculpture, and paper works has grown steadily over the ensuing years. The Genns' sole drive was to

Right, the facade. Note diamond patterning. Below, the rear of the house with its sgraffito frieze carved by Italian craftsmen.







Top left, a typically open, uncluttered interior space with two of Nancy Genn's paper works on rear wall. Left, the diamond pattern repeated on a stairway. Right, one of several arches that bring the Mediterranean theme inside.


Baldwin

Top left, handsome geometry of wrought iron gates on an upstairs porch. Lower left, trellis is reminiscent of those on Maybeck's Christian Science church. Right, with its arches and soft colors, a wall that could be in Florence.

restore the house as closely as possible to Maybeck's original intentions for it.

Over time they repainted most of the interiors in Mediterranean earth tones. They uncovered and renewed the diamond pattern that Maybeck had used as decoration inside and out. They chose furnishings compatible with the rich redwood interior trim and paneling, and assiduously avoided clutter in the generous interior spaces. The concrete frame permitted long spans free of intervening supports, and the house has wide windows.

Shortly after moving into the house she had a conversation with Maybeck, who said that he was pleased that it would be the home of an artist. What has been done since would enhance his pleasure.

It's not just that the Genns have been good to the house, but she feels that the house has had a profound impact on her art. She draws energy from its power and inspiration from its "strong, bold lines." □

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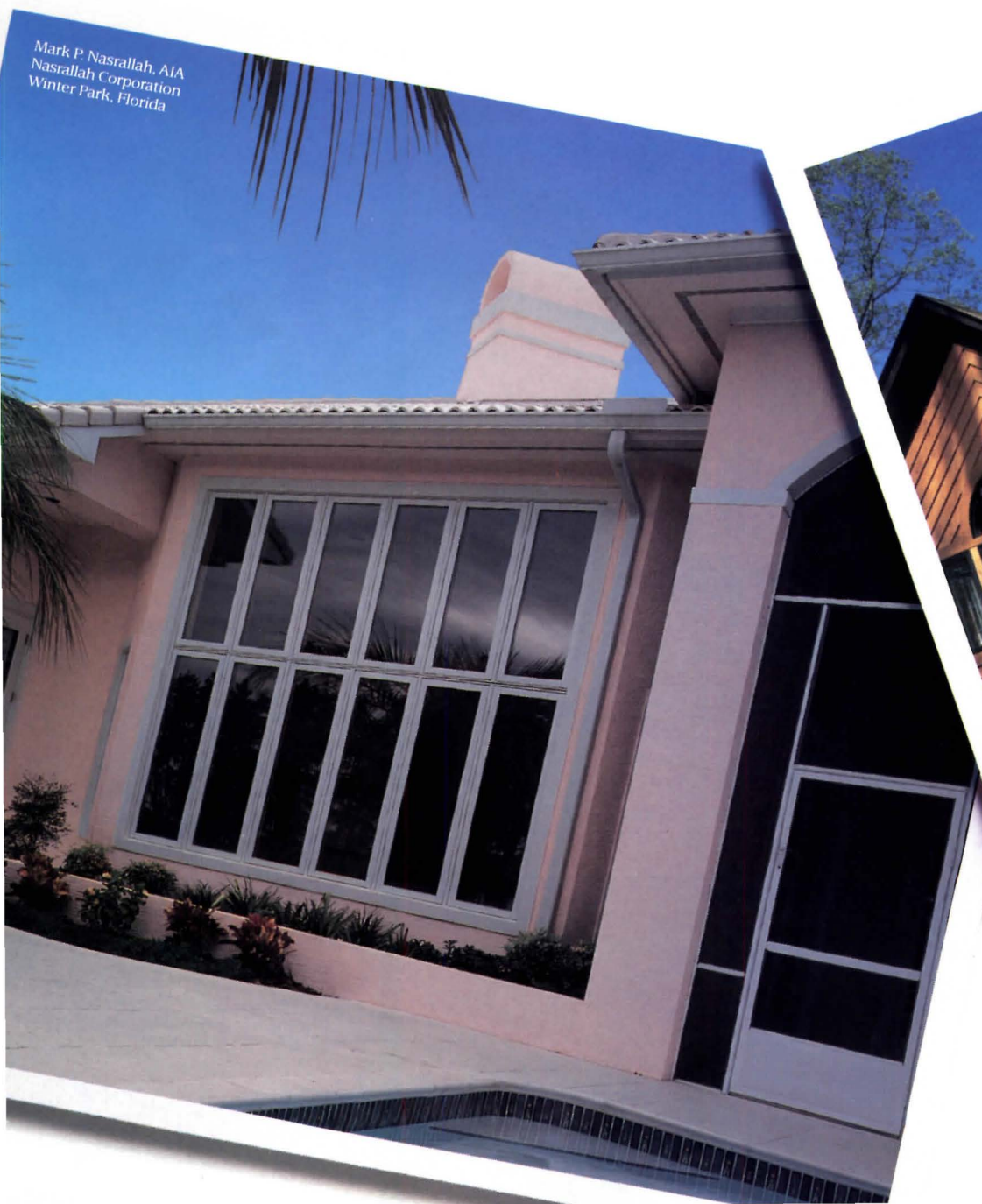

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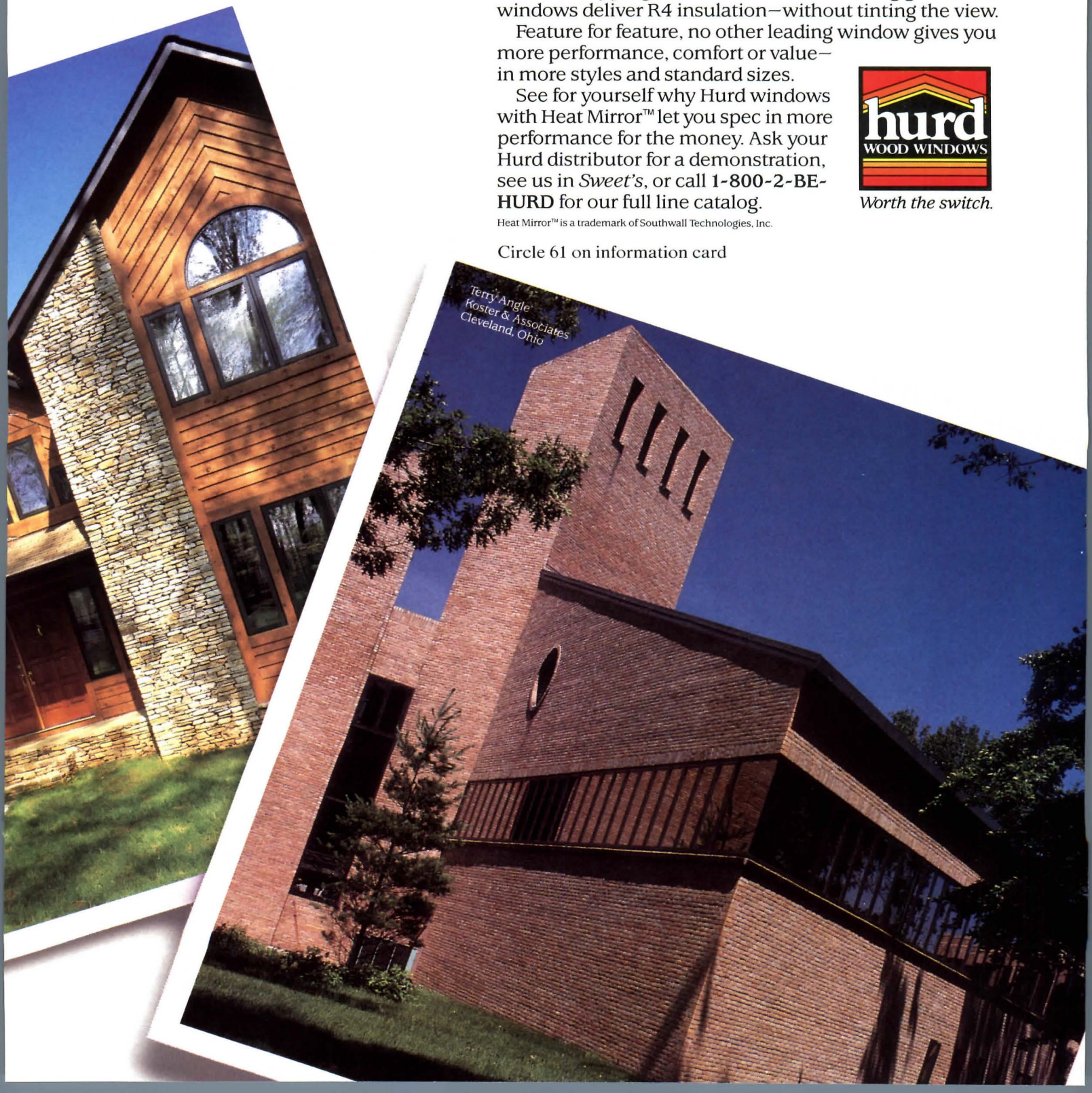

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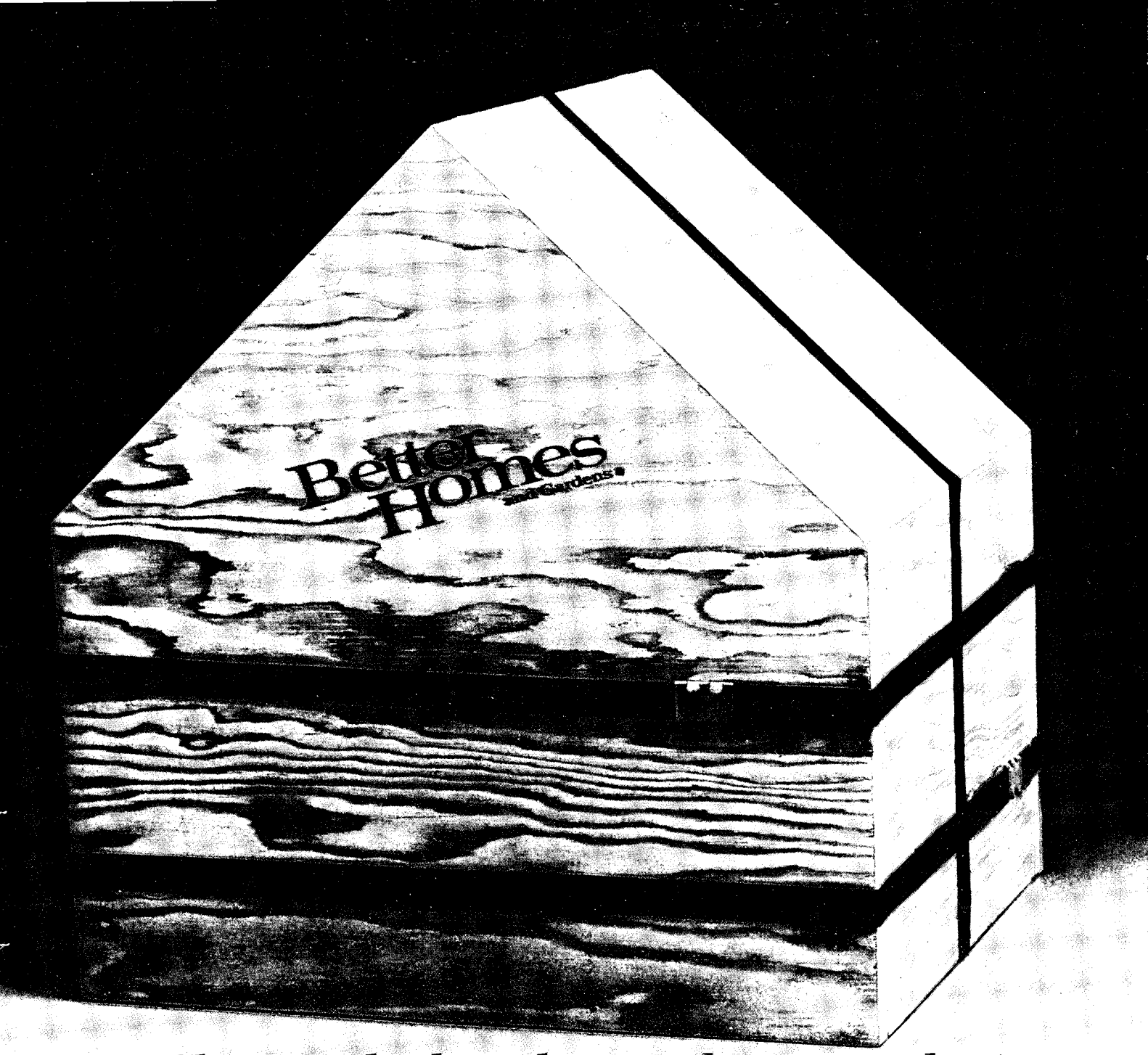

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*According to independent surveys.

CATEGORY 1 – Completed/Existing

FIRST PRIZE
Gensler and Associates/Architects
Project: Capital Bank, Miami, Florida

SECOND PRIZE — Tied
(Right)
Walter Chatham, AIA
Project: 301-311 West Fourth Street, Winston-Salem, North Carolina

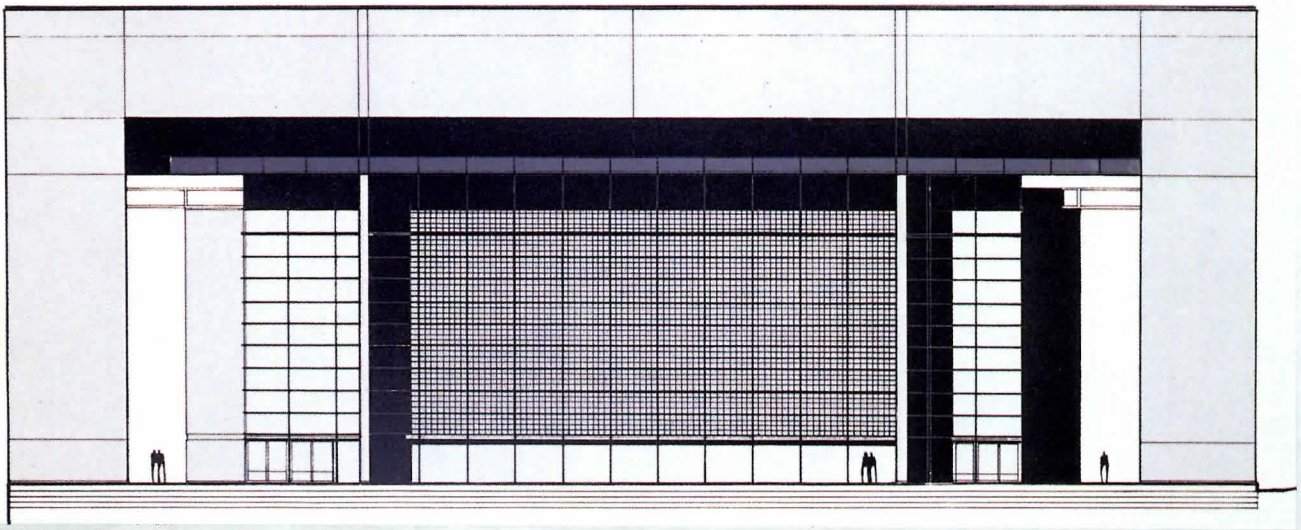
(Left)
Hoover Berg Desmond
Project: North Classroom Building, Auraria Higher Education Center, Denver, Colorado

HONORABLE MENTIONS
(Not shown)
Jack L. Gordon Architects, P.C.
Project: New York State Psychiatric Institute—Elevator/Stair Tower Addition, New York, New York

William McDonough Architects
Project: Triangle Artists' Workshop 1987—Collaborative Architecture Project, Pine Plains, New York

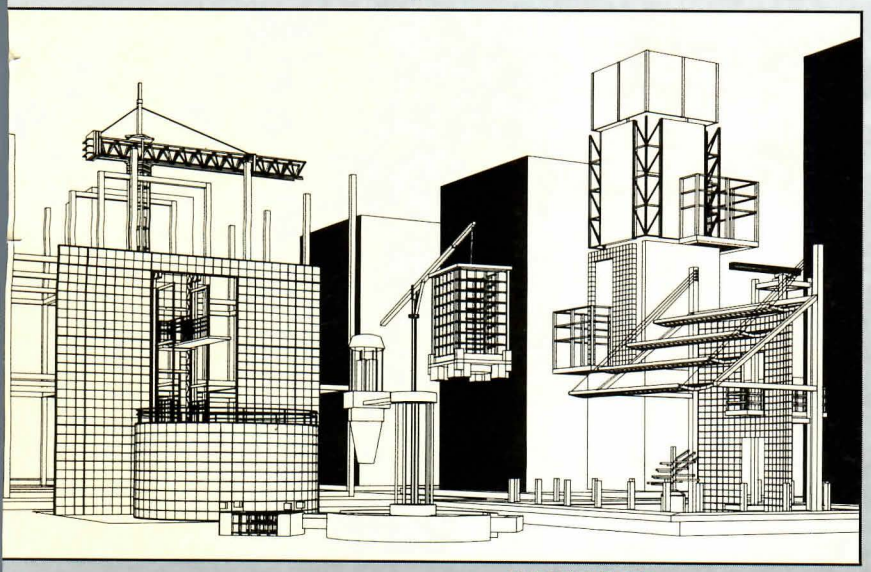
soared!

CATEGORY 2 – Planned/Pending/In-Works

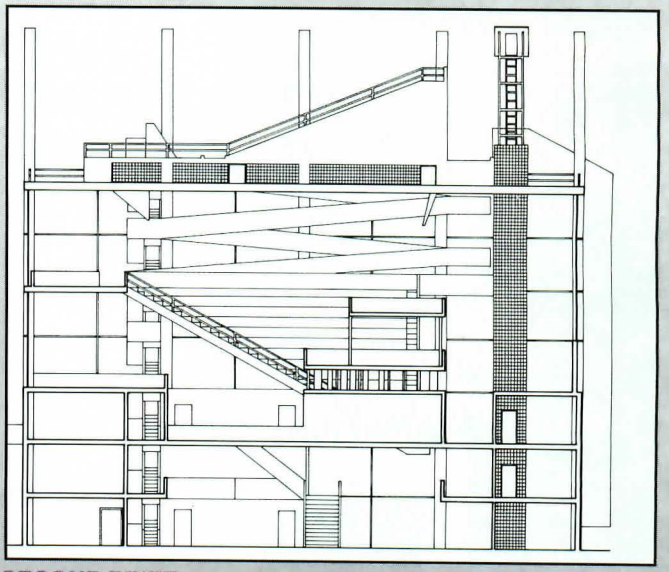


IRST PRIZE
ouglas E. Oliver
roject: Clemson Performing Arts Center Design
ompetition, Clemson University, Clemson, South Carolina

CATEGORY 3 – Conceptual



FIRST PRIZE
University of Colorado at Denver,
School of Architecture and Planning
Project: Five Projects:
Glass Block in the City



SECOND PRIZE
Eric Ibsen
Project: A Modern Church

HONORABLE MENTIONS (Not shown)
Thelean Shu
Project: An American Film Institute,
New York, New York

Yi-Shio Margaret Kuo
Project: Dedication to Glass Block

Mark S. Klancic
Project: Viewpoint to the Universe

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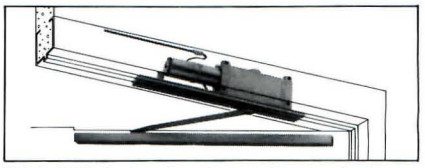

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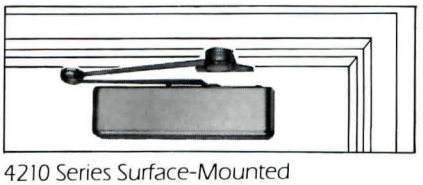

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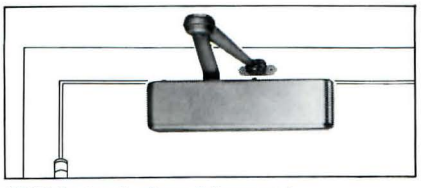

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Using Video Cameras in Restoration

By Dennis B. Jones and C. Barrett Kennedy

Videocameras have taken the place of 8mm cameras for home movies because videocams are so easy to operate, quality is high, and the results are as immediate as loading the VCR. For those very reasons, the videocamera has found its way onto construction sites as well, at first as part of the construction administration process. Now, with the help of data management and CADD software, videocameras are going a step further to record as-built conditions at the site for computer-aided analysis.

Our desire to combine existing technologies to automate the traditional manual task of recording on-site conditions was founded on the tenets of historic preservation. It is our observation that human-induced resource degradation results not only from neglect and vandalism but also from well-intentioned but inappropriate preservation actions by uninformed administrators, designers, and tradesmen.

In practical application, the simpler it is to set up, operate, and maintain the information system, the more useful and successful it will be. The complex structure of the system, the hierarchies, and the links between information fields must be transparent to the user. It is important to note, however, that, along with the need to understand and capitalize on technological opportunities, a thorough understanding of resource management tasks and responsibilities is essential to adapt emerging information management technologies and tools appropriately and successfully to serve preservation needs.

The application of videographic documentation and computer data processing technologies facilitates the entire process of architectural documentation and design. The videographic methodology that was developed for this research project consists of four primary phases. First is the recording of the site, structures, and elements of the architectural resource and transporting digitized images to the computer. Second is integrating the diverse resource knowledge base that consists of many media types into a unified information management system. The third primary phase is analyzing the resource images to facilitate image processing and the extraction of dimensional information. And the fourth comprises assembly of the analyzed resource information into graphic simulations of historic scenes and comtemporary design proposals using three-dimensional computer models and CADD-generated drawings.

The process of documentation begins with the visual recording of the site and the resources at hand. A videographic recording can convey the context or sense of place of a site through continuous video images supplemented with an audio account of environmental sounds and verbal commentary. This imagery, sound, and commentary is immediately accessible in the field, providing an instant confirmation of the quality and content of the audio/video document.

The video documentation crew works its way around the exterior of a subject building, recording overall views of the structure and the site. Detailed information about materials, joints, evidence of physical condition, unique or significant features, and specific environmental information may be included as part of the video record. The interior of the building may be recorded the same way.

The videotape record provides a library of images of the site that can be accessed for computer-aided viewing reference or analysis. Currently, we digitally capture and store images from videotape into the computer's memory by a process called "frame grabbing." This entails converting the video signal, which is in line (raster) form, to the computer's digital signal, which is in dot (pixel) form. The computer image, which replicates the video image in color and resolution, is then stored in the computer's memory structure (magnetic or optical disk) for future reference and manipulation.

Through the use of frame grabbing techniques with television cameras and videotape recordings, a wide array of information from many media sources, such as sketches, slides, photographs, handwritten notes, and drawings, can be merged into a single environment. Each of the case study projects in this research employed this digitizing process to assemble a library of images from various sources.

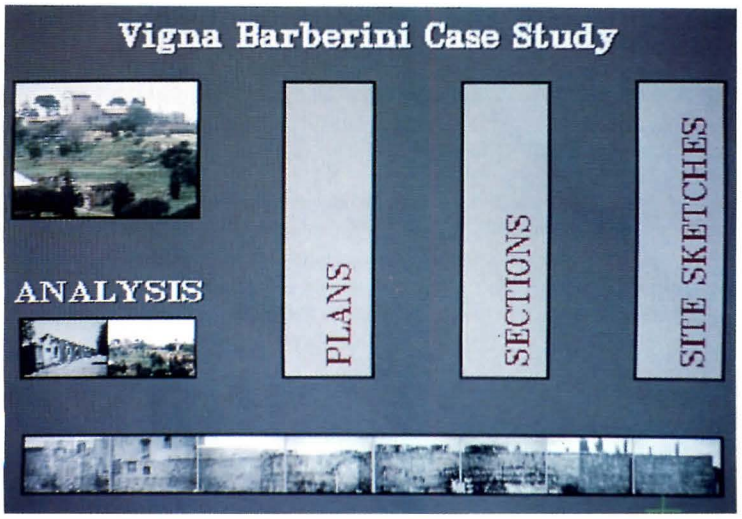
As the volume of digitized images and associated data files increases, the need for a comprehensive information management tool becomes essential. We devised a system with capabilities for integrating and manipulating numeric, textual, and image data. The system (CRISTAL by VideoCad Inc.) is a spreadsheet-based image and information management system that capitalizes on proven, contemporary computer hardware and software technologies to facilitate the transmission and combination of complex graphic data forms. The software manages information in spreadsheet files, image files, and text files.

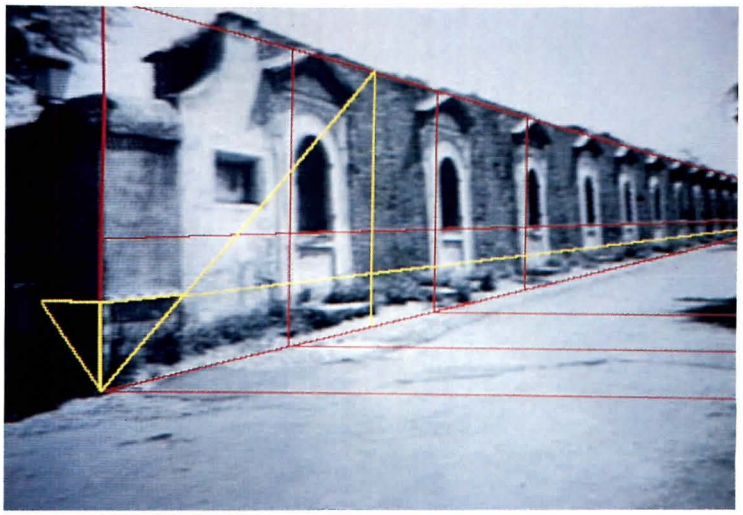
With spreadsheet files, the field worker stores numeric, tabular, or computational information in cells. Image files allow storage of graphic and visual information in digital form, which can be displayed, annotated, or manipulated by the software's image processing functions. Text files are for descriptive information. They are stored in standard ASCII format and may be generated by another data base, most word processing software, other spreadsheets, or a built-in editor function of this particular software package.

Macro commands provide the means to execute automatically a set of predefined information-management operations or calculations. They are the heart of application development capabilities of a computerized information management system. Through macros, a person can tailor for specific applications a

Mr. Jones is an associate professor at VPI&SU, director of the Center for Design Science, and a technical adviser on computer science to the National Endowment for the Arts. Mr. Kennedy is a professor of architecture at the Savannah College of Art and Design and a doctoral candidate in environmental design and planning at VPI&SU. *Robert P. Schubert and research associate Michael G. Yamarik also contributed to this work.*

For ease of use, the menu of as-built computerized archives includes miniatures of the stored video images, left. The user touches mouse to menu image and the full image appears, right below, for further manipulation.





library of easily remembered commands for project personnel to access, activate, and control any of the functions of the keyboard, menus, or other routines simply and quickly.

Another crucial data base capability, called data links, integrates information in various forms into a common-reference data base. Many software packages can link different data types together by implementing a unique set of macro commands, which include operations for loading or saving a spreadsheet, image, or text file, sorting and querying a range of cells to form a data base, and a subroutine and menu system that provides users with menus for accessing information. Links between data files are created by coordinating the execution of a macro sequence that activates these files when specified conditions are met.

An example of a data link system is the resource data base that the researchers created for the National Park Service. The prototype was developed for Mount Rainier National Park (Longmire, Wash.) and consists of a data base that contains images and associated tabular information describing the park's historic building resources. A list of descriptive image titles is entered into the spreadsheet, along with a key code that can be used for search and sort criteria, and a macro set for linking specified files to other data files. The program then initiates a macro sequence that presents the user with a menu of operations, such as "Insert" and "Delete" records, "Search" for a record, and "Sort" records. A user selects the Sort command to tell the computer how to order image titles. Referencing from the resulting list, the user specifies an image title with the Search command. He or she then may load the image from memory and display it on the graphics screen.

The software program we used also features an integrated videographic data management system, which allows the user to tie information access commands to visual cues. A Screen Map feature links macro commands in a worksheet to image icons and other component parts of an image displayed on the graphics screen. When in the Screen Map mode, a user selects an icon displayed on the graphics screen by positioning the mouse-controlled cursor on the icon and pressing the right mouse button. The computer then executes the corresponding macro commands. The macro commands activate a predefined event or sequence of events. These macros are capable of displaying an image or a series of images in the graphic screen that are related to the selected graphic icon. The macros may command the computer to display a worksheet or series of text files containing construction, assembly, task specifications, decriptive commentary, or numeric data. Another set of macro commands might display another Screen Map of image icons to provide access to another level of the information base.

It was just such a graphical interface strategy that allowed us to integrate the information base for Mount Rainier National Park. In that prototype application for the National Park Service, reference data pertaining to individual natural and cultural resources, such as statements of significance, descriptive summaries, and dimensional data, are stored in the system's worksheet environment. These data fields were linked to other text files and to the image data base through the Screen Map icons in the graphics environment. We developed macro sequences to allow the system user a high degree of discretion in working with the visual information base through access and display. Image processing capabilities permit the system user to annotate and graphically manipulate individual images and to overlay or combine component parts of various images to form a single integrated image that addresses particular diagnostic, analytical, interpretive, or prescriptive concerns. The information base can be dissected to an increasingly particular level of detail by implementing additional layers of icon-activated worksheet menus.

Once an information base of graphic, text, and numeric data is assembled, analysts use videographic and image processing software in two basic ways. One is to graphically simulate a building to show historic or proposed modifications through image manipulation. The other is dimensional analysis, in which the

Video images are measured via overlaid stadia, right; then are converted to CADD, right below.

User may computer-alter existing conditions, left above, to 'recreate' the original building, left.

analyst extracts dimensions from an image based on planar geometrical constructs.

Graphic simulations are useful in re-creating an image of what a building might have looked like in the past or in portraying the visual impact of contemporary design proposals. Using the image processing capabilities of the prototype system, the colors, structure, and form of a building image can be altered at will to restore elements and appearance according to analytic evidence, including historic references such as original photographs and contemporary sketches.

The Hull House case study is an example of the use of image processing software to re-create the original appearance of a circa 1840 dogtrot cabin. The system we used (AT&T's Truevision Image Processing System, TIPS) provides the capability of painting over an image, cutting and pasting pieces of images together, manipulating image colors, and other image processing functions. Based on the historical evidence, we created an image of the original Hull House with TIPS by editing and manipulating images of the existing house to undo recorded alterations. The processed image of what we believe to be the original house then was stored as a new, individual file in the information base to serve as historic and visual reference for the Hull House record.

The computer program also is capable of finding dimensions directly from digital images. Such dimensional data establishes a foundation for creating measured drawings or 3D model representations of an architectural resource. The two- and three-dimensional videographics analysis system we used (VideoCad's Videographic Computer Assisted Designer) has the capacity to construct the necessary geometry for extracting dimensions from digitized (raster) images. A three-dimensional reference stadia is included in the video recording of each of the building views to be dimensioned. These key reference views are assigned labels accordingly when they are digitized from the videotape source and stored in the digital data base. Poplar Forest, Thomas Jefferson's plantation near Lynchburg, Va., for which a major preservation effort currently is being planned, served as the case study project for the videographic analysis component of our research.

The dimensioning process begins with locating and marking the control points on the reference stadia in the digital image. This establishes the basis for the computation of a dimensional grid overlay. Each of these control points is located using a mouse cursor to indicate the reference targets on the stadia. The marking of the control points enables the software to compute the planar grid construct that is used to calculate dimensions. The computed grid consists of three planes, each of which can be used as a dimensional field: left of the stadia, right of the stadia, and the ground plane. Because the computed grid is a three-dimensional construct that can be moved and rotated, the stadia-generated grid need only be defined once per image.

Once the planar grid is constructed and adjusted to a known baseline dimension, dimensions can be extracted from the image by using the mouse cursor to mark the two end points of a desired vector in the image that lies on one of the defined planar surfaces. The software computes the actual distance between the two points, as well as the absolute horizontal (X) and vertical (Y) differentials. Component parts of a building image that do not coincide with any of the planes can be dimensioned by adjusting the location or orientation of the grid to coincide with the appropriate planar surface.

To accommodate this planar variety in any given image, the dimensional grid can be manipulated in three basic ways. One is moving the grid along an X,Y, Z axis to align one of the grid planes with a surface in the image that contains the vector to be measured. The second is rotating the grid about an X,Y,Z axis to align one of the grid planes with a surface in the image that contains the vector to be measured. Third is extending the grid to allow the dimensional analysis of elements that are located outside of the geometrical construct generated by the original orientation of the stadia.

The dimensional values extracted from the image are reported to the user (displayed on the graphics screen) as an X,Y coordinate readout. If desired, the values can be accumulated or stored in a predefined numeric data base. Dimensions can be organized in a spreadsheet so that quantitative analysis of various building characteristics, such as surface area calculations, can be performed. The dimensional values also can be stored in data base records that contain associated information, such as material types. This makes it possible to generate reports for material lists, cost estimating, and specifications. Analyzing the images in the data base and obtaining the dimensional results is the final stage in the videographic data acquisition process.

Because of the limitations of the hardware employed in this research for image resolution, the planar videographic dimensioning techniques used by the VCAD system yield results that are not sufficiently accurate to produce exceptionally accurate as-built drawings. On the other hand, the VCAD system may be enhanced by the application of high-resolution stereoscopic image pairs and analytic photogrammetric methods, laser calibration systems, and edge detection methods that have shown promise in providing exceptionally accurate results (tolerances within millimeters). Image resolution can be enhanced further by using high-resolution (1,000 to 2,000 dots per inch) digital scanners to transfer drawings, photographs, and slides into the computer, surpassing the image quality of the lower-resolution "frame grabbing" process. In addition, opportunities for using high definition video, which can generate digital images with up to 1,000 lines per inch resolution, should be explored.

Although our development of this methodology was conceived for use in historic preservation projects, it is applicable to other existing buildings as well. Using the information that has been recorded, assembled, and analyzed by the three previous stages of the methodology, architects can represent by computer-aided design models and drawings the complex 2D and 3D graphic characteristics of any building. The use of 3D computer models provides the means of dynamically examining a building in the context of its site from various perspectives. The 3D construct enables the system user to move around and through the computer model of the building. Colors and textures can be applied to the surfaces of the computer model by using image processing techniques that enhance the realistic appearance of the representational form. Computer models also allow the impact of contemporary maintenance activities, design proposals, and management strategies to be graphically simulated (we used AT&T's Three-dimensional Object Processing and Animation Software). These models can serve as a basis for design development, project presentation and review, marketing, and maintenance management.

The 3D computer model of a building, as an independent entity in the resource data base, can be used to produce accurate CADD design development or production drawings (elevations, plans, sections, etc.). The as-built drawings can be annotated with dimension strings and details that represent a complete graphic record of the existing building. The measured drawings also provide a foundation for the development of construction documents that can facilitate maintenance, restoration, and adaptive use projects.

The generation of CADD drawings represents the final component in the integrated videographic system of architectural data acquisition, analysis, and graphic representation. Considered as a whole, the proposed videographic method reflects the effective resource recording, management, analysis, and representational advantages that the image processing technologies hold for the architecture profession. The integrated, comprehensive information base that can be assembled by the appropriate application of these technological tools can facilitate the resolution of the routine and cyclic maintenance, rehabilitation, and new construction issues facing public and private sector administrators, designers, and developers.

Videographic applications for building documentation and design only recently have begun to have an influence on the architecture profession. Opportunities for further exploration of the issues raised in this research are extensive, and concerted efforts to transfer and adapt appropriate emerging technologies to the needs of the preservation community and architecture profession can have a significant impact on the management of our cultural heritage.

A major obstacle in assembling extensive information bases around video imaging technologies is the permanent data storage solutions (relating to cost, volume, and access time) that are required. Storage devices, such as hard disks or optical WORM drives, have inherent limitations in terms of storage capacity and access speed when handling high-resolution image files. These constraints can be minimized through the development of complex image compression techniques based on fractal geometry. While these data compression algorithms can improve on contemporary digital storage solutions, image storage on analog rather than digital media may provide a more feasible storage alternative for the near term. Laser disk systems continue to offer significant advantages as an image storage medium. A 12-inch laser disk can accommodate 54,000 single-frame images (or 30 minutes of real-time analog video recordings) per side.

There are additional storage and display technologies that represent promising alternatives to the methods explored in this research. Compact disks (CD), which are widely accepted for audio applications, now are being recognized for their potential in computer imaging. It also should be noted that high-definition television (HDTV), using digital technology to display images, provides a direct interface for the efficient display of CD image data.

At the current stage of system development, the process of creating computer models and measured drawings with the videographically generated dimensional information can be a cumbersome task. Whereas videographic dimensioning computes linear measurements that have to be transposed to a series of two-dimensional data bases, a Stereoscopic Coordinate System could produce actual three-dimensional coordinate information. As dimensions are extracted from an image, this information could be put directly into the graphic processing system to facilitate the construction of a 3D computer model. Object-oriented programming tools such as Hierarchical Object Oriented Programming System (HOOPS) and Extended Programming Hierarchical Interface Graphics System (XPHIGS) may be able to provide the necessary operational capabilities to support such modeling systems. These programming tools can provide a common programming denominator, creating a structure that allows information to be shared across different operating environments or systems.

The as-built recording system software, which still is in the beta testing phase, was developed exclusively by the research and development group VideoCad Inc. Beyond historic records, practical applications may include facilities management records, CADD input for adaptive use, and design simulations for design review and development. Architects, engineers, and resources managers are the primary intended users. □

Landmark Research in Relating Color and Form

The results are reported in a new book. By Timothy B. McDonald

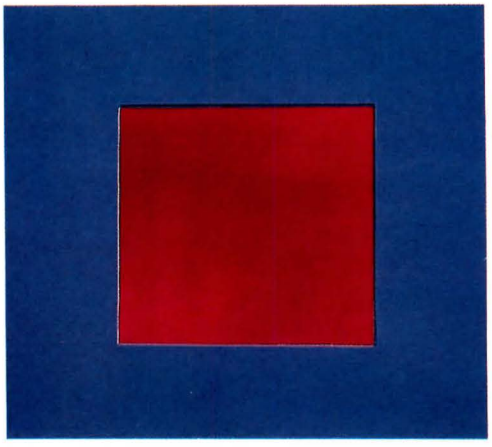
Lois Swirnoff, painter and professor of design at UCLA, holds what can be considered a unique position in the worlds of art and architecture: she believes that designers and design educators need to consider form, color, and light as inseparable. She states that "color is a constituent of form" and proceeds from the premise that "color can be considered a dimension."

In her new book, *Dimensional Color* (Birkhaüser Boston Inc., 1989), Swirnoff presents the process and results of her research in three-dimensional color, including a series of studies she undertook with her students. She quotes Goethe, who said in *Theory of Colors,* "We now assert, extraordinary as it may in some degree appear, that the eye sees no form, in as much as light, shade, and color constitute that which to our vision distinguishes object from object, and the parts of objects from one another. From these three, light, shade, color, we construct the visual world."

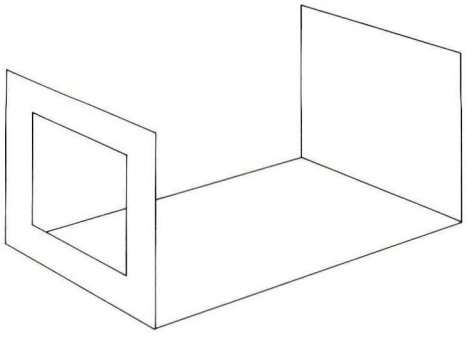
"One hundred fifty years later," Swirnoff writes, "this startling assertion contrasts with the modern assumption that form is 'pure,' while color is 'mere sensation.' This bias persists in design education, where generally each is studied independently of the other."

Swirnoff studied with Josef Albers at Yale, and the first studies she carried out with her students reflect his work. The important difference is that her studies are three-dimensional, building up, so to speak, from Albers's two-dimensionality. During these and other studies, Swirnoff's students gradually were sensitized to the effect of color and its manipulation through "games of invention and strategy." These studies are, of course, more than games. They are a visual analysis, aimed at understanding the complex interactions of color and perceived dimension. Swirnoff's goal is to provide a rational basis for the selection and use of color in the environment.

The first of Swirnoff's studies began with a model consisting of a windowlike frame constructed of mat board, attached to the front of an open-faced box. With Color-aid paper, the frame was colored gray, while the back wall of the box was colored red or blue. As the studies progressed, these colors were varied.



Photographs courtesy of Lois Swirnoff



Directly above is a drawing of the gray box frame constructed by Swirnoff to study the effect of color on depth perception. When viewed head on, some colors, such as red, appear to move in front of the frame, while others, such as blue, appear behind it.

Viewed directly through the frame at a prescribed distance, some colors, such as brilliant red, appeared to move forward and float in front of the frame. Other colors, such as blue, visually remained behind the frame. Varying the color, its saturation, and its value altered the perceived depth of the box and in some cases actually reversed the spatial relationship of frame to box.

Swirnoff then varied the frame/open-box studies by adding a vertical red panel half the width of the box, between the frame and a green back wall. When viewed through the frame, the two complementary colors (red and green) appeared to move beyond the frame and "vibrate at their mutual edge," in a manner similar to what happens when complementary colors are viewed in two dimensions.

The students then constructed a series of colored frames. These had proportionally smaller openings and were arranged one behind the other in the box. A sequence of four colors for the frames was selected by juxtaposing two complementary colors, such as orange and blue-violet. At their boundary appeared a third color, referred to as the "intermediary," which became the color for one of the frames. Further juxtaposing of intermediary colors with the two original colors produced a "logical sequence" of three colored frames and the color of the back wall.

When viewed in the same manner as in the other studies, this logical sequence produced, as one might expect, a longitudinal space. However, when the frames were made proportionately irregular, each colored surface appeared to contain a small square within it, and the whole appeared flat. Swirnoff also found that, when the center color (the color of the back wall) was particularly bright, it appeared to radiate spatially, greatly influencing the brightness of the colors around it. A bright color placed against the back wall also could appear to reverse the sequence of colors, visually turning things inside out.

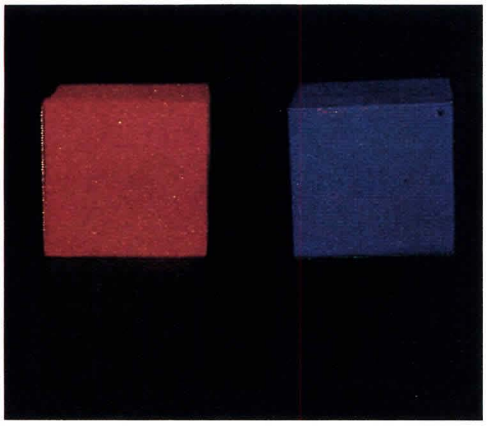
When the colors weren't selected logically, the results were varied, often producing "spatially ambiguous" windows. Spatial relationships also were affected if the selected colors were viewed in concentric frames. Larger upper borders of color reinforced the perception of depth; when the larger borders were the lower borders, the colors appeared to advance toward the viewer.

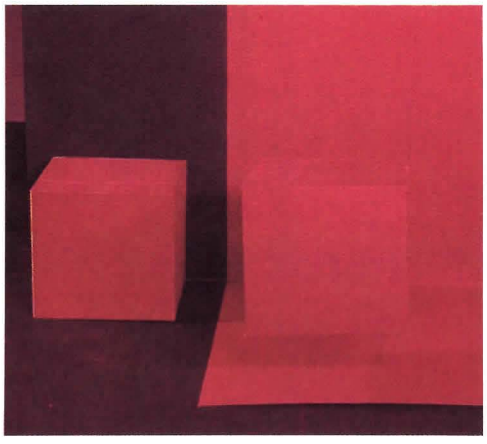
"What is significant in this group of experiments is that the perceptual sequencing in hue and brightness between the colors matters, and not their actual positions as planes of depth," says Swirnoff. Additional experiments successfully used color to shape space into pyramids, cones, and tunnels.

Swirnoff further used the frame/open-box studies to illustrate what she called "a compelling spatial illusion." When three equally spaced panels (one being the colored back wall) of logically selected color were viewed through the frame, an illusion of two diagonally intersecting planes of colors was created. Many variations were tried, and, as long as the colors were "related sequentially, as logical intermediaries in hue and brightness," the results were the same. Only when the middle color was brighter or darker would the illusion fail. In some cases, when the colors didn't relate as hues but were still logical steps of monochromatic brightness, a three-dimensional zigzag illusion was created. The contrasting effect between the first and the third panel appears along the mutual boundary with the middle panel.

The frame/open-box studies illustrate "a significant relationship between the perception of the boundaries between adjacent hues and the visual experience of space. . . . Color can be regarded as an important aspect of spatial perception, since, in their juxtapositions, colors can result in bounded fields or planes that can be interpreted to have direction, orientation, and location, the properties of visual space," Swirnoff adds.

To test the premise that the perception of shape, size, and placement of colored objects is one interdependent psychological process rather than a number of independent functions, Swirnoff set up a series of studies. Two cubes of unequal size but equal brightness (one red and one blue) were placed within a 4x4x8-foot frame that had been painted black. Although the two were aligned to appear at equal distance from the monocular viewer, the red cube (the larger of the two, but placed farther back from the viewer) showed a tendency





Top, two unequally sized cubes appear the same size. The red seems to advance, and the blue, to recede. Above, of the two equal sized red cubes, the red on black appears closer, while the red on red, although physically closer, seems further away.

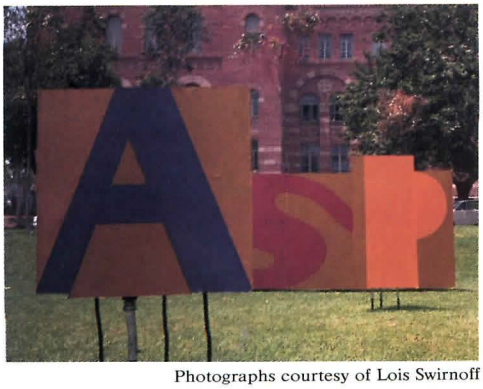
to advance, while the blue cube appeared to recede. This illusion was compounded when the blue cube was moved higher in the visual field; despite the fact the blue cube was closer, it appeared farther away.

In another study, two red cubes of equal size were placed next to each other on different backgrounds—one on a dark background, and the other on a red background. The red cube on the red background, although closer to the viewer, dissolved into its surroundings and appeared smaller than the red cube on the dark background. To further test this result, cubes of contrasting colors and sizes were arranged in a progression against backgrounds of various colors. By manipulating the colors of the cubes, their relative heights, and/or their background, Swirnoff was able to affect the monocular viewer's perception of size, placement, and distance.

To study the intensity of hues outside the studio, Swirnoff and her students erected a "large-scale illusion." The word "ASPEN" appeared when viewed from a single vantage point—a hole pierced through a screen. It was just an illusion, however. What appeared to be one panel was actually several three-dimensional forms erected at different points in a spatial field 40 feet wide by 100 feet deep. Limiting themselves to four hues for the words and one hue for the background color, the students split the letters between the three-dimensional forms. This effectively dispersed the colors throughout the depth of the field and added to the ambiguity. By spreading the colors throughout the depth of field, they were able to study the persistence of color intensity. Not only did the hues maintain their intensity, but the contrasting effect between the letters and the background color was maintained as well.

The assemblage remained in place for two weeks, presenting an opportunity to study the effects of changing angles of incidence and intensity of light. The assem-

Below, the word 'aspen' is an illusion within a 40-foot by 100-foot field, viewed through a hole in a screen. The bottom photo shows the actual placement of the letters, viewed from a different vantage point.



Photographs courtesy of Lois Swirnoff

blage maintained a uniform appearance under most circumstances. Swirnoff concludes that, "if color is integrated within the spatial coordinates of the field, it can be a unifying factor in environmental or architectural design."

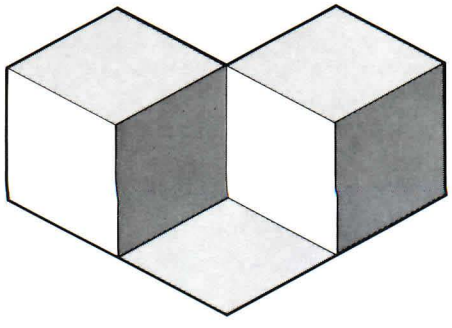
The ability to distinguish three-dimensional forms depends on perception of light and shadow. For instance, we depend on the ratio of light and dark to estimate the depth of an angle. Under the same lighting conditions, a 90-degree angle reads quite differently from a 45-degree angle.

Swirnoff wanted to study how light and shadow affect our ability to read angles. She began the tests without color, using only panels constructed of mat board, set at 90 degrees to one another. Under a lamp, one panel was in shadow while the other was lighted. After observing the panels for a time, a subject was asked to select a gray that matched the panel in shadow. When compared under the same lighting conditions, the actual shadow typically was much darker that the gray paper selected. Finally, through trial and error, a gray that matched the panel in shadow was selected.

This final gray usually turned out to be twice as dark as the first gray selected. When placed on the lighted panel, the dark gray paper cancelled out the contrast between the lighted panel and the panel in shadow. No longer clearly a 90-degree angle, the three-dimensional form, seen through a mask appeared reduced to two frontal and parallel panels. "The contrast between the light and shadow of a 90-degree angle then is greatly underestimated by the eye.

To determine how hue and brightness affect the geometry of form, Swirnoff had the students replace the white panels with colored ones. They found that a fully saturated red was affected less than a fully saturated yellow. It seems that no fixed rule or system applies. However, Swirnoff concludes that "value is the fundamental building block of form. When color is related to the visual proportion of light and shadow, it influences the appearance of boundaries that constitute the experience of volume."

Below, an experiment to show how shades and shadows affect interpretation of angles.



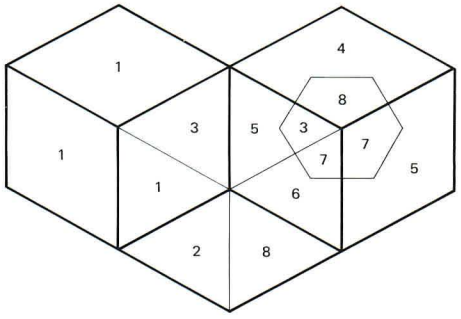
By manipulating color, light, and shadow, it is possible to alter the appearance and even create the illusion of form. To understand the relationship between simple volumes and color, Swirnoff began model studies with an open box with three cubes stacked pyramidlike in the corner. The result was a three-dimensional, multifaceted model with planes of equal size and shape. If color, light, and shadow were manipulated, however, each facet had the potential of appearing either convex or concave.

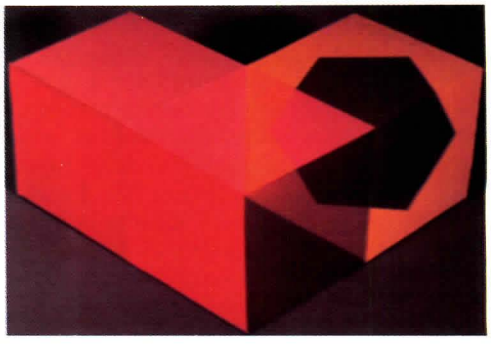
As with the 90-degree-angle studies, the students began with a white mat board model, matching the shadows with gray paper. Again, the volume effectively was cancelled out and a flattened appearance created. The students then shifted the light to the opposite of its original location. The grays then appeared exaggerated, illustrating how the angle and distance of light can affect the appearance of volumes.

Using color to express the proportion of light and shadow as established in the previous white-model studies, the faces of the cubes were sectioned diagonally with pairs of colors. Placing new, carefully selected colors on the original model created the appearance of a new form.

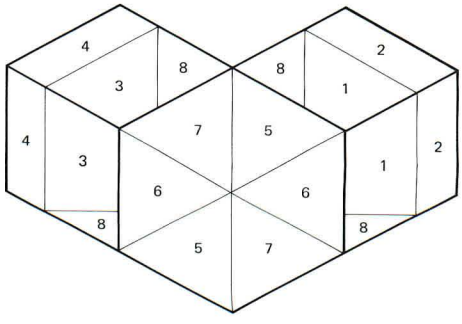
To understand how color interacts with form, Swirnoff and the students undertook a series of "chameleon-like" studies. The objective was the visual transformation of a simple geometric form. A white model, very much like those used in the previous studies, was constructed, consisting of two cubes joined along one vertical edge, with a square panel joining their common base. The observer directly in front of the model looked at it with one eye for several minutes. Viewing the model in this manner, the observer saw an illusion of a middle cube appear between the actual cubes. After prolonged observation, this middle cube seemed to "lift from, and reverse its position in space." Once observed, the illusion of volume/void would hold even when the observer moved (within a certain limit).

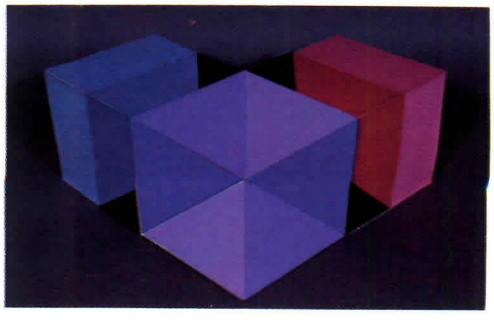
"Once seen, this ambiguous configuration can be played upon, its articulation a function of the position of color. The perception of forms in space depends upon the resolution of all visual clues, light and shadow, hue and boundary, as a total pattern. If color can significantly influence





The top drawing shows a color key for the photo of the model immediately below it. The model was illuminated from two sides and above, so the light on the top horizontal plane is real. The cube on the right appears to be flattened into an orange hexagon surrounding a gray hexagon. The drawing below shows the key for another exercise, seen in the bottom photo. The red and blue side cubes are arranged to appear flat in the center, and small black triangles separate them from the violet center cube.





boundary, then three-dimensionality can be contingent upon it," says Swirnoff.

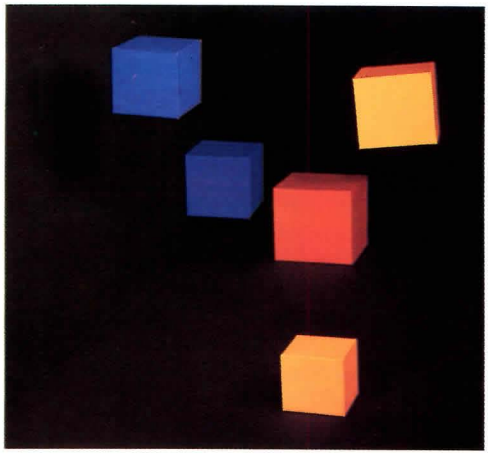
She then assembled a series of visually impressive studies to back up her statement. Using only flat, uniformly colored paper (reds, oranges, browns, and grays) her students transformed the model into studies that looked quite different. In one study, one of the cubes appeared as a "flattened hexagon, surrounded by a smaller gray hexagon," and the second cube was elongated into a "projecting rectangular solid, which, as it intersects the adjacent field, appears transparent."

All the studies showed that it was possible, simply by choosing the correct color, either to enhance or to contradict the model's volumetric characteristics. "Just as forms can be changed, so can they be articulated, and by the same visual means. To create or delete boundaries with color is the result of proximity or relative distance between the colors juxtaposed and the underlying patterns of light and shadow," Swirnoff concludes.

Between ultimate light and dark are myriad subtle gradations, of which the human eye can distinguish approximately 10 million levels. The contrasts between these levels create boundaries that visually organize the surfaces of and give form to objects. To better understand the effects of gradations of light and shadow on the perception of three-dimensional objects, Swirnoff had each of her students construct two model pyramids of identical size: one white and the other colored with gray Color-aid paper. The two pyramids were pinned next to each other on the studio wall at a prescribed height and then lighted and observed from a regulated distance. After a time, the pyramids appeared altered, as either a "volume or a square intersected by two diagonals."

Gray paper then was applied to a flat facsimile of the white pyramid, in an effort to match the shadows on its four sides. Placed side by side on a wall, this facsimile and the white pyramid appeared similar in pattern. Then the students used gray paper on a second pyramid to match the lights and darks on the lighted pyramid, with Color-aid gray paper placed on a second pyramid. Again (as with the 90-degree-angle study), student selections for shadow colors were much lighter than the shadows naturally cast.

In another phase of the study, all four triangular faces of the pyramid were masked with four distinct values. Placed on the wall next to the white model, the gray pyramid appeared flatter, even when



Above, the color and hue of the various sized cubes distorts their actual placement.

observed at angles other than head-on. "A discrepancy was observed in the tilt of the diagonals between the triangular planes. On the gray model, these were distinctly straighter than those of the white pyramid! The effect of angular relocation, a function of diminished contrast, was sustained from different vantage points. It was a surprising confirmation of the relativity of form," reports Swirnoff.

After the triangular faces of the model were visually flattened with gray paper, the pyramid was rotated. Each time the pyramid was rotated, a different effect was perceived: at one point, the pyramid appeared diamond-shaped; at another point, it appeared bisected diagonally. The students repeated the test under different levels of illumination and made the same observation each time. "Significant to the appearance of volume is the angle of incidence, rather than the intensity of light," concludes Swirnoff.

"When grouped in an expanded visual field, individual hues tend to organize so that reds are visually connected to reds, and blues to blues," says Swirnoff. In order to demonstrate this phenomenon, called "constellation," and test its limits, Swirnoff constructed a 4x4x8-foot black box. Three open sides of the box allowed the observer to view the five colored cubes placed in it. Each cube was a different size, but they were positioned along a vertical axis so as to appear the same size. Two cubes were yellow, two were blue, and one was red. Because they all appeared equal in size, they tended to "float" against the black field.

In the first study, the two yellow cubes visually clustered and moved forward, but remained "anchored" around the centrally located red cube. The two blue cubes also clustered, but receded from the brighter yellows and red.

The next study in this series tested the influence of size relationships on visual constellation. This time the cubes were distributed along a lateral axis. As before, the two yellow cubes clustered, despite their difference in size. The red cube, larger than the rest, again maintained its central position as a hub, exerting a strong spatial effect.

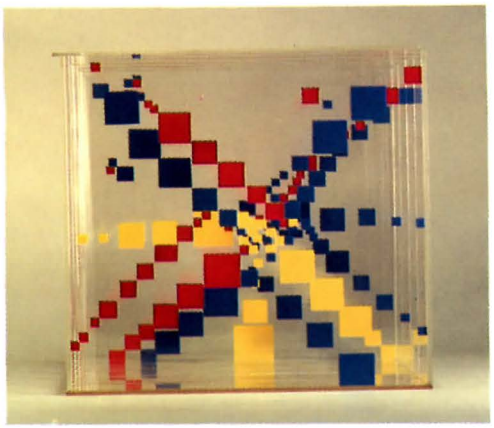
The three-dimensional studies that followed showed that "color can be the predominant factor in organizing groups of objects in space." For the first study, students worked with colored truncated blocks on a square base, arranging the blocks into patterns using color, form, and light. Next they worked with simple colored spools, balancing color distribution against "numerical possibilities."

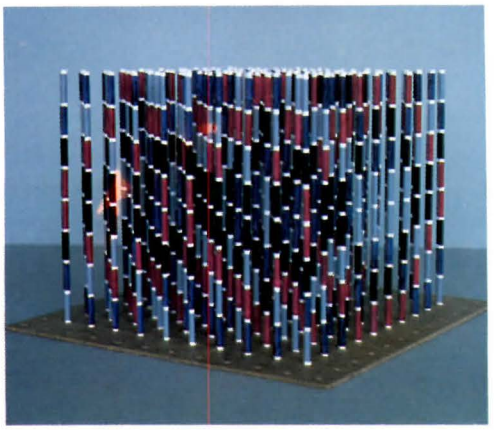
In further studies, students explored different types of pattern-making. Perhaps the most visually interesting was their work with projected patterns in space. Using Mondrian's paintings as a point of reference, they arranged small, square chips of primary colors on five upright square planes of transparent plexiglass. These planes were positioned one behind the other at equal distances. When viewed frontally, some of the studies resolved themselves into symmetrical patterns. However, as the viewer moved around the model, the patterns dissolved back into square chips floating in space. Even so, some of the colored chips acted as visual hubs around which colors clustered, while others assembled in linear sequences.

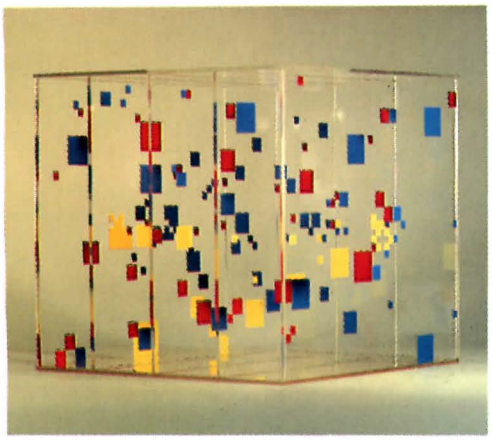
Swirnoff conceded, however, that "color clusters or constellations were more often developed as projections or superimpositions of separate two-dimensional patterns in space; very few were coherent, three-dimensional entities." The three-dimensional Mondrian studies revealed that the students had a limited capacity to think visually in three dimensions.

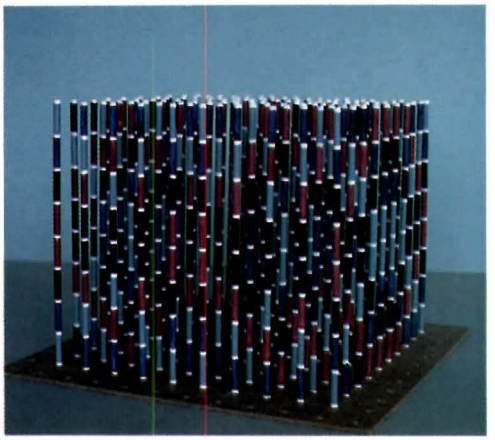
Arthur L. Loeb's work on color and symmetry defines the limited number of groups that are possible between colors and distinguishes between them numerically. Swirnoff and the students used Loeb's parameters to construct a series of studies concerning color symmetry and repetition over a flat plane. As with Albers's work, the Loeb studies were two-dimensional, and Swirnoff took them a step further, into the third dimension.

The final product resulted in an assemblage of 100 wood dowels set upright in a pegboard base. Each dowel was sectioned









The photos at left above show the Mondrian cube experiment. Right and above, color and placement of wooden dowels create 3-D sequences of color. Below, right, color reflectivity influences depth perception.

off vertically and painted according to a preconceived color and numerical system. Viewing the model from many vantage points, the students could confirm many of the observations made in previous exercises: colors clustered then dispersed, expanded then contracted; space opened between colors, then closed as the observer moved around the model.

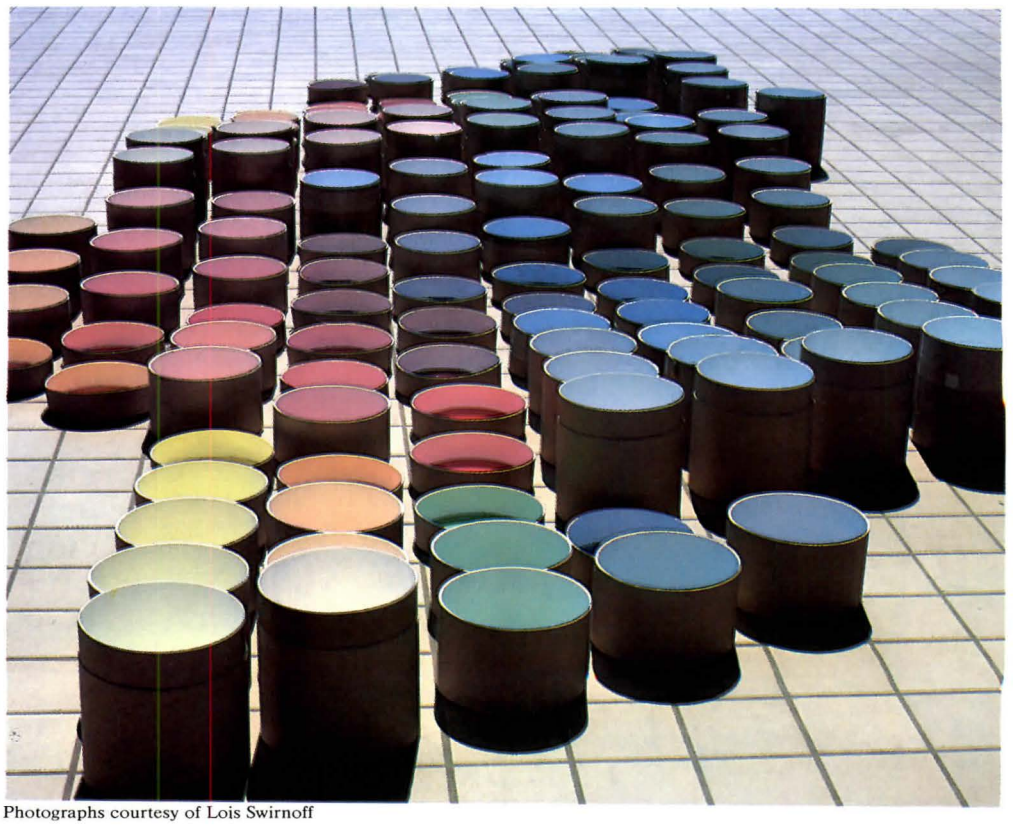
To study the behavior of color as reflected light, Swirnoff used cardboard cylinders of varying height, with the interior bases painted different hues and the interior walls painted white to "activate reflectivity from the base to the walls."

Set in bright, direct sun at noon, the cylinders appeared to be filled to the brim with color. The intensity of reflected color depended on the hue, the height of the cylinder, and the time of day, as well as the angle of incidence and the wavelength of the light. "The longer reds and oranges filled their containers to the maximum reflectivity, while greens and blues under the same circumstances floated in the containers," says Swirnoff.

The designer's role in creating the urban environment is of particular concern to Swirnoff, who discerns what she calls "an arbitrary or subjective use of color, as if there were no visual constraints or rules to the game." In her book, she describes and documents examples of indigenous or vernacular use of color in cities. She calls for inclusion of color in the urban scheme, by design as well as by custom.

Swirnoff believes in the primacy of visual education and that the place to start in design education is by integrating its rational and sensory components. Her book indeed illustrates a rational basis for educating designers about color. Its influence on the field of architecture may encourage the development of forms that are quite different from what we see today. □

Swirnoff, Lois. Dimensional Color, *in the design science collection, Arthur Loeb, series editor. 1989/9½x9¾/283 illus./hardcover/$69/0-8176-3253-0. A Pro Scientia Viva title. Published by Birkhäuser Boston Inc. c/o Springer-Verlag N.Y. Inc., 44 Hartz Way, Secaucus, N.J. 07096. (201) 348-4033.*



Photographs courtesy of Lois Swirnoff

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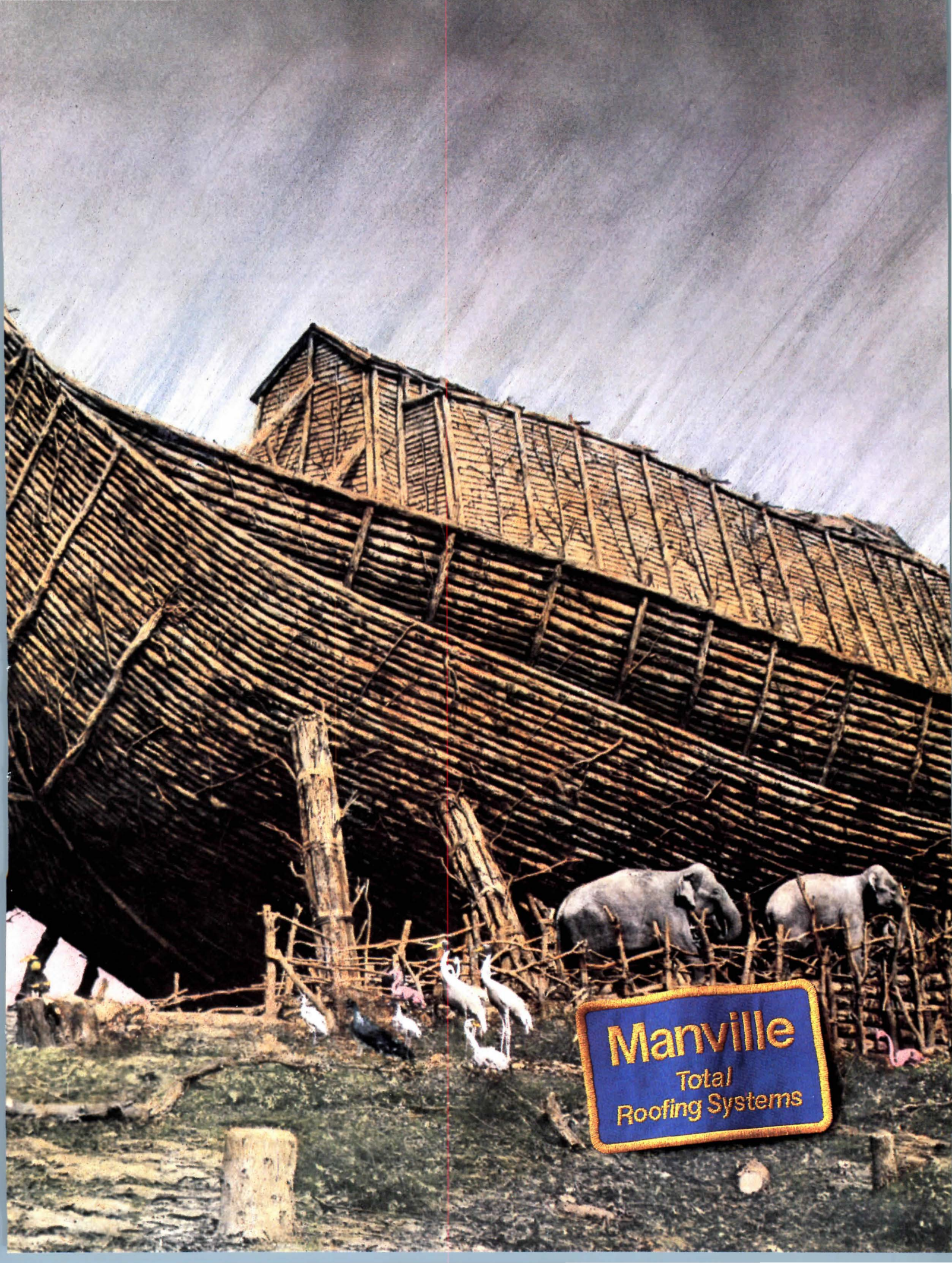
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Relating Fire Codes To Reality

'The numbers do not represent true performance.'
By Christine Beall, AIA

Building codes identify several types of construction with regard to fire safety. Fire-resistant construction is defined in the Uniform Building Code as construction that resists the spread of fire. Noncombustible construction is defined as materials of which no part will ignite and burn when subjected to fire.

Low-rise, multiple-unit buildings such as apartments, nursing homes, motels, and condominiums are constructed to essentially the same fire safety standards as single-family dwellings despite the significantly increased risks posed by the proximity of units and the vulnerability of occupants to the actions of their neighbors. How much longer, in good conscience, can we continue to build multiple-unit housing of combustible materials? How many more apartment dwellers and nursing home residents must die before we re-examine fire test methods and rating classifications to bring equity to the evaluation process?

Multiple-unit buildings generally are built of wood frame and gypsumboard to achieve the one-hour rating required by codes. This can be done with simple 2x4 construction, 16 inches on center, with one layer of ⅝-inch Type X gypsumboard on each side of the wall. But is the one-hour rating truly representative of the performance of the structure during a fire? By the same token, does it seem reasonable that a noncombustible, six-inch solid concrete wall is capable of resisting fire for only three hours, an eight-inch double-wythe brick wall for four hours, and an eight-inch grouted concrete block wall for four hours?

Logic suggests that these numbers do not represent true performance. To understand the discrepancies, we must look at the method of testing wall and floor assemblies and the critieria for assigning fire ratings.

Fire-resistance ratings are based on standard tests established by the Amercian Society for Testing and Materials (ASTM), National Fire Protection Association (NFPA), and National Bureau of Standards (now National Institute for Standards and Technology). Under the ASTM E119 fire test standard, sample wall and floor specimens are subjected to controlled heat applied according to standard time-temperature curves for a maximum of eight hours and 2,300 degrees Fahrenheit. Load-bearing wall assemblies must later undergo a hose-stream test for impact, erosion, and thermal shock. Throughout the test, bearing walls are loaded to develop full design stresses. Within 24 hours after the test is completed, bearing walls also must be able safely to sustain twice their normal superimposed load (simulating, for instance, a roof collapse).

The fire test is terminated when any one of three possible end-point criteria is reached: (1) an average temperature rise of 250 degrees Fahrenheit or a maximum rise of 350 degrees Fahrenheit is measured on the unexposed side of the wall assembly;

Ms. Beall is an architect and specifications consultant in Austin, Tex.

(2) heat, flame, or gases escape to the unexposed side of the assembly and ignite cotton waste samples; or (3) failure under design load occurs. Fire-resistance ratings are assigned according to the time elapsed when the test is terminated. The first two end-point criteria concern containment of fire spread through the assembly, while the third concerns the structural integrity of the building. Despite this disparity, all the criteria carry equal weight in determining the assigned fire ratings.

Protected wood frame construction generally fails the ASTM E119 fire endurance test because of structural collapse (see Figure 1). Concrete and masonry structures fail on the heat transmission criterion. Such failure means that the average temperature of the unexposed side of the wall has risen 250 degrees Fahrenheit, a lower heat than often is used for cooking food. Most building construction materials and building contents will not burn at this temperature.

Other discrepancies in the fire tests include fuel consumption and furnace pressure for the tests. The furnace temperature is controlled according to the standard time-temperature curve. As a result, the amount of fuel required by the exposing fire may depend on the properties of the test specimen. If the specimen itself burns (as in wood frame construction), it contributes to the furnace temperature and reduces the amount of fuel needed to sustain the time-temperature curve. In a real building fire, then, a combustible assembly adds to the fuel load and therefore to the intensity of the fire.

If, on the other hand, the specimen absorbs heat from the furnace, as is the case with concrete and masonry, more fuel is required to maintain the required test conditions. The amount of fuel consumed during a fire test is a good indicator of the actual fire endurance of an assembly, but this factor is not recognized in assigning ratings (see Figure 2).

In real building fires, heat and gas movements create positive pressure, especially in the immediate vicinity of the fire. However, the ASTM E119 standard does not specify negative or positive furnace pressure during tests. In the United States and Canada, almost all tests are conducted with negative pressure to prevent the escape of hazardous gases into the laboratory. In Europe, however, furnaces are required to operate with more realistic positive pressure and have safety devices that force emissions out an exhaust flue. Negative pressures tend to draw cool air into the furnace (especially through cracks and gaps in wood frame construction), thus extending the endurance time of the wall or assembly. The ratings obtained using negative pressure therefore are a poor indicator of actual fire performance in a building (see Figure 3).

Noncombustible construction, compared with protected wood frame construction, controls or prevents substantial fire spread because it does not contribute fuel to the fire. In fact, it reduces the total fire load and the intensity of the fire. Noncombustible construction also provides containment; does not contribute to a fire in concealed spaces of wall, floor, or roof assemblies; maintains the structural integrity of the building to allow for safe exit of occupants and access for firefighters; and does not produce toxic gases or contribute to smoke generation. □

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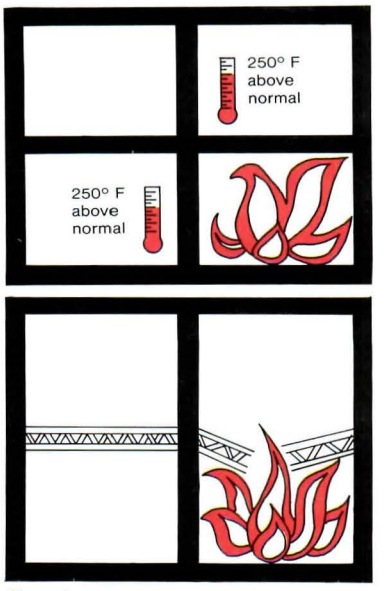

Figure 1
Disparity between rating based on heat transmission or on structural collapse

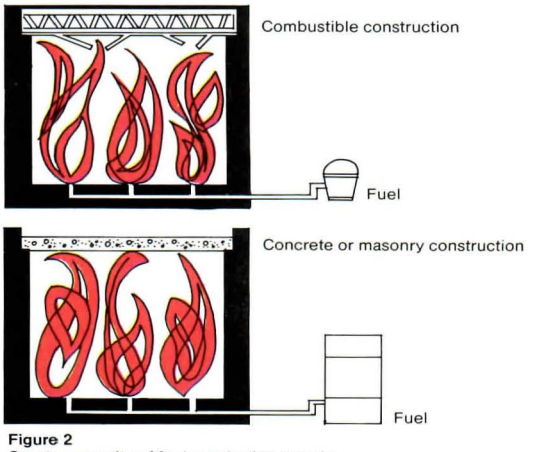

Figure 2
Greater quantity of fuel required to sustain fire for noncombustible construction

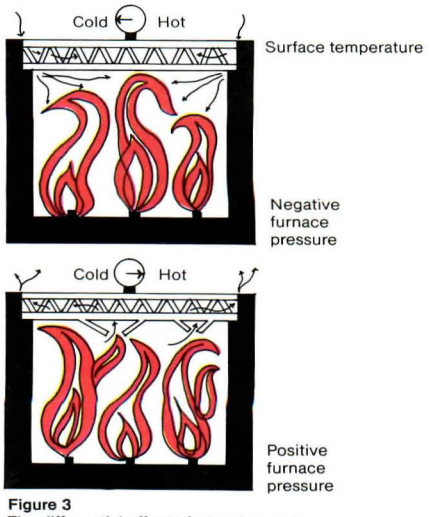

Figure 3
The differential effect of negative and positive furnace pressure on fire performance

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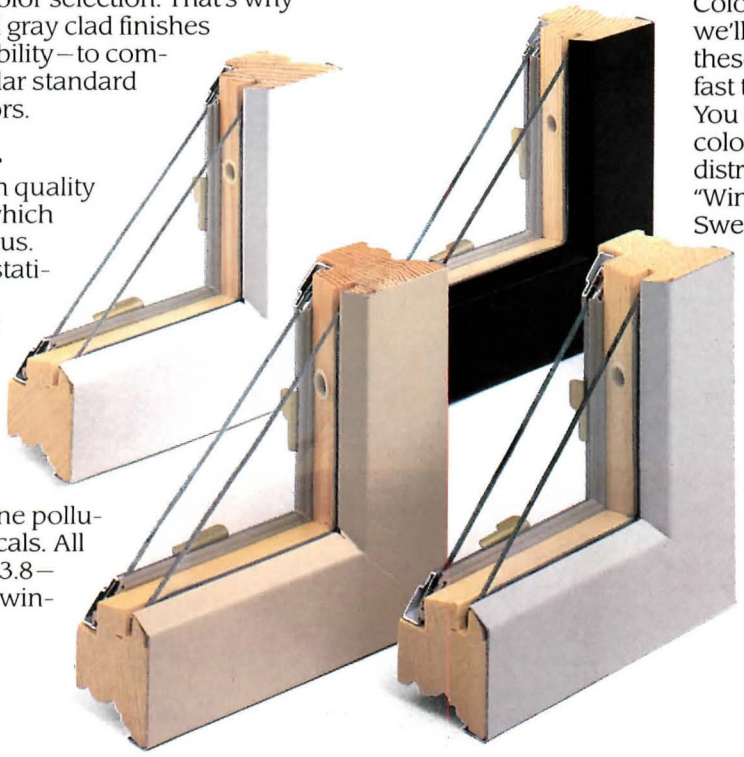

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Photo courtesy of Western Wood Products

Prefab Housing: An Update

A great deal is happening here and abroad. By Forrest Wilson

A great mass-production revolution has begun," Le Corbusier wrote in 1923 in *Vers une Architecture.* "Industry furnishes new tools to adapt to a new epoch, animated by a new spirit, that of industrialized building. The problem of the house is a problem of the epoch. We must create the mass-production house, the mass-production spirit." Le Corbusier concluded with a battle cry: "Architecture or revolution."

We have mass-produced housing, but no architectural revolution. Why mass production sent Le Corbusier into a tizzy is hard to understand, because mass production of building components has been part of every epoch. The columns of the Parthenon were mass-produced; and Socrates, as a young stonecutter, may have been one of the production workers. The great pyramid and the "House of the Governors" at Uxmal in Yucatán was built of mass-produced parts by a culture using stone tools in the 11th or 12th century. The Pilgrims cut and shaped ready-to-use house timbers from the virgin forests of the New World and sent them back on the Mayflower in 1621 to help pay for their passage.

During the 1830s, the 2x4 and the cut nail revolutionized industrialized housing in the United States. By the 1870s there were freight rates for portable buildings. An entire prefabricated town could be purchased in St. Louis—houses at $200 and civic structures at $1,000—and shipped west. Why all the fuss about mass production half a century later?

The cause of Le Corbusier's manifesto and plea for architectural control of housing perhaps may be grounded in recent history and the contemporary state of mass-produced housing. The modern housing industry and mass production in the United States were created by a bureaucracy, not a revolution, with the establishment of the Federal Housing Administration in 1930. Prior to this time, most home builders had materials delivered to the job site and cut them to size at the building. This was called "stick" construction and known as the "traditional" method of building houses. But, by 1940, 30 firms were manufacturing and selling prefabricated houses at a rate of 2,000 units a year between 1935 and 1940.

During World War II, housing manufacturers went into the demountable, emergency, minimal-on-site-labor housing business. The industry gained good experience but lost its reputation. "Jerry-built" and "cheap" became synonymous with mass-produced housing.

The demand for buildings following the war was met by increased production of housing components, pre-engineered metal buildings, and the pre-assembly of commercial building parts. Among the most notable of these efforts was the 1946 Lustrom house of Carl Strandlund, backed by the Reconstruction Finance Corp. (RFC). Strandlund was given financing and a surplus war plant. The all-metal, 1,035-square-foot house was assembled from mass-produced steel parts using automotive fabrication techniques on an assembly line that moved at 20 feet per minute. Porcelain enameled panels, glass fiber insulation, rubber gasketing, and a radiant heating system based on a plenum above the ceiling were all part of the design. The 12½-ton house was loaded on a trailer, and the parts were unloaded in sequence of erection, reported Louis Barwig. The project failed, Barwig wrote, when RFC withdrew its support in March 1950. Strandlund encountered financing, delivery, and other problems, but the idea was popular, Barwig concluded. *Architectural Forum* called it "the first real demonstration of the seductive theory that houses can be turned out like automobiles."

Immediately thereafter, the wood prefabrication industry grew rapidly from the mid-1950s to the mid-1960s. Sales of pre-engineered metal buildings tripled, and by 1967 the mobile home industry produced 250,000 units a year selling at $6,000 each. More than three-quarters of the low-cost single-family housing market was in mobile homes. Thousands of component manufacturers were making everything from trusses to tilt-ups, and a quarter of all single-family houses were prefabricated. There were nearly 600 housing manufacturers of all sizes, product lines, and

Above, triumph of the mass-produced 2x4 and cut nail in the balloon-framed house, circa 1890.

Above, mass-produced components including walls, trusses, and gable ends, stored and ready for shipment. Right, interior of U.S. component manufacturer's housing factory.

operations by the time of the memorable 1967 Battelle report, commissioned by the AFL-CIO to assess the state of mass-production house building. Most manufacturers shipped their prefabricated parts to the building site, where the parts were added to the assembly. In most instances, the value of the components represented about 20 percent of the cost of the house, Battelle estimated.

Most of the house manufacturers used an architectural plan—the same plan, repeated with minor variations. Most companies had dropped out of the low-cost housing market by this time, and those that continued tied their products to land sales. By 1967, stick building combined with components had became the "traditional" way of building.

The housing component industry received a huge boost from Ezra Ehrenkrantz's School Construction Systems Development (SCSD) program in California. His goal was to develop new products and encourage manufacturers to work together to create "systems." SCSD guaranteed a product market. The plan worked. Speaking recently about the SCSD program, Ehrenkrantz said that at least 5,000 buildings were built with SCSD components, including schools, hospitals, warehouses, and office buildings.

Another major landmark in the housing component industry was Operation Breakthrough, launched shortly after the Battelle report appeared. It was a competition to find the most promising approaches to industrialized housing. The winners were to be subsidized to develop and build model units on a series of selected sites aross the country. The sites would serve as experiments in design, and the most successful would become the basis for volume production. Hundreds of organizations were represented at the first bidders' meeting, and more than 200 full systems were submitted for evaluation. In all the submissions—full, partial, and market aggregation schemes—totaled more than 600. Twenty-two systems were selected, as were sites, site planners, sponsors, construction managers, and developers.

In practice, however, the power of the federal government to overcome the obstacles to industrialized building was weaker than expected, according to Richard Bender in his book on industrialized building, *A Crack in the Rear View Mirror.* State and local governments were less interested than anticipated. Most of the systems selected were not particularly innovative, and those that were retreated under the pressures of meeting the program milestones. Costs rose and budgets were cut during the economic slump of the early 1970s, and the number of units to be built was reduced. Some of the consortiums collapsed.

The housing industry today

Don Carlson, editor and publisher of *Automated Builder* magazine, divides the housing industry into five segments: production builders, component manufacturers, panelizers, mobile home builders, and modular home builders. A little over half the housing units built today are by production builders incorporating factory-manufactured components to a greater or lesser degree. For instance, 95 percent use prefabricated roof trusses, and 65 percent use parallel-chord floor trusses, Carlson says.

Component manufacturers make wall panels, roof and floor trusses, gable ends, doors, windows, and other parts. They use highly sophisticated, capital-intensive machinery. Roof trusses are engineered for span, wind load, snow load, live load, and dead load for the specific area in which the units will be built. During the past five years, the number of builders using machine-stress graded lumber has doubled.

Panelizers do "custom" housing and comprise about one-quarter of the housing industry. The remainder do completed units, about 17 percent building mobile homes and the rest "modular" homes. The latter's "cheap" image is gone; modular construction is advertised for "luxury" condominiums.

For all these types of prefabricated housing, computers have played an extensive role over the past 20 years. An operator in Peoria can punch in a parts list from drawings that will instruct a wall-panel machine in California to produce finished walls for a three-bedroom house and have them completed in three hours. In component manufacturing, high-speed plotters largely have replaced drafters.

According to the latest figures, all segments of the U.S. housing industry declined in 1988, with the exception of modular homes, which rose 17 percent. About 100,000 modular and 272,000 mobile homes were built. Panelized builders did 653,000 homes and site-built builders did 820,000. There are now 2,000 component manufacturers where none existed before 1952, says Carlson, and they will do anything from start to finish.

Right, Japanese version of the stick-built house (Japan).

Housing industrialization also has spilled over to the "commercial end." There are special unit manufacturers that make everything but housing. They do banks, savings and loans, hospitals, and schools. One such firm in Texas inventories rooms for 1,000 kids, says Carlson. A school principal can call this firm just before school opens and can have the rooms delivered the next day anywhere within a 600-mile radius (as long at it's in Texas).

Controversy exists over whether the housing industries of other countries can serve as role models for this country. A few years ago, the U.S. housing industry appeared mightily impressed by the accomplishments of five or six giant Japanese firms (see Oct. 1986, page 94). Although these firms comprised only about 12 percent of the housing market then (the share has risen to about 20 percent today), they were heralded as the wave of the future. The Japanese conceive of housing as a consumer product and market four or five basic models. New models are marketed when the appeal of the old appears to wane, as with refrigerators, toasters, and dune buggies.

Another fascinating example is Sweden, which appears to be the nation most advanced in the quality production of factory housing (see Oct. 1986, page 98). More than 90 percent of Swedish single-family houses now are assembled from factory-built elements, up from 40 to 45 percent in the mid-1970s. Predictions have it that on-site building in Sweden will disappear well before the end of this century.

It is questionable, however, whether either the Japanese or the Swedish system would work in the United States. Ehrenkrantz believes that the important social agendas of homelessness and the difficulties of first-time home buyers are not recognized or agreed upon in public policy in this country. And, without the right political environment, nothing happens. Part of the problem is that during the last seven or eight years the Federal Reserve has manipulated interest rates and money supply for economic goals, and the construction industry, which accounts for 7 to 10 percent of the gross national product, has been squeezed with interest rates. Squeezing it or allowing it to expand affects the other 90 percent of the GNP. The construction industry cannot plan or invest capital for what architects do, and there is little investment in innovation. Consequently, there are fewer people making precast concrete and fewer steel fabricators today than there were 20 years ago. Materials selection is reduced, and there is very little ongoing research and design.

"I predict Japan will invade the American housing industry, take it over, and do so without question," says Ehrenkrantz. "They cannot fail if we continue as we are. The Japanese must have a place to put their capital. Their banks are now the biggest in the world and their interest rates are lower than ours."

Five years ago, Carlson would have agreed with Ehrenkrantz, but he thinks differently today. The yen has soared in value; the dollar has dropped. Instead of their coming here, we will send houses to them, he says. We can build a panelized house in this country and ship it to Japan more cheaply than the Japanese can make it. The economics have to be right but are totally in Japan's favor.

We are going to have to think in terms of global markets, says Carlson. In 1992, just three years from now, the European Common Market will abolish all its trade boundaries. We should think about doing the same thing on this continent, possibly erasing the Canadian and Mexican borders. The new union could be a formidable competitor.

Photo courtesy of Western Wood Products

What's a consumer to do?

With U.S. housing policy in its current state of flux, what part can consumers play in garnering affordable housing for themselves? Carlson says that without question the consumer should discover the component industry. He or she could take drawings to the component manufacturer and order parts. The component manufacturer could erect the shell in a few days, even one day. Work on the job site could be cut to less than a week, and the cost of interest on the construction loan (always one to two points above prime rate) would be eliminated. A house now can be built in less time than it takes the bank to do the paperwork on a home mortgage loan. Some modular builders, knowing it takes six weeks for a mortgage loan to be approved, do not start manufacture until two weeks before the loan is to be signed, and they still meet their deadline, he says.

Others advocate self-help projects. Ehrenkrantz, the architect of the SCSD system, says that self-help housing can indeed be done. "In 1968, we did a housing project in St. Louis working with corporations and aggregated a large market," he says. "Labor unions worked with both the black and white community. With systems building, we could put up a house in a single day, and the price was 20 percent below housing allowances for public housing. They had said, 'We cannot solve the problem—if you

Above, an effective system of automated mass-produced housing is alive and well in America. It is based on mass-produced components fastened with nailing plates and delivered on specially designed trailers large enough to hold an entire house that can be assembled in a single day (below).

Below, the computer has almost totally replaced drafters in the industrialized housing industry.

do, you can have the work.' We solved it, and they killed the project—they did not want it solved.

"In the 1960s," he continues, "11 or 12 percent of housing was self-help. These were big numbers. We studied 27 projects and developed an efficiency factor. We analyzed every task and made a comparison between what an able-bodied, unskilled person could do in relation to a skilled person, in terms of hours and efficiency. It might take 2 to 3 hours for the unskilled where it would take one for the skilled. The worst ratio was 52 hours to one in the 'setting out' of the house. We called 2-to-1 the 'John Henry factor.' We then found how much time people could put in on the work, and we could determine from this how many hours could be put on the job profitably. Then [George] Romney came to HUD, and all the money that was to go to self-help housing was put into Operation Breakthrough instead. The society was not ready."

John Steffian, dean of the school of architecture at the University of Maryland, says there is an underground industry in self-built housing that has been a tradition since before it was called self-built housing, and it still lives. But Steffian also believes that the housing industry as a whole, with its tendency toward increased industrialization, is doing nothing to further self-help building. He says that in this country the stumbling blocks include the high cost of land and an economy that won't allow potential self-builders to take the necessary time away from a job.

Steffian also objects to the societal stumbling blocks for consumers that are generated by the housing industry. What real estate people now are promoting—a "starter house" to be sold when it gets too small, followed by another to be bought while raising a family and then sold so the owner can move into a retirement village—is a marketing concept that benefits only salespeople, he says. The life cycles of buildings and families must match, and houses must be capable of accommodating three or four generations if neighborhoods are to flourish. "When you make houses like appliances and discard them like toasters," Steffian says, "the community goes out with the trash."

Steve Kendall, a professor at Catholic University in Washington, D.C., says that innovation is governed by who controls, and therefore can change, the design stages of the components and assemblies. If the elements of housing construction are small, cheap, and generalized, they are within the economic grasp of many, including homeowners.

Kendall cites an example of a building technology that distributes control widely at all stages and over time: light, 2x4 framing, which originated in the United States in the 1830s. It allows building by skilled crews and repair by the homeowner. It was not invented by private industry or government. It can accommodate a diverse group of participants and a rapidly growing and changing market, and it has allowed technical innovation from independent sources to act upon it, Kendall says. It cannot be dominated by professional interests and has accommodated significant changes without requiring basic change in the construction method. For 150 years there has been prefabrication using elements of the 2x4 system, including whole houses, panels, precut framing members, and other assemblies.

Few construction methods are capable of generating this broad an application, nor are many building strategies able to accommodate participation by so many independent parties, says Kendall. In this sense, he adds, the 2x4 system is "arguably the most advanced and complex industrially produced system for building houses in the world."

Le Corbusier, where were you when we needed you in 1830? □

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Radiant Floor Heating Warms Up

As better systems and materials become available. By Alex Wilson

Radiant floor heating has had a mixed history. After a glamorous beginning with the ancient Roman baths—where flue gases from wood furnaces were ducted under stone floors—widespread use of radiant floor heat had to await development of concrete floor slabs and durable piping. In the 1940s and '50s, radiant floor heating gained a fairly large following, first with iron pipe and then with copper embedded in floor slabs.

Frank Lloyd Wright was among the earliest proponents of the technology and used it as his heating system of choice in many buildings during the 1940s and '50s. Wright first encountered radiant subfloor heating in the home of a Japanese baron and subsequently used it beneath the bathroom floors of the Imperial Hotel. "The indescribable comfort of being warmed from below was a discovery. . . . All ugly electric heat fixtures (dangerous too in a bathroom) were eliminated," he wrote. "No heating was visible nor was it felt directly as such. It was really a matter *not of heating at all* but an affair of *climate.*" Wright brought the concept back home and incorporated subfloor heating in many of his Usonian houses.

Unfortunately, the systems seldom worked well. The quality of components used for these systems was not as high as the enthusiasm of their users. After a few years of use—usually no more than 10 to 20—most failed miserably. Iron pipe rusted out. Copper pipe was eaten away by sulfites in the concrete. Furthermore, because energy efficiency standards were so low at the time, uncomfortably high floor temperatures were required to deliver the needed amount of heat. Systems were shut down and sealed off and replaced by conventional methods of heating, such as hot air radiators or baseboard hydronic heating systems.

Now the concept is coming back. In this country radiant floor heating is regaining popularity rapidly for both residential and commercial buildings. While many heating contractors and architects, especially those who have been around for a while, are understandably gun-shy, more and more are realizing the potential offered: enhanced comfort for building occupants; elimination of exposed heating pipes, ducts, and registers; even lower energy use.

Fortunately, this time around there are better materials available. Radiant floor heating systems put in today should still be working well 50 years from now. Components that are most likely to wear out are accessible and easily replaced. Indeed, European countries have a well-established radiant floor heating industry and a solid 15 years of experience with new materials—we can learn from their successes and mistakes as the industry takes off in the United States.

The growing popularity of radiant floor heating can be attributed to several features of the systems. First and foremost is comfort. With the entire floor turned into the heating system, the heating density (number of Btus per square foot) can be kept quite low and still provide the required number of Btus to heat the space. With a large radiator surface area just a few degrees warmer than room temperature, almost all the heat will be delivered by radiation. In typical hydronic baseboard radiators, by contrast, the temperature of the heating element is much higher (typically 160 to 180 degrees Fahrenheit), and convection takes over as the primary means of heat distribution.

Radiant heat is more comfortable than convective heat for a number of reasons. First, the mean radiant temperature is kept higher, reducing radiant heat loss from occupants. Second, the

Mr. Wilson is a technical writer in Brattleboro, Vt., whose most recent article in Architecture *focused on radon.*

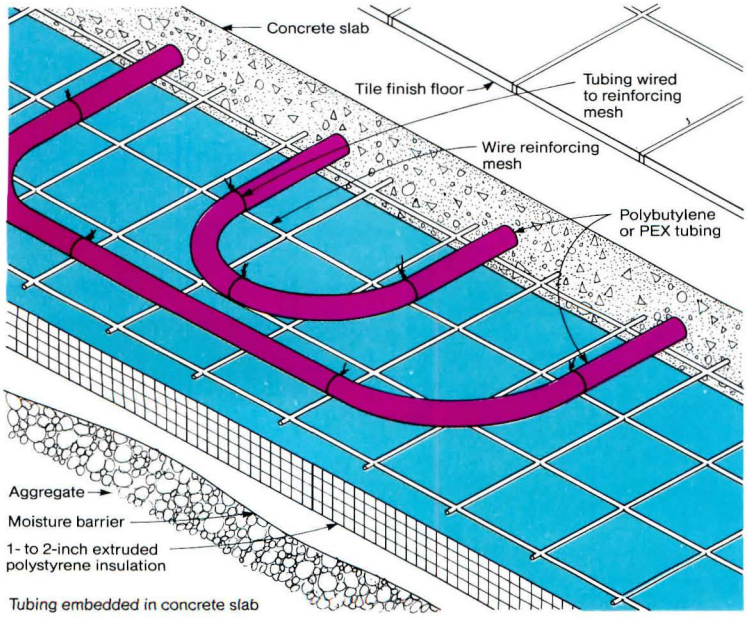


Figure 1

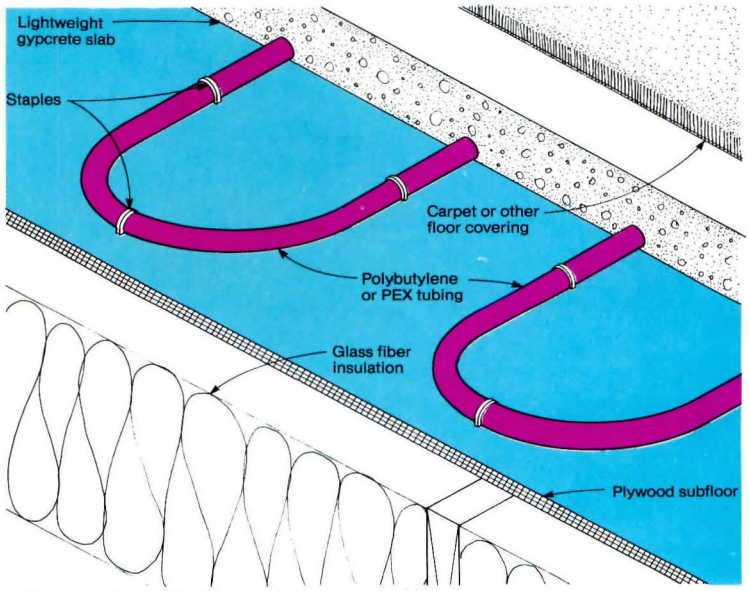


Figure 2

floor is the warmest part of the room, keeping occupants' feet warm. Warm feet convey a greater overall sense of comfort, according to physiologists. Third, radiant heat does not contribute to convection currents and the resultant temperature stratification that is common in most buildings. With fewer convection currents, there will be fewer drafts. The net result for building occupants is greater comfort, even at lower air temperatures.

Because air temperatures actually can be kept lower in a building with radiant floor heat, while maintaining adequate levels of comfort, the building owner can realize energy savings as high as 20 to 30 percent compared with forced hot air heat, or 5 to 15 percent over conventional baseboard hydronic heat, according to one firm specializing in radiant floor heating.

Another feature of radiant floor heating systems, the one that attracted Frank Lloyd Wright to the technology, is that the heating system is out of the way. There are no ducts, heating registers, or baseboard heaters to take into account when planning interior design and layout.

Radiant floor heating is most common today with slab-on-grade buildings (though, as we will see below, these systems are not limited to concrete slabs). In the United States, slightly more than 50 percent of new houses built in 1983 used slab-on-grade construction, according to the Bureau of the Census; and the percentage has risen steadily since the mid-'70s. Regionally, however, there are dramatic differences in foundation types. Slabs are far more common in Southern states, than they are in Northern states.

Small commercial buildings also can make good use of in-slab radiant floor heating. Maintenance garages are ideal candidates. With trucks driving in and out and the resultant intermittent large-volume air exchange, these buildings are very difficult to heat with hot air systems. Radiant floor heating systems work by circulating warm water through tubing in the floor. There are a number of different types of radiant floor systems, depending on how the tubing is integrated into the floor system. Most common is a concrete slab with tubing embedded in it, as shown in Figure 1. Before the slab is poured, tubing is tied to the reinforcing wire mesh in a serpentine pattern. In cold climates the full slab usually is insulated underneath with extruded polystyrene (one or two inches) to minimize heat loss through the underside of the slab.

Radiant floor heating systems are not limited to full concrete slabs, however. Thin radiant slabs made of lightweight gypsum concrete, as shown in Figure 2, are becoming almost as common. Slabs as thin as 1¼ inches are poured directly on wood subfloors to which the tubing has been clamped. These thin slabs add only about 15 pounds per square foot to the dead load of the floor and are suitably flexible to withstand some deflection. Some manufacturers recommend that the subfloor onto which the thin slab is to be poured should meet or exceed L/360 deflection standards.

While the heat delivery from radiant slabs is most effective with a masonry finish floor, such as slate or tile, other floor coverings such as vinyl, wood, and carpeting can be used as well. There are a number of laminated wood flooring products on the market designed specifically for use over slabs, but expansion and contraction make some wood flooring systems inappropriate for heated slabs. Humidity from the slab also can be a problem if the slab is not properly designed and poured.

The finished floor surface should be taken into account when the radiant floor heating system is being designed and sized to ensure that heat delivery will be adequate. Table 1 shows the insulating values of a number of common floor coverings. If one room in a building is to have a thick pile carpet and the others tile, the radiant slab should account for the differences to prevent the carpeted room from being colder than the others.

Finally, radiant floor heating systems can be installed even without a slab. There are two different ways to accomplish radiant floor heating with wood floors. As shown in Figure 3, the tubing can be attached to the underside of the subfloor, either by itself or with special aluminum radiating fins. An air space is provided below the tubing, and foil-faced insulation is installed below that. Because the heat must be conducted upward through both the subfloor and finish floor, as well as any floor covering, the heating effectiveness is lower, and higher-temperature water usually must be circulated through the tubing.

Another alternative with wood floors, shown in Figure 4, is to lay the tubing on top of the subfloor between sleepers (again, with or without radiating fins) and install the finish floor on

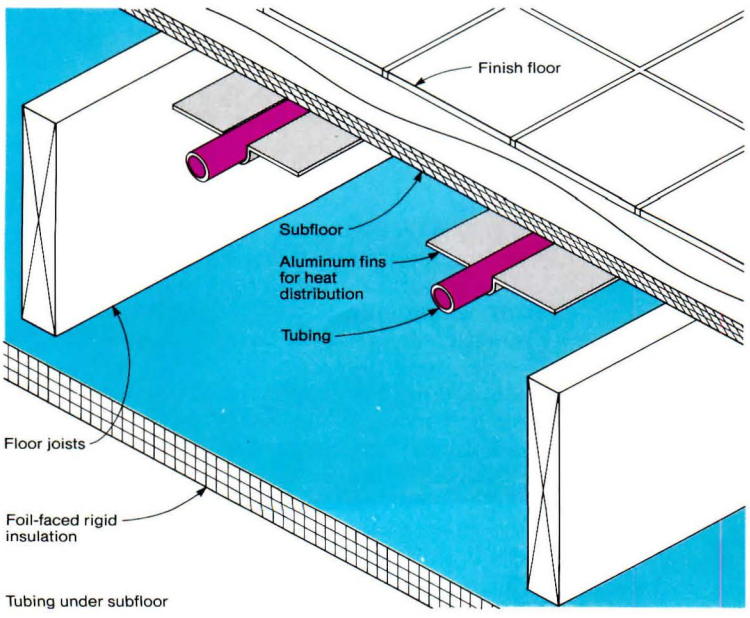


Figure 3

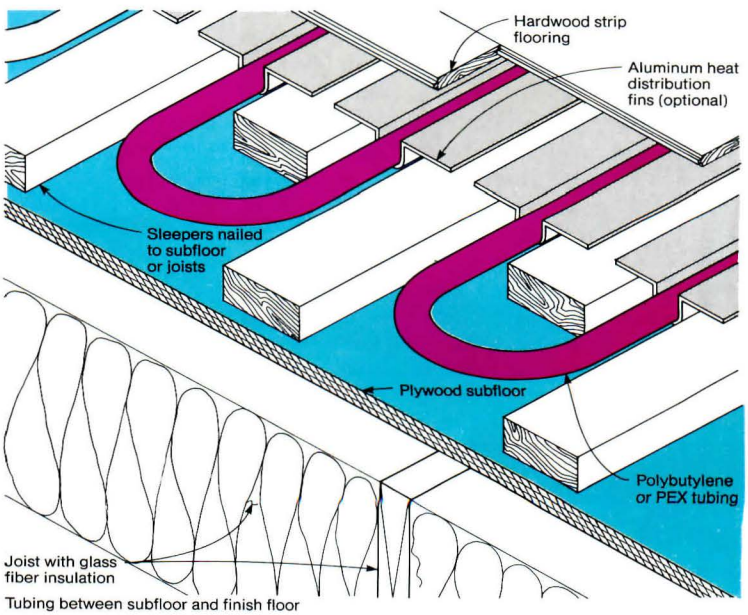
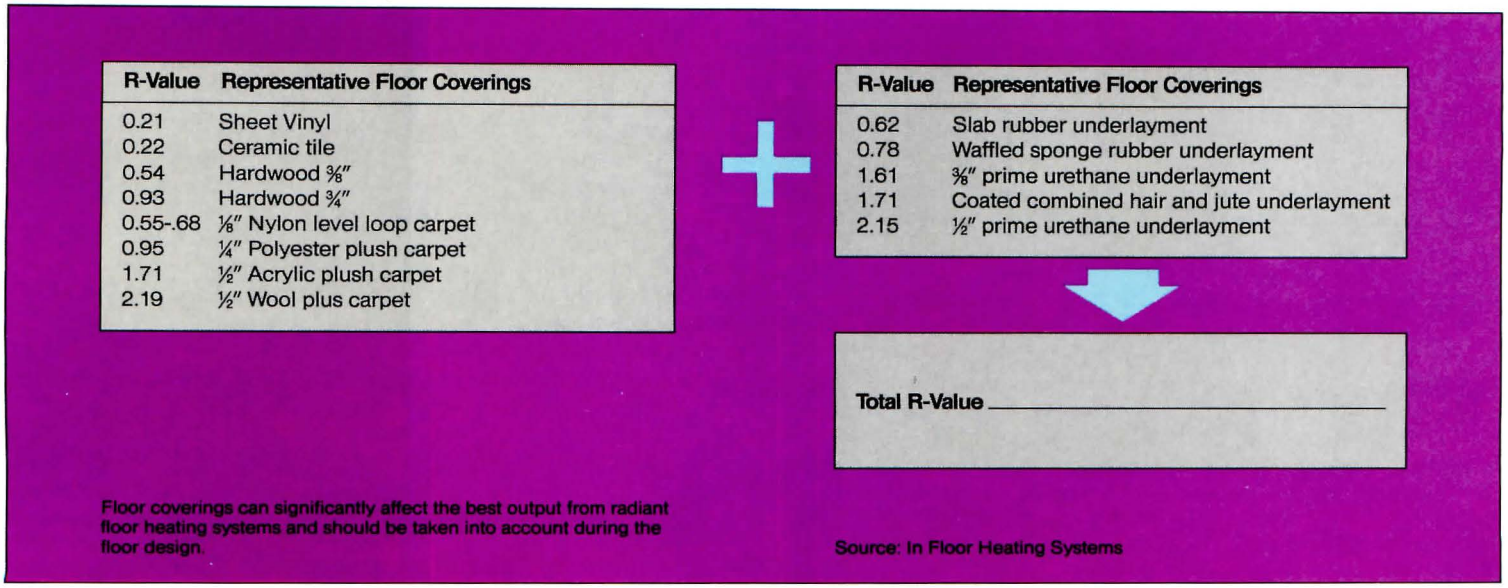


Figure 4

R-Values of various floor coverings



top of the sleepers. The joists should be insulated below, but an air space and radiant barrier are not required. With this system, there is not as much wood for the heat to be conducted through, so it will work more effectively than the other wood floor option described, but still it generally will require a higher temperature for the circulating water than will the in-slab radiant floor systems described. Again, aluminum fins can be used to help distribute heat from the tubing.

There are three types of tubing being used in radiant floor heating systems: polybutylene, cross-linked polyethylene with oxygen diffusion barrier (PEX), and rubber. Polybutylene, the least expensive, is widely used in Europe and the United States for radiant slabs, and the major U.S. manufacturer recently extended its warranty to 25 years for tubing used in its systems.

Cross-linked polyethylene generally is considered a better tubing for radiant floor heating systems, but it is quite a bit more expensive, in large part because it is imported from several manufacturers in Europe (one of which is expected to open an American plant soon). The most commonly expressed benefit of PEX tubing over polybutylene, though probably not the most important, is that it is impermeable to oxygen diffusion, while polybutylene is not. The claim by PEX proponents is that oxygen can diffuse through other tubings and corrode the boiler and fittings of the heating system.

Other radiant floor heating experts, however, such as Denny Adelman of Exotech Design Inc. of Newport, R.I., which sells both PEX and polybutylene tubing, disagree with the oxygen diffusion argument. Adelman, who also publishes a newsletter on radiant hydronic heating, "The New Hydronics News," says that more oxygen will get into a boiler through pipe fittings and air vents than through the tubing and that all radiant floor heating systems should include corrosion inhibitors in the circulating water and an oxygen "resorber" to eliminate oxygen from the system. The more significant benefits to PEX tubing are its greater strength, resistance to crimping, and better long-term durability.

At least one manufacturer offers double-walled rubber tubing (hose) for radiant floor heating systems. The system tubing has a unique supply and return line connection to simplify tubing layout and ensure even heat delivery. EPDM rubber multitube mat also is used for radiant floors. Because of the narrow-diameter tubing and a much higher rate of oxygen diffusion, however, the product is considered less appropriate than the other tubings described.

Radiant floor heating systems are very different from conventional hydronic heating systems. With radiant slabs, in particular, there is a quite long lag time between when heat is provided to the slab and when the room is warmed. In addition, radiant slabs operate with a lower water temperature than conventional hydronic heating systems. The control system must take this into account, both in regulating the flow of water through the floor and in controlling the water temperature.

An interesting feature of radiant floor heating systems is that, even though they respond slowly to a rise in the thermostat setting, they respond very quickly to a drop in air temperature. In a maintenance garage, for example, when a door left open lowers the air temperature, heat output from the slab increases immediately and can very quickly restore comfort.

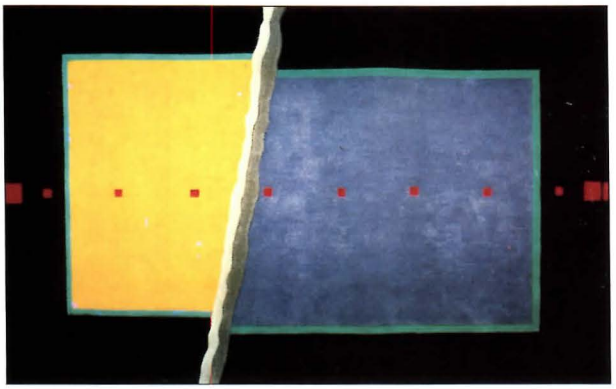
Radiant floor heating systems require lower-temperature water than most boilers produce. To deliver water of the proper temperature, motorized mixing valves or thermo-mechanical tempering valves usually are included in the control system. In addition, boiler temperature may be regulated with a modulating aquastat that gauges the outside temperature and sets the boiler temperature accordingly. It is important to note that some boilers will not operate well with radiant floor heating; therefore, the boiler always should be specified at the same time as the radiant floor system to ensure proper operation.

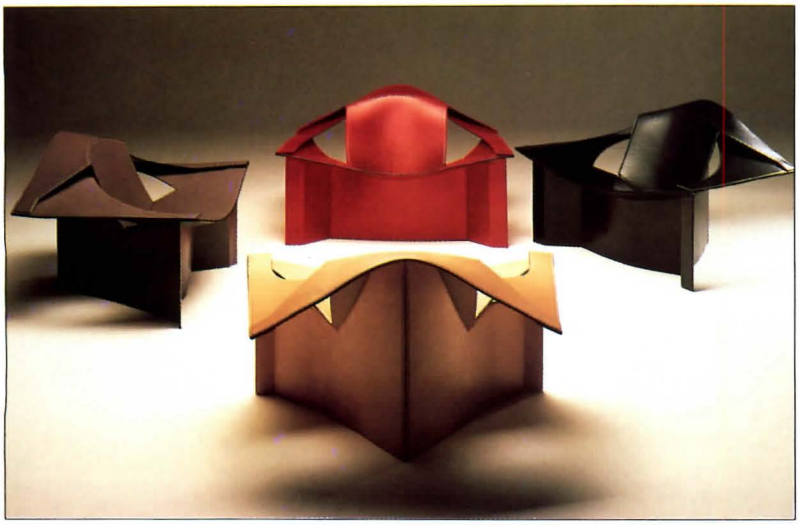
Zoning generally is accomplished with advanced European manifolds, which outperform conventional American zoning equipment considerably. A West German firm, with a North American plant in British Columbia, is a leading supplier of advanced control and zoning systems for radiant floor systems.

As for heat transfer fluid, a high-quality propylene glycol antifreeze with corrosion inhibitors generally is recommended, at least in northern climates. While tubing usually will not be damaged by freezing, frozen tubing can cause the concrete to crack. □

PRODUCTS

Award-Winning Rug
The Mood Swing rug, right, is a dramatic, off-center rectangular design that won second prize at last year's 10th annual Edward Fields/ASID Rug Design Competition in Washington, D.C. Celeste G. Oxford designed the 100 percent New Zealand virgin wool rug.
Edward Fields Inc.
Circle 402 on information card



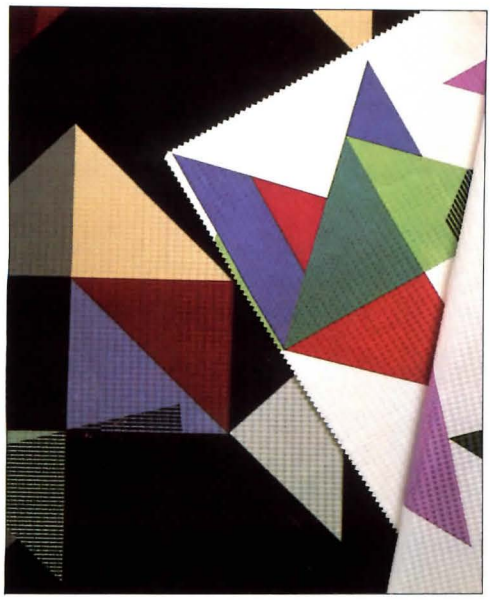


Leather Armchair
The Equity Eq 4, above, designed by Jacques H. Pollard in 1987 for Matteograssi S.p.A., is covered entirely in coach hide and has a folding seat and base. Its anatomical form is held in place by tension created when the seat is opened. The chair is available in a variety of colors.
Matteograssi S.p.A.
Circle 401 on information card

Utility Sink
The Alape triple-bowled kitchen sink from Epic Inc., right, is designed to accept either a two-handle or center-mount kitchen faucet. Alape comes in an array of standard colors and faucet configurations and has individually designed optional accessories, such as chopping boards and sink baskets.
Epic Inc.
Circle 404 on information card

Minimal Slender Up-light
The Cirrus wall sconce, above, is designed by Ron Rezek for Artemide Inc. The cast aluminum wall-mount fixture comes in white or custom colors, gold leaf, silver leaf, or brushed aluminum. The sconce measures 4x36x7 inches. Cirrus is available in either incandescent, fluorescent, or halogen lamps. Standard incandescent bulbs are not included in the order.
Artemide Inc.
Circle 403 on information card

Products is written by Amy Gray Light



Contemporary Fabric Design
Jab, the European Collection, introduces Evori, a 100 percent cotton fabric in a vivid geometric design based on a series of triangles that makes a crisp visual statement. Available in three colorways, Evori comes 55 inches wide with a repeat of 35 inches and is offered through Stroheim & Romann Inc.
Stroheim & Romann Inc.
Circle 405 on information card

Oak Office Furniture
A new line of oak furniture designed for drafting offices is available from Plan Hold Corp. Called the Oak Collection, the line includes a four-post drafting table, flat drawer files, taborets, and storage units. Drafting tables and flat files have steel drawers, and tables are available in three sizes, whereas the five-drawer flat files come in three sizes, with matching bases and caps. Taborets are available with either two or three drawers.
Plan Hold Corporation
Circle 406 on information card

Clear, Flexible Scales and Rulers
See-through scales produced on flexible, 0.18 mm-thick, clear film are available in many scales, including inches and picas, in lengths of up to 48 inches and in a variety of widths. These new film scales are suggested when it is necessary for the surface being measured to be viewed, or for measuring curved and irregularly shaped objects. The scales may be fastened or glued to a work surface or other area. Since the scales are flexible, they will measure curved surfaces and circumferences without cracking or tearing. Measurements may be read off the edge of the scale or taken through the scale.
Gaebel Enterprises Inc.
Circle 407 on information card

Automatic Sliding-Door Sensor
A new motion/presence detection system for sliding doors, designed to be unaffected by ambient light, metal floors, sound, and radio waves, has been introduced by Besam Inc. and will be shipped with every automatic sliding door from the company in 1989.

The Eye Cue System monitors the entire entrance area inside and outside a door by means of an active infrared technology that senses both presence and motion and positively identifies plastic or metal shopping carts, luggage carriers, and other poorly reflective objects. Other distinguishing features of the system include a larger pattern size recognizing approach traffic early on; artificial intelligence that differentiates and adjusts to changes in surroundings such as weather conditions, movement of merchandise displays, placement of mats, and so on; and a patented circuit operation that will hold doors in an open position if the motion detector becomes inoperative.
Besam Inc.
Circle 408 on information card

Office Security System
Yale Security Inc.'s Yaletronics Cardcode electronic locking system for commercial and industrial facilities offers the flexibility to program locks for normal

and high-security operation, with each lock capable of recognizing up to 150 magnetically encoded cards.

Cardcode provides each system with a programming card, a master voiding card, and an inventory control system for employee and executive card pairs. Among the advantages of the system are the ability to control access to high-security areas, the flexibility to program the system to suit a business's particular needs, and the option, through a hand-held interrogator, to determine which individual cards have been used on any individual lock. A microcomputer controls the system, which operates both commercial-grade steel-case mortise locks and heavy-duty cylindrical locks, with the standard Cardcode system featuring the mortise lock with ¾-inch dead-locking latch bolt and one-inch dead bolt. Each lock is self-contained, requiring little or no wiring.
Yale Security Inc.
Circle 409 on information card

Door Handles Catalogue
A wide variety of Union door handles available from Nichimen America Inc., including custom-made designs in a range of materials and finishes, are shown in a 39-page, color brochure.
Nichimen America Inc.
Circle 410 on information card

Lotus Chair
Kusch USA introduces the Lotus Chair (above), a stacking chair that uses a new forming technology that combines a steel frame with a molded wooden back for flexible support. The molding system shapes veneer fibers into a curvilinear form to create the flowing back support. The chair is available in a wide range of aniline dyes, wood-tone stains, powder coats, and chrome finishes.
Kusch USA
Circle 411 on information card

Lombardo's Ambient Light
Flos Inc.'s AeTo ambient floor lamp, created by Italian architect Fabio Lombardo, provides easily focused direct and diffused light for contract and residential applications.

AeTo features a pointed-edge, oval reflector that angles back and forth on a 72-inch stem. A reflectorized dichroic coating is used for the diffuser. The metal lamp stem is set into a weighted base, which houses an adjustable dimmer switch. The reflector support and stem are aluminum with a baked enamel finish.

AeTo is available in metallic blue, black, or silver and uses a 400-watt halogen lamp. A companion wall sconce is available in the same finishes.
Flos Incorporated
Circle 412 on information card

Colors Added to Vinyl Flooring Line
Armstrong World Industries has added five colors to its Medintech line of commercial sheet flooring, bringing the color choices to 11 for the homogeneous, nonlayered, vinyl sheet flooring. The new colors are called opal, carnation, sky, wintergreen, and lava. All the colors are designed so that they can be used together to create interesting patterns and combinations. By specifying different colors for the flooring and heat welding rod, designers can use the seams as design elements. The flooring has the look of subtly textured terrazzo or granite and is intended for use in areas where cleanliness is a primary concern. The floor's seams can be heat-

continued on page 137

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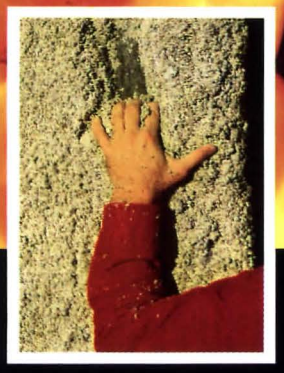
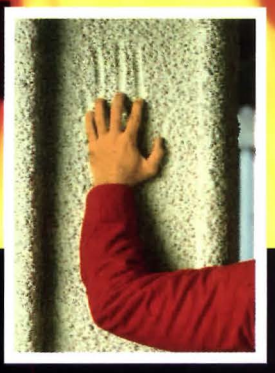


Mineral Wool
Sprayed Fiber



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GRACE
Construction Products

Circle 51 on information card

Products *from page 135*
welded or chemically bonded to help seal out dirt and moisture. In addition to welding or bonding for cleanliness, Medintech can be flash-coved, or run four to six inches up the wall, to eliminate the crevice where the floor and wall meet.
Armstrong World Industries Inc.
Circle 413 on information card

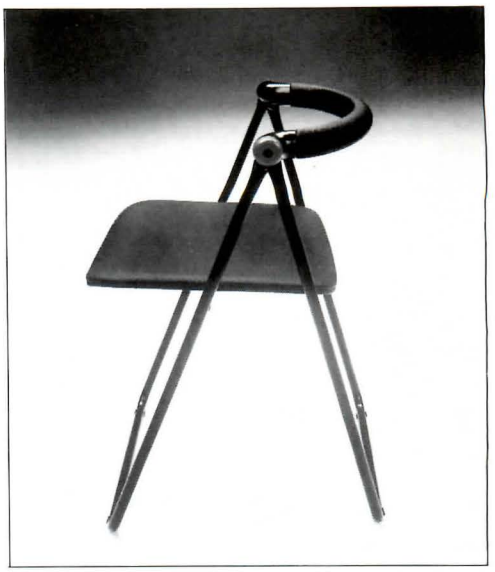
Set and Level Bathroom Fixture Strips
The Secur-Strip is a self-adhesive, flexible plastic strip used to compensate for uneven floor/wall surfaces in setting and leveling bathroom fixtures. The toothed edge of the strip lets the user mold it into any desired shape for attaching it 1/16 inch from the outer edge of the fixture.

It is then cut with a pair of scissors. The flexible strip withstands pressure when the fixture is leveled, and it helps eliminate chipping and grinding. Secur-Strip also provides a sealed surface that repels bacteria. Joints then are sealed. Each strip is approximately 20 inches long.
Bojsen International
Circle 414 on information card

Fireproofing for High-Abuse Areas
Isolatek International Corp. markets three high-density fireproofing products for exposed structural steel that provide protection up to three times greater than standard, concealed, spray-applied fireproofing, according to the manufacturer.

Cafco Deck-Shield 460, 560, and 800 fireproofing products are formulated for unconcealed areas prone to excessive mechanical abuse. All three products have been UL-tested and classified to meet required fire ratings of up to four hours. The products are asbestos-free.

Cafco Deck-Shield 460 is a spray-applied fireproofing substance recommended for areas such as building mechanical rooms and loading docks. This product also is designed to provide good thermal insulation and acoustic control. Cafco 560 fireproofing is a cementitious material for structures requiring a hard surface, such as industrial facilities, power generating facilities, warehouses, and parking garages. It can be either spray- or trowel-applied. The highest-density, toughest fireproofing product is Cafco 800. This material is formulated to withstand severe physical conditions. Suitable for exterior use, Cafco 800 is designed to meet the performance requirements of industrial, nuclear power generating, and offshore marine environments. Cafco 800 has been tested in accordance with UL 1709, to provide high-intensity fire protection, and UL 263, for standard fire resistance.
Isolatek International Corporation
Circle 415 on information card



New Contract Chairs
G.E. International has opened a new showroom in New York City, showcasing contract seating for the architect, designer, and specifier. The manufacturer offers chairs from manufacturers around the world, such as the folding chair above, that reflect a variety of styles, needs, and specific uses for contemporary interiors.
G.E. International Inc.
Circle 416 on information card
Products continued on page 139

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Modular Furniture Additions
Harden Furniture introduced at the Neocon 21 show in Chicago its new full-length hutch and corner connecting units, which can be incorporated into the company's modular systems.

These adaptations can be used alone or with the flipper door or three-quarter door units. The corner unit was designed to enable the system to form an inside corner as well as to create a unified look. Doors are offered in 20- or 30-inch units to fit within the modular system. All furniture is constructed of solid cherry wood. Most configurations can be designed for computer support.
Harden Furniture
Circle 417 on information card

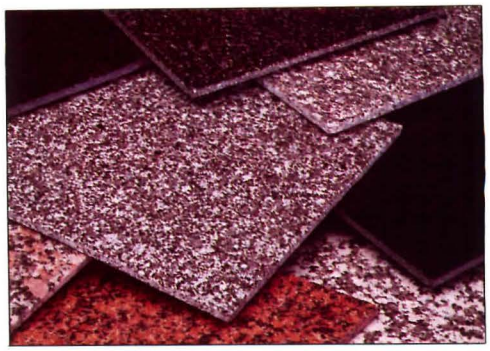
Cosmos Bath Fittings Catalogue
A complete collection of Edition Cosmos bath fixtures, faucets, and accessories from Dornbracht is shown and described in a 12-page, color catalogue. All fixtures are available in chrome, white, red, and Durabrass, the manufacturer's exclusive no-polish, no-tarnish brass finish.
Santile International Corp. of Houston
Circle 418 on information card

Indirect Lighting System
Progress Lighting's 12-volt Hide-A-Lite System provides warm, indirect, uniform illumination and soft task lighting for work surfaces. The light sources are only ¾ inch deep, so they can be installed in places where other lights will not fit and can illuminate straight or contoured runs, around angles, or around curved corners.

Hide-A-Lite covered strips are available in six lengths. Each aluminum socket strip and cover is ¾ inch deep and 1¾ inches wide. The protective cover is installed with push-on nylon cap nuts. The strips come complete with five-watt, wedge-base lamps. They are designed for installation under framed or frameless cabinets and under shelves.

Open-face strips are 48 inches long and measure ¾ inch wide. These aluminum strips come with three- or five-watt, wedge-base lamps. These strips are suggested for concealed straight run installations in valances, coves, cabinet interiors, and toe-spaces.

Flexi-strips for angles and curves are flexible, open-face strips with three moveable sections that pivot independently and can be field cut if shorter lengths are desired. The strips will carry the run of lights through tight inside or outside curves down to a radius of six inches and angles as small as 23 degrees.
Progress Lighting
Circle 419 on information card



Granite Tile
Stonetile Inc., the new U.S. office of one of Australia's largest granite tile manufacturers, is now distributing tiles made in Australia from granites found only in that country. The natural stone (above) is cut with diamond saws and finished with highly polished, etched, or flamed surfaces. Tile sizes for etched or flamed styles are 12 inches square in two thicknesses. Ten different colors are currently being produced.
Stonetile Inc.
Circle 420 on information card

Transom Windows
Transom windows of vinyl-clad wood from Andersen Corp. come fully assembled and with Low-E glazing. The stationary units
continued on page 141

What's behind every Fry molding?

Fry representative consults on site of Library Tower project, Los Angeles, California. I.M. Pei & Partners, Design Architect. Ellerbe Becket, Executive Architect.

Our people. You'll find them behi every Fry architectural molding. From product selection to installation and beyond, Fry is there with you throughout the entire design/build process.

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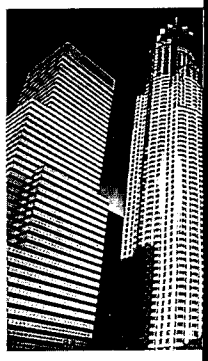
Our team of product specialists. Fry is eager to assist with product selection supported by samples and detailed technical information. Simply call or fax us your inquiry.



Library Tower

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Look for us in Sweets catalogue 9200/Fry.

Products *from page 139*
come in a variety of sizes and are designed to be installed over Perma-Shield Narroline double-hung windows. The transom window's vinyl-sheathed exterior comes in white or an earth-tone color, and the natural wood interior can be stained or painted to match the interior trim.
Andersen Corporation
Circle 421 on information card

Expanded Tambour Line
Marlite has added 11 solid colors, four prefinished solid wood selections, and high-pressure laminate capabilities to its line of Tambour Plank products.

The Diamond Classic palette features an invisible protective melamine topcoat that resists stains, mars, and scratches, making it especially applicable for use in high-traffic commercial environments.

The four solid wood selections are all prefinished. Oak Tambours include half-round, deep V-scored, and flat profiles. Flat profiles are available with 1- and 2-inch scoring. Marlite High Pressure Laminate Tambour Planks are available in the colors and surfaces selected from the palettes of leading laminate manufacturers. All tambour planks are available in modules 16 inches by eight feet high that adhere to curved or straight surfaces using the manufacturer's adhesive.
Marlite
Circle 426 on information card

New Designs Added to Laminates
Ralph Wilson Plastics Co. introduces a new colorway to the Glace group of Wilsonart brand decorative laminates, as well as a new pattern to its Design Group 1 collection. Created to resemble a smallscale stonelike pattern, Green Glace rounds out the laminate group.

Spektrum laminate is an intricate combination of black and white with red, blue, and yellow achieved through a collection of tiny dots reminiscent of pointillism. A crystal finish gives the pattern subtle dimension and tactile interest.
Wilsonart Ralph Wilson Plastics Co.
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CREDITS

Charleston Navy Yard Rowhouses, Charlestown, Mass. (page 54). *Architect: William Rawn Associates, Boston.* Principal: William L. Rawn III, AIA. Project architect: Donald Klema. Structural engineer: LeMessurier Consultants. Mechanical engineer: C.A. Crowley Engineering. Civil engineer: C.A.Q. Planning and Engineering. Geotechnical: McPhail Associates. Landscape architect: Michael Van Valkenburgh. General contractor: Mirabassi Associates. Client: Bricklayers and Laborers Non-Profit Housing Co.

Mer Rouge Villas, Mer Rouge, La. (page 58). *Architect: Wenzel & Associates, Tunica, Miss.* Civil engineer: CGH Engineers. Mechanical and plumbing: Gordin McCool. Electrical engineer: Jim Lane.

Rison Villas, Rison, Ark. (page 58). *Architect: Wenzel & Associates, Tunica, Miss.* Civil engineer: Boulder Engineering. Mechanical and plumbing: Gordin McCool. Electrical engineer: Jim Lane.

St. Catherine's Village, Madison, Miss. (page 60). *Architect: Cooke Douglass Farr, Jackson, Miss.* Principal in charge: William H. Cooke Jr. Programming. Robert E. Farr II, AIA. Project architect: David S. Patterson, AIA. Landscape/site planning. James R. Somers. Civil engineer: Jack V. Williams. Structural engineer: Robert Karlak. Mechanical engineer: L. Jager Smith Jr. Electrical engineer: James W. Lane. Architectural design consultants: Mockbee Coker Howorth. General contractor: Nickles & Wells Construction Co.

Rancho Ramillette, Concan, Tex. (page 68). *Architect: Taft Architects, Houston.* Partners: John J. Casbarian, AIA, Danny Samuels, AIA, Robert H. Timme, AIA. Project architect: Larry Dailey. Support team: Robert Bruckner, Steve Hecht, Eric Morris, Mark Volpendesta. Structural engineer: Hayne. Mechanical and electrical engineer: Burr Engineers. Interior furniture: Trina Stinson-Jones. Contractor: Caldwell Construction Co. □

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