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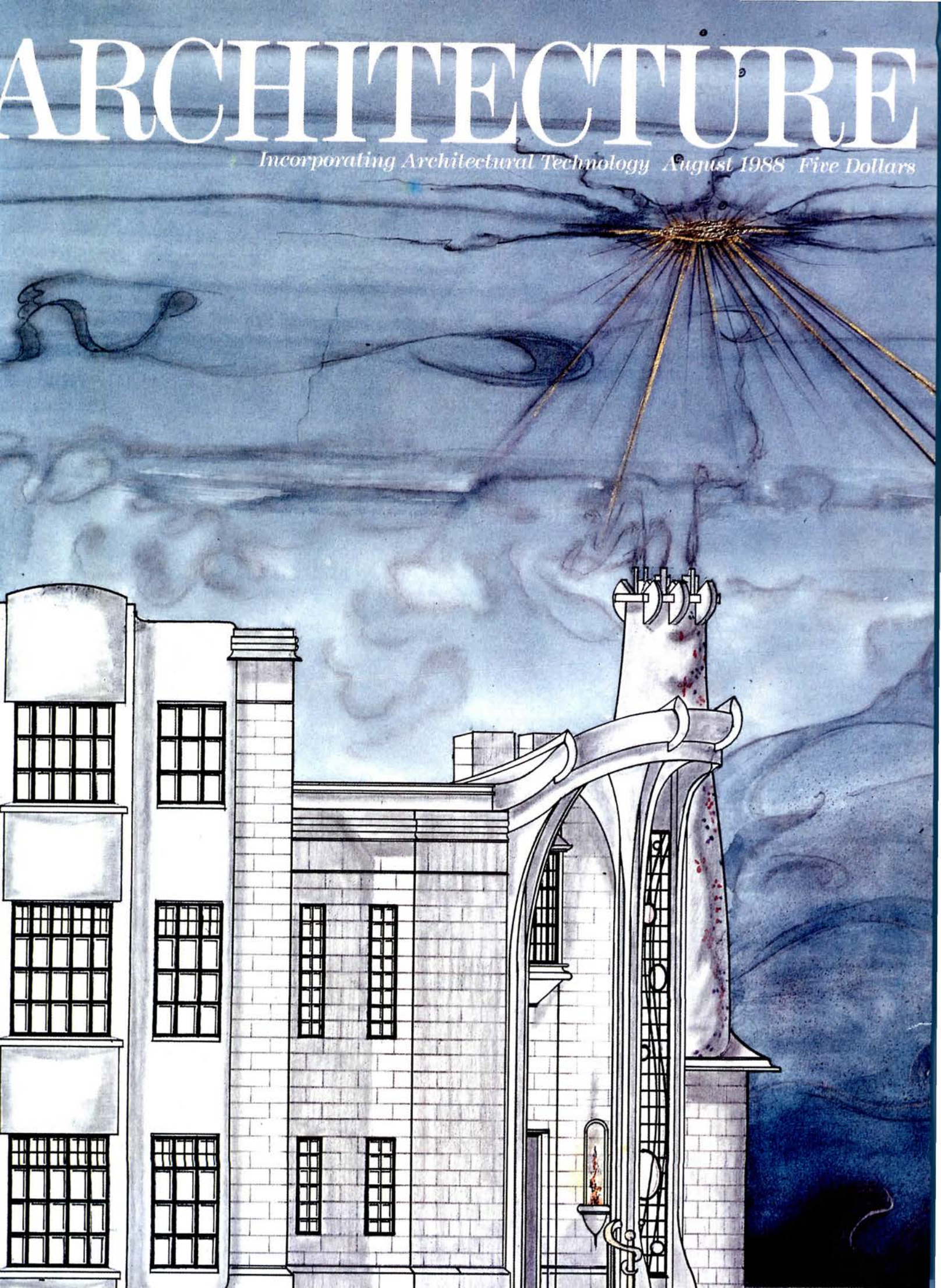

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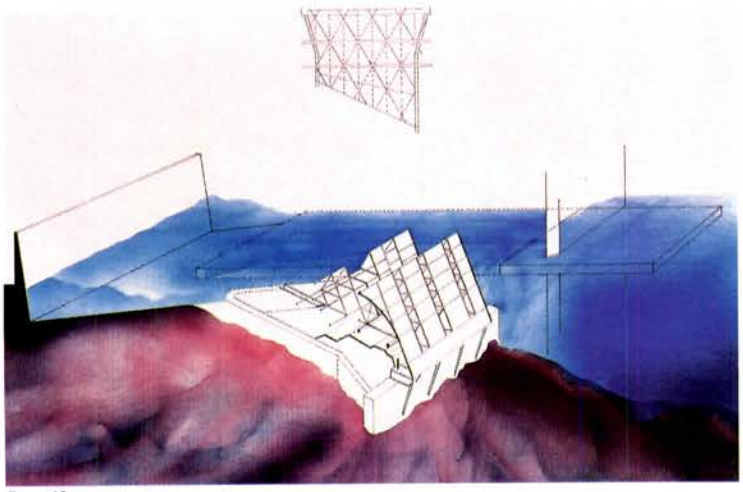

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ARCHITECTURE, publication number ISSN0746-0554, official magazine of the American Institute of Architects, is published monthly by the American Institute of Architects at 1735 New York Ave. N.W., Washington, D.C. 20006. **Individual subscriptions:** U.S. and its possessions: $37 for one year, $55 for two years, $72 for three years. Canada: $43 for one year, $63 for two years, $82 for three years. Foreign: $61 for one year, $103 for two years, $145 for three years. Single copies, $5 each (except for May and September issues, which are $10). Publisher reserves the right to refuse unqualified subscriptions. For subscriptions: write circulation department, ARCHITECTURE. 1735 New York Ave. N.W., Washington, D.C., 20006; allow eight weeks. Quotations on reprints of articles available. Microfilm copies available from University Microfilm, 300 N. Zeeb Road, Ann Arbor, Mich. 48106. Referenced in The Architectural Index, Architectural Periodicals Index, Art Index, Avery Index to Architectural Periodicals. Second class postage paid at Washington, D.C., and additional mailing offices.

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Alaska Community Action Program introduces Heat Mirror glazing to vernacular building.

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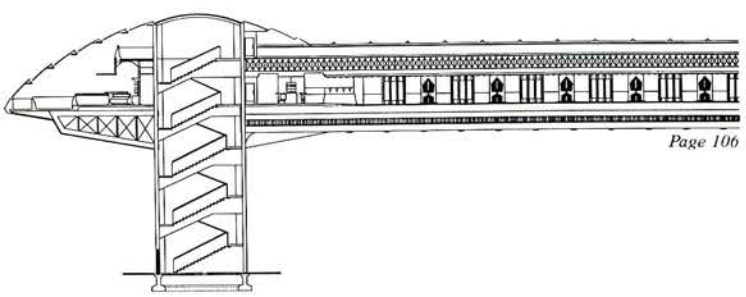
Cover

McGill University student Trevor Marchand's drawing of an urban house, with N. Garrison and P. Webster as design critics (see page 56).

News

Technology & Practice



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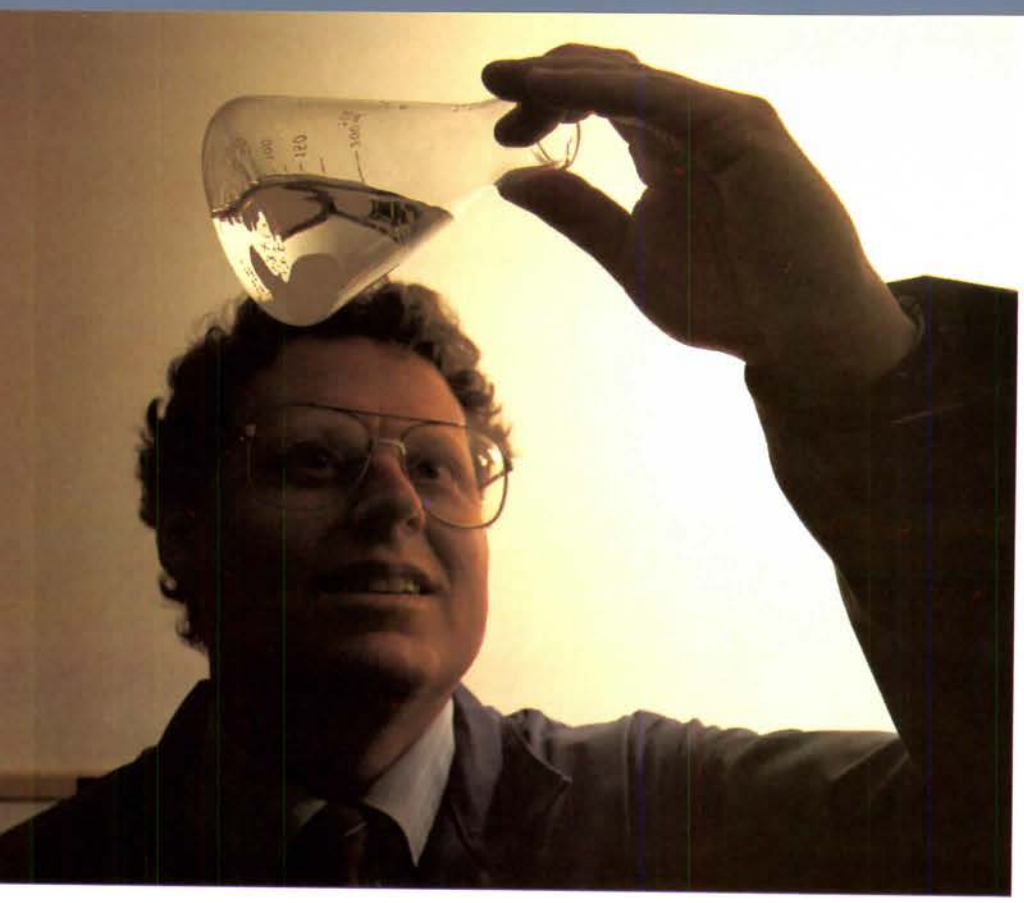

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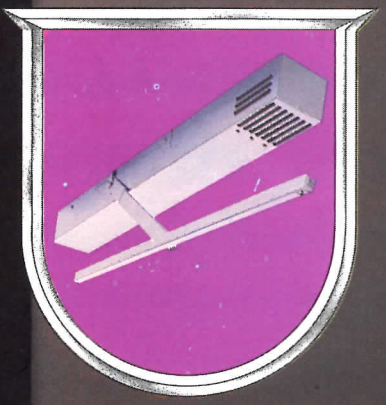

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EVENTS

Aug. 3-31: Exhibition of 1988 AIA Honor Awards, AIA headquarters, 1735 New York Ave. N.W., Washington, D.C. 20006.
Aug. 3-Sept. 2: Exhibition entitled "That Exceptional One: Women in American Architecture, 1888-1988," San Francisco. Contact: David Caruso, Events Director, Western Merchandise Mart, 1355 Market St., San Francisco, Calif. 94103.
Sept. 2-Nov. 6: Exhibition entitled "Frank Lloyd Wright and Madison: Eight Decades of Artistic and Social Interaction," Madison, Wis. Contact: Elvehjem Museum of Art, 800 University Ave., Madison, Wis. 53706.
Sept. 5-8: Conference on "Healthy Buildings," Stockholm, Sweden. Contact: Preston McNall, National Bureau of Standards, U.S. Department of Commerce, Gaithersburg, Md. 20899.
Sept. 10: Seminar entitled "Frank Lloyd Wright's Vision for Madison," Taliesin, Spring Green, Wis. Contact: Frank Lloyd Wright Foundation, Taliesin, Spring Green, Wis. 53588.
Sept. 12-16: Course on the Application of Infrared Scanners to Detect Building Energy Loss, Atlanta. Contact: Paul Grover, Infraspection Institute, 33 Juniper Ridge, Shelburne, Vt. 05482.
Sept. 13-16: Society for Marketing Professional Services National Convention, Dallas. Contact: Lois Boemer, SMPS, 801 N. Fairfax St., Suite 215, Alexandria, Va. 22314.
Sept. 15-16: International Market Square Annual Design Conference and Furnishings Exposition, Minneapolis. Contact: Irene Silber, International Market Square, 275 Market St., Minneapolis, Minn. 55405.
Sept. 15-16: Training Program on Downtown Design, Springfield, Ill. Contact: Vicki Onderdonk, National Main Street Center, National Trust for Historic Preservation, 1785 Massachusetts Ave. N.W., Washington, D.C. 20036.
Sept. 17-20: ASME Biennial Conference on Mechanical Vibration and Noise, Montreal, Quebec. Contact: Andrea Elyse Messer, American Society of Mechanical Engineers, 345 E. 47th St., New York, N.Y. 10017.
Sept. 19-21: International Brick/Block Masonry Conference, Dublin, Ireland. Contact: IBMAC, 4 Upper Leeson St., Dublin 4, Ireland.
Sept. 20-22: National Design Engineering Conference and Show, New York City. Contact: American Society of Mechanical Engineers, 345 E. 47th St., New York, N.Y. 10017.
Sept. 22-24: Conference entitled "Urban Waterfronts '88: Accent on Access," Washington, D.C. Contact: Waterfront Center, 1536 44th St. N.W., Washington, D.C. 20007.
Sept. 27-28: Capital Design Week Conference for Interior Designers and Architects, Washington, D.C. Contact: Washington Design Center, 300 D St. S.W., Washington, D.C. 20024.
Sept. 30-Oct. 1: Seminar on Regional Loss Prevention, Orlando, Fla. Contact: Thomas B. Cohn, Association of Engineering Firms Practicing in the Geosciences, 8811 Colesville Rd., Suite G106, Silver Spring, Md. 20910.
Oct. 1-4: Symposium on Pueblo Style and Regional Architecture, Albuquerque, N.M. Contact: Dr. Wolfgang Preiser, School of Architecture, University of New Mexico, Albuquerque, N.M. 87131.

LETTERS

Of Buildings and Cities: I have just finished reading your April edition about New York. The concept of short comments on New York by a wide array of urbanists is fascinating, enjoyable, and very enlightening. It is well done.

The comments confirm my long-standing concern that architects have not built American cities, but have very simply built buildings. Our development system has perpetuated the need for architects to achieve identity by getting an award or recognition for an individual building, no matter what it does to the urban fabric. I have always had this fantasy of being a featured speaker at a national AIA convention and detailing this point of view to the members.

I say this even though I have long been a friend of the architecture profession and the individuals who make it up. Wherever I have worked they have been the principal supporters for planning and urban design, and now even in furthering progressive transportation improvements. But the need to achieve a reputation for an outstanding building in order to get more clients to do more outstanding buildings, which could be placed in any city or situation, urban or suburban, has prevented architects from contributing to the overall city form. This is regrettable, since the architect, more than anyone, has the ability to influence the shape of our cities.

John E. Hirten, Director
Department of Transportation Services
City and County of Honolulu

Copyrights: The article about copyrights by Dale Ellickson [April, page 132] was well done and timely. While the copyright infringement problem relative to an architect's design is probably not a major issue within the bigger picture of an architect's practice, the lack of compensation for the "stolen" design or the lack of recognition as the creator of the original design are significant aspects of the issue that hit closest to home—in the pocket and in the ego.

Recent articles in *The Artist's Magazine* address the copyright problem from the artist's view. It seems that several states and federal courts have taken the position that the states are immune from prosecution when sued for copyright infringement. A potentially dangerous precedent is being established here.

The consequences might appear obvious, but think through this scenario for a minute. State architect's office hires Firm A to design a district office for the state police. Next funding year two more district offices are erected in other parts of the state. It's no surprise that the two new buildings look exactly like the first one, site adapted from the original plan. Is the original architect liable for problems that occur on the subsequent buildings? Should the original architect be compensated for repeated use of his original creative design?

A new group called Creative Majority has been formed to focus national attention on the problem of copyright infringement by the states. I recommend that AIA review the "states immunity" issue and its particular application to architects. Aligning the power and prestige of AIA behind the newly formed Creative Majority would greatly assist that group in its efforts to curtail copyright infringement by the states. We are also, after all, creative artists.

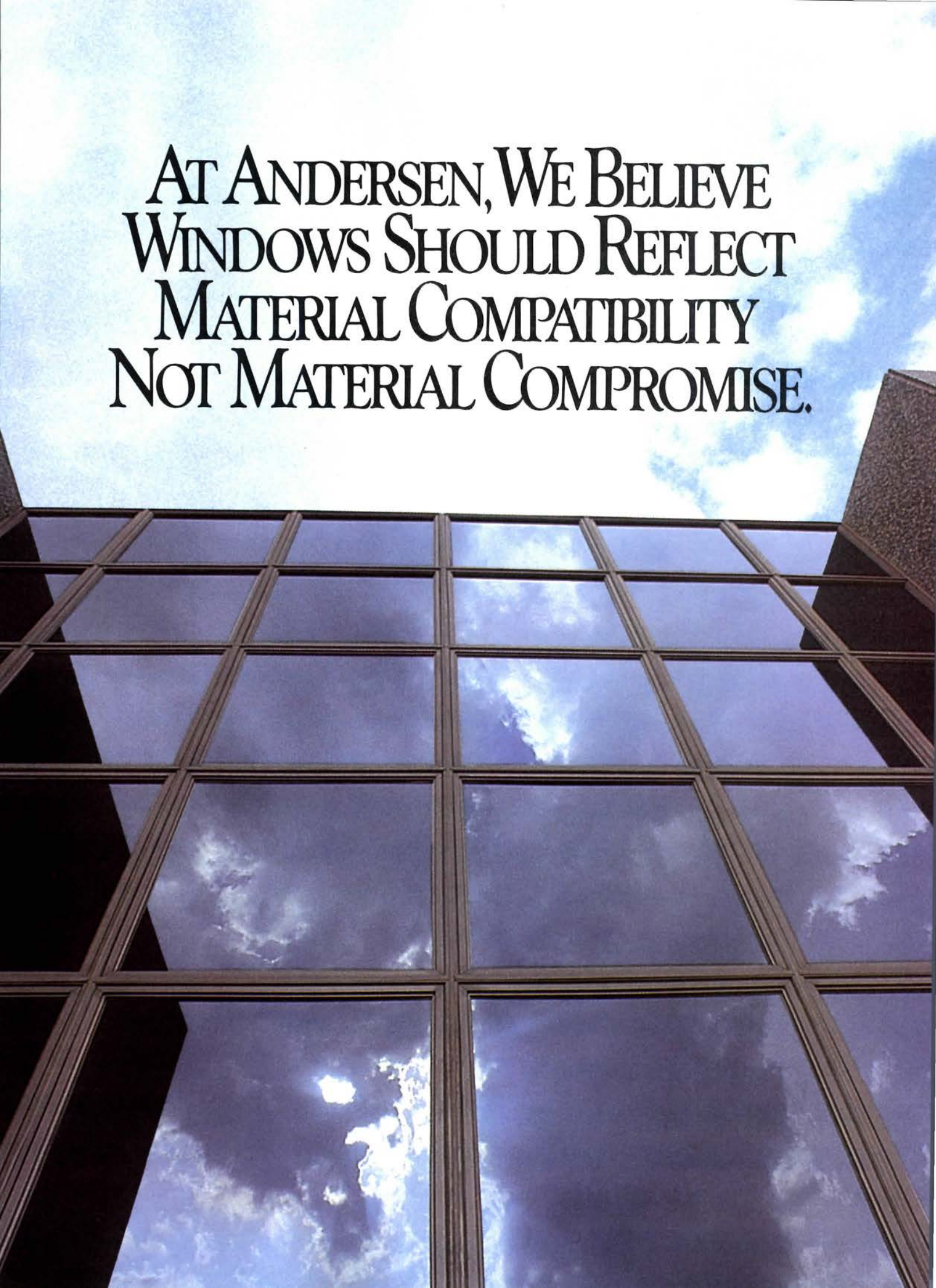
John C. Bland, AIA
Albuquerque, N.M.

Collaboration with Crafters: In your brief April story about the New Heights restaurant in Washington, D.C., it should be noted that the success of the restaurant is due to a collaborative effort among the architect, the owner, *and* craftspeople. The photos shown highlight a deftly joined bar by Robert Kowolski on one page and, on the other, triangular tables, four-species railings, and stained glass panels by Tom Swift, all of which are highly successful works in their own right. There were several other very talented people responsible for components not shown or mentioned in the article.

Edward S. Fleming Jr., AIA
Washington, D.C.

Amplifications: In the May article about trends in skyscrapers, pages 124-131, Cline Bettridge Bernstein Lighting Design was a consultant for the Lincoln Centre building in Minneapolis. Also in May, credits for Rowes Wharf in Boston by SOM/Chicago, shown on pages 118-123, should have listed Jo Le Mieux-Murphy as technical coordinator for the residential section, as well as Peter Exley and Jane Harrison as staff for that section. Credits for the Christian Theological Seminary, shown on pages 86-89 of the June issue, appear with the credits for this issue.

Corrections: A. Epstein & Sons International of Chicago was associated with Murphy/Jahn and was architect of record for the United Airlines terminal at O'Hare International Airport, featured on pages 158-165 of the May issue. Also in that issue, the photograph of the Facilities Systems headquarters in Eagan, Minn., on page 248 should have been credited to Tom Hysell.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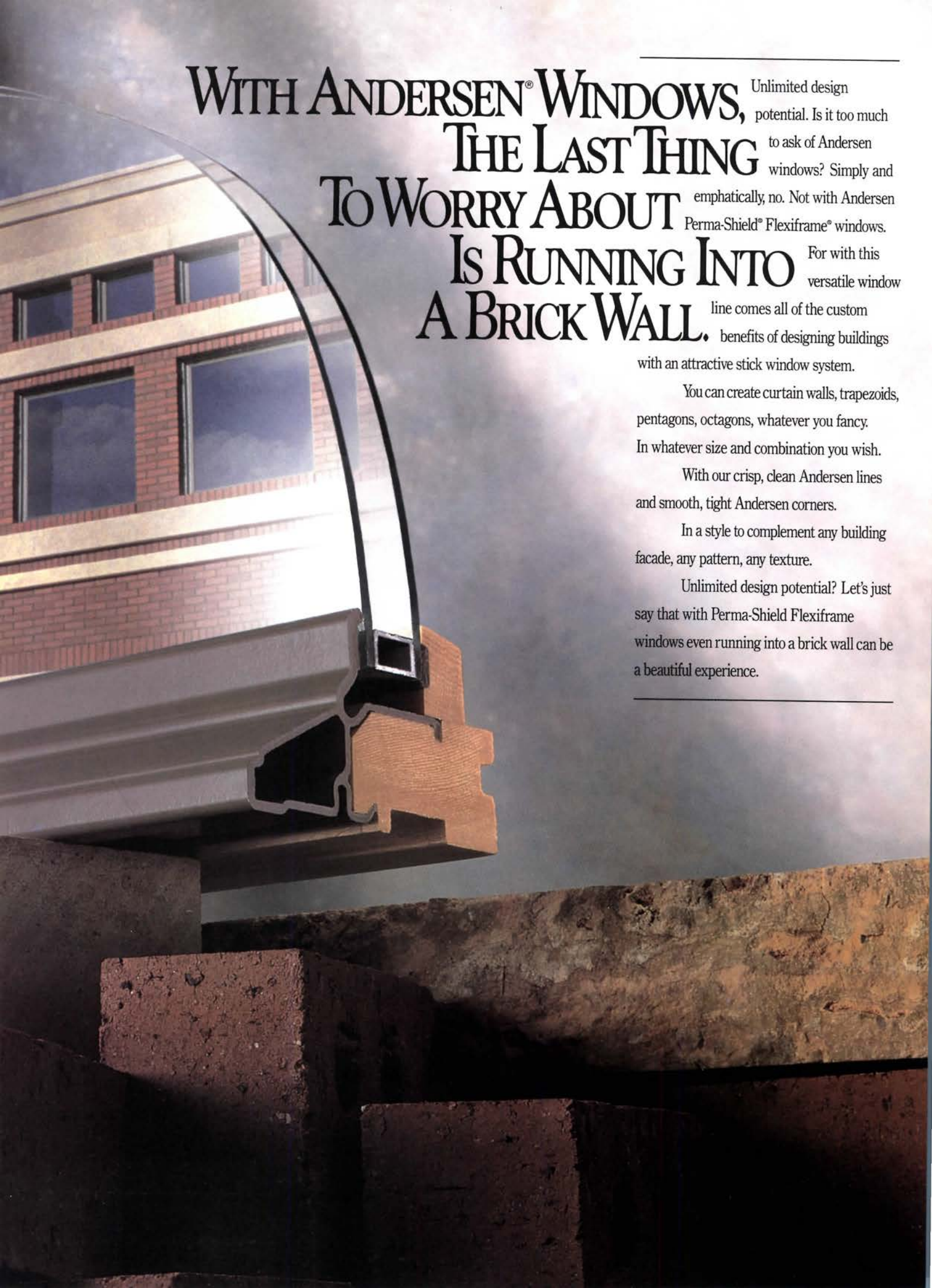

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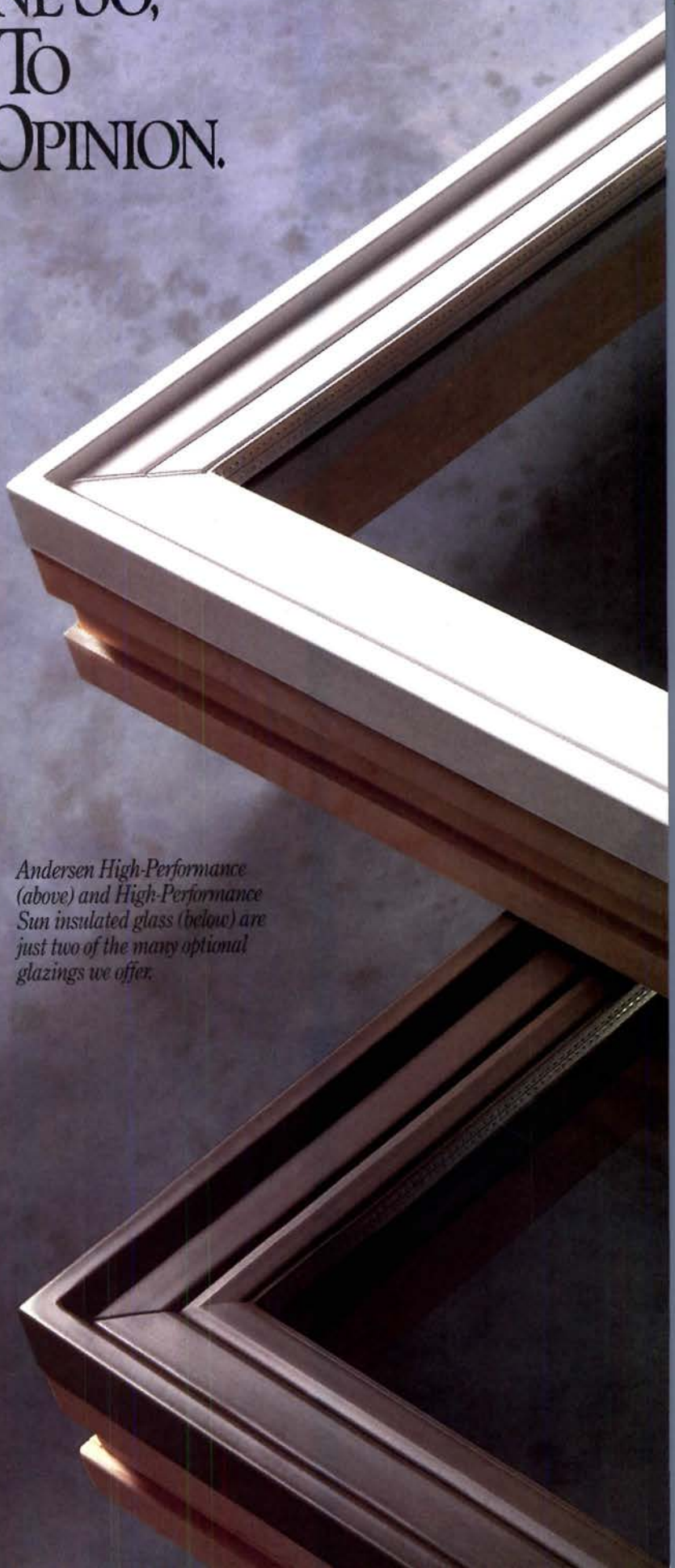

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Awards & Competitions

Beeby's Neoclassical Design Wins Chicago Library Competition

An unabashedly neoclassical scheme by Thomas Beeby, FAIA, of Hammond Beeby & Babka has won Chicago's competition for a $140 million public library on a prominent site in the city's South Loop. Although the controversial design/build competition format (see Feb., page 25) drew only five proposals, the architects represented managed to cover many of the stylistic bases of the 1980s. Those proposals, submitted by architect/developer/contractor teams for the Harold Washington Library, reflect the diversity of today's architectural styles and respond in very different ways to Chicago's rich and varied architectural history.

The jury of 11, which included Henry N. Cobb, FAIA, as its only practicing architect, selected the scheme in late June. The five proposals had been on view for a month at the city's Cultural Center in an unusual exhibition that encouraged visitors to comment on the schemes. More than 8,000 people filled out comment cards, which were submitted to the jury.

If the public comments carried much weight with the jurors, it's not surprising that Beeby's scheme won the competition. His proposal looks very much like what people are used to large central libraries looking like. Beeby's design is not a strictly literal classical interpretation, but it immediately recalls the grand and glorious libraries of the late 19th and early 20th centuries, such as McKim, Mead & White's Boston Public Library and Carrère & Hastings's New York City Public Library.

In describing his proposal, Beeby said, "We've tried to create a library that relates to other historical public buildings with classic overtones. It looks like other buildings you see in Chicago—the Auditorium, City Hall, the Cultural Center, and the Art Institute. Yet at the same time it is extremely functional, modern, and flexible inside."

In an era of cable television, videos, and novels recorded on cassettes, this traditional and formal building seems to be saying that this is a place where you will still be able to check out plain old books.

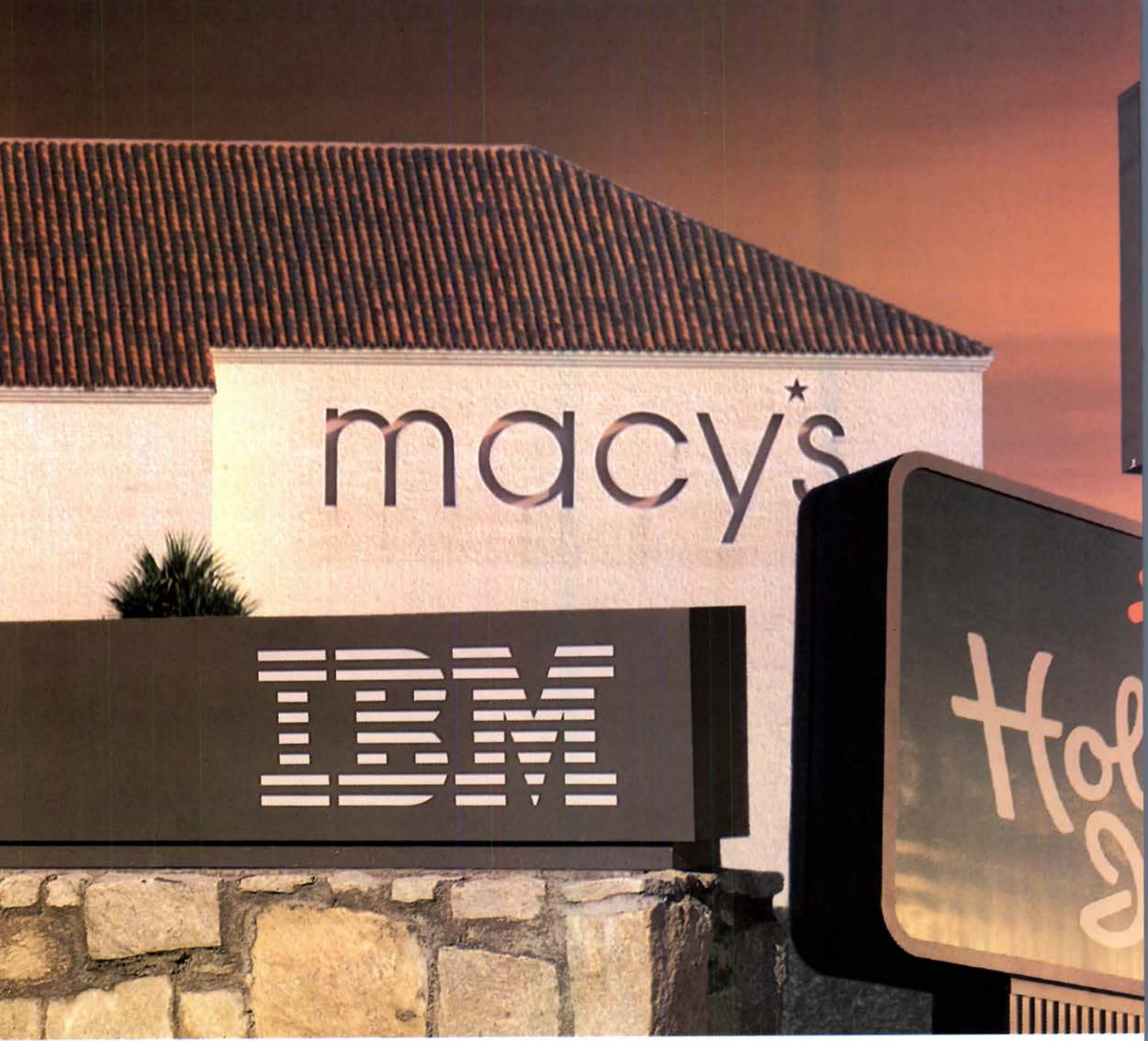
Beeby's winning scheme has a rusticated granite base, tall and recessed arched windows, and oversized sculptures on the roof. A grand lobby entrance opens onto a three-tiered atrium and is connected to the street, the subway, and the "L." Two floors of administrative offices are arranged around a landscaped winter garden of restaurants and public spaces. The scheme completely fills its site, bounded by Congress and State streets, while attempting to reinforce Congress Parkway, one of the original main axes of Daniel Burnham's 1909 plan.

Among the other teams that entered somewhat traditional schemes was that of Adrian Smith, FAIA, of Skidmore, Owings & Merrill/Chicago in collaboration with Ricardo Legorreta, Hon. FAIA, of Mexico City. They proposed a limestone and granite building with a barrel-vaulted roofline and an asymmetrical window pattern. The interior would have featured a 12-story atrium with operable skylights and windows and a stained glass wall rising the entire height.

The scheme submitted by Dirk Lohan, FAIA, of Lohan Associates reflects a modernist esthetic with a limestone and pat-

continued on page 26

Above, winning design by Thomas Beeby of Hammond Beeby & Babka. Right, schemes by Adrian Smith of SOM and Ricardo Legorreta (top) and by Dirk Lohan of Lohan Associates (bottom).



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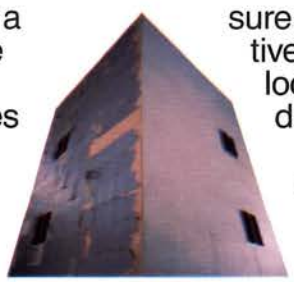

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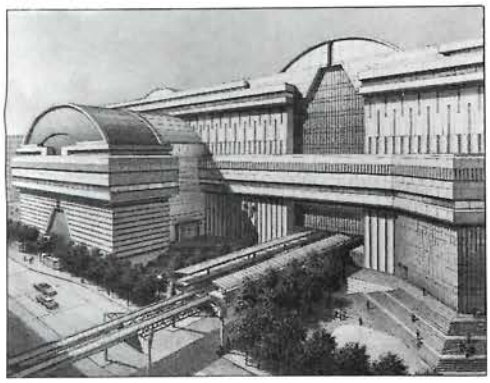


Top, design by Arthur Erickson with Vickrey/Ovresat/Awsumb Associates. Above, scheme by Helmut Jahn of Murphy/Jahn.

terned aluminum symmetrical box. The gridded South Street facade features expansive glazing and six 30-foot-high, wall-mounted lanterns. The interior has a three-level great hall.

The other two schemes took a different direction in reponse to site constraints of the program, which gave the architects the option of extending the library north over the "L" or recommending other uses for this parcel of land.

The scheme submitted by Helmut Jahn, FAIA, of Murphy/Jahn calls for a granite and marble elevated building bridging the elevated tracks along Van Buren Street. Within this modernist colonnade, along State Street, Jahn has tucked a series of small forms—pyramid, cone, sphere, and pentagon; they house a restaurant, bookstore, gift shop, and other similar enterprises. Like the other entrants, Jahn incorporated a soaring interior space repeating his exterior materials.

Arthur Erickson, Hon. FAIA, in association with Vickrey/Ovresat/Awsumb Associates, proposed a massive, limestone and precast, eclectic building that also would bridge the elevated tracks above Van Buren Street.

When the winner was announced, jury Chairman Norman Ross predicted: "We think you will be happy with the library you're going to have. It will be functional, beautiful, will fit into Chicago, and will be copied elsewhere, all around the world."

—Lynn Nesmith

Amphitheater with Canopy Wins Architectural Award

Damberg, Scott, Peck & Booker of Duluth, Minn., won the second annual Du Pont Hypalon excellence in architecture award for an outdoor theater at Ironworld U.S.A., an interpretative center in Chisholm, Minn. The firm was presented a cash award of $10,000 for its winning entry in the new construction category. No prize was awarded in the restoration/reconstruction category. The awards program is open to all U.S. and Canadian architects with buildings completed within the past five years that incorporate single-ply membrane roofing systems based on Du Pont Hypalon synthetic rubber.

The Ironworld amphitheater sits on the edge of a 300-foot-deep, man-made canyon created from an open-pit mine on the Mesabi Iron Range in northeastern Minnesota. A large back wall is built of concrete, and a tensile-supported, steel space-frame canopy hangs over the stage and seating area. The facility also contains dressing rooms and sound and lighting systems. Permanently installed crane-shaped devices of steel support the space frame to provide a column-free interior with unobstructed views of the stage. A single-ply membrane roofing system was used on all flat roof surfaces and the suspended canopy, while metal roofing was used on gabled sections to recall historical mining structures.

The awards jury cited design principal Darryl Booker, AIA, for creating an "interesting mixture of architectural and structural vocabularies approaching a kind of constructionist esthetic that is appealing."

Jurors were Bernardo Fort-Brescia, AIA; Thomas Hines, professor of history and architecture at UCLA; and Adele Naude Santos of the University of Pennsylvania.

Four Educators Receive New Institute Honor

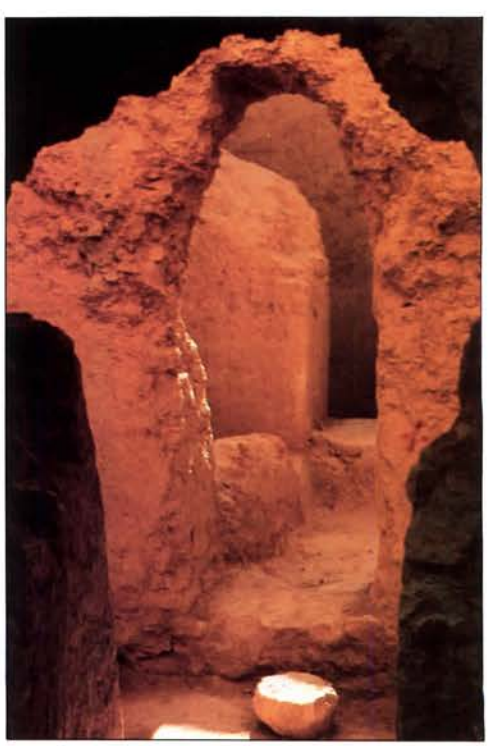
AIA has honored four university educators in a new awards program that recognizes excellence in the teaching of architecture. Selected from entrants representing more than 50 schools of architecture, the honorees were cited for "their exemplary teaching and creation of instructional materials that could serve as models for other architecture programs around the country."

The winners are:

- Peter Batchelor, AIA, professor at North Carolina State University, recognized for his course, "Theory of Urban Form," which attempts to establish the link between the theoretical concepts of physical urbanism and the spatial concerns of architecture.
- Richard Norman, AIA, professor at Clemson University, for "Architectural Color Graphics," an introductory course on color theory and the interactive manipulation of color computer graphics.
- Robert A. Fisher, AIA, of Ball State University, in association with professors Benson, Eggink, and Koester and English professor Jane Haynes, for "Writing in the Design Curriculum," a program to improve writing skills throughout the design process.
- Dan Rockhill, AIA, of the University of Kansas, for "Building Technology Practicum," a course on materials and techniques that provides hands-on experience.

Seattle Architect's Photo Selected in AIA Contest

Roger Williams of Seattle has won first prize of $1,000 in the 1988 AIA architectural photography competition. His photo (below), entitled "Shepherd," was taken in Meteora, Greece. The second prize of $700 goes to William Shaw of Natick, Mass., for "Portal" (bottom), photographed in Diryha, Saudi Arabia. Tom Davis of Austin, Tex., won third prize, and Jae Kauh of Upper Arlington, Ohio, received the Louise Bethune award for best image of an architectural subject in the United States. The competition, organized by the St. Louis Chapter/AIA, was open to members of AIA and AIAS and associate members of AIA. *News continued on page 28*



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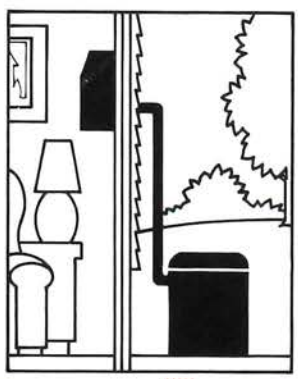

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Exhibition

Decon Show Opens, Generates Unheated Summer Symposium

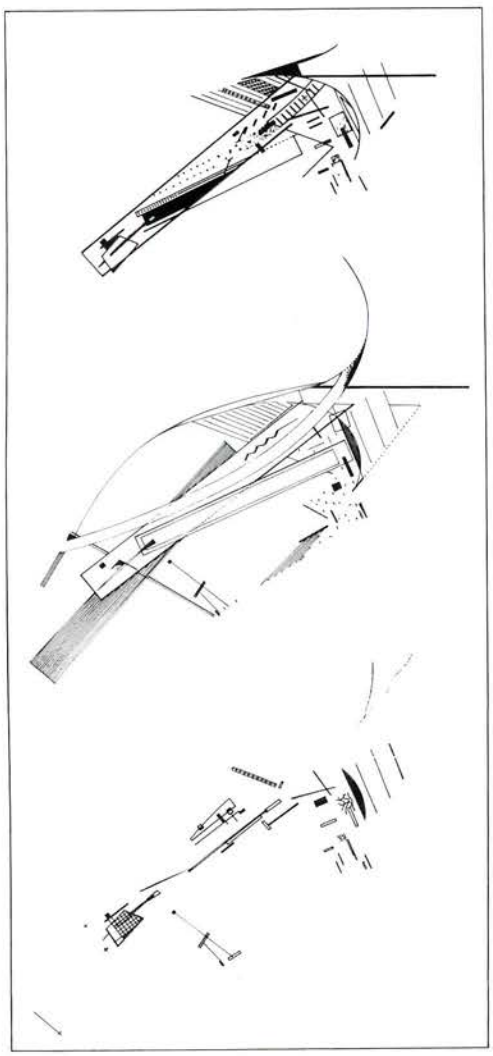
Every professional journalist knows that the lazy, hazy, crazy days of summer are some of the worst in the year for the writing trade. It's too hot to move or think much, everyone's on vacation with a taste for fiction, and there's not much going on to write about. Luckily for architectural journalists, this summer there's the deconstructivist architecture show at the Museum of Modern Art in New York City, which has kept wordsmiths busy delving into the meaning and potential effect of this exhibit.

The show presents the work of seven architects from around the world—Peter Eisenman, FAIA, Frank Gehry, FAIA, Zaha Hadid, Rem Koolhaas, Daniel Libeskind, Bernard Tschumi, and the firm Coop Himmelblau—all of whom appear to have a passion for designing contorted, distorted buildings. The designs are presented in models and drawings (no photographs of actually built work). The show is curated by Philip Johnson, FAIA, and Mark Wigley, a New Zealand architect and a lecturer at Princeton's architecture school.

The show opened in June, a few days after the summer solstice, and will close on the 30th of this month, a few days before Labor Day, the unofficial end of summer. Thus, with a symmetry not found in most of the work displayed, the show nests in a season of heat and drought, producing in certain quarters a heated confrontation between those who praise or dismiss it and a drought of cogent articulation of what it all means, if anything.

A week after the show's opening there was a symposium at the museum on deconstructivist architecture, which brought together six academicians—Kurt Forster of the Getty center of arts and humanities; Michael Hayes and Anthony Vidler, both of Princeton; Jeffrey Kipnis of Ohio State University; Rosalind Krauss of Hunter College; and Wigley, who acted as moderator.

There was a full moon on the night of the symposium, which may have accounted for the wealth of archi-babel that spewed forth from the panelists. A member of the audience said it reminded him of "the old days at the institute," referring to Eisenman's now defunct Institute for Architecture and Urban Studies, famous for the dense verbiage some of its faculty and attendees fashioned out of the English language.



Two projects on view at the deconstructivist architecture show at the Museum of Modern Art in New York City: model at top is Daniel Libeskind's City Edge, an office and residential development in the Tiergarten section of West Berlin. Building rises 10 stories high over the Berlin Wall. Drawings are of Zaha Hadid's Peak project, an exclusive club that juts from hills overlooking Hong Kong Harbor.

Despite the moderator's intent for the show to "start an argument" among the panelists, the evening limped along. Wigley, sporting a deconstructivist haircut, was no Morton Downey Jr., and he failed to ignite the conferees into heated discussion. There was a lot of talk about "phallic pleasure" (Hayes), bidets (Vidler), late capitalism (Krauss), and "a breach in architectural representation" (Kipnis), but the panelists (save Krauss) generally celebrated the show for what they believed it stood for. Krauss, an art critic, called it bad sculpture.

People in the audience were less kind. In a short Q&A period they criticized the show as being "too slick and superficial." Their suspicion was evident that the exhibit was a vehicle to perpetrate yet another architectural style and that the designs ignored function.

The show is very small—only two rooms arrived at through a gallery hung with Russian constructivist work, postured as decon's granddad. Ten projects are displayed, spanning a decade. Most have been published widely and are familiar— such as Hadid's Peak project in Hong Kong, Gehry's own house in Santa Monica, Calif., and Tschumi's Parc de La Villette in Paris. Some are shockingly conventional in being marginally deconstructive, such as Koolhaas's Rotterdam apartment building. Others are simply shocking, such as Libeskind's City Edge project for Berlin, which rises from the ground like an emerging subway train and hangs above the Berlin Wall.

All of the work has a family resemblance—models that appear to have been damaged during shipping, drawings that depict aerial views of train wrecks. What makes it deconstructivist architecture? We have to rely on Wigley's catalogue of the show, because none of the architects speak for their own work. In fact some of the architects may not see their work as deconstructivist. Gehry, for one, has said that this brand of architectural theory might be the end of architecture.

Wigley's catalogue essay tells us more about what deconstructivist architecture is not than what it is. "Deconstructivist architecture is not an '-ism,'" writes Wigley. The work exhibited will not promote a certain kind of practice or certain kinds of architectural objects. It's not a new style or a movement. It's not a vision of the future. It does not constitute an avant-garde, and it's not a "rhetoric of the new." The work doesn't derive from a cultural condition, from the mode of contemporary philosophy known as deconstruction, or from an unsettled world. It's not a new spirit of the age. So what is it?

continued on page 30

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Exhibition *from page 28*

Give up? "It is the ability to disturb our thinking about form that makes these projects deconstructive," explains Wigley. "What is being disturbed is a set of deeply entrenched cultural assumptions which underlie a certain view of architecture, assumptions about order, harmony, stability, and unity." In other words, decon is about what things look like, about form and composition, about esthetic manipulation, about fine art. It's about what happens when an architect "countermands traditional formal inhibitions in order to release the suppressed alien," Wigley continues, "in order to subvert form in radically different ways."

So relax. It's about suppressed inhibitions and aliens—the stuff of great summer novels and other harmless diversions. When summer's over, it'll be time to go back to work.—MICHAEL J. CROSBIE

Civic Design

Probing the Urban Impacts Of Olympic Games Architecture

During the week of June 13, planners and architects from many nations gathered in Seoul, South Korea, for a conference on "Hosting the Olympics: The Long-Term Impact." The conference was organized by the graduate school of environmental studies of Seoul National University and by the East Asian planning and architecture program of the Massachusetts Institute of Technology. It was sponsored by the city of Seoul.

Seven past and future Olympic cities—Melbourne, Tokyo, Mexico City, Montreal, Los Angeles, Seoul, and Barcelona—were presented as case studies in an effort to discover what the long-term effects of the Olympic Games really are on the host city and nation. Many of the planners clearly saw the Olympics less as a sporting event than as a once-in-a-lifetime opportunity to achieve major city planning goals. Some of the long-term effects claimed or proposed were:

- Acceleration of infrastructure improvements, including roads, rapid transit, and communications systems.
- Increased tourism.
- A legacy of better sports facilities for the public, fostering better overall physical fitness and health and thus reducing costs of national health care.
- Redistribution of amenities in the host city, for example from richer to poorer communities.
- Growth in a spirit of volunteerism and cooperation among citizens after their experience of working together to put on the Olympics.
- Similarly, growth in the private sector's ability to work with various levels of government—a valuable legacy of know-how and personal relationships.
- Profits for investment in the host city, as in Los Angeles where the 1984 Olympics netted $200 million, some of which is now being used to support city athletic and cultural programs.
- Improvement in the image and confidence of the host city and nation, especially in the case of a nation such as South Korea, which is just emerging as a major international player. In such a case, the hosting of the Olympics can become a proclamation of arrival.

Hong Bin Kang, director of the Housing Research Institute of South Korea, defined some of these ambitions clearly when he said of the Seoul effort: "This was the approach the Olympic planners took: taking advantage of Olympic preparations, they attempted to accelerate the future state already sketched or planned."

Other speakers suggested that such an acceleration might be followed by an equal and opposite deceleration after the Games. There was some skepticism, too, about the ability of analysts either to forecast impacts with any accuracy or even to identify them afterward. And the great differences among the host cities and their circumstances were noted frequently. Some speakers argued that the Olympics should be about sports and not about city planning, yet most agreed that if nothing but a sporting event were considered the host city could easily find itself left with an expensive white elephant after the Games. Despite their differences, the participants' consensus was that the conference, the first ever held on this topic, was enormously informative and enlightening. And—thanks in part to an eloquent talk by professor Julian Beinart of MIT—the conference brought many of these host city representatives to a new understanding of the Olympics as a great and significant ritual event in contemporary culture.

The group toured the new Olympic sports complex in Seoul, where the 1988 Games will take place next month, and visited the Olympic Village, a complex of 5,500 apartments and a vast commons designed by the Cambridge, Mass., firm Woo & Williams, whose proposal won an international competition. The village will be home to athletes and journalists during the Games and then will metamorphose into an experimental housing estate. All its units have been presold to residents who will occupy them after the Games.

—ROBERT CAMPBELL

News continued on page 32

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Senate Votes to Add Statue Of Nurse to Vietnam Memorial

Despite opposition by the art and architecture communities, among others, the addition to the Vietnam Veterans Memorial of a statue honoring servicewomen was overwhelmingly approved by the U.S. Senate in June.

Sen. Daniel Evans (R-Wash.) cast the lone dissenting vote, arguing that the statue would detract from the design of the monument. It was the statue that Evans objected to, not recognition of the services by women in the armed forces.

The realistic statue of a nurse is proposed for a prominent position on the 2.2-acre site of the Vietnam Veterans Memorial, Washington's most visited national monument.

However, the statue is not yet a fait accompli. Both the National Capital Planning Commission and the Commission of Fine Arts have rejected the idea of an addition to the memorial. And, at press time, the House had yet to act. At hearings held late in June by the libraries and monuments subcommittee, the chairman, Rep. Mary Rose Oakar (D-Ohio) pointed out that resolving this issue would be difficult because it involves "a memorial that holds great passion for many, because of both its place in history and the power of its artistic merit. Few memorials reach out to people in the way that Maya Ying Lin's wall does," said Oakar. "It is a true work of art."

Opposition to the statue addition is led by Robert Doubek, former project director of the Vietnam Veterans Memorial Fund. He is backed not only by the National Capital Planning and Fine Arts commissions but also by other groups including the Women in Military Service for America Memorial Foundation.

Testifying for AIA, Brooklyn architect Laurie Maurer, FAIA, denounced legislation that would authorize the statue. It would intrude on the memorial, said Maurer, and would be imposed without consulting the original memorial designer and without regard for the judges who selected that design.

AIA does not oppose the underlying motivation of the legislation, which is to recognize the sacrifices of women in the Vietnam War; it opposes only that such recognition should be in the form of an addition to the existing memorial. "It is time to let the memorial rest," Maurer said, "to do what it was intended to do—aid in the process of bringing the American people together in remembrance, in commemoration, and in reconciliation."

Concurrently, another piece of proposed legislation that would place a 60-foot flagpole at the apex of the monument has gained 234 cosponsors in the House; hearings had not yet been held at press time. Fine Arts Chairman J. Carter Brown has opposed the bill, claiming that such action would make the monument look like a golf green.

Oakar has asked the libraries and monuments subcommittee to work out a compromise concerning the proposed nurse statue at the Vietnam Veterans Memorial so that she can bring a recommendation to the full House for a vote before October, when the 100th Congress will adjourn. Should no action be taken by then, new legislation would have to be introduced in the 101st Congress.

—Elena Marcheso Moreno

BRIEFS

Danish Medal of Honor

The Federation of Danish Architects presented its medal of honor to Charles M. Sappenfield, FAIA, for his communication in America about Danish architecture through lectures, presentations, and exhibitions. The award has been given only three times in the United States.

Loeb Fellows Named

Eight individuals have been awarded Loeb Fellowships in advanced environmental studies at the Harvard University graduate school of design for the 1988-89 academic year. The fellows are Cynthia Davidson-Powers, editor of *Inland Architect,* Chicago; Thomas Fox, executive director, Neighborhood Open Space

continued on page 35

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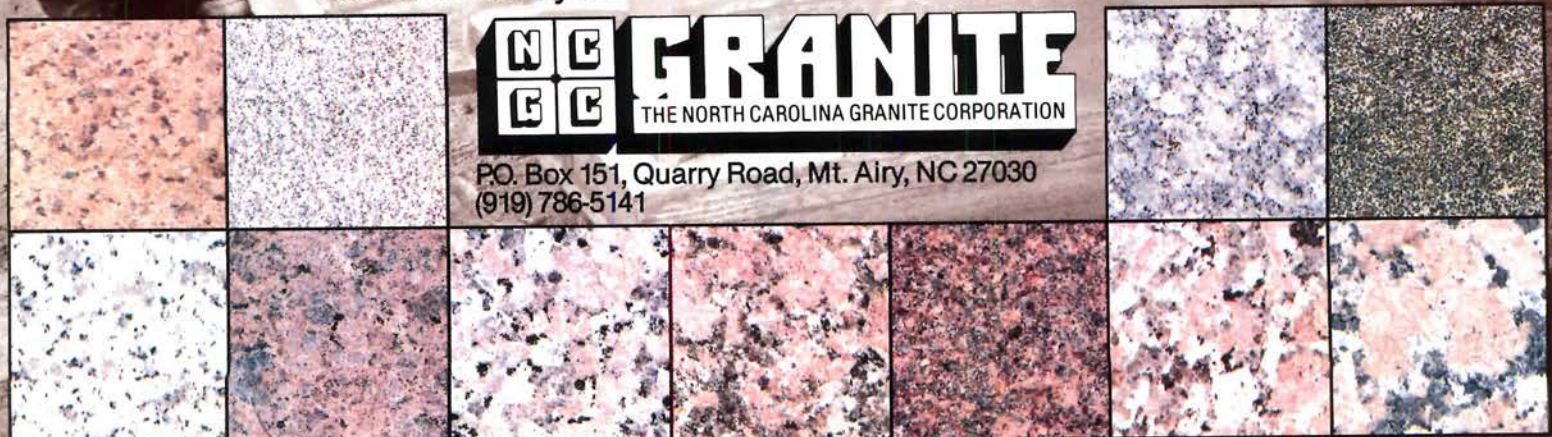

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Briefs *from page 32*
Coalition, New York City; Joseph Gonzalez, design partner, SOM/Chicago; Ann Hershfang, undersecretary of the Massachusetts Executive Office of Transportation and Construction, Boston; Leslie Kerr, landscape architect, U.S. Fish and Wildlife Service, Anchorage; Otile McManus, assistant metropolitan editor of the Boston *Globe;* Gerald Pucillo, director of housing, Boston archdiocesan planning office for urban affairs; Leif Selkregg, architect/urban planner, Capital Projects Office, Anchorage.

M.Arch. Program in Affordable Housing
The McGill University school of architecture has established a new Master of Architecture option in the subject of affordable housing. The research-oriented program will explore innovative housing solutions. Contact Professor Witold Rybczynski, McGill University, School of Architecture, Macdonald-Harrington Building, 815 Sherbrooke St. West, Montreal, Quebec, Canada H3A 2K6.

Steedman Fellow
David T. Mayernik, a Philadelphia architect, was selected for the Steedman Fellowship in architecture at Washington University in St. Louis. He was chosen from 108 entries in a national competition for the design of a wine museum and tourist center for an existing site near the Missouri River. The Steedman Fellowship provides $11,000 for a year of travel and architectural study abroad.

ACSA Awards Recipients
Eight individuals recently were honored by the Association of Collegiate Schools of Architecture for their outstanding contributions to architectural education and practice. Awards were presented to John Hejduk, FAIA; Harold N. Cooledge, FAIA; Bernd Foerster, FAIA; Romaldo Giurgola, FAIA; Joseph Passonneau, FAIA; John G. Williams, FAIA; Robert Venturi, FAIA; and Anthony Schuman, AIA.

Walker Art Center Exhibition Series
The Walker Art Center in Minneapolis will show projects by young designers in a series of six exhibitions over three years, entitled "Architecture Tomorrow." Beginning Oct. 30, *the center will* exhibit works of Frank Israel; Morphosis (Thom Mayne and Michael Rotondi); Tod Williams and Billie Tsien; Stanley Saitowitz; Elizabeth Diller and Ricardo Scofidio; and Steven Holl. For more information contact Deborah E. Blakely, Walker Art Center, Vineland Place, Minneapolis, Minn. 55403.

GE Superabrasives Design Winner
J. Marshall Strabala of Harvard University won first prize of $2,000 and a trip to Italy in the GE Superabrasives/AIAS student design competition, which called for design of an addition to the Des Moines Art Center. □

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Methodology for Behavioral Research and Design

Methods in Environmental and Behavioral Research. Edited by Robert Bechtel, Robert Marans, and William Michelson. (Van Nostrand Reinhold, $39.95.) **Environmental Design Research: How to Do It and How to Apply It.** Robert Wehrli (John Wiley & Sons, $47.95.)

The field of environmental and behavioral research has come of age. Although public health investigations of urban settings date from the mid-19th century, research into the functional and social/psychological implications of designed environments is of more recent origin. Massive urban renewal and housing projects after World War II led eventually to serious questioning by designers, social researchers, and politicians. Researchers, initially isolated in departments of psychology, geography, architecture, etc., now belong to national and international organizations, hold conferences, and sponsor journals—all focused on the multidisciplinary area of environmental and behavioral research. Most reputable schools of architecture and landscape architecture now employ social scientists on their faculties, while several schools of psychology (for example, at City University of New York, the University of Utah, and the University of Arizona) run active research and teaching programs in environmental psychology. In 1989, the Environmental Design Research Association will hold its 20th annual conference. The field of environmental and behavioral research is clearly here to stay. Two recent books on its research methods and strategies summarize both the clear progress that has been made and the problems that still need to be addressed.

Methods in Environmental and Behavioral Research, edited by Robert Bechtel, Robert Marans, and William Michelson, is an excellent overview of research methods and applications. Individual chapters are written by the three editors and by a total of 12 other researcher-writers; considering the multiple authorship, this is a remarkably cogent and coherent presentation of "how to" approaches, including observation, survey research, paper and pencil tests, trade-off games, environmental simulation, time budgets, landscape assessment, the approaches of ecological psychology, and approaches to use in researching environments for children and for older people. The kinds of methods and approaches best used in post-occupancy evaluations are discussed, and a chapter on environmental programming deals with the critical issues of research application in the design process.

This book is useful in various ways. For the teacher of environmental and behavioral studies in a school of architecture, the whole book is highly recommended as a text: it is well organized, clearly written, relatively jargon-free, and has excellent bibliographies at the end of each chapter. To appeal to students of design, however, it should have been much more amply illustrated.

The practicing designer might not want to read the whole book cover to cover, but every chapter stands on its own and certain ones are particularly useful. "Observation: The World Under a Glass," by Robert Bechtel and John Zeisel, is a comprehensive and readable account of how both casual and systematic observation methods may be used to peruse environments in use. As they remark, "It is the most fun of any of the methods in environment and behavior research... and remains the one method that people can use with minimal training." The chapters on "Survey Research" by Robert Marans and on "Evaluation of Designed Environments: Methods for Postoccupancy Evaluation" by Craig Zimring are comprehensive without being too academic or turgid and should be required reading for any practitioner bent on sponsoring a study of one of his or her buildings from a user's perspective. The chapter on "Perceptual Simulations of Environments" by Peter Bosselmann and Kenneth H. Craik is a fascinating account of how *pre*construction evaluations of proposed environments are being used by highway and city planners to judge the likely impacts of new construction.

By contrast, other chapters deal with methods that are so complex or time-consuming that a practicing professional would probably not be drawn to use them. What might have been the concluding chapter on "Environmental Programming" by Kent Spreckelmeyer—how to use research in the programming phase of design—is a useful overview of approaches but surprisingly ignores the issue of how to use, incorporate, and place in priority the burgeoning area of research information translated into "design guidelines." It is surely this kind of research presentation—for example, Sandra Howell's *Design for Aging* and Diane Carsten's *Site Planning for Elderly Housing*—that professional designers are most likely to see and use.

In contrast to *Methods in Environmental and Behavioral Research*, edited by three social scientists, Robert Wehrli's *Environmental Design Research: How to Do It and How to Apply It* is written by an architect who took a career detour through environmental psychology and became chief of architectural research at the National Bureau of Standards. Ironically, considering the usual criticisms of social scientists by architects, the first book is far more readable and jargon-free, while Wehrli's book on the same subject tends to be dense and off-putting in its length, print style, format, and almost total lack of illustrations.

This is unfortunate because, in a number of respects, the second book deals with areas quite ignored in the first book—areas of interest to architects. For example, a chapter on "How Information Is Applied in Design" describes the design process as a series of phases and relates the kinds of research information affecting each phase, with many real-world examples. Most social researchers—although now alerted to the need to present behavioral research for designers in a succinct, illustrated format—are relatively ignorant of the complexity of the design process and of the often conflicting demands of budget, codes, user needs, etc. While Wehrli doesn't tell us how to balance these demands, he does present a clear and coherent account of the different stages of design.

A chapter on the essence of scientific research informs the designer about basic criteria and vocabulary, so that research being consulted can be reasonably judged for its validity. A chapter on "Methods of Environmental Design Research" ranges far too wide, in my opinion—from build-

continued on page 41

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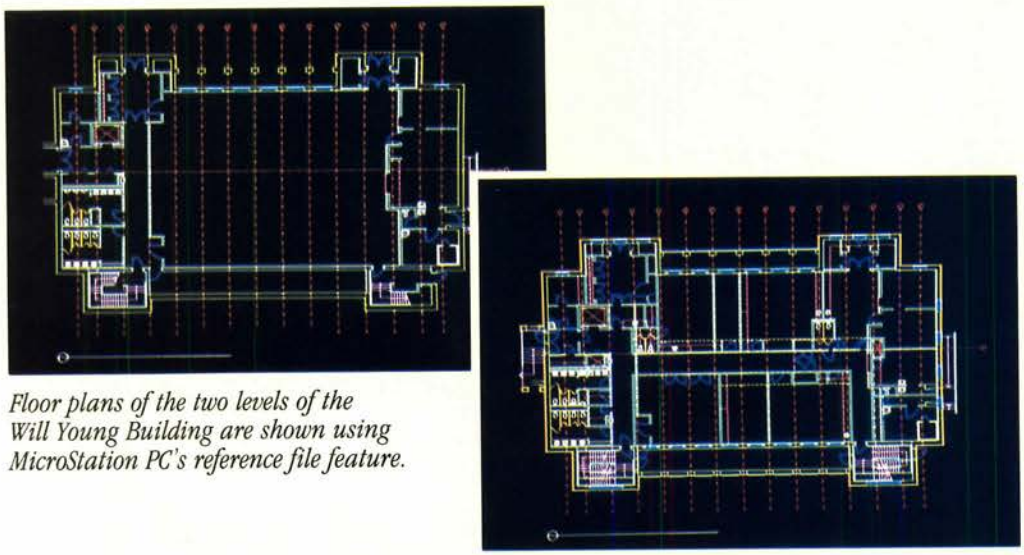
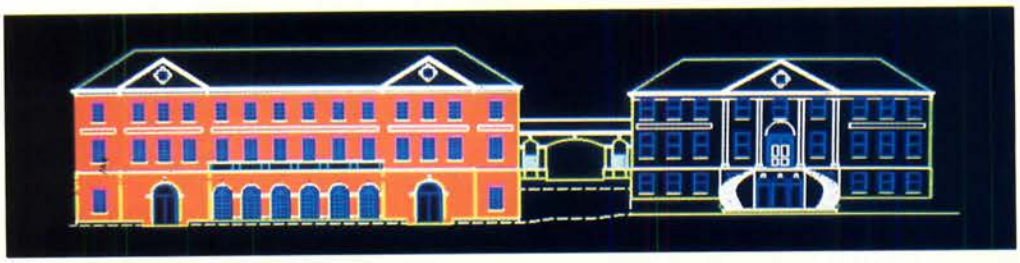
How MicroStation works for Dennis Yates Associates

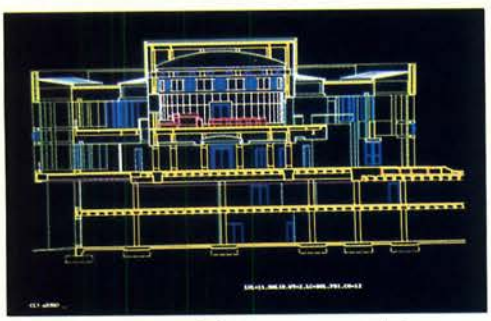
Dennis Yates Associates is an architectural firm in Concord, N.C. Using MicroStation PC, they designed the Governmental Center for Cabarrus County in Concord and also the Will Young Building, an educational and fellowship facility for the First Presbyterian Church.



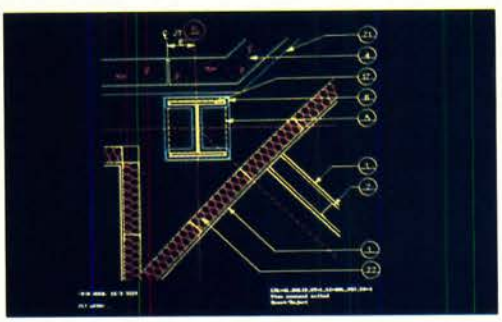
Floor plans of the two levels of the Will Young Building are shown using MicroStation PC's reference file feature.



Representation of the Will Young Building attached to the existing building



Building section of the Governmental Center, designed with MicroStation PC



Column details of the Governmental Center, designed with MicroStation PC

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Books *from page 39*
ing performance and economics to market research and postoccupancy evaluation. It tries to cover too much and covers nothing in enough detail; less than three pages on postoccupancy evaluation compares poorly with 31 pages in the book by Bechtel, et al.

But Wehrli's book includes some intriguing chapters not usually found in texts on research. One on successful research writing is comprehensive and useful; however, this chapter might have been complemented by one on research *illustration*, since that seems to be one of the keys to communicating research to designers. Chapters on "Writing Winning Proposals" and "Go-Getting Grantsmanship" provide practical information on funding sources and structuring research proposals.

Perhaps the most provocative section deals with what prevents research (technical, behavioral, structural) from playing its potential role in informing design decisions. Wehrli proposes four myths: the "design-is-research" myth, the "research-cannot-be-applied" myth, the "no-information" myth, and the "know-it-all" myth. While it may be useful to find commonalities between research and design, and while "designers confuse their creation of a new architectural form with the creation of new knowledge,...sharply defining the line between design and research is a healthier attitude...Research informs; design forms."

Wehrli contends (and I concur) that "the research-cannot-be-applied myth must be quietly buried." Much research on acoustics, materials, lighting, etc., has found its way into codes and textbooks. Research on behavioral needs in particular building forms is now available in numerous jargon-free, highly illustrated books of performance guidelines, such as those dealing with housing for the elderly, nursing homes, play areas for disabled and able-bodied children, and site planning for family housing.

The no-information myth is palpably absurd; information abounds. This myth "avoids the problem of selecting among available information sources by a diversionary tactic, that of ignoring the sources altogether. Declaring an absence of information, the designer escapes any obligation to tap it."

The know-it-all myth is perhaps understandable, considering the breadth of knowledge already required of designers. But, Wehrli declares, "they must flex their muscles and accept heavier loads....The advance of research is inevitable and its benefits for building users and city dwellers inescapable."

In short, Wehrli concludes, "Scarcely any profession other than that of designers finds itself struggling so desperately to enter the modern age of technology while preserving the spirit of its art traditions....However, it is not essential that designers...set aside their old beliefs, for environmental design research will forge ahead without them." Better still would be forsaking the myth described above, "putting the needs of clients and users foremost, and finding a way to integrate science and art."

Wehrli's book, while somewhat heavy-handed as a how-to text, raises important questions that the architectural profession can no longer ignore.

—Clare Cooper Marcus

Ms. Cooper Marcus teaches in the college of environmental design at the University of California, Berkeley.

The Lost Meaning of Classical Architecture. George Hersey. (MIT Press, $9.95.)

Yale historian George Hersey has provided three useful lessons in *The Lost Meaning of Classical Architecture.* One is that, to study an ancient (or even simply a foreign) culture and its correlative architecture, you have to adopt its "head"—its whole way of thinking. We tend to take for granted our ways of perceiving and thinking, much as a fish assumes water is the only livable environment. Thus, through our ignorance, we can and do insult foreigners by the very way we walk or stand. Our appreciation of our brief past as a nation is similarly myopic, and it is increasingly difficult to understand exactly how a given historical figure, say John Adams, really thought and felt, even though he spoke something like modern American English.

And what about a truly ancient and foreign culture and its correlative architecture? Well, one could do as the postmodernists do—ignore the culture (too much work) and simply soak up the images, let them roll around in the head for a while, and then let them settle willy-nilly like dust on the drafting board. Or one can go through the bother of learning the language, ancient Greek. Language is the nexus of culture; architecture its reflection.

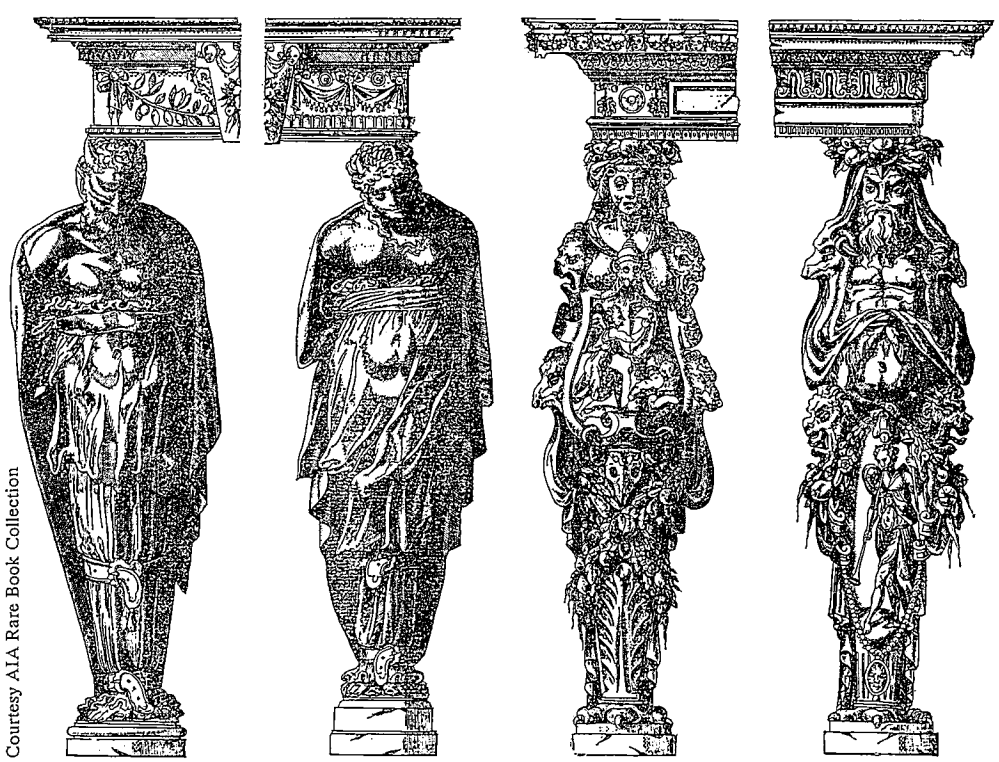
Hersey's second lesson is that once you have the basic tools you have to use them properly. Unfortunately, we have suffered a great reduction in our modes of considering, analyzing, and comprehending. Already by the 13th century the secrets of classical architecture and its culture had been lost. Renaissance architects never really quite recovered it (and Hersey takes us through many amusing fumblings—much Renaissance theorizing about architecture is mumbo-jumbo), but they left enough headway for later resuscitation. And it's a good thing they did, because the original source material is gone. Vitruvius makes reference to ancient Greece's "60-odd architectural treatises." How many were still around in 1304 in Arabic or Latin is debatable. None is today.

Following the Renaissance's "artist's version" of classical architecture we got the archeological (positivist) version in the 19th century. Thus we have exact physical scale copies of the Parthenon hither and thither (the closest one to me is in Nashville, Tenn.) built with zero understanding or authentic feeling.

The appropriate methodology Hersey uses turns out to be something like literary analysis, a cultural vestige of associate reasoning that, until recently, appeared to be on its way out even in its home base of literature departments. Its purest creative outlet is poetry; its purest intellects

continued on page 42

Below, from The Lost Meaning of Classical Architecture: *four of 36 figures by Hugues Sambin in* De la diversite des termes, *1572, a 'new degree of monstrosity in architectural thought.'*



Courtesy AIA Rare Book Collection

Books *from page 41*
are critics of poetry, such as Harold Bloom (who is also of Yale and also likes to fool around with ancient Greek words).

Language in ancient Greece was still in the process of forming, not just in vocabulary and structure but in its relationship with thinking. Words that sounded alike or were spelled somewhat alike were assumed to be connected in meaning, connotation, denotation, etc., in a way that positivists today would consider childish. It wasn't childish to the ancient Greeks; it was how they thought. For example, we see a green, metal highway sign that says "Manhattan" and think of no more than our arrival in the chief borough of New York City. An ancient Greek would think of that, as well as men, hats, the number 10, green trees, emeralds, shields, money, sweet amber drinks with cherries plus a host of other spirits, and a variety of puns and rhymes like "ban Latin"—all equal in value as the utility of the various meanings might pass in turn.

By a strenuous effort to replicate such processes, Hersey "deduces" that caryatids and telamones evolved out of real-life prisoners tied to wooden pillars, that guttae are drops of rendered fat dripping from their surmounting triglyphs, which were sacrificial thighbones chopped in three. And that the tympanum was (as it remains today in the symphony drum) a structure of bones covered with animal skins. Egg and dart moldings are chicken talons surrounding eggs (and sometimes yokes). By the time he gets done you get the sinking feeling that the only common, enduring Western style of architecture has been "ours" in only the shallowest of ways.

Yet Hersey has done us a service. He has awakened us to the great reduction of knowledge (and, more importantly, ways to get knowledge) we have suffered from since Comte. It comes as a shock, as Petrarch's work must have. We're in another dark age. Imagine! Not only is classical architecture a set of vacant, more or less pretty images to us, but we even have to "richen-up" our now impoverished language (and the way we use it) to get any inkling of the breadth of our ignorance. In the gentlest of ways Hersey points out that Allan Greenberg, who is the last working Beaux-Arts trained architect (the product of a fortuitously backwater colony) hadn't the vaguest idea of what all that detail meant that he is so adept at manipulating.

The third lesson is that in general our current knowledge of and renewed interest in ornament and decoration are hopelessly misguided. Hersey is tantalizingly reticent here, preferring to be seminal rather than know-it-all. "Ornament," he points out, used to mean "equipment." A Greek general ornamented his army with shields and spears; after successful battles they would ornament their temples with the shields and spears of the vanquished.

The way we normally use and think about the words ornament and decoration is entirely different from that of the ancient Greeks. We are stuck with the idea of "pretty but dumb" and can't get by it, while the real key to Greek ornament and decoration had nothing to do with beauty, esthetics, attractiveness, or prettiness in any of their modern senses. Instead, ornament and decoration had to do with equipment and meaning, or signifying. All architectural detail *meant* something and, for the ancient Greek, could be literally read like a book. When the people of the West lost the ability to read buildings, Victorian decorative gibberish or art nouveau vegetation became possible. So did no decoration at all.

What should we do now? Classical is all we have for the moment (and not for the first time). Gothic is hopelessly "special," typologically mired in churches. We understand pagodas even less, though we're lately putting them in our history books in an egalitarian (and unilateral, as usual) mood. Modern foundered between moralism, the shadow classsic (Mies is a classical architect now), and the Giedion/Einstein party line about space. The last was an elitist, emperor's-clothes type of trick, and ordinary people soon tired of being fed the hole instead of the doughnut. Postmodernism, achingly intelligent while carefully unintelligible—desperate to maintain some Masonic secrets now that the moral and spatial jigs are up—has been firmly skewered by the pop-culture movie "Beetlejuice" as truly stupid.

So, just when classical starts to look good again, Hersey ruins the game. It was buildable when we were ignorant—but how can we do it now that we know all this chicken-bone stuff? How can we endlessly rebuild very specific meanings of ritual and sacrifice that haven't been culturally relevant for 2000 years? Ignorance was easier than hypocrisy.

We now have the same chances that Alberti had: truly to know ancient architecture and to go beyond it by injecting our *own* meaning into it. That was in fact Petrarch's ambition: not to copy Roman stuff but to understand what secrets had made their age superior so that Renaissance people could use those secrets to create and typify their own achievements. It never happened. The Renaissance slipped into mannerism, just like today, and architects manipulated empty images instead.

We have a chance here to surpass both the Renaissance and Periclean Athens by building meaning, as Athens did, and trying hard to forget the dead end of ornament and decoration in the pretty sense we know it. The results will be automatically beautiful, just as one's own child always is—no matter what he or she looks like.—David Clarke, AIA

Mr. Clarke teaches architecture history and management at Southern Illinois University, Carbondale.

Interior Design Illustrated. Francis D.K. Ching. (Van Nostrand Reinhold, $21.95.)

Frank Ching has extended his books on architecture to interior design. Although this book is devoted to interior design, it is essentially Ching's continued exploration of another facet of architecture.

Ching's books are handmade, hand lettered, and hand drawn; and, although their success has stimulated a plethora of imitations, none approach his mastery and skill in this medium. What makes Ching's books a joy to hold, good to read, and excellent teaching tools is that the medium is indeed the message. Drawings—and I include his hand lettering in this category—speak on a level other than words. Readers are instructed on both levels.

Interior Design Illustrated has five chapters: interior space, interior design, design vocabulary, interior design elements, and interior environmental systems. The book defines space and its enclosure and combines the elements of design with the elements of structure. Like Ching's other books, it accomplishes the most difficult task of all—the one at which most design studios fail miserably—the synthesis of the elements of architecture.

The book also contains design criteria and evaluation and describes user reqirements and the elements of programming. There is a quick method for drawing perspective. Color, texture, and lighting are addressed.—Forrest Wilson

The Practical Specifier. Walter Rosenfeld, AIA, CSI. (McGraw-Hill, $29.95.)

According to the publisher, this manual of construction documentation for architects supplements the training that architectural specifiers receive in the field. Rosenfeld provides tips and procedures for coping with the everyday problems that arise during the specification process. Topics presented include writing a master outline spec, drafting tentative sections to ward off deadlines, and the "seven sins of specifying." The book may be used as a supplement to the Construction Specification Institute's *Manual of Practice.*

The Spec Guide. The authors of *Solar Age* magazine. (Solar Vision Inc., $49.99.)

This is the eighth edition of *The Spec Guide,* first established in 1978 to provide architects and specifiers with reference to the variety of energy products and equipment available. The new edition contains more than 1,000 products.

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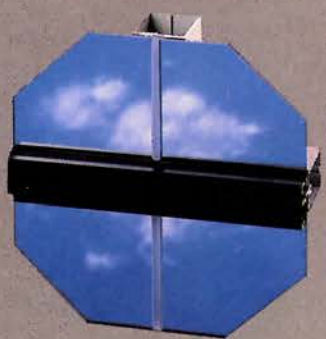

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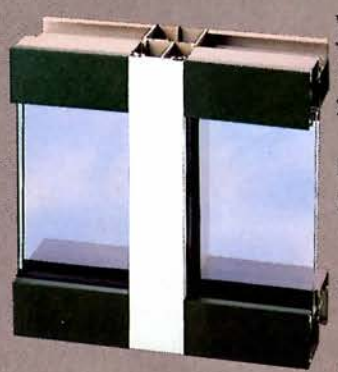

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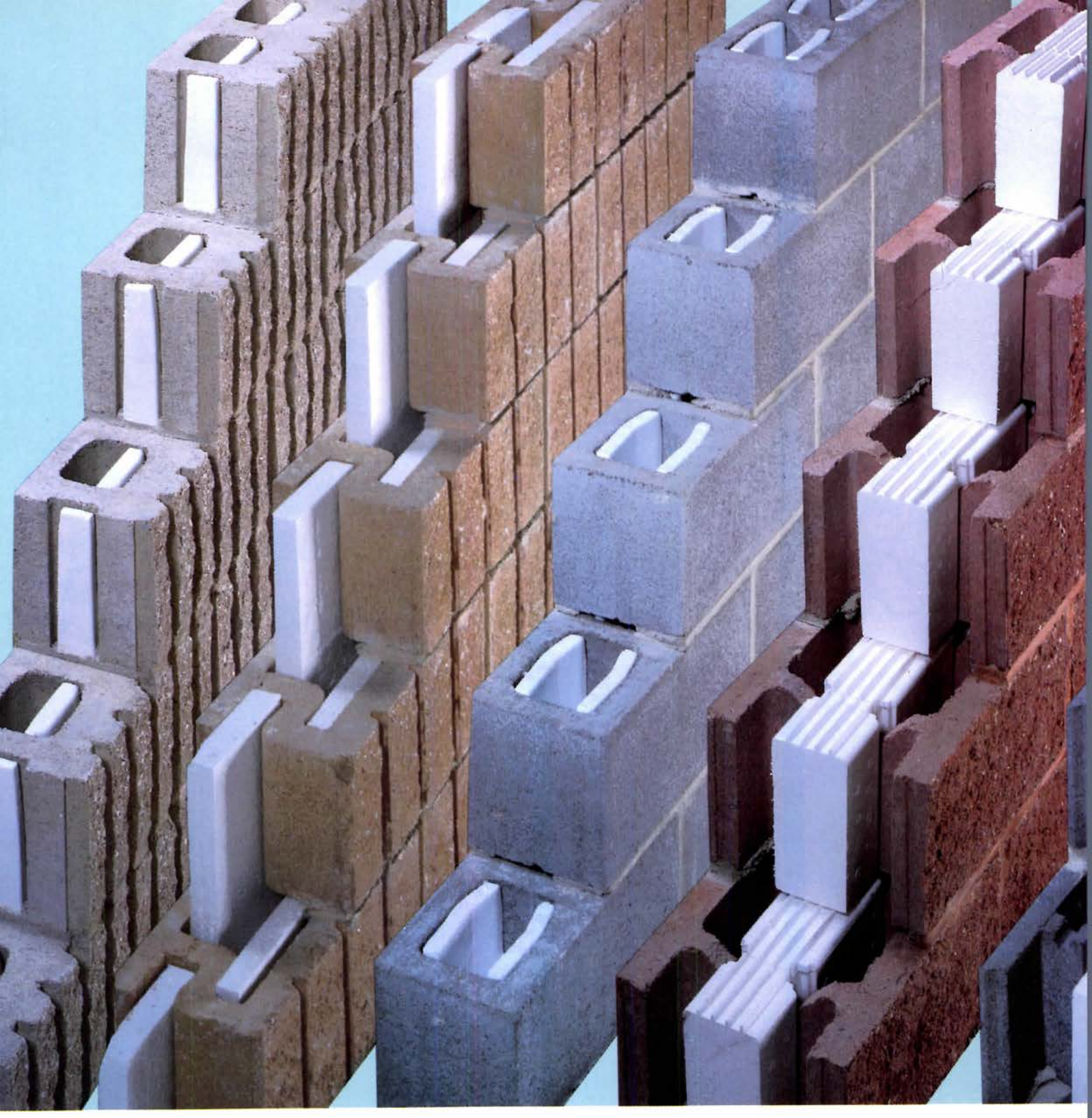

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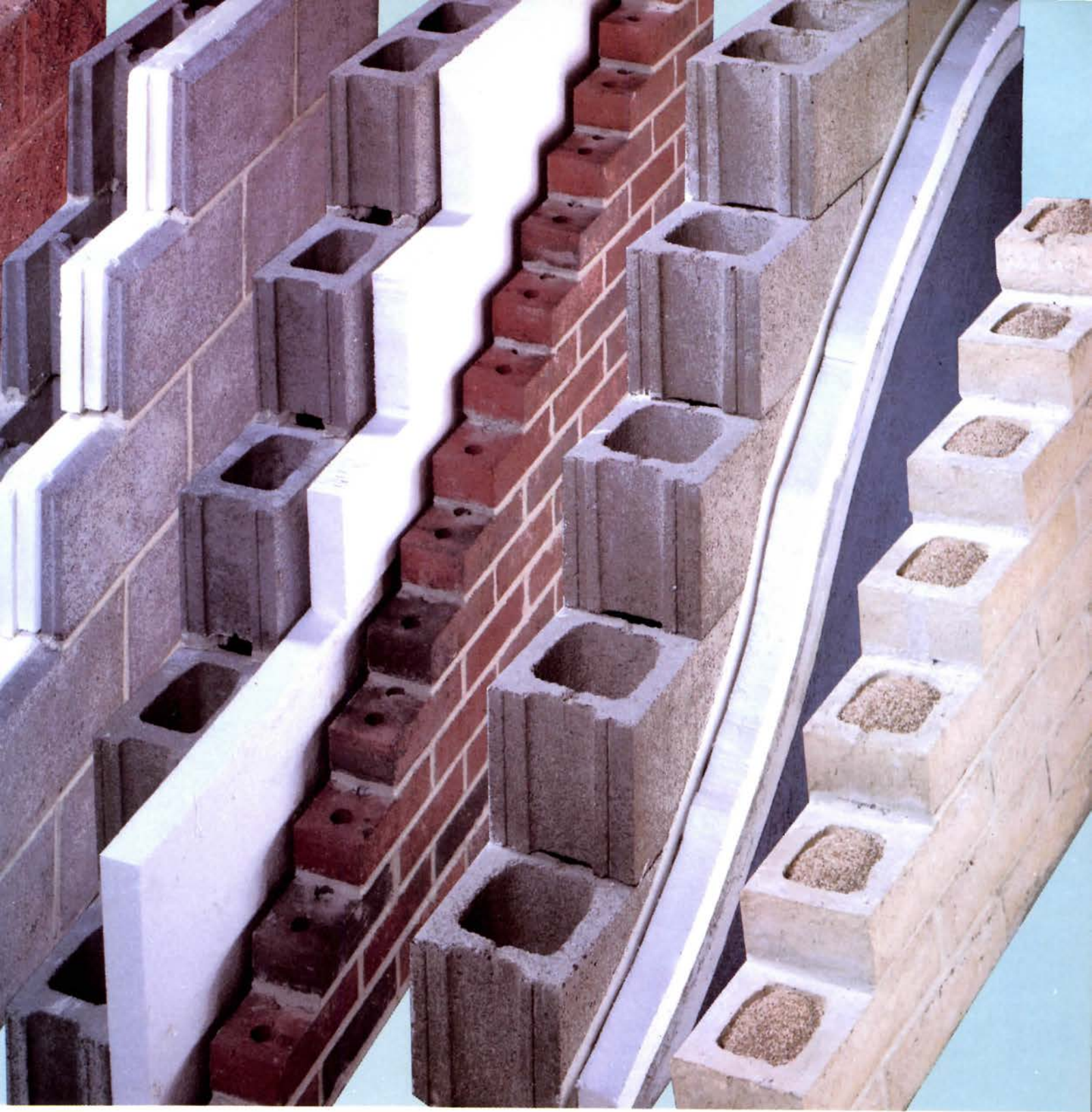

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ARCHITECTURE

Recently there have been rumblings of a reaction against contextualism. Diehard modernists regard it as a handmaiden of postmodernism, which they sense to be in retreat, and yearn for the good old days when the approved way of reaction to a rich, old, decoration-laden context was to contrast with it in every way possible. The successors to the postmodernists in the avant-garde are more interested in chaos than harmony or counterpoint and resist having their exploding forms constrained by the surroundings. Sometimes, in fact, they describe these forms as frontal attacks against their surroundings. They also reject many of the historicist responses to context of recent years as "pallid" and retrogressive.

It will come as no surprise to regular readers that in this corner contextualism is still highly valued. Indeed it is one of the most salutary developments in architecture in many years and the most positive legacy of postmodernism. (If indeed postmodernism is sufficiently in the past to speak of it in terms of legacies. We're not so sure.)

At any rate new buildings need to be thought of as building blocks of larger environments, not as isolated events but as contributions to a continuum of time as well as space. To put it simply, we can't build satisfying cities by treating each new building as if it stood alone, however proudly.

The building of cities will be the subject of the December issue (originally scheduled to consist of firm profiles, which will be moved to February of next year). December will deal with urban affairs in general, with urban design, and with individual buildings in urban contexts.

Another scheduling announcement: The January issue will deal with works of American architects abroad. As always, ideas and submissions are welcome for both issues. Deadlines will be Oct. 1 for the issue on cities, Nov. 1 for the overseas issue. The current issue contains our annual set of profiles of architecture schools.

—D.C.

Close-Knit Band Of Individualistic, 'Feisty' Students

Yale University school of architecture.
By Michael J. Crosbie

T. Charles Erickson

Yale University's school of architecture in New Haven, Conn., grew out of the nation's first university gallery, the Trumbull Art Gallery, which opened in 1832. The Yale school of fine arts commenced a generation later, and in 1905 instruction in architecture began, growing into its own department in 1916.

The architecture program has shared with its sister arts of painting and sculpture full enfranchisement as an academic pursuit at Yale, which distinguishes the school from its counterparts at other universities. "The founding of the painting department at Yale in 1840," explains architecture professor Kent Bloomer, "legitimized the fine arts as a part of higher thought in America. The fine arts had been considered subordinate to other kinds of thought. Yale is different from Harvard in that respect. Harvard calls its fine arts the history of art. Yale calls the fine arts the actual making of things. It mixes practice with reflection."

By coincidence or design, the architecture school has been marked by a consistency of attention to the practice of architecture. Most of the school's heads have been not professional academicians but practicing architects. Thomas H. Beeby, AIA, who started his tenure as Yale's dean in 1986, joins a list of predecessors that includes the late Wallace K. Harrison and George Howe, Paul Rudolph, Charles Moore, FAIA, and Cesar Pelli, FAIA.

Yale's is a graduate program, although there is an undergraduate major in architecture available to Yale College students. Most grad students are enrolled in the first-professional degree program leading to a Master of Architecture. The school also has a two-year, postprofessional M. Arch. program for students with professional architecture degrees, and a two-year, nonprofessional master's degree in environmental design for independent study. The total graduate student population is fewer than 150—a small school—with all but 20 students in the first-professional degree program.

The small student body lends a close, almost cozy feeling to the place. Beeby describes it as "family-like," with students and faculty on a first-name basis with each other. The students I spoke with described a culture of support among their fellow classmates. "One thing I found extraordinary when I came here to visit," says one first-year student, "was that people were willing to put down their work and talk to you. It's a very friendly atmosphere; people help each other. There's a certain amount of competitiveness, but you find that anywhere."

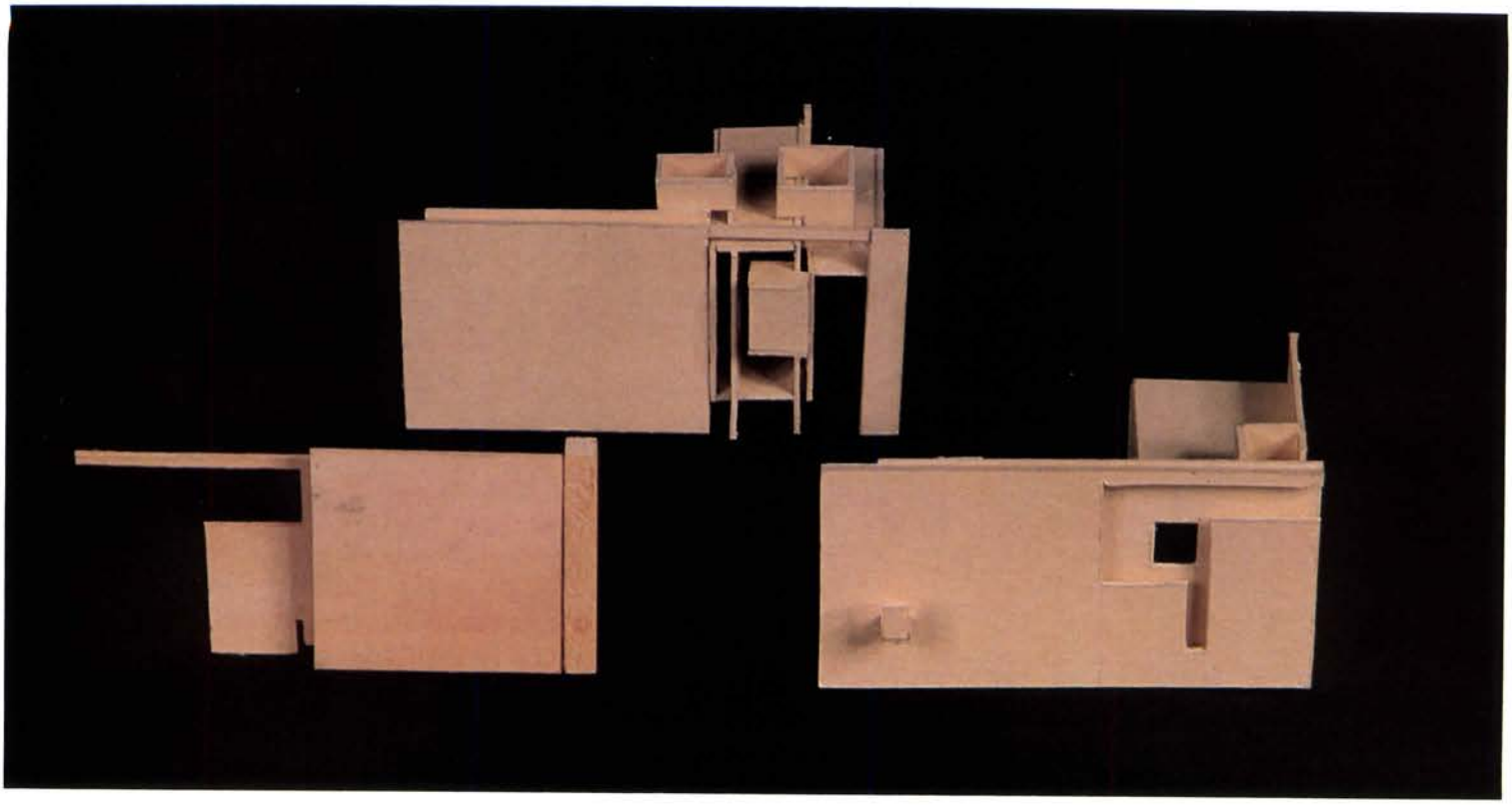
Yale architecture students are typically not timid about letting their views about the quality of their education be known, and they are involved in the workings of the school. They sit on various committees, including admissions, publish one of America's oldest architecture school journals, *Perspecta,* and have instituted a lively, informal broadside in the form of "Rap Sheets" where in-house contributors debate issues relevant to the school and the discipline. The students organize symposia, exhibits, and lectures and are frequent visitors to the dean's office, laden with petitions to expunge faculty members or otherwise influence the direction of the school.

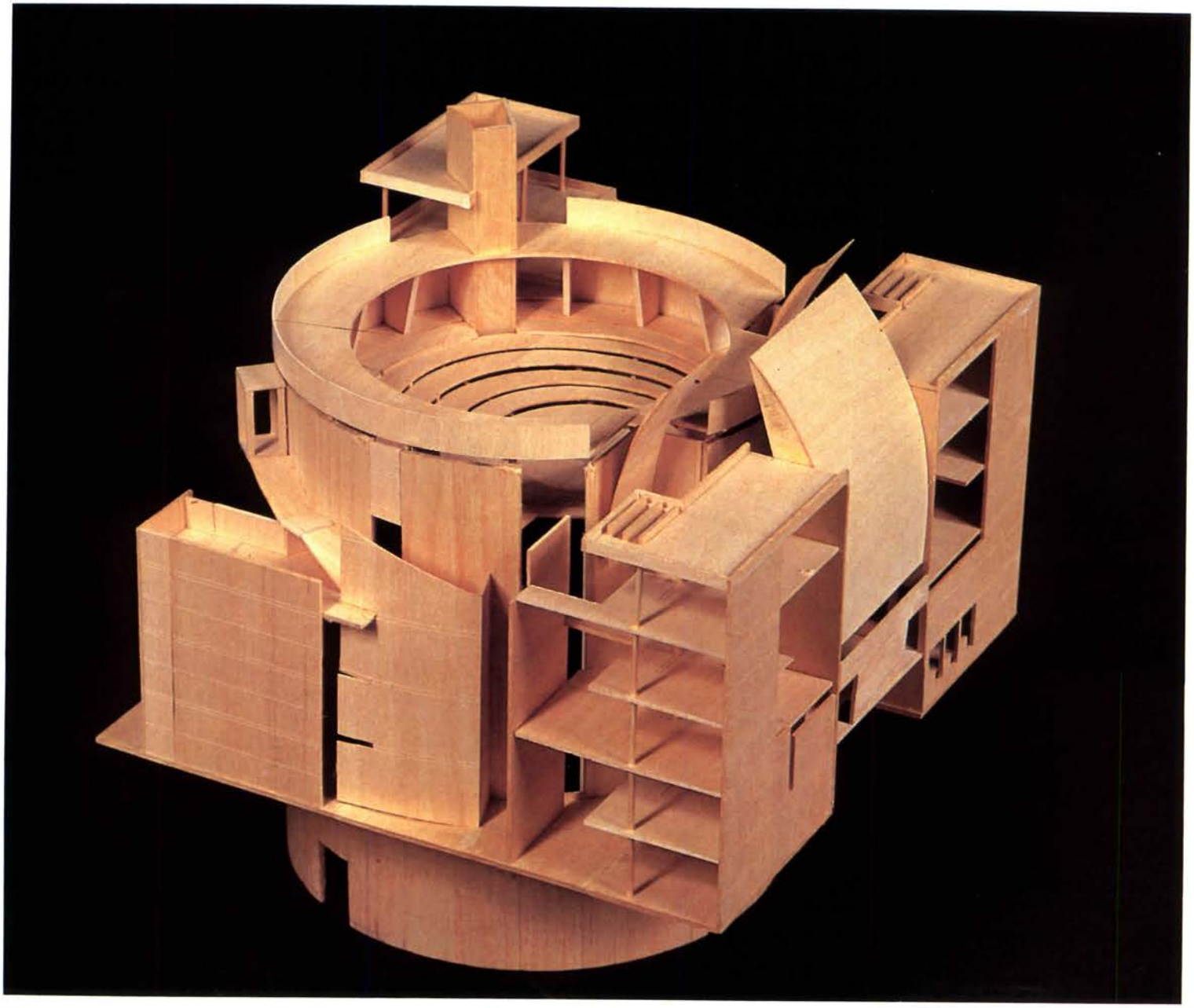
"The students are feisty," says Alan Plattus, who has taught at Yale for the past two years. "They're independent minded, some of them stubborn. I think that quality is passed down from year to year. There's almost a 'laying on of hands,' a process by which the upper-level classes give the entering class a sense of what it means to be a student at the Yale school of architecture. They're challenging, hard to teach, but fun to teach. They don't take anything for granted. You have to continually establish not your authority but your interest and your commitment to what you're doing."

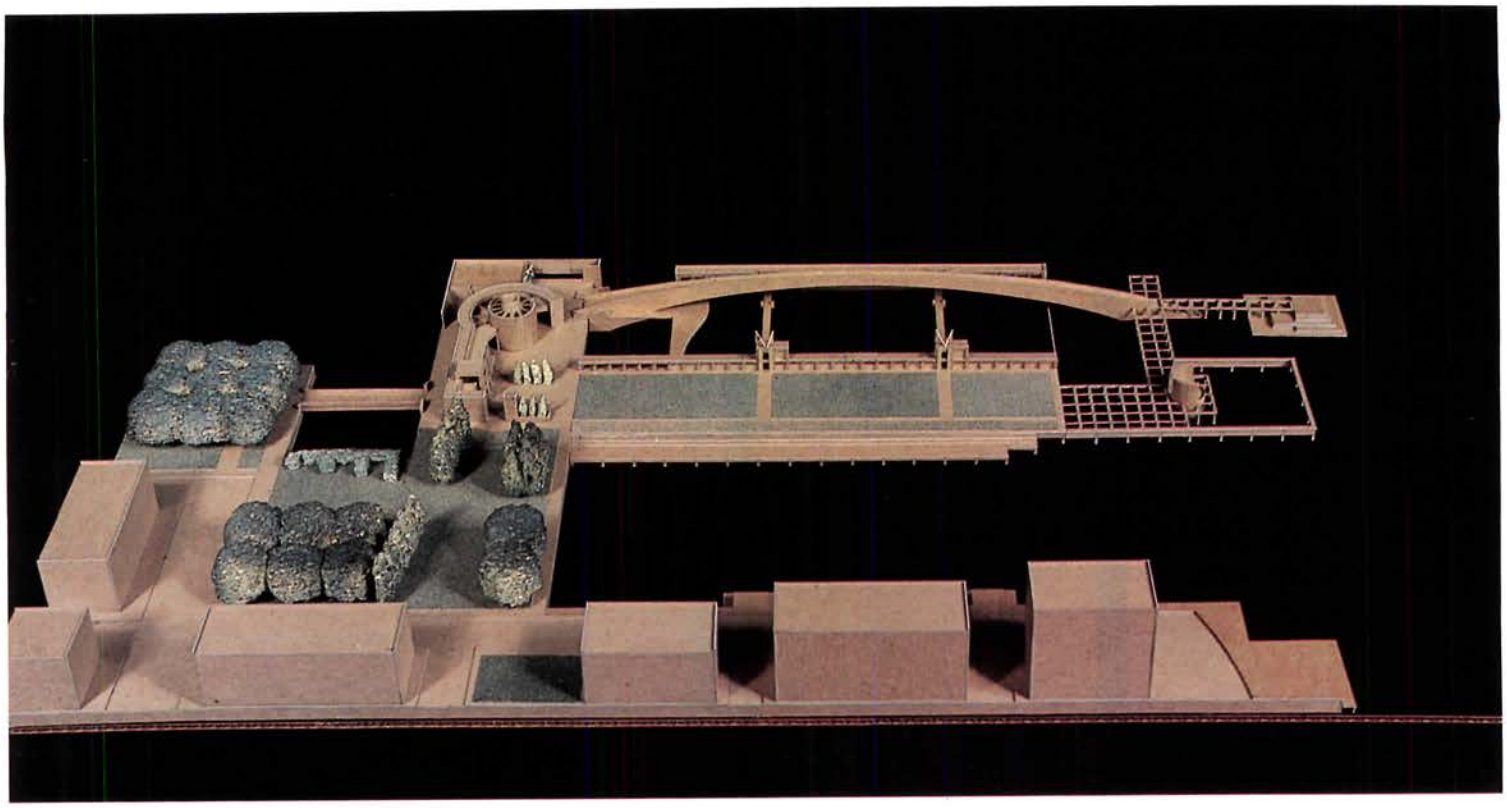
Other elements of the Yale student persona are self-motivation and an emphasis on individual exploration of the discipline. Because there is no reigning design ideology at Yale (although there is a certain broad-based affirmation of architecture as a built, three-dimensional reality) the students are expected to develop a personal, internally grounded approach to architecture. Beeby points out that this quality has marked the school for decades. "It has a consistency to it that has to do with ideas of self-realization, of actually being able to pursue your interests with a vengeance, and have the institution support you." There is something quaintly American about this approach—ruggedly individualistic—and Yale architecture grads have made their reputations primarily as sole practitioners or within small offices.

The predilection for personal exploration means that Yale students need to propel themselves through the program. "Somebody who needs to be spoon-fed will not do well here," one student explains. "This is not a good place for someone looking to live by a set of rules." The theme of finding your own path in architecture makes the desk crit particularly challenging to the studio professor, who tries to divine what the student's architectural motivations are and how they can be articulated.

Above, Art & Architecture Building. Right, above, house for an art patron by Natalie Gray; below, Manhattan theater complex by Alan Organschi; both with George Ranalli as critic.







"If you seem to be solving a design problem for them," says Plattus, "they'll say, 'fine, you know how to solve it, but I have to figure it out for myself.' There's more engaging of students on what they're trying to do at a conceptual level. Students here are very wary of anything that smacks of dogma or canonical ways of designing. It forces you as a design teacher to be much more oblique about the criticism you give."

All but a few students seem comfortable with the notion that Yale does not espouse a single architectural ideology. In fact, many say that the school's openness to entertain any approach to design is the reason they chose Yale. "The attitude of the school is that it's a place where resources can be brought and students can be exposed to different ideas and issues and theories," says associate dean Martin Gehner. "Then the students have to be in a position to say that this is a path to pursue or not."

The approach is liberating to some students whose backgrounds have constricted their exposure to architecture in its various guises. "I got my undergrad degree from Cornell, a place that was very dogmatic, and for me Yale's been a great experience as a complement to that," says a third-year student. "You're free to explore what interests you."

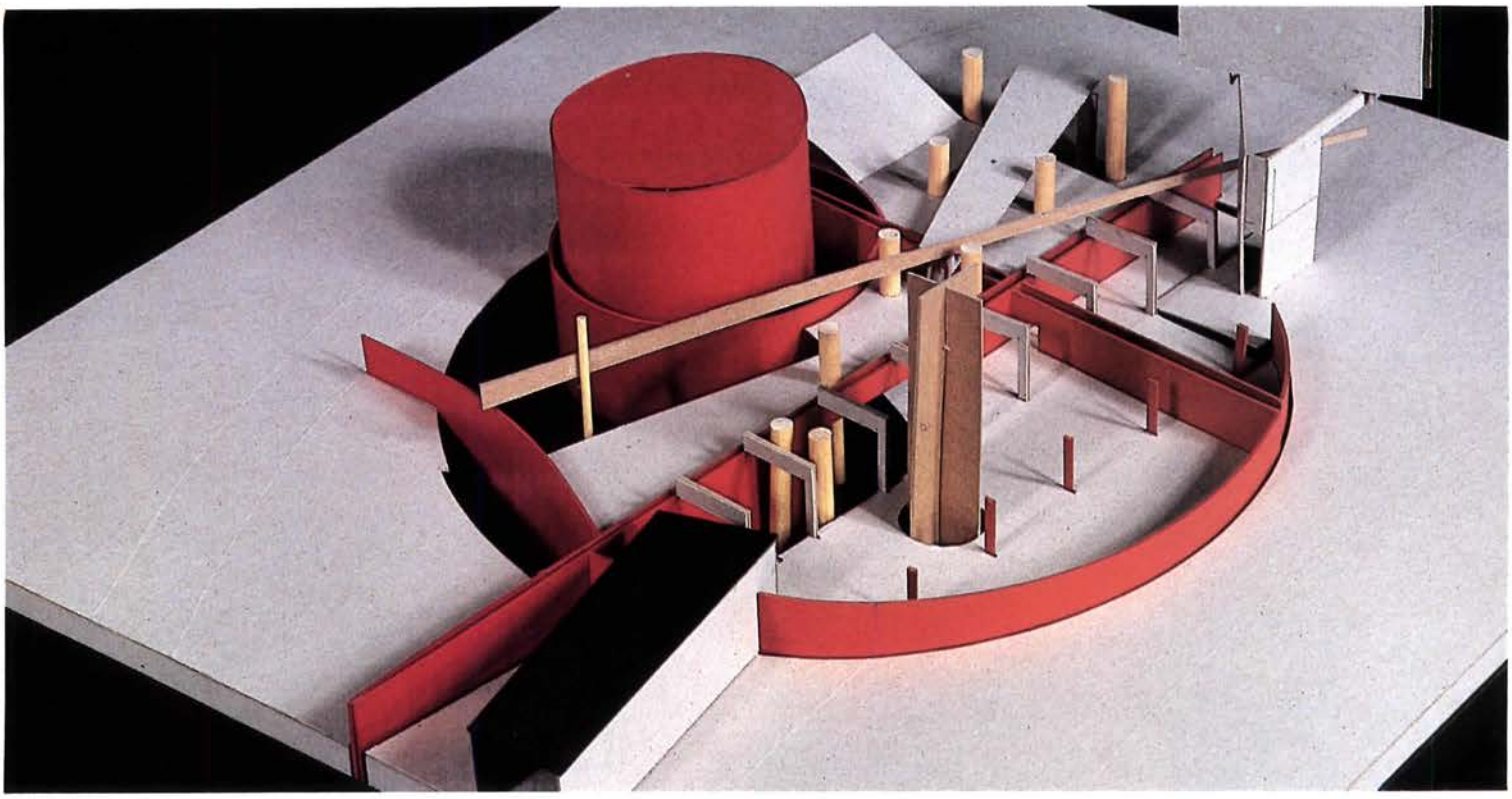
Yet the freedom dictates a certain rigor on the part of the students to construct their own context of architectural expression, to find their own voice. In a sense the school encourages students to become not what the school represents, which is a repository of contemporary approaches to architecture, each presented in as nonjudgmental a fashion as possible. The students who gain the most from the school will develop their own system of architectural values from which they can make design decisions.

"If you take a position within a range of positions that could be taken," a student explains, "then you'd better well be prepared from beginning to end to set that position clear. Theoretical foundations are everywhere. Everyone tries to come up with a thoughtful validation of what they're doing. They crit you on the strength of your ideas—not whether they're the right ideas, but whether they're clear to you if that's what you intend."

The three-year, six-semester M. Arch. curriculum is structured to give students a broad understanding of architecture as a discipline and a profession, and then to provide them with opportunities for exposure to the leading practitioners and theorists of the day as grist for the mill of personal exploration. The first three semesters are defined as the core, where students are occupied with required courses in building science, drawing, environmental systems, history, and theory, with a smattering of electives. As in most architecture curricula, the bulk of the time is devoted to studio. The studio courses are taught by full-time faculty, recurrent visiting faculty, and local practitioners. The design problems start as basic, formal introductions to the issues of scale, form, space, circulation, etc., and grow more complex and longer in duration.

Michael S. Crosbie

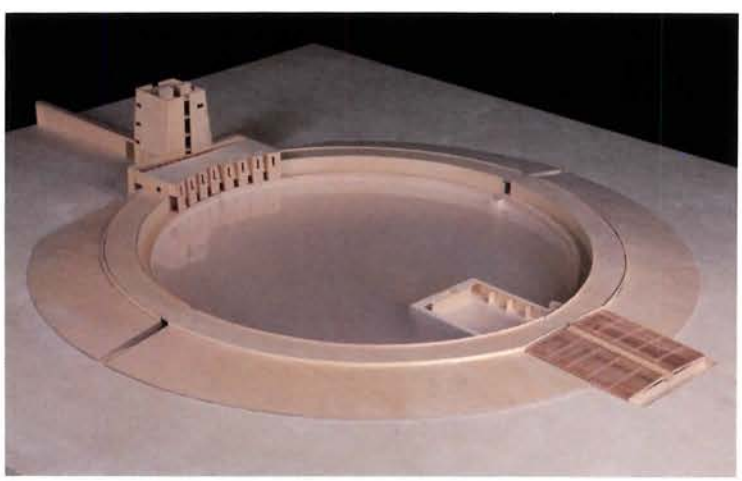
Part of the second-semester studio is devoted to a building project—a program instituted by Charles Moore that has shown amazing resilience amid the changing fashions of architectural education over the past two decades (see Oct. '85, page 81). It's now become a full-fledged Yale tradition and one of the most popular design projects among the students. Each year the entire first-year class constructs a group-designed public building in a local town—this year's project is a barn in East Lyme, Conn. "Once you've done extensive work on your building project," says one student, "there's no question in your mind what a grade beam is. You know it. You get your hands dirty. There's no experience like going out in the field." Academic class identity is strong at Yale, in large part due to the building project, which can galvanize a class and give rise to some stars on the building site whose talents were not evident in studio. A number of students complained that in the past few years the projects have gotten larger and more unwieldy (last year's project, a 2,000-square-foot concert pavilion in Bridgeport, Conn., is now nearing completion, delayed because of the city's building moratorium after the L'Ambiance building collapse—see Dec. '87, page 40).

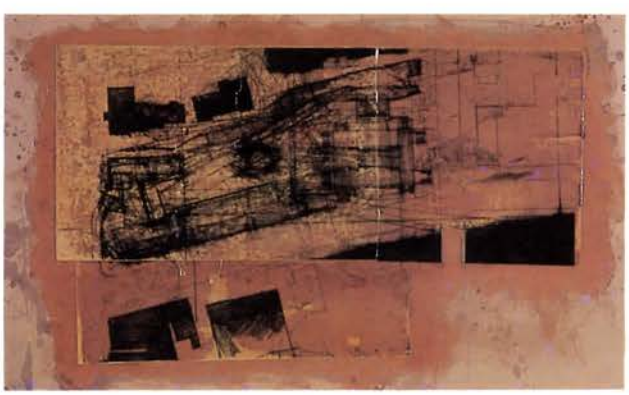


Refining and strengthening the core has been one of Beeby's pet projects. He teaches in a core studio and views the sequence as essential to giving the student a basis from which to build a personal architecture. "In a world where ideologies are rampant and don't seem to be approaching each other with any coalescence, you're confronted with choices," says Beeby. "There has to be a common ground to discuss and compare these things, and an architecture school is where it should happen. The core is where you get structured, didactic information, so by the time students reach the end of core they not only ought to be prepared to do the work and have technical skills but should be critically attuned where they can question the premises of the advanced studios."

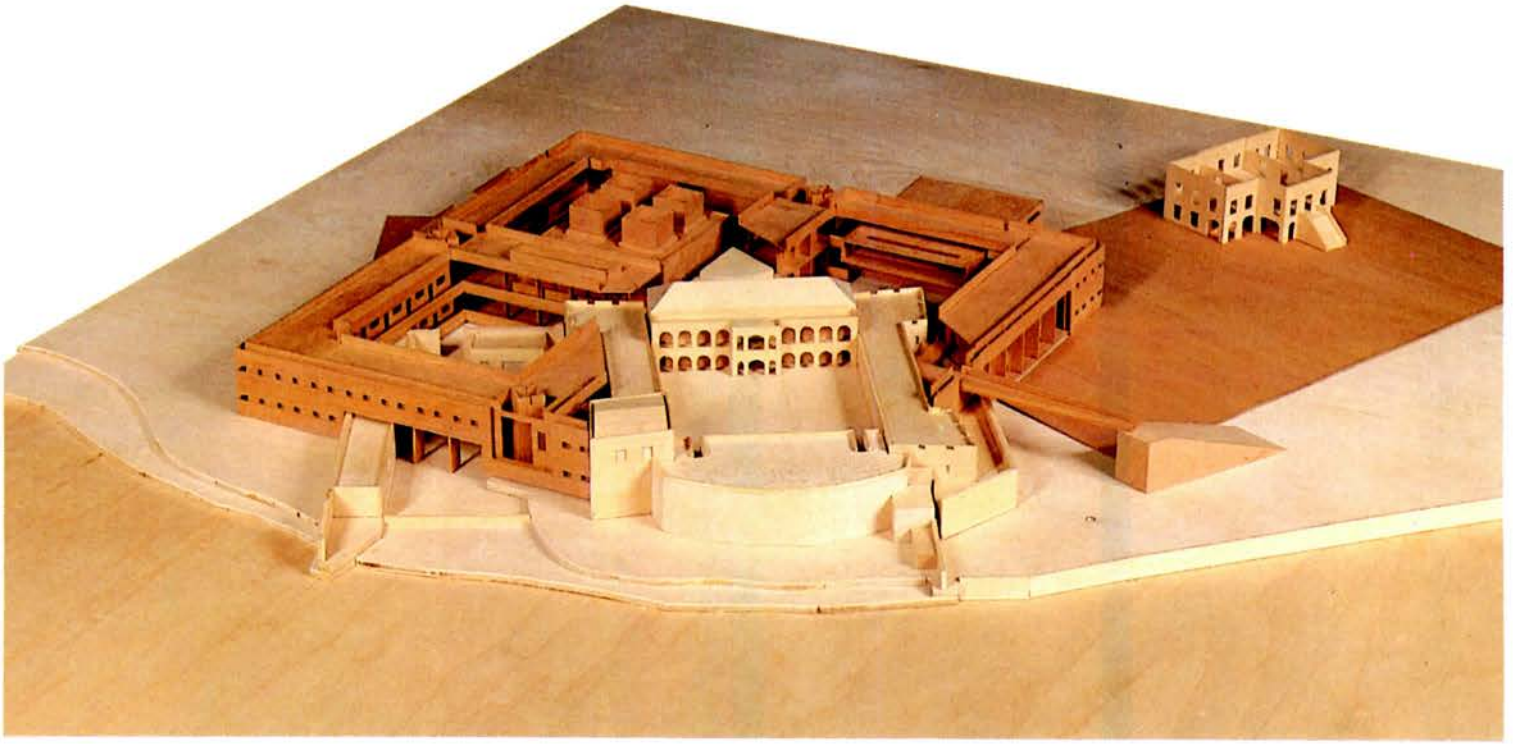
To that end, Beeby has pumped up some previously uncoordinated theory courses into an "objective, nonideological survey of architectural theory from Vitruvius to Venturi," as he describes it. The mere process of selecting what to include in such courses is subjective, but the students have found the courses, especially the introductory survey taught by Plattus, absorbing. Fine-tuning the core and coordinating its content have been aided by a sense of congeniality and cooperation brought by Beeby. "There's been increased communication within the school," says associate professor Alex Purves, AIA, "particularly among the faculty."

Gearing the core's studio content for the first semester or two is made difficult by the mixture of incoming students, 60 percent of whom have undergraduate architecture degrees and the rest backgrounds in liberal arts or sciences. The content needs to balance between those struggling with a new discipline and means of expression and those who communicate with architectural buzzwords and are proficient in technical skills. "One year we had a student who had taken one drawing course sitting next





Facing page, above, master plan for a site in Hoboken, N.J., on the Hudson River to include a park and cemetery as a 'ritual focus,' by Laura Turlington, with Hugh Hardy and Malcolm Holzman as visiting critics; below, 1987 student building project concert pavilion nearing completion on a waterfront site in Bridgeport, Conn. This page, from top: planetarium complex in Flushing Meadows, N.Y., by Gilbert Schafer, with Bernard Tschumi as visiting critic; independent thesis project for water treatment plant in Kitty Hawk, N.C., by Anthony Markese; drawing and model of museum for modern architecture on the site of Yale's Art & Architecture Building, by Kevin Gannon, with Tadao Ando as visiting critic.



to a guy with a B. Arch. and seven years at SOM," says Kent Bloomer. "Here was a wildly undisciplined student who drew buildings like Turner next to a student almost constipated with too much undeveloped technical knowledge. We try to get the two to work on each other."

A number of first-year students with architecture backgrounds I spoke with reported that they found their first year occasionally boring, less intense than they expected, while the students new to architecture found their lives consumed with new ideas and terminology and inspired by their classmates' technique. The trained may envy the neophytes for their abilities to express fresh views of architecture, while they also pass on some tricks of the drawing trade. By the end of the first year, it's nearly impossible to distinguish the two groups. The best of the trained students have begun to question the assumptions of their previous education, and their nontrained counterparts can begin to appreciate architecture in light of their education in philosophy, history, literature, physics, whatever.

The students' work reflects their general concern for not appearing confined to a recognizable style or idiom, although for the most part the projects have a tentative, at times obtuse, affiliation with structural expression and the intricate, mannered collisions of constructivism. There's a resemblance to work you might find at RISD, Cooper Union, or SCI-ARC. But there's also classical expression, or commercial corporate developer architecture, which you won't find at those other schools. Most of the work is done in models, while the drawings have a transparent, ethereal quality. Working in models may be tied to the school's current widespread interest in architecture's "materiality," a word you often hear. Materiality has to do with how materials come together, how their connections are expressed, the craft of building, what some might identify as the very core issues of architecture as a physical construct. The preference for models may be a way for the students to explore these issues, albeit in miniature, but they're still making an object that is closer to architecture than a drawing.

The students stress process over product; they are interested in documenting with sketches or study models how the design evolved—a record of their exploration of an idea. Presentation technique is usually up to the student, although visiting critics may at times require certain kinds of drawings, which a few in the class usually will *refuse to do*. There's suspicion of presentations that look too polished or slick. "The suspicion has to do with the value of technique in a world of ideas," observes Beeby, "a suspicion of technical virtuosity at the expense of content."

The last three semesters of the program are devoted to some required lecture courses, more electives, and advanced studios. Most of the advanced studios are taught by a changing cast of the world's most celebrated architects. Local lore has it that Everett Meeks, the school's dean from 1922 to 1947, started the tradition of bringing in distinguished visitors when nearly the entire faculty resigned just weeks before the fall term began. Most architecture schools occasionally snare an accomplished practitioner or theorist for a jury or studio, but Yale's "star system" is institutionalized in the form of six chaired visiting professorships per academic year. Last year's visitors included Tadao Ando, Bernard Tschumi, Mario Gandelsonas, Werner Seligmann, Josef Kleihues, Hugh Hardy, FAIA, and Malcolm Holzman, FAIA. Visitors in the recent past have included James Stirling, Hon. FAIA (a yearly visitor between 1966 and 1984), Robert Venturi, FAIA, Aldo Rossi, Frank Gehry, FAIA, Helmut Jahn, FAIA, Arata Isozaki, Hon. FAIA, and Rob Krier.

The visitors are selected by the dean through suggestions made by the students and faculty. At the beginning of the semester, the visitors, students, and faculty meet for "the lottery," in which the visitors and faculty members outline the issues and projects that their respective studios will address, and entertain questions. The students rank the studios of their choice and, based on their seniority and history of first-picks, are assigned to studios. Apparently it can be a degrading experience for the visitors if the students react unfavorably to the studio agenda or challenge a distinguished guest about conducting a headless studio as a no-show critic.

"The students are assiduous about researching the work of potential visitors, poring over books and magazines in the library. If they don't like the way a teacher presents himself or herself, it doesn't matter how famous you are, they'll torpedo you," says Plattus. "They're demanding about how the studio operates, about the interest level of the problem, the involvement of the critic, and the critic's willingness to engage them in dialogue." Muses Beeby, "To ask someone who's an esteemed, renowned architect from another culture, where esteemed and renowned people are treated with great respect, to run through this meat market of show-and-tell presents some cultural problems. The students are somewhat sensitive to that, but they're interested in their education. I've instituted a lunch before the lottery so at least I can explain to the visitors what the implications are."

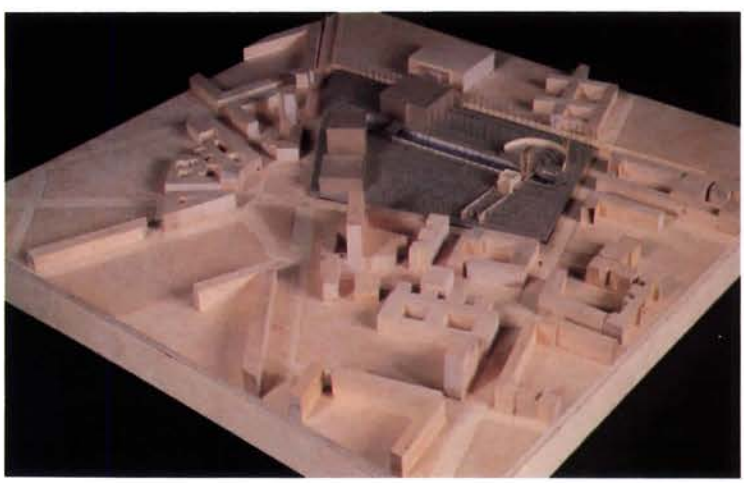
There are other questions as to the educational content of the star studios. Alexander Gorlin, AIA, who has taught at Yale since 1980, has found that, "if you're a visitor with a foreign accent, that makes you more exotic and therefore more in demand. Being a great architect doesn't mean you're a great teacher. We have visitors who can't speak English, and I don't care how great Mario Botta is, a lot of communication has to do with speaking as well as drawing." Ando had an interpreter.

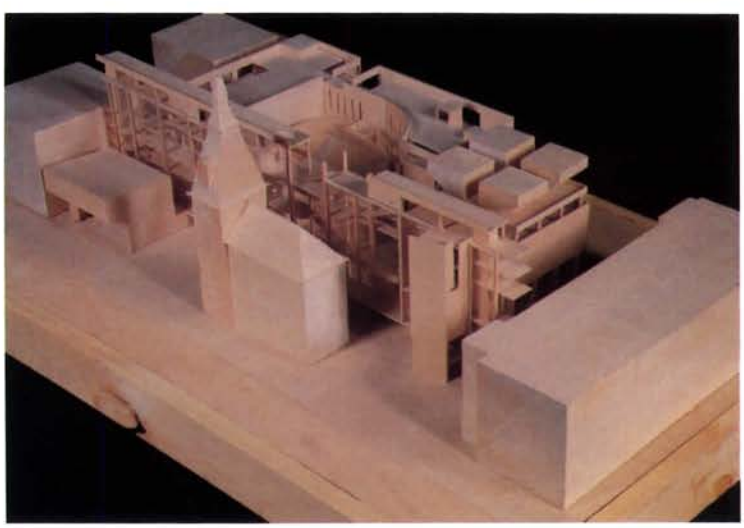
Gehner points out that sometimes the visitors have agendas that are at odds with the students. "If one of the stars has a priority for a job out in Chicago, they may postpone a review or studio time, and that always gets negative feedback from the students, and they're primary. But some of the stars are stars because they don't necessarily listen to someone else's priorities." He adds that Yale's location in New Haven works to the school's advantage by keeping the stars' extracurricular distractions at bay.

In defense of the star system, Beeby believes that "one conversation with Bob Venturi might offer more to a student than a year with a teacher interpreting what he says." Beeby sees no reason not to invite back the best visitors or to find ways of using visitors in the core.

This year the school's home, Paul Rudolph's Art & Architecture Building, marks its quarter-century anniversary and is enjoying a revival of interest and appreciation among the students, to the chagrin of some of the faculty, who remember when, in 1969, students of another generation were suspected of torching it. The building is in bad shape, butchered by renovations, dirty, leaky, bombed daily by pigeons who roost in its towers, cold in winter, hot in summer, unbelievably cramped for space. "It's like working in a gas station," remarked one student. Another appraises it this way: "It confronts you. This is what architecture can be. You're always discovering parts of it that you never knew were there before. It still generates controversy 25 years after. I think it's inspirational." Beeby sits on the university's buildings and grounds committee and hopes for a major restoration, bringing the building back to something as close to Rudolph's intentions as possible. There are plans for an exhibit to commemorate its 25th anniversary this fall.

If there are major renovations due for the school itself, Beeby isn't saying, although he admits that the entire program is being examined and critiqued by the faculty with student input. The dean believes that the school ought to be the object of continual debate and evolution—not unlike architecture itself. □





Facing page, independent thesis project for a government center in St. Croix by Kevin O'Brien. This page, from top, a music center for Yale University by Stephen Luoni, with Cesar Pelli as critic; a memorial park and forum dedicated to human rights in Friedrichstadt, West Berlin, by Laura Weiss, with Werner Seligmann as visiting critic; Yale performing arts center adjacent to the New Haven Green, behind spired City Hall, by Li Wen, with Mario Gandelsonas as visiting critic.

'This Is a School That Maintains Its Own Traditions'

McGill University school of architecture, Montreal. By John Pastier

Quebec is not a grape-growing province, yet the best comparison for the McGill University school of architecture is a good bottle of wine. Not an annual vintage, whose quality may fluctuate from year to year, but a mellow cream sherry whose production method capitalizes on lineage and emphasizes stability. Founded in 1896, it is Canada's second-oldest architecture school and only a year younger than Harvard's. The university itself has long had the reputation of being the country's finest, and for many years was Canada's closest equivalent to an Ivy League institution. And if it is true that the grapes of architectural education flourish most abundantly and best in the soil of large cosmopolitan cities, then the school is ideally situated, since its tradition-laden graystone campus lies literally within the shadows of downtown Montreal's skyscrapers.

This relatively small school is subtly different from comparable U.S. institutions, and the distinctions stem largely from a contrasting national character. For all our sense of cultural and economic superiority, Canada may well be the more civilized of the two nations. Canadians seem generally better educated, more polite and cooperative, and less brash and self-interested. These qualities help foster a student population that is relatively unspoiled, open-minded, and academically serious and a faculty that is secure and genuinely collegial. At the same time, there is considerable diversity in both groups: while McGill is an English-language institution, almost half the architecture students are of French-speaking background, and the faculty, although small, traces its origins to a dozen nations on four continents.

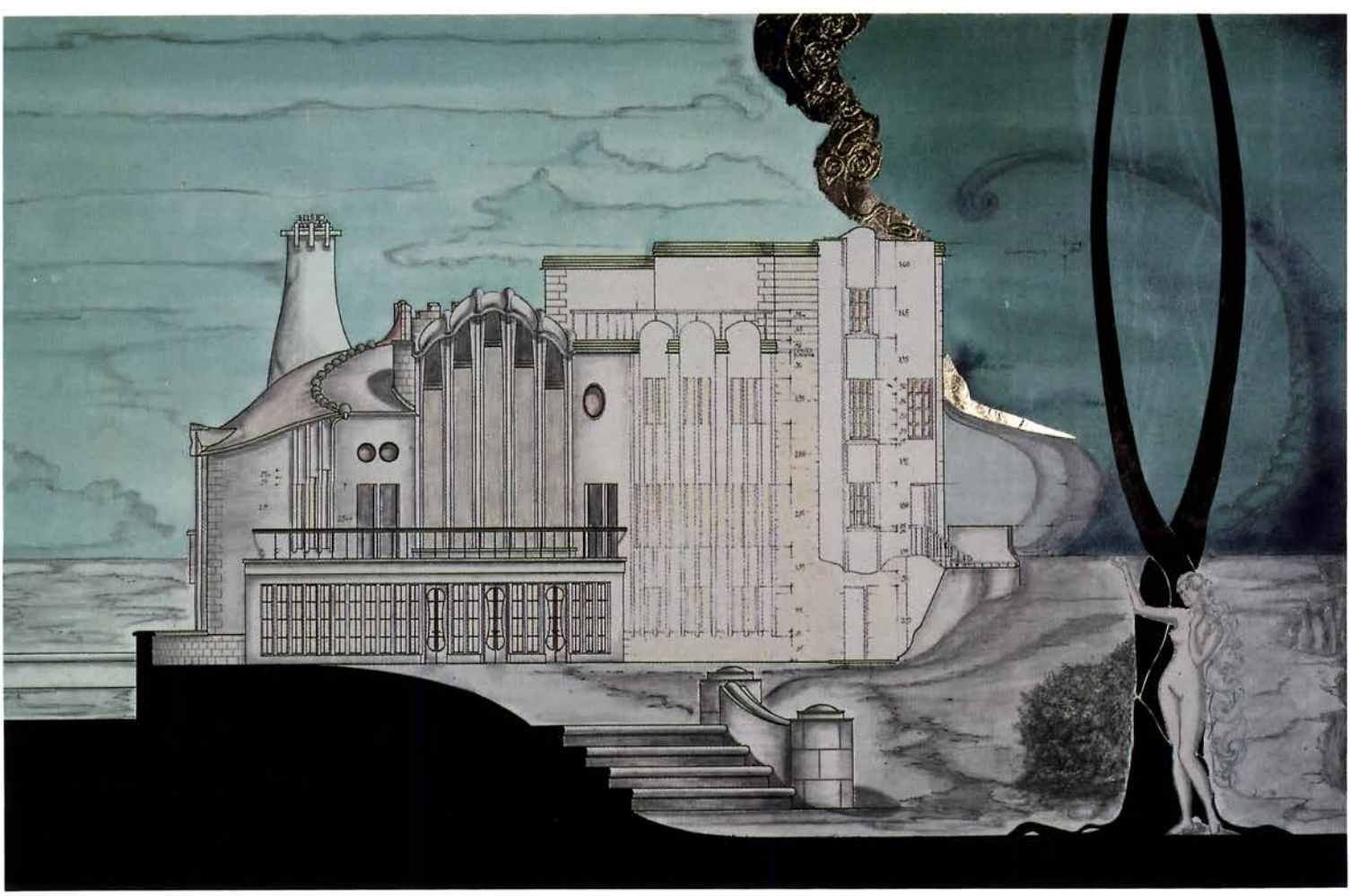
Drawn by McGill's location and reputation, students are high caliber. Last year's 45 entering undergraduates represented just 15 percent of the applicants, all of whom had completed two years of college elsewhere under Quebec's unusual structure of higher education. Since tuition fees are set at about $320 per semester for Canadian citizens (about $260 in U.S. currency) and since McGill has the best scholarship program of any architecture school in the country, economic factors do not greatly impede the meritocratic admission process. The fees are low because McGill is now a public institution, albeit a privately administered one. Given the quality of its students, the architecture school finds no need to enforce a preconceived attrition rate. (In this respect, ironically, many good schools have much in common with many bad ones.) And, since the school is part of the college of engineering, there is considerable rigor in the the technical courses. Students must have a science background that includes college math, physics, and chemistry, and they must take the same structural, surveying, and computer science courses as engineering majors.

McGill's alumni demonstrate the success of the program. The list includes Raymond Affleck, Moshe Safdie, and Arthur Erickson, probably the three Canadian practitioners best known internationally. Graduates now in academia include Alvin Boyarsky, head of the Architectural Association in London, Blanche Lemco van Ginkel, former head of the University of Toronto architecture school, and Douglas Shadbolt, organizer of two new Canadian architecture schools and head of a third. (McGill alumni or faculty members have founded nearly half and headed nearly all of the country's architecture programs.) Alumni known through their writings include Jan Rowan, former editor of *Progressive Architecture,* Oscar Newman, author of *Defensible Space,* and Witold Rybczynski, author of *Home* and a current faculty member. Three Rhodes scholars, the only ones ever produced by any of Canada's 10 architecture schools, have graduated from McGill since 1970.

It is tempting to call the school conservative, and certainly the term applies in some respect, but this is an incomplete and potentially misleading description. Perhaps a better term would be transparent, in the sense of a good computer program that does its job without getting in the way of the user or exhibiting any quirks of its own. There is no official dogma or school style, and comparatively little following of fashion. Student work manifests less rote postmodernism, neoconstructivism, Aldo Rossi-ism, and deconstructivism than is common in most other schools. The permanent faculty, all of whom are McGill graduates, were educated in the modern tradition, yet there is little sign that this viewpoint is thrust upon students. Rather, students are allowed to explore their own stylistic inclinations, for better or worse, within a pedagogical framework of problem solving and awareness of context. The result is a great diversity in student work, sometimes at the price of visual fluency and impact, but one can usually sense that the designs have grown out of considerations other than purely formal preconceptions. And even the exceptions are not necessarily predictable; last spring there were two projects either explicitly or implicitly in the art nouveau style.

Another alternative to the conservative label is provided by McGill's director, Bruce Anderson, who says that "this is a school that maintains its own traditions." McGill's sense of its own history is strong because it is old, it is something of an island within French-speaking Canada, and four of its eight directors over a span

Above, Macdonald-Harrington building, home to McGill's school of architecture. Right, above and below, design for a house on an inner-city site by third-year student Trevor Marchand.



of 47 years are still involved with its affairs. The earliest and most influential of these, John Bland, was instrumental to McGill's success. He enrolled as a student in 1928 and 13 years later became the first Canadian native (and the second non-Scotsman) to head the institution. During his 31-year directorship, he resurrected a school that had almost been phased out; he expanded enrollment from 23 to 133 in his first eight years (enrollment is now about 210). Soon after assuming his post, Bland brought McGill squarely into the 20th century by admitting women and adding housing design and town planning to the curriculum. Later, town planning was expanded into a graduate program that offered the first advanced architecture degree in Canada. Subsequently, it became a separate school of city planning with space in the architecture building.

According to his successor, Norbert Schoenauer, Bland "built the base for the school, and it hasn't changed that much since. He had a rare ability to find dedicated people and then give them autonomy to teach in their own way. He encouraged diversity rather than a chorus-line staff holding a single consistent position. There was little conflict, partly because people had their own interests."

In one fundamental respect, however, total consistency prevailed. Bland presided over a transition from a narrow and outdated arts and crafts orientation to a rational, nondogmatic modernism suited to Canada rather than Europe. In the beginning, he recently told an interviewer, "we tried to find an architecture that was ours, that belonged to us." His appointments all contributed to that search. Although outstanding, the new teachers were not internationally prominent, with one major exception. Historian Peter Collins was an erudite and brilliant scholar who, while sympathetic to modernism, was also aware of its shortcomings and was sufficiently prescient to anticipate two decades ago much of the postmodern revolution.

Early in his directorship, Bland expanded the curriculum from five to six years, but in the late 1960s he had to compress it to four. The reduction was mandated by a sweeping change in higher education that reflected the political ascendancy of French-speaking people and populist values in Quebec. To create a more unified and democratic school system, the provincial government instituted a community college network designated as *Colleges d'enseignement general et professionel,* or CEGEPs. These colleges offered three-year diploma programs for vocational students and mandatory two-year preparatory courses for those going on to universities, where degrees would be given after three more years of study. For the architecture school, this meant that the six-year B.Arch. program had to be condensed to four, and an intermediate nonprofessional degree had to be granted after the third year.

Naturally, some problems resulted, most notably the loss of one year of design education. Not everyone considers the CEGEPs an improvement over the older system; one professor calls the process "two more years of high school." (Canadian high schools end a year sooner than U.S. high schools; thus university-prep CEGEPs provide the 12th and 13th years of schooling.) Anderson, however, believes the change has been helpful "now that the system has gone through its growing pains and reached a level of seriousness." He observes that students now come to McGill with one more experience under their belts, and, by coming later, they arrive more mature. And there are ways to ease the procrustean effects of the accelerated architecture schedule. About 80 percent of the students take longer than four years to graduate, disposing of their nondesign course requirements early to allow more time for their advanced design courses. The school requires six months' work experience between the B.S. and B.Arch. degrees; for students with less than a "B" design average, the work requirement is raised to a full year.

Some aspects of the undergraduate program are unusual. The rigor of the engineering classes is reflected in the design sequence, where all the courses are designated as "design and construction." (The student who designed an art nouveau house also produced a complicated set of working drawings for it.) A course on philosophy of structures has until recently included theoretically sophisticated ice-structure projects whose construction was a highly visible midwinter campus ritual. In a totally different direction, the school's special opportunities for visual expression include a well-equipped lab for printmaking, photography, filmmaking, and computer-aided design. Six short courses in sketching and freehand drawing are required, with two others offered as electives. The work done in these studios, taught by artist Gentile Tondino, is of notably higher quality than is usual in architecture schools. The basic design course begins with a challenging team assignment called a mood box—an expressionistic model meant to convey the spirit of a play, a special place, or some other knotty subject.

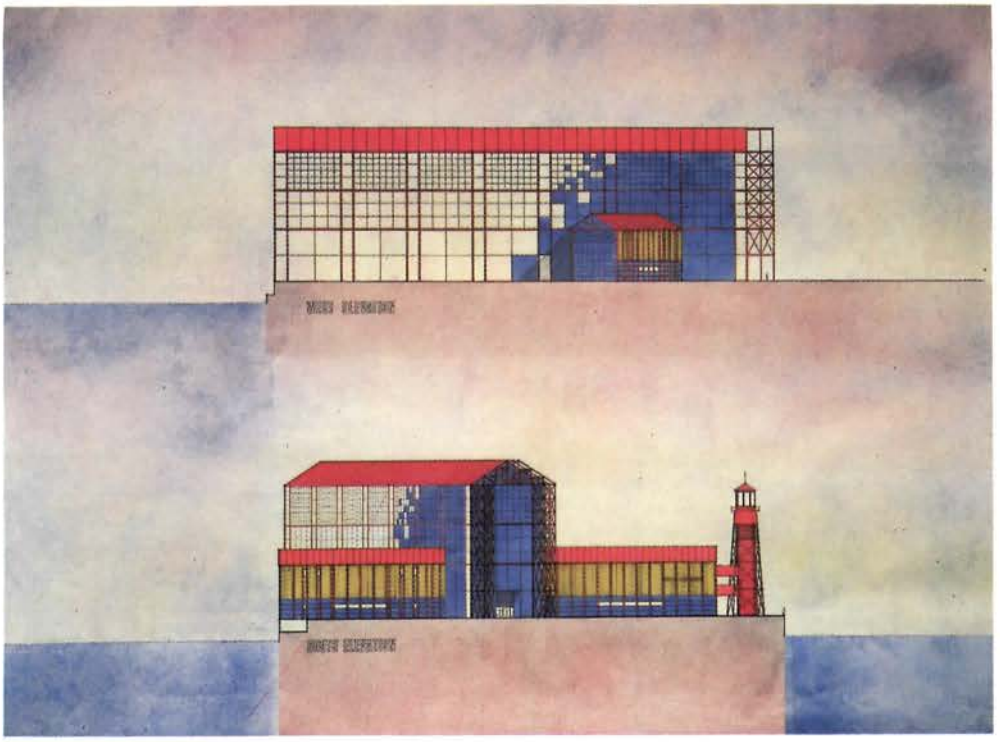
Where many other schools promulgate abstract theory and narrow design role models, McGill concentrates on tools of thought, expression, and construction. In this sense it may be deemed old-fashioned—Kenneth Frampton reputedly quipped that "this is like stepping back into the '50s" after seeing some thesis projects—but it could just as easily be considered ahead of its time.

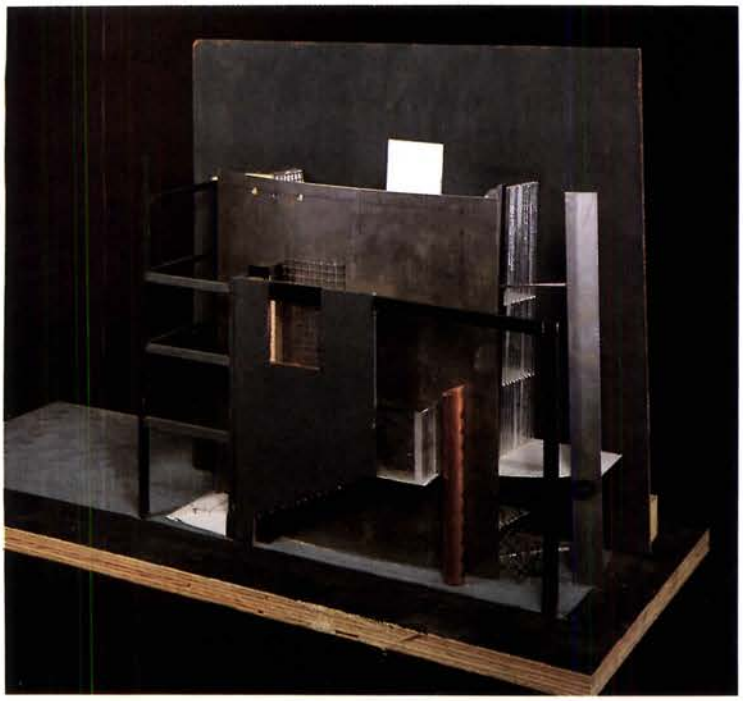
The graduate division differs greatly from the B.Arch. program. It is much smaller, with only one-sixth as many students, and is as specialized as the other is generalized. It consists of three "streams": architectural design, minimum-cost housing, and architectural history and theory. The first is in flux since its head, Norbert Schoenauer, has just retired. Under Ricardo Castro, it will become more theoretical and diversified. The housing stream, a one-year program headed by Witold Rybczynski, has been geared to Third World problems but is about to be expanded to include an affordable-housing option addressing North American situations. Anderson is now raising $250,000 in private funds (a major sum by McGill standards) to underwrite the program's three-year development phase, and he plans to recruit students from Canada's leading architectural offices. As the housing crisis deepens, this will clearly be a significant and stimulating field of study.

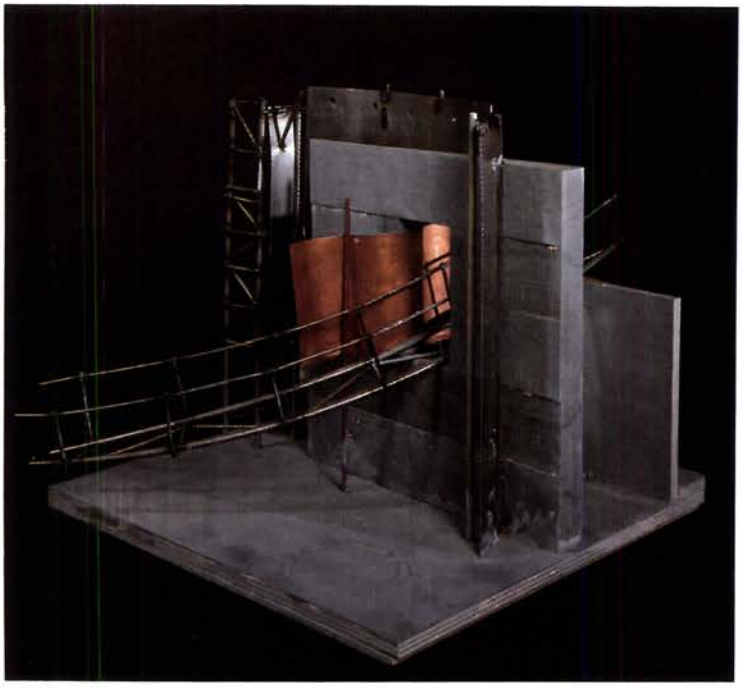
Architectural history and theory is a new option directed by Alberto Perez-Gomez, former head of Carleton University's architecture school, author of *Architecture and the Crisis of Modern Science,* and the first Saidye Rosner Bronfman professor of architectural history. This is probably the McGill school's most intense and demanding program, yet its enthusiastic students seem to thrive on the challenge. The first two semesters of course work have been completed, and the initial class of nine (six of whom followed Perez-Gomez from Carleton) will spend this fall semester on thesis projects. If successful, the somewhat experimental process will support Perez-Gomez's contention that history is "the only authentic ground for theory and practical reason in the making of architecture."

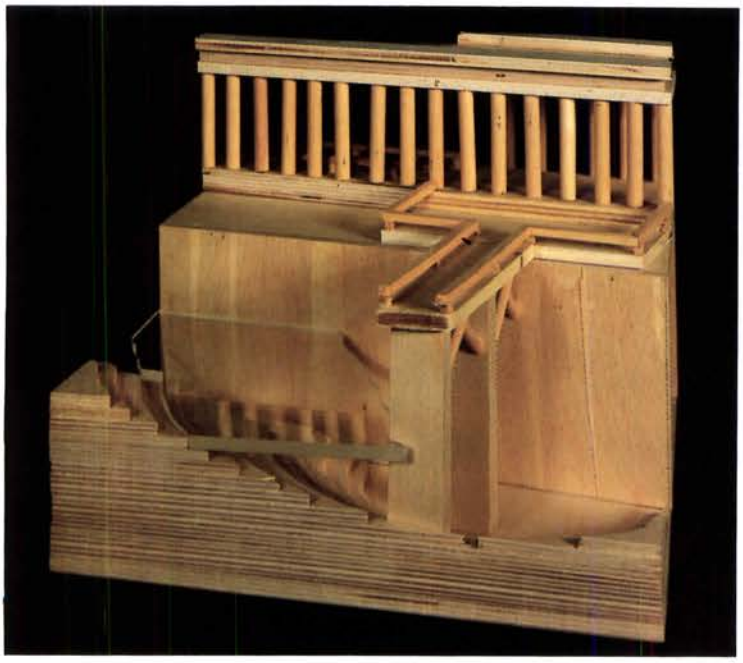
As it stands, the history and theory program promises to bring McGill new intellectual acclaim and alter its reputation for pure pragmatism. But an even greater potential is now being pursued. Phyllis Lambert's Canadian Centre for Architecture will soon open its new $38-million quarters embodying a conservation laboratory, library, exhibition galleries, bookstore, collections of prints, drawings, and photography, center for resident scholars, lecture hall, restaurant, and public park. Employing a staff of 100, this unmatched scholarly resource singlehandedly will make Montreal a world capital of architectural studies. While the city's three architecture schools all will gain from the CCA's presence, McGill is negotiating a formal relationship involving an expanded history-theory program and cross appointments between its fac-

Right, top, maritime museum for Montreal, located on a pier on the city's waterfront, by fourth-year student Mary Leslie, with Derek Drummond as critic. Middle, structural model for a rangers' residence and work station in Florida's Everglades National Park, by first-year student Dominic Bourgeois; bottom, finished rendering for another design by first-year student Denis Coupal for the same project, with David Covo and Derek Drummond as critics.









ulty and CCA scholars. Such an arrangement could strengthen both institutions. (Although the school cannot compete in resources with the CCA, it has a very good library, an outstanding and energetic librarian in Irena Murray, and the Canadian Architecture Collection, a 70,000-item archive of drawings and photographs assembled and catalogued under John Bland's continuing direction.) Should this union be achieved, McGill's history-theory program would have extraordinary prospects.

Students, of course, can't take as long a view as schools or faculties. Like so many others, McGill's are worked to their limits and can be impatient with the status quo. Many undergraduates feel the school "could use some spice" in the form of outsiders, new ideas, strong ideologues, and "philosophers" (i.e., theorists rather than pragmatists.) One asserts that "it's fun to be hit with strong convictions." Some see their teachers as conservative and refer to "a faculty of resistance." Even the mood box, which would appear to be an attractive assignment, is seen by some as "a threatening experience."

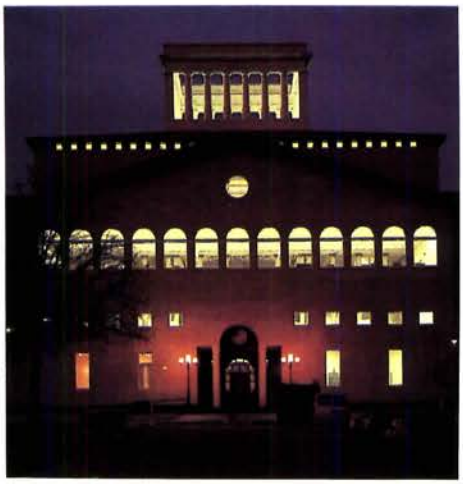
Still, most reactions are positive. Students like the school's affordability and the wide range of backgrounds represented in their peers. Montreal is considered "a privileged location" rich in extracurricular possibilities and permitting "lots of spontaneity," but this is offset by the chronic problem of lack of time for anything besides schoolwork. The thesis year is seen as an opportunity "to do something different" from the preceding, highly structured years and to gain self-confidence in the process.

Predictably, graduate student views are more complex. One design major, looking back on his McGill undergraduate days, found the engineering emphasis "stressful, energy-consuming, and untranslating" to architectural matters. He wonders if there may be "a hidden agenda in having so many engineering courses." Another feels that McGill is "isolated from the U.S. and Canada." And yet they are there, partly because "there are very few graduate programs in Canada" but also because McGill is a good choice among those few. Many of the graduate students exhibit a mature idealism. One woman, for example, has entered the history-theory program, not to become an academic but to gain intellectual and psychic strength to deal with the inevitable frustrations and compromises of practice. A young developer and contractor who has worked with the Inuits in the far north has entered the minimum-cost housing program to further his effectiveness in those efforts.

For all its traditions, McGill is evolving more rapidly than at any time since Bland's early restructuring. Last year the school moved into the renovated, 93-year-old Macdonald-Harrington building, and these new quarters nicely meet the Vitruvian criteria of firmness, commodity, and delight. Anderson's main priority is to strengthen graduate studies and research. Accordingly, two graduate options are undergoing major change, the third is just a year old, and a Ph.D. program will begin next year. Acknowledging charges that the school is ingrown (all professors are McGill graduates), Anderson vows that "the next person we hire will not have McGill training." The faculty is seniority-heavy—all 13 members are tenured—but the school will fill a junior position soon and plans to keep hiring over the next few years. Despite inflation, universitywide cuts have reduced architecture's annual budget by $140,000 since 1980, even as enrollment has risen. Anderson calculates that the school is short four faculty positions and hopes to catch up in the next three years. With its new home, new graduate programs, and prospects of new blood and a formal alliance with the Canadian Centre for Architecture, McGill is once again advancing vigorously, just as it did nearly a half-century ago. □

Left, top and middle, respectively, 'room for reflection' and early study of 'archive and garden of memories,' both by second-year student Eric Bunge; bottom, final stage of 'archive and garden of memories' by second-year student Eric Turcotte, all with Ricardo Castro and Richard Brook as critics. Right, 'mood box' by first-year students Sheldon Reich, Peter Scriver, Evelyn Sulmistras, and John Theodosopoulos.


IX
VI



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'The Building Continues To Be a Lightning Rod'

University of Houston college of architecture. By David Dillon

In Houston everything bows to the freeway, and that includes the University of Houston college of architecture. Five years ago it was a scattering of Quonset huts and bland 1960s buildings, so nondescript that most students didn't know it existed. But thanks to Claude Nicholas Ledoux Architects with Philip Johnson, the school now has a freeway profile to rival that of the Astrodome. From I-45 the University of Houston *is* the architecture building. The Quonset huts have been replaced by a semiclassical billboard with arched entries and a square tempietto that glows like the dome of some unnamed statehouse.

But if Johnson's "little schoolhouse" finally has brought students and faculty together in one place, it hardly has made them of one mind. The building continues to be a lightning rod that sparks heated discussions about the school's future.

Enthusiasts view it as both a stylish solution to chronic space problems and a requisite cause célèbre that will lift a consistently underfunded and undervalued institution to prominence. Already the building has become a stop on the Gray Line tour. School groups surge through it during the day, and in the evening its atrium has been the setting for everything from art shows and presidents' balls to the 15th-anniversary celebration of the Rice Design Alliance, not known for partying on foreign soil.

"The University of Houston has always been the back door of architecture education in Texas," says professor Burdette Keeland, a key figure in the selection of Philip Johnson. "We thought it would be nice to pull it up and put it on the front porch, and the only way to do that was to get a great architect to design a building for us."

Critics see the building as a rejection of the school's blue-collar, bootstrap heritage, in which the making of architecture has always been more important then the surroundings. Students describe it as an "academic Galleria" and sardonically list Xerox as design consultant. According to some faculty members the move from frontier quarters, which had to be reconstructed each semester, to a slick corporate setting has skewed the school's priorities.

"We're still going through culture shock," says professor John Perry, AIA, director of the honors program. "Before the building all there was was the work. That was the only reason to be at the University of Houston. You sure as hell didn't come for the building. It's making us something that we are not."

The story of the new building is like the story of the college of architecture, a blend of high aspirations and good-ol'-boyism liberally seasoned with inspired ad-libbing. The school of architecture was founded in 1946 as a branch of the school of engineering. Its first dean was Richard Lilliott, an English professor with a minor in architecture. To compensate for having no professional credentials, Lilliott hired his next-door neighbor, Donald Barthelme, to teach design. The two of them subsequently persuaded the late Howard Barnstone to prolong a family visit and take over several studios.

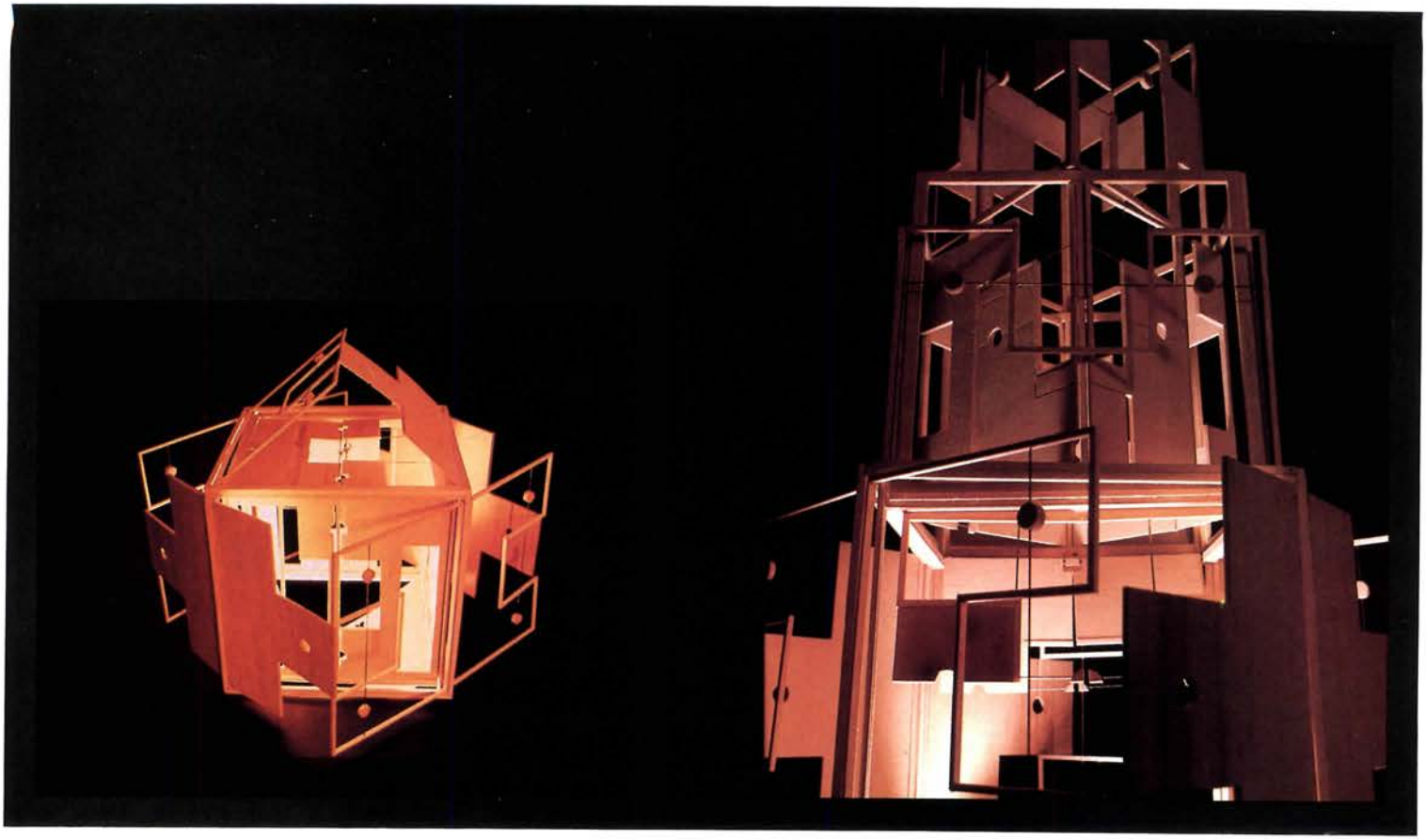
Fresh from Yale and several years in Europe, Barnstone brought cosmopolitan savvy to a school still known locally as "Cougar High." He combined a command of architectural history with a passion for the work of Mies, Eero Saarinen, Rudolph, and other leading modernists of the day. Over the years he wooed many of them to UH as critics and lecturers, often enlisting his students to dun local businesses for the stipends.

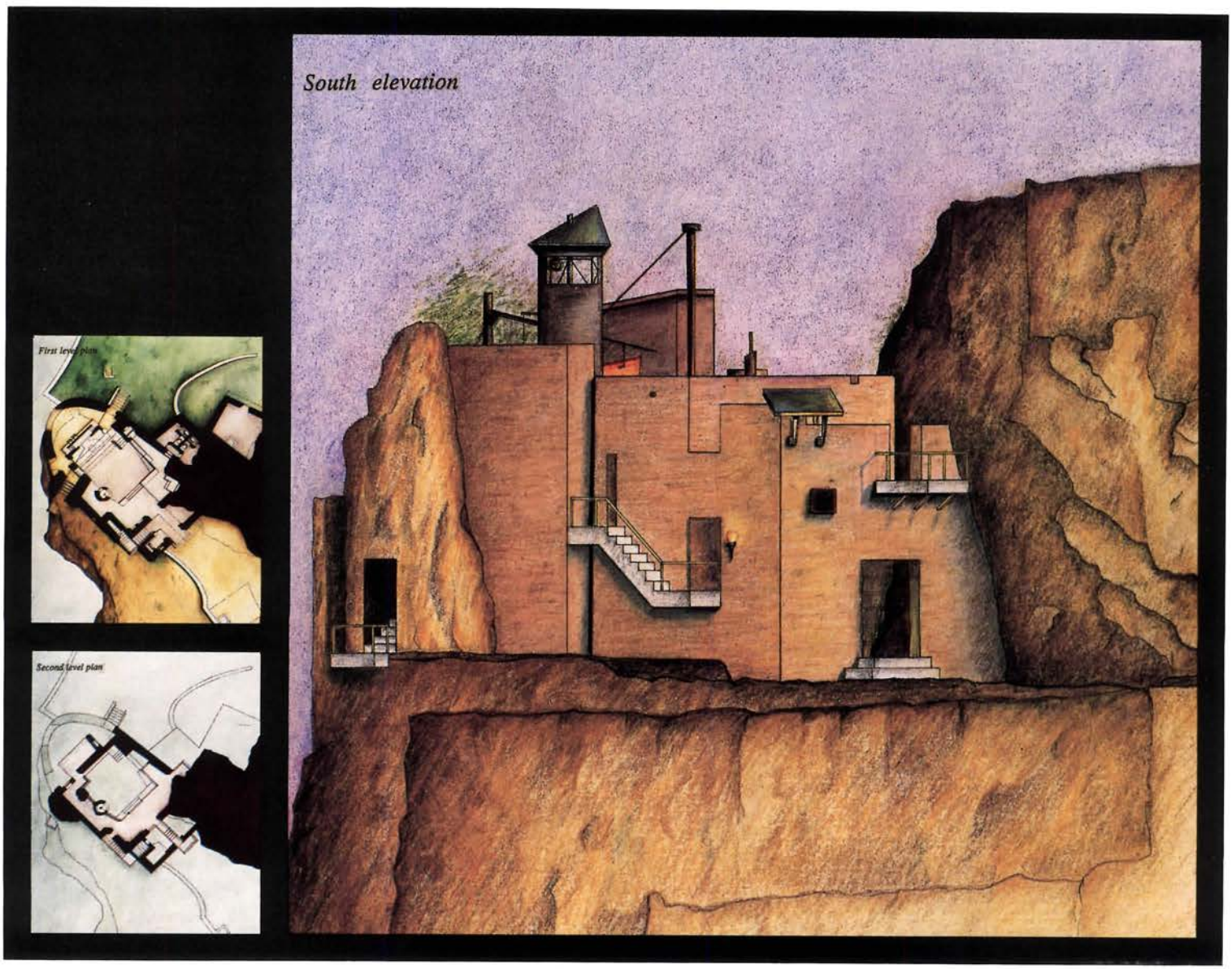
This kind of ad hoc, make-do attitude has been the school's cachet ever since. It has never operated with five-year plans and elaborate organizational charts. It is undogmatic and frequently iconoclastic, with no gurus and no controlling ideology other than a commitment to continual self-renewal. Historically, it has neither depended on nor tolerated strong administrative leadership. The faculty runs the school while the deans, like British monarchs, exercise residual authority as best they can.

"You could never consciously put together a place like this," says associate dean Peter Wood. "At the same time there appears to be genius here that keeps it going." Lilliott departed in the mid-1960s, shortly after the school joined the university system; he was succeeded by Eugene George, a law-and-order advocate from Kansas who quickly was replaced by William Jenkins, FAIA. Jenkins is still on the job after 18 years, a Methuselan performance in a state where the other five architecture schools either have new deans or are searching for them.

Jenkins describes himself as a compromise candidate. "I was chosen because I was a mediator. I was offensive to the fewest

Above, Houston's college of architecture building. Right, top images, three-dimensional analysis of the process of DNA by Ngu Kek-Lee, with Peter Eisenman as critic; below, 'puppeteer's retreat' on a desert site, to be used in staging Hopi puppets, by Wai Leng Lim, with Eric Perry as critic.




South elevation
First level plan
Second level plan

people. If I had interviewed for the job I never would have got it."

Lacking the prestige of Rice and the deep-pocket alumni backing of Texas A&M and UT-Austin, UH made its way as a pragmatic, no-frills architecture school where bright students with no money could get a decent education. It rarely gets the National Merit scholar, but it does attract the East L.A. street kid and the tobacco-chewing farm boy from Grand Saline, Tex., who would never get in the door of an Ivy League school. UH has no dormitories and few scholarships. Even though tuition is only $400 a semester for residents, many students work part-time as clerks and waiters. Many are the first in their families to go to college.

"The kids who come here still believe in the American dream," says Perry. "They believe that if they work hard they'll succeed, and that if they work harder than anyone else they'll do even better." Low tuition and a history of intellectual openness also have made UH attractive to foreign students, particularly from the Middle East, Africa, and Southeast Asia. Several recent graduates were boat people. Of the 585 students enrolled in 1987-88 (484 undergraduate and 101 graduate) 14 percent were foreign, 11 percent Hispanic, 7 percent Asian, and 6 percent black. Women made up 27 percent of the undergraduates and 46 percent of the graduate students.

"The United Nations aspect of the school makes for a rich experience for students, and frequently a thrilling place to teach," says assistant professor William Stern, AIA.

Anyone admitted to the University of Houston can enroll in the architecture program. There are no quotas or special exams. But the attrition rate is high. A freshman class of 170 typically condenses to 100 by the second year and to roughly 75 by the end of the fifth. Despite the turnover—perhaps as much the result of second thoughts as lack of ability—the faculty members believe the school gains far more than it loses by this policy. "As long as you maintain standards at the upper level so that people aren't just sliding through, the policy makes sense," says instructor Geoffrey Brune.

The design studio is the heart of the UH program, with other subjects playing clearly supporting roles. Theory is a minor interest, and there is now only one architectural historian on the faculty. Alberto Perez-Gomez, author of *Architecture and the Crisis of Modern Science,* departed several years ago for McGill. Last year the introductory architectural history survey was taught mainly by the design faculty. "The prestige of the school is in design," says one instructor. "We just get by in the other areas."

Above and facing page, right, mixed-use project including retail, housing, and marina in Seabrook, Tex., based on master plan guidelines developed in studio, by Jose Rossi, with Shafik Rifaat and Betty Bollinger as critics; facing page, left, observatory by Sharon Chapman, with Geoffrey J. Brune as critic.

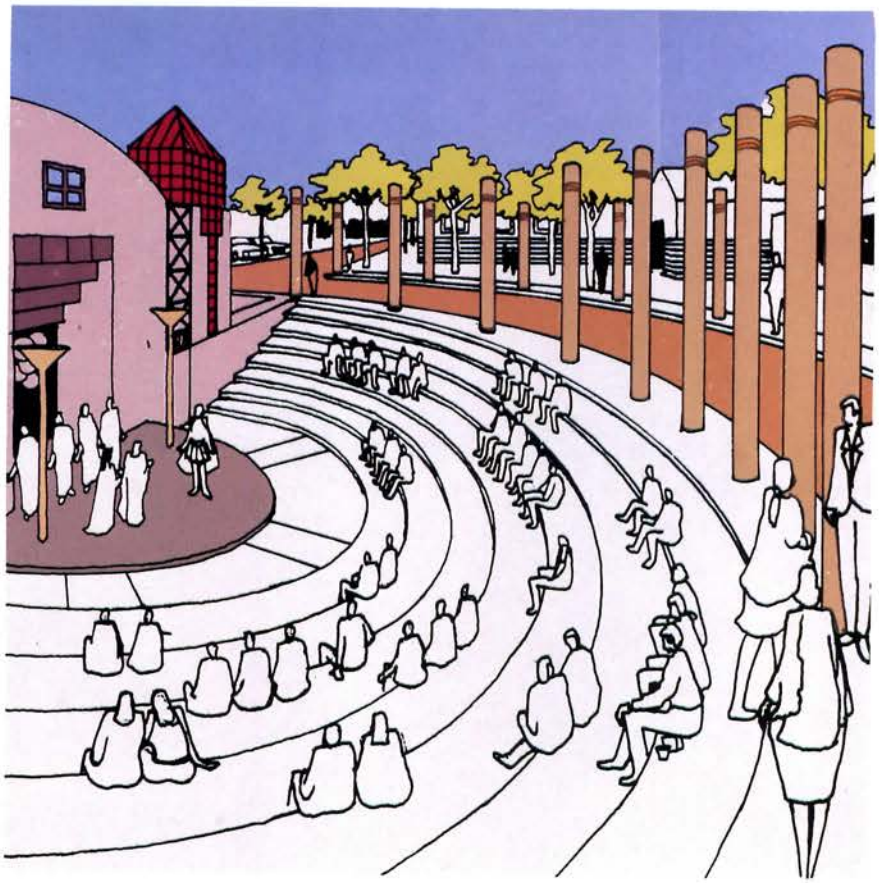
First- and second-year studios are formalistic and abstract, consisting of series of familiar point, path, and field problems overlaid with a heavy emphasis on tectonics. Models are the primary teaching tools, reflecting UH's long-standing preference for building first and drawing later.

In the third year the focus shifts to projects with real programs and real sites, including Houston projects and student design competitions. Two third-year studios entered the City of Birmingham (England) competition last year. Once again, the emphasis is on how buildings go together, not on codes or isms.

In the past the fourth- and fifth-year studios were the weakest parts of the undergraduate program. "If you weren't in the honors program there wasn't much to challenge you," says one recent graduate. "The range of studio options was extremely limited." Now, however, there are upper-level studios in housing, prisons, preservation, Texas architecture, and urban design as well as theme studios based on the special interests of individual instructors. The school has no thesis requirement, although students may choose to do a directed independent study project in the fifth year.

UH's graduate architecture program was begun in 1974 and has slowly assumed a prominent position in the curriculum. The first semester is an accelerated version of the first year of the undergraduate program; the second semester concentrates on analytical problems derived from historic buildings. The second and third years are more autonomous, although starting this fall third-year graduate students and fifth-year undergraduates will be allowed to take the same studios. The hope is that mixing ages and abilities will enrich the experience of both groups while broadening the range of studio options.

Despite the absence of a grand plan and, until recently, ade-



quate facilities—or maybe because of those factors—UH students consistently turn out excellent work, rigorous, well made, and ambitious without being cheaply fashionable. The work in many of the upper-division studios ranks with the best student work in the country. It's hard to believe that some of it *is* student work.

"It's one of the best-kept secrets in American architectural education," says Stanley Tigerman, FAIA, a frequent visiting critic and director of a comparable program at the University of Illinois at Chicago. "The kids are fabulous. They aren't fey or snotty. They work like hell and can be motivated 16 different ways."

To deepen its program, as well as to build bridges to the larger architectural community, UH started an ambitious visiting critics program in 1974. A critic spends one week in the honors studio, working on a problem of his or her choice, and also delivers a public lecture. Among the visitors have been Peter Eisenman, FAIA, Kenneth Frampton, John Hejduk, FAIA, Michael Graves, FAIA, Daniel Libeskind, and Richard Meier, FAIA. Several have visited more than once. It's also to the school's credit that it imported many of these critics years before they appeared in the pages of *Time* and *Newsweek*.

Yet experimentation has its perils. The school is still raw from the tumultuous departure several years back of three Cranbrook disciples of Libeskind—Ben Nicholson, Willie Taylor, and Mark Schneider. On the surface, UH's pragmatic, real-world orientation and Libeskind's abstract and theoretical focus seem poorly matched. At the same time, the school has a history of bringing in talented young architects, giving them an opportunity to teach, then sending them on their way. It's part of the school's self-renewal program as well as an economical way for a cash-poor school to staff itself.

But in this case it backfired. While many UH students were devoted to the "Cranbrook Three"—and by all signs did extraordinary work under their direction—the faculty for the most part found them overbearing and divisive. "We probably got two more than the school really needed," says one instructor. "They were like Moonies," says another, "completely closed to looking at architecture in any other way than their own." Jenkins, in retrospect, believes "they were as committed as Communists to overthrowing the status quo."

Bahram Shirdel, another Cranbrook alumnus who preceded the "Three" but left after one year to teach at Harvard, concedes their subversive objectives but faults UH for not being more receptive to innovative ideas.

"We had no intention of meshing with the existing program," he says. "We wanted to see if we could introduce things into architecture that others were not thinking about. They stayed there too long, maybe, but now there is a vacuum at the school. The situation is not as healthy as it was."

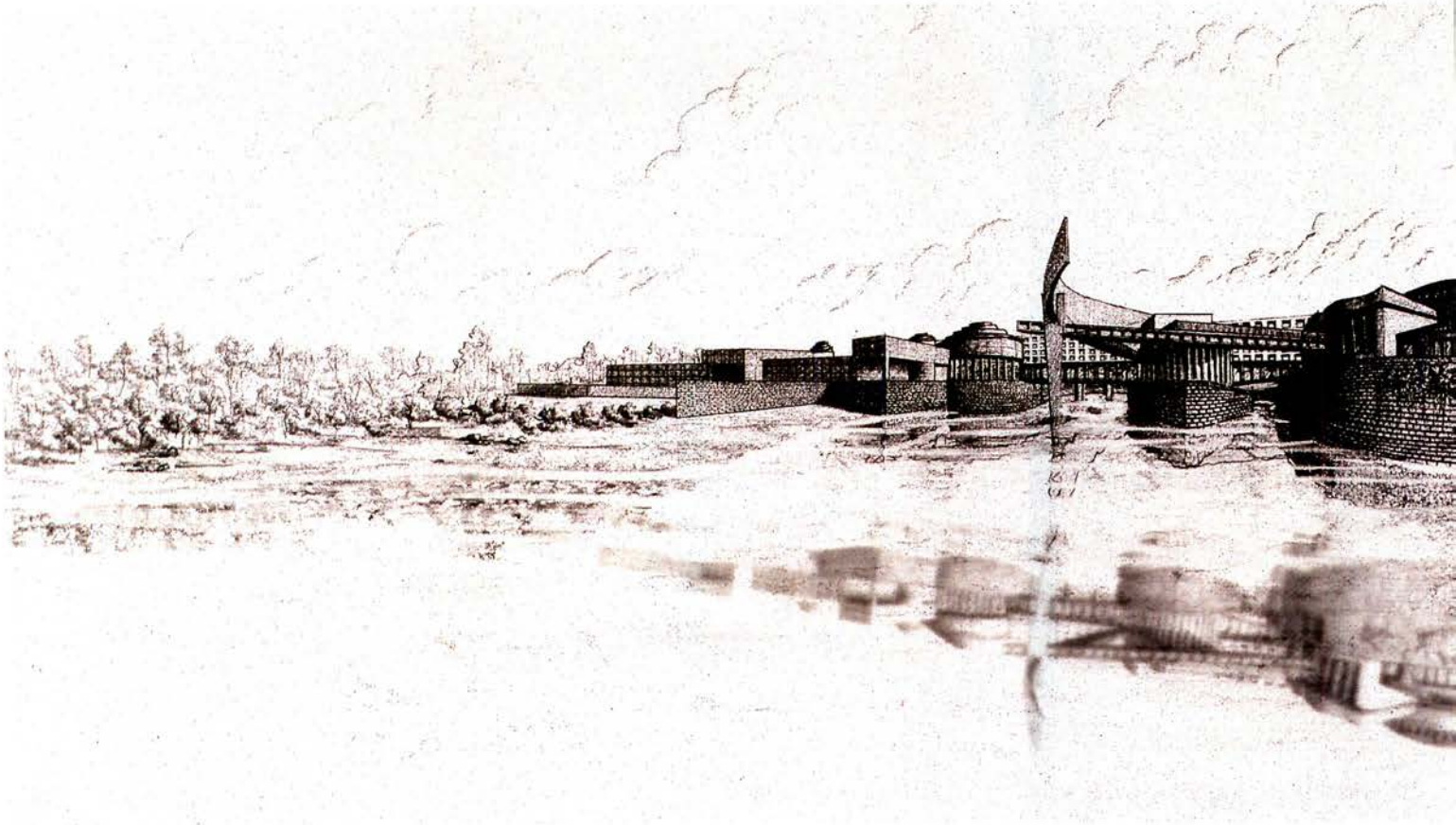
Even as ardent a supporter of the school as Tigerman views the dismissal of the Cranbrook crowd as evidence of unresolved tensions in the UH program. "Presented with options that don't suggest immediately how to build, they get very nervous. There is real insecurity there, and that's a problem," he says.

Veteran observers of UH would say that it has learned to institutionalize insecurity. It is constantly looking over its shoulder at Rice and casting longing glances in the direction of its rivals in Austin and College Station. Some of this attitude played a part in the selection of Philip Johnson as the architect for the new building. The school had known since the mid-1970s that it might get a building, and at various times the faculty had drawn up lists of possible architects but had reached no consensus. James Stirling, Hon. FAIA, was rejected, Keeland recalls, because he was thought "not sufficiently leading-edge." Arata Isozaki, Hon. FAIA, and Hardy Holzman Pfeiffer met similar fates for equally inscrutable reasons.

Interest sagged until 1982, when it became clear that the legislature was going to appropriate funds for the new building. Jenkins pushed for an international design competition and even managed to find money to pay for it. But university officials doubted that a competition was politically feasible.

Still partial to his idea, yet knowing delay could be fatal, Jenkins agreed to Keeland's suggestion that Philip Johnson be approached about designing their "little schoolhouse." Keeland and Johnson had been friends since the 1950s, when Keeland was at Yale, and they had worked together on the design of St. Thomas University in Houston, funded by the de Menil family. Keeland made the request during a dinner party at Dominique de Menil's house. Johnson was enthusiastic. He had never designed an architecture school building. Letters followed quickly, and the deal was struck.

While Johnson was off consulting Ledoux, UH surmounted the last political hurdle by hiring the Houston firm of Morris/



Aubry to be the local associate and architect of record. Local architects might resent Johnson's repeated carpetbagging, but they could hardly oppose one of their own.

Johnson and John Burgee arrived for the great unveiling in the spring of 1983. Burgee carried a Bloomingdale's bag containing the model; Johnson followed closely behind with a smaller bag from Tiffany's containing no one knew what. The model delighted the university president and others. It wasn't glass, and it had a roof. At an appropriate moment, Johnson reached into the Tiffany bag, pulled out the tempietto, and ceremoniously crowned his own creation.

Whether the new building will change the direction of the college is unclear. UH has proved to be a remarkably resilient institution, and the students will probably find a way to convert their corporate palace into more comfortable quarters. In the meantime they can take pleasure in knowing that they are probably the only architecture students in the country with their own personal flat files.

More pressing is the question of where the architecture school will find the money to sustain its present program. The University of Houston cannot draw on the state's permanent university fund, which funnels west Texas oil royalties to A&M and UT-Austin. UH can dip into a smaller state fund but only for new buildings, not for salaries and new programs. "We are currently operating on a 1984 budget," says Jenkins. "At the same time we have a 20 percent larger program and a much more expensive building."

To cope, the college is establishing a series of centers or institutes, which are expected to raise their own funds and contribute to the university coffers in the form of grants and new graduate students. The most successful to date is the Sasakawa International Center for Space Architecture (SICSA), funded by a $3 million grant from a Japanese shipping conglomerate. A percentage of the grant goes to the college of architecture. Yet SICSA is an anomaly, having more to do with engineering and industrial design than with architecture in a traditional sense. The other proposed centers—for health and environment, preservation, interiors, and computer technology—are still in the formative stages.

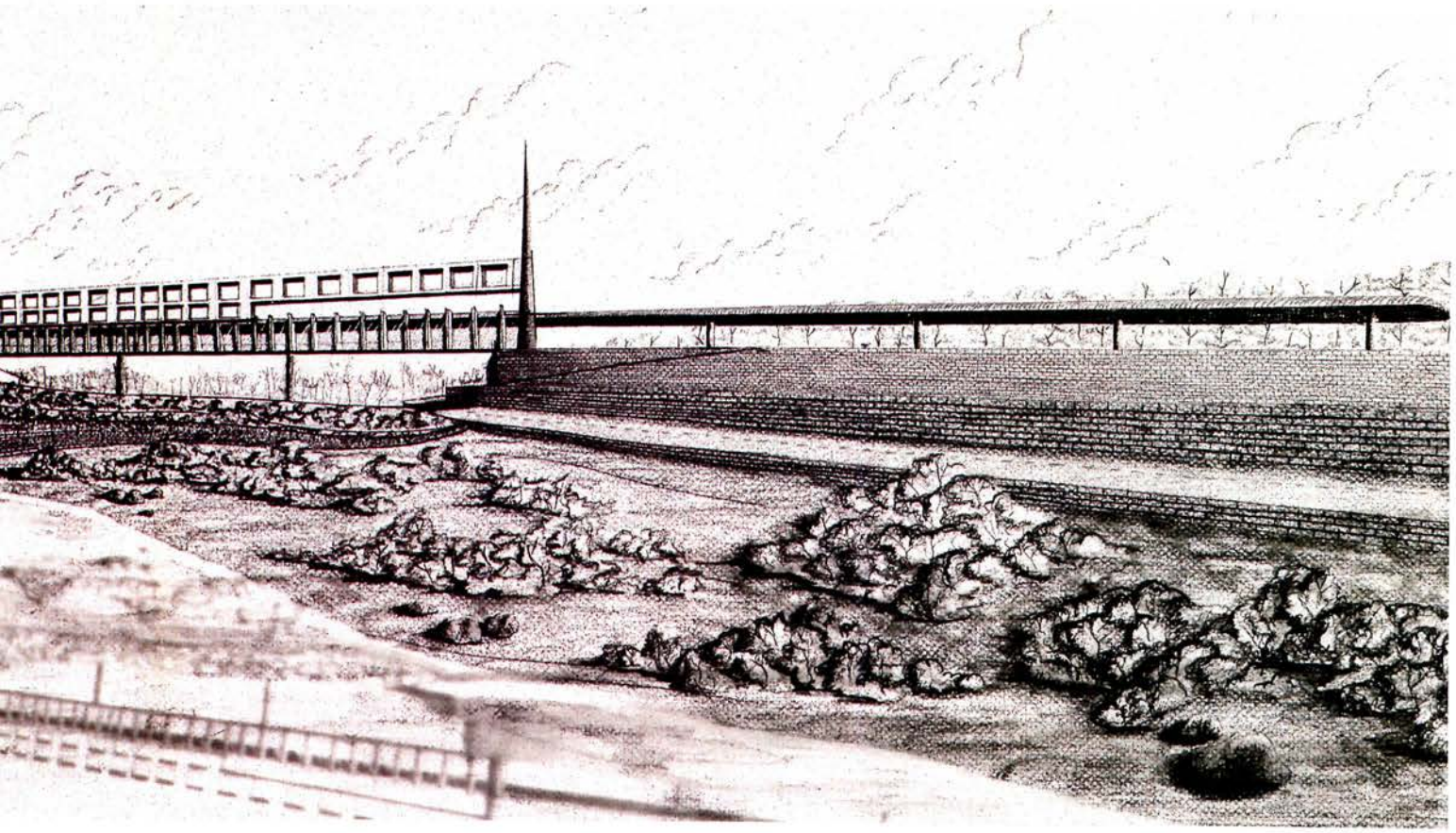
The institutes are a response to university demands for more research and development programs, as well as a means for the school to market itself more effectively in Houston. Yet the prospects are uncertain. UH has made its reputation as a design school with a strong emphasis on building. That's why most of its students go there. Whether it can, or should, play the specialization game is debatable. The combination of new buildings, new programs, and new economic uncertainties means that the UH college of architecture is at a crossroad, which is where most architecture schools seem to be most of the time. The teachers who have guided the program to its present high level—most notably Bruce Webb, Robert Timme, AIA, Robert Griffin, and John Perry—all have been on the scene for nearly 15 years. These former young turks by their own account have become old turks and probably are in need of a breather.

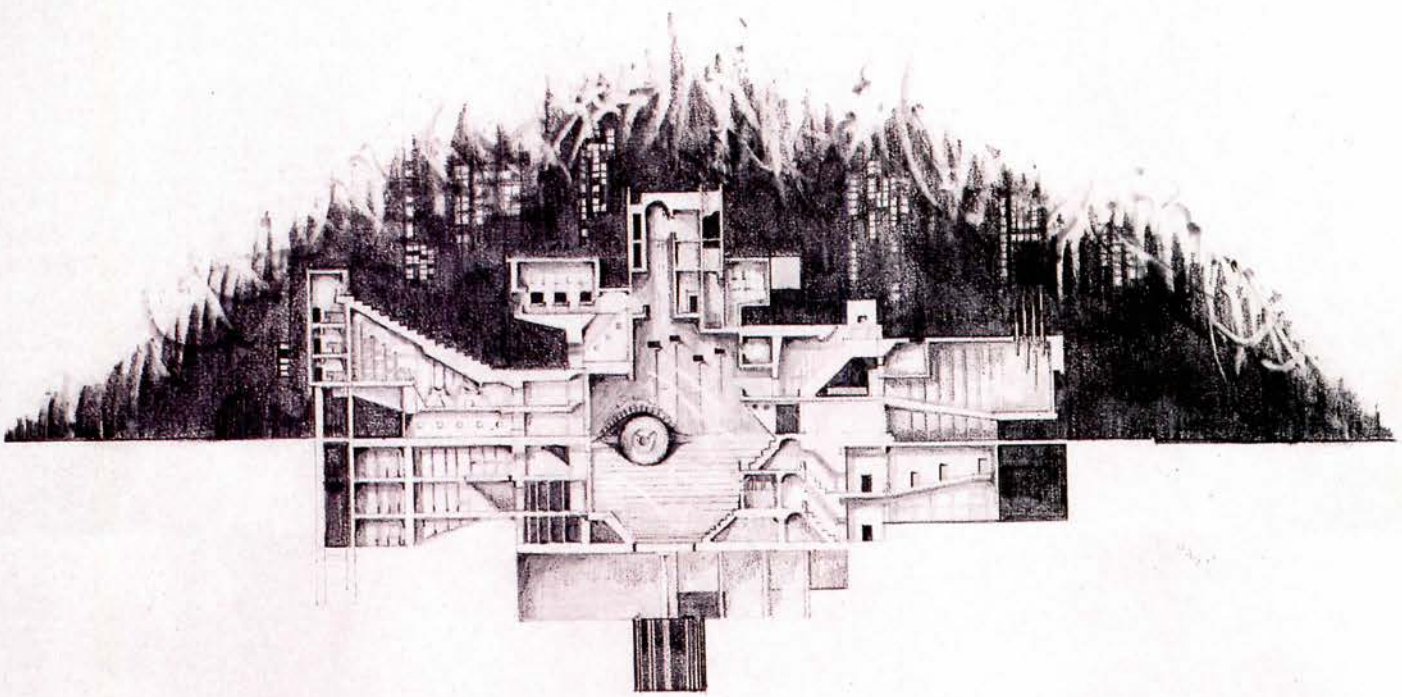
Above, a musuem of the American Indian, sited in Dallas, by Jesus Porras, with Paul Kennon as visiting critic, connects several pavilions with an axial pathway. Right, section through 'American film institute' in New York City by James Kek Lee, with Christopher G. Genik as critic, was drawn to allude to a 'sectional reading of the city as static artifact.'

Some people believe the school's mysterious DNA will assert itself once again and carry the school for the next decade. But even if that happens, will it make what is clearly an excellent school into one of national distinction or merely keep it running in place? "We've done the difficult job of getting good work out of our students," says Peter Wood. "Perhaps it's time to experiment with other things, like organization."

The college is now too large to do things as it did even five years ago, yet too small to exploit many new opportunities. It may decide to become smaller, tougher, and more focused and to bring in a dean with an agenda and a clear vision for the future. Or it may choose to expand into new areas that are now only tentatively represented in the curriculum. There is support for both courses but, as is typical for the university, no clear consensus about which path to choose.

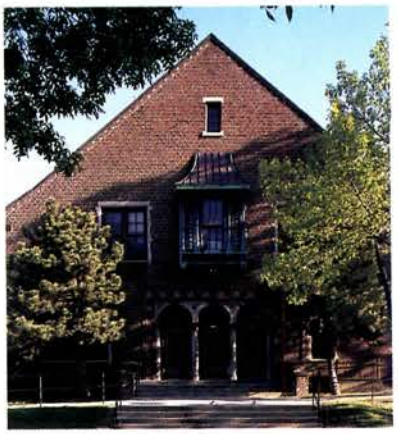
"The school has thrived on tactical plans and limited horizons," says Webb. "Most things seem to have emerged through responding to issues and situations and taking advantage of opportunities as they presented themselves. We'll probably go on that way until someone comes along who thinks he has all the answers. It seems to be part of the Houston psyche to think that way." □



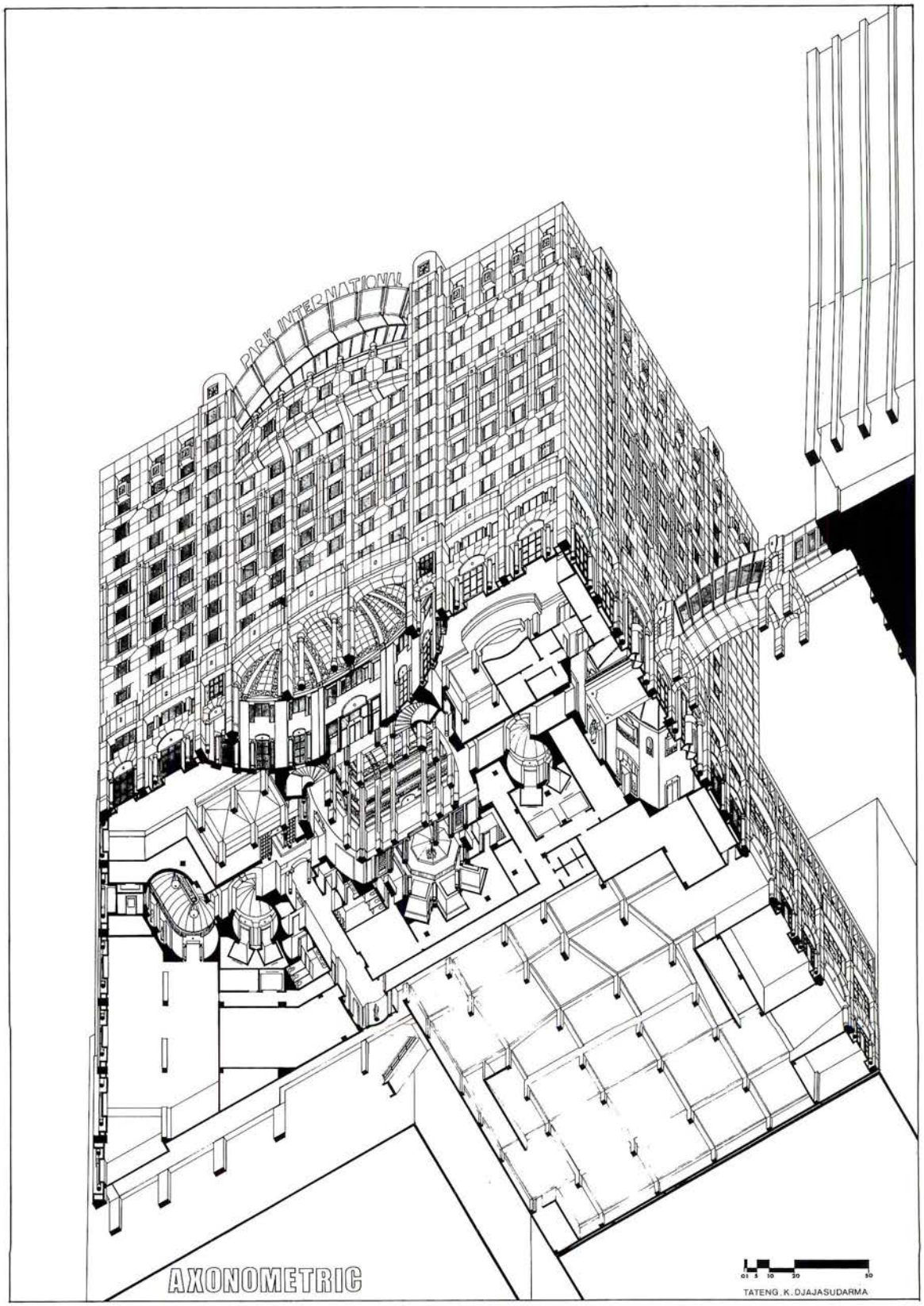


'Bright-Eyed Challenger' In a Blue-Collar City

University of Wisconsin-Milwaukee school of architecture. By M. Stephanie Stubbs



Paul Olsen



Above, Engelmann Hall, home of UWM's school of architecture and urban planning. Right, a thesis design for the Park International Hotel, by student Tateng Djajasudarma with Rick Jules, Larry Witzling, and John Wellhoefer as faculty advisers.

The University of Wisconsin-Milwaukee's school of architecture and urban planning is, at the age of 19 years, one of the new kids. It has the appeal of a bright-eyed challenger, confident in its native ability, eager to learn and grow, and ready to take on the world with newfound skills. Its location is propitious, its program innovative, its faculty young and alert, its students eager, its building—not so hot, but even that has turned out to be a plus. The school has used its youth to advantage. Carl V. Patton, urban planner and dean of the school for the past five years, explains, "We're not hidebound by traditions that others bow to, so we're able to be flexible. Of course, high-quality design education is very important to us, but we're also pushing other frontiers, such as community service and computer-aided design."

The school of architecture and urban planning is just a few blocks from the shore of Lake Michigan, on one of the main-street edges of a commuter campus that serves as academic home to 26,000 students. A mixed bag of many architectural styles, the campus covers the equivalent of 24 city blocks on the upper east side of Milwaukee, whose population, including surrounding suburbs, just tops 1.5 million.

Milwaukee contains architecture of almost every imaginable style, plus an Olmsted park system, and its architecture and urban planning programs are touted in university publicity releases as an "excellent learning laboratory for the students and faculty of both departments." For the students, however, it seems the local architectural Oz is Chicago. An hour and a half away, the Second City is close enough to visit yet far enough away to remain properly awesome. Chicago has proved an apt place from which to draw design inspiration for any desire, as well as a wellspring of visiting critics. It is also the place of opportunity for many of the school's graduates.

Still, it is Milwaukee's ethnic, blue-collar presence that shapes the school, which offers Wisconsin's only architecture program and is largely state supported. Patton says, "We try to combine our teaching, our research program, and our community service. We are not completely funded by the state—we have to earn money through funded projects."

The need for outside funding and the school's underdog status give rise to one or two competition studios every year. The Milwaukee students perform amazingly well in the Chicago Chapter/AIA's annual student design competition, ASCA's national design programs, and industry-sponsored programs, often trouncing competition from nearby, more established programs. Milwaukee's relative newcomer status is the reason for encouraging students to participate in competitions, says Patton. "No one really knows that much about us, and if you compare us to other schools people tend to say, 'Oh, well, by reputation . . .' But let us get them on a level playing field, in a competition, and we'll see who is better."

Robert Greenstreet, chair of the architecture department, adds, "The other reason we do competitions is that they add a lot of excitement around here. When the students are involved in a competition, they work harder, and I think it brings out the best in them."

The best seems just below the surface, waiting to be tapped. The real source of the school's persona and its spirit is the students. Although one-quarter of the 750 students are from out of state (and half of these are from 30 different foreign countries), the majority, especially in the undergraduate programs, are from Milwaukee or small, outlying towns. "Typically, undergrads are first-generation university from blue-collar families, who are coming here to get an education to better themselves," says Greenstreet. "They work harder than any students I've ever come across—they are amazingly diligent and an absolute joy to teach and an enormous source of pride for the school."

M. Caren Connolly, an assistant professor, echoes his sentiment. "The students' work ethic is very strong. On the whole, when they begin the program their verbal presentation is very poor, but when they graduate you wouldn't believe how far along they've come. They also are not very well traveled. For many, their first trip to Chicago is when a faculty member takes them, and they all of a sudden realize that there's a world out there. The students also tend to be a little bit older—they often work for a few years to get the money to go to school."

Admission standards for the school of architecture are among the highest on campus. Patton reports that applications this year are up 47 percent from last year. "We get the pick of the crop," he says. "The out-of-state tuition is relatively high—anyone who goes here has to really want to go here."

Milwaukee's undergraduate students traditionally have gone on to Milwaukee's graduate architecture program but now are starting to go to other schools, including those in the Ivy League. Likewise, students from other schools are starting to come to Milwaukee's graduate school.

Ninety percent of the 26,000 students attending the University of Wisconsin-Milwaukee live at home, Greenstreet says. "Many have jobs as well, which can cause an enormous problem [for the architecture program]. We work very hard to keep the students here, and to keep things hopping. This year, for example, we have a lecture series on late Friday afternoons, bringing in outside people. Afterward, we get one studio class to pin up their work, and we have a small reception. We had a film series, a faculty forum. Once a month we try to do something special—like Careers Day, and Graphics Day, where various faculty members give presentations of their work, and International Day, where foreign students present examples of architecture, crafts, and food from native countries."

The students say they like and appreciate these special programs, especially sessions in which faculty members get up and speak their minds. They have an active chapter of AIAS, and they write, edit, and publish their own magazine, *Archimage,* featuring student and faculty work. "The faculty really care about us and listen to what we say," one student comments. "My favorite example is that, when they brought in new faculty candidates, they had them speak to us and then asked us what we thought." Did the students' comments have any impact? "Sure," he says. "They didn't hire any of the ones we thought were duds."

The building in which all this happens is Engelmann Hall, an undistinguished 1930s high school, barely large enough for the 750 students. It has been painted and furnished nicely, but many of the classrooms are awkwardly proportioned for studios and crits. A gym and a large auditorium flank the main body of the hall; both are for general university use. The building suffers from occasional vandalism, the bane of any urban campus. Still, the school has managed to turn the three-story brick lemon into lemonade. Students receive credit for working during summers to redesign and construct existing spaces into studios and crit rooms, with impressive results. Engelmann's basement now houses a spacious pin-up room that doubles as a student lounge, as well as a student-run cooperative bookstore stocking a fine array of texts, drafting equipment (a godsend when your parallel rule snaps a wire at the 11th hour), and an assortment of snacks.

Improvements continue, and the building is to be expanded to the east, where there is now an open field. The addition is expected to be completed by 1993. A decision last year to move the school's library collection into the newly expanded campus library (a long block away from the architecture school) is lamentable, if understandable. There simply isn't enough space in Engelmann to house the library.

The architecture school at UWM has a six-year program consisting of three levels and leading to the accredited Master of Architecture. Students enter the program at various levels, depending on previous education. Average studio sizes are one faculty member to 16 students in undergrad studios and one to 12 at the graduate level.

Level one, the pre-architecture program, includes freshman and sophomore years under the direction of associate professor Kent Keegan. The students learn basic architectural precepts and presentation techniques. One thing immediately apparent is that these young people can *draw.* Many observers attribute this widespread talent to Keegan's tutelage.

Level two, the architecture studies program, covers junior and senior years and provides a general introduction to the problems

and techniques of environmental design. Students who complete the level two course of studies receive a Bachelor of Science in architectural studies, an unaccredited degree.

Level two breaks down into three required studios, nicknamed "smaller than buildings," "buildings," and "larger than buildings" (urban scale). Most students in the B.S. program also elect to take a fourth studio. Usually a required studio will have about 50 students and a team of three teachers. Everyone does the same project, and each teacher works with a subgroup of students. Frederick A. Jules, AIA, explains a typical building-level studio: "We teach a simplified building type, such as row houses, using a particular technology tied to the building design. We lecture on public/private gradients and the technology of construction, and we look at building types. I teach figuration typology—programmatic/esthetic/construction, because I believe that we are trying to train professionals who can identify what the profession is in regard to those elements. We can't expect undergrads to know this—we are just defining what they must go find. We tell them what is typical and what is the state of the art in architecture."

Assistant professor James W. Shields, who teaches the urban design studio, also is interested in figuration. "We have students design the public street. Instead of working with a city block, we take the space of two city blocks and we have them design the public space in between."

Level three, graduate study in the department of architecture, leads to a Master of Architecture, the first professional degree. Level three is a two-year program for those with a B.S. in architecture and a three-year program for those with a bachelor's degree in an unrelated field. Each student chooses three faculty advisers for his or her thesis. The range of thesis projects demonstrates the latitude students are given to find their niche in the profession. Some are urban in scale (redesign of a mixed-use development in Chicago); others are a single building (a Milwaukee brewery). Presentation media range from watercolor to ink on mylar to models as the primary emphasis.

Thesis presentation is an *event.* Students enter the crit room with smiles on their faces instead of in the more traditional lambs-before-the-slaughter mode. The professors are generous with praise and gentle with criticism; any student who has reached this phase has already jumped the major hurdles, and thesis presentation is sort of a coming-out party. ("We crack down on them hard all semester and won't let them present until we are certain they are ready," Greenstreet says.) Families and friends come to the critique; some have even flown in from Indonesia. It is hard to tell who is proudest—the professors, the parents, or the students themselves. It also has become a custom for the students to offer refreshments to their guests. Foreign students prepare native dishes, some quite elaborate. But all would be hard-pressed to top the student who had raw oysters flown in from Maryland and after his presentation proceeded to shuck them for everyone, demonstrating skills of the bartending trade he had learned while working his way through architecture school.

The range of topics for student presentations, like the broad variety of presentation media, clearly indicates that the school has no party line on design styles. Everything goes, from vernacular architecture to deconstructivism. Greenstreet says, "We consciously avoid a school design philosophy—though we argue about philosophy all the time. The strength of the school is a lot of very talented individuals who have different viewpoints. We encourage students to work with different people and to make up their own minds. Our philosophy is excellence. As long as the results of the studio are good, we encourage the divergent viewpoints on what constitutes design philosophy. I wouldn't want to see it any other way."

Connolly has seen this phenomenon develop during her four years with the school. "When I first started, all the drawings were ink on mylar, with no shade or shadow. The students would pin up their projects, and *they'd all be identical.* It's been blown wide open—Bob [Greenstreet] has pushed different styles of graphics, and once the drawings got looser the designs started getting looser in the sense that there was a much wider range of thought."

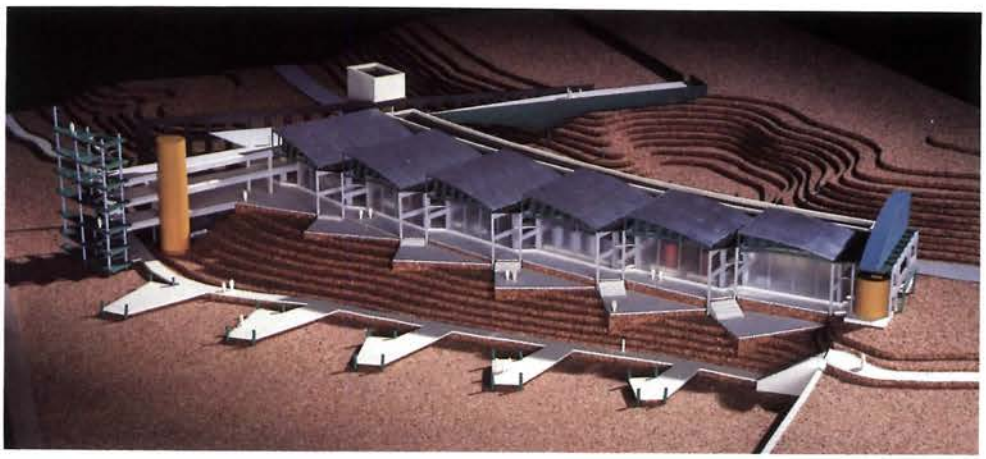
Although studios form the heart of the architecture program, a number of supplemental courses deserve note. One is Douglas C. Ryhn's preservation technology course, in which students research and report on archaic methods of construction and then build an *objet* using that method in the school's well-equipped shop and graphics lab. This year's bumper crop included plaster casts made from latex molds, hand-painted ceramic tiles, and etched glass door panels à la Frank Lloyd Wright, which will be installed in the school. Another important course is "The Art of Detailing," a construction technology course taught by assistant professor Gil Snyder and associate professor Michael Utzinger. Detailing is taught as an integral part of the design process. Utzinger also teaches the structures classes. "We are simulating structural testing on computers, and students can then see the actual tests done in the structural testing lab," he says. "We found that numerical analysis often tended to get in the way of students' comprehending conceptual processes. We also use computer programs for energy analysis. In general, we're shifting from text-type programs to Macintosh-type graphics programs. This may be a whole different approach to how we teach technical subjects."

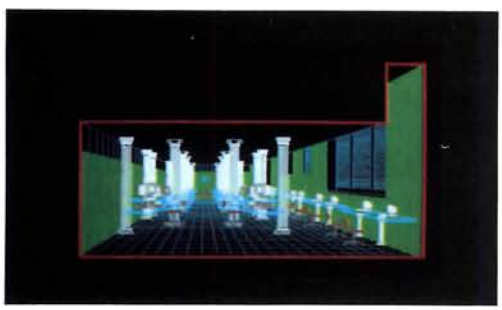
The approach is certainly pervasive in design studios as well. The computer laboratory, under the direction of Mark Roth, academic staff specialist, has become a nerve center for the school. Associate professor Anthony J. Schnarsky's computer-aided design studio is an elective much sought after by students, who turn out an impressive array of projects using IBM PC/ATs with Autocad, as well Mac IIs. Perhaps most impressive is the nine-student graduate studio project entitled "Space Architecture: Lunar Base Scenarios," headed by student leader Edwin G. Cordes and Schnarsky; the project received technical guidance from Astronautics Corp. of America, a local high-tech firm. The students take to CADD as a design tool with almost cavalier ease. "It's great," one said, "like having a giant, supersonic pencil at your fingertips."

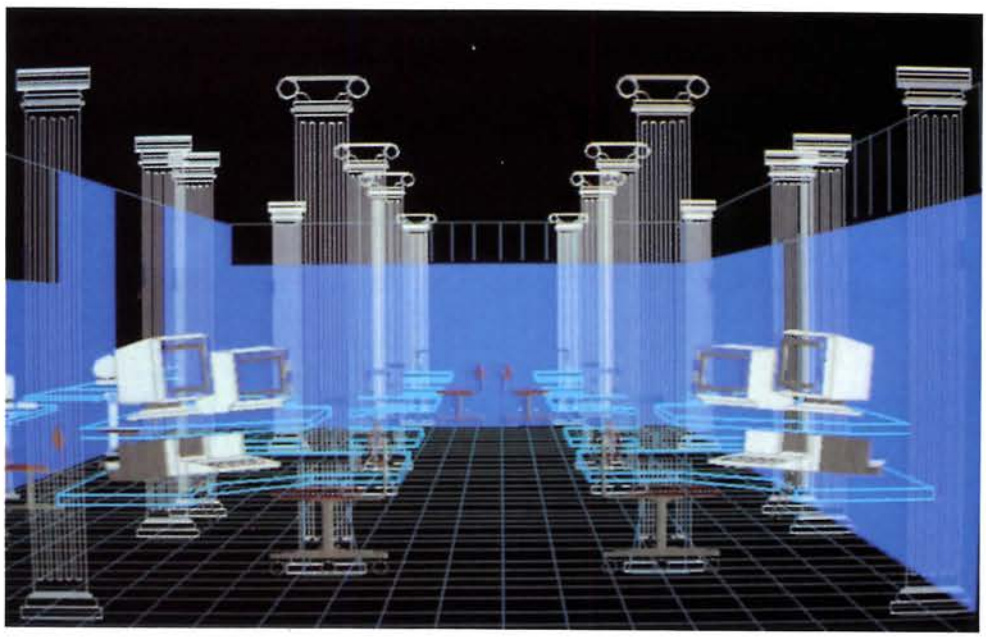
Another significant, if smaller, component is urban planning. The professional planning program offered at UWM is two years of graduate study leading to a master's degree. A number of planning courses are also available to undergraduates. Of particular interest to architects is the joint master's program in urban planning and architecture. "There is a great opportunity for students in the joint program to get two degrees in three years by taking the cores of the architecture and planning programs and taking the remainder of their credits in overlap areas," says associate professor K. David Reed. The joint program started seven years ago and has averaged 10 students each year. Most enter the program with a B.Arch., so Reed's strategy is to get them to immerse themselves in planning during the first year, after which they can pull together their skills in the two disciplines. A few students take the three-year Master of Architecture as part of the joint degree, which adds up to a four-year program.

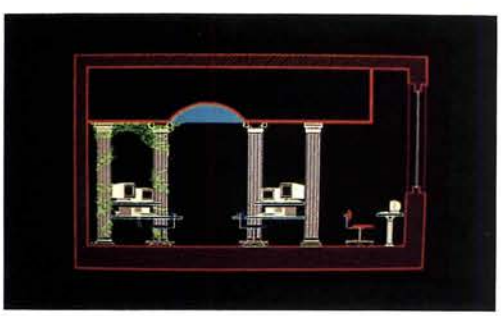
"We try to get students to choose a particular interest or topic and make sure that it is covered in the classes they take. We have a fair number of pretty mature students who know what they want or who have been around the school awhile and know what courses will benefit them most," Reed says.

The links between the architecture program, the urban planning program, and the school's devotion to research and community service present themselves clearly in the Small Towns program. For the past 12 years, the school has participated in advocacy storefront redevelopment for communities surrounding the city. These communities request services from the school, usually through the university extension program. They pay a fee to support two students for 10 weeks in the summer, and the students, who are from either the architecture or the planning program, generally produce a landscape plan or specific guide for redesign of one or a few shops and a general book of guidelines for community improvements. It's a type of summer internship, but the students are more on their own—living in the town, working on the street, and interacting with the community.

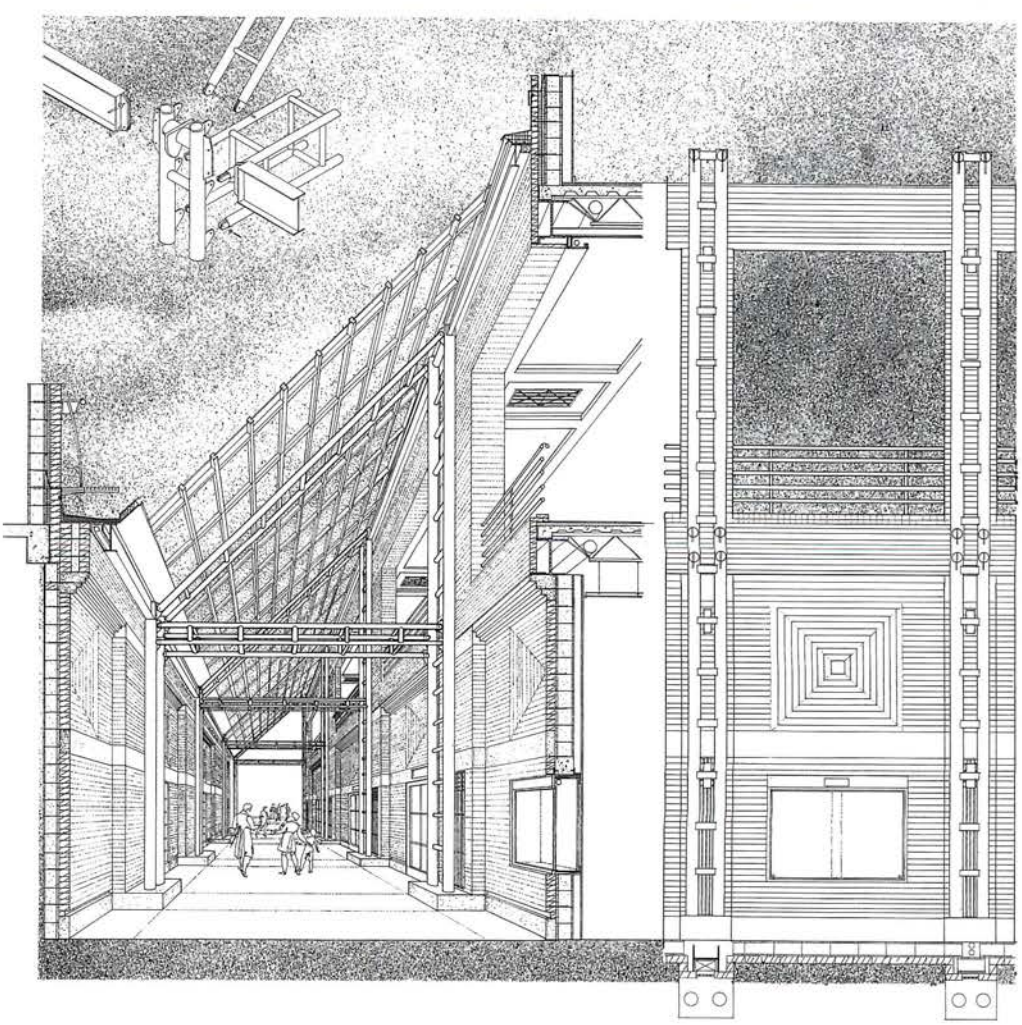








The screen shots, above and middle right, show CADD-generated interior design for the school's computer lab. The project, for an undergraduate introductory CADD course, is by student Jeff Hermann, under the direction of associate professor Tony Schnarsky. The model, above right, is student Gary Jaeger's graduate thesis project for a Milwaukee brewery. Jaeger's faculty advisers were David Glasser, Kent Keegan, and Kevin Forseth. The drawing, below right, is a graduate-level design for an extension to the engineering school at UW's Madison campus. Students Curt Behnke, David Jaekels, Brian Peterson, and Clark Thiel designed the project for a construction technology course, under the direction of Mike Utzinger and Gil Snyder.



The Small Towns program, now under the direction of Reed and Ryhn, has generated 26 advocacy projects, including one continuing project in Kenosha, Wis., (of recent Chrysler Corp. pull-out fame). And, "for the first time, this year we have an extension project in Milwaukee proper, where we're working on an old strip of commercial development. Also this year we've got one in Crystal Falls, Michigan, so we've crossed the state border," says Reed. He and Ryhn also have been active in development of the Main Street program of Wisconsin, the state legislation for which recently was passed. Within the next three years, this program will support state-level work in five communities.

The intellectual pinnacle of the school is its Ph.D. program, one of 12 architectural Ph.D.s offered in the United States, and the second-newest. It is also the stomping grounds of the school's star and most distinguished professor, Amos Rapoport. The Milwaukee Ph.D. program's area of concentration is environment/behavior studies. "We just had an internal [university] five-year-mark review," says coordinator Gary T. Moore. "The program was rated excellent. One recommendation was addition of a second program, and we are about ready to propose either urban design and development or architectural history, theory, and criticism."

The first student entered the Ph.D. program five years ago; now there are 20 students. Four or five are accepted each year out of an applicant pool of about 50. It's a classic Ph.D. program of three parts: required core courses in the first year; reading and preparation for exams in the second; and dissertation, which usually takes two years. The first student is expected to complete his dissertation this December. A third of the Ph.D. candidates concentrate on applied research, and the remainder pursue basic research such as housing for alternative life styles. This past academic year, all of the national research awards that could be won by students—from the Environmental Design Research Association, the American Psychological Association, and ACSA—were won by Milwaukee's students.

Although most Ph.D. candidates enter the program with some professional experience and a master's degree in hand, the master's is not required. "It's a Y-shaped path," Moore explains. "If someone gets a Bachelor of Science in architecture and wants to practice, then clearly he or she should get a Master of Architecture. If that person wants to be a researcher/scholar, then its a Ph.D."

Moore also has served as director of the school's Center for Architecture and Urban Planning Research. "We have no set agenda," he says. "The center exists to help the faculty do whatever research that they feel is important. Four research areas are very strong: environment/behavior, policy planning, community design and development—mostly applied work in Milwaukee and surrounding areas—and the new and strongly emerging area of architectural theory and history." To date, the center has received $3.5 million for research, more than half of it in the last four years. At any given time, about 45 percent of the faculty members are principal investigators on externally funded research projects, while others do scholarly research with internal funding.

The faculty often work together on research projects as well as in the classroom, mixing and matching their skills with apparent pleasure. Greenstreet explains, "The faculty move up and down in the studios—they'll teach graduate studio one year, and undergraduate the next. Our tenure approval rate in the last five years is 100 percent, in a university where the average rate is about 64 percent. It's a very creative environment for junior faculty to learn about the things they have to do to get tenure. Most of our faculty, after about 10 years, go off to higher-positioned jobs."

Thomas C. Hubka, associate professor and first-year veteran of Milwaukee after years of teaching at the University of Oregon and a three-year stint in private practice, concurs. "One reason I came here is that the faculty members talk to each other, but not with that ecumenical zeal. And there's not the 30 percent deadwood that you find in a lot of schools. You may not agree that the area that people are teaching in is particularly relevant to what you are doing, but they do communicate."

The alternative to the tenurial tradition of "publish or perish" is practice, and a third of the Milwaukee faculty are involved in professional practice. Shields, who together with Jules and Harry Van Oudenallen, AIA, runs the local firm JVOS Architects, says, "I feel that it is really critical for some percentage of full-time faculty to be practicing, to provide a role model for students. There is no pressure here that the faculty be involved in research—the tenure system here requires distinguished work in either research or practice."

The balance of the faculty is due to shift from its slightly top-heavy status with the influx of five assistant professors this fall. Three have Ph.Ds, one is black, and two are women. Although minority student enrollment is the highest it has been in a decade, it is still low, but Wisconsin's minority population is also low. "It's not a lack of trying on the part of the school," says Connolly, one of four women faculty members and one of two who teach design. "But the faculty are diverse in their philosophies, in where they went to school, and in the parts of the country they came from."

A nicety of UWM's program is all the amenities offered to community and high school students. Courses during the school year introduce local high school students to planning and design concepts. During the summer, Saturday courses are offered in model building, photography, design, and CADD. "We want the high school kids to feel as though they are part of the school," Patton says. "We give them keys and encourage them to use the building. We're hoping that some of them will pursue a college education and even develop an interest in architecture and planning as a career."

On a larger scale, among the school's current economic development efforts is the International City Design Competition to be held this year and next as part of the Union of International Architects triennial series of design competitions for future cities. Subtitled "Future of the Industrial City," the competition will focus worldwide attention on designs for Milwaukee in the year 2020. It is being sponsored by 15 local corporations and foundations that have contributed more than $450,000 to the effort. The competition will award $125,000 in prize money to winning designers.

Other special programs are geared for the architecture students, to increase their exposure to the world beyond Milwaukee. For instance, the annual distinguished visitors program this year offered a studio called "Topics in Community and Design," which brought planning and architecture students together in a studio setting with Graham Anderson from New Zealand. The school also has exchange programs with France, Indonesia, and China. This summer Reed and Greenstreet are taking 20 students to Oxford to explore "new and old—inserting 20th-century architecture into context," says Reed.

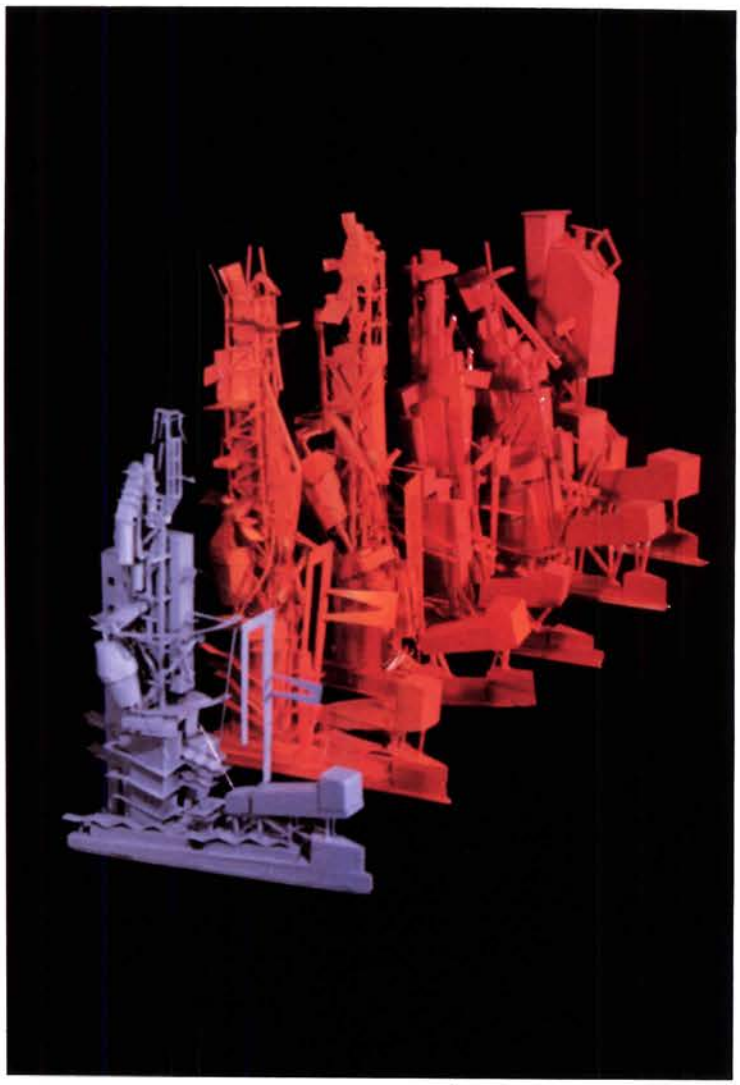
Complaints about the school are small—the students want another copying machine, and they worry (as students do everywhere) about the future emphasis of DE-sign teaching in the school. One teacher says there's a need to emphasize written communication; another wishes for more diverse points of view in historical presentation. But the energy core is present, and this school and its alumni are going places. Greenstreet says, "There must be 100 of our alumni in Chicago now—as many as 25 in SOM, for example. Every major firm in Chicago probably has between one and eight of our grads. Typically, if an alumnus goes to work for a firm, the firm will call and say, 'Do you have any more alumni?' because they work very hard and are very serious about the profession. Firms come from Minneapolis, Chicago, Florida, and Baltimore to recruit. We get inquiries from New York City. You have to be realistic about the slow process—we're a young school. But we're beginning to make an impact beyond the region."

"We aren't Harvard or MIT," faculty and students alike told me time and again, sometimes with a note of apology. "Why should you be?" I replied. "You're just right as you are." □

Graduate student Alan Freysinger created the plaster cast of a terra-cotta ornament, left, for Doug Rhyn's historic preservation class. The renderings, below, show another design for the extension of the engineering school at the Madison campus. Graduate students Joe Hassel, Lee Finley, and Charles Kiker worked under the direction of faculty member Kevin Forseth.

'Preparing Architects To Question And Explore'

Georgia Tech school of architecture, Atlanta.
By Robert A. Ivy Jr., AIA



Courtesy Georgia Tech News Bureau

For 80 years, Georgia Tech's architecture program has had a reputation as a tough, broad-shouldered school that has consistently produced generations of competent architects—young practitioners tempered in the heat of mathematics and physics, well grounded in the ABCs of building sciences, capable of calculating the structural loads of their own designs, able to draw, ready to work. Tech alumni, whose numbers include both John Portman, FAIA, and Hugh Stubbins, FAIA, have personified "architect" to laymen and have served as role models for aspiring professionals in cities and small towns across the South. Architects love to hire Tech graduates.

All of the above is stereotype; the reality of Georgia Tech in 1988 is richer. The "new" Tech resembles a laboratory, alive with intellectual energy, exploring contemporary architecture's attempts to synthesize technology and art, debating theory in the absence of a canonical modern style or method, while still teaching the basics.

The framework that allows both fundamental pedagogy and simultaneous freedom of exploration is the four-plus-two program: Georgia Tech maintains a highly structured four-year undergraduate program (granting a Bachelor of Science) that lays the groundwork for a two-year master's program, the first professional degree. Faculty link the two programs, frequently teaching at both the undergraduate and graduate levels.

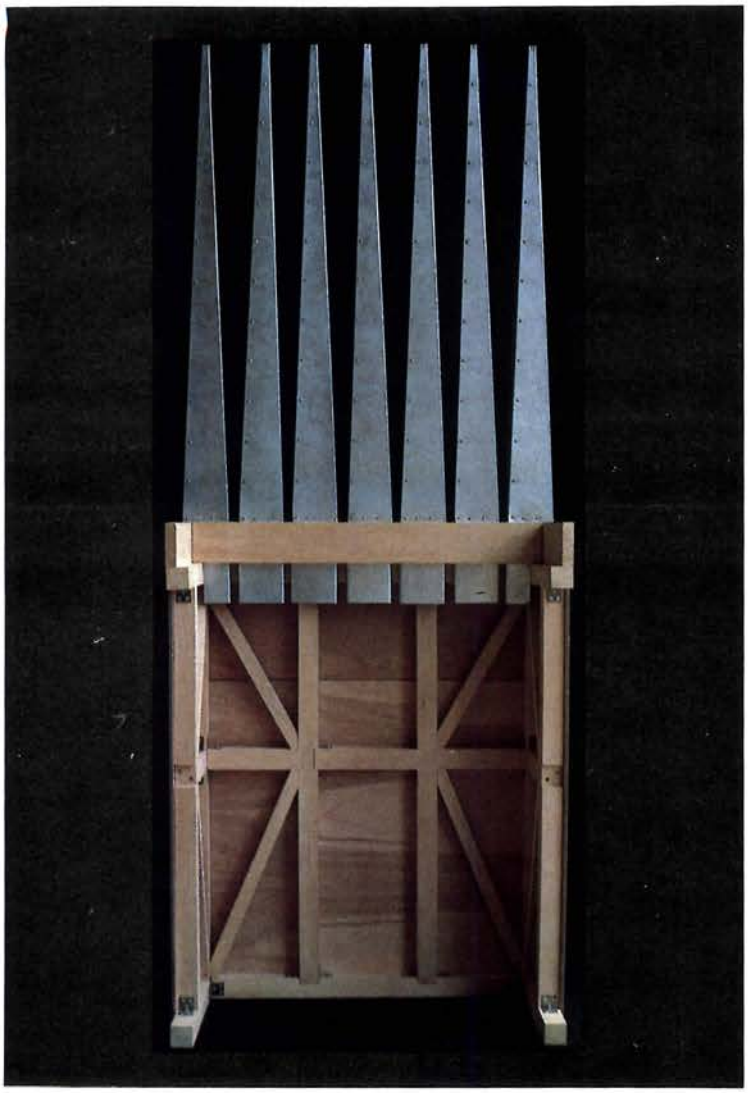
This vertical cross-pollination by faculty seems to result in shared energy across the program. Assistant professor James Williamson, who teaches both undergraduates and graduate students, seeks to discover the "poetic potential" in each project. "I do not teach that differently at different levels," he says, although his graduate-level courses offer more choice, more freedom, and more experimentation.

The school's experimental laboratory extends into Atlanta, a sprawling metropolitan area ringed by expressways and criss-crossed by rail and bus transit, its new towers pushing through the trees and hills at the intersections. Professor Alan H. Balfour has had an impact on the school as former director of both the graduate and undergraduate programs. He lauds the "diversity" of Atlanta; his studios frequently examine urban issues in a city "that has never been healthier." Others cite opportunities for practice, a thriving arts community, and a growing stock of specimen buildings, from the freestanding confectionary 1920s palazzos of Philip Schutze in lushly landscaped Northwest Atlanta to Portman's downtown Peachtree Center, plus recent work of Richard Meier, Michael Graves, and Burgee/Johnson.

Burgee/Johnson's IBM building looms on the horizon above the Georgia Institute of Technology, joining skyscrapers stamped with homegrown logos "Coke" and "BellSouth." The campus, simultaneously urban and suburban, belongs to an institute with a specific challenge to both instruct students and perform research in science and technology. Tech is not a broad-ranging university; its scope is focused. The study of architecture at Tech, which began in 1908, has evolved from small department status to an influential entity within the larger institution, although architecture's 766 students account for less than 10 percent of the institute's 11,700 enrollment.

Two fundamental changes to Georgia Tech's architecture program occurred in the 1970s that loosed the school's current vitality while giving it a stronger sense of self: in 1973, the four-plus-two program supplanted a five-year program; in 1975, the school of architecture within the college of engineering became the college of architecture, a critical change in self-image and a vital move toward independence from engineering's shadow. By 1976, as plans were made for a new building, William L. Fash had arrived to be the new college's first dean.

The college was organized into four departments, the largest of which is architecture, comprising 544 students in 1988. For



Facing page, left, college of architecture's new building (left in photo) and old building; right, mixed-use project for Pershing Point in Atlanta by Chris Mills, with Alan Balfour as critic. This page, left, 'House of Suicide,' class project based on work by John Hejduk, with James Williamson as critic; right, 'rock and roll cemetery' by Lyle Green, with Merrill Elam as critic.

the past two years that department has been led by associate directors Randy Roark, AIA, and Richard Dagenhart, both of whom awaited the appointment, recently concluded, of a permanent program director. Building construction, industrial design, and city planning, the three other previously established departments, share a collective enrollment smaller than architecture's. In response to Georgia Tech's emphasis on research, Fash also established three areas of specialized study in architectural conservation, rehabilitation technology, and construction research.

Fresh faculty helped shape the personality of the newly defined college. All recruitment had a similar imperative: "It is expected of the faculty that they do creative work and be recognized," Fash says. The faculty members seem serious, engaged in their work, aware of the importance of their tasks, and diverse. When asked to discuss the school, virtually every teacher communicates his or her ideas about theory, course work, research, or writing. These teachers share an implicit passion for their subject, reveling in differing points of view.

If a common language offers clues to a community's enthusiasm, the vocabulary of Georgia Tech professors, spiked with transitive verbs, is the language of debate. In conversation faculty members refer to "confronting the city," "intruding into the fabric of the building," "asserting presence," "making a culture," "struggling" for answers, "engaging" different points of view.

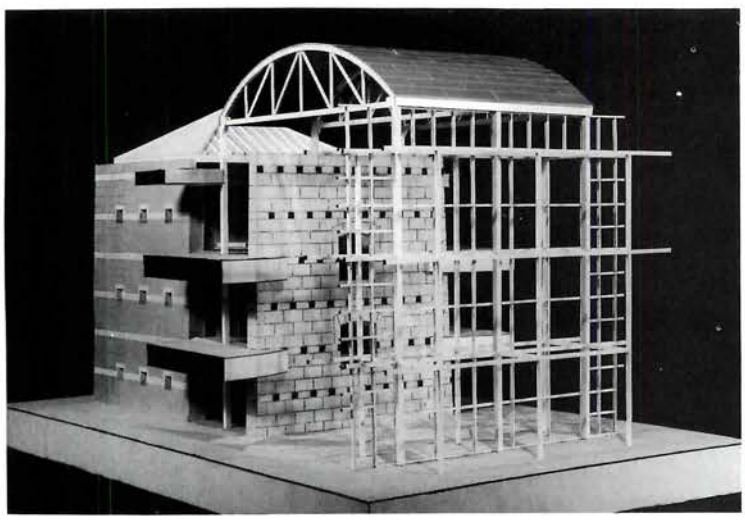
The student population is fairly diverse by Southeastern university standards. The majority of undergraduates are Georgia residents, but those enrolled in extended studies (who already hold a bachelor's degree in another discipline) or in graduate school (roughly one-half with undergraduate degrees from Tech) come from all over the Eastern United States, with the surrounding states leading the population. Women comprise 40 to 50 percent of the student body; minorities seem to play a minor role.

The students disperse into apartments scattered around the city, and that affects the character of the school. One student characterized the student population as "aloof," with little bonding between individual students after freshman year. Another felt the city drew students and teachers apart and that there were few opportunities for unscheduled meetings with teachers.

Students and teachers inevitably meet at length in the design studio, held in either the "old" or the "new" building—the first, 1950s vintage, modernist, brick; the 1980 addition a hard-edged, three-story, reinforced concrete building by the Atlanta-based Cooper, Carry & Associates, organized around a central atrium. As undergraduates, students follow a structured path through both buildings, led by five or six faculty members in each studio.

The first three years of the undergraduate program are not unlike those of other schools. In addition to core courses in technology and history, students progress through a syllabus that states goals and builds skills quarter by quarter, beginning with the fundamentals of drawing and composition. For the second year, students analyze significant buildings, move to the design of a complete object (in this case frequently a house), and finish the year with a small museum, which combines programmatic requirements of circulation or entry with design of a three-dimensional object. The third year is a time of examining whole buildings with real programs on specific sites.

A vertical studio that began as a second-year project has grown into a "special problems" course involving students from the second year through the graduate program. The project, the



Top and above, elementary school in Paris, completed in Paris studio by Daniel Gallagher, with George Johnston as critic; left, Buckhead branch library in Atlanta by Sam Van Nostrand, with George Johnston as critic. Facing page, 'host's house' for a character in the short story 'The Dinner Party,' designed by Michael Wilbur, with Randal Roark as critic.

construction of a "mask" by Cooper Union architecture dean John Hejduk, FAIA, is a collaboration of instructor Williamson, the students, and Hejduk. Based on Hejduk's evocative sketches for the "House of Suicide" and the "House of the Mother of Suicide," the students produce models, drawings, and a finished full-scale construction with the financial assistance of Portman and the Chicago-based Graham Foundation.

The fourth year is the watershed that sets Tech's undergraduate program apart from its peers, when roughly 50 percent of the class move en masse to Paris where students and faculty spend three quarters examining urbanism. The program, affiliated with the Ecole des Beaux-Arts, is a true exchange. French professors join Atlanta faculty in the spring of each year, while 15 to 20 French students visit the home of "Coca" and the Atlanta Braves each summer.

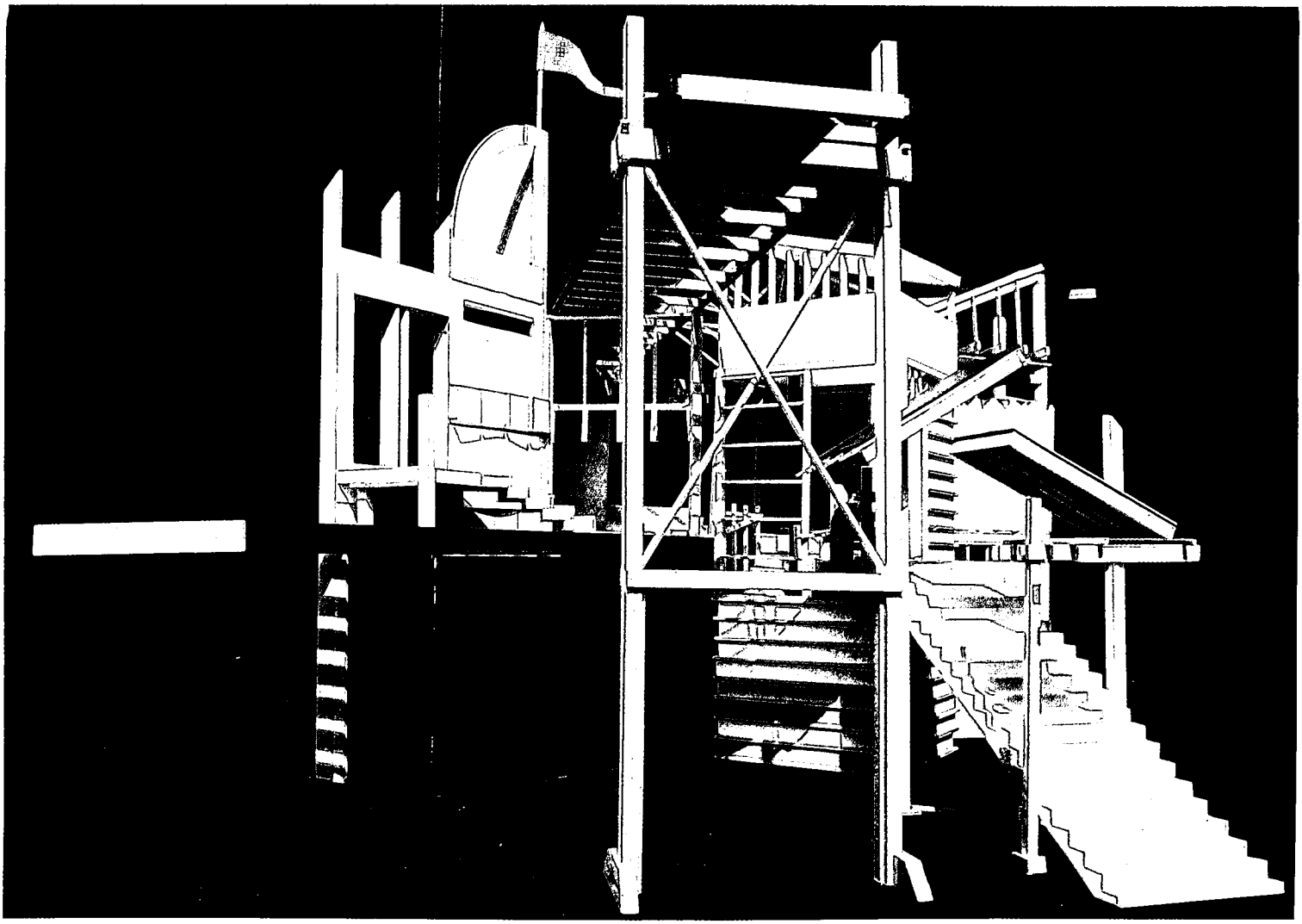
The school attempts to make the fourth year as powerful for those students who remain in Atlanta as for those who emigrate. Assistant professor George Johnson, who coordinates the fourth year, explores disparate urban models in the Atlanta program's fourth-year studios. This past year, students studied the western waterfront of Manhattan, designing individual components that fit into a much larger structure ("intervening in existing fact," as the studio critic described it). The Manhattan project occupied the first quarter, was followed by a quarter of urban study in detail ("how the pieces of the city are manifested"), and concluded with the macrocosm ("how the city is manifested"). Essays in drawing as well as large models were the results of the project, which served as an exit exam for fourth-year students, whose numbers had dropped from 120 freshmen to 50 seniors.

If four years of undergraduate life scatter most out into the city, perhaps the most cohesive group at Tech is the extended-studies students, who spend two years together as a class at the undergraduate level in a curriculum coordinated to prepare them for graduate study. Assistant professor Lane Duncan, AIA, is impressed with their qualities as students: he sees older students who have acquired undergraduate degrees in other fields elsewhere, who are highly motivated to succeed, who range in age from 28 to 40, and who are aware of the value of the education they seek.

Graduate education is an individual pursuit, whether at the master's or Ph.D. level. Most graduate students have left the campus for at least a year before returning; 90 percent of Georgia Tech graduate students have at least one year's experience in a professional office, and most work while in graduate school. The school's goal is to "award a professional degree to a person challenged at the highest level," says Dagenhart. At Georgia Tech, the program is divided into three parts—theory, practice, and "confronting the city."

Out of six required quarters in the master's program, three must be taken in optional studios, three in academics. In the spring of 1988, instructor Jennifer Bloomer's graduate studio attempted an "intrusion into the High Museum," using Sir John Soanes's London house as a model; Balfour's class laid claim to Peachtree Street "as a vortex of the city"; while professor Dale Durfee's studio in tall buildings designed a skyscraper on a specific site in Atlanta.

The most experimental quarter of graduate school occurs during the fall of the second year. To walk into the gallery and confront the neoconstructivist, sculptural models that result from



the SGF competition held that quarter is to realize that something unusual is going on at Georgia Tech. A regional company, the Southern GF Corp., sponsors the juried competition, awarding a traveling fellowship for the powerful, allusive, nonfigurative student work. In 1987, the contest singled out a triangular block on Peachtree Street to "engage current questions of architectural theory and practice in relationship to the city." SGF studios are by definition an exploration, essays that "increase graduate students' level of confidence, let them experiment."

The exploratory work has been published, perhaps leading to some criticism in the profession that the school is going too far or that new faculty members have too theoretical a bias. Ray Stainback, FAIA, a partner in the Atlanta firm of Thompson, Ventulett, Stainback & Associates, interviews Georgia Tech graduates each week, and he disagrees. "The students seem well prepared to go into the profession," Stainback says. "They have their heads up, they are looking around, have a sense of how to market themselves, and have the skills to present work."

Patricia Kerlin, a graduate student who has worked in architects' offices for several years, underscores Stainback's remarks. She feels that the school is "good at teaching basic skills." Merrill Elam, partner in the Atlanta firm Scogin Elam & Bray, currently employs three SGF competition winners in her office. All three are effectively dealing with pragmatics, yet "they are in touch with potential. They can see something resolved in a rich, unusual, expanded way," she says.

Commonly heard complaints are limited but similar. Students and faculty mention the need for coherent structure for curriculum and better communication from the top down. Lack of adequate counseling "resulted in a level of incompleteness" for 1978 master's recipient Kevin Cantley, AIA, who, like current students, feels that the school should offer assistance in decision making but feels well prepared and enriched by the program. And the library was almost universally lamented as too small and too limited, although nearby Emory University's holdings were cited as a substitute resource.

In response to a call for a more unified curriculum, Roark and Dagenhart recently coordinated a proposal with the faculty that will change both undergraduate and graduate education from a linear, chronological approach to an analogical method that combines design, technology, and history. The change expected to affect the school most immediately is the naming of a director of the architecture program. Giuseppe Zambonini, a critic at Yale with an architectural practice in New York City, has accepted a position that had remained unfilled for two years. He may bring structure and coherence to the program.

Tech has also named a new president, John P. Crecine, who may further change the college of architecture, for he, with a background in industrial management and social sciences, is the institute's first chief executive not trained as an engineer. His announced emphasis on liberal arts and computers may add dimensions to the architecture curriculum.

The school that has produced generations of competent practitioners seems to be breaking new ground, "embracing pluralism," according to Fash. Associate professor Douglas C. Allen summed it up when he said, "Conventional practice and conventional teaching of architecture are no longer enough."

Georgia Tech is preparing for the next generation of architecture by preparing architects not only to draw or to calculate but to question and to explore. Joel Barkley, a third-year student, came to Tech to get a "strong technical grounding." Since arriving, he has realized that, as he says, "It takes more than business ambition or the desire to learn technology" to succeed in architecture. Tech's college of architecture is still teaching the basics but also is functioning as a laboratory in pursuit of the quality that elevates architecture from craft to art. □

Contrasting Pair Of El Paso Schools

Similar only in quality.
By David Dillon

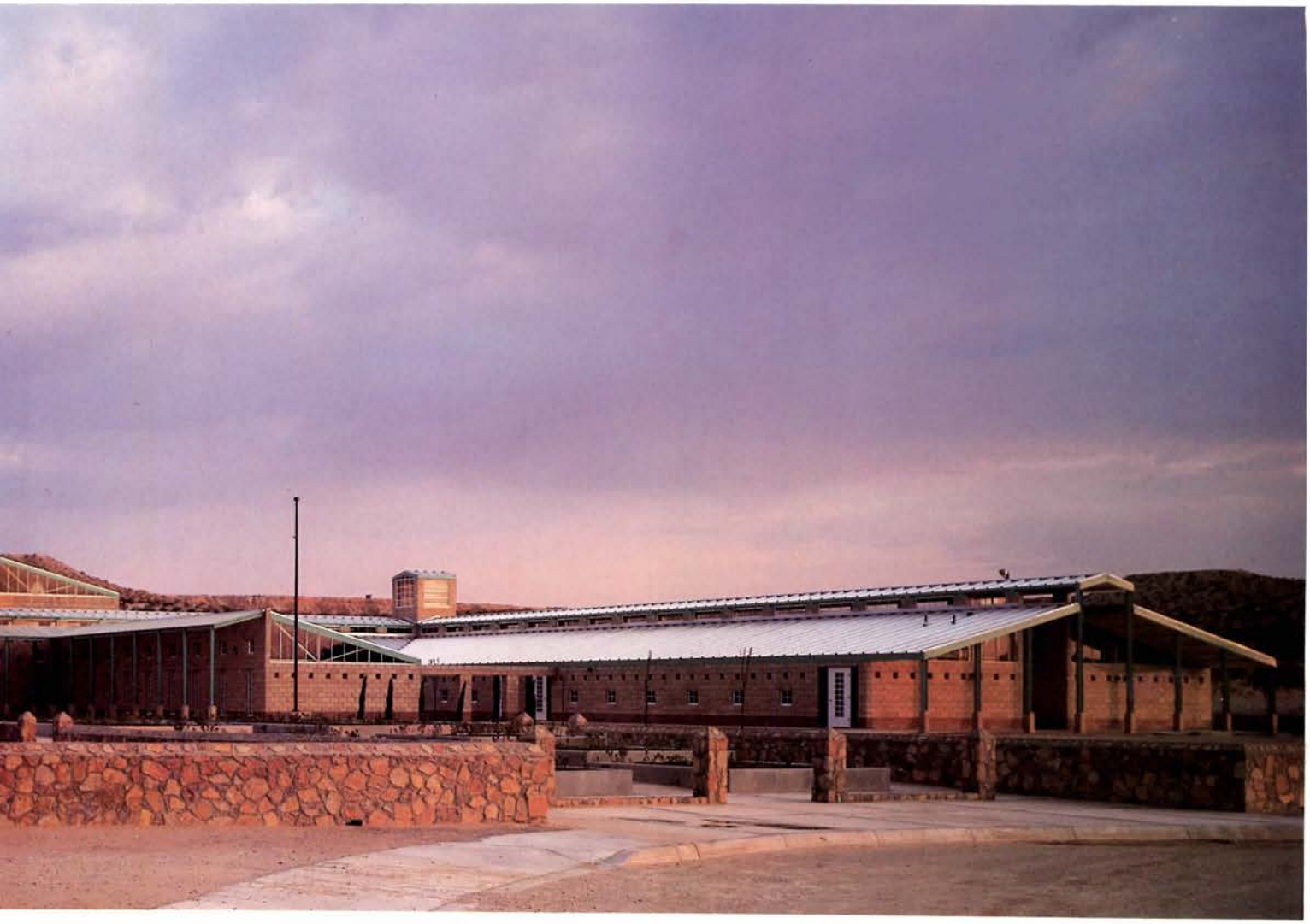
El Paso is to the rest of Texas as a fandango is to a reel. It is a detached and mysterious place, high, dry, and windy, surrounded by military bases yet having a culture inspired as much by Benito Juarez as by Uncle Sam. It is the only large city in Texas on Mountain Standard Time and the only city in the United States with a Bhutanese-style university.

Some of this intriguing diversity is evident in the design of two new elementary schools in the area. Whitaker School in Castner Heights is a playful Venturiesque creation that resembles a large toy box turned upside down. Riverside School in Sunland Park, N.M., just across the Rio Grande from downtown El Paso, is a rigorously rational design that translates the local rural vernacular into convincing civic architecture.

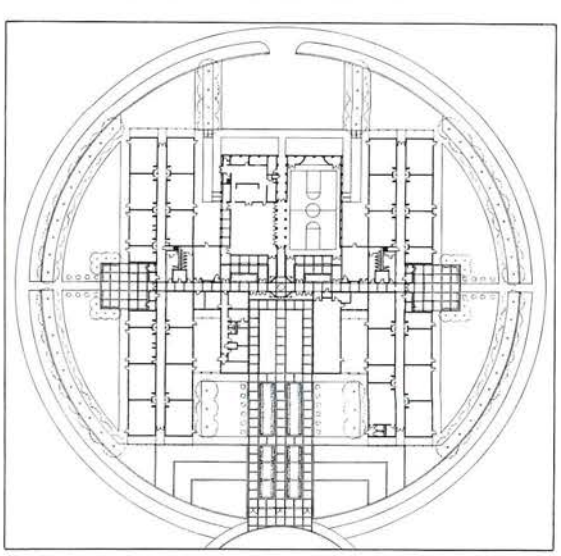
Yet, despite their stylistic differences, the two address similar educational problems. Both serve extremely poor school districts, in which many of the children are recent immigrants from Mexico and a high percentage speak no English. Whitaker is bordered by a public housing project and a new subdivision occupied by young families and retired military personnel. Riverside sits on a rural highway, overlooking clusters of house trailers and concrete block and metal buildings. Residents work at the nearby Sunland Park racetrack or commute to El Paso for construction and domestic jobs. The school dropout rate in both districts is high; in neither would a conventional two-story brick box have sparked interest in learning.

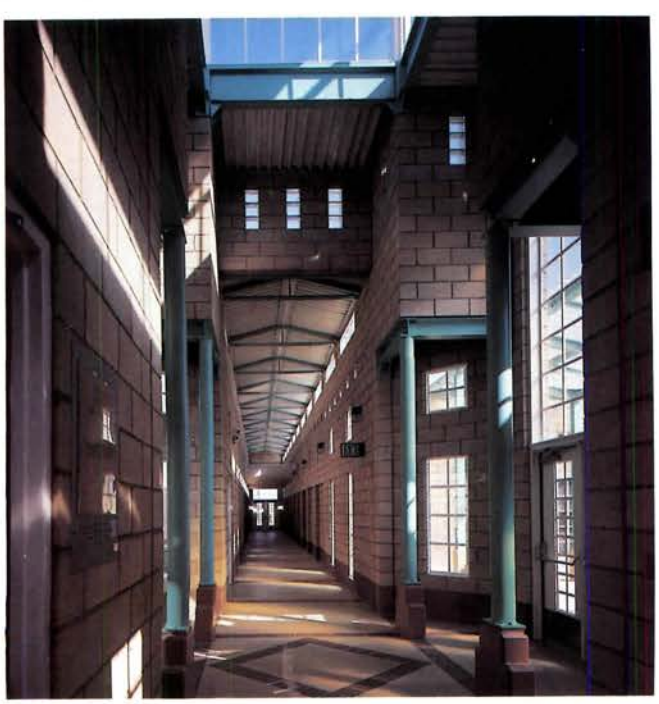
The Gadsden Independent School District, which includes Sunland Park, commissioned Perkins & Will to design three elementary schools to replace two overcrowded and outdated schools in a rapidly expanding area. Each was to accommodate 600 students, be a center for community activities, and serve as a prototype for future expansion.

At Riverside School, a low rock wall encircles the grounds. Center photo shows back side of central twin pavilions. Below, the entry tower flanked by library and administration wings.



Photographs © Richard Payne, AIA



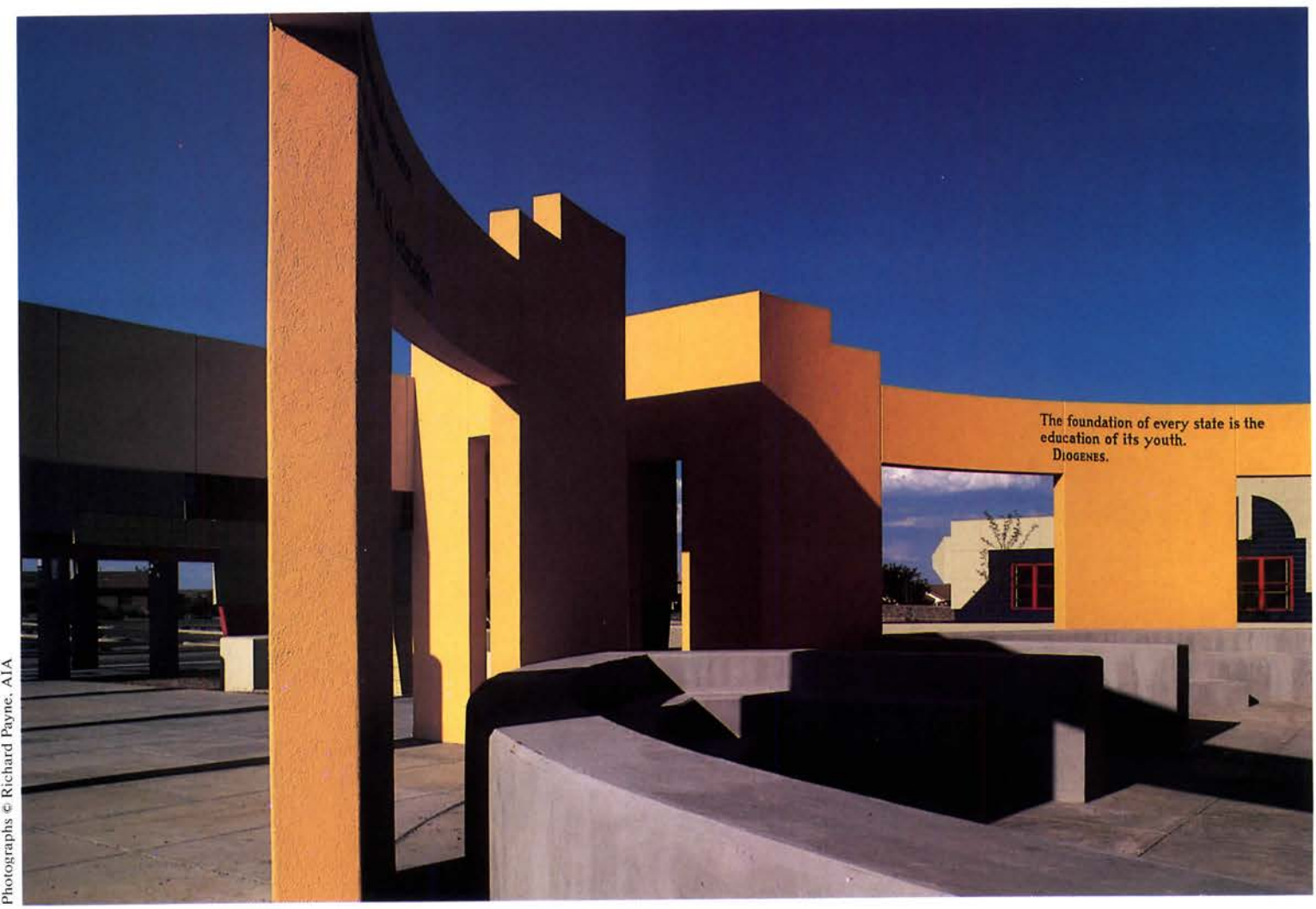


At Riverside School, Perkins & Will's Ralph Johnson, AIA, working with Mimbres Inc. of Santa Fe, elected to play off the small-scale, unpretentious architecture of the town, abstracting basic elements and arranging them in a more hierarchical and civic fashion. Many Sunland Park houses are surrounded by low stone walls, so Johnson circumscribed Riverside with a stone wall that keeps the desert at bay while also marking the boundary between natural and built spaces. The basic building materials are likewise those of the community: colored concrete block, corrugated metal, steel posts, glass fiber panels. All are simple, sturdy, inexpensive materials that belong to a farming and ranching esthetic.

Johnson then arranged the elements in a clear hierarchy. The dominant forms belong to the gymnasium and the auditorium, large spaces meant to be used by the community as well as the school. Next come the administrative offices and library, shared by children, teachers, and staff, followed by two classroom wings scaled to the children. Linking these elements is a series of courtyards and plazas that create a feeling of a village within a village.

The interiors are Spartan but not cold or dull: concrete block,

Above, a side entrance at Riverside School, on axis with entry tower. Left, the hall inside Riverside's main entrance; concrete block and painted bar joists are primary surfaces.



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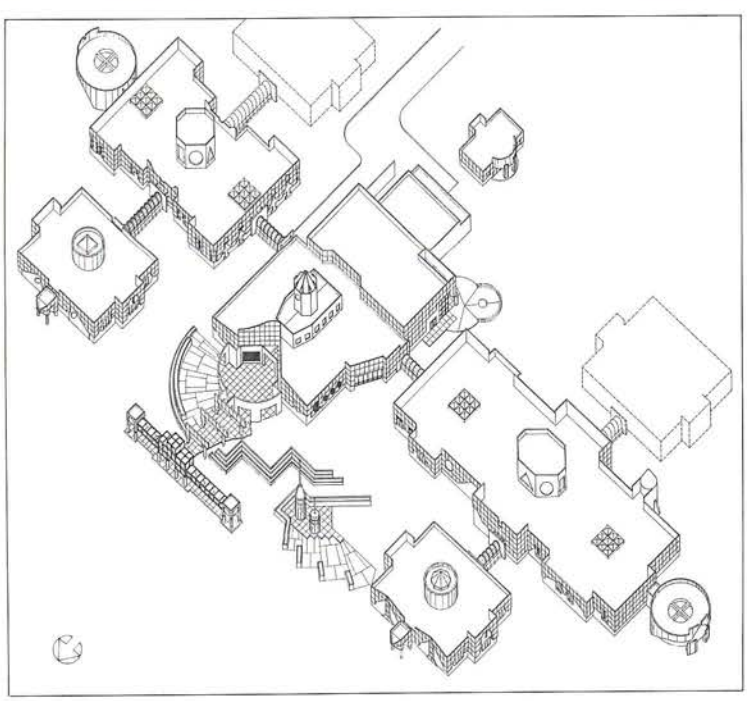


exposed bar joists painted green, standing seam metal roof. There is no pretense, no attempt to pass off an inexpensive job ($52 per square foot) as something other than it is. Here and there are small patios and courtyards with canvas awnings, where children can gather between classes.

Centering the entire composition is a tall steel tower housing the town clock, which simultaneously marks the entrance to the school and stands on axis with Sunland Park's main street. This school is not an elitist enclave but an extension and expression of the community. Some initial skepticism about the school's forms and materials has given way to enthusiastic approval, and the community now holds dances and parties in the gymnasium. Absenteeism among children and teachers is reportedly down. The children seem to feel that the school is theirs rather than an imposition of some remote bureaucracy.

The architect for Whitaker School, Fisher Cordova Prestidge of El Paso, decided from the start to imbue the school with the spirit of a playground. Rejecting a single monolith, the designers arranged six separate units on the landscape like gigantic Legos. In the center are the administrative offices, library, cafe-

At Whitaker School, shown on this page, an inscribed semicircular pergola (above) frames entrance courtyard. In axonometric, central building houses administration, library, and cafeteria.

Above, Whitaker School's entrance is surmounted by a giant representation of an open book; American flag is on 'page' extending toward the camera. Right, the central atrium in one of the classroom buildings; materials include tile and corrugated metal. Facing page, one of the Plexiglas-covered bridges that link the freestanding components of Whitaker School.

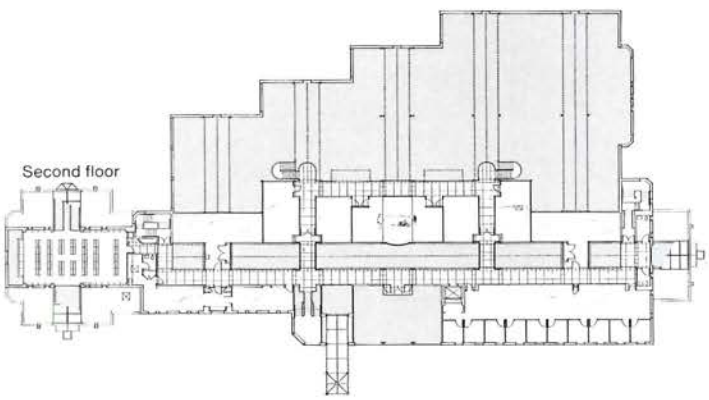
teria, and other basic facilities. To either side, connected by a long corridor with colorful Plexiglas bridges, are classrooms for 700 children and various small public spaces that function as academic town squares. As the school grows, additional units can be plugged into the system, as indicated in the axonometric shown on previous pages.

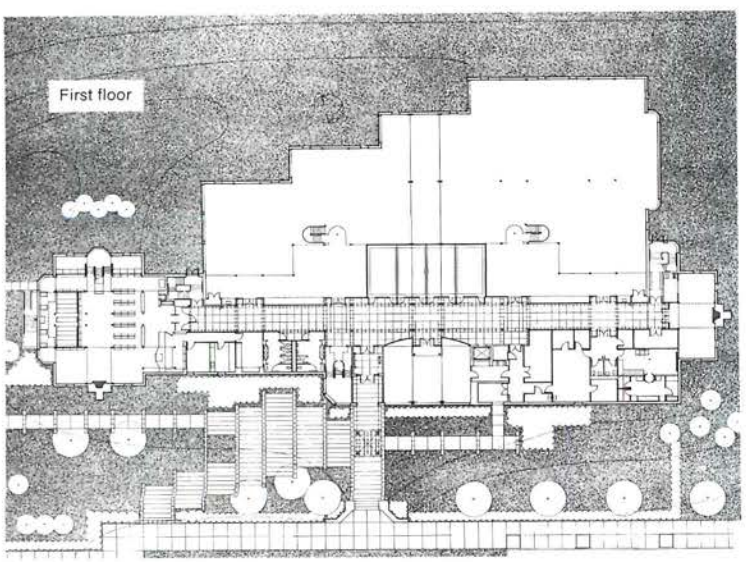
Fisher Cordova Prestidge started out designing warehouses and industrial buildings, and that experience shows in this school's interiors. Corrugated metal, concrete block, tile, and synthetic stucco are the basic materials, all cleanly and frugally used. Offsetting these obvious economies are abundant natural light and generous use of bold primary colors on door frames, mullions, railings, and other surfaces. It is hard to resist skipping down the corridors at Whitaker.

The exterior is even more playful, although in places the whimsy seems forced and gratuitous. The main entrance is a Star Wars pergola framing a semicircular courtyard, beyond which stands an entry facade in the shape of an open book, inscribed with an American flag and an inspirational message from former Columbia University president Grayson Kirk. It's easy to see why children would love all this stuff; it's also easy to wish some of it gone.

Elsewhere we find atria shaped like rocket ships and Crayolas and exterior walls dressed up with cutouts of paper dolls, joggers, and musical notes. Even Pac-Man turns up to give this sprawling decorated shed an electronic dimension. As at Riverside, some of Whitaker's neighbors were dismayed at first by all the architectural frivolity, but now the protests reportedly have turned to cheers. The school is being used for community activities, and the grounds are the scene of picnics, ball games, even an occasional hot-air balloon launch. Absenteeism is down, and there has been no vandalism.

"When students feel that a school is theirs, they are likely to guard it and look after it," says Whitaker principal Dorothy McCarthy. "This is not just another scary brown box." □





Competition Winner Built as Designed

Roger Williams College architecture building, Kite Palmer Architects.
By Michael J. Crosbie

The new architecture building at Roger Williams College in Bristol, R.I., is the product of a national design competition that drew more than 150 entries from across the country, some from nationally known firms. But it was a firm from nearby Providence that won. William L. Kite Jr., AIA, of Kite Palmer Architects says that being close enough to visit the site may have given him a leg up on the competition. Kite's winning entry seemed to the jury to best embody the program's call for "an outstanding design, compatible with existing campus buildings, [incorporating] consideration of cost effectiveness and energy conservation."

As written by the architecture school's director, Raj Saksena, AIA, and Boston Architectural Center president Bernard Spring, FAIA, the building's program called for accommodation of 280 undergraduate students, faculty and administration offices, flexible studio space, jury rooms, computer labs, a library, and social spaces. The built result is nearly identical to the competition entry—an amazing feat, considering the tight budget and a clientele naturally inclined to tinker with the design. Some minor changes were made after faculty and student reaction to the design, and the building was constructed for $100 a square foot.

The fact that this building is for architects and future architects did not paralyze Kite's drawing arm. "We didn't design this

as a statement for other architects," he says. "We wanted to create logical, functional spaces that were inspirational without being overpowering. We wanted working spaces expressing concern for detailing and integration." Kite designed a quiet building that would accommodate varied student interests—a building antithetical to, for example, Paul Rudolph's Yale Art & Architecture Building. "No one's tried to burn it down yet," Kite muses. Saksena detects a change in the students' behavior since occupying the building. "There's an intensity in the program that I only hoped for. The students want to be around the building."

The jury praised the clarity of the design—a two-story, daylighted spine, anchored at one end by the library and at the other by a comfortable, well-used lounge. Fed by the spine is a battery of faculty, administration, exhibit, and support spaces on the east side. To the west, the building steps along in one immense studio, rigorously Spartan, bathed in natural light. Studio groups are defined by the setbacks and movable partitions. At a mezzanine level over the studio, review spaces and a computer lab offer sweeping views and an elevated plateau from which to critique student work.

Outside, the inventive use of inexpensive split-face, smooth, and tinted concrete block is playful. Two fireplaces, one in the library and another in the student lounge, are blocky sculptural forms on the exterior. The main entrance is signaled with an open steel canopy on concrete columns that appears to have been pulled directly out of the facade, leaving behind a void with the same profile as the canopy. All of the gabled elements serve as apertures for daylighting.The building nods to the scale and massing of nearby 1960s campus buildings but otherwise draws no architectural parallel to them—a wise choice, which clearly makes it the best building at Roger Williams College. □

Above left, multitextured exterior, with main entrance at left in photo; above, studio spaces glow at dusk; right middle, central spine; right, overview of studio.

Photographs © Steve Rosenthal

Quietly Elegant Classroom Addition

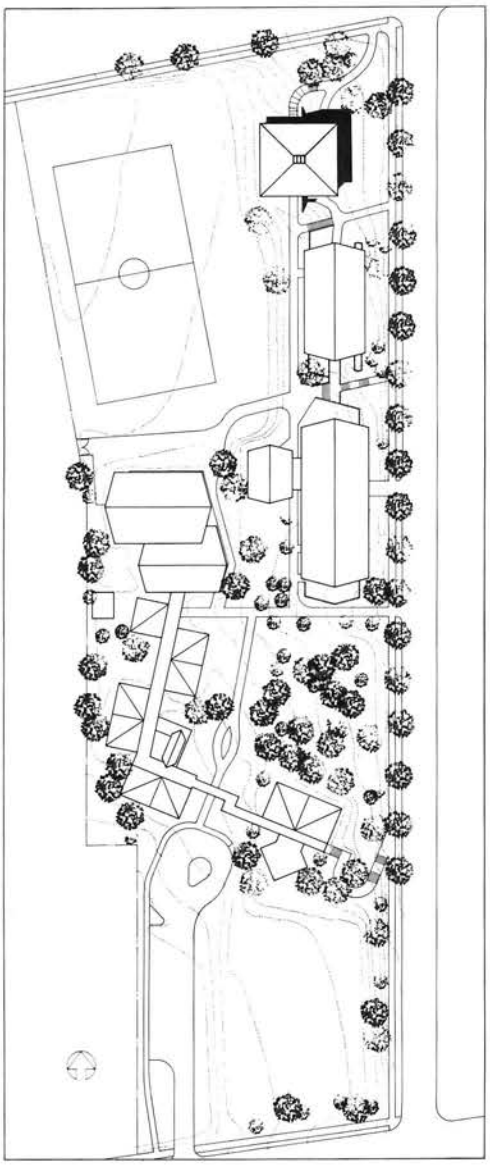
To the Foote School, New Haven. Roth & Moore Architects. By Michael J. Crosbie

The Foote School in New Haven, Conn., was founded in the 1920s as an elementary school for children of faculty at nearby Yale University. It is located in a residential section of New Haven on a wooded site that slopes up from the street. In the 1950s Perkins & Will gave the small campus an architectural identity in the form of one- and two-story brick buildings with ganged windows, shallow pitched roofs, and broad overhangs, linked by walkways. When selected recently by the school to design a classroom building with an assembly space, Roth & Moore Architects of New Haven took its cues from the buildings already there, "but we interpreted them in a new way," says Harold Roth, FAIA.

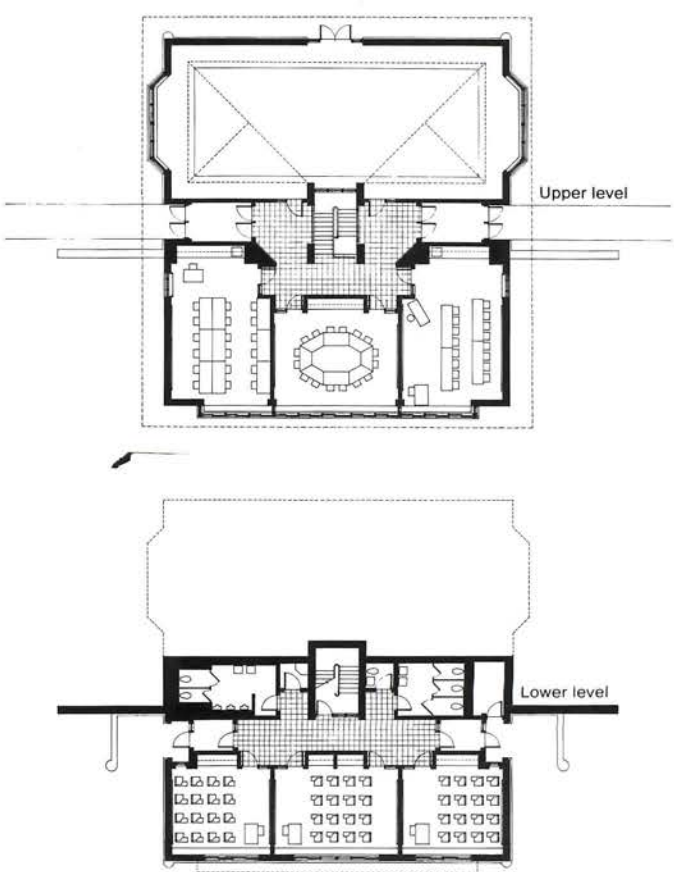
The architect sited the building at the end of a long walkway that connects buildings along a north-south spine. Previously the walkway petered out past the campus's northernmost building. Now the new building terminates the walkway, which leads right into its upper level. It gives the campus a northern boundary and the school a strong presence from the street, as the building is near a corner. The building nearly matches the brick color of the rest of the campus, but, where the older buildings have darker bricks mixed in, Roth pulled those darker hues out for banding and accents around windows and doors. A more subtle brick pattern occurs on a streetside, cantilevered bay where stretcher courses form a counterpoint between soldier courses.

The new building's roof is low with generous overhangs. But, where the other buildings have clipped gable roofs with a pitch so shallow you can barely see them, the new building's hip roof is steeper. With its peaked skylights the roof provides a scale and solidity appropriate to a building that forms an end to the campus. It reads as one story at campus level, but, from the street, as the grade slopes away, it's a two-story building with lower entrances punctuated by octagonal windows above.

The 7,500-square-foot building has a compact plan, neatly divided by its north-south axis. To the east are two levels of classrooms and a conference room. The upper-level rooms are expansive with their east walls of glass and oak bookcases below. On the west side of the axis is a multipurpose space that serves primarily as an exercise room. Its ceiling follows the slope of the hip roof and then splays down on its north and south ends to diminish the scale of the room near identical window bays. Interior windows to the east deliver more illumination from the skylight, which makes this building glow. The interior staircase is at the heart of the building, minimizing circulation space. Bathed in daylight from above, it acts as a lantern with a zippy red railing and offers views into the multipurpose room. □



Facing page and directly below, two views of Foote School's exterior. View from road (left) shows building's two-story side in scale with residential neighborhood, while axial view of one-story side depicts building as approached from north-south walkway, with one of campus's original buildings at right in photo. Bottom, skylighted central staircase delivers natural light to interior and provides dramatic vertical space with view to multipurpose room.



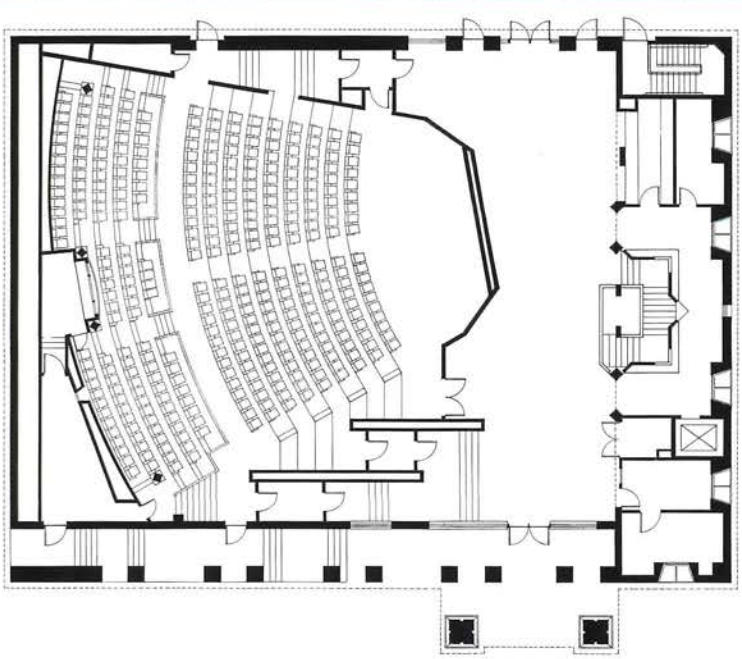
Academic Accent for A Research Center

Auditorium building, Cold Spring Harbor Laboratory, Centerbrook Architects. By Lynn Nesmith

Cold Spring Harbor Laboratory looks more like a quaint New England fishing village than one of the world's leading biological research centers. The latest addition to this bucolic scientific community along Long Island's north shore is the Oliver and Lorraine Grace Auditorium by Centerbrook Architects. It's a building that respects its modest neighbors without imitating them, borrowing freely from a number of forms while owing allegiance to no particular style.

Founded in 1890 by the Brooklyn Academy of Arts and Sciences as a summer educational retreat for high school science teachers as well as a marine biological research center, Cold Spring Harbor Laboratory has a distinguished scientific history and a diverse architectural history. The laboratory's earliest functions were housed in a collection of weatherboard buildings along the harbor that were built when the community was an active whaling port. Nine buildings date from the 19th century, including the 1893 Jones Laboratory, the first building on the grounds erected specifically for scientific purposes (and a 1981 AIA honor award winner for Centerbrook, then called Moore Grover Harper). The laboratory continued to expand and went through numerous changes in name and major sponsors, emphasis of scientific research, and sources and levels of fund-

Photographs © Peter Aaron/ESTO

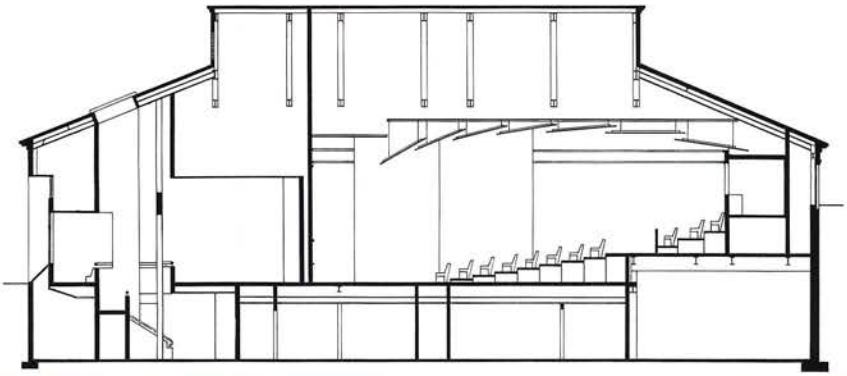


Above, a loggia running the length of the south facade provides shading in summer while the oversized dormers admit natural light to the lobby. Photo at far left shows east end and north elevation with a single dormer above the back entrance.

ing. New buildings ranged from ornate Victorian houses to summer cottages, to Italian Renaissance-inspired stucco and brick, and to the ever prominent simple wooden vernacular.

In 1968, James D. Watson, codiscoverer of the DNA molecule, became director of the laboratory. As self-appointed guardian of its architectural heritage and tranquil setting, Watson, with his wife, Elizabeth, soon formed a loyal client/architect alliance with first Charles Moore, FAIA, and then Centerbrook. This relationship has led to more than 25 separate commissions in the last 15 years, including renovations and new construction that deftly meld technology with comfortable buildings.

In recent years Cold Spring Harbor's major research programs and attendance at its conferences and courses have grown significantly; by 1982 the laboratory had established a master plan to develop facilities to fulfill its role as a major center for postgraduate education in molecular biology. According to William H. Grover, FAIA, as the laboratory evolves into a year-round



Left and above, seating encircles the stairway, creating alcoves for impromptu gatherings of scientists. Top left, the lecture hall is equipped with a sophisticated audiovisual system. Right, large dormer crowns glazed entrance that opens onto paved courtyard; octagonal gazebo is visible through window.

educational institution, there is a deliberate effort to design buildings that reflect the "feeling of an academic campus."

For Grace Auditorium, Grover selected a palette of materials that feel at once permanent and collegiate. The building is framed in steel with a veneer of dark brown and terra-cotta colored bricks set in alternating courses. The shallow hipped roof is clad in Vermont slate. Grace Auditorium is oriented toward the south and nestled into a low but prominent knoll near the main vehicular entrance to the laboratory grounds. Four large dormer windows of varied heights and setbacks pierce the roof. The portico was deliberately overscaled to create the sense of a grand entrance to not only Grace Auditorium but also the campus.

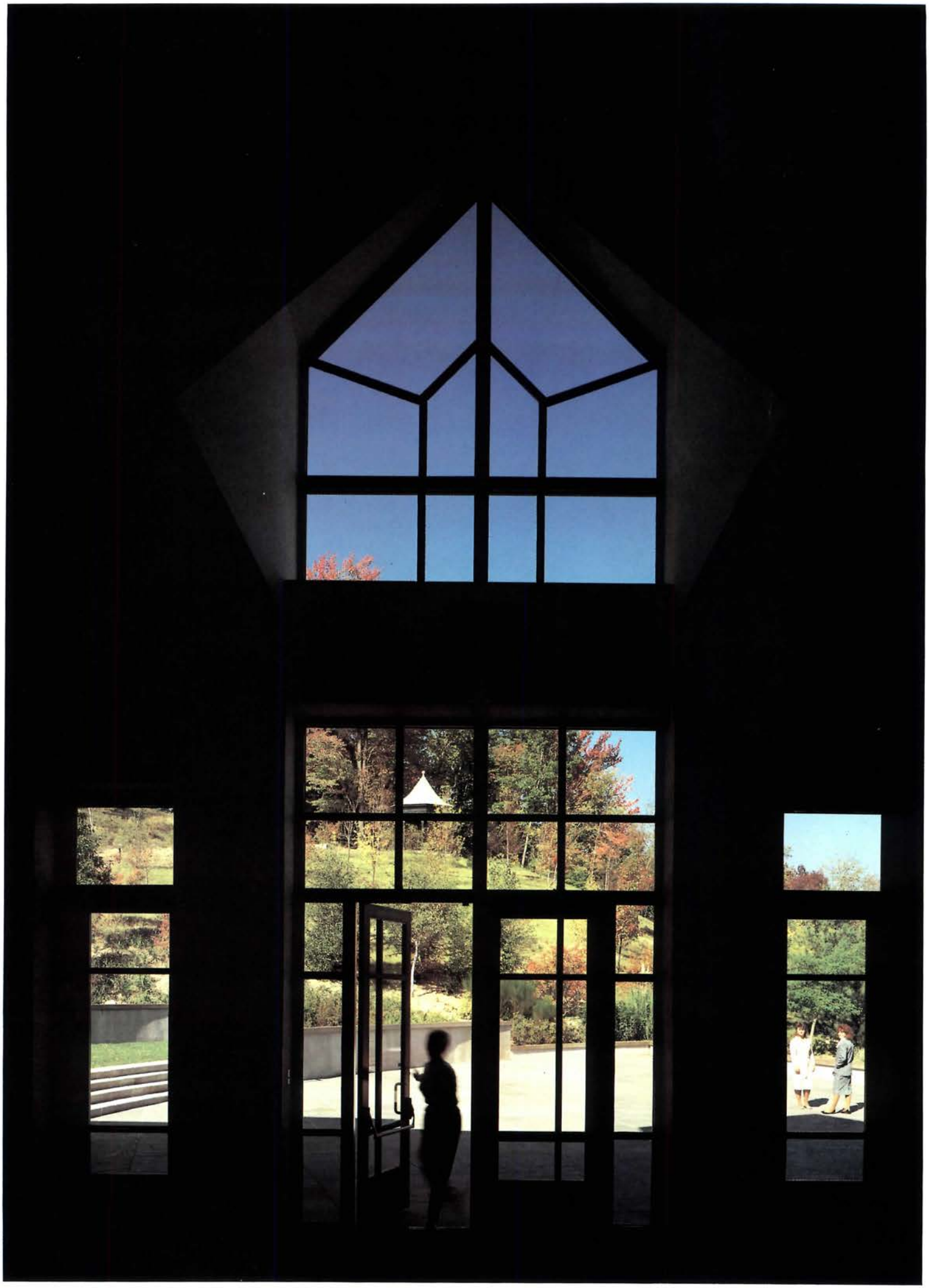
The main component of the building is a 360-seat lecture hall. Interior colors are greens and blues, and molding and ceiling baffles are finished blond wood. Triangular piers clad in gray laminate with recessed uplights flank the doorways. Encircling the room is a royal blue silk-screen frieze representing a continuous DNA molecule.

The lower level houses a bookstore, administrative offices, and the laboratory's sophisticated computer center. The stairway, subdued in comparison with similar, more playful Moore and Centerbrook creations, has angled and layered walls, cutouts, and a pair of skylights that bring natural light to the lower level.

The back of the building opens onto a bluestone-paved patio surrounded by stepped grassy terraces. Steps lead to a pedestrian pathway that continues up the landscaped hillside to an octagonal gazebo, a Centerbrook creation incorporating the elegant copper roof of a 1920s pump house from an estate across the harbor.

The crest of the hill is the site of a proposed neuroscience center and visitors' lodge. Centerbrook's scheme for this $20 million complex, approved by the laboratory's director and trustees, awaits funding.

Research scientists who have spent summers there have fondly referred to Cold Spring Harbor as "Camp Cancer." Grace Auditorium is a step in the laboratory's evolution to a year-round schoolhouse of modern biology. □



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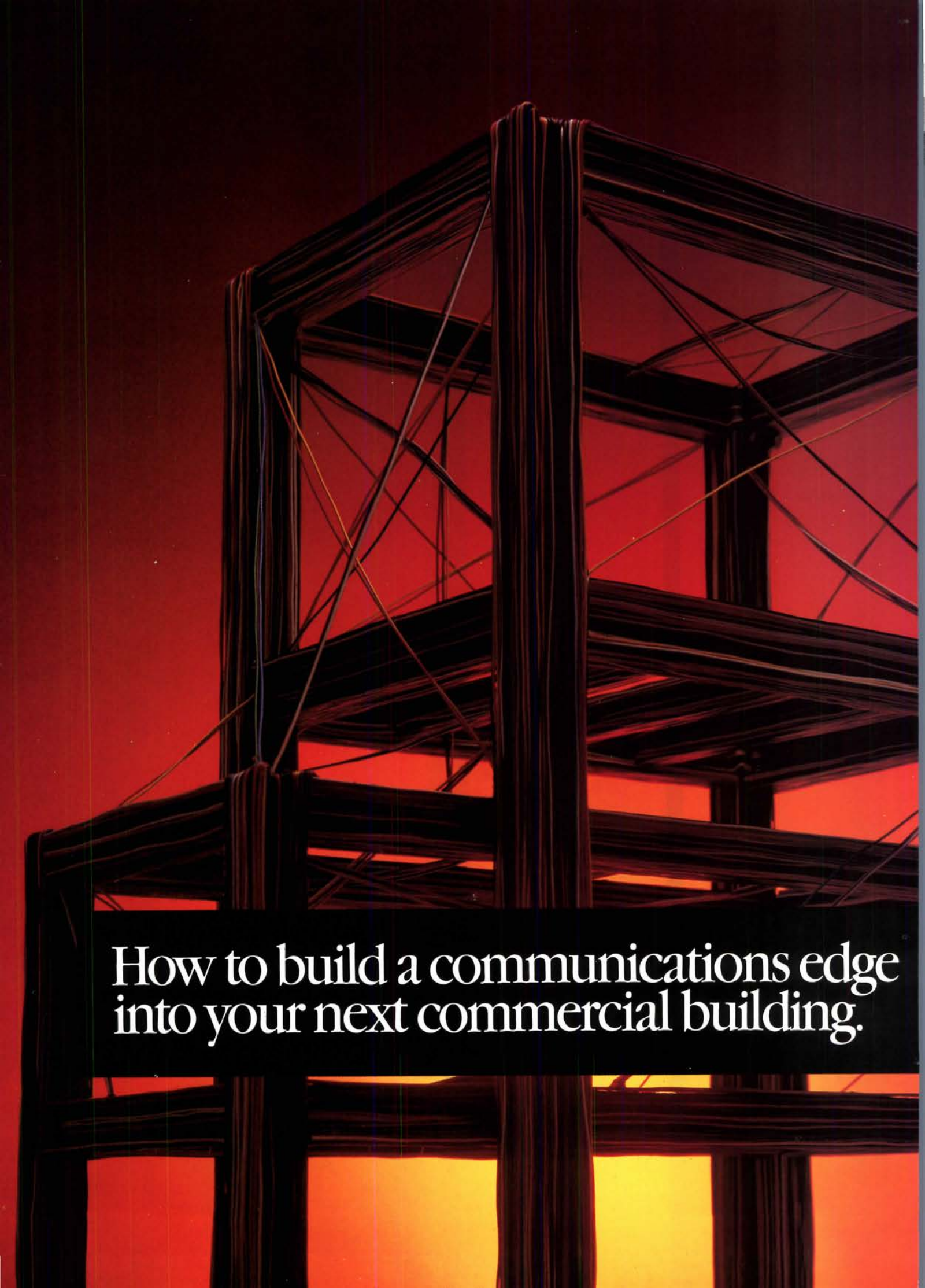
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Covering Holes in the Wall

Window membranes over the years and into the future. By Forrest Wilson

Etymologically, the term "window" derives from the Old Norse *vindr-auga,* or "wind-eye." Through most of its architectural transformations, the window has remained a symbolic "hole in the cave wall," whether magnificently surrounded by ornate decoration in 16th-century Spanish palaces or formed of animal skins stretched over a simple opening to let light into early New England houses. Pierced marble slabs or alabaster were the membrane material in Asian Indian and Byzantine windows. Moslems set brilliantly colored chunks of glass in cement frames in Syria and Egypt. In China and Japan, rice paper, protected by a sliding wooden shutter, let light in and kept cold drafts out. Shell-thin panes of marble, mica, and horn were used by the Chinese and Romans of ancient times.

Animal skins, talc, oiled paper, parchment—any and all translucent substances—have been used as lenses for the wind-eye. Pliny the Elder described a "forcing vessel" in which cucumbers were grown in cold weather, protected by "transparent stone." We suspect the covering was thin sheets of lapis specularis (talc).

Glass was not common in Rome during these times, but by the end of the second century it was used in many wealthy homes and imperial villas. After the fall of Rome, glass did not appear in Europe again until the middle of the 12th century, this time in church windows. The Abbot Suger laid the foundation stone for the choir of St. Denis and for the age of Gothic style in 1140. By the beginning of the 13th century, great rose windows were in place in Gothic cathedrals. They were animated light shows responding to changes in exterior light from sunrise to sunset, winter and summer—the MTV of the Middle Ages.

Today, glass is the universal material for windows, the transparent membrane of choice to let in light and warmth and keep out smells, dirt, noise, and itinerant rodents. However, simple glass has been a rare, prohibitively expensive luxury through much of window history; it has been a reasonably priced, readily available material for only a little over a century and a half.

Simple glass as a membrane filling probably will not last out this century as the dominant window material, and it will take the decorative-holes-in-cave-walls concept with it as it disappears. The idea of static facade now is challenged by the concept of animated thermal barrier. The poets' charming metaphors of windows as "eyes to the soul" may soon be written into architectural specifications, if present laboratory research proves successful. There are now experimental models of windows that not only blink of their own accord but also send back messages. The reader should not ignore these experiments as flights of poetic nonsense—animated windows are now operating in Japan.

The two most common window types—the French window, reaching to the floor with double casements opening as doors, and the double-hung sashes that slide up and down within a frame—appeared during the Renaissance in France and England, respectively. Inigo Jones pioneered large glass windows in England early in the 17th century and later used sliding sashes in Whitehall Palace. Late in that century, wealthy collectors and institutions, such as the Oxford Botanic Garden, financed plant and seed hunting expeditions around the world. Consequently, the first bona fide glass greenhouse was built in Chelsea in 1680, according to John Hix, author of *The Glass Building* (MIT Press, 1974).

The "wind-eye" of Strasbourg Cathedral, built 1230-1365.

By about 1750, glass polishing was mechanized and plate glass was cast. Greenhousing in England became a fine art with construction of the Hackney Botanic Nursery in London in 1771. The nursery boasted an 80-foot-long palm house as well as a double camellia house replete with a copper-sashed, 120-foot-long, curvilinear glass roof decorated with curved iron astragals. The building was steam heated and had its own rain-making machine for the palms. The exotic plants ended up in the greatest greenhouse of them all, the Crystal Palace in London's Hyde Park, completed to house "The Great Exhibition" of 1851. Joseph Paxton, the designer, began his career as a gardener and designer of hothouses. The building, according to Nikolaus Pevsner, was "a showcase filled with useless and bizarre objects, from an eighty-blade sportsman's knife to a floating Church for seamen." The most impressive exhibition was the great building itself.

The Crystal Palace covered 900,000 square feet and used 400 tons of sheet glass—equivalent to a third of England's total glass production a decade earlier. Paxton demanded, and got, the largest sheet possible from the Chance Brothers, the glass manufacturer. Each sheet was made by blowing glass into hollow cylinders, cutting it longitudinally, and allowing it to open, flatten, and cool.

The glass walls and roof were supported by 3,300 cast-iron columns and 2,224 principal girders. There were 24 miles of main gutter and 205 miles of wood sash bars enclosing a volume of 33 million cubic feet at a cost of roughly a penny per cubic foot.

DuPont Photo

Left, laminated safety glass is removed from autoclave. Facing page, from top: silicone sealants attach glass dome; PVB safety-glass sheeting; and heat mirror glass production.

The 20th century

1900-1920: At the turn of the century, only 7 percent of material used in constructing the average house is glass, used mostly in windows. Laminated glass originates in England, composed of sheets of transparent celluloid cemented with balsam between two pieces of glass. Its cost is high, its performance low. The Larkin Building of 1904 in Buffalo is designed with fixed glazing. The architect, Frank Lloyd Wright, later will describe it in his autobiography as "a simple cliff of brick hermetically sealed, one of the first 'air conditioned' buildings in the country."

Bruno Taut designs the "Glashaus" Pavilion for the Werkbund Exhibition at Cologne in 1914. A display for the glass industry, it is composed of a concrete lamellar dome designed to show the use of glass, with a glass envelope, glass ceilings, glass floors, and glass tiles. In 1916, Edward Bevedictus patents laminated glass that uses a gelatin adhesive to bond celluloid sheeting (cellulose nitrate) between the pieces of glass. It is used during World War I for goggles, gas-mask lenses, and motor vehicle and aircraft windshields, but the glass becomes brittle quickly and sunlight causes the sandwich to change color. Willis Polk's Hallidie Building in San Francisco, completed in 1918, boasts the first true curtain wall in a large urban structure. A delicate glass front is hung from floor slabs cantilevered three feet in front of reinforced concrete columns.

1920-1940: New types of glass and manufacturing techniques become important: cast plate glass is displaced by continuously rolled glass, and safety glass is used commercially. Architects explore different applications of glazing. In 1921 Mies van der Rohe proposes a glass tower, and in 1925 Peter Behrens designs a glass house over the Seine for the International Exposition of Decorative Arts in Paris. In the United States, the legendary Buckminster Fuller designs the legendary Dymaxion House, which is enclosed in double-pane glass of varying opacities for different functions.

In the early 1930s, five U.S. companies join to develop new high-test safety glass. After a six-year, $6 million investment in research and development, they arrive at polyvinyl butyral resin (PVB).

Rohm & Haas begins production of Plexiglas sheet in 1936. Total annual sales include 4,000 square feet for spectacles, display cases, and lighting fixtures. Plexiglas is exhibited at the New York World's Fair in 1939.

About the same time, the U.S. Army replaces glass in windows of military aircraft with methyl methacrylate plastic sheet, which is lighter in weight and more transparent than glass and formable into three-dimensional shapes with mild heating. It also withstands increased pressure differentials and weathering and is shatter-resistant. Bullets make clean holes in it.

1940-1960: Electrical energy production rises dramatically from 180 billion kwh in 1940 to 389 billion kwh in 1950; free use of glass may be contributing to this phenomenon. The Corning Glass Center in Corning, N.Y., is set up as a showplace to demonstrate the myriad contemporary uses of glass, including photosensitive glass; plate glass sheets; patterned glass blocks for walls; glass insulation, curtains, and chairs; and a visitors' entryway over a bridge enclosed in a tunnel of glass tubing.

In Europe, vinyl window frames are introduced because of wood shortages. And the most up-to-date, most esthetically pleasing use of "holes-in-cave-walls" award goes to Le Corbusier for the Chapel Notre-Dame-du-Haut at Ronchamp, completed in 1955.

1960-1980: Building energy requirements climb steadily through the 1960s. Curtain wall technology develops standard catalogue items, and operable windows in commercial buildings disappear. Synthetic caulking compounds seal curtain wall joints, and the sealed building type dominates commercial, institutional, and high-rise residential buildings, creating total dependence on mechanical systems.

Windowless schools appear in the early 1960s, and a research report of the Educational Facilities Laboratories explains: "The ventilating function has been taken over by mechanical systems that can condition the air in any classroom to any desired degree of freshness and warmth or coolness and to any desired rate of movement. The emphasis on daylighting has been shifted to new technologies of artificial illumination . . . [and] the only valid reason for having windows in any classroom is . . . [that] an 'eye' to the outdoors may be desirable for educational purposes."

At the other end of the building spectrum, Fuller's U.S. Pavilion at Expo 67 in Montreal is a double-thickness dome enclosed in a clear plastic, incorporating shades in plastic coverings attached to sun-tracking sensors. It remains in operation for two months.

During the 1970s, our view toward energy consumption in general, and glazing in particular, makes a dramatic about-face. The U.S. Department of Commerce reports that electrical energy production in 1970 has reached 1,638 billion kwh. But the oil embargo hits in 1973, bringing fourfold price increases by OPEC. New products, processes, and legislation are introduced to reduce energy consumption, and, after 1974, buildings consume 24 percent less energy than those built between 1971 and 1973. Power consumption for lighting in typical commercial buildings drops from five to six watts per square foot to two to three watts per square foot due to dramatic improvements in lamp and fixture design. Single glazing, common prior to 1974, gives way to double glazing as standard.

The U.S. Department of Energy, created in 1977, begins research and development of solar energy demonstration programs. The active systems involving collectors, piping, and storage tanks add to building cost; many prove economically prohibitive. Interest shifts to passive systems involving windows and roof overhangs, and daylighting re-emerges as a popular design issue. DOE sponsors research to invent film transparent to visible sunlight but opaque to long-wavelength infrared (heat) radiation, to allow sunlight into buildings and block heat loss. (The result will prove to be "low-emissivity" film.) In 1979, DOE builds solar demonstration buildings—schools, libraries, stores, and public facilities—and discovers that daylighting and solar radiant heat are popular concepts among building designers and users.

1980-present: Insulating, reflecting, shading, acoustical, and fire-resistive glass appear early in this decade. Low-emissivity coatings achieve significant heat reflection in their early applications by enhancing the "greenhouse" effect, that is, reducing heat loss to the outdoors. Glass manufacturers predict that by 1990 half of all residential windows and a quarter of all glazing will be low-e windows.

Plastics play a major part in window design, as extruded vinyl windows coupled with insulating glass come to make up the fastest growing window category. Worldwide production of PVB resin sheeting exceeds 160 million pounds, of which 20 to 25 percent is being used in architectural applications of safety glass by 1987. In 1988, sound-absorbing laminates in United Airlines' new "Terminal for Tomorrow" at Chicago's O'Hare International Airport cover 15 acres. Much of it is laminated safety glass with PVB.

A European clear glass now carries a fire rating previously available only for wired glass and glass block. Made of two panes of tempered glass sandwiching an inner cavity filled with a transparent gel of water and inorganic salts, this new glass type provides 90 minutes of fire resistance. When exposed to fire, the gel forms a heat-insulating crust.

The U.S. Department of Commerce estimates that energy use will increase 25 percent by the year 2000.

Coming attractions

• Intelligent building skins will predict the weather, according to Adrian C. Pitts of the United Kingdom Department of Building Science, Sheffield, England. Pitts says that new materials and technologies will permit dynamic rather than static response to variations in external climate. Local weather will be predicted over a period of several hours, and sensors will activate building and system performance.

• In the development of transparent insulating materials, Quan-

Courtesy of G.E. Silicone Sealants Division

Courtesy of G.E. Silicone Sealants Division

DuPont Photo

tum Optics in California is working on a slab of porous silica with cavities measuring several nanometers (billionths of a meter) in diameter. The cavities trap air molecules and reduce the transfer of thermal energy. A ½-inch-thick slab of "aerogel" can provide about an R-10 insulating value.

Marlo Martin, president of Quantum Optics, says that even if aerogel were not transparent it would be an interesting material as an insulator. It also has unusual sound transmission qualities: it is the only material Martin is aware of that has a sound velocity less than the sound velocity of air.

Aerogel silica glass is delicate and susceptible to moisture. Therefore, it is sandwiched between two panes of ordinary glass, the edges are sealed, and a very mild vacuum is introduced. Presently the problem is one of manufacture, because it must be dried in a high-pressure vessel, such as an autoclave.

The initial market for aerogel may be skylights, which cause high energy loss when stratified warm air is quickly passed through them to the exterior. Aerogel causes some light scattering and has a bluish tint but is completely transparent.

• Electrochromic glass is activated by passing a current through an electrochemically active polymer film sandwiched between two panes of glass. As the current is altered, the color changes from blue-gray to colorless but remains at the tint opacity it has when the current is turned off. It will not change tint again until a current is applied again. According to EIC President David Rauh, who has been working on electrochromic technology under contract to DOE for four years, the objective is to reduce costs for the building market.

Power use is negligible—the amount needed to activate a square meter of glass is equivalent to that consumed by a 100-watt incandescent bulb in one or two seconds of use.The cost trade-off is between lighting and airconditioning. Airconditioning loads can be reduced, optimally, from 25 to 30 percent, but the reduction of natural light adds to lighting cost. The need for venetian blinds, curtains, or other shading devices is eliminated.

Electrochromic eyeglasses and motorcycle helmets will probably be manufactured successfully before the technology for large areas in buildings is economically feasible. EIC is under contract to NASA to invent a visor to cut down the glare of sunlight.

• Laboratory investigations of technology for core daylighting, using hollow rectangular "light ducts" with reflective interior surfaces to conduct sunlight from a building's surface to its core, will continue. In 1983, such passive solar optics systems were used in the University of Minnesota's civil and mineral engineering building.

• Holographic diffractive structures (HDSs) are clear, lightweight, stationary devices that track the sun through the course of the day and through the seasons of the year. An HDS can be programmed to redirect a range of solar angles. Systems dynamically respond to nonoptimal solar positions, redirecting sunlight to areas deep within the core of the structure and controlling glare in the perimeter areas.

The basic idea, says Elizabeth King of the Advanced Environmental Research Group in Woolwich, Me., is to use holograms as lenses. Most daylighting excludes full sunlight because it is too intense. King says the HDS uses the full light spectrum, which holograms break into component parts. They can project the individual colors, combine them as they like, or use them all as white.

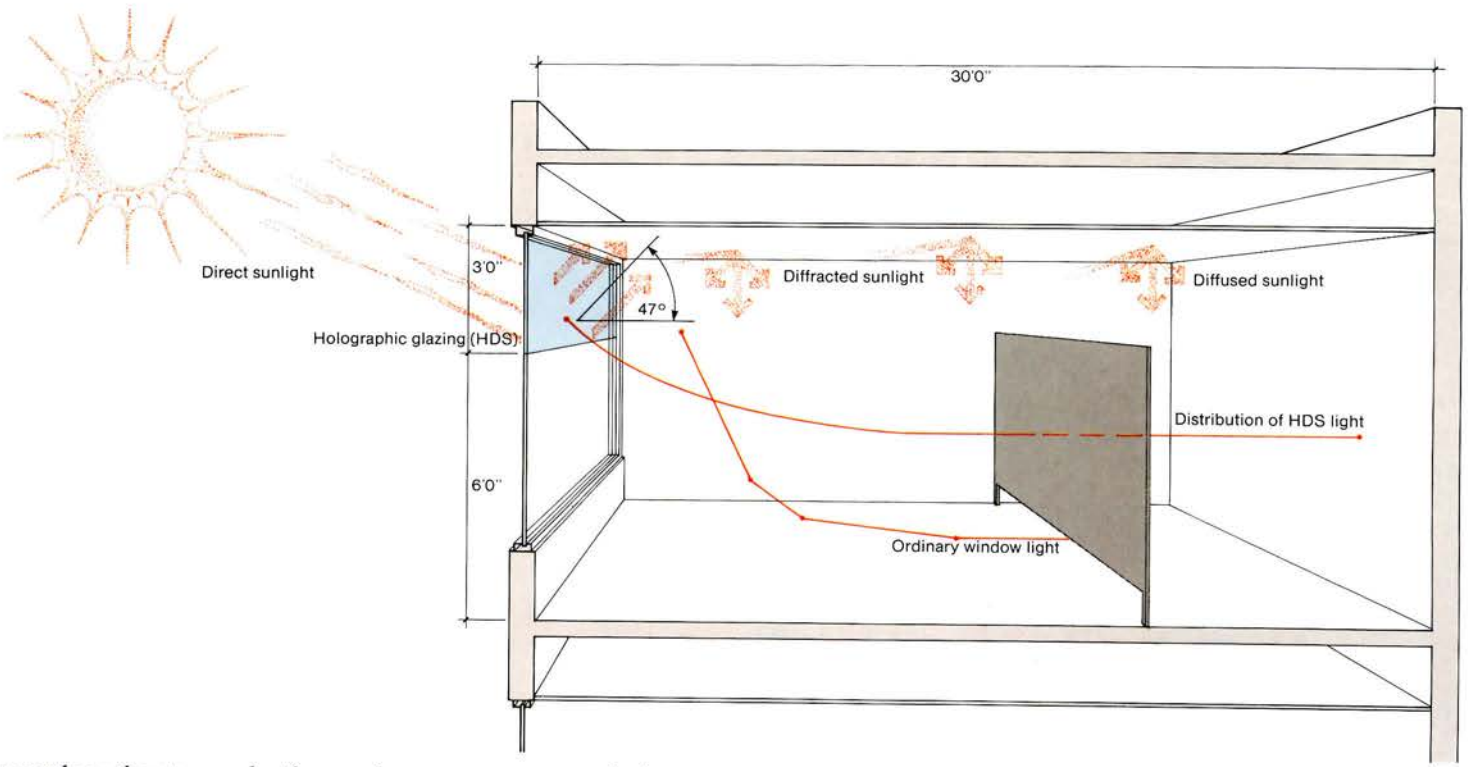
"The criteria for what we do are changing," King says. "At the outset, DOE wanted a uniform stationary white light, but now it is interested in the importance of movement, variety, color, and reducing ambient light."

The Japanese have contacted the Advanced Environmental Research Group to use holographic technology to daylight a huge fish market in the center of Tokyo. This market is a major source of government revenue, and it wants quality light to inspect fish properly. King also reports that the group went to China to work on the optimization of seaweed and fish growth in the desert of Inner Mongolia. "We are working on supplying moonlight for

Below left, the Japanese himawari ("sunflower") device tracks the sun and uses plastic Fresnel lenses to capture and direct sunlight into optical fibers that then transfer the light to the desired location. Below right, the himawari in an interior application. Facing page, diagram indicates a holographic diffractive structure, which tracks the sun, breaks the light spectrum into component parts, and redirects it to the building's interior.

Courtesy of La Foret Engineering

Courtesy of La Foret Engineering



an outdoor theater production, and we see no reason why it cannot be done with holography," she says.

HDSs could be used to illuminate the dark canyons in cities like New York and Chicago. Holographic panels placed on the spandrels of tall buildings could transmit light onto the sidewalks and streets below. Imagine, says King, rainbows on State Street.

• The himawari (Japanese for "sunflower") light collection and transmission device tracks the sun and uses Fresnel lenses to focus sunlight into optical fibers that transmit the light to the desired location. The device was developed by Kei Mori, of Keio University in Tokyo. In 1987 there were 79 himawari systems in use, most located in Japan. They illuminate private homes, museums, office buildings, hospitals, schools, resorts, and nursing homes. Accessories and parts are now available in the United States, and Mori's company, La Foret Engineering and Information Services, plans to open an assembly factory here soon.

Light enters the himawari through a protective acrylic resin capsule, and hexagon-shaped, honeycomb-patterned Fresnel lenses capture incoming parallel light rays, which then are focused onto the polished input ends of fiber-optic cables. The capsule filters out some ultraviolet light, while the Fresnel lenses filter out almost all remaining ultraviolet and about 60 percent of the infrared rays. A microprocessor-controlled tracking system keeps the lenses trained on the sun and, after sunset, returns the sunflower to face the rising sun. The sensor sends information to a small internal computer that directs the tracking of the pulse motors.

Light is sent to the space through the fiber-optic "light pipes." Although the spectrum is almost identical to that of natural sunlight, the filtered light brings less heat and less ultraviolet and infrared radiation, and therefore it is useful in clothing stores and art galleries to prevent fading and discoloration. Plants flourish under the filtered light, and the himawari also may be useful in treating rheumatism.

• Curtain walls have been used for heating and cooling since 1968. Vertical mullions, horizontal transoms, and glass units form a weathertight, hermetically sealed, insulated assembly. Water, adjusted to the desired temperature, is circulated through the interior profiles of the units. Although the total surface of the gridwork oriented to an interior space normally is larger than the surface of a conventional radiator, the space can be heated and cooled without additional radiators if a heat exchange system is incorporated in the gridwork profiles.

In a scheme proposed by Fritz Gartner of Gundelfingen, West Germany, the mullions are connected to a normal heating system such as a radiator. Also, the degree of circulation is controlled by thermostatic valves similar to those in a conventional radiator. The same system can be extended to use the mullions of the curtain wall as air ducts for supply and return air. Projects in use have air distributed up and down four floors from a plant room, reducing duct and installation costs. Additionally, floor heights and the resulting cost of the building envelope are reduced.

• Changes in design for thermal comfort, ventilation, lighting, and glare control in West German office buildings will lead to new window performance criteria. Most significant is the move toward individual control of window performance, following the trend away from open plan working spaces and back toward individual rooms and zones for small groups. In the United States there is also a trend toward user-interactive microclimate control to satisfy the diverse individual physiological and psychological makeup, as well as in preferences in activity and dress.

The future of "wind-eye" technology was predicted by Mike Davis of Richard Rogers Partnership Ltd. at a recent conference in London. Davis foresees a second generation of building skins—"polyvalent walls"—incorporating dynamically variable properties. These walls will use low-voltage electrical distribution systems, simple sensing, and logic and control devices. They will be connected, Davis says, to computers that monitor other building services in a total, coordinated, intelligent building. The walls will selectively darken, lighten, change color, carry imagery, and display information. The building facade will become an information screen. Lest the mind boggle at Davis's 21st-century "rose window" predictions of facades that maintain interior comfort while advertising "New Coke," the reader should remember that Davis is a member of the architecture firm that gave us the Centre Pompidou and Lloyd's of London. □

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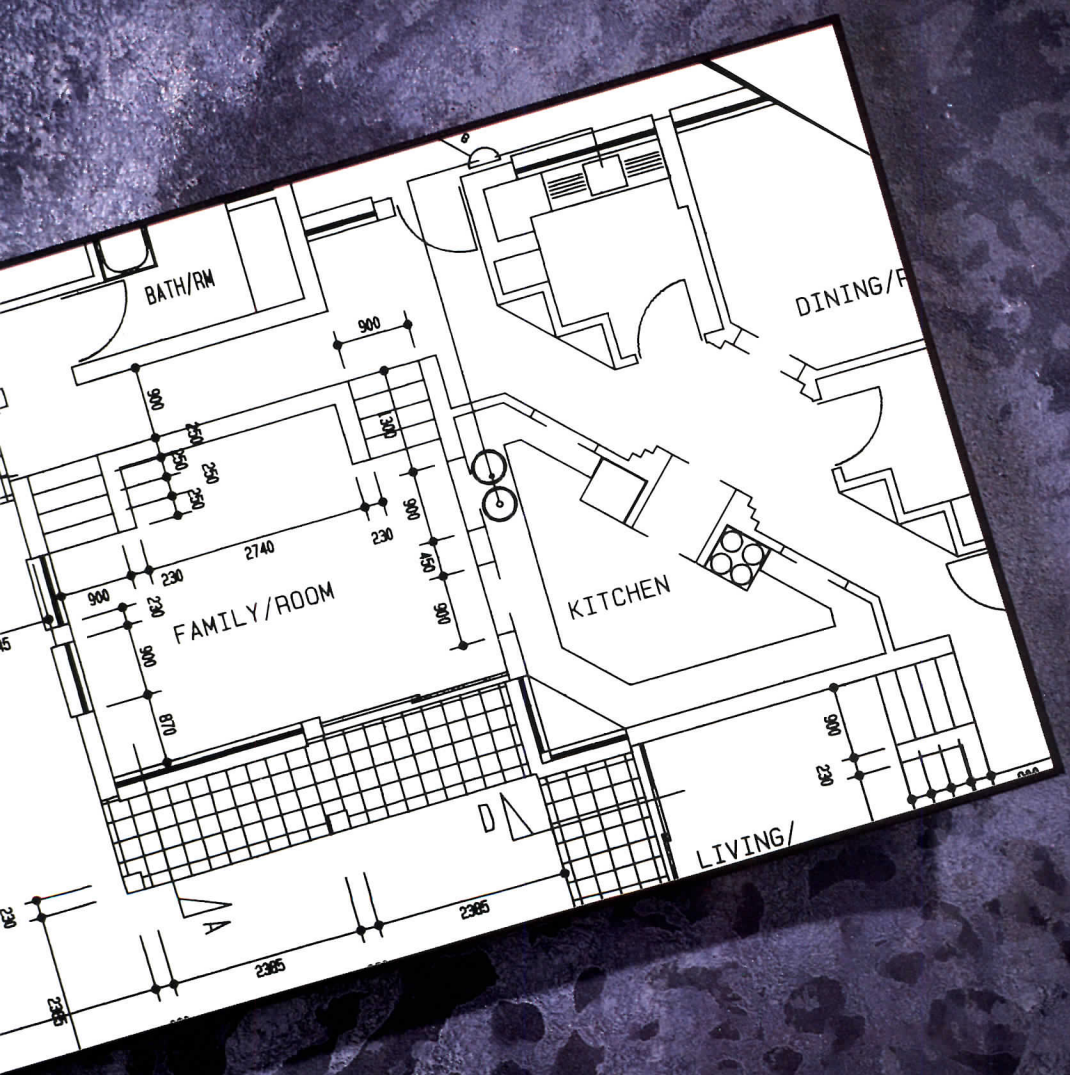


Keeping Wind from Raising the Roof

Testing and designing for uplift resistance. By Richard Coursey

Figure 1

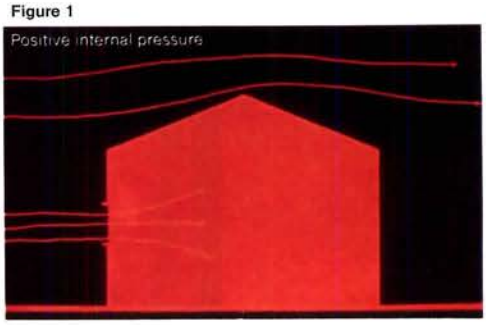
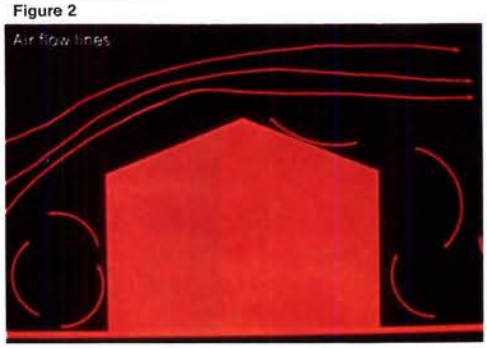


Figure 2



Wind is a major concern of single-ply roofing manufacturers, building owners, architects, and roofing contractors alike. Virtually every method used to attach such a roofing system to a roof deck has failed at one time or another because of high winds. As a result, most building code authorities regularly take measures to ensure that all roofs pass wind uplift tests before they are approved for commercial installation. The use of Underwriters Laboratories (UL) and Factory Mutual (FM) labeling and classifications for resistance to wind uplift sometimes is miscommunicated in the commercial roofing marketplace, but it is a topic that all members of the building team have a vested interest in understanding.

Wind uplift occurs when the air pressure inside a building is greater than the air pressure outside. As wind passes over a building, external air pressure decreases and causes a corresponding increase in the air pressure differential between the inside and outside of the building. As the internal air pressure tries to equalize itself with the external air pressure, the resulting force, called wind uplift, tries to lift the roof off the building in order to achieve equilibrium. Wind uplift also occurs in localized areas of the roof, due to drag and air velocity, causing the roof membrane to be pulled up from the roof deck. This phenomenon occurs on roofs even if steps are taken to prevent air filtration through the roof deck (see Figures 1 and 2).

In addition to the air pressure inside a building, there are several other factors that can increase wind uplift significantly, including the building's position relative to the wind direction and the terrain surrounding the building. Both of these factors create turbulence and/or vortices that can magnify existing negative forces (see Figure 3).

Factory Mutual Research, the testing organization for a group of insurance companies, approves roofing materials based on performance in a comprehensive series of tests outlined in FM Standard 4470. In addition to wind uplift resistance, the tests also evaluate roofing materials for their durability and their resistance to fire, hail, leakage, and corrosion of metal parts. FM rates all roofing assemblies as Class I or Class II; approval in either class is granted only after the roof assembly successfully completes every individual test of FM Standard 4470.

For the test for wind uplift resistance, a roofing assembly (membrane, insulation, slip sheets, etc.) is attached to a test platform in accordance with the roofing manufacturer's specifications and then is sealed and clamped around the perimeter. Wind pressure, starting at 30 pounds per square foot (psf), is introduced from the deck's underside. Each minute thereafter, an additional 15 pounds of pressure is applied to the assembly until the roof membrane fails or the test ends. If the membrane achieves and withstands a load of 60 psf for at least one minute, it is rated I-60. A rating of I-90—now the highest FM rating—is given when a load of 90 psf is reached and maintained for one minute.

The FM wind uplift resistance test does not correlate directly to miles per hour of wind velocity but rather is designed to generate a positive pressure from below. This then is compared to a calculated design pressure based on wind velocity. This pressure represents double the highest wind uplift design pressure that can be expected in a particular wind zone. An I-60 rating, for example, means that the roof system is considered suitable to sustain a maximum design load of 30 psf with a minimum safety factor of two. An I-90 rating corresponds to a maximum design load of 45 psf with a safety factor of two (see Figure 4).

FM's Standard 4470 recently has been revised to include a test that also measures the fastener corrosion resistance, among other items. This test is conducted in a chamber charged with sulphur dioxide and water at 104 degrees centigrade and 100 percent relative humidity for eight hours. The chamber is then evacuated, opened, and allowed to oxidize for 16 hours.The entire 24-hour period represents one cycle. After 15 cycles, the fasteners are evaluated visually for surface rust. The test prescribes that the area rusted shall not equal 15 percent.

Unlike FM's test, the UL test for wind uplift resistance is not part of a series of tests. Additionally, it is independent of the organization's other roofing tests, and UL classifies for wind uplift resistance independent of fire resistance. UL's three ratings for wind uplift resistance are Classes 30, 60, and 90.

Unlike FM, the UL standard for wind uplift testing, called UL 580, directly correlates to miles per hour of wind velocity. The UL 580 test is relatively simple in concept and is based on the principle of positive/negative pressure to simulate gusting. A 10x10-foot roofing sample is attached to a sample roof deck according to the manufacturer's specifications. A positive wind pressure is applied to the underside of the roof assembly for one hour and 20 minutes; after 10 minutes an oscillating negative wind pressure is begun and applied to the external surface (upper side) for the next 60 minutes. The combination of oscillating

Mr. Coursey is the technical product manager for J.P.S. Elastomerics Inc., Easthampton, Mass.

external negative pressure on the top side with positive pressure from underneath is intended to simulate the potential effects of wind gusts.

For a Class 30 rating, the integrity of the roofing system must be maintained for the first test of an hour and 20 minutes under conditions calculated to simulate a wind velocity of 100 mph. For a system to achieve a Class 60 rating, the *same* deck assembly must be tested a second time for an hour and 20 minutes at a correspondingly higher pressure, or the design equivalent of a 140 mph wind speed. For a Class 90 rating, the same deck is tested a third time for an hour and 20 minutes under pressure equivalent to a wind speed of 170 mph. To achieve a Class 90 rating, system integrity must be maintained for an accumulated total of four hours.

It is important to understand the differences between roofing systems and what to look for in a UL or FM classification rating. It should also be noted that the three types of conventional single-ply roofing system attachment methods—ballasted, fully adhered, and mechanically attached—have come under scrutiny recently for their ability to resist wind uplift.

Ballasted roofs—loosely laid, single-ply membranes held on a deck with a layer of up to 1,000 pounds of stones per square (a square equals 100 square feet)—are, at best, moderately effective against wind velocities in excess of 80 mph. Because strong winds can move ballast stones from corners, perimeters, and other critical areas of a roof, ballasted roofing systems have several inherent limitations and can require expensive and labor-intensive maintenance.

In addition, ballasted roofing is a subject of concern in high wind regions of the United States, such as the coastal and plains states. During windstorms in these regions, stones blown off roofs have damaged surrounding buildings. Broken windows, dented cars, and bodily injury can result from flying ballast. Equally important, because the roof is covered with ballast, roof inspection, leak detection, and repairs generally are more difficult, time-consuming, and expensive with a ballasted roof system than with fully adhered or mechanically attached systems. Finally, the exorbitant weight of a fully ballasted roof poses problems for architects who wish to use lighter-gauge (and less expensive) structural steel when designing new facilities.

Fully adhered roofing systems consist of a single-ply membrane glued to pre-anchored insulation board. One of the most important elements of a fully adhered roofing system is the adhesive used to bond roofing materials to the deck. The adhesive also relies on the structural integrity of the underlying material (insulation board) to keep the membrane intact in high wind.

Because insulating boards often are made of lightweight and relatively weak materials, some are not suitable for fully adhered roofing systems. Furthermore, in a high wind there is a greater risk that the facer to which the adhesive membrane is bonded will separate from the insulation core or that the insulation itself will delaminate.

Mechanically attached roofing systems, if installed properly, can effectively secure a roof against wind uplift. A mechanically attached system consists of a singly-ply membrane secured to the roof deck by fasteners installed through the membrane and underlying insulation and into the roof deck. The installation process is relatively fast, and the finished roof is substantially lighter than a ballasted roof, allowing for greater freedom in building design and for flexibility in reroofing applications.

Like every other singly-ply roofing system available, mechanically attached systems are not without faults. Their problems include moisture-caused deterioration of fasteners not designed to combat corrosion; an insufficient number of attachment points or a low pull-out value of attachment points, which can cause a roof to fail in high winds; and membranes that, unless they are scrim-reinforced, may tear around the fasteners. The right combination of membranes and fasteners can minimize these problems.

It is important that building owners and architects insist on fasteners with coatings that protect against corrosive, abrasive, acidic, salt, and humid environments. Four popular fastener materials are stainless steel, nonmagnetic and extremely resistant to corrosion, used for both steel and wood decks; all-purpose carbon steel, multicoated steel screws for steel and wood decks; reinforced plastic containing a barbed steel insert that extends into lightweight gypsum decks to prevent pull-out; and concrete-embedded spikes made of carbon steel and designed to attach membranes to structural concrete decks.

Frequently overlooked in installing a roofing system is the fastener pattern and membrane layout around the perimeter of the building. Better wind uplift resistance can be achieved by installing perimeter half-sheets and specifying tighter fastening patterns around the edges of a building. This is crucial in coastal regions and areas of high elevation and for tall buildings.

Wind uplift problems can be minimized by specifying roofing materials and components specifically designed and tested to pass and then *exceed* the existing test standards. □

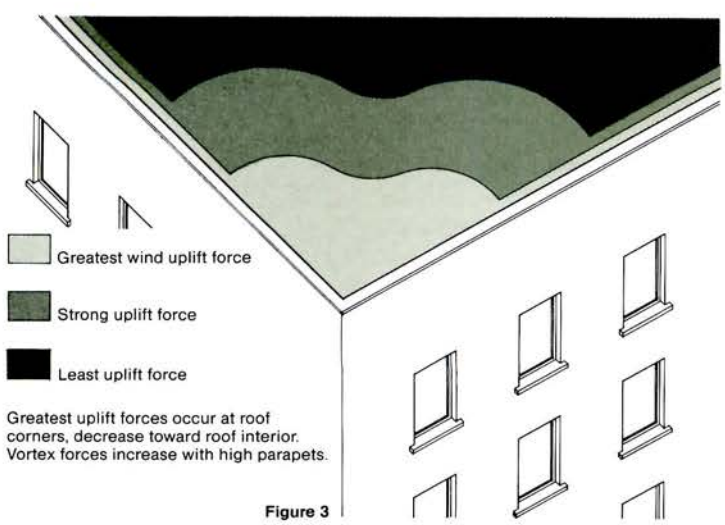


Figure 3

FM 4470					
Elapsed time	0-1 hour	1-2 hours	2-3 hours	3-4 hours	4-5 hours
PSF	30	45	60	75	90
Rating			I-60		I-90

UL 580		
Elapsed time	Wind velocity	Rating
1 hour, 20 min.	100 mph	Class 30
2 hours, 40 min.	140 mph	Class 60
4 hours	170 mph	Class 90

Figure 4 Ratings for UL 580 and FM 4470 wind uplift tests

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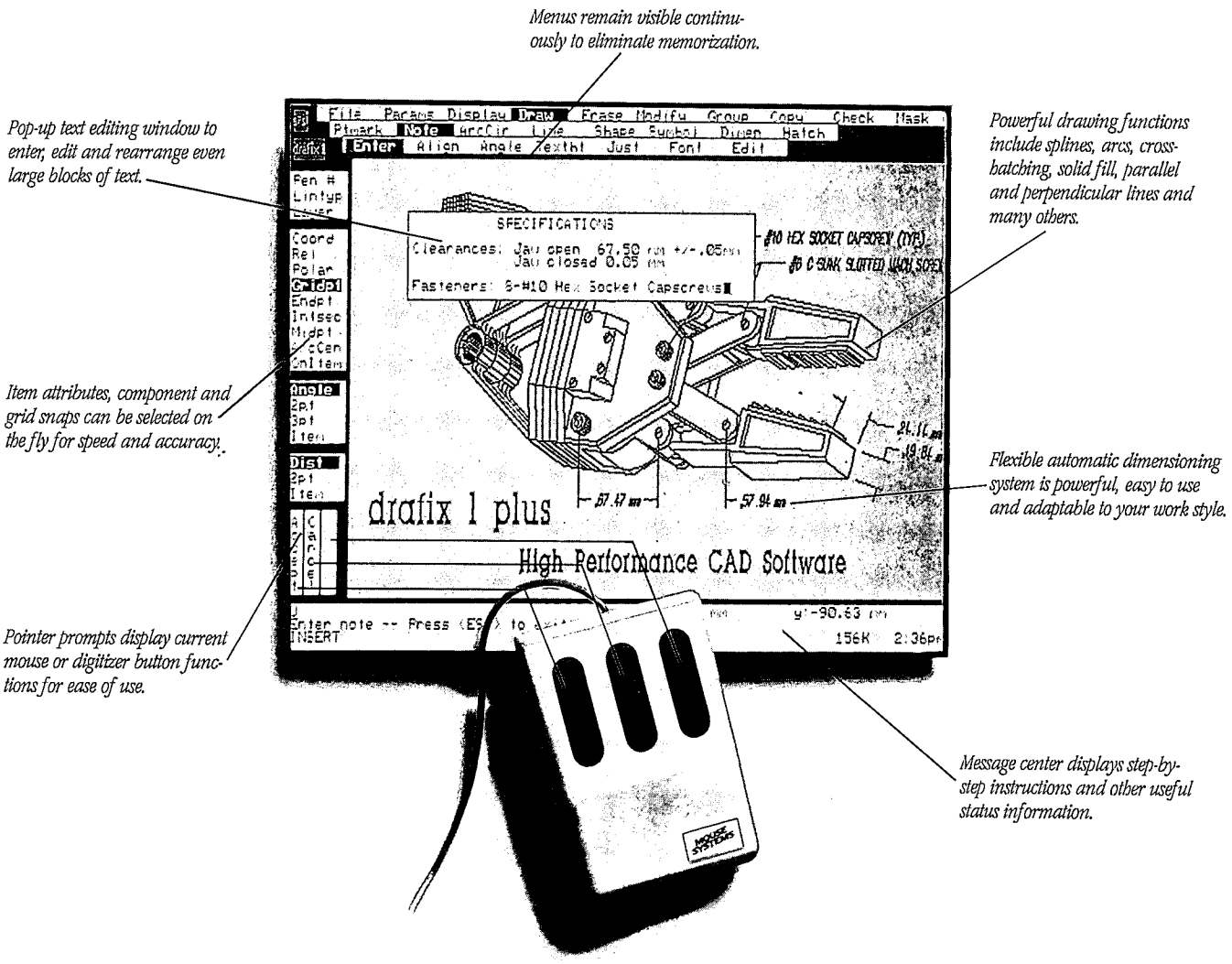

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Low-Cost CADD Programs: Imperfect but Improving Fast

According to a team of evaluators.
Introduction by Oliver R. Witte

They laughed when a new generation of computer-aided design was introduced six years ago with the promise that it would deliver 80 percent of the power previously available only on minicomputers or mainframes and deliver it at 20 percent of the cost. Kicking sand at the puny microcomputer and the simple programs that ran on it was easy. Autocad, Cadvance, and Versacad took the insults in stride and concentrated on building their power. Their success is evident. Now there are dozens of micro-based systems and only a handful of minis. In fact, it's getting hard to tell micro-based from mini-based CADD. The PCs and their software keep getting more powerful and complex. Even the prices are edging up as the new dominators of the CADD market flex their muscles.

So it's no surprise that the next generation of low-priced newcomers is now showing up, making claims that sound quite familiar. The difference is that this time no one is laughing. Indeed, two of the new kids are offspring of older programs written for the microcomputer.

Still, each generation must make its own way. Thus, seven of the newer low-cost CADD systems have been subjected to evaluation. They are Autosketch, CCS Designer, Designcad, Drafix, Easycad, Generic CADD, and Lasercad. Autosketch is a subset of Autocad, and Easycad is a subset of Fastcad.

CADD programs running on the Macintosh were not included; they will be reviewed later this year.

"Low-cost" for this article is defined as priced under $500. Two other programs—Ecad and Micrografx Designer—cost a little more. Since both have merit, they are discussed, but separately.

The low-cost CADD software was evaluated using much the same approach that ARCHITECTURE and, previously, ARCHITECTURAL TECHNOLOGY have taken in the past. Each program was placed in the hands of two registered architects, who chose their programs on a first-come, first-served basis. All evaluators are clustered in the Chicago area for reasons of synergy. The evaluators, working as volunteers, agreed to design all or part of a building using the program. They then met May 2 at the A/E/C Systems show to compare notes on the suitability of the programs for their offices.

The purpose of this evaluation was primarily to compare the low-cost CADD systems with medium-cost CADD systems, and secondarily to compare the low-cost CADD systems with each other. Since all the evaluators had been using medium-cost CADD systems, this introduces a risk of bias. To help readers assess the applicability of the reports for their offices, a brief background on each evaluator is included.

Asked whether the *80-20 rule* (*80* percent of the power for 20 percent of the cost) is as true today for low-cost systems compared with medium-cost systems as it was six years ago for medium-cost systems compared with mini-based systems, the evaluators declined to give a simple answer. Conditions have changed, they said.

Six years ago, architects were offered both lower-cost software and lower-cost computers. The choice was between a mini-based system costing $75,000 per workstation and a micro-based system costing $15,000 for software and all hardware including plotter. The first article on the subject published in ARCHITECTURAL TECHNOLOGY, in 1984, explained exactly how the $15,000 would be spent to obtain a complete system. Today, however, the 80-20 claim is based only on software—a $2,500 program versus a $500 program. Even granting that the price differential between some CADD programs is greater than $2,000 and that a $79.95 program need not run on the hottest new 80386 personal computer, the maximum difference now between low-cost and medium-cost CADD systems is unlikely to exceed $10,000. That's still a lot of money for a small practice, but nothing like $60,000.

But does the new generation of low-cost CADD programs really offer 80 percent of the computing power of the older generation of medium-cost programs? The surprising answer is that a few do, and more are likely to do so soon. For example, when the evaluators took their first look at Easycad, they yawned politely. But when Easycad2 was released last March, their reaction changed to enthusiasm. And, just when it appeared that software prices had hit rock bottom, Pelton Engineering released what it calls its "short version" of Ecad for $79—one-tenth the price of its more expensive sibling. Unfortunately the new version arrived too late to be reviewed here. Generic CADD Level 3, released just before press time, pulled together options previously sold separately at a higher price.

The low-cost programs fill an important void left by medium-cost CADD vendors that do not provide demonstration versions. An architect who wants to try out a program to get a feel for how CADD works without spending thousands of dollars has few options other than buying one of the low-cost programs. Exceptions include Skok and Autodesk. Skok will provide without charge a crippled version of Drawbase that will do everything but plot, print, and save drawings. Instructions for how to use the program are provided on the disk. If a manual is desired, the price is $50. Autodesk sells, through authorized dealers only, a "Show Version" of Autocad for $120. Users may plot or print but not save a drawing. A manual is not available.Versacad and Cadvance provide self-running demos, but they do not give the user a chance to experiment.

None of the low-cost CADD programs is copy protected. All will run with 512K of RAM except Ecad, which requires 640K. All use floating point mathematics except Micrografx Designer, which uses the integer method for greater speed. All except Ecad provide a tutorial to guide the beginner through a sample CADD

drawing. A chart accompanying this article compares other features.

Part of the problem with low-cost CADD programs as a group, the evaluators agreed, is that they have been praised excessively in published reviews elsewhere. Thus, when the programs were put to work they failed to live up to expectations. Among the hyperbole written about some low-cost CADD programs is that they have "all the features one expects from a 2D CADD package." And the classic example of CADD oversell: "Who needs an architect? Do it yourself!"

Drafix is the only low-cost program that has been praised consistently by evaluation teams over the last two years as competitive with those costing more. Some evaluators called it the best value of all CADD programs under review.

What about a low-cost computer to run the low-cost CADD programs? Unfortunately, architectural CADD places heavy demands on a computer's speed, display monitor, and memory. Only one combination seemed to promise any significant breakthrough—Drafix on an Atari. The two can be purchased, ready to do serious CADD, for $1,700 (list price) plus plotter. The evaluators praised it, but with qualifications.The common problem with almost all the low-cost CADD programs is that they must appeal to a broad market to generate enough sales to produce a profit. Most of the programs are not architectural, and they don't claim to be.

Simple tasks like drawing walls with parallel lines, adding dimension strings that meet office standards, and inserting doors and windows from a prepared library of symbols seem awkward and clumsy compared with a program like Datacad or Cadvance. Basic drawing commands for snaps, curves, and fills may be missing entirely. The number of available text fonts and layers may seem sparse. For example, Autosketch supports only one font and CCS Designer supports only one layer. Or the program might support feet and decimals rather than feet, inches, and fractions.

If a drawing of any size is contemplated, the requirement of most low-cost CADD programs to contain both the program and the drawing within 640K of RAM is a significant limitation. Three programs will write large files to a hard disk: CCS Designer, Easycad2, and Lasercad.

Another important fundamental missing from some low-cost CADD programs is support—by the vendor, by the dealer, and by the computer equipment already on your desk. The thrill of low-price software might dim if you have to buy a new graphics card to run it.

In an interesting switch, Autodesk provides free, direct support for Autosketch but not for Autocad. Users who have a problem with Autosketch may call either their dealers or Autodesk. Questions about Autocad must be directed to a dealer. Complete Computer Services, which sells one of the lowest-cost CADD programs reviewed here, is among the very few CADD vendors that provide both free technical support and a toll-free phone number to reach it. Several vendors have toll-free numbers, but only for sales information.

Beware, too, of the optional extras. The base price of some CADD programs is modest only until you start buying the translators, utilities, libraries, etc., needed to do serious CADD. Wait until you have added up all the costs of the systems you are comparing before deciding which has the lowest price.

At the conclusion of this evaluation, none of the architects wanted to switch from their medium-cost programs to a low-cost program. However, they all were prepared to recommend the better low-cost models to colleagues who are considering their first CADD purchase and for CADD training. Anyone who does buy a program for those reasons should make sure that it is easy to install and easy to use and that the drawing files of the low-cost system will be compatible with architectural CADD programs.

Most vendors of the low-cost CADD programs can cite features that their higher-cost competitors still have not implemented. For example, Autosketch supports both multiple line types and multiple colors on the same layer. Autocad still does not. Ecad can keep in memory a larger drawing size than is displayed on the screen, permitting instant pans and zooms. Other programs can do this too, but only with a graphics card that costs more than $2,000.

One of the skeptical evaluators was David J. Engelke, AIA, of Madison, Wis. "My conclusions are based not on the total capability of these programs but rather on their usefulness to do architectural work," Engelke said. "Although the programs have many features, they are not implemented so they can be used in a productive manner."

Paul Zinni, AIA, of Chicago didn't see it that way. "It's better to fully utilize a low-cost system than to underutilize a high-cost system," he said. "Why pay for something you don't need?"

That question had Erol Altay of Chicago, a Lasercad evaluator, arguing with himself. "My first response is that if an architect requires a production system, he or she can afford the $2,500 difference in software," he said. "But there are two answers to this. First, the $500 package addresses the one- or two-person office with a PC being used for word processing. Second, Lasercad is positioned to make inroads into a market of users whose hardware and ability to invest in training of personnel would make them otherwise inaccessible. As an Autocad user, I would be very tempted to venture $295 and a few hours to look at Lasercad."

What surprised Altay and the other evaluators was not that the low-cost CADD programs are imperfect but that they are improving so quickly. "We know that accessibility and usefulness can be mutually exclusive," Altay said. "What the low-priced, medium-power packages are showing—Lasercad in particular—is that this ain't necessarily so."

Considering that more than 400,000 low-cost CADD programs have been sold, it is tempting to conclude that their vendors have been kicking a lot of sand in the faces of the higher-cost competitors. But it might also be said that they are doing the competition a favor by opening a market that otherwise would take much longer to develop.

Autosketch

Autosketch, like Autocad, is a product of Autodesk, and in fact was written by the company's chairman, John Walker. Autosketch is aimed at anyone who prepares precision production drawings, reports, and illustrations, said product manager Kathleen Doney. It is especially useful for architects who need to make preliminary sketches but who don't use CADD often enough to get comfortable with as powerful a program as Autocad. Since all features of Autosketch are a subset of Autocad, no drawings or drawing skills are lost in transition, she said.

The two programs are distinguished primarily by their accessibility and power. Autosketch, with about 80 percent of the drawing commands of Autocad, excels at simple drawing, is easy to learn, and is fun to use. With its Macintosh-like, pull-down menus,

drawing begins immediately. The manual and tutorial are adequate but unnecessary. Even office employees unfamiliar with CADD were inspired to sit down, draw, and enjoy their first encounter with CADD.

The standard version of Autosketch costs $79.95 and supports, but does not require, a math coprocessor chip in the computer. A speed-enhanced version, which requires a coprocessor, costs $99.95. The standard version runs three times faster with a coprocessor, and the speed-enhanced version runs nine times faster. We recommend the speed-enhanced version, which actually uses less memory than the standard version (330 versus 293 kilobytes) and thus allows more memory for drawing files and RAM-resident software such as Sidekick. The program keeps track of file size in the upper right corner, so the user isn't surprised by a full file.

Autosketch was easier to get up and running than CCS Designer or Designcad. Autosketch supports only a few graphics-display devices: a color graphics adapter (CGA), an enhanced graphics adapter (EGA) and a Hercules card. The program likewise limits the pointing devices to a mouse, joystick, or keyboard cursor keys, although digitizers that emulate the Microsoft mouse, such as the Summasketch Plus, also will work. The list of supported output devices is much more extensive and includes laser printers.

Autosketch has most of the basic drawing commands but only one type of arc. It has a good set of editing commands including break, stretch, mirror, and rotate. There are five types of zooms and a pan. With an EGA card, the program can display seven colors and eight line types.

Autosketch is not an efficient system for producing architectural drawings. Although it can be used to produce creative drawings, it is more a toy than an office tool, as indicated by the inclusion of a game in the menu. Missing features are parallel lines, hatching, and automatic symbol insertion and cleanup. Only one text face is available. Although files can be saved in DXF format for transfer to other programs, DXF files cannot be imported into Autosketch.

The program uses an arrow as a cursor. Easycad's method is better. Its arrow turns to crosshairs when picking points.

If you want to experiment with CADD but don't want to spend the money or time to learn a full-featured program, for $99.95 Autosketch is a good choice.

—David J. Engelke, AIA, and Lee Schwerin, AIA

CCS Designer

Complete Computer Services not only provides free technical support for its CADD program, CCS Designer, but also will pay for your phone call. This is remarkable for any computer products vendor, and especially for the vendor of a CADD program costing only $79.95—among the least expensive of those reviewed here.

CCS Designer is identical to Designcad but with fewer features. Both programs were written by American Small Business Computers, and the drawing philosophy is the same: set one or more points on the screen and direct the program to connect them.

With fewer than 50 commands to learn, the program can be picked up in less than two hours. On the other hand, editing is hampered by the limited number of commands. Each command can be selected with a single touch of the keyboard. There is no on-screen menu. Drawing is easy with the program's eight line types and a range of arcs, circles, and boxes. A status line on top of the screen can show the number of points picked, color, zoom factor, and cursor coordinates in feet, inches, and decimals.

Although the price is right and the features many, much is missing. CCS Designer lacks measuring and scaling commands except by the most rudimentary method of counting and interpolating units. Our attempts at autodimensioning were only marginally successful. Shading is merely a solid tone that can be turned on or off. And only one layer is available.

Options include a DXF utility and separate libraries for architectural, flow chart, and electrical and plumbing fixtures. Each of the four options costs $39.95.

Just what CADD market CCS hopes to reach is unclear, but it surely isn't the demanding AEC community. Other programs in this evaluation—most notably Easycad2, but also Ecad and Lasercad—come much closer to being productivity tools.

—David J. Engelke, AIA, and John H. Hanson, AIA

Designcad

Formerly called Prodesign II, Designcad is second largest in sales among CADD programs, according to figures supplied by the vendors. American Small Business Computers, which developed the program, said 135,000 copies have been sold, nosing out Generic CADD with 130,000 sales. Autocad, the leader, has sold 150,000.

Priced at $299.95, Designcad has more features than many of the programs under evaluation here. Although not architect-friendly, it is suitable for use in a small office with light construction document work. Fewer than 5 percent of sales have been to architects, the vendor said.

The drawing technique is different from most CADD programs. With Designcad, points are entered first and then the command. To draw a straight line, for instance, one enters the end points and presses the "v" key to generate a vector. With this flexibility, Designcad easily generated landscape plot plans and survey drawings. Objects also can be stretched or pushed into any shape desired. Sequences must be learned, however, because the program doesn't prompt the user.

Designcad assumes that the purpose of a digitizer is to trace a drawing. When zooming in, the perimeter of the digitizing tablet remains constant with the perimeter of the original drawing and not with the screen view of the drawing. After a couple of zooms, it can become difficult to find the cursor. When a digitizer is used, commands cannot be selected from the screen menu with a puck or stylus.

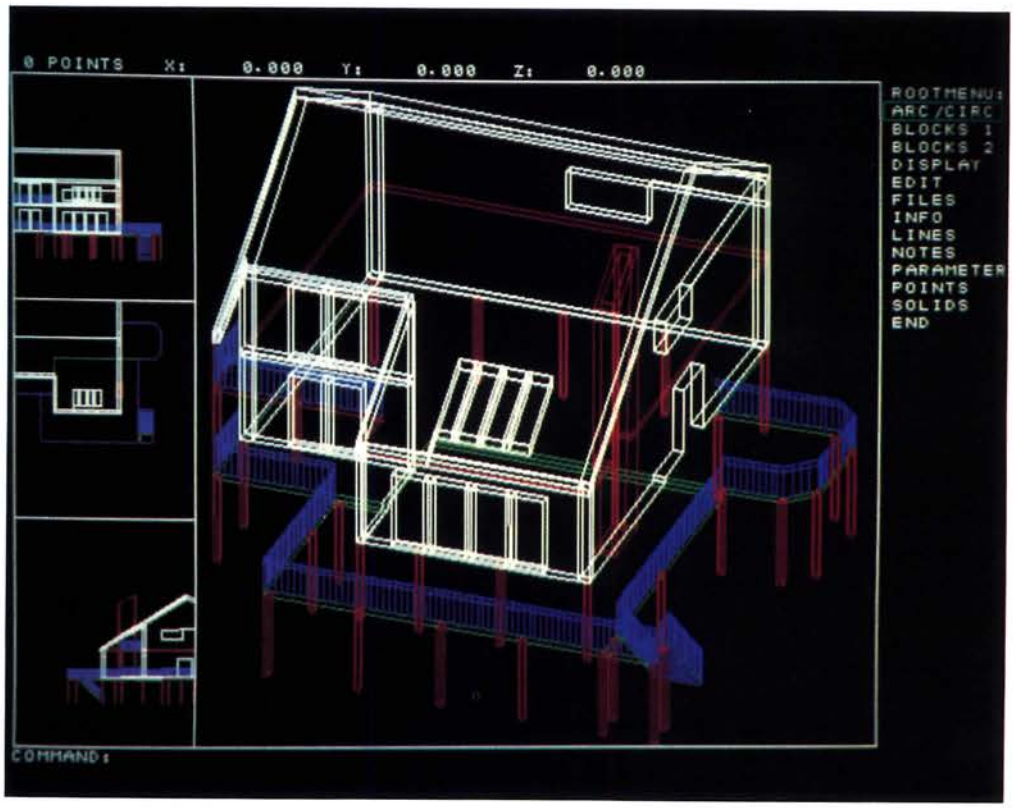
Plots are easy to send to the printer, so we used the software for proposal flow charts, bubble diagrams, and door and window schedules. We also used a Wordperfect word processing program with Designcad to make a low-cost desktop publishing system.

Designcad supports various line types and thicknesses and permits area and length calculations. The program will recognize expanded memory if it is installed, although this feature is not documented. A version capable of supporting a math coprocessor is available at no extra charge.

The program has many of the features architects desire, although they are not implemented efficiently. A parallel line command is available, but intersections are not cleaned up. Parallel and perpendicular lines were quick and easy for curves and circles—a powerful asset for the program. A symbol library comes with the program, but the architectural symbols are very residential. The tutorial uses the keyboard to move the cursor.

The evaluators of this program were of two minds regarding the Designcad manual. Engelke commented that the manual is short and incomplete, terms are confusing, and it offers very little information on how to use commands. Explanations for how to customize the command menu and hatching patterns are insufficient, he added. Zinni, however, judges software by how well the manual is written, and he gave Designcad high marks. For projects from residential to light commercial, Designcad has more than 80 percent of the power of the higher-cost systems.

—David J. Engelke, AIA, and Paul Zinni, AIA



Three-dimensional view of a house envelope, alongside elevations and plans, is possible on Designcad, right.

Drafix

Drafix stands head and shoulders above the rest of the field in low-cost CADD. We found it quite competitive with programs priced 10 times higher. The only program that comes close is Easycad2, but the availability of architectural symbols puts Drafix ahead.

Two versions are available—Drafix 1 Plus, which runs on IBM and compatible computers, and Drafix 1, an earlier version, which runs on Atari computers. The Plus version adds text editing and curved splines. It costs $295, versus $195 for the earlier version. Architectural, mechanical, and electrical symbol libraries are available for $150 each. A DXF conversion utility costs $95, and a compatible 3D wire frame program adds $295.

Excellent as Drafix 1 Plus is, we were most intrigued by the possibilities of Drafix 1 on the Atari. Despite its reputation as a game machine, Atari has excellent graphics power. Its Motorola 68000 processing chip makes it comparable to an IBM AT computer running at eight megahertz.

The Atari model on which we ran the program was the 1040 ST. Its list price is $699.96, including one megabyte of RAM, a one-megabyte floppy-disk drive, a 640-by-400 monochrome monitor, a mouse, and the operating system. A 20-megabyte hard disk would add $799.95. For that price, you get a compact computer that will travel almost anywhere. The Atari frequently was taken home in the evenings by staff members. Furthermore, you get a CADD program that will draw 2D documents with the best of the low-cost CADD programs. And now the architectural symbols library is available for the Atari.

A complete CADD system for less than $1,000 (plus plotter) is a bargain, but there are drawbacks. The biggest is that Atari hardware runs in the GEM operating system. Most other CADD systems run under DOS, which means that drawing files cannot be transferred readily from the Atari to either the IBM or the Macintosh. Architects using Atari may be forced to throw away all their data if they upgrade later. We use the Atari strictly for training, since our other stations operate in MS-DOS.

With Drafix 1 Plus, the vendor, Foresight Resources, addresses the specific needs of architects. Documentation isn't perfect, but it has been improved. The tutorial is easy to use and is supported by screen depictions. New features include the ability to draw ellipses and complex curves freehand. Users now can move the cursor in drawing mode without drawing a line, too.

Of great benefit to us is the new ability to generate and edit text like a word processor. Unlike most CADD programs, text can be revised without erasing and re-entering it. The pop-up window aids in highlighting the text prior to its placement. The Plus version comes with more standard fonts than previous versions and adds Autocad-compatible fonts such as simplex and complex.

The new architectural symbols are fairly extensive but cumbersome. Since they are not visible on the screen or digitizing tablet, the user must constantly refer to the manual. Drafix does not automatically trim walls when symbols are inserted, nor can symbols be dragged into position visually.

The DXF-file-exchange utility is typically easy to use, although we discovered that it would not work with Autocad prior to Release 9. Furthermore, since both the Drafix program and data files must exist within the confines of 640K of RAM, large drawings must be dissected before being imported.

Stretch functions that locate a point to which a user can snap multiple lines stand out as an advantage. Also helpful is the ability to store multiple views and fields for quick reference. Still

Mr. Engelke is a vice president of Potter, Lawson & Pawlowsky, a 40-member architecture firm in Madison, Wis. He has been an evaluator of Autocad, Megacadd, Solidvision and Ultracadd. Mr. Schwerin is project architect for Hyatt International, Chicago. He has been a Cadvance evaluator for three years. Mr. Hanson is president of Stenbro Associates, a 10-member architecture firm in Chicago. He has evaluated Point Line and Anvil. Mr. Zinni has been working with CADD for five years in Chicago, mostly on mainframe computers. He previously evaluated Fastcad.

needed is the ability to display multiple line weights on a monochrome monitor. The program also should permit an object to be grouped as its components are entered. A larger library of hatch options would be helpful, too.

—Walter Hainsfurther, AIA, and Raymond L. Harriman

Easycad2

Easycad2 is the most improved program in this evaluation. The previous version, on which we started work, was unimpressive. But when we saw Easycad2 our reaction changed to enthusiasm. We believe it should rank at the top, possibly sharing honors with Drafix and Autosketch, although neither of these programs appears to pack the power and punch of Easycad2.

Perhaps the most stunning aspect of the revised program is its speed. The block deletion of half a 1.1-megabyte drawing took 49 seconds in Datacad and 11 seconds in Easycad2. Redrawing the entire file on the screen took 22 seconds with Datacad and five seconds with Easycad2, both using an enhanced graphics adapter.

The only way to get Datacad to beat the speed of Easycad2 is to equip the computer with a high-speed graphics board such as the Nth Engine, which costs $2,495 compared with $300 for an EGA board. The Nth Engine redrew the Datacad file in 1.7 seconds. Easycad2 does not support Nth Engine.

Last September, Microsoft began selling its mouse bundled with Easycad2 for $175. Since the program costs $169.95 separately, this means that buyers can obtain either Easycad2 or a mouse for $5.05 if they already plan to buy one or the other.

Easycad2 appears to have the highest percentage of architects among its users of any low-cost CADD program. Evolution Computing estimates that architects account for 60 percent of its customers. New Easycad2 features of interest to architects are 16 pattern fills, some architectural; 16 line styles; 16 colors that can be selected in midcommand from an on-screen palette; up to 256 layers that can be hidden, shown, or frozen independently; a built-in macro language, complete with an on-screen tutorial, which can be used to customize the menu and automate lengthy or complex command sequences; and easy transfer of drawings to other CADD programs or to a desktop publishing environment.

Easycad2 was not written with the architect in mind, however. Evolution Computing is relying on other developers to adapt the program for our needs. We doubt that this approach can produce a well-integrated CADD solution.

Most noticeable was the lack of architectural icons or symbols. Although it is possible to draw walls as parallel lines (using an unfilled polygon command), doors and windows were inserted most easily by drawing our own icon on a separate file and recalling it as needed. Cutting and healing the wall still had to be done manually. Snapping the cursor to an intersection is somewhat awkward because both lines must be identified first.

On a scale of one to 10, we rate the manual a 10. It is well written and the tutorials are easy to understand. It could be used by a beginner. Still, loading the program suddenly became complex when we discovered that the driver for our mouse was not included. We had to install the driver that came with the mouse and add the initialization routine to the start-up file—not the

Top and middle, Easycad floor plans with menus displayed. Bottom, Easycad drawings by J. Michael Standish, a student at the Frank Lloyd Wright School of Architecture.

kind of job a beginner would enjoy. Next, we had to call Evolution to confirm that the plotter driver identified on the menu as HP 7595A would operate our Hewlett Packard Draftmaster II plotter. A pleasant surprise was the inclusion of a driver for our HP Laserjet Series II. It works well for small, quick, high-quality test plots.

A problem during plotting is that users must calculate the units assigned to the drawing as they relate to the "real world" plot scale. We saw this in some early CADD software, and we didn't like it any better then.

There are pleasant surprises as well. We found stretch and undo-stretch commands—both time savers—as well as associative dimensioning and hatch patterns. A brief retreat to the manual explained the command modifiers "not," "and," and "and/or," which permit drawing elements to be included or excluded after the initial set of entities is defined but prior to executing the command. The ability to group and ungroup drawing elements is handy. Unfortunately, we were not able to figure out how to execute a command such as zoom-in while in the midst of drawing a line.

Given the low price of Easycad2 and the AT-generation computer it is intended to run on, serious CADD is now available to any firm, even one on a tight budget.

—Robert C. Robicsek, AIA, and Edward W. Wenzler, AIA

Generic CADD

Generic CADD has repositioned itself for three levels of users. Levels 1 and 2 are for beginners and amateurs. Level 3, priced at $199.95, is intended for architects and other professionals and replaces the earlier Generic version 3.0 and a series of options, all of which cost $249.95 purchased separately.

Plenty of optional extras remain. The vendor, Generic Software, sells 28 symbol libraries, priced from $24.95 to $74.95. Doors and windows are in Basic Home Design, priced at $49.95. A math coprocessor appears to be an essential investment. Generic Software reports that the program draws 18 times faster with a coprocessor. A drawing we created with version 3.0 took one minute 48 seconds to display on a Compaq 286 with coprocessor, compared with 15 seconds for the same drawing on the same computer in Cadvance.

Other options include 3D Solid Modeling for $349.95, conversion utilities for DXF and desktop publishing (each $49.95), and a driver for dot matrix printers ($49.95).

We got our first look at Level 3 just at deadline for this evaluation. Improvements included faster operation, the ability to place symbols visually by dragging them on the screen, an option of tick marks for line terminators, and more snap and drawing commands. The program now recognizes expanded memory, which makes larger drawings possible. The program also allows the user to set certain defaults, such as whether snap is on or off.

A driver for our Sigma 400 graphics card was included with version 3.0 but was dropped from Level 3. Our mouse works but not our plotter. On the other hand, the Dotplot program to output drawings to a dot matrix printer worked well.

The program has a parallel line function for drawing cavity walls, but we were able to get it to clean up the intersections only twice in six tries.

Macros are supported, but only through the programming language. It is not just a matter of memorizing keystrokes. Since the menu exists as an ASCII text file, it can be edited and customized with macros.

We liked the two-key editing commands. The first letter describes what you want manipulated, and the second letter describes the manipulation. With Cadvance, the many steps and variables can be time-consuming without much practice.

The program appears to offer a safe way to experiment with CADD. The vendor offers a money-back guarantee for 60 days—no questions asked.

The authors disagreed with respect to the architectural applicability of Generic CADD. Rook concluded that the program is suitable for use by an architect. "At least as a minimal-investment exposure to CADD, I think Generic CADD has made a great start," he said. Jankowski, dissenting, said, "While Generic CADD may serve some as a low-cost introduction to CADD, its severe limitations prevent it from serving as a useful tool in a professional office."

—James C. Jankowski, AIA, and B. Gregg Rook

Lasercad

Lasercad has an architectural look. It is built in a project-oriented, overlay fashion that incorporates drawing, layout, and block handling in a way that is quite natural for architectural production. It is so accessible for architects that drafting room staff who before had actively avoided sitting at a screen were lining up to try Lasercad.

Lasercad is priced at $495, which is higher than some other programs, but it includes options frequently offered at extra cost, such as printer and plotter drivers, bidirectional DXF utility, and a symbol library.

All Lasercad drawings can be placed in one file. Layers are shared. Common layers are updated automatically, since there is only one occurrence of the common layer. This is terrific if you are overlay oriented.

Three pen widths can be displayed on the screen. Line-width substitutes for differentiation by color, since the top, drawing layer is always white. While layers may be any one of 16 colors, the color of a layer may not be changed once it is set up. This is the opposite of Autocad, which permits a layer to have only one line type but multiple colors. Lasercad makes more sense to us.

Lasercad works best with a mouse. Tablet menus are not supported. One flaw is that the toggle between the two drawing menus is located in different parts, requiring a mouse movement when

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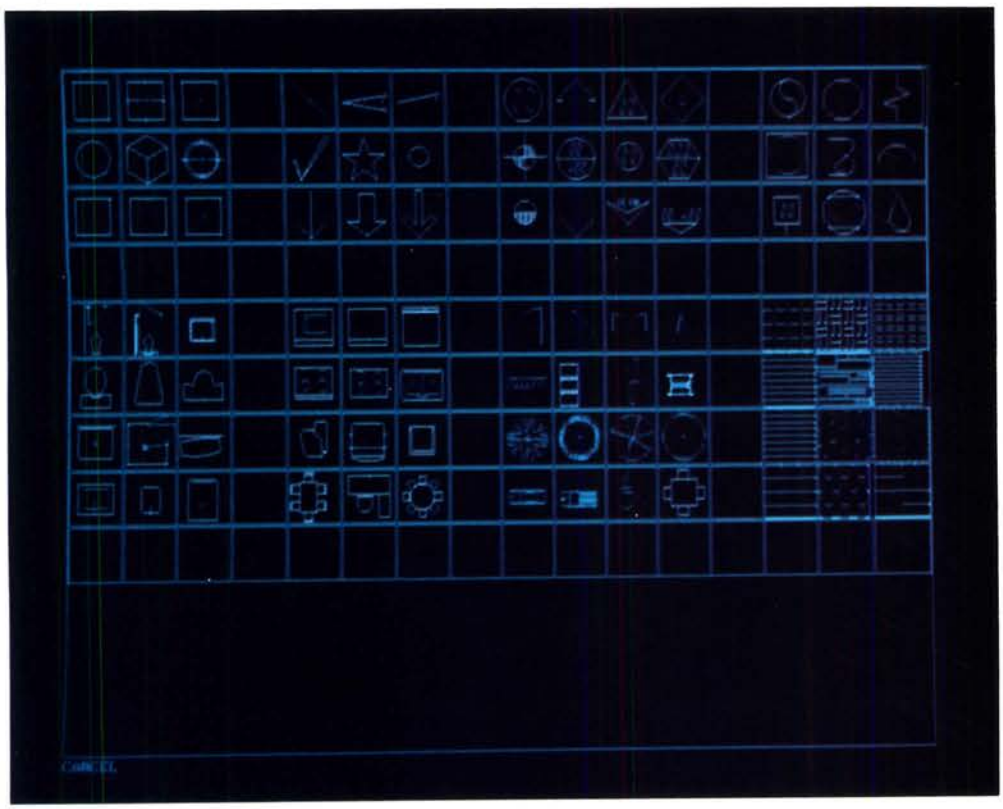
Mr. Hainsfurther is a project architect with Orville I. Kurtz & Associates, Des Plaines, Ill. He has been a Drafix evaluator for three years. Mr. Harriman is a partner in Otis Associates, a 50-member architecture firm in Northbrook, Ill. He has been working with Drawbase for two years. Mr. Robicsek is a vice president of Environ, a 30-member architecture firm in Chicago. He has been an Autocad evaluator for four years. Mr. Wenzler is a partner in William Wenzler & Associates, a Milwaukee architecture firm with seven employees. He has been an evaluator of Datacad for three years. Mr. Jankowski is executive vice president of Ross Barney + Jankowski, a 12-member architecture firm in Chicago. He has been an evaluator of Cadvance for four years. Mr. Rook is a project manager for Heard & Associates, a 15-member architecture firm. He has four years of Autocad experience.



A library of icons on architecture-friendly Lasercad.

going between the two. The Summagraphics 4 button puck allowed the toggle, but the GTCO Micro Digipad did not.

The Lasercad drawing sequence is not architecturally intuitive. The sequence—selection and definition—is natural but requires a mental reorientation. The process of graphic generation involves first defining parameters and then selecting objects.

Drawing in multiple scales is easy—just draw them on different layers. This remains a *bête noire* for Autocad to this day. Also unlike Autocad, Lasercad includes a plot spooler directly within the program. A spooler avoids tying up the computer to run the plotter.

Other useful features include a sketch command with Bezier curves, a snap-to-angle command that is like drawing with a T-square and triangle, zooming at an angle, and the ability to zoom or pan in the midst of a drawing command to facilitate the precise placement of the second point of a line or arc.

Our main objection to Lasercad is its lack of speed. It is just too slow for any kind of production work. Every redraw of the screen requires a regeneration—that is, a recalculation of all the figures. Comparing zoom times, Autocad is three to four times faster. Autocad's "zoom previous," compared with Lasercad's "restore," is three to five times faster. But Lasercad's restore is executed as fast as or 50 percent faster than Autocad's "regen." The other major shortcoming that we found with the Lasercad program is the inability to customize the program menu or command structure.

Minor complaints include the lack of a good tangent-to-circle command and the inability to import text from a word processor. This is especially surprising since attributes can be extracted from symbols to generate schedules and lists.

—Erol M. Altay and Charles Grant Pedersen, AIA

Ecad, Micrografx Designer

Two programs fell outside the generally accepted definition of "low-cost" CADD as priced under $500. Yet they stimulated too much interest and comment among the evaluation teams to ignore.

The evaluators of Micrografx Designer were Kevin S. Campbell, AIA, and Frank E. Heitzman, AIA. Ecad was evaluated by Marshall F. Hjertstedt, AIA, and David G. Patton, AIA.

Both programs suffer from schizophrenia. Micrografx hasn't made up its mind whether it wants Designer to be a CADD program or an illustration program. Ecad is a bit pricey for CADD beginners and a bit limited for power drafting.

Micrografx Designer is for architects who love to draw and need computer-generated color output. The program allows shading, shadow, color, and texture studies. It is a great presentation tool, with impressive strengths in graphic arts and technical illustration, including a good text processor. Instead of being limited to 16 colors, as are most low-cost CADD programs using EGA graphics boards, this program allows a selection of colors along a continuum of hue, value, and brightness. Designer didn't work well as a production drafting tool. The program, an upgrade from Inavision, is priced at $695. A library of architecture symbols costs an extra $49.95. A DXF translator adds $99. Free technical support expires after 60 days.

The Designer attributes make it an excellent postprocessor for other CADD programs. Combining drawings, data bases, and word processing files is easy with Designer because it runs under Microsoft Windows, which makes it possible to view and manipulate multiple documents on the screen at once. For CADD, the program supports 64 layers, multiple line weights, complex curves, autodimensioning, and E-size drawings. But it could not be coerced into working at a quarter-inch scale. All scales are decimal based, and in large documents the round-off error of 1 = 0.020833 (the decimal equivalent of 1/4 inch = 1 foot) leads to inaccurate dimensioning.

The DXF utility worked well, but we had trouble moving drawings from Designer to Pagemaker. All the transferred drawings

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Mr. Altay is vice president of Barancik, Conte & Associates, Chicago. The firm has a staff of 25. He is an experienced Autocad user. Mr. Pedersen heads his own three-member architecture firm in Hillside, Ill. He has been an evaluator of Versacad for four years. Mr. Campbell is a principal of Architechnology, a three-member architecture firm in Chicago. He previously evaluated Ultracadd. Mr. Heitzman teaches architecture at Triton College, River Grove, Ill., and heads his own three-member architecture firm in Oak Park, Ill. He teaches Autocad and has evaluated Megacadd. Mr. Hjertstedt is president of his own four-member A E firm in Chicago. He is an Arris evaluator. Mr. Patton is senior project architect for Anderson Mikos Architects, a 20-member firm in Oak Brook, Ill. He has worked with Versacad for three years.

	Autosketch	CCS Designer	Designcad	Designer	Drafix	Ecad	Easycad	Generic CADD	Lasercad
First sale	10/86	5/86	3/85	1/88	2/86	10/83	3/86	10/85	6/82
Sales as of 6/1/88†	60,000	25,000	135,000	3,000	30,000	2,000	25,000	130,000	2,000
Sales to architects†	25%	4%	5%	30%	33%	20%	60%	50% to AECs	25%
Program size	293K††	135K	300K	200K	400K	200K	200K	420K	128K
Drawings entirely in RAM	Yes	No	Yes	Yes	Yes	Yes	No	Yes	No
Recognize expanded memory	No	Yes	Yes	No	No	No	Yes	Yes	Yes
Coprocessor	Supported	Supported	Supported	No	Supported	Required	Supported	Supported	Supported
Macros	No	No	Yes	No	Yes	No	Yes	Yes	No
Two-way DXF file transfer	No	□	Yes	Yes	□	□	Yes	□	Yes
Inches and fractions	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Parallel lines with cleanup	No	No	○	No	Yes	No	No	○	Yes
Architectural symbols	No	□	Yes	□	Yes	□	No	□	Yes
Drag and scale symbol	Yes	No	No	Yes	No	No	Yes	Yes	No
Snap to intersection	No	No	Yes	No	No	Yes	No	Yes	Yes
Hatch patterns	No	No	39	Yes	14	26	24	20	100
Layers	10	1	21	64	256	25	256	256	1,024
Nested commands	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes
Import text files	No	No	Yes	Yes	No	No	No	No	No
Fonts supplied by vendor	1	2	17	6	16	1	3	7	4
3D	No	No	□	No	□	Yes	No	□	No
Associative dimensioning	Yes	No	Yes	Yes	No	No	Yes	No	Yes
Add attributes to symbols	No	No	Yes	No	No	Yes	No	No	Yes
Newsletter	No	Bimonthly	Quarterly	Quarterly	Bimonthly	Quarterly	Monthly	Monthly	No

NOTES:
No = Could not be performed conveniently enough to satisfy the evaluators.
□ = Available from the vendor at extra cost.
○ = Intersections not cleaned up.
† = According to vendor.
†† = Speed enhanced version.

we produced came out shorter and wider than the original.

Ecad, priced at $795, is expensive compared with the low-cost CADD programs, but still significantly less than its competition, which starts at $2,500. An architectural library, with 240 symbols including doors and windows in plan and elevation, costs $200, and a bidirectional DXF utility adds another $100. A coprocessor is required.

A short version, priced at $79, was issued too late to be reviewed here. The vendor, Pelton Engineering, said the short version is identical to the more expensive version except that it supports only one layer, limits the drawing size to 11x17 inches, and does not allow symbols to have attributes (such as name of manufacturer, price, and stock number).

The standard program has a powerful dynamic pan and zoom capability. The area available for instant panning is four screens by four screens in size. Once a factor is set (by a procedure not explained simply in the manual), zooms also are virtually instantaneous, even with dense drawings. The program can create three-point perspective, which can be modified, saved, and plotted. It is also possible to sequence a series of views to create the effect of walking through a building.

Another impressive feature is the logical filing system, which can work like pin-bar drafting. Each drawing layer is a separate DOS file, and all drawing files for a project can be assigned to one directory, which allows different drawings (e.g., architectural plan and structural plan) to share layers.

On the downside, the program was written first for engineers and isn't as friendly to architects as other programs. Few architectural symbols are supplied. The program supports a more limited range of commands than Versacad or Arris.

When the program specifies 640K of RAM, it means it. Ecad will not run on computers with anything other than DOS as RAM-resident. Ecad's support for peripheral devices also is limited. For example, the only graphics board options are AT&T, Hercules, and EGA. Although a mouse and digitizer are supported by Ecad, the program is oriented more to operation with a keyboard.

Hjertstedt considered Ecad a good CADD first purchase and definitely an exception to the notion that low-cost CADD systems are toys. Patton agreed that Ecad compares strongly with the other programs evaluated but felt it lacks a few simple and advanced commands that would make it a truly competitive production tool. □

Following is vendor contact information for the low-cost programs featured.

AutoSketch, *version 1.03, by Autodesk, 2320 Marinship Way, Sausalito, Calif. 94965, phone (415) 332-2344. To order direct, call (800) 223-2521. For referral to nearby dealer, call (800) 445-5415. For technical support, call (415) 331-4030.*

CCS Designer, *version 3.0, marketed by Complete Computer Services, 189 Airport Blvd., Burlingame, Calif. 94010, phone (415) 692-7250. To order, call (800) 346-4227. For support, call (800) 242-7007.*

Designcad, *version 3.0, by American Small Business Computers, 327 S. Mill St., Pryor, Okla. 74361, phone (918) 825-4844.*

Drafix 1 *and* Drafix 1 Plus, *version 2.0, by Foresight Resources, 10725 Ambassador Dr., Kansas City, Mo. 64153, phone (800) 231-8574.*

Easycad2, *version 2.0, by Evolution Computing, 437 S. 48th St., Suite 107, Tempe, Ariz. 85281, phone (602) 967-8633.*

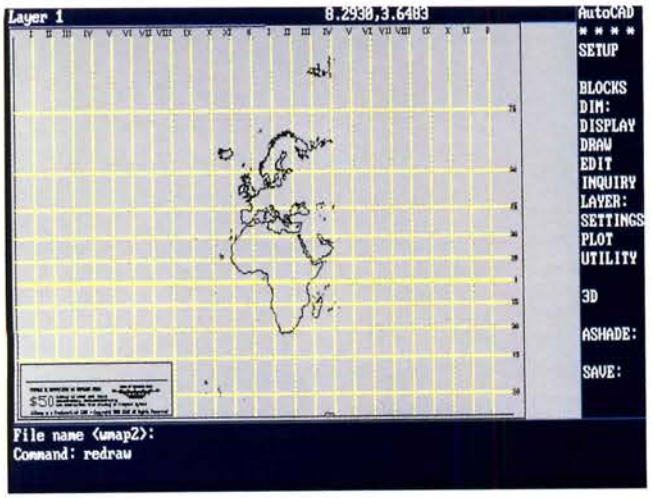
Generic CADD, Level 3, *version 1.01, by Generic Software, 11911 N. Creek Pkwy. South, Bothell, Wash. 98011, phone (800) 228-3601.*

Lasercad, *version 5.0, by A.I. Systems, 2450 East 7000 South, Salt Lake City, Utah 84121, phone (801) 942-8949.*

Designer, *version 1.1, by Micrografx, 1820 N. Greenville Ave., Richardson, Tex. 75081, phone (214) 234-1769.*

Ecad, *version 9.1, by Pelton Engineering, 3991 Smugglers Cove Rd., Victoria, B.C. V8N 4M1, phone (604) 477-8126.*

FastCAD®



AutoCAD® Release 9 REDRAW-3 seconds*

FastCAD® 1.21 REGEN-3 seconds*

WHAT ARE YOU WAITING FOR?

The drawing is Bradley's World Map—not a benchmark created by a vendor to make a product look good, but a real-world production drawing similar to your own projects in size and complexity. The table shows that for complex drawings, FastCAD's regen is faster than either AutoCAD's regen or redraw.

What does this mean to you? It means you won't lose your patience or train of thought waiting for redraws. A CAD system becomes a viable "what if" tool when you aren't reluctant to view a change at several scales. All CAD systems allow changes—we don't make you wait.

Computer System	Norton SI Adv. Ed.	FastCAD Regen	AutoCAD Redraw	AutoCAD Regen	FastCAD Save	AutoCAD Save
* Compaq 386/20 with 387/20, ESDI controller 130M hard disk, 640K RAM + 256K EMM, EGA, Compaq DOS 3.31	24.2	2.92 s	25.39 s	120.06 s	2.25 s	74.84 s
IBM Personal System/2 Model 50, 10MHZ 80286, with 10mhz 80287, 20M hard disk, 640K RAM, VGA, IBM DOS 3.30	9.7	11.17 s	61.07 s	333.41 s	7.29 s	223.74 s
Compaq 286, 8mhz 80286 with 5.33 mhz 80287, 30M hard disk, 640K RAM, EGA, Compaq DOS 3.31	7.7	13.49 s	42.58 s	280.32 s	3.74 s	100.48 s
AZ Computer XT, 8mhz 8088 with 8mhz 8087, 30M hard disk, 640K RAM, EGA, MS-DOS 3.30	1.7	15.35 s	89.30 s	550.98 s	4.69 s	203.74 s

All times are measured in seconds.

FastCAD's regen on the slowest machine is faster than AutoCAD's redraw on the fastest!

FastCAD—the next generation CAD program. $2,295. Call or write for information about FastCAD's product family, benefits, XP Toolkit, hardware support and dealer locations. Detailed benchmark information available on request.

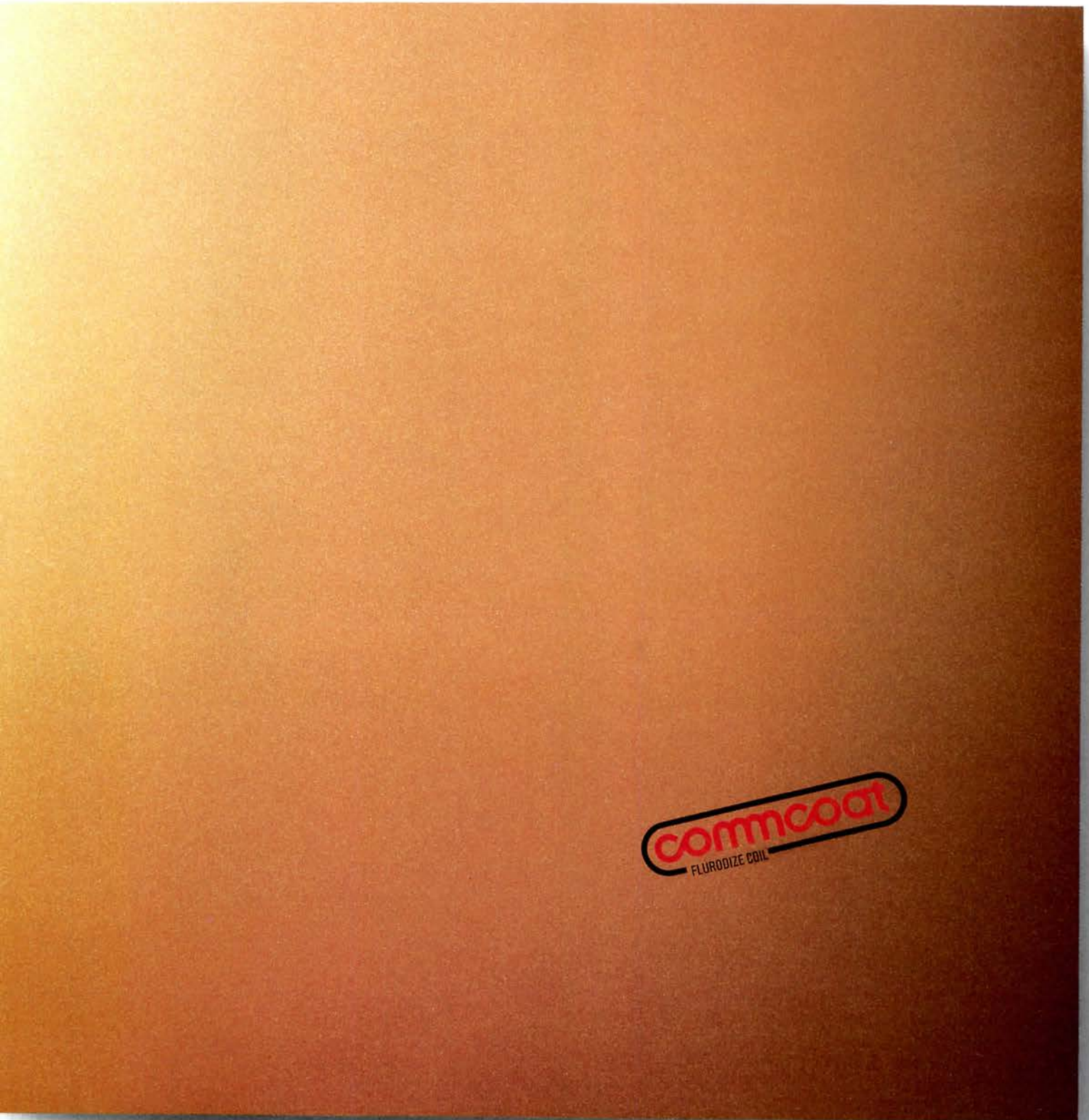
EVOLUTION
COMPUTING

437 S. 48th Street, #106
Tempe, AZ 85281
602-967-8633

World Map available for $50 from: ADSI/190 E. 5th Avenue/Naperville, IL 60540

Circle 70 on information card

The new surface anodized can't match.



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The remarkable finish is made by bonding a Flurodize coating to our finest aluminum substrate, right in our rolling mill.

Commcoat looks a lot like anodized aluminum. Only better. And it comes in seven exciting colors. (Extrusions, too.)

For a price no higher than anodized.

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To get your hands on some, call any of these distributors: Petersen Aluminum Corporation, Wrisco Industries or Idéal Métal Inc. Laminated panels are produced by Alucobond Technologies.

Or call us at 1 (800) 556-1234, Ext. 174. In California, 1 (800) 441-2345, Ext. 174.

COMMONWEALTH ALUMINUM

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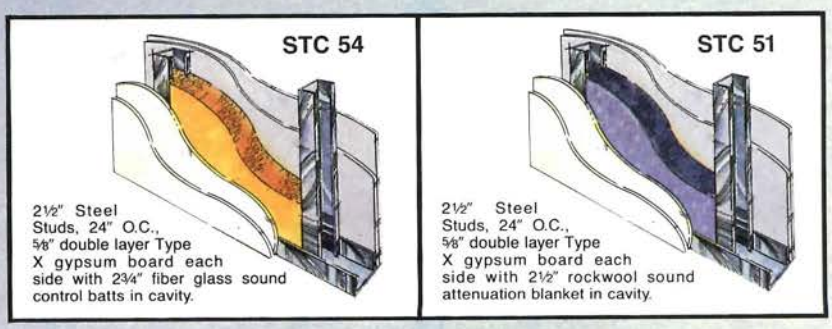
From the Stone Age

Why specify yesterday's sound control insulation when today's fiber glass from Manville delivers more?

Breaking with the past can be difficult. But when it comes to designing acoustical performance into interior walls, Manville Fiber Glass Sound Control Batts make the decision easy.

Manville Sound Control Batts are designed for press-fit installation in partitions in a wide range of commercial construction. In these applications, the fiber glass batts provide important benefits when compared to traditional rockwool insulation:

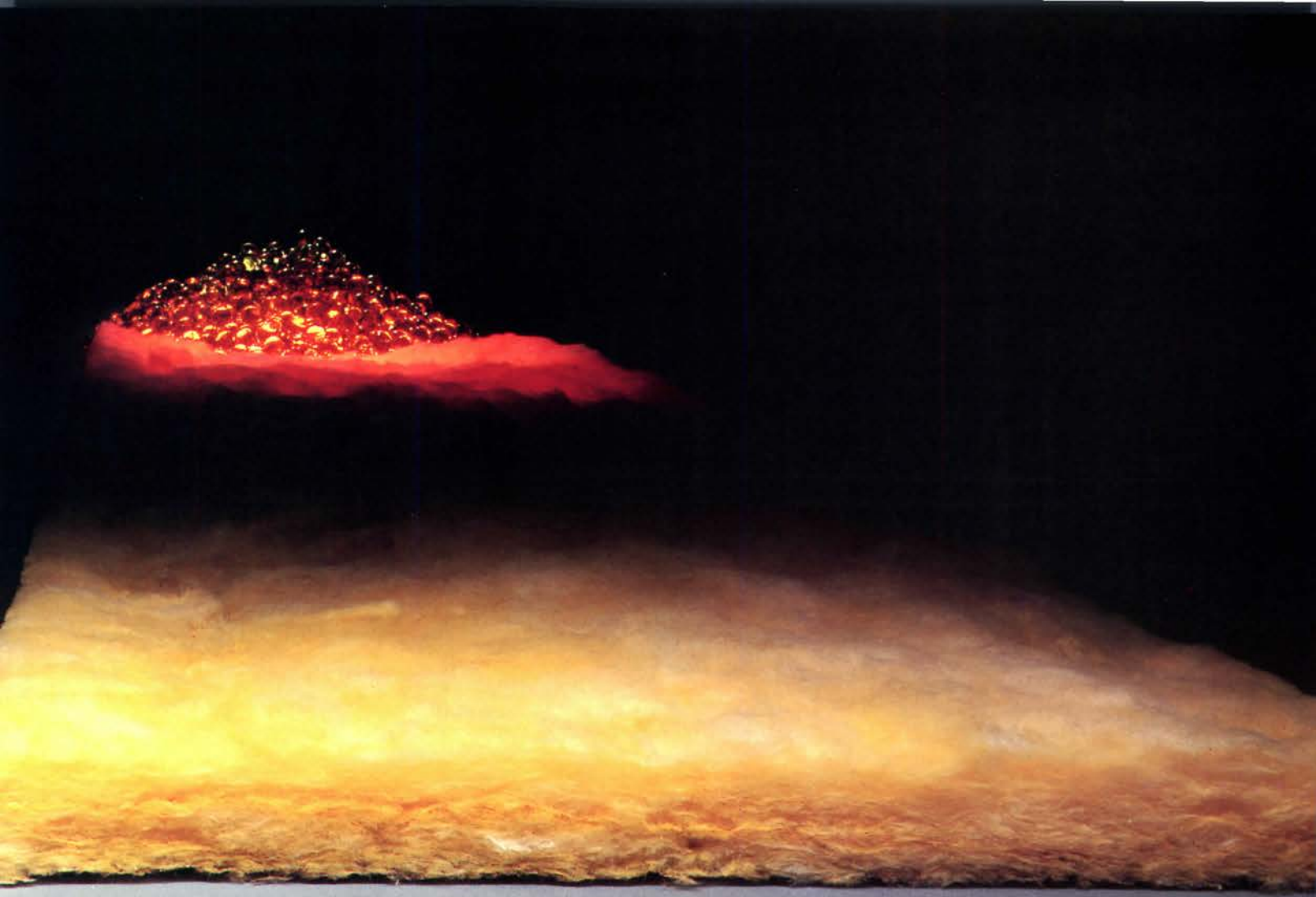


Equal or Superior STC Ratings.

Manville Sound Control Batts effectively reduce sound transmission through steel stud wall constructions. In the examples shown above, fiber glass batts offer equal or even improved STC ratings even though the density of the rockwool is significantly more.

High Acoustical Values Without High Density.

ASTM tests conducted by independent laboratories show



to the Golden Age.

that density has no effect on STC ratings. With a density of only 0.3 to 0.8 pcf, fiber glass provides the same STC rating as rockwool products with densities of 2.5 to 10.0 pcf. The lower-density fiber glass is particularly effective in sound absorption because of the many inter-fiber air pockets that trap and dissipate sound energy.

And All the Advantages of Fiber Glass.

Along with the ability to produce equal or better Sound Transmission Loss values when compared to higher density products, Manville batts also offer all the inherent benefits of fiber glass: a cleaner, easier to handle product; lower installed costs; resistance to breakdown from vibration; and a high degree of recovery to assure complete cavity fill.

Resilient Manville Fiber Glass Sound Control Batts in full 8 ft. lengths completely fill the wall cavity while 2 looser fitting rockwool batts are required for the same space.

The evolution of sound control insulation has moved from the stone age into the golden age of Manville Sound Control Batts—a product that offers lower installed costs than rockwool, equal or superior acoustical values, and the additional benefits of fiber glass. For more information, write P.O. Box 5108, Denver, Colorado 80217-5108. Or call toll-free 1-800-654-3103.

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Manville

Today's Insulations

IDP: Still Controversial but Increasingly a Fact of Life

By Douglas E. Gordon

The arguments are familiar. The Intern-Architect Development Program is good because it provides a structured national system (a "road map") for interns preparing themselves for entrance into the profession. IDP is bad because it forces yet another gratuitous requirement on both those seeking to enter the profession and the practitioners who must show the ropes to the neophytes (possibly to lose them promptly to a competitor).

Such arguments quickly become moot when one considers that registration boards around the country are endorsing, accepting, and outright requiring participation in IDP for anyone wishing to take the architectural registration examination.

Moreover, what's missing from these assessments is the longer view, according to Lois Thibault, AIA, staff director of IDP for AIA. "On the one hand, schools of architecture cannot simulate the realities of practice, and practitioners have the professional responsibility of comprehensively exposing their interns to diverse areas of architectural practice," she said. "On the other hand, interns who make a goal of licensure lose sight of the purpose of the training requirement, which is to perfect the education and skills necessary for competent practice. Too many in our profession view internship as an impediment rather than an opportunity."

Architectural registration boards in 27 states require or soon will require IDP training for licensure, and such a requirement is close to adoption in five other states, said Robert A. Rosenfeld, director of internship programs with NCARB. Presently in those five states nearing adoption, along with 15 other states, the registration boards accept IDP training as equivalent to their training standard for licensure. Registration boards of the remaining three states, the District of Columbia, and the U.S. Virgin Islands formally endorse IDP training. In only three U.S. territories—Guam, the Northern Mariana Islands, and Puerto Rico—has no action been taken by the jurisdictional registration boards with respect to IDP.

The galloping rate of state board acceptance of IDP, coupled with the large number of architecture school graduates fiercely pursuing licensure, seems to indicate that IDP is beyond the point of debate. One's time is better spent in understanding IDP and turning it to advantage.

"Most of the problems IDP faces now are based in misunderstanding of the program," Thibault said. The program is not a prescriptive one. Its flexibility allows a variety of approaches and settings. In the mid-'70s, when firm specialization became the norm, the relationship between architect-mentor and intern took a beating. Interns complained that they were being used as cheap labor while practitioners disparaged the skills of new graduates and resisted responsibility for training. The response by NCARB and AIA was to establish IDP. AIA is responsible for the network of advisory sponsors (employers), advisers (usually assigned through local AIA chapters), and the supplementary education program. NCARB maintains the record-keeping system and oversees the training standard itself.

Stated as simply as possible, IDP training requires that interns meet minimum levels of exposure in each of 14 training areas through participation, observation, or simulation. Experience is measured in "value units," each of which represents eight hours of training. The 14 areas (with minimum required value units in parentheses) are: programming—client contact (10), site and environmental analysis (10), schematic design (15), building cost analysis (10), code research (15), design development (40), construction documents (155), specifications and materials research (15), documents checking and coordination (15), bidding and contract negotiation (10), construction phase—office (15), construction phase—observation (15), office procedures (15), and professional activities (10). An additional 115 required value units are allocated within subgroups of these topics. There also is a "related special activities" category, which carries no value unit requirement but is included for the sake of recording valuable experience. Related special activities include such diverse specialties as energy conservation, computer applications, teaching, and historical restoration. Of the 700 value units required to satisfy the IDP training standard, 465 must be met in specified areas, leaving the balance to be accrued in any area, including supplementary education.

With a variety of levels of recording and reportage, following the IDP guidelines is a matter left up to the individual intern's desires and statutory licensure requirements. However, regular contact with an architect-mentor—inside or outside the intern's place of employment—is very important for guidance and evaluation. IDP also advises supplementary education.

It's not hard to see what good an intern derives from IDP. What might not be apparent are the benefits to practitioners in terms of attracting and keeping promising people. IDP coordinating committee literature reports that Maui firms offer IDP to attract University of Hawaii graduates away from Honolulu. Likewise, James S. Gaspari, AIA, of North Brunswick, N.J., uses IDP to entice interns from the New York City market. Burt Hill Kosar Rittelmann's director of operations, Cecil Tranquill, added IDP to his firm's benefits package to recruit promising interns. And the Tennessee Valley Authority, among other public agencies, finds that an in-house IDP program allows it to compete successfully with private practice for the best and brightest graduates. In fact, TVA staff architect Robin Ellerthorpe, AIA, serves as Tennessee's state IDP coordinator as part of his TVA job description.

Roy F. Gilley III, AIA, of Gilley-Hinkel Architects, Bristol, Conn., spends two evenings a month conducting educational sessions for a group of architecture graduates enrolled in IDP. "I began back in 1985, with principals from three other firms in the area, to work with eight interns from our firms, discussing the AIA *SupEdGuides,* outside readings, research, and guest-speaker presentations," Gilley said. Working with the other principals on education sessions to supplement on-the-job training, Gilley found that they all benefited from brushing up on their technical knowledge and presentation skills. "The meetings were a forum for architects to learn from one another," he said.

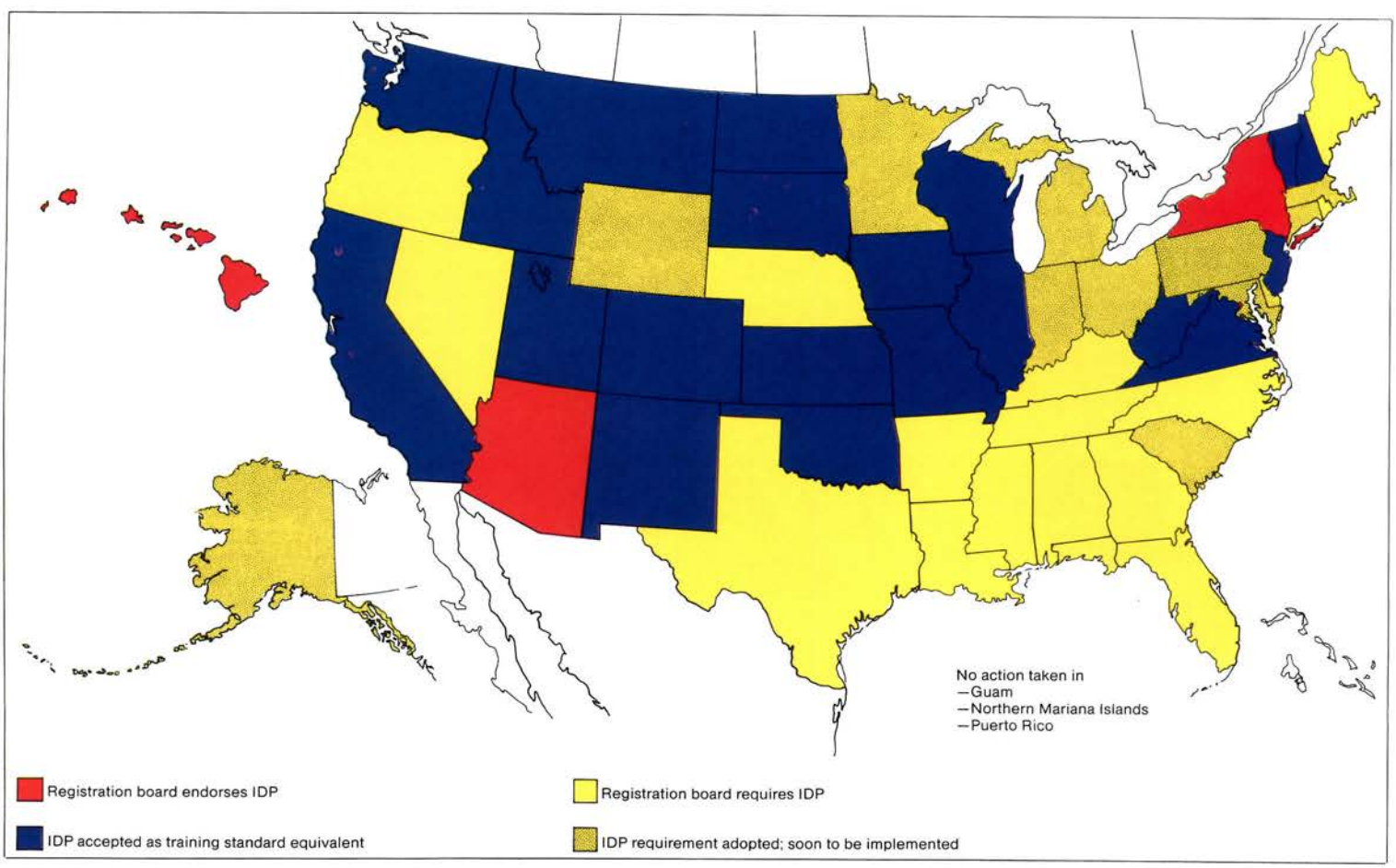
The other principals have since dropped out of the program because of their other commitments, but Gilley's practice continues to benefit from IDP involvement, he said. "I get calls from interns all over this section of the country asking for guidance. These are the dedicated people I'd like to have working for me, and my work with IDP puts us in touch. A lot of architecture graduates hop around among firms so they can get some broad experience before they become registered. By going out of my way to provide that variety right here, I find I am able to keep my best people interested."

"Intern development is a two-way street," said Mitchell S. Elliott, a 1982 graduate from the University of Nebraska who recently completed IDP. As of this year, the Nebraska architectural registration board requires IDP training for admission to the exam. "Firms want to get the best people, of course. But for any architecture graduate to become the best, he or she needs the support of the firm as well. I was lucky to find an employer, Mike Purdy, of Purdy & Slack in Omaha, who was also a willing mentor. Especially now, with the IDP requirement in Nebraska, if architecture graduates don't get support from their employers in pursuing IDP, they leave.

"Of course, IDP isn't going to guarantee employees will stay," Elliott added. "Recently, I switched to another firm, Wilscam/Birge Associates, to broaden my experience, but not without first talking it out with Mike. He and I are still very good friends with a professional relationship that promises to last for years. Besides, we both benefited from my working within the IDP program. For instance, to fulfill client-contact requirements, Mike would bring me along to client meetings and I would take notes, which left him free to concentrate on the client. I got a sense of client development while Mike was able to devote his full attention to the meeting agenda—and he got good meeting notes as well."

Elliott's mentor, Michael L. Purdy, AIA, concurred. "I benefited from helping Mitch through IDP because it put my work in a new perspective," he said. "I found that teaching practice means thinking about aspects I might not otherwise take time to consider. If I was going to show Mitch how to do something, I wanted to make sure I was getting it right myself. So I would definitely say IDP helped me by making me more conscious of the way the firm does things."

"If there is a ground swell of support for IDP, you will see it coming from the bottom up," Elliott predicted. "Those of us going through IDP now will be those who support and implement it in the years to come. We understand it. We know it doesn't involve a lot of firm time nor an unreasonable commitment from principals. And we know it's beneficial to the firm." □



Award Winning Ideas For Training In Practice

By Phillip G. Bernstein, AIA

Every firm struggles with its obligation to train its staff members and expand on their knowledge brought from school or past experience. At a bare minimum, every new employee must become familiar with office procedures and standards. But ours is an apprenticeship profession where continued education after school is necessary to develop skills essential for registration and for practice in a world increasingly complex and risky. From desk crits to seminar series, how do firms educate?

In pursuit of answers, the Architectural Education Initiative—AIA's mechanism for promoting excellence in professional education, both before and after graduation—formed a task force charged this year with identifying and publicizing innovative ideas for practice training. Thus were born the Citations for Outstanding Education in Practice, an annual event that allows firms to submit their education/training programs for recognition by AIA. By publicizing interesting ideas, the AEI hopes to encourage firms to continue educating their staffs.

In evaluating 1988 submissions, the task force used three criteria: Does the program have relevance to the needs and values of the profession? Is there a demonstrable link between intent and outcome? Is the program transferable to other firms and organizations?

Of the firms of various sizes, shapes, and practice types that submitted their programs, four were chosen for honors at this year's AIA convention. They are presented here, along with the other submissions worthy of mention.

SGPA Planning and Architecture

In a series of remarkable seminars and training programs, the San Diego firm SGPA Planning and Architecture actively encourages the professional growth and advancement of its staff. The planning and design firm of 100 first was inspired to enhance quality control by improving project management skills. The Project Management for Architects seminars, a 24-session sequence to teach "a systematic project management approach," includes presentations by senior managers on such basics as proposals, scheduling, staff planning/scheduling, negotiation, document management, and construction cost management. The class entitled Priorities, Strategies, Delegation, and Time Management would benefit many a first-year student. It has generated enough interest in the San Diego professional community that it is now offered for credit at a local university. An instructor's guide outlines specifics of the course for the project managers and professors who teach it.

Other SGPA techniques are used internally. Taking a cue from manufacturing giant Hewlett Packard, the firm has created "quality circles" where staff meet regularly to evaluate performance and recommend changes in policy. Handbooks for production

Mr. Bernstein is a project architect and in-house education coordinator at Kaplan/McLaughlin/Diaz architects, San Francisco. He also is a member of AIA's firm recognition task force. Other members of the task force are Samuel A. Anderson, AIA, of Glave Newman Anderson Architects, Richmond; Lawrence Leis, AIA, of Louis & Henry Inc., Louisville, Ky.; Cynthia Woodward, AIA, RTKL Architects, Baltimore; and Professor Bruce Evans, University of Cincinnati.

standards and secretarial procedures have resulted from these meetings. Lessons learned from construction contract administration are transmitted in Construction Administration War Games, in which project architects, job captains, construction administrators, and certain lucky interns solve problems based on real field examples.

In a twist on the traditional first-day office tour, each new employee also is assigned a mentor, a senior associate responsible for answering questions about everything from office policy to copy machines.

SGPA has adopted its own version of the NCARB Intern Development Program, in which the intern architects rotate through a training cycle of all disciplines. Interns also benefit from 16 weeks of seminars to prepare for the registration exam. CADD training, in many firms a baptism by fire, is a rigorous series of classes comprising exercises, quizzes, and computer-generated certificates of completion. Classes during office time are complemented by training exercises after hours.

But SGPA's commitment to practice education does not stop at the office front door. AIA special interest groups organized by the firm include a CEO interaction group where local heads of firms exchange advice; an Autocad users group; and a project management roundtable. A survey of local firms' employee benefits that SGPA started is now produced by the San Diego Chapter/AIA. The firm has an established role in the education of its architectural community and a commitment to that education evidenced by an extraordinary range of well-considered and well-executed programs.

The National Park Service

Although the National Park Service is not a typical firm, its Skills Development Plan for Historic Architects is a progressive example of professional education. Few firms have 97 professionals spread across 10 regional offices, or the responsibility for 15,000 identified prehistoric or historic structures. NPS architects must use highly specialized skills not often available to recent graduates, and NPS is committed to developing those skills in architects who may be in NPS service for as long as 30 years. In what other professional setting must one know the subtleties of Guastivino tile vaulting or craft practices in 18th-century paneling?

Yet it is not so much the particulars as NPS's philosophical approach to practice education that is interesting. A universe of 120 skills required to accomplish the NPS mandate was identified, from which a sophisticated, self-directed learning environment to teach those skills was developed. At the center of this universe are 21 skills considered essential, and the development plan trains architects to achieve basic, advanced, or master proficiency in each of them. Training in such topics as preservation philosophy, standards, history, design, materials, structure, and finishes (the list is extensive) serves a dual, reciprocal purpose. The participant achieves necessary competence, and the collective body of preservation knowledge is augmented by each participant, who must distribute extensive documentation of training and research results.

NPS describes the program as voluntary and self-directed. Subscribers agree to a three-year commitment culminating in three tangible education products that demonstrate knowledge of specific preservation skills. Senior historic architects review, evaluate, and criticize proposed programs and results.

NPS has its own version of IDP. In what NPS calls its Independent Development Plan, every historic architect has a mandatory training plan, which, after the basic training steps, includes a personal study plan for skills development designed by the individual. A guidebook for the program details aspects of important preservation skills, outlines information sources, and serves as the basis for the study plan. An example is a study plan that surveyed slate roofing practices and included several days of field research combined with examination of early trade catalogues and interviews with roofing contractors. The completed study was distributed to regional offices, historical societies, and NPS's skills development archives. In the process, the program produced a local slate-roofing expert.

An outline of NPS's motivations for creating its skills development program suggested another worthy goal: enhancing communication with members of related disciplines. Crafters, scientists, engineers, conservators, and historians all play important roles in preservation, just as the involvement of specialists is a part of mainstream architectural practice. The architect's ability to communicate effectively with these specialists is crucial to success. Participants in NPS's development plan actively seek out and involve ouside disciplines in their studies.

The historic architects of NPS set an enviable example with their skills development program. Few firms enjoy the resources of the federal government to develop a training program, but important lessons still can be learned from NPS's refined training sequence. Any thoughtful effort to determine important skills and develop appropriate competence will enhance staff performance and service.

The Tarquini Organization

Effective training programs do not require formal organization and extensive preparation, only a conviction that staff development encourages better work. The Tarquini Organization, a firm of approximately 40 architects, planners, and interior designers in Camden, N.J., uses an informal curriculum to enhance quality of service, staff morale, and in-house relations.

Most offices have periodic in-house project reviews. Tarquini schedules mandatory presentations on alternate Mondays and invites everyone to participate, from the president and project managers to the receptionist and clerk. Current projects and office policies are presented by project architects and managers (enhancing presentation skills) and are vigorously discussed among the staff. Nonprofessional staff are given some extra insight into the processes and products of architectural practice, and everyone is informed about current work in the office—all for the price of lunch once a week. Other Mondays feature product lunches, which are equally well attended. Tarquini sees both presentations as important to enhancing staff knowledge and thus quality of service. Lunches conclude with distribution of "Food for Thought" —fortune cookies containing pithy sayings and reminders to strive for success.

"In a Nutshell" is another Tarquini invention to increase staff awareness about interpersonal relations. The communication skills taught in the famous Carnegie seminars have been abstracted

into weekly handouts given to each member of the staff. An anecdote quoted from Carnegie's course is printed with a cartoon, and each handout is accompanied by a token related to the principle being discussed. For example, a sheet entitled "Techniques in Handling People: Don't Criticize, Condemn, or Complain" includes a cartoon of a man being chased by a swarm of bees after kicking a beehive; a tiny felt bee is pinned to the sheet. This quick, inexpensive, informal training tool, typical of Tarquini's relaxed but effective methods, is easily applied to other ideas and policies.

Jova/Daniels/Busby

Training programs are not the only way to educate and motivate the staff. Jova/Daniels/Busby of Atlanta has established a prize of a $2,500 fellowship with sabbatical, given each year to recognize an outstanding member of its staff who shows potential for professional growth. The prize is to be used for scholarly investigation—study, travel, or special projects of value to the firm—that must be completed within six months after the award.

Everyone in the firm is invited to nominate candidates for the prize on the basis of "quality of effort, dedication, perseverance, creative contribution, . . . and potential for benefit from the award." Nominees for the 1987 prize were praised for design sensitivity and commitment, integrity, attention to detail, loyalty to the firm, and positive attitude, all characteristics the prize encourages among the staff.

Principals and associates narrow the field of contenders to four finalists, who are asked to submit proposals describing how they would use the fellowship and to what benefit for the firm. The 1987 nominees presented a variety of programs, including study of perceptual drawing skills at Stanford, presentation of papers about Atlanta to the International Union of Architects Congress in London, and participation in the International Association of Lighting Designers leading to the creation of lighting installation measurements for the firm. The concise and carefully crafted proposals submitted by J/D/B staff demonstrate the enthusiasm the prize generates each year.

The jury, which includes firm managers, other architects and educators, and representatives from the media, chooses the winner. The 1987 prize was awarded at the Carter Presidential Center amid press releases, special lectures, and much fanfare. The winner was Doug Kleppin, praised in his nomination for "talent, attitude, and ability to define a problem and create an innovative and concise solution." His winning proposal was to design prototypical duplex housing for underprivileged families in Atlanta's historic Grant Park neighborhood, where he hopes to bring "quality architectural design to an urban housing problem, which is often ignored by the architectural community." The project client, a nondenominational ministry to the urban poor, will construct the finished design and then sell the house to a church-sponsored family on favorable terms. The proposal suggested that the firm exploit its construction contacts for donations of materials and time for the project.

The J/D/B prize is admirably efficient and effective. For surprisingly little time and expense, the firm receives a range of benefits. Its staff members are motivated and their morale enhanced. The firm is educated on topics often outside its everyday practice. It can make a tangible contribution to the community. And it generates desirable publicity and goodwill. The $2,500 price tag seems well worth the investment.

Other good ideas

Several common strategies emerged in the submissions for citation. Many firms convene informal seminars to transmit standards and policies, especially about project management and quality control. Brown bag lunches, usually about design or building technology, as well as catered lunches for product presentations, are an industry standard. And the regular influx of intern architects usually generates some organized form of preparation for the licensing exam. Some other ideas of interest follow.

Henningson, Durham & Richardson, Alexandria, Va., gives university tuition supplements to deserving minority architecture students.

Earl Swenson Associates, Nashville, conducts community issues programs to discuss design philosophy and goals. The firm has associated with a Japanese firm in an architects' exchange program.

Collaborative Design Group, Tucson, Ariz., a young firm, has established a continuing relationship with an "architect emeritus" to provide learned advice and support.

The associates at Beyer/Blinder/Belle, New York City, tap the rich resources of the city's architectural community for regular lectures on design and theory.

Gilley-Hinkel Architects, Bristol, Conn., pools teaching resources with other area firms to provide IDP and registration seminars for intern architects.

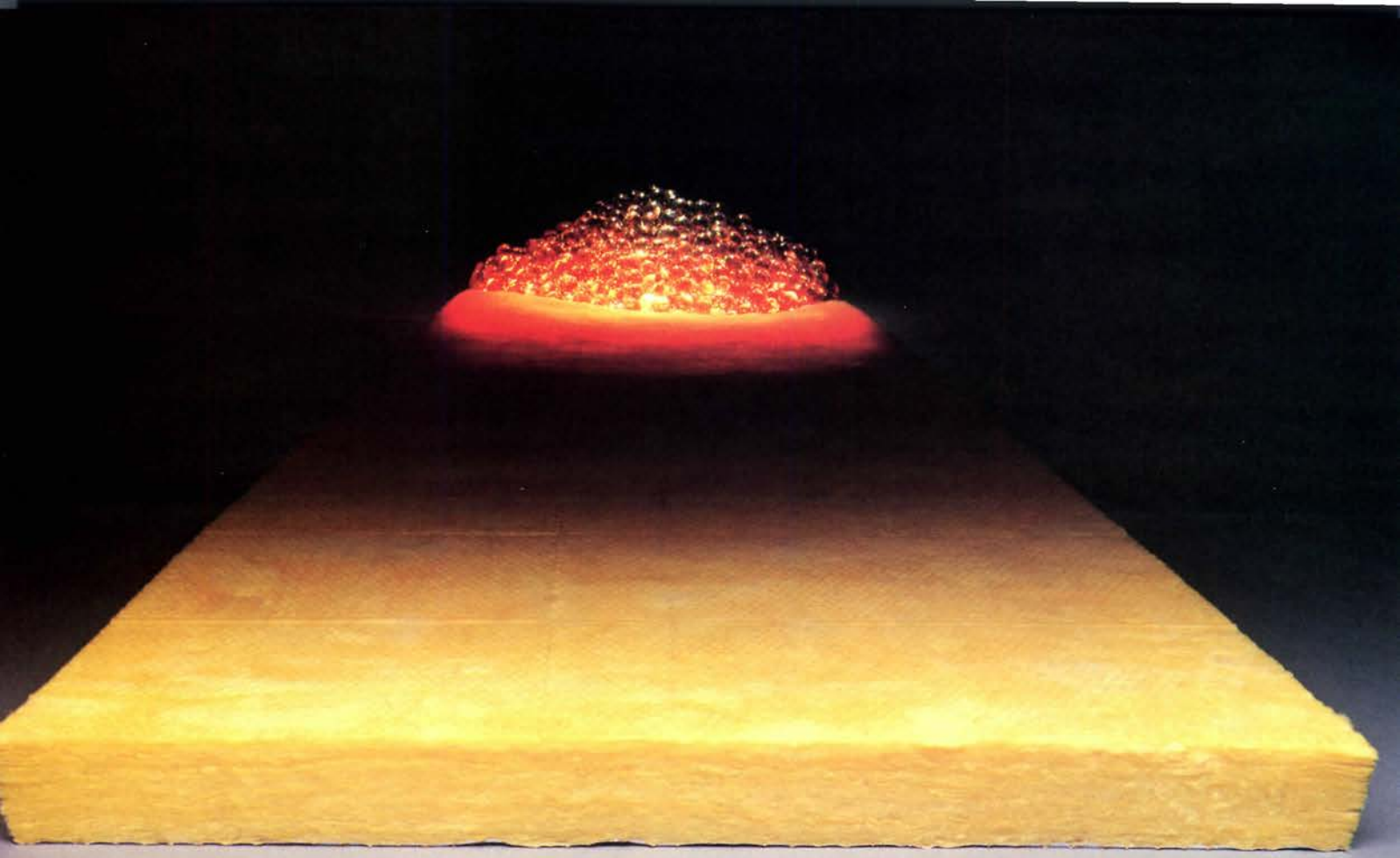
CRSS's Houston office uses a curriculum called the Problem-Seeking Workshop to present project organization and quality control techniques while simultaneously teaching office management standards.

Wayne Ruga Architect, Martinez, Calif., prepares annual professional education objectives for its staff and insists that each professional write articles, attend symposia, lecture, and teach.

Kubala/Washatko, Cedarburg, Wis., holds regular seminars to refine its mission statement, which sets goals and objectives for the firm.

All these case studies might suggest that only firms of 20 or more can mount effective office education programs. But that conclusion misses the point. From university extension courses to weekly handouts, training techniques must be tailored to the resources and needs of individual firms. Multiple-session seminars on project management and quality control may prove too expensive for a small firm, which might accomplish the same training with informal after-work discussions. Those same small firms could consider pooling resources with other offices to produce larger training programs and using the local AIA chapter for help.

The wide range of programs and philosophies submitted for this year's citations suggests that many firms are committed to practice education and that their commitment goes beyond obligatory training in office procedures and policies. The strengths and weaknesses of architectural education are a much-discussed topic these days, and many professionals believe that graduates are ill prepared for the real world. Perhaps they are. But the interest and enthusiasm demonstrated by the applicants for the Citations for Outstanding Education in Practice affirm that ours is an apprenticeship profession that takes many years to master. The schools simply cannot produce "little architects" fully prepared to take on today's difficult world of increasing technical complexity, demanding clients, and legal risk. A commitment to continuing education in the office, no matter what the method, is critical to the success and future of our profession. □



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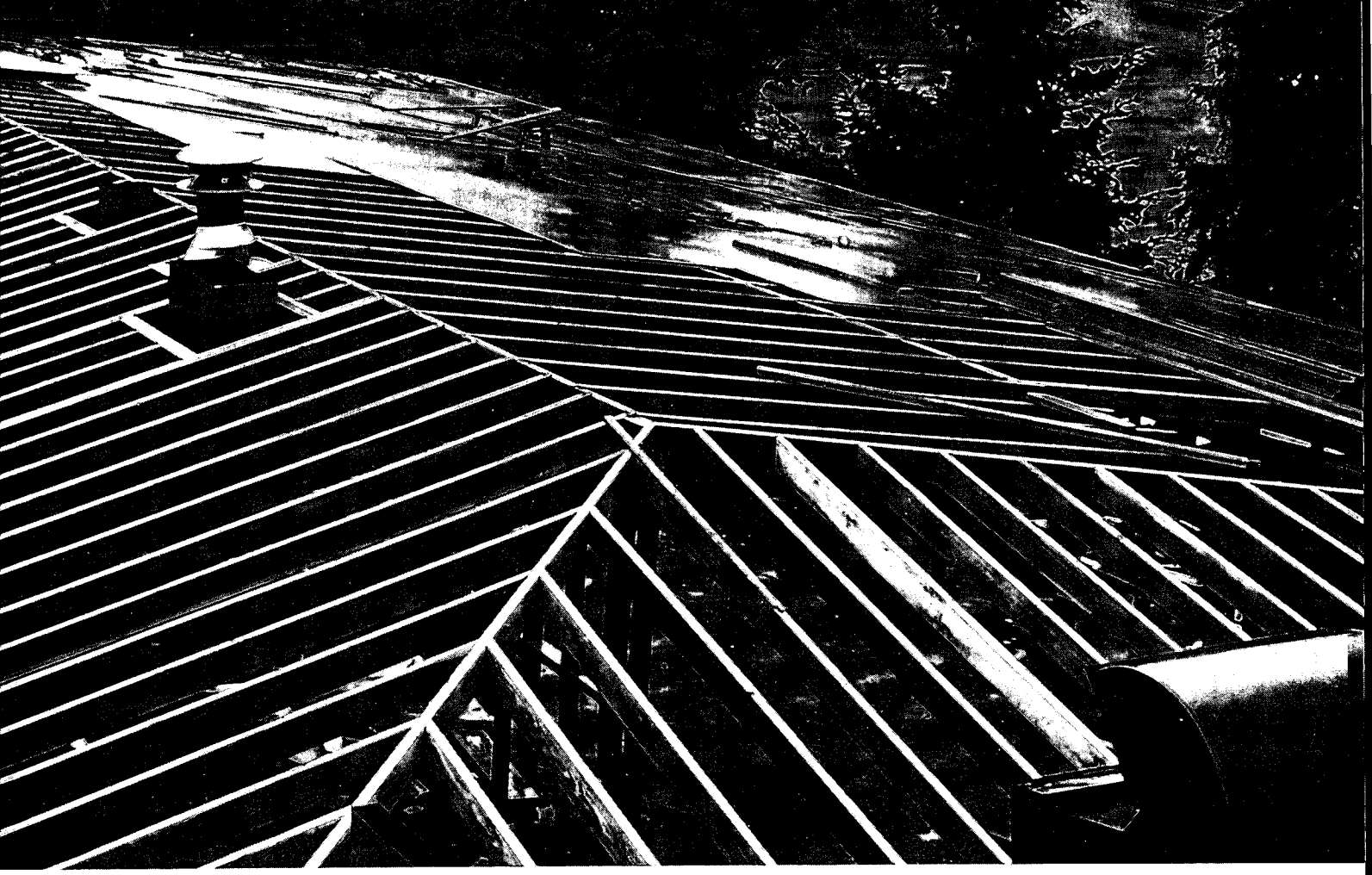

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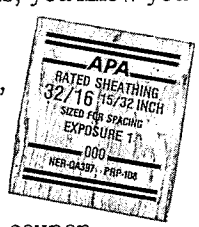

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Designing for Security From the Inside Out

By Billy G. Cook

To many architects, building security means guns, gates, and guards. Security elements are added to a building and, if done carefully, do not detract from the external appearance. This is the traditional view. It is no longer sufficient.

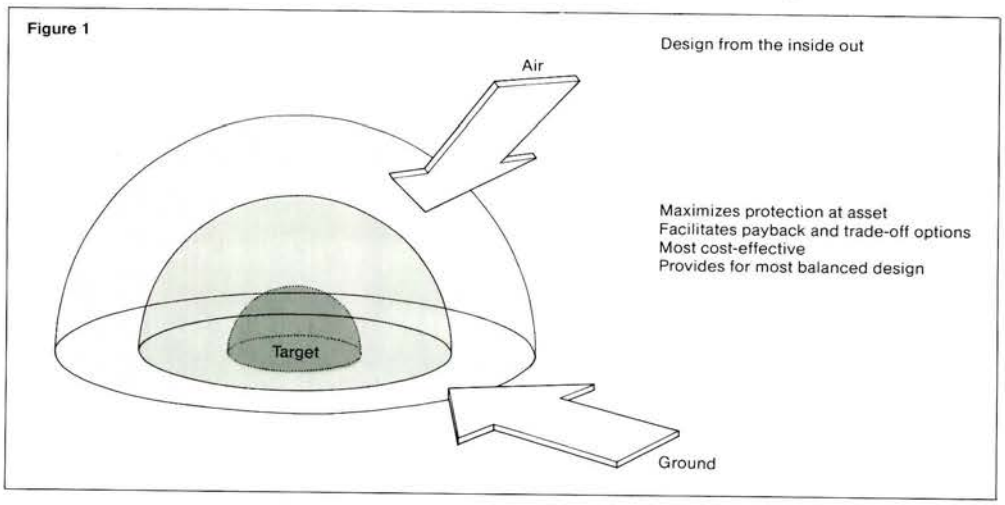
Without question, a good security system should incorporate exclusion technology for preventing or resisting attack from air and ground; such technology includes fences, barriers, and earth berms. But a security system cannot be considered separately from the facility it is to protect. Effective security design begins inside the building and is engineered from the inside out. Architects experienced in protective design integrate security with other building functions and systems from the first phases of design. For high-threat and important industrial security, this may include advanced delay technology that impedes intruders once they are inside building perimeter barriers.

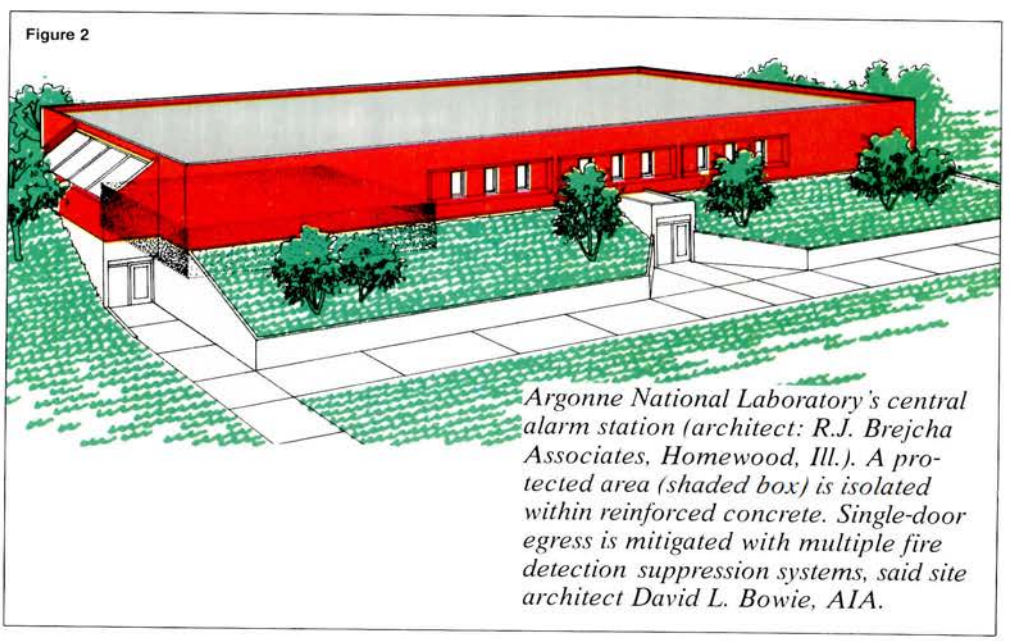
Beginning from the inside out means first identifying all the specific items, areas, and persons to be protected within a facility, as well as the real and potential threats to them (Figure 1). There are typically many levels of protection desired for many elements within a building (life safety, for example, is a constant top priority) and many means of protection. Once assets are identified, the design team integrates operational and support protection strategies with each other and with the day-to-day operational equipment, HVAC, and electrical and communication systems, all within the code approval process and the budget. Implementation means installation, training, maintenance, and updating.

Protection strategy within a confined space can be simply illustrated by imagining an open cube surrounding a given asset. Without specific security measures, it is theoretically possible to reach the asset by penetrating any face of the cube. The asset is in the center of the cube and is initially accessible from all sides. A protection strategy might locate the cube on the ground and use earth berms to cover the top and three sides. The cube becomes a bunker-type structure. This configuration reduces the physical security problem from a three-dimensional attack on six faces to a one-dimensional attack on one face. Further refinements may be possible by reducing the remaining exposed face with more earth. Minimization is a single door to the bunker through a tunnel. An example of this refinement is the Cheyenne Mountain facility operated by the U.S. Air Force.

All facilities cannot be hardened bunkers, of course. But, in general, the design approach is the same for any facility. Security design depends on building function, location, and levels of protection desired. The central alarm station at Argonne National Lab is one example of maximum protection, functionality, and minimum obtrusiveness with respect to the external appearance (Figure 2).

Hardening the periphery is only part of the strategy. Delay is the central element in the defense of fixed installations, and it extends from the inside. Delay after initial adversary action provides valuable

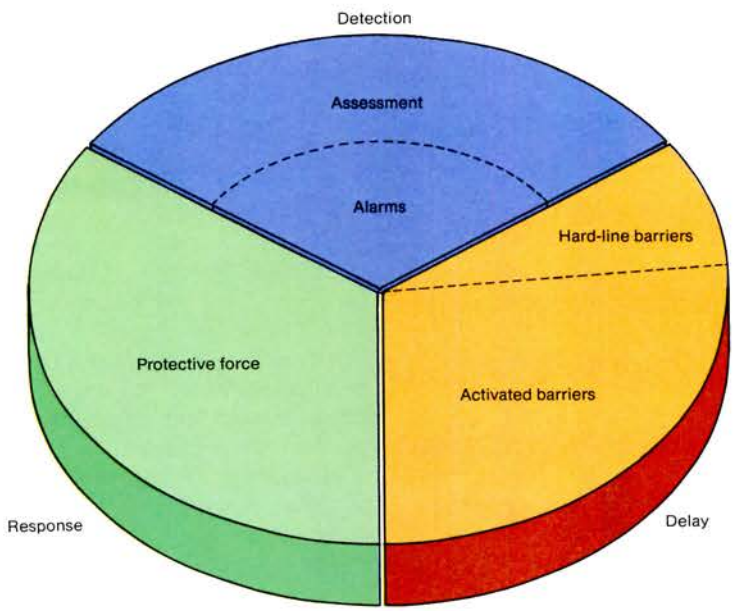




Argonne National Laboratory's central alarm station (architect: R.J. Brejcha Associates, Homewood, Ill.). A protected area (shaded box) is isolated within reinforced concrete. Single-door egress is mitigated with multiple fire detection suppression systems, said site architect David L. Bowie, AIA.

Col. Cook, retired from the Army, has managed a $250 million high-tech security upgrade in Europe involving seven NATO nations; he also was deputy assistant secretary for security affairs for the U.S. Department of Energy. He is now a vice president of the Hinsdale, Ill., security consulting firm R.E. Timm & Associates Inc.

Figure 3



A balanced and well-conceived security system consists of three functions in equal proportion—detection, delay, and response. Defeating any one of these functions means defeat of the entire system. Delay is key because it ties together detection (a very dependable science) and response (typically undependable).

time in which facility personnel may coordinate and execute orderly policies and procedures, such as summoning outside security forces and, if appropriate, moving personnel into safe havens, destroying sensitive materials, and executing evacuations. Delay also places adversaries in a position of defense rather than offense and precludes a swift-strike success.

A result of the dynamics of a detection-delay-response strategy (Figure 3) is that insufficient delay time overstresses the response function. Personnel must be dispatched and deployed quickly, and in a manner that maximizes their chance of survival. To ensure that a response to a surprise is effective, the shorter the delay time designed into a facility, the greater the number of on-call security-response personnel required (and the higher the personnel cost). The delay time designed into a facility, then, becomes a significant and directly proportionate life-cycle cost factor. Furthermore, an uncontrolled surprise attack overstresses one of the more vulnerable elements in any security system—human response. Command, control, communication, intelligence, and coordination become strained, untimely, or lost to overwhelming demands if intruders are not sufficiently delayed at preselected points.

Intrusion delay for the building is extremely difficult to achieve in appreciable quantities by either adding or improving fixed barriers or by increasing the size of the protective force. Improvements in fixed barriers generally consist of more, thicker, or better barriers. But those improvements often become expensive for their small gains in delay relative to other means.

Adding more people is a very expensive alternative and in some instances may be impractical or politically unwise. Additionally, in some locations, it may be prudent to avoid adding highly visible fixed barriers. Interior activated barriers (IABs) are the most effective means of delaying intruders during an attack, with minimum obtrusiveness the rest of the time. Exterior barriers generally provide tens of seconds of delay. Delay due to interior fixed barriers is usually measured in minutes. IABs can provide from 30 minutes to hours of delay, depending on design, and they fall into two classes of application—deployment in a volume, usually an interior office of some sort, or deployment at a room perimeter, such as an entrance or interior passageway.

One of the difficult things about giving examples of top-level security design is the need for security. The more you talk about a protective system, the less secure it is. For that reason, case study presentation is impractical. An example of IABs, though, can be seen in a general description of the systems R.E. Timm & Associates (RETA) uses. The volume system discharges cold smoke, an opaque particulate fog that totally obscures vision so that a high-intensity light isn't visible an inch from one's face. The smoke makes eye-hand coordination impossible, minimizes one's ability to use hand or power tools and explosives, disorients intruders without harming them much, permeates quickly through large areas (2,500 to 50,000 cubic feet in normal applications), and eventually settles to a powder that can be vacuumed from room surfaces.

Volume systems are appropriate in public reception areas of protection-sensitive buildings where passive appearance is a requirement, such as embassies, bank foyers, international buildings, nuclear reactors, and government office buildings. A volume system works well in any large, open area that requires a pleasant and professional appearance.

The building perimeter system RETA uses is an aggressively sticky foam stored within the walls or doors of relatively small access corridors. The foam immediately deploys when its containment is ruptured by explosives or power tools used by persons attempting to break through the door or wall, or it may be deployed by command from a control center. Many unobtrusive configurations are possible. Once deployed, the foam forms an extremely sticky barrier that works like flypaper to delay or stop intruders. The IAB provides a low-cost, highly effective delay-producing barrier that gains the time necessary for a successful response.

Both systems typically are used in conjunction with fixed barriers, such as security doors, hardened walls, and single-point access to secure areas. Foam barriers are suitable for blocking entrance hallways, passageways, or reinforcing walls, while cold smoke is most practical for delaying adversaries in large areas where rapid deployment and minimal equipment damage are strongly desired.

Ultimately, the architect coordinates the design team, including a security engineer, to plan, analyze, evaluate, substantiate, and validate protective strategy. This process starts in design development and continues through construction documents to ensure that the security system works while permitting, if not facilitating, day-to-day operations. □

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PRODUCTS

Ways of Covering Walls

Adam James Textiles introduces 'Moonlight,' shown top left. Brayton Collections' 'Almost' appears left, and Lee Jofa's 'Lancelot,' and 'Tropical Paisley' are above and bottom left, respectively.

"Color Weave" fabric from Linekin Bay Fabrics is handwoven on looms from yarns of predominantly natural fibers by textile designer, colorist, and craftsperson Robin Whitter. The Color Weave program provides contract upholsteries, wall coverings, and drapery textiles, customized to client specifications.

Two new collections of wall coverings, fabrics, furniture, and trimmings are available from Lee Jofa. "Tropical Paisley" is a densely patterned design on cotton sateen featuring a tree-of-life motif translated into a traditional paisley print. "Lancelot" is a tightly woven blend of wool/rayon/cotton with horizontal ribbing interrupted by geometric motifs. "Lancelot" is available in eight colors.

Adam James Textiles, the contract upholstery subsidiary of the J.M. Lynne Co., introduces "Moonlight" to its collection of contract fabrics. Styled by textile designer and colorist Laura Deubler Mercurio, "Moonlight" is a contemporary interpretation of a traditional damask Jacquard weave, combining 40 percent wool and 55 percent cotton, with 5 percent nylon

added for greater durability. The fabric is available in 11 colors.

The Brayton Textile Collection presents "Almost," a leather look-alike wall covering and upholstery that offers performance results and visual characteristics similar to leather. "Almost" is composed of 100 percent nylon fibers laid in a three-directional axis similar to the natural structure of collagen found in leather. The fabric is 54 inches wide and available in 20 colors.

A textured, vertical silk wall covering with a subtle raised diamond motif is "Marquis," from Vicrtex Wallcoverings. The pattern is available in 21 colors ranging from neutrals to medium tones. The wall covering weighs 25 ounces per linear yard, measures 54 inches wide, and has a UL-rated Class A fire rating.

Westgate Fabrics introduces "Fresh Harvest," a coordinated collection of fruit and vegetable patterns with a companion trellis design and coordinated plaids and trims. The fabrics, 54 inches wide and available in six colors, are glazed cotton chintz screen prints and woven textured cotton plaids.

Scalamandre introduces "Piccolo," a collection of fabrics in soft, subtle shades that may be paper-backed for wall coverings. Composed of 90 percent silk and 10 percent Dacron polyester, 53 inches wide, the fabric has passed wall covering test NFPA Class A.

Lynnescape linen look fabric wall covering from J.M. Lynne Co. is designed to withstand the rigors of high traffic commercial areas. Woven of 100 percent polyolefin fiber, the wall covering features high abrasion resistance, cleanability using

continued on page 130

Products *is written by Amy Gray Light.*

Products *from page 129*
traditional cleaning methods, mildew resistance, and a Class A fire rating. The collection is available in four designs and 62 colors.

Stroheim & Romann's American Collection features 15 wallpapers and three coordinating borders in homespun ensembles that capture the spirit of early America. All wallpapers and borders are strippable, vinyl coated, and pretrimmed. Wallpapers are 27 inches wide with 18 inches repeat, and borders are 6¾ inches wide with 12⅝ inches repeat; both come in five colors.
Linekin Bay Fabrics
Circle 401 on information card
Lee Jofa
Circle 402 on information card
Adam James Textiles Inc.
Circle 403 on information card
Brayton Textile Collection
Circle 404 on information card
Vicrtex Wallcoverings
Circle 405 on information card
Westgate Fabrics Inc.
Circle 406 on information card
Scalamandre
Circle 407 on information card
J.M. Lynne Company Inc.
Circle 408 on information card
Stroheim & Romann Inc.
Circle 409 on information card

Soundsoak Applause acoustical wall panels from Armstrong World Industries (shown below) have a flannel-like fabric finish and a factory-engineered, beveled edge that highlights the panel joint. Additional three-dimensional detailing is possible at the panel joint with an optional beaded spline. The splines can be upholstered with Soundsoak Applause fabric or furnished in a matte-black finish that can be painted or left to create a fine-scale black reveal. The flannel-like fabric is also available on 2x4-foot and 2x6-foot appliqués with a Velcro mounting system.
Armstrong World Industries
Circle 410 on information card

Alliance Wall Porcelain Returned Edge Panels are enamel-on-steel panels that fuse to steel at high temperatures, resulting in a hard, nonporous surface. Panels are flush and butted for wall mounting and interior partition systems. Interior semigloss panels may be written on and wiped clean with Alliance Wall Rite-On, Wipe-Off dry marker pens, tempera paint, crayons, or water-soluble markers. Because the panels are steel, magnets adhere. Alliance-Wall panels can be silk-screened using virtually any imprintable image such as company logos, stylized graphics, or large murals. The panels are suggested for hospitals, institutional kitchens, laboratories, and clean rooms because dirt and bacteria can't penetrate porcelain's nonporous surface and because floor-to-ceiling panels leave no cracks or crevices. For this reason, the porcelain interiors have also been approved by the Department of Agriculture for USDA-inspected meat and poultry processing plants. A wide range of color selections and finishes is available. The panels have a 50-year guarantee.

Flexi-Wall Systems' Plaster In A Roll is a patented gypsum-impregnated fire-retardant, flexible wall covering manufactured specifically for concealing cracks and other wall problems. It is suitable as a replacement for conventional plaster in new construction as well as remodeling and repair jobs. An antigraffiti protective coating is also available.

A new vinyl and fabric wall-covering collection from Sincol of America features odor-neutralizing and antistatic properties. The odor-neutralizing wall coverings are made from reprocessed natural raw materials that are mixed with vinyl. The collection's four antistatic styles are said to have very little static electricity, so are less likely to collect dust. The collection features dimensional geometric looks; metallics in copper, silver, and bronze finishes; fabric styles ranging from silks to embroidered linens; wood prints; and a series of ceramic designs with actual chips adhered to the wall-covering surface. All wall coverings are untrimmed and 36 inches wide. The average roll is 55 yards.

Clearseal III is an invisible wall-cover protector with built-in stain resistance introduced by Columbus Coated Fabrics, a line marketed by Borden Inc. Clearseal III is designed to cause no loss of texture or definition in the wall covering's embossing detail, nor will it affect its installation. Common household cleaners remove from Clearseal III stains such as mustard, catsup, lipstick, coffee, motor oil, milk, ink from most ballpoint pens, crayons, and permanent felt tip markers. The protective coating holds a Class A fire rating and is available 54 inches wide by 30 yards long, precision-trimmed per bolt.

Ispo Inc. recently introduced its Pearlescent exterior and interior wall finish, a premixed, 100 percent acrylic resin, textured wall coating with special pigments that produce a radiance on the finished surface. The Pearlescent finish is integrally colored and requires no priming over uniform, sound surfaces. It reputedly offers excellent weathering characteristics and resists fading, chipping, and peeling. The exterior finish can be used as a detail finish or as a decorative and protective coating over prepared concrete, masonry, and stucco. For interior applications, Pearlescent Finish provides a coating for prepared drywall, concrete, masonry, or plaster walls. It is available in eight standard colors.

The Signature Series, a vertical flame-retardant fabric system developed by Knoll, is made with blends of natural and inherently flame-retardant fibers. When the flame-retardant fiber is combined with linen, silk, or wool, it reputedly reacts like a chameleon in that it takes on the visual and tactile character of the natural fiber components. Custom fabrics can be created using yarns and fabric blends.

Guard brand or contract vinyl wall covering from Columbus Coated Fabrics offers an early fire warning potential that activates ionization-type smoke alarms at temperatures below 300 degrees Fahrenheit. The wall covering also includes the Clearseal III stain-resistant coating on its surface and meets or exceeds Types IV, V, VI classifications of ASTM F793. It is UL-labeled and rated for its flame spread properties.
AllianceWall Corporation
Circle 411 on information card
Flexi-Wall Systems
Circle 412 on information card
Sincol of America Inc.
Circle 413 on information card
Columbus Coated Fabrics, Borden Inc.
Circle 414 on information card
Ispo Inc.
Circle 415 on information card
Knoll International Inc.
Circle 416 on information card
Columbus Coated Fabrics, Borden Inc.
Circle 417 on information card

BF Goodrich introduces three textured, vinyl wall coverings from its BFG design group. "Agora" has a subtle texture designed to open up a space and provide a clean, uncluttered backdrop. Available in 30 colors, it comes in a 24-ounce ply weight. "Profile" is designed to resemble granite that has been smoothed by decades of wind, sun, and water. It is available in 26 colors, several of which contain metallic flecks, which add a mica-like shine to the wall covering. "Profile" comes in a 21-ounce ply weight. "Origami" wall covering's three-dimensional design is inspired by the art of Japanese paper folding. When a light source is reflected off the wall covering at different angles the pattern is altered, creating various shading effects. The wall covering is available in 35 colors, five of which are metallic. The metallic colors are designed to add an opalescent glaze to the wall covering. It is available in a 15-ounce ply weight. All three wall

continued on page 132

To keep your roof from coming apart, go to pieces.

Corrosion-resistant fasteners. What goes down won't come up.

We'd like to assume something for a minute. You put a roof over your head so you can stay dry. And warm. (Or cool, for those of you in more tropical climates.)

Now, if a roof is going to do all this, it has to be put together with all the right pieces. In all the right places. By all the right people.

Introducing the Stevens Hi-Tuff Plus™ Total Roofing System.

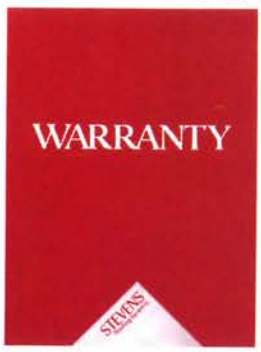
Hi-Tuff Plus is a fully-integrated roofing system.

We started with the membrane itself. (45 mils of white scrim-reinforced Hypalon*.) We included the most popular insulations. (100% UL labeled.) The fasteners. (Stainless steel and ceramic coated.) And the roof-edge fascia. (In a variety of metals and colors.)

Our color-coordinated fascia has the edge in fighting high winds.

And that's not all, folks.

Once we got all the right pieces together, we made sure only the best applicators would be allowed to put them together. So we picked our most experienced contractors and made them authorized Hi-Tuff Plus applicators. They, in turn, make sure your roof meets our inspectors tough standards. For at least 15 years.



Our 15-year, 70 m.p.h. warranty covers all system components.

We'll back it into the 21st century.

O.K., so a 15-year warranty's nothing new in the roofing business. What is new is what it covers.

Our warranty doesn't just cover the membrane. It covers the insulation. The fasteners and plates. The adhesives. The fascia. And the workmanship. In short, every part of the system. Even against winds up to 70 m.p.h.

And if, within 15 years, your roof leaks, we'll fix it. Period. Our Sweets brochure can tell you more. Ask for it at 1-800-848-4400, ext. 163.

All insulation is UL labeled.

Circle 84 on information card

*Hypalon is a registered trademark of Du Pont.

Products *from page 130*
coverings meet Type I Federal Specifications CCC-W-408A and CCFA-W-101A Class A UL fire rating.

Several vinyl-backed wall coverings are available from the Schumacher Contract Collection. Among them is "Illuminations," a design exclusive to Schumacher's division, 27 inches wide and available in seafoam, peach, rose, and light gray. "Cheviot" comes in a flame-stitch pattern. Available in 27- and 54-inch widths, the patterns come in blue, seafoam, beige, peach, gray, and rose shades.

"Colorscapes" from Vicrtex Wallcoverings come in 32 designs and 146 colors. The design motifs include textural prints, tweeds, diagonals, plaids, herringbones, geometrics, tailored stripes, stylized florals, and silks. The color palette ranges from pale pastels to rich jewel-tone accents. The wall coverings are sold by the linear yard at 48 inches wide, and in most instances can be precision trimmed to a 24-inch width for ease of installation in tight places.

A new line of hand painted, textured, vinyl-based wall coverings introduced by the Art People creates the appearance of a three-dimensional, dragged brush design. The wall coverings are available in three finishes: Becca, a single-color matte; Sprint, a luminescent single-color finish; and Geo, a multicolored finish. The entire line is packaged in standard 27-inch-wide rolls and meets Class A fire ratings.

A vinyl and fabric wall covering collection from Sincol of America emphasizes deeply dimensional contemporary designs, woven-fabric looks resembling plain or embroidered linens, and homespuns, burlaps, and damasks. One design, "Sparkling Sand," features mica chips in four metallic hues. All of the wall coverings in the collection meet ASTM-84, Class A requirements for flame retardance. The materials are untrimmed and 36 to 38 inches wide. They are packaged in 55-yard bolts and sold by the yard.

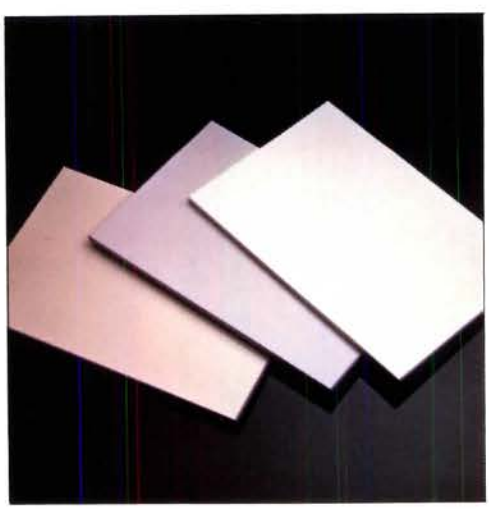
New Sun-Tex "Acclaim" wall coverings by Sunwall of America, Borden Inc., have strong textures resembling embossing, and feature durable, scrubbable, strippable, fabric-backed, 27-inch-wide vinyl with co-ordinating borders. The line carries a Class A fire rating and comes in shades of beige, taupe, mauve, blue, seafoam, and gray, with accents of burgundy and green.

BF Goodrich, Fabricated Polymers division
Circle 418 on information card
Schumacher Contract, Wallcovering division
Circle 419 on information card
Vicrtex Wallcoverings
Circle 420 on information card
Art People
Circle 421 on information card
Sincol of America Inc.
Circle 422 on information card
Sunwall of America, Borden Inc.
Circle 423 on information card

NEW AND NOTEWORTHY

Wood Ceiling
Wood Grille Modular Ceilings (below), a collaboration in design from Armstrong World Industries and Forms + Surfaces, offer acoustical performance with the warmth and character of natural wood. Ceiling units are installed in a standard 15/16-inch T-Bar grid and may be specified with or without acoustical backing. Wood Grille Ceilings without acoustical backing are acoustically transparent and should be used with sound-absorptive materials in the plenum to achieve acoustical control. All wood members are pressure impregnated with fire-retardant chemicals and are finished in clear lacquer.
Forms + Surfaces
Circle 424 on information card

Glass Surfaces
Neoparium 8 crystallized glass surface panels (below) for exterior and interior walls feature panels only 5/16 inch thick, but reputedly strong, durable, and dirt-resistant. The panels come in dimensions of up to 36x48 inches; curved panels also are available. They are suitable for countertops, bathrooms, kitchens, or entire buildings.
Forms + Surfaces
Circle 425 on information card



Plotter With Multi-Pen Option
An enhanced large-format pen plotter for the micro-based CAD/CAE market features a maximum axial speed of 20 inches per second (ips), diagonal speed of 28 ips, and line resolution of .001 inches.

The LP 4000 reputedly handles the largest range of media sizes available on any plotter. Users can plot on any size media, with plots continuously adjustable up to larger than full-size E drawings. Maximum media size is 37½x81 inches. Plots can be done on cut sheet or roll stock, and the plotter works on bond, vellum, matte polyester, double matte mylar, and acetate film media. It also features programmable setup and default parameters for nonvolatile memory.

A self-capping, multi-pen changer is available in four-pen modules, expanding pen capacity to 20 pens. Adapters allow users to employ a wide variety of pens.

An option that adds vector sorting and plotting intelligence is also available. The HyperBuffer analyzes and reorders plot data files and minimizes pen changes and "pen-up" movements. The HyperBuffer also provides a 512k buffer, which stores up to one megabyte of plot data by means of data compression techniques. Like a print spooler, the buffer can queue several plot files at once.

The LP4000 is fully compatible with and supports all major microcomputer hardware and software.
Ioline
Circle 426 on information card

Systems Detect, Locate Moisture
Two systems are available that detect, signal, and locate the presence of moisture.

The PermAlert II system from Midwesco is suggested for specially controlled dry environments such as piping vaults for nuclear power plant cooling systems, computer rooms, and other places where wetness could cause damage or indicate a severe problem. The control panel is linked to a solid-state detector cable installed in the area to be monitored. Audible and visible alarms are activated when moisture intrudes, the location is digitally displayed, and the time placed in memory. Damage to the cable is also signaled, found, and reported. The PermAlert II is designed to monitor both water-based and hydrocarbon fluids.

Raychem Corp.'s TTAS-1 Water Alarm System is designed to continuously monitor and detect water in small areas housing valuable equipment and materials such as telephone switching centers, cable vaults, process control rooms, archive storage rooms, mechanical equipment rooms, and other high-risk building areas subject to water leaks from building airconditioning units, compressor pumps, water heaters, plumbing lines, drains, and sprinkler systems.

The TTAS-1 system comes in a single package that includes preterminated Trace-

continued on page 134

How Galvalume™ sheet gives Countryside Cathedral a little help from above.

Owner: Countryside Cathedral, Clearwater, Fla.
Design/Build Contractor: UNICO, Clearwater, Fla.
Building System Manufacturer: Ceco Building Division, Southern Region, Columbus, Miss.
Steel Material: Bethlehem Galvalume sheet

When the Countryside Cathedral, Clearwater, Florida, put their new house of worship out for construction bids, their concern was for future—as well as present—costs.

Their contractor, UNICO, told them to put their confidence in a Galvalume sheet standing seam roof system. And not without good reason. Because the advantages of a Galvalume sheet standing seam roof compared to a single-ply or built-up roof are very real, indeed.

For example, the combined weight of the support structure and the Galvalume sheet roofing (about 1.5 lb/sq ft) is lighter than either a built-up or single-ply system (up to 15 lb/sq ft). And this reduced deadload can add up to important foundation cost savings.

Consider also that since a Galvalume sheet standing seam roof can be installed year round, construction can proceed without delay—contributing to earlier occupancy.

And since this Galvalume sheet roof system requires very little slope for good drainage (1/4 in. in 12 in. minimal), it's perfectly suited to low roof profiles like the Cathedral's.

But the advantages of a Galvalume sheet standing seam roof don't end when the construction does.

This weathertight roof system isn't plagued by the thermal shock, ponding water and inevitable leakage that occurs with built-up roofing.

It's sensitive to energy costs, too. Installing insulation is easy. Up to 12 in. of insulation can be accommodated within the system. And Galvalume sheet's reflectivity adds to the savings by reducing air-conditioning costs.

Then there are its low life-cycle costs to consider. Galvalume sheet's aluminum/zinc alloy coating is resistant to corrosive atmospheres such as Clearwater's marine environment. Even to acid rain, which is comforting information for some parts of the country. That's why Bethlehem confidently warrants the base material for twenty years and six months.

If you're ever in Clearwater, drop by the Countryside Cathedral to enjoy its quiet dignity. You'll find the visit inspirational. On several levels.

For information on Galvalume sheet and its many applications, telephone toll-free **1-800-352-5700, Ext 400.** Or write Bethlehem Steel Corporation, Industry Marketing Division, Bethlehem, PA 18016.

Galvalume is a trademark of BIEC International, Inc.

Bethlehem BETHLEHEM STEEL

Circle 86 on information card

Products *from page 132*
Tek 100 water-sensing polymer cable, an electronic alarm module, and installation accessories.

The TraceTek sensing cable detects conductive liquid at all points along its length. As soon as it comes in contact with water, a 95-decibel alarm sounds. A green indicator light on the front of the alarm module confirms that the power is on, a yellow light warns of a break in system continuity, and a red light signals the presence of water. The system automatically resets after a leak is cleaned up and the cable is dried.

The module is equipped with dry relay contacts that can activate remote alarms or other external devices. Two relay circuits are provided with a contact rating of 10 amps at 277 VAC. If there is a loss of power, the relay contacts can be used to actuate pumps, turn on a remote indicator, activate a phone dialer, or switch off equipment. The alarm module can be flush- or surface-mounted.

A second version of the system is available that detects acids, bases, and deionized water. The TTAS-3 hazardous-fluid alarm system is designed to monitor containment tanks, wet stations, small laboratories, sinks, drain lines, and other areas where the detection of corrosive or hazardous fluids is needed.
PermaPipe division of Midwesco Inc.
Circle 427 on information card
TraceTek Products, Raychem Corporation
Circle 428 on information card

Custom Carpeting
Edward Fields Inc. makes custom-designed contract or residential carpeting using 100 percent virgin wool imported from New Zealand. The wool is dyed to match each designer's specific color palette. The manufacturer claims the only limit to the designs is the client's imagination, as all sizes, shapes, colors, and textures are possible. Shown above is Chamonix, a design inspired by the châteaux of the Loire Valley and the era of King Francis I. Chamonix is available as an area rug or as wall-to-wall carpeting in any color palette, sized to fit.
Edward Fields Inc.
Circle 429 on information card

Security and Management System
Kinetic Access, a microsystem security and management tool for the IBM PC, XT, AT, or compatibles, operates with DOS versions 2.0 and 3.0 to protect against malicious snooping, piracy, and sabotage, as well as user errors.

The system provides four hierarchical security levels, each with its own password. After booting up a logo screen (for graphics monitors), the user is prompted for a security level and password. If the password is not matched in three attempts, a siren sounds and the computer is incapacitated until it is shut off or re-booted. If the log-on attempt is successful, the user is presented with a menu of programs he or she is entitled to execute. Level four, the highest security level, can view and run any application known to its system. Any program given a protection level of four appears on the menu only when the level four user is logged on. Any program assigned a protection level of three will be seen on level three and four menus, and so on. A program assigned a protection level of one may be seen by anyone successfully logging on at any level. Whatever may be seen by a user may be exe-

continued on page 136

Most people use Clearprint vellum for something they can't even see.

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Nothing.

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Exceptional vellum starts with exceptional raw materials. We only use the finest-grade, 100% new cotton fiber. Then we treat it with an exacting proprietary process. It must then pass through 38 quality control checks.

The result is vellum of superior durability, erasability, permanence, transparency and resistance to age. And it comes in sheets and rolls in 16-, 20- and 22-pound weights.

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A08

Circle 92 on information card

Products *from page 134*
cuted by entering the associated menu number. Program execution then proceeds, and when completed or aborted, control is returned to the Kinetic Access system.

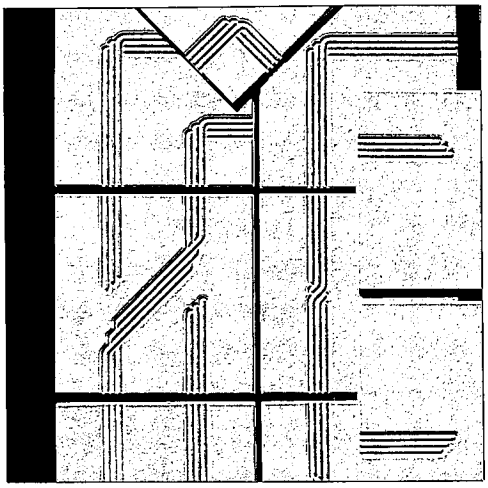
The system includes a hardware device that controls the booting process and a resident control program that requires 45K of RAM memory while in operation.
Kinetic Corporation
Circle 430 on information card

Carpet Square Adhesive
Durabond D-2 carpet square adhesive spray formula allows easy removal of carpet squares when necessary to replace worn, stained, or burned carpet sections, or for access to mechanical areas such as header ducts, communications lines, and electrical lines under the carpet area. The pressure-sensitive acrylic-emulsion adhesive with high tack is available in one-gallon and five-gallon pails.
USG Industries Inc.
Circle 431 on information card

Undercarpet Cabling
AMP Inc.'s integrated undercarpet cabling systems combine power, data, and telephone cabling into one package. The low-profile cabling when covered with carpeting is virtually invisible, and installed carpet squares remain perfectly flat. Heavy copy machines and printers can be rolled over the cabling without causing damage. Reconfiguring old undercarpet cabling for installation of new cables and monuments is possible, often without much interference in daily activities, depending on the degree of modification. Minor modifications to the undercarpet system, such as the relocation of individual monuments or fittings, are normally performed by a company electrician.
AMP Incorporated
Circle 432 on information card

Patio Door
The Dallas in-swing aluminum patio door features Q-Lon weatherstripping and a one-piece dual durometer sweep that provides a positive seal and protection against air infiltration. Optional features include a thermally broken door frame and an insulating glass produced by the manufacturer.

The patio door doesn't require maintenance or adjustment, and it features two-inch panel screws and domestic brass-plated hinges. It is available in most residential sizes with a choice of one, two, or three panels and can be assembled for right, left, or center entry. Sliding screens are available for the operating panel of the door, which is factory glazed and prefinished in bronze, white, or an acrylic paint. Optional antique brass hardware is available; however, any hardware with standard 2⅜-inch backset will fit. Keyed deadbolt locks are also standard.
General Aluminum, a part of Dallas Corporation
Circle 433 on information card



Acoustical Ceiling
Armstrong World Industries' Syllables line of acoustical ceilings introduces System M (shown above), a multipaneled system with a raised triple-bead detail that twists and overlaps, providing many design possibilities. Ten coordinated patterns are offered, making System M the most flexible of the Syllables line. All the panels are pre-engineered to work together within each system.
Armstrong World Industries
Circle 434 on information card

Spacers Prevent Rebar Drift
Snap-in place rebar spacer clips help assure accurate rebar spacing and prevent drift when concrete is placed. Dura-Tech rebar spacers are designed to maintain the proper distance between rebars and the concrete surface, and between rebars themselves, to prevent exposure of rebars in concrete and assure placement for structural integrity. The manufacturer states that the lightweight and sturdy rebars will not discolor or oxidize.

A broad selection of configurations of spaces is offered for same-day shipment. Custom designed spacer clips can be made for applications that cannot be met with standard clips.

A free box of samples in various designs for evaluation and testing is available along with an application brochure.
Dura-Tech
Circle 435 on information card

Commercial Carpets
Armstrong World Industries' updated and expanded Artline Collection won the 1987 ASID Product Design Award. Introduced at the 1987 NEOCON program, the Artline additions are constructed of Antron XL nylon that is designed to resist abrasion and to retain texture for durability. A heavy denierage per filament of the fiber offers strength, resiliency, and appearance retention. Special fiber cross sections help hide soil, and permanent antistatic filaments reduce static electricity shocks. Two additions to the Artline Collection, Styleline and Spaceline, are new patterns on the original Artline cut pile plush construction. The dyed patterns allow greater color freedom, flexibility, and clarity in the integrated tufted design by allowing up to 11 colors in one colorway. Both styles can be custom colored to meet exact color requirements for special jobs.

An eight-page color brochure from Lees Commercial Carpet Co. is intended to be used as a guide to selecting commercial carpets and modular systems. Special sections detail carpet collections designed for offices, schools, universities, health care, hospitality, and retail environments. Custom-design programs in modular systems are also shown. Current specifications, performance and test data, charts, and schematic drawings are included in the literature.

Patrick Carpet Mills' Visionetics Series can translate almost any motif, including corporate logos, fabric themes, and customized borders, into standard or customized Patrick tufted cut pile carpeting through the use of computerized individual needle control, yarn placement, and color control. Since each needle is individually controlled, radically random repeats may be programmed and as many colors as there are needles may be used in the full 12-foot width.

The DesignTec computer from Karastan/Bigelow Commercial Carpet, a division of Fieldcrest-Cannon, allows the specifier to create carpeting—from design and color to texture and weight—and translates those designs into a tuft-by-tuft grid based on the specifier's design and colors. The DesignTec computer can be applied to a variety of Bigelow tufted base weights, including cut, loop and cut and loop piles. Most carpets are crafted with Antron nylon, a soil, wear-, and static-resistant fiber. Several standard DesignTec styles are also available in hundreds of color combinations.
Armstrong World Industries
Circle 436 on information card
Lees Commercial Carpet Company
Circle 437 on information card
Patrick Carpet Mills
Circle 438 on information card
Karastan/Bigelow Commercial Carpet, division of Fieldcrest-Cannon
Circle 439 on information card

Emergency Path Marking System
The VDN-s path marking system consists of an invisible light source combined with emergency evacuation information printed with an invisible chemical on standard carpets. Carpeting can be printed with information such as arrows, distance figures, and other written emergency information. An ultraviolet light illuminates the information when it shines on the carpet, enabling people to read the direction of emergency exits or emergency information even in heavy smoke or darkness. It also encourages evacuees to remain close to the floor, helping to prevent inhalation of toxic fumes, gas, and smoke that accompany a fire. Luminescent materials can be applied to most woven and printed

continued on page 139

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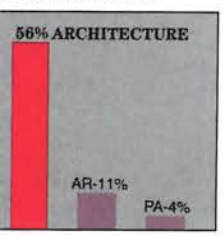

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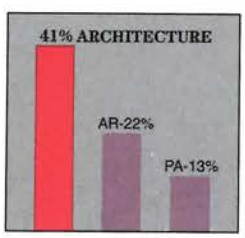

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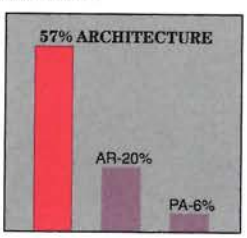

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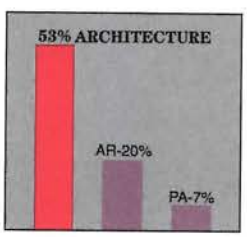

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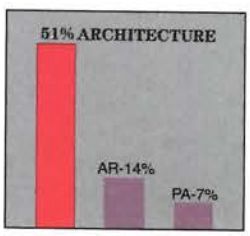

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Desert View School, Sunland Park, N.M. (page 78). *Architect: Perkins & Will, Chicago.* Perkins & Will design team: Ralph E. Johnson, AIA, design principal; Jim Toya, project manager; Elisabeth Fakatselis; Jerry Johnson; Mark Romack; Stuart Royalty; Carolyn Smith. Project architects: Kestutis Germanas and Sam Jamron of Mimbres, Inc. Consulting engineer: Cervantes P.E. & Associates. Architect's representative: Joseph Cervantes. Structural engineer: Mimbres Inc. Mechanical engineer: Bridgers & Paxton Inc. Electrical engineer: Tierra del Sol Engineering Inc. Civil engineer: Perkins & Will. General contractors: Wooten Construction Co. and Snider/Chapman Construction Co. Electrical contractor: Lynco Electric. Mechanical contractor: New Mexico Mechanical Co. Specification consultant: Gordon Bosl. Owner: Gadsden Independent School District.

J.M. Whitaker Elementary School, El Paso, Tex. (page 78). *Architect: Fischer Cordova Prestidge, El Paso.* Structural engineer: Fischer Cordova Prestidge. Mechanical and electrical engineer: Robinet & Associates. Landscape architect: Walter Weaver Inc. General contractor: J.E. Boyd General Contractor Inc. Owner: El Paso Independent School District.

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NEW PRODUCTS/MANUFACTURERS LITERATURE ITEMS																										
411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	401	402	403	404	405	406	407	408	409	410		
436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	426	427	428	429	430	431	432	433	434	435		
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16 17 18 19 20	21 22 23 24 25	26 27 28 29 30	31 32 33 34 35	36 37 38 39 40
41 42 43 44 45	46 47 48 49 50	51 52 53 54 55	56 57 58 59 60	61 62 63 64 65
66 67 68 69 70	71 72 73 74 75	76 77 78 79 80	81 82 83 84 85	86 87 88 89 90
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NEW PRODUCTS/MANUFACTURERS LITERATURE ITEMS			401 402 403 404 405	406 407 408 409 410
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436 437 438 439 440	441 442 443 444 445	446 447 448 449 450	451 452 453 454 455	456 457 458 459 460

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A AIA Member (1) YES ☐ (2) NO ☐

B Your Job Function:
- Owner/Partner/Principal (1) ☐
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- Staff Architect (3) ☐
- Other (4) ☐

C Do You Write or Approve Product Specifications (1) YES (2) NO ☐

D Your Organization:
- Architectural or A/E Firm (1) ☐
- Government Agency (2) ☐
- Commercial, Industrial or Institutional (3) ☐

E Annual Dollar Volume:
- Under $500,000 (1) ☐
- $500,000-$1,000,000 (2) ☐
- $1,000,000-$5,000,000 (3) ☐
- Over $5,000,000 (4) ☐

F Reason for Inquiry:
- Current Project (1) ☐
- Future Projects (2) ☐

PLEASE CONTACT ME QUICKLY ON ITEMS

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Here's an easy way to obtain more information on the products advertised in this issue of ARCHITECTURE

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A bold clean design statement, this sturdy fountain is ideal for modern and post-modern architectural settings.

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Introducing

GRAFIK Eye™

4-Scene, 4-Zone Preset Dimming Control

GRAFIK Eye Control—Preset dimming with a sleek, thin profile design

Create 4 Distinct Lighting Scenes. . . Recall Each by Touching a Button

The GRAFIK Eye Preset Dimming Control offers:

- coordinated lighting control in one sleek, thin profile unit.
- control of 4 independent lighting zones (circuits) which create 4 distinct lighting scenes.
- the ability to transform the lighting of any space with the simple touch of a button.

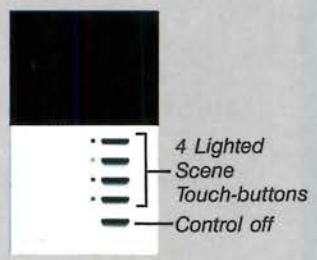
The GRAFIK Eye Control can:

- provide proper lighting levels for multiple functions.
- emphasize unique features that have been designed for the space.
- create different moods or ambiance.

The GRAFIK Eye unit controls up to **2000 watts*** of incandescent, incandescent low voltage, and fluorescent lighting.

GRAFIK Eye Control with white opaque cover Dimensions: .295" thin x 8⅞" x 4½"

Thin profile



Auxiliary Scene Activator provides remote touch-button control from 1 or 2 additional locations. Dimensions: .295" thin x 2¾" x 4½"

Wireless Remote Control Accessory for GRAFIK Eye Control. Dimensions: .93" thin x 1.5" x 5.7"

For more information on the GRAFIK Eye Preset Dimming Control, call Lutron's Hotline toll-free:
(800) 523-9466 (U.S.A.)
(800) 222-4509 (Pennsylvania)

* For applications requiring more than 2000W/VA total load, consult the Lutron Hotline.

LUTRON®

Lutron Electronics Co.,Inc.
205 Suter Road
Coopersburg, PA 18036 U.S.A.

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